

# IQBSFR AES/EBU Digital Audio ReMapper with Stereo Combiner and Gain Control



## Module Description

The IQBSFR accepts two isosynchronous AES/EBU inputs (4 input subframes). Digital audio sample rates of 32, 44.1 and 48 kHz are automatically detected, however input sample rates between 25 and 55 kHz may be applied. The IQBSFR automatically corrects framing errors of up to one sample with respect to either input A or B, or the AES Reference. The two independent outputs (4 output subframes) can be configured to output any combination of the four input subframes or mute. Additionally, there is a gain compensated stereo combiner for each stereo input pair, left plus right, left minus right and right minus left, which can be mapped to any of the output channels. The IQBSFR also incorporates independent gain control for all four input channels of -12 to +6 dB in 0.25 dB steps. For added flexibility there are three outputs for Output A and two outputs for Output B. Additionally, a control selection allows the IQBSFR to form a 2x2 crosspoint switcher.

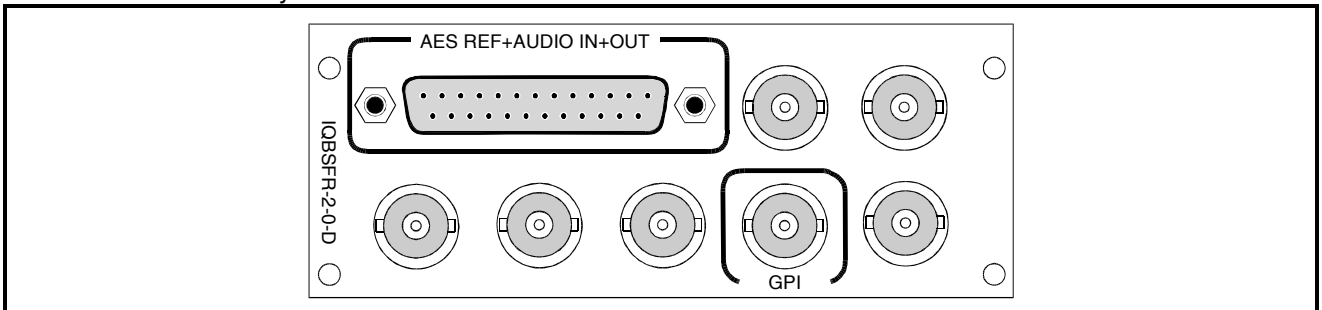
A GPI port is included, and is RollCall controlled only. The GPI port will enable the user to toggle between two state-saving memory stores for quick reconfiguration of card, activation is by way of a closed contact level trigger.

Versions are available with either balanced (D type connector) or unbalanced (BNC) audio connections. The AES/EBU inputs are capable of receiving digital audio from either, up to 150m of AES approved quality cable for balanced inputs or up to 500m of RG59B or equivalent cable for unbalanced inputs. Other features include a peak programme meter and channel status monitoring and editing.

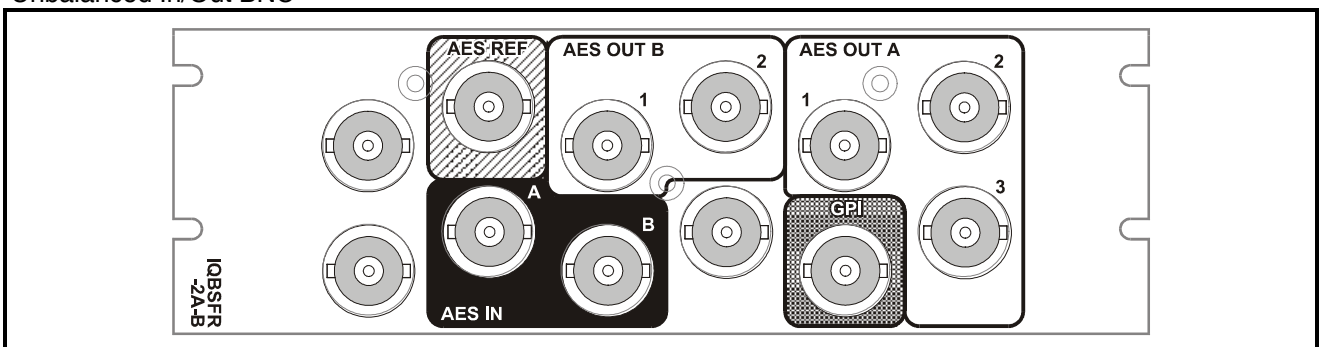
RollCall provides full remote control and monitoring.

## REAR PANEL VIEWS

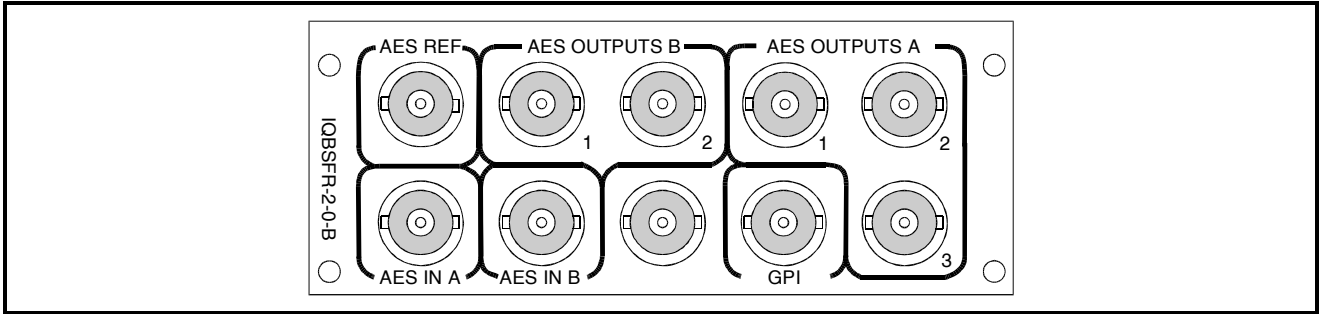
Balanced In/Out 25 way D



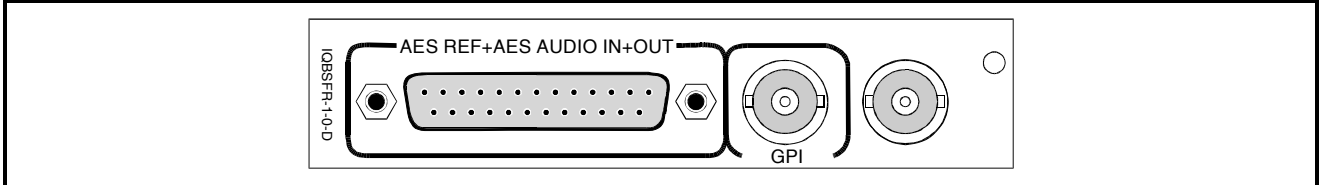
Unbalanced In/Out BNC



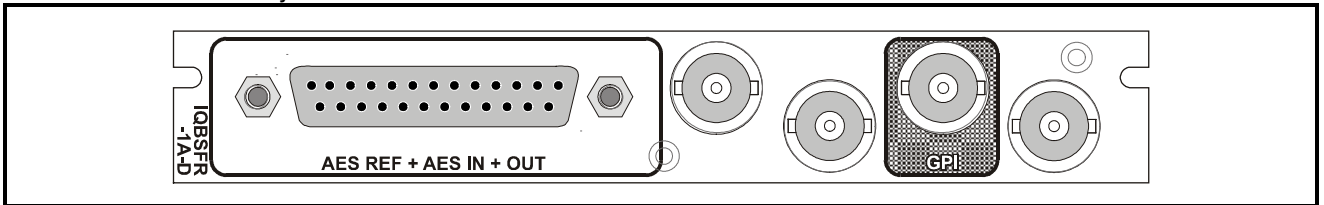
Unbalanced In/Out BNC



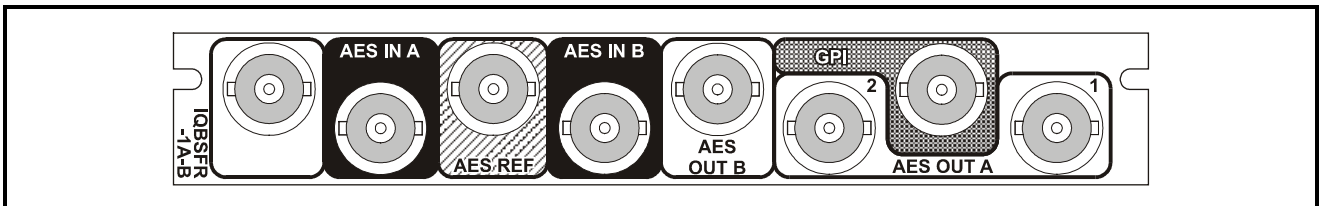
Balanced In/Out 25 way D



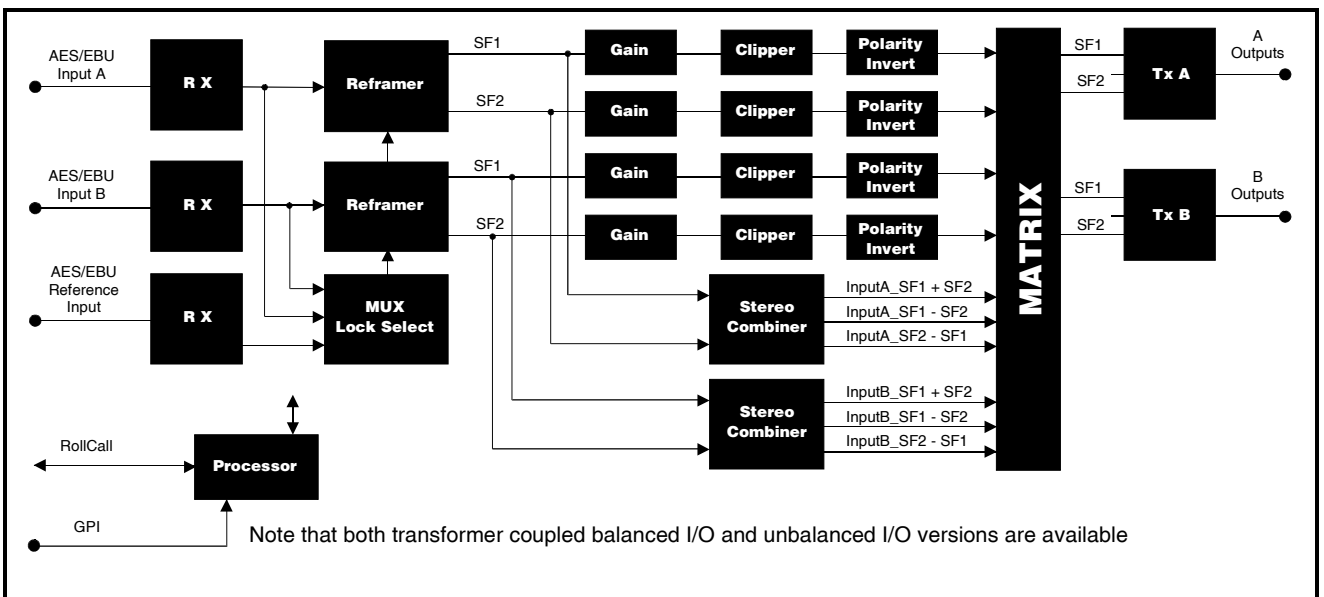
Balanced In/Out 25 way D



Unbalanced In/Out BNC



BLOCK DIAGRAM



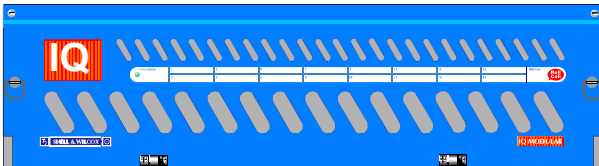
Versions of the module cards available are:

IQBSFR-2-0-D	I/O connections via 25 way 'D' connector	Double width module
IQBSFR-2-0-B	I/O connections via BNC connectors	Double width module
IQBSFR-2A-B	I/O connections via BNC connectors	Double width module
IQBSFR-1-0-D	I/O connections via 25 way 'D' connector	Single width module
IQBSFR-1A-D	I/O connections via 25 way 'D' connector	Single width module
IQBSFR-1A-B	I/O connections via BNC connectors	Single width module

**Note that there are two styles of rear panels available. They are not interchangeable between the two styles of enclosures. However, the cards may be fitted into any style of enclosure.**

**'A' Style Enclosure**

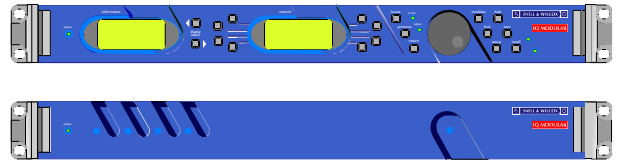
Rear panels **with** the suffix A may only be fitted into the 'A' style enclosure shown below.



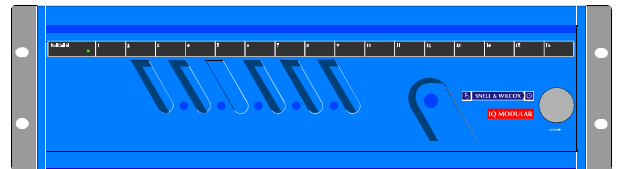
(Enclosure order codes IQH3A-E-O, IQH3A-E-P, IQH3A-N-O, IQH3A-N-P)

**'O' Style Enclosures**

Rear panels **without** the suffix A may only be fitted into the 'O' style enclosures shown below.



(Enclosure order codes IQH1S-RC-O, IQH1S-RC-AP, IQH1U-RC-O, IQH1U-RC-AP, Kudos Plus Products)



(Enclosure order codes IQH3N-O, IQH3N-P)



(Enclosure order codes IQH3U-RC-O, IQH3U-RC-P)

## Features

Two independent outputs configurable from any combination of the four input subframes

- Enables re-assigning of DVTR audio channels
- Stereo Combiner for each stereo input pair, L+R, L-R & R-L
- Handles up to 24-bit digital audio
- Polarity inversion, selectable for any input subframe
- Framing error correction of up to one sample
- Gain adjustment of -12 dB to +6 dB in 0.25 dB steps, for any input subframe
- AES/EBU reference input
- GPI interface for memory recall
- Automatic 32, 44.1 and 48 kHz detection
- Peak Detect
- Low Level Indicator (below -66 dBFS)
- Subframe Status monitoring for AES receivers and transmitters
- Subframe Status editor for Destination and Origin, can be inserted or be transparent
- Four memory locations for storage and recall of selected parameters
- Transformer coupled Balanced Inputs and Outputs or Optional Transformerless Unbalanced Inputs and Outputs
- RollCall remote control and reporting

TECHNICAL PROFILE

Features

**Signal Inputs**

- Digital (-D)..... 2 x AES/EBU Balanced via 25 way D
- Digital (-B)..... 2 x AES/EBU Unbalanced via BNC
- Digital Reference (-D) ..... 1 x AES/EBU Balanced via 25 way D
- Digital Reference (-B)..... 1 x AES/EBU Unbalanced via BNC
- Standards ..... AES3–1992

**GPI Interface**

- GPI ..... 1 closed contact via BNC connector

**Signal Output A**

- Digital (-D)..... 3 x AES/EBU Balanced via 25 way D
- Digital (-B) ..... 3 x AES/EBU Unbalanced via BNC

**Signal Output B**

- Digital (-D)..... 2 x AES/EBU Balanced via 25 way D
- Digital (-B)..... 2 x AES/EBU Unbalanced via BNC
- Standards ..... AES3–1992

**Card Edge Controls (also available via RollCall)**

- ReMapper, 4 channel output configuration  
Independently configure the 4 output subframes from any of the 4 input subframes, from the stereo combiner or mute
- Router configuration..... Route any of the two inputs to any of the two outputs

- Peak Level Input Select ..... Input A, B or A OR'd B
- Re-framer Reference Select AES Input A, B or AES Reference

**Indicators**

- Peak Level ..... Illuminates when selected input peaks at 0 dBFS
- Low Level ..... Illuminates when A or B input falls below –66 dBFS
- Power OK

**Functions Available via RollCall Only**

- Input Lock Detect ..... Displays Channel Status information for both AES inputs and AES output
- Input Sample Rate Detect .. Automatic 32, 44.1, 48 kHz detection
- Channel Status Monitor ..... Origin and Destination editor, can be inserted or remain transparent
- Channel Status Editor ..... Origin and Destination editor, can be inserted or be transparent
- Gain adjustment ..... -12 dB to +6 dB w.r.t. input level, in 0.25 dB steps
- Input mute ..... Any of the four input channels can be muted
- Polarity inversion ..... Selectable polarity inversion for any input channel
- GPI control ..... External memory recall, toggles between two of the four memory stores, user selectable
- Memory Store ..... 4 locations for storage and recall of selected parameters

## Specifications

### Digital Signal Input (-D)

Sample Rate ..... 25 – 55 kHz / up to 24 bits

Input Impedance ..... 110 Ohms Balanced

Cable Length ..... >150 m of AES3 cable

### Digital Reference Input (-D)

Sample Rate/bits ..... 25 – 55 kHz / up to 24 bits

Input Impedance ..... 110 Ohms Balanced

Cable Length ..... >150m of AES3 cable

### Digital Signal Input (-B)

Sample Rate/bits/bits ..... 25 – 55 kHz / up to 24 bits

Input Impedance ..... 75 Ohms Unbalanced

Cable Length ..... >500 m of RG59 cable

### Digital Reference Input (-B)

Sample Rate/bits ..... 25 – 55 kHz / up to 24 bits

Input Impedance ..... 75 Ohms Unbalanced

Cable Length ..... >500 m of RG59 cable

### Digital Signal Output (-D)

Sample Rate ..... Same as Input

Output Level..... 3 V p-p typical into 110 Ohms  
Balanced AES/EBU

### Digital Signal Output (-B)

Sample Rate ..... Same as Input

Output Level..... 1 V p-p typical into 75 Ohms  
Unbalanced AES/EBU

### Power Consumption

Module Power Consumption  
3.1W max

### Performance

Distortion (THD+Noise) < 0.0001%, 1 kHz  
@ -0.1 dBFS (24 bits)

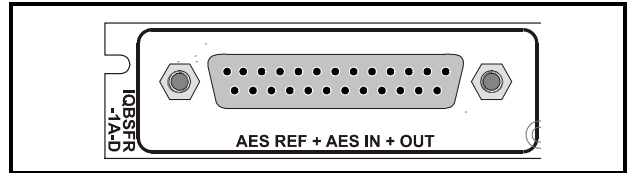
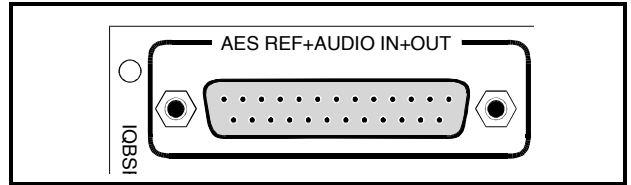
Stereo combiner gain ..... -6 dB for each subframe; 0 dB  
overall

INPUTS AND OUTPUTS

**AES Inputs and Outputs (-D versions)**

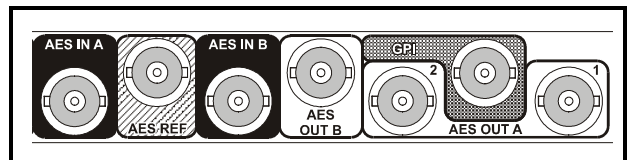
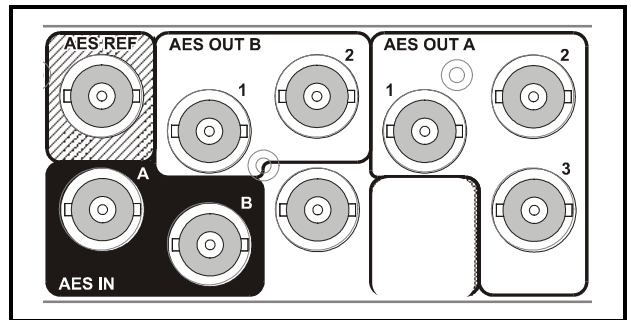
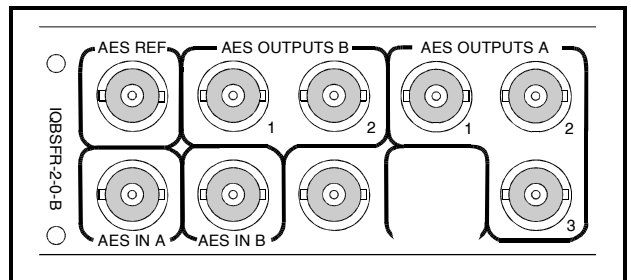
All AES input and output connections are made via this 25 way female D-type connector.

For connection data consult the tables on page 5.



**AES Inputs and Outputs (-B versions)**

All AES input and output connections are made via these BNC connectors.



**GPI Input**

The GPI port is a closed contact type. When enabled this is used to toggle between two memory stores which have been selected by the user.

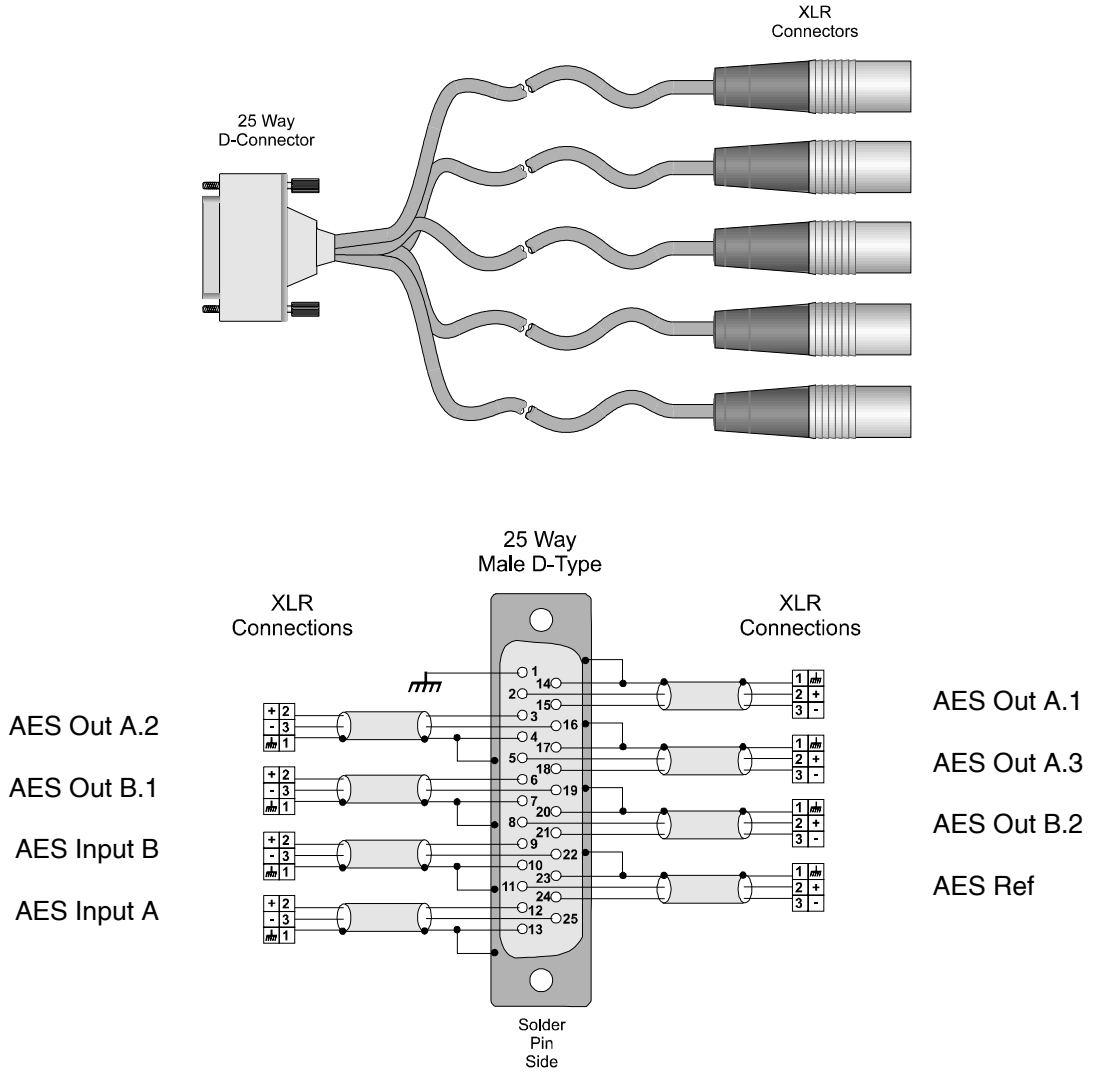


## Connection Details

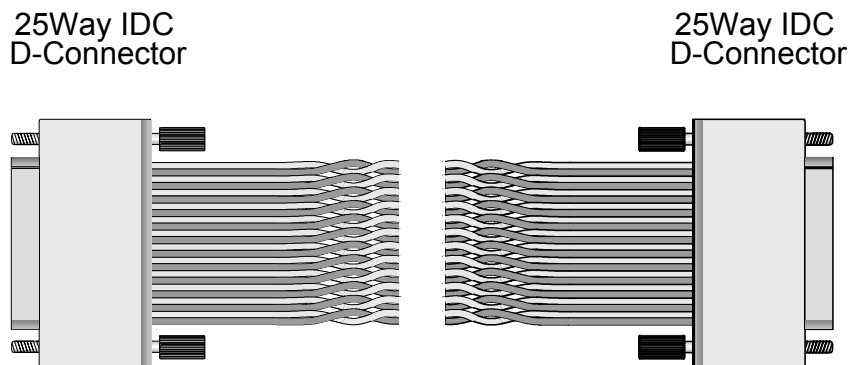
25 Way D Connector Pin Number	Description	Ribbon Cable Strand Number	Standard Pin Assignment
1		1	CHASSIS
14		2	GND1
2	AES OUT A.1+	3	1+
15	AES OUT A.1 -	4	1-
3	AES OUT A.2 +	5	2+
16	AES OUT A.2 -	6	2-
4		7	GND2
17		8	GND3
5	AES OUT A.3 +	9	3+
18	AES OUT A.3 -	10	3-
6	AES OUT B.1+	11	4+
19	AES OUT B.1 -	12	4-
7		13	GND4 (CH)
20		14	GND5
8	AES OUT B.2+	15	5+
21	AES OUT B.2 -	16	5-
9	AES IN B +	17	6+
22	AES IN B -	18	6-
10		19	GND6
23		20	GND7
11	AES REF +	21	7+
24	AES REF -	22	7-
12	AES IN A +	23	8+
25	AES IN A -	24	8-



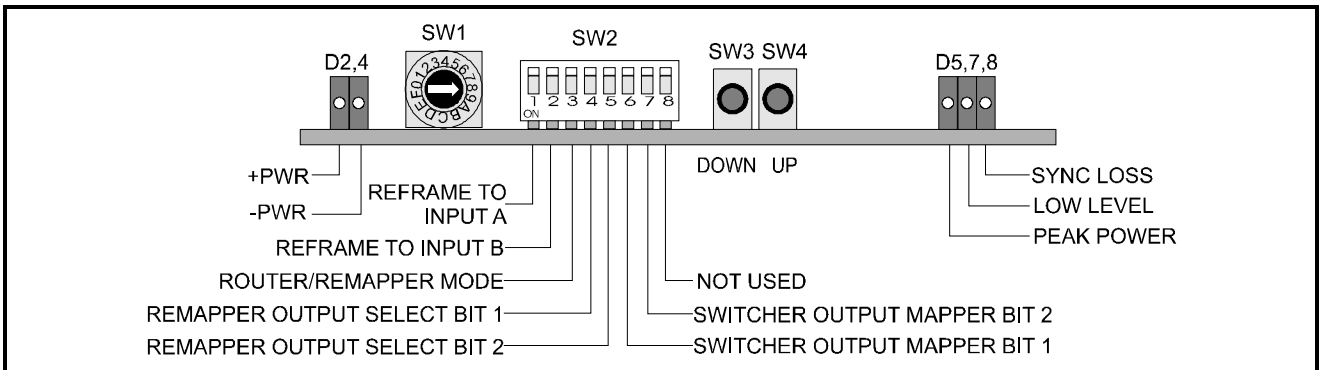
Example of Connection Details to XLR Connectors



Connection Details via IDC connectors

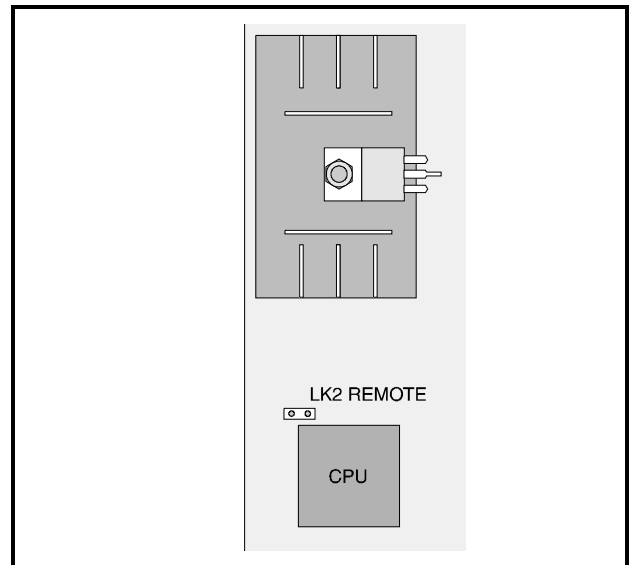


CARD EDGE CONTROLS



Note that the unit will respond to both local and remote control, one system overriding the settings of the other. For cards using the RollCall™ remote control system, activating these switches will override the remote control settings. The RollCall™ control panel will then follow these settings.

Note that in Main-frames where RollCall™ is not available the link LK2 (Remote) located near the CPU at the front of the card, should be set to the OFF (unconnected) position. This ensures that when the unit is powered-up the factory default settings of parameters not available as card edge adjustments, are loaded. With the link in the ON (connected) position the card will power-up with the last settings sent by the remote control panel.



LED INDICATORS

**Power**

These two indicators are illuminated when the positive and negative supplies are present.

**Peak Power D5**

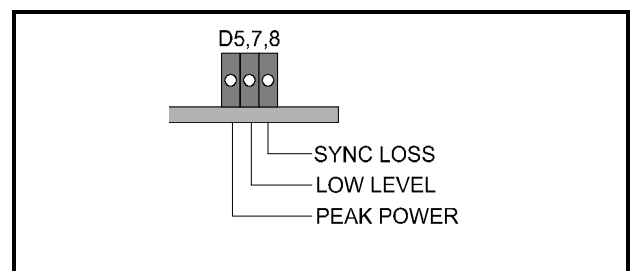
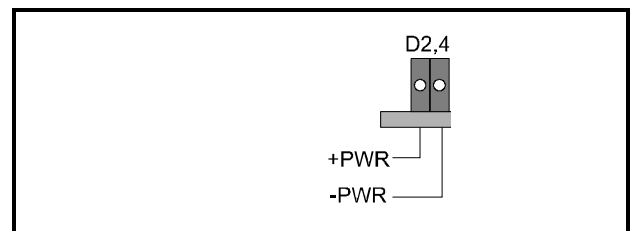
This indicator will become illuminated when the peak digital value is detected on the Right or Left channels.

**Low Level D7**

This indicator will become illuminated when the input level falls below -66 dBFS during a period of over 500ms.

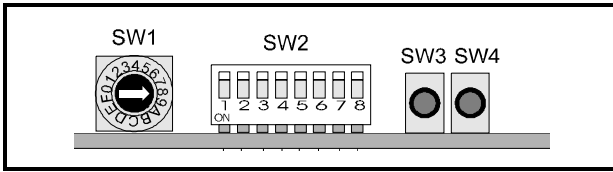
**Sync Loss D8**

This indicator will become illuminated when the units re-framing input is lost.



SW1, SW2 and SW3

Various modes and selections can be made using these switches.



SW1

This switch selects the **Input ReMapper** mode as shown below:

*Note that this mode is only active when SW2 position 3 is set to ON and is used in conjunction with SW2 positions 4 and 5.*

SW1 Position	Input ReMapper State
0	Input_A_SF1
1	Input_A_SF2
2	Input_B_SF1
3	Input_B_SF2
4	Input_A_SF1+SF2
5	Input_A_SF1-SF2
6	Input_A_SF2-SF1
7	Input_B_SF1+SF2
8	Input_B_SF1-SF2
9	Input_B_SF2-SF1
A	Mute

For the output ReMapper mode select see SW2 positions 4 & 5

SW2

This switch sets various functions.

Down = ON

Up = OFF

**Reframing** options are set by positions 1 and 2

Function	Position 1	Position 2
Reframe to Input A	ON	OFF
Reframe to Input B	OFF	ON
Reframe to Reference	OFF	OFF
Reframe to Reference	ON	ON

The **module operating mode** is set by position 3

Function	Position 3
Router Mode	OFF
ReMapper Mode	ON

**Output ReMapper** selection is set using a 2-bit code on positions 4 & 5

Function	Position 4	Position 5
Output_B_SF2	ON	ON
Output_B_SF1	OFF	ON
Output_A_SF2	ON	OFF
Output_A_SF1	OFF	OFF

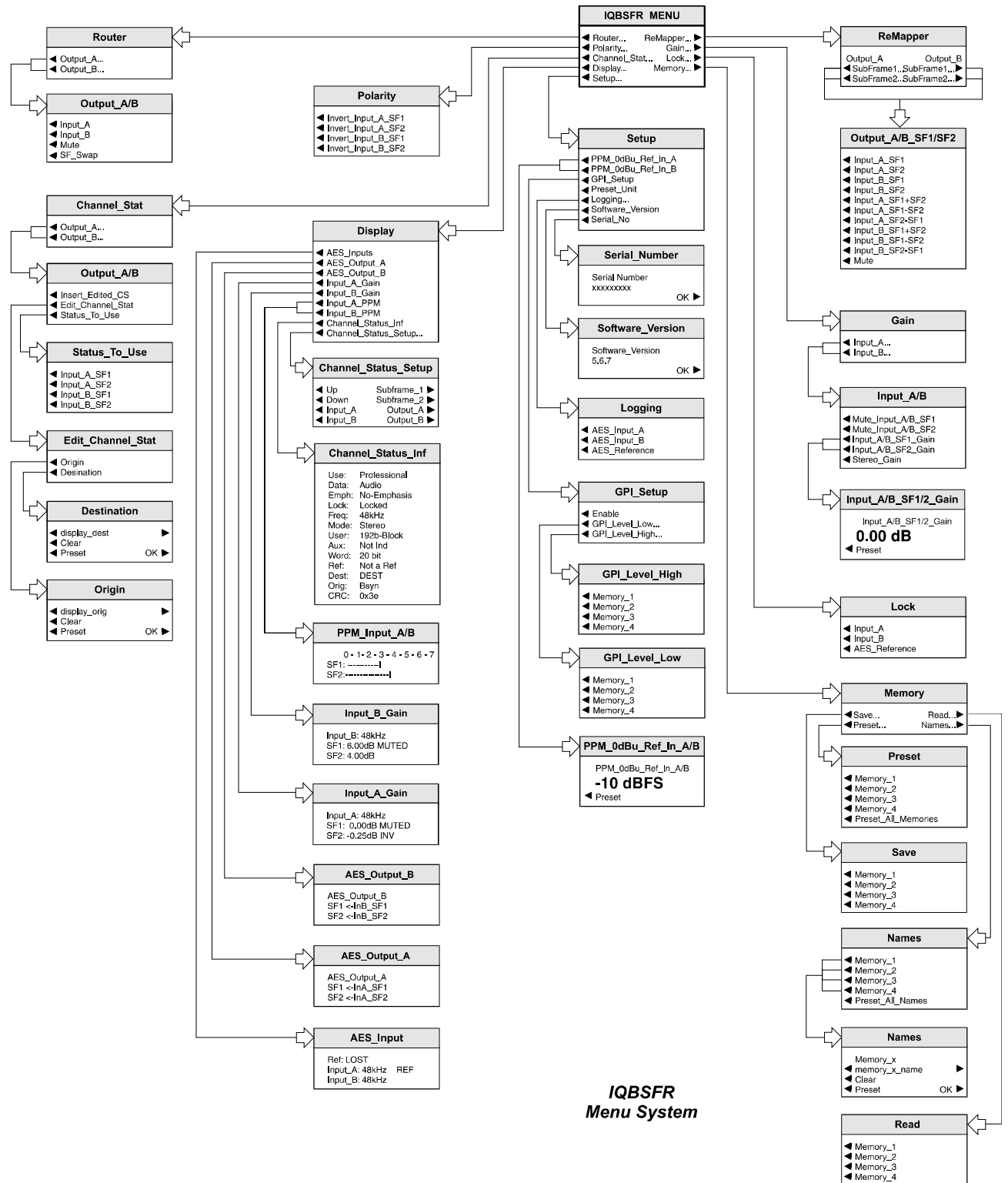
**To Store** the unit must be in ReMapper Mode (SW2 position 3 set to ON) then both SW3 and SW4 should be pressed together.

**Switcher Output Mapper** positions 6 & 7 (Active when SW2 position 3 is set to OFF)

Function	Position 6
Input_A to Output_A	OFF
Input_B to Output_A	ON

Function	Position 7
Input_A to Output_B	OFF
Input_B to Output_B	ON

To set the unit to the **Preset** state (default values) set SW1 to position F and press SW3 and SW4 at the same time.



**IQBSFR**  
**Menu System**

OPERATION FROM AN ACTIVE CONTROL PANEL

The card may be operated with an active control panel via the RollCall™ network.

The menus available for this card are shown on page opposite and will appear in the Control display window.

Operational details for the remote control panel will be found in SECTION 1 of the Modular System Operator's Manual.

**MENU DETAILS**

(see IQ Menu System Opposite)

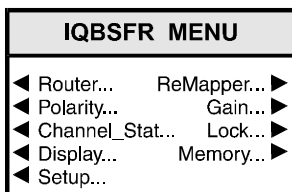
**MAIN MENU**

The main, or top level menu allows various sub-menus to be selected by pressing the button adjacent to the required text line.

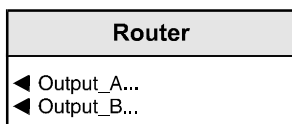
Note that where a menu item is followed by three dots (...) this indicates that a further sub-menu may be selected.

Whenever a menu item is selected the parameters of that selection will be displayed in the Information window of the front panel. Where the selection is purely a mode selection and does not enable a sub-menu, the text will become reversed (white-on-black) indicating that the mode is active. If the mode is not available for selection the text will remain normal.

**MAIN MENU**

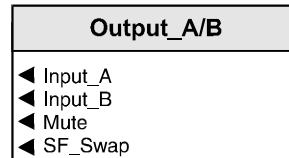


The Router allows the assignment of any of the two inputs to any of the two outputs.



Either output A or output B may be selected and the assignment chosen from the sub menu.

The selected output may be assigned to Input A, Input B, Mute or SF Swap.



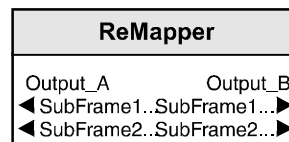
The Subframe 1 to Subframe 2 Swap (SF\_Swap) function swaps the Subframe 1 and Subframe 2 channels on the output selected.

The outputs may be silenced by using the Mute function.

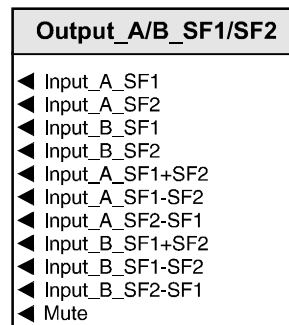


This will reveal a sub-menu that will allow the assignment of any input subframe to any output subframe including the stereo combiner:

The output subframe should first be selected from the following list:

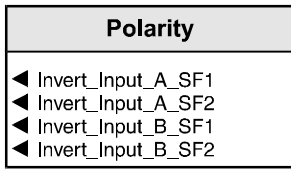


Then assignment to the output should then be selected from the following list:

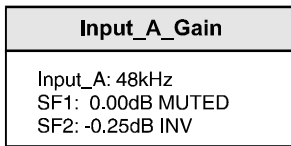


◀ **Polarity...**

This allows the inversion of any of the four output subframes (phase swapping of 180°).

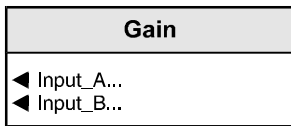


Note that when an input is selected to be inverted the text string shown in the display window under the **Display/Input\_A/B\_Gain** menu will indicate **INV**

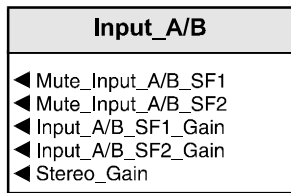


Note that the inversion does not effect the input to the stereo combiner.

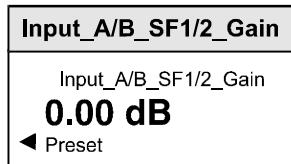
**Gain... ▶**



This function allows the inputs to be muted and **INPUT** gain to be adjusted individually or simultaneously (Stereo Gain)

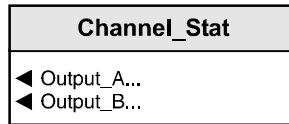


The gain functions reveal a numerical display showing the gain in dB that is adjustable using the spinwheel.

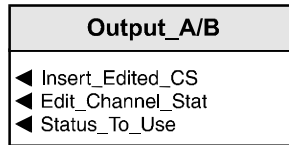


The range of adjustment is from -12 dB to +6 dB. Preset is to 0.00dB.

◀ **Channel\_Stat.**



This selection enables a sub-menu that allows the channel status to be routed; also the destination and origin can be edited.



◀ **Insert\_Edited\_CS**

Enabling this function will allow new/edited channel status information (use the **◀ Edit\_Channel\_Stat** item below) to be inserted in the data stream of either Output A or Output B.

◀ **Edit\_Channel\_Stat**

This item allows channel status information of the origin or the destination to be changed/edited.

◀ **Origin**

This allows the originating channel status information to be changed.

The text may be edited by using the push buttons to select the position in the text and the spinwheel to select the new text character.

Select **◀ OK** to save the text, **◀ Clear** to clear the text or **◀ Preset** to return to the default (BSFR) text.

◀ **Destination**

This allows the destination channel status information to be changed.

The text may be edited by using the push buttons to select the position in the text and the spinwheel to select the new text character.

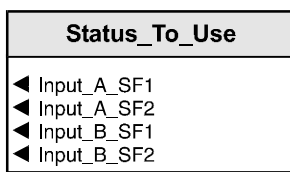
Select **◀ OK** to save the text, **◀ Clear** to clear the text or **◀ Preset** to return to the default (DEST) text.

◀ **Status\_To\_Use**

This allows the selection of available Channel Status blocks (from selected outputs) to be used.

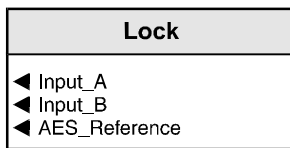
e.g. If **Output\_A\_Subframe\_1** was mapped to **Input\_A\_Subframe\_1**, and **Output\_A\_Subframe\_2** was mapped to **Input\_B\_Subframe\_2** then the C.S. block for either of the assigned outputs can be used as the correct C.S. block for **Both** the Subframe 1 and Subframe 2 subframes of **Output\_A**, this is because independent control of both C.S. blocks on the output stage is not possible.

Selections available are:



**Lock... ▶**

This selection reveals a sub-menu that allows the option to reframe the input(s) to either input or a synchronous reference.



If the locking input signal is lost then the next available input is used to reframe. If no inputs are detected then digital silence @48 kHz will be generated.

Selections available are:

◀ **Input\_A**

Unit will lock to the signal at Input A

◀ **Input\_B**

Unit will lock to the signal at Input B

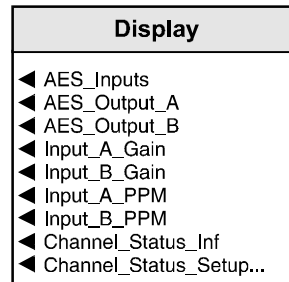
◀ **AES\_Reference**

Unit will lock to the AES Reference (via D connector or AES Ref BNC)

Note that the locking information will be displayed when the AES\_Inputs display is selected.

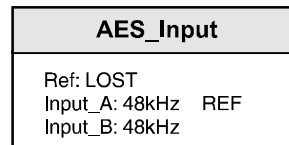
◀ **Display...**

This menu allows information about the input/output signal and channel status to be displayed in the LCD window.



◀ **AES\_Inputs**

Use this item to select the inputs for interrogation. This menu will show the source of the reference signal and the sampling rate of the AES/EBU input signals. If no input is detected *Lost* will be displayed. If the input sampling rate is not that of the recognised standards then ?? will be displayed.



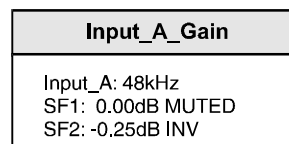
Note that **REF** will apply to the input that has been selected by the LOCK function.

◀ **AES\_Output\_A** and ◀ **AES\_Output\_B**

This menu will display the output mapping, presently selected by the user.

◀ **Input\_A\_Gain** and ◀ **Input\_B\_Gain**

This will display the input settings of the selected input using the **Gain\Input\_A/B\_SF1/2\_Gain** function and also the sampling rate. The display will also indicate whether or not the input has been inverted by inserting a suffix of **INV** or if the input has been muted by inserting **MUTED** with the later having priority. e.g.



Note that the input gain adjustment does not effect the inputs to the stereo combiner.

◀ **Input\_A\_PPM** and ▶ **Input\_B\_PPM**

This selection will reveal a bargraph display showing the peak level of the both input subframes of input A and B.

The scale is divided into 8 equal divisions, each representing a 4 dB level increment.

The 0 dB point is defined as 4 and maybe set to between -12 dBFS and -24 dBFS using the **PPM\_0dBu\_Ref\_In\_A** in the **Setup** menu.

This metering function follows standard Peak Programme characteristics.

▶ **Channel\_Status\_Inf**

Selecting this item will display information about the channel status, examples of which are shown below:

Channel_Status_Inf	
Use:	Professional
Data:	Audio
Emph:	No-Emphasis
Lock:	Locked
Freq:	48kHz
Mode:	Stereo
User:	192b-Block
Aux:	Not Ind
Word:	20 bit
Ref:	Not a Ref
Dest:	DEST
Orig:	Bsyn
CRC:	0x3e

▶ **Channel\_Status\_Setup...**

Selecting this window will reveal a sub-menu which will allow the channel status information for the inputs, outputs and sub-frames 1 and 2 to be viewed.

Channel_Status_Setup	
◀ Up	Subframe_1 ▶
◀ Down	Subframe_2 ▶
◀ Input_A	Output_A ▶
◀ Input_B	Output_B ▶

*Note that the Up and Down push buttons selections should be used for this function as the spinwheel will not be operational.*

**Memory ▶**

This function reveals a sub-menu that allows control of the memory functions.

Memory	
◀ Save...	Read...▶
◀ Preset...	Names...▶

▶ **Save**

This function reveals a sub-menu that allows the settings of all items to be saved. Up to 4 different set-ups may be saved in the 4 memory locations. They can all be renamed using the **Names** menu

**Read ▶**

This function reveals a sub-menu that allows 4 different settings of all items to be recalled from the 4 memory locations as saved in the **Save** function.

▶ **Preset**

This selection allows individual (select the location memory number), or all, (select **Preset\_All\_Memories**), memory locations to be preset to their default (factory) settings.

**Names ▶**

This selection allows the naming of memory 1 to 4 locations.

To name a memory location select:

▶ **Names** to reveal the sub-menu.

Select the memory location to be renamed e.g.

▶ **Memory\_1**

Names	
Memory_x	
◀ memory_x_name ▶	
◀ Clear	
◀ Preset	OK ▶

To compile/edit the text the right ▶ and left ◀ buttons adjacent to the upper text line in the menu should be used to select the character position in the text and the spinwheel used to select the character.

The ◀ **Clear** function blanks out the selected character.

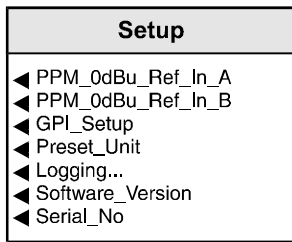
The ◀ **Preset** function loads the default text, for example, **Memory\_1**.

**O.K. ▶** saves the caption text and returns to the main menu.



◀ Setup...

This selection reveals a sub-menu that allows various functions to be set.

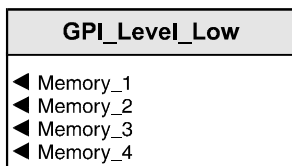
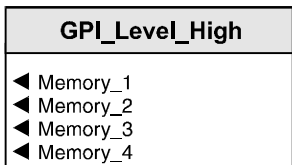
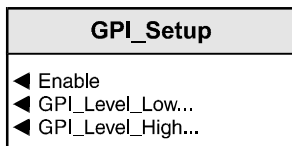


◀ PPM\_0dBu\_Ref\_In\_A  
 ◀ PPM\_0dBu\_Ref\_In\_B

These selections will reveal a numerical display of dBFS that sets the 0 dBu reference point for Input A and input B PPM meter.

◀ GPI\_Setup

This function will reveal a sub-menu that allows the GPI function to be enabled (Enable becomes highlighted) and the reaction to either a low or high signal to be selected.



Selecting GPI\_Level\_High will allow the selected memory store to be recalled when the GPI input is at a low level.

Selecting GPI\_Level\_Low will allow the selected memory store to be recalled when the GPI input is at a low level.

Note that the GPI settings cannot be corrupted by a GPI memory recall.

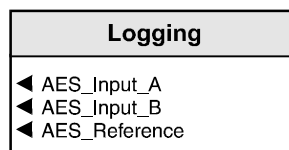
◀ Preset\_Unit

Selecting this item sets all adjustment functions that include a preset facility, to their preset values. Note that this is a momentary action and the text will not become reversed

◀ Logging

If a logging device is attached to the RollCall™ network, information about various parameters will be reported to the logging device assigned in the Remote Control Interface system. (See Section 1, The RCIF Menu System)

The parameters that may be selected for logging are as follows:



◀ Software\_Version

Selecting this item reveals a display showing the version of the software fitted in the module. Select OK to return to the System Menu.

◀ Serial\_No

Selecting this item reveals a display showing the serial number of the module. Select OK to return to the System Menu.

### Dolby E Compatibility

Dolby E is an audio format that enables professional broadcast equipment to handle multichannel audio and metadata conveniently and easily. Dolby E allows up to 8 channels of audio and associated metadata to be carried using a standard stereo AES-EBU digital signal.

Snell and Wilcox Ltd. is a member of the Dolby E Partner Program.

It has been verified that the model(s) indicated in the table below will pass 16-bit, 20-bit and 24-bit Dolby E streams transparently in the modes shown.

Product Category	Manufacturer	Model	Test Date	Location	Dolby Engineer	OEM Contact
Modular Audio Products	Snell & Wilcox	IQBSFR Audio shuffler	09.08.01	9.8.01 S&W UK	RAF, JYP	Snell & Wilcox Lee Hunt

Product Settings
N/A

Software Revision (If applicable)	Product Serial Number
V5.9.8	

Test Configuration	Number of Audio Bits Passed	Channel Status Bits	Delay (E-E)
DM100 connected directly to input/output of card	24	Passed through	7 AES frames

#### Compatibility

Level (Fully, Conditionally, Partially)	Reason
Conditional	Can be used to pass through Dolby E when configured not to shuffle channels

**Manual Revision Record**

Date	Version No.	Issue No.	Change	Comments
220698	1	1		First Issue
070898	1	2	Input/Output 1 to A, 2 to B	New Issue
221098	1	3	Note that “the GPI input has not yet been defined” added.	New Issue
240899	1	4	Changes for V5.5.6 software.	New Issue
131299	1	5	Gain change –12 to +6 dB	New Issue
110100	1	6	Changes for V5.6.7 software	New issue released
280302	1	7	Now includes information for the 3A enclosure modules	New manual issued
070403	1	8	Power consumption added to techspec	New manual issued