



# IQBADX Four Channel Analog and D1 AES/EBU Audio Data Extractor

## Module Description

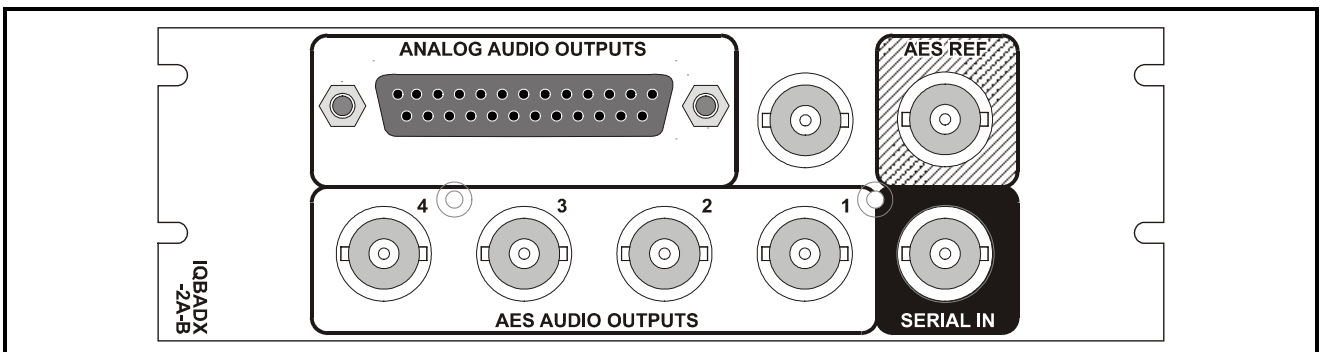
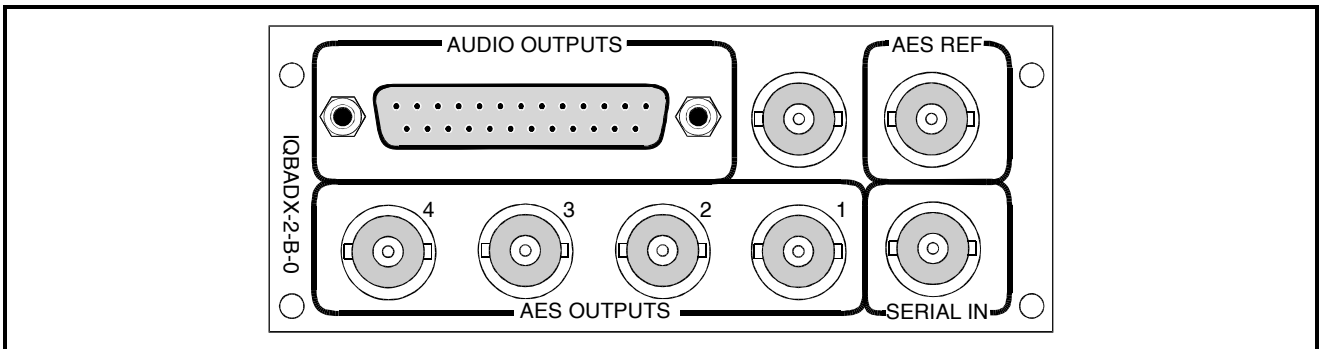
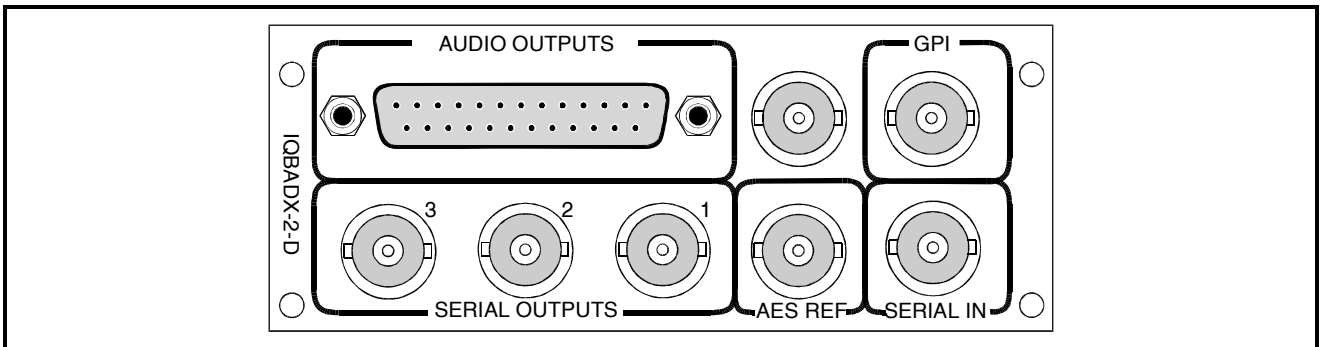
The IQBADX extracts four audio pairs from SDI video (D1 - 270MBit) to four analog and four AES/EBU outputs. 20-bit digital to analogue conversion ensures high audio signal quality.

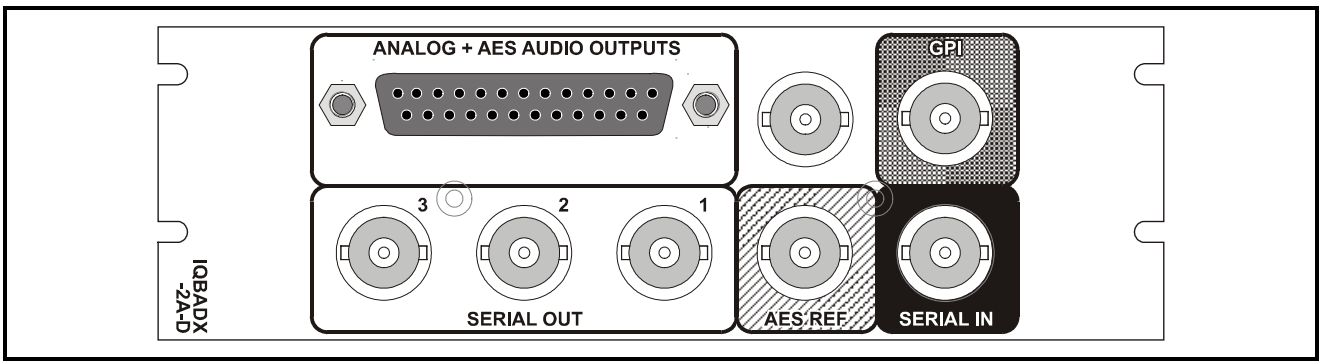
A crystal locked PLL ensures low output jitter. The analog audio output level is adjustable between +12 and +24 dBu for 0 dB FS in via preset trimpots. Extraction may be from any group and pair independently for each channel-pair. Extraction is fully compliant with SMPTE 291M and SMPTE 272M-A for synchronous-to-video audio at 48 kHz.

When audio data is absent from a selected channel-pair address, the output will be silence or tone (selectable).

The SDI input is equalized to > 200 m of cable. Full EDH monitoring is included. All analogue audio connections are via a 25 way D connector. AES connections are balanced via a 25 way D connector (-D versions) or unbalanced BNC (-B versions).

## REAR PANEL VIEWS





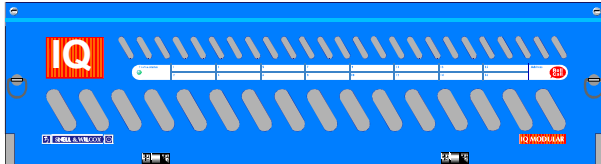
Versions of the module cards available are:

IQBADX-2-D	Balanced Analog + AES Outputs + GPI Input, 4 SDI Outputs	Double width module
IQBADX-2A-D	Balanced Analog + AES Outputs + GPI Input, 4 SDI Outputs	Double width module
IQBADX-2-B	4 Balanced/Unbalanced AES Outputs and analog outputs	Double width module
IQBADX-2A-B	4 Balanced/Unbalanced AES Outputs and analog outputs	Double 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**

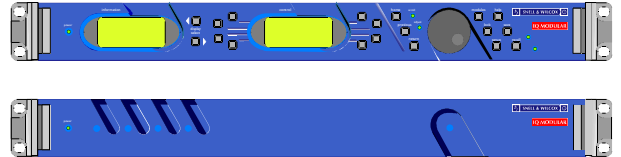
Rear panels **with** the suffix A may only be fitted into the 'A' style enclosure shown below.



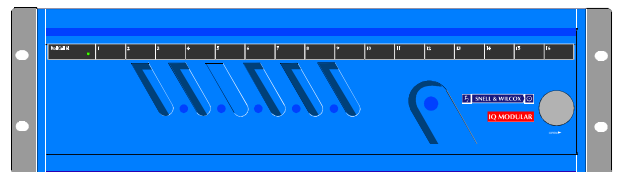
(Enclosure order codes IQH3A-E-0, IQH3A-E-P, IQH3A-0-0, IQH3A-0-P)

**'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-0, IQH1S-RC-AP, IQH1U-RC-0, IQH1U-RC-AP, Kudos Plus Products)

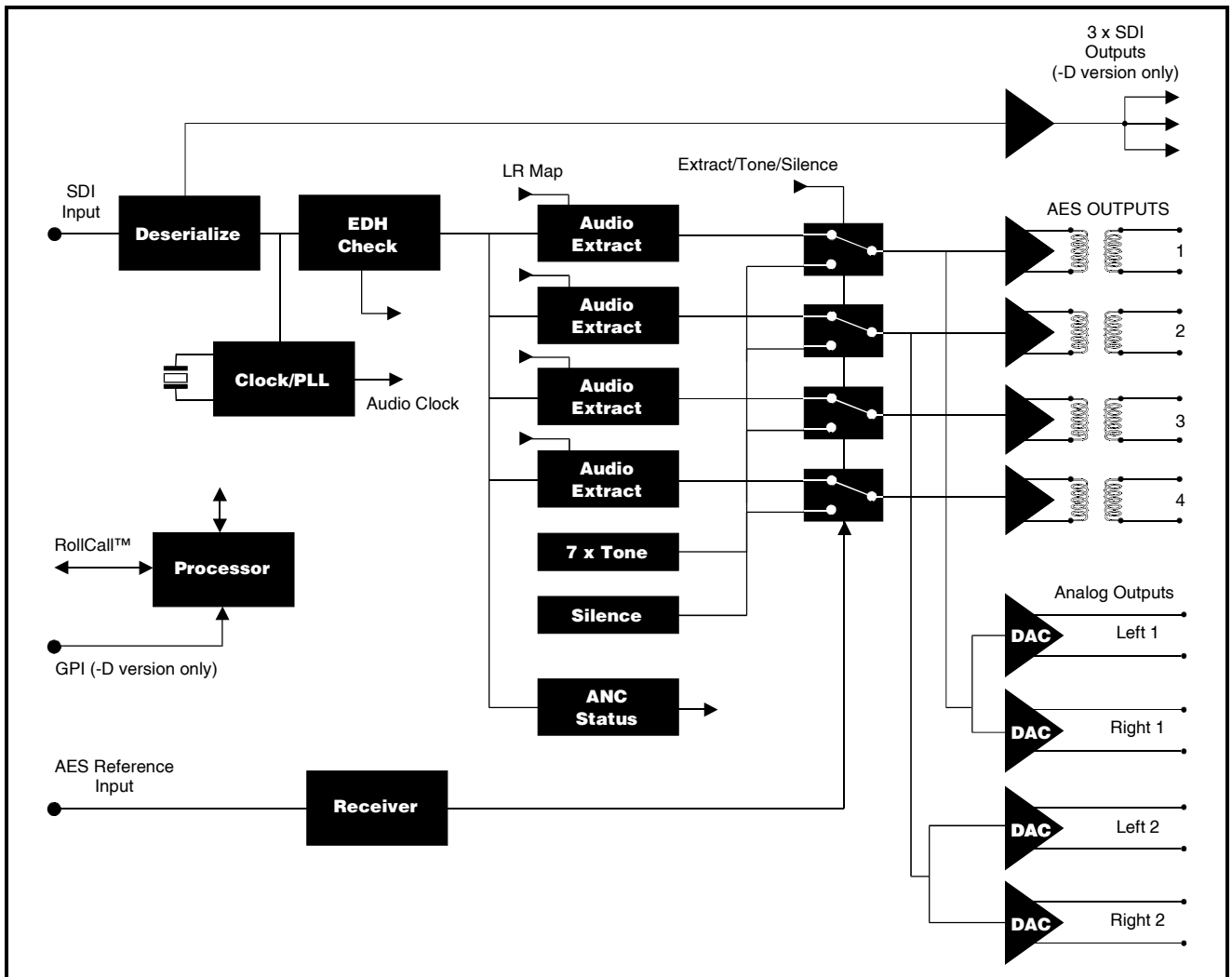


(Enclosure order codes IQH3N-0, IQH3N-P)



(Enclosure order codes IQH3U-RC-0, IQH3U-RC-P)

## BLOCK DIAGRAM



## Features

Demultiplexes four audio pairs from serial 4:2:2 video

- Simultaneous Analog and AES/EBU digital outputs
- Audio extraction independently selectable by pair
- Channel 1/2 mapping (1/2,2/1,1/1,2/2)
- 20-bit digital to analog conversion, -95 dB THD+N (FS)
- Analog output level manually adjustable +12 to +24 dBu for 0 dB FS in
- Crystal PLL for low jitter
- Automatic 525 and 625 line operation
- Embedded audio presence indication
- 7 internal precision tones or silence selectable for output
- EDH monitoring
- RollCall control
- General Purpose control Input (GPI) (-D version only)
- Balanced (D-type) or Unbalanced (BNC) AES versions

## TECHNICAL PROFILE

**Features****Signal Inputs**

Digital Video.....	1 Serial (D1-270) via BNC
GPI .....	1 via BNC (-D only)
AES Audio .....	1 AES Reference (48 kHz, synchronous to input SDI only)
Standards .....	SMPTE 259M-C-1997, SMPTE 272M-A-1994

**Signal Outputs**

Analog Audio .....	4 Channels (2 Stereo Pairs)
Digital Video.....	3 Reclocked SDI (-D only)
AES/EBU Audio .....	4 Stereo pairs (balanced/unbalanced)
Standards .....	SMPTE 259M-C-1997, SMPTE 272M-A-1994, AES3-1992

**Specifications**

Serial Input Return Loss.....	Better than 15 dB to 270 MHz
Serial Input Receive length	>200 m
Analog Audio Outputs .....	Level Manually Adjustable +12 dBu to +24 dBu Output Impedance 45 to 55 ohms
AES Audio Outputs .....	Typically 3 V pk to pk into 110 ohms (Transformer Balanced) via 25 way 'D' connector
AES Audio Outputs .....	(Unbalanced) Typically 1 V pk to pk into 75 ohms via BNC
THD+N .....	-95 dB typical at 1 kHz
Dynamic Range .....	105 dB
Conversion .....	20-bit
Sampling.....	48 kHz Synchronous to SDI video stream

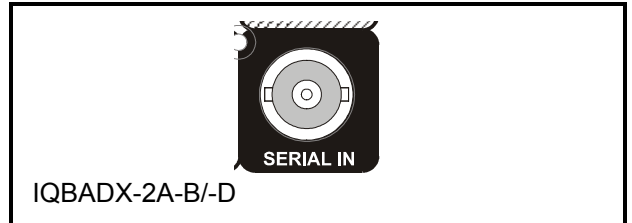
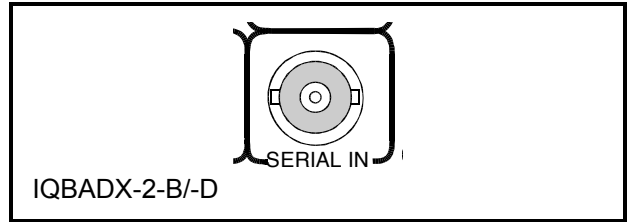
**Power Consumption**

Module Power Consumption	11 W max
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INPUTS

Serial Digital Video Input

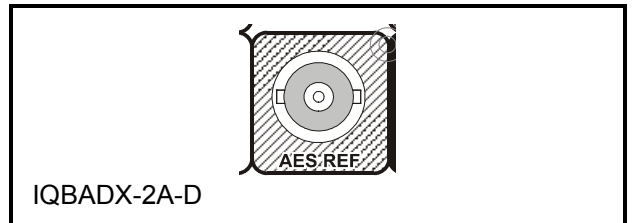
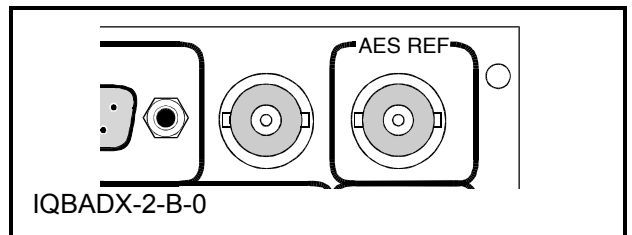
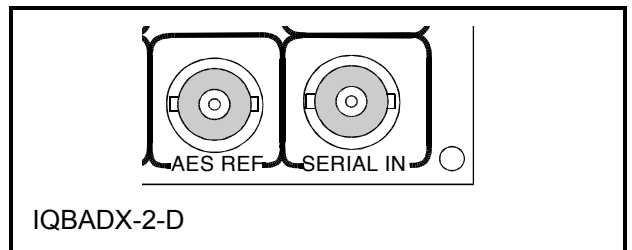
The serial digital input to the unit is made via this BNC connector which terminates in 75 Ohms.



AES Reference Input

The AES reference input connection is made via a BNC connector.

If a suitable AES reference signal is present the digital outputs will be frame-synchronised to this signal. (48 kHz only).



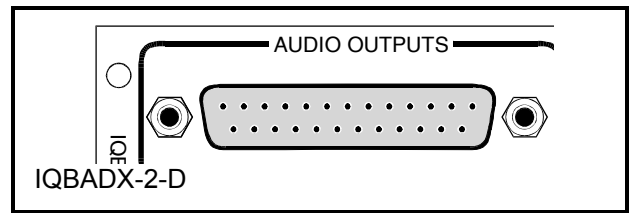
## OUTPUTS

## IQBADX-D/-2A-D

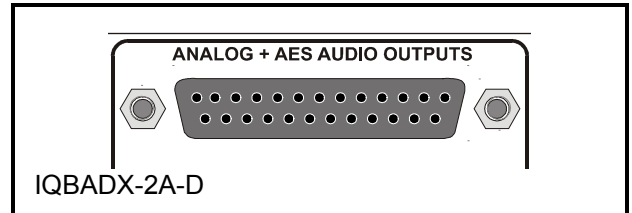
Analog and AES audio output connections are made via the 25 way female D-type connector. There are four balanced analog and four balanced AES outputs available.

For connection data consult the tables on page 5.

If a suitable AES reference signal is present the digital outputs will be frame-synchronised to this signal. (48 kHz only).



IQBADX-2-D

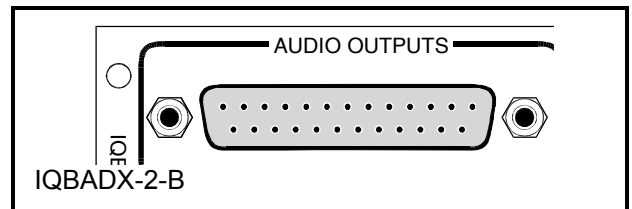


IQBADX-2A-D

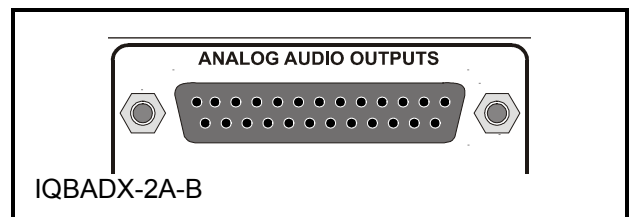
## IQBADX-B/-2A-B

Analog audio output connections are made via the 25 way female D-type connector. There are four balanced analog outputs available.

For connection data consult the tables on page 5.

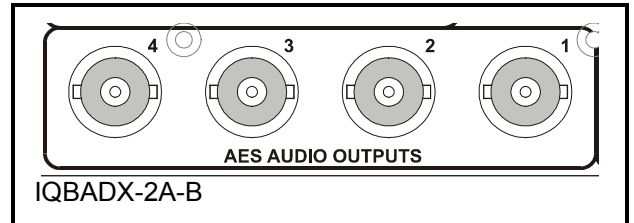
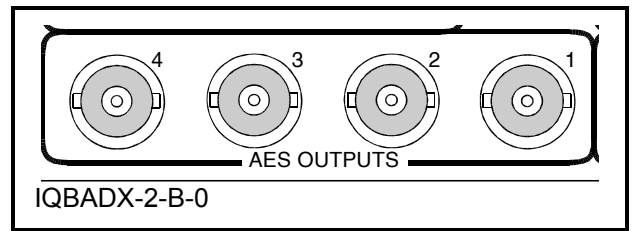


IQBADX-2-B



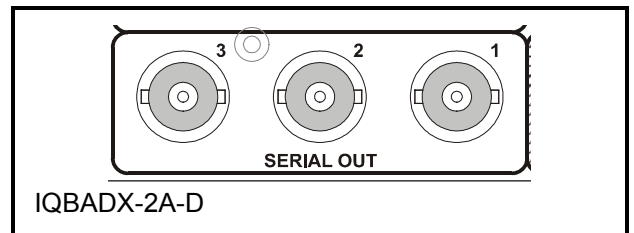
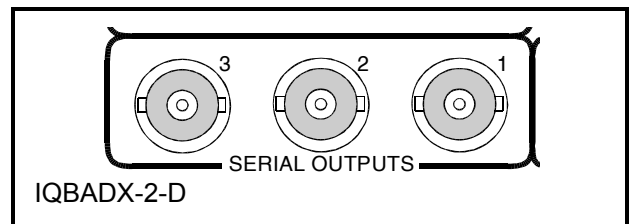
IQBADX-2A-B

AES audio output connections are made via these four BNC connectors. There are four unbalanced AES outputs available.



Serial Digital Video (IQBADX-2-D/-2A-D only)

These are the three isolated Serial Digital outputs of the unit via BNC connectors for 75 Ohms.



## Connection Details IQBADX-D

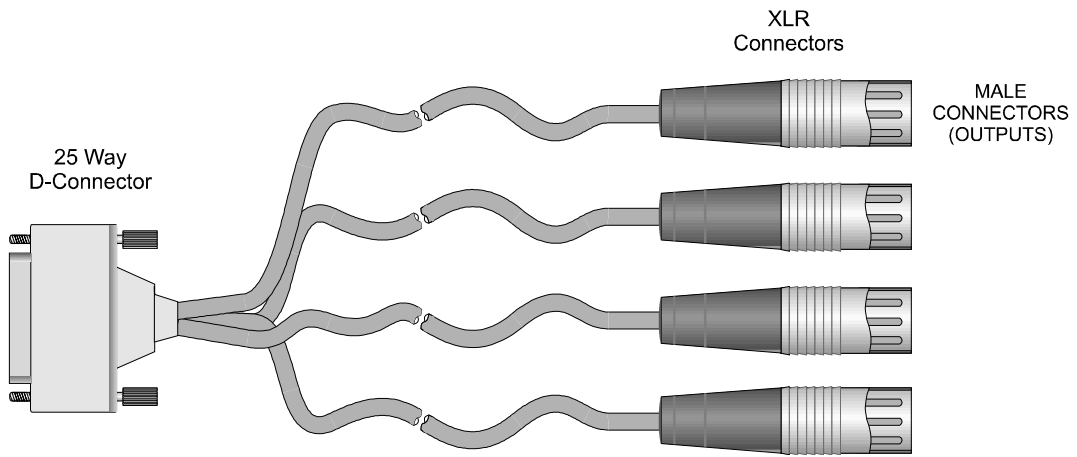
25 Way D Connector Pin Number	Description	Ribbon Cable Strand Number	Standard Pin Assignment
1	Chassis	1	CHASSIS
14	ANALOG OUT 1 GND	2	GND1
2	ANALOG OUT 1 + (Left)	3	1+
15	ANALOG OUT 1 - (Left)	4	1-
3	ANALOG OUT 1 + (Right)	5	2+
16	ANALOG OUT 1 - (Right)	6	2-
4	ANALOG OUT 1 GND	7	GND2
17	ANALOG OUT 2 GND	8	GND3
5	ANALOG OUT 2 + (Left)	9	3+
18	ANALOG OUT 2 - (Left)	10	3-
6	ANALOG OUT 2 + (Right)	11	4+
19	ANALOG OUT 2 - (Right)	12	4-
7	ANALOG OUT 2 GND	13	GND4 (CH)
20	GND	14	GND5
8	AES OUT 1 +	15	5+
21	AES OUT 1 -	16	5-
9	AES OUT 2 +	17	6+
22	AES OUT 2 -	18	6-
10	AES 2 GND	19	GND6
23	AES 3 GND	20	GND7
11	AES OUT 3 +	21	7+
24	AES OUT 3 -	22	7-
12	AES OUT 4 +	23	8+
25	AES OUT 4 -	24	8-
13	AES 4 GND	25	GND8

## Connection Details IQBADX-B

1	Chassis	1	CHASSIS
14	ANALOG OUT 1 GND	2	GND1
2	ANALOG OUT 1 + (Left)	3	1+
15	ANALOG OUT 1 - (Left)	4	1-
3	ANALOG OUT 1 + (Right)	5	2+
16	ANALOG OUT 1 - (Right)	6	2-
4	ANALOG OUT 1 GND	7	GND2
17	ANALOG OUT 2 GND	8	GND3
5	ANALOG OUT 2 + (Left)	9	3+
18	ANALOG OUT 2 - (Left)	10	3-
6	ANALOG OUT 2 + (Right)	11	4+
19	ANALOG OUT 2 - (Right)	12	4-
7	ANALOG OUT 2 GND	13	GND4 (CH)
20	GND	14	GND5
8	Not Used	15	5+
21	Not Used	16	5-
9	Not Used	17	6+
22	Not Used	18	6-
10	GND	19	GND6
23	GND	20	GND7
11	Not Used	21	7+
24	Not Used	22	7-
12	Not Used	23	8+
25	Not Used	24	8-
13	GND	25	GND8

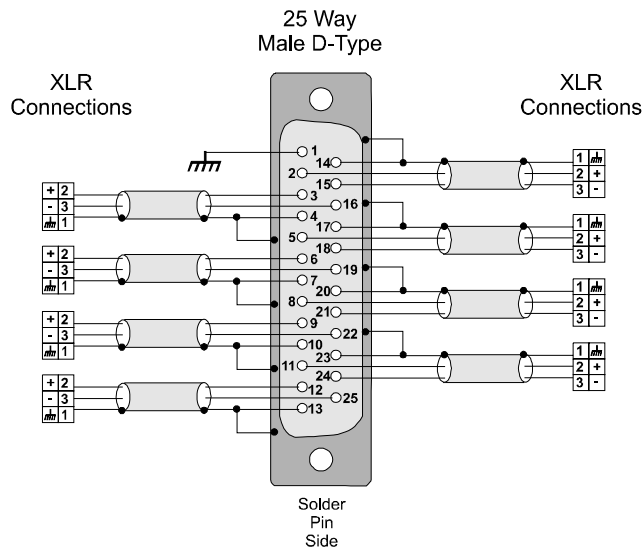
Example of Connection Details to XLR Connectors





**IQBADX-D**

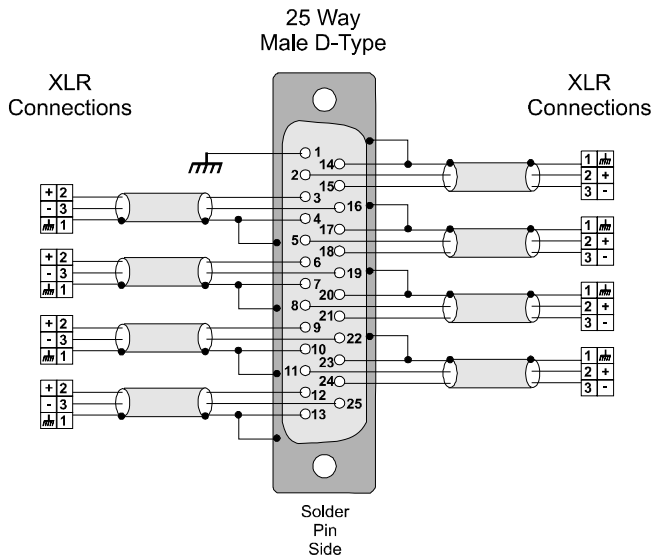
- Analog Output 1 Right
- Analog Output 2 Right
- AES Output 2
- AES Output 4



- Analog Output 1 Left
- Analog Output 2 Left
- AES Output 1
- AES Output 3

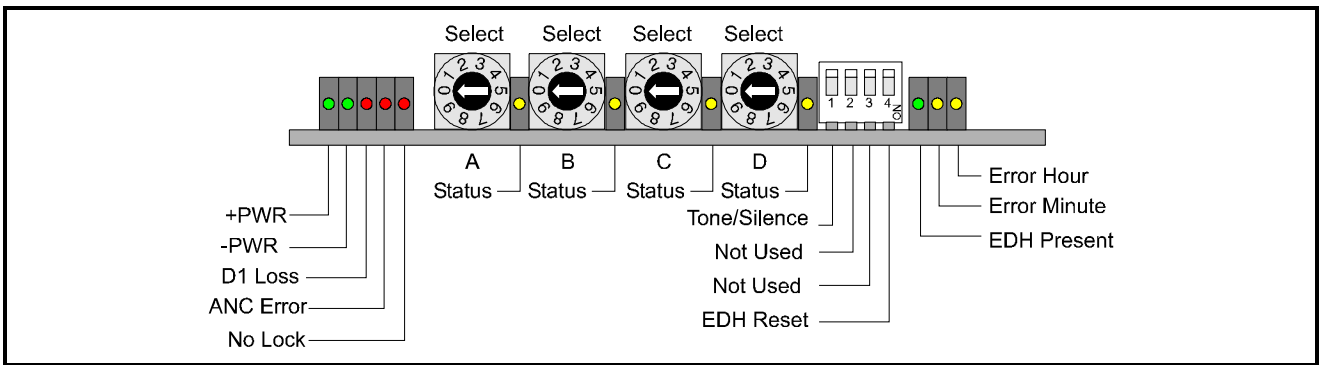
**IQBADX-B**

- Analog Output 1 Right
- Analog Output 2 Right
- Not Used
- Not Used



- Analog Output 1 Left
- Analog Output 2 Left
- Not Used
- Not Used

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 REMOTE link (see opposite) should be set to the OPEN (OFF) 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 CLOSED (ON) position the card will power-up with the last settings stored in the non-volatile memory.

LED INDICATORS

PWR (Power)

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

D1 Loss

This LED will become illuminated when there is no D1 input.

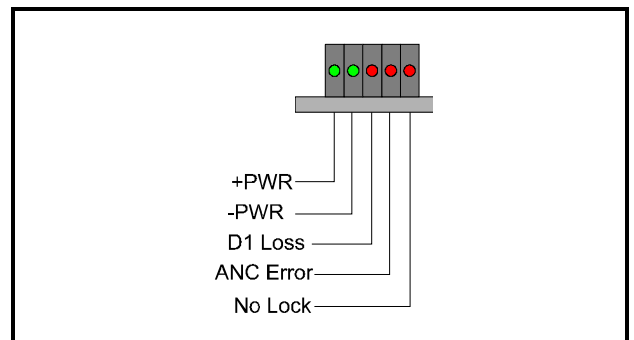
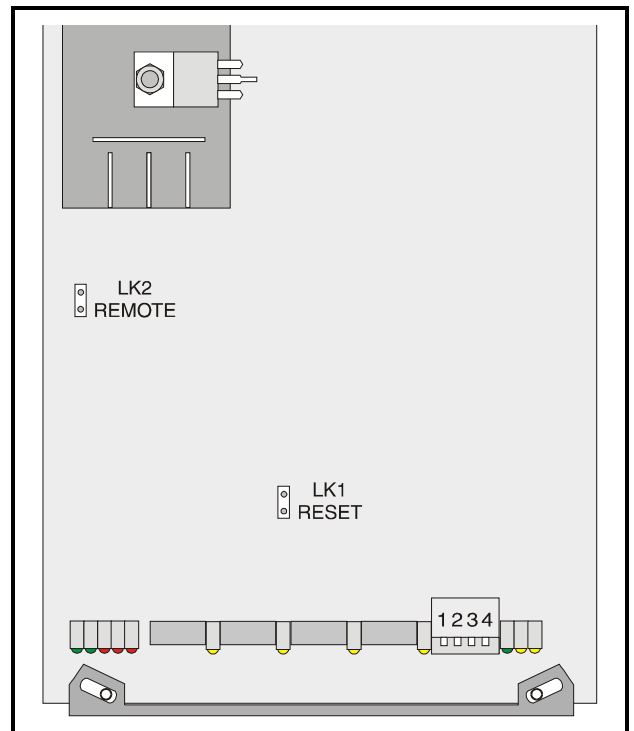
ANC ERROR

This LED will become illuminated for a period of time each time a checksum error is detected in the embedded ancillary data packets.

NO LOCK

If the card is expecting to phase up the AES outputs to a reference which is not present this LED will illuminate.

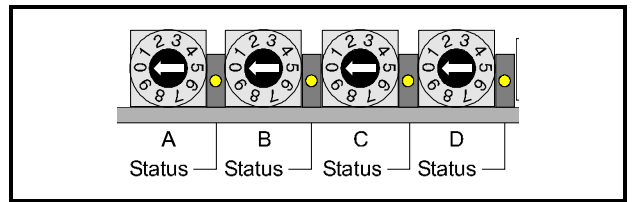
If the applied AES reference is not synchronous to the input SDI it will be rejected and this LED will flash.



STATUS LED's

These LED's will

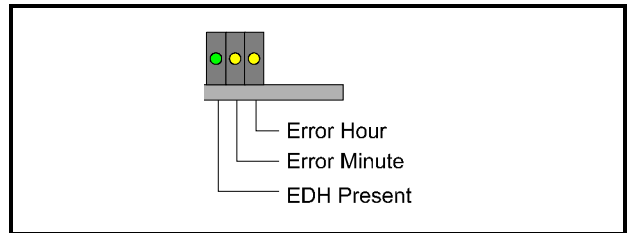
1. **Become illuminated** when either Tone or Silence is selected.
2. **Flash** if there is no AES at the selected address.
3. **Will not be illuminated** if the extractor channel is working.



EDH PRESENT / ERROR

This LED will become illuminated if the input D1 video has embedded EDH data.

This LED will also briefly blink off whenever the EDH checksum errors are detected.



EDH MINUTE / HOUR

These LED's provide the EDH error minute & hour history indicating occurrence of errors within their respective time periods.

These LED's will remain OFF if no errors have occurred within their time period, or if the incoming D1 video does not contain EDH data.

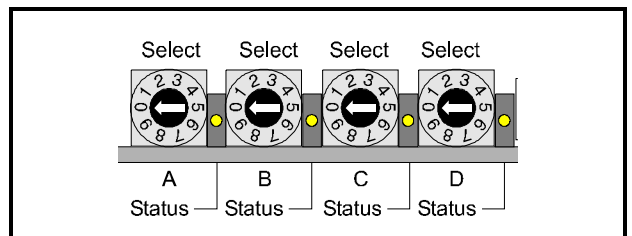
BCD SELECT SWITCHES

These switches select which embedded channel or tone/silence is to be output.

Settings are as follows:

1 to 8 select stereo pair for extraction

- 1 group 1, pair 1 (Pair 1)
- 2 group 1, pair 2 (Pair 2)
- 3 group 2, pair 1 (Pair 3)
- 4 group 2, pair 2 (Pair 4)
- 5 group 3, pair 1 (Pair 5)
- 6 group 3, pair 2 (Pair 6)
- 7 group 4, pair 1 (Pair 7)
- 8 group 4, pair 2 (Pair 8)
- 9 test-tone
- 0 silence



## 4-WAY DIP SWITCH

*Setting to the DOWN (ON) position enables the function.*

## POSITION 1 TONE / SILENCE

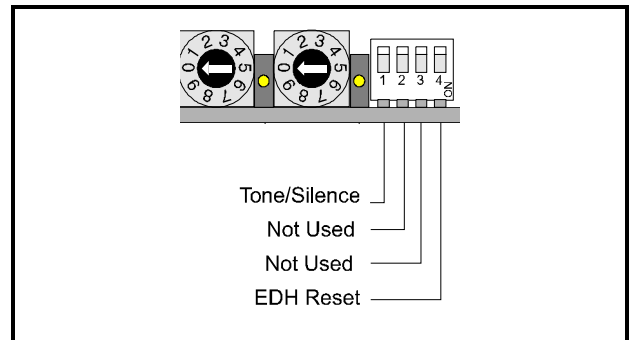
Selects tone (down) or silence (up) for the output in the event of an extraction failure.

## POSITIONS 2 and 3

These positions are not used.

## POSITION 4 EDH RESET

When enabled this will clear EDH error history.



## SMPTE 272M SUPPORT

The cards conform to SMPTE 272M-A

- A synchronous audio at 48 kHz;  
20-bit audio data packets

The cards do not support  
SMPTE 272M-B,C,D,E,F,G,H,I,J

- B synchronous audio for composite video
- C 48 kHz synchronous, with audio & extended data packets
- D asynchronous audio
- E 44.1 kHz audio
- F 32 kHz audio
- G 32 kHz to 48 kHz continuous sampling rate range
- H audio frame sequence
- I time delay tracking (monitor only)
- J non-coincident 'Z' bits in a channel pair

**ALIGNMENT OF ANALOG OUTPUT LEVELS**

The relationship between audio levels in the digital and analog domains is set via four multi-turn trimpots one per output channel. The adjustment range is +12 dBu to +24 dBu output for 0 dBFS digital audio level.

The generalised relationship is:

$$\text{Analog (dBu)} = \text{Digital (dBFS)} + \text{Headroom (dB)}$$

For Example:

Digital audio level = -20 dBFS  
 Required analog headroom = +18 dB  
 Analog level for -20 dBFS = -20 + 18 = -2 dB

To re-align the analog outputs for different headrooms a known digital audio level has to be applied. This can be done either by de-embedding an embedded tone or the card's internal tone generator may be used. In all cases the card must be supplied with a valid SDI digital video source.

**Using the card's internal tone generator:**

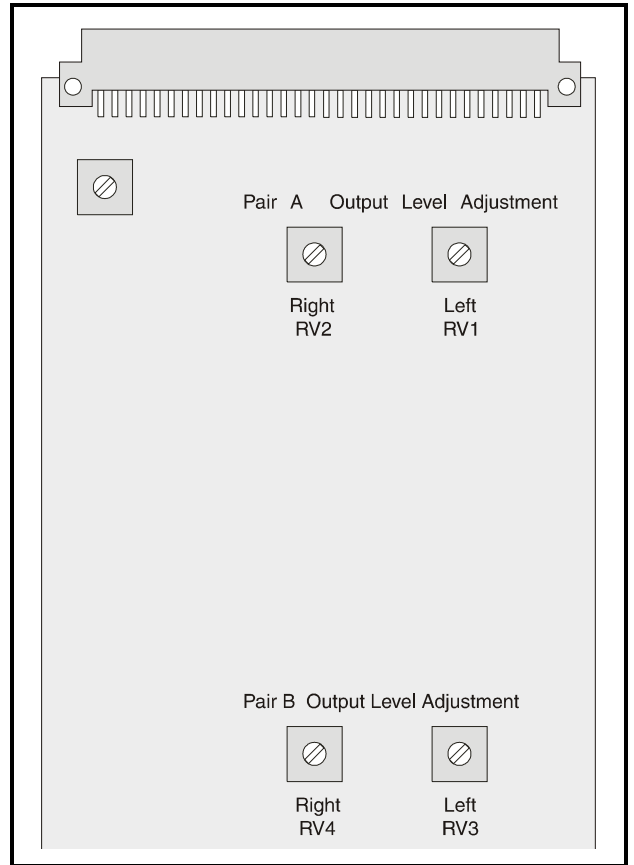
Connect the analog outputs to an audio level meter. Via RollCall, set outputs 'A' and 'B' to '0dBFS\_1kHz'. Adjust the multi-turn trimpots for the required analog headroom.

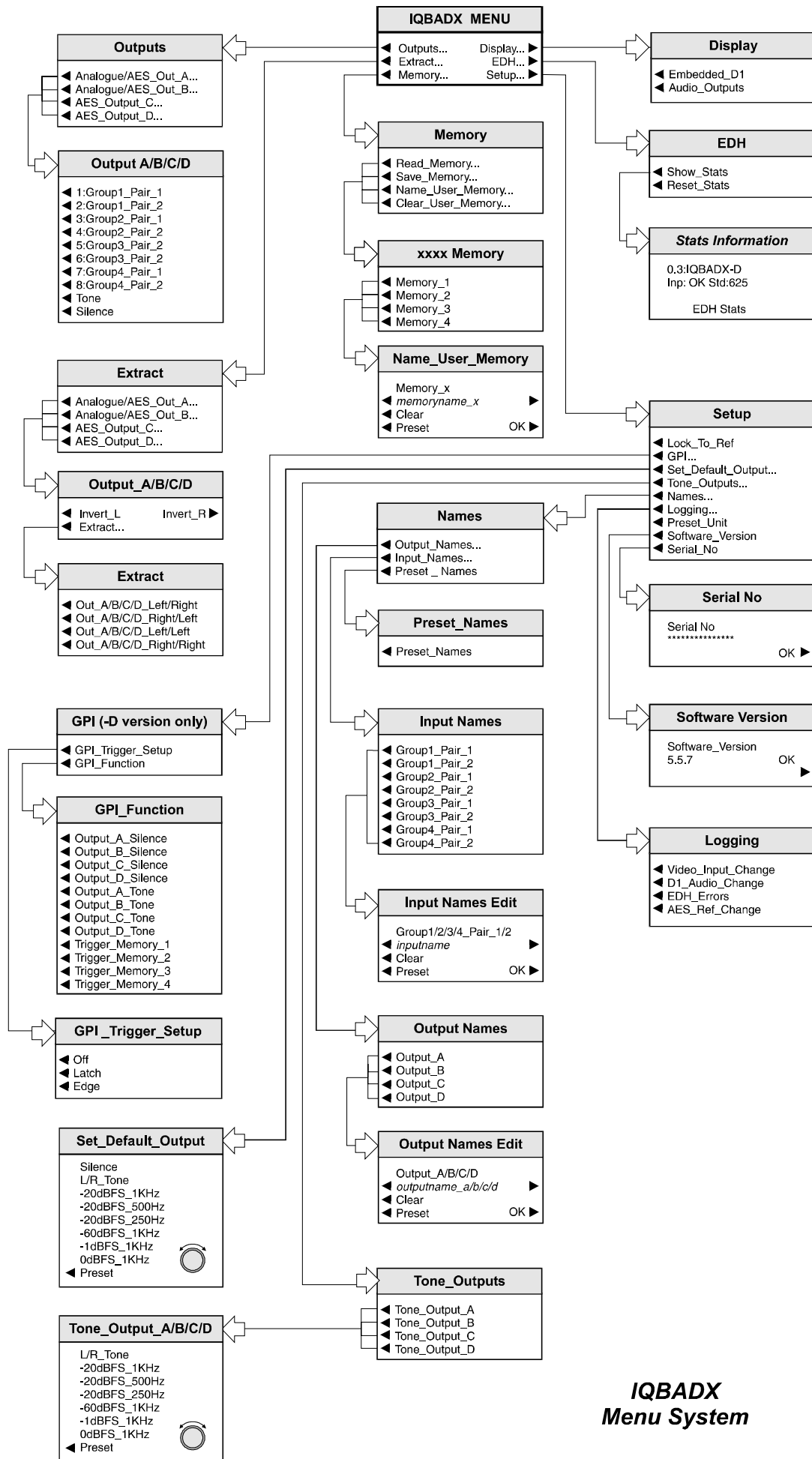
**Using an SDI feed with embedded tone:**

Connect the analog outputs to an audio level meter. Via RollCall or the card edge controls configure de-embedders 'A' and 'B' to extract the test signal. Adjust the multi-turn trimpots for the required analog level.

**Trimpot Functions**

- Output\_A Left (Analog output 1, Left) ..... RV1
- Output\_A Right (Analog output 1, Right)..... RV2
- Output\_B Left (Analog output 2, Left) ..... RV3
- Output\_B Right (Analog output 2, Right)..... RV4





***IQBADX  
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 IQBADX Menu System Opposite)

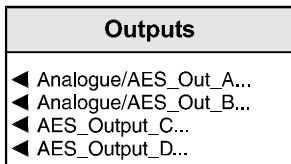
**MAIN MENU**

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

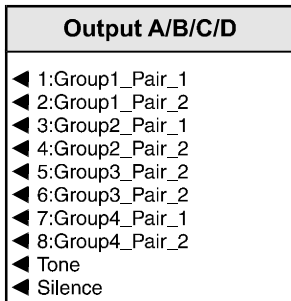
Note that where a menu item is followed by three dots (...) this indicates that a further sub-menu may be selected.

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.

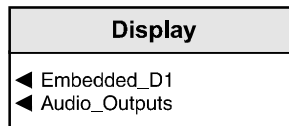
**← Outputs**



The outputs can be set to any of the eight possible embedded audio addresses, or can be fixed to an internally generated test signal (tone or silence).



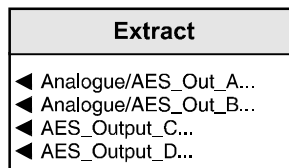
**Display ▶**



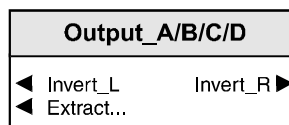
The status of the embedded data on the input D1 stream (select **Embedded\_D1**), and the extractor outputs (select **Audio\_Outputs**) may be monitored here.

The information to be displayed in the LCD window.

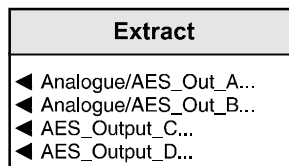
**← Extract**



An output may be selected and various processes applied to that output.

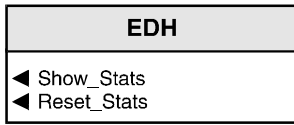


This menu allows the left and right channels to be inverted and, using the Extract function,



the output channels may be reformatted.

**EDH ▶**

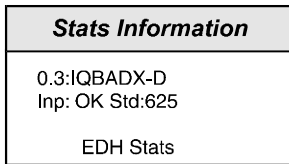


The input D1 stream is continuously monitored for EDH errors. Basic information on this can be monitored and/or reset here.

The following functions may be selected:

**◀ Show\_Stats**            The information will be displayed in the LCD window

For example:

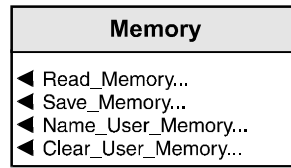


**◀ Reset\_Stats**            Data will be reset

Factory preset is to Show\_Stats.

**◀ Memory**

This function reveals a sub-menu that allows control of the user memories.



**◀ Read\_Memory**

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

**◀ Save\_Memory**

This function reveals a sub-menu which allows the settings of all items to be saved. Up to 4 different set-ups may be saved in the 8 memory locations. They can all be renamed using the Name\_User\_Memory menu item.

**◀ Name\_User\_Memory**

This selection allows renaming of memory 1 to 4 locations. To rename a memory location when operating in a particular standard, select:

◀ Name Memory to reveal the sub-menu.

Select the memory location to be renamed e.g.

◀ Memory\_1

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.

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

**◀ Clear\_User\_Memory**

This selection allows individual memory locations to be cleared and returned to their default (factory) settings.



◀ Setup

Setup
◀ Lock_To_Ref
◀ GPI...
◀ Set_Default_Output...
◀ Tone_Outputs...
◀ Names...
◀ Logging...
◀ Preset_Unit
◀ Software_Version
◀ Serial_No

◀ Lock\_To\_Ref

The AES outputs from the extractor are mutually synchronised, in that their sample frames are co-timed.

If a suitable AES reference signal is present the digital outputs can be frame-synchronised to it by activating this function.

Factory setting is enabled.

◀ GPI

The GPI connector is used for accepting GPI information (from mechanical switch contacts, relay contacts etc.) The resulting action that the unit takes may be selected from this menu.

GPI (-D version only)
◀ GPI_Trigger_Setup
◀ GPI_Function

◀ GPI-Trigger\_Setup

GPI_Trigger_Setup
◀ Off
◀ Latch
◀ Edge

The trigger input has 3 user selectable modes of operation:

◀ Off

When selected the function is not active

◀ Latch

*When the contact is closed the function is activated; when the contact is open, the function is de-activated.*

◀ Edge

(Edge-triggered) With each open-to-closed trigger the GPI function is toggled between activated and de-activated.

◀ GPI\_Function

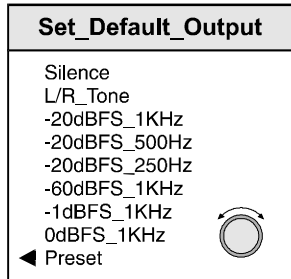
GPI_Function
◀ Output_A_Silence
◀ Output_B_Silence
◀ Output_C_Silence
◀ Output_D_Silence
◀ Output_A_Tone
◀ Output_B_Tone
◀ Output_C_Tone
◀ Output_D_Tone
◀ Trigger_Memory_1
◀ Trigger_Memory_2
◀ Trigger_Memory_3
◀ Trigger_Memory_4

The action resulting from the GPI input being activated may be programmed from this list:

- ◀ Output\_A\_Silence *(output A will be silence)*
- ◀ Output\_B\_Silence *(output B will be silence)*
- ◀ Output\_C\_Silence *(output C will be silence)*
- ◀ Output\_D\_Silence *(output D will be silence)*
- ◀ Output\_A\_Tone *(output A/B/C/D will be a tone as selected from the Tone\_Outputs menu)*
- ◀ Output\_B\_Tone
- ◀ Output\_C\_Tone
- ◀ Output\_D\_Tone
- ◀ Trigger\_Memory\_1 *(settings stored in the memory location will be activated)*
- ◀ Trigger\_Memory\_2
- ◀ Trigger\_Memory\_3
- ◀ Trigger\_Memory\_4

◀ **Set\_Default\_Output**

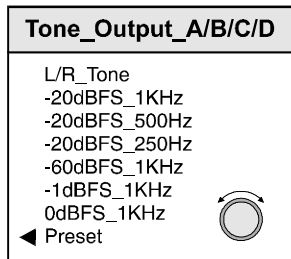
The outputs are always active. In the event of an extraction failure (due to there being no data at the targeted address) an internally generated signal may be selected as the output for both Output A or Output B.



Selections are as follows:

- ◀ Silence
- ◀ L/R\_Tone (Left = -20 dBFS at 1 kHz  
Right = -20 dBFS at 500 Hz+2 kHz mixed)
- ◀ -20dBFS\_L/R\_Tone
- ◀ -20dBFS\_1KHz
- ◀ -20dBFS\_500Hz
- ◀ -20dBFS\_250Hz
- ◀ -60dBFS\_1KHz
- ◀ -1dBFS\_1KHz
- ◀ 0dBFS\_1KHz Preset setting is to silence.

◀ **Tone\_Output**

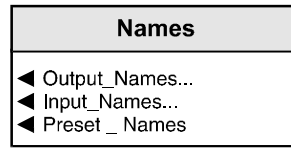


An internally generated tone signal may be selected as the output for Output A, B, C or D.

- ◀ L/R\_Tone (Left = -20 dBFS at 1 kHz  
Right = -20 dBFS at 500 Hz+2 kHz mixed)
- ◀ -20dBFS\_1KHz
- ◀ -20dBFS\_500Hz
- ◀ -20dBFS\_250Hz
- ◀ -60dBFS\_1KHz
- ◀ -1dBFS\_1KHz
- ◀ 0dBFS\_1KHz

Preset setting is L/R\_Tone.

◀ **Names**



Default names are given to the outputs and the possible embedded inputs which are little more than relative descriptions. These names may be edited to provide more meaningful information related to the equipment installation.

To edit a name select either

◀ **Output\_Names**

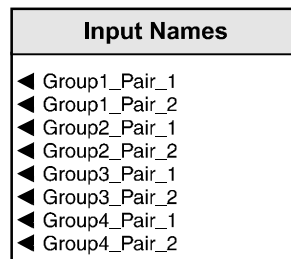
or

◀ **Input\_Names**

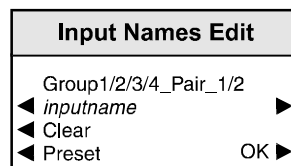
or

◀ **Preset\_Names** (returns to default names)

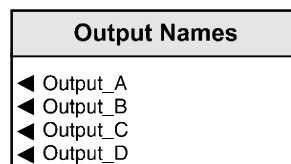
Selecting **Input Names** will reveal a menu that allows an input location to be selected i.e.



Select the desired location (this will reveal an editing window) and edit the name using the spinwheel/push buttons. (Use same method as for naming the memory names)



Selecting **Output Names** will reveal a menu that allows an output location to be selected i.e.



Select the desired output (this will reveal an editing window) and edit the name using the spinwheel/push buttons. (Use same method as for naming the memory names)

**◀ 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 logging sub-menu allows the following information to be made available for logging:

Logging
◀ Video_Input_Change
◀ D1_Audio_Change
◀ EDH_Errors
◀ AES_Ref_Change

Factory preset is nothing enabled.

**◀ 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.*

**◀ 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\_Number**

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

## Extractor Operation

The SMPTE 272M standard specification allows for up to four groups of digital audio to be embedded in a component D1 digital video stream.

Each group consists of two stereo pairs (four channels), giving a total of sixteen audio channels for all four groups.

A single IQBADX module is capable of extracting four stereo pairs, or eight channels, so two IQBADX cards are required to extract all sixteen possible channels.

The embedded AES audio data must be sampled at 48 KHz, clock synchronous to the video stream. Asynchronous operation is not supported.

The IQBADX module contains four independent extractors, each one assignable to any of the possible embedded audio pairs. If any of the extractors are set to the same address they all will output that extracted pair. Additionally, any output can provide an AES test tone (1 KHz, -20 dB) or 'digital silence'.

A total of exactly 1920 audio samples occur within one frame of 625-line video. For 525-line video the relationship is 8008 audio samples over five video frames.

The audio data is usually distributed evenly throughout each video frame, situated in the non-active picture regions between the end of one line and the start of the next. The majority of lines contain three audio samples, some four, and certain reserved lines may contain no samples. Other sample counts are also possible.

These differences in sample count between lines mean that some FIFO buffering is required to supply output audio samples during lines containing no samples, and to absorb the excess from lines with several.

An audio extractor should be able to process ancillary packets where ever and whenever they appear. However, there are usually practical and operational limitations such as the finite length of the extractor FIFO buffer, and the length of the audio delay introduced by the buffering process.

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### IQBADX FIFO Buffer Length :

A FIFO buffer requires that before any samples are read out a minimum number must be written in. This number determines the latency (delay) and implies limitations on the embedded sample distribution. So-called 'smart buffers' make assumptions about the distribution of audio samples within the video frame and so can utilise smaller FIFOs. The 24-bit sample distribution given in SMPTE-272M for example requires a 'smart buffer' length of 57 samples with a read-write offset of 17 samples. A simple buffer however needs to be 80 samples long with 40 samples offset. In both cases the buffers can handle a maximum change in usage of 40 samples but the 'smart' buffer knows when this happens and so can use less memory and have a lower latency.

For any known sample distribution the required buffer capacity can be calculated. The simple buffer needs to be twice this in length

SMPTE-272M, 24-bit example	40 samples
Panasonic D5 VTR, 625 lines	6 samples
Sony Digital Betacam, DVW-500P	5 samples
S&W IQBAI / BAIR inserter modules	14 samples
Tektronix TSG-422	7 samples
S&W MDD-3000 digital decoder	7 samples

**Manual Revision Record**

Date	Version No.	Issue No.	Change	Comments
180100	1	1		First Issue
161000	1	2	O/P controls added, channel topair	New manual issued
280302	1	3	Now includes information for the 3A enclosure module	New manual issued
010403	1	4	Power consumption added to techspec	New manual issued
050804	1	5	No Lock data corrected	New manual issued