

IQBAAX Extractor 4:2:2 to Analog Audio



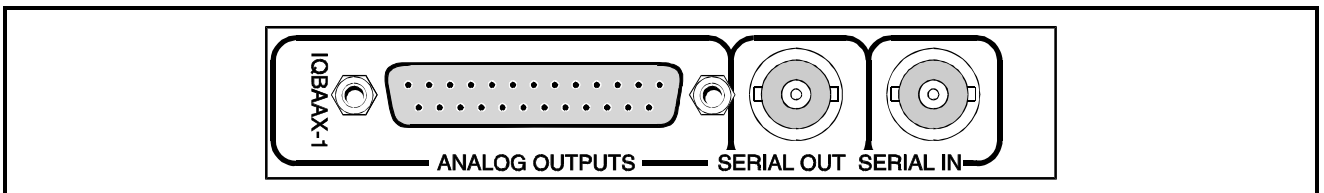
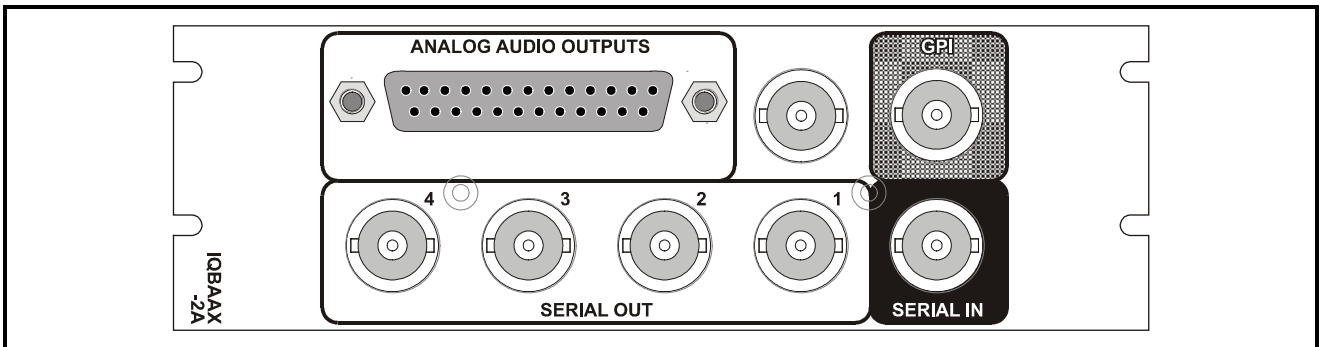
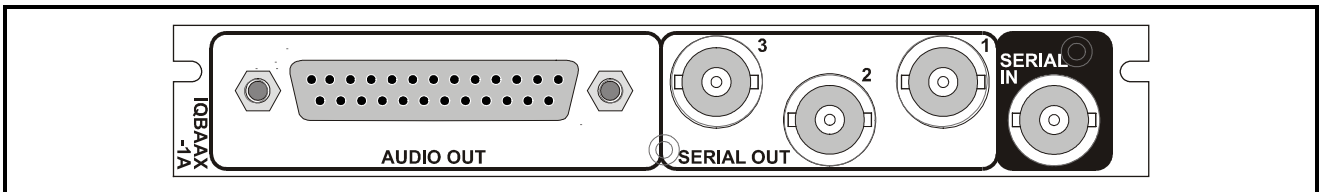
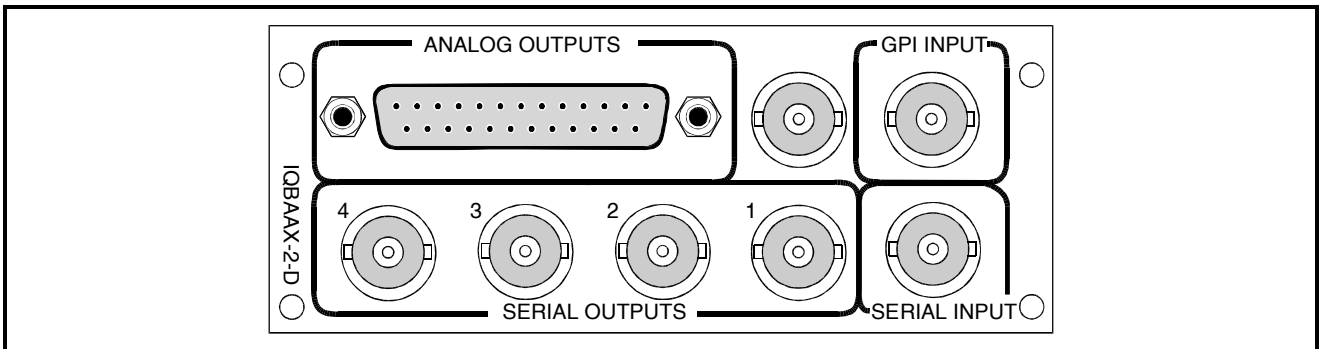
Module Description

The IQBAAX extracts two audio pairs from SDI (270 MBit) video to analog audio. 20-bit digital-to-analog conversion ensures the highest audio signal quality. A crystal locked PLL minimizes clock jitter. The audio output is adjustable between +12 and +24 dBu for 0 dBFS input. Extraction may be from any group and pair for each channel-pair. Extraction is fully compliant with SMPTE 291M and SMPTE 272M-A for synchronous audio at 48 kHz.

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

The SDI input is equalized to >200 m of cable. Full EDH monitoring is included. All audio connections are via a 25 way D connector

REAR PANEL VIEWS



Versions of the module cards available are:

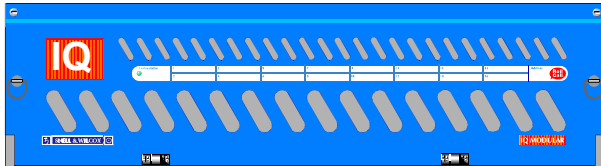
IQBAAX-2-0	Double width module
IQBAAX-1A	Single width module
IQBAAX-2A	Double width module

Note that this product will not be available after February 2005. Please contact your local Snell & Wilcox dealer or visit their web site at www.snellwilcox.com for details of alternatives.

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

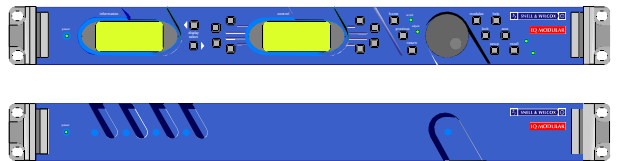
Rear panels **with** the suffix A may only be fitted into the 'A' style enclosure shown below.



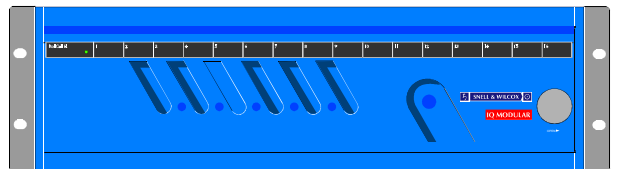
(Enclosure order codes IQH3A-E-O, IQH3A-E-P, IQH3A-N-O, IQH3A-N-P)

'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)

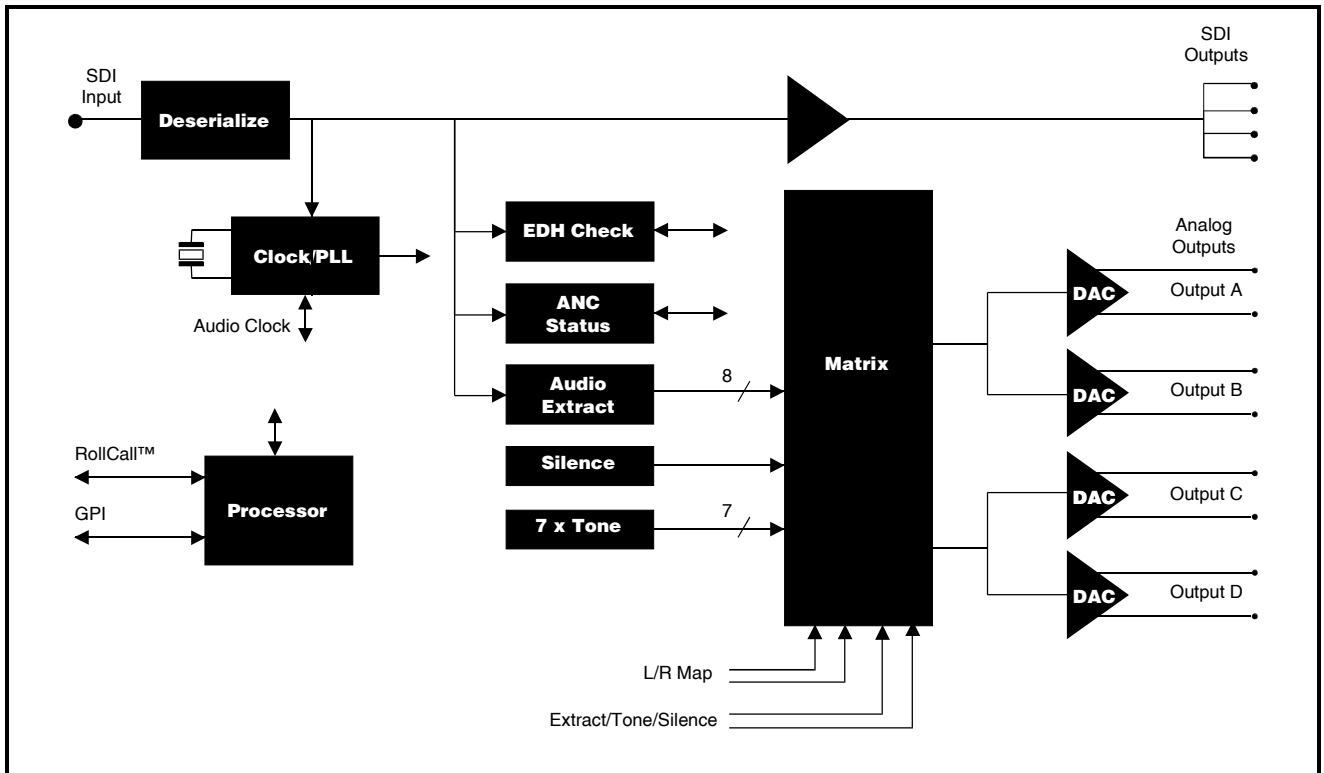


(Enclosure order codes IQH3N-O, IQH3N-P)



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

BLOCK DIAGRAM



Features

- Demultiplexes two audio pairs from serial 4:2:2 video
- Audio extraction group and pair selectable
- Channel 1 to 2 (left/right) mapping
- 20-bit digital-to-analog conversion
- -95 dB THD + N
- 105 dB dynamic range
- Automatic 525 and 625 line operation
- Crystal PLL for low jitter
- Analog output level manually adjustable +12 to +24 dBu
- Embedded audio presence indication
- Tone or silence output
- 7 precise internal tones
- EDH monitoring
- RollCall™ control

TECHNICAL PROFILE

Features

Signal Inputs

Digital Video 1 Serial Digital
 GPI 1 General Purpose Control
 Standards SMPTE 259M-C-1997, SMPTE 272M-A-1994

Signal Outputs

Analog Audio 4 Channels (2 Stereo Pairs)
 Digital Video 4 Reclocked SDI
 Standards SMPTE 259M-C-1997, SMPTE 272M-A-1994

Card Edge Controls (also available via RollCall)

Output Audio Assign Assign to pair, test tone or silence
 Local/Remote Control Select
 Local operation or via RollCall™
 remote control
 EDH Reset..... Clear EDH error history

Specifications

Serial Input Return Loss..... Better than 15 dB to 270 MHz
 Receive length >200 m
 Analog Audio Outputs Level Manually Adjustable +12 dBu
 to +24 dBu
 Output Impedance 45 to 55 ohms
 THD+N -95 dB typical at 1 kHz
 Dynamic Range 105 dB
 Conversion 20-bit

Select Tone/Silence Output Tone or Silence on
 Extraction Fail

Indicators

EDH Error History Presence/Minute/Hour
 No D1..... Loss of SDI D1 Input
 ANC Error Checksum Errors in Embedded
 Ancillary Data
 Extractor Status Operational Status of Extractors

Functions Available via RollCall™ Only

Audio Data Channels Present Reporting
 Report Presence
 Map Channels 1/2 Map 1/2 of selected Pair
 Tone selection..... 7 Internally Generated + Silence
 EDH Error History Errors & time since last reset.
 Line Standard Reporting Report 525 or 625
 Naming Naming of each audio channel
 (for User reference only)

Sampling 48 kHz Synchronous to D1 video
 stream

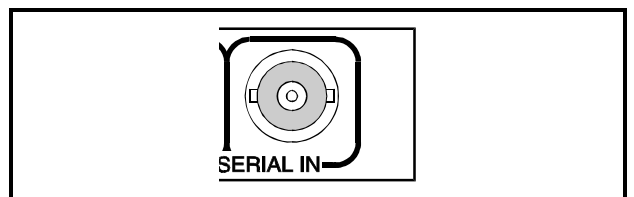
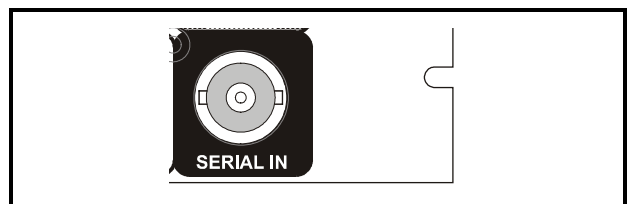
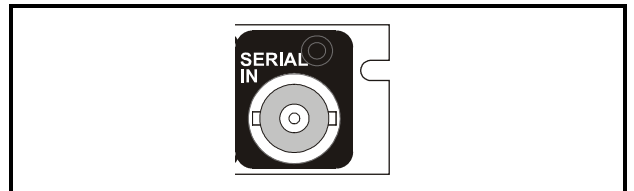
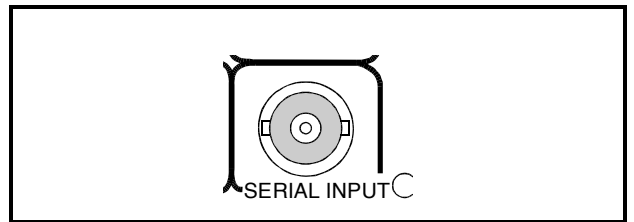
Power Consumption

Module Power Consumption
 11.5 W max at 600 ohms
 8.5 W max at >200K ohms

INPUTS

Serial Digital Video Input

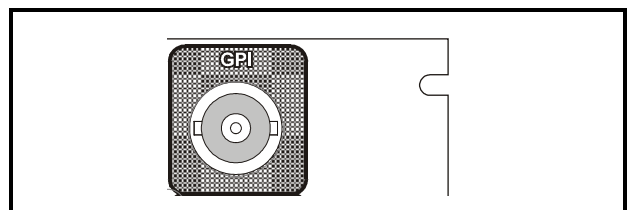
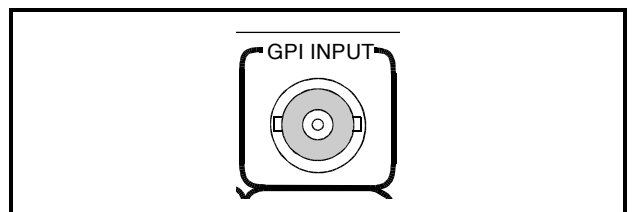
The serial digital input to the unit is made via this BNC connector which terminates in 75 Ohms.



GPI

This input will accept an external signal such as a contact closure and will activate a function selected via the RollCall remote control system.

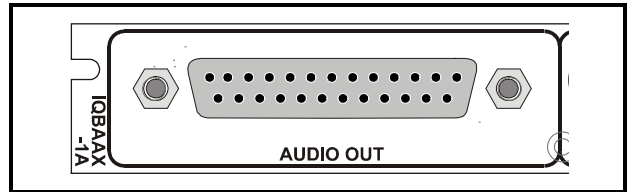
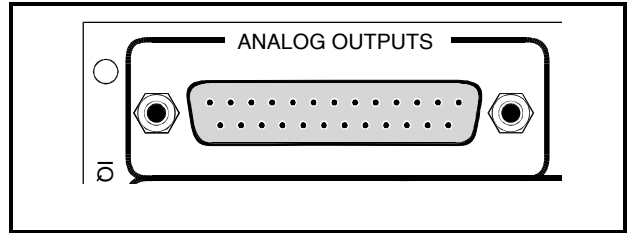
When enabled the interface will respond to a closed contact event from the BNC GPI input and enable the item selected from the **GPI/GPI_Function** menu item.



OUTPUTS

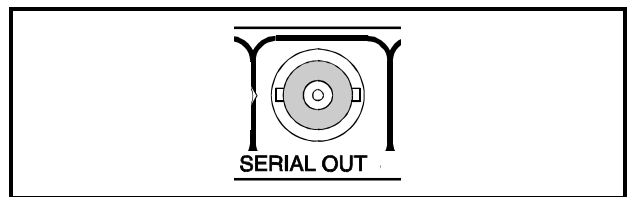
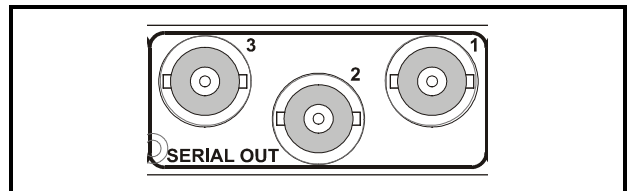
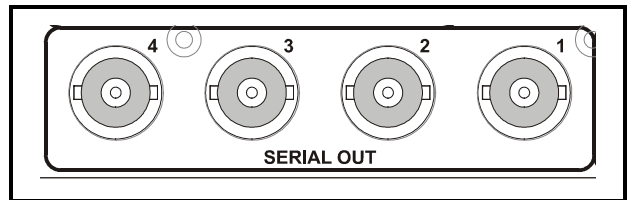
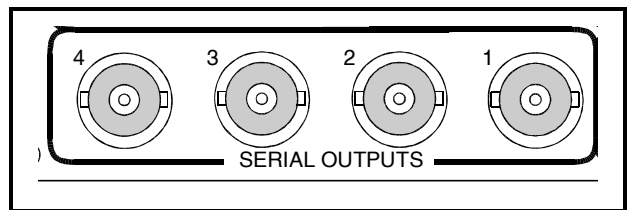
Analog audio output connections are made via this 25 way female D-type connector. There are 4 output channels (2 Stereo Pairs).

For connection data consult the table on page 5.



Serial Digital Video

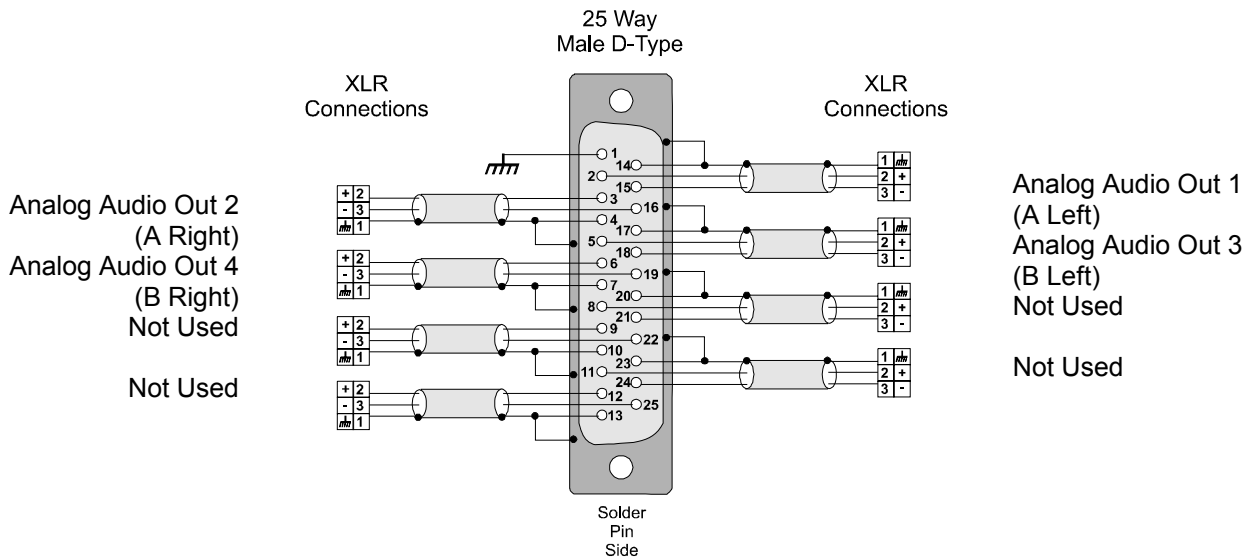
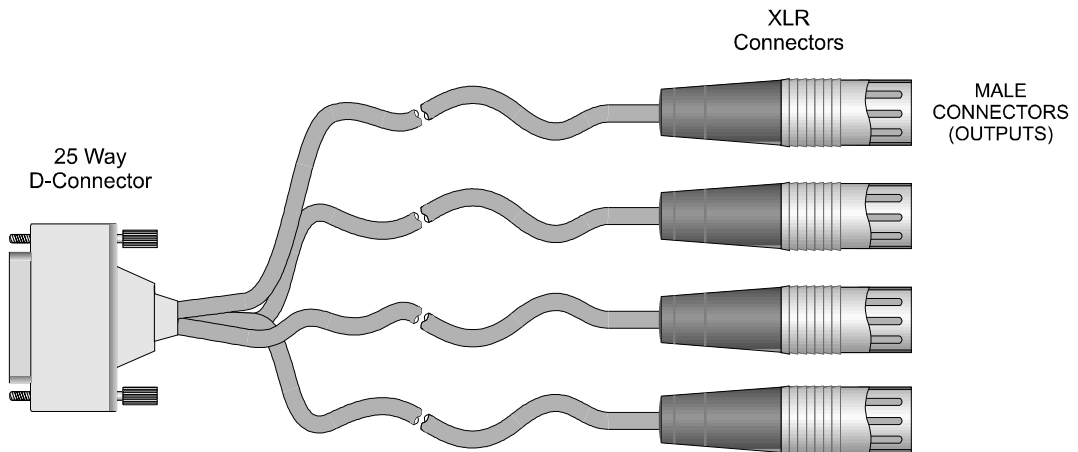
These are the four (-2 versions), 3 (-1A version) or 1 (-1 version) isolated Serial Digital outputs of the unit via BNC connectors for 75 Ohms.



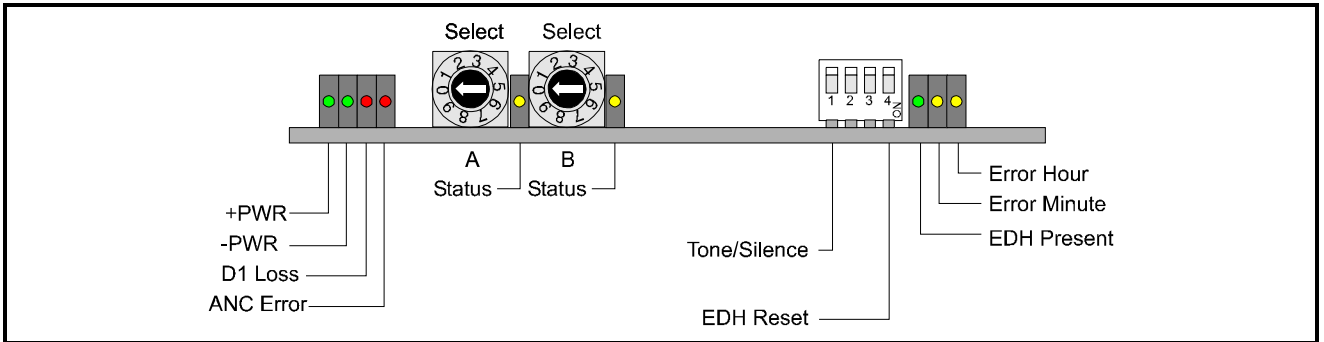
Connection Details

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

Connection Details to XLR Connectors

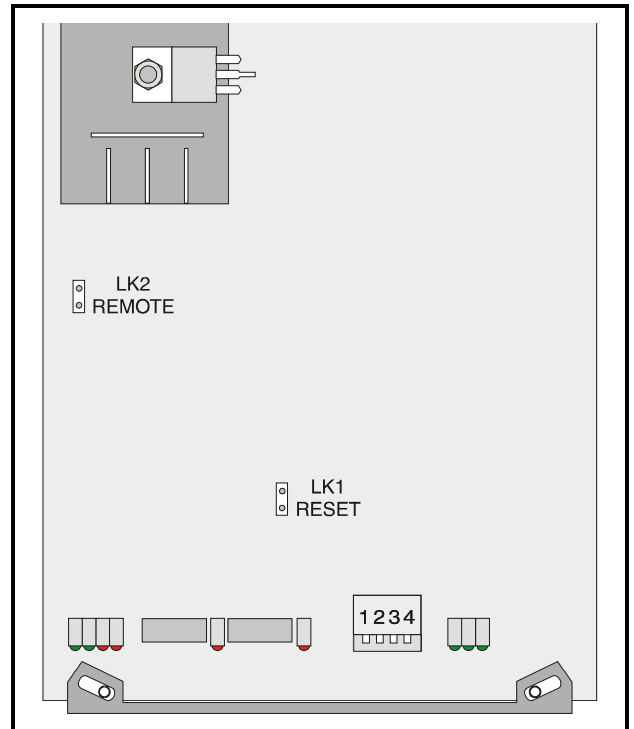


CARD EDGE CONTROLS



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 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

Power

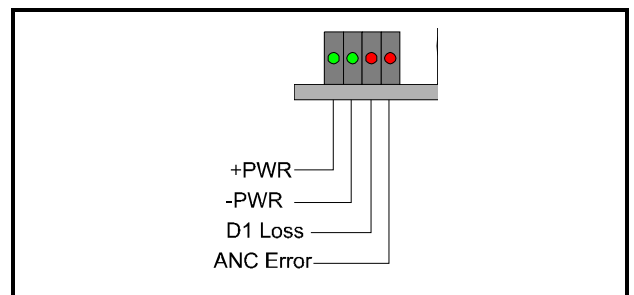
These two PWR indicators are illuminated when the positive and negative supplies are present.

D1 Loss

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

ANC ERROR

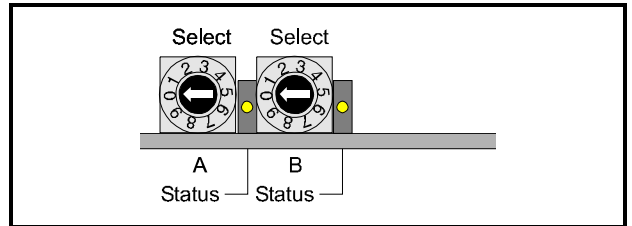
This LED will become illuminated for a short interval each time a checksum error is detected in the embedded ancillary data packets.



STATUS LED's

These LED's will

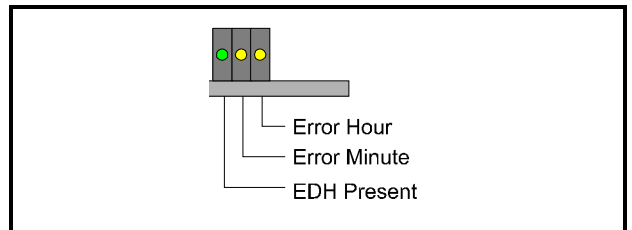
1. **Become illuminated** when Tone/Silence is selected
2. **Flash** if extraction has failed (output tone/silence)
3. **Will not be illuminated** if extraction is successful



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.

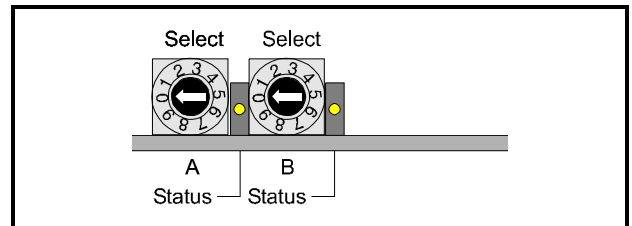
These LED's will remain OFF if no errors have occurred within their time period, or if the incoming D1 video does not contain EDH data.

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

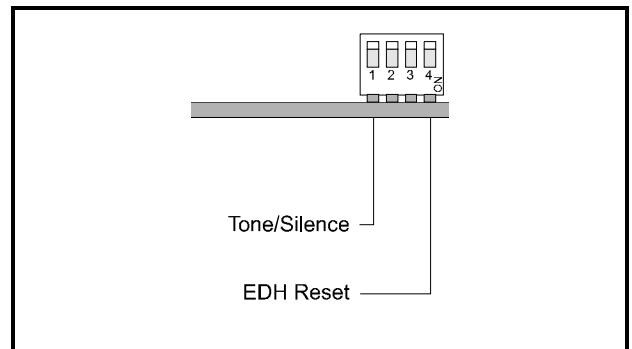


4-WAY DIP SWITCH

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

TONE / SILENCE

Selects tone (down) or silence (up) This will become the output if an extraction is unsuccessful.



EDH RESET

When enabled this will clear EDH error history.

SMPTE 272M SUPPORT

The cards conform to SMPTE 272M-AJ

- 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

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:

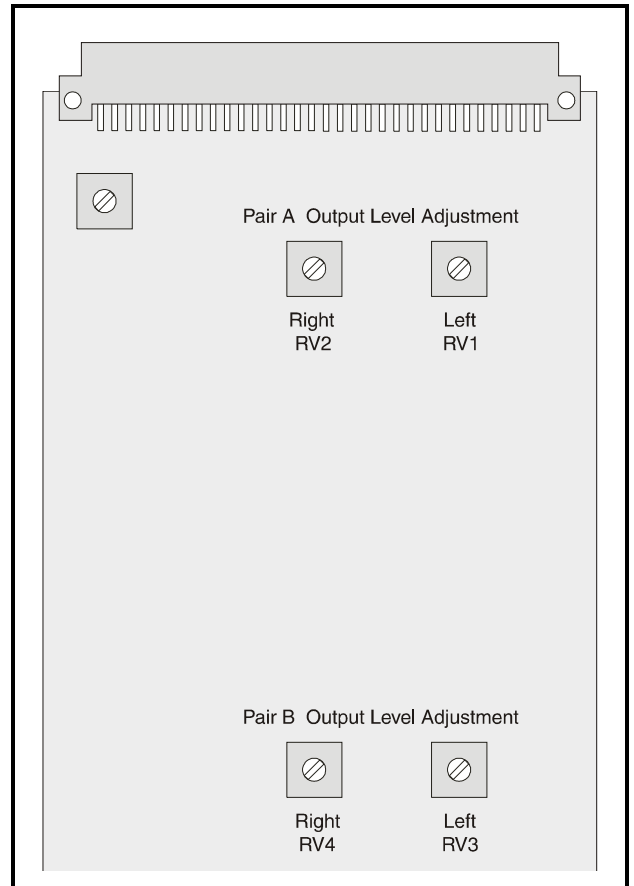
Connect the analog outputs to an audio level meter. Via RollCall, set outputs 'A' and 'B' to '0dBFS_1kHz'. Adjust the multi-turn trimpots for the required analog headroom.

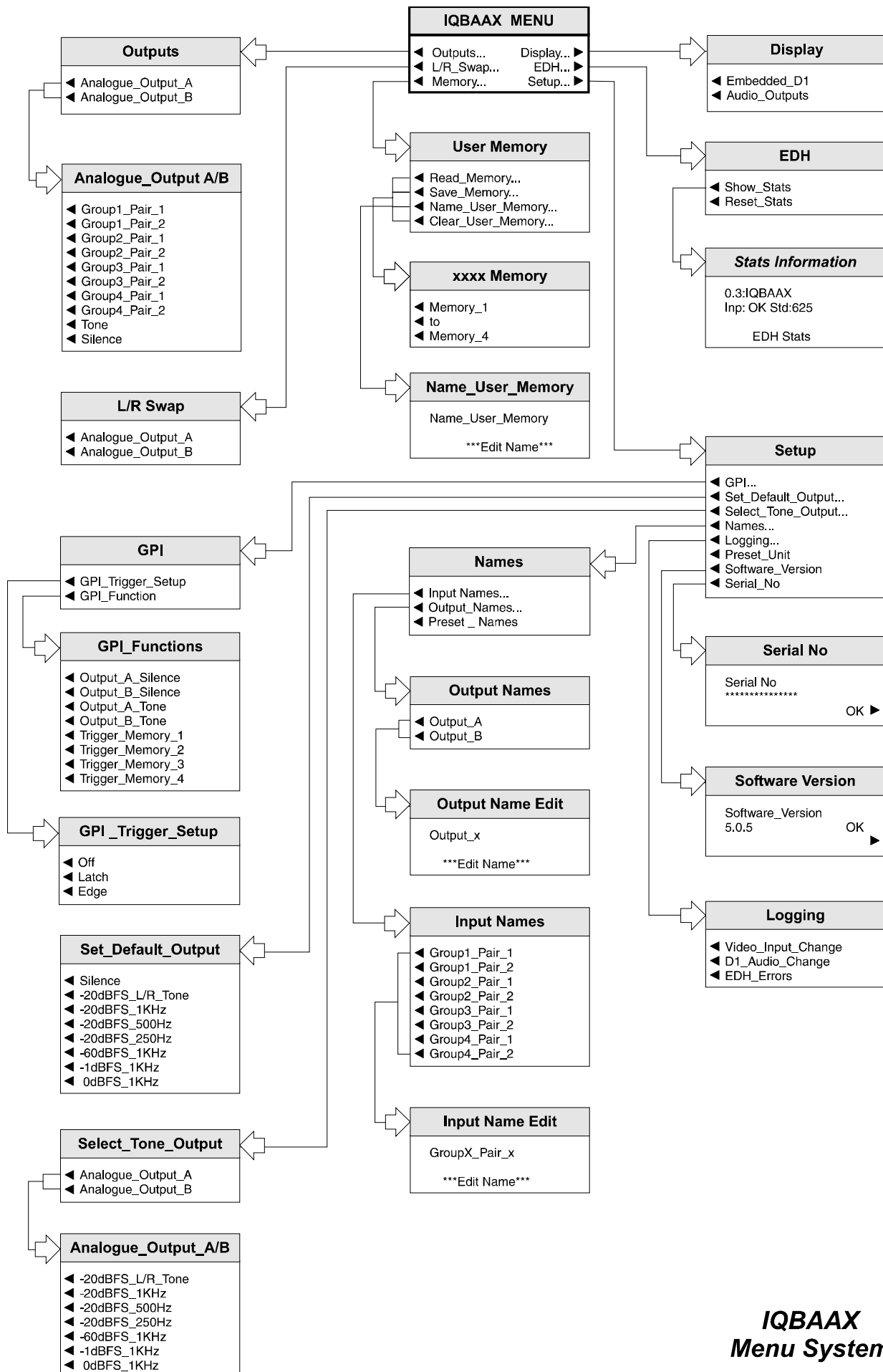
Using an SDI feed with embedded tone:

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





***IQBAAX
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.

◀ Outputs

The digital outputs are independently controlled. They 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).

This menu allows either the Analogue_Output_A or Analogue_Output_B to be selected.

The assign item may then be selected which allows the output to be assigned to a group (1 or 2) and pair 1, 2 or tone/silence.

The factory setting for the outputs are:

"Analogue_Output_A" Group 1 channel-pair 1
"Analogue_Output_B" Group 1 channel-pair 2

and the factory default names are:

Group 1, channels 1 & 2:	"Group1_Pair1
Group 1, channels 3 & 4:	"Group1_Pair2
Group 2, channels 1 & 2:	"Group2_Pair1
Group 2, channels 3 & 4:	"Group2_Pair2"
Group 3, channels 1 & 2:	"Group3_Pair1
Group 3, channels 3 & 4:	"Group3_Pair2"
Group 4, channels 1 & 2:	"Group4_Pair1
Group 4, channels 3 & 4:	"Group4_Pair2

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 menu allows this information to be displayed in the LCD window.

◀ L/R_Swap

Each analogue output consists of two channels. These may be positionally swapped for both **Analogue_Output_A** and **Analogue_Output_B** independently.

◀ 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
Reset_Stats	Data will be reset

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

◀ 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-Trigger_Setup

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

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

- ◀ Output_A_Silence *(output will be silence)*
- ◀ Output_B_Silence *(output will be silence)*

- ◀ Output_A_Tone
- ◀ Output_B_Tone *(output A/B will be a tone as selected from the Select_Tone_Output menu)*

- ◀ 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
- ◀ -20dBFS_L/R_Tone
- ◀ -20dBFS_1KHz
- ◀ -20dBFS_500Hz
- ◀ -20dBFS_250Hz
- ◀ -60dBFS_1KHz
- ◀ -1dBFS_1KHz
- ◀ 0dBFS_1KHz

Factory setting is silence.

◀ Select_Tone_Output

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

- ◀ -20dBFS_L/R_Tone
- ◀ -20dBFS_1KHz
- ◀ -20dBFS_500Hz
- ◀ -20dBFS_250Hz
- ◀ -60dBFS_1KHz
- ◀ -1dBFS_1KHz
- ◀ 0dBFS_1KHz

Factory setting is -20dBFS_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

◀ Input_Names

or

◀ Output_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.

- ◀ Group1_Pair_1
- ◀ Group1_Pair_2
- ◀ Group2_Pair_1
- ◀ Group2_Pair_2
- ◀ Group3_Pair_1
- ◀ Group3_Pair_2
- ◀ Group4_Pair_1
- ◀ Group4_Pair_2

Select the desired location (this will reveal an editing window) and edit the name using the spinwheel/push buttons.

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

- ◀ Output_A
- or
- ◀ Output_B

Select the desired output (this will reveal an editing window) and edit the name using the spinwheel/push buttons.

◀ 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:

Video_Input_Change
D1_Audio_Change
EDH_Errors

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 IQBAAX module is capable of extracting one group of audio data (two stereo pairs, or four channels) so four IQBAAX 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 IQBAAX module contains two independent extractors, each one assignable to any of the 8 possible embedded audio pairs. If both extractors are set to the same address they both will output that extracted pair. Additionally, any output can provide a test tone (e.g. 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.

The circular buffer in the IQBAAX has a 48-sample latency (1 ms) and can accommodate a wide range of sample distributions.

