

# IQBMX3 Digital Audio 3 x 1 Router

## Module Description

The IQBMX3 accepts three synchronous AES/EBU stereo inputs. 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 IQBMX3 automatically corrects framing errors of up to one sample with respect to any of the inputs available. The output can be configured to output any of the three inputs and can be switched on the audio frame or by fading X and V pattern cross-fading. An additional operating mode enables automatic priority input selection so in the event of signal loss on input A, input B will be selected; with loss on A and B the unit will select input C.

Versions are available with either balanced (D type connector) or unbalanced (BNC) audio connections.

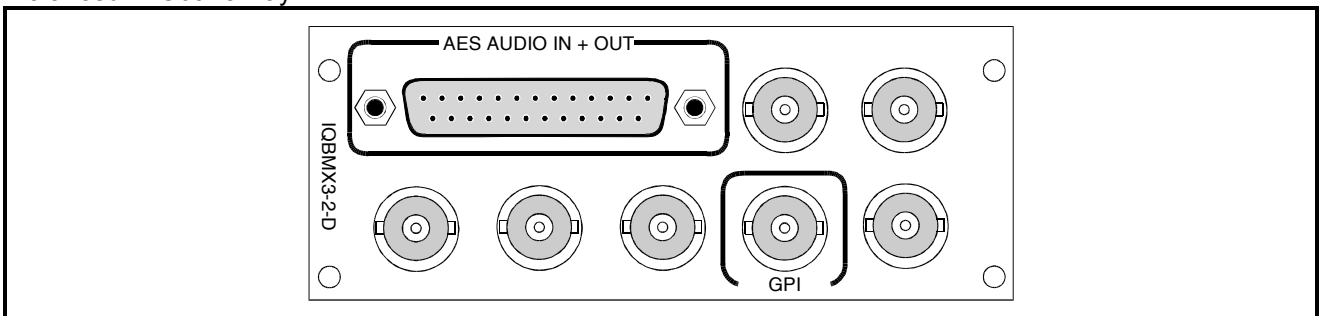
The AES/EBU inputs are capable of receiving digital audio from either, up to 150 m of AES approved quality cable for balanced inputs or up to 500 m of RG59B or equivalent cable for unbalanced inputs. Other features include a peak programme meter, channel status monitoring editing and low level detection.

A GPI port is included, and is RollCall controlled only. The GPI port will enable the user to change the output assignment with a closed contact (level or pulse) trigger. A 10 kΩ linear slider pot can also be connected to the GPI port to enable the user to have control of the fade.

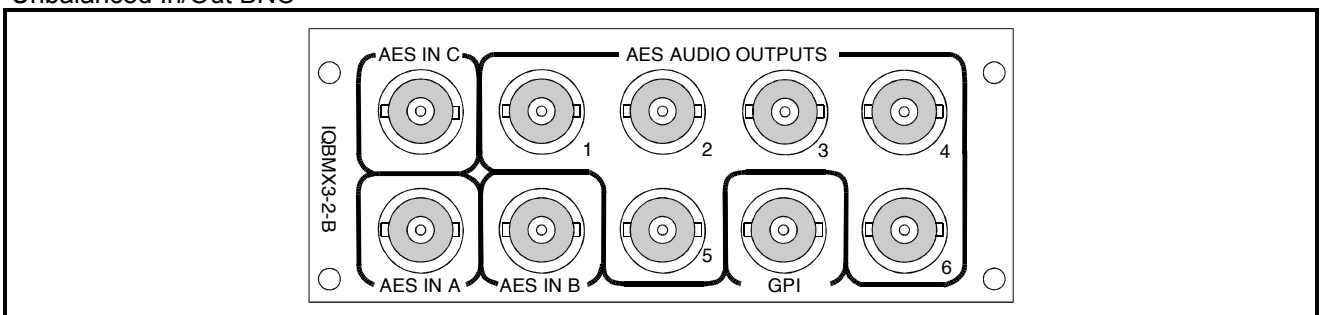
RollCall provides full remote control and monitoring.

## REAR PANEL VIEWS

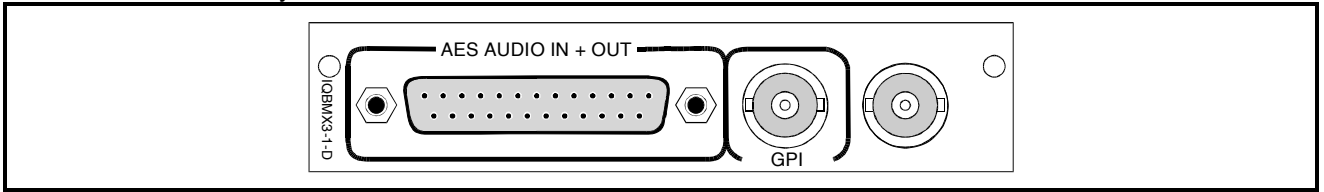
### Balanced In/Out 25 way D



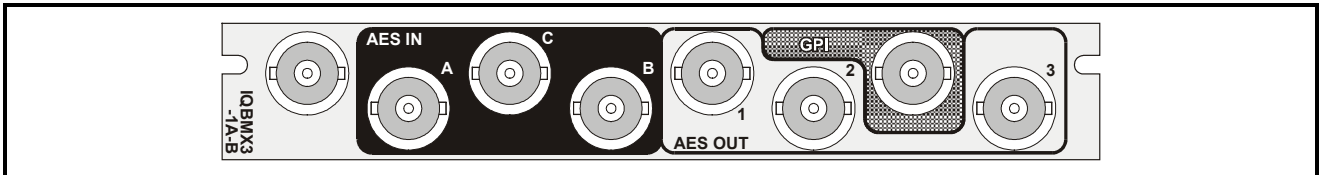
### Unbalanced In/Out BNC



Balanced In/Out 25 way D



Unbalanced In/Out BNC



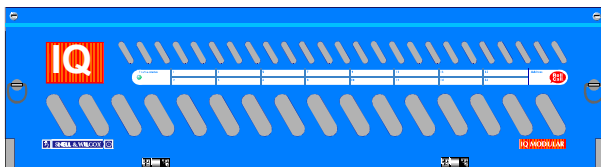
Versions of the module cards available are:

IQBMX3-2-D	I/O connections via 25 way 'D' connector	Double width module
IQBMX3-2-B	I/O connections via BNC connectors	Double width module
IQBMX3-1-D	I/O connections via 25 way 'D' connector	Single width module
IQBMX3-1A-B	I/O connections via 25 way 'D' connector	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

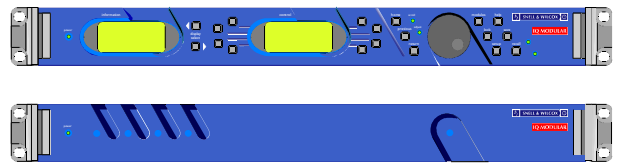
Rear panels **with** the suffix A may only be fitted into the 'A' style enclosure shown below.



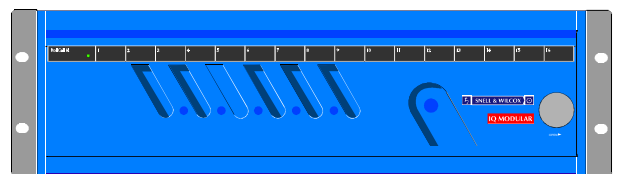
(Enclosure order codes IQH3A-E-O, IQH3A-E-P, IQH3A-N-O, IQH3A-N-P)

'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)

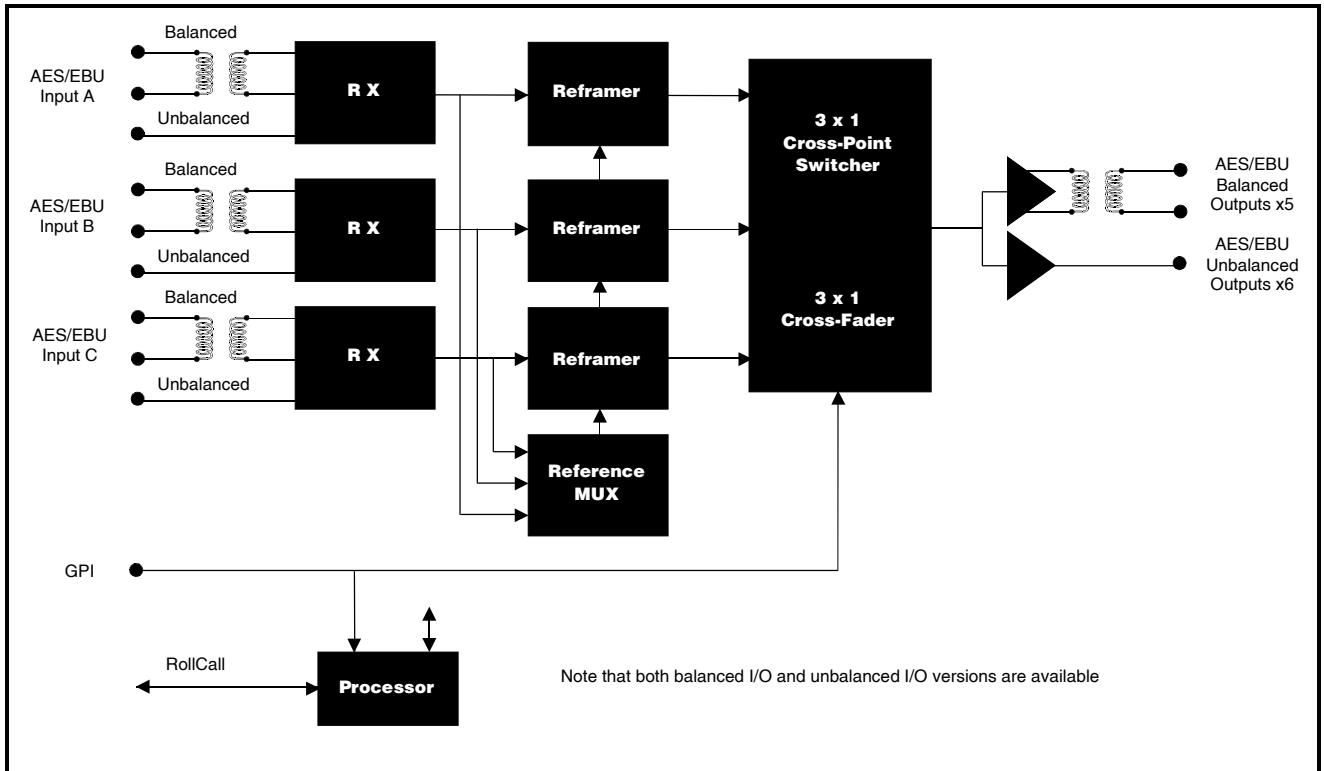


(Enclosure order codes IQH3N-O, IQH3N-P)



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

## BLOCK DIAGRAM



## Features

- 3x1 Router with switching on audio frame or with fading (X or V-fading user selectable)
- Framing error correction of up to one sample
- Automatic 32, 44.1 and 48 kHz operation
- Peak Programme Meter with adjustable 0 dBu reference
- GPI Interface for closed contact function activation or analogue linear pot for fader control (RollCall user selectable only)
- Low Level Indicator (below -66 dbFS)
- Channel Status monitoring for AES receivers and transmitters
- Channel Status editor for Destination and Origin, can be inserted or be transparent
- 3 Transformer coupled balanced Inputs
- Optional Transformerless unbalanced Inputs
- 5 Transformer coupled balanced outputs
- Optional 6 Transformerless unbalanced outputs
- Can receive digital audio from up to 150m of AES cable (balanced inputs) or up to 500m of RG59B coax cable or equivalent (unbalanced inputs)
- Four memory locations for storage and recall of selected parameters
- RollCall remote control and reporting

## TECHNICAL PROFILE

**Features****Signal Inputs**

Digital Audio Input (Balanced –D versions)	3 Channel Pairs AES/EBU via 25 way D Connector
Digital Audio Input (Unbalanced –B versions)	3 Channel Pairs AES/EBU via BNC Connectors
GPI control input	Activation via Pulse, level, closed contact function, triggered or from 10 k linear variable resistor giving analog control. RollCall Enabled

**Signal Outputs**

Digital Audio (Balanced –D versions)	5 per channel pair AES/EBU via 25 way D Connector
Digital Audio (Unbalanced –B versions)	6 per channel pair AES/EBU via BNC Connectors

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

Configure Output	From any of the 3 inputs or output digital silence
Fade Type	X-Fade or V-Fade
Fading period	0 to 3 seconds in 0.2 second steps
Switching Select	Switch on Audio Sample Frame or Cross-Fade
Re-Framer Reference Select	Digital Audio Input A, B or C

**LED Indicators**

Peak Level	Operates when Input A, B or C peaks at 0 dBFS
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**Specifications**

Input Impedance	Balanced 110 Ohm Unbalanced 75 Ohm
Sampling Frequency	Same as input
Cable Length	Balanced, > 150 m of AES3 Cable Unbalanced, up to 500 m of RG59 or Equivalent
Output Impedance	Balanced 110 Ohm Unbalanced 75 Ohm
Output Signal level	Balanced 3 V pk to pk typical Unbalanced 1 V ±0.1 V pk to pk

**Performance**

Insertion Delay	3 samples plus up to 1 sample, depending on re-framer reference
Framing errors	Up to one sample corrected
THD+N	< -117 dB @ 700 Hz (24 bits)
Fader Law	X – Fade = Linear V – Fade = Audio log taper

Low Level	Operates when Input A, B or C falls below 66 dBFS
Sync Loss	Operates when the re-framing reference is lost
Error on Inputs A, B and C	Operates when there is an error on the AES inputs
Power OK	+5 V and –5 V
Functions Available via RollCall™ Only	
Input sample rate detect	Automatic 32, 44.1, 48 kHz detection
GPI Port Control	Enable GPI control, and GPI signal type selectable from: - High or low level trigger Negative or positive pulse trigger Analog linear slider pot for controlled fading GPI function selectable from: - Fade between Input A and Input B -> Output Fade between Input B and Input C -> Output Fade between Input C and Input A -> Output
Channel Status Monitor	Displays Channel Status information for both receiver and transmitter
Channel Status Editor	Origin and Destination editor, can be inserted or be transparent
Peak Programme Meter	Scale of 0 - 7, in 4 dB steps, adjustable 0 dBu reference (‘4’) –10 dBFS to –24 dBFS.

Fader cut-off level	-48 dBFS
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**Power Consumption**

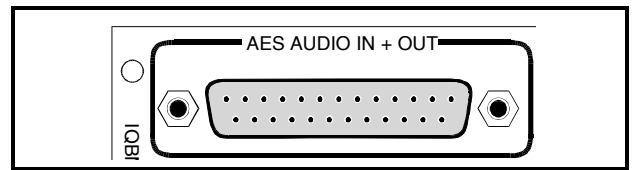
Module Power Consumption	
-B versions	5.24 W max
-D versions	3.12 W max

INPUTS AND OUTPUTS

(-D versions)

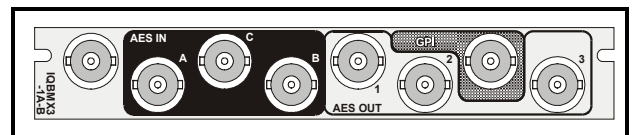
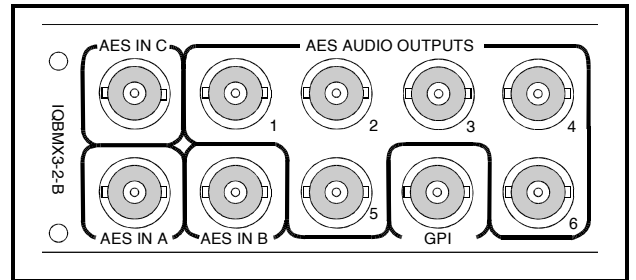
All AES input and output connections are made via this 25 way female D-type connector.

For connection data consult the tables on page 5.



(-B versions)

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



**GPI Input**

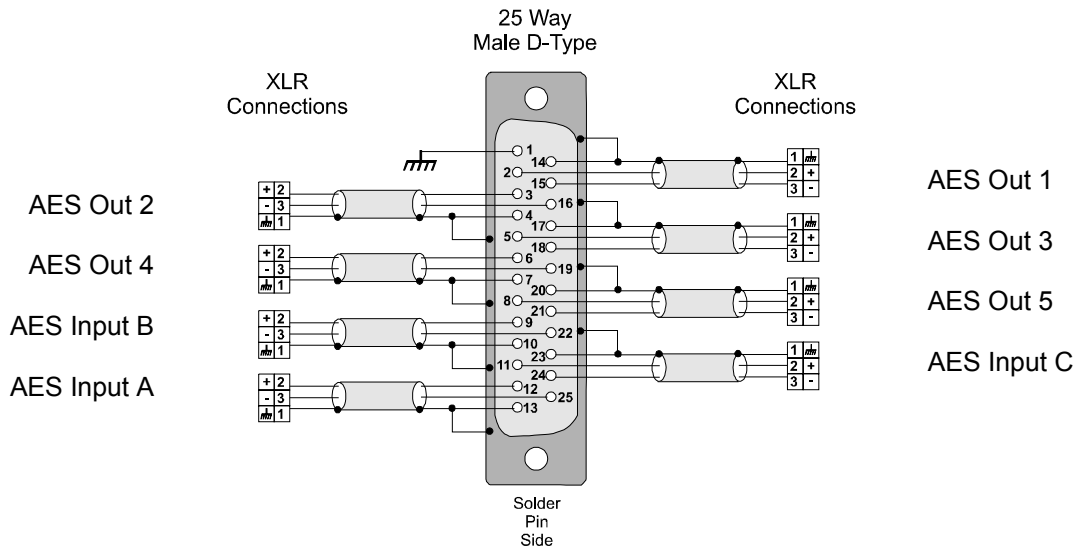
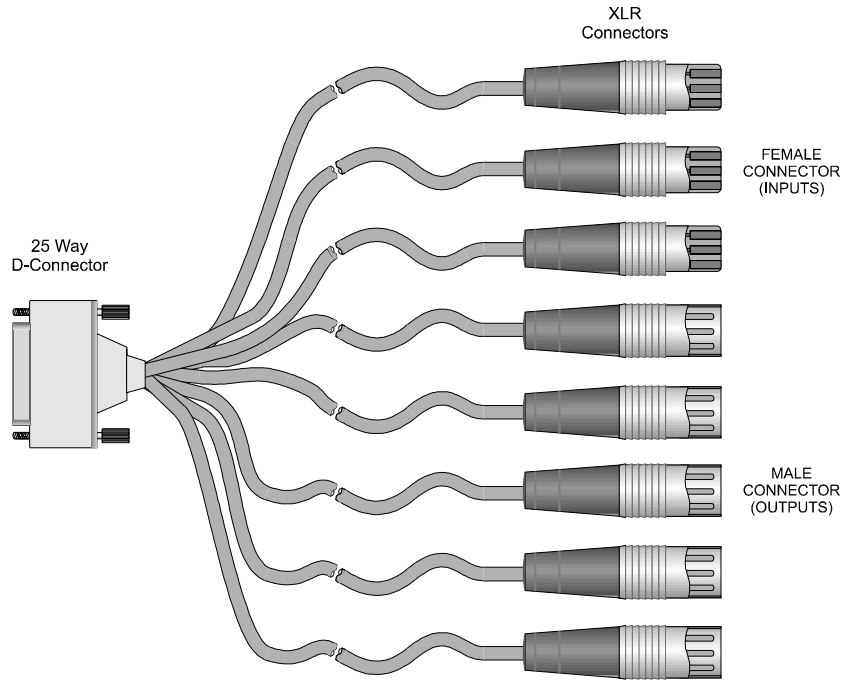
This BNC connector accepts control signal inputs from various devices to enable fade commands.



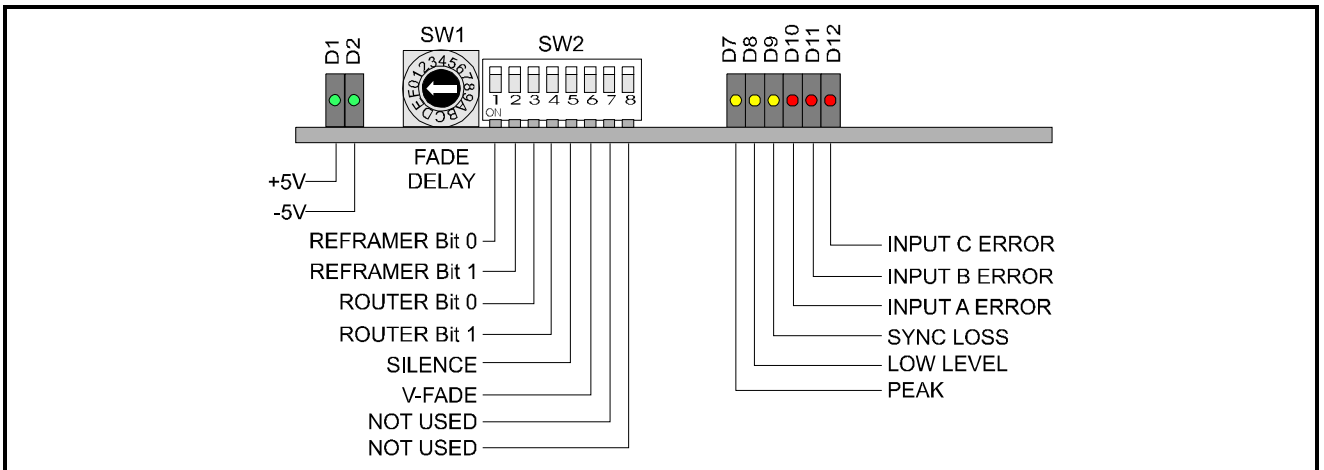
## Connection Details

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

Example of Connection Details to XLR Connectors

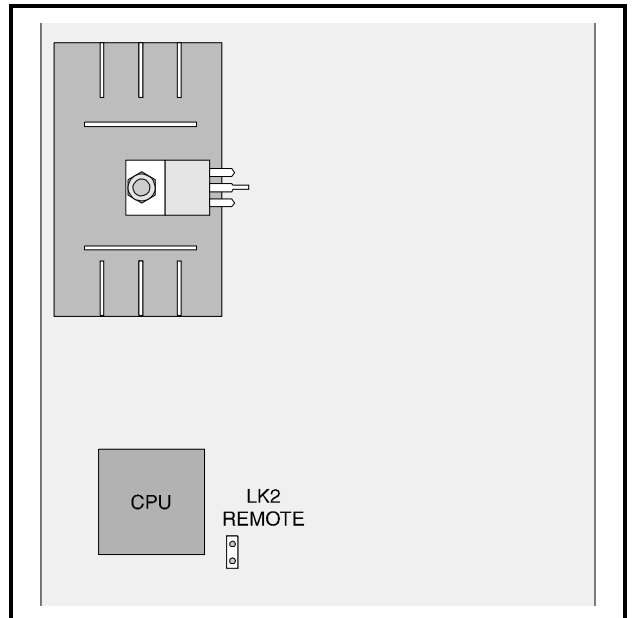


CARD EDGE CONTROLS



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 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 used.

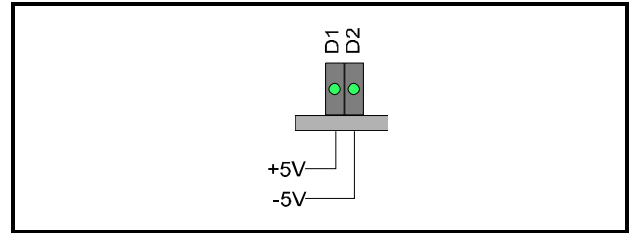




LED INDICATORS

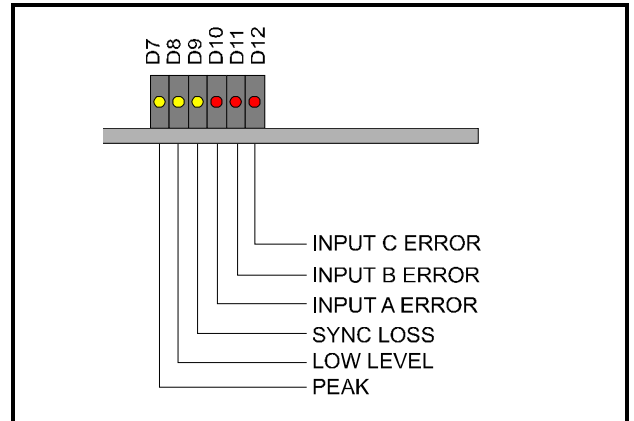
**Power D1 and D2**

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



**Peak Power D7**

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



**Low Level D8**

This indicator will become illuminated when the input level falls below -66 dBFS during a period of over 500 ms on the left or right channels on any of the AES inputs.

**Sync Loss D9**

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

**Input A, B, C Error**

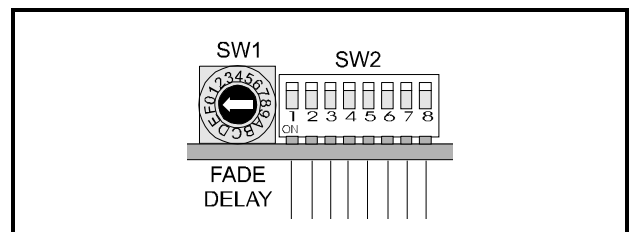
These indicators will become illuminated when an input error is detected on input A, B, and C.

**Fade Delay SW1**

When a fade is activated this switch is used to adjust the delay.

When set to 0 the delay is 0 sec. (Frame Switching)

Each clockwise increment (0 to F) increases the delay by 0.2 sec up to a maximum of 3.0 seconds.



**DIP Switch SW2**

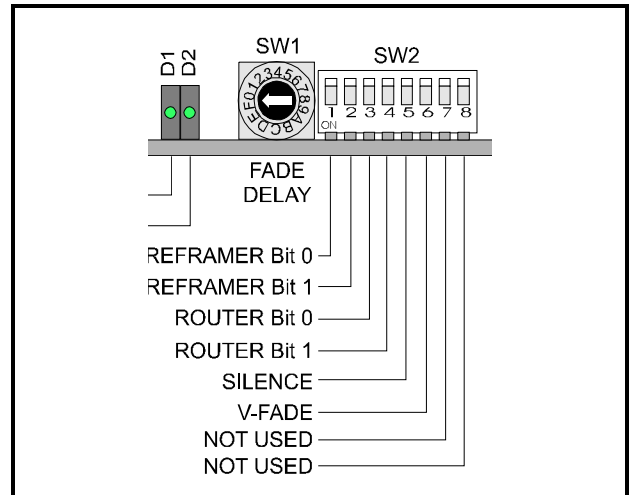
Various modes and selections can be made using this switch.

**Positions 1 and 2 Reframer Select**

The input signal that the unit will reframe to can be selected using the 2-bit code set up with these switch positions.

Down = ON and Up = OFF, X = Don't care

Reframer Input Select	Position 1 (Bit 0)	Position 2 (Bit 1)
Input A	OFF	OFF
Input B	ON	OFF
Input C	X	ON



**Positions 3 and 4 Router Output Select**

These positions represent a 2-bit code that selects the input signal that will be routed to the output.

Down = ON and Up = OFF, X = Don't care

Input Select	Position 3 (Bit 0)	Position 4 (Bit 1)
Input A	OFF	OFF
Input B	ON	OFF
Input C	X	ON

**Position 5 Silence**

When set to the ON position the output of the unit will fade to silence with the fade time set by the Fade Delay control.

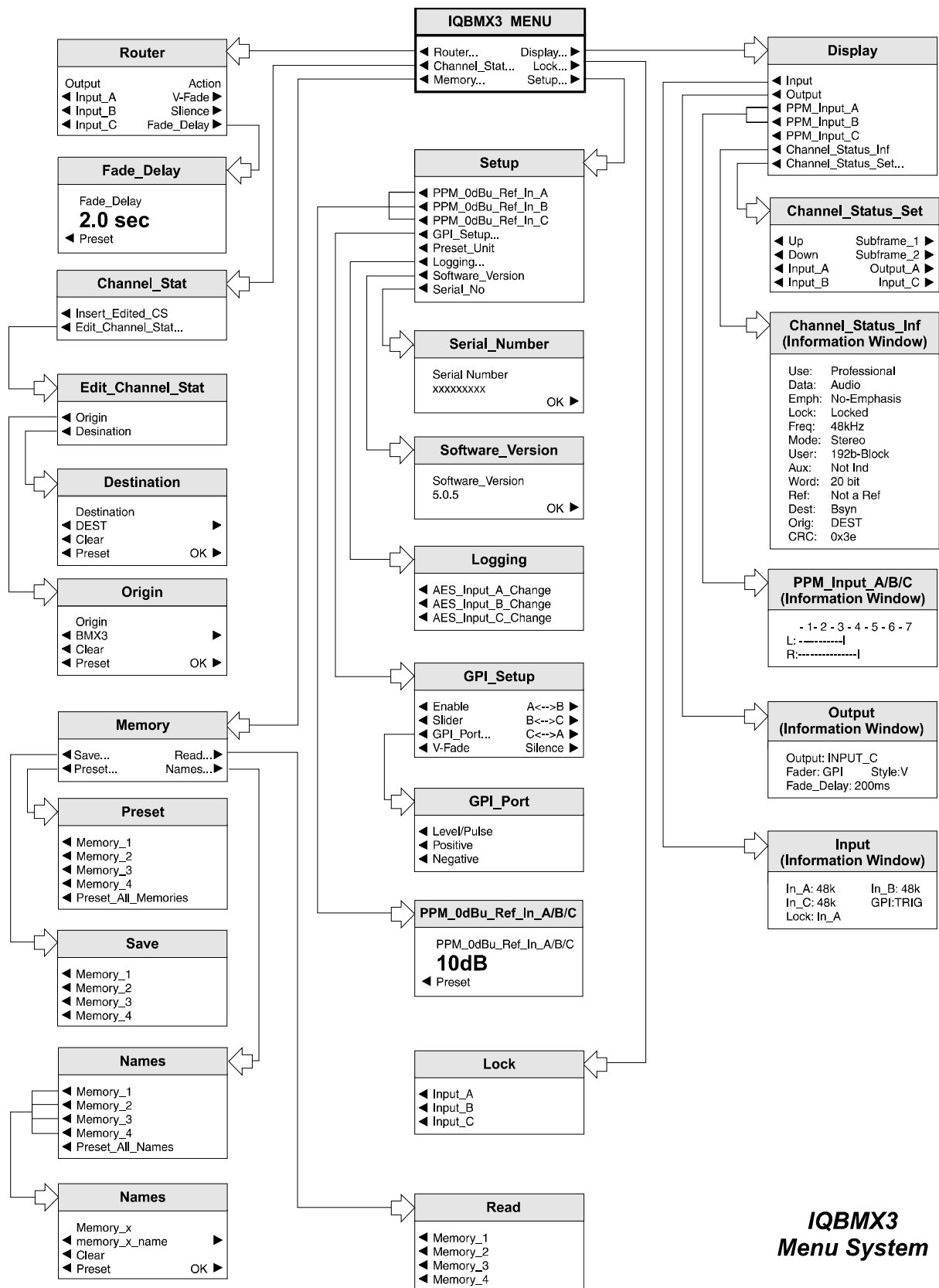
**Position 6 V-Fade**

When set to the ON position the fade function will be a fade down from one signal to silence and then a fade up from silence to the other signal during a time period set by Fade Delay control.

When set to the OFF position the fade function will be a cross fade from one signal to the other signal during a time period set by Fade Delay control.

*Note that the Information window will indicate the type of fade selected. i.e. either a X-Fade (cross fade) or a V-Fade. (Display function set to **Output**)*

Positions 7 and 8 have no function on this unit.



***IQBMX3  
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.

◀ Router...

Router	
Output	Action
◀ Input_A	V-Fade ▶
◀ Input_B	Silence ▶
◀ Input_C	Fade_Delay ▶

This reveals a sub-menu that allows assignment of any of the inputs to the output and also actions that may be applied to the output signal.

**Output**

This allows an input to be selected that may be routed to the output.

**Action**

V-Fade ▶

When highlighted the fade action will be a fade down from one signal to silence then fade up from silence to the other signal during a time period set by Fade Delay control.

When not highlighted action will be a cross fade from one signal to the other signal during a time period set by Fade Delay control. (X-Fade)

*Note that the Information window will indicate the type of fade selected. i.e. either a X-Fade (cross fade) or a V-Fade. (Display function set to **Output**)*

Silence ▶

When enabled the output of the unit will fade to silence during a time period set by the Fade Delay control.

Fade\_Delay ▶

Fade_Delay
Fade_Delay
<b>2.0 sec</b>
◀ Preset

This function will reveal a numerical display of time in seconds for the fade time when fading from one signal to the other. The spinwheel adjusts the time in steps of 0.2 second from 0 to 3 seconds.

Default is to 0.

**Display... ►**

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

**◀ Input**

Use this item to select the inputs for interrogation.

Input	
In_A: 48k	In_B: 48k
In_C: 48k	GPI:TRIG
Lock: In_A	

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 \*\* will be displayed. If the input sampling rate is not that of the recognised standards then ?? will be displayed. It will also display the GPI use (SLIDER or TRIG) and will also display which input is used for reframing.

- In\_A, B, C: This indicates the input sample frequency
- GPI: This indicates the type of control expected via the GPI port  
TRIG = Pulse or Level  
SLIDER = Variable resistor
- Lock: This shows the reframing input selected

**◀ Output**

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

Output (Information Window)
Output: INPUT_C Fader: GPI Style:V Fade_Delay: 200ms

- Output: This indicates the input that has been routed to the output
- Fader: This indicates the method of fader activation:  
GPI: Fader activated by the GPI port  
ROU: Fader activated by RollCall and card edge switches
- Fade\_Delay: This indicates the time taken to complete a fading assignment
- Style: This indicates the fading style used, either V or X

- ◀ PPM\_Input\_A**
- ◀ PPM\_Input\_B**
- ◀ PPM\_Input\_C**

This selection will reveal a bargraph display in the Information window, showing the peak level of the left and right input channels of input A and B

PPM_Input_A/B/C (Information Window)
- 1 - 2 - 3 - 4 - 5 - 6 - 7 L:-----  R:-----

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 -10 dBFS and -24 dBFS using the **PPM\_0 dBFS\_Reference** in the **Setup** menu.

This metering function follows standard Peak Programme characteristics.

◀ Channel\_Status\_Inf

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

Channel_Status_Inf (Information Window)	
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:	Bsyn
Orig:	DEST
CRC:	0x3e

Note that the Up and Down push buttons in the Channel\_Status\_Set menu should be used to select the text lines in this menu as the spinwheel will not be operational.

◀ Channel\_Status\_Set..

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

Channel_Status_Set	
◀ Up	Subframe_1 ▶
◀ Down	Subframe_2 ▶
◀ Input_A	Output_A ▶
◀ Input_B	Input_C ▶

◀ Channel\_Stat.

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

Channel_Stat
◀ Insert_Edited_CS
◀ Edit_Channel_Stat..

◀ 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 the Output.

◀ 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.

Origin
Origin
◀ ORIG ▶
◀ Clear ▶
◀ Preset OK ▶

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 (BMX3) text.

◀ Destination

This allows the destination channel status information to be changed.

Destination
Destination
◀ DEST ▶
◀ Clear ▶
◀ Preset OK ▶

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.

**Lock... ▶**

This selection reveals a sub-menu that allows the option to reframe the input(s) to any of the three inputs. If the locking input signal is lost then the next available input is used to reframe. If no inputs are detected then digital silence 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

**◀ Input\_C**

Unit will lock to the signal at Input C

**◀ Memory**

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

**◀ 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**

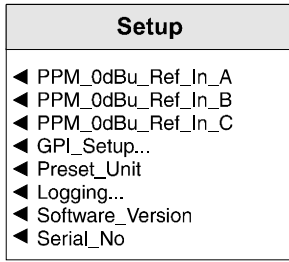
To compile/edit the text the right ▶ and left ◀ buttons adjacent to the upper text line in the menu should be used to select the character position in the text and the spinwheel used to select the character.

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

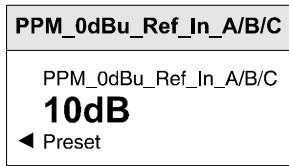
The **◀ Preset** function loads the default text, for example, Memory\_1.

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

Setup... ▶



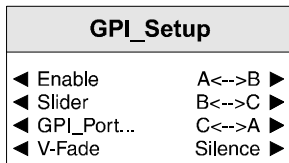
This selection reveals a sub-menu that allows various functions to be set.



These selections will reveal a numerical display of dB that sets the 0 dBu reference point for Input A, B and C.

◀ GPI\_Setup

The unit may be configured to respond in different ways to various types of signals connected to the GPI input using this menu.



◀ Enable

When this item is highlighted the GPI function is active; when not highlighted the function is disabled.

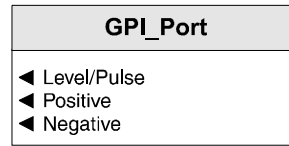
◀ Slider

When enabled the fade function may be controlled from a variable resistance connected across the GPI input connector. The value should be approximately 10 k Ohms Linear track.

*Note that when performing a cross fade (X-Fade) this function follows a **linear law**; when performing a V-Fade this function follows a **logarithmic law**.*

◀ GPI\_Port...

This allows the GPI port to respond to the following types of signal:



◀ Level/Pulse Responds to a change of DC level i.e. from a low to a high or from a high to a low or a pulse waveform. The polarity may be set from below:

◀ Positive Responds to a positive level or pulse input

◀ Negative Responds to a negative level or pulse input

◀ V-Fade

When highlighted the fade action will be a fade down from one signal to silence and then a fade up from silence to the other signal during a time period set by Fade Delay control.

When not highlighted action will be a cross fade from one signal to the other signal during a time period set by Fade Delay control. (X-Fade)

A<-->B ▶

When enabled the fade action initiated by the GPI signal will be between Input A and Input B.

B<-->C ▶

When enabled the fade action initiated by the GPI signal will be between Input B and Input C.

C<-->A ▶

When enabled the fade action initiated by the GPI signal will be between Input C and Input A.

Silence ▶

When enabled the action initiated by the GPI signal will be to fade the output to silence. When triggered again the output will fade back to the previous input.

**For more details of the fade characteristics see the Appendix on page 16.**



**◀ 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:

Logging
◀ AES_Input_A_Change
◀ AES_Input_B_Change
◀ AES_Input_C_Change

**◀ 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.

# Appendix

## FADE FUNCTIONS (Enabled by GPI Commands)

### Actions

All fade functions are intended to simulate the effect of mechanical operations and will respond alternately to the GPI input signals e.g. if Pulse/Positive action has been selected to control a fade from Input A to Input B the first positive pulse received will perform a fade from Input A to input B; the next positive pulse received will perform a fade from Input B to Input A; the next positive pulse received will perform a fade from Input A to input B etc.

This action also applies to the Slider and Level methods of control.

With the exception of the **Slider** function, all fades will occur during the time set by the **Fade Delay** function.

In the Slider mode the fade time will follow the time taken to physically change the mechanical device setting.

It should be noted that under these conditions the unit would automatically limit the minimum time between fast fades to prevent clicks or other unwanted effects occurring.

### Slider Operation

If for example a fade between Input A and Input B is controlled using a variable resistor, at one end of the travel the output will be Input A and the other end of travel will be Input B. If a cross fade (X-Fade) has been selected the fade will follow a linear law using a standard linear track variable resistor; if a V-Fade has been selected the fade will follow a logarithmic law using a standard linear track variable resistor.

### Level

In this case the fade will occur when the input level passes through a threshold level. If Positive has been selected the fade will occur when the signal changes from a low level to a high level; if negative has been selected the fade will occur when the signal changes from a high level to a low level.

(A low level is defined as below 1.16 V and a high level defined as greater than 2 V.)

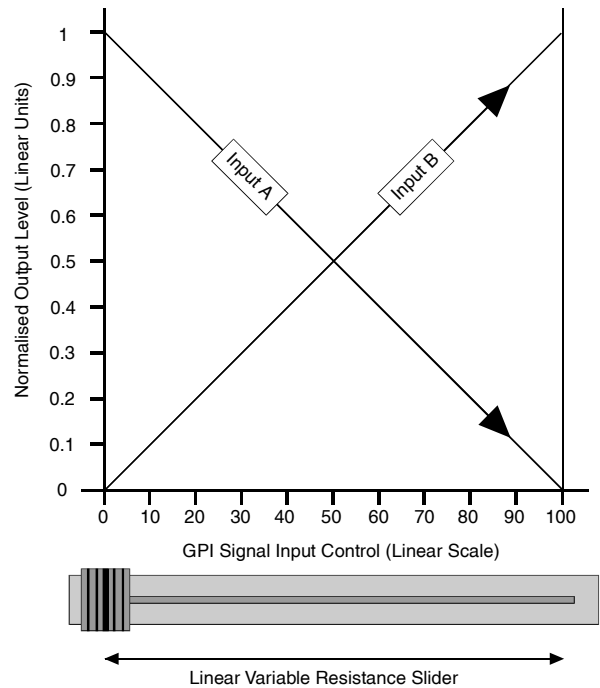
### Pulse

In this case the fade will occur when a pulse signal is received. If Positive has been selected the fade will occur when a positive going signal is received; if negative has been selected the fade will occur when a negative going signal is received.

## Fade Laws

### Cross Fade (X-Fade)

When a cross fade is performed between two signals under the control of a GPI signal, the output will follow the characteristics of the graph below.

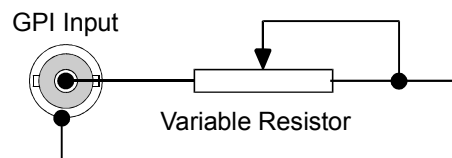


In the **Slider** mode the output will be proportional to the movement of the mechanical device.

In **Level** mode the above action will occur automatically in a time determined by the Fade Delay setting each time the threshold is passed.

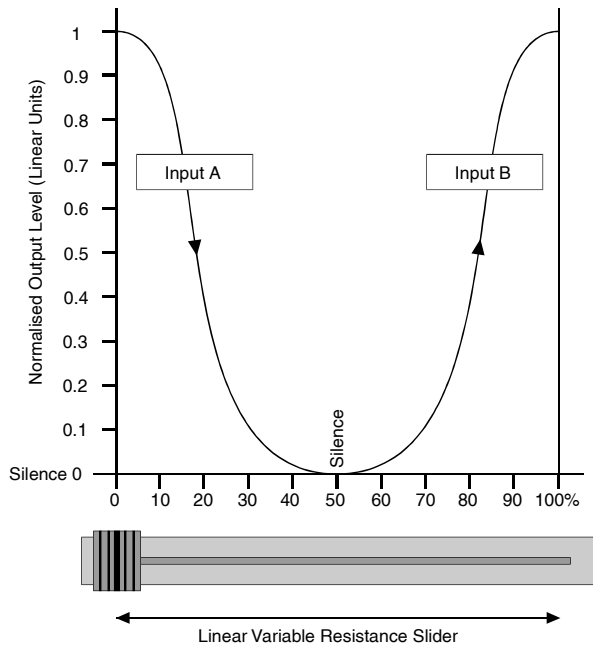
In **Pulse** mode the above action will occur automatically in a time determined by the Fade Delay setting each time a pulse of the correct polarity is received.

### Slider Control Convention



## V-Fade

When a V-Fade is performed between two signals under the control of a GPI signal, the output will follow the characteristics of the graph below.



In the **Slider** mode the output will fade up (to maximum) or down (to silence) following a logarithmic law with the linear movement of the mechanical device.

In **Level** mode the output will fade up (to maximum) or down (to silence) automatically in a time determined by the Fade Delay setting each time the threshold is passed.

In **Pulse** mode the output will fade up (to maximum) or down (to silence) automatically in a time determined by the Fade Delay setting each time a pulse of the correct polarity is received.

