

# IQBSYN Digital Audio Synchroniser



## Module Description

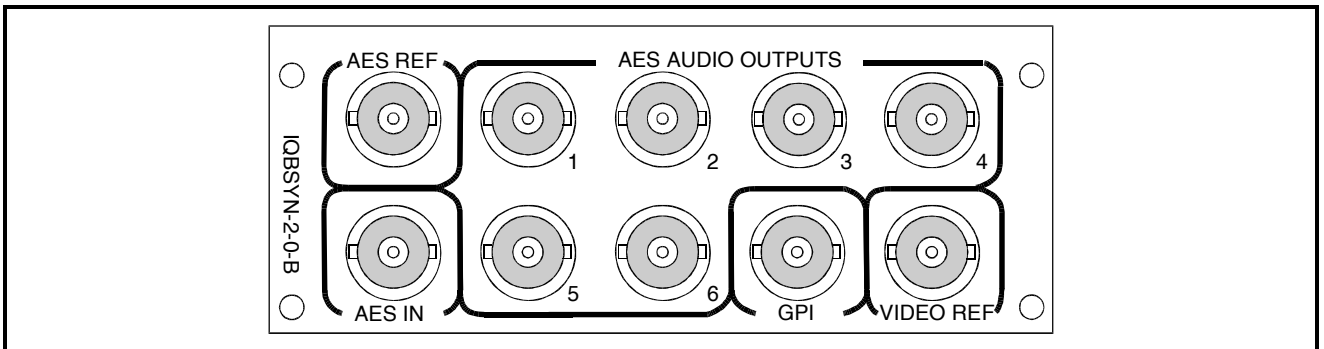
The IQBSYN synchronizes the sampling of a single input stereo channel of either 32, 44.1 or 48 kHz to either a 48 kHz AES/EBU reference or video black. The output sample rate is 48 kHz. With an input sample rate of 48 kHz a programmable delay of up to 340 ms can be added, and a delay of up to 510 ms can be added with an input of 32 kHz. This may be used with the unique RollTrack™ automatic delay control system to compensate for lip sync errors introduced by video processing. The delay will follow an external pulse or control messages over RollCall without audible disturbance even in instances of video frame synchronizer wrap.

It will sample rate convert between 25 kHz and 55 kHz, however the additional delay feature will only operate for the recognized standards of 32, 44.1 and 48 kHz. All internal processing is at 20-bit, with the final result after rate conversion of 24-bits, with the output sample rate of 48 kHz. In the absence of a reference the output will be re-sampled to an internal reference of 10 ppm, or optionally 1 ppm stability. For added flexibility, 6 outputs are provided and 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.

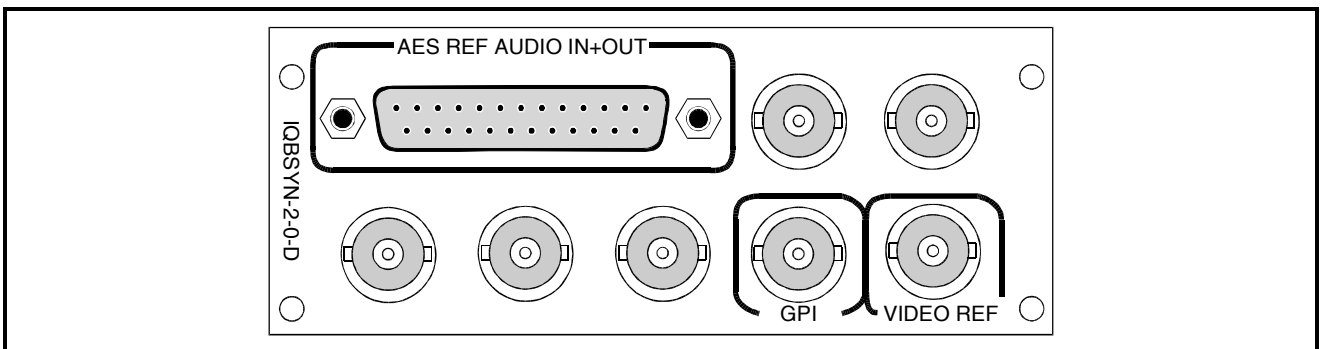
RollCall provides full remote control and monitoring.

## REAR PANEL VIEWS

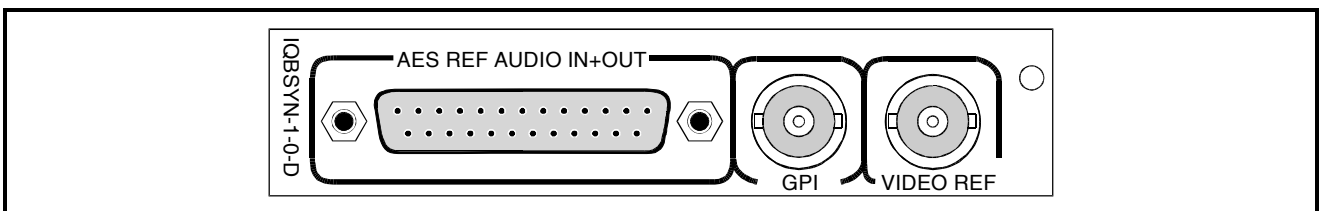
### Unbalanced Audio Interfaces



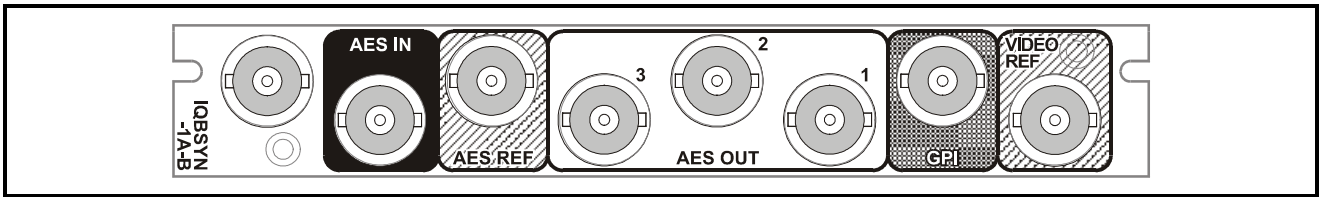
### Balanced Audio Interfaces



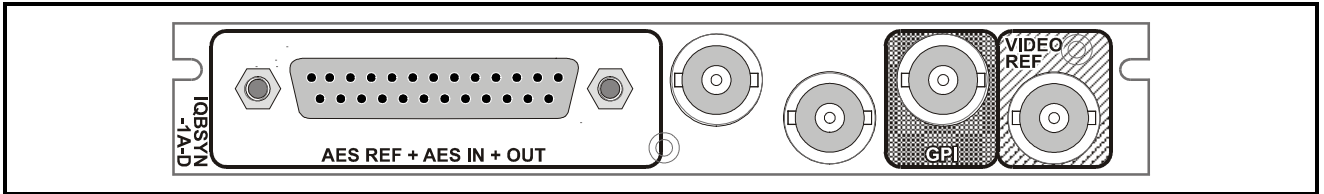
### Balanced Audio Interfaces



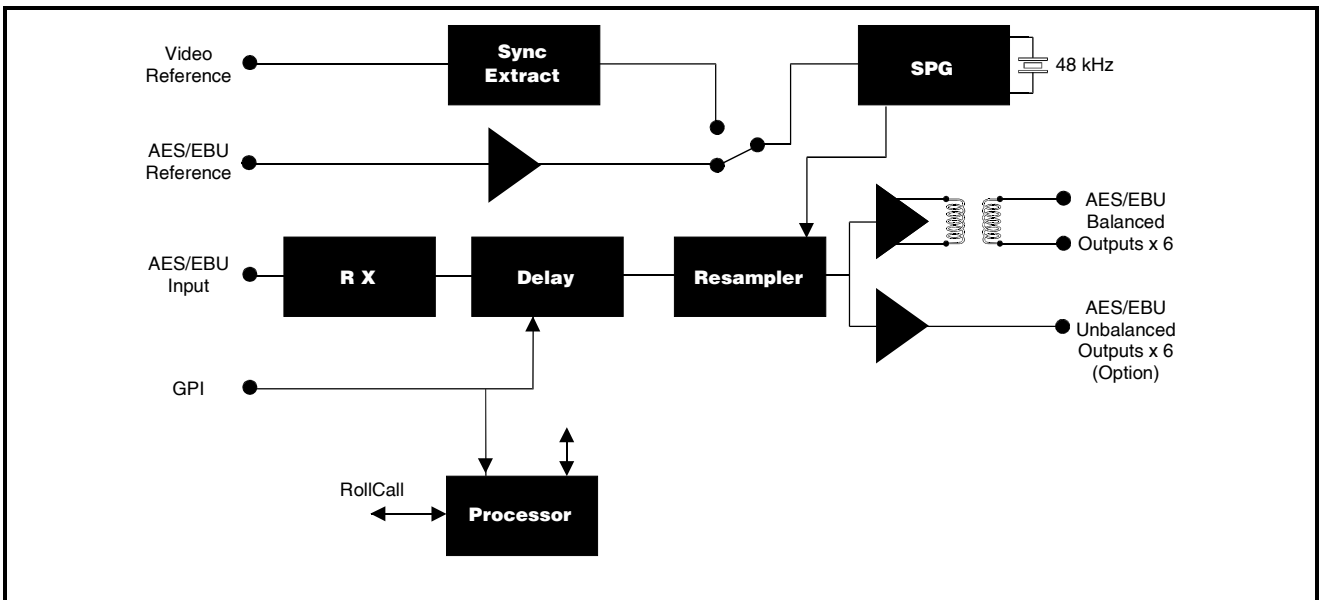
Unbalanced Audio Interfaces



Balanced Audio Interfaces



BLOCK DIAGRAM



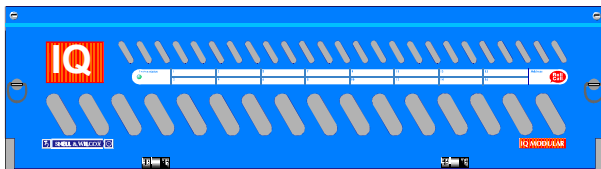
Versions of the module cards available are:

IQBSYN-2-0-B	AES I/O connections via BNC connectors	Double width module
IQBSYN-1-0-D	AES I/O connections via 25 way 'D' connector	Single width module
IQBSYN-1-S-D	AES I/O connections via 25 way 'D' connector 1 ppm Xtal	Single width module
IQBSYN-2-S-B	AES I/O connections via BNC connectors 1 ppm Xtal	Double width module
IQBSYN-1A-D	AES I/O connections via 25 way 'D' connector	Single width module
IQBSYN-1-A-B	AES 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**

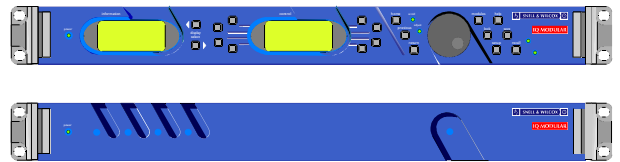
Rear panels **with** the suffix A may only be fitted into the 'A' style enclosure shown below.



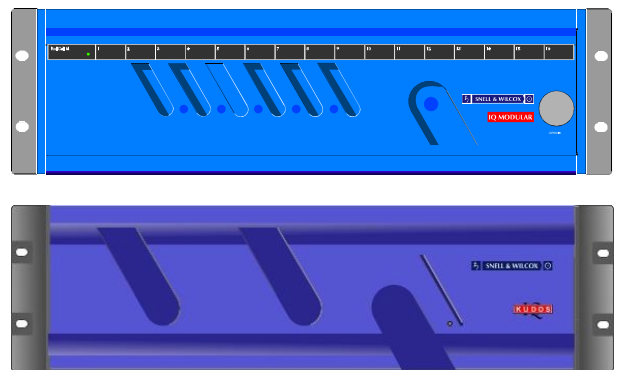
(Enclosure order codes IQH3A-E-O, IQH3A-E-P, IQH3A-N-O, IQH3A-N-P)

**'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)

## Features

- Stereo 20-bit re-sampling to 48kHz AES/EBU reference or video black
- Additional audio delay with RollTrack, up to 510 ms
- Built-in reference generator
- Automatic 32, 44.1 and 48 kHz input detection
- 6 transformer coupled balanced outputs
- Optional 6 transformerless unbalanced outputs
- Can receive digital audio from up to 150 m of AES cable (balanced inputs) or 500 m of RG59B or equivalent (unbalanced inputs)
- RollCall remote control and monitoring
- Peak program meter with adjustable 0 dBu reference
- Low level Indicator (below -66 dBF)
- GPI interface for external delay tracking or closed contact function activation (user selectable)
- Channel status monitor for AES receiver and transmitter
- Channel status editor for destination and origin, can be inserted or be transparent
- Output digital silence when there is no input present.

## TECHNICAL PROFILE

**Features****Signal Inputs**

Digital Audio Input.....	2 Channels (1 Stereo Pair)
Digital Audio Reference .....	1 AES/EBU 48 kHz reference
Video Reference .....	525 or 625 line video black
GPI control input.....	Pulse input for External delay tracking or closed contact function activation, selectable from: Lock to Video Lock to AES Manual Delay RollTrack Delay. RollTrack + Manual Delay
Standards .....	AES3-1992

**Signal Outputs**

Digital Audio.....	Up to 6 x Serial Digital 48 kHz
Standards .....	AES3-1992

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

Lock select.....	Free-run or lock to AES or Video
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**Specifications**

Input Impedance .....	Balanced 110 Ohm Unbalanced 75 Ohm
Sampling Frequency Range	25 – 55 kHz*
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
Signal level .....	Balanced 3 V pk to pk typical Unbalanced 1 V pk to pk $\pm 0.1$ V
Minimum Insertion Delay....	850 $\mu$ s
Reclocking .....	Yes
Time Taken to reach Maximum delay from Minimum delay	45 Seconds at 32 kHz 35 Seconds at 44.1 kHz 30 Seconds at 48 kHz

Delay adjust/ offset .....	To add additional audio delay 32 kHz Maximum delay 510 ms 44.1 kHz Maximum delay 370 ms 48 kHz Maximum delay 340 ms
Delay Select.....	Manual, Delay Pulse Input

**Functions Available via RollCall™ Only**

Input sample rate detect.....	Automatic 32 kHz, 44.1 kHz, 48 kHz detection
RollTrack.....	Automatic delay control over RollCall™
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, 4 dB steps, adjustable 0dBu reference ('4') – 10 dBFS to -24 dBFS.

Digital Reference Input Pull-In Range	+2 Hz to -1 Hz
Sampling.....	48 kHz frame locked to 48 kHz AES/EBU Reference, 48 kHz frame locked to PAL video reference, 48 kHz frame locked to every 5th frame of an NTSC video reference (Conforms to AES11 – 1997 spec)

\* Any input sample rate between the specified range may be applied however the additional delay feature will only operate for the recognised standards of 32, 44.1 and 48 kHz

**Power Consumption**

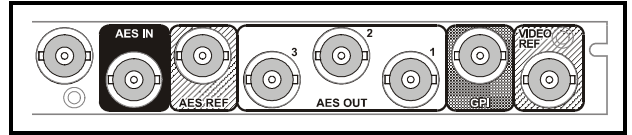
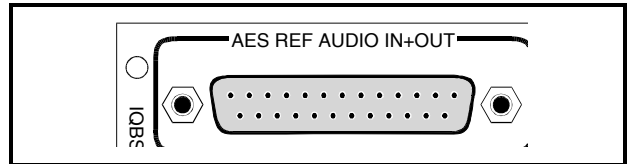
Module Power Consumption	3.5W max.
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INPUTS AND OUTPUTS

(-D versions)

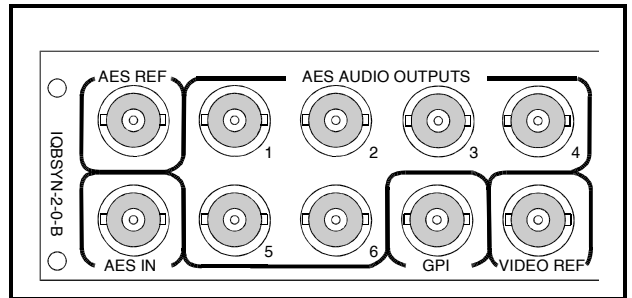
All AES input and output connections are made via this 25 way female D-type connector.

For connection data consult the tables on page 7.



(-B versions)

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



GPI Input

1. External Delay

The input/output signal delay time may be set manually using the card edge control, via RollCall™ or may be set by a signal applied to this connector which should be a TTL compatible signal.

The audio will be delayed for a period equal to the duration that this signal is in the HIGH state. This function may be made to respond to a LOW state via the RollCall remote control system.

*Note that if no pulse is detected after reset the delay will be set to the minimum.*

2. Function to Activate

This function may only be selected via the RollCall remote control system (see *GPI\_Input\_Use, Menu Details /Setup page 29.11* )

When selected the interface will respond to a closed contact event from the BNC GPI input and enable the item selected from the Func\_To\_Activate menu.



Video Reference Input

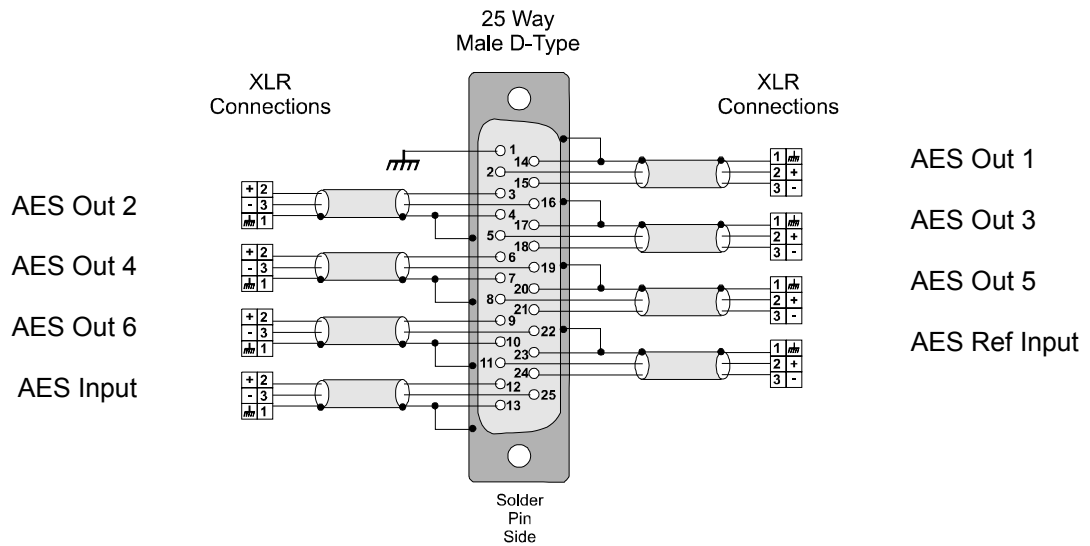
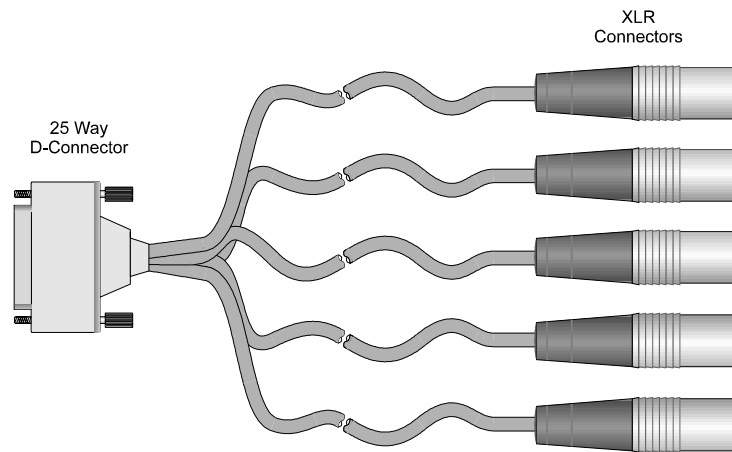
A standard analog video or black burst reference signal may be connected to this BNC connector. The signal is terminated internally at 75 Ohms.



## Connection Details (-D Versions)

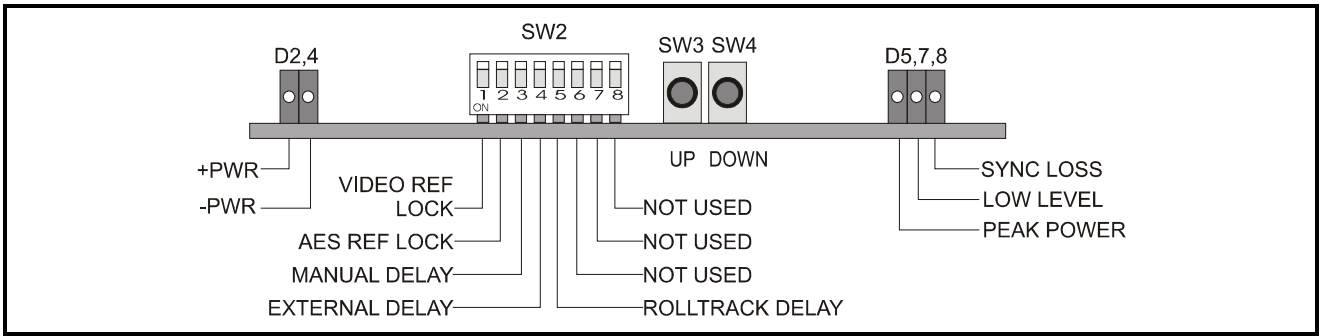
25 Way D Connector Pin Number	Description	Ribbon Cable Strand Number	Standard Pin Assignment
1		1	CHASSIS
14	AES OUT 1 Ground	2	GND1
2	AES OUT 1 +	3	1+
15	AES OUT 1 -	4	1-
3	AES OUT 2 +	5	2+
16	AES OUT 2 -	6	2-
4	AES OUT 2 Ground	7	GND2
17	AES OUT 3 Ground	8	GND3
5	AES OUT 3 +	9	3+
18	AES OUT 3 -	10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

Example of Connection Details to XLR Connectors (-D Versions)





CARD EDGE CONTROLS



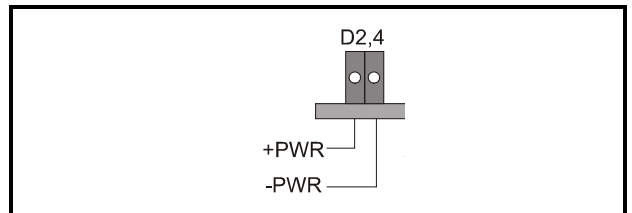
Adjustment of the settings of the **IQBSYN** is available either via card edge controls and/or via a more comprehensive remote control system using **RollCall™**

Note that the availability of some of the card edge controls will depend on the card version; see feature table for variations.

LED INDICATORS

**Power**

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

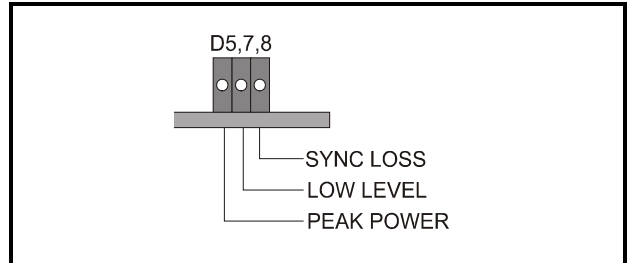


**Peak Power D5**

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.

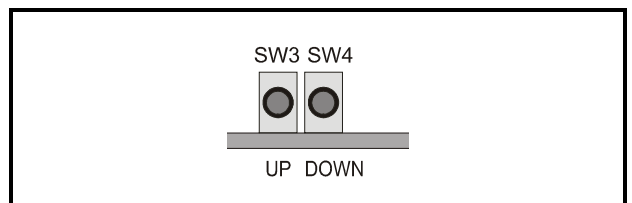


**Sync Loss D8**

This indicator will become illuminated when the unit is not locked to either the Video or the AES reference signal.

**Delay SW3 & 4**

These two push button switches allow the delay period to be manually set when SW2 position 3 is set to ON.



SW3 increments the delay and SW4 decrements the delay in steps of 1 ms. If either of the buttons is pressed for more than 2 seconds the step value will change to 10 ms steps. If both buttons are pressed together the delay will reset to 0 ms.

**SW2****Position 1 Video Reference Lock**

This allows the unit to lock to the Video Reference signal by setting to the ON (down) position.

**Position 2 AES Reference Lock**

This allows the unit to lock to the AES Reference signal by setting to the ON (down) position.

When **both** positions 1 and 2 are set to OFF (up) or ON (down) position the function will be in the FREERUN mode and the unit will not be locked to either the Video Reference signal or the AES reference signal.

**Position 3 Manual Delay**

When this position is set to the ON position the unit delay will be set by the push buttons SW3 and SW4.

**Position 4 External Delay**

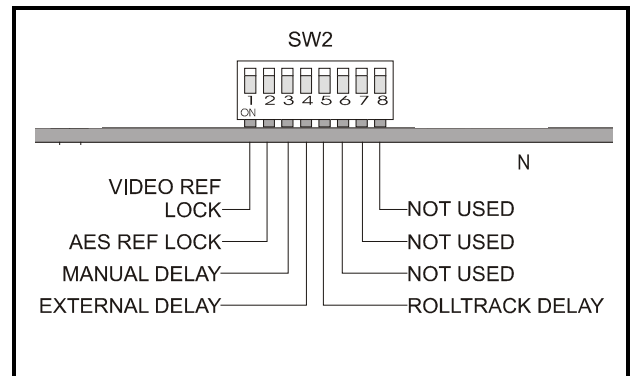
When this position is set to the ON position the unit delay will be set by the external TTL signal connected to the BNC connector labelled GPI.

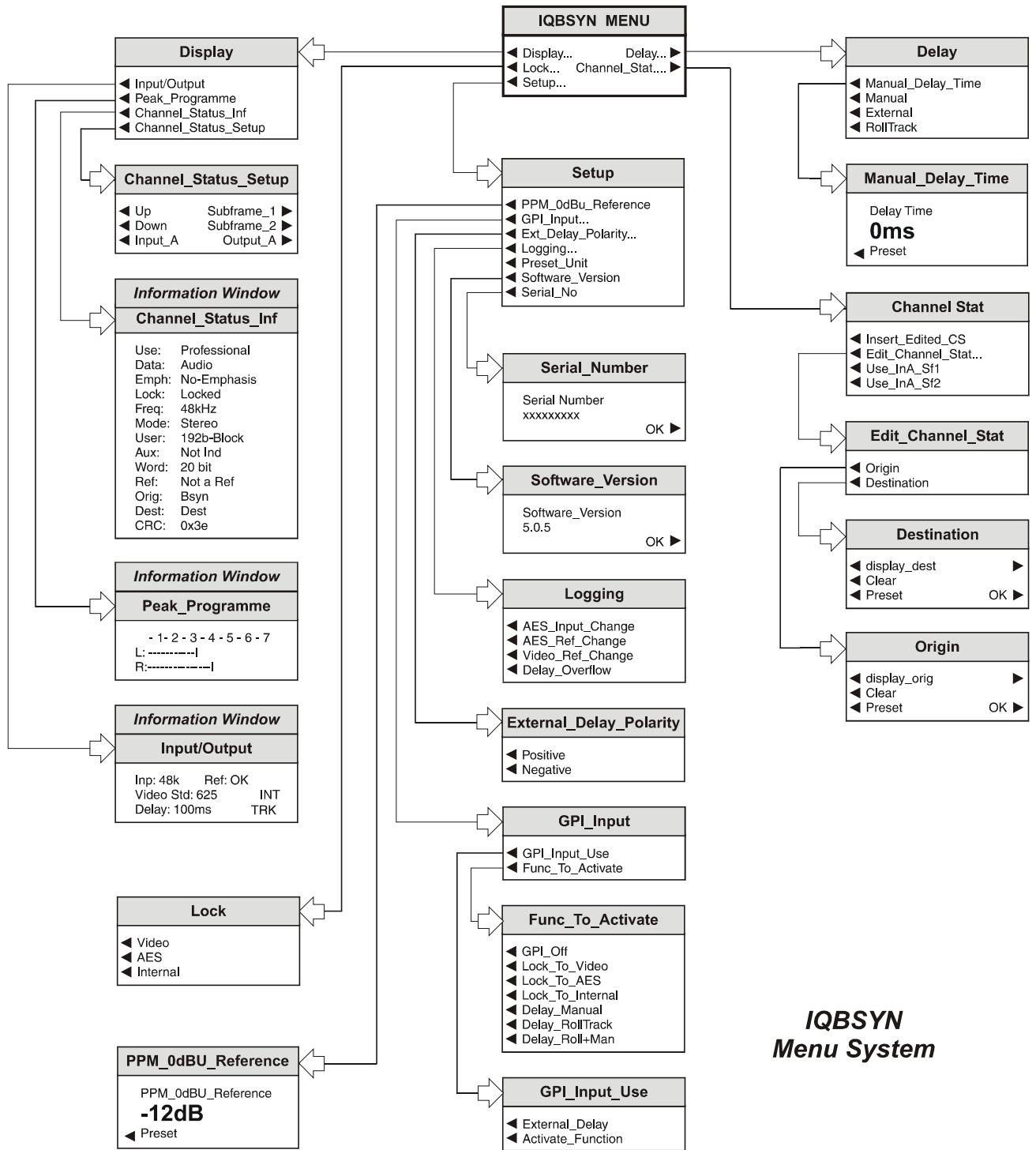
**Position 5 RollTrack Delay**

When this function is selected the delay time is set to the Manual value **plus** the value received via the RollTrack system on channels 14+15+16+17.

Data is transmitted at regular intervals from a RollTrack compatible device but if data is not received by this unit from a channel within 30 seconds, the delay time for that channel will assume a value of zero.

Positions 6, 7 and 8 are not used on this unit.





***IQBSYN  
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 IQBSYN 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.

**◀ Display**

This item allows information about the input/output signals and channel status to be seen.

Display	
◀ Input/Output	
◀ Peak_Programme	
◀ Channel_Status_Inf	
◀ Channel_Status_Setup	

**◀ Input/Output**

Input/Output	
Inp: 48k	Ref: OK
Video Std: 625	INT
Delay: 100ms	TRK

This menu will show the characteristics of the input signal, the output signal, the state of the reference, the video standard, the locking mode and the delay time.

Note that when the delay time is changing the abbreviation "TRK" will appear flashing in the lower right hand corner of the display; when the delay time has settled to a fixed value the word will disappear.

**◀ Peak\_Programme**

This selection will reveal a bargraph display showing the peak level of the left and right input channels.

Peak_Programme	
- 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 may be set to between -12 dB and -24 dB using the Setup\PPM\_0 dBU\_Reference menu item.

This metering function follows standard Peak Programme characteristics.

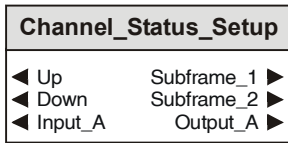
**◀ Channel\_Status\_Inf**

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

Use: Professional/ Consumer  
 Data: Audio/Non-Audio  
 Emph: No-Emphasis/Not Ind/50/15µs/CCIT J.17  
 Lock: Locked/Unlocked  
 Freq: 48kHz/44.1kHz/32kHz/Not Ind  
 Mode: Stereo/Monaural/2-Channel/Pri/Sec/  
 Not Ind  
 User: HDLC/192b-Block/User/Not Ind  
 Aux: Not Ind/TalkBack/Main Audio  
 Word: 24/ bits/23 bits/22 bits/21 bits/20 bits/  
 19 bits/18 bits/17 bits/16 bits  
 Ref: Not a Ref/Grade 2/Grade 1  
 Orig: Bsyn  
 Dest: Dest  
 CRC: 0x3e

◀ Channel\_Status\_Setup

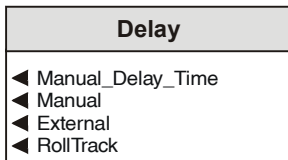
Selecting this window will reveal a sub-menu that will allow the channel status information for the input, output and sub-frames 1 and 2 to be viewed.



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

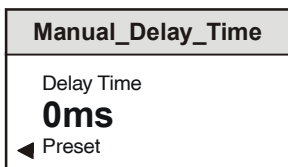
Delay ▶

This selection enables a sub-menu that allows the delay source and the delay between the input signal and the output signal to be set.



◀ Manual\_Delay\_Time

The spinwheel is used to adjust the delay time when this function is enabled. The time will be shown as a numerical value in the display window.



*Note that when the audio delay is being controlled remotely the display window will show the current delay setting.*

The range of adjustment is from 0 to approximately 510 ms (depending on the sample rate) in increments of 1 ms.

*Note that if the input sample rate is neither 32 kHz, 44.1 kHz, or 48 kHz but within the range of 25 kHz to 55 kHz then the delay will be set to the minimum insertion delay as stated in the specification.*

The preset value is 0 ms.

◀ Manual

When selected the delay time may be set using the Manual\_Delay\_Time function or the card edge controls.

◀ External

This selection allows an external TTL signal connected to the GPI BNC to set the delay. This function can be set to respond to either a positive (active high) or negative (active low) pulse. Use the External\_Delay\_Polarity function in the Set-up menu to select polarity.

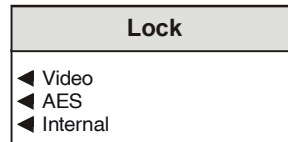
◀ RollTrack

When this function is selected the delay time is set to the value received via the RollTrack system on channels 14+15+16+17.

Data is transmitted at regular intervals from a RollTrack compatible device but if data is not received by this unit from a channel within 30 seconds, the delay time for that channel will assume a value of zero.

◀ Lock

This selection reveals a sub-menu that allows the standard and mode of the locking source to be set.



Selections available are:

◀ Video

Unit will lock to external Video (via Video Ref BNC input)

◀ AES

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

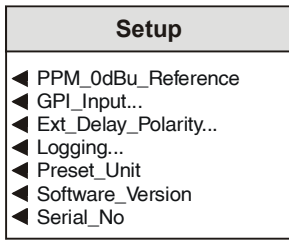
◀ Internal

The unit will freerun and will not be locked to any external signal.

Note that if the selected (Video or AES) locking signal is lost the unit will revert to the Internal mode; when the same signal returns the unit will revert to locking to the same signal.

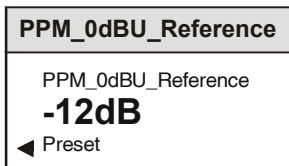
◀ Setup

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



◀ PPM\_0dBu\_Reference

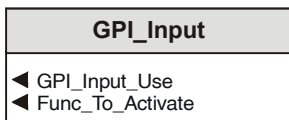
This selection will reveal a numerical display of dB's that sets the 0 dBU reference point.



The range of adjustment is from -12 dB to -24 dB.

◀ GPI\_Input

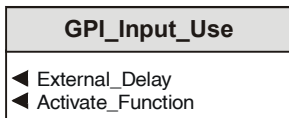
This selection reveals a sub-menu which allows the function of the GPI connection to be set up.



Selections available are:

◀ GPI\_Input\_Use

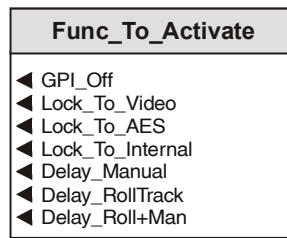
This menu allows the GPI input connection to provide a signal to be used in various ways.



◀ External\_Delay Uses the external signal from the GPI BNC to set the delay.

◀ Activate\_Function Activates a function selected from the Func\_To\_Activate Menu.

◀ Function\_To\_Activate



When this selection is made and the GPI\_Input\_Use\Activate\_Function mode is enabled, the unit will respond to the GPI signal in a manner set by a selection from this sub-menu.

Selections available are:

◀ GPI\_Off The GPI function will not be active

◀ Lock\_To\_Video The unit will lock to the Video Ref signal

◀ Lock\_To\_AES The unit will lock to the AES Ref signal

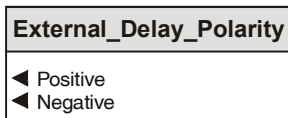
◀ Lock\_To\_Internal The unit will lock to the internal (freerun) signal

◀ Delay\_Manual The delay will become the delay set up by the Manual\_Delay\_Time setting or by the card edge controls.

◀ Delay\_RollTrack When this function is selected the delay time is set to the value received via the RollTrack system on channels 14+15+16+17.

◀ Delay\_Roll+Man When this function is selected the delay time is set to the value received via the RollTrack system on channels 14+15+16+17 plus the manual delay setting.

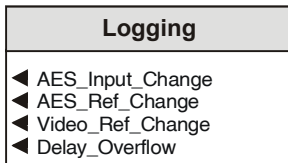
◀ Ext Delay Polarity



This selection allows the polarity of the external TTL signal connected to the GPI BNC to be selected as responding to either a positive (active high) or negative (active low) pulse.

◀ 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)

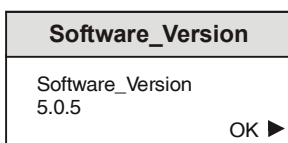


◀ Preset\_Unit

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

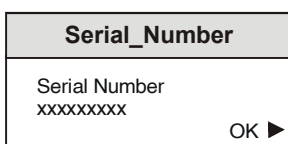
Selecting this item reveals a display showing the version of the software fitted in the module.



Select OK to return to the System Menu.

◀ Serial\_No

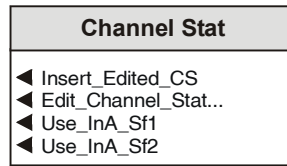
Selecting this item reveals a display showing the serial number of the module.



Select OK to return to the System Menu

Channel\_Stat ▶

This menu allows the channel status information to be manipulated.

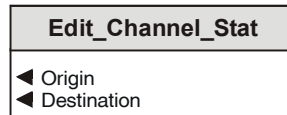


◀ Insert\_Edited\_CS

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

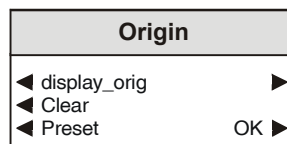
◀ Edit\_Channel\_Stat

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 (BSYN) text.

◀ Destination

This allows the destination channel status information to be changed.



The text may be edited in the same manner ◀ Preset to return to the default (DEST) text.

## RollTrack Audio Delay Tracking

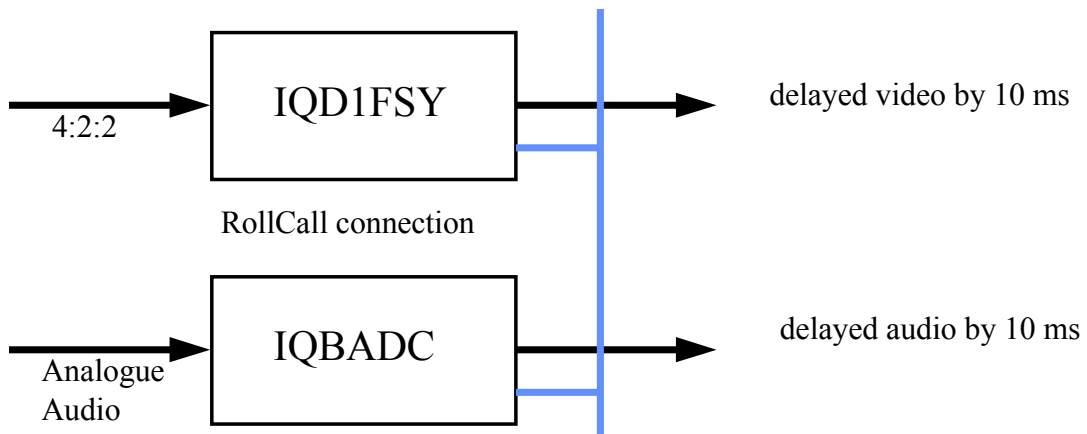
RollTrack is a feature of RollCall™ (Snell & Wilcox’s proprietary remote control system), that allows devices to communicate across the RollCall network with no direct user intervention.

RollTrack Audio Delay Tracking enables Snell & Wilcox RollCall™ compatible audio delay products to track delay introduced by RollCall™ compatible video processing products.

The current products that implement RollTrack Audio Delay Tracking are:

Audio Delay Modules	Video Modules	Other Products	
IQBAAD	IQD1FSY	ALCHEMIST	MDD3000
IQBADC	IQDMSDS	CPP100	MDD550
IQBDAC	IQDAFS	CPP200	MDD560
IQBDAD	IQDMSDS	NRS500	MDD570
IQBSYN	IQDMSDP	HD5050	MDD2000
IQBADCD	IQDSYN		

The simplest configuration is a single video unit and a single audio delay in a RollCall™ system. The audio delay will have the same delay as through the video path. If the delay changes the audio delay will track.



The next level of configuration is where there are multiple Frame Synchronizers (for example) each connected through RollCall™ to their own tracking Audio Delay. (It is worth stating that the synchronizers and audio delays do not have to be in the same enclosure; the addressing scheme, discussed later, allows for the units to be positioned anywhere in the RollCall™ domain.)

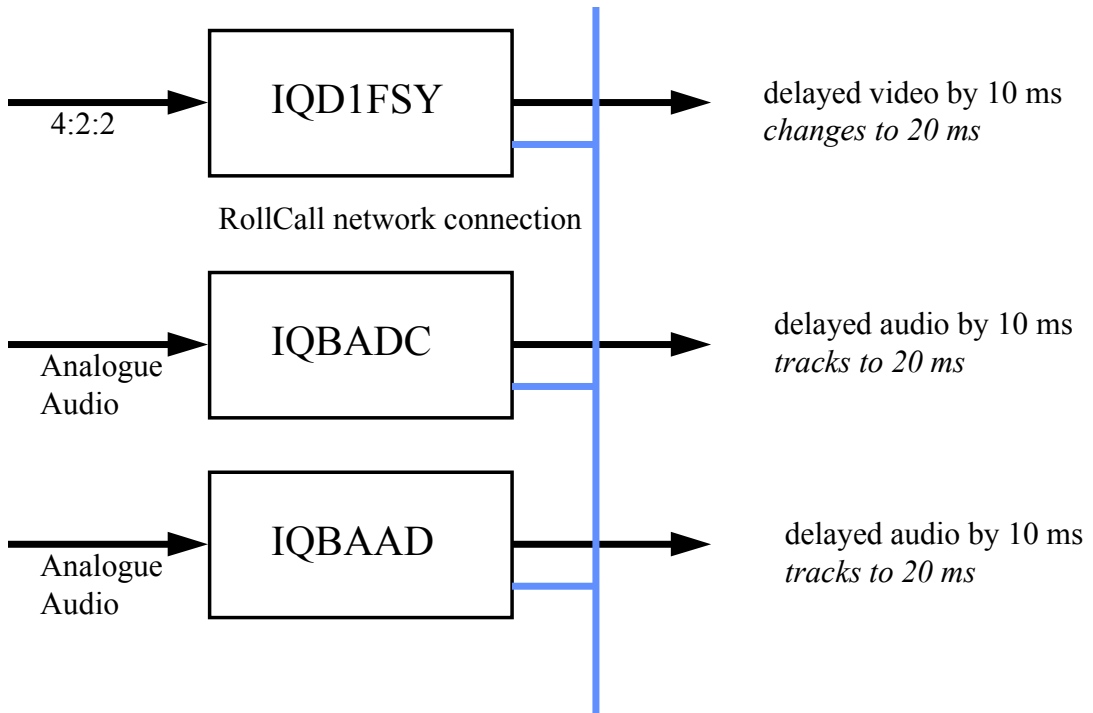
The maximum number of video units and audio delays in a RollCall™ system is set by the maximum limit of the number of modules in a RollCall™ network and is currently 3840 on a single network without bridges.

The unique identification of the destination unit (a decimal number) for various modules is as follows:

Module	ID
IQBADC	51
IQBDAC	52
IQBAAD	53
IQBDAD	54
IQBSYN	89
IQBADCD	107

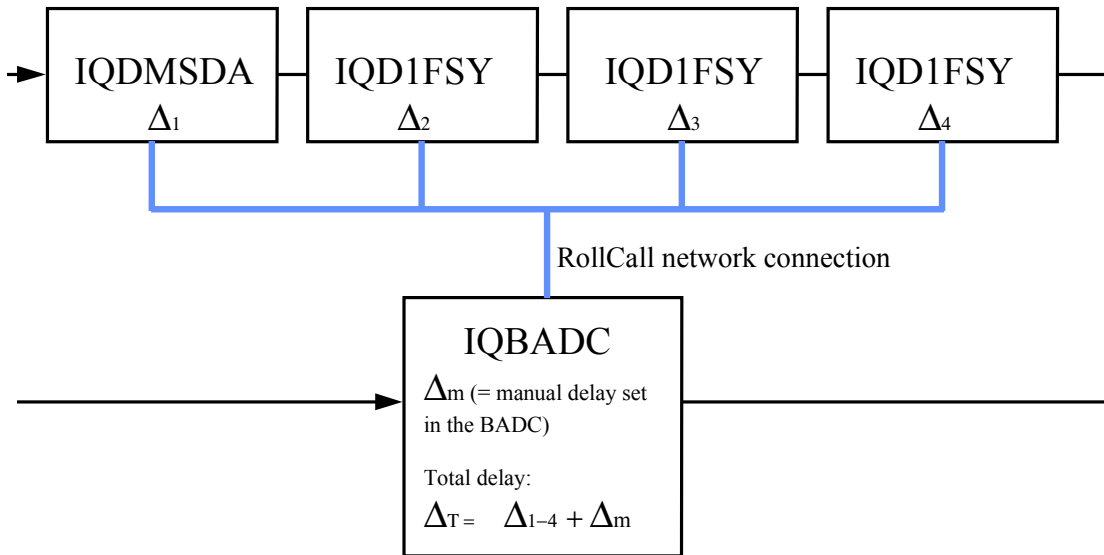


The next level of complexity is a *vertical delay cluster* where a video unit can have up to eight audio delays tracking - of the same or different types.



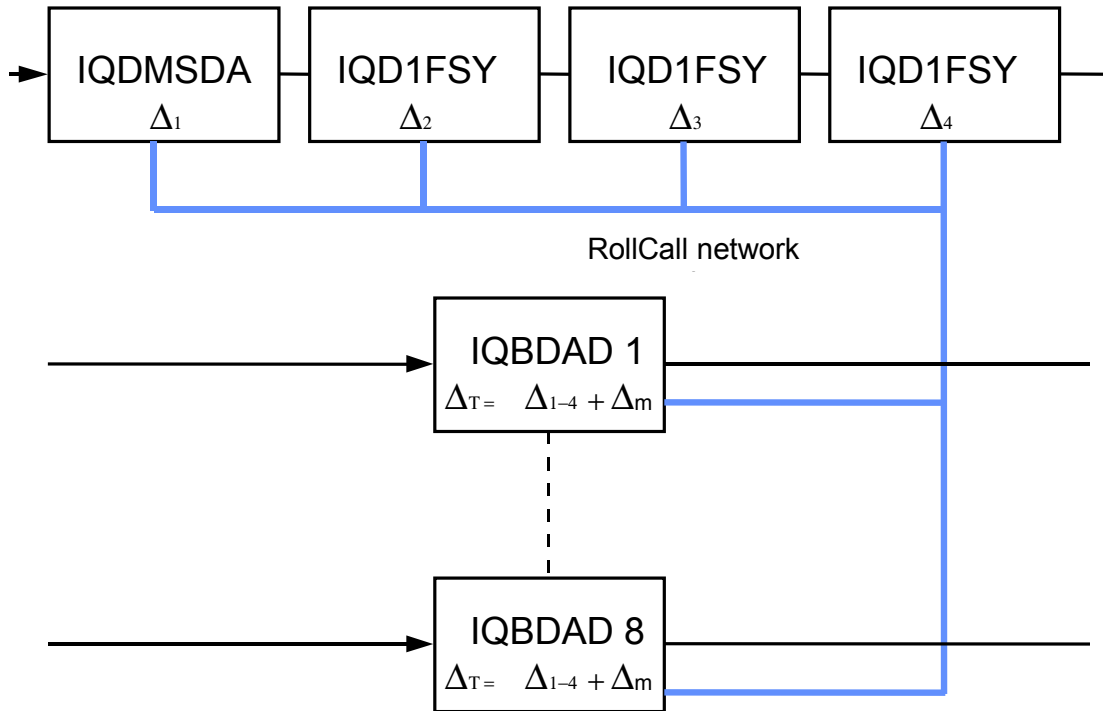
From one to eight audio delay products can be connected via RollCall™ to a single frame synchronizer, for example. If the synchronizer delay changes, then however many audio delays are connected will track the delay. The audio delays can also have a manual delay which will be added to the RollTrack delay.

The next level of complexity is a *horizontal delay cluster* where an audio delay can track up to four video units.



The total delay time through the audio delay is then the sum of the individual delays introduced by the video units plus the manual delay of the audio unit. The manual delay can be set to compensate for any fixed propagation delay in the video path or may be set to zero.

The next level of complexity is a *matrix delay cluster* where each audio delay (up to eight) can track up to four video units. This configuration is in effect a four by eight matrix of video units and audio delay units. The total delay time through the audio delay units is then the sum of the individual delays introduced by the video units plus the manual delay of the audio unit.



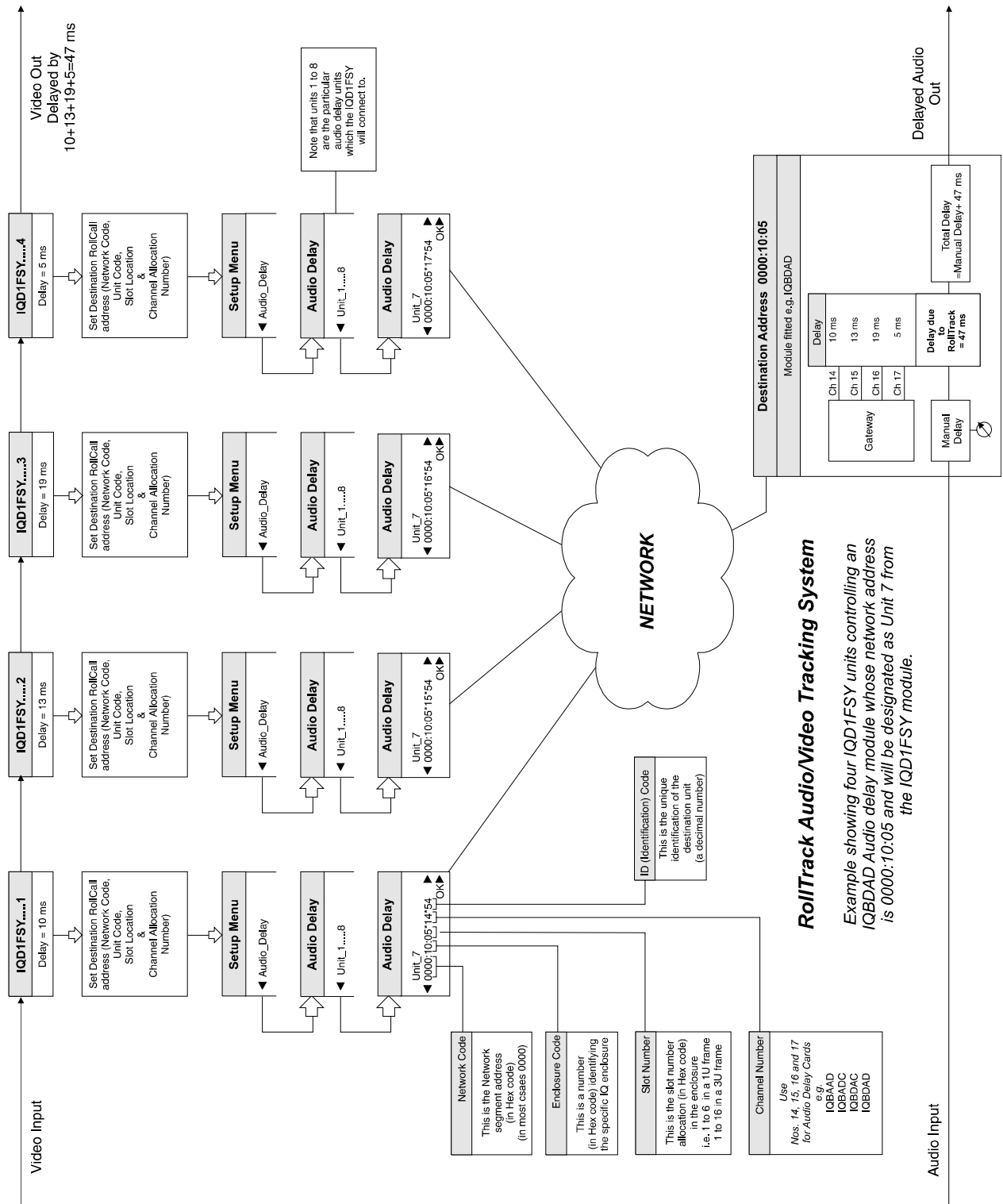
As any of the delay times change in the video path so will the audio delay time track this delay. A virtual connection is made between from, say, an IQD1FSY to an IQBDAD by:

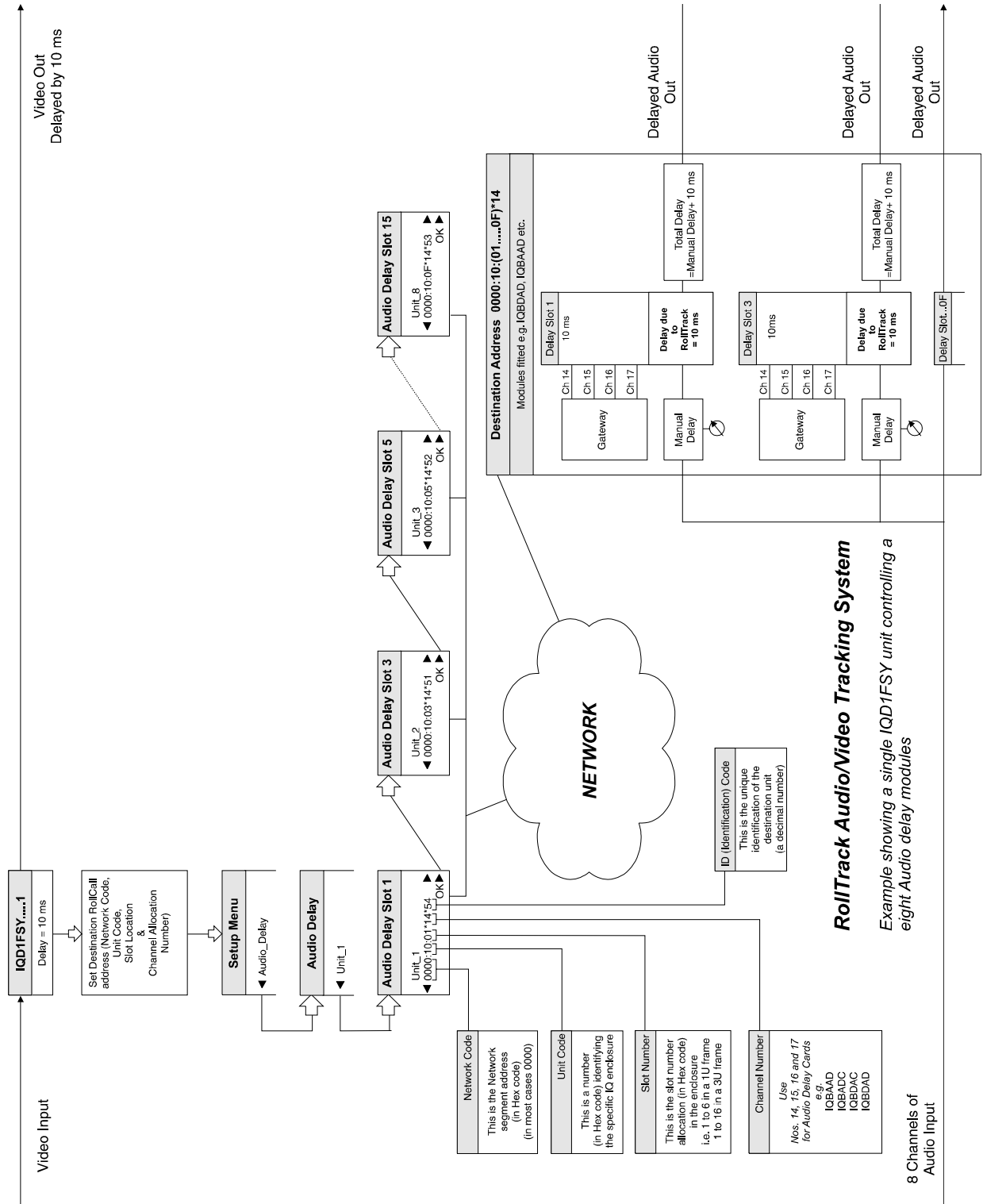
- selecting the *Setup...* Menu of the IQD1FSY
- then selecting the *Audio\_Delay...* Menu
- then choosing from *Unit\_1* to *Unit\_8*
- then entering the unique network address of the IQBDAD in the form  $nnnn:xx:yy*z*d$  where
  - $nnnn$  = network address and in most cases will be 0000(hex);
  - $xx$  = IQ enclosure address (hex);
  - $yy$  = slot address of the IQBDAD (hex)
  - $z$  = the connection (or channel) number (decimal) - see table below.
  - $d$  = the unique identification of the destination unit (decimal) The ID entered must match the receiving units own ID or else the command will be ignored. If the ID value is set to 00, the receiving unit does not perform an ID match and will always accept the incoming command
- then selecting the *Delay...* Menu of the IQBDAD
- then selecting *RollTrack*

Example of Network Addresses with Channel Numbers and ID Numbers

	D1FSY 1	D1FSY 2	D1FSY 3	D1FSY 4
<b>Audio delay 1</b>	0000:10:01*14*54	0000:10:01*15*54	0000:10:01*16*54	0000:10:01*17*54
<b>Audio delay 2</b>	0000:10:03*14*54	0000:10:03*15*54	0000:10:03*16*54	0000:10:03*17*54
<b>Audio delay 3</b>	0000:10:05*14*54	0000:10:05*15*54	0000:10:05*16*54	0000:10:05*17*54
<b>Audio delay 4</b>	0000:10:07*14*54	0000:10:07*15*54	0000:10:07*16*54	0000:10:07*17*54
<b>Audio delay 5</b>	0000:10:09*14*54	0000:10:09*15*54	0000:10:09*16*54	0000:10:09*17*54
<b>Audio delay 6</b>	0000:10:0B*14*54	0000:10:0B*15*54	0000:10:0B*16*54	0000:10:0B*17*54
<b>Audio delay 7</b>	0000:10:0D*14*54	0000:10:0D*15*54	0000:10:0D*16*54	0000:10:0D*17*54
<b>Audio delay 8</b>	0000:10:0F*14*54	0000:10:0F*15*54	0000:10:0F*16*54	0000:10:0F*17*54

The most complex system would be an array of matrix delay clusters





### ***Manual Revision Record***

Date	Version No.	Issue No.	Change	Comments
020498	1	1		Manual Issued
270798	1	2	SW2 drawing page 7 corrected Positions 1 & 2 reversed	New manual issued
141100	1	3	Card edge drawing/text corrected SW2 1, and 2 functions reversed	New manual issued
301100	1	4	Changes to menus, UP DOWN switches swapped	New manual issued
150402	1	5	Now includes information for the 3A enclosure modules	New manual issued
070403	1	6	Power consumption added to techspec	New manual issued