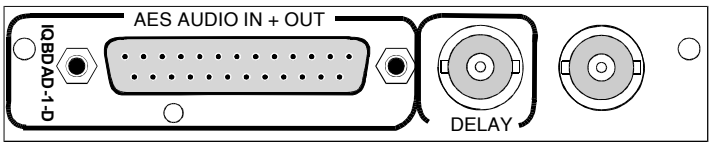
IQBDAD 2 Channel Digital Audio delay

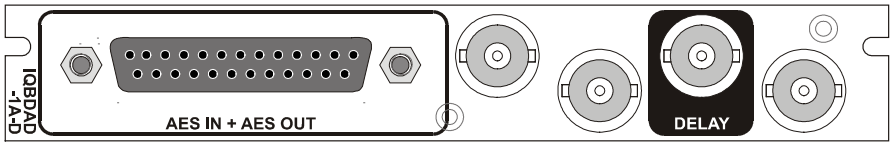
The IQBDAD provides an AES/EBU audio stream with up to 1.8 seconds of delay. Operation is at sample rates of 32, 44.1 or 48 kHz.

REAR PANEL VIEWS

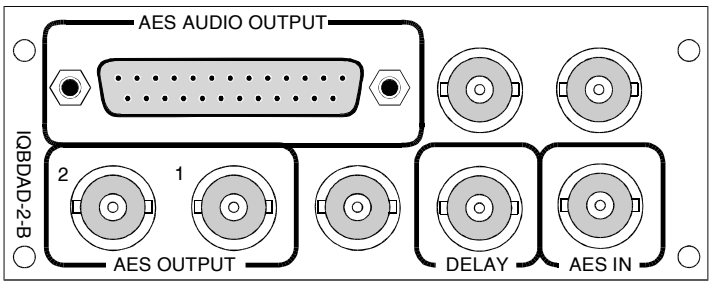
Balanced I/O



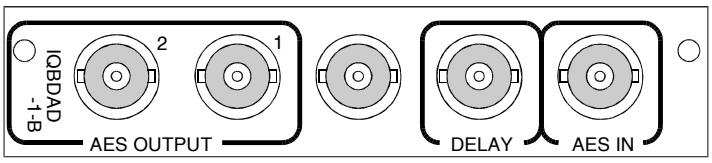
Balanced I/O



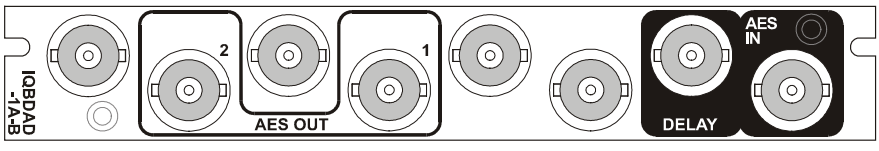
Unbalanced Outputs



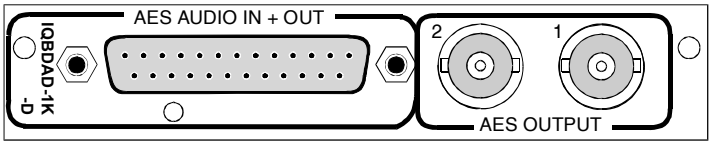
Unbalanced Outputs



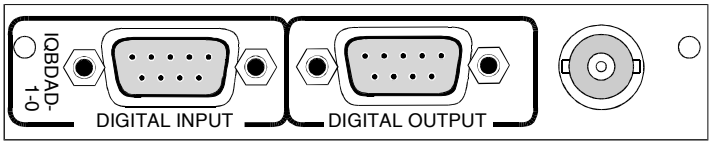
Unbalanced Outputs



Balanced I/O



Balanced I/O 9-way D



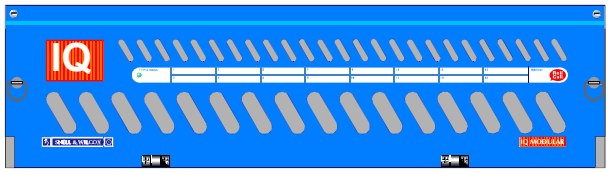
Versions of the module cards available are:

IQBDAD-1-D	4 Stereo outputs 25 way D connector	Single width module
IQBDAD-1K-D	4 Stereo outputs 25 way D connector	Single width module
IQBDAD-1A-D	4 Stereo outputs 25 way D connector	Single width module
IQBDAD-2-B	2 Stereo outputs Unbalanced BNC	Double width module
IQBDAD-1-B	2 Stereo outputs Unbalanced BNC	Single width module
IQBDAD-1A-B	2 Stereo outputs Unbalanced BNC	Single width module
IQBDAD-1-0	2 Stereo output 9 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

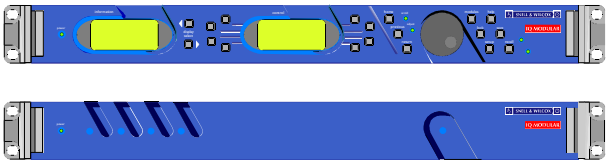
Rear panels ***with*** the suffix A may only be fitted into the 'A' style enclosure shown below.



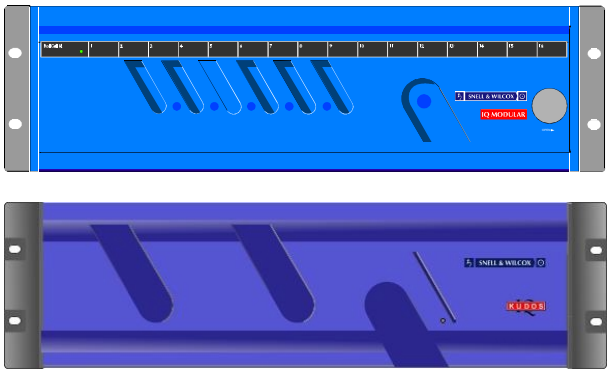
(Enclosure order codes IQH3A-E-O, IQH3A-E-P, IQH3A-N-O, IQH3A-N-P)

'O' Style Enclosures

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

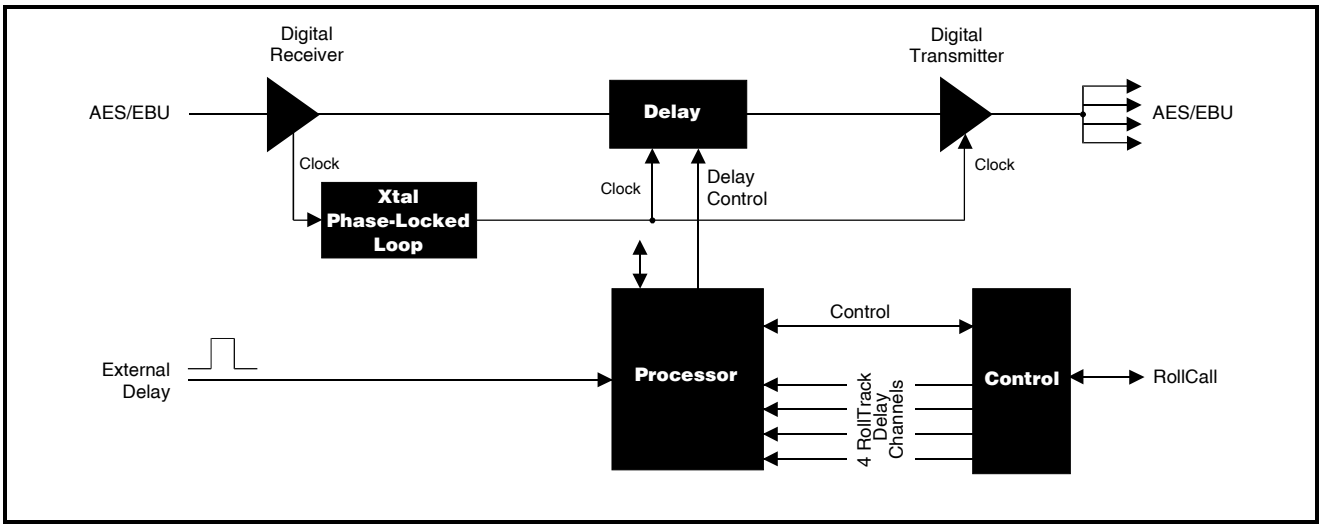


(Enclosure order codes IQH1S-RC-O, IQH1S-RC-AP, IQH1U-RC-O, IQH1U-RC-AP, Kudos Plus Products)



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

BLOCK DIAGRAM



Features

- Up to 1.8 seconds of AES/EBU delay, adjustable in 1 ms steps via RollCall
- Operates at 32, 44.1 or 48 kHz
- Dolby E compliant when using a fixed delay
- Four balanced outputs (25D rear only)
- Delay may be programmed to change only during "silence"
- Full RollCall remote control permits RollTrack automatic delay tracking

TECHNICAL PROFILE

Features

Signal Inputs

Digital..... 1 Balanced AES/EBU
(-D Versions) via 25D
1 Unbalanced AES/EBU
(-B Versions) via BNC

Delay ..... 1 via BNC (-D, -B Versions)

Standards AES3–1992

Signal Outputs

Digital AES/EBU ..... 2 AES/EBU (-0 Versions) 9 way D
4 Balanced AES/EBU
(-D Versions) via 25 way
2 Balanced, 2 Unbalanced
AES/EBU (-2-B Versions)
2 Unbalanced AES/EBU
(-1-B Versions)

Standards AES3–1992

Card Edge Controls (also available via RollCall)

Delay Time..... 0.01 s to 1.8 s in increments of
0.01 s

Mute..... On/Off

Functions Available via RollCall™ Only

Reporting and Logging..... Digital Input Presence
Overflow
Digital Sample Rate

Specifications

Digital Input Level (Balanced)
0.2 V to 7 V pk to pk into
110 Ohms

Digital Output Level (Balanced)
Greater than 3 V pk to pk into
110 Ohms

Digital Receive Distance (Balanced)
Greater than 150 m
(Using 110 Ohm AES
recommended cable)

Digital Input Level (Unbalanced)
0.03 V to 5 V pk to pk into
75 Ohms

Digital Output Level (Unbalanced)
Typically 1 V pk to pk into
75 Ohms

Digital Receive Distance(Unbalanced)
Greater than 1 k m of RG59 or
equivalent

Digital Path ..... 32 kHz, 44.1 kHz and 48 kHz 20-bit

Power Consumption

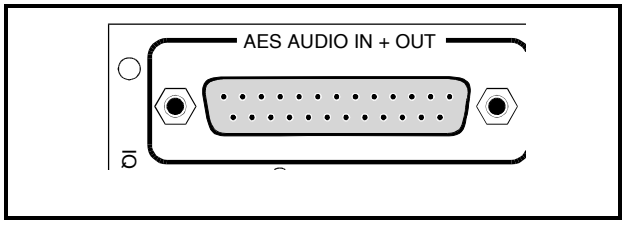
Module Power Consumption 2W max

INPUTS

AES/EBU Input (-1-D versions**)**

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

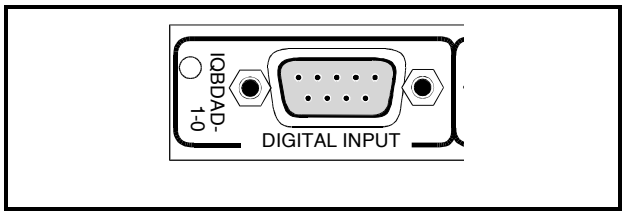
For connection data consult the tables on page 7.



AES/EBU Input (-1-0 version)

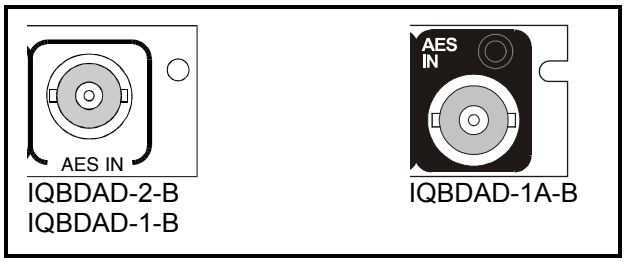
All digital inputs are made via this 9 way female D-type connector

For connection data consult the tables on page 7.



AES/EBU Input (-2-B and –1A-B versions)

This BNC connector is used for the AES/EBU digital input.

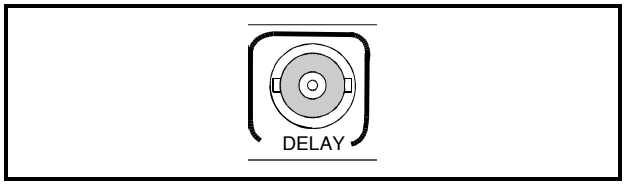


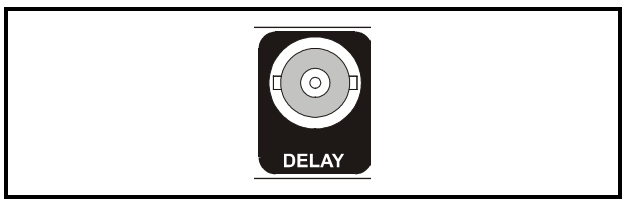
Delay Input

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 signal should be a TTL compatible signal.
The audio will be delayed for a period equal to the duration that this signal. Either active positive or negative may be selected from the menu system.
Note that if no pulse is detected the delay will be set to the minimum of less than 0.5 ms.

To activate audio delay control from this input it should be selected directly via RollCall™

For more information see Appendix on page 16.



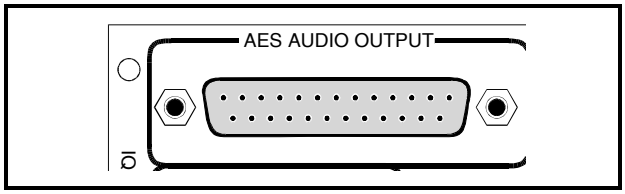


OUTPUTS

AES/EBU Output (-2-B version)

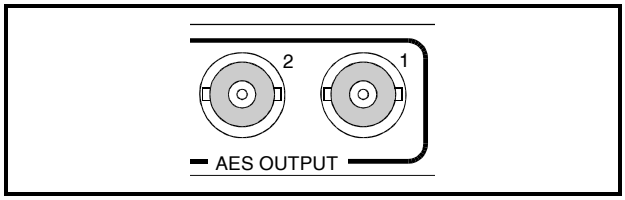
All digital output connections are made via this 25 way female D-type connector.

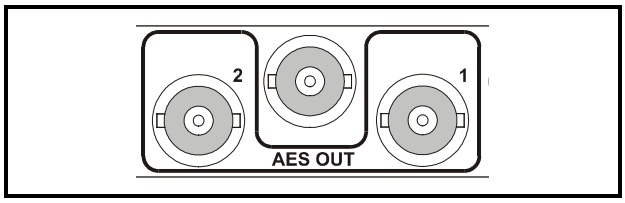
For connection data consult the tables on page 7.



AES/EBU Unbalanced Outputs

All unbalanced digital outputs are made via these BNC connectors.

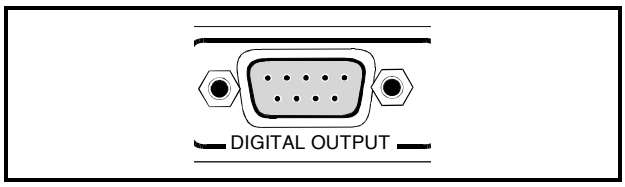




AES/EBU Output (-1-0 version)

All digital outputs are made via this 9 way female D-type connector

For connection data consult the tables on page 7.

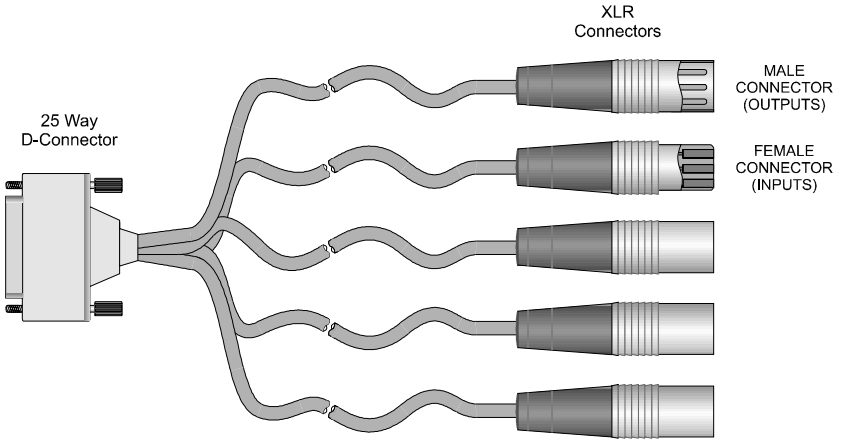


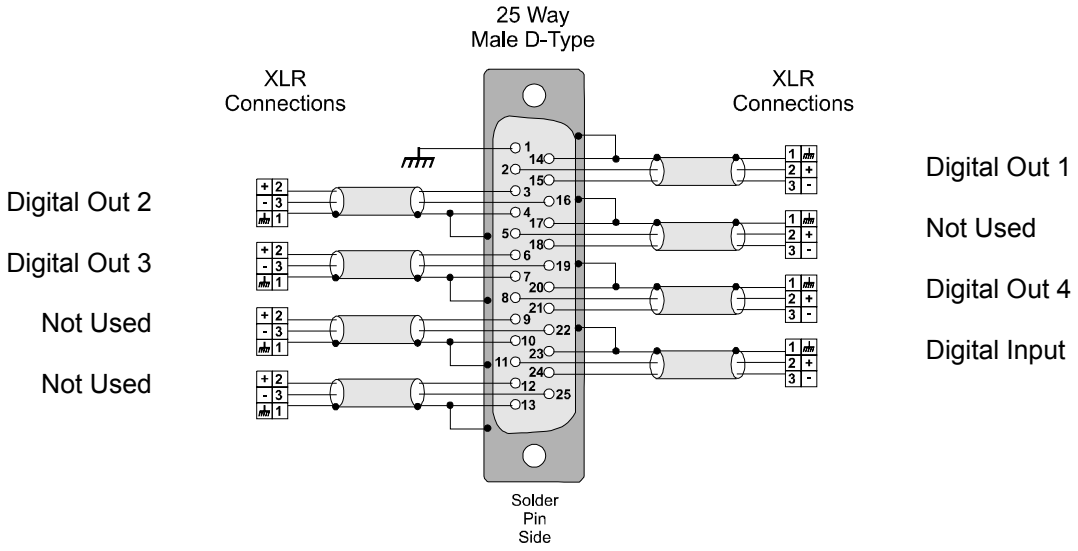
Connection Details

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

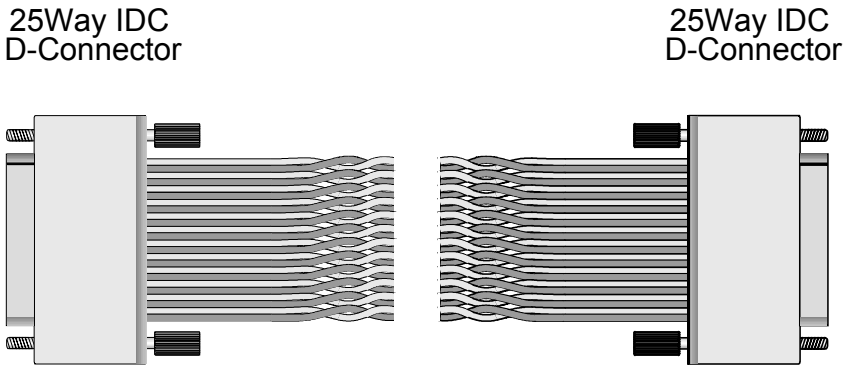
9 Way D Connector Pin Number	Description	Ribbon Cable Strand Number	Standard Pin Assignment
INPUT:			
1		1	CH
6		2	GND1
2	AES IN +	3	1+
7	AES IN -	4	1-
3		5	2+
8		6	2-
4		7	GND2
9		8	CH
5		9	CH
OUTPUT:			
1		1	CH
6		2	GND1
2	AES OUT 1 +	3	1+
7	AES OUT 1 -	4	1-
3	AES OUT 2 +	5	2+
8	AES OUT 2 -	6	2-
4		7	GND2
9		8	CH
5		9	CH

Connection Details to XLR Connectors

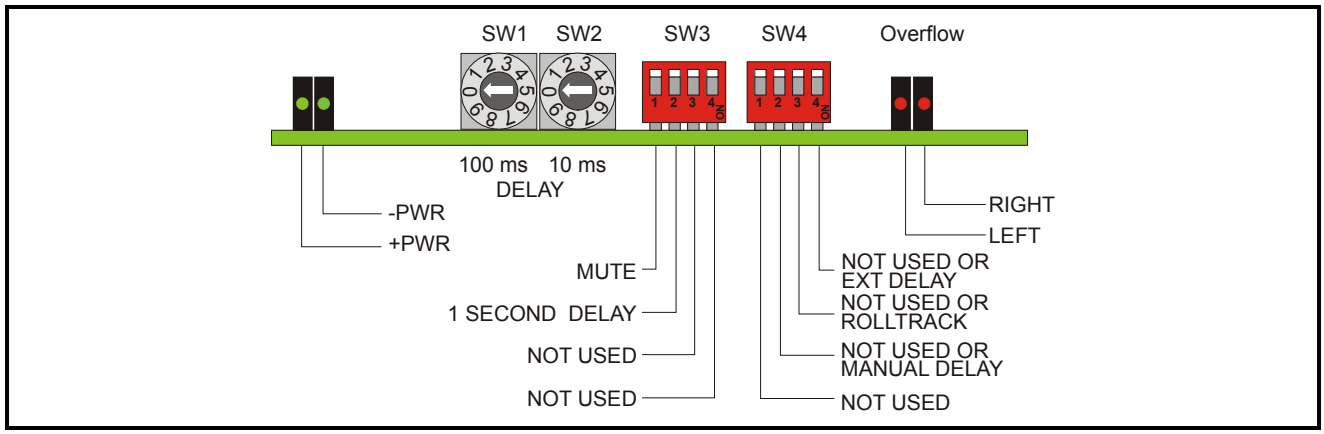




Connection Details via IDC connectors



CARD EDGE CONTROLS



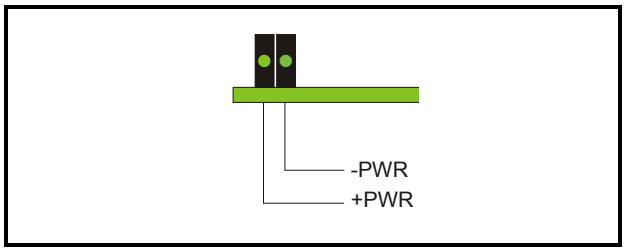
*Adjustment of the settings of the **IQBDAD** is available either via card edge controls and/or via a more comprehensive remote control system using RollCall™*

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

LED INDICATORS

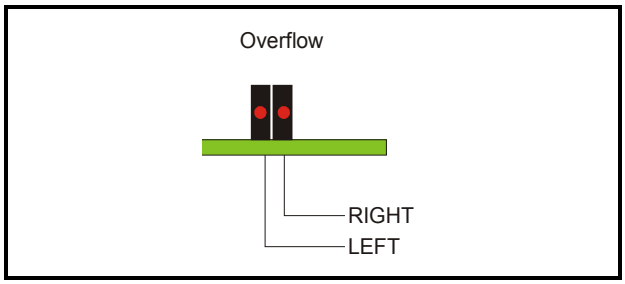
Power

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



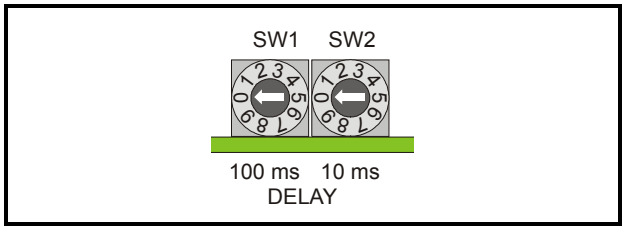
Overflow

These two indicators are illuminated when the peak digital value is detected on the Right and Left channels.



Delay

These two switches allow the delay period to be manually set. SW1 adjusts the time in increments of 100 ms and SW2 in increments of 10 ms.

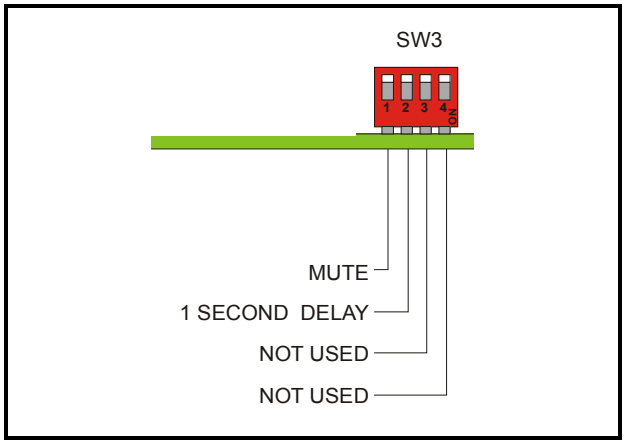


SW3

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

Position 1	Enables the Mute function
Position 2	Increases delay by 1 second

Positions 3 and 4 are not used.



SW4

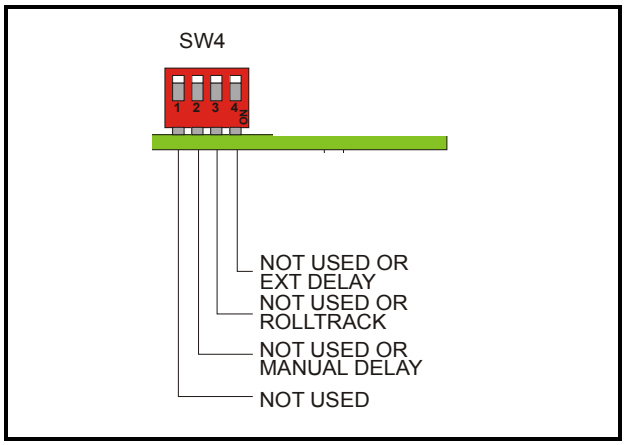
This switch has two modes of operation:

1. When the total delay (*physically* set by SW1/SW2 and the 1 second delay of SW3 position 2) is less than 1900 ms, positions 2, 3 and 4 will have no function and are not used.

2. When the total delay (*physically* set by SW1 and SW2 plus the 1 second delay enabled by SW3 position 2) is greater than 1900 ms, SW4 positions 2, 3 and 4 will allow **delay** selections to be made.

Position 1	Not used
Position 2	Selects Manual Delay
Position 3	Selects RollTrack Delay
Position 4	Selects External Delay

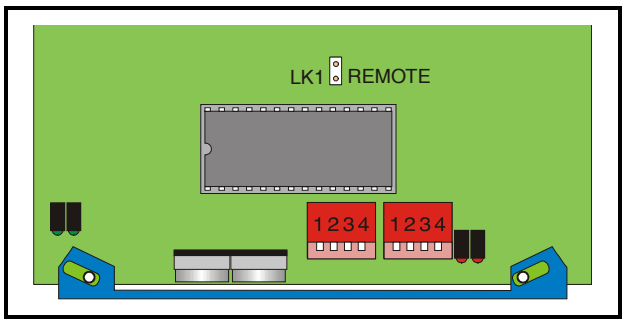
   Any additive combination of positions 2, 3 and 4 may be used.



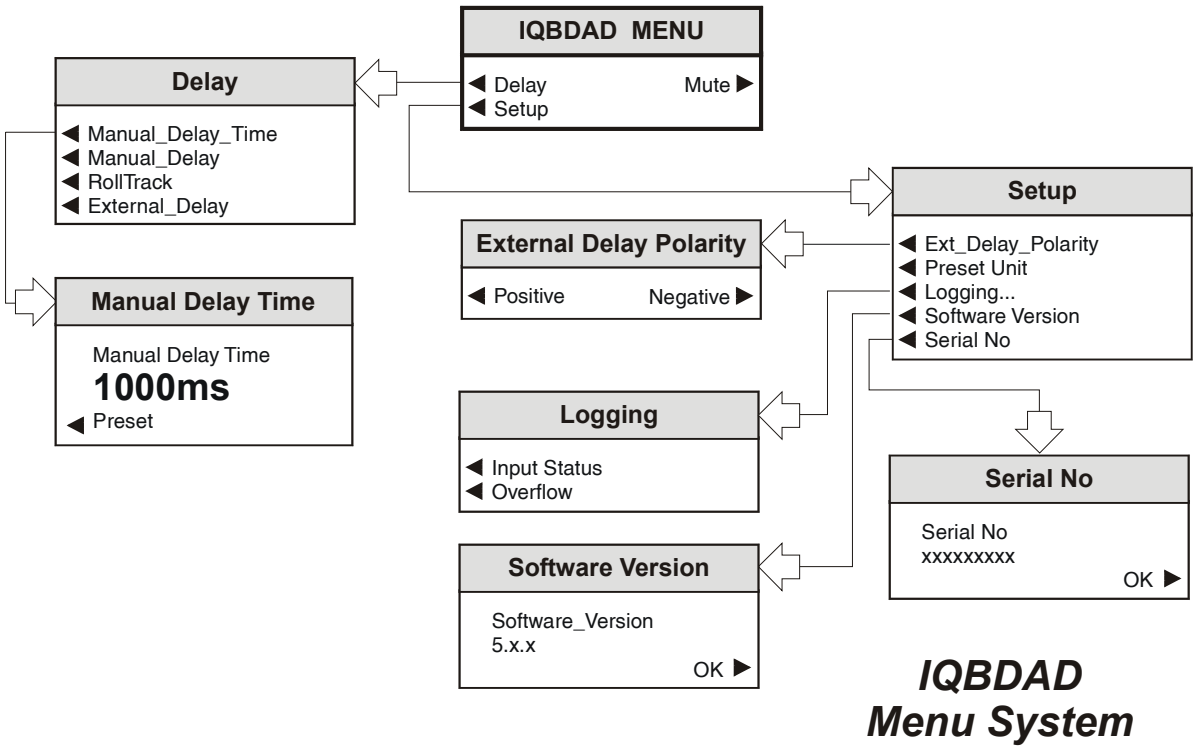
Note that when setting the delay greater than 1900 ms with SW1 and SW2, the display will show a maximum of 1900 ms, not over 1900 ms.

LK1 REMOTE

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 SW3 and SW4 will override the remote control settings. The RollCall™ control panel will then follow these selections.



Note that in Mainframes where RollCall™ is not available the link LK1 (Remote) located near 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 card will power-up with the last settings sent by the remote control panel.



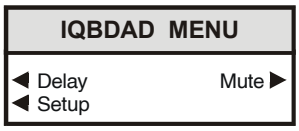
IQBDAD
Menu System

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 the previous page and will appear in the Control display window.

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.

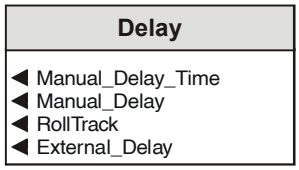


Note that where a menu item is followed by three dots (...) this indicates that a further sub-menu may be selected.

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.

◀ 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.



The total delay time will be the sum of the *enabled delay functions.*

Any of the following may be selected:

Nothing checked.....No delay
Manual delay .....Manual delay only
External delay.....External delay only
RollTrack .....RollTrack delay only

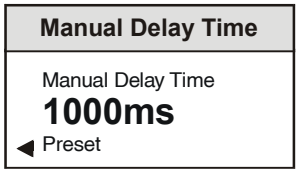
The following combinations may also be used:

- Manual delay + RollTrack delay
- Manual delay + External delay
- RollTrack delay + External delay
- Manual delay + RollTrack delay + External delay

Preset is to Manual.

◀ 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 and by the bargraph display.
Note that when the audio delay is being controlled remotely the bargraph will indicate the current delay setting.



The range of adjustment is ±1800 ms in increments of 1 ms.

The preset value is 0 ms.

◄ Manual Delay

This selection allows the manual delay time to be set using the Manual Delay Time function or the card edge controls.

◄ RollTrack

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 60 seconds, the delay time for that channel will assume a value of zero.

◄ External Delay

This selection allows an external TTL signal connected to the `Delay' 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 Ext Delay Polarity function in the Set-up menu to select polarity.

Mute ►

The output signal will be muted when this toggle ON/OFF function is used.

◄ Setup

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

Setup
◄ Ext_Delay_Polarity
◄ Preset Unit
◄ Logging...
◄ Software Version
◄ Serial No

◄ Ext Delay Polarity

External Delay Polarity	
◄ Positive	Negative ►

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

◄ Preset Unit

Selecting this item sets all adjustment functions that include a prset 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.

Logging
◄ Input Status
◄ Overflow

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

- Input Status
- Overflow

◄ Software Version

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

Software Version
Software_Version 5.x.x
OK ►

Select OK to return to the System Menu.

◄ Serial Number

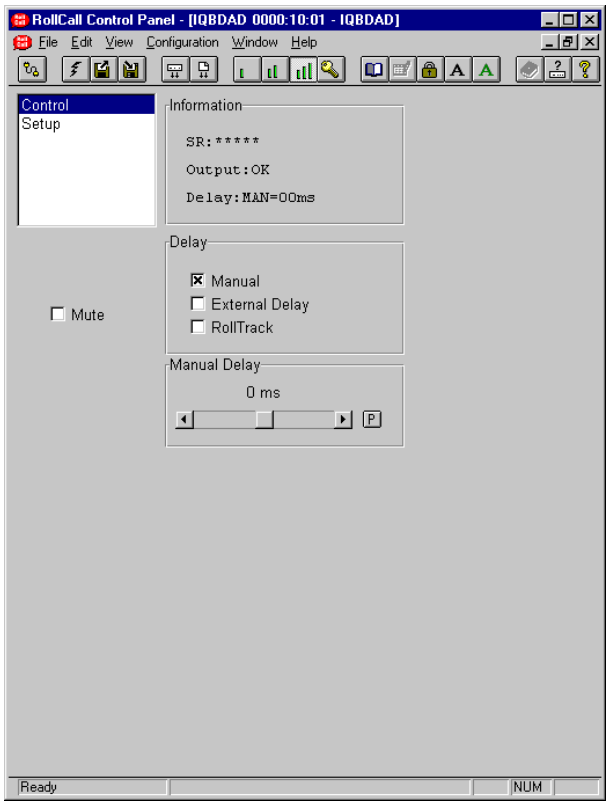
Selecting this item reveals a display showing the serial number of the module.

Serial No
Serial No xxxxxxxxx
OK ►

Select OK to return to the System Menu.

RollCall PC Control Panel Screens for the IQBDAD

Control



This screen contains the main controls for the unit.

Mute

The output signal will be muted when this toggle function is used.

Delay

This item allows the delay source to be selected.

The total delay time will be the sum of the *enabled delay items.*

Any of the following may be selected, by means of checkboxes:

Nothing checked ..... No delay
Manual ..... Manual delay only
External delay..... External delay only
RollTrack ..... RollTrack delay only

The following combinations may also be used:

- Manual delay + RollTrack delay
- Manual delay + External delay
- RollTrack delay + External delay
- Manual delay + RollTrack delay + External delay

Preset is to Manual.

Manual Delay

The scrollbar may be used to adjust the delay time when this function is enabled. The time in milliseconds will be shown as a numerical value above the scroll bar

Note that when the audio delay is being controlled remotely the delay will be indicated here.

The range of adjustment is ±1800 ms in increments of 1 ms.

Selecting Preset P will return to the preset value of 0 ms.

Setup

Logging

If a logging device is attached to the RollCall™ network, information about the selected item will be reported to the logging device assigned in the Remote Control Interface system.

Software Version

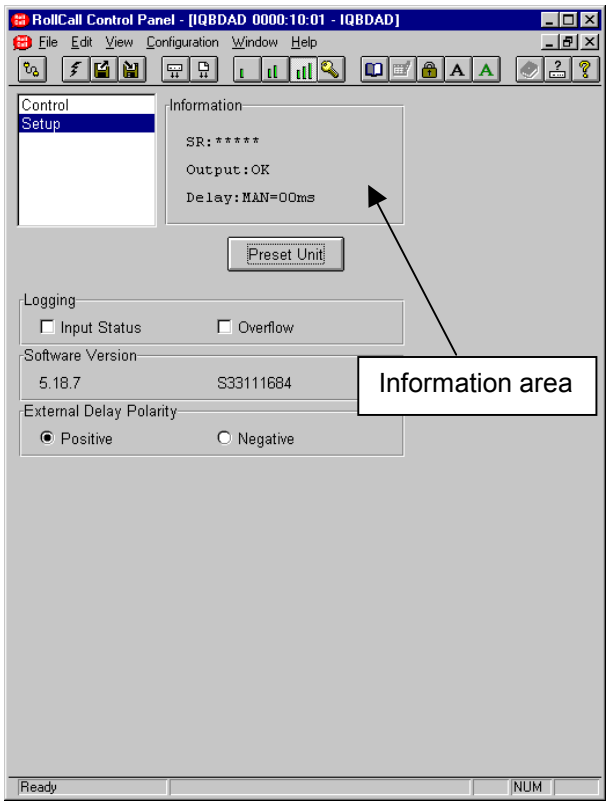
This item shows the version of the software fitted in the module followed by the serial number of the module.

External Delay Polarity

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

Preset Unit

Selecting this item sets all adjustment functions that include a preset facility, to their preset values.



Information Area

This area shows the status of the unit in an abbreviated form.

The first line shows the internal sample rate (SR).

```
SR:*****
```

The second line shows the state of the output.

```
Output:OK
```

The third line shows the delay source(s) selected and the delay time in milliseconds.

```
Delay:MAN=00ms
```

Appendix

Delay Function

In addition, by selecting a delay of 1900ms or greater on the front switches, the headroom switches change their operation to become "Manual delay", "RollTrack delay" and "External delay" on/off selection respectively.
Only when any of these switches are moved are their settings latched into memory (so accidentally cycling through a delay of 1900ms will not change the delay selection).
When the delay is set back to a value of 1800ms or less the switches resume their normal operation of sample rate selection and attenuation selection.

RollTrack Audio Delay Tracking

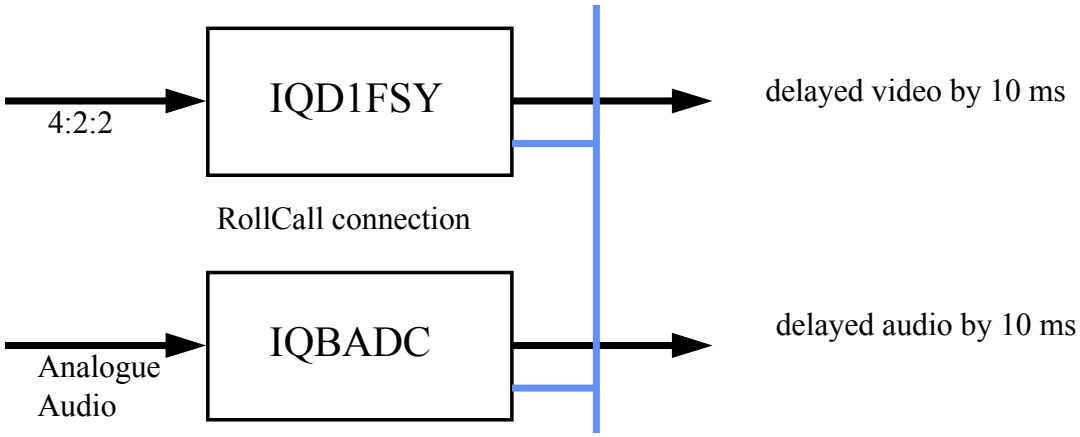
RollTrack is a feature of RollCall™ (Snell & Wilcox's proprietary remote control system), that allows devices to communicate across the RollCall network with no direct user intervention.

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.



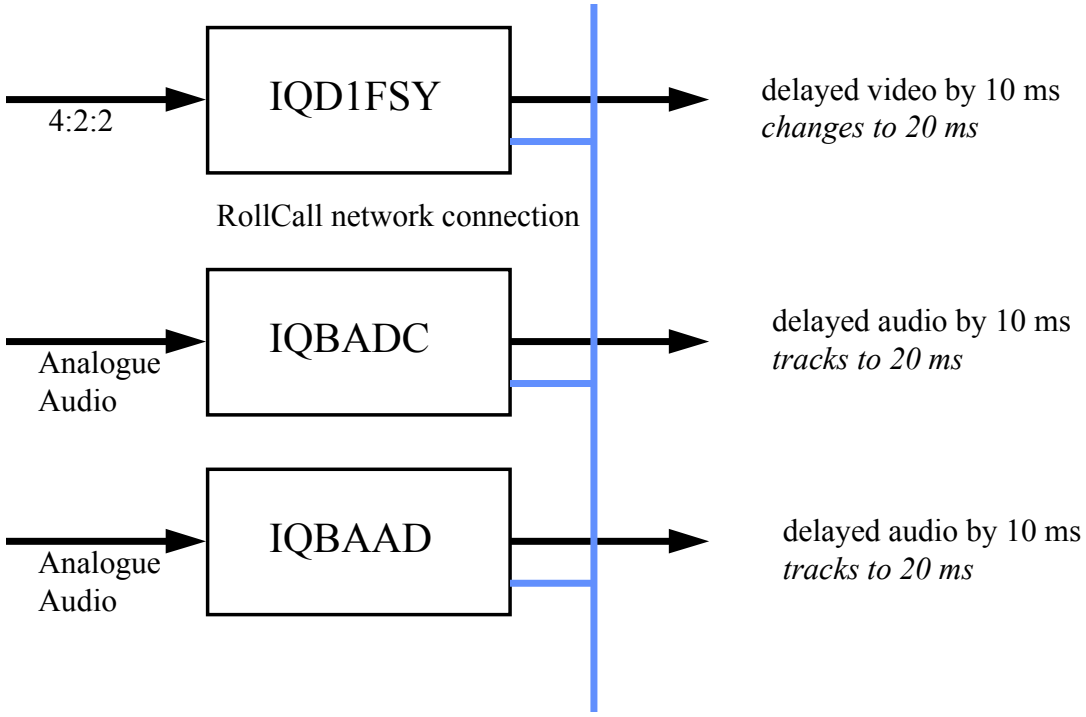
The next level of configuration is where there are multiple Frame Synchronizers (for example) each connected through RollCall™ to their own tracking Audio Delay. (It is worth stating that the synchronizers and audio delays do not have to be in the same enclosure; the addressing scheme, discussed later,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

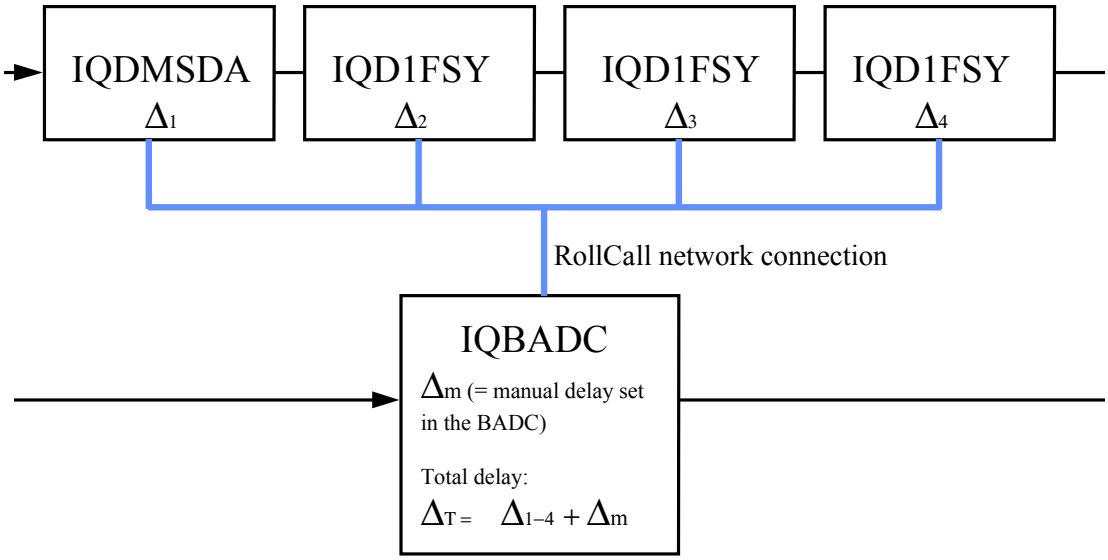
Module	ID
IQBADC	51
IQBDAC	52
IQBAAD	53
IQBDAD	54
IQBSYN	89
IQBADCD	107

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.



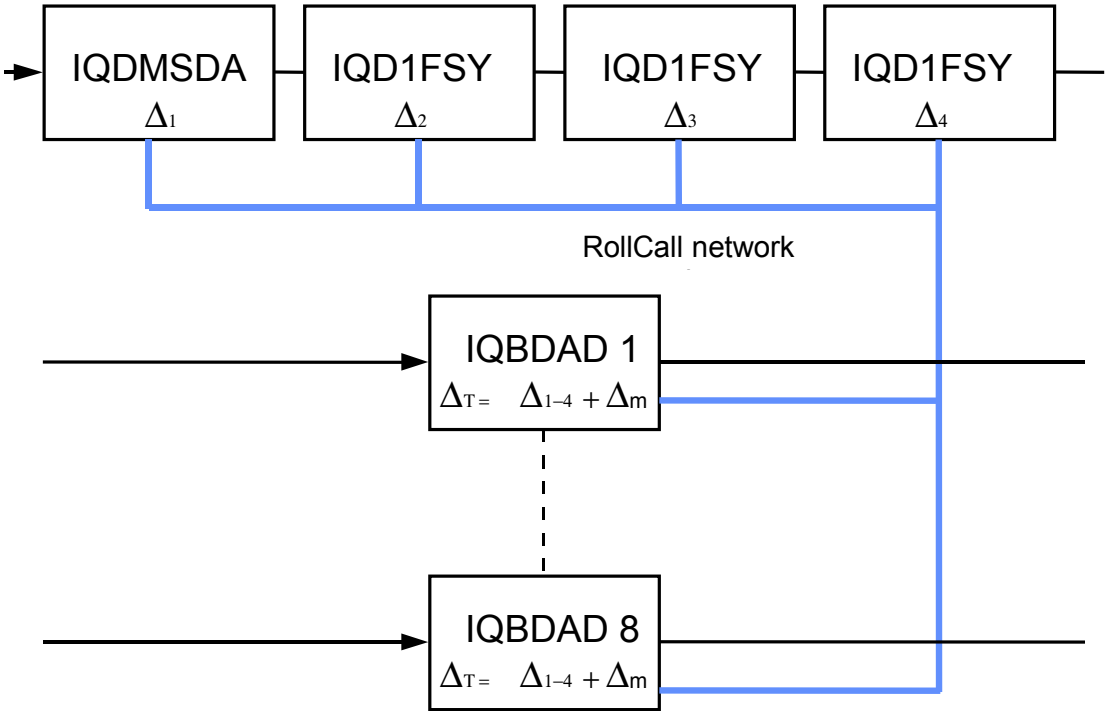
From one to eight audio delay products can be connected via RollCall™ to a single frame synchronizer, for example. If the synchronizer delay changes, then however many audio delays are connected will track the delay. The audio delays can also have a manual delay which will be added to the RollTrack delay.

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.



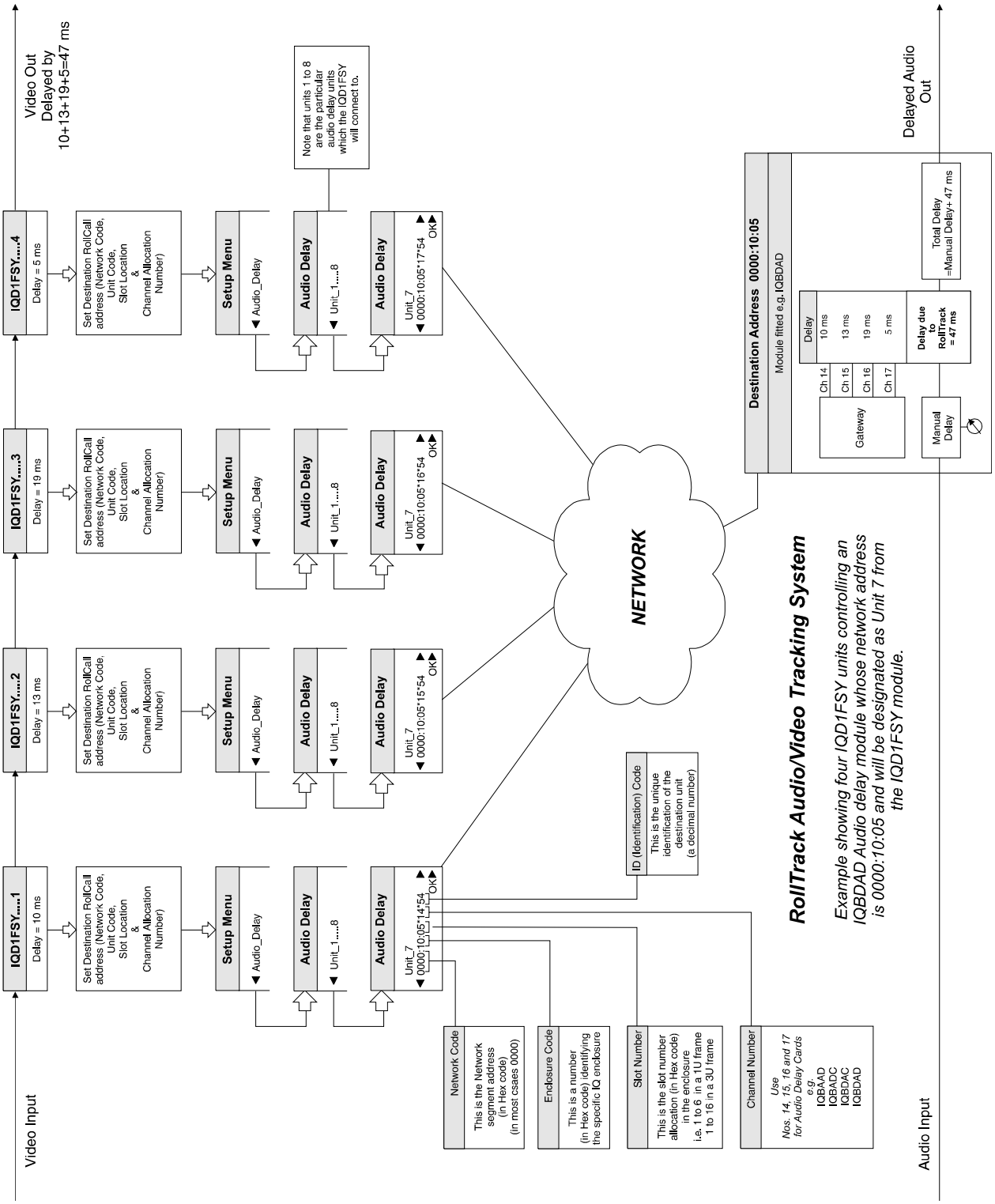
As any of the delay times change in the video path so will the audio delay time track this delay.
A virtual connection is made between from, say, an IQD1FSY to an IQBDAD by:

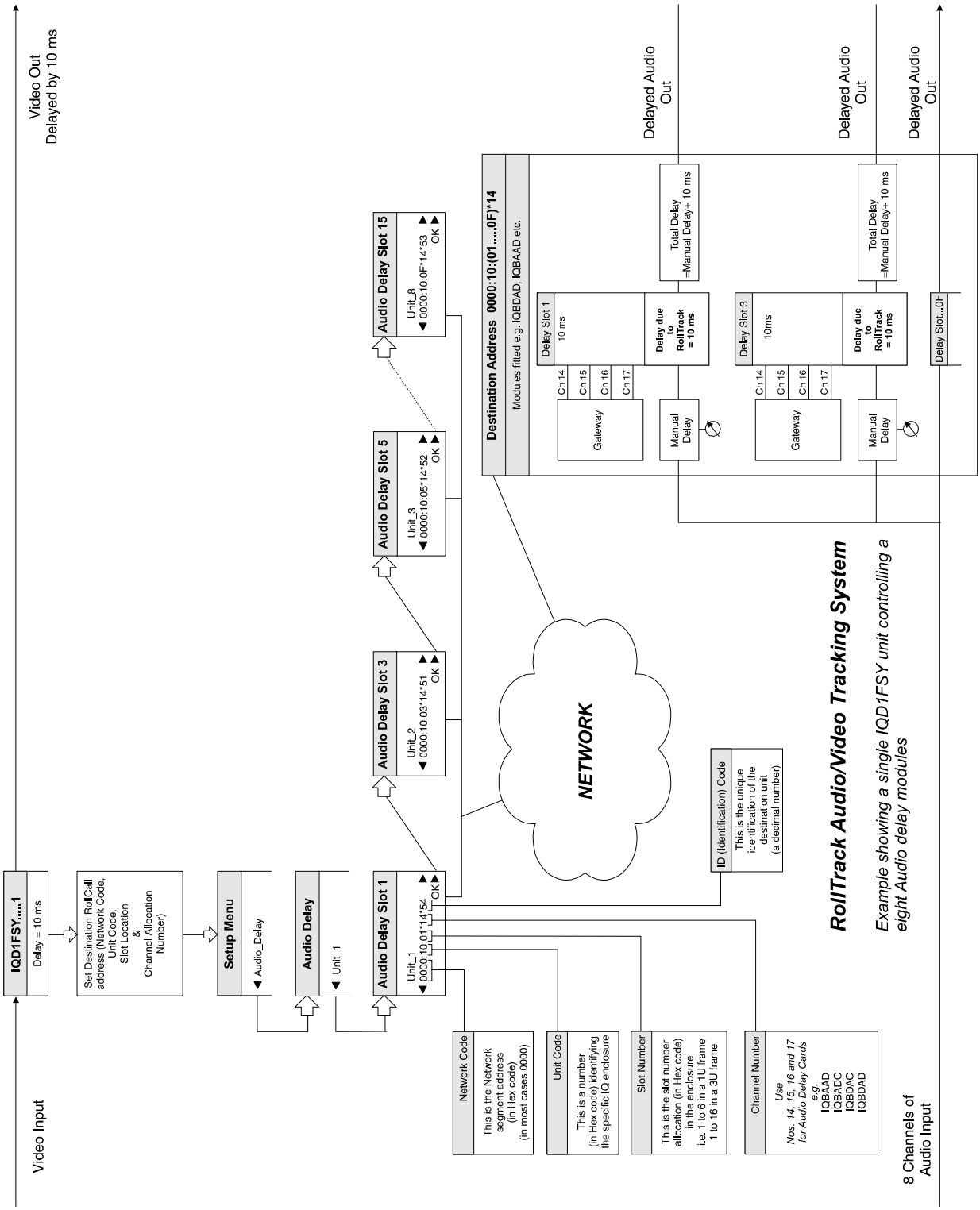
selecting the *Setup...* Menu of the IQD1FSY
then selecting the *Audio_Delay...* Menu
then choosing from *Unit_1* to *Unit_8*
then entering the unique network address of the IQBDAD in the form *nnnn:xx:yy*z*d*
where *nnnn* = network address and in most cases will be 0000(hex);
xx = IQ enclosure address (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**
Audio delay 1	0000:10:01*14*54	0000:10:01*15*54	0000:10:01*16*54	0000:10:01*17*54
Audio delay 2	0000:10:03*14*54	0000:10:03*15*54	0000:10:03*16*54	0000:10:03*17*54
Audio delay 3	0000:10:05*14*54	0000:10:05*15*54	0000:10:05*16*54	0000:10:05*17*54
Audio delay 4	0000:10:07*14*54	0000:10:07*15*54	0000:10:07*16*54	0000:10:07*17*54
Audio delay 5	0000:10:09*14*54	0000:10:09*15*54	0000:10:09*16*54	0000:10:09*17*54
Audio delay 6	0000:10:0B*14*54	0000:10:0B*15*54	0000:10:0B*16*54	0000:10:0B*17*54
Audio delay 7	0000:10:0D*14*54	0000:10:0D*15*54	0000:10:0D*16*54	0000:10:0D*17*54
Audio delay 8	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




Video Out
Delayed by 10 ms
IQD1FSY.....1
Delay = 10 ms
Set Destination RollCall address (Network Code, Unit Code, Slot Location & Channel Allocation Number)
Setup Menu
Audio_Delay
Audio Delay
Unit_1
Audio Delay Slot 1
Unit_1
0000:10:01*14*54
OK
Audio Delay Slot 3
Unit_2
0000:10:03*14*51
OK
Audio Delay Slot 5
Unit_3
0000:10:05*14*52
OK
Audio Delay Slot 15
Unit_8
0000:10:0F*14*53
OK
Destination Address 0000:10:(01.....0F)*14
Modules fitted e.g. IQBDAD, IQBAAD etc.
Delay Slot 1
10 ms
Ch 14
Ch 15
Ch 16
Ch 17
Gateway
Manual Delay
Delay due to RollTrack = 10 ms
Total Delay =Manual Delay+ 10 ms
Delay Slot 3
10ms
Delay Slot..0F
Delayed Audio Out
NETWORK
ID (Identification) Code
This is the unique identification of the destination unit (a decimal number)
Network Code
This is the Network segment address (in Hex code) (in most cases 0000)
Unit Code
This is a number (in Hex code) identifying the specific IQ enclosure
Slot Number
This is the slot number allocation (in Hex code) in the enclosure i.e. 1 to 6 in a 1U frame 1 to 16 in a 3U frame
Channel Number
Use Nos. 14, 15, 16 and 17 for Audio Delay Cards e.g. IQBAAD IQBADC IQBDAC IQBDAD
RollTrack Audio/Video Tracking System
Example showing a single IQD1FSY unit controlling a eight Audio delay modules
Video Input
8 Channels of Audio Input

Dolby E Compatibility

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

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

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

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

Product Settings
For Dolby E pass through the unit must be set to a fixed delay

Software Revision (If applicable)	Product Serial Number
V5.17.7	

Test Configuration	Number of Audio Bits Passed	Channel Status Bits	Delay (E-E)
DM100 connected directly to input/output of card	24	Passed through	6 AES frames offset (with additional delay in 1 ms increments)

Compatibility

Level (Fully, Conditionally, Partially)	Reason
Conditional	Samples are dropped/repeated when the delay changes so a fixed delay must be used

Manual Revision Record

Date	Version No.	Issue No.	Change	Comments
240196	1	1		First Issue
200297	1	2	Replace pages 24.5 and 24.6	25 way D connection details `AES OUT 2' corrected
130397	1	3	Replace page 24.3	Digital i/p & o/p level change
200397	1	4	25 way to XLR drawing corrected	Solder pin side now shown
090597	1	5	RollTrack details added	
141097	1	6	ID data added to RollTrack text	New manual issued
281097	1	7	New menu data added	New manual issued
140598	1	8	New rear panels added (now 5)	New manual issued
201198	1	9	Card edge switches named and SW4 functions added	New manual issued
090999	1	10	Page 15 Auto to RollTrack	New manual issued
280302	1	11	Now includes information for the 3A enclosure modules	New manual issued
020403	1	12	Power consumption added to techspec	New manual issued
130104	1	13	For BAIF card + templates added	New manual issued