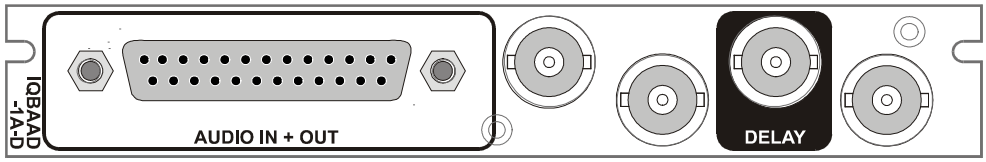
IQBAAD 2 Channel Analog Audio Delay

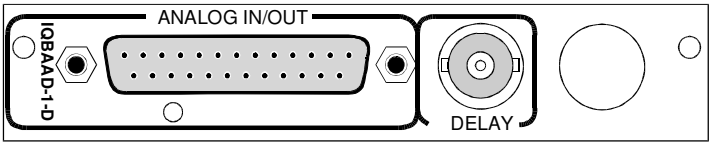
Module Description

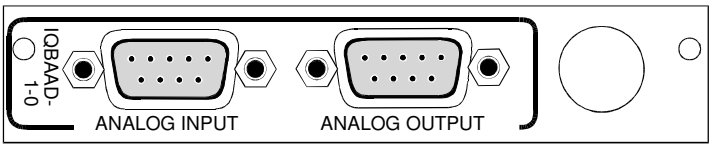
The IQBAAD provides up to 1.8 seconds of delay (at 20-bit digital) with analog stereo I/O.

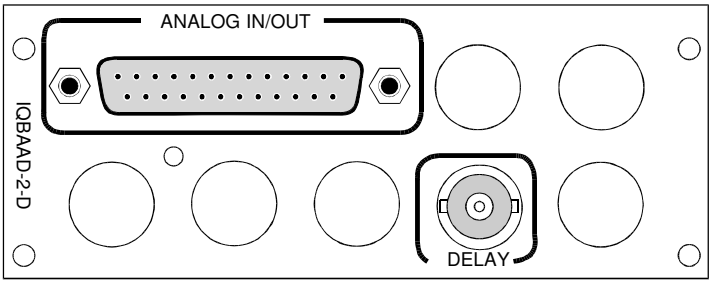
A precision attenuator permits operation at +18, +21 or +24 dB. A crystal locked clock operates at 48 kHz. Up to two outputs are available

REAR PANEL VIEWS









(Obsolete)

This device complies with Part 15 of the FCC rules.
Operation is subject to the following two conditions:
1, this device may not cause harmful interference, and
2, this device must accept any interference received, including interference that may cause undesired operation.

Versions of the module cards available are:

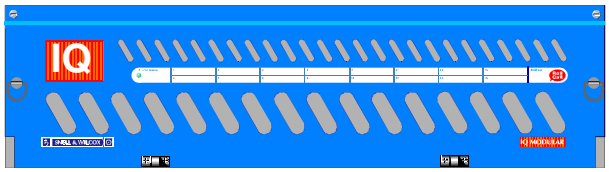
IQBAAD-1-0	Single width Module 9 way D connectors
IQBAAD-1-D	Single width Module 25 way D connector
IQBAAD-1A-D	Single width Module 25 way D connector
IQBAAD-2-D	Double Width Module 25 way D connector (Obsolete)

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

Note that there are two styles of rear panels available. They are not interchangeable between the two styles of enclosures. However, the cards may be fitted into any style of enclosure.

'A' Style Enclosure

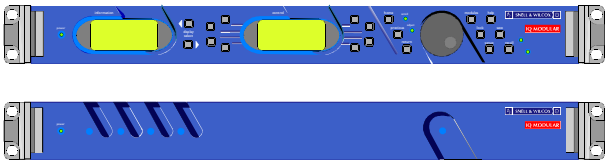
Rear panels ***with*** the suffix A may only be fitted into the 'A' style enclosure shown below.



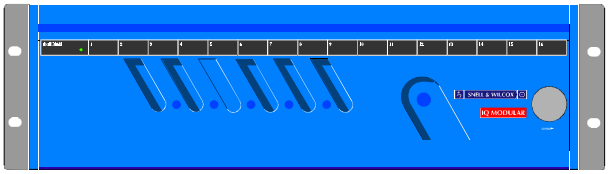
(Enclosure order codes IQH3A-E-0, IQH3A-E-P, IQH3A-0-0, IQH3A-0-P)

'O' Style Enclosures

Rear panels ***without*** the suffix A may only be fitted into the '0' style enclosures shown below.



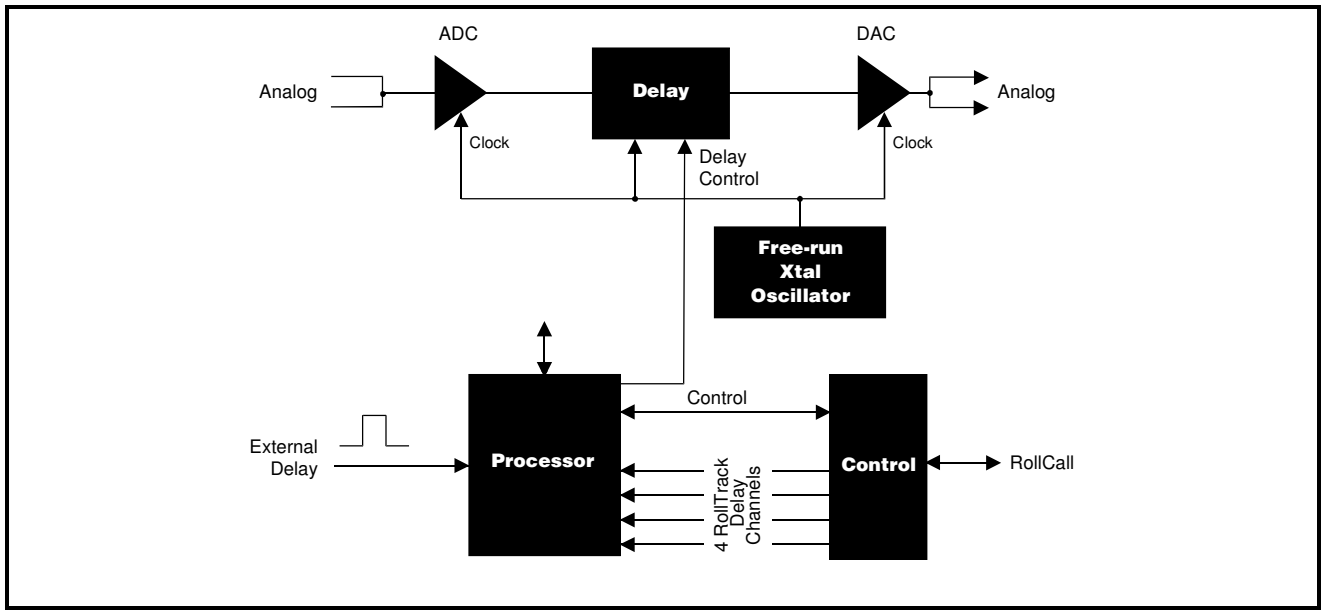
(Enclosure order codes IQH1S-RC-0, IQH1S-RC-AP, IQH1U-RC-0, IQH1U-RC-AP, Kudos Plus Products)



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

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

BLOCK DIAGRAM



Features

Up to 1.8 seconds of delay, adjustable in 1 ms steps via RollCall

- Delay may be programmed to change only during "silence"
- Headroom set to +18, +21 or +24 dBu
- Operates at 48 kHz
- 20-bit sampling resolution
- Two balanced outputs (25D rear only)
- Overflow indication
- Full RollCall remote control permits RollTrack automatic delay tracking

TECHNICAL PROFILE

Features

Signal Inputs

Analog .....2 Channels (1 Stereo Pair)

Delay .....1 Via BNC (-D Versions)

Signal Outputs

Analog .....1 x 2 Channels (1 Stereo Pair) –0 Versions (9 way D)
2 x 2 Channels (2 Stereo pairs) –D Versions (25 way D)

Card Edge Controls (also available via RollCall)

Analog Attenuator..... 18, 21, 24 dBu

Delay Time ..... 0.01-1.8 Sec in 100 ms Steps

Mute ..... On/ Off

Functions Available via RollCall™ Only

Reporting and Logging..... Overflow

Specifications

Analog Input/Output Level ..3 Headroom Ranges:
18 dBu (8.8 V pk to pk)
21 dBu (12.3 V pk to pk)
24 dBu (17.5 V pk to pk)

Analog Input Impedance.....10 k ohms

Analog Output Impedance ..50 ohms

Digital Path.....48 kHz, 20-bit

Total Harmonic Distortion + Noise
Less than 0.006% at 700 Hz and –1 dBFs

Total Harmonic Distortion + Noise
Less than 0.006% at 700 Hz and -28 dBFs

Noise Floor.....Better than -100 dBFs (20 Hz to 20 kHz)

Channel Amplitude Matching
Better than ±0.15 dBu

Output Level Accuracy..... Better than ±0.2 dBu

Flatness..... Better than +0.1 dBu to -0.3 dBu (20 Hz to 20 kHz with reference to 1 kHz)

Minimum Delay..... Less than 0.5 ms

Power Consumption

Module Power Consumption
7.2 W max

EMC Performance Information

Environment ..... Commercial and light industrial E2

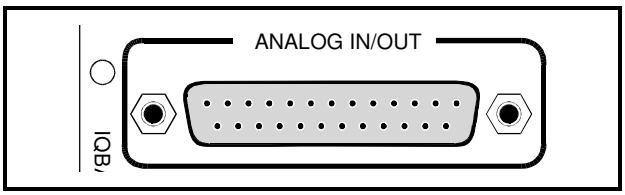
Peak Mains Inrush Current following a 5 second mains interruption
No mains input

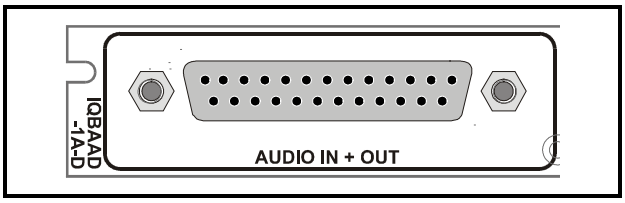
Performance Information ... No performance degradations or cable length limitations

INPUTS AND OUTPUTS

All analog input and output connections are made via this 25 way female D-type connector (-2D and -1D versions).

For connection data consult the tables on page 6.

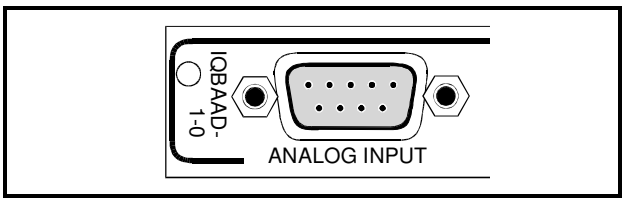




Analog Input

All analog inputs are made via this 9 way female D-type connector (-1 version only)

For connection data consult the tables on page 6.

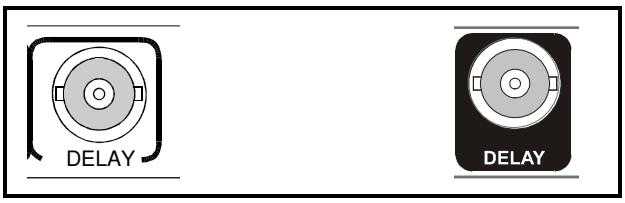


Delay Input

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™

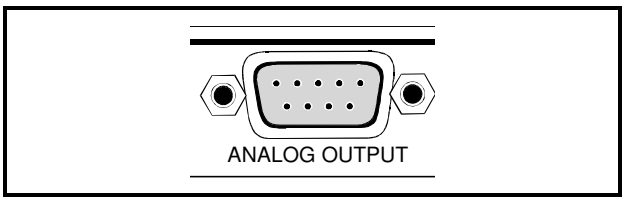
For more information see Appendix on page16.



Analog Output

All analog outputs are made via this 9 way female D-type connector (-1 version only)

For connection data consult the tables on page 6.

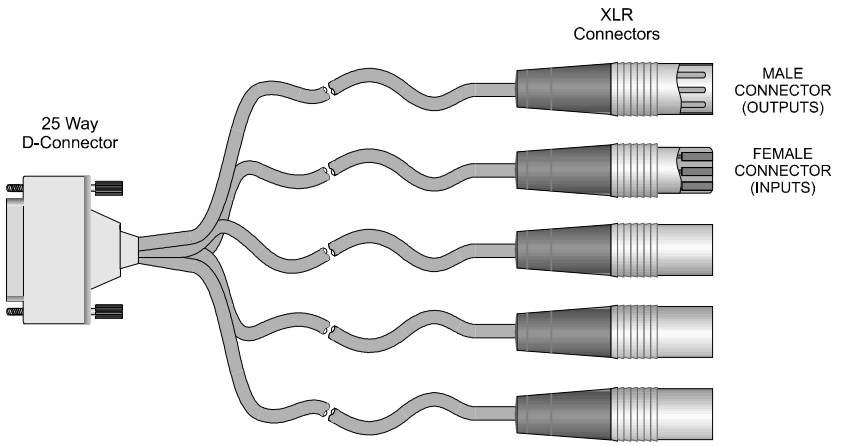


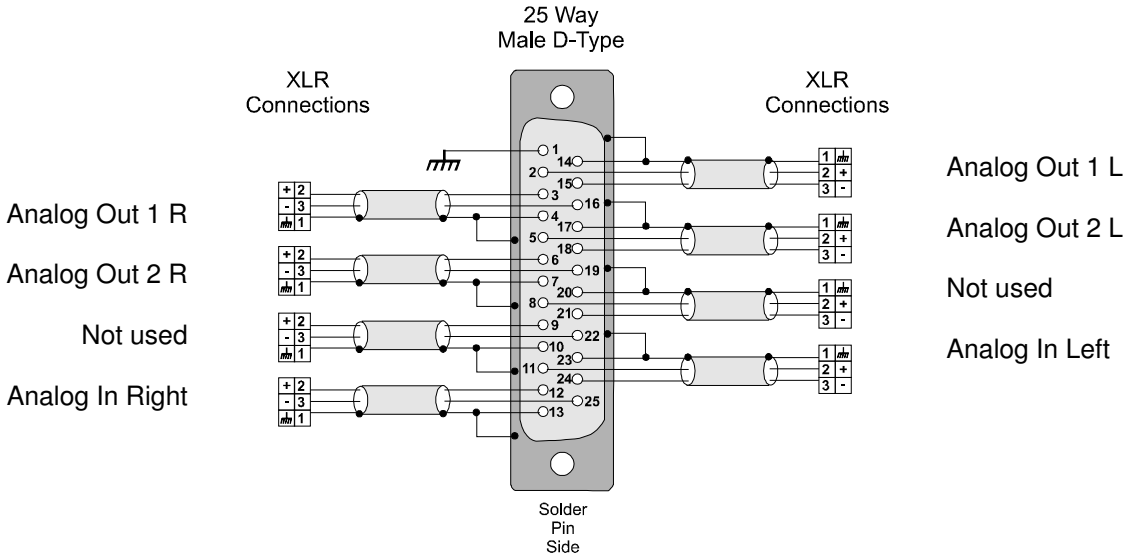
Connection Details

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

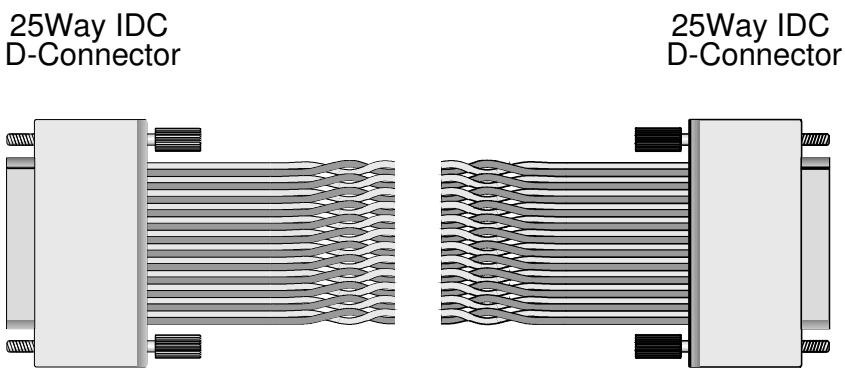
9 Way D Connector Pin Number	Description	Ribbon Cable Strand Number	Standard Pin Assignment
INPUT			
1		1	CH
6		2	GND1
2	ANALOG IN Left +	3	1+
7	ANALOG IN Left -	4	1-
3	ANALOG IN Right +	5	2+
8	ANALOG IN Right -	6	2-
4		7	GND2
9		8	CH
5		9	CH
OUTPUT			
1		1	CH
6		2	GND1
2	ANALOG OUT 1 Left+	3	1+
7	ANALOG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

Connection Details to XLR Connectors

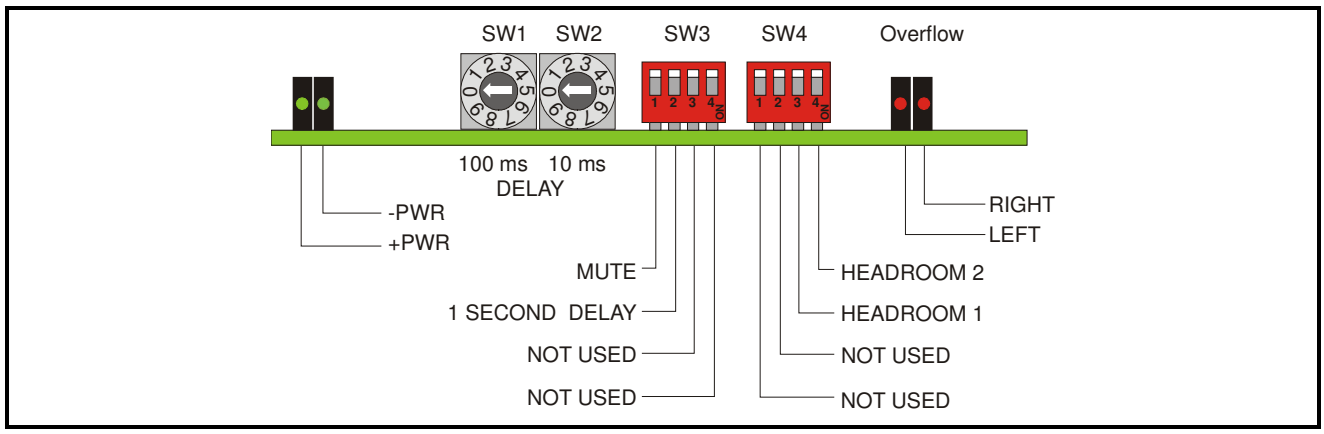




Connection Details via IDC connectors



CARD EDGE CONTROLS



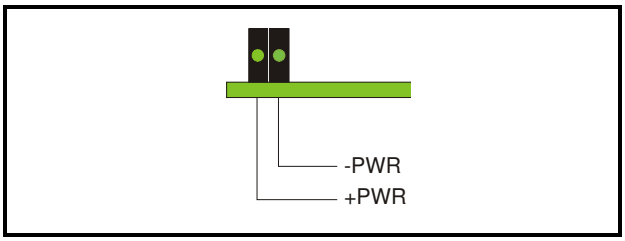
*Adjustment of the settings of the **IQBAAD** is available either via card edge controls and/or via a more comprehensive remote control system using RollCall™*

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

LED INDICATORS

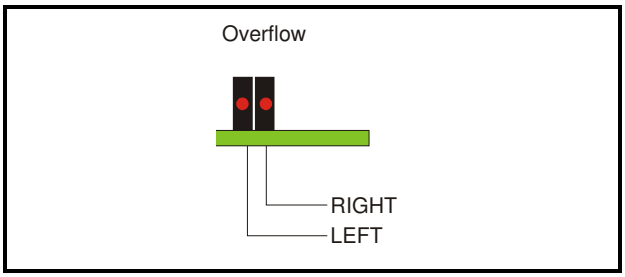
Power

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



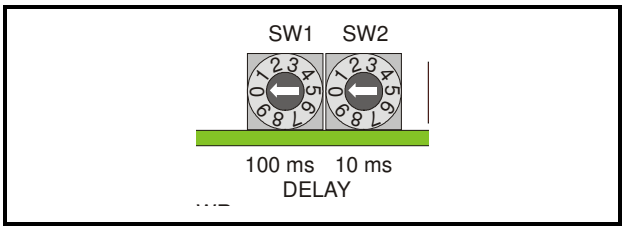
Overflow

Two indicators are illuminated when bit overflow is detected on the Right and Left channels.



DELAY CONTROLS SW1 and SW2

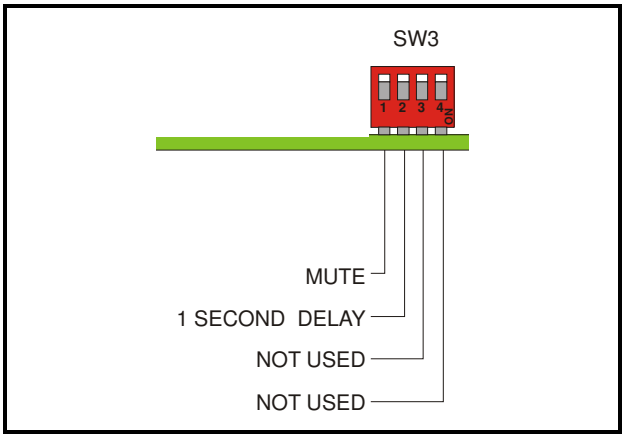
These two switches allow the delay period to be manually set. SW1 switch adjusts the time in increments of 100 ms and SW2 in increments of 10 ms.



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 & 4	Not used



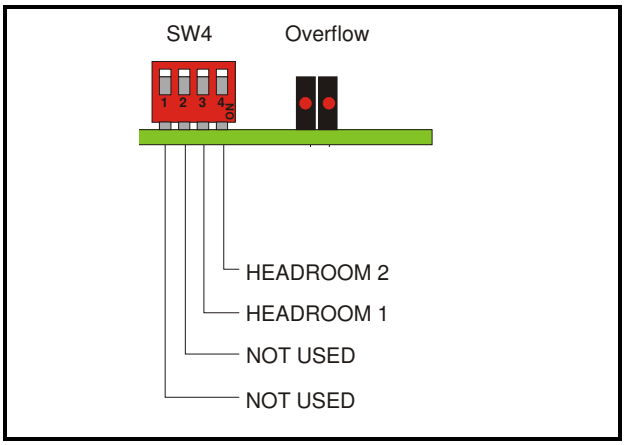
SW4

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

Positions 1 & 2 Not used

Positions 3 & 4 Headroom Select
(see below where 1 = ON)

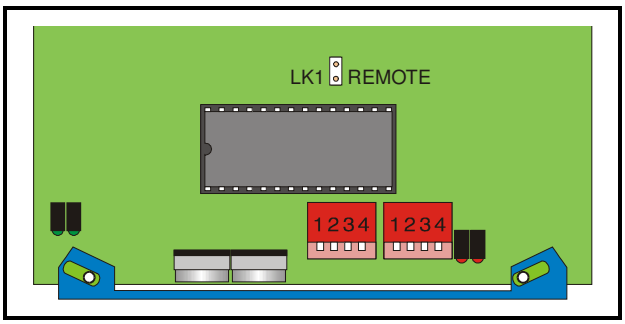
Headroom	Pos 3	Pos 4
18 dBu	0	0
21 dBu	1	0
24 dBu	0	1
18 dBu	1	1

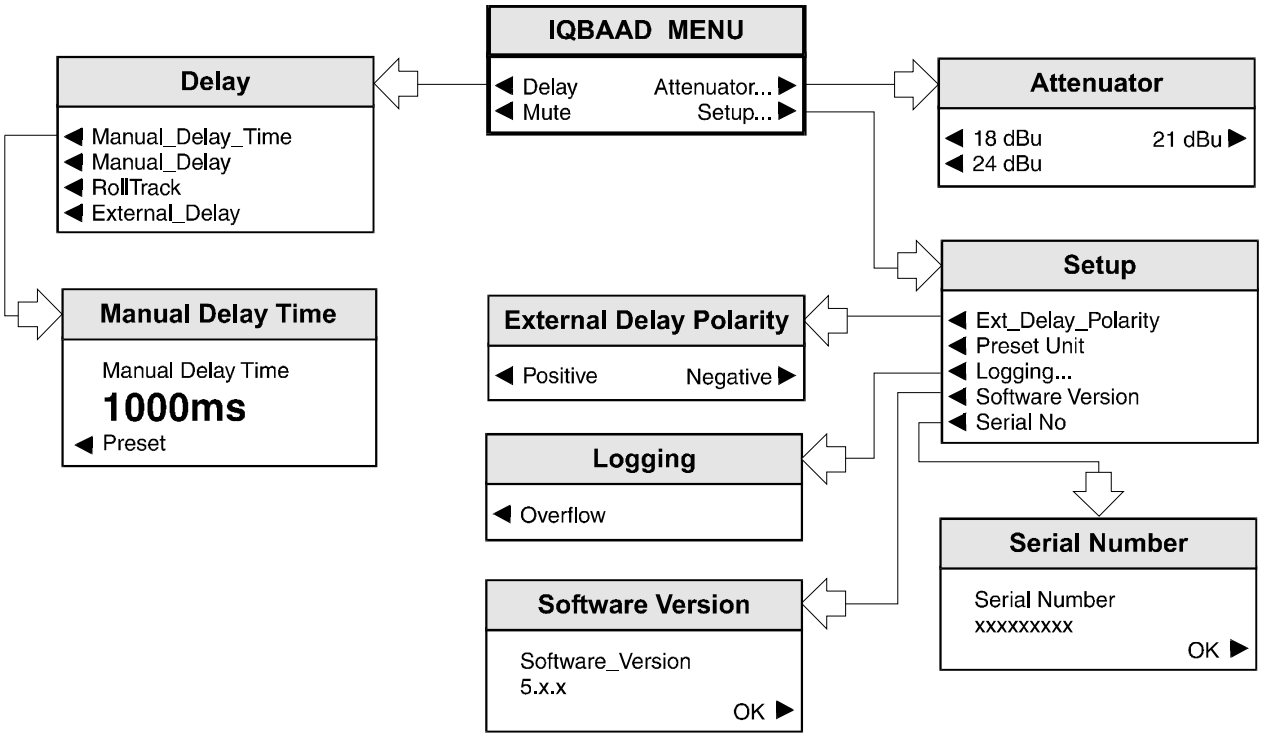


LK1 REMOTE

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 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 card will power-up with the last settings sent by the remote control panel.





IQBAAD Menu System

OPERATION FROM AN ACTIVE CONTROL PANEL

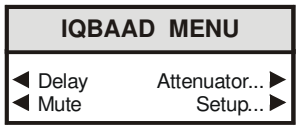
The card may be operated with an active control panel via the RollCall™ network.

The menus available for this card are shown on the previous page and will appear in the Control display window.
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 on previous page)

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.

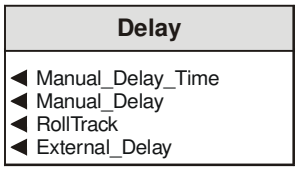


Note that where a menu item is followed by three dots (...) this indicates that a further sub-menu may be selected.

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:

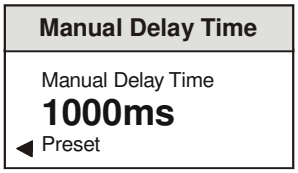
Nothing checked ..... No delay
Manual delay..... Manual delay only
External delay ..... External delay only
RollTrack..... RollTrack delay only

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.

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.

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.

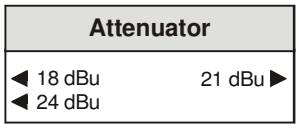
◄ External Delay

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.

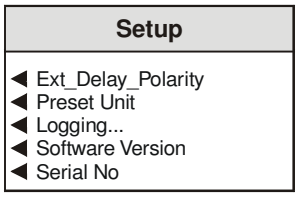
Attenuator… ►



This sub-menu allows the headroom to be set to 18 dBu, 21 dBu and 24 dBu.

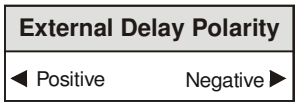
Preset is to 18 dBu.

Setup ►



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

◄ Ext Delay Polarity



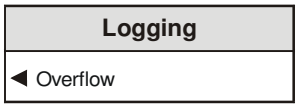
This selection allows the polarity of the external TTL signal connected to the `Delay' BNC to be selected as responding to either a positive (active high) or negative (active low) pulse.

◄ Preset Unit

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

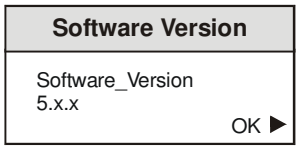
Note that this is a momentary action and the text will not become reversed.

◄ Logging



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

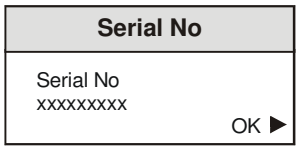
◄ Software Version



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

Select OK to return to the Setup Menu.

◄ Serial No

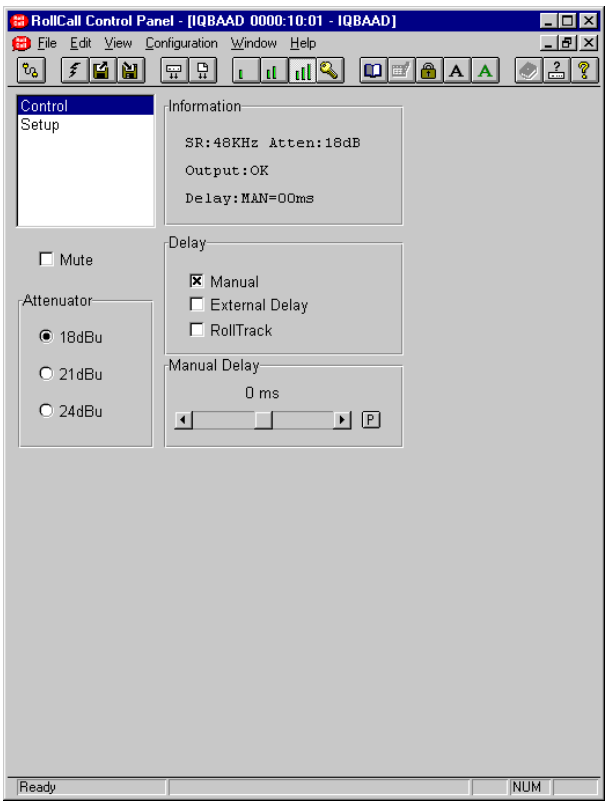


Selecting this item reveals a display showing the serial number of the module.

Select OK to return to the Setup Menu.

RollCall PC Control Panel Screens for the IQBAAD

Control



This screen contains the main controls for the unit.

Mute

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

Attenuator

This item allows the headroom to be set to 18 dBu, 21 dBu and 24 dBu.

Preset is to 18 dBu.

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 only..... 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, and Overflow selected this information will be reported to the logging device assigned in the Remote Control Interface system.

Software Version

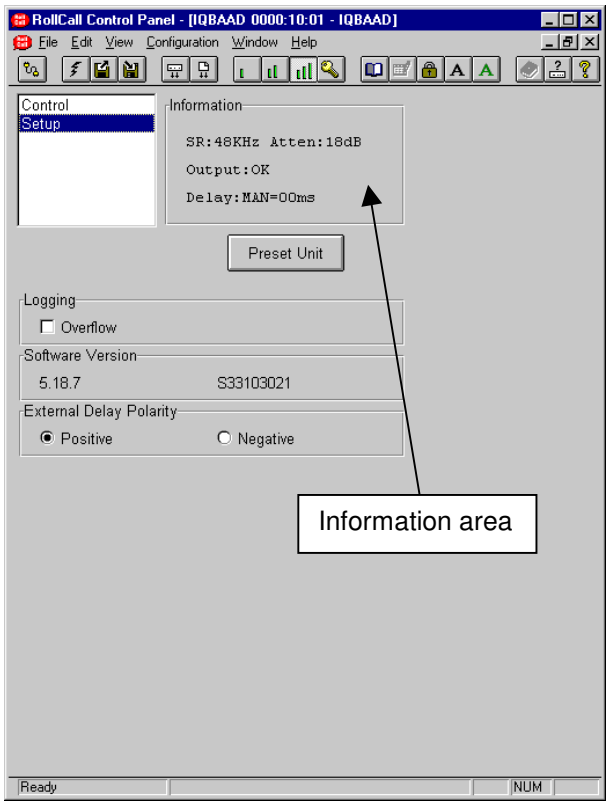
This item shows the version of the software fitted in the module followed by the serial number of the module.

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) and the selected value of attenuation.

```
SR:48KHz Atten:18dB
```

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

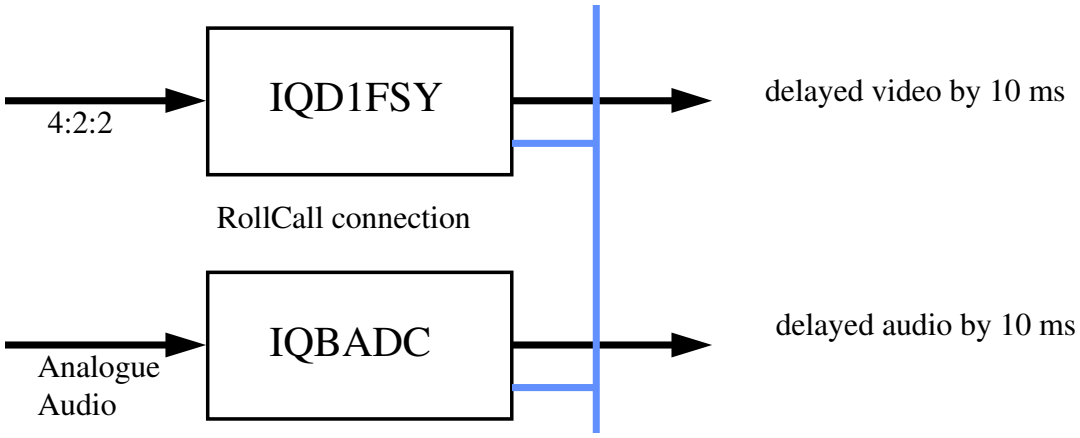
RollTrack is a feature of RollCall™ (Snell & Wilcox's proprietary remote control system), that allows devices to communicate across the RollCall network with no direct user intervention.

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.



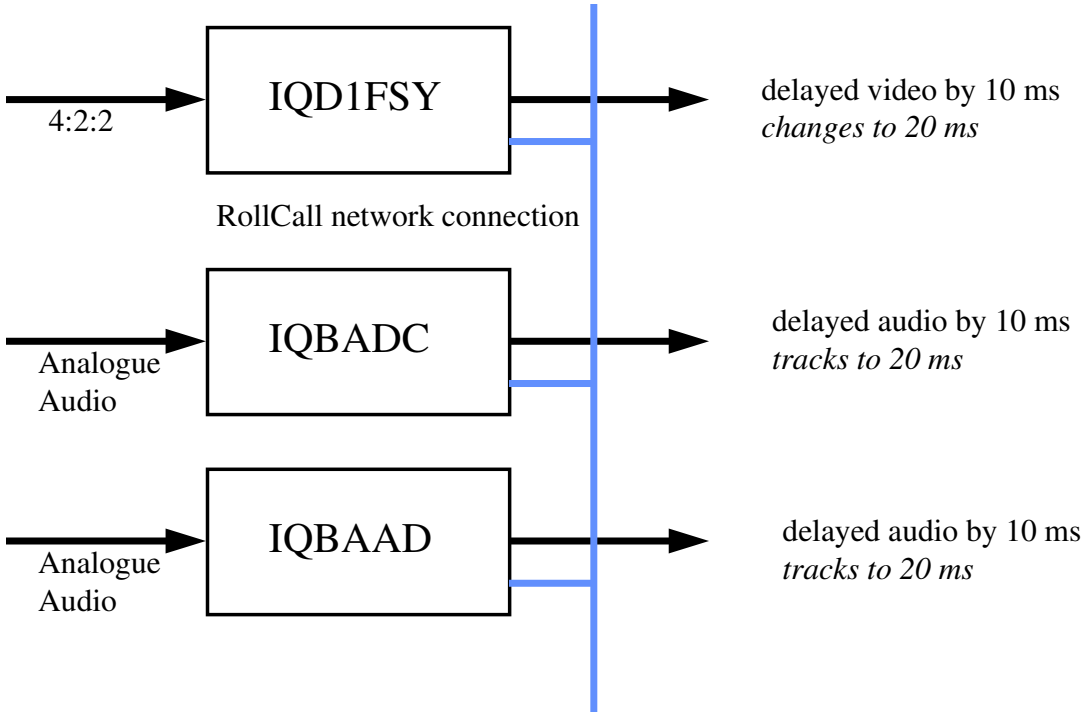
The next level of configuration is where there are multiple Frame Synchronizers (for example) each connected through RollCall™ to their own tracking Audio Delay. (It is worth stating that the synchronizers and audio delays do not have to be in the same enclosure; the addressing scheme, discussed later,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

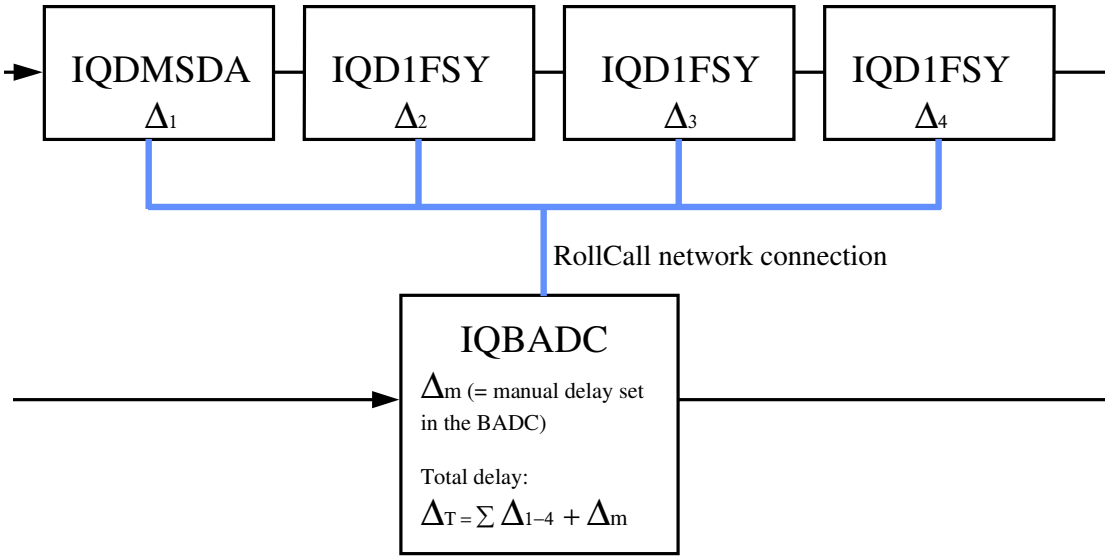
Module	ID
IQBADC	51
IQBDAC	52
IQBAAD	53
IQBDAD	54
IQBSYN	89
IQBADCD	107

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.



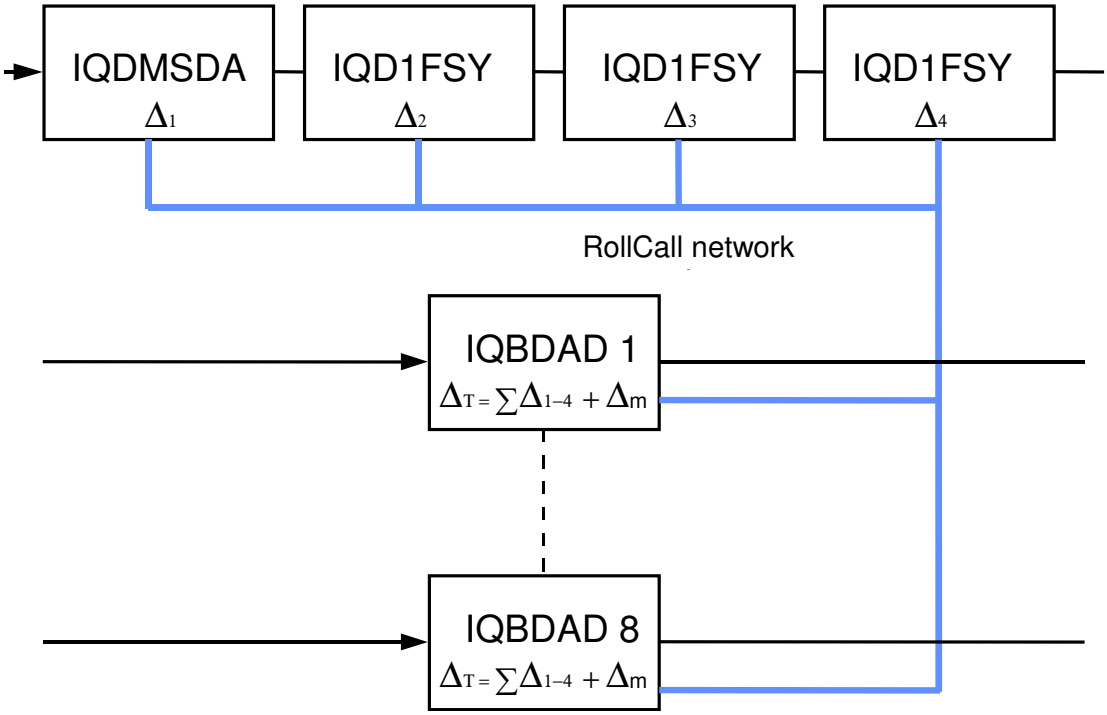
From one to eight audio delay products can be connected via RollCall™ to a single frame synchronizer, for example. If the synchronizer delay changes, then however many audio delays are connected will track the delay. The audio delays can also have a manual delay which will be added to the RollTrack delay.

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.



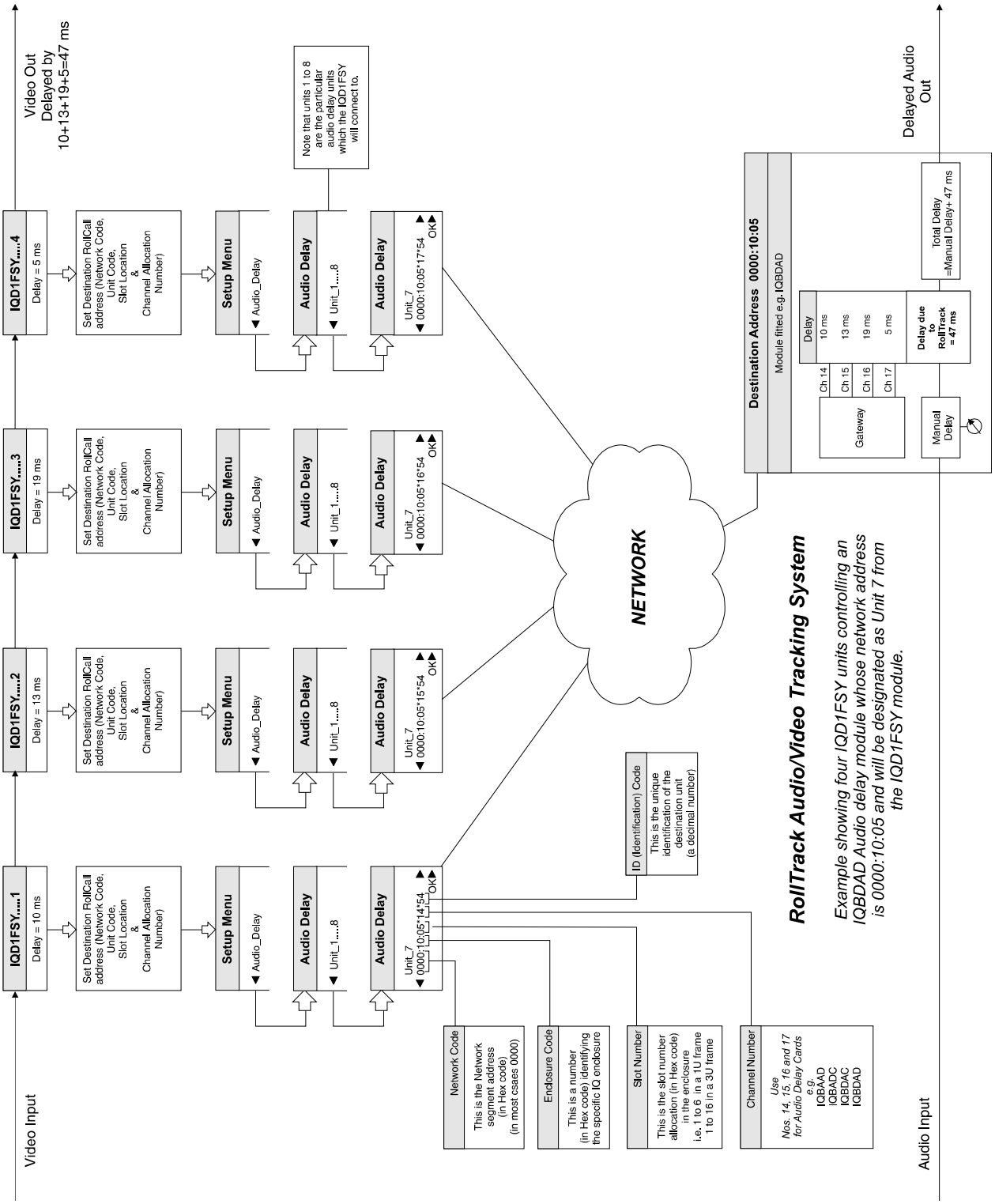
As any of the delay times change in the video path so will the audio delay time track this delay.
A virtual connection is made between from, say, an IQD1FSY to an IQBDAD by:

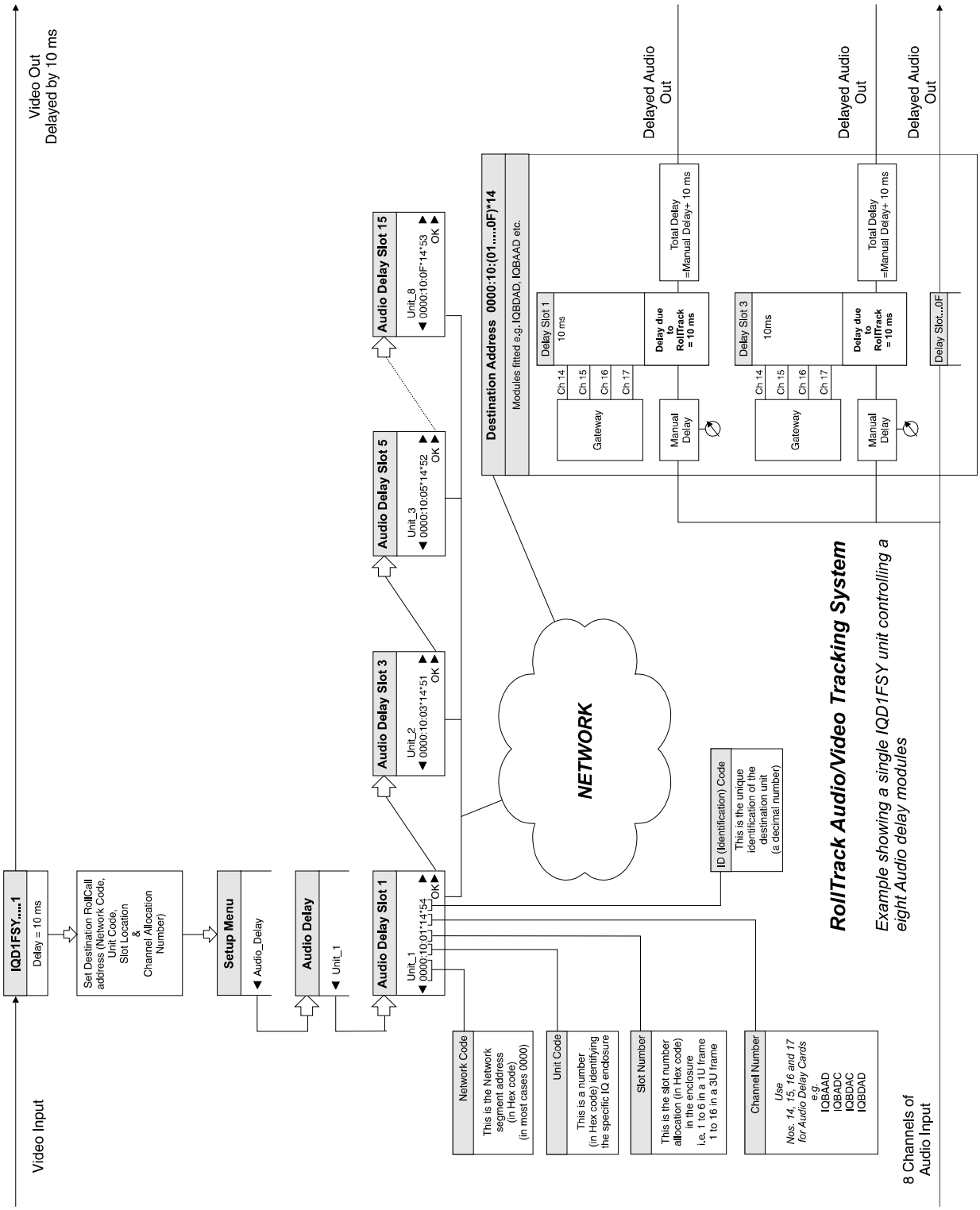
selecting the *Setup...* Menu of the IQD1FSY
then selecting the *Audio_Delay...* Menu
then choosing from *Unit_1* to *Unit_8*
then entering the unique network address of the IQBDAD in the form *nnnn:xx:yy*z*d*
where *nnnn* = network address and in most cases will be 0000(hex);
xx = IQ enclosure address (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
NETWORK
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
Delayed Audio Out
Delayed Audio Out
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
Video Input
8 Channels of Audio Input
RollTrack Audio/Video Tracking System
Example showing a single IQD1FSY unit controlling a eight Audio delay modules

Manual Revision Record

Date	Version No.	Issue No.	Change	Comments
200397	1	2	25 way to XLR drawing corrected	Solder pin side now shown
080597	1	3	RollTrack details added	
141097	1	4	ID data added to RollTrack	New manual issued
281097	1	5	New menu items added	New manual issued
290499	1	6	FCC label added	New manual issued
100699	1	7	Numbering of card edge switches corrected	New manual issued
090999	1	8	EMC performance data added and Page 15 Auto to RollTrack	New manual issued
110402	1	9	Now includes information for the 3A enclosure modules	New manual issued
310303	1	10	Power consumption added to techspec	New manual issued
130104	1	11	For BAIF card + templates added	New manual issued
210105	1	12	Not available note added	New manual issued
191206	1	13	AES references removed	New manual issued