Snell Advanced Media

User Instruction Manual

IQUDC00

Synchronizing HD/SD-SDI Up, Down and Cross Converter

Information and Notices

Copyright and Disclaimer

Contact Details

Customer Support

For details of our **Regional Customer Support Offices** please visit the SAM website and navigate to Support/24/7-Support.

www.s-a-m.com/support/247-support/

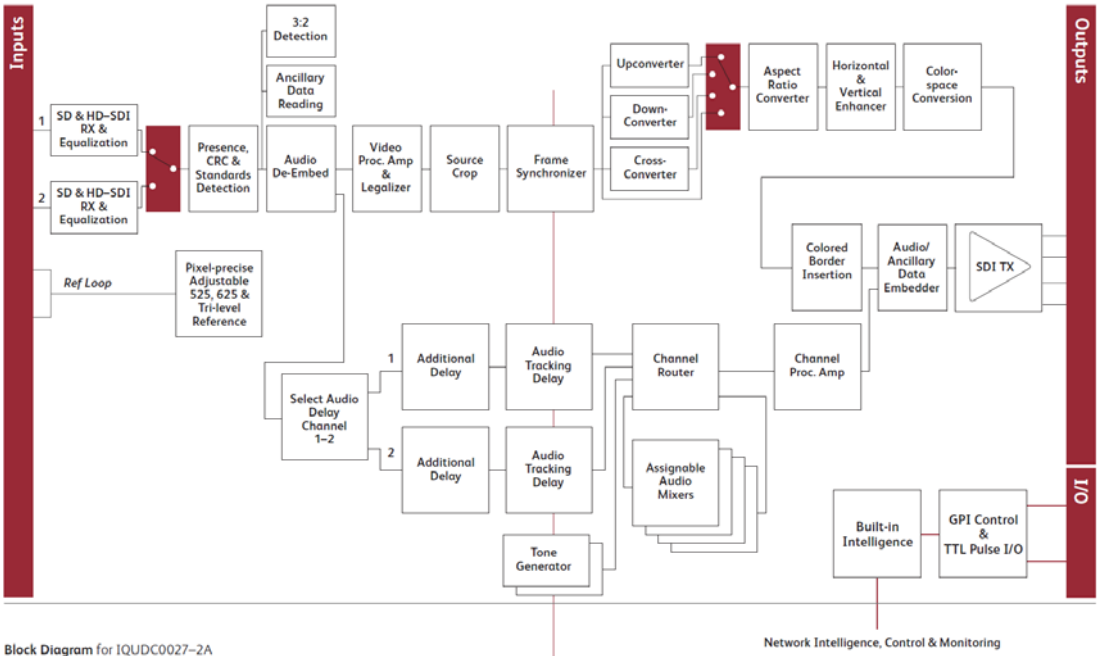
Customers with a support contract should call their personalized number, which can be found in their contract, and be ready to provide their contract number and details.

Contents

1 Introduction

1.1 Module Description

The IQUDC00 is a flexible up, down, and cross converter with synchronizer, suitable for converting SD-SDI signals to HD-SDI or vice-versa and for transcoding HD-SDI, or SD-SDI, signals of the same frame rate. Features include a frame accurate variable aspect ratio converter with pan, tilt, and zoom adjustments, and extensive metadata transcoding including CC608-708, WST and VITC data. A video processor amplifier and legalizer provides complete control over the video levels, and a powerful enhancement feature allows picture detail to be sharpened. Both embedded PCM and non-PCM audio can be handled seamlessly, with the capability of processing up to 16 channels of embedded audio alongside the video.



Block Diagram for IQUDC0027–2A

The IQUDC00 flexibility in multi-rate HD and SD support means that the module can operate in a SD system today and a HD one tomorrow. 16, 20 and 24-bit audio sources can all be handled. PCM audio can be processed alongside Dolby E and other non-PCM signals with selection made on a pair-by-pair basis. Internally, the PCM audio is treated as separate channels allowing stereo, mono and discrete surround sound operation as well as multi-lingual working. Any input PCM audio channel can be routed to any output channel.

The sophisticated audio processing features include comprehensive audio delays, gain control, phase inversion and mixing.

The module is fully Dolby E compatible and can handle other non-PCM audio streams including Dolby AC3 (Dolby Digital) passed as AES data.

These modules also have dedicated video control features that include video Proc. Amp controls. This allows the IQUDC00 to be employed as the prime control unit in a processing chain providing all audio and video controls required to prepare signals.

Delay can be inserted in the audio path to compensate for video processing. The audio delays can be both fixed and can track video synchronizers to keep sound in perfect sync with the pictures. Unlike other products which claim smooth operation but simply remove sections of audio to fit, high-quality audio synchronization circuits track the video delay without missing any of the original content as the sound is temporally compressed or stretched to fit. The audio delay capability can be used for synchronous non-PCM audio so that Dolby E sources can be delayed either to match the video or to re-time the Dolby blocks to realign with the video frames if necessary.

1.2 Order Codes

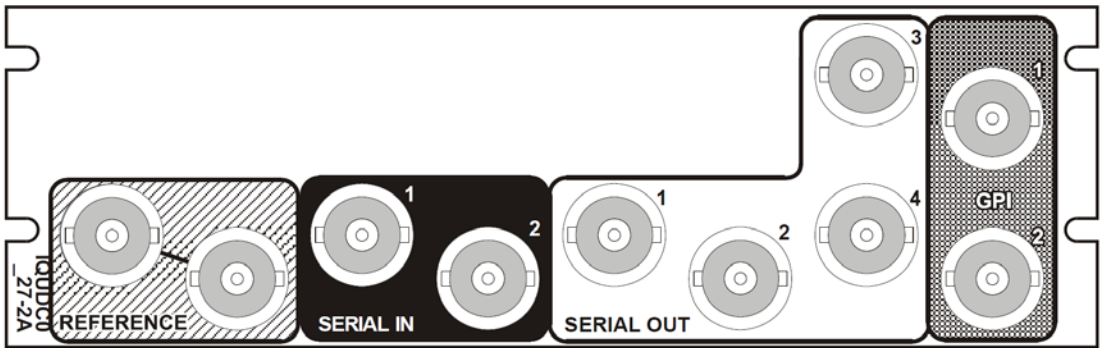
Note: Modules with “A” order codes (for example, IUDC0000-2**A**) can be fitted into either A- or B-style enclosures. Modules with “B” order codes (for example, IQUDC0000-2**B**) can only be fitted into B-style enclosures. See page 8.

The following product order codes are covered by this manual:

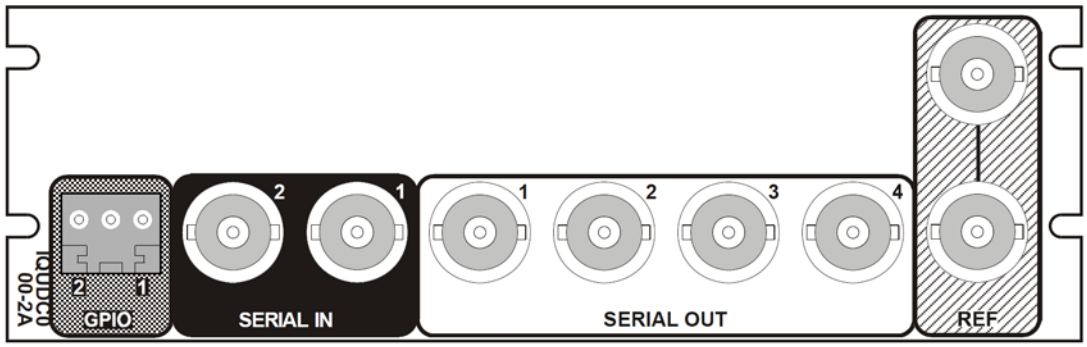
IQUDC0027-2A HD/SD Up, Down and Cross Converter. 2 SDI inputs, 4 SDI outputs, analog reference loop-through, 2 GPI/Os, double-width module.

IQUDC0000-2A
IQUDC0000-2B HD/SD Up, Down and Cross Converter. 2 SDI inputs, 4 SDI outputs, analog reference loop-through, 2 GPI/Os, double-width module.

1.3 Rear Panel View



IQUDC0027-2A



IQUDC0000-2A(B)

1.4 Enclosures

The module can be fitted into the enclosure types shown.

Important: Although IQ modules are interchangeable between enclosures, their rear panels are enclosure specific. An IQH3B enclosure accepts modules with either “A” or “B” order codes. An IQH3A or IQH1A enclosure accepts modules with “A” order codes only. See page 7.

1.4.1 B-style Enclosure

Enclosure order codes: IQH3B-S-0, IQH3B-S-P

1.4.2 A-style Enclosures

Enclosure order code: IQH1A-S-P

Enclosure order codes: IQH3A-S-0, IQH3A-S-P

Enclosure order codes: IQH3A-E-0, IQH3A-E-P, IQH3A-0-0, IQH3A-0-P

Enclosure order code: IQH1A-S-P

1.5 Feature Summary

The IQUDC00 provides the following features:

- Selectable up, down and cross conversion for HD/SD-SDI inputs with clean transition between standards.
- Frame synchronizer, with minimum delay mode.
- HD Tri-sync / SD Bi-Level Reference Input with passive loop-through.
- User variable static aspect ratio conversion with 40 programmable display memories – fixed selection, including pan, tilt and zoom functions with pixel accurate control.
- Line 23 WSS and Video Index AFD and SMPTE 2016 signalling (reading and writing).
- Simultaneous metadata conversion for:
  - Closed caption passing CEA608 to/from CEA708 compatibility bytes.
  - WST transcoding between ETSI 300-706 and OP-47 standards.
  - SMPTE 12M VITC to/from ATC timecode trancoding.
- Horizontal and vertical picture enhancement including advanced horizontal detail enhancer, with low, medium and high frequency band presets and custom gain and noise rejection controls.
- Fully programmable ancillary bridge to allow forwarding of packet based ancillary (DID/SDID) across the scalar.
- Color space conversion – auto, ITU 60 and ITU 709 (SMPTE-274).
- Advanced RGB gamut legalizer with selectable RGB area masks, and video proc. amp with hue control and luma clipper.
- Input blanking adjustment and output color border.
- 16-channel embedded audio with synchronizing and processing for PCM audio signals (gain and invert).
- Channel-level audio routing.
- 4 off 4x1 assignable audio mixers.
- 2 independent audio delay channels for 8 pairs including selectable fixed delay and tracking delays.
- Tracking audio delay which seamlessly tracks the video delay or external RollTrack / GPI inputs.
- Dolby E support – passing and pair routing synchronous non-PCM audio with a delay that matches the picture.
- Filmic field detection optimizes 3:2, 2:2 and other picture cadences (not active in min delay mode).
- Input Loss Detection – Cut to Black, Pattern or Freeze.
- Caption generator with up to 16 user definable characters, including adjustable X, Y sizing and caption position.
- Y/C timing adjustment.
- Remote Status Monitoring – Input standard, Reference Status and CRC/EDH error checking.
- 16 user memories.
- 2 GPI input/outputs.

2 Technical Specification

Inputs and Outputs	
Signal Inputs	
Inputs	2x SD/HD Serial Digital
Standards	1.5 Gbps HD-SDI, SMPTE 292M/296M
	270 Mbps SDI, SMPTE 259M-C / DVB-ASI
Analog Reference	1 x Analog Reference with loop-through
	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level)
	SD bi-level - RS170A
	HD Tri-level - SMPTE 240M, 274M and 296M
Standards	HD Tri-sync / SD Bi-sync, SMPTE 274M, RS170A

Input			Output					
			25		50	29.97		59.94
			576i	1080i	720P	480i	1080i	720P
25		576i	●	●	●			
		1080i	●	●	●			
50		720P	●	●	●			
29.97		480i				●	●	●
		1080i				●	●	●
59.9		720P				●	●	●

IQUDC00 Map of Input to Output Standards

Output			Reference			
			SD Bi-level		HD Tri-level	
			625/50	525/59.94	50	59.94
25	576i		●			
	1080i		●		●	
50	720P		●		●	
29.97	480i			●		
	1080i			●		●
59.9	720P			●		●

IQUDC00 Reference Locking Output Standard Map

Signal Outputs	
SDI Outputs	4x SD/HD Serial Digital
Standards	1.5 Gbps HD-SDI, SMPTE 292M/296M
	270 Mbps SDI, SMPTE 259M-C / DVB-ASI
Control Interface	
GPI	2x GPI (I/O configurable)
Electrical	TTL compatible, active low driven
Controls	
Indicator: IQUDC00 Card	
Power	OK (Green)
FPGA	V-OK (Green)
FPGA	H-OK (Green)
Fault	Card Fault (Red)
Error	User Error (Red)
Warning	Operating Error (Yellow)
OK	Operation OK (Green)
Indicator: Secondary Card	
Power	OK (2x Green)
CPU Running	OK (Green Flashing)

FPGA Running	OK (Yellow Flashing)
Status	OK (Green), Warning (Yellow), Error (Red)
Input 1	Active (Green)
Input 2	Active (Green)
SDI Error	Error (Red)
Reference Lock	OK (Green)
Error	Card Fault (Red)
Warning	Operator Error (Yellow)
OK	Operation OK (Green)
Video Controls	
Select Input	1, 2, Backup Enable
Define Input OK	5 backup rules defining input and GPI status
Output Resolution	1080i, 720p, SD
Input Standards List	Select video standards for valid output
Black Level	±200 mV in steps of 1 mV
Master Video Gain	±6 dB in steps of 0.1 dB
Y-Gain	±6 dB in steps of 0.1 dB
Cb/Cr Gain	±6 dB in steps of 0.1 dB
Note: The total range of both Master + Y and Master + C controls is +6 dB to -10 dB	
Y/C Delay	SD +3 to -4 pixels, HD +7 to -8 pixels
Hue	-45° to +45°
RGB legalizer	On/Off
RGB legalizer, ask	700 mV, 720 mV and 735 mV presets
Luma Clipper	White max. 90% to 109% Black min. -7% to 10%
Pattern Select	100% Color Bars, 75% Color Bars, SMPTE Bars, Tartan Bars, Pluge Ramp, H Sweep, Pulse & Bar, Black, Burst
Caption Enable	Off/On
Caption Generator	Programmable up to 16 characters
Caption Size	X-Y adjust
Caption Position	X-Y adjust
Manual Freeze	On/Off
Freeze	Frame
Video Channel Control	Y On/Off, C On/Off
Reference Select	External / input video
Default Video Output	Pattern / freeze field / black
H and V enhancement	On/Off
H and V enhancement	Sharpen / soften (+3 to -2)
Metadata Support	Closed captions, CC608-708 (compatibility bytes), WST-OP47, VITC-ATC, WST-SMPTE2031, OP42-OP47
Aspect Ratio Conversion Controls	
Signalling Type	WSS (ETSI or AFD), VI (SMPTE, AFD or AFD-2008), SMPTE 2016
Fixed Selection	Full Frame, Box 16:9 top > 16:9, 4:3 box 14:9 top > 16:9, Box 16:9 > 16:9, Box 4:3 > 4:3, 4:3 > box 16:9, 16:9 > box 4:3, 4:3 box 14:9 > 16:9, 16:9 box 14:9 > 4:3

Note: Terminology is:
(source aspect for ambiguous 14:9) (Box when present) (source AFD) > (box) (target display aspect)

ARC Display Memories	40x Save / Recall (manually or via signalling) / Rename
Size	60% to 200% on 0.1% steps
Aspect	60% to 200% on 0.1% steps
Pan/Tilt	+75% in 0.1% steps (H resolution is 1/32nd of pixel) (V resolution is 1/16th of field line)
Origin	Top Left / Center
Input Crop	Left / Right / Top / Bottom
Output Border	Left / Right / Top / Bottom
Output Border Color	Red / Green / Blue
Audio Controls	
Channel Routing	Output channels routed from SDI (16 embedded channels from any group), test tone and silence
Output Side Control Proc - Gain and Polarity	Independent Gain, Mute, and Polarity control over embedded output channels. +12 dB to -36 dB in 0.1 dB steps
Mixer source (4 source per mixer)	Independent Gain, Mute, and Polarity control. +12 dB to -36 dB in 0.1 dB steps
Channel 1 Delay Sources	
Manual Delay Offset	Up to +2 s in 0.25 ms steps, common to any selected pairs
Variable Audio Delay Control Source	Up to 0.5 s from RollTrack + GPI + Video Synchronizer Delay
Channel 2 Delay Sources	
Manual Delay Offset	Up to +2 s in 0.25 ms steps, common to any selected pairs
Variable Audio Delay Control Source	Up to 0.5 s from RollTrack + GPI + Video Synchronizer Delay
Tone Setup	
Frequency	1 kHz, 2 kHz, 4 kHz, mute @ -20 dBFS or -18 dBFS
Other Controls	
GPI Configuration	Not Used / as an output / as an input
GPI Input	Activates on contact closure: Freeze, Pattern, Black, Mono Y only, Mono CbCr only, Use reference, Memory recall ARC Recall
GPI Output	Produces an output for: Input Loss, Reference OK, Freeze, Pattern, Black, Monochrome
User Memories	16x Save, Recall, Rename
Input / Output Names	User configurable naming of individual embedded audio and mixer channels
RollCall Features	
Logging	Input Status Input Standard Reference Status Embedded audio status (pairs 1-8) VBI/ANC input and output ANC Error ANC Error secs CRC CRC Error secs
RollTrack Controls	Source, Address, Command, Status, Sending
RollTrack Sources	Unused, Video Delay, Input Present, Input Loss, Reference Loss, Reference OK, Output Freeze, Output Unfreeze, Audio Delay, Embedded Audio (Pairs 1-8), Input Standard

Specifications	
Input / Output Standards	
Input 480i/29	Output 1080i/29, 720p59
Input 576i/25	Output 1080i/25, 720p50
Down Conversion	
Input 1080i29	Output 480i/29, 720p59
Input 1080i25	Output 576i/25, 720p50
Cross Conversion	
Input 1080i29	Output 720p59, 1080i29
Input 720p59	Output 1080i29, 720p59
Input 1080i25	Output 720p50, 1080i25
Input 720p50	Output 1080i25, 720p50
Input 480i/29	Output 480i/29
Input 576i/25	Output 576i/25
Processing Delay	Synchronized and input locked: 4 to 6 fields
Minimum Delay	4 fields minus 4 lines
Synchronizer Hysteresis Window	1 line
Reference Source	External – HD tri-Level / SD bi-level / input video syncs
Genlock Adjustment	Horizontal and vertical timing
Horizontal Timing	0 to 1 output line in steps of 1 pixel
Vertical Timing	0 to 1 output frame in steps of 1 line
Signal Inputs	
Connector / Format	BNC/75 Ohm panel jack on standard Snell connector panel
Input Cable Length	Up to 140 m Belden 1694 A @ 1.5 Gbps, Up to 275 m Belden 1694 A @ 270 Mbps
Input Return Loss	>15 dB
Reference Input	
Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level), SD bi-level – RS170A HD tri-level – SMPTE 240M, 274M and 296M
Connector / Format	BNC / 75 Ohm panel jack on standard Snell connector panel
Analog Reference Return Loss	SD bi-level > 40 dB to 5.5 MHz HD tri-level > 35 dB to 30 MHz
Signal Outputs	
Connector / Format	BNC / 75 Ohm panel jack on standard Snell connector panel
Output Return Loss	>15 dB
Embedded Audio	
Embedded Audio Handling	HD - 24-bit synchronous 48 kHz to SMPTE 299M, SD - 20-bit synchronous 48 kHz to SMPTE 272MA
Embedded Audio Delay	Minimum 3 ms, Maximum 2.5 s
Channel Status Information	Handled and checked
Power Consumption	
Module Power Consumption	16 W (max.)

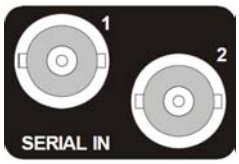
3 Connections

This section describes the physical input and output connections provided by the IQUDC00.

3.1 IQUDC0027-2A

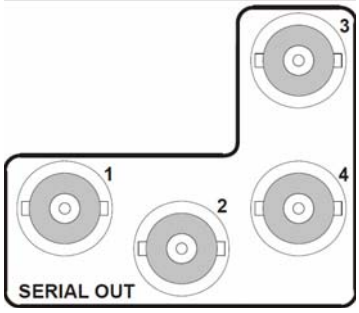
3.1.1 SDI Inputs

The two serial digital inputs to the unit are made via BNC connectors that terminate in 75 Ohms.



3.1.2 SDI Outputs

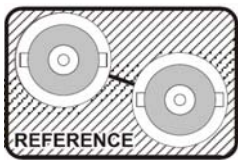
Four serial digital outputs from the module are made via BNC connectors which terminate in 75 Ohms.



Note: EDH information will not be passed through to the output signal.

3.1.3 Analog Reference Input

The external sync input to the module is made via the passive loop-through BNC connectors for 75 Ohms.



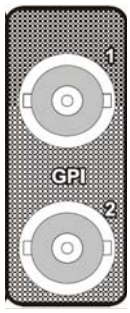
It should be noted that proper operation to the full specification can only be achieved with a correctly terminated, noise-free, stable, black sync reference input. Whilst lock may be achieved with an unsuitable sync source the increased jitter evident on the SDI output will affect locking and cable length performance at the receiving equipment.

Note: If the loop-through facility is not used, the unused BNC socket must be fitted with a 75 Ohm terminator.

Note: The IQUDC00 also has 75 R termination link for reference input located on the board.

3.1.4 General Purpose Interface

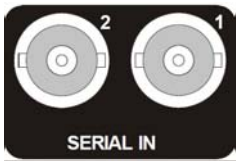
Two GPI connections may be configured as inputs or outputs using BNC connectors for 75 Ohms.



3.2 IQUDC0000-2A(B)

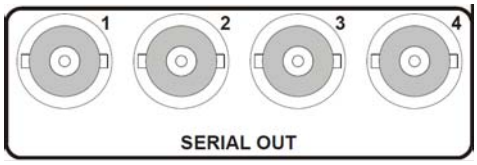
3.2.1 SDI Inputs

The two serial digital inputs to the unit are made via BNC connectors that terminate in 75 Ohms.



3.2.2 SDI Outputs

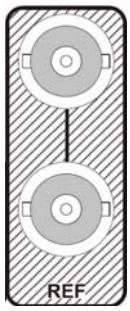
Four serial digital outputs from the module are made via BNC connectors which terminate in 75 Ohms.



Note: EDH information will not be passed through to the output signal.

3.2.3 Analog Reference Input

The external sync input to the module is made via the passive loop-through BNC connectors for 75 Ohms.



It should be noted that proper operation to the full specification can only be achieved with a correctly terminated, noise-free, stable, black sync reference input. Whilst lock may be achieved with an unsuitable sync source the increased jitter evident on the SDI output will affect locking and cable length performance at the receiving equipment.

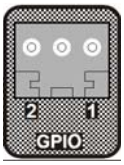
Note: If the loop-through facility is not used, the unused BNC socket must be fitted with a 75 Ohm terminator.

Note: The IQUDC00 also has 75 R termination link for reference input located on the board.

3.2.4 General Purpose Interface

General Purpose Interface (GPI) connections are made via a 3-pin closing contact screw terminal connector.

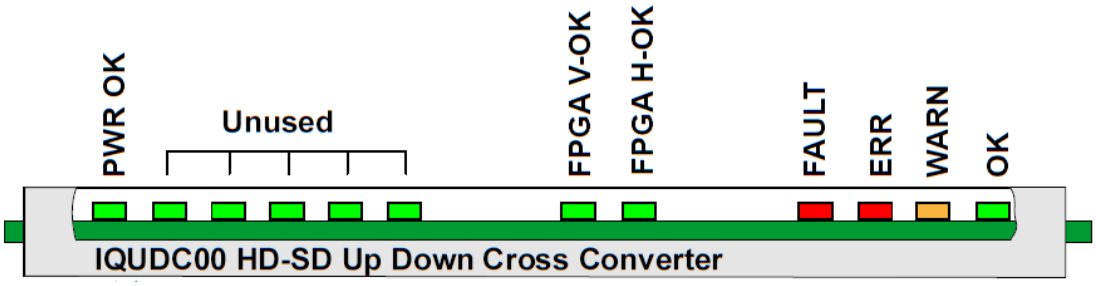
Pin 2 is ground and may be shorted to either Pin 1 or 3 to provide an input. When not shorted, the voltage measured between the pins determines the output status.



4 Card Edge Status

4.1 IQUDC00 Card

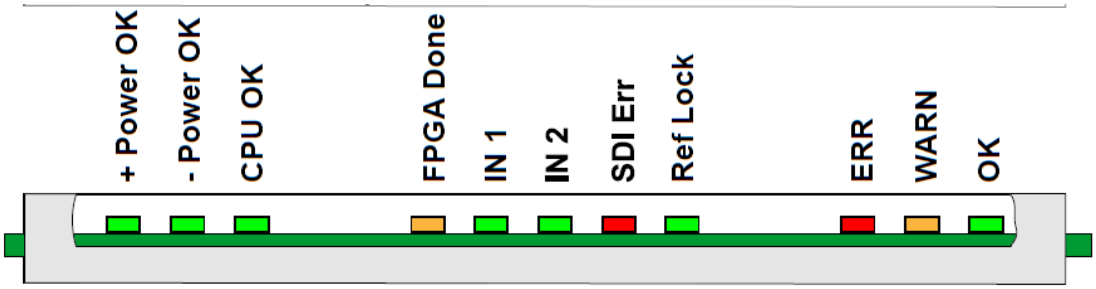
The LEDs on the edge of the IQUDC00 card indicate its operating status.



LED	Color	Description
PWR OK	Green	When illuminated, this indicates that the power supply is present.
The 5 undefined green LEDs are for debug only and can be ignored.		
FPGA V-OK	Green	When illuminated, this indicates that FPGA V has configured correctly.
FPGA H-OK	Green	When illuminated, this indicates that FPGA H has configured correctly.
FPGA OK	Green	Flashes when the FPGA is running. When the module is booting, this LED is illuminated continuously, until the SDI is enabled.
FAULT	Red	When illuminated, this indicates a board internal fault and service is required.
ERR	Red	When illuminated, this indicates a user type error, preventing a good video output.
WARN	Yellow	When illuminated, this indicates an operational problem, which may compromise the video output.
OK	Green	When illuminated, this indicates that the module is operating correctly, where none of the previous 3 LEDs are lit.

4.2 Secondary Card

The LEDs on the edge of the secondary card indicate its operating status.



LED	Color	Description
+Power OK	Green	When illuminated, this indicates that the positive power supply is present.
-Power OK	Green	When illuminated, this indicates that the negative power supply is present.
CPU OK	Green	This LED flashes when the CPU is running.
FPGA Done	Orange	This LED flashes when the FPGA is running.
IN 1, IN 2	Green	These LEDs indicate which input has been selected.
SDI Err	Red	Illuminated if any CRC, EDH or TRS errors are detected on the SDI input. It is also illuminated when the input is lost.
Ref Lock	Red	Illuminated when genlock is enabled and locked.
ERR	Red	Indicates board fault conditions, including: • **Audio clock lock fault:** Audio sub-system fails to lock to video clocks. • **Serializer lock fault:** Output serializer fails to lock. • **SDI JTAG board fault:** Internal JTAG interface is inadvertently enabled. In all cases continuous illumination indicates a board fault and a service is required. Perform a Factory Reset and supply a valid SDI video source before calling service.
WARN	Yellow	Indicates operational errors, including: • **Embedder Status - ANC overflow:** Indicates the embedder has run out of ancillary space over quite a few lines. Due to heavy use of ancillary space on the video input, particularly in SD. • **Input Video - Incompatible Frame Rate:** Detected input standard is incorrect frame rate. • **Input Video - SDI problem:** CRC or other SDI errors detected on selected input in the last whole field. • **Reference - Lock Failure:** Genlock failed to lock to selected source. Will generally light up in transitional states like standard changes, but continuous illumination indicates a problem. More information is available in the status window.
OK	Green	When illuminated, this indicates that the module is operating correctly.

5 Controlling the IQUDC00 from the RollCall Control Panel

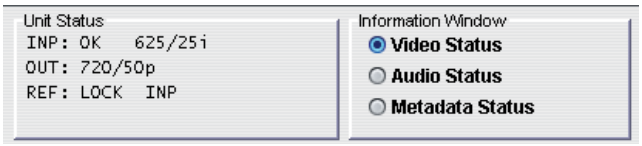
5.1 The Information Window

The information window is displayed in the upper-right corner of each screen and displays basic information about the video, audio and reference status of the module.

Select either **Video Status**, **Audio Status** or **Metadata Status** to display the corresponding information.

5.1.1 Video Status

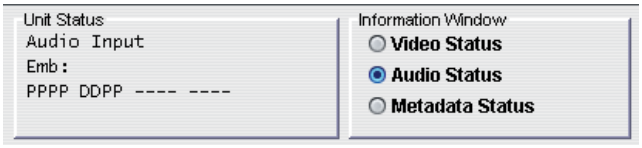
When **Video Status** is selected, the video input status is displayed:



Name	Status	Description	Standard
INP:	**OK**	Signal received	
	FAIL	Signal failed	
	LOST	No signal received	
OUT:			Detected video input standard is displayed, e.g. **1080/29i** (Blank if input lost).
REF:	**OK-F** + STD	Free running	Displays the reference standard.
	LOCK + STD	Valid ref and genlocked	
	LCK-F	Valid ref but ambiguous field type	
	LOST	No ref signal found	
	FAIL	Genlock not possible	
	FAIL INP	Failed to genlock to input	
	LOCK INP	Genlock to input video	
	FRZ	The unit is in freeze mode	
	MON	The unit is in monochrome mode	
	PAT	The output is a pattern	
	ANC	Ancillary data is passed and operating normally	
	BLK	The output signal is black	

5.1.2 Audio Status

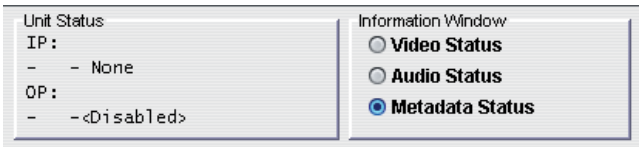
When **Audio Status** is selected, the status of the embedded audio input is displayed where



Name	Status	Description
Audio Input	**P**	Channel is a PCM audio input.
Emb:	**?**	No audio input is detected
--------	**D**	Signal is data (non-PCM, Dolby, etc.)

5.1.3 Metadata Status

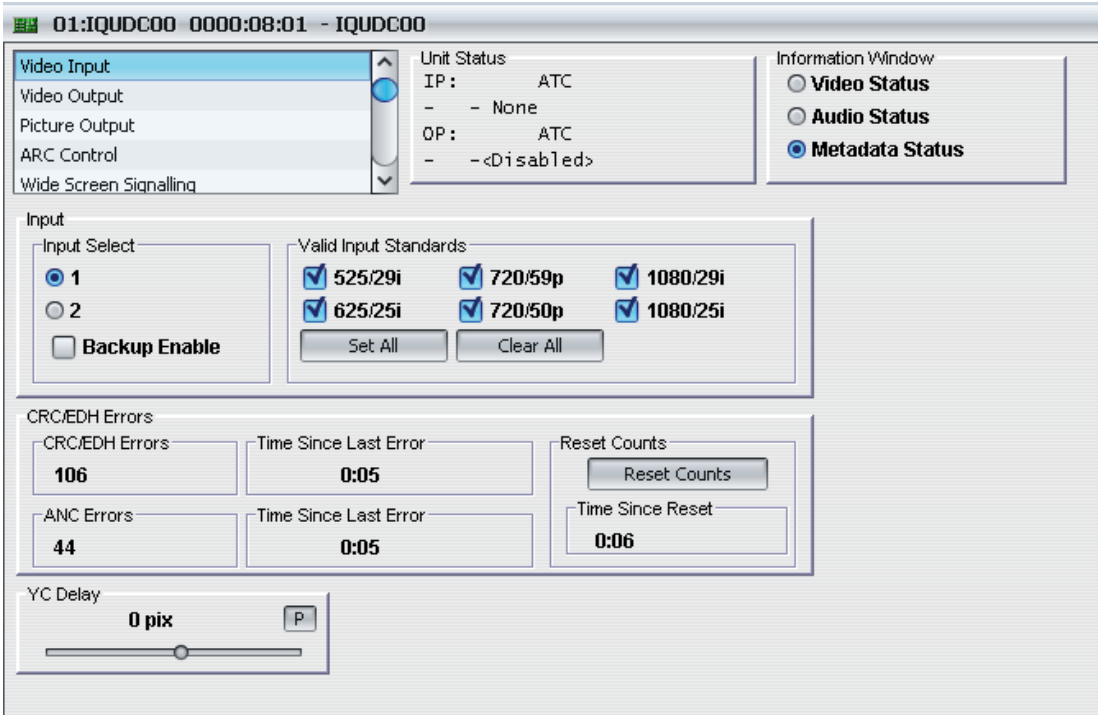
When **Metadata Status** is selected, the following information is displayed:



Name	Status		Description
IP:	2016 WSS VI ATC VITC OP47 608 708	(signalling data) (signalling data) (signalling data) (timecode data) (timecode data) (closed caption data) (closed caption data) (closed caption data)	Indicates the presence of signalling, timecode, or closed caption metadata in the input.
--------	The first set of figures (4:3) shows the input aspect ratio. The second set (4:3 SP 14:9) describes the input picture format. Note that if all items in the **Input Wide Screen Signal** control are unchecked the second set of figures will show **<Disabled>**.		
OP:	2016 WSS VI ATC VITC OP47 608 708	(signalling data) (signalling data) (signalling data) (timecode data) (timecode data) (closed caption data) (closed caption data) (closed caption data)	Indicates the presence of signalling, timecode, or closed caption metadata in the output.
--------	The first set of figures (16:9) shows the output aspect ratio. The second set (4:3 SP 14:9) describes the output picture format. Note that if all items in the **Output Interface** control are unchecked the second set of figures will show **<Disabled>**.		

5.2 Video Input

The **Video Input** screen enables control and monitoring of the video input signal.



5.2.1 Input Select

This allows input and backup selection.

- **1/2:** enables either input 1 or Input 2 to be selected for processing.
- **Backup Enable:** When selected, a predefined action takes place when a chosen event occurs. For details see section 5.18.

5.2.2 Valid Input Standards

This allows the unit to accept or disregard particular video input standards by checking the appropriate boxes.

- **Set All:** When selected all standards will be checked and accepted.
- **Clear All:** When selected all check boxes will be cleared and the required valid input standards may then be checked.

Note: If any other standards are detected, an invalid standard will be assumed and any events that depend on this will be triggered.

5.2.3 CRC/EDH Errors

This item provides information about the Cyclic Redundancy Checksum errors and Error Detection Handling.

- **CRC/EDH Errors:** This will display the total CRC error count or EDH errors since the last reset.
- **Time Since Last (CRC/EDH) Error:** This will show the time in 5 second intervals up to 1 minute then in minute intervals, since the last error was detected.
- **ANC Errors:** This will display the total number of ANC errors since the last reset.
- **Time Since Last (ANC) Error:** This will show the time in 5 second intervals up to 1 minute then in minute intervals, since the last error was detected.

- **Reset Counts:** This will reset the error counters to zero.
- **Time Since Reset:** This will show the time in 5 second intervals up to 1 minute then in minute intervals, since the counters were last reset.

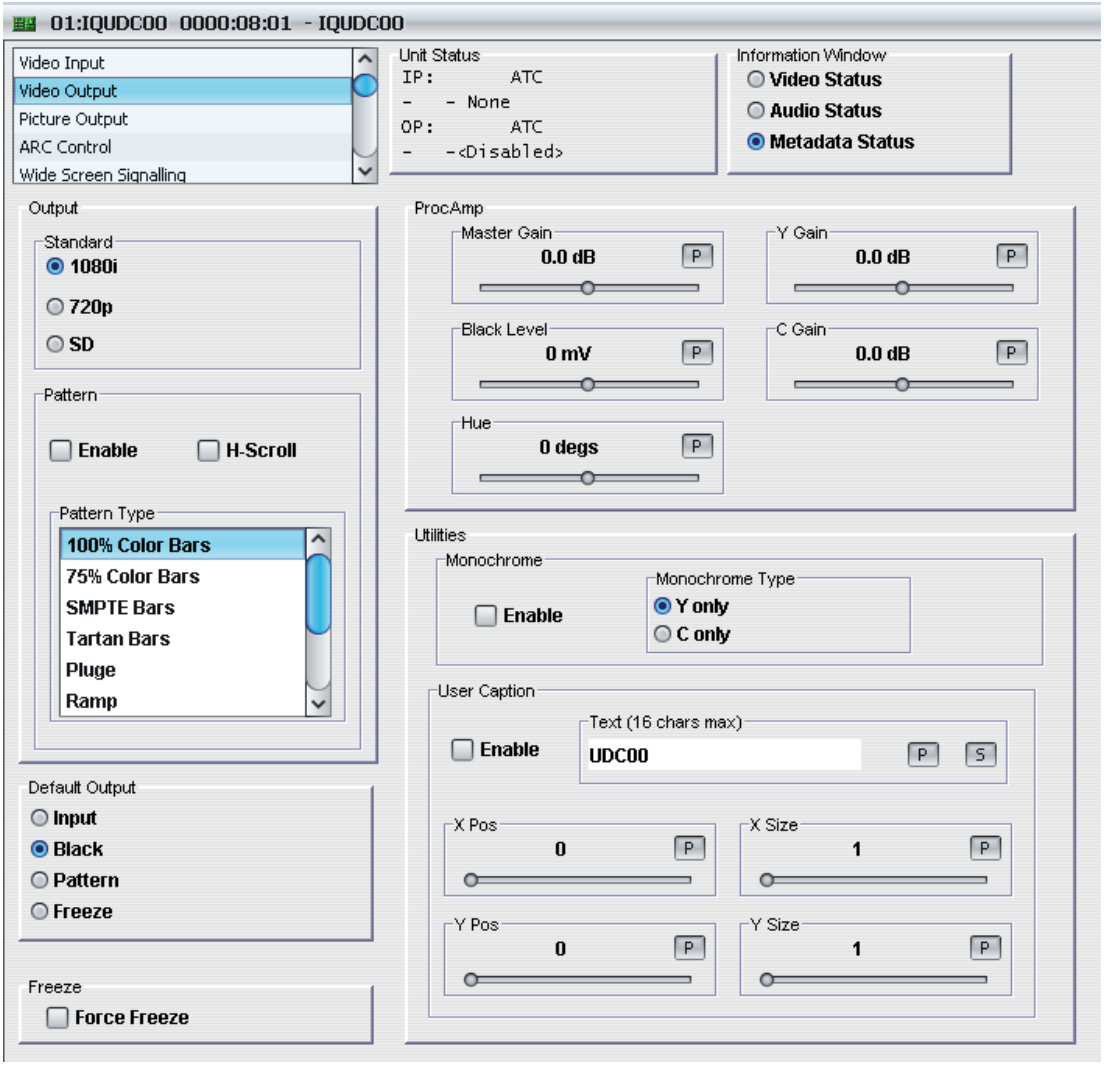
Note: If the selected input changes, the CRC/EDH counts will be automatically reset once the software has decided that the input is correctly locked.

5.2.4 YC Delay

This allows the timing of the chrominance signal relative to the luminance signal to be adjusted, (i.e. Y to Cb/Cr timing) in pixels. By using the scroll bar the timing may be adjusted by +3 to -4 pixels (SD) +7 to -8 pixels (HD) in 1 pixel steps. Preset is to 0 pixels.

5.3 Video Output

The **Video Output** screen enables control and monitoring of the video output signal.



5.3.1 Output

5.3.1.1 Standard

This allows the output standard to be selected.

Options are as follows:

- 1080i
- 720p
- SD

Note: The output frequency will follow the reference or the input.

5.3.1.2 Pattern

This allows the pattern functions to be set up.

- **Enable:** When checked the output will become the pattern selected from the Pattern Type list.
- **H-Scroll:** When checked the selected pattern will scroll from left to right at a fixed rate. This mode is useful for differentiating between an input test pattern signal that

has become a frozen picture (caused by a loss of input signal) and a test pattern that has been chosen to be the output.

- **Pattern Type:** This allows a pattern to be selected from the list. This pattern will become the output signal when Pattern/Enable is checked. Options are as follows:
  - 100% Color Bars
  - 75% Color Bars
  - SMPTE Bars
  - Tartan Bars
  - Pluge
  - Ramp
  - Sweep
  - Pulse & Bar
  - Burst
  - Black

5.3.2 Default Output

This controls the units response to a loss of input signal. Options are:

- **Freeze:** When checked the output picture will freeze.
- **Black:** When checked the output picture will cut to black.
- **Out Pattern:** When checked the output picture will become the pattern selected via the Output/Pattern Type function.

5.3.3 Freeze

A **Force Freeze** check box, when checked, forces the output to become a frozen frame picture.

5.3.4 ProcAmp

This function allows the gain and black level of the signal to be adjusted.

- **Master Gain:** This allows the overall gain (Y and Cb/Cr) to be adjusted over a range of ±6 dB in steps of 0.1 dB. Preset value is 0.0 dB.
- **Y Gain:** This allows the Y (luminance) gain to be adjusted by ±6 dB in steps of 0.1 dB. Preset value is 0 dB.
- **C Gain:** This allows the Cb/Cr (color difference) gain to be adjusted by ±6 dB in steps of 0.1 dB. Preset value is 0 dB.

Note: The total range of both Master + Y and Master + C controls is +6 dB to -10 dB.

- **Black Level:** This allows the black level to be adjusted by ±200 mV in steps of 1 mV. Preset value is 0.
- **Hue:** This allows the hue to be adjusted from -45 degs to +45 degs. Preset is to 0 degs.

5.3.5 Utilities

5.3.5.1 Monochrome

This allows video channel controls to be selected.

- **Enable:** When checked, the monochrome functions will be enabled.

5.3.5.2 Monochrome Type

This controls the monochrome output functions.

- **Y Only:** When selected, the output picture will become monochrome using only the Y component of the signal.
- **C Only:** When selected, the output picture will become monochrome using only the CbCr components of the signal.

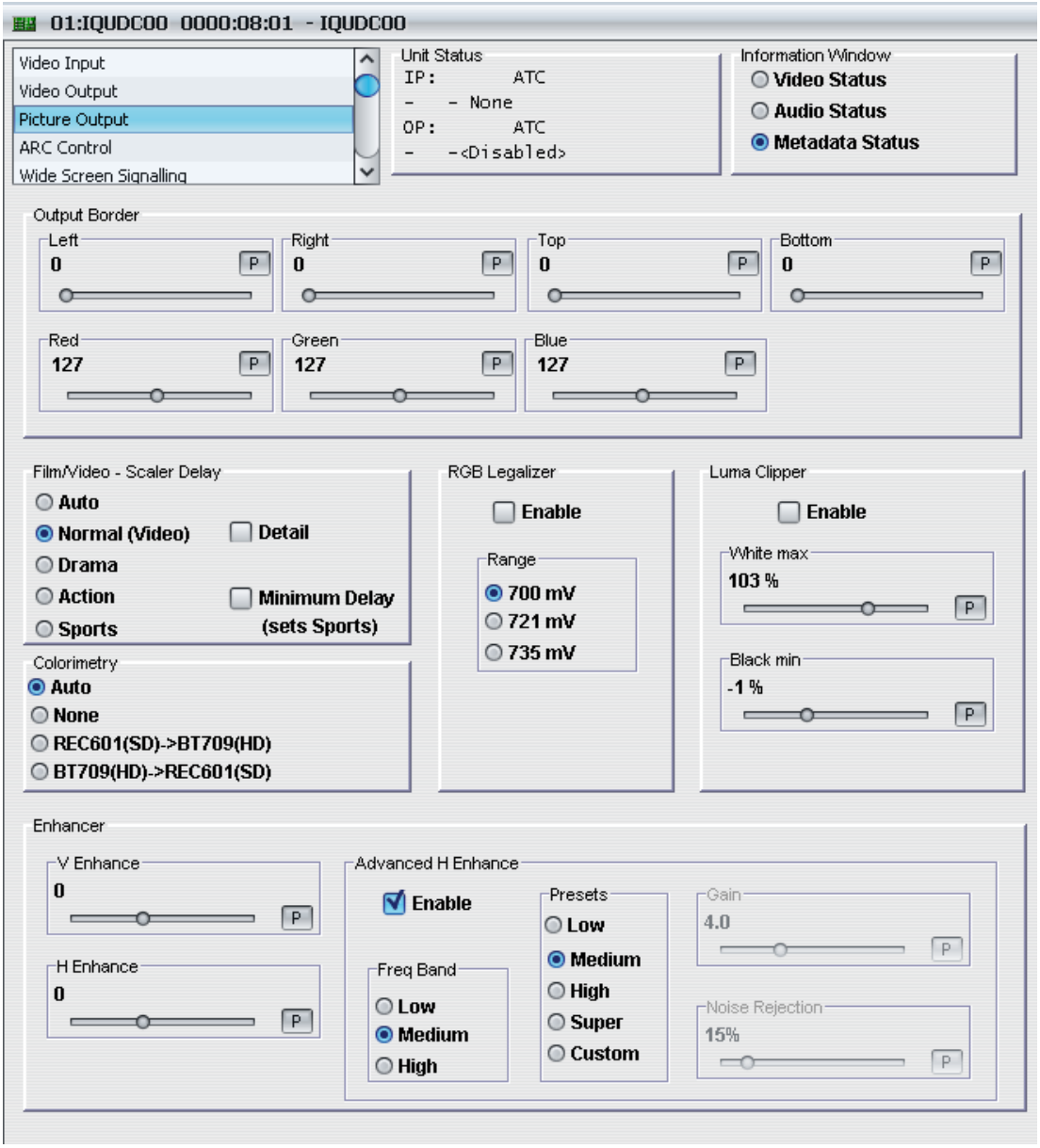
5.3.6 User Caption

These controls allow a user caption to be displayed on the video output.

- **Enable:** Select to enable the video caption.
- **Text:** Enter the caption text in this field, and then click **S** to save. Click **P** to return to the default text (**Captions ON**). A maximum of 16 characters can be entered.
- **X Pos / Y Pos:** Use the slider bars to position the caption along the X and Y axis.
- **X Size / Y Size:** Use the slider bars to resize the height and width of the caption. The range of adjustment for each is 1 to 5 units.

5.4 Picture Output

The **Picture Output** screen enables adjustments to be made to the output picture.



5.4.1 Output Border

This allows a user-defined border to be placed around the output picture.

- **Left:** This adjusts the size of the left-hand border. The range of adjustment will depend on the selected output standard. Control is in steps of 1 pixel and preset value is 0 pixels.
- **Right:** This adjusts the size of the right-hand border. The range of adjustment will depend on the selected output standard. Control is in steps of 1 pixel and preset value is 0 pixels.
- **Top:** This adjusts the size of the top border. The range of adjustment will depend on the selected output standard. Control is in steps of 1 line and preset value is 0 lines.
- **Bottom:** This adjusts the size of the bottom border. The range of adjustment will depend on the selected output standard. Control is in steps of 1 line and preset value is 0 lines.

- **Red/Green/Blue:** This allows the color of the border (the unused area outside the picture) to be adjusted. The level of each color may be adjusted from 0 to 255 units in steps of 1 unit. Preset levels are 127 units.

Note: Borders should be measured as offsets from the extreme. For example a right border of 4 would be 4 pixels from the highest legal pixel for any video mode. An example would be where the highest legal pixel is 1920 then the border would apply at 1916. Pixels are counted with 1 as the first.

5.4.2 Film/Video - Scaler Delay

IMPORTANT: This control will have a large effect on output video quality.

The detection algorithms have been optimized so that the maximum possible range of material can be converted in a single pass.

- **Auto:** When set to Auto the sequence detector will automatically identify film or video and convert accordingly. An example of this use may be to guide the conversion when the input contains scenes of both film and video types. This also allows extraction of film frame and pull-down cadences without introducing any conversion artifacts and giving the best sharpness. However, any false detection caused by mixed sources could be objectionable. It may be worth trying this conversion type when up-converting as the enhanced detail possible on film source will give a sharper output.
- **Normal (Video):** (Factory Preset Condition) This setting provides the most diffuse temporal aperture. This uses a patented 3-field conversion to maintain detail level whilst rejecting alias artifacts. It is well suited to down-conversion. It will force the detector to a video conversion mode. All inputs will be treated as video, which is a safer conversion. An example of this use may be to produce a conversion with best motion performance on material containing a mix of video and film motion types.
- **Drama:** This setting provides an increase the sharpness of the temporal aperture over the Normal setting. It will provide good vertical detail on stiller scenes.
- **Action:** This setting provides a more diffuse temporal aperture than the Sports setting. It will provide good clarity when viewing fast-moving scenes.
- **Sports:** This setting provides the sharpest temporal aperture and is optimized for reduced “bleeding” across video cuts. This mode will also give the clearest view of very fast action scenes, but at the expense of vertical detail on stiller scenes.

Note: Care should be taken to reselect input type when starting a new conversion.

- **Detail:** When checked this selects an alternative horizontal coefficient set for Normal or Sports modes.
- **Minimum Delay:** When checked, the video path delay will be reduced to between two to three fields when locked to reference and two fields when locked to input (plus any H and V offset settings). This means that there will be no 3:2 detection and processing and the output scaling will not be co-timed with WSS. The output scaling will lag WSS by one field. This control is also present on the Genlock and Video Delay menu. Selecting it automatically selects the Sports setting.

5.4.3 Colorimetry

This controls the color space conversion applied to produce the output signals.

The conversion may cause very strong colors to extend out of range and as a result become clipped.

Processing such as the filters in the video conversion will create further edge effects (ringing), particularly for larger scaling ratios, and positive enhancement will add to this effect. Whilst there is a provision in SMPTE-274 and ITU-R BT.601 for overshoots in the -7% / +8% headroom given, measurement devices frequently report violations to much tighter limits by default. These are generally only necessary to protect downstream RGB or composite video processing when the respective coders have no internal legalization.

A simple luminance and chrominance limiter is provided in the IQUDC00 to give correction for the majority of practical cases of large signal excursion. If full legalization for RGB and/or Y+C gamut is required then it is recommended a downstream gamut legalizer is used.

The following option are provided:

- **Auto:** In this mode the best color space conversion for the signal process is selected. This is derived from the definition of the input and output video standards.
- **None:** In this mode no color space conversion is performed.
- **REC601(SD)->BT709(HD):** Conversion from Rec. ITU-R BT.601 (SD) to ITU-R BT.709 (HD) color output.
- **BT709(HD)->REC601(SD):** Conversion from ITU-R BT.709 (HD) to Rec. ITU-R BT.601 (SD) color output.

5.4.4 RGB Legalizer

RGB gamut legalization ensures that both the HD and SD outputs of the unit meet specified color limits.

- **Enable:** Select to enable the RGB Legalizer.
- **Range:** Select the range required:
  - **700 mV** RGB Lo 0 mV, RGB Hi 700 mV.
  - **721 mV** RGB Lo -21 mV, RGB Hi 721 mV.
  - **735 mV** RGB Lo -35 mV, RGB Hi 735 mV. The **735 mV** selection should be used in conjunction with the luma clipper (set at presets) to generate images that adhere to EBU R103-200 specification.

5.4.5 Luma Clipper

When luminance levels are too high or too low, devices such as encoders and displays can have problems. The luma clipper is used to limit signals above and below predefined limits.

- **Enable:** Select to enable the Luma Clipper
- **White Max:** This sets the upper limit of the clipper. The range is minimum 90% (825 digital 10 bit value) to maximum 109% (1019) with increments of 1%. The preset value is 103%.
- **Black Min:** This sets the lower limit of the clipper. The range is minimum -7% (4) to maximum 10% (152) with increments of 1%. The preset value is -1% (55).

5.4.6 Enhancer

This controls the amount of detail enhancement that may be applied.

- **V Enhance:** This adjusts the levels of high frequency vertical information to make the output pictures appear sharper. The range is -2 to +3 in unity steps and the preset value is 0.
- **H Enhance:** This adjusts the levels of high frequency horizontal information to make the output pictures appear sharper. The range is -2 to +3 in unity steps and the preset value is 0.

5.4.6.1 Advanced H Enhance

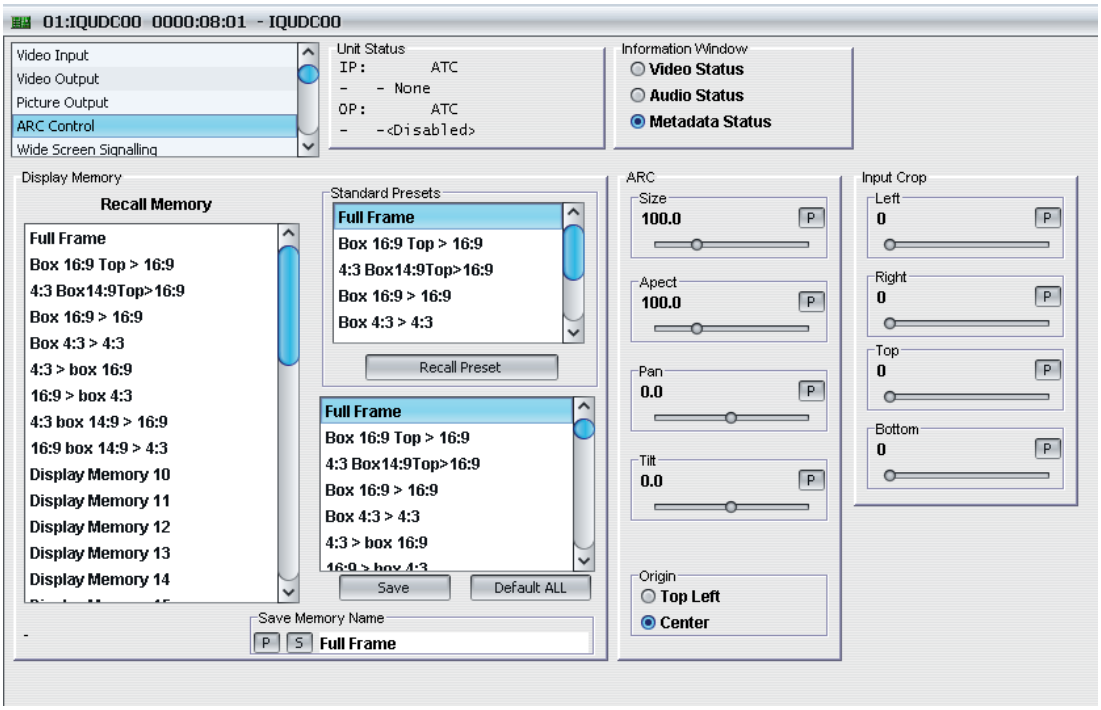
The Advanced Horizontal Enhancer allows enhancement to be selectively applied to the low frequency band, medium frequency band, or high frequency band. Four presets are available as well as custom gain and noise rejection.

- **Enable:** Select to enable advanced horizontal enhancement.
- **Freq Band:** Select the frequency band to which enhancement will be applied.
- **Presets:** The following present controls are provided:
    - **Low:** Sets Gain to 2.0 and Noise Rejection to 15% for the selected frequency band.
    - **Medium:** Sets Gain to 4.0 and Noise Rejection to 15% for the selected frequency band.
    - **High:** Sets Gain to 6.0 and Noise Rejection to 15% for the selected frequency band.
    - **Super:** Sets Gain to 8.0 and Noise Rejection to 15% for the selected frequency band.
    - **Custom:** Allows Gain and Noise reduction to be manually adjusted.
- **Gain:** If the Custom preset is selected, this allows the Gain to be adjusted on the selected frequency band.
- **Noise Rejection:** If the Custom preset is selected, this allows the Noise Rejection to be adjusted on the selected frequency band.

5.5 ARC Control

This **ARC Control** screen allows the aspect ratio conversion to be controlled manually including picture size and position adjustments.

All parameters on this page are saved in global Display Memories.



5.5.1 Display Memory

These are user programmable memories which are used in conjunction with the automatic aspect ratio conversion (under **Wide Screen Signaling** control) and any manual aspect conversion selections. By default they have the first nine loaded with the scaling values used for the aspect mapping, but any can be modified or overwritten for customization. In particular use of the input crop may be desirable to hide WSS (line 23) or 608 (line 21) signaling.

5.5.1.1 Standard Presets

To recall a setup from the list of standard presets, select a name from the list (text is highlighted, Full Frame in the example opposite) and click on **Recall Preset** and the new settings will be applied immediately.

5.5.1.2 Recall Memory

This also allows copying of individual aspect conversions back into original or new Display Memories.

To recall a setup from memory, select a name from the list (text is highlighted, **Full Frame** in the example above) and the new settings will be applied.

Adjustments may be made using the ARC controls (Size, Aspect, Pan and Tilt) and then the setup saved to a display memory location selected from the list. To save the setup select the location (text is highlighted) and click **Save**.

The name of the memory location may then be changed using the **Save Memory Name** item.

Note: If any changes are made to the ARC controls the text highlighting will disappear and an asterisk will be shown below the Recall Memory list. (The current conversion would normally be shown here).

5.5.1.3 Default All

Selecting this item will return all 40 display memory settings and their names to their default factory values.

For details of active formats and transform descriptions please see pages 23 and 24.

5.5.1.4 Save Memory Name

The display memory name may be changed with this function. This name will then appear in the Display Memory/Recall Memory list and on the **Wide Screen Signaling** screen Display Memory lists.

Selecting Preset (**P**) will return the text to the default name.

5.5.2 ARC

This allows the size and position of the picture to adjusted.

- **Size:** This adjusts the size of the whole image. Both vertical and horizontal size change together while maintaining the aspect ratio of the image. The range of control is from 60% to 200% in 0.1% steps. Preset value is 100%.
- **Aspect:** This adjusts the horizontal size of the image, allowing the shape (aspect ratio) of the output image to be changed. Increasing the value will increase the width of the picture. The range of control is from 60% to 200% in 0.1% steps. Preset value is 100%.
- **Pan:** This adjusts the horizontal position of the output image. The range of control is ±75% in 0.1% steps. Preset value is 0.0%. Increasing values will move the picture to the right.
- **Tilt:** This adjusts the vertical position of the output image. The range of control is ±75% in 0.1% steps. Preset value is 0.0%. Increasing values will move the picture down.
- **Origin:** This defines the fixed position of the picture within the raster.
    - **Top Left:** The picture will be positioned at the top left hand corner of the raster. This allows easier support of a few picture formats where the active picture format is a partial screen contained in a larger resolution "carrier".
    - **Center:** The picture will be positioned in the center of the raster.

5.5.3 Input Crop

This function allows the adjustment of input blanking, and used where the source video has pixels/lines at the edge of the picture that are not required to be displayed. When set, the unit blanks any output data generated by the input data, regardless of the display control settings.

- **Left:** This adjusts the left-hand edge of blanking. A setting of 0 (default) indicates that no input pixels are blanked, 3 cause the first 3 input pixels to be blanked, etc.
- **Right:** This adjusts the right-hand edge of blanking. A setting of 0 (default) indicates that no input pixels are blanked, 2 cause the last 2 input pixels to be blanked, etc., e.g. pixels 1920 and 1919 from a 1080i picture.
- **Top:** This adjusts the top edge of blanking. A setting of 0 indicates that no input lines that are normally visible should be blanked, 4 cause the first 4 input lines to be blanked, etc.
- **Bottom:** This adjusts the bottom edge of blanking. A setting of 0 indicates that no input lines that are normally visible should be blanked, 1 cause the last input line to be blanked, etc., e.g. line 720 from a 720p picture.

Note: Blanking should be measured as offsets from the extreme. For example, a value of 4 would be 4 pixels from the highest legal pixel for any video mode. An example would be where the highest legal pixel is 1920, blanking would apply at 1916. Pixels are counted with 1 as the first.

5.6 Wide Screen Signaling

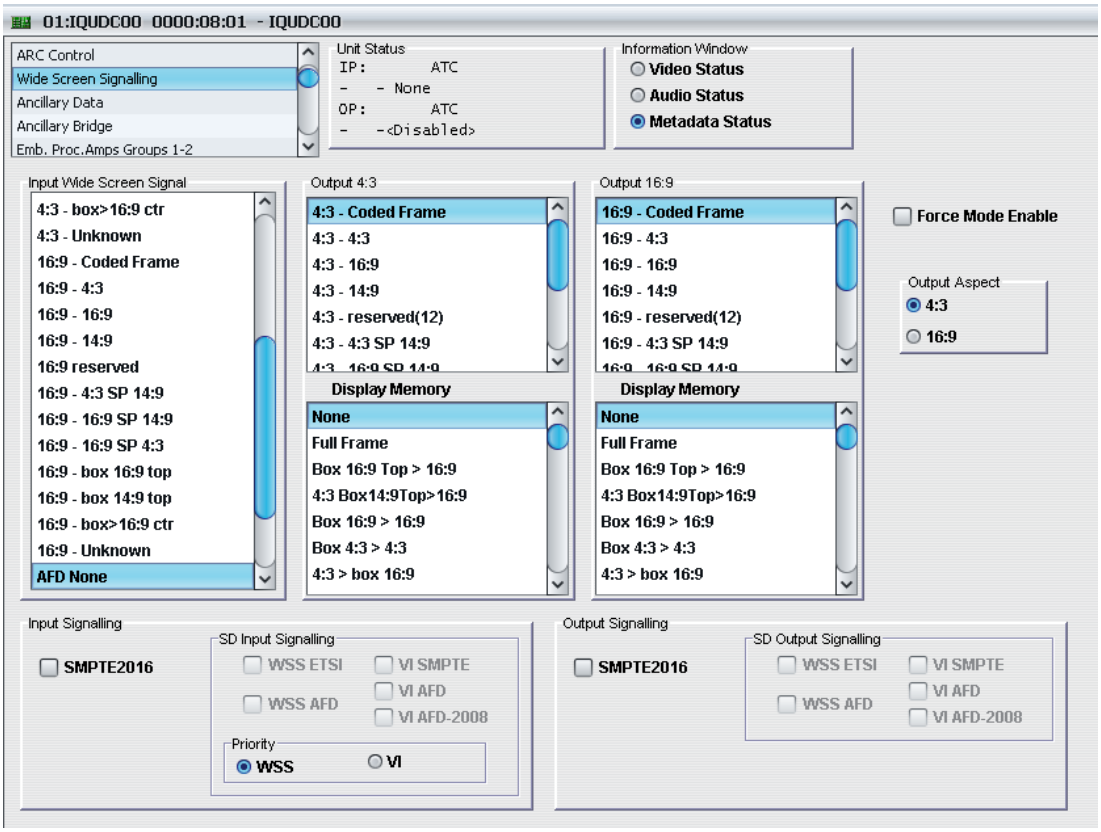
The **Wide Screen Signaling** screen allows wide screen signaling and picture aspect conversions to be set up.

For more details please see *Appendix A*.

Automatic aspect ratio control from input signaling can be done using mapping tables for aspect conversions (Display Memory recalls) and signaling to downstream devices. Use of Display Memories allows non-standard transformations & overscan preferences to be applied.

The internal format uses Aspect Ratio & Active Format (ETSI 101154) displayed as 16:9 - 4:3 in the screen shot.

Note: Apart from enabling the desired input and output interfaces and output aspect ratio there should be no need to modify this area, since the mapping is designed to produce expected conversions from the consistent format descriptions.



5.6.1 Input Wide Screen Signal

This allows input signal choice for configuration of mapping tables, and forcing for previewing mappings. When all input signalling enables have been disabled, i.e. WSS/VI/2016, or when any is enabled but no signalling is present, the AFD Input value will be **AFD None**.

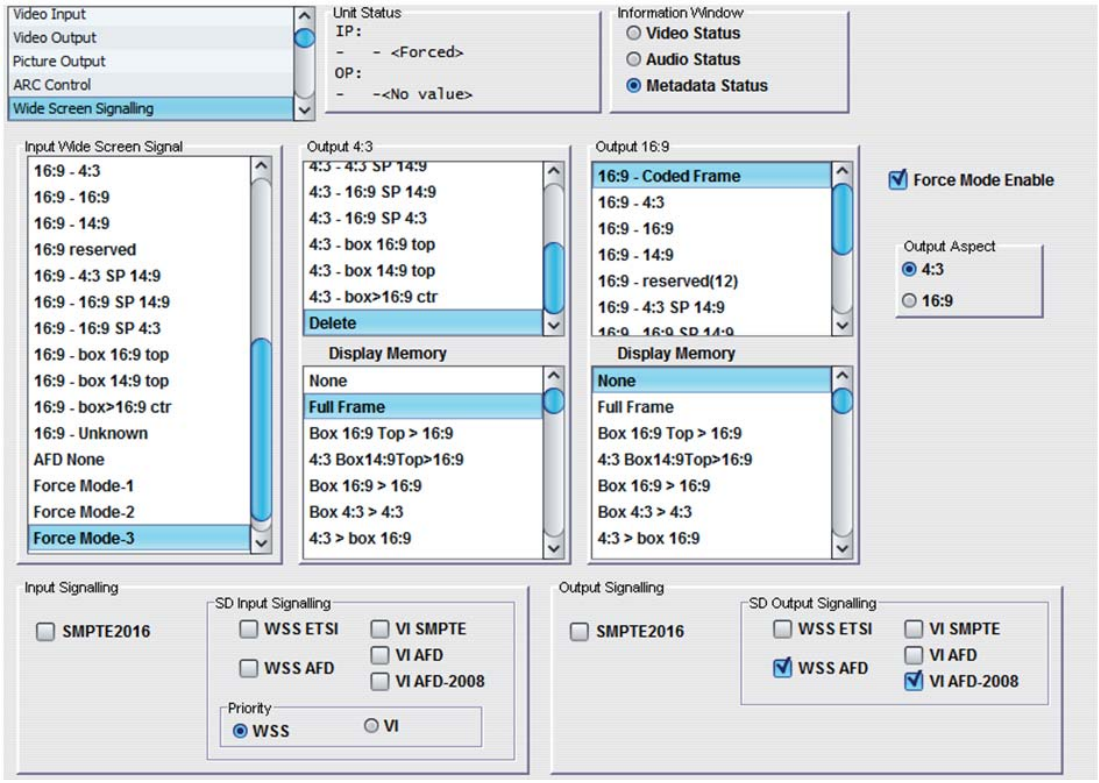
5.6.2 Output 4:3 / Output 16:9

The four list boxes in the **Output 4:3** and **Output 16:9** columns constitute the mapping tables, and are modifiable at any time. They may be returned to the original state with Factory Defaults.

A memory selection of **None** inhibits a load of a memory so the last aspect conversion is held.

Input active formats may include **Unknown** (e.g. for Video Index RP186) and a mapping to **Coded Frame** (i.e. full screen) is assumed though this is modifiable.

An output selection of **Delete** is used if you wish to remove output wide screen signalling for any input AFD. This will force any enabled signalling to OFF, whilst this setting is in operation. In this mode, the Unit Status window, with **Metadata Status** selected, will display **<No value>**, as shown below.



5.6.3 Input Signaling

5.6.3.1 SMPTE2016

Selecting this option enables the IQUDC00 to react to incoming SMPTE2016 wide screen signaling information. It is not necessary to specify the expected input line because this is automatically detected.

5.6.3.2 SD Input Signaling

The ICUDC00 can react to incoming VI or WSS signaling in the input stream.

Note: The appropriate VBI lines must be selected on the Ancillary Data screen.

- **WSS ETSI:** Wide screen signaling to ETS 101154 (line 23). 625/50 only.
- **WSS AFD:** Wide screen signaling including Active Format based on ARD Spec 1 (UK). 625/50 only.
- **VI SMPTE:** Video Index to SMPTE RP186 line 11/324 (625), line 14/276 (525).
- **VI AFD:** Video Index including Active Format based on ARD Spec 1 (UK).
- **VI AFD-2008:** Video Index including Active Format based on RP168A (AFD 2008).
- **Priority:** WSS / VI permits the appropriate input interface to be used when both are present to avoid any possible conflicts.

5.6.4 Output Signaling

5.6.4.1 SMPTE2016

Selecting this option sets the IQUDC00 to insert SMPTE2016 wide screen signaling.

The appropriate VANC output line must be set up for SMPTE2016 on the Ancillary Data screen. In bypass mode, this can simply follow the input line. However, in up conversion mode, this line number must be set manually.

5.6.4.2 SD Output Signaling

The IQUDC00 can be set to insert VI and /or WSS signaling in the output stream. Select the VI / WSS output coding check boxes to enable insertion. Both WSS and VI can be inserted simultaneously.

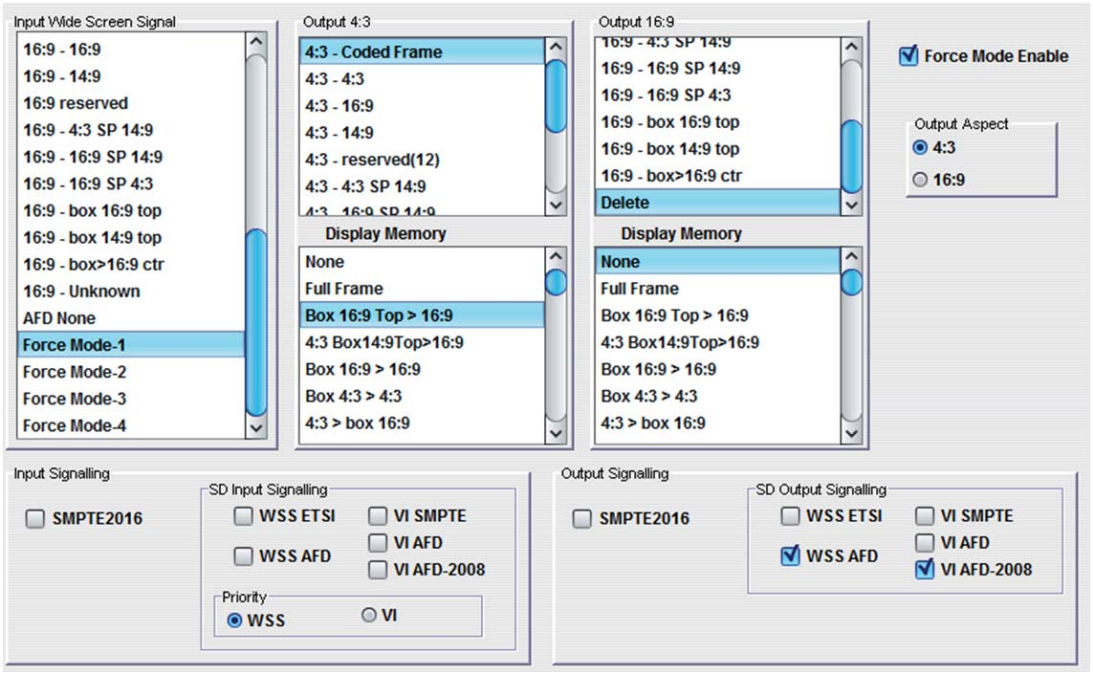
Note: The appropriate VBI lines must be enabled for VI / WSS on the Ancillary Data Screen.

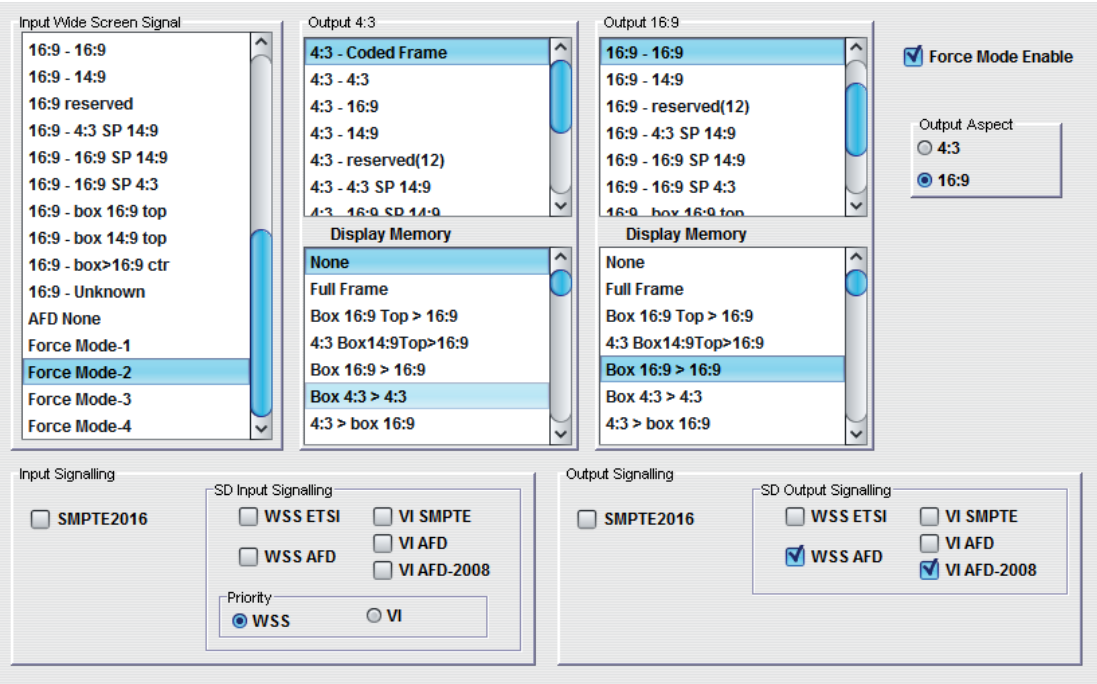
- **WSS ETSI:** Wide screen signaling to ETS 101154 (line 23). 625/50 only.
- **WSS AFD:** Wide screen signaling including Active Format based on ARD Spec 1 (UK). 625/50 only.
- **VI SMPTE:** Video Index to SMPTE RP186 line 11/324 (625), line 14/276 (525).
- **VI AFD:** Video Index including Active Format based on ARD Spec 1 (UK).
- **VI AFD-2008:** Video Index including Active Format based on RP168A (AFD 2008).

5.6.4.3 Force Input Mode

When checked, this allows previewing of the conversion mappings by forcing an equivalent input wide screen signal.

Up to 4 manual settings are available when **Force Mode Enable** check box is enabled. You can assign AFD / ARC combinations for different force modes. Select the one required using the **Input Wide Screen Signal** listbox.





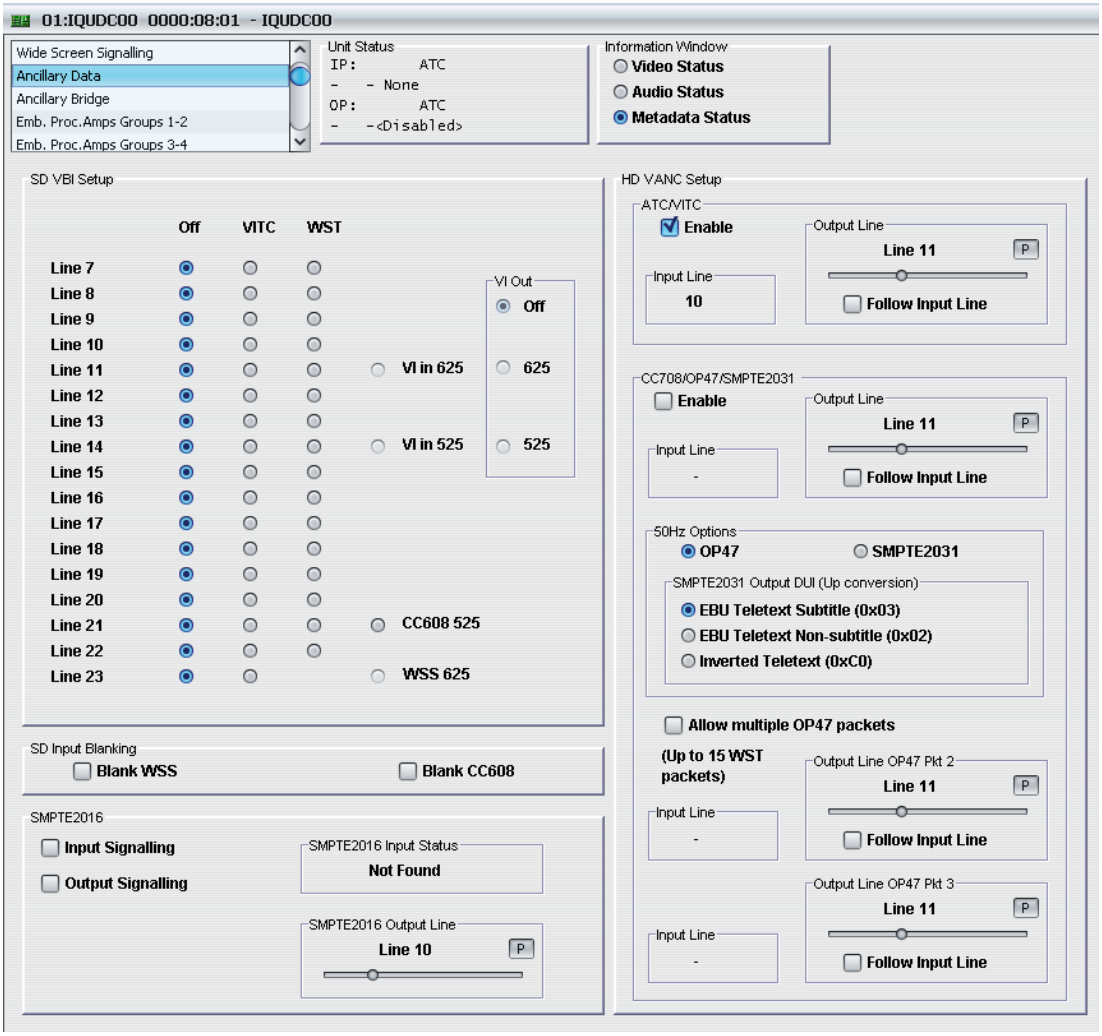
5.6.4.4 Output Aspect

This allows the output aspect ratio to be chosen, either **4:3** or **16:9**. This will be the target aspect ratio choice for conversion to and for indication as the current output. As such it will direct the mapping choices.

The **Output Aspect** setting is stored for each input wide screen signal selection.

5.7 Ancillary Data

The **Ancillary Data** screen allows the line position of various signaling functions to be selected.



5.7.1 SD VBI Setup

For each SD VBI line in the range 7 - 23 (field 1), the data type / format can be selected. The options for each line are:

- **Off:** The line is not being used.
- **VI:** VideoIndex (SMPTE RP186).
- **WSS:** Wide screen signaling (ETSI 300294) - only enabled for 625.
- **VITC:** Vertical Interval Timecode (SMPTE 12M).
- **WST:** Teletext (ETSI 300706) - in SD pass-through mode, up to 16 lines are supported (7:22).
- **CC608:** US closed caption (CEA608) - this line is tied to line 21 (525) only.
- **VI Out:** A separate control for VI output is controlled by the enable of VI output signalling. This allows mixing VITC or WST data on the same output data line.

Each SD VBI line can be used for only one data type at a time.

When both the input and output are HD, this control is grayed out.

When both input and output are SD (SD Bypass Mode), multiple lines can be enabled for WST and VITC. However, for all other data types (VI WSS, and CC608) only one line can be active at any time.

When either the input or output is HD (i.e. when performing up conversion or down conversion), only one line can be active at any time for each data type. If changing from SD bypass mode, where multiple WST and VITC can be enabled, all but the first line will be disabled.

Input or output wide screen signalling automatically reserve the correct VBI line for WSS (line 23) and VI (11 [626] and 14 [525]).

VITC, up to 2 lines are selectable, it is recommended that the lines are not placed consecutively. WST, any number of lines may be selected, however if upconverting (to OP47) allow up to 5 lines per OP47 packet.

5.7.2 SD Input Blanking

- **Blank WSS:** this allows blanking of active video WSS input signalling.
- **Blank CC608:** this allows blanking of active video 608 data.

5.7.3 HD VANC Setup

These controls allow HD vertical ancillary data to be configured.

If both the input and output are HD (HD bypass mode), both the input and output controls will be available. As well, in this mode, the Follow Input Line check box will also be available. Selecting this check box will cause SMPTE2016 output data to be inserted on the same line as is specified for the input.

- **ATC/VITC:** The ATC/VITC controls enable the user to monitor the input line on which the IQUDC has detected incoming ATC/VITC data, and/or on which output line the IQUDC will insert ATC/VITC data. The **Enable ATC/VITC** check box must be selected in order for these controls to have any effect.
- **CC708/OP47:** The CC708/OP47 controls enable the user to monitor the input line on which the IQUDC has detected incoming CC708/OP47 data, and/or on which output line the IQUDC will insert CC708/OP47data. The **CC708/OP47 Enable** check box must be selected in order for these controls to have any effect. The moding of input and output line controls is the same as for SMPTE2016. The IQUDC automatically switches between CC708 (for 29i/59p standards), and OP47 (for 25i/50p standards).
    - **Caption processing WST / OP47:** As already indicated up to 16 lines WST processing is available. In up-conversion or down-conversion modes up to 15 lines may be transferred to or from OP47 packets (up to 5 lines per packet). OP47 lines may be placed on one output line or separated.
    - **Caption processing WST / SMPTE2031:** Up to 5 WST lines may be processed to SMPTE2031 ancillary when up-converted.

5.7.4 SMPTE2016

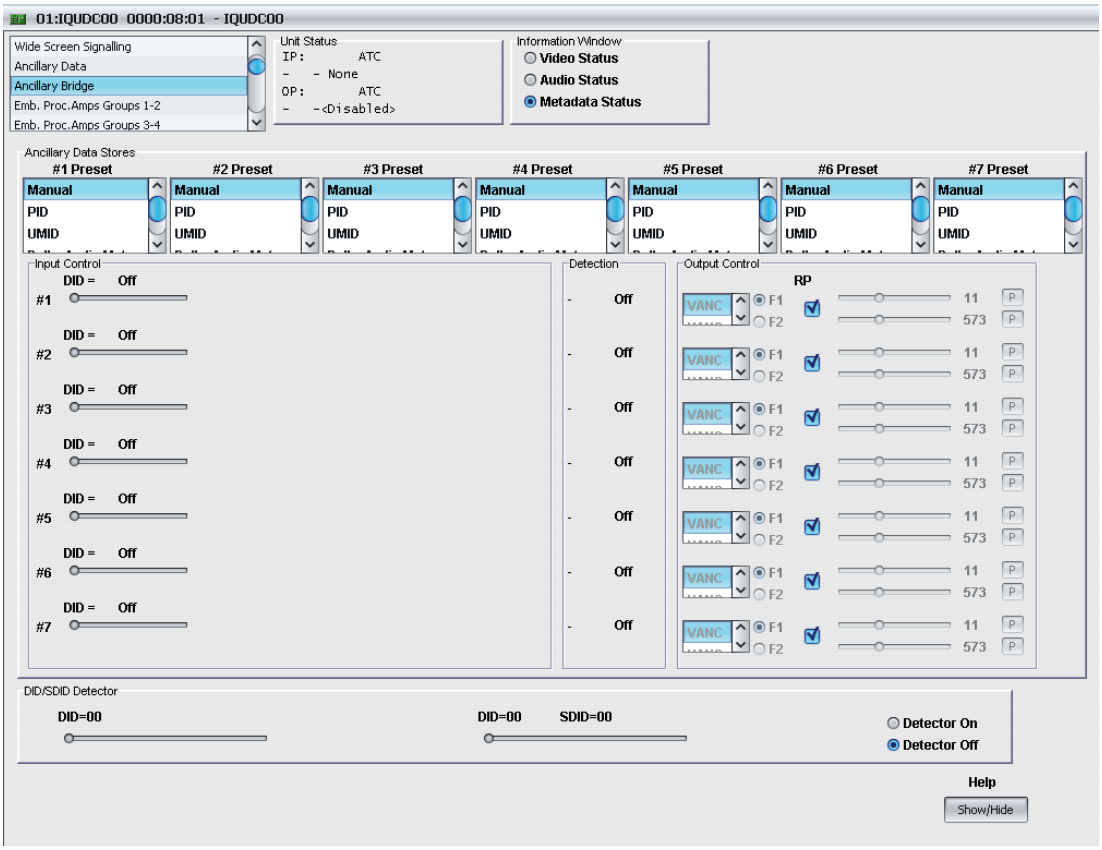
- **Input Signalling:** When this option is selected, the IQUDC will detect input SMPTE2016 signalling.
- **Output Signalling:** When this option is selected, the IQUDC will insert SMPTE2016 output data.
- **SMPTE2016 Input Status:** Allow you to monitor on which input line SMPTE2016 is detected
- **SMPTE2016 Output Line:** Allows you to specify which output line it is to be inserted by dragging the slider control.

Note: Please ensure output SMPTE2016 is placed on a separate VBI/VANC line from any other ancillary data type. If this occurs the controls and logging will show a line clash warning.

5.8 Ancillary Bridge

The **Ancillary Bridge** screen allows detection of packet based ancillary data and re-insertion on the output (unaltered). This should not be used for packet types already processed (708. OP47, SMPTE2016, SMPTE2031, ATC) by the ancillary data block. The exception is in processing SD-ATC, where you should use the bridge.

The ancillary bridge provides a generic bridging mechanism to forward packets from input to output. Up to 7 blocks can be configured; each block processes 1 field's worth of data. If data is present, the detected line is indicated (in the **Input Control** area) and whether this is located in VANC or HANC (in the **Detection** area). The use may optionally program the output on any available line (in the **Output Control** area), although other ancillary packets may also use the same line (concatenated). This rule works except for 2016 output which must be left on its own line).



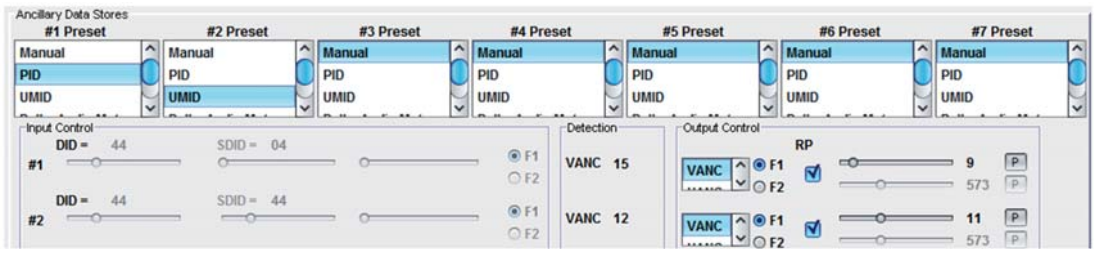
Example

In the example below there are 2 different data packets available **PID** (44,04), field 1, and **UMID** (44,44), field 1.

PID data is present in the VANC on line **15**.

UMID data is present in the VANC on line **12**.

This data is now wrapped around the scaler and output on lines **9** and **11** respectively.



5.8.1 Ancillary Data Stores

These are 7 preset data stores, labelled **#1 Preset** to **#7 Preset**, that display any detected ancillary data packets in the input. Each store configures 1 “block” or “field” of data.

There are 5 possible options:

- **Manual:** user configures DID and, optionally, SDID values.
- **PID:** (44,04).
- **UMID:** (44,44).
- **Dolby Audio metadata:** SMPTE2020 (E3).
- **OFF:** turns off any enabled controls.

5.8.1.1 Input Control

Displays detected DID or SDID at the input for each of the ancillary data blocks displayed in the above preset stores.

5.8.1.2 Detection

If data is present, displays the detected line and whether this is located in VANC or HANC.

5.8.1.3 Output Control

Displays the output lines in which the ancillary data is re-inserted.

5.8.2 DID/SDID Detector

This allows browsing of all HANC and VANC data packets.

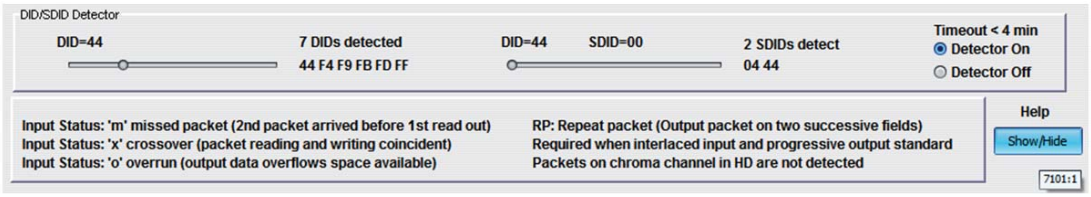
If the detector is enabled, it will turn off after 4 minutes.

When enabled if any packets are detected, the list of DID values are shown. If there are more than 6 DIDs present, use the left-hand slider to change the parsed list.

To check the SDID combinations, move the left hand detector to the DID value, any SDID values are then displayed. If there are more than 6 associated SDID values, use the right-hand slider to change the parsed list.

Example

In the example below DID of 0x44, there are 2 SDIDs listed 0x04 and 0x44. These correspond to UMID and PID packet types.

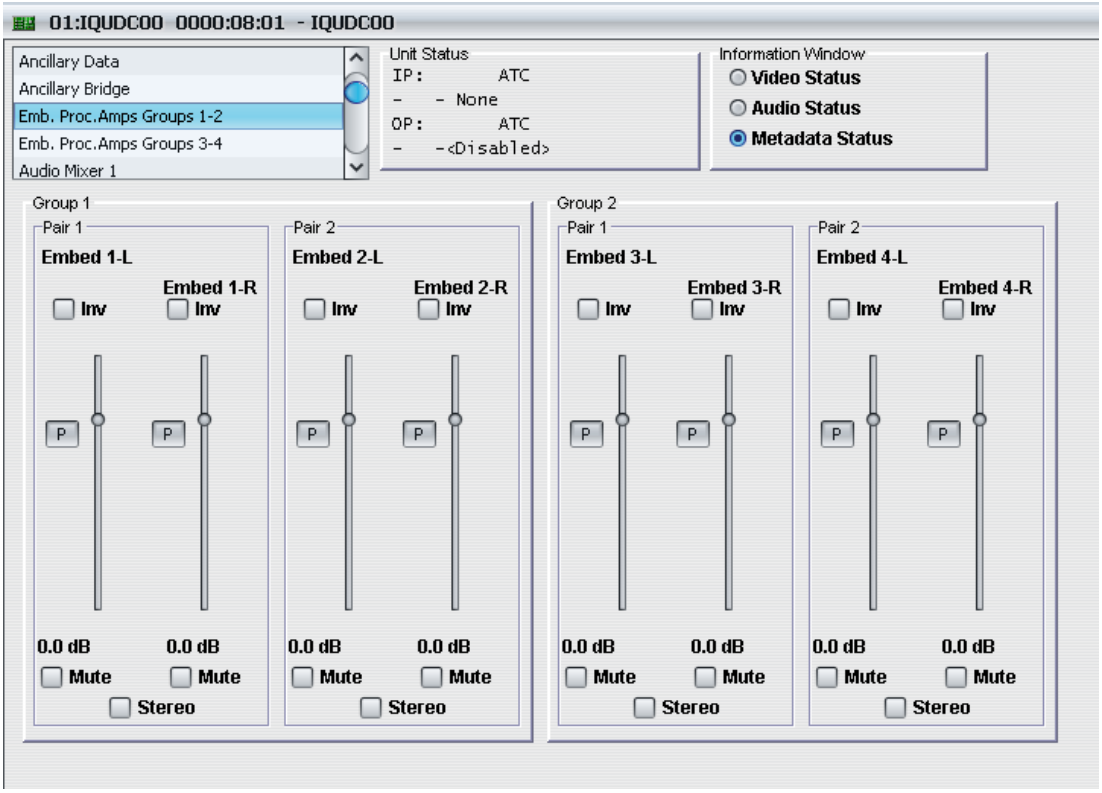


5.9 Emb. Proc. Amps Groups 1-2 and 3-4

This allows the gain of the 16 embedded audio channels to be adjusted. It also allows for phase inversion and instant mute to be applied to any channel.

Note: These controls will not be available when the embedder is disabled.

Also they will not be available if a data source is embedded. This could be due to a data source being fed into the UDC or the source is marked as Data in the Embedded I/P Setup menu.



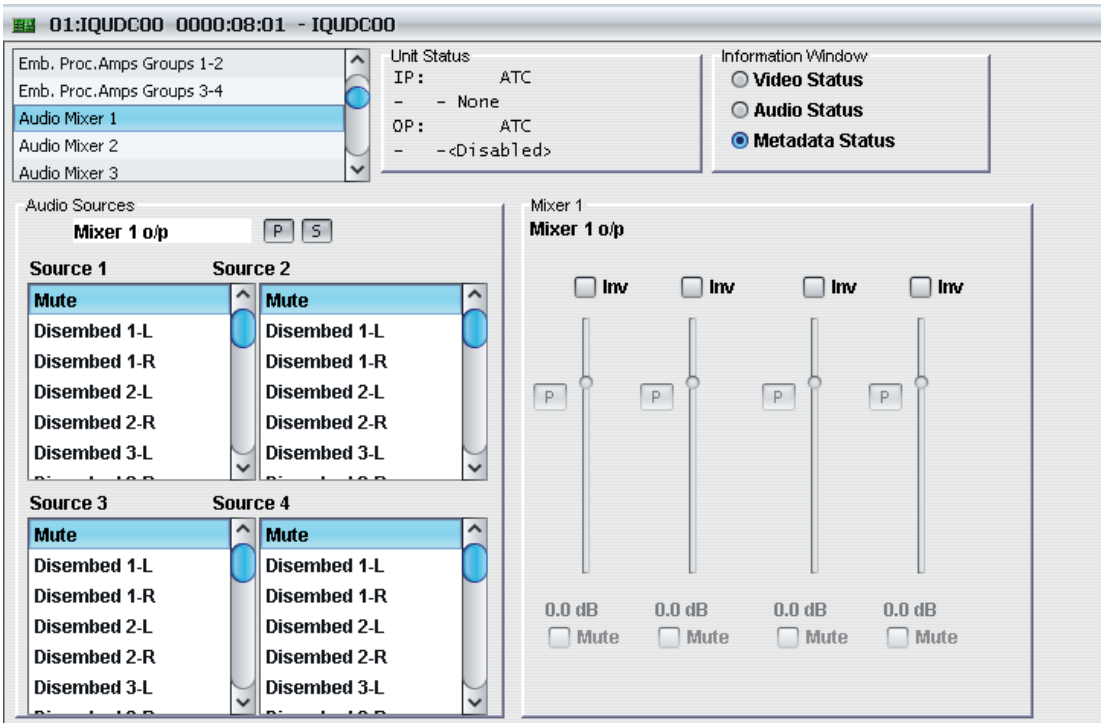
5.9.1 Groups 1 to 4, Pairs 1 and 2

- **Embed 1-8 L & R:** The scroll bars allow the gain of the channel may be adjusted over a range of +12 to -36 dB in 0.1 dB steps. Preset (**P**) is to 0 dB.
    - **Inv:** When checked the signal polarity will be inverted.
    - **Mute:** When checked the channel will be muted.
    - **Stereo:** When checked the two channels of the pair will be linked together (configured as a stereo pair) and any adjustments made to one channel will automatically be applied to both channels. This allows rapid harmonious adjustment when audio pairs are carrying stereo signals.

5.10 Audio Mixer 1 - 4

The audio mixers can be used to create new, mixed audio feeds from the incoming audio channels. This is useful when, for example, stereo incoming feeds are required in mono or discrete surround sound feeds are required in stereo.

Not only can the incoming feeds be mixed together but the exact balance can be set using the faders. This allows finer control over the resulting sound than a simple mono function. Additional applications include mixing together incoming background audio with local foreground audio such as adding commentary to a sports feed. The invert function can be applied to one of the channels being mixed to create a mix-minus channel for foldback.



5.10.1 Audio Sources

The inputs can be selected from the list.

Note: If Mute or one of the test tones is selected as the source (i.e. a fixed level signal source), the corresponding gain control will be grayed out and will not be adjustable.

To change the name, type the new text in the text area and then click **S**. The new name will replace the name in the mixer gain control section. Selecting Preset (**P**) will return the text to the default text (Mixer 1, Mixer 2, Mixer 3 or Mixer 4).

5.10.2 Mixer 1 / 2 / 3 / 4

Each of the four mixers has four inputs with individual gain controls that allow the mixing levels for each of the input signals, to be adjusted.

The range of adjustment is from +12 dB to -36 dB in steps of 0.1 dB. Preset Is to 0.0 dB.

The outputs of these mixers provide four extra input selections for the Channel Router.

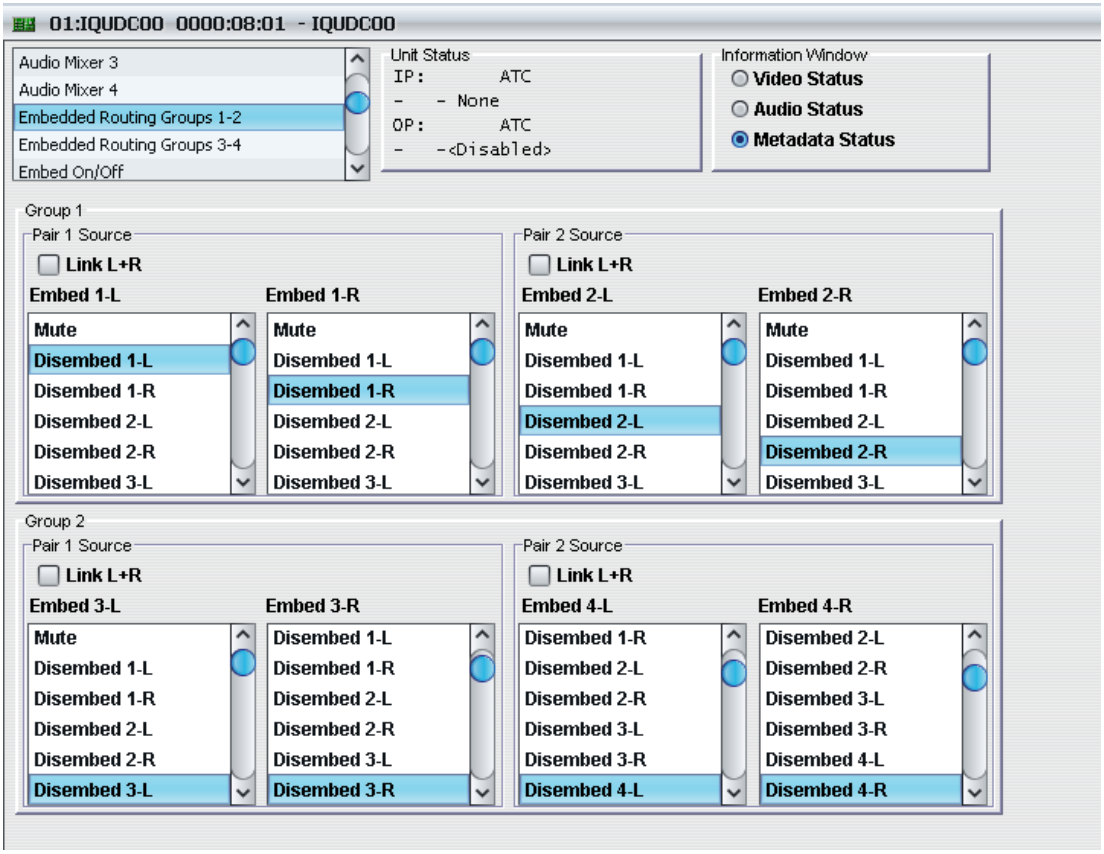
5.10.2.1 Clip Indicators

At the top of each fader the word **Clip** will appear briefly if the audio level reaches the 0 dBFS point, i.e. the digital limit. The fader level should be reduced to prevent this occurring. If the output level of the mixer reaches the 0 dBFS point (due to the addition of the input signals) the word Clip will appear briefly above the four faders. The fader levels should be reduced to prevent this occurring.

5.11 Embedded Routing Groups 1-2 and 3-4

This allows the signal sources for the SDI embedder to be selected from the list. Mute and audio tones may also be selected. The channels can be selected individually for total control over the embedded audio.

Factory default routing is one-to-one, e.g. Disembed 1-L to Embed 1-L, Disembed 1-R to Embed 1-R, etc.



5.11.1 Link L+R

When checked the selected source will be automatically paired with the corresponding left/right source and configured as a stereo pair.

Note: A corresponding left/right source will be automatically chosen when available.

If a mixer output is selected as a source a different mixer output will be automatically chosen for the other left/right channel. Mixer 1 is paired with Mixer 2 and Mixer 3 is paired with Mixer 4.

If a tone is selected as the source the same tone will be automatically selected for the other left/right channel.

If the selected source is a data source or it has been configured as a data source in the Embedded I/P Setup menu the corresponding left/right source will automatically be chosen.

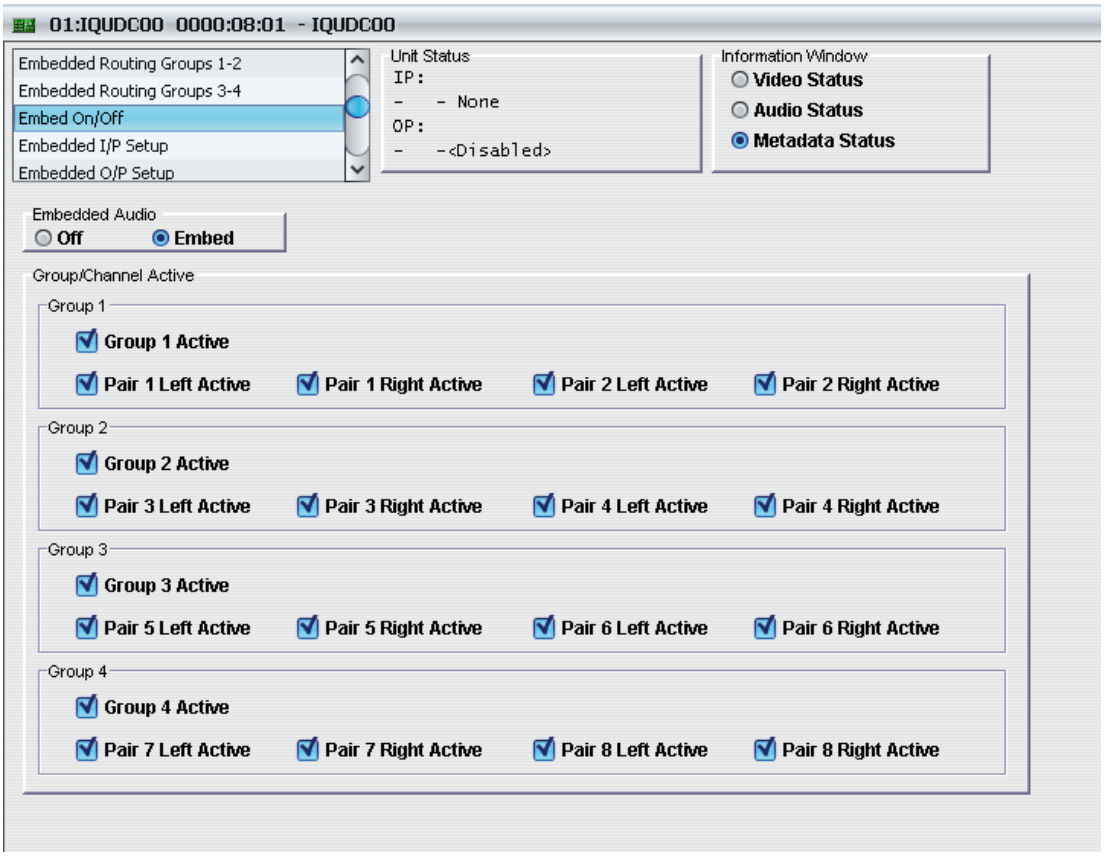
5.12 Embed On / Off

This allows the embedding function to be turned on or off. In the normal operation, audio is de embedded from the incoming HD-SDI or SD-SDI stream. A new set of 16 channels of audio are then embedded at the output of the module.

If the user has chosen to simply to pass the embedded audio from input to output, the channels are still extracted and embedded in this way.

There are three levels of control. The top level control sets whether any embedding will be performed or not. The second level controls embedding of an individual group. The third level controls each audio channel.

If the group is defined as inactive, then the individual channel selections for that group are disabled.



5.12.1 Embedded Audio

This control can be useful for testing when looking for technical issues with the system. In pass mode all the audio is left completely untouched by the module.

- **Off:** When selected, no audio is embedded.
- **Embed:** When checked, all activated audio groups and channels will be embedded onto the SDI video.

Factory reset is to all groups/channels enabled.

5.12.2 Group/Channel Active

This allows the embedding of four channels of the two pairs in each of the four groups to be activated or deactivated.

5.12.2.1 Group 1 to Group 4

This allows the selection of channels for embedding within a particular group.

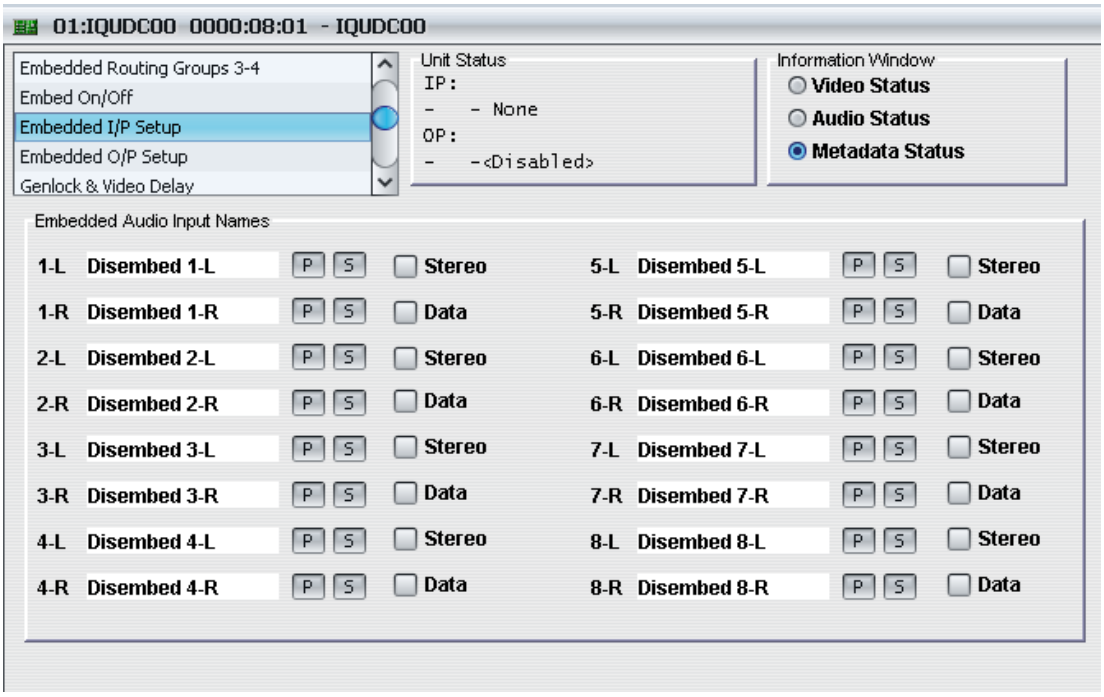
- **Group 1 to 4 Active:** When checked the group will embedded. When unchecked the group will not be embedded.
- **Pair 1 to 8 Left/Right Active:** When an item is checked the channel becomes active and will be available for embedding. When unchecked the channel will not be available for embedding.

Factory reset is to **Embed On** and all groups/channels enabled.

5.13 Embed I/P Setup

The **Embed I/P Setup** screen allows the user to determine whether an input audio pair should be treated as PCM audio or non-PCM audio - data. It also allows the names of the disembedded audio inputs to be changed from the default names (Disembed 1-L, etc.).

Embedded audio is a pair based system. This means that they carry the sound as two channels and it is not possible to carry just one channel. Of course, the IQUDC00 can pass and process either channel as well as both. This is because the module is channel-based internally. When an embedded feed is used to carry non-PCM data then the whole data space is allocated to that function. In this mode the feed has to be treated together, it has to be treated as the equivalent of a pair. For example, a non-PCM feed at the input will occupy the same space as two audio channels and must be passed to the output as two channels-worth of data.



5.13.1 Embedded Audio Input Names

Note that when a channel has been designated as a stereo signal the corresponding left/right channel will not appear on the screen.

These names are used in the lists for the following functions:

- Audio Mixer routing
- Embedded Routing

Note: Names are stored as part of the Memory function so that a new set of names can be recalled by a memory.

5.13.1.1 Stereo

This function treats the input audio pair as PCM audio.

5.13.1.2 Data

This function allows the module to treat the feed as data and to keep all the data together.

If the user sets the type to data then the pair will be treated as a non-PCM data feed through the circuitry within the module. This mode also protects the feed from PCM audio-specific operations such as gain and tracking delay. It also ensures that the audio is routed as a pair.

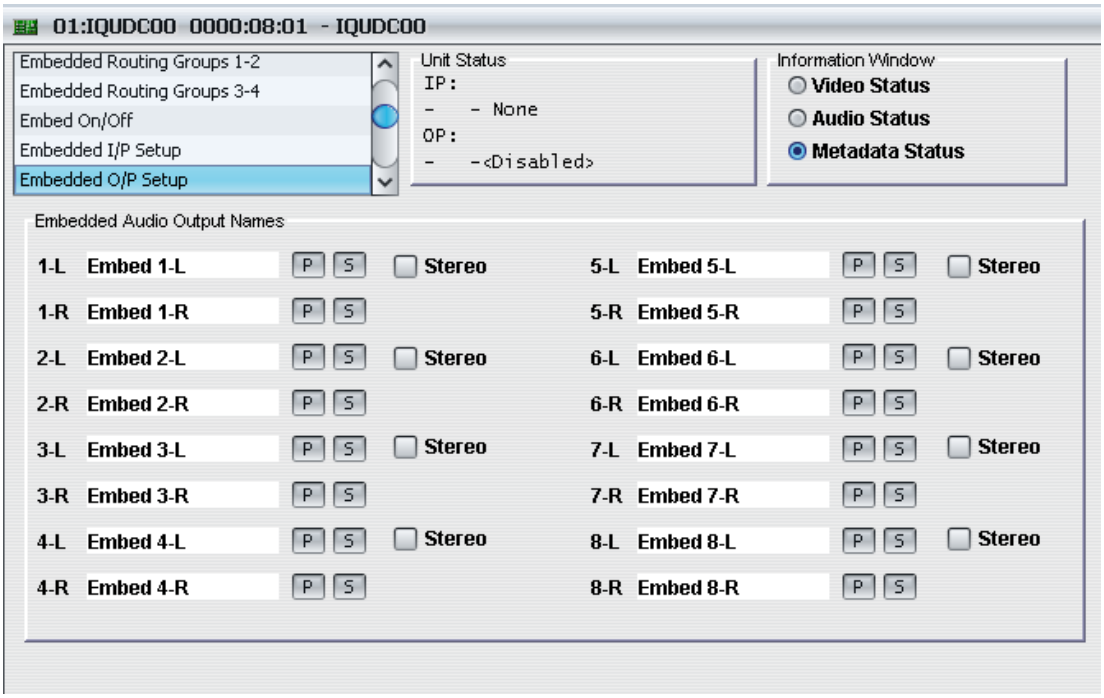
Note: Non-PCM sources are automatically treated as data sources, even when data isn't selected.

When selected as data the corresponding stream is treated as a non-PCM signal. The module then protects this stream from processing that would damage the data. One stream is equivalent to two PCM audio channels so in this mode there are no operations that can split the data. This mode is suitable for processing Dolby E and Dolby AC3 (Dolby Digital) data.

5.14 Embedded O/P Setup

The **Embedded O/P Setup** screen allows the names of the embedded audio outputs to be changed from the default names (Embed 1-L, etc.) and be designated as a stereo pair.

Note: Names are stored as part of the Memory function so that a new set of names can be recalled by a memory.



5.14.1 Embedded Audio Output Names

These names will appear in the Embed Proc Amps screen.

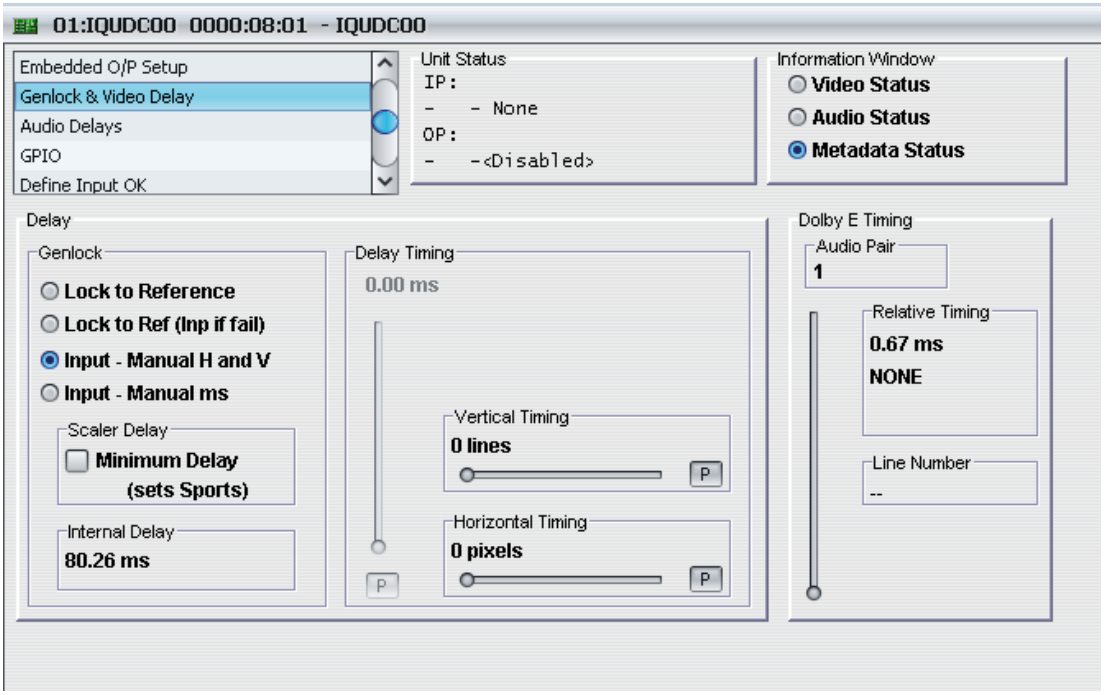
5.14.1.1 Stereo

This allows the left and right channels to be designated as a stereo pair.

Note: When a channel has been designated as a stereo signal the corresponding left/right channel will not appear on the screen.

5.15 Genlock & Video Delay

The **Genlock & Video Delay** screen is used to select the genlocking and delay functions of the synchronizer.



5.15.1 Genlock

This allows the genlock options to be selected.

5.15.1.1 Lock to Reference

When selected the unit will lock to an external black (burst) reference signal. In this mode Reference Status item will display the amplitude of the reference sync signal.

A reference input of a frame rate different to the output (mismatched), will force an input fail condition, resulting in the selection of the default output.

			Reference			
			SD Bi-level		HD Tri-level	
			625/50	525/59.94	50	59.94
Output	25	576i	●			
		1080i	●		●	
	50	720P	●		●	
	29.97	480i		●		
		1080i		●		●
	59.9	720P		●		●

IQUDC00 Reference Locking Output Standard Map

5.15.1.2 Lock to Ref (Input if fail)

When selected the unit will lock to the incoming reference if present but if no reference is present it will lock to the input.

Input - Manual H and V

The unit locks to the input and the H & V sliders are enabled to adjust delay. (The ms slider disabled). This allows the adjustment of the delay by changing the vertical and horizontal timing.

When a delay is required to be defined in terms of video lines, maybe to round up to the next frame boundary, this mode can be used. However, it may introduce complications on changes of video standard, and the minimum delay can go below the 0.75 ms audio minimum delay that would prevent delay matching.

Vertical Timing

This allows the vertical timing to be adjusted. The range of adjustment is 0 to (output standard lines per frame - 1) lines in steps of 1 line. The preset value is 0 lines.

Horizontal Timing

This allows the horizontal timing to be adjusted. The range of adjustment is 0 to (output standard pixels per line -1) pixels in steps of 1 pixel. The preset value is 0 pixels.

The total delay is the sum of Vertical Timing + Horizontal timing. The sum of horizontal and vertical timing is post limited to be between 0 and 1 frame of the current standard.

5.15.1.3 Input - Manual ms

When selected the unit locks to the input and the ms slider is enabled to adjust delay.

The range of control is 0 to output standard frame ms in steps of 0.01 ms. The preset value is 0 ms.

When a delay is required to be defined in terms of time, maybe to suit an audio or mixed interlace / progressive multi-standard environment, this mode can be used.

When selected the Vertical and Horizontal controls will be unavailable (grayed out).

The total delay (in normal mode, not minimum delay mode) will be the sum of four interlaced fields or four progressive frames + scroll bar value.

Note: The Vertical and Horizontal Timing controls (even though they are grayed out) will report this value (numerically in lines and pixels) when this control is adjusted.

5.15.1.4 Scaler Delay

When **Minimum Delay** is checked, the video path delay will be reduced to between two to three fields when locked to reference and two fields when locked to input (plus any H and V offset settings).

When Minimum Delay mode is selected, the output scaling will remain co-timed with the output wide screen signalling (WSS/VI/SMPTE2016), but changes will be one frame late relative to the input signalling/video.

This control is also present on the Picture Output menu, selecting it automatically selects the Sports setting on that menu.

5.15.1.5 Internal Delay

This displays the value of the current delay in milliseconds. This is useful to check that a suitable delay has been set.

This is the total delay through the unit and is made up of:

- The fixed scaler delay (4 interlaced fields/progressive frames in normal mode, 2 in low delay).
- The genlock control set by the user (H and V timing, or ms).
- Any offset between reference and input signalling timing, when genlock locked to ref.

5.15.2 Dolby E Timing

An indication of Dolby E header phasing at the outputs helps making corrections and avoids clicking or other corruption on downstream switching due to the 5% inter-frame guard band being misaligned with the video switch point.

Each of the 8 output embedded pairs (including passed input audio groups) may be selected for display & logging. It will report a line offset or indicate a missing Dolby E header (maybe indicating PCM audio).

5.15.2.1 Audio Pair

This control allows the selection of one of the eight embedded audio pairs (two for each of the 4 groups) for measurement. The number of the selected pair is numerically displayed.

5.15.2.2 Relative Timing

This will display the relative time delay (time of the embedded Dolby E reference with respect to its normal line position after the video frame switch point) in milliseconds (negative for late or higher line count). An out of limit flag (Timing Error Flag) is also displayed.

Timing Error flag

- **NONE:** No Dolby E header found. This may be because the pair is PCM or muted.
- **OK:** Close to normal line.
- **Early or Late:** Shown when out of safe range (outside +150 / -1250 us in 25 Hz, +150 / -1000 us in 29.97 Hz rates).

Ambiguity flag

- **Frame?:** When the output standard is 720P this indicates Dolby E packets straddle 2 frames so no correct phasing is possible.
- **Early or Late:** Shown when out of safe range (outside +150 / -1250 us in 25 Hz, +150 / -1000 us in 29.97 Hz rates).

5.15.2.3 Line Number

This will report the line number in which the Dolby E reference point is found.

5.15.3 Dolby E Logging

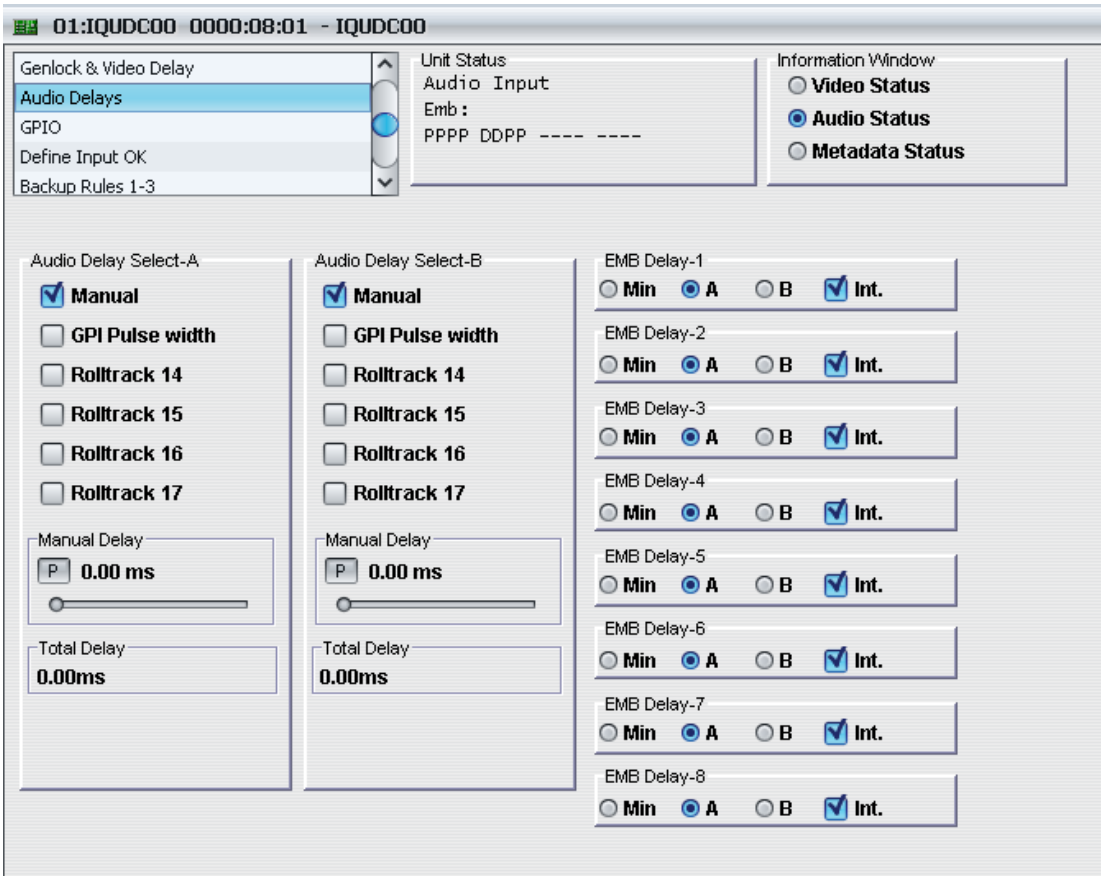
Dolby E position will be reported **Early**, **Late** or **OK** with the limits for each output standard as below:

Standard	Switch Point	Early Line	Normal Line	Late Line
625/25i	6	<9	11	>30
525/29.97i	10	<12	14	>29
1080/25i	7	<15	19	>54
1080/29.97i	7	<17	22	>55
720/50p	7	<20	25	>71
720/59.94p	7	<23	29	>73

Note: All HD standards use line 7 for the frame switching line. Unsupported frame rates are: 23.98, 24, 30, 60 in i or p or sf types.

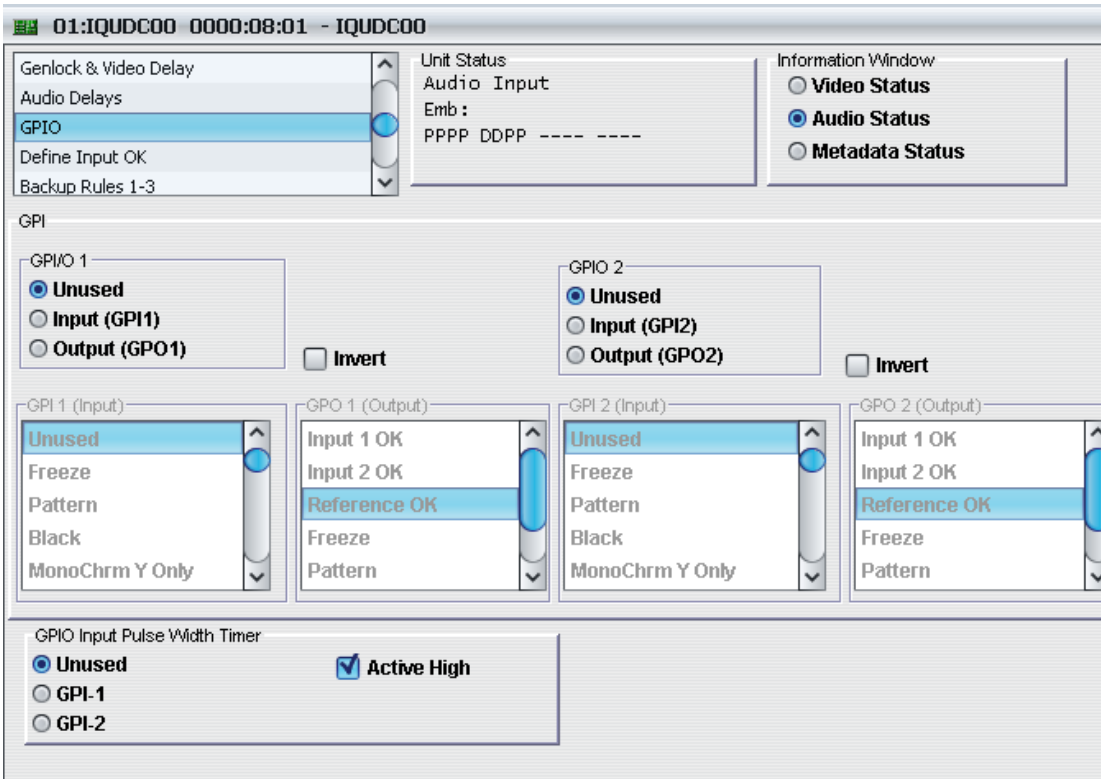
5.16 Audio Delays

The **Audio Delays** screen allows the audio delay functions to be configured.



5.17 GPIO

This screen allows the General Purpose Input/Output functions to be configured.



5.17.1 GPI/O 1 and GPI/O 2

This allows GPI to be configured in the following ways:

- **Unused:** GPI is inactive.
- **Input:** GPI is configured as an input.
- **Output:** GPI is configured as an output.

5.17.2 GPI 1 (Input) or GPI 2 (Input)

When the GPI is configured as an input, this item allows an action to be chosen that will occur when the GPI input is grounded or, if the Invert function is selected, becomes open.

Each of the following options is initial edge triggered. Once this has taken place, the option will be selected until some other process, or (where applicable) the returning edge, deems otherwise.

The options are as follows:

- **Freeze:** The output picture will be frozen. When released (input open) the output picture will be unfrozen.
- **Pattern:** The output picture will become the selected pattern. When released (input open) the output picture will revert to normal.
- **Black:** The output picture will cut to black. When released (input open) the output picture will revert to normal.
- **MonoChrm Y Only:** The output picture will become monochrome using only the Y component of the signal. When released (input open) the picture will revert to normal color.

- **MonoChrm CbCr Only:** The output picture will become monochrome using only the CbCr components of the signal. When released (input open) the picture will revert to normal color.
- **Use I/P Ref (SDI):** When initiated, the unit will lock to the video input. When released (input open) this state will remain; i.e. it will not revert to the previous state.
- **Use Ext Ref (Analog):** When initiated, the unit will lock to the reference signal. When released (input open) this state will remain; i.e. it will not revert to the previous state.
- **Select Inp 1, Select Inp 2:** Input 1 or Input 2 will be selected.
- **Select Input:** This is a toggle function that selects between Input 1 (inactive) and Input 2 (active).
- **Select Backup:** This will enable the Backup Rules function.
- **Memory 1 to 16:** The unit will revert to the setup stored in the selected memory location. When released (input open) this state will remain; i.e. it will not revert to the previous state.

Note: **GPI Input Edge Switching Operation.** With the exception of Memory Recalls 1-16 and reference actions the GPI input will switch on both edges, hence the switch to the inactive state will perform the reverse function. This may obviously override any other control operations performed while the GPI was active.

5.17.3 GPI 1 (Output) and GPI 2 (Output)

When the GPI is configured as an output, this item allows an action to be chosen that will produce an output signal at the GPI connector. The GPI output will be driven to ground or, if the Invert function is selected, becomes open.

The options are as follows:

- **Input 1 (or 2) OK:** An output signal will be produced if the HD SDI input is present and OK.
- **Reference OK:** An output signal will be produced if the reference signal is present and OK.
- **Freeze:** In output signal will be produced when freeze is selected.
- **Pattern:** An output signal will be produced when patterns are enabled.
- **Black:** An output signal will be produced if the picture has become cut to black.
- **Monochrome:** An output signal will be produced if the picture has become a monochrome picture.

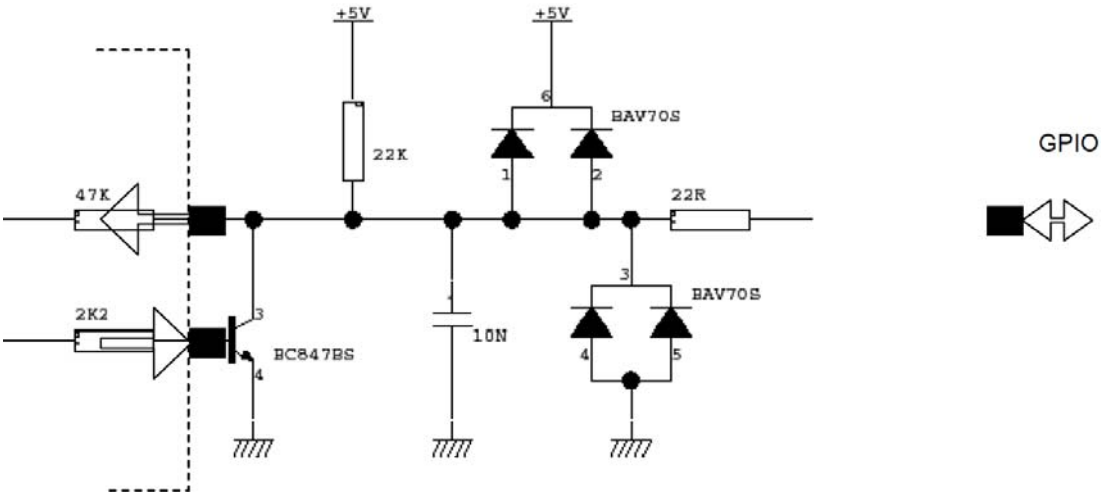
5.17.4 GPIO Input Pulse Width Timer

The audio delay may be controlled by the width of a pulse on the GPI input.

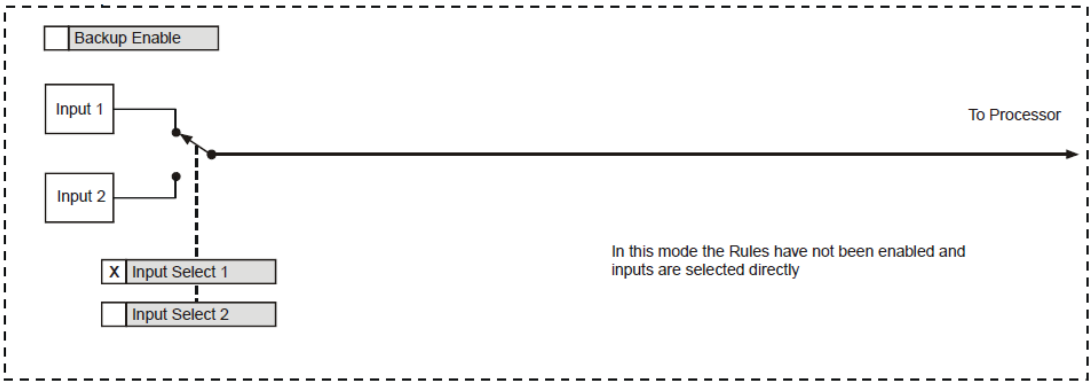
Options are:

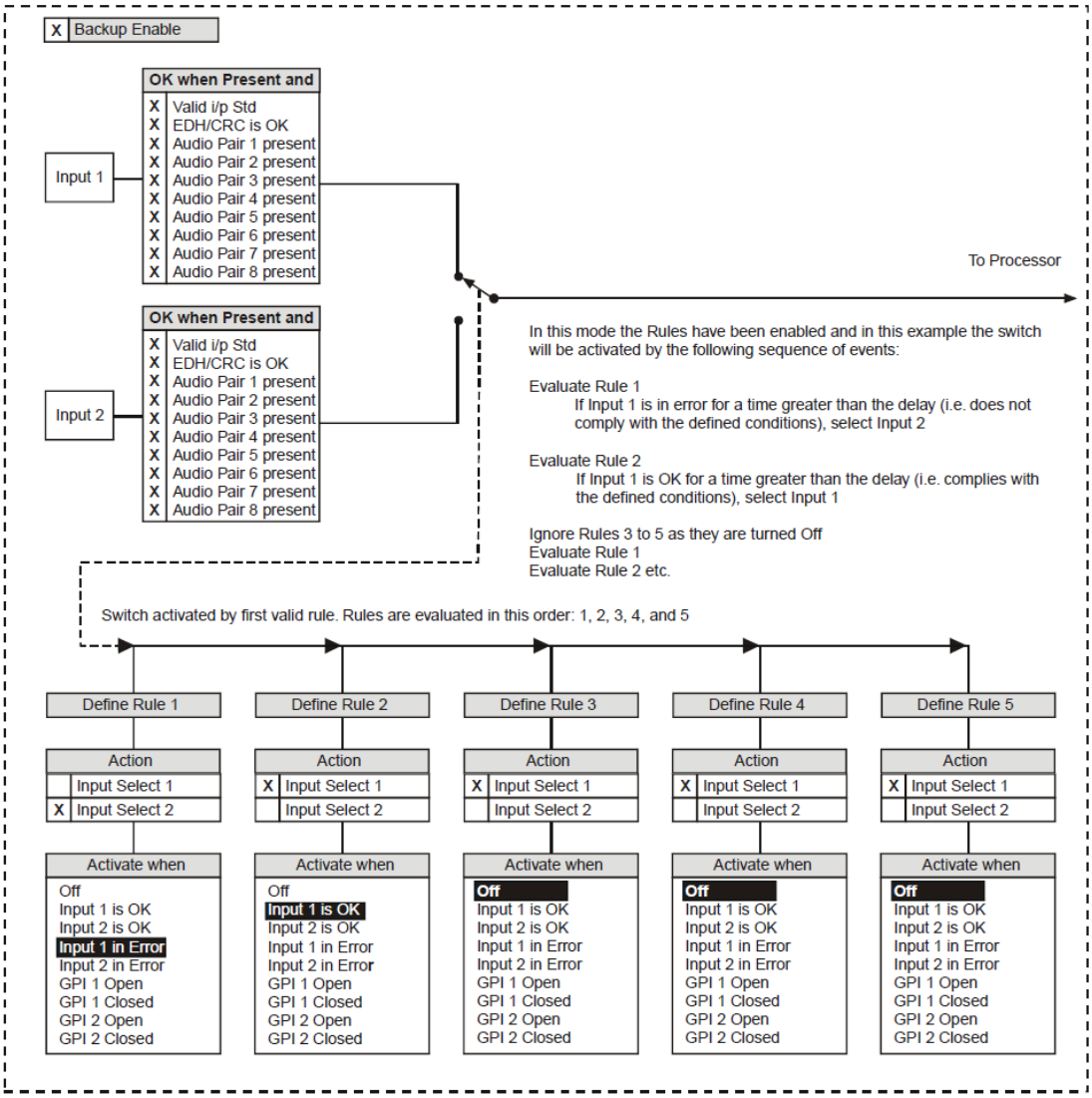
- **Unused:** The function is not active.
- **GPI-1:** Function is active on GPI 1 port.
- **GPI-2:** Function is active on GPI 2 port.
- **Active High:** Checked, delay time while input is high. Unchecked, delay time while input is low.

5.17.5 GPI Interface Circuitry



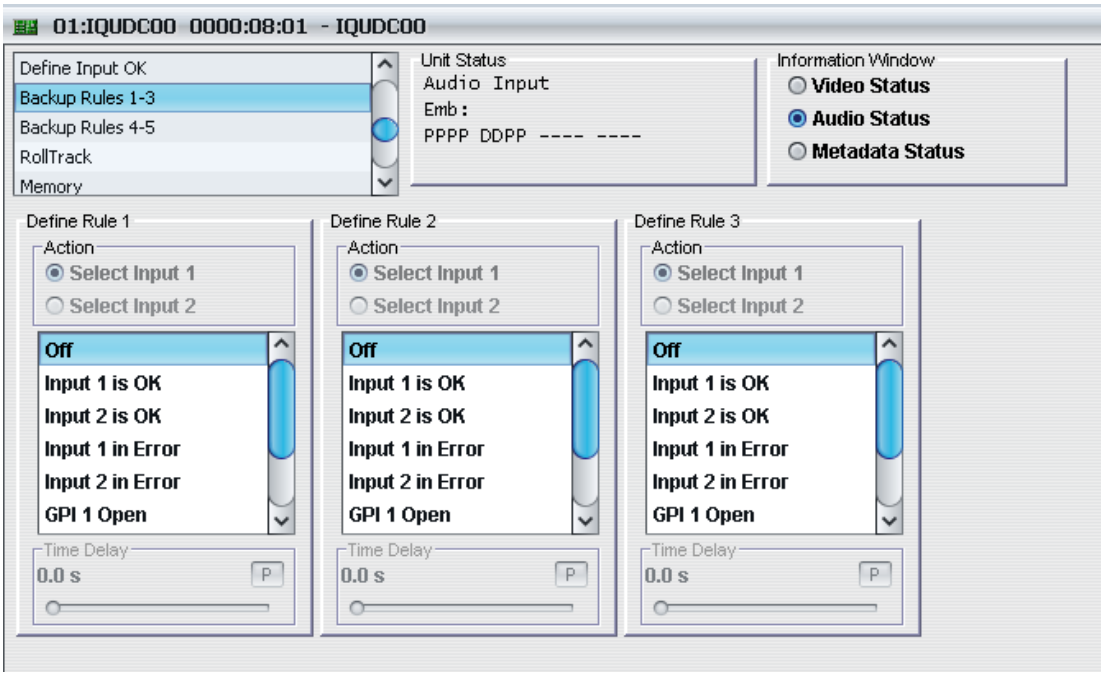
5.17.6 Define INput OK and Backup Rules Overview




X Backup Enable
OK when Present and
X Valid i/p Std
X EDH/CRC is OK
X Audio Pair 1 present
X Audio Pair 2 present
X Audio Pair 3 present
X Audio Pair 4 present
X Audio Pair 5 present
X Audio Pair 6 present
X Audio Pair 7 present
X Audio Pair 8 present
Input 1
Input 2
To Processor
In this mode the Rules have been enabled and in this example the switch will be activated by the following sequence of events:
Evaluate Rule 1
If Input 1 is in error for a time greater than the delay (i.e. does not comply with the defined conditions), select Input 2
Evaluate Rule 2
If Input 1 is OK for a time greater than the delay (i.e. complies with the defined conditions), select Input 1
Ignore Rules 3 to 5 as they are turned Off
Evaluate Rule 1
Evaluate Rule 2 etc.
Switch activated by first valid rule. Rules are evaluated in this order: 1, 2, 3, 4, and 5
Define Rule 1
Define Rule 2
Define Rule 3
Define Rule 4
Define Rule 5
Action
Input Select 1
Input Select 2
Activate when
Off
Input 1 is OK
Input 2 is OK
Input 1 in Error
Input 2 in Error
GPI 1 Open
GPI 1 Closed
GPI 2 Open
GPI 2 Closed

5.18 Backup Rules 1-3/4-5

The **Backup Rules 1-3/4-5** screen defines what action is taken when a chosen event occurs



5.18.1 Action

Either **Select Input 1** or **Select Input 2** may be chosen as the action taken when an event, chosen from the following list, occurs:

- Off (function is not available)
- Input 1 is OK
- Input 2 is OK
- Input 1 in Error
- Input 2 in Error
- GPI 1 Open
- GPI 1 Closed
- GPI 2 Open
- GPI 2 Closed

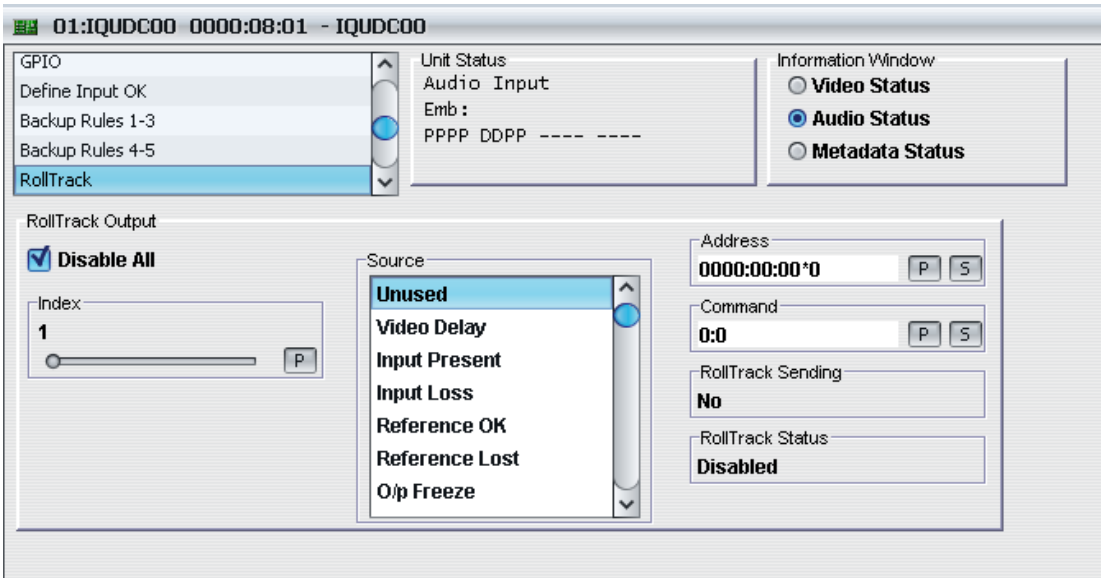
5.18.2 Time Delay

For each rule it is possible to set a time delay. This is the length of time that the rule must be evaluated as true for before activating the action. If the rule is evaluated as false before the set time expires the action will be prevented and the time reset.

Each rule is evaluated in turn with Rule 1 taking the highest priority. If the rule is evaluated as true then the selected action will take place - the actions available are to Select Input 1 or Select Input 2.

5.19 RollTrack

The **RollTrack** screen allows information to be sent, via the RollCall™ network, to other compatible units connected on the same network.



5.19.1 Disable All

When checked, all RollTrack items are disabled.

5.19.2 Index

This slider enables up to 70 RollTrack outputs to be setup. Dragging the slider selects the RollTrack Index number, displayed below the slider. Clicking the **P** button selects the default preset value.

5.19.3 Source

This slider enables the source of information that triggers the transmission of data to be selected. Dragging the slider selects the RollTrack source, displayed below the slider. Clicking the **P** button selects the default preset value. When no source is selected, **Unused** is displayed.

Options are:

- Unused
- Video Delay
- Input Present
- Input Loss
- Reference OK
- Reference Lost
- O/p Freeze
- O/p UnFreeze
- GPI 1 High
- GPI 1 Low
- GPI 1 InActive
- GPI 2 High

AFD - Coded Frame
AFD - 4:3
AFD - 16:9
AFD - 14:9
AFD - 4:3 SP 14:9
AFD - 16:9 SP 14:9
AFD - 16:9 SP 4:3
AFD - box 16:9 top
AFD - box 14:9 top
AFD - box>16:9 ctr
4:3 - Coded Frame
4:3 - 4:3

- GPI 2 Low 4:3 - 16:9
- GPI 2 InActive 4:3 - 14:9
- De-embed 1 Present 4:3 - 4:3 SP 14:9
- De-embed 1 Lost 4:3 - 16:9 SP 14:9
- De-embed 2 Present 4:3 - 16:9 SP 4:3
- De-embed 2 Lost 4:3 - box 16:9 top
- De-embed 3 Present 4:3 - box 14:9 top
- De-embed 3 Lost 4:3 - box>16:9 ctr
- De-embed 4 Present 4:3 - Unknown
- De-embed 4 Lost 16:9 - Coded Frame
- De-embed 5 Present 16:9 - 4:3
- De-embed 5 Lost 16:9 - 16:9
- De-embed 6 Present 16:9 - 14:9
- De-embed 6 Lost 16:9 - 4:3 SP 14:9
- De-embed 7 Present 16:9 - 16:9 SP 14:9
- De-embed 7 Lost 16:9 - 16:9 SP 4:3
- De-embed 8 Present 16:9 - box 16:9 top
- De-embed 8 Lost 16:9 - box 14:9 top
- Input Std - 525 16:9 - box>16:9 ctr
- Input Std - 625 16:9 - Unknown
- Input Std - 720/59
- Input Std - 720/50
- Input Std - 1080/29
- Input Std - 1080/25
- Input 4:3
- Input 16:9

5.19.4 Address

The destination for the information is set by the network code address as follows. This item enables the address of the selected destination unit to be set.

The address may be changed by typing the new destination in the text area and then selecting the **S** button to save the selection. Clicking the **P** button returns to the default preset destination.

The RollTrack address consists of four sets of numbers, for example, **0000:10:01*99**.

- The first set (**0000**) is the network segment code number.
- The second set (**10**) is the number identifying the (enclosure/mainframe) unit.
- The third set (**01**) is the slot number in the unit
- The fourth set (**99**) is a user-settable number that is a unique identification number for the destination unit in a multi-unit system. This ensures that only the correct unit will

respond to the command. If left at 00 an incorrectly fitted unit may respond inappropriately.

5.19.5 Command

This item enables a command to be sent to the selected destination unit.

The command may be changed by typing a code in the text area and then selecting the **S** button to save the selection. Clicking the **P** button returns to the default preset command.

The RollTrack command consists of two sets of numbers, for example: **84:156**.

- The first number (**84**) is the actual RollTrack command.
- The second number (**156**) is the value sent with the RollTrack command.

5.19.6 RollTrack Sending

A message is displayed here when the unit is actively sending a RollTrack command. Possible RollTrack Sending messages are:

String	A string value is always being sent.
Number	A number value is always being sent.
No	The message is not being sent.
Yes	The message is being sent.
Internal Type Error	Inconsistent behavior. Please contact your local Snell agent.

5.19.7 RollTrack Status

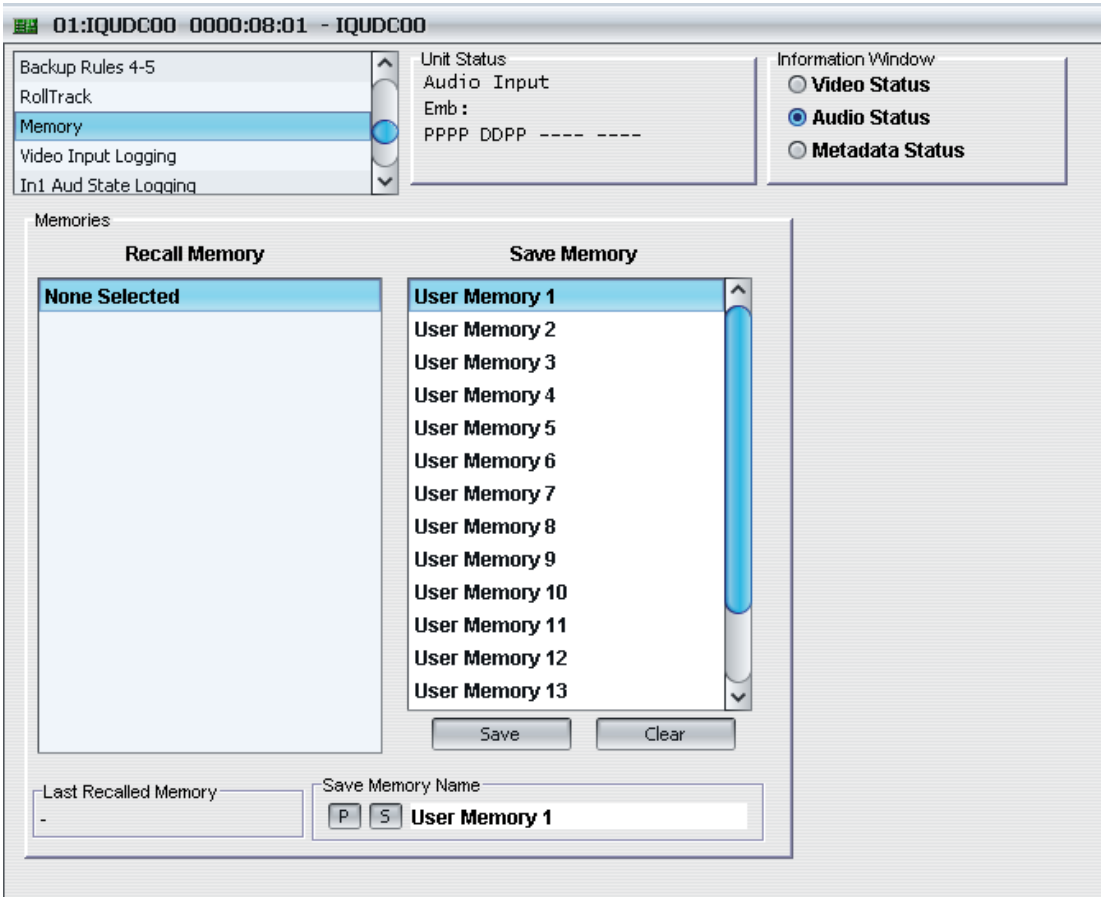
A message is displayed here to indicate the status of the currently selected RollTrack index. Possible RollTrack Status messages are:

OK	RollTrack message sent and received OK.
Unknown	RollTrack message has been sent but it has not yet completed.
Timeout	RollTrack message sent but acknowledgement not received. This could be because the destination unit is not at the location specified.
Bad	RollTrack message has not been correctly acknowledged at the destination unit. This could be because the destination unit is not of the type specified.
Disabled	RollTrack sending is disabled.

5.20 Memory

The **Memories** screen enables up to 16 setups to be saved and recalled later.

Default memory names can be changed to provide more meaningful descriptions.



5.20.1 Recall Memory

This column lists the settings that have been previously saved. If no settings have been saved, **None Selected** is displayed.

To recall the settings saved in a memory:

In the **Recall Memory** column, select the memory to recall by clicking on it. The recalled settings will be applied and the memory name will appear in the **Last Recalled Memory** section.

Note: User memories do not recall log field states. I.e., whether a log value has been enabled or disabled.

5.20.2 Save Memory

This column lists the 16 pre-set memory names that are available for use.

To save settings:

In the **Save Memory** column, select a memory location, and then click **Save**. The current settings are saved and the memory appears in the **Recall Memory** column.

5.20.3 Last Recalled Memory

The **Last Recalled** pane displays the most recently recalled memory. If any of the settings have been changed since it was recalled, an asterisk will be displayed after the memory name.

5.20.4 Save Memory Name

This option enables the pre-set memory names to be changed (to something more memorable or meaningful), if required.

To change a memory name:

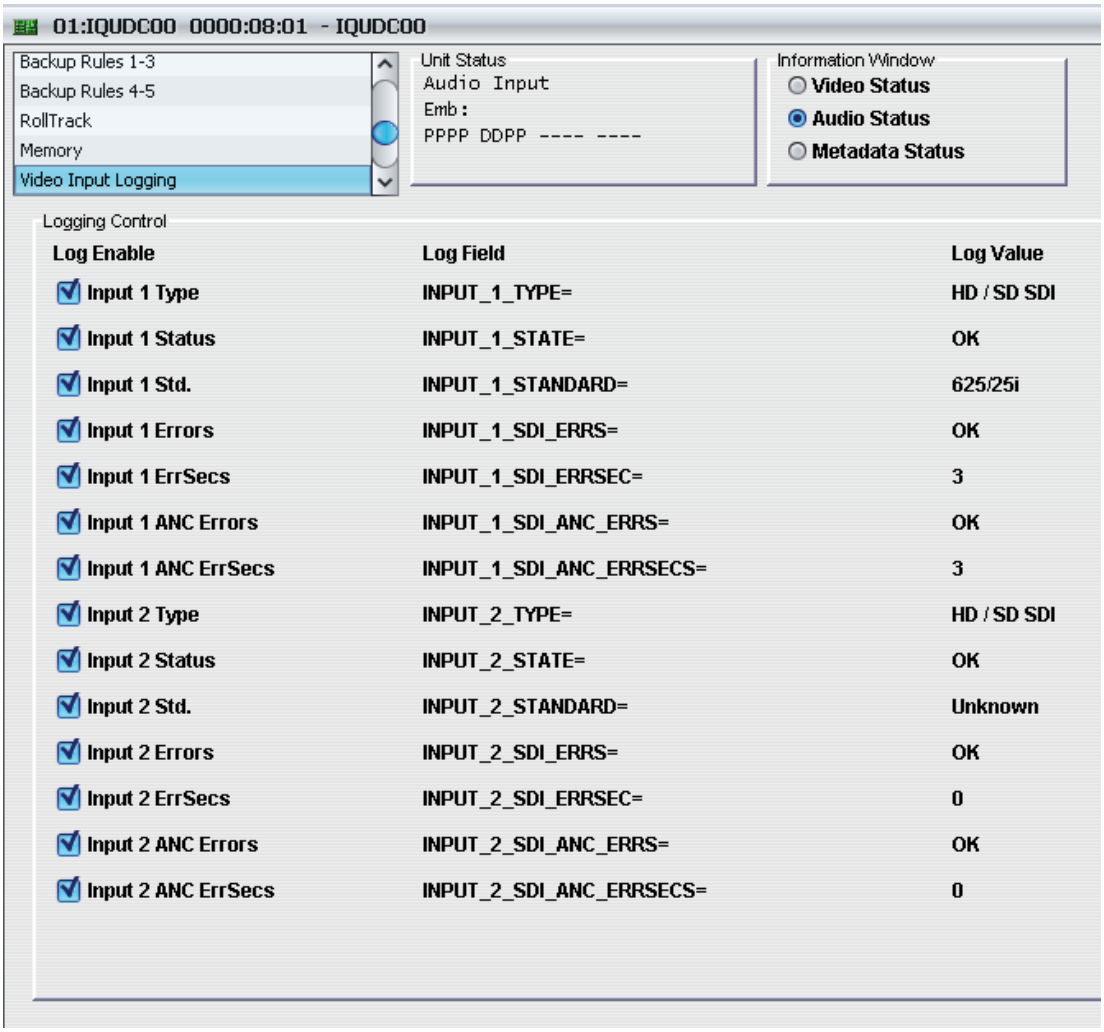
In the **Save Memory Name** field, type the new memory name, and then click the **S** button. To return the memory to its default preset value, click **P** button.

5.21 Logging

Information about various parameters can be made available to a logging device that is attached to the RollCall™ network.

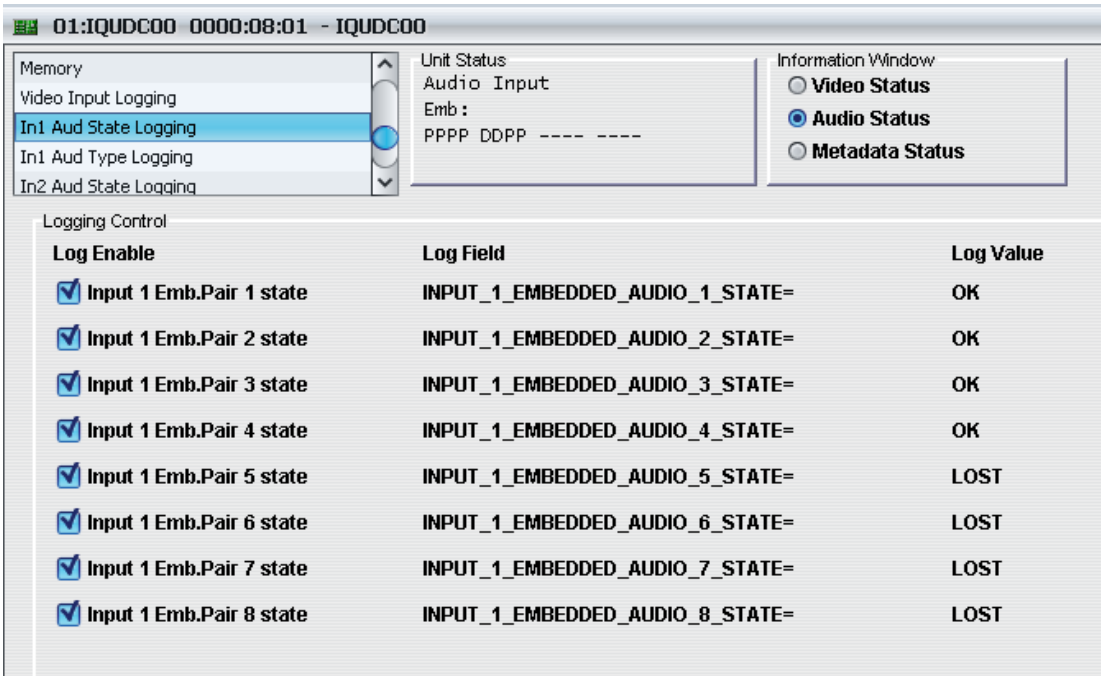
5.21.1 Video Input Logging

The **Video Input Logging** screen allows the status of the video inputs to be logged.



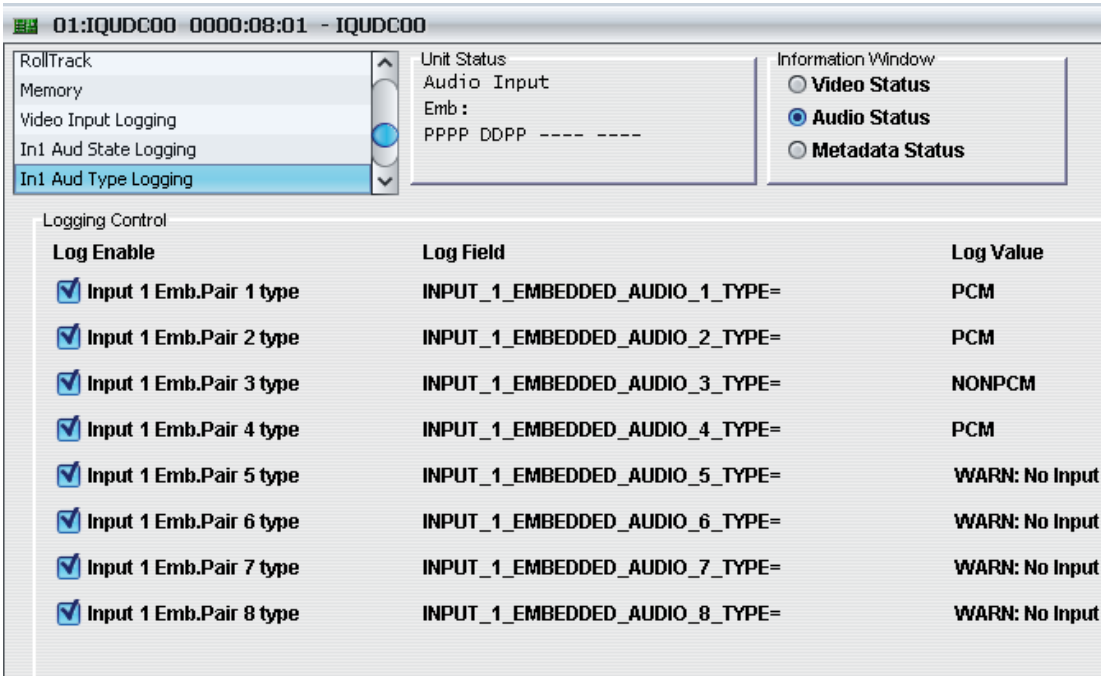
5.21.2 In1/2 Aud State Logging

The **In1/2 Aud State Logging** screens allow the status of the embedded audio to be logged.



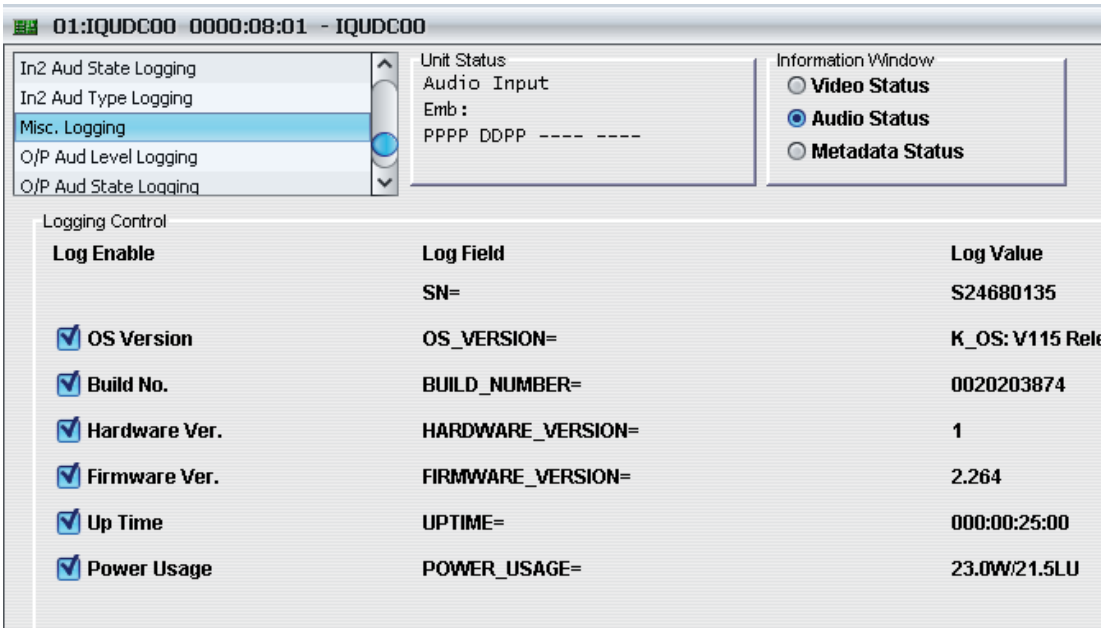
5.21.3 In1/2 Aud Type Logging

The **In1/2 Aud Type Logging** screens allow the type of the embedded audio to be logged.



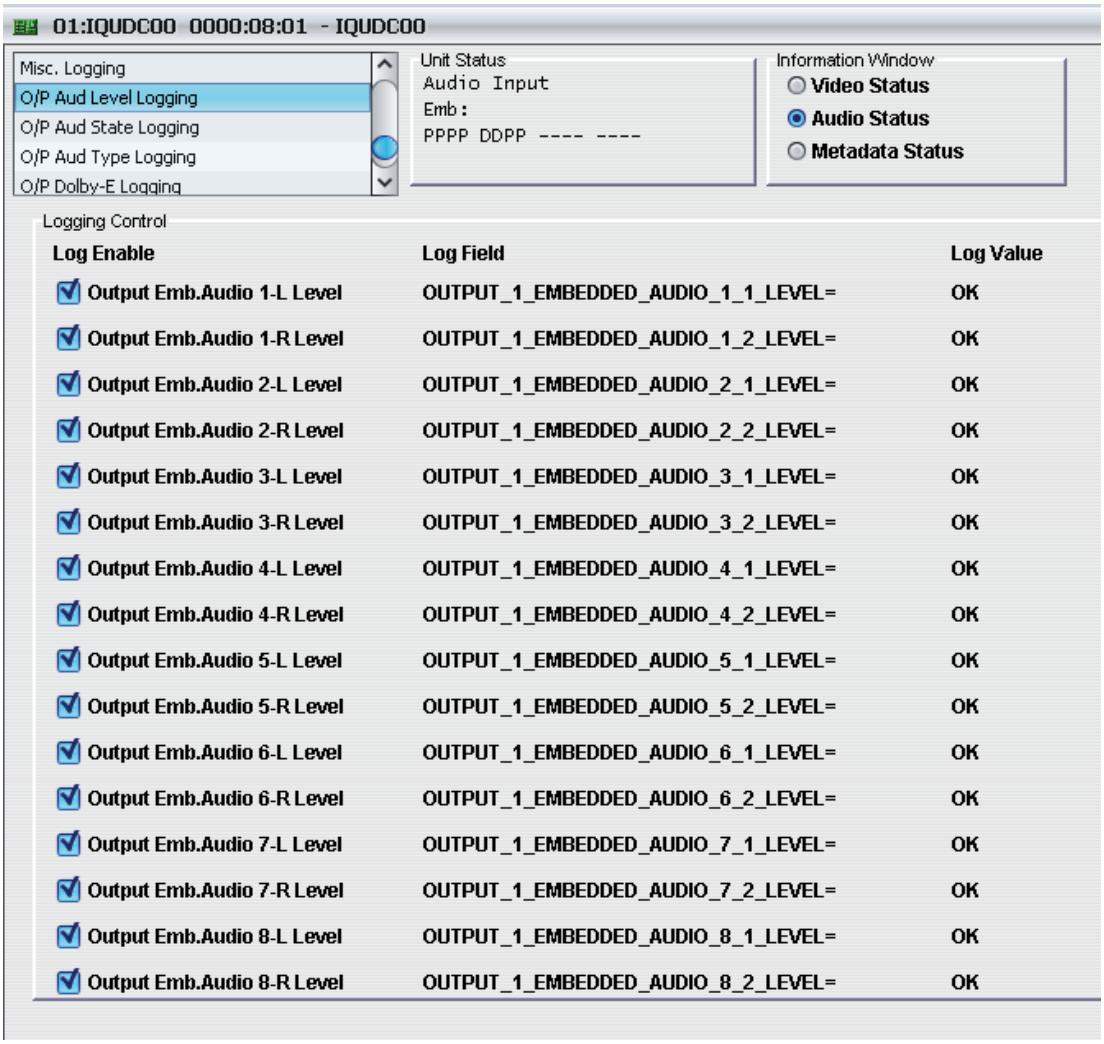
5.21.4 Misc Logging

The **Misc Logging** screen allows various items of information to be logged.



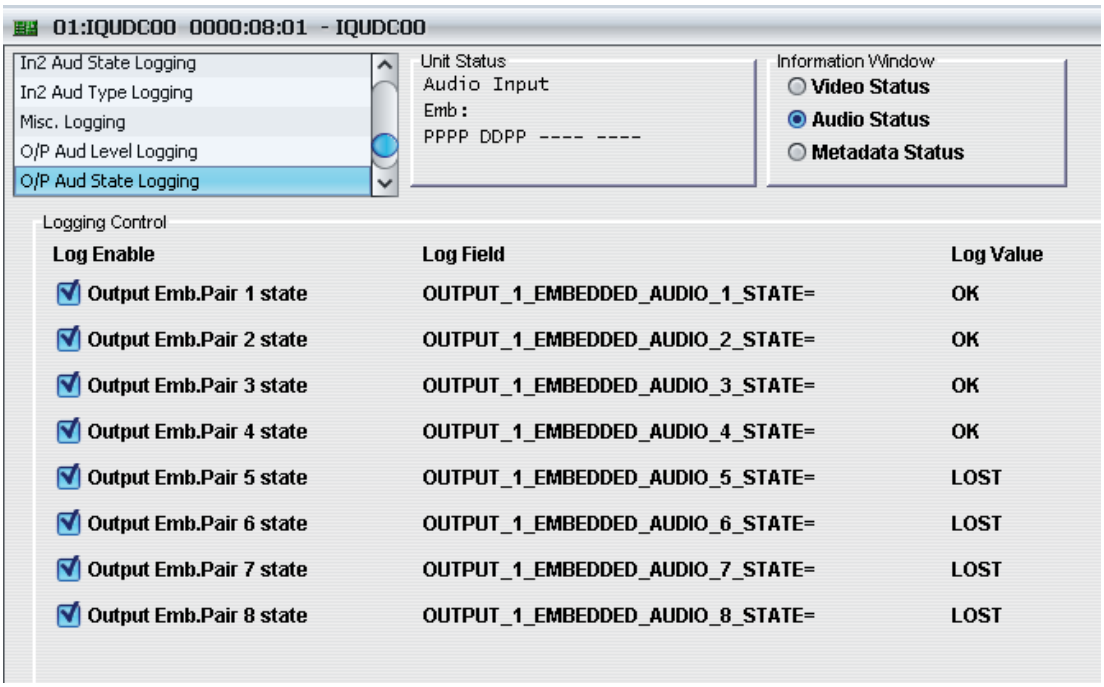
5.21.5 O/P Aud Level Logging

The **O/P Aud Level Logging** screen allows the level of embedded audio output to be logged.



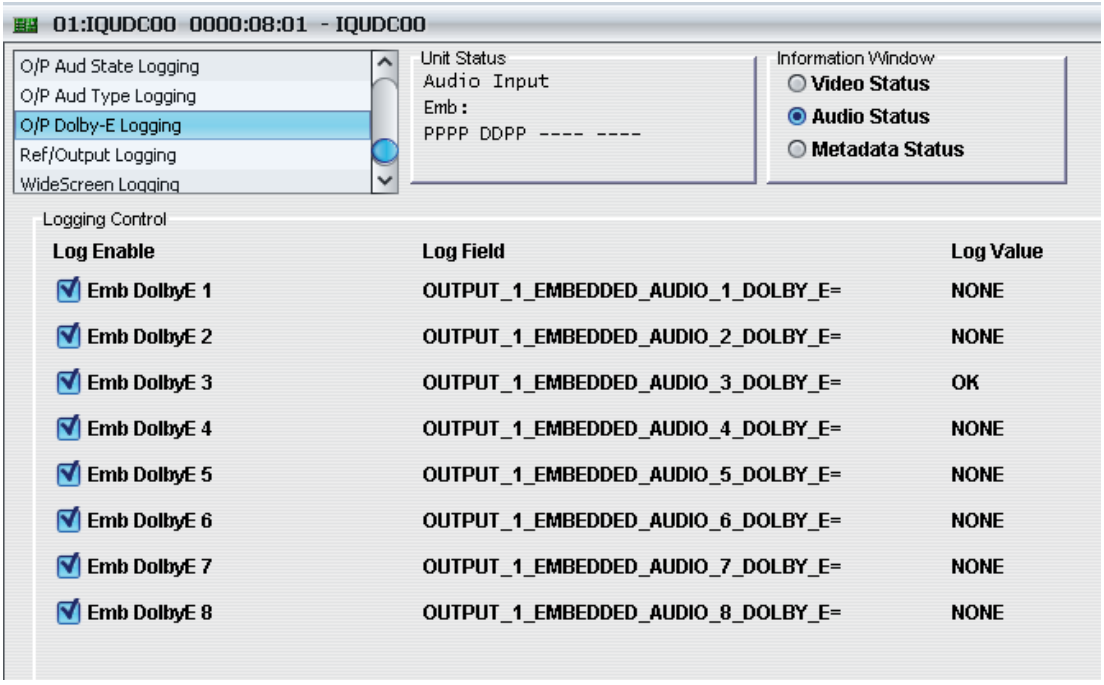
5.21.6 O/P Aud State Logging

The **O/P Aud State Logging** screen allows the state of the embedded audio output to be logged.



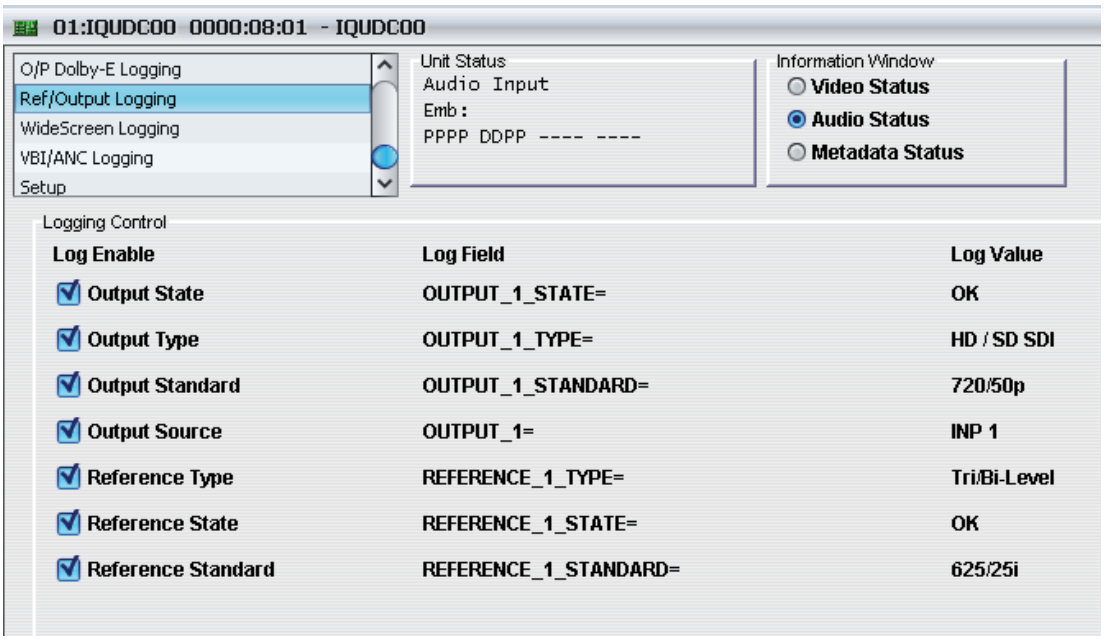
5.21.7 O/P Dolby E Logging

The **O/P Dolby E Logging** screen allows Dolby E logging.



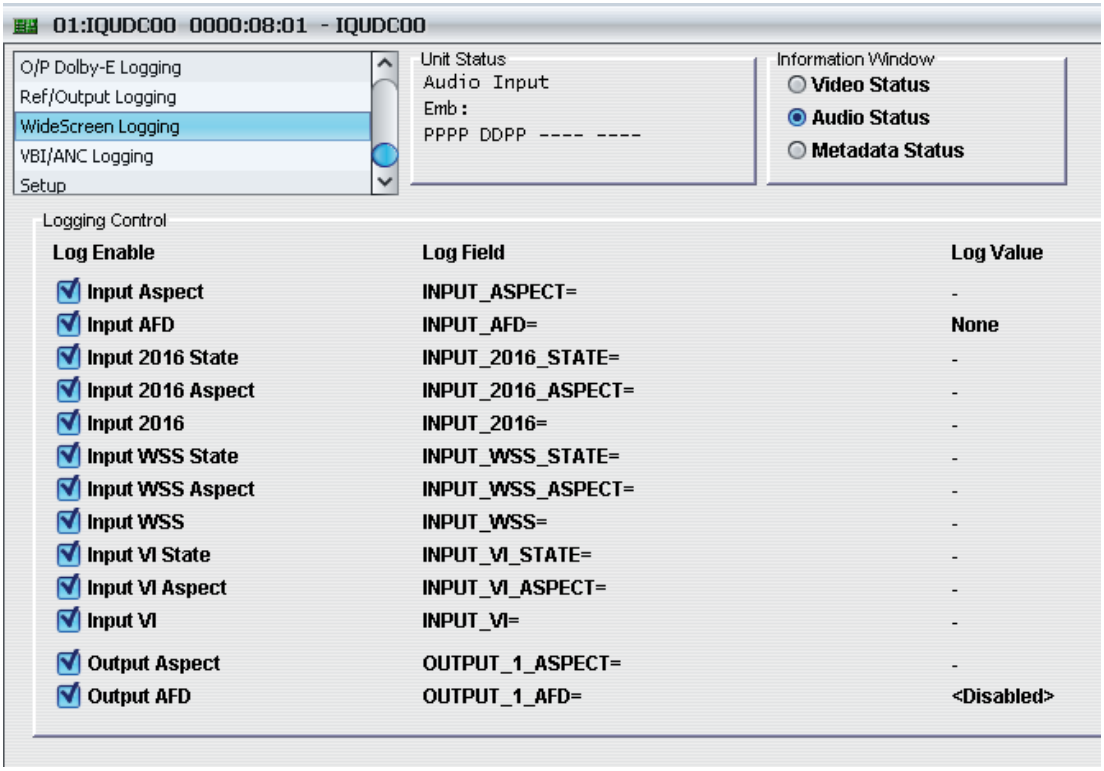
5.21.8 Ref/Output Logging

The **Ref/Output Logging** screen allows the status of the reference and the video output signal to be logged.



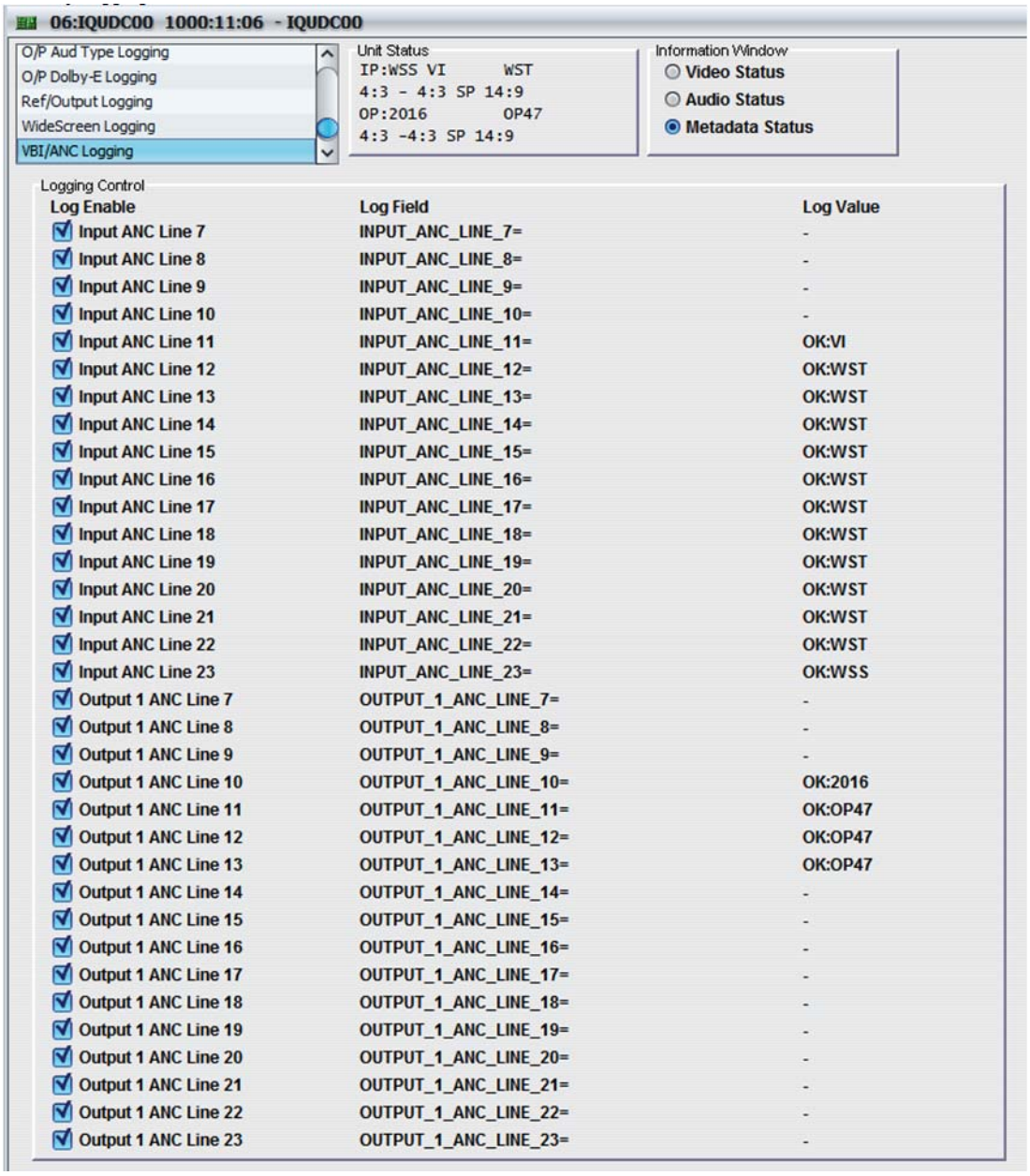
5.21.9 Wide Screen Logging

The **Wide Screen Logging** screen allows the wide screen parameters of the inputs and outputs to be logged.



5.21.10 VBI/ANC Logging

The **VBI/ANC Logging** screen logs the presence (or lack) of VBI or VANC data packets and the associated line.



Example

In the example above, the unit is up-converting 625 to 1080i25. There is VI (line 11), WSS (line 23), and 11 lines of WST (lines 12-22) on the input.

On the output there is SMPTE2016 signalling on line 10, and 3 packets of OP47 on lines 11, 12 and 13 (5 + 5 + 1 WST lines).

5.21.11 Log Field Descriptions

Log Field	Type	Description
INPUT_*N*_TYPE=	FIXED	Valid values are: • HD SDI • SD SDI
INPUT_*N*_STATE=	ENUM	Valid values are: • FAIL:Lost • OK • FAIL:Error
INPUT_*N*_STANDARD=	STRING	This displays the current input signal standard. For example, 1080/29i. If the input standard is not recognized or supported the field will display: WARN:Unknown
INPUT_*N*_SDI_ERRS=	ENUM	Valid values are: • NONE • OK • WARN
INPUT_*N*_SDI_ERRSEC=	NUM	
INPUT_*N*_SDI_ANC_ERRS=		Valid values are: • NONE • OK • WARN
INPUT_*N*_SDI_ANC_ERRSECS=	NUM	
INPUT_1_EMBEDDED_AUDIO_1_STATE= to INPUT_1_EMBEDDED_AUDIO_8_STATE= --- INPUT_2_EMBEDDED_AUDIO_1_STATE = to INPUT_2_EMBEDDED_AUDIO_8_STATE=	ENUM	These fields display the current embedded input audio state. Valid values are: • FAIL:Lost • OK • LOST • Unknown
INPUT_1_EMBEDDED_AUDIO_1_TYPE= to INPUT_1_EMBEDDED_AUDIO_8_TYPE= --- INPUT_2_EMBEDDED_AUDIO_1_TYPE = to INPUT_2_EMBEDDED_AUDIO_8_TYPE=	ENUM	These fields display the current embedded input audio type. Valid values are: • PCM • NON PCM • Unknown • WARN • No Input
OS_VERSION=	STRING	Displays the operating system name and version. For example, KOS V115.
BUILD_NUMBER=	STRING	Displays the build number.

Log Field	Type	Description
HARDWARE_VERSION=	STRING	Displays the hardware version number.
FIRMWARE_VERSION=	STRING	Displays the FPGA version.
UPTIME=	STRING	Displays the time since the last restart in the format ddd:hh:mm:ss.
OS_VERSION=		Displays the operating system name and version. For example, KOS V115.
OUTPUT_1_EMBEDDED_AUDIO_1_1_LEVEL= to OUTPUT_1_EMBEDDED_AUDIO_8_2_LEVEL=		These fields display the current embedded output audio level. Valid values are: • WARN:Silent • WARN: Quiet • OK • WARN:Loud • WARN:Overflow
OUTPUT_1_EMBEDDED_AUDIO_1_STATE= to OUTPUT_1_EMBEDDED_AUDIO_8_STATE=		These fields display the current embedded output audio state. Valid values are: • FAIL:Lost • OK • LOST • Unknown
OUTPUT_1_EMBEDDED_AUDIO_1_TYPE= to OUTPUT_1_EMBEDDED_AUDIO_8_TYPE=		These fields display the current embedded output audio state. Valid values are: • PCM • NONPCM • Unknown • WARN • No Input
OUTPUT_1_EMBEDDED_AUDIO_1_DOLBY_E= to OUTPUT_1_EMBEDDED_AUDIO_8_DOLBY_E=		These fields display the current embedded output audio Dolby E. Valid values are: • NONE • OK
OUTPUT_1_STATE=	FIXED	• OK
OUTPUT_1_TYPE=	FIXED	• HD SDI • SD SDI
OUTPUT_1_STANDARD=	STRING	Displays the current output video standard.
OUTPUT_1=	STRING	Displays the relevant input source for the output video.
REFERENCE_1_TYPE=	FIXED	Displays the reference type. Valid values are: • Tri Level • Bi Level

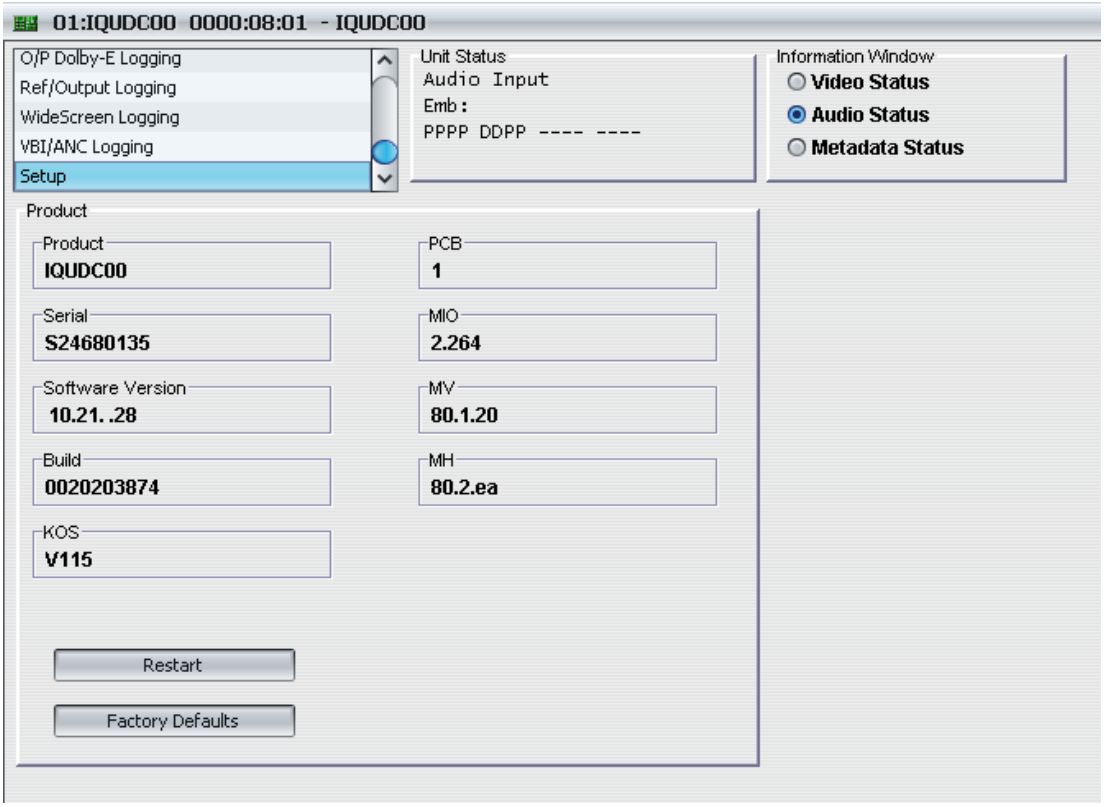
Log Field	Type	Description
REFERENCE_1_STATE=	ENUM	Displays the reference state. Valid values are: • FAIL:Lost • OK • FAIL:Error
REFERENCE_1_STANDARD=	STRING	Displays the current video standard of the reference signal. For example, 1080/59P
INPUT_ASPECT=		• 4/3 (coded aspect ratio) • 16/9 (coded aspect ratio)
INPUT_AFD=		• CodedFrame (active format) • 4/3 (4:3 center active format) • 16/9 (16:9 enter active format) • 14/9 (14:9 center active format) • 4/3 SP 14/9 (4:3 shoot-and-protect 14:9 active format.) • 16/9 SP 14/9 (16:9 shoot-and-protect 14:9 active format.) • 16/9 SP 4/3 (16:9 shoot-and-protect 4:3 active format.) • Box 16/9 top (active format) • Box 14/9 top (active format) • Box >16/9 ctr (center active format) • Unknown (unknown active format)
INPUT_2016_STATE=	FIXED	Displays the state of the SMPTE 2016 signaling data. Valid values are: • FAIL:Lost • OK • FAIL:Error
INPUT_2016_ASPECT=		• 4/3 (coded aspect ratio) • 16/9 (coded aspect ratio)
INPUT_2016=		Displays the relevant input source for the SMPTE 2016 signaling data.
INPUT_WSS_STATE=		Displays the wss signaling data state. Valid values are: • FAIL:Lost • OK • FAIL:Error
INPUT_WSS_ASPECT=		• 4/3 (coded aspect ratio) • 16/9 (coded aspect ratio)
INPUT_WSS=		Displays the relevant WSS signaling data.

Log Field	Type	Description
INPUT_VI_STATE=		Displays the VI signaling data state. Valid values are: • FAIL:Lost • OK • FAIL:Error
INPUT_VI_ASPECT=		• 4/3 (coded aspect ratio) • 16/9 (coded aspect ratio)
INPUT_VI=		Displays the relevant VI.
OUTPUT_1_ASPECT=		• 4/3 (coded aspect ratio) • 16/9 (coded aspect ratio)
OUTPUT_1_AFD=		• CodedFrame (active format) • 4/3 (4:3 center active format) • 16/9 (16:9 enter active format) • 14/9 (14:9 center active format) • 4/3 SP 14/9 (4:3 shoot-and-protect 14:9 active format.) • 16/9 SP 14/9 (16:9 shoot-and-protect 14:9 active format.) • 16/9 SP 4/3 (16:9 shoot-and-protect 4:3 active format.) • Box 16/9 top (active format) • Box 14/9 top (active format) • Box >16/9 ctr (center active format) • Unknown (unknown active format)

Log Field	Type	Description
INPUT_ANC_LINE_*N*= OUTPUT_1_ANC_LINE_*N*=		Displays the status of the input /output VBI/VANC ancillary data line. • - (HD/SD, No data present none expected) • LOST:608 (SD, Line 21 only) • LOST:WSS (SD, Line 23 only) • LOST:VITC (SD) • LOST:WST (SD) • LOST:VI (SD, Line 11 or Line 14 only) • LOST:VI/WST (SD, Output only. Line 11 or Line 14 only) • OK:608 (SD, Line 21 only) • OK:WSS (SD, Line 23 only) • OK:VITC (SD) • OK:WST (SD) • OK:VI (SD, Line 11 or Line 14 only) • OK:VI/WST (SD, Output only. Line 11 or Line 14 only) • WARN:608 Empty (SD) • OK:VI/VITC (SD, Output only) • OK:2016 (SD/HD,Output only) • FAIL:2016 Clash (SD/HD) • OK:ATC (HD) • OK:ATC/OP47 (HD) • OK:ATC/708 (HD) • OK:OP47 (HD) • OK:2031 (HD) • OK:708 (HD) • OK:ATC/2031 (HD)

5.22 Setup

The **Setup** screen displays basic information about the module, such as the serial number and software versions. The functions on the screen may be used to restart the module or return all settings to their factory or default settings.



- **Product:** The name of the module.
- **Serial No:** The module serial number.
- **Software Version:** The currently installed software version number.
- **Build:** The factory build number. This number identifies all parameters of the module.
- **KOS:** The operating system version number.
- **PCB:** The Printed Circuit Board revision number.
- **MIO/MV/MH:** The module FPGA firmware revision numbers.

5.22.1 Restart

The **Restart** button enables the module to be rebooted, simulating a power-up/power-down cycle.

5.22.2 Factory Defaults

The **Factory Defaults** button enables the module settings to be reset to their factory defaults.

Note: Resetting the module to its factory defaults also clears all the saved memory settings.

Appendix A Active Formats & Signal Mapping

A.1 Active Picture Areas

The active picture areas used in the wide screen signaling scheme for aspect ratio control are described here for reference. A basic principle of operation is that any picture can be processed from the following information:

- The whole picture aspect ratio (i.e. the target or coded screen).
- The active area used within the screen (outside is generally left black to create a letterbox in either orientation).
- How much of the active area is to be preserved (optional shoot-and-protect area indicated in the table by the circles).
- Where within the screen the active area is (optional top attribute used for extended subtitle area).

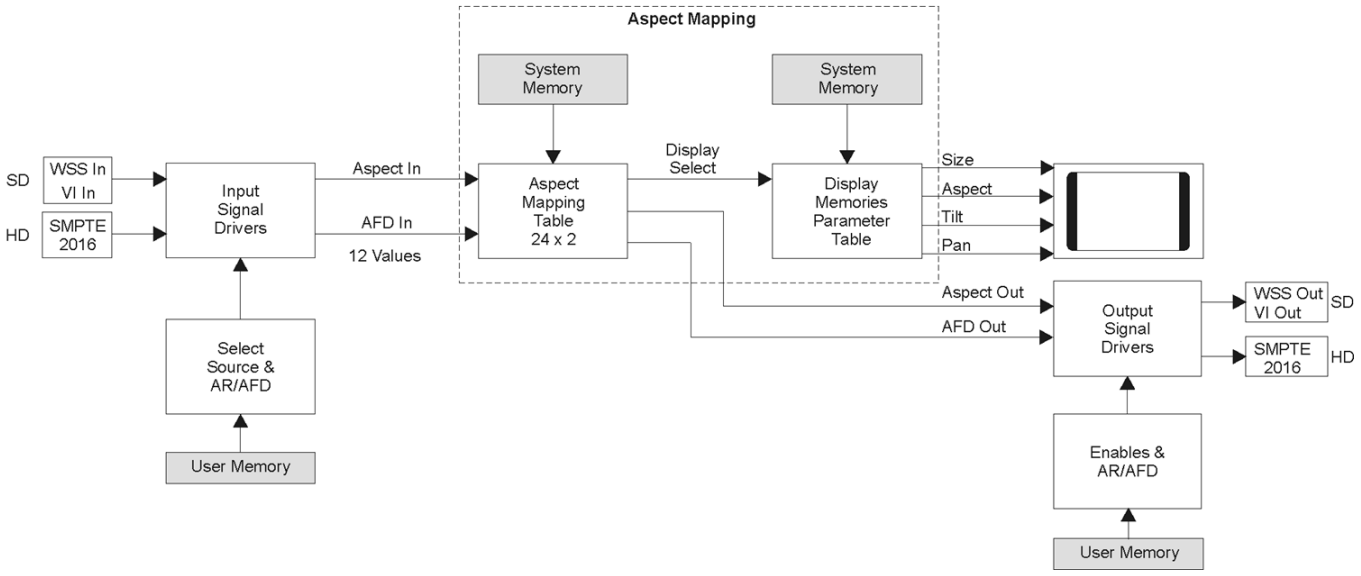
Knowing this and the output aspect ratio for conversion to, it is possible to do a mapping which will correct the aspect ratio while preserving the active picture and minimizing black bar area.

A.2 Wide Screen Signaling and Aspect Ratio Control Overview

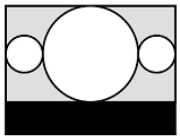
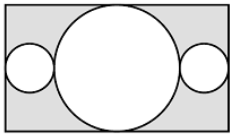
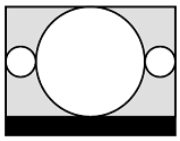
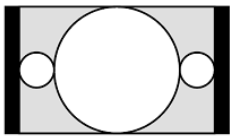
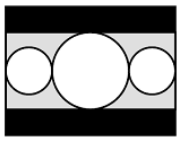
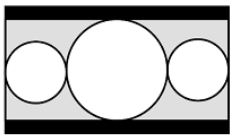
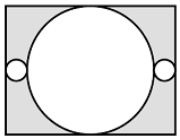
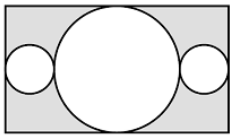
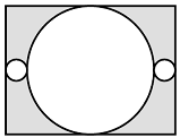
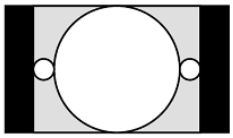
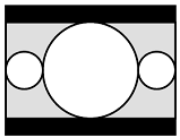
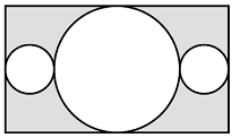
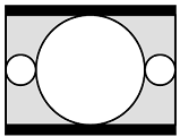
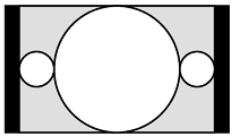
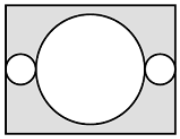
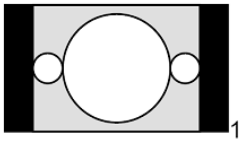
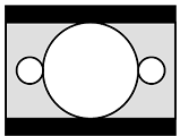
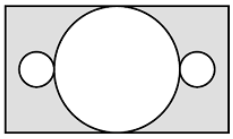
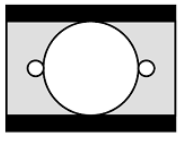
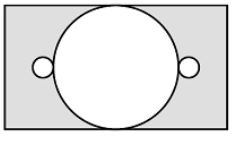
The Input signal drivers decodes and defaults selected signaling to give a valid Aspect Ratio (strictly 4:3 or 16:9) and Active Format Descriptor (AFD) (8 ARDSPEC1 entries, plus 3 extended and unknown pair). If no input signal or data is present, the aspect ratio & AFD will be “4:3 - Unknown”.

These two signals are sent to the aspect mapping table (see below), which is initialized by a full set of defaults. This uses Aspect and AFD pair (24 values) to call up fixed and programmable Display memories.

Display memory functions include Size, Aspect, Tilt, Pan and Input Crop Left / Right / Top / Bottom.

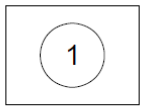
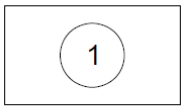
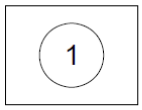
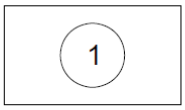
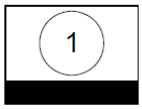
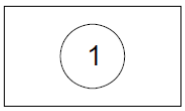
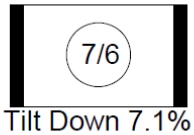
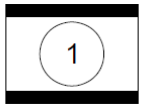
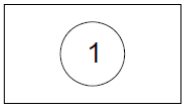
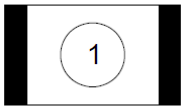
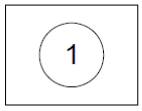
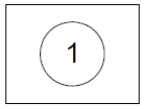
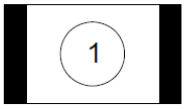
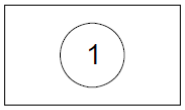
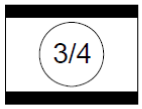
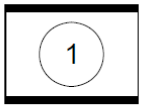
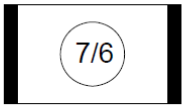
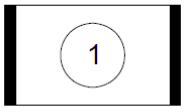
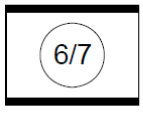


A.3 Active Formats Illustrated

Active_format		Illustration of described format	
value	description	in 4:3 coded frame	in 16:9 coded frame
0000 - 0001	reserved		
0010	box 16:9 (top)		
0011	box 14:9 (top)		
0100	box > 16:9 (centre)		
0101 - 0111	reserved		
1000	As the coded frame		
1001	4:3 (centre)		 (see note)
1010	16:9 (centre)		
1011	14:9 (centre)		
1100	reserved		
1101	4:3 (with shoot & protect 14:9 centre)		 1
1110	16:9 (with shoot & protect 14:9 centre)		
1111	16:9 (with shoot & protect 4:3 centre)		

NOTE: It is recommended to use the 4:3 coded frame mode to transmit 4:3 source material rather than using a pillar box to transmit it in a 16:9 coded frame. This allows for higher horizontal resolution on both 4:3 and 16:9 sets.

A.4 Transformation Descriptions

Input		Transformation	Output	
4:3	16:9		4:3	16:9
		(1) Description Full Frame Size 100% | Aspect 100%		
		(2) Description Box 16:9 Top > 16:9 Size 133% | Aspect 75%		 Tilt Down 12.5%
		(3) Description 4:3 Box 14:9 Top > 16:9 Size 116.7% | Aspect 75%		 Tilt Down 7.1%
		(4) Description Box 16:9 > 16:9 Size 133.3% | Aspect 75%		
		(5) Description Box 4:3 > 4:3 Size 100% | Aspect 133.3%		
		(6) Description 4:3 > Box 16:9 Size 100% | Aspect 75%		
		(7) Description 16:9 > Box 4:3 Size 75% | Aspect 133.3%		
		(8) Description 4:3 Box 14:9 > 16:9 Size 116.7% | Aspect 75%		
		(9) Description 16:9 Box 14:9 > 4:3 Size 85.7% | Aspect 133.3%		

These are the Standard Presets for Display Memories and are also copied into the first 9 user Display Memories. They are heavily used by the wide screen signaling based automatic Aspect Ratio Control functionality as the core transformations. Transformation naming terminology (also default memory name) is:

(source aspect for ambiguous 14:9) (box when present) source AFD > (box) target display aspect.

A.5 Mapping of External Signaling to Internal States

Signaling supports WSS ETSI 300294 (Line 23), Video Index (SMPTE RP186), and the ARD Spec versions of both these interface formats. These are all translated into an internal Aspect Ratio and ETSI 101154 AFD format for use in the mapping tables and error handling to allow a consistent view.

This table shows how WSS ETSI (Line 23) is mapped into the internal format. Where a resulting conversion cannot be turned back into an ETSI signal the WSS output will be disabled.

ARD Spec formats directly map onto the unshaded formats. Both Video Index SMPTE and the ARD Spec variants provide for unknown active formats so a valid output signal can always be maintained.

Note that ARD Spec codes are 0 to 7 rather than the AFD range of 8 upwards. Code (12) Reserved is supported in case customized legacy schemes make use of it.

WSS ETSI Coded Aspect In	Internal Coded Aspect & Active Format (AFD)	WSS ETSI Coded Aspect Out
-	4:3 & Unknown	(0) Full format 4:3
-	16:9 & Unknown	(7) Full format 16:9
(4) Box 16:9 top	4:3 & (2) Box 16:9 top	(4) Box 16:9 top
-	16:9 & (2) Box 16:9 top	No signal
(2) Box 14:9 top	4:3 & (3) Box 14:9 top	(2) Box 14:9 top
-	16:9 & (3) Box 14:9 top	No signal
(5) Box > 16:9 centre	4:3 & (4) Box >16:9 centre	(5) Box > 16:9 centre
-	16:9 & (4) Box >16:9 centre	No signal
(0) Full format 4:3	4:3 & (8) As coded frame	(0) Full format 4:3
(7) Full format 16:9	16:9 & (8) As coded frame	(7) Full format 16:9
-	4:3 & (9) 4:3 centre	(0) Full format 4:3
-	16:9 & (9) 4:3 centre	No signal
(3) Box 16:9 centre	4:3 & (10) 16:9 centre	(3) Box 16:9 centre
-	16:9 & (10) 16:9 centre	(7) Full format 16:9
(1) Box 14:9 centre	4:3 & (11) 14:9 centre	(1) Box 14:9 centre
-	16:9 & (11) 14:9 centre	No signal
-	4:3 & (12) Reserved	No signal
-	16:9 & (12) Reserved	No signal
(6) Full 4:3 shoot-and-protect 14:9 centre	4:3 & (13) 4:3 shoot-and-protect 14:9 centre	(6) Full 4:3 shoot-and- protect 14:9 centre
-	16:9 & (13) 4:3 shoot-and-protect 14:9 centre	No signal
-	4:3 & (14) 16:9 shoot-and-protect 14:9 centre	No signal
-	16:9 & (14) 16:9 shoot-and-protect 14:9 centre	No signal
-	4:3 & (15) 16:9 shoot-and-protect 4:3 centre	No signal
-	16:9 & (15) 16:9 shoot-and-protect 4:3 centre	No signal
Numbers in brackets in this column indicate ETSSI line 23 codes	Numbers in brackets in this column indicate Active Format Codes	Numbers in brackets in this column indicate ETSSI line 23 codes

A.6 4:3 Target Aspect Default Mapping

Source Coded Aspect & AFD Default Display	Memory	Default Target Coded Aspect & AFD
4:3 - Unknown	<none>	4:3 - (8) As coded frame
16:9 - Unknown	<none>	4:3 - (8) As coded frame
4:3 - (2) Box 16:9 top	Full frame	4:3 - (2) Box 16:9 top
16:9 - (2) Box 16:9 top	16:9 > box 4:3	4:3 - (10) 16:9 centre
4:3 - (3) Box 14:9 top	Full frame	4:3 - (3) Box 14:9 top
16:9 - (3) Box 14:9 top	16:9 box 14:9 > 4:3	4:3 - (11) 14:9 centre
4:3 - (4) Box >16:9 centre	Full frame	4:3 - (4) Box >16:9 centre
16:9 - (4) Box >16:9 centre	16:9 > box 4:3	4:3 - (4) Box >16:9 centre
4:3 - (8) As coded frame	Full frame	4:3 - (8) As coded frame
16:9 - (8) As coded frame	16:9 > box 4:3	4:3 - (10) 16:9 centre
4:3 - (9) 4:3 centre	Full frame	4:3 - (9) 4:3 centre
16:9 - (9) 4:3 centre	Box 4:3 >	4:3 4:3 - (9) 4:3 centre
4:3 - (10) 16:9 centre	Full frame	4:3 - (10) 16:9 centre
16:9 - (10) 16:9 centre	16:9 > box 4:3	4:3 - (10) 16:9 centre
4:3 - (11) 14:9 centre	Full frame	4:3 - (11) 14:9 centre
16:9 - (11) 14:9 centre	16:9 box 14:9 > 4:3	4:3 - (11) 14:9 centre
4:3 - (12) reserved	<none>	4:3 - (12) reserved
16:9 - (12) reserved	<none>	4:3 - (12) reserved
4:3 - (13) 4:3 shoot-and-protect 14:9 centre	Full frame 4:3 - (13)	4:3 shoot-and-protect 14:9 centre
16:9 - (13) 4:3 shoot-and-protect 14:9 centre	Box 4:3 > 4:3 4:3 - (13)	4:3 shoot-and-protect 14:9 centre
4:3 - (14) 16:9 shoot-and-protect 14:9 centre	Full frame	4:3 - (14) 16:9 shoot-and-protect 14:9 centre
16:9 - (14) 16:9 shoot-and-protect 14:9 centre	16:9 > box 4:3	4:3 - (14) 16:9 shoot-and-protect 14:9 centre
4:3 - (15) 16:9 shoot-and-protect 4:3 centre	Full frame	4:3 - (15) 16:9 shoot-and-protect 4:3 centre
16:9 - (15) 16:9 shoot-and-protect 4:3 centre	16:9 > box 4:3	4:3 - (15) 16:9 shoot-and-protect 4:3 centre

A.7 16:9 Target Aspect Default Mapping

Source Coded Aspect & AFD	Default Display Memory	Default Target Coded Aspect & AFD
4:3 - Unknown	<none>	16:9 - (8) As coded frame
16:9 - Unknown	<none>	16:9 - (8) As coded frame
4:3 - (2) Box 16:9 top	Box 16:9 top > 16:9	16:9 - (8) As coded frame
16:9 - (2) Box 16:9 top	Full frame	16:9 - (2) Box 16:9 top
4:3 - (3) Box 14:9 top	4:3 box 14:9 top > 16:9	16:9 - (3) Box 14:9 centre
16:9 - (3) Box 14:9 top	Full frame	16:9 - (3) Box 14:9 top
4:3 - (4) Box >16:9 centre	Box 16:9 > 16:9	16:9 - (4) Box >16:9 centre
16:9 - (4) Box >16:9 centre	Full frame	16:9 - (4) Box >16:9 centre
4:3 - (8) As coded frame	4:3 > box 16:9	16:9 - (9) 4:3 centre
16:9 - (8) As coded frame	Full frame	16:9 - (8) As coded frame
4:3 - (9) 4:3 centre	4:3 > box 16:9	16:9 - (9) 4:3 centre
16:9 - (9) 4:3 centre	Full frame	16:9 - (9) 4:3 centre
4:3 - (10) 16:9 centre	Box 16:9 > 16:9	16:9 - (10) 16:9 centre
16:9 - (10) 16:9 centre	Full frame	16:9 - (10) 16:9 centre
4:3 - (11) 14:9 centre	4:3 box 14:9 > 16:9	16:9 - (11) 14:9 centre
16:9 - (11) 14:9 centre	Full frame	16:9 - (11) 14:9 centre
4:3 - (12) reserved	<none>	16:9 - (12) reserved
16:9 - (12) reserved	<none>	16:9 - (12) reserved
4:3 - (13) 4:3 shoot-and-protect 14:9 centre	4:3 > box 16:9	16:9 - (13) 4:3 shoot-and-protect 14:9 centre
16:9 - (13) 4:3 shoot-and-protect 14:9 centre	Full frame	16:9 - (13) 4:3 shoot-and-protect 14:9 centre
4:3 - (14) 16:9 shoot-and-protect 14:9 centre	Box 16:9 > 16:9	16:9 - (14) 16:9 shoot-and-protect 14:9 centre
16:9 - (14) 16:9 shoot-and-protect 14:9 centre	Full frame	16:9 - (14) 16:9 shoot-and-protect 14:9 centre
4:3 - (15) 16:9 shoot-and-protect 4:3 centre	Box 16:9 > 16:9	16:9 - (15) 16:9 shoot-and-protect 4:3 centre
16:9 - (15) 16:9 shoot-and-protect 4:3 centre	Full frame	16:9 - (15)16:9 shoot-and-protect 4:3 centre

Italics in the above table indicate input signalling value combinations that make limited sense.

A.8 Products Featuring RollTrack™

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

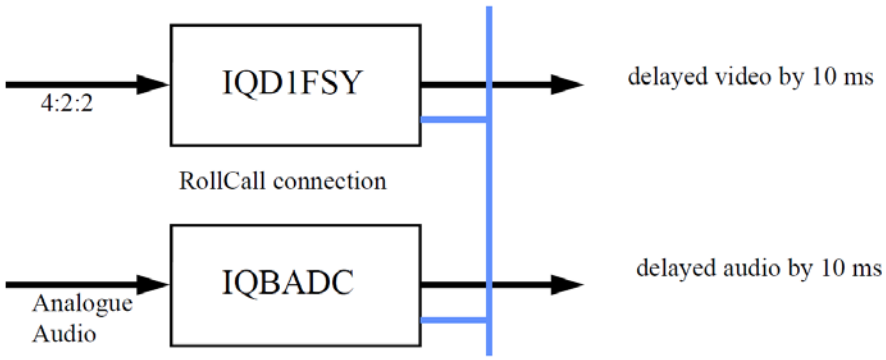
RollTrack Audio Delay Tracking enables RollCall™ compatible audio delay products to track delay introduced by RollCall™ compatible video processing products.

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		

A.9 Configuration: Single Video Unit and Single Audio Delay

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.



A.10 Configuration: Multiple Video Units and Audio Delays

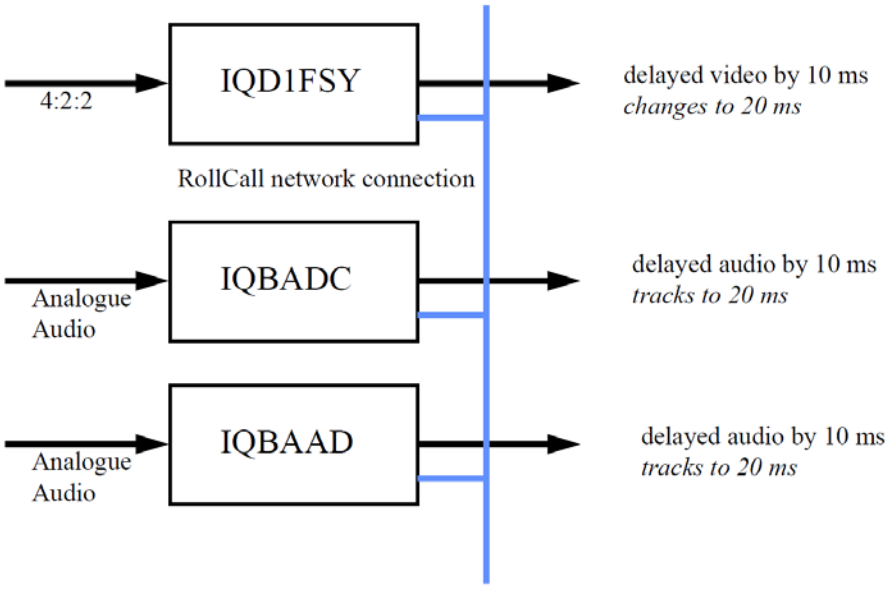
The next level of configuration is where there are multiple Frame Synchronizers (for example) each connected through RollCall™ to their own tracking Audio Delay. (It is worth stating that the synchronizers and audio delays do not have to be in the same enclosure; the addressing scheme, discussed later,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

A.11 Configuration: Vertical Delay Cluster

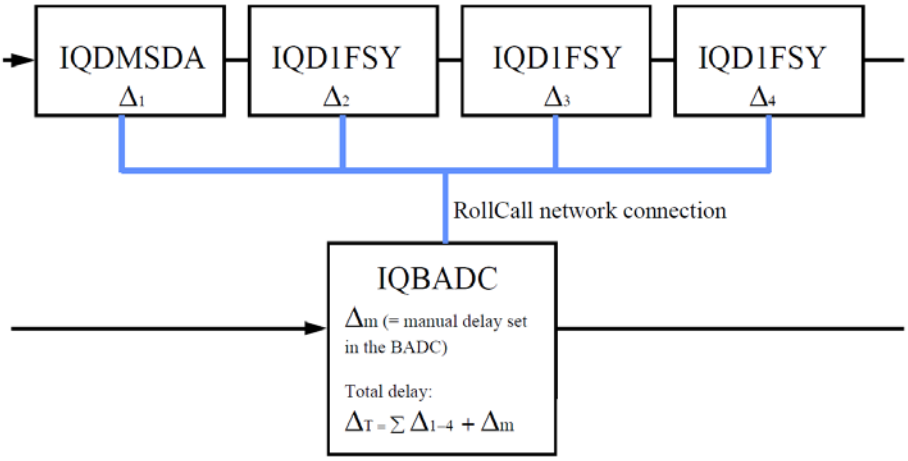
The next level of complexity is a vertical delay cluster where a video unit can have up to eight audio delays tracking - of the same or different types.



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.

A.12 Configuration: Horizontal Delay Cluster

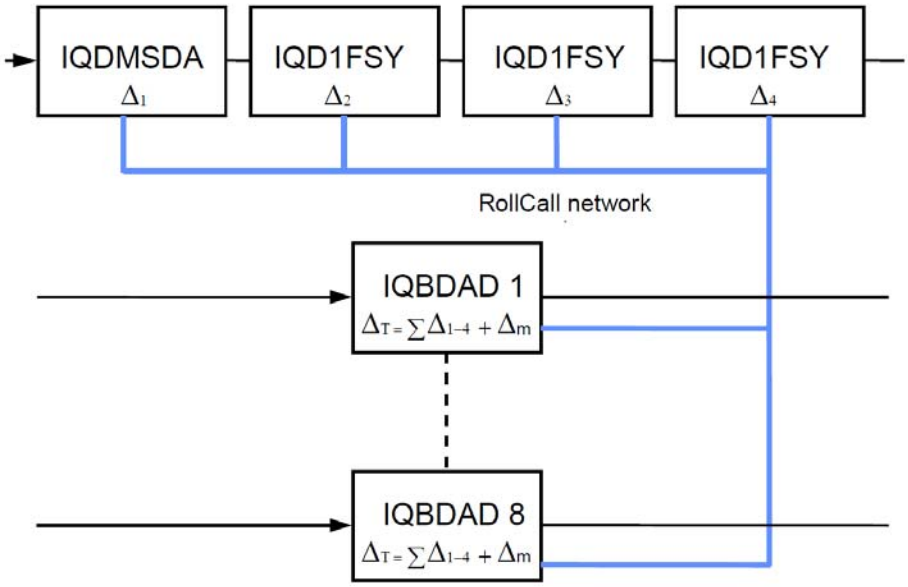
The next level of complexity is a horizontal delay cluster where an audio delay can track up to four video units.



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.

A.13 Configuration: Matrix Delay Cluster

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.

To make a virtual connection between from, say, an IQD1FSY to an IQBDAD:

1. Select the **Setup...** Menu of the IQD1FSY.
2. Select the **Audio_Delay...** Menu.
3. Choosing from **Unit_1** to **Unit_8**.
4. Enter 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.
5. Select the **Delay...** Menu of the IQBDAD.
6. Select RollTrack.

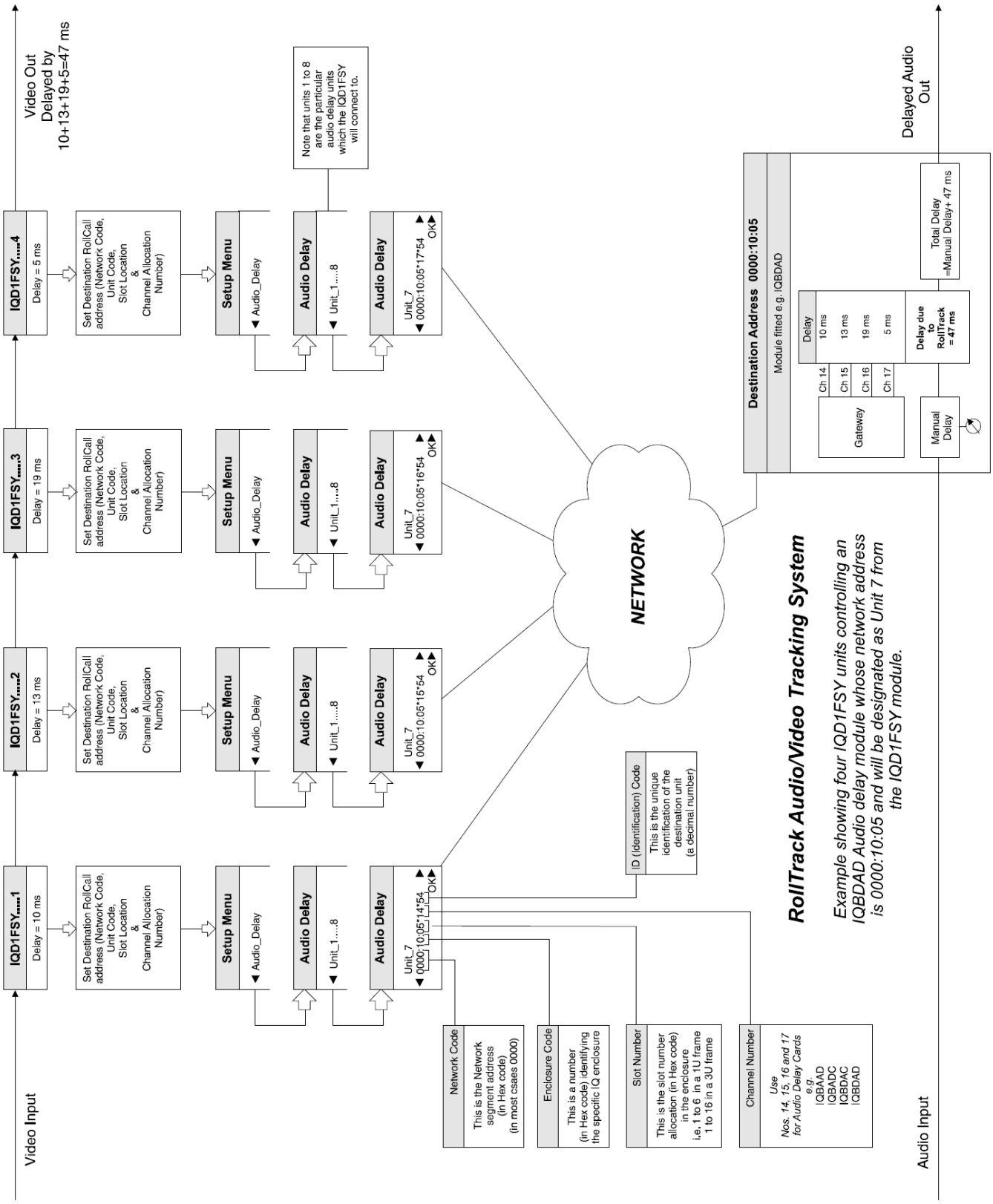
Example

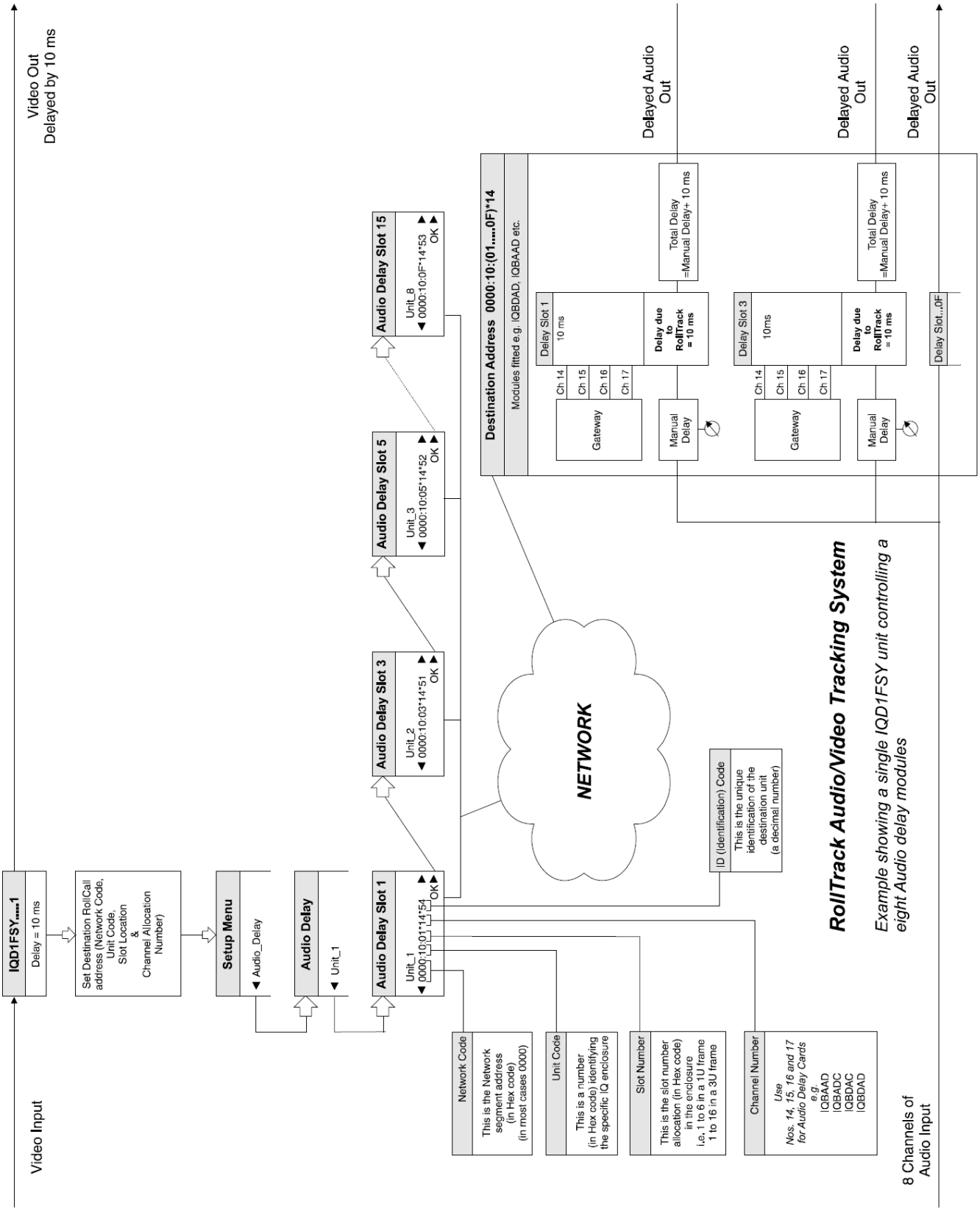
Example of Network Addresses with Channel Numbers and ID Numbers

	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

A.13.1 Configuration: An Array of Matrix Clusters

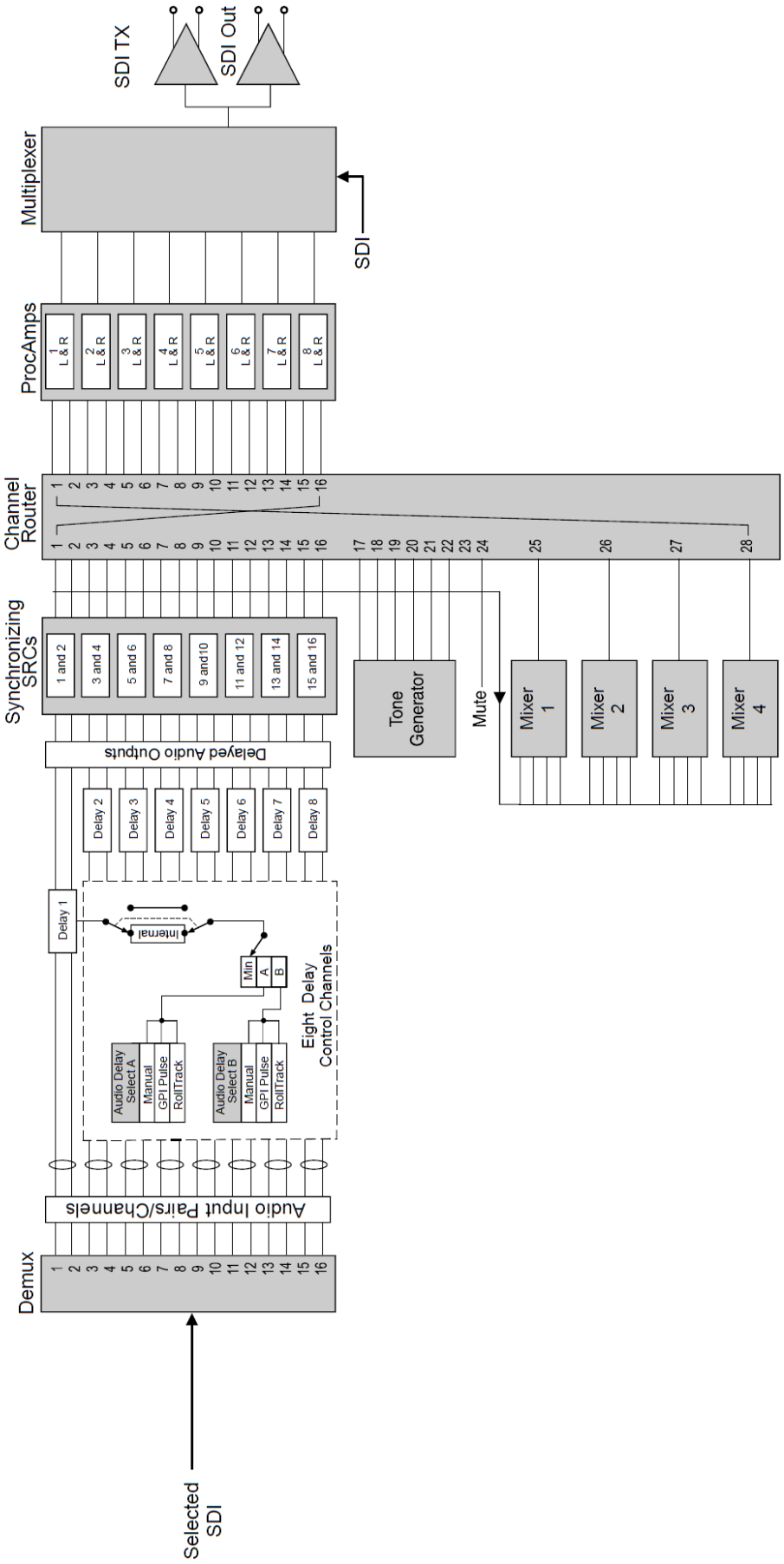
The most complex system would be an array of matrix delay clusters.



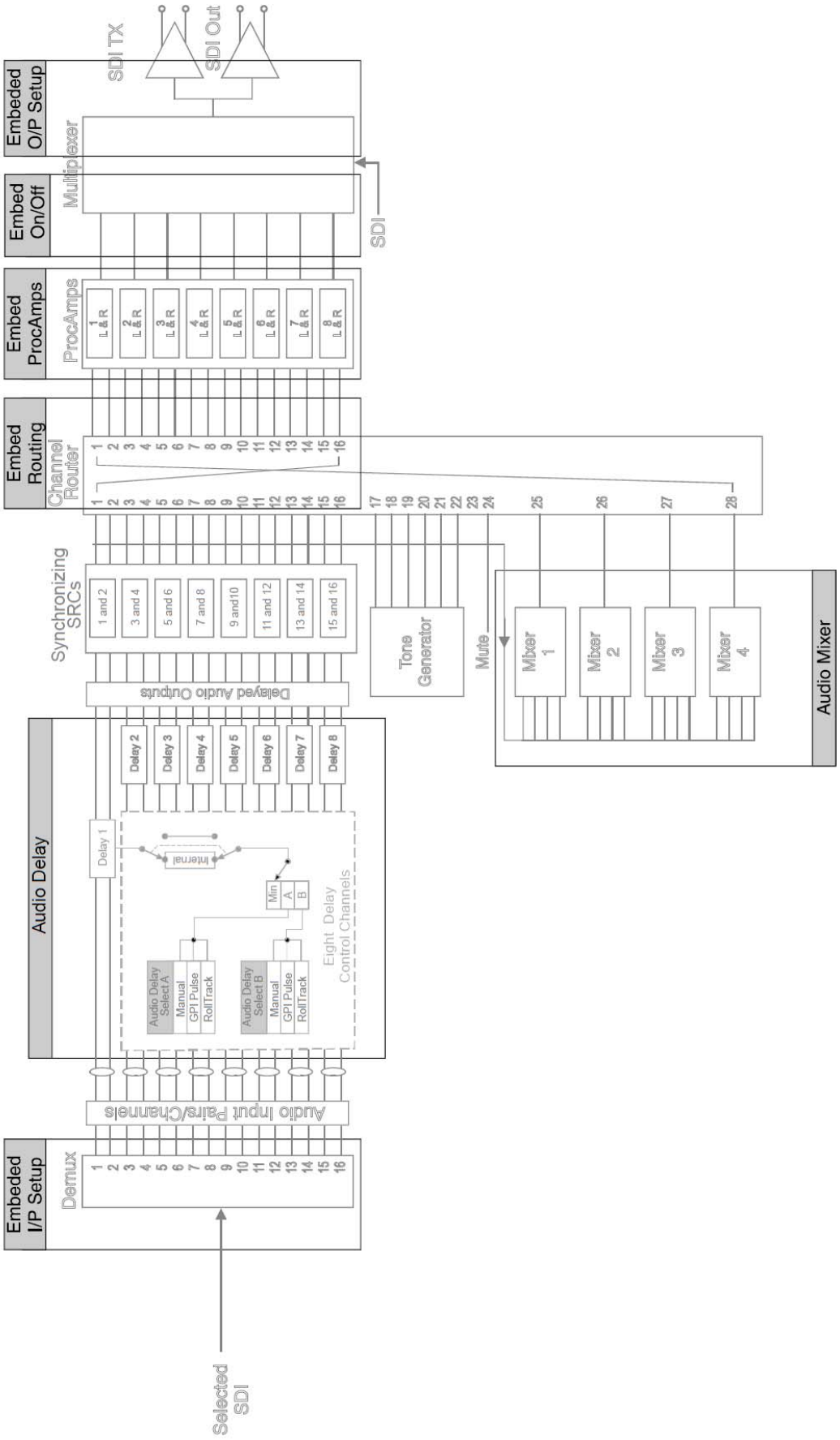

Video Out
Delayed by 10 ms
IQD1FSY.....1
Delay = 10 ms
Set Destination RollCall address (Network Code, Unit Code, Slot Location & Channel Allocation Number)
Setup Menu
Audio_Delay
Audio Delay
Unit_1
Audio Delay Slot 1
Unit_1
0000:10:01*14*54
OK
Audio Delay Slot 3
Unit_2
0000:10:03*14*51
OK
Audio Delay 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
Delay due to RollTrack = 10 ms
Manual Delay
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
RollTrack Audio/Video Tracking System
Example showing a single IQD1FSY unit controlling a eight Audio delay modules
Video Input
8 Channels of Audio Input

Appendix B Audio Processing

B.1 Audio Processing Overview



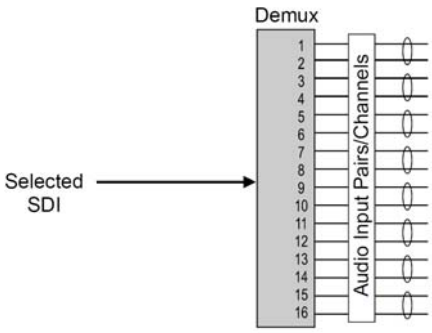
B.2 Audio Processing Showing Control Panel Screens



B.3 SDI Demultiplexer

The audio channels are demultiplexed from the SDI signal as eight 2-channel pairs that are fed to the audio delay processor.

Note that embedded audio handling for HD is 24 bit synchronous 48 kHz to SMPTE 299M and SD is 20-bit synchronous 48 kHz to SMPTE 272M-A.



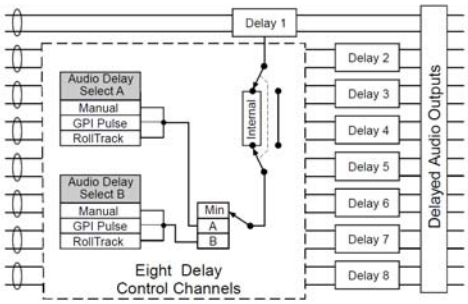
B.4 Audio Delay Processor

The Demultiplexed SDI is fed to eight separate delay blocks. Each block processes one audio pair (2 channels) at the same time, the delay time being the same for both channels.

The delay time may be set to Min (the delay will be 3 ms or 0.75 ms for data.) or to a time set by one of two (A and B) Audio Delay Selectors plus Internal (if selected in addition). Internal will add an audio delay equal to the unit's video delay.

The delay time set by each of these selectors is controlled by a combination of the following:

- **Manual:** delay set by the Manual Delay control will be applied.
- **GPIO Input Pulse:** The audio delay may be controlled by the width of a pulse on the GPI input.
- **RollTrack:** A delay set by external RollTrack commands will be applied.

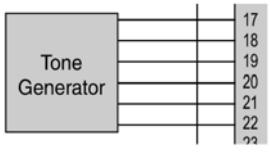


B.5 Tone Generator

A tone generator provides the following signals to the channel router:

- 1 kHz at 20 dBFS
- 2 kHz at 20 dBFS
- 4 kHz at 20 dBFS
- 1 kHz at 18 dBFS
- 2 kHz at 18 dBFS
- 4 kHz at 18 dBFS

Note that the frequency and level of these signals is not adjustable.

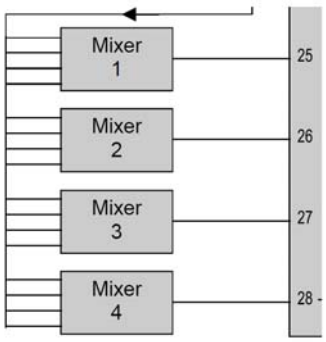


B.6 Mixers 1 to 4

There are four separate 4 input, 1 output audio mixers available. Each mixer has four inputs with individual gain controls that allow the mixing levels for each of the input signals, to be adjusted.

The inputs may be any of the following:

- Mute
- Disembed 1 to 8 Left/Right
- Tone Generator outputs
- Embedder ProcAmps

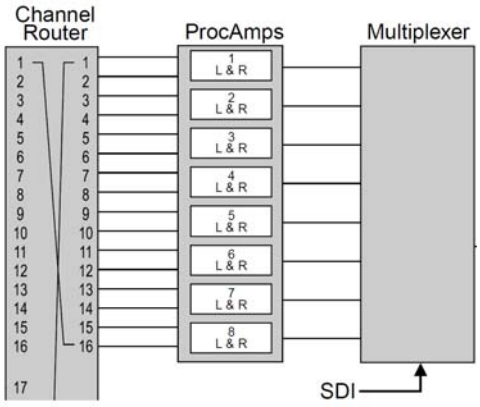


There are eight 2-channel ProcAmps that receive their inputs from the output of the channel router.

The two channels are processed as Left and Right with control of Gain, Inversion, Muting and a Stereo mode.

The outputs are configured as eight 2-channel signals in four groups and these are fed to the Multiplexer where they are embedded onto the SDI signal.

The audio channels are demultiplexed from the SDI signal as eight 2-channel pairs that are fed to the audio delay processor.



Note that embedded audio handling for HD is 24-bit synchronous 48 kHz to SMPTE 299M and SD is 20-bit synchronous 48 kHz to SMPTE 272M-A.

B.7 SDI TX

The embedded SDI signal is fed to two output amplifiers, each providing two SDI outputs.