Innovation in the
Multi-Screen World

User Instruction Manual

IQSYN20

HD/SD-SDI Frame Synchronizer

Information and Notices

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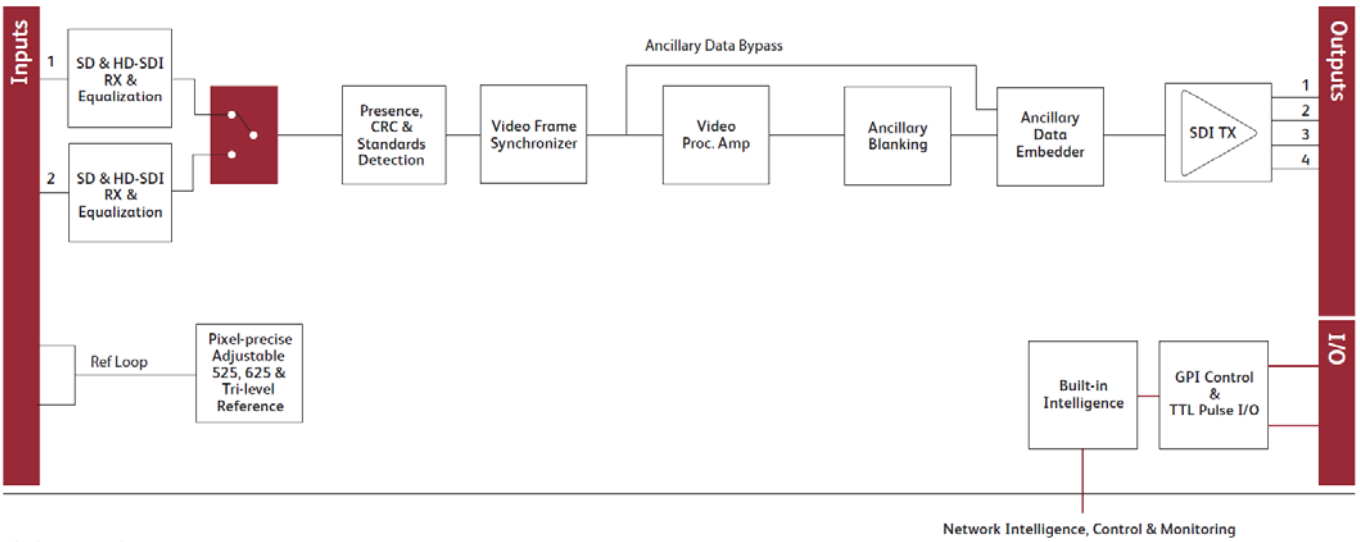
1. Introduction

1.1 Module Description

The IQSYN20 provides synchronization for HD-SDI 1.5 Gbps or SD-SDI 270 Mbps signals. Using agile synchronization that is router switching tolerant makes this module ideal for lines input applications using SDI video signals. A video processing amplifier provides complete control over the video levels, and additional video delay is available. A particularly powerful feature for constructing simple solutions to difficult system problems is the router at the input to the synchronizer. That means that the IQSYN20 can easily be placed at the end of main and redundant feeds or be used where an HD-SDI feed is complemented by an up-converted SD-SDI or even a digitized and up-converted analog feed.



Block Diagram for IQSYN2027–2A

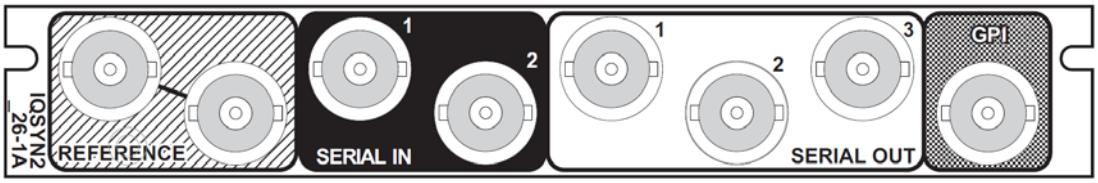
1.2 Order Codes

The following product order codes are covered by this manual:

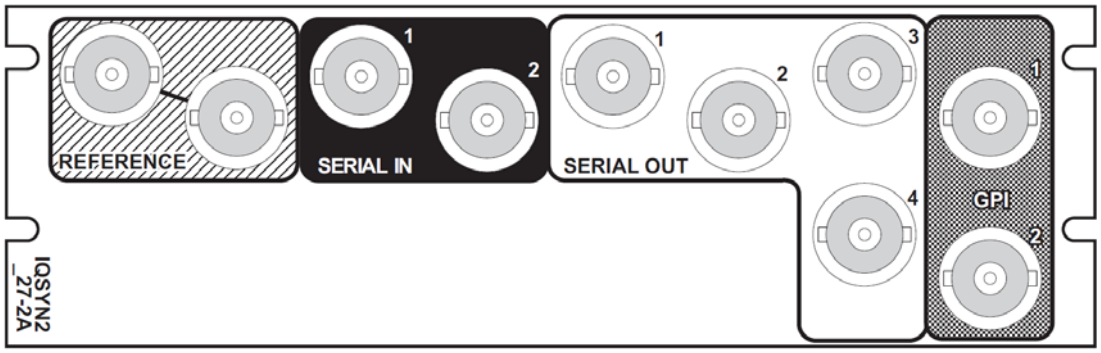
IQSYN2026-1A	HD-SDI and SD-SDI Synchronizer. 3 outputs.
IQSYN2027-2A	HD-SDI and SD-SDI Synchronizer. 4 outputs.
IQSYN2039-2A	HD-SDI and SD-SDI Synchronizer with relay input bypass. 4 outputs.

1.3 Rear Panel View

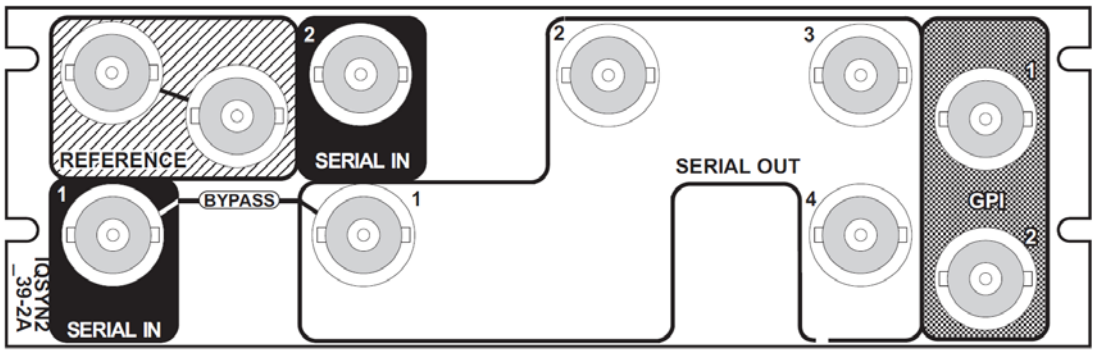
The following rear panel types are available:



IQSYN2026-1A



IQSYN2027-2A



IQSYN2039-2A

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.

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 Features

- Agile HD/SD-SDI synchronizer capable of referencing to a bi-level or tri-level reference
- Dual selectable HD/SD-SDI inputs with auto switching
- Agile synchronizer locking capable of handling mis-timed inputs of up to 5 lines without output video disturbance (SMPTE RP168 compliant)
- Standards supported:
  - HD-SDI to SMPTE 292M/274M/296M
  - SD-SDI to SMPTE 259M-C
- Precision wide range genlock adjustment allowing you to time any HD/SD-SDI signal to pixel accuracy
- Independent horizontal and vertical ancillary data blanking
- Input loss detection – input pass through/switch or black/pattern/freeze and Input SDI, CRC, EDH and ANC data checking and reporting
- Emergency input bypass option enables the SDI input signal to be passed through to SDI output 1 in the event of frame power failure or module removal
- Can be used as a video delay without synchronization, up to 1 frame
- Video processing controls including video gain and offset
- In-built test pattern generator
- 16x user memories

2. Technical Specification

Inputs and Outputs	
Signal Inputs	
SDI Inputs	2x HD/SD-SDI
Electrical	1.5 Gbps HD-SDI, SMPTE 292M 270 Mbps SDSDI, SMPTE 259M-C
Connector / Format	BNC / 75 Ohm panel jack on standard Snell connector panel
Input Cable Length	Up to 140 m Belden 1694A @ 1.5 Gbps (40 m input cable length and 35 m output cable length, relay bypass version. Belden 1694A @ 1.5 Gbps) Up to 275 m Belden 1694A @ 270 Mbps
Note: Specified cable lengths are a guide only. Exact cable length performance will depend on the quality of the cable used, the SDI video rate and the system setup. It is advisable not to cascade modules using the relay rear version although it may be possible if the interconnecting cable lengths are kept to an absolute minimum.	
Return Loss	>-15 dB
Relay Bypass Versions	
Input Return Loss	>-8 dB (When not in BYPASS mode)
Output Return Loss	>-8 dB (When not in BYPASS mode)
Reference Input	
Analog Reference Input	1 x Analog Reference with passive loop-through SMPTE 240/ 274M and RS170A
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	
SDI Outputs	3x / 4x HD/SD-SDI
Electrical	1.5 Gbps HD-SDI, SMPTE 292M 270 Mbps SDSDI, SMPTE 259M-C
Connector/Format	BNC / 75 Ohm panel jack on standard Snell connector panel
Return Loss	>-15 dB
Controls	
Indicators	
+Power OK	OK (Green)
-Power OK	OK (Green)
CPU OK	OK (Green flashing)
FPGA Done	OK (Yellow flashing)
In 1	OK (Green), Loss (Off)
In 2	OK (Green), Loss (Off)
SDI Err	Error (Red)
Reference Lock	OK (Green)
Error	Error (Red)
Warning	Warning (Yellow)
OK	OK (Green)
Video Controls	
Select Primary Input	1/2/Auto with user configurable rules

Output Standard	Select, Follow Input, Follow Reference
Standards List	Select video standards for automatic follow
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
Pattern Select	100% Color Bars, 75% Color Bars, SMPTE Bars, Tartan Bars, Pluge Ramp, H Sweep, Pulse and Bar, Burst
Blank Ancillary Data	Blank All, Blank HANC, Pass All, Pass when Output Standard equals Input Standard
VBI Line Blank	Individual lines for each video standard
Manual Freeze	On/Off
Freeze	Field/Frame
Video Channel Control	Mono, Y/C blank
Reference Select	External with phasing, Input Video with delay (Units: Lines and Pixels), Free-run
Default Video Output	Pattern / freeze / black / run through / redundant input
Auto Backup Rules	5 rules with Video presence and standard, Video Errors, Audio presence, GPI actions and Time Delays
Other Controls	
GPI Configuration	Not Used, as an output, as an input, pulse width timer + invert
GPI Input	Activates on contact closure:Freeze, Pattern, Black, Blank ANC, Mono Y only, Mono CbCr only, Use I/P and Ext. reference, select I/P 1 and 2 and Backup, Memory recall
GPI Output	Produces an output for: Input 1 and 2 OK, Reference OK Freeze, Pattern, Black, Monochrome
User memories	16x Save / Recall / Rename
RollCall Features	
Logging	Input Status, ANC, EDH, CRC Errors and standard, Reference Status and Standard Video output status and standard
RollTrack Controls	Source, Address, Command, Status, Sending
Roll Track Sources	Internal or detected device states that trigger the sending of RollTracks: Unused, Video Delay, Input Present /Input Loss, Reference OK / Loss, Output Freeze / Unfreeze, GPI High / Low / Inactive, Input Select, De-embed PCM / Data / Lost, Out (video standard)
Specifications	
Video Standards	750(720)/60p, 1125(1080)/30i 750(720)/59p, 1125(1080)/30sF 750(720)/50p, 1125(1080)/29i 1125(1080)/30p, 1125(1080)/29sF 1125(1080)/29p, 1125(1080)/25i 1125(1080)/25p, 1125(1080)/25sF 1125(1080)/24p, 1125(1080)/24sF 1125(1080)/23p, 1125(1080)/23sF 1125(1035)/30i 1125(1035)/29i 525(480)/29i, 625(576)/25i
Minimum Delay	1 line

Video Delay	1 line to 1 frame + 1line (synchronizing) 1 line to 1 frame – 1 pixel (delay mode)
Synchronizer Hysteresis Window	HD - 4 µs SD - 11 µs
Reference Source	External – HD tri-level (HD output only), SD bi-level, Input Video syncs
Genlock Adjustment	Up to ±1 frame in steps of 1 pixel
Power Consumption	
Module Power Consumption	8.6 W (max.) 9.1 W (max.) - Relay Bypass Version

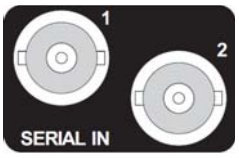
3. Connections

This section describes the physical input and output connections provided by the IQSYN20.

3.1 IQSYN2026-1A / IQSYN2027-2A / IQSYN2039-2A

3.1.1 SDI Inputs

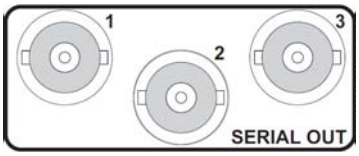
Serial digital inputs to the unit are made to the unit via two BNC connectors which terminate in 75 Ohms.



3.1.2 SDI Outputs

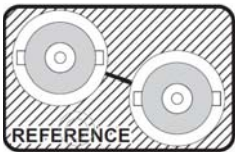
Serial digital outputs from the unit are made to the unit via BNC connectors which terminate in 75 Ohms.

- 3 outputs (IQSYN2026-1A)
- 4 outputs (IQSYN2027-2A / IQSYN2039-2A).



3.1.3 Analog Reference Input

The external sync input to the unit 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.

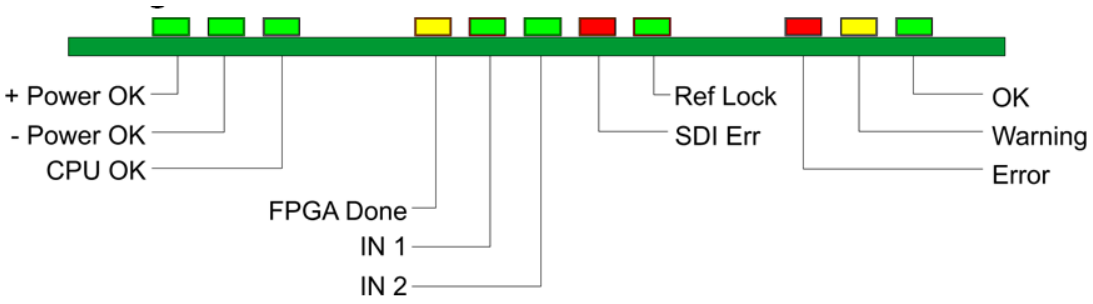
3.1.4 GPI

General Purpose Interface via BNC 75 Ohms connectors may be configured as inputs or outputs.

- 1 GPI (IQSYN2026-1A)
- 2 GPI (IQSYN2027-2A / IQSYN2039-2A).

4. Card Edge LEDs

The LEDs on the edge of the module indicate its operating status:



LED	Color	Description
POWER +	Green	Indicates that a positive power supply is present.
POWER -	Green	Indicates that a negative power supply is present.
CPU OK	Green	Flashes to indicate that the CPU is running.
FPGA OK	Yellow	Flashes when the FPGA is running. When the unit is booting, this LED is illuminated continuously, until the SDI is enabled.
IN 1, IN 2	Green	These LEDs are illuminated when a valid input is present at the Serial Data Inputs.
SDI ERR	Red	This LED is illuminated if any CRC, EDH or TRS errors are detected on the selected SDI input or a loss of SDI.
REF LOCK	Green	This LED indicates that a reference signal is present.
ERROR	Red	This LED indicates board fault conditions. When the unit is booting, this LED is illuminated, until the SDI is enabled. Board fault errors include: • **Serializer lock fault**. Output serializer fails to lock. • **SDI JTAG board fault**. Internal JTAG interface is inadvertently enabled. 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.
WARNING	Yellow	This LED indicates operational errors. Operational errors include: • **Input Video: Incompatible input standard**. Detected input standard is invalid. • **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. This LED may be briefly illuminated in transitional states like standard changes. Continuous illumination indicates a problem. More information is available in the status window.
OK	Green	Indicates that the module is operating correctly.

5. Controlling the IQSYN20 from the RollCall Control Panel

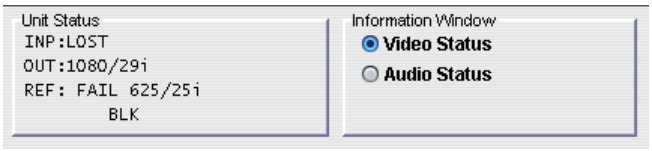
5.1 The Information Window

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

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

5.1.1 Video Status

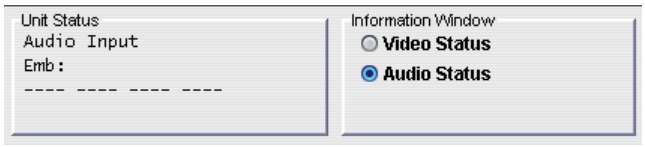
When **Video Status** is selected, the status of the video input and reference is displayed:



Name	Status	Description
INP: (Line 1)	Displays the status of the video input, followed by the standard of the input, or last valid signal.	
	OK 1080/29i	Valid input signal received. Detected standard of input signal, or last valid input signal, is displayed, e.g. 1080/29i.
	LOST	No input signal received.
	FAIL	Invalid input signal received, e.g. frame rate differs between input and output.
	MISM	Valid input signal received but different (mismatched) format to the selected output, e.g. input is 1080/29i and output is 1080/29p.
OUT: (Line 2)	Displays the operating standard of the unit.	
	Unknown	The input signal standard is not recognized.
	1080/29i	Operating standard is displayed, e.g. 1080/29i.
REF: (Line 3)	Displays the status of genlock, followed by the standard of the analog reference signal when in Free-Run or Lock to Reference mode.	
	FREE	Free run, with no reference connected.
	OK F 1080/29i	Free run. Detected standard of reference signal is displayed, e.g. 1080/29i.
	LOCK 1080/29i	Valid reference and genlocked. Detected standard of reference signal is displayed, e.g. 1080/29i.
	LK F	Valid reference but ambiguous field type.
	LOST	No reference signal found.
	FAIL	Genlock not possible.
	FAIL INP	Failed to genlock to input.
	LOCK INP	Genlocked to input video.
(Line 4)	Displays the status of the ancillary data and the output picture.	
	ANC	Ancillary present.
	FRZ	Output frozen.
	PAT	Output pattern.
	MON	Monochrome.
	HBL	Horizontal ancillary data is being blanked.
	BLK	Output black.

5.1.2 Audio Status

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

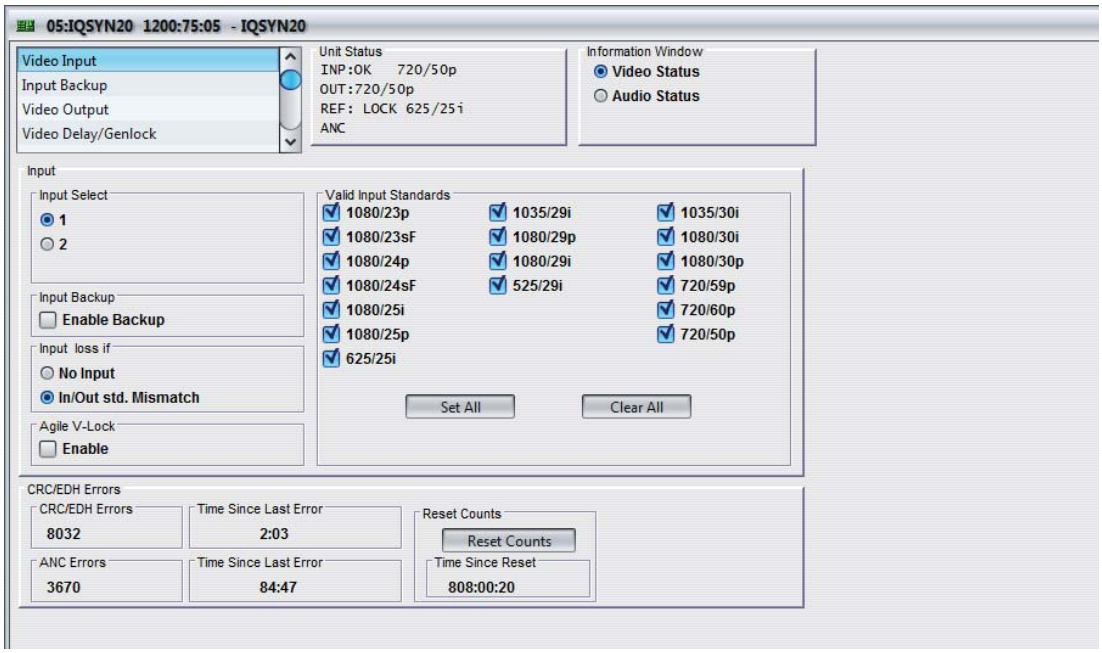


Name	Status	Description
Audio Input Emb: --------	P	Channel is a PCM audio input.
	□	No audio input is detected.
	D	Signal is data (non-PCM, Dolby, etc.).

5.2 Video Input

The **Video Input** screen enables you to specify the settings for the video inputs:

- Selection of input source.
- Enable any specified backup rules.
- Specify the input loss conditions.
- Specify valid input standards.
- View information about CRC/EDH errors.



5.2.1 Input Select

Enables the selection of either input 1 or Input 2 for processing. This control is duplicated on the **Input Backup** screen.

5.2.2 Input Backup

When selected, if a backup rule is triggered, the action defined in the backup rules takes place. This control is duplicated on the **Input Backup** screen.

5.2.3 Input Loss If

The module can take automatic action if the input signal is lost. This control defines what is a loss of input and what will cause the automatic actions to be triggered.

- **No Input:** If there is no input signal of any type this will be considered to be a loss of input.
- **In/Out std. Mismatch:** If the standard of the input signal does not match the output standard this will be considered to be a loss of input.

5.2.4 Agile V-Lock

This function is intended to permit correct reception of upstream switched misaligned 625/25i and 525/29i sources without picture disturbance. In HD standards, a mechanism is in place to re-synchronize after a switch, which makes this mode unnecessary. A tolerance of +/- 5 lines misalignment between sources is permissible which is wider than the 5 µs allowance specified in SMPTE RP-168, and it is assumed that the correct switch point with respect to the source is used.

Note: Due to the time required to recognize a change in picture framing in standard definition (SD) there must be a minimum delay of 4 lines so that no displaced picture is seen at the output during a misaligned switch. This may be assured in a synchronizing mode (external reference or free-run) by setting the Frames delay value to at least 1.

Application areas that require agility over delay will suit this function better. Poor and unstable signals may benefit from having this function disabled.

Note: Correct operation of agile V-lock requires a correct vertical reference point. On some legacy equipment from before 1995 the end of vertical blanking was on the permissible lines 10-19 as well as on the current line 20. This practice is no longer permitted, and will prevent correct vertical alignment of non-compliant legacy 525/59i sources. If this is the case then disable Agile V-Lock.

5.2.5 Valid Input Standards

The **Valid Input Standards** check boxes specify the video input standards that the module will accept. The module will automatically detect the standard of the received input and block any signal that does not comply with these selected video formats.

By default, all input standards are selected.

- **Set All:** Click this button to select all check boxes.
- **Clear All:** Click this button to de-select all check boxes.

Note: If any other standards are detected, an invalid standard will be assumed and this will force an input video loss with the FAIL status.

5.2.6 CRC/EDH Errors

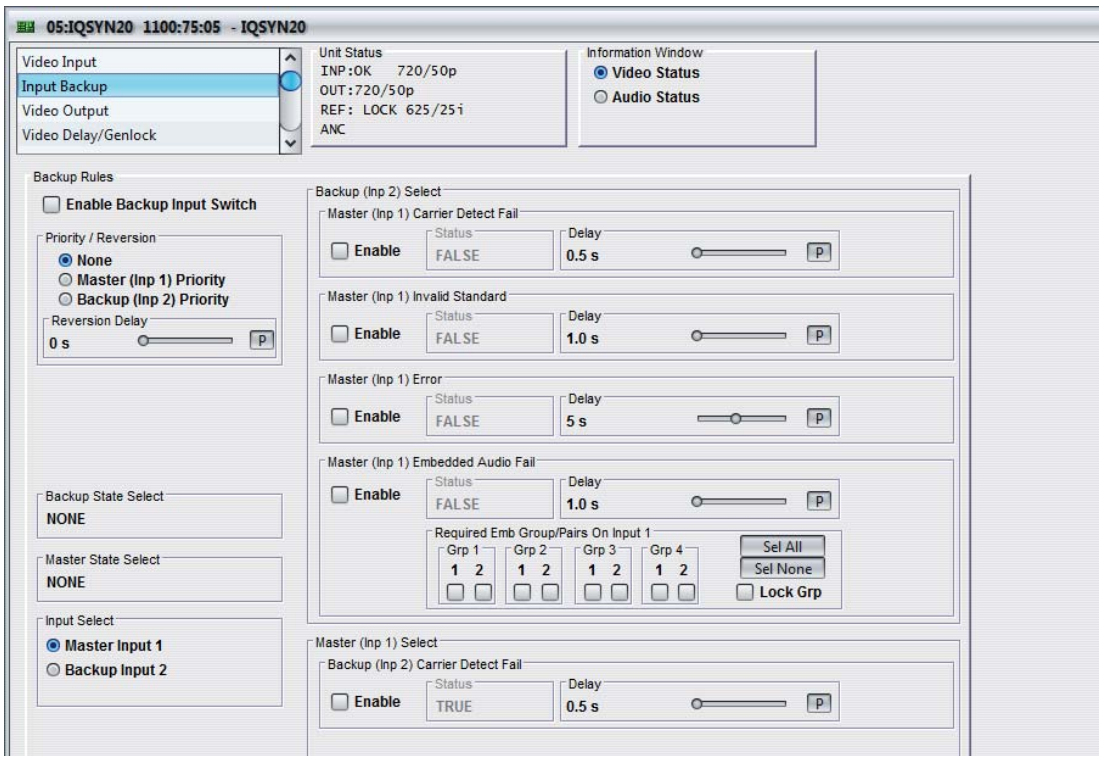
This item provides information about the Cyclic Redundancy Checksum errors (CRC) and Error Detection Handling (EDH).

- **CRC/EDH Errors:** This displays the total CRC or EDH Full Frame error count 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 ancillary data (ANC) errors since the last reset. All ancillary packets are checked. Hence, a problem video source or dropout can produce a large number of errors.
- **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 ancillary data 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.

5.3 Input Backup

The **Input Backup** screen enables the IQSYN20 to be configured to detect if the input signal on Master (Inp 1) fails and automatically switch to the Backup (Inp 2) signal.



5.3.1 Enable Backup Input Switch

Select this option to enable the input backup switch functions. This control is duplicated on the **Video Input** screen.

5.3.2 Priority / Reversion

These settings apply to the Carrier Detect Fail controls and specify the input that will be given priority and the time that a lost signal must have been regained before the system will revert to the input that has priority.

- **None:** Neither Input 1 nor Input 2 has priority. If a signal is lost, causing the module to switch to the other input, when the signal is regained, the module will not revert to the original input.
- **Master (Inp 1) Priority:** Input 1 has priority. Normally, the module will use the Input 1 signal. If the signal on Input 1 is lost, the module will switch to Input 2. If the signal on Input 1 is subsequently recovered, the module will revert to using Input 1 after the time specified as the Reversion Delay has elapsed.
- **Backup (Inp 2) Priority:** Input 2 has priority. Normally, the module will use the Input 2 signal. If the signal on Input 2 is lost, the module will switch to Input 1. If the signal on Input 2 is subsequently recovered, the module will revert to using Input 2 after the time specified as the Reversion Delay has elapsed.
- **Reversion Delay:** Use the slider bar to specify the time that must elapse before the priority input will revert to a recovered signal. The range of adjustment is 0 - 100 seconds and the preset value is 0 s.

Note: If the signal fails on both Input 1 and Input 2, the unit will switch to the priority input.

If any of the Backup (Inp 2) Select controls are enabled, the Priority/Reversion controls will not be available.

5.3.3 Backup State Select

This reflects the overall status of the Backup (Inp 2) Select controls, which are:

- Master (Inp 1) Carrier Detect Fail
- Master (Inp 1) Invalid Standard
- Master (Inp 1) Error
- Master (Inp 1) Embedded Audio Fail

If none of these options are enabled, Backup State Select will display None.

If all of the enabled options have a status of False, Backup State Select will display False.

If one or more (but not necessarily all) of the enabled options have a status of True, Backup Select State will display True.

5.3.4 Master State Select

This reflects the status of the Backup (Inp 2) Carrier Detect Fail control.

If the Backup (Inp 2) Carrier Detect Fail control is not enabled, Master State Select will display None.

If the Backup (Inp 2) Carrier Detect Fail control is enabled, Master State Select will display the control's status - either True or False.

5.3.5 Input Select

Use the radio buttons to manually select either Input 1 or Input 2. This control is also present on the Video Input screen. Changes made to the control on either screen will be reflected on the other.

5.3.6 Master (Inp 1) Carrier Detect Fail

When this option is enabled, Backup (Inp 2) will be selected if the signal on Master (Inp 1) is lost and is missing for more than the time specified by the Delay control.

- **Enable:** Select the check box to enable this option.
- **Status:** This displays the carrier status. It will show True in the event of failure, otherwise it will show False.
- **Delay:** Use the slider bar to specify the amount of time that must elapse before a change of status is reported. The range of adjustment is from 0.5 s to 10.0 s. The preset value is 0.5 s.

5.3.7 Master (Inp 1) Invalid Standard

When this option is enabled, Backup (Inp 2) will be selected if an invalid standard, as specified on the Video Input screen, is detected on Master (Inp 1) and remains for the time specified by the Delay control.

- **Enable:** Select the check box to enable this option.
- **Status:** This displays the Invalid Standard status. It will show True if an invalid standard is detected, otherwise it will show False.
- **Delay:** Use the slider bar to specify the amount of time that must elapse before a change of status is reported. The range of adjustment is from 1 s to 5 s. The preset value is 1 s.

5.3.8 Master (Inp 1) Error

When this option is enabled, Backup (Inp 2) will be selected if the signal on Master (Inp 1) is in error and in error for more than the time specified by the Delay control.

- **Enable:** Select the check box to enable this option.
- **Status:** This displays the input error status. It will show True if an error is present, otherwise it will show False.
- **Delay:** Use the slider bar to specify the amount of time that must elapse before a change of status is reported. The range of adjustment is from 1 s to 5 s. The preset value is 1 s.

5.3.9 Master (Inp 1) Embedded Audio Fail

When this option is enabled, Backup (Inp 2) will be selected if any of the audio groups specified by the Required Emb Groups/Pairs On Input 1 control fail for more than the time specified by the Delay control.

- **Enable:** Select the check box to enable this option.
- **Status:** This displays the audio status for audio that has been specified as required. It will show True for audio fail, otherwise it will show False.
- **Delay:** Use the slider bar to specify the amount of time that must elapse before a change of status is reported. The range of adjustment is from 1 s to 10 s. The preset value is 1 s.
- **Required Emb Groups/Pairs On Input 1:** Select the check boxes for all audio groups/pairs that are required in order for the input to be considered acceptable. If any selected audio group/pair fails for more than the time specified by the Delay control, the input will switch to Backup (Inp 2). If audio fails on a group/pair that is not marked as required, the input will be considered acceptable and no switch will occur.
  - **Sel All:** Selects all of the Required Emb Groups/Pairs On Input 1 check boxes.
  - **Sel None:** Clears all of the Required Emb Groups/Pairs On Input 1 check boxes.
  - **Lock Grp:** Selecting this option locks groups together. Selecting one channel in the group will automatically select the other. Clearing one channel in the group will automatically clear the other.

5.3.10 Backup (Inp 2) Carrier Detect Fail

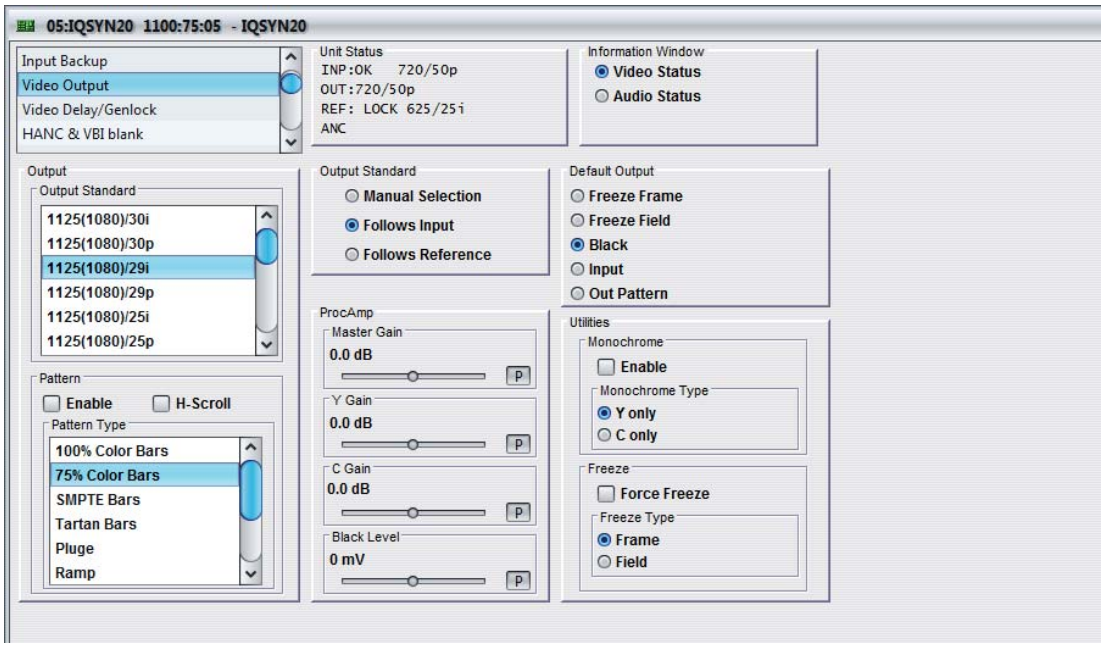
When this option is enabled, Master (Inp 1) will be selected if the signal on Backup (Inp 2) is lost and is missing for more than the time specified by the Delay control.

- **Enable:** Select the check box to enable this option.
- **Status:** This displays the carrier status. It will show True in the event of failure, otherwise it will show False.
- **Delay:** Use the slider bar to specify the amount of time that must elapse before a change of status is reported. The range of adjustment is from 0.5 s to 10.0 s. The preset value is 0.5 s.

5.4 Video Output

Use the settings on the **Video Output** screen to:

- Specify the video output standard.
- Set up the test pattern, if any, to be generated.
- Specify the default output to be generated in response to a loss of input.
- Adjust the signal gain and black levels.
- Control the unit's monochrome functions.
- Control the unit's picture freeze function.



5.4.1 Output

Selects the output video standard, depending on whether Manual Selection, Follows Input or Follows Reference is selected. See “Output Standard” on page 22.

Select the output standard from the following list:

1125(1080)/30i	1125(1080)/23sf
1125(1080)/30p	1125(1035)/30i
1125(1080)/29i	1125(1035)/29i
1125(1080)/23p	750(720)/60p
1125(1080)/25i	750(720)/59p
1125(1080)/25p	750(720)/50p
1125(1080)/24p	750(720)/59p
1125(1080)/24sf	525(480)/29i
1125(1080)/23p	625(576)/25i

5.4.2 Output Standard

This function defines how the output standard is selected.

- **Manual Selection:** When selected, the output standard is the one selected via the Output/Output Standard list.
- **Follows Input:** When selected, the output standard is set to be the same as the input standard.
- **Follows Reference:** When selected, the output standard is set to be the same as the reference input standard.

Note: If you have selected Follows Input or Follows Reference, you can pre-select the output standard for use with the Manual Selection option. If you then select Manual Selection, the specified standard is used.

5.4.3 Pattern

This enables 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.

5.4.3.1 Pattern Type

This enables 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	Ramp
75% Color Bars	Sweep
SMPTE Bars	Pulse & Bar
Tartan Bars	Burst
Pluge	Black

5.4.4 Default Output

This controls the module's response to a loss of input signal as set via the Video Input/Input Loss if and Valid Input Standards functions. Options are:

- **Freeze Frame:** When selected, the output becomes a frozen frame picture.
- **Freeze Field:** When selected, the output becomes a frozen field picture.
- **Black:** When selected, the output picture cuts to black.
- **Input:** When selected, the incoming signal is displayed whenever possible.
- **Out Pattern:** When selected, the output picture will become the pattern selected via the Output/Pattern Type function.

5.4.5 ProcAmp

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

- **Master Gain:** This enables 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 enables the Y (luminance) gain to be adjusted by ±6 dB in steps of 0.1 dB. Preset value is 0 dB.
- **C Gain:** This enables 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 enables the black level to be adjusted by ±200 mV in steps of 1 mV. Preset value is 0.

5.4.6 Utilities

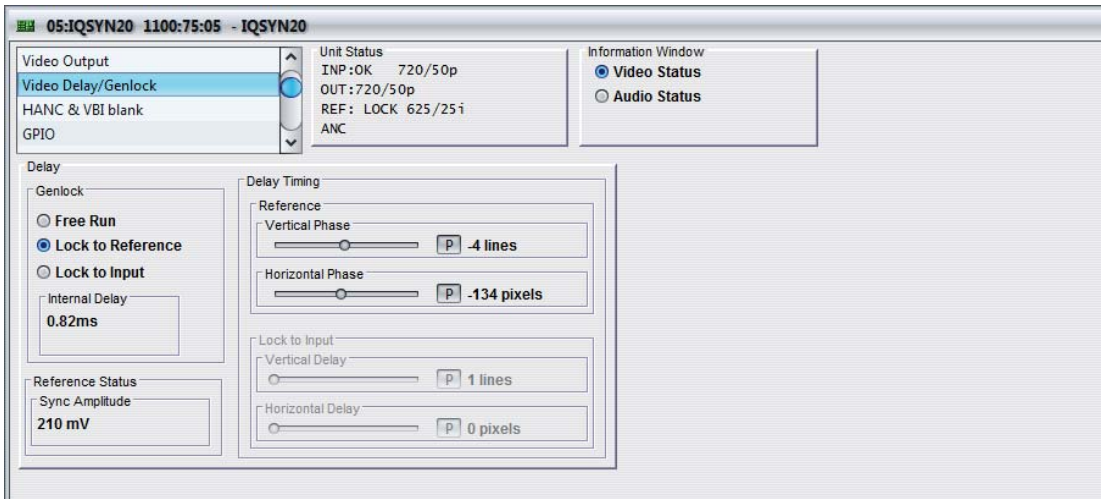
The Monochrome settings control the monochrome output functions.

- **Enable:** When checked, the monochrome functions are enabled.
- **Y Only:** When selected, the output picture becomes monochrome using only the Y component of the signal.
- **C Only:** When selected, the output picture becomes monochrome using only the CbCr components of the signal.
- **Force Freeze:** When checked, the output picture becomes frozen.
- **Frame:** When selected, the frozen output picture is derived from a Frame.
- **Field:** When selected, the frozen output picture is derived from a Field.

Note: The Freeze function is disabled on a power cycle of the module.

5.5 Video Delay/DolbyE/Genlock

The **Video Delay/Genlock** screen enables control of the video delay through the unit.



As a frame-based video synchronizer with up to 1 frame of storage, there are many possibilities for timing the output video. Each has an impact on delay through the unit and the possible level of control. Of these there are two classes of operation: referenced modes and delay modes.

Referenced Modes

In a referenced mode, video output is independently timed from the input, so that the output is always aligned to the reference raster to match other equipment for switching and processing purposes. This is the normal frame synchronizer operating mode, in which the buffer will always have a good whole frame of video to display (whether live, frozen, black or test pattern). In addition, due to the independence of output timing, it will be able to "firewall" the video. See page 47 for further details.

The delay through the unit remains within the one-frame operating range of the buffer but cannot be directly controlled since it is externally defined by the output and input references. However, phasing relative to any external output reference is adjustable.

Delay modes (Lock to Input)

Delay modes use the input reference to determine the output reference. These are not synchronizing modes but are utility delay generation modes, which may be useful when audio processing or a simple delay is required. The output is stable only if the input is stable, so it is not, therefore, a viable firewall mode.

The total delay is summed from calculated and measured delays to a resolution of one video line, and shown in the Internal Delay box. This is then available for use in the tracking Audio Delays.

5.5.1 Genlock

The Genlock function enables you to specify the Genlock or Video Delay mode, which defines the source of timing for the output video.

- **Free Run:** This is a special case of referenced type mode. When selected, the unit's output will not be locked to any input signal. Instead, it will run nominally at the correct frame rate and synchronize input video to this. This mode may be used to stabilize and firewall poor sources in the absence of a station reference.
- **Lock to Reference:** This is the normal referenced mode and the factory preset/default setting. When selected, the unit will lock to an external black (burst) reference signal, either bi-level SD or tri-level HD. Horizontal or Vertical Timing adjustments are possible for correctly phasing to match other sources.

Lock to Reference mode may be used to stabilize, firewall and correctly phase (synchronize) incoming line or post-router switched sources to a station reference.

The reference should be correctly terminated and clean of noise and jitter to give the best possible results. A bi-level reference of the correct frame rate is always acceptable, but a tri-level HD reference is only acceptable for a HD output. There are many cross-locking modes possible, and for this purpose the correct frame rate is either the output frame rate, double or half the rate. When an interlaced output is referenced to a progressive source, the field relationship is unknown and this is indicated with REF: LK-F in the status window. When an unsuitable reference is given, the unit will fail to lock and REF: FAIL will be displayed in the video status window.

In this mode, Reference Status displays the amplitude of the reference sync signal, either peak for bi-level (typically 300 mV) or peak-peak for tri-level (typically 600 mV). Note that unterminated tri-level syncs will have the indication clipped to around 1 Volt.

- **Lock to Input:** 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 permit delay matching.

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

Note: When the delay is set below the minimum possible, this control will limit at 1 video line. When the delay is set above the maximum possible, this control will limit at just below 1 video frame.

5.5.2 Delay Timing

The Delay Timing function is only available in **Lock to Reference** and **Lock to Input** modes. It enables you to specify the vertical and horizontal timing, which enables video delay to be adjusted in steps of one line.

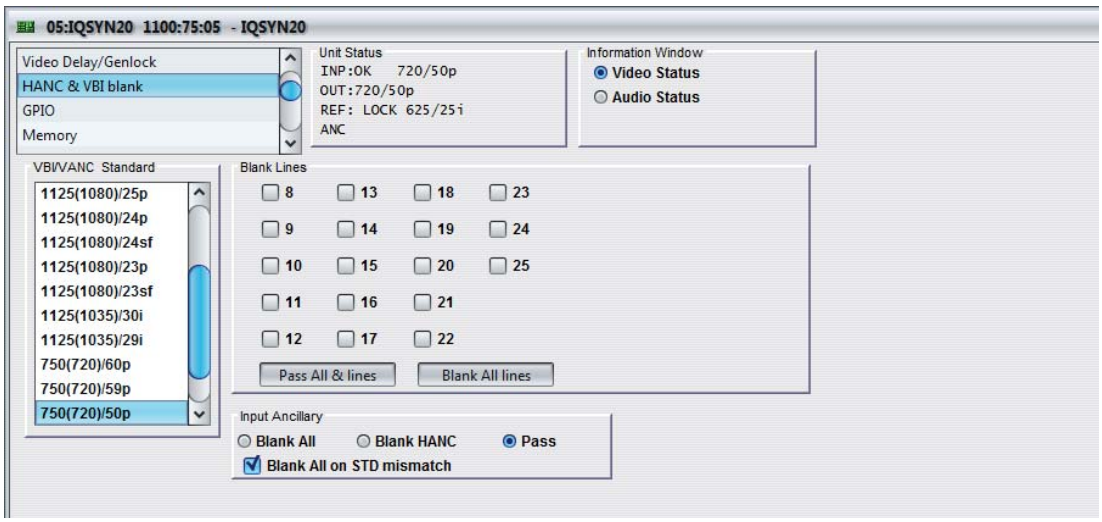
- **Vertical Phase/Delay:** Enables the video delay to be adjusted in steps of one line. The range of adjustment is one line short of an output frame in either direction. The preset value is 0 lines.
- **Horizontal Phase/Delay:** Enables the video delay to be adjusted in steps of one line. The range of adjustment is one pixel short of an output line in either direction. The preset value is 0 pixels.

The total delay is the sum of vertical and horizontal timing. An overall effect is to enable a delay of 1 frame - 5 lines, for example, to align an earlier 5-line delay device to the next frame boundary.

The sum of vertical and horizontal timing is post-limited to be under +/- a frame of the current standard. There is also a forced minimum delay of 1 line.

5.6 HANC & VBI Blank

The **HANC & VBI Blank** screen enables ancillary data lines to be blanked or passed through the module.



5.6.1 VBI for Standard

This item allows the Vertical Interval data (all or specific lines) contained in the input signal to be blanked or passed through the module. It allows the selection of which vertical interval lines to pass through to the output and which lines to blank.

Standards that may be selected are:

1125(1080)/30i	1125(1080)/23sf
1125(1080)/30p	1125(1035)/30i
1125(1080)/29i	1125(1035)/29i
1125(1080)/23p	750(720)/60p
1125(1080)/25i	750(720)/59p
1125(1080)/25p	750(720)/50p
1125(1080)/24p	750(720)/59p
1125(1080)/24sf	525(480)/29i
1125(1080)/23p	625(576)/25i

Different standards will display different VBI lines.

5.6.2 Blank Lines

To prevent specific lines from being passed to the output signal, select them from the **Blank Lines** section.

To allow all displayed vertical interval lines to be passed to the output signal, click **Pass All Lines**.

To prevent all displayed vertical interval lines from being passed to the output signal, click **Blank All Lines**.

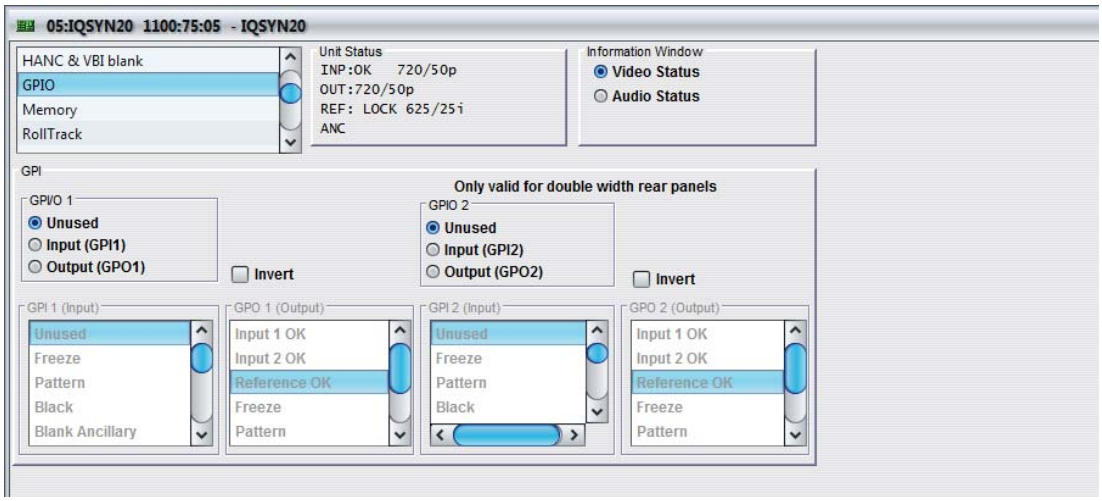
5.6.3 Input Ancillary

The Input Ancillary controls enable you to specify whether to pass or blank ancillary data:

- **Blank All:** When selected, remove all ancillary data. This overrides the VBI Blank Lines control.
- **Blank HANC:** When selected, removes horizontal ancillary data (HANC).
- **Pass:** When selected, enables ancillary data to pass unaltered. The pass-through operations will not alter audio packets for groups that the IQSYN20 has not selected for embedding.
- **Blank All on STD mismatch:** When checked, removes all ancillary data, if the input signal fails to match the output standard.

5.7 GPIO

The **GPIO** screen enables the General Purpose Input/Output functions to be configured.



5.7.1 GPIO 1 and GPIO 2

This enables GPIO ports to be configured:

- **Unused:** The GPIO port is inactive.
- **Input:** The GPIO port is configured as an input.
- **Output:** The GPIO port is configured as an output.

Note: GPIO 2 is only valid for the double-width module.

5.7.2 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:

- **Unused:** This enables a direct GPI to RollTrack without calling the other states.
- **Freeze:** The output picture is frozen. When released (input open) the output picture becomes unfrozen.
- **Pattern:** The output picture becomes the selected pattern. When released (input open) the output picture reverts to normal.
- **Black:** The output picture cuts to black. When released (input open) the output picture reverts to normal.
- **Blank Ancillary:** The ancillary data is blanked. When released (input open) ancillary data will be passed.
- **MonoChrm Y Only:** The output picture becomes monochrome using only the Y component of the signal. When released (input open) the picture reverts to normal color.

- **MonoChrm CbCr Only:** The output picture becomes monochrome using only the CbCr components of the signal. When released (input open) the picture reverts to normal color.
- **Use I/P Ref (SDI):** When initiated, the unit locks to the video input. When released (input open) this state remains, i.e. it does not revert to the previous state.
- **Use Ext Ref (Analog):** When initiated, the unit locks to the reference signal. When released (input open) this state remains, i.e. it does not revert to the previous state.
- **Select Inp 1, Select Inp 2:** Input 1 or Input 2 is selected.
- **Select Input:** A toggle function that selects between Input 1 (inactive) and Input 2 (active).
- **Select Backup:** Enables the Backup Rules function.

Note: **GPI Input Edge Switching Operation.** With the exception of 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.

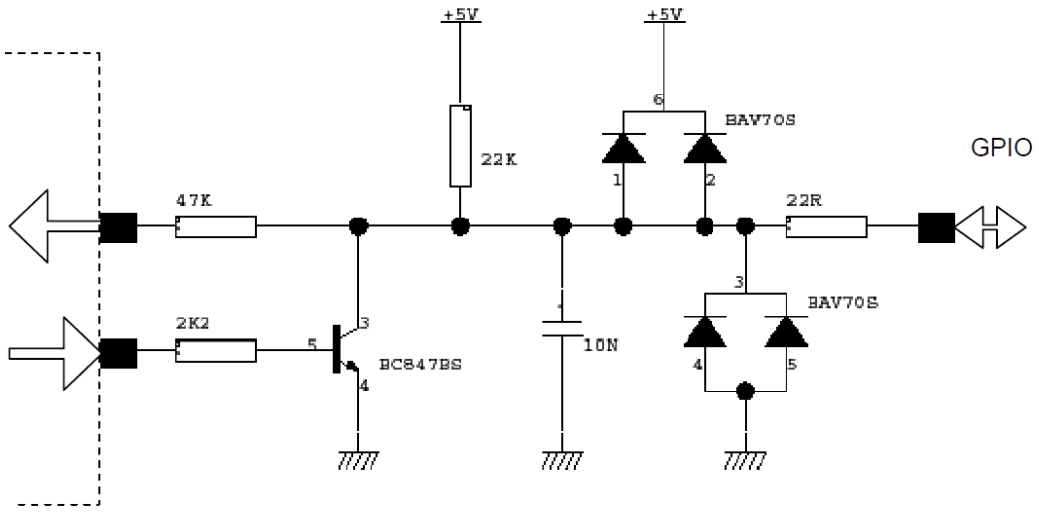
5.7.3 GPI 1 (Output) and GPI 2 (Output)

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

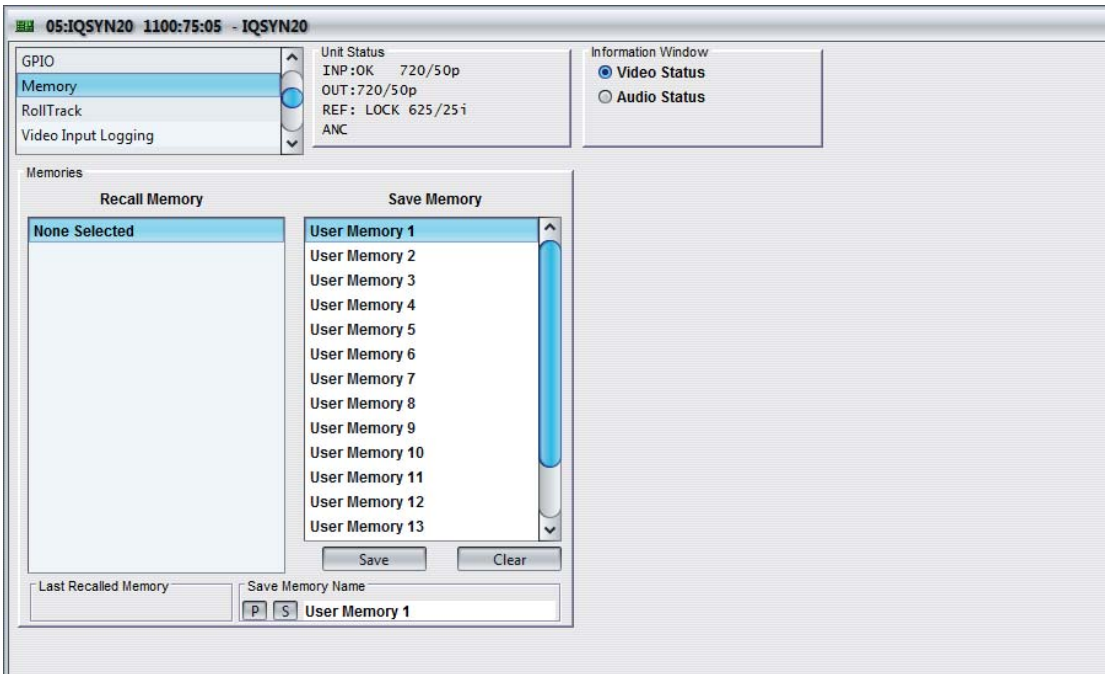
5.7.4 GPIO Interface Circuitry



5.8 Memory

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

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



5.8.1 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.

5.8.2 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.

To clear a memory location:

In the **Save Memory** column, select a memory location, and then click **Clear**. The current settings stored for that memory are cleared. After you clear a memory location, it disappears from the **Recall Memory** list.

5.8.3 Last Recalled

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.

5.8.4 Save Memory Name

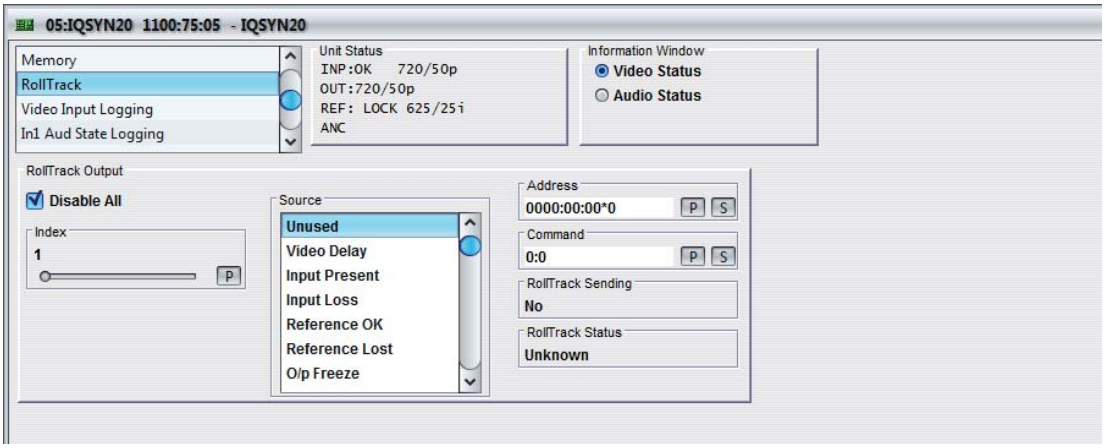
This option enables the pre-set memory names to be changed (to something more memorable or meaningful), if required.

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.

5.9 RollTrack

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



5.9.1 Disable All

When checked, all RollTrack items are disabled.

5.9.2 RollTrack Index

This slider enables up to 16 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.

5.9.3 RollTrack 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.

Unused — No RollTracks sent.

Video Delay — Output tracking delay, used to slave another module to the internal video delay of this unit, continuously sent. In this case, the Command first value (channel) is normally 14-17, and the second value is ignored because a dynamic value is sent.

Input Present — The video input is recognized, and valid as determined by the **In/Out std**. **Mismatch** and **Valid Input Standards** settings.

Input Loss — Video input is missing or invalid as determined by the **In/Out std**. **Mismatch** and **Valid Input Standards** settings.

Reference OK — Reference is present and valid as required by the current Genlock mode.

- If not used, as in **Free-run**, this is always true.
- In **Lock to Input**, this will be active if video input is valid.
- In **Lock to Reference** mode this will be active if the external reference signal is present and is correctly locked to.

Reference Lost — Reference is missing of invalid, as required by the current Genlock mode.

O/P Freeze	Freeze is applied manually, or by input loss, or invalid as determined by the **In/Out Std**. **Mismatch** and **Valid Input Standards** settings.
O/P Unfreeze	Unfreeze is applied manually, or by input loss, or invalid as determined by the **In/Out Std**. **Mismatch** and **Valid Input Standards** settings.
INP1/2 Select	RollTrack is sent on selection of Input 1 or Input 2.
GPI1/2 High	Send when Unused or Input, and either Invert set and GPI Low or Invert not set and GPI High.
GPI1/2 Low	Send when Unused or Input, and either Invert set and GPI Low or Invert not set and GPI High.
GPI1/2 InActive	GPIO 1 or GPIO2 s unused or is set as Output.
De-embed 1-8 PCM Present	Embedded pair 1-8 is present and valid on incoming PCM.
De-embed 1-8 Data Present	Embedded pair 1-8 is present and valid on incoming data.
De-embed 1-8 Lost	Embedded pair 1-8 is missing, or incoming video is missing / invalid.
Out (video standard)	Send when the specified output standard is detected.

5.9.4 RollTrack Address

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 unexpectedly.

5.9.5 RollTrack 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.

5.9.6 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.

5.9.7 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.

5.10 Logging

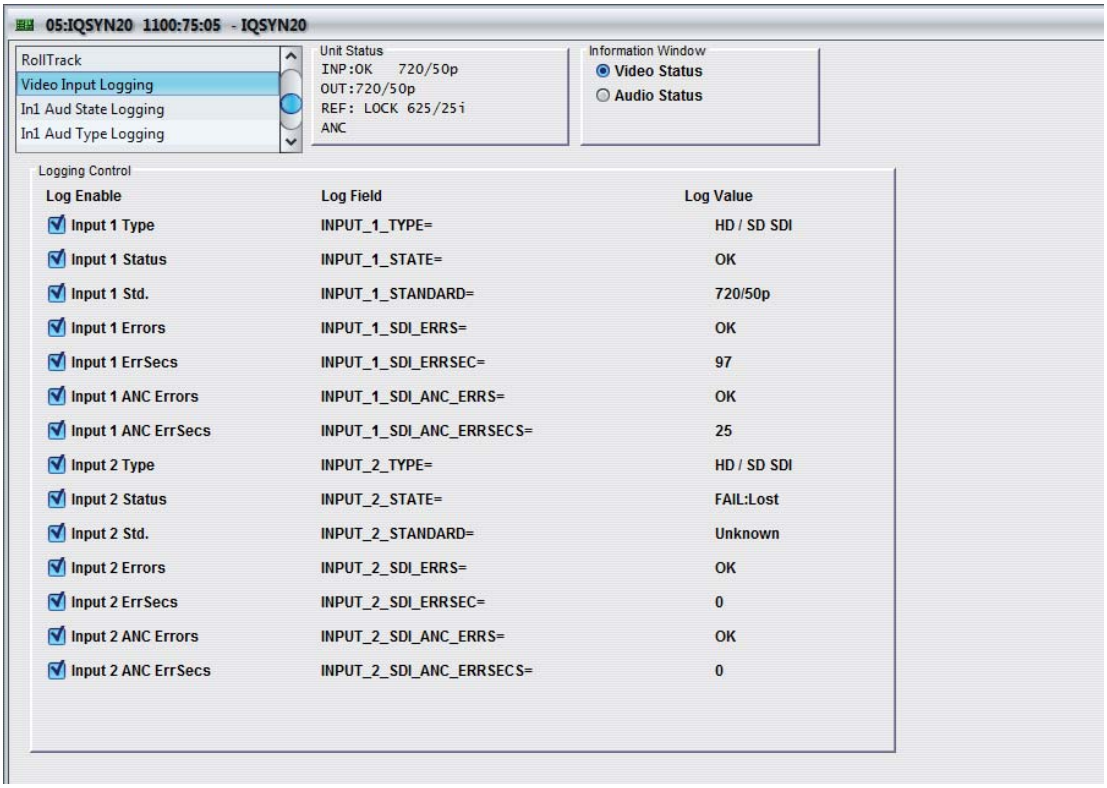
Information about several parameters can be made available to a logging device that is connected to the RollCall network.

Each logging screen comprises three columns:

- **Log Enable**: Select the check boxes that correspond to the parameters for which log information should be collected.
- **Log Field**: Displays the name of the logging field.
- **Log Value**: Displays the current log value.

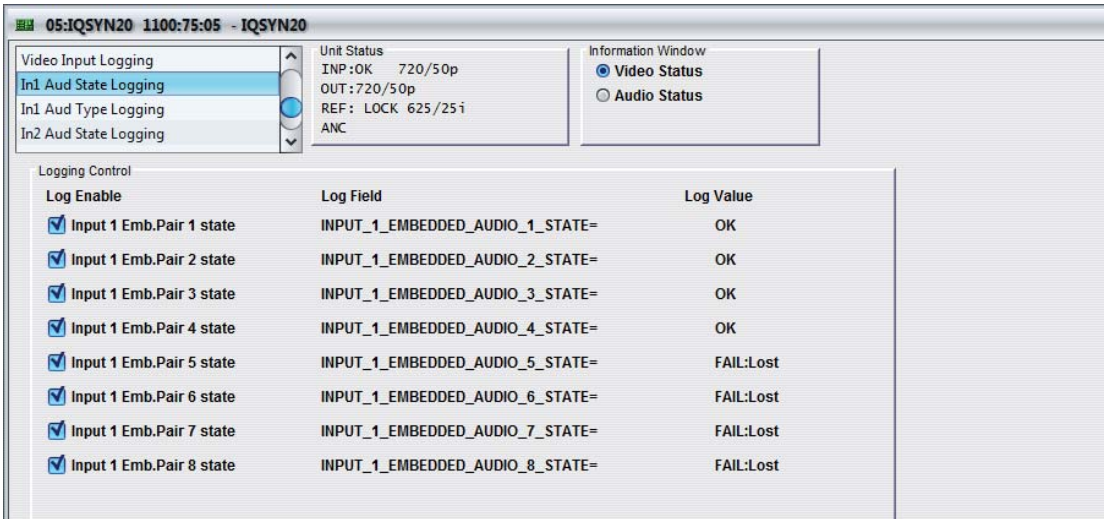
5.10.1 Video Input Logging

The **Video Input Logging** screen displays the current log information for the relevant video inputs.



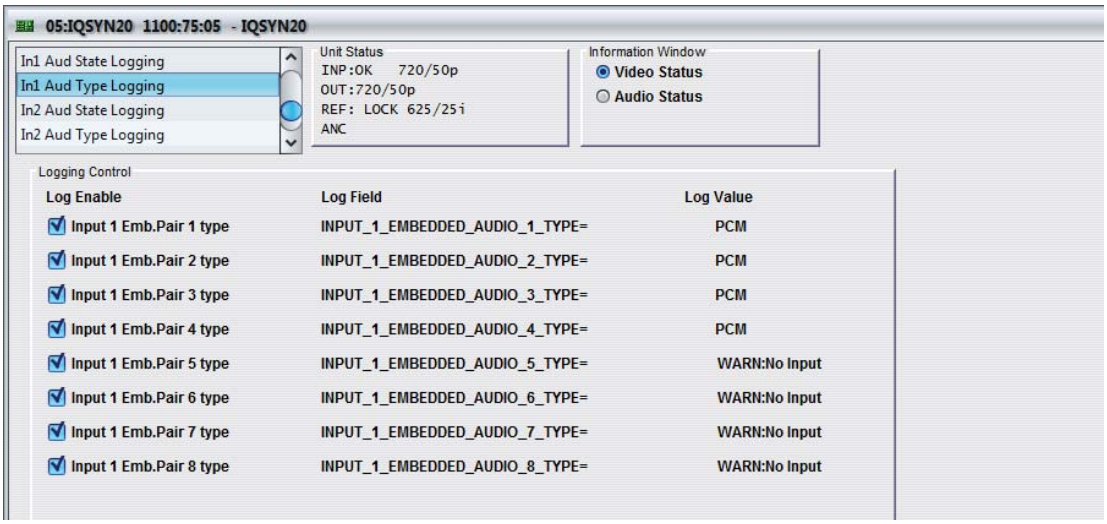
5.10.2 In1/2 Aud State Logging

The **In1/2 Aud State Logging** screens display the state log values for the embedded audio on each input.



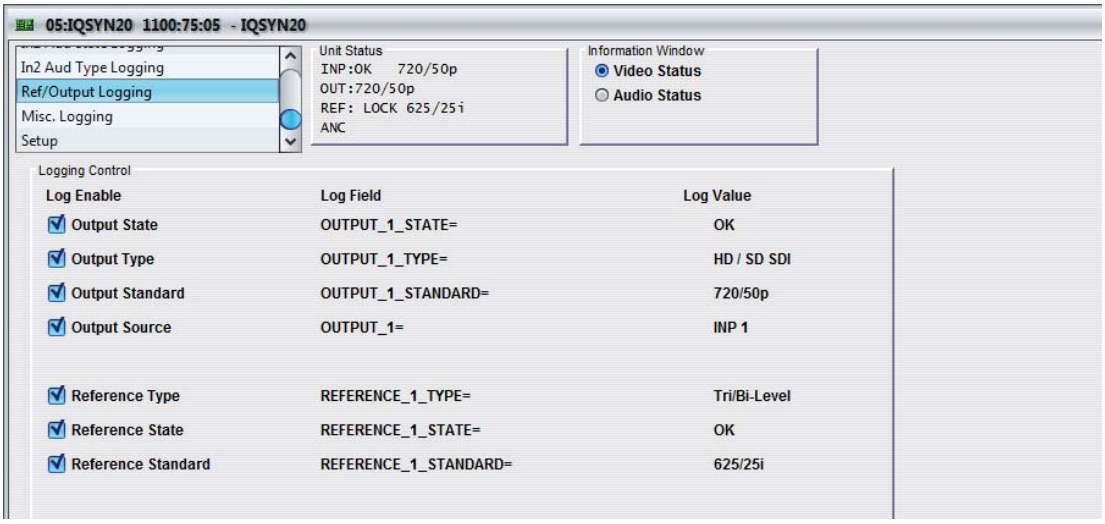
5.10.3 In1/2 Aud Type Logging

The **In1/2 Aud Type Logging** screens display the type log values for the embedded audio on each input.



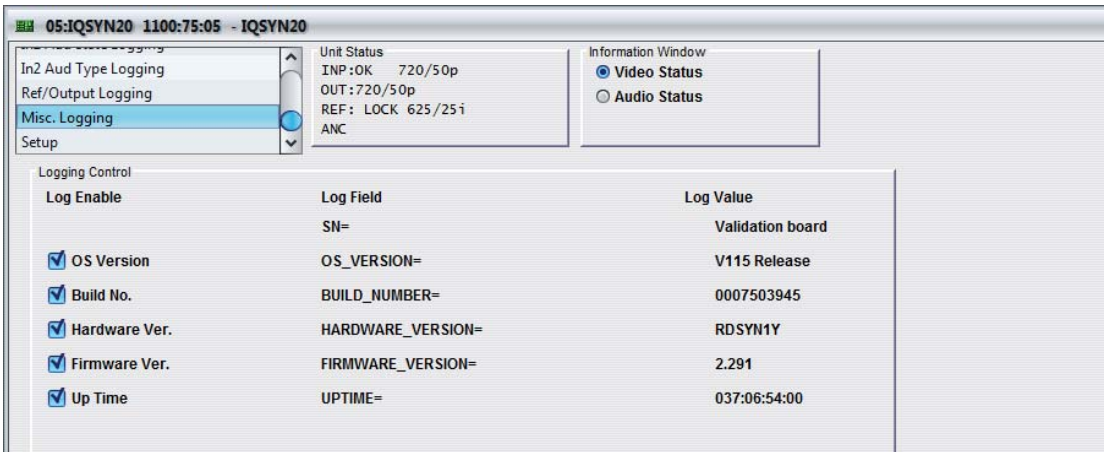
5.10.4 Ref/Output Logging

The **Ref/Output Logging** screen displays the current log information for the status of the video output and the reference signal.



5.10.5 Misc. Logging

The **Misc. Logging** screen displays the current log information about the unit's basic parameters.



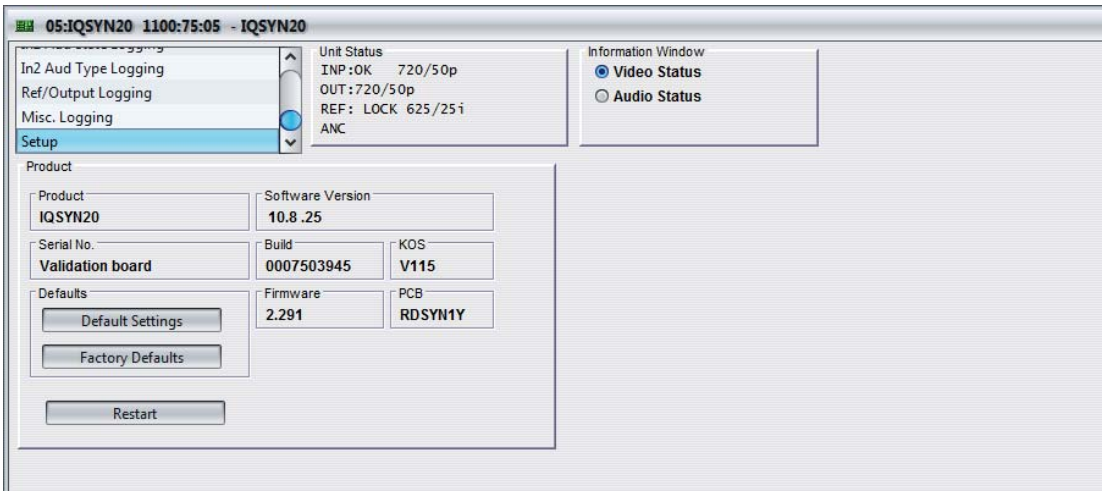
5.10.6 Log Field Descriptions

Log Field	Description
INPUT_N_TYPE=	This displays the type of input as specified by the unit's configuration. Valid values are HD /SD SDI.
INPUT_N_STATE=	Displays the current input state. Valid values are: • OK • WARN:Mismatch • FAIL:Lost **Note:** WARN:Mismatch indicates that the input and output standards are not the same.
INPUT_N_STANDARD=	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=	Displays SDI errors. Valid values are: • OK • WARN
INPUT_N_SDI_ERRSEC=	Displays the number of errored seconds since last counter reset.
INPUT_N_SDI_ANC_ERRS=	Displays ANC errors. Valid values are: • OK • WARN
INPUT_N_SDI_ANC_ERRSEC=	Displays the number of errored seconds since last counter reset.
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=	These fields display the current embedded input audio state. Valid values are: • UNKNOWN • OK • LOST • WARN:Off • FAIL:Lost
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=	These fields display the current embedded input audio state. Valid values are: • UNKNOWN • PCM • NONPCM • WARN:No Input
OUTPUT_*N*_STATE=	• OK • Pattern • Black • Freeze
OUTPUT_*N*_TYPE=	HD / SD SDI.
OUTPUT_*N*_STANDARD=	Displays the current output video standard.
OUTPUT_*N*=	Displays the relevant input source for the output video.

Log Field	Description
REFERENCE_1_TYPE=	Displays the reference type. Valid values are: • OK:Tri-Level • OK:Bi-Level • WARN:Unknown
REFERENCE_1_STATE=	Displays the reference state. Valid values are: • OK • FAIL:Error • FAIL:Lost
REFERENCE_1_STANDARD=	Displays the current video standard of the reference signal. For example, 1080/59P.
SN=	Displays the module serial number, which consists of an S followed by eight digits.
OS_VERSION=	Displays the operating system name and version. For example, KOS V115.
BUILD_NUMBER=	Displays the build number.
HARDWARE_VERSION=	Displays the hardware version number.
FIRMWARE_VERSION=	Displays the firmware version number.
UPTIME=	Displays the time since the last restart in the format ddd:hh:mm:ss.

5.11 Setup

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



- **Product:** The name of the module.
- **Software Version:** The currently installed software version number.
- **Serial No:** The module serial number.
- **Build:** The factory build number. This number identifies all parameters of the module.
- **KOS:** The operating system version number.
- **Firmware:** The module firmware revision number.
- **PCB:** The Printed Circuit Board revision number.
- **Licensed Options:** The currently installed licensed options associated with the module.

5.11.1 Default Settings

The **Default Settings** button enables module settings to be reset to their factory defaults, leaving user memories intact.

5.11.2 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.

5.11.3 Restart

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

Appendix A. RollTrack Audio Delay Tracking

A.1 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.

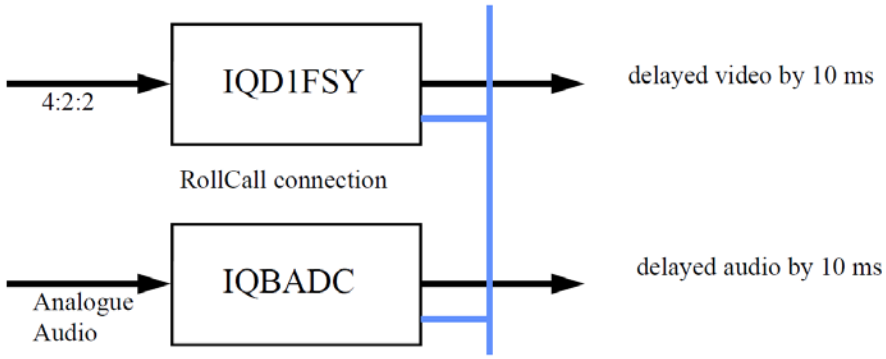
RollTrack Audio Delay Tracking enables RollCall™ compatible audio delay products to track delay introduced by RollCall™ compatible video processing products.

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.2 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.3 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.

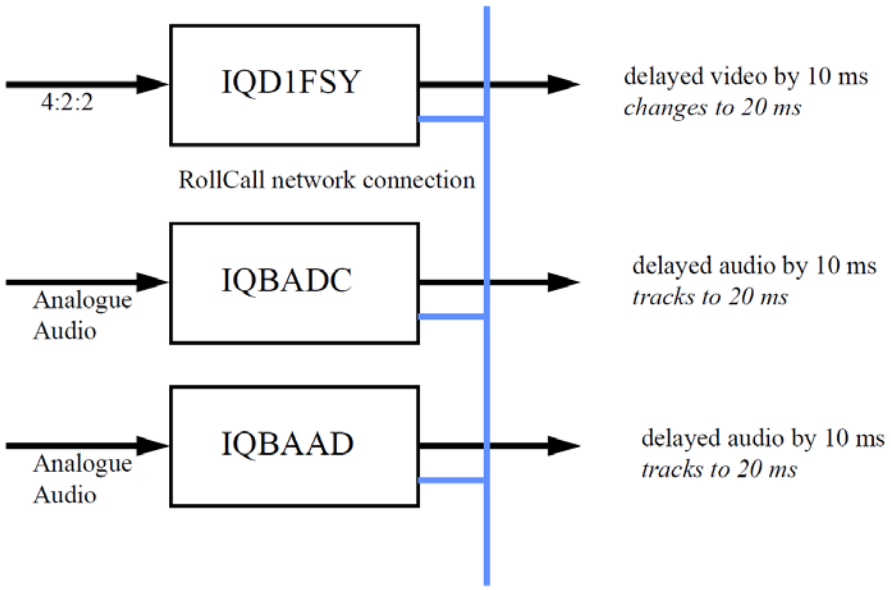
The unique identification of the destination unit (a decimal number) for various modules is as follows:

Module	ID
IQBADC	51
IQBDAC	52
IQBAAD	53

Module	ID
IQBDAD	54
IQBSYN	89
IQBADCD	107

A.4 Configuration: Vertical Delay Cluster

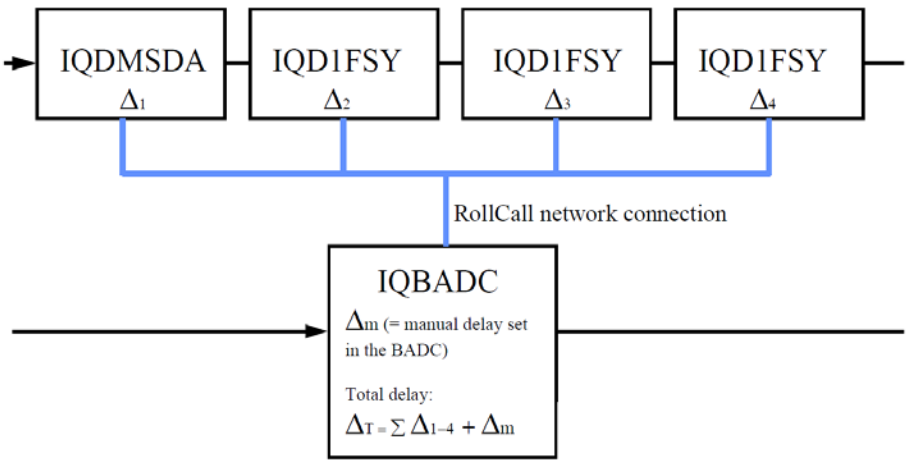
The next level of complexity is a vertical delay cluster where a video unit can have up to eight audio delays tracking - of the same or different types.



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.5 Configuration: Horizontal Delay Cluster

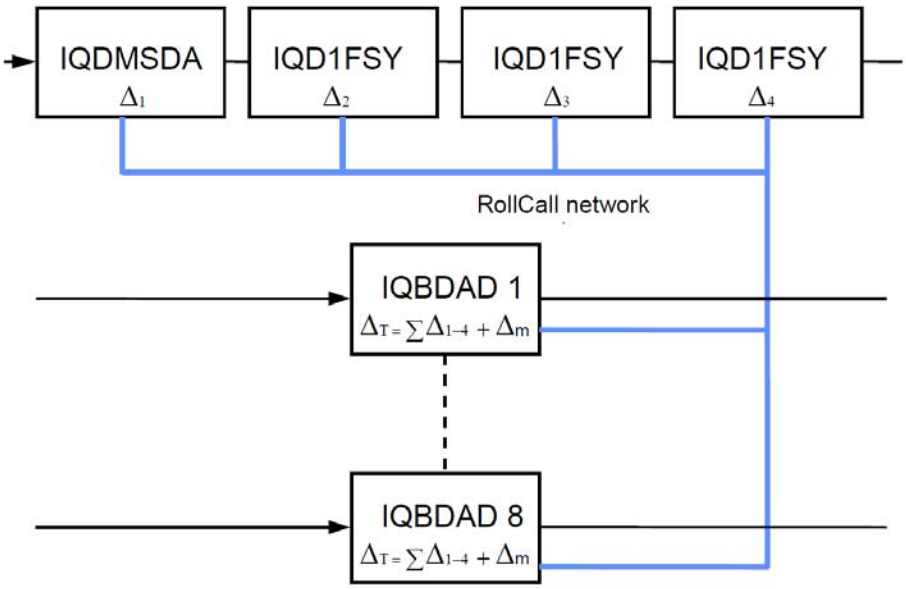
The next level of complexity is a horizontal delay cluster where an audio delay can track up to four video units.



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.6 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.

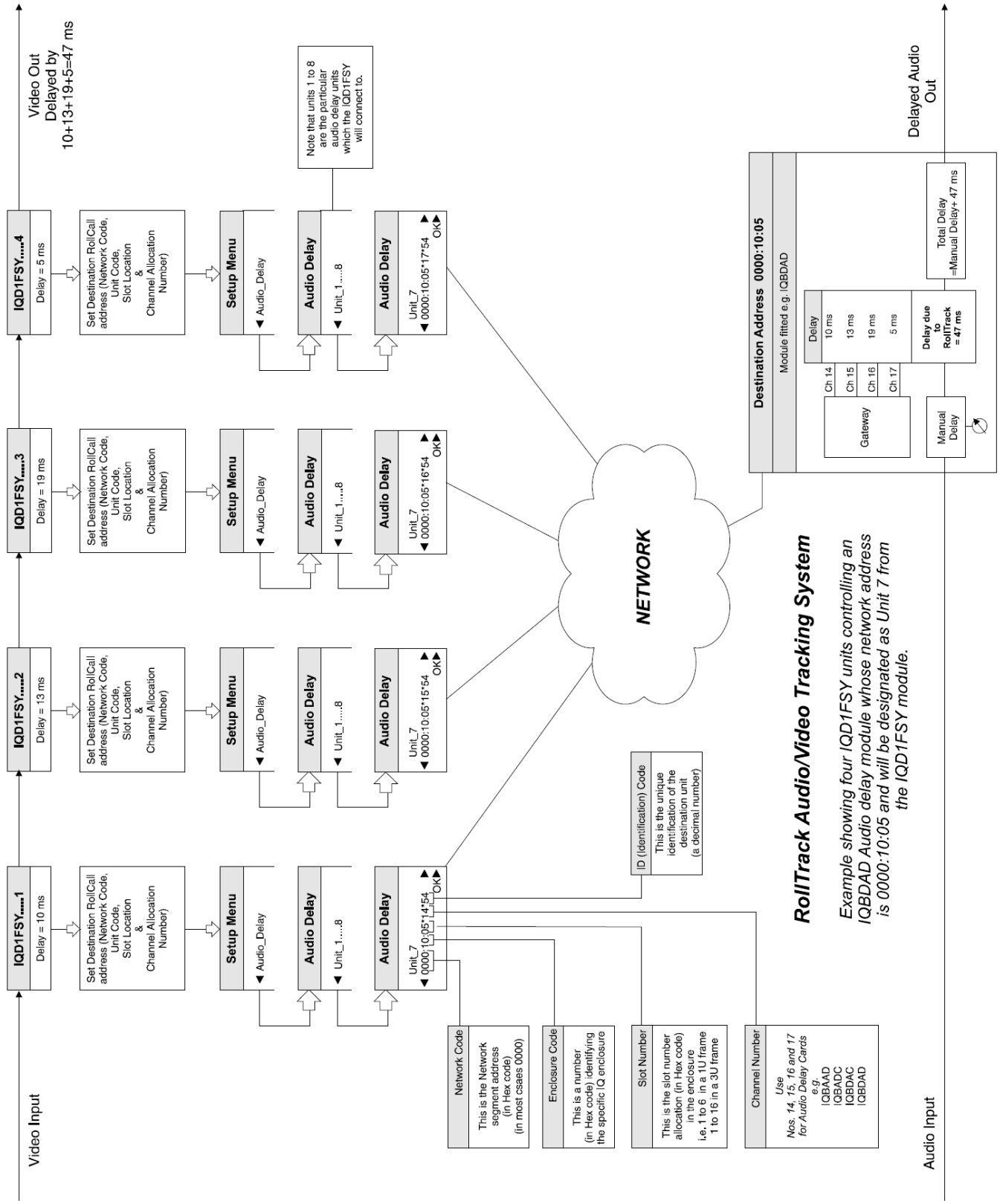
Example

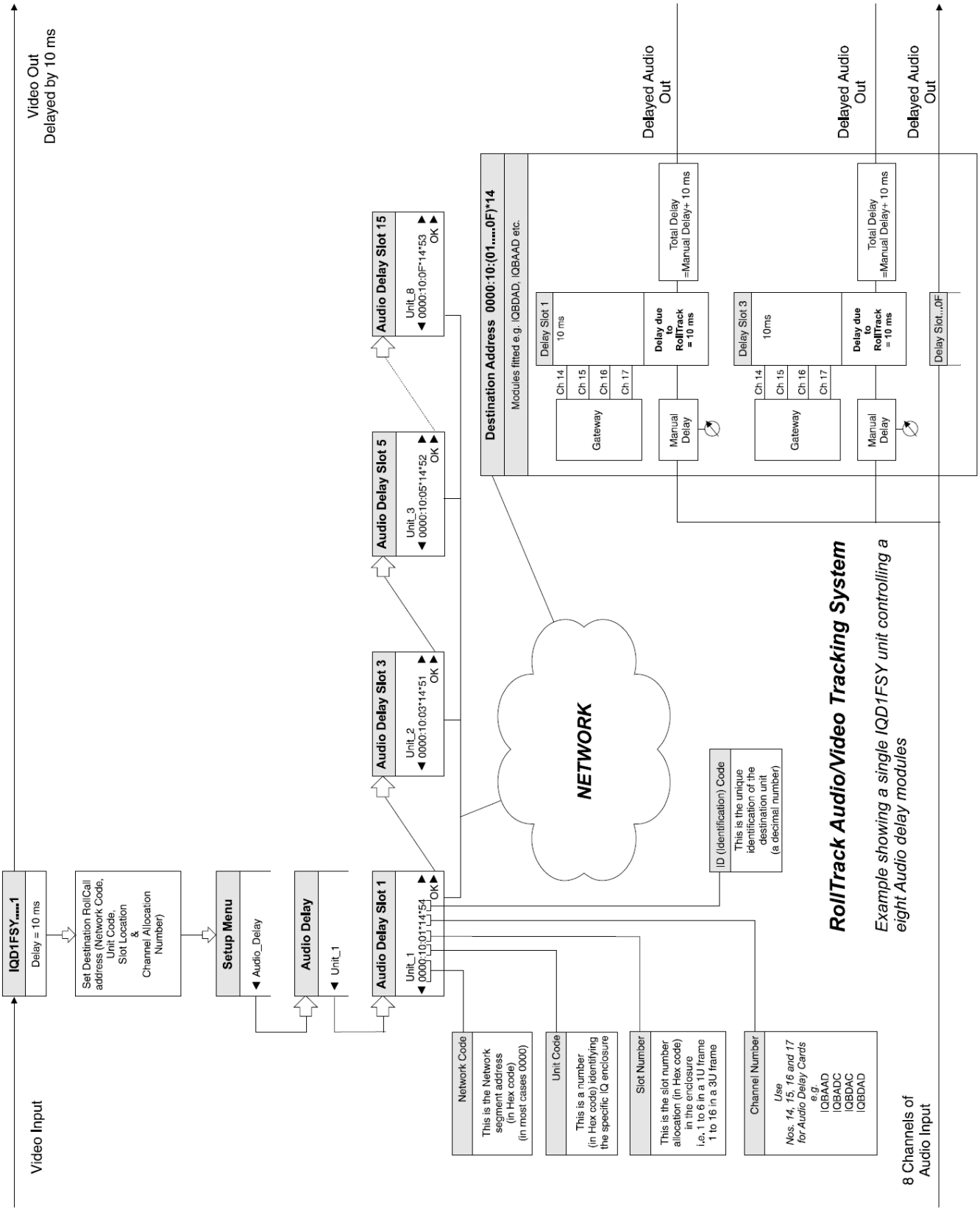
Example of Network Addresses with Channel Numbers and ID Numbers.

	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.6.1 Configuration: An Array of Matrix Clusters

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





Appendix B. Firewall

B.1 Introduction

The firewall protects a digital signal output against propagation of errors or disruptions in the input signal. It ensures that the signal stream at that output is continuously valid no matter what happens at the input. If the input suffers any dropout, loss of data, break or discontinuity in the carrier, then this will not be reflected in the output. Default valid data will be used to pad the output stream such as video black, a freeze, or audio silence.

A firewall will not ensure the picture or audio is what you want to see or hear, of course; a corrupted signal will lead to loss of original content. A firewall will ensure, however, that valid content will get through. In short, it ensures the integrity, not the content, of the digital stream.

B.2 How a Firewall Equipped Product Behaves

The essential behavior of a system containing a firewall is that the input to the unit containing the firewall can be removed and later replaced with another signal and during this sequence the unit following the one with the firewall will see no disturbance at its input.

B.3 Why Use a Firewall?

Any equipment downstream of a Snell product with firewall protection can expect to be fed with a continuous input stream. Dropouts in the signal, disturbances due to switching and errors in the composition of the signal will not penetrate the firewall and will therefore not corrupt operations downstream.

The examples below illustrate where firewalls are of most benefit.

B.3.1 Using a Firewall at the Beginning of a Chain

Snell firewalls are excellent for use at the beginning of a chain of units, significantly improving the time to restore an output when a problem is detected at the input.

Traditionally, a damaged signal will pass through all the equipment in a chain, each unit losing lock on the signal it passes. In this scenario, the damage in the signal appears at the input of every device along the chain causing a loss of lock to be cascaded down the chain. When the input signal is restored, each unit in the chain may take a few seconds to recover. However, each unit cannot start recovery until the previous unit in the chain has locked to the signal and delivered a valid signal. Thus, even a minor problem in the input signal, such as a break in the carrier, can lead to several seconds of disruption at the output.

B.3.2 Using a Firewall to Protect MPEG Encoders

Placing a Snell firewall in front of MPEG encoders ensures that their operation is not disrupted in the event of a break in the incoming content.

When a break in the integrity of the input signal occurs, MPEG encoders often corrupt their output and typically take a long time to recover. Video synchronizers can help but they only protect the video. Loss of audio, in this case, will cause a loss of lock even though the integrity of the video was maintained.

For transmission encoders, disruption can mean a break in the output. For recording encoders ,such as those in a video server, this can mean that the recording is lost.

B.4 How a Firewall is Tested

A variety of equipment is used to test the firewall behavior. The test consists of analyzing the data downstream of the firewall product looking for discontinuities in the signal stream. While it is intended that all products fed by a firewall equipped unit will accept the signal as

uninterrupted, it is accepted that there is a wide variety of real-world performances. Therefore the reference product used to test whether the output streams are continuous is the Snell IQMUX01 for both AES and SDI signals.

B.5 Performance of Firewall Equipped Products Versus Genlock Mode

The table below summarizes the behavior of products for different genlock modes:

Synchronizer Mode

	Referenced	Input locked	Free run
SDI Video	Firewall	No firewall	Firewall
Embedded Audio (PCM)	No Firewall	No Firewall	No Firewall
Ancillary Data	No Firewall	No Firewall	No Firewall

B.6 When Firewall Protection is Not Provided

A firewall protects against disruption or illegal signals at the input and not against corrupt or illegal reference provision.

Note: When changing genlock mode, the firewall is not maintained for the video output during the change, e.g. when changing from free-running mode to referenced mode or when the reference is adjusted or interrupted.

Appendix C. Ancillary Passing

C.1 SMPTE 272M and 299M

The SMPTE 272M and 299M standard specifications allow for up to four groups of AES/EBU digital audio to be embedded in a component digital video SD or HD stream, respectively. Each group consists of two stereo pairs, comprising four channels, resulting in a total of sixteen audio channels for all four groups. This horizontal ancillary (HANC) data increasingly shares space with other types of ancillary data such as EDH, timecode and UMID labels making the insertion and passing a complex process.

For 625-line (or other 25 Hz) video, 1920 audio samples occur in each frame. For 525-line (or other 29.97 Hz) video, 8008 audio samples occur over five video frames. Audio data is distributed evenly throughout each video frame, situated in the non-active picture regions between the end of one line and the start of the next.

In SD, most lines contain three or four audio samples per active group. In HD, most lines contain one or two samples per active group. Additional lines are reserved after the SMPTE RP-168 switch points, which contain no samples. This is in contrast to most ancillary data, which resides in a fairly fixed HANC or VANC (vertical ancillary) space.

C.2 SMPTE 291M

The SMPTE 291M standard defines the structure and space formatting for ancillary data within digital video streams. Within HANC data space, ancillary packets follow immediately after the end of active video (EAV) marker, including line numbers in HD. They are contiguous with each other until either the end of the last packet or the start of active video (SAV) marker. Unused space is filled with black level blanking. Likewise, VANC data space follows from the SAV to the EAV markers throughout vertical blanking, which is in principal similar to vertical blanking interval (VBI) use in legacy SD environments for typically analogue data waveforms.

The IQSYN20 allows separate blanking of HANC and VBI line spaces to completely remove data stored within those spaces for when specific applications demand it.

The ancillary formatter passes any data space with no recognizable ancillary packets unchanged, but will operate when it finds a packet after EAV or SAV. Data packets for passing are buffered while deleted packets are dropped. This requires a holding buffer and a delay so that all passed packets can be shuffled up earlier in the data space without gaps.

Embedded ancillary data that does not conform to the space formatting requirements of SMPTE 291M may not be recognized, and so could be destroyed by the IQSYN20 card. For example, if the data packets do not start immediately following the EAV marker the inserter will overwrite the packets. Similarly, if a data packet does start in the correct place but a second packet does not immediately follow the first one the second packet will be overwritten.

To summarize:

- Marked for deletion and audio packets to be replaced, are removed from the ancillary data space for most efficient and clean use of data space.
- Ancillary packets are shuffled up within the data space during reformatting.
- Incoming ancillary data must be SMPTE 291M compliant.

