Snell Advanced Media

User Instruction Manual

IQUPC30

SD-SDI Up Converter with Frame Synchronizer

IQUPC31

Dual-channel SD-SDI Up Converter with Frame Synchronizer

IQUPC32

SD-SDI Up Converter with Frame Synchronizer and AES I/O

IQUPC33

Dual-channel SD-SDI Up Converter with Frame Synchronizer and AES I/O

Information and Notices

Copyright and Disclaimer

Contact Details

For details of our Regional Customer Support Offices, please visit the SAM website and navigate to Support/Contact Support.

www.s-a-m.com/support/contact-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 Description

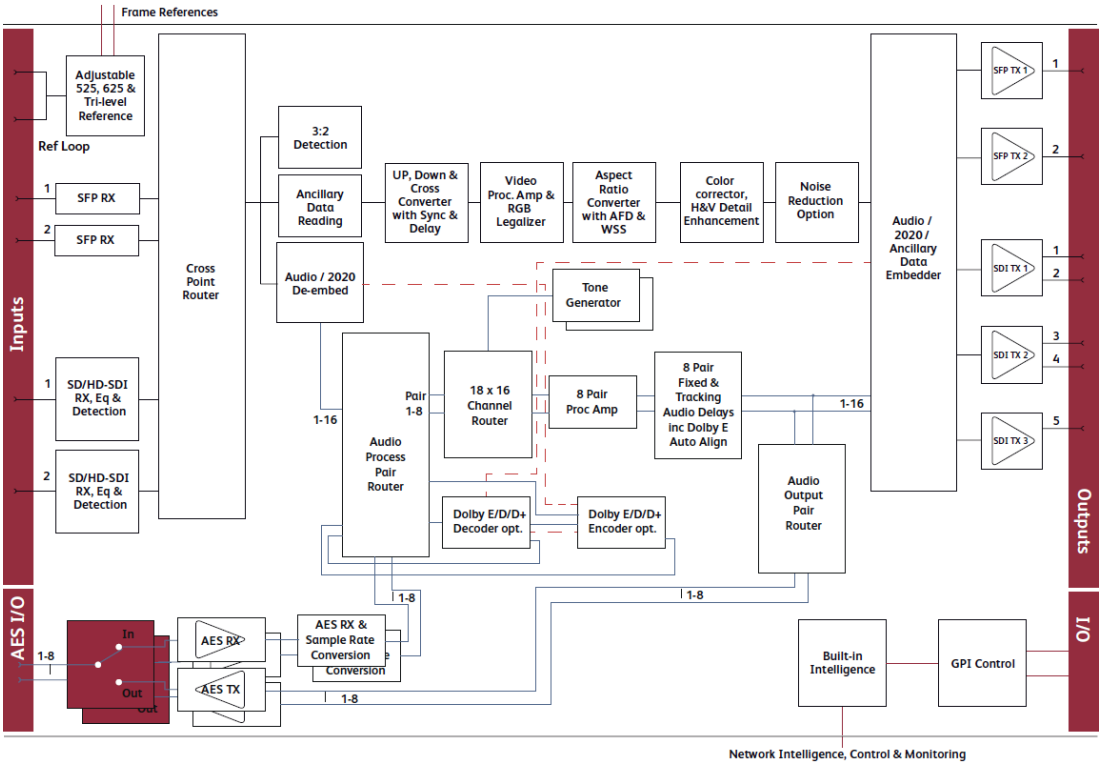
The IQUPC modules provide multi-rate up conversion for SD-SDI digital video signals. Using high-quality motion adaptive de-interlacing and flexible scaling technology, the modules are ideal for space-constrained installations, or for applications requiring simultaneous HD and SD output feeds.

The frame synchronizer is capable of referencing to a SD bi-level or HD tri-level reference and a variable aspect ratio converter with frame accurate reading and writing of WSS, VI, and 2016 AFD signaling. Audio handling includes audio channel routing, delay adjustment and level controls, as well as AES audio I/O on the IQUPC32 and IQUPC33. Video metadata such as timecode, closed captions, and teletext captions can also be passed through the modules or processed according to the required output standard.

To allow the modules to be further tailored to system requirements, software options are available to provide noise reduction, sidebar keying, logo insertion, upgrade to up, down and cross conversion, and linear frame rate conversion. Versions are also available with SFP cages which enable fiber conversion, additional electrical outputs on HD-BNCs, or local monitoring via HDMI.

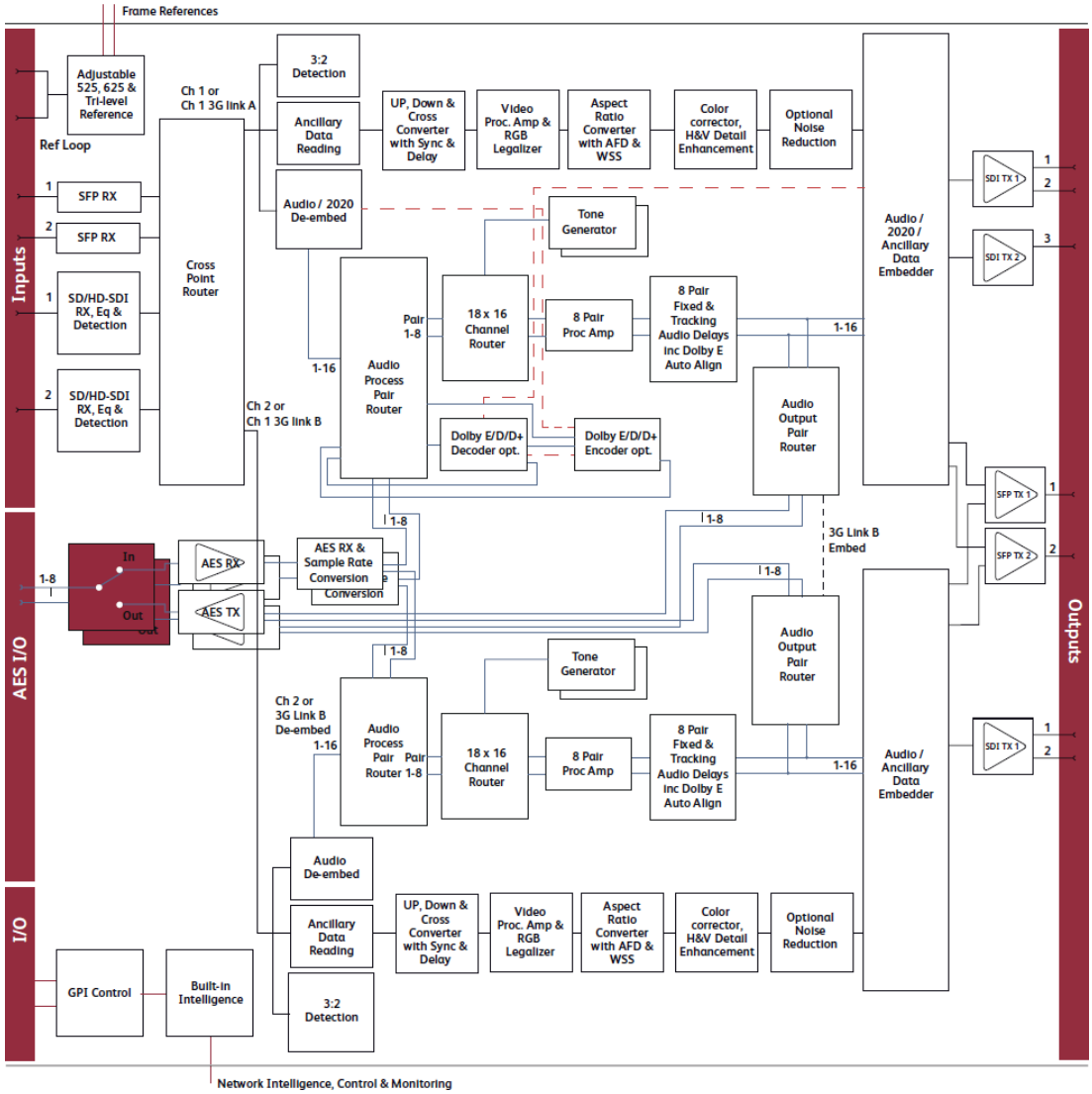
1.2 Block Diagrams

1.2.1 IQUPC30 and IQUPC32



Note: Block diagram includes IQDNC30–33 and IQUDC30–33.

1.2.2 IQUPC31 and IQUPC33



Note: Block diagram includes IQDNC30–33 and IQUDC30–33.

1.3 Features

- Up conversion with frame synchronization.
- Native RollCall control.
- Flexible video and audio i/o configurations.
- 16-channel embedded audio processing.
- Dolby-E guard-band alignment.
- Fiber i/o options.

Key video and metadata processing features:

- Standards: 525i, 625i, 720p23/24/25/29/50/59, 1080i50/59, 1080p23/24/25/29, 1080psf23/24/25/29, 1080p50/59 (A/B).

Note: Low frame rate support (i.e. 23, 24, 25, 29 Hz) is not available in modules which were upgraded to V5.2.7 or above after installation. Only new builds of modules at version 5.2.7 and above will support low frame rate signals.

- L23, video index, and SMPTE 2016 (AFD) signaling.
- Closed caption CEA608 <> CEA708.
- Timecode conversions.
- WST/RDD-08 and WST/SMPTE2031 conversion.
- Insertion of SMPTE ST352 payload identification for psf standards.
- Proc amp, gamma, legalizer.
- Full range of enhancement, horizontal and vertical.
- Conversion aperture control.
- Noise reduction (option).
- Sidebar key (option).
- Logo insertion (option).
- Linear frame rate conversion (option).
- Upgrade to full up/down/cross functionality (option).
- 2 GPI/O terminals via 3-pin screw terminal connector.

Key audio features:

- Embedded Audio 16-channel embedded audio processing.
- PCM audio processing includes channel level routing, gain and delay compensation.
- Non-PCM processing features pair level routing and delay compensation. Dolby-E data is passed with a delay to match the video and with co-timed audio frame drop or repeat.
- Eight AES audio ports, individually assignable as inputs or outputs.
- AES audio inputs, individually available to any or all processing channels.
- AES audio outputs (48 kHz), separately assignable to any processing channel.
- AES input is auto-detected as PCM (32 to 96 kHz) or non-PCM (48 kHz locked to relevant video input).

Note: AES I/O is only applicable to the IQUPC32 and IQUPC33.

1.4 Order Codes

Note: Modules with “A” order codes (for example, IQUPC3000-1**A**3) can be fitted into either A- or B-style enclosures. Modules with “B” order codes (for example, IQUPC3000-1**B**3) can only be fitted into B-style enclosures. See page 17.

1.4.1 Hardware Options

1.4.1.1 IQUPC30

IQUPC3000-1A3	Up converter. 2 SDI inputs, 4 SDI outputs, 1 reference loop.
IQUPC3000-1B3	Up converter. 2 SDI inputs, 4 SDI outputs, 1 reference loop, 2 enclosure reference inputs.
IQUPC3001-1B3	Up converter. 2 SDI inputs, 5 SDI outputs, 2 GPIOs, 2 enclosure reference inputs.
IQUPC3002-1A3	Up converter. 2 SDI inputs, 3 SDI outputs, 1 SFP cage, 1 reference input.
IQUPC3002-1B3	Up converter. 2 SDI inputs, 3 SDI outputs, 1 SFP cage, 1 reference input, 2 enclosure reference inputs.
IQUPC3003-1B3	Up converter. 2 SDI inputs, 4 SDI outputs, 1 SFP cage, 2 enclosure reference inputs.

1.4.1.2 IQUPC31

IQUPC3100-1B3	Dual-channel up converter. 2 SDI inputs, 4 SDI outputs, 1 reference loop, 2 enclosure reference inputs.
IQUPC3101-1B3	Dual-channel up converter. 2 SDI inputs, 5 SDI outputs, 2 GPIOs, 2 enclosure reference inputs.
IQUPC3102-1B3	Dual-channel up converter. 2 SDI inputs, 3 SDI outputs, 1 SFP cage, 1 reference input, 2 enclosure reference inputs.
IQUPC3103-1B3	Dual-channel up converter. 2 SDI inputs, 4 SDI outputs, 1 SFP cage, 2 enclosure reference inputs.

1.4.1.3 IQUPC32

IQUPC3200-2A3	Up converter. 2 SDI inputs, 4 SDI outputs, 8 unbalanced AES inputs/outputs, 1 reference loop.
IQUPC3200-2B3	Up converter. 2 SDI inputs, 4 SDI outputs, 8 unbalanced AES inputs/outputs, 1 reference loop, 2 enclosure reference inputs.
IQUPC3202-2A3	Up converter. 2 SDI inputs, 3 SDI outputs, 8 unbalanced AES inputs/outputs, 1 SFP cage, 1 reference input.
IQUPC3202-2B3	Up converter. 2 SDI inputs, 3 SDI outputs, 8 unbalanced AES inputs/outputs, 1 SFP cage, 1 reference input, 2 enclosure reference inputs.
IQUPC3203-2A3	Up converter. 2 SDI inputs, 4 SDI outputs, 8 balanced AES inputs/outputs, 2 GPIOs. 1 SFP cage, 1 reference loop.
IQUPC3203-2B3	Up converter. 2 SDI inputs, 4 SDI outputs, 8 balanced AES inputs/outputs, 2 GPIOs, 1 SFP cage, 1 reference loop, 2 enclosure reference inputs.

1.4.1.4 IQUPC33

IQUPC3300-2A3	Dual-channel up converter. 2 SDI inputs, 4 SDI outputs, 8 unbalanced AES inputs/outputs, 1 reference loop.
IQUPC3300-1B3	Dual-channel up converter. 2 SDI inputs, 4 SDI outputs, 8 unbalanced AES inputs/outputs, 1 reference loop, 2 enclosure reference inputs.
IQUPC3302-1A3	Dual-channel up converter. 2 SDI inputs, 3 SDI outputs, 8 unbalanced AES inputs/outputs, 1 SFP cage, 1 reference input.
IQUPC3302-1B3	Dual-channel up converter. 2 SDI inputs, 3 SDI outputs, 8 unbalanced AES inputs/outputs, 1 SFP cage, 1 reference input, 2 enclosure reference inputs.
IQUPC3303-1A3	Dual-channel up converter. 2 SDI inputs, 4 SDI outputs, 8 balanced AES inputs/outputs, 2 GPIOs, 1 SFP cage, 1 reference loop.
IQUPC3303-1B3	Dual-channel up converter. 2 SDI inputs, 4 SDI outputs, 8 balanced AES inputs/outputs, 2 GPIOs, 1 SFP cage, 1 reference loop, 2 enclosure reference inputs.

1.4.2 Software Options

1.4.2.1 IQUPC30 and IQUPC32

IQOPTM-NR	Software option to add noise reduction, for details see section 5.4.4.
IQOPTM-SBK	Software option to add sidebar keying, for details see section 5.6.4.
IQOPTM-UDC	Software option for to add up, down, and cross conversion.
IQOPTM-LC	Software option to add linear frame-rate conversion, for details see Appendix A
IQOPTM-LOG	Software option to add logo insertion, for details see section 5.3.10 and Appendix B

1.4.2.2 IQUPC31 and IQUPC33

IQOPTM-2NR	Software option to add noise reduction, for details see section 5.4.4.
IQOPTM-2SBK	Software option to add sidebar keying, for details see section 5.6.4.
IQOPTM-2UDC	Software option to add up, down, and cross conversion.
IQOPTM-2LC	Software option to add linear frame-rate conversion, for details see Appendix A
IQOPTM-2LOG	Software option to add logo insertion for each channel, for details see section 5.3.10 and Appendix B

Note: The software options apply to both processing channels on the IQUPC31 and IQUPC33.

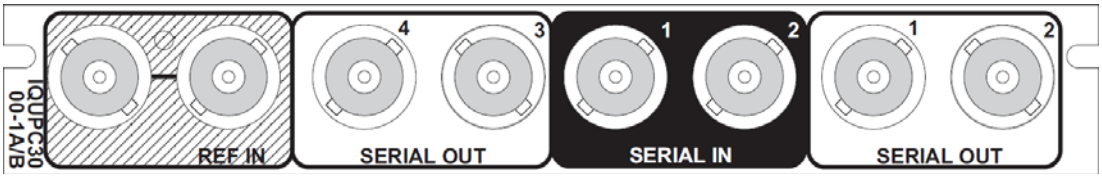
1.4.3 SFP Options

FC1-13T1	Single 1310 nm fiber TX.
FC1-13T2	Dual 1310 nm fiber TX.
FC1-15T1	Single 1550 nm fiber TX.
FC1-15T2	Dual 1550 nm fiber TX.
FC1-R1	Single fiber RX.
FC1-R2	Dual fiber RX.
FC1-13TR	Fiber transceiver 1310 nm TX/RX.
FC1-HDBT2	HD-BNC dual TX.
FC1-HDBR2	HD-BNC dual RX.
FC1-HDMI2	HDMI TX with 2 m cable.
FC1-HDMI4	HDMI TX with 4 m cable.
Fiber CWDM Tx	Wavelengths available on request.

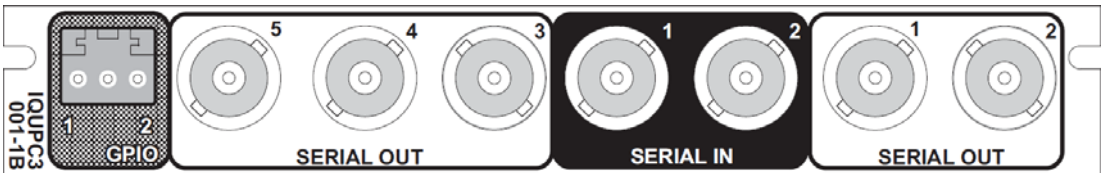
Note: SFP options must be ordered in addition to a module.

1.5 Rear Panels

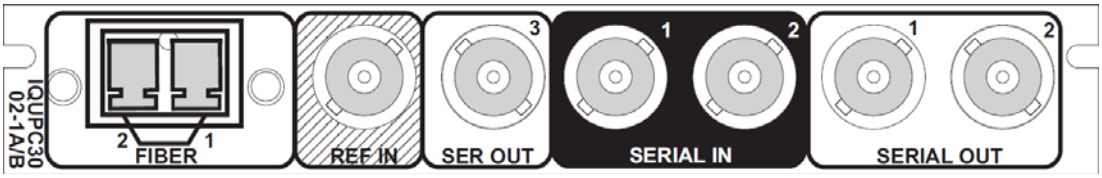
1.5.1 IQUPC30



IQUPC3000-1A(B)3



IQUPC3001-1B3



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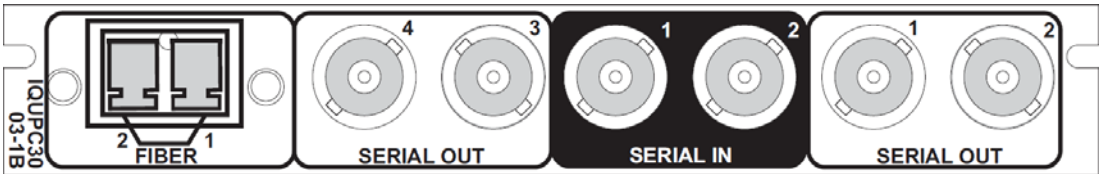
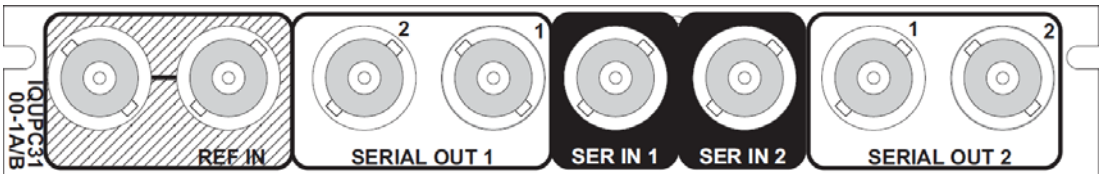
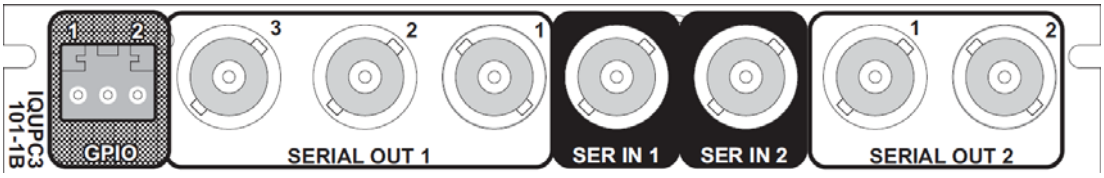


IQUPC3003-1B3

1.5.2 IQUPC31



IQUPC3100-1B3



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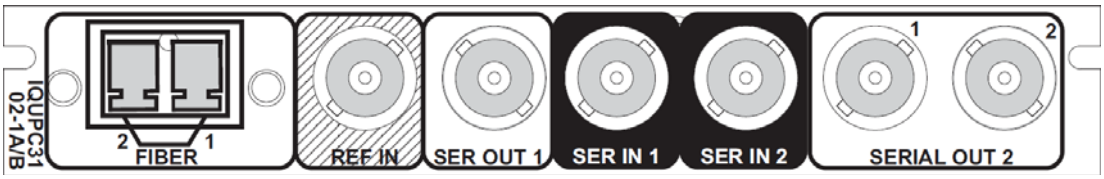
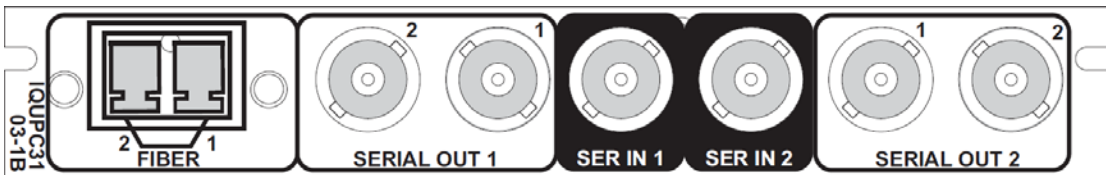
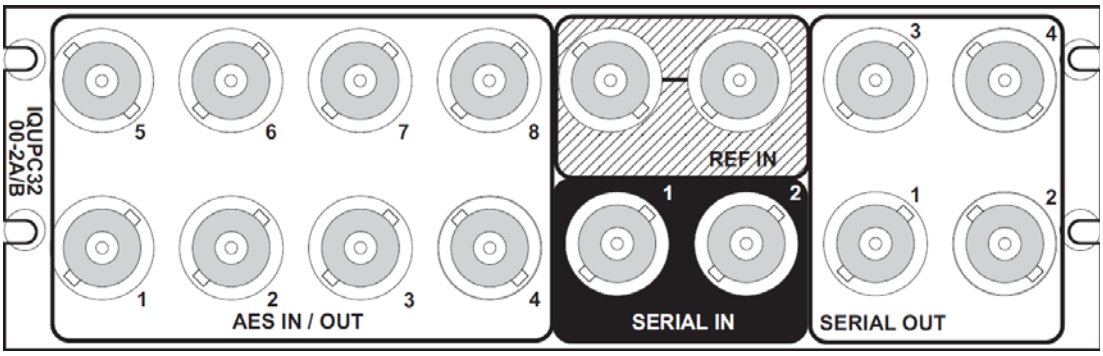


IQUPC3102-1B3

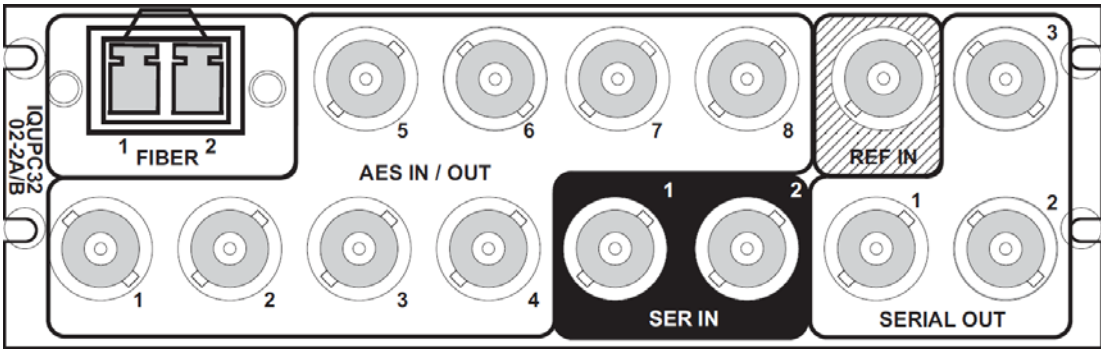


IQUPC3103-1B3

1.5.3 IQUPC32



IQUPC3200-2A(B)3



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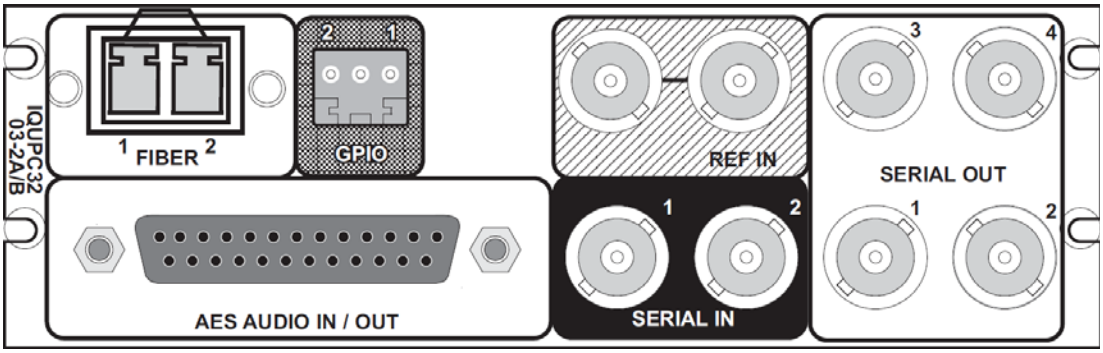
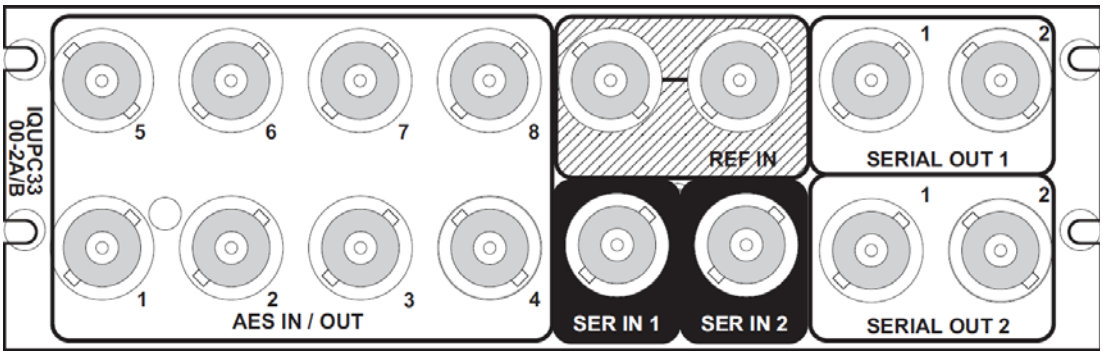


IQUPC3203-2A(B)3

1.5.4 IQUPC33



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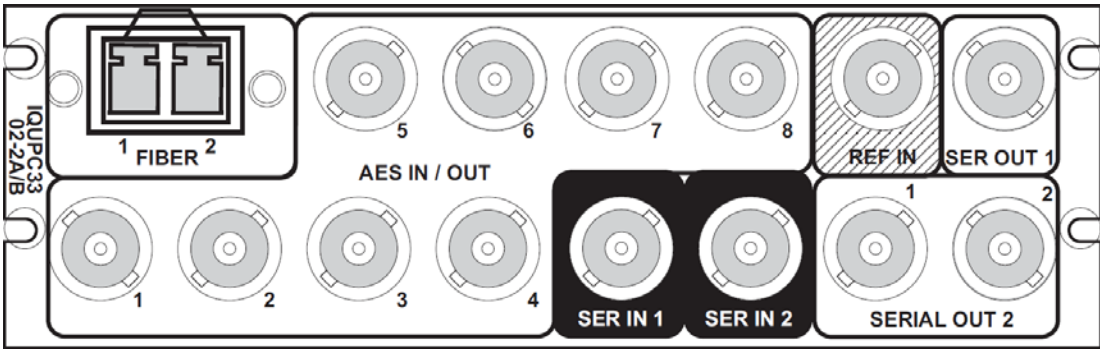
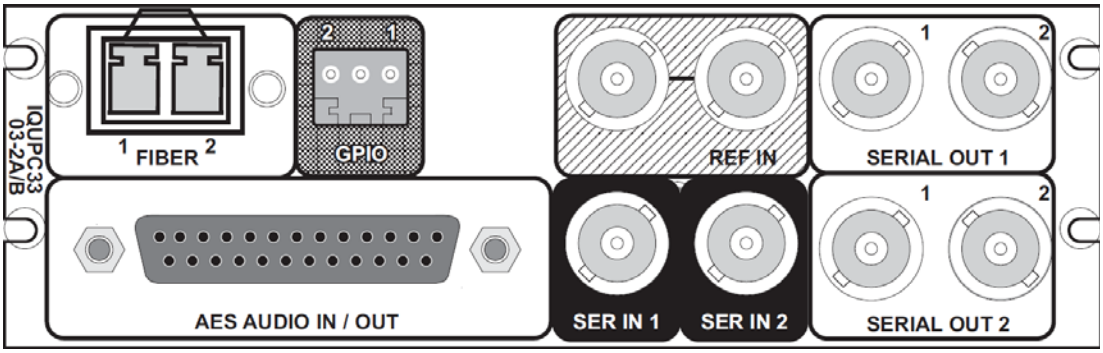


IQUPC3302-2A(B)3



IQUPC3303-2A(B)3

1.6 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 10.

1.6.1 B-style Enclosure

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

Note: The IQH3B enclosure provides two internal analog reference inputs. These inputs are applicable to modules with “B” order codes only.

1.6.2 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

2 Technical Specification

Inputs and Outputs	
Video Signal Inputs	
SDI Inputs	2
Input Cable Length	Up to 80m Belden 1694A @ 3 Gbit/s Up to 120m Belden 1694A @ 1.5 Gbit/s 100m typical Belden 1694A @ 270 Mbit/s (with output set to 1080p rates)
Input Standard (auto detect)	525i, 625i.
Analog Reference	1 single or 1 passive loop-through, depending on rear panel type Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level) SD bi-level – RS170A HD tri-level – SMPTE 240M, 274M
Audio Signal Inputs	
AES Inputs	8 x balanced AES inputs or 8 x unbalanced AES inputs, depending on rear panel type (AES applicable to IQUDC32 and IQUDC33 only)
Fiber Signal Inputs	
Inputs	Up to 2, depending on SFP type fitted
Optical	3 Gbit/s HD-SDI 1.485 Gbit/s HD-SDI 270 Mbit/s SD-SDI
Connector/Format	LC singlemode
Standard	SMPTE 297-2006
Video Signal Outputs	
SDI Outputs	Up to 5, depending on rear panel type
Output Standard	525i, 625i, 720p23/24/25/29/50/59, 1080i50/59, 1080p23/24/25/29, 1080psf23/24/25/29, 1080p50/59 (A/B).
Note: Low frame rate support (i.e. 23, 24, 25, 29 Hz) is not available in modules which were upgraded to V5.2.7 or above after installation. Only new builds of modules at version 5.2.7 and above will support low frame rate signals.	
Payload Identification Codes	Insertion of SMPTE ST-352 payload identification codes for psf standards
Audio Signal Outputs	
AES Outputs	8 x balanced AES outputs or 8 x unbalanced AES outputs, depending on rear panel type (AES applicable to IQUDC32 and IQUDC33 only)
Fiber Signal Outputs	
Outputs	Up to 2, depending on SFP type fitted
Optical	270 Mbit/s SD-SDI
Connector/Format	LC singlemode
Standard	SMPTE 297-2006
Control Interface	
GPI	2 x closing contact I/O interface (ST), depending on rear panel type

Conversion Functions (per channel on IQUPC31 and IQUPC33)	
Modes	Up and cross conversion Aspect ratio conversion Synchronization Linear frame rate conversion (option)
Conversion Processing	Still Process: Detects still images and applies an aperture with full (progressive) vertical frequency response Enhanced Still: Adds field motion detection to still process. Prevents artifacts on moving repetitive patterns
Aspect Ratio Conversion (auto/manual)	AFD (SMPTE 2016), VI (RP186), WSS (L23)
SD Input Format	Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9
SD Output Format	Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9
Metadata	Closed caption CE608 <> CE708 Timecode conversions Teletext subtitles WST/RDD-08 and WST/SMPTE 2031 conversion.
Audio Functions (per channel on IQUPC31 and IQUPC33)	
AES Audio	Eight AES audio ports individually assignable as inputs or outputs. Inputs individually available to any or all processing channels. Outputs (48kHz) separately assignable to any processing channel. AES input is auto-detected as PCM (32 to 96 kHz) or non-PCM (48 kHz locked to relevant video input).
Embedded Audio	16-channel embedded audio processing. PCM processing includes channel-level gain and delay compensation, and channel-level routing with L/R swap and phase invert feature. Non-PCM processing includes pair level routing and delay compensation. Dolby E data is passed with delay to match the video, and co-timed audio frame drop or repeat.
Embedded Audio	Enable/Blank
Embedded Audio Routing	
Processed Pair 1–8	Disembed 1–8
Output Channels 1–16	Processed Pair 1–8, Tone, Silence
Processed Audio Control	
Invert Phase	Channels 1–16
Pair 1–8 Gain L/R	+18 dB to -18 dB in 0.1 dB steps
Pair 1–8 Manual Delay	-40 ms to +200 ms in 1 ms steps
Global Manual Delay	-40 ms to +200 ms in 1 ms steps
Dolby E	
Dolby E Auto Alignment	+/- 10 line offset in 1 line steps
Tone	
Frequency	100 Hz to 10 kHz in 100 Hz steps

Processing Functions (per channel on IQUPC31 and IQUPC33)	
Freeze	On/Off
Legalizer	Off, 700mV, 721mV, 735mV, 746mV
Genlock	Reference Lock, Input Lock, Free Run
Pattern	Off, Black, Ramp, Bars
Caption	On/Off, Scrolling
Edit Caption	19 characters available
Proc amp	
Black Level	+100 mV to -100 mV (0) in 0.8 mV steps
Contrast	-6dB to +6 dB (0) in 0.2 dB steps
Saturation	-6dB to +6 dB (0) in 0.2 dB steps
Y Gamma	0.4 to 1.7 (1) in 0.1 steps
YC Offset	-20 to 20 (0) in 2 luma pixel steps
	Note: Defaults shown in brackets
Enhancement	
Nonlinear Enhancer	Frequency Band Selection: Low, Med, High Four preset enhancement modes: Low, Med, High, Super Manual enhancement mode with H Gain and H Noise Rejection levels
Conversion Aperture	
Vertical	Frequency Band Selection: Low, Med, High Five vertical preset enhancement levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2
Horizontal	Five horizontal preset sharpness levels: Low 2, Low 1, Normal, High 1, High 2 Five horizontal preset detail levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2
Other Controls	
GPI Input Low/High Select	Black, Freeze, Pattern, User Memories 1–16
GPI Output Source	Black, Freeze, Pattern
Memory Naming	User configurable naming of memories 1–16
RollTrack Index	Up to 50 RollTrack destinations
Optical Logging	Tx Laser Bias High Warning Tx Power Low Warning Tx Power High Warning
Laser Wavelength	Input 1 (2) Rx Power High Warning Input 1 (2) Rx Power Low Warning Input 1 (2) Rx Power Measurement
RollTrack Sources	Unused, Input Present, (1 & 2, Fiber 1 & 2), Input Loss (1 & 2, Fiber 1 & 2), Reference OK and Loss
Information Window	Video Input Status, Video Output Status, Audio Status, Metadata Status, Reference Status
Factory Default	Resets all module settings to factory defaults and clears memories
Default Settings	Resets all module settings to factory defaults but does not clear memories
Module Information	Software Version, Serial Number, Rear Panel ID, Frame Slot

Specifications	
Electrical	3 Gbit/s SDI, SMPTE 424M 1.5 Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C
Connector/Format	BNC/75 Ohm panel jack on standard IQ connector panel
Return Loss	>-15 dB (270 Mbit/s, 1.5 Gbit/s) >-10 dB (3 Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10 Hz) / 0.2 UI (1 kHz) 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100 kHz)
Reference Source	External – HD tri-level/SD bi-level/Input Video syncs
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
Embedded Audio Handling	HD: 24-bit synchronous 48 kHz to SMPTE 299M SD: 20-bit synchronous 48 kHz to SMPTE 272M-A
Digital Audio Inputs (Unbalanced)	
Connector/Format	BNC
Sample Frequency	PCM: 25 to 96 kHz Non-PCM: 48 kHz
Input Cable Length	>500m of RG59 cable
Impedance	75 Ohms
Standard	AES3id
Digital Audio Inputs (Balanced)	
Connector/Format	25-way D-type
Sample Frequency	PCM:25 to 96 kHz Non-PCM: 48 kHz
Input Cable Length	>150m of AES3 cable
Impedance	110 Ohms
Standard	AES3
Digital Audio Outputs (Unbalanced)	
Connector/Format	BNC
Level	1 V p-p typical into 75 Ohms
Standard	AES3id
Digital Audio Outputs (Balanced)	
Connector/Format	25-way D-type
Level	3 V p-p typical into 110 Ohms
Standard	AES3
Optical 1310 nm TX	
Wavelength	1310 nm
Spectral Width (FWHM)	>1.5 nm (typical)
Output Power	0 to -5 dBm (-2 dBm typical)
Extinction Ratio	>7.5:1 (typical)
Link Distance	Up to 30 Km @ 270 Mbit/s Up to 21 Km @ 1.5 Gbit/s Up to 10 Km @ 3 Gbit/s

Optical 1550 nm TX	
Wavelength	1550 nm
Spectral Width (FWHM)	1 nm
Output Power	4 to 0 dBm
Extinction Ratio	>7.5:1 (typical)
Link Distance	Up to 50 Km @ 270 Mbit/s, 1.5 Gbit/s, or 3 Gbit/s
Optical RX	
Input Wavelength Range	1260 nm (min.), 1620 nm (max.)
Optical Power Input Range	>0 dBm, <-20 dBm
Link Distance	Up to 30 Km
Power Consumption	
Module without Fiber	IQUPC30: 11.0W IQUPC32: 10.1W IQUPC31: 13.6W IQUPC33: 13.8W
Module with Fiber	IQUPC30: 12.0W IQUPC32: 11.1W IQUPC31: 14.6W IQUPC33: 14.8W

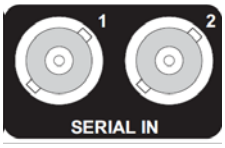
3 Connections

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

3.1 IQUPC3000-1A(B)3

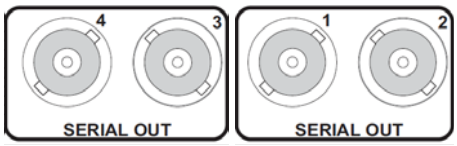
3.1.1 SDI Inputs

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



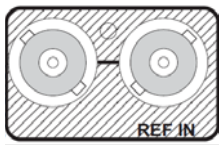
3.1.2 SDI Outputs

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



3.1.3 Reference Inputs

An external sync input to the module is made via passive loop-through BNC connectors which terminate in 75 Ohms.



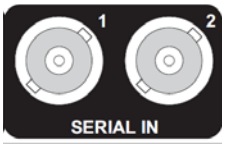
Operation to full specification is only possible with a correctly terminated, noise-free, stable, black sync reference input. While lock may be achieved with an unsuitable sync source, the increased jitter evident on the SDI output will affect locking and cable length performance at the receiving equipment.

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

3.2 IQUPC3001-1B3

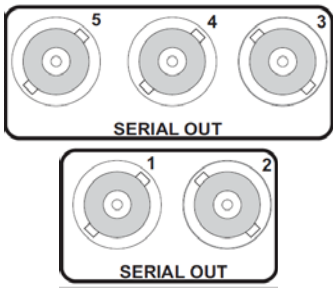
3.2.1 SDI Inputs

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



3.2.2 SDI Outputs

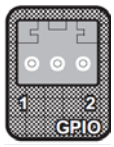
Serial digital outputs from the module are made via five BNC connectors which terminate in 75 Ohms.



3.2.3 GPIO

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

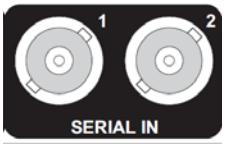
Connections can be inputs or outputs.



3.3 IQUPC3002-1A(B)3

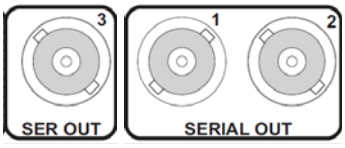
3.3.1 SDI Inputs

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



3.3.2 SDI Outputs

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



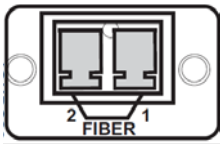
3.3.3 Reference Inputs

External sync input to the module is made via a BNC connector which terminates in 75 Ohms.

3.3.4 SFP

A dual SFP connector offers support for a variety of SFP options (see page 12).

Two ports provide dual TX, dual RX, or a TX/RX combination, dependent on the module fitted.



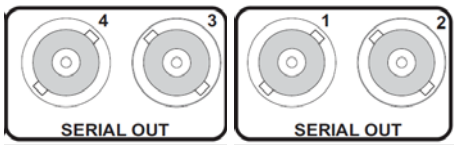
3.4 IQUPC3003-1B3

3.4.1 SDI Inputs

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

3.4.2 SDI Outputs

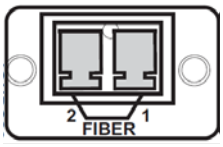
Serial digital outputs from the module are made via four BNC connectors which terminate in 75 Ohms.



3.4.3 SFP

A dual SFP connector offers support for a variety of SFP options (see page 12).

Two ports provide dual TX, dual RX, or a TX/RX combination, dependent on the module fitted.



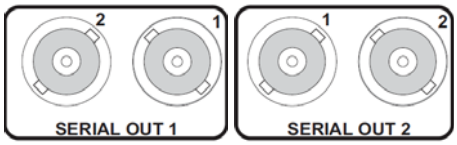
3.5 IQUPC3100-1B3

3.5.1 SDI Inputs

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

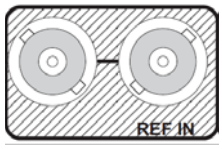
3.5.2 SDI Outputs

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



3.5.3 Reference Inputs

An external sync input to the module is made via passive loop-through BNC connectors which terminate in 75 Ohms.



Operation to full specification is only possible with a correctly terminated, noise-free, stable, black sync reference input. While 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.

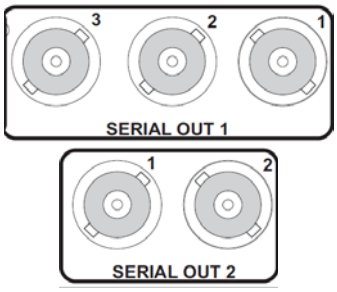
3.6 IQUPC3101-1B3

3.6.1 SDI Inputs

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

3.6.2 SDI Outputs

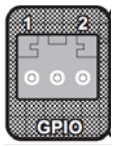
Serial digital outputs from the module are made via five BNC connectors which terminate in 75 Ohms.



3.6.3 GPIO

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

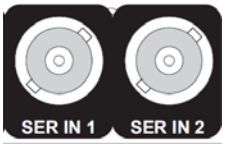
Connections can be inputs or outputs.



3.7 IQUPC3102-1B3

3.7.1 SDI Inputs

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



3.7.2 SDI Outputs

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

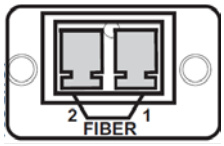
3.7.3 Reference Inputs

External sync input to the module is made via a BNC connector which terminates in 75 Ohms.

3.7.4 SFP

A dual SFP connector offers support for a variety of SFP options (see page 12).

Two ports provide dual TX, dual RX, or a TX/RX combination, dependent on the module fitted.



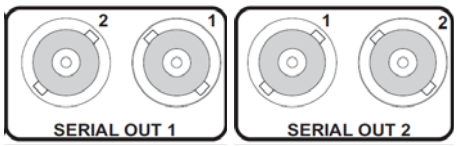
3.8 IQUPC3103-1B3

3.8.1 SDI Inputs

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

3.8.2 SDI Outputs

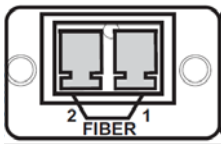
Serial digital outputs from the module are made via four BNC connectors which terminate in 75 Ohms.



3.8.3 SFP

A dual SFP connector offers support for a variety of SFP options (see page 12).

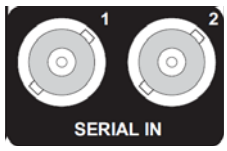
Two ports provide dual TX, dual RX, or a TX/RX combination, dependent on the module fitted.



3.9 IQUPC3200-2A(B)3

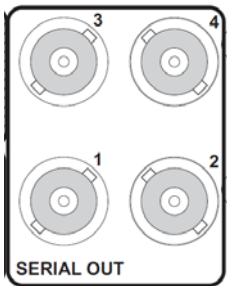
3.9.1 SDI Inputs

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



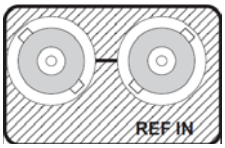
3.9.2 SDI Outputs

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



3.9.3 Reference Input

An external sync input to the module is made via passive loop-through BNC connectors which terminate in 75 Ohms.



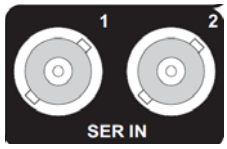
Operation to full specification is only possible with a correctly terminated, noise-free, stable, black sync reference input. While lock may be achieved with an unsuitable sync source, the increased jitter evident on the SDI output will affect locking and cable length performance at the receiving equipment.

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

3.10 IQUPC3202-2A(B)3

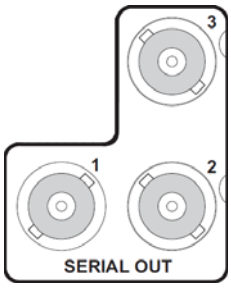
3.10.1 SDI Inputs

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



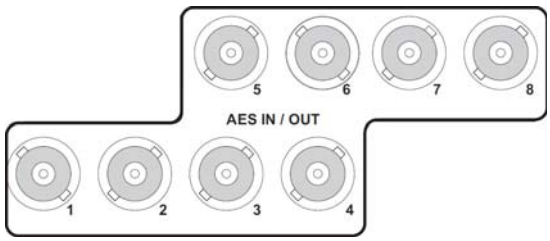
3.10.2 SDI Outputs

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



3.10.3 AES Inputs/Outputs

AES audio inputs/outputs to/from the module are made via eight BNC connectors which terminate in 75 Ohms.



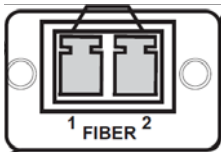
3.10.4 Reference Input

External sync input to the module is made via a BNC connector which terminates in 75 Ohms.

3.10.5 SFP

A dual SFP connector offers support for a variety of SFP options (see page 12).

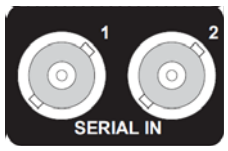
Two ports provide dual TX, dual RX, or a TX/RX combination, dependent on the module fitted.



3.11 IQUPC3203-2A(B)3

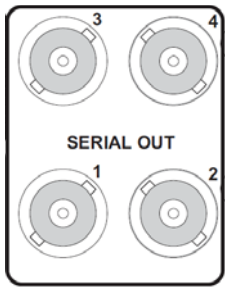
3.11.1 SDI Inputs

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



3.11.2 SDI Outputs

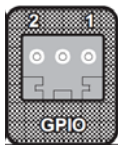
Serial digital outputs from the module are made via four BNC connectors which terminate in 75 Ohms.



3.11.3 GPIO

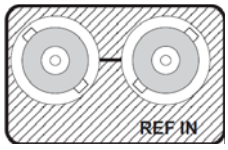
General Purpose Interface (GPI) connections are made via a 3-pin closing-contact screw terminal connector.

Connections can be inputs or outputs.



3.11.4 Reference Input

An external sync input to the module is made via passive loop-through BNC connectors which terminate in 75 Ohms.



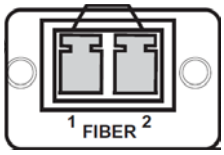
Operation to full specification is only possible with a correctly terminated, noise-free, stable, black sync reference input. While lock may be achieved with an unsuitable sync source, the increased jitter evident on the SDI output will affect locking and cable length performance at the receiving equipment.

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

3.11.5 SFP

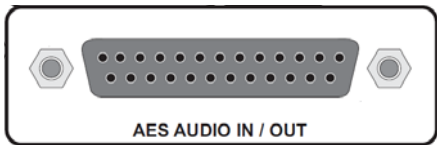
A dual SFP connector offers support for a variety of SFP options (see page 12).

Two ports provide dual TX, dual RX, or a TX/RX combination, dependent on the module fitted.



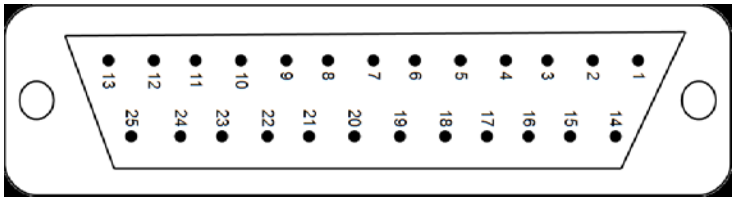
3.11.6 AES Inputs/Outputs

AES audio inputs/outputs to/from the module are made via a 25-way D-type connector.



Where supported by the appropriate rear panel, AES connections are as follows:

25 Way D-Type Connector



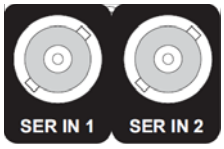
Solder Pin Side

AES Audio I/O			
Channel	**25 Way D-Type Pin**	**Channel**	**25 Way D-Type Pin**
Chassis	1	GND5	20
GND1	14	Port 4+	8
Port 8+	2	Port 4-	21
Port 8-	15	Port 3+	9
Port 7+	3	Port 3-	22
Port 7-	16	GND6	10
GND2	4	GND7	23
GND3	17	Port 2+	11
Port 6+	5	Port 2-	24
Port 6-	18	Port 1+	12
Port 5+	6	Port 1-	25
Port 5-	19	GND8	13
GND4	7	-	-

3.12 IQUPC3300-2A(B)3

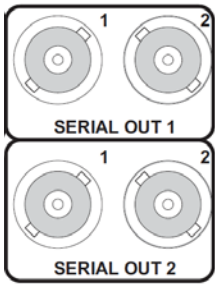
3.12.1 SDI Inputs

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



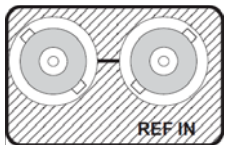
3.12.2 SDI Outputs

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



3.12.3 Reference Input

An external sync input to the module is made via passive loop-through BNC connectors which terminate in 75 Ohms.



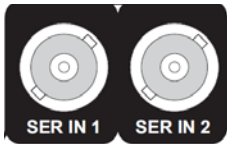
Operation to full specification is only possible with a correctly terminated, noise-free, stable, black sync reference input. While lock may be achieved with an unsuitable sync source, the increased jitter evident on the SDI output will affect locking and cable length performance at the receiving equipment.

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

3.13 IQUPC3302-2A(B)3

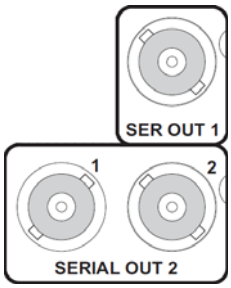
3.13.1 SDI Inputs

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



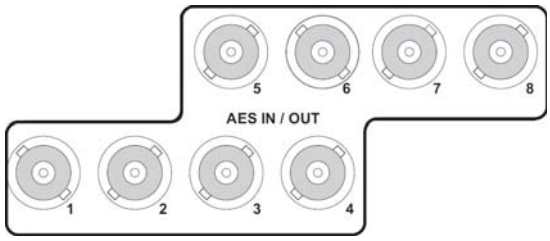
3.13.2 SDI Outputs

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



3.13.3 AES Inputs/Outputs

AES audio inputs/outputs to/from the module are made via eight BNC connectors which terminate in 75 Ohms.



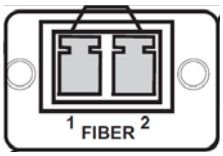
3.13.4 Reference Input

External sync input to the module is made via a BNC connector which terminates in 75 Ohms.

3.13.5 SFP

A dual SFP connector offers support for a variety of SFP options (see page 12).

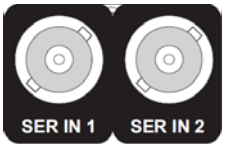
Two ports provide dual TX, dual RX, or a TX/RX combination, dependent on the module fitted.



3.14 IQUPC3303-2A(B)3

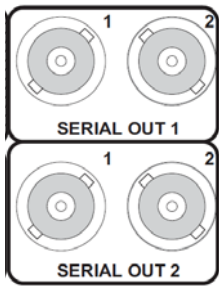
3.14.1 SDI Inputs

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



3.14.2 SDI Outputs

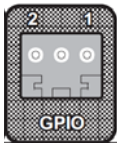
Serial digital outputs from the module are made via four BNC connectors which terminate in 75 Ohms.



3.14.3 GPIO

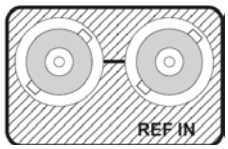
General Purpose Interface (GPI) connections are made via a 3-pin closing-contact screw terminal connector.

Connections can be inputs or outputs.



3.14.4 Reference Input

An external sync input to the module is made via passive loop-through BNC connectors which terminate in 75 Ohms.



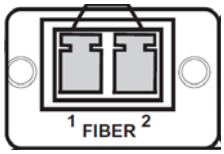
Operation to full specification is only possible with a correctly terminated, noise-free, stable, black sync reference input. While lock may be achieved with an unsuitable sync source, the increased jitter evident on the SDI output will affect locking and cable length performance at the receiving equipment.

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

3.14.5 SFP

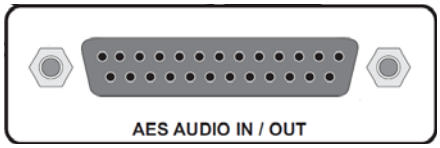
A dual SFP connector offers support for a variety of SFP options (see page 12).

Two ports provide dual TX, dual RX, or a TX/RX combination, dependent on the module fitted.



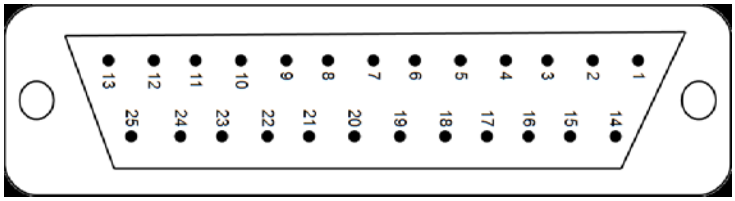
3.14.6 AES Inputs/Outputs

AES audio inputs/outputs to/from the module are made via a 25-way D-type connector.



Where supported by the appropriate rear panel, AES connections are as follows:

25 Way D-Type Connector

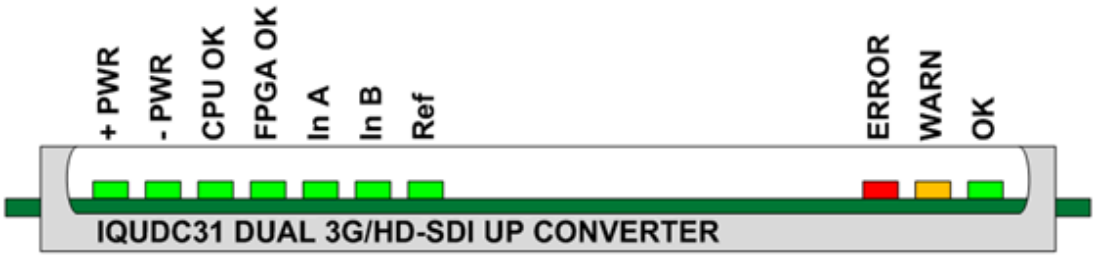


Solder Pin Side

AES Audio I/O			
Channel	**25 Way D-Type Pin**	**Channel**	**25 Way D-Type Pin**
Chassis	1	GND5	20
GND1	14	Port 4+	8
Port 8+	2	Port 4-	21
Port 8-	15	Port 3+	9
Port 7+	3	Port 3-	22
Port 7-	16	GND6	10
GND2	4	GND7	23
GND3	17	Port 2+	11
Port 6+	5	Port 2-	24
Port 6-	18	Port 1+	12
Port 5+	6	Port 1-	25
Port 5-	19	GND8	13
GND4	7	-	-

4 Card Edge LEDs

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



LED	Color	State	Indication
+ PWR	Green	Illuminated	A positive power supply is present.
- PWR	Green	Illuminated	A negative power supply is present.
CPU OK	Green	Flashing	The CPU is running.
FPGA OK	Green	Flashing	The FPGA is running.
IN A	Green	Illuminated	A valid input is present on channel 1.
IN B	Green	Illuminated	A valid input is present on channel 2.
REF	Green	Illuminated	Genlock to selected reference OK.
	Green	Flashing	Genlock to selected reference is crosslocked or has a reference standard error.
ERR	Red	Illuminated	The CPU is not running.
WARN	Yellow	Illuminated	The channel 1 or channel 2 selected input is lost.
OK	Green	Illuminated	The module is operating correctly.

5 Operation Using the RollCall Control Panel

Note: The screens shown in this section are for guidance and reference only, and may be slightly different to those on your unit.

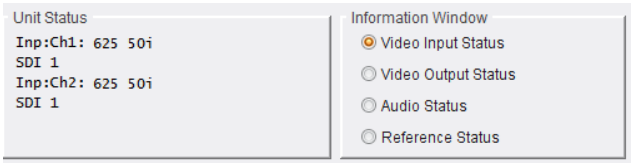
5.1 Information Window

The Information Window is displayed at the top of each screen. When an option is selected in the Information Window, the Unit Status area shows corresponding information about the status of the module.

Note: Processing channel 2 information is only applicable to the IQUPC31 and IQUPC33.

5.1.1 Video Input Status

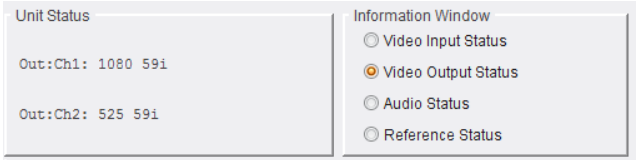
When Video Input Status is selected in the Information Window, the Unit Status area shows input status information for processing channels 1 and 2.



Information	Status	Description
Inp: Ch1: Inp: Ch2:	625 50i *(example)*	Shows the current detected input video standard. For a list of supported standards, see page 18.
	Loss	No input signal received.
	SDI 1	Input source is SDI 1.
	SDI 2	Input source is SDI 2.
	CVBS	Input source is CVBS.
	SFP 1	Input source is SFP 1.
	SFP 2	Input source is SFP 2.

5.1.2 Video Output Status

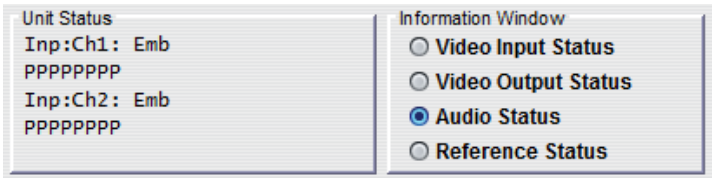
When Video Output is selected in the Information Window, the Unit Status area shows output status information for processing channels 1 and 2.



Information	Status	Description
Out: Ch1: Out: Ch2:	1080 50i *(example)*	Shows the current output video standard. For a list of supported standards, see page 18.
	Loss	No output signal.

5.1.3 Audio Status

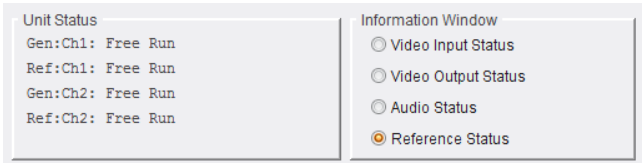
When Audio Status is selected in the Information Window, the Unit Status area shows embedded audio input status information for processing channels 1 and 2.



Information	Status	Description
Inp: Ch1: Emb Inp: Ch2: Emb	L	No audio signal received.
	P	Audio input is PCM.
	D	Audio input is data or Dolby E (non-PCM).
	Note: The number of status letters shown denotes the number of audio pairs. For example, eight status letters = eight audio pairs.	

5.1.4 Reference Status

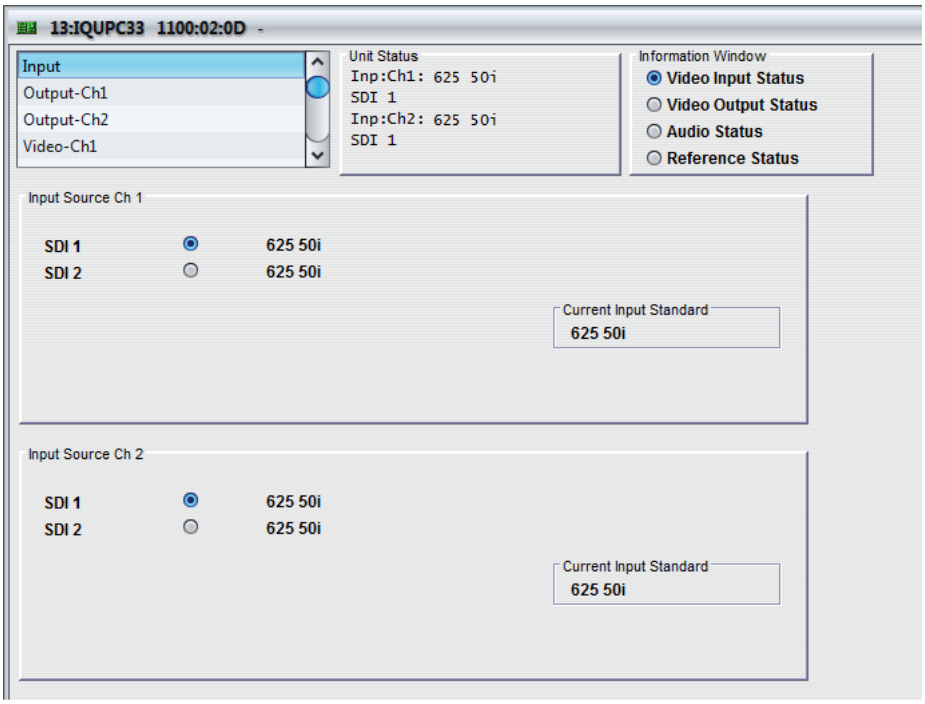
When Reference Status is selected in the Information Window, the Unit Status area shows genlock and reference status information for processing channels 1 and 2.



Information	Status	Description
Gen:Ch1: Gen:Ch2:	Mod Ref	Output video locked to the incoming rear-panel reference.
	Chs Ref A	Output video locked to incoming chassis reference A.
	Chs Ref B	Output video locked to incoming chassis reference B.
	Ch1 Input	Output video locked to channel 1 input.
	Ch 2 Input	Output video locked to channel 2 input.
	Free Run	Output video locked to an internal reference clock.
Ref:Ch1: Ref: Ch2:	Loss	No reference present.
	Genlock	Locked to reference.
	Clocklock	Cross-locked to reference.
	Free Run	Free-running.

5.2 Input

The Input screen enables you to select a video input source for each processing channel.



Note: The Input Source Ch 2 controls are only applicable to the IQUPC31 and IQUPC33.

5.2.1 Input Source Ch 1 and Ch 2

Input Source Ch 1 and Ch 2 lists the available video input sources. A choice of the following is available, depending on the rear panel fitted:

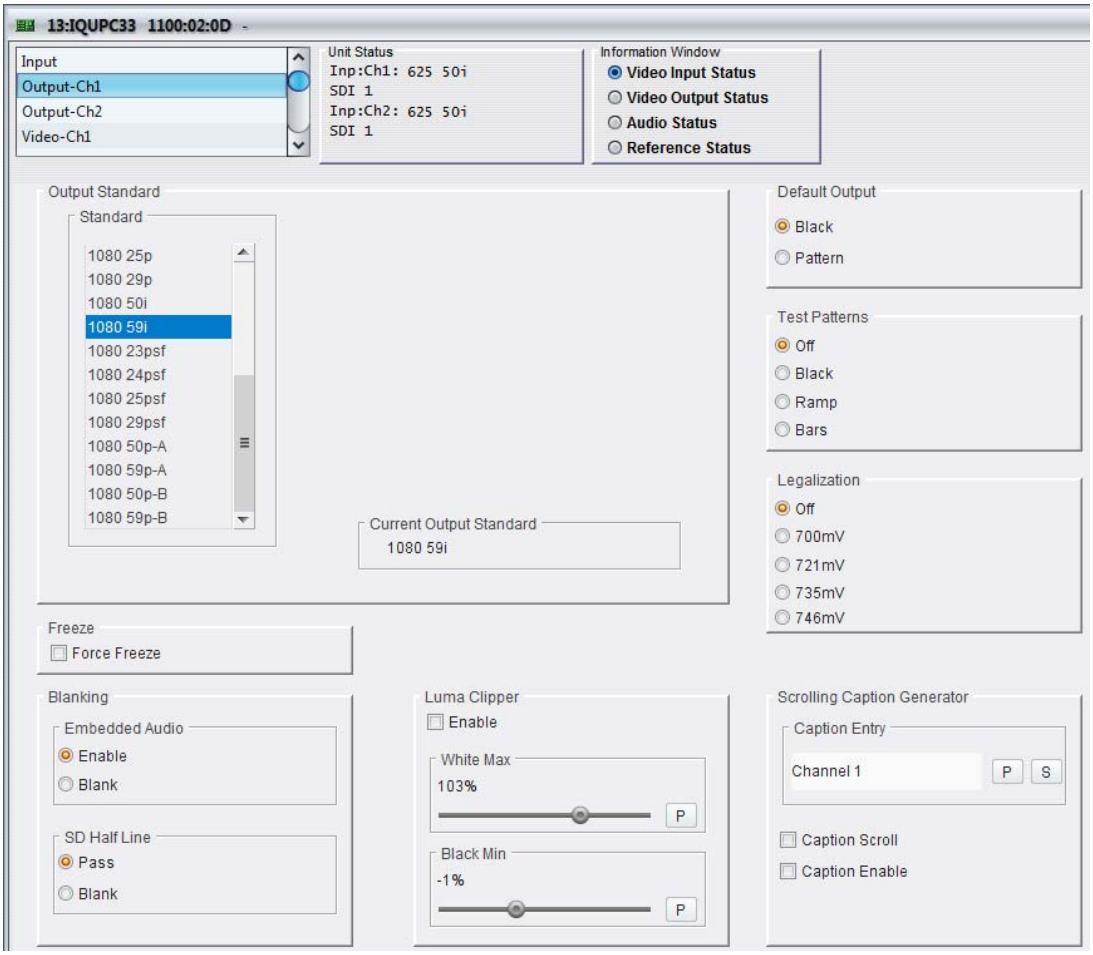
- **SDI 1–2:** Always present. Enables the selection of serial input 1 or serial input 2 respectively.
- **SFP 1–2:** The Small Form-factor Pluggable (SFP) inputs are only available to products with an SFP connector rear panel. If the rear panel has no SFP connector, the input option is hidden.

  The SFP input selections will appear grayed out if either no SFP module or an unsupported SFP module is inserted in the rear panel connector.
- **Current Input Standard:** Shows the video standard of the input source selected.

Note: The unit automatically detects the input standard.

5.3 Output-Ch1 and Ch2

The Output-Ch1 and Ch2 screens enable you to apply various settings and adjustments to the video output signal for each video processing channel.



Note:

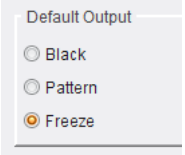
- The Output-Ch2 screen and SFP Output Routing selection control are only applicable to the IQUPC31 and IQUPC33.
- The screen shot above shows the Output Standards available when the Linear Frame Rate converter option is fitted. When not fitted, only same frame rate (i.e. format) conversions are permitted.
- Low frame rate support (i.e. 23, 24, 25, 29 Hz) is not available in modules which were upgraded to V5.2.7 or above after installation. Only new builds of modules at version 5.2.7 and above will support low frame rate signals.

5.3.1 Output Standard

- **Format:** Selects the output format.
- **Default Field Rate:** Selects the output field/frame rate from a choice of Last Valid Input, 50 Hz, and 60 Hz. This control only has an effect when the channel's selected video input is not detected.

  Note: The output video field/frame rate will be the same as the selected input to the channel. If the input is not detected, default field rate allows user control of output field/frame rate.
- **Current Output Standard:** Shows the output standard currently in use.

5.3.2 Default Output



On input signal loss, select

- Black to set default output to black (default)
- Pattern to set default output to the last chosen test pattern
- Freeze to freeze the screen at the last frame received before signal loss.

Note: If the last chosen test pattern was black, then if default output is chosen to be “Pattern”, the output will go to black on input loss.

5.3.3 Scrolling Caption Generator

The Scrolling Caption Generator overlays a black text box with a user-defined caption onto the output video. This is generally used as a setup or debug tool to help identify a video stream on a monitor.

- **Caption Entry:** User-defined caption. To enter a caption:

  In the Caption Entry field, enter the required text and click S to set. To return to the preset value, click P (“Channel 1” is the preset caption).

  Note: Text can be no more than 19 characters.

- **Caption Scroll:** Enables slow-speed horizontal scrolling of the caption within the black text box. Scrolling is from right to left, and wraps around for continuous display.
- **Caption Enable:** The master enable – turns the caption display on and off.

5.3.4 Freeze

The Force Freeze check box enables you to freeze the output picture.

5.3.5 Legalization

All color video signals are ultimately coded as RGB for display on a picture monitor. The Legalizer ensures that the output video stays within the legal RGB gamut limit, making it suitable for the broadcast signal chain. To achieve this, the Legalizer reduces the gain equally on all channels.

The level the legalizer scales down to is selected using the radio buttons in RollCall. Anything in the RGB space above the selected level is scaled down to that level. Anything in the RGB space below 0 mV is clipped to 0 mV. This is a good compromise between minimizing hue change and raising apparent brightness.

Legalizer choices are:

- Off (Default)
- 700mV
- 721mV
- 735mV
- 746mV

5.3.6 SFP Output Routing

In a dual-channel product that has SFP TX connectors, the source of the SFP output can be either channel 1 or channel 2. The SFP outputs are only available in products variants that have an SFP connector rear panel. If the rear panel has no SFP connector, the output option is hidden.

Note: The SFP input selections will appear grayed out if either no SFP module or an unsupported SFP module is inserted in the rear panel connector.

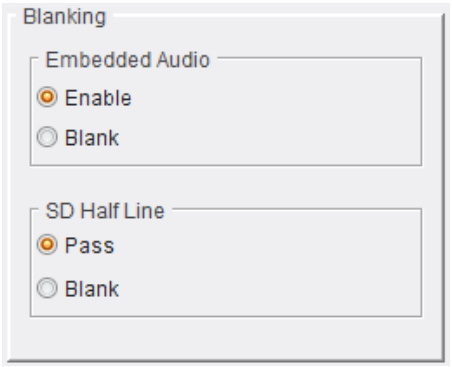
- **SFP Source 1 and 2:** Selects the source, either channel 1 or channel 2, for SFP 1 and SFP 2 if they are transmit ports.

  Note: SFP Source 1 and 2 can be set from either the Output-Ch1 or Output-Ch2 screen – any change in one screen is reflected in the other. See page 40.

5.3.7 Test Patterns

The Test Patterns list enables you to choose the type of pattern displayed on the output picture. You can choose from Off, Black, Ramp, and Bars.

5.3.8 Blanking



- **Embedded Audio:** Enables audio embedding in the output video. This control does not affect any other horizontal data.
- **SD Half Line:** Blanks the source half lines. This can be useful for certain ARC settings, for example, SD16:9AN to SD4:3 Fit to Width.

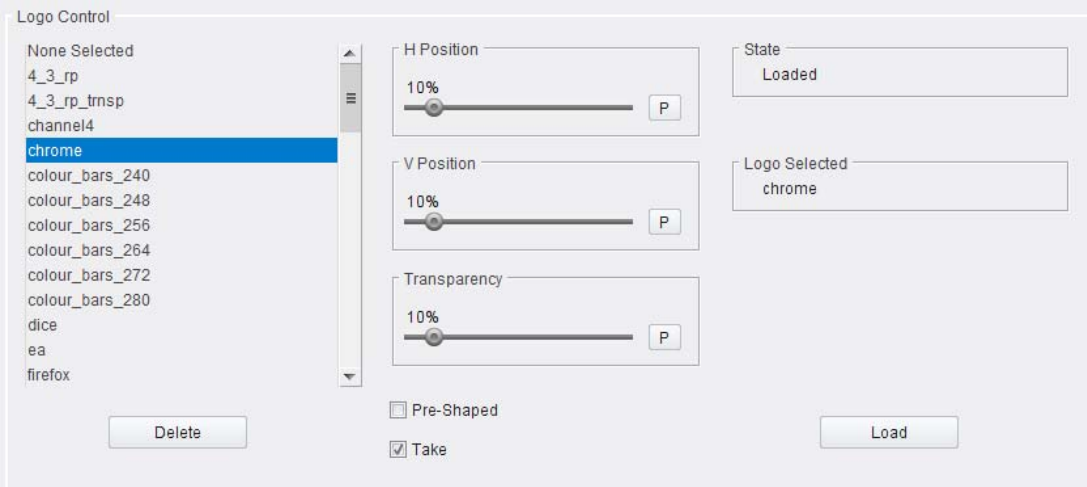
5.3.9 Luma Clipper

When enabled, the Luma Clipper applies a hard clip to white maximum and black minimum levels.

- **White Max**: Hard clip maximum white. The adjustment range is 90% to 109% in 1% steps.
- **Black Min**: Hard clip minimum black. The adjustment range is -7% to 10% in 1% steps.

5.3.10 Logo Control (Option)

When the optional logo inserter is installed, additional controls are available.



- **Logo control** - Lists the available logos that have been uploaded to the unit via the separate logo installation application (see Appendix B). The currently selected logo is highlighted.
- **Load**: Click Load to load the selected logo.
- **Take** - Displays the logo.
- **H position** - H position determines the horizontal placement of the logo from 0% (left edge of picture) to 100% (the logo's furthest edge is on the picture right edge), in steps of 1%.

  Preset is 10%.
- **V position** - V position determines the vertical placement of the logo from 0% (top of picture) to 100% (the logo's bottom edge is on the picture bottom edge), in steps of 1%.

  Preset is 10%.
- **Transparency** - Transparency allows you to adjust the visibility of the logo from 0% (fully visible) to 100% (invisible) in steps of 1%.

  Preset is 10%.
- **Pre-shaped** - Indicates if the logo is pre-shaped (see Appendix B)
- **Delete** - Deletes the highlighted logo.

Note: For a logo to be deleted, it must first have been loaded.

- **State** - Indicates if a logo has been loaded and is ready for display.
- **Logo selected** - Indicates the name of the logo currently being displayed.

Note:

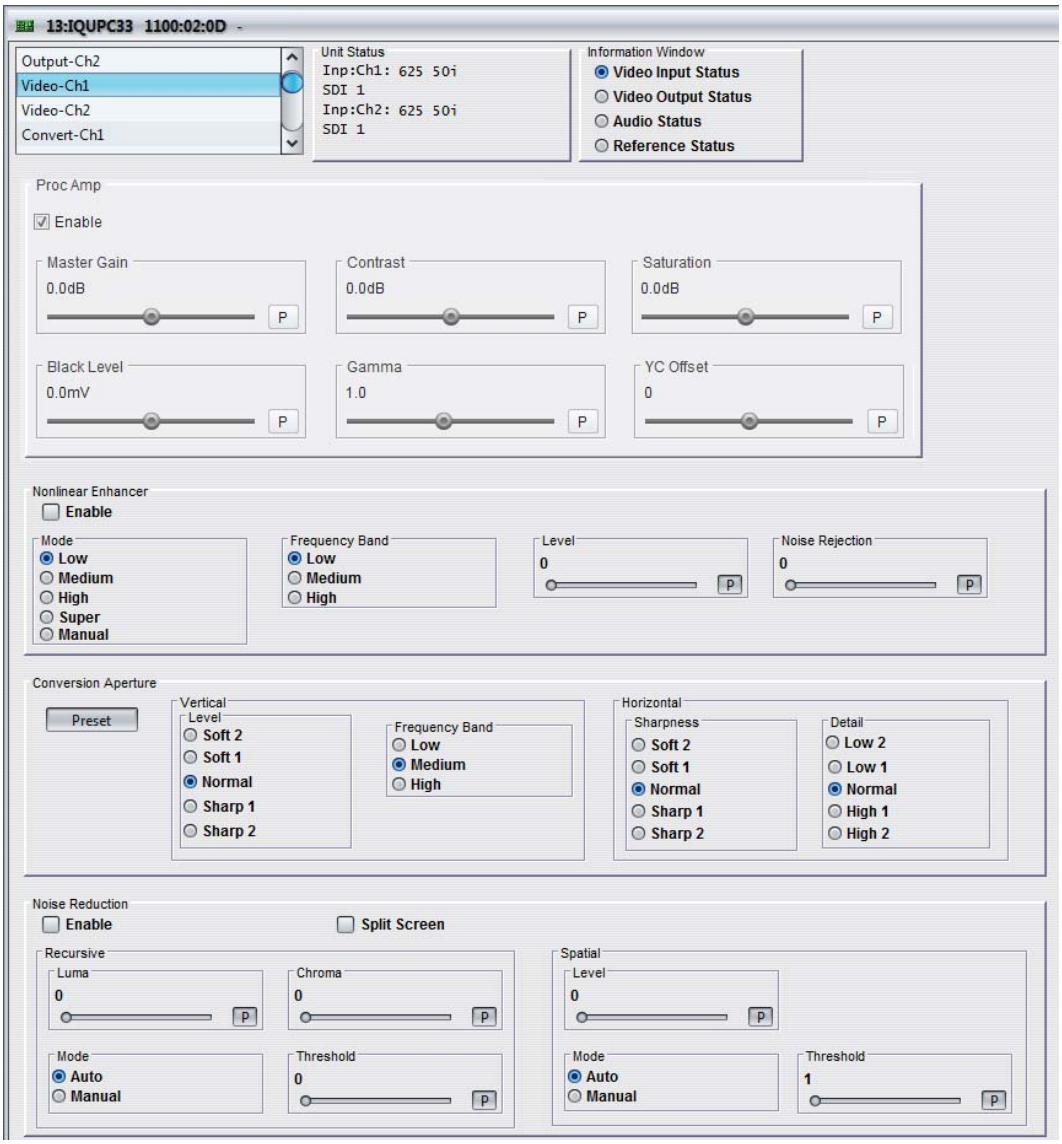
- For more details about the Logo insertion option including information about how logos are uploaded to the module, please see Appendix B
- Loading the logo ready for display can take up to a few minutes depending on the logo length. Short or static logos will only take a few seconds. The logo displayed state will report progress in loading the logo.

Logo insertion worked example:

1. To insert a new logo, select the logo from the list under Logo Control, click the **Load** button, then enable the logo by clicking in the **Take** box.
2. To change the logo, select the required logo from the list, then click the **Load** button. This will display the new logo.
3. To remove a logo from display, uncheck the **Take** box.
4. To display the logo shown in the Logo Selected box, click in the **Take** box.

5.4 Video-Ch1 and Ch2

The Video-Ch1 and Ch2 screens enable you to apply various types of signal processing to the signal being converted, and includes Proc Amp, Nonlinear Enhancer, Conversion Apertures, and Noise Reduction (option) controls.



Note: The Video-Ch2 screen is only applicable to the IQUPC31 and IQUPC33.

5.4.1 Proc Amp

The Process Amplifier (Proc Amp) enables you to correct video inconsistencies, such as contrast.

- **Enable:** Enables the Proc Amp.
- **Master gain**: Adjusts contrast and saturation together from -6 dB to 6 dB in 0.2 dB steps. The preset value is 0 dB.
- **Contrast**: Adjusts the contrast. The adjustment range is -6 dB to 6 dB in 0.2 dB steps. The preset value is 0 dB.
- **Saturation:** Adjusts the color saturation. The adjustment range is -6 dB to 6 dB in 0.2 dB steps. The preset value is 0 dB.

- **Black Level:** Adjusts the black level. The adjustment range is -100 mV to 100 mV. The preset value is 0 mV.
- **Gamma:** Adjusts the gamma curve. The adjustment range is 0.4 to 1.7 in 0.1 steps. The preset value is 1.0.
- **YC Offset:** Adjusts the horizontal chroma shift, for use when correcting upstream luma-chroma displacement. The adjustment range is -20 to 20 in steps of 2 luma clocks.

  At the input picture edge, zero chroma is shifted into the active picture area. If the ARC is set to show less than the full width of the input picture, valid input picture chroma is shifted into the output picture area.

5.4.2 Nonlinear Enhancer

The Nonlinear Enhancer defines the amount of enhancement applied to a video to help regain lost detail. This could be as a result of degraded material, post production processes, or because the initial capture conditions were not ideal.

The controls enable you to apply enhancement to the low, medium, and high frequency bands, and to create a custom setting if required.

- **Enable:** Enables the enhancer.
- **Mode:** Preset controls.
  - **Low:** Sets Level to 2 and Noise Rejection to 15% for the selected frequency band.
  - **Medium:** Sets Level to 4 and Noise Rejection to 15% for the selected frequency band.
  - **High:** Sets Level to 6 and Noise Rejection to 15% for the selected frequency band.
  - **Super:** Sets Level to 8 and Noise Rejection to 15% for the selected frequency band.
  - **Manual:** Enables you to manually adjust the Gain and Noise Rejection.
- **Frequency Band:** Specifies the frequency band to which the enhancement is applied.
- **Level:** Adjusts the enhancement level. The adjustment range is 0 to 192. The preset value is 0.
- **Noise Rejection:** Adjusts the Gain and Noise Rejection. The adjustment range is 0 to 100 in steps of 1. The preset value is 0.

5.4.3 Conversion Aperture

The Conversion Aperture controls enable you to control the horizontal and vertical rescaler apertures from a range of presets.

5.4.3.1 Preset

Preset returns all settings to their default values.

5.4.3.2 Vertical

Vertical controls aliasing in down-converted content.

- **Level:** Specifies the enhancer strength.
  - **Soft 1–2:** Provides attenuation in the frequency band specified.
  - **Normal:** Nominally flat frequency response.
  - **Sharp 1–2:** Applies more boost in the frequency band specified.
- **Frequency Band:** Specifies the frequency band to which the enhancement is applied.

5.4.3.3 Horizontal

Horizontal controls aliasing in down-converted content

- **Sharpness:** Determines the sharpness of the output by changing the rate of anti-alias filter cut-off.
  - **Soft 2:** Recommended for severely over enhanced source material.
  - **Soft 1:** Recommended for over enhanced source material.
  - **Normal:** Optimum setting for balancing detail and alias.
  - **Sharp1:** Recommended for slightly soft source material.
  - **Sharp 2:** Recommended for very soft source material.
- **Detail:** Determines the amount of detail allowed through to the output by moving the anti-alias filter stop band.
  - **Low 2:** Recommended for severely over enhanced source material.
  - **Low 1:** Recommended for over enhanced source material.
  - **Normal:** Optimum setting for balancing detail and alias.
  - **High 1:** Recommended for slightly soft source material.
  - **High 2:** Recommended for very soft source material.

5.4.4 Noise Reduction (Option)

The Noise Reduction controls enable you to reduce levels of noise and grain.

- **Enable:** Master enable for all the noise reduction processing.
- **Split Screen:** Displays a split screen view of the output image – one side of the screen shows the image with noise reduction, and the other side of the screen shows the image without noise reduction.

5.4.4.1 Recursive

To achieve noise reduction, the recursive filter applies a temporal recursive filter to both luminance and chrominance picture content. To avoid blurring moving objects, the filter includes motion detection and adaption which disables the filter when significant motion is present.

The Luma and Chroma controls set the maximum noise reduction (0 = off). You can set the sensitivity of motion detection either automatically with Auto mode, or manually with the Threshold slider.

- **Luma:** Adjusts the amount of noise reduction applied to the luminance signal. The adjustment range is 0 to 7 in steps of 1. The preset value is 0.
- **Chroma:** Adjusts the amount of noise reduction applied to the chrominance signal. The adjustment range is 0 to 7 in steps of 1. The preset value is 0.
- **Threshold:** Adjusts the noise reduction threshold. The adjustment range is 0 to 7 in steps of 1. The preset value is 0.
- **Mode:** Choose between automatic or manual filtering.

  In Auto mode, the background noise level is measured and the threshold set to give a good compromise between noise reduction and motion blur. In Manual mode, increasing the Threshold value allows for pictures with higher background noise.

  Note: For best results in Manual mode, always set the threshold to the lowest value for the desired noise reduction.

5.4.4.2 Spatial

The spatial noise reduction filter operates on luminance only and uses nearby samples to average out noise. Picture objects and edges are detected and the filtering disabled.

You can set the sensitivity of edge detection either automatically with Auto mode, or manually with the Threshold slider.

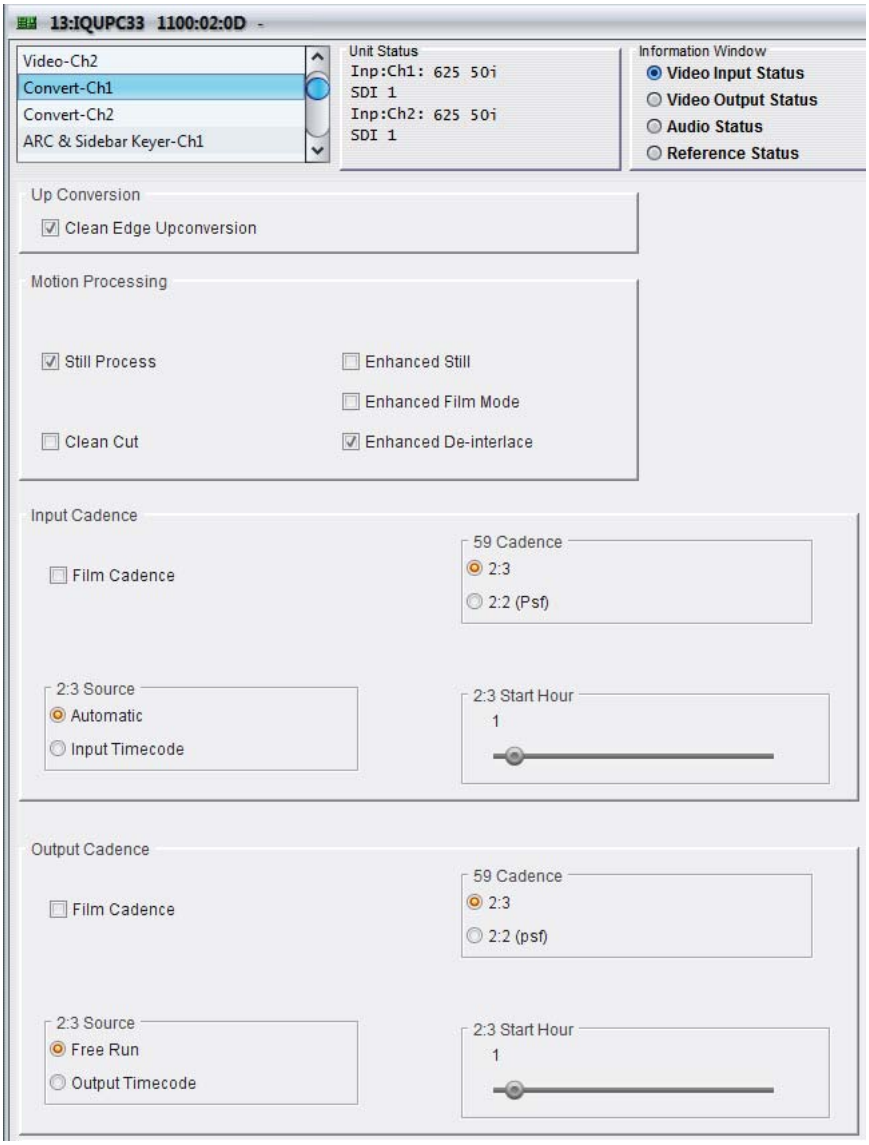
- **Level:** Adjusts the level of noise reduction applied to the signal. The adjustment range is 0 to 7 in steps of 1. The preset value is 0.
- **Threshold:** The adjustment range is 1 to 4 in steps of 1. The preset value is 1.
- **Mode:** Choose between automatic and manual filtering.

  In Auto mode, the background noise level is measured and the threshold set to give a good compromise between noise reduction and picture softness. In Manual mode, increasing the Threshold value allows for pictures with higher background noise.

  Note: For best results in Manual mode, always set the threshold to the lowest value for the desired noise reduction.

5.5 Convert-Ch1 and Ch2

The Convert-Ch1 and Ch2 screens enable control of motion processing and improve the conversion performance of stationary content.



Note: The Convert-Ch2 screen is only applicable to the IQUPC31 and IQUPC33.

5.5.1 Up Conversion

Clean Edge Upconversion: Enables the Texture Adaptive Upconversion (TAU) process which helps to adapt away any horizontal ringing (vertical edges).

5.5.2 Motion Processing

- **Still Process**: Uses powerful motion detection techniques to extract the maximum resolution from interlaced sources while format or standards converting (where fitted). The benefits of this processing are prominent on static logos and computer-generated overlays.
- **Enhanced Still**: Adds field motion detection to still processing. This reduces artifacts on moving repetitive patterns.
- **Enhanced Film Mode**l: Applies an aperture with full progressive frequency response where the input is film transported by an interlaced video rate input, with cadence enabled (see section 5.5.3).
- **Enhanced De-interlace**: Replaces missing lines with a gradient between the previous and following lines. This control improves the appearance of de-interlaced images and is useful when dealing with complex shapes.
- **Clean Cut**: Prevents temporal filtering across a cut in scenes, which can result in several frames either side of the cut being a mix of the two different scenes.

5.5.3 Enhanced Film Mode

The Enhanced Film Mode provides a set of solutions to enable optimized conversion of film originated content. Film originated content may be transported by standards supporting the original film frame rate, such as 1080 23.98p. Film originated content may also be packed into interlaced standards using a rule based method to map source frames to interlaced fields. In this case, the interlaced standard's content is described as having a film cadence.

In order to perform high quality conversion of film originated content, the cadence must be identified and used to adapt the interpolation process. The Enhanced Film Mode also permits the synthesis of film cadence in the output.

The Enhanced Film Mode features include:

- 2:3 detection and removal when converting 59.94 2:3 to 23.98 psf.
- Maintain 2:3 cadence when up-converting 59.94 2:3 content.
- Maintain psf cadence when appropriate.
- Control 2:3 cadence with respect to timecode.

The “Enhanced Film Mode” sets a sharp conversion aperture suited to filmic content. Select “on” under the Enhanced Film Mode menu option (default is off). For content that is not exclusively filmic, or where there are inconsistencies with the input cadence, this mode may create higher visibility of artifacts.

Note: This mode is only relevant for film originated content where the cadence is carried in an interlaced format. In circumstances where the film originated content is carried in a progressive format, the “Enhanced Film Mode” setting should not be used.

5.5.4 Input Cadence

Input Cadence controls allow you to define any cadence associated with the input video.

- **Film Cadence** - Enable if the input content is film originated, or simulates film originated content. Default = Off.
- **59 Cadence** - If the input is film originated and its frame rate is 59.94Hz, then the cadence should be defined as either
  - 2:3 (Default)
  - 2:2 (psf)
- **2:3 Source**
  - When set to **Automatic** (Default) the input cadence will be determined by the cadence detection circuit. This feature is useful when the source material contains mixed cadences.
  - When set to **Input Timecode**, the user defines the relationship between timecode and the 2:3 sequence. This feature is useful when the source material contains known continuous 2:3. This setting removes any uncertainty that may be associated by use of the sequence detector (automatic mode).
- **2:3 Start Hour** - This control allows the user to define the position of timecode when the 2:3 sequence begins. The assumption is made that the start of the 2:3 sequence is aligned with the start of program and under normal working practices, that the start of program is coincident with a integer hour value.

  This control is only active when “2:3 Source” is set to Input Timecode. Control is available from 1 hour to 23 hours in steps of 1 hour. Default is 1 hour.

5.5.5 Output Cadence

The Output Cadence controls enable you to define the required cadence of the output video.

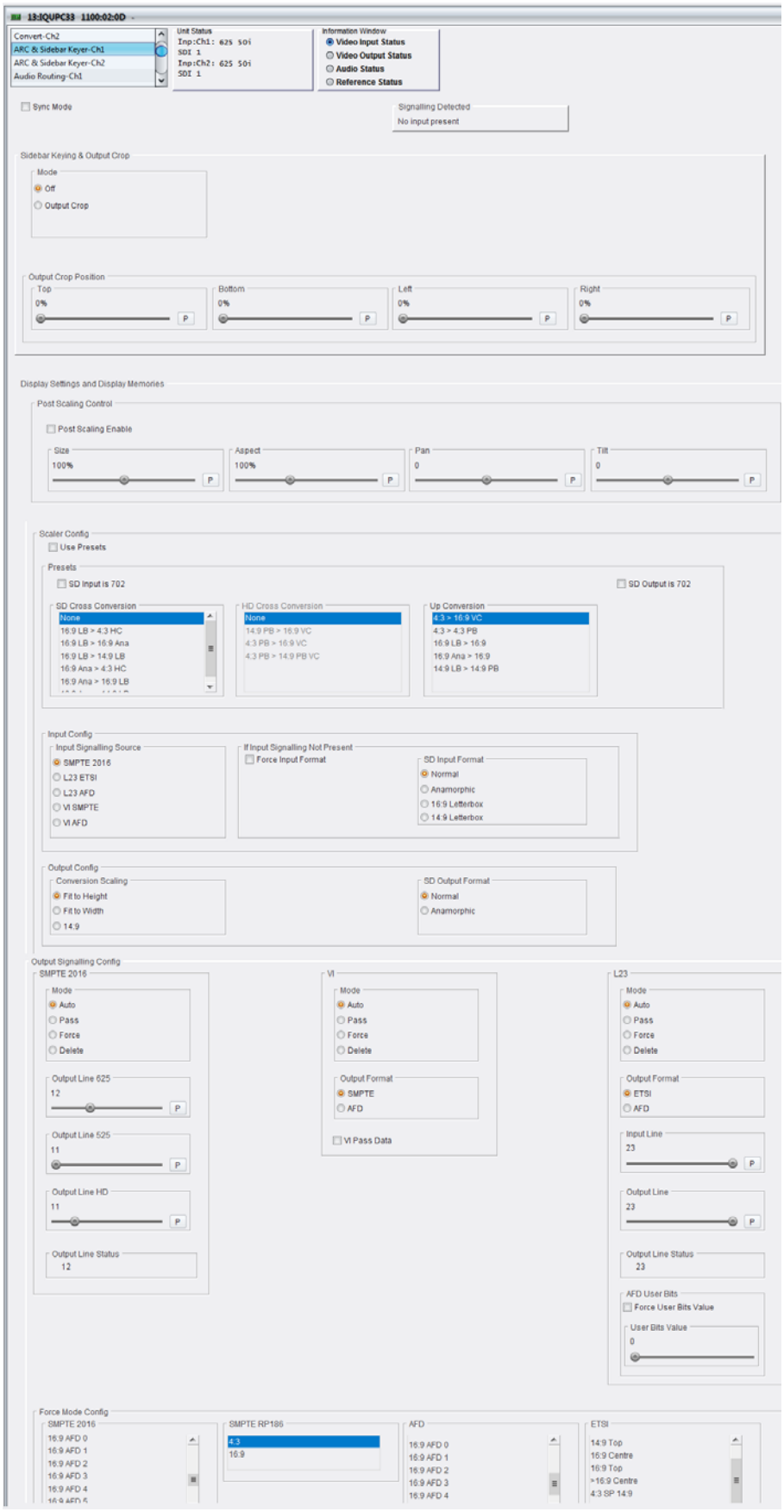
- **Film Cadence** - Enable if the output content is required to have a film cadence associated with it. Default = Off
- **59 Cadence** - If the output is to have a film cadence associated with it and its frame rate is 59.94Hz, then the cadence should be defined as either
  - 2:3 (Default)
  - 2:2 (psf)
- **2:3 Source** - In circumstances where the output is defined as 59.94 2:3, this control allows the user to decide if they wish to control the starting point of the 2:3 sequence with respect to timecode.
  - When set to **Free Run** (Default) the output 2:3 cadence starting point is not defined. The output will have continuous 2:3, but may vary from conversion to conversion.
  - When set to **Output Timecode**, the user defines the point where the 2:3 sequence starts relative to timecode.
- **2:3 Start Hour** - This control allows the user to define the starting position of the 2:3 sequence with respect to timecode. It is only active when 2:3 Source is set to Output Timecode.

  Control is available from 1 hour to 23 hours in steps of 1 hour. Default is 1 hour.

Note: Cadence support is only available to modules released at V5.2.7 and above. Earlier modules which were upgraded to V5.2.7 after installation will not support cadence control.

5.6 ARC & Sidebar Keyer-Ch1 and Ch2

The Aspect Ratio Control (ARC) & Sidebar Keyer-Ch1 and Ch2 screens enable you to control the aspect ratio of a picture from a range of options, or to adjust the size and position of the picture manually.



5.6.1 Sync Mode

The Sync Mode check box disables the ARC feature when input and output formats are the same. This gives the lowest latency.

5.6.2 Aspect Signaling Control Enable

The Aspect Signaling Control Enable check box enables aspect signaling.

5.6.3 Signaling Detected

Signaling Detected shows the status of any aspect ratio signaling detected at the input. If Status shows “None”, no valid signaling is detected.

5.6.4 Sidebar Keying & Output Crop (Option)

The Sidebar Keying & Output Crop functionality provides post ARC cropping of the output picture and allows a second video picture to be keyed into the cropped area. When output cropping is enabled, the actual size of the output picture does not change, just how much of the active picture remains visible. The portion that is “cropped” is either default black (in Output Crop mode) or is replaced by a secondary video picture (in Sidebar Key mode) – the “cropped” portion still forms part of the output picture.

Note: Output Crop is always available but Sidebar Key is a licensed option.

5.6.4.1 Mode

- **Off:** Disables both Output Crop and Sidebar Keying.
- **Output Crop:** Crops the output picture. In this mode the cropped area is black by default. The cropped area is defined using the Output Crop Position controls. See see section 5.6.4.2 below.
- **Sidebar Key:** Keys a second video picture into the cropped area, as defined using the Output Crop Position controls (see see section 5.6.4.2 below). When selected, the source of the second video picture is becomes available in the Sidebar Key Source menu. See page 55.

5.6.4.2 Output Crop Position

The Output Crop position controls enable you to adjust which portion of the video picture is visible by applying a border around the outside of the picture. The controls do not alter the output active picture size – each control separately defines a percentage of the picture to be replaced by a border. In Output Crop mode, the border is default black. In Sidebar Key mode, the border is the “key” area replaced by the secondary Sidebar Key video source.

Controls are paired: top with bottom and left with right. A pair of controls has limitations to prevent an overlap. The rule is that only 99% of the picture can be cropped, either horizontally or vertically. For example, if Top is set to 50%, Bottom cannot exceed 49%.

- **Top:** Crops the output picture, from the top-edge down. The adjustment range is 0% to 99% in 1% steps (0%). The default is 0%.
- **Bottom:** Crops the output picture, from the bottom-edge up. The adjustment range is 0% to 99% in 1% steps. The default is 0%.
- **Left:** Crops the output picture, from the left-edge right. The adjustment range is 0% to 99% in 1% steps. The default is 0%.
- **Right:** Crops the output picture, from the right-edge left. The adjustment range is 0% to 99% in 1% steps. The default is 0%.

5.6.4.3 Sidebar Key Source

If the sidebar key option is available, the Sidebar Key Source control will also be present. This control becomes active when Sidebar Key mode is selected. Firstly a border is set up around the active picture using the separate Output Crop Position controls. This control then selects the secondary video source to be keyed over the border area.

In order for this to work correctly, the following rules must be met:

- Sidebar Key Source must be of the same format and frame rate to the output video standard for this channel.
- If the key source selected is of a different standard to the main video output standard, only Output Crop Mode is available.
- Ensure the key source has the correct vertical genlock alignment. If not, the sidebar key will not have the correct vertical position.

The available sidebar key sources vary depending on the product variant:

- Single-channel product: all video inputs are available.
- Dual-channel product: all video inputs plus output from other channel are available.

Note: All video inputs is Serial SDI, CVBS, and SFP.

Sidebar Key Source options that are not available to the product are hidden from the selection list (for example, the output of the second channel in a single-channel product, or SFP input if no SFP rear is fitted).

Sidebar Key Source options that are not suitable are grayed out from the selection list (for example, the source is the not the same output standard as the video it is being “keyed” into, or SFP 2 is actually a TX so is not available as an input.

5.6.5 Post Scaling Control

Post Scaling Control enables you to manually adjust the size and position of the output picture, post ARC scaling. This is an additional level of control which does not affect the ARC.

- **Post Scaling Enable:** Enables the Post Scaling controls.
- **Size:** Adjusts the size of the whole output image while maintaining aspect ratio. The adjustment range is 80% to 120% in 1% steps. The preset value is 100%.
- **Aspect:** Adjusts the aspect ratio of the output image. The adjustment range is 70% to 150% in 1% steps. The preset value is 100%.
- **Pan:** Adjusts the horizontal position of the output image. Range is from -50 to 50 pixels in steps of 1 pixel. Preset = 0
- **Tilt:** Adjusts the vertical position of the output image. Range is -50 to 50 lines in steps of 1 line. Preset = 0

5.6.6 Standard Presets When No Aspect Signaling

If no input aspect signaling is available and the conversion required is always from a known input aspect ratio to another known input aspect ratio, one of the standard presets may be selected. The presets are sub-divided into SD to SD cross conversion and SD to HD/3G up conversion.

Note: These presets are only active when the Aspect Signaling Control Enable check box is deselected.

5.6.6.1 SD Input is 702

SD Input is 702 is an additional ARC preset mode, which is available for incoming content that uses a 702 sample line rather than a 720 sample line. If the incoming content uses a 702 sample line, select the check box. This introduces an additional H scaling factor of 720/702, resulting in a slight horizontal stretch.

This control only has an effect on SD inputs.

Note: SD Input 702 introduces an additional h scaling factor of 720/702.

5.6.6.2 SD Output is 702

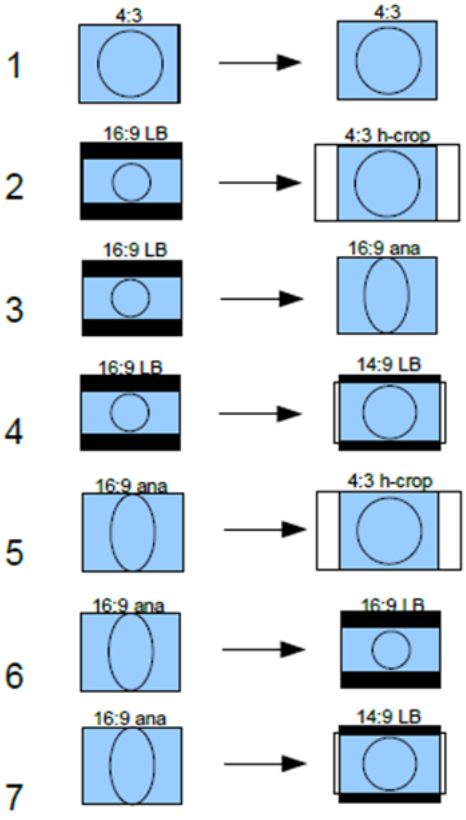
SD Output is 702 is an additional ARC preset mode, which is available for outgoing content that requires a 702 sample line rather than a 720 sample line. If the outgoing content requires a 702 sample line, select the check box. This introduces an additional H scaling factor of 702/720, resulting in a slight horizontal squeeze.

This control only has an effect on SD outputs.

Note: SD Output 702 introduces an additional h scaling factor of 702/720.

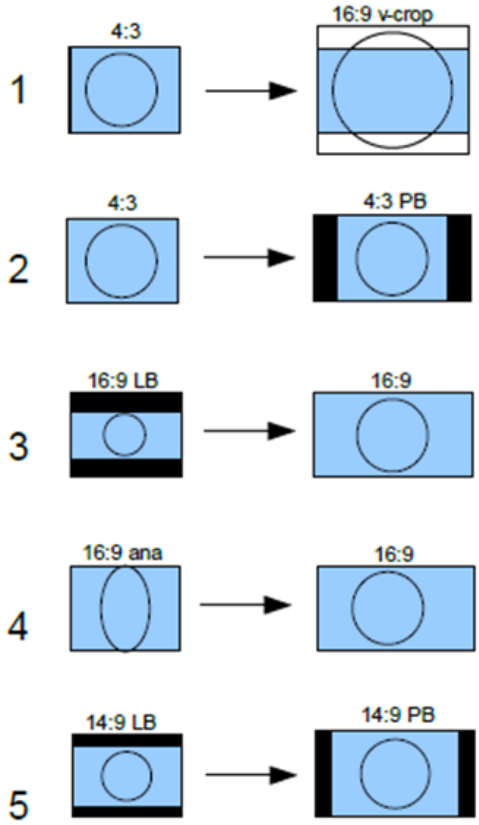
5.6.6.3 SD Cross Conversion

LB = letterbox, h-crop = horizontal crop, ana = anamorphic.



5.6.6.4 Up Conversion

LB = letterbox, PB = pillarbox, v-crop = vertical crop, ana = anamorphic.



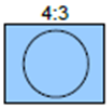
5.6.7 Aspect Signaling Control – Scaling Control

The Scaling Control functions enable you to configure the ARC output format. The controls are only active when using input aspect signaling to control the ARC input format. Using input aspect signaling allows dynamic control of the ARC. A fixed aspect is selected for the output image, and the aspect signaling then defines the incoming image aspect ratio. As this signal changes on frame boundaries, the ARC is reconfigured to perform the correct conversion.

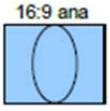
5.6.7.1 SD Input Format if Signaling Unknown

When using input aspect signaling with an SD input source, it is possible to set a default input ARC setting. If, for any reason, the input SD aspect signaling cannot be detected, the ARC assumes this default setting.

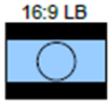
- **Use Manual if Unknown:** Enables manual ARC control.
- **SD Input Format:** The SD input format.
  - **Normal:** Default 4:3 aspect ratio.

  - **Anamorphic:** Horizontally squeezes a widescreen image to fit a standard 4:3 aspect ratio.

- **Letterbox:** Preserves the original aspect ratio of film shot in a widescreen aspect ratio, with bars visible at the top and bottom of the screen.



5.6.7.2 SD Output Format

When Aspect Signaling Control is enabled and the output video is SD, this control enables you to set fixed output aspects for the ARC.

- **Normal:** Default aspect ratio.
- **Anamorphic:** Horizontally squeezes a widescreen image to fit a standard 4:3 aspect ratio.

See see section 5.6.8 for a list of possible ARC conversions using input signaling and a combination of SD Output Format and Scaling Conversion controls.

5.6.7.3 Conversion Scaling

Conversion Scaling enables you to set fixed ARC output aspects.

- **Fit to Height:** Scales the image to fit the height of the screen while maintaining the aspect ratio.
- **Fit to Width:** Scales the image to fit the width of the screen while maintaining the aspect ratio.
- **14:9:** Can scale either a 4:3 image for viewing on a 16:9 screen, or a 16:9 image for viewing on a 4:3 screen. This is a compromise in order to maintain the aspect ratio of the image, but will crop some of the image in the process (top and bottom when viewing 16:9 and left and right when viewing 4:3).

See see section 5.6.8 for a list of possible ARC conversions using input signaling and a combination of SD Output Format and Scaling Conversion controls.

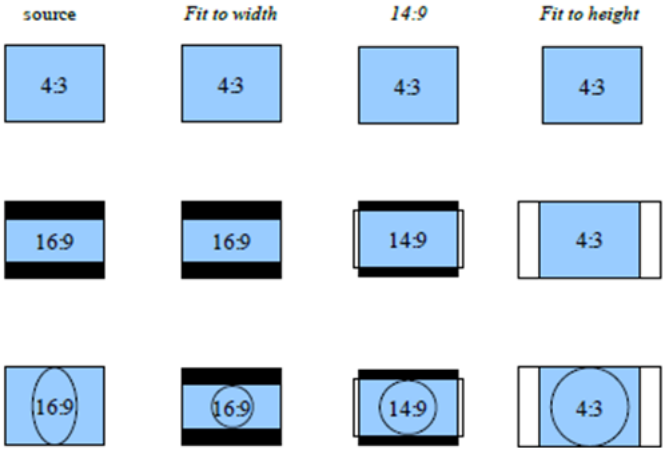
5.6.8 Input Signaling ARC Conversions

It is possible to manually fix the output aspect of the ARC when using input signaling. The input to the ARC is then defined by the dynamic input signaling.

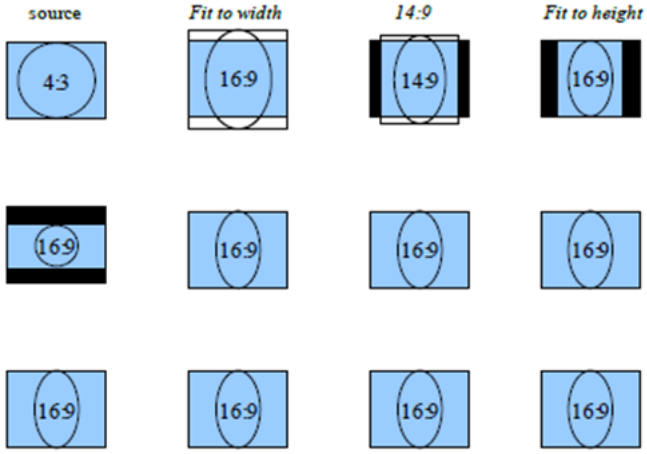
The following sections show the ARC conversions possible using input signaling and a combination of SD Output Format and Scaling Conversion controls. For each of the conversions there are four columns of images. The first column shows the source image in various formats, with each format described in the accompanying input signal. The next three columns show the output image format when the Fit to Width, 14:9, or Fit to Height Conversion Scaling controls are selected.

5.6.8.1 SD Cross Conversion

SD Output Format = Normal (4:3).

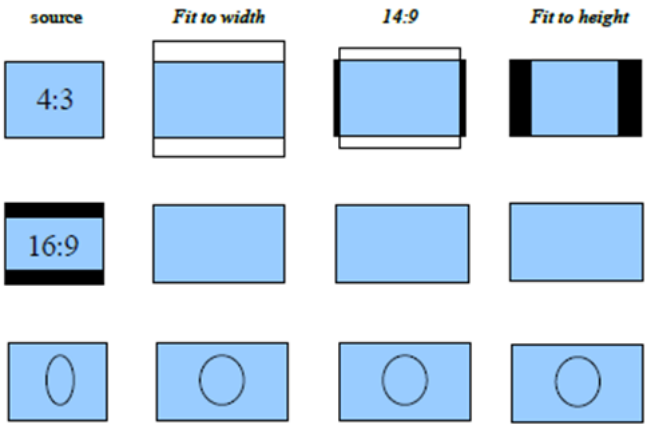


SD Output Format = Anamorphic (16:9).



5.6.8.2 Up Conversion

SD Output Format has no effect as output is HD.



5.6.9 Aspect Signaling Control – Signaling Config

The Aspect Signaling Control functions define which of the supported aspect signaling standards defines the input of the ARC.

5.6.9.1 Source

The Source box lists the available supported aspect signaling standards.

- **SMPTE 2016:** SMPTE ST 2016-1. Format for Active Format Description (AFD) and Bar Data.
- **L23 ETSI:** ETSI EN 300 294 v1.4.1. Television systems, 625-line television Widescreen signaling (WSS)
- **L23 AFD:** West Country TV/HTV/Central TV L23_SPEC.doc 1997.
- **VI SMPTE:** SMPTE RP 186-1995. Video Index Information Coding for 525- and 625-line Television Systems.
- **VI AFD:** SMPTE RP 186-2008. Video Index Information Coding for 525- and 625-line Television Systems.

When Alternate Center Cut is on, action on receipt of certain AFD codes changes to that described in section 5.6.9.3.

5.6.9.2 SMPTE 2016

The SMPTE 2016 controls define how the SMPTE 2016 signaling is configured when the Aspect Signaling Control Enable check box is selected. The controls also enable you to choose the output line number on which output signaling is embedded.

- **Mode:** Four modes of operation are available.
  - **Auto:** Automatically generates an output SMPTE 2016 signal with AFD data that matches the output aspect of the ARC.
  - **Pass:** Passes input signal information through the unit unchanged when SMPTE 2016 is selected as the input signaling source.

    The output signal may not represent the actual aspect of the output image. If no SMPTE 2016 signal is present at the input, no SMPTE 2016 signal will be output.
  - **Force:** Generates an output SMPTE 2016 signal with AFD data that matches what is selected in the Force Output Signaling Setup – SMPTE 2016 list. The list contains 16 AFD codes for coded frame AR of 4:3, and eight AFD codes for a coded frame AR of 16:9.
  - **Delete:** Disables embedding of SMPTE 2016 output signaling in the output video.
- **Output Line 625:** Selects the line number on which SMPTE 2016 signaling is embedded when the video output format is 625. The range is from line 7 to line 22 in one-line steps. The default is line 12.
- **Output Line 525:** Selects the line number on which SMPTE 2016 signaling is embedded when the video output format is 525. The range is from line 11 to line 19 in one-line steps. The default is line 11.
- **Output Line HD:** Selects the line number on which SMPTE 2016 signaling is embedded when the video output format is HD. The range is from line 9 to line 20 in one-line steps. The default is line 11.
- **Output Line Status:** Shows the output line number on which SMPTE 2016 signaling is embedded. If no line number is selected, “OFF” is displayed.

Note: In the SD domain, take care to avoid a line clash if embedded VITC and SMPTE 2016 are both enabled. VITC will take priority and overwrite the SMPTE 2016 packet if the same output line is selected for both.

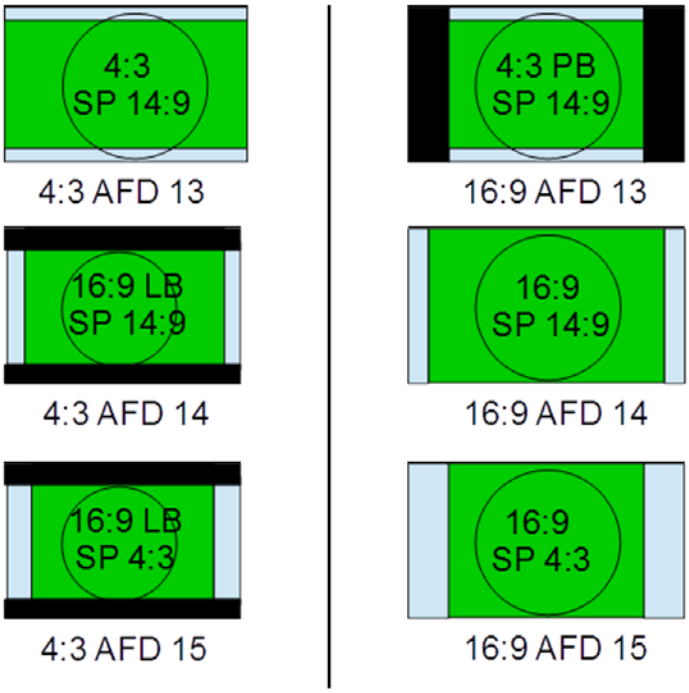
5.6.9.3 Alternate Center Cut

Alternate center cut is off by default. When off, behavior on receipt of certain specific AFD codes ignores protected regions. When Alternate center cut is on, the ARC behavior for these six specific codes will be to remove any Black bars and also remove the grey bars that will leave the “Alternative Centre”. The Alternative centre will therefore be stretched to fit the screen so that the whole “white area” fills the screen. This will override Fit to width, 14:9 and Fit to height setting, so that all three give the same output result. It also overrides the “SD Output Format” control (“Anamorphic” or “Normal”). See SMPTE ST 2016-1:2009, pages 7, 8 and 9.

The behavior with Alternate center cut on and off is shown in the table below:

AFD Format	Interpretation with Alternate Centre Cut Off	Interpretation with Alternate Centre Cut On
4:3 AFD 13	4:3	4:3 Alt 14:9
4:3 AFD 14	16:9LB	16:9LB Alt 14:9
4:3 AFD 15	16:9LB	16:9LB Alt 4:3
16:9 AFD 13	4:3PB	4:3PB Alt 14:9
16:9 AFD 14	16:9	16:9 Alt 14:9
16:9 AFD 15	16:9	16:9 Alt 4:3

Alternate Center Cut Illustrations



5.6.9.4 VI (SMPTE RP 186-95/08)

The Video Index (VI) Config controls enable you to specify VI signaling output actions.

VI is valid for both 625 and 525 output video formats. The lines used are:

- 625: Field 1 line 11, field 2 line 324.
- 525: Field 1 line 14, field 2 line 276.

VI signaling supports two output formats, which are the two versions of the SMPTE RP 186 specification.

- **Mode:** Output options.
  - **Auto:** When Output Format is set to SMPTE, Auto generates an output VI signal conforming to SMPTE RP 186-95 with scanning system information that matches the output aspect of the ARC. If Output Format is set to AFD, Auto generates an output VI signal conforming to SMPTE RP 186-08, with scanning system information and AFD that matches the output aspect of the ARC.
  - **Pass:** When either VI SMPTE or VI AFD is selected as the input signaling source, any valid SMPTE RP 186-95/08 input signal is passed through to the output unchanged irrespective of what output format is set. For both output formats, the output signal may not represent the actual aspect of the output image. If no VI signal is present at the input, then no VI signal will be output.
  - **Force:** When Output Format is set to SMPTE, Force generates an output SMPTE RP 186-95 signal with scanning system information that matches what is selected in the Force Output Signaling Setup – SMPTE RP 186 list. 4:3 and 16:9 are available, but the actual code used is determined by the output video standard: 625 or 525.

    When Output Format is set to AFD, Force generates an output SMPTE RP 186-08 signal with scanning system information and AFD codes that match what is selected in the Force Output Signaling Setup – AFD list. The list contains eight AFD codes for scanning 4:3 system information, and eight AFD codes for scanning 16:9 system information. The actual scanning system information used is determined by the output video standard: 625 or 525.
  - **Delete:** Disables embedding of any SMPTE RP 186-95/08 output signaling in the output video.
- **Output Format:** Output format options.
  - **SMPTE:** Generates output VI signaling conforming to SMPTE RP 186-95, carrying just the scanning system information relating to the output aspect of the ARC.
  - **AFD:** Generates output VI signaling conforming to SMPTE RP 186-08. This carries the scanning system information as well as AFD codes relating to the output aspect of the ARC. (This specification was originally generated as ARDSPEC1 by several Major UK broadcasters and later incorporated into SMPTE RP 186 2008 version.)
- **VI Pass Data:** Allows passing of VI user bits data to the output video. Note that the input signaling source selected has to match the selected output format.

5.6.9.5 L23 (ETSI EN 300 294 v1.4.1)

The L23 Config controls define how the output ETSI EN 300 294 signaling is configured when the Aspect Signaling Control Enable check box is selected. This signaling format is generally referred to as WSS or Line 23 (L23), as this is the default line used to carry this signal in 625. WSS is only valid for 625 output video formats and is only supported for 625 output video format.

WSS signaling supports two output formats: ETSI EN 300 294, and a non-standard variant of ETSI EN 300 294.

- **Mode:** Output options.
  - **Auto:** If Output Format is set to ETSI, Auto generates an output WSS signal conforming to ETSI EN 300 294, with AFD codes that match the output aspect of the ARC. If Output Format is set to AFD, Auto generates an output WSS signal conforming to L23, with scanning system information and AFD codes that match the output aspect of the ARC.
  - **Pass:** When either L23 ETSI or L23 AFD is selected as the input signaling source, any valid ETSI EN 300 294 input signal is passed through to the output unchanged irrespective of what output format is set. For both output formats, the output signal may not represent the actual aspect of the output image. If no WSS signal is present at the input, then no WSS signal will be output.
  - **Force:** When Output Format is set to ETSI, Force generates an output ETSI EN 300 294 signal with AFD codes that match what is selected in the Force Output Signaling Setup – ETSI list. The list contains eight AFD codes.

    When Output Format is set to AFD, Force generates an output ETSI EN 300 294 signal that is modified to carry VI scanning system information and AFD codes that match what is selected in the Force Output Signaling Setup – AFD list. The list contains eight AFD codes for scanning 4:3 system information, and eight AFD codes for scanning 16:9 system information. The actual scanning system information used will always be 625, as WSS is only supported in 625 video output.
  - **Delete:** Disables embedding of ETSI EN 300 294 output signaling in the output video.
- **Output Format:** Inserts L23 information in either AFD or ETSI format.
  - **ETSI:** Generates output WSS signaling conforming to ETSI EN 300 294, carrying just the AFD codes relating to the output aspect of the ARC.
  - **AFD:** Generates output WSS signaling conforming to ETSI EN 300 294; however, payload of the signal has an alternative meaning: it has been modified to carry Video Index Scanning system information and AFD codes relating to the output aspect of the ARC. (This specification was originally generated as L23 spec by several major UK broadcasters and manufacturers. It has never been released as an official standard.)
- **Input Line:** WSS information is generally carried in the fist half of line 23; however, if the information is required on a different line, use the slider to specify the line on which it is carried in the input. The range is from line 10 to line 23 in one-line steps.

  Note: ETSI EN 300 294 signaling will only be extracted from this line number if the video input format is 625.

- **Output Line:** WSS information is generally carried in the first half of line 23; however, if the information is required on a different line, use the slider to specify the line on which it is carried in the output. The range is from line 10 to line 23 in one-line steps.

  Note: ETSI EN 300 294 signaling will only be extracted from this line number if the video input format is 625.

- **Output Line Status:** Shows the output line number on which WSS information is carried. If no line number is selected, “OFF” is displayed

- **AFD User Bits:**

  - **Force User Bits Value:** Forces the value set on the User Bits Value slider into the L23 output.

  - **User Bits Value:** Sets the line on which the four additional user bits are carried.

Note: WSS output signaling is only available in SD 625 output video format.

5.6.10 Aspect Signaling Control – Force Output Signaling Setup

Force Output Signaling Setup enables you to define the scanning system information and AFD codes inserted in the output signaling when Force is selected for any of the following three signaling types: SMPTE 2016, VI SMPTE RP 186, and WSS ETSI EN 300 294.

- **SMPTE 2016:** When SMPTE 2016 output signaling mode is set to Force, this control offers a list of 16 AFD codes for coded frame AR of 4:3 and the same AFD codes for a coded frame AR of 16:9. Selecting one will generate a SMPTE 2016 output signal.

- **SMPTE RP 186:** When VI output signaling mode is set to Force and output format is set to SMPTE, this control offers a list of two scanning system information codes: 4:3 and 16:9. The actual code used is determined by the output video standard: 625 or 525. Selecting one will generate a SMPTE RP 186-95 output signal.

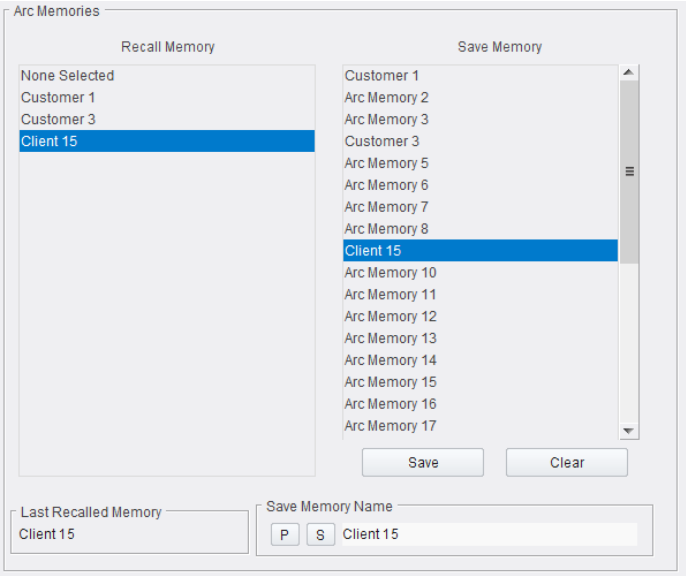
- **AFD:** When VI or L23 output signaling modes are set to Force, and their output formats are set to AFD, this control offers a list of eight AFD codes for scanning system information of 4:3, and eight AFD codes for scanning 16:9 system information. The actual scanning system information used is determined by the output video standard: 625 or 525. Selecting one will generate the following output signaling:

  - SMPTE RP 186-08: VI mode = Force, Output Format = AFD.

  - ETSI EN 300 294 (with SMPTE RP 186-08 payload): L23 mode = Force, Output Format = AFD.

- **ETSI:** When WSS output signaling mode is set to Force and output format is set to ETSI, this control offers a list of eight AFD codes. Selecting one will generate a ETSI EN 300 294 output signal.

5.6.11 ARC Memories



ARC memories allow save and recall of ARC settings, without changing any of the other unit settings. They are useful where specific ARC control needs to be rapidly changed, for example response to signaling, without changing any of the unit input, output, enhancement etc settings. There are 32 ARC memories.

5.6.11.1 To save a new ARC memory setting

- Select the required memory from list of 32 available ARC memories to which you want to save the current settings.

Note: Default memory names are ARC memory 1 to ARC memory 32.

- Click **Save**

The memory will now appear in the “Recall Memory” list.

5.6.11.2 To recall an existing ARC memory

- Select the required memory to recall from the list of saved memories.

The ARC memory settings are recalled.

5.6.11.3 To clear an existing ARC memory

- Select the required memory from the list of saved memories.
- Click **Clear**

The ARC memory settings are now cleared.

5.6.11.4 To change the ARC memory default name

- Select the required memory from the Save Memory list.
- Delete the current name in the Save Memory Name box.
- Enter the desired name in the Save Memory Name box.
- Click the **S** button

The ARC memory name has now been changed.

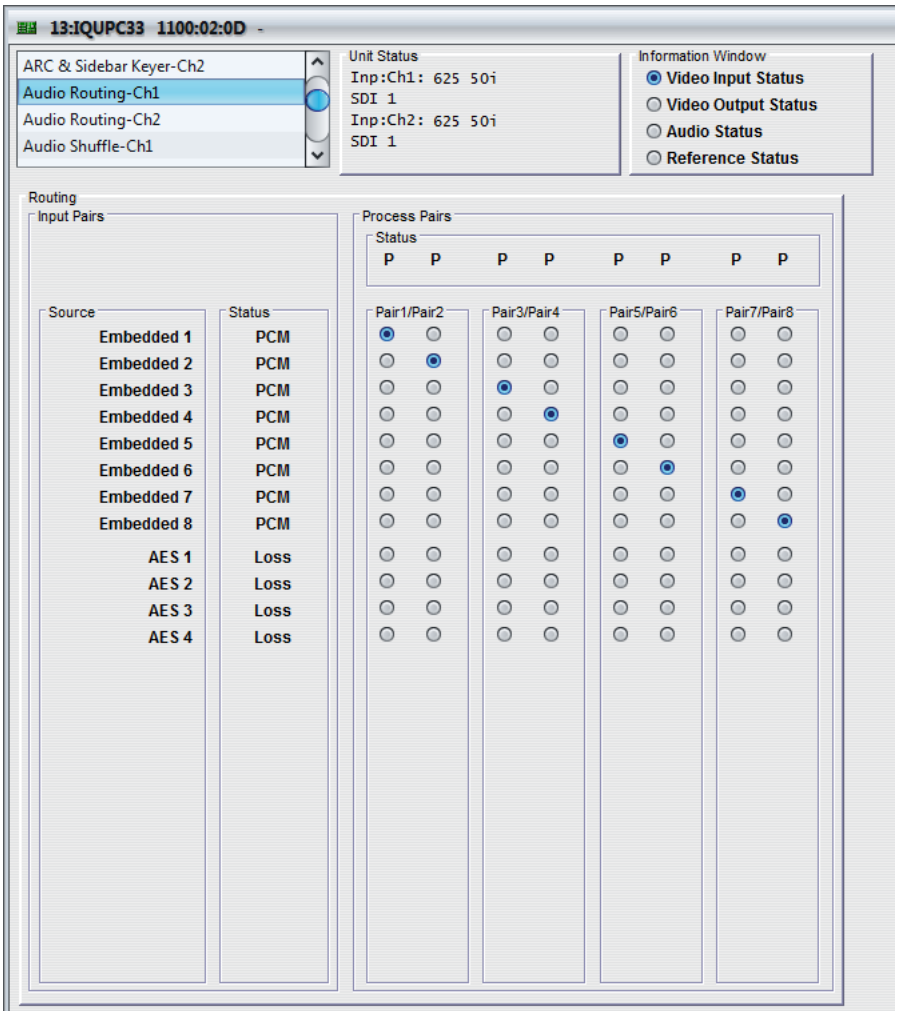
5.6.11.5 To revert an ARC memory name back to default

- Select the required memory from the Save Memory list.
- The current name appears in the Save Memory Name box.
- Click the **P** button

The ARC memory name has now been changed back to its original default name.

5.7 Audio Routing-Ch1 and Ch2

The Audio Routing-Ch1 and Ch2 screens are the first stage of the channel-based audio routing, with eight process pairs available for selection. The matrix of radio buttons enable you to route any available audio input pair to any process pair.



Note: The Audio Routing-Ch2 screen is only applicable to the IQUPC31 and IQUPC33.

5.7.1 Input Pairs

All audio input pairs available for routing on the process channel are listed here along with their current input status. The input pairs displayed are dependent on the product configuration and licensing options. Each input pair corresponds to a row of radio buttons in the routing matrix.

5.7.1.1 Source

Source lists the input sources available for routing.

- Embedded 1 –8: If the selected video input to the processing channel is capable of carrying embedded audio, the de-embedded audio pairs will be available here. Up to eight audio pairs are available for each processing channel.
- AES 1–8: If the AES pairs are configured as inputs on the Audio I/O AES page screen, the input AES audio pairs will be available here. Up to eight AES audio pairs are available for each processing channel.

5.7.1.2 Status

The Status box shows the input status of the corresponding audio pair in the Source list.

- PCM: Audio is PCM.
- Loss: Audio is unavailable or invalid.
- Data: Audio is non-PCM and not Dolby E.
- DolbyE: Audio is Dolby E.

5.7.2 Process Pairs

Eight output pairs are available from the routing matrix. These pairs are called the process pairs, each of which corresponds to a column of radio buttons in the routing matrix.

- To route an input source pair to a process pair, simply select the radio button that intersects the desired input pair row, with the desired process pair column.

5.7.2.1 Status

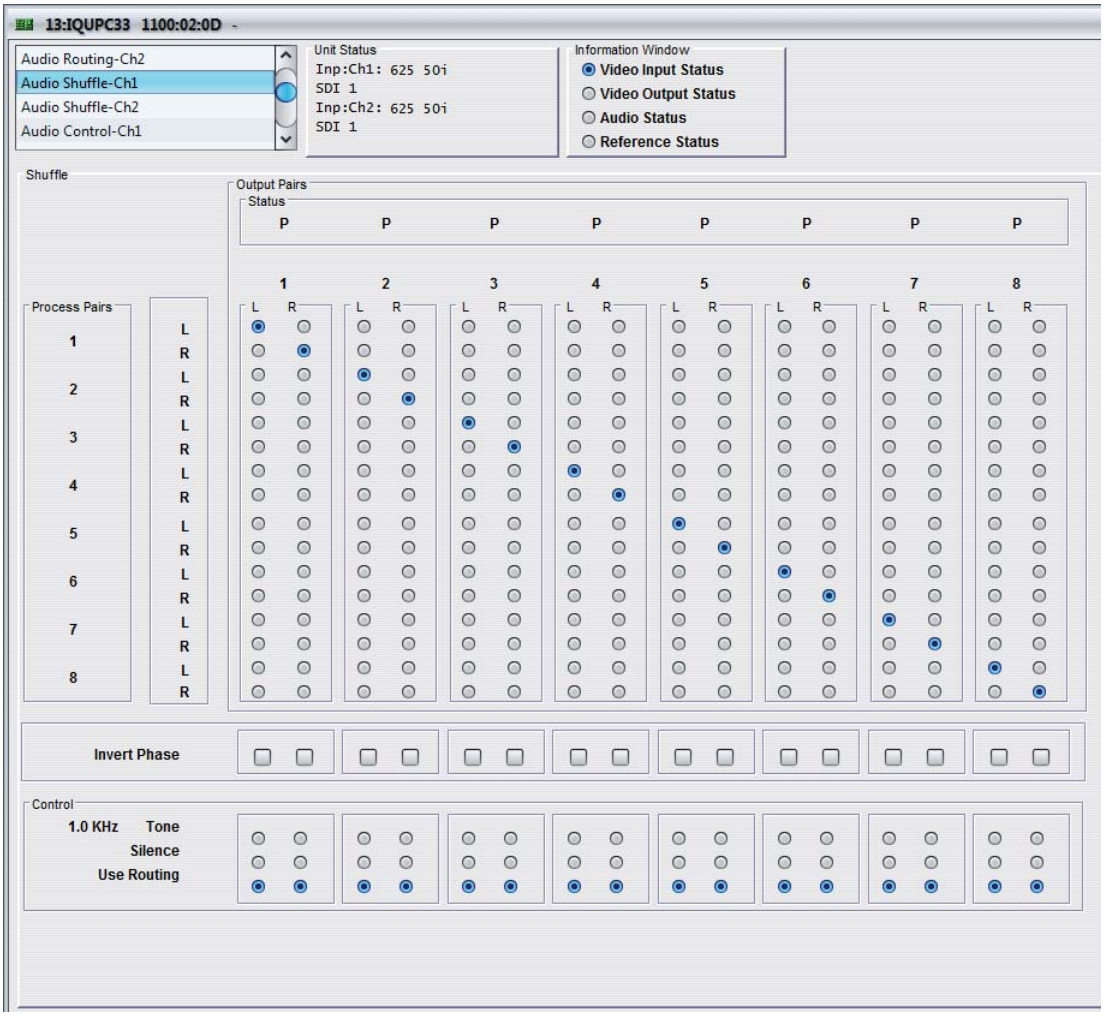
The Status box shows the status of the corresponding process pair.

- P: Audio pair routed from input sources is PCM.
- L: Audio pair routed from input sources is not detected (Loss).
- N: Audio pair routed from input sources in non-PCM.

Note: The “N” status refers to any valid input that is non-PCM, such as Data, Dolby D, or Dolby E.

5.8 Audio Shuffle-Ch1 and Ch2

The Audio Shuffle-Ch1 and Ch2 screens enables channel-based routing for PCM audio. Non-PCM audio is restricted to pair-based routing as channels cannot be split. The matrix of radio buttons enable you to route any available audio input pair to any process pair, providing this routing adheres to certain rules. See “Channel-based Routing Rules” on page 70 for more information.



Note: The Audio Routing-Ch2 screen is only applicable to the IQUPC31 and IQUPC33.

5.8.1 Process Pairs

The Process Pairs column shows the eight process pairs selected on the Audio Routing-Ch1/Ch2 screen. Each of the eight pairs is split into left and right channels to allow channel-based routing. Each process pair channel corresponds to a row of radio buttons in the shuffle matrix.

5.8.2 Output Pairs

16 output channels available from the shuffle matrix. These channels are grouped as pairs for output processing, such as embedding. These channels are called the output pairs, each of which corresponds to a column of radio buttons in the shuffle matrix.

- To route a process channel to an output channel, simply select the radio button that intersects the desired process channel row, with the desired output channel column.

5.8.2.1 Status

The Status box shows the status of the corresponding output pair.

- P: Audio pair routed out has two channels of PCM audio.
- N: Audio pair routed out has two channels of non-PCM audio.
- T: Audio pair routed out has two channels of test-tone audio.
- S: Audio pair routed out has two channels of silent audio.
- F: Audio pair routed out has two channels of forced mute (silent) audio.

Note: "T" (test tone) and "S" (silence) are both considered PCM audio. Therefore, according to the channel-based routing rules, tone and silence can be routed with PCM audio. If only one channel of the output pair is test tone or silence, its status as a pair is shown as "P" (PCM).

5.8.3 Channel-based Routing Rules

Although channel-based routing of PCM data is possible with this module, an issue may occur when channels contain non-PCM data, such as Dolby E. Because of the nature of this type of data, a left/right pairing must remain together and be processed and routed as a pair. If not, the encoded data can become corrupt or, most likely, meaningless. This is also true if two channels of non-PCM data are routed together, but are not originally from the same encoding source. Outputting an audio pair that comprises one channel of non-PCM and one of PCM could potentially damage downstream audio equipment – it may become confused as to whether the channels are PCM or non-PCM.

For these reasons, each time a selection is made in the shuffle matrix, the software will compute a basic set of routing rules to guarantee that the output routing setup is valid. If the output routing setup is invalid, the module automatically forces both channels of the output pair to be muted. The status reporting will show "F" for force mute to indicate that this has occurred.

Note: Certain rules determine which combinations are valid. An invalid combination will force the output to silence. The following table shows the rules that govern output pair combinations.

The left-channel data type is shown in the left column, the right-channel data type is shown across the top. The resultant status reported for the output pair is shown in the body of the table.

	Non-PCM	PCM	Tone	Silence	Loss
Non-PCM	N or F	F	F	F	F
PCM	F	P	P	P	F
Tone	F	P	T	P	F
Silence	F	P	P	S	F
Loss	F	F	F	F	F

P = PCM, N = non-PCM, S = silence, T = test tone, F= forced mute (silence).

To be recognized as valid non-PCM, both channels must:

- come from the same output pair
- have the left and right channels the correct way around
- not have the phase inverted

Failing to meet these conditions will cause the pair to be muted and the Status to show "F".

5.8.4 Invert Phase

The Invert Phase check boxes enable you to invert the audio phase of an output channel. Each check box is vertically aligned with the output channel that it controls. Each channel can be inverted independently of the other channel in its pairing. This is a useful control for dealing with input audio discrepancies.

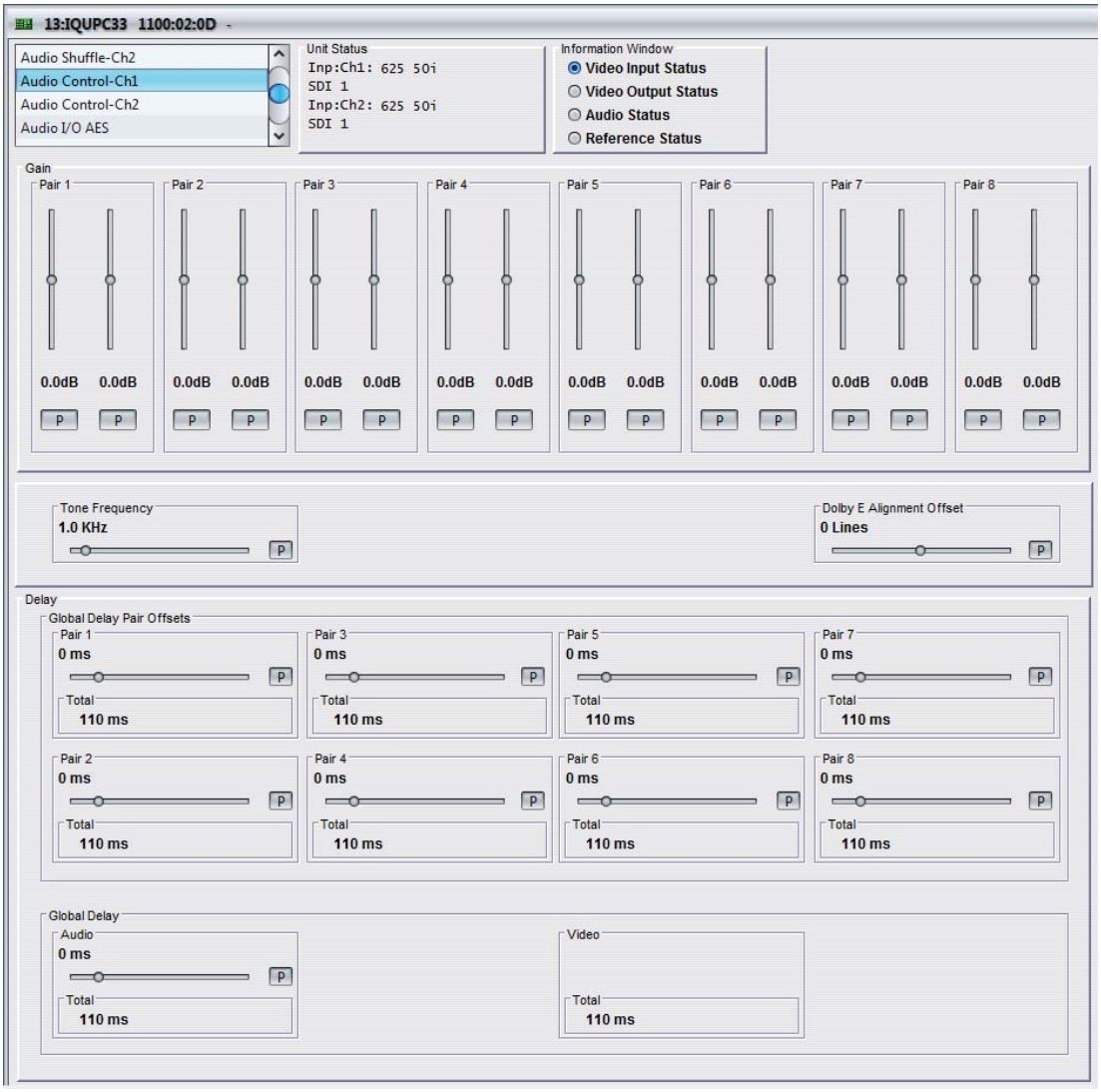
5.8.5 Control

Each radio button in the Control area is vertically aligned with the output channel that it controls, and for each channel is mutually exclusive. This means that each output channel has three modes of operation selectable.

- **Tone:** Output channel will output an internally generated test tone, dependant on routing rules.
- **Silence:** Output channel will output internally generated silence, dependant on routing rules.
- **Use Routing:** The shuffle matrix defines which process pair channel is routed to which output channel, dependant on routing rules.

5.9 Audio Control-Ch1 and Ch2

The Audio Control-Ch1 and Ch2 screens enable you to adjust the gain of the eight output pairs as configured on the Audio Shuffle-Ch1 and Ch2 screens.



Note: The Audio Control-Ch2 screen is only applicable to the IQUPC31 and IQUPC33.

5.9.1 Gain

The Pair 1–8 sliders adjust the gain of the left and right channels of the output pairs. The adjustment range is -18 dB to 18 dB in 0.1 dB steps. The preset value is 0 dB.

5.9.2 Tone Frequency

The Tone Frequency slider enables you to select the tone frequency. The selected frequency is also shown on the Audio Shuffle-Ch1 and Ch2 screens, next to the Tone radio buttons. The adjustment range is 0.1 KHz to 10 KHz in 0.1 KHz steps. The preset value is 1 KHz.

Note: All 16 output channels can independently turn tone on, but as there is only one test tone generator, it will be the same tone inserted on all channels.

5.9.3 Delay

The Delay controls enable you to set delay pair offsets and the audio delay relative to the video delay.

5.9.3.1 Tracking Audio Delay (where fitted*)

The module measures video delay input to output, and automatically compensates the audio via precision sample rate conversion. In this way, AV delay error is reduced to less than 2 ms. This is ideal for content where AV timing is critical e.g. lip sync (talking heads and musical events), and removes the need for manual adjustment. However, user adjustable audio delay (global and pairwise) is still additionally available, to compensate for up/down stream audio timing errors.

Note: *Tracking Audio Delay is not available in modules which were upgraded to V5.2.7 or above after installation. Only new builds of modules at version 5.2.7 and above will have tracking audio delay.

5.9.3.2 Global Delay

The Global Delay control shows the total video and audio delay for the current video conversion. The preset value for audio delay is the same as total video delay, in order that the two should be co-timed.

- **Audio:** Adjusts the audio delay relative to the video delay. The slider controls all eight audio output pairs as a bulk group. The adjustment range is -40 ms to 200 ms in 1 ms steps. The preset value is 0 ms.

  This is actually an offset to the total video delay. The preset value of 0 ms means that audio delay matches video. Moving the slider to -10 ms, means all eight output channels will be 10 ms earlier than the video at the output.

  The total global audio delay is displayed in the Total box: total global audio delay = (total video delay + global audio delay).

- **Video:** The Total box shows the current total video delay.

Note: Global delay is applied to all channels. Individual channel delays are added/subtracted from this delay.

5.9.3.3 Global Delay Pair Offsets

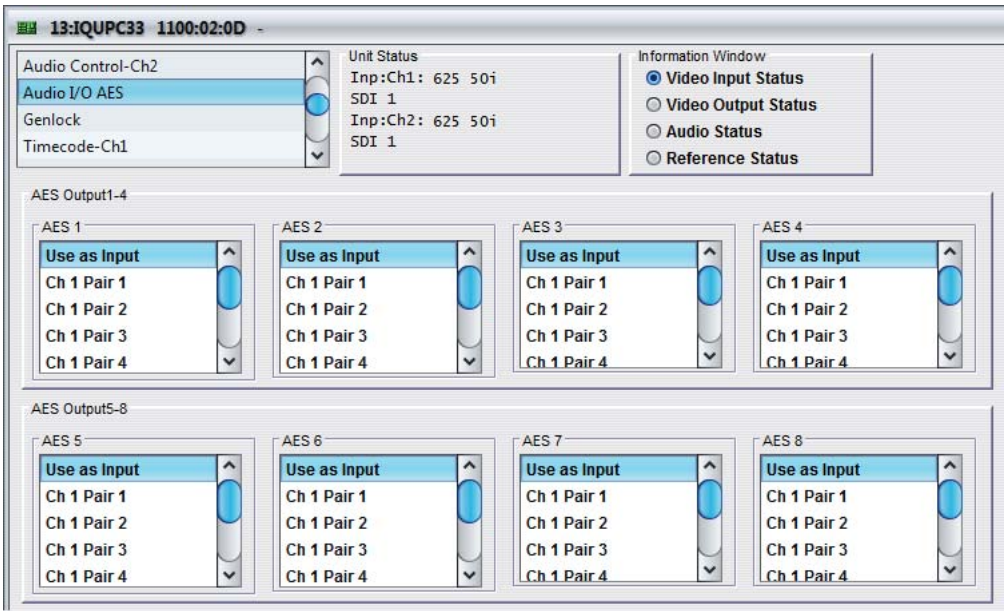
In addition to the Global Delay controls, eight separate controls enable you to adjust each audio output pair individually. Each slider applies an additional delay to the pair, which is offset from the audio global delay.

- **Pair 1–8:** Adjusts the audio delay offset for each of the eight audio output pairs. The adjustment range is -40 ms to 200 ms in 1 ms steps. The preset value is 0 ms.

  The total global audio delay pair offset is displayed in the Total box: total global audio delay pair offset = (total video delay + global audio delay + pair offset).

5.10 Audio I/O AES

The Audio I/O AES screen enables you to configure up to eight external AES connections.



5.10.1 AES 1–8

Each AES connector can be set to be either an input or an output. If set as an input, the connectors are hard-wired to the eight AES input pairs (shown in the Input Pairs – Source list on the Audio-Routing Ch1 screen). If set as an output, these controls select which source is routed to the AES connector.

For each AES pair, the following list of sources is available:

- **Use as Input:** Sets AES connector to be an input.
- **Ch 1 Pair 1:** Output Pair 1 as routed on Audio Shuffle-Ch1 Routing screen.
- **Ch 1 Pair 2:** Output Pair 2 as routed on Audio Shuffle-Ch1 Routing screen.
- **Ch 1 Pair 3:** Output Pair 3 as routed on Audio Shuffle-Ch1 Routing screen.
- **Ch 1 Pair 4:** Output Pair 4 as routed on Audio Shuffle-Ch1 Routing screen.
- **Ch 1 Pair 5:** Output Pair 5 as routed on Audio Shuffle-Ch1 Routing screen.
- **Ch 1 Pair 6:** Output Pair 6 as routed on Audio Shuffle-Ch1 Routing screen.
- **Ch 1 Pair 7:** Output Pair 7 as routed on Audio Shuffle-Ch1 Routing screen.
- **Ch 1 Pair 8:** Output Pair 8 as routed on Audio Shuffle-Ch1 Routing screen.
- **Ch 2 Pair 1:** Output Pair 1 as routed on Audio Shuffle-Ch2 Routing screen.
- **Ch 2 Pair 2:** Output Pair 2 as routed on Audio Shuffle-Ch2 Routing screen.
- **Ch 2 Pair 3:** Output Pair 3 as routed on Audio Shuffle-Ch2 Routing screen.
- **Ch 2 Pair 4:** Output Pair 4 as routed on Audio Shuffle-Ch2 Routing screen.
- **Ch 2 Pair 5:** Output Pair 5 as routed on Audio Shuffle-Ch2 Routing screen.
- **Ch 2 Pair 6:** Output Pair 6 as routed on Audio Shuffle-Ch2 Routing screen.
- **Ch 2 Pair 7:** Output Pair 7 as routed on Audio Shuffle-Ch2 Routing screen.
- **Ch 2 Pair 8:** Output Pair 8 as routed on Audio Shuffle-Ch2 Routing screen.

Note: If a pair is set as an output, it appears grayed out on the Audio Routing Ch1 screen.

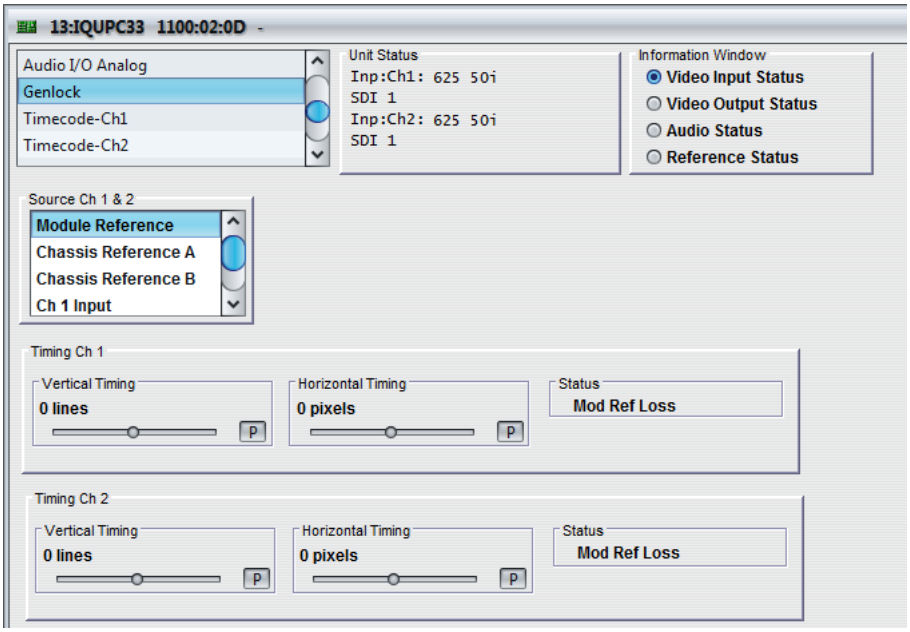
5.11 Genlock

The Genlock screen provides controls for locking the output video clock to the genlock source (input or reference) regardless of the video standard. If the genlock source and the video output are the same frame rate, for example, 50 Hz or 59.94 Hz, Genlock locks the output to the vertical phase of the genlock source, giving consistent and repeatable delay.

Note: Lock to input wherever possible. Only lock to an external reference if necessary.

When attempting to pass non-PCM audio, ensure that Genlock is enabled. If using an external reference, it must be clock-locked to the input video.

Note: If Genlock is set to Free Run, non-PCM audio will always be corrupt.



Note: The Source Ch2 and Timing Ch2 controls are only applicable to the IQUPC31 and IQUPC33.

5.11.1 Source Ch 1 and Ch 2

One genlock circuit applies to channel 1 and channel 2 output video signals. The Source menu enables you to select options for a genlock source.

- **Module Reference:** Locks the output video to the incoming rear-panel reference.
- **Chassis Reference A:** Locks the output video to incoming chassis reference A.
- **Chassis Reference B:** Locks the output video to incoming chassis reference B.
- **Ch1 input:** Locks the output video to the channel 1 input.
- **Ch2 input:** Locks the output video to the channel 2 input.
- **Free Run:** Locks the output video to an internal reference clock.

5.11.2 Timing Ch 1 and Ch 2

The Timing controls enable you to specify the horizontal and vertical genlock timing for each channel.

- **Vertical Timing:** Adjusts the vertical timing of the output signal with respect to the reference signal. The adjustment range is one output line in one-line steps. The preset value is 0.
- **Horizontal Timing:** Adjusts the horizontal timing of the output signal with respect to the reference signal. The adjustment range is one output frame in one-pixel steps. The preset value is 0.
- **Status:** Shows the status of the currently assigned reference. For example, if genlock is assigned to input 1, Status shows “Ch 1 Input” followed by the current status of the input. If there is no signal on the assigned reference, Status shows “REF Loss”.

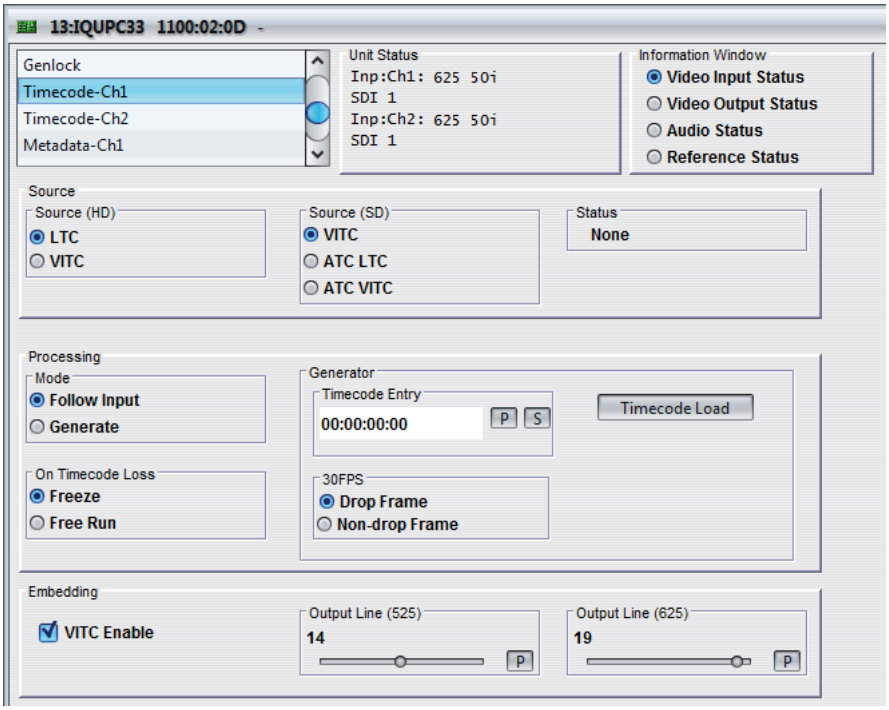
5.12 Timecode-Ch1 and Ch2

The Timecode-Ch1 and Ch2 screens provide timecode processing control.

For HD video inputs, ATC LTC and ATC VITC timecode data formats are supported. For HD video outputs, the timecode data format is fixed to ATC VITC. This is present in all HD video outputs if Follow Input mode is selected (with a valid input timecode detected), or if Generate mode is selected.

For SD video inputs, VITC, ATC LTC and ATC VITC timecode data formats are supported. For SD video outputs, the timecode data format is fixed to VITC. This is present in all SD video outputs if the VITC Enable check box is selected, and either Follow Input mode is selected (with a valid input timecode detected), or Generate mode is selected.

Note: External LTC timecode is not supported.



Note: The Timecode-Ch2 screen is only applicable to the IQUPC31 and IQUPC33.

5.12.1 Source

The Source controls enable you to choose a timecode format for HD and SD input video: LTC or VITC for HD, and VITC, ATC LTC, or ATC VITC for SD.

5.12.1.1 Source HD

For HD video standards, the supported input timecode format is ATC. This means that timecode data formatted as LTC, VITC, or both will be detected at the input; however, only one format can be selected.

- **LTC:** Select ATC LTC only if detected when video input is HD.
- **VTIC:** Select ATC VITC only if detected when video input is HD.

If the selected format is not detected at the input, no timecode processing will be available.

5.12.1.2 Source (SD)

For SD video standards, the supported input timecode formats are VITC and ATC. As with HD, ATC can mean that timecode data formatted as LTC, VITC, or both will be detected at the input; however, only one format can be selected.

- **VITC:** Select VITC only if detected when video input is SD.
- **ATC LTC:** Select ATC LTC only if detected when video input is SD.
- **ATC VTIC:** Select ATC VITC only if detected when video input is SD.

If the selected format is not detected at the input, no timecode processing will be available.

5.12.1.3 Status

The Status box reports which type of embedded timecode is detected within the video input to this processing channel. If no valid timecode is detected, “None” is displayed.

5.12.2 Processing

The processing controls enable you to select a mode of operation for timecode processing.

5.12.2.1 Mode

Two modes are available for timecode processing.

- **Follow Input:** The input timecode is read every frame and the actual time elapsed since timecode 00:00:00:00 is calculated. This elapsed time is then converted into an output timecode that matches the output video frame, and inserted into the output.

  There is an additional and complicated process to compensate for clock offset between in and out, which will generate repeated or skipped timecodes as necessary, just as happens when synchronizing at the same standard. If the output is clock-locked to the input, this process has no effect.

- **Generate:** The unit generates the output timecode internally to match the output video standard. You can specify a start time in the Timecode Entry box. See see section 5.12.2.3 below.

5.12.2.2 On Timecode Loss

On Timecode Loss defines how the embedded output timecode should behave if input timecode cannot be detected.

- **Freeze:** On timecode loss, the output timecode will freeze at the last valid detected input value, until the valid input returns.
- **Free Run:** On timecode loss, the output timecode will switch to free-run and generate its own timecode starting from the last valid detected input value, until the valid input returns.

Note: In Follow Input mode, only the selected source type of ANC packet is inserted into the output video. Therefore, the action on timecode loss is only applicable to the selected ATC type.

5.12.2.3 Generator

When timecode Generate mode is selected, the controls enable you to enter a specified starting timecode of the free-running internal timecode generator.

Note: When Generate mode is selected, both ATC LTC and ATC VITC are embedded in the output.

- **Timecode Entry:** In this field you can enter a value to specify when the internally generated timecode starts. Once set, the internally generated timecode will start when you select the Timecode Load button. To enter a value:

  In the Timecode Entry field, enter the required value and click S to set. To return to the preset value, click P.

- **Timecode Load:** Manually triggers the internally generated timecode, starting at the time specified in the Timecode Entry field.

- **30FPS:** Output timecode always follows the correct count sequence for the output standard, except when following an input timecode that does not represent actual time (except if the input is flagged as 59 non-drop).

  Drop Frame operates as follows:

  - When converting timecode from 29/59 Hz to 29/59 Hz standards, the output drop-frame type automatically matches the input (the Drop Frame control has no effect).
  - When using the internal timecode generator with a 29/59 Hz output standard, the drop-frame type is determined by the Drop Frame control.
  - When converting 23 Hz inputs to anything, follow input will give a broken timecode sequence.

5.12.3 Embedding

The Embedding controls enable you to enable/disable embedding of VITC in SD output video, and to choose the line on which it is embedded for both 525 and 625 outputs.

- **VITC Enable:** Enables the embedding of VITC in the SD output.

  Note: This control only enables the embedding of VITC. In order for VITC to be present in the output SD video, a valid timecode must be detected at the input when in Follow Input mode, or when Generate mode is selected.

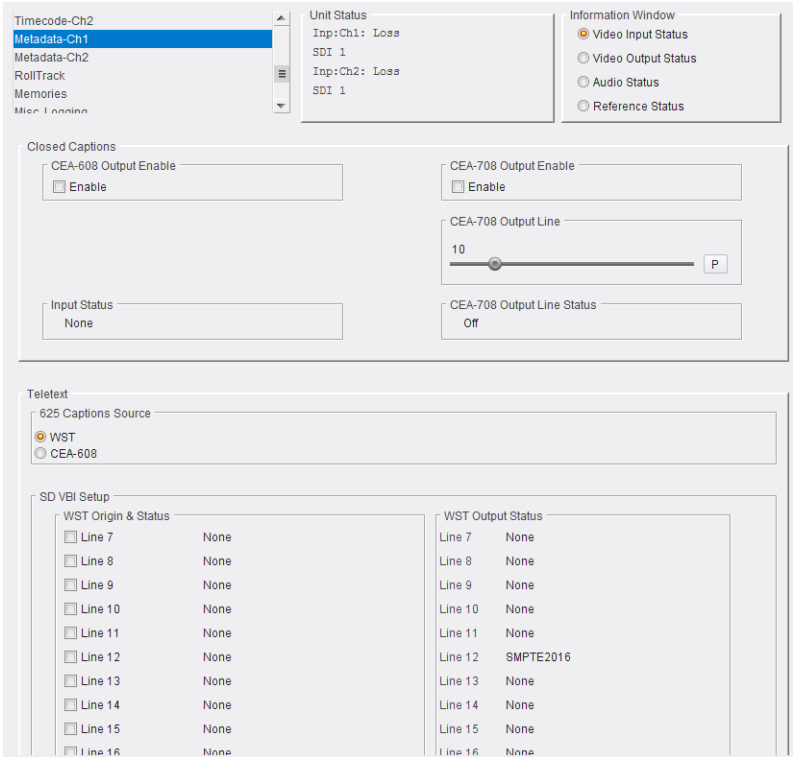
- **Output Line (525):** Selects the output line on which VITC is placed when the channel output is 525. The range is from line 11 to line 17 in one-line steps. The default is line 14.

- **Output Line (625):** Selects the output line on which VITC is placed when the channel output is 625. The range is from line 7 to line 20 in one-line steps. The default is line 19.

  Note: The line number stated is the first of the two lines used to embed VITC. The second line will always be the line selected + 2. For example, the default line for 525 is 14. Therefore VITC will be embedded on lines 14 and 16.

5.13 Metadata-Ch1 and Ch2

The Metadata-Ch1 and Ch2 screens enable you to control a set of closed captions and teletext subtitle information.



Note: The Metadata-Ch2 screen is only applicable to the IQUPC31 and IQUPC33.

5.13.1 Closed Captions

Closed Captions covers CEA-608 and CEA-708 specified captioning. Although these specifications support captioning in multiple video standards, CEA-608 is only supported in 525 input or output as a line 21 signal. CEA-708 is only supported in 59 Hz HD video standards as a VANC packet with a Caption Distribution Packet (CDP) payload.

Closed Caption pass-through is possible if a valid input closed caption is present and input and output video standards are the same.

Closed Caption transcoding is supported from CEA-608 to CEA-708 by taking the decoded bytes from the line 21 signal and inserting them into the compatibility byte within the CDP.

Closed captions are automatically detected in the input video, and the detected format shown in the Status window. For closed captions to be embedded in the output video, they must be enabled. User control for on which line to embed CEA-708 is provided, but CEA-608 is always fixed at line 21.

5.13.1.1 CEA608/708

- **CEA-608/708 Output Enable:** Enables embedding of CEA-708 captioning as an embedded VANC packet in 59 Hz HD output video.

  Note: The Output Enable controls only enable embedding of output closed captioning. For closed captioning to be present in the output video, valid input closed captioning must be detected, and you must select the correct output standard to support pass-through or transcoding.

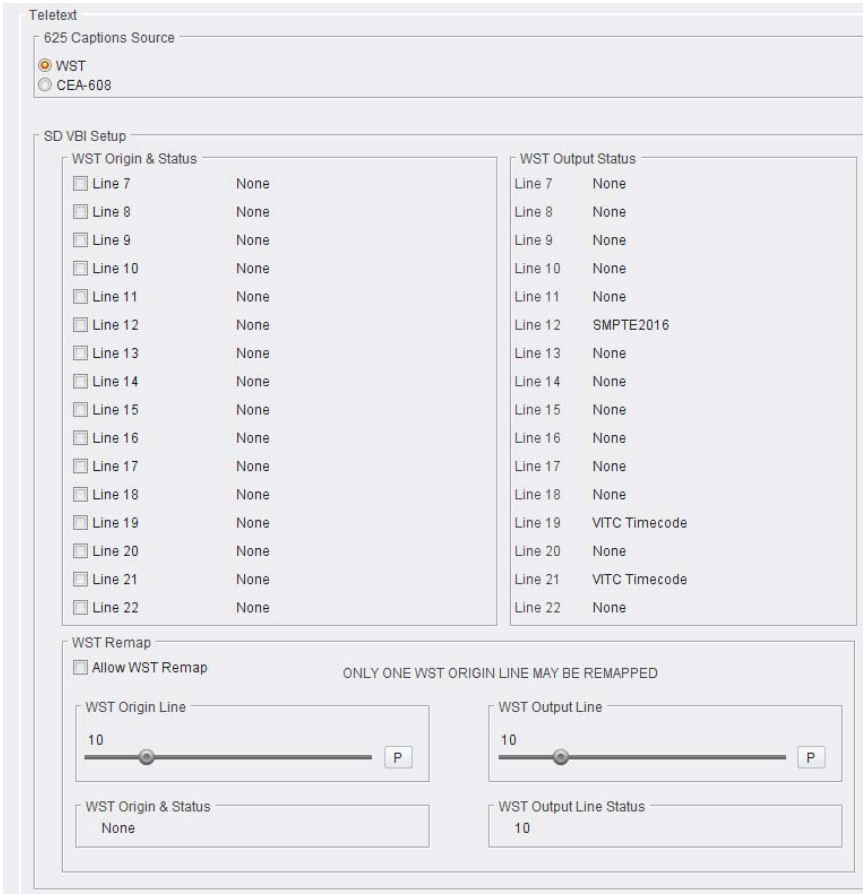
- **Output Line:** Selects the output line on which to insert CEA-708 VANC packets. The range is from line 8 to line 20 in one-line steps. The default is line 10.

- **CEA-708 Output Line Status:** Shows the output line number on which CEA-708 VANC packets are inserted. If no line number is selected, “OFF” is displayed.

5.13.1.2 Status

The Status box shows if either CEA-608 or CEA-708 captions are detected on the input.

5.13.2 Multi-line WST



The unit can pass World System Teletext (WST) for SD and RDD-08 or SMPTE 2031 teletext for HD. You can enable or disable teletext output and specify the input and output lines used.

Teletext covers World System Teletext (WST) subtitles, SMPTE RDD-08 and SMPTE 2031. For WST and RDD-08, only subtitle information is supported or processed. SMPTE 2031 VANC packets may be teletext subtitles, non-subtitles, or inverted teletext.

WST is only supported in 625 input or output encoded signals. RDD-08 is only supported in 50 Hz HD video standards as a VANC packet with a Subtitling Distribution Packet (SDP) payload. Teletext subtitle transcoding is supported from WST to RDD-08 by taking the

decoded bytes from the WST signal and inserting them into the payload within the SDP (see below). Transcoding from RDD-08 to WST is only possible if the SDP contains valid subtitles, which are extracted and encoded as an output WST signal.

Teletext pass-through

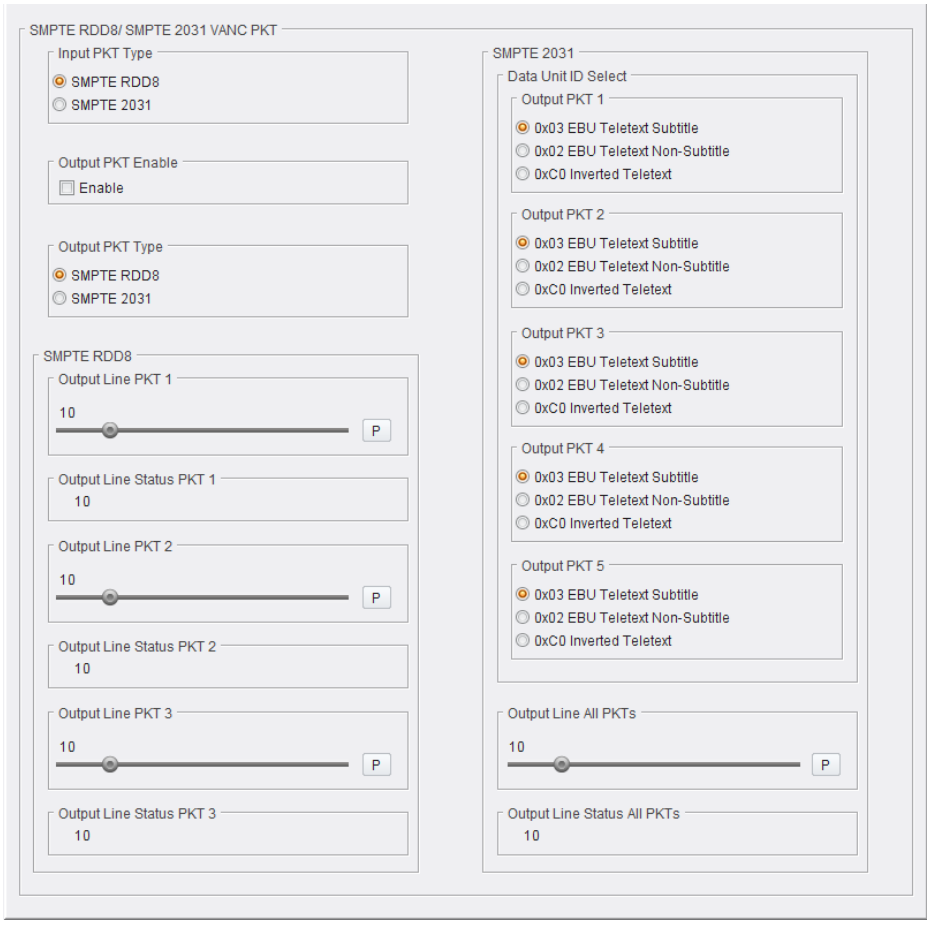
Teletext pass-through is possible if a valid input teletext subtitle is present and input and output video standards are the same. For SD video that uses a large number of WST VBI (where the VBI may have multiple lines of WST and 2 Timecode lines) the unit can encode/decode/transcode up to 15 lines of WST. In up and down conversion applications, this would use up to 3 RDD-08 (OP47) packets. RDD08 OP47 allows for 15 lines of WST to be encoded. SMPTE2031 allows only 5 lines of WST to be encoded,

625 Input - 625 Output

You can select which input lines of WST are encoded on the output. For the lines selected the status of WST being detected on that line is reported back.

The unit allows for up to 15 lines of WST to be selected on the input. If valid WST is detected on the selected lines, they will be placed on the same lines on the output. The status for each line will be reported back.

It is also possible to remap one WST origin line. In this case, select Allow WST remap. If valid WST is detected on the line selected by “WST origin line” it will be put on the line selected by the user control “WST output line”.



625 Input - HD Output

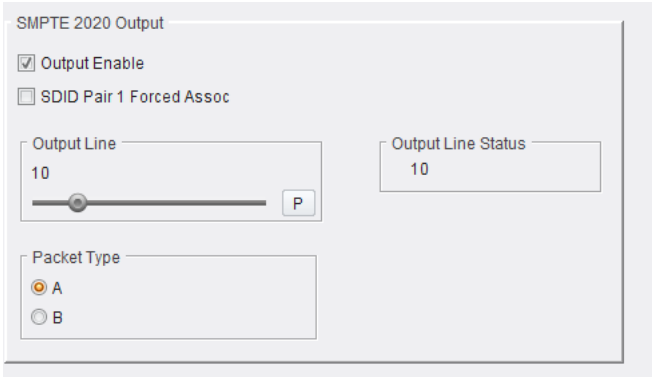
In applications where the video is upconverted, you can select which lines of WST are encoded.

1. If RDD08 (OP47) conversion is selected, then up to 15 lines can be encoded in the RDD-08 packet. A maximum of 3 packets are allowed on the output, each with individual line number controls. The number of output RDD-08 packets on the output is decided by the number of valid WST lines decoded on the input. The first five WST lines are encoded in the first RDD-08 packet, the next 5 in the second RDD-08 packet and so on.

2. If SMPTE2031 conversion is selected, then the first 5 lines selected on the input are encoded in the 2031 packet. Each single WST line corresponds to one SMPTE2031 packet on the output. All packets will be placed on the same line selected by the user control (Output Line All PKTs). The Data Unit ID can be set to Teletext Subtitle, Teletext Non-Subtitle or Inverted Teletext.

5.13.3 SMPTE 2020 Output

SMPTE 2020 Output: Selects the output line on which to insert a SMPTE 2020 VANC packet if the output is enabled. The range is from line 8 to line 20 in one-line steps. Preset is line 10.



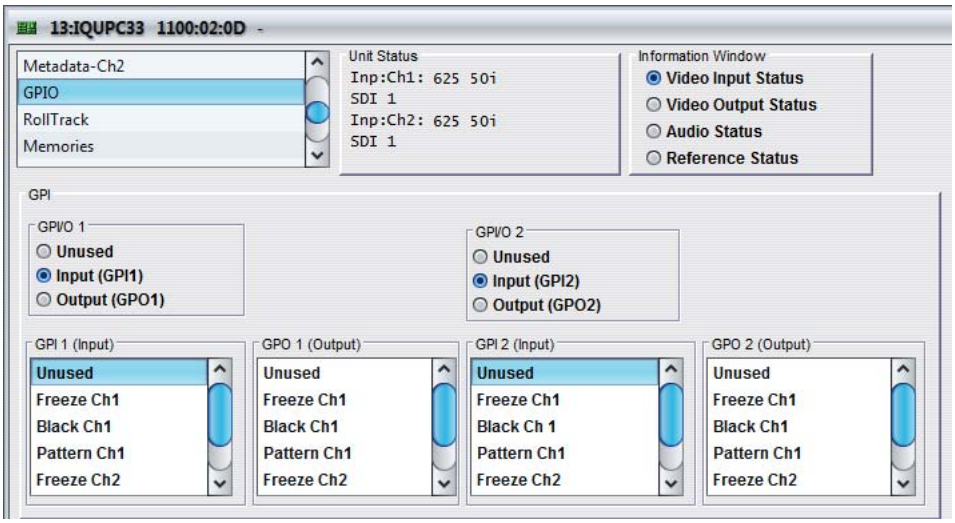
It is possible to set a forced association in the SMPTE 2020 metadata which sets the Secondary Data ID (SDID) values used to identify the VANC packets to 45/02 (pair 1).

To use this control, enable “SDID Pair 1 Forced Assoc” from the Dolby menu under the sub-menu SMPTE 2020 Output. When enabled, the outgoing 2020 data will be labelled 45/02 (pair 1).

5.14 GPIO

The GPIO screen enables you to configure General Purpose Interface Input/Output functions.

If a rear panel with GPIO screw terminal connections is fitted, the controls on this screen will be active. The screw terminal connector provides two GPIOs that can be configured as either an input or an output.



5.14.1 GPIO 1 and 2

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

5.14.2 GPI 1 and 2 (Input)

When the GPI is configured as an input, a low to high transition will trigger the GPI input function. Each of the following options is initial-edge triggered. Once this has taken place, the option remains selected until some other process is initiated.

- **Freeze Ch1:** The output picture will be frozen and the Freeze check box on the Output screen selected.
- **Black Ch1:** The output picture will be black and the Test Patterns – Black radio button on the Output screen selected.
- **Pattern Ch1:** The output picture will be a ramp and the Test Patterns – Ramp radio button on the Output screen selected.
- **User Memory 1 to 16:** Any saved user memories will appear in the GPI Input list. The default memory name is “User Memory *N*”, where *N* is the memory number from 1 to 16.

  The name that appears here is the same as that on the Memories screen. Triggering this input will perform a memory recall exactly as it would on the Memories screen.

5.14.3 GPI 1 and 2 (Output)

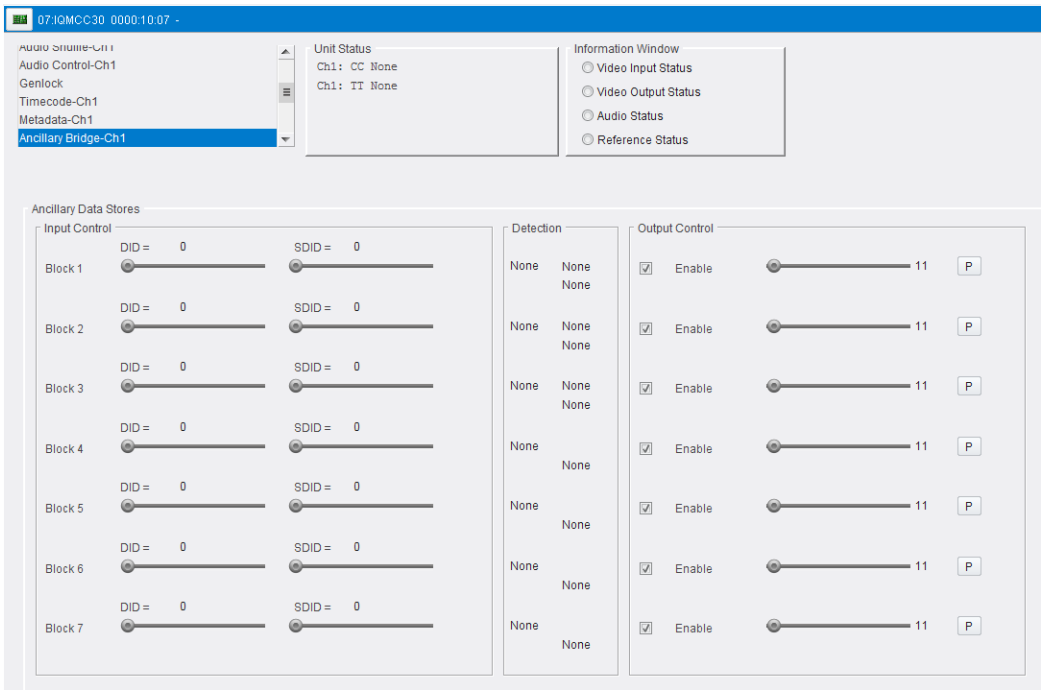
When the GPI is configured as an output, this enables you to choose an action that will produce an output signal at the GPI connector. The GPI output will be driven to low when the action is true or high when false.

- **Freeze Ch1:** GPI output will be driven low when freeze is selected, and will return high when freeze is deselected.
- **Black Ch1:** GPI output will be driven low when Test Patterns – Black is selected on the Output screen, and will return high when Test Patterns – Black is deselected.
- **Pattern Ch1:** GPI output will be driven low when Test Patterns – Ramp is selected on the Output screen, and will return high when Test Patterns – Ramp is deselected.

5.15 Ancillary Bridge-Ch1,Ch2

The Ancillary Bridge 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, RDD08, SMPTE2016, SMPTE2031, ATC) by the ancillary data block. The exception is in processing SD-ATC, where you should use the bridge.

You can select the ANC packet type to be transferred and the line number at the output on which the transferred packet is to appear, then the bridge operates automatically when enabled.



5.15.1 Operation

1. Select the ANC packet type to be transferred using the DID and SDID Input Controls.
2. Select the output line using the Output Control (default is 11).
3. Check the Enable box in Output Control (default is enabled).

5.15.2 Warnings

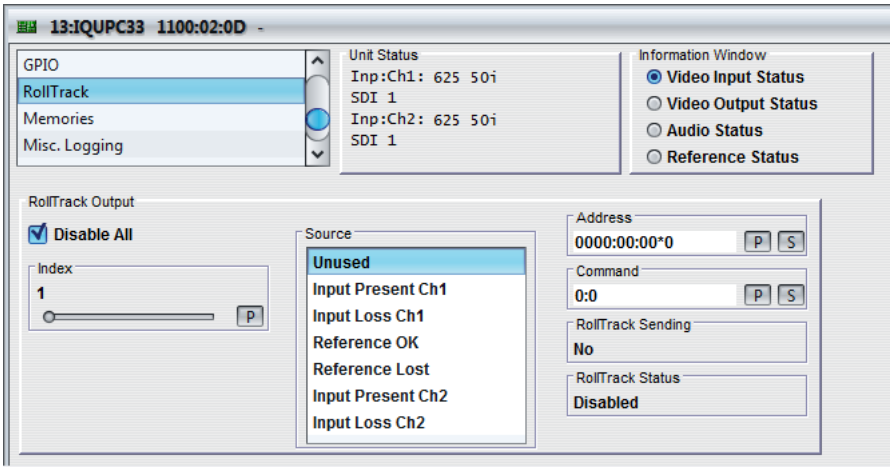
- The ANC bridge can only transfer up to seven different ANC packet types.
- For each of the seven ANC types, only one packet can be handled at a time. When a packet has been read from the input, until its nominated output line occurs and the packet is read from the store, any other packets of the same type are ignored. No line number is reported for a packet which has been ignored.
- No changes can be made to the ANC packets; they are forwarded exactly as received.
- There is no control to reset the stores. When not in use they should left reading DIDs which never occur such as 0 or 255 so that old packets aren't transmitted when the output line numbers are programmed.
- There is no check of remaining ancillary space at the start of a packet transmit. ANC packet length is from 4 to 259 words but the packet lengths are not reported to the CPU. Errant packets are corrupted by the syncs they try to overwrite.

5.15.3 Special features

- If more than one of the stores is set to transmit in the same space (HANC or VANC) of the same line, the packets will be transmitted in ascending order of store number.
- More than one store can be set to pass the same type of packet. The lowest numbered empty store is used. Different input fields and output line numbers can be used.
- The line number on which an input packet occurs and whether it was in HANC or VANC is reported each store. These registers are cleared after they are read so subsequent reads will say 0 - valid line numbers are from 1. This is how to tell whether the nominated ANC packets are occurring or not (a valid output line number must be set since new packets aren't reported whilst a store is full).
- If the DID for a store is set to 128 or greater, the SDID register is ignored and all packets with that DID can be passed through that store. (These packets are type 1 and the place of the SDID is taken by a data block number.)
- A range of up to 32 SDIDs can be matched for a given DID by setting the SDID range bits for a store.
  To pass a single SDID, set the range to 0.
  For Dolby metadata (SMPTE 2020-1) the SDIDs can be from 1 to 9 so the SDID would be 1 and the range 8.

5.16 RollTrack

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



5.16.1 Disable All

The Disable All check box disables all RollTrack functions.

5.16.2 Index

The Index slider enables you to set up five different RollTrack outputs.

5.16.3 Source

The Source list specifies the source of the information that triggers the data transmission.

Unused	No RollTracks sent.
Input Present	Input is detected and valid.
Input Loss	Input is not detected.
Reference OK	Selected reference is detected and valid.
Reference Lost	Selected reference is not detected.

5.16.4 Address

Address enables you to select the address of the selected destination unit.

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

- The first set, 0000 in the example, is the network segment code number.
- The second set, 10 in the example, identifies the enclosure/mainframe unit.
- The third set, 01 in the example, identifies the slot number in the unit.
- The fourth set, 99 in the example, is a user-defined number that identifies the destination unit in a multi-unit system. This ensures that only the correct unit responds to commands. If left at 00, an incorrectly fitted unit may respond unexpectedly.

Rolltracks can be internally looped back using address FFFF:00:00.

5.16.5 Command

Command enables a command to be sent to the selected destination unit. Each RollTrack command comprises two sets of numbers, for example, 33039:3.

- The first set, 33039 in the example, is the RollTrack command number, which identifies the command.
- The second set, 3 in the example, is the value sent with the command.

5.16.6 RollTrack Sending

Rolltrack Sending shows information when the unit is sending a RollTrack command.

No	The command is being sent.
Yes	The command is being sent.

5.16.7 RollTrack Status

RollTrack Status shows information about the status of the selected RollTrack Index.

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

5.16.8 Configuring a RollTrack Action

1. Use the Index slider to select the Index number. This identifies the RollTrack action being configured. You can create up to five RollTrack actions.
2. From the Source list, select the source that will trigger RollTrack transmission.
3. In the Address field, enter the RollTrack address and click S to set. To return to the preset value, click P.
4. In the Command field, enter the RollTrack command and click S to set. To return to the preset value, click P.

5.16.9 Viewing RollTrack Information

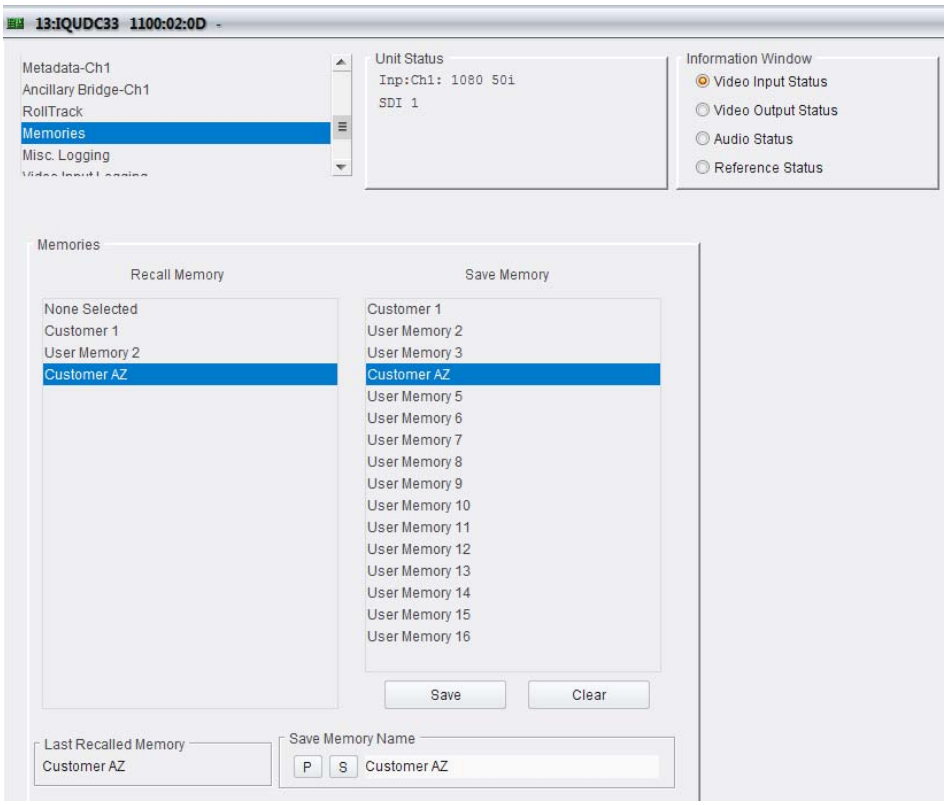
See see section 5.16.6 and see section 5.16.7.

5.17 Memories

The Memories screen enables you to save up to 16 memory setups and recall them when required.

You can change the default memory names to more relevant ones if required.

Note: You can store and recall all control in a user memory except for the following sections: Log Enable, RollTrack, GPIO, Memories.



5.17.1 Saving Memory Settings

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

5.17.2 Changing a Memory Name

- In the Save Memory Name field, type the new memory name and click S to set. To return the memory to its preset value, click P.

5.17.3 Recalling a Memory

The Recall Memory list recalls the settings saved in a memory location. The Last Recalled Memory box shows the most recently recalled memory.

To recall a memory:

- In the Recall Memory column, select the memory you want to recall. The recalled settings are applied and the memory name appears under Last Recalled Memory.

Note: Memories do not recall log field states, such as whether a log value is enabled or disabled.

5.17.4 Last Recalled Memory

The Last Recalled Memory box shows the most recently recalled memory.

5.18 Logging

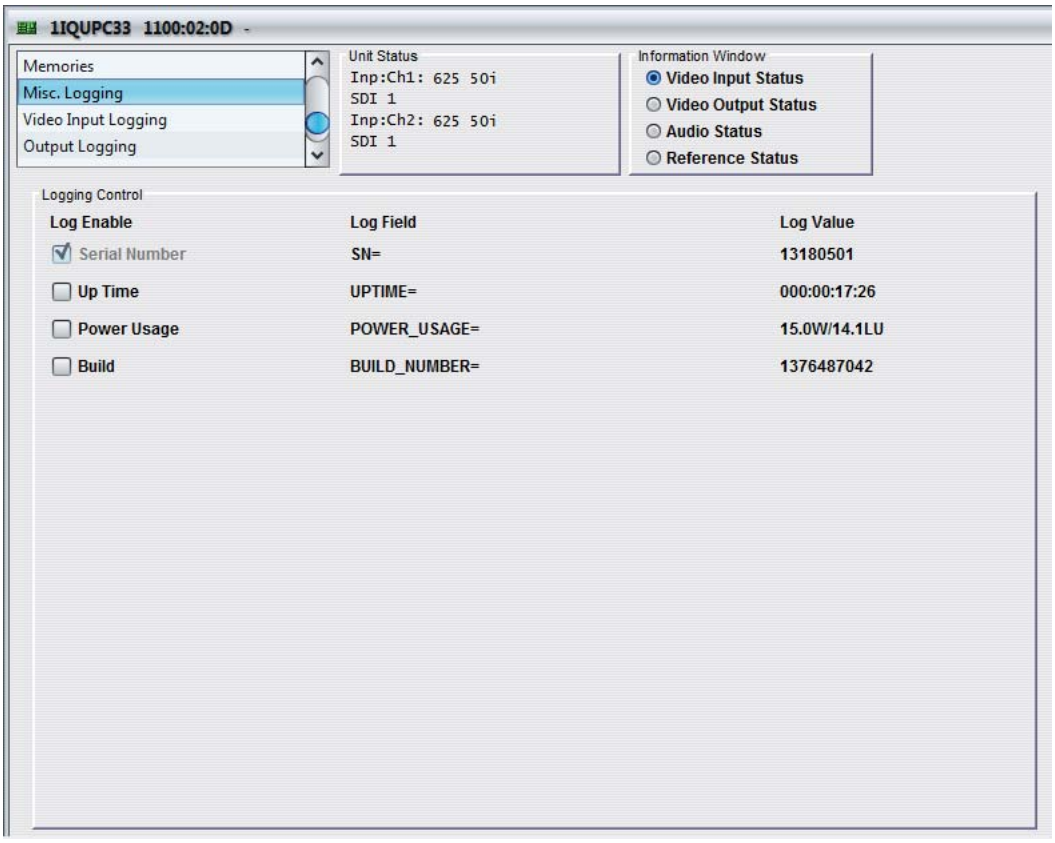
Logging makes information about various parameters available to a logging device connected to the RollCall network.

Each logging screen has three columns:

- **Log Enable:** Use the check boxes to select the parameters for which log information should be collected.
- **Log Field:** Shows the name of the logging field.
- **Log Value:** Shows the current log value.

5.18.1 Misc. Logging

The Misc-Logging screen shows the current log information for the unit's basic parameters.



Log Field	Description
SN=	The module's unique serial number. Note: this cannot be deselected.
UPTIME=	Shows the time since the last restart (format ddd:hh:mm:ss).
POWER USAGE=	The power rating for the module. Note: this is not a live power reading, but a maximum power rating.
BUILD=	The factory build number. This number identifies all parameters of the module.

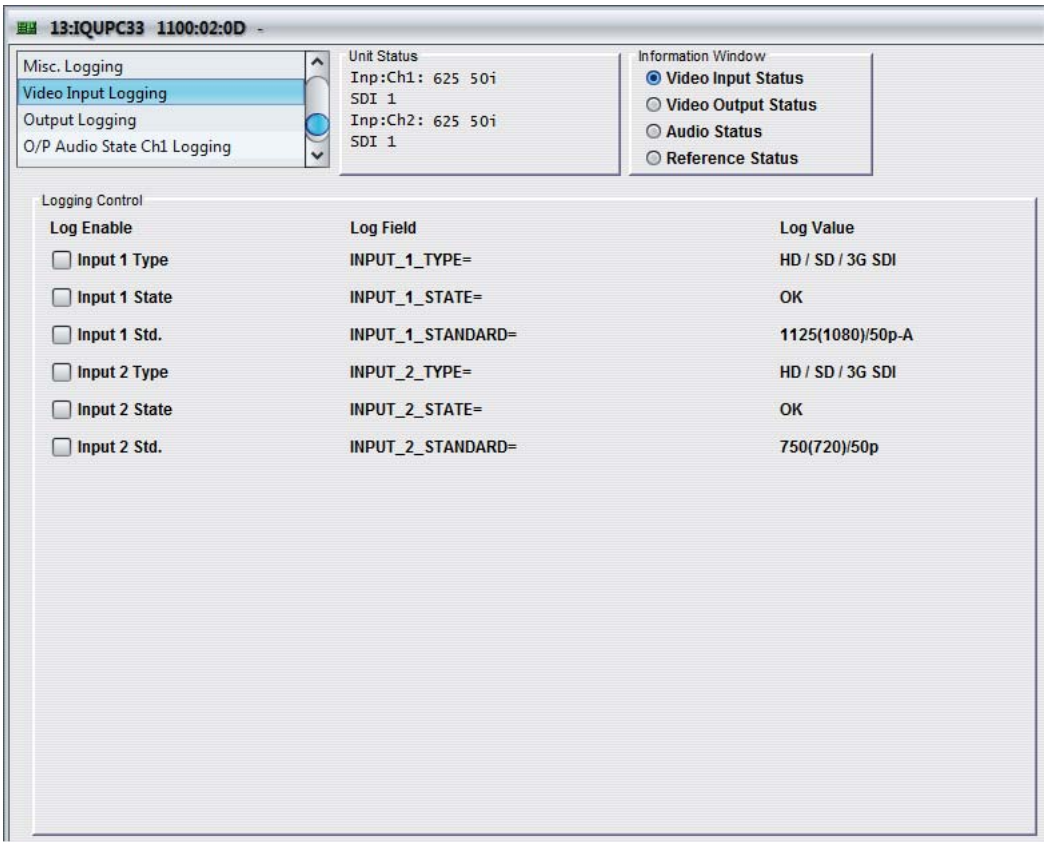
5.18.2 Video Input Logging

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

Up to five inputs are available. Inputs 1 & 2 are serial SDI and are present on all variants of rear panel. Input 3 is CVBS (if fitted). Inputs 4 & 5 are SFP inputs (if fitted).

SFP inputs appear if a rear panel with an SFP connection is fitted. The SFP input selections will appear grayed out if either no SFP module or an unsupported SFP module is inserted in the rear panel connector.

Note: Inputs are the physical connections to the rear panel and not inputs to the processing channels.



Log Field	Description
INPUT_*N*_TYPE=	The type of input as specified by the module's configuration: • HD/SD/3G SDI – SDI BNC serial input connection
INPUT_*N*_STATE=	The current input state: • OK – Input signal is good • Fail – Input signal is not detected
INPUT_*N*_STANDARD=	The current input standard. See supported input standards information.

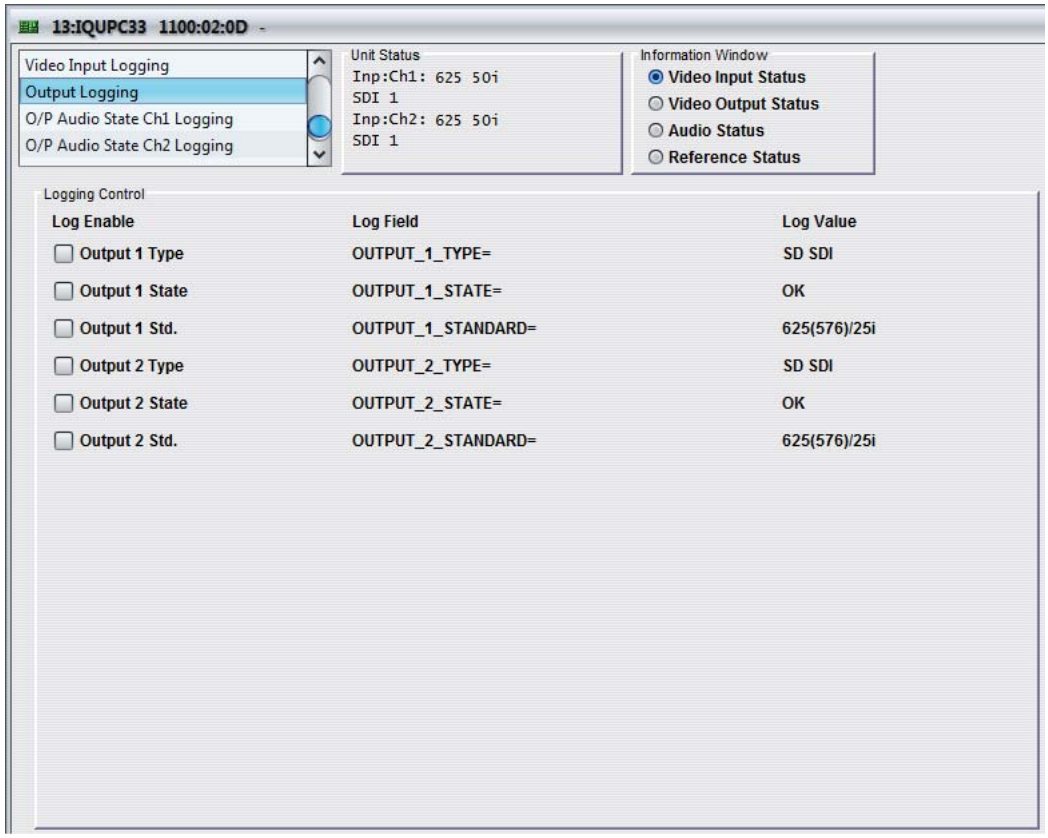
5.18.3 Ref/Output Logging

The Ref/Output Logging screen displays the current log information for the external reference inputs, and the output of each processing channel.

The Reference field is present if a rear panel with external reference input connection is fitted.

Output 1 is always present on all variants of rear panel. Output 2 is present on dual-channel product variants.

Note: The outputs are not the physical connections to the rear panel, but the output of the processing channels.



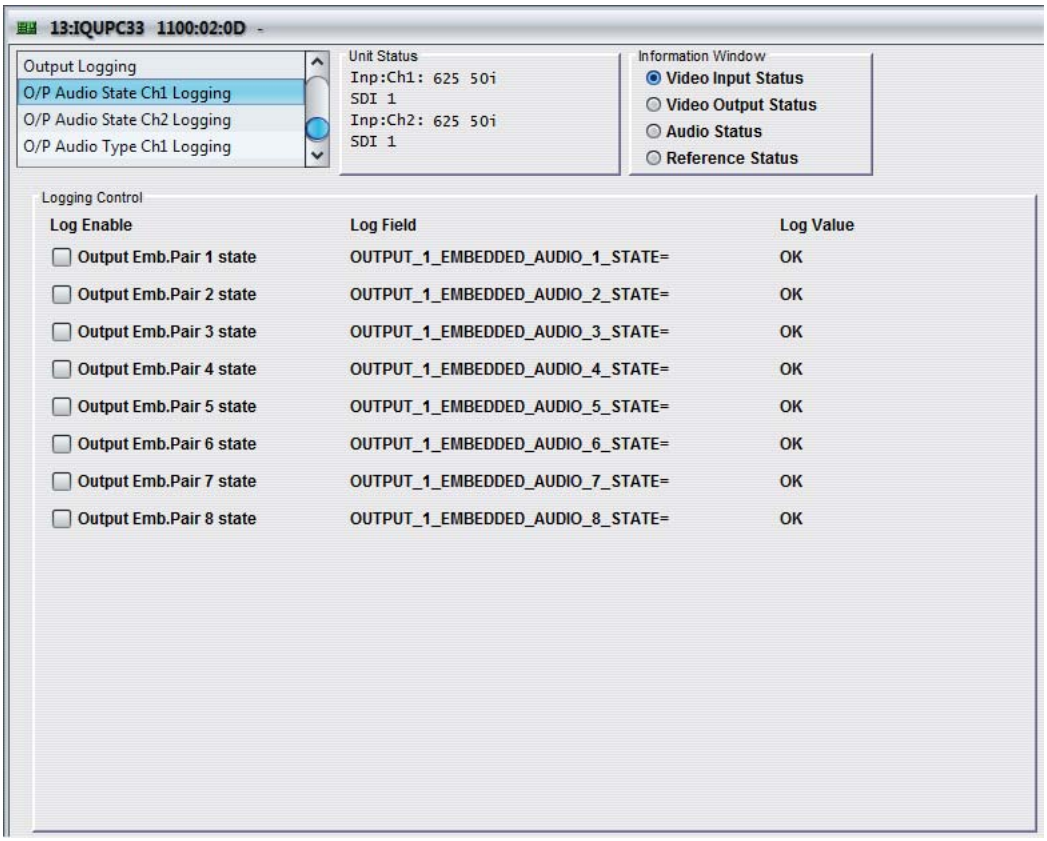
Log Field	Description
OUTPUT_*N*_TYPE=	The type of output as specified by the module's configuration: • HD/SD SDI – SDI BNC serial input connection
OUTPUT_*N*_STATE=	The current output state: • OK – Input signal is good • Fail – Output signal error
OUTPUT_*N*_STANDARD=	The current output standard. See supported output standards information.

Note: Output 2 is only applicable to the IQUPC31 and IQUPC33.

5.18.4 O/P Audio State Ch1 and Ch2 Logging

The O/P Audio State Ch1 and Ch2 Logging screens display the state of the eight audio pairs from the respective output processing channel. These are the eight audio output pairs selected on the Audio Shuffle-Ch1 and Ch2 screens.

Note: The outputs are not the physical connections to the rear panel, but the output of the processing channels.



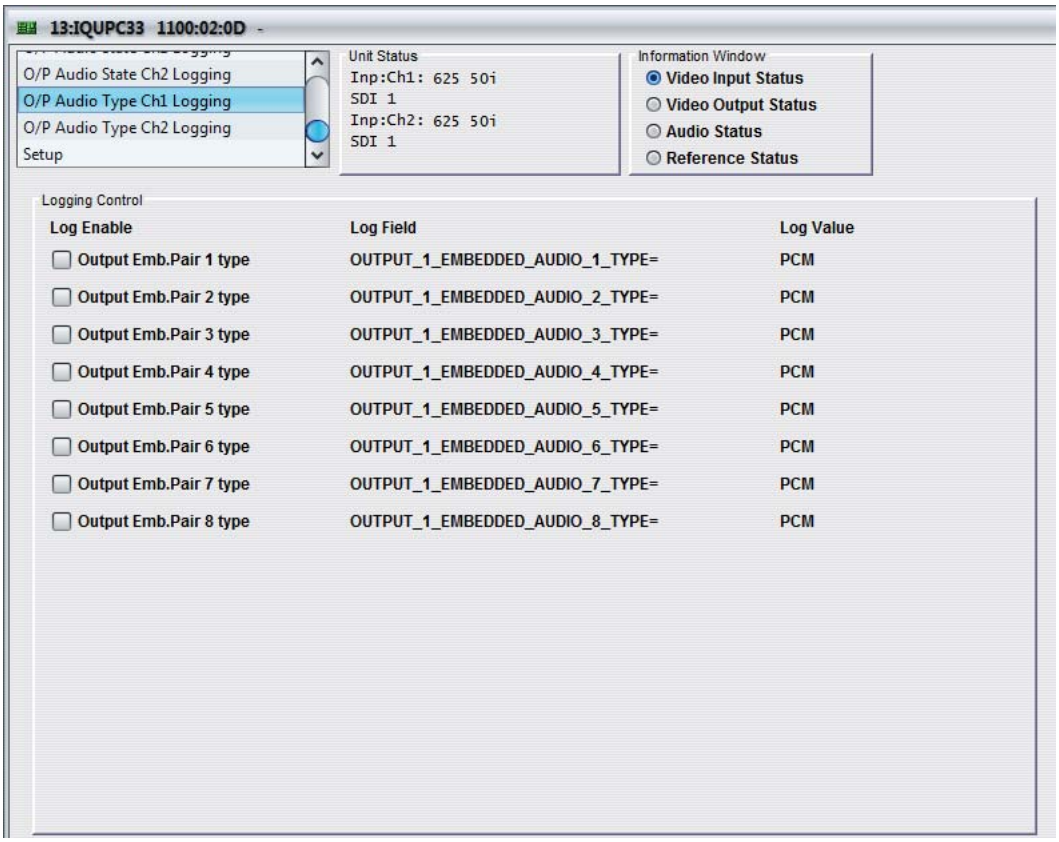
Log Field	Description
OUTPUT_*N*_EMBEDDED_AUDIO_*N*_STATE=	The audio output state as specified by the module's configuration: • HD/SD SDI – SDI BNC serial input connection

Note: The Output Audio State Ch2 Logging screen is only applicable to the IQUPC31 and IQUPC33.

5.18.5 O/P Audio Type Ch1 and Ch2 Logging

The O/P Audio Type Ch1 and Ch2 Logging screens display the state of the eight audio pairs from the respective output processing channel. These are the eight audio output pairs selected on the Audio Shuffle-Ch1 and Ch2 screens.

Note: The outputs are not the physical connections to the rear panel, but the output of the processing channels.

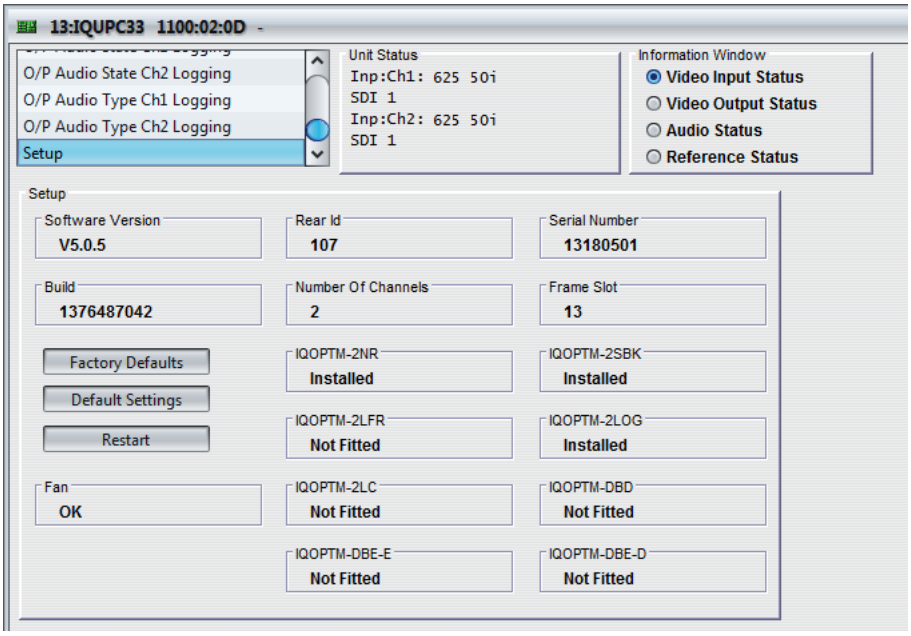


Note: The Output Audio Type Ch2 Logging screen is only applicable to the IQUPC31 and IQUPC33.

Log Field	Description
OUTPUT_*N*_EMBEDDED_AUDIO_*N*_TYPE=	The audio output type as specified by the module's configuration: • PCM • Non-PCM • Tone • Silence • Loss

5.19 Setup

The Setup screen displays basic information about the unit such as the serial number and software version.



- **Software Version:** The currently installed software version.
- **Rear ID:** The rear panel ID number.
- **Serial Number:** The module's serial number.
- **Build:** The factory build number. This number identifies all parameters of the module.
- **Number of Channels:** The number of processing channels.
- **Frame Slot:** The module's current frame slot.
- **Fan:** Fan status.
- **Licensed Options:** (For example, IQOPTM-2NR.) Shows which licensed options are installed. If a licensed option has not been purchased, its status shows "Not Fitted". For more information on licensed options, see "Software Options" on page 11.

5.19.1 Factory Defaults

The Factory Defaults button resets the module settings to their factory defaults, and clears all user memories.

5.19.2 Default Settings

The Default Settings button resets the module settings to their factory defaults, leaving user memories intact.

5.19.3 Restart

The Restart button reboots the module, simulating a power-up/power-down cycle.

Appendix A Linear Frame Rate Converter Option

If the IQOPTM-LC or IQOPTM-2LC option is fitted, the module will offer one (LC) or two (2LC) channels of linear frame rate conversion as part of the upconversion process.

In this case, additional output frame rates will be available for each input frame rate.
For example, an incoming signal at 625 50i can be converted to 1080 59i.

Simple conversion set-up: worked example assuming SDI I/O

1. Connect 625 50i SDI input to Serial In 1.
2. Connect the desired reference signal to either of the two BNCs available on Ref In (this is optional if free run or input lock are required).
3. Connect monitor to Serial Out 1.
4. Connect required downstream equipment to Serial Out 2.
5. Navigate to the Output page.
6. Select the desired output format and standard e.g. 1080 59i.
7. Navigate to the Genlock page
8. Select the appropriate genlock source (reference, input or free-run).

You are now converting 625 50i video to 1080 59i, the output of which can be viewed on the monitor you have connected in step 3.

You can verify the input, output and reference status using the information window.
To view the required status select from:

- Video Input Status
- Video Output Status
- Reference Status

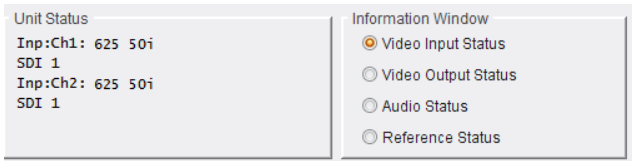


Figure 1 Video Input Status

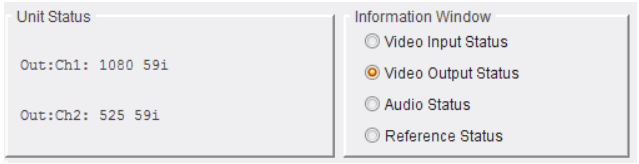


Figure 2 Video Output Status

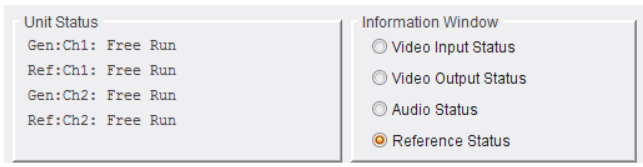


Figure 3 Reference Status

Appendix B Logo Insertion

B.1 Logo Insertion Introduction

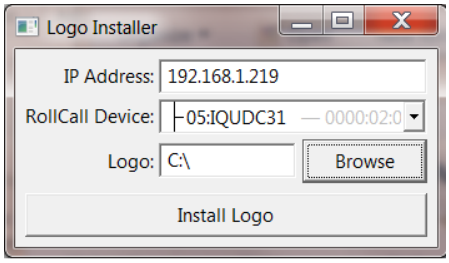
The logo insertion option provides the facility to key an imported static or animated graphics image onto the video output. The logo inserter accepts most common graphics formats and will generate video format specific files with the appropriate interlace and color gamut for keying onto the output video without rescaling.

To use the logo inserter, first upload logos onto the module using the logo uploader application (see section B.2). Then, access the logo insertion controls via the Output Control (see section 5.3.10).

Logos of size up to 400 pixels by ¼ picture height (maximum 480 lines) can be displayed. The logo sequence capacity is 10,000,000 pixels (approx 44s for 150x50 @ 60Hz), and the module can store up to 64 logos.

B.2 Logo Uploader

To upload logos onto the module, run the logo upload application on your PC. A dialog box will appear as shown below:



Enter the IP address of your IQ frame and choose the module you wish to load the logo into Then browse to the folder containing your required logos, and click “Install Logo”. This will upload the logo to your unit.

Note: This stage can take up to a minute depending on the length of the logo. Short or static logos will upload in a few seconds.

B.3 Filename convention

Logos must be packaged in a directory with the same name as the logo. Logo files must take the form <logo_name><specifier>.<extension> where <logo_name> equals the directory's name.

A <specifier> of the form _<standard> indicates that this logo is intended for this specific standard. If no _<standard> specifier is included, then this logo is the default for any standards which do not have a standard-specific logo.

Possible values for <standard> are: 525i, 625i, 720p, 1080p and 1080i.

A <specifier> of the form _<index> indicates that this file is part of a multi-file sequence for an animated logo. Any non-negative decimal value may be used for <index>. The files in a sequence are sorted in increasing order of their respective <index>es by numerical value. Leading zeros do not affect the sort order, and it is not required that the <index> values are contiguous, however all images in a multi-file sequence must have the same width and height.

If both _<standard> and _<index> specifiers are used, then they should be written as _<standard>_<index>, not _<index>_<standard>.

The <extension> is not used as the logo option will auto-detect the image format.

Examples of valid logo filenames are:

Logo name	Type of logo
C:\logos\brandlogos\brandlogo.jpg	Single logo jpeg file
C:\logos\brandlogos\brandlogo_625i.png C:\logos\brandlogos\brandlogo_1080i.png	Two versions of the logo targeting different output standards
C:\logos\brandlogos\brandlogo_001.tiff C:\logos\brandlogos\brandlogo_002.tiff .... C:\logos\brandlogos\brandlogo_064.tiff	Animated logo of sequence length 64

B.4 Displaying logos

You can access the logo insertion controls via the Output Control (see section 5.3.10). Select the logo from the list and adjust its position and transparency as required.

The logo files should contain a key (there is no “self key” option), but if no key is found then the entire logo image will be displayed, i.e. a rectangle cut-out of the logo image size.

RGB graphics formats are automatically converted to SD and HD color spaces and levels. YUV graphics will be presented as is for both HD and SD. The YUV range is assumed to be 16 (black) to 235 (white). Other values are clipped. Key channel levels for all graphics formats are 0 (off) to 255 (100% key).

In linear mode “Transparency” controls both key gain and logo gain; in pre-shaped mode only key gain is controlled.

B.5 Animated logos

Animated logos will always be displayed as animations (there is no static frame selection). The duration depends on the graphics image size, for example, with a 10% raster size a 10 second clip at 60Hz frame-rate could be supported.

Interlaced video standards will treat each image of the original sequence as a single field of the resultant animation. Frame to field conversion is performed by simply removing those lines which should not be present in a particular field.

Animated logos will not display until load is complete, and will always start from the first frame in the sequence when fully loaded. Animated logos can be loaded as a sequence of still images or a sequences of moving video (e.g. MPEG) files. One animation can be created from a sequence of files of different types as long as the image size is the same in each file.

Animated logos are displayed at the output-side frame rate. If an animation is designed to be played at 50fps but the current output standard is 59Hz it will play out faster than designed.

B.6 Logo key

The logo insertion option supports use of a pre-shaped key, a linear key or no key.

A linear key cross-fades between background+foreground and foreground so the key can follow the shape of the logo. If the key is “pre-shaped” it is possible to simply cross-fade between background and foreground. This would naturally change the edge shape of the logo but the pre-processing of the key will mean that the final result will be the intended edge shape.

