grass valley
A BELDEN BRAND

IQUDC40

SD/HD/3G/UHDTV1 CONVERTER

User Manual

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www.grassvalley.com

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Title

Part Number

Revision 2019-02-15, 15:41

Important Safety Information

This section provides important safety guidelines for operators and service personnel. Specific warnings and cautions appear throughout the manual where they apply. Please read and follow this important information, especially those instructions related to the risk of electric shock or injury to persons.

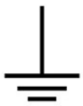
Symbols and Their Meanings

Indicates that dangerous high voltage is present within the equipment enclosure that may be of sufficient magnitude to constitute a risk of electric shock.

Indicates that the user, operator or service technician should refer to the product manuals for important operating, maintenance, or service instructions.

This is a prompt to note the fuse rating when replacing fuses. The fuse referenced in the text must be replaced with one having the ratings indicated.

Identifies a protective grounding terminal which must be connected to earth ground prior to making any other equipment connections.



Identifies an external protective grounding terminal which may be connected to earth ground as a supplement to an internal grounding terminal.

Indicates that static sensitive components are present, which may be damaged by electrostatic discharge. Use anti-static procedures, equipment and surfaces during servicing.

Indicates that the equipment has more than one power supply cord, and that all power supply cords must be disconnected before servicing to avoid electric shock.

The presence of this symbol in or on Grass Valley equipment means that it has been tested and certified as complying with applicable Underwriters Laboratory (UL) regulations and recommendations for USA.

The presence of this symbol in or on Grass Valley equipment means that it has been tested and certified as complying with applicable Canadian Standard Association (CSA) regulations and recommendations for USA/Canada.

The presence of this symbol in or on Grass Valley equipment means that it has been tested and certified as complying with applicable Underwriters Laboratory (UL) regulations and recommendations for USA/Canada.

The presence of this symbol in or on Grass Valley equipment means that it has been tested and certified as complying with applicable Intertek Testing Services regulations and recommendations for USA/Canada.

The presence of this symbol in or on Grass Valley product means that it complies with all applicable European Union (CE) directives.

The presence of this symbol in or on Grass Valley product means that it complies with safety of laser product applicable standards.

Warnings

A warning indicates a possible hazard to personnel, which may cause injury or death. Observe the following general warnings when using or working on this equipment:

•Appropriately listed/certified mains supply power cords must be used for the connection of the equipment to the rated mains voltage.

- This product relies on the building's installation for short-circuit (over-current) protection. Ensure that a fuse or circuit breaker for the rated mains voltage is used on the phase conductors.
- Any instructions in this manual that require opening the equipment cover or enclosure are for use by qualified service personnel only.
- Do not operate the equipment in wet or damp conditions.
- This equipment is grounded through the grounding conductor of the power cords. To avoid electrical shock, plug the power cords into a properly wired receptacle before connecting the equipment inputs or outputs.
- Route power cords and other cables so they are not likely to be damaged. Properly support heavy cable bundles to avoid connector damage.
- Disconnect power before cleaning the equipment. Do not use liquid or aerosol cleaners; use only a damp cloth.
- Dangerous voltages may exist at several points in this equipment. To avoid injury, do not touch exposed connections and components while power is on.
- High leakage current may be present. Earth connection of product is essential before connecting power.
- Prior to servicing, remove jewelry such as rings, watches, and other metallic objects.
- To avoid fire hazard, use only the fuse type and rating specified in the service instructions for this product, or on the equipment.
- To avoid explosion, do not operate this equipment in an explosive atmosphere.
- Use proper lift points. Do not use door latches to lift or move equipment.
- Avoid mechanical hazards. Allow all rotating devices to come to a stop before servicing.
- Have qualified service personnel perform safety checks after any service.

Cautions

A caution indicates a possible hazard to equipment that could result in equipment damage. Observe the following cautions when operating or working on this equipment:

- This equipment is meant to be installed in a restricted access location.
- When installing this equipment, do not attach the power cord to building surfaces.
- Products that have no on/off switch, and use an external power supply must be installed in proximity to a main power outlet that is easily accessible.
- Use the correct voltage setting. If this product lacks auto-ranging power supplies, before applying power ensure that each power supply is set to match the power source.
- Provide proper ventilation. To prevent product overheating, provide equipment ventilation in accordance with the installation instructions.

- Do not operate with suspected equipment failure. If you suspect product damage or equipment failure, have the equipment inspected by qualified service personnel.
- To reduce the risk of electric shock, do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so. Refer all servicing to qualified service personnel.
- This unit may have more than one power supply cord. Disconnect all power supply cords before servicing to avoid electric shock.
- Follow static precautions at all times when handling this equipment. Servicing should be done in a static-free environment.
- To reduce the risk of electric shock, plug each power supply cord into separate branch circuits employing separate service grounds.

Electrostatic Discharge (ESD) Protection

Electrostatic discharge occurs when electronic components are improperly handled and can result in intermittent failure or complete damage adversely affecting an electrical circuit. When you remove and replace any card from a frame always follow ESD-prevention procedures:

- Ensure that the frame is electrically connected to earth ground through the power cord or any other means if available.
- Wear an ESD wrist strap ensuring that it makes good skin contact. Connect the grounding clip to an *unpainted surface* of the chassis frame to safely ground unwanted ESD voltages. If no wrist strap is available, ground yourself by touching the *unpainted* metal part of the chassis.
- For safety, periodically check the resistance value of the antistatic strap, which should be between 1 and 10 megohms.
- When temporarily storing a card make sure it is placed in an ESD bag.
- Cards in an earth grounded metal frame or casing do not require any special ESD protection.

Battery Handling

This product may include a backup battery. There is a danger of explosion if the battery is replaced incorrectly. Replace the battery only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions. Before disposing of your Grass Valley equipment, please review the *Disposal and Recycling Information* at:

http://www.grassvalley.com/assets/media/5692/Take-Back_Instructions.pdf

Cautions for LCD and TFT Displays

Excessive usage may harm your vision. Rest for 10 minutes for every 30 minutes of usage.

If the LCD or TFT glass is broken, handle glass fragments with care when disposing of them. If any fluid leaks out of a damaged glass cell, be careful not to get the liquid crystal fluid in your mouth or skin. If the liquid crystal touches your skin or clothes, wash it off immediately using soap and water. Never swallow the fluid. The toxicity is extremely low but caution should be exercised at all times.

Recycling/Disposal

European (CE) WEEE directive.

This symbol on the product(s) means that at the end of life disposal it should not be mixed with general waste.

Visit www.grassvalley.com for recycling information.

Safety and EMC Standards

This equipment complies with the following standards:

CE

Information Technology Equipment - Safety Part 1

EN60950-1: 2006

Safety of Information Technology Equipment Including Electrical Business Equipment.

UL1419 (4th Edition)

Standard for Safety – Professional Video and Audio equipment (UL file number E193966)

EMC Standards

This module conforms to the following standards:

EN55032:2015 (Class A)

Electromagnetic Compatibility of multimedia equipment - Emission requirements

EN61000-3-2:2014 (Class A)

Electromagnetic Compatibility - Limits for harmonic current emissions

EN61000-3-3:2013

Electromagnetic Compatibility - Limits of voltage changes, voltage fluctuations and flicker

EN55103-2:2009 (Environment E2)

Electromagnetic Compatibility, Product family standard for audio, video, audio-visual and entertainment lighting control apparatus for professional use. Part 2. Immunity

Warning: This equipment is compliant with Class A of CISPR 32. In a residential environment this equipment may cause radio interference.

FCC / CFR 47:Part 15 (Class A)

Federal Communications Commission Rules Part 15, Subpart B

Caution to the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

EMC Performance of Cables and Connectors

Grass Valley products are designed to meet or exceed the requirements of the appropriate European EMC standards. In order to achieve this performance in real installations it is essential to use cables and connectors with good EMC characteristics.

All signal connections (including remote control connections) shall be made with screened cables terminated in connectors having a metal shell. The cable screen shall have a large-area contact with the metal shell.

Signal/Data Ports

For unconnected signal/data ports on the module, fit shielding covers. For example, fit EMI blanking covers to SFP+ type ports; and fit 75 Ω RF terminators to BNC type ports

Coaxial Cables

Coaxial cables connections (particularly serial digital video connections) shall be made with high-quality double-screened coaxial cables such as Belden 8281 or BBC type PSF1/2M and Belden 1694A (for 3Gbps).

D-Type Connectors

D-type connectors shall have metal shells making good RF contact with the cable screen. Connectors having indents which improve the contact between the plug and socket shells are recommended.

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1 Introduction

Description

The IQUDC40 is a flexible 4K UHD processing module able to process and translate both quadrant (square division) and 2SI (2-sample interleave) quad-link formats, as well as 12G SDI single-link signals. Converting to or from 4K UHD to HD/SD allows re-purposing of existing assets, and all common video and audio processing tasks are also covered.

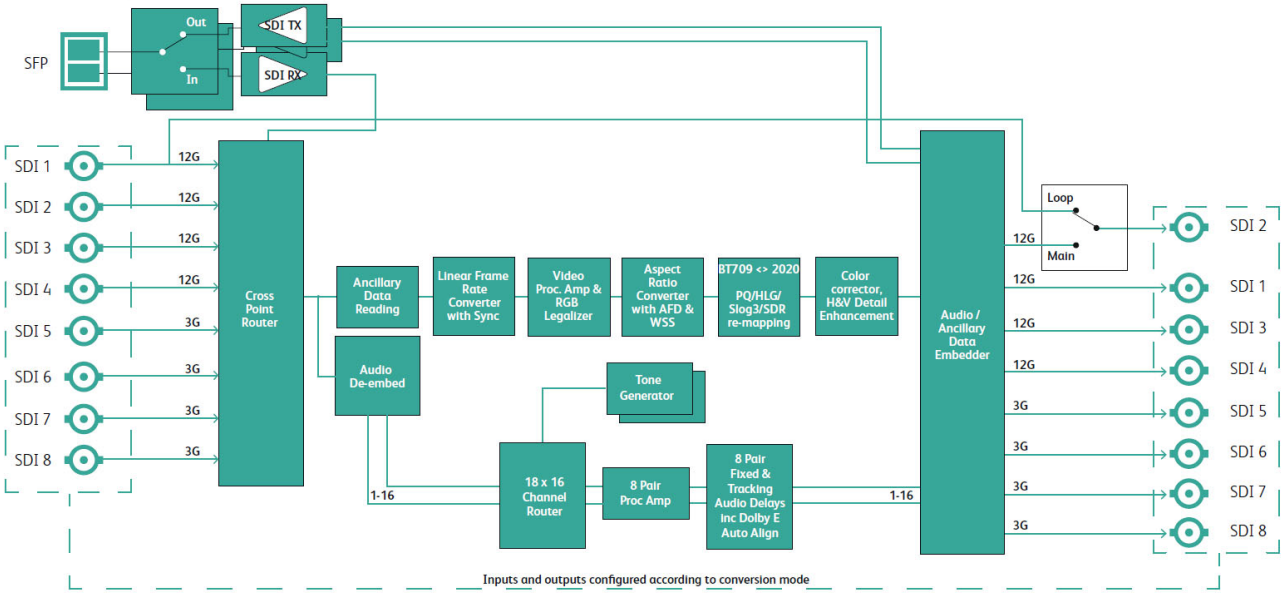
The IQUDC40 includes a frame synchronizer, capable of referencing to a SD bi-level or HD tri-level reference, and a variable aspect ratio converter with reading and writing of WSS, VI and 2016 AFD signaling (not available in 4K UHD to 4K UHD mode). Video processing includes powerful picture enhancement tools, including edge enhance, High Dynamic Range and Wide Color Gamut support, allowing S-Log3, HLG or PQ UHD feeds to be integrated into an SDR workflow, for example. Audio handling includes channel routing, delay adjustment and level controls. Video metadata such as timecode, SMPTE ST 2020 Dolby, closed captions and teletext captions can also be passed through the module or processed according to the required output standard.

Feature Summary

- High-quality up/down/cross conversion for SDI video inputs, including conversion aperture control and cadence insertion, detection and removal (e.g. 1080i/59 3:2 to 4K23).
- 4K UHD interfacing to translate between 2SI and square division work- flows for maximum signal compatibility.
- Frame synchronizer with HD tri-sync/SD bi-level reference input, up to 8 frames of video delay and input loss detection with default output ofblack/pattern.
- Aspect ratio conversion including preset ARC maps relative to conversion modes, pan, tilt and size adjustments.
- Aspect ratio control (signaling reading and writing) using ETSI WSS and AFD Video Index signaling (RP186, SMPTE ST 2016).
- Video proc. features include: gain, offset, hue, horizontal and vertical picture enhancement, color corrector and RGB gamut legalization.
- Wide color gamut support with BT709 and BT2020 color space conver- sion including manual and automatic operation.
- High Dynamic Range support including SDR to HDR mapping with en- hancement, translation between HDR formats — PQ, HLG, S-Log3, and mapping to SDR (custom HDR LUT loading for .cub files also included).
- Metadata support — closed caption passing or processing for CEA608/708 and OP42/OP47/WST captions, VITC or SMPTE ST 12 timecode translation and SID passing.
- Processing for 16 channels of embedded audio present on the incoming SDI stream with no disturbance during video synchronizer frame wraps or drops.
- Audio proc. features including: channel routing, gain, invert, pair delay and internal tone generator.
- 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.
- Dolby E support - Detection of PCM/non-PCM audio to SMPTE ST 337/338, pair routing and Dolby E header re-alignment.

- Integrated fiber I/O support via SFP module.
- Built-in test pattern generator and 8 user configurable memories.
- RollCall control and monitoring compatible with standard logging and reporting features.
- RollTrack triggers available for detected module states, including input loss and reference loss.

Block Diagram



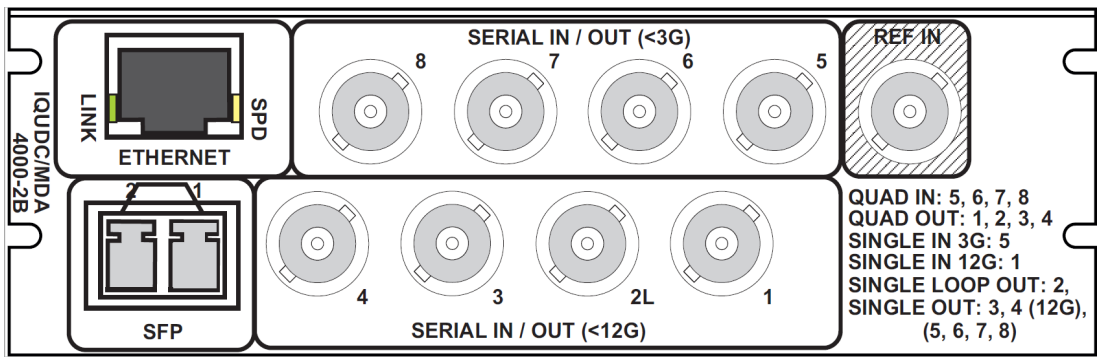
Order Codes

The following product order codes are covered by this manual:

FGAN IQUDC4000-2B4 - UHD-4K format converter with HDR support for quad link and 12G-SDI signals. 1 12G-SDI input with loop-through, 2 12G-SDI capable outputs, 4 3G-SDI input and outputs (selectable), external or frame reference, single 12G capable fiber Tx/Rx.

Rear Panel

The following rear panel type is available:

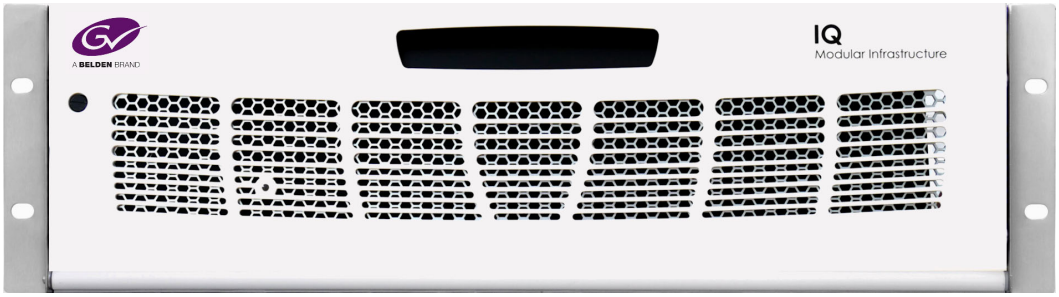


IQUDC4000-2B4

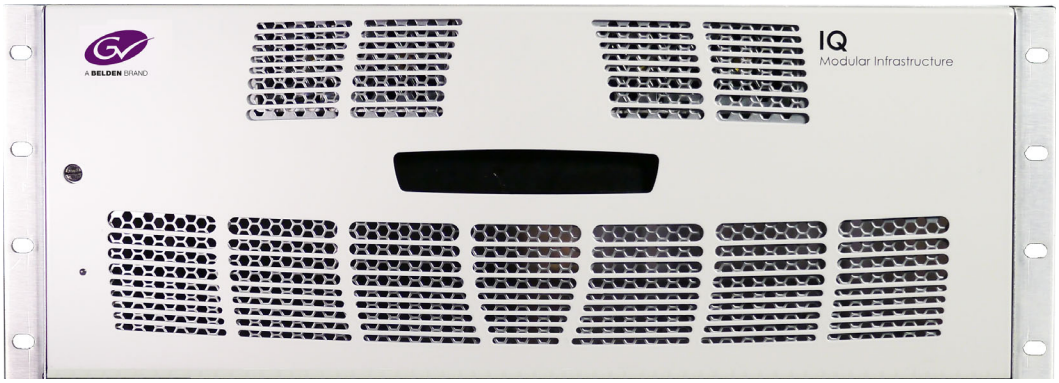
Enclosures

The module can be fitted into the enclosures shown below.

B-Style Enclosures



IQH3B



IQH4B

Note: IQH3B and IQH4B enclosures each provide two internal analog reference inputs. These inputs are applicable to modules with "B" order codes only.

2 Technical Specifications

Inputs and Outputs	
SDI bidirectional inputs/ outputs	4 x 12G/3G/1.5G/SMPTE ST270M 4 x 3G/1.5G/SMPTE ST270M
Input cable length	Up to 44m Belden 1694A @ 12 Gb/s Up to 150m Belden 1694A @ 3 Gb/s Up to 180m Belden 1694A @ 1.5 Gb/s >350m Belden 1694A @ 270 Mb/s
Standards	SD: 525, 625, 270 Mb/s SD-SDI SMPTE ST 259 HD: 720 50/59.94/60p, 1080 25/29/30i, 1.5 Gb/s HD-SDI SMPTE ST 292/SMPTE ST 299 3G: 1080/2160 (quad) 50/59.94/60p, 3 Gb/s HD-SDI, SMPTE ST 425 level A, dual-link level B 12G: 2160 50/59.94/60p (2SI) (input on BNC 1 only), 12 Gb/s UHD-4K SDI, SMPTE ST 2082-10 UHDTV1 video interfaces: • Square division (4 x 1.5Gbps links) for <= 30fps • Square division (4 x 3Gbps links) for > 30fps • Sample interleaved SMPTE ST425-3 (2 x 3Gbps links) for <=30fps • Sample interleaved SMPTE ST425-5 (4 x 3Gbps links) for > 30fps
Reference	1x analog reference Black (HD tri-level and SD bi-level) and black burst (SD bi-level) selectable from IQH3B/IQH4B frame reference connections or external BNC
Fiber Signal Input	
Inputs	Up to 2
Optical	12 Gb/s UHD-SDI, 3 Gb/s HD-SDI, 1.485 Gb/s HD-SDI or 270 Mb/s SD-SDI
Connector/format	LC singlemode
Conforms to	SMPTE ST 297-2006
Fiber Signal Output	
Outputs	Up to 2
Optical	12 Gb/s UHD-SDI, 3 Gb/s HD-SDI, 1.485 Gb/s HD-SDI or 270 Mb/s SD-SDI
Connector/format	LC singlemode
Conforms to	SMPTE ST 297-2006

Video Functions	
Input source select	SD/HD/4K UHD-SL BNC1, SD/HD BNC5, UHD-QL, SFP1
Input 4K UHD interface	Auto, 2SI, SDQ
Output formats	2160p, 1080p, 1080i, 720p, 625i, 525i
3G output format	Level A/B
Output 4K UHD Interface	2SI, SQD
Output SI PID	4K UHD, 3G/HD
Output 4K UHD ANC embed	Link 1, all links
Output legalization	Off, 700 mV, 721 mV, 735 mV, 746 mV
Colorimetry	Auto, BT709, BT2020
SDR gamma	2.0, 2.4
Test patterns	Off, black, ramp, bars
SDR/HDR modes	SDR, HLG, PQ, S-Log3, User LUT
SDR/HDR clip	Hard/soft
PQ level	1K, 2K, 4K, 10K
Proc Amp	
Black Level	+100 to -100 mV (0) in 0.8 mV steps
Contrast	-6 dB to +6 dB (0) in 0.2 dB steps
Saturation	-6 dB to +6 dB (0) in 0.2 dB steps
Y Gamma	0.4 to 1.7 (1) in 0.1 steps
Enhancement	
Filter	Vertical and horizontal filters with preset normal, narrow or wide settings
Nonlinear enhancer	Frequency band selection: med, high. Six preset enhancement modes
Color corrector	RGB lift: +200 to -200 mV in 0.8 mV steps RGB gain: +6.0 to -6.0 dB in 0.2 mV steps
Noise reducer	Multiband
Edge enhance	Horizontal & vertical
Additional video-audio delay	8 frames
Aspect ratio conversion	AFD (SMPTE ST 2016), VI (RP186), WSS (L23) (manual or auto)
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
Auto zoom	On/off
Manual zoom	Zoom ±20%
Audio Shuffle	
Input channel 1-16	Disembed 1-16
Output channels 1-16	Processed channels 1-16, tone, silence
Invert phase	Channels 1-16
Audio Control	
Pair 1 to 8 gain L/R	+18dB to -18dB in 0.1dB steps

Pair 1-8 manual delay	-40 to +200ms in 1ms steps
Global manual delay	-40 to +200ms in 1ms steps
Tone	
Frequency	100 Hz to 10 kHz in 100 Hz steps
Genlock Selection	Frame A, frame B, external, input, freerun
Timing	Horizontal and vertical adjustment
Timecode	
Source	LTC, VITC
Processing	Follow input, generate
Timecode loss	Freeze, freerun
Metadata	Closed caption CE608 <> CE708 Teletext subtitles WST/RDD8/2031 conversion ST2020 output line selection
Other Controls	
Logging	Input 1-4 name, type, state Genlock state Output standard
RollTrack Index	Up to 32 RollTrack destinations
RollTrack Sources	Unused, input present, input loss, reference OK & loss
Information window	Video input status, reference status
Factory default	Resets all module settings to factory-specified default values and clears memories
Default settings	Resets all module settings to factory-specified defaults but does not clear memories
Module information	Reports software version, serial number, temperature
General Specifications	
Connector/format	BNC/75Ω panel jack on standard IQ connector panel
Return loss	>-15 dB (270 Mb/s, 1.5 Gb/s) >-10 dB (3 Gb/s)
Output jitter	SD-SDI 0.2 UI (10 Hz) / 0.2 UI (1 kHz), 3G/HD-SDI 1.0 UI (10 Hz) / 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 ST 240 and SMPTE ST 274
Embedded audio handling	HD: 24-bit synchronous 48 kHz to SMPTE ST 299 SD: 20-bit synchronous 48 kHz to SMPTE ST 272-A

Input standard	(Auto detect) 525, 625 720 50/59.94/60p 1080 50/59.94/60i 1080 50/59.94/60p (levels A and B) 720/1080/2160 23/24/25/29.97/30p 1080 23/24/25/29.97/30 PsF, with film detection and processing 2160 50/59.94/60p (levels A and B)
Output standard	525, 625 720 50/59.94/60p 1080 50/59.94/60i 1080 50/59.94/60p (levels A and B) 720/1080/2160 23/24/25/29.97/30p 1080 23/24/25/29.97 PsF, with film detection and processing 2160 50/59.94/60p (levels A and B)
Power Consumption	17PR max (18PR max with SFP)

Conversion Capabilities

Note: The I/O is mode dependent.

- Inputs shown in BLUE
- Processed outputs shown in GREEN
- Loop output shown in ORANGE

Mode 1 – SD/HD/3G up/down/crossconversion

Output Connection	SD	HD 720P (23-60) 1080i (50-60) 1080p (≤30)	3G 1080p-A 1080p-B (>30)	6G 2160p (≤30)	12G 2160p (>30)	Dual Link 2160p 2SI (≤30)	Quad Link 2160p 2SI (>30) SQD (23-60)
BNC 1							
BNC 2	BNC 1 Loop Output						
BNC 3							
BNC 4							
BNC 5							
BNC 6							
BNC 7							
BNC 8							
SFP 1 (Rx)							
SFP 1 (Tx)							

Mode 2 – SD/HD/3G to 4K UHD-QL + 4K UHD-SL

Output Connection	SD	HD 720P (23-60) 1080i (50-60) 1080p (≤30)	3G 1080p-A 1080p-B (>30)	6G 2160p (≤30)	12G 2160p (>30)	Dual Link 2160p 2SI (≤30)	Quad Link 2160p 2SI (>30) SQD (23-60)
BNC 1							
BNC 2	BNC 1 Loop Output						
BNC 3							
BNC 4							
BNC 5						Channel 1	Channel 1
BNC 6						Channel 2	Channel 2
BNC 7							Channel 3
BNC 8							Channel 4
SFP 1 (Rx)							
SFP 1 (Tx)							
SFP 2 (Tx)							

Mode 3 – 4K UHD-QL to SD/HD/3G

Output Connection	SD	HD 720P (23-60) 1080i (50-60) 1080p (≤30)	3G 1080p-A 1080p-B (>30)	6G 2160p (≤30)	12G 2160p (>30)	Dual Link 2160p 2SI (≤30)	Quad Link 2160p 2SI (>30) SQD (23-60)
BNC 1							
BNC 2							
BNC 3							
BNC 4							
BNC 5						Channel 1	Channel 1
BNC 6						Channel 2	Channel 2
BNC 7							Channel 3
BNC 8							Channel 4
SFP 1 (Rx)							
SFP 1 (Tx)							
SFP 2 (Tx)							

Mode 4 – 4K UHD-SL to SD/HD/3G

Output Connection	SD	HD 720P (23-60) 1080i (50-60) 1080p (≤30)	3G 1080p-A 1080p-B (>30)	6G 2160p (≤30)	12G 2160p (>30)	Dual Link 2160p 2SI (≤30)	Quad Link 2160p 2SI (>30) SQD (23-60)
BNC 1							
BNC 2				BNC 1 Loop Output			
BNC 3							
BNC 4							
BNC 5							
BNC 6							
BNC 7							
BNC 8							
SFP 1 (Rx)							
SFP 1 (Tx)							
SFP 2 (Tx)							

Mode 5 – 4K UHD-SL to 4K UHD-QL + 4K UHD-SL

Output Connection	SD	HD 720P (23-60) 1080i (50-60) 1080p (≤30)	3G 1080p-A 1080p-B (>30)	6G 2160p (≤30)	12G 2160p (>30)	Dual Link 2160p 2SI (≤30)	Quad Link 2160p 2SI (>30) SQD (23-60)
BNC 1							
BNC 2				BNC 1 Loop Output			
BNC 3							
BNC 4							
BNC 5						Channel 1	Channel 1
BNC 6						Channel 2	Channel 2
BNC 7							Channel 3
BNC 8							Channel 4
SFP 1 (Rx)							
SFP 1 (Tx)							
SFP 2 (Tx)							

Mode 6 – 4K UHD-QL to 4K UHD-SL

Output Connection	SD	HD 720P (23-60) 1080i (50-60) 1080p (≤30)	3G 1080p-A 1080p-B (>30)	6G 2160p (≤30)	12G 2160p (>30)	Dual Link 2160p 2SI (≤30)	Quad Link 2160p 2SI (>30) SQD (23-60)
BNC 1							
BNC 2							
BNC 3							
BNC 4							
BNC 5						Channel 1	Channel 1
BNC 6						Channel 2	Channel 2
BNC 7							Channel 3
BNC 8							Channel 4
SFP 1 (Rx)							
SFP 1 (Tx)							
SFP 2 (Tx)							

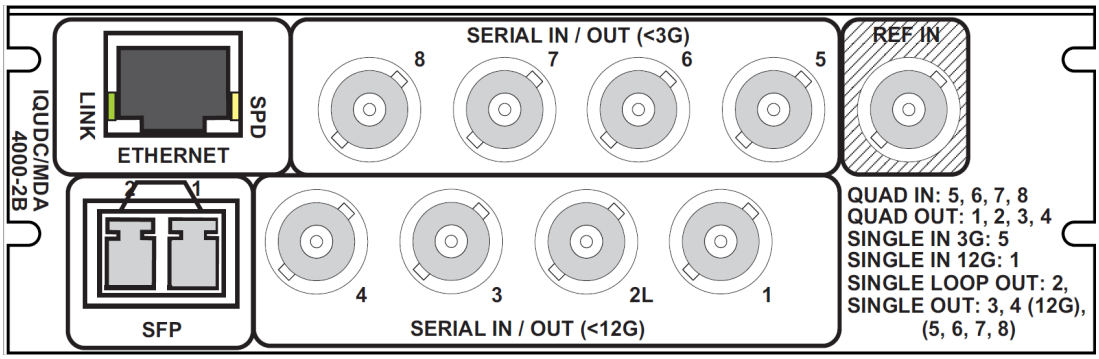
Mode 7 – 4K UHD-QL to 4K UHD-QL

Output Connection	SD	HD 720P (23-60) 1080i (50-60) 1080p (≤30)	3G 1080p-A 1080p-B (>30)	6G 2160p (≤30)	12G 2160p (>30)	Dual Link 2160p 2SI (≤30)	Quad Link 2160p 2SI (>30) SQD (23-60)
BNC 1						Channel 1	Channel 1
BNC 2						Channel 2	Channel 2
BNC 3							Channel 3
BNC 4							Channel 4
BNC 5						Channel 1	Channel 1
BNC 6						Channel 2	Channel 2
BNC 7							Channel 3
BNC 8							Channel 4
SFP 1 (Rx)							
SFP 1 (Tx)							
SFP 2 (Tx)							

3 Connections

This section describes the physical input and output connections provided by the IQUDC40.

Rear Panel View



IQUDC4000-2B4

Input and Output Connections

Label	Description	Connector
12G SDI in	12G SDI input	1 x BNC
12G SDI out	12G SDI output	1 x BNC
SDI in 1, 2, 3, 4	SDI inputs	4 x BNC
SDI out 1, 2, 3, 4	SDI outputs	4 x BNC
Network	10/100 BaseT Ethernet connection	1 x RJ45
Reference	Reference input	1 x BNC
Option I/O	Signal input/output	1 x dual SFP compatible

Note: If the reference connector is not in use, it must be fitted with a 75 Ohm BNC terminating plug. If not terminated correctly, genlock performance may be degraded.

Note: The option sockets allow for a dual Small Form Factor Pluggable (SFP) transceiver module. The SFP modules can be used to add optional fiber connectivity, or optional I/O using HD BNC connectors.

Fiber Connectivity

A dual fiber port is provided as standard. The port can be configured as one of the following:

- Dual HD/3G receiver (RX/RX)
- Single HD/3G/12G receiver (RX)
- Dual transmitter (TX/TX)
- Transceiver (RX/TX)

4 Card Edge LEDs

The LEDs on the edge of the IQUDC40 indicate its operating status.

LED	Color	State	Description
OK	Green	Illuminated	Module is operating correctly.
Warn	Yellow	Illuminated	Board warning condition. LED is Illuminated if one or more services are down.
Error	Red	Illuminated	Board fault condition. LED is illuminated if the module is down or restarting.
Ref OK	Green	Illuminated	Reference has been selected and is present.
Input OK	Green	Illuminated	Input has been selected and a valid input is present.
CPU OK	Green	Flashing	CPU is running.
- Power	Green	Illuminated	Good - power supply is present.
+ Power	Green	Illuminated	Good + power supply is present.

5 System Operation

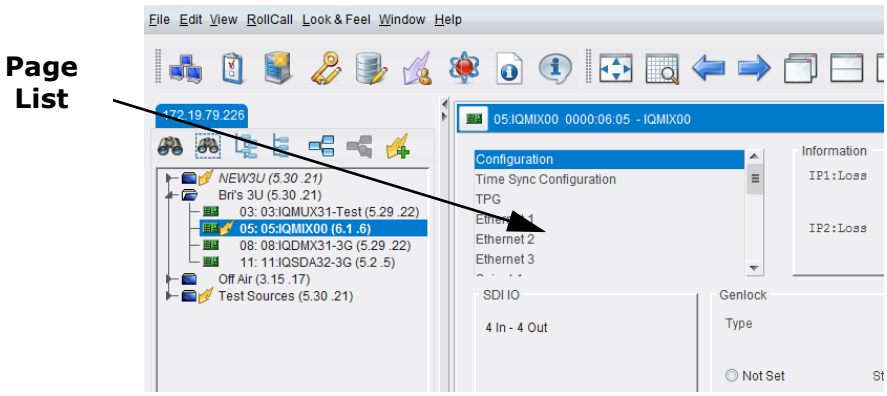
Operation Using RollCall

This section contains information on using the IQUDC40 with RollCall.

For help with general use of the RollCall application, open the user manual by clicking the button on the main RollCall toolbar.

Navigating Pages in the RollCall Template

The RollCall template has a number of pages, each of which can be selected from the list at the top left of the display area. Right-clicking anywhere on the pages will also open a page view list, allowing quick access to any of the pages.



Template Pages

Template Pages

The following pages are available for the IQUDC40. Please note that what is displayed on these pages is dependent on the module's capabilities. So, the illustrations in this manual may differ somewhat from what is seen in your environment.

- **Input/Output** - see page 27.
- **Video Processing** - see page 32.
- **Convert Processing** - see page 39.
- **ARC** - see page 42.
- **Audio Shuffle** - see page 51.
- **Audio Control** - see page 54.
- **Genlock** - see page 56.
- **Timecode** - see page 58.
- **Metadata** - see page 60.
- **Network** - see page 63.
- **Setup** - see page 65.
- **Logging and RollTrack** - see page 67.

Setting Values

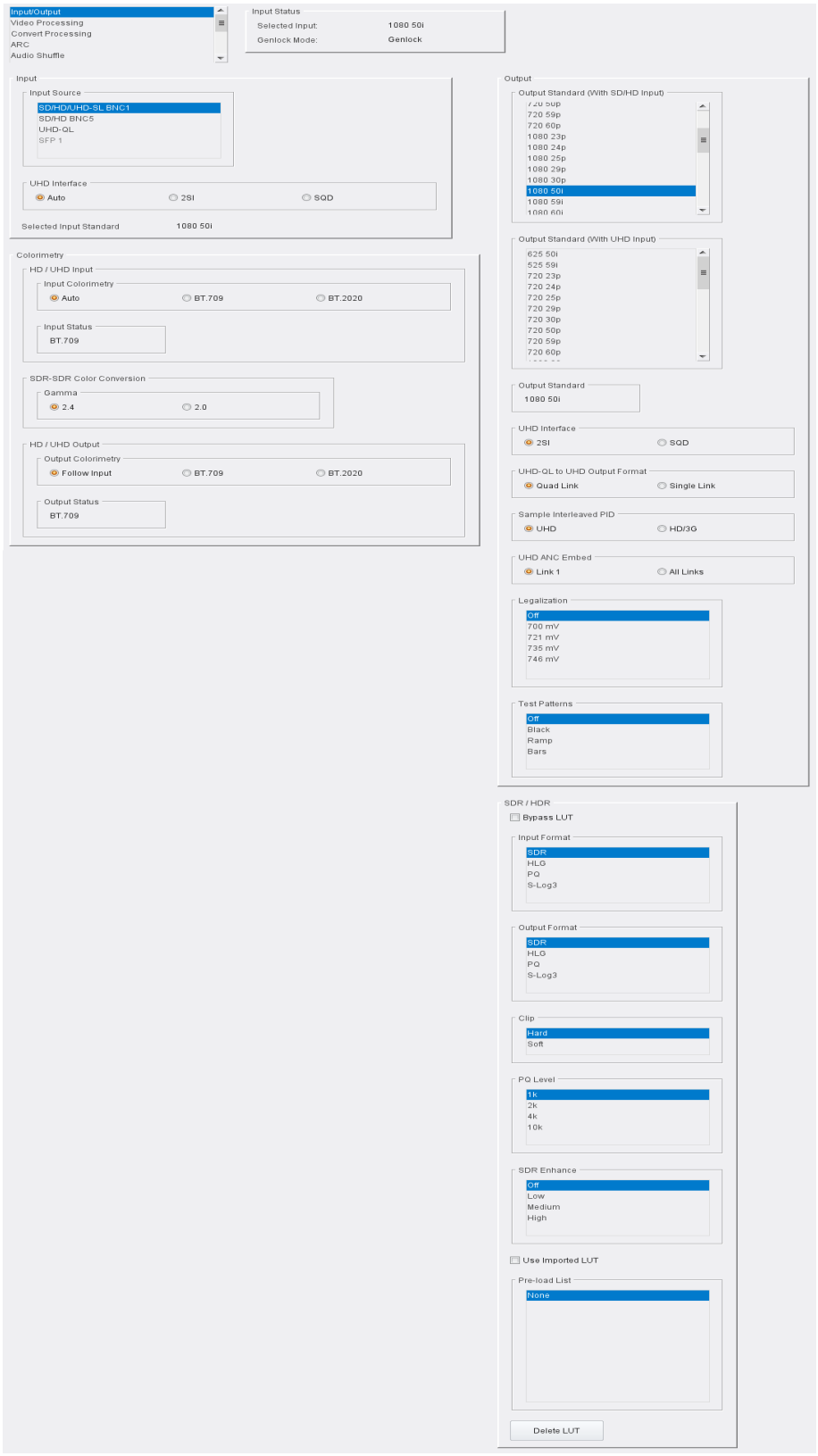
Many of the settings within the templates have values, either alpha or numeric.

When setting a value in a field, the value, whether text or a number, must be set by pressing the ENTER key, or clicking the S **Save Value** button.

Clicking an associated P **Preset Value** button returns the value to the factory default setting.

Input/Output

The Input/Output page allows input sources and output destinations to be selected.



Input/Output Page

The following facilities are available from this page:

Option	Operation
Input	Allows selection of the input source and UHD interface type. Choose input from: • **SD/HD/UHD-SL BNC1** • **SD/HD BNC5** • **UHD-QL** • **SFP 1** (if fitted) Note: Audio and metadata are processed from Input 1 only. Audio and metadata on Inputs 2 - 4 are ignored.
UHD Interface	Input format setting for Dual/Quad link interface (BNCs 1-4). Choose from: • **Auto** (default) - use embedded PID to identify Sample Interleaved format. If ST425-3/5 PID (0x96,0x97,0x98) is not detected, Square Division is enabled. • **SQD** - manually selects Square Division. • **2SI** - manually selects ST425-3/5 format.
Colorimetry	• **HD/UHD Input** - Displays input colorimetry setting for HD, 3G and UHD. SD is fixed at BT.601. Colorimetry in use is reported as shown:. • **Auto** - Sample interleaved: use embedded PID to identify colorimetry. Square Division: selects BT.709. • **BT.709** • **BT.2020**
Input Status	Displays the current input colorimetry standard.
SDR-SDR Color Conversion	Sets the gamma used in the color conversion process. A gamma of 2.0 gives a better color match between 2020 and 709 cameras, while 2.4 gives a better color match between 2020 and 709 displays. See *ITU-R BT.2087* for more information. Choose from: • **2.0** • **2.4**
HD/UHD output	Sets the output colorimetry standard for HD, 3G and UHD. Choose from: • **Follow Input**: Output colorimetry will be the same as the input colorimetry (as detected or forced). • **BT.709** • **BT.2020**
Output Status	Displays the current output colorimetry standard.
Output standard with SD/HD input	Use this control to set the required output standard when the input is SD, HD or 3Gbps. **Note**: 2160 23p-30p outputs are carried on 4 x 1.5Gbps links in Square Division, or 2 x 3Gbps Level C links (outputs A1 and A2) in Sample Interleaved. 2160 50p-60p outputs are carried on 4 x 3Gbps links.
Output standard with UHD input	Use this control to set the required output standard when the input is UHD. **Note**: When input and output are both UHD, the output frame rate will follow the input frame rate.
Output standard	Displays the output standard currently selected.

Option	Operation
UHD interface	Selects the output format. Choose from: • **2SI/12G**: Sample-interleaved format. Allows 6G/12G output via the 12G BNC. • **SQD (quad link)**: Square division format. Available only via output BNCs 1-4 and SFPs 1-4. When selected, the 12G output is not available as the 12G BNC is a duplicate of link 4.
2SI Mode	When **UHD Interface** is set to **2SI**, the output available on SFP3/4 and the 12G BNC can be selected as either 12G or Quad-link fibre: • **12G** - 12G BNC and SFP3/4 output UHD in 12G single-link format. • **Quad SFP** - SFP3/4 are set to output 3G quad-link channels 3 & 4 (channels 1 & 2 are output from SFP1/2). The 12G BNC outputs a copy of quad-link channel 4.
Sample Interleaved PID	Sets the embedded Payload ID for Sample Interleaved. Choose from: • **UHD** - some quad link monitors may not operate with UHD PID. In these cases, select HD/3G. Note that 12G monitors will require a UHD PID. • **HD/3G**
UHD ANC embed	Sets whether ANC (VANC + HANC) data is inserted on all links or just link 1. For non-UHD output standards, ANC is inserted on all output BNCs.
Legalization	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. Anything in the RGB space above the selected value (e.g. 700mV) is scaled down to that value. Anything in the RGB space below 0mV is clipped to 0mV. This is a good compromise between minimizing hue change and raising apparent brightness. Legalizer choices are: • **Off** • **700mV** • **721mV** • **735mV** • **746mV**
Test Pattern	Choose from: • **Off** • **Black** • **Ramp** • **Bars**

Option	Operation

SDR/HDR	Allows SDR/HDR parameters to be set. HDR adjustments are available for some conversions only.
	• **Input format** - Input gamma is set manually. Select from:
	  • **SDR**
	  • **HLG**
	  • **PQ**
	  • **S-log3**
	• **Output Format** - Select the output format to be used. Select from:
	  • **SDR**
	  • **HLG**
	  • **PQ**
	  • **S-log3**
	• **Clip** - With some HDR conversions, the maximum supported output level is less than the source level. The Clip tool is provided to address this. Select from:
	  • **Hard** - High brightness levels not supported in the selected output format are hard clipped to the maximum supported brightness level.
	  • **Soft** - Brightness levels close the maximum supported in the selected output format are progressively attenuated to avoid an abrupt cut-off. Soft clipping is a non-reversible process.
	• **PQ Level** - Sets the grading level (L_W) of the input (PQ > HLG) or output (PQ > PQ). Select from:
	  • **1k** (1000cd/m^2)
	  • **2k**
	  • **4k**
	  • **10k** (10000cd/m^2)
	  See *SMPTE ST 2084:2014 - Dynamic Range Electro-Optical Transfer Function of Mastering Reference Displays* for more information on PQ.
	• **SDR Enhance** - When converting SDR to any HDR mode, automatically increases the brightness of SDR content near peak white. Select from:
	  • **Off** - SDR is converted into HDR format without alteration.
	  • **Low** - High-brightness content is slightly increased in level.
	  • **Medium** - High-brightness content is further increased in level.
	  • **High** - High-brightness content is significantly raised in level.

	• **Use Imported LUT** - Enable if an imported custom look-up table (LUT) is to be used. See below for information on importing a LUT. • **Pre-load List** - Select the LUT to be used from the list. Active only if **Use Imported LUT** is enabled. • **Delete LUT** - Click to delete the LUT currently selected on the **Pre-load List**.

About Custom LUTs

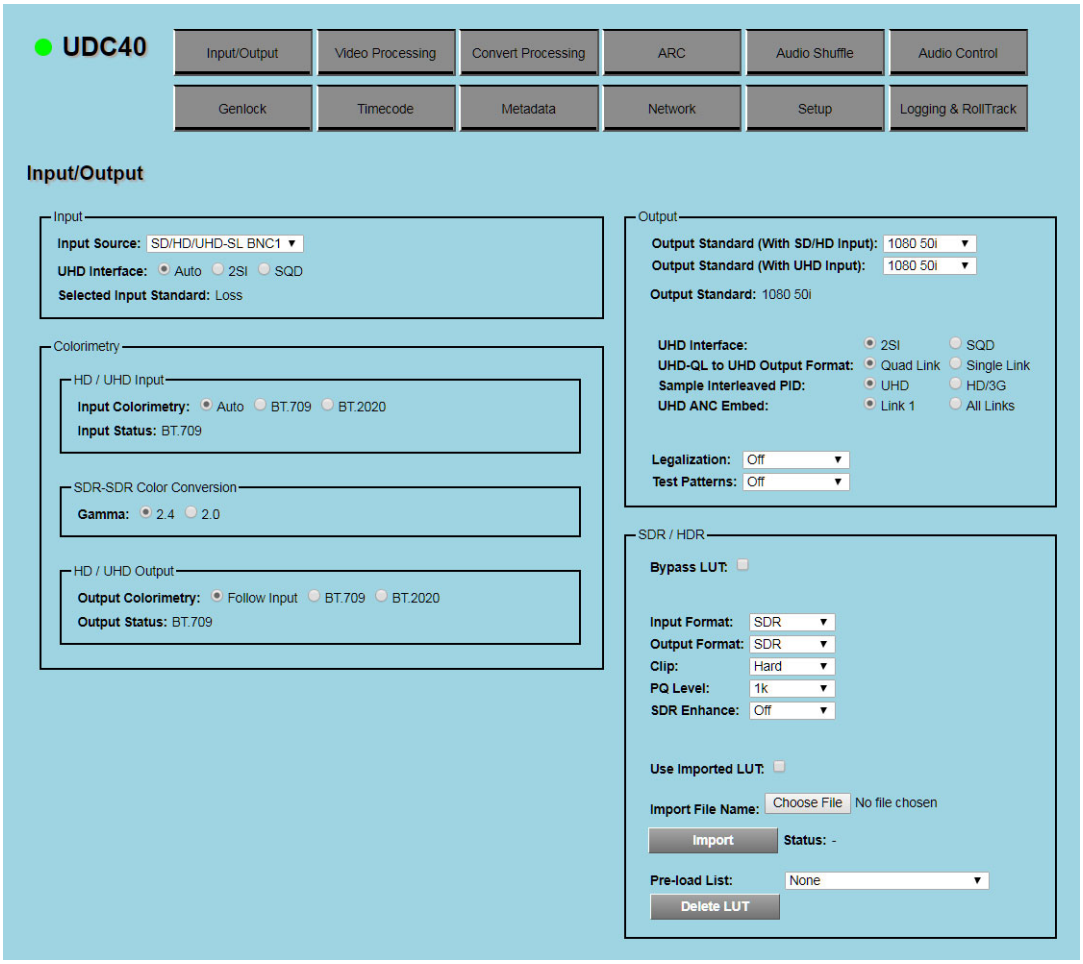
Custom look-up tables can be used when performing color conversions, rather than the on-board default LUT. These can be imported in the form of .cube files. See https://wwwimages2.adobe.com/content/dam/acom/en/products/speedgrade/cc/pdfs/cube-lut-specification-1.0.pdf for information on the Cube LUT specification.

Up to 32 files can be imported, via the web interface. When imported, these are added to the **Pre-load List** and may be selected for use as needed.

Importing a Custom LUT

Follow these steps to import a custom LUT:

1 Open a web browser window, type the module's IP address (see page 63) into the address bar, and press RETURN. The browser connects to the module, and a user interface allowing control of the module is displayed:



Browser Control Interface

The buttons at the top of the screen correspond to the RollCall control pages, and offer the same functionality. The UI is intuitive and easy to use.

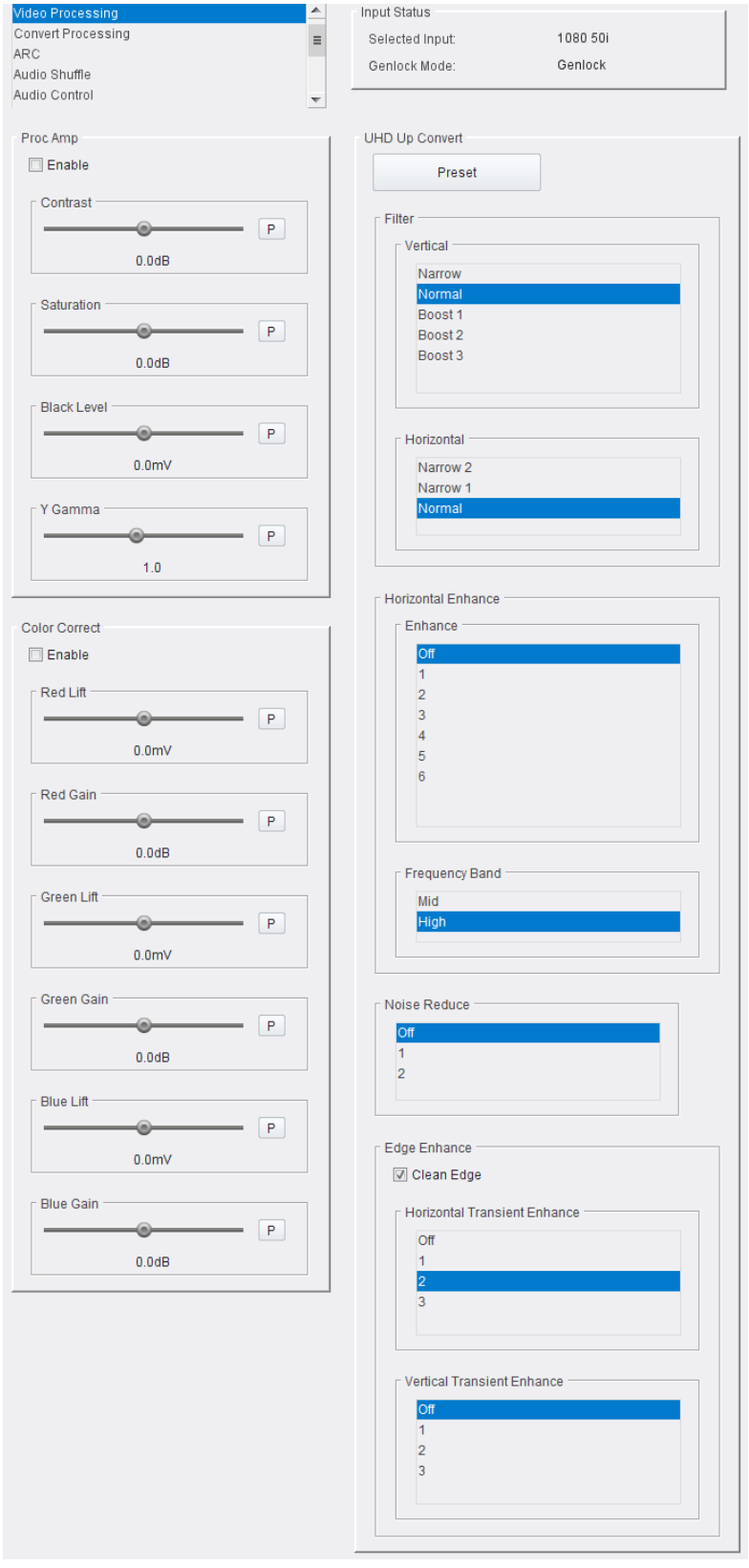
2 In the **SDR/HDR** section, click **Choose File**; a Windows Browse dialog is displayed. Select the file to be uploaded, and click **Open**; the Browse dialog is closed, and the filename is displayed next to **Choose File**.

3 Click **Import**; the file is imported, and added to the **Pre-load List**. The **Status** is updated to **Done**.

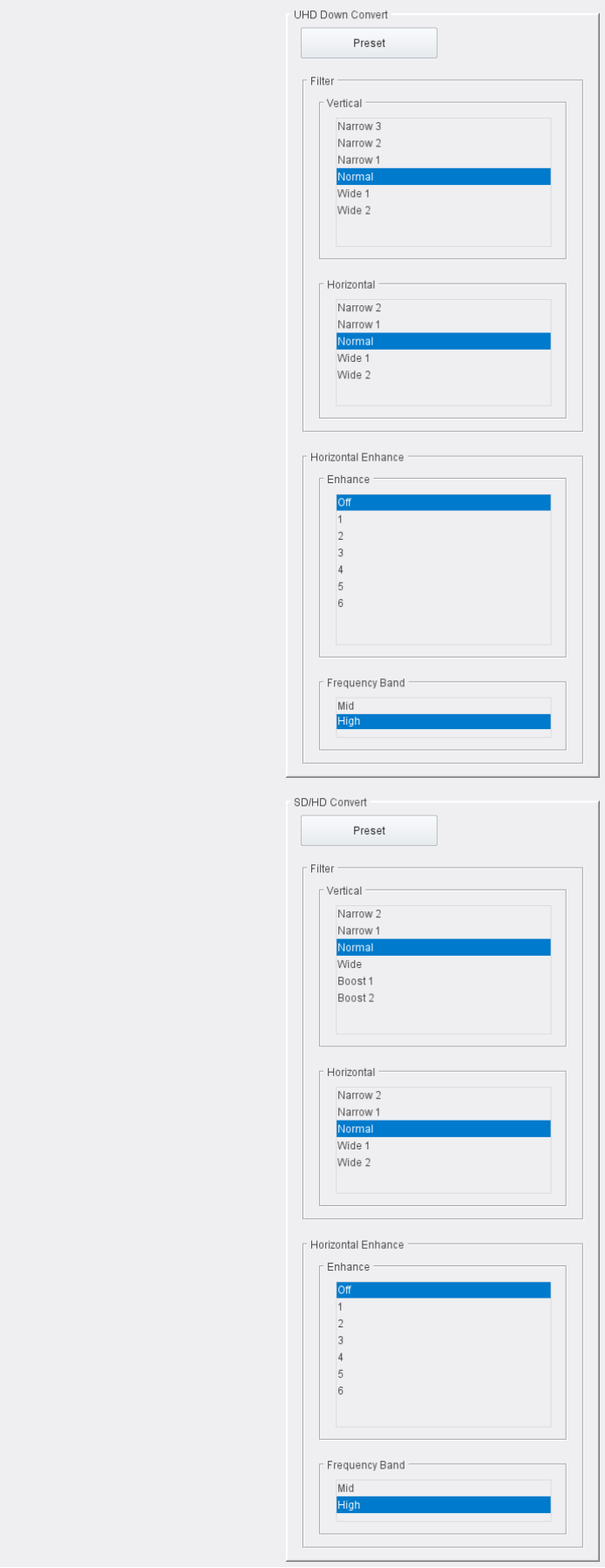
Repeat for each LUT file to be imported.

Video Processing

The Video Processing page provides controls allowing various types of signal processing to be applied to the signal being converted.



Video Processing Page (1)



Video Processing Page (2)

The following facilities are available from this page:

Process Amplifier (Proc Amp)

Allows video inconsistencies to be corrected.

Menu Option	Operation
Enable	Select checkbox to activate **Proc Amp** functions.
Contrast	Adjusts the contrast from -6dB to +6dB in 0.2dB steps. Default is 0dB.
Saturation	Adjusts the color saturation from -6dB to +6dB in 0.2dB steps. Default is 0dB.
Black level	Adjusts the black level from -100mV to +100mV in 0.8mV steps. Default is 0mV.
Y gamma	Adjusts the luma gamma from 0.4 to 1.7 in 0.1 steps. Preset is 1.0.

Color Correct

Menu Option	Operation
Enable	Select checkbox to activate **Color correct** functions.
Red lift	Red channel offset can be adjusted from -200mV to +200mV in steps of 0.8mV. Default is 0mV.
Red gain	Red gain can be adjusted from -6dB to +6dB in steps of 0.2dB. Default is 0dB.
Green lift	Green channel offset can be adjusted from -200mV to +200mV in steps of 0.8mV. Default is 0mV.
Green gain	Green gain can be adjusted from -6dB to +6dB in steps of 0.2dB. Default is 0dB.
Blue lift	Blue channel offset can be adjusted from -200mV to +200mV in steps of 0.8mV. Default is 0mV.
Blue gain	Blue gain can be adjusted from -6dB to +6dB in steps of 0.2dB. Default is 0dB.

UHD Up Convert

Note: These settings apply only when converting from SD/HD to UHD.

Menu Option	Operation
Preset	Click to set all enhancers to default preset values.
Vertical filter	Select as required: • **Narrow**: Reduces vertical bandwidth of the HD source prior to up-conversion. May be useful when HD source contains excessive enhancement (ringing), which may be unacceptable in UHD. • **Normal** (default): Passes all source vertical frequencies without attenuation or boost. • **Boost 1**: Applies a small amount of boost within the HD frequency band. This can increase the visual sharpness of the up-converted image. • **Boost 2**: Applies a larger amount of boost beginning at a lower frequency. • **Boost 3**: Maximum boost. Transient overshoot will be visible.
Horizontal filter	Select as required: • **Narrow 2**: Reduces horizontal bandwidth of HD source prior to up-conversion. May be useful when HD source contains excessive enhancement (ringing), which may be unacceptable in UHD. • **Narrow 1**: Applies a small reduction in horizontal bandwidth of HD source prior to up-conversion. May be useful when HD source contains some enhancement, which may be unacceptable in UHD. • **Normal** (default): Passes all source horizontal frequencies without attenuation.
Horizontal enhance filter	Applies horizontal frequency boost to make the image visually sharper. Adaptive processing prevents an increase in noise level and excessive boost on textures. Select a level as required. • **Off** (default) • **1** • **2** • **3** • **4** • **5** • **6**
Frequency band	Selects the frequency band to which the **Horizontal enhance** filter is applied. Select as required: • **Mid** (default) • **High**

Menu Option	Operation
Noise reduce	Multi-band noise reduction reduces noise visibility in up-converted images, without introducing visual artifacts. Select a level as required. Note this process will not reduce noise that is already visible in the HD source. • **Off** (default) • **1** • **2**
Edge enhance	• **Clean edge** - Enable the checkbox to activate adaptive processing designed to remove 'ringing', often evident in up-conversion processing. • **Horizontal transient enhance** - Sharp vertical edge detail in the HD source, such as captions and graphics, is identified, and the gradient of these transients is increased to occupy the full UHD bandwidth. Adaptive processing ensures that textures are preserved. Select a level as required. • **Off** • **1** • **2** • **3** • **Vertical transient enhance** - Sharp horizontal edge detail in the HD source, such as captions and graphics, is identified, and the gradient of these transients is increased to occupy the full UHD bandwidth. Some degradation of fine textures may be evident when using higher settings. Select a level as required. • **Off** • **1** • **2** • **3**

UHD Down Convert

Note: These settings apply only when converting from SD/HD to UHD.

Menu Option	Operation
Preset	Click to set all enhancers to default preset values.
Vertical filter	Select as required: • **Narrow 3**: Reduces vertical bandwidth of the down-conversion process. May be useful when the UHD source contains high levels of mid-frequency content. • **Narrow 2**: As above, but with less bandwidth reduction. • **Narrow 1**: As above, but with minimal bandwidth reduction. • **Normal** (default): Optimized bandwidth setting. Passes all vertical frequencies compatible with the HD output. • **Wide 1**: Allows some alias frequencies to pass, which may give an apparent increase in picture sharpness. • **Wide 2**: Allows a wider band of alias frequencies to pass.

Menu Option	Operation
Horizontal filter	Select as required: • **Narrow 2**: Reduces horizontal bandwidth of the down-conversion process. May be useful when the UHD source contains high levels of mid-frequency content. • **Narrow 1**: As above, but with less bandwidth reduction. • **Normal** (default): Optimized bandwidth setting. Passes all horizontal frequencies compatible with the HD output. • **Wide 1**: Allows some alias frequencies to pass, which may give an apparent increase in picture sharpness. • **Wide 2**: Allows a wider band of alias frequencies to pass.
Horizontal enhance	Applies horizontal frequency boost to make image visually sharper. Adaptive processing prevents an increase in noise level and excessive boost on textures. Select a level as required. • **Off** (default) • **1** • **2** • **3** • **4** • **5** • **6**
Frequency band	Boost can be set to operate on either the highest or mid frequencies. Select a level as required. • **Mid** (default) • **High**

SD/HD Convert

Note: These settings apply only when converting between SD and HD.

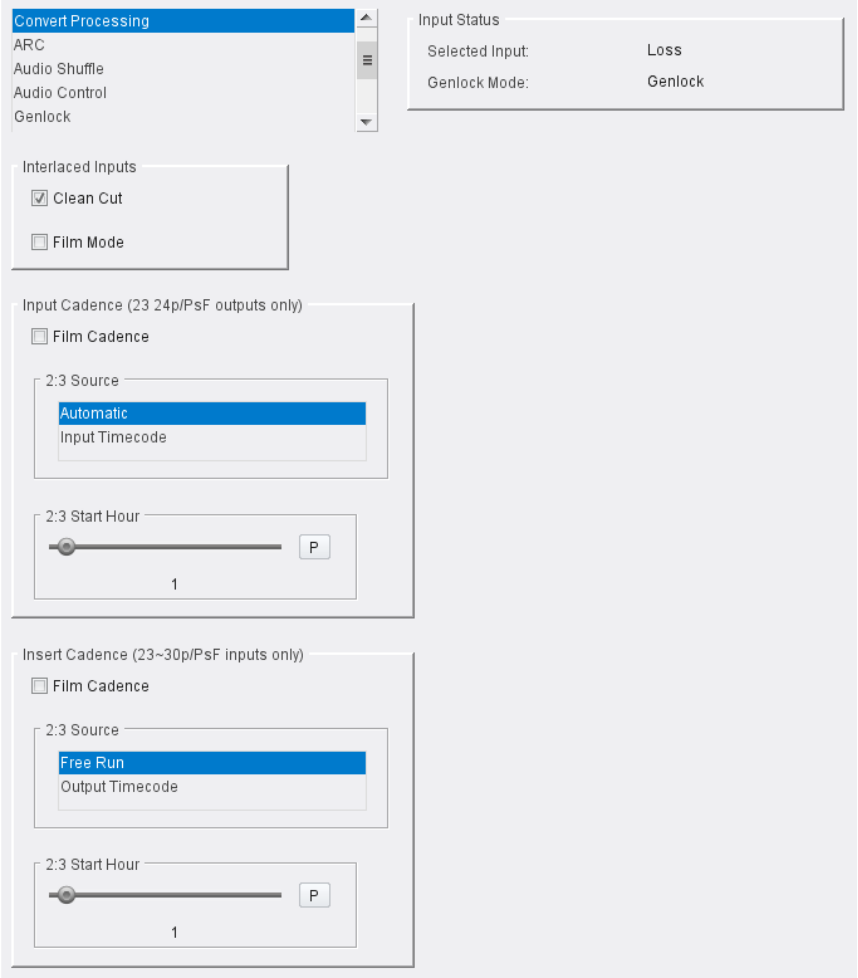
Menu Option	Operation
Preset	Click to set all enhancers to default preset values.
Vertical filter	Select as required: • **Narrow 2**: Reduces the vertical bandwidth of the conversion process. • **Narrow 1**: As above but with less bandwidth reduction. • **Normal** (default): Optimized bandwidth setting. Passes all vertical frequencies. • **Wide**: For some down conversion modes, **Wide** allows extended bandwidth to pass. This may give an apparent increase in picture sharpness. In up conversion modes, this setting is the same as **Normal**. • **Boost 1**: Boosts high frequencies with SD-HD or HD-HD conversions. For HD-SD, the bandwidth is increased further to allow more alias frequencies to pass. • **Boost 2**: As Boost 1, but giving greater boost or more alias.

Menu Option	Operation
Horizontal filter	Select as required: • **Narrow 2**: Reduces the horizontal bandwidth of the conversion process. May be useful when down converting HD material containing high levels of mid-frequency content which results in interline flicker in the SD output. • **Narrow 1**: As above but with less bandwidth reduction • **Normal**: Optimized bandwidth setting. Passes all horizontal frequencies compatible with the output format. • **Wide 1**: For HD to SD conversion, allows some alias frequencies to pass which may give an apparent increase in picture sharpness. Will have limited effect in HD to HD conversion. • **Wide 2**: Allows more alias frequencies to pass with HD to SD.
Horizontal enhance	Applies horizontal frequency boost to make image visually sharper. Adaptive processing prevents an increase in noise level and excessive boost on textures. Select a level as required. • **Off** (default) • **1** • **2** • **3** • **4** • **5** • **6**
Frequency band	Boost can be set to operate on either the highest or mid frequencies. Select a level as required. • **Mid** (default) • **High**

Convert Processing

The Convert Processing page 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. **Film mode** (see Interlaced Inputs, on page 40) also permits the synthesis of film cadence in the output.



Convert Processing Page

The following facilities are available from this page:

Interlaced Inputs

Menu Option	Operation
Clean cut	Clean cut processing detects scene changes and prevents interpolation across the cut. Permitted only if **Film cadence** is not enabled (see section). Default = **Off**.
Film mode	Use **Film mode** if input is interlaced (1080i or 525 or 625) and contains film-originated content. This adjusts the conversion aperture to give maximum vertical bandwidth. Default = **Off**. **Note**: This mode is relevant only for film-originated content where the cadence is carried in an interlaced format. Where film-originated content is carried in a progressive format, **Film mode** should not be used.

Input cadence (23 24p/PsF outputs only)

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

Menu Option	Operation
Film Cadence	If the input content is film-originated with a 2:3 cadence, or simulates film-originated content, the **Film cadence** check box should be enabled. Otherwise, it should be disabled. **Note**: This feature is not available when converting UHD 59p to UHD 23p, or UHD 60p to UHD 24p. Default = **Disabled**. **Example 1**: Input UHD 59p (with embedded 3:2 cadence), Output 1080 23p. Input frame sequence: A, A, B, B, B, C, C, D, D, D … When cadence is **On** the output frame sequence will be: A, B, C, D … When cadence is **Off** the output will be a linear frame rate conversion.
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 an integer hour value. This control is active only when **2:3 Source** is set to **Input timecode** and Drop-Frame Timecode is present. For non-Drop Frame Timecode sources this control has no effect. Control is available from 1 hour to 23 hours, in steps of 1 hour. The default is 1 hour.

Insert cadence (23~30p/PsF inputs only

Allows the insertion of film cadence on the output. Output frame rate must be 50, 59 or 60Hz. For all other output frame rates, cadence processing is automatically disabled.

Example 1:

Input 1080 23p, Output UHD 59p.

Input frame sequence: A, B, C, D …

When the **Film cadence** check box is enabled, the output frame sequence will be A, A, B, B, B, C, C, D, D, D …

When the **Film cadence** check box is disabled, the output will be a linear frame rate conversion.

Example 2:

Input 720 25p, Output UHD 50p

Input frame sequence: A, B, C, D …

When the **Film cadence** check box is enabled, the output frame sequence will be: A, A, B, B, C, C, D, D …

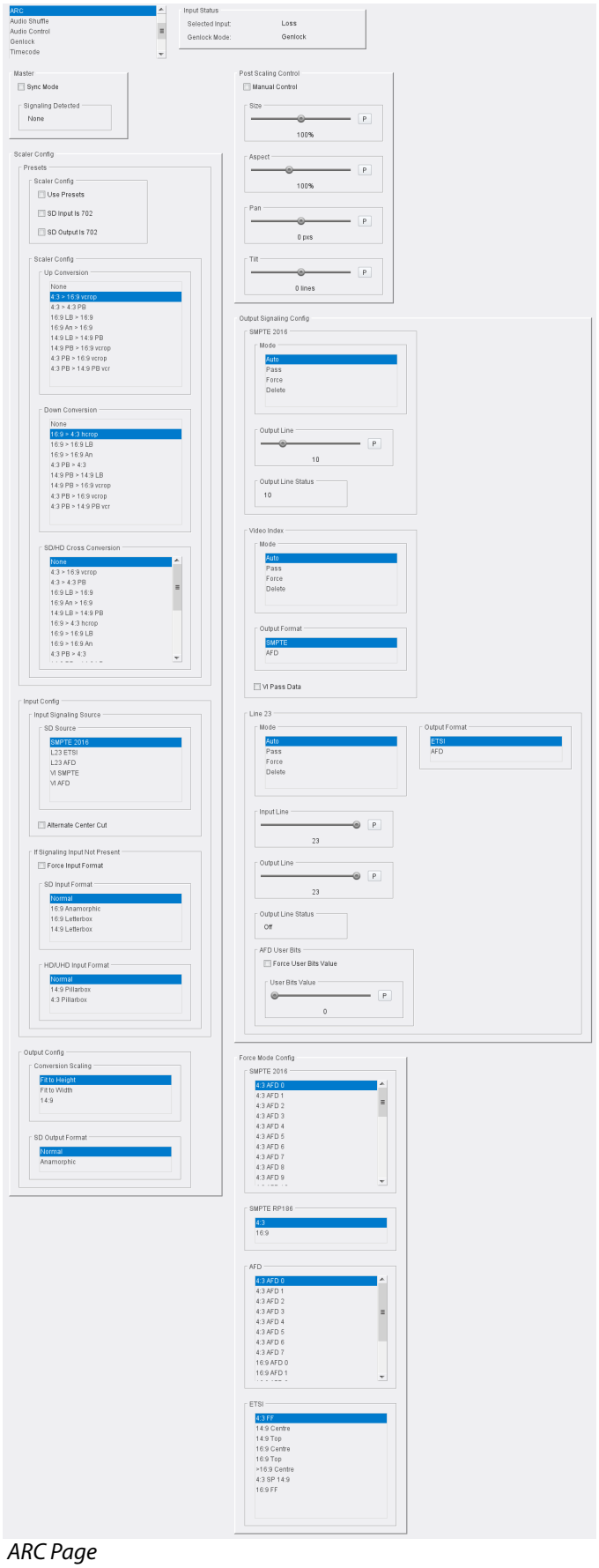
When the **Film cadence** check box is disabled, the output will be a linear frame rate conversion.

Default = **Disabled**

Menu Option	Operation
2:3 Source	If the output is 59Hz (60Hz) and a 2:3 cadence style is selected, this control allows the sequence to be locked to output 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 active only when **2:3** is set to **Output timecode** and the Timecode generator is set to **Drop-Frame**, or, when following input timecode, the source has **Drop-Frame Timecode** present. When operating with non-Drop Frame Timecode this control has no effect. Control is available from 1 hour to 23 hours, in steps of 1 hour. Default is 1 hour.

ARC

The ARC (Aspect Ratio Control) page allows the user to specify the aspect ratio of a picture from a range of options, or to adjust the size and position of the picture manually.



ARC Page

The following facilities are available from this page:

Master

Menu Option	Operation
Sync Mode	When **Sync mode** is enabled, processing latency is reduced if there is no ARC (same format input to output, i.e. the module is operating as a synchronizer). This gives the lowest latency. Options are: • **Disabled** (default): normal operation. The ARC controls will function. • **Enabled**: If scaler features are inactive (no aspect ratio conversion) and **Sync mode** enabled, the scaler is bypassed, so reducing the processing latency. It is possible to bypass the scaler only when up-converting 1080p to UHD, down-converting UHD to 1080p or synchronizing (same standard/UHD format in and out). In all other modes the scaler is active and this control will have no effect on latency. Vertical filter controls are disabled when **Sync mode** is active.
Signaling detected	Displays the currently detected signaling.

Scaler Config

The **Scaler** offers preset controls for management of the aspect ratio. The following controls are available:

Menu Option	Operation
Presets	Select as required: • **Use presets**: Enables presets. • **SD input is 702**: Use for incoming SD content that uses a 702 sample line rather than a 720 sample line. • **SD output is 702**: Generates SD output with a 702 sample line.
Up conversion	Sets the SD to UHD aspect ratio conversion. Available up-convert presets are:

From (SD)	To (UHD)
4:3	16:9 vcrop (default)
4:3	4:3 PB
16:9 LB	16:9
16:9 An	16:9
14:9 LB	14:9 PB
14:9 PB	16:9 vcrop
4:3 PB	16:9 vcrop
4:3 PB	14:9 PB vcrop

LB = Letterbox, PB = Pillarbox, Vcrop = Vertical Crop, An = Anamorphic

<table>
<tr><th>Menu Option</th><th>Operation</th></tr>
<tr><td>Down conversion</td><td>Sets the UHD to SD aspect ratio conversion.
Available down convert presets are:
<table>
<tr><th>From (UHD)</th><th>To (SD)</th></tr>
<tr><td>16:9</td><td>4:3 hcrop (default)</td></tr>
<tr><td>16:9</td><td>16:9 LB</td></tr>
<tr><td>16:9</td><td>16:9 An</td></tr>
<tr><td>4:3 PB</td><td>4:3</td></tr>
<tr><td>14:9 PB</td><td>14:9 LB</td></tr>
<tr><td>14:9 PB</td><td>16:9 vcrop</td></tr>
<tr><td>4:3 PB</td><td>16:9 vcrop</td></tr>
<tr><td>4:3 PB</td><td>14:9 PB vcrop</td></tr>
</table>
LB = Letterbox, PB = Pillarbox, Vcrop = Vertical Crop, An = Anamorphic</td></tr>
<tr><td>SD/HD Cross conversion</td><td>Sets the SD to HD aspect ratio conversion.
Available cross convert presets are:
<table>
<tr><th>From (SD)</th><th>To (HD)</th></tr>
<tr><td>4:3</td><td>16:9 vcrop</td></tr>
<tr><td>4:3</td><td>4:3 PB</td></tr>
<tr><td>16:9 LB</td><td>16:9</td></tr>
<tr><td>16:9 An</td><td>16:9</td></tr>
<tr><td>14:9 LB</td><td>14:9 PB</td></tr>
<tr><td>16:9</td><td>4:3 hcrop</td></tr>
<tr><td>16:9</td><td>16:9 LB</td></tr>
<tr><td>16:9</td><td>16:9 An</td></tr>
<tr><td>4:3 PB</td><td>4:3</td></tr>
<tr><td>14:9 PB</td><td>14:9 LB</td></tr>
<tr><td>16:9 LB</td><td>4:3 hcrop</td></tr>
<tr><td>16:9 LB</td><td>16:9 An</td></tr>
<tr><td>16:9 LB</td><td>14:9 LB</td></tr>
<tr><td>16:9 An</td><td>4:3 hcrop</td></tr>
<tr><td>16:9 An</td><td>16:9 LB</td></tr>
<tr><td>16:9 An</td><td>14:9 LB</td></tr>
<tr><td>14:9 PB</td><td>16:9 vcrop</td></tr>
<tr><td>4:3 PB</td><td>16:9 vcrop</td></tr>
<tr><td>4:3 PB</td><td>14:9 PB vcrop</td></tr>
</table>
LB = Letterbox, PB = Pillarbox, Vcrop = Vertical Crop, An = Anamorphic</td></tr>
</table>

Input Config

Configures the module to respond to aspect signaling control. If input signaling is not present, **Force input format** (see below) can be used.

Menu Option	Operation
Input signaling source	When an SD source contains more than one style of signaling, select the appropriate item: • **SMPTE 2016** (default) • **L23 ETSI** • **L23 AFD** • **VI SMPTE** • **VI AFD** **Alternate center cut** - Disabled by default. When disabled, behavior on receipt of certain specific AFD codes ignores protected regions. When **Alternate center cut** is enabled, the ARC behavior for these six specific codes will be to remove any black bars and also remove the gray bars that will leave the alternative center. The alternative center 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** settings, 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 *Format for Active Format Description and Bar Data*, pages 7-9. Behavior with **Alternate center cut** enabled and disabled is shown in the table below:

AFD Format	Interpretation - Alt Center Cut Disabled	Interpretation - Alt Center Cut Enabled
4:3 AFD 13	4:3	4:3 Alt 14:9
4:3 AFD 14	16:9 LB	16:9 LB Alt 14:9
4:3 AFD 15	16:9 LB	16:9 LB Alt 4:3
16:9 AFD 13	4:3 PB	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

LB = Letterbox, PB = Pillarbox

Menu Option	Operation

If signaling input not present	Select as required:
	Force Input Format - This control allows an SD input format to be applied if a signaling input is not present. It is disabled by default.
	When enabled, the input format is forced to that selected from the **SD Input Format** and **HD/UHD Input Format** lists.
	Formats available are:
	• SD Input Format
	  • **Normal** - use default aspect ratio.
	  • **16:9 Anamorphic** - horizontally squeezes a widescreen image to fit a standard 4:3 aspect ratio.
	  • **16:9 Letterbox** - preserves the original aspect ratio of film shot in a widescreen 16:9 aspect ratio, with bars visible at the top and bottom of the screen.
	  • **14:9 Letterbox** - preserves the original aspect ratio of film shot in a widescreen 14:9 aspect ratio, with bars visible at the top and bottom of the screen.
	• HD/UHD Input Format
	  • **Normal** (default): use default aspect ratio.
	  • **14:9 Pillarbox**: preserves the original aspect ratio of HD content with a 14:9 aspect ratio, with bars visible at the sides of the screen.
	  • **4:3 Pillarbox**: preserves the original aspect ratio of HD content with a 4:3 aspect ratio, with bars visible at the sides of the screen.

Output Config

Select the required output from the **Conversion Scaling** and **SD Output Format** lists:

Menu Option	Operation
Conversion Scaling	• **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).
SD Output Format	• **Normal** (default): Use default aspect ratio • **Anamorphic**: Horizontally squeezes a widescreen image to fit a standard 4:3 aspect ratio.

Post Scaling Control

The **Post Scaling Control** enables the size and position of the picture to be adjusted manually.

Option	Operation
Manual Control	**Disabled** (default) **Enabled** - Enables manual adjustment of aspect ratio. Note: These controls do not operate in UHD to UHD mode. Adjusting the picture size in any down or cross-conversion mode can increase the amount of visible alias. To avoid this it is recommended that the Horizontal and Vertical filters are set to **Narrow 1** (see page 35).
Size	Adjusts the size of the whole output image while maintaining the aspect ratio. Range is 80% to 120% in steps of 1%. Default is 100%.
Aspect	Adjusts the aspect ratio of the output image. Range is 70% to 150% in steps of 1%. Default is 100%.
Pan	Adjusts the horizontal position of the output image. Range is -50 to +50 pixels in steps of 1 pixel. Default is 0 pixels.
Tilt	Adjusts the vertical position of the output image. Range is -50 to +50 lines in steps of 1 line. Default is 0 lines.

Output Signaling Config

Controls the signaling applied to the output.

Option	Operation

SMPTE 2016	Available options are:
	• **Mode**:
	  • **Auto** - Automatically sets the conversion based on a combination of the input and output standards.
	  • **Pass** - Passes SMPTE 2016 information through the module unchanged.
	  • **Force** - Forces the conversion specified on the output.
	  • **Delete** - Deletes SMPTE 2016 information from the output signal.
	• **Output Line** - Selects the output line on which SMPTE 2016 information is placed.
	• **Output Line Status** - Displays the line number on which SMPTE 2016 information is placed.

Notes

In the SD domain, take care to avoid a line clash if embedded VITC and SMPTE 2016 are both enabled.
In the event of both VITC and SMPTE being required:

- For SD 625 signals, SMPTE2016 is relocated to the line before the VITC line, i.e. if VITC is at default 19 and 21, SMPTE2016 will be placed on either 18 or 20 respectively when there is a clash.

Notes

- For SD 525 signals, SMPTE2016 is relocated to the line between the two VITC lines, i.e. if default VITC is on lines 14 and 16, SMPTE2016 will be placed on line 15 in the event of a clash.

Video Index

Configures Video Index (VI) signaling. Available controls are:

Option	Operation
Mode	• **Auto** (default): Automatically sets the conversion based on a combination of the input and output standards. • **Pass**: Passes VI information through the module unchanged. • **Force**: Forces the conversion specified on the output. • **Delete**: Deletes VI information from the output signal.
Output Format	• **SMPTE** (default): Outputs Video Index information according to SMPTE RP186. • **AFD**: Outputs Video Index information according to ARDSPEC1.
VI Pass Data	• **Disabled** (default): VI data other than coded frame and AFD are blanked. • **Enabled**: User data from the source VI are passed from the input to the output.

Line 23

Configures Line 23 (L23) signaling. Available controls are:

Option	Operation
Mode	• **Auto** (default) - Automatically sets the conversion based on a combination of the input and output standards. • **Pass** - Passes L23 information through the module unchanged. • **Force** - Forces the conversion specified on the output. • **Delete** - Deletes L23 information from the output signal.
Output Format	• **ETSI** (default) - Outputs L23 information according to ETSI EN 300 294 v1.4.1. • **AFD** - Outputs L23 information according to *West Country TV/HTV/ Central TV L23_SPEC.doc 1997*.
Input Line	Selects the input line from which the L23 information is read. The range is from line 10 to line 23 in one-line steps. Default = line 23.
Output Line	Selects the output line on which L23 information is placed. The range is from line 10 to line 23 in one-line steps. Default = line 23.
Output Line Status	Displays line number of where the signaling is placed.

Option	Operation
AFD user bits	**Force user bits value** - allows user-defined bits to be inserted. Options are: • **Disabled** (default). • **Enabled** - Allows up to four user-defined bits to be inserted.
AFD user bits value	From 0 to 15 in steps of 1. Set as required. Default = 0.

Force Mode Config

Inserts specific signaling codes regardless of the source aspect ratio.

SMPTE 2016: When enabled, inserts valid SMPTE 2016 data when none is present on the input. Available codes are:

4:3 AFD 0	16:9 AFD 0
4:3 AFD 1	16:9 AFD 1
4:3 AFD 2	16:9 AFD 2
4:3 AFD 3	16:9 AFD 3
4:3 AFD 4	16:9 AFD 4
4:3 AFD 5	16:9 AFD 5
4:3 AFD 6	16:9 AFD 6
4:3 AFD 7	16:9 AFD 7
4:3 AFD 8	16:9 AFD 8
4:3 AFD 9	16:9 AFD 9
4:3 AFD 10	16:9 AFD 10
4:3 AFD 11	16:9 AFD 11
4:3 AFD 12	16:9 AFD 12
4:3 AFD 13	16:9 AFD 13
4:3 AFD 14	16:9 AFD 14
4:3 AFD 15	16:9 AFD 15

SMPTE RP-186: When enabled, inserts valid RP-186 data when none is present on the input. Available codes are:

4:3 (default)

16:9

AFD: When enabled, inserts valid AFD codes when none are present on the input. Available codes are:

4:3 AFD 0	16:9 AFD 0
4:3 AFD 1	16:9 AFD 1
4:3 AFD 2	16:9 AFD 2
4:3 AFD 3	16:9 AFD 3
4:3 AFD 4	16:9 AFD 4

4:3 AFD 5	16:9 AFD 5
4:3 AFD 6	16:9 AFD 6
4:3 AFD 7	16:9 AFD 7

ETSI: When enabled, inserts valid ETSI codes when none are present on the input. Available codes are:

4:3 FF

14:9 Center

14:9 Top

16:9 Center

16:9 Top

> 16:9 Center

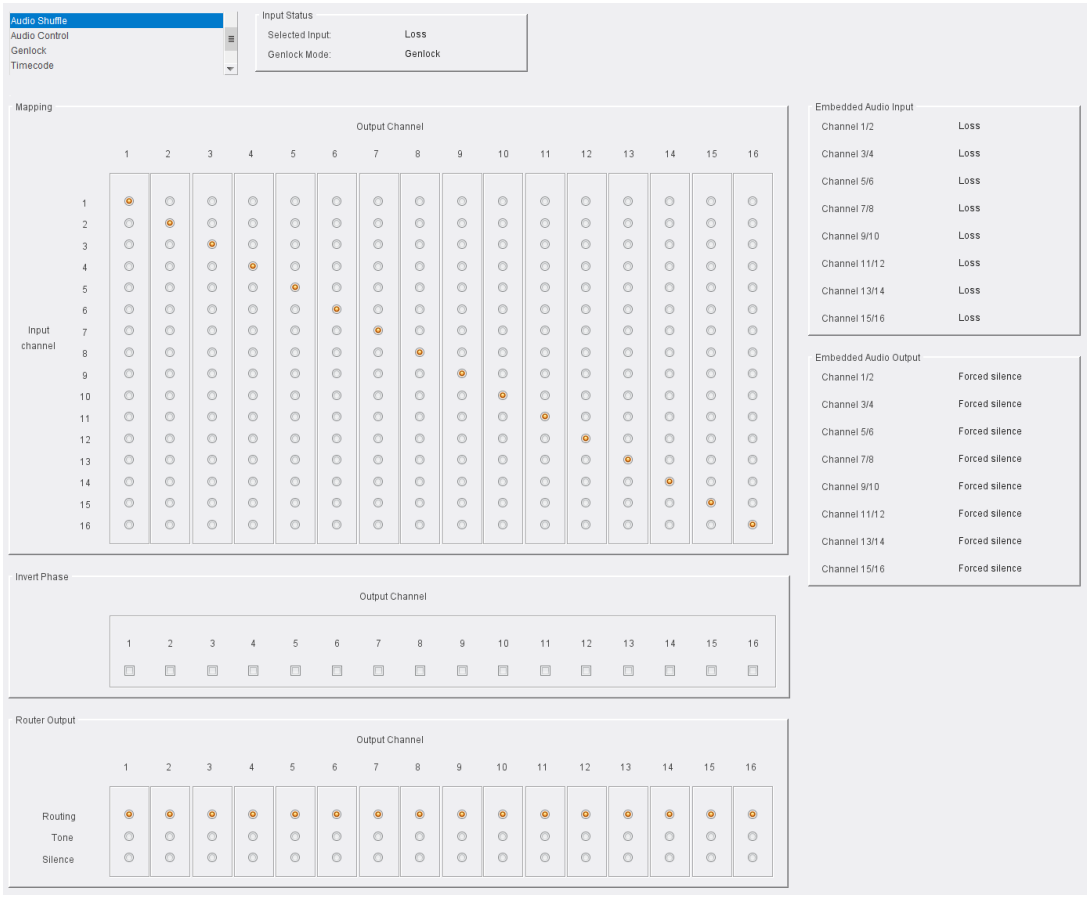
4:3 SP 14:9

16:9 FF

FF = Full Format

Audio Shuffle

Audio shuffle allows routing from each process pair to the output. Facilities to invert audio phase and insert tone or silence are also available here.



Audio Shuffle page

Notes

The **Audio Shuffle** menu allows any configuration of audio channels to be routed to the output. Illegal combinations will result in the output being forced to silence.
If both audio channels of an audio pair have been derived from non-PCM audio channels, there are two possible states, **Non-PCM** or **Forced silence**. To be recognized as valid non-PCM (**N**), both channels must:

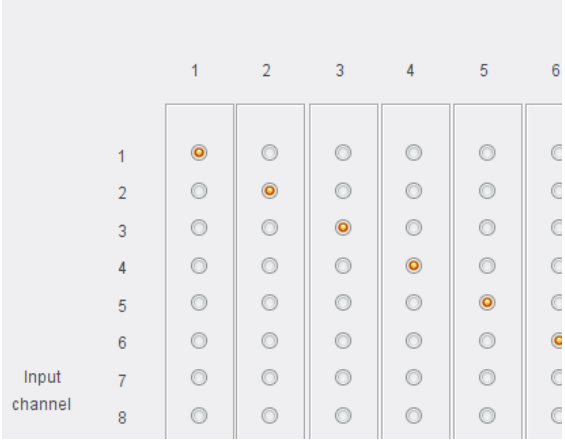
- Have come from the same input pair;
- Have the left and right channels the correct way round;
- Not have the phase inverted.

A failure of any of these conditions will cause the pair to be muted and the status to be reported as **Forced silence**.

Assigning an output from a processing channel

To use source audio from Input 3 in Output 3:

- Open the **Audio Shuffle** page.
- In the **Mapping** section, select the button in the position where the **Input Channel 3** column intersects with the **Output Channel 3** row:



Audio Shuffle Selection

Additional processing options are available:

Invert Phase - Causes the phase of left and right audio channels to be inverted. This is useful when dealing with input audio discrepancies. Enable channel check boxes as required.

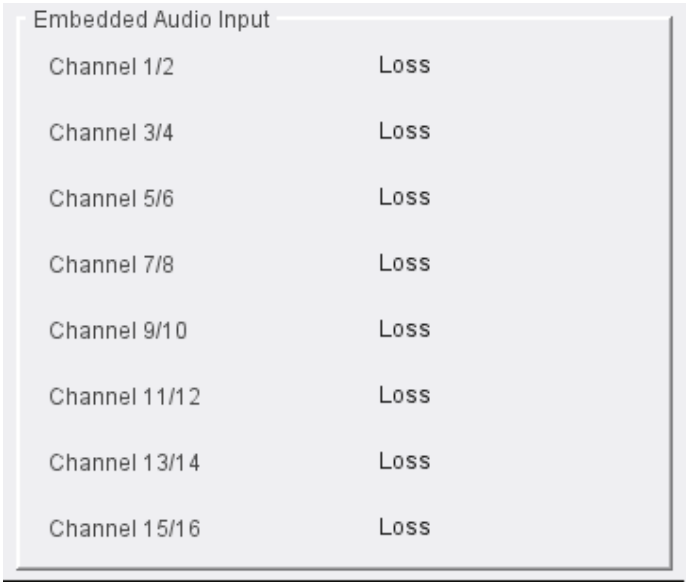
Note: Phase invert is available only for PCM audio.

Router Output: Routing - Passes audio to output without performing additional processing.

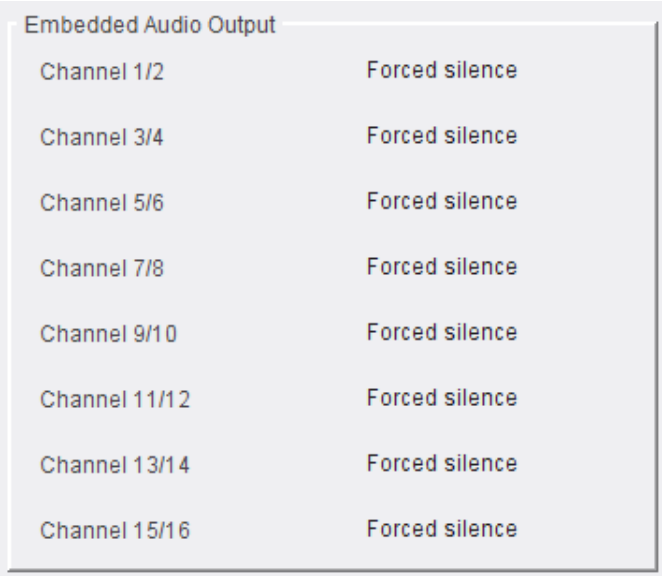
Router Output: Tone - Inserts a tone into the selected audio channel.

Router Output: Silence - Mutes the selected audio channel.

The settings made here are displayed on the **Embedded Audio Input** and **Embedded Audio Output** panes:



Embedded Audio Input pane



Embedded Audio Output pane

Possible values are:

- **Routed**
- **Tone**
- **Forced Silence**

Audio Control

The Audio Control page provides tools to adjust the audio on each processing channel.

Audio Control page

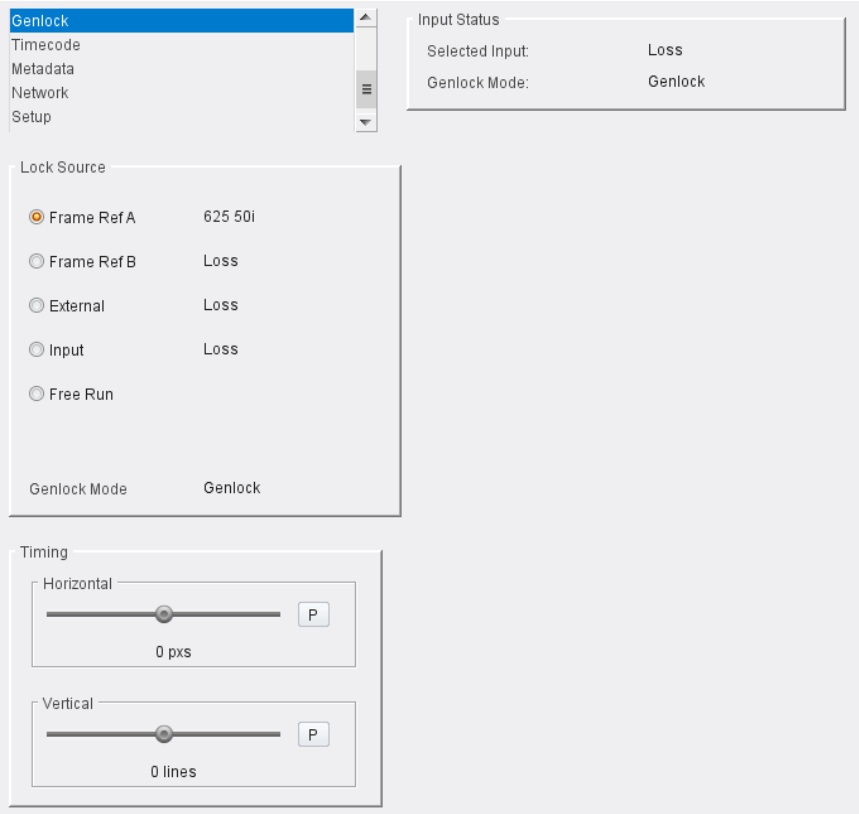
Audio Control	Available Choices
Gain	Audio gain can be adjusted from -18dB to +18dB in steps of 0.1dB. Default is 0dB. Use the channel sliders to adjust the gain on individual channels. Alternatively, use the **Master** control to adjust the gain for all channels at once.
Pair delay	Pair delay can be adjusted for each of the eight audio channel pairs. The adjustment range is -40ms to +200ms in 1ms steps. The default value is 0ms. Use the channel sliders to adjust the delay on channel pairs. Alternatively, use the **Master** control to adjust the delay on all channel pairs at once.
Delay statuses	Shows the total delay per pair in ms.
Video delay	Shows the current total video delay through the module.
Tone frequency	Tone frequency can be selected from 100Hz to 10000Hz in steps of 100Hz. Default is 1000Hz.
Dolby E alignment offset	Dolby E alignment offset can be selected from -10 lines to +10 lines in steps of 1 line. Default is 0 lines.

Notes

- Global delay is applied to all channels. Individual pair delays are added/ subtracted from this delay.
- Pair delay is added instantaneously and will produce an audible disturbance.
- Global delay is added or subtracted at the rate of 2ms/s, and does not produce an audible disturbance. Allow time for the global delay to settle to the desired value.
- The maximum audio delay (video processing delay + added audio delay) is limited to 260ms.

Genlock

The Genlock page provides control over system interaction with timing references.



Genlock page

Genlock locks the output video clock to the genlock source (frame reference, external reference or input), 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. If the video output frame rate differs from the genlock source frame rate, the output will 'clock lock' to the genlock source. Clock lock ensures that the output audio 48kHz clock remains locked to the genlock source.

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

The following facilities are available from this page:

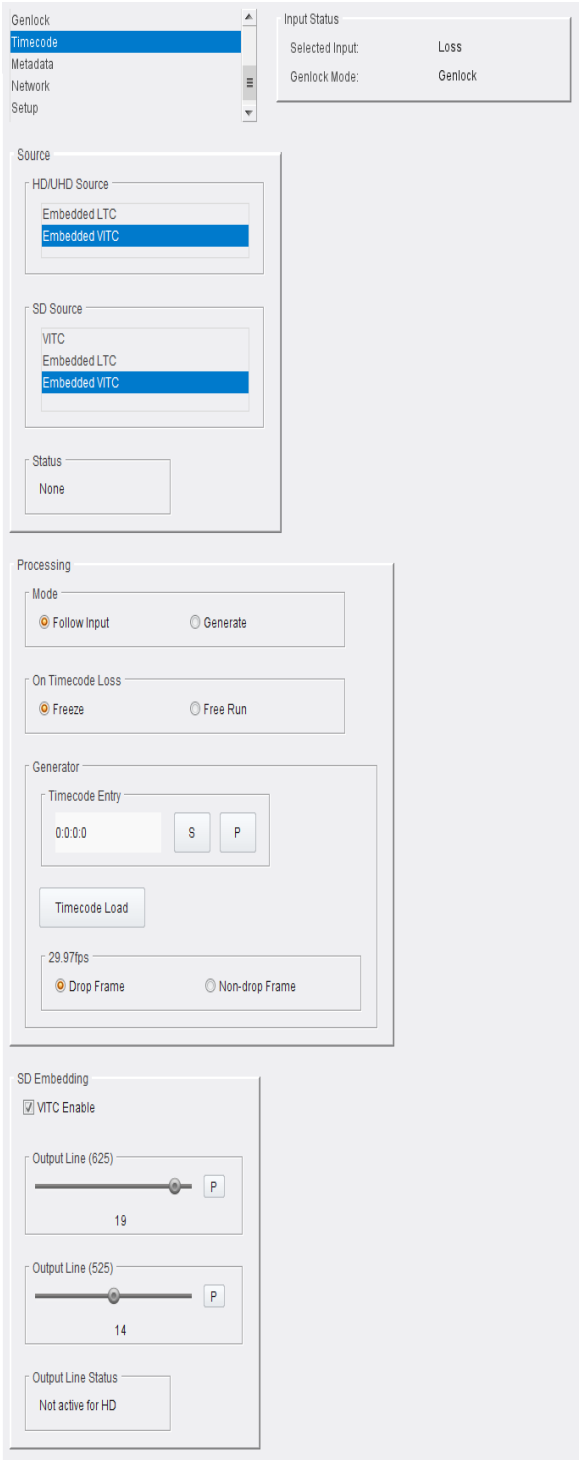
Menu Option	Operation
Lock Source	• **Frame Ref A**: locks to enclosure reference A. • **Frame Ref B**: locks to enclosure reference B. • **External**: Locks to an external reference. • **Input**: Locks output to input. When input and output frame rates are integer related, selecting **Input** will force the module to a fixed processing delay. • **Free run**: locks the output video to an internal reference clock.
Genlock Mode	Reports: selected lock mode, output format, lock status (**genlock**, **clocklock**, **freerun**).

Menu Option	Operation
Timing - Horizontal	Adjusts the horizontal timing of the output signal with respect to the reference signal, from pixel -2640 to pixel 2640 in steps of 1 pixel. Default = 0 pixels
Timing - Vertical	Adjusts the vertical timing of the output signal with respect to the reference signal, from line -1125 to line 1125 in steps of 1 line. Default = 0 lines

Note: Genlock timing adjustments will take effect only when the **Lock Source** is set to **Frame Ref A/B** or **External**.

Timecode

The Timecode page enables setup and control of the module's timecode options for VITC (Vertical Interval Timecode), LTC (Linear Timecode), and ATC (Ancillary Timecode). In the HD domain, both Embedded VITC and Embedded LTC are supported. In the SD domain, VITC, ATC LTC and ATC VITC are supported.



Timecode page

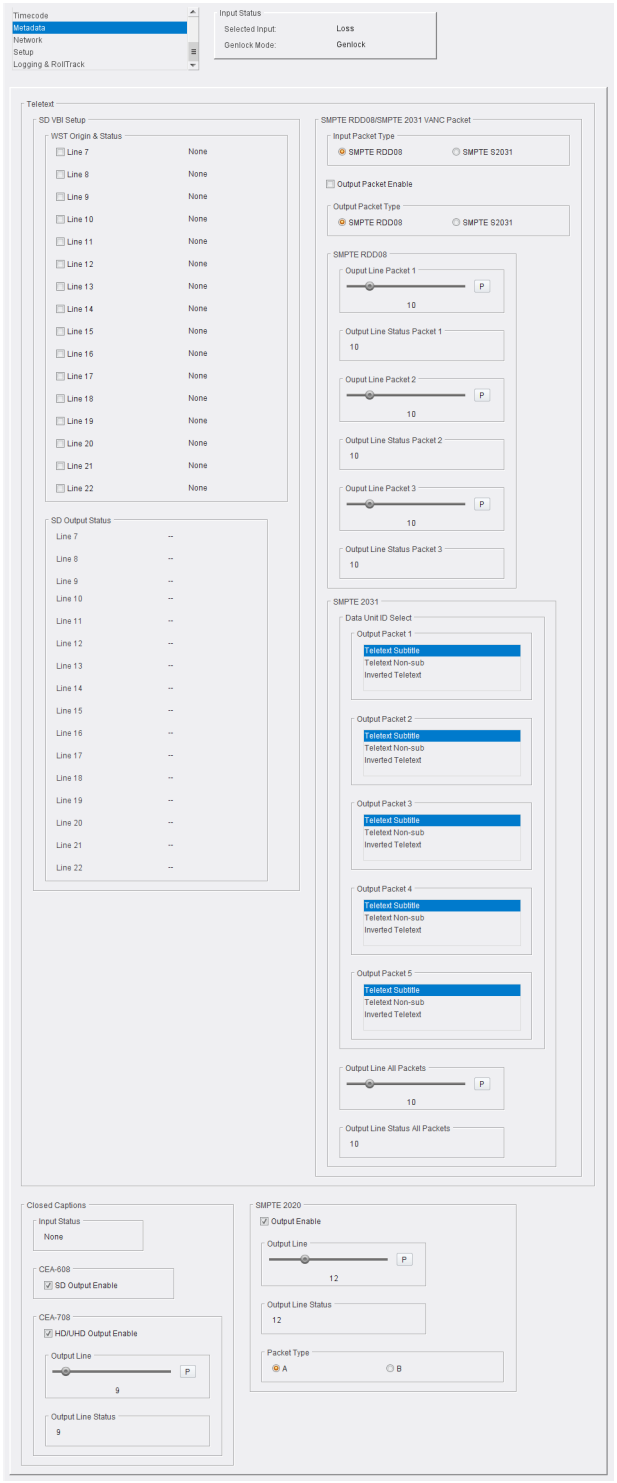
When present, timecode can be handed over from the input or internally generated. Where the input frame rate is 29.97 fps, both drop frame and non-drop frame modes are supported. For 29.97fps outputs, timecode can be configured as either drop frame or non-drop frame.

The following facilities are available from this page:

Menu Option	Operation
Source	Select as required. **HD/UHD**: • **Embedded LTC** (default) • **Embedded VITC** **SD**: • **VITC** (Default) • **Embedded LTC** • **Embedded VITC**
Status	Reports the output line containing timecode.
Processing	**Mode**: • **Follow input** (default): When active, only the selected source type of ANC packet is inserted into the output video. So, the action on timecode loss is applicable only to the selected ATC type. • **Generate**: Allows the user to generate timecode using the value entered in **Generator Timecode Entry** as a start point. The action taken on selection of the **Generate** mode depends on the previous timecode handling state: if the mode was Input trigger, the output timecode will jump to the timecode value in **Generator Timecode Entry** when **Generator Timecode Load** is selected. If the mode was **Follow Input**, the output timecode will jump to the timecode value in **Generator Timecode Entry** as soon as the mode is changed to **Generate**. When **Generate** mode is selected, both ATC, LTC and ATC VITC are embedded in the output. **On Timecode Loss**: • **Freeze** (default): freezes output timecode. • **Free run**: timecode free runs from the current timecode value.
Generator	• **Timecode Entry**: The value to be used as a start point when generating timecode. Enter as appropriate. • **Timecode Load**: Click to load the value entered in **Generator Timecode Entry**.
Drop Frame	Select: • **Drop Frame** • **Non-drop Frame** (default)
SD Embedding	Select as required. **VITC enable**: • **Enabled** (default) • **Disabled** **Output Line (625)**: • Selects the output line on which VITC is placed when the output is 625. The range is from line 7 to line 20 in steps of 1 line. Default is line 19. **Output Line (525)**: • Selects the output line on which VITC is placed when the output is 525. The range is from line 11 to line 17 in steps of 1 line. Default is line 14. **Output Line Status**: • Reports the output line containing timecode.

Metadata

The Metadata page provides control of closed caption and teletext information. When upconverting or downconverting at the same frame rate, incoming SD or HD closed captions and subtitles are converted to the correct format in the HD or SD output.



Metadata page

The following facilities are available from this page:

Teletext

The module can pass World System Teletext (WST) for SD and RDD-08 teletext for HD. Teletext output can be enabled or disabled, and the input and output lines to be used specified.

SMPTE RDD08 - Up to 15 lines can be encoded in the OP47 packet. A maximum of three packets are allowed on the output, each with individual line number controls. The number of output OP47 packets is decided by the number of valid WST lines decoded on the input. The first five WST lines are encoded in the first OP47 packet, the next five in the second OP47 packet, and so on.

SMPTE 2031 - Up to 5 SMPTE 2031 packets are allowed to be inserted on the output, with each packet containing data from one SD teletext line. The first five lines selected on the input are encoded in the 2031 packet. All packets will be placed on the line selected by the **Out line** controls.

Menu Option	Sub-Option	Description
SD VBI setup	WST Origin & Status	Choose: • **Disabled** (default) • **Enabled** for each of Line 7 - Line 22.
	SD Output Status	Reports status for each of output Line 7 - Line 22.
SMPTE RDD08/SMPTE ST2031 VANC Packet	Input Packet Type	Select as required: • **SMPTE RDD08** (default) • **SMPTE 2031**
	Output Packet Enable	Select as required: • **Disabled** (default) • **Enabled**
	Output Packet Type	Choose: • **SMPTE RDD08** (default) • **SMPTE 2031**
	SMPTE RDD08	Select: • **Output Line Packet 1**: select line from 8 to 20. Default is line 10. • **Output Line Status Packet 1**: reports line number. • **Output Line Packet 2**: select line from 8 to 20. Default is line 10. • **Output Line Status Packet 2**: reports line number. • **Output Line Packet 3**: select line from 8 to 20. Default is line 10. • **Output Line Status Packet 3**: reports line number.
	SMPTE ST2031	**Data Unit ID Select**: for each of output packets 1 - 5, select from: • **Teletext subtitle** • **Teletext non-subtitle** • **Inverted teletext**
		• **Output Line All Packets**: select line from 8 to 20 as required. Default is line 10.
		• **Output Line Status All Packets**: reports output line number.

Closed Captions

The **Closed Captions** controls allow closed captions to be enabled or disabled, and the input and output lines used to be specified. Available controls are:

Menu Option	Operation
Input status	Reports captions that have been detected.
CEA-608	Select whether to enable SD Output: • **Off** (default) • **On**
CEA-708 out	Select whether to enable HD/UHD Output: • **Disabled** (default) • **Enabled**
CEA-708 output line	Selects the output line on which to insert CEA-708 packets; the range is from line 8 to line 20 in one-line steps. The default is line 10.
CEA-708 output line status	Reports output line on which the captions are being inserted.

SMPTE 2020

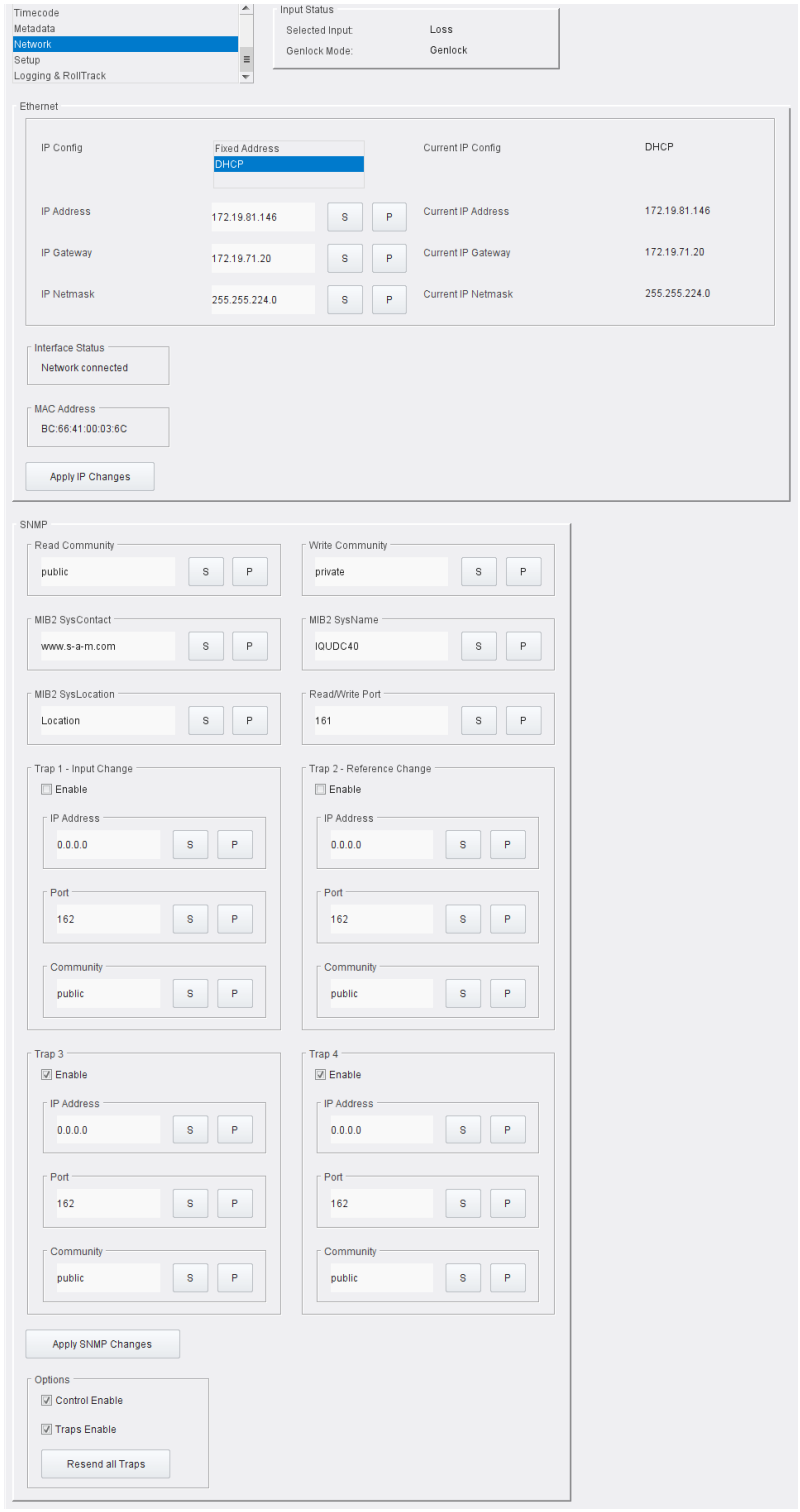
The UHD range allows insertion of SMPTE2020 Dolby metadata packets. Available controls are:

Control	Function
Output Enable	Enables the insertion of SMPTE 2020 Dolby metadata packets. Choose: • **Disabled** (default) • **Enabled** for each of Line 7 - Line 22.
Output Line	Selects the output line on which to insert Dolby metadata. The range is from line 8 to line 20 in one-line steps. Default is line 12.
Output Line Status	Reports on which output line the metadata is being inserted. If no line number is selected, **OFF** is displayed.
Packet Type	Select ST-2020 packet type: • **A SMPTE 2020-2-2008** • **B SMPTE 2020-3-2008**

Note: If the line selected is already in use (by VITC, for example), the VANC embedding hierarchy will embed the SMPTE 2020 packet on the nearest available line.

Network

The Network page allows network settings to be configured.



Network page

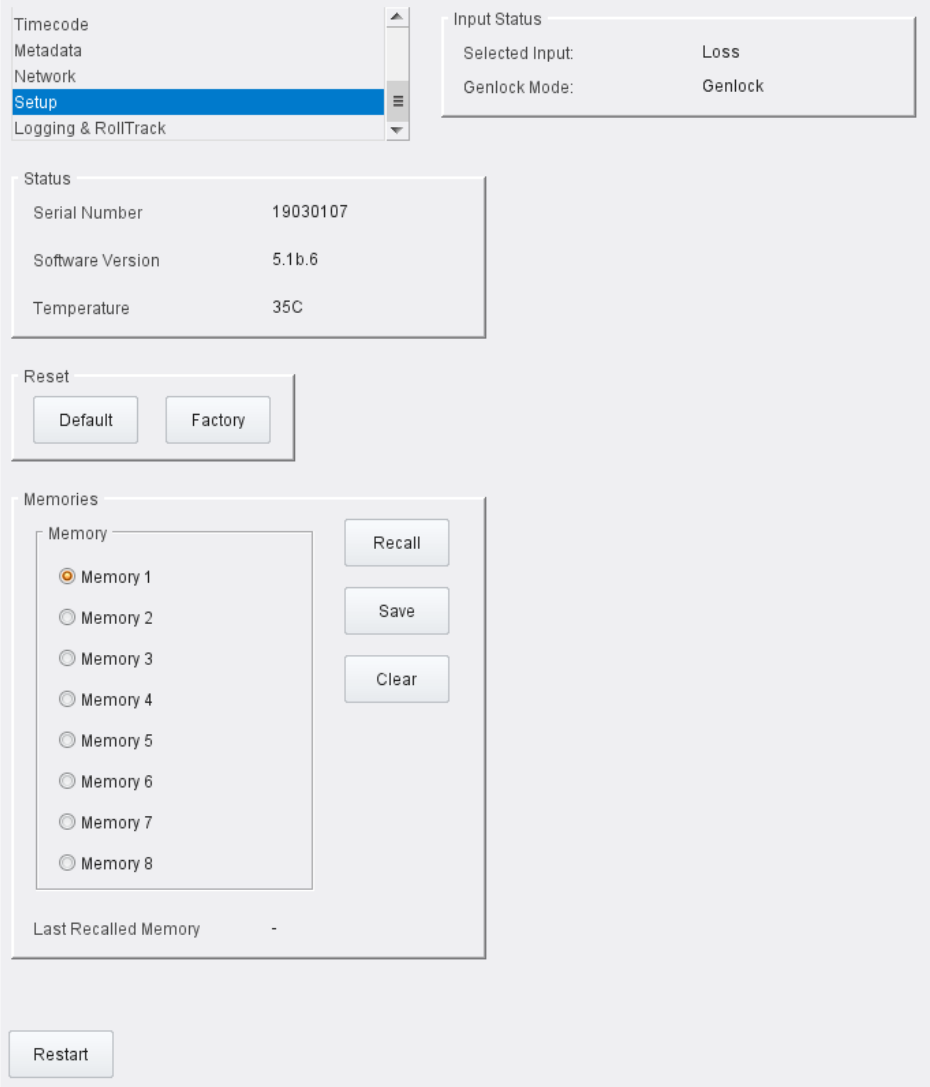
The following functions are available:

Control	Function
Ethernet:	
IP Config	Select: • **Fixed Address** for the module to use a fixed IP address. • **DHCP** for the module to use an IP address assigned by DHCP.
Current IP Config	Select whether the module should use an IP address set manually or via DHCP. Choose from: • **Fixed Address** • **DHCP**
IP Address	Enter the IP address to be used when **Fixed Address** is selected.
Current IP Address	Reports the IP address currently assigned to the module.
IP Gateway	Enter the IP address of the gateway to be used when **Fixed Address** is selected.
Current IP Gateway	Reports the IP address of the gateway currently used by the module.
IP Netmask	Enter the IP netmask to be used when **Fixed Address** is selected.
Current IP Netmask	Reports the IP netmask currently used by the module.
Interface Status	Reports status of the IP interface.
MAC Address	Reports the MAC address of the UHD module.
Apply IP Changes	Click to apply changes to IP config.
SNMP:	
Read Community	Enter the read community string. Default is "public".
Write Community	Enter the write community string. Default is "private".
MIB2 SysContact	Enter the name of the person responsible for the managed node.
MIB2 SysName	Enter the name of the managed node.
MIB2 SysLocation	Enter the physical location of the node.
Read/Write Port	Select the UDP read/write port for sending and receiving requests.
Trap 1 - Input change	Reports changes to input. To activate, set **IP Address**, **Port** and **Community** details as required, and click **Enable**.
Trap 2 - Reference change	Reports changes to the reference. To activate, set **IP Address**, **Port** and **Community** details as required, and click **Enable**.
Apply SNMP Changes	Click to apply changes to SNMP.
Options	Allows SNMP controls and traps to be enabled or disabled. Select check boxes as required. • **Resend all Traps** - Click to send current SNMP status.

Note: Each SNMP Agent needs to be configured with Read and Write community values. The community provides a very rudimentary level of security. If a GET request is received from an SNMP Manager and the Read community value in the GET message matches the read community value set in the agent, the agent will respond with the value requested. Similarly, when an agent receives a SET command, the Write community value must match.By default most SNMP Agents have a read community value of *Public* and a write community value of *Private*. To prevent unauthorized access to a device, these values should be changed by the user.

Setup

The Setup page displays basic information about the module, such as the serial number and software version. Use the functions on the page to restart the module or to return all settings to their factory or default settings.



Setup page

The following functions are available:

Control	Function
Status:	
Serial number	Module serial number.
Software version	Currently installed software version number.
Temperature	Current module temperature.
Reset	Click to reset the module. Choose from: • **Default** - All controls are reset to their default values, except for network configuration and IP addresses. • **Factory** - All controls are reset to their default values, **including** network configuration and IP addresses.

Control	Function
Memories	Allows the module to be reset to one of 10 previously saved configurations. Available functions are: • **Memory** - Select a memory to recall, save or clear. • **Recall** - Click to load the contents of the selected memory. • **Save** - Click to save current configuration to the selected memory. Note network settings are NOT saved. • **Clear** - Click to clear the selected memory.
Last Recalled Memory	Displays the last memory to be recalled.
Restart	Click to power cycle the module.

Logging & RollTrack

The Logging & RollTrack page enables information on various parameters to be made available to a logging device, and also allows information to be sent to RollTrack-compatible units connected to the RollCall network.

Logging

Each logging page 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.

Logging & RollTrack page

The following log fields are available:

Log Field	Function
INPUT_N_NAME=	Logs name of input.
INPUT_N_TYPE=	Logs input type. Possible values are: • **SD/HD/3G/12G SDI** • **1.5G/3G SDI QUAD** • **SD/HD/3G/12G SFP** • **SD/HD/3G SDI**
INPUT_N_STATE=	Logs input state. Possible values are: • **Inactive** • **OK** • **FAIL:Lost**
INPUT_N_STANDARD=	Logs input standard. Possible values are: • **Inactive** - input not selected. • **Loss** - no valid input detected. • **525/59i** • **625/50i** • **720/23p** • **720/24p** • **720/25p** • **720/29p** • **720/30p** • **720/50p** • **720/59p** • **720/60p** • **1080/23p** • **1080/24p** • **1080/29p** • **1080/30p** • **1080/50p-A** • **1080/59p-A** • **1080/60p-A** • **2160/23p** • **2160/24p** • **2160/25p** • **2160/29p** • **2160/30p** • **2160/50p** • **2160/59p** • **2160/60p**
GENLOCK_N_STATE=	Logs Genlock state. Possible values are: • **Unknown** • **OK:Genlock** • **WARN:Clock lock** • **FAIL:Free run** • **FAIL:Loss**

Log Field	Function
OUTPUT_N_STANDARD =	Logs output standard. Possible values are: • **Loss** - no output. • **525/59i** • **625/50i** • **720/23p** • **720/24p** • **720/25p** • **720/29p** • **720/30p** • **720/50p** • **720/59p** • **720/60p** • **1080/23p** • **1080/24p** • **1080/29p** • **1080/30p** • **1080/50p-A** • **1080/59p-A** • **1080/60p-A** • **2160/23p** • **2160/24p** • **2160/25p** • **2160/29p** • **2160/30p** • **2160/50p** • **2160/59p** • **2160/60p**

Where N is the input/output number

RollTrack

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

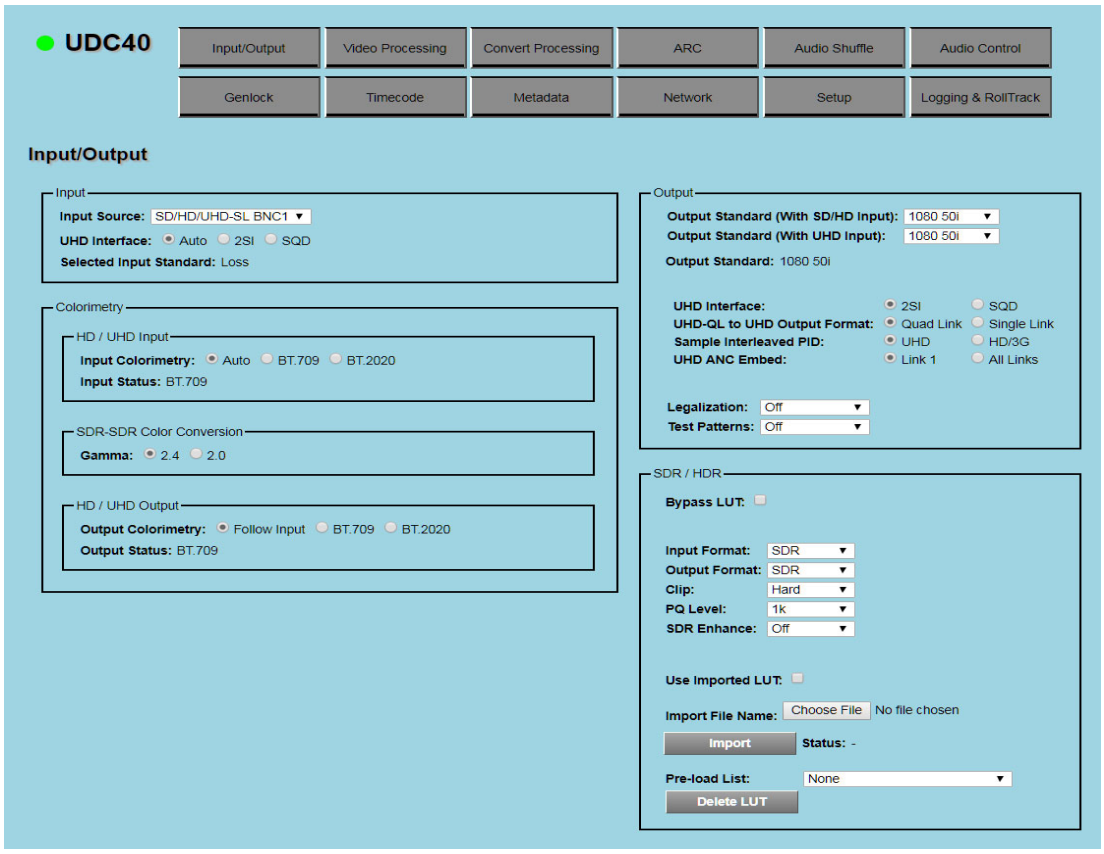
The following functions are available:

Control	Function
Disable All	When checked, all RollTrack items are disabled.
RollTrack Index	This slider allows up to 16 distinct RollTrack outputs to be set up. Dragging the slider selects the RollTrack Index number, displayed below the slider. Clicking P selects the default preset value.
RollTrack Source	The source of information that triggers transmission of data is selected with this control. Dragging the slider selects the RollTrack source, displayed below the slider. Clicking **P** selects the default preset value. When no source is selected, **Unused** is displayed.

Control	Function
RollTrack Address	This item enables the address of the selected destination unit to be set. The address may be changed by typing the new destination into the text field, then clicking **S** to save the selection. Clicking **P** returns to the default preset destination. The RollTrack address consists of four sets of numbers, for example, **0000:10:01*99**: • The first set, **0000**, is the network segment code number. • The second set, **10**, is the number identifying the enclosure. • The third set, **01**, is the slot number in the enclosure. • The fourth set, **99**, is a user-definable number that is a unique identifier for the destination unit in a multi-unit system. This ensures that only the correct unit will respond to the command. If left at **00**, an incorrectly fitted unit may respond inappropriately.
RollTrack Command	This item enables a command to be sent to the selected destination unit. The command may be changed by typing a code in to the text field, and then selecting **S** to save the selection. Clicking **P** returns to the default preset command. A RollTrack command consists of two sets of numbers, for example: **84:156**: • The first number, **84**, is the actual RollTrack command. • The second number, **156**, is the value sent with the RollTrack command.
RollTrack Status	A message is displayed here to indicate the status of the currently selected RollTrack index. Possible RollTrack Status messages are: • **OK** - RollTrack message was sent and received successfully. • **Unknown** - RollTrack message has been sent but transmission has not yet completed. • **Timeout** - RollTrack message has been sent but acknowledgment has not been not received. This could be because the destination unit is not at the location specified. • **Bad** - RollTrack message has not been correctly acknowledged at the destination unit. This could be because the destination unit is not of the type specified. • **Disabled** - RollTrack sending is disabled.

Operation Via Web Browser

The IQUDC40 can be operated from a web browser as well as via RollCall. Simply type the module's IP address, shown on the Network page (see page 63), into a browser address bar. This will open a user interface allowing control of the module:



Browser Control Interface - UI Input and Output

The buttons at the top of the screen correspond to the RollCall control pages, and offer the same functionality. The UI is intuitive and easy to use.

6 Contact Us

Grass Valley Technical Support

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

www.grassvalley.com/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.

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