HD2020 VIDEO PASSPORT

1RU Multi-Path Video Converter
And Frame Synchronizer

User Manual

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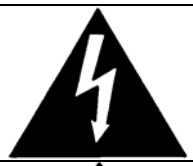
IMPORTANT SAFETY INSTRUCTIONS

	The lightning flash with arrowhead symbol within an equilateral triangle is intended to alert the user to the presence of un-insulated “Dangerous voltage” within the product’s enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.
	The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (Servicing) instructions in the literature accompanying the product.

- Read these instructions
- Keep these instructions.
- Heed all warnings.
- Follow all instructions.
- Do not use this apparatus near water
- Clean only with dry cloth.
- Do not block any ventilation openings. Install in accordance with the manufacturer’s instructions.
- Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
- Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than other. A grounding-type plug has two blades and a third grounding prong. The wide blade or the third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
- Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles and the point where they exit from the apparatus.
- Only use attachments/accessories specified by the manufacturer
- Unplug this apparatus during lightning storms or when unused for long periods of time.
- Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

WARNING
TO REDUCE THE RISK OF FIRE OR ELECTRIC – SHOCK, DO NOT EXPOSE THIS APPARATUS TO RAIN OR MOISTURE

WARNING
DO NOT EXPOSE THIS EQUIPMENT TO DRIPPING OR SPLASHING AND ENSURE THAT NO OBJECTS FILLED WITH LIQUIDS ARE PLACED ON THE EQUIPMENT

WARNING
TO COMPLETELY DISCONNECT THIS EQUIPMENT FROM THE AC MAINS, DISCONNECT THE POWER SUPPLY CORD PLUG FROM THE AC RECEPTACLE

WARNING
THE MAINS PLUG OF THE POWER SUPPLY CORD SHALL REMAIN READILY OPERABLE

INFORMATION TO USERS IN EUROPE

NOTE

This equipment with the CE marking complies with both the EMC Directive (2004/108/EC) and the Low Voltage Directive (2006/95/EC) issued by the Commission of the European Community.

Compliance with these directives implies conformity to the following European standards:

- EN60065 Product Safety
- EN55103-1 Electromagnetic Interference Class A (Emission)
- EN55103-2 Electromagnetic Susceptibility (Immunity)

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to the European Union EMC directive. 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.

CE	EN60065 EN55103-1: 1996 EN55103-2: 1996	Safety Emission Immunity

	EN504192 2005 Waste electrical products should not be disposed of with household waste. Contact your Local Authority for recycling advice

INFORMATION TO USERS IN THE U.S.A.

NOTE

FCC CLASS A DIGITAL DEVICE OR PERIPHERAL

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.

WARNING

Changes or Modifications not expressly approved by Evertz Microsystems Ltd. could void the user's authority to operate the equipment.

Use of unshielded plugs or cables may cause radiation interference. Properly shielded interface cables with the shield connected to the chassis ground of the device must

Evertz Microsystems Ltd FC For Home or Office Use	Tested to comply with FCC Standards	This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: This device may cause harmful interference, and This device must accept any interference received, including interference that may cause undesired operation.

REVISION HISTORY

REVISION	DESCRIPTION	DATE
0.1	Preliminary	Aug 08
0.2	Minor formatting changes & updates throughout	Feb 09
1.0	First Release	Mar 09

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Tables

1. OVERVIEW

The Evertz HD2020 Video PassPort™ is a high performance 1 RU video converter and frame synchronizer platform. The HD2020 integrates four fully independent and unique up/down/cross conversion paths (including frame synchronization) and a wide range of video/audio input/outputs. The Video PassPort™ is equally suited for analog, digital, HDTV and hybrid facilities and represents the ideal choice for broadcasters making the transition to digital television (DTV) and high definition television (HDTV). The HD2020's processing capabilities and simple to use front panel interface makes it an ideal choice for ENG truck applications.

The HD2020 can support up to four 3G*/HD/SD coax serial digital in, four 3G*/HD/SD fiber optic serial digital in, composite analog video in, component analog video in (future feature), four mono analog audio in, eight AES digital audio in as well as a DVI input. The HD2020 can support up to four 3G*/HD/SD coax serial out, four 3G*/HD/SDI fiber optic serial out, composite analog video out, component analog video out (future feature), eight mono analog audio out, eight AES digital audio out as well as a program DVI output. A second DVI output is also available on which the HD2020 can display and monitor eight select video clean switch inputs/outputs. A reference input with a passive loop is available to allow the HD2020 to lock to external reference. Dual 10/100 compatible Ethernet ports are provided for SNMP control/monitoring in addition to connectivity for video/audio streaming**.

This Evertz converter is packaged in a space saving 1RU form factor and is designed for high availability 24/7 applications. The HD2020 has a front serviceable and removable processing electronics, dual redundant power supplies in addition to a removable front control panel. Twenty (20) front panel buttons can be programmed with user defined "Control Macros" to deliver simple operator device control. Using the front panel SHIFT button, an additional 20 "Control Macros" can be made available. A USB port is included in the front panel to support up-loading and down-loading of device configurations (future feature).

* 3G I/O supported in HD2020A
** video/audio streaming requires *STREAMLINK*™ FLEX module

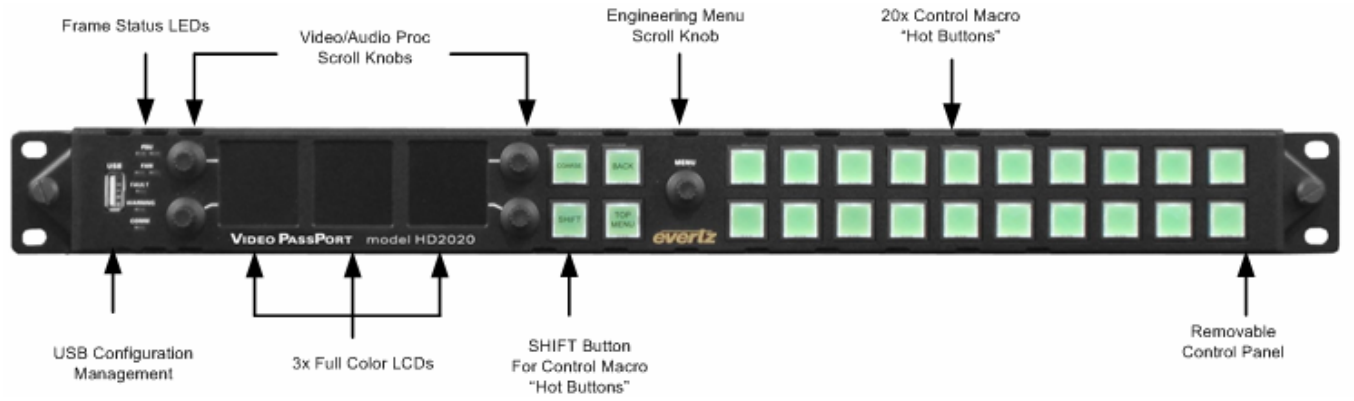

Figure 1-1: HD2020 Video PassPort™ Front Panel

An embedded web server enables quick and easy uploading, downloading and design of system configurations using the STAMP™ configuration tool. Eight configurable GPIOs are also available on the HD2020 rear panel (GPO functionality implemented at the time of this manual's writing).

Finally, 8x Flex BNCs (4x Flex Left and 4x Flex Right) are incorporated to allow future expansion of functionality using Flex Processing Modules.

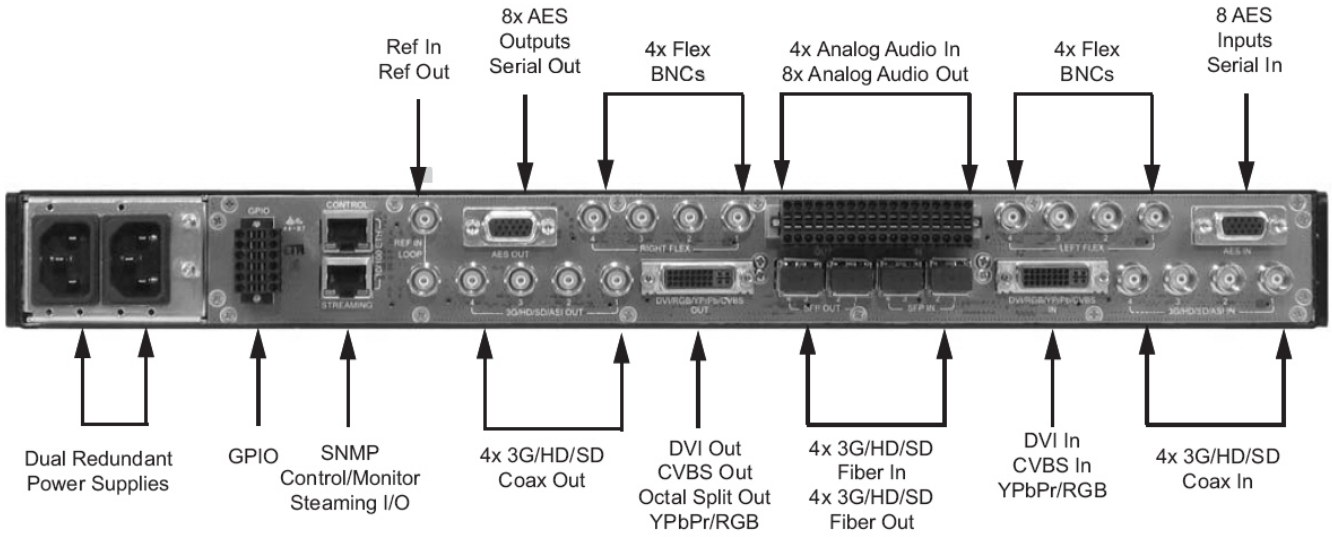

Figure 1-2: HD2020 Video PassPort™ Rear View

Within the HD2020 architecture (refer to Figure 1-3) four fully independent and unique up/down/cross conversion paths can be connected to any system input/output using the unit's internal serial digital cross-point. Eight unique video sources can also be routed to the Advanced Audio/Video Bridge (AAVB). Within the AAVB, sources are routed to the HD2020 internal audio processor, two internal eight input video clean switches and the internal octal split display processor. The HD2020 also supports internal colour bars and tone generation with source ID character burn-in capabilities.

Within the audio processor, per channel audio delay is available for each input audio channel. Following this, stereo to 5.1 up-mixing (+UMX), 5.1 to stereo down-mixing (+DMX), Intelligain™ audio loudness management (+IG) can be done on selected input audio channels. In addition, a programmable audio equalizer is also available with the +EQ option. Intellisync™ (+IS) audio/video delay processing can also be supported (future feature).

Two audio embedders with 16 channel support and per channel audio routing, inversion, gain and mono mixing capabilities feed the two AAVB clean switch outputs. Similar per channel audio routing, inversion, gain and mono-mixing capabilities are available for the 8x AES outputs (16 channels) and the 8x mono analog audio outputs.

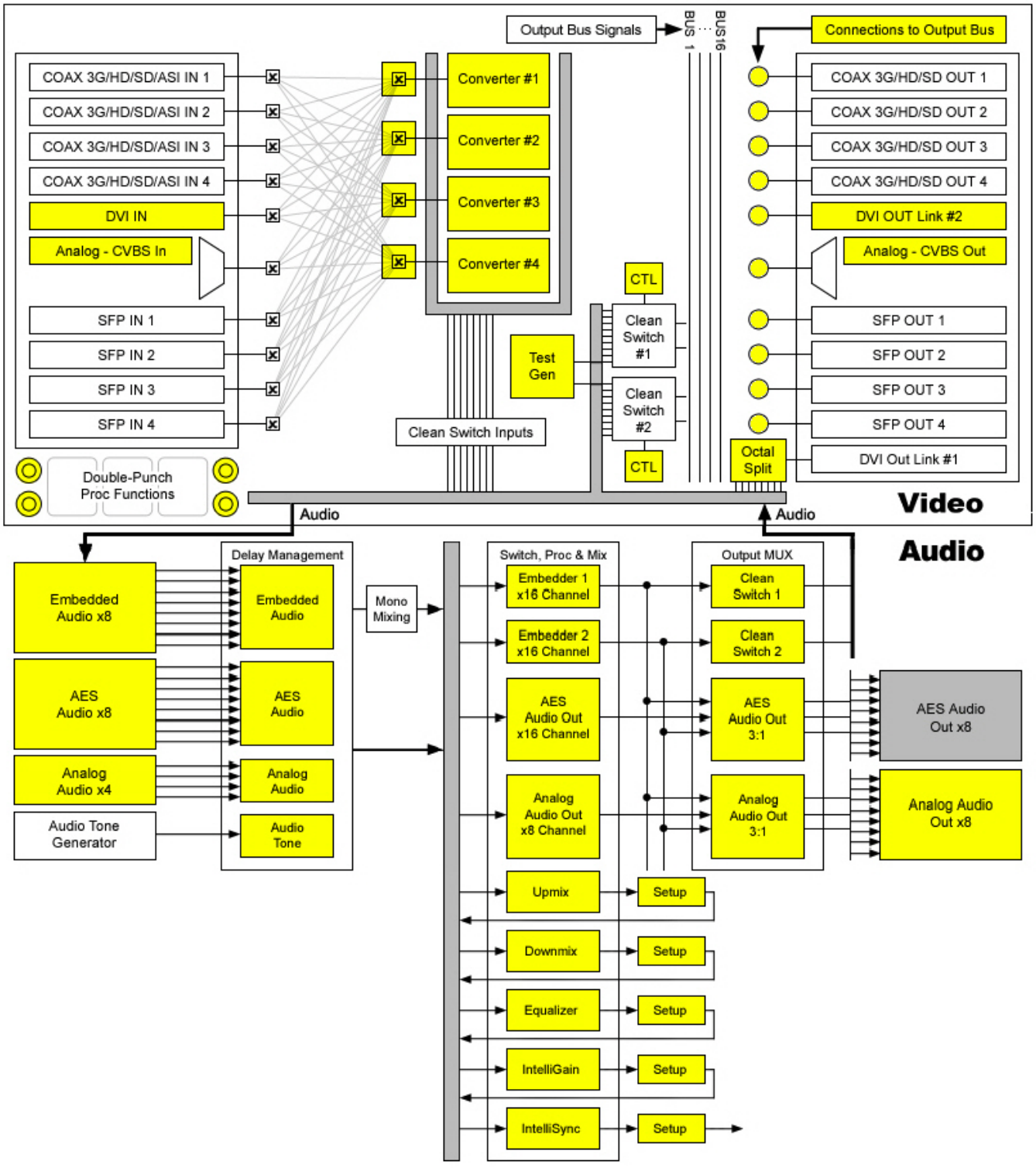

Figure 1-3: HD2020 Block Diagram

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2. INSTALLATION

2.1. REAR PANEL OVERVIEW

The rear panel of the HD2020 Video PassPort unit is shown in Figure 2-1.

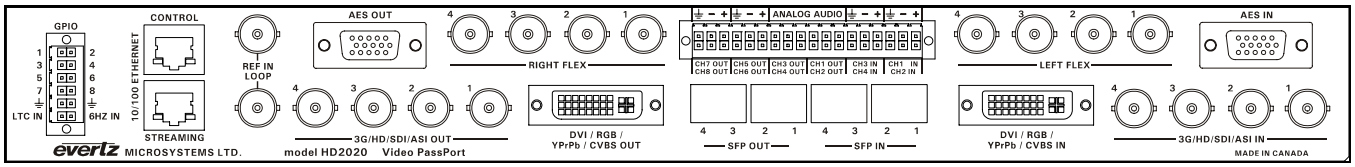
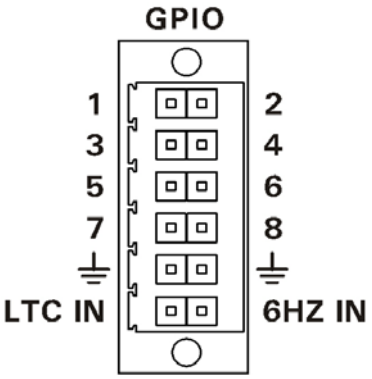


Figure 2-1: Rear View of HD2020

2.1.1. GPIO Connections

GPIO: General Purpose input/outputs. At the time of writing, only the GPO's are implemented.



PIN #	Name	Description
1	GPIO1	General Purpose Input/Output #1
2	GPIO2	General Purpose Input/Output #2
3	GPIO3	General Purpose Input/Output #3
4	GPIO4	General Purpose Input/Output #4
5	GPIO5	General Purpose Input/Output #5
6	GPIO6	General Purpose Input/Output #6
7	GPIO7	General Purpose Input/Output #7
8	GPIO8	General Purpose Input/Output #8
9	GND	Signal Ground.
10	GND	Signal Ground.
11	LTC IN	LTC IN Input (not used at time of writing)
12	6HZ IN	6HZ In Input (not used at time of writing)

Table 2-1: Pin out for General Purpose Inputs/Outputs

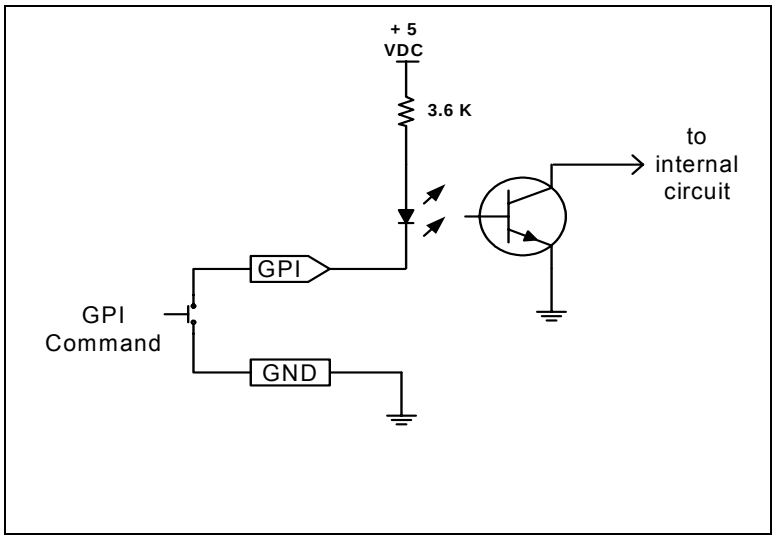


Figure 2-2: GPI Input Circuitry

Figure 2-2 shows the internal circuit for the General Purpose Inputs (GPIs). Figure 2-3 shows the internal circuit for General Pupose Output (GPOs). The GPO is active low with internal pull up (10k Ohm) resistors to +5V. When the output goes low it is able to sink up to 10mA. When high, the signal will go high (+5V). **Do not draw more than 100μA from the output.**

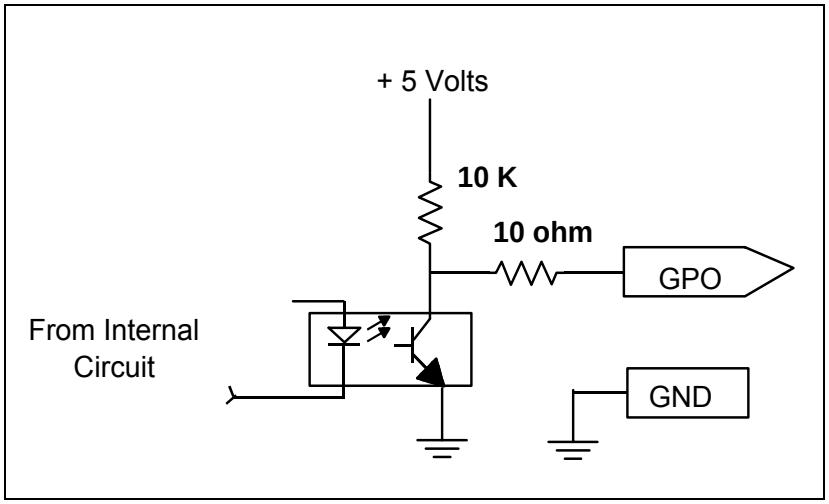


Figure 2-3: GPO Output Circuitry

2.1.2. Reference Video Connections

REF IN/LOOP: BNC for supplying external reference and passive loop out. Only Bi-level sync (or colour black) NTSC references supported at the time of writing.

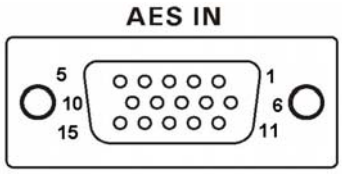
2.1.3. AES Audio Connections

AES OUT: Eight (8) unbalanced AES outputs are provided on a DB15 connector.

DB15 to BNC breakout cables are available for AES I/O (ordered as HD2020 accessory) DB15 connector and breakout cable pinout information provided below.

AES IN: Eight (8) unbalanced AES inputs are supported on a DB15 connector.

DB15 to BNC breakout cables are available for AES I/O (ordered as HD2020 accessory) DB15 connector and breakout cable pinout information provided below.



Female

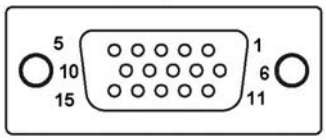
PIN #	Name	Description
1	Not used	Reserved for future use
2	Not used	Reserved for future use
3	Not used	Reserved for future use
4	Not used	Reserved for future use
5	Not used	Reserved for future use
6	Not used	Reserved for future use
7	AES In 2	AES Input 2 – Unbalanced
8	Not used	Reserved for future use
9	AES In 6	AES Input 6 – Unbalanced
10	AES In 5	AES Input 5 – Unbalanced
11	AES In 1	AES Input 1 – Unbalanced
12	AES In 8	AES Input 8 – Unbalanced
13	AES In 7	AES Input 7 – Unbalanced
14	AES In 4	AES Input 4 – Unbalanced
15	AES In 3	AES Input 3 – Unbalanced
Shell	GND	Ground

Table 2-2: AES Input Audio Connector Pinout

High Density DB-15 PIN (male)	Breakout Cable Connector	Ground/ Shield Connection	Labelled Name	HD2020 Connector Pin Map
1	Red Wire	None	W1 RED	Pin 1 – Not used
2	Green Wire	None	W2 GREEN	Pin 2 – Not used
3	Blue Wire	None	W3 BLUE	Pin 3 – Not used
4	Not Used	N/A	N/A	Pin 4 – Not used
5	Not used	N/A	N/A	Pin 5 – Not used
6	White Wire	None	W4 WHITE	Pin 6 – Not used
7	Coax BNC Male	Soldered to Shell	AES A2	Pin 7 – AES In 2
8	Yellow	None	W5 YELLOW	Pin 8 – Not used
9	Coax BNC Male	Soldered to Shell	AES B2	Pin 9 – AES In 6
10	Coax BNC Male	Soldered to Shell	AES B1	Pin 10– AES In 5
11	Coax BNC Male	Soldered to Shell	AES A1	Pin 11– AES In 1
12	Coax BNC Male	Soldered to Shell	AES B4	Pin 12– AES In 8
13	Coax BNC Male	Soldered to Shell	AES B3	Pin 13– AES In 7
14	Coax BNC Male	Soldered to Shell	AES A4	Pin 14– AES In 4
15	Coax BNC Male	Soldered to Shell	AES A3	Pin 15– AES In 3
Shell	Black Wire		GND	GND

Table 2-3: AES Audio Input Breakout Cable (Evertz Part # WPAES8-BNCM-6F)

AES OUT



Female

PIN #	Name	Description
1	Not used	Reserved for future use
2	Not used	Reserved for future use
3	Not used	Reserved for future use
4	Not used	Reserved for future use
5	Not used	Reserved for future use
6	Not used	Reserved for future use
7	AES Out 2	AES Output 2 – Unbalanced
8	Not used	Reserved for future use
9	AES Out 6	AES Output 6 – Unbalanced
10	AES Out 5	AES Output 5 – Unbalanced
11	AES Out 1	AES Output 1 – Unbalanced
12	AES Out 8	AES Output 8 – Unbalanced
13	AES Out 7	AES Output 7 – Unbalanced
14	AES Out 4	AES Output 4 – Unbalanced
15	AES Out 3	AES Output 3 – Unbalanced
Shell	GND	Ground

Table 2-4: AES Output Audio Connector Pinout

High Density DB-15 PIN (male)	Breakout Cable Connector	Ground/ Shield Connection	Labelled Name	HD2020 Connector Pin Map
1	Red Wire	None	W1 RED	Pin 1 – Not used
2	Green Wire	None	W2 GREEN	Pin 2 – Not used
3	Blue Wire	None	W3 BLUE	Pin 3 – Not used
4	Not Used	N/A	N/A	Pin 4 – Not used
5	Not used	N/A	N/A	Pin 5 – Not used
6	White Wire	None	W4 WHITE	Pin 6 – Not used
7	Coax BNC Male	Soldered to Shell	AES A2	Pin 7 – AES Out 2
8	Yellow	None	W5 YELLOW	Pin 8 – Not used
9	Coax BNC Male	Soldered to Shell	AES B2	Pin 9 – AES Out 6
10	Coax BNC Male	Soldered to Shell	AES B1	Pin 10– AES Out 5
11	Coax BNC Male	Soldered to Shell	AES A1	Pin 11– AES Out 1
12	Coax BNC Male	Soldered to Shell	AES B4	Pin 12– AES Out 8
13	Coax BNC Male	Soldered to Shell	AES B3	Pin 13– AES Out 7
14	Coax BNC Male	Soldered to Shell	AES A4	Pin 14– AES Out 4
15	Coax BNC Male	Soldered to Shell	AES A3	Pin 15– AES Out 3
Shell	Black Wire		GND	GND

Table 2-5: AES Audio Output Breakout Cable (Evertz Part # WPAES8-BNCM-6F)

2.1.4. Analog Audio Connections

ANALOG AUDIO: The 36 pin analog audio terminal block connector has eight balanced mono analog audio outputs and four balanced mono analog audio inputs.

Analog audio is connected using a removable terminal strip. This pinout is shown below in Table 2-6.

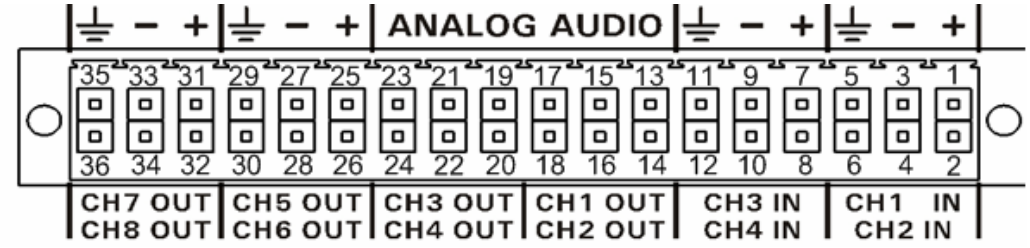


Figure 2-4: Analog Audio Connector

PIN #	PIN OUT	DESCRIPTION
1	CH1 IN +	Channel 1 Analog Audio Input +
2	CH2 IN +	Channel 2 Analog Audio Input +
3	CH1 IN -	Channel 1 Analog Audio Input -
4	CH2 IN -	Channel 2 Analog Audio Input -
5	CH1 IN GND	Channel 1 IN Ground
6	CH2 IN GND	Channel 2 IN Ground
7	CH3 IN +	Channel 3 Analog Audio Input +
8	CH4 IN +	Channel 4 Analog Audio Input +
9	CH3 IN -	Channel 3 Analog Audio Input -
10	CH4 IN -	Channel 4 Analog Audio Input -
11	CH3 IN GND	Channel 3 Ground
12	CH4 IN GND	Channel 4 Ground
13	CH1 OUT +	Channel 1 Analog Audio Output +
14	CH2 OUT +	Channel 2 Analog Audio Output +
15	CH1 OUT -	Channel 1 Analog Audio Output -
16	CH2 OUT -	Channel 2 Analog Audio Output -
17	CH1 OUT GND	Channel 1 OUT Ground
18	CH2 OUT GND	Channel 2 OUT Ground
19	CH3 OUT +	Channel 3 Analog Audio Output +
20	CH4 OUT +	Channel 4 Analog Audio Output +
21	CH3 OUT -	Channel 3 Analog Audio Output -
22	CH4 OUT -	Channel 4 Analog Audio Output -
23	CH3 OUT GND	Channel 3 OUT Ground
24	CH4 OUT GND	Channel 4 OUT Ground
25	CH5 OUT +	Channel 5 Analog Audio Output +
26	CH6 OUT +	Channel 6 Analog Audio Output +
27	CH5 OUT -	Channel 5 Analog Audio Output -
28	CH6 OUT -	Channel 6 Analog Audio Output -
29	CH5 OUT GND	Channel 5 OUT Ground
30	CH6 OUT GND	Channel 6 OUT Ground
31	CH7 OUT +	Channel 7 Analog Audio Output +
32	CH8 OUT +	Channel 8 Analog Audio Output +
33	CH7 OUT -	Channel 7 Analog Audio Output -
34	CH8 OUT –	Channel 8 Analog Audio Output -
35	CH7 OUT GND	Channel 7 OUT Ground
36	CH8 OUT GND	Channel 8 OUT Ground

Table 2-6: Analog Audio Connector Pin Out

2.1.5. 3G/HD/SDI/ASI Input and Outputs

3G/HD/SDI/ASI OUT 1-4: There are four BNCs on the rear panel, which are capable of supporting 3G*, HD, SDI or ASI** output signals.

***** 3G supported in the HD2020A only
** ASI processing requires specific HD2020 FLEX modules (future feature)

3G/HD/SDI/ASI IN 1-4: There are four BNCs on the rear panel, which are capable of supporting 3G*, HD, SDI or ASI* input signals.

***** 3G supported in the HD2020A only
** ASI processing requires specific HD2020 FLEX modules (future feature)

2.1.6. DVI Connections

DVI/RGB/YPrPb/CVBS IN: The female "DVI RGB/YPrPb/CVBS IN" connector on the rear of the panel enables the user to connect both DVI and analog video signals to the HD2020 using a breakout cable. Evertz breakout cable #WPDVI-DVIBNC5 (optional accessory for the HD2020) is used for this purpose. Refer to breakout cable in Figure 2-5.

Once the WPDVI-DVIBNC5 breakout cable is connected to the HD2020, DVI signals are supplied to the female DVI connector and analog video is supplied to the 5x BNCs. Input DVI resolutions supported include 1080p and 720p.

NOTE: At the time of this manual's writing, EDID is not currently supported. Special care should be taken to ensure that relevant DVI sources do not require EDID support to operate properly. If a DVI source requires EDID to be present, external EDID processors (i.e. a "DVI Detective" from Gefen) can be used to ensure that the DVI source operates correctly.

When connecting analog composite video to the HD2020, use the GREEN channel of the break-out cable.

Note that at the time of writing only NTSC video signals are supported.

When connecting component analog video to the HD2020 connect Y or G video to the GREEN channel, B or Pb video to the BLUE channel, R or Pr video to the RED channel, External H sync (if applicable) to the GREY channel and External V sync (if applicable) to the BLACK channel. At the time of this manual's writing, component analog video inputs are not supported.

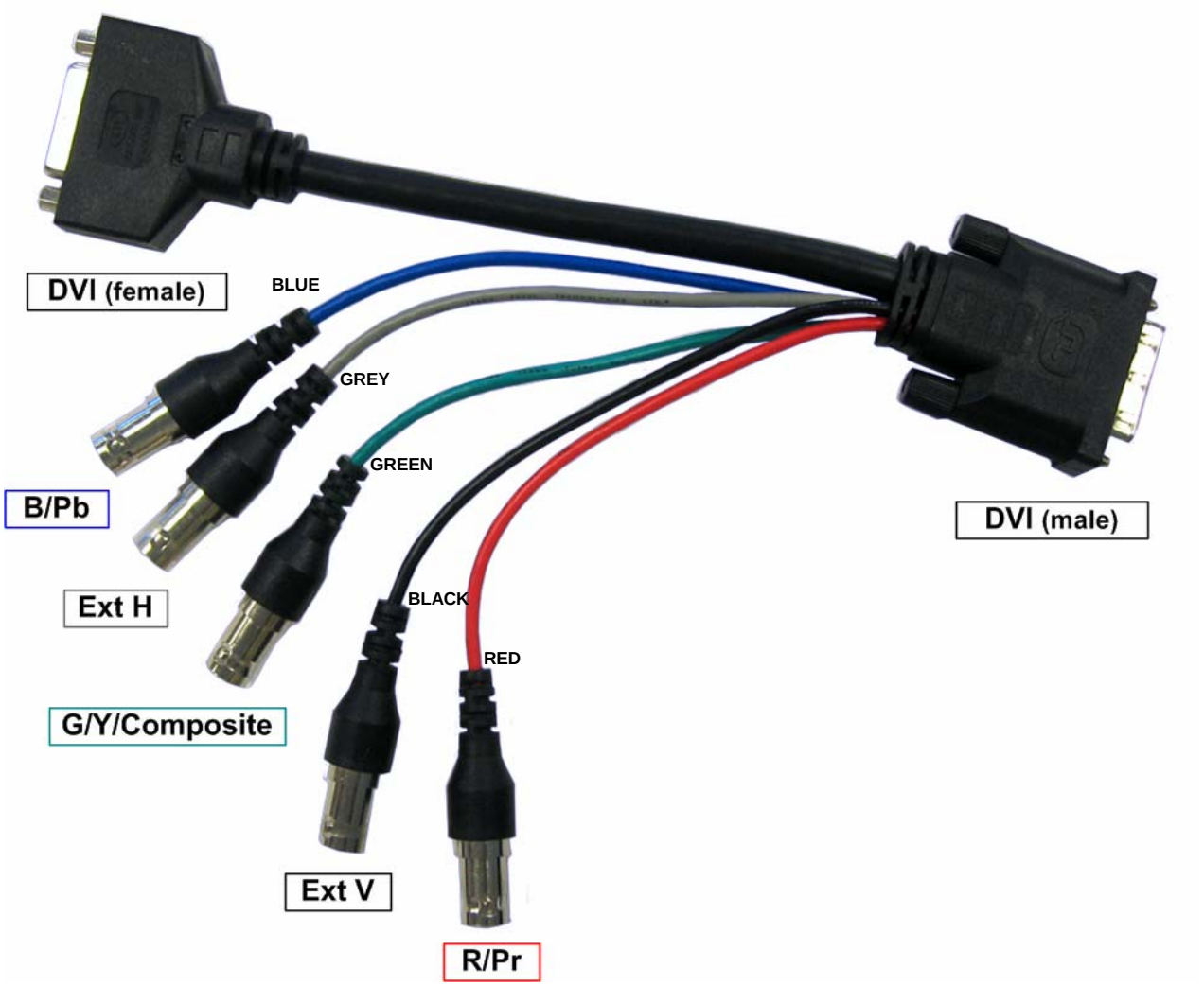


Figure 2-5: Evertz Breakout Cable #WPDVI-DVIBNC5

DVI/RGB/VPrPb/CVBS OUT: The female "DVI/RGB/YPrPb/CVBS OUT" connector on the rear of the panel enables the user to connect to both DVI and analog video signals generated by the HD2020 using two breakout cables. The first cable is Evertz breakout cable #WPDVI-DVIBNC5 (optional accessory for the HD2020). The second cable is Evertz breakout cable #WPDVI-DVI2 (optional accessory for the HD2020). Refer to Figure 2-6 for a diagram of the breakout cable.

When connecting to the HD2020, first connect cable #WPDVI-DVI-BNC5 to the female DVI connector on the HD2020. After this, connect cable #WPDVI-DVI2 to the female DVI connector on cable #WPDVI-DVI-BNC5.

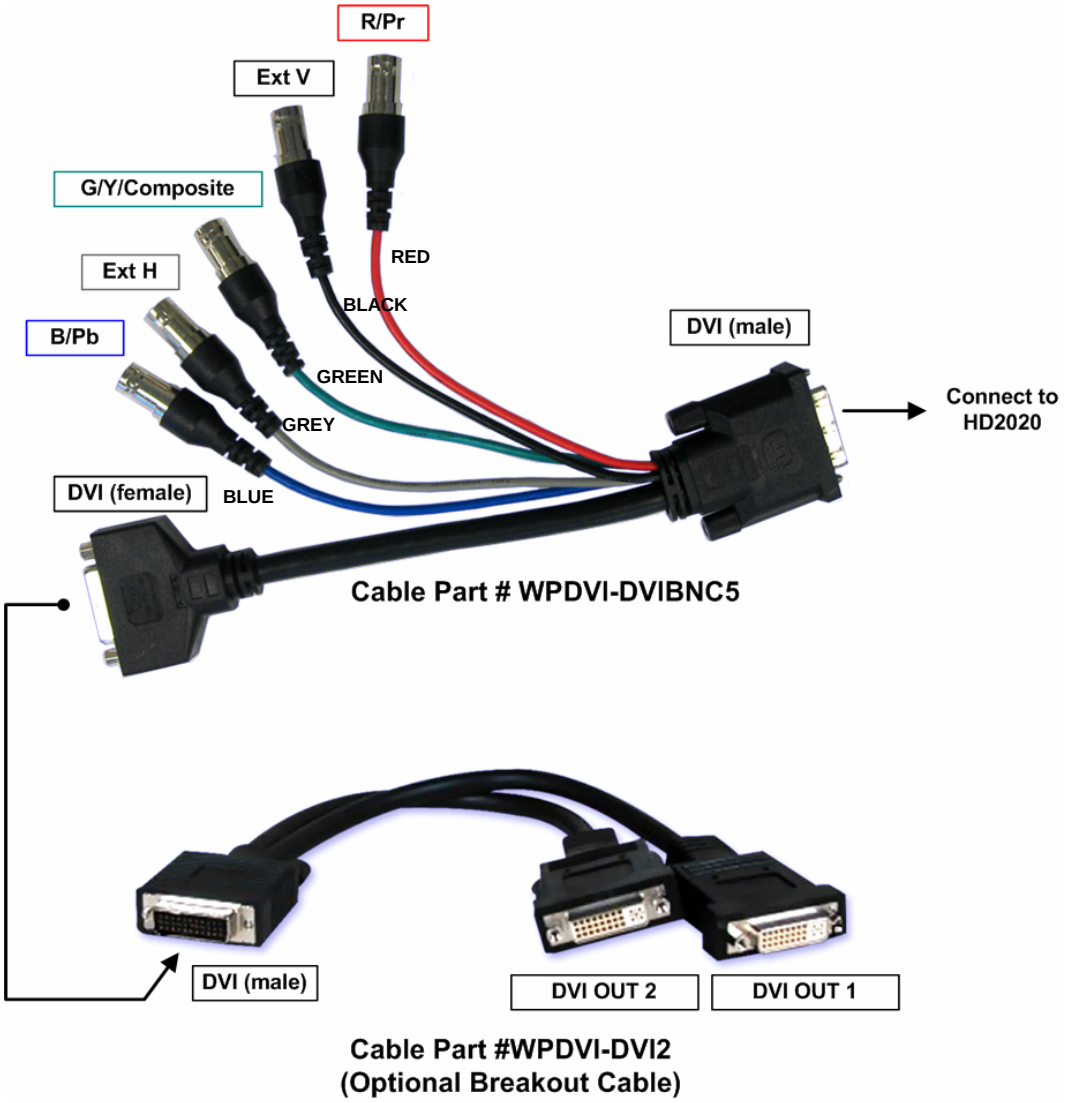


Figure 2-6: Two Connected DVI Cables

DVI OUT #1 carries the HD2020's DVI octal split output. Octal split resolutions supported include 1680x1050, 1920x1080p, 1440x 900. Operating the octal split resolution is selected based on the operating resolution of the HD2020's clean switch processor.

DVI OUT #2 carries the HD2020's DVI program output. PGM out DVI resolutions include 1920x1080i and 1280x720p at the time of writing.

When utilizing analog composite video from the HD2020, the composite video cable should be connected to the GREEN channel of the break-out cable. Please note that at the time of this manual's writing only NTSC video signals are supported.

When connecting component analog video from the HD2020, connect the Y or G video cable to the GREEN channel, the B or Pb video cable to the BLUE channel, the R or Pr video cable to the RED channel, the External H sync video cable (if applicable) to the GREY channel and the External V sync video cable (if applicable) to the BLACK channel. At the time of writing, component analog video outputs are not supported.

2.1.7. Flex Processing Module Connectors

RIGHT FLEX: Allows future expansion of functionality using Flex Processing Modules.

LEFT FLEX: Allows future expansion of functionality using Flex Processing Modules.

2.1.8. Optical Connections

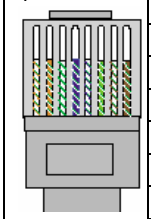
SFP IN: SFP fiber cage accepting 2x Dual SFP fiber RX.

SFP OUT: SFP fiber cage accepting 2x Dual SFP fiber TX.

2.2. CONNECTING TO AN ETHERNET NETWORK

The HD2020 is designed for use with 10Base-T (10 Mbps), 100Base-TX (100 Mbps) Ethernet cabling systems. There are two Ethernet ports labelled CONTROL and STREAMING. The CONTROL Ethernet port is intended for monitoring/control of the HD2020. The STREAMING port is intended for streaming content out of the HD2020. At the time of writing, the STREAMING options are not available. As a result, either port may be used for monitoring/control of the HD2020 without compromise. "Straight-Through" Ethernet cables may be used when connecting to the HD2020.

Straight-through RJ-45 cable can be purchased or can be constructed using the pinout information in Table 2-7. A colour coded wiring table is provided in Table 2-7 for the current RJ-45 standards (AT&T 258A or EIA/TIA 258B colour coding shown). Also refer to the notes following the table for additional wiring guide information.



Pin #	Signal	EIA/TIA 568A	AT&T 258A or EIA/TIA 568B	10BaseT or 100BaseT
1	Transmit +	White/Green	White/Orange	X
2	Transmit –	Green/White or White	Orange/White or Orange	X
3	Receive +	White/Orange	White/Green	X
4	N/A	Blue/White or Blue	Blue/White or Blue	Not used (required)
5	N/A	White/Blue	White/Blue	Not used (required)
6	Receive –	Orange/White or Orange	Green/White or Green	X
7	N/A	White/Brown	White/Brown	Not used (required)
8	N/A	Brown/White or Brown	Brown/White or Brown	Not used (required)

Table 2-7: Standard RJ45 Wiring Colour Codes

Note the following cabling information for this wiring guide:

- Only two pairs of wires are used in the 8-pin RJ-45 connector to carry Ethernet signals.
- Even though pins 4, 5, 7 and 8 are not used, it is mandatory that they be present in the cable.
- 10BaseT and 100BaseT use the same pins; a crossover cable made for one will also work with the other.
- Pairs may be solid colours and not have a stripe.
- Category 5 cable must use Category 5 rated connectors.

Devices on the Ethernet network continually monitor the receive data path for activity as a means of checking that the link is working correctly. When the network is idle, the devices also send a link test signal to one another to verify link integrity.

10/100: This Amber LED is ON when a 100Base-TX link is last detected. The LED is OFF when a 10Base-T link is last detected (the LINK LED is ON). Upon power-up the LED is OFF as the last detected rate is not known and therefore defaults to the 10Base-T state until rate detection is completed.

LN/ACT: This dual purpose Green LED indicates that the HD2020 has established a valid linkage to its hub, and whether the HD2020 is sending or receiving data. This LED will be ON when the HD2020 has established a good link to its supporting hub. This gives you a good indication that the segment is wired correctly. The LED will BLINK when the HD2020 is sending or receiving data. The LED will be OFF if there is no valid connection.

The HD2020 has a specific IP address that may be set through the engineering front panel or the HD2020's embedded STAMP™ configuration tool.

Please note that once a change to the HD2020's IP address is made via the front panel engineering menu or through the loading of a specific STAMP™ configuration file, the change in IP address DOES NOT become effective until the unit is power cycled or re-booted.

2.3. SERVICING INSTRUCTIONS

CAUTION: These servicing instructions are for use by qualified service personnel only. To reduce risk of electric shock, do not perform any servicing instructions in this section of the manual unless you are qualified to do so.

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3. TECHNICAL DESCRIPTION

3.1. SPECIFICATIONS

3.1.1. Coax Inputs

Number of Inputs:	4
Connector:	BNC per IEC 61169-8 Annex A
Input Equalization:	300m @ 270 Mbs with Belden 1694A or equivalent 100m @ 1.5 Gbs with Belden 1694A or equivalent
Return Loss:	> 15 dB to 1.5 GHz
Data Rate:	Auto-sensing SD and HD (270 Mbs & 1.5 Gbs)
Formats:	525i/59.94, 720p/59.94, 1080i/59.94, 625i/50, 720p/50, 1080i/50 *

3.1.2. Coax Outputs

Number of Outputs:	4
Connector:	BNC per IEC 61169-8 Annex A
Signal Level:	800 mV nominal
DC Offset:	0V ± 0.5V
Rise/Fall Time:	200 ps nominal
Overshoot:	< 10% of amplitude
Return Loss:	> 15 dB to 1.5 GHz
Wide Band Jitter:	< 0.20 UI
Format:	525i/59.94, 720p/59.94, 1080i/59.94, 625i/50, 720p/50, 1080i/50 *

3.1.3. Fiber Inputs

Number of Inputs:	4
Connector:	LC
Form Factor:	Dual Optical SFP Receiver
Wavelength:	1260-1620 nm
Data Rate:	Auto-sensing SD and HD (270 Mbs and 1.5 Gbs)
Formats:	525i/59.94, 720p/59.94, 1080i/59.94, 625i/50, 720p/50, 1080i/50*

3.1.4. Fiber Outputs

Number of Outputs:	4
Connector:	LC
Form Factor:	Dual Optical SFP Transmitter
Wavelength:	1310 nm
Data Rate:	SD and HD (270 Mbs and 1.5 Gbs)
Format:	525i/59.94, 720p/59.94, 1080i/59.94, 625i/50, 720p/50, 1080i/50*

3.1.5. DVI and Analog Video Inputs

Number of Inputs: 1
Connector: DVI-I (Female)
Breakout Cable: DVI-I to DVI-D and 5x RGBHV BNCs (Part # WPDVI-DVIBNC5 optional accessory)
Standards DVI-D: 1080p/720p @ 59.94 HZ (no HDCP)
DVI-D: 1080p/720p @ 50 Hz (no HDCP)*
CVBS – NTSC on G channel
CVBS – PAL on G channel*

3.1.6. DVI and Analog Video Outputs

Number of Outputs: 1
Connector: DVI-I (Female)
Breakout Cables: DVI-I to 2x.single link DVI and 5x RGBHV BNCs (Part # WPDVI-DVIBNC5 optional accessory)
DVI-D "Y Cable" (Part #WPDVI-DVI2 optional accessory)
DVI-D Out 1: 1080i/720p @ 59.94 HZ (no HDCP)
DVI-D Out 1: 1080i/720p @ 50 (no HDCP)*
DVI-D Out 2: 1680x1050 out when clean switch/octal split running at 1080i
DVI-D Out 2: 1920x1080p out when clean switch/octal split running at 720p
DVI-D Out 2: 1440x900 out when clean switch/octal split running at 525i
CVBS – NTSC on G channel
CVBS – PAL on G channel*

3.1.7. Analog Audio Inputs

Number of Inputs: 4
Type: Mono signals, balanced analog audio
Connector: Removable terminal strip
Input Impedance: 10k Ω minimum (differential)
Sampling Freq: Analog signal sampled at 48 KHz
Signal Level: 0 dBFS = 19 dBu/25 dBu software selectable
Freq Response: ± 0.5 dB (20 Hz to 20 kHz)
THD+N: > 99 dB (20 Hz to 20 KHz, - 1 dBFS)
CMRR: > 99 dB @ 1KHz

3.1.8. Analog Audio Outputs

Number of Outputs: 8
Type: Mono signals, balanced analog audio
Connector: Removable terminal strip
Output Impedance: 60k Ω max
Output Loads: Hi Z
Peak: Conv Level 0 dBFS = 18 dBu/24 dBu software selectable
Sampling Freq: 48 KHz
Freq Response: +/- 0.1 dB (20 Hz to 20 kHz)

3.1.9. AES Audio Input

Number of Inputs: 8x AES inputs
Standard: SMPTE 276M, synchronous or asynchronous
Connector: DB15
Input Type: Unbalanced
Impedance: 75 Ω
Signal Level: 1 Vp-p
Sampling Rate: 48 KHz

3.1.10. AES Audio Outputs

Number of Outputs: 8x AES inputs
Standard: SMPTE 276M
Connector: DB15
Input Type: Unbalanced
Impedance: 75 Ω
Signal Level: 1 Vp-p
Sampling Rate: 48 KHz

3.1.11. GPIO Specifications

Number: 8 (only outputs available at the time of writing)
Type: Opto-isolated, active low with internal pull-ups to +5V
Connector: Removable terminal block
Signal Level: Closure to ground
Function: Tally of front panel button push

3.1.12. Reference Input

Type: NTSC colour black 1V p-p
PAL colour black 1 Vp-p*
Connector: BNC per IEC 61169-8 Annex A
Passive loop

3.1.13. Ordering Options

HD2020: Multi-Path Video Converter and Frame Synchronizer (two conversion paths standard)

+2X Upgrade to Four Conversion Paths
+CF2G Embedded Compact Flash for Test Signal Storage
+AA Balanced Analog Audio I/O
+FP HD2020 Local Front Panel
+FL-HIO Triple bidirectional HD/SD I/O left flex module
+FR-HIO Triple bidirectional HD/SD I/O right flex module
+UMX Stereo to 5.1 PCM Surround Sound Up-Mix
+DMX 5.1 PCM Surround Sound Down-Mix
+IG Intelligain Audio Loudness Management
+EQ Programmable Audio Frequency Equalizer
+2TX 1x Dual SFP Fiber Transmitter (two fiber outputs)
+4TX 2x Dual SFP Fiber Transmitter (four fiber outputs)
+2RX 1x Dual SFP Fiber Receiver (two fiber inputs)
+4RX 2x Dual SFP Fiber Receiver (four fiber inputs)
+PCRCP PC Remote Virtual Control Panel

3.1.14. HD2020 Accessories

HD2020-RCP HD2020 Remote Control Panel
WPDVI-DVIBNC5 DVI to DVI/RGBHV break out cable
WPDVI-DVI2 DVI “Y’ break out cable
WPAES8-BNCM-6F WPAES8-BNCM-6F cable (included)

- Release 1.0 support for 59.94 Hz video rates. Release 2.0 support for 50 Hz video rates.

4. STAMP WEB CONFIGURATOR™ TOOL

Sections 4.1 to 4.11 outline each page of the web configuration tool and instruct the user on how to save and load configurations to and from the HD2020 from your computer.

NOTE: Configurations DO NOT become effective until downloaded to the unit and activated using the engineering front panel. In other words, configurations and settings defined using the embedded server tool are not immediately reflected or synchronized with the unit in a real time fashion.

NOTE: Configurations generated using older revisions of HD2020 software/firmware and configuration tools are always compatible with newer revisions of software/firmware. However, configurations generated using newer revisions of HD2020 software/firmware may not be compatible with older revisions of HD2020 software/firmware.

NOTE: When RESTORING or SELECTING a configuration using the HD2020 front panel, the configuration name will be highlighted in red should a compatibility issue between the configuration and the active revision of firmware on the unit be encountered.

Before the user can configure the HD2020 using the *Initial System Configuration* tool, the user must following the instructions outlined in section 4.1 to access the *Initial System Configuration* tool via a web browser.

4.1. SETTING UP THE INITIAL SYSTEM CONFIGURATION TOOL

The *Initial System Configuration* tool enables the user to configure the HD2020 for initial use.

1. To access the Initial System Configuration Tool for the HD2020, the user must first obtain the network settings of the unit.

2. Power cycle the HD2020. The HD2020 has a specific IP address that may be set through the engineering front panel or the HD2020's embedded STAMP™ configuration tool. It is important to note that once a change to the HD2020's IP address is made via the front panel engineering menu or through the loading of a specific STAMP™ configuration file, the change in IP address DOES NOT become effective until the unit is power cycled or re-booted.

3. Using the rotary encoders on the HD2020, navigate to the MISC menu on the unit and select NETWORK and then select IP ADDRESS. Please note the IP address of the unit.

4. Using the rotary encoders on the HD2020, navigate to the MISC menu on the unit and select NETWORK and then select SUBNET MASK. Please note the SUBNET MASK address of the unit.

5. Using the rotary encoders on the HD2020, navigate to the MISC menu on the unit and select NETWORK and then select GATEWAY. Please note the GATEWAY address of the unit.

6. Configure your computer's LAN settings so that your PC has a non-conflicting IP address and uses the same SUBNET MASK and GATEWAY. As shown in Figure 4-1.

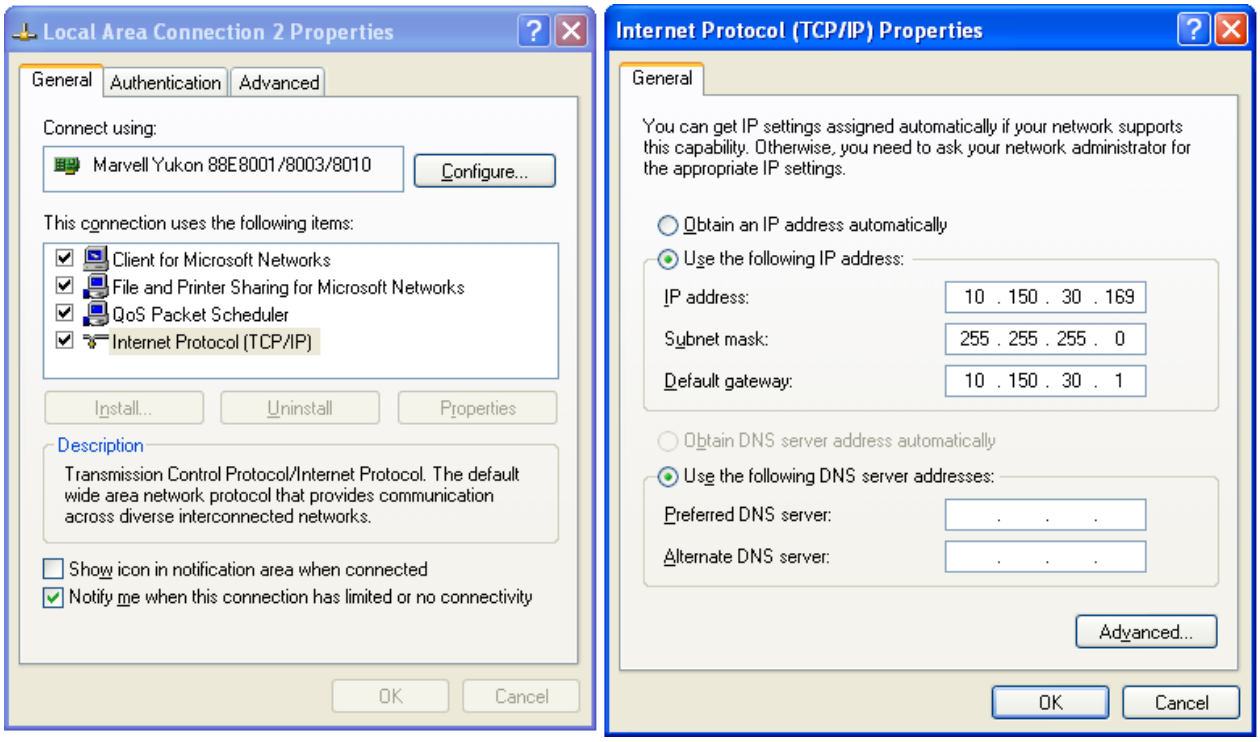

Figure 4-1: TCP/IP Properties

7. Open a web browser and ensure all PROXY SERVERS are disabled. Proxy server settings can be checked by navigating within the Internet Explorer TOOLS ► INTERNET OPTIONS ► CONNECTIONS ► LAN SETTINGS as shown in Figure 4-2.

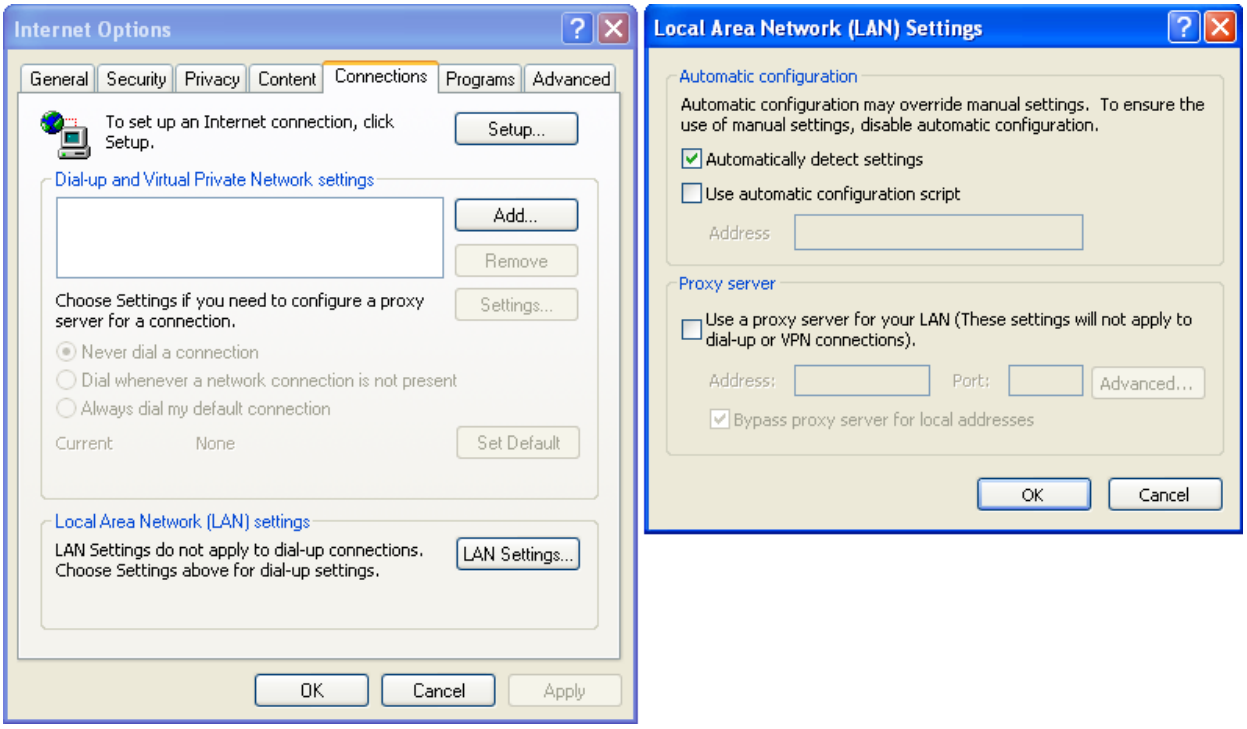

Figure 4-2: LAN Settings

8. Open your web browser and type in the IP address of the HD2020. As shown in Figure 4-3 below where the IP address of the unit is 10.150.30.10

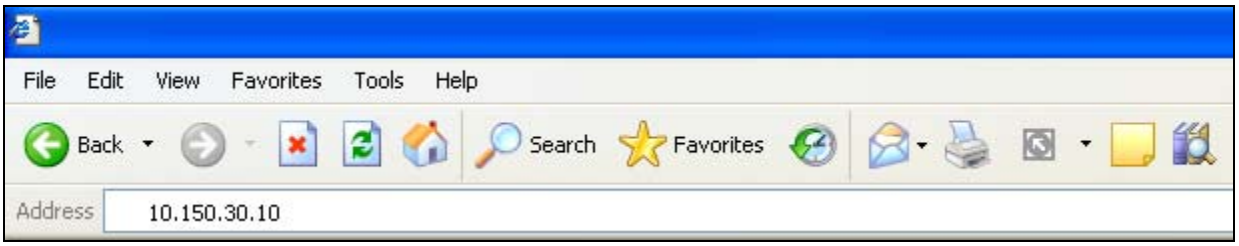

Figure 4-3: Entering the IP Address

9. Once completed, the *Initial System Configuration* tool should appear in the browser window.

10. Navigate through each PAGE in the configuration tool to generate an HD2020 configuration. The following sections will guide the user through the configuration process.

4.2. ETHERNET CONFIGURATION

Screen 1 enables the user to change the network settings.

The HD2020 has a specific IP address that may be set through the engineering front panel or the HD2020's configuration tool.

It is important to note that once a change to the HD2020's IP address is made via the front panel engineering menu or through the loading of a specific configuration file (IP address defined via the screen below), the change in IP address DOES NOT become effective until the unit is power cycled or re-booted.

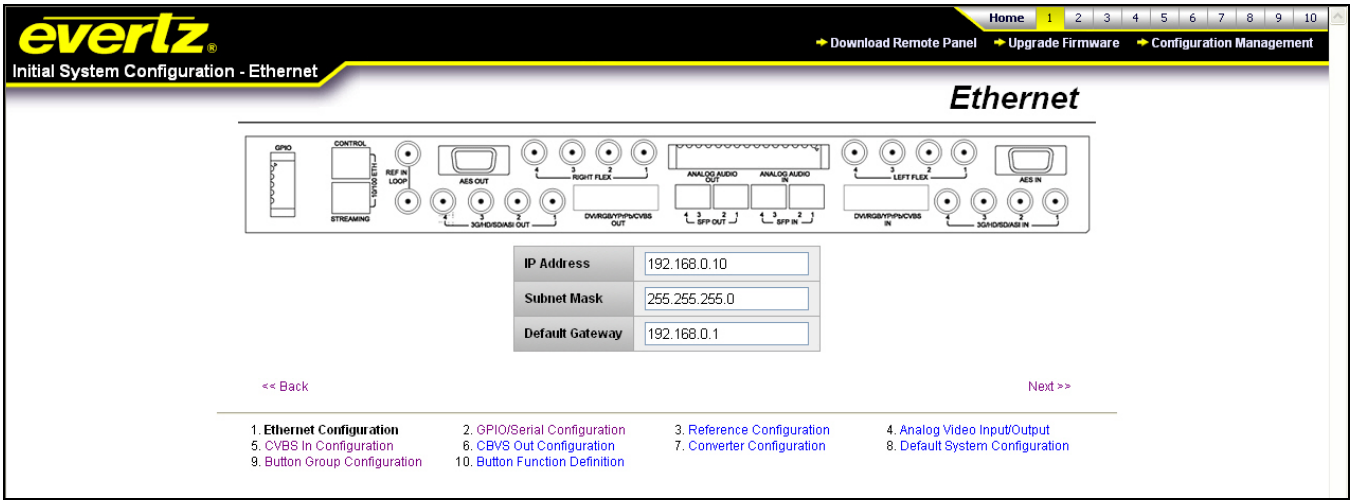

Figure 4-4: Ethernet Window

4.2.1. Setting the IP Address

To set the IP address of the HD2020, enter the IP into the ***IP Address*** field.

4.2.2. Setting the Subnet Mask

To set the subnet mask of the HD2020, enter the desired subnet mask into the ***Subnet Mask*** field.

4.2.3. Setting the Default Gateway

To set the gateway of the HD2020, enter the desired default gateway into the ***Default Gateway*** field.

4.3. GPIO/SERIAL CONFIGURATION

Screen 2 enables the user to define the configuration for the HD2020 General Purpose Input/Outputs (GPIO). At the time of writing, only GPO functionality is enabled.

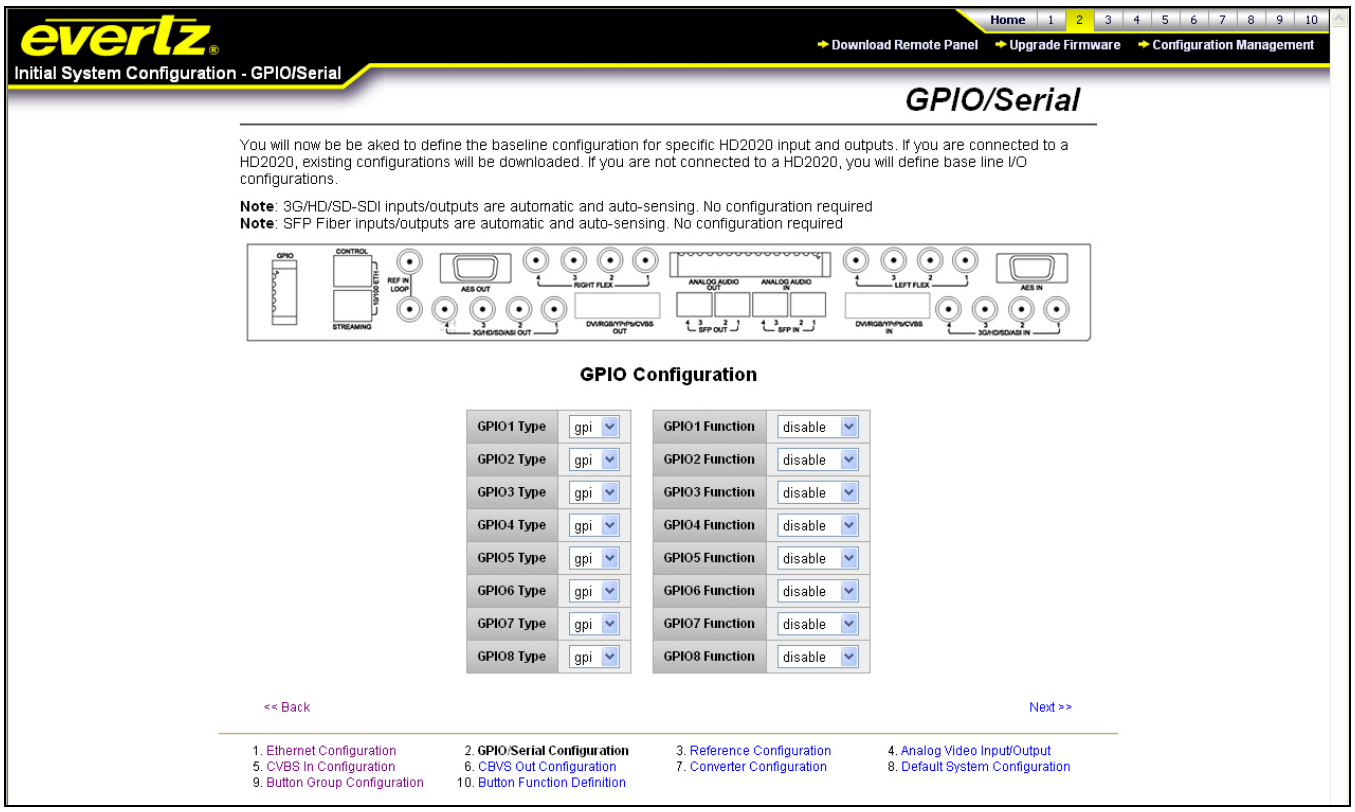

Figure 4-5: GPIO/Serial Window

4.3.1. Setting the GPIO Type

There are 8 general-purpose input/outputs available, listed GPIO1 to GPIO8.
For the ***GPIO1 Type*** - ***GPIO8 Type*** controls, select *gpi* or *gpo.*

Selecting ***gpi*** configures the relevant general-purpose input/output to be a general-purpose input.
Selecting ***gpo*** configures the relevant general purpose input/output to be general purpose output.
Note that at the time of this manual's writing only GPO functionality has been enabled.

For the sake of brevity, only the ***GPIO1 Type*** control is described in this manual.

CONTROL	PARAMETER	DESCRIPTION
GPIO1 Type	**gpi**	Configures the relevant general-purpose input/output to be a general-purpose input (not functional at the time of writing).
	gpo	Configures the relevant general-purpose input/output to be a general-purpose output.

4.3.2. Setting the GPIO Function

This control allows the user to disable a particular general-purpose input/output or link a particular general-purpose input/output to one of the 40 front panel hot buttons. Note that the front panel SHIFT button is used to access hot buttons 21-40. When the SHIFT button is NOT active (or illuminated), the front panel hot buttons are buttons 1-20. When the SHIFT button is active (or illuminated), the front panel hot buttons are buttons 21-40. When a general-purpose input/output is selected to be a general-purpose output, it will provide a tally when the selected button is pressed. If the general-purpose input/output is selected to be a general-purpose input, activation of the input will initiate a virtual push or activation of the selected button. For the sake of brevity, only the ***GPIO1*** control is described in this manual.

CONTROL	PARAMETER	DESCRIPTION
GPIO1	**Disable**	Disables the use of the selected general purpose input/output.
	BUTTON 1…40	Links the general purpose input/output to buttons 1 through 40.

4.4. REFERENCE CONFIGURATION

Screen 3 enables the user to configure the reference control for the HD2020.

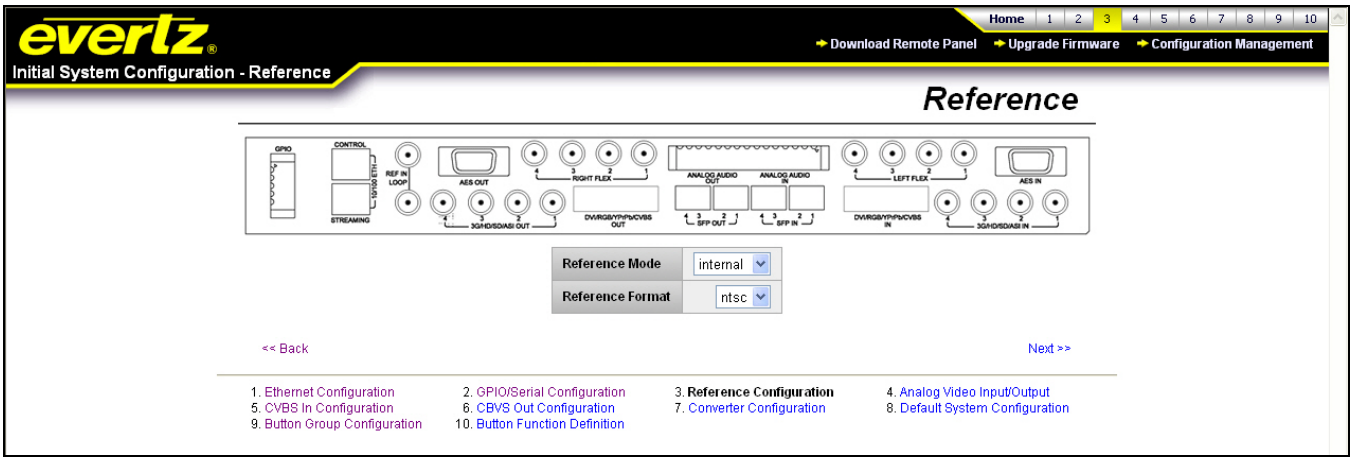

Figure 4-6: Reference Window

4.4.1. Setting the Reference Mode

This control enables the user to select the reference mode for the HD2020. To set the reference mode, select either *internal* or *external* from the ***Reference Mode*** control drop down menu. Select *external* when supplying the HD2020 an external reference signal. Select *internal* when the HD2020 is intended to operate as a self-locking system. When operating in *internal* mode, the HD2020's composite output must be looped to the HD2020's REF IN BNC.

CONTROL	PARAMETER	DESCRIPTION
REFERENCE MODE	**Internal**	Selecting this parameter enables the HD2020 to operate as a self-locking system when the HD2020's composite output is fed back into the HD2020's REF IN BNC.
	External	Selecting this parameter enables the user to apply and lock to an external bi-level reference.

4.4.2. Setting the Reference Format

The ***Reference Format*** control enables the user to select the reference format for the HD2020. At the time of manual writing, only *NTSC* is available for selection.

Bi-level NTSC reference or composite NTSC signals may be applied as a valid reference signal.

4.5. ANALOG VIDEO INPUT/OUTPUT CONFIGURATION

Screen 4 enables the user to set the parameters for the analog video inputs and outputs. The HD2020 is designed to accept composite analog video and component analog video inputs. However, *composite analog in* and *component analog in* are not simultaneously available. The user must configure the HD2020 for composite in OR component in. Similarly, the HD2020 is designed to output composite analog video OR component analog video. The user must configure the HD2020 for composite out OR component out. This page is used for making these selections. At the time of writing, component analog I/O is not currently implemented. As a result, only *composite* may be selected for Analog Video Input and Analog Video Output.

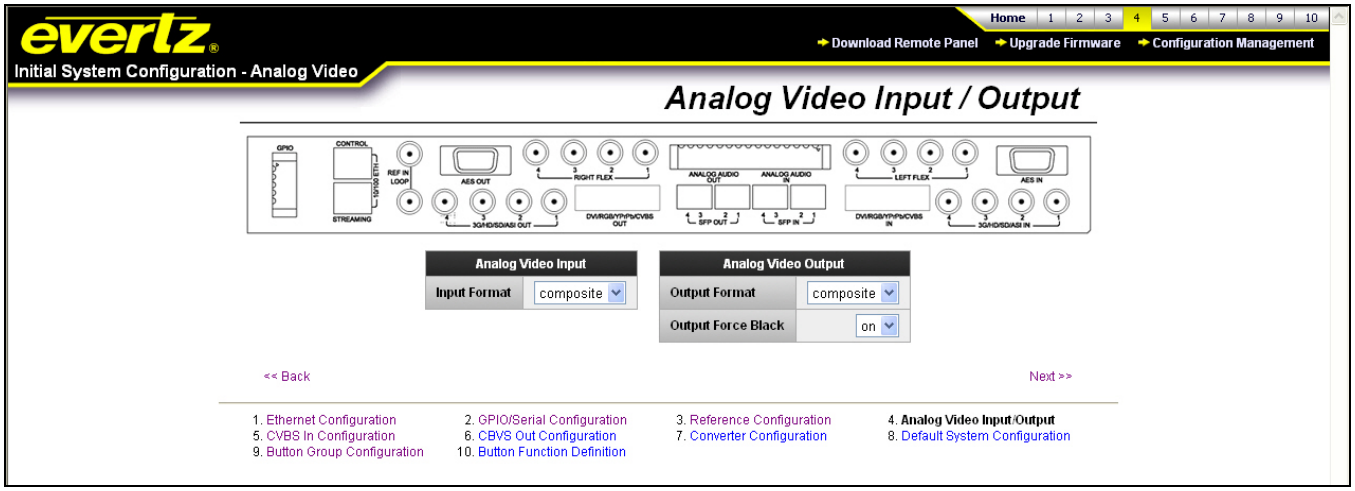

Figure 4-7: Analog Video Input/Output Window

4.5.1. Analog Video Input

4.5.1.1. Input Format

The ***Input Format*** control enables the user to select the analog video input format. Currently only *composite* format is available.

4.5.2. Analog Video Output

4.5.2.1. Output Format

The ***Output Format*** control enables the user to select the analog video output format. Currently only *composite* format is available.

4.5.2.2. Output Force Black

The ***Output Force Black*** control allows the user to control whether the analog video output is forced to black.

CONTROL	PARAMETER	DESCRIPTION
OUTPUT FORCE BLACK	**On**	When *On* is selected the analog video outputs are forced to be black.
	Off	When *Off* is selected the analog video output will contain the active video as generated by the HD2020 and supplied to its video D to A converter.

4.6. CVBS IN CONFIGURATION

Screen 5 enables the user to configure the CVBS IN. The CVBS IN Configuration Controls are explained in detail below.

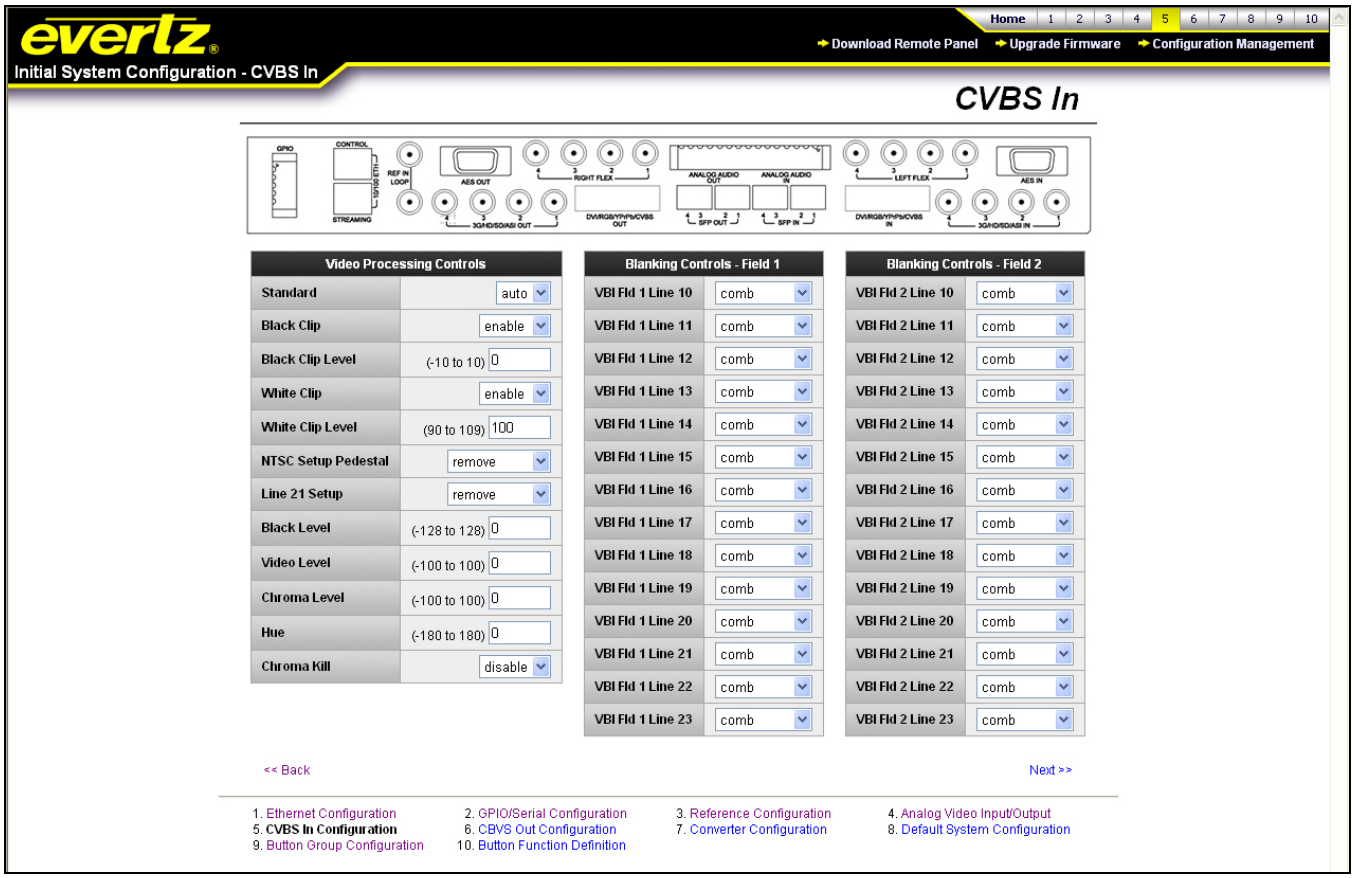

Figure 4-8: CVBS In Window

4.6.1. Video Processing Controls

4.6.1.1. Setting the Video Standard

The **Standard** control enables the user to select the video standard. Use the drop down menu to select the appropriate video standard. The *Video Standard* options are listed in the following table. At the time of writing, only NTSC inputs are supported. Therefore the user must select *NTSC* for this control.

CONTROL	PARAMETER	DESCRIPTION
STANDARD	NTSC	Sets the video standard to NTSC.
	PAL	Sets the video standard to PAL (not currently implemented).
	Auto	In *Auto* mode, the Genlock reference video standard is used to determine what standard to use (not currently implemented).

4.6.1.2. Setting the Black Clip Control

The ***Black Clip*** control is used to set whether the black clip will be enabled or not.
Enabling the ***Black Clip*** control forces the HD2020 to clip all values below the level defined by the ***Black Clip Level*** control.

Disabling the ***Black Clip*** control bypasses the clipping function.

CONTROL	PARAMETER	DESCRIPTION
BLACK CLIP	**Enable**	Enables the Black Clip control.
	Disable	Disables the Black Clip control.

4.6.1.3. Setting the Black Clip Level

The **Black Clip Level** control enables the user to set the level of the black clip. To set the black clip level, enter a value between -10 and 10 into the ***BLACK CLIP LEVEL*** field. The units are IRE.

4.6.1.4. Setting the White Clip Control

Enabling the ***White Clip*** control forces the HD2020 to clip all value above the level defined by the ***White Clip Level*** control. Disabling the ***White Clip*** control bypasses the clipping function.

CONTROL	PARAMETER	DESCRIPTION
WHITE CLIP	**Enable**	Enables the White Clip control.
	Disable	Disables the White Clip control.

4.6.1.5. Setting the White Clip Level

The ***White Clip Level*** control enables the user to set the level of the white clip.
To set the white clip level, enter a value between 90 and 110 into the ***WHITE CLIP*** *level* field. The units are IRE.

4.6.1.6. Setting the NTSC Setup Pedestal

The NTSC Setup Pedestal control is used to select whether or not the HD2020 removes pedestal from the composite video inputs. Select *Remove* to remove pedestal from the input. Select *dontRemove* to pass the input through this processing block.

CONTROL	PARAMETER	DESCRIPTION
NTSC SETUP PEDESTAL	**Remove**	Removes the NTSC Setup Pedestal.
	dontRemove	Does not remove the NTSC Setup Pedestal.

4.6.1.7. Setting the Line 21 Setup

The **Line 21 Setup** control is used to set whether or not the HD2020 removes setup from Line 21 of the incoming composite video signal. Select *Remove* to remove setup from line 21 of the incoming video signal and select *dontRemove* to bypass the removal of line 21 setup.

CONTROL	PARAMETER	DESCRIPTION
LINE 21 SETUP	**Remove**	Removes the Line 21 Setup.
	dontRemove	Does not remove the Line 21 Setup.

4.6.1.8. Setting the Black Level Control

This control sets the black level of the decoded video.
To set the *black level*, enter a value between -128 and 128 into the *black level* field.

4.6.1.9. Setting the Video Level Control

This control sets the overall video level/gain.
To set the **Video Level** control, enter a value between -100 to 100 into the *video level* field.

4.6.1.10. Setting the Chroma Level Control

This control sets the overall chroma level/ gain.
To set the **Chroma Level** control, enter a value between -100 to 100 into the *chroma level* field.

4.6.1.11. Setting the Hue Control

The hue of the decoded signal can be adjusted with this control.
To adjust the hue, enter a value between -180 to 180 into the *hue* field.

4.6.1.12. Setting the Chroma Kill

The **Chroma Kill** control can be used to turn on and off the composite decoder's chroma kill circuitry.
When *enabled*, the output of the composite decoder will be black and white.
When *disabled*, the output of the composite decoder will be colour.
To set the chroma kill, enter either *enable* or *disable* from the drop down menu.

CONTROL	PARAMETER	DESCRIPTION
CHROMA KILL	**Enable**	Enables the Chroma Kill control.
	Disable	Disables the Chroma Kill control.

4.6.2. Setting the Blanking Controls – Field 1

The *Blanking Controls – Field 1* controls enable the user to set what type of video processing will be applied to lines 10 through 23 of the incoming video signal. Each line may be comb filtered, notch filtered, blanked or bypassed directly to the Y channel output. For the sake of brevity only the control for line 10 is shown in this manual. Field 1, line 10 processing is determined using the **VBI FLD 1 LINE 10** control. At the time of writing, this feature is not implemented.

CONTROL	PARAMETER	DESCRIPTION
VBI FLD 1 LINE 10	**Comb**	Comb filter content on line 10.
	Notch	Notch filter content on line 10.
	bypassToY	Bypass content on line 10 to Y channel output.
	Blank	Blank content on line 10.

4.6.3. Setting the Blanking Controls – Field 2

The *Blanking Controls – Field 2* controls enable the user to set what type of video processing will be applied to lines 10 through 23 of the incoming video signal. Each line may be comb filtered, notch filtered, blanked or bypassed directly to the Y channel output. For the sake of brevity, only the control for line 10 is shown in this manual. Field 2, line 10 processing is determined using the **VBI FLD 2 LINE 10** control. At the time of writing, this feature is not implemented.

CONTROL	PARAMETER	DESCRIPTION
VBI FLD 2 LINE 10	**Comb**	Comb filter content on line 10.
	Notch	Notch filter content on line 10.
	bypassToY	Bypass content on line 10 to Y channel output.
	Blank	Blank content on line 10.

4.7. CVBS OUT CONFIGURATION

This screen enables the user to configure the composite video output of the HD2020.

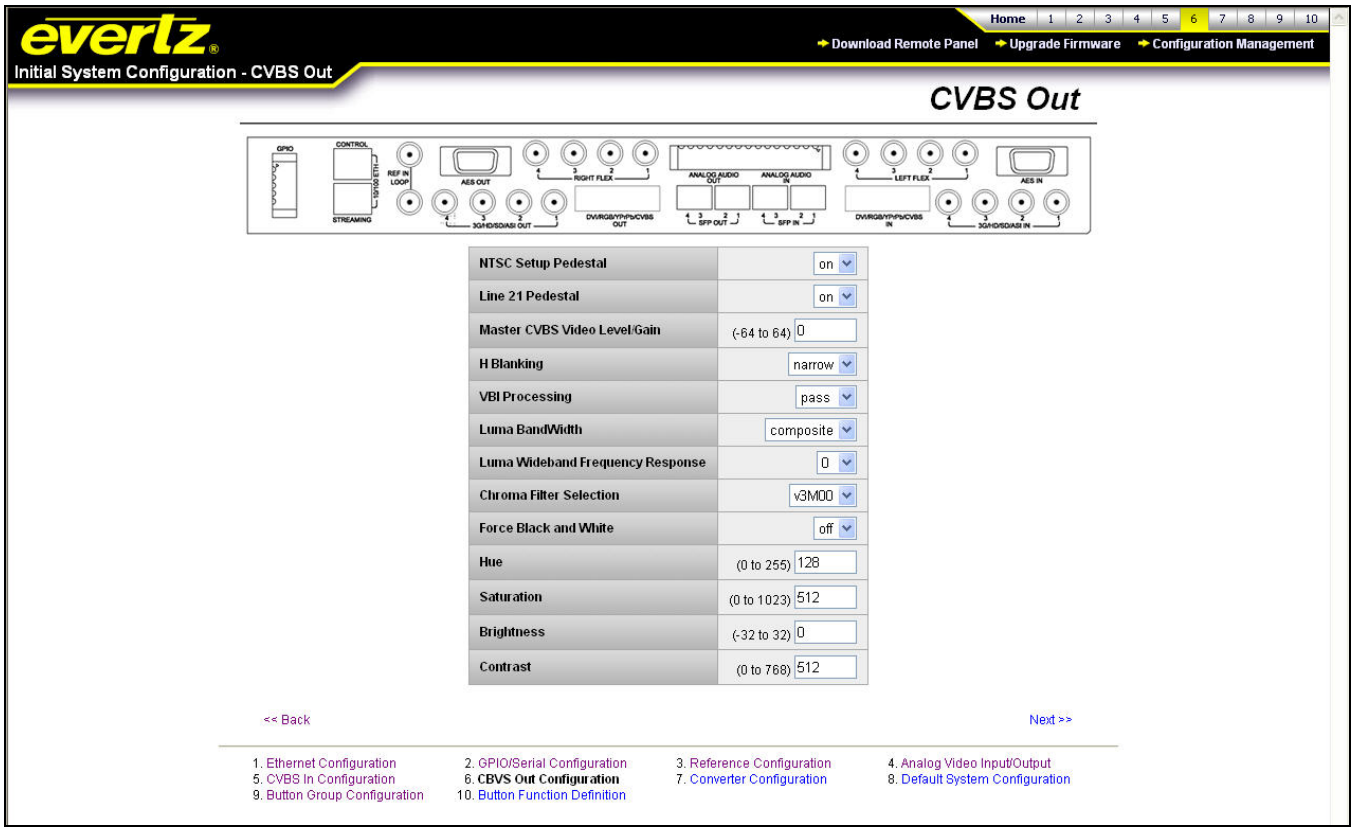

Figure 4-9: CVBS Out Window

4.7.1. Enabling the NTSC Setup Pedestal

Composite NTSC analog video may have a 7.5 IRE pedestal while 4:2:2 SDI video does not. This control, when set to *On*, will add the pedestal and re-scale the video accordingly. The setup pedestal should not be present on composite video when operating in Japan. To set the NTSC Setup Pedestal, select either *on* or *off* from the drop down menu.

CONTROL	PARAMETER	DESCRIPTION
NTSC SETUP PEDSTAL	**On**	Turns the NTSC Setup Pedestal On.
	Off	Turns the NTSC Setup Pedestal Off.

4.7.2. Enabling Line 21 Pedestal

Closed captioning has been defined to NOT have a 7.5 IRE pedestal, but it is placed on the first active line of video where there may be a pedestal. The upstream closed captioning encoder should not have generated a setup pedestal. When encoding composite video with properly keyed captioning, a pedestal must not be generated. This control, when set to *Off*, will not create the 7.5 IRE pedestal on line 21. When set to *On*, the 7.5 IRE pedestal will be generated on line 21.

CONTROL	PARAMETER	DESCRIPTION
LINE 21 PEDESTAL	**On**	Turns the Line 21 Pedestal On.
	Off	Turns the Line 21 Pedestal Off.

4.7.3. Setting the Master CVBS Video Level Gain

This control enables the user to set the video level gain for the composite video output. To set the video gain, enter a value between -64 and 64 into the *Master CVBS Video Level Gain* field.

4.7.4. Setting the H Blanking

The **H Blanking** setting enables the user to set the Horizontal blanking boundaries. To set the H blanking control, select either *narrow* or *wide* from the drop down menu. *Narrow* H blanking corresponds to 10.7µs wide blanking. *Wide* H blanking corresponds to 11.2 µs blanking.

CONTROL	PARAMETER	DESCRIPTION
H BLANKING	**Narrow**	When set to *Narrow*, the H blanking will be 10.7µsec wide.
	Wide	When set to Wide, the H blanking will be 11.2µsec.

4.7.5. Setting the VBI Processing

The Vertical Blanking interval may be passed through to the composite analog video output or may be blanked. To set the **VBI Processing** control, select either *pass* or *blank* from the drop down menu.

CONTROL	PARAMETER	DESCRIPTION
VBI PROCESSING	**Pass**	When set to *Pass*, the VBI will be passed to the composite analog video outputs.
	Blank	When set to *Blank*, the VBI will be blanked on the composite analog video outputs.

4.7.6. Setting the Luma Bandwidth

The **Luma Bandwidth** control enables the user to set the luma bandwidth of the composite analog video output. To set the luma bandwidth, select either *composite* or *wideband* from the drop down menu.

CONTROL	PARAMETER	DESCRIPTION
LUMA BANDWIDTH	**Composite**	The luma channel will be filtered with a standard composite filter.
	Wideband	Enables the luma bandwidth to be set by Luma Bandwidth Frequency Response control.

4.7.7. Setting the Luma Wideband Frequency Response

When the **Luma Bandwidth** control is set to *Wideband*, the **Luma Wideband Frequency Response** controls a set of high frequency response curves with +/- 4dB range. If you want to observe the filtering, supply a component multiburst or H sweep test. To set the **Luma Wideband Frequency Response** control, enter a value between -6 to 6 into the ***Luma Wideband Frequency Response*** data field.

4.7.8. Setting the Chroma Filter Selection

The Cb and Cr channels may be filtered with a number of bandwidths ranging from 650k to 3.0 MHz. The Chroma Filter Selection control, selects which chroma filter will be applied.

CONTROL	PARAMETER	DESCRIPTION
CHROMA FILTER SELECTION	**650k**	650k chroma filter applied.
	1.0MHz	1.0 MHz chroma filter applied.
	1.3MHz	1.3 MHz chroma filter applied.
	2.0MHz	2.0 MHz chroma filter applied.
	3.0MHz	3.0 MHz chroma filter applied.

4.7.9. Enabling Force Black and White

The **Force Black and White** control enables the user to force black and white video to be generated on the composite output. Select *on* to make the composite analog output black and white. Select *off* to enable colour video on the composite output.

PARAMETER	DESCRIPTION
On	Generated composite analog video will be black and white only.
Off	Generated composite analog video will be color.

4.7.10. Setting the Hue

This **Hue** control allows the user to adjust the Hue of the analog video in steps of 0.175 degrees.
To set the hue, enter a value between 0 and 255 into the *Hue* field.

4.7.11. Setting the Saturation

The **Saturation** control allows the user to adjust the saturation of the analog video. Saturation is identified as the strength or purity of the colour. Saturation is represented by the amount of grey in proportion to the hue.

To set the saturation, enter a value between 0 and 1023 into the *saturation* field.
Setting the saturation Level to 0 will desaturate the image and apply a full grey tone.
Setting the saturation Level to 1023 will create a fully saturated image.
Setting the saturation Level to 512 is neutral.

4.7.12. Setting the Brightness

This **Brightness** control allows the user to adjust the brightness of the analog video output. The brightness level makes simple adjustments to the tonal range of the video. Brightness can be defined as the relative lightness or darkness of a colour.

To set the brightness, enter a value between -32 and 32 in the *brightness* field.
Setting the brightness level to –32 will fully darken the output video.
Setting the brightness level to +32 will fully lighten the output video.

4.7.13. Setting the Contrast

The **Contrast** control allows the user to adjust the contrast of the analog video. The contrast level makes simple adjustments to the tonal range of the video.

To set the contrast, enter a value between 0 and 768 into the *contrast* field. The default value is 512.

4.8. CONVERTER CONFIGURATION

There are four fully independent and unique up/down/cross converters in the HD2020. Each processing path includes frame sync functionality. Each processing path has its own unique set of controls. These controls include frame sync controls, video conversion, video aspect ratio conversion, video proc controls and video noise reduction controls.

Click on the "**Converter #1 Parameters**" text and the control window for conversion path #1 will be moved to the front of the screen so its parameters can be set.

Click on the "**Converter #2 Parameters**" text and the control window for conversion path #2 will be moved to the front of the screen so its parameters can be set.

Click on the "**Converter #3 Parameters**" text and the control window for conversion path #3 will be moved to the front of the screen so its parameters can be set.

Click on the "**Converter #4 Parameters**" text and the control window for conversion path #4 will be moved to the front of the screen so its parameters can be set.

For the sake of simplicity, only controls for the Converter #1 are described below. Converters #2, #3 and #4 have identical controls.

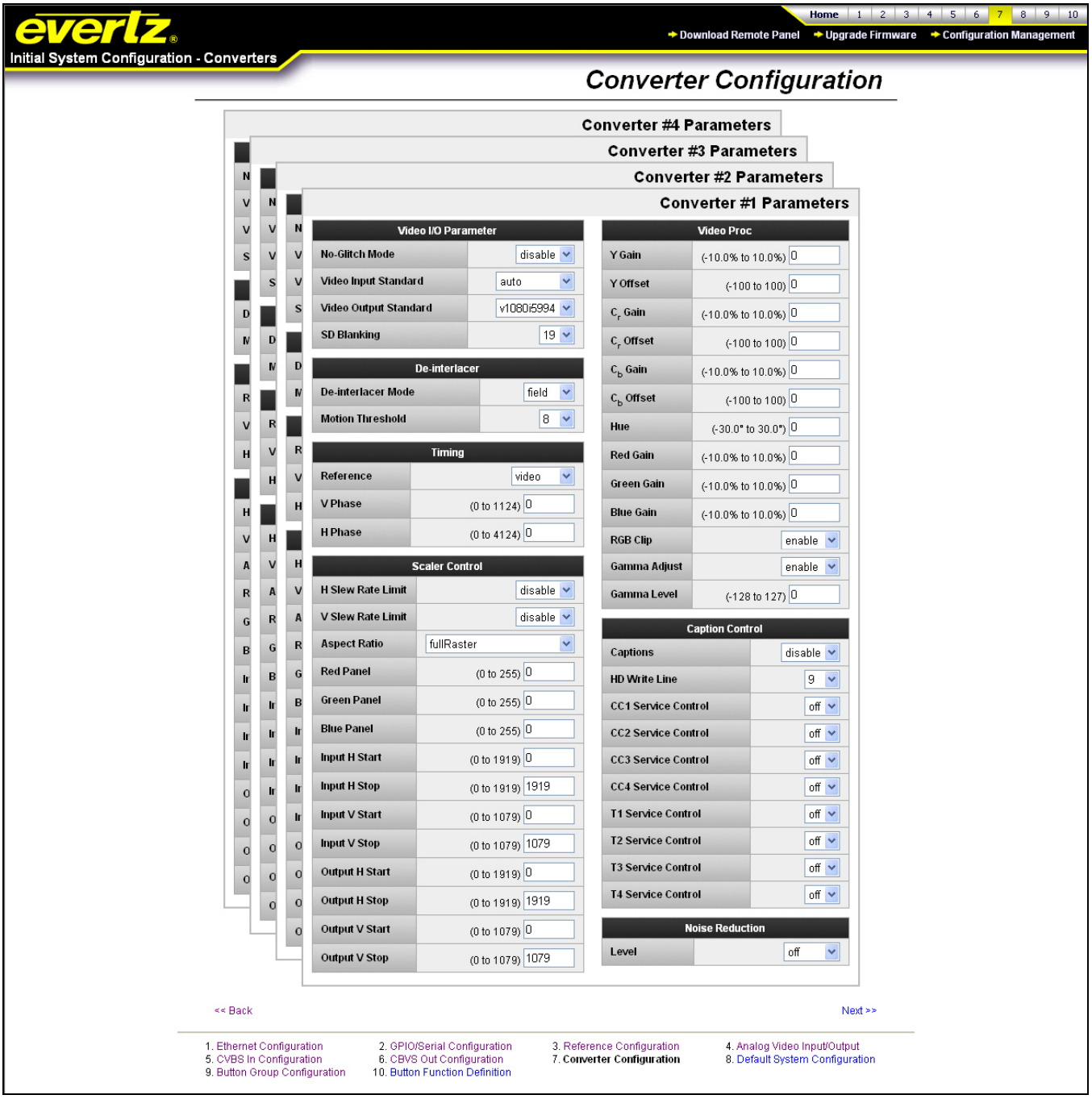

Figure 4-10: Converter Configuration Window

4.8.1. Video I/O Parameter

4.8.1.1. Enabling the No-Glitch Mode

At the time of this manual's writing the **No-Glitch Mode** control is not enabled. Future functionality will be enabled and disabled using the No-Glitch Mode control.

Select either *enable* or *disable* from the drop down menu.

CONTROL	PARAMETER	DESCRIPTION
NO-GLITCH MODE	**Enable**	RESERVED FOR FUTURE USE
	Disable	RESERVED FOR FUTURE USE

4.8.1.2. Setting the Input Standard Video

The **Video Input Standard** control selects the input video standard being used. Interlaced video formats are shown with the number of fields per second. Progressive formats are shown with the number of frames per second. Converters are not capable of temporal processing, so it will not convert between 59.94 and 60 or between 50 and the 60 related frame rates. When the input standard is set to *Auto*, the module will auto-detect the video standard. To select a specific video input standard, select a standard from the standard list of format. The following options will be listed in the drop down menu:

CONTROL	PARAMETER	DESCRIPTION
VIDEO INPUT STANDARD	**Auto**	Auto-detect input video standard.
	525i5994	Select 525i/59.94 as the input video standard.
	720p5994	Select 720p/59.94 as the input video standard.
	1080i5994	Select 1080i/59.94 as the input video standard.

4.8.1.3. Setting the Video Output Standard

The **Video Output Standard** control selects the output video standard. Converters are not capable of temporal processing, so it will not convert between 59.94 and 60 or between 50 and the 60 related frame rates. To set the output video standard, select a standard from the standard list of supported output video formats.

CONTROL	PARAMETER	DESCRIPTION
VIDEO OUTPUT STANDARD	**525i5994**	Select 525i/59.94 as the output video standard.
	720p5994	Select 720p/59.94 as the output video standard.
	1080i5994	Select 1080i/59.94 as the output video standard.

4.8.1.4. Setting the SD Blanking

With the **SD Blanking** control, you can adjust which standard definition lines will be blanked prior to up-converting the signal. All active video lines up to and including the selected line number will be blanked. Normally line 21 (where closed caption information may be present) is blanked. Captioning will still be processed normally; this control prevents caption waveforms from being processed as video. To set the SD Blanking control, select a value from the list of supported line numbers.

CONTROL	PARAMETER	DESCRIPTION
SD BLANKING	19	Lines up to and including line 19 will be blanked.
	20	Lines up to and including line 20 will be blanked.
	21	Lines up to and including line 21 will be blanked.
	22	Lines up to and including line 22 will be blanked.
	23	Lines up to and including line 23 will be blanked.

4.8.2. De-Interlacer

4.8.2.1. Setting the De-Interlacer Mode

With the **De-Interlacer Mode** control, the user can set whether the module will perform field- or frame-based conversion. To set the de-interlacer mode, select either *field* or *frame* from the drop down menu.

CONTROL	PARAMETER	DESCRIPTION
DE-INTERLACER MODE	Field	In *Field* mode, the format translator/cross-converter works on a field-by-field basis. This mode is recommended for 3:2 pulldown content on interlaced input video formats. It gives a softer vertical up-conversion.
	Frame	In *Frame* mode, the format translator/cross-converter works on a complete frame basis thus providing a crisper image. *Frame* is a good option for interlaced input images that do not contain 3:2 pulldown.

4.8.2.2. Setting the Motion Threshold

With the **Motion Threshold** control, the user can change the threshold of what is deemed motion by the de-interlacer. To set the motion threshold control, enter a value between 0 and 15 into the *Motion Threshold* field. Level 8 is the recommended default setting.

4.8.3. Timing Settings

4.8.3.1. Setting the Reference

Each individual converter is fed a copy of the reference that is supplied to the HD2020 REF IN BNC. To allow each converter to lock to this reference, the **REFERENCE** control should be set to *external*. This will ensure that all converters lock to the same reference and ensure seamless operation of the HD2020 internal video clean switch and audio processing modules. To have the converters lock to the incoming video, select *video*. Note that when selecting video, sources will drift over time relative to the system reference and the signals applied to the video clean switch will appear to vertically roll with respect to each other.

CONTROL	PARAMETER	DESCRIPTION
REFERENCE	**Video**	Select *Video* to lock the output video to the input video. When there is no input video, the output video will free run.
	External	Select *External* to lock the output video to the HD2020 REF IN BNC. If the reference disappears or is not valid, the converter will lock to the incoming video.

4.8.3.2. Setting the V Phase

With the **V Phase** control, you can set the vertical timing of the output video with respect to the reference. Setting this control to *0* keeps the output video frame aligned with the converter's reference input or with the incoming video if reference is missing. For normal operation, the **V Phase** control for each converter should be set to *0*. This will ensure all video signals supplied to the HD2020 internal video clean switch (if utilized) are aligned properly. If the **V Phase** control is set to a non zero value, sources on the video clean switch will appear vertically offset.

Increasing the value will delay the output video in one-line increments of the output video standard. In order to advance the vertical timing of the output video with respect to reference, set the control to the maximum total number of lines of the output video minus the number of lines that you wish to advance the output video (e.g.: for 1080i/59.94 output video the total number of lines is 1125, so to advance the output video 5 lines, set the value to *1120*). When increasing the **V Phase** causes it to go beyond the limit of the frame buffer, the *V Phase Offset* will wrap to the beginning of the frame buffer, resulting in a change of one frame of throughput delay between the video input and the video output.

To set the **V Phase**, enter a value between *0* and *1124* into the *V Phase* field.

4.8.3.3. Setting the H Phase

With the **H Phase** control, the user can set the horizontal timing of the output video with respect to the reference input. Setting this control to *0* keeps the output video line aligned with the reference. For normal operation, the **H Phase** control for each converter should be set to *0*. This will ensure all video signals supplied to the HD2020 internal video clean switch (if utilized) are aligned properly.

Increasing this value will delay the output video in one-sample increments. In order to advance the horizontal timing of the output video with respect to the reference, set the control to the maximum number of samples per line for the output video standard minus the number of samples that you wish to advance the output video.

To set the **H Phase**, enter a value between 0 and 1124 into the *H Phase* field.

4.8.4. Scaler Control

4.8.4.1. Setting the H Slew Rate Limit

The **H Slew Rate Limit** control enables and disables the Horizontal Slew Rate Limit for the Scaler. Enabling the **H Slew Rate Limit** control causes the internal video processing to adapt for sharp horizontal transitions in the video content and minimize edge ringing that may occur due to such transitions. Disabling the **H Slew Rate Limit** control bypasses the edge processing in the scaler.

To set the **H Slew Rate Limit** control, select either *enable* or *disable* from the drop down menu.

CONTROL	PARAMETER	DESCRIPTION
H SLEW RATE LIMIT	**Enable**	Enables the H Slew Rate Limit. The internal video processing will adapt its filtering for sharp horizontal transitions in the video content and will minimize edge ringing that may occur due to such transitions.
	Disable	Disables the H Slew Rate Limit.

4.8.4.2. Setting the V Slew Rate Limit

The **V Slew Rate Limit** control enables and disables the Vertical Slew Rate Limit for the Scaler. Enabling the **V Slew Rate Limit** control causes the internal video processing to adapt for sharp vertical transitions in the video content and minimize edge ringing that may occur due to such transitions. Disabling the **V Slew Rate Limit** control bypasses the edge processing in the scaler.

To set the **V Slew Rate Limit** control, select either *enable* or *disable* from the drop down menu.

CONTROL	PARAMETER	DESCRIPTION
V SLEW RATE LIMIT	**Enable**	Enables the V Slew Rate Limit. The internal video processing will adapt its filtering for sharp vertical transitions in the video content and will minimize edge ringing that may occur due to such transitions.
	Disable	Disables the V Slew Rate Limit.

4.8.4.3. Setting the Aspect Ratio

The **Aspect Ratio** control sets the aspect ratio control that will be performed during the up/down/cross conversion process. Many of the standard aspect ratio conversions are listed as pre-defined options that may be selected. In addition to this, custom aspect ratio conversions can be defined using the *USER* mode of operation. Once *USER* is selected, **Input H Start**, **Input H Stop**, **Input V Start**, **Input V Stop**, **Output H Start**, **Output H Stop**, **Output V Start**, **Output V Stop** control are used for this purpose. The region of the input raster defined by the **Input H Start**, **Input H Stop**, **Input V Start**, **Input V Stop** is scaled to the region of the output raster defined by the **Output H Start**, **Output H Stop**, **Output V Start**, **Output V Stop.**

Coloured image side panels can be utilized to fill regions of the output raster that are outside the region defined by the output image raster controls. To set the aspect ratio, select one of the following options from the drop down menu:

CONTROL	PARAMETER	DESCRIPTION
ASPECT RATIO	Full raster	Converts the full input raster to full output raster. If the input and output aspect ratios are not equivalent there will be aspect distortion.
	User	Converts the region of the input raster defined by the **Input H Start**, **Input H Stop**, **Input V Start**, **Input V Stop** controls to the region of the output raster defined by the **Output H Start**, **Output H Stop**, **Output V Start**, **Output V Stop.** Coloured image side panels can be utilized to fill regions of the output raster that are outside the region defined by the output image raster controls.
	sidePanel43toTBCut169 *letterBox139toTBCut169* *letterBox149toTBCut169* *Stretch139toTBCut169* *Stretch149toTBCut169* *Stretch169toTBCut169*	These settings convert the input picture to 16:9 top and bottom cuts.
	Stretch139toSidePanel43 *Stretch149toSidePanel43* *Stretch169toSidePanel43*	These settings squeeze common stretched input video back to 4:3 side panel images on a 16:9 aspect raster.
	V43to43SidePanelon169 *V43to139Stretchon169* *V43to149Stretchon169* *V43to169Stretchon169* *V43to139Cropon169* *V43to149Cropon169* *V43to169Cropon169*	These settings are common up-converter settings for converting 4:3 aspect ratio images to common 16:9 formats. These settings are not appropriate for cross- or down-conversion.
	V169to169LetterBoxon43 *V169to149LetterBoxon43* *V169to139LetterBoxon43* *V169to43SideCuton43* *V169to43Squeezeon43*	These settings are common down-converter settings for converting 16:9 aspect ratio images to common 4:3 formats. These settings are not appropriate for cross- or up-conversion.

4.8.4.4. Setting the Panel Colour

There are three controls used to set the side panel colors called **Red Panel**, **Green Panel**, **Blue Panel**. The control for each color component works in the same way, so for the sake of simplicity, only the menu item for the **Red Panel** control will be included in this manual.

The **Red Panel** control defines the red color component for the desired side panel color. Set the **Red Panel** control field to the red value required (range *0* to *255*).

Hint: You can use a standard color picker such as is available in Microsoft Paint to determine the color values that you wish to use.

4.8.4.5. Setting the Input H Start

The **Input H Start** control defines the starting horizontal portion of the input image that will be processed to the output. **Input H Start** does not have any effect when the pre-defined aspect ratios are used. To set the **Input H Start** control, enter a value between 0 and 1919 into the *Input H Start* field. The default value is 0.

4.8.4.6. Setting the Input H Stop

The **Input H Stop** control defines the ending horizontal portion of the input image that will be processed to the output. **Input H Stop** does not have any effect when the pre-defined aspect ratios are used. To set the **Input H Stop** control, enter a value between 0 and 1919 into the *Input H Stop* field. The default value is 0.

4.8.4.7. Setting the Input V Start

The **Input V Start** control defines the starting vertical portion of the input image that will be processed to the output. **Input V Start** does not have any effect when the pre-defined aspect ratios are used. To set the **Input V Start** control, enter a value between 0 and 1079 into the *Input V Start* field. The default value is 0.

4.8.4.8. Setting the Input V Stop

The **Input V Stop** control defines the ending vertical portion of the input image that will be processed to the output. **Input V Stop** does not have any effect when the pre-defined aspect ratios are used. To set the **Input V Stop** control, enter a value between 0 and 1079 into the *Input V Stop* field. The default value is 0.

4.8.4.9. Setting the Output H Start

The **Output H Start** control determines where to place the selected portion of the input image onto the output video raster. The **Output H Start** control defines the starting horizontal position for the video content on the output image raster. The input image will be stretched to fill the width defined by **Output H Start** and **Output H Stop**. Areas of the output image raster not filled with video content will be filled with the pre-defined panel colours.

To set the **Output H Start** control, enter a value between 0 and 1919 into the *Output H Start* field.

4.8.4.10. Setting the Output H Stop

The **Output H Stop** control determines where to place the selected portion of the input image onto the output video raster. The **Output H Stop** control defines the ending horizontal position for video content on the output image raster. The input image will be stretched to fill the width defined by **Output H Start** and **Output H Stop**. Areas of the output image raster that are not filled with video content will be filled with the pre-defined panel colours.

To set the **Output H Stop** control, enter a value between 0 and 1919 into the *Output H Stop* field.

4.8.4.11. Setting the Output V Start

The **Output V Start** control determines where to place the selected portion of the input image onto the output video raster. The **Output V Start** control defines the starting vertical position for video content on the output image raster. The input image will be stretched to fill the width defined by **Output V Start** and **Output V Stop**. Areas of the output image raster that are not filled with video content will be filled with the pre-defined panel colours.

To set the **Output V Start** control, enter a value between 0 and 1079 into the *Output H Start* field.

4.8.4.12. Setting the Output V Stop

The **Output V Stop** control determines where to place the selected portion of the input image onto the output video raster. The **Output V Stop** control defines the starting vertical position for video content on the output image raster. The input image will be stretched to fill the width defined by **Output V Start** and **Output V Stop**. Areas of the output image raster that are not filled with video content will be filled with the pre-defined panel colours.

To set the **Output V Stop** control, enter a value between 0 and 1079 into the *Output H Stop* field.

4.8.5. Video Proc

4.8.5.1. Setting the Y, Cr, Cb, R, G, B Gain

The **Y Gain**, **Cr Gain**, **Cb Gain**, **R Gain**, **G Gain**, **B Gain** enable the user to change the gain of the video signal in the Y Cb Cr space or the R G B space. The **Y Gain**, **Cr Gain**, **Cb Gain**, **R Gain**, **G Gain**, **B Gain** controls all operate in the same manner. Gain adjustments in the Y, Cb, Cr domain are made first, followed by gain adjustments in the RGB domain. Illegal values are clipped after gain adjustments. For the sake of simplicity, only the **Y Gain** control will be described in this manual.

With **Y Gain** control, the user can adjust the gain of the Y channel over a range of +/-10% in 0.1% steps. To set the gain value for the Y channel, enter a value between -10% and 10% into the appropriate *Y gain* field.

4.8.5.2. Setting the Y, Cr and Cb Offset

There are three controls that set the DC Offset of each component in the Y Cb Cr space.
For the sake of simplicity, only the Y Offset control will be included in this manual.

The **Y Offset** controls enable the user to adjust the DC offset of the Y channel in +/- 100 quantization levels. To set the offset value for the Y channel, enter a value between -100 and 100 into the appropriate *Y offset* field.

4.8.5.3. Setting the Hue

With the **HUE** control, the user can adjust the Hue or color of the video with a +/- 30 degrees range in 0.1 degree steps. To set the hue for the converter, enter a value between -30 and 30 degrees into the *Hue* field.

4.8.5.4. Enabling the RGB Clip

The **RGB Clip** control enables and disables the converter's internal RGB clipper/color legalizer. When enabled, the module will clip any illegal levels of R, G, and B (individually) to black and white levels. This control is normally set to *Disable* in order to allow for super black or other test patterns to pass through the module.

CONTROL	PARAMETER	DESCRIPTION
RGB Clip	**Enable**	When enabled, the module will clip any illegal levels of R, G, and B (individually) to black and white levels. If disabled, then the illegal values are passed unmodified.
	Disable	This control is normally set to *Disable* in order to allow for super black or other test patterns to pass through the module.

4.8.5.5. Setting the Gamma Adjust

The **Gamma Adjust** control enables and disables the converter's ability to adjust gamma. Gamma is defined by the way brightness is dispersed across the intensity spectrum. The gamma is the relationship between the **input voltage and the resulting intensity of the output.** To set the Gamma Adjust control, select either *enable* or *disable* from the drop down menu.

CONTROL	PARAMETER	DESCRIPTION
Gamma Adjust	**Enable**	When enabled, the module will allow the user to adjust the gamma level.
	Disable	If disabled, then the gamma level is set to 0.

4.8.5.6. Setting the Gamma Level

With the **Gamma Level** control, the user can adjust the Gamma correction factor. Gamma correction utilizes the balance of the "tone curve" in order to flatten the line and get the gamma closer to the ideal 1.0 value. To set the gamma level, enter a value between -128 and 127 into the *gamma level* field.

4.8.6. Caption Control

4.8.6.1. Enabling the Captions

The **Captions** control allows the user to enable caption control. When the **Captions** control is *enabled*, any closed captioning will be mapped to line 21 if the output video is SD, or to the designated HD write line if the output video is HD. When the **Captions** control is *disabled*, no closed captioning is encoded in the VANC of the output video. To set the caption control, select either *enable* or *disable* from the drop down menu.

CONTROL	PARAMETER	DESCRIPTION
CAPTIONS	**Enable**	Any closed captioning will be mapped to line 21 if the output video is SD, or to the designated HD write line if the output video is HD.
	Disable	Disables the captions insertion into the output video.

4.8.6.2. Setting the HD Write Line

The **HD Write Line** control will set the HD line where the HD VANC captions are inserted on the output HD video as per SMPTE 334M. To set the HD write line control, enter a value between 7 and 24 into the *HD write line* field.

NOTE: When setting the HD Write Line, be aware of the *Start of Active Video Line* in 1080i and 720p. If HD VANC captions are inserted past the *Start of Active Video*, most HD devices will drop the HD captions.

4.8.6.3. Setting the CC1 to CC4 Service Controls

There are four controls that will map close caption and text channels into EIA708 caption services. These controls are the **CC1 Service Control**, **CC2 Service Control**, **CC3 Service Control**, **CC4 Service Control**. For the sake of simplicity, only one control will be outlined in this manual.

The **CC1 Service Control** will map CC1 into an EIA708 Caption Service when values *1* through *16* are selected. Currently, the converter only supports 16 services (1 to 16). When **CC1 Service Control** is set to *off*, the CC1 is not mapped to any EIA708 Caption Service.

4.8.6.4. Setting the T1 to T4 Service Controls

Using **T1 Service Control**, **T2 Service Control**, **T3 Service Control** and **T4 Service Control** the user can set controls for T1 to T4. For the sake of simplicity, only the T1 Service Control will be outlined in this manual. The **T1 Service Control** will map T1 into an EIA708 Caption Service. Currently, the converter only supports 16 services (1 to 16).

When T1 Service Control is set to *off*, the T1 is not mapped to any EIA708 Caption Service. To set the T1 Service control, select a value between 1 and 16 from the *T1 Service Control* drop down menu.

4.8.7. Noise Reduction

4.8.7.1. Setting the Noise Reduction Level

This **Noise Reduction** manages the level of noise reduction to apply to the video signal. The selection levels automatically set the motion detection threshold and the aggressiveness of the filters to remove noise. To set the noise reduction level, select one of the following options from the drop down menu:

CONTROL	PARAMETER	DESCRIPTION
NOISE REDUCTION	**Off**	When the control is set to *Off*, there is no noise reduction. The input video is left untouched.
	Low	When the control is set to *Low*, the noise reducer will have a lower motion detection threshold and a less aggressive filter. This level of noise reduction is used for video that has low random noise, where removal of low-level details is minimized.
	Middle	When the control is set to *Middle*, the noise reducer will have an average threshold set for the motion detection threshold and aggressive filters. This level of noise reduction is used for video that has typical amounts of random noise, where the module will remove random noise and affect low-level details, more so than a *Low* setting.
	High	When the control is set to *High*, the noise reducer will have a high motion detection threshold and a very aggressive filter. This level of noise reduction is used for video that has a high level of random noise, where the filters will remove the random noise, but will soften the low-level details.

Note: Setting the value **higher** than needed to remove the noise present will **over-soften areas of low amplitude, fine details**.

Note: Setting the value **too low** may cause the circuitry to **leave random noise that it could remove**. However, removal of low-level details will be minimized.

4.9. DEFAULT SYSTEM CONFIGURATION

The *Default System Configuration* enables the user to define the default state of the system resources and system routing for both audio and video. This default state is the configuration that the HD2020 will enter into upon power-up and prior to the activation of the button dependant control.

It is important to review your system line diagrams when defining your default configuration. Many parameters in the HD2020 will not change on a front panel "button-by-button basis". Such parameters should be defined in the default system configuration page rather than in the Button Definition page (refer to section 4.11). This will save a significant amount of time when programming the front panel button states.

Figure 4-11 shows the high level HD2020 system architecture. The HD2020 has several ordering options. If a particular option is not ordered, it will not show up in this system architecture diagram as shown in Figure 4-11. Each yellow box contains parameters that may be set within this page. Note that many of the parameters defined in the previous web pages will show up as default values in this web page. For example, if the user clicks on the "Converter #1"box within this page, the values defined on Web Page 7 for Converter #1 will appear.

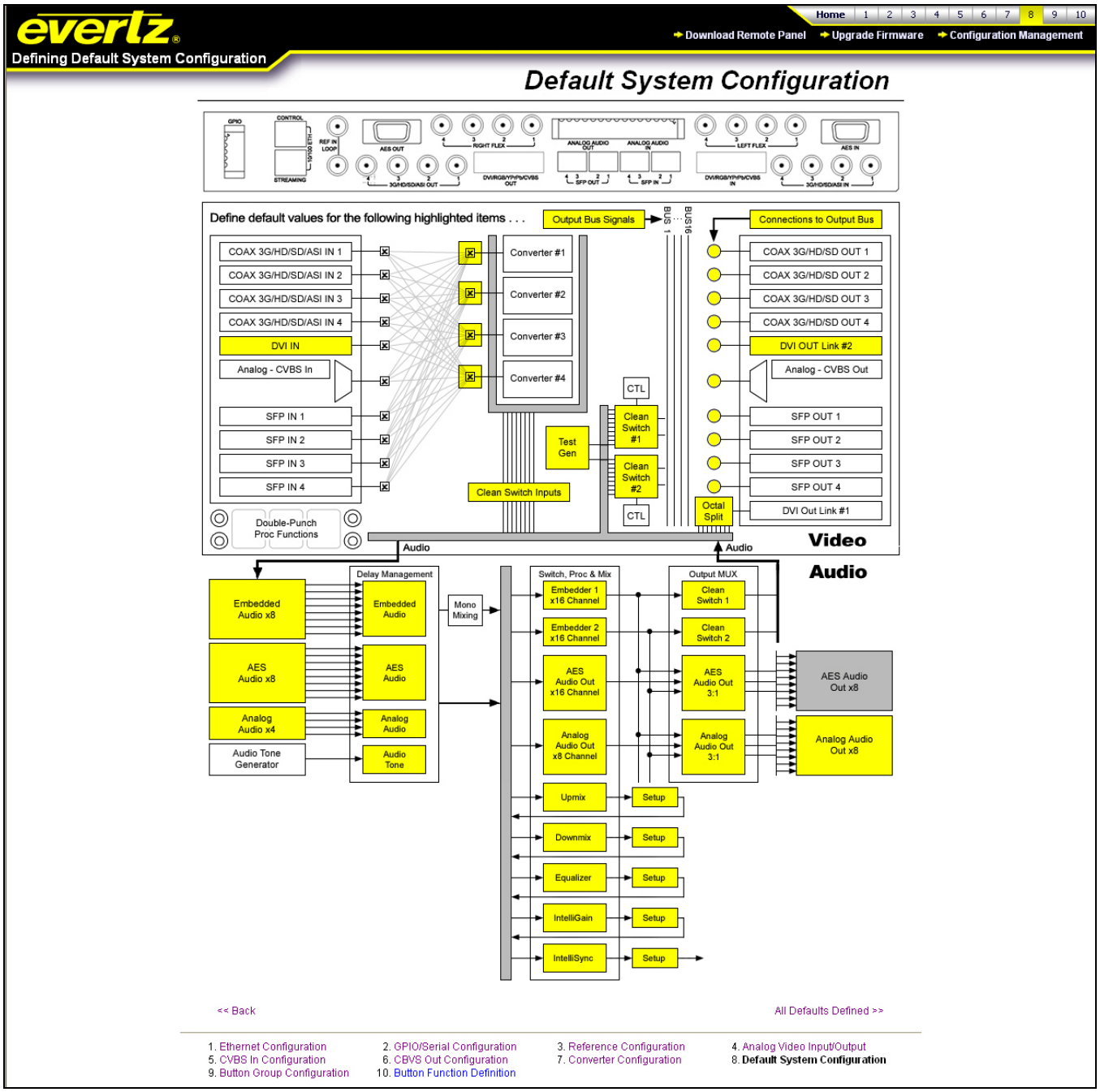

Figure 4-11: Default System Configuration Window

4.9.1. Device Configuration Windows

4.9.1.1. DVI IN Configuration

The HD2020 has a DVI input that can be used to accept either 720p or 1080p input video signals. 720p input signals are immediately frame synced and converted to SDI so that the signal can then be routed to any other HD2020 processing resource. 1080p input signals are immediately frame synced, interlaced to 1080i and converted to SDI. Since these signals are always frame synced, it is not always necessary to assign one of the four HD2020 frame sync+conversion resources to this input. For example, this signal could be directly routed to the video clean switch or any other output bus if conversion or video proc-ing is not required.

Within the HD2020 configuration tool, you must specifically configure the DVI input for the signal format that is being applied.

At the time of this manual's writing the "AUTO" option is not enabled. You must select 720p or 1080p. Again, note that when a 1080p DVI signal is applied to this input, the signal is immediately interlaced to be a 1080i signal.

By clicking on the yellow DVI IN box, a window will appear as shown in Figure 4-12 and Figure 4-12. The user will be able to configure the DVI input for the correct video format.

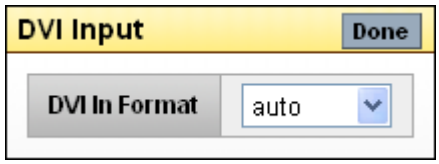

Figure 4-12: DVI Input Window

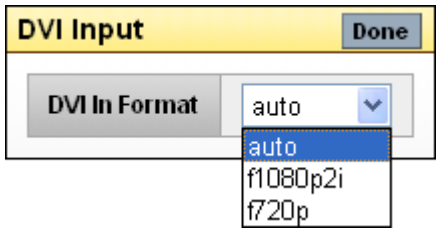

Figure 4-13: Selecting the DVI In Format

4.9.1.2. Input Routing Configuration

The HD2020 has an internal video HD/SD-SDI cross-point that allows you to route any video input to any video frame/conversion resource, video clean switch input or video output bus. Clicking on the yellow INPUT ROUTING button enables you to define the routing for each conversion path. Select the appropriate routing for each converter by using the available drop down menus as shown in Figure 4-14. Each conversion path has the same list of available video sources.

It is important to note that you can route the output of the two video clean switches back into one of the video converters. By doing this, you can simultaneously generate both an SD and HD copy of the video clean switch outputs.

To access the input routing dialog box as shown in Figure 4-14, select the following routing icon  .

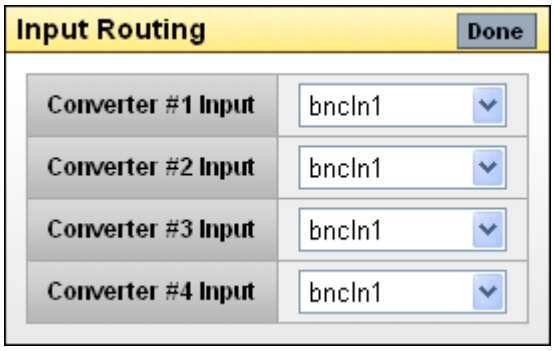

Figure 4-14: Input Routing Window

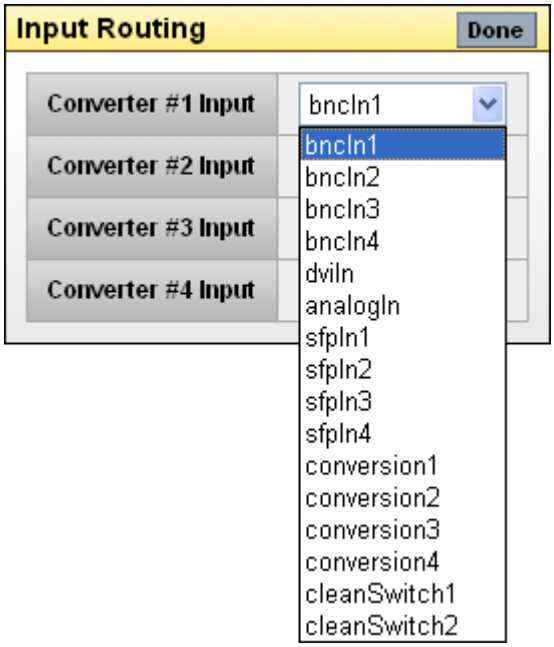

Figure 4-15: Selecting the Converter Input

4.9.1.3. Output Bus Signal

The HD2020 has 16 output buses that various video signals may be connected to. The 16 output buses are connected to the HD2020's internal HD/SD-SDI crosspoint. As a result, each output bus may connect directly to any HD2020 HD/SD inputs, converter outputs or clean switch outputs. To configure the HD2020 output buses, click on the yellow box labelled "Output Bus Signals". This will bring up a pop-up window, as shown in Figure 4-16, that allows you to select the source of video for each of the 16 output buses. All output buses have access to the same source of video. The sources are displayed in the drop down menu of Figure 4-17.

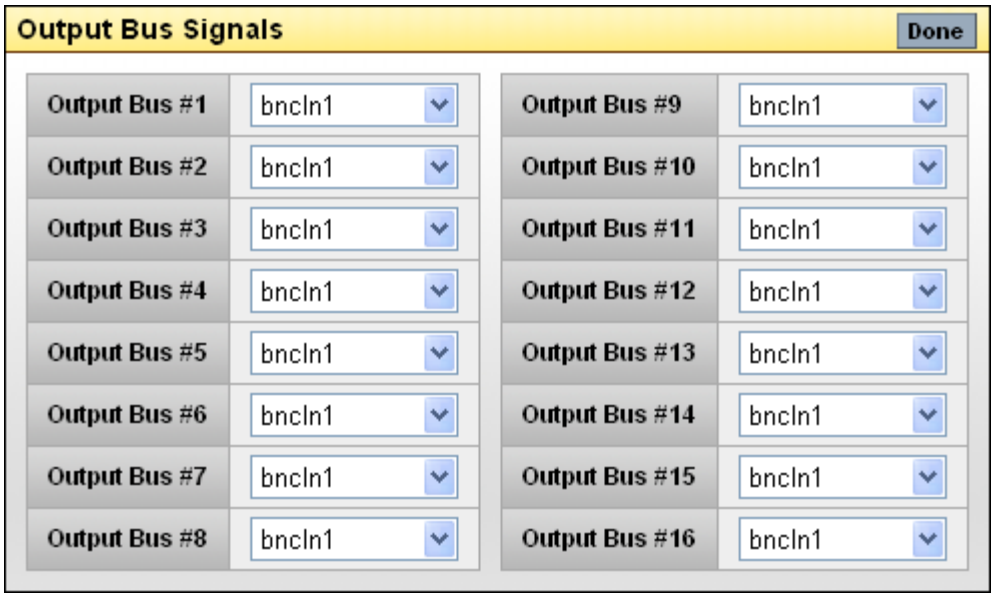

Figure 4-16: Output Bus Signals Window

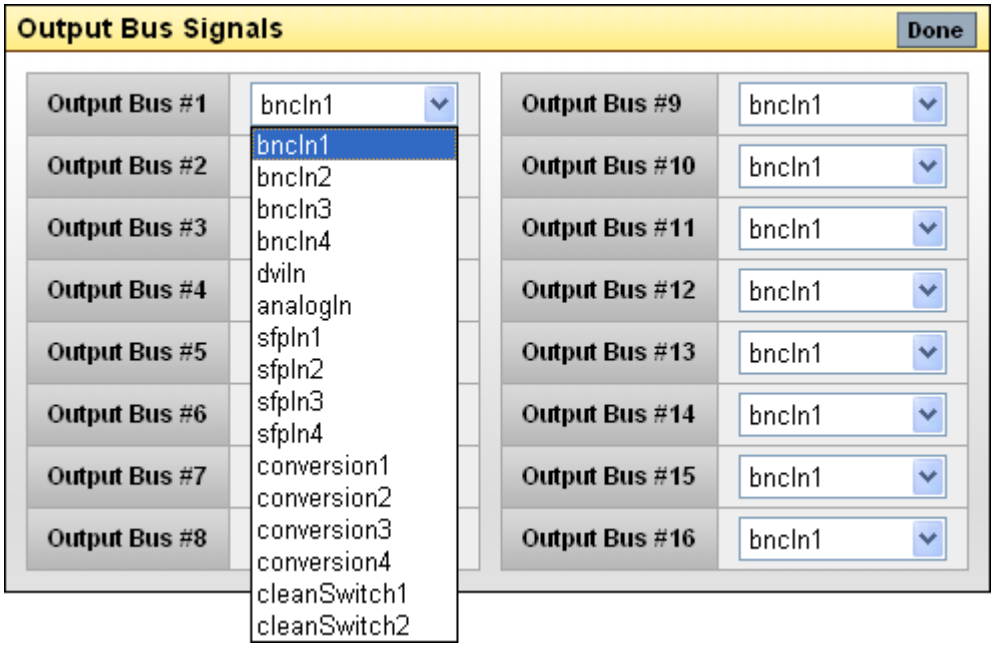

Figure 4-17: Assigning Signals to the Output Buses

4.9.1.4. Connecting Physical HD2020 Outputs to Internal Output Busses

Each of the physical outputs of the HD2020 may be configured to connect to a specific output bus. All coax, fiber, analog and DVI outputs have access to all 16 output busses. To set the Output Bus, select one of the yellow circles indicated under the *Connections to Output* Bus label in Figure 4-18. A dialog box will appear, as shown in Figure 4-19, which enables the user to connect a particular HD2020 physical output to an internal output bus.

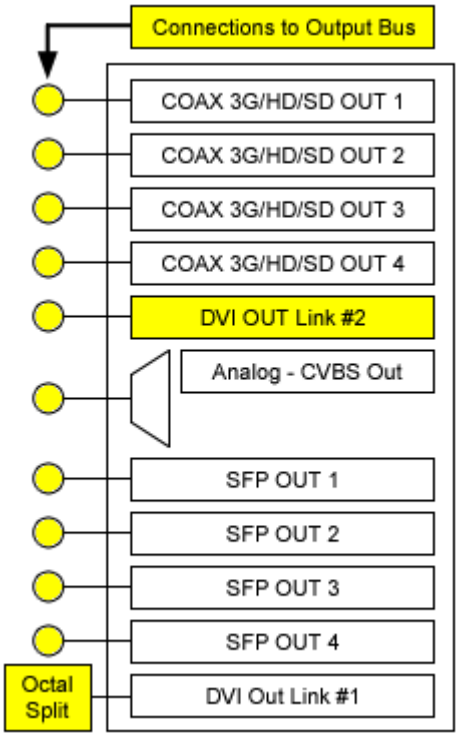

Figure 4-18: Connections to Output Bus

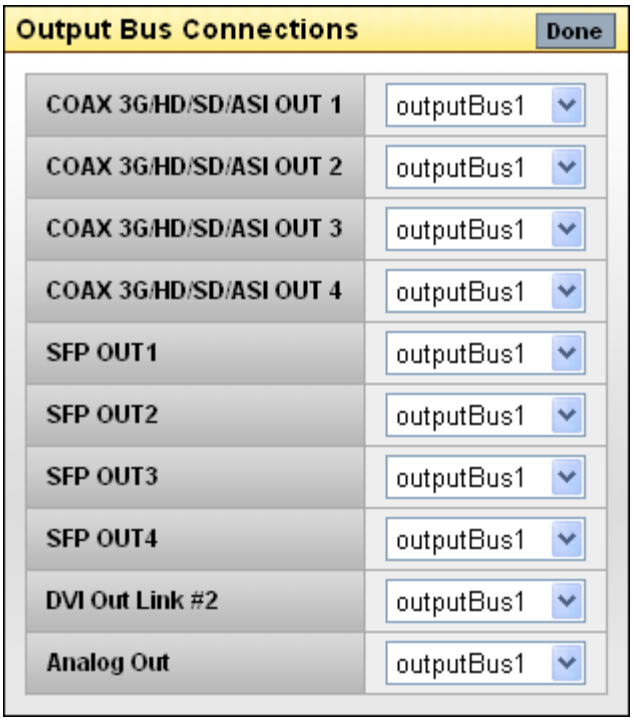

Figure 4-19: Connections to Output Bus

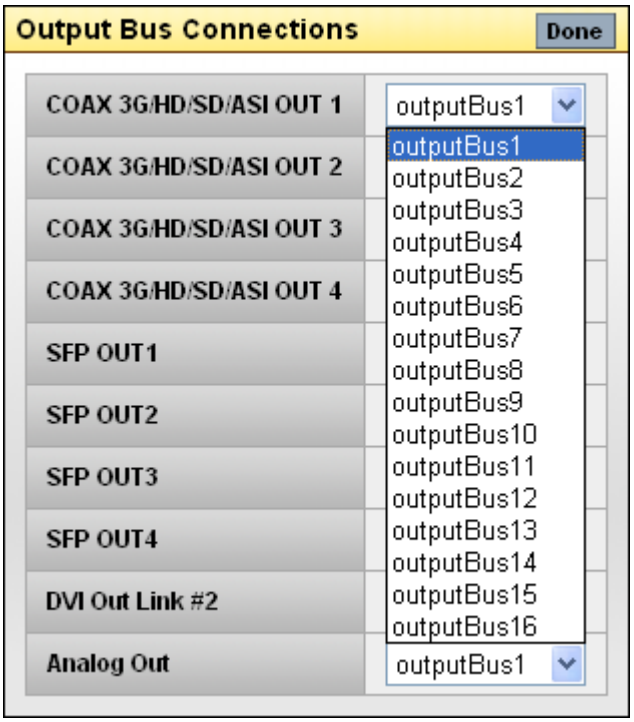

Figure 4-20: Connecting the Physical HD2020 Outputs to Output Buses

4.9.1.5. Test Signal Generation

The HD2020 has an internal video test signal generator on which you can select the video format and the video test pattern. You can also overlay user defined text on the test pattern signal to assist with source or truck identification. To configure the internal test signal generator, click on the yellow box labelled “Test Gen”. A pop-up window will appear enabling the user to select the video format, video test pattern, enable/disable the source ID character burn-in function and type in the custom source ID text. Refer to Figure 4-21 for available video formats and enabling and disabling the source ID character burn-in.

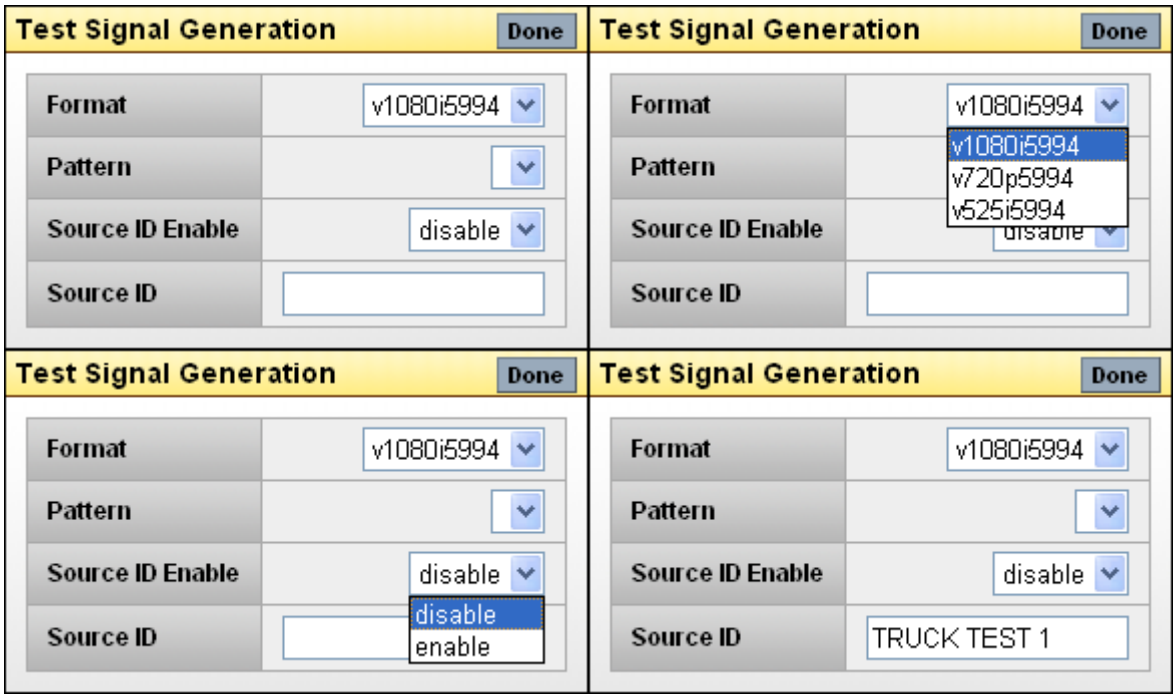

Figure 4-21: Selecting the Test Signal Generator Parameters

4.9.1.6. Clean Switch Inputs

The HD2020 has two integrated video clean switches that can be used to perform seamless switching between various video sources of the same format. Using these internal video clean switches ensures that absolutely no interruptions occur in video timing OR video content when switching between video sources. There are two internal clean switches so that this type of switching can be done on a Program and Preview basis.

To utilize the video clean switch it is customary to assign eight inputs to the clean switch that are effectively static input routes. Following this, the clean switch router control (labelled CTL in the system block diagram) is used to select between those eight inputs. These sources should be of the same video format and should be timed within +/- 0.5 lines of each other and the system. Non-locked source can be fed through the HD2020’s internal frame sync+up/down/cross converters to lock video sources to a common time base and video format. Converter outputs are then routed to the clean switch inputs. Alternatively, sources that are already genlocked to the same reference that the HD2020 uses can be routed directly to the clean switch inputs.

NOTE: It is not necessary for Clean Switch #1 and Clean Switch #2 to operate on the same video format. For example, Clean Switch #1 could switch between 4x 720p sources routed to Clean Switch Source #1-4 and Clean Switch #2 could switch between 4x 1080i sources routed to Clean Switch Sources #5-8.

To assign clean switch inputs, click on the yellow box labelled “Clean Switch Input”. This will pop up a window that allows you to select clean switch inputs and select the video format source for those inputs. All clean switch inputs have the same available sources of video shown in Figure 4-23.

At the time of this manual’s writing the “Auto” function for clean switch input format is not enabled. You must select the appropriate video format for each clean switch source in question.

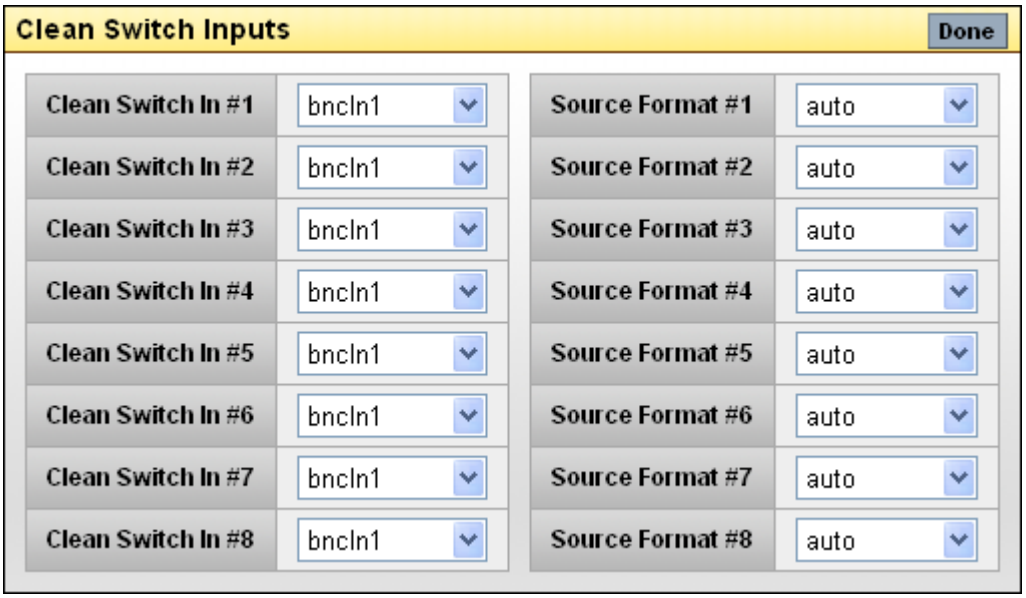

Figure 4-22: Clean Switch Inputs

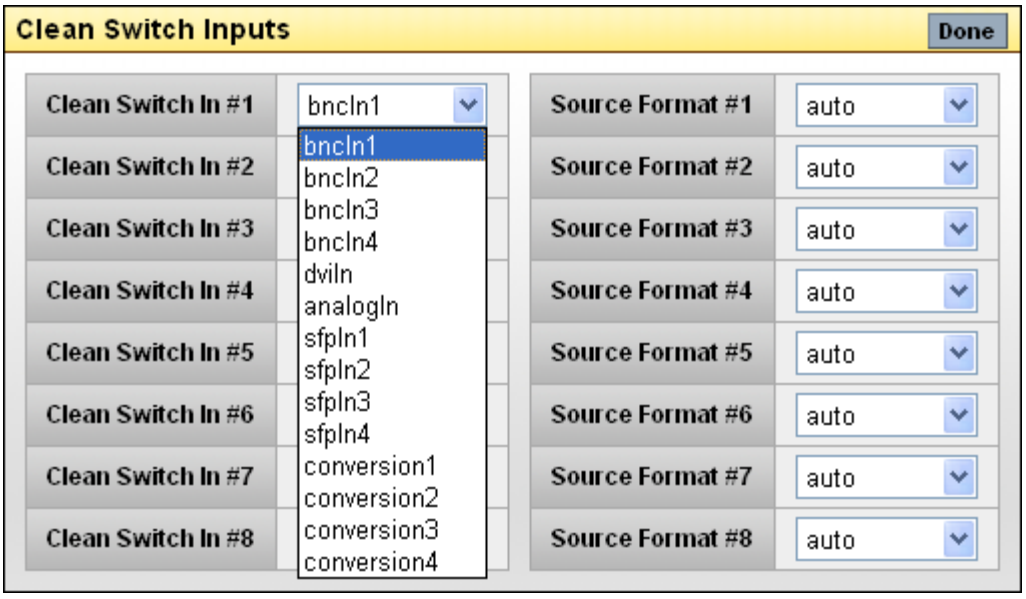

Figure 4-23: Clean Switch Inputs Window with Clean Switch In Drop Down Menu

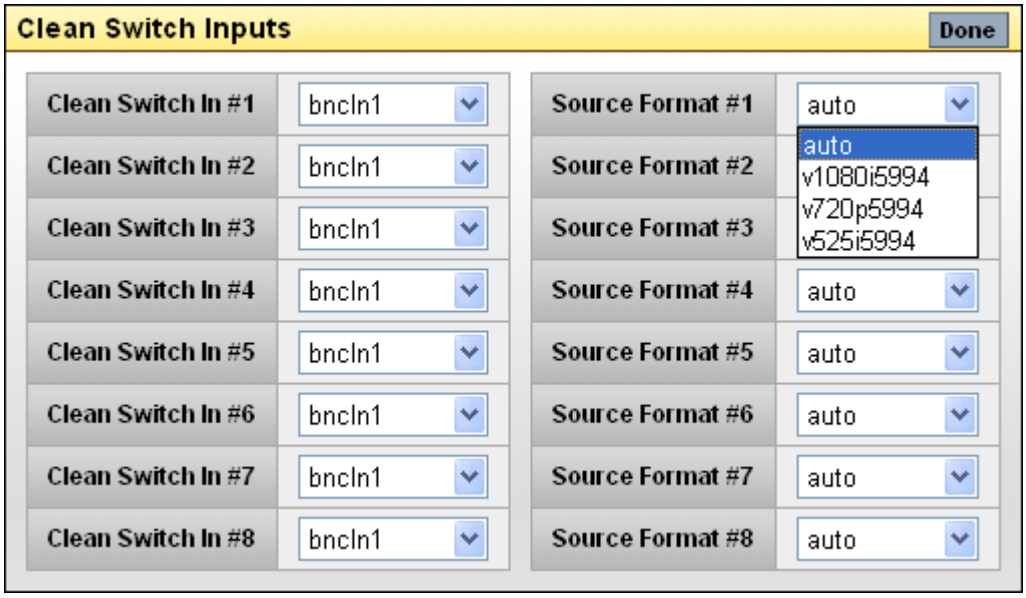

Figure 4-24: Clean Switch Inputs Window with Source Format Drop Down Menu

4.9.1.7. Clean Switch Output

The HD2020 has two internal video clean switches. Upon power-up, the user must define which clean switch inputs are routed to the clean switch output. By clicking the yellow "CTL" box, the user may define which clean switch inputs are routed to clean switch outputs. Clean Switch #1 and Clean Switch #2 have all eight clean switch inputs available to them. Refer to Figure 4-26 for an example of how to select the default clean switch outputs.

This control enables the user to set the clean switch output. Clean switch #1 and #2 will have the same options, therefore for brevity, only Clean Switch #1 Output will be described in this manual.

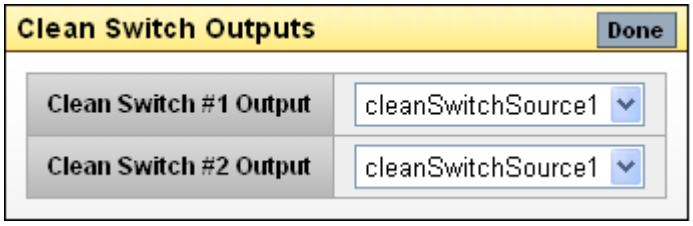

Figure 4-25: Clean Switch Outputs Window

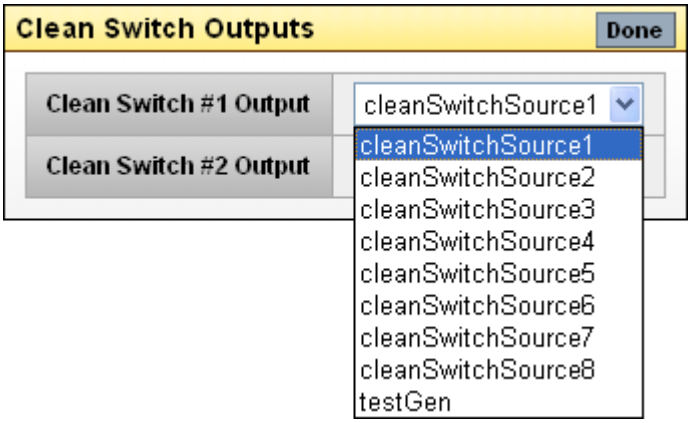

Figure 4-26: Selecting Clean Switch Outputs

4.9.1.8. Configuring the DVI Output

The HD2020 has a DVI output that must be specifically configured to match the output video format that will be supplied to it.

Clicking the yellow box labelled “DVI OUT LINK #2” enables the user to set the video format. At the time of this manual’s writing the “Follow Source” option is not implemented and the user **MUST** set the video format using the drop down menu. Refer to Figure 4-28 for an example of how to set the DVI output format.

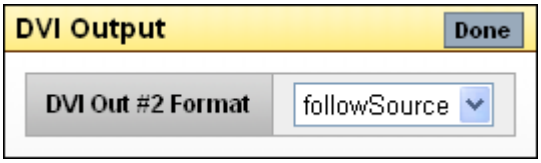

Figure 4-27: DVI Output

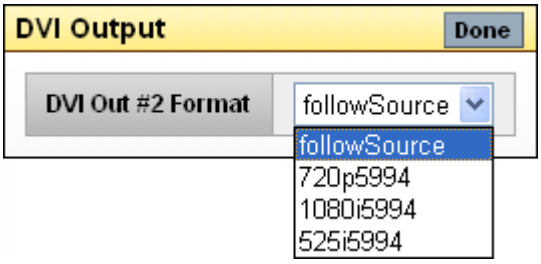

Figure 4-28: Connecting the Physical HD2020 to the Output Busses

4.9.1.9. Configuring the Internal Octal Split Processor

The HD2020 has an internal video octal split video processor.

The octal split processor divides its output screen into nine windows. All window sizes are equal in size and cannot be changed. Eight of these nine windows are used to display specific video sources and monitor the embedded audio levels in those sources. Audio levels are displayed within each window using a text to indicate the measured audio levels. Audio bar graphs will be implemented at a future date. The ninth window is used to indicate audio levels for the HD2020 analog audio inputs and the AES inputs.

The octal split processor allows the user to monitor Clean Switch Output #1, Clean Switch Output #2 and Clean Switch Sources 1-6. Refer to Figure 4-29 for a mapping of the octal split windows.

WINDOW #1 CLEAN SWITCH OUT #1	WINDOW #9 AUDIO METERING ANALOG AUDIO IN AES AUDIO IN	WINDOW #2 CLEAN SWITCH OUT #2
WINDOW #3 CLEAN SWITCH SOURCE #1	WINDOW #4 CLEAN SWITCH SOURCE #2	WINDOW #5 CLEAN SWITCH SOURCE #3
WINDOW #6 CLEAN SWITCH SOURCE #4	WINDOW #7 CLEAN SWITCH SOURCE #5	WINDOW #8 CLEAN SWITCH SOURCE #6

Figure 4-29: Octal Split Window Mapping

The HD2020 octal split must be set to specific resolutions to match operating the baseline clean switch operating format.

When the clean switch video format is set to 525i, the octal split resolution must be set to 1440x900 or 1920x1080.

When the clean switch video format is set to 720p, the octal split resolution must be set to 1920x1080.

When the clean switch video format is set to 1080i, the octal split resolution must be set to 1680x1050 or 1920x1080. Refer to Figure 4-31 for an illustration of how to set the octal split output resolution

Each window of the octal split may have static UMD (Under Monitor Display) characters superimposed over the video window. Window UMD characters are user programmable. Refer to Figure 4-31 for an example of how to set the status UMD characters.

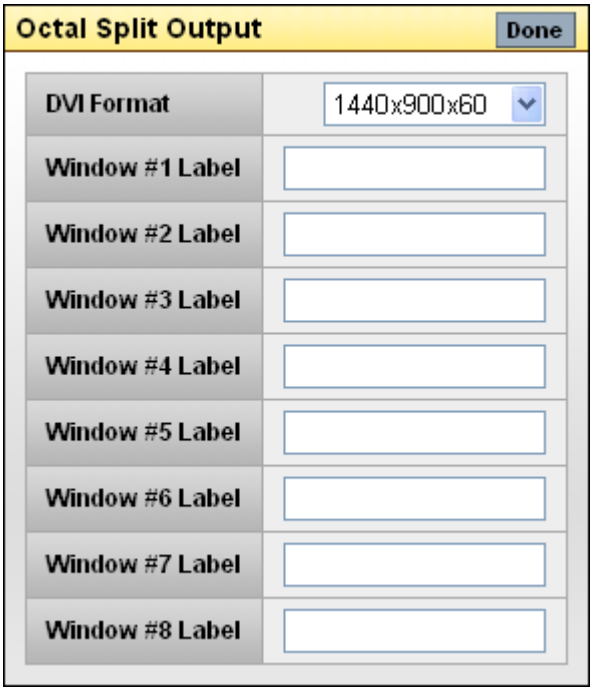

Figure 4-30: Octal Split Output Window

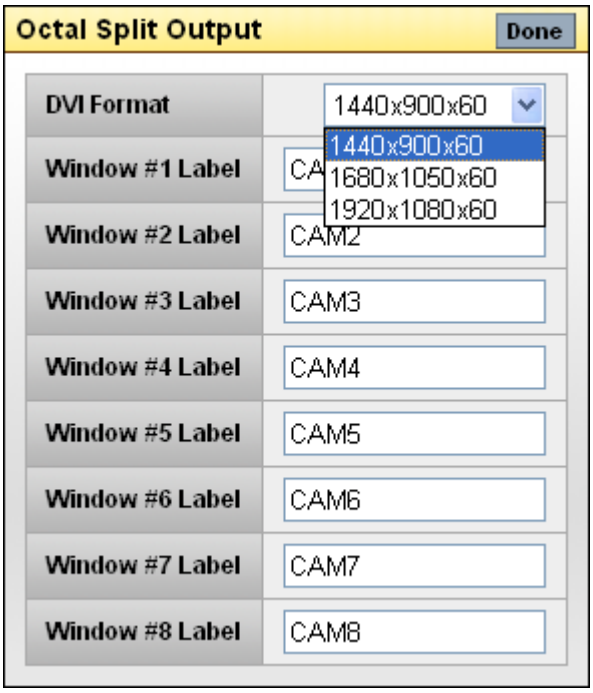

Figure 4-31: Octal Split Resolution and Window UMD Configuration

4.9.1.10. Configuring the Embedded Audio Sample Rate Converters

The HD2020 de-embeds 2 groups (8 channels of audio) from each of the clean switch video sources. There are 8 video clean switch sources and therefore eight audio de-embedders. For each audio channel pair there is an audio sample rate converter that can be enabled, disabled, or set to auto. Click on the yellow box labelled “Embedded Audio x8” and a pop-up window will appear that has drop down menus for each sample rate converter. It is recommended that all audio sample rate converters remain in *auto* mode.

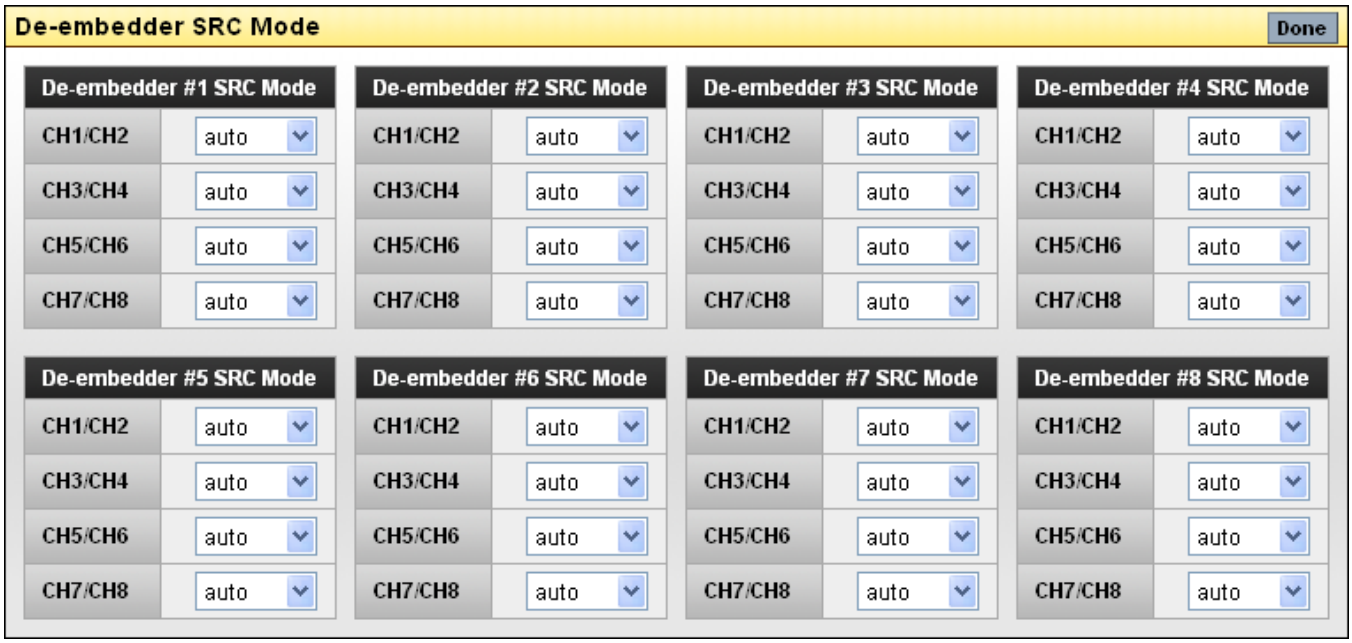

Figure 4-32: Configuring the Embedded Audio Sample Rate Converters

4.9.1.11. Configuring the AES Audio Sample Rate Converters

The HD2020 has 8x discrete AES inputs. For each AES input there is an audio sample rate converter that can be *enabled*, *disabled* or set to *auto*. Click on the yellow box labelled “AES Audio x8” and a pop-up window will appear that has a drop down menu for each sample rate converter. It is recommended that all audio sample rate converters remain in *Auto* mode.

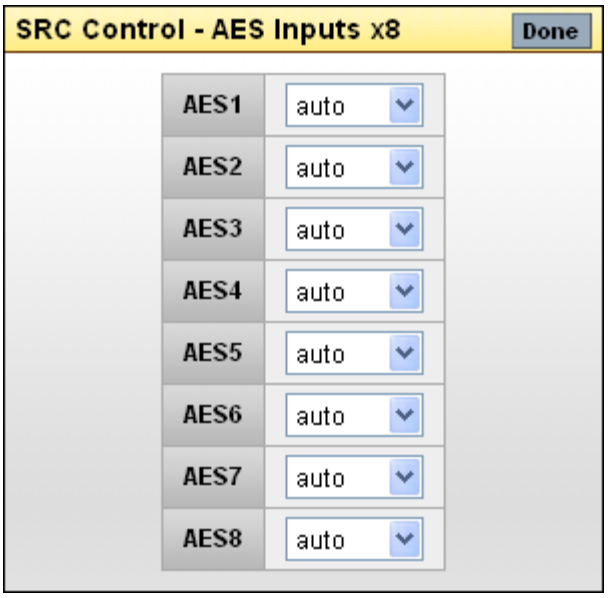

Figure 4-33: Source Control – AES Input x8 Window

4.9.1.12. Configuring the Analog Audio Input Levels

The HD2020 has 4x analog audio inputs. For each analog audio input you can define the analog audio dynamic range. Click on the yellow box labelled “Analog Audio x4” and a pop-up window will appear that has a drop down menu for each analog audio channel. Select either 19dBU or 25 dBU to match the incoming level for each analog audio channel. Refer to Figure 4-35 for an example of how to set the analog audio levels.

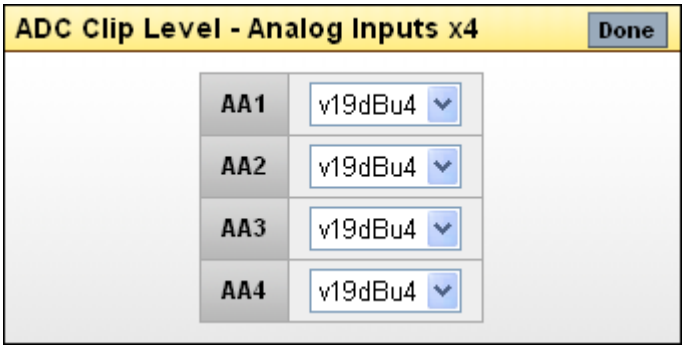

Figure 4-34: ADC Clip Level – Analog Input x4 Window

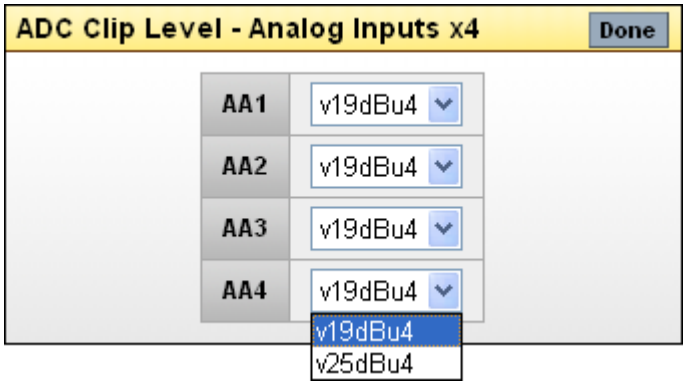

Figure 4-35: Configuring the Analog Audio Input Levels

4.9.1.13. Configuring the Embedded Audio Per Channels Delays

The HD2020 de-embeds 2 groups (8 channels of audio) from each of the clean switch video sources. There are 8 video clean switch sources and therefore eight audio de-embedders. There is a per channel audio delay control for each embedded audio channel. Click on the yellow “Embedded Audio” text under the Delay Management box and a pop-up window will appear that will enable you to set the per channel audio delay for embedded audio (in terms of audio samples). Enter a value from 0 to 16383 audio samples in each window as appropriate. Each audio sample is 48 KHz. Therefore 0 samples correspond to 0ms of delay and 16383 corresponds to ~ 314 ms.

Refer to Figure 4-36 for an illustration of the per channel embedded delay.

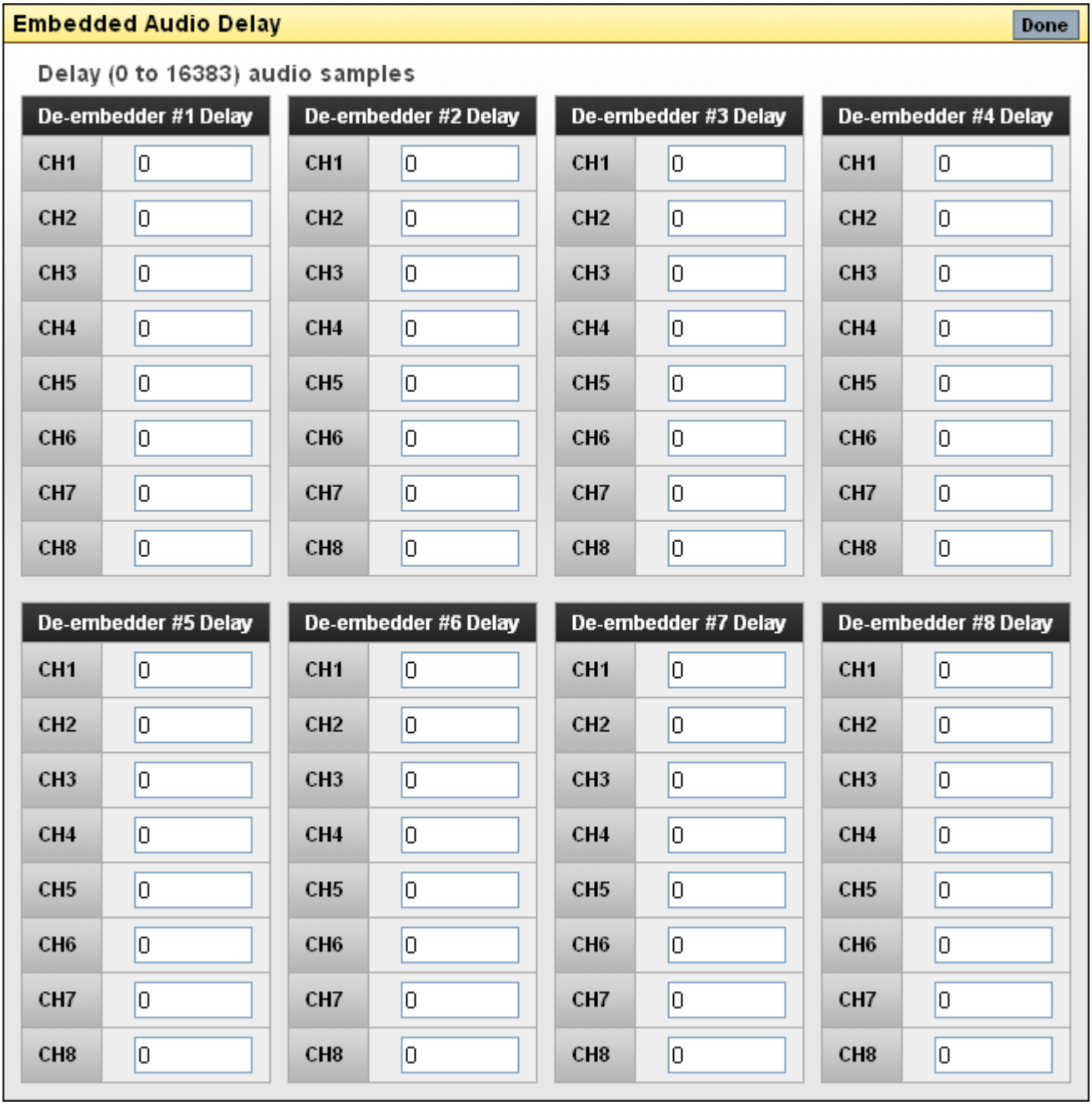

Figure 4-36: Configuring the Embedded Audio per Channel Delay

4.9.1.14. Configuring the AES Audio per Channels Delays

The HD2020 has 8x AES inputs (16 channels). There is a per channel audio delay control for each of these 16 channels of audio. Click on the yellow box labelled “AES Audio” under the Delay Management box and a pop-up window will appear that will enable you to set the per channel audio delay for AES audio (in terms of audio samples). Enter a value from 0 to 16383 audio samples in each window as appropriate. Each audio sample is a 48 KHz audio sample. Therefore 0 samples correspond to 0ms of delay and 16383 corresponds to ~ 314 ms. Refer to Figure 4-37 for an illustration of the per channel AES delay.

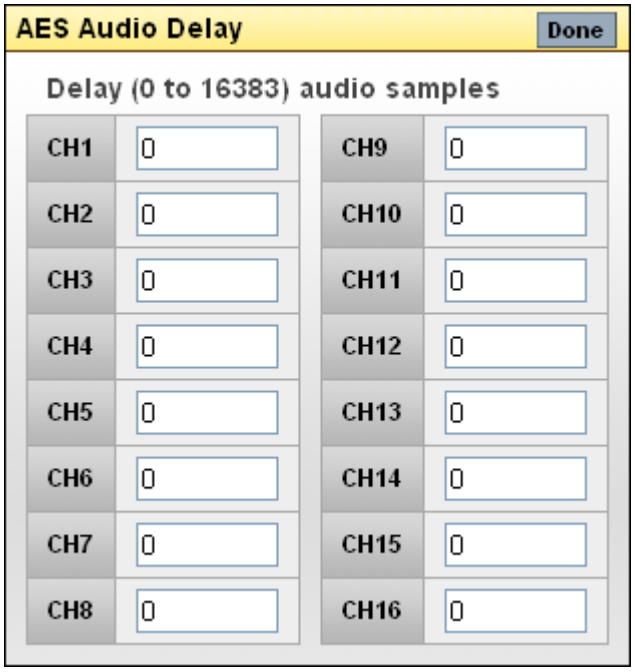

Figure 4-37: AES Audio Delay

4.9.1.15. Configuring the Analog Audio per Channels Delays

The HD2020 has 4x Analog Audio inputs. There is a per channel audio delay control for each of these channels of audio. Click on the yellow box labelled “Analog Audio” under the Delay Management box and a pop-up window will appear that will enable you to set the per channel audio delay for analog audio (in terms of audio samples). Enter a value from 0 to 16383 audio samples in each window as appropriate. Each audio sample is a 48 KHz audio sample. Therefore 0 samples correspond to 0ms of delay and 16383 corresponds to ~ 314 ms.

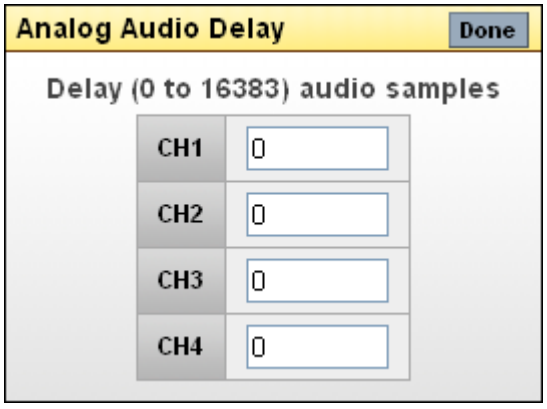

Figure 4-38: Analog Audio

4.9.1.16. Configuring the Audio Tone Generator per Channels Delays

The HD2020 has an internal 8-channel audio tone generator. There is a per channel audio delay control for each of these channels of audio. Click on the yellow box labelled “Audio Tone” under the Delay Management box and a pop-up window will appear that will enable you to set the per channel audio delay for the internal tone generator (in terms of audio samples). Enter a value from 0 to 16383 audio samples in each window as appropriate. Each audio sample is 48 KHz. Therefore 0 samples correspond to 0ms of delay and 16383 corresponds to ~ 314 ms.

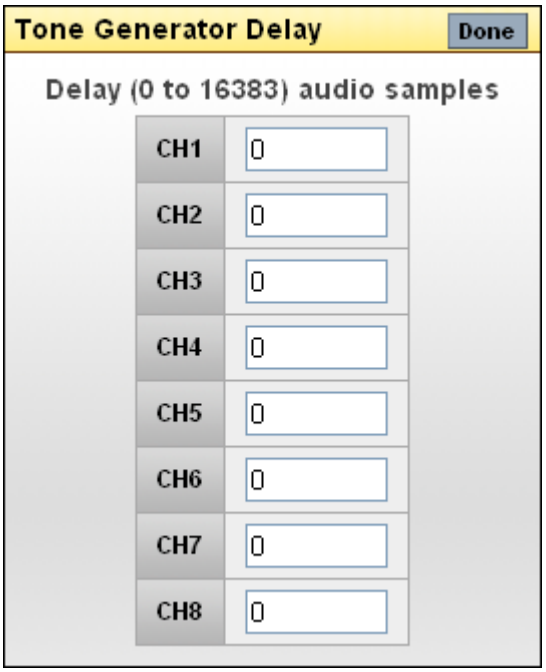

Figure 4-39: Tone Generator Delay Window

4.9.1.17. Mono Mixing

The HD2020 has an internal bank of mono mixers. The mono mixers perform a mono mix of adjacent audio channels with embedded audio, AES audio input, Analog Audio input and the tone generators. There is no configuration of the mono mixers available. Mono mixes of the adjacent audio channels are made available to down stream processors like the audio routers/channel swappers.

4.9.1.18. Audio Embedder #1

The HD2020 has two 16 channel audio embedders. Audio Embedder #1 embeds audio for clean switch #1 output video and Audio Embedder #2 embeds audio for clean switch #2 output video. Click on the yellow box labelled “Embedder 1 x 16 channel” and a pop-up window will appear for configuring the audio embedder.

Each output channel of audio has the two input mixer. There is an X input and a Y input. These two inputs can be mixed together to generate a single output audio channel. The X channel and the Y channel have phase inversion, audio gain, and audio routing capabilities.

In many applications, the Y input is not used and the gain for the Y channel is set to MUTE so that it is not mixed into the final output audio channel. Refer to Figure 4-40 for an illustration of the embedded audio mixer.

The user can configure each of the 16 channels of audio. For the sake of brevity, configuration for one of these audio channels will be illustrated. All other 15 channels are programmed in a similar fashion. To program channel 1, click on the box labelled with the number "1". You will note that the box for channel 1 will be darker than the other boxes. This indicates that you are configuring audio output channel number 1. Following this, the X and Y inputs for channel 1 output must be configured.

To select the audio source for the X input, click on the drop down beside the text *Source Select X*. The list of all available audio sources will then appear. Audio from the AES inputs, the Analog Audio inputs and the audio de-embedded are all made available. In addition, mono down-mixes and audio from any of the other advanced audio processes are available (i.e. down-mixed audio, up-mixed audio etc). Refer to Figure 4-41 for an illustration of selecting the audio source for the X input. The X input may also have audio inversion applied to it. Select enable to invert the selected channel of audio and select disable to pass through the selected audio channel. Refer to Figure 4-42 for an illustration of enabling and disabling the audio inversion control.

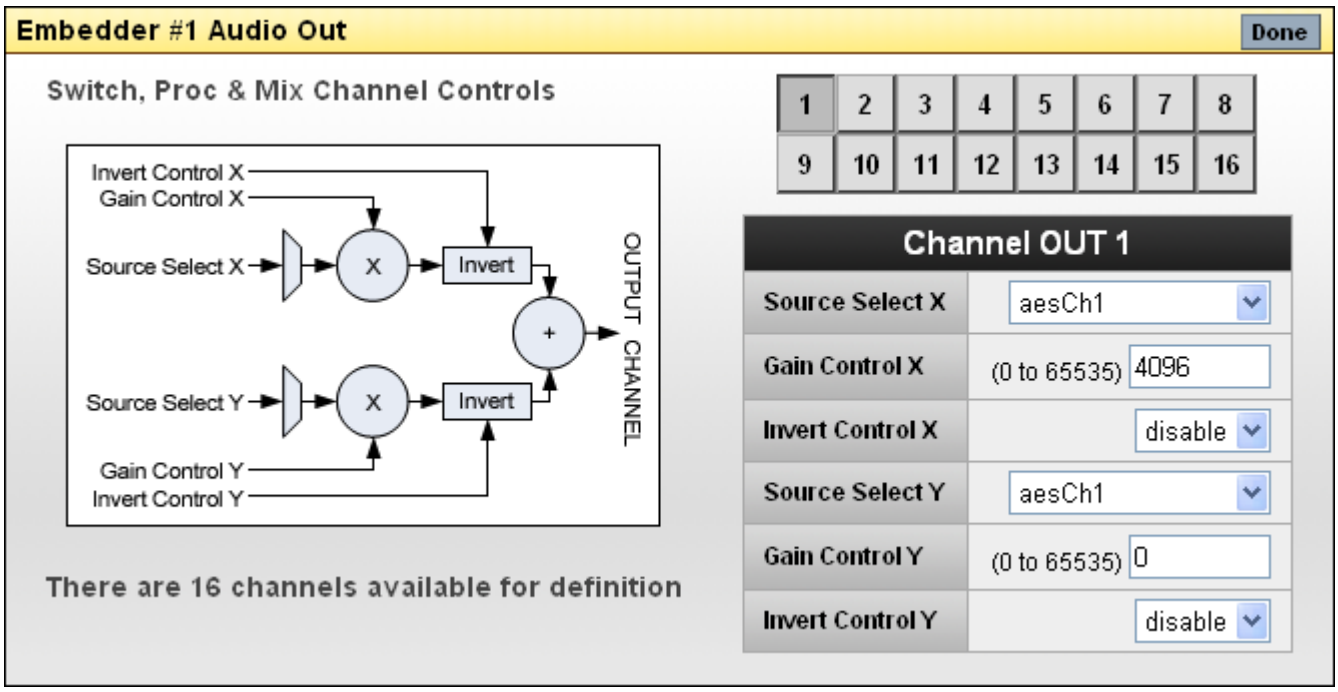

Figure 4-40: Embedder #1 x16 Channel

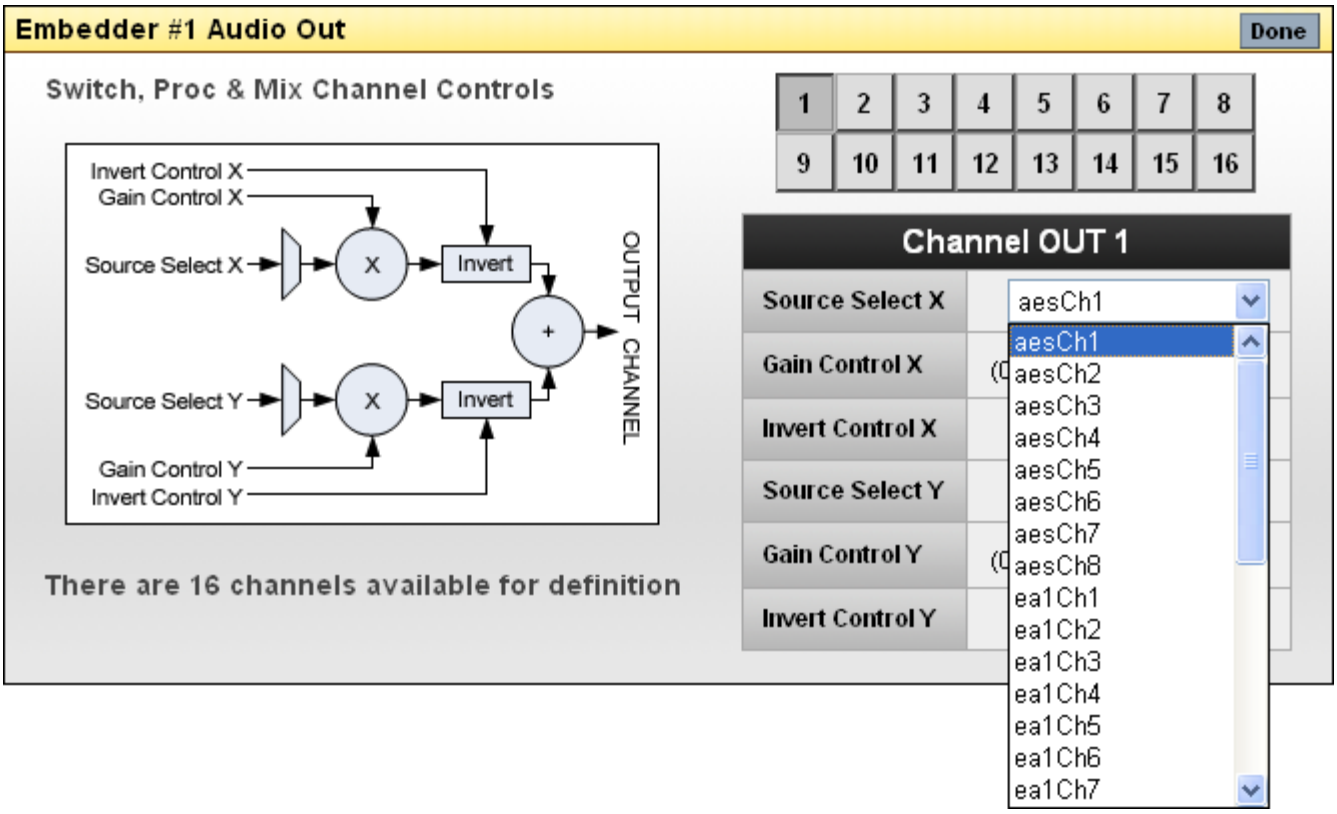

Figure 4-41: Audio Routing for Embedder #1, Channel 1

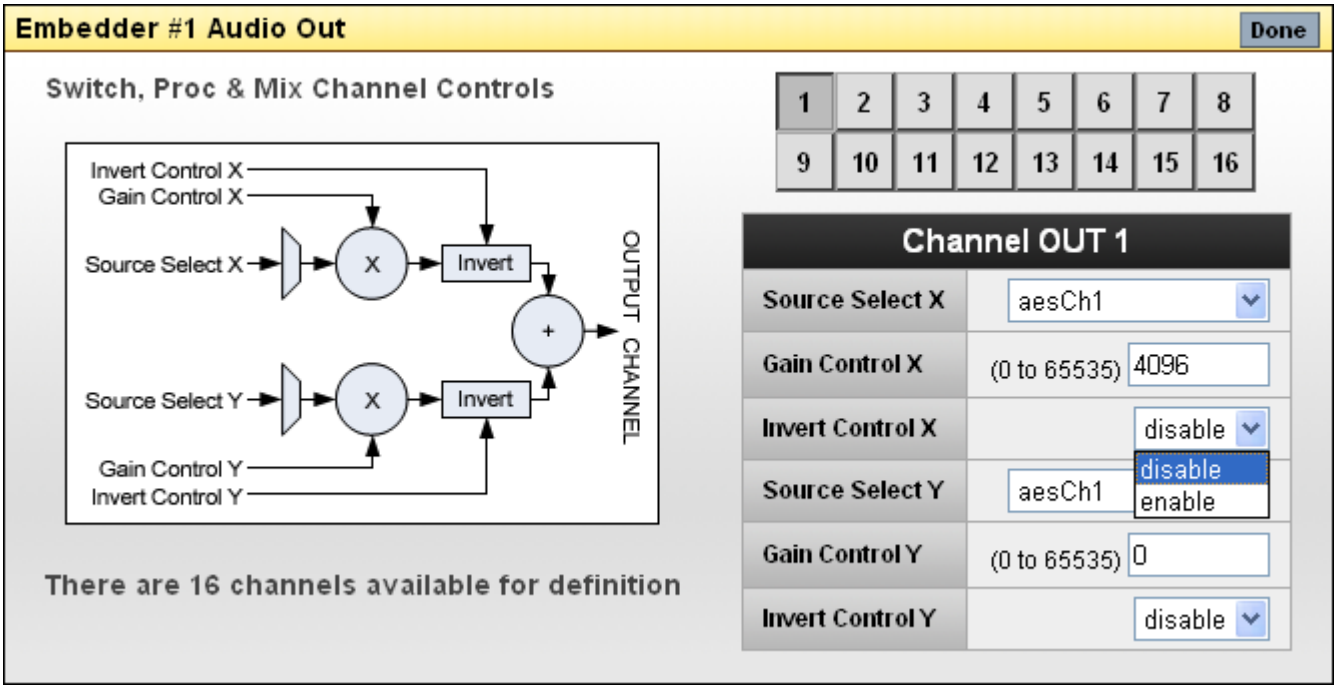

Figure 4-42: Audio Inversion for Embedder #1, Channel 1

There is a gain control for both the X and Y input. Enter a value between 0 and 65535 to select the audio gain. The actual (linear) gain is the entered number divided by 4096. For example, 2048 is equivalent to -6 dB. Incrementing/decrementing one value in the audio gain range corresponds to an –0.1 dB/+0.1 dB change in audio gain. Level 1 corresponds to – 72 dB gain. Level 0 corresponds to mute (-199 dB). Level 4096 corresponds to 0 dB gain. Level 65535 corresponds to be + 24 dB gain.

The audio mixer Y input is configured in exactly the same way as the X input. As a final stage of processing the X and Y inputs (with their respective gains applied) are summed together to generate the final output audio channel. If such mixing is not desired simply set the Y input gain to 0 and the Y input to the mixer will be muted and the X+Y summing process effectively disabled.

4.9.1.19. Audio Embedder #2

The HD2020 has two 16 channel audio embedders. Audio Embedder #1 embeds audio for clean switch #1 output video and Audio Embedder #2 embeds audio for clean switch #2 output video. Click on the yellow box labelled “Embedder 2 x 16 channel” and a pop-up window will appear for configuring the audio embedder. Embedder #2 is configured in exactly the same way as Embedder #1. Refer to section 4.9.1.18.

4.9.1.20. AES Audio Router

The HD2020 has 8x AES outputs (16 channels of audio). Click on the yellow box labelled “AES Audio Out x 16 channel” and a pop-up window will appear for configuring the AES outputs. Refer to Figure 4-43 for an illustration of the AES audio output router. The AES output channels are configured in exactly the same way as Embedder #1. Refer to section 4.9.1.18.

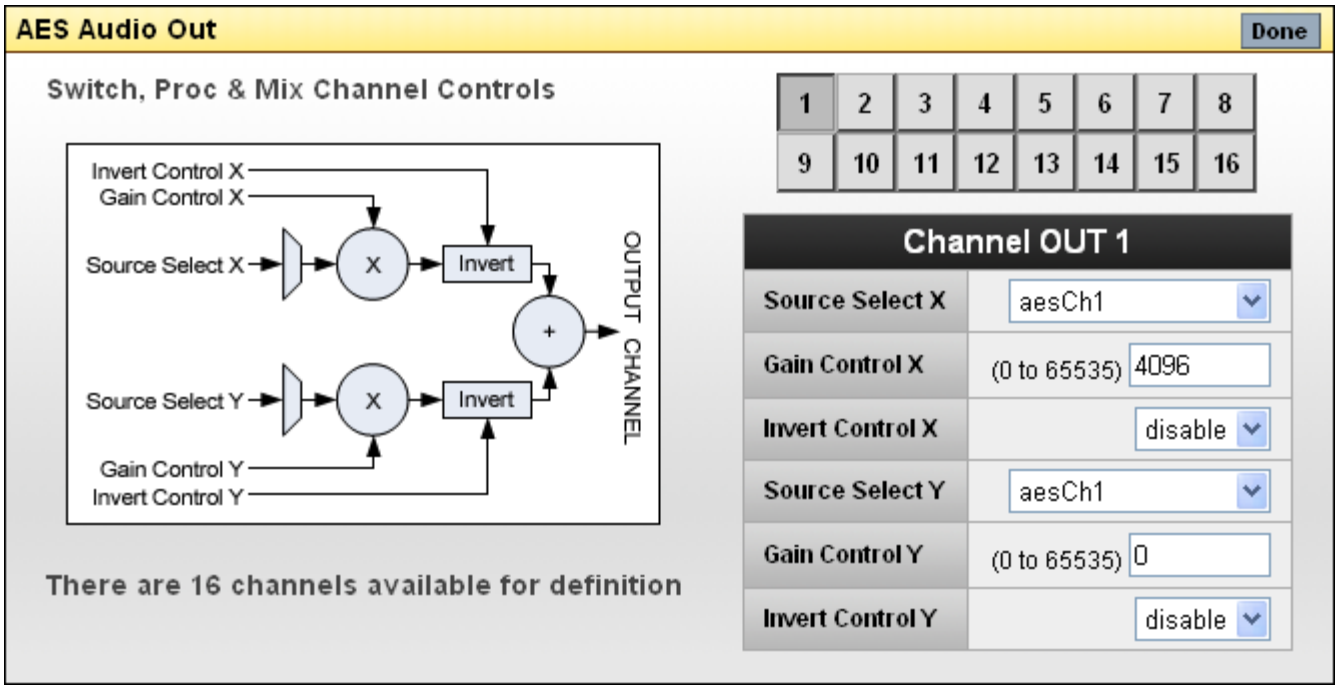

Figure 4-43: AES Audio Out

4.9.1.21. Analog Audio Router

The HD2020 has 8x Analog audio outputs. Click on the yellow box labelled “Analog Audio Out x8 channel” and a pop-up window will appear for configuring the Analog Audio outputs. Refer to Figure 4-44 for an illustration of the Analog Audio output router. The analog audio output channels are configured in exactly the same way as Embedder #1. Refer to section 4.9.1.18.

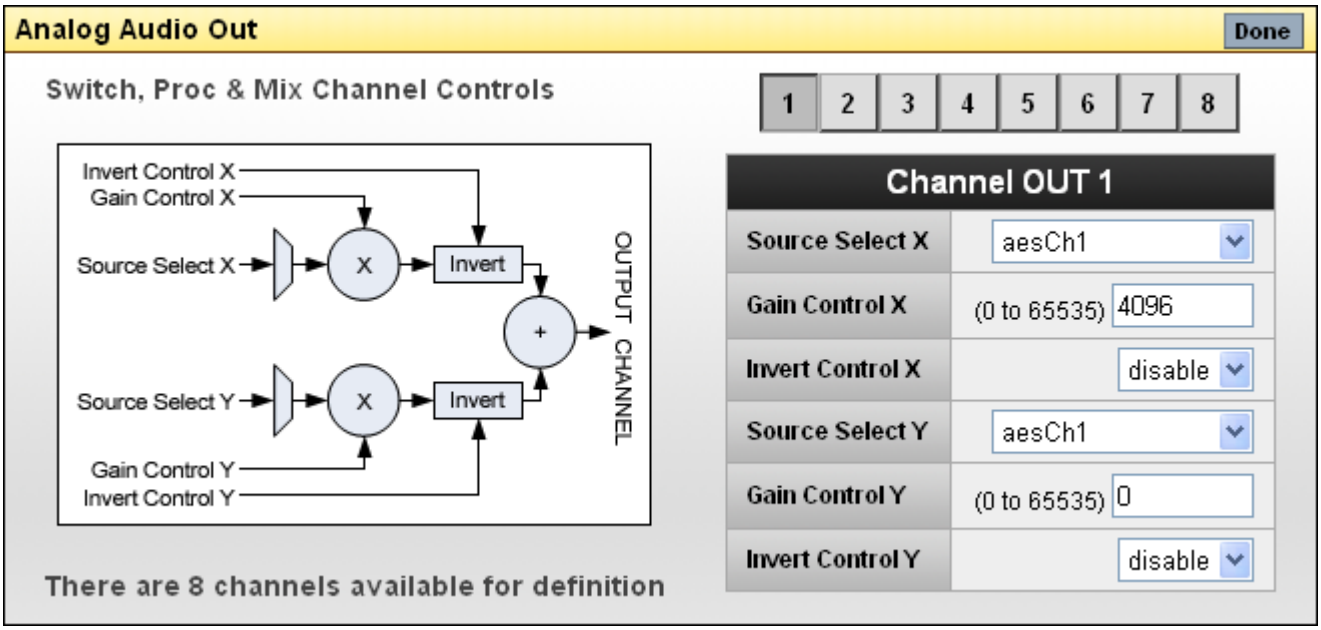

Figure 4-44: Analog Audio Out

4.9.1.22. Embedder #1 Configuration

Several static configuration bits for Embedder #1 should be set to ensure proper operation with down-stream equipment. The Embedder #1 Configuration enables the user to set the C bit resolution (20 or 24 bit) and set the Audio Pro Mode (force or don’t force). To configure Embedder #1, click on the yellow box labelled “Clean Switch 1” and a pop up will appear. Refer to Figure 4-45 for an illustration of Embedder #1 configuration.

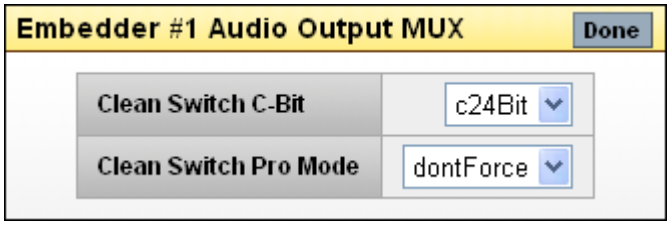

Figure 4-45: Embedder #1 Audio Output MUX

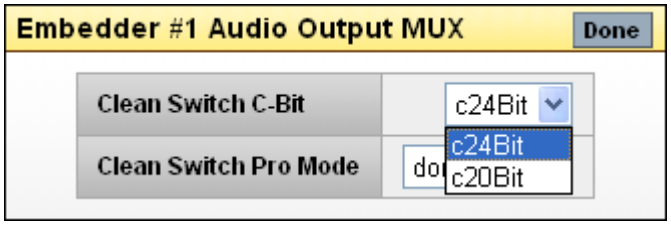

Figure 4-46: Configuring the Clean Switch C-Bit

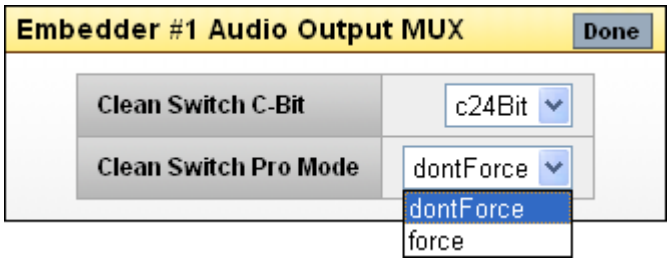

Figure 4-47: Configuring the Clean Switch Pro Mode

4.9.1.23. Embedder #2 Configuration

Several static configuration bits for Embedder #2 should be set to ensure proper operation with down-stream equipment. The Embedder #2 Configuration enables the user to set the C bit resolution (20 or 24 bit) and set the Audio Pro Mode (*force* or *don't force*). To configure Embedder #2, click on the yellow "Clean Switch 1" box and a pop up will appear for configuration. Embedder #2 is configured in exactly the same way as Embedder #1 (see section 4.9.1.23).

4.9.1.24. AES Output Mux Configuration

The AES outputs on the HD2020 may be configured to follow the audio routing/processing as defined via the AES mixers (refer to section 4.9.1.20) or may be configured to follow Embedder #1 mixers (refer to section 4.9.1.18) or may be configured to follow Embedder #2 mixers (refer to section 4.9.1.19). To select what set of mixers the AES outputs follow click on the yellow box labelled "AES Audio Out 3:1" and a pop-up window will appear to enable such configuration. Refer to Figure 4-48 for an illustration of the AES Output Mux.

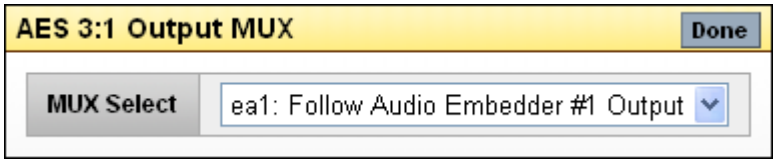

Figure 4-48: AES 3:1 Output MUX

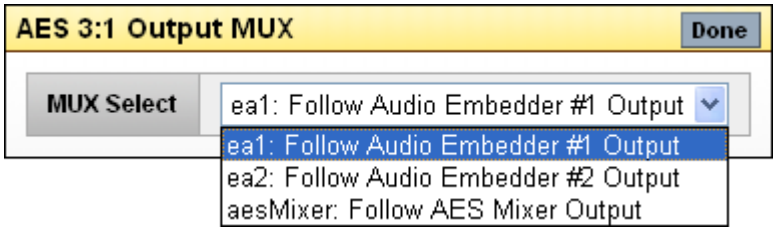

Figure 4-49: Selecting the AES 3:1 Output Mux

4.9.1.25. Analog Audio Output Mux Configuration

The analog outputs on the HD2020 may be configured to follow the audio routing/processing as defined via the analog mixers (refer to section 4.9.1.21) or may be configured to follow Embedder #1 mixers (refer to section 4.9.1.18) or may be configured to follow Embedder #2 mixers (refer to section 4.9.1.19). Since there are only 8 analog outputs and there are up to 16 channels on each of the audio embedders, there is an option for the 8 analog outputs to follow group1+2 or follow group 3+4 of embedder #1 or embedder #2. To select what set of mixers the analog audio outputs follow click on the yellow box labelled "Analog Audio Out 3:1" and a pop-up window will appear to enable such configuration. Refer to Figure 4-50 for an illustration of how to configure the Analog Output Mux.

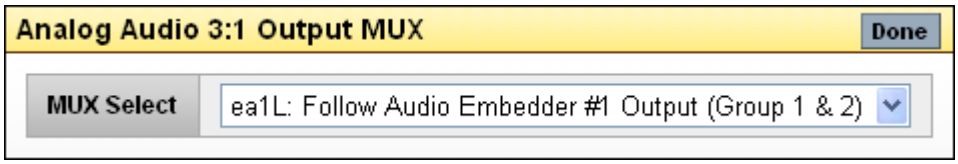

Figure 4-50: Analog Audio 3:1 Output MUX

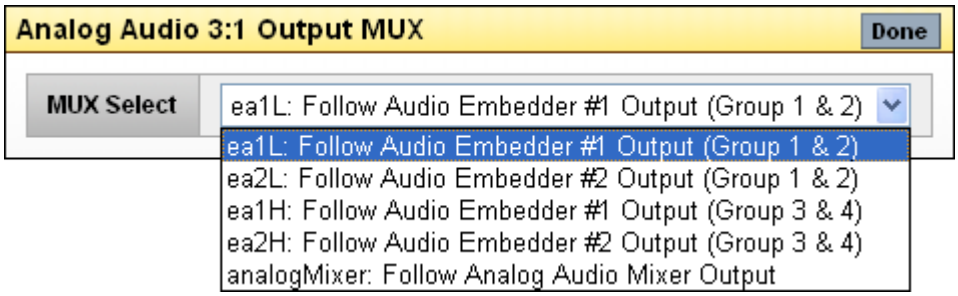

Figure 4-51: Selecting the Analog Audio 3:1 Output Mux

4.9.1.26. Analog Audio Output Level Configuration

The analog outputs on the HD2020 may be individually configured for different audio levels (18 dBu or 24 dBu). To select the audio levels for the analog audio, click on the yellow box labelled "Analog Audio Output" and a pop-up window will appear to enable such configuration. Refer to Figure 4-53 for an illustration of how to configure the analog audio output levels.

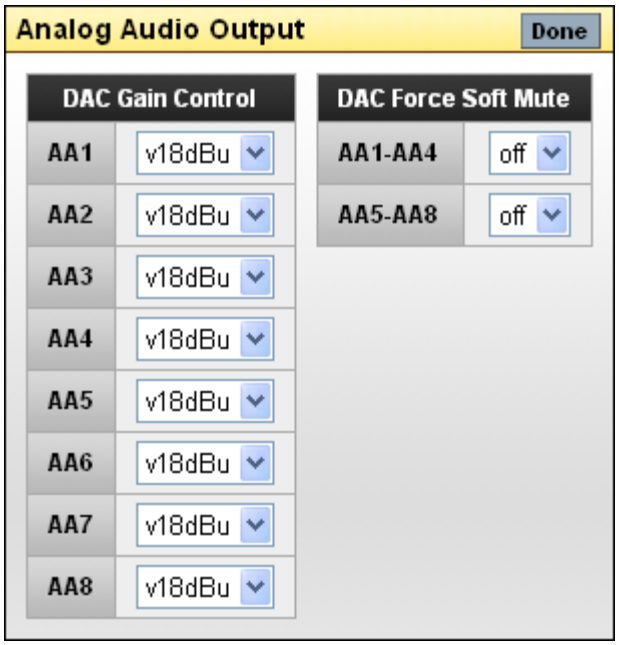

Figure 4-52: Analog Audio Output x8

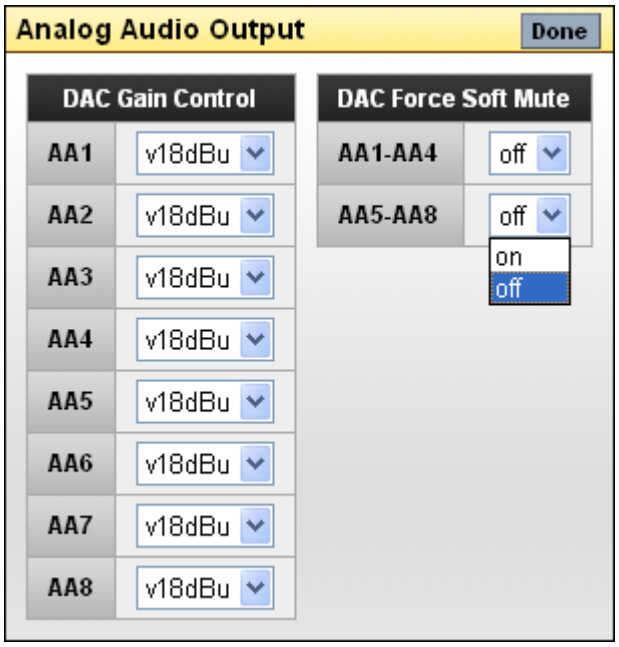

Figure 4-53: Analog Output Level Configuration

4.10. BUTTON GROUP CONFIGURATION

The Button Group Configuration web page enables the user to configure the front panel button grouping for the HD2020. A button group is a number of buttons that will typically have a similar fashion. The unique characteristic about a button group is that only one button from a particular group may be active (or illuminated on the front panel) at a time. By defining multiple groups of buttons complex front panel operations may be designed. For example, multi-destination router or audio breakaway type functions can be designed using multiple button groups.

The front panel of the HD2020 consists of 20 physical "hot buttons" as highlighted in green in Figure 4-54. There are 40 logical "hot buttons" on the HD2020 front panel. When the SHIFT key (denoted with the ↑) is activated or highlighted, logical buttons 21-40 are accessed. When the SHIFT key is not activated or highlighted logical buttons 1-20 are accessed.

Each button may be assigned to one group and there is one default button assigned to each group. The default button is the button that will be automatically activated (or illuminated on the front panel) in that group when a configuration is loaded into the HD2020.

In Figure 4-54, four unique button groups have been defined. The button with the "D" in front of the button name is the default button for that group.

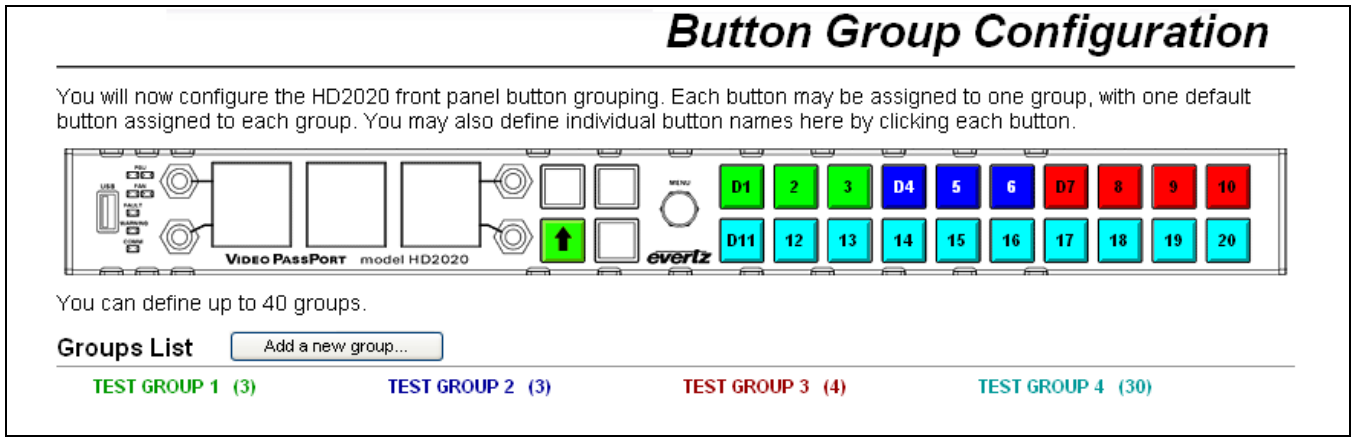

Figure 4-54: Button Group Configuration Window

The user may define individual button names in this screen by clicking each button and entering a name into the dialog box that appears. Clicking on one of the green buttons will launch a dialog box that prompts the user to assign the selected button a new name, as shown in Figure 4-55. To do so, select a button and enter the button name into the "Button Name" field.

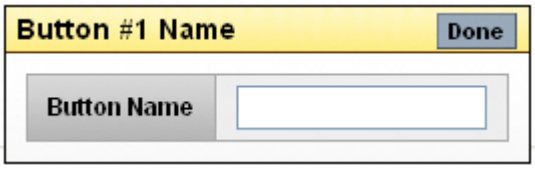

Figure 4-55: Assign a Button Name

To create a new button group, click on the "*Add a new group"* link within the configuration page. A *New Group* dialog box will appear, as shown in Figure 4-56. Assign the group a name by entering a name into the *Group Name* field. In Figure 4-56, "TEST GROUP 1" was selected as the group name.

To assign buttons to the selected group, use the left and right arrows to manage the buttons. To add a button to the group, select or highlight the button name from the *All Buttons* column and use the green arrow (pointing to the right) to move the selected button into the *This Group* field. For example, Figure 4-56 identifies that buttons 1-3 were assigned to TEST GROUP 1. To remove a button from a group, select or highlight the button name from the *This Group* field and use the red arrow (pointing to the left) to remove the button from the group. Once complete, select the *Done* button.

Any newly created groups will be listed under the *Groups List* section and can be edited by clicking on the group name.

The first button moved into a particular group is automatically made the default button for that group. The button that is defined as the default button will be the bolded button in the *This Group* column.

To change the default button, double click on the desired button name in the *This Group* column. In Figure 4-56, button 1 identifies *Button1* as the default button in *Test Group 1*.

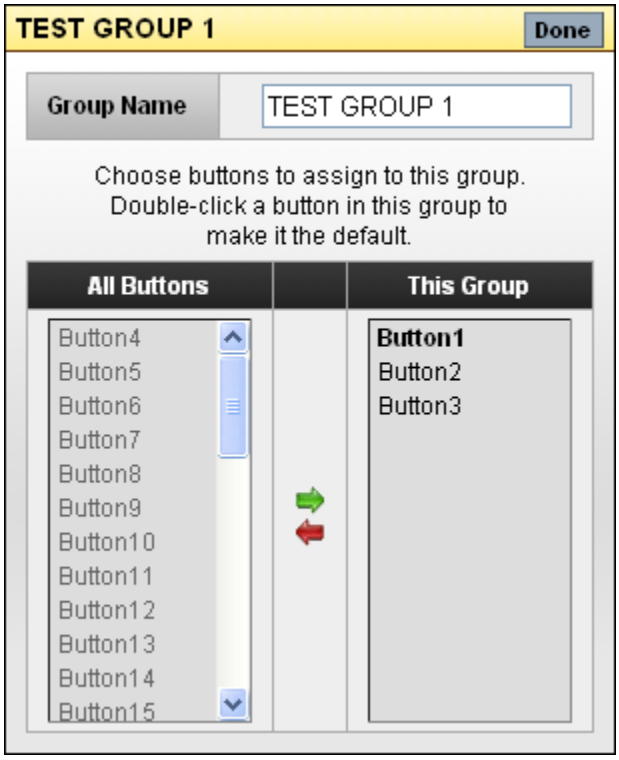

Figure 4-56: New Group Dialog Box

4.11. BUTTON FUNCTION DEFINITION

The Button Function Definition web page allows the user to define the function that each button on the front panel will perform when activated. Refer to Figure 4-57 for an illustration of the basic button configuration page. Figure 4-58 illustrates the same page with button group definitions pre-defined.

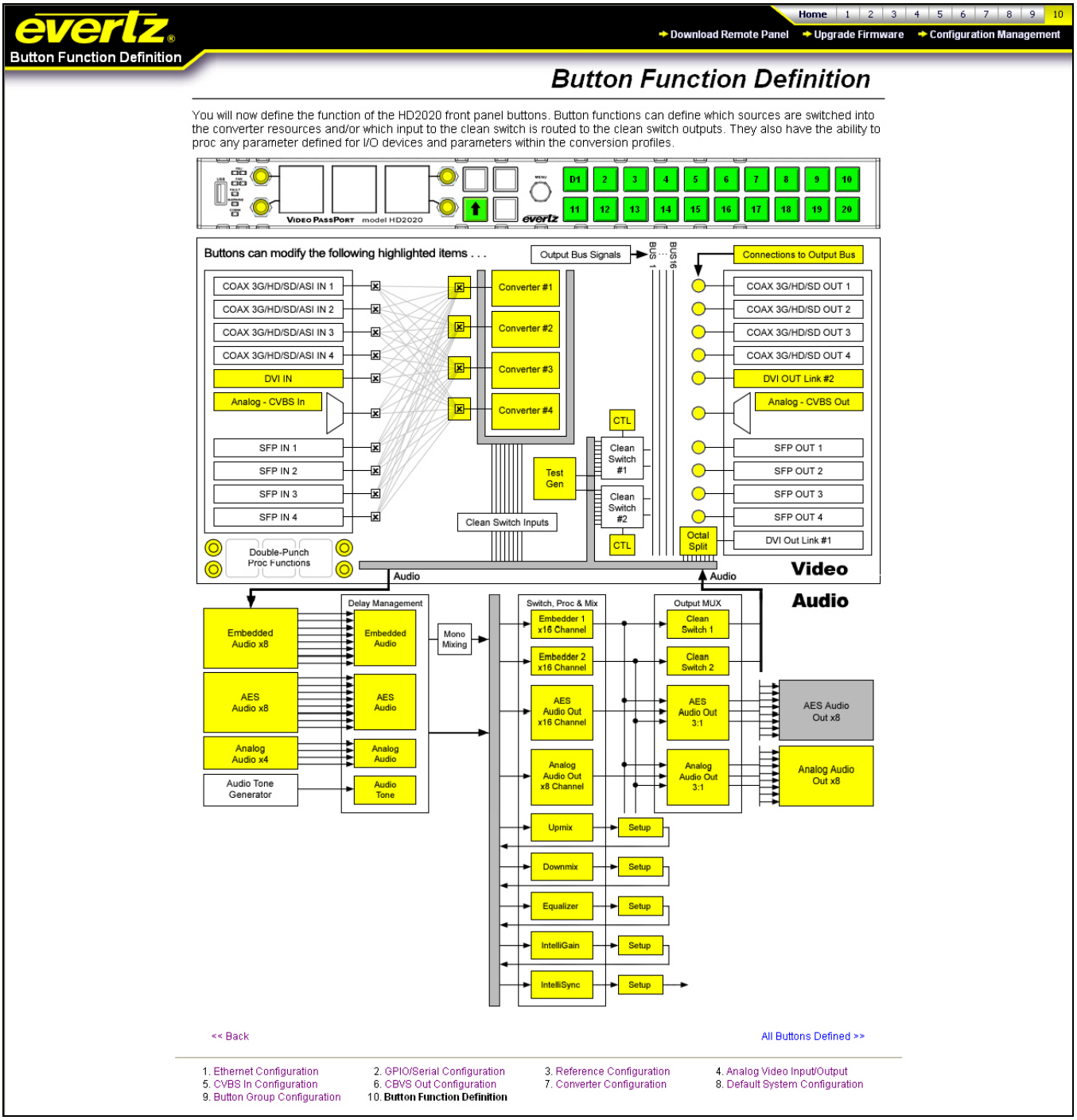

Figure 4-57: Button Function Definition Window

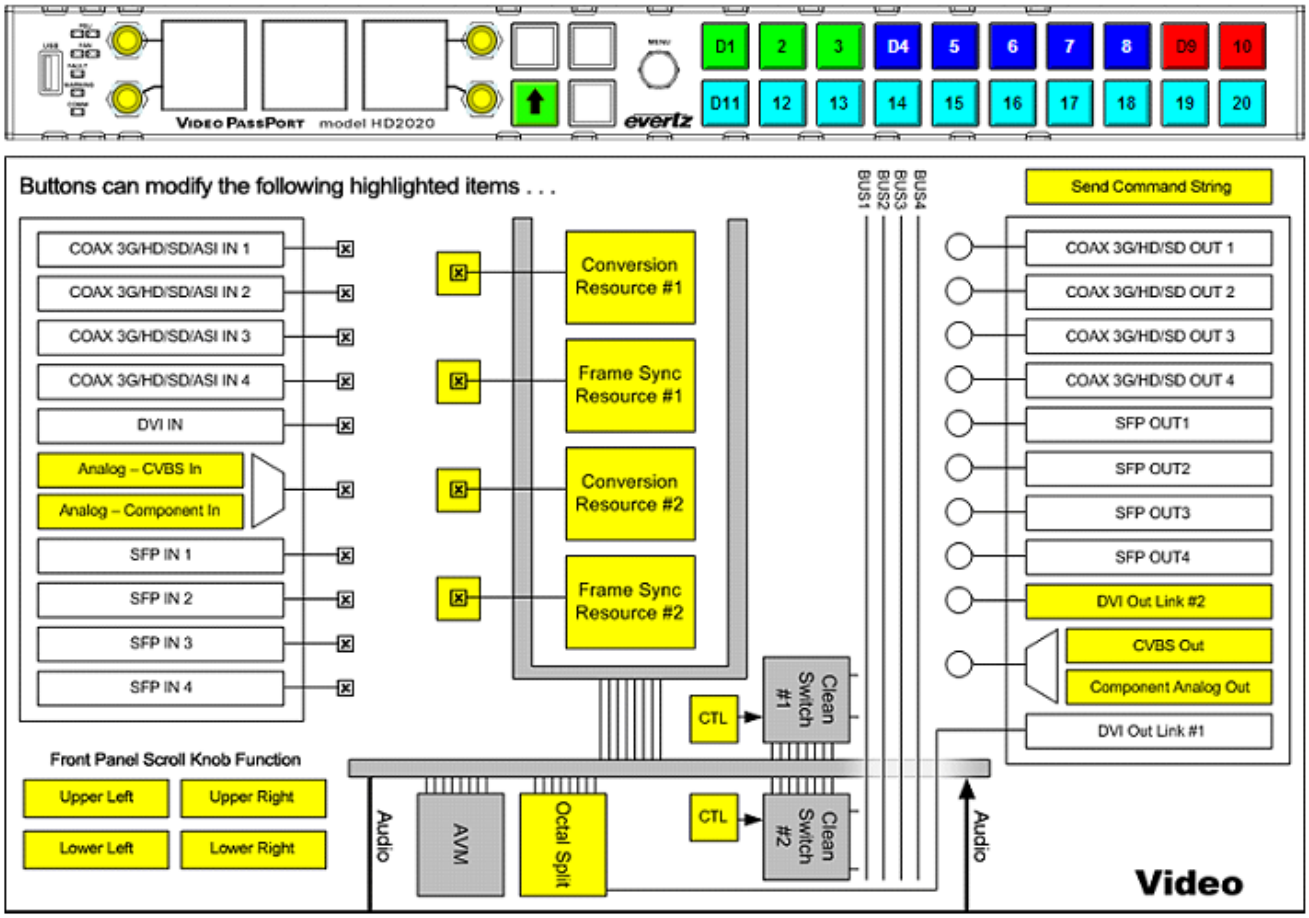

Figure 4-58: Button Function Definition Window with Button Groups

To configure the function that a particular button will perform, depress the button on the pictorial representation of the HD2020. Note that it is possible to define the function that will be performed when a single button is activated and when a combination of buttons is made active. Refer to Figure 4-59 for an illustration of activating a single button for configuration and a combination of buttons for configuration.

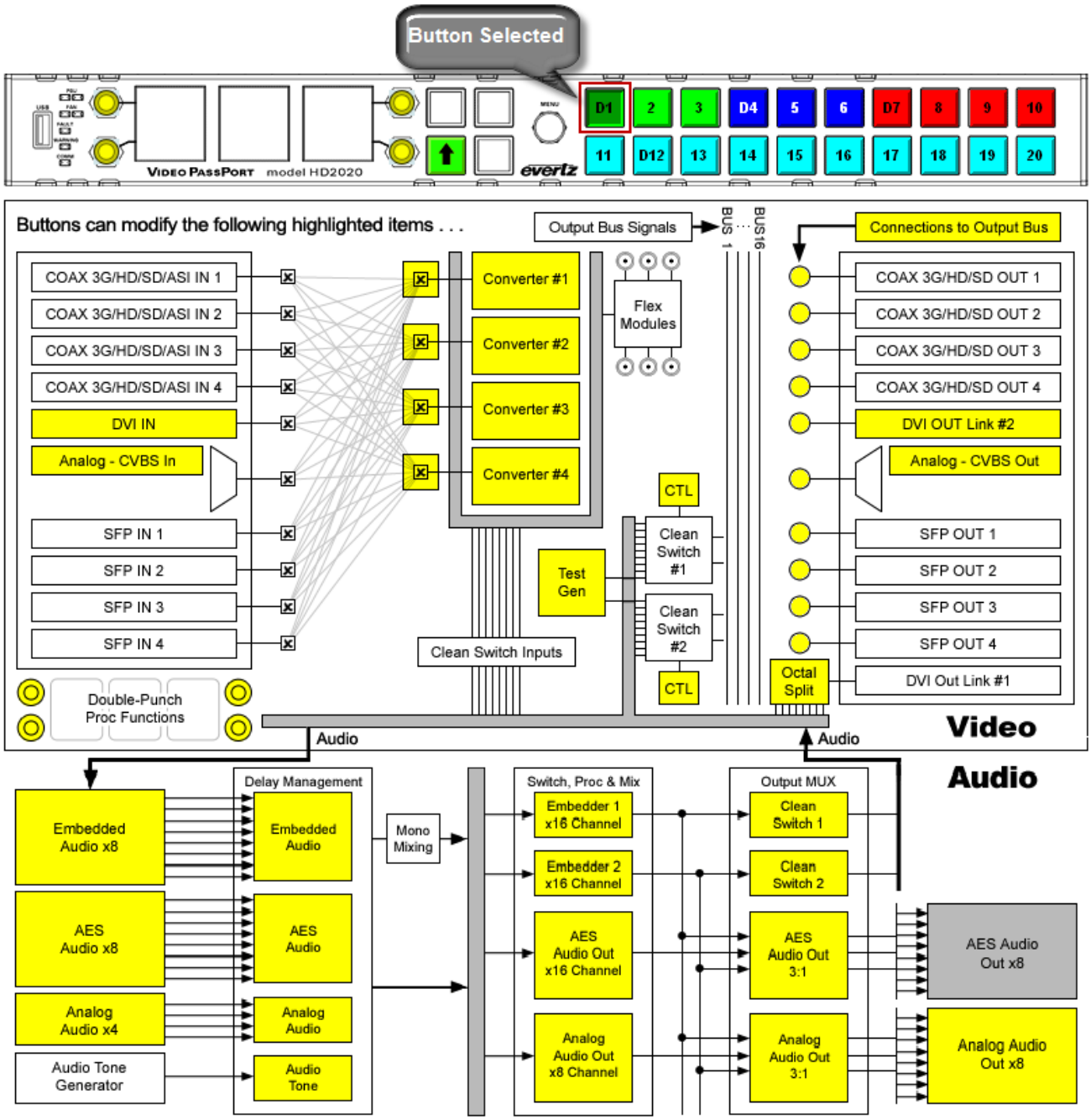

Figure 4-59: Activating a Single Button and Button Combination

Once a single button (or button combination) has been selected, you may then proceed to define what parameters will change once that button is physically activated on the front panel. To do this, click on any of the yellow boxes within the system architecture and a pop-up window will appear for that particular processing element. When the pop-up window appears, for the first time all parameters will appear greyed out. This indicates that when the button is activated, that parameter will not be changed. However, by clicking on the name of any parameter, the value will change from grey to white. When the parameter value has changed from grey to white, it indicates that particular parameter can be changed when the button is activated. The parameter will change to the value that is selected.

On a per button basis you may change a single or multiple parameter(s) within a single processing block and across processing blocks. Refer to Figure 4-60 for an example of how to change the clean switch input to output routing when button 1 is activated.

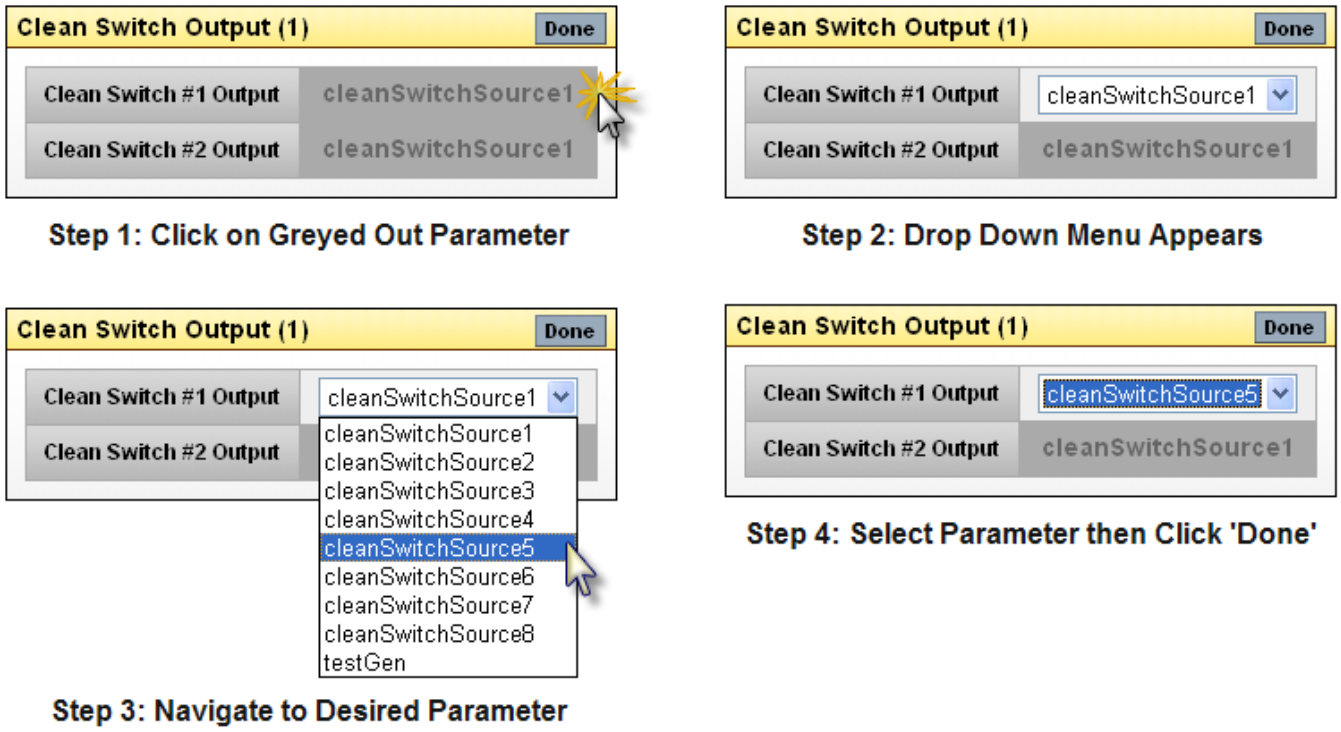

Figure 4-60: Activating a Single Button and Button Combination

The complexity of the functions that may be implemented using single button and multiple button configurations is much more than the example illustrated above but it should serve to demonstrate the concept behind button function definitions. It is important to note that pressing the SHIFT button on this page accesses buttons 21-40.

The user can also use the *Button Definition Page* to define the HD2020 front panel response to two quick successive activations. This is called a “double punch” function. When a “double punch’ is physically performed on the front panel, a user defined set of parameters can appear on the Left and Right hand side LCDs of the front panel. Once they appear, the four scroll knobs on the front panel may then be used to process those parameters.

To define what parameters appear on the front panel LCDs when a particular button is “double punched’, first select the button and then click on the “Front Panel Scroll Knob” text. Once this is done you may select what parameter will appear in the top-left, bottom-left, top-right and bottom-right LCD areas. Refer to Figure 4-61 for an example of defining what parameters will appear when button 2 is “double punched’. In this example, Hue, Y Gain, Y Offset for conversion path 1 will appear in the front panel LCD buttons.

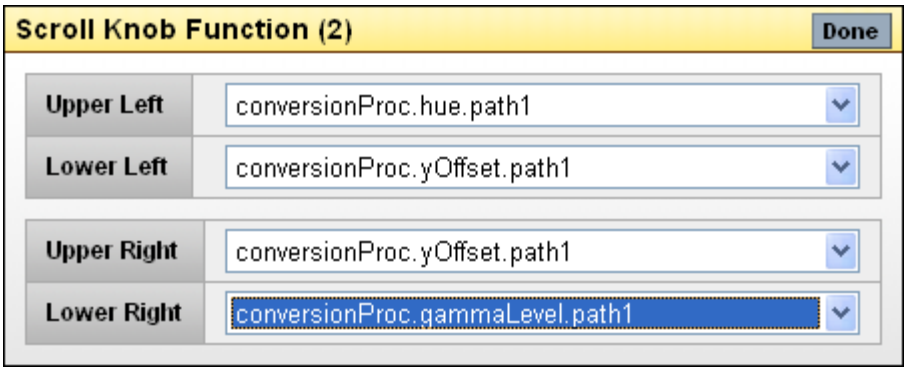

Figure 4-61: Scroll Knob Function Window

4.12. UPGRADING HD2020 FIRMWARE

To upgrade the HD2020 firmware click on the “UPGRADE FIRMWARE” hyperlink near the top level of the HD2020 web configuration tool. Note that when the HD2020 firmware is upgraded **ALL** configuration files in the HD2020 WILL BE MAINTAINED and are not erased from the unit.

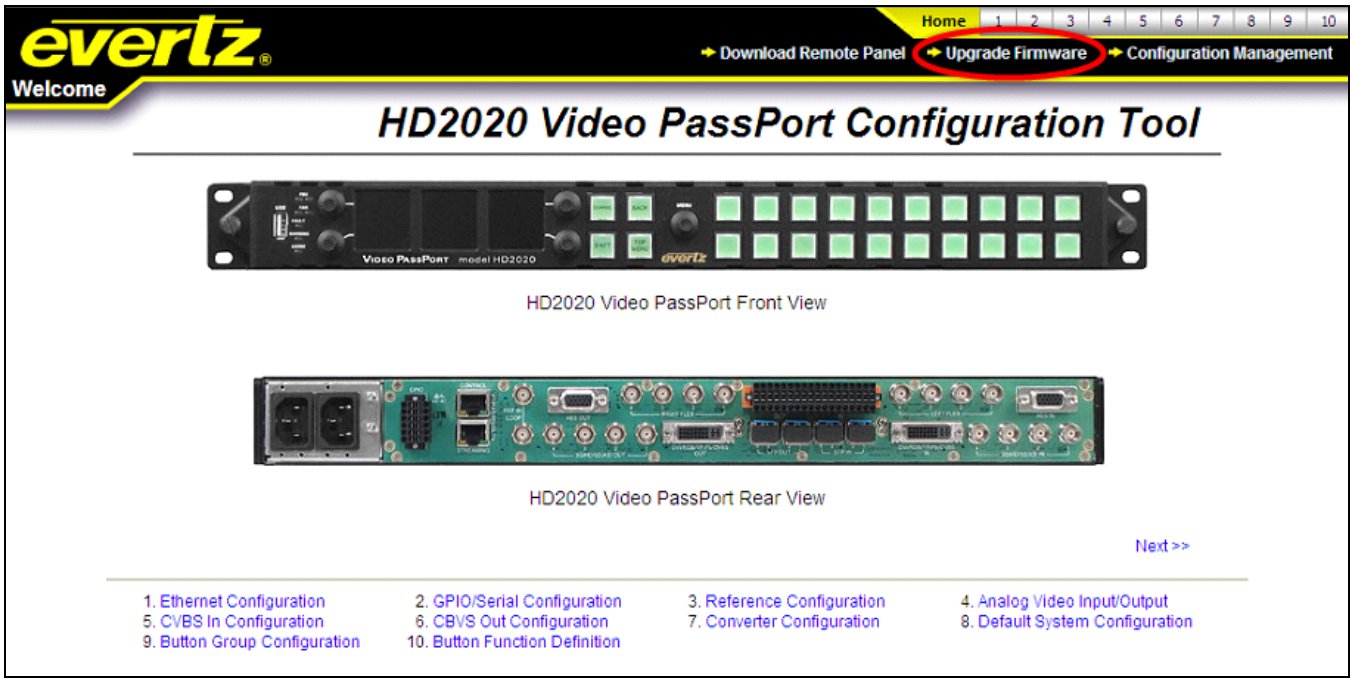

Figure 4-62: Navigating to Upgrade Firmware

Once selected, the web page for upgrading the HD2020 will appear.

Click the BROWSE button and navigate to the HD2020 firmware file. The HD2020 firmware file has an extension of “.img”. After selecting the new firmware, click the **UPLOAD TO HD2020** button.

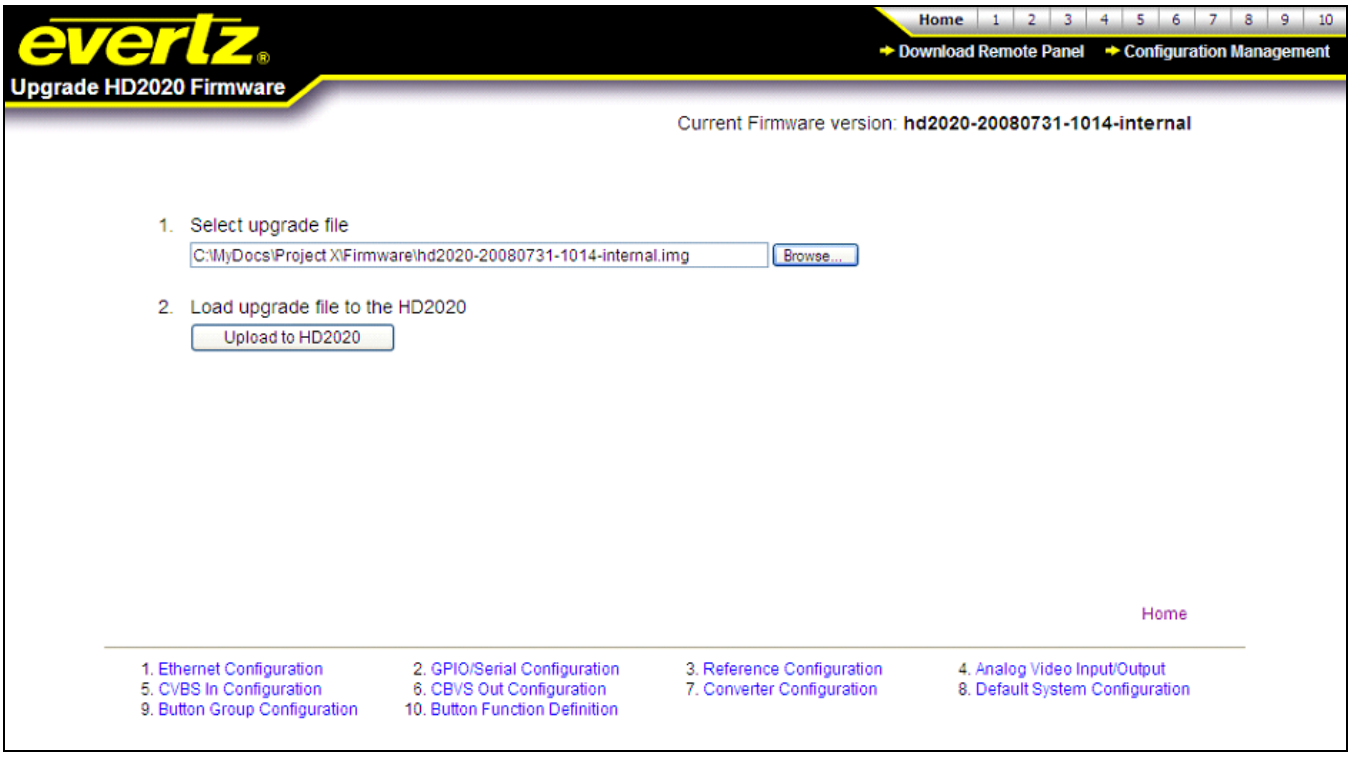

Figure 4-63: Selecting a Firmware File

After a short period of time, the firmware file will be uploaded to the HD2020 and a confirmation statement will be presented on the web page indicating the selected file is a valid HD2020 firmware file as shown in Figure 4-64.

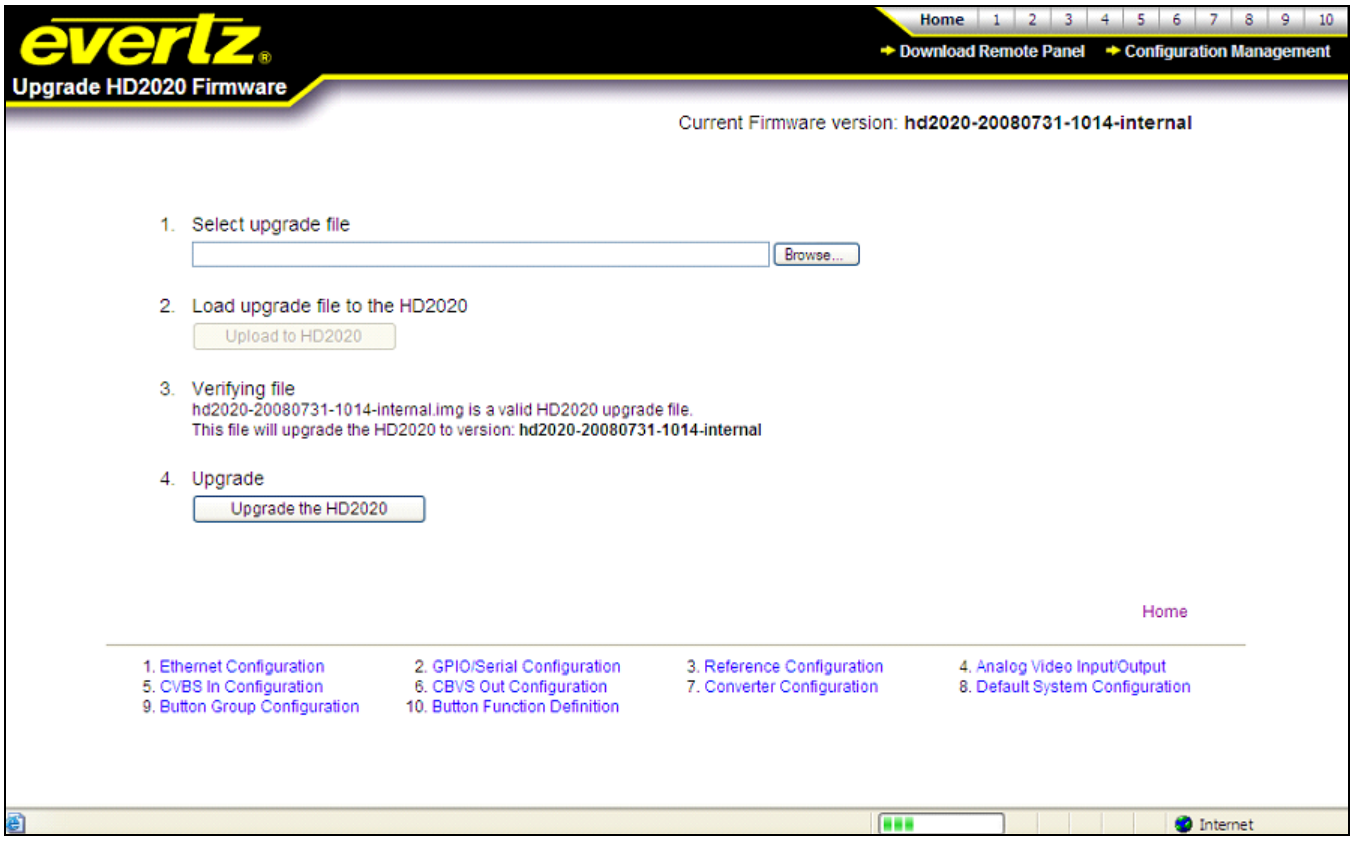

Figure 4-64: Uploading a Firmware File to the HD2020

To complete the upgrade process, press the **UPGRADE THE HD2020** button. The firmware file will be loaded and the unit must then be re-booted.

Figure 4-65: Final HD2020 Firmware Upgrade Step

4.13. MANAGING HD2020 CONFIGURATION FILES

The HD2020 web configuration tool is used to generate configuration files that are stored in the unit and then restored or selected via the HD2020 front panel. The web configuration tool is not designed to change unit parameters in a real time fashion. VLPRO based control must be used for changing device parameters in real time (contact the factory for availability information).

To manage the HD2020 configuration files, click on the CONFIGURATION MANAGEMENT hyperlink near the top right hand corner of the web page. This will load the configuration management web page shown in Figure 4-67.

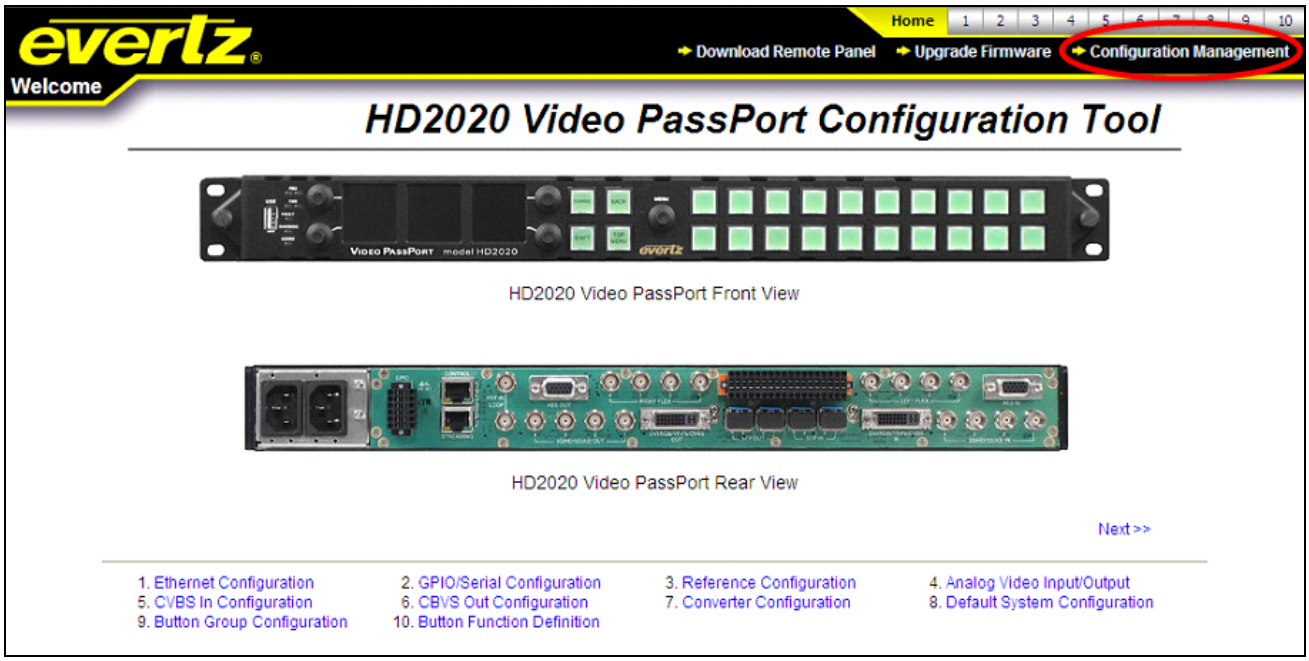

Figure 4-66: Navigating to the HD2020 Configuration Management Page

When navigating through the HD2020 web configuration tool and changing parameters, you are generating a “working configuration file”. All settings within this “working configuration file” are stored in the web pages only until the file is saved.

The left hand side of the *Configuration Management* page allows you to save and recall HD2020 configurations on your local PC. Click the “SAVE” hyperlink embedded in the line of text that reads “Save the current working configuration to a local file”. This will allow you to save your working configuration to a file. To load a configuration file from your PC and make it the “working configuration file”, click the BROWSE button on the left hand side of the page. This will allow you to browse to a HD2020 configuration file and load it in as the “working configuration file”.

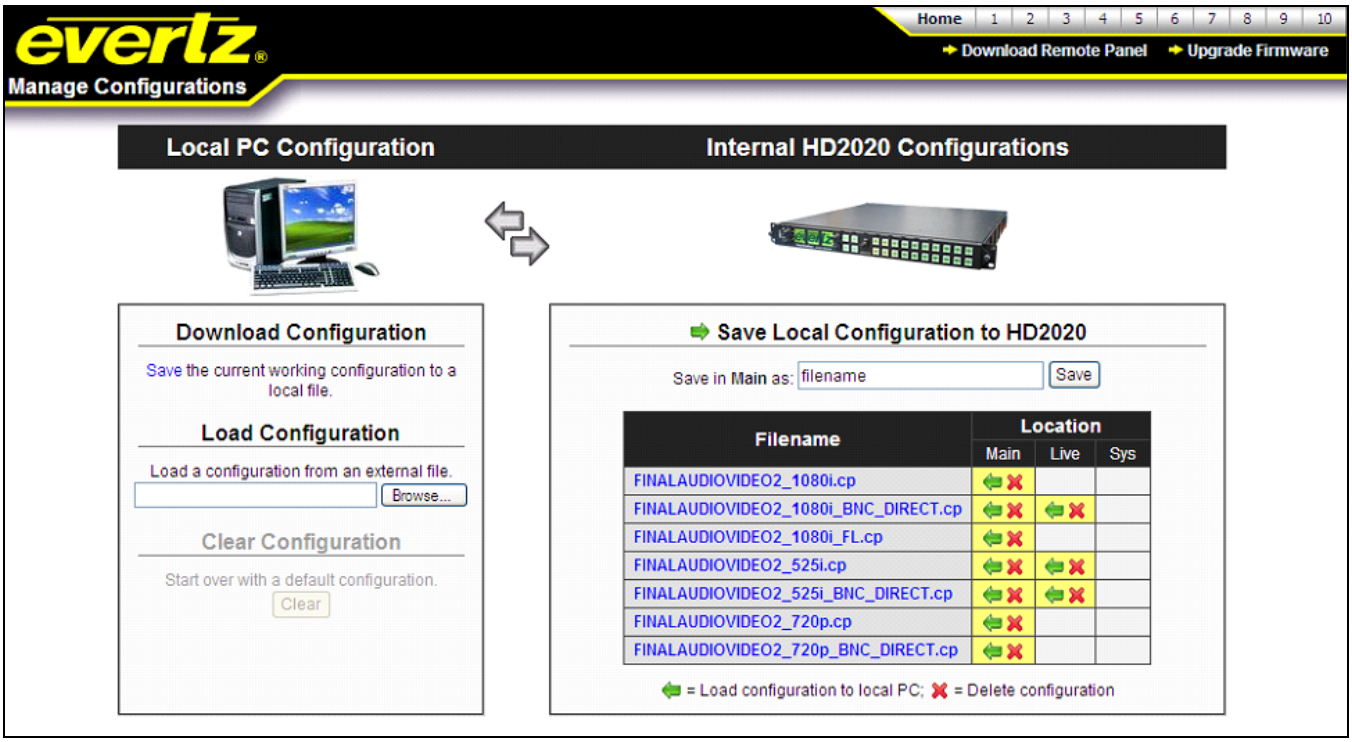

Figure 4-67: HD2020 Configuration Management Page

To save a “working configuration file” to the HD2020 hardware, enter a file name into the text box beside the words “Save in Main as”. Following this, push the SAVE button. The file will then be stored in the HD2020 and will show up in the list of available HD2020 configurations.

Configurations are selected (or restored) via the HD2020 front panel. Two types of files are stored within the HD2020. The first type is labeled “MAIN”. These are the engineering files that get saved to the HD2020 when a configuration file is first designed and downloaded into the HD2020. The second type is labeled “LIVE”. Files under the LIVE category are the engineering configuration files that get saved to the HD2020 PLUS any configuration changes that are done via the HD2020 front panel. Effectively the LIVE files are the “running memory” of a particular HD2020 configuration.

On the HD2020 front panel, the MAIN files are selected (made active) when “RESTORED” and LIVE files are selected (made active) when “SELECTED”. To RESTORE a file, navigate through the engineering front menu system as follows SYSTEM -> CONFIG -> RESTORE. To SELECT a file, navigate through the engineering front menu system as follows SYSTEM -> CONFIG -> SELECT.

Each file has a left point green arrow and a red “X” under the LIVE or MAIN title. By clicking on the left point green arrow a file can be loaded back into the configuration tool and made the “working configuration file”. By clicking the red “X”, the file will be deleted from the HD2020.

4.14. ACCESSING THE HD2020 PC REMOTE CONTROL PANEL (+PCRCP OPTION)

The HD2020 has a PC Remote Control Panel option (+PCRCP). When purchased your HD2020 will show a hyperlink called “Download Remote Panel”, which can be located near the top of the screen. Click this hyperlink and the HD2020 +PCRCP software will be downloaded to your PC.

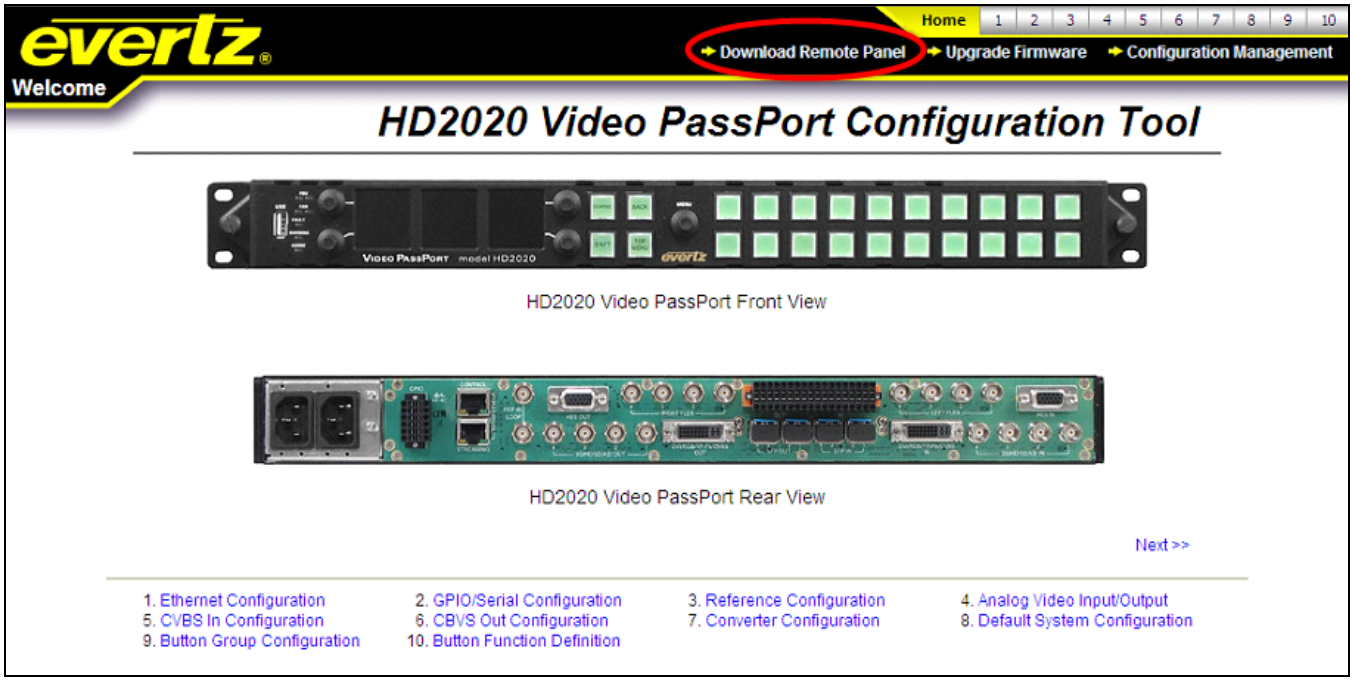

Figure 4-68: Navigating to the HD2020 Remote Control Panel (+PCRCP)

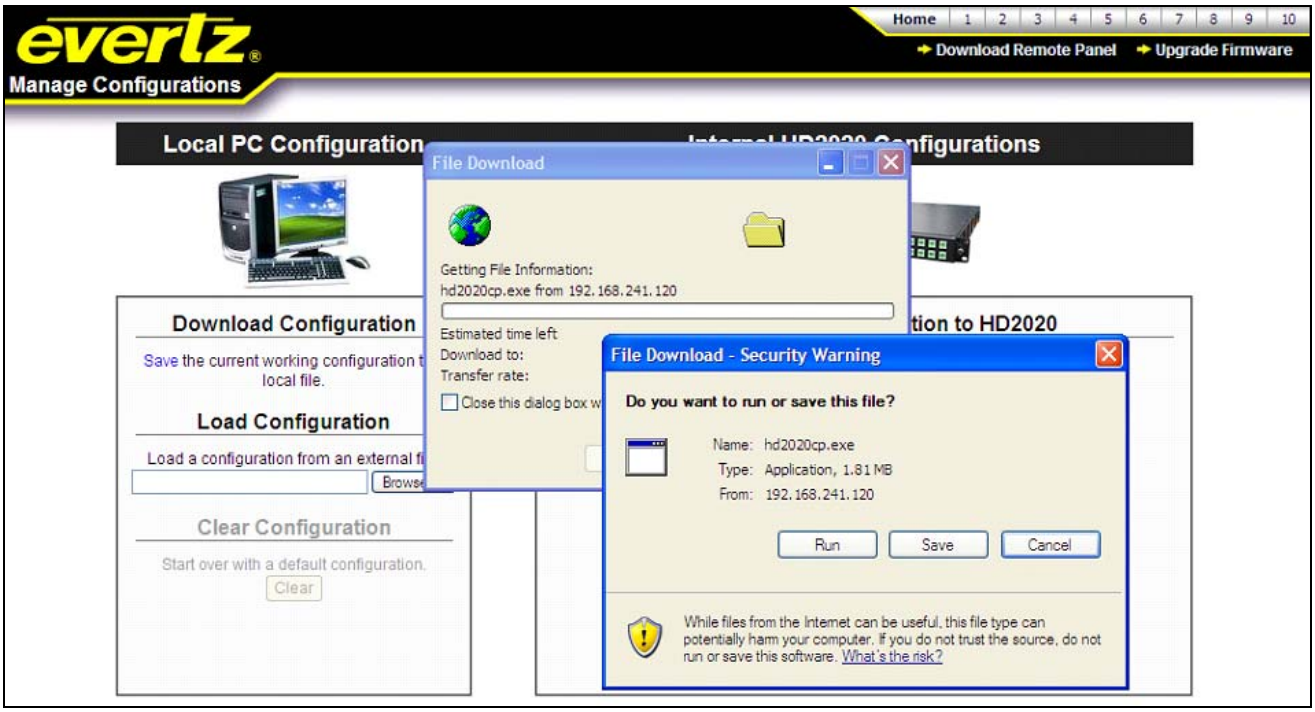

Figure 4-69: Downloading the HD2020 Remote Control Panel (+PCRCP)

If you choose to SAVE this file, you can launch it at any time from your PC. You may also choose to RUN this file immediately. Once this application is launched, you will be prompted to enter the IP address of the unit to which you desire to control. You will also be asked for a user name and password. The user name is “remote” and the password is “remote”. After this information is entered click the CONNECT button and the +PCRCP control surface will be launched as shown in Figure 4-71.

Figure 4-70: Downloading the HD2020 Remote Control Panel (+PCRCP)

The HD2020 PCRCP enables you to remotely control the HD2020 with an exact replica of the hardware front panel. Changes made via the PCRCP are reflected in real time and on the hardware front panel. Changes made on the hardware front panel are reflected in real time on the PCRCP.

Figure 4-71: Operating HD2020 PCRCP

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5. PANEL OPERATION

The HD2020 removable front panel has an intuitive user interface providing a 2D menu structure that utilizes three full colour front panel LCDs. Twenty fully configurable “Hot Buttons” on this front panel provides operators with quick and easy access to programmable “control macros”. In addition, four scroll knobs surround the three full colour LCD screens to enable intuitive control of user selectable processing parameters. The front panel USB port provides a simple way to upload and download box configurations.

Figure 5-1: Front Panel View of HD2020

5.1. REMOVING AND INSERTING THE HD2020 FRONT PANEL

To remove the front panel, simply undo the “thumb screws” on the left and right hand side of the panel. Following this, extract the front panel by pulling it directly away/outward from the HD2020.

DO NOT angle or twist the front panel during the extraction process. Damage to the front panel itself or the front panel mating PCB (not shown in the diagram above) may occur.

To re-insert and re-activate the front panel, mechanically line up the front panel thumb screws with their associated screw holes. Also, align the front panel electrical connector (not show in diagram above) with the front panel mating PCB. Insert the front panel pushing it directly towards the HD2020. DO NOT angle or twist the front panel during the insertion process.

Once this is done, tighten the front panel thumb-screws. The front panel should now be properly inserted into the HD2020. At this point, the HD2020 front panel still needs to be re-activated. This can be done by holding down the “COARSE” button and then pressing the “TOP MENU” button.

Perform this operation until the HD2020 front panel menu re-appears.

5.2. HD2020 FRONT PANEL USB PORT

The USB Port is for future functionality. This port will be used for uploading and downloading device configuration files.

5.3. HD2020 FRONT STATUS LEDS

The HD2020 has numerous front panel status LEDS. The following sections will provide descriptions for the HD2020 LEDs.

5.3.1. PSU LEDs

The HD2020 has dual redundant power supplies. The right LED will be green when both power supplies are present and functioning properly. The left LED will be red when a fault has been detected with one of the two power supply bricks.

5.3.2. FAN LEDs

The HD2020 has multiple fans providing airflow to cool the internal electronics. All fans are located on the HD2020 power supply. The right LED will be green when all fans are operating properly. The left LED will be red when a fault has been detected with any of the HD2020 fans. Fans are monitored for gross failure as well as under-speed conditions.

5.3.3. FAULT LED

This LED will be red when a serious internal fault has been detected within the HD2020 (future functionality).

5.3.4. WARNING LED

This LED will be red when a non-critical internal fault/error has been detected within the HD2020 (future functionality).

5.3.5. COMMS LED

This LED will be activated when a remote PC is controlling the HD2020 using the +PCRCP option.

5.4. HD2020 FRONT PANEL SCROLL KNOBS

The HD2020 has four scroll knobs that surround the left hand side LCD screen and the right hand side LCD screen. These are used when processing audio/video parameters or device configuration parameters via the front panel “button punch” function (refer to section 4-10). Turn the scroll knob to the left to increase a parameter value and turn the scroll knob to the right to decrease a parameter value. Push the scroll knob in to “TAKE” or make active the new proc parameter value.

Note that pushing down on the COARSE button and rotating the scroll knobs at the same time increases the rate at which you can cycle through the full range of a particular parameter functional range.

5.5. HD2020 FRONT PANEL LCDS SCREENS

These full colour LCDs are used for displaying and navigating through the engineering menu as well as proc audio/video parameters.

5.6. ENGINEERING MENU SCROLL KNOB

The HD2020 has a scroll knob in, approximately, the middle of the front panel that is used for navigating the engineering menu. The scroll knob can turn left and right to scroll up and down engineering menus. Push the scroll knob in to select parameters.

5.7. ENGINEERING MENU NAVIGATION BUTTONS

The HD2020 has four front panel buttons that are used for navigating the engineering menu.

COARSE Button: The top left button is labeled COARSE. When holding this button down, the rate at which you scroll through the device parameters increases.

SHIFT Button: After pressing this button once it will illuminate. Once it is illuminated, the user can access logical front panel buttons 21-40 on the front panel. When this button is not illuminated, the user can access logical front panel buttons 1-20.

BACK Button: This button is used when navigating the engineering front menu system. Pushing this button causes you to move back one level in the engineering menu structure.

TOP MENU Button: This button is used when navigating the engineering front menu system. Pushing this button causes you to move to the very top level in the engineering menu structure.

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