HDMI to SDI + Audio Converter

Convert and Scale HDMI to SDI

PRODUCT MANUAL

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Copyright Notice

Subject: HDMI to SDI + Audio Converter
Revision: A, October 2011

Table of Contents

PREFACE

Conventions Used in this Manual

Throughout this manual you will notice certain conventions that bring your attention to important information. These are **Notes** and **Warnings**. Examples are shown below.

Note: Important Notes appear in blue text preceded by a yellow exclamation point symbol, like this.

A note is meant to call the reader's attention to helpful information at a point in the text that is relevant to the subject being discussed.

Warning! All Warnings appear in red text, followed by blue text, and preceded by a red stop sign, like this.

A warning is meant to call the reader's attention to critical information at a point in the text that is relevant to the subject being discussed.

> **BEFORE STARTING ANY PROCEDURE, IT IS RECOMMENDED THAT YOU READ THE INSTRUCTIONS THOROUGHLY!**

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1 Introduction

1.1 Contents

When you receive your Thinklogical® HDMI to SDI Converter, you should find the following items:

- HDMI to SDI Converter (HDC-000001) or
  HDMI to SDI Converter with Xtreme 3G+ Extension Option (HDC-000001-LC)
- AC/DC adapter universal input 90-264 VAC (PWR-000022-R)
- HDMI to SDI Converter Product Manual

1.2 Product Overview

The Thinklogical® HDMI to SDI Converter is a stand-alone product allows for advanced real-time image correction and scaling, while at the same time functioning as a video converter which supports an HDMI or DVI input to an SDI output of SD/HD/3G SDI. The HDMI to SDI Converter/Extender has a fiber output that is fully compatible with our SDI Xtreme 3G line of receivers for a comprehensive conversion and extension solution.

H: 1.5" (38.1mm) x **D:** 7.75" (196.85mm) x **W:** 7.65" (136.65mm)

1.3 Laser Information

The HDMI to SDI Converter *with Xtreme 3G+ Extension Option* is designed and identified as a **Class 1 LASER product.**
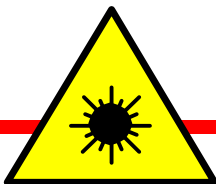
CLASS 1 LASERS do not require any special precautions under conditions of normal use.

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2 System Features

2.1 General System Features

The Thinklogical® HDMI to SDI Converter allows you to seamlessly convert an HDMI or DVI signal to a broadcast quality SDI signal. The unit is full SMPTE compliant and includes a genlock input. User interface options include a front panel LCD and encoder and remote control via the Serial port (RS-232) and Ethernet port. Audio inputs include HDMI embedded (up to 8 channels), digital AES (single stereo pair) and balanced analog (single stereo pair). Audio outputs include SDI embedded (up to 8 channels).

The HDMI to SDI Converter also has a fiber output option that is fully compatible with the Thinklogical® SDI Xtreme 3G+ line of receivers for a comprehensive conversion and extension solution. The Xtreme 3G+ Extension version includes a Serial port (RS-422) and has the option of Single-Mode or Multi-Mode over one or two fibers.

HDMI to SDI Converter rear panel view

Each HDMI to SDI Converter system includes the following features:

Conversion/Scaling:

- Video Input: HDMI, DVI

- Audio Sources: HDMI embedded (up to 8 channels), Balanced analog (single stereo pair), Balanced digital AES (single stereo pair)

- Video Output: SD-SDI (SMPTE 259M-C), HD-SDI (SMPTE 292), 3G (SMPTE 424M, 425 Level A and B)

- Audio Outputs: SDI embedded (up to 8 channels)

- Fiber optic output compatible with Thinklogical's® SDI Xtreme 3G+ Receivers

- User Control via front panel, RS-232 and Ethernet

- Front panel LCD with encode knob

- SMPTE standards supported: 259M-C, 292, 424M, 425 level A and level B

- Genlock capable

- Automatic video input detection

Video Processor Features:

- Per pixel motion-adaptive video noise reduction- removes the white Gaussian noise present in most types of video

- Content adaptive block and mosquito noise reduction- significantly reduces the blocking and mosquito noise artifacts present in compressed video

- Advanced per-pixel, motion-adaptive, edge-adaptive 3D de-interlacing with support for arbitrary film cadences- removes "jaggies" and "feathering" to produce smooth and clear images

- Adaptive scaling- produces sharp and clean images and low or high resolutions

- Natural dept expansion- enhances details and sensation of depth for greater realism and super resolution effect

- Adaptive contrast enhancement (ACE) brings out shadow detail without crushing mid-tones or highlights

- Intelligent color remapping (ICR) enables vivid color without hue shifts and clipping while maintaining accurate flesh tone

- Qdeo™ true color- a unique solution for using the full dynamic range of 10-bit and 12-bit displays which eliminates contouring seen when viewing typical 8-bit consumer video

2.2   Technical Specifications

Frame Rate Formats Supported: Progressive, Interlaced, PsF

| Function	Video Standards Supported	Formats
SD-SDI	SMPTE 259M	PAL and NTSC
HD-SDI	SMPTE 292M	All standard HD-SDI compatible formats
3G SDI	SMPTE 424M, 425M, Level A and B	All SMPTE 425 level A and B compatible formats

Dimensions	**Height: 1.5" (38.1 mm)** **Depth: 7.75" (196.85 mm)** **Width: 7.65" (136.65 mm) (Tolerance: ± .039"; .1000 mm)**
Weights	**Converter- 1 lb (0.45 kg); Extender - 1.5 lbs (0.68 kg)** **Shipping Weight: 9 lbs (4.08 kg) pair**
Operating Temp and Humidity	**0° to 50°C (32° to 122 °F), 5% to 95% RH, non-condensing**
Power Consumption	**Converter - 10 watts per unit; Extender - 12 watts per unit**
Supply Voltage	**+12.0 VDC**
DC Adapter	**AC/DC adapter universal input, 90-264 VAC**
Optical Distance (Xtreme 3G+ Extension Option)	**Up to 50 meters with Type OM1** **Up to 350 meters with Type OM2** **Up to 750 meters with Type OM3** **Up to 1000 meters with Type OM4** **Up to 40 kilometers with Type OS2**
Compliance	**Approvals for US, Canada, and European Union**
Warranty	**12 months from date of shipment. Extended warranties available**

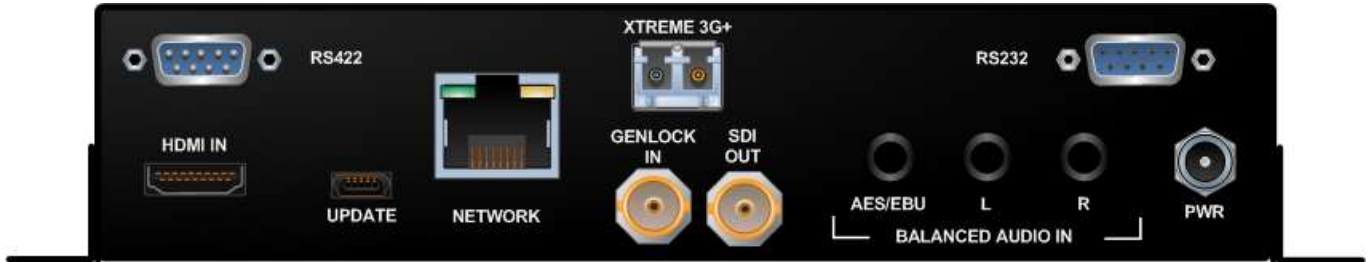# 3 Connecting the HDMI to SDI Converter

3.1   Types of Connections

All physical connections to the product use industry-standard connectors. Non-supplied cables that may be needed are commercially available. All interface connections are found on the rear of the unit.
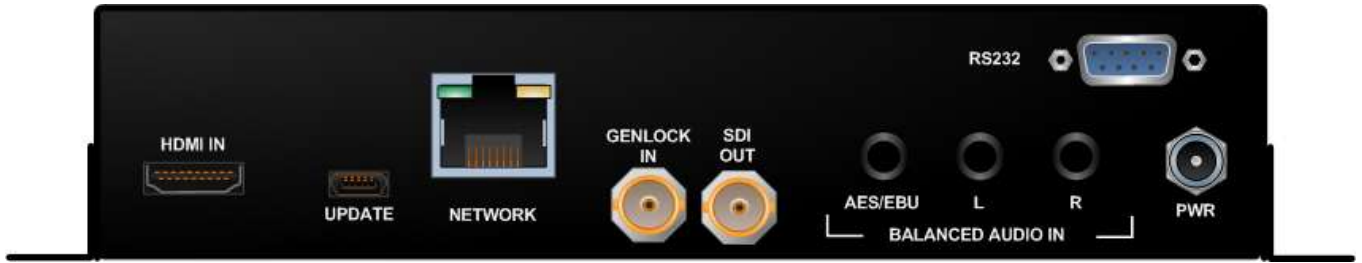
HDMI to SDI Converter rear panel

HDMI to SDI Converter with Xtreme 3G+ Extension Option rear panel

3.2 SFP+ Modules

Small Form-factor Pluggable modules are short-wavelength transceivers designed for use in bi-directional fiber-optic channel links. Each SFP module is hot-pluggable and operates on 3.3VDC.

The HDMI to SDI Converter with the Xtreme 3G+ Extension option contains SFP+ modules that serve as the fiber-optic couplers for the fiber cables to and from Thinklogical® units.

⚠ **<u>Note:</u> Always use dust caps to protect against damage when a fiber optic connector is not attached to its coupling device (fiber optic equipment, bulkheads, etc.)**

Dust Plug

SFP+ Module; It is good practice to install dust plugs in unused SFP+s

3.3 Fiber Optic Cable

Fiber optic cables connect the Transmitters to the Receivers. Standard multi-mode fiber optic cables must be 50 or 62.5 microns, terminated with LC type fiber optic connectors. **Be careful not to kink or pinch the fiber optic cable as it is being installed and keep all bend radii to no less than 3 inches (76.2mm).**
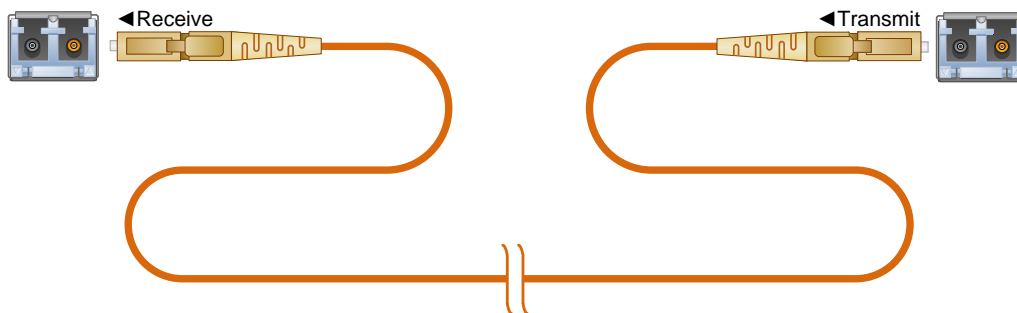
Standard multi-mode fiber optic cable (up to 1000 meters),
50 or 62.5 microns, terminated with LC-type connectors

With two fibers connected (in models with one SFP) or with three fibers connected (in models with two SFPs) video information is transmitted from the TX to the RX over fiber L1 (and L3 in models with two SFPs). Fiber L2 is used as a data return path from the RX to the TX, allowing full duplex, bi-directional RS-232 data transfer.

3.4 RS-232 Pin Out

Pin 1   Pin 5

Pin 9

RS-232
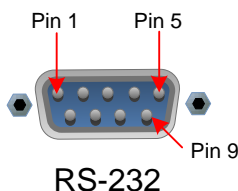
Pin 1   DCD_OUT
Pin 2   RX_ IN
Pin 3   TX_OUT
Pin 4   DTR_IN
Pin 5   GND
Pin 6   DSR_OUT
Pin 7   RTS_IN
Pin 8   CTS_OUT
Pin 9   RI_OUT

3.5 RS-422 Pin Out *(Xtreme 3G+ Extension Option Only)*

The RS-422 connector on 3G+ models is wired to emulate an SMPTE 207M Machine Control Pin-out. The HDMI to SDI product may be software configured to flip the transmit and receive polarities on both TX and RX boards.

⚠️ **Note: The Tx and RX must be configured with the same transmit and receive polarity in order to function correctly.**

The RS-422 pin-out is:

Tx without Jumper *or* Rx with Jumper	Tx with Jumper *or* Rx without Jumper
1. Frame Ground	1. Frame Ground
2. Receive B	2. Transmit A
3. Transmit A	3. Receive B
4. Receive Common	4. Receive Common
5. Spare	5. Spare
6. Transmit Common	6. Transmit Common
7. Receive A	7. Transmit B
8. Transmit B	8. Receive A
9. Frame Ground	9. Frame Ground

4 Set Up
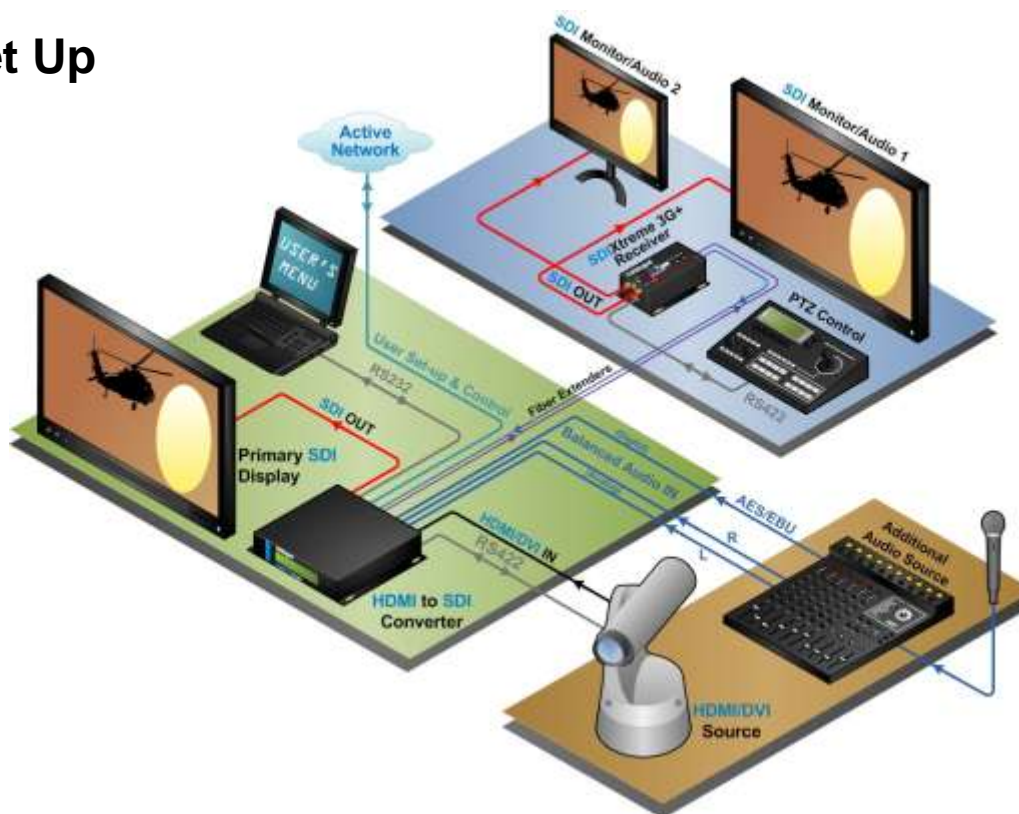
HDMI to SDI Converter/Extender Application – SDI, HDMI and audio source converted and extended via fiber to Thinklogical's® SDI Xtreme 3G+ receiver, to SDI destination

4.1 Desktop

The HDMI to SDI Converter has been designed specifically for all desktop requirements. This compact unit takes up very little space on the desk and it can be conveniently mounted below the desktop, out of the way. The HDMI to SDI Converter chassis does not need to be opened or accessed. The front panel should be visible and unobstructed so that the front panel encode knob and LCD display are accessible. All connections are made to the rear of the chassis.

4.2 Cooling

The HDMI to SDI Converter does not require special cooling or ventilation. No fan means that it does not add to the ambient noise in your equipment room. Be sure not to block the air vents on the sides of the unit and leave at least 2" of space on both sides. If mounted in an enclosed rack, it is recommended that the rack have a ventilation fan to provide adequate airflow through the unit(s).

Note: Be sure to leave adequate ventilation space on both sides of the unit (2"minimum)

4.3 HDMI to SDI Converter/Extender Setup
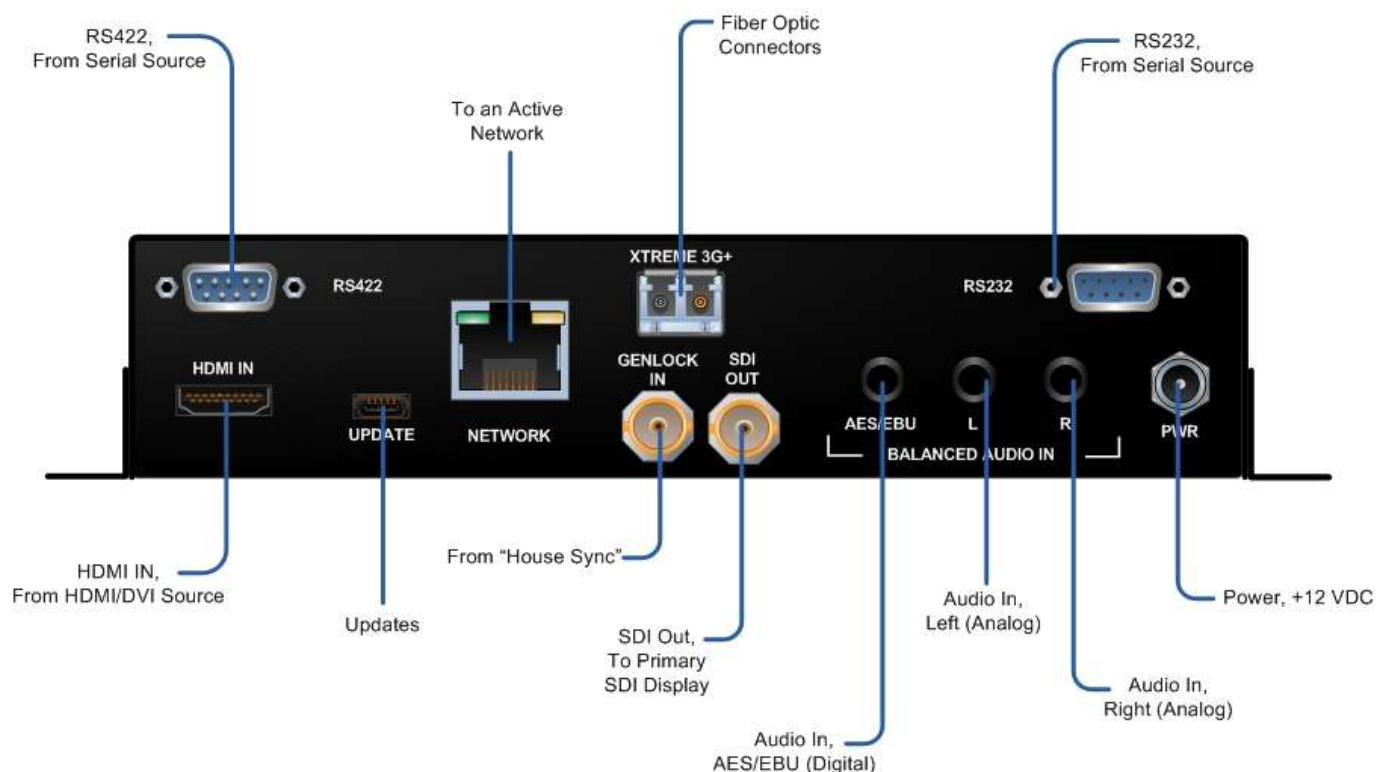
HDMI to SDI Converter with Xtreme 3G+ Extension Option back panel

For order of installation events, see **Appendix A** for our **Quick Start Guide.**

5 General Front Panel Usage

The two front panel LED's will display the status of the applied HDMI input signal as well as the applied genlock signal. The top LED will be steady red if power is applied and no HDMI signal is detected. It will flash green if the input signal is detected as a DVI input and will be steady green for an HDMI input. The bottom LED will be off until a valid genlock is applied. It will flash green if a signal is present but not locked and it will be steady green when in the locked condition.

HDMI to SDI Converter Front Panel

The configured Input and Output settings are displayed on the Front Panel LCD. If no signal is present at the time of power up, the display will read "Not Configured" for both the Input and Output. Pressing the encoder knob once will display the product description and the 7 different main menus as the knob is turned. If the encoder is not pushed or turned in 20 seconds, the screen will go back to the top level. More detailed information about using the Front Panel Display can be found in **Appendix C**.

5.1 User Menu Configurations

The HDMI to SDI Converter has many configuration options and Appendices B and C will cover these options in detail. Every configuration can be set regardless of the user interface (e.g. RS-232, Front Panel Display or Web Interface). Not all settings are output to the Front Panel display due to the display limitations.
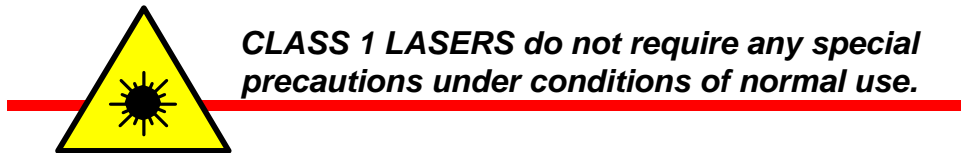
6 Regulatory & Safety Compliance

6.1 Safety Requirements

Symbols found on the product

Markings and labels on the product follow industry-standard conventions. Regulatory markings found on the products comply with domestic and many international requirements.

The HDMI to SDI Extender is designed and identified as a **Class 1 LASER product.**

CLASS 1 LASERS do not require any special precautions under conditions of normal use.

6.2 Regulatory Compliance

Thinklogical® products are designed and made in the U.S.A. Our products have been tested by a certified testing laboratory and found to be compliant with the following standards (both domestic USA and many international locations):

North America

Safety
ANSI/UL60950-1: 1st Edition (2003)
CAN/CSA C22.2 No. 60950-1-03

LASER Safety
CDRH 21CFR 1040.10
Class 1 LASER Product

Electromagnetic Interference
FCC CFR47, Part 15, Class A
Industry Canada ICES-003 Issue 2, Revision 1

Australia & New Zealand

This is a Class A product. In a domestic environment this product may cause radio interference, in which case the user may be required to take adequate measures.

European Union

Declaration of Conformity

Manufacturer's Name & Address: **Thinklogical$_\circledR$**
                                         100 Washington Street
                                       Milford, Connecticut 06460 USA
                                       Telephone 1-203-647-8700

These products comply with the requirements of the Low Voltage Directive 72/23/EEC and the EMC Directive 89/336/EEC.

6.3   Standards with Which Our Products Comply

Safety

CENELEC EN 60950-1, 1st Edition (2001)

LASER Safety

IEC60825:2001 Parts 1 and 2

Class 1 LASER Product

Electromagnetic Emissions

EN55022: 1994 (IEC/CSPIR22: 1993)

EN61000-3-2/A14: 2000

EN61000-3-3: 1994

Electromagnetic Immunity

EN55024: 1998 Information Technology Equipment-Immunity Characteristics

EN61000-4-2: 1995 Electro-Static Discharge Test

EN61000-4-3: 1996 Radiated Immunity Field Test

EN61000-4-4: 1995 Electrical Fast Transient Test

EN61000-4-5: 1995 Power Supply Surge Test

EN61000-4-6: 1996 Conducted Immunity Test

EN61000-4-8: 1993 Magnetic Field Test

EN61000-4-11: 1994 Voltage Dips & Interrupts Test

6.4 Supplementary Information

The following statements may be appropriate for certain geographical regions and might not apply to your location.

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigencies du Règlement sur le matériel brouilleur du Canada.

Warning! This is a Class A product. In a domestic environment, this product may cause radio interference, in which case the user may be required to take corrective measures.

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

Note: This Class A digital apparatus complies with Canadian ICES-003 and has been verified as being compliant within the Class A limits of the FCC Radio Frequency Device Rules (FCC Title 47, Part 15, Subpart B CLASS A), measured to CISPR 22: 1993 limits and methods of measurement of Radio Disturbance Characteristics of Information Technology Equipment.

Note: The user may notice degraded audio performance in the presence of electromagnetic fields.

Note: If using a keyboard that is noise susceptible, a ferrite ring on the keyboard cable may be needed to comply with Immunity Requirements

Product Serial Number

Thinklogical₍®₎ products have a unique serial number, imprinted on an adhesive label that is fixed to the bottom of the chassis. The serial number includes a date-code. The format for the date-code is 2 digits for the month, 2 digits for the day and 2 digits for the year, plus two or three digits for a unique unit number. This serial number is also found on the original shipping carton.

Connection to the Product

Connections and installation hardware for our products use industry-standard devices and methods. All wiring connections to the customer equipment are designed to minimize proprietary or customized connectors and cabling. Power connections are made with regionally appropriate power cords and approved methods.

7 How to Contact Us

7.1 Customer Support

Thinklogical® is an engineering company and you will receive the information you require directly from our most knowledgeable engineers. We believe that the first line of support is the design engineer that developed the product. Therefore, your questions will be handled promptly by our in-house engineers who are most familiar with your products.

> ## Thank you for choosing Thinklogical® products for your application.
> *We appreciate your business and are dedicated to helping you successfully use our products.*
> ### *thinklogical® is always here to help you.*
> *To contact us, please use the following telephone numbers and internet-based methods:*

Website

Check out our website for current product offerings, support information and general information about all of the products we offer.

Our internet website offers product information on all current systems, including technical specification sheets and installation guides (for viewing online or for download), product diagrams showing physical connections and other information you might need.

Internet: **www.thinklogical.com**

⚠️ **Note: Most online documents are stored as Adobe Acrobat "PDF" files. If you do not have the Adobe Acrobat reader needed to view PDF files, visit www.adobe.com for a download.**

Email

Thinklogical® is staffed **Monday through Friday from 8:30am to 5:00pm**, Eastern Time Zone. We will try to respond to your email inquiries promptly, use the following email addresses for your different needs:

info@thinklogical.com – Information on Thinklogical® and our products.

sales@thinklogical.com – Sales Department - orders, questions or issues.

support@thinklogical.com – Product support, technical issues or questions, product
repairs and request for Return Authorization.

Telephone

Telephone Sales: Contact our expert sales staff via telephone in Milford, CT at **1-203-647-8700** or if in the continental US, you may use our **toll-free number 1-800-291-3211**. We are here Monday through Friday from 8:30am to 5:00pm, Eastern Time Zone. Ask for your representative's direct dial phone number when you call.

Telephone Product Support: Contact Product Support via telephone in Milford, CT at **1-203-647-8700**. The support lines are manned Monday through Friday, 8:30am to 5:00pm, Eastern Time Zone.

International Sales: Please contact our US sales staff in Milford, CT at **1-203-647-8700**. We are here Monday through Friday, 8:30am to 5:00pm, Eastern Time Zone (same as New York City). If leaving a voice message please provide a "best time to call back" so we may reach you at your convenience.

Our switchboard attendant will direct your call during regular business hours. We have an automated attendant answering our main telephone switchboard after regular business hours and holidays. You can leave voice messages for individuals at any time. Our Sales Representatives have direct numbers to speed up your next call to us.

Fax

Our company facsimile number is **1-203-783-9949**. Please indicate the nature of the fax on your cover sheet and provide return contact information.

7.2   Product Support

Thinklogical's® support personnel are available **Monday through Friday from 8:30am to 5:00pm**, Eastern Time Zone. If your application requires assistance at some time outside of our normal business hours, please contact us beforehand and we will do our best to make arrangements to help you with your Thinklogical® products.

Warranty

Thinklogical® warrants this product against defects in materials and workmanship for a period of one year from the date of delivery. Thinklogical® and its suppliers disclaim any and all other warranties.

⚠ **Note: Thinklogical₍®₎ Inc. products carry a one year warranty, with longer term available at time of purchase on most products. Please refer to your product invoice for your products Warranty Terms & Conditions.**

Defect remedy shall be the repair or replacement of the product, provided that the defective product is returned to the authorized dealer within a year from the date of delivery.

If you wish to return your device, contact the Thinklogical₍®₎ authorized dealer where you purchased the device, or if you purchased directly, call Thinklogical₍®₎ at **1-800-291-3211** (USA).

Return Authorization

In the event you must return a product to Thinklogical₍®₎ directly, please contact **Customer Support** at **1-800-291-3211** or **1-203-647-8700**. Customer Support will ask you to describe the problem and will issue you a **R**eturn **M**erchandise **A**uthorization number (RMA#). Pack the device in its original box, if possible, and return it with the RMA# printed on the outside of the box.

⚠ **Note: DO NOT return a product to Thinklogical₍®₎ without a *Return Material Authorization.***

Return address for products with Return Material Authorization:

Thinklogical₍®₎, LLC
Attn: RMA#
100 Washington Street
Milford, CT 06460 USA

PH: 1-800-291-3211 (USA only)

Our Address

If you have any issue with a product, have product questions or need technical assistance with your Thinklogical₍®₎ system, please call us at **1-800-291-3211 (USA only)** or **1-203-647-8700** and let us help. If you'd like to write us, our mailing address is:

Thinklogical₍®₎ LLC.
100 Washington Street
Milford, CT 06460 USA

APPENDIX A: HDMI to SDI QuickStart Guide

APPENDIX B: GUI

The graphical user interface (GUI) for the HDMI to SDI Converter was developed for ease of use to create, set, and recall custom configurations. There are 6 main menus that allow you to configure the **Input/Output, Video Processor, Audio, User Configurations, Xtreme 3G** and **System Information**. There are sub-menus under the video processor menu for **Video Control** and **Picture Control.**

⚠️**Note: When power has been cycled on a unit it will reset to factory settings unless the "Set Power On Config" has been set in the User Menu.**

Input/Output Menu

This menu allows you to select the input and the format of the output. There is also an option to select the 3D output as well as Enable Genlock. By clicking the "Take" button at the bottom of the screen you are able to commit the output format that you have selected.

Video Processor > Video Control

The video control sub-menu allows you to control De-Interlacer, Noise Reducer, Compression Artifact Reducer, Edge Enhancer, and Adaptive Contrast Enhancer.
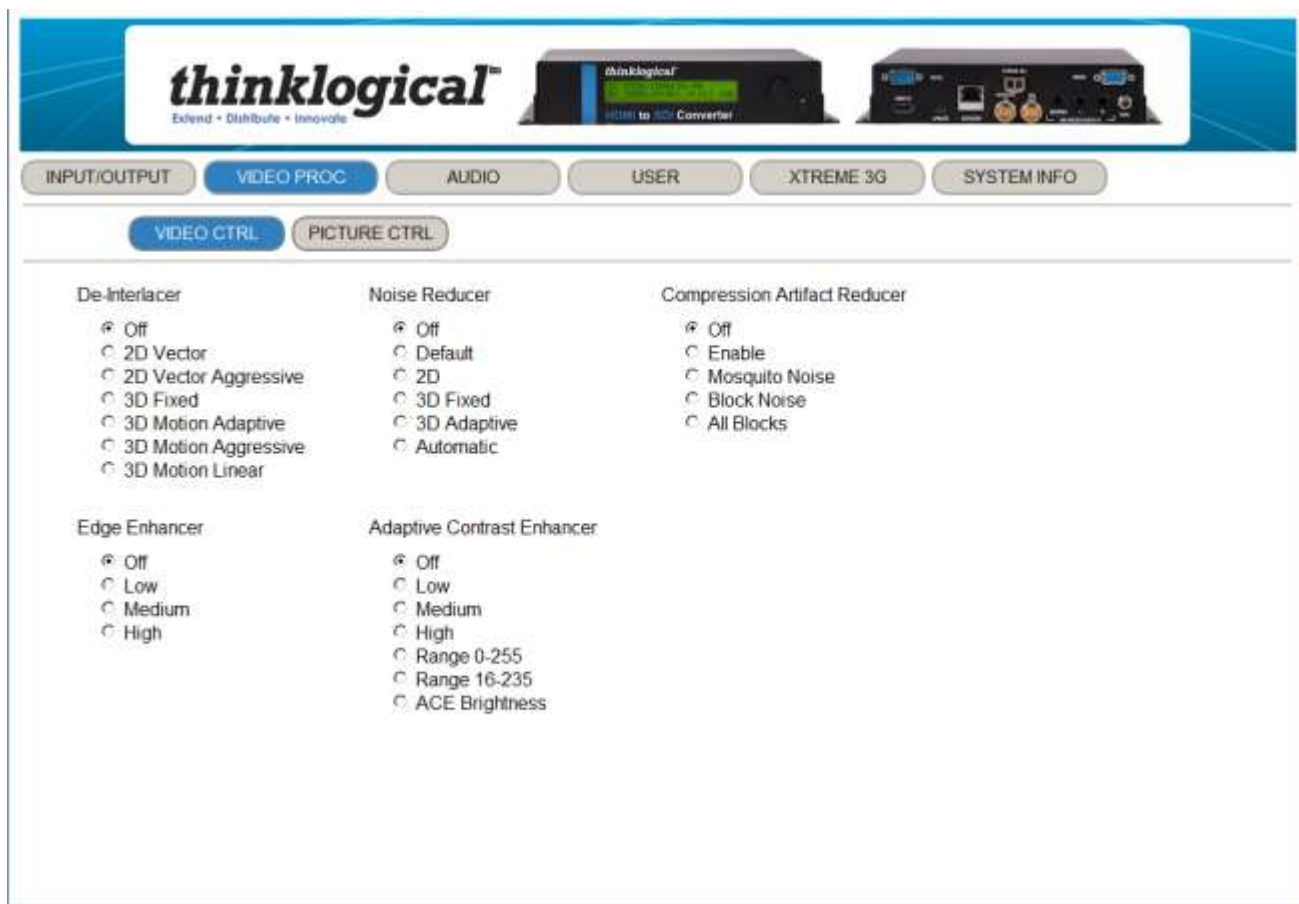
Video Processor > Picture Control

The picture control sub-menu allows you to control Hue Saturation, Advanced Color Remapping, Flesh Tone Correction and Color Temperature. You can also reset all levels back to the factory default.

Audio

The audio menu allows you to select which output audio channel is sourced with any input audio channel. It also allows you to enter an audio delay (from -50 ms to +50 ms) when needed.

User

The user menu allows you to save your current configuration by name or restore factory configuration. You can also use the drop down menu to "Select Config Name" and set power on configuration (which sets the current configuration to be the default power on configuration), restore factory configuration and delete the selected configuration.

Xtreme 3G

The Xtreme 3G menu is valid only if the Xtreme 3G+Extension Option is installed. This menu allows you to view the Xtreme 3G Module and 3G SFP information of the unit in use. From this menu, you can also change the communication behavior of the RS-422 by selecting "Toggle DCE/DTE".

System Info

The system info menu allows you to view information for the inputs and outputs as well as Genlock and software and firmware versions.

Input Locked			Output Locked	
Video Format	1920x1080p @ 25.00(HDMI)		Video Format	1080i60(HD) 4:2:2 10b
Active Clocks per Line	1920		Words per Active Line	1920
Clocks per Line	2640		Total Words per Line	2200
Horizontal Freq	281		Lines per Active Frame	540
HSync Width	44		Total Lines per Frame	1125
Interlaced	0		Progressive	0
Pixel Frequency	74.36MHz		PSF	0
Total Lines	1920		Rate Select	HD
Vertical Frequency	250		1.000 or 1.001	1.000
VSync Front Porch	4		Data Stream 1 VPID	0x00 0x00 0x00 0x00

Version Information			Genlock off	
FPGA Version	0x0002		Video Format	
Software Version	52 02		Reference Present	
Linux Version	S2H V1.00		Reference Locked	
GUI Version	H2S.01.03		FSync Clock Present	
			VSync Clock Present	
Temperature	132 F (56 C)		HSync Clock Present	
IP Address	192.168.075.200		Genlock Verification	
Mask	255.255.255.000			
Gateway	192.168.075.253			

APPENDIX C: Front Panel Display and RS-232

Front Panel Display

Front panel encoder knob is an easy way to quickly configure the unit without the need for any other communication interfaces. The encode knob is used to cycle through the different configuration/settings menus. Pressing the encoder knob will either enter into a new lower-layered menu or commit the selection.

The configured Input and Output settings are displayed on the Front Panel LCD. If no signal is present at the time of power up, the display will read "Not Configured" for both the Input and Output. Pressing the encoder knob once will display the product description and the 7 different main menus as the knob is turned. If the encoder is not pushed or turned in 20 seconds, the screen will go back to the top level.

Most commands will have a confirmation message displayed that shows acknowledgement of the command. Due to the limited amount of data that can be displayed via the LCD, not all detailed data can be displayed. It is suggested to either use the RS-232 or Ethernet interface for such queries.

Front panel LCD with encode knob

RS-232 Interface

The RS-232 and RS-422 interface menus will have an **'exit'** option. Selecting this option will display the menu items one level up. The **SPACE** bar will repeat the current menu and the **ENTER** key will return the user to the top level menu. This document will be formatted similar to how the configuration menus are displayed on power-up.

The RS-232 setup and configuration is as follows:
- Use Hyperterm or similar type interface.
- Baud rate is 115200, 8 bits, no parity, 1 stop bit, no flow control
- Emulate VT-100 mode

MAIN USER MENU:
  A: Set Input Select
  B: Set Output Select
  C: Video Processing Setup
  D: Audio Info and Setup
  E: User Config Setups
  F: System Settings
  G: System Information

MAIN MENU A: Set Input Select

⚠ **Note:** **A valid input must be applied in order for the configuration to be used.**

a: AUTO mode ON
Detects when a video source has changed format. On cable insertion, the unit performs a re-configuration of the last known output setting with the new input. This is the default mode.

b: AUTO Mode OFF
Turns off the AUTO mode.

MAIN MENU B: Set Output Select
Selects the output format of the SDI video. Default is 1080i @ 60

a: Standard Def. Output
Selects the menu for Standard Definition video output format.

> **SUB-MENU a: Standard Def. Output**
> Selects a SD output format type of the selected resolutions:
> **a:** 480i @ 59.94 (525-270)
> **b:** 576i @ 50 (625–270)

b: High Definition Output
Selects the menu for High Definition video output format.

> **SUB-MENU b: High Definition Output**
> Selects a HD output format type of the selected resolutions:
> **a:** 720p @ 23.97
> **b:** 720p @ 24
> **c:** 720p @ 25
> **d:** 720p @ 29.97
> **e:** 720p @ 30
> **f:** 720p @ 50
> **g:** 720p @ 59.94
> **h:** 720p @ 60
> **i:** 1035i @ 59.94
> **j:** 1035i @ 60
> **k:** 1080i @ 50
> **l:** 1080i @ 59.94
> **m:** 1080i @ 60
> **n:** 1080p @ 23.97
> **o:** 1080p @ 24
> p: 1080p @ 25
> **q:** 1080p @ 29.97
> **r:** 1080p @ 30
> **s:** 1080psf @ 23.97

t: 1080psf @ 24
                    u: 1080psf @ 25
                    v: 1080psf @ 29.97
                    w: 1080psf @ 30

⚠️ **Note: All HD outputs are 10 bit YCbCr 4:2:2**

c: 3G Level A Output
    Selects the menu for 3G Level A video output format.

        <u>**SUB-MENU c: 3G Level A Output**</u>
        Selects a 3G Level A output format type of the selected resolutions:
                    a: 1080i @ 50
                    b: 1080i @ 59.94
                    c: 1080i @ 60
                    d: 1080p @ 23.97
                    e: 1080p @ 24
                    f: 1080p @ 25
                    g: 1080p @ 29.97
                    h: 1080p @ 30
                    i: 1080p @ 50   4:2:2 10b
                    j: 1080p @ 59.94   4:2:2 10b
                    k: 1080p @ 60   4:2:2 10b
                    l: 1080sf @ 23.97
                    m: 1080sf @ 24
                    n: 1080sf @ 25
                    o: 1080sf @ 29.97
                    p: 1080sf @ 30

1080p50, 1080p59.94, and 180p60 can only be YCbCr 4:2:2 10 bit. All other resolutions will proceed to a sub-menu for color space and bit width selection.

d: 3G Level B Output
    Selects the menu for 3G Level B video output format.

        <u>**SUB-MENU d: 3G Level B Output**</u>
        Selects a 3G Level B output format type of the selected resolutions:
                    a: 1080i @ 50
                    b: 1080i @ 59.94
                    c: 1080i @ 60
                    d: 1080p @ 23.97
                    e: 1080p @ 24
                    f: 1080p @ 25
                    g: 1080p @ 29.97
                    h: 1080p @ 30
                    i: 1080p @ 50   4:2:2 10b
                    j: 1080p @ 59.94   4:2:2 10b
                    k: 1080p @ 60   4:2:2 10b
                    l: 1080sf @ 23.97

> **m:** 1080sf @ 24
> **n:** 1080sf @ 25
> **o:** 1080sf @ 29.97
> **p:** 1080sf @ 30

1080p50, 1080p59.94, and 1080p60 can only be YCbCr 4:2:2 10 bit. All other resolutions will proceed to a sub-menu for color space and bit width selection.

Menu after 3GA / 3GB resolution selection:

Output DL/3G Color Space/Bits Menu
Selects the output color space (YCbCr or RGB) and the bit width (10 or 12 bits):

> **a:** YCbCr 4:4:4 10b
> **b:** YCbCr 4:4:4 10b
> **c:** YCbCr 4:4:4 10b
> **d:** RGB   4:4:4 10b
> **e:** RGB   4:4:4 10b

MAIN MENU C: Video Processing Setup

a: Comp. Artifact Reducer
Selects the menu for Component Artifact Reducer (CAR) video processing functions.

SUB-MENU a: Comp. Artifact Reducer
This feature is used to reduce compression artifacts that are caused by video compression schemes such as MPEG2. Mostly used on YCbCr 4:2:2 interlaced or progressive input video.

> **a: Comp. Arti. Reducer EN**
> Enables the Compression Artifact Reducer.

> **b: Mosq. Noise Reducer EN**
> Enables the Mosquito (Ringing) Noise Reducer.

> **c: Block Noise Reducer EN**
> Enables the Block (8x8) Noise Reducer.

> **d: Non Std Block Noise Det EN**
> Enables the Non-Standard Block Detection.

> **e: Enable All CAR Blocks**
> Enables All the above (A,B,C,D) Noise Reduction Blocks.

> **f: Disable All CAR Blocks**
> Disables All the Noise Reduction Blocks.

b: DeInterlacer
Selects the menus for the DeInterlacer (DEINT) video processing functions.

SUB-MENU b: DeInterlacer
Selects the menu for the DeInterlacer (DEINT) video processing functions.

a: Deinterlacer BYPASS
Bypasses the deinterlacer (input is progressive).

b: Deint 2D VECTOR
Sets the Interlacer for 2D Vector mode (Interlaced input DEFAULT mode).

c: Deint 2D VECTOR AGGRES.
Sets the Interlacer for 2D Aggressive mode (Interlaced input).

d: Deinterlacer DEFAULT
Sets the Interlacer for DEFAULT mode.

c: Noise Reducer
Selects the menus for the Noise Reduction (NR) video processing functions.

SUB-MENU c: Noise Reducer
Selects the menus for the Video Noise Reduction (NR) video processing functions. Used mostly on YCbCr 4:2:2 Input video.

a: Noise Reducer DISABLE
Disables the Noise Reduction block.

b: Noise Reducer 2D
Sets the Noise Reducer for 2D (Spatial) mode.

c: Noise Reducer 3D Fixed
Sets the Noise Reducer for 3D Fixed (Temporal) mode.

d: Noise Reducer 3D Adapt
Sets the Noise Reducer for 3D Adaptive (Temporal) mode.

e: Noise Reducer Default
Sets the Noise Reducer for Default mode.

f: Noise Reducer Automatic
Sets the Noise Reducer for Automatic mode.

d: Picture Control
Selects the menus for Picture Control (PC) video processing functions.

SUB-MENU d: Picture Control

a: Set All Levels Default
Restores Contrast, Brightness, Tint, Black, Color Temp levels to defaults.

b: Set Contrast Level
Enter the Contrast Level 0 to +10. The Default value is 10.

c: Set Brightness Level
Enter the Brightness Level -100 to +100. The Default value is 0.

d: Set Tint Level
Enter the Tint Level -180 to +180. The Default value is 5.

e: Set Black Level
Enter the Black Level 0 to +100. The Default value is 0.

f: Set Color Temperature

SUB MENU f: Video Set Color Temperature Menu

a: Color Temperature NORMAL
Sets the color temp to 6500.

b: Set Color Temperature COOL
Sets the color temp to 8000.

c: Color Temperature WARM
Sets the color temp to 6000.

d: Color Temperature CUSTOM
Enter Color Temp Level 6000 to 8000 (Normal = 6500)

e: Edge Enhancer
Selects the menus for Edge Enhancement (EE) video processing functions.

SUB-MENU e: Edge Enhancer
Selects the menus for Edge Enhancement (EE) video processing functions.
a: Edge Enhancer OFF
b: Edge Enhancer LOW
c: Edge Enhancer MED
d: Edge Enhancer HIGH

f: Color Management Unit
Selects the menus for Color Management Unit (CMU) video processing functions.

SUB-MENU f: Color Management Unit
Selects the menus for Color Management Unit (CMU) video processing functions.

a: Hue Saturation Menu
    a: Hue Saturation ENABLE
    b: Hue Saturation DISABLE
    c: Intelligent Saturation ENABLE
    d: Intelligent Saturation DISABLE
    e: Set HUE Saturation Level
    f: Set HUE Global Sat. Level
    g: ICR Advanced Menu

⚠️ **Note: Hue saturation needs to be enabled (selection 'a') in order for 'Set HUE Saturation Level' (selection 'e') to be valid.**

b: Qdeo True Color Menu
    a: Qdeo True Color OFF
    b: Qdeo True Color SOFT
    c: Qdeo True Color GENTILE
    d: Qdeo True Color MEDIUM
    e: Qdeo True Color HIGH

c: Film Grain Gain Menu
    a: Disable Film Grain Gain
    b: Set Film Grain Gain
     Range is 0 - 255. Default is 0.
    c: Set FGG Temporal Freq.
     Range is 0 - 255. Default is 0.
    d: Flesh Tone Correction
        a: Set FTDC Preset Enable
        b: Set FTDC Preset Level 1
        c: Set FTDC Preset Level 2
        d: Set FTDC Preset Level 3
    e: Set FTDC Preset Level 4
    f: Set FTDC Preset Level 5
    g: Set FTDC Preset Level 6
    h: Set FTDC Preset Disable
    e: Set GAMMA Menu
        a: GAMMA Disable
        b: GAMMA 1.8
        c: GAMMA 2.5
        d: GAMMA S-Curve Light
        e: GAMMA S-Curve Dark

g: Adapt. Contrast Enhancer
Selects the menus for the Adaptive Contrast Enhancer (ACE) video processing functions.

> **SUB-MENU g: Adapt. Contrast Enhancer**
> Selects the menus for the Adaptive Contrast Enhancer (ACE) video processing functions.
>
> > **a: ACE PRESET OFF**
> > **b: ACE PRESET LOW**
> > **c: ACE PRESET MEDIUM**
> > **d: ACE PRESET HIGH**
> > **e: ACE PRESET RANGE 0-255**
> > **f: ACE PRESET RANGE 16-235**
> > **g: ACE Brightness Menu**
> > > **a: Brightness DISABLE**
> > > **b: Brightness DEFAULT**
> > > **c: Brightness Taper Size**
> > > Enter Taper Size (16, 32, 64, 128, 256, 512).
> > > **d: Brightness Taper Side**
> > > Enter Taper Side Select (1,2).
> > > **e: Brightness Enhancement**
> > > Enter Enhancement Level (1-15).
> > > **f: Brightness Threshold 1**
> > > Enter Threshold 1 Level (0-1023).
> > > **g: Brightness Threshold 2**
> > > Enter Threshold 2 Level (0-1023).

MAIN MENU D: Audio Info and Setup

a: Enable Audio Output
Enables the embedded audio output from the selected input.

b: Disable Audio Output
Mutes all embedded audio output channels.

c: Audio Source Menu
Menu to select either embedded audio, balanced audio, or AES/EBU audio.

d: Get Audio Input Info
Displays Information about the Input audio.

e: Set Audio Delay
Audio Delay range is from -50 - +50 in mS with the default being 0.

f: Get Audio Delay
The programmed Audio Delay in mS.

g: Get Audio Channel Cfg.
Get the audio channel mapping.

h: Assign Audio Channels
   Configure input to output channel configuration.

i: Swap Audio Left/Right
   Swap the left and right channels on any of the four enbedded audio groups.

j: Get Audio Left/Right Swap
   Displays the swap status of the 4 embedded audio groups.

k: Set Analog Audio Gain
   Adjust the gain on the balanced audio pair for left and right channels.

l: Get Analog Audio Gain
   Displays the gain of the left and right channels.

MAIN MENU E: User Config Setups

a: Save Current Config
   Saves the current system settings to the non-volatile Memory. Maximum of 20 characters for the record name.

b: Set Power On Config
   This option will set the current configuration to the user in-accessable region of flash. This configuration is restored during power up.

c: Restore Config Record
   Recall any one of the current saved configuration records.

d: Restore Factory Config
   By selecting this, the HDMI to SDI Converter will delete the stored power on configuration. Configuration and will re-configure to the factory default on the next power cycle (1080i @ 60 Hz).

e: Erase Record(s)
   Erase a particular record or all records.

MAIN MENU F: System Settings

a: Enable Genlock
   Enables the genlock feature (Valid signal needs to be applied).

b: Disable Genlock
   Disables genlock. Genlock needs to be disabled before changing output settings.

c: Ethernet Settings
   Settings for the network interface.

d: Front Panel Contrast Settting
   Adjusts the LCD contrast.

e: Toggle RS422 DCE/DTE
Changes the communication behavior of the RS422 (Valid only if EXtreme 3G+ option is installed).

<u>**MAIN MENU G: System Information**</u>
The following is used for retrieving information regarding current setup and signal detection information. The 'Get Input Info', 'Get Output Info' will display the signal format only on the Front Panel whereas the other communications interfaces will display more verbose information.

a: Get Software Version
Displays the System's software version number

b: Get FPGA Version
Displays FPGA version number

c: Get LINUX Version
Displays the version of software running on the Ethernet device.

d: Get Local Temperature
Displays the temperature inside the box

e: Get Input Info
Displays Information about the video and embedded audio signal on BNC Input.

f: Get Output Info
Displays Information about the video and embedded audio signal on SDI Output.

g: Get Genlock Info
Displays Information about the Genlock status.

h: Get Xtreme 3G Info
Displays Information about the Xtreme 3G transmit card (If installed).

APPENDIX D: Ordering Information

HDC-000001   HDMI to SDI Converter
HDC-000001-LC   HDMI to SDI Converter/Extender

Optics for HDMI to SDI Converter with Xtreme 3G+ Extention
VOP-M19   HDC Optics Package Mulit-Mode, LC
VOP-S04   HDC Optics Package Single-Mode, LC