Model 2430DAC-HD
HDTV Digital to Analog Converter

Instruction Manual

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INFORMATION TO USERS IN EUROPE

NOTE

CISPR 22 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 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.

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 be used

REVISION HISTORY

REVISION	**DESCRIPTION**	**DATE**
1.0	Original Version	Jun 01
1.1	Added input to output delay specification	Jun 04

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Figures

Tables

1.   OVERVIEW

The 2430DAC-HD is a professional quality digital to analog converter for HDTV. The 2430DAC-HD supports all signal standards specified in SMPTE 240M, SMPTE 274M and SMPTE 296M.

DIP switch control allows the user to select between YPrPb, RGB or VGA style analog outputs with a variety of sync output options. User controlled 4:3 alignment markers also allow for convenient framing of the video signal. With the supplied VGA to BNC breakout cable the 2430DAC-HD can easily interface to either standard broadcast monitors or VGA computer monitors.

Features:
- Support for all SMPTE 240M, 274M and 296M video formats
- Full 10 Bit Broadcast quality
- 4:4:4 interpolated component output
- DIP switch selectable YPrPb, RGB or VGA outputs with bi-level or tri-level sync
- 15 pin VGA connector plates for use with VGA computer monitors
- Front panel LEDs indicate video presence, module faults
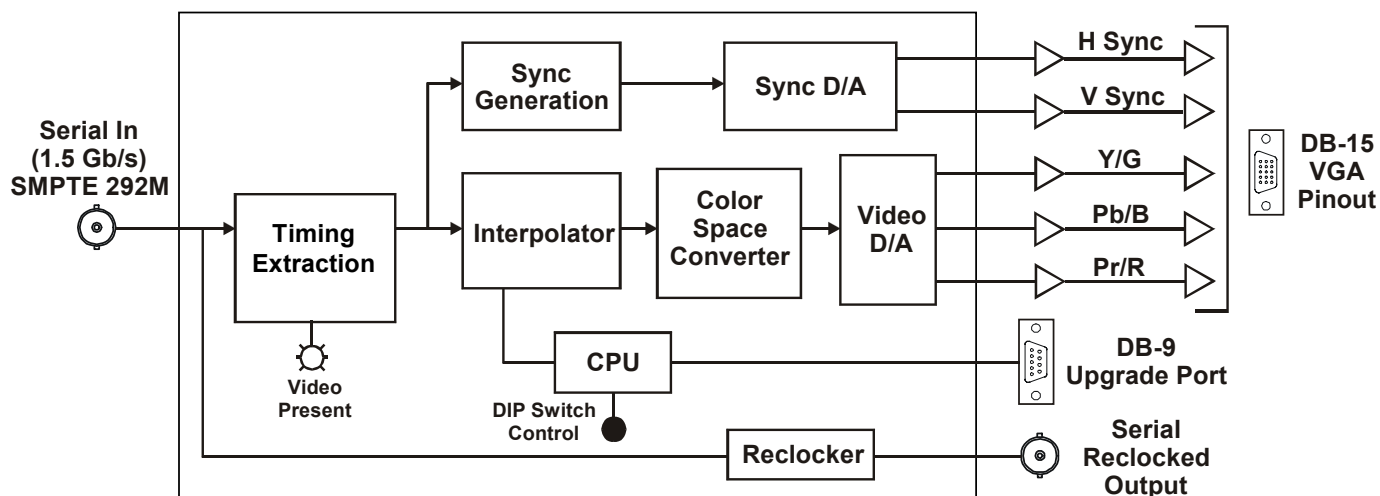
Figure 1: 2430DAC-HD Block Diagram

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2.   INSTALLATION

The 2430DAC-HD is a compact module that has two BNC connectors and one high density 15 pin D connector for video, and a serial port for firmware upgrades.
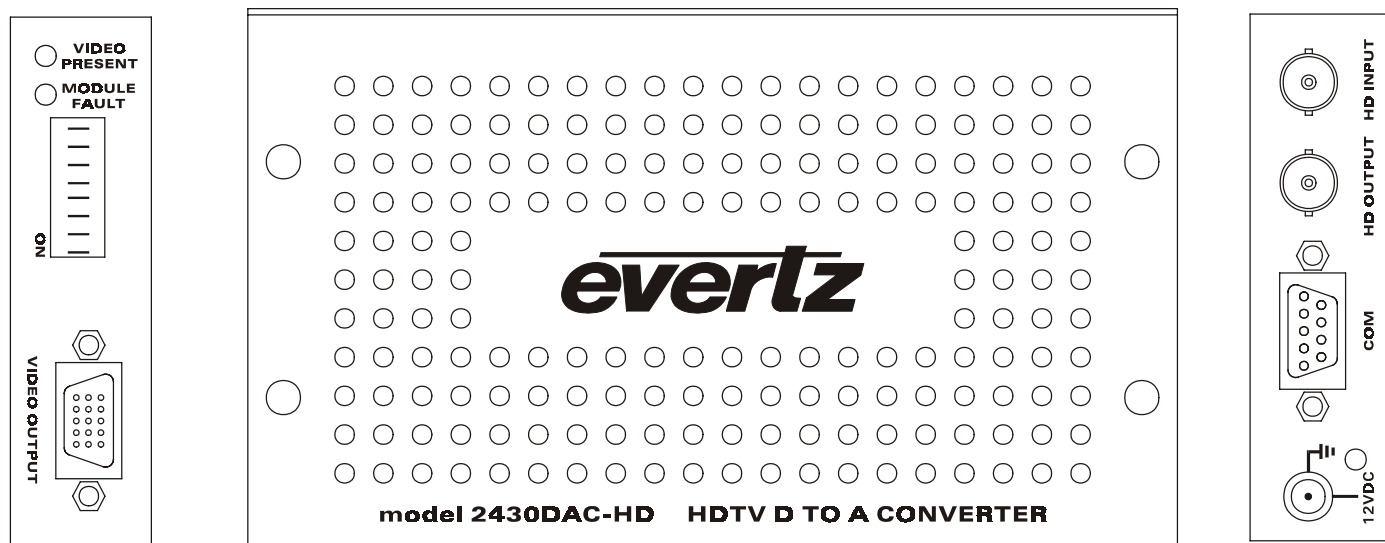
Figure 2: 2430DAC-HD Module

2.1.   POWER

The 2430DAC-HD comes with an auto-ranging DC voltage adapter that automatically senses the input voltage. Power should be applied by connecting a 3-wire grounding type power supply cord to the power entry module on the DC voltage adapter.   The power cord should be minimum 18 AWG wire size; type SST marked VW-1, maximum 2.5 m in length. The DC cable of the voltage adapter should be connected to the DC power jack on the rear panel. A green LED located beside the power connector will be illuminated when there is power applied to the 2430DAC-HD.

2.2.   VIDEO IN AND OUT

HD INPUT Input BNC connector for 10-bit serial digital video signals, compatible with the SMPTE 292M standard. The 2430DAC-HD automatically selects the video standard.

HD OUTPUT   This BNC connector is used to output a reclocked copy of the input video.

VIDEO OUTPUT   This female HD 15 pin D connector is compatible with standard VGA monitor connectors. The outputs can be programmed as standard VGA signals or Y, Pb, Pr or RGB outputs from the 2430DAC.   These outputs can have either bi-level or tri-level sync superimposed. The output signals available are selected using DIP switches 1 to 4. (See Table 4) When the VGA mode is selected you can connect a standard VGA monitor using a straight through VGA Cable. When other modes are selected you can connect a standard broadcast monitor using the 15 pin D to BNC adapter cable provided with the module.

Pin #	Name	Description
1	R	Red
2	G	Green
3	B	Blue
4	--	Not connected
5	--	Not connected
6	AGND	Video Analog Ground
7	AGND	Video Analog Ground
8	AGND	Video Analog Ground
9	--	Not connected
10	AGND	Video Analog Ground
11	AGND	Video Analog Ground
12	--	Not connected
13	Hsync	Horizontal Sync
14	Vsync	Vertical Sync
15	--	Not connected

Table 1: Video I/O Pinout

2.3.   FIRMWARE UPGRADE PORT

The **COM** connector is a female 9 pin D connector used for connecting a computer to upload firmware to the 2430DAC-HD. Table 2 shows the pinout of the male high density DB-15 connector. See section 6 for information on upgrading the firmware in the 2430DAC-HD.

Pin #	Name	Description
1		
2	TxD	RS-232 Transmit Output
3	RxD	RS-232 Receive Input
4		
5	Sig Gnd	RS-232 Signal Ground
6		
7		
8		
9		

Table 2: COM Port Pinout

3. SPECIFICATIONS

3.1. VIDEO INPUT

Standard: 1.485 Gb/sec SMPTE 292M
Standards supported are:
SMPTE 240M (1035i)
SMPTE 274M (1080i, 1080psF, 1080p [except 1080p/60 and 1080p/59.94]
SMPTE 296M. (720p)
Connector: 1 BNC per IEC 60169-8 Amendment 2.
Equalization: Automatic 125m @ 1.5Gb/s (Belden 1694)

3.2. RE-CLOCKED HD SERIAL VIDEO OUTPUT

Number of Outputs: 1
Standard: same as input
Connectors: BNC per IEC 60169-8 Amendment 2
Signal Level: 800mV nominal
DC Offset: 0V ±0.5V
Rise and Fall Time: 200ps nominal
Overshoot: <10% of amplitude
Wide Band Jitter: < 0.2 UI

3.3. ANALOG VIDEO OUTPUTS

Standard: SMPTE 240M, 274M, or 296M – same as input
Connector: 15 pin high density female D type
Signal Level:
    Video: 1Vpp nominal YPrPb/RGB or 0.7Vpp nominal VGA - Selectable as per Table 4
    Sync: 300mV or 4V
Impedance: 75 ohm
DC Offset: 0V ±0.1V
Return Loss: > 45 dB up to 30 MHz

3.4. INPUT TO OUTPUT PROCESSING DELAY

Processing Delay: 800nsec

3.5. UPGRADE PORT

Standard: RS-232
Connector: Female DB-9
Baud Rate: 57600
Format: 8-bits, no parity, 1 stop bits

3.6. ELECTRICAL

Voltage: + 12VDC
Power: 6 Watts.
EMI/RFI: Complies with FCC regulations for class A devices.
Complies with EU EMC directive.

3.7. PHYSICAL

Dimensions: 6" L x 3.5" W x 1" H
(152mm L x 89mm W x 25mm H)
   With Mounting Flanges: 6" L x 4" W x 1" H
(152mm L x 114mm W x 25mm H)
Weight: 0.5 lbs. (0.28 Kg)

4. STATUS LEDS

The location of the status LEDs is shown in Figure 2.

MODULE FAULT This Red LED will be on when input video is lost or there is a fault in the module.

VIDEO PRESENT: This Green LED will be On when there is a valid HDTV video signal present at the module input.

POWER This Green LED will be on when there is power applied to the unit. (Located beside DC power connector)

5. USER CONTROLS

The 2430DAC-HD is equipped with an 8 position DIP switch to allow the user to select various output signals available formats. The On position is down, or closest to the printed circuit board. . Table 3 gives an overview of the DIP switch functions.

DIP Switch	Function
1	
2	Video Output signal select
3	
4	
5	Aspect Ratio Marker enable
6	Not used
7	Not used
8	Not used

Table 3: DIP Switch Functions

5.1.   SELECTING THE OUTPUT SIGNAL FORMATS

When the 2430DAC is operating in the single link 4:2:2 mode, (DIP switch 6 Off) DIP switches 1 to 4 are used to select the combination of output signals present on the video output connectors as shown in Table 4.   When using the VGA output mode, the VGA monitor must have sufficient resolution and vertical resolution to display the input video. Table 5 shows the minimum VGA monitor requirements for each video format supported by the 2430DAC-HD.

DIP Switch*				Description	Pr / R	Y / G	Pb / B	Sync
1	2	3	4					
Off	Off	Off	Off	YPrPb with Tri Level	Pr + Tri-level Sync	Y + Tri-level Sync	Pb + Tri-level Sync	Tri-level Sync
On	Off	Off	Off	YPrPb with Bi Level	Pr + Bi-level Sync	Y + Bi-level Sync	Pb + Bi-level Sync	Bi-level Sync
Off	**On**	Off	Off	RGB with Tri Level	R+ Tri-level Sync	G + Tri-level Sync	B + Tri-level Sync	Tri-level Sync
On	**On**	Off	Off	RGB with Bi Level	R + Bi-level Sync	G + Bi-level Sync	B + Bi-level Sync	Bi-level Sync
Off	Off	**On**	Off	RGB Tri Level on G	R	G + Tri-level Sync	B	Tri-level Sync
On	Off	**On**	Off	RGB Bi Level on G	R	G + Bi-level Sync	B	Bi-level Sync
Off	**On**	**On**	Off	VGA	R	G	B	H & V Sync
On	**On**	**On**	Off	RGB Tri Level Ext.	R	G	B	Tri-level Sync
Off	Off	Off	**On**	RGB Bi Level Ext.	R	G	B	Bi-level Sync

Table 4: Video Output Selection Switch Settings

Video Format	Minimum Horizontal Resolution	Minimum Vertical Resolution	Minimum Vertical Refresh Rate	Minimum Horizontal Refresh Rate
1080i/60 (59.94)	1920 dots	1080 lines	60 (59.94) Hz	33.75 (33.72) kHz
1080i/50	1920 dots	1080 lines	50 Hz	28.1 kHz
1080p/24sF (23.98)	1920 dots	1080 lines	48 (47.97) Hz	27 (26.97) kHz
1035i/60 (59.94)	1920 dots	1080 lines	60 (59.94) Hz	33.75 (33.72) kHz
720p/60 (59.94)	1280 dots	720 lines	60 (59.94) Hz	45 (44.96) kHz

Table 5: Minimum VGA Monitor Requirements

5.2.   CONTROLLING THE ASPECT RATIO MARKERS

DIP switch 5 controls whether the aspect ratio markers will be enabled.

DIP 5	FUNCTION	DESCRIPTION
Off (default)	Off	The markers will be Off.
On	On	The markers will be On.

Table 6: 4:3 Marker Switch Settings

5.3.   UPGRADING THE 2430DAC-HD FIRMWARE

The 2430DAC-HD module is fitted with a COM port connector that can be connected to a PC with a straight through cable.

6.1.   REQUIREMENTS

You will need the following equipment in order to update the 2430DAC-HD Firmware
- PC with available communications port. The communication speed is 57600 baud, therefore a 486 PC or better with a 16550 UART based communications port is recommended.
- "Straight-thru" serial extension cable (DB9 female to DB9 male) or (DB25 female to DB9 male)
- Terminal program that is capable of Xmodem file transfer protocol. (such as HyperTerminal)
- New firmware supplied by Evertz.

6.2.   UPDATE PROCEDURE

6.2.1. Part 1 – Configuring the unit for Firmware upgrades

1. Connect the 9 pin male connector on the straight through serial extension cable to the COM port on the end of the 2430DAC-HD. Connect the 9 pin female connector to the PCs' RS-232 communications port

6.2.2. Part 2 – Terminal program Setup

2. Start the terminal program.

3. Configure the port settings of the terminal program as follows:

Baud	57600
Parity	no
Data bits	8
Stop bits	2
Flow Control	None

4. Apply power to the 2430DAC-HD. After the unit powers up, a banner with the boot code version information should appear in the terminal window. The cursor to the right of the word "BOOT>" should be spinning for about 5 seconds then the unit will continue to boot.

For example:

```
EVERTZ 7700PB MONITOR 1.0
COPYRIGHT 1997, 1998, 1999 EVERTZ MICROSYSTEMS LTD.
COLD BOOT |
```

5. The following is a list of possible reasons for failed communications:

- Defective 2430DAC-HD Serial Upgrade cable.
- Wrong communications port selected in the terminal program.
- Improper port settings in the terminal program. (Refer to step 7 for settings).

6. While the cursor is spinning press the <CTRL> and <X> keys on your computer keyboard at the same time, this should stop the cursor from spinning. The spinning prompt will only remain for about 5 seconds. You must press <CTRL-X> during this 5 second delay. If the unit continues to boot-up, simply cycle the power and repeat this step.

7. Hit the <ENTER> key on your computer once.

8. Type the word "upgrade", without quotes, and hit the <ENTER> key once.

9. The boot code will ask for confirmation. Type "y", without quotes.

10. You should now see a prompt asking you to upload the file.

6.2.3. Part 3 – Uploading the new firmware

11. Upload the "*.bin" file supplied using the X-Modem transfer protocol of your terminal program. If you do not start the upload within 10 minutes the 2430DAC-HD Boot code will time out. You can restart the upgrade process by removing and reinstalling the module.

12. The boot code will indicate whether the operation was successful upon completion of the upload.

    For Example:

```
UPLOAD OKAY
7700PB COLD BOOT> |
```

13. The following is a list of possible reasons for a failed upload:

    - If you get the message "transfer cancelled by remote" you must restart the terminal program and load the bin file, then remove and install the module again.
    - The supplied "*.bin" file is corrupt.
    - Wrong file specified to be uploaded.
    - The PCs' RS-232 communications port can't handle a port speed of 57600.
    - Noise induced into the 2430DAC-HD Serial Upgrade cable.

6.2.4. Part 4 – Completing the Upgrade

14. Type the word "boot", without quotes, and hit the <ENTER> key once or power cycle the unit. The unit should now reboot.

15. You can now close the terminal program and disconnect the serial cable.

The update procedure is now completed.

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