TABLE OF CONTENTS

Figures

Tables

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REVISION HISTORY

REVISION	DESCRIPTION	DATE
0.1	Preliminary Version	Mar 05
1.0	Updated safety section and added assembly and labeling sections	Aug 05
1.1	Updated specifications	Sep 05
1.2	Minor corrections throughout manual	Apr 07
1.3	Updated menu structure throughout section 4.2	Apr 09

WARNING

Never look directly into an optical fiber. Non-reversible damage to the eye can occur in a matter of milliseconds.

Do not hook up the 7707MR-HD DWDM cards directly with a short fiber optic cable. The 7707MR-HD DWDM cards produce +7dBm of power, which will damage the receiver if connected directly.

1. OVERVIEW

The 7707MR-HD is a *Vista*LINK® enabled fiber optic receiver for one HD or SD digital video signal, accompanied by four AES audio signals, serial data, and one GPIO signal. Audio and control signals are de-embedded from the HD, SD, or SDTi video signal that is applied to the optical input. The 7707MR-HD is designed to operate with a companion 7707MT-HD transmitter, to permit communication over fiber optic cable with low latency.

Monitoring and control of card status and parameters is provided locally, at the card-edge, or remotely via *Vista*LINK® capability. The wide-band optical input of the 7707MR-HD is compatible with all available 7707MT-HD transmitter wavelengths. This card occupies one card slot and can be housed in either a 1RU frame, which will hold up to three modules, or a 3 RU frame, which will hold up to 15 modules.

Features
- HD/SD video, AES audio, serial data, and GPIO conveniently presented in a single product.
- Provides de-embedding of audio and control signals from HD-SDI (SMPTE 292M), SD-SDI (SMPTE 259M-C), or SDTi (SMPTE 305.2M).
- With sample rate conversion enabled on the companion 7707MT-HD transmitter, transport of audio and control signals is independent of video interruptions other than format change.
- Controllable audio output interface for balanced or unbalanced AES.
- Bi-directional serial port accommodates RS-422, RS-232, or RS-485 data.
- Serial data rates up to 153Kb/s with low latency through link.
- Comprehensive signal and status monitoring via four-digit card-edge display, or *Vista*LINK®.
- DWDM wavelengths also available (ITU-T G.694.1 compliant).
- Accepts any optical wavelength in the1270nm to 1610nm range.
- Compatible with multi-mode and single-mode fiber (dual fiber version).
- SC/PC, ST/PC, or FC/PC fiber connector options.
- Fully hot-swappable from front of frame.
- *Vista*LINK® enabled for remote monitoring and control when installed in 7700FR-C frame with 7700FC *Vista*LINK® Frame Controller.

Several versions of the 7707MR-HD allow the user to choose the optimal function / price / performance ratio to suit a particular application. Versions with an F2 suffix transmit and receive optical over separate fibers. Versions with a W suffix transmit (1310nm) and receive (1550nm) on different wavelengths over a single fiber. Versions with no suffix transmit and receive on the same wavelength (1310nm) over a single fiber.

Table 1-1 shows some typical applications and power budget calculations for the 7707MR-HD.

FIBER TYPE	FIBERS	OPTICAL/LINK BUDGET	TRANSMIT SIDE		RECEIVE SIDE		DESCRIPTION
			ORDERING INFO	TX POWER	ORDERING INFO	Rx SENSITIVITY	
Multi-Mode	2	<1kM	7707MT13-HD-F2	-7dBm	7707MR13-HD-F2	-23dBm	1310nm on Tx & Rx fibers
Single Mode	2	16dB/45Km	7707MT13-HD-F2	-7dBm	7707MR13-HD-F2	-23dBm	1310nm on Tx & Rx fibers
Single Mode	1	9dB/25Km*	7707MT-HD	-10dBm	7707MR-HD	-19dBm	1310nm, bi-directional, one fiber
Single Mode	1WDM	20dB/57Km	7707MT-HD-W	-1dBm	7707MR-HD-W	-21dBm	1310nm/1550nm, WDM, bi-directional on one fiber
Single Mode	1CWDM	19dB/76Km**	7707MTyy-HD-F2	0dBm	7707MRxx-HD-F2	"-23dBm	Different CWDM wavelengths for Tx & Rx with 8 channel CWDM Mux/Demux**
Single Mode	1CWDM	24dB/96Km**	7707MTyy-HD-F2	0dBm	7707MRxx-HD-F2-H	"-28dBm	Different CWDM wavelengths for Tx & Rx with 8 channel CWDM Mux/Demux**,
Single Mode	1DWDM	25dB/100Km**	7707MTDyyy-HD-F2	"+7dBm	7707MRDxxx-HD-F2	"-23dBm	Different DWDM wavelengths for Tx & Rx with 8 channel DWDM Mux/Demux***
Single Mode	1DWDM	30dB/120Km***	7707MTDyyy-HD-F2	"+7dBm	7707MRDxxx-HD-F2-H	"-28dBm	Different DWDM wavelengths for Tx & Rx with 8 channel DWDM Mux/Demux***
With >20dB return loss on fiber interface				Tx Power Rx Sensitivity are nominal values ±1dBm			
** Assumes 8ch CWDM Mus/Demux loss of 3.5dB				Fiber loss = 0.35/0.25dB per Km @1310nm/1550nm			
***Assumes 8 Ch DWDM Mux/Demux loss of 5dB							

Table 1-1: 7707MR-HD Application Configuration
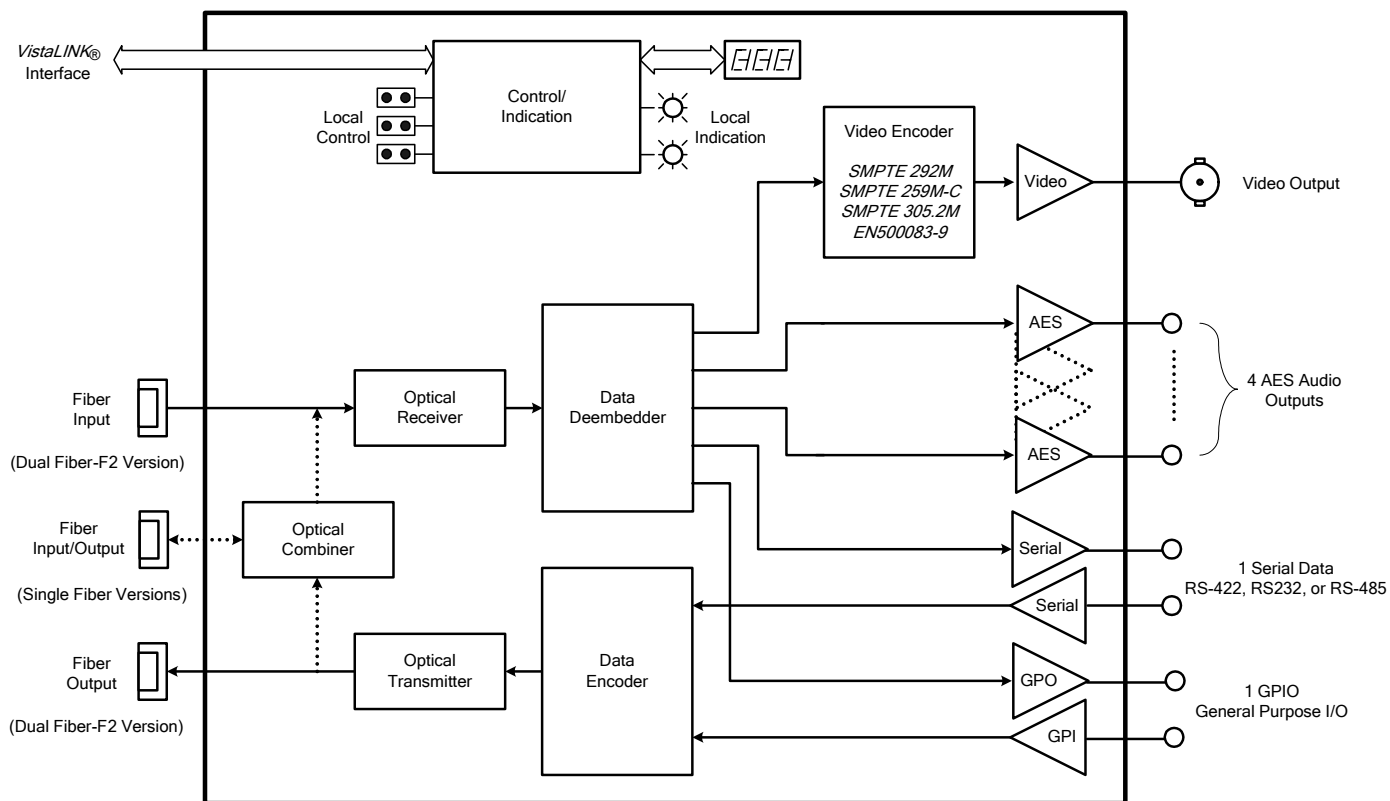
Figure 1-1: 7707MR-HD Block Diagram

2. INSTALLATION

Each 7707MR-HD module comes with a companion rear plate that has two BNC connectors, a multi-pin removable terminal block, and an SC/PC (shown), ST/PC or FC/PC optical connector. For information on mounting the rear plate and inserting the module into the frame see section 3 of the 7700FR chapter. The following diagram shows single-fiber and dual-fiber rear plate options.
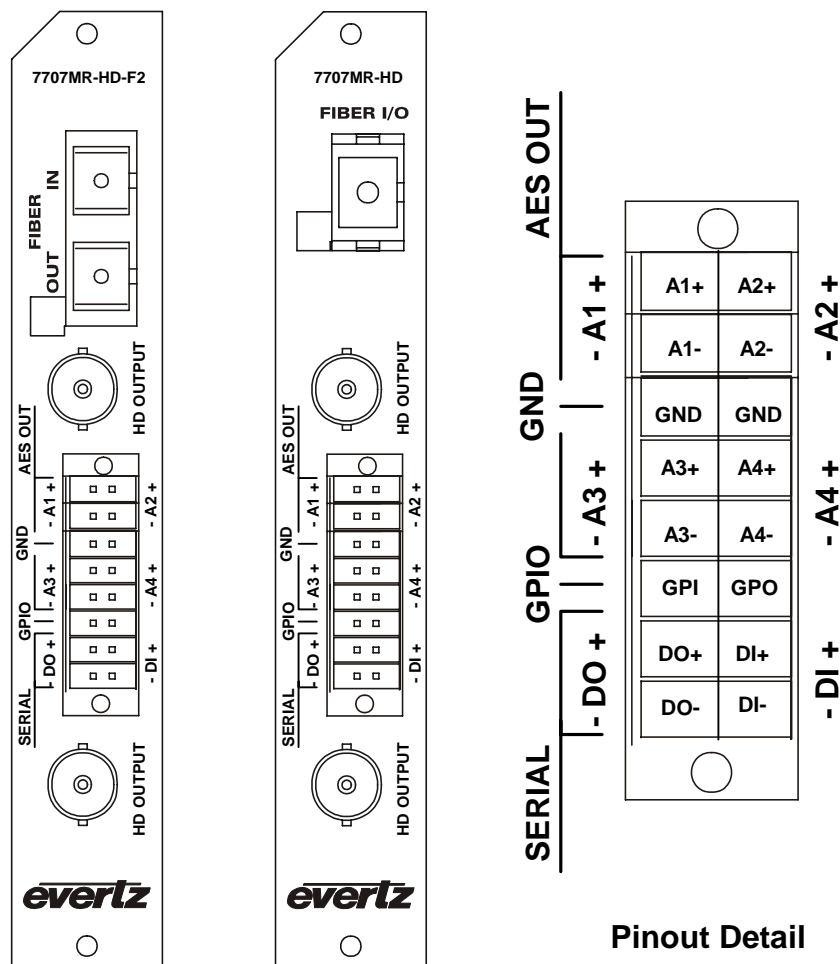
Figure 2-1: 7707MR-HD Rear Plates & Pin Out

2.1.1. Electrical Signal Connections

HD OUTPUT: Reclocked, level-restored, loop-back output BNC connectors for serial digital video signals compatible with HD-SDI (SMPTE 292M), SD-SDI (SMPTE 259M-C), and SDTi (SMPTE 305.2M) standards. See section 3.1 for video output specifications. The 7707MR-HD maintains active output video while optical input video is not suitable for transmission (LINK…ERR or STD…ERR condition. See section 4.2.1). In this case, active picture will be black.

AES OUTPUT: AES audio output connections of the removable terminal block. The 7707MR-HD has four AES audio outputs, designated as A1, A2, A3, and A4. Each of these four channels has a positive and negative terminal associated with it, and is able to output balanced or unbalanced AES. See section 0 for details about configuring the output type. Balanced and unbalanced audio signals are connected as follows:

Balanced - Connect positive and negative audio signals to the corresponding positive and negative terminals of the 7707MR-HD. Signal amplitude, rise/fall times, and impedance are automatically adjusted to match balanced AES specifications when the output type is configured through the card-edge menu.

Unbalanced - Connect unbalanced audio signals to the positive output terminal of the 7707MR-HD. Leave the negative output terminal unconnected. Signal amplitude, rise/fall times, and impedance are automatically adjusted to match unbalanced AES specifications when the output type is configured through the card-edge menu.

See section 3.2 for AES audio output specifications.
See section 0 AES audio output type configuration instructions.

SERIAL I/O: Bi-directional serial data connections of the removable terminal block. The 7707MR-HD accommodates one channel of RS-422, RS-232, or RS-485 serial data. Data input connections are labeled DI, while data output connections are labeled DO. The card must be configured for use with RS-422, RS-232, or RS-485, as described in section 4.2.9. Serial data connections are assigned per the data type selected. RS-422, RS-232, and RS-485 signals are connected as follows:

RS-422 - Connect positive and negative RS-422 input and output signals to the corresponding positive and negative terminals of the 7707MR-HD. Bi-directional data will be communicated to and from the companion 7707MT-HD.

RS-232 - Connect each RS-232 input data signal to the positive or negative DI terminal of the 7707MR-HD. The companion 7707MT-HD will output each signal on the corresponding positive or negative DO terminal. Likewise, serial data signals applied to the companion 7707MT-HD will be output from the 7707MR-HD.

RS-485 - Operation with RS-485 requires that DI and DO terminals be connected together. The DI+ terminal should be connected to the DO+ terminal, and the DI- terminal should be connected to the DO- terminal. Connect positive and negative RS-485 signals to the corresponding positive and negative terminals of the 7707MR-HD. Bi-directional data will be communicated to and from the companion 7707MT-HD.

See section 3.3 for serial data specifications.
See section 4.2.9 to 4.2.14. for serial data configuration instructions.

GPIO: General Purpose Input and Output connections of the removable terminal block. The General Purpose Output is a normally-open dry-contact relay closure. The General Purpose Input is an active-low, opto-isolated connection.

See section 3.4 and 3.5 for GPIO specifications.

2.1.2. Optical Signal Connections

For details about link operation, see sections 4.1 and 4.2.

2.1.2.1. Single Fiber Version

FIBER I/O: This is the optical input/output of the single-fiber 7707MR-HD version of the module. The connector is a female SC/PC (shown), ST/PC, or FC/PC connector as specified at the time of purchase. This input/output should be connected to the FIBER I/O connector of a companion single-fiber 7707MT-HD module with a suitable fiber optic cable.

Single-fiber versions of the 7707MR-HD are designed to work with single-mode fiber optic cable. Single fiber 7707MR13-HD versions use 1310nm wavelengths. Single fiber 7707MR13M-HD-W versions transmit and receive on 1310nm and 1550nm wavelengths respectively.

The optical output can be configured to operate in continuous or discontinuous mode as described in section 4.2.6. If discontinuous mode is selected, while the optical input to the 7707MR-HD is invalid (LINK…LOS condition, section 4.2.1) then this optical output will be disabled. If continuous mode is selected, while the optical input is invalid then this optical output will contain invalid information, but will still output.

2.1.2.2. Dual Fiber Versions

FIBER IN: This is the optical input to the dual-fiber 7707MR-HD-F2 version of the module. The connector is a female SC/PC (shown), ST/PC, or FC/PC connector as specified at the time of purchase. This input should be connected to the FIBER OUT connection of a companion dual-fiber 7707MT-HD-F2 module with a suitable fiber optic cable. The dual fiber 7707MR-HD-F2 version accepts input wavelengths from 1270nm to 1610nm, accommodating standard, CWDM or DWDM transmission schemes. When connected directly to a companion dual-fiber module, the 7707MR-HD-F2 is compatible with multi-mode fiber optic cable. If not connected directly (i.e. connected through CWDM, DWDM, WDM, or splitter/combiner) the 7707MR-HD-F2 is compatible only with single-mode fiber optic cable.

FIBER OUT   This is the optical output of the dual-fiber 7707MR-HD-F2 version of the module. The connector is a female SC/PC (shown), ST/PC, or FC/PC connection as specified at the time of purchase. This optical output is available in 1310nm, 1550nm, and up to sixteen CWDM wavelengths (ITU-T G.694.2 compliant). This output should be connected to the FIBER IN connector of a companion dual-fiber 7707MT-HD-F2 module with a suitable fiber optic cable. The output wavelength is marked on the rear panel of each 7707MR-HD-F2. When connected directly to a companion dual-fiber module, the 7707MR-HD-F2 is compatible with multi-mode fiber optic cable. If not connected directly (i.e. connected through CWDM, DWDM, WDM, or splitter/combiner) the 7707MR-HD-F2 is compatible only with single-mode fiber optic cable. The optical output can be configured to operate in continuous or discontinuous mode as described in section 4.2.6.

If discontinuous mode is selected, while the optical input to the 7707MR-HD is invalid (LINK…LOS condition, section 4.2.1) then this optical output will be disabled. If continuous mode is selected, while the optical input is invalid then this optical output will contain invalid information, but will still output.

2.2. CARE AND HANDLING OF OPTICAL FIBER

2.2.1. Safety

CLASS 1 LASER PRODUCT
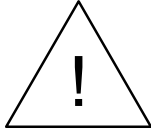
Background colour: yellow
Triangular band: black
Symbol: black

2.2.2. Assembly

Assembly or repair of the laser sub-module is done only at Evertz facility and performed only by qualified Evertz technical personnel.

2.2.3. Labeling

Certification and Identification labels are combined into one label. As there is not enough room on the product to place the label it is reproduced here in the manuals.

- There is no date of manufacture on this label as it can be traced by bar code label placed on the Printed circuit board of each Evertz plug-in module
- The Model number is one of: 7707MR13-HD, 7707MR13L-HD-W, 7707MR13-HD-F2
  7707MRxx-HD, (xx = 27, 29, 31, 33, 35, 37, 43, 45, 47, 49, 51, 53, 55, 57, 59, 61)
  7707MRDyyy-HD (Dyyy represents ITU Grid Channel: D200, D210, D220, D230, D240, D250, D260, D270, D280, D290, D300, D310, D320, D330, D340, D350, D360, D370, D380, D390, D400, D410, D420, D430, D440, D450, D460, D470, D480, D490, D500, D510, D520, D530, D540, D550, D570, D580, D590, D600)
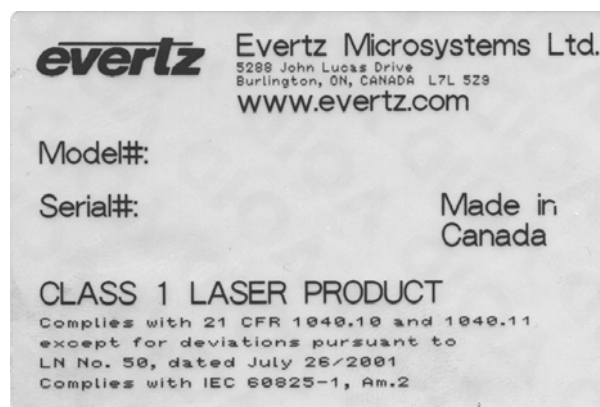
Figure 2-2: Reproduction of Laser Certification and Identification Label

2.2.4. Handling and Connecting Fibers

> **Never touch the end face of an optical fiber. Always keep dust caps on optical fiber connectors when not connected and always remember to properly clean the optical end face of a connector before making a connection.**

The transmission characteristics of the fiber are dependent on the shape of the optical core and therefore care must be taken to prevent fiber damage due to heavy objects or abrupt fiber bending. Evertz recommends that you maintain a minimum bending radius of 5 cm to avoid fiber-bending loss that will decrease the maximum attainable distance of the fiber cable. The Evertz fiber optic modules come with cable lockout devices, to prevent the user from damaging the fiber by installing a module into a slot in the frame that does not have a suitable I/O module. For further information about care and handling of fiber optic cable see section 3 of the Fiber Optics System Design section of this manual binder.

3.   SPECIFICATIONS

3.1.   SERIAL DIGITAL VIDEO OUTPUT

Number of Outputs:	2
Standards:	SMPTE 292M (HD-SDI), SMPTE 259M-C (SD-SDI), SMPTE305.2M (SDTi)
Connector:	BNC per IEC 61169-8 Annex A
Signal Level:	800mV Nominal
DC Offset:	0V $\pm$ 0.5V
Rise Fall Time:	150ps nominal @1.485Gb/s
	600ps nominal @270Mb/s
Overshoot:	<10% of amplitude
Return Loss:	>15dB up to 1.5Gb/s
Wide Band Jitter:	<0.2UI

3.2.   AES AUDIO OUTPUTS

Number of Signals:	4 (user selectable for balanced or unbalanced)
Standards:	AES3-2003 (Balanced AES), SMPTE 276M (Unbalanced AES)
Connector:	12 pin removable terminal strip
Sampling Rate:	48KHz
Resolution:	up to 24 bits
Signal Level:	
Balanced:	1Vp-p $\pm$0.1V
Unbalanced:	2Vp-p $\pm$0.1V Differential
Rise/Fall Times:	
Balanced:	20ns $\pm$5ns
Unbalanced:	35ns $\pm$5ns
Return Loss:	> 15dB to 6MHz
Wideband Jitter:	< 10nsp-p, with conditions of minimum to maximum cable length
Latency:	
SRC enabled:	< 6ms @48KHz, < 9ms @32KHz
SRC disabled:	< 4ms @48KHz, < 6ms @32KHz
Impedance:	
Balanced:	110Ω
Unbalanced:	75 Ω

3.3.   SERIAL DATA

Number of Signals:	1 input/output
Connector at Breakout:	Multi-pin Removable Terminal Block
Signal Type:	RS-422, RS-232, or RS-485 (selectable)
Input Termination:	High impedance
Input Failsafe Bias:	5KΩ to 5V on DI+ (selectable)
Baud Rate:	Up to 153Kb/s (selectable

3.4. GENERAL PURPOSE INPUTS

Number of Signals:	1 Input
Connector at Breakout:	Multi-pin Removable Terminal Block
Type:	Opto-isolated, Active low
Input Voltage:	
Safe Voltage Range:	-20V to +10V
Off Condition (min):	+3.5V
On Condition (max):	+2.5V(active low)
Input Current (min):	1mA
Input Current (max):	10mA(internally limited)

3.5. GENERAL PURPOSE OUTPUTS

Number of Signals:	1 GPO Outputs, 1 Common Reference (GPO COMMON)
Connector at Breakout:	Multi-pin Removable Terminal Block
Output Type:	Dry contact relay closure to GPO COMMON, normally open
Output Current (min):	100mA

3.6. OPTICAL INPUTS/OUTPUTS

Number of Outputs:	1 (Single fiber version)
	2 (Dual fiber version)
Connector:	Female SC/PC, ST/PC or FC/PC
Return Loss:	> 14 dB
Rise and Fall Time:	200 ps nominal
Wide Band Jitter:	< 0.20UI
Fiber Size:	9 μm core / 125 μm overall
Input Optical Sensitivity:	See Table 1-1
Wavelengths:	
Standard:	1310nm, 1550nm (nominal)
CWDM:	1270nm to 1610nm (See ordering information)
DWDM:	C-Band/L-Band (ITU-T G.694.1 compliant)
Output Power:	
1310nm FP:	-7dBm $\pm$ 1dBm
CWDM:	0dBm $\pm$ 1dBm
DWDM:	+7dBm $\pm$ 1dBm

3.7. ELECTRICAL

Voltage:	+12VDC
Power:	
Non-DWDM:	9W
DWDM:	12W

3.8. PHYSICAL

7700 or 7701 frame mounting

Number of slots:	1

4.   STATUS INDICATORS AND DISPLAYS

The 7707MR-HD has 7 LED Status indicators and a 4 digit alphanumeric display on the front card edge to show operational status of the card at a glance. The card edge pushbutton is used to select various displays on the alphanumeric display. Figure 4-1 shows the locations of the indicators and pushbutton.
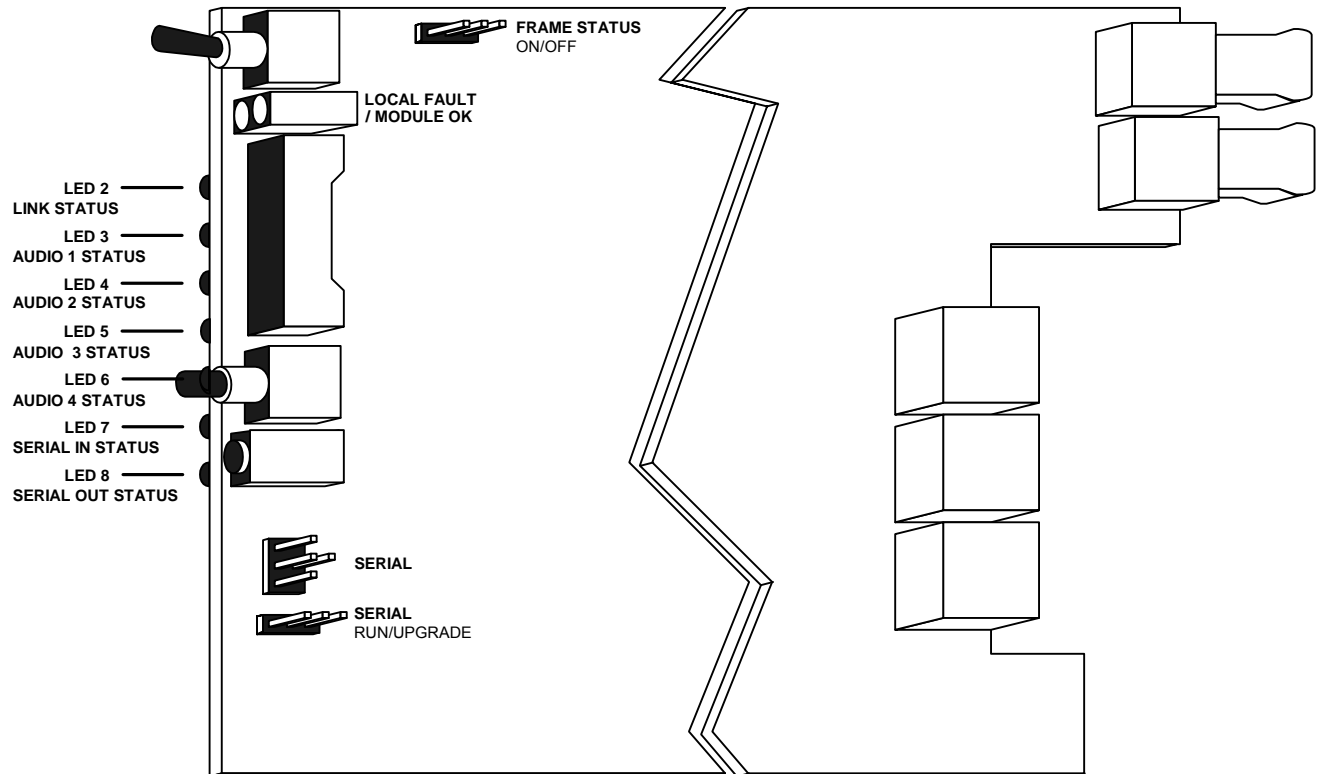
Figure 4-1: Location of Status Indicators and Jumpers

4.1.   STATUS INDICATOR LEDS

Two large LEDs at the front card-edge indicate operational health of the module as follows:

MODULE OK: This green LED indicates good module health. It will be on while a valid signal is present at the video input, the output laser is operating properly, and the card power is good.

LOCAL FAULT: This red LED indicates poor module health. Three conditions could cause this fault indication to be active: No valid signal is present at the video input, operation of the output laser is erroneous, or if a card power fault exists (i.e. a blown fuse). The LOCAL FAULT indication can also be reported to the frame by setting the FRAME STATUS jumper.

There are seven small LEDs on the back of the card-edge that indicate signal presence. Some of these LEDs are Bi-colour, and able to illuminate as red, or green. The functions of these LEDs are as follows:

LED 2, LINK STATUS: This LED indicates the status of the Fiber Input. When a valid optical input signal is detected the LED will be green. When CRC errors are detected within the input video signal (with error detection enabled, see section 4.2.15) the LED will flash red. If no valid optical signal is detected on the fiber input of the 7707MR-HD the LED will remain off.

LED 3, AUDIO 1 STATUS: This LED indicates the status of Audio Output 1. When a valid output audio signal is detected the LED will be green. If no audio is detected on the first audio output of the 7707MR-HD the LED will remain off.

LED 4, AUDIO 2 STATUS: This LED indicates the status of Audio Output 2. When a valid output audio signal is detected the LED will be green. If no audio is detected on the first audio output of the 7707MR-HD the LED will remain off.

LED 5, AUDIO 3 STATUS: This LED indicates the status of Audio Output 3. When a valid output audio signal is detected the LED will be green. If no audio is detected on the first audio output of the 7707MR-HD the LED will remain off.

LED 6, AUDIO 4 STATUS: This LED indicates the status of Audio Output 4. When a valid output audio signal is detected the LED will be green. If no audio is detected on the first audio output of the 7707MR-HD the LED will remain off.

LED 7, SERIAL IN STATUS: This LED indicates the status of the Serial input data. When a valid input data signal is detected the LED will be green. When parity errors are detected (with error detection enabled, and parity information present) the LED will flash red. If no data is detected on the serial data input of the 7707MR-HD the LED will remain off.

LED 8, SERIAL OUT STATUS: This LED indicates the status of Serial output data. When a valid output data signal is detected the LED will be green. If no output serial data is detected the LED will remain off.

4.2.   DOT MATRIX DISPLAY

Additional signal and status monitoring is provided via the 4-digit dot-matrix display located at the card-edge. The card-edge pushbutton and toggle-switch are used to navigate through the display menu. Figure 4-2 provides a quick reference to the display menu structure.

The most recent user selection will be maintained in non-volatile memory in the event of power loss to the module.

|	Menu Level 1	Menu Level 2	Menu Level 3	Menu Level 4	Menu Level 5
Pushbutton ⇨					
	Indications				
	LASR...ERR (Laser Error) Supersedes **LINK...LOS** (Fiber-Link Loss) Supersedes **OK** (Ay-Okay)				
	Selections	Selections	Selections	Indications	
	STAT (Status)	**FIN** (Fiber-Link Input)	**STD** (Video Standard)	**Standards Per Table** / **LOS** (Loss of Video)	
			GRP1 (Audio Group 1) **GRP2** (Audio Group 2) **GRP3** (Audio Group 3) **GRP4** (Audio Group 4)	Indications: **FREE** (Group Unused) **USED** (Group Used) **LOS** (Loss of Video)	
		PWR (Optical Power)	Indications: **-1** to **-40** (dBm Value) **OVR** (power over max) **LOW** (power under min)		
		VER (Software Version)	Indications: **Software Version**		
		BACK (Abort)			
	Selections	Selections	Selections	Selections	
⇧	**CTRL** (Control)	**FOUT** (Fiber-Link Output)	**LASR** (Laser Enable Mode)	**CONT** (Continuous) **DISC** (Discontinuoust)	
Toggle Switch		**AES1** (AES Output 1) **AES2** (AES Output 2) **AES3** (AES Output 3) **AES4** (AES Output 4)	**TERM** (Termination)	Selections: **BAL** (Balanced 100Ω) **UBAL** (Unbalanced 75Ω)	
⇩		**SER** (Serial Data)	**TYPE** (Data Type)	Selections: **232** (RS-232) **422** (RS-422) **485** (RS-485)	
			RATE (Baud Rate)	Selections: **Selections Per Table**	
			BIAS (Failsafe Bias)	Selections: **ON** (Bias On) **OFF** (Bias Off)	
		EMBD (De-embedding)	**A1+2** (AES1 and AES2) **A3+4** (AES3 and AES4)	Selections: **GRP1** (Audio Group 1) **GRP2** (Audio Group 2) **GRP3** (Audio Group 3) **GRP4** (Audio Group 4) **NONE** (Don't De-embed)	
			SER (Serial Data)	**LN1** (Vanc Embed Line 1)	Selections: **0** (Line 0) to **2047** (line 2047) **NONE** (Don't Embed Line 1)
				LN2 (Vanc Embed Line 2)	Selections: **0** (Line 0) to **2047** (line 2047) **NONE** (Don't Embed Line 2)
				DID (Data ID)	Selections: **50** (DID=50) to **5F** (DID=5F)
				SDID (Secondary Data ID)	Selections: **1** (SDID=1) to **FF** (SDID=FF)
			GPIO (GPIO Data)	**LN** (Vanc Embed Line)	Selections: **0** (Line 0) to **2047** (line 2047) **NONE** (Don't Embed)
				DID (Data ID)	Selections: **50** (DID=50) to **5F** (DID=5F)
				SDID (Secondary Data ID)	Selections: **1** (SDID=1) to **FF** (SDID=FF)
			HCLN (Output Hanc Cleaning)	Selections: **ON** (Clean Output Hanc) **OFF** (Pass Output Hanc)	
		EDET (Error Detection)	**FIN** (Fiber-Link Input)	Selections: **ON** (Indicate Errors to LED) **OFF** (Disable Error Indication)	
		JACK (Monitor Jack)	**CHAN** (Audio Channel)	Selections: **AUD1** (Audio 1) **AUD2** (Audio 2) **AUD3** (Audio 3) **AUD4** (Audio 4)	
			VOL (Volume)	Selections: **0** to **64** (Arbitrary Range)	
		DISP (Display Orientation)	Selections: **HORZ** (Horizontal) **VERT** (Vertical)		
		FRST (Factory Reset)	Selections: **NO** (Abort) **YES** (Accept)		
		BACK (Abort)			

Figure 4-2: Card Edge Menu Structure

4.2.1. Display Warning Status Indications

Upon entering menu level 1 on power up, or following a configuration selection, the default display selection will indicate the warning status of the 7707MR-HD. This warning status indication can also be entered while already in menu level 1, by using the toggle switch. During normal operation, while no warnings conditions are active, the **OK** indication will be displayed. Three warning indications can supersede this display state. The following list describes possible indications for this menu item, listed in order of display priority:

LASR…ERR   Laser Error Warning. Flashing indication alternates between **LASR** and **ERR**
LINK…LOS   Video Loss of Optical Signal. Flashing indication alternates between **LINK** and **LOS**
OK   Okay. No warning conditions are active

4.2.2. Displaying the Video Standard

The card-edge display of the 7707MR-HD can report the signal standard present at the fiber optic input. To indicate the input video standard, select the STAT (Status) menu item in menu level 1, followed by FIN (Fiber Input) and STD (Video Standard) menu items.

```
STAT
  FIN
    STD
      1080i/60
      1080i/59.94
      1080i/50
      1035i/60
      1035i/59.94
      1080i/48
      1080i/47.96
      720p/60
      720p/59.94
      NTSC
      PAL
      LOS
```

1080i/60	1080i/60 standard is present
1080i/59.94	1080i/59.94 standard is present
1080i/50	1080i/50 standard is present
1035i/60	1035i/59.94 standard is present
1035i/59.94	1035i/59.94 standard is present
1080i/48	1080i/48 standard is present
1080i/47.96	1080i/47.96 standard is present
720p/60	720p/60 standard is present
720p/59.94	720p/59.94 standard is present
NTSC	NTSC standard is present
PAL	PAL standard is present
LOS	Loss of signal. No valid video signal is detected at the fiber input.

4.2.3. Displaying the Status of Input Video Embedded Audio Groups

The 7707MR-HD allows the user to monitor the status of input video embedded audio groups. This allows for easy identification of active groups. To view the current status of input video embedded audio groups, select the STAT (Status) menu item in menu level 1, followed by the FIN (Fiber Input) and GRP1, GRP2, GRP3 or GRP4 (Audio Groups 1 through 4) menu items.

STAT		FREE	The monitored audio group is unused in applied input video.
FIN		USED	The monitored audio group is used in applied input video.
GRP1		LOS	No video input detected.
GRP2			
GRP3			
GRP4			
LOS			
USED			
FREE			

4.2.4. Displaying the Received Optical Power

The 7707MR-HD is equipped with an on-board optical power meter and can report the power to the card edge display in units of dBm. To indicate the input strength of the received signal, select the STAT (Status) menu item in menu level 1 followed by the PWR (Optical Power) menu item.

STAT		`-40` to `0`	Power monitoring range (in dBm units) for the standard optical receiver option.
PWR		`-40` to `-7`	Power monitoring range (in dBm units) for the high sensitivity (-H) optical receiver option.
-40 to 0		LOW	Received optical power is less than –40dBm.
-40 to -7		OVR	Received optical power is greater than maximum. *CAUTION: Never exceed the maximum specified optical input power for the specific product option that you posses. See section 3.1 for optical input specifications. Exceeding the maximum optical input power can permanently damage the optical receiver.*
LOW			
OVR			

4.2.5. Displaying the Firmware Version

Software operating on the 7707MR-HD has a version number associated with it. This version number can be indicated to the display. By this means, it can be verified that the module is operating with the most recent software. To indicate the software version to the display, select the STAT (Status) menu item in menu level 1, followed by the VER (Software Version) menu item. The following list describes possible indications for this menu selection:

VER x.x BUILD xxx   Software version. Character string scrolls across four digit display.

4.2.6. Selection the Output Laser Enable Mode

In some applications it is desirable to have the laser output disabled while no input video signal is present at the optical input (LINK…LOS condition). Alternatively, it may be preferable to maintain an optical output signal, even with no input video. The 7707MR-HD supports both modes of operation. If the continuous mode of operation is selected, while the input to the 7707MR-HD is invalid (LINK…LOS condition), the output will also contain invalid information, but will still output. To configure the output laser enable mode, select the CTRL (Control) menu item in menu level 1 followed by the FOUT (Video Output) and LASR (Laser) menu items.

CTRL		`CONT`	Continuous operation. Laser is always enabled, even without valid video input.
FOUT			
LASR		`DISC`	Discontinuous operation. Laser is disabled when no valid input video is detected.
CONT			
DISC			

4.2.7. Selecting Balanced or Unbalanced Audio

The 7707MR-HD provides card-edge configuration of AES outputs, as balanced or unbalanced. To configure the output type, select the CTRL (Control) menu item in menu level 1 followed by the AES1, AES2, AES3 or AES4 (AES 1 through AES 4) menu items followed by TERM (Termination Impedance).

CTRL		`BAL`	Configures output impedance, rise/fall times, and amplitude for balanced AES.
AES1			
AES2		`UBAL`	Configures output impedance, rise/fall times, and amplitude for unbalanced AES.
AES3			
AES4			
TERM			
BAL			
UBAL			

4.2.8. Selecting the Serial Data Type

The serial data interface of the 7707MR-HD is configurable as RS-422, RS-232, or RS485. To select the data type, select the CTRL (Control) menu item in menu level 1, followed by the SER (Serial Data), followed by the TYPE (Data Type).

CTRL		`232`	Configures card to transmit RS232.
SER		`422`	Configures card to transmit RS422.
TYPE		`485`	Configures card to transmit RS485.
232			
422			
485			

4.2.9. Selecting the Serial Data Rate

To select the serial data rate, select the CTRL (Control) menu item in menu level 1, followed by the SER (Serial Data), followed by the RATE (Baud Rate).

CTRL				300	Configures card to transmit at 300Kb/s
	SER			600	Configures card to transmit at 600 Kb/s
		RATE		1K2	Configures card to transmit at 1.2 Kb/s
			300	2K4	Configures card to transmit at 2.4 Kb/s
			600	4K8	Configures card to transmit at 4.8 Kb/s
			1K2	9K6	Configures card to transmit at 9.6 Kb/s
			2K4	14K4	Configures card to transmit at 14.4 Kb/s
			4K8	19K2	Configures card to transmit at 19.2 Kb/s
			9K6	38K4	Configures card to transmit at 38.4 Kb/s
			14K4	57K6	Configures card to transmit at 57.6 Kb/s
			19K2	76K8	Configures card to transmit at 76.8 Kb/s
			38K4	115K	Configures card to transmit at 115 Kb/s
			57K6	153K	Configures card to transmit at 153 Kb/s
			76K8		
			115K		
			153K		

4.2.10. Configuring the Serial Data Fail Safe Bias

RS-485 applications sometimes require a failsafe bias at the serial data interface, to ensure a known signal state while communications are in an idle state. The 7707MR-HD provides a configurable failsafe bias to accommodate such requirements. To configure the failsafe bias, select the CTRL (Control) menu item in menu level 1, followed by the SER (Serial Data), followed by the BIAS (Failsafe Bias). The following list describes possible configurations for this menu item:

CTRL				ON	Enables fail safe bias
	SER			OFF	Disables fail safe bias
		BIAS			
			ON		
			OFF		

4.2.11. Selecting Audio De-embedding Group

This user menu item provides configuration of the de-embedded audio groups. To select the audio de-embedding groups select the CTRL (Control) menu item in menu level 1, followed by the EMBD (De-embedding) and then A1+2 (AES 1 and AES 2) or A3+4 (AES 1 and AES 2) menu items.

CTRL				GRP1	De-embed group 1 to the selected AES outputs (A1+2 or A3+4).
	EMBD			GRP2	De-embed group 1 to the selected AES outputs (A1+2 or A3+4).
		A1+2		GRP3	De-embed group 1 to the selected AES outputs (A1+2 or A3+4).
		A3+4		GRP4	De-embed group 1 to the selected AES outputs (A1+2 or A3+4).
			GRP1	NONE	AES outputs (A1+2 or A3+4) will be mute.
			GRP2		
			GRP3		
			GRP4		
			NONE		

4.2.12. Selecting Serial Data De-embedding Parameters

The 7707MR-HD de-embeds serial data from vertical ancillary (VANC) data space of the optical input video. The VANC de-embedding parameters of the 7707MR-HD should be configured to match embedding parameters of the companion 7707MT-HD. Configuration parameters are provided by selecting the CTRL (Control) menu item in menu level 1, followed by the EMBD (De-embedding) and SER (Serial Data) menu items.

CTRL	**LN1**	Serial data de-embed line 1
EMBD	**LN2**	Serial data de-embed line 2
SER	**DID**	Data ID
LN1	**SDID**	Secondary Data ID
LN2		
DID		
SDID		

To select the data embedding line select the CTRL (Control) menu item in menu level 1, followed by the EMBD (De-embedding) and SER (Serial Data) menu items. The following list describes possible user selections for LN1 (VANC Embed Line 1) and LN2 (VANC Embed Line 2) menu item.

CTRL	**0 to 2047**	Serial Data de-embed line (note available lines for particular standard)
EMBD	**NONE**	Disable de-embedding configured by this parameter (LN1 or LN2)
SER		
LN1		
LN2		
0 to 2047		
NONE		

To configure a desired DID select the CTRL (Control) menu item in menu level 1, followed by the EMBD (De-embedding) and SER (Serial Data) menu items.

CTRL	**50 to 5F**	Sets the ID used for data de-embedding
EMBD		
SER		
DID		
50 to 5F		

To configure a desired SDID, select the secondary data ID line, then select the CTRL (Control) menu item in menu level 1, followed by the EMBD (De-embedding) and SER (Serial Data) menu items.

CTRL	**1 to FF**	Sets the secondary ID used for data de-embedding
EMBD		
SER		
SDID		
1 to FF		

4.2.13. Selecting GPIO De-embedding Parameters

The 7707MR-HD de-embeds GPIO from vertical ancillary (VANC) data space of the optical input video. The VANC de-embedding parameters of the 7707MR-HD should be configured to match embedding parameters of the companion 7707MT-HD. Configuration parameters are provided by selecting the CTRL (Control) menu item in menu level 1, followed by the EMBD (De-embedding) and GPIO (GPIO Data) menu items.

CTRL	
EMBD	
GPIO	
LN	
DID	
SDID	

`LN`   Serial data de-embed line
`DID`   Data ID
`SDID`   Secondary Data ID

To select the data embedding line, select the CTRL (Control) menu item in menu level 1, followed by the EMBD (De-embedding) and GPIO (GPIO Data) menu items. The following list describes possible user selections for LN (VANC Embed Line) menu item.

CTRL
EMBD
GPIO
LN
0 to 2047
NONE

`0 to 2047`   Serial Data de-embed line (note available lines for particular standard)
`NONE`   Disable de-embedding configured by this parameter

To configure a desired DID select the CTRL (Control) menu item in menu level 1, followed by the EMBD (De-embedding) and GPIO (GPIO Data) menu items. The following list describes possible user selections for DID (Data ID).

CTRL
EMBD
GPIO
DID
50 to 5F

`50 to 5F`   Sets the ID used for data de-embedding

To configure a desired SDID, select the secondary data ID line, then select the CTRL (Control) menu item in menu level 1, followed by the EMBD (De-embedding) and GPIO (GPIO Data) menu items. The following list describes possible user selections for SDID (Secondary DID).

CTRL
EMBD
GPIO
SDID
1 to FF

`1 to FF`   Sets the secondary ID used for data de-embedding

4.2.14. Selecting Output Video HANC Cleaning

The optical video input signal may contain embedded audio information from the companion 7707MT-HD, and may also contain other information located in horizontal ancillary data space. The user might wish to maintain this information in an unaltered state, or the user could favour cleaning this information. To enable or disable output video cleaning select the CTRL (Control) menu item in menu level 1 followed by the EMBD (De-embedding) and HCLN (Clean Input Hanc) menu items.

CTRL
EMBD
HCLN
ON
OFF

ON   Clears all data in the horizontally ancillary data space.
OFF   Passes all data in the horizontally ancillary data space.

4.2.15. Selecting Fiber Input Error Detection

The 7707MR-HD is capable of detecting CRC or EDH errors in optical input video. To turn error detection ON or OFF, select the CTRL (Control) menu item in menu level 1 followed by the EDET (Error Detection) menu items, followed by FIN (Fiber Input) menu item.

CTRL
EDET
FIN
ON
OFF

ON   Enable error detection. Errors will be reported to the card edge LED or VistaLINK®.
OFF   Disable error detection.

4.2.16. Selecting the Headphone Monitoring Jack Channel

The 7707MR-HD provides a convenient headphone monitoring jack at the card-edge. The monitored audio channel is configured by the user, via the card-edge interface. Volume of the headphone monitoring jack can also be adjusted using the card-edge volume control. To configure the headphone monitoring jack channel, select the CTRL (Control) menu item in menu level 1, followed by the JACK (Audio Jack) and CHAN (Audio Channel) menu items.

CTRL
JACK
CHAN
AUD1
AUD2
AUD3
AUD4

AUD1   Channel 1 is selected to the headphone monitoring jack
AUD2   Channel 2 is selected to the headphone monitoring jack
AUD3   Channel 3 is selected to the headphone monitoring jack
AUD4   Channel 4 is selected to the headphone monitoring jack

To configure the headphone volume, select the CTRL (Control) menu item in menu level 1, followed by the JACK (Audio Jack) and VOL (Volume) menu items.

CTRL
JACK
VOL
0 to 64

0 to 64   Sets the volume of the headphone jack.

4.2.17. Setting the Orientation of the Display

The 7707MR-HD provides the ability to adjust the orientation of the display. When using a 3RU frame it is convenient to have the text read vertical whereas when using a 1RU frame a horizontal display is desirable. To change the orientation of the display select the CTRL (Control) menu item in menu level 1, followed by the DISP (Display) menu item.

CTRL	
DISP	
HORZ	
VERT	

HORZ   Sets the orientation of the text to horizontal
VERT   Sets the orientation of the text to vertical

4.2.18. Selecting the Factory Reset Configuration

It is convenient to have a quick method of returning all configuration settings to a default state. The 7707MR-HD provides a factory reset for this purpose. All values, which are user configurable, will be returned to a known state, as indicated below. To initialize a factory reset, select the CTRL (Control) menu item in menu level 1, followed by the FRST (Factory Reset) menu item.

CTRL	
FRST	
NO	
YES	

NO   Do not initialize factory reset. Return to previous menu item, without changes.
YES   Initialize factory reset.

A factory reset will initialize the following configurations (as described by menu item and selection):

```
CTRL/VOUT/STD          AUTO
CTRL/VOUT/LASR         CONT
CTRL/AES1/TERM         BAL
CTRL/AES2/TERM         BAL
CTRL/AES3/TERM         BAL
CTRL/AES4/TERM         BAL
CTRL/SER/TYPE          422
CTRL/SER/RATE          9K6
CTRL/SER/BIAS          OFF
CTRL/EMBD/A1+2         GRP1
CTRL/EMBD/A3+4         GRP2
CTRL/EMBD/SER/LN1      9
CTRL/EMBD/SER/LN2      10
CTRL/EMBD/SER/DID      52
CTRL/EMBD/SER/SDID     1
CTRL/EMBD/GPIO/LN      9
CTRL/EMBD/GPIO/DID     52
CTRL/EMBD/GPIO/SDID    2
CTRL/EMBD/HCLN         ON
CTRL/EDET/FIN          OFF
CTRL/JACK/CHAN         AUD1
CTRL/JACK/VOL          30
```

5. JUMPERS AND CONTROLS

Several jumpers, located at the front of the module are used to preset various operating modes.

5.1. SELECTING WHETHER LOCAL FAULTS WILL BE MONITORED BY THE GLOBAL FRAME STATUS

The FRAME STATUS jumper determines whether local faults (as shown by the Local Fault indicator) will be connected to the 7700FR frame's global status bus.

FRAME STATUS: To monitor faults on this module with the frame status indicators (on the Power Supply FRAME STATUS LED's and on the Frame's Fault Tally output), install this jumper in the ON position. (default)

When this jumper is installed in the OFF position, the local faults on this module will not be monitored.

5.2. CONFIGURING THE MODULE FOR FIRMWARE UPGRADES

UPGRADE: The UPGRADE jumper is used when firmware upgrades are being done to the module. For normal operation it should be installed in the *RUN* position. See the *Upgrading Firmware* section of this manual for more information.

To upgrade the firmware in the module unit pull it out of the frame. Move the UPGRADE jumper into the *UPGRADE* position. Install the Upgrade cable provided (located in the vinyl pouch in the front of this manual) onto the SERIAL header at the card edge. Re-install the module into the frame. Run the upgrade as described in the *Upgrading Firmware* section of this manual. Once the upgrade is complete, remove the module from the frame, move the UPGRADE jumper into the *RUN* position, remove the upgrade cable and re-install the module. The module is now ready for normal operation.

6.   VISTALINK® REMOTE MONITORING/CONTROL

6.1.   WHAT IS VISTALINK®?

VistaLINK® is Evertz's remote monitoring and configuration platform which operates over an Ethernet network using Simple Network Management Protocol (SNMP). SNMP is a standard computer network protocol that enables different devices sharing the same network to communicate with each other. VistaLINK® provides centralized alarm management, which monitors, reports, and logs all incoming alarm events and dispatches alerts to all the VLPro Clients connected to the server. Card configuration through VistaLINK® PRO can be performed on an individual or multi-card basis using simple copy and paste routines, which reduces the time to configure each module separately. Finally, VistaLINK® enables the user to configure devices in the network from a central station and receive feedback that the configuration has been carried out.

There are 3 components of SNMP:

1. An SNMP manager, also known as a Network Management System (NMS), is a computer running special software that communicates with the devices in the network. Evertz VL-Fiber demo Manager graphical user interface (GUI), third party or custom manager software may be used to monitor and control Evertz VistaLINK® enabled fiber optic products.

2. Managed devices, (such as 7707MT-HD and 7707MR-HD cards), each with a unique address (OID), communicate with the NMS through an SNMP Agent. Evertz VistaLINK® enabled 7700 series modules reside in the 3RU 7700FR-C Multi-Frame and communicate with the manager via the 7700FC VistaLINK® frame controller module, which serves as the Agent.

3. A virtual database, known as the Management information Base (MIB), lists all the variables being monitored, which both the Manager and Agent understand. Please contact Evertz for further information about obtaining a copy of the MIB for interfacing to a third party Manager/NMS.

For more information on connecting and configuring the VistaLINK® network, see the 7700FC Frame Controller chapter.

6.2.   VISTALINK® MONITORED PARAMETERS

The following parameters can be remotely monitored through the VistaLINK® interface.

Parameter	Description
Laser Error Warning Status	See section 4.2.1
Link Loss Warning Status	See section 4.2.1
Standard Error Warning Status	See section 4.2.1
Input Video Standard Status	See section 4.2.2
Input Video Audio Group Status	See section 4.2.3
Input Optical Power	See section 4.2.4

Table 6-1: VistaLINK® Monitored Parameters

6.3. VISTALINK® CONTROLLED PARAMETERS

The following parameters can be remotely controlled through the VistaLINK® interface.

Parameter	Description
Output Video Standard Control	See section 4.2.2
Laser Enable Mode Control	See section 4.2.6
Audio Output Type Control	See section 4.2.7
Serial Data Interface Control	See section 0 through 4.2.10
Audio De-embedding Control	See section 4.2.11
Serial Data De-embedding Control	See section 0
GPIO De-embedding Control	See section 4.2.13
Output Video HANC Cleaning Control	See section 4.2.14
Output Video VANC Cleaning Control	See section 4.2.14
Fiber Error Detection Control	See section 4.2.15
Serial Data Error Detection Control	

Table 6-2: VistaLINK® Controlled Parameters

6.4. VISTALINK® TRAPS

The following traps are reported via the VistaLINK® interface.

Trap	Description
Laser Error Warning Status	See section 4.2.1
Link Loss Warning Status	See section 4.2.1
Standard Error Warning Status	See section 4.2.1

Table 6-3: VistaLINK® Traps