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REVISION HISTORY

REVISION	DESCRIPTION	DATE
0.1	Preliminary Version	Oct 2006
0.2	Minor modifications	Mar 2007
1.0	Added –F2 version manual entries and backwards compatibility notes with the 7707MR-HD receiver	May 2008
1.1	Added table format throughout section 4.2	May 2009
1.2	Removed references to VistaLINK® enabled functionality	May 2009
1.3	Updated output power specifications	Aug 2010

WARNING

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

1. OVERVIEW

The 7707MTA-HD is a fiber transmitter that extends one HD or SD digital video signal over a fiber optic link, accompanied by four AES audio signals, serial data, two GPIs and two GPOs. Audio and control signals are embedded into HD, SD, or SDTi video for optical transport. Embedded audio and control are extracted from the optical signal by a companion receiver module. DVB-ASI signals may also be transparently passed, but audio, serial data and GPIO functions are disabled. The 7707MTA-HD is designed to operate with a companion 7707MRA-HD receiver.

Monitoring and control of card status and parameters is provided locally at the card-edge. The 7707MTA-HD occupies one card slot and can be housed in either a 1RU frame, which will hold up to three modules, or a 3RU 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 embedding of audio and control signals into HD-SDI (SMPTE 292M), SD-SDI (SMPTE 259M-C), or SDTi (SMPTE 305.2M)
- Transparently passes DVB-ASI
- Flexible routing and mixing of input and embedded audio to/from all 4 groups, with L/R resolution
- Adjustable input AES delay up to 42ms
- Feed-forward AES error status for selectable pop-reduction on companion 7707MRA-HD
- Audio sample rate conversion permits asynchronous input of 32KHz, 44.1KHz, or 48KHz AES, with up to 24-bit resolution
- Audio sample rate conversion may be disabled to permit Dolby^{TM}-E support
- Audio inputs automatically accept balanced or unbalanced AES without configuration
- Bi-directional serial port accommodates RS-422, RS-232, or RS-485 data up to 153Kbaud
- Monitoring of input video format, audio group availability, EDH or CRC errors, optical power, etc
- Comprehensive signal and status monitoring via four-digit card-edge display
- SC/PC, ST/PC, or FC/PC fiber connector options
- Fully hot-swappable from front of frame
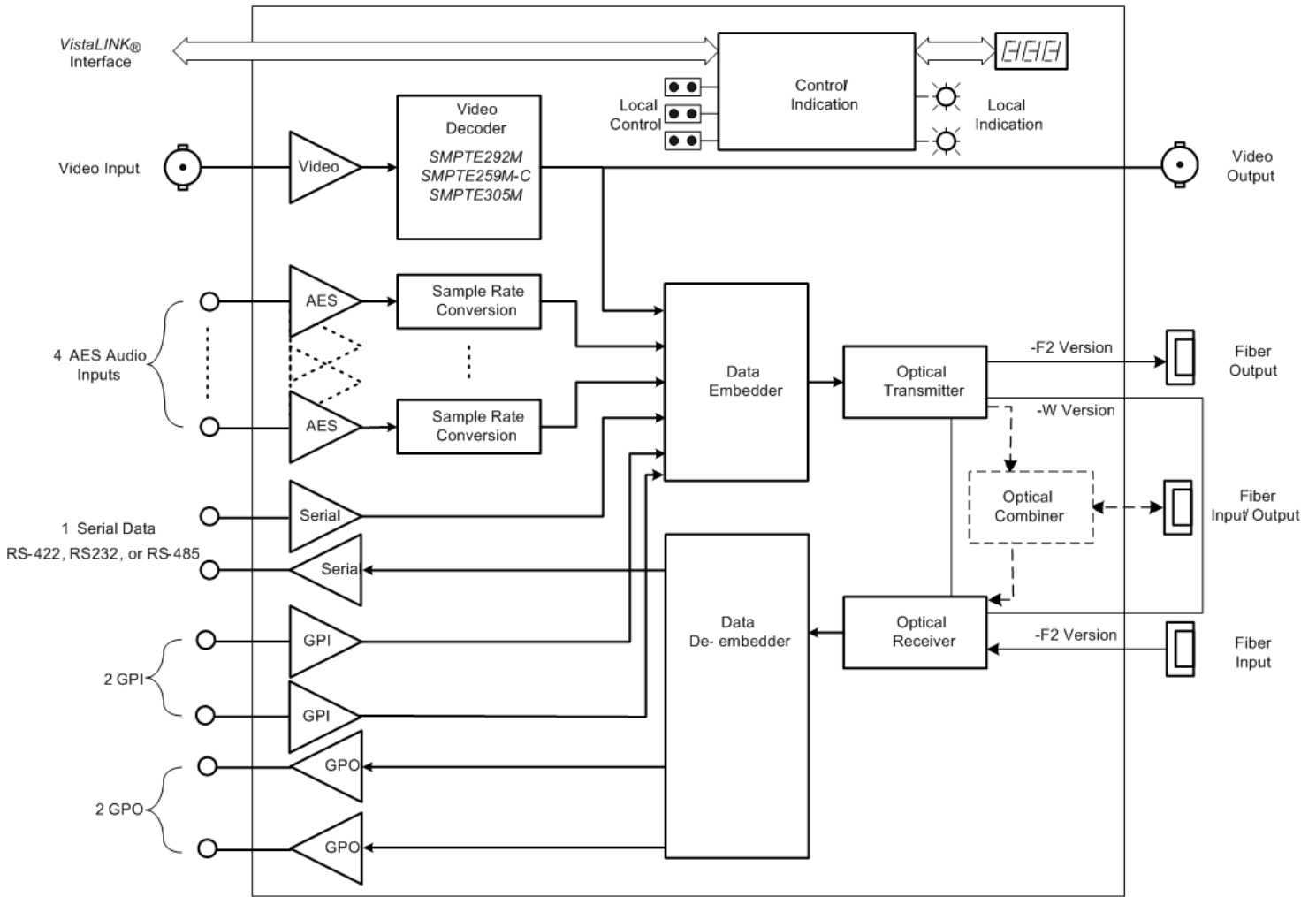
Figure 1-1: 7707MTA-HD Block Diagram

2.   INSTALLATION

Each 7707MTA-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 (two optical connectors for the –F2 version). For information on mounting the rear plate and inserting the module into the frame see section 3 of the 7700FR chapter.
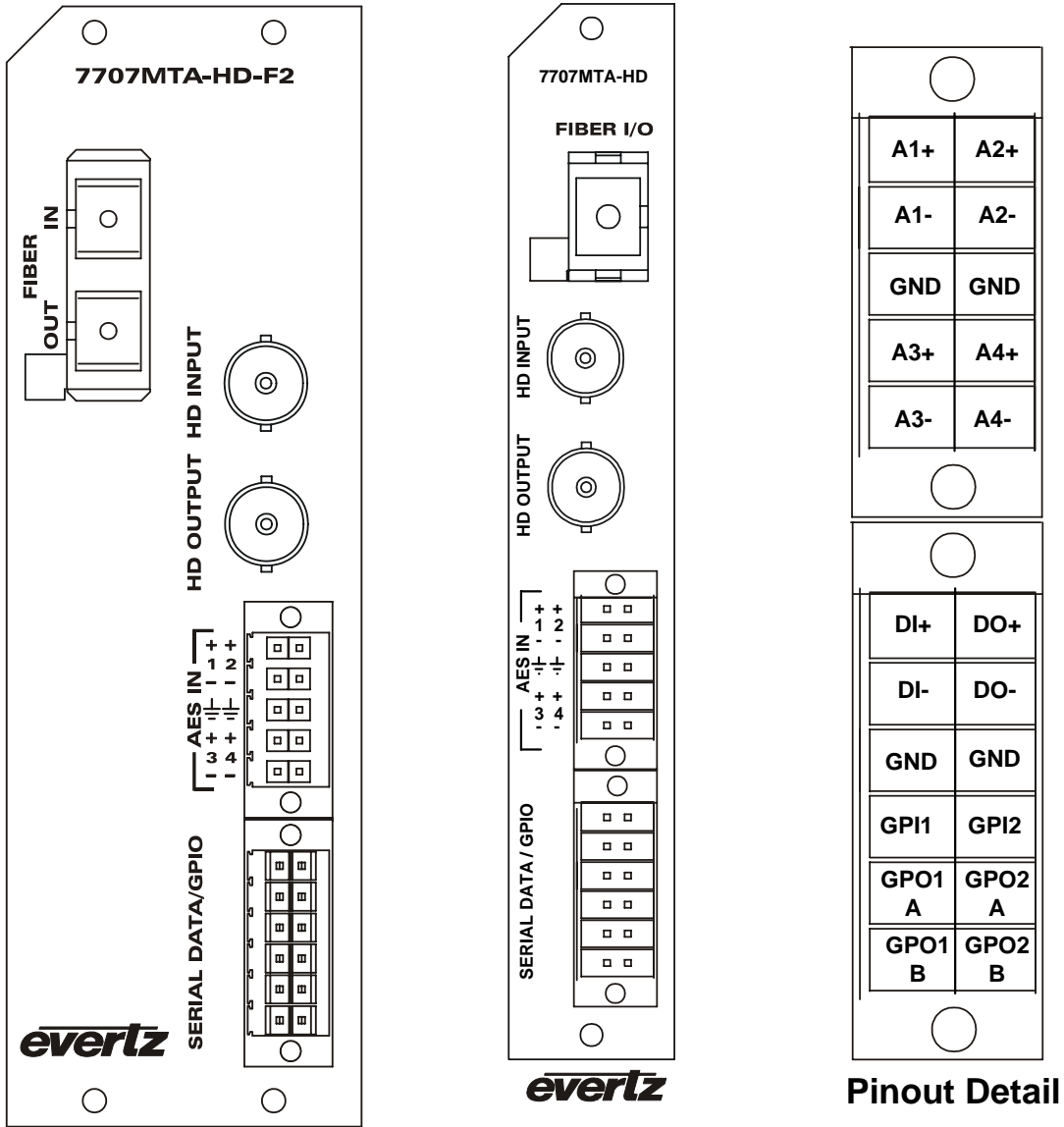
Figure 2-1: 7707MTA-HD Rear Plate & Pin Out (3RU Version)

Pinout Detail
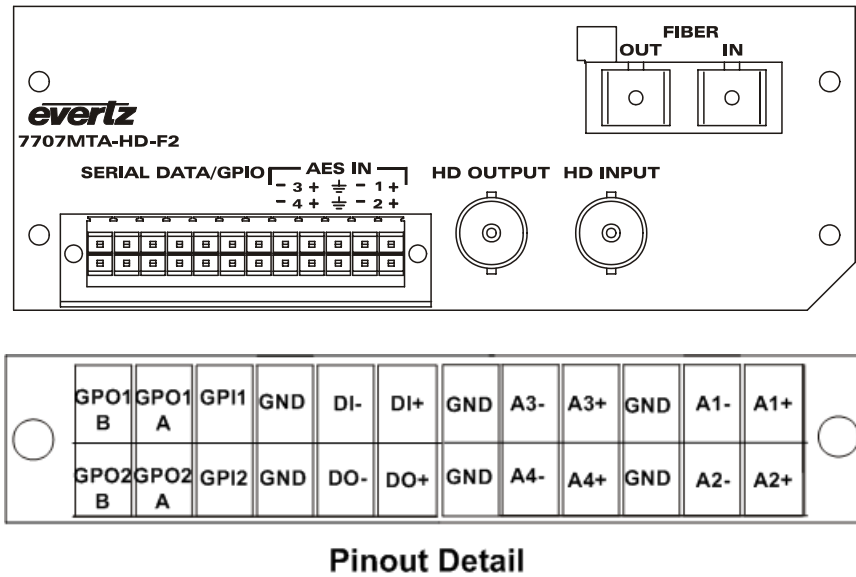
Figure 2-2: 7707MTA-HD Rear Plate & Pin Out (1RU Version)

2.1.1. Electrical Signal Connections

HD/SD INPUT :   Input BNC connector for serial digital video signals compatible with HD-SDI (SMPTE 292M), SD-SDI (SMPTE 259M-C), SDTi (SMPTE 305.2M) and DVB-ASI standards. This input provides adaptive equalization for up to 100m of industry standard Belden 1694A cable, at 1.485Gb/s. At 270Mb/s, this input provides adaptive equalization for up to 300m of Belden 1694A cable. See section 3.1 for video input specifications**.**

HD/SD OUTPUT: Reclocked, level-restored, loop-back output BNC connector for serial digital video signals compatible with HD-SDI (SMPTE 292M), SD-SDI (SMPTE 259M-C), SDTi (SMPTE 305.2M), or DVB-ASI (EN 500083-9) standards. See section 3.2 for video output specifications**.**

AES IN: AES audio input connections of the removable terminal block. The 7707MTA-HD accommodates four AES audio channels, 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 accept balanced or unbalanced AES without card configuration. 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 7707MTA-HD. This connection arrangement yields a nominal 110Ω input impedance for balanced audio signals.

Unbalanced - Connect unbalanced audio signals to the positive input terminal of the 7707MTA-HD. Leave the negative input terminal unconnected. This connection arrangement yields a nominal 75Ω input impedance for unbalanced audio signals.

See section 3.3 for AES audio input specifications.

SERIAL: Bi-directional serial data connections of the removable terminal block. The 7707MTA-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 3.4. Serial data connections are assigned per the data type selected. RS-422 and RS-232 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 7707MTA-HD. Bi-directional data will be communicated to and from the companion 7707MRA-HD.

RS-232 - Connect each RS-232 input data signal to the negative DI terminal (DI-) of the 7707MTA-HD. The companion 7707MRA-HD will output each signal on the corresponding negative DO terminal (DO-). Likewise, serial data signals applied to the companion 7707MRA-HD will be output from the 7707MTA-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 7707MTA-HD.

See section 3.4 for serial data specifications.
See section 4.2.10 to 4.2.15 for serial data configuration instructions.

GPI: General Purpose Input connections of the removable terminal block. The General Purpose Input is an active-low, opto-isolated connection activated by connection to the ground pin.

GPO: The General Purpose Output is dry-contact relay closure. The A and B terminals are jumper selectable as normally open, or normally closed, via a jumper on the I/O board. See section 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 Versions

FIBER I/O: This is the optical input/output of the single-fiber 7707MTA-HD-W 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 7707MRA-HD-W module with a suitable fiber optic cable.

The 7707MTA-HD-W is designed to work with single-mode fiber optic cable. The 7707MTA15-HD-W transmits and receives on 1550nm and 1310nm wavelengths respectively.

Note that while the optical input to the companion 7707MRA-HD-W is invalid (eg. not connected) then the optical output of the companion 7707MRA-HD will also be invalid. This will result in a LINK…LOS condition (section 4.2.1) at the optical input of the 7707MTA-HD-W.

The optical output of the 7707MTA-HD-W can be configured to operate in continuous or discontinuous mode as described in section 4.2.8. If discontinuous mode is selected, while the video input to the 7707MRA-HD-W is invalid (VID…LOS condition, section 4.2.1) then this optical output will be disabled. If continuous mode is selected, then a valid optical video output will be maintained.

2.1.2.2.　　　　Dual Fiber Versions

FIBER IN:　　This is the optical input to the dual-fiber 7707MTA-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 7707MRA-HD-F2 module with a suitable fiber optic cable. The dual fiber 7707MTA-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 7707MTA-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 7707MTA-HD-F2 is compatible only with single-mode fiber optic cable.

FIBER OUT:　　This is the optical output of the dual-fiber 7707MTA-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 7707MRA-HD-F2 module with a suitable fiber optic cable. The output wavelength is marked on the rear panel of each 7707MTA-HD-F2. When connected directly to a companion dual-fiber module, the 7707MTA-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 7707MTA-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 4.2.9.

If discontinuous mode is selected, while the optical input to the 7707MTA-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**

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 the bar code label placed on the Printed circuit board of each Evertz plug-in module
* The Model number is 7707MTA15-HD-W
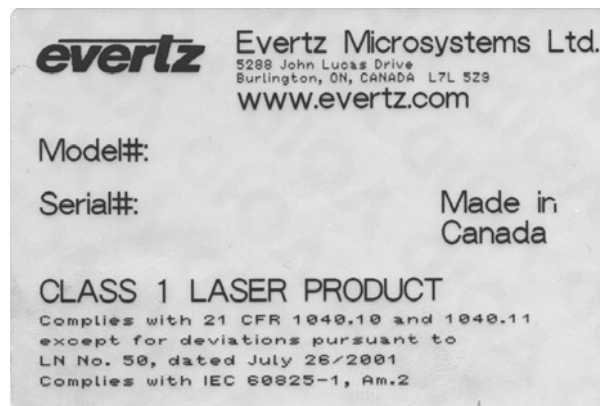
Figure 2-3: Reproduction of Laser Certification and Identification Label

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 chapter of this manual binder.

3.   SPECIFICATIONS

3.1.   SERIAL DIGITAL VIDEO INPUT

Number of Signals:	1 Input
Standards:	SMPTE 292M (HD-SDI), SMPTE 259M-C (SD-SDI), SMPTE 305.2M (SDTi), DVB-ASI (without separate AES, serial data and GPIO)
Connector:	1 BNC per IEC 61169-8 Annex A
Equalization:	Automatic to 100m (typ) @1.485Gb/s with Belden 1694A or equivalent cable Automatic to 300m (typ) @270 Mb/s with Belden 1694A or equivalent cable
Return Loss:	> 15 dB up to 1.5GHz

3.2.   SERIAL DIGITAL VIDEO OUTPUT

Number of Signals:	1 Output
Standards:	SMPTE 292M (HD-SDI), SMPTE 259M-C (SD-SDI), SMPTE 305.2M (SDTi), EN500083-9 (DVB-ASI)
Connectors:	1 BNC per IEC 61169-8 Annex A
Signal Level:	800mV nominal
DC Offset:	0V ±0.5V
Rise and Fall Time:	150ps nominal @1.485Gb/s 600ps nominal @270Mb/s
Overshoot:	<10% of amplitude
Return Loss:	> 15 dB up to 1.5GHz
High Freq. Jitter:	< 0.2 UI

3.3.   AES AUDIO INPUTS

Number of Signals:	4 Inputs
Standards:	AES3-2003 (Balanced AES), SMPTE 276M (Unbalanced AES)
Connector:	10 pin removable terminal strip
Sampling Rate:	32KHz, 44.1KHz, 48kHz
Resolution:	up to 24 bits
Minimum Input:	< 200mVp-p
Maximum Input:	
Balanced:	> 7Vp-p
Unbalanced:	> 1.2Vp-p
Equalization:	
Balanced:	< 1500ft @ 48KHz, with Belden 1800B, and 2Vp-p source signal
Unbalanced:	< 1200m @ 48KHz, with Belden 8281, and 1Vp-p source signal
Latency:	<1ms @ 48 kHz, <1.2ms @ 32 kHz
SRC Enabled:	add 3.3 ms
Pop-reduction Enabled:	add 4 ms (pop-reduction on the companion 7707MRA-HD)
Impedance:	
Balanced:	≈ 110Ω
Unbalanced:	≈ 75Ω
Return Loss:	> 15dB, from 1MHz to 6MHz
Wideband Jitter:	< 10nsp-p, with conditions of minimum to maximum cable length

3.4. 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)

3.5. GENERAL PURPOSE INPUTS

Number of Signals:	2 inputs
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)

3.6. GENERAL PURPOSE OUTPUTS

Number of Signals:	2 outputs
Connector at Breakout:	Multi-pin Removable Terminal Block
Output Type:	Dry contact relay closure, jumper selectable between normally open and normally closed
Output Current (min):	100mA

3.7. OPTICAL INPUTS/OUTPUTS

Number of Connections:	2 (1 Input plus 1 Output for –F2 version)
	1 (-W version)
Connector:	Female SC/PC (retractable cover optional), ST/PC or FC/PC
Return Loss:	> 14 dB
Rise and Fall Time:	200 ps nominal
Fiber Size:	9 μm core / 125 μm overall
Input Optical Sensitivity:	-28 dBm (-W version), -21dBm for companion 7707MRA13-HD-W
	-23 dBm (-F2 version), -28 for High Sensitivity (-H version)
Wavelengths:	Transmit on 1550nm, back channel receive on 1310nm (-W only)
	Transmit of 1310 nm, 1550nm, CWDM, DWDM (-F2 only)
Output Power:	-1 dBm (-W version, -8dBm for companion 7707MRA13-HD-W)
	-7 dBm (-F2 version with 1310nm FP Laser)
	0 dBm (-F2 version with CWDM DFB Laser)
	+7dBm (-F2 version with DWDM DFB Laser)
Maximum Input Power:	-1 dBm

3.8. ELECTRICAL

Voltage: +12VDC
Power: 12W

3.9. PHYSICAL

7700 or 7701 Frame Mounting
Number of Slots: 1 (-W version)
                              2 (-F2 version)

4. STATUS INDICATORS AND DISPLAYS

The 7707MTA-HD has 10 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.
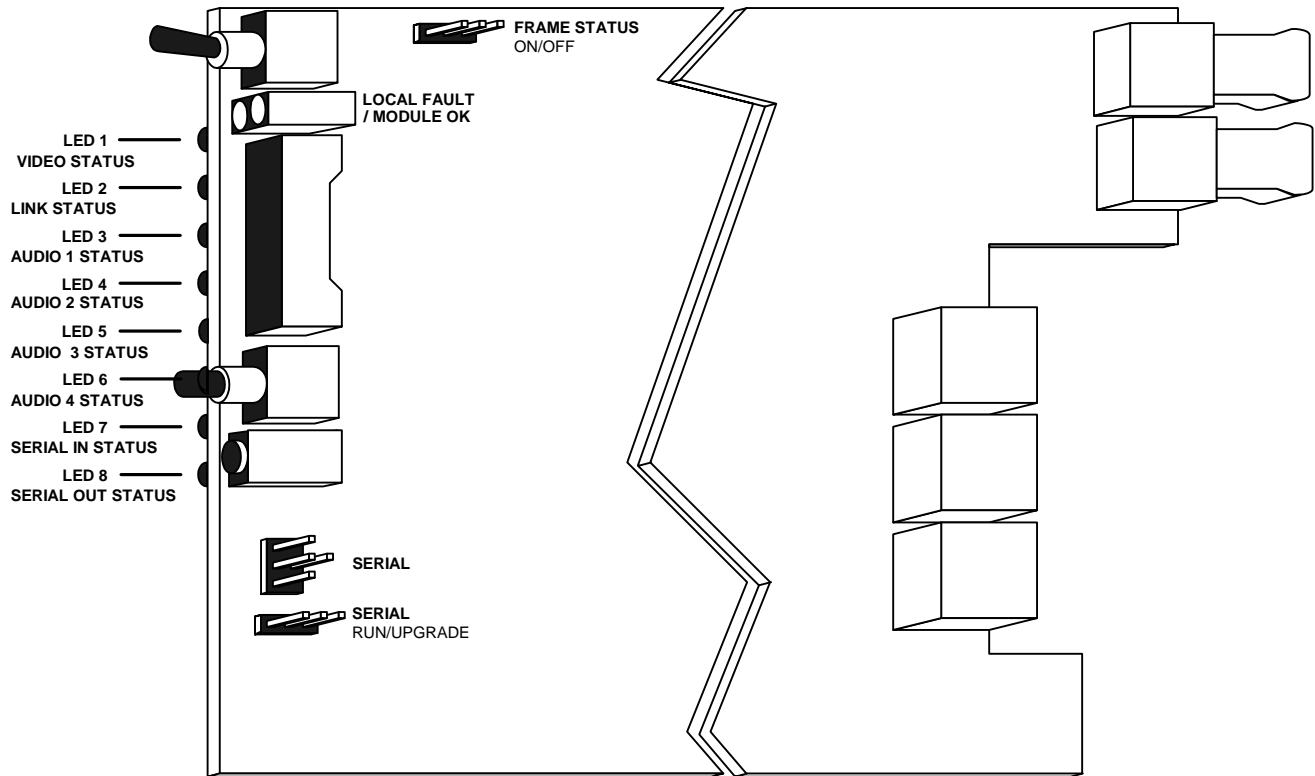
Figure 4-1: Location of Status Indicators and Jumpers

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

LED 1, VIDEO STATUS: This LED indicates the status of the video Input. When a valid input video signal is detected the LED will be green. When CRC errors are detected within the input video signal (with error detection enabled, see section 4.2.22) the LED will flash red. If no video is detected on the video input of the 7707MTA-HD the LED will remain off.

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 4.2.21) the LED will flash red. If no valid optical signal is detected on the fiber input of the 7707MTA-HD the LED will remain off. Note that while the optical input to the companion 7707MRA-HD is invalid (eg. not connected) then the optical output of the companion 7707MRA-HD will also be invalid. This will result in a LINK…LOS condition (section 4.2.1) at the optical input of the 7707MTA-HD.

LED 3, AUDIO 1 STATUS: This LED indicates the status of Audio Input 1. When a valid input audio signal is detected the LED will be green. When errors are detected within the input audio signal (with error detection enabled, see section 4.2.23) the LED will flash red. If no audio is detected on the first audio input of the 7707MTA-HD the LED will remain off.

LED 4, AUDIO 2 STATUS: This LED indicates the status of Audio Input 2. When a valid input audio signal is detected the LED will be green. When errors are detected within the input audio signal (with error detection enabled, see section 4.2.23) the LED will flash red. If no audio is detected on the second audio input of the 7707MTA-HD the LED will remain off.

LED 5, AUDIO 3 STATUS: This LED indicates the status of Audio Input 3. When a valid input audio signal is detected the LED will be green. When errors are detected within the input audio signal (with error detection enabled, see section 4.2.23) the LED will flash red. If no audio is detected on the third audio input of the 7707MTA-HD the LED will remain off.

LED 6, AUDIO 4 STATUS: This LED indicates the status of Audio Input 4. When a valid input audio signal is detected the LED will be green. When errors are detected within the input audio signal (with error detection enabled, see section 4.2.23) the LED will flash red. If no audio is detected on the fourth audio input of the 7707MTA-HD the LED will remain off.

LED 7, SERIAL IN STATUS: This LED indicates the status of 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, see section 4.2.24) the LED will flash red. If no data is detected on the serial data input of the 7707MTA-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 4-1 and Figure 4-2 provide 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.

Pushbutton ⇨

Menu Level 1	Menu Level 2	Menu Level 3	Menu Level 4	Menu Level 5	Menu Level 6	Menu Level 7

Indications

LASR...ERR (Laser Error)
Supersedes
LINK...LOS (Fiber-Link Loss)
Supersedes
VID...LOS (Video Loss)
Supersedes
OK (Ay-Okay)

Selections / Selections / Selections / Indications

STAT (Status)

VIN (Video 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)

AES1 (AES Input 1) / **AES2** (AES Input 2) / **AES3** (AES Input 3) / **AES4** (AES Input 4) — Indications: **32K** (32KHz) / **44K** (44KHz) / **48K** (48KHz) / **LOS** (Loss of Signal)

GPI1 (GPI Input 1) / **GPI2** (7707MTA-HD Only) — Indications: **ON** (Active) / **OFF** (Inactive)

GPO1 (GPO Output 1) / **GPO2** (7707MTA-HD Only) — Indications: **ON** (Active) / **OFF** (Inactive) / **LOS** (Loss of Link)

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

CTRL (Control)

FOUT (Fiber-Link Output)
- **LASR** (Laser Enable Mode) — Selections: **CONT** (Continuous) / **DISC** (Discontinuous)
- **GEN** (Output On LOS) — Selections: **BLK** (Black Active Picture) / **GRAY** (Gray Active Picture) / **OFF** (Generation Off)

AES1 (AES Input 1) / **AES2** (AES Input 2) / **AES3** (AES Input 3) / **AES4** (AES Input 4)
- **SRC** (Sample Rate Convert) — Selections: **ON** (Enable Conversion) / **OFF** (Disable Conversion)
- **DLY** (Audio Delay) — Selections: **MIN** to **42ms** (delay in ms)

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 (Embedding)

Destinations ◀ Sources

AUD (Audio)
- **GRP1** (Group 1) / **GRP2** (Group 2) / **GRP3** (Group 3) / **GRP4** (Group 4)
  - **CH1** (Group Channel 1) / **CH2** (Group Channel 2)
  - Sources: **AES1** (AES Input 1) / **AES2** (AES Input 2) / **AES3** (AES Input 3) / **AES4** (AES Input 4) / **G11** (Goup 1, Channel 1) / **G12** (Goup 1, Channel 2) / **G21** (Goup 2, Channel 1) / **G22** (Goup 2, Channel 2) / **G31** (Goup 3, Channel 1) / **G32** (Goup 3, Channel 2) / **G41** (Goup 4, Channel 1) / **G42** (Goup 4, Channel 2) / **MIX1** (Mixer 1) / **MIX2** (Mixer 2) / **MIX3** (Mixer 3) / **MIX4** (Mixer 4) / **NONE** (Mute Channel)

SER (Serial Data)
- **ENB** (Embedder Enable) — Selections: **ON** (Enable Embedder) / **OFF** (Disable Embedder)
- **DID** (Data ID) — **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)

COAX (Coaxial Output Video) — Selections: **LOOP** (Loop-back Video) / **EMBD** (Embedded Video)

⇧ **Toggle Switch** ⇩

Figure 4-2: Card Edge Menu Structure

Figure 4-3: Card Edge Menu Structure Continued

4.2.1. Displaying 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 7707MTA-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 warning conditions are active, the **OK** indication will be displayed. Four 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   Loss of Optical link input. Flashing indication alternates between **LINK** and **LOS**
VID…LOS   Loss of Video input. Flashing indication alternates between **VID** and **LOS**
OK   Okay. No warning conditions are active

Note that while the optical input to the companion 7707MRA-HD is invalid (e.g. not connected) then the optical output of the companion 7707MRA-HD will also be invalid. This will result in a LINK…LOS condition at the optical input of the 7707MTA-HD.

4.2.2. Displaying the Standard of Input Video

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

STAT	
VIN	
STD	
Standards Per Table	
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
`SDTI-N270`	SDTi standard is present, with 525i structure
`SDTI-P270`	SDTi standard is present, with 625i structure
`DVB-ASI`	DVB-ASI standard is present
`N270`	525i standard is present
`P270`	625i standard is present
`LOS`	Loss of signal. No valid video signal is detected at the selected input

4.2.3. Displaying the Embedded Audio Status of Input Video

The 7707MTA-HD allows the user to monitor the status of input video embedded audio groups. This allows conflicts to be identified and resolved. To view the current status of input video embedded audio groups, select the STAT (Status) menu item in menu level 1, followed by the VIN (Video Input) and GRP1, GRP2, GRP3 or GRP4 (Audio Groups 1 through 4) menu items.

STAT	
VIN	
GRP1 – GRP4	
FREE	
USED	
LOS	

`FREE`	The monitored audio group is unused in applied input video
`USED`	The monitored audio group is used in applied input video
`LOS`	Loss of video input signal

4.2.4. Displaying the AES Audio Sample Rate

The 7707MTA-HD can detect the sample rate of valid AES input audio on each channel, which can be reported to the display. To indicate the AES input sample rate, select the STAT (Status) menu item in menu level 1, followed by the AES1, AES2, AES3, or AES4 (Audio Input 1 through 4) menu item.

STAT
AES1 – AES4
32K
44K
48K
LOS

`32K`   AES input sample rate is 32KHz
`44K`   AES input sample rate is 44.1KHz
`48K`   AES input sample rate is 48KHz
`LOS`   Loss of AES input signal

4.2.5. Displaying the GPI Status

The 7707MTA-HD can display the status of the GPI inputs. To indicate the GPI input state, select the STAT (Status) menu item in menu level 1, followed by the GPI1 or GPI2.

STAT
GPI1
GPI2
ON
OFF

`ON`   GPI is active
`OFF`   GPI is inactive

4.2.6. Displaying the GPO Status

The 7707MTA-HD can display the status of the GPO outputs. To indicate the GPO status, select the STAT (Status) menu item in menu level 1, followed by the GPO1 or GPO2.

STAT
GPO1
GPO2
ON
OFF
LOS

`ON`   GPO is active
`OFF`   GPO is inactive
`LOS`   Loss of optical link input signal

4.2.7. Displaying the Received Optical Power

To display the received optical power, select the STAT (Status) menu item in menu level 1, followed by the PWR (optical power) option.

STAT
PWR
-40 to 0
LOW
OVR

`-40` to `0`   Power monitoring range (in dBm units)
`LOW`   Received optical power is less than –40dBm
`OVR`   Received optical power is greater than maximum

CAUTION: Never exceed the maximum specified optical input power for the specific product option that you possess. See section 3.1 for optical input specifications. Exceeding the maximum optical input power can permanently damage the optical receiver.

4.2.8. Displaying the Firmware Version

Software operating on the 7707MTA-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.

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

4.2.9. Selecting the Laser Output Mode on LOS

In some applications it is desirable to have the laser output disabled while no input video signal is present (VID…LOSS condition). Alternatively, it may be preferable to maintain an optical output signal, even with no input video. Note that the Output Mode on LOS selection (section 4.2.10) determines the output signal content. The 7707MTA-HD supports both modes of operation. To configure the output laser enable mode, select the `CTRL` (Control) menu item in menu level 1 followed by the `FOUT` (Fiber Output) and `LASR` (Laser) menu items.

CTRL
FOUT
LASR
CONT
DISC

CONT   Continuous operation. Laser is always enabled, even without valid video input

DISC   Discontinuous operation. Laser is disabled when no valid input video is detected

4.2.10. Selecting the Video Output Mode on LOS

In order to maintain audio transport during input video loss, a generated output video signal may be enabled during this condition. A black or gray active picture may be selected. Alternately, to force a downstream signal loss during this condition, output generation may be disabled. Note that the Laser Enable Mode supersedes this selection. To configure the output mode on LOS, select the `CTRL` (Control) menu item in menu level 1 followed by the `FOUT` (Fiber Output) and `GEN` (Generation) menu items.

CTRL
FOUT
GEN
BLK
GRAY
OFF

BLK   Enable output generation with black active picture

GRAY   Enable output generation with gray active picture

OFF   Disable output generation

4.2.11. Selecting AES Sample Rate Conversion

Audio must have a sample rate of 48KHz, and be synchronous to video for embedding. To accommodate other input audio sample rates, or asynchronous signals, the 7707MTA-HD provides sample rate conversion. Sample rate conversion should be turned on for normal operation, however, Dolby-E audio uses a proprietary encoding scheme that is not compatible with sample rate conversion; it should be disabled for Dolby-E. Note that Sample Rate Conversion adds 3.2ms audio latency when enabled. To enable or disable sample rate conversion, select the `CTRL` (Control) menu item in menu level 1, followed by the `AES1, AES2, AES3,` or `AES4` (Audio Inputs 1 through 4) and `SRC` (Sample Rate Convert) menu items.

CTRL
AES1 – AES4
SRC
ON
OFF

ON   Enable sample rate conversion
OFF Disable sample rate conversion
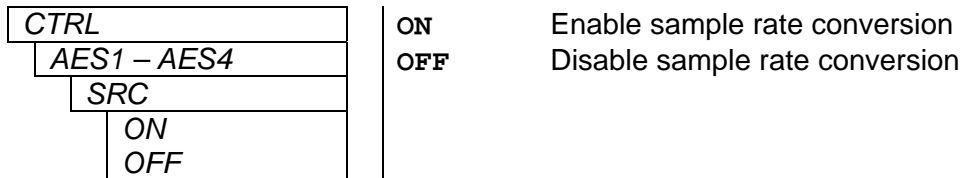
4.2.12. Selecting the Audio Delay

Audio may be delayed with respect to video in addition to the 7707MTA-HD's inherent latency by up to 42 ms. To set the audio delay, select the `CTRL` (Control) menu item in menu level 1, followed by the `AES1, AES2, AES3,` or `AES4` (Audio Inputs 1 through 4) and `DLY` (Delay) menu items.

CTRL
AES1 – AES4
DLY
0 – 42ms

0-42   Audio delay in milliseconds
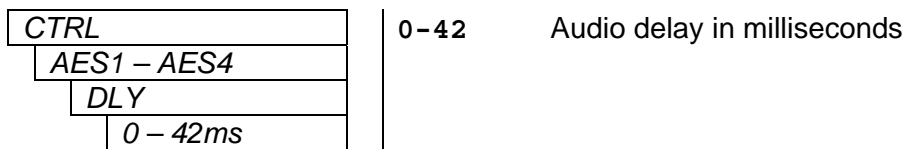
4.2.13. Selecting the Serial Data Type

The serial data interface of the 7707MTA-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
SER
TYPE
232
422
485

232   Configures card to transmit RS232
422   Configures card to transmit RS422
485   Configures card to transmit RS485
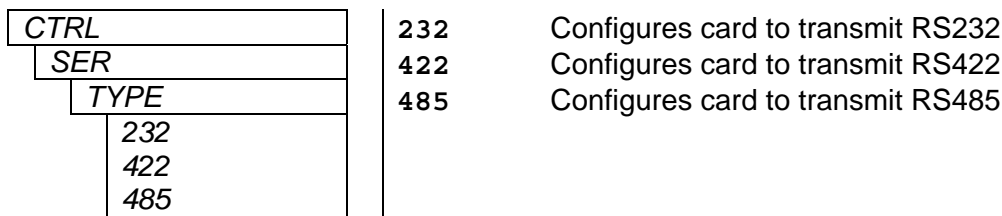
4.2.14. Selecting the Serial Data Rate

A serial data rate selection is only required for RS-485 data. 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).

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

CTRL
  SER
    RATE
      SELECTIONS
      PER TABLE

4.2.15. Selecting 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 7707MTA-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).

CTRL
  SER
    BIAS
      ON
      OFF

ON	Enables fail safe bias
OFF	Disables fail safe bias

4.2.16. Selecting the Audio Embedding Groups

This user menu item provides configuration of the embedded audio groups. Incoming embedded audio groups are cleaned from the video, and should be re-assigned as desired using this menu option. To select the audio embedding groups select the CTRL (Control) menu item in menu level 1, followed by the EMBD (Audio Embedding), AUD (Audio), and GRP1, GRP2, GRP3 or GRP4 menu items. Then, select from CH1 or CH2 (channel 1 or 2) for that audio group.

CTRL
EMBD
AUD
GRP1 – GRP4
CH1
CH2
AES - NONE

AES1	AES input 1
AES2	AES input 2
AES3	AES input 3
AES4	AES input 4
G11	Embedded group 1, channel 1
G12	Embedded group 1, channel 2
G21	Embedded group 2, channel 1
G22	Embedded group 2, channel 2
G31	Embedded group 3, channel 1
G32	Embedded group 2, channel 2
G41	Embedded group 4, channel 1
G42	Embedded group 4, channel 2
MIX1	Mixer 1
MIX2	Mixer 2
MIX3	Mixer 3
MIX4	Mixer 4
NONE	Mute channel

4.2.17. Selecting Serial Data Embedding Parameters

The 7707MTA-HD embeds serial data into horizontal ancillary (HANC) data space of the video. To provide flexibility, the user is able to configure HANC embedding parameters. Configuration parameters are provided by selecting the CTRL (Control) menu item in menu level 1, followed by the EMBD (Embedding) and SER (Serial Data) menu items.

CTRL
EMBD
SER
ENB
DID
SDID
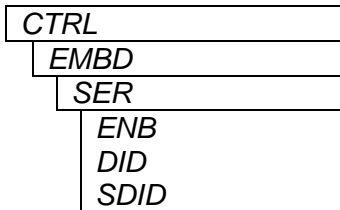
ENB	Embedder enable/disable
DID	Data ID
SDID	Secondary Data ID

The serial data embedder may be enabled and disabled depending on the requirements for serial data transport. To enable or disable the embedder, select the ENB menu item and the select from:

CTRL
EMBD
SER
ENB
ON
OFF
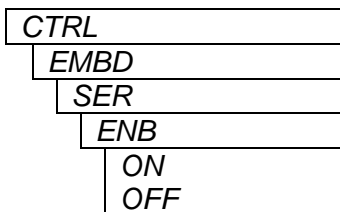
ON	Embedder enabled
OFF	Embedder disabled

The SMPTE 291 standard describes ancillary data packet and space formatting. Per this specification, embedded data has an associated Data ID (DID). To configure a desired DID select the CTRL (Control) menu item in menu level 1, followed by the EMBD (Embedding) and SER (Serial Data) menu items.

CTRL
EMBD
SER
DID
50 to 5F

50 to 5F   Sets the ID used for data embedding

The SMPTE 291 standard describes ancillary data packed and space formatting. Per this specification, embedded data has an associated Secondary Data ID (SDID). To configure a desired SDID, select the secondary data ID line, and select the CTRL (Control) menu item in menu level 1, followed by the EMBD (Embedding) and SER (Serial Data) menu items.

| |
|---|
| *CTRL* |
| *EMBD* |
| *SER* |
| *SDID* |
| *1 to FF* |

1 to FF   Sets the secondary ID used for data embedding

4.2.18. Selecting GPIO Embedding Parameters

The 7707MTA-HD embeds GPIO into vertical ancillary (VANC) data space of the video. To provide flexibility, the user is able to configure VANC embedding parameters. Configuration parameters are provided by selecting the CTRL (Control) menu item in menu level 1, followed by the EMBD (Embedding) and GPIO (Serial Data) menu items.

CTRL
EMBD
GPIO
LN
DID
SDID

LN   Serial data embed line
DID   Data ID
SDID Secondary Data ID

4.2.18.1.   Selecting the Vanc Embed Line

The user must note the range of VANC space for the particular video standard used, and configure the 7707MTA-HD accordingly to embed GPIO. To select the data embedding line, select the CTRL (Control) menu item in menu level 1, followed by the EMBD (embedding) and GPIO (Serial Data) menu items.

CTRL
EMBD
GPIO
LN
0 to 2047
NONE

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

4.2.18.2. Selecting the Data ID

The SMPTE 291 standard describes ancillary data packet and space formatting. Per this specification, embedded data has an associated Data ID (DID). To configure a desired DID select the CTRL (Control) menu item in menu level 1, followed by the EMBD (Embedding) and GPIO (Serial Data) menu items.

| CTRL |
|---|
| EMBD |
| GPIO |
| DID |
| 50 to 5F |

50 to 5F   Sets the ID used for data embedding
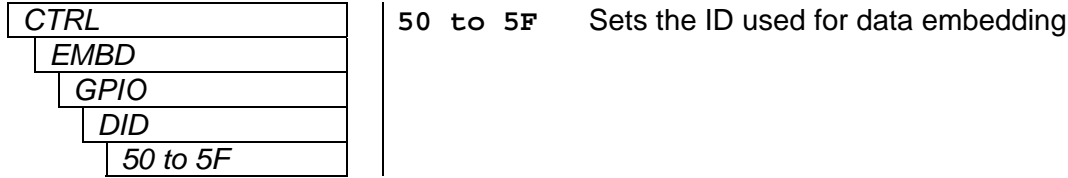
4.2.18.3. Selecting the Secondary Data ID

The SMPTE 291 standard describes ancillary data packed and space formatting. Per this specification, embedded data has an associated Secondary Data ID (SDID). To configure a desired SDID, select the secondary data ID line, and select the CTRL (Control) menu item in menu level 1, followed by the EMBD (Embedding) and GPIO (Serial Data) menu items.

CTRL
EMBD
GPIO
SDID
1 to FF

1 to FF   Sets the secondary ID used for data embedding
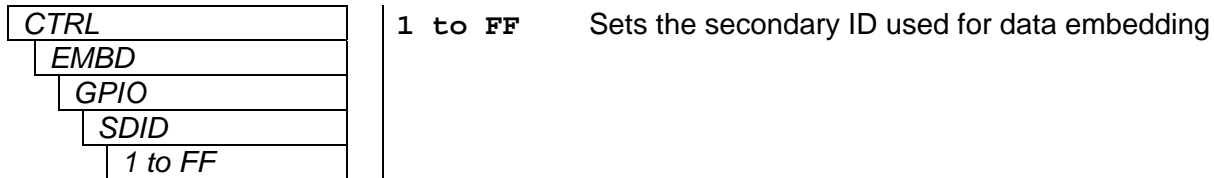
4.2.19. Selecting the Source of Coaxial Output Video

The 7707MTA-HD provides a coaxial video output. The source of this output may be a loopback direct copy of the input video, or it may output video with audio embedded as per the 7707MTA-HD embedder settings.

CTRL
EMBD
COAX
LOOP
EMBD

LOOP   Loopback video input
EMBD   Video with audio embedded by 7707MTA-HD
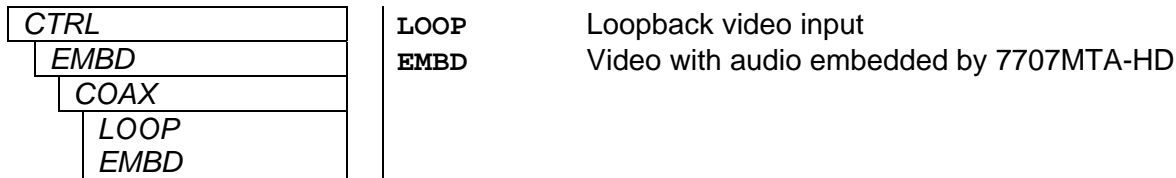
4.2.20. Selecting the Audio Mixer Configuration

Internal audio mixers allow audio channel summing for voiceover, downmix and other applications. To configure the audio mixers, selecting the CTRL (Control) menu item in menu level 1, followed by the MIX (mixer) menu item. Then select from the L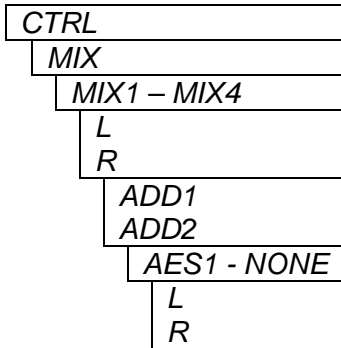 (left) channel or R (right) channel. Select ADD1 for the first source to be summed, or ADD2 for the second source to be summed.

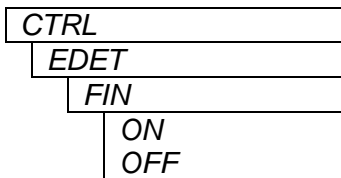|	
CTRL	
MIX	
MIX1 – MIX4	
L	
R	
ADD1	
ADD2	
AES1 - NONE	
L	
R	

AES1	AES input 1
AES2	AES input 2
AES3	AES input 3
AES4	AES input 4
G11	Embedded group 1, channel 1
G12	Embedded group 1, channel 2
G21	Embedded group 2, channel 1
G22	Embedded group 2, channel 2
G31	Embedded group 3, channel 1
G32	Embedded group 3, channel 2
G41	Embedded group 4, channel 1
G42	Embedded group 4, channel 2
NONE	Mute channel

Summed mixer channels become available sources for the audio embedders (see section 4.2.14).

4.2.21. Selecting Fiber Input Error Detection

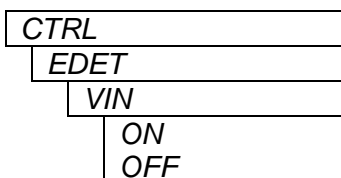The 7707MTA-HD is capable of detecting CRC or EDH errors in optical input video. To turn error detection on or off, select the CTRL (Control) menu item in menu level 1 followed by the EDET (Error Detection) menu items, and then select the FIN (Fiber Input) menu item.

CTRL	**ON**	Enable error detection. Errors will be reported to the card edge LED
EDET		
FIN	**OFF**	Disable error detection
ON		
OFF		

4.2.22. Selecting Video Input Error Detection

The 7707MTA-HD is capable of detecting CRC or EDH errors at the video input. 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, and then select the VIN (Video Input) menu item.

CTRL	**ON**	Enable error detection. Errors will be reported to the card edge LED
EDET		
VIN	**OFF**	Disable error detection
ON		
OFF		

4.2.23. Selecting AES Error Detection

The 7707MTA-HD is capable of detecting errors at the AES inputs. 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, and then select the `AIN` (AES Inputs) menu item.

CTRL
EDET
AIN
ON
OFF

ON   Enable error detection. Errors will be reported to the card edge LED

OFF   Disable error detection

4.2.24. Selecting the Headphone Monitoring Jack Channel

The 7707MTA-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
AES1 – NONE

AES1	AES input 1
AES2	AES input 2
AES3	AES input 3
AES4	AES input 4
G11	Embedded group 1, channel 1
G12	Embedded group 1, channel 2
G21	Embedded group 2, channel 1
G22	Embedded group 2, channel 2
G31	Embedded group 3, channel 1
G32	Embedded group 2, channel 2
G41	Embedded group 4, channel 1
G42	Embedded group 4, channel 2
MIX1	Mixer 1
MIX2	Mixer 2
MIX3	Mixer 3
MIX4	Mixer 4
NONE	Mute 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 50

0 to 50   Sets the volume of the headphone jack

4.2.25. Selecting the Display Orientation

The 7707MTA-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

4.2.26. Selecting the Factory Reset Configuration

It is convenient to have a quick method of returning all configuration settings to a default state. The 7707MTA-HD provides a factory reset for this purpose. All values that 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. The following list describes possible user selections for this menu item:

NO   Do not initialize factory reset. Selecting *NO* returns the user to the previous menu item, without changes.
YES   Initialize factory reset.

5.   JUMPERS AND CONTROLS

Several jumpers, located at the front of the module are used to preset various operating modes. Figure 4-1 shows the locations of the jumpers.

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 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.   BACKWARDS COMPATIBILITY

This card can be linked with the previous generation 7707MR-HD receivers, providing that it is of the same type (either –W of –F2). The following chart outlines what signals can be transmitted.

7707MTA-HD to 7707MR-HD Compatibility	
Signal Type	**Compatibility**
Video: HD-SDI (SMPTE292M) SD-SDI (SMPTE259M-C) SDTi DVB-ASI	YES
Audio: AES3-2003 (Balanced AES) SMPTE276M (Unbalanced AES)	YES
Data: RS-232 RS-422 RS-485	YES
General Purpose Inputs and Outputs	NO