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REVISION HISTORY

<u>REVISION</u>	<u>DESCRIPTION</u>	<u>DATE</u>
0.1	Preliminary Version	Oct 06
0.2	First Card Release	Mar 07
1.0	Added –F2 version manual entries and backwards compatibility notes with the 7707MT-HD transmitter	May 08
1.1	Added table format throughout section 4.2	Apr 09
1.2	Removed references to VistaLINK [®] enabled functionality	May 09

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Although every attempt has been made to accurately describe the features, installation and operation of this product in this manual, no warranty is granted nor liability assumed in relation to any errors or omissions unless specifically undertaken in the Evertz sales contract or order confirmation. Information contained in this manual is periodically updated and changes will be incorporated into subsequent editions. If you encounter an error, please notify Evertz Customer Service department. Evertz reserves the right, without notice or liability, to make changes in equipment design or specifications.

WARNING



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

1. OVERVIEW

The 7707MRA-HD is a fiber optic receiver for one HD or SD digital video signal, accompanied by four AES audio signals, serial data, two GPI and two GPO signals. Audio and control signals are de-embedded from the HD, SD, or SDTi video signal that is applied to the optical input. The 7707MRA-HD is designed to operate with a companion 7707MTA-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. 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
- Supports HD-SDI and SDI video
- Provides de-embedding of audio and control signals from HD-SDI (SMPTE 292M), SD-SDI (SMPTE 259M-C), or SDTi (SMPTE 305.2M)
- Demultiplexes up to 4 AES audio, bi-directional RS-232/422 and 2 GPIO with HD-SDI or SDI
- Supports all SMPTE 292M (1.485Gb/s) rates/standards
- Supports 525/625 line component 4:2:2 SDI @ 270Mb/s
- DolbyTM E compatible
- Built in jitter attenuation
- Transparently passes DVB-ASI (without embedded audio, serial data and GPIO)
- Controllable audio output interface for balanced or unbalanced AES
- Selectable AES pop-reduction minimizes clicks due to audio interruptions or errors
- Bi-directional serial port accommodates RS-422, RS-232, or RS-485 data up to 153Kbaud
- Comprehensive signal and status monitoring via four-digit card-edge display
- SC/PC (retractable cover optional), ST/PC, or FC/PC fiber connector options
- Fully hot-swappable from front of frame
- Local display of optical signal strength, video, audio and data presence, video and AES formats, GPI and GPO status
- Accepts any wavelength in the 1270nm to 1610nm range
- Optical output wavelengths of 1310nm, 1550nm, and up to sixteen CWDM wavelengths (ITU-T G.694.2 compliant)
- Occupies a single or dual card slot and can be housed in the 1RU 7701FR frame which holds up to three single or dual slot modules, the 3RU 7700FR-C frame which has a 15 slot capacity, the portable 3RU 350FR frame which has a 7 slot capacity, or a standalone enclosure which holds a single module

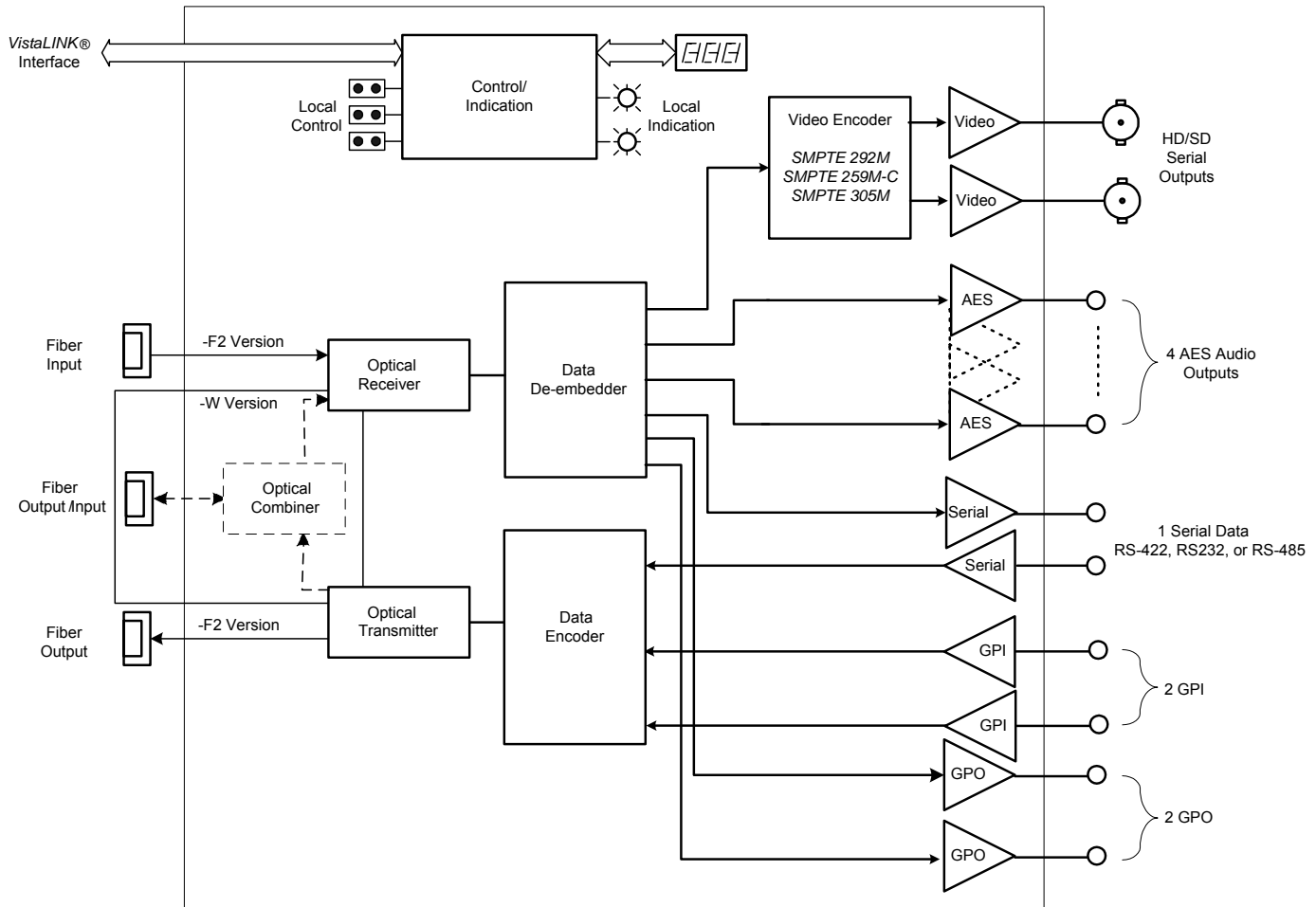


Figure 1-1: 7707MRA-HD Block Diagram

2. INSTALLATION

Each 7707MRA-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.

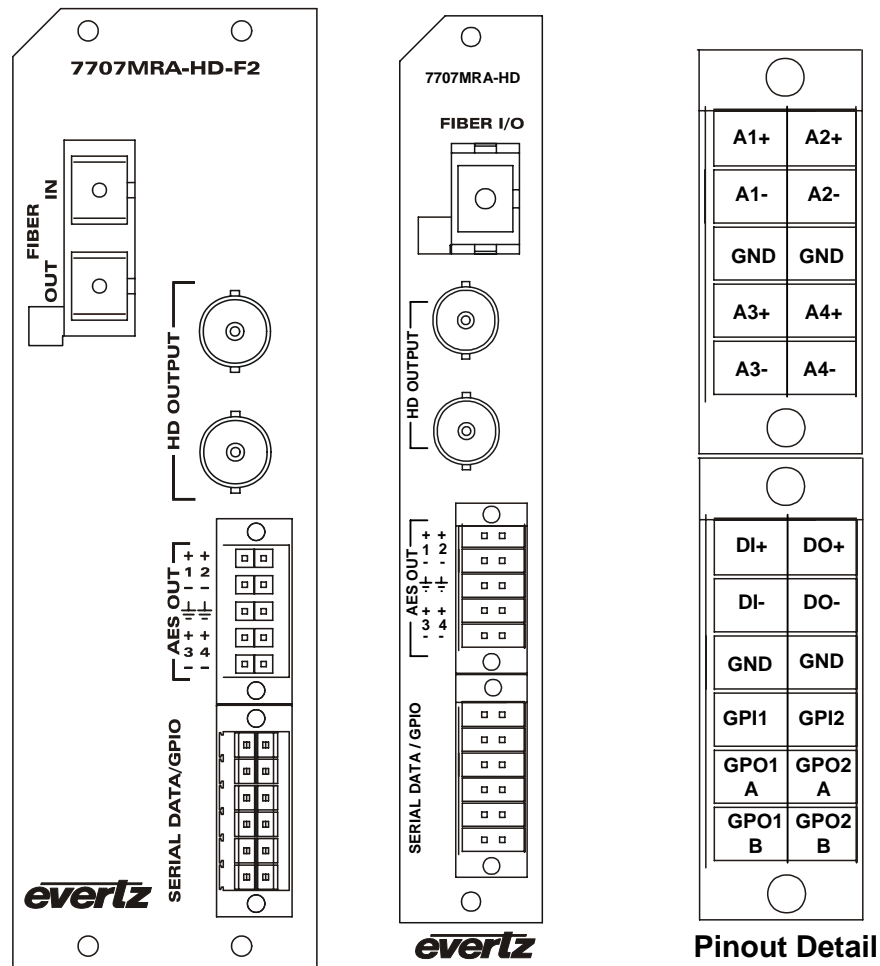


Figure 2-1: 7707MRA-HD Rear Plates & Pin Out

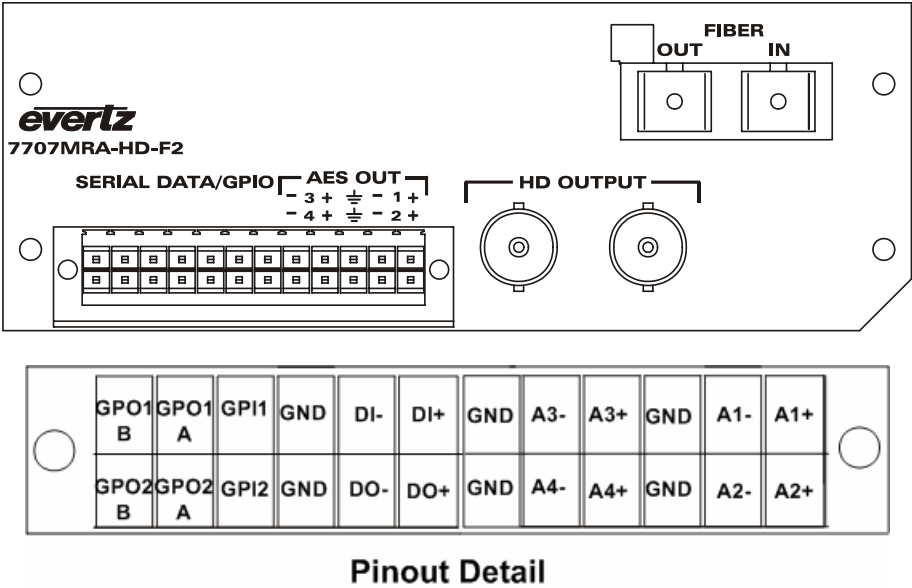


Figure 2-2: 7707MRA-HD Rear Plates & Pin Out (1RU version)

2.1.1. Electrical Signal Connections

HD/SD 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), DVB-ASI and SDTi (SMPTE 305.2M) standards. See section 3.1 for video output specifications.

AES OUTPUT: AES audio output connections of the removable terminal block. The 7707MRA-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 4.2.8 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 7707MRA-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 7707MRA-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 4.2.8 AES audio output type configuration instructions.

SERIAL I/O: Bi-directional serial data connections of the removable terminal block. The 7707MRA-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 7707MRA-HD. Bi-directional data will be communicated to and from the companion 7707MTA-HD.

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

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

See section 3.3 for serial data specifications.

See section 4.2.9 to 4.2.14 for serial data configuration instructions.

GPI: General Purpose Input connections of the removable terminal block. The General Purpose Inputs are active-low, opto-isolated connections.

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 3.4 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 7707MRA-HD 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 7707MTA-HD-W module with a suitable fiber optic cable.

The 7707MRA-HD is designed to work with single-mode fiber optic cable. The 7707MRA13-HD-W transmits at the 1310nm wavelength.

The optical output can be configured to operate in continuous or discontinuous mode as described in section 4.2.7. If discontinuous mode is selected, while the optical input to the 7707MRA-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 7707MRA-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 7707MTA-HD-F2 module with a suitable fiber optic cable. The dual fiber 7707MRA-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 7707MRA-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 7707MRA-HD-F2 is compatible only with single-mode fiber optic cable.

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



Background colour: yellow
Triangular band: black
Symbol: black

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: 7707MRA13-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 the fiber optic cable see section 1 of the Fiber Optics System Design section of this manual binder.

3. SPECIFICATIONS

3.1. SERIAL DIGITAL VIDEO OUTPUT

Number of Outputs:	2 (regenerated)
Standards:	SMPTE 292M (HD-SDI), SMPTE 259M-C (SD-SDI), SMPTE305.2M (SDTi), DVB-ASI (audio outputs, serial data and GPIO will not be present)
Connector:	1 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
Alignment 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:	Removable terminal strip
Sampling Rate:	48KHz
Resolution:	up to 24 bits
Signal Level:	
Balanced:	1Vp-p \pm 0.1V
Unbalanced:	3.5Vp-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:	<1ms @ 48 kHz, <1.2ms @ 32 kHz
SRC Enabled:	add 3.3 ms (SRC on the companion 7707MTA-HD-W)
Pop Minimization Enabled:	add 4 ms
Impedance:	
Balanced:	110 Ω
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:	5K Ω to 5V on DI+ (selectable)
Baud Rate:	Up to 153Kb/s (selectable)

3.4. GENERAL PURPOSE INPUTS

Number of Signals:	2
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:	2
Connector at Breakout:	Multi-pin Removable Terminal Block
Output Type:	Dry contact relay closure to GPO COMMON, normally open or normally closed configuration is jumper selectable
Output Current (min):	100mA

3.6. OPTICAL INPUTS/OUTPUTS

Number of Connections:	2 (1 Input plus 1 Output for -F2 version) 1 (-W version)
Connector:	Female SC/PC, ST/PC or FC/PC
Return Loss:	> 14 dB
Rise and Fall Time:	200 ps nominal
Fiber Size:	9 μ m core / 125 μ m overall
Input Optical Sensitivity:	See Error! Reference source not found. : Applications
Configuration	
Wavelengths:	Transmit on 1550nm, back channel receive on 1310nm (-W only) Transmit of 1310 nm, 1550nm, CWDM, DWDM (-F2 only)
Output Power:	-8 dBm (-1dBm for companion 7707MTA-HD-W)
Input Optical Sensitivity:	-28 dBm (-W version), -21dBm for companion 7707MRA13-HD-W -23 dBm (-F2 version), -28 for High Sensitivity (-H version)
Maximum Input Power:	-1dBm

3.7. ELECTRICAL

Voltage:	+12VDC
Power:	12W

3.8. PHYSICAL

7700 or 7701 frame mounting	
Number of slots:	1 (-W version) 2 (-F2 version)

4. STATUS INDICATORS AND DISPLAYS

The 7707MRA-HD has 9 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 options on the alphanumeric display. Figure 4-1 displays the locations of the indicators and pushbutton.

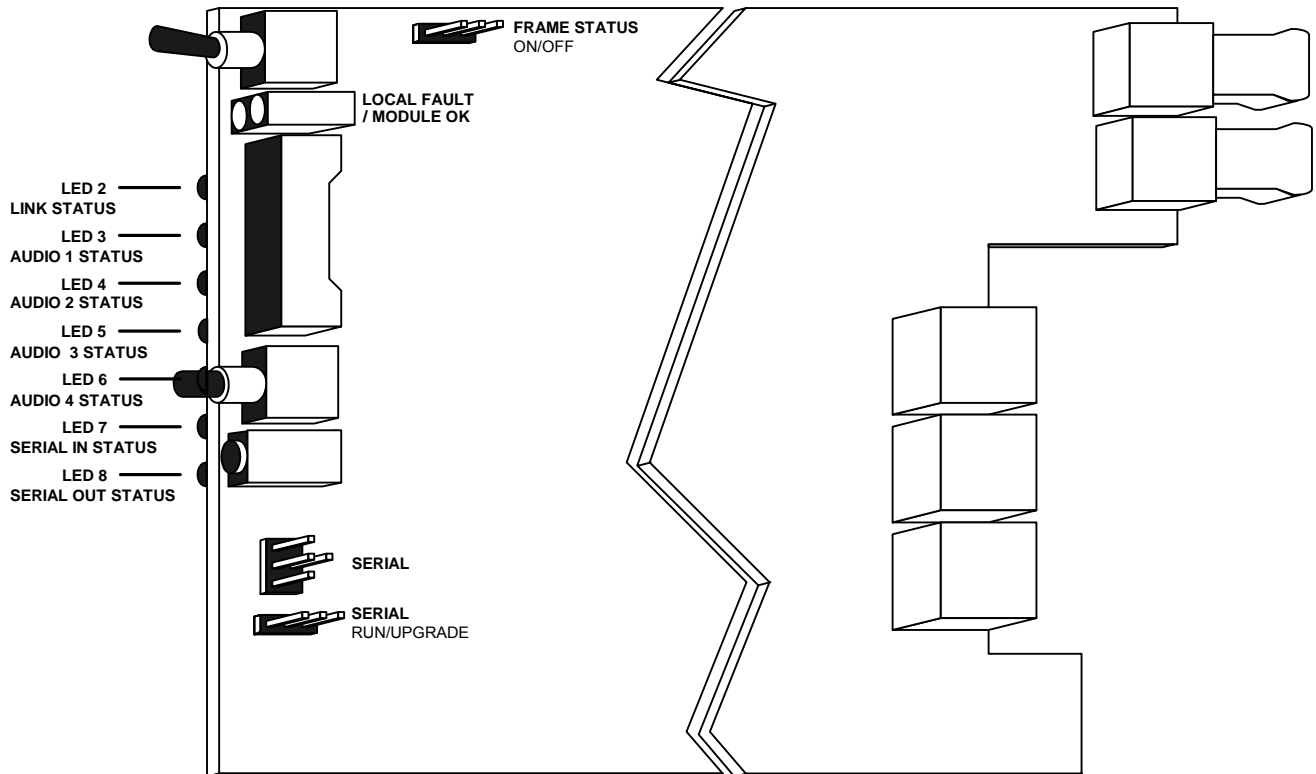


Figure 4-1: Location of Status Indicators and Jumpers

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 4.2.20) the LED will flash red. If no valid optical signal is detected on the fiber input of the 7707MRA-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 7707MRA-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 7707MRA-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 7707MRA-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 7707MRA-HD the LED will remain off.

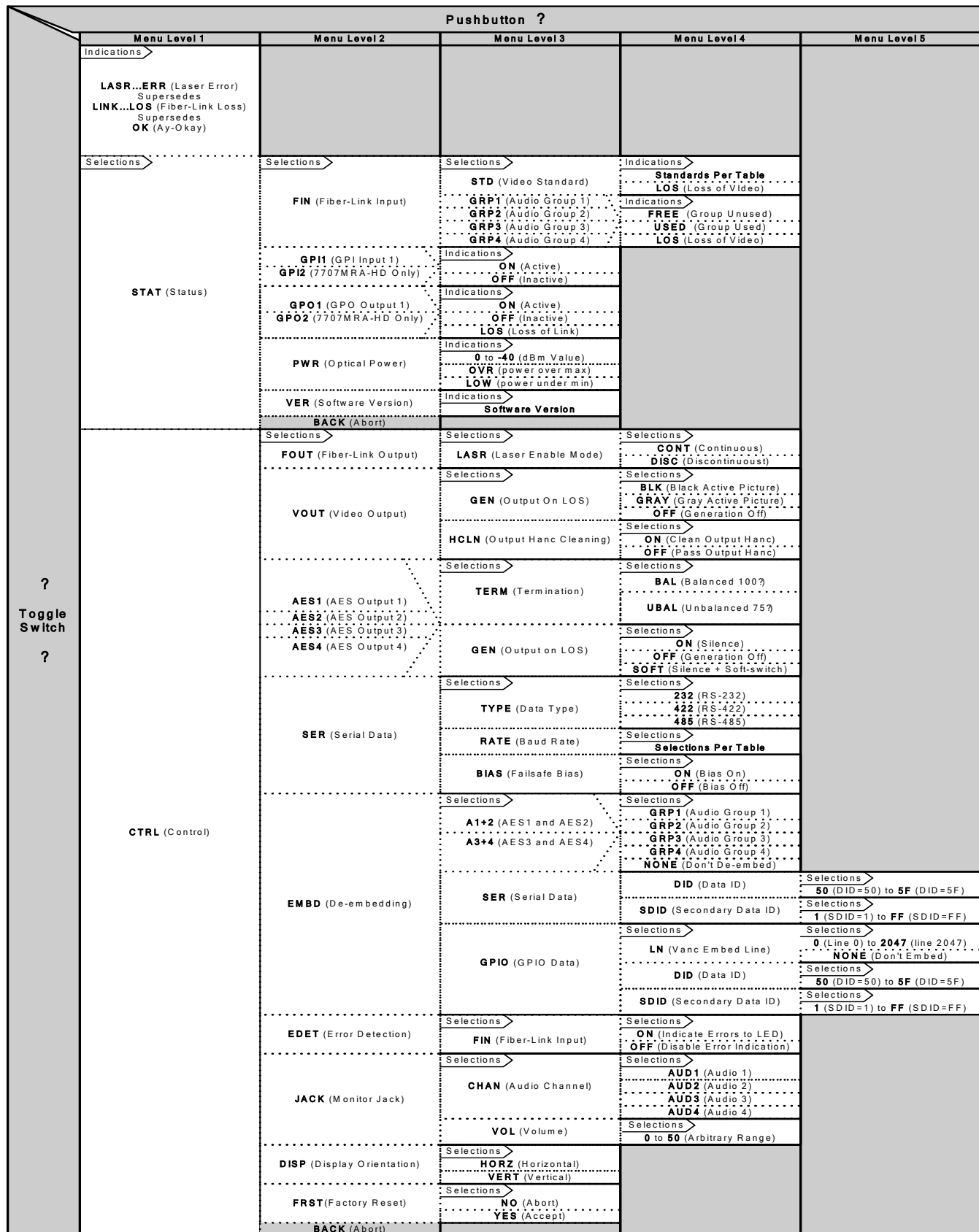
LED 7, SERIAL IN STATUS: This LED indicates the status of Serial input data. When a valid input signal is detected the LED will be green. When parity errors are detected (with error detection enabled and parity information present, see section 4.2.21) the LED will flash red. If no data is detected on the serial data input of the 7707MRA-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.



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 7707MRA-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 Standard of Input Video

The card-edge display of the 7707MRA-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	1080i/60	1080i/60 standard is present
FIN	1080i/59.94	1080i/59.94 standard is present
STD	1080i/50	1080i/50 standard is present
1080i/60	1035i/60	1035i/59.94 standard is present
1080i/59.94	1035i/59.94	1035i/59.94 standard is present
1080i	1080i/48	1080i/48 standard is present
/50	1080i/47.96	1080i/47.96 standard is present
1035i/60	720p/60	720p/60 standard is present
1035i/59.94	720p/59.94	720p/59.94 standard is present
1080i/48	SDTI-N270	SDTi standard is present, with 525i structure.
1080i/47.96	SDTI-P270	SDTi standard is present, with 625i structure.
720p/60	DVB-ASI	DVB-ASI standard is present
720p/59.94	N270	525i standard is present
SDTI-N270	P270	625i standard is present
SDTI-P270	LOS	Loss of signal. No valid video signal is detected at the selected input
DVB-ASI		
N270		
P270		
LOS		



4.2.3. Displaying the Embedded Audio Status of Input Video

The 7707MRA-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.

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

4.2.4. Displaying the GPI Status

The 7707MRA-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*.

<i>STAT</i>	ON	GPI is active.
<i>GPI1 / GPI2</i>	OFF	GPI is inactive.
<i>ON</i>		
<i>OFF</i>		

4.2.5. Displaying the GPO Status

The 7707MRA-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*.

<i>STAT</i>	ON	GPO is active.
<i>GPO1 / GPO2</i>	OFF	GPO is inactive.
<i>ON</i>	LOS	Loss of optical link input signal.
<i>OFF</i>		
<i>LOS</i>		

4.2.6. Displaying the Received Optical Power

The 7707MRA-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)
PWR	LOW	Received optical power is less than -40dBm.
-40 to 0	OVR	Received optical power is greater than maximum.
LOW	CAUTION: <i>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.</i>	
OVR		

4.2.7. Displaying the Firmware Version

Software operating on the 7707MRA-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

4.2.8. 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 at the optical input (LINK...LOS condition). Alternatively, it may be preferable to maintain an optical output signal, even with no input video. The 7707MRA-HD supports both modes of operation. If the continuous mode of operation is selected, while the input to the 7707MRA-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		
CONT		
DISC	DISC	Discontinuous operation. Laser is disabled when no valid input video is detected.

4.2.9. 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. 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	BLK	Enable output generation with black active picture.
VOUT	GRAY	Enable output generation with gray active picture.
GEN	OFF	Disable output generation.
BLK		
GRAY		
OFF		

4.2.10. Selecting Output Video HANC Cleaning

With output HANC cleaning disabled, all embedded audio groups present in the optical input video will be passed transparently to the output. With output HANC cleaning enabled, the audio groups that are selected for de-embedding (see section 4.2.7) will be cleaned from the output video. 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	ON	De-embedded audio groups are cleaned from the output video.
VOUT	OFF	All audio groups pass transparently to the output video.
HCLN		
ON		
OFF		

4.2.11. Selecting Balanced or Unbalanced Audio

The 7707MRA-HDW 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-AES4	UBAL	Configures output impedance, rise/fall times, and amplitude for unbalanced AES.
TERM		
BAL		
UBAL		

4.2.12. Selecting AES Pop-Reduction and Generation on LOS

Three AES output generation modes are available during audio loss. With AES output generation disabled (OFF), the output signal is muted (i.e., no electrical transitions). With AES output generation set enabled (ON), the output signal is AES silence. With AES output pop-reduction enabled (SOFT), the output will buffer audio for 4ms, and fade to mute upon the occurrence of errors in input, embedded, or de-embedded audio. This minimizes audible clicks and pops caused by application/removal of audio to the companion 7707MTA-HD-W, or optical link errors. Note that pop-reduction adds 4ms audio latency when enabled. To configure the output type on loss of input, 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 **GEN** (Generation).

CTRL	OFF Mute AES output during LOS (i.e. no electrical transitions)
AES1-AES4	ON Output AES silence during LOS
GEN	SOFT Output AES silence with Pop-reduction during errors or LOS
OFF ON SOFT	

4.2.13. Selecting the Serial Data Type

The serial data interface of the 7707MRA-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	



4.2.14. 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).

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		

4.2.15. 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 7707MRA-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	ON	Enables fail safe bias
SER	OFF	Disables fail safe bias
BIAS		
ON		
OFF		

4.2.16. Selecting Audio De-embedding Groups

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	The selected AES outputs (A1+2 or A3+4) will be mute.
GRP2		
GRP3		
GRP4		
NONE		

4.2.17. Selecting Serial Data De-embedding Parameters

The 7707MRA-HD de-embeds serial data from horizontal ancillary (HANC) data space of the optical input video. The HANC de-embedding parameters of the 7707MRA-HD should be configured to match embedding parameters of the companion 7707MTA-HD-W. 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	DID	Data ID
EMBD	SDID	Secondary Data ID
SER		
DID		
SDID		

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		



4.2.18. Selecting GPIO De-embedding Parameters

The 7707MRA-HD de-embeds GPIO from vertical ancillary (VANC) data space of the optical input video. The VANC de-embedding parameters of the 7707MRA-HD should be configured to match embedding parameters of the companion 7707MTA-HD-W. 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	LN	Serial data de-embed line
EMBD	DID	Data ID
GPIO	SDID	Secondary Data ID
LN		
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 GPIO (GPIO Data) menu items.

CTRL	0 to 2047	Serial Data de-embed line (note available lines for particular standard)
EMBD	NONE	Disable de-embedding configured by this parameter
GPIO		
LN		
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 GPIO (GPIO Data) menu items.

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

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

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

4.2.19. Selecting Fiber Input Error Detection

The 7707MRA-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		

4.2.20. Selecting the Headphone Monitoring Jack Channel

The 7707MRA-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	AUD1	Channel 1 is selected to the headphone monitoring jack
JACK	AUD2	Channel 2 is selected to the headphone monitoring jack
CHAN	AUD3	Channel 3 is selected to the headphone monitoring jack
AUD1	AUD4	Channel 4 is selected to the headphone monitoring jack
AUD2		
AUD3		
AUD4		

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	0 to 50	Sets the volume of the headphone jack
JACK		
VOL		
0 to 50		

4.2.21. Selecting the Display Orientation

The 7707MRA-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	HORZ	Sets the orientation of the text to horizontal
DISP	VERT	Sets the orientation of the text to vertical
HORZ		
VERT		

4.2.22. Selecting the Factory Reset Configuration

It is convenient to have a quick method of returning all configuration settings to a default state. The 7707MRA-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. Return 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.

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