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REVISION HISTORY

REVISION	DESCRIPTION	DATE
1.0	Original Version	Jan 02
1.1	Added 7707OE-HD-L version Added 8 new CWDM wavelengths	Dec 02
1.1.1	Added information about DVB-ASI compliant outputs	Aug 03
1.1.2	Corrected Figure 3	Oct 03
1.2	Updated, corrected, trap table added	Aug 05
1.2.1	Added jumper information to section 5.2	Apr 07
1.2.2	Updated carrier fault calibration point	Jun 08

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 7707EO-HD DWDM cards and any 7707OE-HD series cards directly with a short fiber optic cable. The 7707EO-HD DWDM card produces +7dBm of power, which will damage the receiver if connected directly.

Do not hook up the 7707EO-HD cards that output more than -7dBm of power (see 7707EO-HD specifications for output power of various laser types) and 7707OE-HD-H high sensitivity receiver cards directly with a short fiber optic cable. The 7707EO-HD cards that produce more than -7dBm of power will damage the receiver if connected directly.

1. OVERVIEW

The 7707OE-HD is a *Vista*LINK® enabled, optical to electrical converter for SMPTE 292M (1.485Gb/s), SMPTE 259M (143-360Mb/s), SMPTE 344M (540Mb/s), DVB-ASI (270Mb/s) and SMPTE 310M (19.4Mb/s) signals. Automatic reclocking, data rate selection and data rate indication is provided for rates from 143Mb/s to 1.485Gb/s. Monitoring and control of card status and parameters is provided locally at the card edge, and remotely via *Vista*LINK®. The 7707OE-HD accepts one fiber input and provides three reclocked coaxial outputs.

The 7707OE-HD 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:

- Supports all SMPTE 292M standards at 1.485Gb/s
- Supports all SMPTE 259M standards with operation from 143Mb/s – 360Mb/s
- Supports SMPTE310M (19.4Mb/s), DVB-ASI (270Mb/s), SMPTE 344M (540Mb/s), and SMPTE 305M (SDTi) rates
- Auto rate selection and indication for all SDI and HD-SDI data rates from 143Mb/s to 1.485Gb/s
- Reclocked optical input, with selectable non-reclock mode – 3 outputs
- 1 output maintains polarity from input to output for DVB-ASI applications
- Comprehensive signal and status monitoring via local four-digit card-edge display, or remotely via *Vista*LINK®
- Detection and display of optical input power, video format, and EDH errors (SDI only)
- Display of received optical power for continuous indication of link integrity
- Wide range optical input (1270nm–1610nm)
- Supports multi-mode and single-mode fiber
- Fully hot-swappable from front of frame
- *Vista*LINK® enabled for remote monitoring and control when installed in 7700FR-C frame with 7700FC Frame Controller

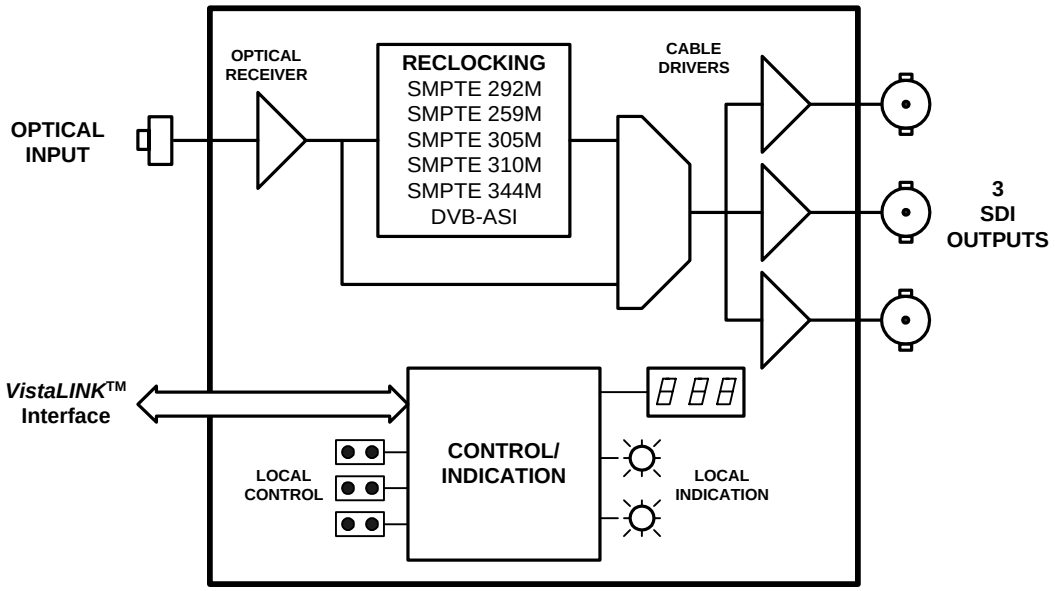

Figure 1-1: 7707OE-HD Block Diagram

2. INSTALLATION

The 7707OE-HD comes with a companion rear plate that has three BNC connectors and one 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.

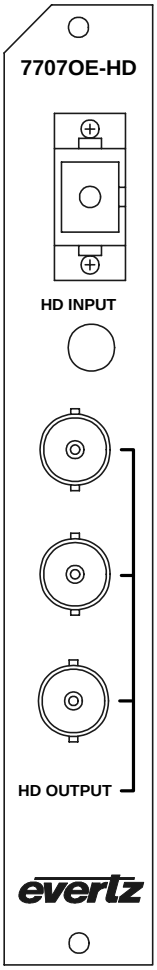

Figure 2-1: 7707OE-HD Rear Panel

OPTICAL INPUT Input for SDI optical signals. Available in SC/PC, ST/PC, FC/PC female connectors. Accepts SMPTE 292M, SMPTE 259M, SMPTE 344M, DVB-ASI or SMPTE 310M optical signals and provides auto-rate selection and reclocking for rates from 143Mb/s to 1.485Gb/s. A non-reclocking mode is also selectable via card edge jumpers, or through the *Vista*LINK® interface. This wide range input accepts optical wavelengths of 1270nm to 1610nm, accommodating standard CWDM or DWDM transmission schemes.

Do not hook up the 7707EO-HD DWDM cards and any 7707OE-HD series cards directly with a short fiber optic cable. The 7707EO-HD DWDM card produces +7dBm of power, which will damage the receiver if connected directly.

Do not hook up the 7707EO-HD cards that output more than -7dBm of power (see 7707EO-HD specifications for output power of various laser types) and 7707OE-HD-H high sensitivity receiver cards directly with a short fiber optic cable. The 7707EO-HD cards that produce more than -7dBm of power will damage the receiver if connected directly.

SDI OUTPUT The 7707OE-HD provides three reclocked serial digital video outputs for signal distribution. Output 3 (the bottom BNC) maintains the same polarity as the input and is DVB-ASI compliant.

2.1. CARE AND HANDLING OF OPTICAL FIBER

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 in the front of the binder.

3. SPECIFICATIONS

3.1. OPTICAL INPUT

Standards: SMPTE 297M
Reclocked: SMPTE 292M, SMPTE 259M A, B, C, D, SMPTE 344M, SMPTE 305M, SMPTE 310M (19.4 Mb/s), DVB-ASI, M2S
Non-Reclocked: Any bi-level signal type at rates of 19.4Mb/s – 1.485Gb/s
Connector: Female SC/PC, ST/PC or FC/PC
Wavelength: 1270nm -1610nm
Optical Sensitivity
Standard: -23dBm @ 1.485Gb/s
High Sensitivity (-H): -28dBm @ 1.485Gb/s
Max. Input Power:
Standard: -1dBm
High Sensitivity (-H): -7dBm
Fiber Size: 62 μm core / 125 μm overall

3.2. SERIAL VIDEO OUTPUTS:

Number of Outputs: 3 Per Card (2 outputs DVB-ASI/M2S compliant)
1 output maintains polarity from input to output for DVB-ASI applications.
Connectors: BNC per IEC 60169-8 Amendment 2.
Impedance: 75Ω(nominal).
Signal Level: 800mV(nominal).
DC Offset: 0V ±0.5V
Rise and Fall Time: <270ps
Overshoot: < 10% of amplitude.
Return Loss: > 12dB to 1.5Ghz
Wide Band Jitter: < 0.2UI (Reclocked)

3.3. ELECTRICAL

Voltage: +12VDC
Power: 8 Watts.

3.4. COMPLIANCE

Electrical Safety: CSA Listed to CSA C22.2 No. 60065-03, UL 60065-03
IEC 60065-(2001-12) 7th Edition
Complies with CE Low voltage directive 93/68/EEC
EMI/RFI: Complies with FCC regulations for class A devices.
Complies with EU EMC directive 89/336/EEC.

3.5. PHYSICAL

7700 or 7701 frame mounting:
Number of slots: 1

4. STATUS INDICATORS AND DISPLAYS

The 7707OE-HD has 6 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 location of the card edge status indicators, dot matrix display, pushbutton and jumpers.

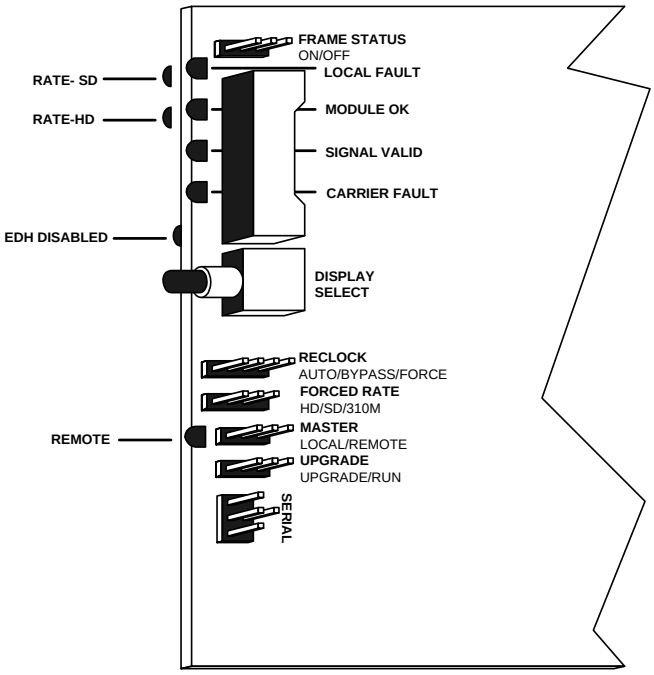

Figure 4-1: 7707OE-HD Status Indicator and Jumper Locations

4.1. STATUS INDICATOR LEDS

LOCAL FAULT: This Red LED indicates poor module health and will be On during the absence of a valid input signal or if a local power fault exists (i.e.: a blown fuse). The LOCAL FAULT indication can also be reported to the frame through the FRAME STATUS jumper.

MODULE OK: This Green LED indicates good module health. It will be On when a valid input signal is present, and the board power is good.

SIGNAL VALID: This Green LED indicates the presence of a valid input signal on the optical input. The optical input is considered valid when the module has attained lock to the signal. If the reclocker is in non-reclock mode, then the input is considered valid when the module detects the presence of a carrier.

CARRIER FAULT: This Yellow LED indicates a weak signal carrier on the optical input. The CARRIER FAULT thresholds are calibrated to an optical power of -16dBm.

NOTE: Newer cards are calibrated to –21dBm or -26dBm for the –H (high sensitivity) version. This value is 2dBm greater than the maximum sensitivity of the cards.

RATE - SD: This Green LED indicates that the reclocker is locked to one of the SD rates.

RATE - HD: This Green LED indicates that the reclocker is locked to the 1.485 Gb/s HD rate.

EDH DISABLED: This Yellow LED indicates that error detection on the card edge display has been deactivated. Press and hold the pushbutton until the LED goes OFF to enable EDH detection.

REMOTE: This Yellow LED located beside the MASTER jumper indicates that local controls of the card are disabled, and that the card is under control of the *Vista*LINK® interface. (See section 6 for information about *Vista*LINK® monitoring and control.)

4.2. DOT-MATRIX DISPLAY

Additional signal and status monitoring is provided via the 4-digit dot-matrix display located on the card edge. The card-edge pushbutton is used to select which data is being displayed in the alphanumeric display. Each time the pushbutton is pressed, the display advances to the next available display. A message indicating what display mode is active is shown for one second. After one second without the pushbutton being pressed, the selected display data is shown.

The following display messages indicate what is being displayed.

PWR	Input Optical Power
STD	Video Standard in Use
EDH	EDH Errors (for SD only)

The details of the optical power, video standards, and EDH error displays are described in sections 4.2.1 to 4.2.3.

4.2.1. Displaying the Optical Power

The 7707OE-HD module can measure and display the input optical power over a range of 0dBm to -40dBm at 1dBm increments. To display the Input Optical Power, press the pushbutton one or more times until the **PWR** message is shown on the display. After one second the detected input optical power will be shown (in units of dBm).

OVR	Indicates optical input power exceeding –1dBm for standard version and -7dBm for "–H" version
-1 to –40	Optical input power within this range for standard version
-7 to –40	Optical input power within this range for "-H" version
LOW	Optical input power below –40 dBm
LOS	Indicates that no valid input signal is present

4.2.2. Displaying the Video Standard

When the reclocker is enabled, the 7707OE-HD detects the Video standards of the signal present at its optical input. To display the Video Standard, press the pushbutton one or more times until the **STD** message is shown on the display. After one second the detected video standard will be shown. The following list describes possible displays and their meaning.

N143	SMPTE 259M-A, 143 Mb/s 4Fsc Composite NTSC
P177	SMPTE 259M-B, 177 Mb/s 4Fsc Composite PAL
N270	SMPTE 259M-C, 270 Mb/s 4:2:2 Component 525 line, 4:3
P270	SMPTE 259M-C, 270 Mb/s 4:2:2 Component 625 line, 4:3
N360	SMPTE 259M-D, 360 Mb/s 4:2:2 Component 525 line, 16:9
P360	SMPTE 259M-D, 360 Mb/s 4:2:2 Component 625 line, 16:9
N540	SMPTE 344M, 540 Mb/s 4:4:4 Component 525 line 4:3
P540	SMPTE 344M, 540 Mb/s 4:4:4 Component 625 line 4:3
HD	SMPTE 292M, 1.485 Gb/s
310M	SMPTE 310M, 19.4 Mb/s
BYP	Indicates the reclocker is in non-reclock mode.
LOS	Indicates that no valid input signal is present.

4.2.3. Displaying the EDH Errors

For SD rates, EDH errors are displayed in a different manner than optical power and video standards. When EDH error detection is enabled, the display of EDH errors will take precedence, and overwrite the existing indication with the message **EDH**. The EDH error display shows if any EDH errors have occurred during the previous 1-second interval. If the EDH errors are continuous, then the display will alternate between the EDH display and the selected video standard or equalization displays, allowing both to be monitored.

To enable the EDH error display, press and hold the pushbutton until the EDH DISABLE LED goes Off. To disable the EDH error display, press and hold the pushbutton until the EDH DISABLED LED turns On. The EDH error display can only be enabled when there is a SMPTE 259M or SMPTE 344M input signal.

5. JUMPERS AND LOCAL 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 THE RECLOCKING MODE

The RECLOCK jumper allows the user to set the reclocking mode.

RECLOCK To enable reclocking of the coaxial input signal, set the jumper to the AUTO or FORCE positions.

Set the jumper to the AUTO position to select automatic rate selection and reclocking for 19.4,143/177/270/360/540Mb/s and 1.485Gb/s signals.

Set the jumper to the FORCED position, and the FORCE RATE jumper determines the reclocking rate.

Set the jumper to the BYPASS position to disable reclocking of the coaxial input signal. The timing and duty-cycle of the signal are not reconditioned in this mode.

5.2. SELECTING THE RECLOCKING RATE

The FORCED RATE jumper selects the range of reclock rates when the RECLOCK jumper is set to the FORCE position.

FORCED RATE: Set the jumper to the SD position to select automatic reclocking of SMPTE 259M (143-360 Mb/s), SMPTE 305M (SDTi) and SMPTE 344M (540 Mb/s) rates

Set the jumper to the HD position to select reclocking of SMPTE 292M (1.485 Gb/s) signals.

Set the jumper to the 310M position to select reclocking of SMPTE 310M (19.4 Mb/s) signals.

To perform the 310M operation the RECLOCK jumper must be set to FORCE, and the FORCED RATE jumper must be set to 310M.

5.3. 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.

5.4. SELECTING WHETHER MODULE WILL BE CONTROLLED FROM THE LOCAL CONTROLS OR THROUGH THE *VISTA*LINK® INTERFACE

The MASTER jumper selects whether the module will be controlled from the local user controls or through the *Vista*LINK® interface.

MASTER: When this jumper is installed in the LOCAL position, the card functions are controlled through the local jumpers.

When this jumper is installed in the REMOTE position, the card functions are controlled through the *Vista*LINK® interface. The adjacent yellow LED will be On when *Vista*LINK® control in enabled. This LED is intended to alert the user that local controls are not currently active.

5.5. 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 NOTE 1 below). 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 (see NOTE 1). 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.

NOTE 1: The Rev (A) boards have incorrect labeling for the *RUN* / *UPGRADE* modes. The jumper labels shown in Figure 4-1 are correct. On Rev (A) boards, for normal RUN operation set the jumper to the *UPGRADE* position (as shown on the board label - away from the front of the module). For UPGRADE operation the jumper must be set to the *RUN* position (as shown on the board label - closest to the front of the board).

6. *VISTA*LINK® REMOTE MONITORING/CONTROL

6.1. WHAT IS *VISTA*LINK®?

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 *Vista*LINK® enabled fiber optic products.

2. Managed devices, (such as 7707EO and 7707OE-HD cards), each with a unique address (OID), communicate with the NMS through an SNMP Agent. Evertz *Vista*LINK® enabled 7700 series modules reside in the 3RU 7700FR-C MultiFrame and communicate with the manager via the 7700FC *Vista*LINK® 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 *Vista*LINK® network, see the 7700FC Frame Controller chapter.

6.2. *VISTA*LINK® MONITORED PARAMETERS

The following parameters can be remotely monitored through the *Vista*LINK® interface.

Parameter	Description
Card Type	Indicates either 7707OE-HD or 7707OE-HD-H card type.
Master Jumper	The state of the MASTER jumper. When in REMOTE position the cad functions are controlled through the VistaLINK® interface
Optical Power	A range of values describing optical power at the fiber input.
Video Standard	A range of values describing the detected video standard.

Table 6–1: *Vista*LINK® Monitored Parameters

6.3. *VISTA*LINK® CONTROLLED PARAMETERS

When the MASTER jumper is set to the REMOTE position, the following parameters can be remotely controlled through the *Vista*LINK® interface. When the MASTER jumper is set to the LOCAL position the local jumper settings will override the settings configured through the *Vista*LINK® interface.

Parameter	Description
Reclock Mode	Enables or disables signal reclocking.
Rate Mode	Sets the reclocking rate to SMPTE 259M, SMPTE 292M or SMPTE310M rates.

Table 6–2: *Vista*LINK® Controlled Parameters

6.4. *VISTA*LINK® TRAPS

The following parameters can be remotely enabled and monitored through the *Vista*LINK® interface as traps in the Alarm View.

Trap	Description
Signal Present	Indicates the presence of a valid input signal (the state of the SIGNAL VALID LED).
Carrier Weak	Indicates a weak signal carrier (2dBm before maximum input sensitivity) at the Fiber input (the state of the CARRIER FAULT LED).
EDH Error	The status of EDH errors present in the input signal.

Table 6–3: *Vista*LINK® Traps

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