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REVISION HISTORY

<u>REVISION</u>	<u>DESCRIPTION</u>	<u>DATE</u>
1.0	Original Version	Aug 01
1.1	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
1.3	Added VistaLINK traps, Updated Specs	Jun 04
1.4	Added Master Jumper as monitored <i>VistaLINK</i> ® parameter in section 6.2	Sep 04
1.5	Updated safety section and added assembly and labeling sections	July 05
1.5.1	Added Jumper information to section 5.1	Apr 07
1.6	Updated specs and features	Nov 08

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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.



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

1. OVERVIEW

The 7707EO is a *VistaLINK*[®] enabled, electrical to optical converter for SMPTE 259M (143-360Mb/s), SMPTE 344M (540Mb/s), DVB-ASI (270Mb/s) and SMPTE 310M (19.4Mb/s) signals. Monitoring and control of the card status and parameters is provided locally at the card edge, and remotely via *VistaLINK*[®] capability. The 7707EO accepts one coaxial SDI input, and provides one reclocked fiber output and two reclocked coaxial SDI outputs. The fiber output is available in an assortment of optical wavelengths, accommodating standard, or CWDM transmission schemes.

The 7707EO 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:

- Electrical to optical converter for all SMPTE 259M standards with operation from 143Mb/s-360Mb/s
- Supports additional standards of SMPTE 305M (SDTi) SMPTE 310M (19.4Mb/s), SMPTE 344M (540Mb/s), M2S and DVB-ASI (270Mb/s)
- Compatible with multi-mode or single-mode fiber
- Fully hot-swappable from front of frame with no fiber or BNC disconnect/reconnect required
- Occupies one card slot and can be housed in either a 1RU frame which will hold up to 3 modules, a 3RU frame which will hold up to 15 modules, 350FR portable frame that holds up to 7 modules or a standalone frame which will hold 1 module
- Comprehensive signal and card status monitoring via four digit card edge display

Input:

- Automatic input cable equalization to > 300m @ 270Mb/s (Belden 8281)

Outputs:

- Two reclocked serial digital BNC outputs for loop-through or monitoring
- One reclocked fiber output available in 1310nm or 1550nm
- Wideband Jitter < 0.2 UI
- SC/PC, ST/PC, FC/PC connector options

Status LEDs:

- Signal presence indication
- Maximum equalization warning indication
- Module status indication

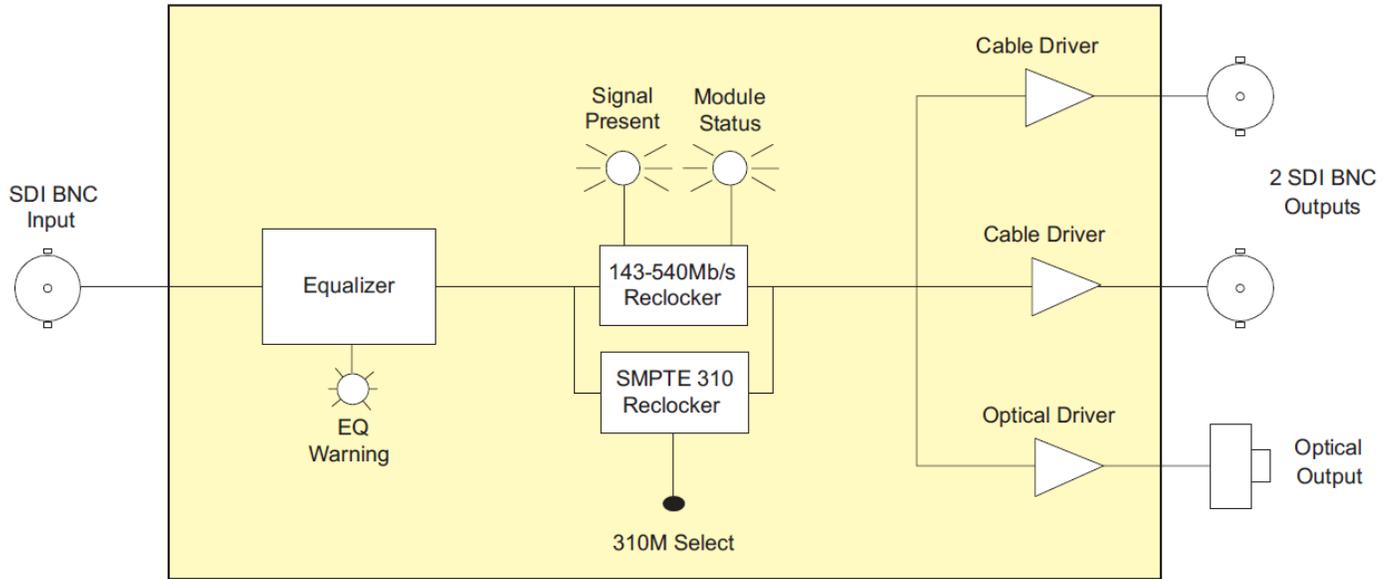


Figure 1-1: 7707EO Block Diagram

2. INSTALLATION

The 7707EO 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.

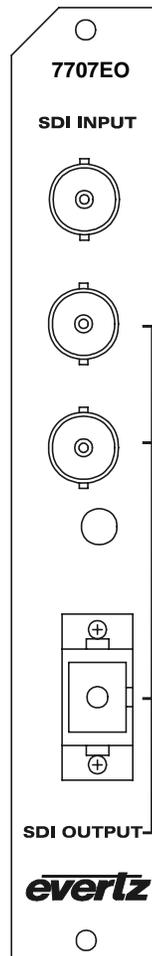


Figure 2-1: 7707EO Rear Panel

SDI INPUT: Input BNC connector for 10-bit serial digital video signals compatible with the SMPTE 259M, SMPTE 344M, DVB-ASI or SMPTE 310M standards. This input provides adaptive compensation for up to 250m of industry standard Belden 8281 cable, at 270Mb/s.

SDI OUTPUT: There are two BNC connectors with serial component video outputs, compatible with the SMPTE 259M, SMPTE 344M, DVB-ASI or SMPTE 310M standards. Reclocking can be provided or may be disabled by the user in Non-Reclock mode. Output 2 (the bottom BNC) maintains the same polarity as the input and is DVB-ASI compliant.

There is one SC/PC (shown), ST/PC or FC/PC female connector with the video output converted to an optical signal as specified in section **Error! Reference source not found..**

FIBER OUT: There is one SC/PC (shown), ST/PC or FC/PC female connector with the optical output from the module. This optical output is available in 1310nm, 1550nm, up to sixteen CWDM wavelengths (ITU-T G.694.2 compliant) and DWDM (ITU-T G.694.1 compliant) wavelengths. This connector should be connected to the **FIBER IN** connector of a matching 7707OE. The optical output laser is enabled only while a valid input signal is detected which is indicated by the SIGNAL VALID LED.

2.1. CARE AND HANDLING OF OPTICAL FIBER

2.1.1. Safety



Background colour: yellow
Triangular band: black
Symbol: black

CLASS 1 LASER PRODUCT

2.1.2. Assembly

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

2.1.3. Labeling

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

- There is no date of manufacture on this label as it can be traced by bar code label placed on the Printed circuit board of each Evertz plug-in module
- The Model number is one of: 7707EO13, 7707EO15, 7707EOxx, (xx = 27, 29, 31, 33, 35, 37, 43, 45, 47, 49, 51, 53, 55, 57, 59, 61) 7707EODyyy (Dyyy represents ITU Grid Channel: D200, D210, D220, D230, D240, D250, D260, D270, D280, D290, D300, D310, D320, D330, D340, D350, D360, D370, D380, D390, D400, D410, D420, D430, D440, D450, D460, D470, D480, D490, D500, D510, D520, D530, D540, D550, D570, D580, D590, D600)



Figure 2-2: Reproduction of Laser Certification and Identification Label

2.1.4. Handling and Connecting Fibers



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

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

3. SPECIFICATIONS

Standards: SMPTE 259M A, B, C, D, SMPTE 297M, SMPTE 305M,
SMPTE 310M, SMPTE 344M, M2S, DVB-ASI

3.1. SERIAL VIDEO INPUT

Connector: 1 BNC per IEC 61169-8 Annex A
Equalization: Automatic to 300m @ 270Mb/s with Belden 8281 (or equivalent)
Return Loss: > 15dB up to 540Mb/s

3.2. SERIAL VIDEO OUTPUTS

Number of Outputs: 2 per card-reclocked
Connector: 1 BNC per IEC 61169-8 Annex A
Signal Level: 800mV nominal
DC Offset: 0V \pm 0.5V
Rise and Fall Time: 900ps nominal
Overshoot: < 10% of amplitude
Return Loss: > 15dB up to 540Mb/s
Wideband Jitter: < 0.2 UI

3.3. OPTICAL OUTPUTS

Number of Outputs: 1
Connector: SC/PC, ST/PC, FC/PC female housing
Return Loss: > 14dB
Wavelength: 1310nm, 1550nm

3.4. OPTICAL POWER

1310nm FP: -7dBm \pm 1dBm
1550nm DFB: 0dBm \pm 1dBm

3.5. ELECTRICAL

Voltage: +12V DC
Power: 6W

3.6. PHYSICAL

Number of Slots: 1

3.7. COMPLIANCE

Electrical Safety:	CSA Listed to UL 60065-03, IEC 60065 Complies with CE Low voltage directive
Laser Safety:	Class 1 laser product Complies with 24 CFR 1040.10 and 1040.11 IEC 60825-1
EMI/RFI:	Complies with FCC Part 15, Class A EU EMC directive

4. STATUS INDICATORS AND DISPLAYS

The 7707EO 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 locations of the indicators and pushbutton.

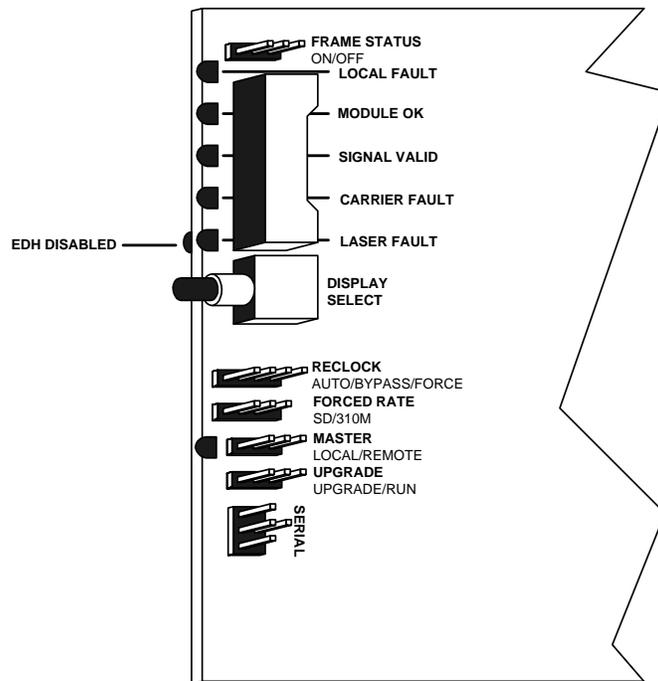


Figure 4-1: Location of Status Indicators and Jumpers

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, if a laser fault exists, or if a local input power fault exists (ie: 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 laser and board power are good.

SIGNAL VALID: This Green LED indicates the presence of a valid input signal. The coaxial 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 will be On when the cable equalizer detects a weak signal carrier at the coaxial input. The CARRIER FAULT threshold is calibrated to a cable equalization of 95% (250m of Belden 8281 cable).

LASER FAULT: This Red LED indicates poor operation of the optical output laser, leading to limited laser life.

EDH DISABLED: This Yellow LED indicates that the user has deactivated error detection. 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 *VistaLINK*[®] interface. (See section 6 for information about *VistaLINK*[®] 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.

EQ	Equalization Strength
STD	Video Standard in Use
EDH	EDH Errors

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

4.2.1. Displaying the Equalization Strength

To display the Equalization strength, press the pushbutton one or more times until the EQ message is shown on the display. After one second the applied equalization strength will be shown represented as a percentage of the maximum equalizer capability.

EQ
0 – 100%

The following list describes the available selections.

0% to 100%	Indicates applied equalization (e.g. 1m 1694A coax on input = 0%, 125m = 100%).
------------	---------------------------------------------------------------------------------

4.2.2. Displaying the Video Standard

When the reclocker is enabled, the 7707EO detects the video standards of the signal present at its 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.

STD
N143
P177
N270
P270
N360
P360
N540
P540
HD
310M
BYP
LOS

The following list describes the available selections.

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
310M	SMPTE 310M, 19.4 Mb/s
BYP	Indicates reclocker is in non-reclock mode.
LOS	Indicates that no valid input signal is present.

4.2.3. Displaying the EDH Errors

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. The FORCED RATE jumper determines the reclocking rate.

To disable reclocking of the coaxial input signal set the jumper to the BYPASS position. 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 relock rates when the RECLOCK jumper is set to the AUTO or FORCE positions.

FORCED RATE: Set the jumper to the SD position to select automatic reclocking of SMPTE 259M (143-360Mb/s) and SMPTE 344M (540Mb/s) rate 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 THE MODULE WILL BE CONTROLLED FROM THE LOCAL CONTROLS OR THROUGH THE VISTALINK® INTERFACE

The MASTER jumper selects whether the module will be controlled from the local user controls or through the VistaLINK® 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 VistaLINK® interface. The adjacent yellow LED will be On when VistaLINK® control is 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). 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. VISTALINK[®] REMOTE MONITORING/CONTROL

6.1. WHAT IS VISTALINK[®]?

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

There are 3 components of SNMP:

1. An SNMP manager, also known as a Network Management System (NMS), is a computer running special software that communicates with the devices in the network. Evertz VL-Fiber demo Manager graphical user interface (GUI), third party or custom manager software may be used to monitor and control Evertz VistaLINK[®] enabled fiber optic products.
2. Managed devices, (such as 7707EO and 7707OE cards), each with a unique address (OID), communicate with the NMS through an SNMP Agent. Evertz VistaLINK[®] enabled 7700 series modules reside in the 3RU 7700FR-C MultiFrame and communicate with the manager via the 7700FC VistaLINK[®] frame controller module, which serves as the Agent.
3. A virtual database, known as the Management Information Base (MIB), lists all the variables being monitored, which both the Manager and Agent understand. Please contact Evertz for further information about obtaining a copy of the MIB for interfacing to a third party Manager/NMS.

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

6.2. VISTALINK® MONITORED PARAMETERS

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

Parameter	Description
Equalization Strength	A range of values describing equalization being applied to the input.
Master Jumper	The state of the MASTER jumper. In the REMOTE position, the card functions are controlled through the <i>VistaLINK®</i> interface.
Video Standard	A range of values describing the detected video standard.
Signal Present	Indicates the presence of a valid input signal. (The state of the SIGNAL VALID LED)
Carrier Weak	Indicates a weak signal carrier at the coaxial input. (The state of CARRIER FAULT LED)
Laser OK	Indicates deficient operation of the optical output laser. (The state of the LASER FAULT LED)
EDH Error	The status of EDH errors present in the input signal.
Reclock Mode	Selects Reclocking for SD rates.
Rate Mode	State of the FORCED RATE jumper.

Table 6-1: *VistaLINK®* Monitored Parameters

6.3. VISTALINK® CONTROLLED PARAMETERS

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

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

Table 6-2: *VistaLINK®* Controlled Parameters

6.4. VISTALINK[®] TRAPS

The following traps are reported through the *VistaLINK[®]* interface.

Parameter	Description
Signal Not Present	Indicates a loss of valid input signal.
Carrier Strength Weak	Indicates input cable length has exceeded 250m.
EDH Error Present	Indicated an EDH error has occurred in the input video feed.
Laser Not OK	Indicates the laser has turned off or failed.

Table 6-3: *VistaLINK[®]* Traps

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