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REVISION HISTORY

REVISION	DESCRIPTION	DATE
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 4-1	Oct 03
1.3	Added VistaLINK traps, Updated Specs	June 04
1.3.1	Added jumper information to section 5.3	Apr 07
1.3.2	Corrected carrier fault trigger level	Aug 08
1.4	Updated features and specs. Cleaned up format.	Nov 08

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1. OVERVIEW

The 7707OE is a *Vista*LINK® enabled, optical to electrical 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 card status and parameters is both provided locally at the card edge, and remotely via *Vista*LINK®. The 7707OE accepts one fiber input and provides two reclocked coaxial SDI outputs. A coaxial SDI input can be used as a fallback source in case of optical link failure, or can be selected as the primary input.

The 7707OE 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:

- Optical to electrical converter for all SMPTE 259M standards with operation from 143Mb/s-360Mb/s
- Supports SMPTE 310M (19.4Mb/s), M2S, DVB-ASI (270Mb/s), SMPTE 344M (540Mb/s) and SMPTE 305M (SDTi) rates
- Detection and display of optical input power, video format and EDH errors
- Reclocked optical input, with selectable non-reclocked mode
- Wide range optical input (1270nm to 1610nm)
- Supports multi-mode and single-mode fiber
- Redundant second SDI input for automatic failure switching applications
- Automatic input cable equalization to 275m at 270Mb/s (Belden 8281) on coaxial input
- Fully hot-swappable from front of frame
- 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, 3RU 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 or remotely through SNMP and *Vista*LINK®
- *Vista*LINK® capability is available when modules are used with the 3RU 7700FR-C or 350FR frame and a 7700FC *Vista*LINK® Frame Controller module in slot 1 of the frame

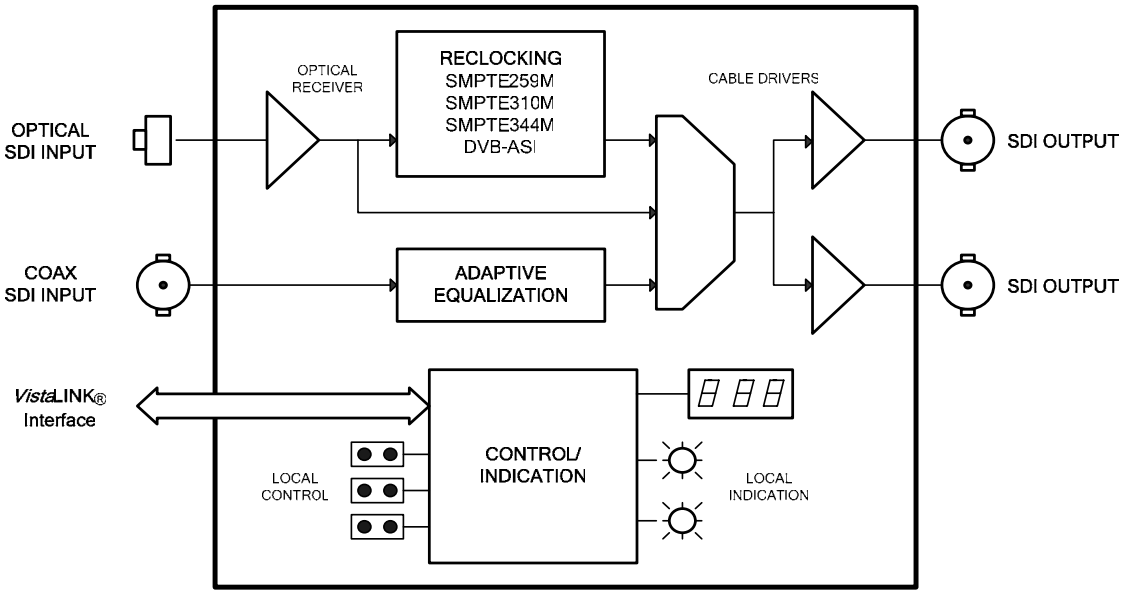

Figure 1-1: 7707OE Block Diagram

2. INSTALLATION

The 7707OE 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.

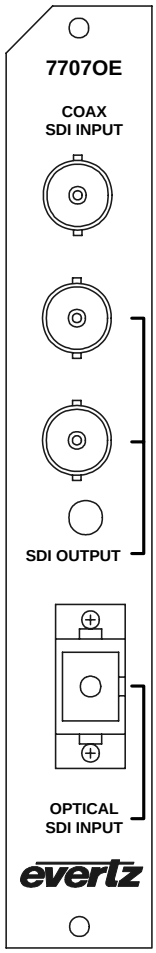

Figure 2-1: 7707OE Rear Panel

OPTICAL SDI INPUT: This is the primary input to the 7707OE, providing reclocking of serial digital signals at the specified rates. 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.

COAXIAL SDI INPUT: This input provides a second Serial Video input. When the SOURCE jumper is set to AUTO mode, the module will switch to the coaxial input in case of optical link failure. In addition, either input may also be selected as the sole signal source. The coaxial input is non-reclocked. (See section 5.1 for more information on setting the SOURCE jumper).

SDI OUTPUT: The 7707OE provides two coaxial outputs for signal distribution. These outputs will contain the signal from either the optical or coaxial input depending on the settings of the SOURCE jumpers. Output 2 (the bottom BNC) maintains the same polarity as the input and is DVB-ASI compliant.

2.1. CARE AND HANDLING OF OPTICAL FIBER

2.1.1. Safety

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

The laser modules used in the Evertz fiber optic modules are Class I, with a maximum output power of 2mW, and wavelengths of either 1310 nm or 1270 to 1610nm.

2.1.2. Handling and Connecting Fibers

Never touch the end face of an optical fiber.

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 3 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 regarding care and handling of fiber optic cable see section 3 of the Fiber Optics System Design chapter of this manual.

3. SPECIFICATIONS

3.1. OPTICAL INPUT

Standards:
Reclocked: SMPTE 259M A, B, C, D, SMPTE 297M, SMPTE 305M, SMPTE 310M, SMPTE 344M, M2S or DVB-ASI
Non-Reclocked: Any bi-level signal type at rates of 19.4Mb/s to 540Mb/s
Connector: Female SC/PC, ST/PC or FC/PC
Wavelength: 1270 to 1610nm
Optical Sensitivity: -32dBm @ 270 Mb/s
Max. Input Power: 0dBm
Fiber Size: 62 μm core / 125 μm overall

3.2. COAXIAL INPUT

Standards:
Non-Reclocked: Any bi-level signal type at rates of 19.4-540Mb/s
Connector: 1 BNC per IEC 61169-8 Annex A
Impedance: 75Ω(nominal)
Equalization: Automatic to 275m(min) @ 270Mb/s with Belden 8281 cable
Return Loss: > 15dB to 540Mb/s

3.3. SERIAL VIDEO OUTPUTS:

Number of Outputs: 2 Per Card (1 output DVB-ASI/M2S compliant)
Connectors: 1 BNC per IEC 61169-8 Annex A
Impedance: 75Ω(nominal)
Signal Level: 800mV(nominal)
DC Offset: ± 0.5V
Rise and Fall Time: 900ps(nominal)
Overshoot: < 10% of amplitude
Return Loss: > 15dB to 540Mb/s
Wide Band Jitter: < 0.15UI (Reclocked)
< 0.20UI (Non-reclocked)

3.4. ELECTRICAL

Voltage: +12VDC
Power: 6 Watts
EMI/RFI: Complies with FCC regulations for class A devices
Complies with EU EMC directive

3.5. PHYSICAL

7700 or 7701 frame mounting:
Number of slots: 1

4. STATUS INDICATORS AND DISPLAYS

The 7707EO has 8 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.

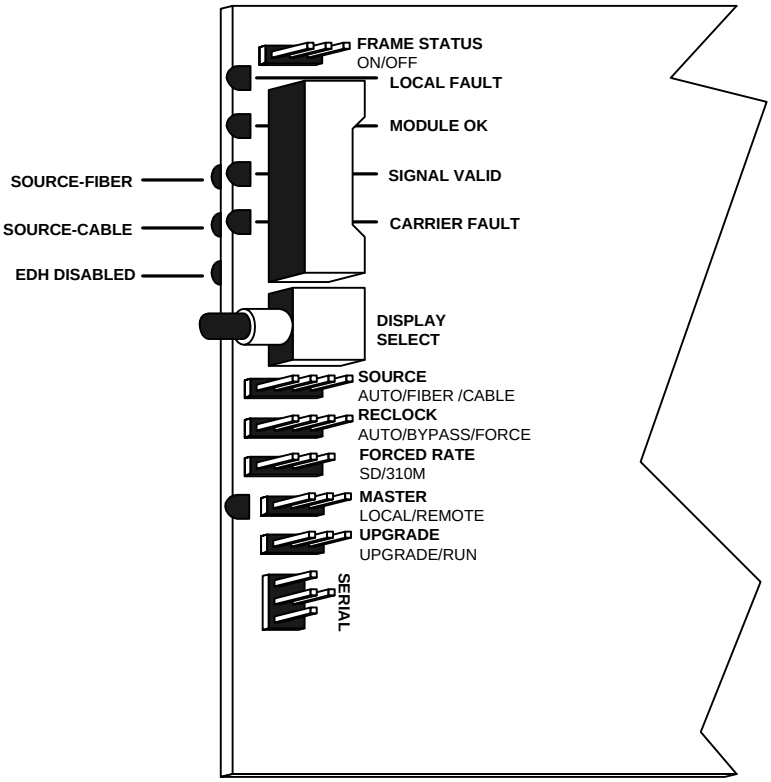

Figure 4-1: Location of Status Indicators and Jumpers

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 or if a local input 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 either the optical or coaxial input (depending on the setting of the SOURCE jumper). The optical input is considered valid when the module has attained lock to the signal. If the reclocker is in non-reclock mode or if the coaxial input is selected, 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 at either the optical or electrical input signal, (determined by the SIGNAL SOURCE jumper. The CARRIER FAULT thresholds are calibrated to an optical power of –26dBm, and cable equalization of 90% (250m of Belden 8281 cable).

SOURCE FIBER: This Green LED will be On when the optical input is selected as the signal source.

SOURCE CABLE: This Green LED will be On when the coaxial input is selected as the signal source.

EDH DISABLED: This Yellow LED indicates that error detection has been deactivated by the user. 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

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 module can measure and display the input optical power over a range of –14dBm to –30dBm 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 powers exceeding 0dBm.
0 to -40	Optical input power within this range.
<MIN	Optical input power below –40 dBm.
LOS	Indicates that no valid input signal is present.
COAX	Indicates that the coaxial input is currently selected.

4.2.2. Displaying the Video Standard

When the reclocker is enabled, the 7707OE 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
310M	SMPTE 310M, 19.4Mb/s
BYP	Indicates reclocker in non-reclock mode.
LOS	Indicates that no valid input signal is present.
COAX	Indicates that the coaxial input is currently selected.

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 INPUT SOURCE

The SOURCE jumper allows the user to set whether the 7707OE will use the Optical or Coaxial Input. The selected input is shown by the SOURCE FIBER and SOURCE CABLE LED's, and remotely through the *Vista*LINK® interface

SOURCE: Set the jumper to the AUTO position to enable automatic switching between the optical and coaxial inputs. The optical input is selected as the default signal source. If the module loses lock on the optical signal and a signal carrier is present on the coaxial input, the module will automatically switch to the coaxial input. If the reclocking mode is set to BYPASS (non-reclock) then the fiber input will always be selected.

Set the jumper to the FIBER position to select the optical input as the only signal source. The SOURCE FIBER LED will be On.

Set the jumper to the CABLE position to select the coaxial input as the only signal source. The SOURCE CABLE LED will be On.

5.2. SELECTING THE RECLOCKING MODE

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

RECLOCK: To enable reclocking of the optical input signal set the jumper to the AUTO or FORCE positions. The reclocked rate is determined by the FORCED RATE jumper.

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

There is no reclocking of the coaxial input.

5.3. SELECTING THE RECLOCKING RATE

The FORCED RATE jumper selects the range of reclock 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.

5.4. 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.

5.5. 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.

5.6. 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. *VISTA*LINK® REMOTE MONITORING/CONTROL

6.1. WHAT IS *VISTA*LINK®?

*Vista*LINK® 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. *Vista*LINK® 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 *Vista*LINK® 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, *Vista*LINK® 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 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 and 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
Master Jumper	Indicates the position of the Master Jumper: Local or Remote.
Optical Power	A range of values describing optical power at the fiber input.
Video Standard	A range of values describing the detected video standard.
Rate Mode	Indicates the position of the Rate Jumper: 310M or SD.
Reclock Mode	Indicates the position of the Reclock Jumper: Bypass or Force.
Source Mode	Indicates the position of the Source Jumper: Fiber, Auto or Cable.

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
Rate Mode	Indicates the position of the Rate Jumper: 310M or SD.
Reclock Mode	Indicates the position of the Reclock Jumper: Bypass or Force.
Source Mode	Indicates the position of the Source Jumper: Fiber, Auto or Cable.

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

6.4. *VISTA*LINK® TRAPS

The following traps are reported through the *Vista*LINK® interface.

Parameter	Description
Signal Present	Indicates a loss of valid input signal.
Carrier Strength Weak	Indicates input cable length has exceeded 250m.
Cable Input Active	Indicates the current input to card is the coaxial.
EDH Error Present	Indicates an EDH error has occurred in the input video feed.
Fiber Input Active	Indicates the current input to card is the fiber.

Table 6-3: *Vista*LINK® Controlled Parameters

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