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REVISION HISTORY

REVISION	DESCRIPTION	DATE
0.1	Preliminary version	Jul 03
0.2	Updated specifications and rear panel drawings	Aug 03
0.3	Updated information on connecting unbalanced AES signals Revised rear panel drawing of 8U version.	Sep 03
0.4	Removed control jumper from diagram, added table 2 (info on firmware with support for simultaneous local and remote control). Edited table 3 parameters and added table 4 (*Vista*LINK™ traps).	Sep 04
1.0	Added 7707AT-8U-DB and updated laser warnings	Aug 05

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 7707AT DWDM cards and 7707AR cards directly with a short fiber optic cable. The 7707AT DWDM card produces +7dBm of power which will damage the receiver if connected directly.

1. OVERVIEW

The 7707AT AES Transmitter extends multiple channels of AES audio over a single fiber optic link. The 7707AT-8U version interfaces to 8 channels of unbalanced AES, while the 7707AT-8 version accommodates unbalanced or balanced AES. The 7707AT-8U-DB has DB-25 connections for unbalanced audio that are backwards compatible with 7705AT-8.

The 7707AT-16 version interfaces to 16 channels of unbalanced or balanced AES. Each 7707AT version is designed to operate with a companion 7707AR AES Receiver, to permit communication over distances up to 50Km, with minimum possible latency.

Monitoring and control of card status and parameters is provided locally, at the card-edge, or remotely via *Vista*LINK™ capability.

The fiber output is available in an assortment of optical wavelengths, accommodating standard, or CWDM transmission schemes. (See Specifications for complete information)

7707AT13	1310 nm FP	-7.5dBm output, suitable for distances up to 50 Km
7707AT13-M	1310 nm FP	0dBm output, suitable for distances up to 75 Km
7707AT15	1550 nm DFB	0dBm output, suitable for distances up to 75 Km

There are several versions with built in isolators specifically suited to coarse wave division multiplexing (CWDM) applications. These versions all have 0dBm output and are suitable for distances up to 75 Km.

7707AT27	1270 nm DFB
7707AT29	1290 nm DFB
7707AT31	1310 nm DFB
7707AT33	1330 nm DFB
7707AT35	1350 nm DFB
7707AT37	1370 nm DFB
7707AT43	1430 nm DFB
7707AT45	1450 nm DFB
7707AT47	1470 nm DFB
7707AT49	1490 nm DFB
7707AT51	1510 nm DFB
7707AT53	1530 nm DFB
7707AT55	1550 nm DFB
7707AT57	1570 nm DFB
7707AT59	1590 nm DFB
7707AT61	1610 nm DFB

There are several versions with built in isolators specifically suited to dense wave division multiplexing (DWDM) applications. The DWDM versions are suitable for distances >120 km @ 270 Mb/s (for DWDM applications contact factory).

7707ATDyyy	DWDM DFB laser output, yyy – ITU channel number

Features:

- Accommodates eight or sixteen AES audio signals.
- 7707AT-8 and 7707AT-16 versions provide interface to balanced or unbalanced signals.
- 7707AT-8U version provides interface to unbalanced signals via convenient BNC connections.
- 7707AT-8U-DB provides DB-25 connections for unbalanced audio, which are backwards compatible with 7705AT-8.
- AES audio sample rate detection is provided independently for each channel.
- Additional audio monitoring via card-edge headphone jack with adjustable volume.
- All configuration settings are controllable through the card-edge user interface, or *Vista*LINK™.
- Comprehensive signal and status monitoring via four-digit card-edge display, or *Vista*LINK™.
- Optical output wavelengths of 1310nm, 1550nm, and up to sixteen CWDM wavelengths (ITU-T G.694.2 compliant).
- DWDM wavelengths also available (ITU-T G.694.1 compliant).
- Compatible with multi-mode and single-mode fiber.
- SC/PC, ST/PC, or FC/PC fiber connector options.
- Fully hot swappable from front of frame.
- *Vista*LINK™ enabled for remote monitoring and control when installed in 7700FR-C frame with 7700FC *Vista*LINK™ Frame Controller.

Fiber Type	Optical/Link Budget	Transmit Side		Receive Side		Description
		Ordering Product Info	TX Power	Ordering Product Info	RX Sensitivity	
Multi-Mode	< 3km	7707AT13-8U 7707AT13-8 7707AT-8U-DB 7707AT13-16	-7dBm	7707AR-8U 7707AR-8 7707AR-16	-28dBm	1310nm Wavelength
Single-Mode	21dB/50km	7707AT13-8U 7707AT13-8 7707AT13-16	-7dBm	7707AR-8U 7707AR-8 7707AR-16	-28dBm	1310nm Wavelength
Single-Mode	24dB/80km**	7707ATxx-8U 7707ATxx-8 7707ATxx-16	0dBm	7707AR-8U 7707AR-8 7707AR-16	-28dBm	CWDM Wavelengths
Single-Mode	31dB/105km**	7707ATxxxx-8U 7707ATxxxx-8 7707ATxxxx-16	+7dBm	7707AR-8U 7707AR-8 7707AR-16	-28dBm	DWDM Wavelengths
Tx Power/Rx Sensitivity are nominal values ± 1dBm **Assume 8 Ch Mux/Demux loss of 3.5dB Fiber Loss = 0.4/0.3dB per km @ 1310nm/1550nm						

Table 1: Typical Application Configurations

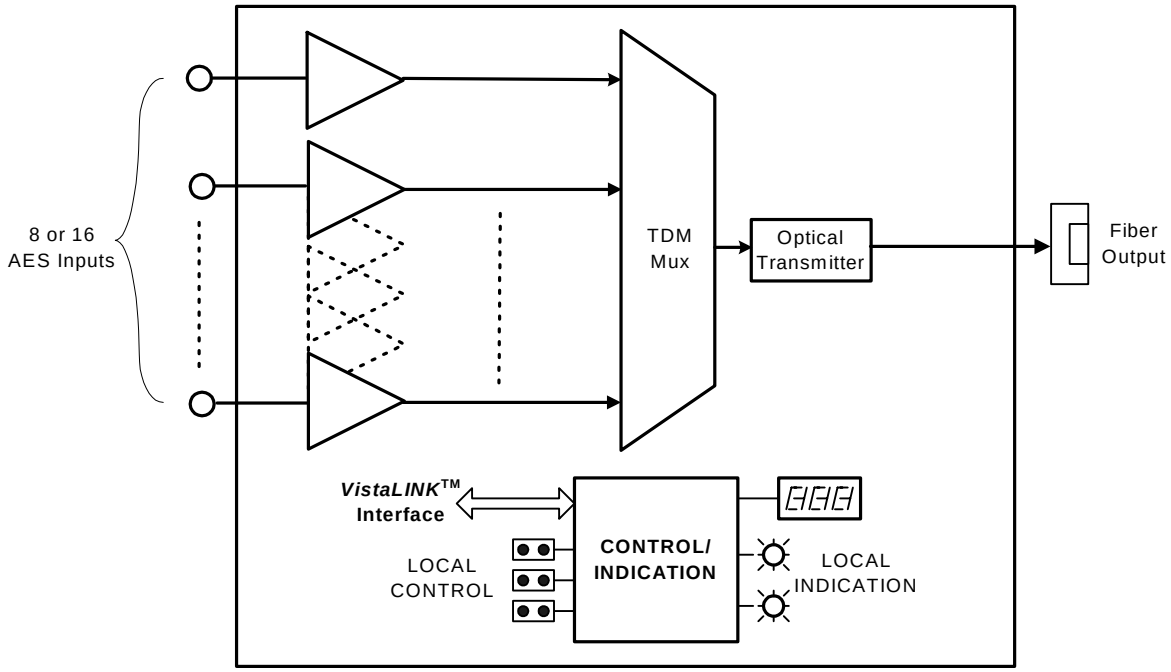

Figure 1–1: 7707AT Block Diagram

2. INSTALLATION

The 7707AT series modules come with a companion rear plate that has AES audio connections and an SC/PC (shown), ST/PC or FC/PC optical connector. The 7707AT-8 and 7707AT-16 versions provide AES connections via multi-pin removable terminal blocks. The 7707AT-8U version provides AES connections via BNCs. The 7707AT-8U-DB version provides AES connections via a DB-25 connector, which is backwards compatible with the 7705AT-8.

For information on mounting the rear plate and inserting the module into the frame see the 7700FR chapter section 3. The following diagram shows rear plate options for each 7707AT version.

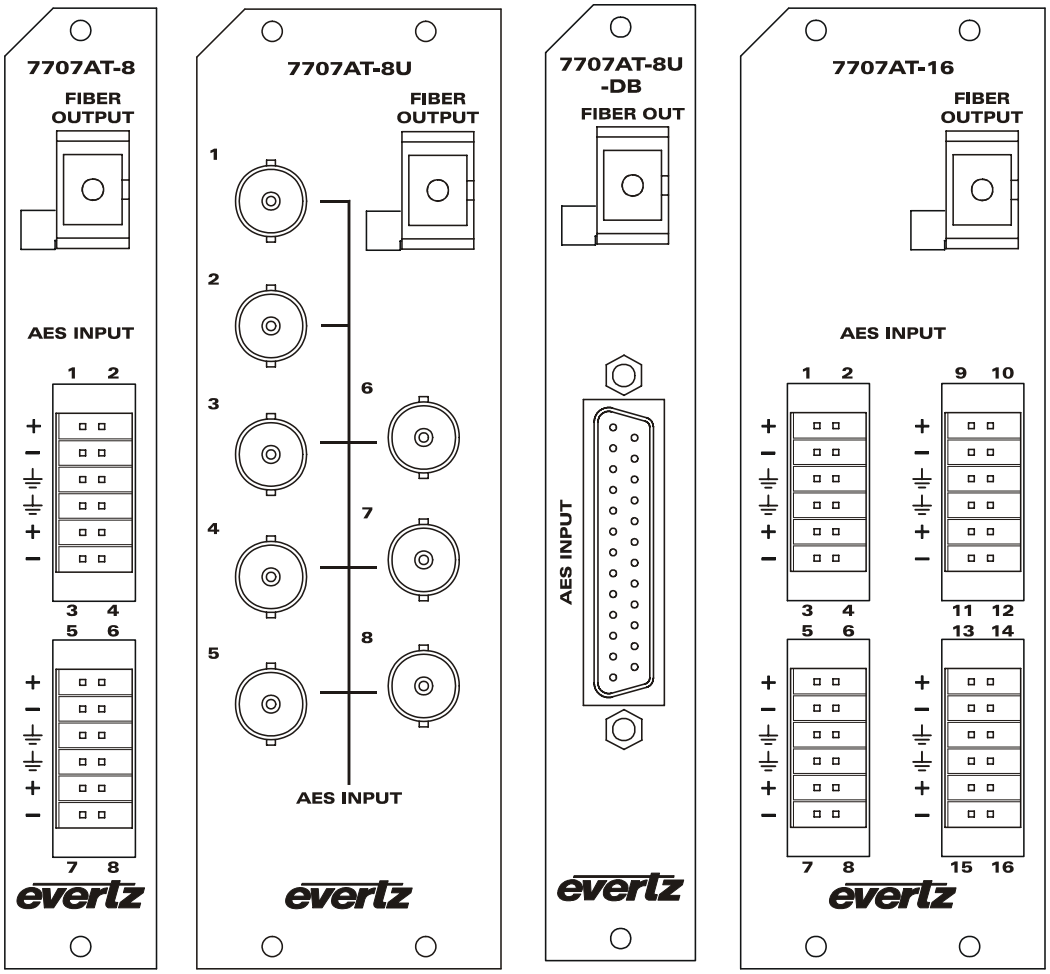

Figure 2–1: 7707AT Rear Panels

2.1. OPTICAL CONNECTIONS

FIBER OUTPUT There is one SC/PC (shown), ST/PC or FC/PC female connector with the optical output of the 7707AT. This optical output is available in 1310nm, 1550nm, up to sixteen CWDM wavelengths (ITU-T G.694.2 compliant) and up to 40 DWDM wavelengths (ITU-T G.694.1 compliant). The output wavelength is marked on the rear panel of each module. When connected directly to a companion module, the output is compatible with multi-mode fiber optic cable. If not connected directly (i.e. connected through CWDM, DWDM, WDM, or splitter/combiner) the output is compatible only with single-mode fiber optic cable.

Do not hook up the 7707VA DWDM cards and 7707AR cards directly with a short fiber optic cable. The 7707VAT DWDM card produces +7dBm of power which will damage the receiver if connected directly.

2.2. SIGNAL CONNECTIONS

AES INPUTS The 7707AT-8U version provides BNC input connections compatible with unbalanced AES audio. The 7707AT-8U-DB provides DB-25 connections for unbalanced AES that are backwards compatible with the 7705AT-8 as shown in Figure 2–2. The 7707AT-8 and 7707AT-16 versions provide terminal block input connections compatible with either balanced or unbalanced AES. Balanced AES audio signals should be connected to the positive (+) and negative (-) input terminals. Unbalanced AES audio signals should be connected to the positive (+) input terminal, while the negative (-) input terminal must be connected to ground. Input impedance and equalization characteristics are selectable to accommodate balanced or unbalanced interfaces. Refer to section 4.2.2 for information on selecting balanced or unbalanced input configurations.

For 7707AT-8U-DB versions the inputs should be set to the unbalanced configuration.

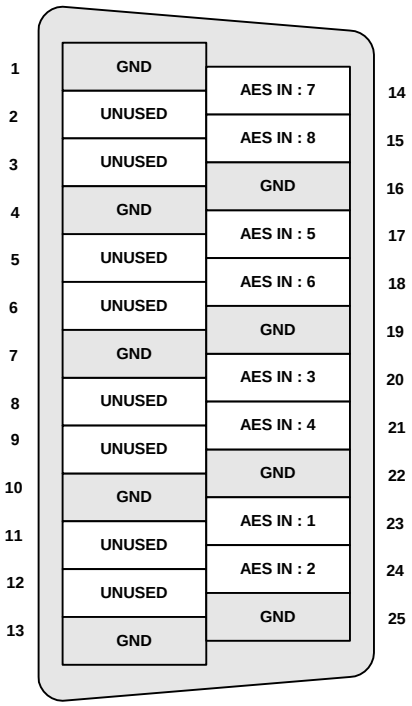

Figure 2–2: 7707AT-8U-DB Pin Outs

2.3. CARE AND HANDLING OF OPTICAL FIBER

2.3.1. Safety

CLASS 1 LASER PRODUCT

Background colour: yellow
Triangular band: black
Symbol: black

2.3.2. Assembly

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

2.3.3. Labeling

Certification and Identification labels are combined into one label. As there is no 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: 7707VAT13, 7707OO13-M, 7707VAT15, 7707VATxx, (xx = 27, 29, 31, 33, 35, 37, 43, 45, 47, 49, 51, 53, 55, 57, 59, 61) 7707VATDyyy (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 2–3: Reproduction of Laser Certification and Identification Label

2.3.4. 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

3.1. AES AUDIO INPUTS

Number of Inputs:
- **7707AT-8U:** 8
- **7707AT-8U-DB:** 8
- **7707AT-8:** 8
- **7707AT-16:** 16

Connectors:
- **7707AT-8U:** BNC per IEC 60169-8, Amendment 2
- **7707AT-8U-DB:** DB-25
- **7707AT-8:** Multi-pin Removable Terminal Blocks
- **7707AT-16:** Multi-pin Removable Terminal Blocks

Standard:
- **7707AT-8U:** SMPTE 276M - Unbalanced AES
- **7707AT-8U-DB:** SMPTE 276M - Unbalanced AES
- **7707AT-8:** AES3-1992, Balanced or Unbalanced (selectable)
- **7707AT-16:** AES3-1992, Balanced or Unbalanced (selectable)

Input Sample Rate: 32 to 48KHz

Input Return loss: >15dB

Input Impedance:
- **Unbalanced:** 75Ω
- **Balanced:** 110Ω

Input Amplitude (max):
- **Unbalanced:** 1.2Vp-p
- **Balanced:** 7Vp-p

Input Amplitude (min):
- **Unbalanced:** 320mVp-p
- **Balanced:** 200mVp-p

Cable Equalization (max):
- **Unbalanced:** 450m (≈ 1900ft) of Belden 1800B cable
- **Balanced:** 1500m (≈ 4900ft) of Belden 1694 cable

3.2. OPTICAL OUTPUT

Connector: SC/PC, ST/PC, FC/PC female housing
Fiber Size and Type: Single Fiber versions: 9 μm core / single mode
Output Wavelengths:
Standard: 1310nm, 1550nm (nominal)
CWDM: 1270nm to 1610nm (ITU-T G.694.2 compliant).
DWDM: 1530nm to 1560nm (ITU-T G.694.1 compliant).
Output Power:
1310nm FP (Standard): -7 dBm ±1dBm
CWDM DFB: 0 dBm ±1dBm
DWDM DFB: +7 dBm ±1dBm

3.3. ELECTRICAL

Voltage: 12V DC
Power (max): 6 Watts (Non DWDM Laser)
8 Watts (DWDM Laser)
EMI/RFI: Complies with FCC regulations for class A devices.
Complies with EU EMC directive.

3.4. PHYSICAL

7700 frame mounting:
Number of Slots:
7707AT-8U: 2 slots
7707AT-8U-DB: 1 slot
7707AT-8: 1 slot
7707AT-16: 2 slots

7701 frame mounting:
Number of Slots:: 1 slot all versions

4. CARD-EDGE MONITORING AND CONTROL

The 7707AT has eight or sixteen LED status indicators and a 4-digit dot-matrix display on the front card-edge to show operational status of the card at a glance. The card-edge pushbutton and toggle switch are used to select various indications to the dot-matrix display. Figure 4–1 shows the locations of the indicators and pushbutton.

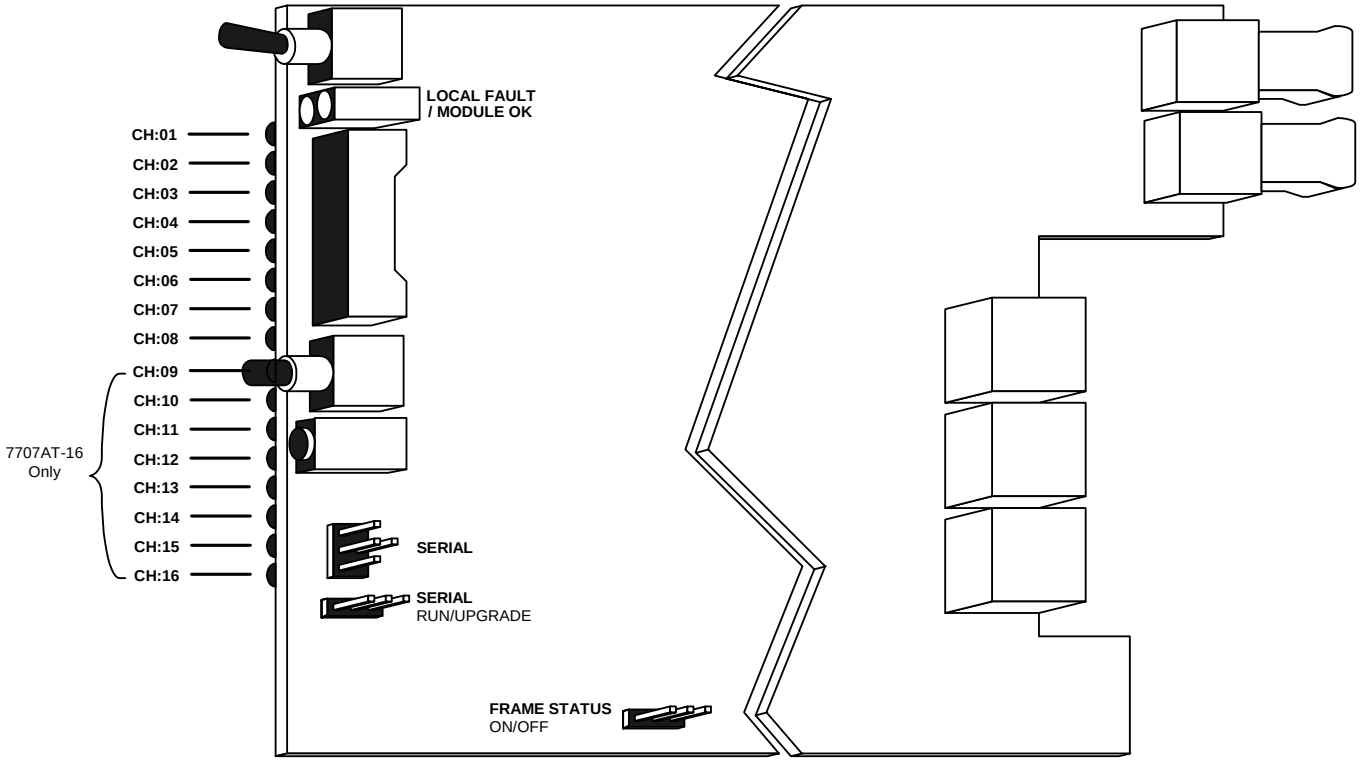

Figure 4–1: Location of Status Indicators and Jumpers

Older modules may have a control jumper and LED located beneath the audio jack that was used to select either remote or local operation. For firmware versions indicated in section 5.2, the card is controllable by local and remote control simultaneously, meaning the jumper is not used. Changes made to the card via the card edge or *Vista*LINK™ will be updated on both the card edge display and *Vista*LINK™ monitored parameters.

4.1. STATUS INDICATOR LEDS

LOCAL FAULT: This red LED indicates poor module health. Two conditions could cause this fault indication to be active: 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.

MODULE OK: This green LED indicates good module health. It will be on while the output laser is operating properly, and the card power is good.

CH:01 to CH:xx **Each of these green LED's indicate the signal presence of the respective AES input channel. Signal presence indication considers X and Y preambles in processed AES.**

4.2. CARD-EDGE DISPLAY AND CONTROLS

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 5 provides a quick reference to the display menu structure.

Pressing the pushbutton advances the display to the next menu level. The toggle-switch may then be used to move up or down through selections of that menu level. Select BACK to return to previous menu level.

If a specific menu selection has a configuration value associated with it, then this may be changed using the toggle switch. Pressing the pushbutton will apply the displayed value and return you to the previous menu level.

The most recent user selection will be maintained in non-volatile memory in the event of power loss to the module.

	Menu Level 1	**Menu Level 2**	**Menu Level 3**	
	Pushbutton⇨	Pushbutton⇨	Pushbutton⇨	
		Menu Selections:	**Configuration Values:**	Return to Level 2
	LASR…ERR (Laser Error) Overrides **RATE** (Audio Rate)	**CH01** thru **CH08 or CH016**	**48K** (48kHz) or **44K** (44kHz) or **32K** (32kHz) or **LOS** (Loss of Signal)	
⇧ Toggle Switch ⇩		**BACK**	Return to Level 1	
	TERM (Termination)	**Menu Selections:**	**Configuration Values:**	
		CH01 thru **CH08 or CH016**	**BAL** (Balanced) **UBAL** (Unbalanced)	
		BACK	Return to Level 1	
	JACK (Monitor Jack)	**Menu Selections:**	**Configuration Values:**	
		CHAN (Channel)	**CH01** thru **CH08 or CH016**	
		VOL (Volume)	**0** thru **64**	
		BACK	Return to Level 1	

Figure 4–2: Card-edge Menu Quick Reference

4.2.1. Displaying the AES Audio Sample Rate

The 7707AT can detect and indicate 32KHz, 44.1KHz, and 48KHz sample rates. Sample rate indication is accommodated through the card-edge interface or *Vista*LINK™. To display the sample rate to the card-edge select the RATE indication in menu level 1. Use the toggle switch to choose the channel for which the indication should be displayed. Press the pushbutton to apply the displayed selection.

CH01 to **CH08** Range of AES Channels for the 7077AT-8, and 7707AT-8U product versions.
CH01 to **CH16** Range of AES Channels for the 7077AT-16 product version.

The following list describes possible sample rate indications for the selected channel:

48K AES sample rate is 48KHz
44K AES sample rate is 44.1KHz
32K AES sample rate is 32KHz
LOS No valid AES signal is detected

Press the pushbutton to return to menu level 1.

4.2.2. Selecting the AES Input Signal Type

The 7707AT-8 and 7707AT-16 product versions accommodate balanced or unbalanced input signals. Input impedance and equalization characteristics are selectable to match either signal type. Refer to section 2.1 for input connection details. Selection of the input signal type is done using the card-edge interface or through *Vista*LINK™ control.

To select the input signal type, select the TERM menu item in menu level 1. The 7707AT allows the input signal type to be set independently for each channel. Use the toggle switch to choose the channel to which the selection will be applied. Press the pushbutton to apply the displayed selection.

CH01 to **CH08** Range of AES Channels for the 7077AT-8 product version.
CH01 to **CH16** Range of AES Channels for the 7077AT-16 product version.

The following list describes possible selections for input signal type:

BAL Input is configured for balanced AES signal type.
UBAL Input is configured for unbalanced AES signal type.

Press the pushbutton to apply the displayed selection and return to menu level 2. You can select other items on menu level 2, or select the BACK menu item to return to menu level 1.

The factory default configuration selects input signal type as BAL.

For 7707AT-8U-DB versions the inputs should be set to the unbalanced configuration.

4.2.3. Selecting the Headphone Jack Channel and Volume

The 7707AT provides a convenient audio monitoring headphone jack at the card-edge. This jack can be used to verify signal presence or content for each AES channel. Headphone jack channel and volume are selectable via the card-edge interface.

To configure the headphone jack, select the JACK menu item in menu level 1. The 7707AT allows user to control the headphone monitoring jack channel and volume. Use the toggle switch to choose the parameter to be controlled. Press the pushbutton to apply the displayed selection.

CHAN Allows selection of headphone monitoring channel.
VOL Allows selection of headphone monitoring volume.

The following list describes possible selections for headphone monitoring channel:

CH01 to **CH08** Range of AES Channels for the 7077AT-8, and 7707AT-8U product versions.
CH01 to **CH16** Range of AES Channels for the 7077AT-16 product version.

The following list describes possible selections for headphone monitoring volume:

0 to **64** Range of volume selection for the headphone monitoring jack.

Press the pushbutton to apply the displayed selection and return to menu level 2. You can select other items on menu level 2, or select the BACK menu item to return to menu level 1.

5. JUMPER 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. FIRMWARE VERSIONS THAT ALLOW CARD TO BE CONTROLLED BY BOTH LOCAL CONTROLS AND THE *VISTA*LINK™ INTERFACE SIMULTANEOUSLY.

Board Option	Support for control on both card edge and *Vista*LINK™ interface available on the following and later firmware versions.
AT-8	1v1_b103

AT-8U	1v1_b53
AT-16	1v1_b82

Table 2: Firmware for simultaneous local and remote control

Note: If the firmware does not support both control types, the CONTROL jumper allows selection of either remote or local control. The corresponding CONTROL LED will be lit when the card is under *Vista*LINK™ control.

5.3. CONFIGURING THE MODULE FOR FIRMWARE UPGRADES

RUN/UPGRADE The RUN/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* chapter in the front of the binder for more information.

To upgrade the firmware in the module unit pull it out of the frame. Move the RUN/UPGRADE jumper J16 into the *UPGRADE* position. Install the Upgrade cable provided (located in the vinyl pouch in the front of the binder) onto SERIAL header J27 at the card edge. Re-install the module into the frame. Run the upgrade as described in *Upgrading Firmware* chapter in the front of the binder. Once the upgrade is completed, remove the module from the frame, move J16 into the *RUN* position, remove the upgrade cable and re-install the module. The module is now ready for normal operation.

6. *VISTA*LINK™ REMOTE MONITORING/CONTROL

6.1. WHAT IS *VISTA*LINK™?

*Vista*LINK™ is Evertz's remote monitoring and control capability 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. For monitoring, there needs to be a detecting device that automatically reports all errors to a central alarm and error logging station. We also need to be able to interrogate individual detector devices from the central station to determine the status of individual channels. Finally, we need to be able to configure devices in the network from the 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 7707AT 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
Laser Fault	Indicates a laser fault condition
Audio Signal Loss	Indicates signal Presence for each channel
Audio Rate	Indicates sample rate for each channel

Table 3: *Vista*LINK™ Monitored Parameters

6.3. *VISTA*LINK™ CONTROLLED PARAMETERS

The following parameters can be remotely controlled through the *Vista*LINK™ interface.

Parameter	Description
Input Signal Type	Selects input as balanced/unbalanced

Table 4: *Vista*LINK™ Controlled Parameters

6.4. *VISTA*LINK™ TRAPS

The following *Vista*LINK™ traps can be enabled and monitored.

Parameter	Description
Audio Signal Loss	Indicates signal presence for each channel

Table 5: *Vista*LINK™ Traps