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REVISION HISTORY

REVISION	DESCRIPTION	DATE
0.1	Preliminary version	Sept 03
1.0	Extended THD and SNR test condition details; released manual	Feb 05
2.0	Headphone jack, menu tree, card edge and various updates	April 05
2.1	Updated safety section and added assembly and labeling sections	Aug 05
2.2	Updated *Vista*LINK® description. Updated features & specs. Updated menu structure format (section 4.2.1 to 4.2.4)	Oct 08
2.3	Added delay specification to section 3.	Oct 09

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-A8, -A12 DWDM cards directly with a short fiber optic cable.   The 7707AT-A8, -A12 DWDM cards produce +7dBm of power which will damage the receiver if connected directly.

1. OVERVIEW

The 7707AT-A series Audio Fiber Transmitters extend multiple channels of analog audio over a single fiber optic link. The 7707AT-A12 version accommodates twelve channels of analog audio, while the 7707AT-A8 version accommodates eight channels. Each 7707AT-A version is designed to operate with a companion 7707AR-A Audio Receiver module, to permit transport of the audio 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 optical output of the 7707AT-A is available in 1310nm, 1550nm, or any one of up to sixteen CWDM wavelengths.

The 7707AT-A8 occupies one card slot and 7707AT-A12 occupies two card slots in the 3RU 7700FR-C frame. Both modules occupy one card slot in the 1RU 7701FR frame, which will hold up to three modules.

Features:
- Eight or twelve professional quality analog audio fiber optic transmitter
- Adjustable audio detection for each channel
- Audio monitoring via card-edge headphone jack with adjustable volume
- All configuration settings controllable through the card-edge user interface, or remotely through SNMP and *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)
- Supports single-mode and multi-mode fiber optic cable
- SC/PC, ST/PC, or FC/PC fiber connector options
- Fully hot-swappable from front of frame
- 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

Fiber Type	Optical/Link Budget	Transmit Side		Receive Side		Description
		Ordering Product Info	TX Power	Ordering Product Info	RX Sensitivity	
Multi-Mode	< 3km	7707AT-13-A8 7707AT-13-A12	-7dBm	7707AR-A8 7707AR-A12	-28dBm	1310nm Wavelength
Single-Mode	21dB/50km	7707AT-13-A8 7707AT-13-A12	-7dBm	7707AR-A8 7707AR-A12	-28dBm	1310nm Wavelength
Single-Mode	24dB/80km**	7707AT-xx-A8 7707AT-xx-A12	0dBm	7707AR-A8 7707AR-A12	-28dBm	CWDM Wavelengths
Single-Mode	31dB/105km**	7707AT-xxxx-A8 7707AT-xxxx-A12	+7dBm	7707AR-A8 7707AR-A12	-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 1-1: Typical Application Configurations
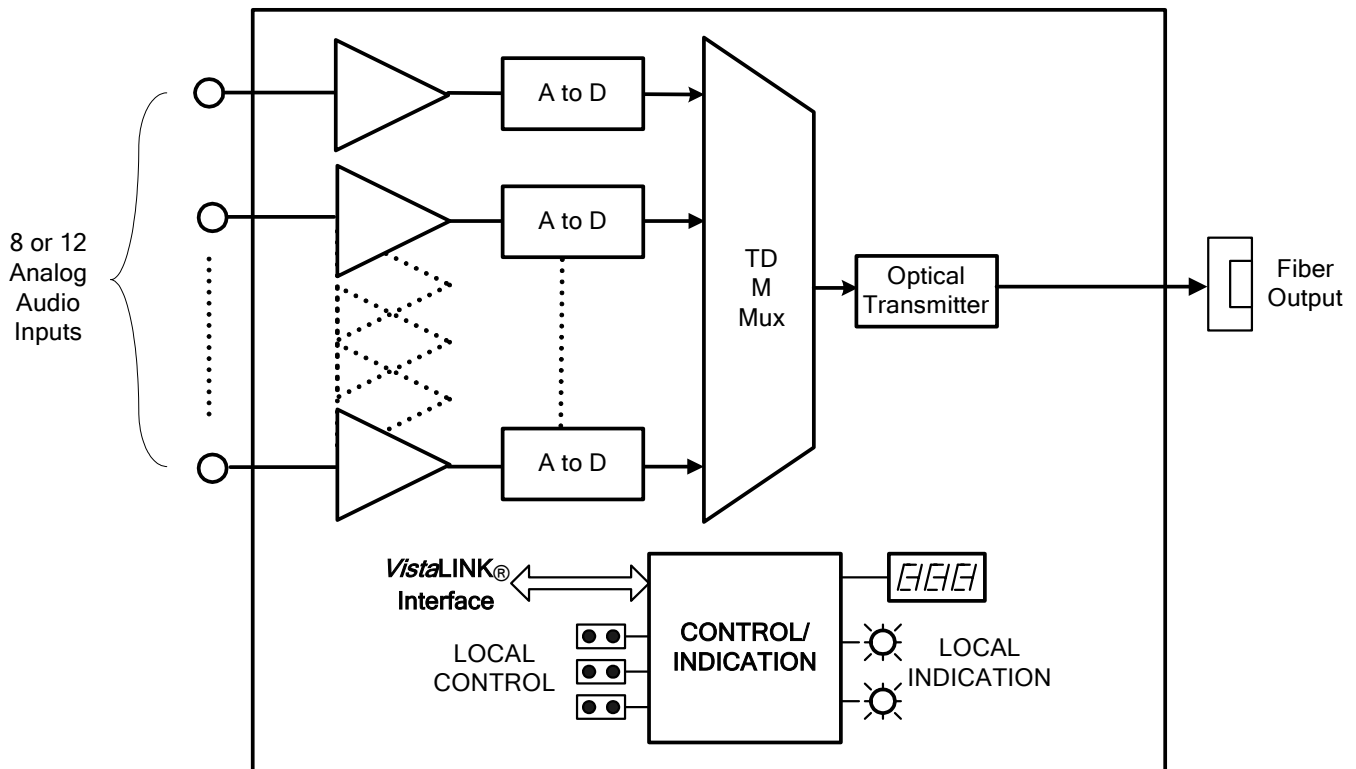
Figure 1-1: 7707AT-A Block Diagram

2. INSTALLATION

The 7707AT-A series modules come with a companion rear plate that has analog audio connections and an SC/PC (shown), ST/PC or FC/PC optical connector. Each version provides analog audio connections via multi-pin removable terminal blocks. 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-A version:
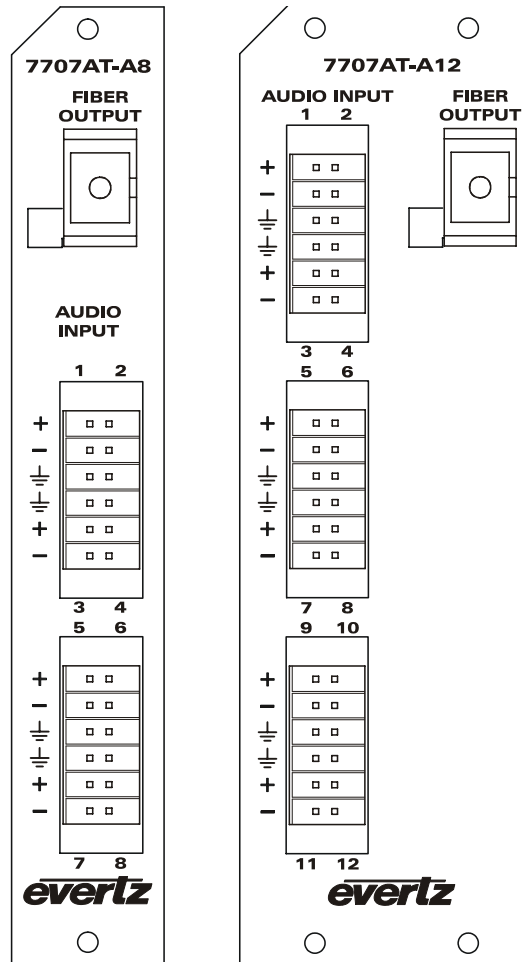
Figure 2-1: 7707AT-A Rear Panels

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-A. This optical output is available in 1310nm, 1550nm, and up to sixteen CWDM wavelengths (ITU-T G.694.2 compliant) and is compatible with multimode fiber when connected directly to a companion 7707AR-A card.

2.2. AUDIO CONNECTIONS

AUDIO INPUTS: The 7707AT-A series modules provide terminal block input connections compatible with either balanced or unbalanced analog audio. Balanced audio signals should be connected to the positive (+) and negative (-) input terminals. Unbalanced audio signals should be connected to the positive (+) input terminal, while the negative (-) input terminal is connected to ground. The audio cables can be secured into the removable portion of the terminal strips using a small screwdriver. The removable part of the terminal strip is then inserted into the rear panel.

> **The shield should be connected at one end of the cable, only to minimize cable ground loops.**
>
> **Shield ground loop currents may arise, if the source equipment "shield ground" potential is significantly different from 7707AT-A local power ground <u>and</u> the shield is grounded at both ends. The card can tolerate about 0.5A of any resulting ground loop current. Exceeding this limit risks causing <u>catastrophic</u> failure of the card.**

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 an 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 inadequate space 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: 7707AT13-A8, 7707AT13-A12, 7707AT15-A8, 7707AT15-A12
- 7707ATxx-A8, A12 (xx= 27, 29, 31, 33, 35, 37, 43, 45, 47, 49, 51, 53, 55, 57, 59, 61)
- 7707ATyyy-A8, A12 (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)
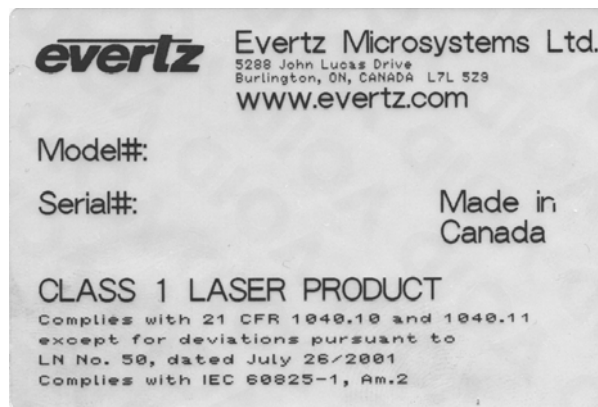
Figure 2-2: Reproduction of Laser Certification and Identification Label

2.3.4. 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 the user maintains 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 regarding care and handling of fiber optic cable see section 3 of the Fiber Optics System Design section of this manual binder.

3.   SPECIFICATIONS

✎ | **Audio performance specifications measured at the output of a companion 7707AR-A Audio Receiver.**

3.1.   ANALOG AUDIO INPUTS

Number of Inputs:
    7707AT-A8:   8
    7707AT-A12:   12
Connectors: Multi-pin Removable Terminal Blocks
Input Level: +24dBu (max)
Frequency Response: ±0.1dB (max, 20Hz to 20KHz)
THD + Noise: -90dB or 0.003% (max, 20Hz to 20KHz bandpass, @1KHz, 0dBFS)
Crosstalk: -100dB (max, 20Hz to 20KHz, measured channel connected at input)
S/N Ratio: 100dB (min, 10Hz to 20KHz bandpass), 90dB (min, 10Hz to 80KHz)
Channel Phase: ±0.5degrees (max, 20Hz to 20KHz)
Input Impedance: 10KΩ (min, differential)
Adjustable Gain: See 7707AR-A Audio Receiver
Sample Rate: 52.7KHz
Resolution: 24 Bits

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 (nom) ±1dBm
    CWDM DFB: 0 dBm (nom) ±1dBm
    DWDM DFB: +7 dBm (nom) ±1dBm

3.3.   SYSTEM PERFORMANCE

Delay of Transmitter/Receiver Pair: <1.3ms

✎ | **Delay is through a 1 meter length fiber cable between the transmitter/receiver modules.**

3.4.   ELECTRICAL

Voltage: 12V DC (nom)
Power:
  7707AT-A8:
    Non DWDM Laser: 8 Watts (max)
    DWDM Laser: 10 Watts (max)
  7707AT-A12:
    Non DWDM Laser: 10 Watts (max)
    DWDM Laser: 12 Watts (max)

3.5.   PHYSICAL

7700 frame mounting:
  Number of Slots:
    7707AT-A8:   1 slot
    7707AT-A12:   2 slots

7701 frame mounting:
  Number of Slots: 1 slots

3.6.   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. CARD-EDGE MONITORING AND CONTROL

The 7707AT-A has eight or twelve 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.
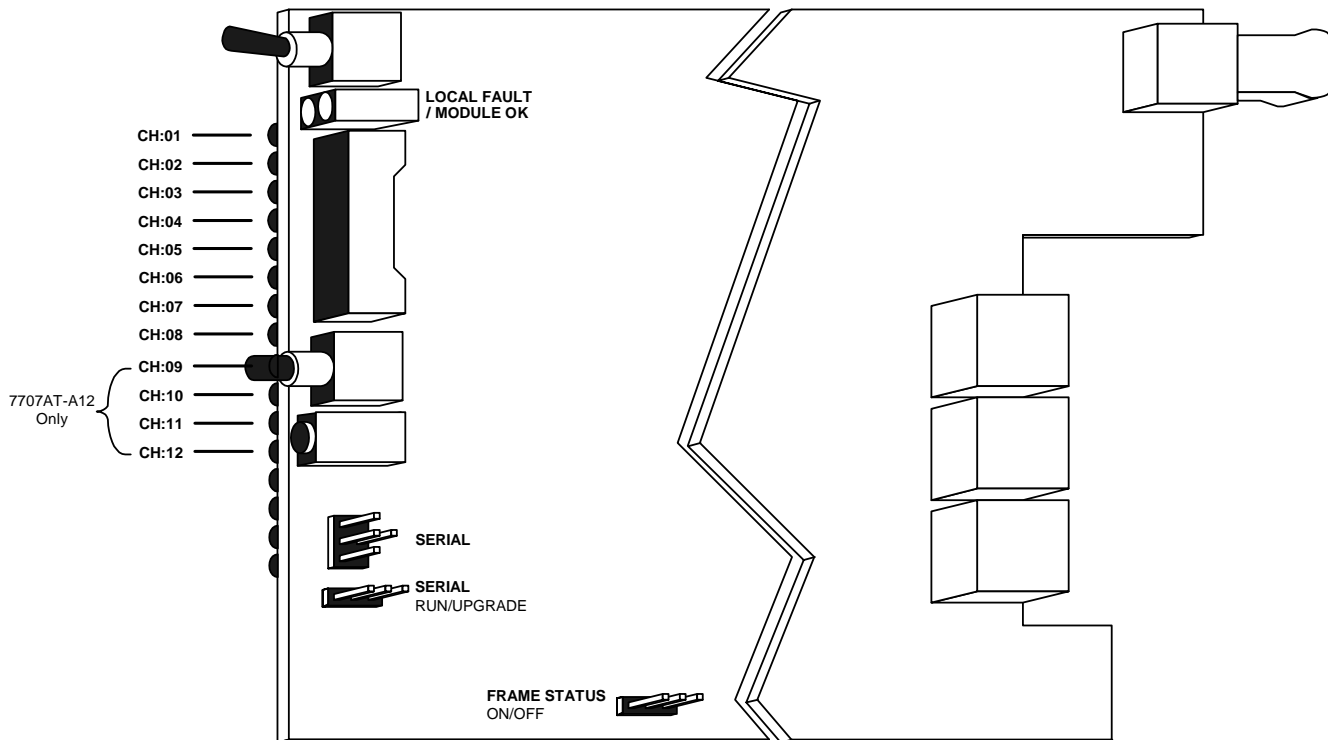
Figure 4-1: Location of Status Indicators and Jumpers

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 LEDs indicate the signal presence of the respective audio input channel. Signal presence indication considers audio detection thresholds set by the user. Please refer to section 4.2.1 for details about setting audio detection thresholds.

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 4-1 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 the 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 will return the user 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	Menu Level4	
	Pushbutton⇨	Pushbutton⇨	Pushbutton⇨	Pushbutton⇨	
		Menu Selections:	**Configuration Values:**		
	LASR…ERR (Laser Error) Overrides	**CHAN** (Channel)	**CH01** thru **CH08 or CH12**	Return to Level 1	
	JACK (Monitor Jack)	**VOL** (Volume)	**0** thru **64**		
⇧		**BACK**	Return to Level 1		
Toggle		**Menu Selections:**	**Menu Selections:**	**Configuration Values:**	
Switch ⇩		**CH01** thru **CH08 or CH12**	**DET** (Detection Level)	**-30** to **+10** (dBu)	
. .			**DUR** (Duration Periodl)	**-1** to **+20** (esc)	Return to Level 1
	CTRL (Control)	(Channel Control)	**BACK**	Return to Level 1	
			Menu Selections:	**Configuration Values:**	
		GLBL (Global Control)	**DET** (Detection Level)	**-30** to **+10** (dBu)	
.			**BACK**	Return to Level 1	
		VER (Software Version)	Software Version		
		BACK	Return to Level 1		

Figure 4-2: Card-edge Menu Quick Reference

4.2.1. Selecting the Headphone Jack Channel and Volume

The 7707AT-A provides a convenient audio monitoring headphone jack at the card-edge. This jack can be used to verify signal presence or content for each audio channel, and is enabled while specific menu items are selected within the JACK menu. The selected audio channel is applied to left and right headphone outputs as a monaural signal. 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-A allows the 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 section. A scrolling line segment will be displayed. The headphone jack will be enabled while in this state. Pressing the pushbutton again will exit this state, and mute the headphone jack.

Upon selecting the VOL menu item, a line segment is displayed. The position of the line segment on the dot-matrix display indicates the configured volume, and can be adjusted via the toggle switch. The headphone jack will be enabled while in this state. Pressing the pushbutton will exit this state, and mute the headphone jack.

JACK
  CHAN
    CH01-CH08
    CH01-CH12
	CHAN Allows selection of headphone monitoring channel.
	
	CH01 to **CH08** Range of audio channels for the 7077AT-A8 product version.
	
	CH01 to **CH12** Range of audio channels for the 7077AT-A12 product version.

JACK
  VOL
    0 THRU 64
	VOL Allows selection of headphone monitoring volume.

The user can select the BACK menu item to return to menu level 1.

4.2.2. Setting the Analog Audio Detection Threshold

In order to properly indicate audio signal presence, a detection threshold is used. The audio detection threshold adjustment is implemented in the digital domain. The specified range of threshold adjustment is –30dBu to +10dBu, in 1dB increments. Threshold adjustment is done using the card-edge interface or through *Vista*LINK® control.

To change the audio detection threshold, select the CTRL menu item in menu level 1. The 7707AT-A allows an audio detection threshold to be set independently for each channel. Use the toggle switch to choose the channel for which the user will adjust the detection threshold. Press the pushbutton to apply the displayed selection.

Use the toggle switch to select the DET menu item and press the pushbutton. The toggle switch may then be used to change the threshold value. Use the toggle switch to select the desired value then press the pushbutton to apply the displayed selection and return to menu level 3.

The factory default configuration applies an audio detection threshold value of 0dBu.

CTRL	
CH1-CH8	
CH1-CH12	
DET	
-30 to +10	

CH01 to **CH08**   Range of channels for the 7707AT-A8.
CH01 to **CH12**   Range of channels for the 7707AT-A12.

-30 to **+10**   Detection threshold range, describing a dBu value

CTRL	
GLBL	
DET	
-30 to +10	

GLBL   Global configuration. Applies profile to all channels.

-30 to **+10**   Detection threshold range, describing a dBu value

The user can select the BACK menu item to return to menu level 1.

4.2.3. Setting the Analog Audio Silence Duration Period

In order to properly indicate audio signal presence, a silence duration period is used. The duration period adjustment is implemented in the digital domain. The specified range of time adjustment is 1sec to 20sec, in 1sec increments. Duration adjustment is done using the card-edge interface or through *Vista*LINK® control.

To change the audio silence duration period, select the CTRL menu item in menu level 1. The 7707AT-A allows an audio silence duration period to be set independently for each channel. Use the toggle switch to choose the channel for which you want to adjust the detection threshold. Press the pushbutton to apply the displayed selection.

Use the toggle switch to select the DUR menu item and press the pushbutton. The toggle switch may then be used to change the threshold value. Use the toggle switch to select the desired value then press the pushbutton to apply the displayed selection and return to menu level 3.

CTRL	
CH1-CH8	
CH1-CH12	
DUR	
-1 to +20	

CH01 to **CH08**   Range of channels for the 7707AT-A8.
CH01 to **CH12**   Range of channels for the 7707AT-A12.

1 to **20**   Silence duration period range in seconds.

The user can select the BACK menu item to return to menu level 1.

4.2.4. Displaying the Software Version

Software operating on the 7707AT-A 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 CRTL (Control) menu item in menu level 1, followed by the VER (Software Version) menu item. The following list describes possible indications for this menu selection:

CTRL
VER
SOFTWARE VERSION
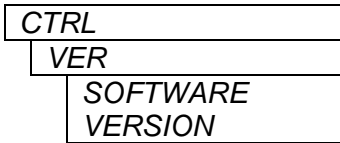
VER x.x BUILD xxx   Software version. Character string scrolls across four digit display.

5.   JUMPERS

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

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. 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 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.

6.1. *VISTA*LINK® MONITORED PARAMETERS

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

Parameter	Description
Card Type	Indicates the product name
Laser Fault	Indicates a laser fault condition
Audio Signal Not Present	Indicates signal presence for each channel

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

6.2.   *VISTA*LINK® CONTROLLED PARAMETERS

The following parameters can be remotely controlled through the *Vista*LINK® interface:

Parameter	Description
Audio Detection Threshold	Selects input audio detection threshold
Audio Silence Duration	Selects the Audio silence duration

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

6.3.   *VISTA*LINK® TRAPS

Card problems can be remotely monitored through the *Vista*LINK® interface:

Parameter	Description
Laser Fault	Indicates Problem with laser
Audio Signal Not Present	Indicates a missing audio signal

Table 6-3: *Vista*LINK® Traps

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