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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 reference and added firmware versions that support simultaneous local and remote control. Updated sections 4.2.1, 4.2.3, 5.2 and tables 3, 4, 5 for updated monitored / controlled parameters and traps.	Sep 04
1.0	Added 7707AR-8U-DB and updated laser warnings	Aug 05
1.1	Updated *Vista*LINK® information and fixed format	Jul 08
1.2	Updated menu structure format throughout 4.2.1 to 4.2.4	Oct 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 7707AT 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.

1. OVERVIEW

The 7707AR AES Receiver extends multiple channels of AES audio over a single fiber optic link. The 7707AR-8U version interfaces to 8 channels of unbalanced AES, the 7707AR-8U-DB has DB-25 connections for unbalanced audio that are backwards compatible with 7705AR-8, and the 7707AR-8 version accommodates unbalanced or balanced AES. The 7707AR-16 is a version that interfaces to 16 channels of unbalanced or balanced AES. Each 7707AR version is designed to operate with a companion 7707AT AES Transmitter, 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 7707AR provides a wide-band optical input, which is compatible with standard, CWDM, or DWDM transmission schemes.

Features:

- Eight or sixteen AES audio fiber optic receiver
- Dolby-E™ compliant
- 7707AR-8 and 7707AR-16 versions provide interface to balanced or unbalanced signals
- 7707AR-8U version provides interface to unbalanced signals via BNC connections
- AES audio sample rate detection provided independently 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®
- Wide-band optical input is compatible with 1310nm, 1550nm, CWDM, or DWDM wavelengths
- 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	7707AT13-8U 7707AT13-8 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 Channel Mux/Demux loss of 3.5dB Fiber Loss = 0.4/0.3dB per km @ 1310nm/1550nm						

Table 1-1: Typical Application Configurations
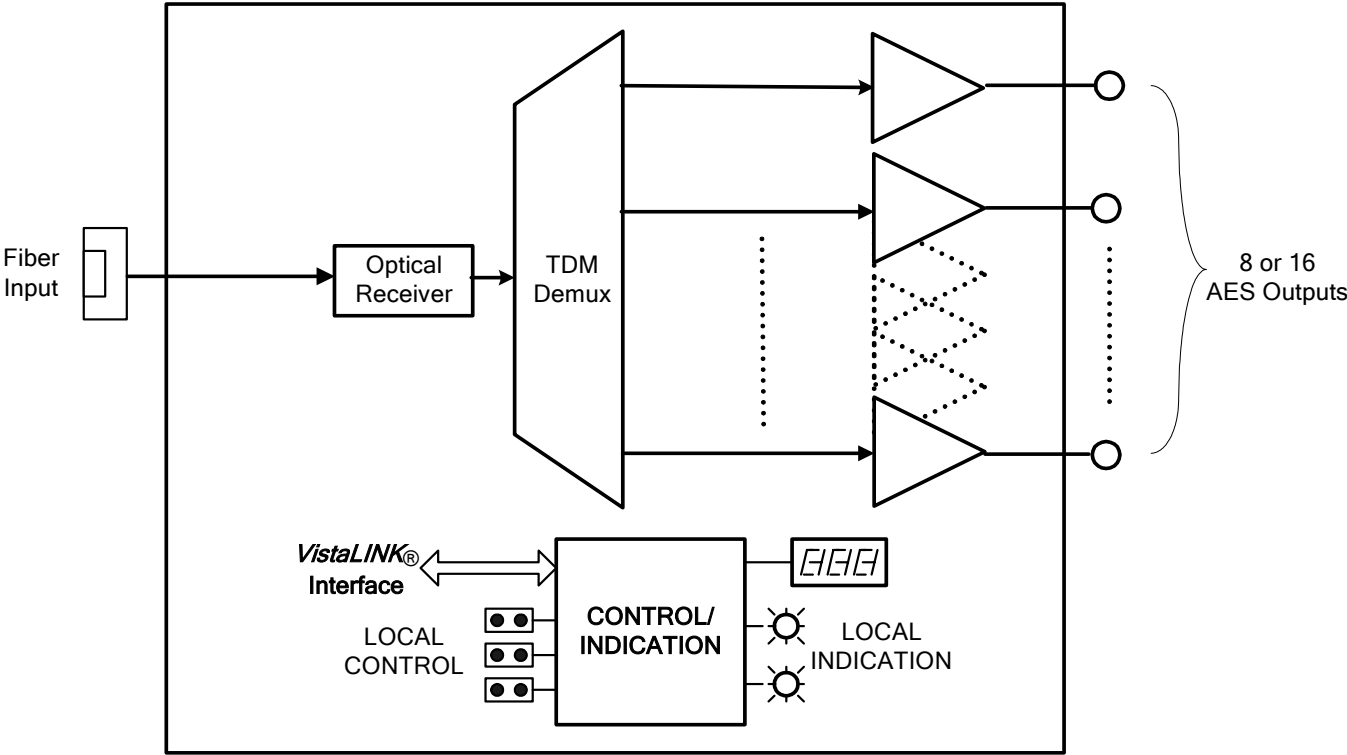
Figure 1-1: 7707AR Block Diagram

2. Installation

The 7707AR 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 7707AR-8 and 7707AR-16 versions provide AES connections via multi-pin removable terminal blocks. The 7707AR-8U version provides AES connections via BNCs. The 7707AR-8U-DB version provides unbalanced AES connections via a DB-25 connector, which is backwards compatible with the 7705AR-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 7707AR version:
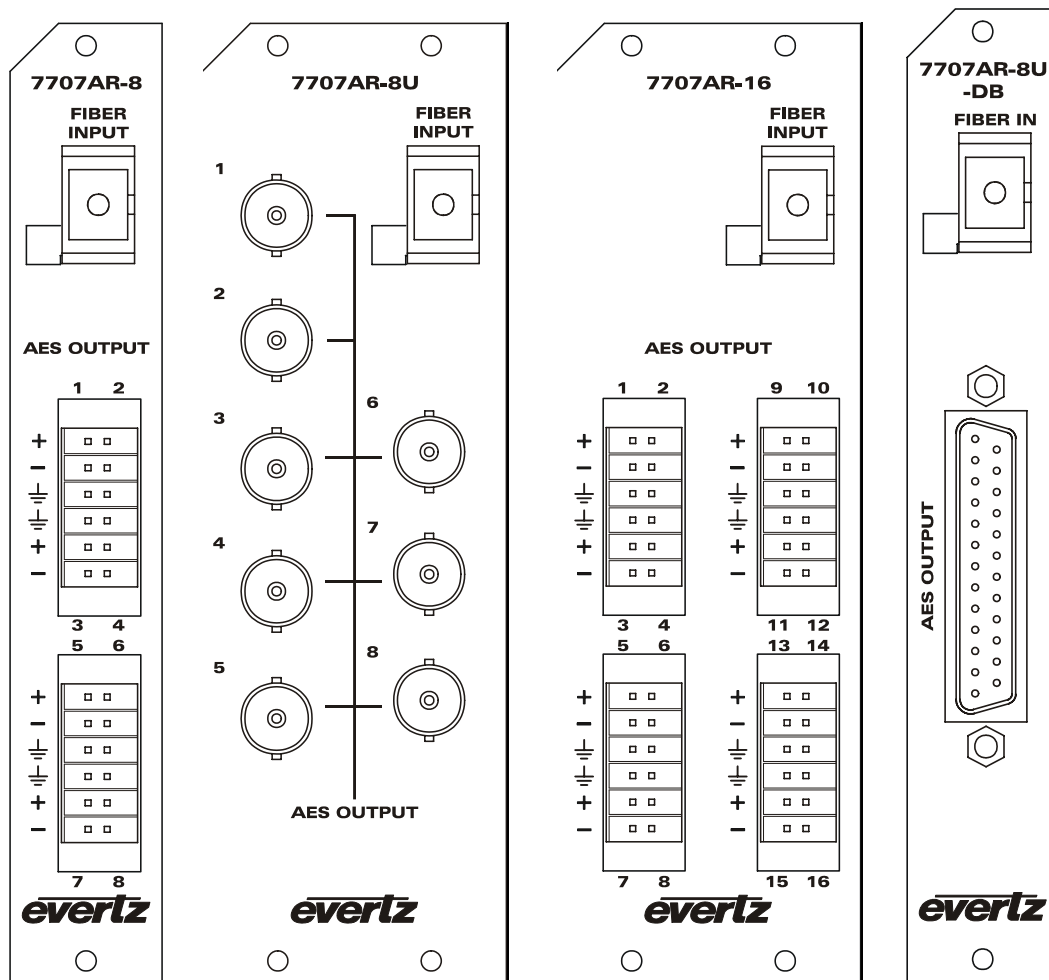
Figure 2-1: 7707AR Rear Panels

2.1.   OPTICAL CONNECTIONS

FIBER INPUT: There is one SC/PC (shown), ST/PC or FC/PC female connector with the optical input to the 7707AR. This wide band optical input accepts optical wavelengths of 1270nm to 1610nm, accommodating standard, CWDM or DWDM transmission schemes. This input is compatible with multimode fiber when connected directly to a companion 7707AT card.

> **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.**

2.2.   AES CONNECTIONS

AES OUTPUTS: The 7707AR-8U version provides BNC output connections compatible with unbalanced AES audio. The 7707AR-8U-DB version has DB-25 connections for unbalanced audio that are backwards compatible with 7705AR-8 as shown in Figure 2-2. The 7707AR-8 and 7707AR-16 versions provide terminal block output connections compatible with either balanced or unbalanced AES. Balanced AES audio signals should be connected from the positive (+) and negative (-) output terminals. Unbalanced AES audio signals should be connected from the positive (+) output terminal, while the negative (-) output terminal remains disconnected. Output impedance, amplitude, and rise/fall times are selectable to accommodate balanced or unbalanced interfaces. Refer to section 4.2.3 for information on selecting balanced or unbalanced output configurations.

> **For 7707AR-8U-DB versions the outputs should be set to the unbalanced configuration.**

1	GND		
2	AES OUT : 7	UNUSED	14
3	AES OUT : 8	UNUSED	15
4	GND	GND	16
5	AES OUT : 5	UNUSED	17
6	AES OUT: 6	UNUSED	18
7	GND	GND	19
8	AES OUT : 3	UNUSED	20
9	AES OUT : 4	UNUSED	21
10	GND	GND	22
11	AES OUT : 1	UNUSED	23
12	AES OUT : 2	UNUSED	24
13	GND	GND	25
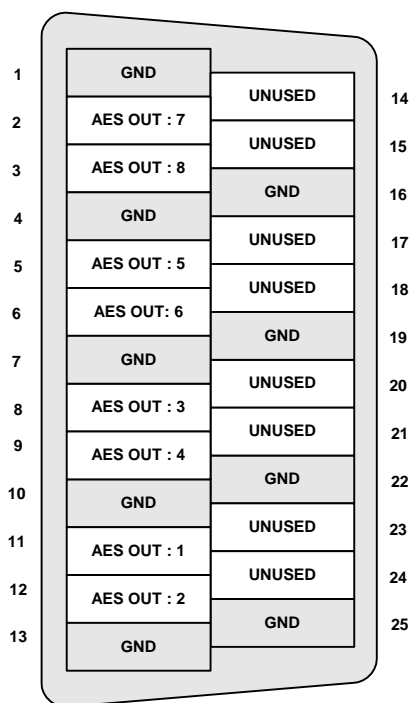
Figure 2-2: 7707AR-8U-DB Pin Out

2.3. 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 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 chapter in the front of the binder.

3.   SPECIFICATIONS

3.1.   AES AUDIO OUTPUTS

Standard:
    7707AR-8U: SMPTE 276M - Unbalanced AES, Dolby-E™ compliant
    7707AR-8/16:   AES3-1992, Balanced or Unbalanced
                                 (selectable), Dolby-E™ compliant
Number of Outputs:
    7707AR-8/8U: 8
    7707AR-16:   16
Connectors:
    7707AR-8U: 1 BNC per IEC 61169-8 Annex A
    7707AR-8/16:   Multi-pin Removable Terminal Blocks
Output Sample Rate: 32 to 48kHz (same as input signal at 7707AT)
Output Impedance:
    Unbalanced: 75Ω
    Balanced: 110Ω
Output Return loss: > 15dB
Output Amplitude:
    Unbalanced: 1V p-p to ±0.1V p-p
    Balanced: 2V p-p to ±0.1V p-p
Output Rise/Fall Times:
    Unbalanced: 35ns ±5ns
    Balanced: 20ns ±5ns
Output Jitter: < 0.1 UI

3.2.   OPTICAL INPUT

Connector: SC/PC, ST/PC, FC/PC female housing
Input Wavelength: 1270 to 1610nm
Input Power (max):   0dBm
Input Optical Sensitivity: -28dBm

3.3.   ELECTRICAL

Voltage: 12V DC
Power (max):   6 Watts
EMI/RFI: Complies with FCC Part 15, Class A
                           Complies with EU EMC directive

3.4. PHYSICAL

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

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

4.   CARD-EDGE MONITORING AND CONTROL

The 7707AR 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.
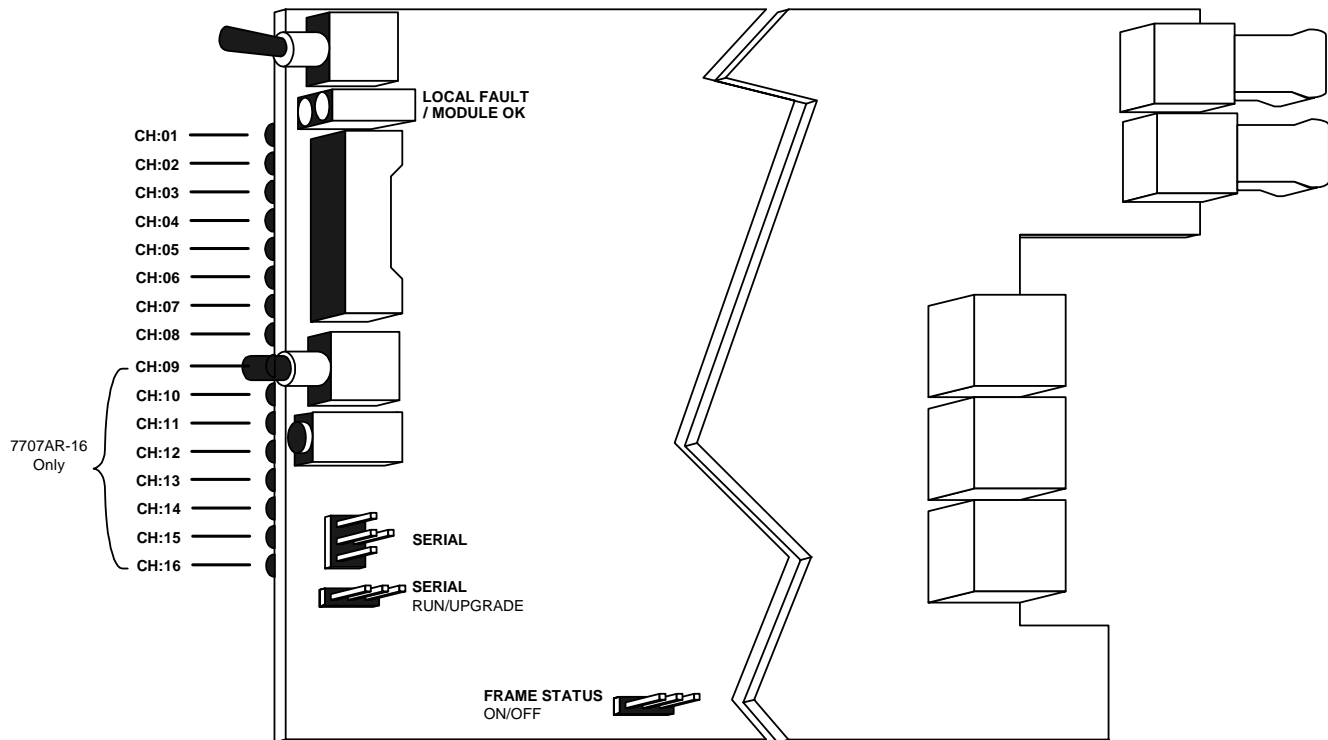
Figure 4-1: Location of Status Indicators and Jumpers

> **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: A link with a companion 7707AT has not been achieved, 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 a link is maintained with a companion 7707AT, 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 output 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 4-2 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 1	
	LINK…LOS (Link Loss) Overrides **PWR** (Optical Power)	**-40** to **+0** (dBm)		
⇧ Toggle Switch ⇩ .	**RATE** (Audio Rate)	Menu Selections:	Configuration Values:	Return to Level 2
		CH01 thru **CH08 or CH016**	**48K** (48kHz) or **44K** (44kHz) or **32K** (32kHz) or **LOS** (Loss of Signal)	
		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 Optical Power

The 7707AR can measure and display optical power over a range of –40 to 0dBm in 1dBm increments. Please heed the maximum optical input power specification for the specific product option being used. Optical power monitoring is accommodated through the card-edge interface or *Vista*LINK®. To display the optical power to the card-edge select the PWR indication in menu level 1.

PWR		**-40 to 0**	Optical input power in dBm units.
-40 TO +0		**<–40**	Optical input powers below –40dBm.
		>0	Optical input powers exceeding 0dBm

If there is no optical power present at the input, the card edge will display:

LINK…LOS   Link fault condition exists. Overrides other indications.

4.2.2. Displaying the AES Audio Sample Rate

The 7707AR 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.

```
┌─────────────────────┐
│ RATE                │
│  ┌──────────────────┤
│  │ CH01 – CH08      │
│  │ CH01 – CH16      │
│  │  ┌───────────────┤
│  │  │ 48K           │
│  │  │ 44K           │
│  │  │ 32K           │
│  │  │ LOS           │
│  │  │               │
│  │  │               │
│  │  │               │
│  │  │               │
└──┴──┴───────────────┘
```

CH01 to **CH08**   Range of AES Channels for the 7707AR-8, and 7707AR-8U product versions.

CH01 to **CH16**   Range of AES Channels for the 7707AR-16 product version.

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

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

Press the pushbutton to return to menu level 1.

4.2.3. Selecting the AES Output Signal Type

The 7707AR-8 and 7707AR-16 product versions accommodate balanced or unbalanced output signals. Output amplitude, rise/fall time, and impedance characteristics are selectable to match either signal type. Please refer to section 2.1 for output connection details. Selection of the output signal type is done using the card-edge interface or through *Vista*LINK® control.

To select the output signal type, select the TERM menu item in menu level 1. The 7707AR allows the output 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.

```
┌─────────────────────┐
│ TERM                │
│  ┌──────────────────┤
│  │ CH01 – CH08      │
│  │ CH01 – CH16      │
│  │  ┌───────────────┤
│  │  │ BAL           │
│  │  │ UBAL          │
│  │  │               │
│  │  │               │
│  │  │               │
│  │  │               │
│  │  │               │
│  │  │               │
└──┴──┴───────────────┘
```

CH01 to **CH08**   Range of AES Channels for the 7707AR-8 product version.

CH01 to **CH16**   Range of AES Channels for the 7707AR-16 product version.

The following list describes possible selections for output signal type:

BAL   Output is configured for balanced AES signal type.

UBAL   Output is configured for unbalanced AES signal type.

Switch to the desired output configuration using the toggle switch. Press the pushbutton to return to menu level 2. The user 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 output signal type as BAL.

✎ | **For 7707AR-8U-DB versions the outputs should be set to the unbalanced configuration.**

4.2.4. Selecting the Headphone Jack Channel and Volume

The 7707AR 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 7707AR 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 selection.

```
JACK
  CHAN
    CH01 – CH08
    CH01 – CH16
```

CHAN	Allows selection of headphone monitoring channel.
CH01 to **CH08**	Range of AES channels for the 7707AR-8 and 7707AR-8U product versions.
CH01 to **CH16**	Range of AES channels for the 7707AR-16 product version.

```
JACK
  VOL
    0 THRU 64
```

VOL	Allows selection of 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. The user 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.
AR-8	1v1_b57
AR-8U	1v1_b57
AR-16	1v1_b68

Table 5-1: 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 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.

6.2. *VISTA*LINK® MONITORED PARAMETERS

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

Parameter	Description
Optical Power	Optical input power from –40dBm to 0dBm.
Link Loss	Indicates a fiber link fault condition.
Audio Signal Loss	Indicates signal loss for each channel.
Audio Rate	Indicates sample rate for each channel.
Optical Power Warning	Indicates optical input power is below alarm threshold level.

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

6.3. *VISTA*LINK® CONTROLLED PARAMETERS

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

Parameter	Description
Output Signal Type	Selects output as balanced/unbalanced
Optical Power Alarm Threshold	Selects the threshold level for the optical power warning

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

6.4. *VISTA*LINK® TRAPS

The following *Vista*LINK® traps can be enabled and monitored:

Parameter	Description
Optical Link Loss	Indicates loss of optical power
Optical Power Warning	Indicates optical input power is below threshold alarm level

Table 6-3: *Vista*LINK® Traps

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