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REVISION HISTORY

REVISION	DESCRIPTION	DATE
0.1	Preliminary version	Sept 03
1.0	Extended THD and SNR test condition details	Feb 05
2.0	Headphone jack, menu tree, card edge and various updates	April 05
2.1	Fixed format and updated *Vista*LINK® description	Oct 08
2.2	Updated menu structure in throughout section 4.2	Apr 09
2.3	Added delay specification to section 3.	Oct 09

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1. OVERVIEW

The 7707AR-A series Audio Fiber Receivers extend multiple channels of analog audio over a single fiber optic link. The 7707AR-A12 version accommodates twelve channels of analog audio, while the 7707AR-A8 version accommodates eight channels. Each 7707AR-A version is designed to operate with a companion 7707AT-A Audio Transmitter, 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 7707AR-A provides a wide-band optical input, which is compatible with standard, CWDM, or DWDM transmission schemes.

The 7707AR-A8 occupies one card slot and 7707AR-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:
- Versions to accommodate eight or twelve analog audio signals
- Adjustable audio detection is provided independently for each channel
- Additional audio monitoring via card-edge headphone jack with adjustable volume
- Adjustable audio gain is provided independently for each channel
- 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®
- Wide-band optical input is compatible with standard, CWDM, or DWDM transmission schemes
- 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 VistaLINK® 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	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
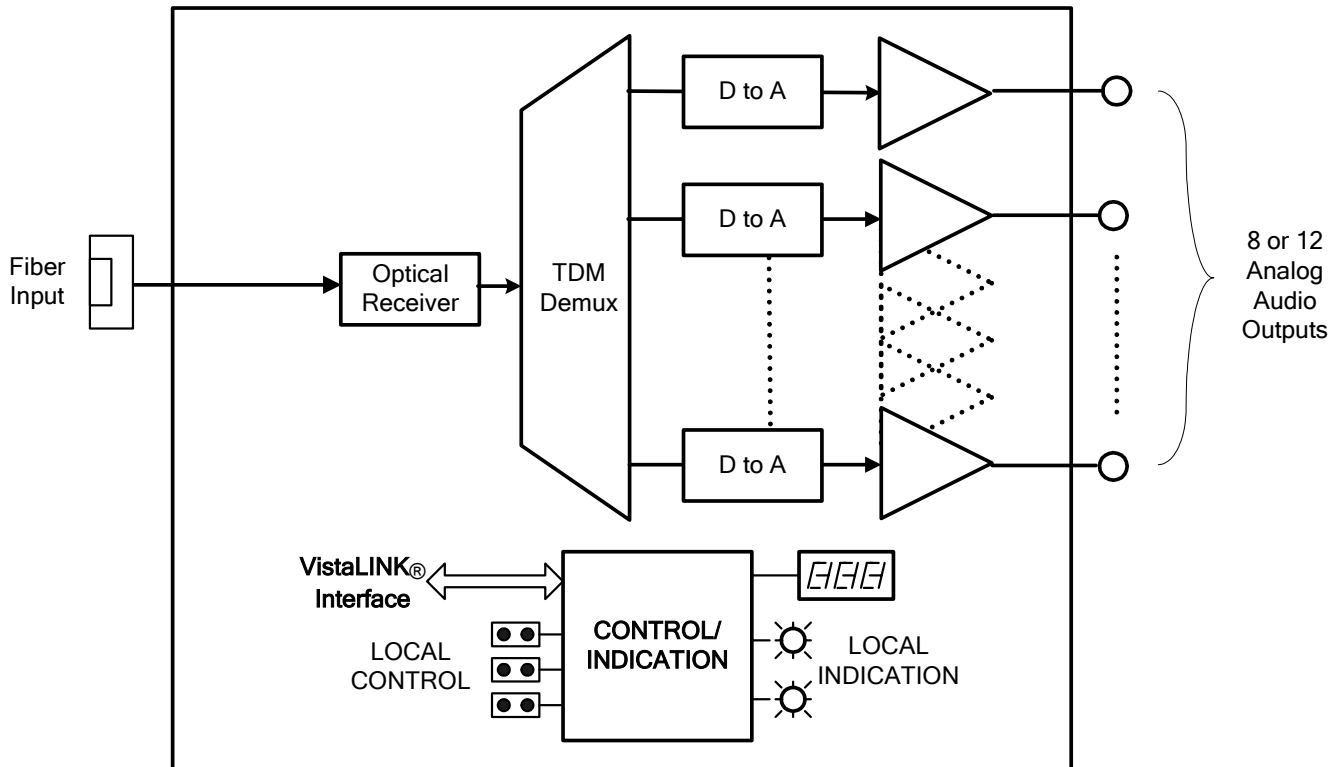
Figure 1-1: 7707AR-A Block Diagram

2.   INSTALLATION

The 7707AR-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 7707AR-A version.
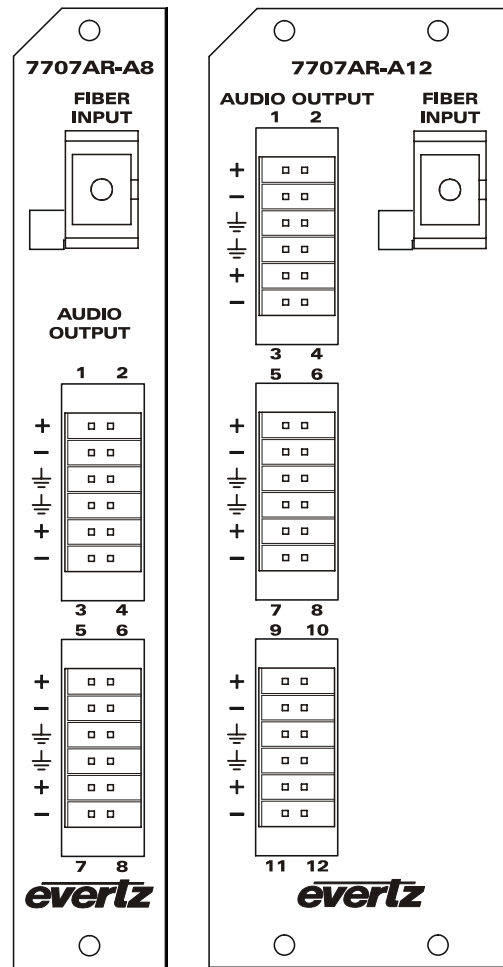
Figure 2-1: 7707AR-A Rear Panels

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-A. 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-A card.

2.2.   AUDIO CONNECTIONS

AUDIO INPUTS: The 7707AR-A series modules provide terminal block output connections compatible with either balanced or unbalanced analog audio. Balanced audio signals should be connected to the positive (+) and negative (-) output terminals. Unbalanced audio signals should be connected to the positive (+) output terminal, while the negative (-) output terminal remains unconnected. 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

> **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 a wavelength of 1310nm or 1270 to 1610nm.

2.3.2. 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 the user maintains 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 binder.

3.   SPECIFICATIONS

3.1.   ANALOG AUDIO OUTPUTS

Number of Outputs:
    7707AR-A8:   8
    7707AR-A12:   12
Connectors: Multi-pin Removable Terminal Blocks
Output Level:
    Into High Impedance: +24dBu (max)
    Into 600Ω: +23dBu (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)
Output Impedance: 66Ω (nom, differential)
Adjustable Gain: -10dB to +10dB (0.5dB increments)
Sample Rate: 52.7KHz
Resolution: 24 Bits

3.2.   OPTICAL INPUT

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

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:
    7707AR-A8:   13.5W (max)
    7707AR-A12:   18.5W (max)
EMI/RFI: Complies with FCC regulations for class A devices
                    Complies with EU EMC directive

3.5. PHYSICAL

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

7701 frame mounting:
  Number of Slots: 2 slots

4.   CARD-EDGE MONITORING AND CONTROL

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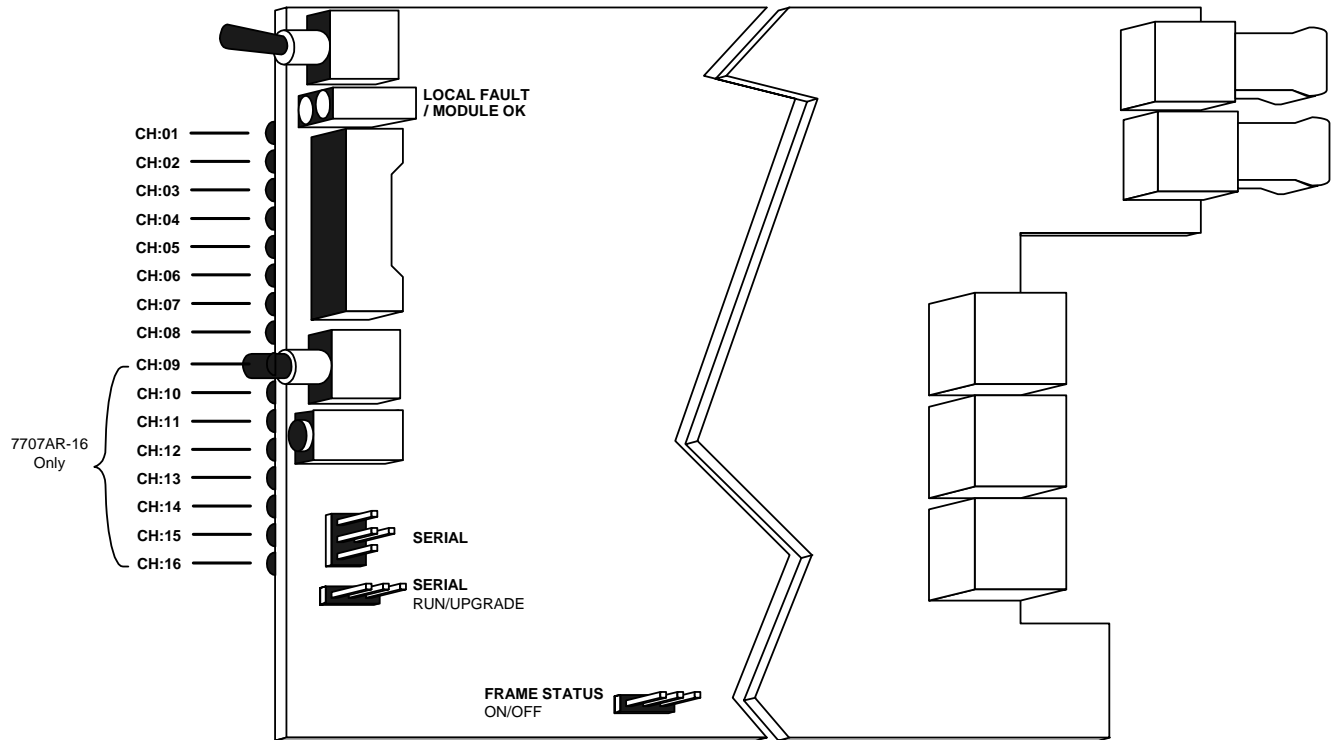
Figure 4-1: Location of Status Indicators and Jumpers

4.1.   STATUS INDICATOR LEDS

LOCAL FAULT: This red LED indicates poor module health. Two conditions could cause this fault indication to be active: A link with a companion 7707AT-A 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-A and the card power is good.

CH:01 to **CH:xx**   Each of these green LED's indicate the signal presence of the respective audio input channel. Signal presence indication considers audio detection thresholds set by the user. Refer to section 4.2.3 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 4-2 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	Menu Level4	
	Pushbutton⇨	Pushbutton⇨	Pushbutton⇨	Pushbutton⇨	
.	**Menu Selections:**	**Configuration Values:**			
	LINK…LOS (Link Loss) Overrides **PWR** (Optical Power)	**-40** to **+0** (dBm)	Return to Level 1		
	JACK (Monitor Jack)	**Menu Selections:**	**Configuration Values:**		
		CHAN (Channel)	**CH01** thru **CH08 or CH12**	Return to Level 1	
⇧		**VOL** (Volume)	0 thru **64**		
Toggle Switch		**BACK**	Return to Level 1		
	CTRL (Control)	**Menu Selections:**	**Menu Selections:**	**Configuration Values:**	
		CH01 thru **CH08 or CH12**	**DET** (Detection Level)	**-30** to **+10** (dBu)	
⇩			**DUR** (Duration Period)	**1** to **20** (sec)	
			GAIN (Audio Gain)	**-10** to **+10** (dB)	Return to Level 1
		(Channel Control)	**BACK**	Return to Level 1	
		GLBL (Global Control)	**Menu Selections:**	**Configuration Values:**	
			DET (Detection Level)	**-30** to **+10** (dBu)	
.			**GAIN** (Audio Gain)	**-10** to **+10** (dB)	
			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. Displaying the Optical Power

The 7707AR-A 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 you possess. 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. The following list describes all possible indications for this menu selection:

```
PWR
  -40 to 0
```

-40 to **0**	Optical input power in dBm units.
LOW	Optical input powers below –40dBm.
>0	Optical input powers exceeding 0dBm.
LINK…LOS	Link fault condition exists. Overrides other indications.

4.2.2. Selecting the Headphone Jack Channel and Volume

The 7707AR-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 7707AR-A allows the user to control the headphone monitoring jack channel and volume. Use the toggle switch to choose the parameter to be controlled.

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

The following table describes possible selections for headphone monitoring channel:

```
JACK
  CHAN
    CH01 thru
    CH08 or CH12
```

CH01 to **CH08**	Range of audio channels for the 7077AR-A8 product version.
CH01 to **CH12**	Range of audio channels for the 7077AR-A12 product version.

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
  VOL
    0 thru 64
```

Allows the user to control the volume output of the card edge Audio Monitor jack.
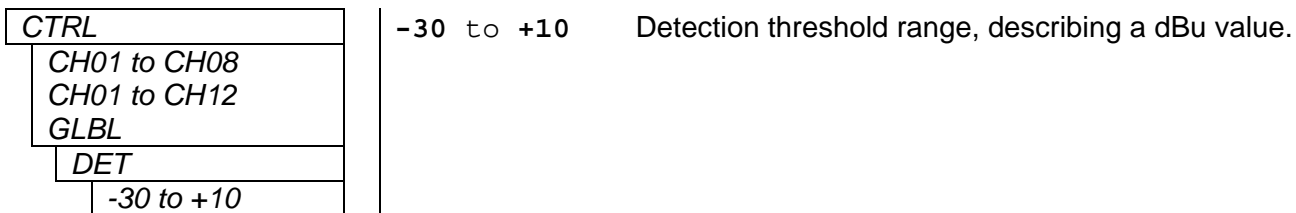
4.2.3. Setting the Analog Audio Detection Threshold

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 7707ATR-A allows an audio detection threshold to be set independently for each channel. Use the toggle switch to choose a channel in order to adjust its detection threshold. Press the pushbutton to apply the displayed selection.

`CH01` to `CH08`   Range of channels for the 7707AR-A8.
`CH01` to `CH12`   Range of channels for the 7707AR-A12.
`GLBL`   Global configuration. Applies profile to all channels.

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.

```
CTRL
   CH01 to CH08
   CH01 to CH12
   GLBL
      DET
         -30 to +10
```

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

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

4.2.4. 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 7707AR-A allows an audio silence duration period to be set independently for each channel. Use the toggle switch to choose a channel in order to adjust its detection threshold. Press the pushbutton to apply the displayed selection.

`CH01` to `CH08`   Range of channels for the 7707AR-A8.
`CH01` to `CH12`   Range of channels for the 7707AR-A12.
`GLBL`   Global configuration. Applies profile to all channels.

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                   │
│   ┌────────────────────┤
│   │ CH01 to CH08       │
│   │ CH01 to CH12       │
│   │ GLBL               │
│   │   ┌────────────────┤
│   │   │ DUR            │
│   │   │   ┌────────────┤
│   │   │   │ 1 to 20    │
└───┴───┴───┴────────────┘
```

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

4.2.5. Setting the Audio Gain

Audio gain adjustment is implemented in the digital domain. The specified range of gain adjustment is 10dBu to +10dBu, in 0.5dB increments. Gain adjustment is done using the card-edge interface or through *Vista*LINK® control. The selected gain value describes voltage gain, and is accurate for high impedance loads. Audio output impedance dictates that the amplitude will reduce slightly as the load impedance is reduced. Subtract approximately 1dB for 600Ω loads.

To change the audio gain, select the CTRL menu item in menu level 1. The 7707AR-A allows independent configuration of each channel. Use the toggle switch to choose the channel for which the audio gain will be adjusted and press the pushbutton to apply the displayed selection.

CH01 to **CH08**   Range of channels for the 7707AR-A8.
CH01 to **CH12**   Range of channels for the 7707AR-A12.
GLBL   Global configuration. Applies profile to all channels.

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

```
┌────────────────────────┐
│ CTRL                   │
│   ┌────────────────────┤
│   │ CH01 to CH08       │
│   │ CH01 to CH12       │
│   │ GLBL               │
│   │   ┌────────────────┤
│   │   │ GAIN           │
│   │   │   ┌────────────┤
│   │   │   │ -10 to +10 │
└───┴───┴───┴────────────┘
```

-10 to **+10**   Gain range, describing a dB value.

The factory default audio gain setting is 0dB.

4.2.6. Displaying the Software Version

Software operating on the 7707AR-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:

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.   *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 7707AR-A 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
Card Type	Indicates Card Version.
Optical Power	Optical input power from –40dBm to 0dBm.
Optical Power Below Threshold	Indicates an optical power below the set threshold.
Optical Link Loss	Indicates a fiber link fault condition.
Audio Signal Not Present	Indicates signal presence for each channel.

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
Audio Detection Threshold	Selects output audio detection threshold.
Audio Gain	Selects output audio gain.
Audio Silence Duration	Sets the audio silence duration period.

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

6.4. *VISTA*LINK_® TRAPS

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

Parameter	Description
Optical Link Loss	Indicates no optical link established.
Optical Power Below Threshold	Indicates the optical power is below the user set threshold.
Audio Signal Not Present	Indicates a loss of audio signal.

Table 6-3: *Vista*LINK_® Traps