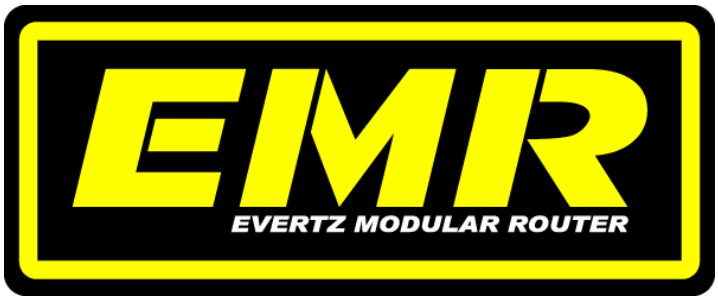

High Density Modular Audio Router

USER MANUAL

EVERTZ MICROSYSTEMS LTD.
5288 John Lucas Drive,
Burlington, Ontario,
Canada L7L 5Z9
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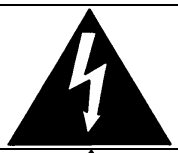
Sales: sales@evertz.com Fax: 905-335-3573
Tech Support: service@evertz.com Fax: 905-335-7571
Web Page: http://www.evertz.com

Version 1.3, October 2011

IMPORTANT SAFETY INSTRUCTIONS

	The lightning flash with arrowhead symbol within an equilateral triangle is intended to alert the user to the presence of un-insulated, dangerous voltage within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.
	The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (i.e.: servicing) instructions in the literature accompanying the product.

- Read these instructions.
- Keep these instructions.
- Heed all warnings.
- Follow all instructions.
- Don't use this apparatus near water.
- Clean only with a dry cloth.
- Don't block any ventilation openings.
- Install in accordance with the manufacturer's instructions.
- Don't install near any heat sources such as radiators, heat registers, stoves, or other apparatuses (including amplifiers) that produce heat.
- Don't defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than other. A grounding-type plug has two blades and a third grounding prong. The wide blade or third prong is provided for your safety. If the plug provided does not fit into your outlet, consult an electrician to replace the obsolete outlet.
- Protect the power cord from being walked on or pinched, particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
- Only use attachments/accessories specified by the manufacturer
- Unplug this apparatus during lightning storms, or when unused for long periods of time.
- Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as damage to the power-supply cord or plug, contact with liquid (or any object small enough to enter the apparatus), exposure to rain or moisture, drop damage, or upon experiencing any abnormal operation.

WARNING:
TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, **DO NOT** EXPOSE THIS APPARATUS TO RAIN OR MOISTURE

WARNING:
DO NOT EXPOSE THIS EQUIPMENT TO DRIPPING OR SPLASHING AND ENSURE THAT NO OBJECTS FILLED WITH LIQUIDS, SUCH AS VASES, ARE PLACED ON THE EQUIPMENT

WARNING:
TO COMPLETELY DISCONNECT THIS EQUIPMENT FROM THE AC MAINS, DISCONNECT THE POWER SUPPLY CORD PLUG FROM THE AC RECEPTACLE

WARNING:
THE MAINS PLUG OF THE POWER SUPPLY CORD SHALL REMAIN READILY OPERABLE

WARNING

Never look directly into an optical fiber. Irreversible eye damage can occur in a matter of milliseconds.

INFORMATION FOR USERS IN EUROPE

This equipment with the CE marking complies with the EMC Directive (89/336/EEC) and the Low Voltage Directive (73/23/EEC) issued by the Commission of the European Community.

Compliance with these directives implies conformity to the following European standards:

- EN60065 Product Safety
- EN55103-1 Electromagnetic Interference Class A (Emission)
- EN55103-2 Electromagnetic Susceptibility (Immunity)

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to the European Union EMC directive. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his/her own expense.

INFORMATION FOR USERS IN THE U.S.A.

FCC Class A Digital Device or Peripheral

This equipment has been tested and found to comply with the regulations for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his/her own expense.

WARNING

Changes or modifications not expressly approved by Evertz Microsystems Ltd. could void the user's authority to operate the equipment.

Use of unshielded plugs or cables may cause radiation interference. Properly shielded interface cables with the shield connected to the chassis ground of the device must be used.

REVISION HISTORY

REVISION	DESCRIPTION	DATE
0.1	Preliminary Release	Aug 2010
1.0	First release	Sept 2010
1.1	Removed references to 3000PS-FM and 3000PS-QT-FM. Updates made in sections 2.2 & 2.3.	Nov 2010
1.2	Corrections made to Delay (+DLY) section	Nov 2010
1.3	Added EMR-ADMX-16X16, EMR-IP16-MADI, EMR-OP16-MADI. Added more information for LTC and data port routers. Updated VistaLINK® screens and descriptions.	Oct 2011

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FIGURES

TABLES

1. OVERVIEW

The EMR is a multi-format modular router that provides a high density solution without compromising functionality. The EMR provides a unified platform for routing digital audio, analog audio, MADI audio, data, and time code. The EMR uses a packet routing core that allows for highly dense applications and also provides the flexibility for expansion as demands grow.

A single 6RU frame can accommodate 288x288 AES, 288 data ports, 288x288 time code signals, or a mix of everything in between. Expansion beyond this is as easy as adding another frame. With two 6RU frames, the EMR can accommodate 576x576 AES signals with full redundancy.

The modular design of the EMR means that there are no limitations to the signal formats that can be added to the router, or limitations to the size at which it can be expanded to. Other products that can be combined with the EMR are master controllers, multi-viewers and more.

Configuration:
The EMR allows any mix of formats within a frame. The inputs and outputs are scalable in blocks of 96 or 48 depending on the format. A system consists of the input stage, the crosspoint, and the output stage. Each input and output device is connected to the crosspoint through a proprietary TDM connection. It is the use of this connection that provides the flexibility for the system to scale and evolve with changing needs.

Scalability:
The EMR can be scaled well beyond a single frame. A single crosspoint module can support up to 16 input modules and 16 output modules, allowing a system to scale to 1536x1536 AES. For larger requirements, multiple crosspoint modules can be combined to scale even further. There really is no limit to the range of the EMR.

Redundancy:
Each input and output card in the EMR contains multiple TDM interfaces that allow connections to multiple crosspoints. Each input card provides multiple TDM outputs that can be used for redundant connections, and each output card provides multiple TDM inputs that can be setup to automatically failover if the primary connection fails. The redundancy structure of the EMR minimizes the chances of any failure to the system.

Control:
When combined with Magnum, the EMR can be controlled using a wide range of control panels and interfaces. The EMR also provides a SNMP interface to control various configuration options.

System Integration:
When combined with the EQX, the EMR provides the ability to route audio universally across various formats. Embedded audio from EQX video sources can be deembedded and routed to AES, analog, or MADI destinations. The system also allows discrete audio sources from AES, analog or MADI to be routed to audio embedders on the EQX. This unique system provides maximum flexibility for routing any audio source to any audio destination.

1.1. FEATURES & BENEFITS

Audio Routing:

- Support for unbalanced/balanced AES, analog, and MADI audio formats
- Input and output sample rate conversion
- Processing capabilities for per channel gain, inversion, quad-mixing and per channel audio delay
- Advanced audio monitoring for loss, silence, over, phase and mono
- Unique HD video output with audio level display for all audio inputs

Data Port Routing:

- Support for RS-232 and RS-422 devices (selectable)
- Conversion between RS-232 and RS-422 devices
- Manual or automatic sensing of controlling and controlled devices
- Sony interface for detecting controlling or controlled devices

Time Code Routing:

- Decoding and encoding capabilities for advanced monitoring
- Handles shuffle speeds up to 70x

Advanced System Control & Interfacing:

- Supports the full range of Quartz remote control panels
- Full VistaLINK® PRO command & control, SNMP
- Supports a wide selection of control protocols
- Ethernet, Serial RS-422/RS-232 connections
- Full integration with 3rd party automation systems

High Availability, 24/7 Design:

- Full modular design
- All modules are hot swappable
- All components are front accessible
- Passive I/O
- External MI connection
- Redundant crosspoint
- Redundant power supply
- Comprehensive system monitoring bus
- VistaLINK® PRO SNMP monitoring of I/O modules

2. COMPONENT OVERVIEW

2.1. EMR FRAME

The EMR is housed in one of three rack-mountable frames. The three available frames are the 3000FR the EMX6-FR and the EMX3-FR. The 3000FR and EMX6-FR frames can accommodate up to 2 hot-swappable power supply units and up to 15 single slot, hot-swappable I/O modules. The EMX3-FR frame can accommodate up to 2 hot-swappable power supply units and up to 5 single slot, hot-swappable I/O modules. Each module has a corresponding passive rear plate, which is mounted via screws to the frame. It is important that all screws are used to fasten the rear plates to ensure proper connectivity with the I/O modules.

The EMR frame is also equipped with a frame controller unit used for facilitating network communications between the frame modules and Magnum.

The 3000FR frame uses a 3000FC frame controller which provides one network connection via an RJ-45 connector and two references via BNC connectors. The BNC labeled 59.94 Hz is the main reference and the BNC labeled 50 Hz is the backup reference. The references do not need to be the frequencies indicated on the frame. Figure 2-1 show the rear of the 3000FR frame and 3000FC connections.

The EMX6-FR and EMX3-FR frames use an EMX-FC frame controller which provides two network connections via RJ-45 connectors and two references via BNC connectors. The BNC labeled Ref 1 is the main reference and the BNC labeled Ref 2 is the backup reference. Figure 2-2 and Figure 2-3 show the rear of the EMX6-FR and EMX3-FR frames respectively. There are also main and backup serial connections to the EMX-FC that are provided for future use.

The EMX6-FR and EMX3-FR frames have optional redundant frame controller configurations.

Note: Rear panels are placed horizontally in the EMX3-FR frame and as a result, some screening labels will be upside down. This is the case for the Analog Audio, Balanced AES, LTC and Data Port modules.

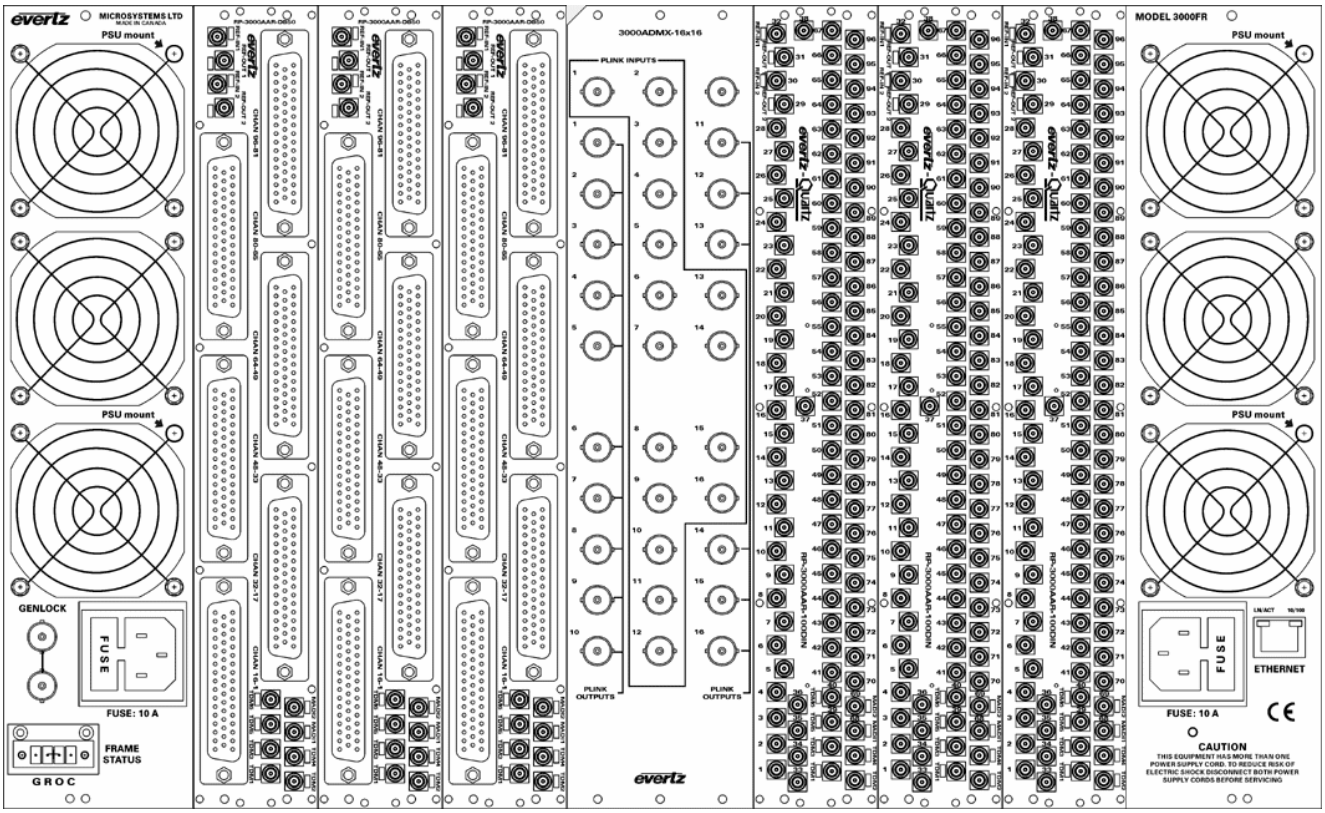


Figure 2-1: 3000FR Rear View

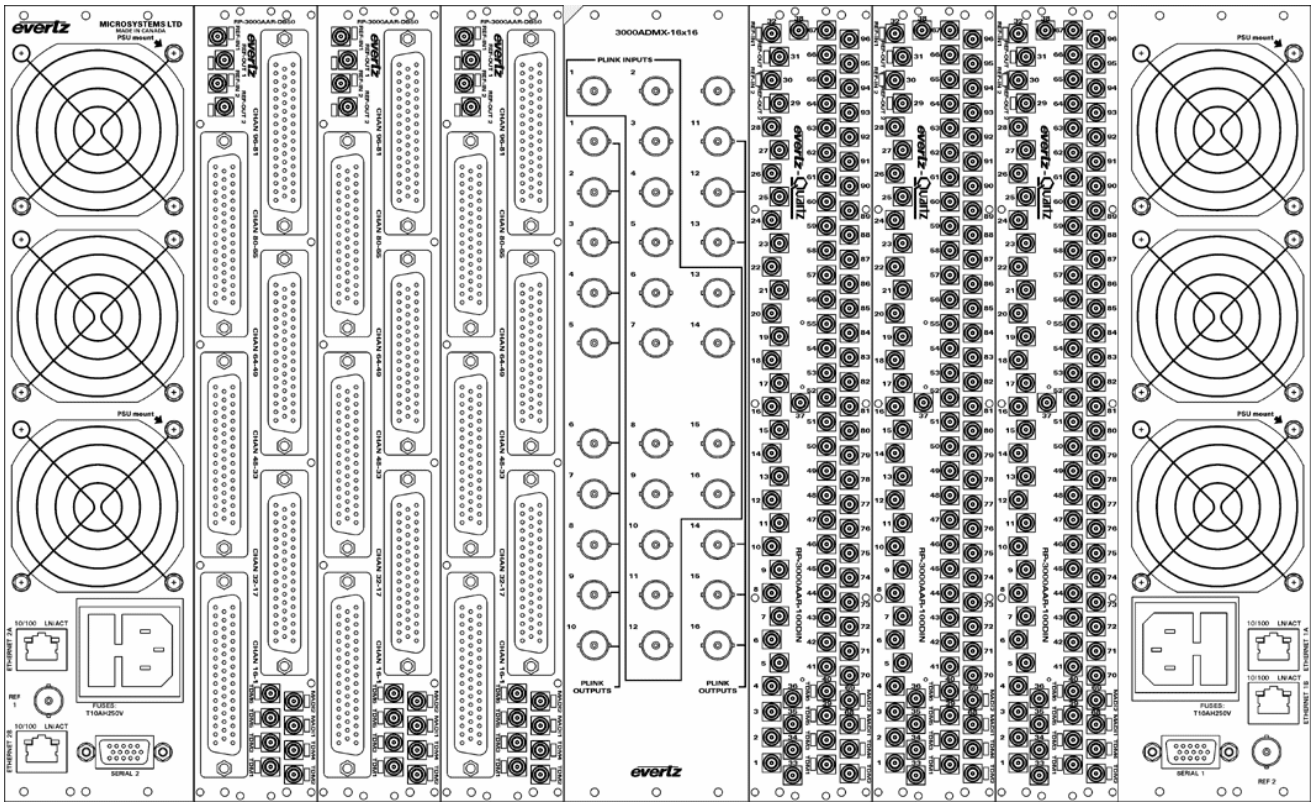


Figure 2-2: EMX6-FR Rear View

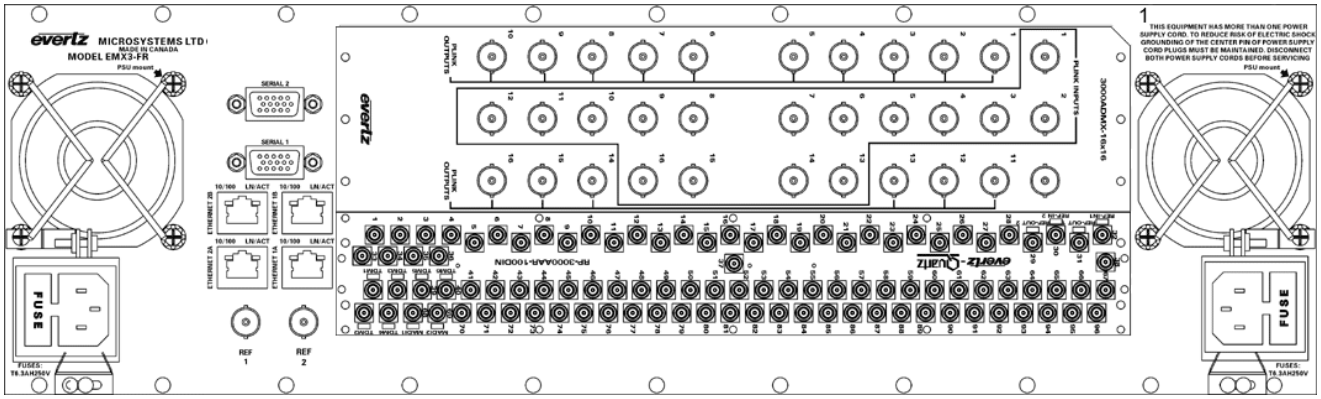


Figure 2-3: EMX3-FR Rear View

2.2. EMR I/O MODULES

The EMR system is built from a variety of input and output modules. All modules are hot-swappable and can reside in any one of the 15 slots of the 3000FR or EMX6-FR frames or 5 slots of the EMX3-FR frame.

Available I/O modules include:

- **EMR-IP96-AESU** 96 Unbalanced AES inputs with TDM outputs
- **EMR-IP96-AESB** 96 Balanced AES inputs with TDM outputs
- **EMR-IP48-AESU** 48 Unbalanced AES inputs with TDM outputs
- **EMR-IP48-AESB** 48 Balanced AES inputs with TDM outputs
- **EMR-IP48-AA** 48 Analog stereo inputs with TDM outputs
- **EMR-OP96-AESU** 96 Unbalanced AES outputs with TDM inputs
- **EMR-OP96-AESB** 96 Balanced AES outputs with TDM inputs
- **EMR-OP48-AESU** 48 Unbalanced AES outputs with TDM inputs
- **EMR-OP48-AESB** 48 Balanced AES outputs with TDM inputs
- **EMR-OP48-AA** 48 Analog stereo outputs with TDM inputs
- **EMR-ADMX-16X16** 16 TDM inputs and 16 TDM outputs
- **EMR-IP16-MADI** 16 MADI inputs with TDM outputs
- **EMR-OP16-MADI** 16 MADI outputs with TDM inputs
- **3000ADMX-16X16** 16 TDM inputs and 16 TDM outputs
- **3000MADI16-TDM4** 16 MADI inputs with TDM outputs
- **3000TDM4-MADI16** 16 MADI outputs with TDM inputs
- **EMR-IP96-LTC** 96 LTC inputs with TDM outputs
- **EMR-IP48-LTC** 48 LTC inputs with TDM outputs
- **EMR-OP96-LTC** 96 LTC outputs with TDM inputs
- **EMR-OP48-LTC** 48 LTC outputs with TDM Inputs
- **EMR-PR48** 48 data ports with TDM inputs and TDM outputs

Detailed module descriptions, module rear plate drawings, and specifications are provided in the following sections.

2.2.1. EMR-IP96(48)-AESU(B) AES Audio Input Module

The EMR-IP96(48)-AESU(B) is an AES audio input card for the EMR. It supports 96 or 48 discrete AES inputs (192 or 96 mono channels). Additionally, there is one MADI input which can carry up to 64 channels of digital audio, giving a total of 256 or 160 mono channels of audio.

There are two versions of firmware supported on the EMR-IP96(48)-AESU(B). One version takes the 256 channels of audio and multiplexes them onto 3 (96 AES version) or 2 (48 AES version) MADI outputs. The other version takes the 256 channels of audio and multiplexes them onto 2 TDM streams. One stream is the main and the other is the redundant. Either TDM stream can be used as the primary since they are identical.

There is also one video monitoring output which can be used to visualize the audio levels using level meters for each channel. This monitoring output is a 720p/59.94 signal that provides a visual confirmation of audio presence and levels. On the unbalanced AES version, the availability of this output depends on the configuration of the link module as described in Table 2-1. This option is not available with the MADI version of firmware.

2.2.1.1. Unbalanced AES Input Rear Panel

The AESU version of the rear panel occupies 2 slots in a frame and has unbalanced AES inputs with DIN 1.0/2.3 connectors as shown in Figure 2-4. The EMR-IP48-AESU uses the same rear plate as the EMR-IP96-AESU but only the first 48 AES inputs are enabled.

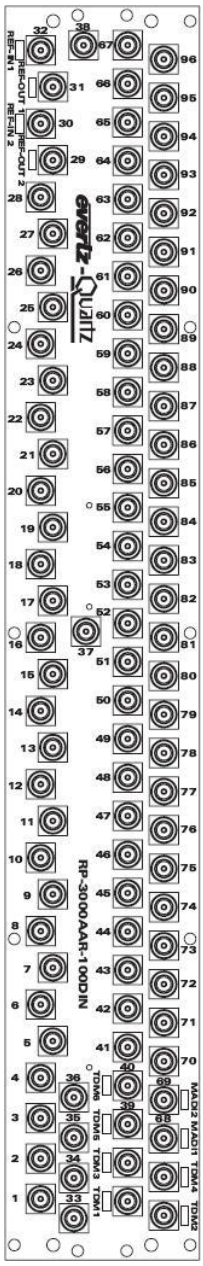


Figure 2-4: EMR-IP96(48)-AESU Rear Plate

Of the 100 DIN 1.0/2.3 connectors, inputs 1-28, 33-38, 41-67, and 70-96 are dedicated AES inputs. The connectors TDM1 and TDM2 are dedicated TDM outputs or MADI outputs depending on the firmware.

Connectors 29-32 are typically used as AES outputs 29-32 but can also be used as monitoring ports. The control of these ports is not currently supported.

Connectors TDM3, TDM4, TDM5/39, TDM6/40, MADI1/68 and MADI2/69 have different functions depending on which link module is installed. The link module is a small printed circuit board (PCB) located near the back of the main module. Depending on which module and firmware are installed, the connectors have different functions. Table 2-1 shows the different I/O configurations available.

LINK MODULE	TDM3	TDM4	TDM5/39	TDM6/40	MADI1/68	MADI2/69
MADI Firmware (A-EMR-AES-UNBALT3)	MADI OUT3	Not Used	AES IN 39	AES IN 40	AES IN 68	AES IN 69
TDM Firmware (A-EMR-AES-UNBALT3)	Video OUT	MADI IN	AES IN 39	AES IN 40	AES IN 68	AES IN 69

Table 2-1: Link Module Options for EMR-IP96(48)-AESU

2.2.1.2. Balanced AES Input Rear Panel

The AESB version of the rear panel occupies 2 slots in a frame and has balanced AES inputs using a rear plate that has 50-pin D-Sub female connectors as shown in Figure 2-5. The EMR-IP48-AESB uses the same rear plate as the EMR-IP96-AESB but only the first three 50-pin D-Sub connectors are enabled.

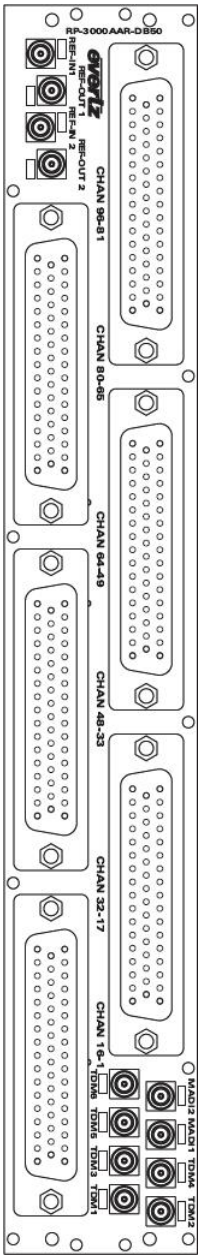


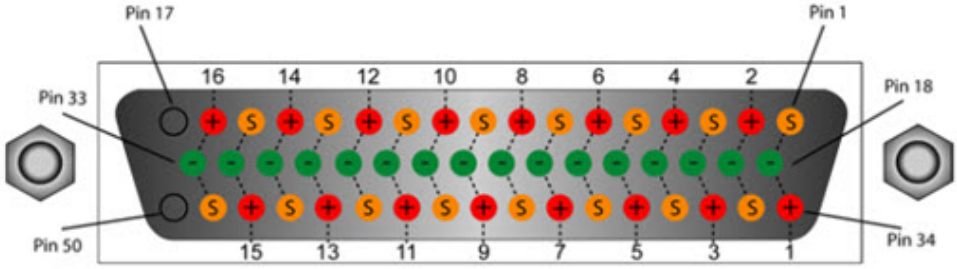
Figure 2-5: EMR-IP96(48)-AESB Rear Plate

The balanced AES inputs are interfaced by 50-pin D-Sub female connectors. Each connector supports 16 mono channels of balanced AES. The pin out for each connector is shown in Table 2-2. All other I/O signals use DIN 1.0/2.3 connectors. The control of the monitoring ports is not currently supported.

Connectors TDM1-TDM3 are MADI outputs when using the MADI firmware. When using the TDM firmware, TDM1 and TDM2 are TDM outputs, while TDM 3 is a video output. The connector MADI2 is a MADI input.

2.2.1.3. Balanced AES Input D50 Connector – Pin Out

The EMR-IP96(48)-AESB audio cards use female 50-pin D-Sub connectors, with each connector carrying 16 signals. Table 2-2 outlines the pinout for the connectors.



D50 Audio Pin-Out Table			
Signal	**+ve Pin**	**-ve Pin**	**Screen**
1	34	18	1
2	2	19	35
3	36	20	3
4	4	21	37
5	38	22	5
6	6	23	39
7	40	24	7
8	8	25	41
9	42	26	9
10	10	27	43
11	44	28	11
12	12	29	45
13	46	30	13
14	14	31	47
15	48	32	15
16	16	33	49

Table 2-2: Balanced AES Audio Input Pin-Out

2.2.1.4. Front Card Edge Controls and LEDs

The EMR-IP96(48)-AESU(B) front card edge has some key controls and indicators that can help in the installation and debugging processes. Figure 2-6 and Table 2-3 show the card edge and describe the expected behavior of each component. If the status indicators do not behave as described it can be a sign of installation or configuration issues.

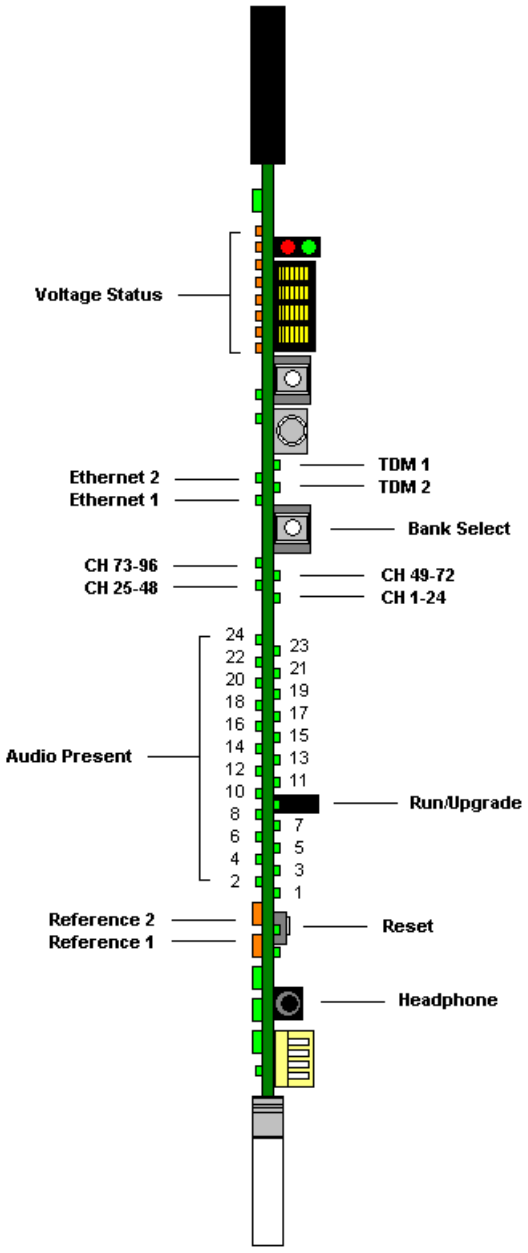


Figure 2-6: EMR-IP96(48)-AESU(B) Front Card Edge

Component	Description
Voltage Status LEDs	This set of LEDs are amber in color and should always be ON
Ethernet 1 LED	This LED is green in color and flashes when there is activity on Ethernet port 1
Ethernet 2 LED	This LED is green in color and flashes when there is activity on Ethernet port 2
Bank Select Push Button	Selects the bank of inputs that are being monitored by the Audio Present LEDs
CH 1-24 LED	This LED is green in color and indicates that inputs 1 to 24 are currently being monitored by the Audio Present LEDs
CH 25-48 LED	This LED is green in color and indicates that inputs 25 to 48 are currently being monitored by the Audio Present LEDs
CH 49-72 LED	This LED is green in color and indicates that inputs 49 to 72 are currently being monitored by the Audio Present LEDs
CH 73-96 LED	This LED is green in color and indicates that inputs 73 to 96 are currently being monitored by the Audio Present LEDs
Audio Present LEDs	This set of LEDs are green in color and indicate the presence of audio on each respective input
Run/Upgrade Jumper	This jumper is used to place the module in upgrade mode when upgrading the firmware
Reference 1 LED	This LED is amber in color and indicates the presence of a valid reference on input 1. It will flash rapidly if reference is present and slowly if it is the primary reference
Reference 2 LED	This LED is amber in color and indicates the presence of a valid reference on input 2. It will flash rapidly if reference is present and slowly if it is the primary reference
Reset Button	This button resets the module
Headphone Jack	This jack allows a user to monitor audio signals from a pair of headphones

Table 2-3: Description of EMR-IP96(48)-AESU(B) Card Edge

2.2.2. EMR-OP96(48)-AESU(B) AES Audio Output Module

The EMR-OP96(48)-AESU(B) is an AES audio output card for the EMR. It supports 96 or 48 discrete AES outputs (192 or 96 mono channels). Additionally, there is one MADI output which can carry up to 64 channels of digital audio, giving a total of 256 or 160 mono channels of audio.

There are two versions of firmware supported on the EMR-OP96(48)-AESU(B). One version de-multiplexes 256 channels of audio from 3 (96 AES version) or 2 (48 AES version) MADI inputs. The other version de-multiplexes the 256 channels of audio from 1 of 2 TDM input streams. One stream is the primary and the other is the redundant. Either TDM stream can be used as the primary since they are identical. The system can be configured to default to the redundant stream if the primary is missing.

There is also one video monitoring output which can be used to visualize the audio levels using level meters for each channel. This monitoring output is a 720p/59.94 signal that provides a visual confirmation of audio presence and levels. On the unbalanced AES version, the availability of this output depends on the configuration of the link module as described in Table 2-4.

2.2.2.1. Unbalanced AES Output Rear Panel

The AESU version of the rear panel occupies 2 slots in a frame and has unbalanced AES outputs with DIN 1.0/2.3 connectors as shown in Figure 2-7. The EMR-IP48-AESU uses the same rear plate as the EMR-IP96-AESU but only the first 48 AES outputs are enabled.

Beside each input labeled TDM there is a small LED adjacent to the connector that will light up solid green if it sees a valid MADI signal (MADI firmware) or valid TDM signal (TDM firmware). For the TDM version of firmware, the LED will remain solid if a valid TDM is the primary TDM and it will flash if a valid TDM is detected but not currently used.

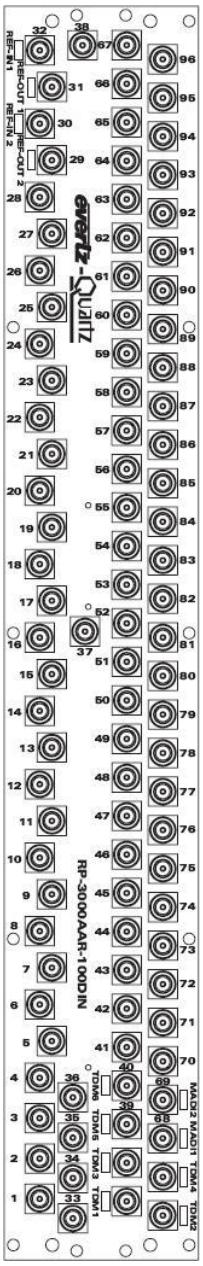


Figure 2-7: EMR-OP96(48)-AESU Rear Plate

Link Module	TDM3	TDM4	TDM5/39	TDM6/40	MADI1/68	MADI2/69
MADI Firmware (A-EMR-AES-UNBALT3)	MADI IN 3	Video OUT	AES OUT 39	AES OUT 40	AES OUT 68	AES OUT 69
TDM Firmware (A-EMR-AES-UNBALT2)	MADI OUT	Video OUT	AES OUT 39	AES OUT 40	AES OUT 68	AES OUT 69

Table 2-4: Link Module Options for EMR-OP96(48)-AESU

2.2.2.2. Balanced AES Output Rear Panel

The AESB version of the rear panel occupies 2 slots in a frame and has balanced AES outputs using a rear plate that has 50-pin D-Sub female connectors as shown in Figure 2-8. The EMR-OP48-AESB uses the same rear plate as the EMR-OP96-AESB but only the first three 50-pin D-Sub connectors are enabled. The control of the monitoring ports is not currently supported.

Connectors TDM1-TDM5 are TDM or MADI inputs depending on the firmware installed. The connector MADI1 is a MADI output, and the connector TDM6 is a video output.

Beside each input labeled TDM there is a small LED adjacent to the connector that will light up solid green if it sees a valid MADI signal (MADI firmware) or valid TDM signal (TDM firmware). For the TDM version of firmware, the LED will remain solid if a valid TDM is the primary TDM and it will flash if a valid TDM is detected but not currently used.

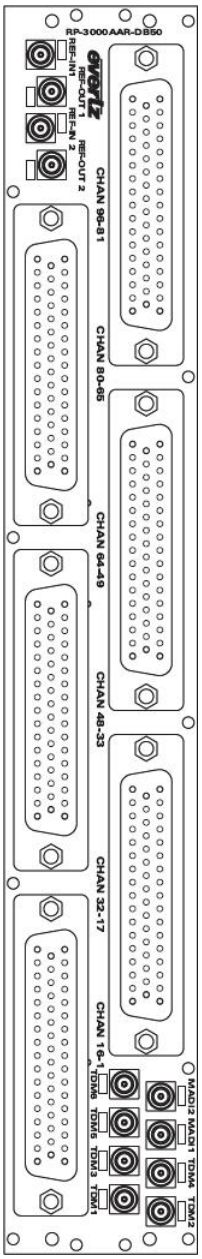
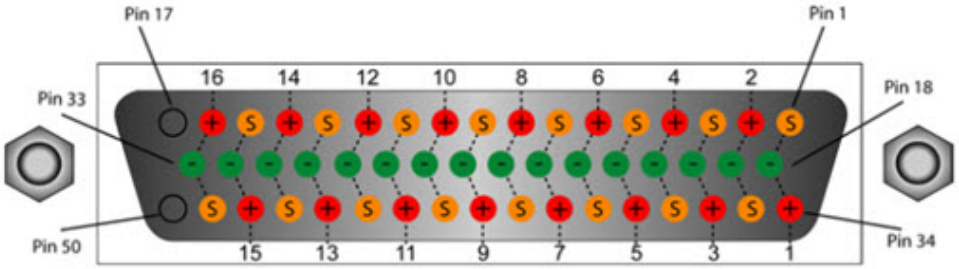


Figure 2-8: EMR-OP96(48)-AESB Rear Plate

2.2.2.3. Balanced AES Output D50 Connector – Pin Out

The EMR-OP96(48)-AESB audio cards use female 50-pin D-Sub connectors, with each connector carrying 16 signals. Table 2-5 outlines the pinout for the connectors.



D50 Audio Pin-Out Table			
Signal	**+ve Pin**	**-ve Pin**	**Screen**
1	34	18	1
2	2	19	35
3	36	20	3
4	4	21	37
5	38	22	5
6	6	23	39
7	40	24	7
8	8	25	41
9	42	26	9
10	10	27	43
11	44	28	11
12	12	29	45
13	46	30	13
14	14	31	47
15	48	32	15
16	16	33	49

Table 2-5: Balanced AES Audio Output Pin-Out

2.2.2.4. Front Card Edge Controls and LEDs

The EMR-OP96(48)-AESU(B) front card edge has some key controls and indicators that can help in the installation and debugging processes. Figure 2-9 and Table 2-6 show the card edge and describe the expected behavior of each component. If the status indicators do not behave as described it can be a sign of installation or configuration issues.

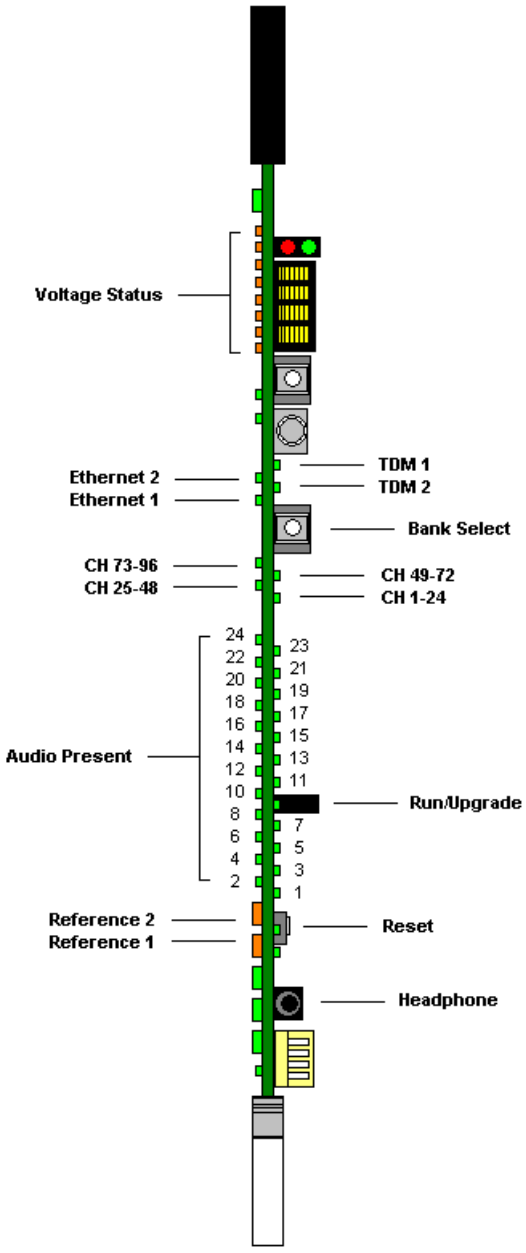


Figure 2-9: EMR-OP96(48)-AESU(B) Front Card Edge

Component	Description
Voltage Status LEDs	This set of LEDs are amber in color and should always be ON
Ethernet 1 LED	This LED is green in color and flashes when there is activity on Ethernet port 1
Ethernet 2 LED	This LED is green in color and flashes when there is activity on Ethernet port 2
TDM 1	This LED is green in color and flashes when a valid TDM signal is detected on TDM input 1 and is solid when it is the primary TDM
TDM 2	This LED is green in color and flashes when a valid TDM signal is detected on TDM input 2 and is solid when it is the primary TDM
Bank Select Push Button	Selects the bank of inputs that are being monitored by the Audio Present LEDs
CH 1-24 LED	This LED is green in color and indicates that inputs 1 to 24 are currently being monitored by the Audio Present LEDs
CH 25-48 LED	This LED is green in color and indicates that inputs 25 to 48 are currently being monitored by the Audio Present LEDs
CH 49-72 LED	This LED is green in color and indicates that inputs 49 to 72 are currently being monitored by the Audio Present LEDs
CH 73-96 LED	This LED is green in color and indicates that inputs 73 to 96 are currently being monitored by the Audio Present LEDs
Audio Present LEDs	This set of LEDs are green in color and indicate the presence of audio on each respective input
Run/Upgrade Jumper	This jumper is used to place the module in upgrade mode when upgrading the firmware
Reference 1 LED	This LED is amber in color and indicates the presence of a valid reference on input 1. It will flash rapidly if reference is present and slowly if it is the primary reference
Reference 2 LED	This LED is amber in color and indicates the presence of a valid reference on input 2. It will flash rapidly if reference is present and slowly if it is the primary reference
Reset Button	This button resets the module
Headphone Jack	This jack allows a user to monitor audio signals from a pair of headphones

Table 2-6: Description of EMR-OP96(48)-AESU(B) Card Edge

2.2.3. EMR-IP48-AA Analog Audio Input Module

The EMR-IP48-AA is an analog audio input card for the EMR. It supports 48 stereo analog pairs (96 mono channels). Additionally, there is one MADI input, which can carry up to 64 additional channels of audio giving a total of 160 channels of audio.

The EMR-IP48-AA consists of two identical half modules to reduce the failure block of the analog component. There are two versions of firmware supported on the EMR-IP48-AA. One version takes the 48 channels of audio and multiplexes them onto 1 MADI output. Each of the half modules per EMR-IP48-AA performs this function so the entire module as a whole provides 2 MADI outputs, each carrying 48 mono channels. The other version of firmware takes the 48 channels of audio from each half module and the MADI input, and multiplexes them onto 2 TDM streams. One stream is the main and the other is the redundant. Either TDM stream can be used as the primary since they are identical.

There is also one video monitoring output which can be used to visualize the audio levels using level meters for each channel. This monitoring output is a 720p/59.94 signal that provides a visual confirmation of audio presence and levels.

The EMR-IP48-AA rear panel occupies 2 slots in a frame and has 50-pin D-Sub female connectors as shown in Figure 2-10. The analog inputs are interfaced by the six 50-pin D-Sub female connectors. Each connector supports 8 stereo pairs of analog audio. The pin out for each connector is shown in Table 2-8. All other I/O signals use DIN 1.0/2.3 connectors. The control of the monitoring ports is not currently supported.

For the TDM version of the firmware, connectors TDM 1 and TDM 5 are the main and redundant TDM outputs respectively. TDM 3 is the video output and the connector labeled MADI2 is a MADI input.

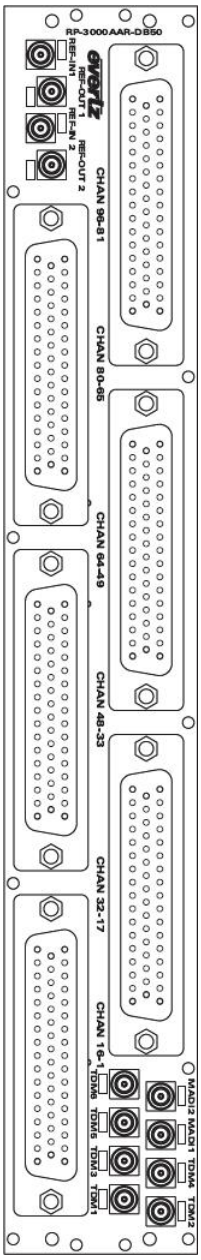


Figure 2-10: EMR-IP48-AA Rear Plate

Note: The rear panel screening for the EMR-IP48-AA does not correspond correctly to the actual inputs when using the MADI version of firmware.

In the MADI version of the firmware, the DIN 1.0/2.3 connectors closest to the left of the rear panel correspond to the half module that is in the left slot when viewed from the front. TDM1 is the MADI output of the left half module and TDM3 is the video output. The three 50-pin D-Sub connectors directly above the DIN 1.0/2.3 connectors are the analog inputs that correspond to the left half module. The connector labeled CHAN 32-17 corresponds to mono channels 1-16, the connector labeled CHAN 64-49 corresponds to mono channels 17-32, and the connector labeled CHAN 81-96 corresponds to mono channels 33-48.

The DIN 1.0/2.3 connectors closest to the right of the rear panel correspond to the half module that is in the right slot when viewed from the front. TDM2 is the MADI output of the right half module and TDM4 is the video output. The three 50-pin D-Sub connectors opposite the DIN 1.0/2.3 connectors are the analog inputs that correspond to the right half module. The connector labeled CHAN 16-1 corresponds to mono channels 49-64, the connector labeled CHAN 48-33 corresponds to mono channels 65-80, and the connector labeled CHAN 80-65 corresponds to mono channels 81-96. Figure 2-11 and Table 2-7 summarize the connectors for the EMR-IP48-AA with the MADI firmware.

Each MADI signal carries 48 channels of audio, leaving the remaining 16 channels empty. For example, MADI 1 carries channels 1-48, and MADI 2 carries channels 49-96.

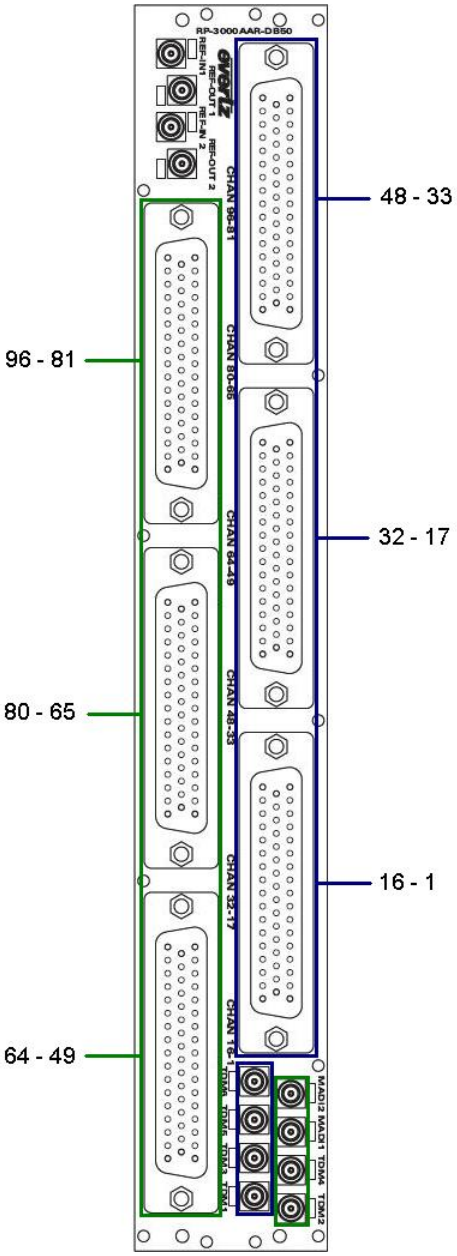


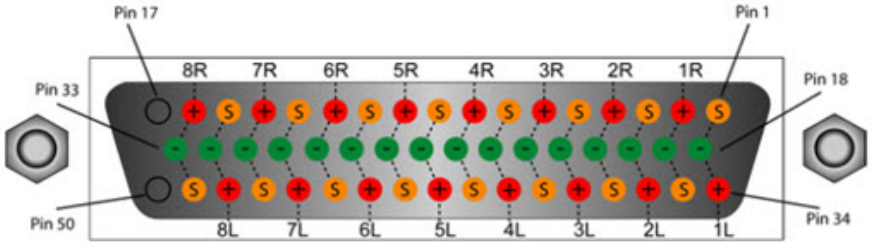
Figure 2-11: EMR-IP48-AA Rear Plate Connection Details (MADI Firmware)

Module (From Front)	LEFT	RIGHT
MADI OUT (Ch 1 – 48)	TDM 1	TDM 2
VIDEO OUT	TDM 3	TDM 4

Table 2-7: EMR-IP48-AA Connections (MADI Firmware)

2.2.3.1. Analog Audio D50 Connector – Pin Out

The EMR-IP48-AA analog audio cards use female D50 connectors, with each connector carrying 8 signal pairs. Table 2-8 outlines the pinout for the connectors.



D50 Audio Pin-Out Table			
Signal	**+ Pin**	**- Pin**	**Screen**
1L	34	18	1
1R	2	19	35
2L	36	20	3
2R	4	21	37
3L	38	22	5
3R	6	23	39
4L	40	24	7
4R	8	25	41
5L	42	26	9
5R	10	27	43
6L	44	28	11
6R	12	29	45
7L	46	30	13
7R	14	31	47
8L	48	32	15
8R	16	33	49

Table 2-8: Analog Audio Input Pin-Out

2.2.3.2. Front Card Edge Controls and LEDs

The EMR-IP48-AA front card edge has some key controls and indicators that can help in the installation and debugging processes. Figure 2-12 and Table 2-9 show the card edge and describe the expected behavior of each component. If the status indicators do not behave as described it can be a sign of installation or configuration issues.

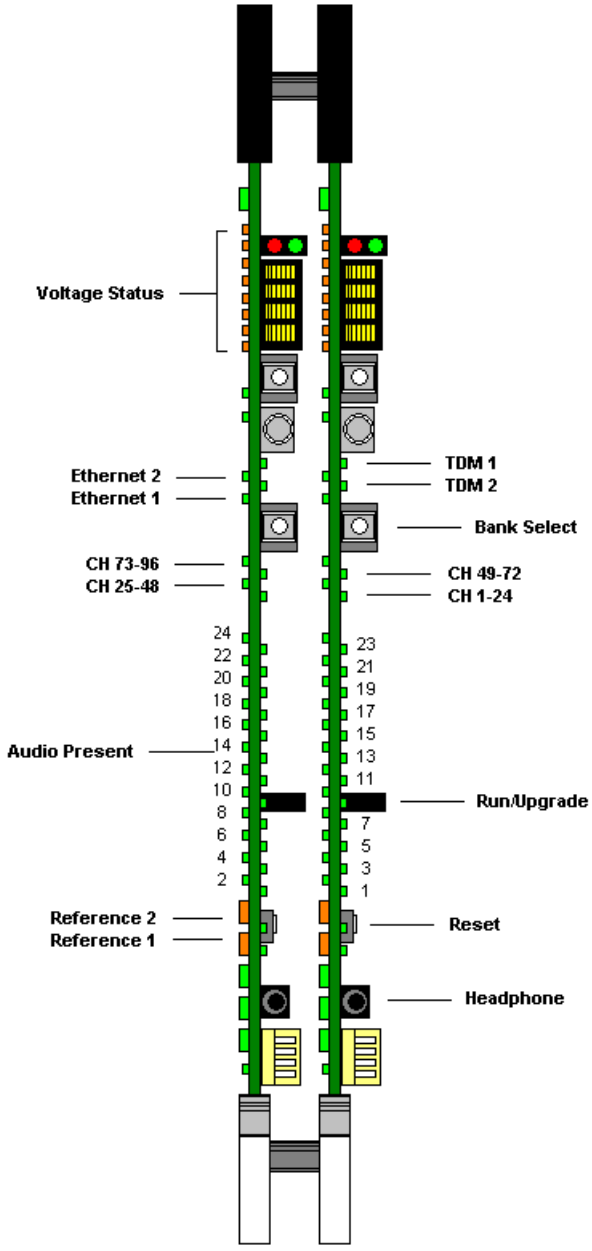


Figure 2-12: EMR-IP48-AA Front Card Edge

Component	Description
Voltage Status LEDs	This set of LEDs are amber in color and should always be ON
Ethernet 1 LED	This LED is green in color and flashes when there is activity on Ethernet port 1
Ethernet 2 LED	This LED is green in color and flashes when there is activity on Ethernet port 2
Bank Select Push Button	Selects the bank of inputs that are being monitored by the Audio Present LEDs
CH 1-24 LED	This LED is green in color and indicates that inputs 1 to 24 are currently being monitored by the Audio Present LEDs
CH 25-48 LED	This LED is green in color and indicates that inputs 25 to 48 are currently being monitored by the Audio Present LEDs
CH 49-72 LED	This LED is green in color and indicates that inputs 49 to 72 are currently being monitored by the Audio Present LEDs
CH 73-96 LED	This LED is green in color and indicates that inputs 73 to 96 are currently being monitored by the Audio Present LEDs
Audio Present LEDs	This set of LEDs are green in color and indicate the presence of audio on each respective input
Run/Upgrade Jumper	This jumper is used to place the module in upgrade mode when upgrading the firmware
Reference 1 LED	This LED is amber in color and indicates the presence of a valid reference on input 1. It will flash rapidly if reference is present and slowly if it is the primary reference
Reference 2 LED	This LED is amber in color and indicates the presence of a valid reference on input 2. It will flash rapidly if reference is present and slowly if it is the primary reference
Reset Button	This button resets the module
Headphone Jack	This jack allows a user to monitor audio signals from a pair of headphones

Table 2-9: Description of EMR-IP48-AA Card Edge

2.2.4. EMR-OP48-AA Analog Audio Output Module

The EMR-OP48-AA is an analog audio output card for the EMR. It supports 48 stereo analog pairs (96 mono channels). Additionally, there is one MADI output, which can carry up to 64 additional channels of audio giving a total of 160 channels of audio.

There are two versions of firmware supported on the EMR-OP48-AA. One version de-multiplexes 96 channels of audio from 2 MADI inputs. The first MADI input supplies the first 64 channels to the module, and the second MADI input supplies the remaining 32 channels. The other version de-multiplexes 160 channels of audio from 1 of 2 TDM input streams. One stream is the primary and the other is the redundant. Either TDM stream can be used as the primary since they are identical. The system can be configured to default to the redundant stream if the primary is missing.

There is also one video monitoring output which can be used to visualize the audio levels using level meters for each channel. This monitoring output is a 720p/59.94 signal that provides a visual confirmation of audio presence and levels.

The EMR-OP48-AA rear panel occupies 2 slots in a frame and has 50-pin D-Sub female connectors as shown in Figure 2-13. The analog outputs are interfaced by the six 50-pin D-Sub female connectors. Each connector supports 8 stereo pairs of analog audio. The pin out for each connector is shown in Table 2-10. All other I/O signals use DIN 1.0/2.3 connectors. The control of the monitoring ports is not currently supported.

For the MADI version of the firmware, the connector labeled TDM1 carries the first 64 audio channels and the connector labeled TDM2 carries the rest of the 32 audio channels.

For the TDM version of the firmware, the connectors labeled TDM1 and TDM 2 are the main and redundant TDM inputs respectively.

In both versions of firmware TDM 6 is the video output and the connector labeled MADI1 is a MADI output. The MADI output is not supported on the MADI version of the firmware.

Beside each input labeled TDM there is a small LED adjacent to the connector that will light up solid green if it sees a valid MADI signal (MADI firmware) or valid TDM signal (TDM firmware). For the TDM version of firmware, the LED will remain solid if a valid TDM is the primary TDM and it will flash if a valid TDM is detected but not currently used.

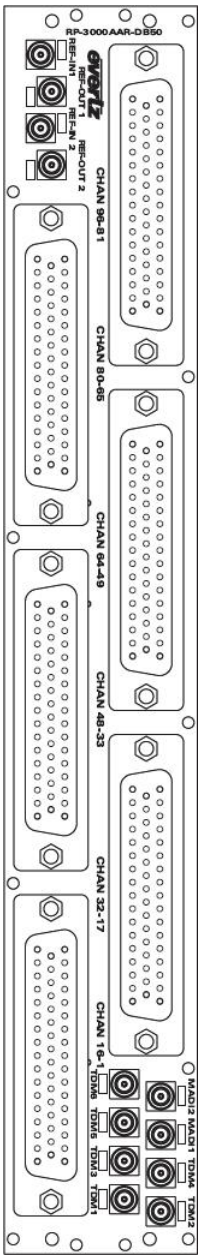
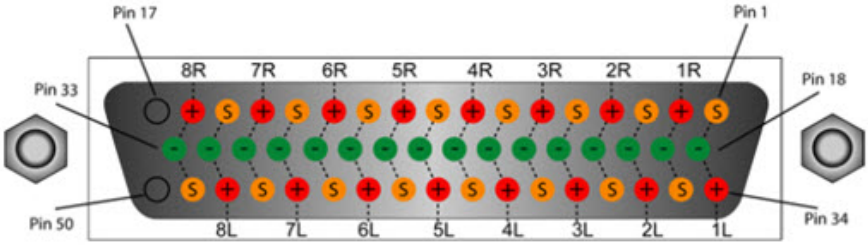


Figure 2-13: EMR-OP48-AA Rear Plate

2.2.4.1. Analog Audio D50 Connector – Pin Out

The EMR-OP48-AA analog audio cards use female D50 connectors, with each connector carrying 8 signal pairs. Table 2-10 outlines the pinout for the connectors.



D50 Audio Pin-Out Table			
Signal	**+ Pin**	**- Pin**	**Screen**
1L	34	18	1
1R	2	19	35
2L	36	20	3
2R	4	21	37
3L	38	22	5
3R	6	23	39
4L	40	24	7
4R	8	25	41
5L	42	26	9
5R	10	27	43
6L	44	28	11
6R	12	29	45
7L	46	30	13
7R	14	31	47
8L	48	32	15
8L	16	33	49

Table 2-10: Analog Audio Output Pin-Out

2.2.4.2. Front Card Edge Controls and LEDs

The EMR-OP48-AA front card edge has some key controls and indicators that can help in the installation and debugging processes. Figure 2-14 and Table 2-11 show the card edge and describe the expected behavior of each component. If the status indicators do not behave as described it can be a sign of installation or configuration issues.

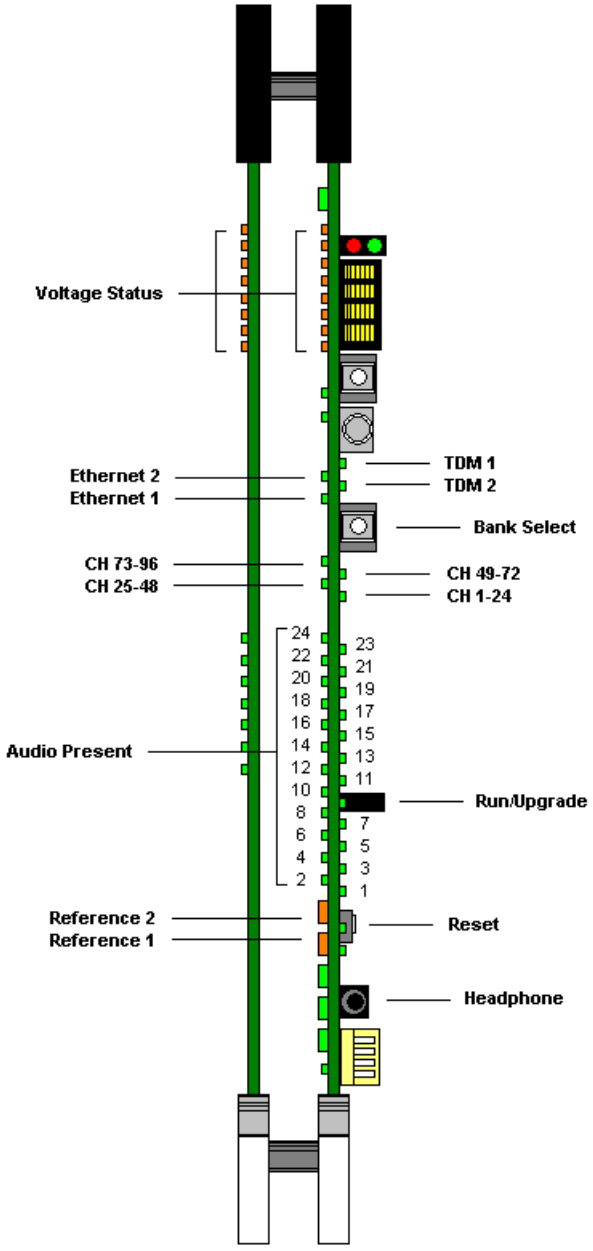


Figure 2-14: EMR-OP48-AA Front Card Edge

Component	Description
Voltage Status LEDs	This set of LEDs are amber in color and should always be ON
Ethernet 1 LED	This LED is green in color and flashes when there is activity on Ethernet port 1
Ethernet 2 LED	This LED is green in color and flashes when there is activity on Ethernet port 2
TDM 1	This LED is green in color and flashes when a valid TDM signal is detected on TDM input 1 and is solid when it is the primary TDM
TDM 2	This LED is green in color and flashes when a valid TDM signal is detected on TDM input 2 and is solid when it is the primary TDM
Bank Select Push Button	Selects the bank of inputs that are being monitored by the Audio Present LEDs
CH 1-24 LED	This LED is green in color and indicates that inputs 1 to 24 are currently being monitored by the Audio Present LEDs
CH 25-48 LED	This LED is green in color and indicates that inputs 25 to 48 are currently being monitored by the Audio Present LEDs
CH 49-72 LED	This LED is green in color and indicates that inputs 49 to 72 are currently being monitored by the Audio Present LEDs
CH 73-96 LED	This LED is green in color and indicates that inputs 73 to 96 are currently being monitored by the Audio Present LEDs
Audio Present LEDs	This set of LEDs are green in color and indicate the presence of audio on each respective input
Run/Upgrade Jumper	This jumper is used to place the module in upgrade mode when upgrading the firmware
Reference 1 LED	This LED is amber in color and indicates the presence of a valid reference on input 1. It will flash rapidly if reference is present and slowly if it is the primary reference
Reference 2 LED	This LED is amber in color and indicates the presence of a valid reference on input 2. It will flash rapidly if reference is present and slowly if it is the primary reference
Reset Button	This button resets the module
Headphone Jack	This jack allows a user to monitor audio signals from a pair of headphones

Table 2-11: Description of EMR-OP48-AA Card Edge

2.2.5. EMR-ADMX-16X16 and 3000ADMX-16X16 Crosspoint Modules

The EMR-ADMX-16X16 and 3000ADMX-16X16 are the crosspoint cards for the EMR. They both utilize a TDM core to allow over 8192x8192 mono audio channels to be routed. Both the EMR-ADMX-16X16 and the 3000ADMX-16X16 have 16 TDM inputs that allow them to be interfaced with any of the EMR input modules and 16 TDM outputs that allow them to be interfaced with any of the EMR output modules.

The EMR-ADMX-16X16 rear panel occupies 1 slot in a frame and uses DIN 1.0/2.3 connectors, while the 3000ADMX-16X16 rear panel occupies 3 slots in a frame and has BNC connectors. Both rear plates are shown in Figure 2-15.

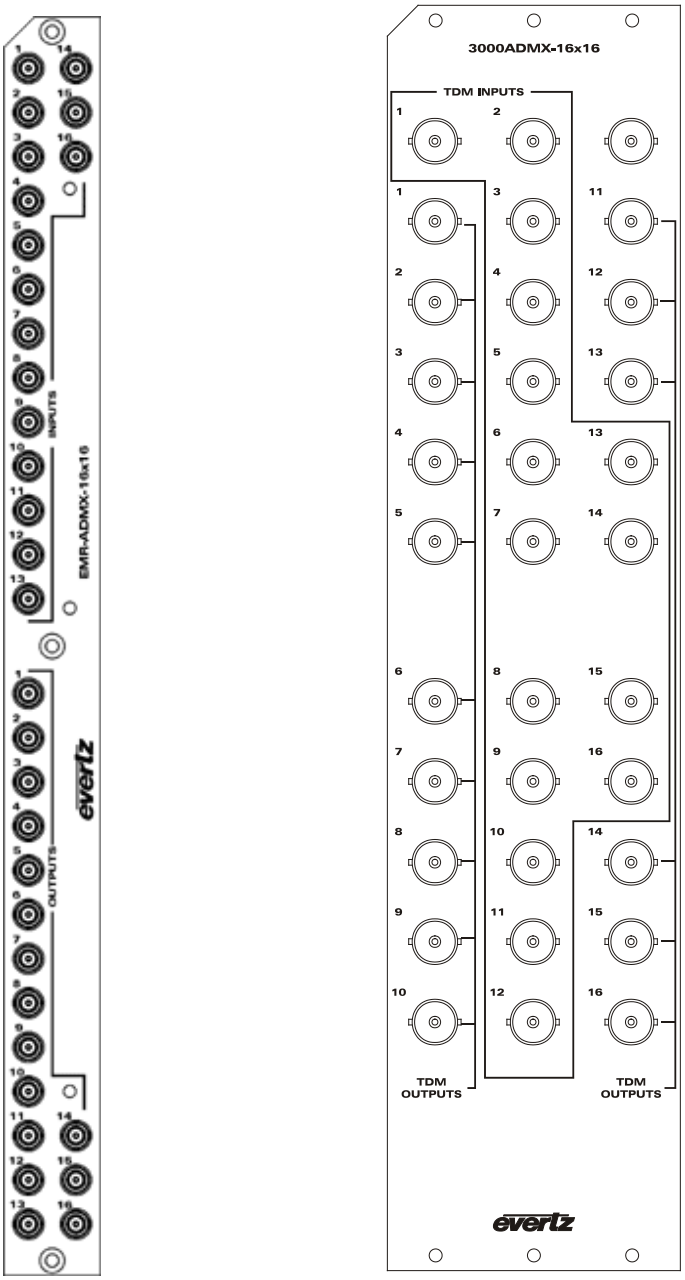


Figure 2-15: EMR-ADMX-16X16 (left) and 3000ADMX-16X16 (right) Rear Plates

2.2.5.1. Front Card Edge Controls and LEDs

The EMR-ADMX-16X16 and the 3000ADMX-16X16 front card edges have some key controls and indicators that can help in the installation and debugging processes. Figure 2-16 and Table 2-12 show the card edges and describe the expected behavior of each component. If the status indicators do not behave as described it can be a sign of installation or configuration issues.

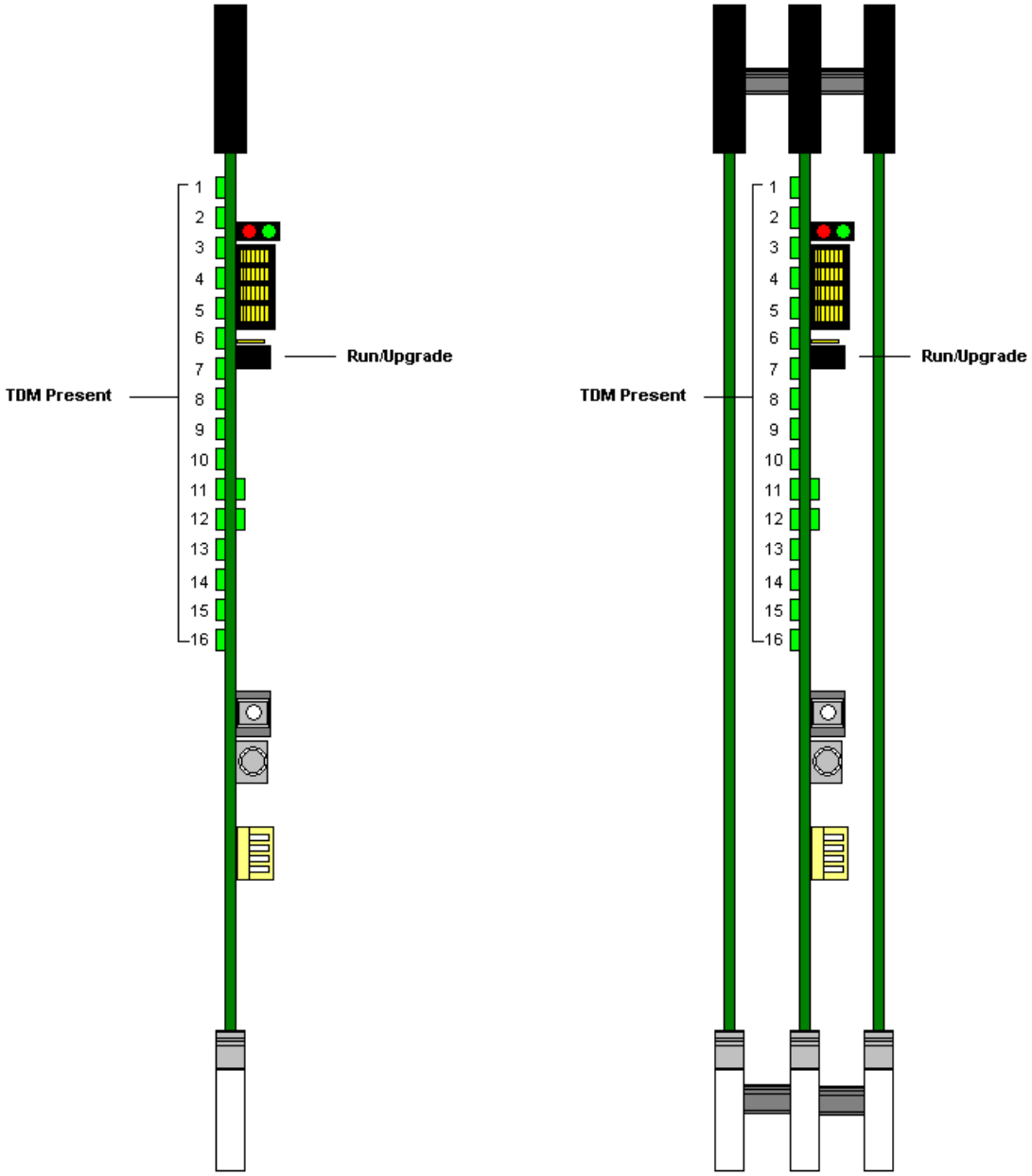


Figure 2-16: EMR-ADMX-16X16 (left) and 3000ADMX-16X16 (right) Front Card Edges

Component	Description
TDM Present LEDs	This set of LEDs are green in color and indicate the presence of a valid TDM connection on each respective input
Run/Upgrade Jumper	This jumper is used to place the module in upgrade mode when upgrading the firmware

Table 2-12: Description of EMR-ADMX-16X16 and 3000ADMX-16X16 Card Edges

Note: If it appears that the TDM presence LEDs do not light up with valid TDM connections, ensure that the module is firmly connected to the rear plate.

2.2.6. EMR-IP16-MADI and 3000MADI16-TDM4 MADI Input Modules

The EMR-IP16-MADI and 3000MADI16-TDM4 are MADI audio input cards for the EMR. They support 16 MADI inputs and 4 TDM outputs. Each MADI input can support both 64 channel and 56 channel MADI.

Of the 4 TDM outputs, only outputs 1 and 2 are required for operation. Outputs 3 and 4 can be used as redundant TDM connections for systems that have more than 1 crosspoint module. TDM output 1 carries 512 audio signals corresponding to MADI inputs 1-8. TDM output 2 carries 512 audio signals corresponding to MADI inputs 9-16.

The EMR-IP16-MADI rear panel occupies 1 slot in a frame and has DIN 1.0/2.3 connectors, while the 3000MADI16-TDM4 rear panel occupies 3 slots in a frame and has BNC connectors. Both are shown in Figure 2-17.

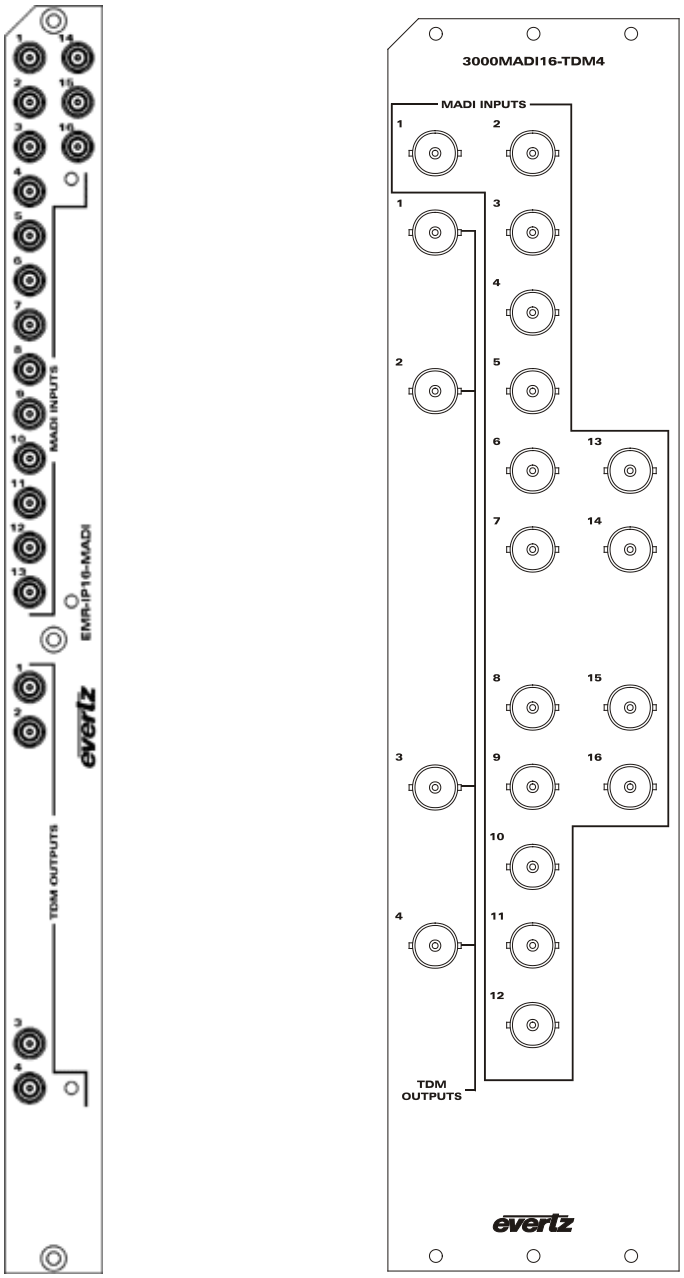


Figure 2-17: EMR-IP16-MADI (left) and 3000MADI16-TDM4 (right) Rear Plates

2.2.6.1. Front Card Edge Controls and LEDs

The EMR-IP16-MADI and 3000MADI16-TDM4 front card edges have some key controls and indicators that can help in the installation and debugging processes. Figure 2-18 and Table 2-13 show the card edges and describe the expected behavior of each component. If the status indicators do not behave as described it can be a sign of installation or configuration issues.

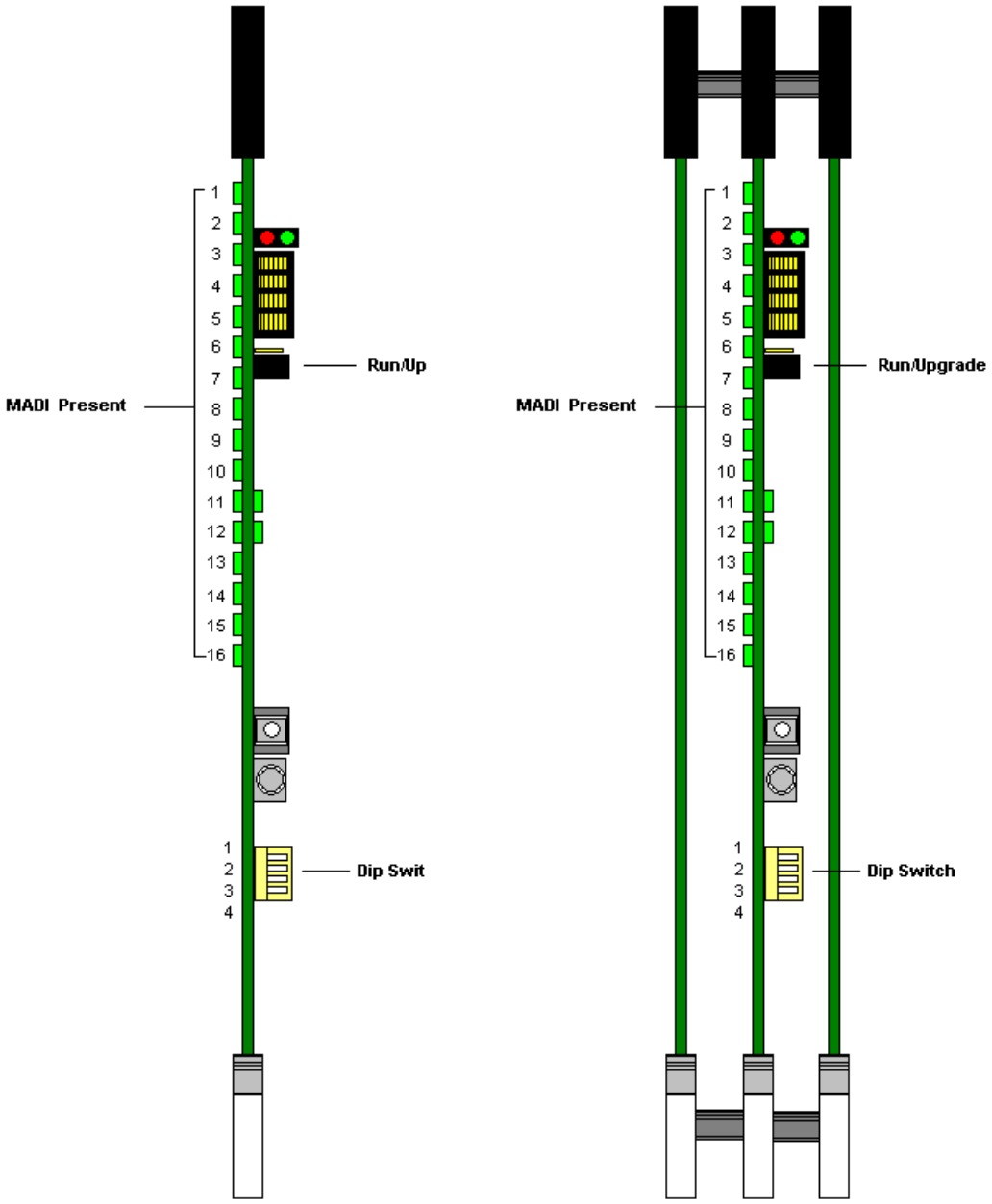


Figure 2-18: EMR-IP16-MADI (left) and 3000MADI16-TDM4 (right) Front Card Edges

Component	Description
MADI Present LEDs	This set of LEDs are green in color and indicate the presence of a valid MADI connection on each respective input
Run/Upgrade Jumper	This jumper is used to place the module in upgrade mode when upgrading the firmware
Dip Switch	This set of switches control the mode of the device. Dip 1 must be up and 3-4 must be down.

Table 2-13: Description of EMR-IP16-MADI and 3000MADI16-TDM4 Card Edge

Note: For normal operation of the 3000MADI16-TDM4 module, dip switch 1 must be set to the up position (OPEN) and dip switches 2-4 must be set to the down position.

2.2.7. EMR-OP16-MADI and 3000TDM4-MADI16 MADI Output Modules

The EMR-OP16-MADI and 3000TDM4-MADI16 are MADI audio output cards for the EMR. They support 4 TDM inputs and 16 MADI outputs. Each MADI output supports 56 or 64 channel MADI depending on a setting in the serial menu.

Of the 2 TDM inputs, only inputs 1 and 2 are required for operation. Inputs 3 and 4 can be used as redundant TDM connections for systems that have more than 1 crosspoint module. TDM input 1 carries 512 audio signals corresponding to MADI outputs 1-8. TDM input 2 carries 512 audio signals corresponding to MADI outputs 9-16.

The EMR-OP16-MADI rear panel occupies 1 slot in a frame and has DIN 1.0/2.3 connectors. The 3000TDM4-MADI16 rear panel occupies 3 slots in a frame and has BNC connectors. Both are shown in Figure 2-19.

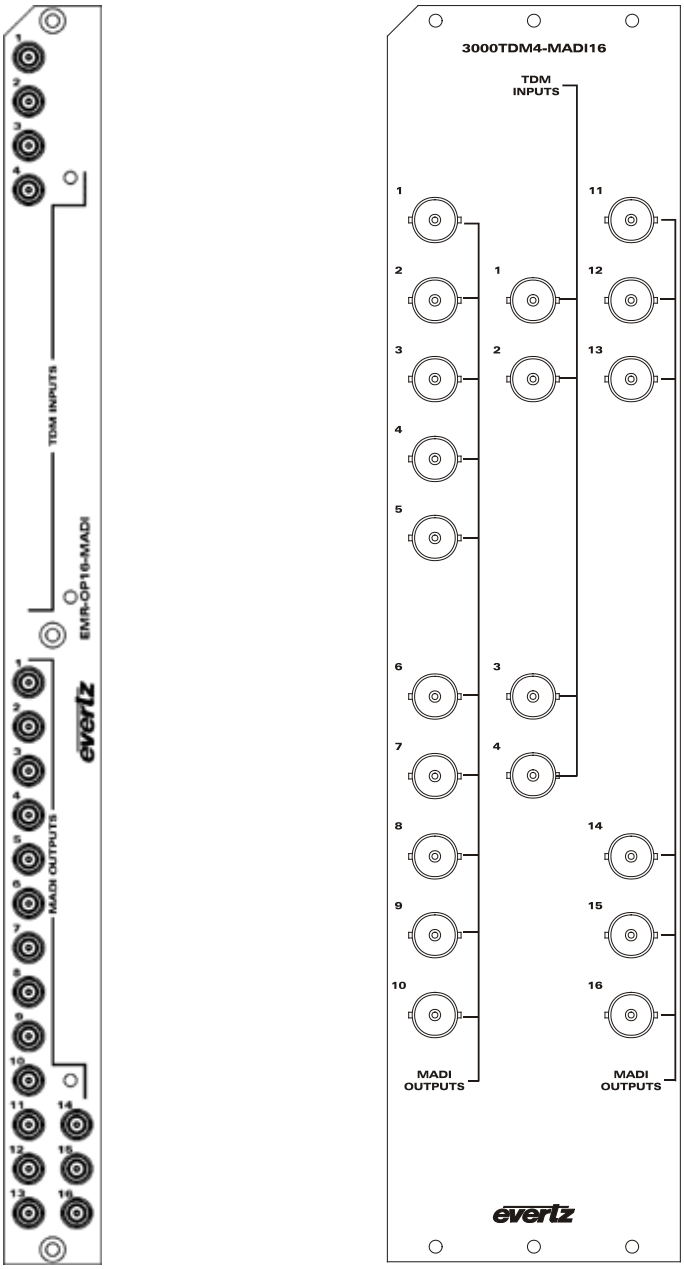


Figure 2-19: EMR-OP16-MADI (left) and 3000TDM4-MADI16 (right) Rear Plates

2.2.7.1. Front Card Edge Controls and LEDs

The EMR-OP16-MADI and 3000TDM4-MADI16 front card edges have some key controls and indicators that can help in the installation and debugging processes. Figure 2-20 and Table 2-14 show the card edges and describe the expected behavior of each component. If the status indicators do not behave as described it can be a sign of installation or configuration issues.

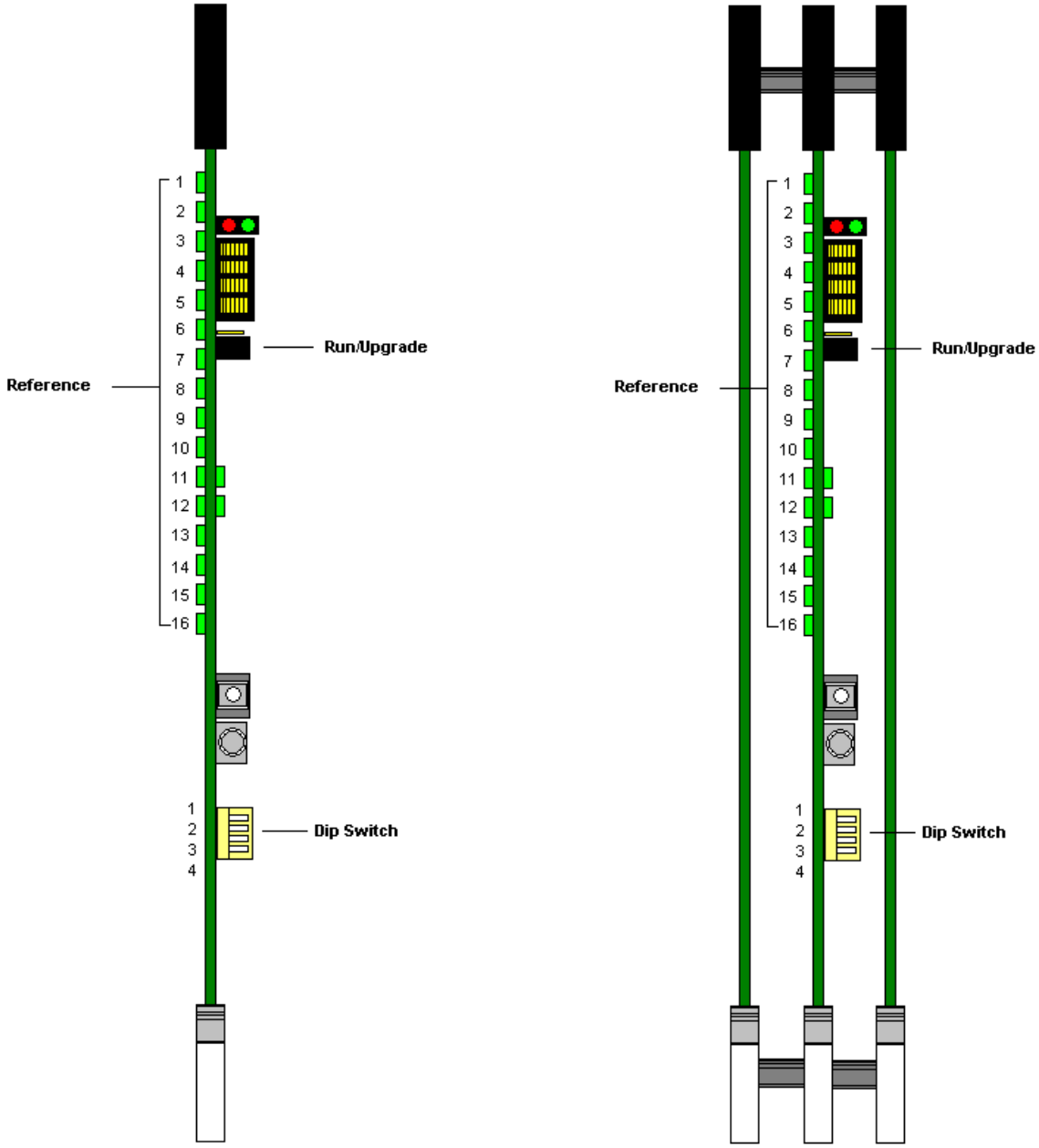


Figure 2-20: EMR-OP16-MADI (left) and 3000TDM4-MADI16 (right) Front Card Edges

Component	Description
Reference LEDs	This set of LEDs are green in color and will in 1 second interval if a valid reference is detected. If no reference is detected they will cycle between on for 1 second and off for 3 seconds.
Run/Upgrade Jumper	This jumper is used to place the module in upgrade mode when upgrading the firmware
Dip Switch	This set of switches control the mode of the device. Dip 1 must be up and 3-4 must be down.

Table 2-14: Description of EMR-OP16-MADI and 3000TDM4-MADI16 Card Edges

Note: For normal operation of the 3000TDM4-MADI16 module, dip switch 1 must be set to the up position (OPEN) and dip switches 2-4 must be set to the down position.

2.2.8. EMR-IP96(48)-LTC Time Code Input Module

The EMR-IP96(48)-LTC is a time code input card for the EMR. It supports 96 or 48 balanced LTC inputs.

The EMR-IP96(48)-LTC input card does not require the use of a 3000ADMX-16X16 for systems with less than 768 LTC inputs. Each LTC input card connects directly to each LTC output card via one of 8 identical TDM outputs.

The EMR-IP96-LTC rear panel occupies 2 slots in a frame and has 50-pin D-Sub female connectors as shown in Figure 2-21. The LTC inputs are interfaced by the six 50-pin D-Sub female connectors. Each connector supports 16 LTC input signals. The pin out for each connector is shown in Table 2-15. The TDM outputs all use DIN 1.0/2.3 connectors.

The EMR-IP48-LTC uses the same rear plate but only the first three 50-pin D-Sub connectors are enabled.

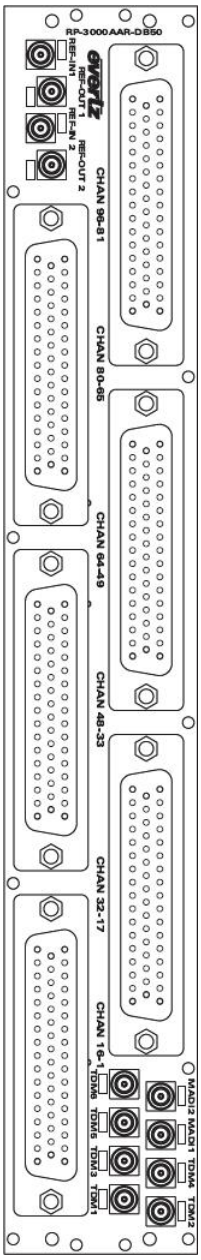
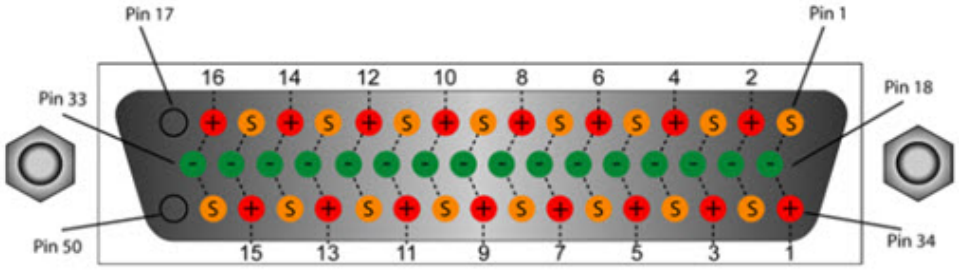


Figure 2-21: EMR-IP96(48)-LTC Rear Plate

2.2.8.1. LTC Input D50 Connector – Pin Out

The EMR-IP96(48)-LTC time code cards use female D50 connectors, with each connector carrying 16 signals. Table 2-15 outlines the pinout for the connectors.



D50 LTC Pin-Out Table			
Signal	**+ve Pin**	**-ve Pin**	**Screen**
1	34	18	1
2	2	19	35
3	36	20	3
4	4	21	37
5	38	22	5
6	6	23	39
7	40	24	7
8	8	25	41
9	42	26	9
10	10	27	43
11	44	28	11
12	12	29	45
13	46	30	13
14	14	31	47
15	48	32	15
16	16	33	49

Table 2-15: LTC Input Pin-Out

2.2.8.2. Front Card Edge Controls and LEDs

The EMR-IP96(48)-LTC front card edge has some key controls and indicators that can help in the installation and debugging processes. Figure 2-22 and Table 2-16 show the card edge and describe the expected behavior of each component. If the status indicators do not behave as described it can be a sign of installation or configuration issues.

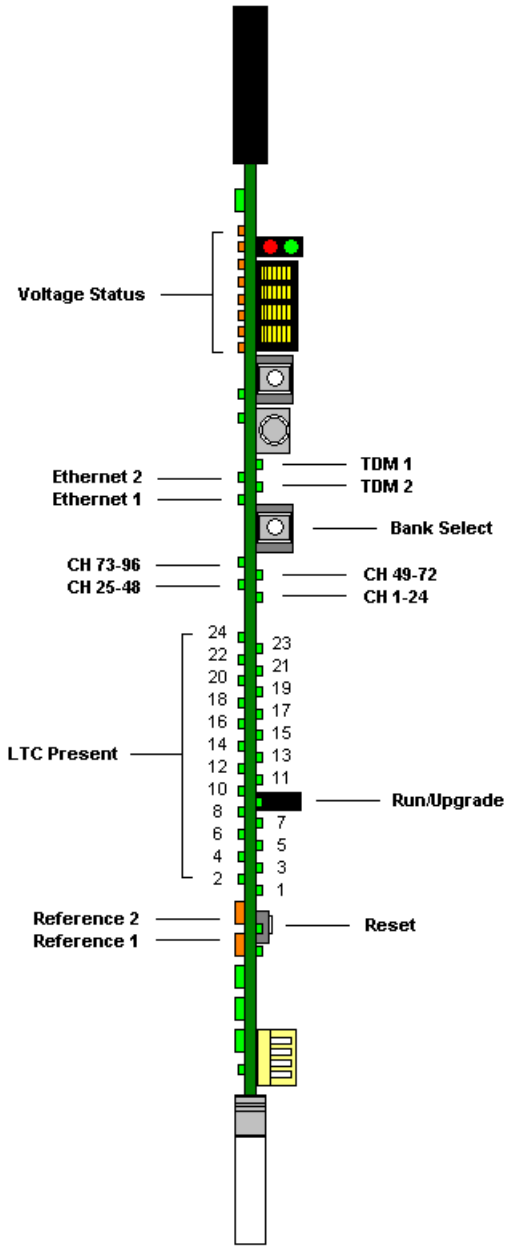


Figure 2-22: EMR-IP96(48)-LTC Front Card Edge

Component	Description
Voltage Status LEDs	This set of LEDs are amber in color and should always be ON
Ethernet 1 LED	This LED is green in color and flashes when there is activity on Ethernet port 1
Ethernet 2 LED	This LED is green in color and flashes when there is activity on Ethernet port 2
TDM 1	This LED is green in color and flashes when a valid TDM signal is detected on TDM input 1 and is solid when it is the primary TDM
TDM 2	This LED is green in color and flashes when a valid TDM signal is detected on TDM input 2 and is solid when it is the primary TDM
Bank Select Push Button	Selects the bank of inputs that are being monitored by the LTC Present LEDs
CH 1-24 LED	This LED is green in color and indicates that inputs 1 to 24 are currently being monitored by the LTC Present LEDs
CH 25-48 LED	This LED is green in color and indicates that inputs 25 to 48 are currently being monitored by the LTC Present LEDs
CH 49-72 LED	This LED is green in color and indicates that inputs 49 to 72 are currently being monitored by the LTC Present LEDs
CH 73-96 LED	This LED is green in color and indicates that inputs 73 to 96 are currently being monitored by the LTC Present LEDs
LTC Present LEDs	This set of LEDs are green in color and indicate the presence of LTC on each respective input
Reference 1 LED	This LED is amber in color and indicates the presence of a valid reference on input 1. It will flash rapidly if reference is present and slowly if it is the primary reference
Reference 2 LED	This LED is amber in color and indicates the presence of a valid reference on input 2. It will flash rapidly if reference is present and slowly if it is the primary reference
Run/Upgrade Jumper	This jumper is used to place the module in upgrade mode when upgrading the firmware
Reset Button	This button resets the module

Table 2-16: Description of EMR-IP96(48)-LTC Card Edge

2.2.9. EMR-OP96(48)-LTC TimeCode Output Module

The EMR-OP96(48)-LTC is a time code output card for the EMR. It supports 96 or 48 balanced LTC outputs.

The EMR-OP96(48)-LTC output card does not require the use of an EMR-ADMX-16X16 or 3000ADMX-16X16 for systems with less than 768 LTC outputs. Each LTC output card connects directly to each LTC input card via one of 8 TDM inputs.

The EMR-OP96-LTC rear panel occupies 2 slots in a frame and has 50-pin D-Sub female connectors as shown in Figure 2-23. The LTC outputs are interfaced by the six 50-pin D-Sub female connectors. Each connector supports 16 LTC output signals. The pin out for each connector is shown in Table 2-18. The TDM inputs all use DIN 1.0/2.3 connectors and are identified using Table 2-17. The sequence in which input cards are connected to the output card determine the sequence of the LTC inputs. The EMR-OP48-LTC uses the same rear plate but only the first three 50-pin D-Sub connectors are enabled.

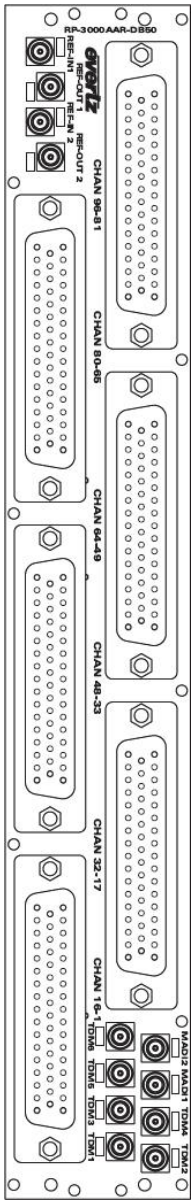


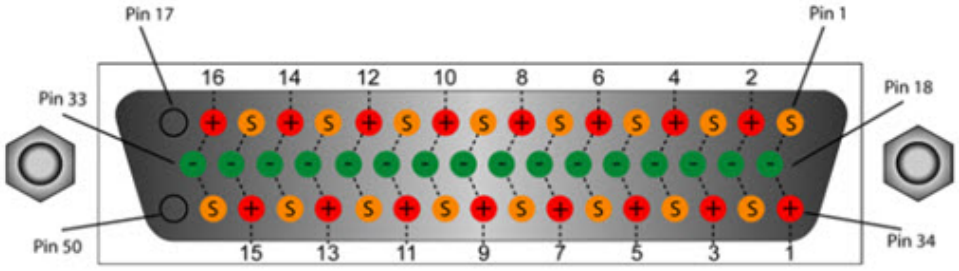
Figure 2-23: EMR-OP96(48)-LTC Rear Plate

Label	TDM 1	TDM 3	TDM 2	TDM 4	TDM 5	TDM 6	MADI 1	MADI 2
TDM Inputs	TDM IN 1	TDM IN 2	TDM IN 3	TDM IN 4	TDM IN 5	TDM IN 6	TDM IN 7	TDM IN 8
LTC Inputs	1-96	97-192	193-288	289-384	385-480	481-576	577-672	673-768

Table 2-17: EMR-OP96(48)-LTC TDM Connections

2.2.9.1. LTC Output D50 Connector – Pin Out

The EMR-OP96(48)-LTC time code cards use female D50 connectors, with each connector carrying 16 signals. Table 2-18 outlines the pinout for the connectors.



D50 LTC Pin-Out Table			
Signal	**+ve Pin**	**-ve Pin**	**Screen**
1	34	18	1
2	2	19	35
3	36	20	3
4	4	21	37
5	38	22	5
6	6	23	39
7	40	24	7
8	8	25	41
9	42	26	9
10	10	27	43
11	44	28	11
12	12	29	45
13	46	30	13
14	14	31	47
15	48	32	15
16	16	33	49

Table 2-18: LTC Output Pin-Out

2.2.9.2. Front Card Edge Controls and LEDs

The EMR-OP96(48)-LTC front card edge has some key controls and indicators that can help in the installation and debugging processes. Figure 2-24 and Table 2-19 show the card edge and describe the expected behavior of each component. If the status indicators do not behave as described it can be a sign of installation or configuration issues.

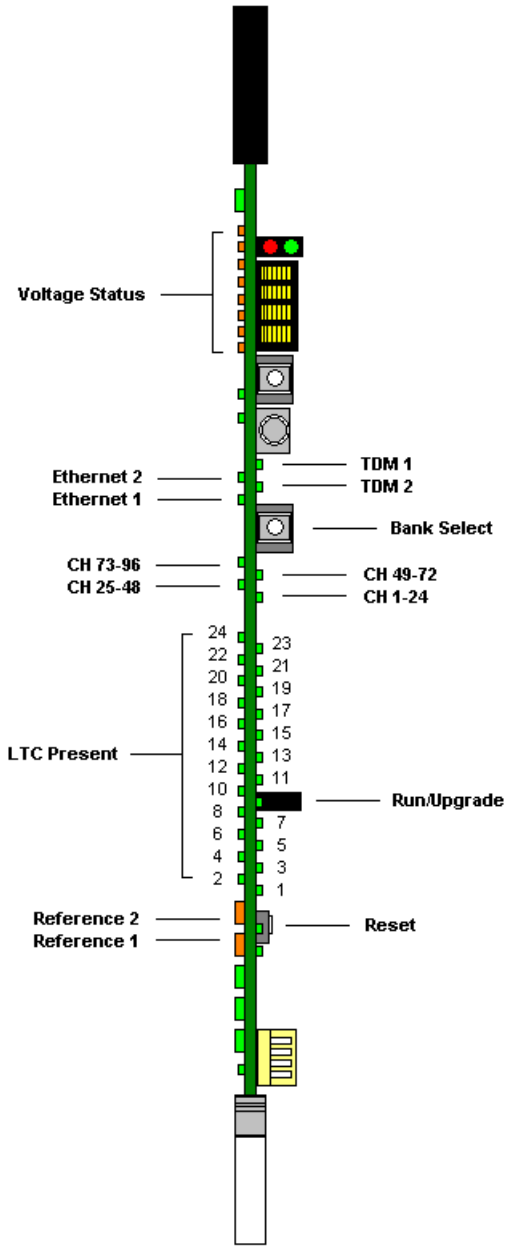


Figure 2-24: EMR-OP96(48)-LTC Front Card Edge

Component	Description
Voltage Status LEDs	This set of LEDs are amber in color and should always be ON
Ethernet 1 LED	This LED is green in color and flashes when there is activity on Ethernet port 1
Ethernet 2 LED	This LED is green in color and flashes when there is activity on Ethernet port 2
TDM 1	This LED is green in color and flashes when a valid TDM signal is detected on TDM input 1 and is solid when it is the primary TDM
TDM 2	This LED is green in color and flashes when a valid TDM signal is detected on TDM input 2 and is solid when it is the primary TDM
Bank Select Push Button	Selects the bank of inputs that are being monitored by the LTC Present LEDs
CH 1-24 LED	This LED is green in color and indicates that inputs 1 to 24 are currently being monitored by the LTC Present LEDs
CH 25-48 LED	This LED is green in color and indicates that inputs 25 to 48 are currently being monitored by the LTC Present LEDs
CH 49-72 LED	This LED is green in color and indicates that inputs 49 to 72 are currently being monitored by the LTC Present LEDs
CH 73-96 LED	This LED is green in color and indicates that inputs 73 to 96 are currently being monitored by the LTC Present LEDs
LTC Present LEDs	This set of LEDs are green in color and indicate the presence of LTC on each respective input
Reference 1 LED	This LED is amber in color and indicates the presence of a valid reference on input 1. It will flash rapidly if reference is present and slowly if it is the primary reference
Reference 2 LED	This LED is amber in color and indicates the presence of a valid reference on input 2. It will flash rapidly if reference is present and slowly if it is the primary reference
Run/Upgrade Jumper	This jumper is used to place the module in upgrade mode when upgrading the firmware
Reset Button	This button resets the module

Table 2-19: Description of EMR-OP96(48)-LTC Card Edge

2.2.10. EMR-PR48 Data Module

The EMR-PR48 is a data port router card for the EMR. Each of the 48 data ports that are available on the module can be configured to support either RS-422 or RS-232 serial protocols. Additionally, each port can be configured to be a master or slave so that devices can be set to controlling or controlled devices.

The EMR-PR48 rear panel occupies 2 slots in a frame and uses 50-pin D-Sub female connectors as shown in Figure 2-25. Each connector supports 8 serial data ports (RS-232 or RS-422). The pin out for each connector is show in Table 2-21.

The EMR-PR48 rear plate also has 4 TDM outputs and 4 TDM inputs via DIN 1.0/2.3 connectors. These connectors allow for further port expansion. The EMR-PR48 can expand to a system of 240 ports without the need for an EMR-ADMX-16X16 or 3000ADMX-16X16 crosspoint. Details of the expansion are shown in Section 4.2.1.

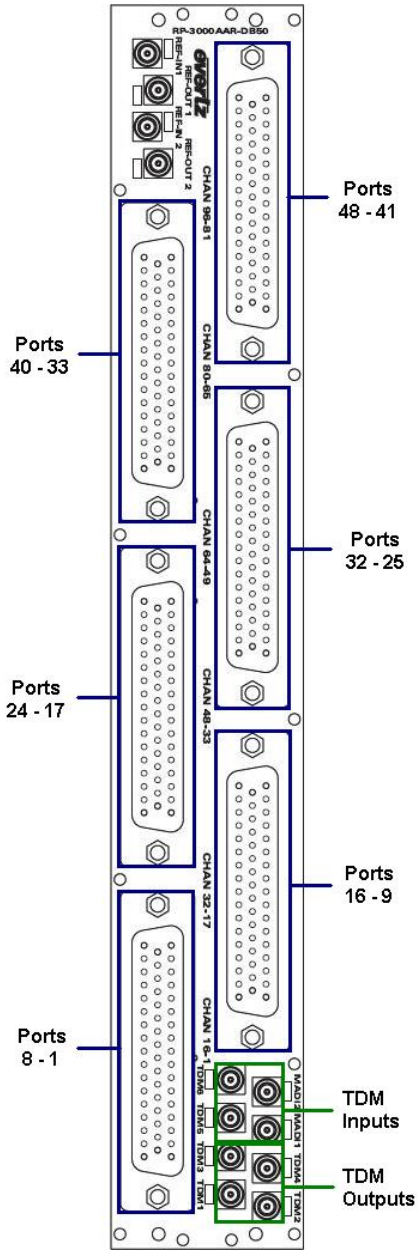


Figure 2-25: EMR-PR48 Rear Plate

Label	TDM 1	TDM 3	TDM 2	TDM 4	TDM 5	TDM 6	MADI 1	MADI 2
Actual I/O	TDM OUT 1	TDM OUT 2	TDM OUT 3	TDM OUT 4	TDM IN 1	TDM IN 2	TDM IN 3	TDM IN 4

Table 2-20: EMR-PR48 TDM Connections

2.2.10.1. Data Port D50 Connector – Pin Out

EMR-PR48 analog audio frames use female D50 connectors, with each connector carrying 8 data ports. The details of how each of the D50 pins map to each of the 8 ports is show in Figure 2-23 .

Port	Signal	Pin
1	IO_1B+/(RXD_1)	2
	IO_1B-	19
	IO_1A+/(TXD_1)	34
	IO_1A-	18
	SONY01	35
2	IO_2B+/(RXD_2)	4
	IO_2B-	21
	IO_2A+/(TXD_2)	36
	IO_2A-	20
	SONY02	37
3	IO_3B+/(RXD_3)	6
	IO_3B-	23
	IO_3A+/(TXD_3)	38
	IO_3A-	22
	SONY03	39
4	IO_4B+/(RXD_4)	8
	IO_4B-	25
	IO_4A+/(TXD_4)	40
	IO_4A-	24
	SONY04	41
5	IO_5B+/(RXD_5)	10
	IO_5B-	27
	IO_5A+/(TXD_5)	42
	IO_5A-	26
	SONY05	43
6	IO_6B+/(RXD_6)	12
	IO_6B-	29
	IO_6A+/(TXD_6)	44
	IO_6A-	28
	SONY06	45
7	IO_7B+/(RXD_7)	14
	IO_7B-	31
	IO_7A+/(TXD_7)	46
	IO_7A-	30
	SONY07	47
8	IO_8B+/(RXD_8)	16
	IO_8B-	33
	IO_8A+/(TXD_8)	48
	IO_8A-	32
	SONY08	49

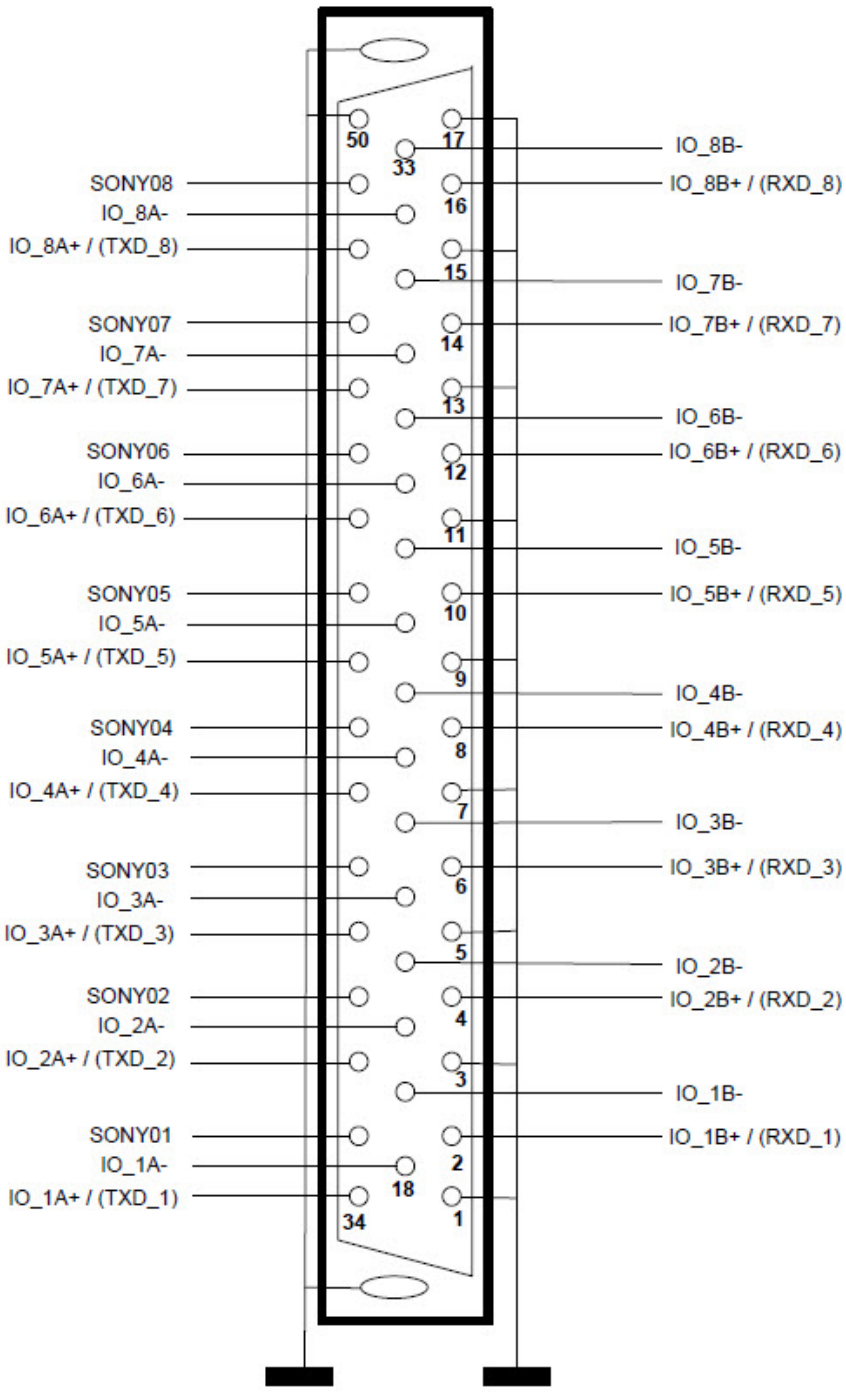


Figure 2-26: Data Port Pin-Out

The pins on each port can vary depending on whether the port is configured for RS-232 or RS-422 and whether the port is configured as a controller or a slave. Depending on these configuration parameters, the pin-outs for each port are different. Table 2-21 shows the mapping for each port with various configurations.

		Controller			Slave		
Port	**D50 Pin**	**RS422**	**RS232**	**D9 Pin**	**RS422**	**RS232**	**D9 Pin**
1	2	Rx+	RXD	7	Tx+	TXD	3
	19	Rx-		2	Tx-		8
	34	Tx+	TXD	3	Rx+	RXD	7
	18	Tx-		8	Rx-		2
	35	Sony		5			5
	1	0v	0v	4 & 6	0v	0v	4 & 6
2	4	Rx+	RXD	7	Tx+	TXD	3
	21	Rx-		2	Tx-		8
	36	Tx+	TXD	3	Rx+	RXD	7
	20	Tx-		8	Rx-		2
	37	Sony		5			5
	3	0v	0v	4 & 6	0v	0v	4 & 6
3	6	Rx+	RXD	7	Tx+	TXD	3
	23	Rx-		2	Tx-		8
	38	Tx+	TXD	3	Rx+	RXD	7
	22	Tx-		8	Rx-		2
	39	Sony		5			5
	5	0v	0v	4 & 6	0v	0v	4 & 6
4	8	Rx+	RXD	7	Tx+	TXD	3
	25	Rx-		2	Tx-		8
	40	Tx+	TXD	3	Rx+	RXD	7
	24	Tx-		8	Rx-		2
	41	Sony		5			5
	7	0v	0v	4 & 6	0v	0v	4 & 6
5	10	Rx+	RXD	7	Tx+	TXD	3
	27	Rx-		2	Tx-		8
	42	Tx+	TXD	3	Rx+	RXD	7
	26	Tx-		8	Rx-		2
	43	Sony		5			5
	9	0v	0v	4 & 6	0v	0v	4 & 6
6	12	Rx+	RXD	7	Tx+	TXD	3
	29	Rx-		2	Tx-		8
	44	Tx+	TXD	3	Rx+	RXD	7
	28	Tx-		8	Rx-		2
	45	Sony		5			5
	11	0v	0v	4 & 6	0v	0v	4 & 6
7	14	Rx+	RXD	7	Tx+	TXD	3
	31	Rx-		2	Tx-		8
	46	Tx+	TXD	3	Rx+	RXD	7
	30	Tx-		8	Rx-		2
	47	Sony		5			5
	13	0v	0v	4 & 6	0v	0v	4 & 6
8	16	Rx+	RXD	7	Tx+	TXD	3
	33	Rx-		2	Tx-		8
	48	Tx+	TXD	3	Rx+	RXD	7
	32	Tx-		8	Rx-		2
	49	Sony		5			5
	15	0v	0v	4 & 6	0v	0v	4 & 6

Table 2-21: Data Port Pin-Out

2.2.10.2. Front Card Edge Controls and LEDs

The EMR-PR48 front card edge has some key controls and indicators that can help in the installation and debugging processes. Figure 2-27 and Table 2-22 show the card edge and describe the expected behavior of each component. If the status indicators do not behave as described it can be a sign of installation or configuration issues.

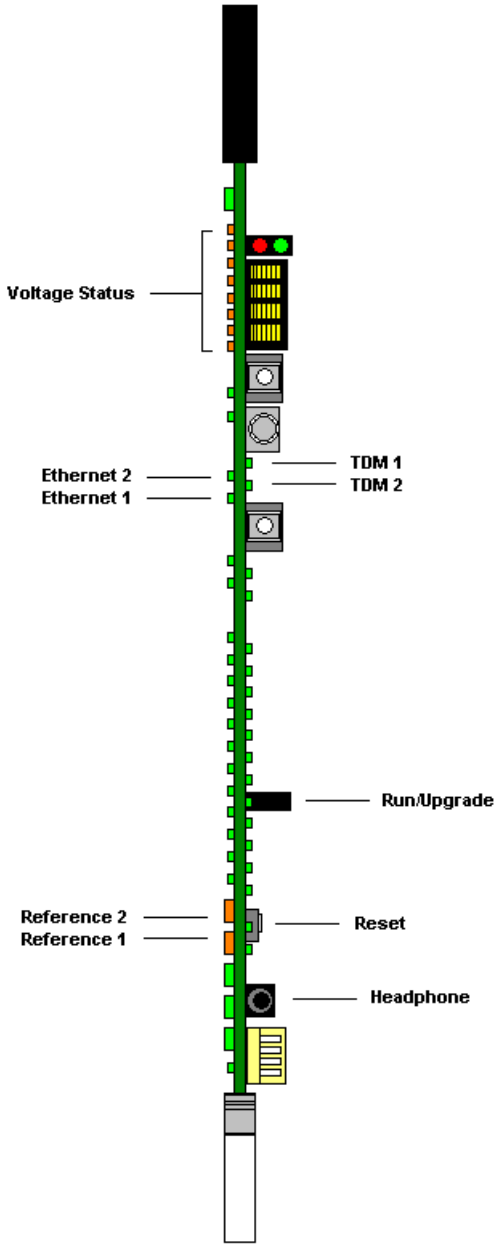


Figure 2-27: EMR-PR48 Front Card Edge

Component	Description
Voltage Status LEDs	This set of LEDs are amber in color and should always be ON
Ethernet 1 LED	This LED is green in color and flashes when there is activity on Ethernet port 1
Ethernet 2 LED	This LED is green in color and flashes when there is activity on Ethernet port 2
TDM 1	This LED is green in color and flashes when a valid TDM signal is detected on TDM input 1 and is solid when it is the primary TDM
TDM 2	This LED is green in color and flashes when a valid TDM signal is detected on TDM input 2 and is solid when it is the primary TDM
Run/Upgrade Jumper	This jumper is used to place the module in upgrade mode when upgrading the firmware
Reset Button	This button resets the module

Table 2-22: Description of EMR-PR48 Card Edge

2.3. INSTALLING AND REMOVING THE MODULES

2.3.1. Installing the Module Rear Plate

In most cases, the EMR frame will already have the modules and rear plates installed within the frame. However, when modules and rear plates need re-positioning, or when additional modules are purchased, proper module/rear plate installation is required.

Each EMR module is shipped with a matching rear panel plate that houses the appropriate connectors for that module.

To install the Rear Plate:

1. Locate the specific slot in the frame and remove any filler plates.
2. Install the rear plate over the open slot by first fitting the plate then tightening the two lock-screws.
3. Fasten the third screw in the middle of the rear plate. (Only on 3000FR)
4. Tighten the screws after the main module is installed.

CAUTION: If any of the screws for the rear plate are missing, please contact Evertz immediately for the specification and/or replacement. Using the incorrect screw can cause thread stripping.

2.3.2. Opening and Closing the Front Panel

In order to insert or remove modules you will have to open the front panel using the following procedure:

1. Turn the two captive screws located on the front panel counter clockwise several turns until they release completely from the front extrusions.

2. Carefully lower the front panel door so that the front edge of the door is lower than the rear of the door.

2.3.3. Installing a Module

1. Orient the module vertically such that the smaller white card ejector is on the bottom, while the larger black card ejector is on the top.

2. Align the card with the card guide corresponding to the slot number where you installed the rear panel plate.

3. Carefully slide the module into the frame and press it completely into the rear panel connectors.

4. Use the upper card-ejector to latch the module into the slot.

5. Make sure that the connectors are fully seated in the rear panel.

6. When this is done, close the front panel and then tighten the screws that hold the rear panel in place.

2.3.4. Removing a Module

1. Press the card ejector down to release the module.

2. Grasp the card using the upper card ejector and pull the module out from the frame.

3. Carefully place the module in a safe place, free from static discharge.

2.4. MOUNTING

The EMR frame is equipped with rack mounting rails and fits into a standard rack space. The 3000FR requires a 19” x 10.5” x 14.5” (483 mm x 260 mm x 368 mm) space, the EMX6-FR requires a 19” x 10.5” x 15.75” (483 mm x 260 mm x 400 mm) space, and the EMX3-FR requires a 19” x 5.25” x 15.75” (483 mm x 133 mm x 400 mm) space. To securely fasten the frame to the equipment rack, make sure that all four mounting screws on each mounting rail are tightened securely.

Note: The EMX6-FR and EMX3-FR have front mounted cooling fans and require that the area below is flush so that there is sufficient room to open the frame completely to be able to remove the modules.

After the unit has been installed in a rack, all cards in the frame should be checked to ensure they are fully seated within the frame. This is best accomplished by simply pushing (simultaneously, with moderate force) on each card's top and bottom insertion/extraction levers. See section 2.3.3 for further information. This step should be repeated any time the frame is shipped, or relocated within a facility.

2.5. COOLING

The EMR frame is designed to ensure adequate cooling for up to 650 watts (3000FR and EMX6-FR) or 360 watts (EMX3-FR) of processing power per frame. Fans at the front and rear of each power supply module accomplish forced air-cooling. Adjacent equipment may be mounted immediately to the top and bottom of the frame. Additional module cooling is provided by interior cooling channels to ensure that even fully loaded frames mounted adjacent to each other will operate within the normal temperature range.

The EMX6-FR and EMX3-FR frames have additional fans mounted to the front door of the frame to provide additional cooling.

CAUTION: For proper cooling, the frame must contain two 3000PS/EMX6-PS power supplies. The EMX3-FR can have one EMX3-PS power supply and one EMX3PS-FM power supply blank panel with cooling fan.

2.5.1. Fan Exhaust

The cooling fans for the power supplies, located at the front of the frame, draw air in the front and exhaust out the sides of the frame. The cooling fans for the modules, located at the rear of the frame, draw air in the front and the exhaust out the rear of the frame.

CAUTION: To ensure adequate cooling, care should be taken to ensure that the fan inlets and exhaust openings are free of obstructions.

2.6. SERVICING INSTRUCTIONS

CAUTION: These servicing instructions are for use by qualified service personnel only. To reduce the risk of electric shock, do not perform any servicing instructions in this section of the manual unless you are qualified to do so.

2.6.1. Changing the Fuses

CAUTION: For continued protection against the risk of fire, replace only with the same type and rating of fuse.

ATTENTION: Pour éviter les risques d'incendie, remplacer le fusible avec un fusible de même calibre.

The fuse holder is located inside the power entry module. To change the fuses, disconnect the line cord from the power entry module and pull the fuse holder out from the power entry module using a small screwdriver. The fuse holder contains two fuses, one for the line and one for the neutral side of the mains connection. Pull out the blown fuse and place a fuse of the correct value in its place.

For 100-120 VAC operation, use ceramic time delay 5 x 20 mm fuses rated for 250 Volts with a 10 amps current rating. For 220-240 VAC operation use ceramic time delay 5 x 20 mm fuses rated for 250 Volts with a 6.3 amps current rating.

For your convenience there are spare fuses located in the vinyl pouch in the front of this manual. Carefully reinsert the fuse holder into the power entry module.

2.6.2. Replacing the Power Supply

Each power supply is a complete assembly, and includes the power supply cooling fan and one frame-cooling fan. In the event that the power supply or one of the fans malfunctions, you will need to replace the power supply assembly with a spare one while the failed assembly is being repaired.

CAUTION: Do not run the frame for extended periods of time with one of the power supplies removed. Proper cooling of the frame requires both power supplies to be inserted into the frame, or one power supply and a power supply blank panel.

The 3000PS, EMX6-PS and EMX3-PS power supplies are hot swappable and can be easily replaced from the front without interrupting the signal integrity of the frame. Each power supply is capable of supplying full power to the frame by itself, however we recommend running with both supplies powered for power redundancy. On frames with only one power supply, a 7800PS-QT-FM blank power supply module with cooling fan ***must*** be inserted into the second power supply space. The 7800PS-QT-FM contains a module-cooling fan and baffles to maintain proper airflow within the frame.

The power supply is secured into the frame by two machine screws through the rear panel (as shown in Figure 2-28). These screws must be removed before the power supply can be extracted from the front.

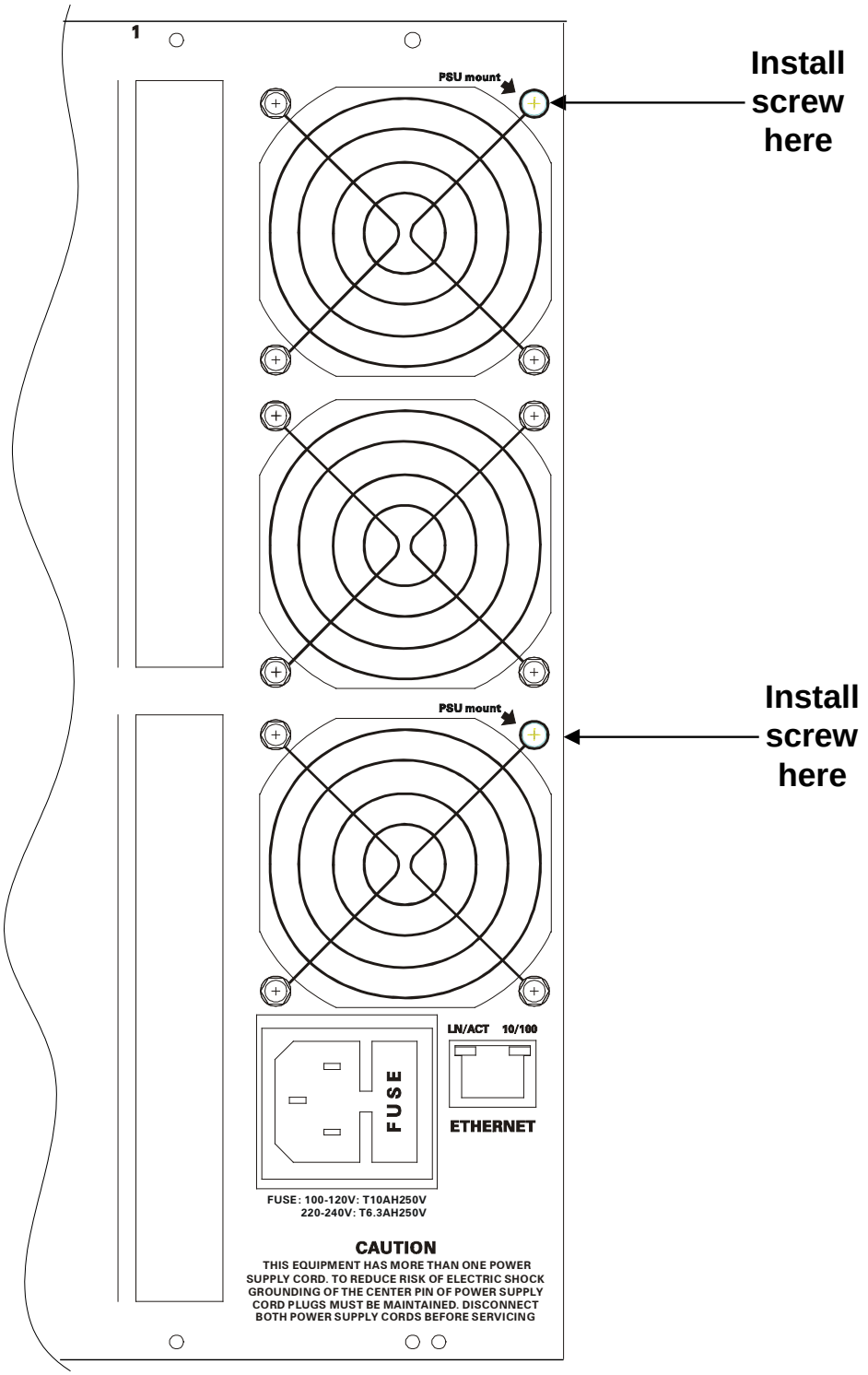


Figure 2-28: Locating the Power Supply Mounting Screw

CAUTION: To reduce the risk of electric shock, you must replace the mounting screw *after* replacing the power supply.

2.7. POWER

The power entry modules contain a standard IEC power inlet connector, two 5 x 20 mm fuse holders, and an EMI line filter.

CAUTION: The EMR frame is shipped with 10 Amp fuses rated for 100-120 VAC operation. If you are operating the EMR System in a country with nominal 220-240 VAC operation, replace the fuses with 6.3 Amp fuses rated for 220-240 VAC operation. See section 2.6.1 for information on changing fuses.

2.7.1. Connecting the Power

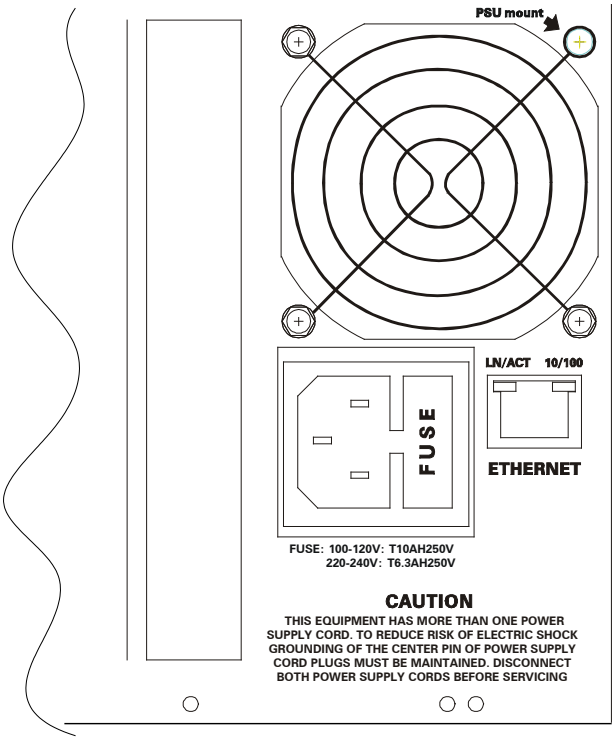


Figure 2-29: Connecting the Power to the Frame

The EMR frame comes standard with one auto-ranging power supply that automatically senses the input voltage over the range of 100 to 240 VAC. An additional power supply can be ordered to provide fully redundant powering of the frame. When only one power supply is fitted, the frame will be fitted with a fan module to ensure the thermal integrity of the frame cooling. In a frame that contains a redundant power supply module, each power supply may be powered from a different AC mains source, allowing complete AC supply redundancy.

Power should be applied by connecting a three-wire, grounding-type power supply cord to the power entry module on the rear panel of each power supply. For use in North America, the power cord should be a minimum 18 AWG wire size; type SVT marked VW-1, maximum 2.5 m in length. For use outside North America, use a power cord approved for the country of use with a minimum 1.00 mm^2 wire size.

CAUTION: To reduce the risk of electric shock, grounding of the ground pin of the main plug must be maintained.

2.7.2. Turning the Power On and Off

Each power supply is fitted with its own power switch. When the switch is turned off, the remaining power supply will power the frame. To completely remove power from the frame, both power supplies must be turned off.

2.7.3. Power Supply Status Indicators

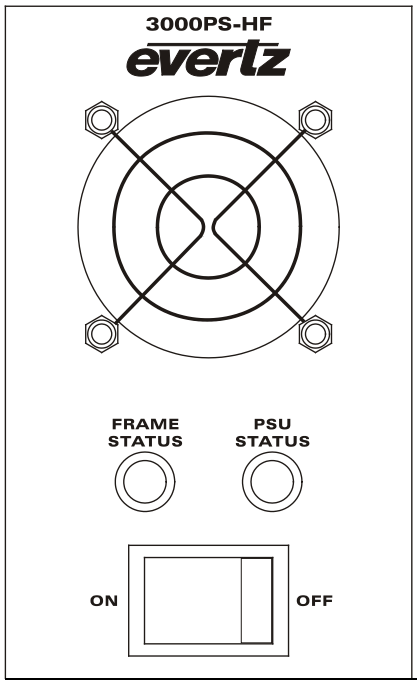


Figure 2-30: Power Supply Status Indicators

Each power supply has two status indicator LEDs. The green PSU STATUS LED indicates the health of the local power supply. The red FRAME STATUS LED indicates the health of the entire frame and is operated by the frame status buss of the frame. The FRAME STATUS LED will be Off under normal conditions and On when there are Frame Status Fault conditions. See section 2.8 for more information about the frame status buss fault conditions.

If one of the power supplies malfunctions, (power cord disconnected, power switch is off, fuse is blown, rear fan is stopped, etc,) then its PSU STATUS LED will go Off, and the red FRAME STATUS LED on both power supplies will turn On. (If the power supplies are fitted with green FRAME STATUS LEDs they will turn Off) The PSU STATUS LED on the power supply that is functioning will remain On. If the frame is connected to VistaLINK® then the power supply fault will send a trap message from the frame.

If there is a fuse failure, contact Evertz customer service regarding the power supply immediately. The power supplies are short circuit protected and should not blow the fuse under a short circuit condition.

2.8. FRAME STATUS FAULT CONDITIONS

The Frame is fitted with a global Frame Status monitoring buss that is connected to each of the power supplies and to each of the modules. When a fault condition occurs on one of the power supplies, or one of the modules, a Frame Status Fault condition is active on the frame status buss. When this occurs the red FRAME STATUS LED on the power supply will come on and the relay on the Frame Status Tally terminal block will activate.

Power supplies, will assert a frame status fault when their PSU STATUS LED is off.

Each module has a large red LOCAL FAULT LED and a large green MODULE OK LED at the top of the card edge. This green LED indicates good module health while the red LED indicates that there is a fault condition on the module. Each module has its own criteria that determines when the red fault LED comes on. When the red LOCAL FAULT LED is On the module can also assert a fault condition on the Frame Status buss. On each module there is a jumper that disables sending local card fault information to the Frame Status Buss. For more information about fault conditions on individual modules, and for the location of the Frame Status Jumper on the module consult the individual chapter for the module. For example, if a module requires video or audio for its functionality and the video or audio is not present, the red LOCAL FAULT LED on the module will be On and the fault will be reported on the frame status buss if the FRAME STATUS jumper on the module is set to the On position (default).

2.9. CARE AND HANDLING OF OPTICAL FIBER

2.9.1. Safety

The **CLASS 1 LASER PRODUCT** sign will appear as the following image:

Background colour: Yellow
Triangular band: Black
Symbol: Black

2.9.2. Assembly

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

2.9.3. Labeling

Certification and Identification labels are combined into one label. As there is not enough room on the product to place the label, it is reproduced here in the manual. See Figure 2-31 below.

Please note: There is not a date of manufacture on this label as it can be traced by the bar code label placed on the printed circuit board of each Evertz plug-in module.

Figure 2-31: Reproduction of Laser Certification and Identification Label

2.9.4. Handling and Connecting Fibers

CAUTION: 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.

Since the transmission characteristics of the fiber depend on the shape of the optical core, care must be taken to prevent fiber damage caused by 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.

Dust particles on the ends of the optical fiber greatly increase the signal loss at interconnections, and large dust particles can even obscure light transmission altogether. To minimize the effects of dust contamination at the interconnections, the fiber should be cleaned each time it is mated or unmated. When using interconnection housings to mate two optical fibers, it is good practice to remove dust particles from the housing assembly with a blast of dry air. Alternatively, you can use the pre-moistened tissue that you should have received with the optical module. Remove this tissue from its package and wipe the end of the fiber connector before mating it to the module.

Whenever a fiber is unmated, it must be covered immediately. Most fiber manufacturers provide a plastic boot that fits over the ferrule body for this purpose.

Fiber interconnections must be made securely. The Evertz fiber optical transmitters and receivers come with SC interconnection housings built into the module. With this style of connector, the fiber assembly and the housing assembly can only be connected in one way and with very good repeatability. The rear fiber interconnect panel that is provided with each module can be ordered with optional SC/PC, ST/PC, or FC/PC connectors. The customer is required to provide the optical fiber with the correct connectors to connect the modules together. SC/PC, ST/PC, and FC/PC interconnection housing and connectors (as well as adapters) are industry standards with many available sources.

3. SPECIFICATIONS

3.1. EMR SPECIFICATIONS

3.1.1. Configuration

AES Inputs:	Selectable in blocks of 96 or 48
AES Outputs:	Selectable in blocks of 96 or 48
Analog Inputs:	Selectable in blocks of 48 (stereo)
Analog Outputs:	Selectable in blocks of 48 (stereo)
MADI Inputs:	Selectable in blocks of 16
MADI Outputs:	Selectable in blocks of 16
LTC Inputs:	Selectable in blocks of 96 or 48
LTC Outputs:	Selectable in blocks of 96 or 48
RS-232/RS-422 Ports:	Selectable in blocks of 48 (RS-232 and RS-422 selectable)

3.1.2. Audio Inputs - AES

Sample Rates:	32kHz, 44.1kHz, 48kHz

3.1.2.1. Balanced Version

Standard:	AES3-1992
Signal Level:	0.2 – 7.0V p-p
Impedance:	110Ω ±20%, transformer coupled
DC on Input:	±50V
Connectors:	D50 female

3.1.2.2. Unbalanced Version

Standard:	SMPTE 276M
Impedance:	75Ω
Return Loss:	25dB, 0.1 - 6.0kHz
Connectors:	DIN 1.0/2.3

3.1.3. Audio Outputs - AES

Sample Rates:	32kHz, 44.1kHz, 48kHz

3.1.3.1. Balanced Version

Signal Level:	2.0 – 7.0V p-p
Impedance:	110Ω, transformer coupled
DC Isolation:	±50V
Rise/fall Time:	3.5 – 10ns
Connectors:	D50 female

3.1.3.2. Unbalanced Version

Signal Level: 1.0 V p-p ±50%,
Impedance: 75Ω
Return Loss: 25dB, 0.1 - 6.0kHz
Jitter: Conforms to ANSI S4.40-1992
Connectors: DIN 1.0/2.3

3.1.4. Analog Audio

Sampling Freq: 48kHz
Freq Response: ±0.08dB
Output Impedance: 400Ω
Input Impedance: 12kΩ minimum
Signal Level: 0dBfs = 18dBu or 24dBu
Noise: -110dB A-weighted
THD+N: >95dB (typically > 98dB)
DC Offset: >±30mV
Crosstalk: <-95dB
I/O Delay: 1.3ms @ 48kHz
Dynamic Range: 24 bits
Connectors: D50 female

3.1.5. Analog to Digital Conversion

Sampling Freq: 48kHz
Freq Response: ±0.05dB
Input Impedance: 12kΩ minimum
Signal Level: 0dBu to18dBu or 24dBu
Noise: -113dB A-weighted
THD+N: >95dB (typically > 98dB)
CMRR: >85dB @1kHz
Crosstalk: <-95dB
I/O Delay: 0.85ms @ 48kHz
Connectors: D50 female

3.1.6. Digital to Analog Conversion

Sampling Freq: 48kHz
Freq Response: ±0.06dB
Output Impedance: 400Ω
Signal Level: 0dBfs to 18dBu or 24dBu
Noise: -115dB A-weighted
THD+N: >95dB (typically > 98dB)
DC Offset: >±30mV
Crosstalk: <-95dB
I/O Delay: 1.3ms @ 48kHz
Dynamic Range: 24 bits
Connectors: D50 female

3.1.7. Data Input Port

Type: RS-232 and RS-422, selectable
Signal Level: 0.2 – 7V p-p
Connectors: D50 female

3.1.8. Data Output Port

Type: RS-232 and RS-422, selectable
Signal Level: 2 – 7V p-p
Impedance: 110Ω
Connectors: D50 female

3.1.9. LTC Reader

Standard: SMPTE 12M-1
Level: 2 – 4V p-p, unbalanced or balanced
Speed: 1/30th to 70x play speed, fwd and rev, machine dependent
Connectors: DIN 1.0/2.3 (unbalanced), D50 female (balanced)

3.1.10. LTC Generator

Standard: SMPTE 12M-1
Level: Adjustable, 0.5 – 4.5V p-p
Rise Time: 40±10ms
Jitter: <2ms
Connectors: DIN 1.0/2.3 (unbalanced), D50 female (balanced)

3.1.11. Switching Reference

Reference Inputs: 2x BNC, analog 525/625 or DARS
Impedance: 75Ω terminating
Connectors: BNC per IEC 61169-8 Annex A

3.1.12. Control

Ethernet: 2x RJ45
Serial
RS-232/RS-422: 2x D9 female

3.1.13. Electrical

Supply: Auto ranging, 100 – 240VAC, 50/60Hz
Power Consumption:
3000FR: 650W
EMX6-FR: 650W
EMX3-FR: 360W
Redundant: PSU Optional

3.1.14. Physical

3000FR:

Height: 10.5” (266mm)
Width: 19.0” (483mm)
Depth: 14.5” (368mm)
Module Capacity: 15 single slot EMR series modules
Weight Approx.: 34.8lbs (15.8kg) with 2 power supplies, no slots occupied
Approximately: 64.0lbs (29kg) with 2 power supplies, all slots occupied

EMX6-FR:

Height: 10.5” (266mm)
Width: 19.0” (483mm)
Depth: 15.75” (400mm)
Module Capacity: 15 single slot EMR series modules
Weight Approx.: 34.8lbs (15.8kg) with 2 power supplies, no slots occupied
Approximately: 64.0lbs (29kg) with 2 power supplies, all slots occupied

EMX3-FR:

Height: 5.25” (133mm)
Width: 19.0” (483mm)
Depth: 15.75” (400mm)
Module Capacity: 5 single slot EMR series modules
Weight Approx.: 17.4lbs (7.9kg) with 2 power supplies, no slots occupied
Approximately: 32.0lbs (14.5kg) with 2 power supplies, all slots occupied

3.2. 3000FC FRAME CONTROLLER MODULE

The 3000FC Frame Controller module provides a single point of access to communicate with the EMR cards. The 3000FC provides a 10Base-T/100Base-TX Ethernet port and handles all communications between the frame and the control system, and serves as a gateway to individual cards in the frame. The 3000FC also provides an RS-232 serial port at the card edge to set up the network addresses.

The 3000FC is housed in a narrow slot underneath the left side power supply in the 3000FR Frame.

3.2.1. Specifications

3.2.1.1. Ethernet

Network Type: Fast Ethernet 100 Base-TX IEEE 802.3u standard for 100 Mbps baseband CSMA/CD local area network
Ethernet 10 Base-T IEEE 802.3 standard for 10 Mbps baseband CSMA/CD local area network
Connector: RJ-45 (on rear panel of 3000FR Frame)

3.2.1.2. Serial Communications

Standard: RS-232
Connector: 9-Pin Female D
Baud Rate: 57600
Format: 8 bits, no parity, 2 stop bits, no flow control

3.2.1.3. Electrical

Voltage: + 12VDC
Power: 7 Watts
EMI/RFI: Complies with FCC Part 15
Class A and EU EMC directive

3.3. EMX-FC FRAME CONTROLLER MODULE

The EMX-FC Frame Controller module provides a single point of access to communicate with the EMR cards. The EMX-FC provides a 10Base-T/100Base-TX Ethernet port and handles all communications between the frame and the control system, and serves as a gateway to individual cards in the frame. The 3000FC also provides an RS-232 serial port at the card edge to set up the network addresses.

The EMX-FC is housed in a narrow slot underneath the left side or right side power supply in the EMX6-FR frame, and to the left of the right side power supply in the EMX3-FR frame.

3.3.1. Specifications

3.3.1.1. Ethernet

Network Type: Fast Ethernet 100 Base-TX IEEE 802.3u standard for 100 Mbps baseband CSMA/CD local area network
Ethernet 10 Base-T IEEE 802.3 standard for 10 Mbps baseband CSMA/CD local area network
Connector: RJ-45 (on rear panel of frame)

3.3.1.2. Serial Communications

Standard: RS-232
Connector: 15-Pin Female D
Baud Rate: 57600
Format: 8 bits, no parity, 2 stop bits, no flow control

3.3.1.3. Electrical

Voltage: + 12VDC
Power: 7 Watts
EMI/RFI: Complies with FCC Part 15
Class A and EU EMC directive

4. SYSTEM OVERVIEW

4.1. INTEGRATED AUDIO ROUTING

The EMR audio routing system is a flexible, scalable system that provides the capability to route various audio formats without discretion. Depending on which input and output components are in the system, analog, AES and MADI audio can be routed from any source to any destination. The EMR uses a high bandwidth interface to connect the various components together. This interface is either MADI or TDM depending on which firmware is installed.

4.1.1. Audio Components Connected

In early versions of the EMR audio routing solution, MADI audio was used as the interface between the various components in the system. In this system, each AES or analog audio input card, converts the incoming audio into a defined number of MADI outputs. The MADI outputs are then interfaced to the crosspoint using a 3000MADI16-TDM4 module. This module converts all of the incoming MADI inputs into TDM outputs. For applications that require MADI inputs, these can be fed directly to the 3000MADI16-TDM4 module.

Once the audio is in the form of TDM, the 3000ADMX-16X16 crosspoint allows any source to be routed to any destination. This is the module which is under the control of the control system and allows routes to be made. All other components surrounding this module map inputs to outputs staticly.

At the output of the crosspoint module, TDM is converted back into MADI outputs using a 3000TDM4-MADI16 module. Using one of the various audio output cards, the MADI can be converted back to AES or analog audio. In applications that require MADI outputs, the audio can be directly sourced from the 3000TDM4-MADI16.

Figure 4-1 shows how the various devices are connected together using MADI as the common interface.

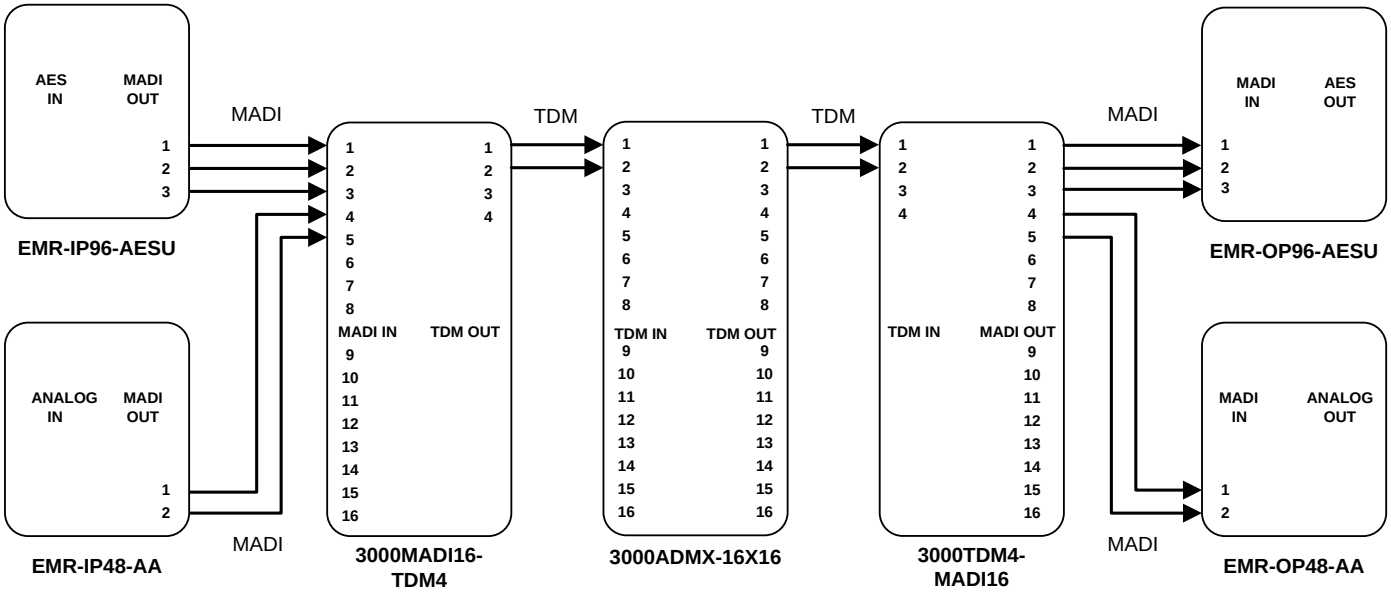


Figure 4-1: EMR Audio Connected with MADI Inteface

Another method of interfacing the various EMR components is entirely using TDM. This system is very similar to the system described previously except the audio input card and audio output cards connect directly to the EMR-ADMX-16X16/3000ADMX-16X16 crosspoint module.

AES, analog and MADI audio input cards all convert their respective formats to TDM. This TDM is connected to the inputs of the EMR-ADMX-16X16/3000ADMX-16X16. As with the previous system, routes from the control system are only made on the crosspoint.

At the output of the crosspoint, the TDM is connected directly to any one of the AES, analog or MADI audio output cards to be converted back to the respective format.

Figure 4-2 shows how the various devices are connected together using TDM as the common interface.

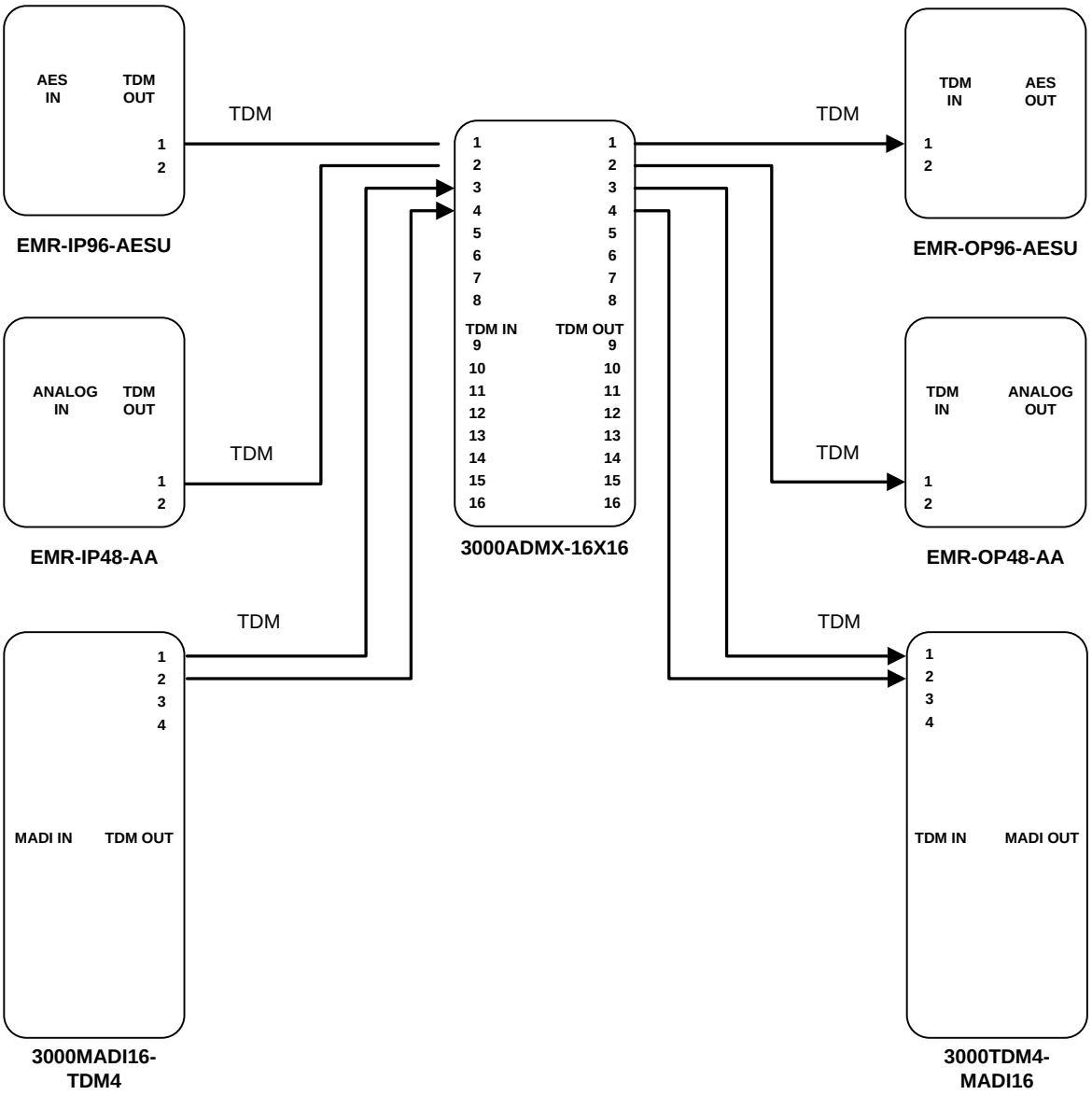


Figure 4-2: EMR Audio Connected with TDM Inteface

4.1.2. Connecting to EQX for Embedded Audio Embedding/De-embedding

In addition to standard AES, analog, and MADI audio routing, the EMR also provides an interface to route embedded audio using the EQX video router, providing a completely integrated audio routing solution. Using the EQX router with the EQX-IP16AD-H(3G)-2TDM audio de-embedder module and EQX-OP16AE-H(3G)-2TDM embedder module, embedded audio can be routed between the EQX and EMR platforms.

The EQX-IP16AD-H(3G)-2TDM audio de-embedder module and EQX-OP16AE-H(3G)-2TDM embedder module both provide TDM interfaces that connect directly to the EMR-ADMX-16X16/3000ADMX-16X16 crosspoint module.

The de-embedder module de-embeds all 16 channels of audio from each of its 16 video inputs and transfers the audio over TDM to the crosspoint. Once provided to the crosspoint, the audio is available to be routed to any of the AES, analog or MADI output modules.

The embedder module embeds all 16 channels of audio to each of its 16 video outputs. The audio provided to the embedder module is sourced from the crosspoint over a TDM connection. This allows the embedded audio to be sourced from any of the AES, analog or MADI audio input modules.

Figure 4-3 shows how the various components between the EQX and EMR are connected. For more information regarding the EQX de-embedder and embedder modules, consult the EQX user manual.

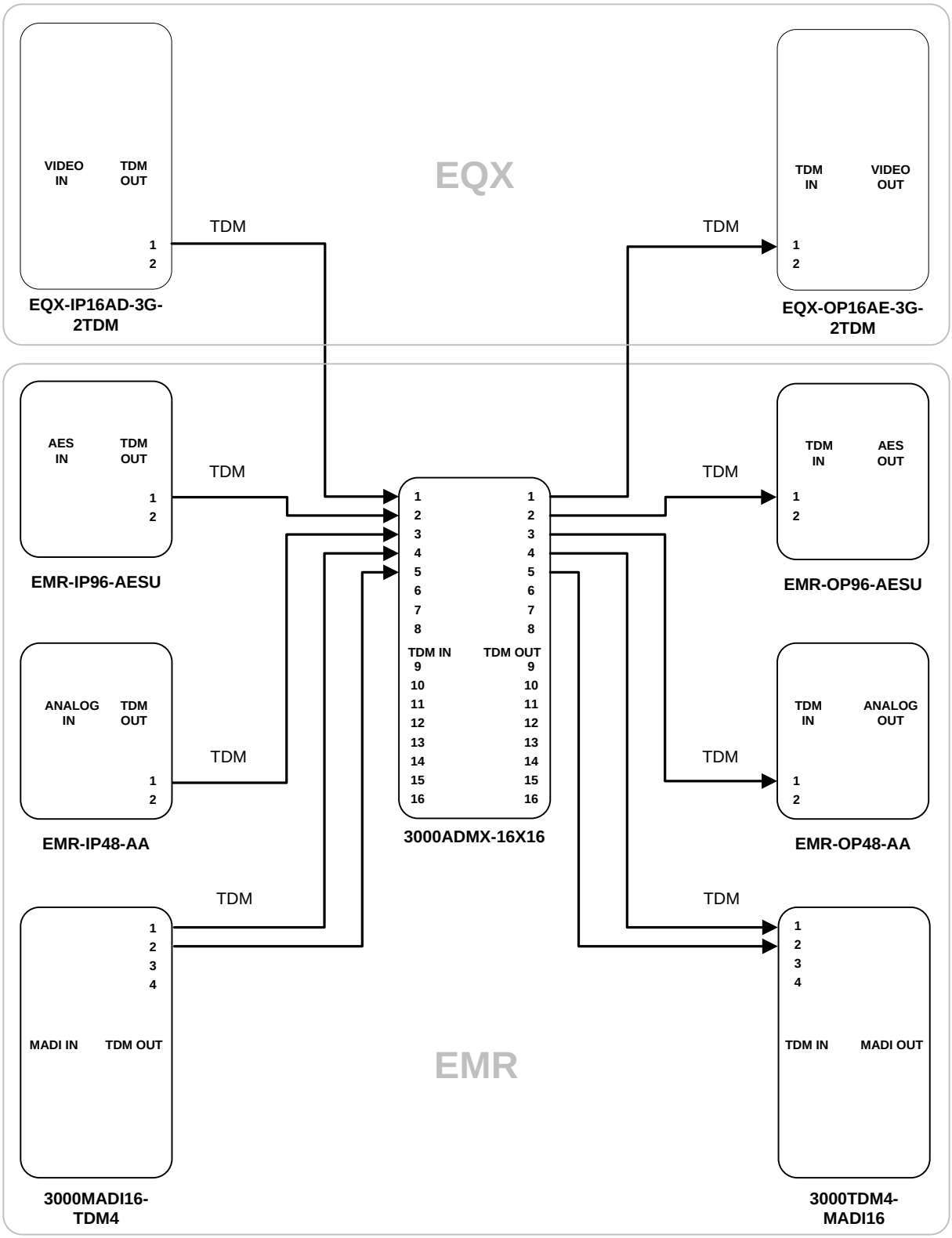


Figure 4-3: EQX and EMR Interconnection

4.1.3. Referencing the Audio Routing System

The integrated audio routing solution which combines the EMR and EQX routers requires that all video and audio sources be synchronous to each other and a common reference. A common video reference must be applied to the EMR and EQX frames. The EMR reference must be a bi-level analog video signal, and the EQX reference can be one of many options. For details regarding the EQX reference structure, consult the EQX user manual.

Note: When using the EMR and EQX as an integrated routing solution, all audio and video sources as well as the EMR and EQX frames must be locked to a common reference.

4.1.4. Cable Length Limitations

The TDM signal used to interface the various components in the EMR system transfers data at very high speeds. As a result, there are certain limitations in the cable length between connections. Using Belden 1694A or equivalent cable, all TDM cable lengths between two devices must be 20m (65ft) or less as show in Figure 4-4.

For connections between EMR components that will exceed 20m, Evertz has a full lineup of fiber conversion gear that can be used to transport the TDM signal. Please contact the factory for more details.

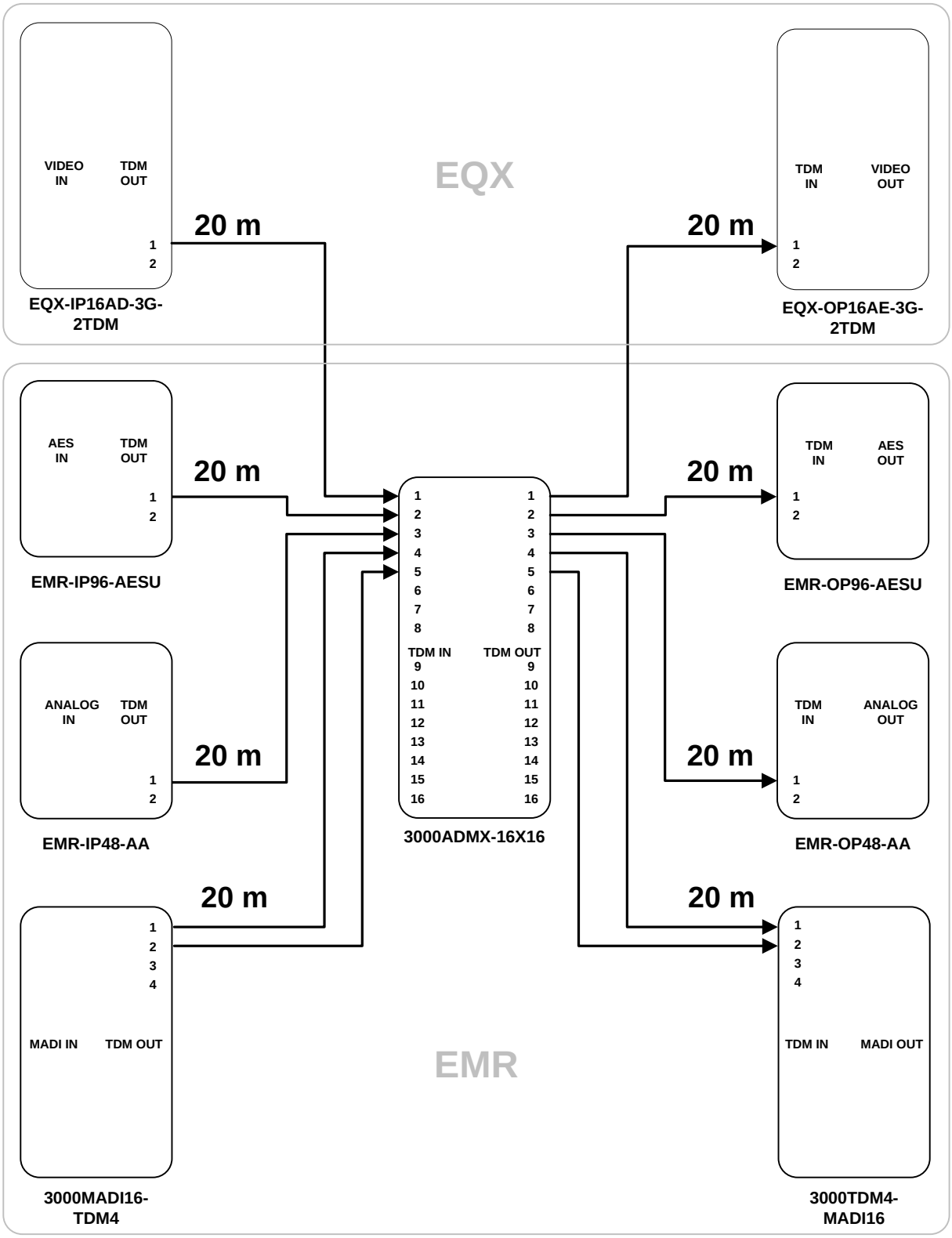


Figure 4-4: TDM Cable Length Limitations

4.1.5. Optional Audio Features

The EMR audio components have several optional features that make the EMR a very powerful audio solution. Each of the components is described in the following sub sections.

4.1.5.1. Sample Rate Conversion (+SRC)

The sample rate conversion option is available on the EMR AES input and output cards. The sample rate conversion option provides the capability to modify the same rate of any incoming audio signal and change it to a user specified sample rate that is locked to the frame reference. The sample rate converters can by bypassed to allow Dolby E/D signals to pass or they can be set in auto mode so that they are enabled only when PCM audio is detected.

Each module has two sample rate conversion blocks, allowing half the signals in the module to convert to one sample rate and the other half to convert to another sample rate. The sample rate conversion also applies to MADI inputs and outputs when supported. Individual channels within the MADI signal pass through independent sample rate converters. Control of the sample rate converters is done using VistaLINK® Pro which is detailed in section 5.1.2.

4.1.5.2. Signal Processing (+DSP)

The signal processing option or audio proc'ing option is available on the EMR AES and analog input and output cards. The signal processing option provides the capability to adjust the gain between -24dBu and +24dBu, invert the phase, and mute each mono audio channel. Each mono channel also contains a quad-input mixer in the processing path. Figure 4-5 provides a conceptual view of the audio signal flow through the various processing stages for one mono audio channel. Control of the processing stages is done using VistaLINK® Pro which is detailed in section 5.1.3.

4.1.5.3. Delay (+DLY)

The delay option is available on the EMR AES and analog input and output cards. The delay option provides the ability to add delay to each mono audio signal on the module. Delay of up to 1.3 seconds can be added to each path in sample increments. If the option is applied to both the input and output modules then a total delay of 2.6 seconds can be applied to the entire audio path. Figure 4-5 shows where the audio delay is applied with respect to the processing path. Control of the audio delay is done using VistaLINK® Pro which is detailed in section 5.1.2.

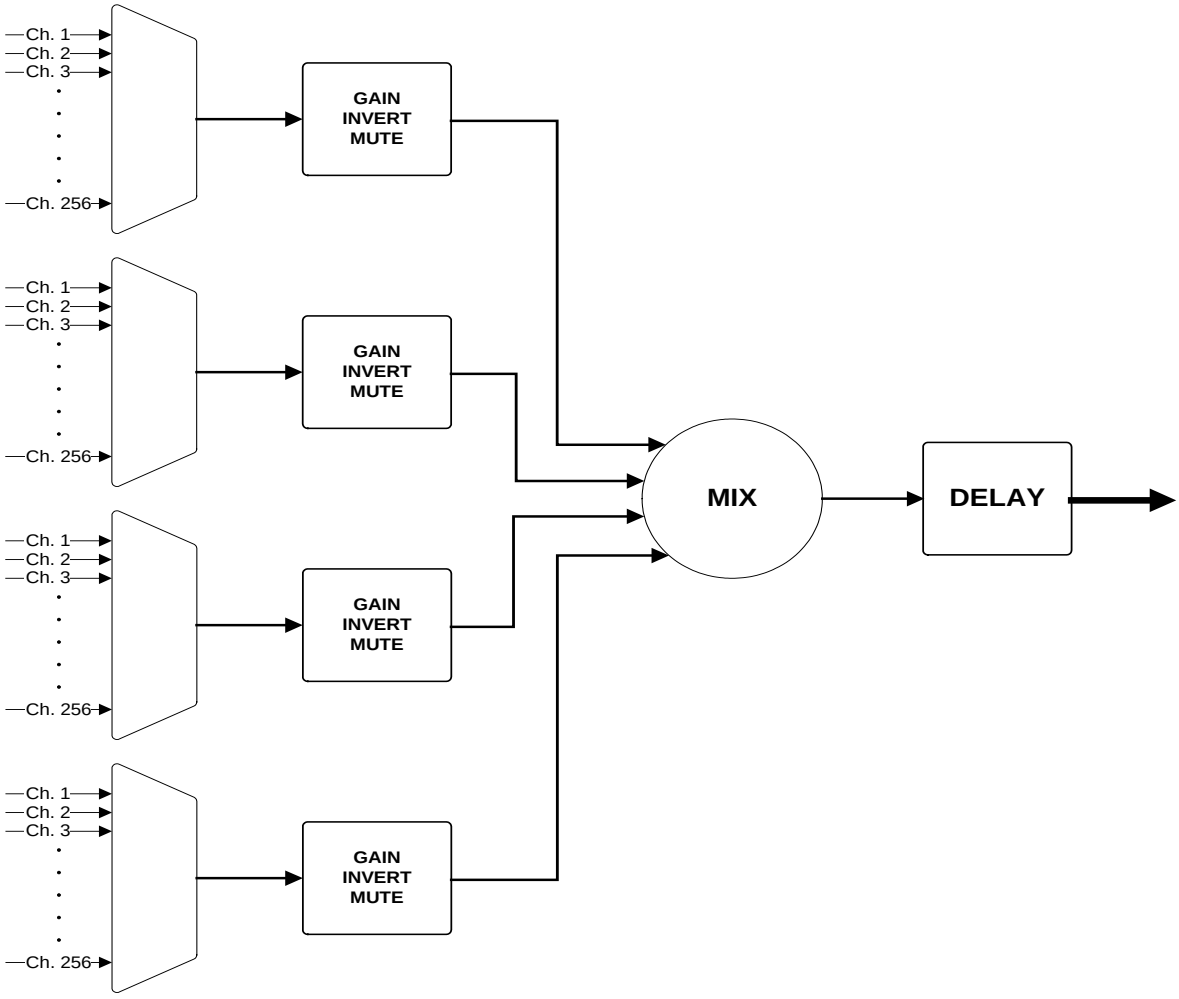


Figure 4-5: Audio Processing Signal Flow

4.1.5.4. Advanced Monitoring (+AM)

The advanced monitoring option is available on the EMR AES and analog input cards. The advanced monitoring option provides two main features. The first is in depth monitoring and alarm presentation of audio loss, over, silence, phase reversal and mono. Each monitoring parameter has a set of controls to define appropriate thresholds and reset values. These values are used to determine when alarms are triggered. The audio loss, over and silence operate on a per channel basis, while the phase reversal and mono operate on a per pair basis. Control of the advanced monitoring is done using VistaLINK® Pro which is detailed in sections 5.1.5 and 5.1.6.

The second feature is the ability to broadcast audio bar level and peak information over Ethernet to supported devices such as VistaLINK® Pro and VIP multi-viewers. This allows the subscribing device to re-create audio bar graphs on a selective basis to monitor AES and analog audio inputs, without using up valuable AES and analog outputs. Refer to section 5.1.6.3 for details.

4.2. TIME CODE ROUTING

The EMR time code routing system utilizes the same TDM technology as the audio router to provide a flexible, high density time code routing solution. Unlike traditional time code routers that perform analog-to-digital and digital-to-analog conversions with a digital crosspoint, the EMR time code router uses time code decoding and encoding techniques. This allows the EMR time code router to handle much higher spooling rates than traditional time code routers. The ability to decode and encode time code also provides the advantage of being able to perform advanced functions such as displaying the time code or delaying and advancing the timecode.

Each time code input card has multiple TDM outputs, all with the same information. This allows a single input card to be connected to multiple output cards. On the output side, each output card has multiple TDM inputs in which it can source a time code output. This allows multiple input cards to be connected to a single output card. This straightforward architecture makes the EMR time code router easy to setup and easy to expand.

With the multiple TDM inputs and outputs available, a 768x768 time code router can be constructed simply by inter-connecting TDM connections. A system with only one input card and one output card is shown in Figure 4-6. A larger system consisting of multiple input and output cards for a 288x288 configuration is shown in Figure 4-7. For systems beyond 768x768, an EMR-ADMX-16X16/3000ADMX-16X16 crosspoint must be utilized.

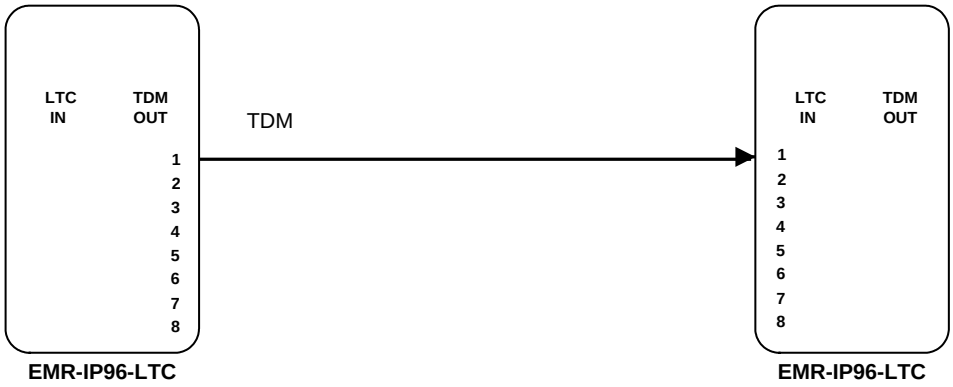


Figure 4-6: 96x96 LTC Configuration

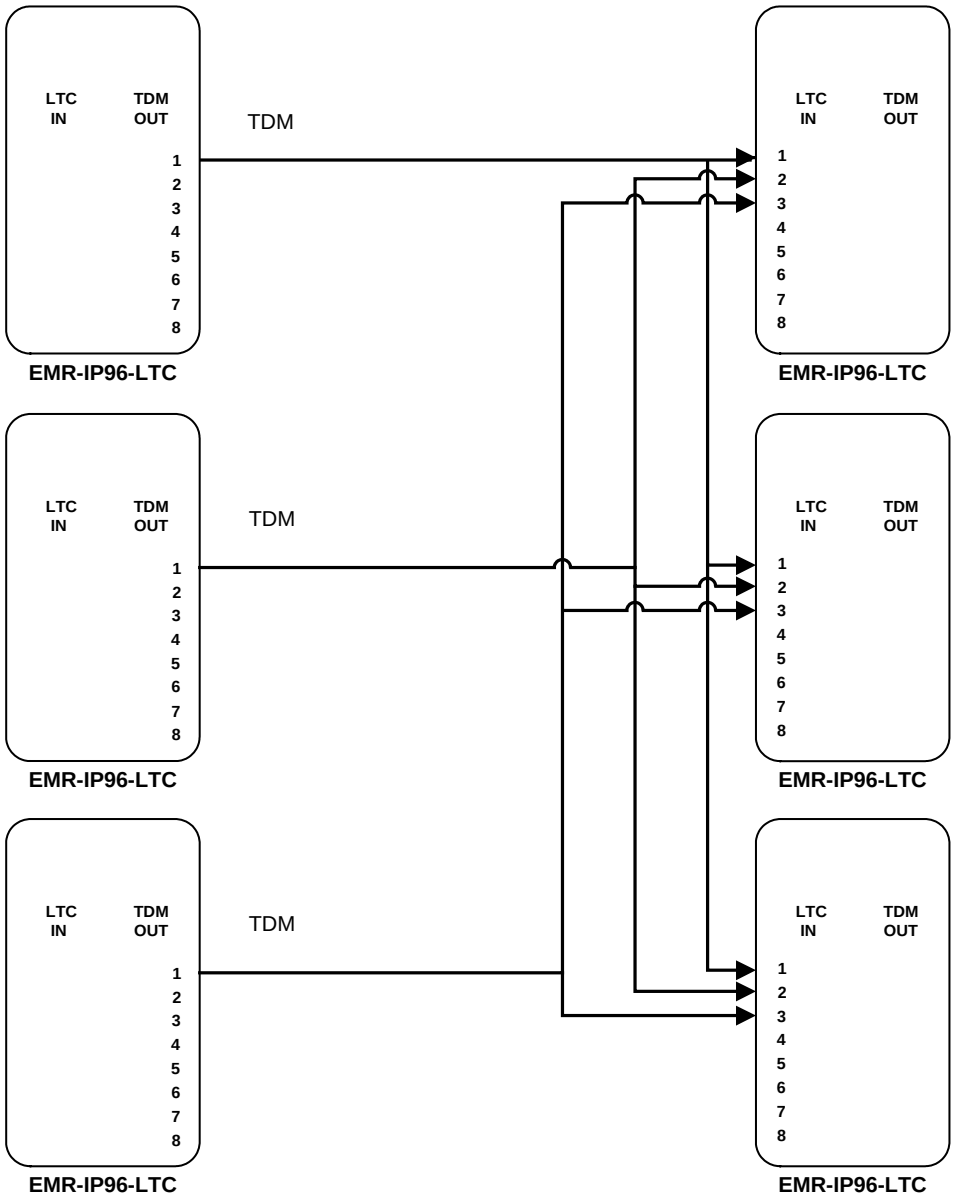


Figure 4-7: 288x288 LTC Configuration

4.2.1. Configuring the LTC Router

To configure the LTC router in a system that does not have an EMR-ADMX-16X16/3000ADMX-16X16 crosspoint, each of the output cards must be given a specific *Card ID* to identify the sequence of destinations. The *Card ID* is set by accessing the configuration menu through the front serial port or through a telnet session.

Once the menu is accessed, the *Card ID* is set by going to menu item 3, then menu item 5.

Note: Each output module in an EMR LTC routing system must be configured with a unique *Card ID* to define the sequence of destinations in the system.

4.2.2. Referencing the LTC Router

A common video reference must be applied to all frames in which the LTC cards within a system are installed. This ensures that the TDM signal that is used to distribute the LTC signals is synchronized amongst all of the cards. The reference must be a bi-level analog video signal.

Note: When using the EMR for LTC routing solutions, the EMR frames must be locked to a common bi-level video reference.

4.3. DATA PORT ROUTING

The EMR data port routing system also takes advantage of TDM technology to provide a flexible, high density data port routing solution. The EMR data port router supports both RS-232 and RS-422 standards simultaneously, with each port being software configurable.

Each EMR data port module contains bi-directional data ports that can either be transmitters or receivers. The function of each port can be manually configurable or it can be set to automatically detect the direction for devices that support the Sony pin.

Note: The Sony pin is not always supported by a Sony VTR. Refer to the manual for the VTR to ensure that it is supported.

A data port module is equipped with TDM inputs and outputs. To inter-connect multiple modules, each module must have one output connected to every other module, and it must also have one input connected from every other module. This provides a bi-directional interface between every module in the system. This system of connecting data port modules allows the EMR data port routing system to grow to 240 data ports without requiring any additional modules. Figure 4-8 shows a 96 data port system consisting of two data port modules. For systems beyond 240 ports, an EMR-ADMX-16X16/3000ADMX-16X16 crosspoint must be utilized.

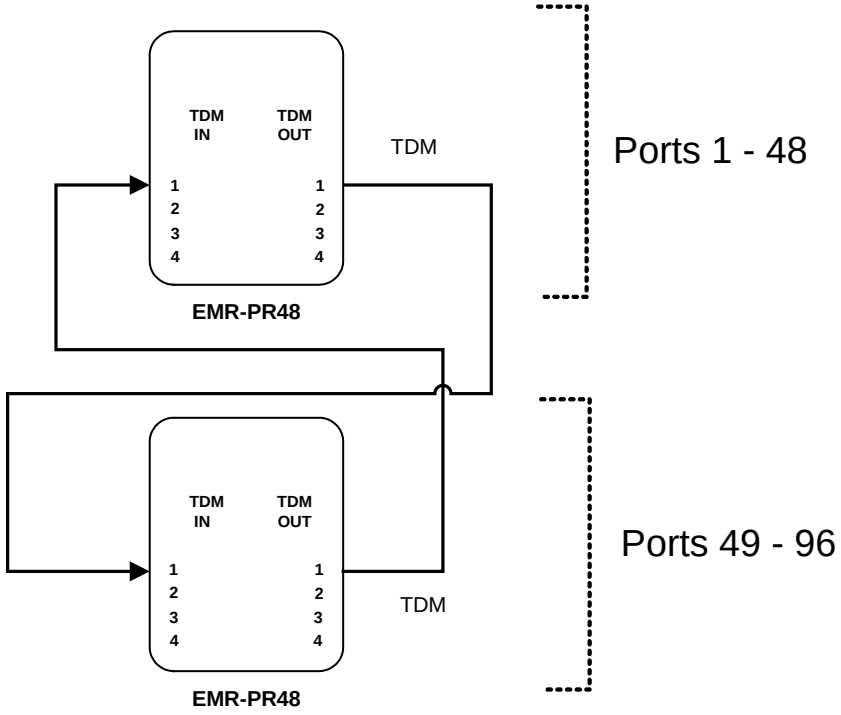


Figure 4-8: 96 Port Configuration

4.3.1. Configuring the Data Port Router

To configure the EMR data port router in a system that does not have an EMR-ADMX-16X16/3000ADMX-16X16 crosspoint, each of the output cards must be given a specific *Card ID* to identify the sequence of ports. The *Card ID* is set by accessing the configuration menu through the front serial port or through a telnet session.

Once the menu is accessed, the *Card ID* is set by going to menu item 3, then menu item 5.

Note: Each module in an EMR data port routing system must be configured with a unique *Card ID* to define the sequence of ports in the system.

4.3.2. Referencing

A common video reference must be applied to all frames in which the data port cards within a system are installed. This ensures that the TDM signal that is used to distribute the data signals is synchronized amongst all of the cards. The reference must be a bi-level analog video signal.

Note: When using the EMR for data port routing solutions, the EMR frames must be locked to a common bi-level video reference.

4.3.3. Wiring TDM Connections on the Data Port Router

For systems that consist of more than 96 ports or more than two data port modules, refer to Table 4-1. The numbers in the columns are any TDM output from the card with the specified Card ID. For example, TDM IN 1 of the card with *Card ID* 1 should be connected to any output from the card with *Card ID* 2.

	TDM IN 1	TDM IN 2	TDM IN 3	TDM IN 4
Card ID 1	2	3	4	5
Card ID 2	1	3	4	5
Card ID 3	1	2	4	5
Card ID 4	1	2	3	5
Card ID 5	1	2	3	4

Table 4-1: EMR Data Port Router TDM Connection

The following tables show the TDM connections for common configurations. These tables also refer to the actual screens on the rear panels so they are easier to follow.

Input Card	Connector	←→	Output Card	Connector
Card ID 1 In 1	TDM 5		Card ID 2 Out 1	TDM 1
Card ID 1 In 2	TDM 6		Card ID 3 Out 1	TDM 1
Card ID 2 In 1	TDM 5		Card ID 1 Out 1	TDM 3
Card ID 2 In 2	TDM 6		Card ID 3 Out 2	TDM 3
Card ID 3 In 1	TDM 5		Card ID 1 Out 2	TDM 2
Card ID 3 In 2	TDM 6		Card ID 2 Out 2	TDM 2

Table 4-2: EMR Data Port System (144 ports, 3 cards)

Input Card	Connector	←→	Output Card	Connector
Card ID 1 In 1	TDM 5		Card ID 2 Out 1	TDM 1
Card ID 1 In 2	TDM 6		Card ID 3 Out 1	TDM 1
Card ID 1 In 3	MADI 1		Card ID 4 Out 1	TDM 1
Card ID 2 In 1	TDM 5		Card ID 1 Out 1	TDM 3
Card ID 2 In 2	TDM 6		Card ID 3 Out 2	TDM 3
Card ID 2 In 3	MADI 1		Card ID 4 Out 2	TDM 3
Card ID 3 In 1	TDM 5		Card ID 1 Out 2	TDM 2
Card ID 3 In 2	TDM 6		Card ID 2 Out 2	TDM 2
Card ID 3 In 3	MADI 1		Card ID 4 Out 3	TDM 2
Card ID 4 In 1	TDM 5		Card ID 1 Out 3	TDM 4
Card ID 4 In 2	TDM 6		Card ID 2 Out 3	TDM 4
Card ID 4 In 3	MADI 1		Card ID 3 Out 3	TDM 4

Table 4-3: EMR Data Port System (192 ports, 4 cards)

Input Card	Connector	←→	Output Card	Connector
Card ID 1 In 1	TDM 5		Card ID 2 Out 1	TDM 1
Card ID 1 In 2	TDM 6		Card ID 3 Out 1	TDM 1
Card ID 1 In 3	MADI 1		Card ID 4 Out 1	TDM 1
Card ID 1 In 4	MADI 2		Card ID 5 Out 1	TDM 1
Card ID 2 In 1	TDM 5		Card ID 1 Out 1	TDM 3
Card ID 2 In 2	TDM 6		Card ID 3 Out 2	TDM 3
Card ID 2 In 3	MADI 1		Card ID 4 Out 2	TDM 3
Card ID 2 In 4	MADI 2		Card ID 5 Out 2	TDM 3
Card ID 3 In 1	TDM 5		Card ID 1 Out 2	TDM 2
Card ID 3 In 2	TDM 6		Card ID 2 Out 2	TDM 2
Card ID 3 In 3	MADI 1		Card ID 4 Out 3	TDM 2
Card ID 3 In 4	MADI 2		Card ID 5 Out 3	TDM 2
Card ID 4 In 1	TDM 5		Card ID 1 Out 3	TDM 4
Card ID 4 In 2	TDM 6		Card ID 2 Out 3	TDM 4
Card ID 4 In 3	MADI 1		Card ID 3 Out 3	TDM 4
Card ID 4 In 4	MADI 2		Card ID 5 Out 4	TDM 4
Card ID 5 In 1	TDM 5		Card ID 1 Out 4	TDM 2
Card ID 5 In 2	TDM 6		Card ID 2 Out 4	TDM 2
Card ID 5 In 3	MADI 1		Card ID 3 Out 4	TDM 2
Card ID 5 In 4	MADI 2		Card ID 4 Out 4	TDM 2

Table 4-4: EMR Data Port System (240 ports, 5 cards)

5. WHAT IS VISTALINK®?

*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. A 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 VistaLINK® Pro Manager graphical user interface (GUI), third party or custom manager software may be used to monitor and control Evertz VistaLINK® enabled fiber optic products.

2. Managed devices (such as EMR modules), each with a unique address (OID), communicate with the NMS through an SNMP 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.

5.1. EMR AUDIO VISTALINK® PARAMETERS

5.1.1. General VistaLINK® Parameters for EMR Audio

The EMR audio modules have general parameters that refer to global functions of the device. These parameters reflect the function of the entire module and are required for general setup. Figure 5-1 shows the VistaLINK® view for the EMR AES output module. The EMR AES input module and the analog audio modules will have similar views.

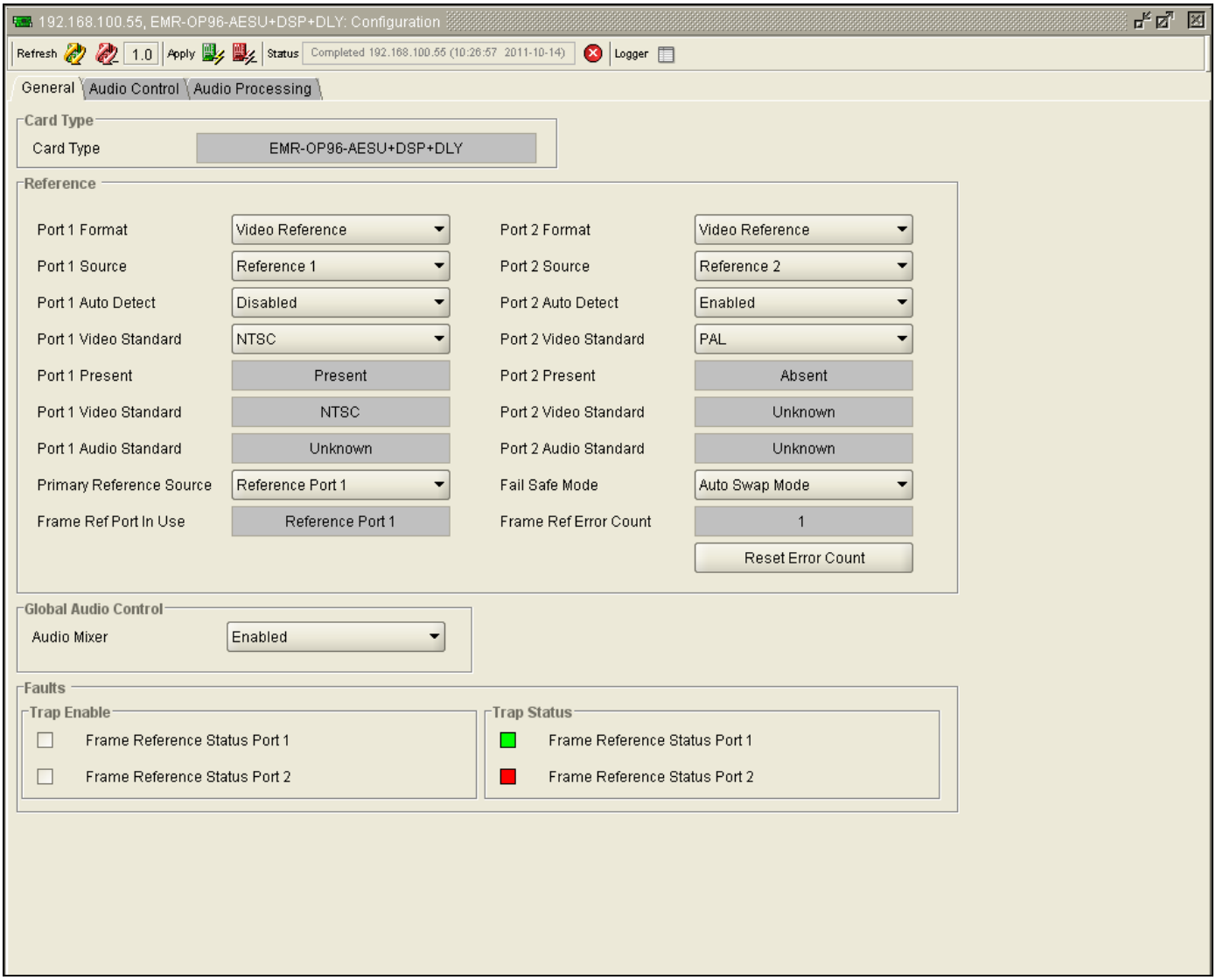


Figure 5-1: VistaLINK® General Tab for EMR Audio

5.1.1.1. General VistaLINK® Control Parameters

The following general audio parameters can be remotely controlled through the VistaLINK® interface. The control parameters for Port 2 have been left out as they are identical in behavior to the Port 1 parameters.

Parameter	Description	Values
Port 1 Format	Sets the format of the reference to input 1	Video Reference Unbalanced Audio Balanced Audio Auto
Port 1 Source	Sets the source of the reference to input 1	Reference 1 Reference 2 DARS 1 DARS 2 Frame Global
Port 1 Auto Detect	Sets the port to auto detect the format and standard of the reference	Disabled Enabled
Port 1 Video Standard	Sets the video standard of the reference signal *(If Auto Detect is enabled then this control will not have any affect)*	NTSC PAL
Primary Reference Source	Sets the primary reference source	Reference Port 1 Reference Port 2
Fail Safe Mode	Sets the behavior of the reference detection mechanism when there is a failure	No Swap Mode Single Swap Mode Auto Swap Mode
Reset Error Count	Resets the Frame Ref Error Count monitoring parameter	None
Audio Mixer	Sets whether the audio mixer controls are used *(+DSP option only)*	Enabled Disabled

Table 5-1: VistaLINK® General Audio Control Parameters

5.1.1.2. General VistaLINK® Monitor Parameters

The following general audio parameters can be remotely monitored through the VistaLINK® interface. The monitor parameters for Port 2 have been left out as they are identical in behavior to the Port 1 parameters.

Parameter	Description
Card Type	Indicates the model of the device including options
Port 1 Present	Indicates the presence of a reference to reference input 1
Port 1 Video Standard	Indicates the video standard of reference input 1 if present
Port 1 Audio Standard	Indicates the sample rate of reference input 1 if present
Frame Ref Port in Use	Indicates which reference port is currently in use
Frame Ref Error Count	Indicates the number of errors accumulated on the reference signal

Table 5-2: VistaLINK® General Audio Monitor Parameters

Note: The Frame Ref Error Count should always be zero once a system has been setup and is in steady state, and after the count has been reset.

5.1.1.3. General VistaLINK® Audio Traps

The following general audio parameters generate traps through the VistaLINK® interface. The trap parameters for Port 2 have been left out as they are identical in behavior to the Port 1 parameters.

Parameter	Description
Frame Reference Status Port 1	Raises a trap when a reference signal is removed from reference input 1

Table 5-3: VistaLINK® General Audio Monitor Parameters

5.1.2. Audio Channel Control VistaLINK® Parameters for Audio EMR

The EMR audio modules have standard control parameters that affect the behavior of each channel independently. These parameters only affect the channel to which they are applied. The affected channel can be selected using the drop down box at the top. Channels are controlled independently but are shown in pairs in the case where users want to control a pair at a time. Figure 5-2 shows the VistaLINK® view for the EMR AES input module. The EMR AES output module and the analog audio modules will have similar views. At the bottom of the tab will be a button that allows the user to apply the settings of channel 1 to all of the channels. Use caution with this function as it will change the state of all signals and cannot be reversed.

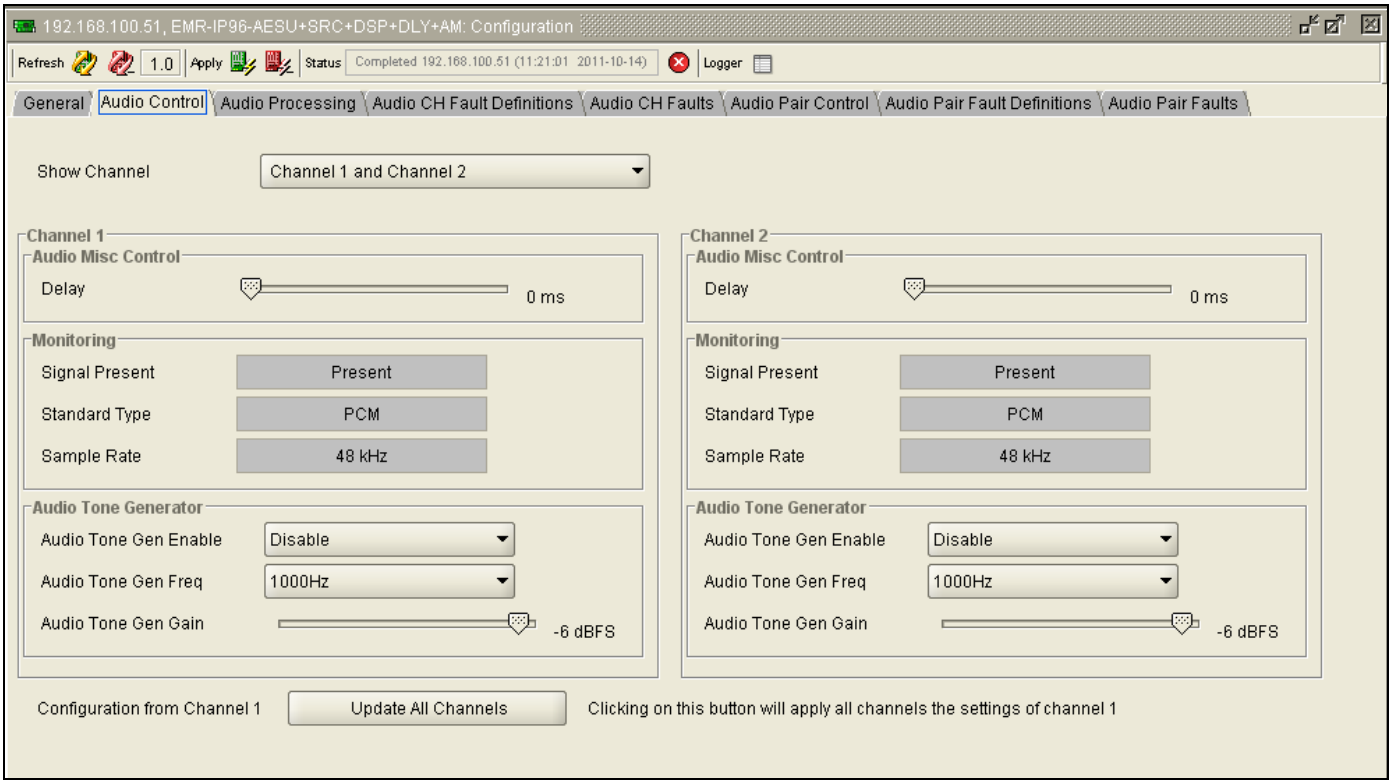


Figure 5-2: VistaLINK® Audio Channel Control Tab for EMR Audio

5.1.2.1. Audio Channel Control VistaLINK® Control Parameters

The following audio channel control parameters can be remotely controlled through the VistaLINK® interface.

Parameter	Description	Values
Delay	Sets the audio delay *(+DLY option only)*	0 – 1364 ms *(in one sample increments)*
Audio Tone Gen Enable	Sets the internal tone generator	Disable Enable
Audio Tone Gen Freq	Sets the frequency of the tone generator	10 Hz 100 Hz 1000 Hz
Audio Tone Gen Gain	Sets the gain of the tone generator	-80 – 0 dBFS *(in 1 dBFS increments)*

Table 5-4: VistaLINK® Audio Channel Control Parameters

5.1.2.2. Audio Channel Control VistaLINK® Monitor Parameters

The following audio channel control parameters can be remotely monitored through the VistaLINK® interface.

Parameter	Description
Signal Present	Indicates the presence of an audio signal
Standard Type	Indicates the type of audio signal
Sample Rate	Indicates the sample rate of the audio signal

Table 5-5: VistaLINK® Audio Channel Control Monitor Parameters

5.1.3. Audio Channel Processing VistaLINK® Parameters for Audio EMR

The EMR audio modules have optional *(+DSP option)* processing parameters that affect the behavior of each channel independently. These parameters only affect the channel to which they are applied. The affected channel can be selected using the drop down box at the top. Channels are controlled independently but are shown in pairs in the case where users want to control a pair at a time. Figure 5-3 shows the VistaLINK® view for the EMR AES output module. The EMR AES input module and the analog audio modules will have similar views. At the bottom of the tab will be a button that allows the user to apply the settings of channel 1 to all of the channels. Use caution with this function as it will change the state of all signals and cannot be reversed.

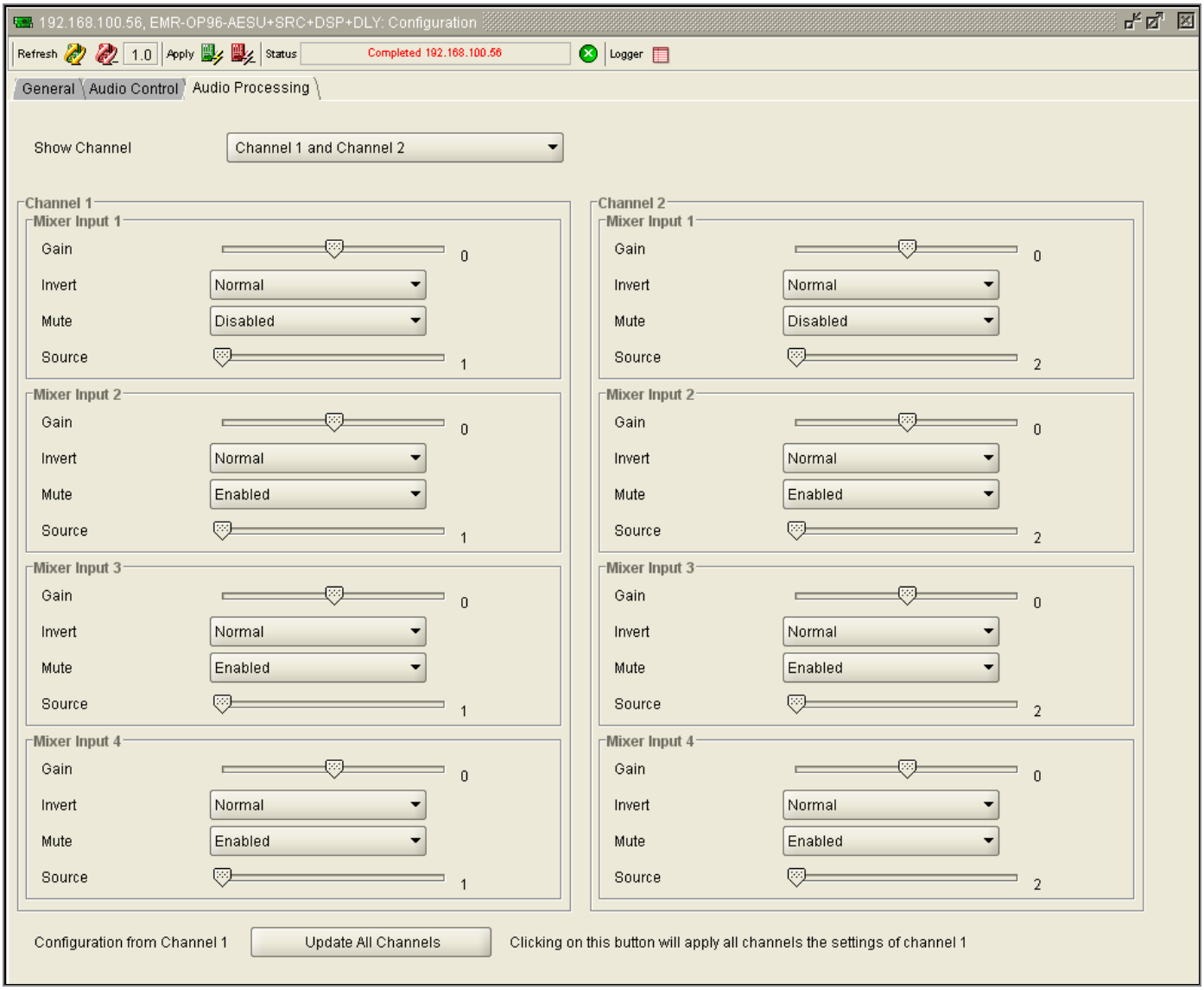


Figure 5-3: VistaLINK® Audio Channel Processing Tab for EMR Audio

5.1.3.1. Audio Channel Processing VistaLINK® Control Parameters

The following audio processing parameters can be remotely controlled through the VistaLINK® interface. Only the parameters for Mixer Input 1 are described but the same logic is applied to Mixer Inputs 2-4.

Parameter	Description	Values
Gain	Sets the gain applied to the signal	-24 to +24 dB *(in 1 dB increments)*
Invert	Inverts the phase of the signal by 90 degrees	Normal Invert
Mute	Mutes the audio signal	Disabled Enabled
Source	Sets the source of the mixer	1 to 256

Table 5-6: VistaLINK® Audio Processing Control Parameters

5.1.4. Audio Pair Control VistaLINK® Parameters for Audio EMR

The EMR AES input module has optional *(+SRC option)* control parameters that affect the behavior of each pair independently. These parameters only affect the pair to which they are applied. The affected pair can be selected using the drop down box at the top. Figure 5-4 shows the VistaLINK® view for the EMR AES input module. At the bottom of the tab will be a button that allows the user to apply the settings of pair 1/2 to all of the pairs. Use caution with this function as it will change the state of all signals and cannot be reversed.

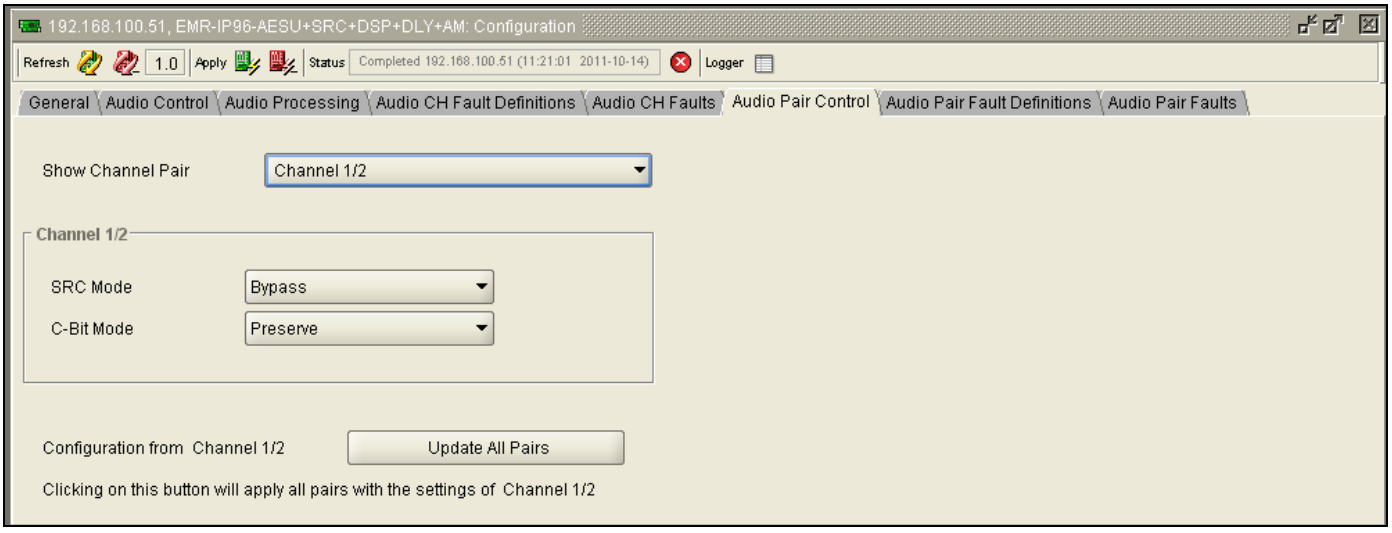


Figure 5-4: VistaLINK® Audio Pair Control Tab for EMR Audio

5.1.4.1. Audio Pair Control VistaLINK® Control Parameters

The following audio pair control parameters can be remotely controlled through the VistaLINK® interface.

Parameter	Description	Values
SRC Mode	Sets the mode of the sample rate converter *(+SRC option only)*	Bypass Enable Auto
C-Bit Mode	Sets the behavior of the channel status bits	Preserve Replace

Table 5-7: VistaLINK® Audio Pair Control Parameters

5.1.5. Audio Channel Fault Definitions VistaLINK® Parameters for Audio EMR

The EMR audio modules have optional *(+AM option)* advanced monitoring parameters that affect the behavior of each channel independently. These parameters only affect the channel to which they are applied. The affected channel can be selected using the drop down box at the top. Channels are controlled independently but are shown in pairs in the case where users want to control a pair at a time. Figure 5-5 shows the VistaLINK® view for the EMR AES input module. The EMR analog audio input module will have a similar view. At the bottom of the tab will be a button that allows the user to apply the settings of channel 1 to all of the channels. Use caution with this function as it will change the state of all signals and cannot be reversed.

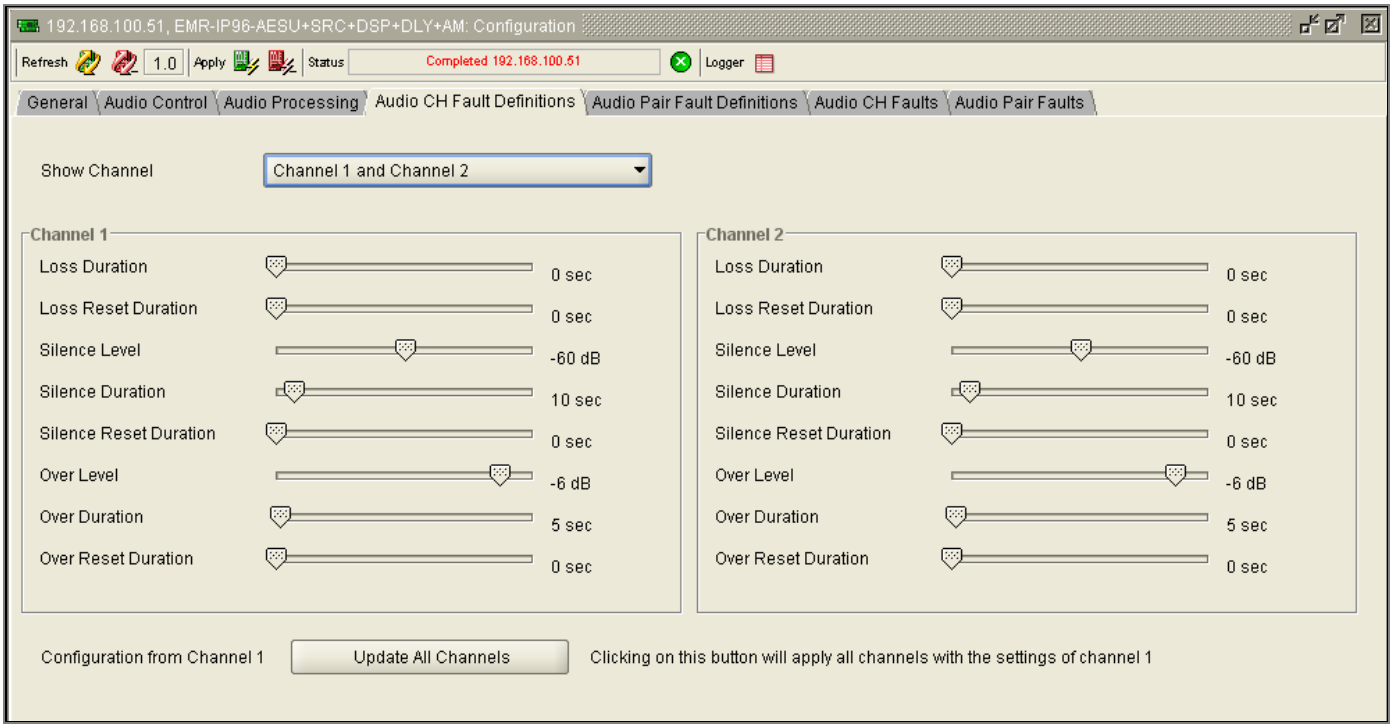


Figure 5-5: VistaLINK® Audio Channel Fault Definitions Tab for EMR Audio

5.1.5.1. Audio Channel Fault Definitions VistaLINK® Control Parameters

The following audio channel fault definitions parameters can be remotely controlled through the VistaLINK® interface.

Parameter	Description	Values
Loss Duration	Sets the duration before the signal is declared lost	0 to 300 seconds
Loss Reset Duration	Sets the duration before the loss detection begins monitoring again	0 to 60 seconds
Silence Level	Sets the level of the signal at which it is declared silent	-80 to -40 dB
Silence Duration	Sets the duration before the signal is declared silent	1 to 128 seconds
Silence Reset Duration	Sets the duration before the silence detection begins monitoring again	0 to 60 seconds
Over Level	Sets the level of the signal at which it is declared over	-45 to 0 dB
Over Duration	Sets the duration before the signal is declared over	1 to 255 seconds
Over Reset Duration	Sets the duration before the over detection begins monitoring again	0 to 60 seconds

Table 5-8: VistaLINK® Audio Channel Fault Definitions Control Parameters

5.1.5.2. Audio Channel Fault Definitions VistaLINK® Traps

The following audio channel fault definitions parameters generate traps through the VistaLINK® interface.

Parameter	Description
Audio Loss	Raises a trap when audio is lost given the thresholds described
Audio Silent	Raises a trap when audio is silent given the thresholds described
Audio Over	Raises a trap when audio is over given the thresholds described

Table 5-9: VistaLINK® Audio Channel Fault Definition Traps

5.1.6. Audio Pair Fault Definitions VistaLINK® Parameters for Audio EMR

The EMR audio modules have optional *(+AM option)* advanced monitoring parameters that affect the behavior of each set of audio pairs. These parameters only affect the pairs to which they are applied. The affected pair can be selected using the drop down box at the top. Figure 5-6 shows the VistaLINK® view for the EMR AES input module. The EMR analog audio input module will have a similar view. At the bottom of the tab will be a button that allows the user to apply the settings of pair 1/2 to all of the pairs. Use caution with this function as it will change the state of all signals and cannot be reversed.

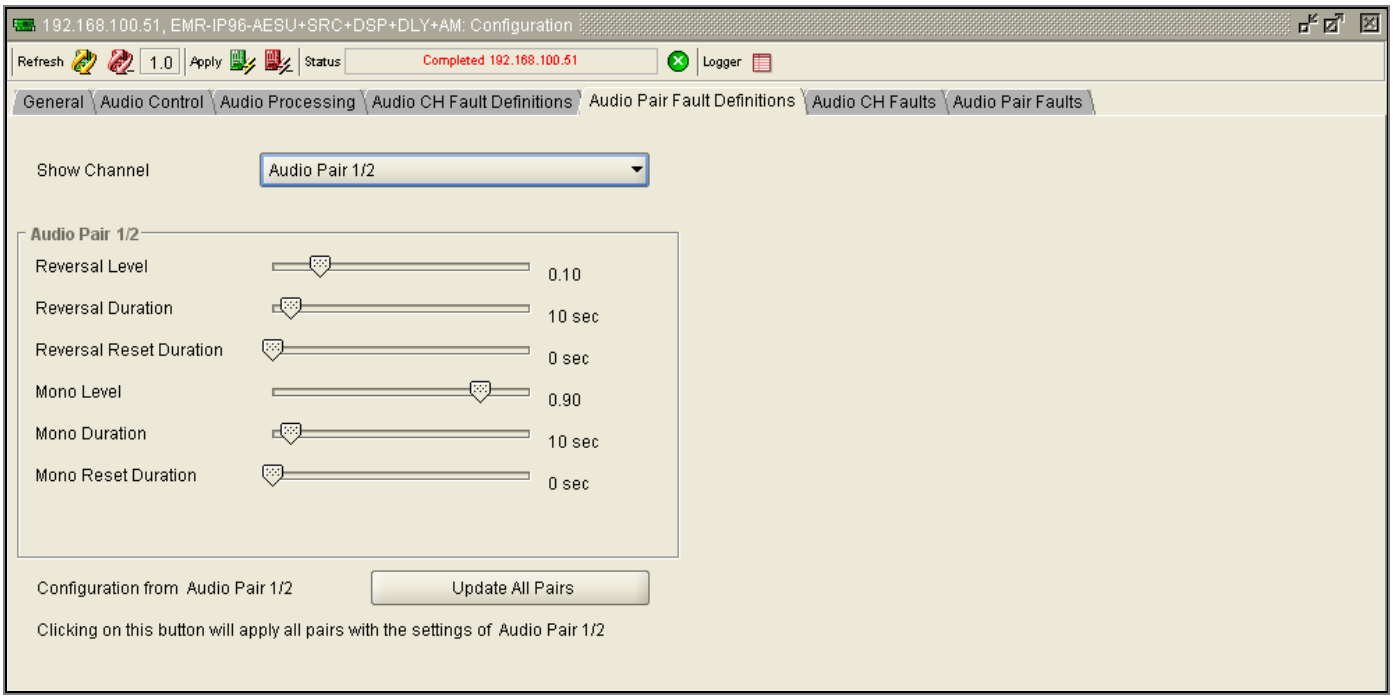


Figure 5-6: VistaLINK® Audio Pair Fault Definitions Tab for EMR Audio

5.1.6.1. Audio Pair Fault Definitions VistaLINK® Control Parameters

The following audio pair fault definitions parameters can be remotely controlled through the VistaLINK® interface.

Parameter	Description	Values
Reversal Level	Sets the ratio of the pair at which it is declared out of phase	0.01 to 0.50
Reversal Duration	Sets the duration before the signal is declared out of phase	1 to 128 seconds
Reversal Reset Duration	Sets the duration before the phase detection begins monitoring again	0 to 60 seconds
Mono Level	Sets the ratio of the pair at which it is declared mono	0.50 to 1.00
Mono Duration	Sets the duration before the signal is declared mono	1 to 128 seconds
Mono Reset Duration	Sets the duration before the mono detection begins monitoring again	0 to 60 seconds

Table 5-10: VistaLINK® Audio Pair Fault Definitions Control Parameters

5.1.6.2. Audio Pair Fault Definitions VistaLINK® Traps

The following audio pair fault definitions parameters generate traps through the VistaLINK® interface.

Parameter	Description
Phase Reversal	Raises a trap when audio pair is out of phase given the thresholds described
Mono	Raises a trap when audio pair is considered the same given the thresholds described

Table 5-11: VistaLINK® Audio Pair Fault Definition Traps

5.1.6.3. Audio Bar Graphs in VistaLINK®

The EMR AES and analog input modules have has optional *(+AM option)* feature that allows them to send audio level and peak information over Ethernet to a device such as VistaLINK®. The bar graph display can be access by right clicking on the device in the navigation tree and selecting the *Audio Bar Graph* option. This will bring up a display that looks like the image shown in Figure 5-7.

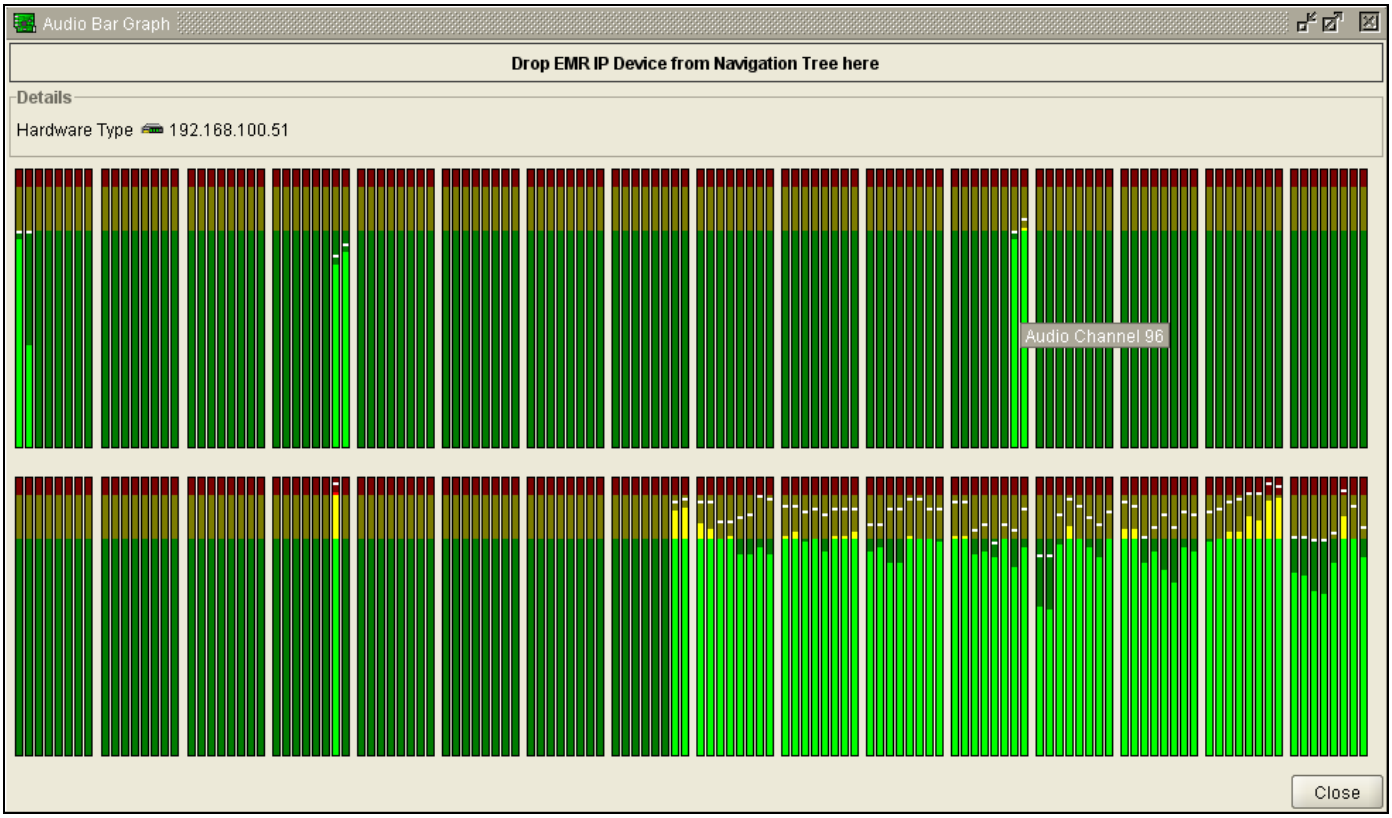


Figure 5-7: VistaLINK® Audio Bar Graph

5.2. EMR DATA PORT VISTALINK® PARAMETERS

5.2.1. Port Configuration VistaLINK® Parameters for EMR Data Port

The EMR data port modules have standard control parameters that affect the behavior of each port independently. These parameters only affect the port to which they are applied. The affected port can be selected using the drop down box at the top. Figure 5-8 shows the VistaLINK® view for the EMR data port module.

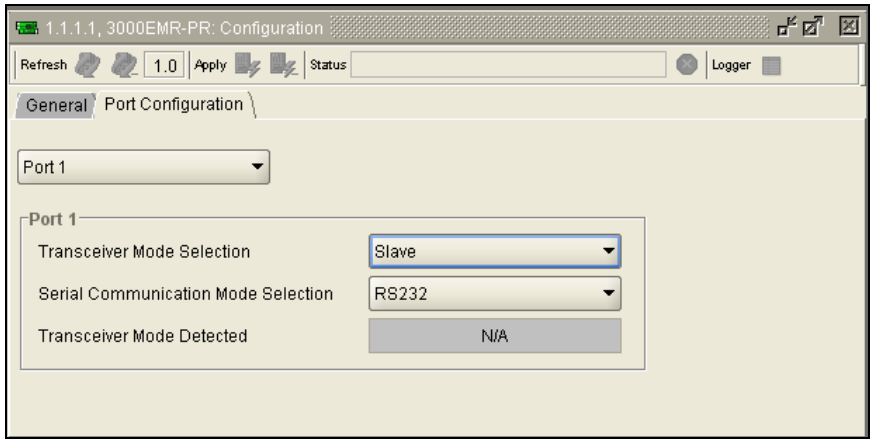


Figure 5-8: VistaLINK® Port Control Tab for EMR Data Port

Note: Refer to Table 2-21 for the pin-out associated with each change to the configuration of the port. In some cases, if the wiring is incorrect, the Transceiver Mode Selection can be used to rectify the problem.

5.2.1.1. Port Configuration VistaLINK® Control Parameters

The following port configuration parameters can be remotely controlled through the VistaLINK® interface.

Parameter	Description	Values
Transceiver Mode Selection	Sets the mode of the transceiver port	Transceiver Off Sony Auto Detect Slave Controller
Serial Communication Mode Selection	Sets the serial communication mode of the port	RS-232 RS-422

Table 5-12: VistaLINK® Port Configuration Control Parameters

5.2.1.2. Port Configuration VistaLINK® Monitor Parameters

The following data port monitor parameters can be remotely monitored through the VistaLINK® interface.

Parameter	Description
Transceiver Mode Detected	Indicates the state of the transceiver when Sony Auto Detect mode is used

Table 5-13: VistaLINK® Port Configuration Monitor Parameters

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6. EMR CONFIGURATION WITH MAGNUM

6.1. EMR INTEGRATED AUDIO ROUTING

The EMR integrated audio routing solution is a sophisticated system that requires a control system to regulate all of the interconnections and to monitor the thousands of possible routes. The EMR audio solution requires the use of Magnum to perform these functions. Magnum is the control system used to configure and control all Evertz routers. The next few sections provide some details on how to get the integrated audio solution up and running. For more detailed instructions, please consult the user manual for Magnum.

6.1.1. Configuration Using Magnum

Before configuring the EMR integrated audio routing solution a decision must be made on whether the system will be configured for mono or stereo operation. This will determine how the size of each device will be defined. For example, in stereo operation, the EMR-IP96-AESU is defined as a 128X2 device. That is, there are 128 AES inputs (96 AES + 1 MADI) and 2 TDM outputs. If the same device is defined in a mono configuration then the size would be 256X2.

Note: The default setup in Magnum is for stereo operation. For mono applications, please contact Evertz service for more details.

6.1.2. Adding EMR Audio Modules to Magnum

Each device in the EMR audio routing system must be added to the server. This is done by using the add button located under the *Devices* section, under *SYSTEM*. Once this button is clicked it will bring up a dialog to add each device. In the dialog, the name, number of inputs, number of outputs and IP address needs to be defined. Take note of the default port that appears after the IP address when the dialog is first brought up. Do not delete this port number. It is required for communications with the device. Figure 6-1 shows the *Add Device* dialog for the EMR-IP96-AESU.

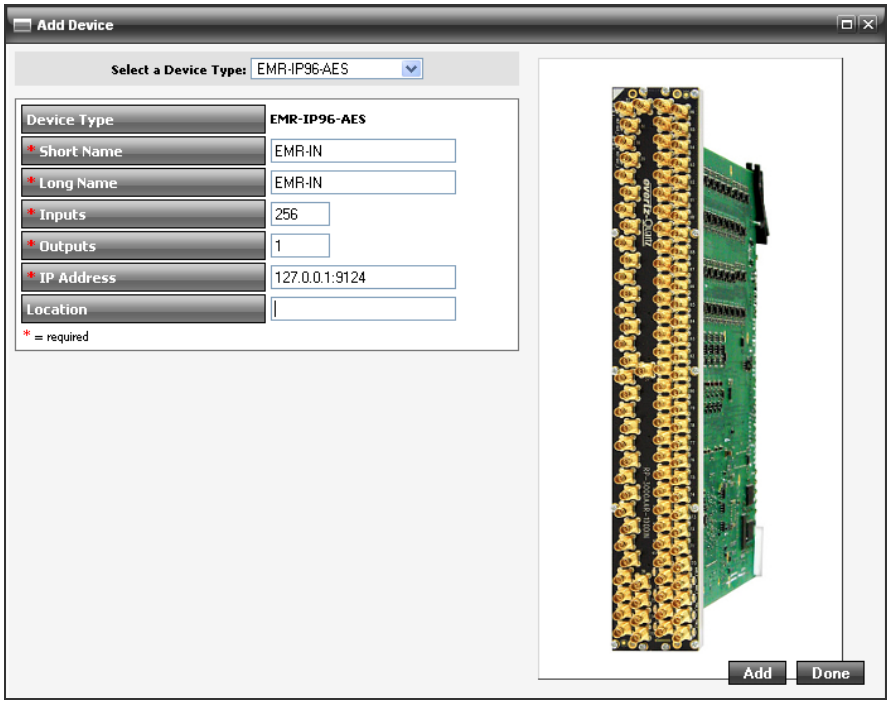

Figure 6-1: Magnum Add Device Dialog

Each EMR input and output module must be added to the server along with the 3000ADMX-16X16 crosspoint module.

Once each module is added to the server, they will all appear in the devices list as shown in Figure 6-2.

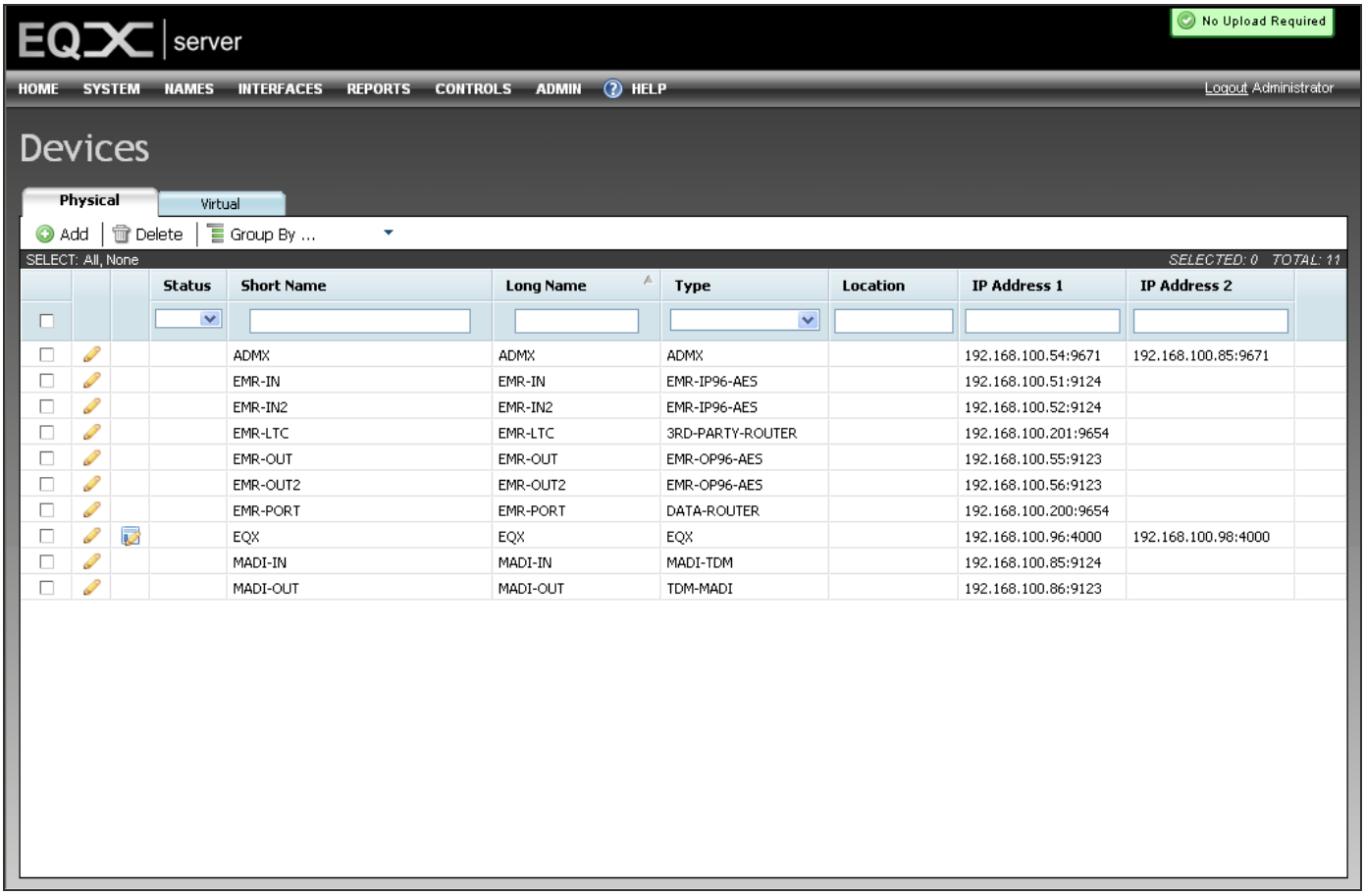

Figure 6-2: Magnum Devices Page

6.1.3. Adding EQX Embedding and De-Embedding Modules to Magnum

For systems that utilized the EQX embedding and de-embedding modules, an additional step is required to add them to the server. Once an EQX router has been defined and added to the system, click on the *Edit* (to enter the EQX layout configuration page shown in Figure 6-3. Within this page, identify each slot which will contain an EQX de-embedder module (AVIP16H-AUD) and EQX embedder module (AVOP16H-AUD). This is done by double-clicking on the slot and selecting the desired device.

Once this is complete, each module will require a specific IP address assigned to it. This is accomplished by right-clicking the slot and entering the *IP Address.*

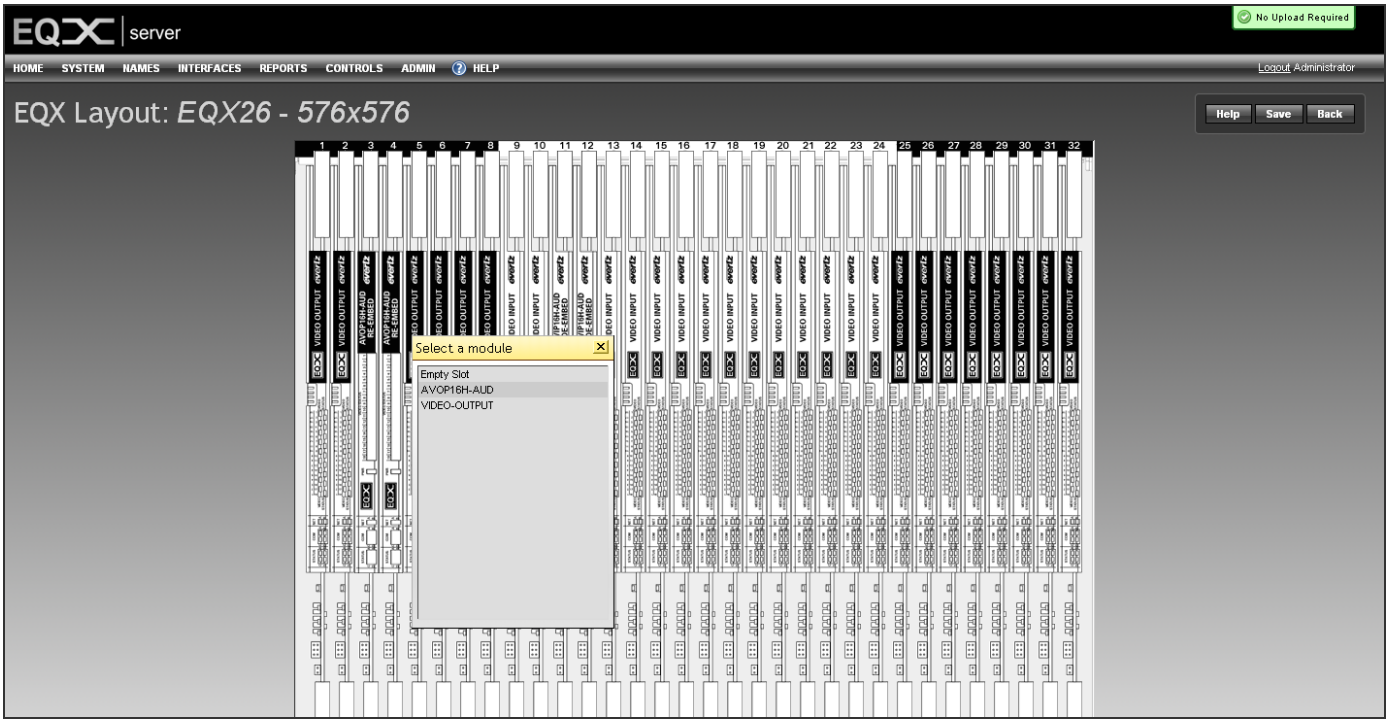

Figure 6-3: Magnum EQX Layout Page

6.1.4. Interfacing All EMR Audio Modules

Once all of devices are added to Magnum, tielines must be created to interface all of the modules. As described earlier, each input module must connect to the 3000ADMX-16X16 via a TDM connection. This TDM connection must be defined in the server so that the control system is aware of how to route the signal. The connections are added using the *Tielines* page under the *SYSTEM* menu.

A tieline from each EMR input module, and each EQX de-embedder to the input of the 3000ADMX-16X16 must be created. Also, a tieline from the 3000ADMX-16X16 to each EMR output module and each EQX embedder must be created. Figure 6-4 shows an example of the tielines that are created for an integrated audio routing system.

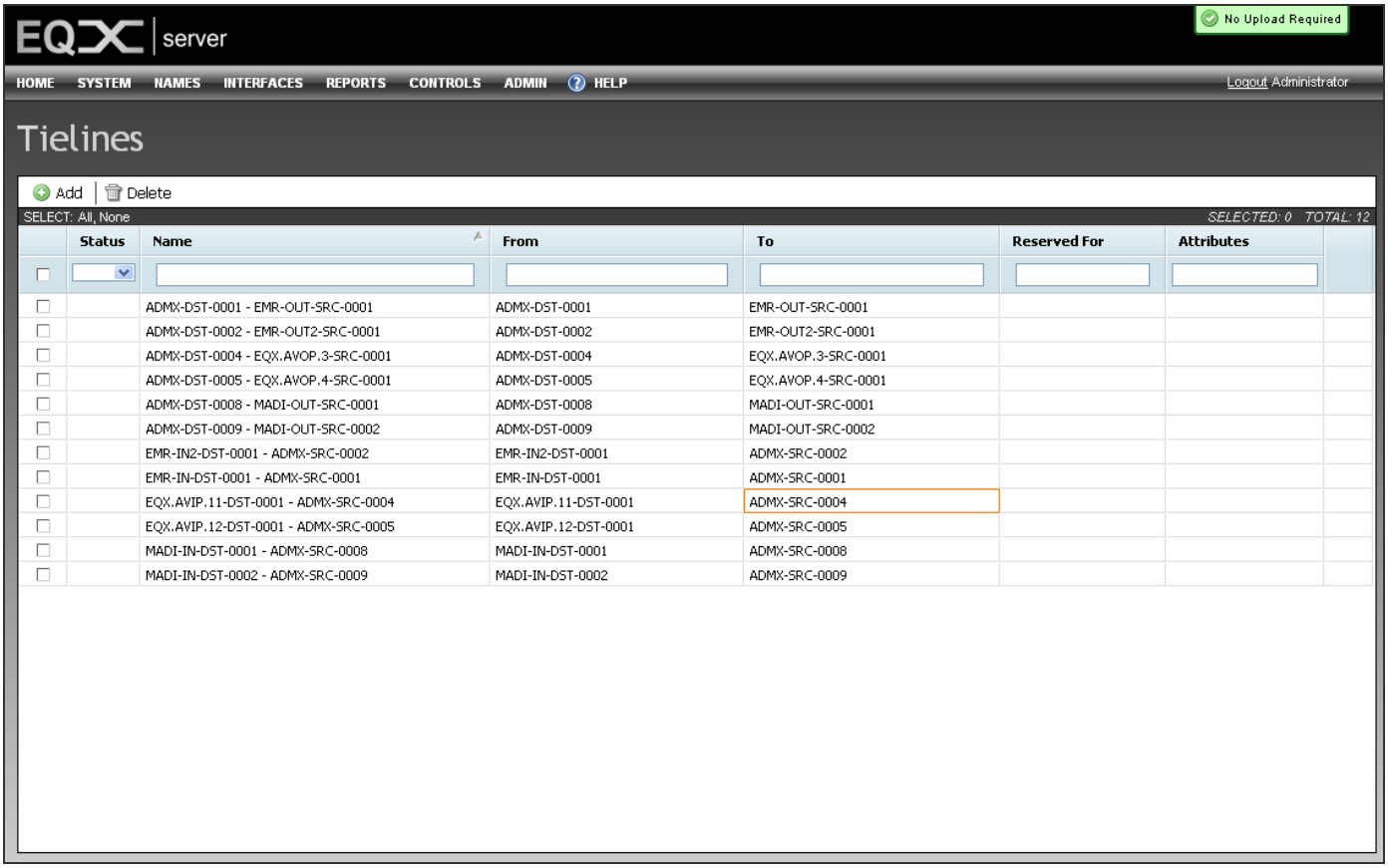

Figure 6-4: Magnum Tielines Page

6.2. TIME CODE ROUTING

The EMR time code router is controlled using Quartz protocol over IP through the frame controller. Within an EMR time code system the input modules are all passive and do not communicate with the control system. Only the output modules communicate with the control system to make route changes.

In any EMR time code system that has multiple output modules, any output module is considered the master and any output module can communicate with the control system. In the case of Magnum, only one output module is added to the *Devices* page but the entire size of the system must be defined appropriately.

For example, the IP address of *Card ID* 1 can be used as the main and the IP address of *Card ID* 2 can be used as the backup.

Note: The default port for communicating with the EMR time code modules is 4000.

6.3. DATA PORT ROUTING

The EMR data port router is controlled using Quartz protocol over IP through the frame controller. In any EMR data port system that has multiple modules, any module is considered the master and any module can communicate with the control system. In the case of Magnum, only one module is added to the *Devices* page but the entire size of the system must be defined appropriately.

For example, the IP address of *Card ID* 1 can be used as the main and the IP address of *Card ID* 2 can be used as the backup.

When defining the size of the data port router, use 337 as the size even if there are fewer ports in the system. Port 337 is the *IDLE* port and is used to park ports that are not used. This is done automatically by the data port router but should be defined in Magnum in order to receive the proper tally information. Any ports that are not available can be hidden using Source and Destination Availability in Magnum.

Note: The default port for communicating with the EMR data port modules is 4000.

7. MODULE UPGRADES

There are two primary upgrade processes available to the user: File Transfer Protocol (FTP) and Serial Upload. Both are described below for specific I/O modules.

7.1. NETWORKING FUNDAMENTALS (FTP UPGRADE PROCESS)

Before any FTP (file transfer protocol) upgrades can be initiated:

- Modules must be pre-configured with IP addresses
- The user must determine the IP address of the PC/laptop
- All nodes must be on the same subnet for the FTP upgrade to work properly

To check if a proper network connection has been established:

1. Connect the network cable from the PC/laptop to the EMR frame

2. Open a Command Prompt window (**Start > Programs > Accessories > Command Prompt**) on the PC/laptop

3. Ping the IP address of the module being upgraded. For example:

C:\ ping 192.168.9.100 <Enter>

If a proper network connection has been established, a “reply” is displayed on the DOS window

If the network connection is faulty, a “Destination Host Unreachable” message is provided. This means that either the IP addresses of the nodes should be verified or the network (Ethernet) cable is faulty.

7.2. UPGRADING THE APPLICATION CODE

There are two upgrade processes available for all EMR modules: File Transfer Protocol (FTP), and Serial Upload. Both FTP and Serial Upgrade methods are described.

7.2.1. FTP Upgrade Method

1. Identify and confirm the IP addresses of the module and PC/laptop, and ensure that they are on the same subnet

2. Power on the EMR system with the module installed in the EMR frame

3. Obtain the new application code from the FTP site and place it on the PC’s local drive

4. Open a DOS window by selecting **Start > Run**, and typing “cmd” in the window that appears, as shown in Figure 7-1

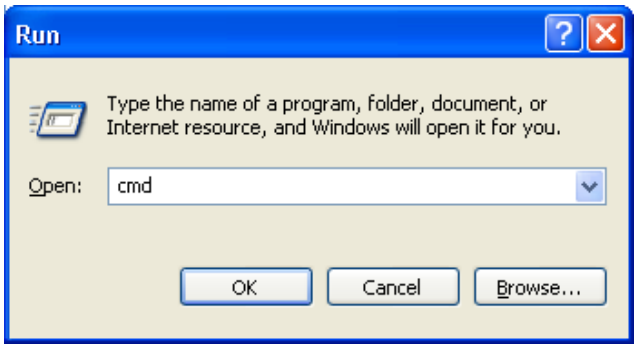

Figure 7-1: Run Window

5. In the DOS window type: ***ftp xxx.xxx.xxx.xxx*** (where the x's represent the module's IP address)
6. Press <ENTER> when prompted for a "Username", and again when prompted for a "Password"
7. At the "FTP>" prompt, type "quote site upgrade"
8. At the "FTP>" prompt, type "put x.bin", where x represents the name of the application (.bin) file

Note: If the application file is not local to where you are performing the FTP, then include the path with the name:

(e.g.: "put c:\temp\emr\firmware.bin")

9. A message indicating the successful connection to the module is displayed
10. At this time, the card-edge will show a "% complete" value, indicating that the card is now uploading the new code. During this time it is mandatory that all power cycles of the module or frame be avoided

7.2.2. Serial Upload Method

This method transfers the new application code via the upgrade serial port on the front edge of the module.

1. Turn off the EMR frame containing the module that is to be upgraded
2. Connect the factory-supplied 7700PB serial upgrade cable (J2 on 3000 modules and J23 on EMR modules) on the front edge of the card, and connect the other end of this cable to a serial port on a PC with a serial terminal program
3. Place a jumper across pins 2 and 3 on (J4 on 3000 modules and J49 on EMR modules) ("Upgrade" mode)

4. Set up the serial communication properties for the COM port as follows:

   COM: Select the COM port
   Bits per second: 115200
   Data bits: 8
   Parity: None
   Stop bits: 2
   Flow control: None

5. Power on the EMR frame with the module installed

6. When the module boots-up, “PPCBOOT>” is displayed on the terminal screen

7. At the prompt type “upload”, then press <ENTER>

8. The following message will be displayed:

   Upload product firmware now

9. Upload the application code by using the *send file* function in the terminal software. When prompted, use the “Xmodem” protocol for data transfer

When the transfer is complete (which can take up to 30 minutes or more) the terminal will return to the PPCBOOT prompt. You should:

1. Turn off the EMR frame

2. Remove the module from the EMR frame and remove the upgrade serial cable

3. Place a jumper across pins 1 and 2 on (J4 on 3000 modules and J49 on EMR modules) (“Run” mode)

4. Re-insert the module into the EMR frame

7.2.3. Upgrading 3000FC and EMX-FC Application Code

The 3000FC and EMX-FC are upgraded via the configuration serial port (J7) near the front of the card.

1. Turn off the EMR frame with the FC card that is to be upgraded.

2. Connect the 7700PB serial upgrade cable supplied with the EMR frame to the J7 on the front edge of the FC card and connect the other end of this cable to a serial port on a PC with a serial terminal program.

3. Place a jumper across pins 1 and 2 on J7 ("Upgrade Mode").

4. Set up the serial communication properties for the COM port as follows:

   COM: Select the COM port
   Bits per second: 57600
   Data bits: 8
   Parity: None
   Stop bits: 2
   Flow control: None

5. Power on the EMR frame with the FC card installed.

6. When the FC card boots up, the following information will be printed on the terminal screen:

```
EVERTZ MCF5272 MONITOR 2.3 BUILD 3 (66 MHZ)
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28F160C3B FLASH DETECTED
BRD=3000FC
MODEL=BA3000FC
PROD=3000FC
FRAME=3000FR
UPGRADE JUMPER INSTALLED
```

7. `UPLOAD FILE NOW, CONTROL-X TO CANCEL`

8. To upload the FC with the new application code, use the *send file* function in the terminal software.

Note: If prompted, use the "Xmodem" protocol for data transfer.

Execute the following steps when the download is complete:

1. Power down the EMR frame.

2. Remove the FC card from the frame.

3. Disconnect the upgrade serial cable, and place a jumper across pins 2 and 3 on J7.

4. Insert the FC card back into the EMR frame and power up the EMR frame.

8. TROUBLESHOOTING THE EMR

This section offers some basic guidance on how to debug the EMR system and provides some tools to facilitate the commissioning process.

8.1. TDM CONNECTIONS

The most essential part of the EMR system is the various TDM connections. Ensuring that all TDM connections are solid and error free should be the very first task of validating the system and also the first step in troubleshooting any issues. The following sections describe how to validate the TDM connections in the system.

8.1.1. Verifying TDM Connections to the EMR-ADMX-16X16

TDM connections to the EMR-ADMX-16X16 are paramount to the function of the system. The presence and validity of the connections can be verified simply by looking at the TDM presence LEDs as described in section 2.2.5.1.

As a further check, more detailed information can be obtained by going to the debug menu either through the front serial port or by telneting to the module. Within the debug menu, there will be an option called *TDM input diagnostics.* This option will display the *Status, Error Rate, and Source* for each input connection.

Using the information from this, check that all expected signals are present and no errors have accumulated. If errors have accumulated then this is an indication of a bad connection to the rear plate, a bad wire, or excessive cable length. Also verify that the source indicated by the card matches the connections defined in Magnum.

8.1.2. Verifying TDM Connections to the EMR Output Modules

The EMR AES and analog modules provide LEDs on the front card edge and rear panel to show TDM presence. Details regarding the locations of the LEDs can be found in section 2.2 for each of the modules. If the LEDs do not display as expected then this is an indication of a bad connection to the rear plate, a bad wire, or excessive cable length.

A flashing LED indicates that the TDM signal is present and valid but not being used by the module. In this case, the module can be configured to use the TDM input using VistaLINK Pro. If the main TDM input does not appear to work, the secondary input can be used simply by moving the connection over. As default the EMR output modules are set to auto detect which TDM input is present at all times.

8.1.3. Verifying TDM Connections to the EQX Embedder and EMR-OP16-MADI Modules

The EQX-OP16AE-H(-3G)-2TDM modules and the EMR-OP16-MADI modules both have the same TDM detection capabilities as the EMR-ADMX-16X16. Each module has a debug menu that can be accessed through the front serial port. Under the *Audio Diagnosics* menu, select *TDM Input Status*. This will display the *Status, Error Rate, and Source* for each input connection.

Using the information from this, check that all expected signals are present and no errors have accumulated. If errors have accumulated then this is an indication of a bad connection to the rear plate, a bad wire, or excessive cable length. Also verify that the source indicated by the card matches the connections defined in Magnum.

8.2. REFERENCES

The EMR system requires that all sources are locked to a common reference. Not doing so can result in undesired distortion or 'pop's in the resulting audio. The following sections describe how to validate the reference for the system.

8.2.1. Verifying Reference to the EMR Modules

All of the EMR AES and analog input and output modules require a common reference. This reference is supplied through the frame. Each card has an LED that provides an indication of whether a reference is present. The behavior and location of the LEDs are described in section 2.2.

If the reference LED does not behave as expected, check the frame to ensure that the correct reference is being used. The EMR modules can be configured using VistaLINK Pro to use one of two references supplied by the frame.

Also, using VistaLINK®, check the Frame Ref Error Count for each module to ensure that it is not accumulating. After a system has been setup and is in steady state, this counter should be reset so that it is zero. If the reference signal is clean then this count should not increase any further.

8.2.2. Verifying Reference to the EMR-OP16-MADI

The EMR-OP16-MADI is the only MADI module that requires a reference to function correctly. This reference is supplied through the frame. A set of LEDs on the front provide an indication of whether a reference is present or not. The behavior and location of the LEDs are described in section 2.2.

8.2.3. Verifying Reference to the EQX De-embedder and Embedder Modules

The EQX-IP16AD-H(-3G)-2TDM and EQX-OP16AE-H(-3G)-2TDM use the reference provided by the EQX frame. Please consult the EQX manual to ensure that the router is configured correctly to use the reference provided.

On each of the EQX-IP16AD-H(-3G)-2TDM and EQX-OP16AE-H(-3G)-2TDM modules, dip switch 4 must be set to either 59.94Hz (CLOSED or down) or 50Hz (OPEN or up). This frequency corresponds to the frequency of the reference. When this is set correctly, status LED C on the respective module should flash green. If the reference is not present or if the dip switch is not configured correctly then the LED will be solid red.

8.3. SIGNALS

8.3.1. Verifying Input Signals to EMR Modules

The EMR AES and analog input modules provide various methods for verifying input signal presence. AES or analog inputs to the EMR can be monitored using one of three available options: the video output, the front card edge LEDs, and VistaLINK PRO. Using one of these methods will enable quick validation of the hardware, rear plate connection, wiring, and patch panel (if applicable) of the input path.

8.3.2. Verifying Output Signals from EMR Modules

The EMR AES and analog output modules provide an internal tone generator that can be used to validate the hardware, rear plate connection, wiring and patch panel (if applicable) of the output path. By using the internal tone generator it is not necessary to prove the path to an input device and through the crosspoint.

8.3.3. Verifying Input Signals to the EMR-IP16-MADI

The EMR-IP16-MADI provides status information regarding its MADI inputs via front card edge LEDs. Details regarding the behavior of the LEDs are explained in section 2.2.6.1.

8.4. MAGNUM CONFIGURATION

8.4.1. Verifying Tieline Definitions

As discussed in section 6.1.4, all TDM connections require an equivalent tieline definition in Magnum. If a tieline has not been defined, or its definition does not match that of the physical connection then the corresponding components will not work. It is important that the two are cross-checked to ensure compatibility as the server does not do any automatic checks to ensure accuracy.

8.4.2. Verifying Source Availability

In order to route any source to a specific destination, the source must be explicitly made available to the destination using Magnum. This is especially true if the system consists of EMR modules and EQX modules. The EMR AES and analog sources must be made available to the EQX destinations that are embedding destinations, and the EQX sources that are de-embedding sources need to be made available to EMR AES and analog destinations.

When configuring source availability, if the desired source does not appear in the list, it is a good indication that the tieline has not been defined correctly.

For systems with multiple EMR input and output modules, ensure that sources from every input module are made available to every output module.

8.5. TROUBLESHOOTING CHECKLIST

When encountering any problems, use this checklist to quickly assess the situation:

1. Are all TDM connections secure and solid?
2. Is a common reference being applied to all parts of the system?
3. Does the input signal reach the input module in question?
4. Does the output signal reach the final destination in question?
5. Are the tielines defined?
6. Is the source available to the destination in question?