TECHNICAL MANUAL

INTEGRITY 600 SERIES

MDX644 HD/SD, AES/DOLBY E AUDIO DE-EMBEDDER/EMBEDDER

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July, 2008

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Chapter 1 About This Manual

1.1 Documentation and Safety Overview

This manual provides instructions for the installation, operation, and maintenance as well as a top-level functional description of the Integrity 600 Series MDX644 Audio De-Embedder/Embedder built by QuStream.

It is the responsibility of all personnel involved in the installation, operation, and maintenance of the equipment to know all the applicable safety regulations for the areas they will be working in. ***Under no circumstances should any person perform any procedure or sequence in this manual if the procedural sequence will directly conflict with local Safe Practices. Local Safe Practices shall remain as the sole determining factor for performing any procedure or sequence outlined in this document.***

1.2 Warnings, Cautions, and Notes

Throughout this document, you should notice various Warnings, Cautions, and Notes. These addendum statements supply necessary information pertaining to the text or topic they address. It is imperative that audiences read and understand the statements to avoid possible loss of life, personal injury, and/or destruction/damage to the equipment. These additional statements may also provide added information that could enhance the operating characteristics of the equipment (i.e., Notes). Examples of the graphic symbol used to identify each type of statement and the nature of the statement content are shown in the following paragraphs:

1.2.1 Warning

	**Warning statements identify conditions or practices that can result in loss of life or permanent personal injury if the instructions contained in the statement are not complied with.**

1.2.2 Caution

	**Caution statements identify conditions or practices that can result in personal injury and/or damage to equipment if the instructions contained in the statement are not complied with.**

1.2.3 Note

	**Notes are for information purposes only. However, they may contain invaluable information important to the correct installation, operation, and/or maintenance of the equipment.**

Chapter 2 Introduction

2.1 DESCRIPTION

QuStream's MDX644 HD/SD, AES/Dolby E Audio De-Embedder/Embedder is a member of the Integrity 600 Series family of video and audio processing products, featuring "Fortel Inside" Technology. This combination de-embedder and embedder supports most international SD and HD specifications, including SMPTE-292M and SMPTE-259M,and incorporates 3Gbs capable circuitry architecture.

The MDX644 is an all in one board that de-embeds all audio groups, processes the audio, and allows combining with external AES/Dolby E inputs to form new embedded groups. Audio processing includes individual channel and user definable group gain, individual channel phase inversion, channel shuffling, summing and compensating delay of de-embedded channels as well as inputs from rear panel BNCs and the midplane. The MDX644 has 1 HD/SD input, 4 AES/Dolby E inputs, 4 AES/Dolby E outputs and 7 embedded HD/SD outputs on a double-width rear panel I/O module.

AES and Dolby E delay of up to 1.3 sec. per channel is available on a group or per channel basis. Dolby E signals cannot be decoded for gain control, phasing or inverting but routing to other groups, delay and synchronization are all possible.

Figure 2-1 shows, for reference only, a typical 600 Series assembly with the rear panel attached to the main circuit board.

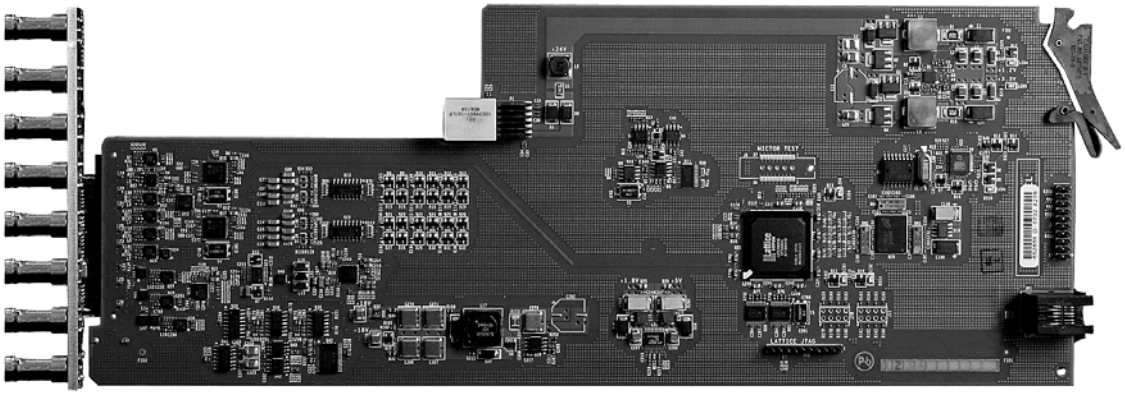


Figure 2-1 Typical Integrity 600 Series Main Board with Rear Panel

2.2 MID-PLANE ROUTING

One of the unique features of the Integrity 600 Series is the mid-plane routing structure of the FRM603 "Smart Frame." This signal routing scheme allows 600 Series modules with mid-plane routing capability to share signals with modules located in adjacent card slots of the chassis frame, or with special purpose "Star Slot Capable" modules installed in frame slots 5 or 16 – the "Star Slots." All modules with mid-plane signal routing capability are equipped with a connector that interfaces the module circuitry to the mid-plane routing traces for the particular slot in which the module is installed. Star Slot Capable modules are equipped with additional connectors that interface these modules bi-directionally to every other frame slot in the chassis. These Star Slot modules can distribute signals to, and receive signals from, all other mid-plane capable cards. This capability allows a much greater degree of flexibility in planning and implementing a signal processing and distribution system than with other more conventional systems. Redundant power, sync reference and control are optionally available to every processing module through the chassis frame.

Like many of the new Integrity 600 Series processing modules, the MDX644 has mid-plane connection capability and has an input multiplexer to take advantage of the interconnections available through the FRM603 chassis frame. Figure 2-2 is a block diagram of the FRM-603 chassis frame showing the various internal routing buses. This illustration is provided here for reference only. Refer to the FRM-603 Technical Manual, QuStream Publication 81-9059-0622-0, for additional information.

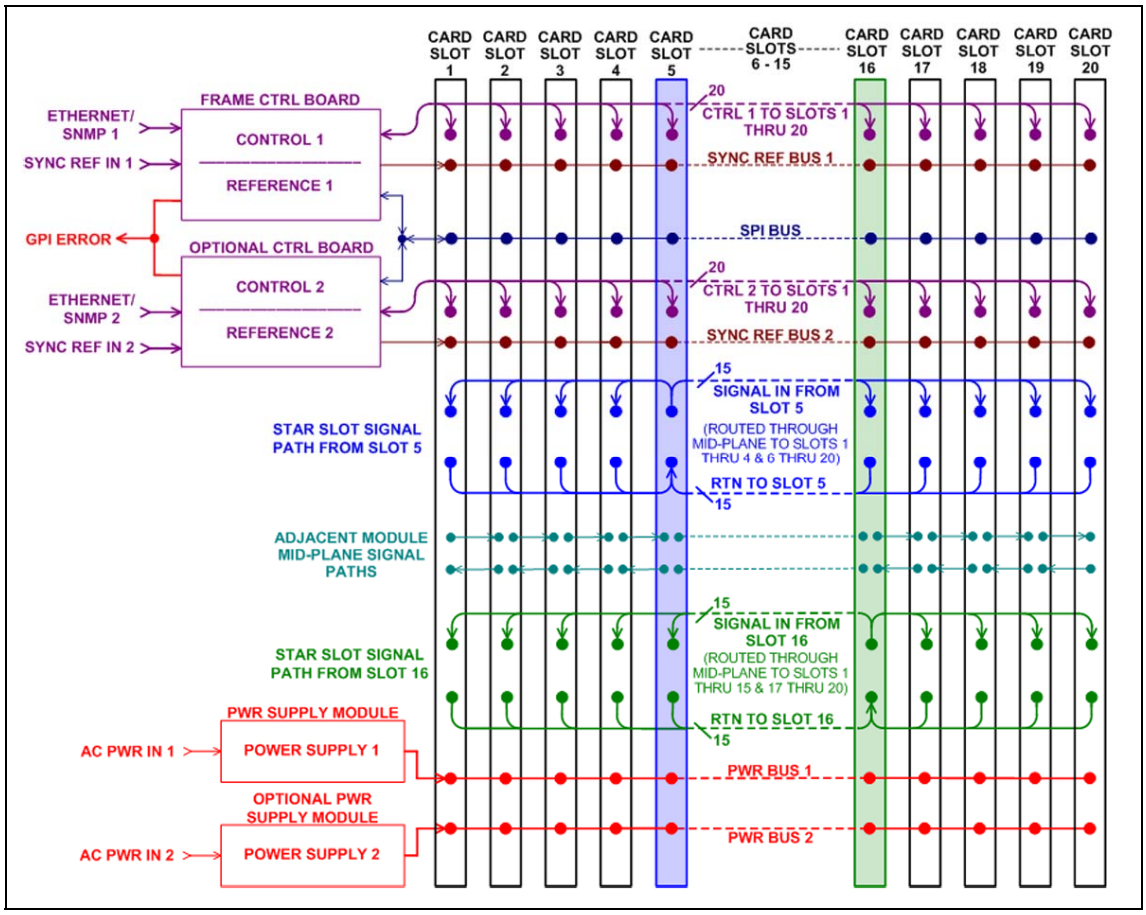


Figure 2-2 Block Diagram - FRM603 Chassis Frame

HD/SD Video and External AES Audio Input signal sources for the MDX644 may be derived from rear panel BNC connectors or, by menu selection, from processing modules in adjacent card slots or from Star Slot Capable modules installed in card slots 5 or 16 over the Star Slot routing busses. All mid-plane routing is configured through an external control device such as the RCP-503 Remote Control Panel, or the SOFT603 PC based software application, via the NET 603 controller. If your frame is not equipped with a NET 603, the input signal source is factory set to order specifications, or if no input choice is specified, to the rear panel BNC connector.

HD/SD Video and de-embedded AES audio output signals from the MDX644 are available via rear panel BNC connectors, and may also be shared with processing modules in adjacent card slots or routed to Star Slot Capable modules over the Star Slot bus.

In the application of the MDX644, audio input signals may be derived from any of three sources:

- Audio embedded on the incoming video signal
- AES audio sources through the four rear panel External AES BNC connectors
- Multiplexed audio signals, referred to in this text as MADI signals, derived from other processing modules in the FRM603 chassis frame via internal midplane routing options

It should be noted that the MDX644 does not interface either as an input or output device with external audio devices using the MADI protocol. MADI protocol is used for routing audio signals over the internal midplane between processing modules installed in the FRM603 chassis. Throughout this manual the use of MADI status and configuration refers to the status and selection of internally routed signals from other 600 Series modules.

Primary Features

- SD/HD embedding and de-embedding.
- Designed for 3G 1080p (SMPTE-424)
- De-embeds all groups and allows full routing of individual channels to combine with external AES channels to form new groups
- Audio processing of de-embedded channels as well as external inputs including delay, gain, summing and phase inversion
- All inputs have sample rate converters to match the input HD/SD clock rate with bypass on any input
- Up to 1.3 seconds of delay compensation on all AES or Dolby E inputs or de-embedded signals
- Outputs 7 HD/SD signals
- Outputs 4 AES/Dolby E signals
- Inputs both SD/HD SDI from 270 MHz to 1.5 G, and 64 AES signals embedded in MADI from other boards through the midplane
- Outputs both SD/HD SDI and MADI to other boards through the midplane

Specifications

SDI inputs (HD and SD)

Connectors

- 1 BNC for HD/SD SDI embedded or un-embedded
- Midplane left, right, Star Slot A or Star Slot B

Impedance 75 ohms
Standards

- SMPTE 292M (1.5Gb) 1080i/50, 1080i/59.94, 1080i/60, 1080p/30, 1080p/29.94, 1080p25, 1080p/24, 1080p/23.98, 1035i/60, 1035i/54.94, 720p/60, 720p/59.94, 720p/50
- SMPTE 259M (270Mb) 525 line and 626 line

Return Loss > 15 dB typical from 5 MHz to 1.5 GHz
Cable length > 300 M at 270 MHz typical with Belden 1694A co-axial cable
> 120 M at 1.5 GHz typical with Belden 1694A co-axial cable
> 100 M at 3.0 GHz typical with Belden 1694A co-axial cable

Note: The MDX644 is designed to be SMPTE 424M 3G ready and versions will be available after the SMPTE committee issues the 3G embedding specifications.

SDI outputs (HD and SD)

Connectors 7 BNCs for embedded HD/SD outputs
Standards Same as the input
Impedance 75 ohms
Return Loss > 15 dB typical from 5 MHz to 1.5 GHz
Signal Level 800 mV ± 10%
Rise and Fall <135 ps (20% to 80%)
Overshoot < 10 %
Jitter ≤ 0.3 UI

AES inputs

Number of inputs

- 4 BNCs
- MADI from Midplane left, right, Star Slot A or Star Slot B

Impedance 75 ohms
Standard AES3
Sensitivity < 100 mVpp
Return Loss < -25 dB, 100 kHz to 6 MHz

AES outputs

Number of outputs

- 4 BNCs
- MADI to midplane left, right or Star Slots

Impedance 75 ohms
Standard AES3
Jitter < ± 4 ns, peak
Return Loss < -25 dB, 100 kHz to 6 MHz

Chapter 3 Installation

3.1 INTERNAL ROUTING CONSIDERATIONS

When determining in which frame slot to install the MDX644 module, you should consider whether or not the internal signal routing capabilities of the frame are to be used for signal input or output sharing with the installed module. For further information on planning an Integrity 600 Series system using internal routing capability, refer to the Technical Manual for the FRM603 Frame, QuStream Publication 81-9059-0622-0.

There are no restrictions on placing modules in the FRM603 frame – any module will function stand-alone in any slot. However, if you are intending to incorporate internal frame routing, adjacent module signal sharing or Star Slot routing, you should have the system pre-planned prior to module installation. QuStream recommends that you make a detailed drawing of your system and follow it when loading modules into the frame. The following guidelines will help you in your system planning, but they are not intended to be an all-inclusive, step-by-step guide.

- Make a listing of the modules you will use in your system, and determine the internal routing capability of each module. Not all 600 Series modules share the same capabilities: for example dual input distribution amplifiers are actually two independent amplifiers; one of which can receive input signals from the module *LEFT* adjacent to it, or the Star Slot *A* routing bus, and the other can receive input signals from the module *RIGHT* adjacent to it, or the Star Slot *B* routing bus.

- Not all modules are equipped for internal signal routing. If you are going to use internal routing in your layout, it would not be advisable to install modules without such capability in a Start Slot or in a frame slot you may need for signal sharing.

- Consider placement of modules you intend to share signals first. Include in your sketch which module will receive a signal from an external source, how you want signals distributed to other modules and with which module the internal routing will terminate.

3.2 MDX644 MODULE INTERNAL ROUTING CAPABILITIES

In planning a system incorporating internal routing, you must consider the internal routing capabilities of the Integrity 600 Series module(s) you are installing. MDX644 modules can derive input signal from either the rear panel BNC, the left adjacent module or the right adjacent module; or if the frame is equipped with a star slot capable module in either, or both, of the star slots, the input signal may be derived from a star slot capable module. MDX644 modules can provide output signal to all internal routing options.

NOTE

When planning a system using mid-plane routing remember that the RIGHT adjacent module is always the next numerically higher slot and LEFT adjacent is always the next numerically lower slot to the one being configured. Slot numbers increase left to right from the FRONT of the frame. Therefore, when viewed from the **REAR** of the frame – the LEFT adjacent module is physically located to the RIGHT, and the RIGHT adjacent module is physically located to the LEFT of the slot you are configuring!!!!

Signal routing capabilities are listed in Table 3-1. All mid-plane routing is configured through an external control device via the NET 603 controller. If your system does not incorporate any Star Slot Capable modules, the mid-plane routing capability between modules is limited to adjacent slot signal sharing. If your frame is not equipped with a NET 603 controller, the input signal source is factory set as specified at time of order; or, if not specified, to the rear panel BNC connector.

Table 3-1 Internal Routing Capabilities – MDX644 Module

		Input Connectivity				Output Connectivity			
Module Type	**Frame Slots Occupied**	**Left Adjacent Module**	**Right Adjacent Module**	**Star A (Slot 5)**	**Star B (Slot 16)**	**Left Adjacent Module**	**Right Adjacent Module**	**Star A (Slot 5)**	**Star B (Slot 16)**
MDX644	2	SMPTE or MADI*	SMPTE or MADI*	SMPTE or MADI* – With a Star Slot Capable Module in Slot 5	SMPTE or MADI* – With a Star Slot Capable Module in Slot 16	SMPTE or MADI	SMPTE or MADI	SMPTE or MADI– With a Star Slot Capable Module in Slot 5	SMPTE or MADI– With a Star Slot Capable Module in Slot 16

*Only one input signal may be active to the module at any time

3.3 INSTALLATION PROCEDURE

Every Integrity 600 Series processing module consists of a rear connector panel and the main circuit card. These two items are shipped as a set, but must be installed individually into the FRM603 Chassis Frame. The MDX644 rear connector panel occupies two card slots in the FRM603, and may be installed in any available side-by-side slots in the chassis frame. Proper installation requires that the rear connector panel be installed before the circuit board. Observe the following precautions before proceeding with installation:

CAUTION

Damage may occur to the rear connector panel or the circuit board if the installation instructions are not properly followed.

- Rear connector panel MUST be installed before the front-mounted circuit board.
- If a circuit board should occupy a chassis frame slot where a rear connector panel is to be added or changed, the circuit card MUST be removed or slid out a minimum of two inches from the front side of the chassis frame before installing the rear connector panel.

It is not necessary to remove power to the chassis frame prior to installing a processing module.

3.3.1 INSTALL REAR CONNECTOR PANEL

Install rear connector panel as follows:

1. If your processing module was shipped with the rear connector panel attached to the main circuit board, separate the two units.
2. Figure 3-1 illustrates the connector panel installation process using a single-width panel; however the procedure is identical for installing a double-width rear panel.
3. Orient the rear connector panel with the main board connector toward the lower edge of the chassis.
4. Install the panel by pressing it upward under the top lip of the chassis frame, and move the panel toward the chassis until it is flat against the chassis frame, refer to Figure 3-1.
5. Allow the bottom edge of the connector panel to drop down into its mating slot at the bottom of the lower edge of the chassis.
6. Install retention screw through connector panel to chassis frame, but **DO NOT** fully tighten the retention screw, leaving the rear panel freedom to move, until after the Main Circuit Board is installed per Paragraph 3.3.2.

CAUTION

DO NOT fully tighten the retention screw until **after** the Main Circuit Board is installed. Severe damage could occur to the main board connector if the rear panel is tightly secured prior to installing the main board.

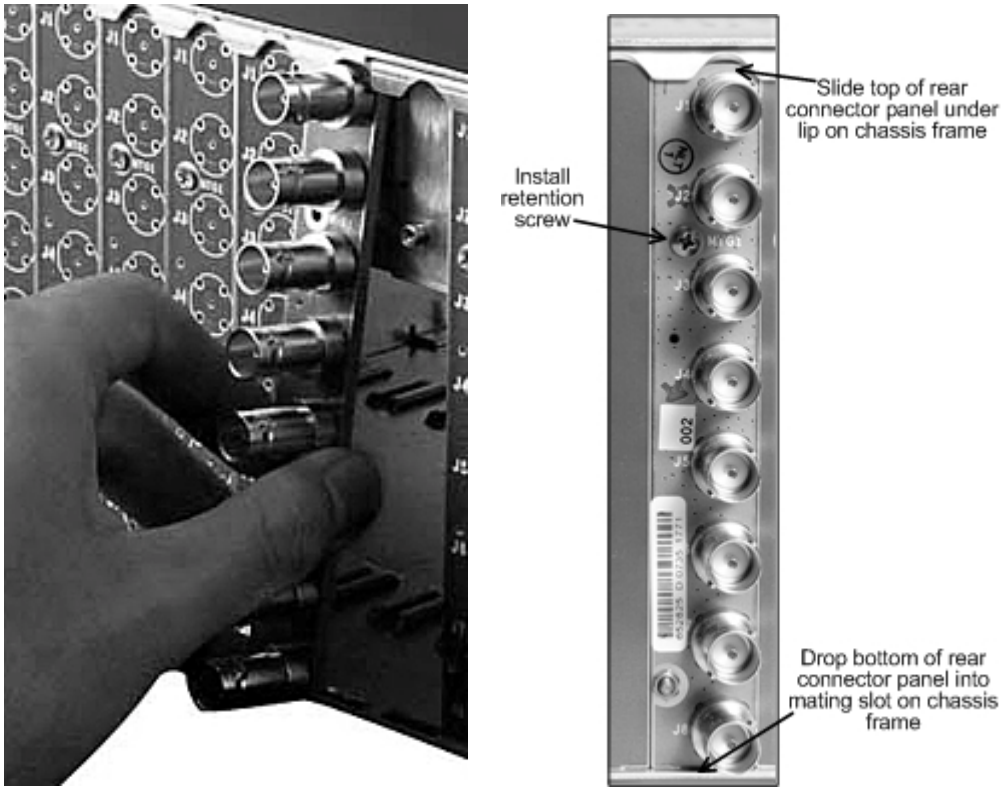


Figure 3-1 Installing Rear Connector Panel

3.3.2 INSTALL MAIN CIRCUIT BOARD

Install main circuit board as follows:

1. Open front access door on the FRM603 chassis frame.
2. Locate the empty card slot that mates to the rear connector panel installed in the previous step.
3. Align the top and bottom edges of the circuit board with the chassis card guides as shown in Figure 3-2.
4. Hold the card ejector lever out (unlocked position) as shown when inserting the board.
5. Press the board into place to ensure solid connection with the mating connectors on the mid-plane and rear connector panel.

NOTE

Do not force the card into position. If the card does not seat with gentle pressure, back it out, realign with the card guides and reinsert the card.

6. When the card is properly seated, press the card ejector lever toward the board to lock the card in position.
7. Once the main board is seated and locked, and all connectors have properly mated, secure the rear connector panel to the chassis frame by tightening the retention screw.
8. Close the chassis frame front access door.

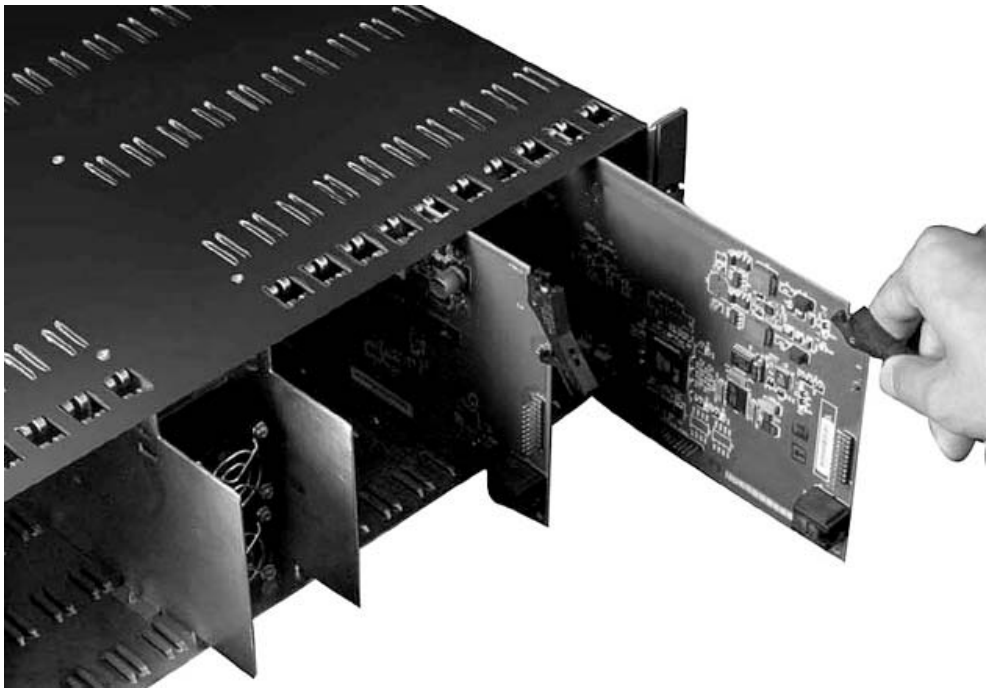


Figure 3-2 Installing Main Circuit Board

3.4 REAR PANEL SIGNAL CONNECTIONS

Input and output connections to the processing module may be made through the rear connector panel, or, in some installations, the internal routing midplane of the chassis frame. The MDX644 uses a double-width rear panel with 16 BNC connectors. When the rear panel connectors are used for I/O connections, the panel layout is shown in Figure 3-3 and the function of each connector is briefly discussed in the following paragraphs. When making connections to the rear panel connectors, use a good quality coaxial cable and ensure that the mating BNC connector is properly installed.

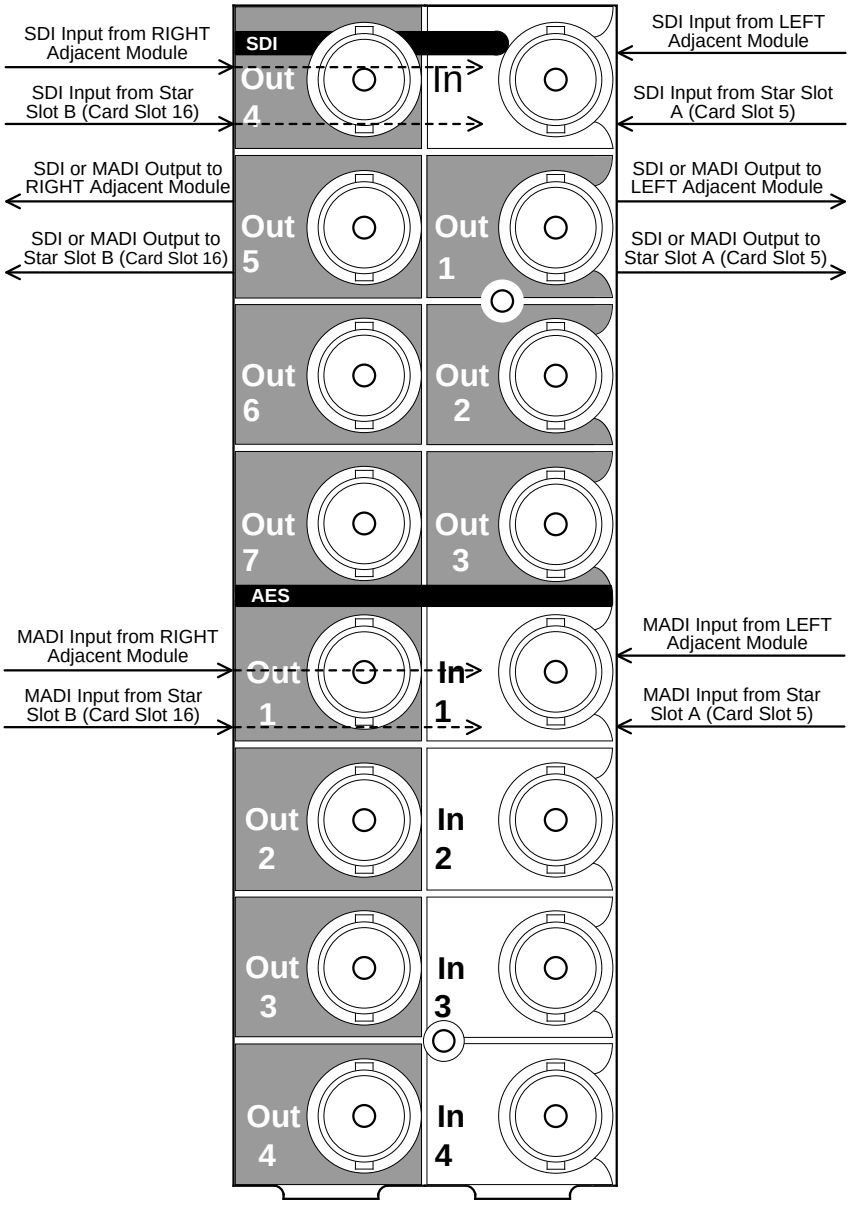


Figure 3-3 MDX644 - Rear Panel Connections

3.4.1 SDI SIGNAL INPUT CONNECTOR

Rear panel connector SDI IN accepts an input of HD or SD video with or without embedded AES audio from an external source.

3.4.2 SDI OUTPUTS

Rear panel connectors SDI OUT 1 through 7 provide outputs of re-clocked HD or SD video with embedded AES audio. These output signals are fixed and cannot be changed through menu selections.

3.4.3 AES INPUTS

Rear panel connectors AES IN 1 through 4 accept inputs of AES audio from external sources for embedding into the SDI output signal.

3.4.4 AES OUTPUTS

Rear panel connectors AES OUT 1 through 4 provide outputs of AES audio de-embedded from the SDI input signal.

3.5 MENU SELECTIONS

Menu selectable outputs may be configured with the RCP-503 Remote Control Panel via the NET 603 Frame Controller option for the FRM-603 Chassis Frame. If your frame is not equipped with the Frame Controller card, the signal outputs are configured at the factory prior to shipment of the MDX644. Refer to the FRM603 Technical Manual, QuStream Publication 81-9059-0622-0, for additional information.

3.6 INITIAL POWER-UP

It is not necessary to remove power when installing the MDX644 module into an active chassis frame. If this is an initial installation, before applying power for the first time, please take time to go back and verify the following:

- Check for electrically sound connections, proper connector placement and possible wiring errors.
- Ensure that the chassis frame has a connection to a source of in-house sync, if required for the application.
- Check that all 600 Series modules, rear panels, power supply and controller modules are securely installed.

There is no power switch on the frame, and it is powered-up simply by connecting the main power cord to a source of primary power. Systems with redundant power supply modules have two main power cords, each of which must be connected to a source of primary power.

When the MDX644 module is initially powered up, look at the status LEDs located along the front edge of the module and verify proper operation as discussed in Paragraph 3.7.

3.7 MDX644 STATUS LEDS

There are 7 status LEDs located along the front edge of each MDX644 module, as shown in Figure 3-4.

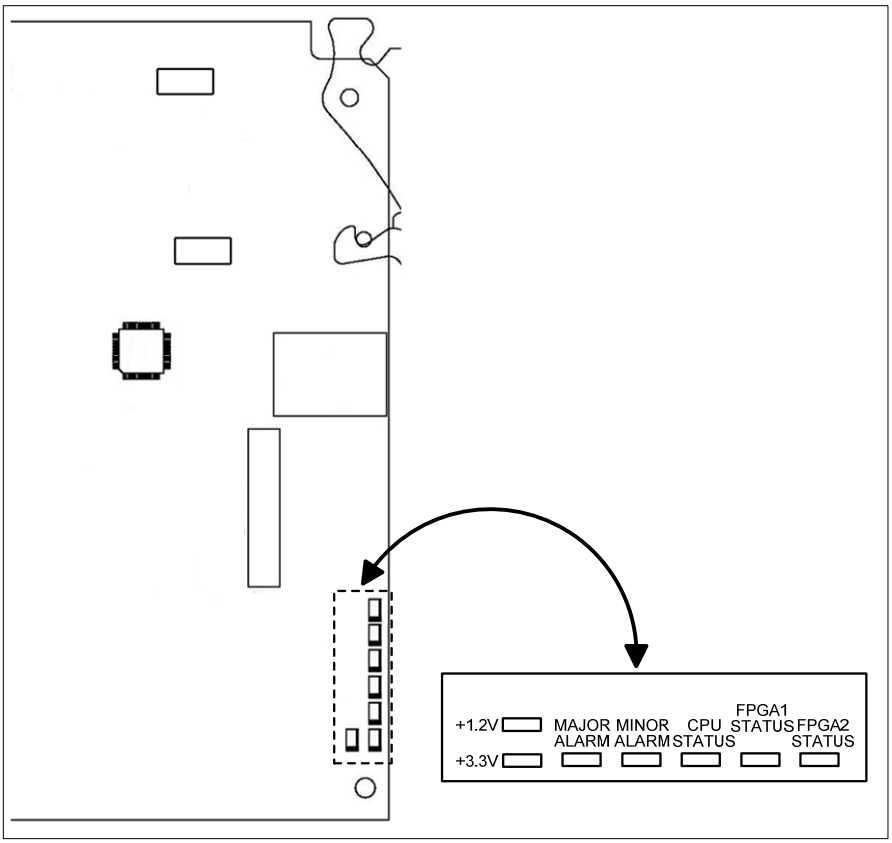


Figure 3-4 MDX644 Status LEDs

Verify that the LED indicators are showing the proper operating status of the module. The function of each LED is discussed is discussed below:

- +1.2V – GREEN – When lit, indicates the 1.2V power supply is operational
- +3.3V – GREEN – When lit, indicates the 3.3V power supply is operational
- MAJOR ALARM – RED – When lit, indicates a major alarm condition detected
- MINOR ALARM – YELLOW – When lit, indicates a minor alarm condition detected
- CPU STATUS – GREEN – When flashing, indicates the CPU is active
- FPGA1 STATUS – GREEN – When lit, indicates the presence of a valid video input signal
- FPGA2 STATUS – YELLOW – When lit, indicates incoming video is an HD-SDI signal; when NOT lit, indicates the incoming video is an SD-SDI signal

Chapter 4 Operation

4.1 OPERATION

There are no operating controls located on the MDX644 module. Input signal source and certain operating parameters of the module may be selected or modified through the Integrity 600 Series RCP-503 Remote Control Panel, if the chassis frame is equipped with at least one NET 603 Frame Controller module. While most installations do indeed opt for the frame controller card, any 600 Series module will function normally without a controller card present in the frame; however, input multiplexer configuration options indicated as "menu selectable" can not be chosen or changed in the field. The module will be factory programmed prior to shipment.

4.2 AUDIO CONFIGURATION

The MDX644 module has the capability to de-embed up to 16 audio channels from 4 AES groups of an incoming SDI signal; and embed up to 16 audio channels as 4 AES groups, per user selection, back into the SDI output signal. In addition, the MDX644 provides output of up to 4 discrete AES audio pairs via rear panel BNC connectors.

Audio signals available for embedding into the output signal may be derived from the de-embedded signals from an incoming SDI signal, AES signals from external sources via 4 discrete rear panel BNC connectors, or selected from up to 64 multiplexed audio signals derived from other Integrity 600 Series processing modules routed through the chassis midplane.

Audio signals from any of the various input sources may be grouped as desired for embedding and discrete AES output using configuration menus discussed in this chapter. Before discussing the menus and their structure, it is important to have a good understanding of the audio capabilities of the module.

Up to 16 audio signals may be selected from any of the available sources as the active audio channels for processing by the MDX644.

4.3 CONFIGURATION MENUS

When a MDX644 module is installed in a FRM603 frame equipped with a NET603 Frame Controller card, certain configuration and operational parameters for the module may be selected through menus displayed via the RCP-503 Remote Control Panel. The following paragraphs introduce the menus and options available through each.

4.4 MAIN MENU - SCREEN 1

Figure 4-1 shows screen 1 of the main menu display for the MDX644 module.

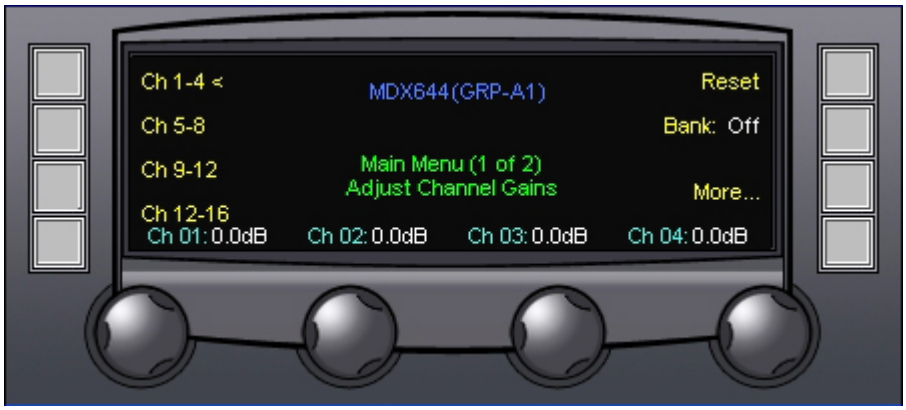


Figure 4-1 Main Menu Screen 1

BANK

Gain of each of the 16 selected audio channels can be adjusted by selections on the main menu screen in one of two ways - independently (Bank: Off) or a sequential set of desired signals may be defined and grouped together as a bank (Bank: On). Up to four banks of signal groups can be defined from the configuration menu as discussed in Paragraph 4.11.3. When signals are banked, gain for each group is adjusted by a single control. Select the desired bank mode by pressing the touch-switch next to the Bank: On/Off menu item to toggle the bank function on or off.

The bank display indicates the current active status of the signal banking function. When the banking function is not active (off), the gain of any audio channel may be independently adjusted as required by selecting the group containing the signal from the channel selection touch-switches on the left side of the display, and then rotating the control knob beneath the desired channel number display, as shown in Figure 4-1.

When banking is set to On as shown in Figure 4-2, the audio channels are shown as banked groups with a single gain control. Gain for the channel groups may be adjusted as required by rotating the control knob beneath the channel group display.

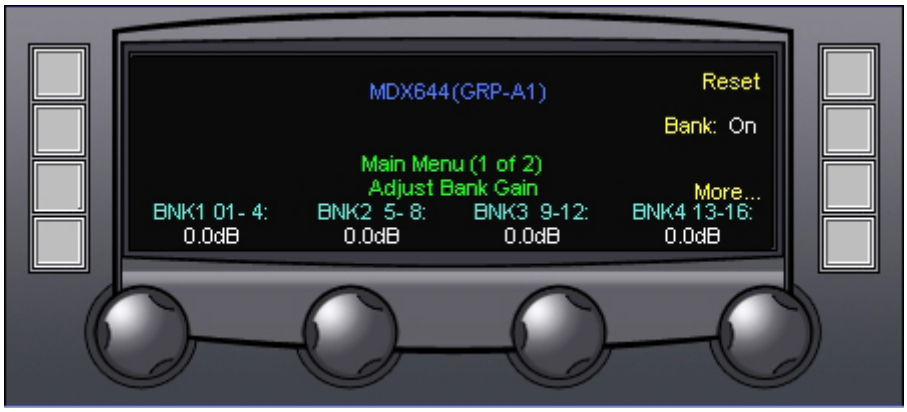


Figure 4-2 Main Menu Screen Showing Linked Audio Channels

RESET (Reset)

Pressing the touch-switch next to the Reset menu entry accesses the Reset Values Menu Screen, Paragraphs 4.4 and 4.5.

MORE (More)

Pressing the touch-switch next to the More menu entry brings up screen 2 of the main menu - discussed in Paragraph 4.6.

4.4.1 RESET MENU SCREEN – BANKING OFF

The Reset Menu Screen shown in Figure 4-3 is displayed when the reset function is selected from the main menu screen while the channel group banking function is not active (off). This menu displays the current settings for each audio channel of the group selected from the main menu along the bottom edge of the display screen. Resetting the values returns each setting to the factory default. Press the touch-switch next to the YES menu entry to accept and execute the reset function. Select the NO menu entry to retain the current set values and return to the main menu display. Figure 4-3 shows the group containing audio channels 1 through 4 as an example. In order to reset values of other channel groups, the desired channel group must be selected on the main menu prior to pressing the reset touch-switch.

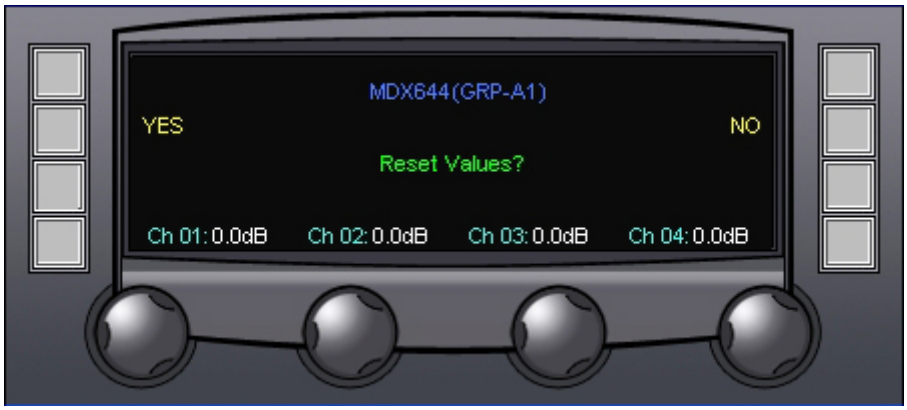


Figure 4-3 Reset Menu Screen Banking Off

4.4.2 RESET MENU SCREEN – BANKING ON

The Reset Menu Screen shown in Figure 4-4 is displayed when the reset function is selected from the main menu screen while the channel group banking function is active (on). This menu displays the current settings for each banked audio channel group along the bottom edge of the display screen. Resetting the values returns each audio channel contained in the group to the factory default. Press the

touch-switch next to the YES menu entry to accept and execute the reset function. Select the NO menu entry to retain the current set values and return to the main menu display.

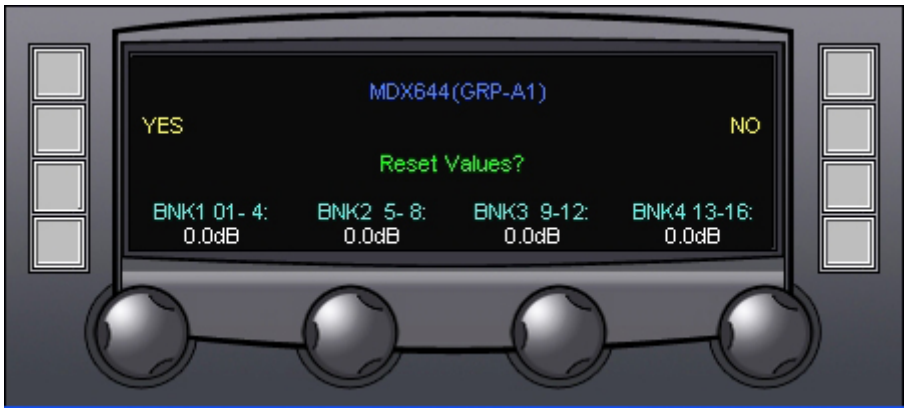


Figure 4-4 Reset Menu Screen – Banking On

4.5 MAIN MENU – SCREEN 2

Screen 2 of the main menu is shown by Figure 4-5 and discussed in the following paragraphs.

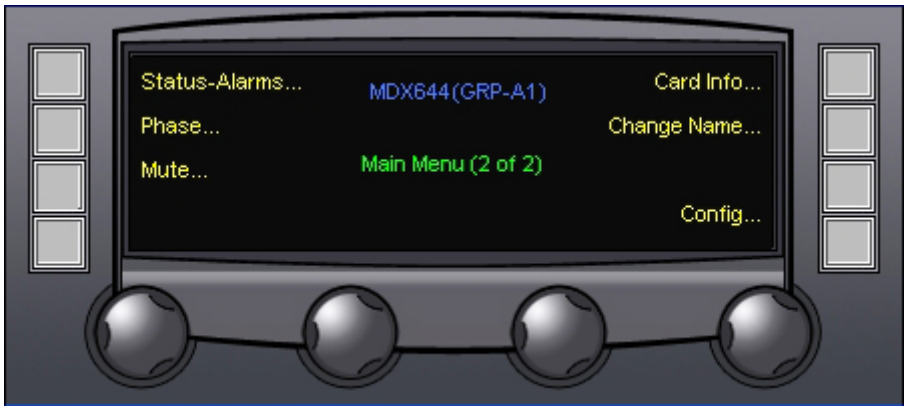


Figure 4-5 Main Menu Screen 2

STATUS-ALARMS

Pressing the touch-switch next to the Status-Alarms selection accesses the Status and Alarms Display and Menu Screen, Paragraph 4.5.

PHASE

Pressing the touch-switch next to the Phase selection accesses the Audio Phase Control Menu Screen, Paragraph 4.8.

MUTE

Pressing the touch-switch next to the Mute selection accesses the Audio Mute Control Menu Screen, Paragraph 4.9.

CARD INFO

Pressing the touch-switch next to the CARD INFO menu item accesses the Card Info Menu discussed in Paragraph 4.10.

CHANGE NAME

Pressing the touch-switch next to the CHANGE NAME menu item accesses the Change Name Menu discussed in Paragraph 4.11.

CONFIG

Pressing the touch-switch next to the Config menu item allows access to the module Configuration Menu Screens via the Access Code Screen, Paragraph 4.12.

4.6 STATUS AND ALARMS DISPLAY AND MENU SCREEN

The Status and Alarms Display and Menu Screen, Figure 4-6, contains both status display and interactive menu entries.

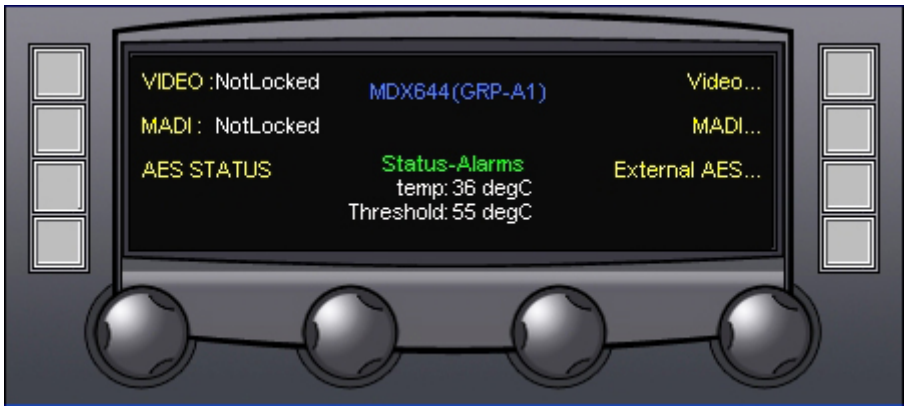


Figure 4-6 Status and Alarms Display and Menu Screen

VIDEO and MADI

There are two display only entries – Video and MADI – that indicate locked or unlocked status for the incoming video source and MADI audio signal routed over the midplane from another processing module in the chassis. These status displays are located on the upper left of the display screen.

TEMPERATURE and THRESHOLD

Temperature (temp:) and Threshold display-only entries indicate, respectively, the current operating temperature of the MDX644 module and the threshold temperature at which a status alarm is activated should the operating temperature ever reach the set threshold.

AES STATUS

Pressing the touch-switch next to the AES STATUS menu item accesses the AES Status screen discussed in Paragraph 4.5.1.

VIDEO

Pressing the touch-switch next to the Video menu item accesses the Video Status screen discussed in Paragraph 4.5.2.

MADI

Pressing the touch-switch next to the MADI menu item accesses the MADI Status screen discussed in Paragraph 4.5.3.

EXTERNAL AES

Pressing the touch-switch next to the External AES menu item accesses the External AES Status screen discussed in Paragraph 4.5.4.

4.6.1 AES STATUS SCREEN

The AES Status Screen, Figure 4-7, displays the current lock status of the AES audio signal inputs and module operating temperature. This is a display screen only – no configuration functions are accessible from this screen.

Display entries along the left and right sides of the display indicate the lock status of AES inputs. Current operating temperature of the module is indicated by the Temperature (temp:) display. The Threshold entry displays the temperature selected through the alarm configuration screen for activating an over-temperature status alarm.

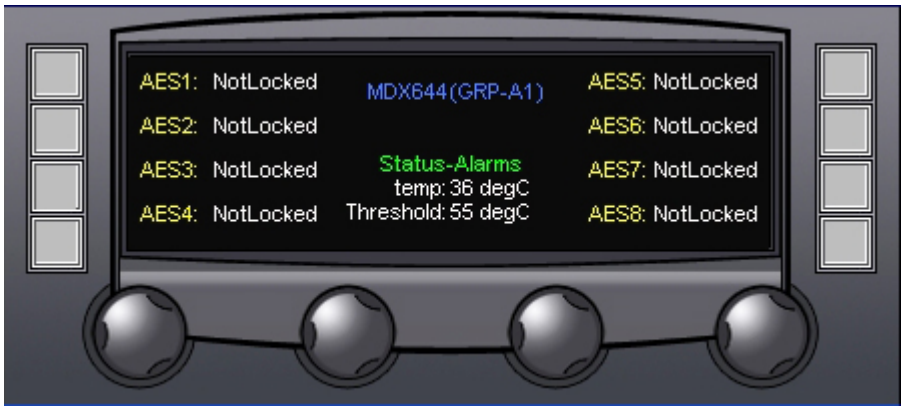


Figure 4-7 AES Status Screen

4.6.2 VIDEO STATUS SCREEN

Options available through the video status screen monitor certain parameters of the input SDI signal and output SDI signal. Enter the Video Status screen by pressing the touch-switch next to the Video entry on the Status Alarms Menu Screen. Figures 4-8 and 4-9 show examples of the Video Status display for

input and output signals, respectively. Entries on the menu screens and functions available through each are discussed below.

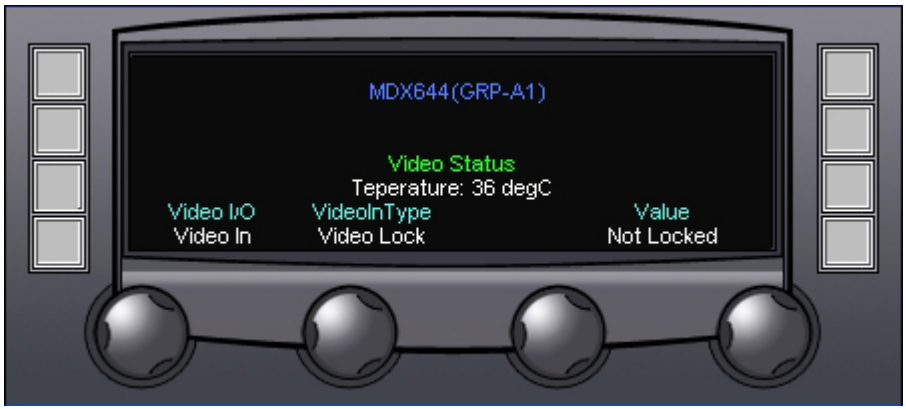


Figure 4-8 Input Video Status Screen

VIDEO I/O

Video I/O selects the video input signal or output signal for status monitoring. The desired signal may be selected by rotating the control knob beneath the Video I/O display. The following options are available:

Video In – Selects monitoring options for the video input signal.

Video Out – Selects monitoring options for the video output signal.

INPUT VIDEO STATUS OPTIONS (VideoInType)

When Video In is selected as the monitor video, as shown in Figure 4-8, the setting of the VideoInType selector determines which function of the input video signal is monitored. The following status monitoring options are available, and results displayed by the Value menu entry:

Video Lock – Displays the current locked or unlocked status of incoming video.

Video Rate – Displays the data rate of the incoming video signal as SD, HD or 3G.

RX PLL Lock – Displays the current locked or unlocked status of the receive phase lock loop.

Scaling Flag – Displays the degree of scaling applied to the incoming video signal.

Carrier Detect – Indicates presence or absence of a video signal carrier.

Reclocker Lock - Displays the current locked or unlocked status of the video reclocker.

Reclocker Rate - Displays the data rate of the video reclocker as SD, HD or 3G.

VALUE

Value is a display only entry to indicate the current status of the selected monitor function.

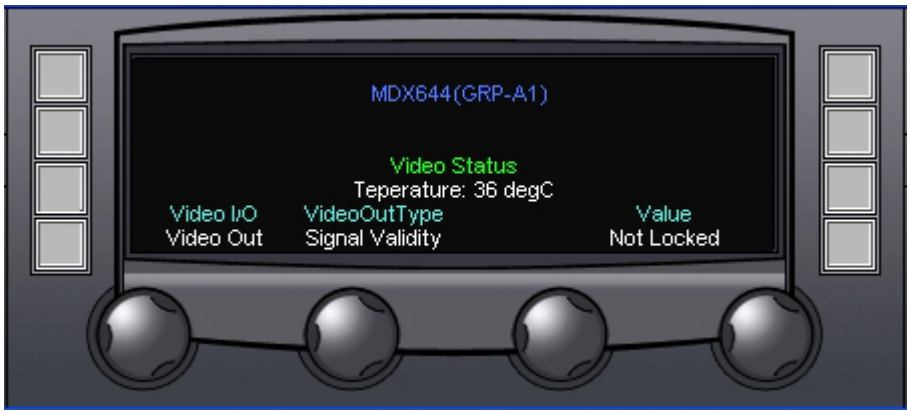


Figure 4-9 Output Video Status Screen

OUTPUT VIDEO STATUS OPTIONS (VideoOutType)

When Video Out is selected as the monitor video, as shown in Figure 4-9, the setting of the status options selector determines which function of the output video signal is displayed. The following status options are available:

Status – Indicates whether the video output signal is enabled or disabled.

TX PLL Lock - Displays the current locked or unlocked status of the transmit phase lock loop.

Reclocker Lock - Displays the current locked or unlocked status of the video reclocker.

Signal Validity – When locked, indicates the video output signal is present.

VALUE

Value is a display only entry to indicate the current status of the selected monitor function.

4.6.3 MADI STATUS SCREEN

MADI Status provides a readout of operational parameters for the MADI protocol audio signal received from another processing module via the midplane routing capability of the chassis frame. Also from this screen, operational status of the MADI output signal from the MDX644 to other processing modules may be monitored. Enter the MADI Status screen by pressing the touch-switch next to the MADI entry on the Status Alarms Menu Screen. Figures 4-10 and 4-11 show examples of the MADI Status display screens. Entries on the menu screens and functions available through each are discussed below.

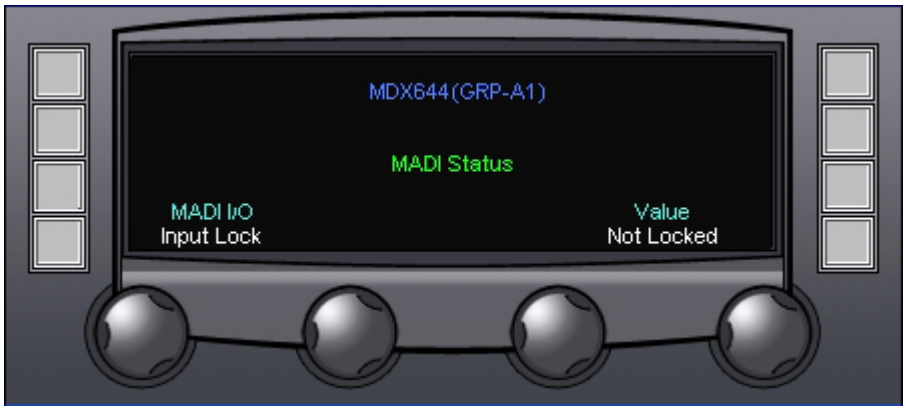


Figure 4-10 MADI Status Screen

MADI I/O

Rotating the control knob beneath the MADI I/O menu entry selects the MADI function for status monitoring, as shown by Figure 4-10. The following options are available, and results displayed by the Value menu entry:

Input Lock – Displays the current locked or unlocked status of incoming MADI signal.

Input Channels – Indicates the midplane routing source of MADI audio.

Out Control – Indicates whether the MADI output from the MDX644 is enabled or disabled.

Active_Channels – Selecting the active channel status function brings up the Channel List display, as shown in Figure 4-11.

VALUE

Value is a display only entry to indicate the current status of the selected monitor function.

CHANNEL LIST

When active channels is selected as the status monitor function, as shown in Figure 4-11, rotating the control knob beneath the Channel List menu entry scrolls through a list of all 64 MADI channels. As the control is rotated, the channels are displayed sequentially, along with an indication of whether or not each channel is currently active.

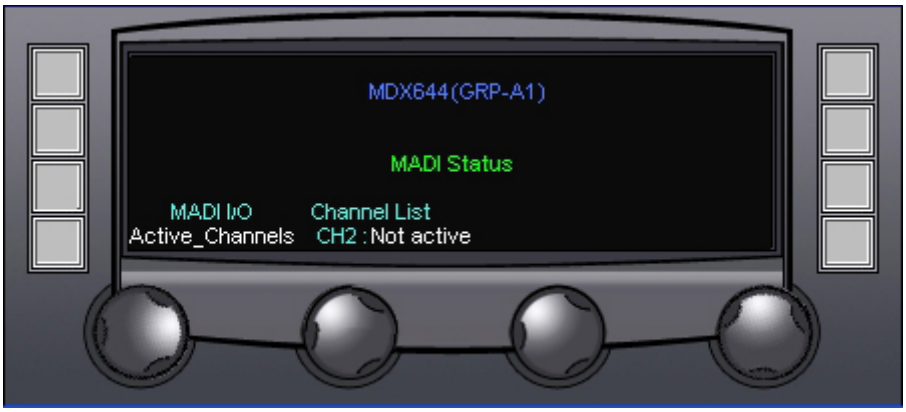


Figure 4-11 MADI Active Channel Status Display

4.6.4 EXTERNAL AES STATUS SCREEN

The External AES Status screen displays the current operational status of AES audio signals received by the MDX644 from external sources. Enter the External AES Status screen by pressing the touch-switch next to the External AES entry on the Status Alarms Menu Screen. Figure 4-12 shows the External AES Status screen. Entries on the screen and functions available through each are discussed below.

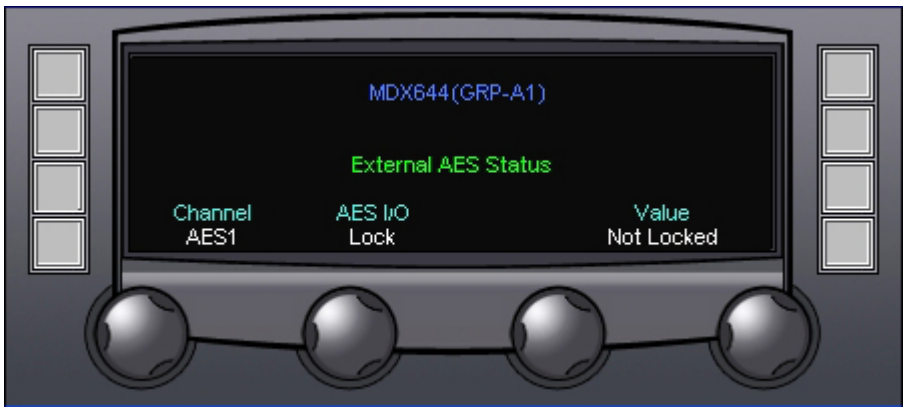


Figure 4-12 External AES Status Screen

CHANNEL

Rotating the control knob beneath the Channel menu entry selects the external AES signal for status monitoring. Any of the four AES external signals may be selected by scrolling through the Channel list.

AES I/O

When an AES channel is selected, as shown in Figure 4-8, the setting of the AES I/O selector determines which function of the AES signal is monitored. The following status monitoring options are available, and results displayed by the Value menu entry:

Type – Indicates whether the selected AES audio signal is an input or an output.

Lock – Displays the current locked or unlocked status of the selected external AES signal.

Rate – Displays the current data rate of the selected external AES signal.

VALUE

Value is a display only entry to indicate the current status of the selected monitor function.

4.7 SET PHASE MENU SCREEN

From the Set Phase menu screen the phase of each of the 16 selected audio channels may be set as normal or inverted. Figure 4-13 illustrates the Set Phase Menu Screen. Audio input channels are accessed by groups of four from the left edge of the menu screen. Pressing the touch switch next to each group accesses the four individual channels in the group. For each group, the audio channels are displayed at the bottom of the screen, along with the current Normal/Inverted phase status of each. Rotating the control knob beneath each audio channel selects whether or not a phase inversion is desired for the indicated channel.

Pressing the touch-switch next to the Reset menu entry returns the module to factory default settings.

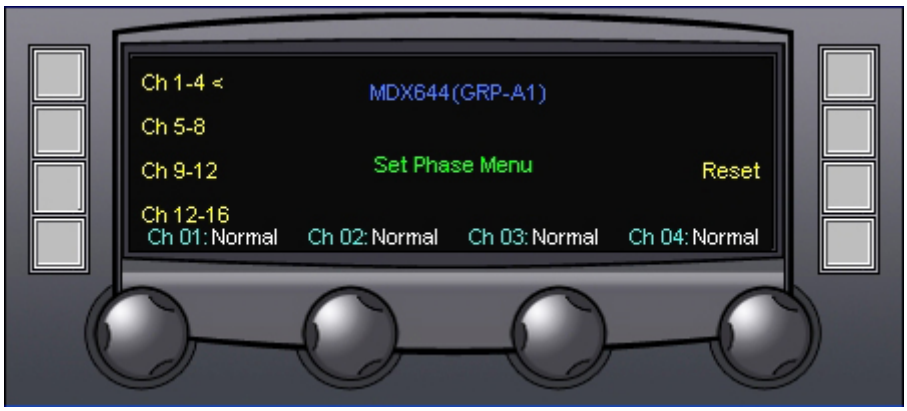


Figure 4-13 Audio Output Phase Menu Screen

4.8 AUDIO OUTPUT MUTE MENU SCREEN

Audio Mute allows any of the 16 selected audio channels to be muted in the output stream. Figure 4-14, illustrates the Audio Output Mute Menu Screen. Input channels are accessed by groups of four from the left edge of the menu screen. Pressing the touch switch next to each group accesses the four individual channels in the group. For each group, the audio channels are displayed at the bottom of the screen, along with the current Mute/Un-mute status of each. Rotating the control knob beneath each audio channel selects whether or not audio from the indicated channel is muted in the output stream.

Pressing the touch-switch next to the Reset menu entry returns the module to factory default settings.

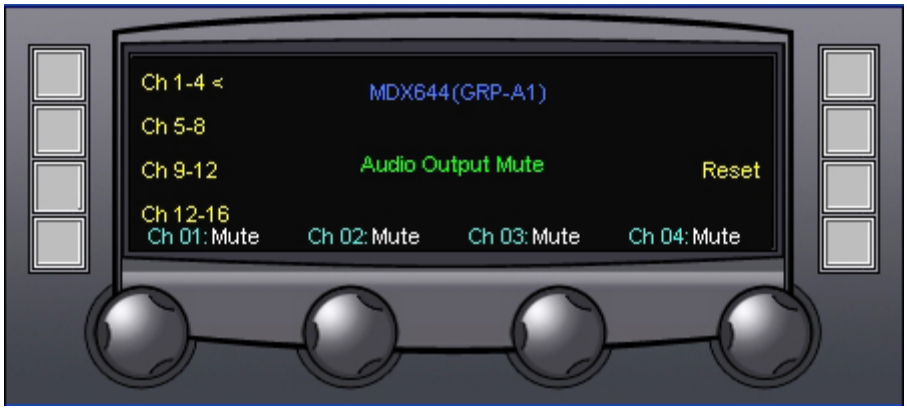


Figure 4-14 Audio Output Mute Menu Screen

4.9 CARD INFO MENU SCREEN

Enter the Card Information menu screen by pressing the touch-switch next to the CARD INFO entry on the main screen. Figure 4-15 shows the Card Info menu display.

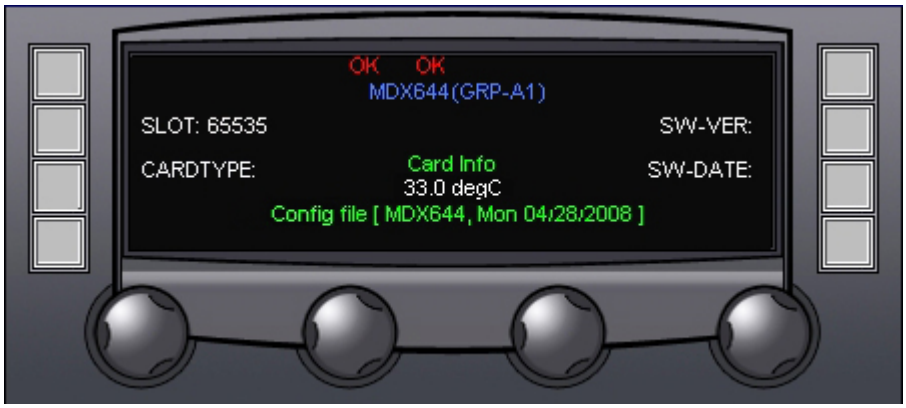


Figure 4-15 Card Information Display Screen

The card information screen displays the following operational data for the MDX644 module:

Current operating temperature of the module

SLOT – Identifies the card slot in the FRM603 frame where the MDX644 module is located

CARDTYPE – Identifies the module

Software Version (SW-VER) – Displays the revision number of the currently loaded software

Software Date (SW-DATE) – Displays the release date of the currently loaded software

4.10 CHANGE NAME MENU SCREEN

Functions available through the Change Name menu screen allow you to enter a descriptive identification name, or alias – up to 8 characters - for each card in the system. Typical application of this feature would be to name the MDX644 module in such a way to associate it with its input signal or function. Figure 4-16 shows the Change Name menu display for the MDX644 module.

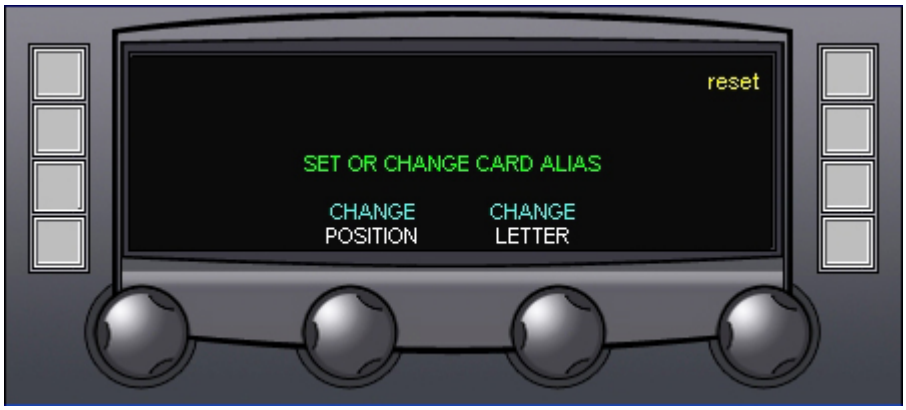


Figure 4-16 Change Name Menu Screen

CHANGE POSITION

Rotating the Change Position control moves the cursor to the desired character position to enter or change.

CHANGE LETTER

Rotating the Change Letter control scrolls through all alphanumeric display characters - letters, numbers and punctuation marks are available. Once the desired character is displayed in the cursor position, simply move the cursor to the next position.

RESET (reset)

Pressing the touch-switch next to the reset menu entry sets the name display to the default card alias.

4.11 CONFIGURATION MENU SCREEN

Functions available through the configuration screens allow audio and video sources to be selected and certain operational parameters to be defined. Enter the Configuration menu screen by pressing the touch-switch next to the Config entry on main screen 2. Before you can gain access to the configuration screen, you will be prompted for the proper access code as shown in Figure 4-17.

Figure 4-17 Keypad Access Code Prompt Screen

Enter the access code [9][9][9] on the control panel keypad to access the Configuration screen, as shown by Figure 4-18. The following options are available:

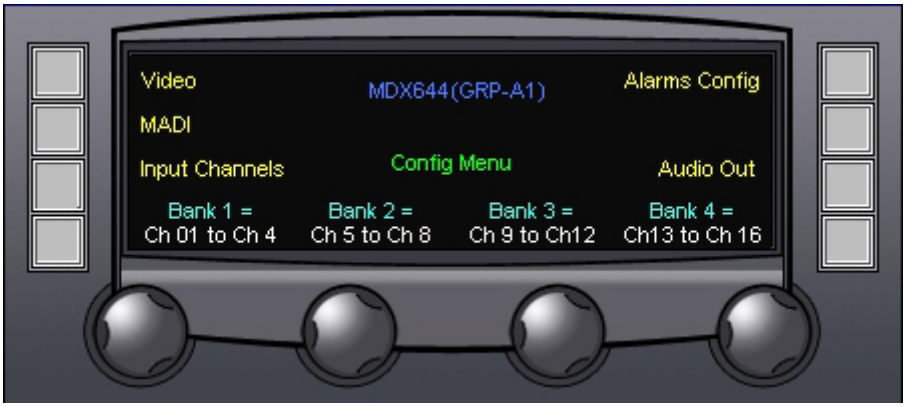


Figure 4-18 Configuration Menu Screen

BANK CONFIGURATION

Bank configuration allows a sequential set of selected audio channels to be defined and grouped together as a "bank;" up to four banks of signal groups can be defined from this menu screen. Beginning with Bank 1, you may select a sequential group of channels, beginning with channel 1, by rotating the control knob beneath the Bank 1 menu entry, to select the desired channel grouping. Once Bank 1 is set, Bank 2 will begin with the next sequential channel number following Bank 1. Include the desired channels for bank 2 by rotating the control knob beneath the Bank 2 menu entry. The lower channel number of the bank is fixed, and will always be the next number in sequence following the highest channel number selected for the previous bank. Follow this pattern to configure up to four banks of channel groupings. Note that it is not necessary to use all four banks – you can assign all 16 channels to Bank 1 or group the channels as you wish – the only constraint is that the channel numbers must be sequential, begin with Bank 1 and continue to Bank 2, etc.

-1.

VIDEO

Pressing the touch-switch next to the Video selection accesses the Video Configuration Screen, Paragraph 4.10.1.

MADI

Pressing the touch-switch next to the MADI selection accesses the MADI Configuration Screen, Paragraph 4.10.2.

INPUT CHANNELS

Pressing the touch-switch next to Input Channels accesses the Input Channels Configuration Screen, Paragraph 4.10.3.

AUDIO OUT

Pressing the touch-switch next to the Audio Out menu item accesses the Audio Output Configuration Screen discussed in Paragraph 4.10.4.

ALARMS CONFIG

Pressing the touch-switch next to the Alarms Config menu item accesses the Alarms Confiuration Screen discussed in Paragraph 4.10.5.

4.11.1 VIDEO CONFIGURATION MENU

Enter the Video Configuration Screen, shown in Figure 4-19, by pressing the touch-switch next to the Video entry on the Configuration Menu Screen. Entries on the menu screen and functions available through each are discussed below.

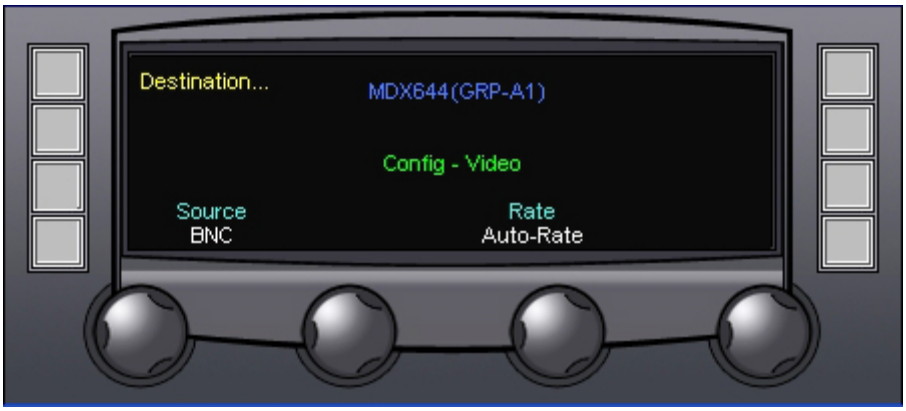


Figure 4-19 Main Video Configuration Menu Screen

SOURCE

The **SOURCE** display indicates the current active video input signal source for the MDX644 module. Desired input signal source may be selected, from the options listed below, by rotating the control knob beneath the display.

- **BNC** allows the user to select the input source for the amplifier as the signal applied to the rear panel BNC connector
- **MIDPLANE** selects the video input signal from available midplane routing sources

MIDPLANE SOURCE

When Midplane is selected as the video source, an additional menu entry labeled "Midplane Source" is displayed above the second control knob, as shown in Figure 4-20. The following midplane routing sources may be selected by rotating the control knob beneath the Midplane Source entry:

- **LEFT** selects the signal source as the signal derived from the module located left-adjacent to the MDX644 module in the FRM603 frame
- **RIGHT** selects the signal source as the signal derived from the module located right-adjacent to the MDX644 module in the FRM603 frame
- **Star-A** selects the signal present on STAR BUS A as the input signal when a star slot compatible module is installed in card slot 5
- **Star-B** selects the signal present on STAR BUS B as the input signal when a star slot compatible module is installed in card slot 16

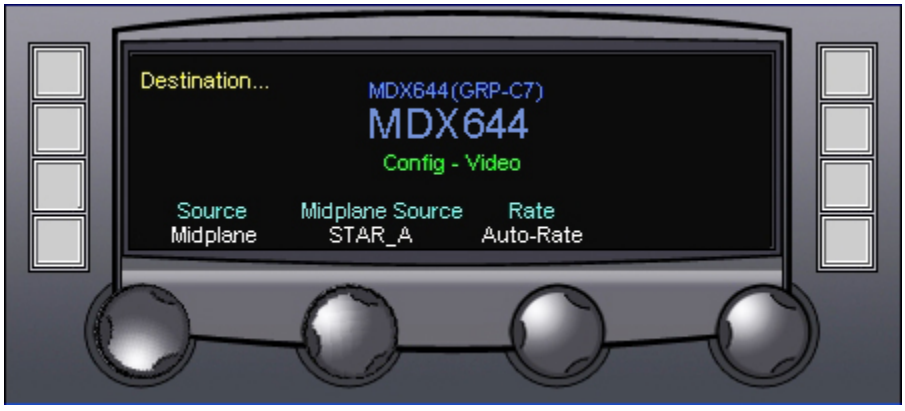


Figure 4-20 Midplane Source Configuration Menu Screen

RATE

RATE sets the data rate for the input video source, and may be selected by rotating the control knob beneath the display. The following options are available:

- **Auto-Rate** – Automatically determines the data rate of the incoming video source
- **SD** – Configures the MDX644 to accept an input of SD-SDI video
- **HD or 3G** – Configures the MDX644 to accept an input of HD-SDI or 3G video

DESTINATION

Through the video destination configuration menu, SDI output video with embedded audio generated by the MDX644 module may be selected for routing to any or all of the midplane routing options. Pressing the touch-switch next to the **DESTINATION** menu item opens the Video Output Configuration Menu screen, as shown by Figure 4-21. Entries on the menu screen and functions available through each are discussed below.

Figure 4-21 Video Output Configuration Menu Screen

LEFT

Rotating the control knob beneath the LEFT menu entry enables or disables video output to the module located left adjacent to the MDX644 in the FRM603 frame

RIGHT

Rotating the control knob beneath the RIGHT menu entry enables or disables video output to the module located right adjacent to the MDX644 in the FRM603 frame

STAR_A

Rotating the control knob beneath the STAR_A menu entry enables or disables video output to a star-slot compatible module located in card slot 5 (Star A) of the FRM603 frame

STAR_B

Rotating the control knob beneath the STAR_B menu entry enables or disables video output to a star-slot compatible module located in card slot 16 (Star B) of the FRM603 frame

4.11.2 MADI CONFIGURATION MENU

MADI configuration selects the source of multiplexed audio from the midplane routing options, if used.

Enter the MADI Configuration Screen, shown in Figure 4-22, by pressing the touch-switch next to the MADI entry on the Configuration Menu Screen. Entries on the menu screen and functions available through each are discussed below.

Figure 4-22 Main MADI Configuration Menu Screen

SOURCE

SOURCE indicates the current active multiplexed audio input signal source from the midplane routing options. The desired input signal source may be selected, from the options listed below, by rotating the control knob beneath the display.

- **LEFT** selects the signal source as the multiplexed audio signal derived from the module located left-adjacent to the MDX644 module in the FRM603 frame
- **RIGHT** selects the signal source as the multiplexed audio signal derived from the module located right-adjacent to the MDX644 module in the FRM603 frame
- **Star-A** selects the signal present on STAR BUS A as the multiplexed audio source when a star slot compatible module is installed in card slot 5
- **Star-B** selects the signal present on STAR BUS B as the multiplexed audio source when a star slot compatible module is installed in card slot 16

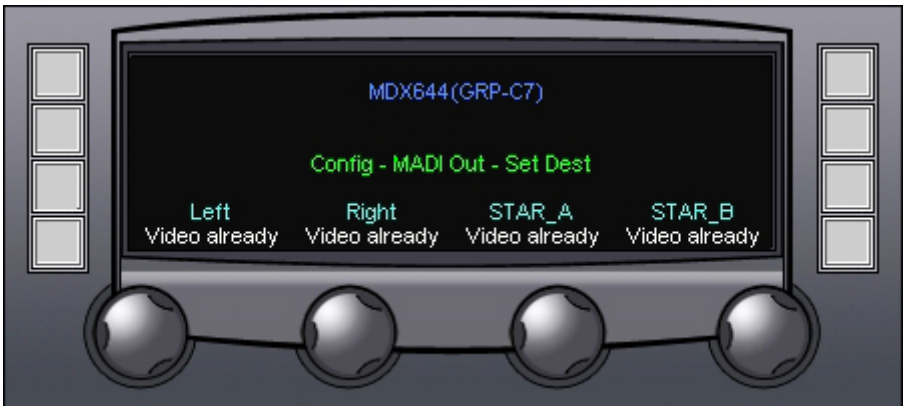
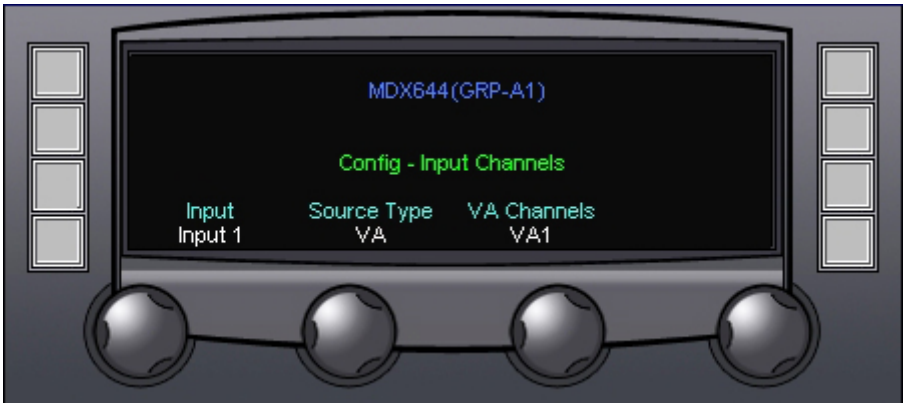


Figure 4-23 MADI Output Configuration Menu Screen

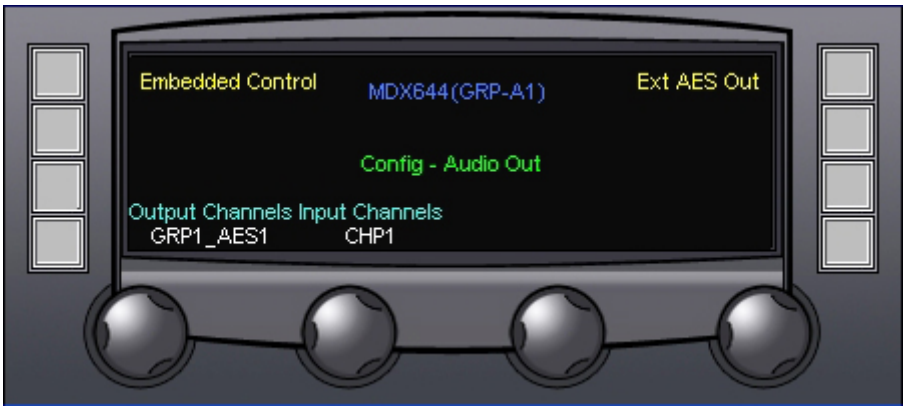
4.11.3 VIDEO CONFIGURATION MENU

Enter the video configuration menu by pressing the touch-switch next to the Video entry on configuration menu screen..

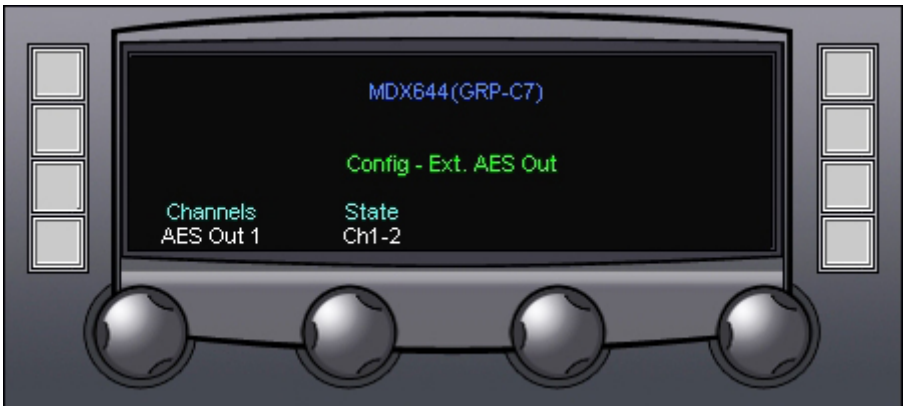


4.11.4 VIDEO CONFIGURATION MENU

Enter the video configuration menu by pressing the touch-switch next to the Video entry on configuration menu screen..

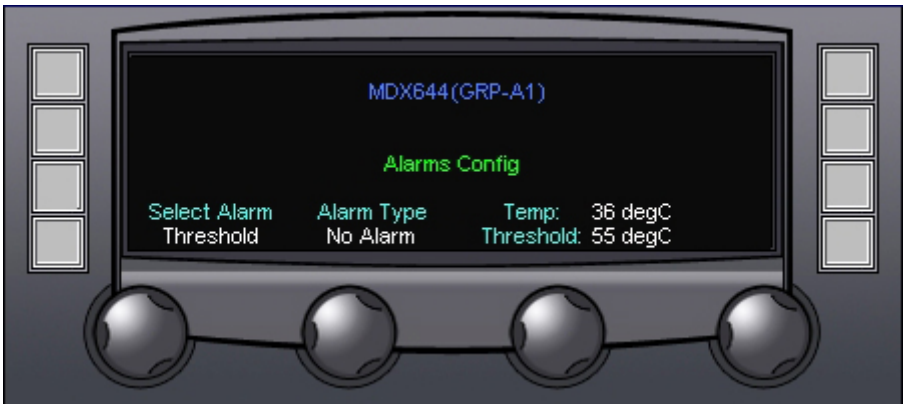

Embedded Control
MDX644(GRP-A1)
Ext AES Out
Config - Audio Out
Output Channels Input Channels
GRP1_AES1
CHP1


MDX644(GRP-C7)
Config - Embed Audio Control
Emb_Groups
State
GRP1
On



4.11.5 VIDEO CONFIGURATION MENU

Enter the video configuration menu by pressing the touch-switch next to the Video entry on configuration menu screen..



ALARM SELECT (Select Alarm)

Alarm Select selects the board function to associate with an alarm. Alarm function may be selected by rotating the control knob beneath the Select Alarm display. The following alarm select options are available:

Over Temperature (OvrTemp) – Triggers an alarm alert condition if the operating temperature of the AAB module reaches or exceeds the selected threshold temperature.

(OvrFlow1) – Triggers an alarm if the DVA module indicates the presence of an error condition in the hardware.

(OvrFlow2) – Triggers an alarm if the DVA module indicates the presence of an error condition in the hardware.

(InLoss1) – Triggers an alarm if sync reference to the DVA module should ever be lost.

(IOB) – Triggers an alarm if sync reference to the DVA module should ever be lost.

(POL) – Triggers an alarm if sync reference to the DVA module should ever be lost.

Alarm Type

The setting of the Alarm Type selector determines which, if any, alarm is associated with the alarm selection. The following configuration options are available:

No Alarm – The displayed alarm selection is not associated with any of the available alarms.

Minor Alarm - The displayed alarm selection will trigger a minor alarm indication when the alarm trip condition exists.

Major Alarm - The displayed alarm selection will trigger a major alarm indication when the alarm trip condition exists.

TEMP

The Temp display indicates the current operating temperature of the AAB module. This is a display only function.

THRESHOLD (Threshold:) – Rotating the Threshold selector determines the temperature (in degrees Celsius) at which the Over Temp alarm will triggers.

NOTE

Temperature (Temp) and Threshold menus entries are only displayed when the Select Alarm control is set to the Over Temperature (OvrTemp) selection.

OVER TEMPERATURE THRESHOLD (OvrTempThresh) – Rotating the OvrTempThresh selector determines the temperature (in degrees Celsius) at which the OvrTemp alarm will trigger.

OVER TEMPERATURE (OvrTemp), Figure 4-13

Setting the Over Temperature alarm triggers an alarm alert condition if the operating temperature of the AES module reaches or exceeds the selected threshold temperature. The following parameters may be selected for the over temp alarm:

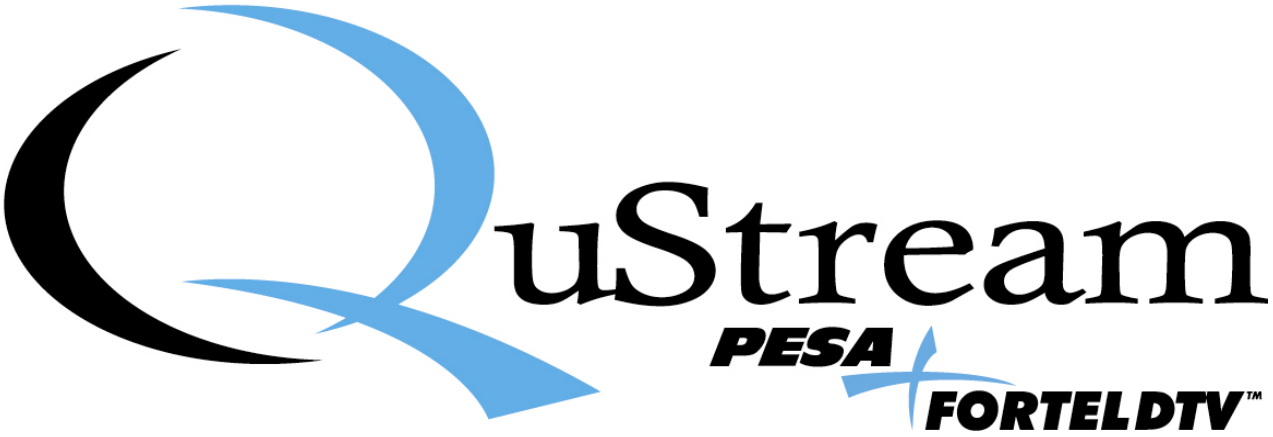
ALARM TYPE

Rotating the control knob beneath the Alarm Type menu entry selects the desired operating option for the over temp alarm from the following choices:

No Alarm – Defeats the alarm function for an over temp condition.

Minor Alarm - Triggers a minor alarm indication when the over temp threshold is reached.

Major Alarm - Triggers a major alarm indication when the over temp threshold is reached.


QuStream
PESA
FORTELDTV™