TECHNICAL MANUAL

VIDEO MATRIX ROUTERS

3G VIDEO INPUT CARD WITH AUDIO DE-EMBEDDING

AND

3G VIDEO OUTPUT CARD WITH AUDIO EMBEDDING

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Thank You !! for purchasing your new Cheetah signal routing equipment from PESA. We appreciate your confidence in our products. PESA produces quality, state-of-the-art equipment designed to deliver our users the highest degree of performance, dependability and versatility available anywhere. We want you to know that if you ever have a concern or problem with a PESA product, we have a team of engineers, technicians and customer service professionals available 24/7/365 to help resolve the issue.

Our commitment is to continue earning the trust and confidence of our customers throughout the industry by incorporating cutting-edge technology into the highest quality, most cost effective products on the market. And we would like to invite you to tell us how we're doing. If you have any comments or suggestions concerning your PESA equipment, please contact our Customer Service Department.

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Chapter 1 About This Manual

1.1 DOCUMENTATION AND SAFETY OVERVIEW

This manual provides product introduction, and instructions for installation and operation of Video Input Cards with Audio De-Embedding and Video Output Cards with Audio Embedding for use in the Cheetah Series of Video Matrix Routing Switchers built By PESA. System circuit cards introduced herein are not stand-alone products and will not function unless mounted in a compatible Cheetah video matrix router mainframe.

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

STOP	**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	**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

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

PESA's Cheetah router family includes two special purpose system circuit cards for de-embedding (DEMUX Card) and embedding (MUX) digital audio with SDI video that marry the video routing capability of the Cheetah Video Matrix Routers with the audio routing capability of the Cheetah DRS Audio Router. Both cards are fully compatible with SDI video signals up to 3Gbps and compliant with SMPTE 259M, 292M and 424M. These cards are used in place of the "standard" SDI video input buffer and video output combiner cards in a Cheetah video router mainframe. Operation of the audio functions is accomplished through screens of the graphical user interface (GUI) of the PERC2000 (P2K) System Controller. Each video card with audio capability must be interfaced to a DRS audio routing system through an available DXE Interface Port. Common CAT5E cable, up to 100M in length, is used to interconnect the audio portion of the MUX and DEMUX cards with a DRS DXE frame.

Audio may be de-embedded from any incoming SDI signal, but can only be embedded to a HD or 3G SDI signal. It is not possible to embed audio into a SD-SDI signal; however, any audio signals embedded onto the SD video are passed through to the output with no degradation to the audio – even if the audio signals are de-embedded for use elsewhere.

This manual assumes the user has a clear understanding and working knowledge of both a Cheetah video router and a DRS audio router, and further assumes the user has access to Technical Manuals for the video router, audio router and the P2K system controller.

2.2 VIDEO INPUT CARD WITH AUDIO DE-EMBEDDING

Each video input card with AES audio de-embedding, called the DEMUX card, provides 16 input channels for SDI video with embedded audio, and processes all audio groups and signals on each video input source. Up to 128 de-embedded audio signals may be selected, by groups of four, through the GUI as independent mono DRS audio sources for interface to a DRS DXE. The Cheetah DEMUX card is shown in Figure 2-1, and Figure 2-2 is a simplified block diagram of the DEMUX card circuitry.

Video circuitry is virtually identical to that present on the "standard" Cheetah 3Gbps video input card, and operation is completely transparent to the audio functions. Video configuration commands and operations are identical to existing cards, and installing the DEMUX card in place of a standard input card should require no changes to video set-ups.

Considering the audio functions of the card, we may think of the DEMUX card as a piece of DRS hardware, operationally identical to a "standard" 128 channel digital audio input frame.

Incoming HD or 3G SDI signals may contain up to four groups of digital audio, and each group may contain up to four independent mono signals. SD-SDI video contains up to two audio groups, with up to four signals per group. The Cheetah DEMUX card can de-embed audio from any incoming signal – SD, HD or 3G. Since the DEMUX card provides inputs for up to 16 video channels, it is possible to de-embed up to 256 mono signals – as up to 64 groups of four signals each. Of these 64 audio groups, any 32 groups, for a total of 128 signals, may be selected as DRS sources.

De-embedded signals are always selected as DRS sources by group – not individual signals. Once the four signals in the group are presented to four individual input channels of the DRS through the DXE interface port, they may then be treated as independent signals for routing to any DRS output or used individually to "build" four channel groups for embedding into video signals by the Output MUX card.

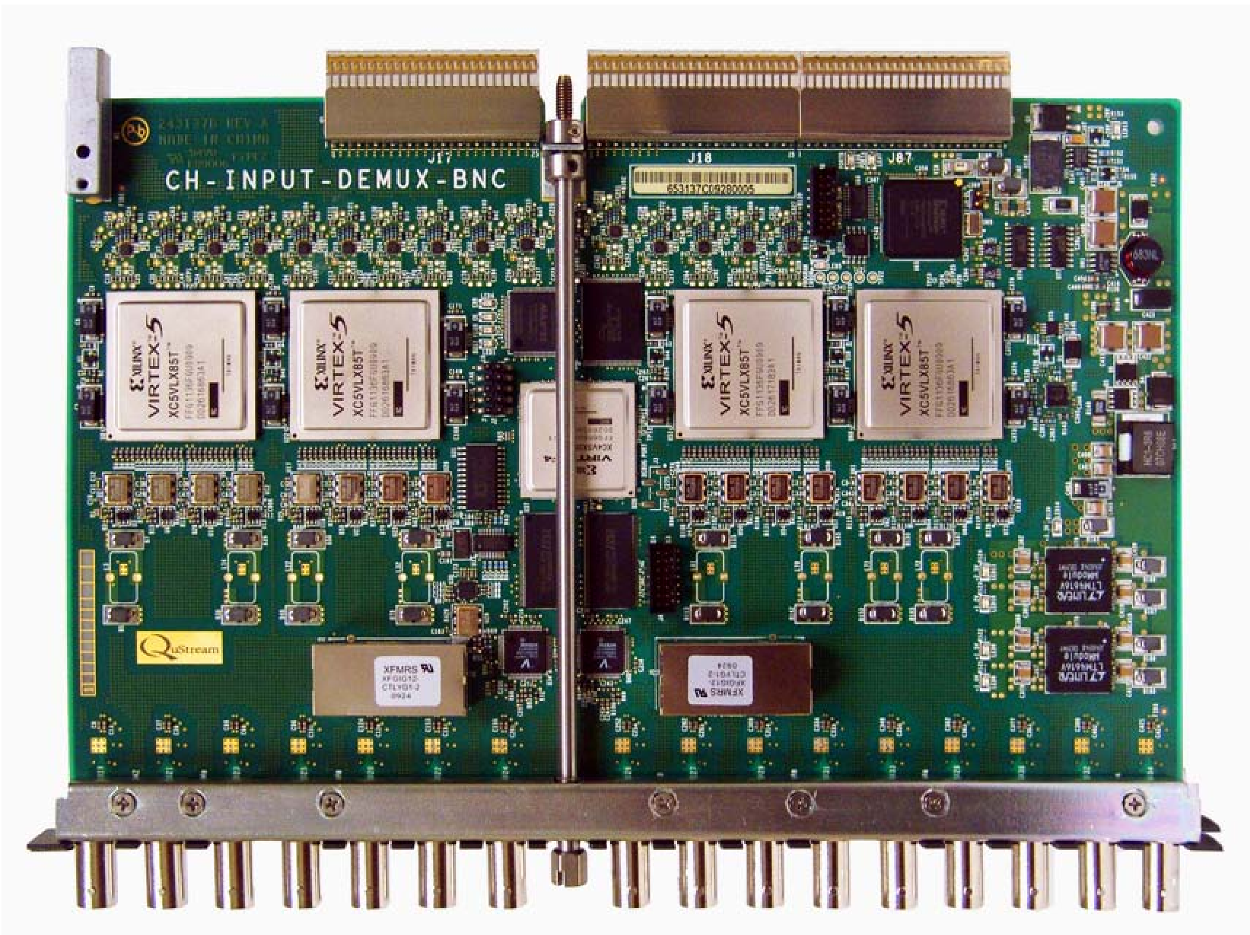


Figure 2-1 Cheetah Input DEMUX 3G Video Card

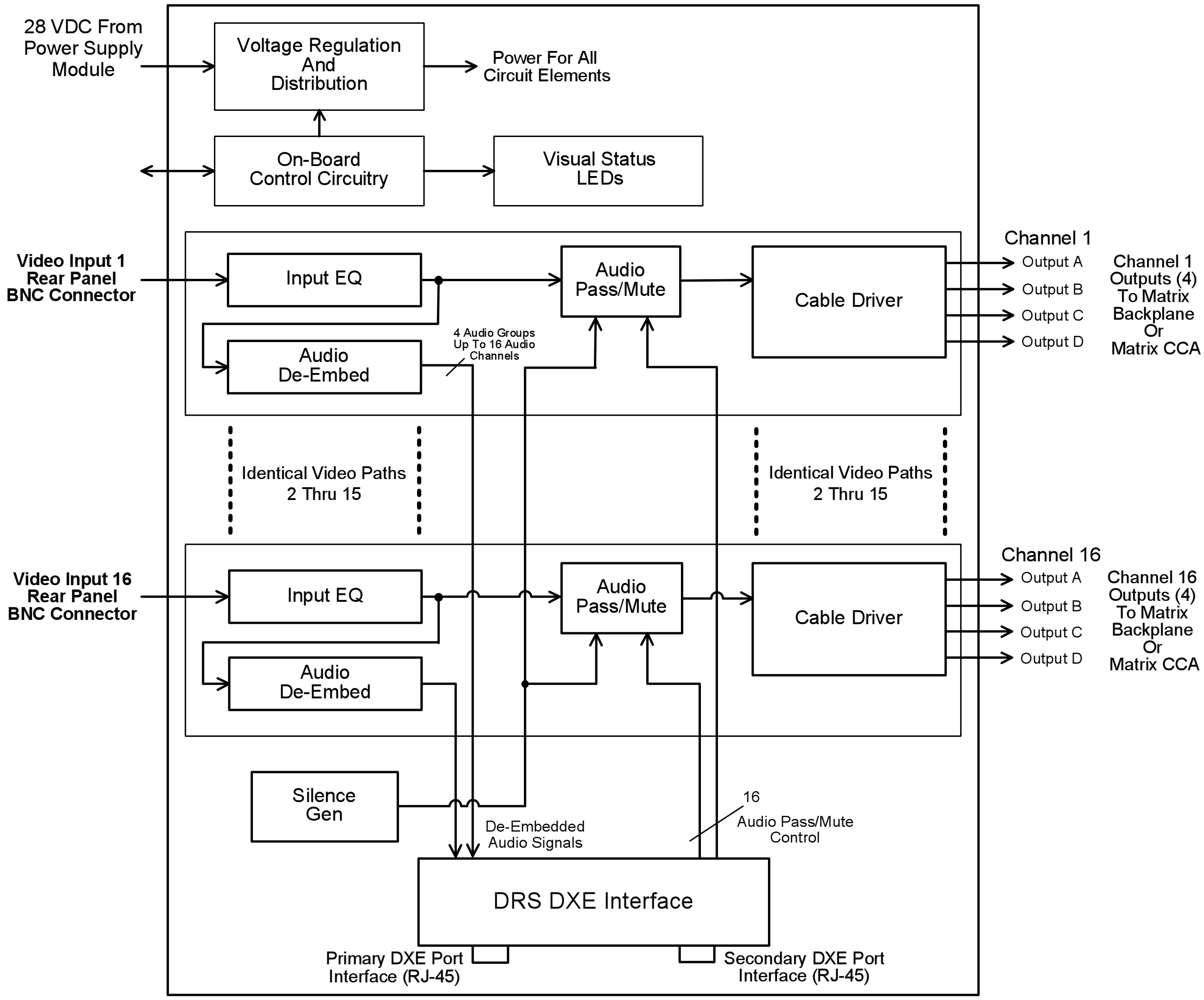


Figure 2-2 Block Diagram – Input DEMUX Card

De-embedding is not a destructive process, and audio signals present in the video stream are still fully intact following the de-embedder. Through the P2K GUI, however, the user may select to “mute” any or all audio groups present on the video signal. Muting is accomplished by replacing original audio data with “silence” data generated by circuitry on-board the DEMUX card. If muting is not selected, the video signal is passed through to the router matrix cards with all original audio content.

There are two RJ-45 connector blocks on each DEMUX card, and these are the primary and secondary connection points to interface the card with a DRS DXE frame. Functionally, the DEMUX card interfaces to DRS exactly as any other audio frame – using CAT5E cable to connect the primary DXE port connector to an open port on the DXE of the channel group to which you wish to assign the de-embedded signals. In systems using a second DXE frame for PAS bus redundancy, the secondary port interface connector on the DEMUX card provides the redundant bus function.

2.3 VIDEO OUTPUT COMBINER CARD WITH AUDIO EMBEDDING

Each video output card with audio embedding, called the MUX card, provides 16 output channels for SDI video with full audio control over each output channel. Through the P2K GUI, the user may select any one of the following audio options for each video channel:

- Pass the video with all original digital audio content intact
- Embed any or all 4 groups with audio signals selected through the DRS Audio Router
- Effectively "mute" audio content on any or all groups by replacing audio data with "silence" data generated on the MUX card.

The Cheetah MUX card is shown in Figure 2-3 and a simplified block diagram of the circuitry is shown by Figure 2-4.

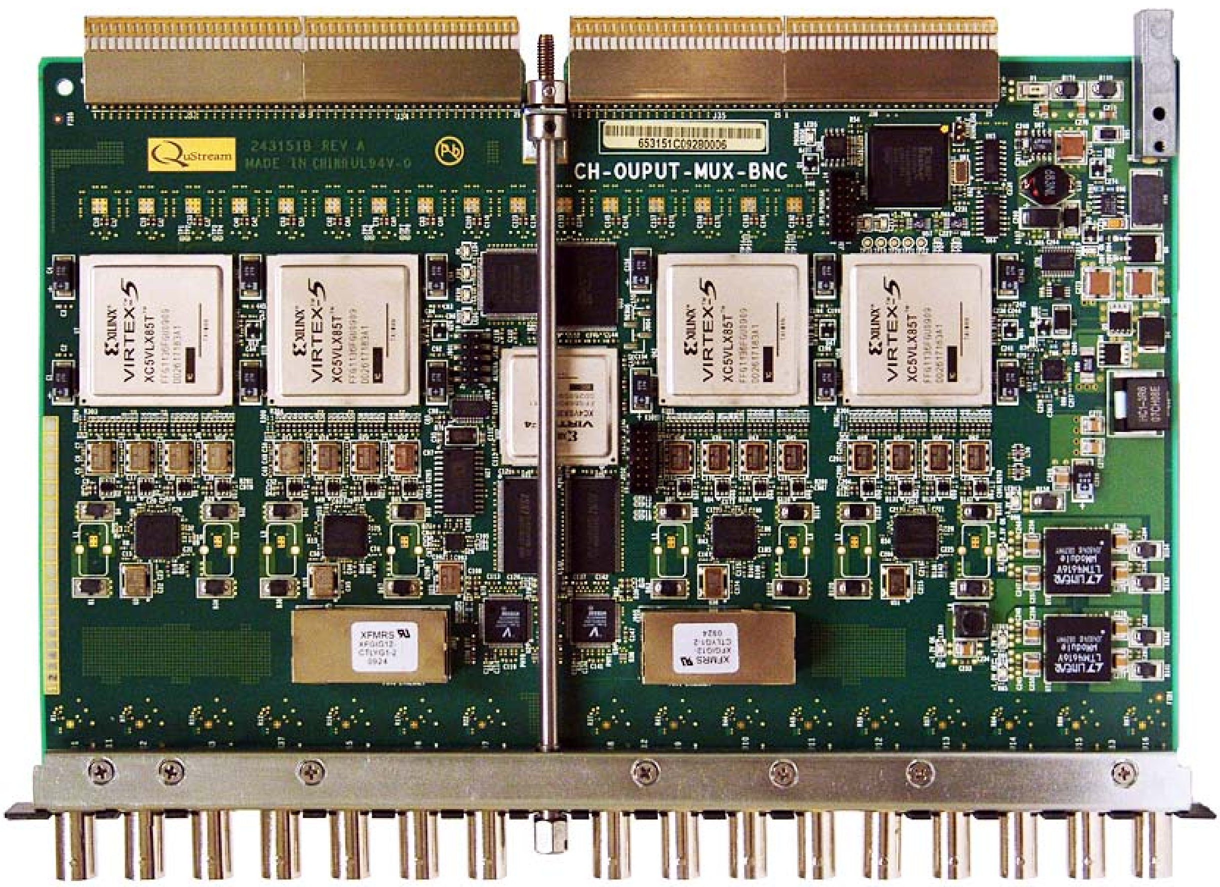


Figure 2-3 Cheetah Output MUX 3G Video Card

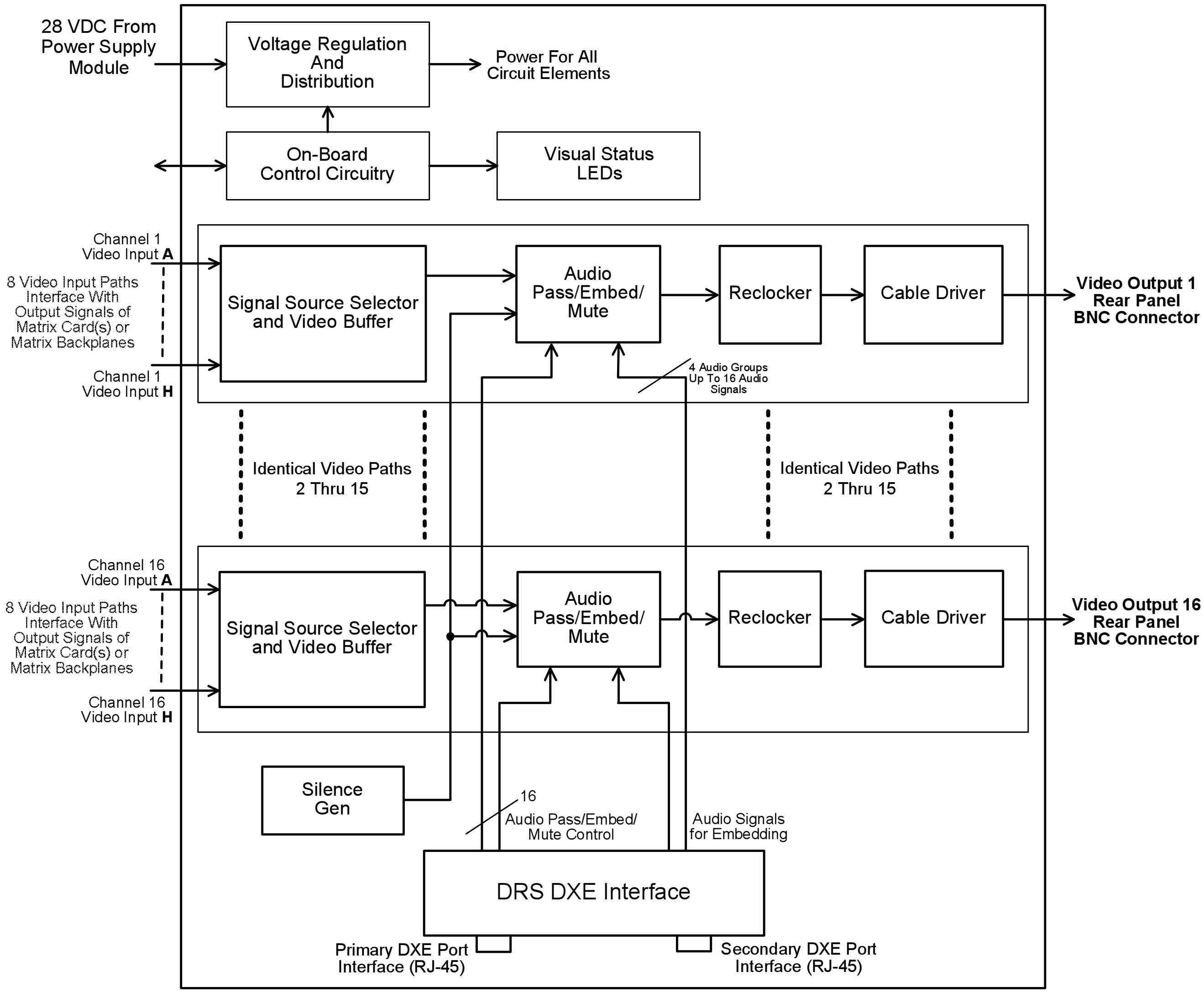


Figure 2-4 Block Diagram – Output MUX Card

Video circuitry is virtually identical to that present on the “standard” Cheetah 3Gbps output combiner card, and operation is completely transparent to the audio functions. Video configuration commands and operations are identical to existing cards, and installing the MUX card in place of a standard output card should not require changes to video set-ups.

Considering the audio functions of the card, we may think of the MUX card as being very similar to a 128 channel digital audio output frame. Although up to 128 audio sources may be selected as output signals, these are always grouped as four signals per audio group for embedding. Interface to a DRS DXE is identical to that of an output audio frame.

Each video path receives signals from the router matrix cards, and one input from the matrix is selected as source video for the path. This signal is routed through audio processing circuitry where, depending on format of the video source and commands received from the DRS, “new” audio data is embedded, original content is passed intact or select audio groups are muted on the output signal.

Audio data may only be embedded into HD-SDI or 3G-SDI video signals. If the source is SD-SDI video, the original audio content is passed intact to the output. Any embed commands that may be configured for the output channel are implemented if the source is a HD or 3G signal and ignored with a SD signal source. Audio is embedded in groups, with up to four signals per group; and up to 4 groups may be embedded into any of the video channels. Any four individual DRS input signals may be selected for inclusion in a designated embed group. Up to 128 individual audio signals may be selected for the groups, thereby allowing up to 32 embeddable groups to be created. Any of the created groups may be embedded into any or all of the HD or 3G video output signals.

There are two RJ-45 connector blocks on each MUX card, and these are the primary and secondary connection points to interface the card with a DRS DXE frame. The MUX card interfaces to DRS using CAT5E cable to connect the primary DXE port connector to an open port on the DXE. Each embed group consists of four individual output channels. Just as with a “standard” audio frame, output channel numbers are assigned to the card as a 128 channel block by the DXE port; however these are always treated as embed groups composed of four numerically sequential output channels. In systems using a second DXE frame for PAS bus redundancy, the secondary port interface connector on the MUX card provides the redundant bus function.

2.4 SPECIFICATIONS

2.4.1 INPUT DEMUX CARD SPECIFICATIONS

- Card Type: Cheetah Input Buffer with Audio De-Embedding
- Number Inputs: 16 independent channels
- Video Inputs SDI up to 3Gbps, compliant with SMPTE 259M, 292M and 424M
- Connector Type BNC
- Data Rates: 3Mb to 3Gbps
- Status Monitoring Power, Temp, Signal Presence
- De-Embedding All audio groups per input, all audio signals per group
- Audio Outputs: Up to 128 mono audio signals selected by group from de-embedded audio
- Form Factor: Standard Cheetah Input Card

2.4.2 OUTPUT MUX CARD SPECIFICATIONS

- Card Type: Cheetah Output Combiner with Audio Embedding
- Number Outputs: 16 independent channels
- Video Outputs SDI up to 3Gbps, compliant with SMPTE 259M, 292M and 424M
- Connector Type BNC
- Data Rates: 3Mb to 3Gbps
- Status Monitoring Power, Temp, Signal Presence
- Embedding Any or all 4 audio groups on HD or 3G SDI signals
- Audio Inputs: Up to 32 groups of four signals per group derived from DRS sources
- Form Factor: Standard Cheetah Output Card

Chapter 3 Installation

3.1 DESCRIPTION

Cheetah MUX and DEMUX system cards install in a standard Cheetah mainframe in place of the "standard" digital video input buffer cards. As part of installation, it is necessary to complete connection of a CAT5E interface cable between each MUX and DEMUX card in the system and the DRS DXE. Connection to a DXE frame is identical to connecting a "standard" DRS audio frame.

Upon completion of hardware installation all operational configuration for de-embed and embed functions is accomplished through menu screens of the P2K GUI. These procedures are discussed in Chapter 4 of this manual.

3.2 CHECK DXE INTERFACE CABLE INSTALLATION

MUX and DEMUX cards are shipped from the factory with a pigtail cable installed between the port connector on the card and a supplied female-to-female RJ-45 cable coupler, as shown in Figure 3-1.

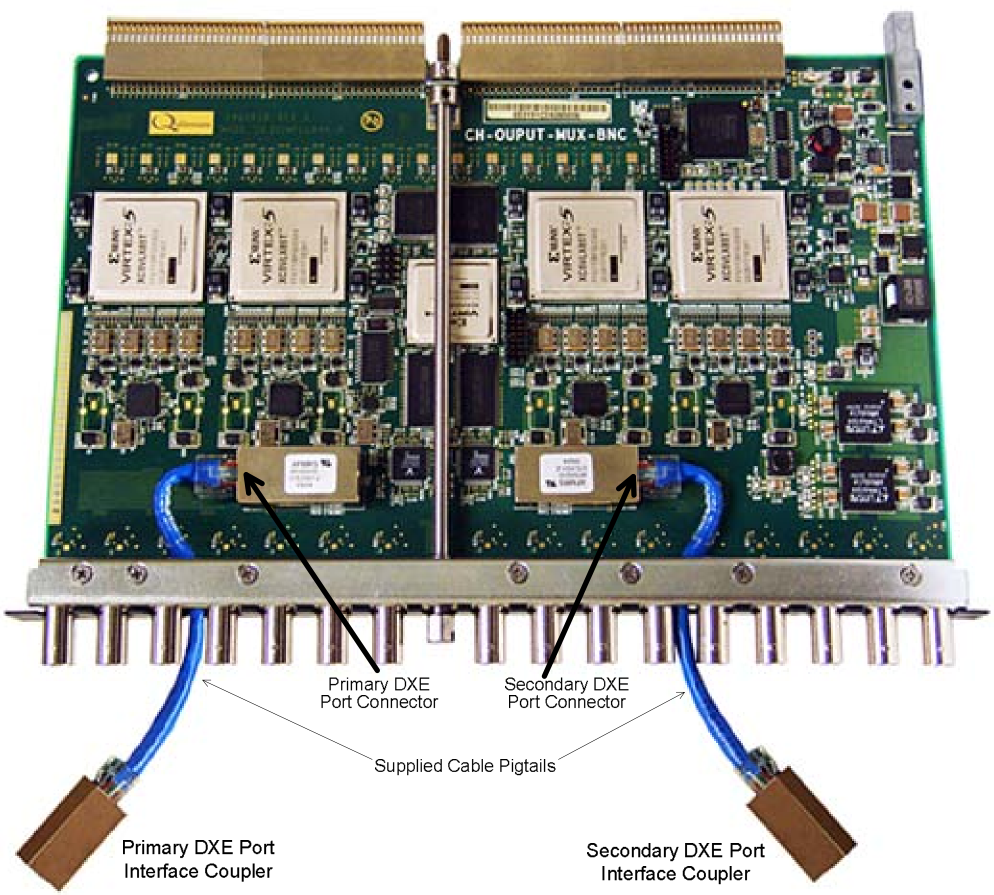


Figure 3-1 RJ-45 Connector and Coupler Locations – DEMUX and MUX Card

Before you install the system cards in the video matrix router mainframe, verify that each supplied pigtail cable on each card is securely installed into its DXE port connector on the card. Verify that a female-to-female cable coupler is securely attached to the loose end of each pigtail cable.

3.3 INSTALL MUX AND DEMUX SYSTEM CARDS

Upon completion of cable verification on all cards, install cards in the Cheetah router mainframe as follows:

1. If you are replacing existing system input or output cards, loosen the hex card retaining screw, as shown in Figure 3-2, securing card into mainframe.

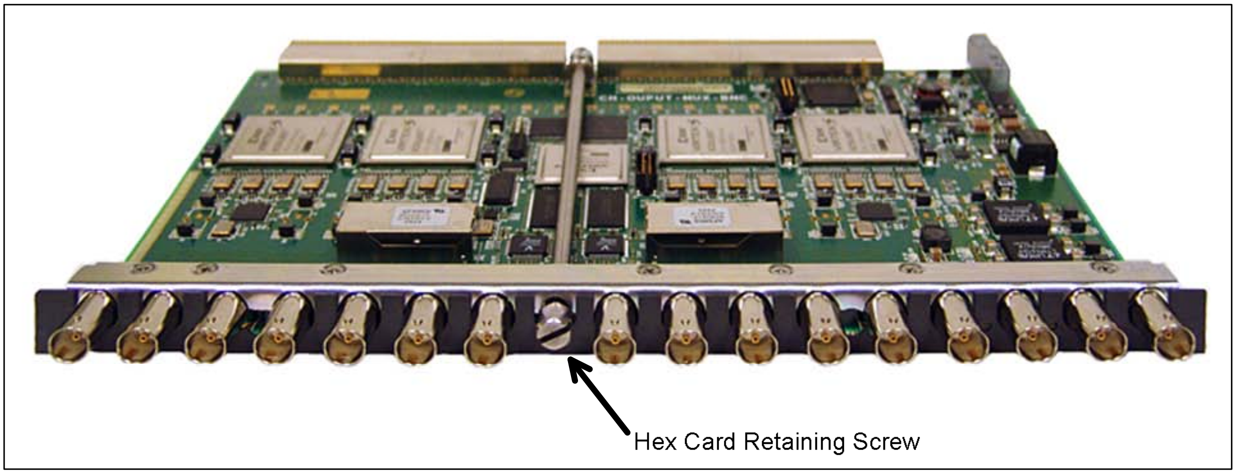


Figure 3-2 Video Card Retaining Screw Location

2. Carefully remove card from mainframe and set aside.
3. Install DEMUX cards with CAT5E DXE interface cables attached in place of all "standard" Cheetah input buffer cards.
4. Carefully install DEMUX cards and ensure that all card edge connectors seat properly and firmly with mating connectors on mainframe mid-plane.
5. Secure card into mainframe by tightening hex card retaining screw, as shown in Figure 3-2.
6. Repeat steps 3 thru 5 for all MUX cards to be installed in place of "standard" Cheetah output combiner cards.

3.4 INSTALL DRS DXE INTERFACE PORT CABLES

A CAT5E PAS bus cable must be installed between the port interface connector on the rear panel of the DXE and the RJ-45 coupler attached to the pigtail cable supplied with each MUX or DEMUX card. Installation is identical for both card types, an output MUX card is shown here for example. Make sure you have a CAT5E cable of proper length to complete connection between the cable coupler and the DRS DXE frame, and that an RJ45 connector is securely attached to each cable end. Install interface cable as follows:

1. Locate the primary and secondary DXE port interface couplers as shown in Figure 3-1.

2. Install RJ-45 connector of CAT5E interface cable to mating primary DXE port coupler and secondary port coupler (if used) on each system card, as shown in Figure 3-3.

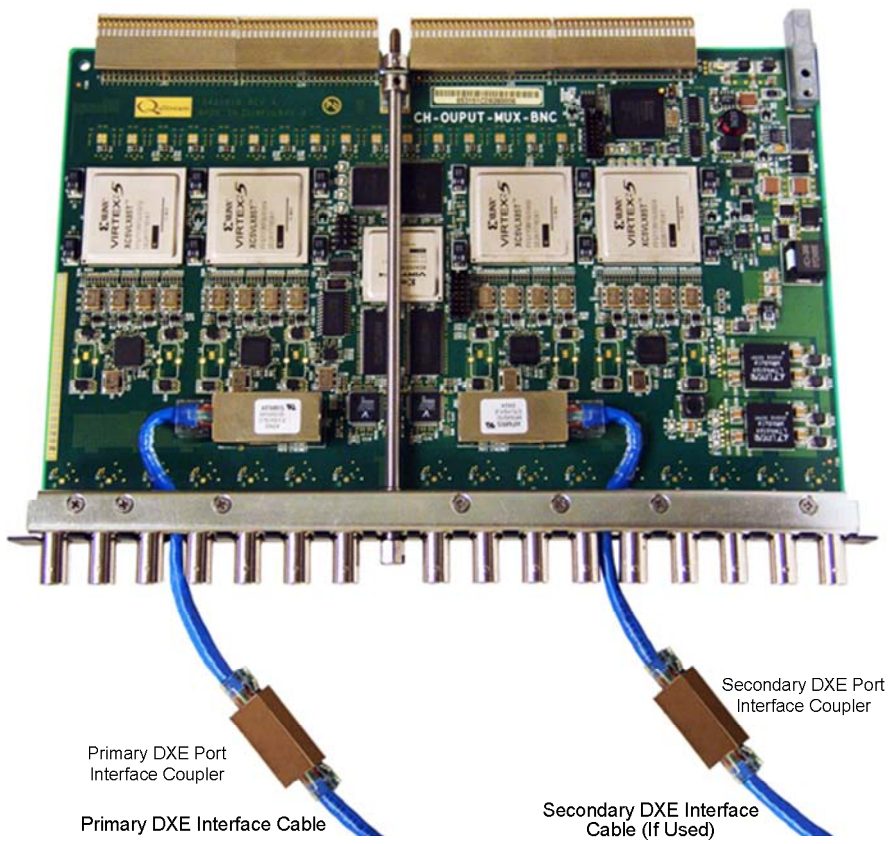


Figure 3-3 DXE Interface Cable Installation

Installing a MUX or DEMUX card to a DRS DXE is an identical process to installing a standard audio frame to a DXE. For all practical purposes you may consider a Cheetah DEMUX card as a 128 channel input block, and a MUX card as a 128 channel output signal block. Each DXE I/O frame port supports a block of 128 channels, therefore a single MUX or DEMUX card fills the entire capacity of one port with input or output signals. Cheetah MUX and DEMUX cards may be mixed with other DRS audio frames within a channel group. A simplified installation procedure is presented here, refer to the DRS Technical Manual if greater detail is needed. An illustration of a DXE rear panel is shown in Figure 3-4 for reference.

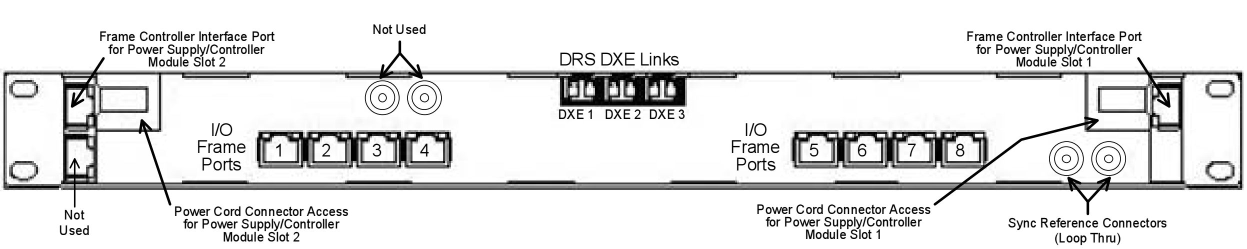


Figure 3-4 Typical DXE Rear Panel

Remember that I/O channel numbers are assigned to an audio block by the order in which the frame containing the block is attached to the I/O frame ports. Be sure that you are connecting the cables from the cards to the DXE in the order you wish to assign channel numbers to the audio signals. Refer to Chapter 4 of this manual for more information. Once you know the order you wish to connect the cables, proceed to complete connections in accordance with the following guidelines:

1. When connecting a single DXE (non-redundant) system, connect the cable from the Primary PAS Bus Connector on the system card to a DXE Frame Port connector, as shown in Figure 3-5. For illustrative purposes only, the figure shows the hook-up for one DEMUX and one MUX card in a 128X128 router arrangement.

2. PAS bus redundancy requires a second DXE frame. In this installation use the Primary PAS Bus connectors to interconnect packet audio stream cables from system cards to the Primary DXE frame, and Secondary DXE connectors to form the second PAS bus with the Redundant DXE frame. Figure 3-6 illustrates a redundant PAS bus system. Use this figure as a guide for installation.

3. Connect all PAS bus cables from system cards to open DXE I/O ports.

When installation of PAS bus cables between all system cards and DXE ports is complete, configure DXE I/O frame ports for the type of system card or audio frame connected to each, through the GUI application of the P2K System Controller. Refer to Paragraph 4-3 of this manual for a discussion of the port configuration procedure. Remember, all active I/O ports on all DXE frames must be configured in order for the DRS to operate properly.

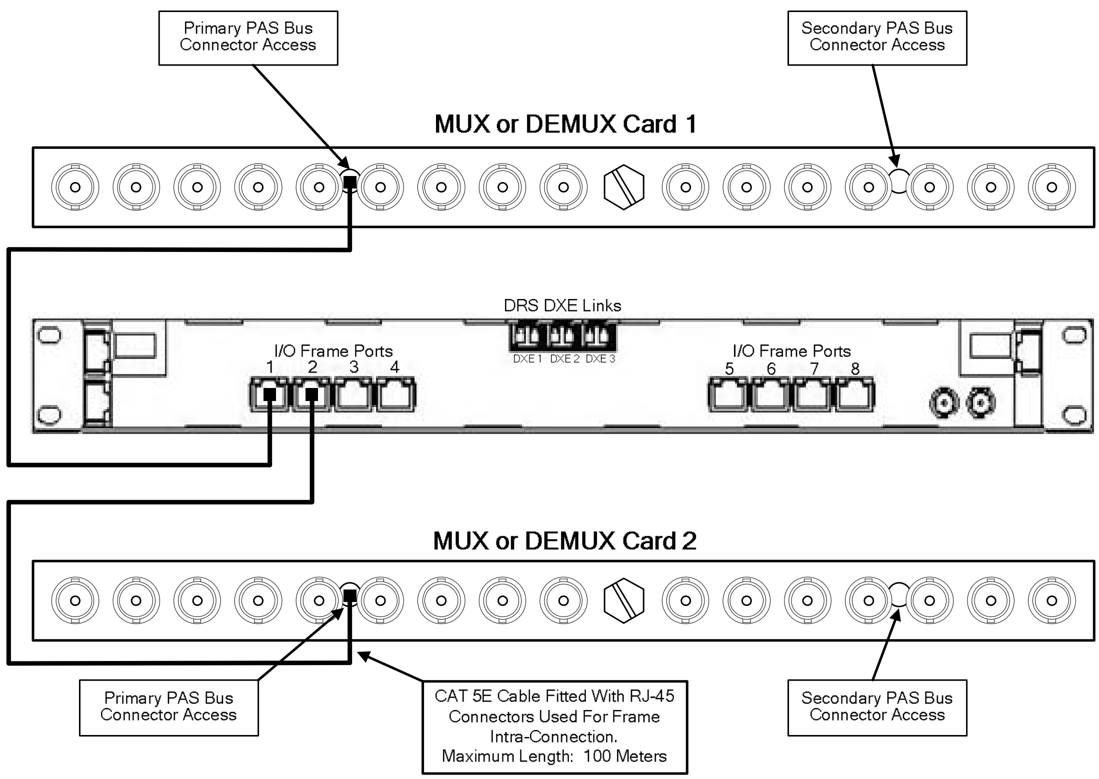


Figure 3-5 Packet Audio Stream Connection (Non-Redundant PAS Bus)

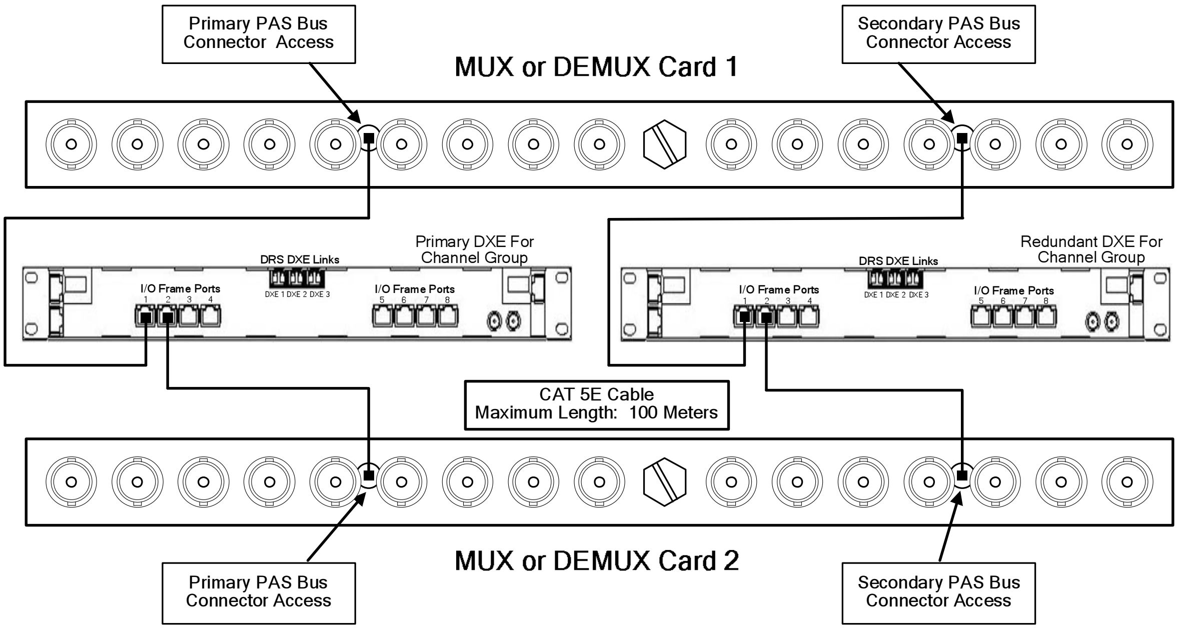


Figure 3-6 Packet Audio Stream Connection (Redundant PAS Bus)

Chapter 4 Operation

4.1 REVIEW OF HARDWARE AND ROUTER CONFIGURATION FILES

Throughout this manual discussions of DRS system installation and operation have assumed that the user has a working knowledge of PESA's DRS router and is familiar with the functional descriptions and system theory presented in the DRS Technical Manual. Before we continue to system setup procedures, let's quickly review configuration and setup information and present it with the MUX and DEMUX cards included in the discussions. If you are already familiar with DRS configuration and setup, you may choose to skip over this material and proceed to the setup paragraphs.

Cheetah MUX and DEMUX cards attach to DXE I/O frame ports in the same manner as "standard" input or output audio frames; and when discussing MUX and DEMUX cards in relation to DRS installations, we may consider and refer to the cards as "frames." In examples and discussions in the following paragraphs, the term frame may generically address either an audio frame or a MUX or DEMUX card. The term input frame, or block, refers to the source of audio signals to the DXE from either an audio frame or a DEMUX card. Likewise, the term output frame, or block, refers to the destination of output audio signals from the DXE, whether it is an actual audio frame or a Cheetah MUX card.

Remember that ***Hardware*** configuration is where the PERC1000 (P1K) Frame Controller in each DXE frame is configured for the number and type of audio blocks under its control and a numerical input/output channel range is assigned to each block. Although hardware configuration functions are performed through the P2K GUI application, and data is stored as part of a saved system configuration file, the system controller has no real intervention in this procedure.

In order for the system controller to operate, we must write a ***Router*** configuration file and load it into controller memory. This file contains programming data for individual sources and destinations such as where (frame and physical connector) each signal connects to the system, the type of signal and names we wish to associate with each; as well as switching levels, components, source groups, destination groups, and other system functions. It is through router configuration that audio signals available through DRS can be paired with video signals in a video matrix frame for AFV or breakaway switching as a group, if desired. In many installations, remote control panels are located at operator stations or consoles; these are programmed through the router configuration file and allow an operator to control designated functions of the router from a remote station. Virtually any routing function available through the P2K control system can be applied to DRS audio signals.

A system configuration file containing both hardware and router configuration data may be named and saved allowing it to be retrieved to the host PC for future modification or use. Multiple configuration files may be written, stored and loaded as needed to allow quick access of different operational set-ups for the routing system. Remember, however, that the act of generating or saving a file does not download the configuration data to either the frame controller or the system controller.

NOTE	**Anytime a configuration file of *either* type is written or modified using the P2K GUI and saved to storage media, *both* hardware and router configuration data are always stored with the file. Therefore you must always either upload from the system controller or retrieve a stored config file with valid hardware and router config data entries on which to make desired modifications. If you start with "clean slate" configuration screens and only make entries for a hardware or router configuration and save the file, it *will not* contain a full set of configuration data; and, if downloaded to the controllers, *will not* allow the DRS to function properly.**

Also as part of DRS configuration it is possible to set several audio characteristics for individual input and output channels, such as gain, balance, phase inversion and stereo remedies. This configuration data is not saved as a part of the P2K configuration file, however, it may be saved as a separate file on the storage media for future modification or use.

4.2 DXE FRAME PORT CONFIGURATION SCREEN

In DRS system architecture, a *channel group* consists of at least one DXE frame and its associated audio frames, and is identified by the numerical range of I/O signals it can process. Audio frames and blocks are connected to DXE frames through the I/O Frame Port connectors on the DXE rear panel in a numerical sequence, and the order of connection assigns the numerical range of input or output channels handled by each block. Every I/O port must be configured through the DXE Frame Port Configuration menu screen to identify the type of audio block(s) connected to the port and assign a numerical bank of channels to the block. Figure 4-1 shows a typical DXE port configuration menu screen using Cheetah MUX and DEMUX boards as example entries.

The main display portion of this window contains a table with a row entry for each of the 8 frame ports on the DXE. Each row is composed of columns that identify certain operational and configuration parameters about the frame port. Before we continue to the procedure for entering hardware configuration data, we need to closely look at each of the columns. Refer to the example DXE Frame Port Configuration Screen shown by Figure 4-1.

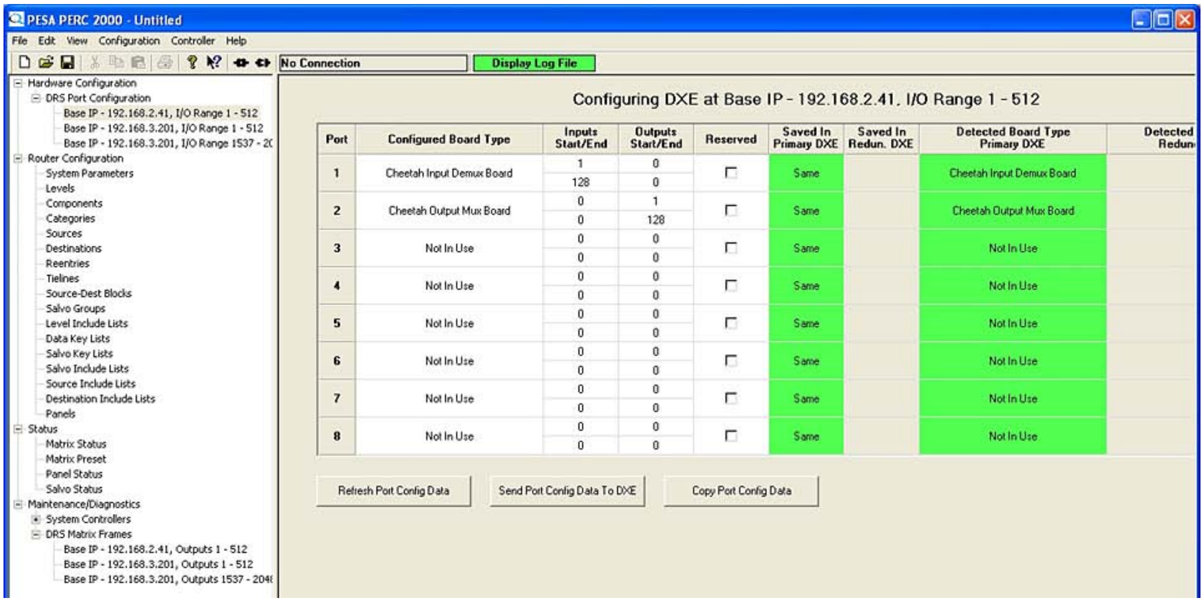


Figure 4-1 DXE Frame Port Configuration Screen Example

When a channel group is selected from the tree listing, data for that group is refreshed as follows prior to display:

- The DXE, primary and redundant, if used, polls its frame I/O ports to determine the type of audio block(s) currently attached to each port.
- The hardware configuration data loaded into the frame controller(s) of each DXE is read to determine the type of audio block(s) programmed in the configuration file as being attached to each I/O port.

At the top of the main window screen the channel group shown for configuration is identified as the DXE, with the base IP address and its I/O range nomenclature displayed. The table in the main display area contains 9 columns, and displays configuration data for the primary DXE and, if equipped, the redundant DXE for the channel group. A brief explanation of the data displayed in each column follows:

- **PORT -** The left-most column labeled PORT, is a listing by port number of the eight physical DXE input/output ports.
- **Configured Board Type** – This entry displays which type of audio frame the currently open GUI configuration file indicates is attached to each of the I/O ports. If an existing configuration file has not been either uploaded from the P2K or retrieved from storage media the currently open GUI file will contain no hardware config data for the ports and the cells in this column will be blank, and remain blank until the operator manually enters frame type data for the indicated I/O port using the pull-down menu in each cell. If data is present in any of the cells, the entry displays the frame type **currently defined in the configuration file open on the host PC for the indicated port**. Regardless of whether frame type data is displayed or not, this column allows the user to enter or modify hardware data using the pull-down menu.

- **Inputs Start/End** – Indicates the numeric range of input channels assigned to the port. This entry is determined by the frame type specified in the previous column and is automatically assigned by the GUI application. If no Configured Board Type entry is listed for the port, this column will also be blank.

- **Outputs Start/End** – Same as the previous column, except it displays the numerical range of output channels assigned to the port. If no Configured Board Type entry is listed for the port, this column will also be blank.

- **Reserved** – A check in the box indicates that the range of input/output channel numbers and frame type have been reserved for future implementation.

- **Saved In Primary DXE –** Compares the actual frame hardware type detected on the physical port to the frame type expected on the port, as **determined by the configuration file loaded into the primary P1K** frame controller. If the actual and expected frame types are the same, the message SAME is displayed on a green background. Should the frame type the P1K controller expects to be present on the port and the frame type actually detected on the port not be the same, the message DIFFERENT is displayed on a red background.

- **Saved In Redun. DXE** – Compares the actual frame hardware type detected on the physical port to the frame type expected on the port, as **determined by the configuration file loaded into the redundant P1K** frame controller, if a redundant DXE is present. If the actual and expected frame types are the same, the message SAME is displayed on a green background. Should the frame type the P1K controller expects to be present on the port and the frame type actually detected on the port not be the same, the message DIFFERENT is displayed on a red background. If a redundant DXE is not used in the installation, the column will be greyed-out or disabled.

- **Detected Board Type, Primary DXE** – When the port configuration screen is selected the Primary DXE frame for the channel group polls the audio block(s) attached to each of its I/O ports. This column displays the results – and indicates the frame type of the actual hardware connected to the indicated port. A comparison is then made between the actual detected hardware and the frame type **indicated in the Configured Board Type column**. If the actual and indicated frame types are the same, the cell is displayed with a green background. Should the GUI application file not yet contain hardware config data, or should it indicate a different frame type from what is actually detected, the cell is displayed with a red background.

- **Detected Board Type, Redundant DXE** – When the port configuration screen is opened, the Redundant DXE frame, if present, for the channel group automatically performs an audit of the frame hardware attached to each of its I/O ports. This column displays the results of the audit – and indicates the frame type of the actual hardware connected to the indicated port. A comparison is then made between the actual detected hardware and the frame type **indicated in the Configured Board Type column**. If the actual and indicated frame types are the same, the cell is displayed with a green background. Should the GUI application file not yet contain any hardware config data, or should it indicate a different frame type from what is actually detected, the cell is displayed with a red background. If a redundant DXE is not used in the installation, the column will be greyed-out or disabled.

To summarize the Frame Port Configuration Screen:

- When the screen is open from the GUI, the frame type for each frame attached to each I/O port of the indicated DXE is detected.
- A comparison is made between the actual frame type connected and the frame type programmed into the P1K controller configuration file for each I/O port
- A comparison is made between the actual frame type connected to each port and the frame type indicated by the currently open GUI file.
- Any comparisons not resulting in a positive match are indicated by a red background in the display cell.

4.3 DXE FRAME PORT CONFIGURATION

In most installations, once the initial hardware configuration data is downloaded to the P1K controllers it will rarely, if ever, change. The only reason to alter hardware configuration would be if audio I/O frames or Cheetah input DEMUX or output MUX cards should be added to, or removed from, an installed system, if signal handling capacity of an installed system is expanded by adding additional DXE frames, or if an additional DXE frame is added to an existing channel group for redundancy.

Use the following procedure to configure the I/O frame ports:

- Launch the P2K GUI application from the desktop icon or browse to the PERC2000.exe file and double click to open the application.
- Expand the Hardware Configuration tree in the left pane of the GUI display, as shown in Figure 4-2; then expand the DRS Port Configuration tree.
- The DRS Port Configuration tree opens to a listing of all DXE frames in the system, identified by the base IP address and the I/O range of each. Remember in previous text we said that we can identify the DXE(s) for a given channel group by the system base IP address and the I/O range of the group. Select the channel group on which you wish to perform hardware configuration.
- The port configuration screen is displayed as shown. The DXE being configured is identified at the top of the configuration box by the base IP address of the DRS system and the numerical I/O range (channel group) of the specific DXE frame. In this example, the DXE at IP address 192.168.2.41 processes data for numerical input channels 1 thru 512 and numerical output channels 1 thru 512.
- When the port configuration screen is initialized the frame type detected on each interface port on each DXE, primary and redundant – if equipped, is displayed in the two right-most columns. Notice in our example screen, one *Cheetah Input Demux Board* and one *Cheetah Output Mux Board* are shown in the listing as a block of 128 input signals and 128 output signals, respectively, just the same as all other audio blocks.

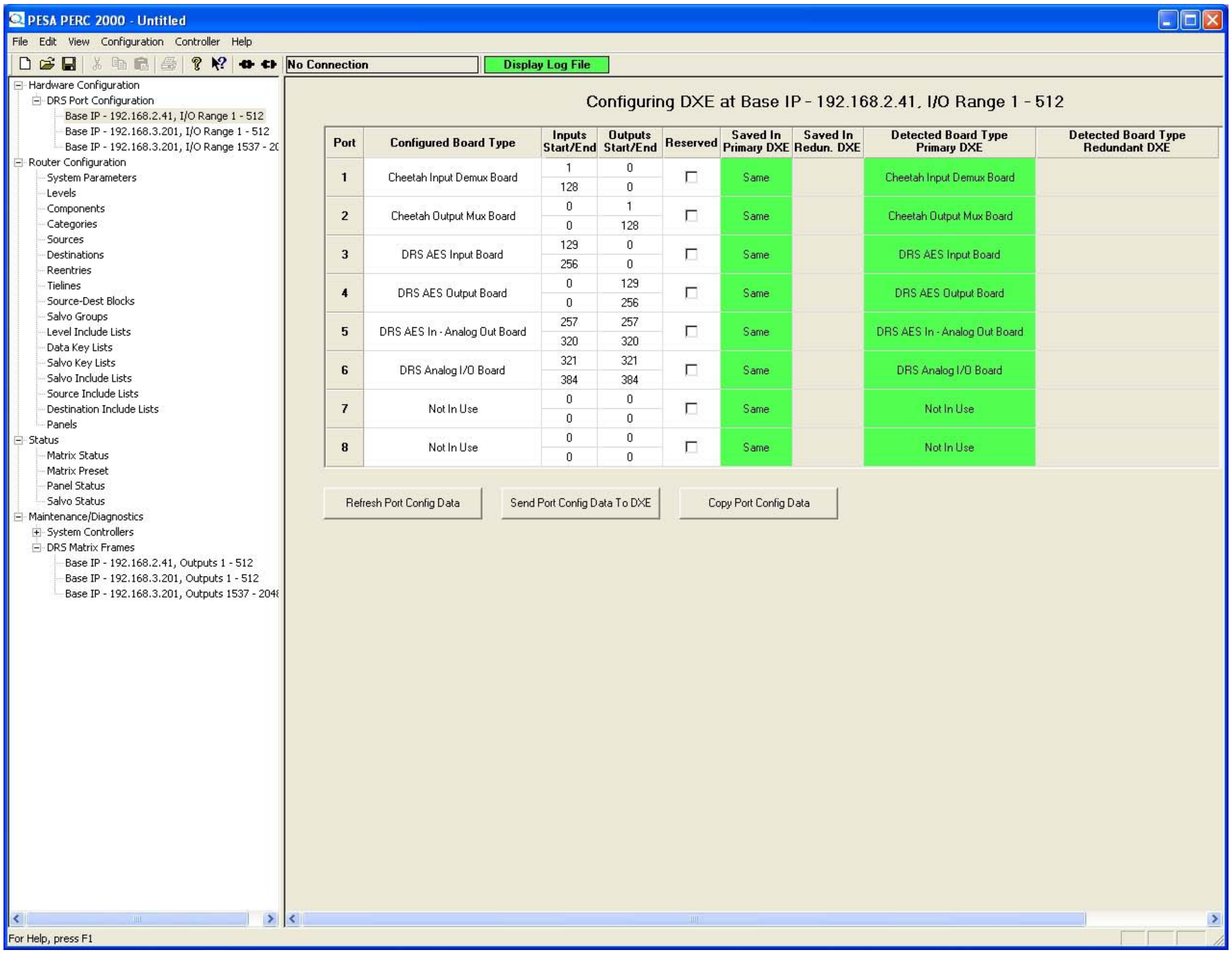


Figure 4-2 Accessing DXE Frame Port Configuration Screen

- If you are generating a "new" hardware configuration, or doing an initial install of the system, and no configuration file has been uploaded from the system controller, the "Configured Board Type" column will be blank. It is from this column that you identify to the frame controller what type of audio frame is connected to each I/O port. If a configuration file has been uploaded from the controller, the detected board type and the configured board type SHOULD agree. If they do not, it means that hardware cabling has been swapped between ports or for some reason the audio frames at the ports have been changed since the loaded configuration file was written.

- If you wish to enter or modify the board type in the configured column, you may use the drop-down menu to assign the board type to each I/O port. Optionally, you may click the "Copy Port Config Data" button below the table and the detected board types at each port will automatically be entered in the configured board type column.

- Input and output channel range is automatically assigned based on the frame type and port order. If you have used the "Copy Port Config Data" option to enter board types, the input and output channel numbers are assigned to all ports.

- If you wish to “reserve” a block of channels for future implementation, select the type of frame you will add in the port number slot for the channel range desired, and check the “Reserved” box next to the board type assignment. The I/O channel range will be assigned to the port based on the entered “future” frame type.

- Once the data for each frame type has been entered to the ports, click on the “Send Port Config Data to DXE” button to download the hardware configuration to all P1K frame controllers in the channel group.

- Repeat this procedure for each channel group and its associated DXE frames.

- Clicking the “Refresh Port Config Data” button causes the DXE to perform board detection at each I/O port and update the data shown in the Detected Board Type columns.

4.4 CHANNEL GROUP STATUS AND SET-UP SCREENS

Setup parameters and status monitoring screens for channel groups are accessed through the P2K GUI. Launch the GUI application from the desktop icon or browse to the PERC2000.exe file and double click to open the application.

Locate and expand the Maintenance/Diagnostics tree in the left pane of the GUI display, as shown in Figure 4-3. Then expand the DRS Matrix Frames tree; this action expands the tree to a listing of all channel groups in the system. Each entry in the listing identifies a channel group of the total system by the base IP address of the system and the numerical *output* channel range of the specified group. Click on any list entry to select and highlight that channel group. The main display screen shows real-time status and setup information for system components specific to the selected channel group. For our example screen, we have selected channel group I/O Range 1 – 512 within the DRS system residing at base IP address 192.168.3.201.

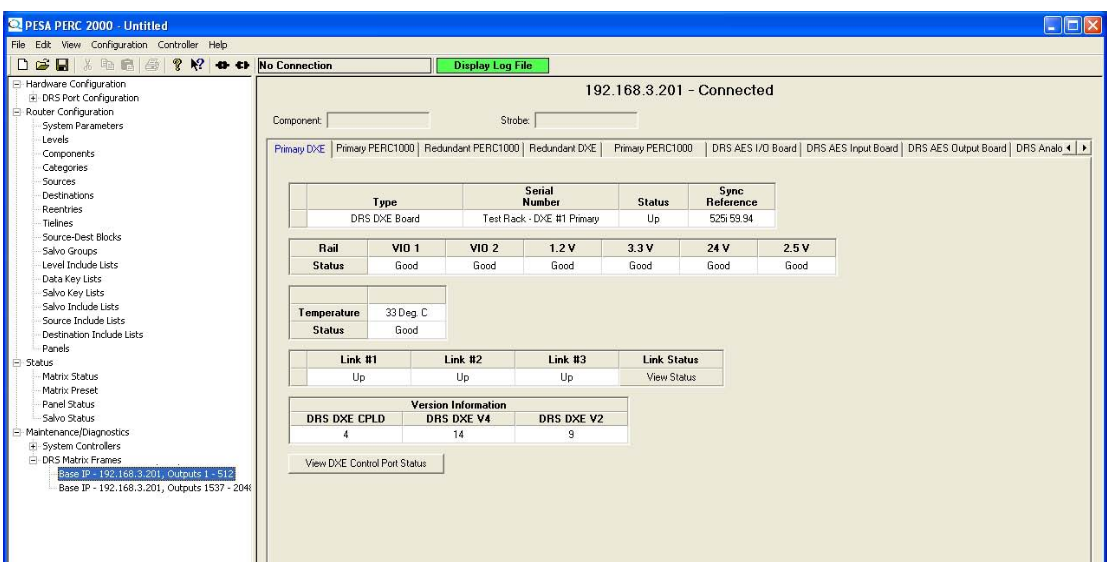


Figure 4-3 Channel Group DXE Status Screen

Let's take closer a look at the screen and the data provided. The base IP address of the system is displayed at the top of the pane, along with a notation that the GUI is **connected** to and communicating with the frame controllers in that channel group. The upper data displays indicate the Component and Strobe values assigned to the channel group within the overall router installation by the router configuration file.

The main display area is a larger pane with tabs at the top; there is a tab for each hardware device (DXE frame(s), frame controller(s), audio blocks) within the channel group. Note in our example screen from left to right there are tabs for the Primary DXE frame and the Primary and Redundant PERC1000 frame controllers contained in it; the Redundant DXE and the Primary PERC1000 frame controller in it; followed by tabs for the audio frames, identified as boards, within the channel group. The display presented when a tab is highlighted provides operating parameters for the selected device. When any audio board tab is selected, monitoring data is displayed for various attributes of the frame containing the board, as well as the circuit board itself.

4.4.1 DXE FRAME STATUS SCREEN

Looking at Figure 4-3, the Primary DXE tab is selected. The displayed data identifies the board by type and serial number, its current operational status and its sync reference source. The next lines provide monitoring data for the frame power supply voltages, status of the power supply and its cooling fan and the surface temperature of the circuit board. The Link Status box displays status of the fiber optic links interconnecting the DXE frames, if any are present.

4.4.2 FRAME CONTROLLER STATUS SCREEN

There is a tab for every frame controller in the channel group located immediately following the tab for the DXE frame containing the controller. As an example we have highlighted the tab for the Primary PERC1000 controller located in the Redundant DXE frame, Figure 4-4.

Looking at Figure 4-4, the displayed data identifies the frame controller circuitry by its *unique* IP address, serial number and MAC address. Just beneath the serial number and MAC address display is a box labeled "Status" which identifies the location and operational status of the selected controller. In our example screen, status identifies the selected controller as the P1K installed in the Primary Controller slot of the frame and shows it is currently the ***active*** frame controller.

The next lines indicate status of the power supply portion of the selected power supply/PERC1000 module, and its cooling fan. The Version Information box displays the revision numbers of the currently loaded firmware modules for the selected frame controller.

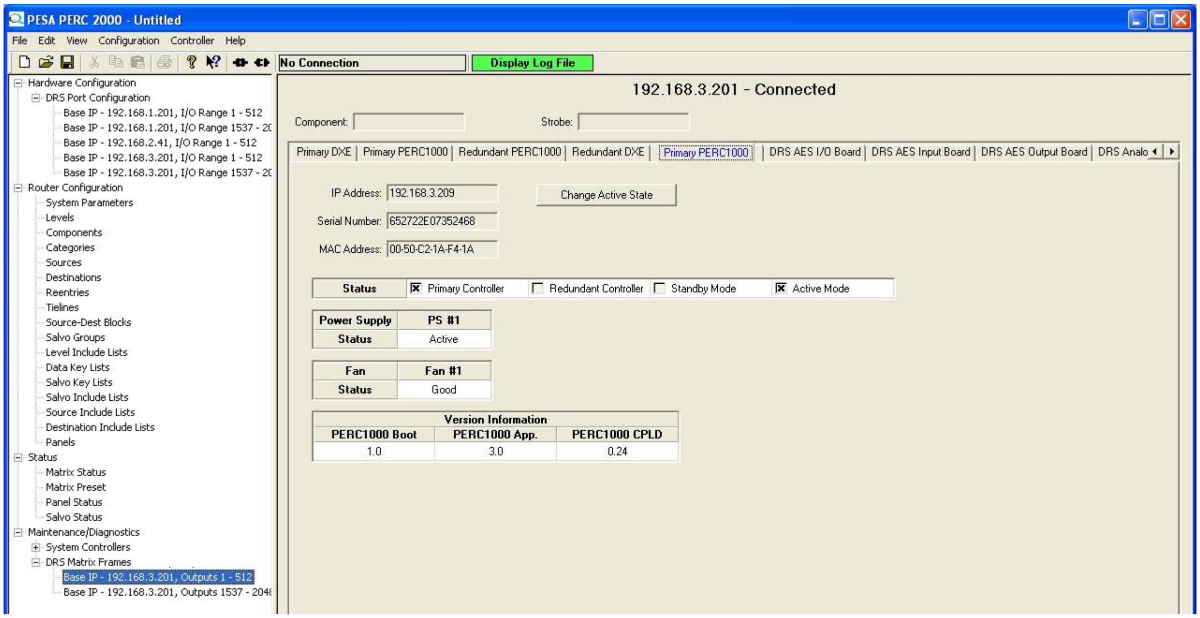


Figure 4-4 Frame Controller Status Screen

4.4.3 AUDIO BOARD STATUS SCREEN

When Cheetah MUX and DEMUX system cards are configured into a channel group, a tab for each card is displayed along with tabs for other DRS audio frames. An example is shown in Figure 4-5. If either the DEMUX or MUX card tab is selected, the display provides data and status for the selected card, just as with any other DRS board and frame. Figure 4-5 shows the audio board display using the Cheetah Input Demux Board tab as an example; however, the screen content is identical for both DEMUX and MUX cards. This audio board contains one input block of 128 channels from the de-embedded audio signals.

The displayed data identifies the board by type and serial number, its current operational status, the range of I/O signals it is processing and its sync reference source. The next lines provide monitoring data for the primary and redundant power supply modules contained in the audio frame, status of the cooling fans and the surface temperature of the circuit board. The Version Information box displays the revision numbers of the currently loaded firmware modules for the selected card.

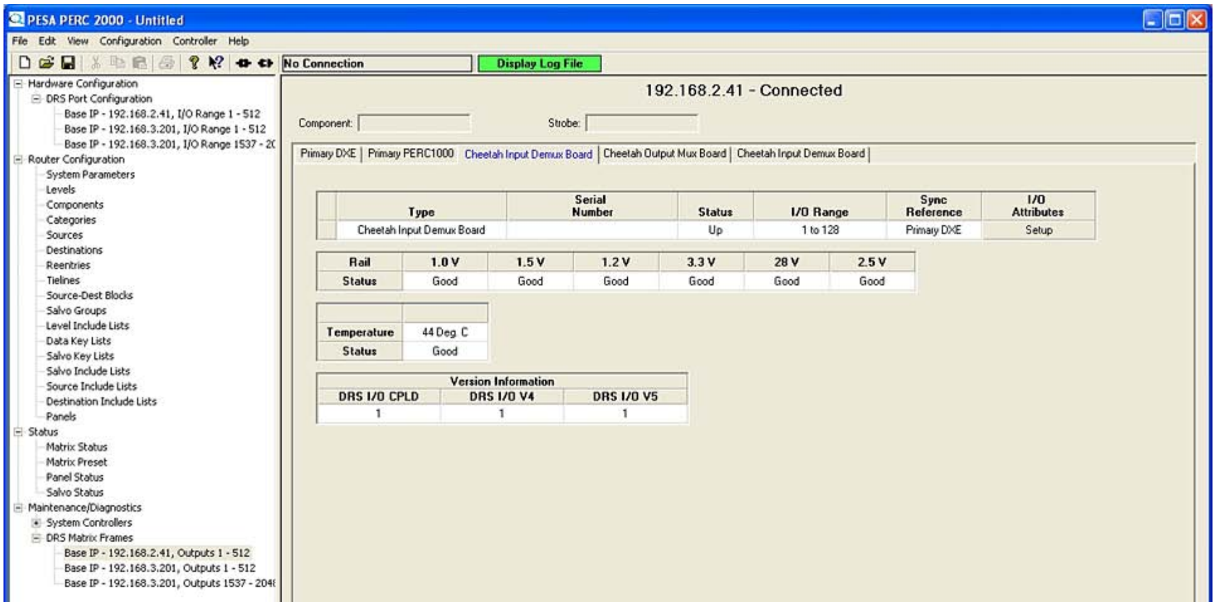


Figure 4-5 Audio Board Display

4.5 ACCESSING AND NAVIGATING MUX AND DEMUX CARD SETUP SCREENS

Setup screens for the Cheetah system cards are accessed through the I/O Attributes screen. The following steps guide you through the procedure to access the setup screen for a particular audio board. Specific operating instructions for modifying or selecting a specific audio attribute are covered in a separate paragraph for that function. Once you have accessed the setup screen for the system card you wish to configure, or the signal(s) or channel(s) you wish to modify, proceed to the paragraph addressing the particular function you wish to use.

From the list of frame controllers under the DRS Matrix Frames directory tree, select the ***base IP address*** of the DRS system and the channel group containing the DEMUX or MUX card you wish to configure. The status and monitoring screen as shown in Figure 4-5 is displayed for the selected channel group.

All components associated with the channel group appear as tabs across the top of the system monitor display screen – primary and redundant DXE frames, primary and secondary PERC1000 frame controllers and tabs for all audio blocks comprising the channel group. Select the tab for the DEMUX or MUX board you wish to setup. Figure 4-6 shows an example screen using the Input Demux Board. The upper line of the status display identifies the Board Type, Serial Number, Status, I/O Range, and the Sync Reference source. The final button on this row selects the Setup screen for the I/O Attributes. Click on the **Setup** button to bring up the attributes screen for the desired card. Setup screens are accessed identically for both DEMUX and MUX cards, as well as all other audio frames except time code. The following paragraphs present detailed configuration procedures for each card type.

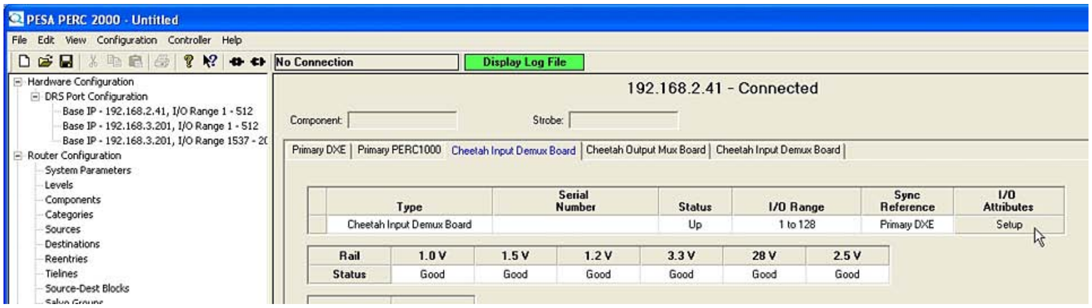


Figure 4-6 Location of I/O Attributes Setup Button

4.6 INPUT DEMUX CARD CONFIGURATION

Each Cheetah Input DEMUX Card receives up to 16 SDI video inputs, of which each video input may contain up to four groups (two for SD-SDI inputs) of embedded digital audio. Each group may contain up to four monaural audio signals, for a possible total of 256 independent audio signals that may be de-embedded from incoming video sources on each DEMUX card. Of these 256 de-embedded signals, up to 128 may be selected through GUI setup screens as audio sources for use by the DRS router. Before we proceed to a discussion of the configuration screens, there are a few operational principles we need to introduce.

Audio signals are always selected as DRS sources by de-embedded group – called DRS Group Assignments - not by individual signals. For example, if you wish to access the first audio signal contained in group 1 of video input 1, then through the GUI you would define a DRS Group Assignment of audio group 1 from video input 1 as a de-embedded source; and select one of the pre-defined ranges of four channel numbers to assign to the four audio signals as four independent, numerically sequential inputs to the DRS router. For our example assume we assign signals in group 1 to DRS channels 1 thru 4; collectively, these four signals would be identified as DRS Group Assignment 1 – 4. To access the first audio signal of the group we would select the signal on physical input 1 of the router for our destination output. If we also assign the four audio signals in group 2 of video input 1 to DRS channels 5 thru 8, identified as DRS Group Assignment 5 – 8, we can further this example by assuming that audio signals 1 and 2 of group 2 are a stereo pair for program audio. If we want to access these signals for routing to a console or other device, we would select DRS inputs 5 and 6 as outputs to our external device.

Once the de-embedded signals become individual audio channels in the DRS routing structure they are treated as any audio signal from any other DRS input frame. In fact, the DEMUX card becomes another type of DRS audio input frame. We can perform any DSP functions available through DRS to any or all of the input signals, and select these signals as a source for any DRS output channel in the system.

4.6.1 INPUT DEMUX PARAMETERS SCREENS

Clicking the I/O Attributes Setup button opens the Input DEMUX Parameters Screen as shown in Figure 4-7. The left-most column, labeled ***Ch. #***, is a list of 128 sequential numbers that correspond to the DRS input channel number of audio signals selected from the de-embedded sources. Remember that audio signals are always selected by group – not individual signals. Notice the second column, identified as ***Input Label***, contains a series of boxes that each span four input channel numbers. The four numbers are the four signals that comprise the DRS group assignment. De-embed groups are not assigned a group number nomenclature, but are identified by the router input channels of which they are composed.

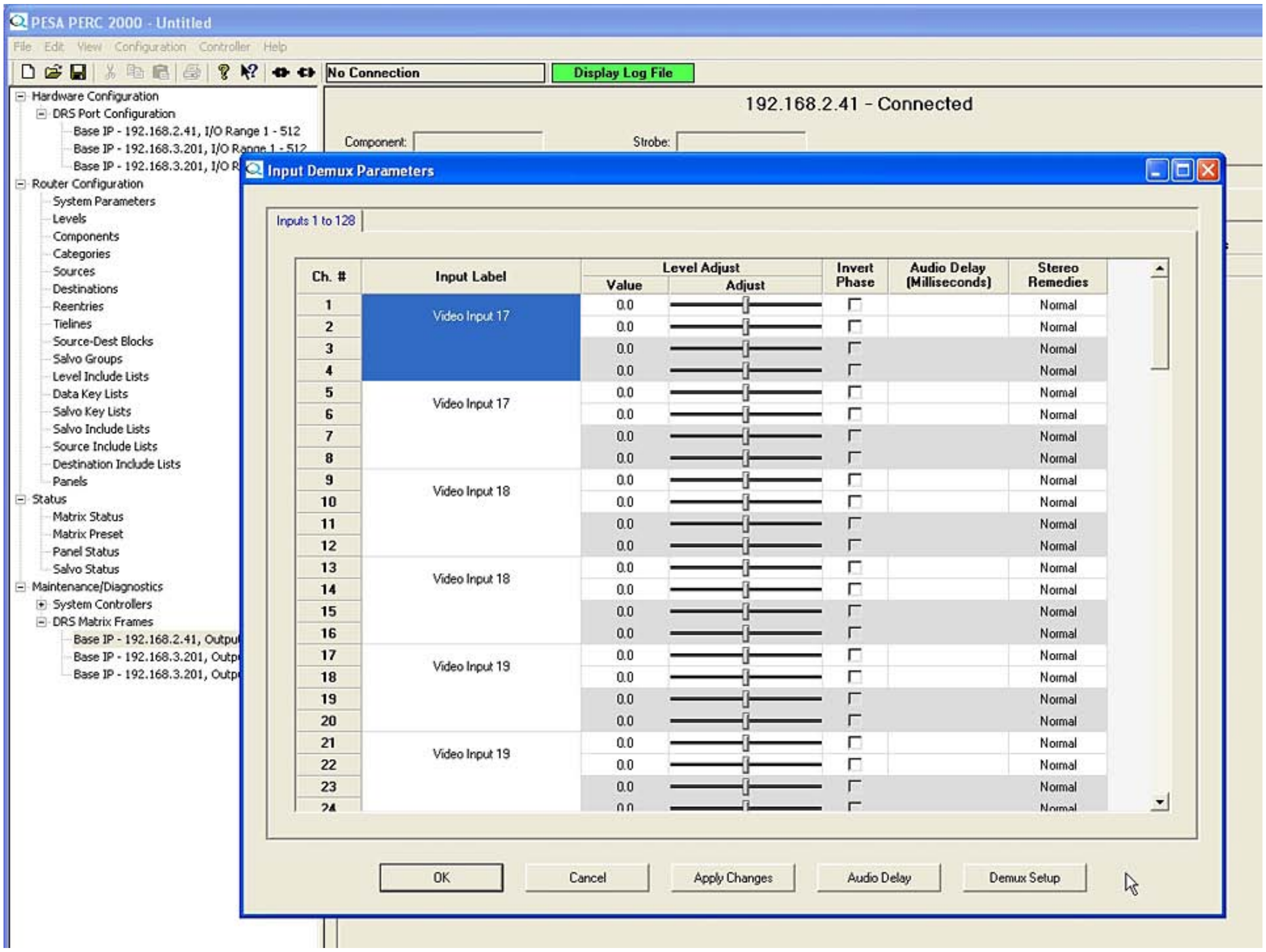


Figure 4-7 Example Input DEMUX Parameters Screen

On our example screen notice that channel numbers 1 thru 4 span one entry in the second column. The label Video Input 17 in the box means that DRS group assignment 1 – 4 is derived from one of the audio groups embedded into video input 17. Likewise, channels 5 – 8 (DRS group assignment 5 – 8) are also labeled Video Input 17, meaning that this signal group was selected from another of the audio groups embedded into video input 17.

Also on the example screen, we see that each audio channel is listed on an individual row for audio adjustment functions. Notice that beginning with the *Level Adjust* columns, and continuing through all of the remaining audio adjustment columns, two channels are always paired, as indicated by alternating row colors. The two audio channels contained in the pair are said to be *adjacent* channels. On our example input screen, adjacent channels 1 and 2 are paired, as are channels 3 and 4, etc. Remember that each channel of the pair represents a separate, independent physical input to the router – derived from the indicated audio group.

In many applications adjacent channels are related, such as left and right audio for stereo. Even though it is a common application, it is not necessary that the paired signals be related – each may carry totally independent audio sources; however, the two channels indicated as paired by the colored rows are always treated as adjacent channels. This is an important consideration in certain of the audio attribute adjustments – such as stereo remedies. In our example input screen channels 1 and 2 are adjacent channels, 3 and 4 are adjacent channels, etc. But, channels 2 and 3 are NOT adjacent channels, nor are channels 4 and 5, and so on. The importance of this is covered in the paragraph on stereo remedies, but for now just grasp the concept of which channels are adjacent – and which are not. Adjacent channels are always shown as paired by the alternating row color.

Each audio signal may be individually set for level, phase inversion and delay. Stereo remedies may be applied to paired adjacent signals. Paragraph 4.8 contains procedures for performing audio channel adjustments.

4.6.2 INPUT DEMUX SETUP SCREEN

Clicking the Demux Setup button on the Input DEMUX Parameters Screen, as shown in Figure 4-7, opens the Input Demux Setup Screen. It is from this screen that de-embedded audio groups are selected as DRS input signals by associating the desired groups with a DRS Group Assignment. An example Demux Setup Screen is shown in Figure 4-8. Notice the header at the top of the screen identifies the DRS audio input channel number range and the channel number of the video inputs selected through this screen. In our example we are selecting sources for DRS inputs 1 – 128 from video inputs 17 – 32.

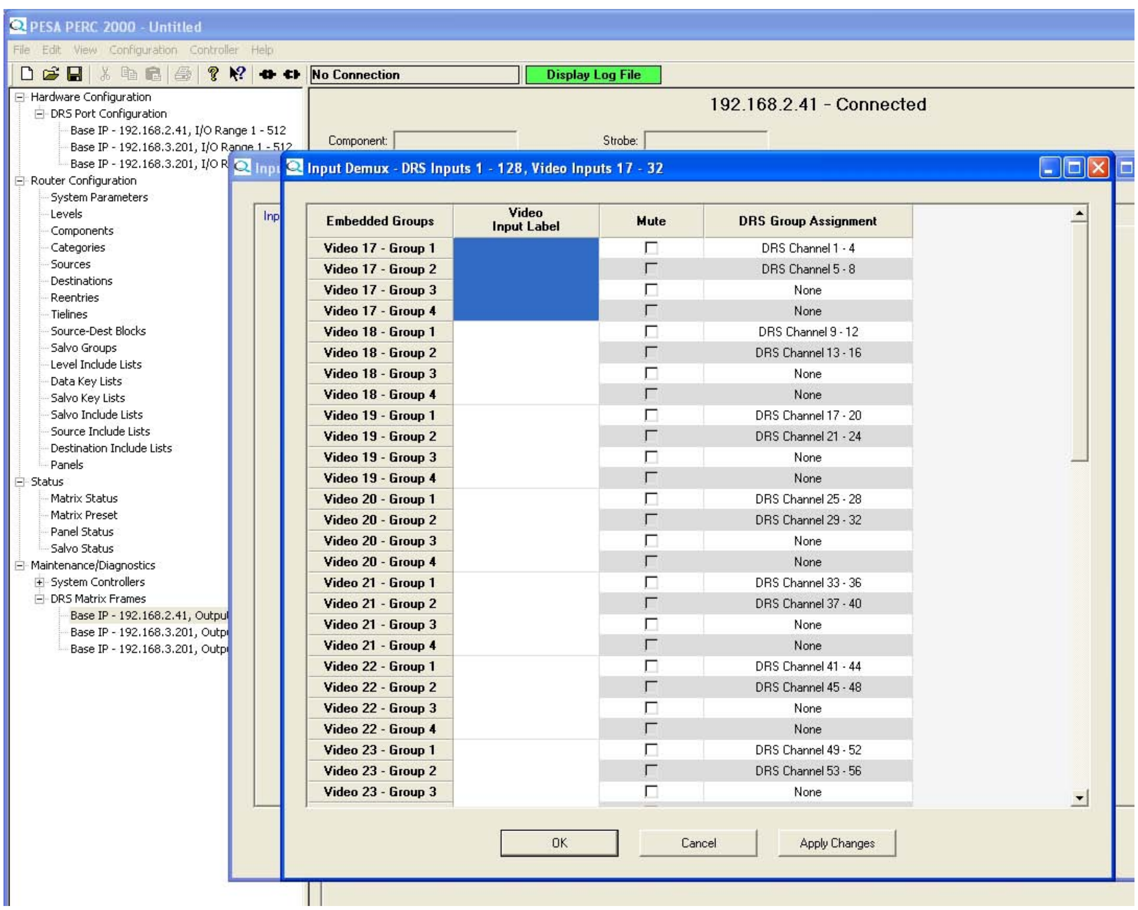


Figure 4-8 Example Input DEMUX Setup Screen

The left-most column, labeled ***Embedded Groups***, contains entries for the channel number of each physical video input to the card, with an entry for each of that channel's four embedded audio groups (two groups if the video source is SD-SDI). The second column, ***Video Input Label***, allows you to enter any text you wish identifying the video signal – such as VTR1, NET2, etc. Usually this label is the name of the video source, but you are free to enter any descriptive label you wish. When a label is present in this box, it will also appear on the Demux Parameters Screen along with the video input channel number to identify the source of the DRS Group Assignment. When you have entered labels for all desired inputs, click on the **Apply Changes** button, Figure 4-8, to apply the functions to the channels and keep the setup screen open for further entries. If you wish to apply your settings and exit the screen, click the **OK** button. **Cancel** exits the screen without applying the changes.

The ***Mute*** column contains checkboxes that may be selected or deselected by mouse click. When a check is present in the box, all audio signals in the indicated group will be replaced with silence data on the video output signal to the matrix cards. This data replacement occurs downstream of the de-embedding function. If the group is given a DRS Group Assignment as a DRS signal source, de-embedded audio is present regardless of the status of the Mute box. Deactivate the mute function and restore embedded audio signals by removing the check from the box. When you have selected or deselected the mute function for all desired audio groups, click on the **Apply Changes** button, Figure 4-8, to apply changes to the channels and keep the setup screen open for further entries. If you wish to apply your settings and exit the screen, click the **OK** button. **Cancel** exits the screen without applying the changes.

The DRS Group Assignment column is where the association is made between embedded audio groups and that groups DRS channel number assignment. The default assignment for all groups is None, meaning that the group is not selected as a DRS signal source. In order to assign an audio group click in the DRS Group Assignment box on the same row as the desired embed group to open the pull-down menu as shown in Figure 4-9. Highlight the entry for the DRS channels you wish to associate with the indicated audio group and click to complete the selection. The group channel assignment is now shown in the box. In our example screen we have associated the four audio signals present in embed group 1 on physical video input 17 with DRS input channels 1 – 4. When you have completed DRS Group Assignment associations for all desired audio groups, click on the **Apply Changes** button, Figure 4-9, to apply the functions to the channels and keep the setup screen open for further entries. If you wish to apply your settings and exit the screen, click the **OK** button. **Cancel** exits the screen without applying the changes.

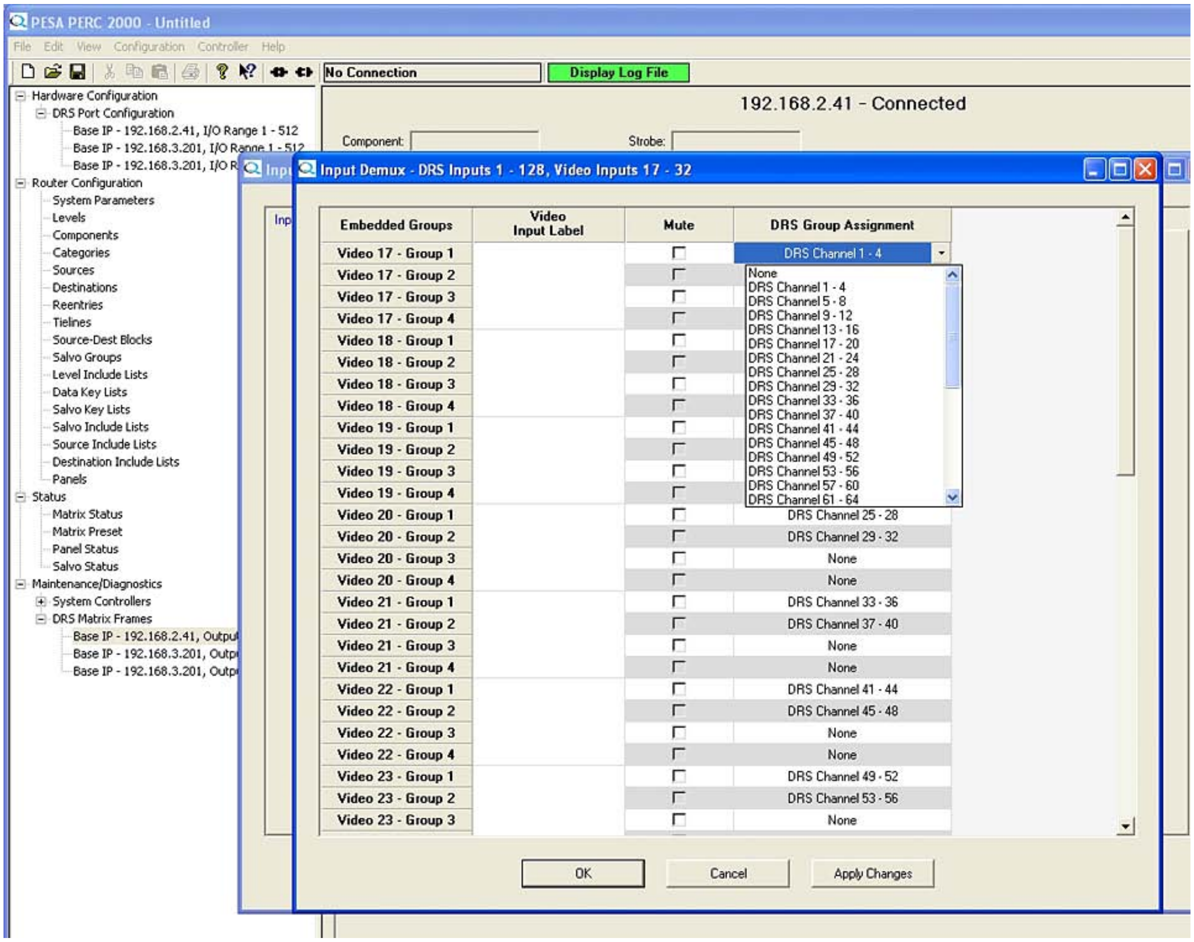


Figure 4-9 Group Assignment Menu

4.7 OUTPUT MUX CARD CONFIGURATION

Each Cheetah Output MUX Card provides 16 SDI video outputs derived from any input source to the video matrix router. The audio MUX portion of the card allows up to four groups of digital audio to be embedded into each video output signal (HD and 3G-SDI only). Each group can contain up to four individual signals, for a total of 16 possible embedded audio signals on each video output. Audio signals for embedding are derived from the DRS audio router in the form of groups, each containing four audio output signals. Audio groups can be "built" by the user through GUI setup screens to contain any four DRS audio sources.

Just as the input DEMUX card is another type of DRS audio input frame, the output MUX card is basically another type of DRS audio output frame. This frame is a single block of 128 output signals - with one very important difference. While you may select up to 128 signals from DRS sources, through the GUI setup screens for the MUX card you will always combine four individually selected output signals into an audio group for embedding.

The 128 audio signals feeding an output mux card are DRS audio output channels, and are embedded into video by DRS Group Assignment. Any available DRS audio source may be routed to DRS output channels for embedding within the video. This allows you to assign up to 32 embed groups from any available DRS sources, with each group composed of four numerically sequential DRS output channels.

Each embed group is referred to as a ***DRS Group Assignment***, and is identified in the GUI by the four output channel numbers that form it. Group assignments are pre-defined, beginning with outputs 1 thru 4, continuing with outputs 5 thru 8, 9 thru 12, etc., up to embed group 32 composed of output signals 125 thru 128. To form the embed group identified as ***DRS Channel 1-4***, you would route the first audio input signal you wish to include in the group to DRS output 1, the second signal to output 2, etc. Remember, embed groups are not assigned a group number nomenclature, but are identified by the output channels of which they are composed.

As an example, let's assume that you wish to embed DRS input signals 31, 32, 151 and 152 onto video output 1 as its first audio group. Through the *router configuration file* you would route DRS physical input 31 to physical output 1, input 32 to output 2, input 151 to output 3 and input 152 to output 4. This action "builds" embed group DRS Channel 1-4 containing the four desired signals. Through the GUI MUX setup screen, we can assign DRS Channel 1-4 for embedding to any audio groups on any video output signals we wish.

4.7.1 OUTPUT MUX PARAMETERS SCREENS

Clicking the I/O Attributes Setup button from the Output Mux card attributes screen opens the Output MUX Parameters Screen as shown in Figure 4-10. The left-most column, labeled ***Ch. #***, is a list of 128 sequential numbers that correspond to the DRS output channel number of audio signals contained in each DRS Group Assignment. Remember that audio signals are always grouped by four to form a group assignment. Notice the second column, identified as ***Output Label***, contains a series of boxes that each span four output channel numbers. The four numbers are the four signals that comprise the DRS group assignment. Embed groups are not assigned a group number nomenclature, but are identified by the output channels of which they are composed.

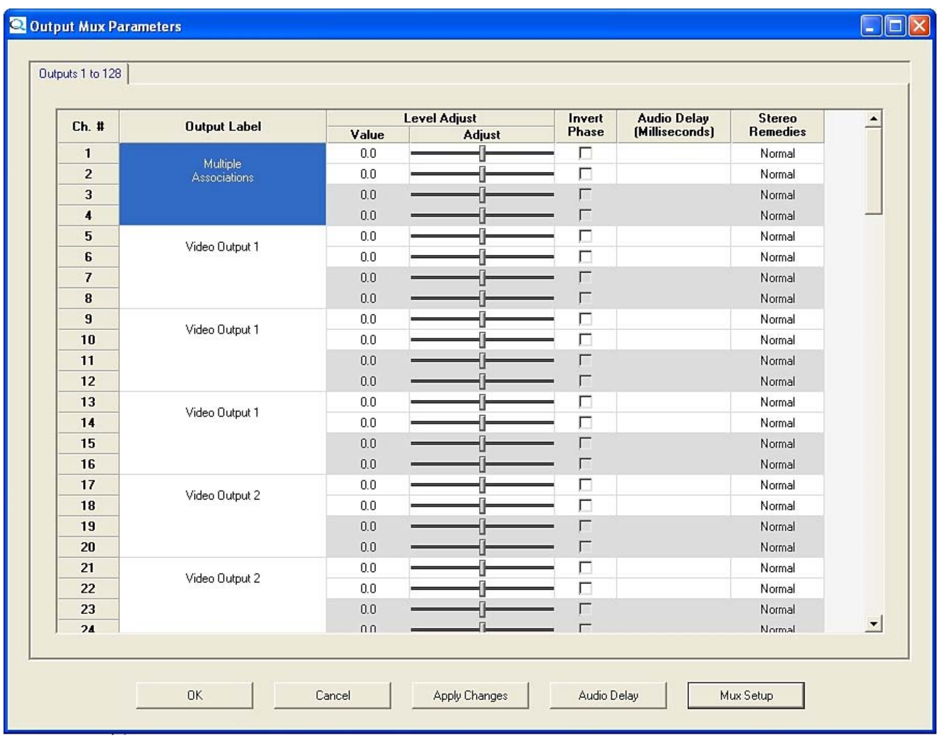


Figure 4-10 Example Output MUX Parameters Screen

On our example screen notice that channel numbers 1 thru 4 span one entry in the second column – under the heading of Output Label. The label displayed in the box indicates into which video output the four channel group is embedded. The term *Multiple Associations* displayed for DRS group assignment 1 – 4 indicates the embed group has been selected for embedding into more than one video output signal. Channels 5 – 8 (DRS group assignment 5 – 8) in our example screen are shown only associated to Video Output 1. This means that the embed group composed of DRS router output signals 5 thru 8 has been selected for embedding into one of the audio groups only on Video Output signal 1. Likewise, the embed group composed of router output signals 9 thru 12 is also selected for embedding into one of the audio groups on Video Output 1. Note that the display in the Output Label box does not identify into which output group of the indicated video signal the audio will be embedded, only that it will be embedded onto either a specified or multiple video output signals. Selections made on the MUX Setup Screen determine into which specific group of the output signal a given embed group will be embedded. Just as with the Input DEMUX screen, if an identification label has been entered for a particular video signal on the setup screen, that label will appear in the box along with the output channel number identifier if that signal is associated with a single embed (DRS Group Assignment) group.

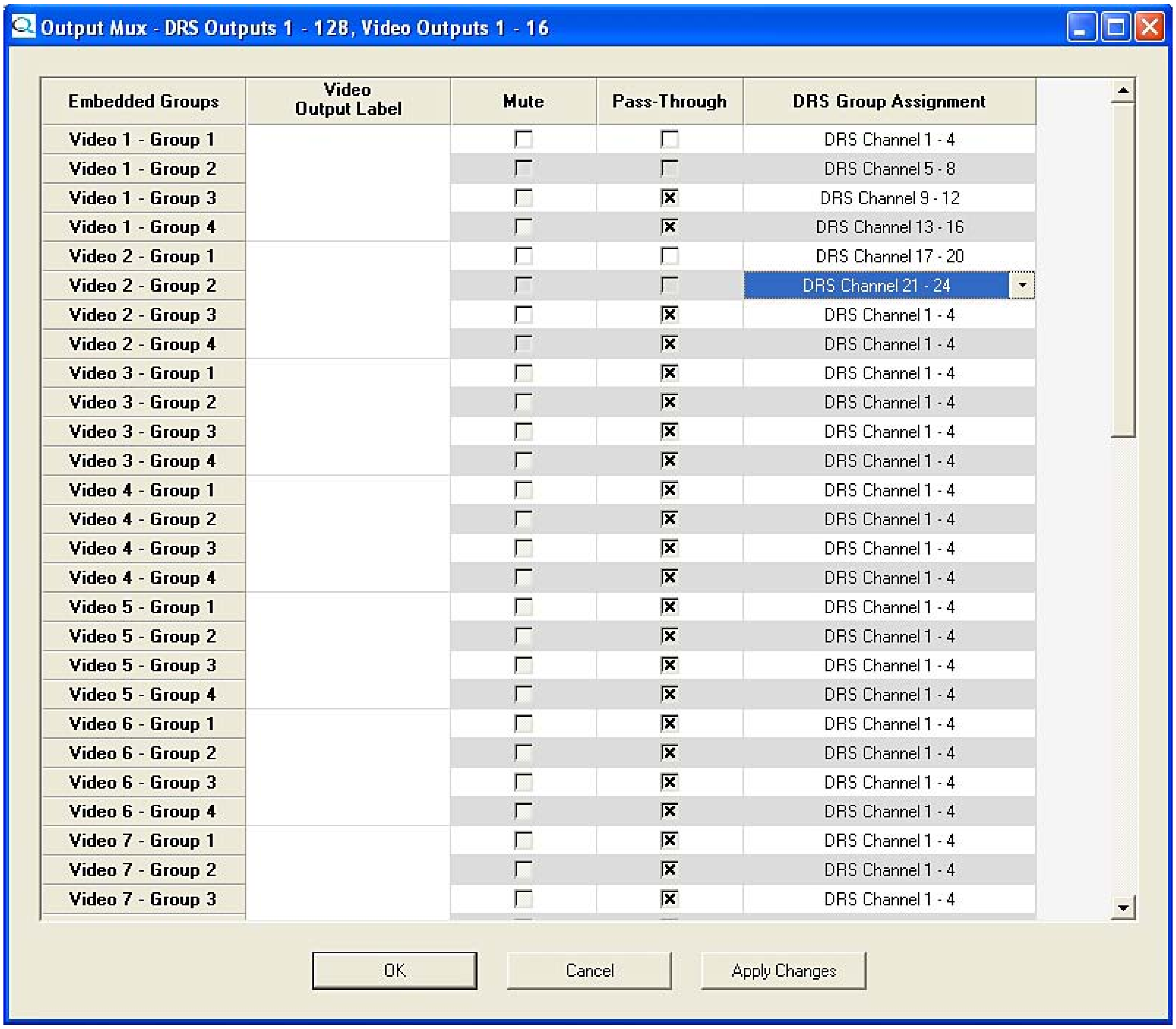
Also on the example screen, we see that each audio channel is listed on an individual row for audio adjustment functions. Notice that beginning with the *Level Adjust* columns, and continuing through all of the remaining audio adjustment columns, two channels are always paired, as indicated by alternating row colors. The two audio channels contained in the pair are said to be *adjacent* channels. On our example input screen, adjacent channels 1 and 2 are paired, as are channels 3 and 4, etc. Remember that each channel of the pair represents a separate, independent physical input to the router – derived from the indicated audio group.

In many applications adjacent channels are related, such as left and right audio for stereo. Even though it is a common application, it is not necessary that the paired signals be related – each may carry totally independent audio sources; however, the two channels indicated as paired by the colored rows are always treated as adjacent channels. This is an important consideration in certain of the audio attribute adjustments – such as stereo remedies. In our example input screen channels 1 and 2 are adjacent channels, 3 and 4 are adjacent channels, etc. But, channels 2 and 3 are NOT adjacent channels, nor are channels 4 and 5, and so on. The importance of this is covered in the paragraph on stereo remedies, but for now just grasp the concept of which channels are adjacent – and which are not. Adjacent channels are always shown as paired by the alternating row color.

Each audio signal may be individually set for level, phase inversion and delay. Stereo remedies may be applied to paired adjacent signals. Paragraph 4.8 contains procedures for performing audio channel adjustments.

4.7.2 OUTPUT MUX SETUP SCREEN

Clicking the Mux Setup button on the Output MUX Parameters Screen, as shown in Figure 4-10, opens the Output Mux Setup Screen. It is from this screen that DRS output channel groups are selected for embedding into video output signals by associating a DRS Group Assignment with the desired video output signal, and audio group of that signal. An example Mux Setup Screen is shown in Figure 4-11. Notice the header at the top of the screen identifies the DRS output channel number range and the channel number of the video outputs selected through this screen. In our example we are selecting groups of DRS outputs 1 – 128 for embedding into video outputs 1 – 16.



Embedded Groups	Video Output Label	Mute	Pass-Through	DRS Group Assignment
Video 1 - Group 1		[ ]	[ ]	DRS Channel 1 - 4
Video 1 - Group 2		[ ]	[ ]	DRS Channel 5 - 8
Video 1 - Group 3		[ ]	[X]	DRS Channel 9 - 12
Video 1 - Group 4		[ ]	[X]	DRS Channel 13 - 16
Video 2 - Group 1		[ ]	[ ]	DRS Channel 17 - 20
Video 2 - Group 2		[ ]	[ ]	DRS Channel 21 - 24
Video 2 - Group 3		[ ]	[X]	DRS Channel 1 - 4
Video 2 - Group 4		[ ]	[X]	DRS Channel 1 - 4
Video 3 - Group 1		[ ]	[X]	DRS Channel 1 - 4
Video 3 - Group 2		[ ]	[X]	DRS Channel 1 - 4
Video 3 - Group 3		[ ]	[X]	DRS Channel 1 - 4
Video 3 - Group 4		[ ]	[X]	DRS Channel 1 - 4
Video 4 - Group 1		[ ]	[X]	DRS Channel 1 - 4
Video 4 - Group 2		[ ]	[X]	DRS Channel 1 - 4
Video 4 - Group 3		[ ]	[X]	DRS Channel 1 - 4
Video 4 - Group 4		[ ]	[X]	DRS Channel 1 - 4
Video 5 - Group 1		[ ]	[X]	DRS Channel 1 - 4
Video 5 - Group 2		[ ]	[X]	DRS Channel 1 - 4
Video 5 - Group 3		[ ]	[X]	DRS Channel 1 - 4
Video 5 - Group 4		[ ]	[X]	DRS Channel 1 - 4
Video 6 - Group 1		[ ]	[X]	DRS Channel 1 - 4
Video 6 - Group 2		[ ]	[X]	DRS Channel 1 - 4
Video 6 - Group 3		[ ]	[X]	DRS Channel 1 - 4
Video 6 - Group 4		[ ]	[X]	DRS Channel 1 - 4
Video 7 - Group 1		[ ]	[X]	DRS Channel 1 - 4
Video 7 - Group 2		[ ]	[X]	DRS Channel 1 - 4
Video 7 - Group 3		[ ]	[X]	DRS Channel 1 - 4

Figure 4-11 Example Output MUX Setup Screen

The left-most column, labeled ***Embedded Groups***, contains entries for each physical video output channel, with an entry for each of that channel's four embedded audio groups. The second column, ***Video Output Label***, allows you to enter any text you wish identifying the video output signal – such as VTR1, NET2, etc. Usually this label is the name of the video destination, but you are free to enter any descriptive label you wish. When a label is present in this box, it will also appear on the Mux Parameters Screen along with the video output channel number to identify the video channel embedded with the indicated DRS Group Assignment. When you have entered labels for all desired outputs, click on the **Apply Changes** button, Figure 4-11, to apply the functions to the channels and keep the setup screen open for further entries. If you wish to apply your settings and exit the screen, click the **OK** button. **Cancel** exits the screen without applying the changes.

The ***Mute*** column contains checkboxes that may be selected or deselected by mouse click. When a check is present in the box, all audio signals in the indicated group on the indicated video output signal will be replaced with silence data. This data replacement occurs regardless of whether or not a DRS group assignment is associated to the embed group. Deactivate the mute function and restore output audio signals by removing the check from the box.

The ***Pass-Through*** column contains a checkbox for each audio embedding group of each video output signal. When a check is present in the box, all audio signals in the indicated group present on the video signal as it enters the output MUX card will be passed through the card unaltered, regardless of any channel assignments that may be displayed in the DRS Group Assignment column for the indicated group. Mute may not be selected for the group when Pass-Through is selected.

When you have selected or deselected the mute and pass-through functions for all desired audio groups, click on the **Apply Changes** button, Figure 4-11, to apply changes to the channels and keep the setup screen open for further entries. If you wish to apply your settings and exit the screen, click the **OK** button. **Cancel** exits the screen without applying the changes.

The DRS Group Assignment column is where the association is made between audio embed groups and the video outputs and specific audio groups of that output on which you wish to embed the selected DRS group assignment. The default assignment for all groups is None, meaning that no audio will be embedded into the indicated output group. In order to assign an audio group for embedding, click in the DRS Group Assignment box on the row of the desired video signal and output group to open the pull-down menu as shown in Figure 4-12. Highlight the DRS channel group you wish to embed into the indicated audio group and click to complete the selection. The group channel assignment is now shown in the box. In our example screen we have associated the four audio signals on DRS physical outputs 1 thru 4 for embedding into group 1 of physical video output 1. When you have completed DRS Group Assignment associations for all desired audio output groups, click on the **Apply Changes** button, Figure 4-12, to apply the functions to the channels and keep the setup screen open for further entries. If you wish to apply your settings and exit the screen, click the **OK** button. **Cancel** exits the screen without applying the changes.

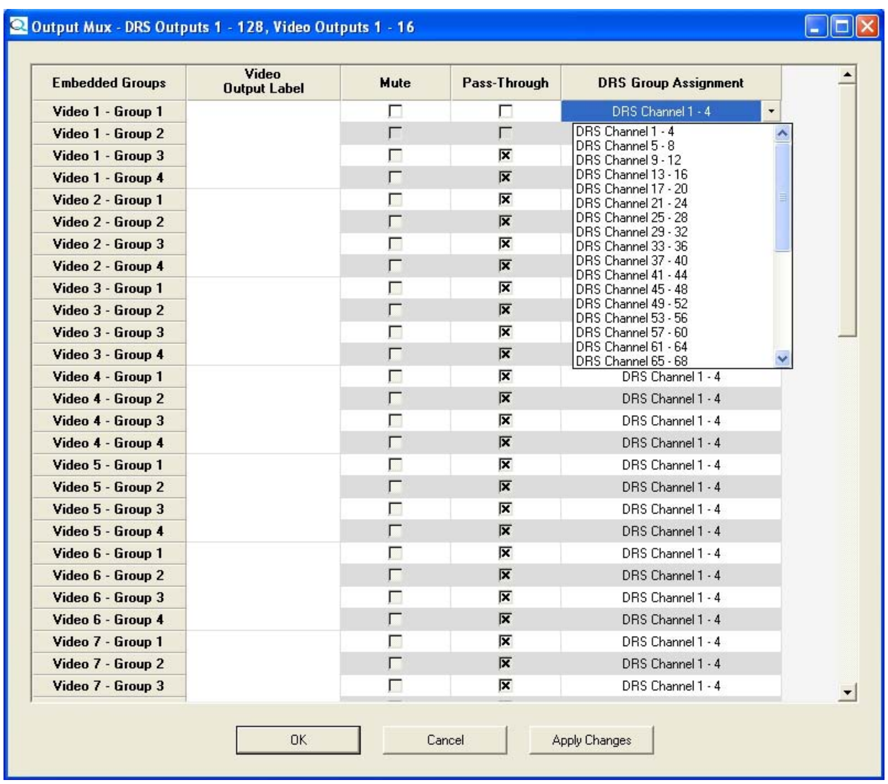


Figure 4-12 Group Assignment Menu

4.8 AUDIO ADJUSTMENT AND DIGITAL SIGNAL PROCESSING FUNCTIONS

Each individual DRS input or output signal may be adjusted for signal level, phase inversion and delay; and stereo remedies may be applied to any pair of adjacent channels. Controls on the screen function identically when setting up a DEMUX board or a MUX board, refer to Figures 4-7 and 4-10.

Remember that input signals may be routed to any output destination. An input signal retains modifications you make, regardless to which output it is routed. Adjustments to an output signal are made on audio routed to the output channel as final processing before leaving the router, regardless of which input it came from. Whether to make adjustments to input signals or output signals is going to be driven by your particular installation.

4.8.1 CHANNEL LEVEL ADJUSTMENT

Level Adjust allows you to set the gain level of an individual audio signal, with an adjustment range of ±6dB. Use your mouse to move the level adjust slider to the desired output level. The box next to the slider labeled Value displays the amount of gain adjustment applied to the signal in dB. You may also click at each end of the slider bar to move the value up or down in 0.1 dB increments. Click the **Apply Changes** button to immediately apply the change and leave the attributes screen open for further changes, if desired. Click the **OK** button to apply the changes and exit the screen. **Cancel** exits the screen without applying any changes.

4.8.2 PHASE INVERSION OPTION

Phase Inversion allows you to apply a 180 degree phase shift to the audio channel. To apply phase inversion, simply click in the Invert Phase click box for the channel you wish to invert. A check in the box indicates that phase inversion is active for that channel. Click the **Apply Changes** button to immediately apply the change and leave the attributes screen open for further changes, if desired. Click the **OK** button to apply the changes and exit the screen. **Cancel** exits the screen without applying any changes.

4.8.3 AUDIO DELAY OPTION

Audio Delay allows you to apply a delay factor to an audio signal channel. Audio channels to delay and delay values are selected through the Delay Setup Screen. To access the Delay Setup Screen, click on the “Audio Delay” button at the bottom of the DEMUX or MUX parameters screen, as shown in Figure 4-13. A DRS AES audio input board is used for this example screen, however, the audio adjustment columns are identical between all DRS audio boards. Clicking the button will bring up the Delay Setup Screen, Figure 4-14. The delay setup screen is identical in appearance and function for all DRS audio board types.

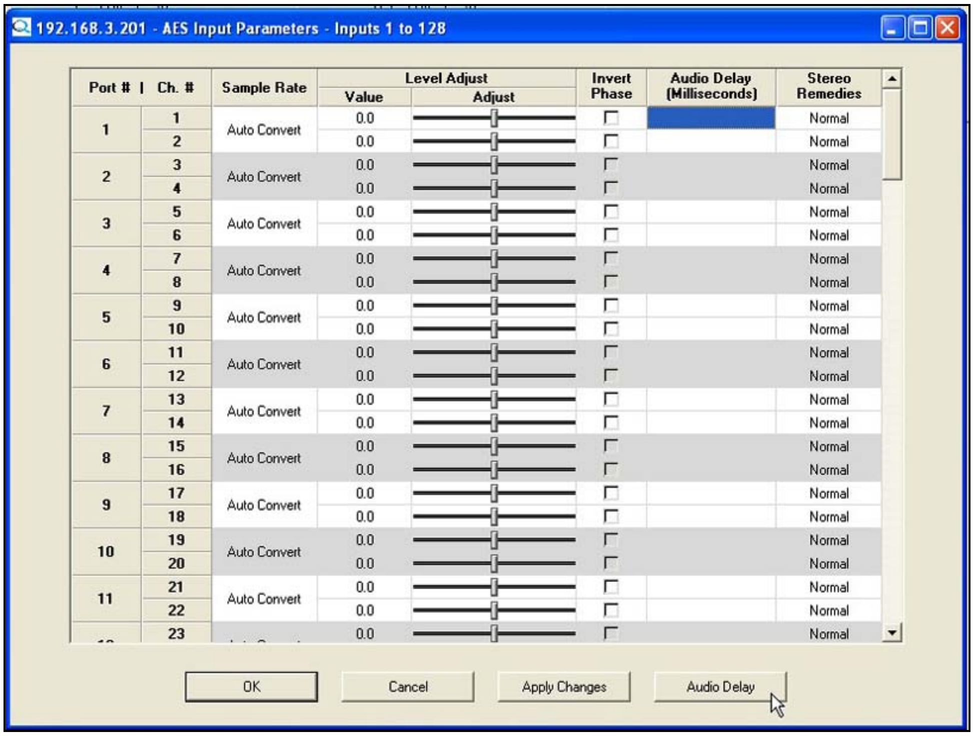


Figure 4-13 Location of Audio Delay Button

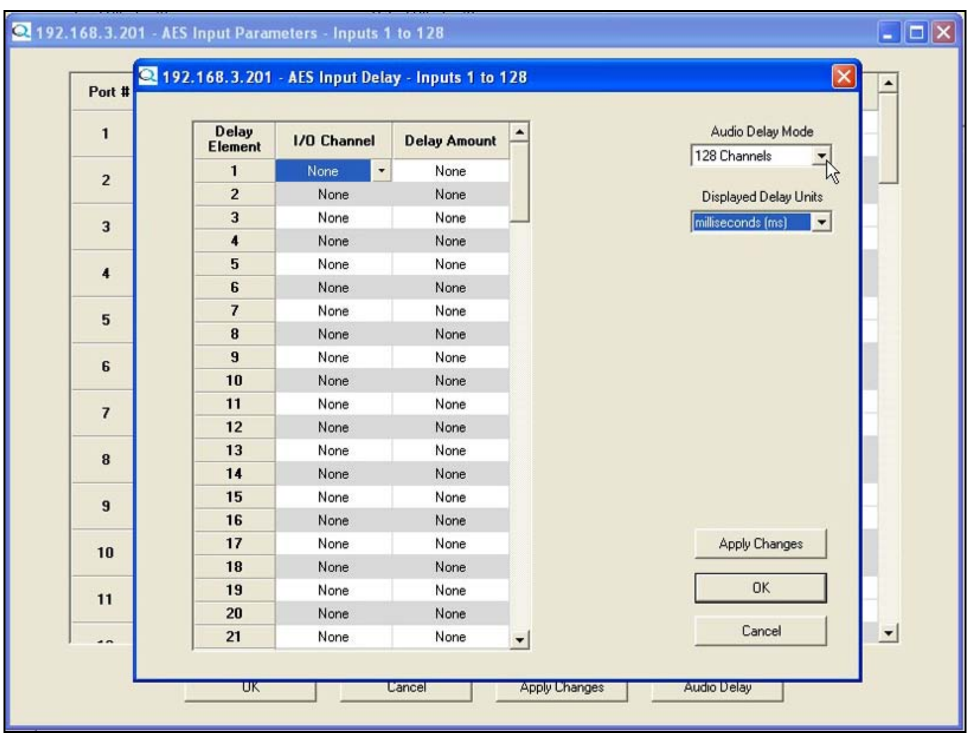


Figure 4-14 Delay Setup Screen

Refer to Figure 4-14 as we discuss the Delay Setup Screen. The leftmost column is labeled Delay Element, the next column is labeled I/O Channel and the third column is labeled Delay Amount. Two drop-down menus are located on the right side of the screen – these are the Audio Delay Mode menu and the Displayed Delay Units menu.

The selection you make from the Audio Delay Mode menu determines how many Delay Elements are available for assignment and also determines the length of delay available to a channel. Figure 4-15 shows the expanded Delay Mode Menu. Options available from the drop-down menu are 128 channels, 64 channels and 32 channels.

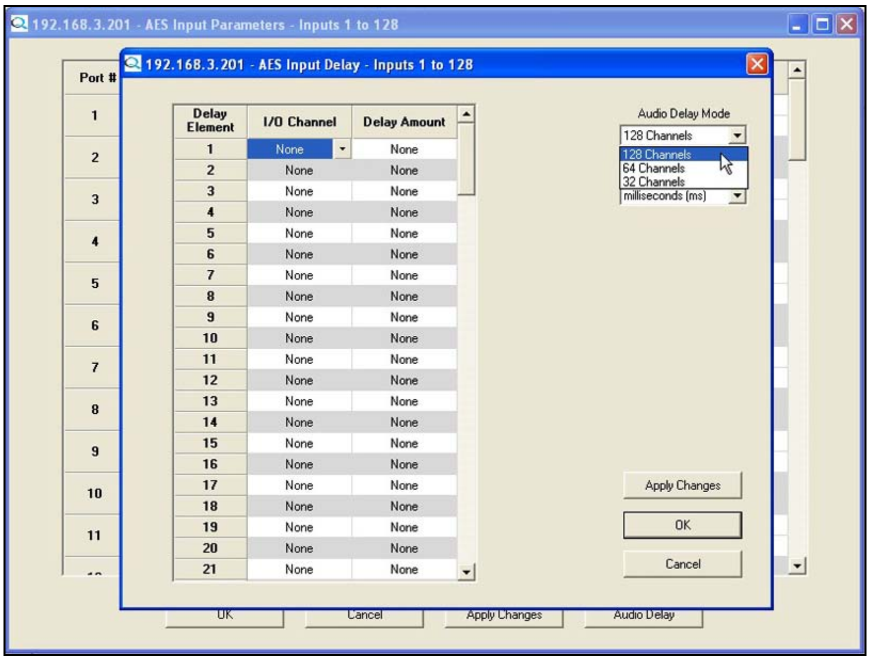


Figure 4-15 Delay Mode Menu

In order to understand the available options we need to briefly discuss the method used to delay audio. Every channel to which you wish to apply a delay must be assigned through one of the available delay elements. Think of a delay element as a discrete delay line, and the number of channels you assign through the delay mode drop-down as the number of available delay lines. The algorithm used to implement the delay is not important to this discussion, but you do need to realize that every available delay element requires a block of system memory. The available memory is divided among all of the delay element allocations. Therefore, the fewer delay elements you allocate, the more memory available for performing the delay algorithm. In simpler terms, this means the fewer channels you allocate from the Audio Delay Mode drop-down menu, a greater amount of delay time can be allocated to each delay element.

More on this, but for now let's look at the next drop-down menu – the Displayed Delay Units menu, Figure 4-16. The selection you make in this menu determines by what unit of measure the delay time is displayed. You may display the delay in terms of NTSC video frames, PAL video frames or in milliseconds. Simply click the unit you wish to use. The selection will be highlighted.

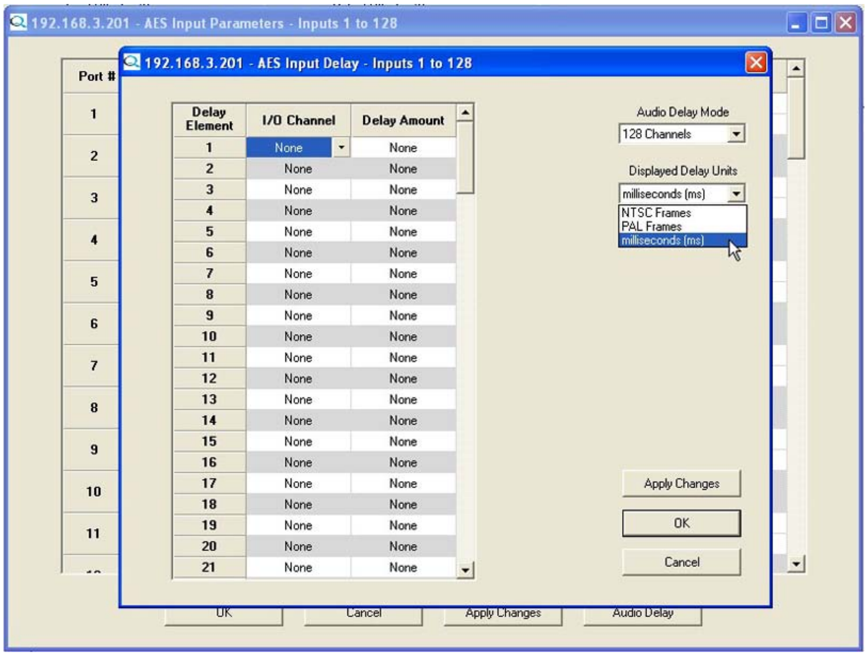


Figure 4-16 Displayed Delay Units Menu

From the previous paragraph we see there is a direct correlation to the number of delay elements we allocate and the amount of delay available to each. Table 4-1 shows the range of delay time that can be selected for each delay element for each of the Audio Delay Mode options. The table also lists the delay times in all three of the available display units.

	NTSC Frames	PAL Frames	Milliseconds
128 Channels	0.160 – 10.230	0.133 – 8.533	5.333 – 341.333
64 Channels	0.160 – 20.460	0.133 – 17.067	5.333 – 682.667
32 Channels	0.160 – 40.919	0.133 – 34.133	5.333 – 1365.333

Table 4-1 Delay Times for Available Channel Options

When setting up the delay option for your system, consider how many audio signals or channels you will need to delay and use the Audio Delay Mode drop-down menu to allocate the delay elements. Remember, the more delay elements you allocate, the less the amount of delay time available to each one. Use the Displayed Delay Units drop-down menu to select the units for delay display. With those selections made, we are ready to begin assigning channels and delay time values.

We used the analogy of a delay element to a discrete delay line. The Delay Element column on the setup screen provides a data entry row for each element. If you selected 128 channels from the delay mode menu – there will be 128 rows, numbered 1 thru 128, in the Delay Element column. Each element is a delay line you can assign to any of the audio signals associated with the particular audio board you are configuring.

To apply delay to an audio channel choose a delay element (delay line) and open the I/O Channel drop-down list on the row of the desired element by clicking in the box as shown in Figure 4-17. The menu listing allows you to select the physical input or output of the audio frame, depending on frame type, you wish to delay. Use the scroll bar to locate the channel number and click the entry to select it. The channel number assigned is displayed in the box.

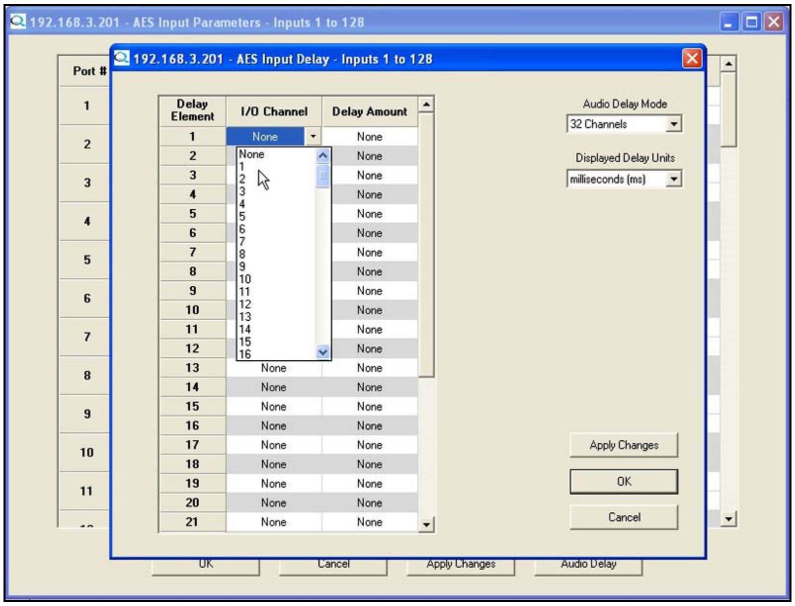


Figure 4-17 I/O Channel Listing

Use the Delay Amount drop-down menu to select the amount of delay you wish to apply to the audio channel as shown in Figure 4-18. The values shown in the menu are displayed in the units you chose in the Displayed Delay Units menu. Use the scroll bar to select the value and click the entry to select it. The delay time is displayed in the box.

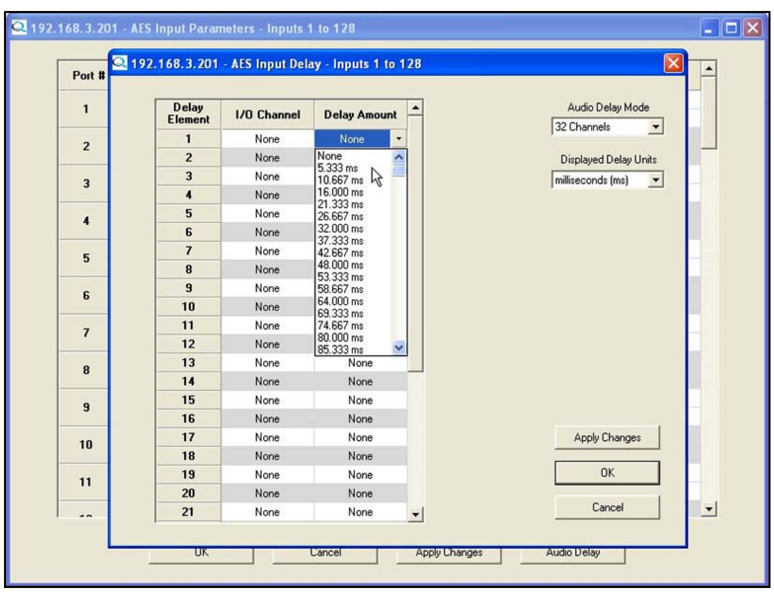


Figure 4-18 Delay Amount Menu

Repeat this process for all channels to which you wish to apply a delay. Once all delay assignments are made, click on the **Apply Changes** button, Figure 4-19, to apply the delay times to the channels and keep the setup screen open for further entries. If you wish to apply your settings and exit the screen, click the **OK** button. **Cancel** exits the screen without applying the settings. Figure 4-19 illustrates a delay setup screen with delay assigned to various channels.

Once entered and activated, audio delay values are displayed on the parameters screen in the Audio Delay column using the selected unit of time measure.

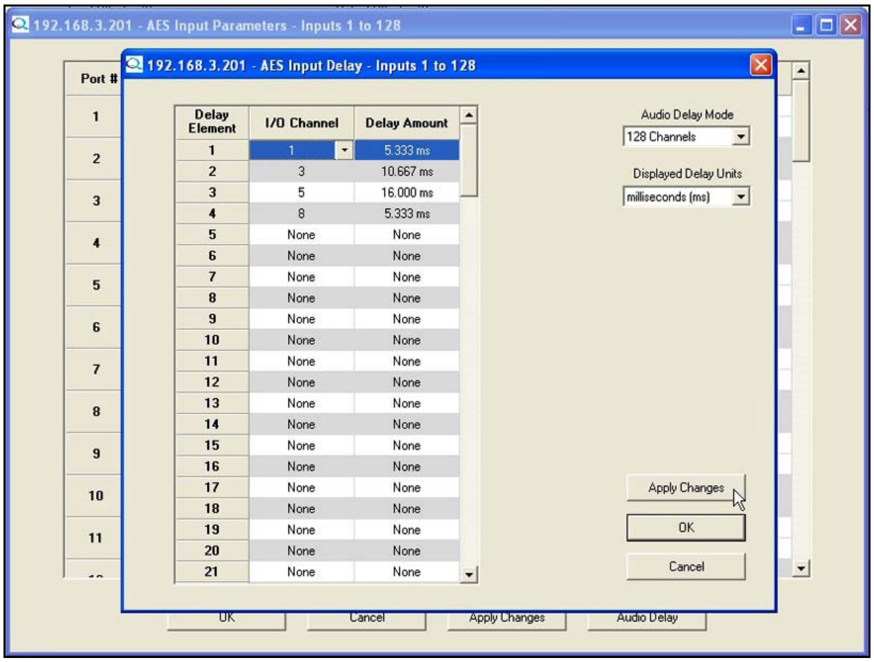


Figure 4-19 Example Delay Setup Screen

Both the I/O Channel box and the Delay Amount box have associated right-click menus. These are shown in Figures 4-20 and 4-21. Each menu function is discussed in the following chart:

I/O Channel Box Right-Click Menu Item	Function
Clear All I/O Channel Selections	Clears all channel assignments from all the Delay Elements
Auto Increment I/O Channel Selections	Allows you to enter a value in a cell, click and drag the cursor to cover the desired number of cells. The block will be filled beginning with the value you entered in the first cell and incrementing the value by one for each cell in the block.

Delay Amount Box Right-Click Menu Item

Clear All Delay Values	Clears all delay time assignments from all the Delay Elements
Set All Delay Values To (cell entry)	This function allows you to right click in any Delay Amount cell and the value entered in that cell will be applied to all cells in the Delay Amount column.
Fill Down	Allows you to enter a value in a cell, click and drag the cursor in a downward direction to cover the desired number of cells. The block will be filled in the downward direction beginning with the value you entered in the first cell and incrementing the value by one for each cell in the block.
Fill Up	Allows you to enter a value in a cell, click and drag the cursor in an upward direction to cover the desired number of cells. The block will be filled in the upward direction beginning with the value you entered in the first cell and incrementing the value by one for each cell in the block.

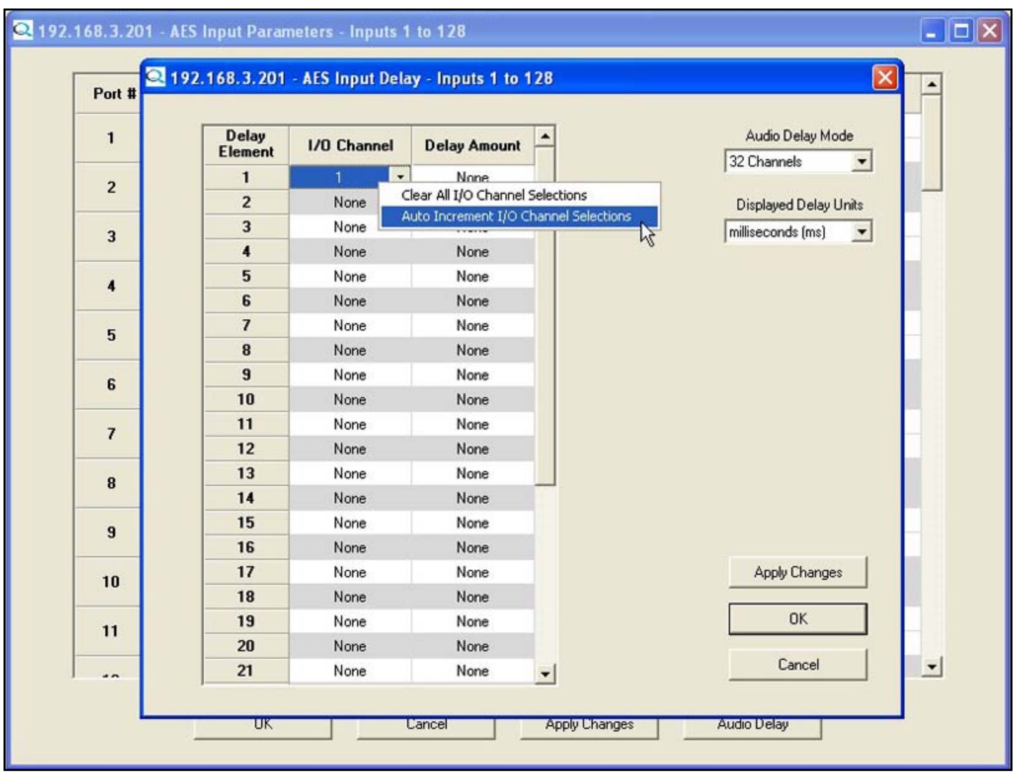


Figure 4-20 I/O Channel Right-Click Menu

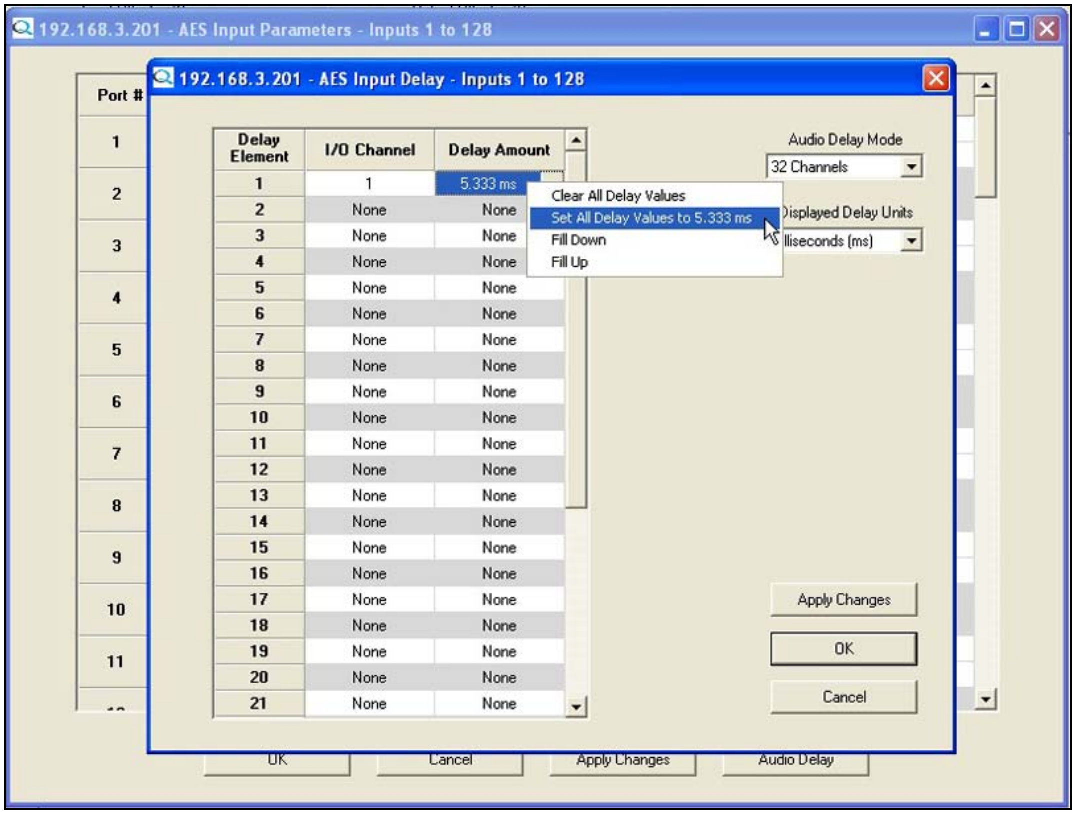


Figure 4-21 Delay Amount Right-Click Menu

4.8.4 STEREO REMEDIES OPTIONS

Stereo Remedies describes a group of commands that allow you to select operational parameters for paired audio channels. Remember that paired audio channels are displayed on the parameters setup screen by alternating color rows, and are said to be adjacent to one another. We also said that in many installations pairs are the left and right channels of a stereo audio source.

Some installation situations may require that the left and right channels of a stereo source be summed into a monaural signal containing both channels, or subtracted to derive the L-R stereo difference signal. Other situations may require that the channel pairs be swapped left for right and vice-versa. The Stereo Remedies functions allow you to easily perform these tasks from the parameters setup screen. Remember, however, that stereo remedies functions can only be applied to channels that are adjacent to one another. In all stereo remedies functions, the first signal of an adjacent pair is processed as the left channel audio and the second signal is processed as the right channel audio.

To access Stereo Remedies, click in the cell of the Stereo Remedies column on the row of the audio channel you wish to modify. Our example screen, Figure 4-22, shows the remedies menu selected for physical router input 641 on an analog input board. The menu choices are the same for all input and output boards. Each selection option is discussed below:

- **Normal** applies no change to the paired channels.
- **Swap** replaces the input signal for the selected channel with the audio signal from the adjacent channel. In the example screen, clicking Swap would cause the signal on physical input 641 to not be routed through channel 641 to the matrix. Instead the audio from input 642 would become the audio routed through channel 641. The audio from input 642 is also routed through channel 642 as normal – provided the remedies selection for channel 642 is Normal. If we select the Swap function in both channels of the pair, the inputs are totally swapped, meaning that the input signal on physical input 641 is routed through channel 642 and vice-versa.
- **L+R** adds the adjacent channel to the selected channel. Again in our example screen, if we select the L+R option for channel 641, audio from physical input 642 is summed with audio from physical input 641 and routed through the matrix as a mixed signal. The signal on channel 642 is not altered and is still available for routing through the matrix. If we select the L+R function for both channels of the pair, we will derive two identical signals, both of which are a summation of physical inputs 641 and 642.
- **L-R** subtracts the second signal of an adjacent pair from the first signal of the pair and routes the stereo difference signal as the output of the selected channel. Remember that the first signal of an adjacent pair is processed as the left channel audio and the second signal is processed as the right channel audio. For example, if we select the L-R option for channel 641, audio from physical input 642 is subtracted from audio of physical input 641 and the difference signal is routed through the matrix on channel 641. If we select the L-R option for channel 642, the algorithm performs exactly the same function - audio from physical input 642 is subtracted from audio of physical input 641 (right audio is subtracted from left audio) and the difference signal is routed through the matrix on channel 642. In this instance, the signal on channel 641 is not altered and is still available for routing through the matrix. If we select the L-R function for both channels of the pair, we will derive two identical difference signals, both of which are the audio from input signal 642 subtracted from audio input signal 641.

When you have entered stereo remedies for all desired channels, click on the **Apply Changes** button, Figure 4-22, to apply the functions to the channels and keep the setup screen open for further entries. If you wish to apply your settings and exit the screen, click the **OK** button. **Cancel** exits the screen without applying the changes.

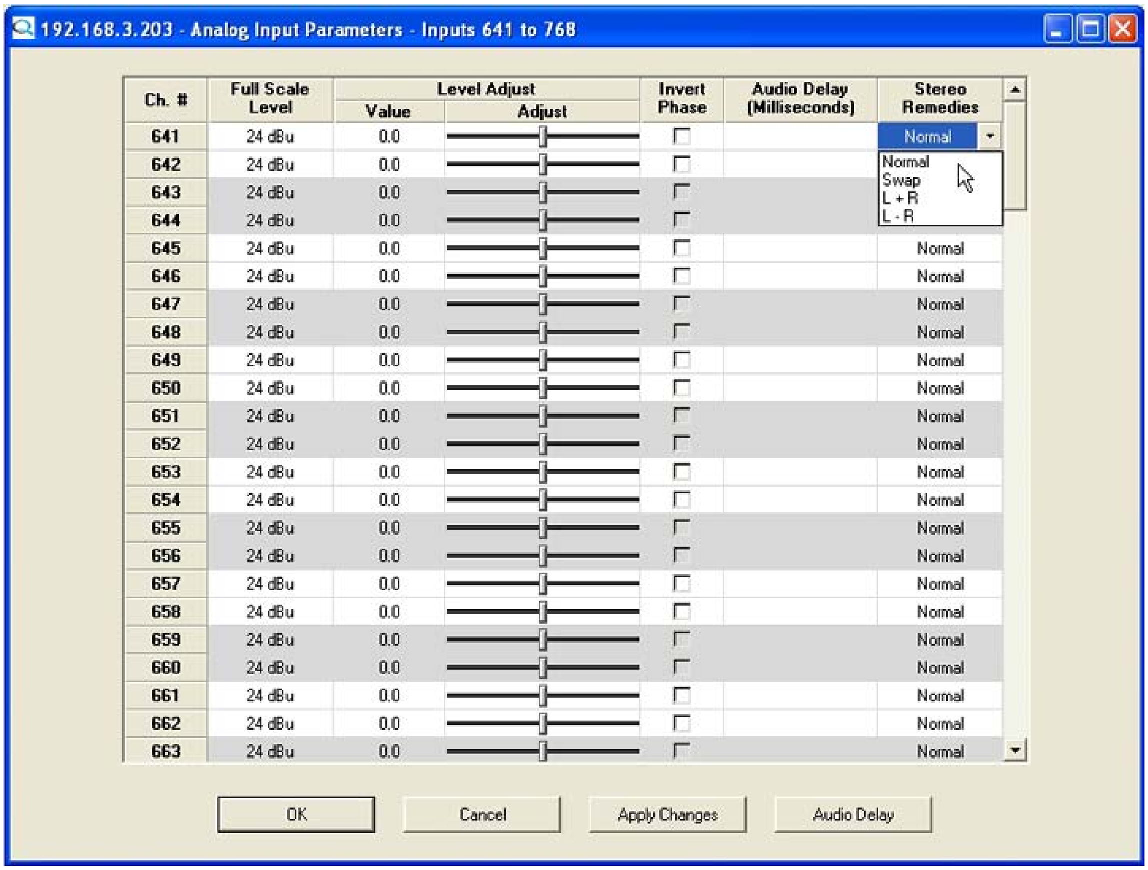


Figure 4-22 Stereo Remedies Menu

4.9 SAVE AND LOAD AUDIO BOARD PARAMETERS

Audio parameters and settings - such as levels, stereo remedies, delay, etc. – for all audio boards in a channel group may be saved as a data file. You may create data files of audio settings for particular applications or productions and quickly reload these as needed. Audio data files are always saved in, and retrieved from, the directory containing the PERC2000.exe file you use to launch the GUI application. Audio data files are always generated with the base IP address of the DRS system and the range of numerical output channels contained in the channel group as the filename, and adding the .dat extension.

The following steps guide you through the procedure to generate an audio data file:

- From the list of channel groups under the DRS Matrix Frames directory tree, select the channel group for which you wish to create an audio data file. Only one file is generated, regardless of the number of DXE frames or frame controllers in the group, but this single file contains audio setting data for all audio boards associated with the channel group.

- This will bring up the DRS Home Screen for the channel group.
- Right click on the highlighted channel group entry in the DRS Matrix Frames directory tree. The menu shown in Figure 4-23 is displayed.
- Select the "Save I/O Board Data" option from the menu.
- You will not be prompted to enter any file data. The audio data file is saved to the directory on the host PC containing the executable file for the P2K GUI. The file is saved with a filename derived from the channel group nomenclature, followed by a .dat extension. Our example screen, Figure 4-23, shows the audio data file we just created saved in the directory named P2K GUI with the filename IP-192.168.3.201.dat. This naming convention is always used when saving audio data files.
- Repeat this procedure for all channel groups in the system by selecting the channel group from the DRS Matrix Frames directory tree.
- Each audio data file is saved into the directory with a filename that allows easy identification of the channel group used to generate it as shown in Figure 4-24.

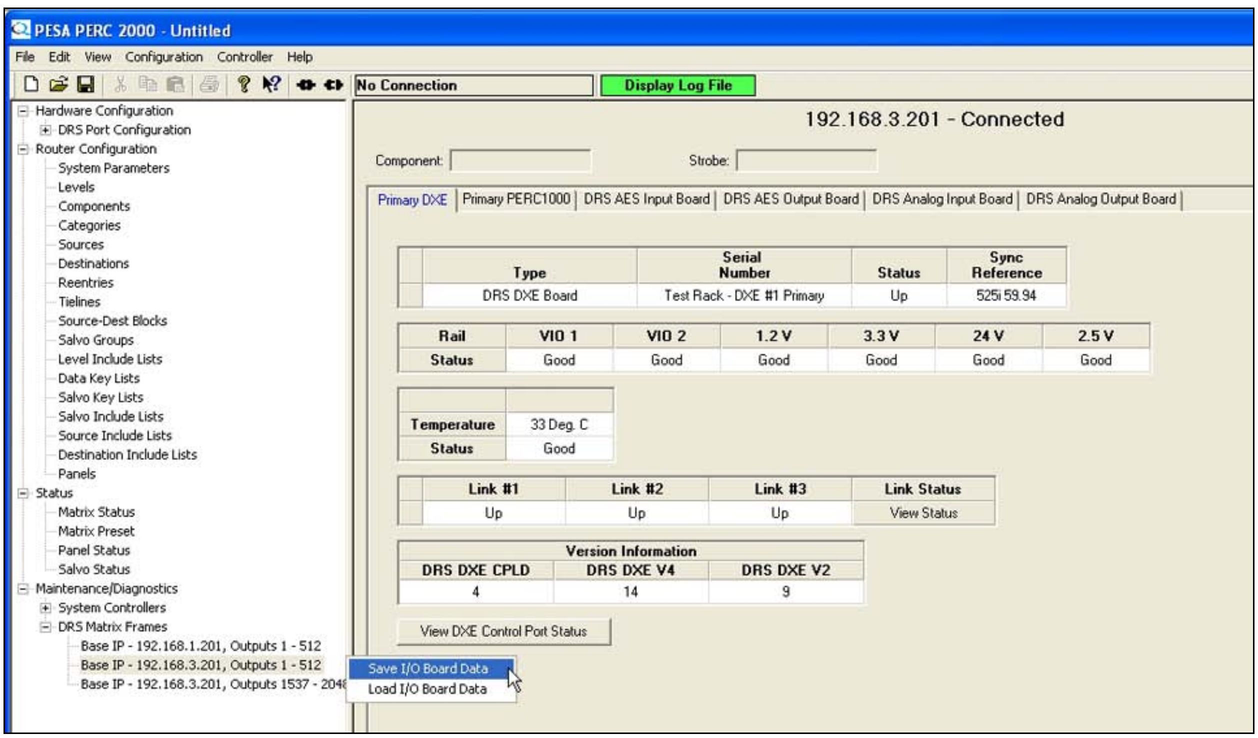


Figure 4-23 Audio Data Save and Load Commands

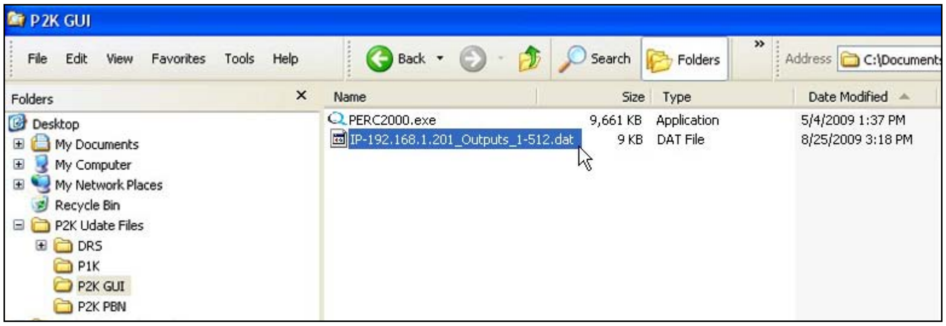


Figure 4-24 Audio Data Filename Location and Structure

In a practical application of this feature you would typically create a folder named to specify a certain application or date. Generate the audio data files for all DXE frames in the system - they will be stored in the folder with the GUI application. Once all needed data files are generated, move the files to the folder you just created.

In order to load audio data to the frame controllers from a saved file, the file must be located in the folder containing the executable file for the P2K GUI. If you have moved these files into another folder, they must be copied into the P2K GUI folder in order to be loaded. You will not have the option to browse to the files, they must be available in the application folder.

The following steps guide you through the procedure to load an audio data file:

- From the list of channel groups under the DRS Matrix Frames directory tree, select the channel group for the DXE frame on which you wish to load an audio data file.
- This will bring up the DRS Home Screen for the channel group.
- Ensure that the audio data file with the filename of the channel group you selected in the directory tree is available in the P2K GUI application folder.
- Right click on the highlighted channel group entry in the DRS Matrix Frames directory tree. The menu shown in Figure 4-23 is displayed.
- Select the "Load I/O Board Data" option from the menu.
- You will not be prompted to enter any file data. The audio data file is read from the directory on the host PC containing the executable file for the P2K GUI.
- Audio data will load and can be verified by checking the setting and parameters on the audio setup screens.
- You may repeat this procedure for all channel groups in the system, selecting the desired group from the DRS Matrix Frames directory tree.

4.10 ACCESSING INTERNALLY GENERATED SIGNALS

Every DRS system contains an internal signal generator. Signals from the generator are accessed by inserting the source number for the desired tone into system configuration files, just as you would with any other audio source channel number; and may be selected for embedding into an output embed group, if desired. The following chart identifies the signals that are available using the source number indicated in the source definition configuration lists.

DRS Generated Signal	Source Number
Audio Silence	4097
Sweep	4098
Tone 100 Hz	4099
Tone 1 kHz	4100
Tone 10 kHz	4101
Tone 1 kHz w/Dip	4102
White Noise 1	4103
White Noise 2	4104
Pink Noise 1	4105
Pink Noise 2	4106

In the Event of Trouble

If you have any questions or problems with your Cheetah MUX or DEMUX System Cards, contact the PESA Customer Service Department:

By E-Mail – service@pesa.com

By Phone – 256-726-9222 (24/7)