USER GUIDE

DRS-SA
STAND ALONE
AUDIO ROUTER

Publication: 81-9059-0693-0, Rev. A

June, 2011

www.PESA.com

Phone: 256.726.9200

Thank You !! for purchasing your new PESA audio router. 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.

Again, thank you for choosing PESA and we look forward to a long-term partnership with you and your facility.

SALES, SERVICE AND ORDERING ASSISTANCE
PESA Corporation
103 Quality Circle, Suite 210
Huntsville AL 35806 USA
www.pesa.com

MAIN OFFICE
Tel: 256.726.9200
Fax: 256.726.9271

SERVICE DEPARTMENT
Tel: 256.726.9222 (24/7)
Toll Free: 800.323.7372
Fax: 256.726.9268
Email: service@pesa.com

TABLE OF CONTENTS

TABLE OF CONTENTS (CONT.)

LIST OF FIGURES

LIST OF FIGURES (CONT.)

LIST OF TABLES

Chapter 1 Important Safety Instructions

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 DRS-SA Audio Routing Switcher built by PESA.

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.**

1.3 PRECAUTIONS

Avoid exposed circuitry - Dangerous voltage or current may be present - do not touch exposed connections, components or circuitry when power is present.

Remove jewelry - Remove jewelry such as rings, watches, or other metallic objects prior to working around or with power cables or power supply modules.

Use proper power cord - Use only the power cord supplied or specified for this product.

Dual power supplies may be present – If your PESA product is equipped with redundant power supplies, two power cords may be present. If possible, connect each power supply cord to a separate branch circuit. Always disconnect both power supply cords prior to servicing exposed circuitry.

Use correct power source — Do not operate this product from a power source that applies more than the voltage specified for the product.

Provide proper ventilation — To prevent product overheating, provide equipment ventilation in accordance with installation instructions.

Use anti-static procedures — Static sensitive components are present which may be damaged by electrostatic discharge. Use anti-static procedures, equipment and surfaces during servicing.

Ensure mains disconnect — If mains switch is not provided, the power cord(s) of this equipment provide the means of disconnection. The socket outlet must be installed near the equipment and must be easily accessible. Verify that all mains power is disconnected before installing or removing power supplies and/or options.

Route cable properly — Route power cords and other cables so that they are not likely to be damaged. Properly support heavy cable bundles to avoid connector damage.

Use correct power supply cords — Power cords for this equipment, if provided, meet all North American electrical codes. Operation of this equipment at voltages exceeding 130 VAC requires power supply cords which comply with NEMA configurations. International power cords, if provided, have the approval of the country of use.

Chapter 2 Introduction

2.1 DESCRIPTION

PESA's DRS Stand Alone (DRS-SA) is a compact system that adds full-feature audio routing capability to a Cougar3 or Jaguar3 video router equipped with an internal small scale system controller (SSC3). DRS-SA incorporates high-speed time division multiplex (TDM) technology for signal routing; and may be configured as a 64input /64 output audio router in 1RU, or as a 128input/128 output audio router in 2 RU. Depending on the circuit card and rear panel type used, DRS may be configured to route single-ended AES, balanced AES or balanced analog audio signals, or a mix of analog and AES.

DRS-SA is denoted as *stand alone* since the audio frame can communicate directly with the SSC3 system controller contained in the video router frame, and does not require connection to a DRS DXE frame for signal distribution, as would be the case with a conventional DRS audio routing system. There is no requirement for a direct connection between the video frame and audio router, as all communication between the audio frame and the SSC3 system controller is conducted over a standard 10/100 Ethernet link.

Operator interface with the DRS-SA is through PESA Ethernet-based PNet remote control panels. Configuration and monitoring functions are performed through operator screens of PESA's Cattrax software control application installed on a host PC which communicates with the SSC3 system controller internal to the video frame.

Figure 2-1 is a front view of a typical DRS-SA rack unit with the front cover in place.

Figure 2-1 DRS-SA Audio Router – Typical Rack Unit

Depending on the I/O signal handling capacity of the system, a DRS-SA router is configured using either one or two chassis frames, each equipped with the appropriate rear panel for the desired signal and connector type, the appropriate router circuit card for the frame function and signal type(s), and a single power supply/controller module - two if power supply/controller redundancy is desired.

Each frame occupies a space of one rack unit (RU) in a standard equipment rack and has a signal-handling capacity of 128 channels. Key to the versatility of the DRS-SA router is the numerous system variants available to accommodate a wide variety of applications. Depending on the configuration, the 128 frame channels may be all input channels, all output channels or a split frame configured as two banks of 64 channels each in various signal type combinations, as shown:

- 1RU Routers
  - 64 Analog input channels, 64 Analog output channels
  - 64 AES input channels, 64 AES output channels
  - 64 Analog input channels, 64 AES output channels
  - 64 AES input channels, 64 Analog output channels
- 2RU Routers
  - 128 Analog input channels, 128 Analog output channels
  - 128 AES input channels, 128 AES output channels
  - 128 Analog input channels, 128 AES output channels
  - 128 AES input channels, 128 Analog output channels
  - 64 Analog and 64 AES input channels, 64 Analog and 64 AES output channels

Digital signal processing (DSP) functions on every input or output channel allow signals to be delayed by a user-determined time period, or signals may be phase inverted. Stereo Remedies, available for all adjacent paired input or output audio signals, allow derivation of a summation signal (L+R) or a difference signal (L-R) of the two adjacent audio channels; or channel swapping of the adjacent pair.

System synchronization and clock timing for the DRS-SA router may be derived from a source of facility sync reference if synchronous audio switching is desired; or, if vertical interval switching is not required (asynchronous switching), an internal oscillator provides switch timing.

Synchronous switching is automatically enabled when a source of NTSC, PAL or Tri-Level sync, 0.5V p-p to 2.0V p-p, is applied to the sync reference input via the loop-thru BNC connectors on the DRS-SA rear panel. Using the loop-thru connectors, DRS-SA may be added to in-house sync distribution in a daisy-chain fashion along with a PESA video router or other facility equipment.

2.2 FEATURES

Features of the DRS-SA Audio Router include:

- Available for AES/EBU or analog audio
- Supports Dolby-E audio
- Setup capabilities for audio delay and phase inversion on every input and output channel.
- Setup capabilities for DRS stereo remedies, allowing the user to derive a summation signal (L+R) or a difference signal (L-R) of two adjacent audio channels; or select adjacent channel swapping of the stereo pair, implemented in input channels and/or output channels
- I/O configurations available as 64X64 (1 RU) or 128X128 (2 RU) in various signal format combinations
- Power redundancy available as an option
- Power supply/controller modules are hot-swappable (frames equipped with redundant modules)
- Sync to any of the following sync source types: NTSC, PAL, Tri-Level, AES Silent
- Ethernet-based control system protocol using PESA's small scale system controller (SSC3)

2.3 SPECIFICATIONS

Analog Audio

Connector Type	6 pin detachable, 2 balanced signals per connector
Input Level	0 dBFS (full scale digital) = +24 dBu, +18 dBu or +12 dBu, GUI selectable
Input Impedance	20 K Ohms, Balanced
Common Mode Rejection	>74 dB minimum, >90 dB typical (20 Hz - 20 kHz)
Output Levels	0 dBFS=+24dBu, +18 dBu or +12 dBu, GUI selectable A/D, D/A
Output Impedance	130 Ohms; balanced
Resolution	24 bits/sample, 96 kHz sample rate
Frequency Response	+/- 0.1 dB (20 Hz - 20 kHz)
THD+N	<0.02% @ 1 kHz, +20 dBu
Cross Talk	<-95 dB
Dynamic Range	95 dB

AES/EBU Audio

Connector Type	6 pin detachable, one balanced AES stream per connector BNC - one single-ended AES stream per connector
Input Level	0.5 -7.0 Vp-p balanced, 0.5 - 2.0 Vp-p single-ended
Input Impedance	110 Ohms balanced, 75 Ohms single-ended
Input Sample Rate	32 kHz- 96 kHz
Output Level	nominal 2 Vp-p balanced, 1 Vp-p single-ended
Output Impedance	110 Ohms balanced, 75 Ohms single-ended
Output Sample Rate	48 kHz or 96 kHz, GUI selectable
Dolby Support	48 kHz synchronous Dolby/ Dolby E are supported

Digital Signal Processing

Gain Adjustment	Independent +/- 6 dB adjustment in 0.1 dB increments for each input and output, GUI selectable.
Audio Delay	Independent delay elements for inputs and outputs. Unrestricted mode provides 0.341 milliseconds (>10 NTSC frames) for each input and output. Restricted mode provides up to 1.365 seconds (>40 NTSC frames) of delay per input and output for a limited number of channels. All delay parameters are GUI selectable.
Phase/Inversion	Independent Control for each input and output, GUI selectable
Stereo Remedies	Independent Control for each pair of inputs and outputs. The L and R channels of each pair may be individually set to L, R, L+R or L-R. All stereo remedies are GUI selectable.

Environmental & Miscellaneous

AC Input Connectors	IEC 320C6 socket (accepts IEC 320 C5 line cord)
Power Requirement	60 VA Max per frame
Input Voltage	90-260 VAC, 47-63 Hz
Operational Temperature	0-40 degrees C
Operational Humidity	90% Non-Condensing
Mechanical Dimensions	1RU 1.75” H x 19.00” W x 14.75” D
Weight	12lbs (per rack frame)

Chapter 3 Functional Description

3.1 OVERVIEW OF SYSTEM ARCHITECTURE

DRS-SA routing systems are implemented in terms of audio signal blocks. Each DRS-SA frame processes 128 signal channels – either as a single block of 128 channels (dedicated input or output frame), or two 64 channel blocks (split frame). Each audio block supports one signal type (input or output) and one signal format (AES digital or analog). Signal types and formats can not be mixed within a block. Figure 3-1 pictorially illustrates the concept of dedicated and split audio frames.

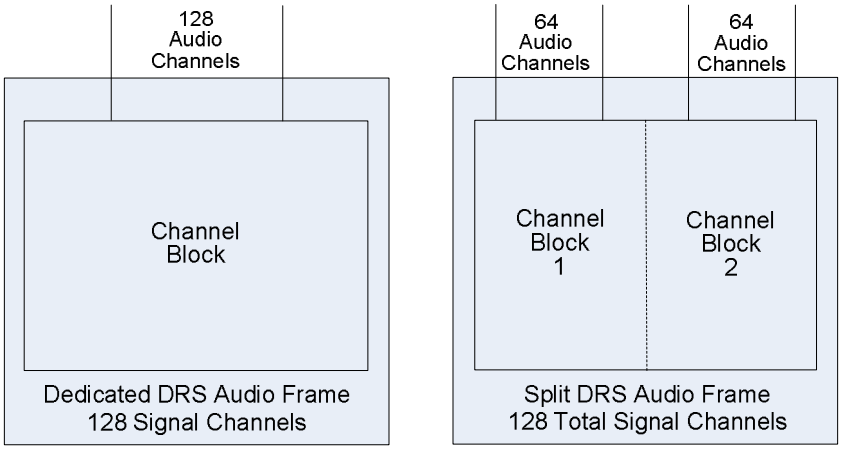


Figure 3-1 Pictorial Representation of Dedicated and Split Audio Frames

64x64 DRS-SA routers are always implemented in a single split frame chassis as a block of 64 input signals and a block of 64 output signals. Both blocks may be the same signal format –AES or analog, or mixed with an input block of one signal format and output block of the other format.

DRS-SA routers with 128x128 signal capacity are configured from two chassis frames – one frame always supports 128 input channels, and the second frame always supports 128 output channels. Input signals and output signals cannot be mixed within the same frame. Both the input and output frame can be implemented as a single 128 channel block of one signal format – AES or analog, or as a split frame with a 64 channel block for AES signals and a 64 channel block for analog signals.

All audio signals are processed by the DRS as digital data. Analog inputs are converted to digital data for routing and AES signal pairs are decoded and routed as two independent mono channels. Any input signal to DRS, whether derived from an AES or analog input block, may be routed to an analog output block channel where DAC circuitry converts the digital signal to an analog output. AES outputs are always paired channels and each signal of the pair may be individually selected from any decoded AES input signal or from any mono analog signal. By configuring both the input chassis and output chassis as split frames with a block of AES and analog signal channels, it is possible to use the DRS as a format converter. For example, routing an analog input to an AES output channel provides not only a router function but also analog to AES conversion capability. In similar manner, routing an AES input to an analog output channel provides AES to analog conversion.

3.2 DRS SYSTEM FUNDAMENTALS

Unlike a traditional crosspoint matrix router, PESA's DRS-SA system distributes audio through an input channel block and an output channel block, interconnected through data exchange engine (DXE) circuitry located on the audio router card. Each input block contains circuitry necessary to convert audio signals to digital data, apply any desired DSP functions to each signal and "packetize" the digital data into a serial stream containing high speed samplings of every input signal in the channel block. The DXE circuitry performs the actual "routing" function by disassembling the incoming data stream to extract audio data for each input channel and constructing an output data stream containing desired audio signal data for every channel of the output signal block. In the output block circuitry, packetized data from the DXE circuitry is extracted, processed, converted to either analog or AES signal format and routed to output connectors.

Figure 3-2 illustrates this concept of a 64X64 router where the input channel block, DXE and output channel block circuitry are all contained on the audio router card contained in a single chassis frame equipped with a frame controller/power supply module.

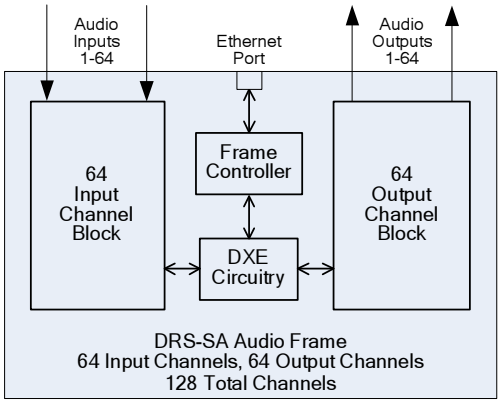


Figure 3-2 Block Diagram – 64x64 Router

Figure 3-3 conceptually illustrates a 2RU DRS-SA system with dedicated chassis frames containing the input and output channel blocks interconnected by CAT5x cable through the data bus connectors. Note that the DXE circuitry is contained on the output signal board - which is why the frame controller/power supply module must be installed in the output signal frame.

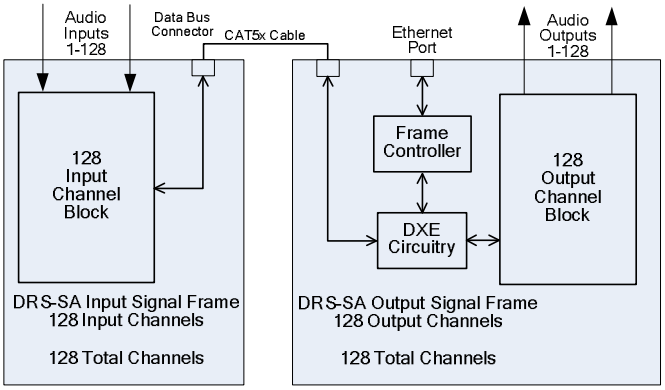


Figure 3-3 Block Diagram – 128x128 Dedicated Frame Router

Figure 3-4 illustrates a 2RU DRS-SA system with split frames containing two 64 channel blocks per frame. This configuration allows routing a mix of analog and AES audio signal types.

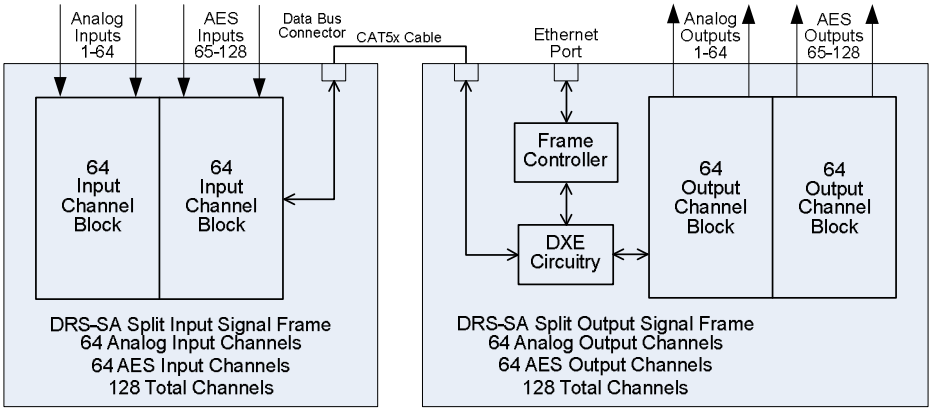


Figure 3-4 Block Diagram – 128x128 Split Frame Router

3.3 DRS-SA AUDIO FRAME

A front view illustration of a typical DRS-SA audio frame with front cover removed, showing location of key components is shown in Figure 3-5.

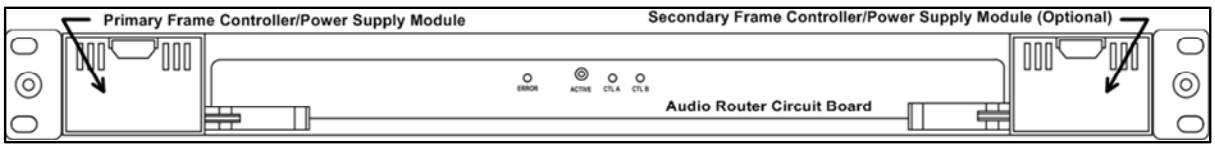


Figure 3-5 Frame Component Layout (Typical)

The DRS-SA audio routing frame contains a Frame Controller/Power Supply Module installed in the primary controller slot that combines functions of the frame controller and power supply into a single removable module. The frame controller interfaces with the SSC3 system controller contained in the video router via Ethernet connection and oversees operation of the audio router through commands and communication with the system controller. DRS supports many advanced audio capabilities easily configured through PESA's Cattrax software control application. One frame controller/power supply module is required per system, a second controller may be installed at any time to add full redundant audio frame power and control capability.

With a 128x128 router consisting of 2 chassis frames, the frame controller function is only required in the frame containing the output signal block(s). The second frame, for input signals, is equipped with a Power Supply/Fan Controller Module, installed in the primary controller slot, which combines functions of the power supply and controller circuitry for the on-board cooling fans into a single removable module. One power supply/fan controller module is required for the input signal frame; a second module may be installed at any time to add redundant power capability.

Audio conversion, data manipulation and interface circuitry is contained on the Audio Router Circuit Board. In addition, the board is equipped with front edge status lights that provide a visual indication of system activity and errors.

An illustration of the rear panel of each available audio frame type, BNC, 6-pin and mixed, showing location of key components is shown by Figure 3-6 thru 3-8. Rear panel connectors used for installation of the DRS-SA system are shown highlighted in bold type. Signal handling capability of each connector type is shown below.

Connector Type	Signal Type
BNC Connectors	AES Audio 75 Ohm, Single-ended
6-Pin Connector (Detachable)	AES Audio 110 Ohm, Balanced or Analog Balanced Audio

NOTE	**BNC connectors are used only for connection of AES audio signals and each AES signal contains a pair of audio signals. In order to accommodate 128 signals, only 64 connectors are required; and to accommodate 64 signals, only 32 connectors are required.**

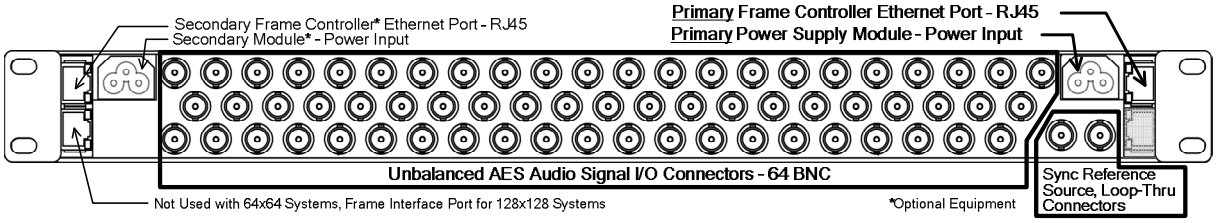


Figure 3-6 DRS Audio Frame – BNC Connector Rear Panel Layout

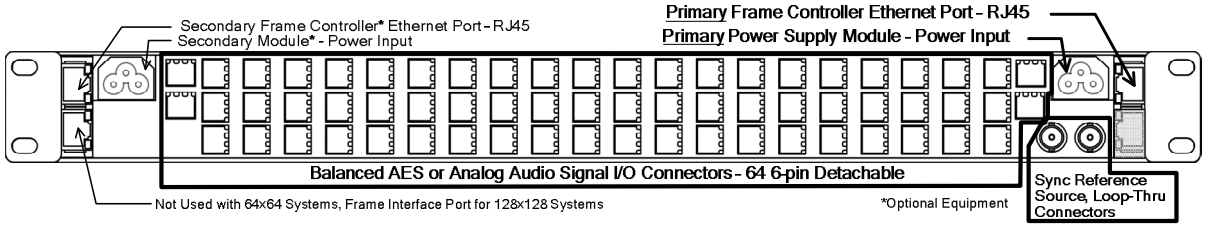


Figure 3-7 DRS Audio Frame – 6-Pin Connector Rear Panel Layout

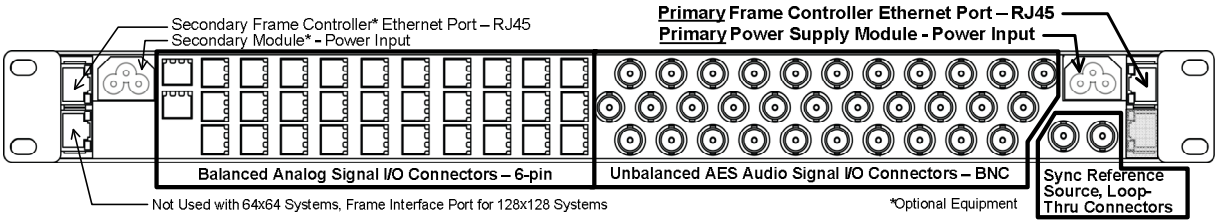


Figure 3-8 DRS Audio Frame – Mixed Connector Rear Panel Layout

- **Primary Frame Controller Ethernet Port** - Access port for connecting frame controller module installed in primary controller chassis slot to an Ethernet interface. Connection is through a standard RJ45 connector for use with Cat5x cable. LEDs on the connector indicate communication activity.
- **Primary Power Input** - Access port for attaching power cord directly to power supply portion of controller module. DRS-SA typically ships from factory with power cord and securing harness pre-installed.

  If you need to remove power cord for any reason, loosen thumb screw on cord harness and pull cord from its mating connector.

  Replace cord by aligning mating connectors, firmly seat connector and secure cord with harness and thumb screw.

  Do not remove power cord while connected to a power source.
- **Audio Signal I/O Connectors** – Depending on the rear panel type, audio connections to the router are made through BNC connectors or 6-pin detachable connectors.
- **Loop-Thru Sync Reference Input** - BNC connectors for attaching a house sync reference signal source to the audio router. Either connector may be used for signal input, and the remaining connector used as a looping output for the signal if you wish to daisy-chain the signal source to other equipment. If the DRS-SA is the last, or only, piece of equipment in the chain, a terminator must be installed on the unused BNC connector.
- **Secondary Controller Ethernet Port and Power Input**- Access ports for attaching power cord and Ethernet interface cable to a second frame controller module installed for system redundancy. Secondary controller is optionally available equipment and not supplied with your DRS-SA system.
- **Frame Interface Port** - There is a Frame Interface Port connector (RJ-45) located on the rear panel of each DRS-SA frame. This is the connector on the left-hand side of the lower edge when viewed from the rear of the frame. When installing a 64x64 single frame DRS-SA router, this connector is not used and should be left open. With 128x128 dual frame systems, these ports provide the link for the audio data stream between the input and output audio frames. When installing a two frame system, interconnect the data ports of the frames with CAT5x cable. If desired, the two frames may be separated by any distance up to 100 meters, using CAT5E cable for interconnect.

In DRS system architecture, the two power supply/controller slots are identified by the nomenclature primary (slot 1) and secondary (slot 2); and the controller device installed in slot 1 is identified as the "primary" controller, the controller in slot 2 is identified as the "redundant" controller, refer to Figure 3-5 for slot locations. Note that this is a naming convention only and in systems with redundant control capability does not indicate whether a controller is operating as the "active" device or the "standby" device. For systems with only one power supply/controller module, the single module is always installed in the primary controller slot, and is the active controller for the frame. Redundant power and control systems have a module installed in each slot. One of the modules is always active, and the second module is operating as the standby controller – regardless of the slot in which each is physically located. During redundant controller operation, the standby controller maintains contact with the active

controller in order to remain current with all parameters and operating status for the frame, and also to monitor the health of the active controller. Should errors occur with the active controller, or if an operator manually initiates a controller changeover command, the standby controller assumes active control of the frame, and the previously active module becomes the standby controller.

3.4 POWER SUPPLY/CONTROLLER MODULES

Two Power Supply/Controller Modules are available in the DRS system architecture. Both supplies are constructed as a modular unit that can slide into either of the two available slots in the chassis frame. In redundant power supply applications, a power supply/controller module is used in both slots of a chassis frame.

A typical power supply/controller module is shown in Figure 3-9. The two modules are distinctly different in *controller* function, even though the power supply portion is identical in function and circuitry with both modules. The two modules are identified as follows:

Power Supply/Frame Controller Module - This module contains the power supply circuitry, a pair of fans used to circulate cooling air through the chassis frame, and a controller circuit that controls operation and reports status of the on-board cooling fans. In addition it contains the PERC1000 Frame Controller circuitry used to communicate with the SSC3 system controller contained in the video frame over an Ethernet link.

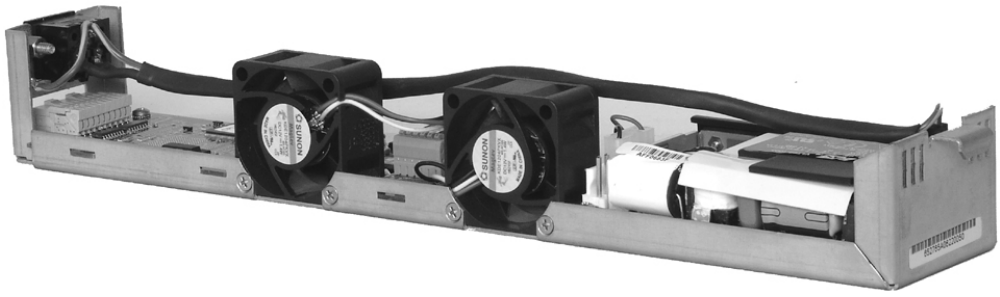


Figure 3-9 Power Supply/Controller Module (Typical)

Power Supply/Fan Controller Module - This module contains the power supply circuitry, a pair of fans used to circulate cooling air through the chassis frame, and a controller circuit that controls operation and reports status of the on-board cooling fans. This module type is used only in the audio input frame in DRS-SA systems composed of 2 chassis frames.

3.5 SYSTEM INTERCONNECTION

The DRS-SA frame controller communicates with the SSC3 system controller over an Ethernet interface. This may be either a closed Ethernet communication loop established directly between devices through an Ethernet switch, or Ethernet communication over the facility network.

Figure 3-10 pictorially illustrates a typical video/audio router system; interconnected through a closed Ethernet communication loop established using the supplied Ethernet switch device. In this application, no component of the router installation is connected to the facility network. Figure 3-11 illustrates the same components in a network installation. In this application, every router component can be directly connected to the network, and use of the Ethernet switch is optional.

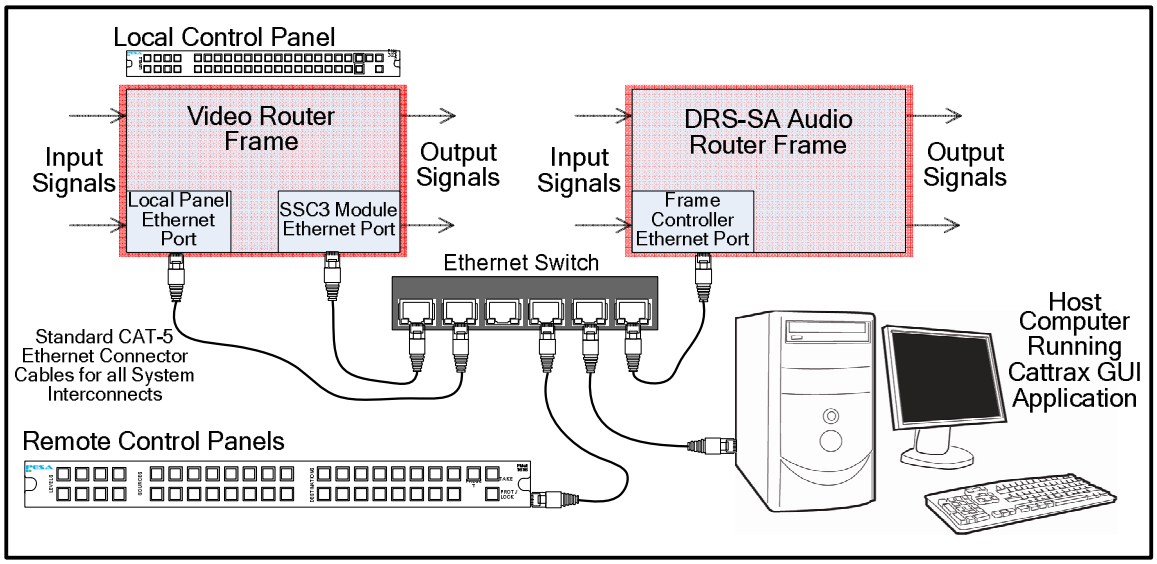


Figure 3-10 - Typical Closed Ethernet Loop Installation

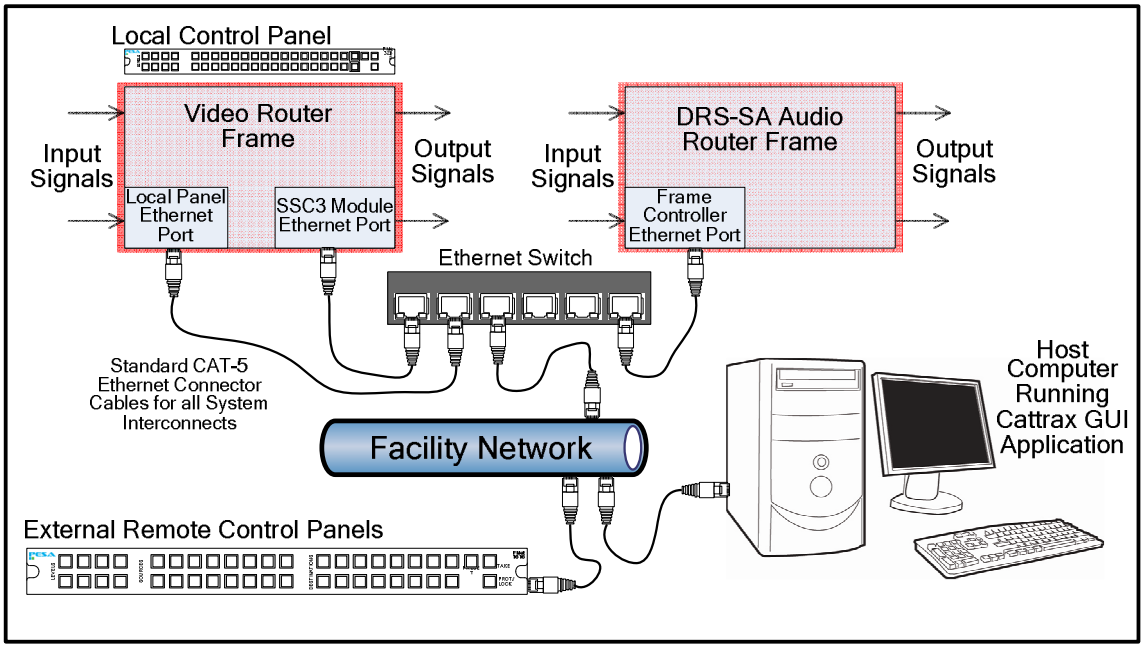


Figure 3-11 Typical Network Installation

Chapter 4 Installation

4.1 MOUNT EACH DRS FRAME IN AN EQUIPMENT RACK

	**Make sure the frame power cords are disconnected from the power source before installing the frame into an equipment rack.**
	**Fans that are mounted inside of this equipment provide forced-air cooling. Do not block airflow around these fans.**

Chassis frames comprising a DRS-SA router system are designed for installation in a standard 19" equipment rack. Provide sufficient space behind the equipment racks to allow for control, signal, interconnect and power cables; and around all sides for cooling. Use all chassis mounting holes, and tighten mounting hardware securely by using the rack equipment manufacturer's suggested torque settings.

Install equipment into racks as follows:

1. Carefully remove equipment from packing container and place each frame near the rack where it will be installed.
2. Loosen two thumbscrews on each end of the chassis front cover and move cover away from chassis. The front cover must be removed from the frame in order to gain access to mounting ears and screw holes.
3. Insert chassis frame into equipment rack and support the bottom of the chassis while mounting hardware is installed.
4. Install the bottom two chassis mounting screws.
5. Install the top two chassis mounting screws.
6. Install Rear Support Rails (Paragraph 4.2)
7. Tighten all chassis mounting screws until they are secure.

4.2 INSTALL REAR SUPPORT RAILS

Each DRS chassis frame is shipped with a Rear Rack Rail Kit. It is important that this kit be installed as part of the mounting procedure for the frame. Major components included with the kit are shown in Figure 4-1. Each kit consists of two rear rack rails, two rail mounting ears and four screws (not shown) to attach rails to the frame.

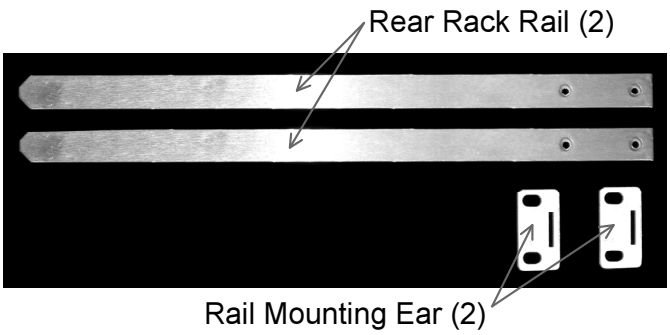
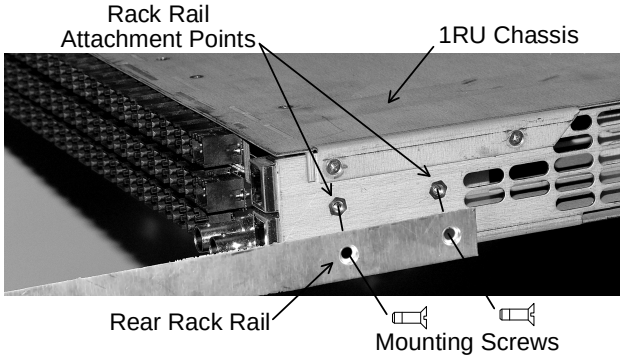
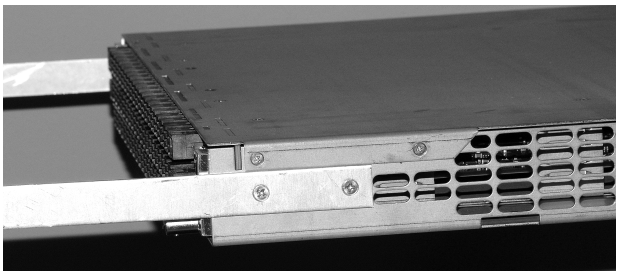


Figure 4-1 Rear Rack Rail Kit

Install Rear Support Rails

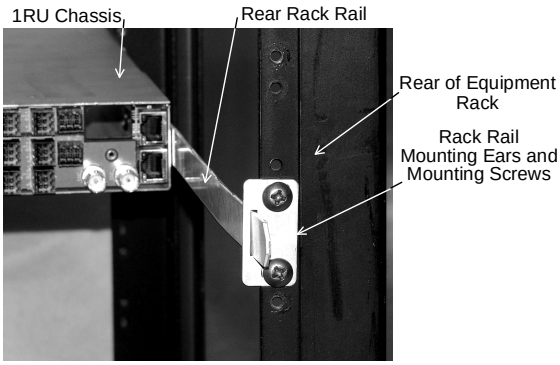
- Mount router frame in equipment rack and secure chassis.
- Install one Rear Rack Rail to chassis at the two Rack Rail Attachment Points using two Mounting Screws as shown at right.





- Repeat on opposite side of chassis using second rack rail and remaining two mounting screws.
- Figure at left shows rear of chassis with both rack rails installed.

- Install rack rail mounting ears by aligning rectangular cutout in mounting ear with one of the rack support rails previously installed and sliding mounting ear onto rail. Ensure that the two screw holes in mounting ear face to outer edge as shown in Figure at right.



- Secure mounting ear to rear rail of equipment rack using two rack mounting screws (not supplied) as shown. Be sure that screw holes in mounting ear align with screw threads in equipment rack in such a way that the chassis is level in equipment rack from front to rear as shown at left.
- Repeat for the remaining mounting ear and rack rail.

4.3 CONNECT EQUIPMENT CABLES

Use the following guidelines when connecting equipment cables:

- Install equipment in rack before connecting cables.
- Relieve strain on all cables to prevent connector separation.
- To the greatest extent possible, separate control, signal, and power cables to minimize crosstalk and interference.

Use as many cable ties as necessary to secure audio cables and CAT5x cables to the rack, as shown in Figure 4-2. This will provide cable strain relief and help route cables away from hazardous areas. Do not use cable ties on fiber optic cable. Route cables away from physical traffic areas to avoid creating a safety hazard (trip or shock).

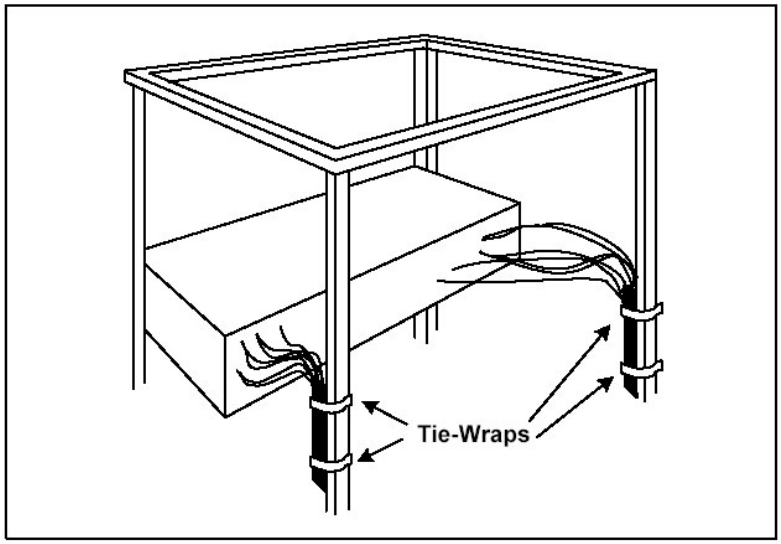


Figure 4-2 Cables Attached To Supports

4.4 CONNECTION CHECKLIST

Once each DRS system frame is installed in an equipment rack, associated system connections can be completed. Order of completion of installation steps is not critical, however, DO NOT apply power to a frame until all signal, sync, and Ethernet network cables have been installed and their connections verified for proper placement and accuracy.

PESA recommends that you create a chart or list of signals attached to router connectors identifying the source and destination of the signal, cable number (or other identification designation) and router channel number assigned to the signal. When connecting cabling with BNC connectors, it's a good idea to make a sketch of the rear panel of the audio frame(s) equipped with BNC connectors and note cable numbers (or other identifier) attached to each I/O connector. When connecting cabling with 6-pin detachable connectors, PESA recommends that you make a sketch or a pin layout table for each connector identifying connector number, signal source and destination, cable numbers (or other identifier) attached to each set of pins and the router channel number associated with each cable. Prepare this sketch or table **BEFORE** attaching wires to male mating plugs, and use it as a reference guide when performing connector assembly. **Carefully** follow connector pin-out data provided in this User Guide when assembling connectors to prevent inadvertent signal swapping. If at all possible, use a continuity measurement device to verify cable connections before attaching mating connectors to DRS rear panel connectors. Retain all of your sketches, cabling diagrams and connection lists, and keep it with your other DRS documentation for future reference.

Use the following guide to insure that all connections are made properly and that power, system interconnect and audio signal cables are correctly installed.

1. Connect an external sync source to the Sync Reference Input (REF) of the DRS-SA frame (output frame only in 2RU systems) using 75 Ohm coaxial cable such as Belden 8281, or equivalent. Be sure to properly terminate external sync sources into a 75Ω load terminator.
2. If using 6-pin detachable connectors, prepare each connector with its associated input or output audio signals using connector pin-out data provided in the following paragraphs. Installation will be much smoother if all connectors intended to mate with rear panel connectors on DRS frames are pre-wired and tested. If possible, use an Ohmmeter or audible signal tracing device to verify continuity of each connection prior to attaching the external connector to the DRS system.
3. When installing a 128x128 system with two chassis frames, interconnect the data interface port of the input and output frame using high quality CAT5x cable.
4. Before the DRS system can be used to make audio switches, a configuration file must be loaded into the SSC3 system controller. This file is generated using PESA's Cattrax control application and contains I/O signal configuration data, level and component assignments and all operational data for the DRS audio router as well as the video router component of the installation.

4.5 CONNECTOR PIN-OUT DATA – INPUT OR OUTPUT FRAMES WITH 128 CHANNEL DEDICATED SIGNAL BLOCK

NOTE	**Pin-out data in this paragraph pertains ONLY to connectors found on input or output frames with a single, dedicated block of 128 input channels or 128 output channels, used in 128x128 systems with two chassis frames. If your DRS-SA system is a 64x64 with one chassis frame, refer to Paragraph 4.6 for proper pin-out data. If your system is a 2RU, 128x128 split frame with a mix of AES and analog inputs and outputs, refer to Paragraph 4.6.3 for proper pin-out data.**

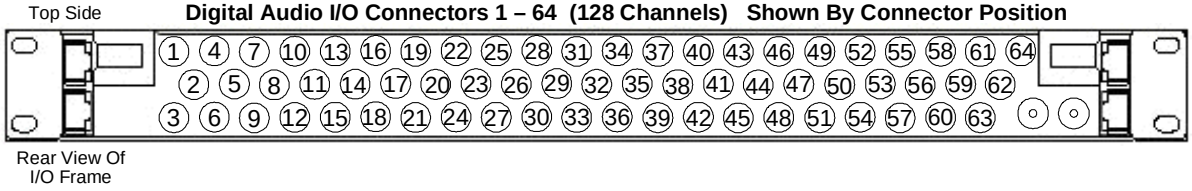
Each chassis frame in a 128x128 DRS-SA system is configured with a rear panel equipped with one of the connector types listed below. The type of rear panel used is dependent on the type of signal connected and type of connector used in the installation. In the following paragraphs, each type of connector is illustrated and pin-out data is provided as a guide when wiring mating connectors to interconnect with the DRS frame.

Connector Type	Signal Type
BNC Connectors	AES Single-ended Audio, 75 Ohm
6-Pin Connector (Detachable)	AES Balanced Audio, 110 Ohm or Analog Balanced Audio

Each AES input or output channel actually contains a pair of audio signals, therefore the full 128 channel capacity of the DRS frame is realized with 64 AES input sources or output signals. In the case of the BNC rear panel there are 64 physical connectors for I/O and all inputs or outputs are AC coupled to router circuitry. With the 6-pin connector rear panel there are actually 128 physical connections (2 sets of connection pins per connector) for input or output signals. When connecting AES digital audio sources to the router, this equates to two sets of physical connection pins for each I/O signal. DRS-SA is designed such that connecting an audio signal to one set of input pins on a connector AC couples the signal to router circuitry and the other connector pins DC couple the signal. Pin-out charts contained in the following paragraphs identify how to connect an input source or an output signal for AC or DC coupling.

4.5.1 BNC CONNECTOR REAR PANEL

Figure 4-3 illustrates a BNC rear panel and identifies I/O channel layout. Carefully follow the connector layout and channel identification chart when completing connections to the DRS router to prevent inadvertent signal swapping.



BNC Connector Number	AES Digital Audio Channels		BNC Connector Number	AES Digital Audio Channels		BNC Connector Number	AES Digital Audio Channels		BNC Connector Number	AES Digital Audio Channels
1	1, 2		17	33, 34		33	65, 66		49	97, 98
2	3, 4		18	35, 36		34	67, 68		50	99, 100
3	5, 6		19	37, 38		35	69, 70		51	101, 102
4	7, 8		20	39, 40		36	71, 72		52	103, 104
5	9, 10		21	41, 42		37	73, 74		53	105, 106
6	11, 12		22	43, 44		38	75, 76		54	107, 108
7	13, 14		23	45, 46		39	77, 78		55	109, 110
8	15, 16		24	47, 48		40	79, 80		56	111, 112
9	17, 18		25	49, 50		41	81, 82		57	113, 114
10	19, 20		26	51, 52		42	83, 84		58	115, 116
11	21, 22		27	53, 54		43	85, 86		59	117, 118
12	23, 24		28	55, 56		44	87, 88		60	119, 120
13	25, 26		29	57, 58		45	89, 90		61	121, 122
14	27, 28		30	59, 60		46	91, 92		62	123, 124
15	29, 30		31	61, 62		47	93, 94		63	125, 126
16	31, 32		32	63, 64		48	95, 96		64	127, 128

Figure 4-3 BNC Rear Panel – Connector and I/O Channel Identification
(Viewed From Chassis Rear)

4.5.2 6-PIN DETACHABLE CONNECTOR REAR PANEL

There are 64 6-Pin I/O connectors on the rear panel; each connector provides 2 physical input or output connections for a total of 128 I/O connections. Figure 4-4 illustrates the 6-pin connector rear panel and shows in detail the orientation of rear panel connectors and pin-out connections of mating plugs.

The mating plug used with the on-board connectors is a solder-less type and uses a spring clamp to securely hold audio cable wires. Connections are made by inserting the wire end into the round receptacle on the plug. The small square hole beside each wire receptacle contains a spring release that loosens the clamp and allows the wire to be removed from its associated receptacle. To remove a wire, simply insert the blade of a small flat tip screwdriver into the release hole adjacent to the receptacle containing the wire you wish to remove, and gently pull the wire from the receptacle.

When connecting AES digital audio inputs and outputs to the router, the 128 input connections equate to two physical connection points for each digital audio signal. One input allows input sources or output signals to be AC coupled to the router and the other allows signals to be DC coupled. When connecting analog input or output signals each set of connector pins is used for a separate single-channel, balanced audio input or output. Analog Audio Outputs MUST be connected to a high-impedance load, ≥10K Ohms. When wiring UNBALANCED analog output signals to external loads, NEVER connect the negative (-) output terminal to any external connection point or to ground. The negative terminal MUST be left floating.

Connector orientation and pin identification diagrams are provided by Figure 4-4. Figure 4-5 provides a detailed view of I/O connector numbering layout and Figure 4-6 illustrates channel I/O pin arrangement for a typical 6-pin connector. Table 4-1 is a detailed I/O channel pin-out chart.

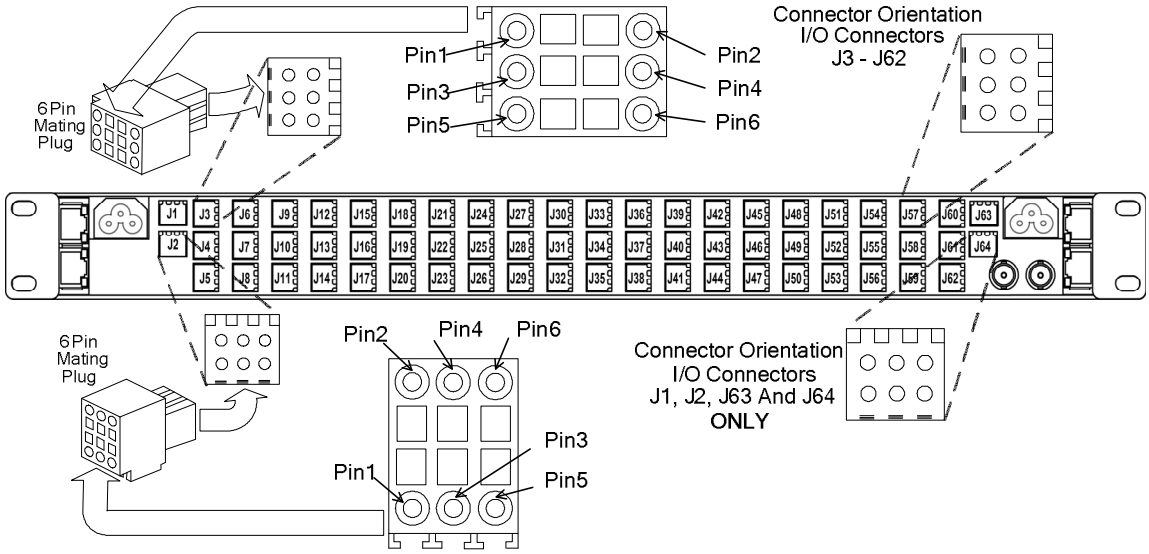


Figure 4-4 6-Pin Connector Rear Panel Orientation and Pin-Out Diagram

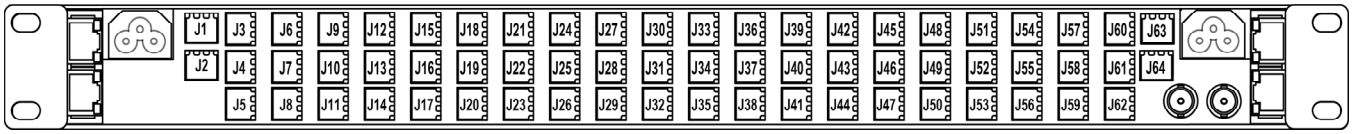


Figure 4-5 6-Pin Connector Rear Panel – Connector Numbering Layout

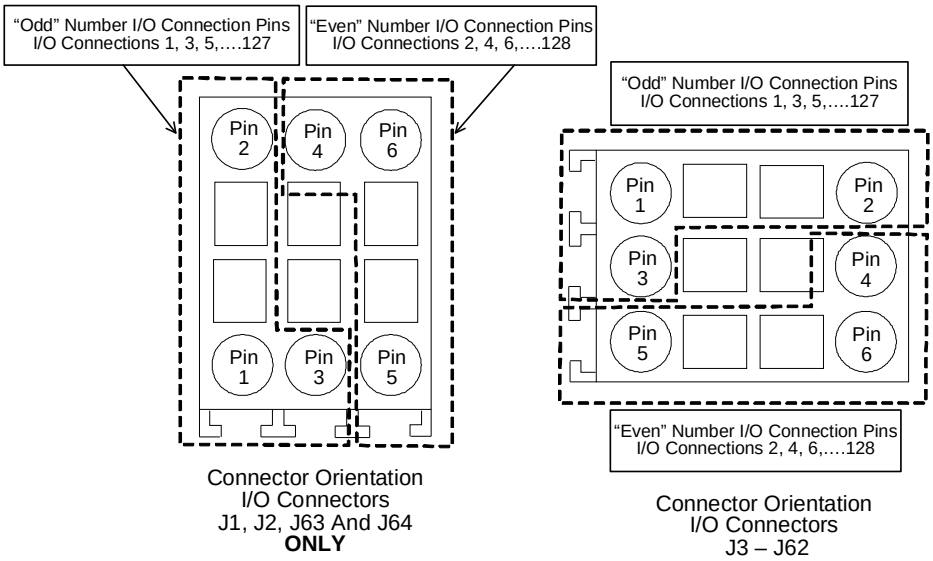


Figure 4-6 6-Pin Detachable Connector – I/O Channel Pin Grouping

Table 4-1 6-Pin Audio Connector Rear Panel – Channel Pin-Out Chart

Connection Pin-Outs By Input/Output Channel
for 6-Pin Detachable Audio Connectors
Refer To Figures 4-8, 4-9 and 4-10 for Proper Connector
Orientation and Channel Assignments

Rear Panel Connector Number	AES Digital Audio Channel	Analog Audio Channel	Pos. (+) Pin	Neg. (-) Pin	Ground (Shield) Pin		Rear Panel Connector Number	AES Digital Audio Channel	Analog Audio Channel	Pos. (+) Pin	Neg. (-) Pin	Ground (Shield) Pin
J1	1 & 2 DC CPLD	1	1	2	3		J7	13 & 14 DC CPLD	13	1	2	3
J1	1 & 2 AC CPLD	2	5	6	4		J7	13 & 14 AC CPLD	14	5	6	4
J2	3 & 4 DC CPLD	3	1	2	3		J8	15 & 16 DC CPLD	15	1	2	3
J2	3 & 4 AC CPLD	4	5	6	4		J8	15 & 16 AC CPLD	16	5	6	4
J3	5 & 6 DC CPLD	5	1	2	3		J9	17 & 18 DC CPLD	17	1	2	3
J3	5 & 6 AC CPLD	6	5	6	4		J9	17 & 18 AC CPLD	18	5	6	4
J4	7 & 8 DC CPLD	7	1	2	3		J10	19 & 20 DC CPLD	19	1	2	3
J4	7 & 8 AC CPLD	8	5	6	4		J10	19 & 20 AC CPLD	20	5	6	4
J5	9 & 10 DC CPLD	9	1	2	3		J11	21 & 22 DC CPLD	21	1	2	3
J5	9 & 10 AC CPLD	10	5	6	4		J11	21 & 22 AC CPLD	22	5	6	4
J6	11 & 12 DC CPLD	11	1	2	3		J12	23 & 24 DC CPLD	23	1	2	3
J6	11 & 12 AC CPLD	12	5	6	4		J12	23 & 24 AC CPLD	24	5	6	4

Table 4-1 6-Pin Audio Connector Rear Panel – Channel Pin-Out Chart (Cont.)

Rear Panel Connector Number	AES Digital Audio Channel	Analog Audio Channel	Pos. (+) Pin	Neg. (-) Pin	Ground (Shield) Pin		Rear Panel Connector Number	AES Digital Audio Channel	Analog Audio Channel	Pos. (+) Pin	Neg. (-) Pin	Ground (Shield) Pin
J13	25 & 26 DC CPLD	25	1	2	3		J23	45 & 46 AC CPLD	45	1	2	3
J13	25 & 26 AC CPLD	26	5	6	4		J23	47 & 48 DC CPLD	46	5	6	4
J14	27 & 28 DC CPLD	27	1	2	3		J24	47 & 48 AC CPLD	47	1	2	3
J14	27 & 28 AC CPLD	28	5	6	4		J24	49 & 50 DC CPLD	48	5	6	4
J15	29 & 30 DC CPLD	29	1	2	3		J25	49 & 50 AC CPLD	49	1	2	3
J15	29 & 30 AC CPLD	30	5	6	4		J25	51 & 52 DC CPLD	50	5	6	4
J16	31 & 32 DC CPLD	31	1	2	3		J26	51 & 52 AC CPLD	51	1	2	3
J16	31 & 32 AC CPLD	32	5	6	4		J26	53 & 54 DC CPLD	52	5	6	4
J17	33 & 34 DC CPLD	33	1	2	3		J27	53 & 54 AC CPLD	53	1	2	3
J17	33 & 34 AC CPLD	34	5	6	4		J27	45 & 46 AC CPLD	54	5	6	4
J18	35 & 36 DC CPLD	35	1	2	3		J28	55 & 56 DC CPLD	55	1	2	3
J18	35 & 36 AC CPLD	36	5	6	4		J28	55 & 56 AC CPLD	56	5	6	4
J19	37 & 38 DC CPLD	37	1	2	3		J29	57 & 58 DC CPLD	57	1	2	3
J19	37 & 38 AC CPLD	38	5	6	4		J29	57 & 58 AC CPLD	58	5	6	4
J20	39 & 40 DC CPLD	39	1	2	3		J30	59 & 60 DC CPLD	59	1	2	3
J20	39 & 40 AC CPLD	40	5	6	4		J30	59 & 60 AC CPLD	60	5	6	4
J21	41 & 42 DC CPLD	41	1	2	3		J31	61 & 62 DC CPLD	61	1	2	3
J21	41 & 42 AC CPLD	42	5	6	4		J31	61 & 62 AC CPLD	62	5	6	4
J22	43 & 44 DC CPLD	43	1	2	3		J32	63 & 64 DC CPLD	63	1	2	3
J22	43 & 44 AC CPLD	44	5	6	4		J32	63 & 64 AC CPLD	64	5	6	4

Table 4-1 Continued on Page 4-10 for Connectors J33 – J64

Table 4-1 6-Pin Audio Connector Rear Panel – Channel Pin-Out Chart (Cont.)

Rear Panel Connector Number	AES Digital Audio Channel	Analog Audio Channel	Pos. (+) Pin	Neg. (-) Pin	Ground (Shield) Pin		Rear Panel Connector Number	AES Digital Audio Channel	Analog Audio Channel	Pos. (+) Pin	Neg. (-) Pin	Ground (Shield) Pin
J33	65 & 66 DC CPLD	65	1	2	3		J45	89 & 90 DC CPLD	89	1	2	3
J33	65 & 66 AC CPLD	66	5	6	4		J45	89 & 90 AC CPLD	90	5	6	4
J34	67 & 68 DC CPLD	67	1	2	3		J46	91 & 92 DC CPLD	91	1	2	3
J34	67 & 68 AC CPLD	68	5	6	4		J46	91 & 92 AC CPLD	92	5	6	4
J35	69 & 70 DC CPLD	69	1	2	3		J47	93 & 94 DC CPLD	93	1	2	3
J35	69 & 70 AC CPLD	70	5	6	4		J47	93 & 94 AC CPLD	94	5	6	4
J36	71 & 72 DC CPLD	71	1	2	3		J48	95 & 96 DC CPLD	95	1	2	3
J36	71 & 72 AC CPLD	72	5	6	4		J48	95 & 96 AC CPLD	96	5	6	4
J37	73 & 74 DC CPLD	73	1	2	3		J49	97 & 98 DC CPLD	97	1	2	3
J37	73 & 74 AC CPLD	74	5	6	4		J49	97 & 98 AC CPLD	98	5	6	4
J38	75 & 76 DC CPLD	75	1	2	3		J50	99 & 100 DC CPLD	99	1	2	3
J38	75 & 76 AC CPLD	76	5	6	4		J50	99 & 100 AC CPLD	100	5	6	4
J39	77 & 78 DC CPLD	77	1	2	3		J51	101 & 102 DC CPLD	101	1	2	3
J39	77 & 78 AC CPLD	78	5	6	4		J51	101 & 102 AC CPLD	102	5	6	4
J40	79 & 80 DC CPLD	79	1	2	3		J52	103 & 104 DC CPLD	103	1	2	3
J40	79 & 80 AC CPLD	80	5	6	4		J52	103 & 104 AC CPLD	104	5	6	4
J41	81 & 82 DC CPLD	81	1	2	3		J53	105 & 106 DC CPLD	105	1	2	3
J41	81 & 82 AC CPLD	82	5	6	4		J53	105 & 106 AC CPLD	106	5	6	4
J42	83 & 84 DC CPLD	83	1	2	3		J54	107 & 108 DC CPLD	107	1	2	3
J42	83 & 84 AC CPLD	84	5	6	4		J54	107 & 108 AC CPLD	108	5	6	4
J43	85 & 86 DC CPLD	85	1	2	3		J55	109 & 110 DC CPLD	109	1	2	3
J43	85 & 86 AC CPLD	86	5	6	4		J55	109 & 110 AC CPLD	110	5	6	4
J44	87 & 88 DC CPLD	87	1	2	3		J56	111 & 112 DC CPLD	111	1	2	3
J44	87 & 88 AC CPLD	88	5	6	4		J56	111 & 112 AC CPLD	112	5	6	4

Table 4-1 6-Pin Audio Connector Rear Panel – Channel Pin-Out Chart (Cont.)

Rear Panel Connector Number	AES Digital Audio Channel	Analog Audio Channel	Pos. (+) Pin	Neg. (-) Pin	Ground (Shield) Pin		Rear Panel Connector Number	AES Digital Audio Channel	Analog Audio Channel	Pos. (+) Pin	Neg. (-) Pin	Ground (Shield) Pin
J57	113 & 114 DC CPLD	113	1	2	3		J61	121 & 122 DC CPLD	121	1	2	3
J57	113 & 114 AC CPLD	114	5	6	4		J61	121 & 122 AC CPLD	122	5	6	4
J58	115 & 116 DC CPLD	115	1	2	3		J62	123 & 124 DC CPLD	123	1	2	3
J58	115 & 116 AC CPLD	116	5	6	4		J62	123 & 124 AC CPLD	124	5	6	4
J59	117 & 118 DC CPLD	117	1	2	3		J63	125 & 126 DC CPLD	125	1	2	3
J59	117 & 118 AC CPLD	118	5	6	4		J63	125 & 126 AC CPLD	126	5	6	4
J60	119 & 120 DC CPLD	119	1	2	3		J64	127 & 128 DC CPLD	127	1	2	3
J60	119 & 120 AC CPLD	120	5	6	4		J64	127 & 128 AC CPLD	128	5	6	4

4.6 CONNECTOR PIN-OUT DATA – SPLIT INPUT OR OUTPUT FRAMES

Split frames, regardless of connector mix, are configured as two blocks of 64 signal channels with connectors for each channel block - referred to as a connector bank. Connectors may be all of the same type, such as two banks of BNCs, or may be a mix of BNC and 6-pin detachable. Connectors available for split frames are the same as those used with dedicated frames and are compatible with the signal types identified in paragraph 3.3.

Connector population for a split frame rear panel is dependent on the type of signals connected and type of connectors used in the installation. Split frames are available where both connector banks are inputs or outputs; or where one bank is for input signals and the other is for output signals (used with 64x64 1RU systems only). Each split frame rear panel is shipped from the factory with a rear panel label identifying each connector bank as input connections or output connections. Regardless of whether the connector bank is used for input signals or output signals, the connector pin-outs and channel number assignments presented in the following paragraphs are the same.

4.6.1 SPLIT FRAME BNC CONNECTOR REAR PANEL

In DRS-SA architecture a split frame BNC connector rear panel is used only in a 64X64, 1RU system to provide one bank of 75 Ohm, single-ended input channels for AES audio and one bank of 75 Ohm, single-ended output channels for AES audio.

NOTE	**There are 32 BNC connectors in each connector bank on the rear panel used for connection of AES audio sources. Since each AES audio signal carries a pair of monaural audio channels, each bank of 32 BNC connectors actually carries 64 channels, for a frame total of 64 input channels and 64 output channels.**

The split frame BNC rear panel is shown in Figure 4-7.

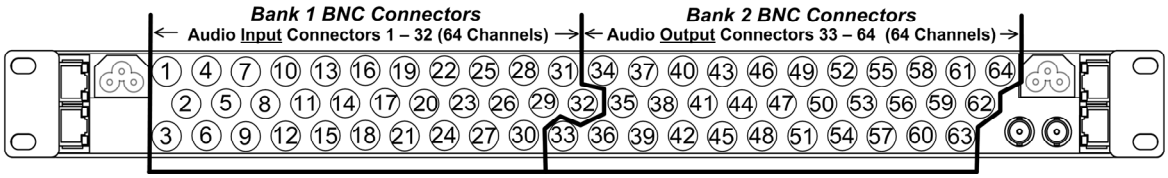


Figure 4-7 BNC Rear Panel – Connector and I/O Channel Identification
(Viewed From Chassis Rear)

Channel pairs of each AES input signal applied to a bank 1 BNC connector are de-muxed and each individual audio channel is assigned a source number through the router as shown in Table 4-2.

Likewise, the two router destination signals that form the pair for each output channel are multiplexed into an AES compliant signal available at the bank 2 BNC connector indicated in the table.

Using Figure 4-7 and Table 4-2 as references connect audio input and output cables to the router.

Table 4-2 Audio Connection Chart – BNC Connectors

Bank 1 BNC Connector Number	Router Source Signals		Bank 1 BNC Connector Number	Router Source Signals
1	1, 2		17	33, 34
2	3, 4		18	35, 36
3	5, 6		19	37, 38
4	7, 8		20	39, 40
5	9, 10		21	41, 42
6	11, 12		22	43, 44
7	13, 14		23	45, 46
8	15, 16		24	47, 48
9	17, 18		25	49, 50
10	19, 20		26	51, 52
11	21, 22		27	53, 54
12	23, 24		28	55, 56
13	25, 26		29	57, 58
14	27, 28		30	59, 60
15	29, 30		31	61, 62
16	31, 32		32	63, 64

Bank 2 BNC Connector Number	Router Destination Signals		Bank 2 BNC Connector Number	Router Destination Signals
33	1, 2		49	33, 34
34	3, 4		50	35, 36
35	5, 6		51	37, 38
36	7, 8		52	39, 40
37	9, 10		53	41, 42
38	11, 12		54	43, 44
39	13, 14		55	45, 46
40	15, 16		56	47, 48
41	17, 18		57	49, 50
42	19, 20		58	51, 52
43	21, 22		59	53, 54
44	23, 24		60	55, 56
45	25, 26		61	57, 58
46	27, 28		62	59, 60
47	29, 30		63	61, 62
48	31, 32		64	63, 64

4.6.2 SPLIT FRAME 6-PIN DETACHABLE CONNECTOR REAR PANEL

In DRS-SA architecture there are several possible applications for the split frame 6-pin connector rear panel:

- All input channels for use in a 128X128, 2RU router to support 64 balanced AES and 64 analog inputs on the input signal frame.
- All output channels for use in a 128X128, 2RU router to support 64 balanced AES and 64 analog outputs on the output signal frame.
- Mixed I/O banks for use in a 64X64, 1RU router to support any of the following combinations:
  - 64 balanced AES inputs, 64 balanced AES outputs
  - 64 analog inputs, 64 analog outputs
  - 64 analog inputs, 64 balanced AES outputs
  - 64 balanced AES inputs, 64 analog outputs

If your router is any of the I/O configurations listed here use the following illustrations and tables for connecting audio signals to the rear panel.

NOTE	**There are 64 6-pin detachable connectors on the rear panel, divided into two banks of 32 connectors per bank; each of which provides 2 physical input or output connections for a total of 64 I/O connections per bank.**

The mating plug used with the on-board connectors is a solder-less type and uses a spring clamp to securely hold input or output cable wires. Connections are made by inserting the wire end into the round receptacle on the plug. The small square hole beside each wire receptacle contains a spring release that loosens the clamp and allows the wire to be removed from its associated receptacle. To remove a wire, simply insert the blade of a small flat tip screwdriver into the release hole adjacent to the receptacle containing the wire you wish to remove, and gently pull the wire from the receptacle.

AES digital channels contain a pair of audio signals, therefore each AES signal cable is connected to only one set of connector pins on each 6-pin connector. Thus, the 64 input connections of each bank allow for two physical connection points in each physical connector for each AES digital audio signal. One set of pins allows input sources or output signals to be AC coupled to the router and the other set allows signals to be DC coupled. The AES Digital column in the pin-out chart identifies the pins that provide DC coupling to the signal and the pins that provide AC coupling; you may use either set of connector pins, depending on how you wish to connect the signal to the router.

When connecting analog input or output signals each set of connector pins is used for a separate single-channel, balanced audio input or output. Analog Audio Outputs MUST be connected to a high-impedance load, ≥10K Ohms. When wiring UNBALANCED analog output signals to external loads, NEVER connect the negative (-) output terminal to any external connection point or to ground. The negative terminal MUST be left floating.

Depending on the system configuration, each connector bank may support input or output signals. The following connector pin-out data is applicable for either signal type. **Carefully** follow pin-out data provided in this text when assembling male mating plug connectors to prevent inadvertent signal swapping. If at all possible, use a continuity measurement device to verify cable connections before attaching mating connectors to DRS rear panel connectors.

Connector orientation and pin identification diagrams are provided by Figure 4-8. Figure 4-9 provides a detailed view of I/O connector numbering layout for the rear panel. Table 4-3 is a detailed I/O channel pin-out chart with connection data for both AES and analog audio signals.

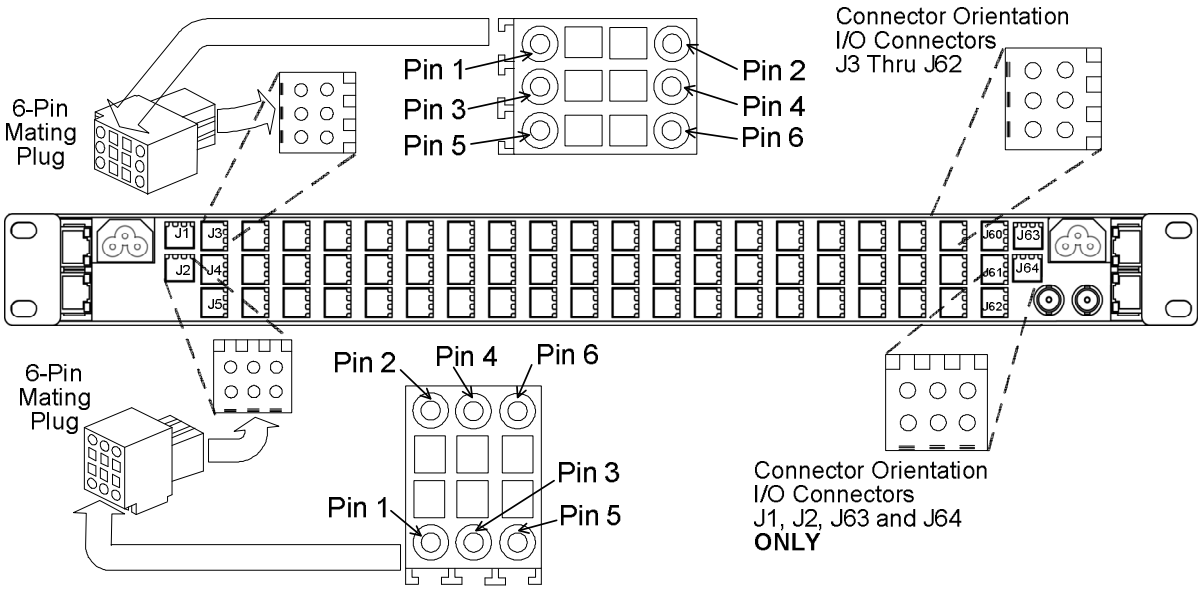


Figure 4-8 6-Pin Connector Rear Panel Orientation and Pin –Out Diagram

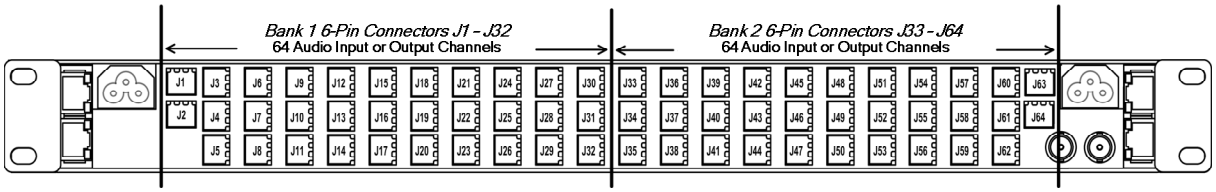


Figure 4-9 6-Pin Connector Rear Panel – Connector Numbering Layout

Table 4-3 6-Pin Detachable Connector Rear Panel - Pin-Out Chart

Pin-Outs By Connector Bank and Input/Output Channel												
Rear Panel Connector Number Bank 1/ Bank 2	AES Digital Router Channel #	Analog Router Channel #	Pos. **(+)** Pin	Neg. **(-)** Pin	Ground (Shield) Pin		Rear Panel Connector Number Bank 1/ Bank 2	AES Digital Router Channel #	Analog Router Channel #	Pos. **(+)** Pin	Neg. **(-)** Pin	Ground (Shield) Pin
J1 / J33	1 & 2 DC CPLD	1	1	2	3		J12 / J44	23 & 24 DC CPLD	23	1	2	3
J1 / J33	1 & 2 AC CPLD	2	5	6	4		J12 / J44	23 & 24 AC CPLD	24	5	6	4
J2 / J34	3 & 4 DC CPLD	3	1	2	3		J13 / J45	25 & 26 DC CPLD	25	1	2	3
J2 / J34	3 & 4 AC CPLD	4	5	6	4		J13 / J45	25 & 26 AC CPLD	26	5	6	4
J3 / J35	5 & 6 DC CPLD	5	1	2	3		J14 / J46	27 & 28 DC CPLD	27	1	2	3
J3 / J35	5 & 6 AC CPLD	6	5	6	4		J14 / J46	27 & 28 AC CPLD	28	5	6	4
J4 / J36	7 & 8 DC CPLD	7	1	2	3		J15 / J47	29 & 30 DC CPLD	29	1	2	3
J4 / J36	7 & 8 AC CPLD	8	5	6	4		J15 / J47	29 & 30 AC CPLD	30	5	6	4
J5 / J37	9 & 10 DC CPLD	9	1	2	3		J16 / J48	31 & 32 DC CPLD	31	1	2	3
J5 / J37	9 & 10 AC CPLD	10	5	6	4		J16 / J48	31 & 32 AC CPLD	32	5	6	4
J6 / J38	11 & 12 DC CPLD	11	1	2	3		J17 / J49	33 & 34 DC CPLD	33	1	2	3
J6 / J38	11 & 12 AC CPLD	12	5	6	4		J17 / J49	33 & 34 AC CPLD	34	5	6	4
J7 / J39	13 & 14 DC CPLD	13	1	2	3		J18 / J50	35 & 36 DC CPLD	35	1	2	3
J7 / J39	13 & 14 AC CPLD	14	5	6	4		J18 / J50	35 & 36 AC CPLD	36	5	6	4
J8 / J40	15 & 16 DC CPLD	15	1	2	3		J19 / J51	37 & 38 DC CPLD	37	1	2	3
J8 / J40	15 & 16 AC CPLD	16	5	6	4		J19 / J51	37 & 38 AC CPLD	38	5	6	4
J9 / J41	17 & 18 DC CPLD	17	1	2	3		J20 / J52	39 & 40 DC CPLD	39	1	2	3
J9 / J41	17 & 18 AC CPLD	18	5	6	4		J20 / J52	39 & 40 AC CPLD	40	5	6	4
J10 / J42	19 & 20 DC CPLD	19	1	2	3		J21 / J53	41 & 42 DC CPLD	41	1	2	3
J10 / J42	19 & 20 AC CPLD	20	5	6	4		J21 / J53	41 & 42 AC CPLD	42	5	6	4
J11 / J43	21 & 22 DC CPLD	21	1	2	3		J22 / J54	43 & 44 DC CPLD	43	1	2	3
J11 / J43	21 & 22 AC CPLD	22	5	6	4		J22 / J54	43 & 44 AC CPLD	44	5	6	4

Table 4-3 6-Pin Detachable Connector Rear Panel - Pin-Out Chart (Cont.)

Rear Panel Connector Number Bank 1/ Bank 2	AES Digital Router Channel #	Analog Router Channel #	Pos. (+) Pin	Neg. (-) Pin	Ground (Shield) Pin		Rear Panel Connector Number Bank 1/ Bank 2	AES Digital Router Channel #	Analog Router Channel #	Pos. (+) Pin	Neg. (-) Pin	Ground (Shield) Pin
J23 / J55	45 & 46 DC CPLD	45	1	2	3		J28 / J60	55 & 56 DC CPLD	55	1	2	3
J23 / J55	45 & 46 AC CPLD	46	5	6	4		J28 / J60	55 & 56 AC CPLD	56	5	6	4
J24 / J56	47 & 48 DC CPLD	47	1	2	3		J29 / J61	57 & 58 DC CPLD	57	1	2	3
J24 / J56	47 & 48 AC CPLD	48	5	6	4		J29 / J61	57 & 58 AC CPLD	58	5	6	4
J25 / J57	49 & 50 DC CPLD	49	1	2	3		J30 / J62	59 & 60 DC CPLD	59	1	2	3
J25 / J57	49 & 50 AC CPLD	50	5	6	4		J30 / J62	59 & 60 AC CPLD	60	5	6	4
J26 / J58	51 & 52 DC CPLD	51	1	2	3		J31 / J63	61 & 62 DC CPLD	61	1	2	3
J26 / J58	51 & 52 AC CPLD	52	5	6	4		J31 / J63	61 & 62 AC CPLD	62	5	6	4
J27 / J59	53 & 54 DC CPLD	53	1	2	3		J32 / J64	63 & 64 DC CPLD	63	1	2	3
J27 / J59	53 & 54 AC CPLD	54	5	6	4		J32 / J64	63 & 64 AC CPLD	64	5	6	4

4.6.3 SPLIT FRAME MIXED 6-PIN DETACHABLE AND BNC CONNECTOR REAR PANEL

In DRS-SA architecture the mixed connector split frame 6-pin and BNC rear panel is used for the following applications:

- All input channels for use in a 128X128, 2RU router to support 64 single-ended AES (BNC) and 64 analog (6-pin) inputs on the input signal frame.
- All output channels for use in a 128X128, 2RU router to support 64 single-ended AES (BNC) and 64 analog (6-pin) outputs on the output signal frame.
- Mixed I/O banks for use in a 64X64, 1RU router to support any of the following combinations:
  - 64 analog (6-pin) inputs, 64 single-ended AES (BNC) outputs
  - 64 single-ended AES (BNC) inputs, 64 analog (6-pin) outputs

If your router is any of the I/O configurations listed here use the following illustrations and tables for connecting audio signals to the rear panel.

There are 32 6-pin detachable I/O connectors and 32 BNC I/O connectors on the mixed rear panel, divided into two banks of 64 channels. Figure 4-10 illustrates the mixed rear panel and identifies I/O channel layout. Carefully follow the connector layout and channel identification when completing connections to the DRS router to prevent inadvertent signal swapping.

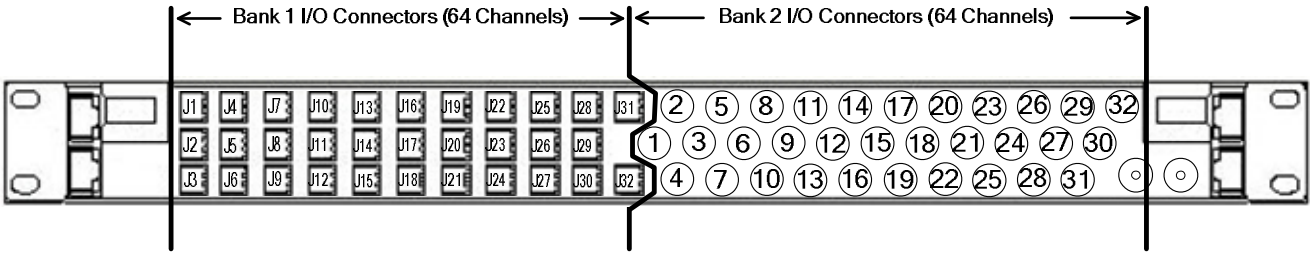


Figure 4-10 Split Frame Mixed 6-Pin and BNC Connectors Shown By Channel Bank and Connector Position

6-Pin Detachable Connector Wiring

Figure 4-10 illustrates the mixed rear panel and identifies connector layout by "J" number. The bank 1 6-pin detachable connectors follow the same pin-outs and channel numbering as bank 1 connectors J1 thru J32 provided in Table 4-3.

The mating plug used with the on-board connectors is a solder-less type and uses a spring clamp to securely hold input or output cable wires. Connections are made by inserting the wire end into the round receptacle on the plug. The small square hole beside each wire receptacle contains a spring release that loosens the clamp and allows the wire to be removed from its associated receptacle. To remove a wire, simply insert the blade of a small flat tip screwdriver into the release hole adjacent to the receptacle containing the wire you wish to remove, and gently pull the wire from the receptacle.

When connecting AES digital audio inputs and outputs to the router, the 64 input connections equate to two physical connection points for each digital audio signal. One input allows input sources or output signals to be AC coupled to the router and the other allows signals to be DC coupled. When connecting analog input or output signals each of the 64 input connections is used for a separate single-channel, balanced audio input or output.

Carefully follow connector pin-out data provided in this text when assembling male mating plug connectors to prevent inadvertent signal swapping. If at all possible, use a continuity measurement device to verify cable connections before attaching mating connectors to DRS rear panel connectors.

Connector orientation and pin identification diagrams are provided by Figure 4-8. Figure 4-10 provides a detailed view of I/O connector numbering layout for the mixed rear panel and Figure 4-6 illustrates channel I/O pin arrangement for a typical 6-pin connector. Table 4-3 is a detailed I/O channel pin-out chart.

BNC Connector Cabling

Follow the connector layout diagram, Figure 4-10, and the channel assignment chart, Table 4-2, when attaching cables to the BNC connectors on the mixed rear panel.

4.7 SYNC REFERENCE CONNECTIONS

Your DRS-SA system is capable of operating in either asynchronous or synchronous switching modes. Asynchronous switching occurs when the audio router is not synchronized with other equipment in the air chain or production chain through an externally generated sync reference signal. In many applications, asynchronous switching is acceptable, but in other circumstances synchronous, vertical interval timed switching is used to insure a smooth audio and video switch.

Your DRS-SA router functions in either mode, but is capable of synchronous, vertical-interval switching by applying a NTSC, PAL or Tri-Level sync source, 0.5V p-p to 2.0V p-p, to the sync reference input.

With 128x128 2RU systems, it is only necessary to attach a source of sync reference to the output signal frame.

DRS-SA provides a pair of loop-thru sync connectors on the rear panel whereby you can easily daisy-chain the sync signal to equipment down-stream of the DRS router. An example of this is shown by Figure 4-11, using a PESA Cougar3 video frame for illustration.

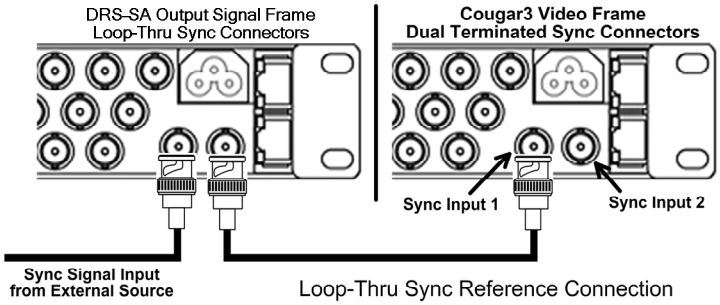


Figure 4-11 Loop-Thru Sync Reference Cabling

In some installations it may be more suitable to not daisy-chain the sync reference signal. If you do provide a separate sync input to the router, and the DRS-SA is the only, or last, piece of equipment in the branch, be sure to install a terminator on the unused BNC.

4.8 DRS-SA CABLING AND CONNECTIONS

Ethernet connections and, with 2RU systems, data interface between the input and output frame are made using common CAT5x cable and RJ-45 connectors. Two types of Ethernet cables are commonly available: those that are “straight-thru” pin-for-pin and “crossover” cables that have transmit leads (TX+ and TX-) and receive leads (RX+ and RX-) exchanged between the two connector ends according to a specified pin-out standard. All DRS connections, both Ethernet and frame interconnect, can use either type of cable. Auto-detect circuitry determines the type of cable used and makes proper internal connections accordingly. This operation is totally transparent and requires no operator input or action.

64X64 System To configure a 64X64 router, connect the primary frame controller to the Ethernet containing the SSC3 system controller, either through an Ethernet switch or a direct connection to the facility LAN. If synchronous switching is desired, connect a source of sync reference to either BNC connector and, if DRS-SA is the last or only equipment in the branch, terminate the unused connector of the loop-thru pair. Refer to Figure 4-12.

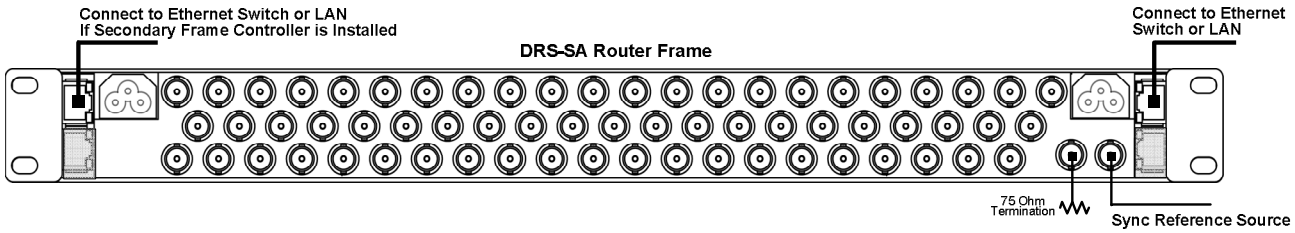


Figure 4-12 64x64 Router System Connections

128X128 System A 128X128 router is configured with 2 chassis frames – one dedicated for input signals, the second dedicated for output signals. System sync and Ethernet connections are made to the output signal frame only, and are connected exactly the same as for a 64x64 system, shown above. With 2RU systems, the input signal frame interconnects with the output signal frame through the data interface ports. You will obtain best performance and highest signal integrity by using a high quality CAT5E cable for interconnection. Input and output frames may be separated by as much as 100 meters, if desired for a particular installation. Install cable between data interface ports as shown in Figure 4-13.

NOTE	**DO NOT CONNECT THE DATA INTERFACE CONNECTORS TO AN ETHERNET NETWORK!!** **Even though the frame data connection is made using RJ-45 connectors and CAT5E cable, it SHOULD NOT be made through the facility LAN. The audio data bus operating parameters require dedicated, point-to-point connections, and WILL NOT function over a network!!**

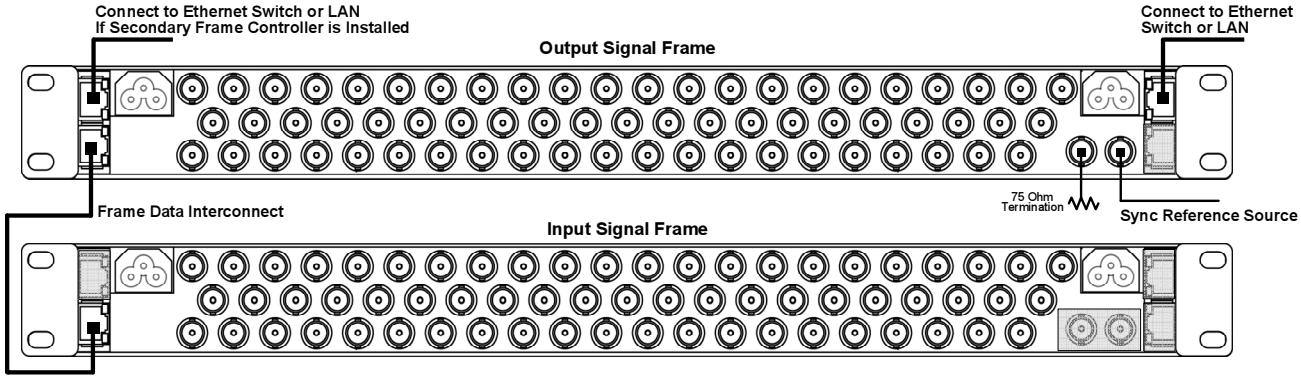


Figure 4-13 128x128 Router System Connections

4.9 POWER CONNECTIONS

Power for DRS-SA is derived from wall receptacles. No special direct wiring or heavy gauge wire is required for this equipment. There are two power connector access ports, one located on the upper left-hand side and the other on the upper right-hand side of the rear panel of each chassis frame. These ports allow access to the power receptacle on the power supply/controller module located in the slot associated with each. In a non-redundant power or control system, only the primary slot will have a power supply module installed. Attach the power cord through the proper access port to the receptacle on the power supply module. Each power supply carries its own dedicated power receptacle. Input power is not bussed between modules. When two power supplies are used a separate power cord must be attached to each receptacle through its access port.

Each access port is equipped with a harness device for the input power cord that secures the cord to prevent accidentally disconnecting the frame from its power source. To use the harness, slip the groove on the power cord connector end horizontally into the opening of the harness. In planning your installation, consider the location of each DRS system frame and how to route and dress power cords from the power source to each frame.

Connecting the power cord to a source of power immediately applies power to the DRS frame. Do not apply power for the first time until all signal, sync and control connections have been made and verified.

4.10 INITIAL POWER-UP

Before applying power to the DRS-SA system for the first time, please take time to go back over your installation:

- Check for electrically sound connections, proper connector placement and possible wiring errors.
- Ensure that, if synchronous switching is desired, the output signal frame has a connection with a source of in-house sync reference and that the loop-through connector is either daisy-chained to the next unit in the chain, or is properly terminated into a 75Ohm load.
- Check that the router circuit card and power supply/controller modules are securely installed.
- Ensure that all RJ-45 connectors are in the proper mating receptacle and are securely snapped in place.

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

- Apply power to frame(s).
- Wait a few seconds for frame to perform processor boot-up, and observe status of the ERROR LED located on front edge of router circuit card as shown by Figure 4-14.
- This LED will initially light upon application of power, but should extinguish after the on-board processor has completed start-up.
- Verify that LED is off on DRS-SA frame(s).

Figure 4-14 Error LED Location

- Once initial power-up procedure is completed, replace front panel by aligning and tightening two thumbscrews, Figure 4-15.

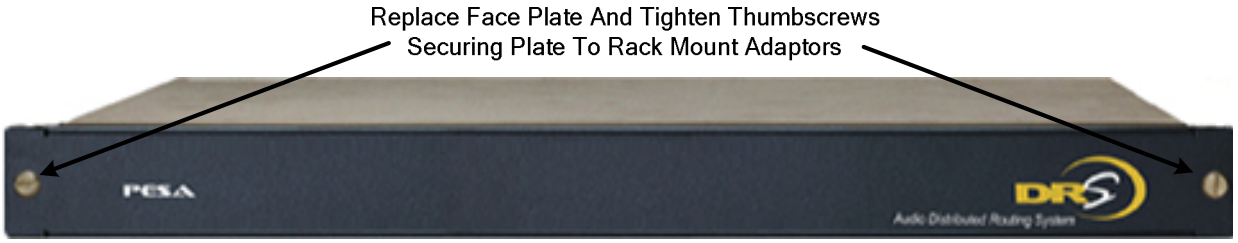


Figure 4-15 Front Panel Replacement

Chapter 5 Operation

5.1 INTRODUCTION

The DRS-SA adds audio routing capability to video routers incorporating PESA's Small Scale System Controller (SSC3), such as the Cougar3 or Jaguar3.

Configuration and control of the router system, including the DRS-SA router, is done through PESA's Cattrax software control application running on a host PC and communicating with the SSC3 system controller through either a closed Ethernet communication loop using an Ethernet switch, or through the facility network. Through Cattrax you can view real-time status of virtually every aspect of router operation, modify many system operating parameters, issue manual switches on individual or multiple destinations, create new, or modify existing, configuration files for the system controller, plus many other control and system monitoring functions.

The configuration file loaded into the system controller is where audio signal switching functions through DRS-SA, such as signal input/output assignments, signal names and aliases, switching levels, components and other special router functions are defined. Through Cattrax you can create application-specific files that define all operational aspects for the router. Once created, a configuration file can be stored, edited or downloaded to the system controller device to become the active operating router configuration.

An introduction to the SSC3 system controller, Cattrax installation and operation, and creating/editing a configuration file is available in the User Guide for the video router frame. The following paragraphs contain operating procedures through Cattrax that are specific for the DRS-SA router. If you are not already familiar with the procedures for navigating and using Cattrax, refer to the video router documentation before continuing with these procedures.

5.2 DRS-SA AUDIO ROUTER DEVICE PROPERTIES

When Cattrax discovers a Cougar3 or Jaguar3 system with video and audio routing capability on the network, in addition to the Devices View entry for the video router, there will be an entry identifying the DRS-SA audio router by its assigned name under the Routers parent header. Expanding the menu entry reveals entries for the main circuit board in the router (denoted as I/O Board) and the Frame Controller, as shown in the example screens of Figure 5-1.

Selecting any of the DRS-SA entries under the parent header displays command or status menus available for the assembly under the Menu Tree window area; and also displays operational properties for the selected assembly in the Device Properties Window area. Figure 5-1 illustrates example Device Properties display for the DRS-SA Router (left figure) and the audio router I/O Board (right figure). All entries are data display only and can not be modified from the window.

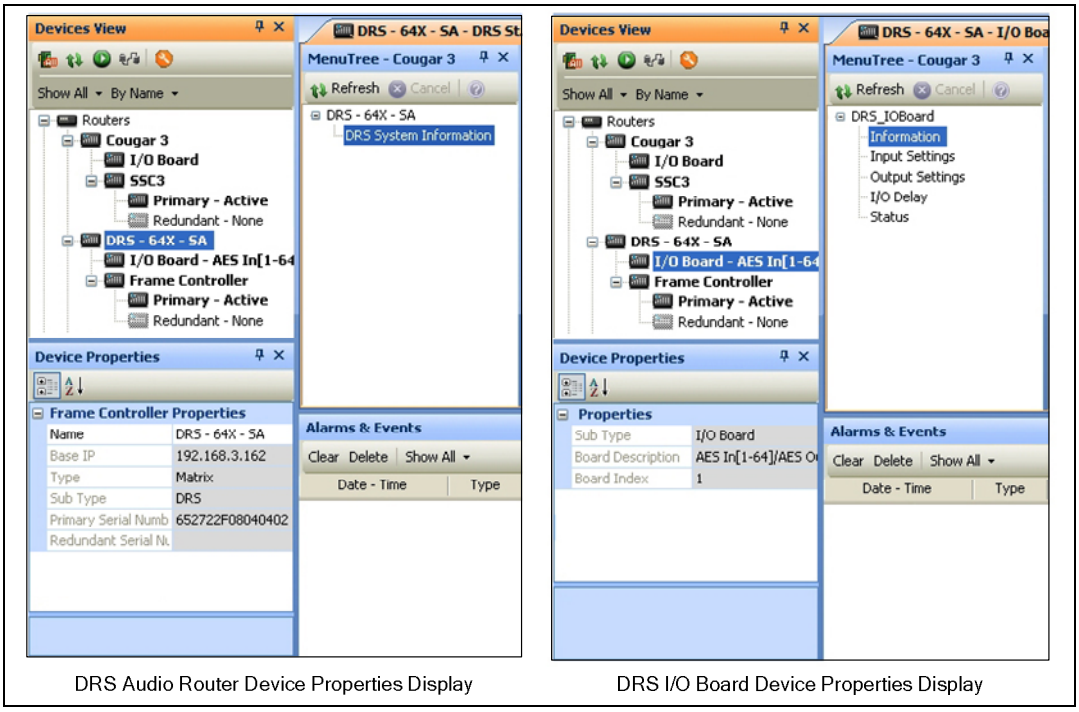


Figure 5-1 Audio Router Device Properties

5.3 AUDIO FRAME CONTROLLER DEVICE PROPERTIES

With the top-level Frame Controller entry selected, the Device Properties window, as shown by Figure 5-2, displays controller type and network communication parameters for the frame controller device(s): The upper area of the window, labeled Frame Controller Properties, is shown with muted fields. Entries in this field cannot be modified.

5.3.1 SETTING AUDIO FRAME CONTROLLER NETWORK PARAMETERS

The lower area of the Device Properties Display, labeled IP Address, displays current network parameters for the frame controller. The frame controller device does not support DHCP protocol, and the factory configured parameters are static until changed.

Factory configured IP address for the frame controller:

- **Frame controller installed in primary controller slot - 192.168.1.201**
- **Frame controller installed in secondary controller slot – 192.168.1.202**

From the Devices Properties Display area you may enter new network parameters, including a new ***Base IP Address*** for the controller devices by entering the new parameters in the active display fields. The newly entered base IP address becomes the assigned address of the primary controller and the secondary controller is assigned the address of *Base IP+1*. Click on *Apply* to apply the changes.

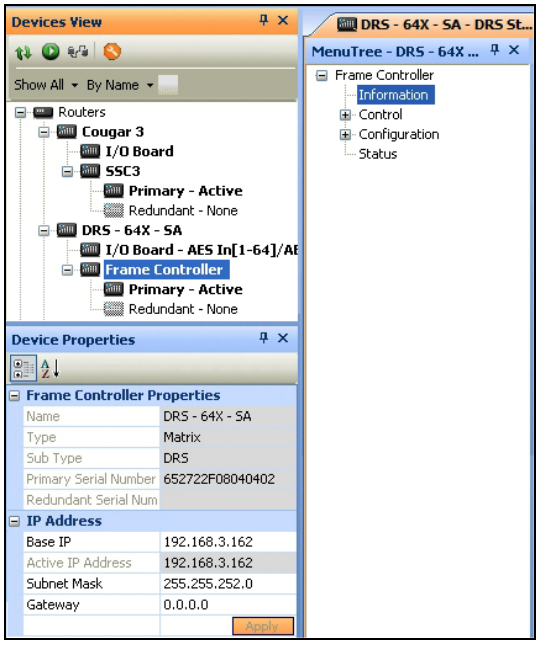


Figure 5-2 Frame Controller Device Properties

When you expand the Frame Controller entry of the Devices View tree, a listing appears that identifies the active or standby status of the Primary and Redundant controller devices, as shown by Figure 5-3. If a redundant controller is present, the current active or standby status of each device is indicated. If no controller device is installed in the redundant slot, the entry is muted and the status is shown as none. When you select either of the device entries, operational parameters for that particular device are shown in the Device Properties display area.

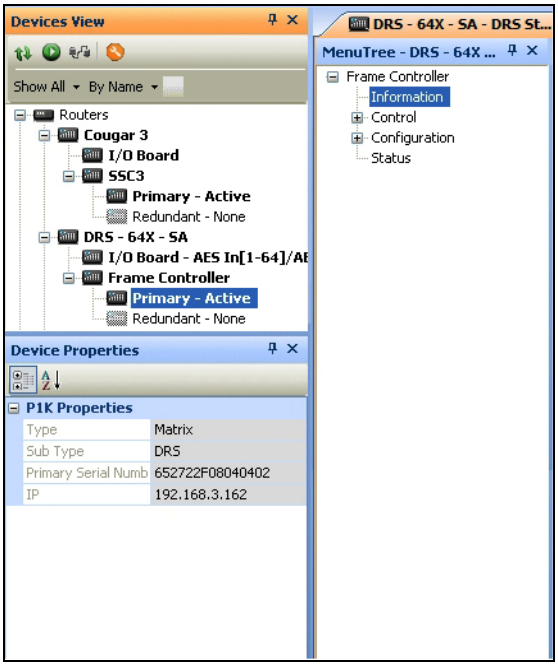


Figure 5-3 System Controller Device Properties

5.3.2 DRS SYSTEM INFORMATION DISPLAY

Selecting the top level DRS entry in the Devices View window displays the DRS System Information text boxes as shown in Figure 5-4. The chassis graphic is included on the screen to identify primary and redundant frame controller module locations.

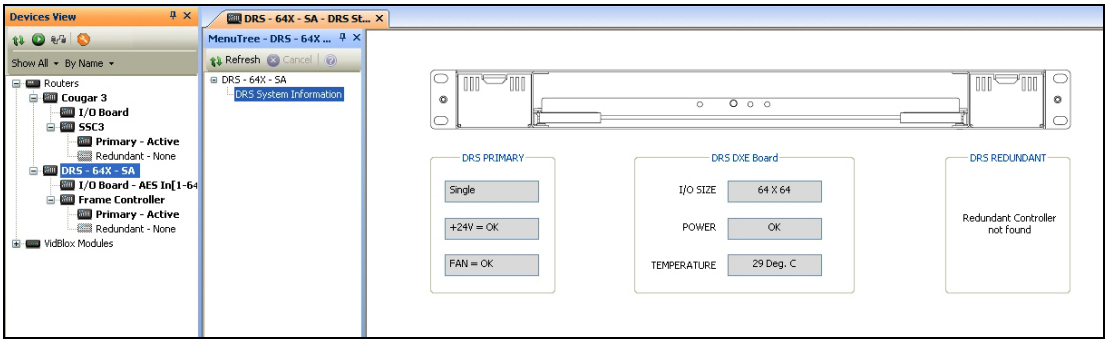


Figure 5-4 DRS System Information Display Text Boxes

- **DRS Primary -** Displays status information for frame controller device installed in the primary controller slot:
  - Active/Standby status of frame controller installed in primary slot; displays the status of *Single* if no redundant frame controller is installed in the frame
  - OK/Error status of 24V power output from module
  - OK/Error status of controller cooling fan

- **DRS DXE Board -** Displays real-time status information for the main circuit board in the DRS router:
  - Signal switching capacity of router board in syntax of number of inputs x number of outputs
  - OK/Error status of power feed to main board
  - Measured temperature of surface of main board

- **DRS Redundant -** Displays status information for secondary frame controller, if second module is installed in the redundant controller slot:
  - Active/Standby status of frame controller installed in redundant slot; displays *Redundant Controller not Found* if no redundant controller device is installed in the frame
  - OK/Error status of 24V power output from module
  - OK/Error status of controller cooling fan

5.4 I/O BOARD MENUS

Commands and screens contained under the **I/O Board** parent header in the Devices View Window provide additional status data and system control functions for board level functions of the audio router.

5.4.1 INFORMATION

The I/O Board Information Screen, Figure 5-5, provides real-time display of the following matrix board parameters:

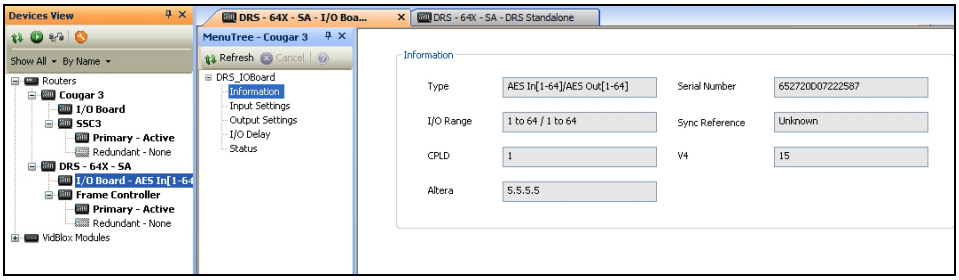


Figure 5-5 I/O Board Information Display

- **Information**

  Type – Identifies the signal format and I/O capacity of the audio router.
  I/O Range – Displays the numerical range of the input and output ports of the router.
  Serial Number – Serial number of router main board.
  Sync Reference – Indicates the presence of a sync reference input signal.
  CPLD, Altera and V4 – These entries identify the version number of firmware code loaded into the respective on-board device.

5.4.2 INPUT SETTINGS

The I/O Board Input Settings Screens allow you to set operating parameters and processing characteristics to input source signals. Example of input settings screens are shown below for both AES and analog audio channels.

An example AES Input Settings Screen is shown in Figure 5-6; and an example Analog Input Setting Screen is shown in Figure 5-7. Columns for each audio adjustment follow a logical pattern of signal flow through the board.

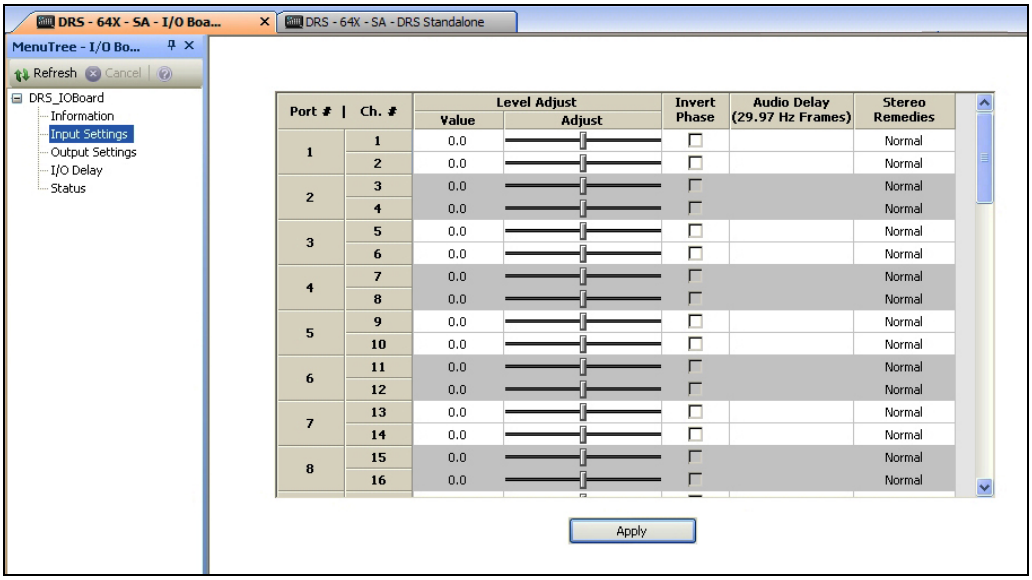


Figure 5-6 AES Audio Input Settings Screen

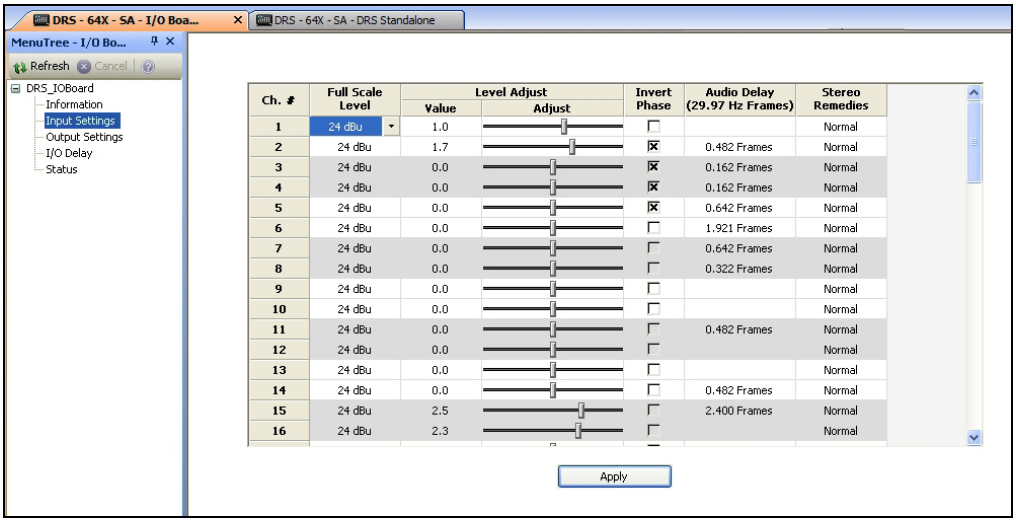
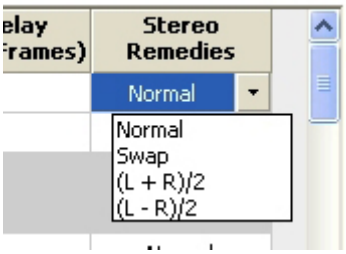


Figure 5-7 Analog Audio Input Settings Screen

- **Port # and Channel # (AES Settings Screen Only)** - The left-most column is labeled Port Number (Port #), the next column to the right is labeled Channel Number (Ch. #). Remember that in AES digital audio, each audio signal actually carries two channels of audio data. The port number entry identifies the physical input port for AES signals on the router rear panel, and the channel number entry identifies the DRS routing channel number of each monaural audio signal carried by the AES input.
- **Channel # (Analog Settings Screen Only)** - The left most column is labeled Channel Number (Ch. #). Remember that in analog audio, each audio signal is exactly that - a single, independent signal. The channel number displayed in the column identifies the physical input number of the router. Each signal can be independently modified.
- **Full Scale Level (Analog Settings Screen Only) -** The value displayed in each row indicates the analog signal level that correlates to a digital audio signal with a full scale value of 0dB. There is a pull-down box in each cell that allows you to individually select the desired level for each analog audio signal, from the choices of 12, 18 or 24dBu. To enter a full scale level value, open the pull-down box for the desired input signal and click on the value.
- **Level Adjust - A**llows 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.
- **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.
- **Audio Delay** - Allows you to apply a delay factor to an audio signal channel. Delay is applied through the I/O Delay screen, Paragraph 5.4.4. The field on this screen indicates whether or not a delay factor is applied to an individual channel; and if so, how much delay is applied.

- **Stereo Remedies** - Describes a group of commands that allow you to select operational parameters for paired audio channels. To access Stereo Remedies, click in the cell of the Stereo Remedies column on the row of the audio channel you wish to modify and open the pull down menu as shown 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.
  - **L+R/2** - Adds the adjacent channel to the selected channel.
  - **L-R/2** - 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.

When you have entered the desired input channel settings on the menu screen, click the **Apply** button to immediately apply the change and leave the attributes screen open for further changes, if desired.

5.4.3 OUTPUT SETTINGS

The I/O Board Output Settings Screens allow you to set operating parameters and processing characteristics to output destination channels. Example of output settings screens are shown below for both AES and analog audio channels.

An example AES Output Settings Screen is shown in Figure 5-8; and an example Analog Output Setting Screen is shown in Figure 5-9. Columns for each audio adjustment follow a logical pattern of signal flow through the board.

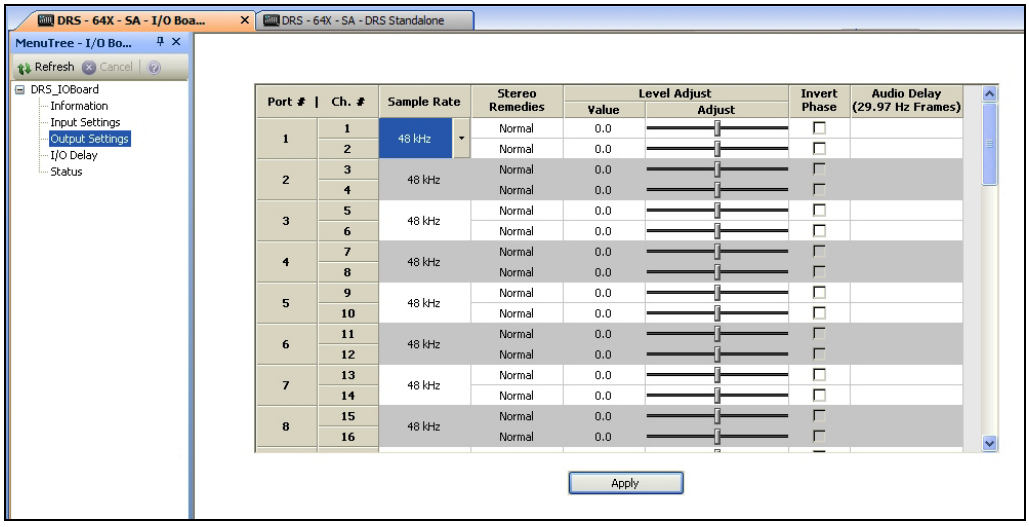


Figure 5-8 AES Audio Output Settings Screen

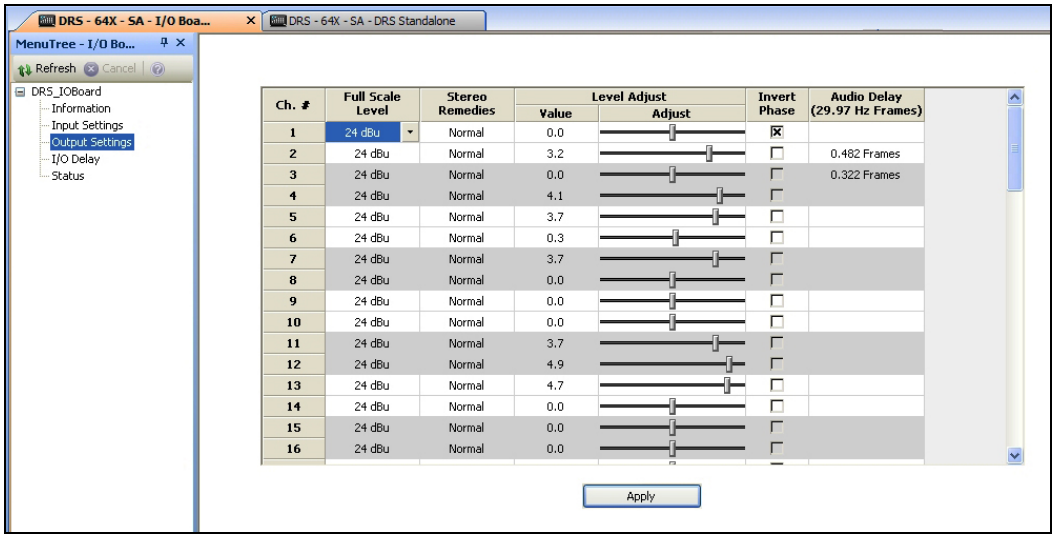
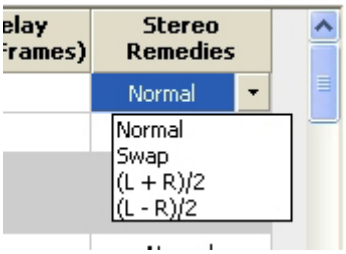


Figure 5-9 Analog Audio Output Settings Screen

- **Port # and Channel # (AES Settings Screen Only)** - The left-most column is labeled Port Number (Port #), the next column to the right is labeled Channel Number (Ch. #). Remember that in AES digital audio, each audio signal actually carries two channels of audio data. The port number entry identifies the physical output port for AES signals on the router rear panel, and the channel number entry identifies the DRS routing channel number of each monaural audio signal carried by the AES output.
- **Sample Rate (AES Settings Screen Only)** - Displayed value indicates the sampling rate of audio signals leaving the router. There is a pull-down box in each cell that allows you to set the output sampling rate for each AES output pair at either 48 kHz or 96 kHz. To enter a sample rate setting, open the pull-down box for the desired output pair and click on the value.
- **Channel # (Analog Settings Screen Only)** - The left most column is labeled Channel Number (Ch. #). Remember that in analog audio, each audio signal is exactly that - a single, independent signal. The channel number displayed in the column identifies the physical output number of the router. Each signal can be independently modified.
- **Full Scale Level (Analog Settings Screen Only)** - The value displayed in each row indicates the analog signal level that correlates to a digital audio signal with a full scale value of 0dB. There is a pull-down box in each cell that allows you to individually select the desired level for each analog audio signal, from the choices of 12, 18 or 24dBu. To enter a full scale level value, open the pull-down box for the desired output signal and click on the value.
- **Stereo Remedies** - Describes a group of commands that allow you to select operational parameters for paired audio channels. To access Stereo Remedies, click in the cell of the Stereo Remedies column on the row of the audio channel you wish to modify and open the pull down menu as shown below.



- **Normal** - Applies no change to the paired channels.
- **Swap** - Replaces the signal for the selected output channel with the audio signal from the adjacent channel.
- **L+R/2** - Adds the adjacent channel to the selected channel.
- **L-R/2** - 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.

- **Level Adjust - A**llows 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.

- **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.

- **Audio Delay** - Allows you to apply a delay factor to an audio signal channel. Delay is applied through the I/O Delay screen, Paragraph 5.4.4. The field on this screen indicates whether or not a delay factor is applied to an individual channel; and if so, how much delay is applied.

When you have entered the desired input channel settings on the menu screen, click the **Apply** button to immediately apply the change and leave the attributes screen open for further changes, if desired.

5.4.4 I/O DELAY

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, Figure 5-10. An AES audio board is used for this example; however, the audio adjustment columns are identical for both AES and analog boards.

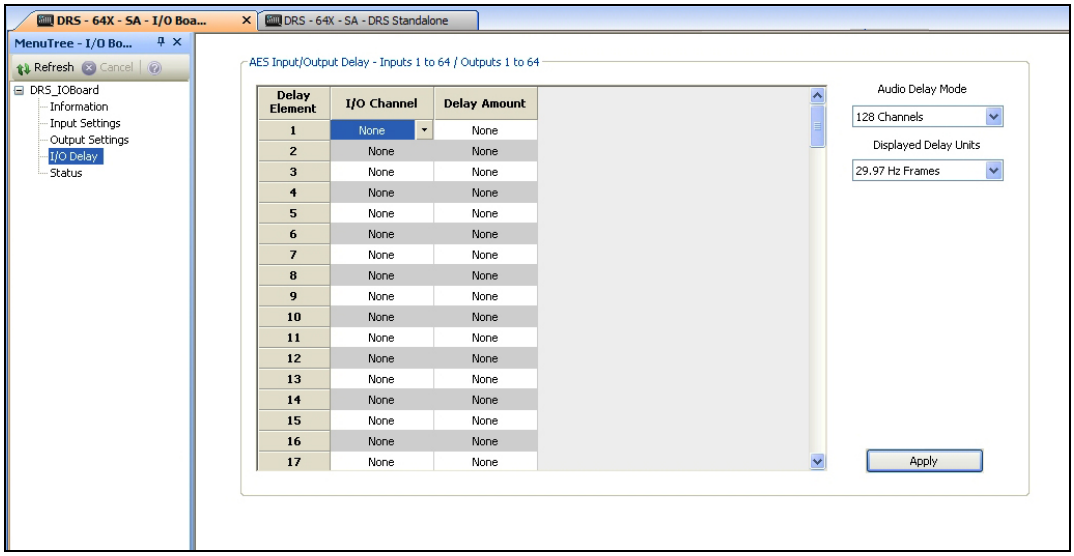


Figure 5-10 Audio I/O Delay Menu

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.

Audio Delay Mode menu determines how many Delay Elements are available for assignment and also determines the length of delay available to a channel. Options available from the drop-down menu are 128 channels, 64 channels and 32 channels.

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. Every available delay element requires a block of system memory, and the available memory is divided among all of the delay element allocations. 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.

The selection you make in *Displayed Delay Units* menu determines by what unit of measure the delay time is displayed. You may display the delay in terms of 29.97 Hz video frames, 25 Hz video frames or in milliseconds. Click the unit you wish to use

There is a direct correlation to the number of delay elements you allocate and the amount of delay available to each. Table 5-1 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.

Table 5-1 Delay Times for Available Channel Options

	29.97 Hz Frames	25 Hz 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

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, you are ready to begin assigning channels and delay time values.

Remember the analogy of a *delay element* as 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 and open the I/O Channel drop-down list on the row of the desired element by clicking in the box. The menu listing allows you to select the *physical* input or output audio channel 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.

Use the Delay Amount drop-down menu to select the amount of delay you wish to apply to the audio channel. 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.

Repeat this process for all channels to which you wish to apply a delay. Once all delay assignments are made, click on the *Apply* button to apply the delay times to the channels. Once entered and activated, audio delay values are displayed on the Input or Output Settings menu screens in the Audio Delay column using the selected unit of time measure.

5.4.5 STATUS

The I/O Board Status Screen, Figure 5-11, provides real-time display of the following DRS main board parameters:

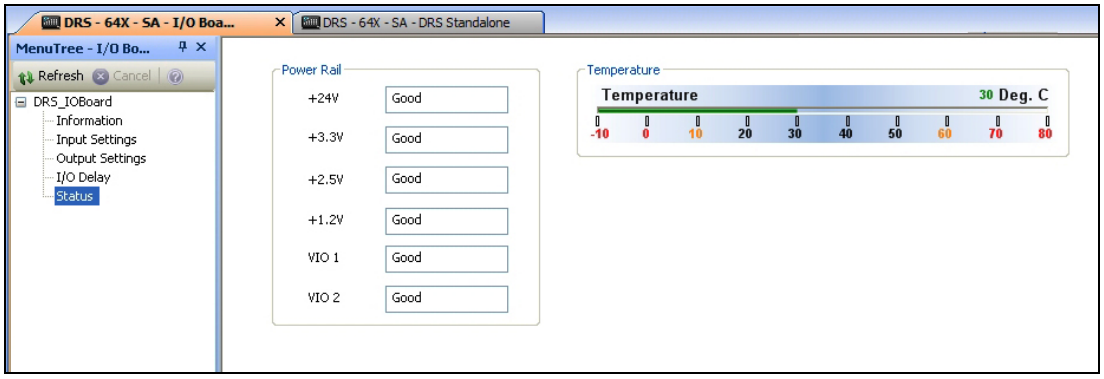


Figure 5-11 Audio I/O Board Status Screen

- **Power Rail -** Displays the real-time Good/Bad status of each voltage rail present on the main router board.

- **Temperature -** Meter display provides a direct analog readout of current surface temperature of main router board.

5.5 FRAME CONTROLLER MENU SCREENS

Commands and screens contained under the *Frame Controller* parent header in the Menu Tree Window allow you to view status and real-time operational information for the frame controller modules. Each command is discussed in the following paragraphs.

5.5.1 INFORMATION

When the Frame Controller Information entry is selected from the menu tree, the screen shown by Figure 5-12 displays the following status information for both primary and redundant frame controllers present in the audio frame. If the DRS does not contain a redundant controller, the message *P1K Not Found* is displayed.

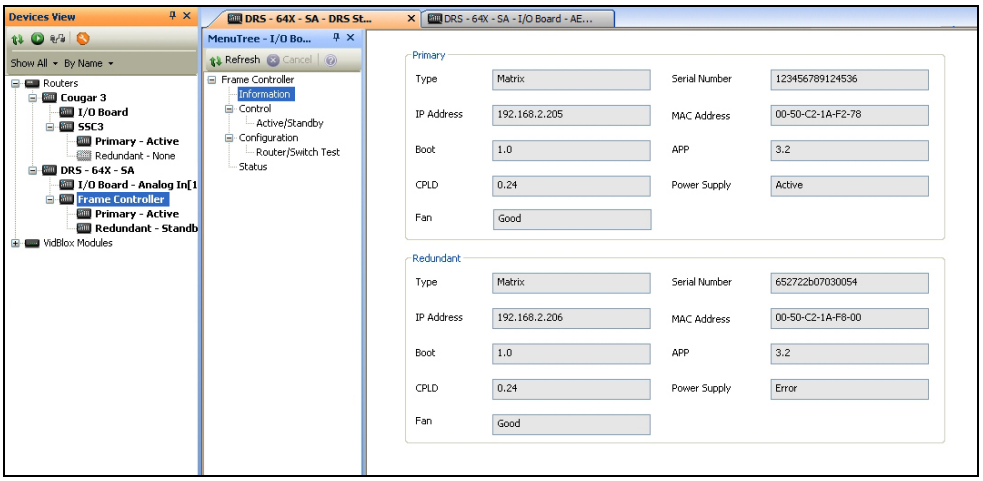


Figure 5-12 Frame Controllers Information Screen

- **Type** – Identifies the device as a matrix frame controller.
- **IP Address** – Displays the IP address assigned to the indicated frame controller device.
- **Serial Number** – Displays the serial number of the frame controller device installed in the indicated position.
- **MAC Address** – Identifies assigned MAC address for controller.
- **Boot, APP and CPLD** – Indicate revision level of firmware loaded into each module.
- **Power Supply** – Displays the status of the power supply device contained on the indicated controller module.
- **Fan** – Indicates current status of cooling fan on-board the indicated controller module.

5.5.2 ACTIVE/STANDBY STATUS AND CONTROL SCREEN

For both the Primary and Redundant frame controller in the audio frame, the Active/Standby status screen, Figure 5-13, displays the IP address and current operating mode. If the router is not equipped with a redundant controller module, the IP address of the primary module is displayed and the mode box indicates that the module is the single controller for the router. If the DRS contains a redundant frame controller, the active or standby status of each module is displayed along with a pair of radio buttons that allow you to swap the active controller. You may use either *Set Mode* button set to initiate the status toggle. A pop-up prompts you to verify the action before the status toggle is implemented.

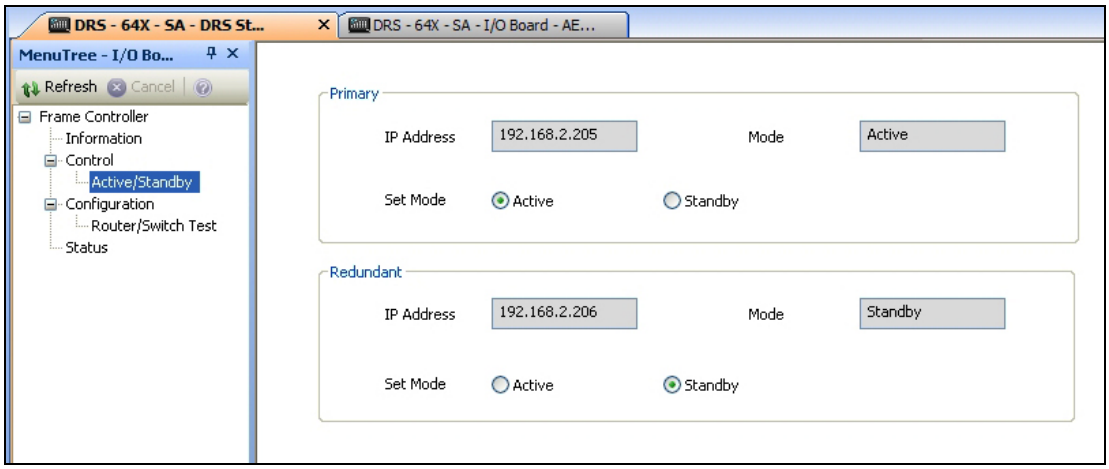


Figure 5-13 Active/Standby Status Screen

5.5.3 ROUTER/SWITCH TEST

The router/switch test configuration screen allows you to read switch status and "TAKE" test switches directly on the DRS router. Status information is read directly from the DRS frame controller and bypasses the SSC3 controller. If you execute any signal switching through this screen, the system controller will **not** know the switch occurred, and will **not** show status for the switch; therefore, this capability should be used for DRS router diagnostics only.

The screen contains three different window areas: Matrix Parameters, All Call/Diagonals, and Status/Scratchpad. An example screen is shown by Figure 5-14.

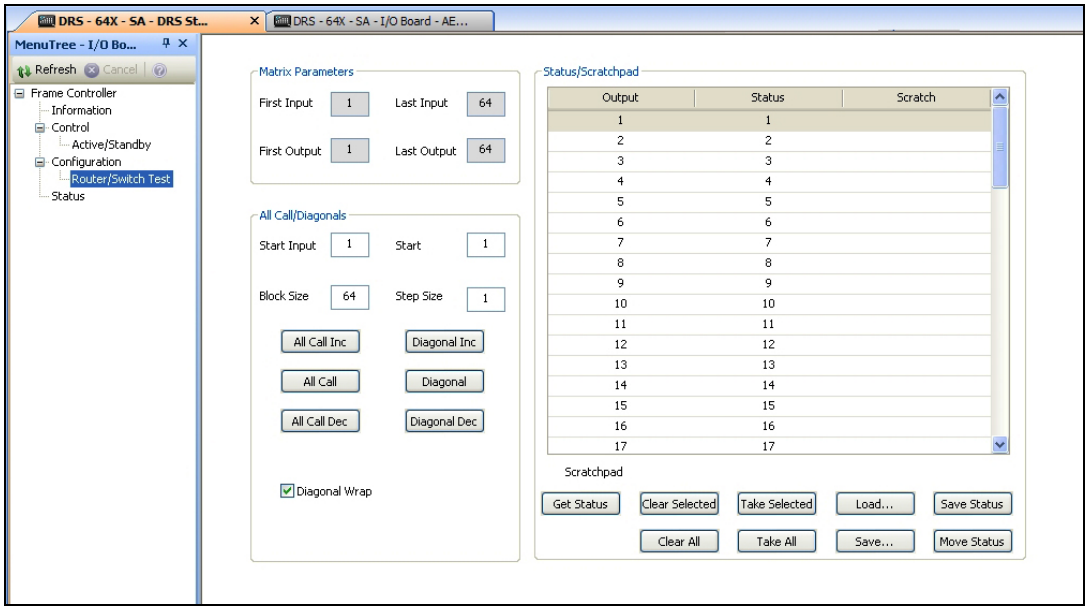
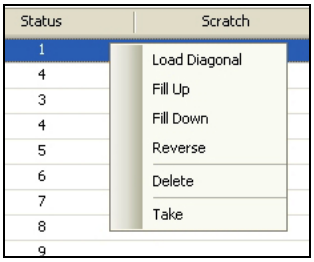


Figure 5-14 Router/Switch Test Screen

- **Matrix Parameters** - This display window shows the matrix dimensions of the DRS router. Information displayed here is used to set bounds for All Call and Diagonal switches as well as set the number of outputs shown in the Status/Scratchpad grid. The four displayed parameters indicate the physical channel number of the first and last input signals and first and last output signals.
- **All Calls/Diagonals** - The All Calls/Diagonals screen allows you to setup and "TAKE" an All Call (a single input to a block of outputs) or a Diagonal (a succession of inputs taken to a succession of outputs in a diagonal pattern e.g. input 1 to output 1, input 2 to output 2, etc.) switching sequence. Executing switching sequences such as these is used to perform integrity checks on the router. Among the parameters that can be set are:
  - **Start Input –** Selects the physical input source routed to all designated destinations during an All Call switching series, or selects the first input used on a Diagonal switch.
  - **Start -** Selects the first physical destination channel to which the designated input signal is switched during an All Call or Diagonal switching sequence.
  - **Block Size -** Selects the number of physical outputs switched during each All Call or Diagonal switching sequence.
  - **Step Size -** Determines the increment size used during a diagonal switching sequence. For example, a step size of 2 would result in a diagonal switching sequence such as input 1 to output 1, input 3 to output 2, input 5 to output 3, etc.
  - **All Call Inc -** Increments the indicated "Start Input" channel by a value of one, and then performs the All Call Command.
  - **All Call -** Causes an All Call switch to occur where the indicated "Start Input" channel is switched to all "Block Size" total outputs beginning with the "Start" channel.
  - **All Call Dec -** Decrements the indicated "Start Input" channel by a value of one, and then performs the All Call Command.
  - **Diagonal Inc -** Increments the indicated "Start Input" channel by a value of one, and then performs the Diagonal Command.
  - **Diagonal -** Causes a Diagonal switch to occur where the indicated "Start Input" channel is switched to the indicated "Start" channel; following which the "Start Input" value is incremented by the value indicated in "Step Size," and that input channel is switched to the output channel following "Start" in sequence. This sequence is continued for the indicated "Block Size" number of output channels.
  - **Diagonal Dec -** Decrements the indicated "Start Input" channel by a value of one, and then performs the Diagonal Command.
- **Status/Scratchpad** - This window displays current status of the audio switching matrix, and allows you to create, preset and "TAKE" a matrix configuration, using the scratchpad area, for integrity testing or signal verification purposes. The Status/Scratchpad grid contains a row for each output in the system, and each row contains four columns. From left to right the columns identify the following parameters:
  - **Output** – The number in the output column identifies the physical output of the router.
  - **Status** – Status identifies the physical input of the router currently switched to the indicated output.

- **Scratch** – When the row is highlighted, you may enter a number corresponding to the physical input of the router you wish to switch to the indicated output when the "TAKE" command is issued.

Scratch configuration preset data and sync source selection can only be entered on a given row when that row is highlighted. You may select any number of outputs (highlighted rows) on which you wish to initiate a matrix switch operation - click on the first row to select. You may add individual rows by holding down the Control key and clicking on additional rows, or you may select a block of rows beginning with the first row selected by holding down the Shift key and selecting the last row you wish to include in the block. After selecting an area of the grid, you can right click the mouse on the selection area. This provides a popup menu, as shown.



- **Load Diagonal** – Loads a diagonal switch into the selected area starting with the input specified in the top selected cell.
- **Fill Up** – Fills selected area from bottom cell of selection.
- **Fill Down** – Fills selected area from top cell of selection.
- **Reverse** – Reverse cells from top to bottom of selected area.
- **Delete** – Deletes contents of selected grid.
- **Take** – Implements switching operation specified in selected scratch area.

In addition to the Status/Scratchpad grid, this window also has a number of command buttons which function as follows:

- **Get status** - Causes the switch status to be retrieved from frame controller and displayed in status grid.
- **Clear Selected** - Clears entries in scratch column of selected area of grid.
- **Clear All** - Clears all entries in scratch column.
- **Take Selected** - This button takes all the switches specified in the selected area of the scratchpad grid.
- **Take All** - Takes all switches specified in scratchpad grid.
- **Load** - Allows you to load current scratchpad from a scratchpad that has been saved to a file.
- **Save** - Saves current scratchpad to a file for later recall.
- **Save Status** – Same as SAVE button but saves status column information as opposed to scratchpad column.
- **Move Status** - Moves status from status column into scratchpad area.

5.5.4 FRAME CONTROLLER STATUS SCREEN

The Frame Controller Status screen, Figure 5-15, provides activity status for the power supply and Good/Fail status for the cooling fan on each frame controller module.

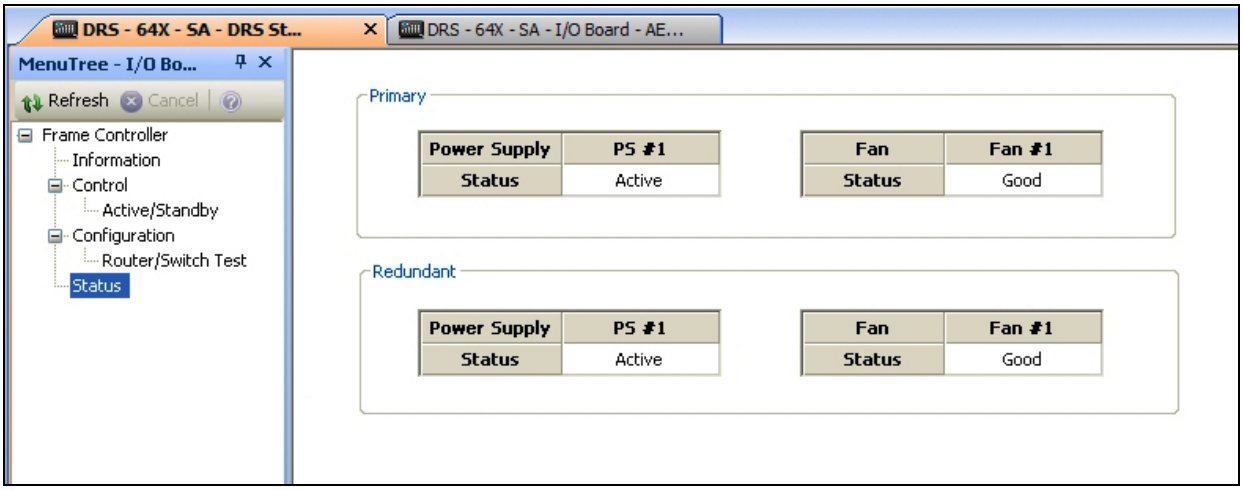


Figure 5-15 Frame Controller Status Screen

5.6 ACCESSING AUDIO TEST SIGNALS

Your DRS audio frame includes an internal signal generator. Signals from the generator are accessed by inserting the source number for the desired test tone, indicated in Table 5-2, into the audio switching levels of a source group in the system configuration file, just as you would with any other audio source channel number. The following table identifies the signals that are available using the source number indicated in the source definition configuration lists.

Table 5-2 Internal Audio Test Tones

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

Chapter 6 Maintenance and Repair

6.1 PERIODIC MAINTENANCE

No periodic maintenance is required.

6.2 PESA CUSTOMER SERVICE

If you are experiencing any difficulty with your DRS router, please contact the PESA Customer Service Department. Skilled technicians are available to assist you 24 hours a day, seven days a week.

6.3 REPAIR

Before attempting to repair this equipment, please consult your warranty documents and the PESA Customer Service Department. Unauthorized repairs may void your warranty.

PC boards in this equipment contain Surface Mount Technology (SMT) components. Special tools are required to replace these components without causing damage to adjacent areas.

Failure to consult with Customer Service before attempting to repair these boards may void your warranty.

6.4 REPLACEMENT PARTS

Only parts of the highest quality have been used in the design and manufacture of this equipment. If the inherent stability and reliability are to be maintained, replacement parts must be of the same high quality. Please consult our Customer Service Department before installing any parts not purchased from PESA.

6.5 FACTORY SERVICE

Before returning any equipment to our factory for service or repair, please contact our Customer Service Department for an RMA number.