PESA
Switching
Systems

# Tiger™

# Audio
# Routing Switcher


**PESA Switching Systems, Inc.**
**330-A Wynn Drive Northwest**
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Part No. 81-9059-0405-0 Revision H

## Service and Ordering Assistance

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Printed in the United States of America.

# FCC Statement

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and

(2) this device must accept any interference received, including interference that may cause undesired operation.

# DECLARATION OF CONFORMITY

according to ISO/IEC Guide 22 and EN 45014

**Manufacturer's Name:** PESA SWITCHING SYSTEMS, INC.

**Manufacturer's Address:** 330A Wynn Drive
Huntsville, AL. 35805
USA

The manufacturer hereby declares that the product

**Product Name:** Tiger Analog Audio Routing Switcher

**Model Number:** All Tiger Analog Audio Routing Switcher models

conforms to the following standards or other normative documents:

**Electromagnetic Emissions:** **EN 50081-1:1992**
**EN 55022:1995**

**Electromagnetic Immunity:** **EN 50082-1:1992**
**EN 61000-4-2:1995**
**EN 61000-4-3:1995**
**EN 61000-4-4:1995**
**EN 61000-4-5:1995**
**EN 61000-4-6:1996**
**EN 61000-4-8:1994**
**EN 61000-4-11:1994**
**ENV 50204:1996**

**Safety:** **EN 60950:1992**

The product herewith complies with the requirements of: **EMC Directive 89/336/EEC**

**Supplementary Information:**

Test reports and compliance documents are on file at the corporate office of PESA Switching Systems, Inc. in Huntsville, Alabama, USA.

Huntsville, July 20,1999
Place and Date

Paul Ethridge
Quality Control Engineer

81905904230 7/99 REV. A

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# Chapter 1 – Introduction

## General

This manual provides instructions for the installation, operation, and maintenance of the PESA Tiger audio routing switcher.

## Safety Warnings

Safety warnings, and other important information, are emphasized in three ways:

**WARNING**

Warning statements identify conditions or practices that could result in personal injury or loss of life.

**CAUTION**

Caution statements identify conditions or practices that could result in damage to equipment.

**NOTE**

Notes add emphasis to information that is important for the correct installation, operation, or maintenance of the equipment.

## Product Description

Each Tiger audio routing switcher can switch 144 dual-channel inputs to 144-dual channel outputs, or be configured as a 288x144 or 144x288 single-channel routing switcher. Each chassis may contain a mix of both analog and digital components, and multiple chassis (both audio and video) may be connected into a system operated by a single controller.

Each channel has its own vertical sync input to allow the switching of two different signal formats in the same chassis. Composite sync, black burst, and standard analog signals in either NTSC or PAL formats may be used.

All Tiger audio routing switchers offer alarm support, switch confirmation, block checking, and power-out-of-range indicators.

Optional equipment includes:

1. An analog or digital output monitor control board. Each output monitor control board controls two 144x1 routing switchers which can be used to monitor any output in the frame downstream of the last amplifier and switch circuit. In a multi-frame system, one output monitor controller must be installed in each frame containing signals to be monitored.
2. A system controller with full software diagnostic capability.

# Specifications

## General

### Power Requirements

Auto Range....100-240 VAC, 47-63 Hz
Power Consumption .... 300 VA

### Physical Characteristics

Height.... 14 in (356 mm) (8 Rack Units)
Width.... 19 in (483 mm)
Depth.... 16 in (406 mm)
Weight.... 85 lb (38.6 kg)

### Operational Environment

Temperature ....0-40° C
Humidity ....0-90% Non-Condensing

## Analog

### Input Characteristics

Level....+28 dBm Max
Impedance: .... 60K Ω
Type ....Electrically Balanced
Coupling....Direct (DC)
Common Mode Rejection Ratio.... -80 dB (50 Hz to 60 Hz)
Connector Type.... 3-pin, 2-part, Detachable Plug

### Output Characteristics

Impedance ....110 Ω, ±20% from 0.1 MHz to 6MHz
Type ....Electrically Balanced
Coupling....Direct (DC)
DC on Outputs....±20 mV
Minimum Load at 28 dBm....600 Ω
Connector Type.... 3-pin, 2-part, Detachable Plug

### Gain Characteristics

Gain.... Unity
Gain Stability .... ±0.05 dB
Adjustment Range.... 1 dB

### Switching Characteristics

DC Offset .... <10 mV, Peak
Switching Transients (30 KHz Low Pass Filter).... <20 mV, Peak

### Frequency Characteristics (Reference 1 KHz)

Sine Wave Response ................................................<±0.1 dB, 20 Hz to 20 KHz
<-3.0 dB to 200 KHz
Square Wave Response (Overshoot and Ringing)
<±5%, 3 KHz, 100 µs Rise Time (20 V p-p)
<±10%, 100 KHz, 10 µs Rise Time (5 V p-p)

### Distortion Characteristics

Total Harmonic Distortion ..................................................... <0.05% @ 28 dBm
20 Hz to 20 KHz with 30 KHz Filter
Intermodulation Distortion ..................................................... <0.02% @ 24 dBm

### Crosstalk (All Inputs and Outputs Hostile)

20 Hz to 20 KHz..........................................................................................<-90 dB

### Hum and Noise

Wideband 10 Hz to 300 KHz .................................................................<-73 dBm
80 KHz Low Pass Filter ..........................................................................<-74 dBm
30 KHz Low Pass Filter ..........................................................................<-81 dBm
15 KHz Low Pass Filter ..........................................................................<-85 dBm
"A" Weighted..........................................................................................<-86 dBm

## Digital

### Input Characteristics

Impedance: ............................................................ 110 Ω / 75 Ω / Hi-Z Selectable
Signal Amplitude........................................ 0.5 V-7 V p-p Terminated into 110 Ω
Connector Type ...................................................... 3-pin, 2-part, Detachable Plug

### Output Characteristics

Impedance .................................................110 Ω, ±20% from 0.1 MHz to 6 MHz
Signal Amplitude........................................... 4 V-5 V p-p Terminated into 110 Ω
Rise/Fall Time ........................5-30 ns Measured From 10-90% Amplitude Points
Jitter.................................................................................................................. <20 ns
Standard.................................................................................... AES3-1993
Data Rate ......................................................................................... DC to 20 Mbps
Connector Type ...................................................... 3-pin, 2-part, Detachable Plug

# Chapter 2 – Installation

## Shipping Damage Inspection

Immediately upon receipt, all shipping containers should be inspected for damage caused in transit. If any damage is noted, save all packing material and contact both PESA and the carrier as soon as possible.

## Unpacking

**CAUTION**

This equipment contains static sensitive devices. A grounded wrist strap and mat should be used when handling the internal circuit boards.

Carefully unpack the equipment and compare the parts received against the packing list and Table 1 on page 6. If any parts appear to be missing, please contact PESA immediately.

## Installation Location

**WARNING**

For safety reasons, this equipment must be located near the socket-outlet or power strip so that the AC line cord plugs are easily accessible (Ref. EN60950:1992 §1.7.2)

This equipment is designed to be installed in a standard 19-inch equipment rack located in an environment conforming to the specifications shown in Chapter 1. Each unit should be located as close as possible to its associated equipment to minimize cable runs.

Consideration should be given to the connection of this equipment to the supply circuit and the effect that possible overloading could have on overcurrent protection circuits and supply wiring. Refer to the nameplate ratings when addressing this concern.

**Table 1. Equipment List**

| **Part No.**<br>**Description** | **Quantity**<br>**Required** |
|---|---|
| 81-9065-2004-0<br>Mainframe Assembly<br>Includes the following:<br>1 each Backplane (81-9065-2020-0)<br>2 each Input Interface boards (81-9065-2069-0)<br>6 each Output Interface boards (81-9065-2025-0)<br>2 each House Sync Interface boards (81-9065-2026-0)<br>1 each Alarm Interface board (81-9065-2056-0)<br>2 each Power Supplies (81-9065-2021-0) | 1 each |
| 81-9065-2019-0<br>Analog Audio Output Monitor Control Board | Notes 1, 2<br>1 max per mainframe |
| 81-9065-2022-0<br>48x16 Analog Audio Crosspoint Board | Note 1<br>3 max per carrier board<br>54 max per mainframe |
| 81-9065-2023-0<br>Analog Audio Carrier Board | Note 1<br>18 max per mainframe |
| 81-9065-2024-0<br>Analog Audio Input Buffer Board | Note 1<br>36 max per mainframe |
| 81-9065-2109-0<br>Digital Audio Input Buffer Board | Note 1<br>36 max per mainframe |
| 81-9065-2110-0<br>Digital Audio Carrier Board<br>(With Re-Clocking Outputs) | Note 1<br>18 max per mainframe |
| 81-9065-2111-0<br>48x16 Digital Audio Crosspoint Board | Note 1<br>3 max per carrier board<br>54 max per mainframe |
| 81-9065-2129-0<br>Digital Audio Output Monitor Control Board | Notes 1, 2<br>1 max per mainframe |
| 81-9065-2130-0<br>Digital Audio Carrier Board<br>(Without Re-Clocking Outputs) | Note 1<br>18 max per mainframe |
| 81-9028-TBD-0<br>DC Power Cable | Note 1 |
| 81-9028-0442-0<br>AC Power Cable | 2 each |
| 81-9029-0811-0<br>WECO Audio Connectors | Note 1 |
| 81-9059-0405-0<br>Tiger Audio Routing Switcher Manual | 1 each |
| 81-9065-2074-0<br>Audio Input Buffer Board Extender | Note 1 |
| 81-9065-2075-0<br>Audio Carrier Board Extender | Note 1 |
| **Note 1:** This item is optional or may be ordered in varying quantities. Please consult your purchase order to verify that you have received the correct quantity.<br>**Note 2:** Although each mainframe may be populated with both analog and digital boards, only one output monitor control board (analog or digital) can be installed per mainframe. | |

## Installation in Equipment Rack

**WARNING**

Due to the weight of this equipment, installation or removal requires at least two persons in order to avoid possible personal injury or equipment damage. This equipment should only be installed in a standard 19-inch equipment rack and only in such a manner as to avoid any tipping hazard from uneven loading of the rack.

**CAUTION**

Forced air cooling is provided by fans located within this equipment. Care should be taken not to block airflow around these fans.

This equipment is designed to be installed in a standard 19-inch equipment rack. Sufficient space must be provided behind the equipment racks to allow for control, signal, and power cables. All panel mounting holes should be utilized and mounting hardware tightened securely.

Install the equipment into the rack as follows:

1. Insert the panel assembly into the equipment rack and support the bottom of the panel assembly until all mounting hardware has been installed and properly tightened.
2. Install the bottom two panel mounting screws.
3. Install the top two panel mounting screws.
4. Install any remaining panel mounting screws.
5. Tighten all of the panel mounting screws until they are secure.

## Interface Connections

The following guidelines should be followed when connecting cables to this equipment.

1. Install the equipment in the rack before connecting cables.
2. All cables should be carefully strain relieved to prevent connector separation.
3. To the extent possible, separate control, signal, and power cables to minimize crosstalk and interference.
4. The liberal use of nylon cable ties to secure cables to the rack is encouraged. This will minimize the amount of force transmitted to the equipment and help route cables away from hazardous areas.
5. Route cables away from walk areas to avoid creating a safety hazard.
6. The shields of audio signal cables (input and output) should be grounded at one end only.

All interface connections are made at the rear of this equipment as shown in Figure 1 on page 8.

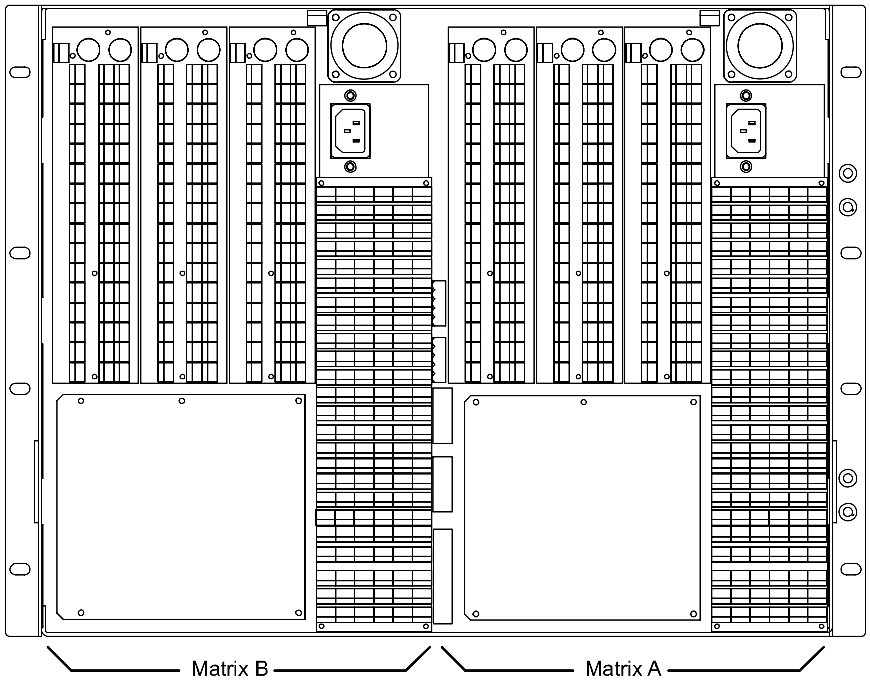



**Figure 1. Rear View**

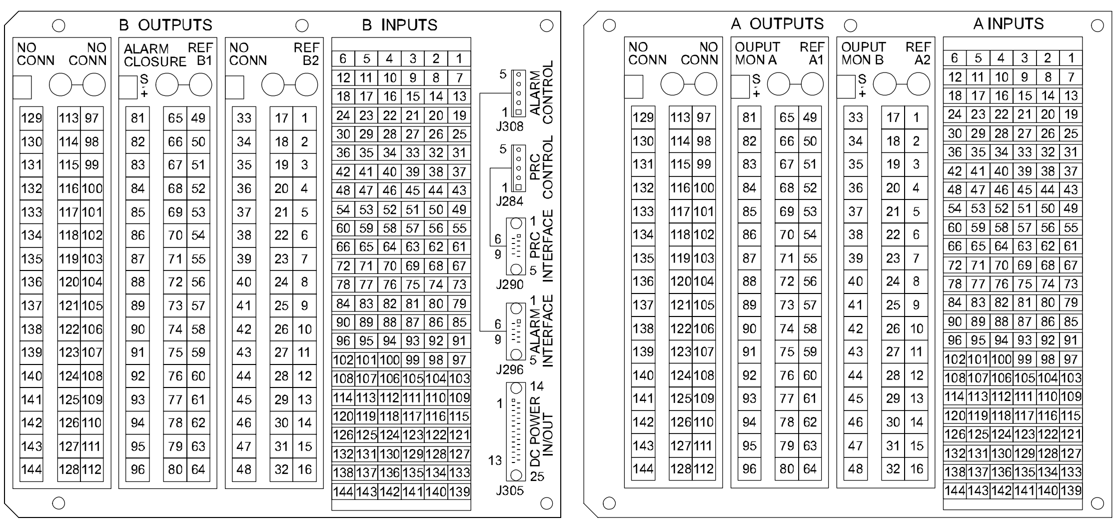



**Figure 2. Interface Connectors**

## Input Signal Connectors (A INPUTS, B INPUTS)

These 3-contact connectors provide the input signal interface. See Figure 3 for an orientation view showing contact locations.

The INPUT connectors are connected to the audio signal sources with cables constructed with 3-contact connectors (Part No. 81-9029-0811-0) and shielded, twisted-pair audio cable (Part No. 81-9028-0043-2, Belden 8451, or equivalent) as shown in Figure 4.

The connector body has an integral strain relief which requires the use of a nylon cable tie (Part No. 81-9021-0028-8).

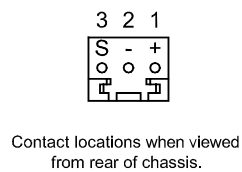



**Figure 3. Input Signal Connector**

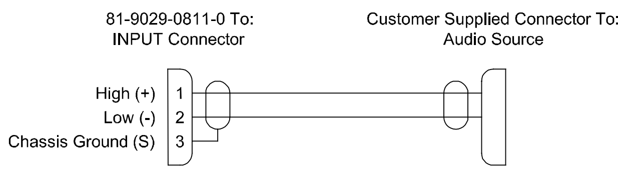



**Figure 4. Input Signal Cable**

### 144x288 Single-Channel Configuration

A dual-channel 144x144 routing switcher may also be configured as a 144x288 single-channel routing switcher. This is done by bifurcating the input cables as shown in Figure 5.

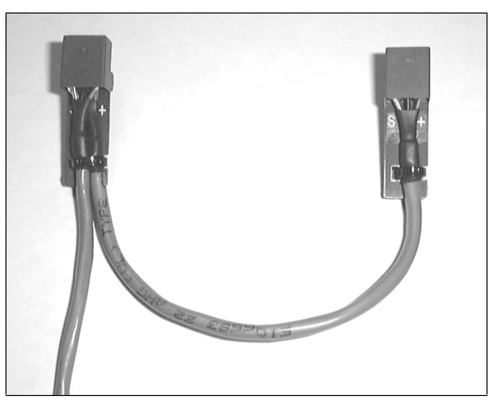


**Figure 5. Bifurcated Audio Signal Cable**

## Output Signal Connectors (A OUTPUTS, B OUTPUTS)

These 3-contact connectors provide the output signal interface. See Figure 6 for an orientation view showing contact locations.

The OUTPUT connectors are connected to the audio signal sources with cables constructed with 3-contact connectors (Part No. 81-9029-0811-0) and shielded, twisted-pair audio cable (Part No. 81-9028-0043-2, Belden 8451, or equivalent) as shown in Figure 7.

The connector body has an integral strain relief which requires the use of a nylon cable tie (Part No. 81-9021-0028-8).

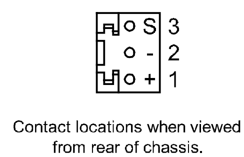



**Figure 6. Output Signal Connector**

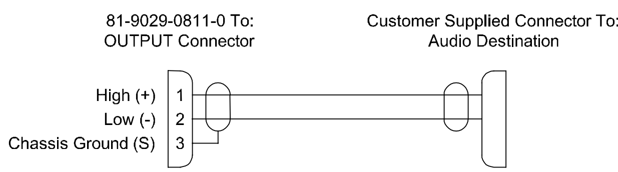



**Figure 7. Output Signal Cable**

### 288x144 Single-Channel Configuration

A dual-channel 144x144 routing switcher may also be configured as a 288x144 single-channel routing switcher. This is done by bifurcating the output cables as shown in Figure 5.

## RS-422 Control Connector (J290 - PRC INTERFACE)

This DB-9 Male connector provides an RS-422 serial communication interface to the required external system controller (e.g. 3500Plus). J290 - PRC INTERFACE uses PESA PRC Protocol (Document No. 81-9062-0316-0), and is wired in parallel with the 5-contact PRC CONTROL system expansion connector. See Figure 8 for an orientation view showing contact locations.

J290 - PRC INTERFACE is the communications interface to a PRC type routing switcher system and is connected to a routing switcher with an AT Serial Modem cable (Part No. 81-9028-0400-0). If necessary, a cable up to 4000 feet in length may be fabricated in the field as shown in Figure 9.

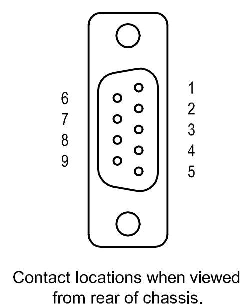



**Figure 8. PRC INTERFACE Connector**

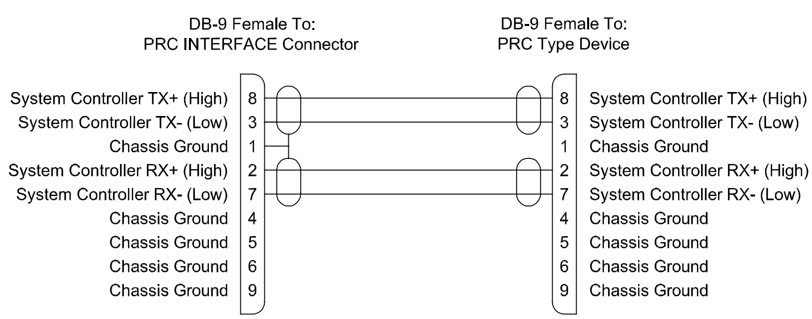



**Figure 9. RS-422 Serial Cable**

# Alarm Connectors

## Alarm Switch Connector (ALARM CLOSURE)

This 3-contact connector provides an optically isolated switch closure during an alarm condition. For more information on alarm conditions, see “Alarm Signal Monitoring” on page 43. See Figure 10 for an orientation view showing contact locations.

ALARM CLOSURE is connected to an external, customer supplied, monitoring circuit with a cable constructed with one 3-contact, screw-terminal connector (PESA Part No. 81-9029-0811-0) and customer supplied cable, as shown in Figure 11. The connector body has an integral strain relief which requires the use of a nylon cable tie (PESA Part No. 81-9021-0028-8).

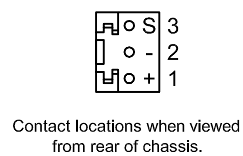



**Figure 10. ALARM CLOSURE Connector**

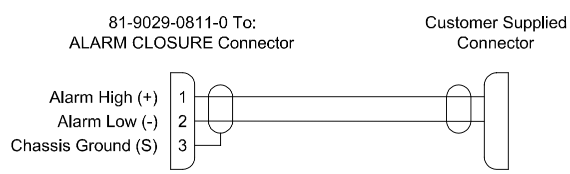



**Figure 11. Alarm Closure Switch Cable**

> **CAUTION**
>
> The alarm circuit connected to this connector must not exceed 12VDC or 10mA.

## Alarm Interface Connector (J296 - ALARM INTERFACE)

This DB9-Male connector provides an interface for an external, customer supplied, alarm monitor and control system, usually a PC. See Figure 12 for an orientation view showing contact locations.

The Alarm System External Control Interface (ECI) may be operated in either RS-232 (point-to-point) mode or RS-422 (multidrop) mode. If RS-232 mode has been selected, this connector is connected to the PC with a cable constructed as shown in Figure 14. If RS-422 mode has been selected, this connector is connected to the PC with a cable constructed as shown in Figure 13.

For more information on selecting communication modes, see "J1, J2, J3 Communication Mode Select Jumper" on page 29.

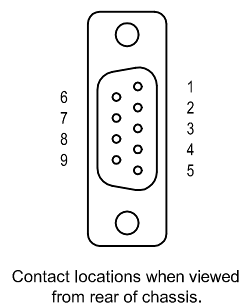



**Figure 12. ALARM INTERFACE Connector**

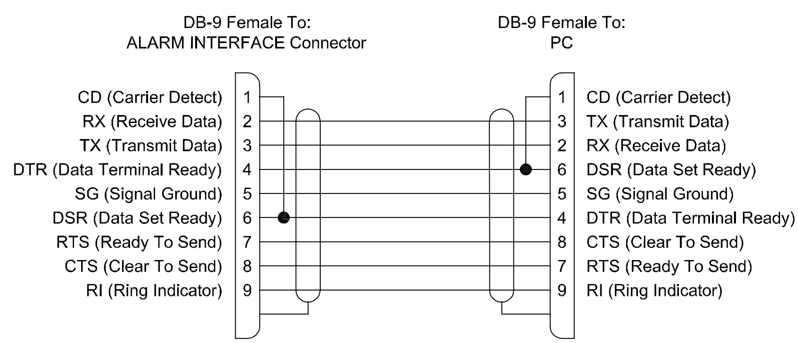



**Figure 13. RS-232 Alarm Interface (Point-to-Point) Cable**

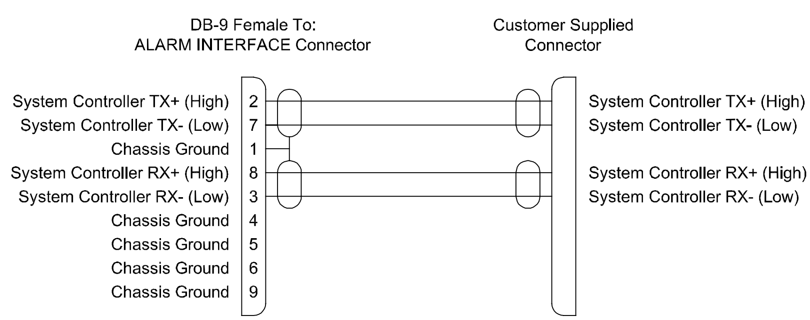



**Figure 14. RS-422 Alarm Interface (Multidrop) Cable**

## House Sync Input Connectors (REF A1, REF A2, REF B1, REF B2)

This equipment contains two External Reference Interface boards with one serving as the backup for the other. Together, the boards are capable of accepting two different house sync signals (e.g. NTSC and PAL). REF A1 and REF B1 are used for one house sync signal, REF A2 and REF B2 are used for the other. These signals are available to the frame as a whole and are not divided between Matrix A and Matrix B.

Each house sync input (e.g. REF A1) is a pair of BNC connectors wired in parallel. Connect house sync to the REF A1, REF A2, REF B1, and REF B2 connectors using coaxial cable and standard BNC connectors. Each frame may use zero, one, or two house sync signals wired as follows:

### House Sync Signals Not Used

When the house sync input connectors will not be used:

1. Install four 75 Ohm terminators, one each to: REF A1, REF A2, REF B1, and REF B2.

### One House Sync Signal Used

When only one house sync signal will be used:

1. Connect the house sync signal to one of the REF A1 connectors.
2. Install a jumper cable between the unused REF A1 connector and one of the REF B1 connectors.
3. Install three 75 Ohm terminators, one each to: REF A2, REF B1, and REF B2.

### Two House Sync Signals Used

When two house sync signals will be used:

1. Connect the first house sync signal to one of the REF A1 connectors.
2. Connect the second house sync signal to one of the REF A2 connectors.
3. Install a jumper cable between the unused REF A1 connector and one of the REF B1 connectors.
4. Install a jumper cable between the unused REF A2 connector and one of the REF B2 connectors.
5. Install two 75 Ohm terminators, one each to: REF B1 and REF B2.

## Output Monitor Connectors (OUTPUT MON A, OUTPUT MON B)

These 3-contact connectors provide the output signal interface for the optional Output Monitor Control boards. See Figure 15 for an orientation view showing contact locations.

OUTPUT MON A and OUTPUT MON B are connected to the customer supplied monitoring equipment with cables constructed with 3-contact connectors (Part No. 81-9029-0811-0) and shielded, twisted-pair audio cable (Part No. 81-9028-0043-2, Belden 8451, or equivalent) as shown in Figure 16.

The connector body has an integral strain relief which requires the use of a nylon cable tie (Part No. 81-9021-0028-8).

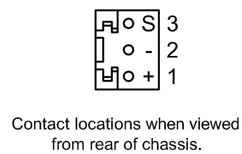



**Figure 15. OUTPUT MON Connectors**

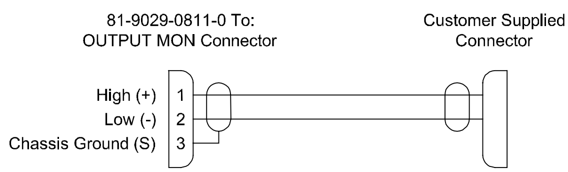



**Figure 16. Output Monitor Cable**

## PRC System Expansion Connector (J284 - PRC CONTROL)

This 5-contact connector is a loop-through connector used to provide an RS-422 serial communication interface using the PESA PRC Protocol (Document No. 81-9062-0316-0). It is wired in parallel with the DB9-Male PRC INTERFACE connector. See Figure 17 for an orientation view showing contact locations.

J284 – PRC CONTROL may be connected to other PESA PRC-type equipment with a cable assembly (Part No. 81-9028-0395-0) constructed as shown in Figure 18. If this cable must be constructed in the field, consult Drawing No. WI50-0250 for assembly details.

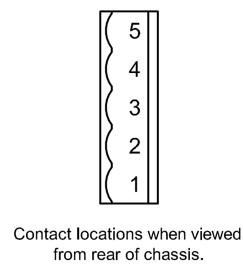



**Figure 17. PRC CONTROL Connector**

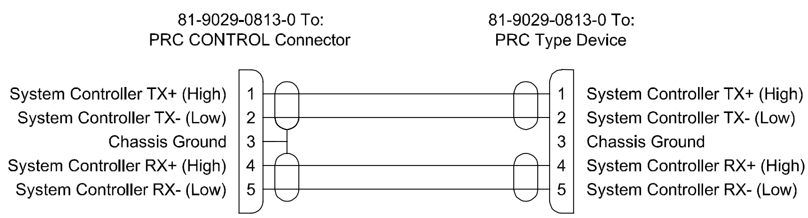



**Figure 18. RS-422 System Expansion Cable**

## Alarm System Expansion Connector (J308 - ALARM CONTROL)

This 5-contact connector is a loop-through connector used to provide an RS-422 serial communication interface using the PESA PRC Protocol (Document No. 81-9062-0316-0). It is wired in parallel with the DB9-Male ALARM INTERFACE connector. See Figure 19 for an orientation view showing contact locations.

J308 – ALARM CONTROL may be connected to other PESA PRC-type equipment with a cable assembly (Part No. 81-9028-0395-0) constructed as shown in Figure 20. If this cable must be constructed in the field, consult Drawing No. WI50-0250 for assembly details.

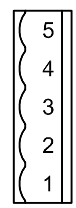



**Figure 19. ALARM CONTROL Connector**

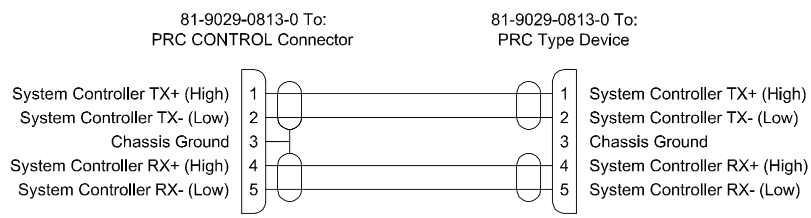



**Figure 20. RS-422 Alarm System Expansion Cable**

# Power Connectors

## AC Power Connectors

**WARNING**

Always use a grounded AC receptacle to avoid a potentially lethal shock hazard in the event of an equipment power line fault.

**NOTE**

This equipment will not meet FCC EMI limits unless both AC line cords are plugged into properly grounded AC receptacles.

Connect the AC line cords (PESA Part No. 81-9028-0143-0) to the Backplane power connectors and then to an AC power source. This equipment is now powered-up and ready for the system controller software to be configured.

**NOTE**

This equipment contains two power supply assemblies connected in parallel. Only one power supply assembly is required to power this equipment. The second power supply assembly serves as a backup for the first. One power supply assembly may safely be removed while the other power supply assembly is connected to the power source.

## DC Power Connector (J305 - DC POWER IN/OUT)

The DB25 DC power connector is reserved for special applications and will only be installed on backplanes which require it.

## Switch and Jumper Settings

If specified when ordered, all DIP switches and jumpers were correctly set prior to shipment.

### Backplane Switch Settings

The Backplane switches (S1 through S4) are four-position, slide-style, DIP switches which control the selection of the strobe, input offset codes, and output offset codes. These switches are located on the front of the Backplane and are accessed by removing the Power Supplies. S1 and S2 are on the left side behind the Matrix A power supply. S3 and S4 are on the right side behind the Matrix B power supply. Figure 21 shows a typical orientation view for these switches.

- S1 Matrix A strobe select
- S2 Matrix A input offset code and output offset code select
- S3 Matrix B strobe select
- S4 Matrix B input offset code and output offset code select

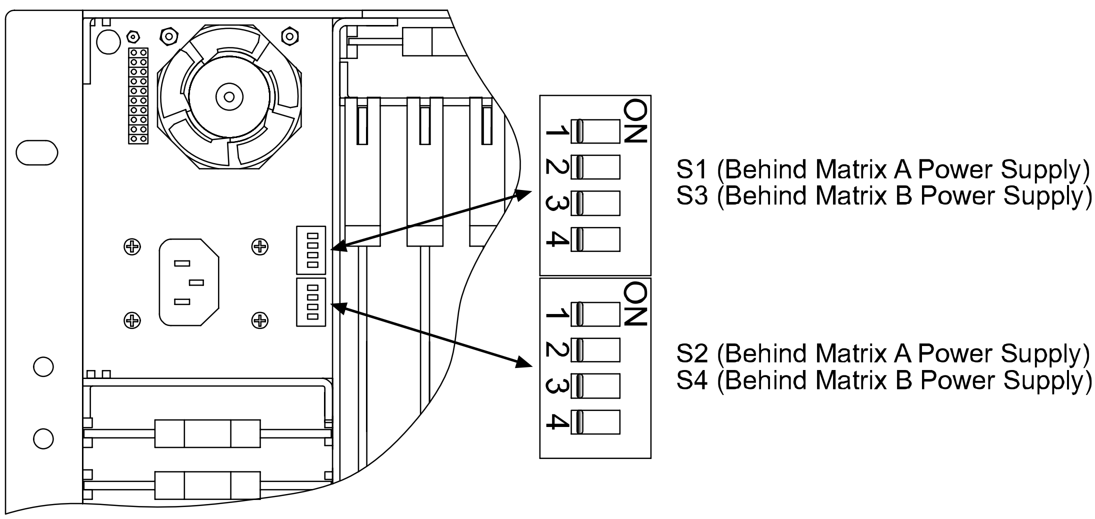



**Figure 21. Backplane Switches**

## S1 - Strobe Assignment - Matrix A

S1 is a four-position, slide-style, DIP switch consisting of four single-pole, single-throw (SPST) switches numbered 1 through 4. It is used to assign Matrix A to one of fifteen strobes. See Table 2 for switch settings.

**Table 2. Backplane Switch S1**

| Backplane S1 Strobe Assignment (Matrix A) | Switch S1-1 | Switch S1-2 | Switch S1-3 | Switch S1-4 |
|---|---|---|---|---|
| Reserved | ON | ON | ON | ON |
| Strobe 1 | OFF | ON | ON | ON |
| Strobe 2 | ON | OFF | ON | ON |
| Strobe 3 | OFF | OFF | ON | ON |
| Strobe 4 | ON | ON | OFF | ON |
| Strobe 5 | OFF | ON | OFF | ON |
| Strobe 6 | ON | OFF | OFF | ON |
| Strobe 7 | OFF | OFF | OFF | ON |
| Strobe 8 | ON | ON | ON | OFF |
| Strobe 9 | OFF | ON | ON | OFF |
| Strobe 10 | ON | OFF | ON | OFF |
| Strobe 11 | OFF | OFF | ON | OFF |
| Strobe 12 | ON | ON | OFF | OFF |
| Strobe 13 | OFF | ON | OFF | OFF |
| Strobe 14 | ON | OFF | OFF | OFF |
| Strobe 15 | OFF | OFF | OFF | OFF |

## S2 - Input and Output Offset Codes - Matrix A

S2 is a four-position, slide style, DIP switch consisting of four single-pole, single-throw (SPST) switches numbered 1 through 4. For Matrix A, positions 1 and 2 are used to select one of four input offset codes and positions 3 and 4 are used to select one of four output offset codes. See Table 3 for switch settings.

**Table 3. Backplane Switch S2**

| Backplane S2 Input & Output Offset Codes (Matrix A) | Switch S2-1 | Switch S2-2 | Switch S2-3 | Switch S2-4 |
|---|---|---|---|---|
| Input Offset Code 1 (1-144) | ON | ON | | |
| Input Offset Code 2 (145-288) | OFF | ON | | |
| Input Offset Code 3 (289-432) | ON | OFF | | |
| Input Offset Code 4 (433-576) | OFF | OFF | | |
| Output Offset Code 1 (1-144) | | | ON | ON |
| Output Offset Code 2 (145-288) | | | OFF | ON |
| Output Offset Code 3 (289-432) | | | ON | OFF |
| Output Offset Code 4 (433-576) | | | OFF | OFF |

## S3 - Strobe Assignment - Matrix B

S3 is a four-position, slide-style, DIP switch consisting of four single-pole, single-throw (SPST) switches numbered 1 through 4. It is used to assign Matrix B to one of fifteen strobes. See Table 4 for switch settings.

**Table 4. Backplane Switch S3**

| Backplane S3 Strobe Assignment (Matrix B) | Switch S3-1 | Switch S3-2 | Switch S3-3 | Switch S3-4 |
|---|---|---|---|---|
| Reserved | ON | ON | ON | ON |
| Strobe 1 | OFF | ON | ON | ON |
| Strobe 2 | ON | OFF | ON | ON |
| Strobe 3 | OFF | OFF | ON | ON |
| Strobe 4 | ON | ON | OFF | ON |
| Strobe 5 | OFF | ON | OFF | ON |
| Strobe 6 | ON | OFF | OFF | ON |
| Strobe 7 | OFF | OFF | OFF | ON |
| Strobe 8 | ON | ON | ON | OFF |
| Strobe 9 | OFF | ON | ON | OFF |
| Strobe 10 | ON | OFF | ON | OFF |
| Strobe 11 | OFF | OFF | ON | OFF |
| Strobe 12 | ON | ON | OFF | OFF |
| Strobe 13 | OFF | ON | OFF | OFF |
| Strobe 14 | ON | OFF | OFF | OFF |
| Strobe 15 | OFF | OFF | OFF | OFF |

## S4 - Input and Output Offset Codes - Matrix B

S4 is a four-position, slide-style, DIP switch consisting of four single-pole, single-throw (SPST) switches numbered 1 through 4. For Matrix B, positions 1 and 2 are used to select one of four input offset codes and positions 3 and 4 are used to select one of four output offset codes. See Table 5 for switch settings.

**Table 5. Backplane Switch S4**

| Backplane S4 Input & Output Offset Codes (Matrix B) | Switch S4-1 | Switch S4-2 | Switch S4-3 | Switch S4-4 |
|---|---|---|---|---|
| Input Offset Code 1 (1-144) | ON | ON | | |
| Input Offset Code 2 (145-288) | OFF | ON | | |
| Input Offset Code 3 (289-432) | ON | OFF | | |
| Input Offset Code 4 (433-576) | OFF | OFF | | |
| Output Offset Code 1 (1-144) | | | ON | ON |
| Output Offset Code 2 (145-288) | | | OFF | ON |
| Output Offset Code 3 (289-432) | | | ON | OFF |
| Output Offset Code 4 (433-576) | | | OFF | OFF |

## Output Monitor Control Board Switch Settings (Analog and Digital)

The optional Tiger Audio Output Monitor Control board controls two 144x1 routing switchers installed inside the Tiger audio routing switcher. It enables the system operator to monitor the output signal downstream of the last amplifier and switch circuits.

The Output Monitor Control board switches (S1 through S8) are four-position, slide-style, DIP switches which control the selection of the strobe, input offset codes, and output offset codes. See Figure 22 for the location of these switches.

- S1 Matrix A strobe select
- S2 Reserved for future use
- S3 Matrix B strobe select
- S4 Reserved for future use
- S5 Matrix A output code select
- S6 Matrix A input code select
- S7 Matrix B output code select
- S8 Matrix B input code select

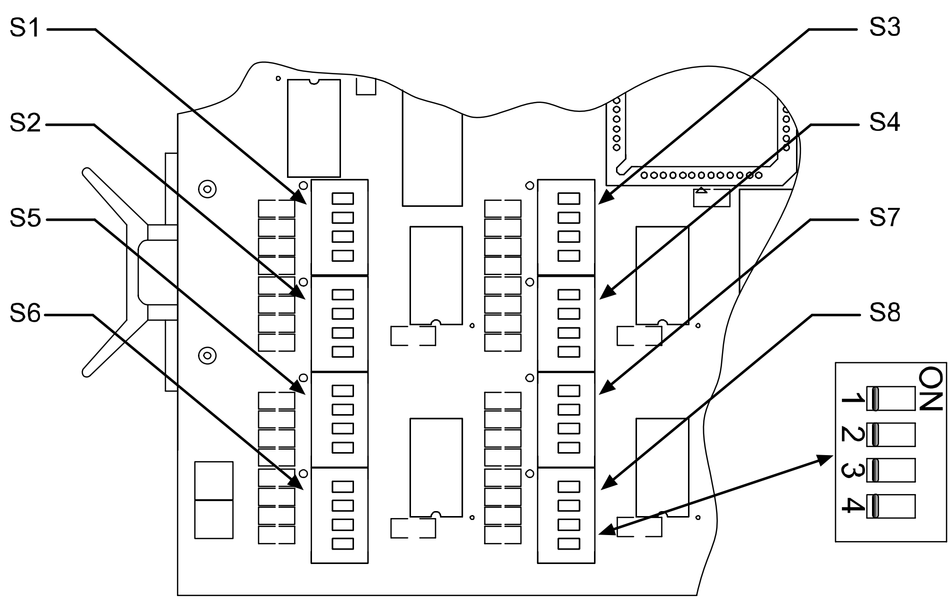



**Figure 22. Output Monitor Control Board Switches**

## S1 - Strobe Assignment - Matrix A

S1 is a four-position, slide-style, DIP switch consisting of four single-pole, single-throw (SPST) switches numbered 1 through 4. It is used to assign Matrix A output monitoring to one of fifteen strobes. See Table 6 for switch settings.

**NOTE**

In a typical switching system, output monitoring strobe assignments mirror the main system strobe assignments. For example, if the system has three strobes for video, left audio, and right audio, the output monitoring strobes would also be set up for video, left audio, and right audio.

**Table 6. Output Monitor Control Board Switch S1**

| Output Monitor Control Board S1 Strobe Assignment (Matrix A) | Switch S1-1 | Switch S1-2 | Switch S1-3 | Switch S1-4 |
|---|---|---|---|---|
| Reserved | OFF | OFF | OFF | OFF |
| Strobe 1 | OFF | OFF | OFF | ON |
| Strobe 2 | OFF | OFF | ON | OFF |
| Strobe 3 | OFF | OFF | ON | ON |
| Strobe 4 | OFF | ON | OFF | OFF |
| Strobe 5 | OFF | ON | OFF | ON |
| Strobe 6 | OFF | ON | ON | OFF |
| Strobe 7 | OFF | ON | ON | ON |
| Strobe 8 | ON | OFF | OFF | OFF |
| Strobe 9 | ON | OFF | OFF | ON |
| Strobe 10 | ON | OFF | ON | OFF |
| Strobe 11 | ON | OFF | ON | ON |
| Strobe 12 | ON | ON | OFF | OFF |
| Strobe 13 | ON | ON | OFF | ON |
| Strobe 14 | ON | ON | ON | OFF |
| Strobe 15 | ON | ON | ON | ON |

## S2 - Reserved for Future Use

S2 is a four-position, slide style, DIP switch consisting of four single-pole, single-throw (SPST) switches numbered 1 through 4. It is reserved for future use. See Table 7 for switch settings.

**Table 7. Output Monitor Control Board Switch S2**

| Output Monitor Control Board S2 Reserved for Future Use | Switch S2-1 | Switch S2-2 | Switch S2-3 | Switch S2-4 |
|---|---|---|---|---|
| Reserved - Set all switches to OFF | OFF | OFF | OFF | OFF |

## S3 - Strobe Assignment - Matrix B

S3 is a four-position, slide-style, DIP switch consisting of four single-pole, single-throw (SPST) switches numbered 1 through 4. It is used to assign Matrix B output monitoring to one of fifteen strobes. See Table 8 for switch settings.

**NOTE**

In a typical switching system, output monitoring strobe assignments mirror the main system strobe assignments. For example, if the system has three strobes for video, left audio, and right audio, the output monitoring strobes would also be set up for video, left audio, and right audio.

**Table 8. Output Monitor Control Board Switch S3**

| Output Monitor Control Board S3 Strobe Assignment (Matrix B) | Switch S3-1 | Switch S3-2 | Switch S3-3 | Switch S3-4 |
|---|---|---|---|---|
| Reserved | OFF | OFF | OFF | OFF |
| Strobe 1 | OFF | OFF | OFF | ON |
| Strobe 2 | OFF | OFF | ON | OFF |
| Strobe 3 | OFF | OFF | ON | ON |
| Strobe 4 | OFF | ON | OFF | OFF |
| Strobe 5 | OFF | ON | OFF | ON |
| Strobe 6 | OFF | ON | ON | OFF |
| Strobe 7 | OFF | ON | ON | ON |
| Strobe 8 | ON | OFF | OFF | OFF |
| Strobe 9 | ON | OFF | OFF | ON |
| Strobe 10 | ON | OFF | ON | OFF |
| Strobe 11 | ON | OFF | ON | ON |
| Strobe 12 | ON | ON | OFF | OFF |
| Strobe 13 | ON | ON | OFF | ON |
| Strobe 14 | ON | ON | ON | OFF |
| Strobe 15 | ON | ON | ON | ON |

## S4 - Reserved for Future Use

S4 is a four-position, slide-style, DIP switch consisting of four single-pole, single-throw (SPST) switches numbered 1 through 4. It is reserved for future use. See Table 9 for switch settings.

**Table 9. Output Monitor Control Board Switch S4**

| Output Monitor Control Board S4 Reserved for Future Use | Switch S4-1 | Switch S4-2 | Switch S4-3 | Switch S4-4 |
|---|---|---|---|---|
| Reserved - Set all switches to OFF | OFF | OFF | OFF | OFF |

## S5 - Output Offset Code Select - Matrix A

S5 is a four-position, slide-style, DIP switch consisting of four single-pole, single-throw (SPST) switches numbered 1 through 4. It is used to select one of sixteen Matrix A output offset codes. See Table 10 for switch settings.

**NOTE**

Each Tiger audio output monitor control board has one output per matrix monitored. Each of these outputs must be assigned a unique output offset code.

**Table 10. Output Monitor Control Board Switch S5**

| Output Monitor Control Board S5 Output Offset Code Select (Matrix A) | Switch S5-1 | Switch S5-2 | Switch S5-3 | Switch S5-4 |
|---|---|---|---|---|
| Output Offset Code 1 | OFF | OFF | OFF | OFF |
| Output Offset Code 2 | OFF | OFF | OFF | ON |
| Output Offset Code 3 | OFF | OFF | ON | OFF |
| Output Offset Code 4 | OFF | OFF | ON | ON |
| Output Offset Code 5 | OFF | ON | OFF | OFF |
| Output Offset Code 6 | OFF | ON | OFF | ON |
| Output Offset Code 7 | OFF | ON | ON | OFF |
| Output Offset Code 8 | OFF | ON | ON | ON |
| Output Offset Code 9 | ON | OFF | OFF | OFF |
| Output Offset Code 10 | ON | OFF | OFF | ON |
| Output Offset Code 11 | ON | OFF | ON | OFF |
| Output Offset Code 12 | ON | OFF | ON | ON |
| Output Offset Code 13 | ON | ON | OFF | OFF |
| Output Offset Code 14 | ON | ON | OFF | ON |
| Output Offset Code 15 | ON | ON | ON | OFF |
| Output Offset Code 16 | ON | ON | ON | ON |

## S6 - Input Offset Code Select - Matrix A

S6 is a four-position, slide-style, DIP switch consisting of four single-pole, single-throw (SPST) switches numbered 1 through 4. It is used to select one of sixteen Matrix A input offset codes. See Table 11 for switch settings.

**NOTE**

In a typical switching system, the output monitor control board input offset code is selected to match that of the matrix being monitored. For example, if the inputs in Matrix A have been designated 289-432, the corresponding input numbers (Code 3) would be used for the output monitor control board associated with them.

**Table 11. Output Monitor Control Board Switch S6**

| Output Monitor Control Board S6 Input Offset Code Select (Matrix A) | Switch S6-1 | Switch S6-2 | Switch S6-3 | Switch S6-4 |
|---|---|---|---|---|
| Input Offset Code 1 (1-144) | OFF | OFF | OFF | OFF |
| Input Offset Code 2 (145-288) | OFF | OFF | OFF | ON |
| Input Offset Code 3 (289-432) | OFF | OFF | ON | OFF |
| Input Offset Code 4 (433-576) | OFF | OFF | ON | ON |
| Input Offset Code 5 (577-720) | OFF | ON | OFF | OFF |
| Input Offset Code 6 (721-864) | OFF | ON | OFF | ON |
| Input Offset Code 7 (865-1008) | OFF | ON | ON | OFF |
| Input Offset Code 8 (1009-1152) | OFF | ON | ON | ON |
| Input Offset Code 9 (1153-1296) | ON | OFF | OFF | OFF |
| Input Offset Code 10 (1297-1440) | ON | OFF | OFF | ON |
| Input Offset Code 11 (1441-1584) | ON | OFF | ON | OFF |
| Input Offset Code 12 (1585-1728) | ON | OFF | ON | ON |
| Input Offset Code 13 (1729-1872) | ON | ON | OFF | OFF |
| Input Offset Code 14 (1873-2016) | ON | ON | OFF | ON |
| Input Offset Code 15 (2017-2160) | ON | ON | ON | OFF |
| Input Offset Code 16 (2161-2304) | ON | ON | ON | ON |

## S7 - Output Offset Code Select - Matrix B

S7 is a four-position, slide-style, DIP switch consisting of four single-pole, single-throw (SPST) switches numbered 1 through 4. It is used to select one of sixteen Matrix B output offset codes. See Table 12 for switch settings.

**NOTE**

Each Tiger audio output monitor control board has one output per matrix monitored. Each of these outputs must be assigned a unique output offset code.

**Table 12. Output Monitor Control Board Switch S7**

| Output Monitor Control Board S7 Output Offset Code Select (Matrix B) | Switch S7-1 | Switch S7-2 | Switch S7-3 | Switch S7-4 |
|---|---|---|---|---|
| Output Offset Code 1 | OFF | OFF | OFF | OFF |
| Output Offset Code 2 | OFF | OFF | OFF | ON |
| Output Offset Code 3 | OFF | OFF | ON | OFF |
| Output Offset Code 4 | OFF | OFF | ON | ON |
| Output Offset Code 5 | OFF | ON | OFF | OFF |
| Output Offset Code 6 | OFF | ON | OFF | ON |
| Output Offset Code 7 | OFF | ON | ON | OFF |
| Output Offset Code 8 | OFF | ON | ON | ON |
| Output Offset Code 9 | ON | OFF | OFF | OFF |
| Output Offset Code 10 | ON | OFF | OFF | ON |
| Output Offset Code 11 | ON | OFF | ON | OFF |
| Output Offset Code 12 | ON | OFF | ON | ON |
| Output Offset Code 13 | ON | ON | OFF | OFF |
| Output Offset Code 14 | ON | ON | OFF | ON |
| Output Offset Code 15 | ON | ON | ON | OFF |
| Output Offset Code 16 | ON | ON | ON | ON |

## S8 - Input Offset Code Select - Matrix B

S8 is a four-position, slide-style, DIP switch consisting of four single-pole, single-throw (SPST) switches numbered 1 through 4. It is used to select one of sixteen Matrix B input offset codes. See Table 13 for switch settings.

**NOTE**

In a typical switching system, the output monitor control board input offset code is selected to match that of the matrix being monitored. For example, if the inputs in Matrix B have been designated 433-576, the corresponding input numbers (Code 4) would be used for the output monitor control board associated with them.

**Table 13. Output Monitor Control Board Switch S8**

| Output Monitor Control Board S8 Input Offset Code Select (Matrix B) | Switch S8-1 | Switch S8-2 | Switch S8-3 | Switch S8-4 |
|---|---|---|---|---|
| Input Offset Code 1 (1-144) | OFF | OFF | OFF | OFF |
| Input Offset Code 2 (145-288) | OFF | OFF | OFF | ON |
| Input Offset Code 3 (289-432) | OFF | OFF | ON | OFF |
| Input Offset Code 4 (433-576) | OFF | OFF | ON | ON |
| Input Offset Code 5 (577-720) | OFF | ON | OFF | OFF |
| Input Offset Code 6 (721-864) | OFF | ON | OFF | ON |
| Input Offset Code 7 (865-1008) | OFF | ON | ON | OFF |
| Input Offset Code 8 (1009-1152) | OFF | ON | ON | ON |
| Input Offset Code 9 (1153-1296) | ON | OFF | OFF | OFF |
| Input Offset Code 10 (1297-1440) | ON | OFF | OFF | ON |
| Input Offset Code 11 (1441-1584) | ON | OFF | ON | OFF |
| Input Offset Code 12 (1585-1728) | ON | OFF | ON | ON |
| Input Offset Code 13 (1729-1872) | ON | ON | OFF | OFF |
| Input Offset Code 14 (1873-2016) | ON | ON | OFF | ON |
| Input Offset Code 15 (2017-2160) | ON | ON | ON | OFF |
| Input Offset Code 16 (2161-2304) | ON | ON | ON | ON |

## Alarm Interface Board Switch and Jumper Settings

The Alarm Interface board switches (S1 and S2) are four-position, slide-style, DIP switches which control the selection of the CPU address, communication speed, and vertical sync signal. The Alarm Interface board jumper uses three eight-position SIP sockets to allow the selection of the communication mode. See Figure 23 for the location of these switches and jumpers.

- J1, J2, J3 Communication mode select jumper
- S1 Communication speed
- S2 CPU address select

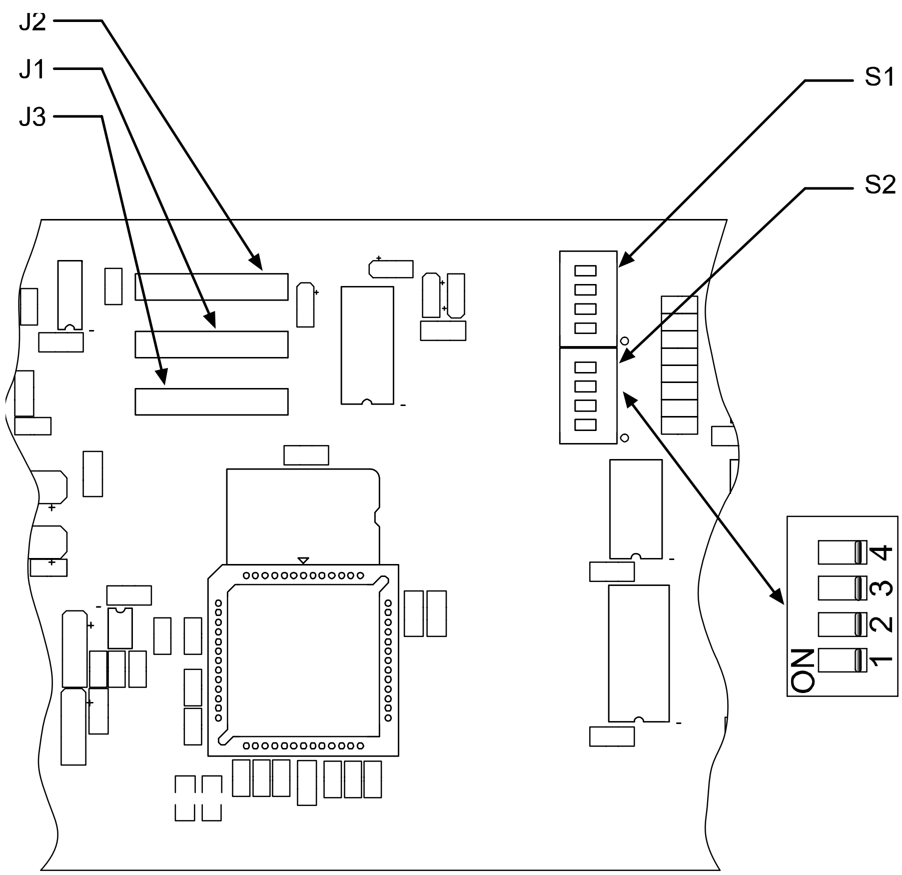



**Figure 23. Alarm Interface Board Switches and Jumpers**

### J1, J2, J3 Communication Mode Select Jumper

J1, J2 and J3 are eight-position SIP sockets installed on the Alarm Interface board for use as the communication mode select jumper. The communication mode is selected by installing an eight-position DIP shunt (PESA Part No. 81-9029-0667-6) as follows:

- J1 to J2 to select the RS-422 Multidrop mode
- J1 to J3 to select the RS-232 point-to-point mode

For more information on communication modes, see “Point-to-Point and Multidrop Modes of Operation” on page 44.

## S1 - Communication Speed

S1 is a four-position, slide-style, DIP switch consisting of four single-pole, single-throw (SPST) switches numbered 1 through 4. It is used to select one of two communication speeds. See Table 14 for switch settings.

> **NOTE**
>
> The communication speed should be selected to match that of the serial port on the PC being used as an alarm monitoring device.

**Table 14. Alarm Interface Board Switch S1**

| Alarm Interface Board S1 Communication Speed | Switch S1-1 | Switch S1-2 | Switch S1-3 | Switch S1-4 |
|---|---|---|---|---|
| 9600 Baud | OFF | | | |
| 38,400 Baud | ON | | | |
| Reserved - Set S1-2 to OFF | | OFF | | |
| Reserved - Set S1-3 to OFF | | | OFF | |
| Reserved - Set S1-4 to OFF | | | | OFF |

## S2 - CPU Address Select

S2 is a four-position, slide-style, DIP switch consisting of four single-pole, single-throw (SPST) switches numbered 1 through 4. It is used to select one of sixteen CPU addresses. See Table 15 for switch settings.

> **NOTE**
>
> CPU Address 0 is only used to send unsolicited responses while in point-to-point mode (see "Point-to-Point and Multidrop Modes of Operation" on page 44 for more information. Otherwise, assign a unique CPU Address to each Alarm Interface in the switching system.

**Table 15. Alarm Interface Board Switch S2**

| Alarm Interface Board S2 CPU Address Select | Switch S2-1 | Switch S2-2 | Switch S2-3 | Switch S2-4 |
|---|---|---|---|---|
| CPU Address 0 | OFF | OFF | OFF | OFF |
| CPU Address 1 | ON | OFF | OFF | OFF |
| CPU Address 2 | OFF | ON | OFF | OFF |
| CPU Address 3 | ON | ON | OFF | OFF |
| CPU Address 4 | OFF | OFF | ON | OFF |
| CPU Address 5 | ON | OFF | ON | OFF |
| CPU Address 6 | OFF | ON | ON | OFF |
| CPU Address 7 | ON | ON | ON | OFF |
| CPU Address 8 | OFF | OFF | OFF | ON |
| CPU Address 9 | ON | OFF | OFF | ON |
| CPU Address 10 | OFF | ON | OFF | ON |
| CPU Address 11 | ON | ON | OFF | ON |
| CPU Address 12 | OFF | OFF | ON | ON |
| CPU Address 13 | ON | OFF | ON | ON |
| CPU Address 14 | OFF | ON | ON | ON |
| CPU Address 15 | ON | ON | ON | ON |

## Carrier Board Switch Settings (Analog)

The analog Carrier board switches (S1 and S2) are four-position, slide-style, DIP switches which control house sync line select. See Figure 24 for the location of these switches.

- S1 House sync line select
- S2 Reserved for future use

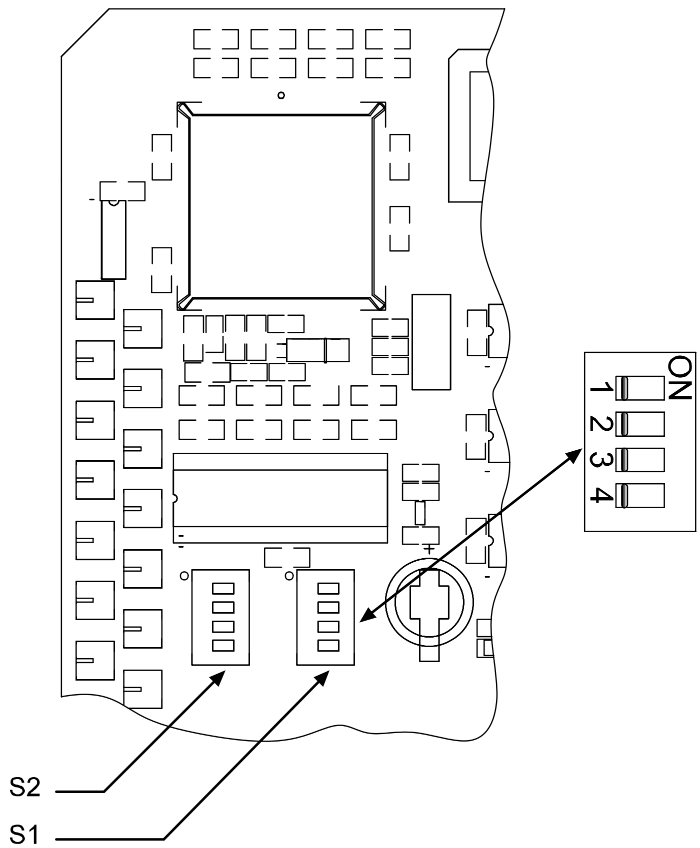



**Figure 24. Analog Carrier Board Switches**

## S1 - House Sync Line Select

S1 is a four-position, slide-style, DIP switch consisting of four single-pole, single-throw (SPST) switches numbered 1 through 4. It is used to select which of four lines in the house sync signals is to be used for synchronized switching. See Table 16 for switch settings.

**Table 16. Analog Carrier Board Switch S1**

| Analog Carrier Board S1 House Sync Line Select | Switch S1-1 | Switch S1-2 | Switch S1-3 | Switch S1-4 |
|---|---|---|---|---|
| House Sync 1 Line 10 | ON | ON | | |
| House Sync 1 Line 11 | OFF | ON | | |
| House Sync 1 Line 12 | ON | OFF | | |
| House Sync 1 Line 13 | OFF | OFF | | |
| House Sync 2 Line 10 | | | ON | ON |
| House Sync 2 Line 11 | | | OFF | ON |
| House Sync 2 Line 12 | | | ON | OFF |
| House Sync 2 Line 13 | | | OFF | OFF |

## S2 - Reserved for Future Use

S2 is a 4 position DIP switch consisting of four single pole, single throw (SPST) switches numbered 1 through 4. It is reserved for future use. See Table 17 for switch settings.

**Table 17. Analog Carrier Board Switch S2**

| Analog Carrier Board S2 Reserved for Future Use | Switch S2-1 | Switch S2-2 | Switch S2-3 | Switch S2-4 |
|---|---|---|---|---|
| Reserved - Set all switches to OFF | OFF | OFF | OFF | OFF |

## Carrier Board Switch Settings (Digital)

The digital Carrier board switches (S1 and S2) are four-position, slide-style, DIP switches which control house sync line select. See Figure 25 for the location of these switches.

- S1 House sync line select
- S2 Reserved for future use

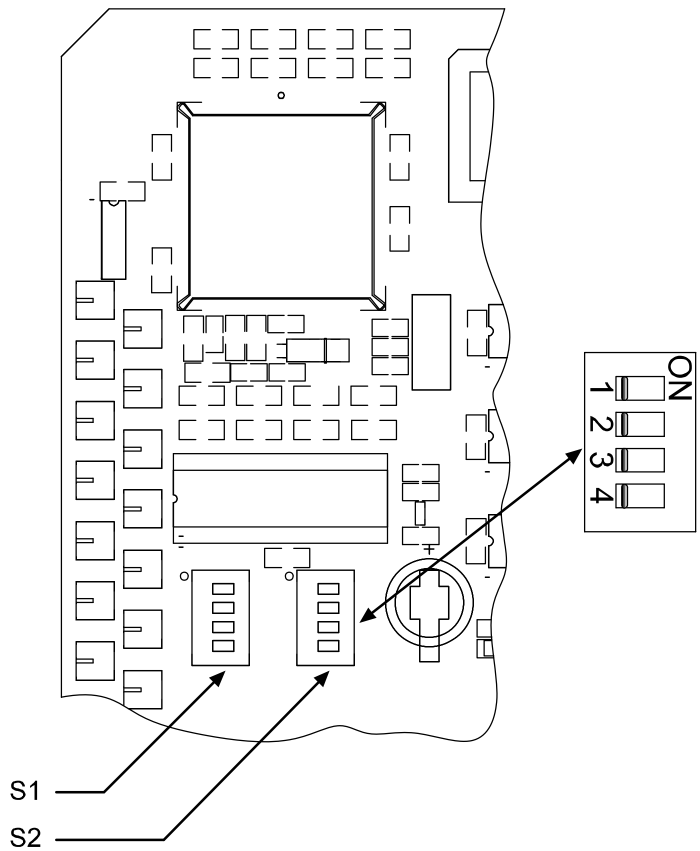



**Figure 25. Digital Carrier Board Switches**

## S1 - Reserved for Future Use

S1 is a 4 position DIP switch consisting of four single pole, single throw (SPST) switches numbered 1 through 4. It is reserved for future use. See Table 18 for switch settings.

**Table 18. Digital Carrier Board Switch S1**

| Digital Carrier Board S1<br>Reserved for Future Use | Switch<br>S1-1 | Switch<br>S1-2 | Switch<br>S1-3 | Switch<br>S1-4 |
|---|---|---|---|---|
| Reserved - Set all switches to OFF | OFF | OFF | OFF | OFF |

## S1 - House Sync Line Select

S2 is a four-position, slide-style, DIP switch consisting of four single-pole, single-throw (SPST) switches numbered 1 through 4. It is used to select which of four lines in the house sync signals is to be used for synchronized switching. See Table 19 for switch settings.

**Table 19. Digital Carrier Board Switch S2**

| Digital Carrier Board S2<br>House Sync Line Select | Switch<br>S2-1 | Switch<br>S2-2 | Switch<br>S2-3 | Switch<br>S2-4 |
|---|---|---|---|---|
| House Sync 1 Line 10 | ON | ON | | |
| House Sync 1 Line 11 | OFF | ON | | |
| House Sync 1 Line 12 | ON | OFF | | |
| House Sync 1 Line 13 | OFF | OFF | | |
| House Sync 2 Line 10 | | | ON | ON |
| House Sync 2 Line 11 | | | OFF | ON |
| House Sync 2 Line 12 | | | ON | OFF |
| House Sync 2 Line 13 | | | OFF | OFF |

## Power Supply Jumper Settings

The Power Supply jumpers use three-pin headers to allow the selection of the over temp shut down mode and fan voltage. See Figure 26 for the location of these jumpers.

- J1 Over Temp Shut Down Mode Select
- J3 Fan Voltage Select

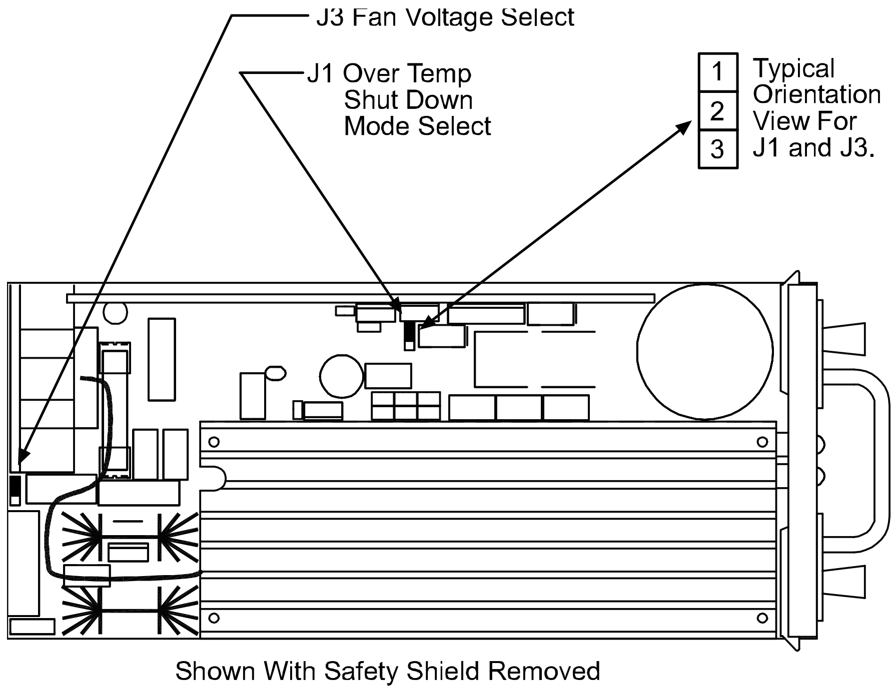



**Figure 26. Power Supply Jumpers**

## J1 Over Temp Shut Down Mode Select Jumper

J1 is a three-pin header installed on the Power Supply for use as the over temp shut down mode select jumper. The automatic shut down mode is selected by installing a two-socket jumper (PESA Part No. 81-9029-0335-0) as follows:

- Pin 1 to Pin 2 to select automatic shut down on over temp
- Pin 2 to Pin 3 to select manual shut down on over temp alarm

**NOTE**

This jumper is installed at the factory to connect pins 1 and 2 so the default mode is automatic shut down in an over temp condition.

## J3 Fan Voltage Select Jumper

J1 is a three-pin header installed on the Power Supply for use as the fan voltage select jumper. The fan voltage is selected by installing a two-socket jumper (PESA Part No. 81-9029-0335-0) as follows:

- Pin 1 to Pin 2 to select 12VDC
- Pin 2 to Pin 3 to select 24VDC

**CAUTION**

This jumper is set at the factory and should not be changed without first consulting PESA Customer Service.

## Subassembly Installation

If specified when ordered, the switches and jumpers on the subassemblies will already be properly configured. Otherwise, please refer to Switch and Jumper Settings on page19.

### Power Supply Installation

> **NOTE**
>
> This equipment contains two power supply assemblies connected in parallel. Only one power supply assembly is required to power this equipment. The second power supply assembly serves as a backup for the first. One power supply assembly may safely be removed while the other power supply assembly is connected to the power source.

The Power Supplies are located as shown in Figure 27 on page 39 and are installed as follows:

1. Align the metallic support plate of the first Power Supply with the card guides in the chassis.
2. Retract the Power Supply latches and carefully insert the Power Supply into the chassis until the connectors on the Power Supply make contact with the Backplane connectors.
3. Firmly push the Power Supply into the chassis until the Power Supply latches engage the corresponding slots in the chassis.
4. Repeat the above steps for the second Power Supply.

### Input Buffer Board Installation

The Input Buffer boards are located as shown in Figure 27 on page 39 and are installed as follows:

1. Align the first Input Buffer board with the card guides in the chassis.
2. Carefully insert the Input Buffer board into the chassis until the connector on the Input Buffer board makes contact with the Backplane connector. If possible, inspect the mating connectors to ensure proper alignment.
3. Firmly push the Input Buffer board into the chassis until the connector on the Input Buffer board is fully mated with the Backplane connector.
4. Repeat the above steps for each additional Input Buffer board.

### 48x16 Crosspoint Board Installation

The 48x16 Crosspoint boards are located on the Carrier boards. Up to three 48x16 Crosspoint boards can be installed on each Carrier board as follows:

1. Align the 48x16 Crosspoint board connectors with the connectors on the Carrier board. Inspect the mating connectors to ensure proper alignment.
2. Firmly push the 48x16 Crosspoint board onto the Carrier board until the connectors are fully mated.
3. Secure the 48x16 Crosspoint board to the Carrier board with the three screws provided.
4. Repeat the above steps for each additional 48x16 Crosspoint board.

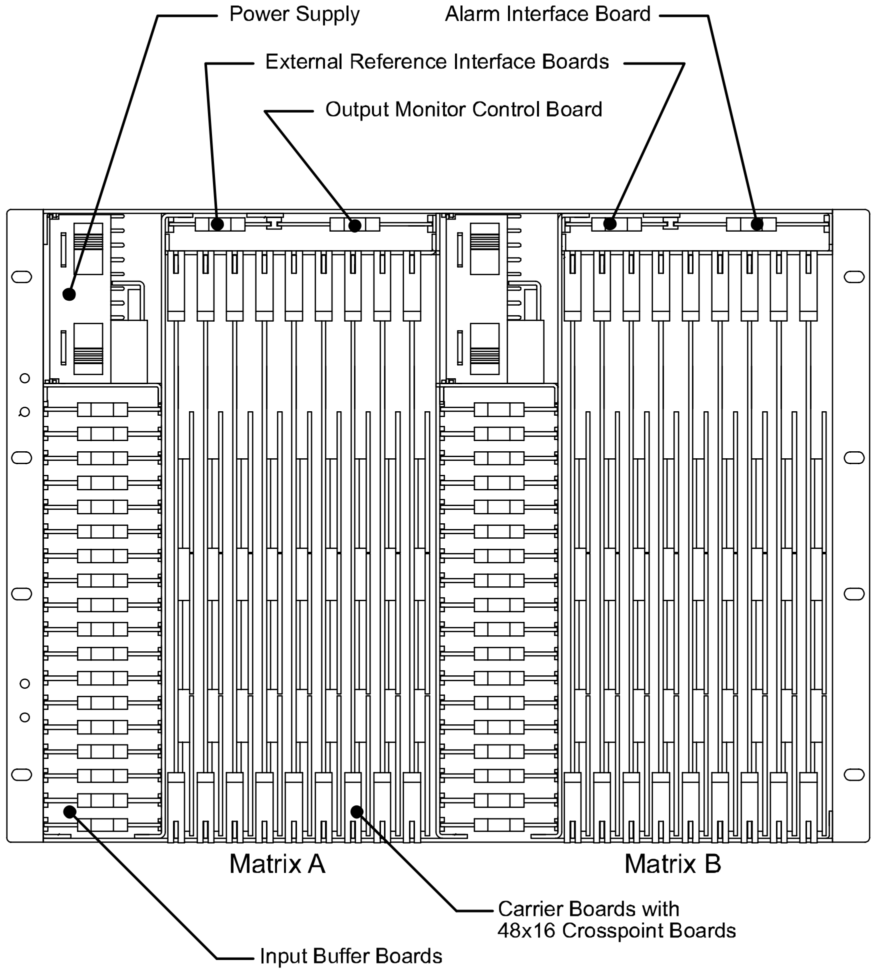



**Figure 27. Front View**

## Carrier Board Installation

The Carrier boards are located as shown in Figure 27 on page 39 and are installed as follows:

1. Align the first Carrier board with the card guides in the chassis.
2. Carefully insert the Carrier board into the chassis until the connectors on the Carrier board make contact with the Backplane connectors. If possible, inspect the mating connectors to ensure proper alignment.
3. Firmly push the Carrier board into the chassis until the card extractors engage the corresponding slots in the chassis. Use the card extractors to push the Carrier board into the chassis until the connectors on the Carrier board are fully mated with the Backplane connectors.
4. Repeat the above steps for each additional Carrier board.

## Output Monitor Control Board Installation

The Output Monitor Control board is located as shown in Figure 27 on page 39 and is installed as follows:

1. Align the Output Monitor Control board with the card guides in the chassis.
2. Carefully insert the Output Monitor Control board into the chassis until the connectors on the Output Monitor Control board make contact with the Backplane connectors.
3. Firmly push the Output Monitor Control board into the chassis until the connectors on the Output Monitor Control board are fully mated with the Backplane connectors.

## External Reference Interface Board Installation

The External Reference Interface boards are located as shown in Figure 27 on page 39 and are installed as follows:

1. Align the first External Reference Interface board with the card guides in the chassis.
2. Carefully insert the External Reference Interface board into the chassis until the connector on the External Reference Interface board makes contact with the Backplane connector.
3. Firmly push the External Reference Interface board into the chassis until the connector on the External Reference Interface board is fully mated with the Backplane connector.
4. Repeat the above steps for the second External Reference Interface board.

## Alarm Interface Board Installation

The Alarm Interface board is located as shown in Figure 27 on page 39 and is installed as follows:

1. Align the Alarm Interface board with the card guides in the chassis.
2. Carefully insert the Alarm Interface board into the chassis until the connector on the Alarm Interface board makes contact with the Backplane connector.
3. Firmly push the Alarm Interface board into the chassis until the connector on the Alarm Interface board is fully mated with the Backplane connectors.

## Output Connector Interface Board Installation

The Output Connector Interface boards are installed on the Backplane at the factory. They are not field serviceable.

## Input Connector Interface Board Installation

The Input Connector Interface boards are installed on the Backplane at the factory. They are not field serviceable.

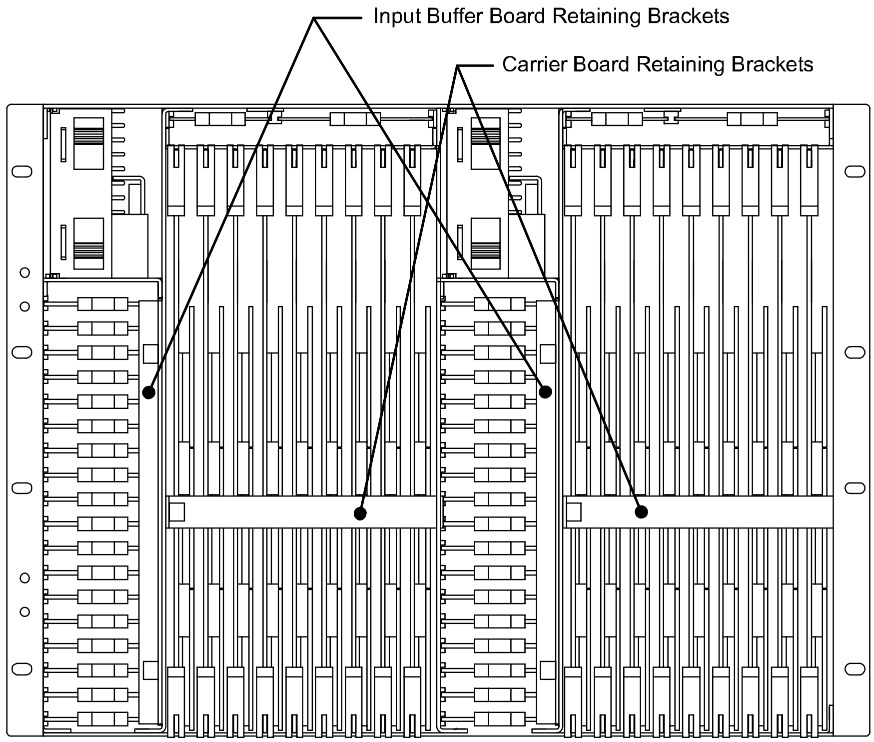



**Figure 28. Circuit Board Retaining Brackets**

## Circuit Board Retaining Bracket Installation

The Input Buffer Board Retaining Brackets and the Carrier Board Retaining Brackets are located as shown in Figure 28 on page 41. These brackets are installed using captive thumbscrews which engage threaded inserts in the chassis.

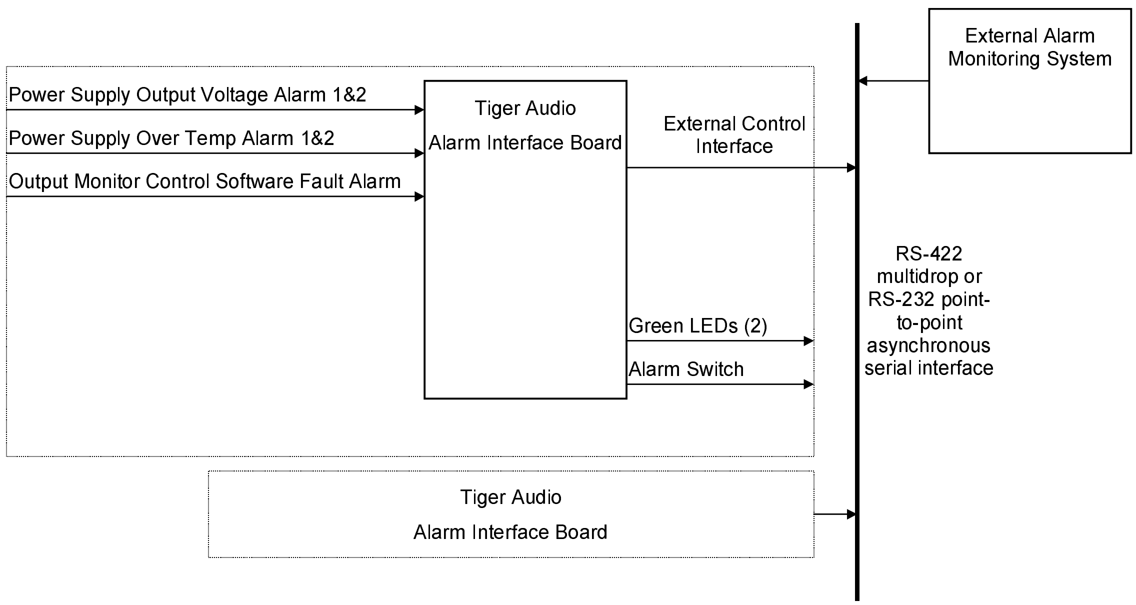
# Chapter 3 – Operation

## General

This equipment is designed to be operated by a system controller such as the PESA 3500Plus System Controller. For detailed operational information, please refer to the system controller manual.

## Alarm Interface Board

The Alarm Interface board contains a single chip implementation of a 68HC11 controller surrounded by system monitoring circuits and an RS-232/RS-422 serial port for external interface. When a monitored signal is outside of its normal operating envelope, the Alarm Interface board reports the condition to an external alarm monitoring system via the serial link.




### Alarm Signal Monitoring

The signals monitored by the Alarm Interface board are as follows:

#### Power Supply Output Voltage Alarm (PS1/PS2)

An A/D converter is used to monitor the power supply output voltage alarm signals. If a signal is lower than 2.0 Volts for a period of 10mS, the alarm is considered active. Two alarm signals are monitored: one for PS1 (in Matrix A) and one for PS2 (in Matrix B).

#### Power Supply Over Temperature Alarm (OT1/OT2)

An A/D converter is used to monitor the power supply over temperature alarm signals. If a signal is lower than 2.0 Volts for a period of 10mS, the alarm is considered active. Two alarm signals are monitored: one for Power Supply 1 (behind Matrix A) and one for Power Supply 2 (behind Matrix B).

### House Sync Error Alarm (VT1/VT2)

The vertical sync signal frequency is verified to be within the range of 20-100 Hz. The signal input is standard TTL voltage levels and is detected using a standard timing circuit. When it is within the proper range, nothing is sent back.

This alarm is not currently available.

### Synchronous Digital Audio House Sync Error Alarm (RF1/RF2)

An A/D converter is used to monitor the vertical sync alarm signals originating on the external reference interface boards. If a signal is lower than 2.0 Volts for a period of 10mS, the alarm is considered active. Two alarm signals are monitored: one for Matrix A and one for Matrix B.

This alarm is not currently available.

### Output Monitor Control Software Fault Alarm (MON)

An A/D converter is used to monitor the software fault alarm signal generated by the optional output monitor control board. If the signal is lower than 2.0 Volts for a period of 10mS, the alarm is considered active. Only one output monitor control board can be installed in each Tiger audio routing switcher.

## External Control Interface (ECI)

The Alarm Interface board communicates with an external alarm monitoring system through the ECI, an RS-232 or RS-422 asynchronous serial interface. The ECI can be set to operate at either 9600 or 38400 baud.

### Point-to-Point and Multidrop Modes of Operation

The system is able to operate in either a point-to-point or multidrop mode of operation.

Point-to-point mode provides a means of outputting alarm information when the alarm occurs. The information is sent out the serial port in an unsolicited fashion. It is also available through standard query.

The multidrop operation provides a means for a single external control element to communicate with multiple Alarm Interface boards. The Alarm Interface board operates the RS-422 port such that it stays off the transmit bus unless it is being queried for information.

### Message Verification

The ECI has no per-byte handshaking. Instead all messages are confirmed on a per-packet basis using a simple checksum verification method.

### Status Solicitation

The Alarm Interface board can be queried for information by the external control.

### Alarm Latching

When an alarm is determined to be active, this information is stored in the Alarm Interface board until the ECI sends a clear command. Once cleared, the alarm is reevaluated to determine if it still active.

### Time Stamping

The Alarm Interface board has no internal time basis and there is no time stamping of events as to when they occur.

## Power Transitions

No data is retained over power transitions. Upon reset, all status is initialized and all current error conditions are reported to the external control interface.

## Protocol

### Message Format

[<Address>]<Cmd><CmdInfo><Checksum><Terminator>

- Address identifies the Alarm Interface board to which the control is communicating. The Address field is not used when address 0 (zero) has been selected.
- Cmd indicates the information being requested by the control or information being sent back to the control.
- CmdInfo is the information that supplements the command.
- Checksum is a standard 2 character HEX ASCII checksum of the information in the message previous to the checksum.
- Terminator is a linefeed character

## Command Set

### Status Query

The status command allows the ECI to poll the Alarm Interface board for active alarms.

- Command Structure: <Address> Q <CS> <lf>
- Response Structure: <Address> R [<Alarm Codes>…..] <CS> <lf>

The alarm codes indicate those alarms that presently active. The codes concatenate in the response until all active alarms are listed. The codes are 3 letters in length and consist of the following:

- PS1 - Power Supply 1 Output Voltage Alarm
- PS2 - Power Supply 2 Output Voltage Alarm
- OT1 - Power Supply 1 Over Temperature Alarm
- OT2 - Power Supply 2 Over Temperature Alarm
- VT1 - Synchronous Digital Audio Vertical Sync 1 Alarm (Not Used)
- VT2 - Synchronous Digital Audio Vertical Sync 2 Alarm (Not Used)
- RF1 – External Reference 1 Vertical Sync Alarm (Not Used)
- RF2 – External Reference 2 Vertical Sync Alarm (Not Used)
- MON - Output Monitor Control Alarm
- RS0 - Alarm Interface board Reset since last Clear

### Clear Alarms

The status command clears alarms returned by the Alarm Interface board. All alarms will continue to be reported (even if they have subsequently gone away) until the clear command is received.

- Command Structure: <Address> C <CS> <lf>
- Response Structure: <Address> A <CS> <lf>

### Unsolicited Alarms

The response is sent by the Alarm Interface board when it is configured for unsolicited response mode of operation. It is sent whenever an alarm transitions to being active.

- Unsolicited Response Structure: <Address> U <Alarm Code> <CS> <lf>

Alarm Codes are the same as used by the Alarm Query command.

## Sample Query and Response

Command is sent to query for alarm conditions

- 1Q82<lf>

where:

- 1 is a decimal number in ASCII representing the address of the Alarm Interface board
- Q is a query request for active alarm status
- 82 is the HEX-ASCII Checksum
- <lf> is the linefeed terminator

A response is sent indicating Power Supply 1 Output Voltage and Power Supply 2 Over Temp are active alarms

- 1RPS1OT21D<lf>

where:

- 1 is a decimal number in ASCII representing the address of the Alarm Interface board
- R indicates alarm Response information
- PS1 indicates the Power Supply 1 Output Voltage alarm is active
- OT2 indicates the Power Supply 2 Over Temp alarm is active
- 1D is the HEX-ASCII Checksum
- <lf> is the linefeed terminator

# Chapter 4 – Functional Description

## Input Connector Interface Board

This board is a passive interface between 3-pin connectors and the frame Backplane. 144 individual input connectors are routed to multi-pin connectors on the opposite side of the board. From the mating multi-pin connectors, signals are routed through the Backplane to the Input Buffer boards.

## Output Connector Interface Board

This board is a passive interface between BNC and 3-pin connectors, and the frame Backplane. 48 individual output connectors are routed to multi-pin connectors on the opposite side of the board. Signals flow from the Carrier board output amplifiers, across the backplane to the Output connector boards.

At the top of each Output Connector Interface board there are also two BNC connectors which are wired in parallel. These are used for the house sync signal inputs.

There is also an additional 3-pin connector at the top of each board. These connectors are used for the alarm switch interface and the optional output monitor outputs.

## Input Buffer Board (Analog)

The Input Buffer boards (up to 36 per frame) serve several functions: input isolation, drive power to the crosspoints, input level adjustment (optional), and common mode rejection.

One circuit will be described, others are the same. U8 is a dual operational amplifier. One amplifier rejects common mode signals, the second amplifier drives the crosspoints. An optional gain control adjusts the level into the second stage.

R142 balances a bridge input to optimize common mode rejection. The input is DC coupled, as is the entire switcher. The common mode trim pot (R142) is factory adjusted and should not require adjusting. If parts are replaced, common mode rejection should be checked.

Power input is through R51 and R57, resistors used as noise filters and fuses to protect PC board traces in case of a current overload condition.

The circuit with Q1 and Q2 senses the voltage levels (more than 75% voltage present) and provides a confidence feedback signal (J1 pin 3) that tells the controller that the board is present and the power is within the set limit.

J1 pin 3 goes low for normal conditions and goes high for fault (low or missing voltage, or if the board is missing). If this pin is not low, giving a confidence reading that the particular input buffer card is in place and has proper power applied, the micro-controller will not allow any output to switch to any input on that card.

## Input Buffer Board (Digital)

The Input Buffer boards (up to 36 per frame) serve these functions: input isolation, impedance matching, and signal buffering to the crosspoint chips.

One circuit will be described, others are the same. The jumper across the input signal is used to select one of three impedance settings; 75 ohm termination (pins 1 to 3), 110 ohm termination (pins 2 to 4), and high impedance (not loaded). The next stage is a differential input 485 receiver. It drives the signal into the final stage which is an octal bus transceiver. The only LED on this card is a power indicator LED, the power is good if the LED is on. J1 pin 3 goes low for normal conditions and goes high for fault (low or missing voltage, or if the board is missing). If this pin is not low, giving a confidence reading that the particular input buffer card is in place and has proper power applied, the micro-controller will not allow any output to switch to any input on that card.

## 48x16 Crosspoint Board (Analog)

Up to three 48x16 Crosspoint boards can be mounted on each Carrier board, up to 54 Crosspoint boards per frame.

This board selects one of 48 inputs to each of 16 outputs. Each 48x16 Crosspoint board contains 48 crosspoint chips, each chip selects one of sixteen inputs. Three chips together with a 4-in-1 out switch form one output capable of selecting one of forty-eight inputs. Input and output buffer amplifiers isolate the board from surrounding circuits.

Control decoding is provided by a single IC. Off board communication is via serial data lines while on board communication is via parallel static binary data lines.

Diagnostic LEDs include “module active”, a yellow LED that when lit indicates at least one crosspoint on the board is active; and a “program error” LED, a red LED that when lit indicates the program in the control chip (U86) is incomplete (bad data) or missing.

Data to the control chip (U86) is downloaded into the chip from the Carrier board during the power up sequence. It is normal for the red LED to be on momentarily during power up.

Power to the board is through resistors R10, R16, and R20. These are part of a filter circuit as well as serving as fuses in case of current overload. If power is lost on a board, check the resistors for proper value with an ohm meter.

## 48x16 Crosspoint Board (Digital)

Up to three 48x16 Crosspoint boards can be mounted on each Carrier board, up to 54 Crosspoint boards per frame.

This board selects one of 48 inputs to each of 16 outputs. Each 48x16 Crosspoint board contains 6 input buffer chips (octal bus transceivers) that drive into a single Xilinx FPGA. The FPGA contains all circuitry for crosspoint connections, output buffering, and control decoding. Diagnostic LEDs include “module active”, a yellow LED that when lit indicates at least one crosspoint on the board is active; and a “program error” LED, a red LED that when lit indicates the program in the FPGA is incomplete (bad data) or missing.

Data to the FPGA is downloaded into the chip from the Carrier board during the power up sequence. It is normal for the red LED to be on momentarily during power up.

Power to the board is through resistor R1 and bead B1. These are part of a filter circuit as well as serving as fuses in case of current overload. If power is lost on a board, check the resistor for proper value with an ohm meter.

## Carrier Board (Analog)

These boards allow selecting one of 144 inputs to each of 16 outputs. Nine of these boards allow selecting one of 144 inputs to each of 144 outputs. Selection of inputs to outputs can range from one input selected by all outputs (ALL CALL) to a different input selected by each output.

Two diagnostic tools that are available from the PESA controller are “ALL CALL” and “DIAGONAL”. All call allows one signal , e.g., Tone, to be placed on all outputs, a “DIAGONAL” switches input one to output one, input two to output two, three to three, etc.

Each of the three 48x16 matrix cards are detected by the carrier board control processor if they are present. Selection of missing crosspoint boards by the controller is prohibited.

Sections of the circuitry to be discussed include: secondary switches (selection of 1st, 2nd or 3rd crosspoint card), output amplifier and relay, output monitor circuits, power circuit, LED indicators, and control circuits.

### Secondary Switches

Using U1 as an example, one of the three inputs, INA1 (PIN 2), INB1 (PIN 15) or INC1 (PIN 10) is selected depending on the input selected (1-48, 49-96, 97-144 respectively). A fourth selection is possible, PIN 7, which is “OFF”. If the system includes more than 144 inputs and an input is selected which is outside of the range of the frame (1-144) the "OFF" is selected. This allows the outputs to be wire-ORed when multiple frames are in the system (systems with over 144 inputs).

## Output Amplifier and Relay

The output amplifier circuitry consists of an IC switch, e.g. U28, op amps for driving the audio line and a relay at the output.

U28 contains four normally open switches, each individually controllable. This switch is interconnected so that two switches can select ground, the other two can select the output of the secondary switch (S1) and the auxiliary input called "B-A tie". This is a feature added to the board for future use. At this time, only the output of the secondary switch can be selected.

This switch IC drives a summing amplifier which drives a gain stage with gain control, a front of card adjustment. This gain stage then drives the power stage to drive the line.

At the output the signal goes through a relay which can disconnect the line driver amplifier from the line (or output). This is used when outputs are wired-ORed to accommodate systems with greater than 144 inputs.

## Output Monitor Circuits

At the output of each output amp, a balanced line delivers signal to U111 or U112, balanced 1 of 8 switches. These select one of the 16 outputs if the monitor controller so directs. Thus, the 1 of 16 selection performed on each carrier card is the first stage of a two stage output monitoring switch. These switches drive output buffers. From the buffers, the signal goes to the output monitor controller card. There, a 1 of 9 switch selects the proper carrier card output.

## Power Circuit

Power input for each voltage is through a 4 amp fuse and an RC filter. Q8 forms a circuit that senses if any of the voltages are low by more than 25%. If any one or more of the voltages, +20V, -20V or +5V is low or missing, the green LED will dim considerably or go out.

## LED Indicators

LED 1 - GREEN - COMBINER ACTIVE

- One or more crosspoints on this card are in use if this LED is on.

LED 2 - GREEN - COMMUNICATIONS ACTIVE

- This LED will be on or flicker when the communications bus is active. The normal condition is on or flickering.

LED 3 - RED - CPU ERROR

- If this light is on, the downloaded program did not get to the point where this light is turned off. It is normal for this light to be on for a second or two during power up. Under normal conditions this light is off.

## Control Circuits

A microcontroller, U58, receives data from the main system controller, checks which slot the 144x16 card is plugged into and distributes the data as required.

Internal RAM is held up (for hours) by a capacitor in case of power failure. Removal of the card from the frame disconnects the hold up capacitor and the data in RAM is lost.

## Carrier Board (Digital)

These cards allow selection of one of 144 inputs to each of 16 outputs. Nine of these cards can be used to select one of 144 inputs to each of 144 outputs. Each of the three matrix cards outputs is connected to a single Xilinx FPGA. The FPGA contains all circuitry for crosspoint connections, output buffering, output monitoring, and control decoding. The output signal from the FPGA is connected to an optional re-clocking chip (0 ohm resistor is used to bypass re-clocker) and then is routed to the output buffer chip (485 transceiver) which drives the signal onto the backplane. The bus off pin of the chip can shut down the transmitter on the output buffer. This is used when multiple frames are connected together.

The control circuit contains a micro-controller that receives data from a main system controller, determines which cards are loaded, and distributes the data to the appropriate cards. The internal RAM is backed up by a large capacitor in the event of a power failure. The removal of the card disconnects the back up power and clears the memory.

The LED indicators are:

- +5v - Positive 5 volts from the main power supply, i.e. the backplane.
- +5va – Positive 5 volts from the on board power supply, i.e. derivative of +/-20 volts from the backplane.
- Combiner active – One or more crosspoints on this card are in use if this LED is on.
- Comm active – This LED will be on or flickering when the communications bus is active.
- CPU error – If this LED is on, the downloaded program has not completed or is corrupt. This LED will be on at initial power up for a few seconds. The normal condition is off.
- Program error – If this LED is on, it indicates the program in the FPGA is incomplete (bad data) or missing. The normal condition is off.

## External Reference Interface Board

Two identical circuits reside on the External Reference Interface board. Different house sync signals (e.g. NTSC and PAL) can drive each circuit. Dual outputs from each circuit drive different parts of the frame. With two of these cards in a frame, backup timed switching is assured.

Care must be exercised, when using multiple house sync signals, to supply the same signal to REF A1 and REF B1. Similarly, be sure that the same signal is connected to REF A2 and REF B2. If only one house sync signal is used, it can be connected to all four inputs.

A green LED is supplied which indicates that the power is OK. Test points are available for exact readings.

## Power Input Filter

The Power Input Filter reduces the amount of radiated and conducted electrical noise leaving the frame through the line cord.

The Power Input Filter enclosure contains no user serviceable parts. When connected to the power line, it contains dangerous voltages.

Although the frame will function if the Power Input Filter is removed and power is supplied directly to the power supply, FCC mandated emission standards will not be met.

## Power Supply

With proper airflow, the Tiger Audio Power Supply will provide 4 amps each from ±20 volts. It will also supply 15 amps of +5 volts. These ratings are for line voltages from 95 to 250 volts AC or DC. Although the unit may operate outside of this range, higher temperatures will be generated with a significant reduction in life expectancy.

A power factor correction circuit forms the input stage. This provides a regulated 350VDC to the output modules. Each module provides one regulated isolated output voltage. After the modules, the output of each goes through an isolation diode. This allows the supplies to be paralleled for backup with auto switchover. They do not normally share the output load.

Also on the power supply assembly are two alarm circuits, a shutdown circuit and a fan speed control circuit.

One alarm circuit is activated if any of the three outputs fail. The second alarm activates if the output module heat sink reaches about 85°C. The supply will continue to work until the modules automatically shut down at 90-95°C. A red LED on the front of the unit indicates an over temp condition. The thermal switch sensing the heat sink for the power factor correction semiconductor activates at 85°C. Jumper J1 allows the user to select whether the supply shuts down when this switch closes or continues to run. Units are normally shipped with the jumper in the no shutdown position.

Frame fan speed control circuitry senses the ambient temperature in the power supply and increases fan speed with increasing temperature.

Each fan circuit has a diode output so that with redundant power supply, either circuit will drive both fans. The highest temperature supply normally controls the fan.

## Alarm Interface Board

The Alarm Interface board's electronic circuits contain several main circuits: power, microprocessor, board coding, alarm control port, alarm monitor, and alarm output circuits.

### Power

The Alarm Interface board uses regulated +5Vdc and -20Vdc supplied by an external power supply. Fuses X1 and X2 provide over current protection for this board. LED1 provides a visible indication that voltage is applied to the board. Capacitors C17-C20 provide low-frequency filtering for the power rails. Bypass capacitors scattered around the board provide noise filtering for the power supply. Ferrite beads B6 and B7 help eliminate conducted EMI back into the power supplies.

### Microprocessor

The microprocessor circuit on the Alarm Interface board primarily consists of U10 (68HC711E9 microprocessor) and U11 (8K SRAM memory). Power on reset for the microprocessor is provided by U8 and clock is provided by U7 (7.3728MHz oscillator). U5 de-multiplexes the low order address lines during bus cycles. U12 (3 to 8 decoder) serves as an address decoder.

### Board Coding

The code select circuit on the Alarm Interface board is comprised of U3 (octal transceiver), DIP switches S1 and S2 and associated pull-up resistors. These switches are used to specify various configuration settings for the board. Closing a switch grounds the input pin of the transceiver; open switches allow the pull-up resistor to pull the transceiver pin to VCC. The microprocessor reads the state of the switches by performing a read cycle at the appropriate address. When addressed, the transceiver places the state of the switches on the data bus.

### Alarm Control Port

The alarm control port is used to pass commands and status between an external controller and the microprocessor on the Alarm Interface board. U1 is an RS-422 receiver/transmitter. U2 is an RS-232 receiver/transmitter. The user may select either RS-422 or RS-232 operation by placing a jumper block between J1 and J2 or J1 and J3.

### Alarm Monitor

The alarm monitor circuit on the Alarm Interface board is composed of U9 (16X1 multiplexer) and its associated components. The microprocessor uses U19 to select the various alarm outputs from the power supplies and circuit cards installed in the frame.

### Alarm Output

U6 (octal register) drives the indicator LEDs (LED2-LED4) and the alarm output driver U4 (opto-coupler). When an alarm condition occurs, LED4 will be illuminated and U4 will provide an alarm closure for the optional external alarm. LED3 is illuminated during the reception of data over the alarm control port and LED2 is illuminated during the transmission of data over the alarm control port.

## Output Monitor Control Board

The Output Monitor Control board's electronic circuits contain several main circuits: power, microprocessor, board coding, PRC control port, matrix control, matrix, and output circuits.

### Power

The Output Monitor Control board uses regulated +5Vdc and ±20Vdc supplied by an external power supply. Additionally, -5Vdc is derived from the -20Vdc supply by dropping 15 volts across Zener diode D2. Fuses X2, X4 and X6 provide over current protection for this board. LED1 provides a visible indication that voltage is applied to the board. Capacitors C29, C30, C31, C37, C48 and C49 provide low-frequency filtering for the power rails. Bypass capacitors scattered around the board provide noise filtering for the power supply. Ferrite beads B5, B6 and B7 help eliminate conducted EMI back into the power supplies.

### Microprocessor

The microprocessor circuit on the Output Monitor Control board primarily consists of U5 (68HC711E9 microprocessor) and U3 (8K SRAM memory). Power on reset for the microprocessor is provided by U14 and clock is provided by U13 (7.3728MHz oscillator). U1 de-multiplexes the low order address lines during bus cycles. U2 and U4 (3 to 8 decoders) serve as address decoders.

### Board Coding

The code select circuit on the Output Monitor Control board is comprised of U23, U11, U24 and U12 (octal transceivers), DIP switches S1 through S8, and associated pull-up resistors. These switches are used to specify input, output, level and vertical trigger settings for the controller.

The Output Monitor Control board handles two independent monitor outputs and coding switches are provided for each output. U23 reads the settings of S5 and S6, U11 reads S1 and S2, U24 reads S7 and S8, and U12 reads S3 and S4. Closing a switch grounds the input pin of the transceiver; open switches allow the pull-up resistor to pull the transceiver pin to VCC. The microprocessor reads the state of the switches by performing a read cycle at the appropriate address. When addressed, the selected transceiver places the state of the switches on the data bus.

### PRC Control Port

The PRC control port is used to pass commands and status between an external controller and the microprocessor on the Output Monitor Control board. U19 is an RS-422 receiver/transmitter. Operational amplifier U21 buffers the incoming signal (thereby reducing the load presented by this board to the external controller). The receiver section of U19 is always enabled (U19 pin 3). The transmitter section is only enabled when this board transmits data to the external controller (enable on U19 pin 4).

## Matrix Control

The Output Monitor Control board provides a control data stream for each of the two monitor outputs. The microprocessor generates MON_DATA and MON_CLK on U5 pins 23 and 24, respectively. U5 pin30 is used to differentiate between the two outputs. This pin is held low for the first output and is held high for the second. Two NAND gates (U16 pins 1, 2, 3 and 4, 5, 6) along with inverters (U15 pins 5, 6 and 11, 10, and 9, 8) use the processor generated signals to produce two individual clock signals A_MON_CLOCK and B_MON_CLOCK. Two back-to-back inverters (U15 pins 1, 2 and 3, 4) provide a matching delay for the data signal. U22 buffers the resulting signals before driving off-board to the monitor crosspoints in each output stage of the main matrix. The monitor data is also latched into U20 and U30. These latches provide addressing for the combiner crosspoints located on the Output Monitor Control board.

## Matrix

Each Carrier board in the audio frame provides a differential pair of audio signals carrying the selected output to be monitored by each card. Crosspoints U9 and U10 select one of these nine pair to be monitored for Matrix A. Likewise, U31 and U32 select the output to be monitored by Matrix B. The selected audio signal is then passed to the output stage.

## Output

The Output Monitor Control board may be populated for either analog or digital operation. For analog operation, operational amplifiers U6, U7, and U8 provide sufficient gain to drive an external connection for the Matrix A output. Relay K1 provides bus-off ability for multi-frame applications. U27, U28, U29 and K2 are used for the Matrix B output.

For digital operation, U33 reclocks the audio signal, and U35 provides drive for the Matrix A output. Likewise, U34 and U36 are used for the Matrix B output.

# Chapter 5 – Maintenance and Repair

## Maintenance

This equipment has been designed to give long, trouble-free service with very little maintenance. Under normal service conditions, the only routine maintenance required is to monitor the air filter for cleanliness.

**CAUTION**

This equipment contains static sensitive devices. A grounded wrist strap and mat should be used when handling the internal circuit boards.

**NOTE**

This equipment has been designed so maintenance operations can be performed while the equipment is operational (has power applied). Only the power supply assemblies and the AC line circuits contain potentially lethal shock hazards.

### Air Filter

The air filter should be checked monthly to ensure that an adequate supply of clean air is available to cool this equipment. If the air filter is dirty, it may be cleaned or replaced with a new air filter (PESA Part No. 81-9021-0620-0). Cleaning may be performed with low pressure air, vacuum, or the use of mild soap and water. Do not use any solvents to clean the air filter.

## Troubleshooting

### Subassembly LEDs

In the rare event this equipment fails to operate correctly, check the appropriate LEDs listed below for information concerning operational status.

## Power Supply

| LED | Color | Schematic Legend | Normal State | Troubleshooting Info |
|---|---|---|---|---|
| 1 | GRN | Power OK | ON | Indicates that output voltage is within design parameters.<br><br>If LED is OFF:<br>1. Check input power connections.<br>2. Replace the power supply.<br>3. Contact PESA Customer Service. |
| 2 | RED | Over Temp | OFF | Indicates that the power supply operating temperature is within design parameters.<br><br>If LED is ON:<br>1. Check for blocked air flow.<br>2. Check for low line voltage.<br>3. Replace the power supply.<br>4. Contact PESA Customer Service. |

## Input Buffer Board (Analog)

| LED | Color | Schematic Legend | Normal State | Troubleshooting Info |
|---|---|---|---|---|
| 1 | GRN | Power OK | ON | Indicates that input voltage to the PCB is within design parameters.<br><br>If LED is OFF:<br>1. Remove and reinstall board to verify backplane connector is properly seated.<br>2. Check power supplies for proper operation.<br>3. Contact PESA Customer Service. |

## Input Buffer Board (Digital)

| LED | Color | Schematic Legend | Normal State | Troubleshooting Info |
|---|---|---|---|---|
| 1 | GRN | Power OK | ON | Indicates that input voltage to the PCB is within design parameters.<br><br>If LED is OFF:<br>1. Remove and reinstall board to verify backplane connector is properly seated.<br>2. Check power supplies for proper operation.<br>3. Contact PESA Customer Service. |

### External Reference Interface Board

| LED | Color | Schematic Legend | Normal State | Troubleshooting Info |
|---|---|---|---|---|
| 1 | GRN | n/a | ON | Indicates that input voltage to the PCB is within design parameters.<br><br>If LED is OFF:<br>1. Remove and reinstall board to verify backplane connector is properly seated.<br>2. Check power supplies for proper operation.<br>3. Contact PESA Customer Service. |

### 48x16 Crosspoint Board (Analog)

| LED | Color | Schematic Legend | Normal State | Troubleshooting Info |
|---|---|---|---|---|
| 1 | YEL | Module Active | ON | Indicates that the module is in use.<br><br>This LED will be ON if at least one crosspoint on the board is active. |
| 2 | RED | Program Error | OFF | Indicates the absence of software errors.<br><br>If this LED is ON:<br>1. Remove and reinstall board to verify crosspoint board/carrier board connector and carrier board/backplane connectors are properly seated.<br>2. Contact PESA Customer Service. |

## Carrier Board (Analog)

| LED | Color | Schematic Legend | Normal State | Troubleshooting Info |
|---|---|---|---|---|
| 1 | GRN | Combiner Active | ON | Indicates that the combiner is in use.<br><br>This LED will be ON if at least one crosspoint on the board is active. |
| 2 | GRN | Comm Active | ON | Indicates that the PRC bus is in use.<br><br>It is normal for this LED to flicker on and off as data is being transmitted over the PRC bus. |
| 3 | RED | CPU Error | OFF | Indicates the absence of software errors.<br><br>If this LED is ON:<br>1. Contact PESA Customer Service |
| 4 | GRN | n/a | ON | Indicates that input voltage to the PCB is within design parameters.<br><br>If LED is OFF:<br>1. Remove and reinstall board to verify backplane connector is properly seated.<br>2. Check power supplies for proper operation.<br>3. Contact PESA Customer Service. |

## 48x16 Crosspoint Board (Digital)

| LED | Color | Schematic Legend | Normal State | Troubleshooting Info |
|---|---|---|---|---|
| 1 | RED | Program Error | OFF | Indicates the absence of software errors.<br><br>If this LED is ON:<br>1. Remove and reinstall board to verify crosspoint board/carrier board connector and carrier board/backplane connectors are properly seated.<br>2. Contact PESA Customer Service |
| 2 | YEL | Module Active | ON | Indicates that the module is in use.<br><br>This LED will be ON if at least one crosspoint on the board is active. |

## Carrier Board (Digital)

| LED | Color | Schematic Legend | Normal State | Troubleshooting Info |
|---|---|---|---|---|
| 1 | RED | CPU Error | OFF | Indicates the absence of software errors.<br><br>If this LED is ON:<br>1. Contact PESA Customer Service |
| 2 | GRN | Comm Active | ON | Indicates that the PRC bus is in use.<br><br>It is normal for this LED to flicker on and off as data is being transmitted over the PRC bus. |
| 3 | YEL | Combiner Active | ON | Indicates that the combiner is in use.<br><br>This LED will be ON if at least one crosspoint on the board is active. |
| 4 | GRN | +5VA | ON | Indicates that the output voltage of the power supply on this PCB is within design parameters.<br><br>If this LED is OFF:<br>1. Replace this PCB.<br>2. Contact PESA Customer Service. |
| 5 | GRN | +5 Volts | ON | Indicates that input voltage to the PCB is within design parameters.<br><br>If LED is OFF:<br>1. Remove and reinstall board to verify backplane connector is properly seated.<br>2. Check power supplies for proper operation.<br>3. Contact PESA Customer Service. |
| 6 | RED | Program Error | OFF | Indicates the absence of software errors.<br><br>If this LED is ON:<br>1. Contact PESA Customer Service |

## Output Monitor Control Board (Analog and Digital)

| LED | Color | Schematic Legend | Normal State | Troubleshooting Info |
|---|---|---|---|---|
| 1 | GRN | Power OK | ON | Indicates that input voltage to the PCB is within design parameters.<br><br>If LED is OFF:<br>1. Remove and reinstall board to verify backplane connector is properly seated.<br>2. Check power supplies for proper operation.<br>3. Contact PESA Customer Service. |
| 2 | RED | Fault | OFF | Indicates the absence of software errors.<br><br>If this LED is ON:<br>1. Contact PESA Customer Service |

## Alarm Interface Board

| LED | Color | Schematic Legend | Normal State | Troubleshooting Info |
|---|---|---|---|---|
| 1 | GRN | n/a | ON | Indicates that input voltage to the PCB is within design parameters.<br><br>If LED is OFF:<br>1. Remove and reinstall board to verify backplane connector is properly seated.<br>2. Check power supplies for proper operation.<br>3. Contact PESA Customer Service. |
| 2 | GRN | TX Data | OFF | Indicates that the alarm port is not transmitting data.<br><br>It is normal for this LED to flicker on and off as data is being transmitted over the alarm bus. |
| 3 | GRN | RX Data | OFF | Indicates that the alarm port is not receiving data.<br><br>It is normal for this LED to flicker on and off as data is being received from the alarm bus. |
| 4 | RED | Frame Alarm | OFF | Indicates the absence of alarm conditions.<br><br>If LED is ON:<br>1. Check the other system LEDs to determine the origin of the alarm and take appropriate corrective action.<br>2. Contact PESA Customer Service. |

## Carrier Board Gain Adjustment

The Carrier board gain adjustment is set at the factory and should not be changed in the field without first contacting the PESA Customer Service Department.

## Output Monitor Control Board Gain Adjustment

The Output Monitor Control board gain adjustment is set at the factory and should not be changed in the field without first contacting the PESA Customer Service Department.

## PESA Customer Service

If the troubleshooting information above has not solved your problem, please contact the PESA Customer Service Department. Skilled technicians are available to assist you 24 hours per day, seven days per week.

Detailed contact information for the Customer Service Department is located inside the front cover of this document.

## Repair

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

**WARNING**

The power supply assemblies in this equipment are not field/user serviceable. These offline switching power supplies contain internal voltages in excess of 300VDC and are not isolated from the AC power source. They should only be serviced by qualified service personnel using appropriate equipment. Because of this, it is strongly suggested that power supplies be returned to the PESA Customer Service Department for service.

**CAUTION**

Many of the PC boards in this equipment contain large numbers of SMT (Surface Mount Technology) components. Special tools are required to replace these components without causing damage to adjacent areas. It is strongly recommended that PESA Customer Service be consulted prior to attempting to repair any of the PC boards in this equipment

### 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. For this reason, we suggest that you consult our Customer Service Department before installing any parts not purchased from PESA.

### Factory Service

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

Detailed contact information for the Customer Service Department is located inside the front cover of this document.

## PESA Documentation

| | |
|---|---|
| IL35-1119 | Drawing Tree, Tiger Audio Switcher |
| WI50-0250 | Wiring Diagram, Cougar Looping Control Cable |
| 81-9059-0405-0 | Manual, Tiger Audio Routing Switcher |
| 81-9062-0316-0 | PESA Router Control Protocol (PRC) |

# Glossary

(Revised: 02-19-01)

## AES/EBU

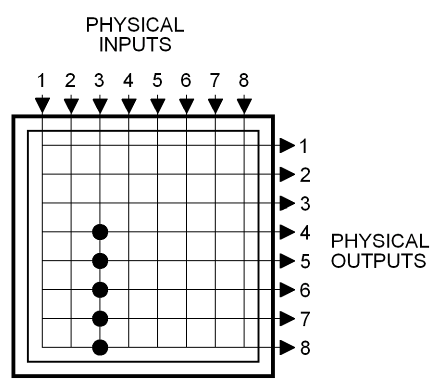
Informal name for a digital audio standard established jointly by the Audio Engineering Society (www.aes.org) and the European Broadcasting Union (www.ebu.ch).

## All Call

A diagnostic procedure that causes a single physical input to be switched to a range of physical outputs, for a specified component, with a single command.

Example: Assume the existence of component RED which spans physical inputs 1 through 8 and physical outputs 1 through 8. All call could be used to switch physical input 3 to physical outputs 4 through 8 with a single command.

See also: Diagonal.




Component: RED 8x8

## ANSI

American National Standards Institute (www.ansi.org).

## Baud

The number of signaling elements that occur each second.

Below 1200 baud, only one bit of information (one signaling element) is encoded in each electrical change. At these speeds baud indicates the number of bits per second.

For example, at 300 baud, 300 bits are transmitted per second (300 bps). Assuming asynchronous communication, which requires 10 bits per character, this translates to 30 characters per second (cps).

Above 1200 baud, it is possible to encode more than one bit in each electrical change. At these speeds, data transmission rates are usually expressed in bits per second (bps) rather than baud.

For example, a 2400 bps modem conforming to CCITT V.22 operates at 600 baud.

Baud was originally a unit of telegraph signaling speed, set at one Morse code dot per second. It was proposed at the International Telegraph Conference of 1927, and named after French Engineer J.M.E. Baudot (1845-1903).

## Black Burst

A composite color video signal which has sync, color burst, and black video. It is used to synchronize other video sources to the same sync and color information.

See also: House Sync.

## Block

A group of contiguous crosspoints in a routing switcher which form the smallest unit on which confidence is checked.

Because of the nature of the circuits involved, individual crosspoints cannot be checked to see if they are operating correctly. Instead, the control circuitry shared by groups of crosspoints is monitored. These groups of crosspoints, called blocks, vary in size according to product type. Block size for RM5 routing switchers is 8 inputs by 2 outputs and block size for PRC routing switchers is 8 inputs by 8 outputs. If any block gives a confidence error, all crosspoints in that block are assumed to be non-functional.

## Block Checking

The continuous, sequential monitoring of confidence for each block in a routing switcher.

Block checking occurs automatically and continuously but can be disabled for troubleshooting purposes.

## Blocked Destination

See: Source Block.

## Blocked Source

See: Source Block.

## Breakaway Switch

A switch where more than one source is switched to a single destination on multiple levels.

Example: Assume the existence of two sources VTR1 and VTR2 which are defined on levels VIDEO and AUDIO, and a destination MON1 which is defined on the same levels. VTR1 is switched to MON1 on the VIDEO level and VTR2 is switched to MON1 on the AUDIO level. The signal reaching MON1 will have the video from VTR1 and the audio from VTR2.

See also: Follow Switch.

## Category

The first portion of a source, destination, or reentry name.

Categories provide an easy means of classifying and grouping switching system devices.

An example of a category is VTR which could be used with the indices 1, 2, and 3 to create the source names VTR 1, VTR 2, and VTR 3.

Category names are one to six characters in length and are constructed using uppercase letters and numbers. The first character must be a letter. Embedded spaces are not permitted.

## Chop

Rapidly switch two different video signals into a monitor or other piece of test equipment. This is done to compare some characteristic of the signals, usually for quality control.

## Chop Rate

The parameter used to control the switching rate when chopping two signals. The signal switching rate is determined as follows:

$$\frac{\text{Video Frame Rate (Frames/Second)}}{\text{Chop Rate}} = \text{Signal Switching Rate (Switches/Second)}$$

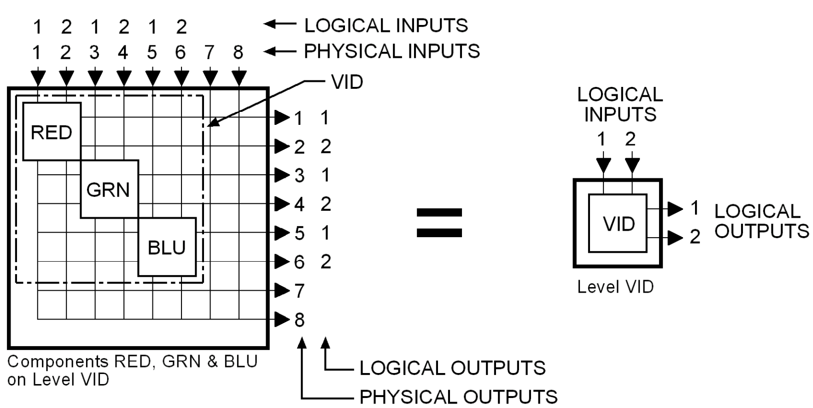
For example, a chop rate of 1 used with NTSC signals (30 Frames/Second) will cause the signals to be switched 30 times per second. A chop rate of 60 used with the same signals will cause them to be switched every two seconds.

## Component

The most basic signal element which can be switched by a single crosspoint. For example, in RGB video, “Red”, “Green”, and “Blue” are components; in stereo audio, “Left” and “Right” are components

In Matrix Space, components of like type are usually grouped together into rectangular matrices of crosspoints having contiguous inputs and outputs. These matrices are also referred to as components and are grouped together into levels.

The example below shows a 2x2 RGB video level made up of three components, “RED”, “GRN”, and “BLU”.




As a general rule, users control the switching of levels, but component switching is handled automatically by the switching system. In the example above, a user could specify a single logical switch, such as VID Input 1 to VID Output 2. This would result in the control system software taking three physical switches by activating crosspoints (1,2), (3,4), and (5,6).

Component names are one to eight characters in length and are constructed using uppercase letters, numbers, and spaces. The first character must be a letter.

## Composite Video

A type of video signal which contains luminance, chrominance, blanking, and synchronizing information. NTSC, PAL, and SECAM are composite video signals, as opposed to RGB video which is not.

See also: Vertical Sync Signal.

## Confidence

A property of a block that indicates whether or not the circuitry controlling the crosspoints in the block is functioning correctly.

When block checking determines that a block is not functioning correctly, the block is said to have a confidence error.

## Confidence Error

See Confidence.

## Configuration

A collection of system definitions that define the environment in which the system controller operates.

The files which comprise a configuration are stored on a PC as either .dbf format files or text files. Each configuration requires its own separate subdirectory.

Configuration names may have up to 32 alphanumeric characters.

## Configuration Lock

A security measure enabled when a configuration is being uploaded or downloaded.

A configuration lock is used to ensure that only one user at a time may download a configuration to the controller.

## Control Panel

See: Panel.

## CPU Link

A bi-directional, communications interface on a system controller. A CPU link has two components: a serial port (RS-232 or RS-422), and a communications protocol to govern how the port is used.

## Crosspoint

The circuitry and components on a printed circuit board which constitute a single physical switch.

See also: Physical Switch.

## Data Key

A user configurable control panel key, whose assigned function is used when the panel is in any mode except Salvo Select Mode.

Many control panels have user configurable keys. Each key can be assigned two functions, one as a data key and one as a salvo key. When the keys are pressed, the data key functions are used except when the panel is in salvo mode.

## Data Key List

A named list of the functions assigned to each data key on a panel.

Multiple panels may share a data key list as long as they are the same type of panel. Different panel types may not use the same data key list.

Data key list names are one to eight characters in length and are constructed using uppercase letters, numbers, and spaces. The first character must be a letter.

## Default Destination

The destination for which status will be displayed when power is applied to a panel, or when a new configuration is downloaded to the controller.

Although not mandatory, it is recommended that a default destination be selected for each panel.

## Destination

One or more logical outputs (limited to one per level), on one or more levels, which are switched together as a group.

Destination names are constructed using one category followed by 0, 1 or 2 indices. If no index is selected, the default “00” (which is not displayed) will be used.

## Destination Block

See: Source Block.

## Destination Group

See: Destination.

## Destination Include List

A named list of the destinations a specific control panel is authorized to control.

A destination include list may be shared by multiple panels.

The default destination assigned to a panel may be controlled even if it is not on the destination include list.

Destination include list names are one to eight characters in length and are constructed using uppercase letters, numbers, and spaces. The first character must be a letter.

## Destination Number

A number assigned to each destination by the controller and used by CPU Protocol 1.

Destination numbers are also assigned to reentries.

## Destination Status

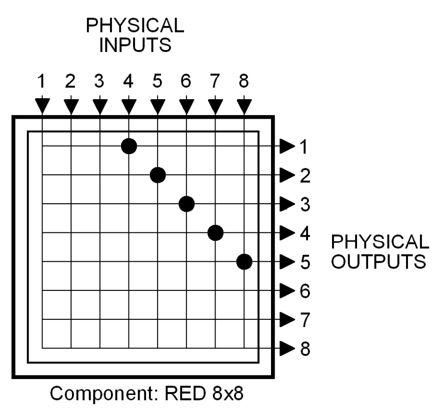
See: Status.

## Diagonal

A diagnostic procedure that causes a range of physical inputs to be switched to a range of physical outputs, in a diagonal pattern starting from a specified coordinate and continuing until the either the inputs or outputs are exhausted, for a specified component, with a single command.

Example: Assume the existence of a component RED which spans physical inputs 1 through 8 and physical outputs 1 through 8 on a routing switcher. A diagonal with a starting input of 4 and a starting output of 1 would cause the following physical switches to be taken: (4,1), (5,2), (6,3), (7,4), and (8,5).

See also: All Call.




## EIA

Electronic Industries Alliance (www.eia.org).

## Follow Switch

A switch where a single source is switched to a single destination on all levels.

Example: Assume the existence of a source VTR1 which is defined on levels VIDEO and AUDIO, and a destination MON1 which is defined on the same levels. VTR1 is switched to MON1 on both the VIDEO level and AUDIO level. The signal reaching MON1 will have the video and audio from the same source, VTR1.

This is the most common manner in which switches are taken on a routing switcher.

See also: Breakaway Switch.

## House Black

See: House Sync.

## House Sync

A composite color video signal which has sync, color burst, and black video. It is used to synchronize other video sources to the same sync and color information.

## Index

The last portion of a source, destination, or reentry name.

Indices provide an easy means of differentiating similar switching system devices.

Each source, destination or reentry name may use 0, 1 or 2 indices. If no index is used, “00” is the default but is not displayed. An example of indices are 1, 2, and 3 which could be used with the category VTR to create the destination names VTR 1, VTR 2, VTR 3, VTR 12, and VTR 22.

Indices are one character in length and are constructed using uppercase letters and numbers. The character 0 (zero) is a default index which may not be changed or deleted.

## Input Offset

In matrix space, the amount by which the origin of a component on strobe x, is offset from the origin of strobe x, measured along the input axis.

The coordinates of crosspoints in matrix space are determined by the strobe they reside on, and their input and output numbers. They are given in the form (input,output) on strobe x. The origin of a component (a matrix of crosspoints) is designated by the point which falls nearest the origin of its strobe (1,1). In Figure A below, the 3x4 component bounded by coordinates (3,2), (5,2), (5,5), and (3,5) has its origin at (3,2).

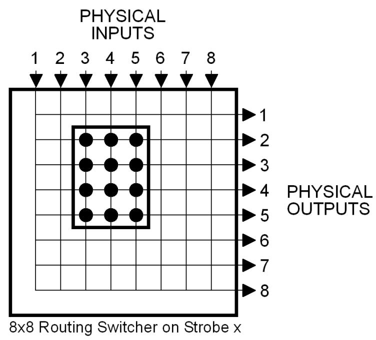



**Figure A**

Input offset is the amount by which the origin of a component is offset from the origin of its strobe, measured along the input axis. A component whose origin coincides with that of its strobe (1,1) will have an input offset of 0. The component shown in Figure A above, has an input offset of 2.

When multiple routing switchers are assigned to the same strobe, the input and output connectors are renumbered to provide a unique coordinate for each crosspoint. Crosspoint coordinates are then determined in the same manner as above. The component shown in Figure B below, has its origin at (12,7) and an input offset of 11.

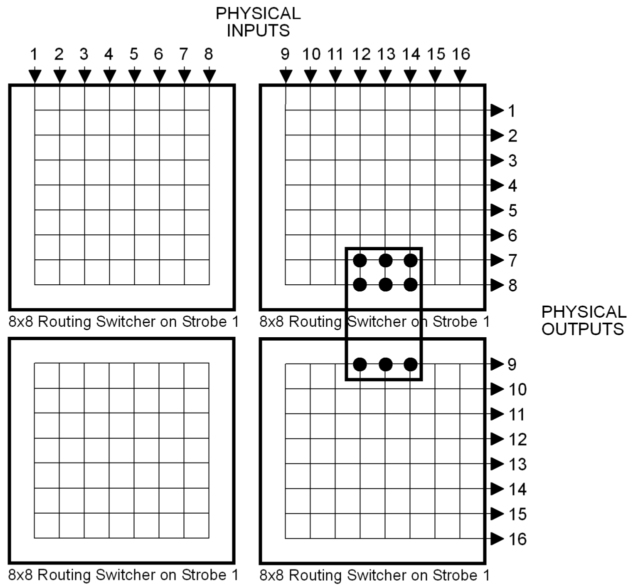

PHYSICAL INPUTS
1 2 3 4 5 6 7 8
9 10 11 12 13 14 15 16
1 2 3 4 5 6 7 8
PHYSICAL OUTPUTS
9 10 11 12 13 14 15 16
8x8 Routing Switcher on Strobe 1
8x8 Routing Switcher on Strobe 1
8x8 Routing Switcher on Strobe 1
8x8 Routing Switcher on Strobe 1

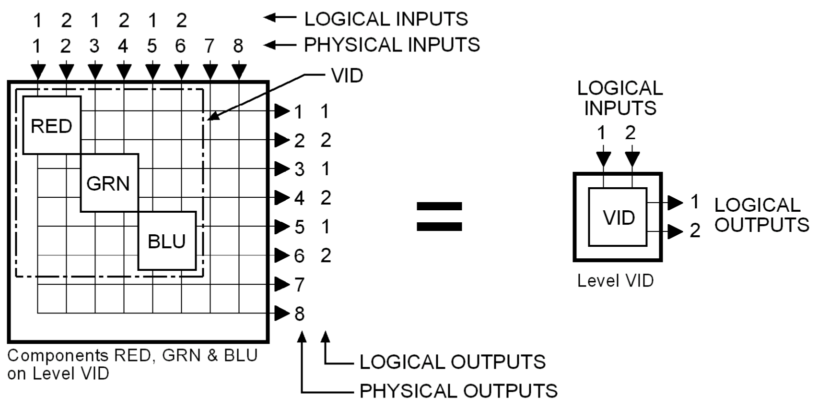
**Figure B**

## Level

A group of related components that are switched together.

A level is sometimes referred to as a level of control and is the basic granularity seen by a user. The components which comprise a level will always be switched together except when performing diagnostic operations.

The example below shows a 2x2 RGB video level made up of three components, “RED”, “GRN”, and “BLU”, all of which are switched together at the same time.




As a general rule, users control the switching of levels, but component switching is handled automatically by the switching system. In the example above, a user could specify a single logical switch, such as VID Input 1 to VID Output 2. This would result in the control system software taking three physical switches by activating crosspoints (1,2), (3,4), and (5,6).

Level names are one to eight characters in length and are constructed using uppercase letters, numbers, and spaces. The first character must be a letter.

## Level Order

A property assigned to a level which controls the order of display when levels are displayed on a control panel or addressed in CPU link protocols.

## Levels of Control List

A named list of the levels a specific control panel is authorized to control.

Multiple panels may share a levels of control list.

Levels of control list names are one to eight characters in length and are constructed using uppercase letters, numbers, and spaces. The first character must be a letter.

## Local Modem

A modem connected to a PC running control system software such as Win3500Plus.

See also: Remote Modem.

## Lock

A property placed on a destination that prevents all panels and ports from taking a switch on that destination, including the panel or port that locked it.

Locks may be cleared by any panel or port that has the same requester code and lock priority as the panel that locked the destination, that has a higher lock priority, or that has a lock priority of 0 (zero).

See also: Lock Priority, Protect.

## Lock Priority

A property of panels and ports which allows them to be grouped with other panels or ports for the purpose of establishing lock and protect authority.

The lower the lock priority number, the higher the priority. Panel lock priorities not explicitly defined automatically default to "0" which gives absolute authority to clear any lock or protect on the system.

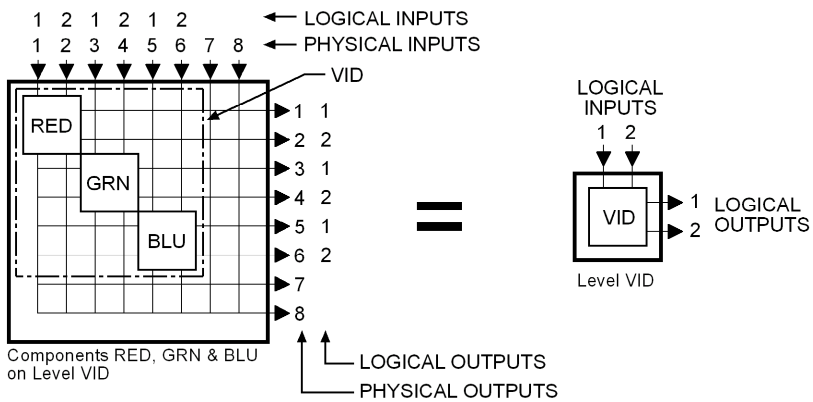
See also: Lock, Protect.

## Logical Input

One or more physical inputs which are switched together as a group.

Logical inputs and outputs are switched level-by-level. Since each level may have more than one component, switching a single logical input or output may involve switching more than one physical input or output.

For example, a RGB input signal represents three physical inputs because it is connected to three input connectors on the routing switcher. However, since all three components (R, G, and B) are switched together as a level, it is a single logical input.




Logical inputs are numbered sequentially, level-by-level, beginning with 1. Input numbers are assigned in the same order as the physical inputs to the component(s) of the level. Since a routing switcher may be configured to have more than one level, it may have more than one logical input designated as number 1. However, within each level, every logical input will have a unique number. Logical outputs are numbered in the same manner. Logical input/output numbering is handled automatically by the control system software as components are configured.

See also: Physical Input.

## Logical Output

See: Logical Input.

## Logical Switch

The control system software command that switches a logical input to a logical output.

See also: Physical Switch.

## Matrix Breakup

The division of a single physical matrix into one or more components.

Matrix breakup allows complex signal types to reside within a single physical matrix. For example, a video matrix is often broken into R, G, and B components.

Matrix breakup is a software function handled by the control system software.

## Matrix Space

A three-dimensional mathematical model of the crosspoints in a switching system.

The coordinates of crosspoints in matrix space are given in the form (input,output) on strobe x.

When a switching system is physically made up of only one routing switcher, the crosspoint coordinates are the same as the input and output connector numbers, and the resulting matrix space has only two dimensions. For example, the coordinates of the crosspoint indicated in Figure A is (4,2) on strobe 1.

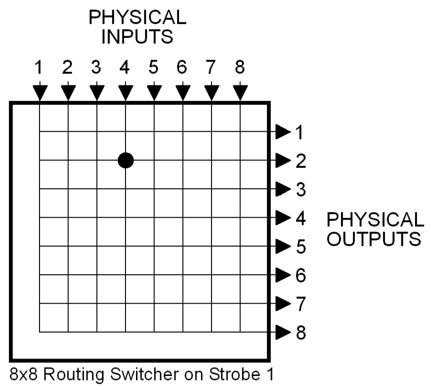



**Figure A**

Two-dimensional matrix space can also be composed of the crosspoints located in multiple routing switchers. The input and output connectors on the additional routing switchers are renumbered as required to ensure that each crosspoint can be identified by a unique (input,output) coordinate. When switching systems are constructed in this manner, matrix space size is no longer constrained by routing switcher size. The switching system shown in Figure B consists of four 8x8 routing switchers assigned to the same strobe. The coordinates of the indicated crosspoint are (12,14) on strobe 1.

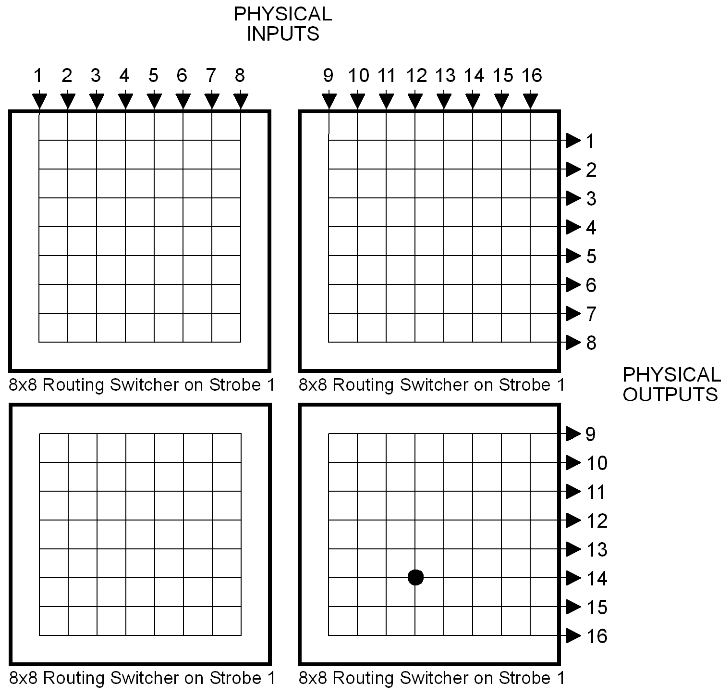



**Figure B**

Strobe numbers are used to introduce a third dimension into matrix space. Every routing switcher in a switching system is assigned to a strobe. In systems using more than one strobe (and, therefore having three-dimensional matrix space), crosspoint coordinates are given in the form (input,output) on strobe x. In Figure C, the coordinates of the indicated crosspoint in the left routing switcher are (4,2) on strobe 1. The coordinates of the crosspoint on the right are (4,2) on strobe 2.

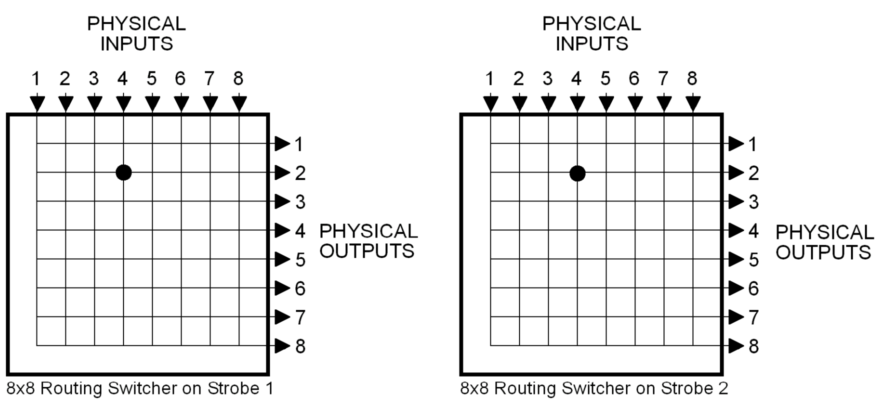



**Figure C**

## NTSC

National Television Standards Committee. The NTSC was responsible for setting television and video standards in the United States. The NTSC standard for television defines a composite video signal with a refresh rate of 60 half-frames (interlaced) per second. Each frame contains 525 lines and can contain 16 million different colors.

See also: PAL, SECAM.

## Output Offset

In matrix space, the amount by which the origin of a component on strobe x, is offset from the origin of strobe x, measured along the output axis.

The coordinates of crosspoints in matrix space are determined by the strobe they reside on, and their input and output numbers. They are given in the form (input,output) on strobe x. The origin of a component (a matrix of crosspoints) is designated by the point which falls nearest the origin of its Strobe (1,1). In Figure A below, the 3x4 Component bounded by coordinates (3,2), (5,2), (5,5), and (3,5) has its origin at (3,2).

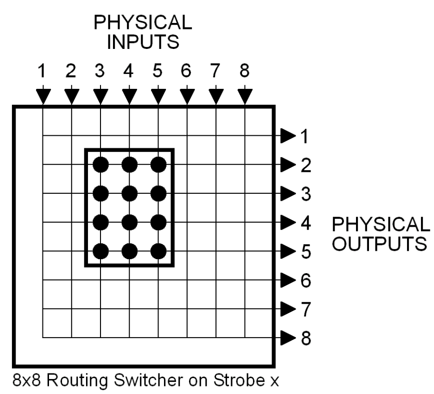



**Figure A**

Output offset is the amount by which the origin of a component is offset from the origin of its strobe, measured along the output axis. A component whose origin coincides with that of its strobe (1,1) will have an output offset of 0. The component shown in Figure A above, has an output offset of 1.

When multiple routing switchers are assigned to the same strobe, the input and output connectors are renumbered to provide a unique coordinate for each crosspoint. Crosspoint coordinates are then determined in the same manner as above. The component shown in Figure B below, has its origin at (12,7) and an output offset of 6.

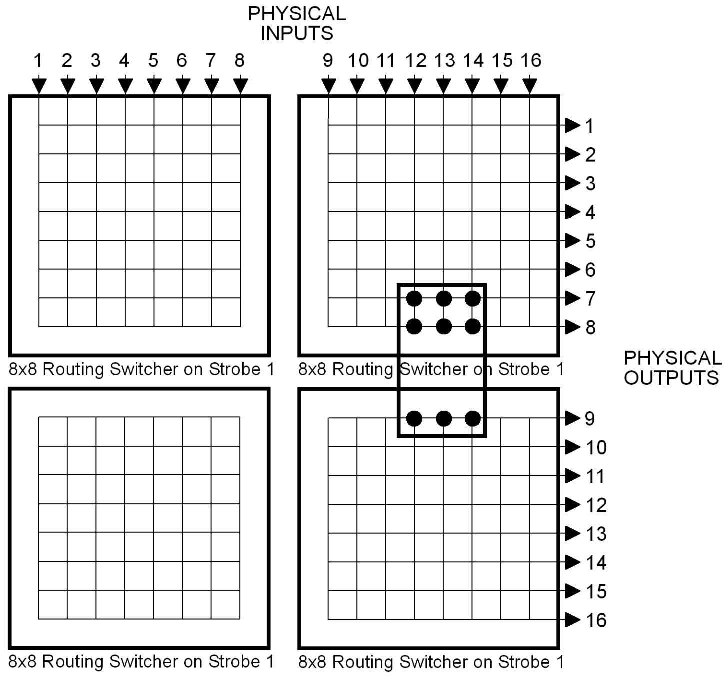



**Figure B**

## PAL

Phase Alternating Line, the dominant television standard in Europe. The United States uses a different standard, NTSC. Whereas NTSC delivers 525 lines of resolution at 60 half-frames per second, PAL delivers 625 lines at 50 half-frames per second.

See also: NTSC, SECAM.

## Panel

A user interface, usually mounted in a standard 19” rack, containing alphanumeric displays, push buttons, LEDs, etc. Sometimes referred to as a control panel.

A panel is used to control a switching system by taking switches, obtaining status, etc.

Panel names are one to eight characters in length and are constructed using uppercase letters, numbers, and spaces. The first character must be a letter.

## Panel Address

A unique identifier, set by DIP switch on every panel, which allows the system controller to differentiate between panels.

## Panel Name

An optional identifier for a control panel.

Individual panels are identified by panel address. Because of this, a panel name is not required when configuring a panel.

Panel names are one to eight characters in length and are constructed using uppercase letters, numbers, and spaces. The first character must be a letter.

## Password

Each User Account and Configuration may be protected with an eight-character, upper case, alphanumeric password.

## PC

Personal computer. Typically used to run control system software such as Win3500Plus.

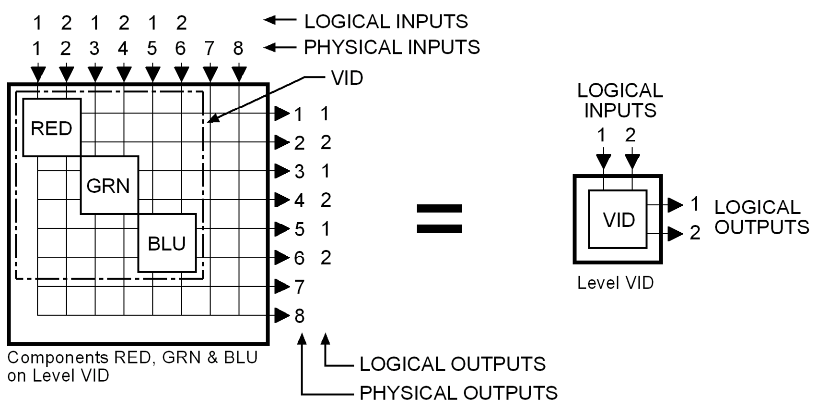
PESA control system software is designed to operate on any IBM® compatible personal computer (AT® or later) with a Microsoft Windows™ operating system (3.1, 95, 98, or NT).

## Physical Input

The electrical signal coming from a device connected to an input connector on a routing switcher.

Physical inputs and outputs are the electrical signals passing through the input and output connectors of a routing switcher. Each connector represents one input or output.

For example, a RGB input signal would represent three physical inputs since it would be connected to three input connectors on the routing switcher.




Physical inputs are numbered sequentially beginning with 1, and have the same number as the corresponding input connector on the routing switcher. This includes connectors which have been renumbered with input offset when multiple routing switchers have a common strobe. Physical outputs are numbered in the same manner.

See also: Logical Input.

## Physical Switch

The hardware that switches a physical input to a physical output. Sometimes referred to as a crosspoint.

See also: Logical Switch, Crosspoint.

## Physical Output

See: Physical Input.

## Port

Any of the serial communications bus interface connectors on a system controller.

Port names are one to eight characters in length and are constructed using uppercase letters, numbers, and spaces. The first character must be a letter. Port names are optional because a port is identified by its address.

## PRC Device

A device designed to be compatible with the PESA Routing Control protocol (PRC).

Ocelot, Cougar, Jaguar, Tiger, and Cheetah routing switchers are PRC devices.

See also: RM5 Device.

## Protect

A property placed on a destination that prevents all panels and ports from taking a switch on that destination, unless taken from a panel or port that has the same requester code as the panel or port that protected it.

Destination protection may be cleared by any panel or port that has the same requester code and lock priority as the panel or port that protected the destination, that has a higher lock priority, or that has a lock priority of 0 (zero).

See also: Lock, Lock Priority, Requester Code.

## Protect Priority

See: Lock Priority.

## Protocol

The format to be used when sending data between two devices.

Protocol names are one to eight characters in length and are constructed using uppercase letters, numbers, and spaces. The first character must be a letter.

## Readback

Information received from a routing switcher reporting which physical input is currently switched to a specified physical output.

To ensure that the configuration in the controller, and the actual state of the physical switches in a routing switcher agree, the routing switcher can be made to read back the status of each physical output. Where the routing switcher reports a different physical input from that expected by the controller, a readback error is declared.

## Readback Error

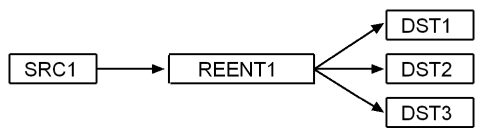
See Readback.

## Reentry

An entity which exists as both a source and destination at the same time, whose function is to facilitate switching a single source to multiple destinations, with a single logical switch.

Reentries are virtual entities that exist in the control software only. Their creation and use does not require any physical modification to the switching system hardware.

Example: Assume the existence of source SRC1 and destinations DST1, DST2, and DST3. Reentry REENT1 is created and switched to the three destinations. With a single logical switch, SRC1 can now be switched to REENT1 and the signal will arrive at all three destinations at the same time.




A reentry is assigned both a source number and a destination number.

Reentry names are constructed using one category followed by 0, 1 or 2 indices. If no index is selected, the default “00” (which is not displayed) will be used.

## Remote Modem

An external modem connected to a system controller.

The remote modem must be an external type capable of being configured to automatically answer incoming calls. Because the system controller does not output any modem configuration information, the remote modem must be completely transparent to the controller. The only modems tested by PESA for use as remote modems are the Practical Peripherals PM288MT II and the U.S. Robotics Sportster 28.8 using the following initialization strings:

PM288MT II: AT S0=2 Q1 X4 &C1 &D0 &K3 &S1 &W0 &Y0

Sportster 28.8: AT &F1 S0=2 &H1 &R2 &I0 L2 Q1 &C1 &D0 Y0 &W0

For more information about these modems and their initialization strings, see the Practical Peripherals web site at http://www.practical.com/ or the U.S. Robotics web site at http://www.usr.com/. Before using any other type of remote modem, please consult with PESA Customer Service.

See also: Local Modem.

## Requester Code

A property of panels and ports which allows them to be grouped with other panels or ports for the purpose of establishing lock and protect authority.

Panel requester codes not explicitly defined automatically default to the panel address.

See also Lock, Lock Priority, Protect.

## RM5 Device

A device designed to be compatible with the System 5 (RM5) control protocol.

The RM4000, RM5000, and Lynx routing switcher families are RM5 devices.

See also: PRC Device.

## Salvo

A group of predefined logical switches taken in the same vertical interval.

Example: Assume the existence of two sources, CART1 and CART2; and three destinations, MON1, VTR1, and VTR2. All of these sources and destinations are defined on two levels, AUD and VID.

By pressing a single control panel key, the user desires to take the following switches: audio and video from CART1 to MON1; audio from CART2 and video from CART1 to VTR1; and audio and video from CART2 to VTR2.

| Destination (Salvo Entry) | Level: AUD | Level: VID |
|---|---|---|
| MON1 | CART1 | CART1 |
| VTR1 | CART2 | CART1 |
| VTR2 | CART2 | CART2 |

Salvo SAL1 is created which will consist of three salvo entries (one salvo entry per destination in the salvo). Each salvo entry is then configured to switch the selected sources on the appropriate levels. Once salvo SAL1 is assigned to a salvo key on the control panel, the user will be able to take all the specified switches with the press of a single key.

All switches in a salvo are taken within the same vertical interval.

Salvo names are one to eight characters in length and are constructed using uppercase letters, numbers, and spaces. The first character must be a letter.

## Salvo Entry

One or more logical switches assigned to a specific destination that is part of a salvo.

Salvo entry names are the same as the destination they are associated with.

## Salvo Include List

A named list of the salvos a specific control panel is authorized to control.

A salvo include list may be shared by multiple panels.

Salvo include list names are one to eight characters in length and are constructed using uppercase letters, numbers, and spaces. The first character must be a letter.

## Salvo Key

A user configurable control panel key, whose assigned function is used when the panel is in salvo select mode.

Many control panels have user configurable keys. Each key can be assigned two functions, one as a data key and one as a salvo key. When the keys are pressed, the data key functions are used except when the panel is in salvo mode.

When a panel is in salvo select mode, a salvo will be executed immediately when the salvo key is pressed.

## Salvo Key List

A named list of the functions assigned to each salvo key on a panel.

Multiple panels may share a salvo key list as long as they are the same type of panel. Different panel types may not use the same salvo key list.

Salvo key list names are one to eight characters in length and are constructed using uppercase letters, numbers, and spaces. The first character must be a letter.

## SECAM

Sequential Couleur Avec Memoire, the line sequential color system used in France, Russia, Eastern Europe, and some Middle Eastern countries. Like PAL, SECAM is based on a 50 Hz power system, displaying interlaced lines at 50 fields per second. The color information is transmitted sequentially (R-Y followed by B-Y, etc.) for each line and conveyed by a frequency modulated sub carrier that avoids the distortion arising during NTSC transmission.

See also: NTSC, SECAM.

## Serial Port

See: Port.

## Shared Input

A logical input which is used by more than one source.

Note that shared outputs are not permitted.

See also: Source Block.

## SMPTE

Society of Motion Picture and Television Engineers (www.smpte.org). A professional organization that recommends standards for the television and film industries.

## Soft Destination Key

See: Soft Key.

## Soft Key

A special type of data key whose assigned function may be changed locally by a panel user.

Control system software is used to designate a data key as either a soft source key or a soft destination key. The assignment of a specific source or destination to the soft key may then be made with either the control system software, or locally at the panel by using Store Mode.

## Soft Source Key

See: Soft Key.

## Source

One or more logical inputs (limited to one per level), on one or more levels, which are switched together as a group.

Source names are constructed using one category followed by 0, 1 or 2 indices. If no index is selected, the default “00” (which is not displayed) will be used.

## Source Block

A means of ensuring that a particular source will not be switched to a specific destination, inadvertently or without adequate permission.

When configuring a switching system, it may be desirable to use source blocking to restrict the switching of certain logical inputs. This may be done while configuring either sources or destinations.

Since a blocked source may contain a logical input that is shared (used by more than one source), care should be taken to ensure that all sources using the logical input are blocked from the destination to be protected.

## Source Group

See: Source.

## Source Include List

A named list of the sources a specific control panel is authorized to control.

A source include list may be shared by multiple panels.

Source include list names are one to eight characters in length and are constructed using uppercase letters, numbers, and spaces. The first character must be a letter.

## Source Number

A number assigned to each source by the controller and used by CPU Protocol 1.

Source numbers are also assigned to reentries.

## Status

A list of all sources on all levels currently switched to a selected destination.

Sometimes also used to refer to the operational state of the control system (lock status, switch status, and panel status).

## Status Level

The default level to be used when displaying the status of a destination receiving signals from multiple sources, on a panel in all levels mode (ALL LEVS).

One function of the LCD display on a panel is to show which source is currently switched to a selected destination. This is known as destination status. Although more than one source can be switched to a single destination (limited to one source per level), the status display can only show one source at a time. When the panel is in all levels mode (ALL LEVS), Status Level is used to designate a default level to be used when displaying status. Only the source on this default level will be displayed. On panels which do not have LCD displays, this is indicated by a continuous, bright, pushbutton light.

If one or more other sources are also switched to the destination (on other levels), an octothorp (the "#" symbol) will be appended to the source name. The other source names can be viewed by toggling each level key in turn to show, level-by-level, which source has been switched to the destination. On panels which do not have LCD displays, this is indicated by an alternating bright/dim push button light.

## Status Method

One of two possible ways to display status when a panel is in all levels (ALL LEVS) mode and the destination is not defined on the Status Level.

When a panel is in all levels mode (ALL LEVS), the status shown will be the source on the Status Level assigned to that panel. If the destination is not defined on the Status Level, Status Method is used to control the resulting display:

If DEF (Default Method) is selected, NO XXXXX will be displayed where XXXXX is the Status Level assigned to the panel.

If GRP (Group Method) is selected, the controller will examine every level sequentially, starting with the level designated as Level Order 1. The source switched on the first level found where the destination is defined, will be displayed as the destination status.

## Stop Bit

In asynchronous communications, a bit that indicates that a byte of data has just been transmitted.

Every byte of data is preceded by a start bit and followed by a stop bit.

## Strobe

The third dimension of matrix space.

Every routing switcher in a switching system is assigned a strobe. This is usually accomplished by setting a DIP switch on the back of the routing switcher. Strobes do not have to be unique and, in larger systems, each strobe might be associated with several routing switchers.

In many switching systems, strobes are used to group levels of the same type together. For example, video may be on Strobe 1, audio on Strobe 2, etc.

## Sync Reference

A vertical sync signal used to ensure that switching occurs in the vertical interval of a video signal.

Sync Reference names are one to eight characters in length and are constructed using uppercase letters, numbers, and spaces. The first character must be a letter.

See also: Vertical Sync Signal.

## System 5 Device

See: RM5 Device.

## TIA

Telecommunications Industry Association (www.tiaonline.org).

## Tieline

A special type of logical switch that allows a logical input on one level to be switched to a logical output on a different level.

**Example 1 - Switch a signal from analog camera ANCAM into an analog-to-digital converter (A/D) and then into digital video tape recorder DIGVTR:** (Figure A) Connect a cable between the appropriate output connector of the analog routing switcher and the input of the A/D, and a cable between the output of the A/D and the appropriate input connector on the digital routing switcher. Configure levels ANAVID and DIGVID and tieline TLINE1 to connect them. Configure destination DIGVTR on level DIGVID. Configure source ANCAM on level ANAVID to use tieline TLINE1. ANCAM may now be switched to DIGVTR with a single logical switch even though they are on different levels.

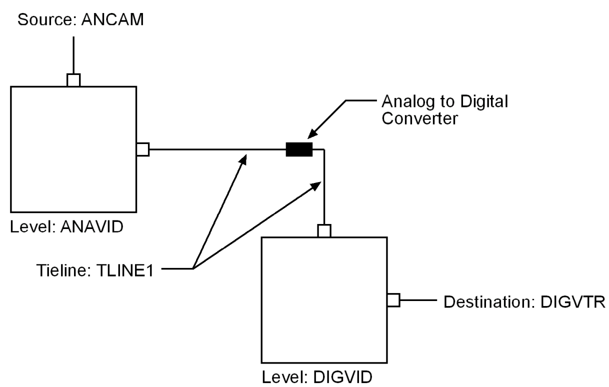



**Figure A**

**Example 2 - Switch a signal from camera CAM1 (connected to a routing switcher in Room A) to video tape recorder VTR1 (connected to a routing switcher in Room B):** (Figure B) Connect a cable between the appropriate output connector of the routing switcher in Room A and the appropriate input connector on the routing switcher in Room B. Create levels VIDA and VIDB and configure a tieline connecting the output of VIDA to the input of VIDB. Define source CAM1 on level VIDA and destination VTR1 on level VIDB. CAM1 may now be switched to VTR1 with a single logical switch even though they (and their respective routing switchers) are located in two separate rooms.

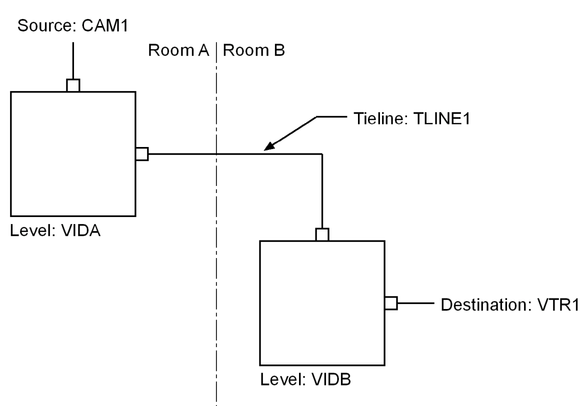



**Figure B**

Tieline names are one to eight characters in length and are constructed using uppercase letters, numbers, and spaces. The first character must be a letter.

## User Account

A set of privileges and an optional user password saved as a user name.

User accounts provide a means of restricting access to certain system functions on a user-by-user basis.

## User Name

An eight-character string consisting of upper case letters, numbers, spaces, and some symbols:

Permitted: ! @ # $ % ^ & * _ + - = [ ] \ : " ; ' < > . ? /

Forbidden: { } | , ( )

## User Password

An eight-character string consisting of letters, numbers, and spaces. A User Password may begin with either a number or a letter. Leading spaces are discarded.

## Vertical Interval

The portion of the video signal in which image information is absent to allow for the video device to prepare for the next frame of information.

## Vertical Sync Signal

A short pulse generated at the beginning of each video timing frame which tells the video monitor when to start a new video timing field. For switching purposes, the vertical sync signal may be derived from house sync.

See also: Sync Reference.

## Vertical Trigger

See: Vertical Sync Signal.

## Video Timing Field

A package of information that contains information required to complete a full scan across a video monitor. There are two types of video fields denoted as odd and even.

## Video Timing Frame

A package of information that contains all the information required to draw an image on a video device. Generally considered with respect to NTSC and PAL signals where the information is transmitted over a fixed time frame. A frame consists of two video timing fields denoted odd and even.

## Working Directory

The location on the PC hard drive where control system software such as Win3500Plus is installed.

If the default settings of the Win3500Plus installation program were used, this will be c:\win3500p for 16-bit versions of the Microsoft Windows OS, and c:\program files\win3500p for 32-bit versions. Configurations may not be saved in the working directory or any subdirectory of the working directory.

**Revision History**

| Rev. | Date | Description | By |
|---|---|---|---|
| A | 07-27-98 | Initial release. | G. Tarlton |
| B | 09-18-98 | Revised and expanded. | G. Tarlton |
| C | 07-20-99 | Revised to remove preliminary status per ECO-3355. | G. Tarlton |
| D | 02-07-00 | Revised and expanded per ECO-3561. | G. Tarlton |
| E | 02-16-00 | Revised Figures 10 and 15 per ECO-3572. | G. Tarlton |
| F | 02-28-01 | Deleted Printing Specification per ECO CE00160. | G. Tarlton |
| G | 02-28-01 | Deleted bills of material, drawings, and schematics per ECO CE00161. | G. Tarlton |
| H | 03-20-01 | Complete revision. Incorporated RS-422 cable information per ECO CE00034. | D. Buie |

PESA

Switching Systems