CHEETAH® 64NE, 64XE, & 64WE VIDEO MATRIX SWITCHERS

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Document Number 81-9059-0577-0 Revision B

Printed in the United States of America.

November 2005

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Chapter 1 ABOUT THIS MANUAL

1.1 DOCUMENTATION AND SAFETY OVERVIEW

This manual provides detailed instructions for the installation, operation, and maintenance of the PESA Cheetah Series Switchers.

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

Additionally, internal access to the frame compartments of the equipment that is described in this manual is restricted to qualified service personnel only.

1.2 WARNINGS, CAUTIONS, AND NOTES

Throughout this document, you should notice various Warnings, Cautions, and Notes. These addendum statements supply invaluable information pertaining to the text that they address. It is imperative that audiences read and understand the statements to avoid possible loss of life, personal injury, destruction/damage to the equipment, and/or added information that could enhance the operating characteristics of the equipment (i.e., Notes). The following subsections represent a description of the Warnings, Cautions, and Notes statements contained in this manual:

1.2.1 WARNING

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

1.2.2 CAUTION

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

1.2.3 NOTE

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

Chapter 2 CHEETAH 64 SERIES INTRODUCTION

2.1 CHEETAH 64 SERIES PRODUCT OVERVIEW

The Cheetah 64 series switchers are full-featured video matrix switchers capable of handling Serial Digital Interface (SDI) and High-Definition Television (HDTV), as well as other non-standard digital signals, in the same frame. Copper and optional fiber input and output modules provide for maximum flexibility.

2.2 CHEETAH 64 SERIES SWITCHERS ANALOG SUPPORT

Additionally, PESA Switching Systems, Inc. offers analog cards for the Cheetah 64 series switchers, which will allow users to maintain legacy equipment during the transition to digital or single-ended, general purpose NTSC video transmission applications such as video data for telemetry, radar, surveillance, high-level TTL video switching, and 75Ω audio. The analog inputs can accept signals from DC to the –3dB roll-off at 50 MHz with voltages up to ±2V standard and ±5V for high level.

To maximize the analog offering for the Cheetah 64 series, all frame sizes (64NE, 64XE, and 64WE) will accept analog matrix and I/O cards. Cheetah 64 series system configurations will allow partitioning for either all analog or all digital cards to reside in the same frame in blocks of 64x64 and 64x128. The 64NE, 64XE, and 64WE frames can be configured for either *all digital* or *all analog.*

The following types of analog I/O cards are available:

- Basic analog input cards, output cards, and matrix cards with maximum bandwidths of 50 MHz.
- Analog input cards and an output cards for high-level signals to support telemetry or other types of sine wave signals with voltage levels to a maximum of ±5V p-p.

Basic analog output cards and the High-Level cards will accept the optional dual-output, piggyback cards.

The frame architecture for the analog model uses common components from sister HD/SD frames, thus allowing for easy future migration to full digital. Power supplies and matrix control cards are the same for Cheetah 64 series analog versions.

2.3 CHEETAH 64 SERIES SWITCHERS FEATURES

2.3.1 Cheetah 64 Series Switchers Features Overview

All Cheetah 64 series (64NE, XE, and WE) video matrix switchers offer alarm support, switch confirmation, block checking, and power-out-of-range indicators. A key feature of the 64NE and 64WE switchers is the Matrix Watchdog™ redundant crosspoint (matrix) option. For critical routing requirements of live, on-air situations or other critical distribution facilities, a redundant crosspoint can be added to automatically swap over in case of failure. This feature is offered as an option in our basic configurations. The Watchdog™ option includes monitoring capabilities to alert personnel of a crosspoint failure.

The Cheetah 64XE is an extremely flexible routing switcher that can be configured in three ways. First, the 64XE expands outputs for a basic 64X128 configuration similar to the 64WE model. Next, the 64XE is offered as a 64X64 that offers output option slots for in-frame format conversion cards. In this configuration, three options are available:

- HD to SDI down-conversion,
- SDI to Composite Analog Video (DAC)
- Fiber Outputs
- Dual Outputs

The 64XE is further enhanced with an option to support either internal fiber or coax I/O. Finally, for those applications that require only a portion of the frame to be configured for output options, the 64XE is flexible enough to accommodate the following three additional sizes:

- 64x80: Output options for 17-64 (first option slot used for 65-80)
- 64x96: Output Options for 33-64 (first two option slots used for 65-96)
- 64x112: Output Options for 49-64 (first three options slots used for 65-112)

The 64WE includes non-expandable outputs (similar to the 64NE) with output options (similar to the 64XE) and has redundant crosspoints.

2.3.2 Cheetah 64 Series Switchers Standard Features

The Cheetah 64 series features include:

- Compact 4RU for the 64NE configuration; 6RU for the 64WE and 64XE configurations
- Full feature control system using either standard PESA PRC Control or PESA Network Control (3500Pro or 3500Pro-LE)
- Video and data signals from 3Mb/s to 1.48Gb/s
- Optional Fiber Input and Output cards for the 64XE and 64WE frames

- Supported signal types:
  - HD Multirate from 3Mbs up to 1.485Gbs (1.5Gbs)
  - SDI and ASI
  - Composite Analog Video
  - AES 75Ω Audio
  - TTL
  - ASI/EBU
- Compatible with SMPTE 259M, 292M TV standards
- Input EQ to 300M SD, 100M HD
- Bypass mode for non-standard data signals (3.0Mbs to 1.5Gbs)
- Output option slots support dual output, fiber output, DAC module for SDI conversion to analog outputs, SD Converter, and HD to SDI converter (down converter)
- Supports for SNMP monitoring and diagnostics
- Full redundant controllers available
- All modules are hot-swappable for on-air maintenance

Chapter 3 CHEETAH 64 SERIES CONFIGURATION MATRIX

3.1 CHEETAH 64 SERIES CONFIGURATION MATRIX OVERVIEW

This section includes a list of all of the major components for the Cheetah 64NE, 64XE, and 64WE Video Matrix Switchers chassis/frames (models).

When discussing output options and expandable outputs, the meanings are as follows:

- **Output Options** pertains to which cards can go into a particular output slot in the frame for a specific configuration(s). This includes cards that offer signal expansion or conversion such as dual outputs, HD to SDI down-conversion, Digital to Analog conversion, and electrical (copper) to fiber conversion. Option cards are offered as "piggy-back" modules that plug onto the base output combiner card.
- **Expandable Outputs** pertains to the number of outputs that a particular frame can be expanded beyond the basic configuration (e.g., 80, 96, 112, or 128 outputs).

Table 1 includes only the active cards that are required for the individual Cheetah 64 series chassis configurations. The blank covers (if necessary) are required for the card locations that are not used (to satisfy chassis component cooling requirements).

Table 2 includes PESA Switching Systems, Inc. part numbers for the corresponding Cheetah 64 Series cards, power modules, and other components

3.2 CHEETAH 64 SERIES CHASSIS CONFIGURATIONS

NOTE	**Table 1 contains values for the maximum card/module configurations for the Cheetah 64 series frame sizes.**

TABLE 1: Cheetah 64 Series Active Components Matrix

CHEETAH 64 SERIES FRAME	COMPONENT SELECTION REQUIREMENTS AND MAXIMUM QUANTITIES												
	Power Supplies	***Matrix Frame Controller***	***Matrix* Card***	***Input Buffer HDMR***	***Input Buffer Fiber***	***Input Buffer Cards (SDI)***	***Output Combiner (SDI)***	***Output Combiner HDMR***	***Output Option Fiber***	***Output Option DAC SD***	***Dual Output Option BNC***	***Output Option HD to SD***	***Output Option HD-MR to SD***
64NE (64x64)	2	2	1 + Matrix Watchdog	4	4	4	4	4	0	0	0	0	0
64XE (64x64)	2	2	1	4	4	4	1 to 8	1 to 8	0 to 4**	0 to 4**	0 to 4**	0 to 4**	0 to 4**
64XE (64x128)	2	2	2	4	4	4	1 to 8	1 to 8	0 to 4	0 to 4	0 to 4	0 to 4	0 to 4
64WE	2	2	1 + Matrix Watchdog	4	4	4	4	4	4	4	4	4	4

** = Matrix "Crosspoint" Card*

*** = Dependant upon configuration (64x64, 64x80, 64x96, 64x112, or 64x128)*

The basic configuration features of the three Cheetah Series models are as follows:

- **64NE:** non-expandable outputs, no output options, and redundant crosspoints (matrix cards).
- **64XE:** expandable to 64x128 outputs, with output options, and no redundant crosspoints.
- **64WE:** non-expandable outputs, with output options, and redundant crosspoints.

3.3 CHEETAH 64 SERIES CHASSIS COMPONENT PART NUMBERS

Refer to Table 2.

TABLE 2: Cheetah 64 Series Chassis Component Part Numbers

STANDARD MAINFRAME COMPONENTS	
81906526750	64NE Mainframe Assembly
81906526900	64WE Mainframe Assembly
81906526760	64XE Mainframe Assembly
81906523810	Power Supply
81903469040	Power Supply (blank)
81906523970	Frame Controller Cards
(P/N determined by software inclusion)	3500 System Controller Cards

INPUT CARDS	
81906527180	Cheetah Input Buffer SD BNC
81906523040	Cheetah Input Buffer HD-MR BNC
81906526120	Cheetah Input Buffer Fiber
81906524320	Cheetah Input Buffer Composite Video
81906524950	Cheetah Input Buffer Hi-Level

OUTPUT CARDS	
81906523150	Cheetah Output Combiner SD BNC
81906526250	Cheetah Output Combiner HD-MR BNC
81906524930	Cheetah Output Combiner Composite Video
81906524330	Cheetah Output Combiner Hi-Level

Table 2: Cheetah 64 Series Chassis Component Part Numbers (cont.)

OPTION CARDS	
81906523170	Cheetah Dual Output, Digital, BNC
81906526130	Cheetah Output Option Fiber
81901703700	Cheetah Output Option DAC
81901703760	Cheetah HD to SD Output Converter
81906524920	Cheetah Dual Output, Analog, BNC
81906524940	Cheetah Dual Output, TTL, BNC

POWER AND OTHER COMPONENTS	
81903469070	Cheetah Input Blank
81903469060	Cheetah Output Blank
81906523980	Cheetah HD Dummy Load Card
81906523810	Cheetah Power Supply, AC
81903469040	Cheetah Power Supply Blank
81906523970	Cheetah Frame Controller Card

MATRIX CARDS	
81906523330	Cheetah Matrix 64x64 Digital Video
81906523980	Cheetah HD Dummy Load Card
81906524340	Cheetah Matrix 64X64 Analog Video

Chapter 4 CHEETAH 64 SERIES VIEWS AND SPECIFICATIONS

There are two chassis' sizes that house the Cheetah 64 Series switchers, which are the 6RU and 4RU chassis. The 64XE and the 64WE are housed in a 6RU chassis and the 64NE is housed in the 4RU chassis. This section will pictorially display the internal layouts of the switchers, depict the connections, and list the system specifications.

This section will be subdivided into the following subtopics:

- Cheetah 64NE Frame Views
- Cheetah 64XE and 64WE Frame Views
- Cheetah 64NE, 64XE, and 64WE Specifications

4.1 CHEETAH 64NE FRAME VIEWS

(For the Cheetah 64NE frame views, see Figures 1 and 2).

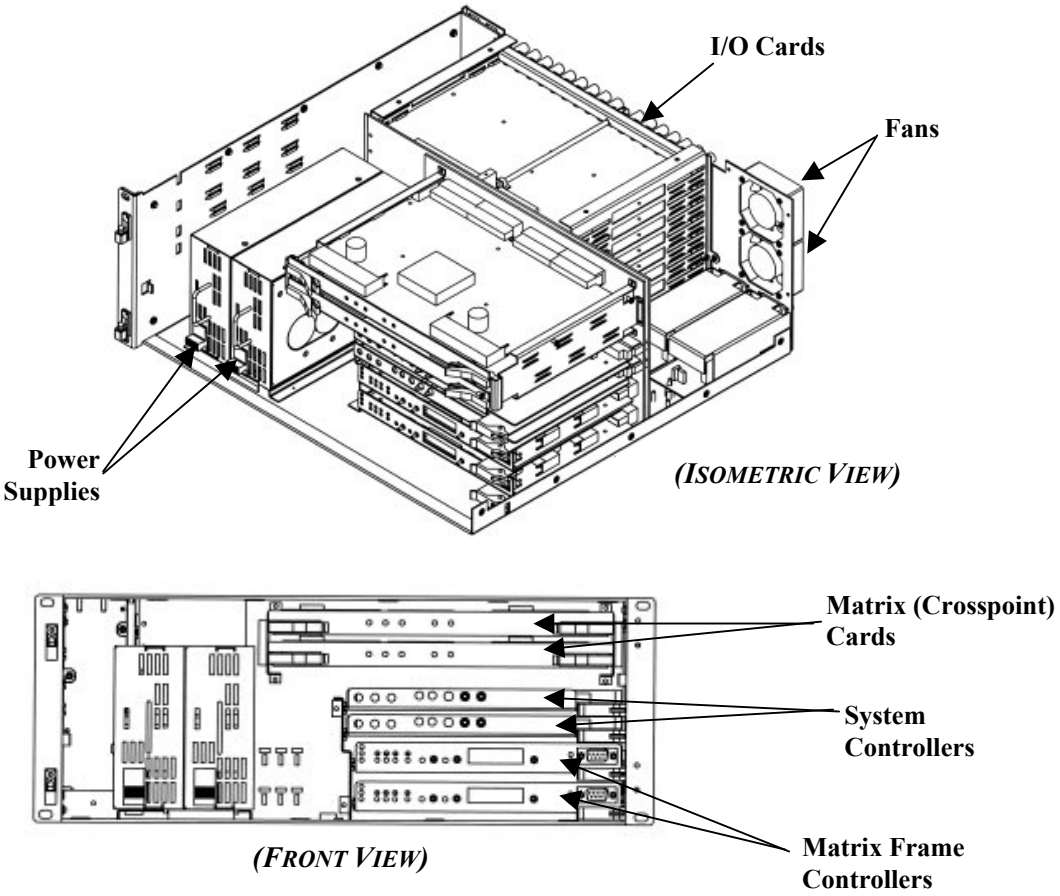


FIGURE 1: Cheetah 64NE Front Views

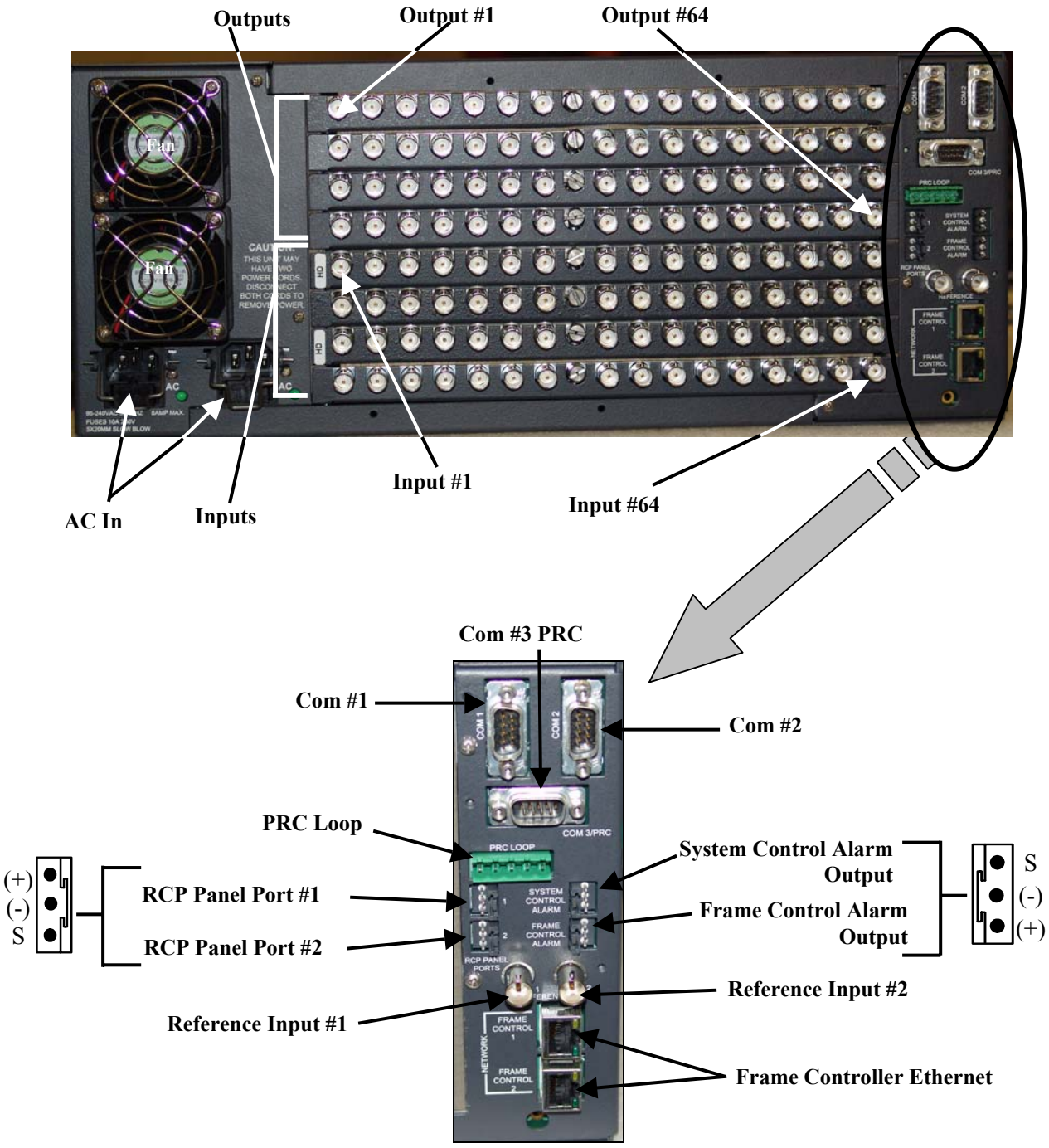


FIGURE 2: Cheetah 64NE Rear View

4.2 CHEETAH 64XE AND 64WE FRAME VIEWS

(For the Cheetah 64XE and 64WE frame views, see Figures 3 through 5).

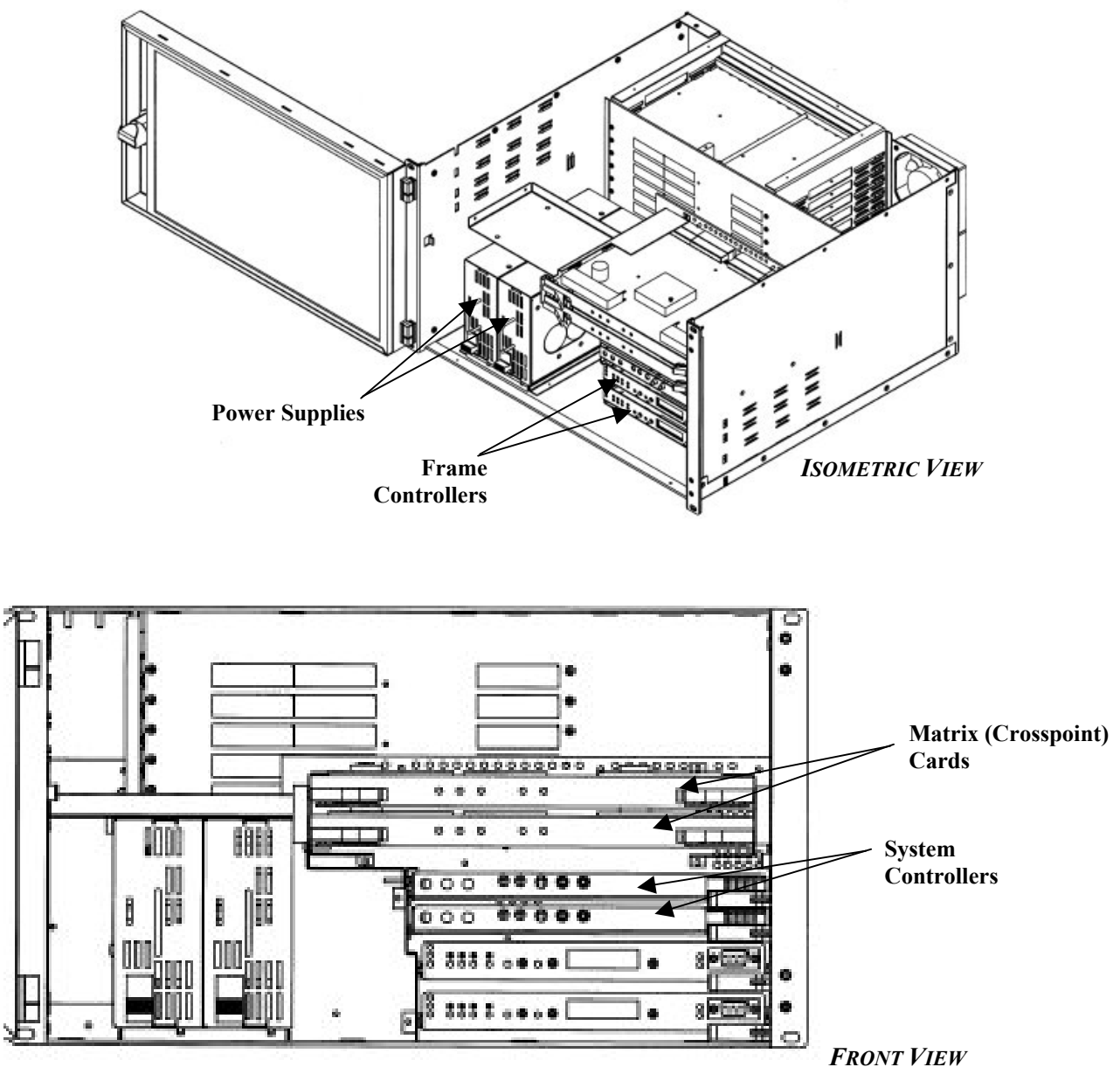
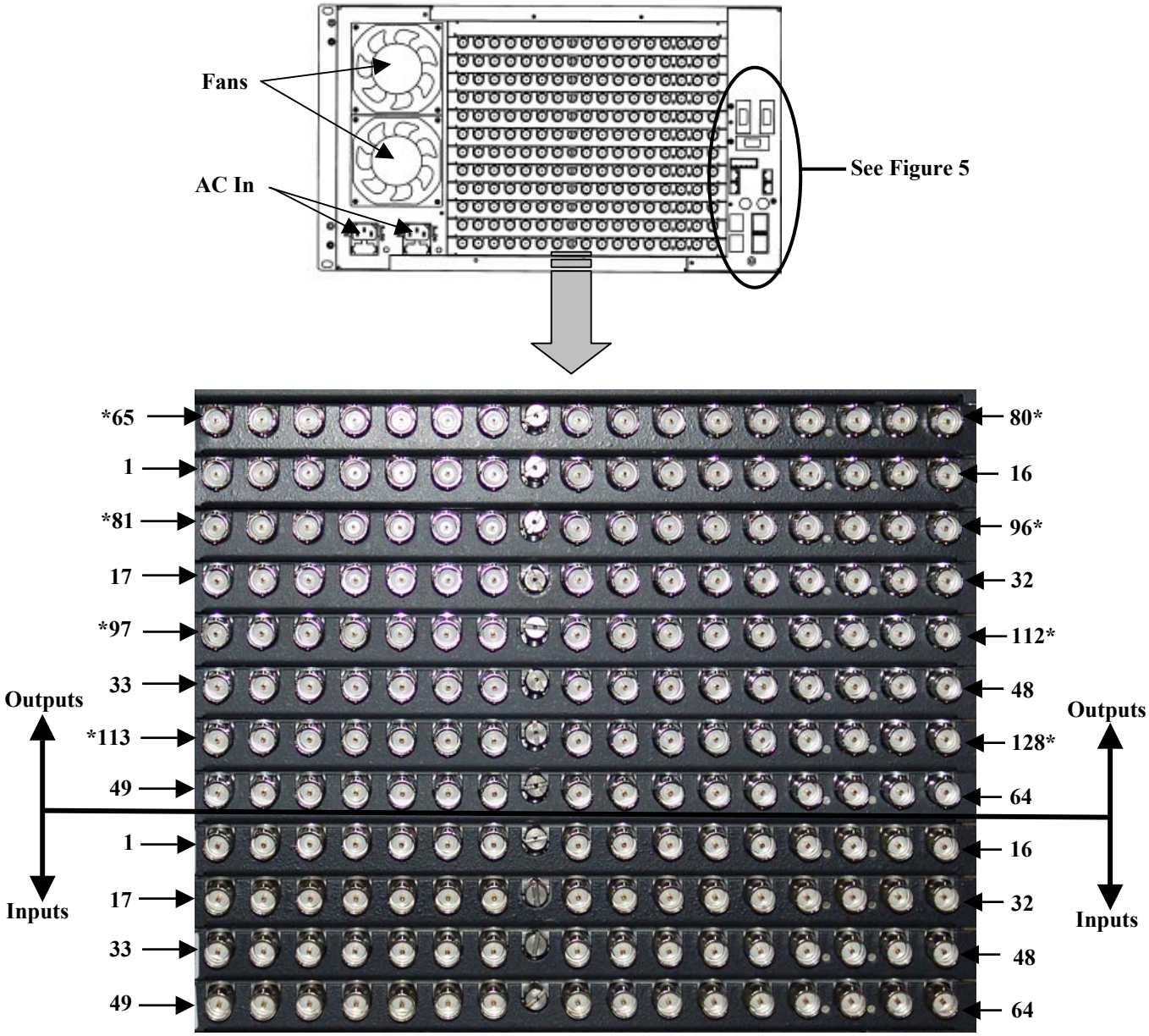


FIGURE 3: Cheetah 64XE and 64WE Frame (Front Views)



(Cheetah 64XE shown above)

NOTE	*= The 64WE Switcher may contain blank panels where the 65 thru 128, 81 thru 96, 97 thru 112, and 113 thru 128 output BNC connectors are in place for the 64XE Switcher. The 64WE switcher can be configured with blank panels or option cards as per customer configuration request.

FIGURE 4: Cheetah 64XE and 64WE Inputs/Outputs

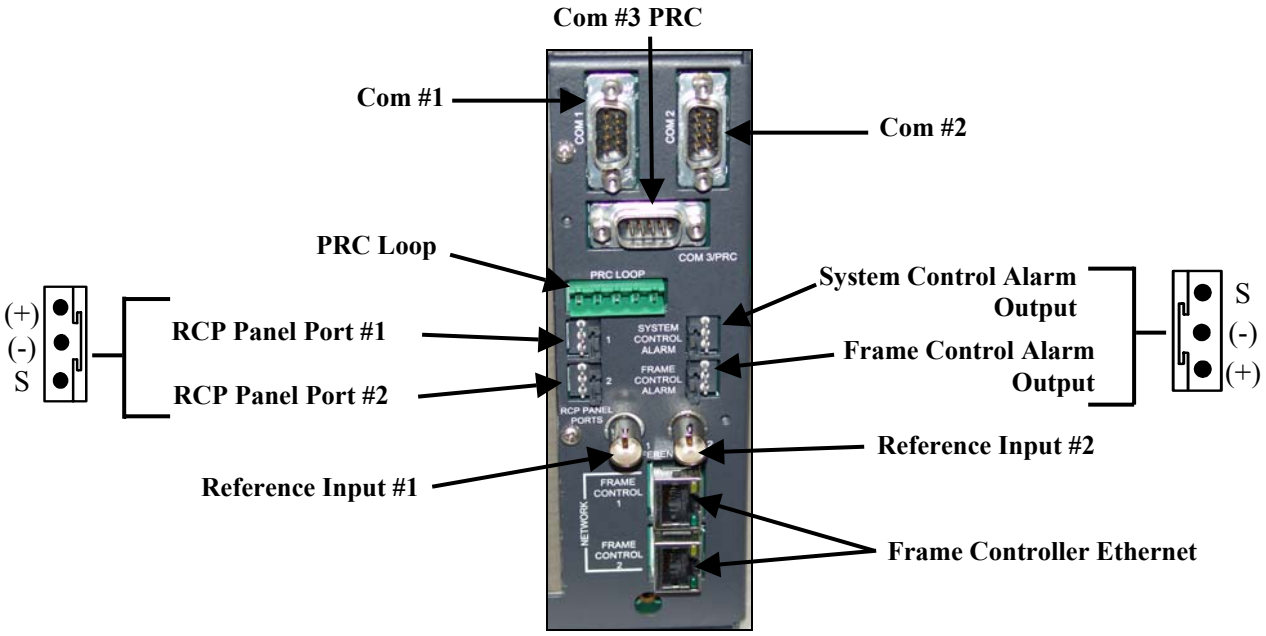


FIGURE 5: Cheetah 64XE and 64WE Rear Connector View

4.3 CHEETAH 64NE, 64XE, AND 64WE SPECIFICATIONS

Physical

RUs: ..... 4 (64NE) & 6 (64XE and 64WE)
Height: ..... 7.0" & 10.50"
Width: ..... 19"
Depth: ..... 20"
Weight: ..... 60 - 90 lbs. (40.82 kg)
(Nominal depending on the configuration)

Supply Power Requirements

Operating voltage: ..... 95-240 VAC, 47-63 Hz
Power consumption: ..... 650Watts Maximum

Power Supplies

DC Input (from the source rectification filter/breaker assy.): ..... 95 VDC to 240 VDC
DC Output: ..... 28 VDC
Maximum Output Watts: ..... 600 Watts

Digital Electrical Signals for Inputs

Standards: ..... High Definition video conforming to SMPTE 292M
..... Serial Digital video conforming to SMPTE 259M
Connector Type: ..... 75Ω BNC
Impedance: ..... 75Ω nominal
Return Loss: ..... HD >15 dB from 5MHz to 1.5 GHz
..... SD > 15 dB from 5 MHz to 540 MHz
Cable Equalization: ..... HD Automatic up to 100 meters, Belden 8281
..... SD Automatic up to 300 meters, Belden 8281

Electrical Signals for Outputs

Connector Type: ..... 75Ω BNC (output card)
..... 75Ω BNC (dual output card)
Signal Level: ..... 800 mV p-p, ±10%
Signal Polarity: ..... Non-inverting with respect to input ports
Impedance: ..... 75Ω nominal
Return Loss: ..... HD > 15 dB from 5MHz to 1.5 GHz
..... SD > 15 dB from 5MHz to 540 MHz

Optical Signals (Fiber Optics) for Inputs (Receivers)

Connector Type: ..... SFF modules w/LC-type (fiber card)
Data Rates: ..... 143 Mbps to 1.485 Gbps
Optical Input Wavelength ..... Single Mode, 1310 nm
Input Power ..... -20 dBm (minimum)

Continued

Cheetah 64NE, 64XE, and 64WE Specifications (cont.)

Optical Signals (Fiber Optics) for Outputs (Transmitters)

Connector Type: ..... SFF modules w/LC-type (fiber card)
Data Rates: ..... 1.0 Mbps to 1.485 Gbps
Optical Output Wavelength ..... Single Mode, 1310 nm, ±20 nm
Output Power ..... -11dBm to -3dBm

Optical Loss Budget

10,000 km (minimum), Single Mode fiber w/2 optical couplings ..... 9.0 dB (minimum)

Signal Operational Specifications

Polarity: ..... All paths non-inverting
Re-clocking SD: ..... Automatic selection of 143 Mb/s, 177 Mb/s, 270Mb/s, 360 Mb/s, 540 Mb/s
Re-clocking HD: ..... Automatic selection of 143 Mb/s, 177 Mb/s, 270 Mb/s, 360 Mb/s, 540 Mb/s and 1.5 GB/s

Reference (Sync) Inputs

No. of Inputs: ..... 2 standard
Connector: ..... 75Ω BNC
Return Loss: ..... > 40 dB, 100 KHz to 30 MHz
Signal Formats: ..... NTSC, PAL (Black Burst), or HD Tri-Level Sync per SMPTE 274, SMPTE 276 M
Signal Level: ..... Nominal 1.0 V p-p ± 6dB

DAC Card Specifications

Connector Type: ..... 75Ω BNC
Connection/Card: ..... 16 Individual Outputs
Conversion: ..... 10 bit Serial Digital to Analog
Over sampling: 4X
Output: ..... NTSC/PAL

Cooling

Internal cooling fans with auto sensing speed adjustments

Control

Panel Com: ..... RS-485, 3 pin WECO, 4 per frame
Control Com: ..... RS-232 or PESA PRC for 3500 Series System
Connector Type: ..... 9-pin, D sub, female
Network Connector: ..... RJ-45, Ethernet, 2 per frame

Continued

Cheetah 64NE, 64XE, and 64WE Specifications (cont.)

Environmental

Operating Temperature: ..... 0-40 °C
Operating Humidity: ..... 10-90% non-condensing

Standard Analog Video Input Characteristics

Level: ..... 1.0V P-P nominal, 2.0V P-P max.
..... (Without obvious distortion)
Impedance: ..... 75Ω internally terminated
Return Loss: ..... > 40 dB to 5.0 MHz
..... > 15dB to 50 MHz
Coupling: ..... Direct (DC)
Type: ..... Balanced
Connector: ..... BNC

Standard Analog Video Output Characteristics

Level: ..... 1.0V P-P nominal, 2.0V P-P max.
..... (Without obvious distortion)
Impedance: ..... 75Ω internally terminated
Return Loss: ..... > 40 dB to 5.0 MHz
..... > 15 dB to 50 MHz
Coupling: ..... Direct (DC)
DC on Out: ..... <±30 mV
Connector: ..... BNC
Number: ..... One (Two Optional)

Standard Analog Video Gain Characteristics

Gain: ..... Unity
Gain Stability: ..... <±0.1 dB
Gain Adjust Range: ..... ±0.5 dB

Standard Analog Video Linear Distortion

Frequency Response: ..... ±0.1 dB to 10 MHz
..... ±0.5 dB to 35 MHz
..... -3.0 dB @50 MHz
Vertical Tilt: ..... 0.25% (50 Hz Square Wave)
Horizontal Tilt: 0.25%
Low Frequency: ..... +0.2% /ms max with 10% Overshoot
..... (10-90% or 90-10% change)

Standard Analog Video Pulse and Bar Responses

Factor (2T) Bar Slope: ..... 0.2% K
Pulse/Bar Ratio: ..... 0.2% K
Pulse Sharp: ..... 0.2% K

Continued

Cheetah 64NE, 64XE, and 64WE Specifications (cont.)

Standard Analog Video Chrominance/Luminance

Gain Inequity: ..... ±1.0% max.
Delay Inequity: ..... ±1.0 ns

Standard Analog Video Non-Linear Distortions

☛ **Note**: *All tests: 10 to 90% @ 3.58MHz or 12.5 to 87.5% @ 4.43Mhz.*

Differential Gain: ..... 0.25% @ 4.43 MHz
Envelope Delay: ..... <2.0ns, 50MHz to 85 MHz
Differential Phase: ..... 0.25° @ 4.43 MHz
Line Time Non-Linearity: 0.2%
Transient Gain: ..... 1.0% (Luminance, Chrominance, or Sync)
Video Crosstalk: ..... ≤ -60 dB to 5.0 MHz (all Inputs and Outputs Hostile)
..... ≤ -35 dB @ 35 MHz

Standard Analog Video Switching Characteristics

Switching Time: ..... ≤ 1.0 µs
Switching Transient: ..... 22 mV (30 IRE Units)
Differential Delay (any Input to any Output) ..... Approx. 8.5ns
..... 11° @ 3.58 MHz
..... 13.5° @4.43 MHz

Standard Analog Video Signal to Noise

Video Filter: ..... -70 dB RMS Noise to P-P Signal to 5.0 MHz

High-Level Analog Video Input Characteristics

Level: ..... ±5.0 V, Referred to Ground
Impedance: ..... 75Ω internally terminated
Return Loss: ..... > 40 dB to 5.0 MHz
..... > 15 dB to 50 MHz
Coupling: ..... Direct (DC)
Type: ..... Balanced
Connector: ..... BNC

High-Level Analog Video Output Characteristics

Level: ..... ±5.0 V, Referred to Ground
Impedance: ..... 75Ω internally terminated
Return Loss: ..... > 40 dB to 5.0 MHz
..... > 15 dB to 50 MHz
Coupling: ..... Direct (DC)
DC on Out: ..... <±50 mV
Connector: ..... BNC
Number: ..... One (Two Optional)

Continued

Cheetah 64NE, 64XE, and 64WE Specifications (cont.)

High-Level Analog Video Gain Characteristics

Gain: ..... Unity
Gain Stability: ..... <±0.1 dB
Gain Adjust Range: ..... ±0.5 dB

High-Level Analog Video Linear Distortion

Frequency Response: ..... ±0.1 dB to 10 MHz
..... ±0.5 dB to 35 MHz
..... -3.0 dB @50 MHz
Vertical Tilt: ..... 0.25% (50 Hz Square Wave)
Horizontal Tilt: 0.25%
Crosstalk: ..... <± -60 dB to 5.0 MHz (All Inputs and Outputs Hostile)
..... <± -35 dB @ 35 MHz

High-Level Analog Video Signal to Noise

Signal to Noise: ..... -70 dB, RMS Noise to P-P Signal to 5.0 MHZ

Chapter 5 CHEETAH 64 SERIES INITIAL SETUP

This section will describe the initial unpacking, site-selection procedures/sequences, and settings for the Cheetah 64 Series switchers.

5.1 UNPACKING AND INSPECTION

This equipment contains electrostatic sensitive devices (ESD). Use a grounded wrist strap, grounding mat, and/or comply with local established ESD procedures when handling the internal circuit cards to prevent destruction from electrostatic discharge.

Immediately upon receipt, inspect all shipping containers. Carefully unpack the equipment and compare the parts received against the packing list. If any parts appear to be missing or damaged, please contact PESA immediately.

5.2 GENERAL CHASSIS INSTALLATION OVERVIEW

The physical size of each Cheetah Series Switcher chassis is determined by the chassis input/output capabilities (i.e., the 64NE chassis is the smallest while the 64XE and 64WE chassis are the largest). If specified when ordered, each Cheetah Switcher will be configured for the intended system at the factory. Before attempting to install any frame, matrix card, controller card, or power supply, carefully read and understand this section.

All Cheetah Switchers contain electrostatic sensitive devices (ESD). Care should be used when it is necessary to handle the internal circuit cards. It is recommended that a grounded wrist strap and grounding mat be used before attempting any equipment installations.

5.3 CHOOSING A LOCATION

For local electrical compliance, this equipment should be located near the socket-outlet, power strip (if plugs are used), or the supply disconnect/breaker so that the AC line cord plugs or the supply disconnect are easily accessible.

This equipment is designed for installation in a standard 19" equipment rack located in an environment conforming to the specifications for each chassis. Locate each unit as closely as possible to its associated equipment to minimize cable runs.

Consider the connection from this equipment to the supply circuit, and the effect that possible overloading can have on overcurrent protection circuits and supply wiring. Refer to nameplate ratings when addressing this concern.

5.4 MOUNTING A CHEETAH 64NE, 64XE, AND 64WE CHASSIS IN AN EQUIPMENT RACK

The mounting configurations for each chassis differ slightly because of physical size and weight. The 64NE chassis is 4-Rack Units (RU) in height while the 64XE and 64WE chassis are 6RU in height.

	**The weight of a fully loaded 64NE chassis is 60 lbs nominal while the 64XE and 64WE chassis weigh 90 lbs nominal (dependant on the configuration). Installation or removal of this equipment requires at least two persons in order to avoid possible personal injury or equipment damage. Install this equipment in such a manner as to avoid any tipping hazard from uneven loading of the rack.**
	**Make sure that all power is disconnected (Lockout/Tagout) before installing the specific frame into the rack.**
	**Fans that are mounted on this equipment provide forced-air cooling. Do not block airflow around these fans. Replace all service panels and blank filler plates. Keep the chassis door closed during normal operation.**

This equipment is designed for installation in a standard 19" equipment rack. Provide sufficient space behind the equipment racks to allow for control, signal, power cables, and free airflow after all cables are installed. Use all chassis mounting holes and tighten mounting hardware securely by using the rack equipment manufacturer's suggested torque settings.

Install the equipment into the rack as follows:

1. Carefully, remove the equipment from the packing container and place the unit near the rack where it will be installed.
2. Insert the chassis into the equipment rack and support the bottom of the chassis while the mounting hardware is being installed.
3. Install the bottom two chassis mounting screws.
4. Install the top two chassis mounting screws.
5. Install any remaining chassis mounting screws.
6. Tighten all of the chassis mounting screws until they are secure. Release/remove the support from the bottom of the chassis.

5.5 SETTING CHEETAH 64NE, 64XE, AND 64WE CHASSIS LEVEL CODES (STROBES)

This subsection will be divided into the following two subtopics:

- Cheetah 64NE Chassis Strobe Switch Locations and Settings
- Cheetah 64XE and 64WE Chassis Strobe Switch Locations and Settings

NOTE	**Set the level codes (strobes) BEFORE installing the matrix frame controller card.**

To set the level codes for all Cheetah Series chassis, use the rotary switches to define a hexadecimal number. Use the settings in the LSB row (lower row) first. For example, to set the Level Strobe to 12, set the LSB Level Strobe switch to C. Switch functions are described in the corresponding Table for the specific chassis. You must ensure that these settings match the settings in the 3500 Series System Controller Software.

NOTE	**If specified by the customer when ordering, these switches will be set at the factory; however, the customer can adjust them as required for system expansion.**

5.5.1 *Cheetah 64NE Chassis Strobe Switch Location and Settings*

CAUTION	**Prior to adjusting any of the chassis strobe switches, it is strongly recommended to contact the PESA Customer Service Department for assistance.**

For the 64NE chassis Strobe Switch location and settings, see Figure 6.

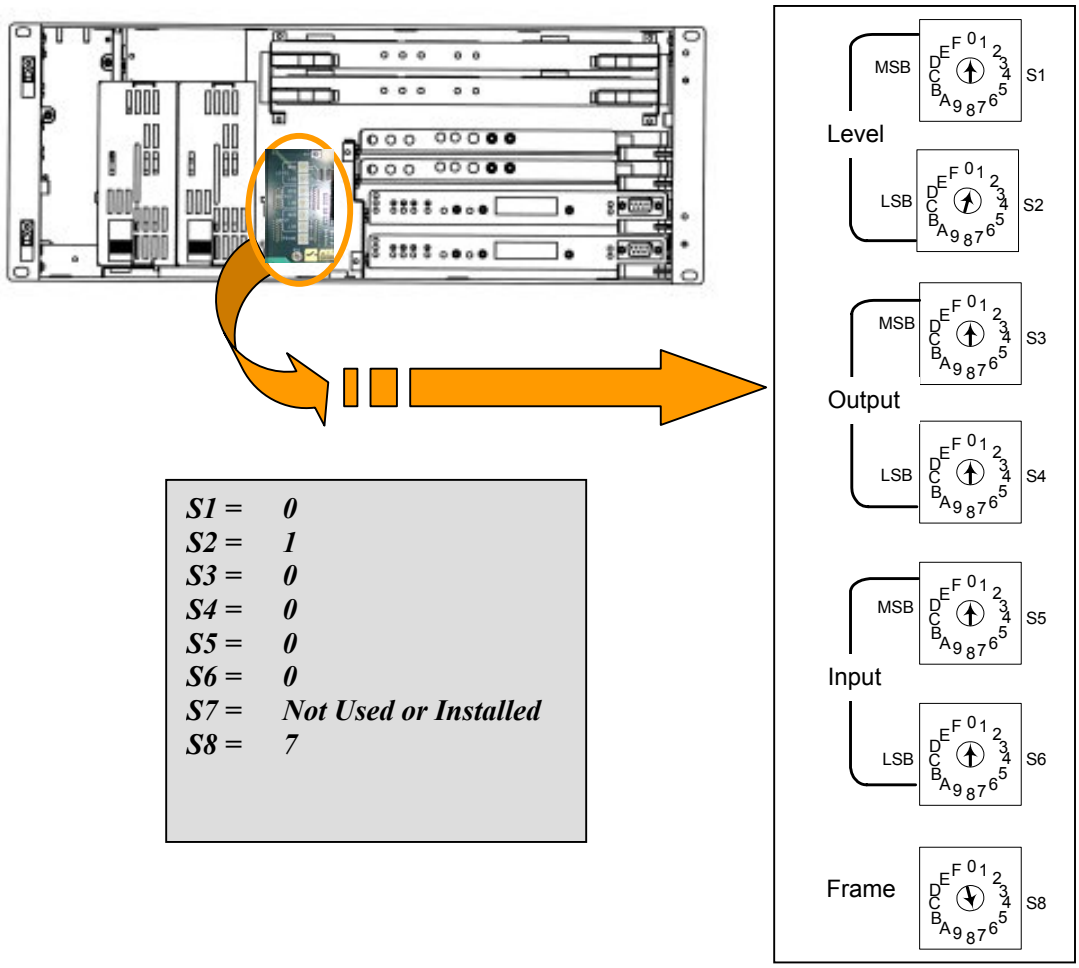


FIGURE 6: Cheetah 64NE Chassis Strobe Switch Location and Settings (Front View)

5.5.2 *Cheetah 64XE and 64WE Chassis Strobe Switches Location and Settings*

This section will be subdivided into the following subtopics:

CAUTION	**Prior to adjusting any of the chassis strobe switches, it is strongly recommended to contact the PESA Customer Service Department for assistance.**

For the 64XE and 64WE chassis Strobe Switch locations and settings, see Figure 7.

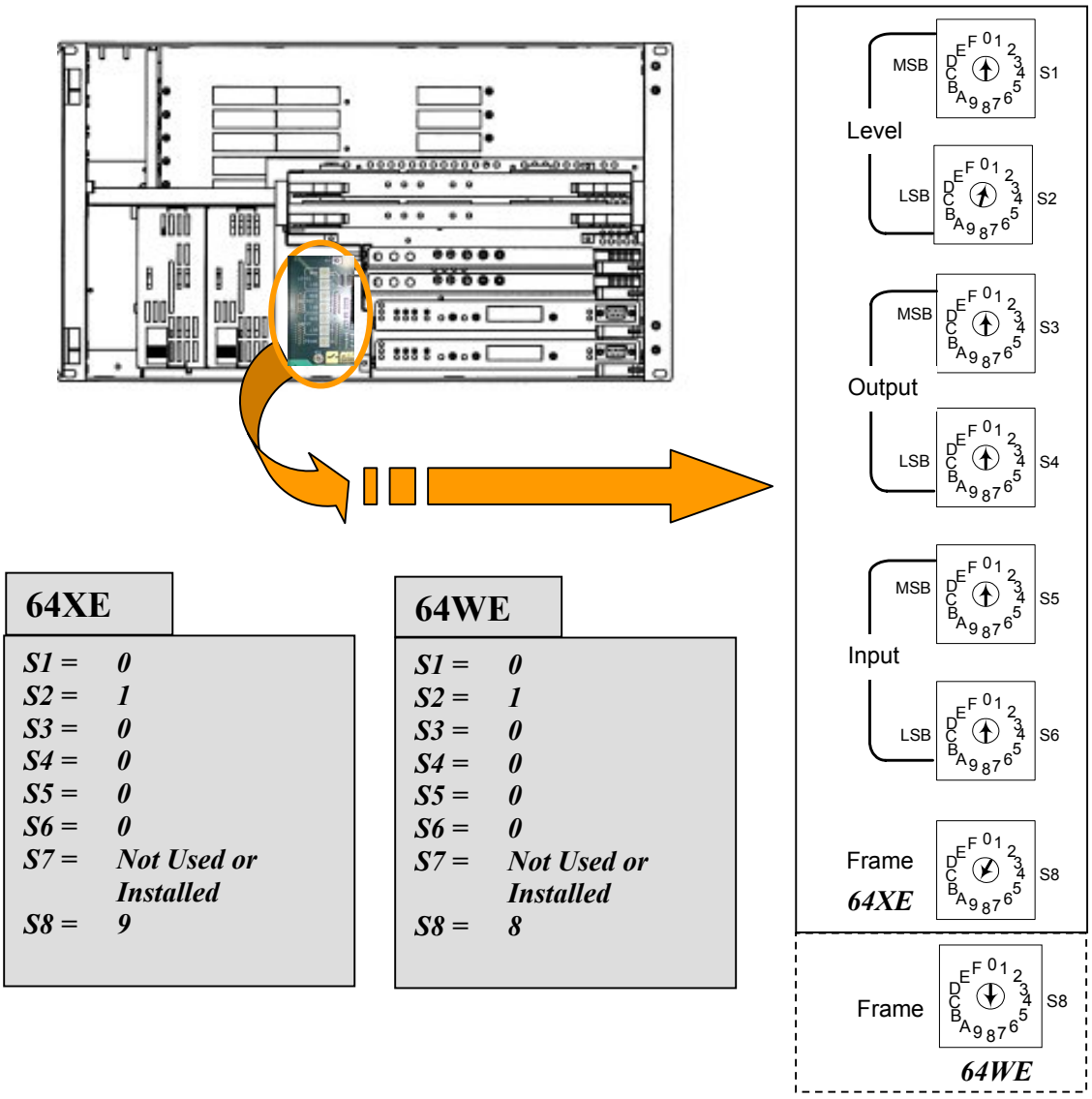


FIGURE 7: Cheetah 64XE and 64WE Chassis Strobe Switch Location and Settings

5.5.3 Cheetah 64 Series Chassis Strobe Switch Functions

Table 3 describes the functions of the various strobe switches for the Cheetah systems:

TABLE 3: STROBE SWITCH FUNCTIONS

ROTARY SWITCH	NAME	DESCRIPTION
S1	Most Significant Bit (MSB) Level Code	The level code identifies the matrix level of the router. This setting accepts 1 to 63 in binary (1 to 3F in hexadecimal). This setting must match the Strobe setting in the 3500 Series software (select **Configuration > Component**. The Strobe setting is at the bottom of the window).
S2	Least Significant Bit (LSB) Level Code	
S3	MSB Output Offsets	This strobe is used to offset output origin when frames are added to the system. This setting accepts 1 to 255 in binary (1 to FF in hexadecimal). Set this strobe to the first offset number you want to use in this unit. This setting must match the Output Offset setting in the 3500 Series software (select **Configuration > Component**. The Input Offset displays in the lower section of the window).
S4	LSB Output Offsets	
S5	MSB Input Offsets	This strobe is used to offset input origin when frames are added to the system. This setting accepts 1 to 255 in binary (1 to FF in hexadecimal). Set this strobe to the first input number you want to use for this unit. This setting must match the Input Offset setting in the 3500 Series software (select **Configuration > Component**. The Input Offset displays in the lower section of the window).
S6	LSB Input Offsets	
S7	Not Used	Not installed or assigned
S8	LSB Frame	Specifies the type of frame the boards are plugged into.

5.6 CHEETAH 64NE, 64XE, AND 64WE CHASSIS POWER SUPPLY BACKPLANE SWITCHES

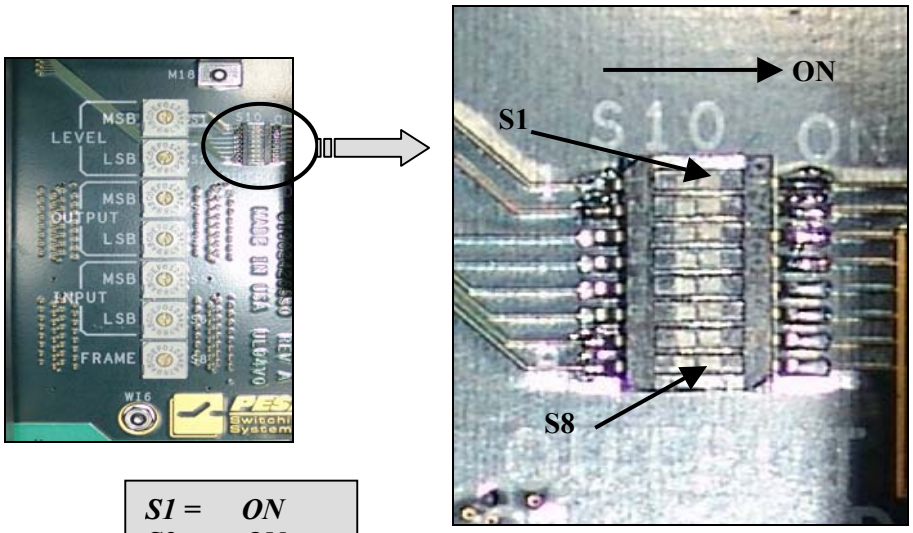
NOTE	**There are no Power Supply backplane switches in the Cheetah 64NE, 64XE, and 64WE chassis configurations.**

5.7 CHEETAH 64NE, 64XE, AND 64WE CHASSIS INPUT/OUTPUT BACKPLANE DIP SWITCHES

NOTE	**There are no Chassis Input/Output Backplane dipswitch settings required for the Cheetah 64NE, 64XE, and 64WE chassis configurations.**

5.8 CHEETAH 64NE, 64XE, AND 64WE CHASSIS MATRIX BACKPLANE SWITCHES

NOTE	**The matrix backplane switches in the Cheetah 64NE, 64XE, and 64WE chassis configurations are preset at the factory and should not be adjusted other than the settings shown in Figure 8.**



S1 =	*ON*
S2 =	*ON*
S3 =	*ON*
S4 =	*ON*
S5 =	*ON*
S6 =	*ON*
S7 =	*ON*
S8 =	*ON*

FIGURE 8: Cheetah 64NE, 64XE, and 64WE Chassis Matrix Backplane Switches

5.9 CHEETAH 64NE, 64XE, AND 64WE CHASSIS SYSTEM CONNECTION LOCATIONS

See Figure 9 for specific system connection locations.

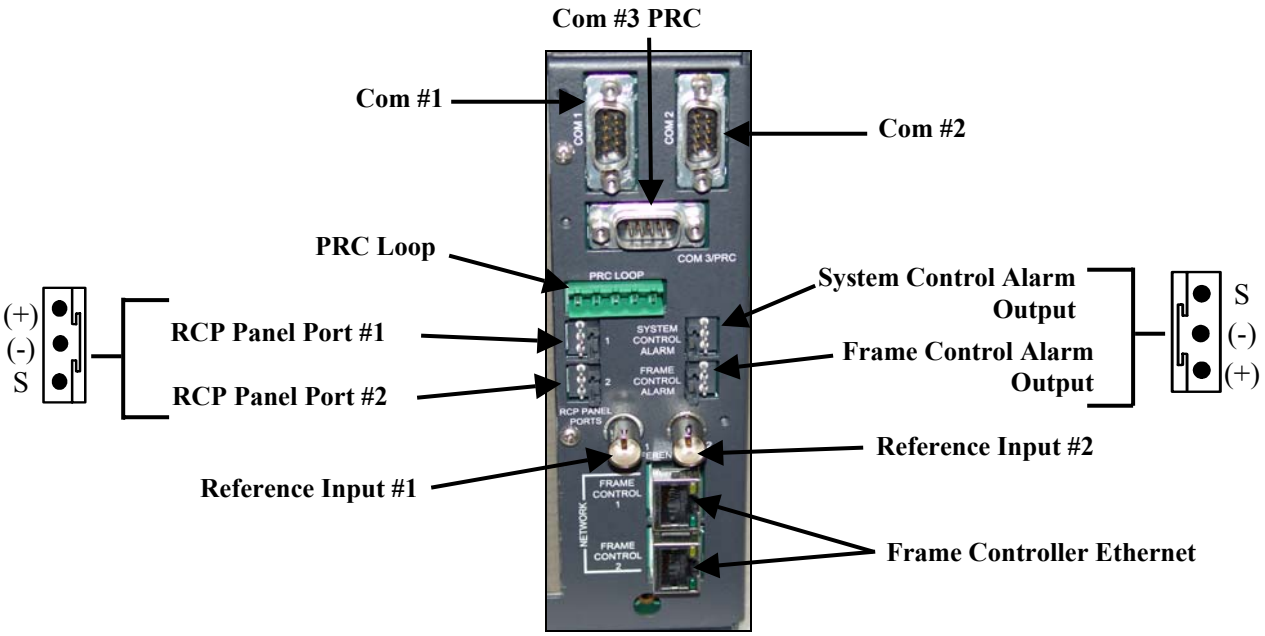
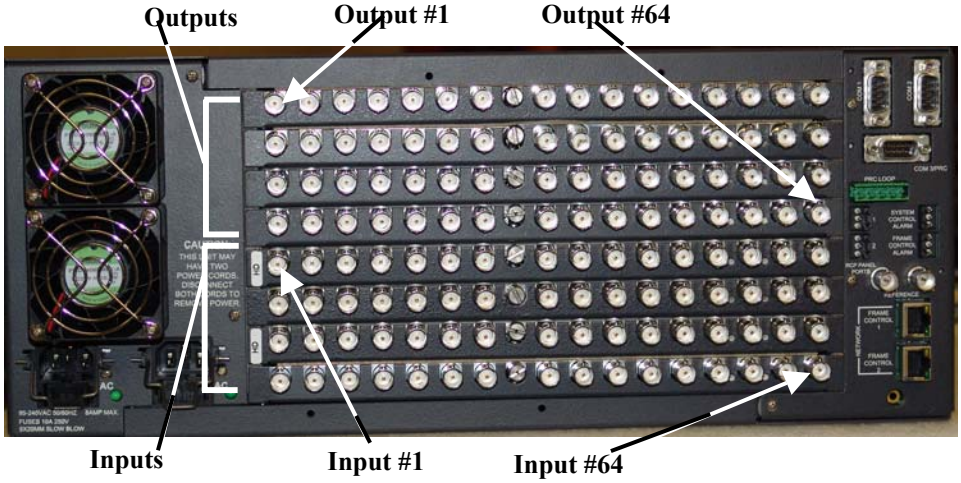


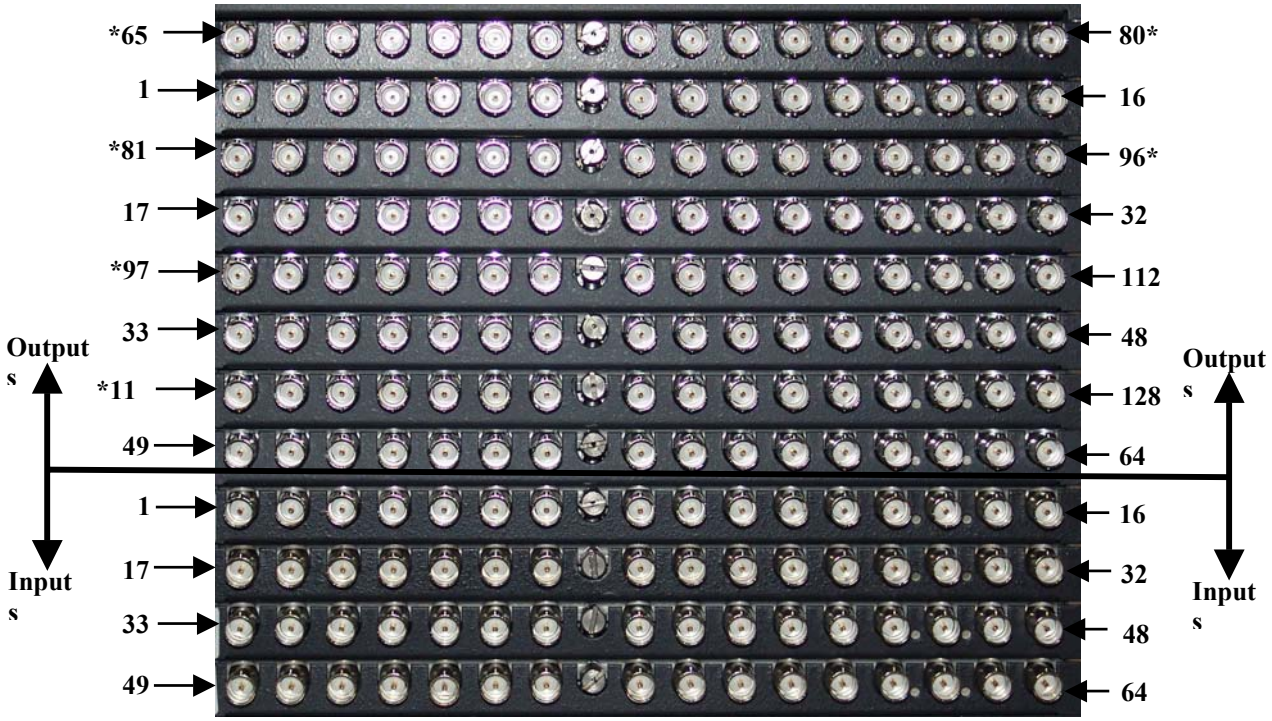
FIGURE 9: 64NE, 64XE, and 64WE Chassis System Interface Connector Locations and Descriptions (Rear View)

5.10 CHEETAH 64NE, 64XE, AND 64WE CHASSIS INPUT/OUTPUT SIGNAL CONNECTORS

These Input/Output (I/O) BNC coaxial connectors, located on the rear of the units (see Figure 10) provide the input/output signal interface.



A) Cheetah 64NE I/O Connections



B) Cheetah 64XE and 64WE I/O Connections

*****= *Slots are used for either option cards (i.e., 64WE chassis) or expansion cards (i.e., 64XE chassis).*

FIGURE 10: Cheetah 64 Series Input/Output Signal Connectors (rear views)

The video input connectors are internally terminated into 75Ω. Use coaxial cable and a standard BNC connector to connect each source. Input and output modules can be populated in increments of 16. Input modules provide up to 100m (meters) of equalization for HD and up to 300m for SDI.

Both HD/multi-rate and SDI output modules include a single copper connection. However, daughter boards can be installed on cards for frames that include output options to provide a second output per bus. The second output can be either copper or fiber (single mode or multi-mode). For SDI applications, a DAC monitor grade, 10-bit output board can be installed as an option. For HD applications, a HD to SD conversion card can be installed as an option.

5.11 CHEETAH 64NE, 64XE, AND 64WE FUSE LOCATIONS AND ASSIGNMENTS

All circuit protection devices (i.e., fuses, current monitoring semiconductors, and temperature circuitry) for the various cards that are installed in the 64NE, 64XE, and 64WE chassis are located on each card and are non-serviceable by the user.

Chapter 6 CHEETAH 64 SERIES CABLE INSTALLATION AND POWER CONNECTIONS

6.1 CONNECTING EQUIPMENT CABLES

Use the following guidelines when connecting equipment cables:

1. Install the equipment in the rack before connecting cables.
2. Relieve strain on all cables to prevent connector separation.
3. To the extent possible, separate control, signal, and power cables to minimize crosstalk and interference.
4. Use as many cable ties as necessary to secure cables to the rack (see Figure 11). This will minimize the amount of force transmitted to the equipment and help route cables away from hazardous areas.

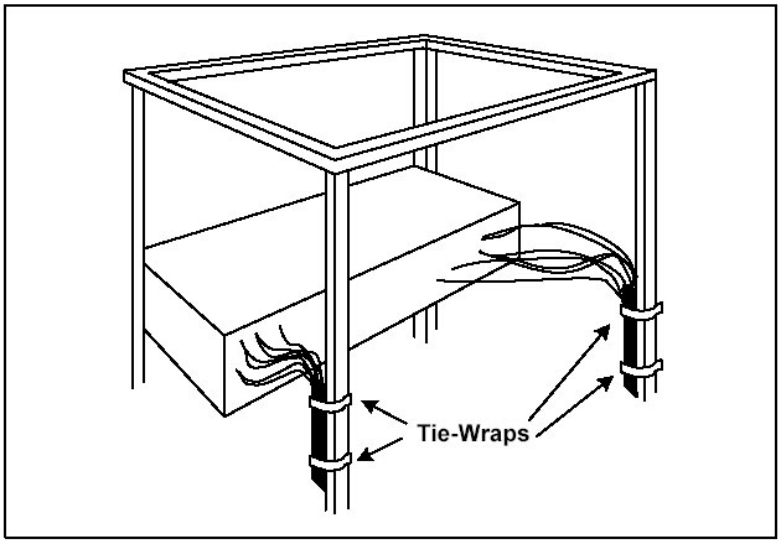


FIGURE 11: Cables Attached to Supports

5. Route cables away from physical traffic areas to avoid creating a safety hazard (trip or shock).
6. Bundle together any cables connected to a single input/output card and separate them from the other bundles with enough slack to create a service loop. This will permit individual card replacement without disruption to the other input/output cards.

6.2 CONNECTION GUIDE CHECKLIST

Once the Cheetah Video Matrix Switcher is installed in the equipment rack, the associated system connections can be completed. Use the following guide to insure that Cheetah Switcher system interconnections are properly connected and that the control, power, sync, and video cables are correctly installed (for further detailed information, refer to the corresponding sub-section in this Chapter).

1. Connect the external sync sources to the reference inputs using Belden 8281 coaxial cable or equivalent. Be sure to properly terminate the external sync sources into 75Ω.
2. Connect the primary external computer to the COM 1 Connector using a 9-pin, RS-232 cable. Please note that this connection **must** be made to configure the internal System Controller using the 3500 Series Control System software package. If a secondary external computer is to be used, connect it to the COM 2 Connector.
3. If additional Cheetah Switchers are to be utilized as part of the switching matrix, connect the PRC Loop jack on the primary Cheetah Switcher to PRC Loop jack on the other Cheetah Switcher using 5-pin ribbon cables.
4. If an external controller (such as the 3500 Series System Controller) is used to control the Cheetah Switcher, connect the external controller to COM 3 PRC using 9-pin RS-422 cable.
5. Connect the RCP control panels to the RCP Panel Ports (#1 and/or #2) using twisted pair cables while observing polarity (refer to Chapter 5). The connections to the control panel may be daisy-chained.
6. If Ethernet connectivity is desired (system controller), connect a 10baseT RJ-45 LAN connector to the System Controller Ethernet jacks.
7. Configure the Ethernet settings as described in the Appendix.
8. If SNMP management of additional Cheetah Switchers is to be utilized, connect the switchers using the Frame Controller Ethernet connectors.
9. Configure the Ethernet and SNMP settings as described in the Appendices.
11. If desired, connect an external alarm to the System Control Alarm (for further connection compliance information, refer to Chapter 5 for connector pin-outs).
12. If desired, connect an external alarm to the Frame Control Alarm (for further connection compliance information, refer to Chapter 5 for connector pin-outs).
13. Connect the video sources to the video inputs using Belden 8281 coaxial cable or equivalent 75Ω coaxial cable.
14. Connect the video outputs to the video destinations using Belden 8281 coaxial cable or equivalent.

6.3 CHEETAH 64 SERIES CHASSIS SUPPLY POWER CONNECTIONS

All Cheetah frames have two AC receptacle power inputs. As depicted in Figure 12, each AC power input is filtered, full-wave bridge rectified, and then fed to the power supply to be diode OR'd with the other rectified power inputs to the system supply.

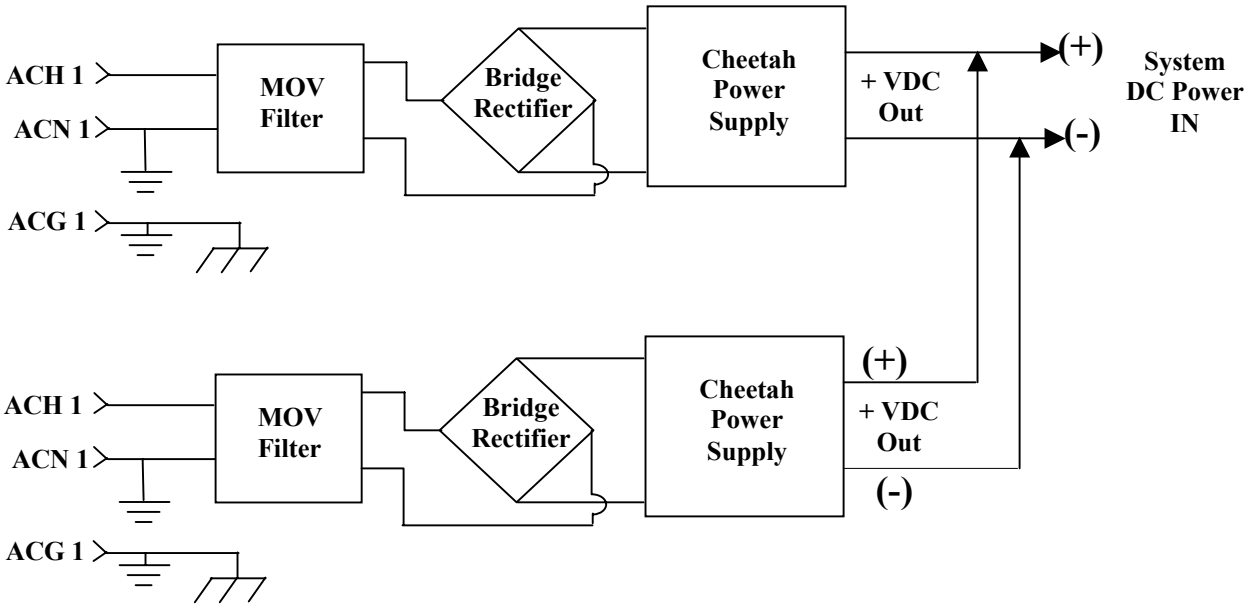


FIGURE 12: Power Supplies Configuration

6.3.1 Cheetah 64 Series Chassis Supply Power

STOP	**Make sure that all source power is within the operating range of the equipment before completing the specific power connections. Read the Maximum Voltage requirements starting in this section (Chapter 6).**

CAUTION	**To prevent damage to the equipment:** • **Read all instructions for proper input voltage ranges.** • **Use the recommended specified power branch circuit ampacity.** • **Follow static prevention precautions prior to handling equipment.**

6.3.1.1 Cheetah 64 Series Chassis Power Cord

AC power cords may differ depending on your power requirements. The chassis is supplied with two USA standard power cords for 120VAC-power service (or the standards for the country that the system is shipped to).

6.3.1.2 Cheetah 64 Series Chassis AC External Power Requirements

The 64x64 and 64x128 chassis are supplied with redundant, prefabricated, UL/CSA approved power cords that include a NEMA 5-15P male and IEC-60320-C13 female line connectors. These cords are for connection to a 120VAC-supply service (refer to Table 4).

TABLE 4: AC Power Connectors

AC Power Cable	Minimum Amps Required	IEC	Pigtail	Service Drops
IEC-type line cord (120VAC connectors)	10A Service	Yes	No	1-Standard 1-Redundant

NOTE	**This AC power filter assembly has been designed for 95-240VAC, which includes connectors and cords specified to handle maximum power requirements.**

6.3.2 Cheetah Chassis International Power Requirements

All Cheetah frames have two AC Main power feeds, which are isolated from each another. All international power requirements are pre-configured at the factory and commercially available, prefabricated power cords designed for the power source that the equipment will be operating are supplied with each unit.

As in the United States, international operation with one power supply is the normal, non-option condition. An optional second (redundant/backup) power supply is available. Typical full-frame power consumption is approximately 6.0 Amps or approximately 650 Watts at 240 VAC nominal regardless of the number of power supplies in use.

Chapter 7 FRAME AND CONTROL VERIFICATION

This section addresses the system components, frame, and control verification sequences that should be performed prior to energizing the system and placing the system in service. Attention to this section will minimize system startup and in-service malfunctions.

7.1 SYSTEM PRE-START VERIFICATION CHECKLIST

A system pre-start verification checklist includes a visual inspection to account for basic setup functions that, if incorrect, could result in immediate system startup malfunctions. The following basic checks should be performed prior to energizing any Cheetah chassis:

1. Verify the main power source is OFF (de-energized).
2. Verify all cards/modules are latched and secure.
3. Verify all blank covers are in place and secure (no open slots in the frame).
4. Verify the line cord(s) are connected to the chassis and are properly terminated to the source power distribution system (i.e., connectors plugged in or pigtails terminated).
5. Inspect for unusual items such as loose wiring, frayed cabling, loose connections or components, and missing cards/modules (basically, check for anything that seems out of place or could present a problem).
6. Proceed to System Startup.

7.2 SYSTEM STARTUP

Perform the Cheetah system startup sequence as follows:

1. Energize the main power source to the chassis.

   Result: The system has a 30 to 45 second delay prior to energizing the components. When the delay has expired, the system will energize and the cards will perform initial self-diagnostics.

	**Verify the blank-cover panels are securely in place. These panels are an integral part of the chassis cooling system. A loose, broken, and/or missing blank-cover panel could result in destructive overheating of equipment components.**

2. Verify the following LED conditions:

	**If any of Step 3's LED conditions are different, perform troubleshooting sequences to correct the problem(s) prior to placing the system in service.**

a. On the Power Supply module, the Power OK LED is illuminated (green)

b. On the 64x64 Matrix module, the following LEDs are illuminated:

- +28 (green)
- +3.3 (green)
- +2.5 (green)

c. On the Matrix Frame Controller (MFC), the following LEDs and LED display are illuminated (single or dual modules):

- Single module: the Control Status display indicates - ØSNGL OK (red)
- Dual modules: the Control Status display of the active module indicates – Active OK while the other module indicates Standby
- Active (green – illuminated on single and Active modules only)
- +28 (green)
- +5 (green)
- +3 (green)

d. On each of the Input and Output modules, the Power LED is illuminated (green).

e. If installed and on the 3500 Series System Controller module(s), the following conditions exist:

1) Dual 3500 Series System Controller module configurations:

- If both 3500 Series System Controller modules' active/standby switches are in the Standby or Active position, then Frame Slot A determines the active module. Otherwise, the active module is selected by the individual module's switch settings.

2) Any 3500 Series System Controller configuration, the Active (amber – on the active module) and Run (green) LEDs are illuminated.

	**At the end of this sequence, there should be no LED indicators that are blinking or any red LEDs illuminated on any of the I/O and Matrix modules/cards. If so, perform troubleshooting to correct the status before proceeding to the next step or section.**

3. Startup Sequence complete. Proceed to Frame Control Verification, Section 7.3.

7.3 FRAME CONTROL VERIFICATION

7.3.1 Frame Control Verification Overview

Frame control verification is required to verify Cheetah chassis component operations and isolate abnormalities prior to connecting peripheral equipment to the system. To assist the user, this verification sequence uses a graphic user interface (GUI) that is communicating directly with the chassis Matrix Frame Controller (MFC) for the diagnostic portion of the sequence. The following equipment/documentation is required:

- PC with preloaded ***PESA Switching Systems, Inc.*** ViewPort software.
- Null-modem serial cable (length determined by distance the PC will be from the chassis)
- ViewPort Manual (P/N 81-9059-0558-0)
- Customer's Cheetah chassis packing list or specification sheet.

7.3.2 Frame Strobe Setting Verification

While referring to the appropriate Chapter for the frame that is being verified, document and archive the frame's present strobe settings as follows:

1. Access the MFC compartment. If necessary, remove the top-most MFC module and blank cover to expose the strobe switches for viewing.
2. Document each strobe switch setting and archive. (Archiving should include an electronic file and hard-copy for ease of future retrieval. This information is invaluable when communicating with the PESA Customer Service group.)
3. Re-install the components that were removed in Step 1.

7.3.3 Frame Control Verification Procedure

Perform the following sequence:

1. Perform the chassis pre-start verification checks and startup sequences as outlined in Sections 7.1 and 7.2 in this Chapter.
2. With the chassis energized (ON) and while referring to the ViewPort manual, carefully connect the null-modem serial cable to the MFC, DB-9 serial connection port and the PC's serial port.

	**If there are any errors noticed while performing the sequential steps in the Frame Verification Procedure, perform troubleshooting sequences to correct the problem(s) prior to proceeding to the next step.**

3. At the PC, access the ViewPort software program and establish communication with the MFC (the module's RX and TX LEDs will be flashing green and yellow, respectfully).

4. While using the ViewPort GUI and referring to the packing list/specification sheet, verify the following:

	**Occasionally, there may be recorded errors during the initial startup sequence. However, they typically can easily be reset when the clear function is initiated.**

   a) Under the Cheetah directory, click on Frame Controller Status. Verify there are no alarms and the MFC configuration (single or dual) is correct as per your specification.

   b) Under the Cheetah directory, click on Inputs. Verify there are no errors and the input module (card) configuration is correct as per your specification.

   c) Under the Cheetah directory, click on Outputs. Verify there are no errors and the output module (card) configuration is correct as per your specification.

   d) Under the Cheetah directory, click on Matrices. Verify there are no errors and the matrix module (card) configuration is correct as per your specification.

   e) Under the Cheetah directory, click on Power Supplies. Verify there are no errors and the power supply module configuration is correct as per your specification.

   f) Under the Cheetah directory, click on Communications Summary. (This display window is used as an overview of all system components.) Verify the status for each component (4) is indicating green and there are no errors being displayed.

5. Frame Control Verification is complete. Exit the ViewPort program and disconnect the serial cable from the PC and MFC. If your system includes the 3500 Series controller module(s), proceed to System Control, Section 7.4.

7.4 SYSTEM CONTROL

NOTE	**This subsection only applies to Cheetah Series systems that are equipped with 3500 Series card(s)/module(s).**

7.4.1 System Control Overview

The 3500 Series System Controller is full-featured, microprocessor-based unit that is designed to interface with various configurations of ***PESA Switching Systems, Inc.*** video and audio routing switchers. The 3500 Series System Controller, working in conjunction with the 3500 Series Control System software, provides a Graphic User Interface (GUI) that enables users to configure and operate a routing switcher system from a standard IBM-compatible Personal Computer (PC) that has the following minimum requirements:

- Processor: 500 MHz or above
- Memory: 128 MB of RAM or more
- Monitor: 800X600 SVGA or better
- Serial Port: One serial port available from COM1 through COM4 available for CPU Link use (Minimum of a 16550 UART preferred.)
- Hard Disk: 100 MB of available space
- Operating System: Microsoft® Windows® NT™ 4.0, Microsoft Windows 2000/Professional, or Microsoft Windows XP (Home and Pro)

Both the 3500 Series System Controller and the 3500 Series Control System software are inherently flexible and easily configured. The 3500 Series LE software has a smaller feature set and is designed for smaller systems.

This subsection addresses the initial user communication setup, the onboard firmware configuration, and initial settings for the specific Cheetah Series chassis system(s) that will be placed in service. Additional reference materials for this section are included in the following documents:

- 81-9059-0549-0 (Manual, 3500 Series System Controller and System Software)
- 81-9059-0432-0 A (03-99 3500Plus Dipswitch Setting Information Technical Bulletin)
- 81-9059-0551-0 (Technical Bulletin. 3500 Series Field Upgrade)
- 81-9059-0554-0 (Installation Guide, 3500Pro/3500 Series LE Software)

7.4.2 System Control Verification Procedure

Perform the following sequence (hot-swap):

1. Perform the pre-start sequences as outlined in Sections 7.1, 7.2, and 7.3 of this Chapter.
2. Remove the 3500 Series card(s) and verify the S1 dipswitch (see Figure 13) settings are correct for the baud rate that you are going to use. If necessary, refer to P/N 81-9059-0432-0 A (03-99 3500Plus Dipswitch Setting Information Technical Bulletin).

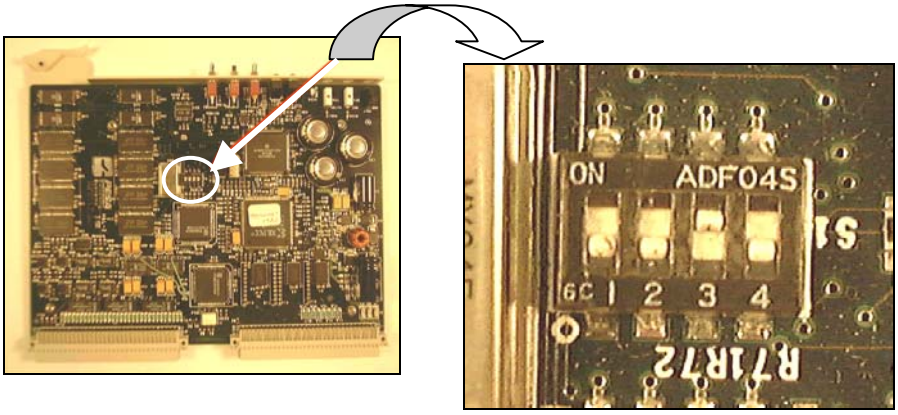


FIGURE 13: 3500 Series Card Dipswitch Locations (set for 9,600 baud rate)

The dipswitch should be set in accordance with Table 5 before the 3500Plus System Controller is installed. For normal operation at **9,600 Baud**, all four switches should be in the **OFF** position as shown in Figure 13. (However, the factory default is 38,400 Baud-rate with switch #3 in the ON position.)

TABLE 5: 3500 Series Card S1 Dipswitch Settings

POSITION	OFF	ON
1	Normal Operation Mode	Software Upgrade Mode
2	Use configuration stored in flash memory	Reboot and ignore configuration stored in flash memory (used to bypass a corrupt configuration).
3	COM1: 9600 Baud	COM1: 38400 Baud
4	Reserved for future use	Reserved for future use

3. Return the card(s) to their proper chassis slot and secure.

4. Connect the Null modem cable to the chassis' COM1 port and the PC's (that has the 3500 Series software installed) serial port.

NOTE	**If any one of the following steps in this sequence cannot be verified and/or performed correctly, you must complete a troubleshooting sequence to correct the problem before proceeding to the next step.**

5. Re-verify the card LEDs' status and Active/Standby switch position as follows:
   - Single 3500 Series card installed:
     a) The Active/Standby switch is in the Active position.
     b) The Run (green) LED is illuminated.
     c) The Active (amber) LED is illuminated.
   - Dual 3500 Series cards installed:
     a) Verify one card's Active/Standby switch is in the Active position and the other card's switch is in the Standby position. (Note that with any other switch configuration, the active card will be system-selected by which card is in chassis' A slot.)
     b) On the Active card, the Run (green) LED is illuminated and the Active (amber) LED is illuminated.
     c) On the Standby card, the Run (green) LED is illuminated and the Active (amber) LED is extinguished.
6. Refer to the 3500 Series System Controller and System Software manual and perform the following:
   d) Verify the 3500 Series controller is communicating (COM1) properly with the PC.
   e) Verify the system configuration matrix is loaded on the 3500 Series controller card (firmware). If not, reload the system configuration in the controller firmware.
   f) Verify the system confidence for the configuration matrix. That is, all system components in the system configuration matrix have communication capabilities (e.g., handshaking) with the 3500 Series System Controller.
   g) Perform a routine diagonal, active test sequence as outlined in the 3500 Series System Controller and System Software manual's diagnostic tool.
7. System Control verification is complete.

Chapter 8 OPERATIONAL DESCRIPTIONS AND CARD/MODULE INSTALLATIONS

This section documents the operational descriptions of the various components of the Cheetah Series Switchers. Typically, this section is accessed for more concise component information and how each component is used in the Cheetah Series systems.

Additionally, this section will describe the installation of the various components of the Cheetah Series Switchers. Even though the unit is shipped with all of the components preinstalled, this section is typically accessed for basic component information and for their replacement (removal and installation) sequences.

8.1 CHEETAH SERIES POWER SUPPLIES

8.1.1 Cheetah Series Power Supply Information

	**Cheetah Series Power Supplies contain electrical shock hazards and should only be serviced by qualified service personnel with experience in servicing off-line switching regulators.**
	**There are no user serviceable parts contained in the Cheetah Series Power Supplies. All service performed on the Power Supplies should be performed by the PESA Service Department.**
	**High Leakage Current at 240VAC. The Cheetah Series Power Supply leakage current exceeds 7.0mA when used at 240 VAC because of leakage through emission filter capacitors.**

The Cheetah Power Supply is responsible for providing a regulated ±28VDC @22A to the switching frame. The Cheetah Power Supply is designed to operate automatically with input AC line voltage ranges from 95-240 VAC and with AC line frequencies of 50/60 Hz. All Cheetah power supplies have built-in, over-current protection circuitry. When two supplies are used, each supply is electrically connected to a common/dedicated buss within the chassis and from there, to the fuse block for overcurrent protection and distribution.

Additionally, each power supply contains dual internal fan controller systems that are isolated from the main DC power output buss connections. Depending on the chassis, there are dependent power supply installation configurations to satisfy the fan operations. In a two-supply system, one supply module becomes the master and the other becomes the slave.

In the event of a Cheetah Power Supply failure, return the malfunctioning unit to the PESA Service Department for replacement. The power supplies contain lethal voltages when operating and should be serviced only by the PESA Service Department. Please call the PESA Service Department for a RMA number before returning any units for replacement. The Service Department's phone number is listed on the front page of this manual.

8.1.2 Cheetah Series Chassis Power Supplies Locations and Allocations

The power supplies are located on the front of the frame as shown in Figure 14.

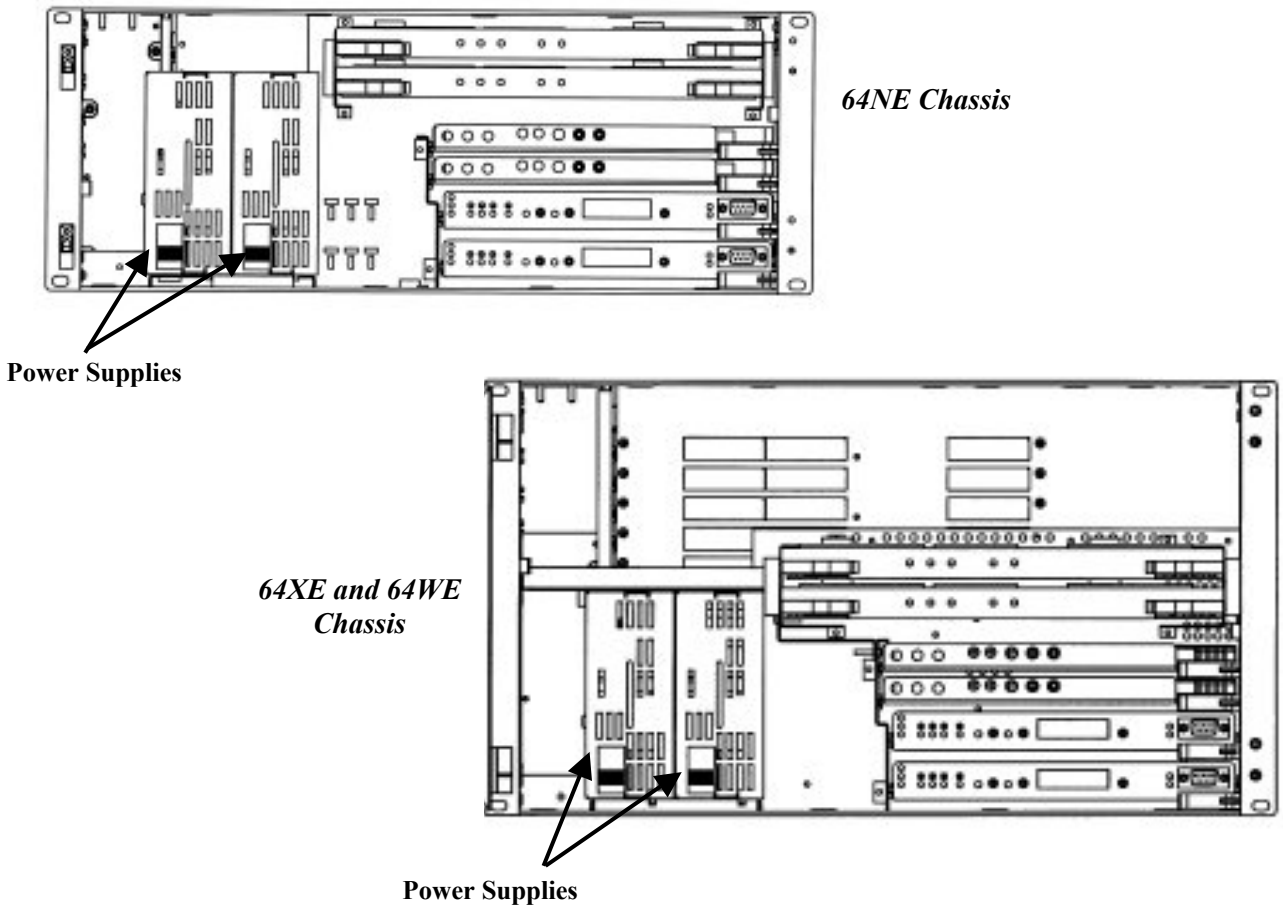


FIGURE 14: Cheetah 64 Series Chassis Power Supply Locations (Front Views)

8.1.3 LED Indicators and Test Points

Three LED indicators and two test points are located on the front of the power supply, as illustrated in Figure 15. The LED indicators are described in Table 6.

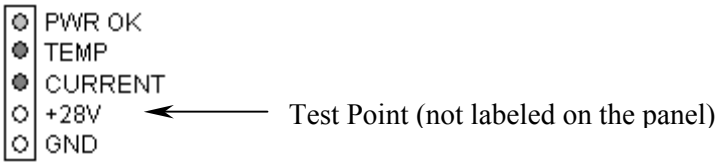


FIGURE 15: Power Supply LED Indicators and Test Points

TABLE 6: Power Supply LED Indicators

LED	COLOR	STATUS	DESCRIPTION
PWR OK	Green	**ON**	Indicates that the +28V power is stable and within normal operating parameters.
Temp	Red	**ON**	Indicates there is an over-temperature condition in the power supply. ***This must be corrected immediately!***
Current	Red	**ON**	Indicates there is an over-current condition in the power supply. ***This must be corrected immediately!***

8.1.4 +28V Test Points

The test point labeled +28V is used to determine by measurement whether +28VDC power is present (bare metal of the chassis can be used for the ground/negative potential).

8.1.5 Installing the Power Supplies

Install each power supply as follows:

1. Align the metallic support plate of the first power supply vertically with the card guides in the chassis.
2. Press upward on the power supply latch located on the front bottom of the assembly 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 unit into the chassis until the power supply latch engages the corresponding slot in the chassis.

NOTE	**The latch on the power supply acts as a retainer latch and a power ON/OFF switch for the unit.**

4. Make sure the latch is *fully engaged* (down and secured/mated into the corresponding slot in the chassis) to enable (energize) the power supply.

CAUTION	**Refer to the appropriate chassis location and allocation descriptions for the total amount of power supplies that are required for proper operation. Each slot must have either a power supply or a blank installed. Refer to the specific section in the manual for the correct slots for your configuration.**

If applicable, repeat the above Steps for the remaining power supplies.

8.1.6 Removing the Power Supplies

To remove a power supply, follow these steps (you may remove power supplies while the Cheetah system is operational [energized], which is called hot-swapping):

CAUTION	**Make sure you will still have the minimum number of power supplies installed before removing power supplies. The minimum number depends on your configuration, which is either one or two power supplies. If you only have one supply installed and you must remove it, de-energize the unit first.**

1. Open the Cheetah front cover.

NOTE	**When the latch on the power supply is moved to the full-upward position, the power supply is switched off and is freed from the retaining slot in the chassis.**

2. Push and hold the latch on the lower front of the power supply in the full-upward position.

3. Once the latch is pushed upward and held, use the unit handle and carefully pull the power supply out of the equipment chassis (the unit is held in place by connector plugs and requires a slight forceful-pulling motion to separate it from the connectors). Repeat for each power supply that you need to remove.

8.2 INPUT BUFFER CARD

8.2.1 Input Buffer Card Overview

The input buffer card provides 16 input video channels. Each input channel provides an equalizer to compensate for cable loss and drivers for internal signal distribution. The input buffer card is available in five versions: SDI, HD-multi-rate, standard analog, high-level analog, and fiber optic.

8.2.2 Input Buffer Card LED Indicators

Two LED indicators are located approximately in the middle of the Input Buffer card's service connection faceplate. The illumination actions of these LEDs are described in the Table 7.

TABLE 7: Input Buffer Card LED Indicators

LED	COLOR	STATUS	DESCRIPTION
COM Error	Red	**ON**	Indicates that an invalid CRC has been detected.
		Blinking	Indicates a loss of communication from the frame controller. This LED can only be reset when a valid CRC is received.
PWR Good	Green	**ON**	Indicates that the +28V, +4.8V, +4.3V, and +3.5V power is stable and within normal operating parameters.
		OFF	Indicates that +28V is not stable or the +4.8V, +4.3V, or +3.5V power supplies are not working.

8.3 OUTPUT COMBINER CARD

8.3.1 Output Combiner Card Overview

Each output combiner card provides 16 output connections from the system. After the signals are combined, the data-rate selection switch selects between video re-timers or bypass mode for non-standard data rates. The output combiner is available in either SDI or HD multi-rate versions, each of which can support option cards for dual-output BNC or fiber option output. The SD can also support a 10-bit digital analog (DAC) card. The HD-MR card can support HD to SD conversion as an option card.

8.3.2 Output Combiner Card LED Indicators

Two LED indicators are located on the Output Combiner card. These LEDs are described in Table 8.

TABLE 8: Output Combiner Card Led Indicators

LED	COLOR	STATUS	DESCRIPTION
COM Error	Red	**ON**	Indicates that a control error has occurred or a loss of receive clock from the frame controller has been detected. A control error includes a bad CRC of the received data, incorrect number of words in the message being received, or corrupted data in the message being received. If a control error occurs, the LED will remain on until a message with a good CRC has been received.
		Blinking	Indicates a missing receive clock error.
PWR Good	Green	**ON**	Indicates that the +28V, +5.0V, +3.7V, and +4.5V power is stable and within normal operating parameters.
		OFF	Indicates that +28V is not stable or the +5.0V, +3.7V, or +4.5V power supplies are not working.

8.4 INSTALLING INPUT/OUTPUT BUFFER CARDS

Install the input/output buffer cards as follows (see Figure 16):

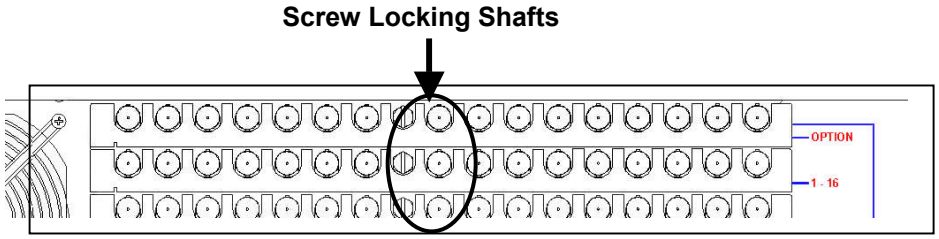


FIGURE 16: Input/Output Signal Connectors (rear view)

1. Align the first input/output buffer card with the card guides in the chassis.
2. Carefully insert the input/output buffer card into the chassis until the screw makes contact with the backplane. This will align the card with its' corresponding backplane contact block.
3. Secure the screw using a hex socket or a flathead screwdriver. As the screw is been tightened, the card will be automatically seated into the contact block on the backplane.
4. Repeat the above steps for each additional input/output buffer card.

5. Reverse the order for removal of the card.

	**Dipswitch settings (for information only) are detailed in the specific Chapter for the chassis configuration that you have.** **These dip switches are set at the factory. Do not change the settings!**

8.5 3500 SERIES SYSTEM CONTROLLER CARDS

The Cheetah may contain up to two 3500 Series System Controllers (see Figure 17). If the primary controller fails, the secondary controller automatically resumes all of the primary controller functions. The System Controller, working in conjunction with the 3500 Series Control System software, enables users to configure and operate a switcher system from a standard IBM compatible PC. The System Controller interfaces between the routing switcher and all user-controlled elements, including RCPs, PCs, etc. Based upon configuration data input during setup and installation, the System Controller sends appropriate I/O control signals to the Cheetah 64x64 Video Matrix Card.

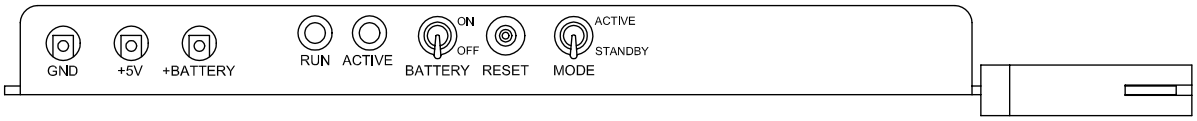


FIGURE 17: 3500 Series System Controller Board Assembly (Front View)

8.5.1 GND

This test point provides a convenient ground connection when measuring voltages at the other test points on the 3500ProSystem Controller Card.

8.5.2 +5V

The voltage measured between this test point and GND is the output of the voltage regulation circuit and should be 5.0VDC (±0.1VDC).

8.5.3 +BATTERY

The voltage measured between this test point and GND is the output voltage of the backup memory power source and should be greater than 2.0VDC when power has been removed from the board.

8.5.4 Battery ON/OFF Select Switch

This SPDT toggle switch is used to enable and disable the backup memory power source. Early designs of PESA system controllers used a battery for backup power. This switch was used to prevent the battery from discharging during prolonged storage.

The 3500 Series System Controller uses a capacitor as a backup power source, which does not need to be isolated during storage. This switch should be in the ON position at all times.

8.5.5 Reset

This SPDT momentary pushbutton switch is used to manually reset the 3500 Series System Controller in the event of system failure or lockup (similar to a warm boot on a PC). To reset the controller, press and hold this switch for about three seconds.

8.5.6 Mode

This SPDT toggle switch is used in a dual-controller system to designate the primary controller and the backup controller. Set the Mode switch to ACTIVE on the primary controller, and to STANDBY on the backup controller. In a single controller system, this switch has no effect.

8.5.7 LEDs

The 3500 Series System Controller board has three LEDs, which are described in Table 10:

TABLE 9: 3500 Series System Controller LEDs

LED	COLOR	PANEL LEGEND	NORMAL STATE	TROUBLESHOOTING INFO
LED1	RED	None (LED is located on the PCB)	**OFF**	Controller board is in RESET state or is in program download mode.
LED2	GRN	RUN	**ON**	Indicates that input voltage to this board is within design parameters. If LED is OFF: 1. Remove and reinstall board to verify backplane connector is properly seated. 2. Check power supplies for proper operation. 3. Contact PESA Customer Service.
LED3	YEL	ACTIVE	**ON**	Indicates that the board is currently in active control of a routing switcher system. NOTE *In a dual controller system, the primary controller ACTIVE LED will be ON and the backup controller ACTIVE LED will be OFF.* If the LED is OFF: 1. Remove and reinstall board to verify backplane connector is properly seated. 2. Ensure the board has been configured to be active. 3. Contact PESA Customer Service.

8.6 64X64 VIDEO (CROSSPOINT) MATRIX CARD

8.6.1 64x64 Video Crosspoint Matrix Card Overview

The 64x64 Video Matrix Card selects one of 64 inputs to each of 64 outputs. Input signals from the input buffer card are buffered to the input of a high-speed matrix. The output of the matrix is again buffered and sent to the output combiner cards. Each matrix card contains input buffer chips (octal bus transceivers) that drive into a single 64x64 crosspoint configuration (see Figure 18).

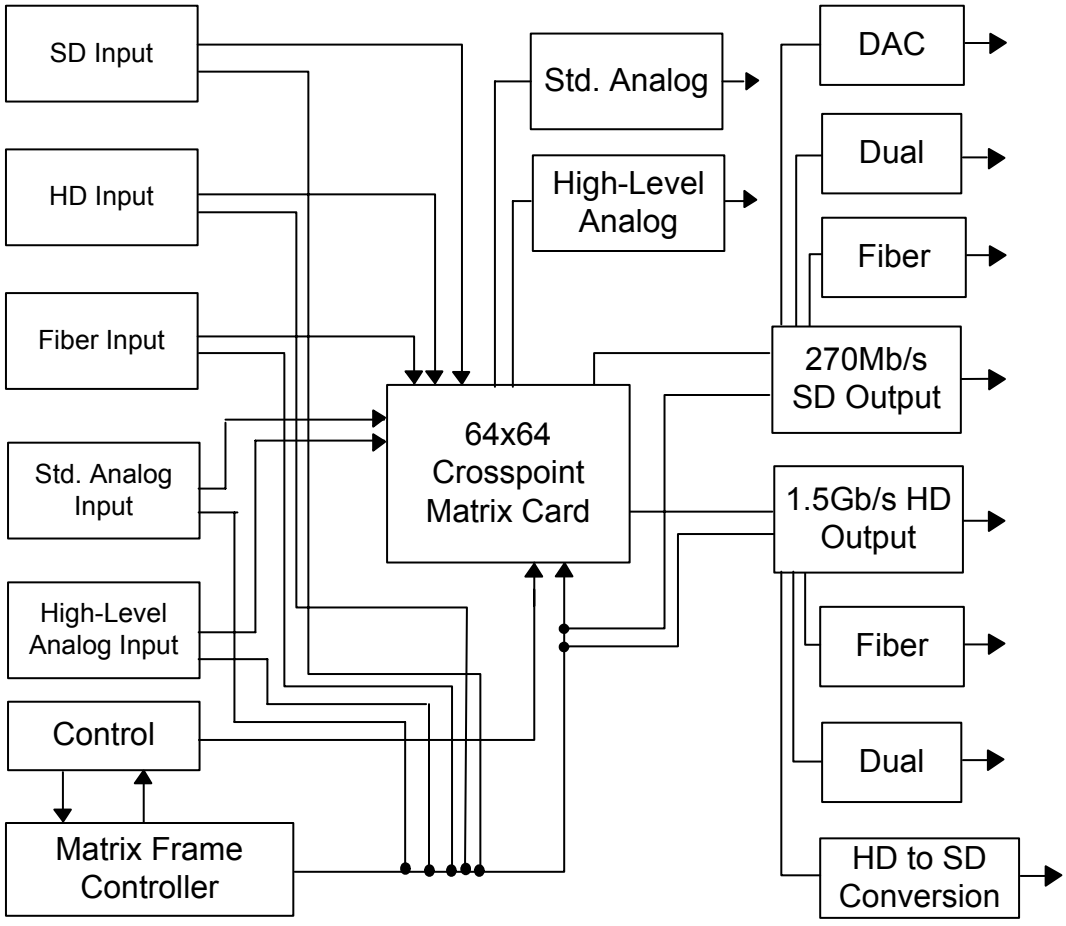


FIGURE 18: 64X64 Video Crosspoint Matrix Card Diagram

8.6.2 64x64 Video Crosspoint Matrix Card LED Indicators

Five LED indicators are located on the 64x64 matrix card faceplate, as illustrated in Figure 19 and described in Table 11.

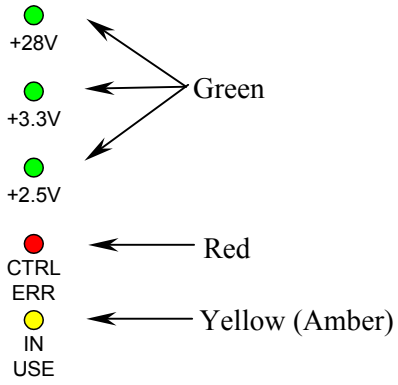


FIGURE 19: 64X64 Video Crosspoint Matrix Card LEDS

TABLE 10: 64X64 Video Crosspoint Matrix Card LED Descriptions

LED	COLOR	STATUS	DESCRIPTION
+28V	Green	**ON**	Indicates that the +28Vpower is stable and within normal operating parameters.
		OFF	Indicates that +28V is not stable or power supplies are not working.
+3.3V	Green	**ON**	Indicates that the +3.3Vpower is stable and within normal operating parameters.
		OFF	Indicates that +3.3V is not stable or power supplies are not working.
+2.5V	Green	**ON**	Indicates that the +2.5Vpower is stable and within normal operating parameters.
		OFF	Indicates that +2.5V is not stable or power supplies are not working.

Table continued on next page

Table 11 (cont.)

LED	COLOR	STATUS	DESCRIPTION
Ctrl Err	Red	**ON**	Indicates that a control error has occurred, or that a loss of receive clock from frame controller has been detected. A control error includes a bad CRC of the received data, incorrect number of words in the message being received, or corrupted data in the message being received. The LED will remain on until a message with a good CRC has been received.
		Blinking	Indicates a missing receive clock error.
		OFF	No alert conditions are present.
In Use	Yellow	**ON**	Indicates that a crosspoint on the matrix card is activated.
Port A/B	Yellow (On the PCB only)	**ON**	These surface-mount LEDs indicate whether the card is communicating with the frame controller via communications port A or B. They are not user-accessible.

8.7 MATRIX FRAME CONTROLLER (MFC)

The matrix frame controller, located on the right front of the unit, is illustrated in Figure 20. For every frame type, at least one Matrix Frame Controller (MFC) is required. The function of the frame controller is to determine frame size, level, input offsets, output offsets, plus other physical characteristics of the frame hardware. Both PESA's PRC protocol and NET PRC protocol are available to the MFC. With the NET-PRC protocol, the MFC has the ability to communicate to a system controller via Ethernet connection. More features include SNMP support and redundant MFC cards with auto changeover. On the front panel of each matrix frame controller is a diagnostic port (on the far right) used for troubleshooting (for further information, refer to Chapter 9 and Appendices).

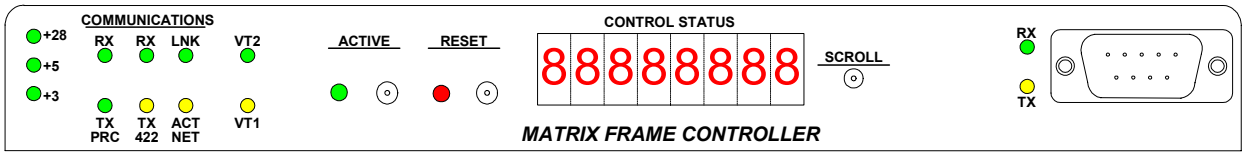


FIGURE 20: Matrix Frame Controller

The MFC has the ability to provide dual operations. By setting each MFC with its own Ethernet address, updates and active switching can be done in parallel that allows immediate crossover during a card failure or network interruption (refer to Appendices for details on Ethernet configuration options).

8.7.1 MFC LED Indicators

The matrix frame controller LED indicators are described in Table 12.

TABLE 11: Matrix Frame Controller LED Indicators

LED	COLOR	STATUS	DESCRIPTION
+28V	Green	**ON**	Indicates that the +28V power is stable and within normal operating parameters.
	Red	**ON**	Indicates that +28V power is not stable.
+5V	Green	**ON**	This LED, when on (green), indicates that the +5V power is stable and within normal operating parameters.
	Red	**ON**	Indicates that +5V power is not stable.
+3V	Green	**ON**	Indicates that the +3V power is stable and within normal operating parameters.
	Red	**ON**	Indicates that +3V power is not stable.
PRC Tx/Rx	Green	**ON**	Indicate that PRC traffic is being transmitted or received.
422 Tx/Rx	Green	**ON**	Indicate that RS-422 traffic is being transmitted or received.
ACT NET	Green	**ON**	Indicates that network activity is present.
LNK	Green	**ON**	Indicates that a network connection exists.
VT1/VT2	Green	**ON**	Indicates that a sync signal is present.
Active	Green	**ON**	Indicates the active controller (when dual controllers are in use).
Reset	Red	**ON**	Indicates that the controller is in Reset mode.
Rx	Green	**ON**	Indicates that Receive data is being received.
Tx	Yellow	**ON**	Indicates that Transmit data is being transmitted.

8.7.2 MFC 8-Character Display

An eight-character display (see Figure 21) is located on the front of the matrix frame controller.

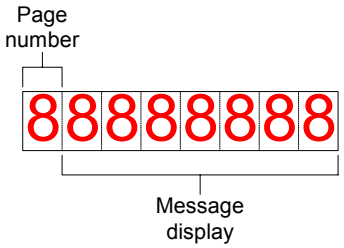


FIGURE 21: 8-Character Display

The display is divided into two fields. The first character on the far left is the first field indicating the page number of the information being displayed. The next seven characters is the second field that indicates the actual message.

Press the "Scroll" button to view successive pages. Each page will appear for 30 seconds, then reset to page 0. Descriptions of the displayed messages are detailed in Table 13.

TABLE 12: 8-Character Display Messages

PAGE	MESSAGE	DESCRIPTION
0	ACTV OK STDB ** SNGL OK SNGL **	Describes which frame controller is active, standby, or single operation. It also indicates whether there is an alarm condition present on the controller.
1	IN XXXX	Shows the number of inputs being controlled by the frame controller.
2	OUTXXXX	Shows the number of outputs being controlled by the frame controller.
3	IOFXXXX	Shows the input offset of the matrix.
4	OOFXXXX	Shows the output offset of the matrix.
5	STRB XX	Shows the PRC strobe of the matrix.
6	TEMP OK TEMPBAD	Shows the alarm status of the over temp indicator.
7	PWR OK PWR BAD	Shows the alarm status of the power supply.
8	FAN OK FAN BAD	Shows the alarm status of the fan circuit.

Table continued on next page

TABLE 13: 8-Character Display Messages (cont.)

PAGE	MESSAGE	DESCRIPTION
9	PRC NO PRC OK PRC BAD	Describes whether the system is communicating via the PRC bus. If so, it indicates whether it has detected any errors on the PRC communication bus.
A	NET NO NET OK NET BAD	Describes whether the system is communicating via the Network Communication. If so, it indicates whether there have been any errors detected.
B	SYN1 NO SYN1 XX	This indicates whether a valid SYNC 1 is present. The type of sync is encoded in the XX.
C	SYN2 NO SYN2 XX	This indicates whether a valid SYNC 2 is present. The type of sync is encoded in the XX.
D	XXX.XXX	This is the first half of the IP address of the frame controller's network node.
E	XXX.XXX	This is the second half of the IP address of the frame controller's network node.
F	INE OK INE BAD	Indicates whether there are any errors detected on any input cards.
G	OTE OK OTE BAD	Indicates whether there are any errors detected on any output cards.
H	MTX OK MTX BAD	Indicates whether there are any errors detected on any matrix cards.
J	PSB OK PSB BAD	Indicates whether there are any errors detected on any power supply cards.
K	INE OK INE BAD	Indicates whether there are any errors detected on any input cards.
L	OTE OK OTE BAD	Indicates whether there are any errors detected on any output cards.
M	MTX OK MTX BAD	Indicates whether there are any errors detected on any matrix cards.
N	PSB OK PSB BAD	Indicates whether there are any errors detected on any power supply cards.

8.7.3 MFC Switch Locations and Settings (S1 and S2)

S1 and S2 are eight-position, slide-style dipswitches consisting of eight, single-pole single-throw (SPST) switches numbered 1 through 8, located on the face of the matrix frame controller card, as illustrated in Figure 22.

STOP	**These dipswitches are set at the factory. Do not change the settings!**

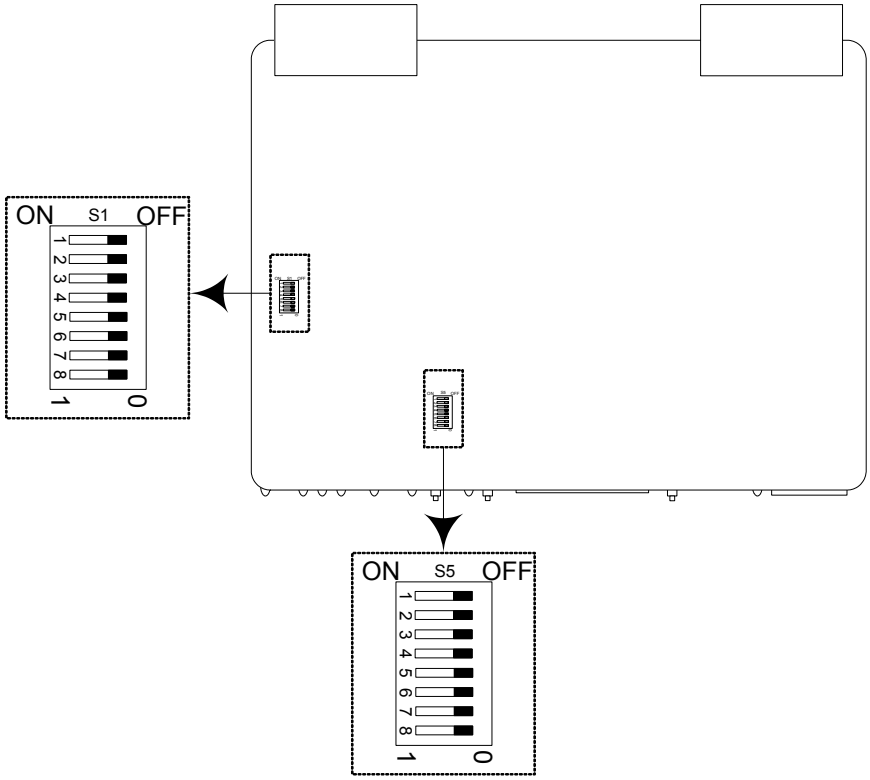


FIGURE 22: MFC Dipswitch Locations

8.8 REAR PANEL CONNECTORS

8.8.1 RS-232 Control Connectors COM 1 and COM 2

COM 1 and COM 2 (see Figure 23) are DB-9 Male connectors that provide RS-232 serial communication interfaces. Pin-outs are shown in Table 14.

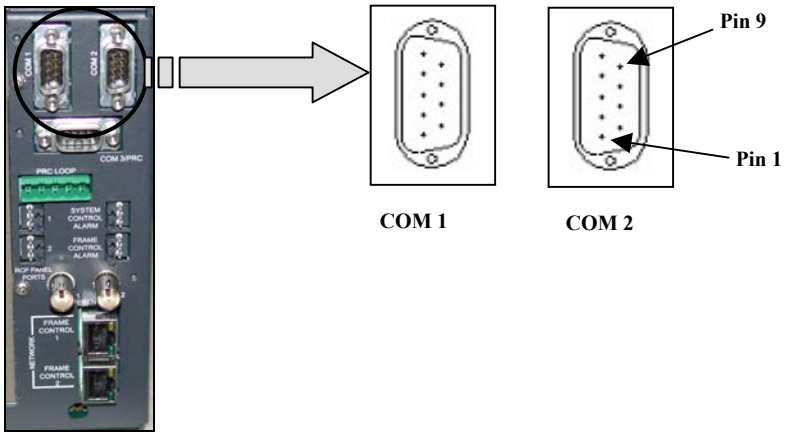


FIGURE 23: RS-232 Control Connectors

TABLE 13: COM1 and COM 2 Pin Assignments

Pin	Signal	In/Out
1	CD	Input
2	RX	Input
3	TX	Output
4	DTR	Output
5	Ground	---
6	DSR	Input
7	RTS	Output
8	CTS	Input
9	RI	No Connect

- COM 1 is the primary RS-232 CPU Link and may be connected to a PC running the 3500 Series Control System software with a null modem cable (Part No. 81-9028-0393-0). Alternatively, COM 1 may be connected to an external control device.

  COM 1 may only be used with the P1E protocol at either 9600 or 38,400 baud. Set the baud rate with a switch on the controller board. Make sure the communication rate for COM 1 in the 3500 Series software matches the baud rate you are using (in the software, select System > Communications).

- COM 2 is a secondary RS-232 CPU Link, which may also be connected to a PC or an external control device. COM 2 may be used with either of the protocols shown in Table 15 and may operate at either 9600 or 38,400 baud. Set the baud rate with a switch on the controller board. Make sure the communication rate for COM 2 in the 3500 Series software matches the baud rate you are using (in the software, select System > Communications).

TABLE 14: PESA CPU Link Protocols

PROTOCOL	DOCUMENT #
CPU Link Protocol No. 1 Extensions (P1E)	81-9062-0408-0
Unsolicited Status Protocol (USP)	81-9062-0409-0

8.8.2 RS-422 Control Connectors COM3/PRC

This DB-9 Male connector (see Figure 24) provides an RS-422 serial communication interface.

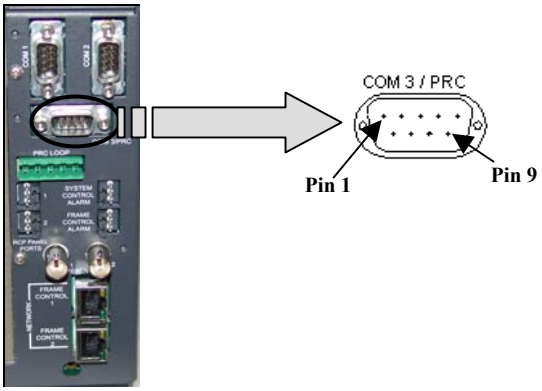


FIGURE 24: RS-422 COM 3/PRC Control Connector

COM 3/PRC is the communications interface to a PRC type routing switcher system and is connected to a routing switcher with a serial control cable (refer to Table 16 for pin assignments).

TABLE 15: COM 3/PRC Pin Assignments

Pin	Signal	In/Out
1	CTS+	Input (not used)
2	MATRIX+	Bi-directional
3	CTLR-	Output
4	RTS-	Output (not used)
5	Ground	---
6	CTS-	Input (not used)
7	MATRIX-	Bi-directional
8	CTLR+	Output
9	RTS+	Output (not used)

8.8.3 System Control Alarm Connector

This three-pin connector, illustrated in Figure 25, provides an interface for an external, customer-supplied, system control alarm (alarm contact locations are also shown).

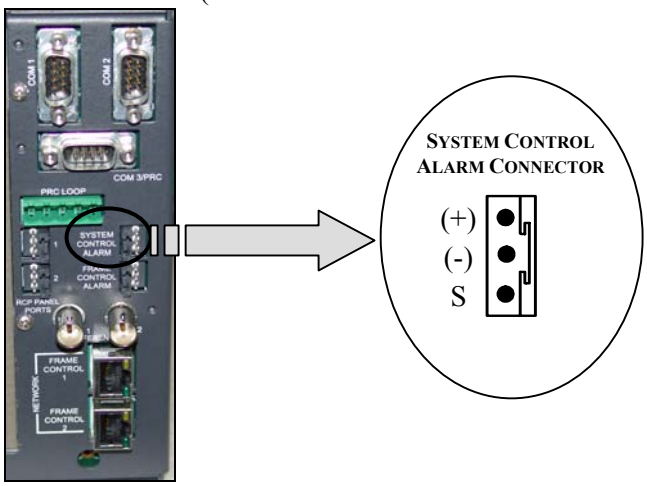


FIGURE 25: System Control Alarm Connector

The 3500 Series controller initiates a system alarm. An alarm condition is declared when the controller is in reset and when the standby controller is gathering configuration information from the primary controller. During an alarm condition, an optically isolated, electronically closed circuit (see Figure 26 on next page) exists between contacts 3 and 1 for Controller A (top) and contacts 2 and 1 for Controller B (bottom). This circuit acts as a switch to trigger an optional external alarm in the event of a controller fault or failure. The controller alarm circuit supplies an electronic contact closure, but does not provide a voltage to the external alarm.

CAUTION	**The Customer-supplied alarm circuit voltage to this connector must not exceed 12VDC and the associated amperage must not exceed 10mA.**

The alarm is activated if any of the following 3500 Series software conditions exist:

- Encounters an interrupt that it does not expect or can not process
- Is unable to synchronize with the other 3500 Series controller (dual controllers)
- Does not get the configuration from the other 3500 Series controller (dual controllers)

The customer supplied external alarm circuit is connected with a cable constructed as shown in Figure 26.

CAUTION	**The Customer-supplied alarm circuit voltage to this connector must not exceed 12VDC and the associated amperage must not exceed 10mA.**

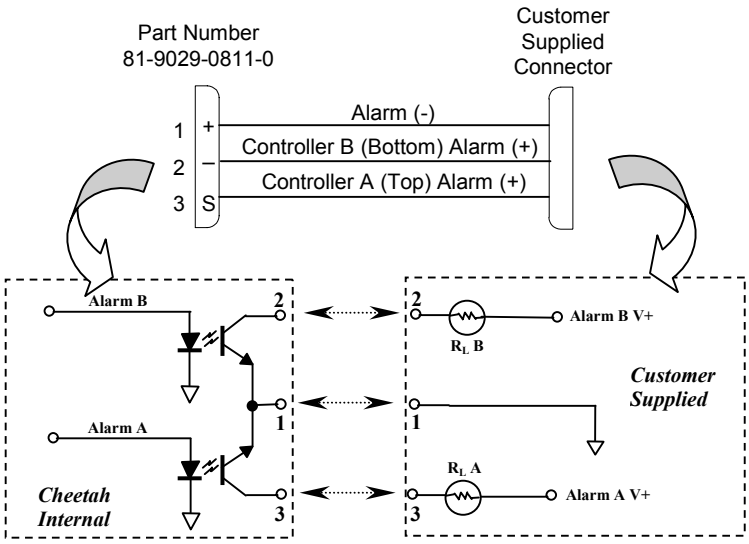


FIGURE 26: Alarm Cable Setting and Associated Schematic

8.8.4 PRC Loop Connector

This five-contact connector, located on the rear of the unit, 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 DB-9-Male PRC Loop connector. Contact locations are illustrated in Figure 27.

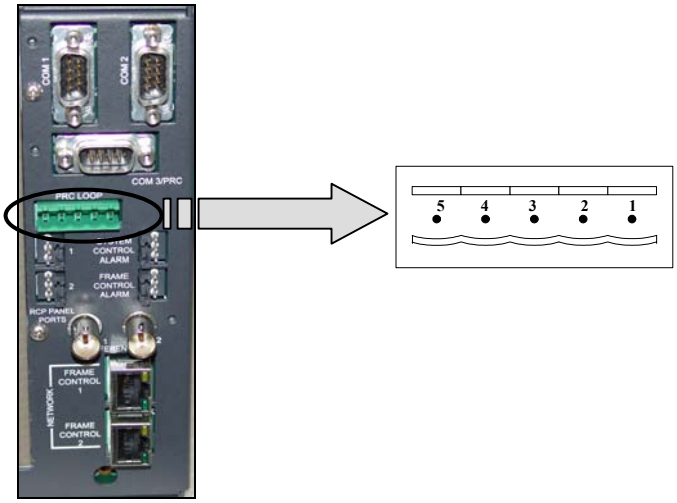


FIGURE 27: PRC Loop Connector

PRC Loop may be connected to PESA PRC-type equipment with a cable assembly (Part No. 81-9028-0395-0) constructed as shown in Figure 28.

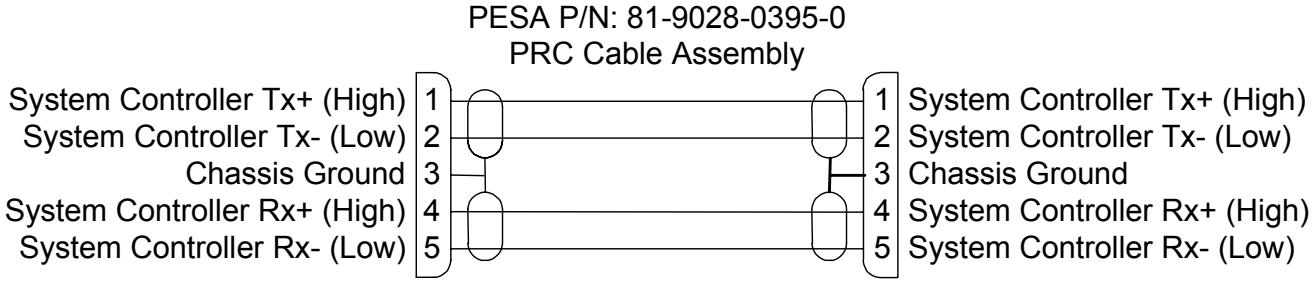


FIGURE 28: RS-422 System Expansion Cable

8.8.5 RCP Panel Port Connectors

Two RCP connectors, located on the rear of the unit and illustrated in Figure 29, provide RS-485 serial communication interfaces using the PESA RCP Protocol (Document No. 81-9062-0300-0).

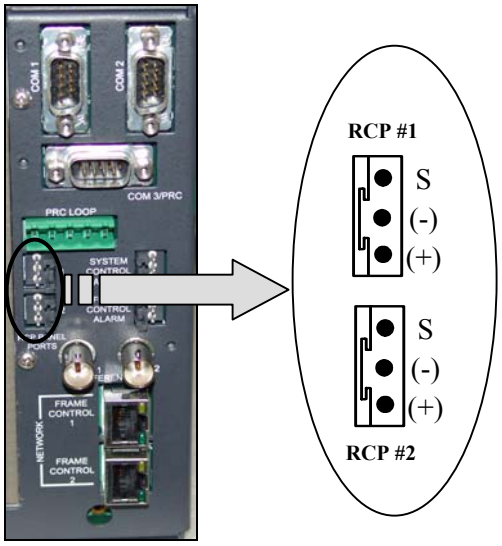
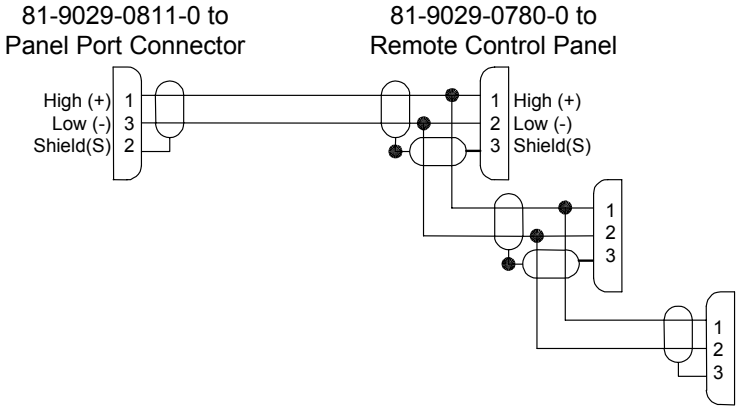


FIGURE 29: RCP Panel Port Connectors

These RCPs are connected to PESA Remote Control Panels with daisy-chained cables constructed with RCP connectors (Part No. 81-9029-0780-0) and shielded, twisted-pair cable (Part No. 81-9028-0043-2, Belden 8451, or equivalent) as illustrated in Figure 30. The connector body has an integral strain relief, which requires the use of a nylon cable tie, which is included with the connector. If this cable tie is not available, use PESA Part No. 81-9021-0028-8.



NOTE	**Cable is not pin for pin! Pins 2 and 3 are swapped.**

FIGURE 30: RS-485 Cable Construction

8.8.6 Network Connectors

The RJ-45 Ethernet connectors, illustrated in the Figure 31, connect the Matrix Frame Controllers and System Controllers to a 10 or 100Mb/s TCP/IP network. Ethernet configuration options are detailed in the Appendix.

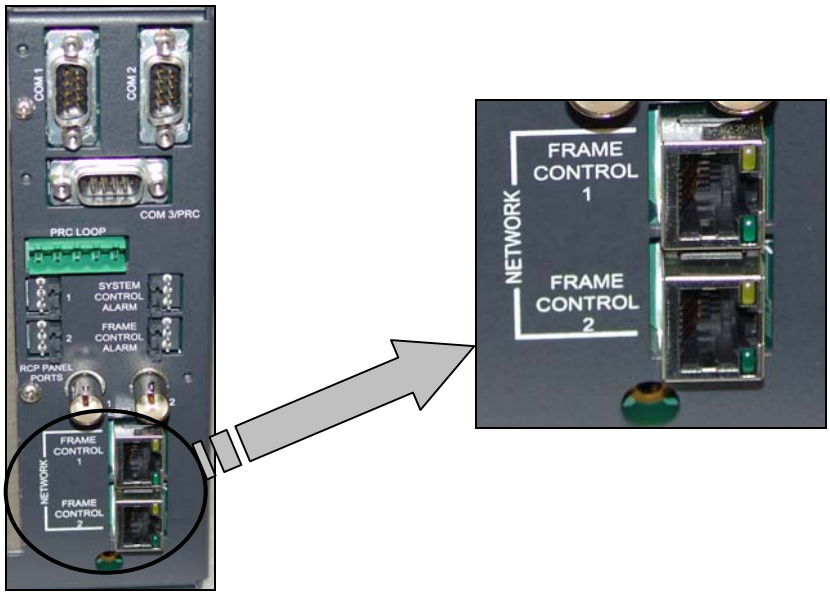


FIGURE 31: Network Connectors

LED indicators are provided as follows (see Figure 32 and refer to Table 17):

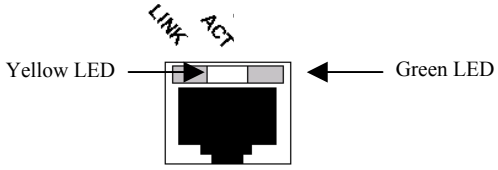


FIGURE 32: Ethernet Connector

TABLE 16 Ethernet LED Indicators

LNK	ON = Ethernet LINK established
100M	ON = The Ethernet connection speed is 100Mb/s OFF = The Ethernet connection speed is 10Mb/s

To connect the cards to the network, do the following:

1. Set the IP address, Subnet mask, Gateway address, and Trap address on Matrix Frame Controller and System Controller to addresses approved by the Network Administrator.

2. Using a straight through RJ-45 Ethernet cable, connect the Ethernet jacks to a 10/100BASE-T hub or switch on the TCP/IP network.

The Slot A Network Frame Control is for the Matrix Frame Controller in Slot A. The Slot B Network Frame Control is for the Matrix Frame Controller located in slot B. The Slot A System Control is for the System Controller located in Slot A. The Slot B System Control is for the System controller located in slot B (see Figure 33 for typical slot locations).

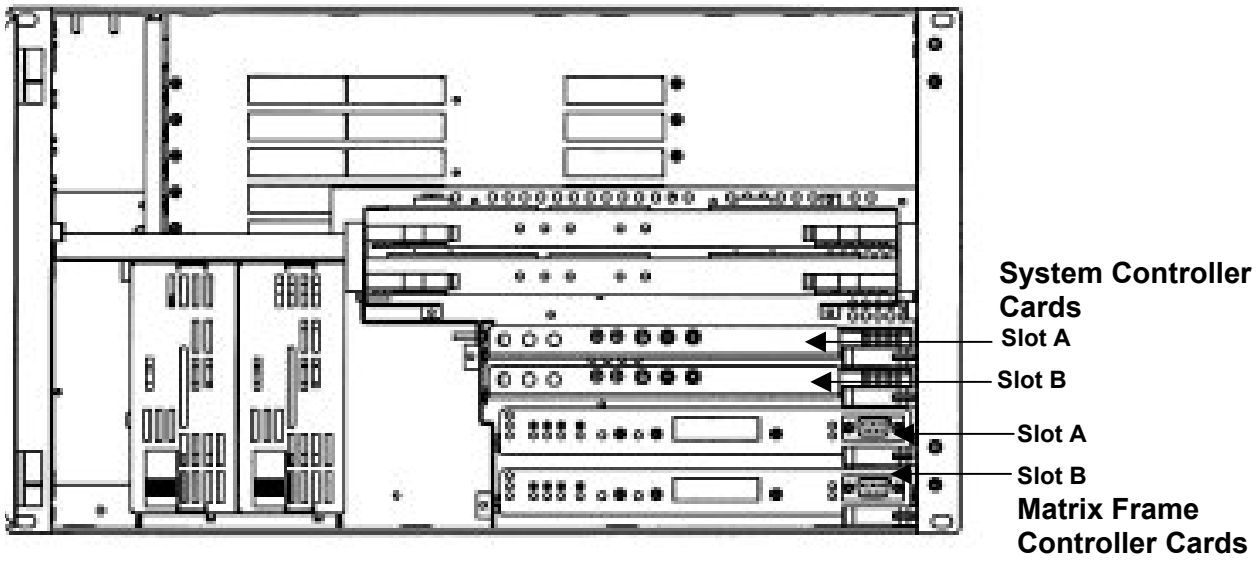


FIGURE 33: Typical Matrix Frame Controller Cards locations, Slot A and Slot B

8.8.7 Frame and System Alarm Connectors

The three-pin connectors, illustrated in Figure 34, provide an interface for an external, customer-supplied frame and system control alarm. The Matrix Frame Controller determines when a frame alarm condition is declared while the System controller determines when a system alarm condition is declared. Alarm contact location is illustrated in Figure 35 on the next page. This circuit acts as a switch to trigger an optional external alarm in the event of a controller/system fault or failure. The alarm circuit supplies an electronic contact closure, but does not provide a voltage to the external alarm. The customer-supplied external alarm circuit is connected with a cable constructed as shown in Figure 35 (next page).

CAUTION	**The Customer-supplied power input to this connector must not exceed 12VDC and the associated amperage must not exceed 10mA.**

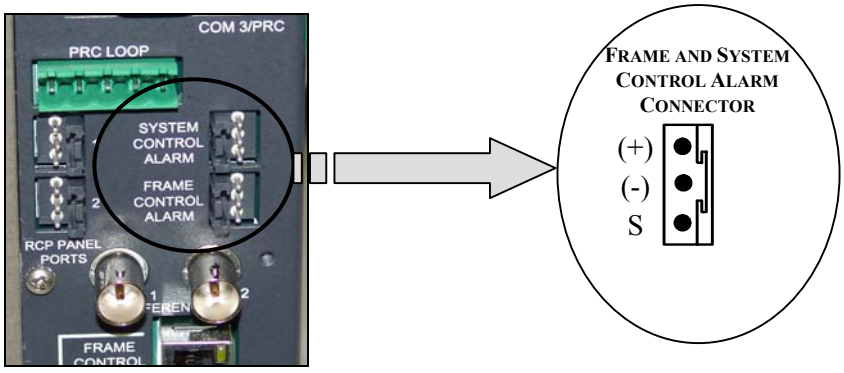


FIGURE 34: Frame and System Control Alarm Connector

The Frame Control alarm is activated if any of the following matrix frame controller conditions exist:

- Detects a card (input, output, matrix, output monitor, power supply, or matrix frame controller) with a temperature out of range (above 114 ºF)
- Detects a fan's voltage out of range
- Detects a power supply's voltage or current out of range. The voltage or current must be out of range for three consecutive times before the Matrix Frame Controller will indicate an alarm.

The System Control alarm is activated if any of the following system conditions exist:

- Detects a system interrupt (i.e., a CPU failure/error, an address error, or an illegal instruction)
- Synchronization problem with dual system cards
- The system configuration is not properly relayed to the dual system cards
- Whenever the system software is being upgraded

CAUTION	**The Customer-supplied alarm circuit voltage to this connector must not exceed 12VDC and the associated amperage must not exceed 10mA.**

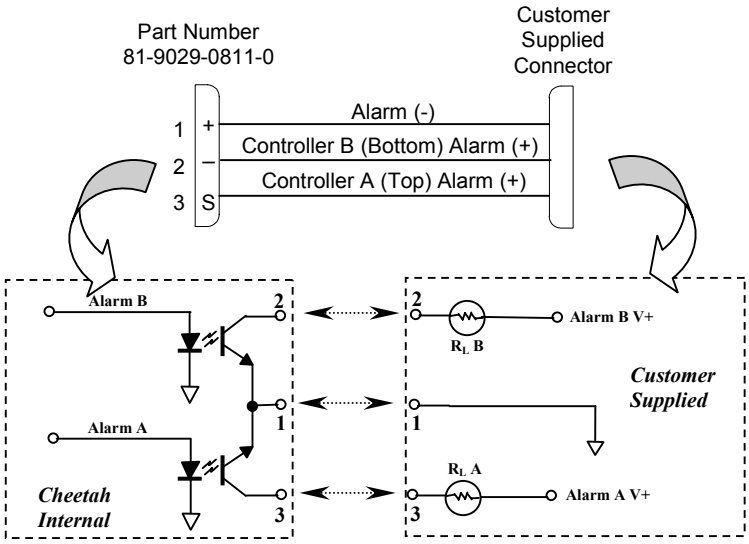


FIGURE 35: Alarm Cable Connection and Circuit Schematic

8.8.8 House Synchronization Input Connectors

These BNC coaxial connectors, illustrated in Figure 36, provide the interface for two, house (analog only) synchronization signals (i.e., NTSC, PAL, 1080i, 1080P, and 720P only). The house sync inputs are individually terminated internally. The synchronization signal cannot be daisy-chained from one routing switcher to another.

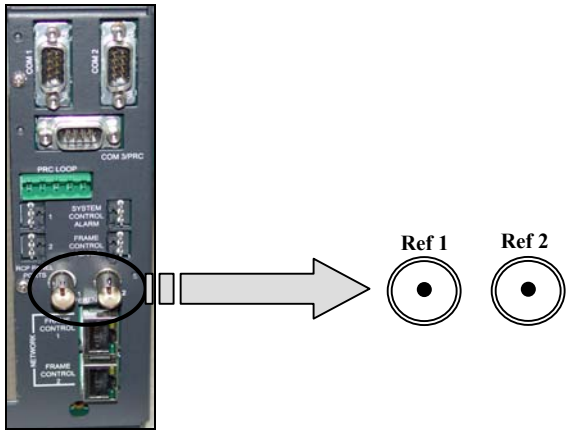


FIGURE 36: House Sync Input (Reference) Connectors

Using the Cheetah GUI, the user can assign a specific reference signal for the system or individual chassis that is used as a synchronization signal for specific output synchronized switching. Once the output has been switched, the output signal remains synchronized to the initial reference assignment until it is switched again with a new reference assignment. An example of a sync assignment would be as follows:

Reference 1 is connected to an NTSC sync signal source and Reference 2 is connected to a PAL sync signal source. Using the GUI, the user assigns Reference 1 to outputs 6 through 10 and Reference 2 to outputs 11 through 16 for a specific chassis.

Reference 1 or 2 should be connected to the house sync source or tri-level source with coaxial cable and standard BNC connectors.

Chapter 9 MAINTENANCE AND REPAIR

This section will address the normal system maintenance sequences, basic troubleshooting scenarios, minor system repairs, and ***PESA Switching Systems, Inc.*** contact information.

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

9.1 MAINTENANCE

9.1.1 Maintenance Overview

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.

	**This equipment contains static sensitive devices. A grounded wrist strap and mat should be used when handling the internal circuit cards.**
	**This equipment has been designed so that maintenance operations can be performed while the equipment is operational (energized and performing switching functions). Only the power supply assemblies and the AC supply line circuits contain potentially lethal shock hazards.**

9.1.2 Air Filter

The air filter(s) 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, either clean it with low-pressure air, vacuuming, or a mild soap-and-water solution (then dry); or replace it with a new air filter (PESA Part No. 81-9065-2360-0).

9.1.3 Fan Replacement Sequences

The fans that are used in all Cheetah chassis configurations are continuous duty, ball bearing, 24VDC brushless, circulating fans. In operation, the fans are voltage-controlled by the power supplies, which receive feedback from the system heat sensors. That is, as the heat increases, the fan voltage is increased thus increasing the fan circulating speed and vice-versa. All fan assemblies in Cheetah chassis are "hot swappable".

	**All fan assemblies used in the Cheetah Series switchers have a continuous-duty rating of 40,000 hours. It is recommended that predicted failure and/or preventive maintenance schedules be implemented to replace fan assemblies during scheduled maintenance periods for fan assemblies that have exceeded 30,000 to 35,000 hours of operation.**

Since the fans are electro-mechanical devices, they will eventually fail due to wear. All fan assemblies are monitored for proper operation and a system alarm is initiated whenever a fan is not operating correctly or has failed.

	**Only authorized personnel should attempt repair or replacement of fan components. Potential injury or equipment damage exists during fan replacements. Always disconnect power to the fan prior to any fan replacement.**

	**Cooling is an integral part of the Cheetah system operation. Any fan alarm must be addressed and corrected as soon as possible. Continued operation of the equipment during a failed fan(s) condition could result in catastrophic equipment failure.**

	**Replace PESA switcher fan assemblies with only PESA-approved replacement fan assemblies. All PESA-approved fan securing #6 hardware are tightened to no more (non-lubricated) than a torque values of 9.6 inch-pounds and #8 to no more than 17.8 inch-pounds.**

There are two types of fan assemblies that are used for the Cheetah series, which are as follows:

- Surface-mount fan assembly (fan is mounted externally to the surface of the chassis)
- Flush-mount fan assembly (fan is mounted internally and is "flush" with the surface of the chassis).

This section will address the replacement sequences for each type of assembly in the Cheetah 64 Series chassis.

9.1.4 Cheetah 64 Series Fan Replacements

These switchers are equipped with two, surface-mounted fan assemblies (see Figure 37) that are easily removed from the rear exterior of the chassis.

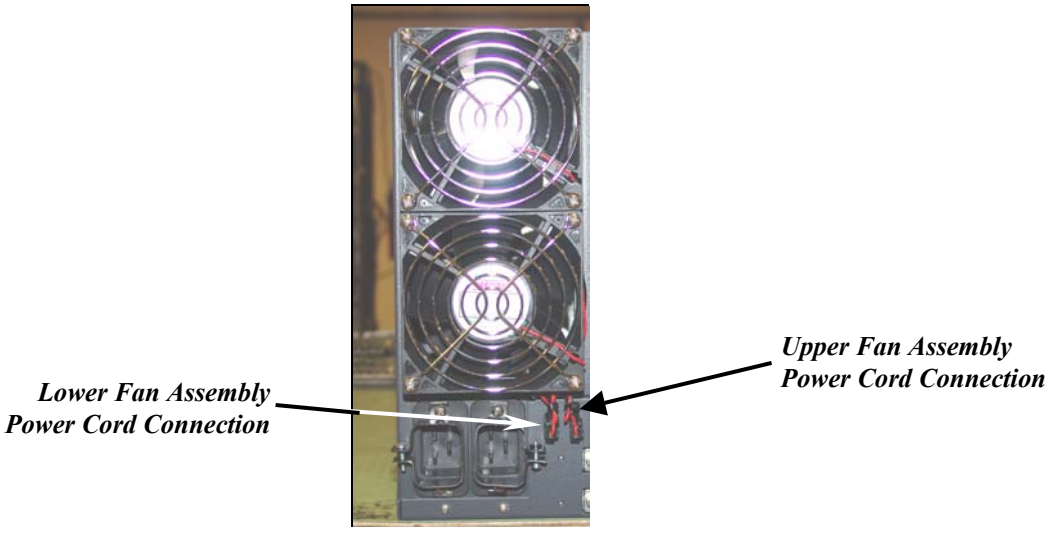


FIGURE 37: 64 Series Fan Assemblies and Associated Power Connections

Perform the following sequence to replace a faulty fan assembly:

1. Disconnect the fan power cord (see Figure 37) from the chassis fan power receptacle.
2. Remove the four fan-assembly retaining screws.
3. Replace the fan and secure with the four, fan assembly with the retaining screws (torque according to screw size).

CAUTION	**When replacing fans during energized system conditions, be aware that the new fan replacement will energize upon power reconnection.**

4. Reconnect the fan power cord to the chassis fan power receptacle.

9.2 TROUBLE SHOOTING

9.2.1 Troubleshooting Overview

Troubleshooting techniques differ from technician to technician. However, all techniques should include a basic troubleshooting starting sequence, which consists of, but is not limited to, the following:

- An Operator interview to account for system actions prior to the system problem to establish failure possibilities
- Verification of correct supply voltages (breaker or disconnect status, supply voltage actually present, etc.)
- System fuse verification (search for open/blown system fuses)
- An initial system inspection that includes the use of personal senses (e.g., feeling for heat, smelling for burned components, listening for unusual noises, and looking for discolored components)

Once the basic troubleshooting starting sequence has been completed, then the actual system troubleshooting (physical portion) can begin.

This section assumes that the basic troubleshooting starting sequence has been completed and the actual system troubleshooting sequence has begun.

9.2.2 Subassembly LEDs

Cheetah Series equipment has been designed to provide the user with basic monitoring and diagnostic system information. If the Cheetah equipment fails to operate correctly, check the appropriate LEDs listed in the following Tables (Tables 18 through 21) for the system's individual components (cards/modules) for information concerning their (and the system's) operational status and suggested actions to perform accordingly.

TABLE 17: Power Supply LEDs

LED	COLOR	STATUS	DESCRIPTION	ACTION REQUIRED
PWR OK	Green	**ON**	+28V power is stable and within normal operating parameters.	None.
		OFF	Power is not present.	Check supply voltage and fuses. Replace the power supply.
Temp	Red	**ON**	+28V power is not within normal operating parameters.	If this alert appears on multiple power supplies, ensure that all of the power supplies are properly installed. If only one power supply appears with this alert, replace it.
			There is an over-temp condition in the power supply. This can occur either because a power supply has been removed, resulting in lower total power; improper cabinet cooling due to exhaust air obstructions, or because an individual power supply is faulty.	Check the fans and make sure all the access panels are in place. Verify the cabinet cooling exhaust air is unobstructed and is being properly vented away from the cabinet. Verify filter media is clean and unobstructed. If the fans are working, the panels are in place, no obstructions to the exhaust air, and the Temp LED is still on, then replace the power supply.
		OFF	No alert conditions are present.	None
Current	Red	**ON**	There is an overcurrent condition in the power supply.	Check to make sure all of the other power supplies are functional (the PWR OK LED is on). If the other power supplies are functional and the Current LED is still blinking, then replace the power supply.
		OFF	No alert conditions are present.	None

TABLE 18: Matrix Board LEDs

LED	COLOR	STATUS	DESCRIPTION	ACTION REQUIRED
Control Error	Red	**ON**	Indicates that a control error has occurred or a loss of receive clock from frame controller has been detected. A control error includes a bad CRC of the received data, incorrect number of words in the message being received, or corrupted data in the message being received. In the case of a control error, the LED will remain illuminated until a message with a good CRC has been received.	Remove and re-insert the board. If the condition continues, replace the board.
		Blinking	Indicates a missing receive clock error.	Remove and re-insert the board. If the condition continues, replace the board.
In Use	Yellow	**ON**	Indicates that a crosspoint on the matrix card is activated.	None
+28V	Green	**ON**	Indicates that the +28Vpower is stable and within normal operating parameters.	None
		OFF	Indicates that 28V is not stable or the 3.3V or 2.5V power supplies are not working.	Remove and re-insert the board. If the condition continues, replace the board.
+3.3V	Green	**ON**	Indicates that the +3.3V power is stable and within normal operating parameters.	None
+2.5V	Green	**ON**	Indicates that the +2.5V power is stable and within normal operating parameters.	None
Port A, Port B (Surface-mounted on the PCB)	Yellow	**ON**	Indicate whether the board is communicating with the frame controller via communications port A or B.	None

TABLE 19: Output Board LEDs

LED	COLOR	STATUS	DESCRIPTION	ACTION REQUIRED
Control Error	Red	**ON**	Indicates that a control error has occurred or a loss of receive clock from frame controller has been detected. A control error includes a bad CRC of the received data, incorrect number of words in the message being received, or corrupted data in the message being received. In the case of a control error, the LED will remain illuminated until a message with a good CRC has been received.	Remove and re-insert the board. If the condition continues, replace the board.
		Blinking	Indicates a missing receive clock error.	Remove and re-insert the board. If the condition continues, replace the board.
Power Good	Green	**ON**	Indicates that the +28V, +5.0V, +3.7V, and +4.5V power is stable and within normal operating parameters.	None
		OFF	Indicates that 28V is not stable or the 5.0V, 3.7V, or 4.5V power supplies are not working.	Remove and re-insert the board. If the condition continues, replace the board.
Port A, Port B (Surface-mounted on the PCB)	Yellow	**ON**	Indicate whether the board is communicating with the frame controller via communications port A or B.	None.

TABLE 20: Input Board LEDs

LED	COLOR	STATUS	DESCRIPTION	ACTION REQUIRED
Control Error	Red	**ON**	Indicates that a control error has occurred or a loss of receive clock from frame controller has been detected. A control error includes a bad CRC of the received data, incorrect number of words in the message being received, or corrupted data in the message being received. In the case of a control error, the LED will remain illuminated until a message with a good CRC has been received.	Remove and re-insert the board. If the condition continues, replace the board.
		Blinking	Indicates a missing receive clock error.	Remove and re-insert the board. If the condition continues, replace the board.
Power Good	Green	**ON**	Indicates that the +28V, +4.8V, +4.3V, and +3.5V power is stable and within normal operating parameters.	None.
		OFF	Indicates that 28V is not stable or that the 4.8V, 4.3V, or 3.5V power supplies are not working.	Remove and re-insert the board. If the condition continues, replace the board.
+28V	Green	**ON**	Indicates that the +28V power is stable and within normal operating parameters. This is a surface-mount LED located on the PCB.	None
+4.8V	Green	**ON**	Indicates that the +3.3V power is stable and within normal operating parameters. This is a surface-mount LED located on the PCB.	**None**

Table continued on next page

TABLE 21: Input Board LEDs (cont.)

LED	COLOR	STATUS	DESCRIPTION	ACTION REQUIRED
+4.3V	Green	**ON**	Indicates that the +4.3V power is stable and within normal operating parameters. This is a surface-mount LED located on the PCB.	None
+3.5V	Green	**ON**	Indicates that the +3.5V power is stable and within normal operating parameters. This is a surface-mount LED located on the PCB.	None
Port A, Port B (Surface-mounted on the PCB)	Yellow	**ON**	Indicate whether the board is communicating with the frame controller via communications port A or B.	None

9.2.3 Unresolved Troubleshooting Problems

If the troubleshooting information and sequences in this section did not resolve your problem, you should contact PESA's Customer Service Department for further assistance. The contact information for the Customer Service Department appears in Section 9.6 and on the front cover of this document.

9.3 REPAIR

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

	**Only Qualified service personnel using appropriate equipment should service the Cheetah Series power supply assemblies in this equipment.**
	**Consult PESA Customer Service before attempting to repair any of the PC cards in this equipment.**

9.3.1 Replacement Parts

Only parts of the highest quality have been incorporated in the design and manufacture of this equipment. If the equipment's inherent stability and reliability are to be maintained, replacement parts must be of the same high quality. For selection of exact replacement parts or for acceptable replacement part substitutions, contact PESA's Customer Service Department before installing any parts not purchased from PESA, Inc.

9.3.2 Return Material Authorization (RMA)

Before returning any equipment for service or replacement, contact PESA's Customer Service Department for an RMA number. The contact information for the Customer Service Department appears in Section 9.6 and on the front cover of this document.

9.4 PESA CUSTOMER SERVICE

9.5 PESA SWITCHING SYSTEMS, INC. CHEETAH SERIES SUPPORT DOCUMENTATION

81-9062-0316-0: PESA Router Control (PRC) Protocol

81-9059-0402-0: 3500 Series System Controller Manual

81-9059-0426-0: 3500 Series Control Software Manual

☛**NOTE** *Additionally, all associated manuals can be downloaded from the PESA Switching Systems, Inc. web site at:* **http://www.pesa.com**.

9.6 PESA SWITCHING SYSTEMS, INC. CUSTOMER SERVICE CONTACT INFORMATION

- **SERVICE AND ORDERING ASSISTANCE**

  PESA Switching Systems, Inc.
  330-A Wynn Drive Northwest
  Huntsville, AL. 35805-1961 - USA
  www.pesa.com

- **MAIN OFFICE**

  Tel: (256) 726-9200
  Fax: (256) 726-9271

- **SERVICE DEPARTMENT**

  Tel: (256) 726-9222 (Hours: 24/7)
  Toll Free: (800) 323-7372
  Fax: (256) 726-9268
  Email: *service@pesa.com*

- **NATIONAL SALES OFFICE**

  PESA Switching Systems, Inc.
  24 Woodbine Avenue, Suite 16
  Northport, NY 11768
  Tel: (631) 912-1301
  Fax: (631) 912-1302
  Toll Free: (800) 328-1008

Chapter 10 APPENDICES

This section is subdivided into the following topics:

- Appendix A: Ethernet Configuration
- Appendix B: SNMP
- Appendix C: PESA Matrix Frame Controller Debug Port Protocol
- Appendix D: Abbreviations, Acronyms, and Definitions (AA&D)

10.1 APPENDIX A: ETHERNET CONFIGURATION

The Matrix Frame Controller supports a variety of interfaces via the Ethernet interface. These include NET PRC, HTTP (HyperText Transfer Protocol - web), SNMP (Simple Network Management Protocol), and Telnet. To configure this access, the following items will need to be configured (refer to Table 22):

NOTE	**The network server automatically assigns the IP Address, Subnet Mask specification, and Gateway specification when the Dynamic Host Configuration Protocol (DHCP) is enabled.**

TABLE 21: Ethernet Configuration

NAME	USAGE	DEFAULT
DHCP On/Off	Automatically obtain an IP address from a (DHCP) server on the network.	On
IP Address	When DHCP is disabled, allows a fixed IP address to be assigned to the Matrix Frame Controller.	0.0.0.0
Subnet Mask	When DHCP is disabled, allows the specification of the subnet mask for the IP address.	0.0.0.0
Gateway	When DHCP is disabled, allows the specification on the default gateway.	0.0.0.0
Telnet On/Off	Enables or disables the Telnet server.	On
Telnet Port	Allows the specification of the TCP port to be used by the Telnet server.	23
Telnet Password	Specifies the password for telnet access.	<blank>
NETPRC Master/Slave	Enables or disables the NETPRC server. Note that the SNMP agent is disabled in Slave mode.	Slave

Table Continued on next page

TABLE 22: Ethernet Configuration (cont.)

NAME	USAGE	DEFAULT
NETPRC Port	Allows the specification of the TCP port to be used by the NETPRC server.	1000
Read Community	Specifies the read community string for the SNMP agent.	public
Write Community	Specifies the write community string for the SNMP agent.	Private
Trap Community	Specifies the trap community string for the SNMP agent.	public
Traps On/Off	Enables or disables SNMP trap generation.	Off
Authentication Traps On/Off	Enables or disables SNMP Authentication failure trap generation.	Off
Trap Target IP	Specifies the IP address to receive SNMP traps.	0.0.0.0

The configuration of these fields are accessed via the DB-9, RS-232 connector on the Matrix Frame Controller. Communication parameters for this serial interface default to 38400 baud, no parity, eight (8) data bits, and one (1) stop bit.

Upon connection to the serial interface (via a communications program such as HyperTerminal), enter the command 'ET' (for Ethernet) at the '>' prompt. The current Ethernet settings will be displayed (note that these settings are unavailable via the Telnet interface). For example,

```
>et
        MAC address: 02:02:02:02:02:02
        SERIAL #: AAAAAA000000001
        DHCP            : ON
        IP address      : 192.168.000.104
        Subnet mask     : 255.255.255.000
        Def Gateway     : 192.168.000.002
    NETPRC : MASTER
    NETPRC port     : 1000
    TELNET  : ON
    TELNET port     : 23
    TELNET pass     :
    RCOMM  : public
    WCOMM : private
    TCOMM  : public
    TRAP            : OFF
    AUTH            : OFF
    TARGET : 000.000.000.000
>
```

Help on how to change one of these settings can be obtained by entering the command 'HE ET' (for Help Ethernet) at the '>' prompt. For example,

```
>he et

     Syntax: ET < DHCP [ON|OFF]  | IP [addr]     | GW [addr]     |
          :      SN [addr]      | DP [port]     | TN [ON|OFF]   |
          :      TP [tport]     | TL [pass]     | RCOMM [str]   |
          :      WCOMM [str]    | TCOMM [str]   | TRAP [ON|OFF] |
          :      AUTH [ON|OFF]  | TARGET [addr] | NP [MASTER|SLAVE] >
     Where :  DHCP ON enables client automatic IP address negotiation.
          :  IP [addr] allows you to set the IP address of the PMFC.
          :  GW [addr] allows you to set the gateway address.
          :  SN [addr] allows you to set the subnet mask.
          :  DP [port] allows you to set the NETPRC IP port.
          :  TN ON enables the on-board telnet server.
          :  TP [port] allows you to set the telnet port.
          :  TL [pass] allows you to set the telnet login password.
          :     where addr is in dotted notation (ex. 192.168.1.1}.
          :     where port is in the range [1000...65535].
          :     where tport is in the range [23,1000...65535].
          :  RCOMM [str] allows you to set the SNMP read community string.
          :  WCOMM [str] allows you to set the SNMP write community string.
          :  TCOMM [str] allows you to set the SNMP trap community string.
          :  TRAP ON enables SNMP traps.
          :  AUTH ON enables authentication traps.
          :  TARGET [addr] allows you to set the trap target IP address.
          :  NP [MASTER|SLAVE] sets the NETPRC type of the PMFC.
>et

     MAC address : 02:02:02:02:02:0a
     SERIAL #    : EEEEEE000000001
     DHCP        : ON
     IP address  : 192.168.000.114
     Subnet mask : 255.255.255.000
     Def Gateway : 192.168.000.002
     NETPRC      : SLAVE
     NETPRC port : 1000
     TELNET      : ON
     TELNET port : 23
     TELNET pass :
     RCOMM       : public
     WCOMM       : private
     TCOMM       : public
     TRAP        : OFF
     AUTH        : OFF
     TARGET      : 000.000.000.000
```

For example, to set the read community string to 'pesa', enter

```
>ET RCOMM pesa
```

and press return. To view your changes, wait for the '>' prompt and enter 'ET'.

10.2 APPENDIX B: SNMP

The Cheetah Matrix Frame Controller contains an SNMP v2c agent, which is also compatible with SNMP v1 management stations. The agent supports the following standards:

RFC 1903 – SNMPv2 Textual Conventions
RFC 1904 – SNMPv2 Conformance Statements
RFC 1905 – SNMPv2 Protocol Operations
RFC 1906 – SNMPv2 Transport Mappings
RFC 1907 – SNMPv2 SNMP MIB Objects
RFC 1908 – SNMPv1 Coexistence
RFC 2011 – SNMPv2 IP MIB Objects
RFC 2012 – SNMPv2 TCP MIB Objects
RFC 2013 – SNMPv2 UDP MIB Objects

Two enterprise MIBs are used to provide full control of Cheetah Switchers. The first, PESA-TC.MIB, is a MIB, which defines some textual conventions. The second, PESA-MATRIX.MIB, contains objects, which allow SNMP-based control and monitoring of one or more Cheetah Switchers.

Both of these MIBs are available at the PESA website, www.pesa.com, for electronic download. The full-text of these MIBs are distributed on the Cheetah SW Toolkit CD that goes out with every Cheetah system.

Note that the agent within the Matrix Frame Controller implements a subset of the PESA-MATRIX MIB. The optional Group tables are reserved for implementation within the System Controller.

The agent is capable of managing multiple Cheetah Switchers. This is accomplished in two steps:

a) Connecting the Cheetah Switchers via the RS-422 Aux Frame Port described in this manual.

b) Set the Matrix Frame Controller, which is to communicate with your SNMP management application to NETPRC Master. Note that if you have redundant Matrix Frame Controllers in the Switcher, BOTH must be configured as NETPRC Master. Refer to the Ethernet section described earlier in Appendix A to accomplish this.

c) Set all other Matrix Frame Controllers, which you have connected, to the NETPRC Master controller to NETPRC Slave.

The agent will then be able to configure and control all of the Cheetah Switchers in the connected collection.

Once you have configured the Matrix Frame Controller's SNMP agent (as described in Appendix A), you may issue SNMP commands. The following commands were issued on a PC running Linux against a pair of small Cheetah Switchers.

The first of these simply obtains the inventory for the two frames.

```
$ snmpwalk 192.168.0.106 pesaFrameInvDeviceType
PESA-MATRIX-MIB::pesaFrameInvDeviceType.1.1 = INTEGER: frameController(6)
PESA-MATRIX-MIB::pesaFrameInvDeviceType.1.2 = INTEGER: frameController(6)
PESA-MATRIX-MIB::pesaFrameInvDeviceType.1.3 = INTEGER: inputBoard(1)
PESA-MATRIX-MIB::pesaFrameInvDeviceType.1.4 = INTEGER: inputBoard(1)
PESA-MATRIX-MIB::pesaFrameInvDeviceType.1.5 = INTEGER: outputBoard(2)
PESA-MATRIX-MIB::pesaFrameInvDeviceType.1.6 = INTEGER: powerSupply(3)
PESA-MATRIX-MIB::pesaFrameInvDeviceType.1.7 = INTEGER: matrixCard(5)
PESA-MATRIX-MIB::pesaFrameInvDeviceType.1.8 = INTEGER: outputMonitorCard(4)
PESA-MATRIX-MIB::pesaFrameInvDeviceType.2.1 = INTEGER: frameController(6)
PESA-MATRIX-MIB::pesaFrameInvDeviceType.2.2 = INTEGER: inputBoard(1)
PESA-MATRIX-MIB::pesaFrameInvDeviceType.2.3 = INTEGER: outputBoard(2)
PESA-MATRIX-MIB::pesaFrameInvDeviceType.2.4 = INTEGER: powerSupply(3)
PESA-MATRIX-MIB::pesaFrameInvDeviceType.2.5 = INTEGER: matrixCard(5)
```

The next set of commands creates a preset (a collection of switches that are to be taken as a group). In this case, the preset contains two switch definitions (preset members). The first connects source 1 to destination 1 on level 2. The second connects source 2 to destination 2, again on level 2. Both are set to utilize the synchronization signal A (REF 1 on the Cheetah back panel).

```
$ snmpset 192.168.0.106 -c private pesaPresetStatus.1 i 2
PESA-MATRIX-MIB::pesaPresetStatus.1 = INTEGER: active(2)
$ snmpset 192.168.0.106 -c private pesaPresetMemberRowStatus.1.2.1  i 1
PESA-MATRIX-MIB::pesaPresetMemberRowStatus.1.2.1 = INTEGER: active(1)
$ snmpset 192.168.0.106 -c private pesaPresetMemberSyncSource.1.2.1  b syncA
PESA-MATRIX-MIB::pesaPresetMemberSyncSource.1.2.1 = BITS: 80 syncA(0)
$ snmpset 192.168.0.106 -c private pesaPresetMemberSourceNum.1.2.1  u 1
PESA-MATRIX-MIB::pesaPresetMemberSourceNum.1.2.1 = Gauge32: 1
$ snmpset 192.168.0.106 -c private pesaPresetMemberRowStatus.1.2.2  i 1
PESA-MATRIX-MIB::pesaPresetMemberRowStatus.2.2.1 = INTEGER: active(1)
$ snmpset 192.168.0.106 -c private pesaPresetMemberSyncSource.1.2.2  b syncA
PESA-MATRIX-MIB::pesaPresetMemberSyncSource.2.2.1 = BITS: 80 syncA(0)
$ snmpset 192.168.0.106 -c private pesaPresetMemberSourceNum.1.2.2  u 2
PESA-MATRIX-MIB::pesaPresetMemberSourceNum.2.2.1 = Gauge32: 2
$ snmpset 192.168.0.106 -c private pesaTakePreset.0 u 1
PESA-MATRIX-MIB::pesaTakePreset.0 = Gauge32: 1
```

Note that if you specify sources, destinations, or synchronization sources which are unknown to the agent, the operations will fail.

10.3 APPENDIX C: PESA MATRIX FRAME CONTROLLER DEBUG PORT PROTOCOL

The PESA Matrix Frame Controller Debug Port protocol is an RS-232 connection that allows service personnel to directly interact with the PESA Matrix frame controller in order to determine the health of the matrix and to perform certain diagnostics. The same protocol is supported via the Telnet connection; however, the network parameters cannot be configured through the Telnet connection.

D1: Port Setup

Baud Rate: 38,400

Data Bits: 8

Stop Bits: 1

Parity: None

Flow Control: None

D2: Command Syntax

Commands consist of the first two non-whitespace ASCII character sequences entered in a command line.

Each command is followed by a series of optional data parameters. Data parameters start after the first whitespace following the command sequence. Commas delimit the data parameters. All data parameters have leading and trailing whitespaces trimmed.

A command is terminated by a Carriage return. A command is not acted on until the carriage return is received.

Command sequences are case insensitive.

D3: Command Line Character Input

The following indicates how characters input into the debug port are handled.

1) Command Entry

Commands are entered character by character onto the command line. All ASCII keys are concatenated onto a string. In addition, entry of the DELETE or BACKSPACE keys will cause the last character that was entered to be removed from the character string.

In verbose mode, all ASCII characters entered into the serial port are echoed back. The DELETE and BACKSPACE keys cause control characters to be echoed that cause the cursor to move back deleting the last character input.

In terse mode, the input characters are not echoed back.

After a command has been executed, the debug port will output the appropriate response (if any) followed by a Carriage Return/Linefeed and the '>' character. The receipt of the '>' character indicates that the next command is ready to be entered.

2) Verbose Mode

The verbose mode responses include text information and formatting that describe the command response in terms that can be read by a user that is using a terminal interface to the debug port – i.e., Human-Machine Interface (HMI).

- Ctl-C – Aborts the current command and starts new command line with a new prompt.
- Ctl-V – Verbose Response Mode (default) – Causes responses to be returned in a verbose mode fit for human consumption of data (plain language).

3) Terse mode

This mode outputs minimal information that fully describes the necessary response data. Its intent is to be read from an automated device such as a PC – i.e., Machine-Machine Interface (MMI).

- Ctl-C – Aborts the current command and starts new command line with a new prompt.
- Ctl-T – Terse Response Mode – Causes commands to be responded to in a terse mode fit for machine consumption of data (programming language).

D5: Command Enumeration

Command Characters in **BOLD** are those characters that are required for the command. The other characters may be entered to help describe the command to a user interface.

1) HE – Help Menu

Syntax:

- **HE**LP [<**cmd**>]

  Where: <**cmd**> is optional in order to receive more help on specific commands.

  AC - Active Status
  AL - Alarm
  AO - All Call (Outputs)
  AS - Output Aspect
  CL - Clear MFCHIP Board Errors
  CO - Communications Status
  DC - Dual Transition Changes
  DT - Dual Takeover
  EC - Error Count
  ET - Ethernet Configuration (local only)
  HE - Help Menu
  IB - Input Board Status
  LR - Output Combiner Force Lock Rate
  MB - Matrix Board Status
  MT - Matrix Type
  OB - Output Board Status
  OOB - Output Option Board Status

PM - Power Management
RC - Roll Call
RE - Reset Board
SB - System Board Status
SS - Switch Status
ST - System Temperature
SW - Switch Crosspoint
SY - Sync Status
TM - Get/Set Time
VE - Versions of Software
VT - Vertical Trigger

Keyboard Commands:
CNTL-T - Terse Mode (does not echo received characters)
CNTL-V - Verbose Mode (echoes received characters)

Response:

- **HE**LP provides a list of the available commands.

Comment:

- Displays a summary of the commands available with a brief description of what they do. Also displays a summary of the control key codes. The response for this is the same for both verbose and terse modes.

2) AL – Alarm

Syntax:

- **AL**

Response:

Comment:

- Responds with an enumeration of alarms that are currently active in the frame controller.

3) RE – Reset Board

Syntax:

- **RE**

Response:

Comment:

- The Reset Board command (**RE**) must be entered twice in a row before the frame controller will be reset.

4) SW – Switch Crosspoint

☛ **NOTE:** *Output Monitor only on digital matrix systems*

Syntax:

- **SW <Output>, <Input>[,M][,<sync>**

  Where: <**Output**> is the output to be switched.
  <**Input**> is the input to be switched.
  [**.M**] indicates to switch the monitor matrix (Default is the primary matrix.)
  <**sync**> is the sync number (0 or 1) to switch to.

5) AC – Active Status

Syntax:

- **AC**

Response:

- SINGLE – single frame controller in system.
  ACTIVE – active frame controller in dual system.
  STANDBY – inactive frame controller in dual system.

Comment:

- Indicates whether the board is active or standby.

6) CO – Communications Status

Syntax:

- **CO**

Response:

- PRC: <status> NET PRC: <status> NET PRC Connections: <num>

  Where: <status> is IDLE, ERROR, or OK
  <num> is the number of Ethernet PRC connections.

Comment:

- Indicates whether we are receiving commands from the PRC port or the NETPRC port. NETPRC indicates the number of connections currently active.

7) SS – Switch Status

☛ **NOTE:** *Output Monitor only on digital matrix systems*

Syntax:

- **SS <Output>[,M]**

  Where: <**Output**> is the output to be switched

  [**.M**] indicates to switch the monitor matrix (Default is the primary matrix.)

Response:

- Output: <out> Input: <in> Level: <lev>

  Where: <out> is the output number.
  <in> is the input number currently switched to the output.
  <lev> is the level (MAIN or MONITOR) for the switch status.

8) RC – Roll Call

Syntax:

- **RC <I | O | M | S| OO>,<A | B>**

  Where: **I** = Input
  O = Output
  OO = Output Option
  M = Matrix
  S = System Board
  A = Port A
  B = Port B

Response:

- Roll Call Port: <port> Type: <type>
  <data>

  Where: <port> is A or B.
  <type> is INPUT, OUTPUT, MATRIX, or SYSTEM.
  <**data**> is the multiple 8 bit data bytes used to indicate a boards exists in the frame.

Comment:

- Roll Call is used to determine if a board exists in the system, which port the board is used to communication on, which slot the board is in relative to the board type, and the boards general condition (Error and/or Over Temperature).

9) IB – Input Board Status

Syntax:

- **IB <Slot>**

  Where: <**Slot**> is the input board slot.

Response:

- WC = xxxx OD1 = xxxx OD2 = xxxx OD3 = xxxx CRC = xxxx
  Total Errors = xxxx

Comment:

- See "Matrix Frame Controller Hardware Interface Protocol MFCHIP" to get specific information on the response.

10) MB – Matrix Board Status

Syntax:

- **MB <Slot>**

  Where: <**Slot**> is the matrix board slot.

Response:

- WC = xxxx OD1 = xxxx OD2 = xxxx CRC = xxxx
  Total Errors = xxxx

Comment:

- See "Matrix Frame Controller Hardware Interface Protocol MFCHIP" to get specific information on the response.

11) OB – Output Board Status

Syntax:

- **OB <Slot>**

  Where: <**Slot**> is the output board slot.

Response:

- WC = xxxx OD1 = xxxx OD2 = xxxx OD3 = xxxx OD4 = xxxx
  OD5 = xxxx OD6 = xxxx OD7 = xxxx OD8 = xxxx OD9 = xxxx
  OD10 = xxxx CRC = xxxx
  Total Errors = xxxx

Comment:

- This syntax describes the status and/or the specific component information.

12) SB – System Board Status

Syntax:

- **SB <Addr>**

  Where: <**Addr**> is the system board address.

Response:

- Power Supplies (Address = 1 to 16):

  WC = xxxx OD1 = xxxx OD2 = xxxx OD3 = xxxx OD4 = xxxx
  OD5 = xxxx OD6 = xxxx OD7 = xxxx OD8 = xxxx CRC = xxxx
  Total Errors = xxxx

- Output Monitor (Address = 17):

  WC = xxxx OD1 = xxxx OD2 = xxxx OD3 = xxxx CRC = xxxx
  Total Errors = xxxx

Comment:

- This syntax describes the status and/or the specific component information.

13) CL – Clear Error

Syntax:

- **CL <I | O | OO| P| M | S>,<addr>**

  Where: **I** = Input
  O = Output
  OO = Output Option
  P = Power Supply
  M = Matrix
  S = System
  <**addr**> = slot or board address

Response:

Comment:

- Clears the total number of errors for the specified board.

14) ST – System Temperature

Syntax:

- **ST [<I | O |OO| M | P>**

  Where: **I** = Input
  O = Output
  OO = Output Option
  M = Matrix
  P = Power Supply

Response:

- **Temperature:**
  Frame Controller: <hex> (<dec>)
  Output Monitor: <hex> (<dec>)
  <type>:
  <hex> (dec)<hex> (dec) …

  Where: <**hex**> is the hex number for the temperature.
  <**dec**> is the decimal number for the temperature
  <type> is the board type (INPUT, OUTPUT, etc).
  The data following the type is the hex (dec) temperature in Celsius for each board of the specified type in the system.

Comment:

- This syntax describes the status and/or the specific component information.

15) VE – Version of Software

Syntax:

- **VE**

Response:

- LOADER: <ver> <date>
  INSTALLER: <ver> <date>
  PMFC: <ver> <date>
  FPGA: <ver>
  Matrix Cards:
  <ver> <ver> … <ver>
  Input Cards:
  <ver> <ver> … <ver>
  Output Cards:
  <ver> <ver> … <ver>
  Output Option Cards:
  <ver> <ver> … <ver>
  Power Supply Cards:
  <ver> <ver> … <ver>
  Output Monitor Card: <ver>

Comment:

- The version command provides the version number and date for each software module in the system. If a software module does not exist, then "Invalid" is displayed.

16) VT – Vertical Trigger

Syntax:

- **VT [<A | B>]**

  Where: **VT** – no port change.
  VT A – change to Port A.
  VT B – change to Port B

Response:

Comment:

- This syntax describes the status and/or the specific component information. The vertical trigger command forces the cards in the system to use the specified port (A or B) as the primary data link.

17) DT – Dual Takeover

Syntax:

- **DT**

Response:

Comment:

- Allows the Standby Frame Controller to take over control of the frame.

18) EC – Error Count

Syntax:

- **EC <I | O | OO | M | P | S>**

  Where: **I** = Input
  O = Output
  OO = Output Option
  M = Matrix
  P = Power Supply
  S = System

Response:

- <Board Type>:
  <error count> <error count> …

Comment:

- Response gives the number of error counts for all of the boards in the frame for the board type that was specified.

19) TM - Get/Set Time

Syntax:

- **TM** [<**mm**/**dd**/**yy**> <**hh**:**mm**:**ss**>]

Response:

Comment:

- Gets/sets the Frame Controller's real time clock.

20) SY - Sync Status

Syntax:

- **SY** <**1** | **2**>

  Where: **1** indicates sync 1 and **2** indicates sync 2

Response:

Comment:

- Indicates the sync reference being detected by the frame controller card.

21) PM - Power Management

Syntax:

- **PM** <**I** | **O** | **M** | **S** | **P** | **OO**>[<**slot**>[<**ON** | **OFF**>]]

  Where: **I** = Input
  O = Output,
  M => Matrix
  S => System
  P => Power Supply
  OO = Output Option
  Slot = is the specific card
  ON => DC Board Power is ON
  OFF => DC Board Power is OFF

PM <**I** | **O** | **M** | **S** | **P** | **OO**>	will display DC Power Status for every board of the specified type
PM <**I** | **O** | **M** | **S** | **P** | **OO**>,<slot>	will display DC Power Status for a specific board of the specified type

Response:

Comment:

- Allows you to remotely turn power on/off to individual cards in the system.

22) OOB - Output Option Board Status

Syntax:

- **OOB <Slot>**

  Where: <**Slot>** is the output option board slot address.

Response:

- WC = xxxx OD1 = xxxx OD2 = xxxx CRC = xxxx Total Errors = xxxx

Comment:

- Specify **Slot** in either a decimal or hex (i.e. 0x05) format (Slot is a one-based number)

23) MT - Matrix Type

Syntax:

- **MT**

Response:

- <**64x64 Matrix**> or <**128x128 Matrix**>

Comment:

- Returns the matrix type loaded in the system. (Used to differentiate between 64x64 and 128x128 digital matrix cards.)

24) AO - All Call (Outputs)

Syntax:

- **AO <Input>**

  Where: Input is the physical input for all outputs. Specify Input in either a decimal or hex (i.e. 0x0005) format.

Response:

Comment:

- Allows you to switch a single input to all outputs of the matrix

25) LR - Output Combiner Force Lock Rate

Syntax:

- **LR** <**slot** | **M**>[,<**output**>,<**rate**>]

  Where: **slot** = the output card
  M = the output monitor card
  output = the output on the card
  rate = (one of the following) :
  143 = 143 Mb/s
  177 = 177 Mb/s
  270 = 270 Mb/s
  360 = 360 Mb/s
  540 = 540 Mb/s
  HD = High Definition
  BYPASS = BYPASS mode
  AUTO = AUTO SELECT

Response:

Comment:

- Allows you to set the reclocker rate on the digital output combiners. If the card does not support the given rate, the command is ignored.

10.4 APPENDIX D: ABBREVIATIONS, ACRONYMS, AND DEFINITIONS (AA&D)

This Appendix includes a listing of the most commonly used abbreviations, acronyms and associated definitions that are used throughout this manual.

AA&D	*DESCRIPTION/DEFINITION*
BNC	Bayonet Neill-Concelman (connector used with coaxial cable that was invented by Mr. Neill-Concelman)
CPU	Central Processing Unit
CRC	Cyclic Redundancy Check
DAC	Digital to Analog Converter
DHCP	Dynamic Host Configuration Protocol
ESD	Electrostatic Sensitive Device
FCC	Federal Communications Commission
FPGA	Field Programmable Gate-Array
Gbps	Gigabytes (1,024 megabytes) per second; or one billion bits of information per second
HD	High Definition
HDMR	High Definition Multi-Rate
HTTP	HyperText Transfer Protocol
IEC	International Electrotechnical Commission
IP	Internet Protocol
LAN	Limited Access Network
LC	Inductor-Capacitor circuit (L is the symbol for inductance); or, Lucent Connector (fiber connector)
LED	Light Emitting Diode
LSB	Least Significant Bit

AA&D continued on next page

***AA&D** (continued)*

AA&D	*DESCRIPTION/DEFINITION*
Mbps	Megabytes per second
MFC	Matrix Frame Controller
MIB	Management Information Base
MSB	Most Significant Bit
NETPRC	NETwork PESA® Routing Controller
NTSC	National Television Standards Committee
PAL	Phase Alternating Line
PC	Personal Computer (typically, IBM-compatible)
PCB	Printed Circuit Board; or Parts Component Board (when populated with components)
P1E	Protocol number 1 Extensions (PESA defined)
PRC	PESA Router Controller
RCP	Remote Control Panel
RMA	Return Material Authorization
SD	Standard Definition
SDI	Standard Definition Interface
SFF	Small-Form-Factor
SNMP	Simple Network Management Protocol
SNR	Signal-to-Noise Ratio
SPDT	Single Pole, Double Throw (switch)
SPST	Single Pole, Single Throw (switch)
syntax	The structural or grammatical rules that define how the symbols in a language are to be combined to form words, phrases, expressions, and other allowable constructs.
TCP	Transmission Control Protocol; or Transfer Control Point
TCP/IP	Transmission Control Protocol/Internet Protocol

AA&D continued on next page

***AA&D** (continued)*

AA&D	*DESCRIPTION/DEFINITION*
Telnet	Telephone Network
USB	Universal Serial Bus (Intel®)

USER NOTES:


PESA
Switching
Systems