CHEETAH GENERATION I (CH SERIES) VIDEO MATRIX SWITCHERS

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Manual: 81-9059-0570-0 Rev C

August, 2009

Printed in the United States of America.

September, 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.***

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: Introduction

2.1 CHEETAH PRODUCT OVERVIEW

The Cheetah 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 SWITCHERS ANALOG SUPPORT

Additionally, PESA Switching Systems, Inc. offers analog cards for the Cheetah 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 series, all frame sizes (64x64, 128x128, 256x256, 256x448 flexi-frame, 512x512, and 1024x256) will accept analog matrix and I/O cards. Excluding the 64x64 frame, Cheetah system configurations will allow partitioning for both analog and digital cards to reside in the same frame in blocks of 64x64. The 64x64 frame can be configured for either all digital or all analog only.

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 analog versions.

NOTE	**Due to the architecture used for the digital frames, analog-switching characteristics that require critical timing may be affected. Mixed length interconnect cabling internal to the frame could cause differential delays to exceed ±4º @ 4.43 MHz on frames larger than 256x.** **Due to termination requirements, partially populated frames may need to have at least one analog matrix dummy-load card installed.** **Additionally, analog matrix frames will not support Video Output Monitoring options.**

2.3 CHEETAH SWITCHERS FEATURES

All Cheetah video matrix switchers offer alarm support, switch confirmation, block checking, and power-out-of-range indicators. Features include:

- Full feature control system using either standard PESA PRC Control or PESA Network Control
- Video and data signal from 3Mb/s to 1.5 GB/s
- Conforms to SMPTE 259M and 292M
- Input EQ to 300M SD, 100M HD
- Bypass mode for non-standard data signals
- Output option slots support dual output, fiber output, DAC module for SDI conversion to National Television Standards Committee / Phase-alternating line (NTSC/PAL) outputs, SD Converter, and HD to SD converter
- Full redundant controllers available
- N+1 redundant internal DC power; full redundant AC power
- All modules are hot-swappable for on-air maintenance
- Dual output monitor

2.4 CHEETAH SERIES VIDEO MATRIX SWITCHERS DOCUMENTATION OVERVIEW

Since there are numerous configurations available for the Cheetah Series switchers, ***PESA Switching Systems, Inc.*** has developed an assembly matrix to assist you in designing a configuration exactly to your needs. Additionally, this manual contains all of the information necessary to describe each Cheetah Series component structure, installation, and operation.

Chapter 3: Configuration Matrix

Since the technology in the switching systems industry is constantly changing, it is important for ***PESA Switching Systems, Inc.*** to offer the most up to date products to our customers. The Cheetah Series product line is continually being upgraded to uphold that commitment. This section includes a Matrix that lists all of the major components for the following Cheetah Series Video Matrix Switchers chassis/frames (models):

- Cheetah 64x64
- Cheetah 128x128
- Cheetah 256x256
- Cheetah 256x448
- Cheetah 512x512
- Cheetah 1024x256

Table 1 includes only the active cards that are required for the individual Cheetah series chassis configurations. The blank covers, which are required for the card locations that are not used (to satisfy chassis component cooling requirements), are included in the associated subsequent subsections for the individual frame products and component descriptions.

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

TABLE 1: Cheetah Series Active Components Matrix

CHEETAH SERIES FRAMES	COMPONENT SELECTION REQUIREMENTS AND MAXIMUM QUANTITIES													
	Power Supplies	*Matrix Frame Controller*	*Input Buffer Cards (SDI)*	*Output Option HD-MR to SD*	*Output Combiner (SDI)*	*Matrix Card*	*Dual Output Option BNC*	*Input Buffer Fiber*	*Output Option DAC SD*	*Output Option Fiber*	*Output Monitor (digital only)*	*Output Option HD to SD*	*Input Buffer HDMR*	*Output Combiner HDMR*
64x64	2	2	4	4	4	1	4	4	4	4	1	4	4	4
128x128	4	2	8	8	8	4	8	8	8	8	1	8	8	8
256x256	8	2	16	16	16	16	16	16	16	16	1	16	16	16
256x448	16	2	16	28	28	28	28	16	28	28	1	28	16	28
512x512	16	2	32	32	32	64	32	32	32	32	1	64	32	32
1024x256	16	2	64	16	16	64	16	64	16	16	1	64	64	16

Chapter 4: Cheetah 64x64 Switcher

4.1 CHEETAH 64X64 PRODUCT AND COMPONENT DESCRIPTIONS

4.1.1 Cheetah 64x64 Frame Configuration Views

(For the Cheetah 64x64 frame configuration see Figures 1 and 2).

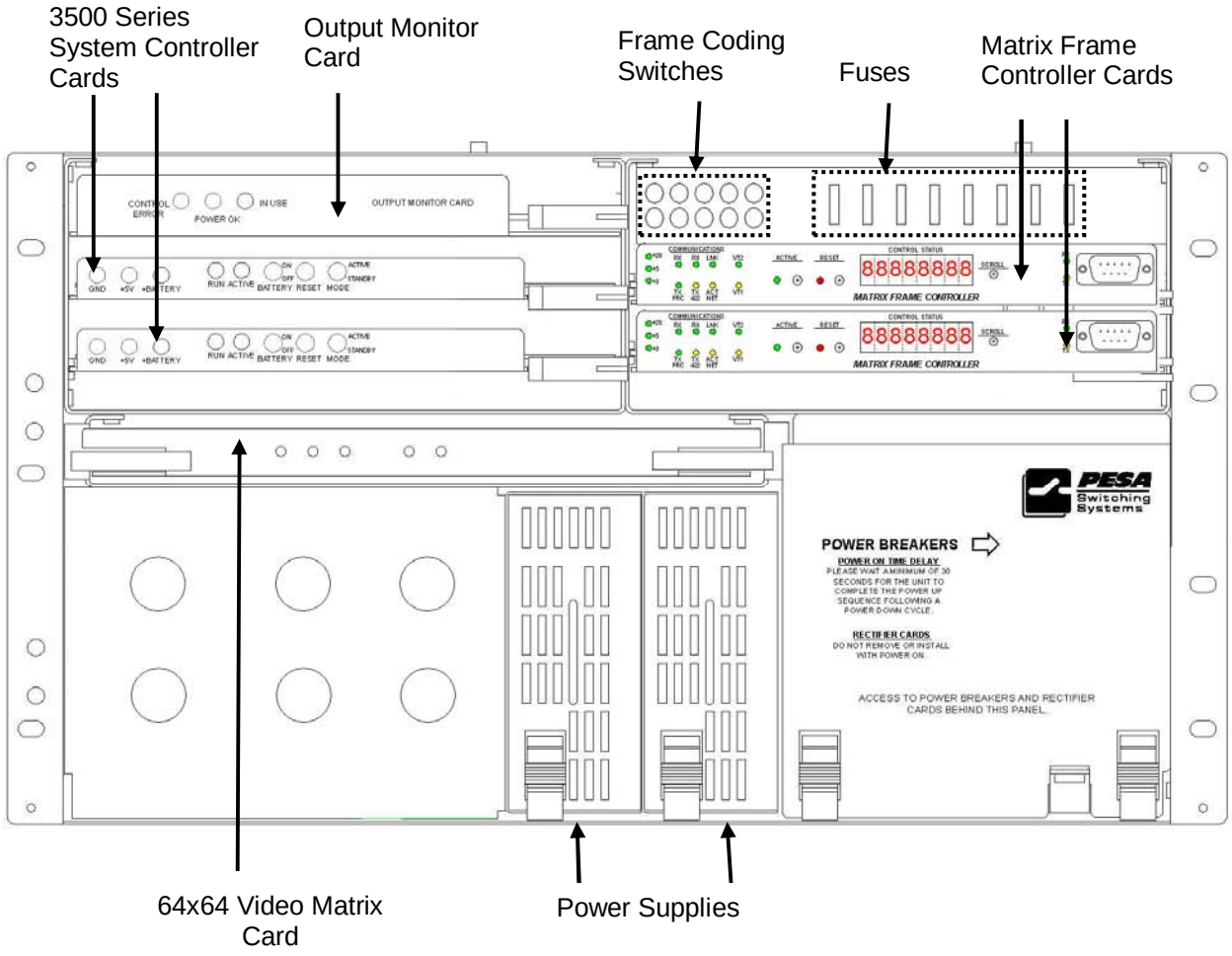


FIGURE 1: Cheetah 64x64 Front View

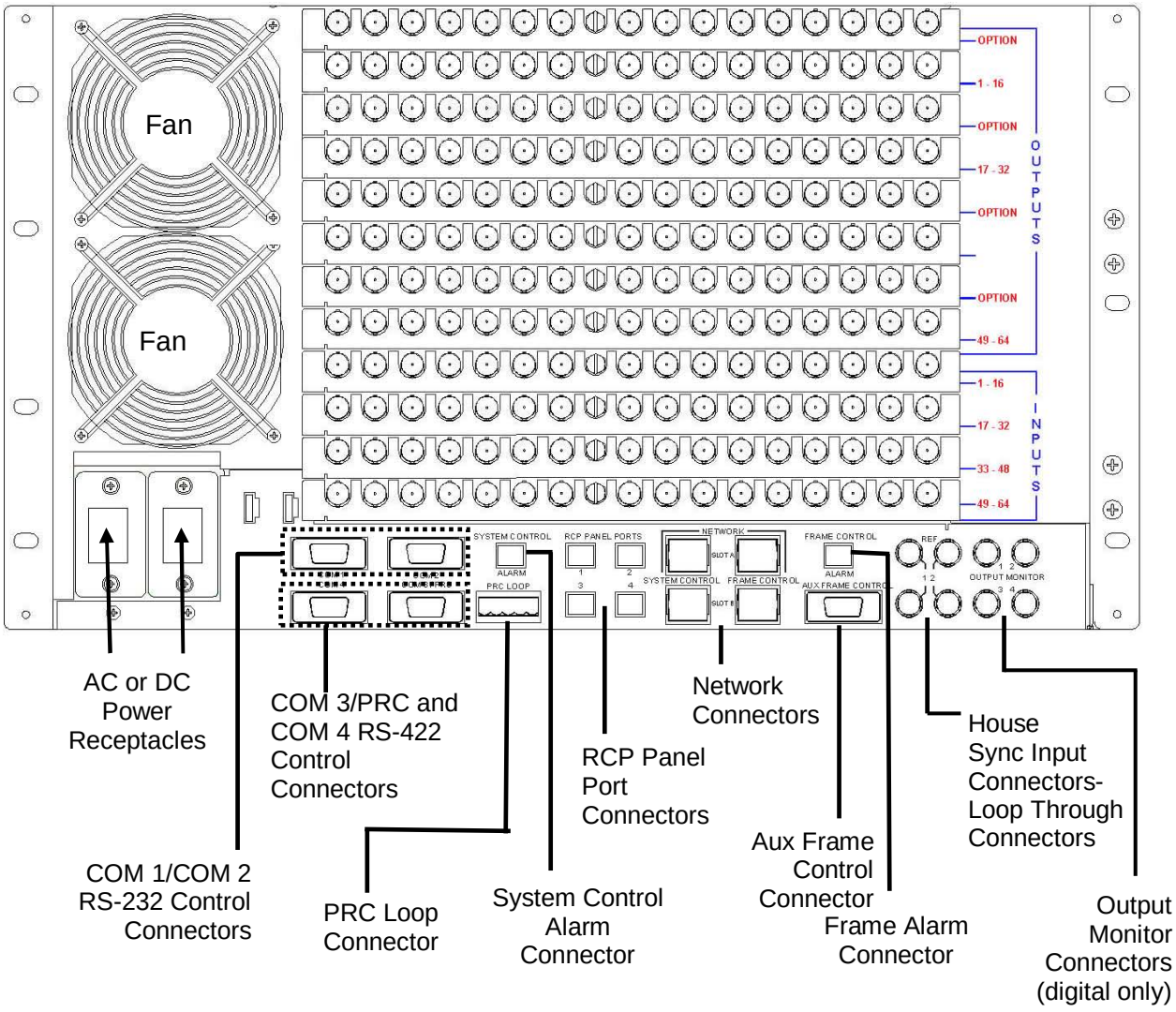


FIGURE 2: Cheetah 64x64 Rear View

4.1.2 Cheetah 64x64 Specifications

Physical

RUs 6
Height ..... 10.50"
Width ..... 19"
Depth ..... 23"
Weight ..... 90 lbs. (40.82 kg)
(May weigh less depending on the configuration)

Supply Power Requirements

Operating voltage ..... 95-240 VAC, 47-63 Hz
Power consumption ..... 350-Watts nominal
..... (Consumption can vary ± 50% depending on configuration)

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: ..... 1.0 Mbps to 1.485 Gbps
Optical Input Wavelength ..... Single Mode, 1200 to 1600 nm
Input Power ..... -20 dBm (minimum)

Continued

Cheetah 64x64 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

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 64x64 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 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 64x64 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 64x64 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

4.1.3 Cheetah 64x64 Component Listing

Tables 2 and 3 include the equipment part numbers, descriptions, and the maximum quantities of each component that can comprise the Cheetah 64x64 Chassis.

NOTE	**The listed items in the following tables may be ordered in varying quantities. However, the listed quantities are the maximum number that can be used in this frame configuration. It must be noted that only four input cards, four output cards, and four output-option cards can be used in any 64x64 chassis I/O configuration. However, the I/O configuration for this chassis is either *all digital* or *all analog*.** **For further configuration support, contact *PESA Switching Systems, Inc.* Customer Support.**

TABLE 2: Cheetah 64x64 Mainframe Component List

PART NUMBER	DESCRIPTION	Max. Qty (see note)
Standard Mainframe Components		
81-9065-2418-0	Mainframe Assembly:	1
81-9065-2381-0	Power Supply	2
81-9034-6904-0	Power Supply (blank)	1
81-9065-2397-0	Frame Controller Cards	2
81-9065-2328-0	Output Monitor Card *(Digital Only)*	1
(P/N determined by software inclusion)	3500 System Controller Cards	2
Matrix 64x64 Card(s)		
81-9065-2333-0	Matrix 64x64 *(Digital Configuration)*	1
81-9065-2334-0	Matrix 64x64 *(Analog Configuration)*	1
Miscellaneous Cards		
81-9065-2521-0	Analog Dummy Load Card*****	Dependent on Configuration
81-9065-2398-0	HD Dummy Load Card*****	Dependent on Configuration

***:** *Dependent on the specific configuration of the chassis and will be noted on the specification sheet that accompanies the equipment. Contact PESA Switching Systems, Inc: Customer Support for specific configuration details for these cards.*

TABLE 3: Cheetah 64x64 all Digital or all Analog Component List

PART NUMBER	DESCRIPTION	Max. Qty (see note)
Analog Input Cards		
81-9065-2495-0	Input Buffer Analog High Level BNC	4
81-9065-2432-0	Input Buffer Analog Video BNC	4
Analog Output Cards		
81-9065-2581-0	Input Expansion Buffer Analog High Level**	4
81-9065-2433-0	Output Combiner Analog High Level BNC	4
81-9065-2492-0	Output Option Analog Video BNC	4
81-9065-2493-0	Output Combiner Analog Video BNC	4
81-9065-2494-0	Output Option Analog High Level BNC	4
Digital and Fiber Input Cards		
81-9065-2612-0	Input Buffer Fiber Top Level	4
81-9065-2321-0	Input Buffer Card SD BNC	4
81-9065-2304-0	Input Buffer HD-MR BNC	4
Digital and Fiber Output Cards		
81-9065-2315-0	Output Combiner SD BNC	4
81-9065-2317-0	Dual Output Option BNC	4
81-9017-0370-0	DAC 10-Bit Plug-On Card	4
81-9065-2613-0	Output Option Fiber Top Level	4
81-9017-0376-0	Output Option HD to SD Converter BNC	4
81-9065-2322-0	Output Combiner HD-MR BNC	4
I/O Blanks		
81-9034-6844-0	Dual Output Option Blank	3
81-9034-6906-0	Output Blank	3
81-9034-6907-0	Input Blank	3

******: *When used, it is inserted next to an output card to expand an input configuration. Contact PESA Switching Systems, Inc: Customer Support for specific configuration details for these cards.*

4.2 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.

4.3 GENERAL CHASSIS INSTALLATION OVERVIEW

The physical size of each Cheetah Series Switcher chassis is determined by the chassis input/output capabilities (i.e., the 64x64 chassis is the smallest while the 512x512 chassis* is 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.

*: The 1024x256 system utilizes the 512x512 chassis.

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.

4.4 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.

4.5 MOUNTING A CHEETAH 64X64 CHASSIS IN AN EQUIPMENT RACK

Since the mounting configurations for each chassis size differ because of physical size and weight, each chassis-mounting configuration will be described separately.

	**The weight of a fully loaded 64x64 chassis is 90 lbs nominal. 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 and the chassis breakers are in the OFF position before installing the specific frame into the rack.**
	**Fans that are mounted inside of 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.

4.6 SETTING CHEETAH 64X64 CHASSIS LEVEL CODES (STROBES)

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 Table 4 on page 18. 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.**

4.6.1 Cheetah 64x64 Chassis Strobe Switches Location

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

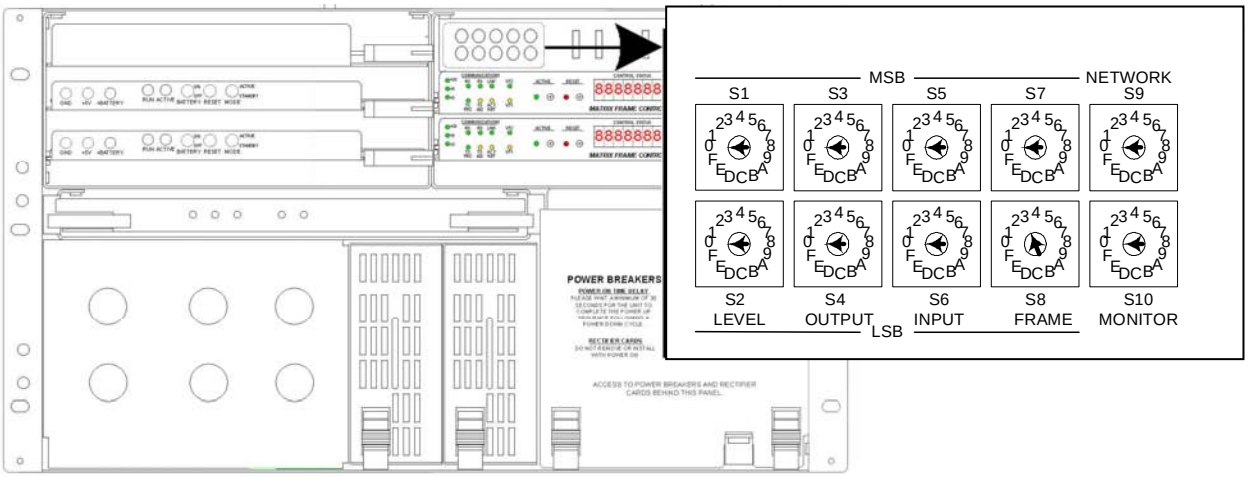


FIGURE 3: Cheetah 64x64 Chassis Strobe Switches Location (Front View)

4.6.2 Cheetah 64x64 Chassis Strobe Switch Functions

Table 4 describes the functions of the various strobe switches for the Cheetah systems:

TABLE 4: Strobe Switch Functions

Rotary Switch	Name	Description
S1	MSB Level Code	(Most Significant Bit) 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	LSB Level Code	
S3	MSB Output Offsets	(Least Significant Bit) 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	MSB Frame	Specifies the type of frame the boards are plugged into. For the Cheetah 64x64 frame, set LSB to 3 and MSB to 0.
S8	LSB Frame	
S9	Network (not used)	Not used.
S10	Monitor	Sets the starting output number. Each switch position increments the output number by 4. If you are not using this feature, leave the level code at zero. If you need to specify a monitor output, add 32 to the Level Code value. Use the resulting number for this setting.

4.7 CHEETAH 64X64 CHASSIS POWER SUPPLY BACKPLANE SWITCHES

NOTE	**There are no Power Supply backplane switches in the Cheetah 64x64 chassis configuration.**

4.8 CHEETAH 64X64 CHASSIS INPUT/OUTPUT BACKPLANE DIP SWITCHES

Each input/output backplane has one eight-position, slide-style switch consisting of eight single-pole single-throw (SPST) switches numbered 1 through 8. Figure 4 depicts the location of these switches with the power supplies removed, and the dipswitch settings.

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

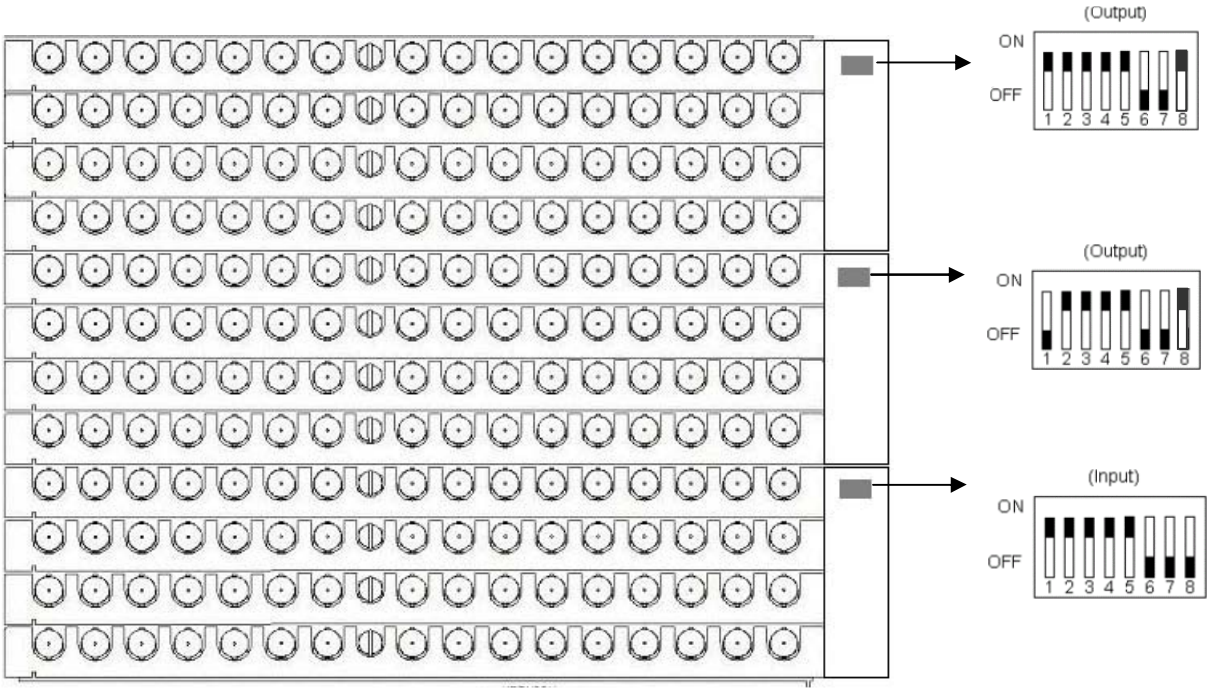


FIGURE 4: Input/Output Backplane Dip Switch Locations and Settings (viewed from the rear of the frame)

4.9 CHEETAH 64X64 CHASSIS MATRIX BACKPLANE SWITCHES

NOTE	**There are no matrix backplane switches in the Cheetah 64x64 chassis configuration.**

4.10 CHEETAH 64X64 CHASSIS SYSTEM CONNECTION LOCATIONS

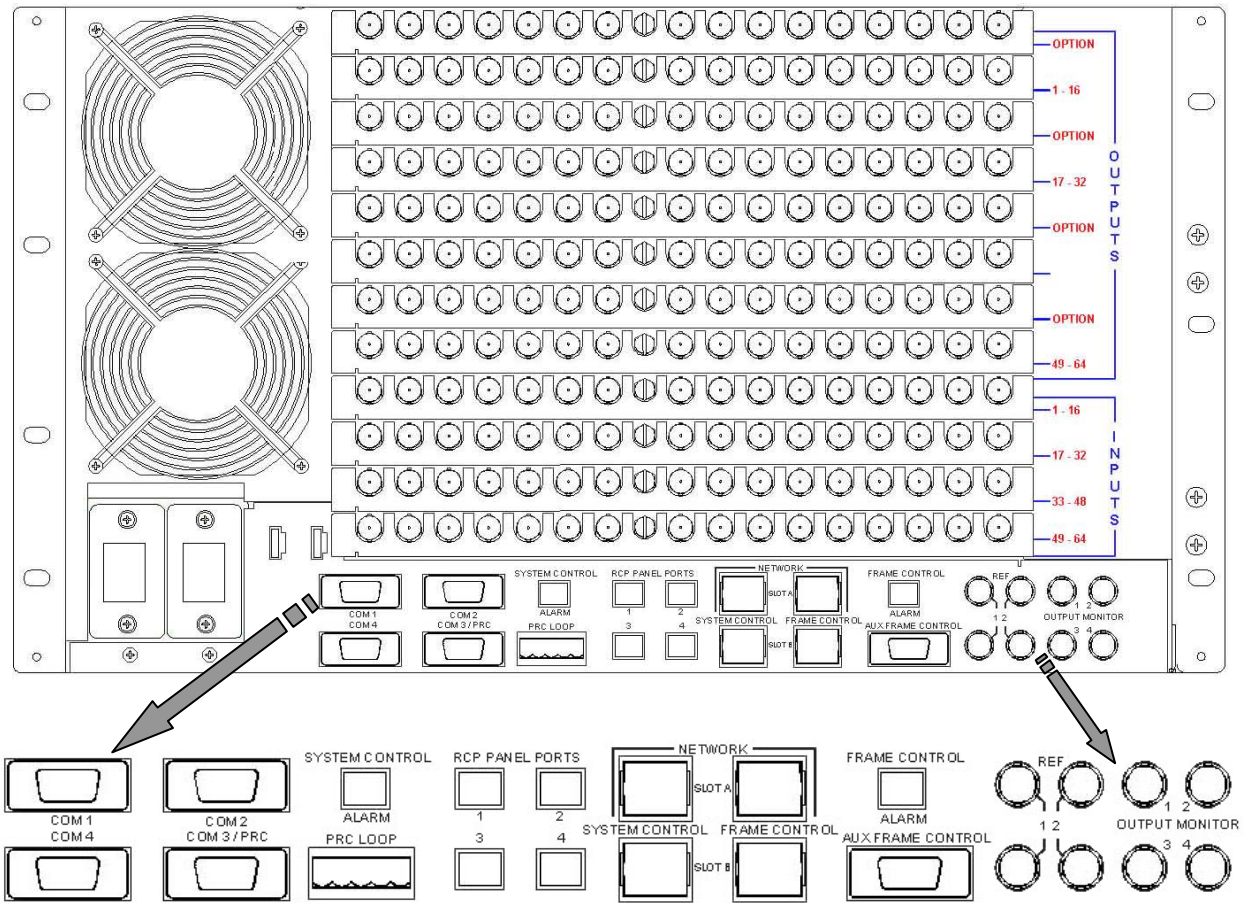


FIGURE 5: 64X64 Chassis System Interface Connector Panel Location (Rear View)

4.11 CHEETAH 64X64 CHASSIS INPUT/OUTPUT SIGNAL CONNECTORS

These Input/output (I/O) BNC coaxial connectors, located on the rear of the unit (see Figure 6) provide the input/output signal interface.

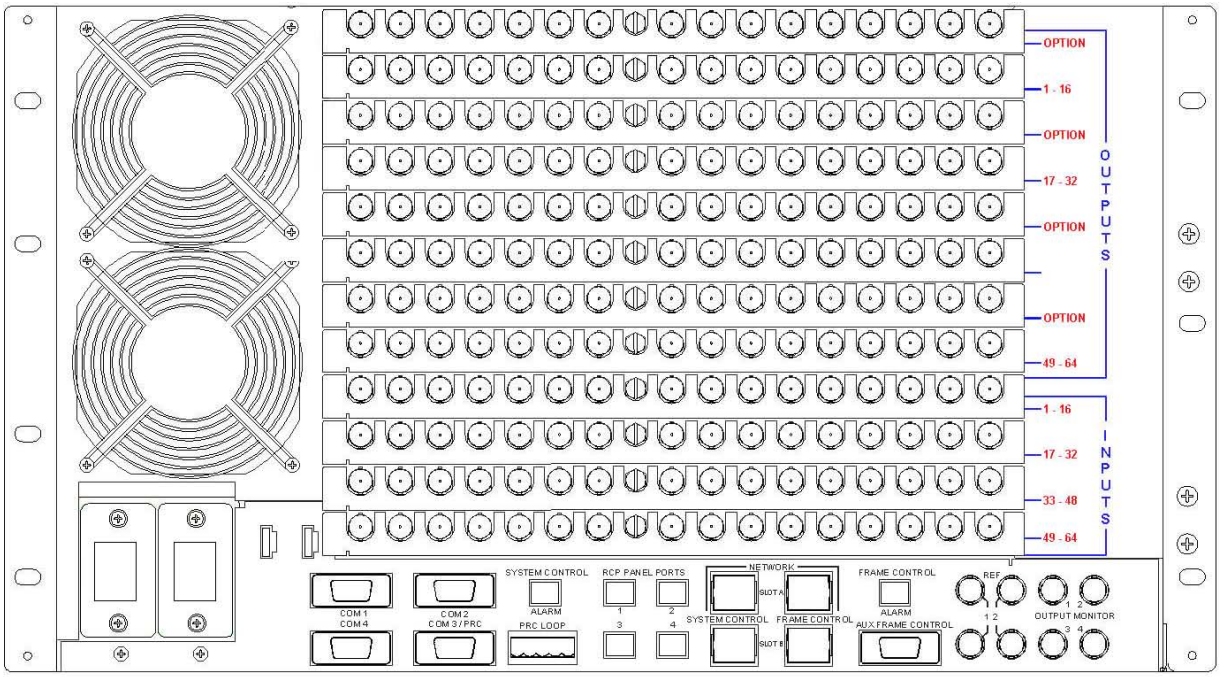


FIGURE 6: Input/Output Signal Connectors (rear view)

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 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.

The Output Slots labeled with "Option" represents an Output Option, which could indicate either dual output or some other conversion-type slots. (For I/O card removal and installation, refer to Chapter 11.)

4.12 CHEETAH 64X64 CHASSIS 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 64x64 chassis are located on each card and are non-serviceable by the user.

Chapter 5: Cheetah 128x128 Switcher

5.1 CHEETAH 128X128 PRODUCT AND COMPONENT DESCRIPTIONS

5.1.1 Cheetah 128x128 Frame Configuration Views

(For the Cheetah 128x128 frame configuration, see Figures 7and 8).

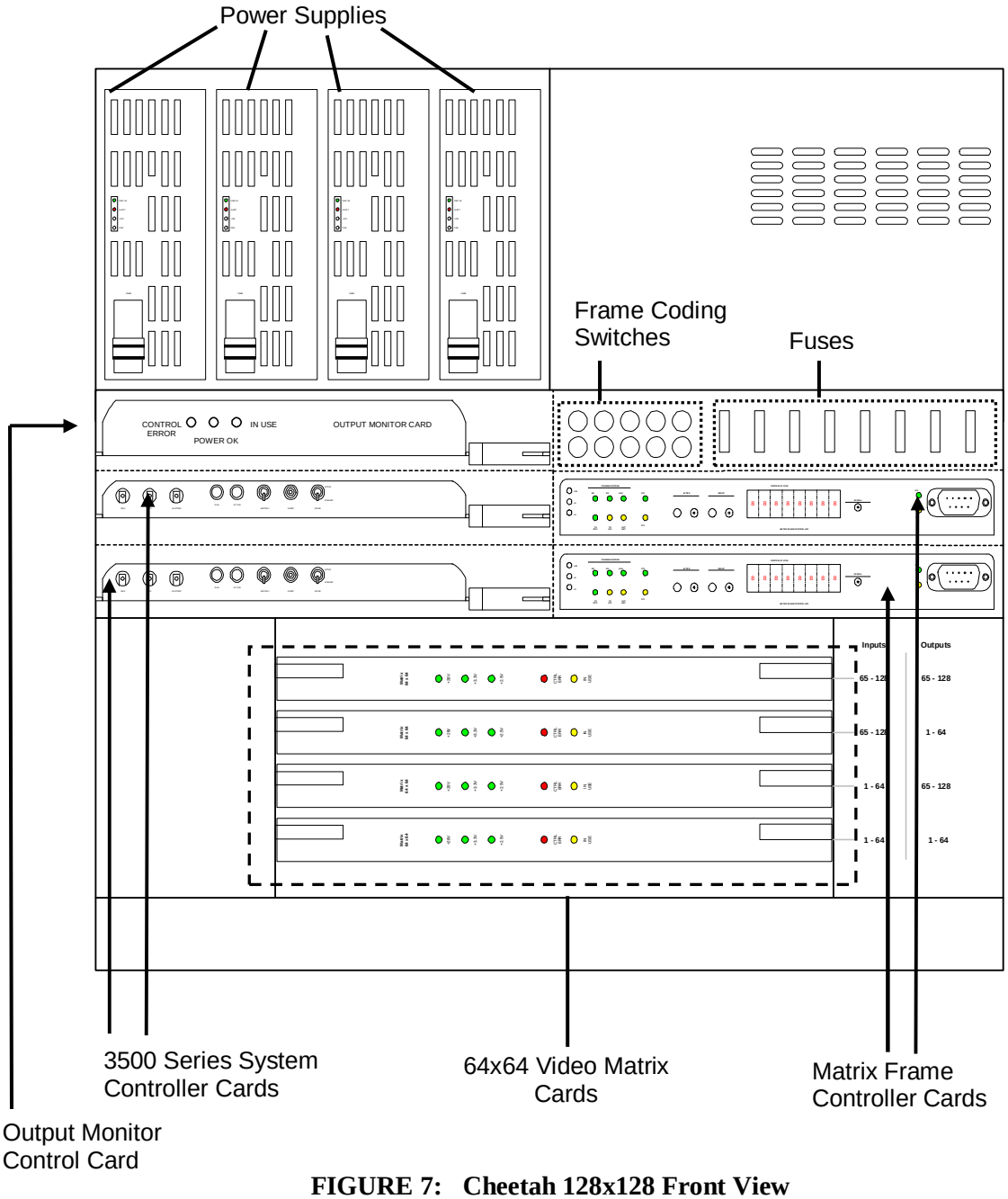


FIGURE 7: Cheetah 128x128 Front View

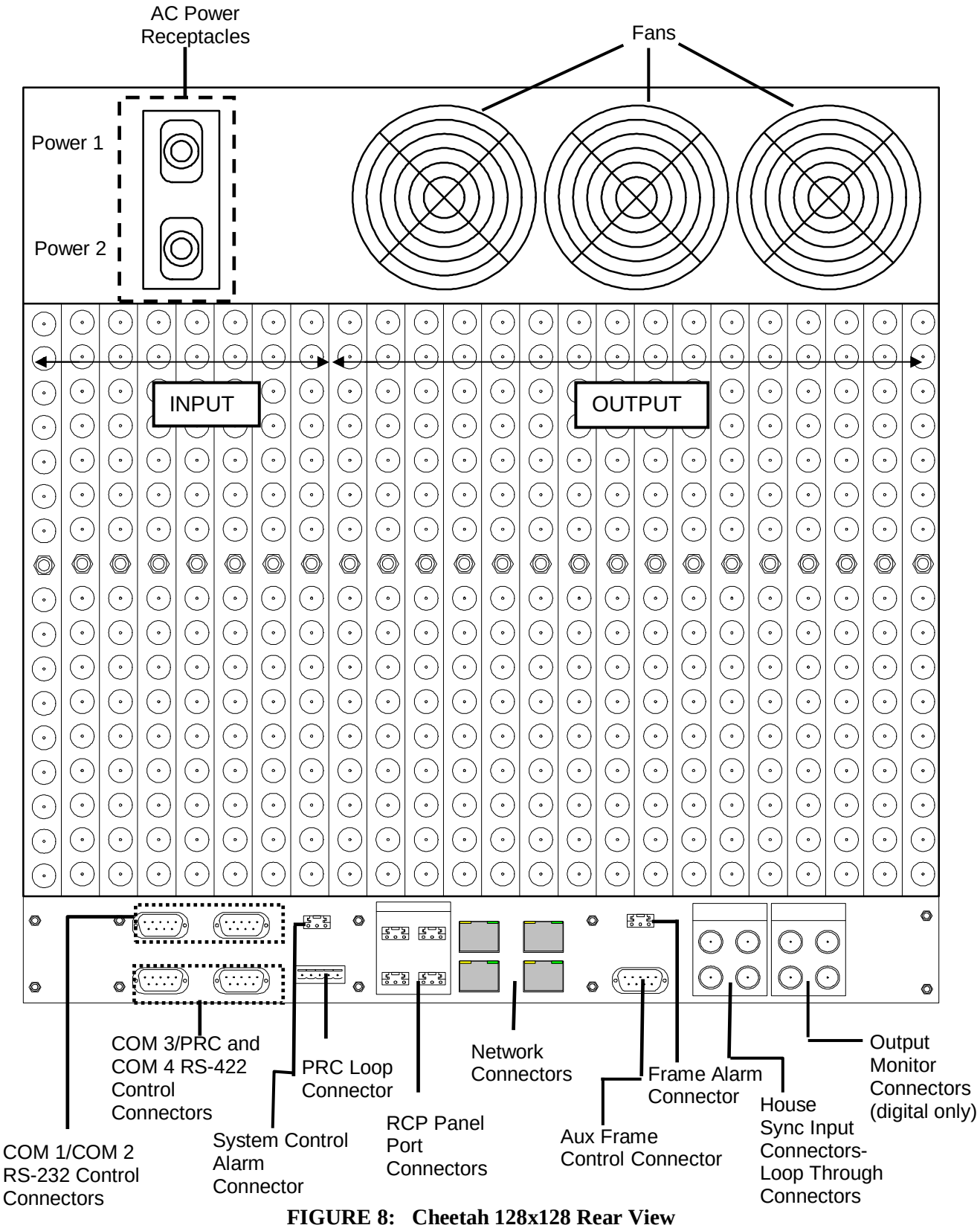


FIGURE 8: Cheetah 128x128 Rear View

5.1.2 Cheetah 128x128 Specifications

Physical

RUs 10
Height ..... 17.5"
Width ..... 19"
Depth ..... 23"
Weight ..... 165 lbs. (74.25 kg)
..... (May weigh less depending on the configuration)

Supply Power Requirements

Operating voltage ..... 95-240 VAC, 47-63 Hz
Power consumption ..... 1200W nominal
..... (Consumption can vary ± 50% depending on configuration)

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: ..... 1.0 Mbps to 1.485 Gbps
Optical Input Wavelength ..... Single Mode, 1200 to 1600 nm
Input Power ..... -20 dBm (minimum)

Continued

Cheetah 128x128 Specifications (cont.)

Optical Signals (Fiber Optics) for Outputs (Transmitters)

Connector Type ..... SFF modules w/LC-type (fiber card)
Data Rates: ..... 1 Mbps to 1.485 Gbps
Optical Output Wavelength..... Single Mode, 1310 nm, ±20 nm
Output Power .....-11 dBm

Optical Loss Budget

10,000 km (minimum), Single Mode fiber w/2 optical couplings..... 9 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 128x128 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 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 128x128 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 o 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 128x128 Specifications (cont.)

High-Level Analog Video Gain Characteristics

Gain: ..... Unity
Gain Stability: ..... <±0.1 dB max.
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

5.1.3 Cheetah 128x128 Component Listing

Tables 5 and 6 include the equipment part numbers, descriptions, and the maximum quantities of each component that can comprise the Cheetah 128x128 product line.

NOTE	**The listed items in the following tables may be ordered in varying quantities. However, the listed quantities are the maximum number that can be used in this frame configuration. It must be noted that only eight input cards, eight output cards, and eight output-option cards can be used in any 128x128 chassis I/O configuration.** **The I/O configuration for this chassis can be mixed (digital and analog). However, mixed configurations can become confusing and support may be needed. For mixed configuration support, contact *PESA Switching Systems, Inc.* Customer Support.**

TABLE 5: Cheetah 128x128 Mainframe Component List

PART NUMBER	DESCRIPTION	Max. Qty (see note)
Standard Mainframe Components		
81-9065-2396-0	Mainframe Assembly:	1
81-9065-2381-0	Power Supply	4
81-9034-6904-0	Power Supply (blank)	3
81-9065-2397-0	Frame Controller Cards	2
81-9065-2328-0	Output Monitor Card *(Digital Only)*	1
(P/N determined by software inclusion)	3500 System Controller Cards	2
Matrix 64x64 Card(s)		
81-9065-2333-0	Matrix 64x64 *(Digital Configuration)*	4
81-9065-2334-0	Matrix 64x64 *(Analog Configuration)*	4
Miscellaneous Cards		
81-9065-2521-0	Analog Dummy Load Card*****	Dependent on Configuration
81-9065-2398-0	HD Dummy Load Card*****	Dependent on Configuration

*****: *Dependent on the specific configuration of the chassis and will be noted on the specification sheet that accompanies the equipment. Contact PESA Switching Systems, Inc: Customer Support for specific configuration details for these cards.*

TABLE 6: Cheetah 128x128 Digital and Analog Component List

PART NUMBER	DESCRIPTION	Max. Qty (see note)
Analog Input Cards		
81-9065-2495-0	Input Buffer Analog High Level BNC	8
81-9065-2432-0	Input Buffer Analog Video BNC	8
Analog Output Cards		
81-9065-2581-0	Input Expansion Buffer Analog High Level**	8
81-9065-2433-0	Output Combiner Analog High Level BNC	8
81-9065-2492-0	Output Option Analog Video BNC	8
81-9065-2493-0	Output Combiner Analog Video BNC	8
81-9065-2494-0	Output Option Analog High Level BNC	8
Digital and Fiber Input Cards		
81-9065-2612-0	Input Buffer Fiber Top Level	8
81-9065-2321-0	Input Buffer Card SD BNC	8
81-9065-2304-0	Input Buffer HD-MR BNC	8
Digital and Fiber Output Cards		
81-9065-2315-0	Output Combiner SD BNC	8
81-9065-2317-0	Dual Output Option BNC	8
81-9017-0370-0	DAC 10-Bit Plug-On Card	8
81-9065-2613-0	Output Option Fiber Top Level	8
81-9017-0376-0	Output Option HD to SD Converter BNC	8
81-9065-2322-0	Output Combiner HD-MR BNC	8
I/O Blanks		
81-9034-6844-0	Dual Output Option Blank	7
81-9034-6906-0	Output Blank	7
81-9034-6907-0	Input Blank	7

******: *When used, it is inserted next to an output card to expand an input configuration. Contact PESA Switching Systems, Inc: Customer Support for specific configuration details for these cards.*

5.2 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.

5.3 GENERAL CHASSIS INSTALLATION OVERVIEW

The physical size of each Cheetah Series Switcher chassis is determined by the chassis input/output capabilities (i.e., the 64x64 chassis is the smallest while the 512x512 chassis* is 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.

*: The 1024x256 system utilizes the 512x512 chassis.

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.

5.4 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.

5.5 MOUNTING A CHEETAH 128X128 CHASSIS IN AN EQUIPMENT RACK

	**The weight of a fully loaded 128x128 chassis is 165 lbs nominal. 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 and the chassis breakers are in the OFF position before installing the specific frame into the rack.**
	**Fans that are mounted inside of 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, and power cables. 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.

5.6 SETTING CHEETAH 128X128 CHASSIS LEVEL CODES (STROBES)

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 Table 7 on page 34. 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.**

5.6.1 Cheetah 128x128 Chassis Strobe Switches Location

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

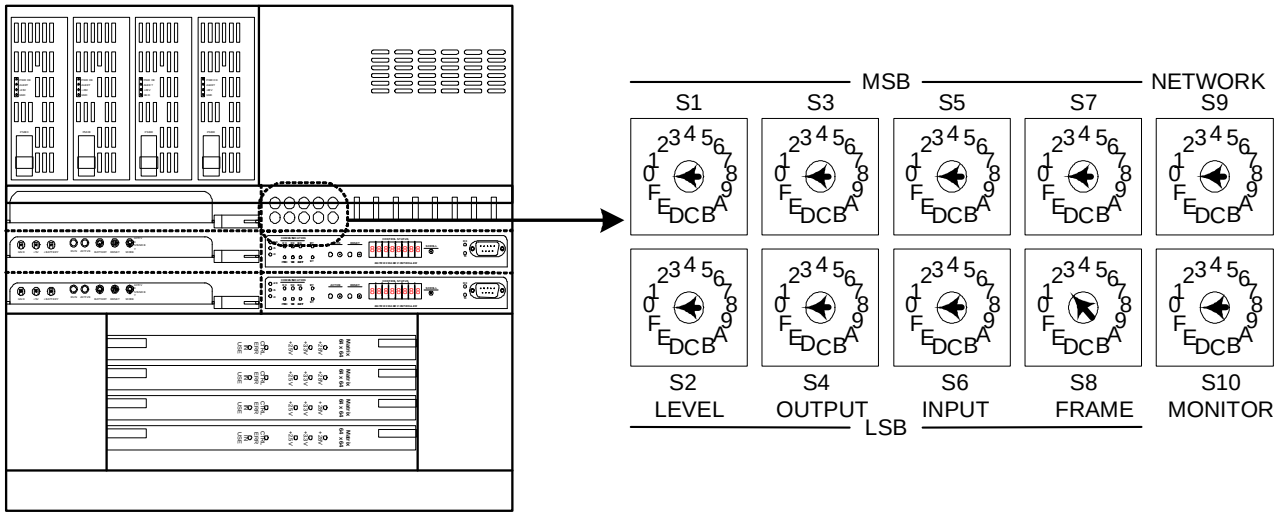


FIGURE 9: Cheetah 128x128 Chassis Strobe Switches Location (Front View)

5.6.2 Cheetah 128x128 Chassis Strobe Switch Functions

Table 7 describes the functions of the various strobe switches for the Cheetah systems:

TABLE 7: Strobe Switch Functions

Rotary Switch	Name	Description
S1	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	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	MSB Frame	Specifies the type of frame the boards are plugged into. For the Cheetah 128x128 frame, set LSB to 2 and MSB to 0.
S8	LSB Frame	
S9	Network (not used)	Not used.
S10	Monitor	Sets the starting output number. Each switch position increments the output number by 4. If you are not using this feature, leave the level code at zero. If you need to specify a monitor output, add 32 to the Level Code value. Use the resulting number for this setting.

5.7 CHEETAH 128X128 CHASSIS POWER SUPPLY BACKPLANE DIPSWITCH LOCATIONS

Each power supply backplane supports two power supplies. Each backplane has one, eight-position, slide-style switch consisting of eight, single-pole single-throw (SPST) switches numbered 1 through 8. Figure 10 depicts the location of these switches with the power supplies removed and the corresponding dipswitch settings.

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

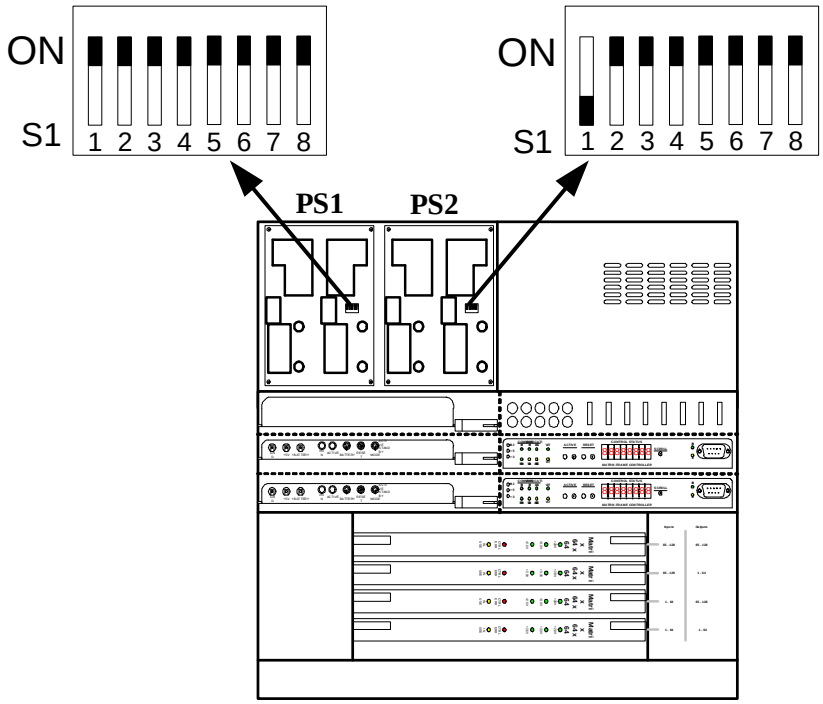


FIGURE 10: 128x128 Power Supply Backplane Dipswitch Locations And Settings (Viewed From The Front Of The Frame)

5.8 CHEETAH 128X128 CHASSIS INPUT/OUTPUT BACKPLANE DIPSWITCH LOCATIONS

Each input/output backplane has one, eight-position, slide-style switch consisting of eight single-pole single-throw (SPST) switches numbered 1 through 8. Figure 11 depicts the location of these switches with the power supplies removed, and the dipswitch settings.

These dipswitches are preset at the factory. Do not change the settings!

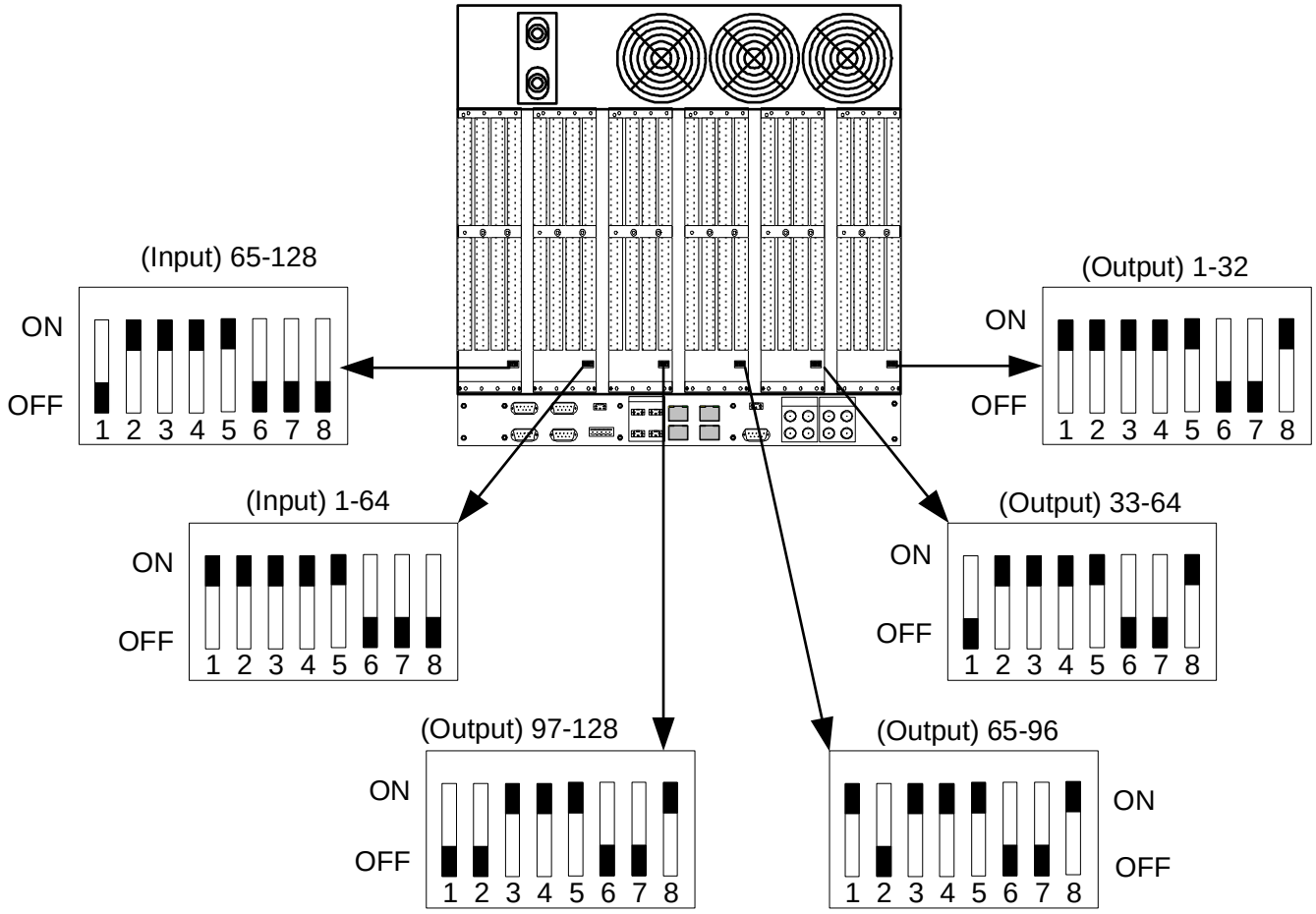


FIGURE 11: 128x128 Input/Output Backplane Dipswitch Locations and Settings (Viewed From the Rear of the Frame)

5.9 CHEETAH 128X128 CHASSIS MATRIX BACKPLANE DIPSWITCH LOCATIONS

The matrix backplane has one, eight-position, slide-style switch consisting of eight, single-pole single-throw (SPST) switches numbered 1 through 8. Figure 12 depicts the location of this switch with the matrix cards removed and the dipswitch settings.

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

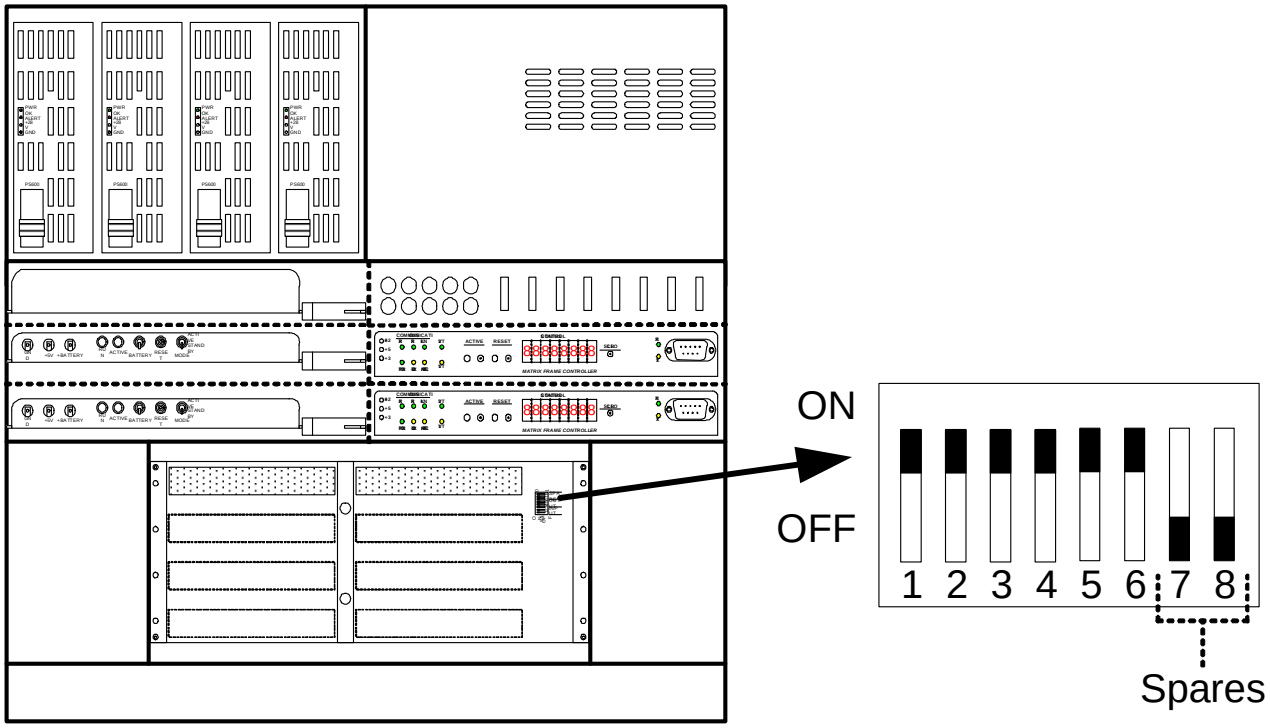


FIGURE 12: 128x128 Matrix Backplane Dipswitch Location And Settings (Viewed From The Front Of The Frame)

5.10 CHEETAH 128X128 CHASSIS SYSTEM CONNECTION LOCATIONS

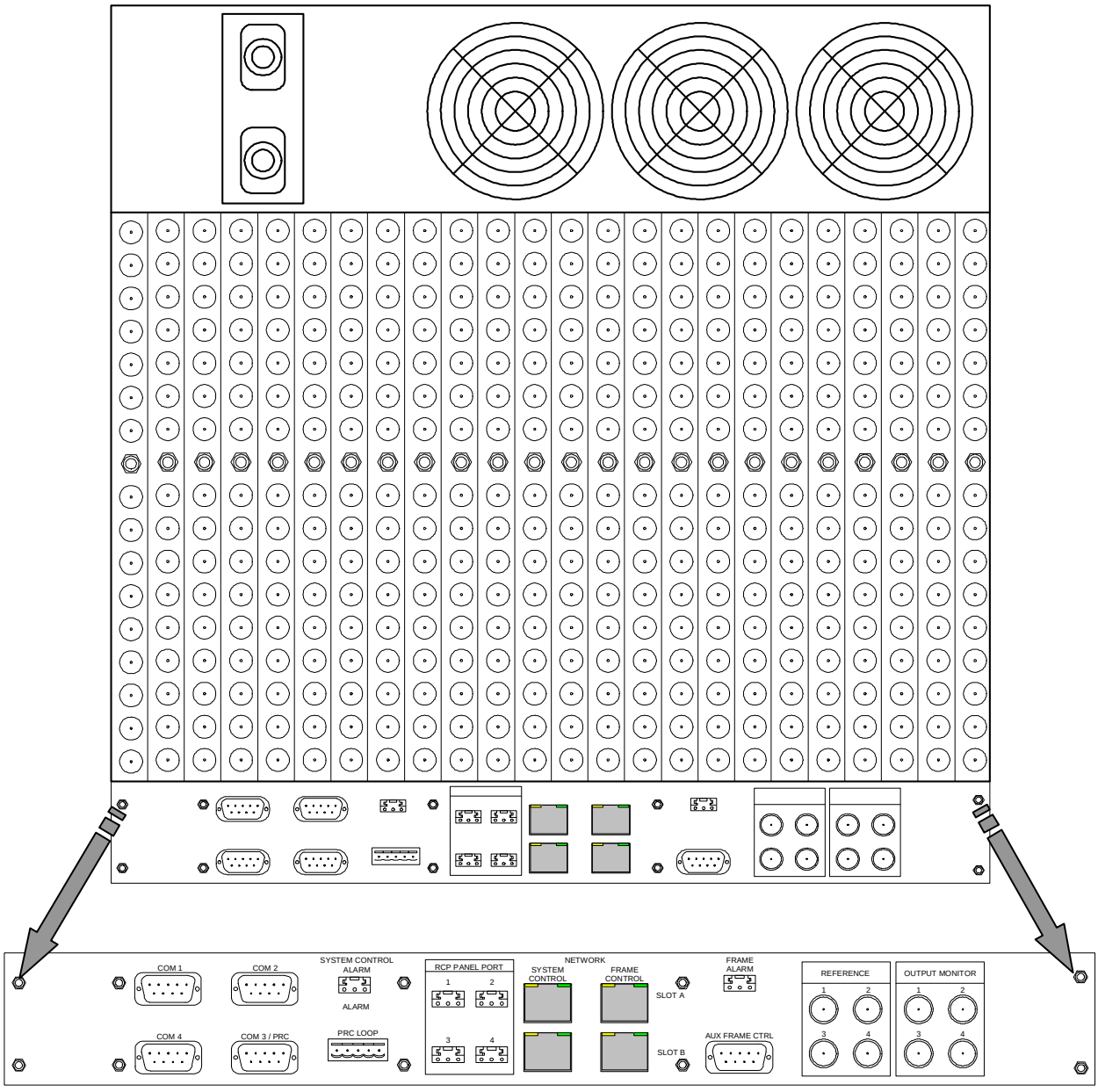


FIGURE 13: 128x128 Chassis System Interface Connector Panel

5.11 CHEETAH 128X128 CHASSIS INPUT/OUTPUT SIGNAL CONNECTORS

These Input/output (I/O) BNC coaxial connectors, located on the rear of the unit (refer to Section 5.12 for I/O locations) provide the input/output signal interface. 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.

Output modules include both HD/multi-rate and SDI output modules that consist of a single copper connection. However, daughter boards can be installed 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.

In the accompanying figures, the slots labeled with "Option" indicate either dual output or some other conversion-type slots. (For I/O card removal and installation, refer to Chapter 11.)

5.12 CHEETAH 128X128 CHASSIS FUSE LOCATIONS AND ASSIGNMENTS

There are eight, 30-amp, plug-in, auto-type fuses located inside the front of the frame as illustrated in Figure 14. Only three of these fuses provide over-current protection for the associated 64x64 matrix and I/O cards (see Figures 14 and 15) associated with this chassis.

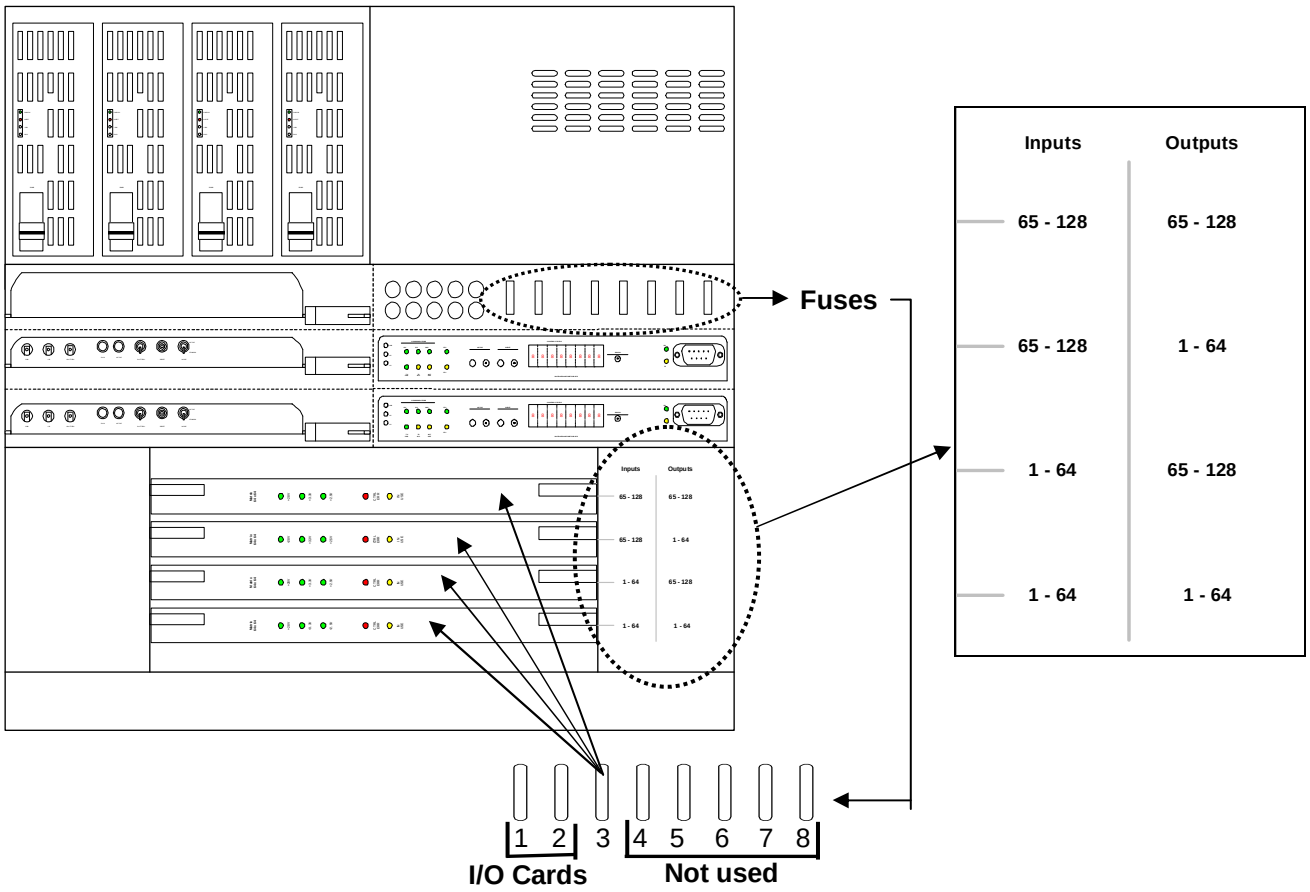


FIGURE 14: 128x128 Chassis Fuse Location and Fuse #3 Assignment

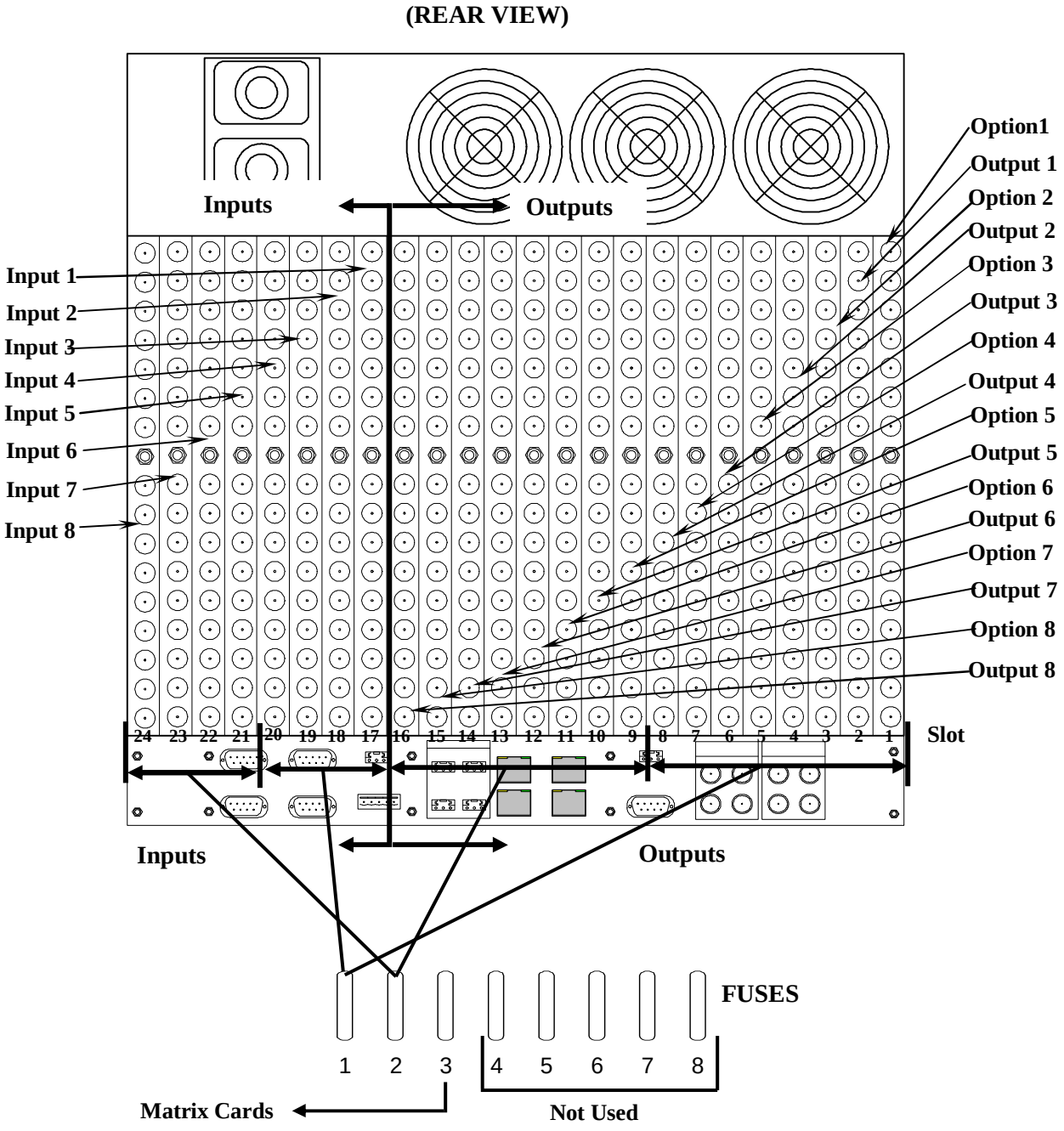


FIGURE 15: 128x128 Chassis Fuse Location and Fuse #2 & #3 Assignments

Chapter 6: Cheetah 256x256 Switcher

6.1 CHEETAH 256X256 PRODUCT AND COMPONENT DESCRIPTIONS

6.1.1 Cheetah 256x256 Frame Configuration Views

For the Cheetah 256x256 frame configuration, see Figures 16 and 17.

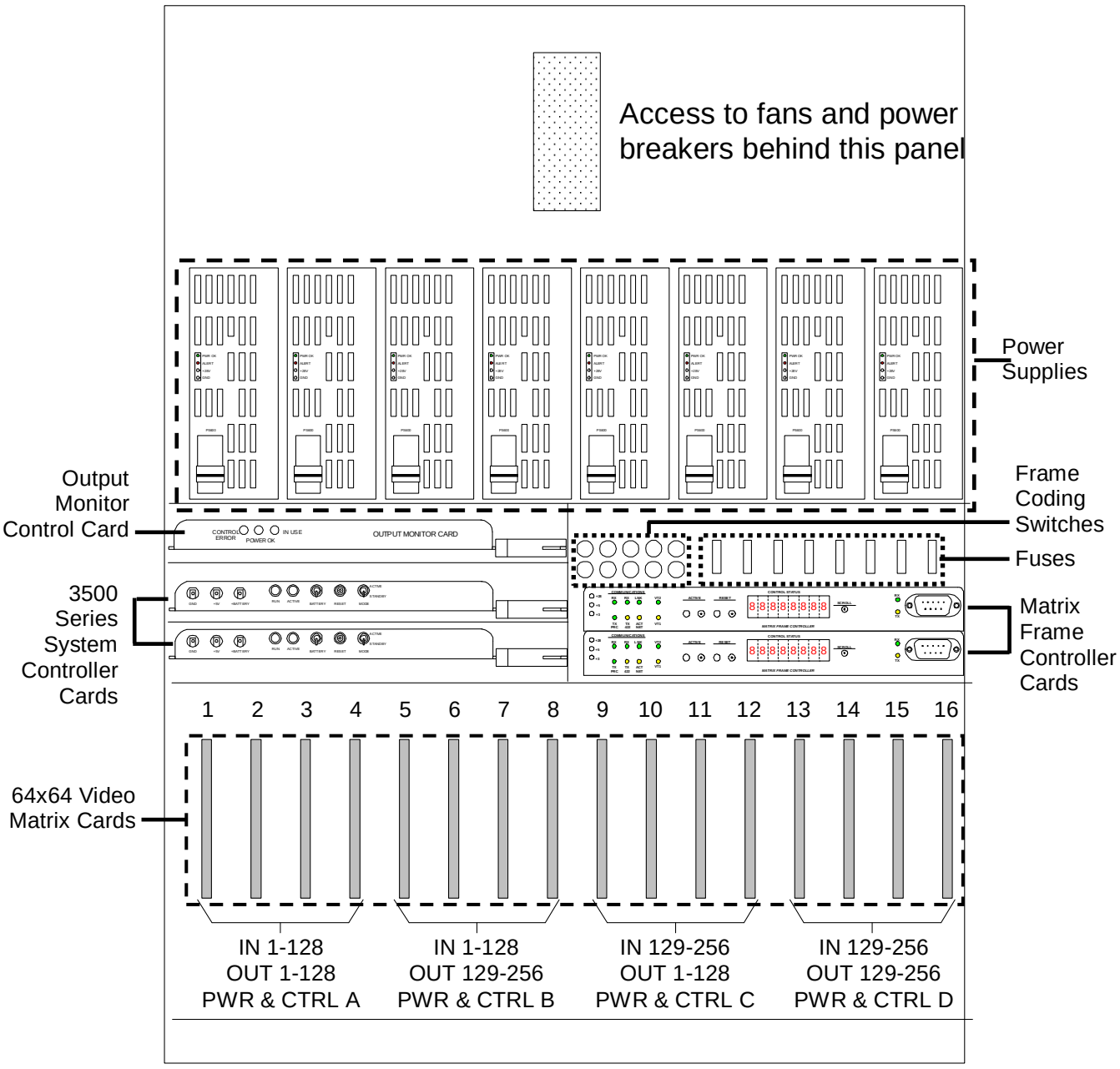


FIGURE 16: Cheetah 256x256 Front View

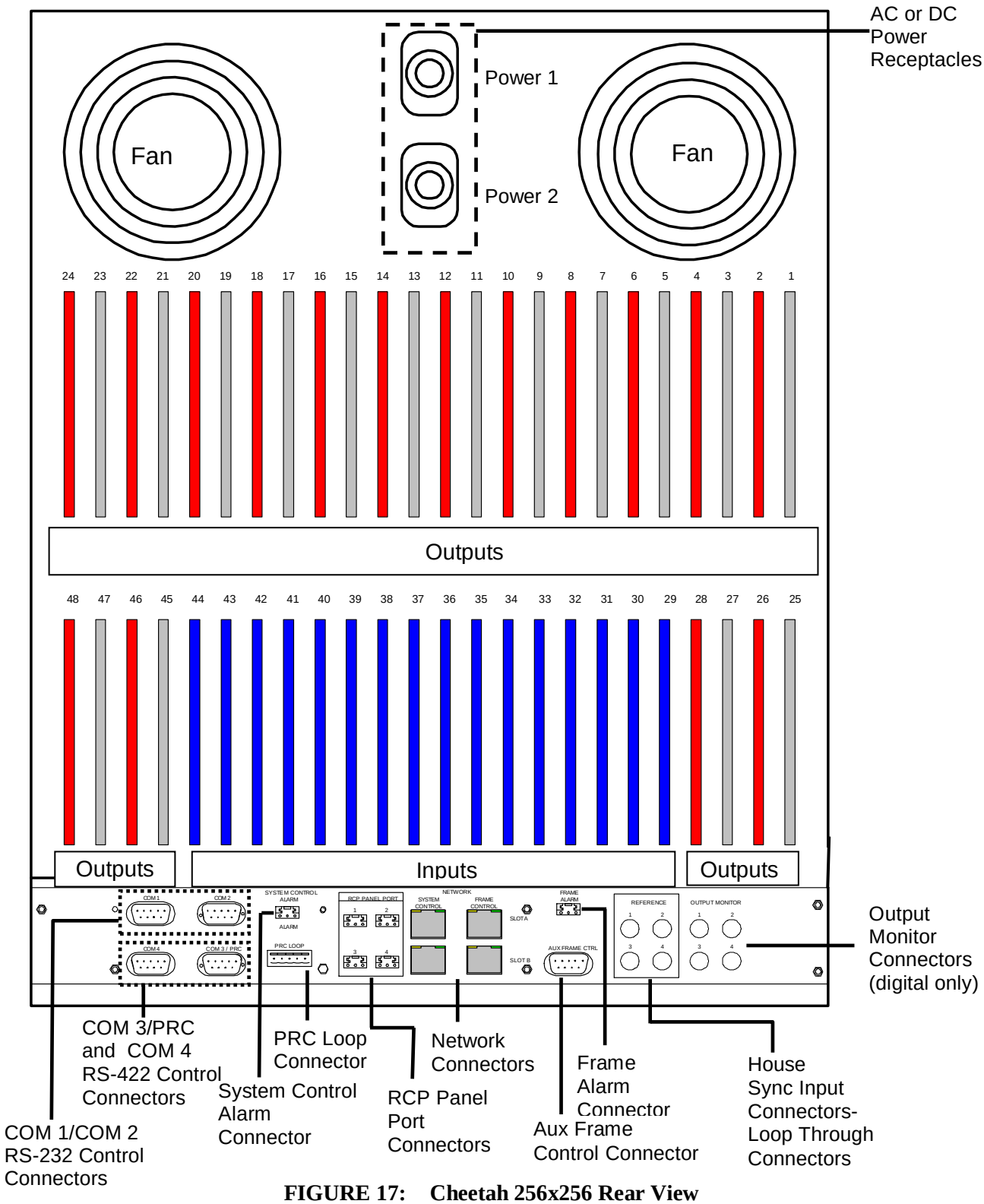


FIGURE 17: Cheetah 256x256 Rear View

6.1.2 Cheetah 256x256 Specifications

Physical

RUs 18
Height ..... 31.5"
Width ..... 19"
Depth ..... 23"
Weight ..... 275 lbs. (123.75 kg)
..... (May weigh less depending on the configuration)

Supply Power Requirements

Operating Voltages ..... 95-240VAC, 47-63 Hz
Power consumption ..... 2900W nominal
..... (Consumption can vary ±50% depending on configuration)

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: ..... 1.0 Mbps to 1.485 Gbps
Optical Input Wavelength ..... Single Mode, 1200 to 1600 nm
Input Power ..... -20 dBm (minimum)

Continued

Cheetah 256x256 Specifications (cont.)

Optical Signals (Fiber Optics) for Outputs (Transmitters)

Connector Type ..... SFF modules w/LC-type (fiber card)
Data Rates: ..... 1 Mbps to 1.485 Gbps
Optical Output Wavelength..... Single Mode, 1310 nm, ±20 nm
Output Power .....-11 dBm

Optical Loss Budget

10,000 km (minimum), Single Mode fiber w/2 optical couplings..... 9 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 256x256 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 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 256x256 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 o 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 256x256 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

6.1.3 Cheetah 256x256 Component Listing

Tables 8 and 9 include the equipment part numbers, descriptions, and the maximum quantities of each component that can comprise the Cheetah 256x256 product line.

NOTE	**The listed items in the following tables may be ordered in varying quantities. However, the listed quantities are the maximum number that can be used in this frame configuration. It must be noted that only 16 input cards, 16 output cards, and 16 output-option cards can be used in any 256x256 chassis I/O configuration.** **The I/O configuration for this chassis can be mixed (digital and analog). However, mixed configurations can become confusing and support may be needed. For mixed configuration support, contact *PESA Switching Systems, Inc.* - Customer Support.**

TABLE 8: Cheetah 256x256 Mainframe Component List

PART NUMBER	DESCRIPTION	Max. Qty (see note)
Standard Mainframe Components		
81-9065-2396-0	Mainframe Assembly:	1
81-9065-2381-0	Power Supply	8
81-9034-6904-0	Power Supply (blank)	7
81-9065-2397-0	Frame Controller Cards	2
81-9065-2328-0	Output Monitor Card *(Digital Only)*	1
(P/N determined by software inclusion)	3500 System Controller Cards	2
Matrix 64x64 Card(s)		
81-9065-2333-0	Matrix 64x64 *(Digital Configuration)*	16
81-9065-2334-0	Matrix 64x64 *(Analog Configuration)*	16
Miscellaneous Cards		
81-9065-2521-0	Analog Dummy Load Card*****	Dependent on Configuration
81-9065-2398-0	HD Dummy Load Card*****	Dependent on Configuration

*****: *Dependent on the specific configuration of the chassis and will be noted on the specification sheet that accompanies the equipment. Contact PESA Switching Systems, Inc: Customer Support for specific configuration details for these cards.*

TABLE 9: Cheetah 256x256 Digital and Analog Component List

PART NUMBER	DESCRIPTION	Max. Qty (see note)
Analog Input Cards		
81-9065-2495-0	Input Buffer Analog High Level BNC	16
81-9065-2432-0	Input Buffer Analog Video BNC	16
Analog Output Cards		
81-9065-2581-0	Input Expansion Buffer Analog High Level**	16
81-9065-2433-0	Output Combiner Analog High Level BNC	16
81-9065-2492-0	Output Option Analog Video BNC	16
81-9065-2493-0	Output Combiner Analog Video BNC	16
81-9065-2494-0	Output Option Analog High Level BNC	16
Digital and Fiber Input Cards		
81-9065-2612-0	Input Buffer Fiber Top Level	16
81-9065-2321-0	Input Buffer Card SD BNC	16
81-9065-2304-0	Input Buffer HD-MR BNC	16
Digital and Fiber Output Cards		
81-9065-2315-0	Output Combiner SD BNC	16
81-9065-2317-0	Dual Output Option BNC	16
81-9017-0370-0	DAC 10-Bit Plug-On Card	16
81-9065-2613-0	Output Option Fiber Top Level	16
81-9017-0376-0	Output Option HD to SD Converter BNC	16
81-9065-2322-0	Output Combiner HD-MR BNC	16
I/O Blanks		
81-9034-6844-0	Dual Output Option Blank	15
81-9034-6906-0	Output Blank	15
81-9034-6907-0	Input Blank	15

******: *When used, it is inserted next to an output card to expand an input configuration. Contact PESA Switching Systems, Inc.: Customer Support for specific configuration details for these cards.*

6.2 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.

6.3 GENERAL CHASSIS INSTALLATION OVERVIEW

The physical size of each Cheetah Series Switcher chassis is determined by the chassis input/output capabilities (i.e., the 64x64 chassis is the smallest while the 512x512 chassis* is 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.

*: The 1024x256 system utilizes the 512x512 chassis.

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.

6.4 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.

6.5 MOUNTING A CHEETAH 256X256 CHASSIS IN AN EQUIPMENT RACK

	**The weight of a fully loaded 256x256 chassis is 275 lbs nominal. 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 and the chassis breakers are in the OFF position before installing the specific frame into the rack.**
	**Fans that are mounted inside of 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, and power cables. 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. Detach the courtesy handles from each side of the chassis by removing the 12 screws that secure the handles to the sides of the chassis.

	**Due to the weight factor of this chassis, careful consideration should be exercised for the safe movement of the chassis into position within the rack and for the chassis stabilization requirement while mounting. It is strongly suggested to implement as many persons, jacks, blocks, etc., as possible to eliminate any unsafe condition that could result during the following mounting phase.**

3. Insert the chassis into the equipment rack and support the bottom of the chassis while the mounting hardware is being installed.
4. Install the bottom two chassis mounting screws.
5. Install the top two chassis mounting screws.
6. Install any remaining chassis mounting screws.
7. Tighten all of the chassis mounting screws until they are secure. Release/remove the support from the bottom of the chassis.

6.6 SETTING CHEETAH 256X256 CHASSIS LEVEL CODES (STROBES)

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 Table 10 on page 53. 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.**

6.6.1 Strobe Switch Locations

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

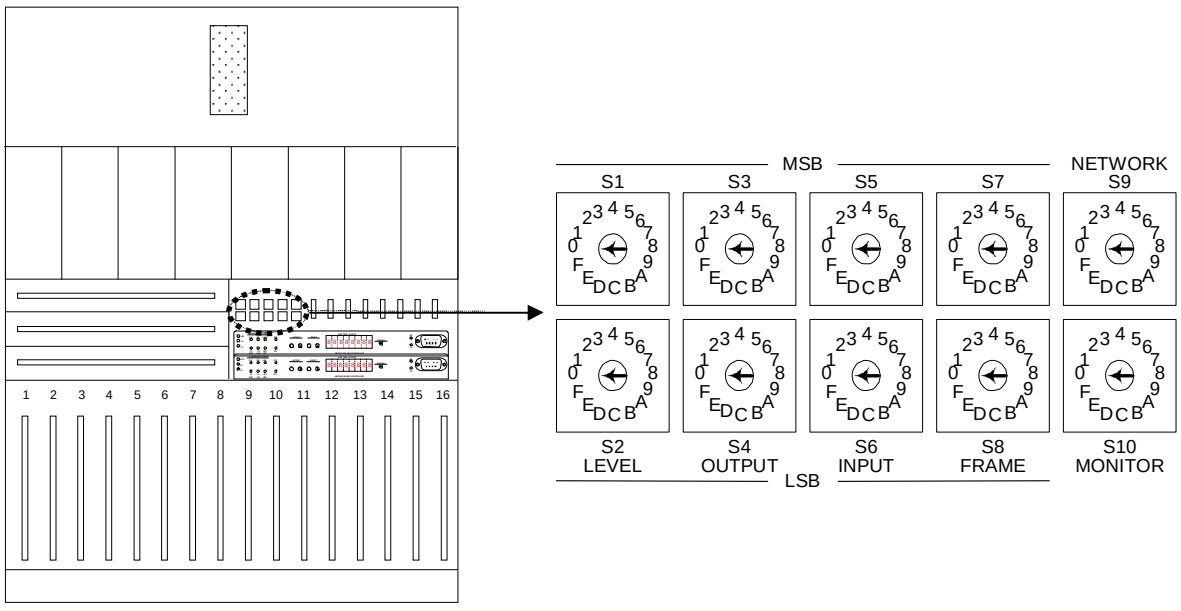


FIGURE 18: Cheetah 256x256 Chassis Strobe Switches Location (Front View)

6.6.2 Cheetah 256x256 Chassis Strobe Switch Functions

Table 10 describes the functions of the various strobe switches for the Cheetah systems:

TABLE 10: Strobe Switch Functions

Rotary Switch	Name	Description
S1	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	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	MSB Frame	Specifies the type of frame the boards are plugged into. For the Cheetah 256x256 frame, set LSB and MSB to 0.
S8	LSB Frame	
S9	Network (not used)	Not used.
S10	Monitor	Sets the starting output number. Each switch position increments the output number by 4. If you are not using this feature, leave the level code at zero. If you need to specify a monitor output, add 32 to the Level Code value. Use the resulting number for this setting.

6.7 CHEETAH 256X256 CHASSIS POWER SUPPLY BACKPLANE DIPSWITCH LOCATIONS

Each power supply backplane supports two power supplies. Each power supply backplane has one, eight-position, slide-style switch consisting of eight single-pole single-throw (SPST) switches numbered 1 through 8. Each power supply backplane supports two power supplies. Figure 19 depicts the location of these switches and the dipswitch settings.

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

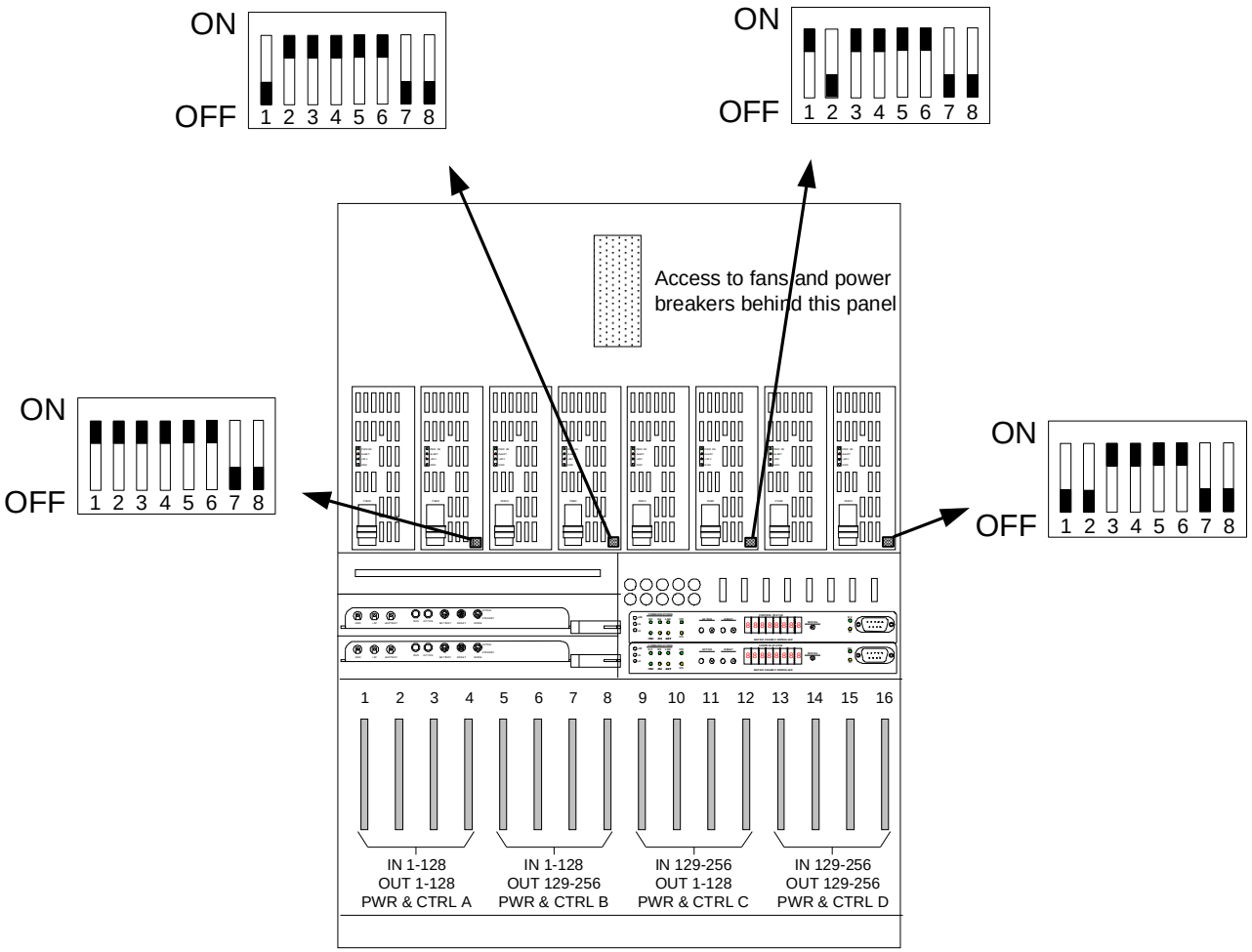
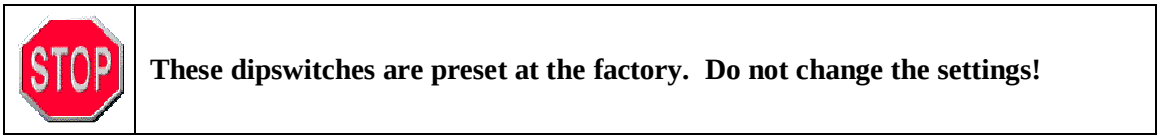


FIGURE 19: 256x256 Power Supply Backplane Dipswitch Locations And Settings (Viewed From the Front of the Frame)

6.8 CHEETAH 256X256 CHASSIS INPUT/OUTPUT BACKPLANE DIPSWITCH LOCATIONS

Each input/output backplane has one, eight-position, slide-style switch consisting of eight single-pole single-throw (SPST) switches numbered 1 through 8. Figure 20 depicts the location of these switches with the power supplies removed and the dipswitch settings.



These dipswitches are preset at the factory. Do not change the settings!

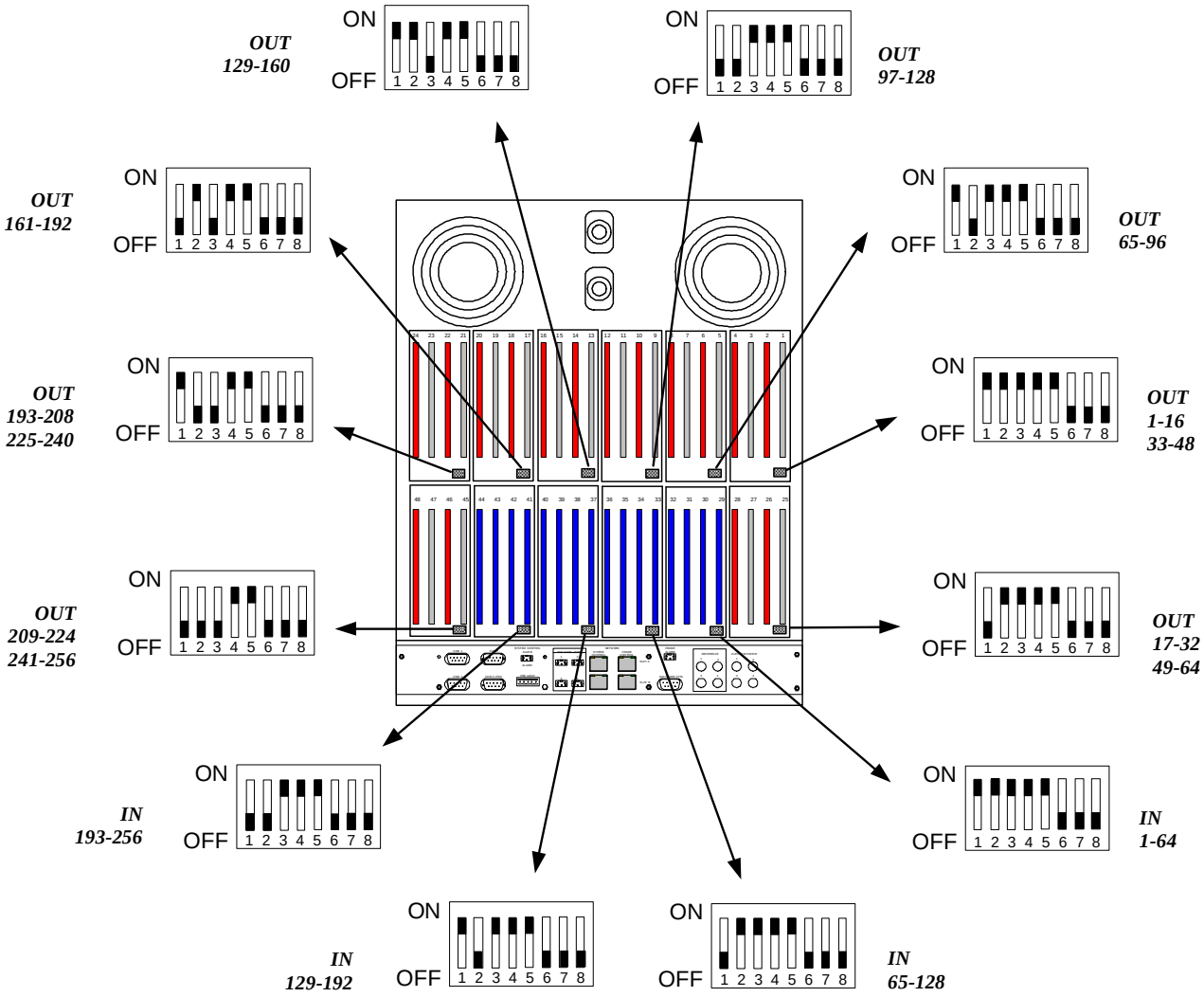


FIGURE 20: 256x256 Input/Output Backplane Dipswitch Locations And Settings (Viewed From The Rear Of The Frame)

6.9 CHEETAH 256X256 CHASSIS MATRIX BACKPLANE DIPSWITCH LOCATIONS

Each matrix backplane has one, eight-position, slide-style switch consisting of eight, single-pole single-throw (SPST) switches that are numbered 1 through 8. Figure 21 depicts the location of this switch with the matrix cards removed, and the dipswitch settings.

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

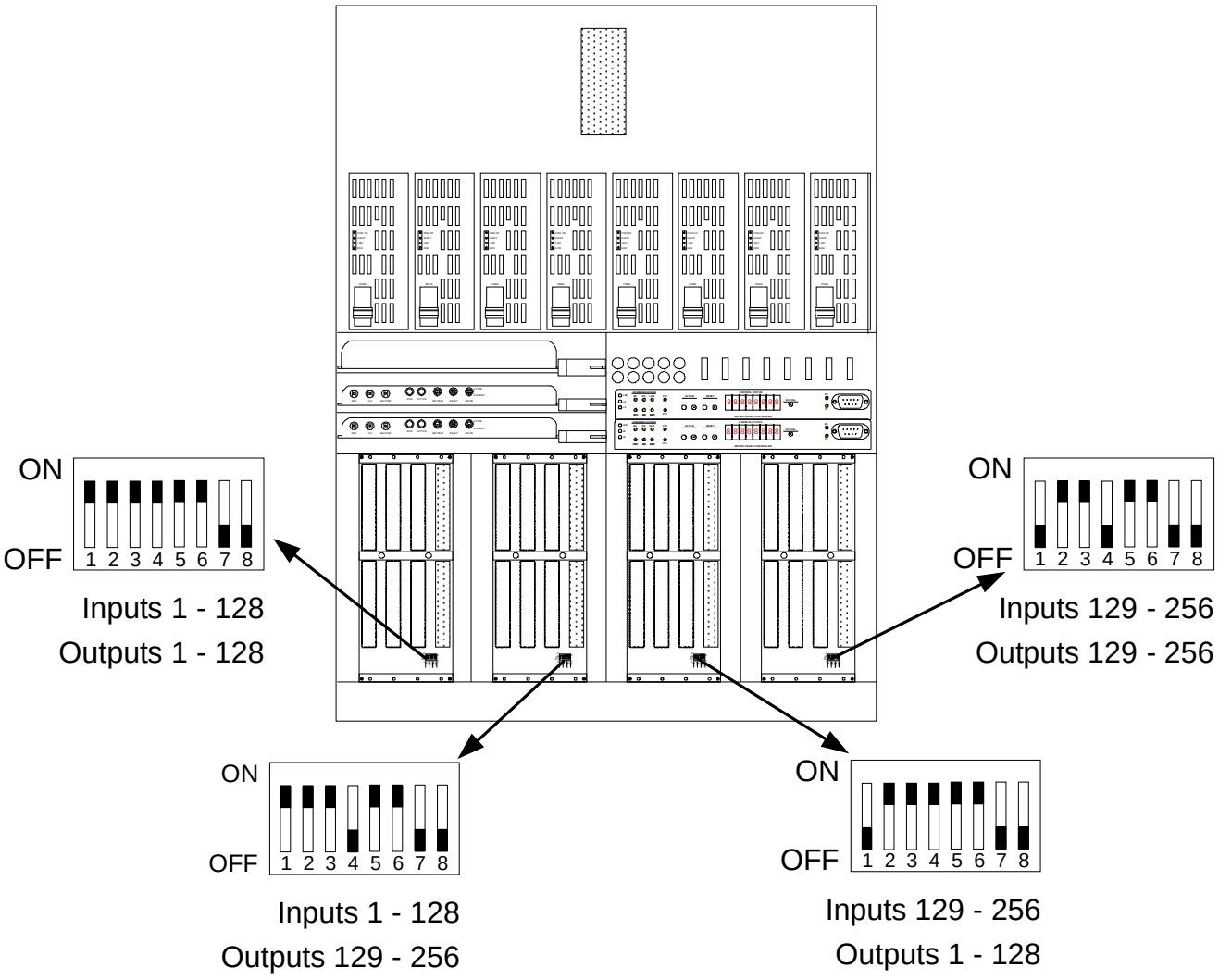


FIGURE 21: 256x256 Matrix Backplane Dipswitch Location And Settings (Viewed From The Front Of The Frame)

6.10 CHEETAH 256X256 CHASSIS SYSTEM CONNECTION LOCATIONS

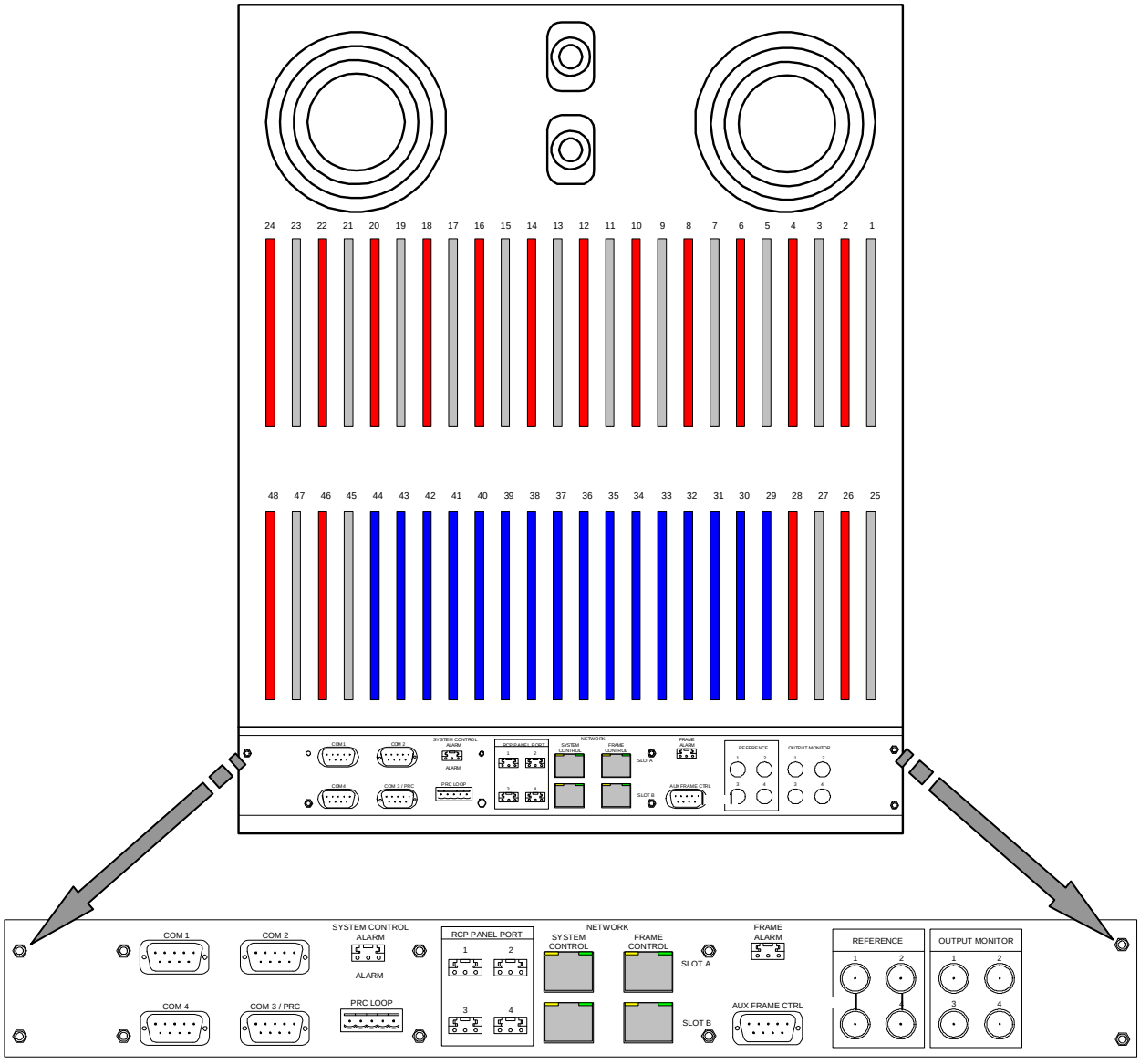


FIGURE 22: 256x256 Chassis System Interface Connector Panel (Rear View)

6.11 CHEETAH 256X256 CHASSIS INPUT/OUTPUT SIGNAL CONNECTORS

These Input/output (I/O) BNC coaxial connectors, located on the rear of the unit (refer to Section 6.12 for I/O locations) provide the input/output signal interface. 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.

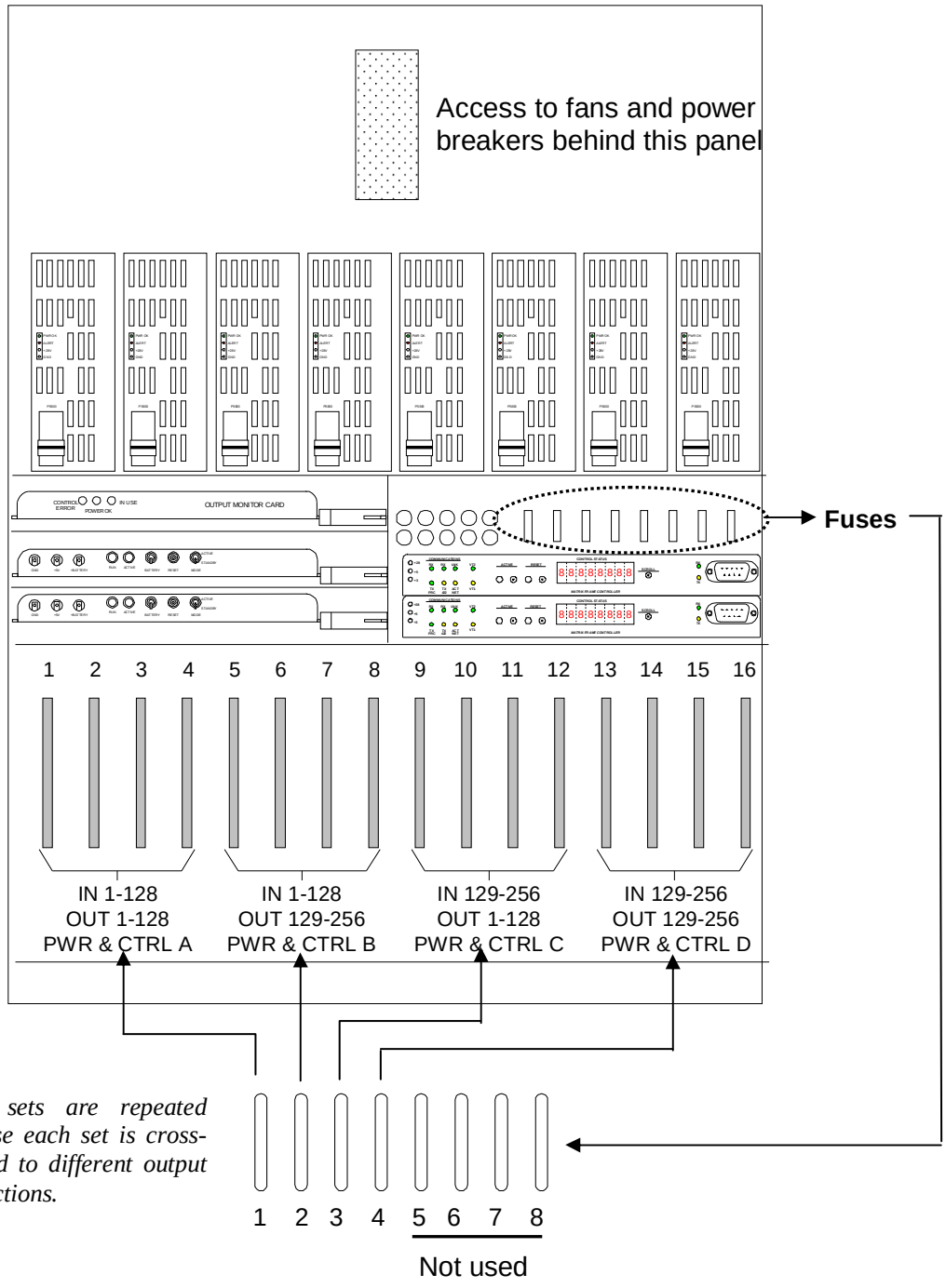
Output modules include both HD/multi-rate and SDI output modules that consist of a single copper connection. However, daughter boards can be installed to provide a second output per bus. The second output can be either copper or fiber (single mode or multi-mode). For SDI applications, a DAC monitor grade, 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.

For I/O card removal and installation, refer to Chapter 11.

In the accompanying figures, the slots labeled “Option” indicate either dual output or some other conversion-type slots.

6.12 CHEETAH 256X256 CHASSIS FUSE LOCATIONS AND ASSIGNMENTS

Eight 30-amp, plug-in, auto-type fuses are located inside the front of the frame as illustrated in the Figures 23 through 25 that provide over-current protection for the associated 64x64 matrix cards.



NOTE: *Input sets are repeated because each set is cross-pointed to different output connections.*

FIGURE 23: 256x256 Fuse Location And Position Assignments

The following graphic illustrates the filter and power distribution on the Cheetah.

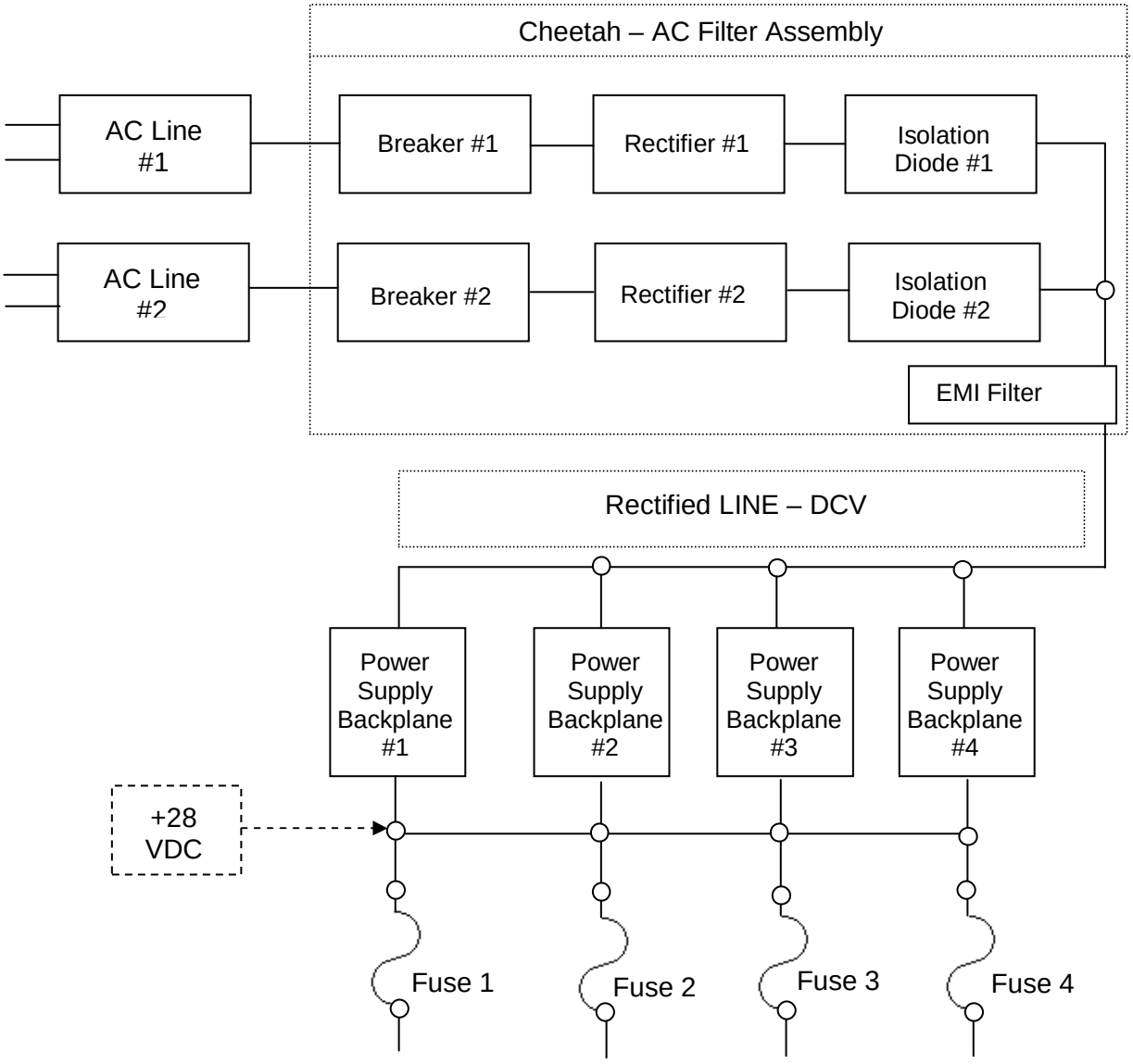


FIGURE 24: 256x256 Filter And Power Distribution

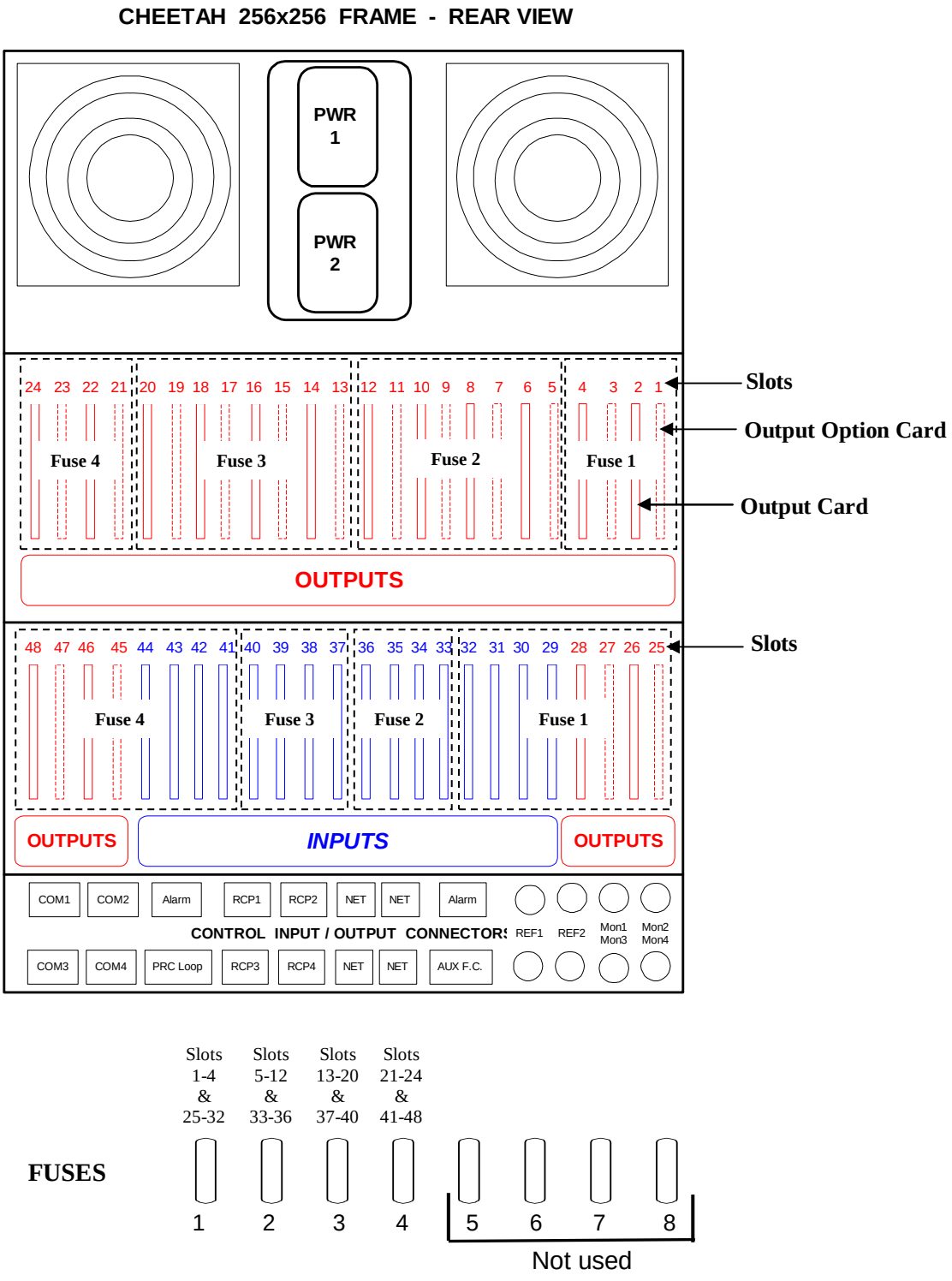


FIGURE 25: 256x256 Fuses For The Input And Output Boards

Chapter 7: Cheetah 256x448 Switcher

7.1 CHEETAH 256X448 PRODUCT AND COMPONENT DESCRIPTIONS

7.1.1 Cheetah 256x448 Frame Configuration Views

For the Cheetah 256x448 frame configuration, see Figures 26 and 27

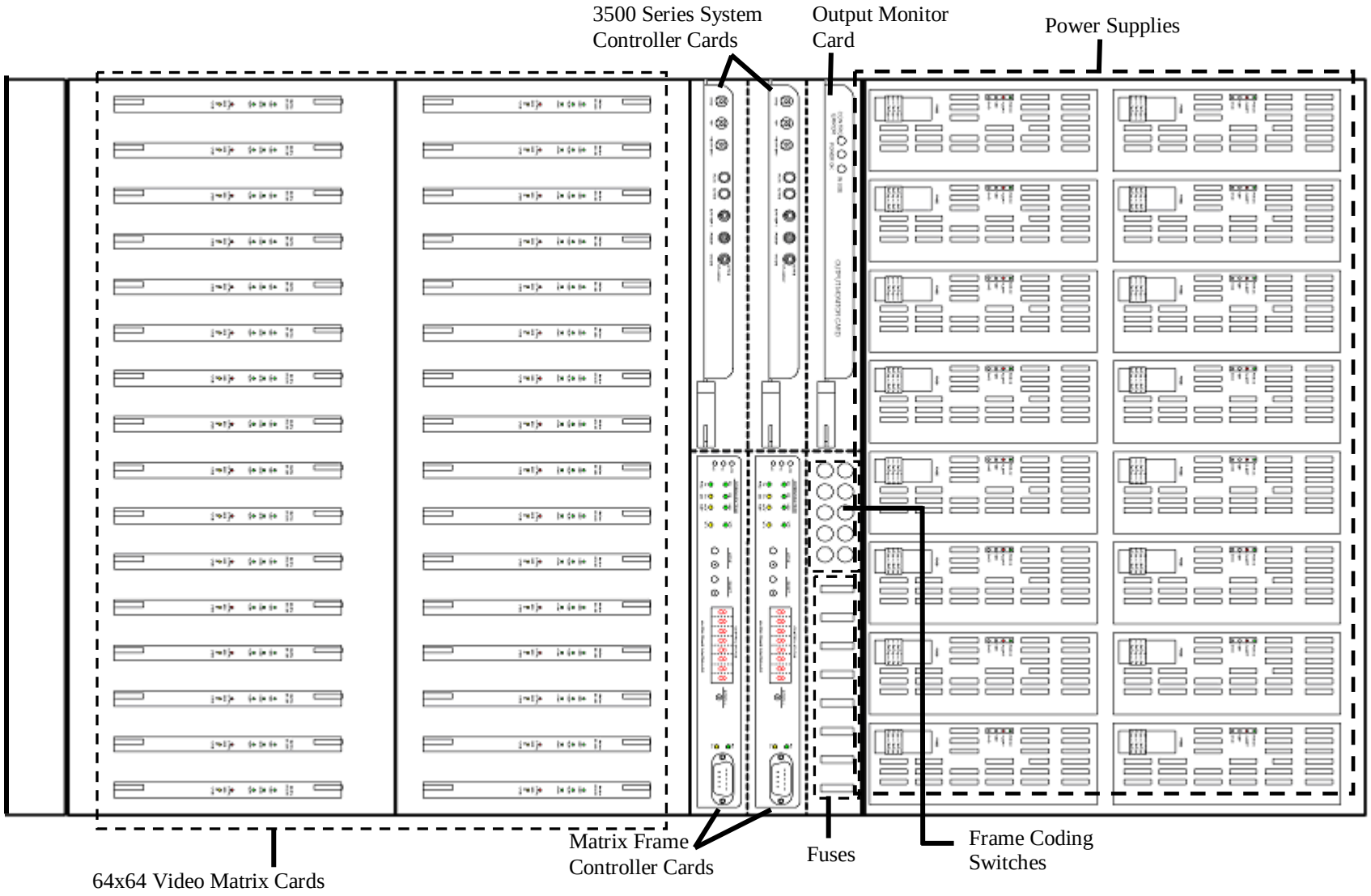


FIGURE 26: 256x448 Front View

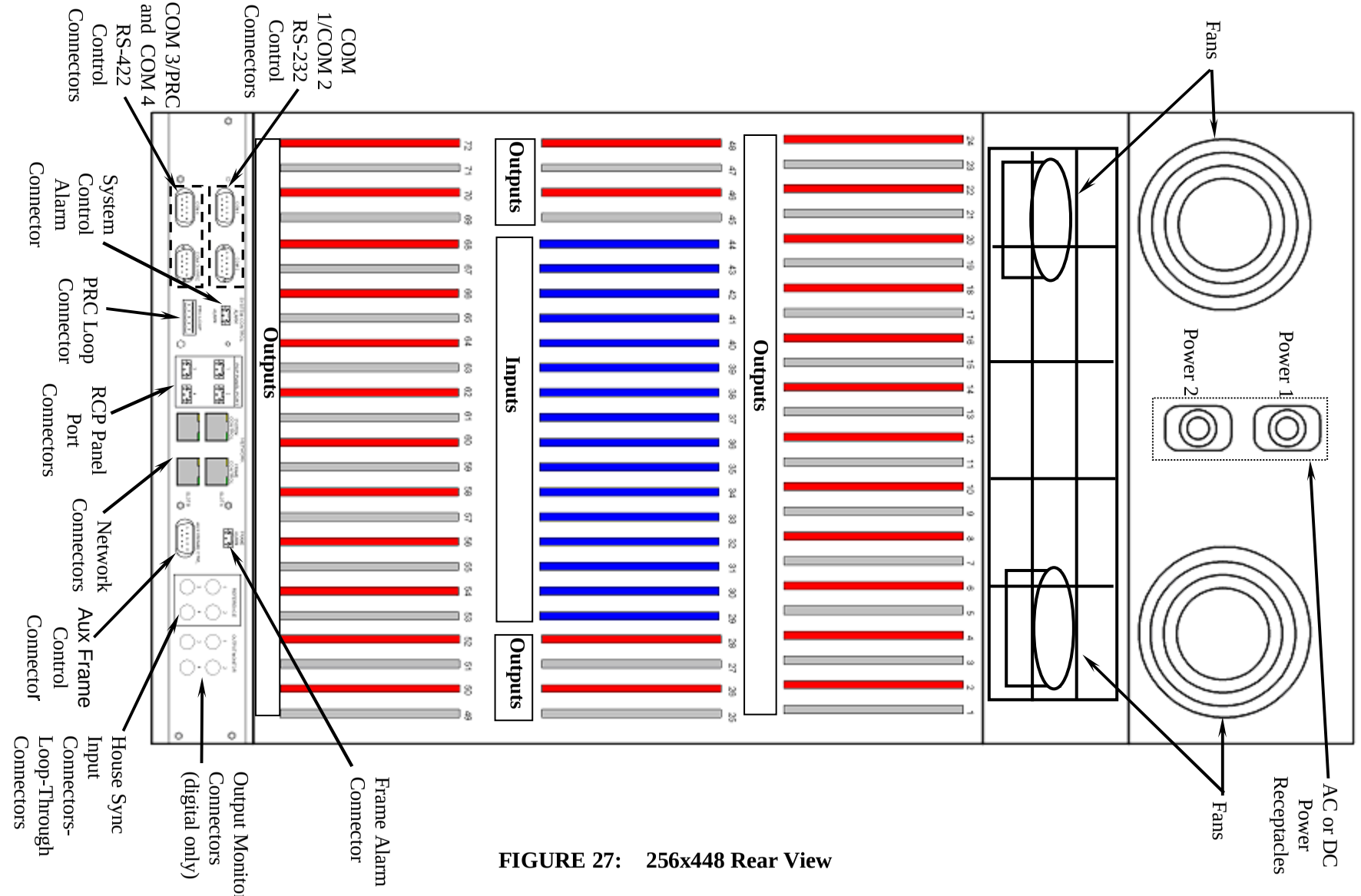


FIGURE 27: 256x448 Rear View

7.1.2 Cheetah 256x448 Specifications

Physical

RUs 27
Height ..... 47.25"
Width ..... 19"
Depth ..... 23"
Weight ..... 425 lbs. (281.25 kg) nominal
..... (May weigh less depending on configuration)

Supply Power Requirements

Operating voltage ..... 95-240 VAC, 47-63 Hz
Power consumption ..... 6000W nominal
..... (Consumption can vary ± 50% depending on configuration)

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: ..... 1.0 Mbps to 1.485 Gbps
Optical Input Wavelength ..... Single Mode, 1200 to 1600 nm
Input Power ..... -20 dBm (minimum)

Continued

Cheetah 256x448 Specifications (cont.)

Optical Signals (Fiber Optics) for Outputs (Transmitters)

Connector Type ..... SFF modules w/LC-type (fiber card)
Data Rates: ..... 1 Mbps to 1.485 Gbps
Optical Output Wavelength..... Single Mode, 1310 nm, ±20 nm
Output Power .....-11 dBm

Optical Loss Budget

10,000 km (minimum), Single Mode fiber w/2 optical couplings..... 9 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 256x448 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 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 256x448 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 o 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 256x448 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

7.1.3 Cheetah 256x448 Component Listing

Tables 11 and 12 include the equipment part numbers, descriptions, and the maximum quantities of each component that can comprise the Cheetah 256x448 product line.

NOTE	**The listed items in the following tables may be ordered in varying quantities. However, the listed quantities are the maximum number that can be used in this frame configuration. It must be noted that only 16 input cards, 28 output cards, and 28 output-option cards can be used in any 256x448 chassis I/O configuration.** **The I/O configuration for this chassis can be mixed (digital and analog). However, mixed configurations can become confusing and support may be needed. For mixed configuration support, contact *PESA Switching Systems, Inc.* Customer Support.**

TABLE 11: Cheetah 256x448 Mainframe Component List

PART NUMBER	DESCRIPTION	Max. Qty (see note)
Standard Mainframe Components		
81-9065-2396-0	Mainframe Assembly:	1
81-9065-2381-0	Power Supply	8
81-9034-6904-0	Power Supply (blank)	7
81-9065-2397-0	Frame Controller Cards	2
81-9065-2328-0	Output Monitor Card *(Digital Only)*	1
(P/N determined by software inclusion)	3500 System Controller Cards	2
Matrix 64x64 Cards		
81-9065-2333-0	Matrix 64x64 *(Digital Configuration)*	32
81-9065-2334-0	Matrix 64x64 *(Analog Configuration)*	32
Miscellaneous Cards		
81-9065-2521-0	Analog Dummy Load Card*****	Dependent on Configuration
81-9065-2398-0	HD Dummy Load Card*****	Dependent on Configuration

*******: *Dependent on the specific configuration of the chassis and will be noted on the specification sheet that accompanies the equipment. Contact PESA Switching Systems, Inc: Customer Support for specific configuration details for these cards.*

TABLE 12: Cheetah 256x448 Digital and Analog Component List

PART NUMBER	DESCRIPTION	Max. Qty (see note)
Analog Input Cards		
81-9065-2495-0	Input Buffer Analog High Level BNC	16
81-9065-2432-0	Input Buffer Analog Video BNC	16
Analog Output Cards		
81-9065-2581-0	Input Expansion Buffer Analog High Level**	16
81-9065-2433-0	Output Combiner Analog High Level BNC	28
81-9065-2492-0	Output Option Analog Video BNC	28
81-9065-2493-0	Output Combiner Analog Video BNC	28
81-9065-2494-0	Output Option Analog High Level BNC	28
Digital and Fiber Input Cards		
81-9065-2612-0	Input Buffer Fiber Top Level	16
81-9065-2321-0	Input Buffer Card SD BNC	16
81-9065-2304-0	Input Buffer HD-MR BNC	16
Digital and Fiber Output Cards		
81-9065-2315-0	Output Combiner SD BNC	28
81-9065-2317-0	Dual Output Option BNC	28
81-9017-0370-0	DAC 10-Bit Plug-On Card	28
81-9065-2613-0	Output Option Fiber Top Level	28
81-9017-0376-0	Output Option HD to SD Converter BNC	28
81-9065-2322-0	Output Combiner HD-MR BNC	28
I/O Blanks		
81-9034-6844-0	Dual Output Option Blank	27
81-9034-6906-0	Output Blank	27
81-9034-6907-0	Input Blank	15

******: *When used, it is inserted next to an output card to expand an input configuration. Contact PESA Switching Systems, Inc.: Customer Support for specific configuration details for these cards.*

7.2 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.

7.3 GENERAL CHASSIS INSTALLATION OVERVIEW

The physical size of each Cheetah Series Switcher chassis is determined by the chassis input/output capabilities (i.e., the 64x64 chassis is the smallest while the 512x512 chassis* is 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.

*: The 1024x256 system utilizes the 512x512 chassis.

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.

7.4 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.

7.5 MOUNTING A CHEETAH 256X448 CHASSIS IN AN EQUIPMENT RACK

	**The weight of a fully loaded 256x448 chassis is 425 lbs nominal. 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 and the chassis breakers are in the OFF position before installing the specific frame into the rack.**
	**Fans that are mounted inside of 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, and power cables. 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. Detach the courtesy handles from each side of the chassis by removing the 12 screws that secure the handles to the sides of the chassis.

	**Due to the weight factor of this chassis, careful consideration should be exercised for the safe movement of the chassis into position within the rack and for the chassis stabilization requirement while mounting. It is strongly suggested to implement as many persons, jacks, blocks, etc., as possible to eliminate any unsafe condition that could result during the following mounting phase.**

3. Insert the chassis into the equipment rack and support the bottom of the chassis while the mounting hardware is being installed.
4. Install the bottom two chassis mounting screws.
5. Install the top two chassis mounting screws.
6. Install any remaining chassis mounting screws.
7. Tighten all of the chassis mounting screws until they are secure. Release/remove the support from the bottom of the chassis.

7.6 SETTING CHEETAH 256X448 CHASSIS LEVEL CODES (STROBES)

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, Table 13 on page 75. 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.**

7.6.1 Cheetah 256x448 Chassis Strobe Switches Location

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

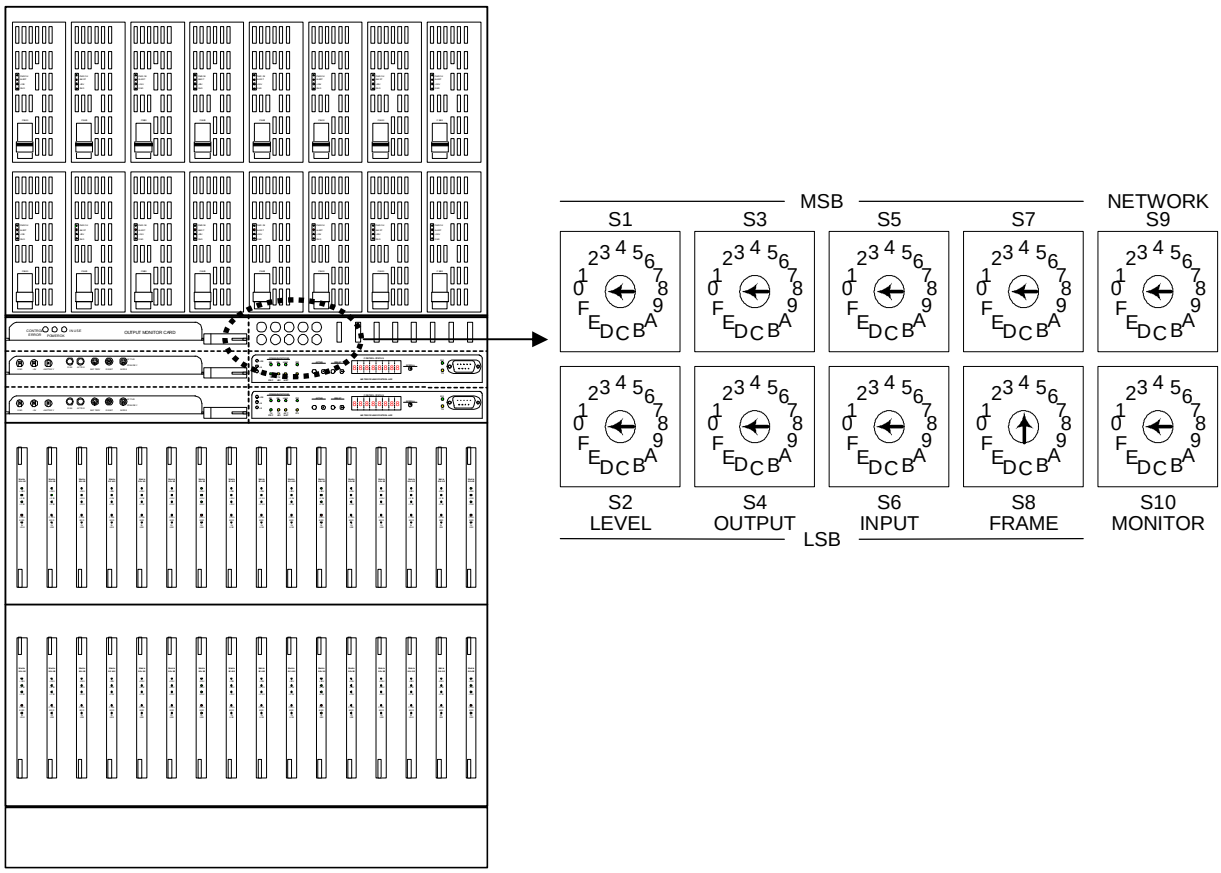


FIGURE 28: Cheetah 256x448 Chassis Strobe Switches Location (Front View)

7.6.2 Cheetah 256x448 Chassis Strobe Switch Functions

Table 13 describes the functions of the various strobe switches for the Cheetah systems:

TABLE 13: Strobe Switch Functions

Rotary Switch	Name	Description
S1	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	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	MSB Frame	Specifies the type of frame the boards are plugged into. For the Cheetah 256x448 frame, set LSB to 4 and MSB to 0.
S8	LSB Frame	
S9	Network (not used)	Not used.
S10	Monitor	Sets the starting output number. Each switch position increments the output number by 4. If you are not using this feature, leave the level code at zero. If you need to specify a monitor output, add 32 to the Level Code value. Use the resulting number for this setting.

7.7 256X448 CHASSIS POWER SUPPLY BACKPLANE DIPSWITCH LOCATIONS

Each power supply backplane has one, eight-position, slide-style switch consisting of eight single-pole single-throw (SPST) switches numbered 1 through 8. Each power supply backplane supports two power supplies. Figure 29 depicts the location of these switches and the dipswitch settings.

These dipswitches are preset at the factory. Do not change the settings!

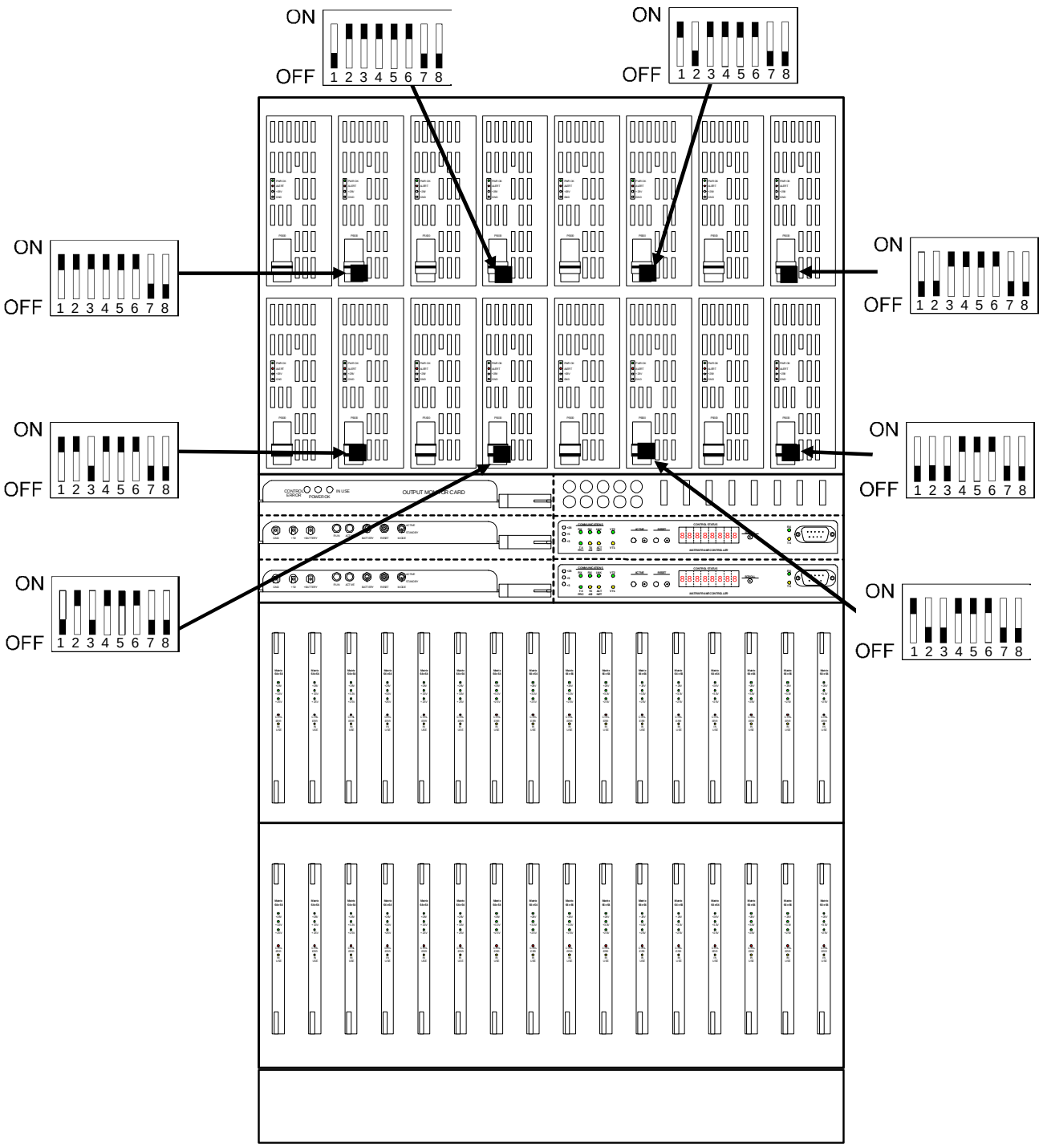


FIGURE 29: 256x448 Power Supply Backplane Dipswitch Locations And Settings (Viewed From The Front Of The Frame)

7.8 256X448 CHASSIS INPUT/OUTPUT BACKPLANE DIPSWITCH LOCATIONS

Each input/output backplane has one, eight-position, slide-style switch consisting of eight single-pole single-throw (SPST) switches numbered 1 through 8. Each input/output backplane supports 4 cards. Figure 30 depicts the location of these switches with the cards removed, and the dipswitch settings.

These dipswitches are preset at the factory. Do not change the settings!

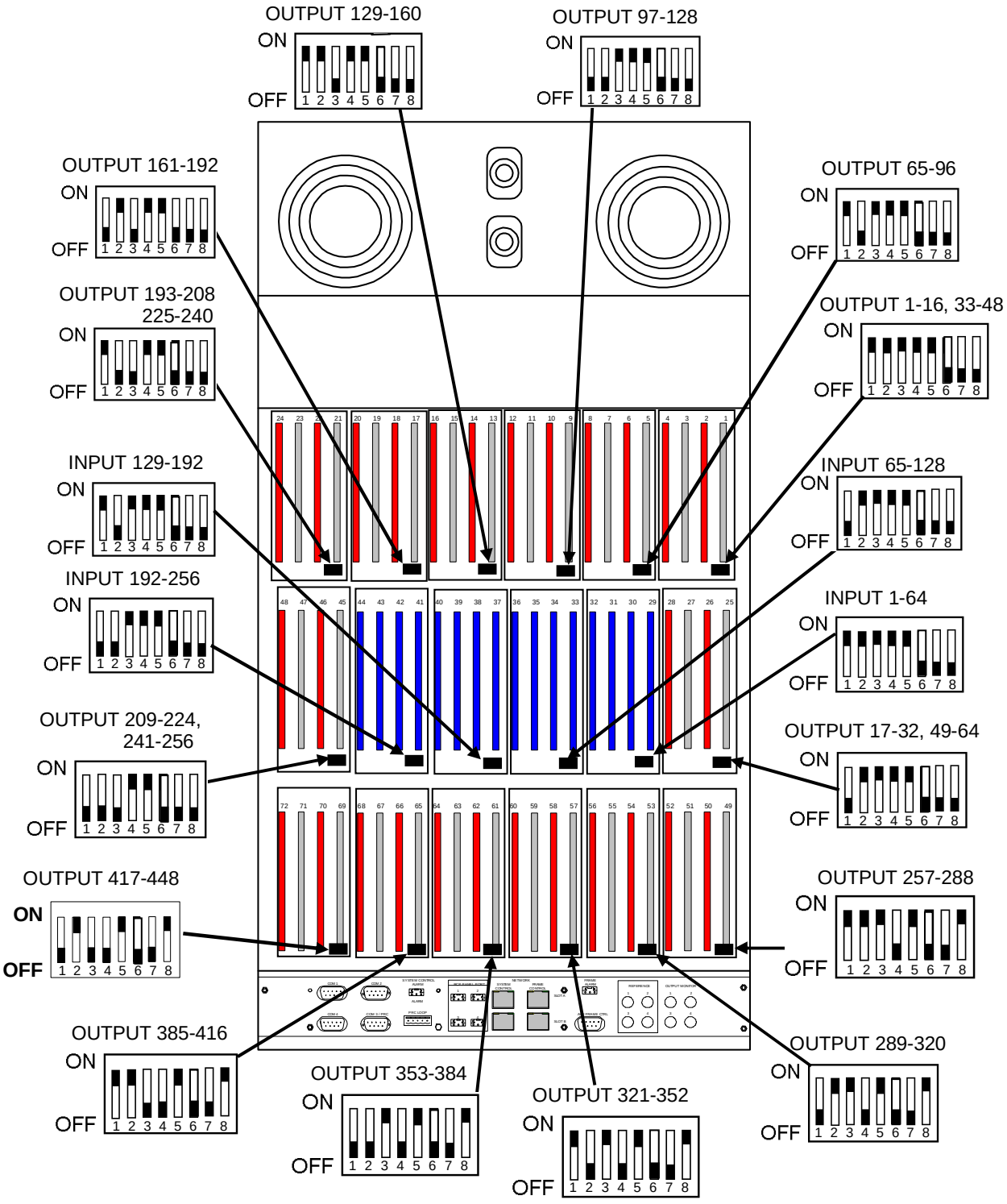


FIGURE 30: 256x448 Input/Output Backplane Dipswitch Locations And Settings (Viewed From The Rear Of The Frame)

7.9 CHEETAH 256X448 CHASSIS MATRIX BACKPLANE DIPSWITCH LOCATIONS

Each matrix backplane has one, eight-position, slide-style switch consisting of eight, single-pole single-throw (SPST) switches numbered 1 through 8. Each backplane supports 4 cards. Figure 31 depicts the location of this switch with the matrix cards removed, and the dipswitch settings.

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

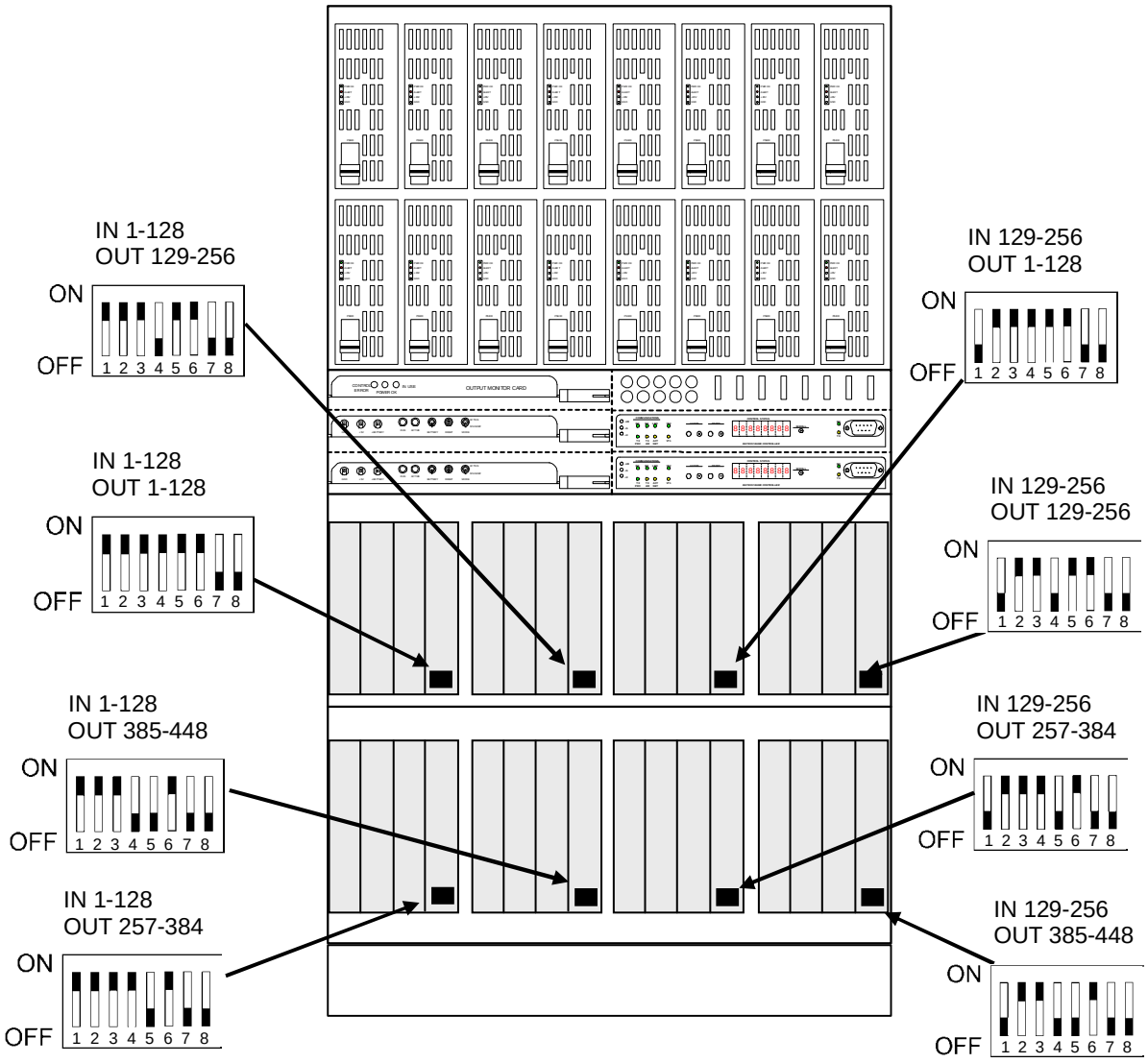


FIGURE 31: 256x448 Matrix Backplane Dipswitch Location and Settings

7.10 CHEETAH 256X448 CHASSIS SYSTEM CONNECTION LOCATIONS

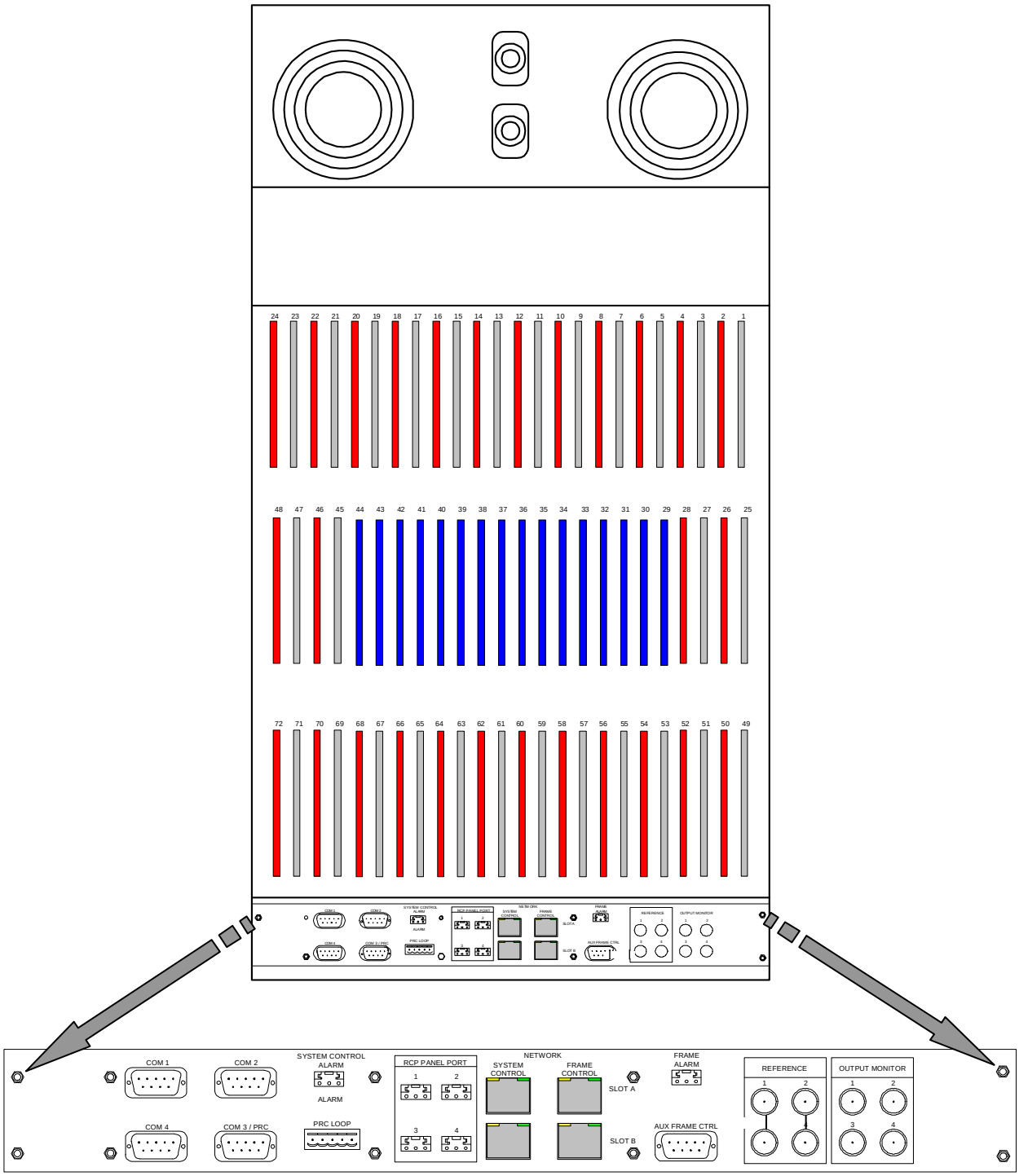


FIGURE 32: 256x448 Chassis System Interface Connector Panel (Rear View)

7.11 CHEETAH 256X448 CHASSIS INPUT/OUTPUT SIGNAL CONNECTORS

These Input/output (I/O) BNC coaxial connectors, located on the rear of the unit (refer to Section 7.12 for I/O locations) provide the input/output signal interface. 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.

Output modules include both HD/multi-rate and SDI output modules that consist of a single copper connection. However, daughter boards can be installed 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.

For I/O card removal and installation, refer to Chapter 11.

7.12 CHEETAH 256X448 CHASSIS FUSE LOCATIONS AND ASSIGNMENTS

Eight, 30-amp, plug-in, auto-type fuses are located inside the front of the frame as illustrated in Figure 33 that provide over-current protection for the associated 64x64 matrix cards. Additionally, the fuses provide protection for the I/O boards in blocks of 64.

In the accompanying figures, the slots labeled "Option" indicate either dual output or some other conversion-type slots.

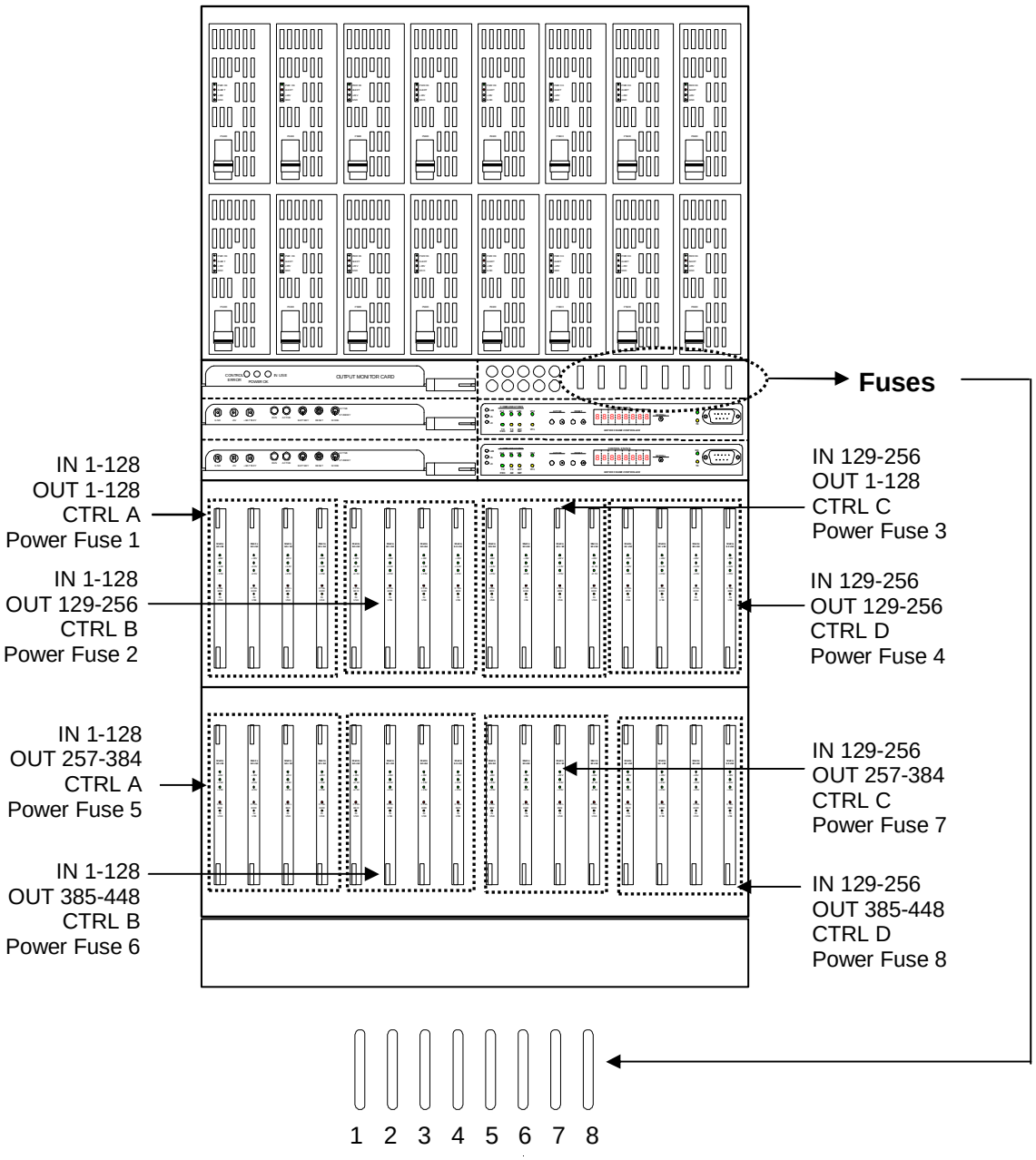


FIGURE 33: 256x448 Fuse Location And Fuse Protection

Figure 34 illustrates the filter and power distribution for the Cheetah 256X448 chassis.

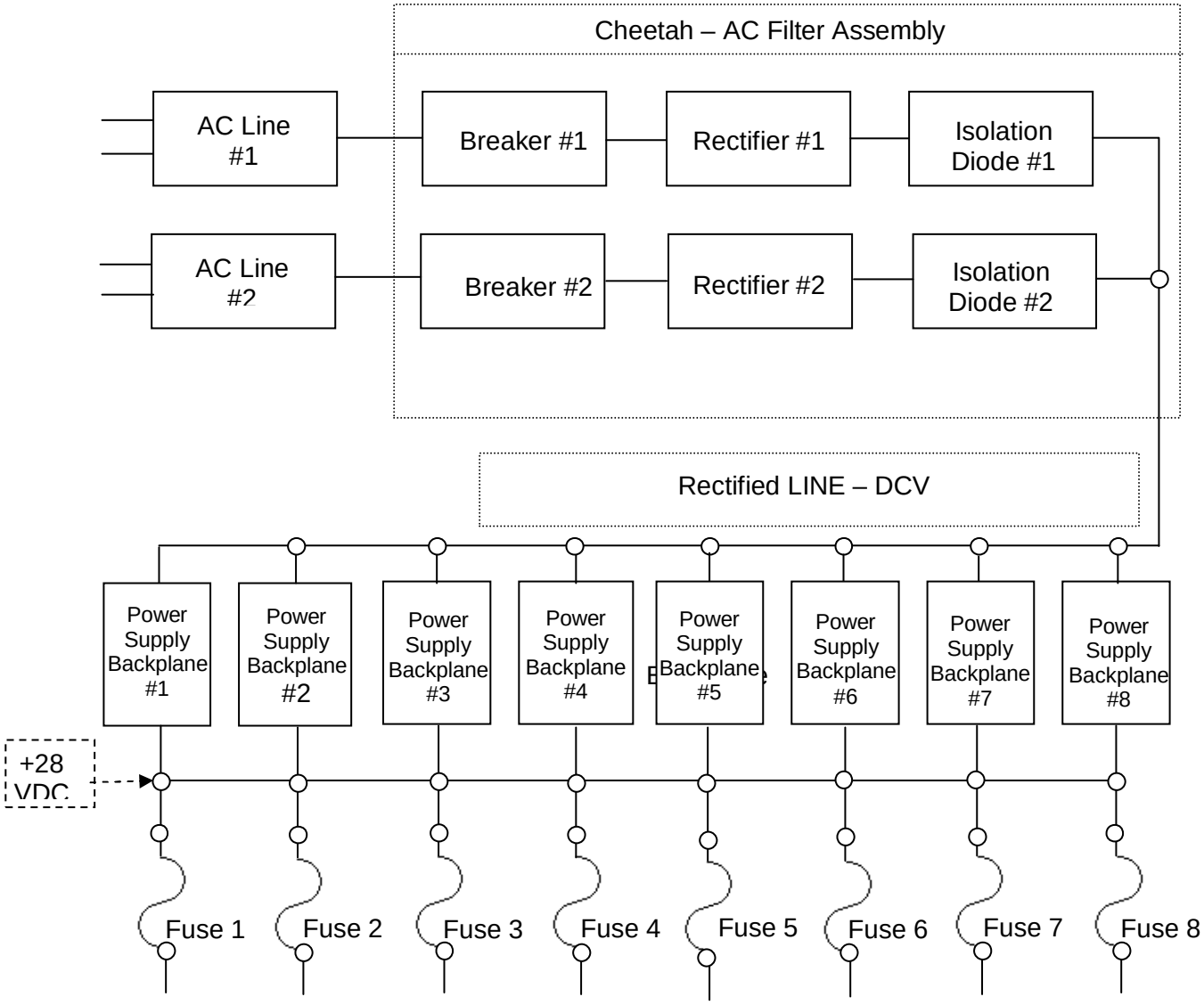


FIGURE 34: 256x448 Filter And Power Distribution

The following figure (see Figure 35) depicts the fuse assignments for the 256x448 Input/Output boards.

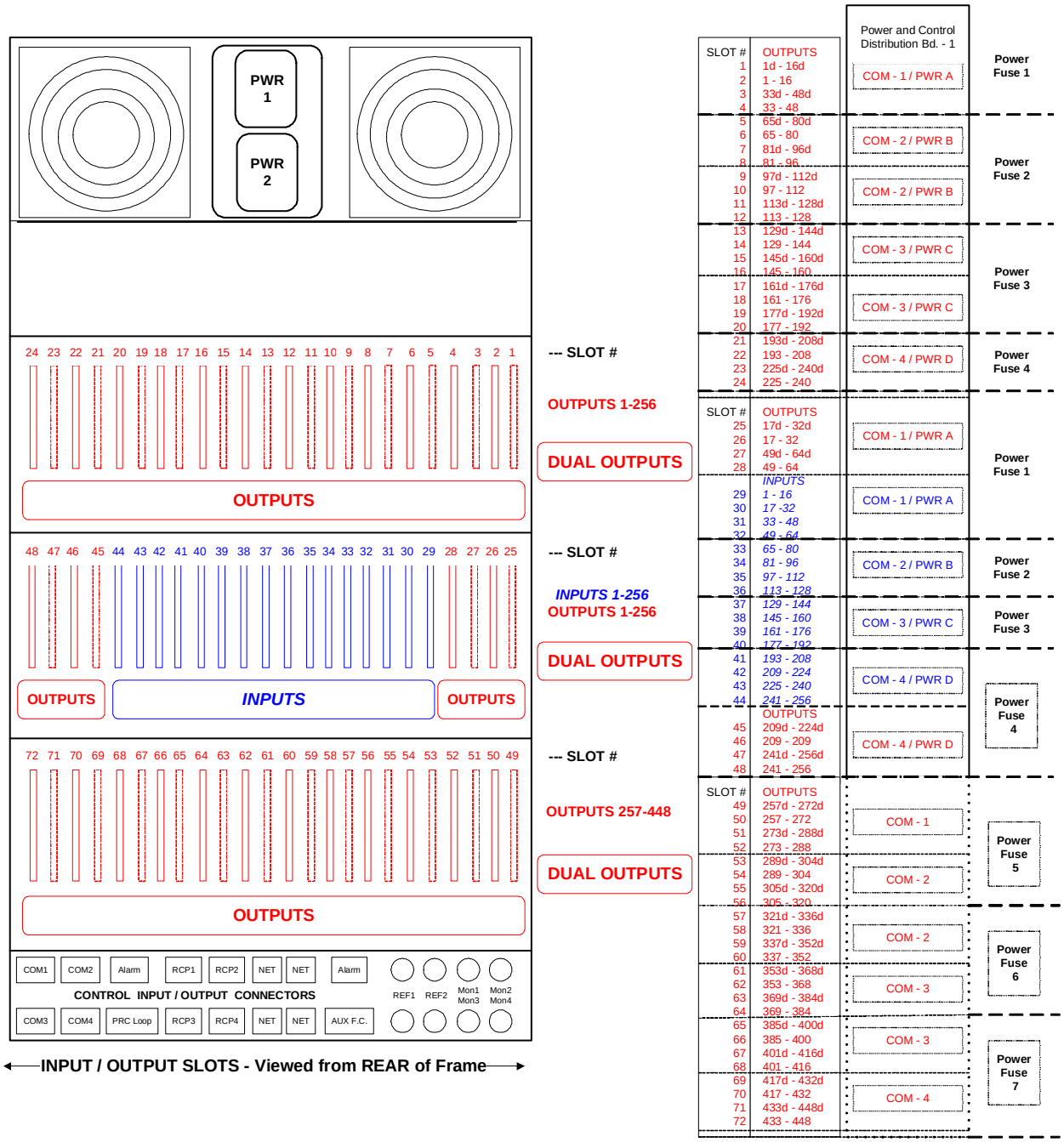


FIGURE 35: 256x448 Fuses Assignments For Input And Output Boards

Chapter 8: Cheetah 512x512 and 1024x256 Switchers

The Cheetah 512x512 and 1024x256 Switchers utilize the same frame configuration with different component setups. This Chapter will address the two configurations and explain the differences.

8.1 CHEETAH 512X512 AND 1024X256 PRODUCT AND COMPONENT DESCRIPTIONS

8.1.1 Cheetah 512x512 and 1024x256 Frame Configuration Views

For the Cheetah 512x512 and 1024x256 frame configuration, see Figures 36 and 37.

NOTE	**The 1024x256 I/O configuration (rear chassis view) is not shown in Figure 37. It is shown and described later in this chapter under fuse and backplane dipswitch configurations.**

STOP	**In the 512x512 and 1024x256 chassis, a power supply must be populated in each Power Supply Bank, which is a minimum of three power supplies. This is required for the monitoring of the cooling fan system.**

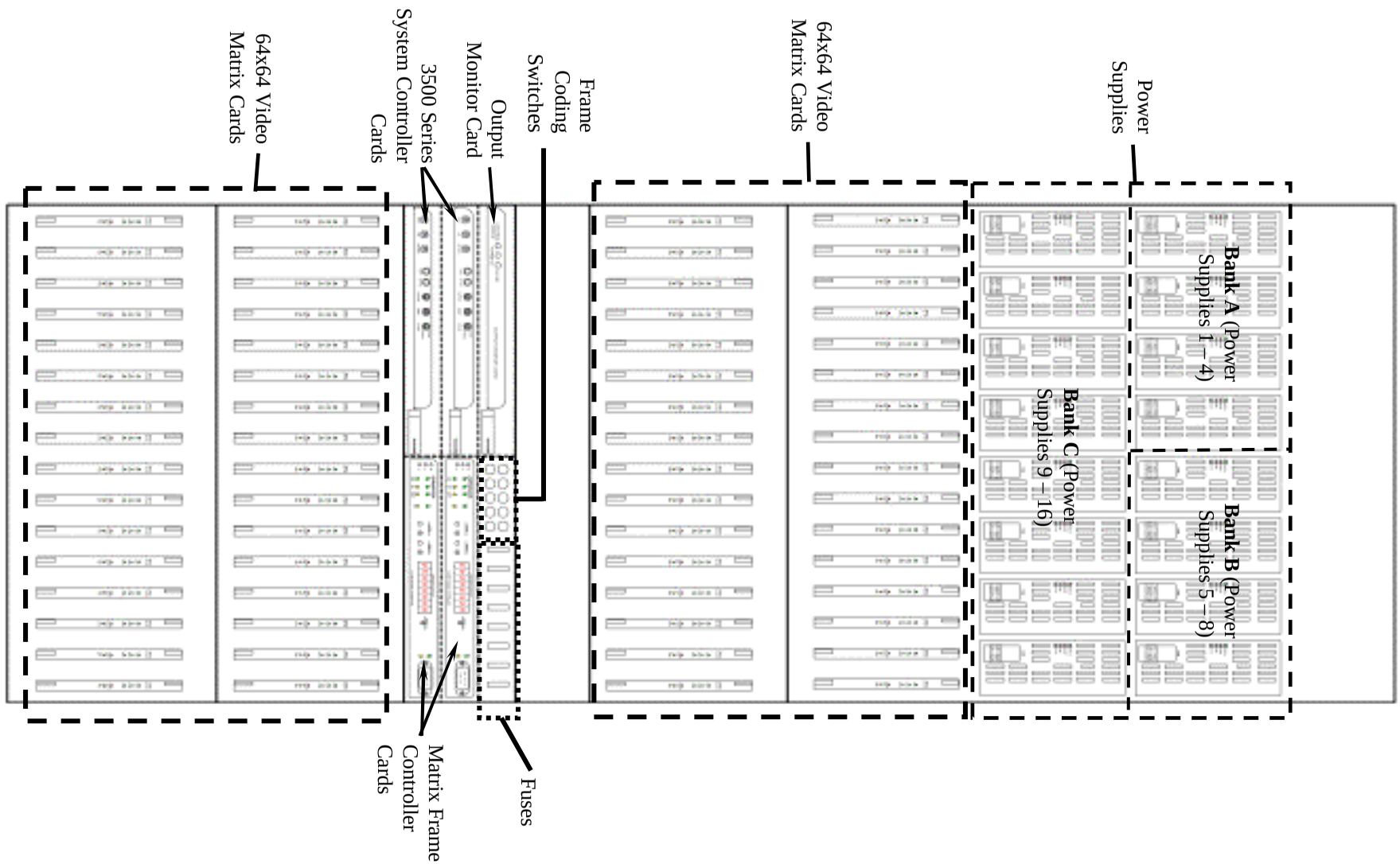


FIGURE 36: 512x512 and 1024x256 Front View

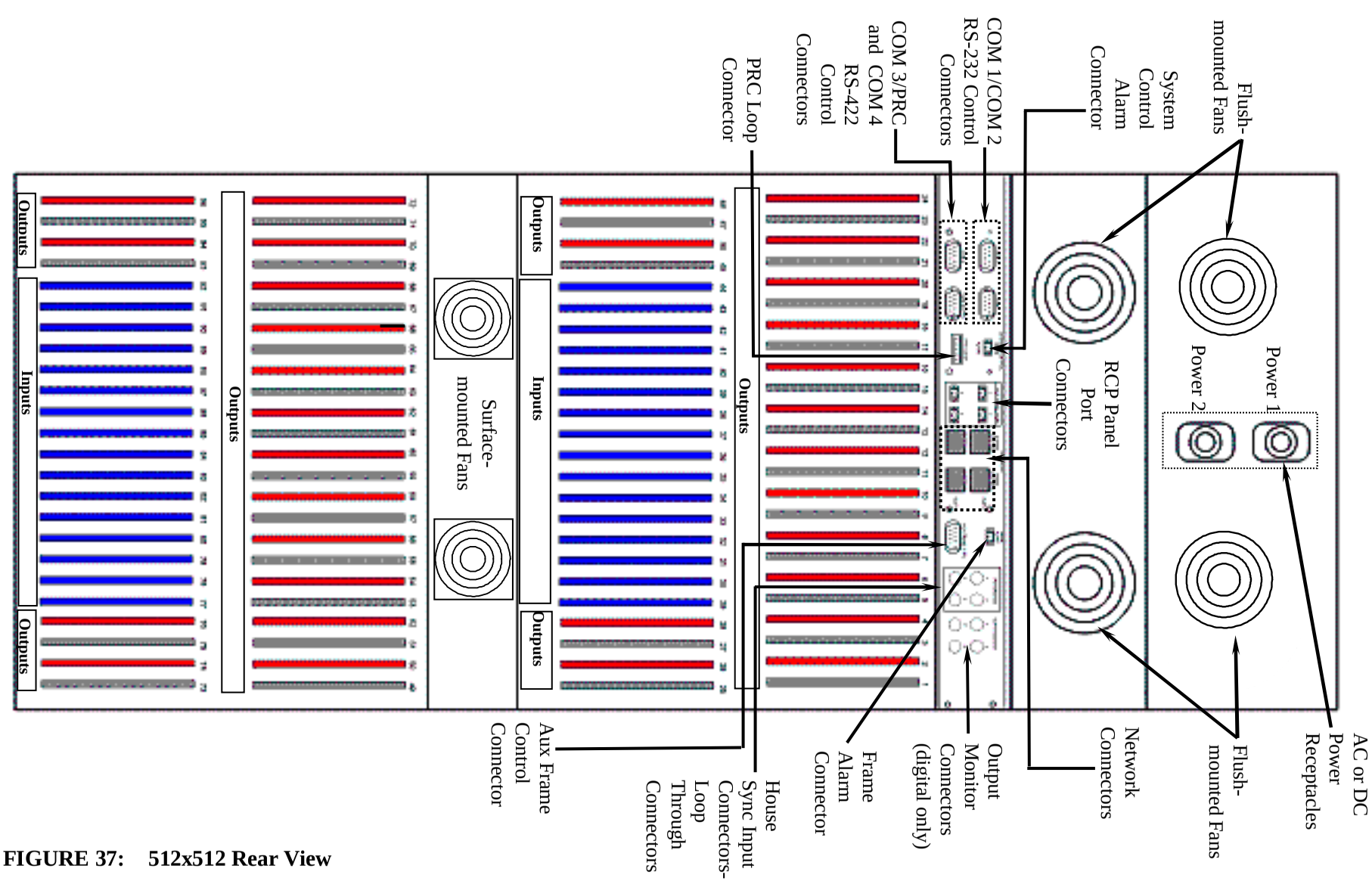


FIGURE 37: 512x512 Rear View

8.1.2 Cheetah 512x512 and 1024x256 Specifications

Physical

RUs 41
Height ..... 71.75"
Width ..... 19"
Depth ..... 23"
Weight ..... 625 lbs. (281.25 kg) nominal
..... (May weigh less depending on configuration)

Supply Power Requirements

Operating voltage ..... 95-240 VAC, 47-63 Hz
Power consumption ..... 6000W nominal
..... (Consumption can vary ± 50% depending on configuration)

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: ..... 1.0 Mbps to 1.485 Gbps
Optical Input Wavelength ..... Single Mode, 1200 to 1600 nm
Input Power ..... -20 dBm (minimum)

Continued

Cheetah 512x512 and 1024x256 Specifications (cont.)

Optical Signals (Fiber Optics) for Outputs (Transmitters)

Connector Type ..... SFF modules w/LC-type (fiber card)
Data Rates: ..... 1 Mbps to 1.485 Gbps
Optical Output Wavelength..... Single Mode, 1310 nm, ±20 nm
Output Power .....-11 dBm

Optical Loss Budget

10,000 km (minimum), Single Mode fiber w/2 optical couplings..... 9 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 512x512 and 1024x256 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 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 max.
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 512x512 and 1024x256 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 o 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 512x512 and 1024x256 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

8.1.3 Cheetah 512x512 Component Listing

The following tables include the equipment part numbers, descriptions, and the maximum quantities of each component that can comprise the Cheetah 512x512 (refer to Tables 14 and 15) product line.

NOTE	**The listed items in the following tables may be ordered in varying quantities. However, the listed quantities are the maximum number that can be used in this frame configuration. It must be noted that only 32 input cards, 32output cards, and 32 output-option cards can be used in any 512x512 I/O configurations.** **The I/O configurations for these chassis' can be mixed (digital and analog). However, mixed configurations can become confusing and support may be needed. For mixed configuration support, contact *PESA Switching Systems, Inc.* Customer Support.**

TABLE 14: Cheetah 512x512 Mainframe Component List

PART NUMBER	DESCRIPTION	Max. Qty (see note)
Standard Mainframe Components		
81-9065-2396-0	Mainframe Assembly:	1
81-9065-2381-0	Power Supply	16
81-9034-6904-0	Power Supply (blank)	15
81-9065-2397-0	Frame Controller Cards	2
81-9065-2328-0	Output Monitor Card *(Digital Only)*	1
(P/N determined by software inclusion)	3500 System Controller Cards	2
Matrix 64x64 Card(s)		
81-9065-2333-0	Matrix 64x64 *(Digital Configuration)*	64
81-9065-2334-0	Matrix 64x64 *(Analog Configuration)*	64
Miscellaneous Cards		
81-9065-2521-0	Analog Dummy Load Card*	Dependent on Configuration
81-9065-2398-0	HD Dummy Load Card*	Dependent on Configuration

***:** *Dependent on the specific configuration of the chassis and will be noted on the specification sheet that accompanies the equipment. Contact PESA Switching Systems, Inc: Customer Support for specific configuration details for these cards.*

TABLE 15: Cheetah 512x512 Digital and Analog Component List

PART NUMBER	DESCRIPTION	Max. Qty (see note)
Analog Input Cards		
81-9065-2495-0	Input Buffer Analog High Level BNC	32
81-9065-2432-0	Input Buffer Analog Video BNC	32
Analog Output Cards		
81-9065-2581-0	Input Expansion Buffer Analog High Level**	32
81-9065-2433-0	Output Combiner Analog High Level BNC	32
81-9065-2492-0	Output Option Analog Video BNC	32
81-9065-2493-0	Output Combiner Analog Video BNC	32
81-9065-2494-0	Output Option Analog High Level BNC	32
Digital and Fiber Input Cards		
81-9065-2612-0	Input Buffer Fiber Top Level	32
81-9065-2321-0	Input Buffer Card SD BNC	32
81-9065-2304-0	Input Buffer HD-MR BNC	32
Digital and Fiber Output Cards		
81-9065-2315-0	Output Combiner SD BNC	32
81-9065-2317-0	Dual Output Option BNC	32
81-9017-0370-0	DAC 10-Bit Plug-On Card	32
81-9065-2613-0	Output Option Fiber Top Level	32
81-9017-0376-0	Output Option HD to SD Converter BNC	32
81-9065-2322-0	Output Combiner HD-MR BNC	32
I/O Blanks		
81-9034-6844-0	Dual Output Option Blank	31
81-9034-6906-0	Output Blank	31
81-9034-6907-0	Input Blank	31

****:** *When used, it is inserted next to an output card to expand an input configuration. Contact PESA Switching Systems, Inc: Customer Support for specific configuration details for these cards.*

8.1.4 Cheetah 1024x256 Component Listing

The following tables include the equipment part numbers, descriptions, and the maximum quantities of each component that can comprise the Cheetah 1024x256 (refer to Tables 16 and 17) product line.

NOTE	**The listed items in the following tables may be ordered in varying quantities. However, the listed quantities are the maximum number that can be used in this frame configuration. It must be noted that only 64 input cards, 16 output cards, and 16 output-option cards can be used in any 1024x256 I/O configurations.** **The I/O configurations for these chassis' can be mixed (digital and analog). However, mixed configurations can become confusing and support may be needed. For mixed configuration support, contact *PESA Switching Systems, Inc.* Customer Support.**

TABLE 16: Cheetah 1024x256 Mainframe Component List

PART NUMBER	DESCRIPTION	Max. Qty (see note)
Standard Mainframe Components		
81-9065-2396-0	Mainframe Assembly:	1
81-9065-2381-0	Power Supply	16
81-9034-6904-0	Power Supply (blank)	15
81-9065-2397-0	Frame Controller Cards	2
81-9065-2328-0	Output Monitor Card *(Digital Only)*	1
(P/N determined by software inclusion)	3500 System Controller Cards	2
Matrix 64x64 Card(s)		
81-9065-2333-0	Matrix 64x64 *(Digital Configuration)*	64
81-9065-2334-0	Matrix 64x64 *(Analog Configuration)*	64
Miscellaneous Cards		
81-9065-2521-0	Analog Dummy Load Card*	Dependent on Configuration
81-9065-2398-0	HD Dummy Load Card*	Dependent on Configuration

***:** *Dependent on the specific configuration of the chassis and will be noted on the specification sheet that accompanies the equipment. Contact PESA Switching Systems, Inc: Customer Support for specific configuration details for these cards.*

TABLE 17: Cheetah 1024x256 Digital and Analog Component List

PART NUMBER	DESCRIPTION	Max. Qty (see note)
Analog Input Cards		
81-9065-2495-0	Input Buffer Analog High Level BNC	64
81-9065-2432-0	Input Buffer Analog Video BNC	64
Analog Output Cards		
81-9065-2581-0	Input Expansion Buffer Analog High Level**	64
81-9065-2433-0	Output Combiner Analog High Level BNC	16
81-9065-2492-0	Output Option Analog Video BNC	16
81-9065-2493-0	Output Combiner Analog Video BNC	16
81-9065-2494-0	Output Option Analog High Level BNC	16
Digital and Fiber Input Cards		
81-9065-2612-0	Input Buffer Fiber Top Level	64
81-9065-2321-0	Input Buffer Card SD BNC	64
81-9065-2304-0	Input Buffer HD-MR BNC	64
Digital and Fiber Output Cards		
81-9065-2315-0	Output Combiner SD BNC	16
81-9065-2317-0	Dual Output Option BNC	16
81-9017-0370-0	DAC 10-Bit Plug-On Card	16
81-9065-2613-0	Output Option Fiber Top Level	16
81-9017-0376-0	Output Option HD to SD Converter BNC	16
81-9065-2322-0	Output Combiner HD-MR BNC	16
I/O Blanks		
81-9034-6844-0	Dual Output Option Blank	15
81-9034-6906-0	Output Blank	15
81-9034-6907-0	Input Blank	63

******: *When used, it is inserted next to an output card to expand an input configuration. Contact PESA Switching Systems, Inc: Customer Support for specific configuration details for these cards.*

8.2 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.

8.3 GENERAL CHASSIS INSTALLATION OVERVIEW

The physical size of each Cheetah Series Switcher chassis is determined by the chassis input/output capabilities (i.e., the 64x64 chassis is the smallest while the 512x512 chassis* is 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.

*: The 1024x256 system utilizes the 512x512 chassis.

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.

8.4 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.

8.5 MOUNTING A CHEETAH 512X512 AND 1024X256 CHASSIS IN AN EQUIPMENT RACK

	**The weight of a fully loaded 512x512 and 1024x256 chassis exceeds 625 lbs nominal. Installation or removal of this equipment requires at least four 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 and the chassis breakers are in the OFF position 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, and power cables. Use all chassis mounting holes, and tighten mounting hardware securely by using the rack equipment manufacturer's suggested torque settings.

	**This unit is extremely heavy. Maneuvering and installation of this unit requires caution, planning, and adequate resources in order to prevent injury to personnel and/or damage to the equipment. It is strongly suggested to implement as many persons, jacks, blocks, etc., as possible to eliminate any unsafe condition that could result during the following mounting phase.**

8.5.1 Cheetah 512x512 and 1024x256 Chassis Special Mounting System

A special system has been developed at the factory to assist in the installation of this chassis. The packaging crate includes a set of nylon 'forearm forklift' straps to help facilitate the transfer of this unit from the crate to the equipment rack. Also included in the packaging crate is the original packaging for these straps. Please read the directions provided by the strap manufacturer prior to using the straps.

Basically, the wooden pallet that the chassis rests on is equipped Teflon®-layered bars, which will enable the unit to be manually 'slid off' the wooded pallet onto the previously installed 'rack mounting installation bracket'. The 'rack mounting installation bracket' also has Teflon-layered bars, which will enable the system to be manually slid into place in the rack once the weight has been transferred from the pallet to the installation bracket.

8.5.2 Cheetah 512x512 and 1024x256 Chassis Mounting Procedure

The following steps should be performed to reduce the weight of the system thus making it slightly easier to maneuver.

NOTE	**Retain these lag bolts because they will be needed to assemble the crate for return shipment to PESA.**

1. Remove all the lag bolts from the top and sides of the wooden crate.
2. Using ESD precautions, remove the PS600 power supplies from the top of the unit.

NOTE	**Prior to performing the next sequence, careful measurements should be completed to insure the proper location and alignment of equipment rack's screw holes to the Cheetah chassis.** **Additionally, since the 'rack mounting installation bracket' will ultimately support the entire weight of the Cheetah chassis until the chassis rack screws can be installed, it is important to insure that the front and rear section of this 'rack mounting installation bracket' are firmly screwed into the equipment rack and secured.**

3. Align the 'rack mounting installation bracket' with the chassis and secure it into position near the bottom of the equipment rack.
4. Using a pallet jack or similar equipment, align and place the Cheetah chassis as close as possible to the equipment rack opening to which it will be installed.
5. If required, use the provided 'forearm forklift' straps and with 'one' person on each strap (4 people total), lift slightly and slide the chassis to transfer the weight of Cheetah chassis from the wooden pallet to the 'rack mounting installation bracket' and then, slide the chassis into position in the rack.
6. Once the Cheetah chassis is inside the equipment rack, install 'all' of the rack screws in the chassis so that the unit is firmly and adequately secured to the equipment rack.
7. Remove the 'rack mounting installation bracket' from the equipment rack.
8. Remove the 'forearm forklift' straps.
9. Prepare the wooden crate, rack mounting installation bracket, and forearm forklift tools for return shipment to **PESA Switching Systems, Inc.**

NOTE	**The install equipment has been sent to assist you in the installation of this product. *PESA Switching Systems, Inc.* will pay the freight charges for the return of this material along with the wooden crate. We would like to ask that you make timely arrangements for the return of these items using Emery/Menlo Worldwide and charging it to PESA Switching Systems, Inc. freight-forwarding account number (to be assigned by PESA).**

8.6 SETTING CHEETAH CHASSIS 512X512 AND 1024X256 CHASSIS LEVEL CODES (STROBES)

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, Table 18 on page 104. 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.**

8.6.1 Cheetah 1024x256 and 512x512 Chassis Strobe Switches Location

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

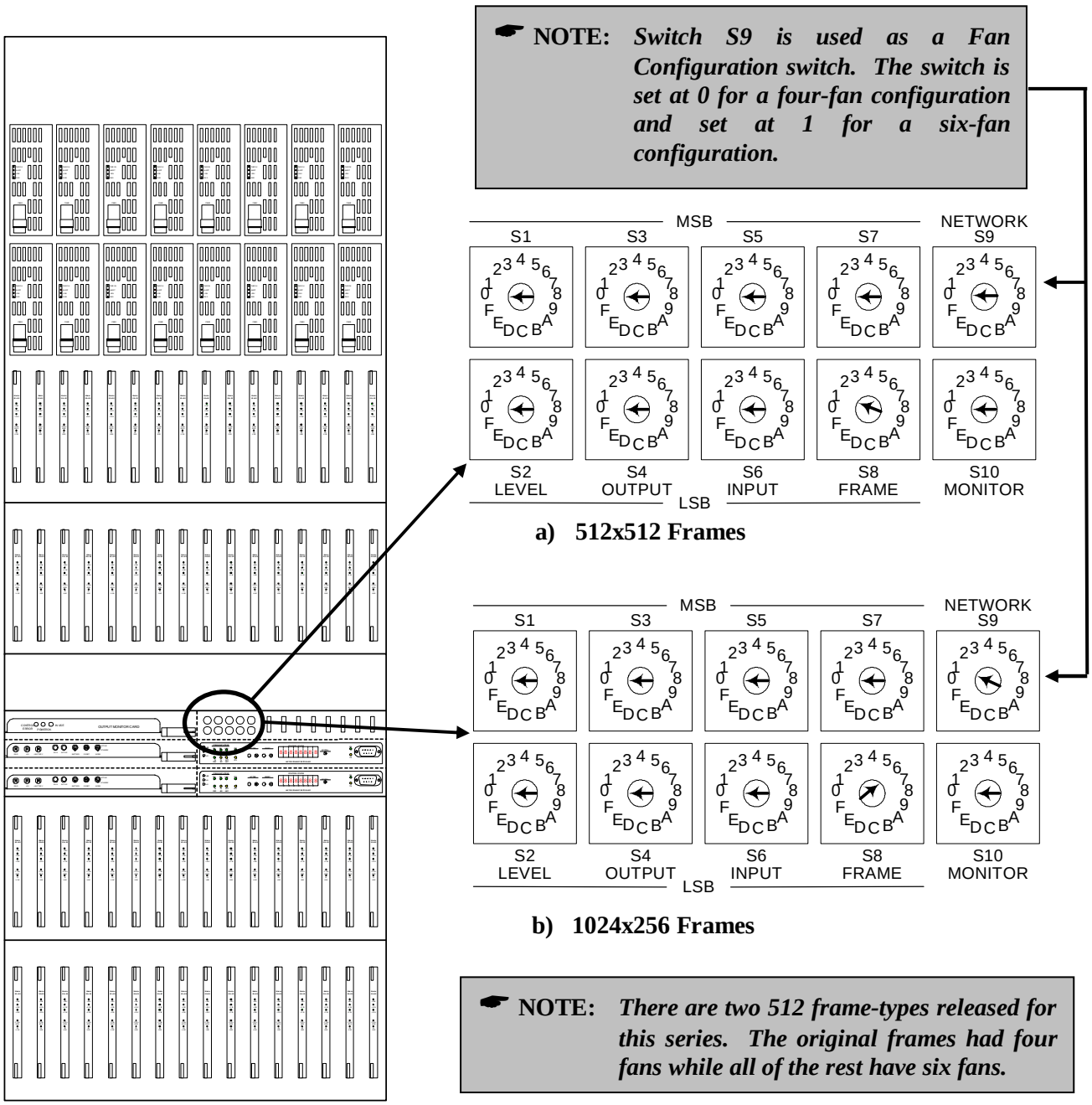


FIGURE 38: Cheetah 1024x256 and 512x512 Chassis Strobe Switches Location (Front View)

8.6.2 Strobe Switch Functions

Table 18 describes the functions of the various strobe switches for the Cheetah systems:

TABLE 18: Strobe Switch Functions

Rotary Switch	Name	Description
S1	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	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	MSB Frame	Specifies the type of frame the boards are plugged into. For the Cheetah 512x512 frame, set LSB to 1 and MSB to 0. For the 1024x256 frame, set LSB to 6 and MSB to 0.
S8	LSB Frame	
S9	Network (Fans)	Set this at 0 for a four-fan system or 1 for a six-fan system.
S10	Monitor	Sets the starting output number. Each switch position increments the output number by 4. If you are not using this feature, leave the level code at zero. If you need to specify a monitor output, add 32 to the Level Code value. Use the resulting number for this setting.

8.7 512X512 AND 1024X256 CHASSIS POWER SUPPLY BACKPLANE DIPSWITCH LOCATIONS

Each power supply backplane has one, eight-position, slide-style switch consisting of eight single-pole single-throw (SPST) switches numbered 1 through 8. Each power supply backplane supports two power supplies. Figure 39 depicts the location of these switches and the dipswitch settings.

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

In the 512x512 and 1024x256 chassis, a power supply must be populated in each Power Supply Bank, which is a minimum of three power supplies. This is required for the monitoring of the cooling fan system.

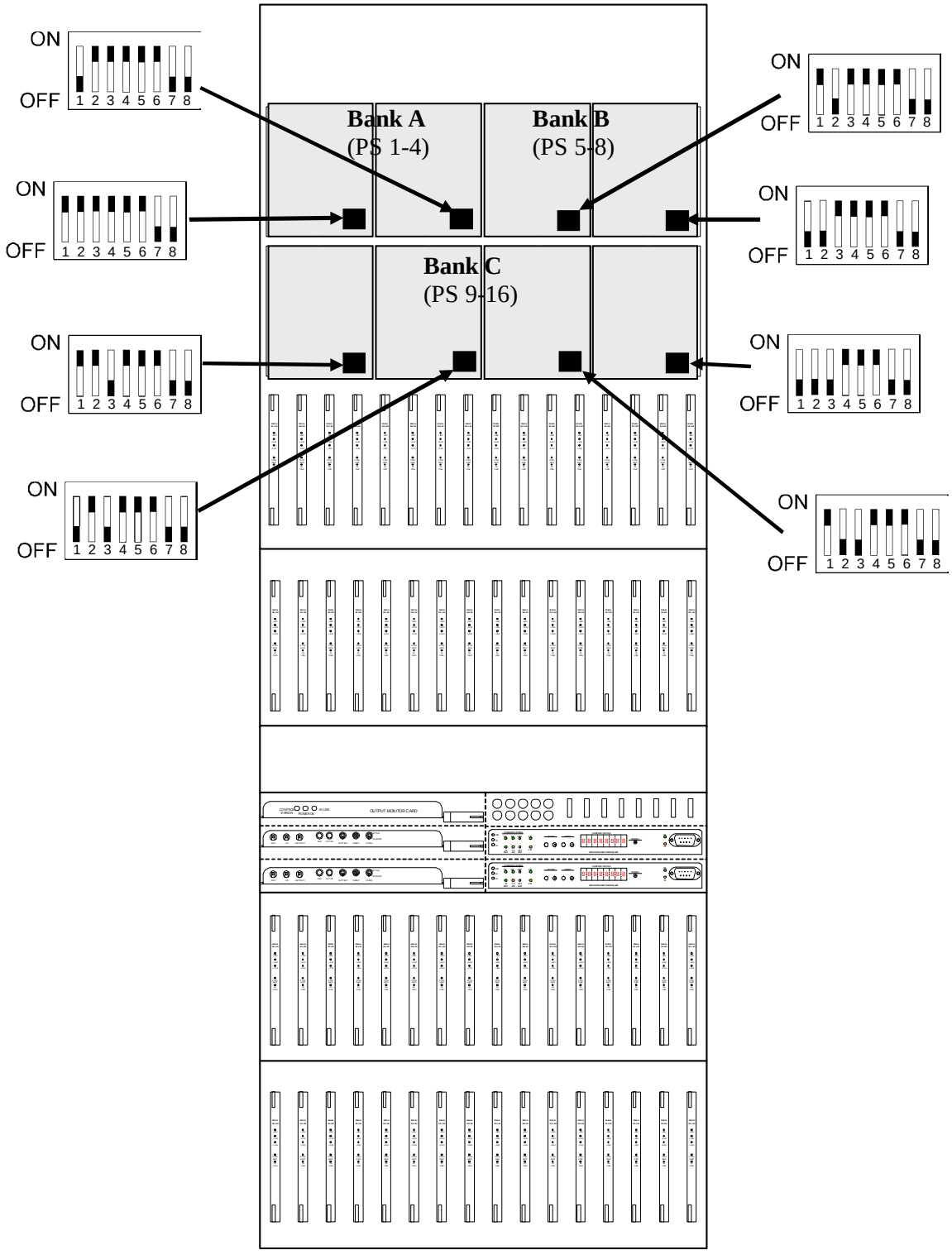


FIGURE 39: 512 Series Power Supply Backplane Dipswitch Locations And Settings (Viewed From The Front Of The Frame)

8.8 CHEETAH 512X512 AND 1024X256 CHASSIS INPUT/OUTPUT BACKPLANE DIPSWITCH LOCATIONS

Each input/output backplane has one, eight-position, slide-style switch consisting of eight single-pole single-throw (SPST) switches numbered 1 through 8. Each input/output backplane supports 4 cards.

Figure 40 (512x512 chassis) and Figure 41 (1024x256 chassis) depict the location of these switches with the cards removed and the dipswitch settings for the corresponding chassis.

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

In Figure 41 (1024x256 chassis), dipswitch position 8 is set to "ON" for all output backplanes, which indicates sequential numbering for output backplanes.

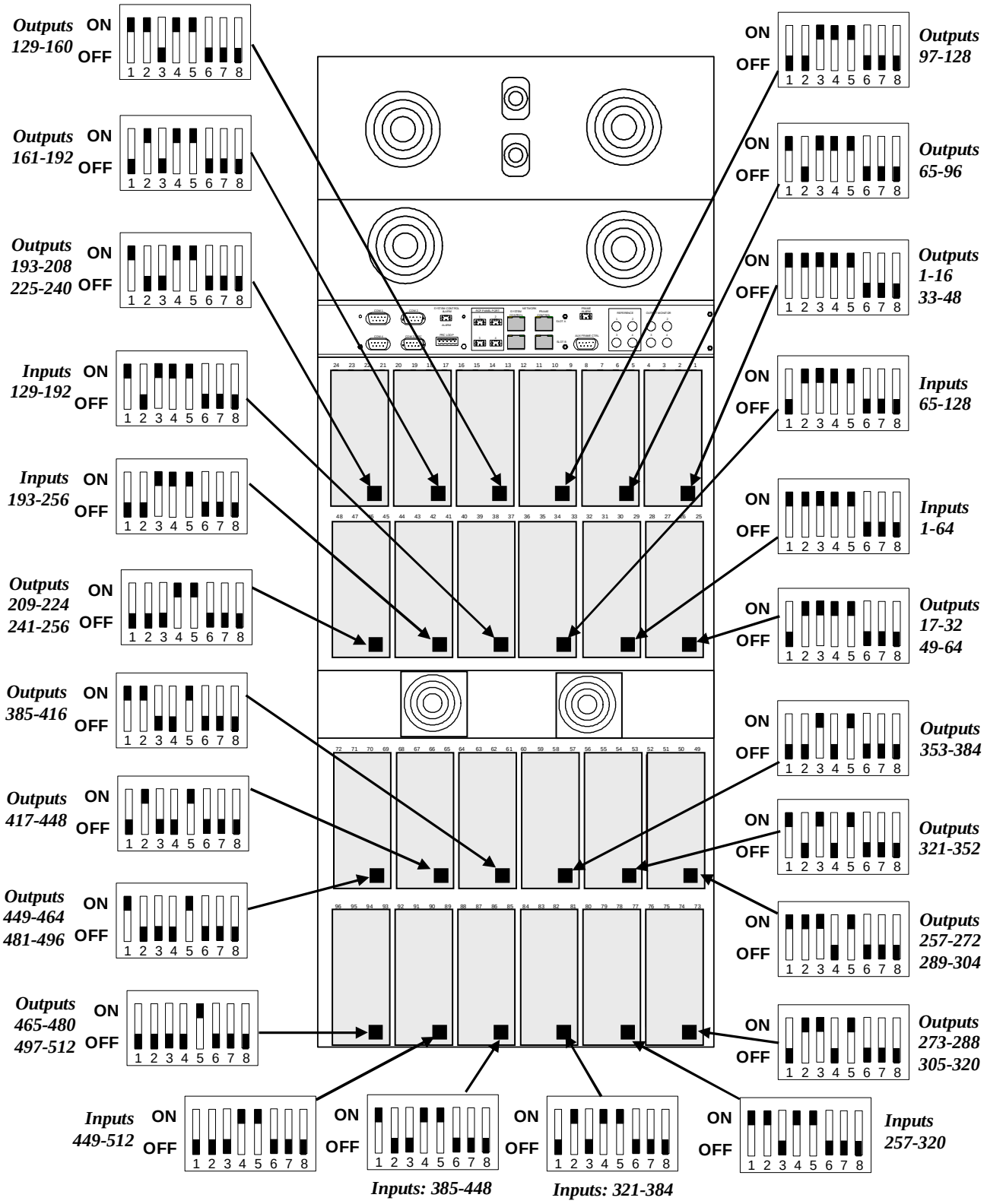


FIGURE 40: 512x512 I/O Backplane Dipswitch Locations and Settings

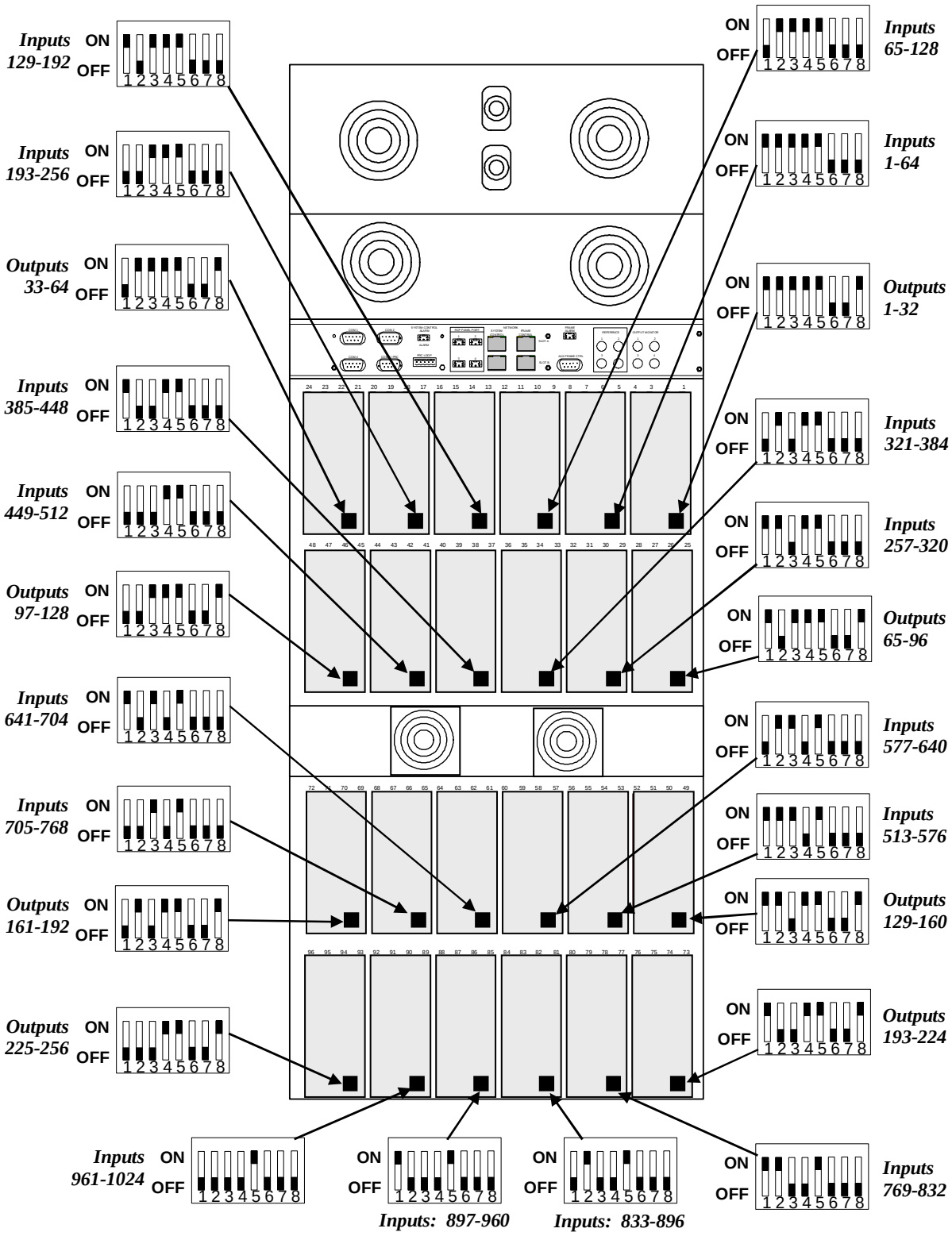


FIGURE 41: 1024x256 I/O Backplane Dipswitch Location and Settings

8.9 CHEETAH 512X512 AND 1024X256 CHASSIS MATRIX BACKPLANE DIPSWITCH LOCATIONS

Each input/output backplane has one, eight-position, slide-style switch consisting of eight single-pole single-throw (SPST) switches numbered 1 through 8. Each input/output backplane supports 4 cards. The following figures depict the locations of these switches with the cards removed and the corresponding dipswitch settings.

The two chassis will be shown separately.

8.9.1 Cheetah 512x512 Chassis Matrix Backplane Dipswitches

The dipswitch locations and settings are shown in Figure 42.

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

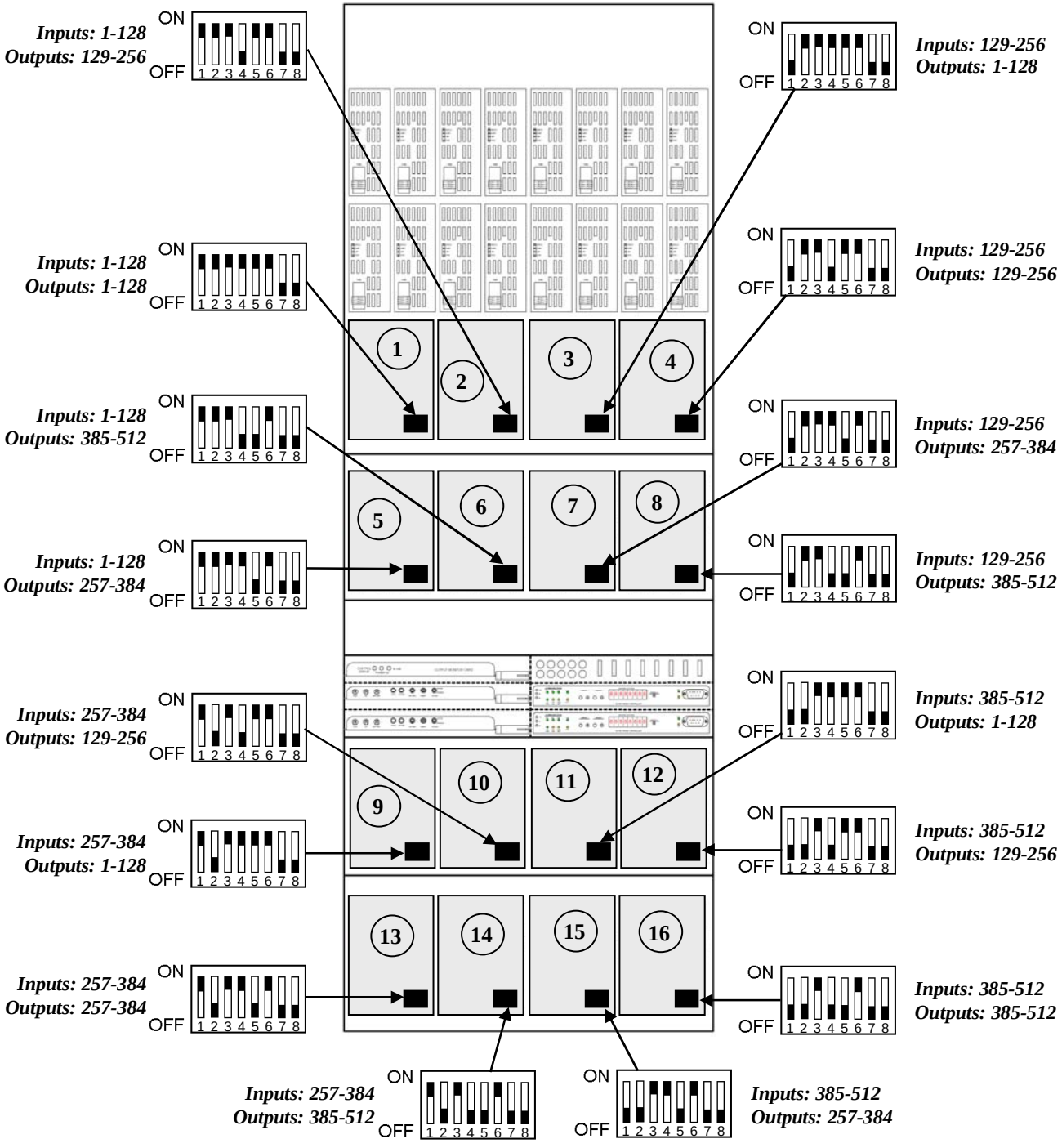


FIGURE 42: 512x512 Matrix Backplane Dipswitch Location And Settings

8.9.2 Cheetah 1024x256 Chassis Matrix Backplane Dipswitches

The dipswitch locations and settings are shown in Figure 43.

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

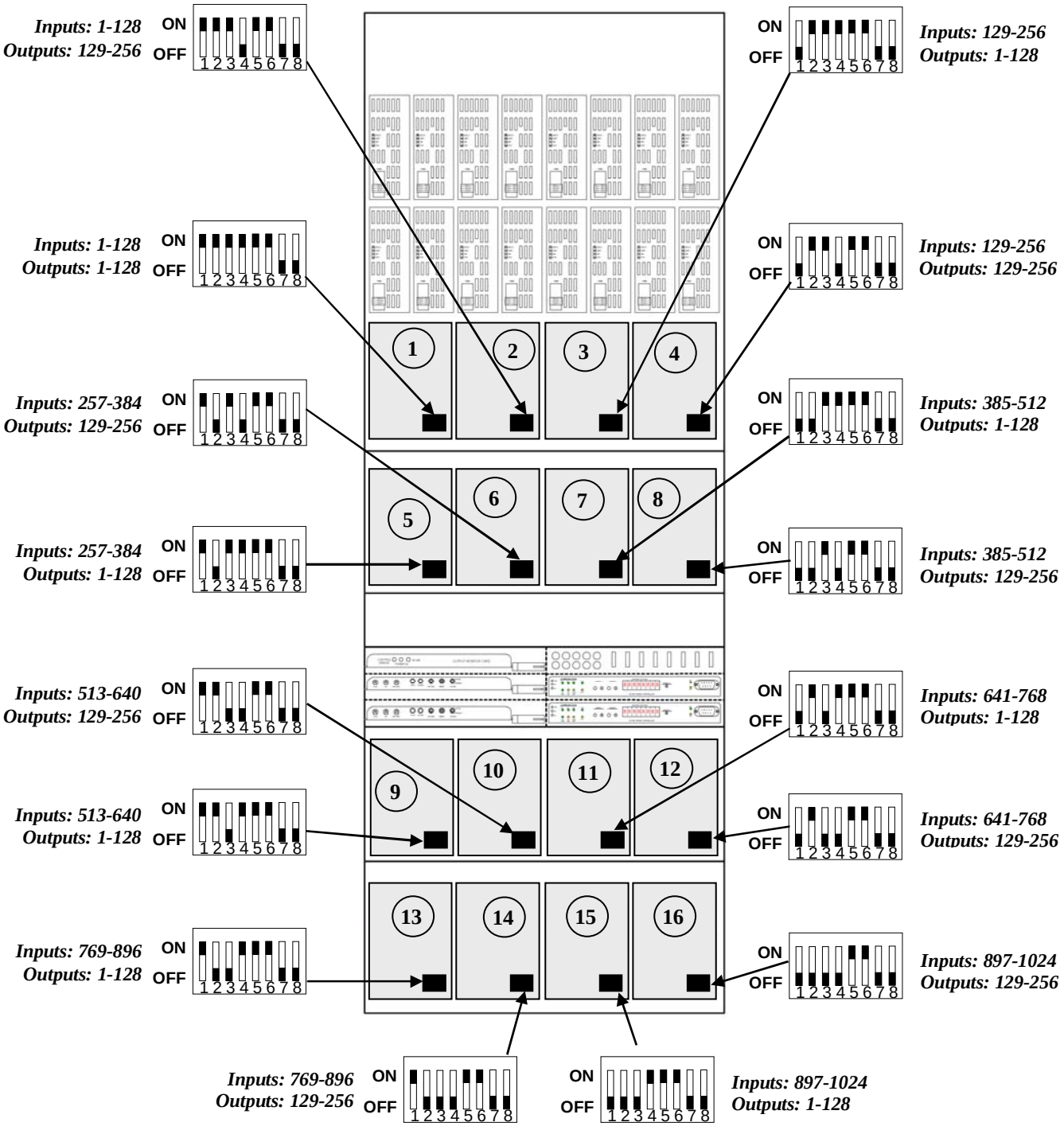


FIGURE 43: 1024x256 Matrix Backplane Dipswitch Location And Settings

8.10 CHEETAH 512X512 AND 1024X256 CHASSIS SYSTEM CONNECTION LOCATIONS

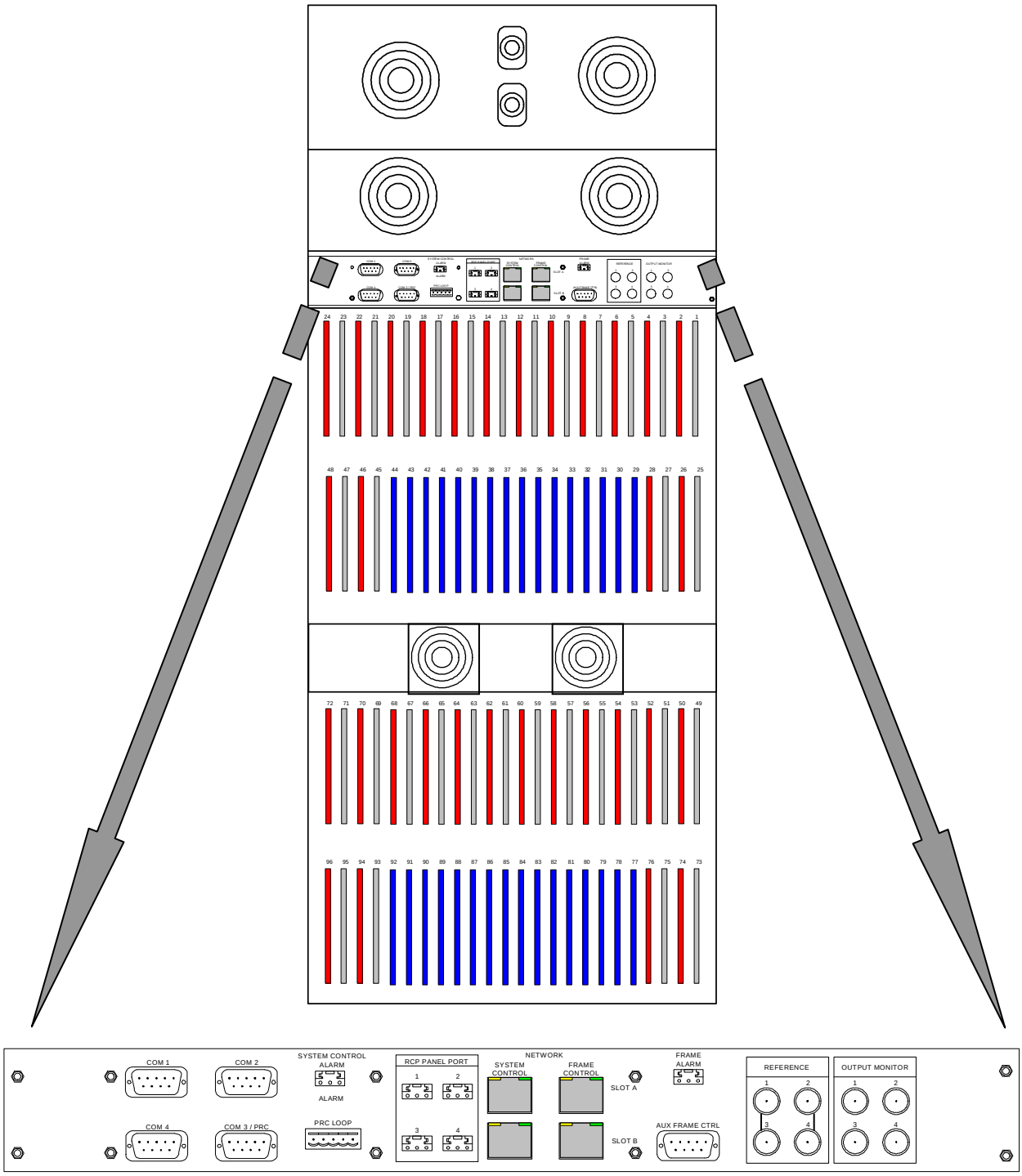


FIGURE 44: 512x512 and 1024x256 Chassis System Interface Connector Panel (Rear View)

8.11 CHEETAH 512X512 AND 1024X256 CHASSIS INPUT/OUTPUT SIGNAL CONNECTORS

These Input/output (I/O) BNC coaxial connectors, located on the rear of the unit (refer to Section 8.12 for I/O locations) provide the input/output signal interface. 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.

Output modules include both HD/multi-rate and SDI output modules that consist of a single copper connection. However, daughter boards can be installed 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.

For I/O card removal and installation, refer to Chapter 11.

8.12 CHEETAH 512X512 AND 1024X256 CHASSIS FUSE LOCATIONS AND ASSIGNMENTS

Eight 30-amp, plug-in, auto-type fuses are located inside the front of the frame as illustrated in Figure 45 that provide over-current protection for the associated 64x64 matrix cards. The fuses also provide protection for the I/O boards, in blocks of 64 (see figures 45 through 48 for associated fuse information).

In the accompanying figures, the slots labeled “Option” indicate either dual output or some other conversion-type slots.

☞ **NOTE:** *For the 1024x256 chassis view, the entire upper portion of the chassis should be populated with components.*

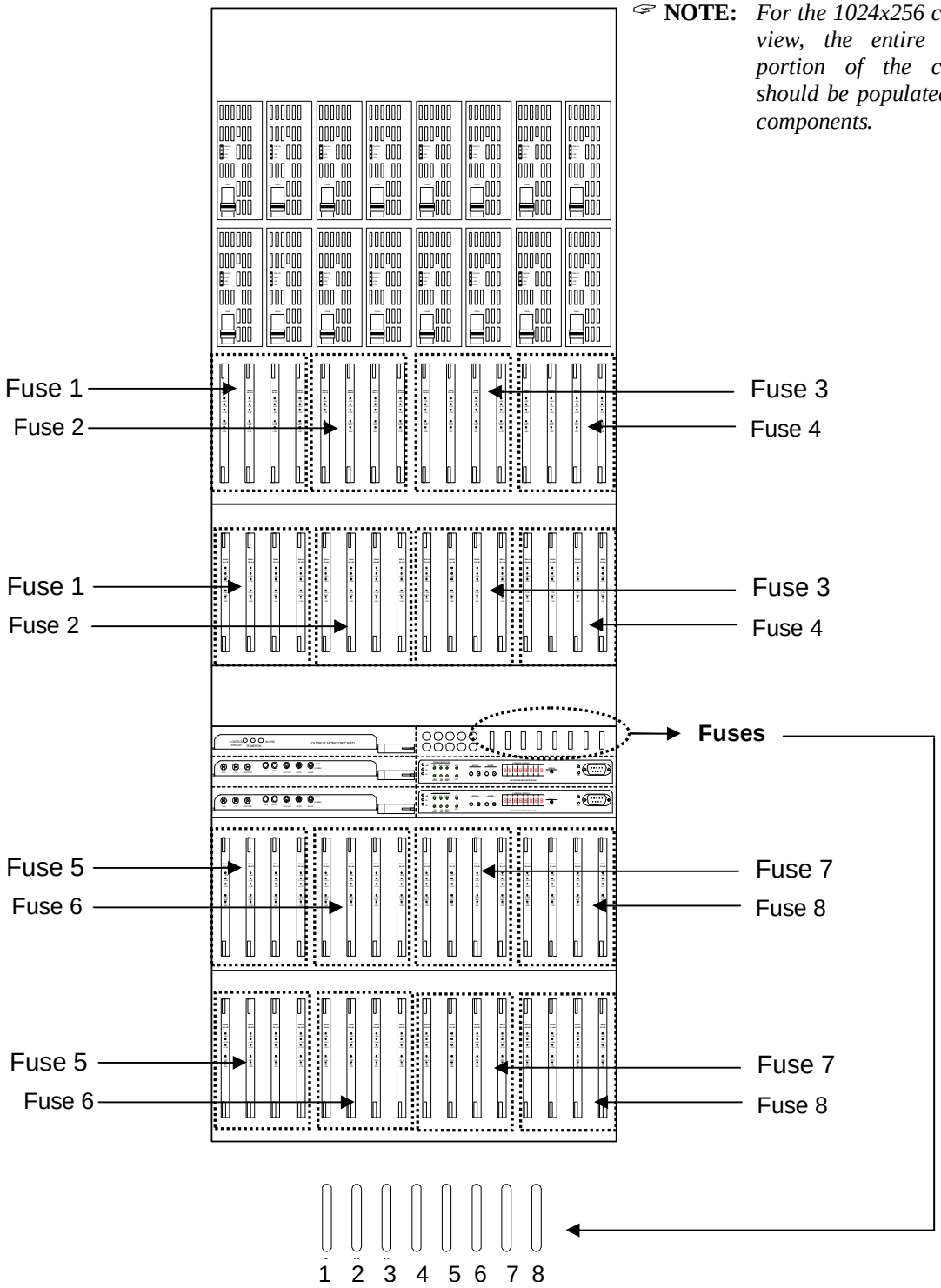


FIGURE 45: 512x512 and 1024x256 chassis Fuse Locations

The following graphic illustrates the filter and power distribution on the Cheetah 512x512 and 1024x256 chassis.

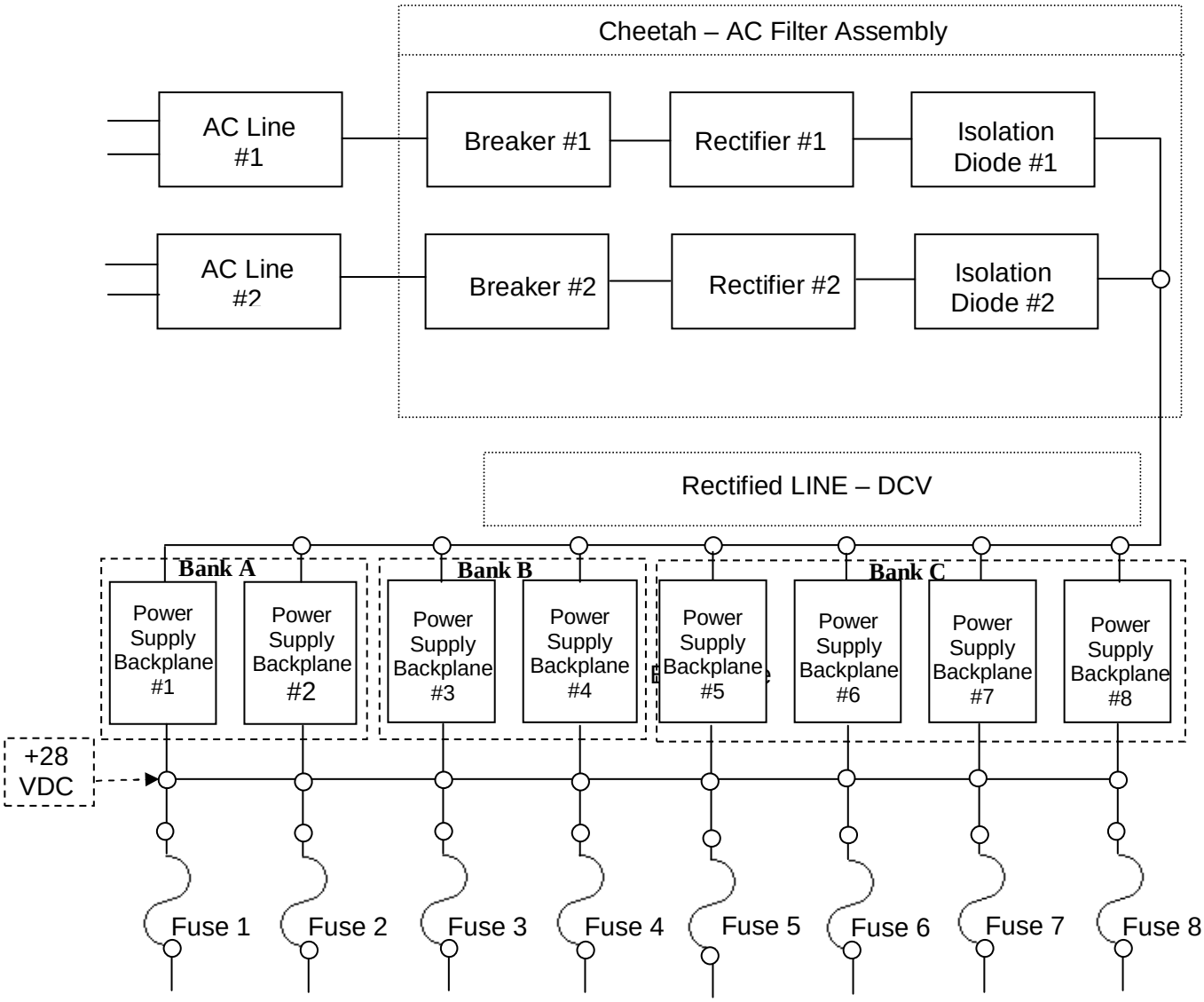


FIGURE 46: Filter And Power Distribution

In the 512x512 and 1024x256 chassis, a power supply must be populated in each Power Supply Bank, which is a minimum of three power supplies. This is required for the monitoring of the cooling fan system.

The following figure (see Figure 47) shows the fuse configuration for the 512x512 chassis Input/Output Boards.

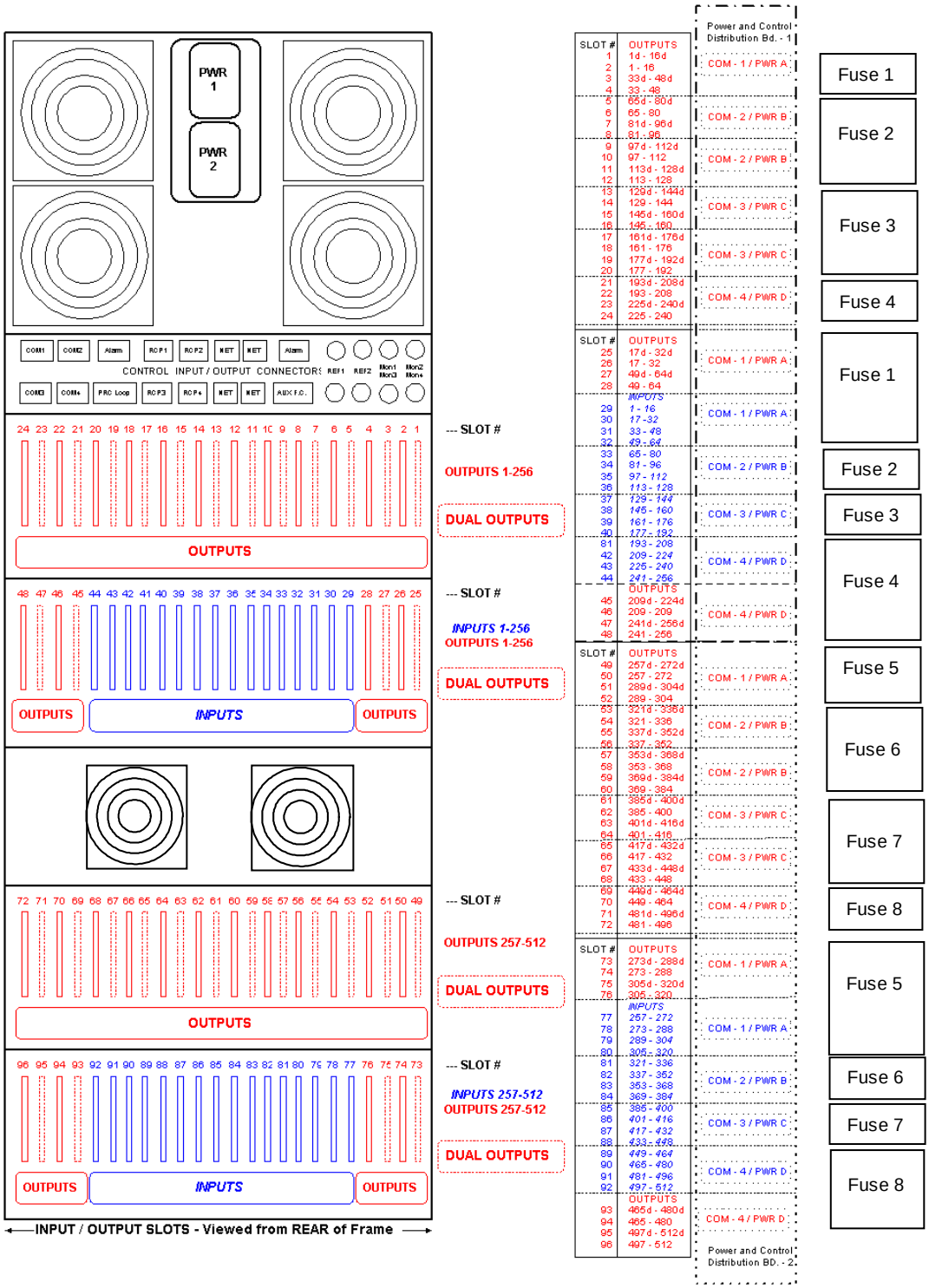


FIGURE 47: 512x512 Chassis Fuses For The Input/Output Cards

The following figure (see Figure 48) shows the fuse configuration for the 1024x256 chassis Input/Output Boards.

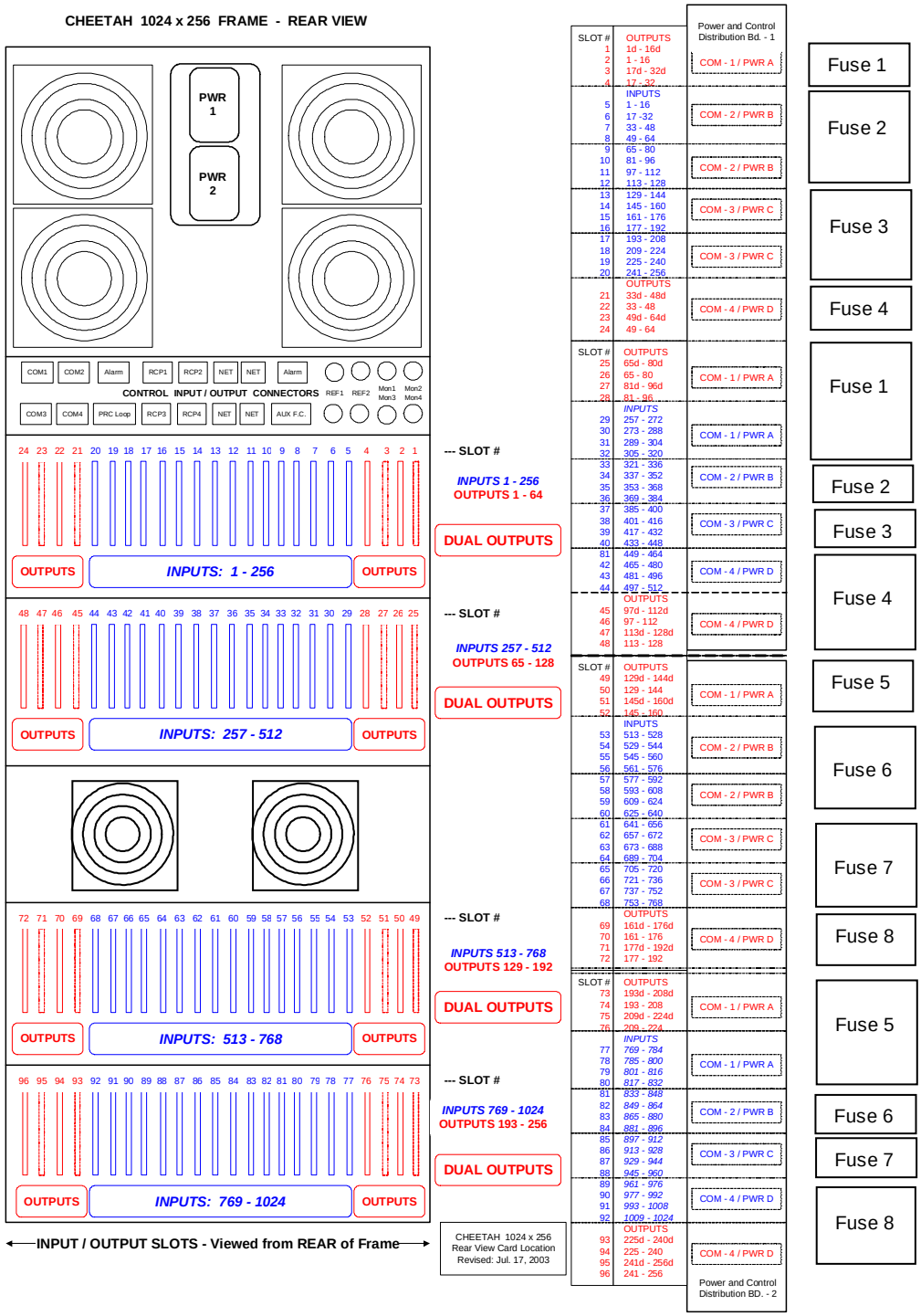


FIGURE 48: 1024x256 Chassis Fuses For The Input/Output Cards

Chapter 9: Cable Installation and Power Connections

9.1 CONNECTING EQUIPMENT CABLES

Use the following guidelines when connecting equipment cables:

1. Install the equipment in the rack before connecting cables.

Relieve strain on all cables to prevent connector separation.

To the extent possible, separate control, signal, and power cables to minimize crosstalk and interference.

Use as many cable ties as necessary to secure cables to the rack (see Figure 49). This will minimize the amount of force transmitted to the equipment and help route cables away from hazardous areas.

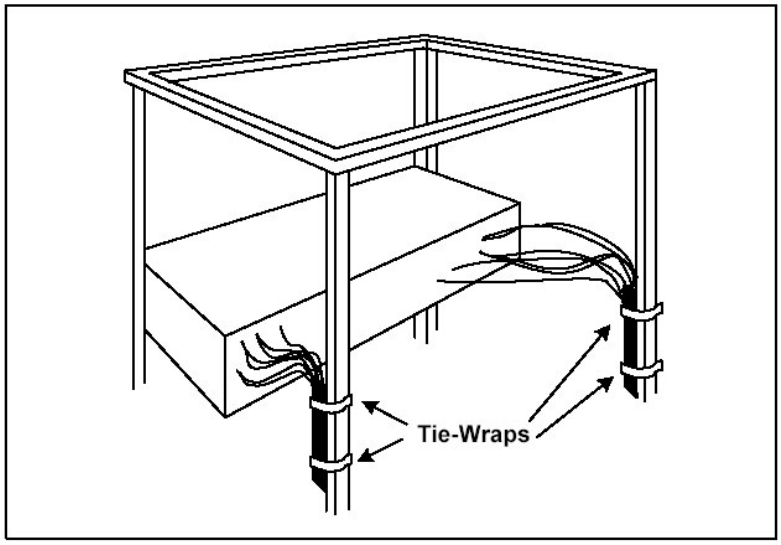


FIGURE 49: Cables Attached To Supports

Route cables away from physical traffic areas to avoid creating a safety hazard (trip or shock).

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.

9.2 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 Output Monitor outputs using Belden 8281 coaxial cable or equivalent. Be sure to properly terminate all outputs with 75Ω terminators.
3. 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.
4. If additional Cheetah Switchers are to be utilized as part of the switching matrix, connect COM 3/PRC on the primary Cheetah Switcher to COM 3/PRC on the other Cheetah Switcher using 5-pin ribbon cables.

If an external controller (such as the 3500 Series System Controller) is used to control the Cheetah Switcher, connect the external controller to COM 4 using 9-pin RS-422 cable.

Connect the RCP control panels to the RCP Panel Ports using twisted pair cables. The connections to the control panel may be daisy-chained.

If Ethernet connectivity is desired, connect a 10baseT RJ-45 LAN connector to the Slot A and Slot B Network jacks.

Configure the Ethernet settings as described in Appendix A.

If SNMP management of additional Cheetah Switchers is to be utilized, connect the switchers using 9-pin RS-422 cables to the Aux Frame Ctrl connector.

Configure the Ethernet and SNMP settings as described in Appendices A and B.

11. If desired, connect an external alarm to the System Control Alarm (for further connection compliance information, refer to Chapter 11 for connector pin-outs).
12. If desired, connect an external alarm to the Frame Control Alarm (for further connection compliance information, refer to Chapter 11 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.

9.3 CHEETAH CHASSIS SUPPLY POWER CONNECTIONS

All Cheetah frames have two AC (or DC) Mains power inputs. As depicted in Figure 50, each AC power input is rectified, then diode OR'd with the other rectified power inputs to the filter assembly.

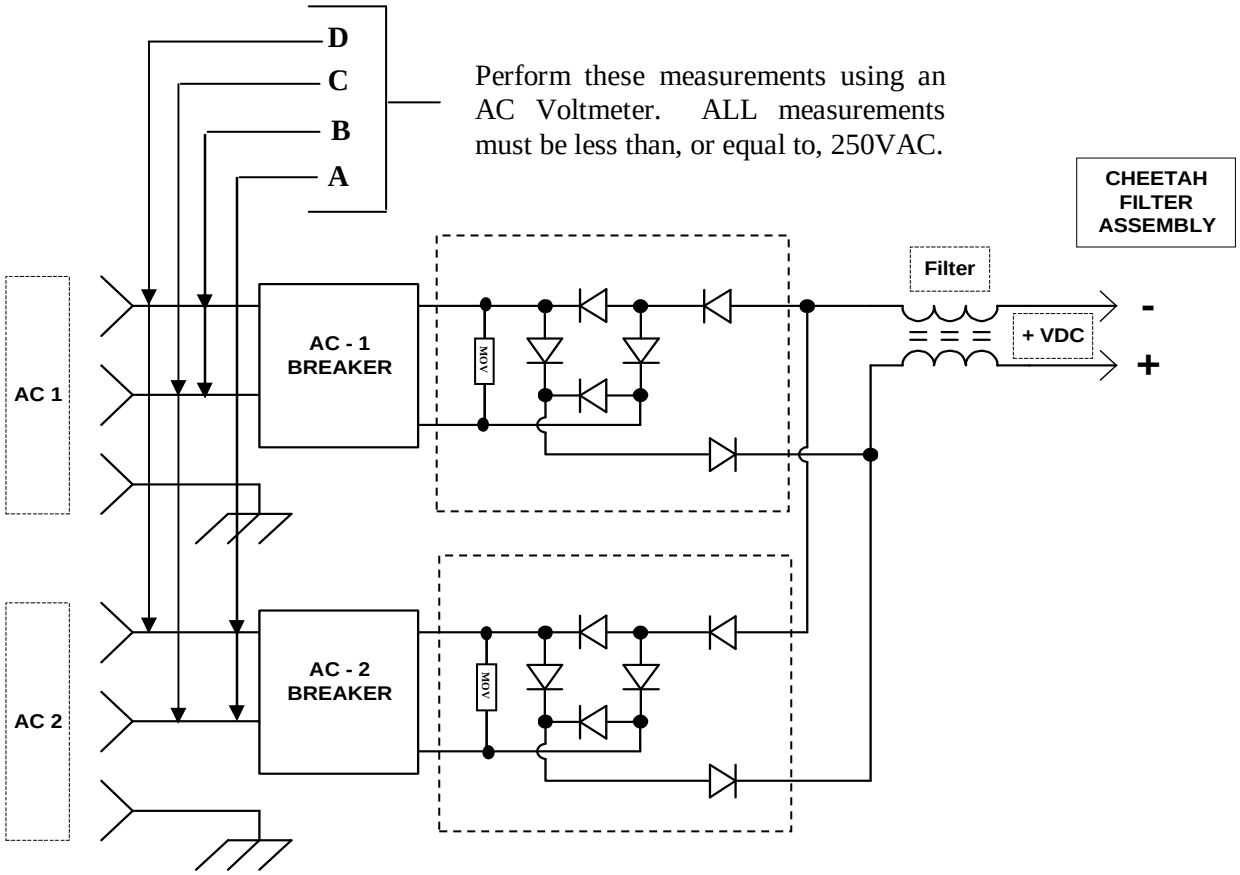


FIGURE 50: Power Supplies Configuration

STOP	**WARNING: The maximum applied voltage to either of the AC power inputs must not exceed 250VAC. In addition, the maximum applied voltage across both AC power inputs must not exceed 250VAC at any time. Whenever two phases of a three-phase power source is applied using different phases on each power input, the voltage between the phases must not exceed 250VAC. Failure to heed this warning will result in serious equipment damage.**

Figure 51 depicts a typical two-phase and three-phase AC line-phasing scenario. Note that in the three-phase line voltage, each voltage phase is 120 degrees out of phase with the other two voltage phases.

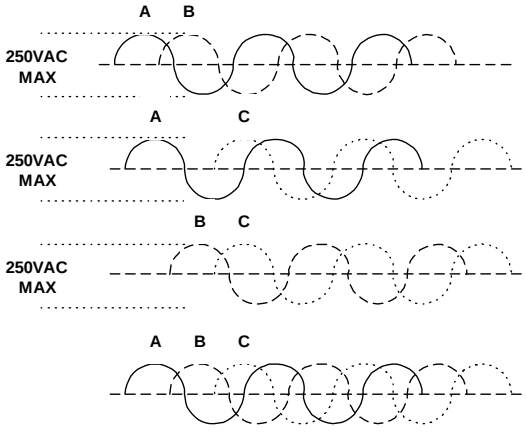


FIGURE 51: Phase Relationships

Additionally, systems with one AC power input supplied from a normal, "in-house" AC line and the other AC power input supplied from an external generator ***must insure*** that, regardless of the voltage-phase relationship between the external generator and the "in house" AC line, the maximum applied voltage between the two AC power inputs ***does not exceed 250VAC***.

NOTE	**If your application requires two independent phases, which exceed the 250VAC maximum, PESA has an interface solution to address your needs. Please contact your PESA dealer or Area Sales Manager.**

CAUTION	**Additionally, it is NOT recommended to use single-phase GFCI circuit protection devices in the supply circuitry of any Cheetah series systems. Due to unbalanced currents in the neutral circuitry, single-phase GFCI devices will typically trip. However (if employed), a three-phase GFCI breaker will not trip except under fault conditions.**

9.3.1 Cheetah 64x64 and 128x128 Chassis Supply Power

	**Make sure that all power is disconnected and the chassis breakers are in the OFF position before completing the specific power connections. Read the Maximum Voltage requirements starting in Section 9.**
	**To prevent damage to the equipment:** • **Read all instructions for proper input voltage ranges.** • **Use the specified power branch circuit ampacity recommended.** • **Follow static prevention precautions prior to handling equipment.**

9.3.1.1 Cheetah 64x64 and 128x 128 Chassis Power Cord and Circuit Breakers

AC power cords may differ depending on your power requirements. The chassis is supplied with the following power cords:

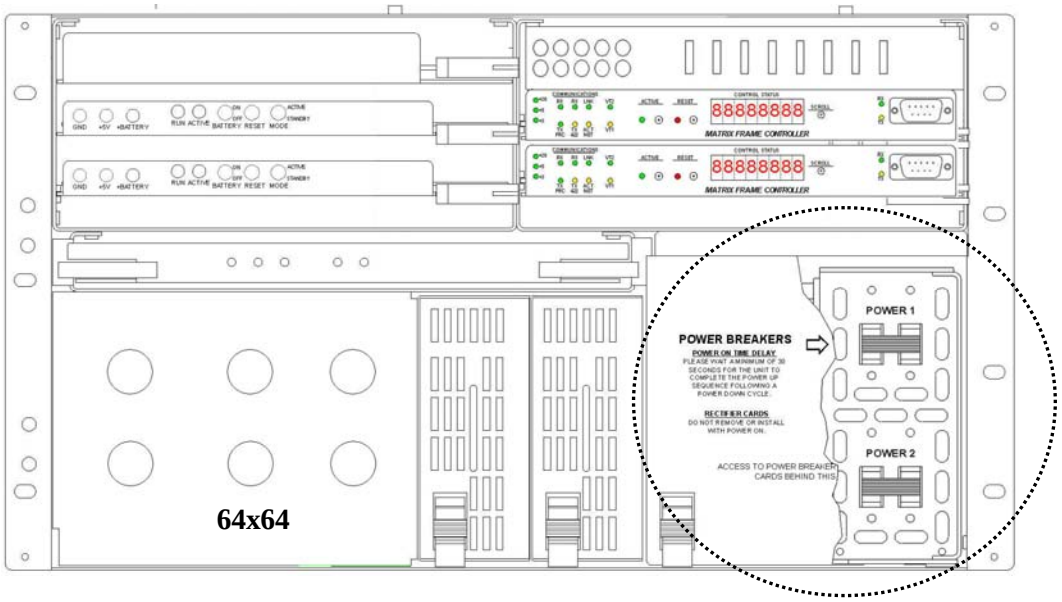
- Two USA standard power cords for 95-120VAC-power service (or the standards for the country that the system is shipped to)
- Two USA standard power cords for 200-240VAC power service (or the standards for the country that the system is shipped to)

Table 19 describes the power connections assigned to the power cord's internal conductors.

TABLE 19: IEC-Type Power Cord Conductor Configuration

Color Code	95-240V	200-240V
Green/Yellow Stripe	Safety Ground	Safety Ground
Blue	Neutral	AC Line
Brown	Line	AC Line

The 64x64 or 128x 128 Chassis two main circuit breakers are mounted behind the protective cover located in the front section of the corresponding frame (see Figure 52).



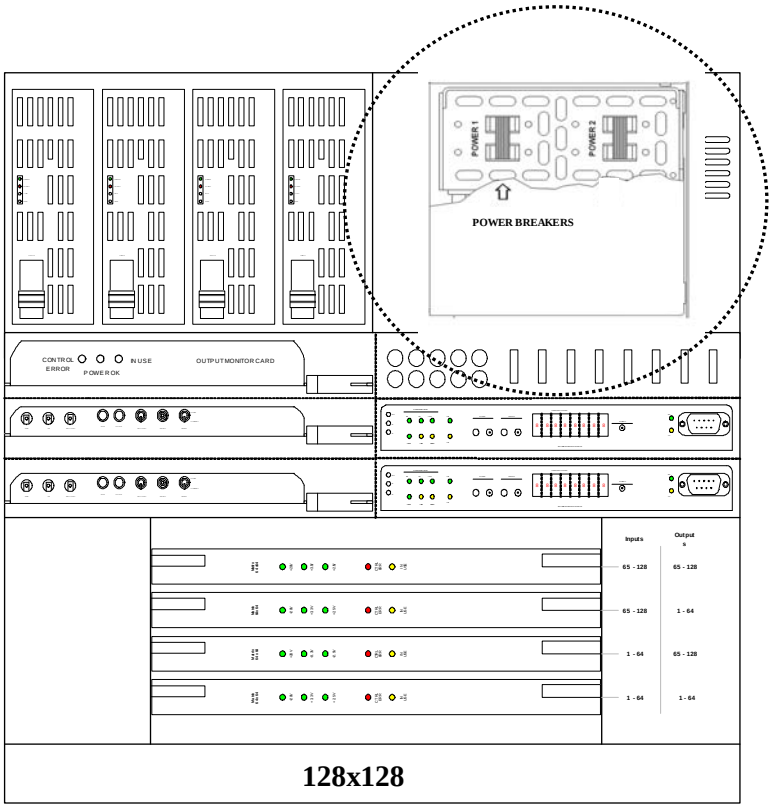


FIGURE 52: Front Panel Circuit Breaker Locations

9.3.1.2 Cheetah 64x64 and 128x128 Chassis AC External Power Requirements

The 64x64 and 128x128 chassis are supplied with four, prefabricated, IEC-type power cords including male and female line connectors. Two cords are for connection to a 95-120VAC-supply service and two cords are for connection to a 200-240VAC-supply service (refer to Table 20). The power cords are differentiated by the male plug's pin alignments.

TABLE 20: AC Power Filter Assembly

AC Power Cable	Minimum Amps Required	IEC	Pigtail	Service Drops
IEC-type line cord (95-120VAC connectors)	20A Service	Yes	No	1-Standard 1-Redundant
IEC-type line cord (200-240VAC connectors)	20A Service	Yes	No	1-Standard 1-Redundant

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

For International Power Requirements for these chassis, refer to Section 9.4.

9.3.2 Cheetah 256x256 Chassis Supply Power

	**Make sure that all power is disconnected and the chassis breakers are in the OFF position before completing the specific power connections. Read the Maximum Voltage requirements starting in Section 9.**

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

9.3.2.1 Cheetah 256x256 Chassis Power Cabling and Circuit Breakers

AC power cords may differ depending on your power requirements. The 256x256 chassis is supplied with either two pigtail cabling assemblies or two, IEC-type power cords (see Figure 53) capable of handling 200-240VAC-voltage range that is preferably connected to dedicated service line.

Each frame's two main circuit breakers are mounted behind the protective cover located in the front section of the associated frame. Table 21 describes the power connections for the power cabling conductors.

TABLE 21: Cabling Conductor Power Connections

Color Code	*95-240V*	*200-240V*
Green/Yellow Stripe	Safety Ground	Safety Ground
Blue	Neutral	AC Line
Brown	Line	AC Line

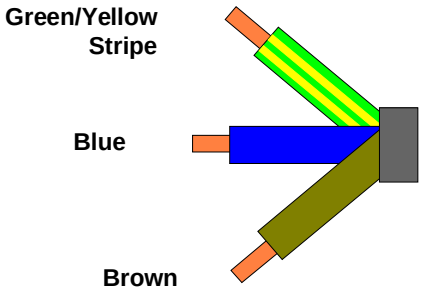


FIGURE 53: Pigtail Cabling Conductors

9.3.2.2 Cheetah 256x256 Chassis AC External Power Requirements

The 256x256 frames are supplied with ***ONE*** of the following two supply-power cabling systems (also, refer to Table 22):

Either:

- Two pigtail-type cable assemblies (see Figure 54 and refer to Tables 22 and 23) that are rated for 95-240VAC or 200-240VAC input supply service connected to preferable dedicated lines.

Or:

- Two, prefabricated, IEC-type power-cord assemblies that are equipped with the appropriate service connectors for connection only to a 200-240VAC input service that has a preferable dedicated line.

TABLE 22: AC Power Filter Assembly

AC Power Cable	Minimum Amps Required	IEC	Pigtail	Service Drops
IEC –type Power Cord (200-240VAC only)	20A Service	Yes	No	1- Standard 1-Redundant
Attached Pigtail Cable (95-240VAC)	40A Service	No	Yes	1-Standard 1-Redundant

NOTE

This AC power filter assembly has been designed for 95-240VAC that includes connectors and cords specified to cover maximum power requirements.

TABLE 23: Pigtail Cabling Conductor Power Connections

Color Code	*200-240V*
Green/Yellow Stripe	Safety Ground
Blue	AC Line
Brown	AC Line

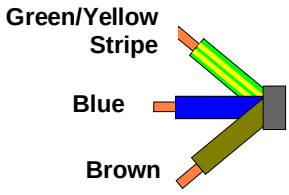


FIGURE 54: Pigtail Cabling Conductors

For International Power Requirements for this chassis, refer to Section 9.4.

9.3.3 Cheetah 256x448, 512 Series, and the 1024x256 Chassis' Supply Power

	**Make sure that all power is disconnected and the chassis breakers are in the OFF position before completing the specific power connections. Read the Maximum Voltage requirements starting in Section 9.**
	**To prevent damage to the equipment:** • **Read all instructions for proper input voltage ranges.** • **Use the specified power branch circuit ampacity recommended.** • **Follow static prevention precautions prior to handling equipment.**

	**In the 512x512 and 1024x256 chassis, a power supply must be populated in each Power Supply Bank, which is a minimum of three power supplies. This is required for the monitoring of the cooling fan system.**

9.3.3.1 Cheetah 256x448, 512 Series, and the 1024x256 Chassis' Power Cabling and Circuit Breakers

The 256x448, 512 Series, and the 1024x256 chassis are supplied with a power cabling assembly (see Figure 55) that meets and/or exceeds the requirements for dedicated input service lines rated for 200-240VAC at 40 amps minimum. Each chassis' two main circuit breakers are mounted behind the protective cover located in the front section of the associated frame. Table 24 describes the power connections for the associated pigtail cabling conductors.

TABLE 24: Pigtail Cabling Conductor Power Connections

Color Code	*200-240V*
Green/Yellow Stripe	Safety Ground
Blue	AC Line
Brown	AC Line

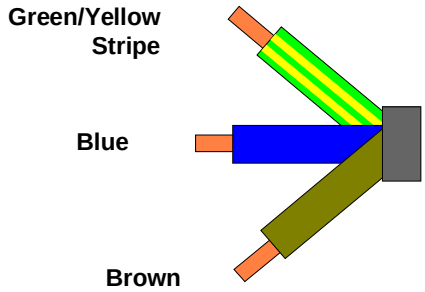


FIGURE 55: Pigtail Cabling Conductors

9.3.3.2 Cheetah 256x448, 512 Series, and the 1024x256 Chassis' AC External Power Requirements

Each 256x448, 512 Series, and the 1024x256 chassis is supplied with pigtail cabling (see Figure 56 and refer to Tables 25 and 26) that is rated for 200-240VAC at 40 amps. The supply power is to be connected to a dedicated service line only.

TABLE 25: AC Power Filter Assembly

AC Power Cable	Minimum Amps Required	Service Drops
200-240V Attached Power Cable pigtails (256x448, 512 Series, and 1024x256 Chassis)	40A Service	1-Standard 1-Redundant

TABLE 26: Pigtail Cabling Conductor Power Connections

Color Code	*200-240V*
Green/Yellow Stripe	Safety Ground
Blue	AC Line
Brown	AC Line

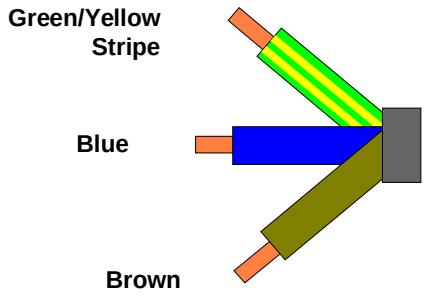


FIGURE 56: Pigtail Cabling Conductors

For International Power Requirements for these chassis, refer to Section 9.4.

9.4 INTERNATIONAL POWER REQUIREMENTS FOR CHEETAH CHASSIS

All Cheetah frames have two AC (or DC) Mains power feeds. For international use only, these power feeds are isolated from each another through a special wiring configuration that is completed at the factory (See Figure 57).

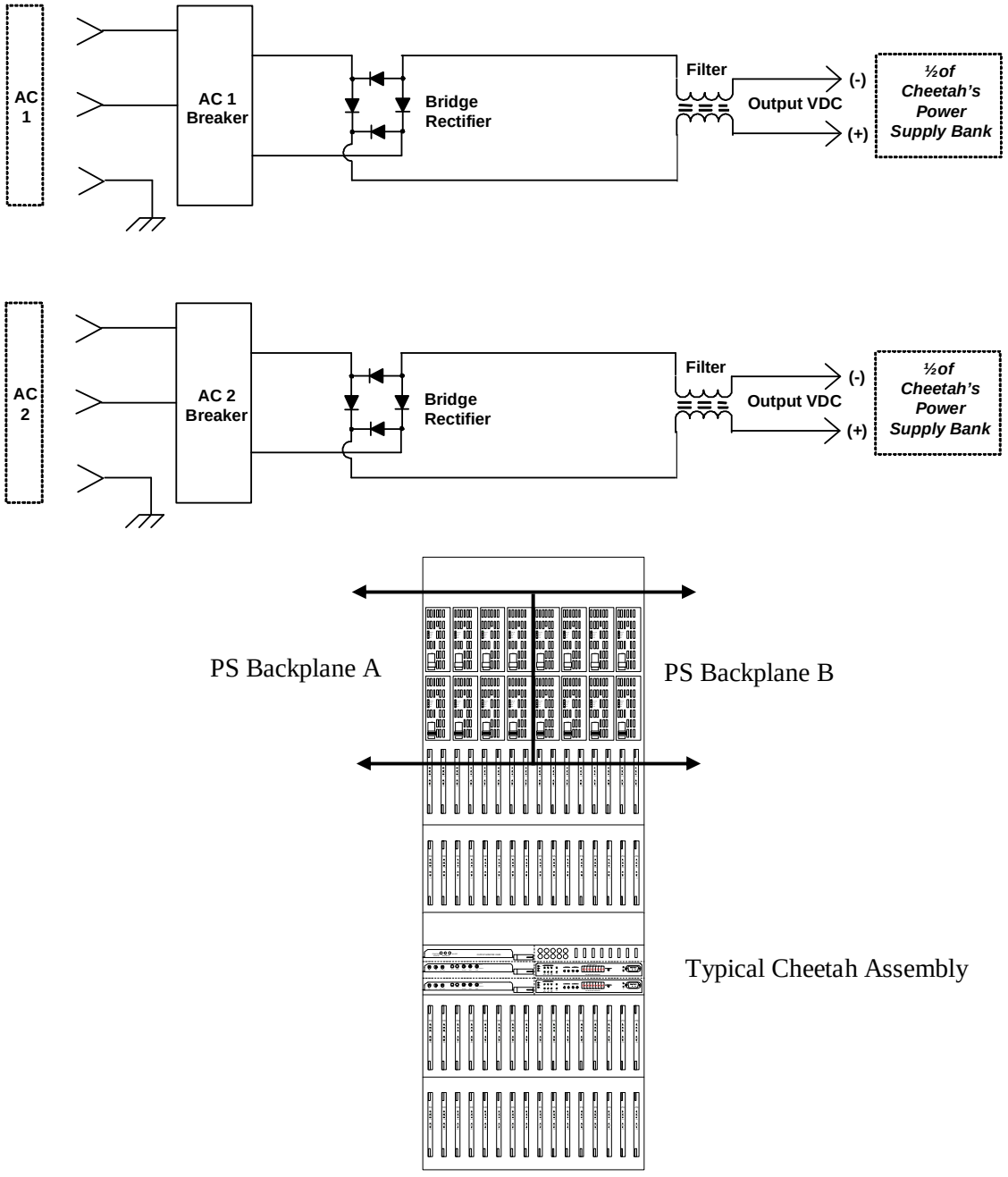


FIGURE 57: International Power Supplies Configuration

In each Cheetah assembly, the entire power supply backplane is divided in half and each half is powered and isolated separately. The following apply to the Cheetah international supply power inputs:

- Two banks of power supplies are required in each Cheetah switcher assembly and each bank must be capable of supplying ALL of the power that is required by the specific Cheetah switcher.
- Both banks must be powered under normal conditions.
- Loss of either AC supply power feed is considered a fault condition.
- When experiencing a loss of one AC supply power feed (fault condition), the remaining supplies will typically operate at 100% of their rated load. An increase in chassis operating temperature is normal as the supplies are typically changing from approximately 50% load to approximately 100% of their rated load.

WARNING: The maximum applied voltage between any leg of either of the isolated AC power inputs must not exceed 250VAC. In addition, the maximum applied voltage between any leg of one AC input and any leg of the other AC power input must not exceed 380VAC nominal at any time. That is, whenever two phases of a three-phase power source is applied using different phases on each power input, the voltage between the phases must not exceed 380VAC nominal. Failure to heed this warning will result in serious equipment damage.

Chapter 10: 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.

10.1 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 the chassis breakers are in the OFF position.
3) Verify all cards/modules are latched and secure.
4) Verify all blank covers are in place and secure (no open slots in the frame).
5) 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).
6) 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).
7) Proceed to System Startup.

10.2 SYSTEM STARTUP

Perform the Cheetah system startup sequence as follows:

1) Energize the main power source to the chassis.
2) Place both chassis breakers in the ON position (handles should be in the UP position). Secure the breaker cover panel.

   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 breaker-cover panel is securely in place. This panel is an integral part of the chassis cooling system. A loose, broken, and/or missing breaker-cover panel could result in destructive overheating of equipment components.

3) 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 the Output Monitor module (if present), the Power OK LED is illuminated (green).

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

f. 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.

4) Startup Sequence complete. Proceed to Frame Control Verification, Section 10.3.

10.3 FRAME CONTROL VERIFICATION

10.3.1 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.

10.3.2 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.

10.3.3 Frame Control Verification Procedure

Perform the following sequence:

1) Perform the chassis pre-start verification checks and startup sequences as outlined in Sections 10.1 and 10.2 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 Output Monitor. Verify the output monitor module (card) configuration is correct as per your specification. For each module, verify the Power Status conditions are green and no other errors are present.

g) 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 10.4.

10.4 SYSTEM CONTROL

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

10.4.1 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). Both the 3500 Series System Controller and the 3500 Series Control System software are inherently flexible and easily configured. The 3500 Series LE 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)

10.4.2 System Control Verification Procedure

Perform the following sequence (hot-swap):

1) Perform the pre-start sequences as outlined in Sections 10.1, 10.2, and 10.3 of this Chapter.

2) Remove the 3500 Series card(s) and verify the S1 dipswitch (see Figure 58) 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).

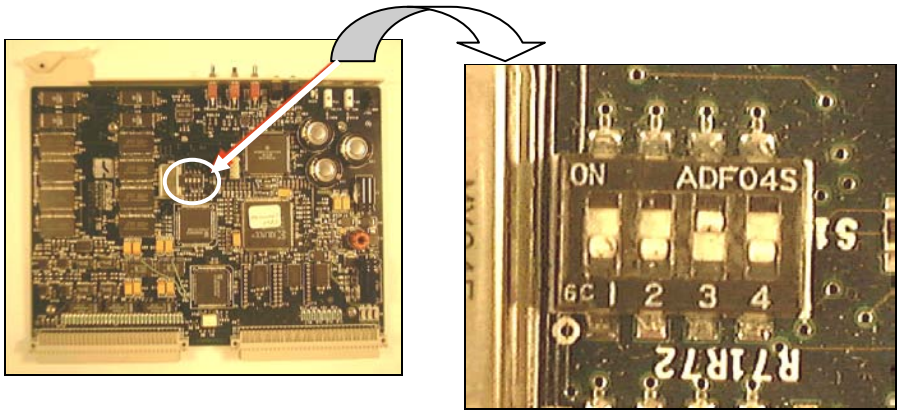


FIGURE 58: 3500 Series Card Dipswitch Locations (set for 9,600 baud rate)

The dipswitch should be set in accordance with Table 27 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 58. (However, the factory default is 38,400 Baud-rate with switch #3 in the ON position.)

TABLE 27: 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:
   a) Verify the 3500 Series controller is communicating (COM1) properly with the PC.
   b) Verify the system configuration matrix is loaded on the 3500 Series controller card (firmware). If not, reload the system configuration in the controller firmware.
   c) 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.
   d) 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 11: 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.

11.1 CHEETAH SERIES POWER SUPPLIES

11.1.1 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 3.5mA 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 or more 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, which are described in each chassis power supply locations and allocations configuration in this section.

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 only be serviced 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.

11.1.2 Cheetah Series Chassis Power Supplies Locations and Allocations

The power supplies are located on the front of the frame as shown in the following subsections. Additionally, the minimum and/or maximum amount of power supplies that can be used with each Cheetah Series frame will be listed with the associated chassis.

STOP	**Each Power Supply slot in the chassis must have either a power supply or a blank installed to satisfy the cooling requirements or destructive overheating of the components could result.**

11.1.2.1 64x64 Cheetah Chassis Power Supplies

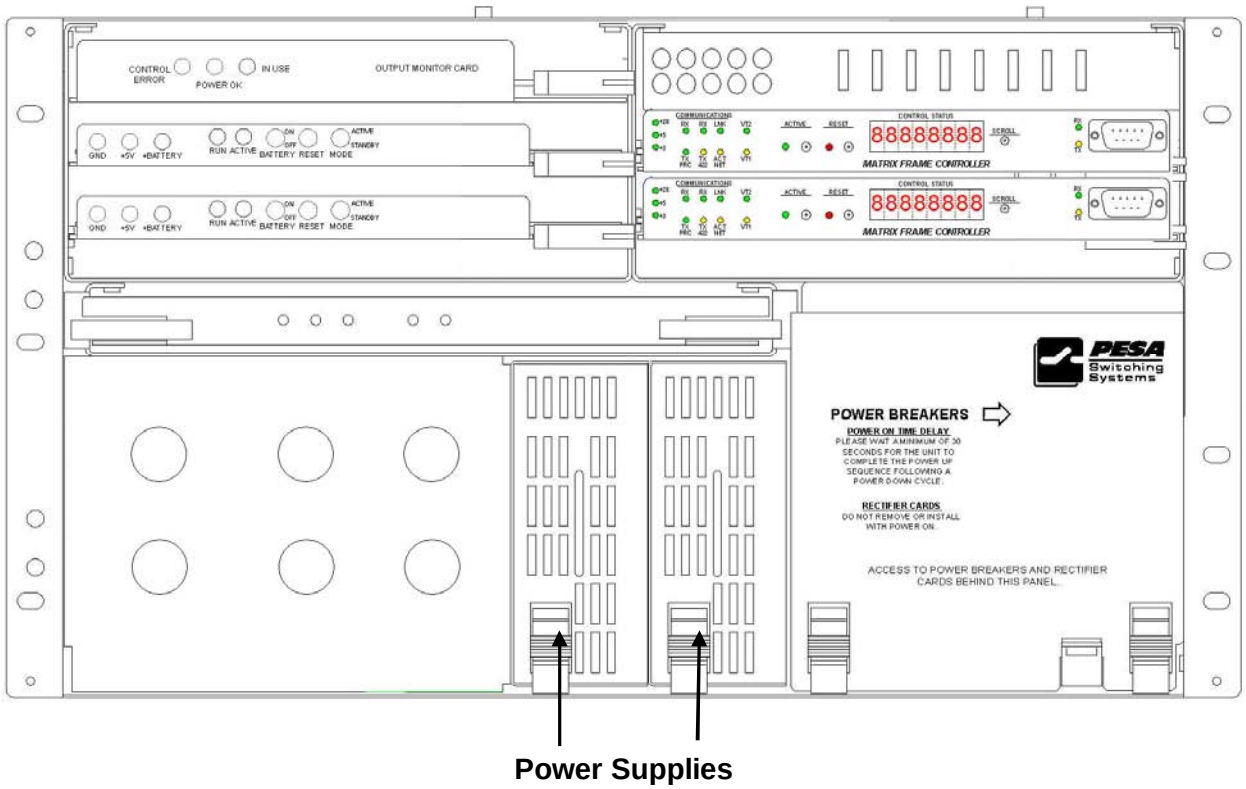


FIGURE 59: 64x64 Chassis Power Supply Locations (Front View)

CAUTION	**Each slot must have either a power supply or a blank installed. If you only install one power supply, you can install it in either slot.**

11.1.2.2 128x128 Cheetah Chassis Power Supplies

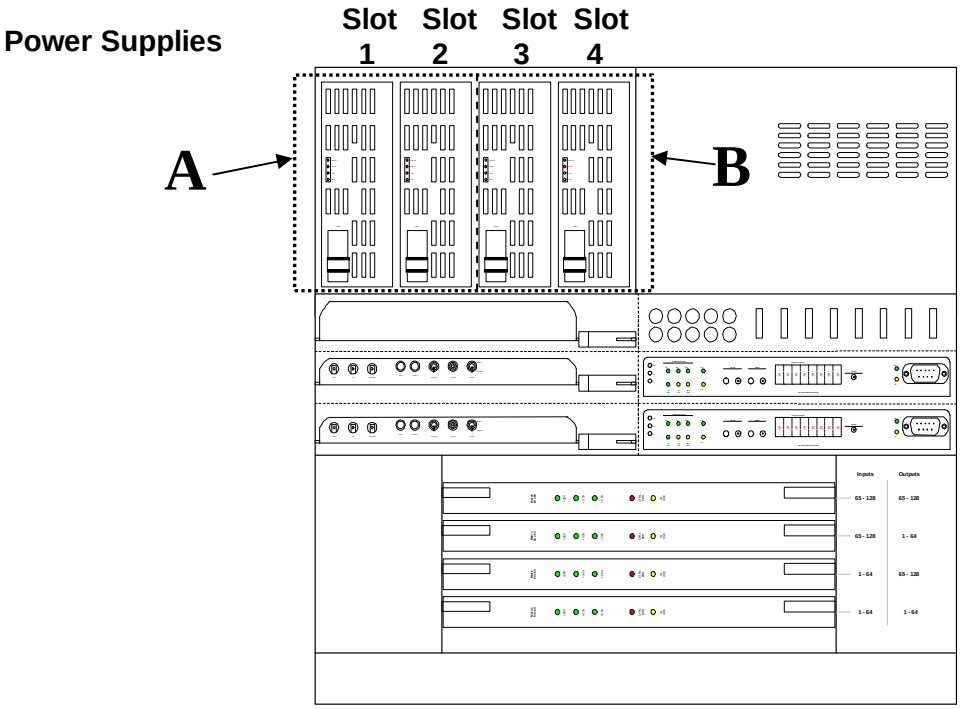


FIGURE 60: 128x128 Chassis Power Supply Locations (Front View)

CAUTION	**Each slot must have either a power supply or a blank installed. If you only install two power supplies, you *MUST* install one in Bank A and one in Bank B to satisfy the fan operating configurations.**

11.1.2.3 256x256 Cheetah Chassis Power Supplies

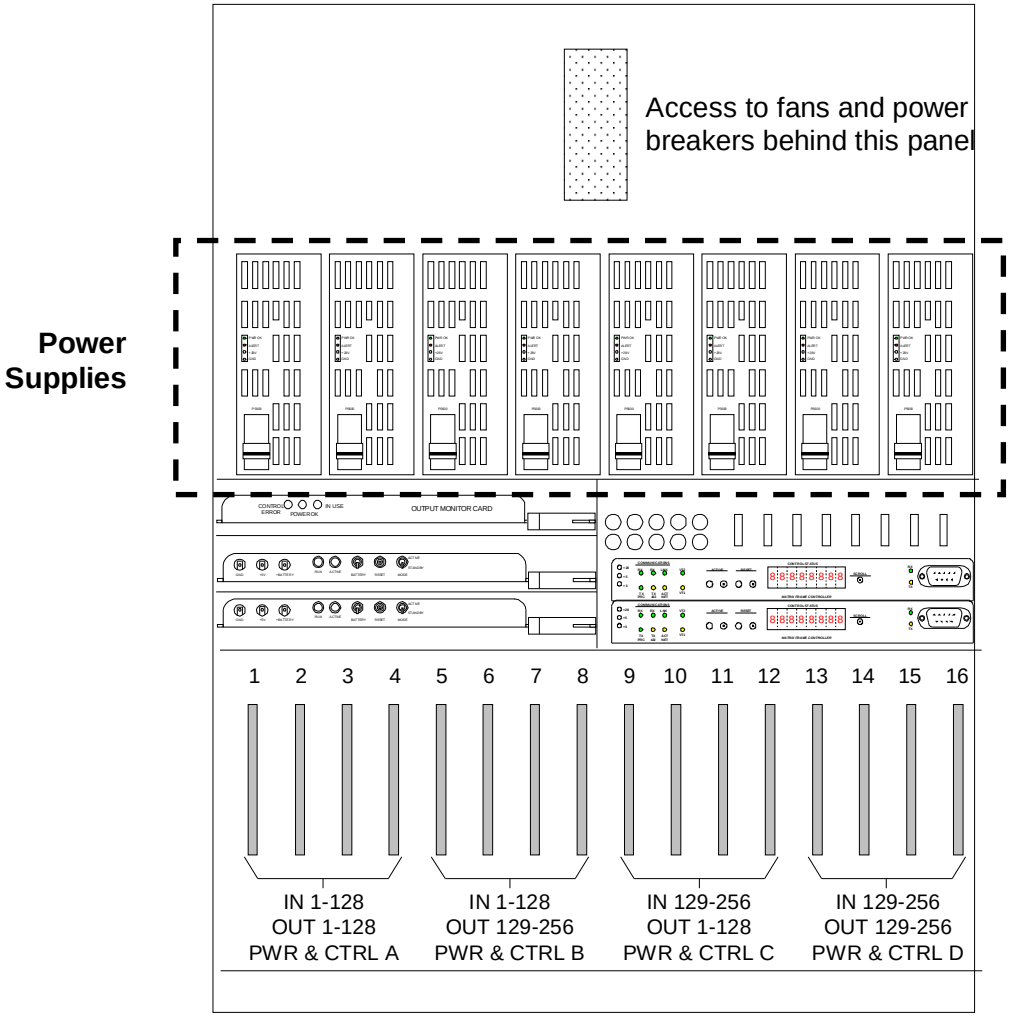


FIGURE 61: 256x256 Chassis Power Supply Locations (Front View)

CAUTION	**You can install up to eight power supplies. Each slot must have either a power supply or a blank installed. You can install them in any slot.**

11.1.2.4 256x448 Cheetah Chassis Power Supplies

The power supply locations for this chassis will be at the very top of the frame as shown in Figure 62.

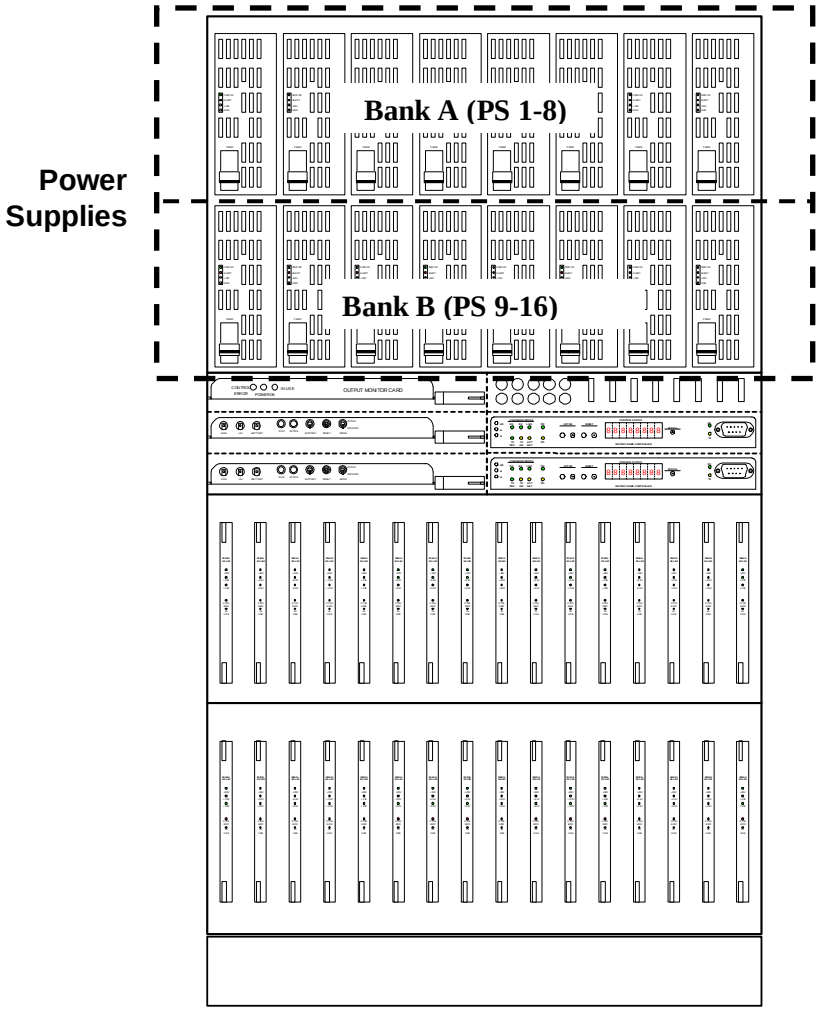


FIGURE 62: 256x448 Chassis Power Supply Locations (Front View)

CAUTION	**You can install up to 16 power supplies. A minimum of 2 power supplies must be installed and each bank must have at least one power supply installed. Each slot must have either a power supply or a blank installed. You can install them in any slot.**

STOP	**In the 256x448 chassis, a power supply must be populated in each Power Supply Bank, which is a minimum of two power supplies. This is required for the monitoring of the cooling fan system.**

11.1.2.5 512x512 and 1024x256 Cheetah Chassis Power Supplies

The power supply locations for these chassis will be at the very top of the frame as shown in Figure 63. However, the other component configurations will differ.

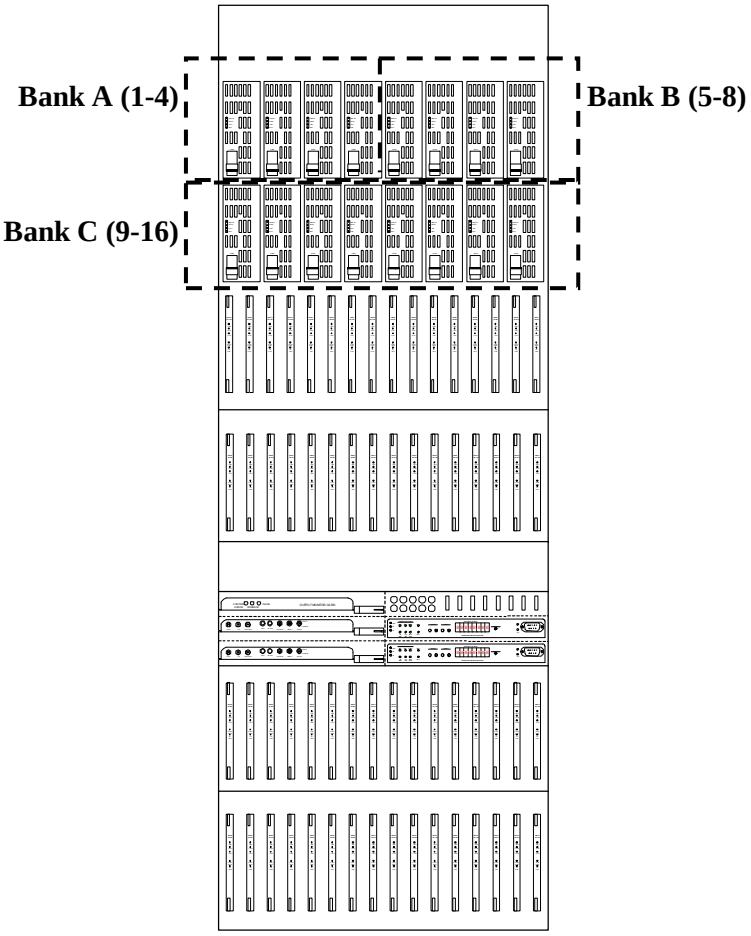


FIGURE 63: 512x512 and 1024x256 Cheetah Chassis Power Supply Banks

CAUTION	**You can install up to 16 power supplies. A minimum of 3 power supplies must be installed and each bank must have at least one power supply installed. Each slot must have either a power supply or a blank installed. You can install them in any slot.**

STOP	**In the 512x512 and 1024x256 chassis, a power supply must be populated in each Power Supply Bank, which is a minimum of three power supplies. This is required for the monitoring of the cooling fan system.**

11.1.3 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 64. The LED indicators are described in Table 28.

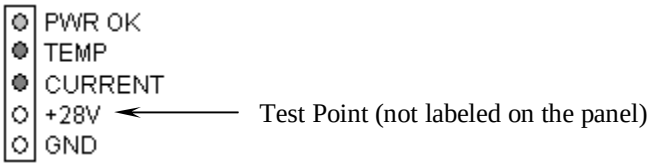


FIGURE 64: Power Supply LED Indicators And Test Points

TABLE 28: 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!***

11.1.4 +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).

11.1.5 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.

	**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.

	**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.

11.1.6 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):

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

1. Open the Cheetah front cover.

	**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.

11.2 INPUT BUFFER CARD

11.2.1 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.

11.2.2 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 29.

TABLE 29: 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.

11.3 OUTPUT COMBINER CARD

11.3.1 Output Combiner Card Overview

Each output combiner card provides 16 output connections from the system. Each output channel can combine up to eight signals from individual matrix cards. 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.

11.3.2 Output Combiner Card LED Indicators

Two LED indicators are located on the Output Combiner card. These LEDs are described in Table 30.

TABLE 30: 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.

11.4 INSTALLING INPUT/OUTPUT BUFFER CARDS

Install the input/output buffer cards as follows (see Figure 65):

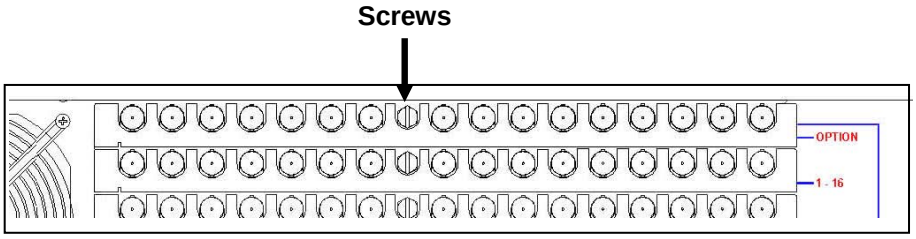


FIGURE 65: Input/Output Signal Connectors (rear view)

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!**

11.5 OUTPUT MONITOR CARD

11.5.1 Output Monitor Card Overview

The Output Monitor Card (see Figure 66) controls Output Monitor Connectors 1 and 2 located on the back (lower right) of the Cheetah. You will generally use the connectors for quality assurance or to troubleshoot specific outputs. Using the 3500ProControl software, you can select specific outputs to monitor.

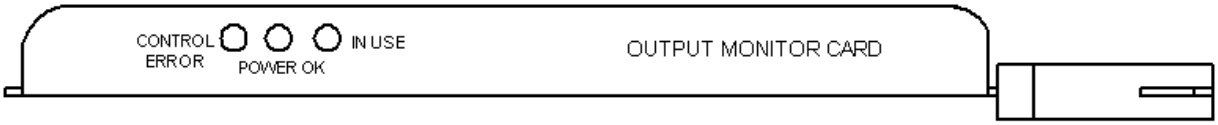


FIGURE 66: Output Monitor Card

The Output Monitor Card is internally strobed to "33", which will be automatically offset by 32 based on the Frame strobe setting. For example, if the Frame strobe is set to 10, the internal Output Monitor Card strobe will be automatically set to 42.

11.5.2 Output Monitor Card LED Indicators

Three LED indicators are located on the front of the Output Monitor card. These LEDs are described in Table 31.

TABLE 31: Output Monitor Card LED Indicators

LED	Color	Status	Description
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. 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.
Power OK	Green	**ON**	Indicates that the +28V, +4.8V, +4.3V, and +3.5V power is stable and within normal operating parameters.
		Blinking	Indicates that 28V is not stable or the 4.8V, 4.3V, or 3.5V power supplies are not working.
In Use	Yellow	**ON**	Indicates that a crosspoint on the matrix card is activated.

11.5.3 Installing the Output Monitor Control Card

To install the Output Monitor Control Card into a Cheetah Routing Switcher chassis, perform the following steps:

1. Open the Cheetah Chassis front door.
2. Align the card horizontally with the card guides in the chassis.
3. Carefully, slide the card straight into the chassis just until the connector on the card makes initial contact with the backplane connector. If possible, inspect the mating connectors to ensure proper alignment.
4. Firmly, push the card into the chassis until the connector on the card is fully mated with the backplane connectors.
4. Push the card-latch inward and secure to lock the card in place.

11.5.4 Removing the Output Monitor Control Card

To remove the Output Monitor Control Card from a Cheetah Routing Switcher chassis, follow these steps:

1. Open the Cheetah Chassis front door.
2. Firmly, pull the card-latch outward to release the card from the backplane connectors.
3. Carefully, slide the card straight out of the chassis.

11.6 3500 SERIES SYSTEM CONTROLLER CARDS

The Cheetah may contain up to two redundant 3500 Series System Controllers (see Figure 67). If the primary controller fails, the secondary controller automatically resumes all of the primary controller functions. The System Controller, working in conjunction with 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.

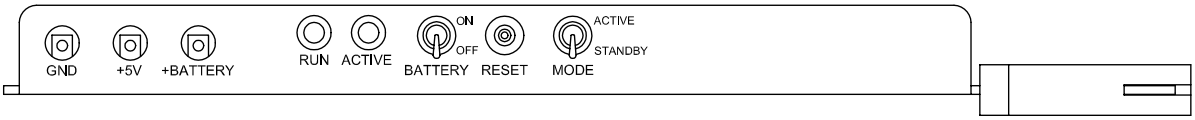


FIGURE 67: 3500 Series System Controller Board Assembly Front View

11.6.1 GND

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

11.6.2 +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).

11.6.3 +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.

11.6.4 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.

11.6.5 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.

11.6.6 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.

11.6.7 LED's

The 3500 Series System Controller board has three LEDs, which are described in Table 32:

TABLE 32: 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.

11.7 64X64 VIDEO (CROSSPOINT) MATRIX CARD

11.7.1 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 68).

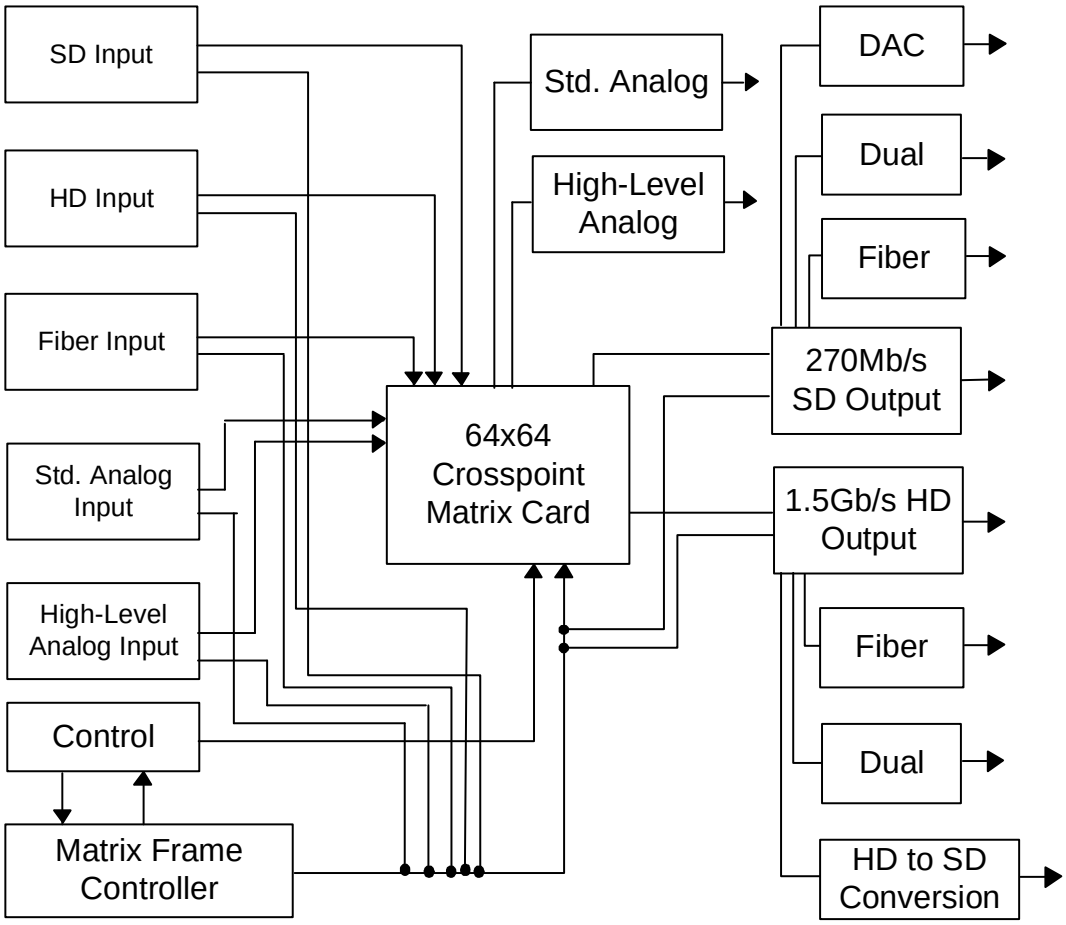


FIGURE 68: 64x64 Video Crosspoint Matrix Card Diagram

11.7.2 64x64 Video Crosspoint Matrix Card LED Indicators

Five LED indicators are located on the 64x64 matrix card faceplate, as illustrated in Figure 69 and described in Table 33.

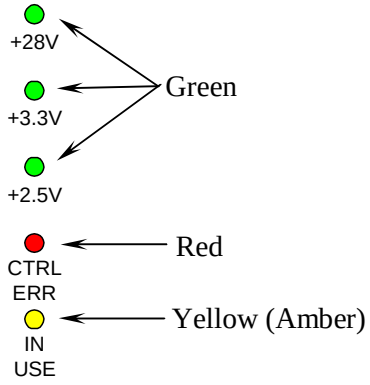


FIGURE 69: 64x64 Video Crosspoint Matrix Card LEDs

TABLE 33: 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 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 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 power supplies are not working.

Table continued on next page

Table 33 (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.

11.8 MATRIX FRAME CONTROLLER (MFC)

The matrix frame controller, located on the right front of the unit, is illustrated in Figure 70. 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 frame of each matrix frame controller is a diagnostic port (on the far right) used for troubleshooting (for further information, refer to Chapter 12 and Appendix A).

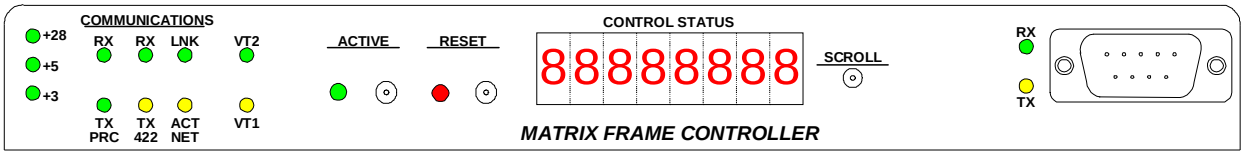


FIGURE 70: Matrix Frame Controller

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 Appendix A for details on Ethernet configuration options).

11.8.1 MFC LED Indicators

The matrix frame controller LED indicators are described in Table 34.

TABLE 34: 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 transmitted.
Tx	Yellow	**ON**	Indicates that Transmit data is being transmitted.

11.8.2 MFC 8-Character Display

An eight-character display (see Figure 71) is located on the front of the matrix frame controller.

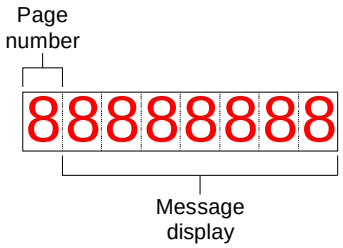


FIGURE 71: 8-Character Display

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 35.

TABLE 35: 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 35: 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.

11.8.3 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 72.

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

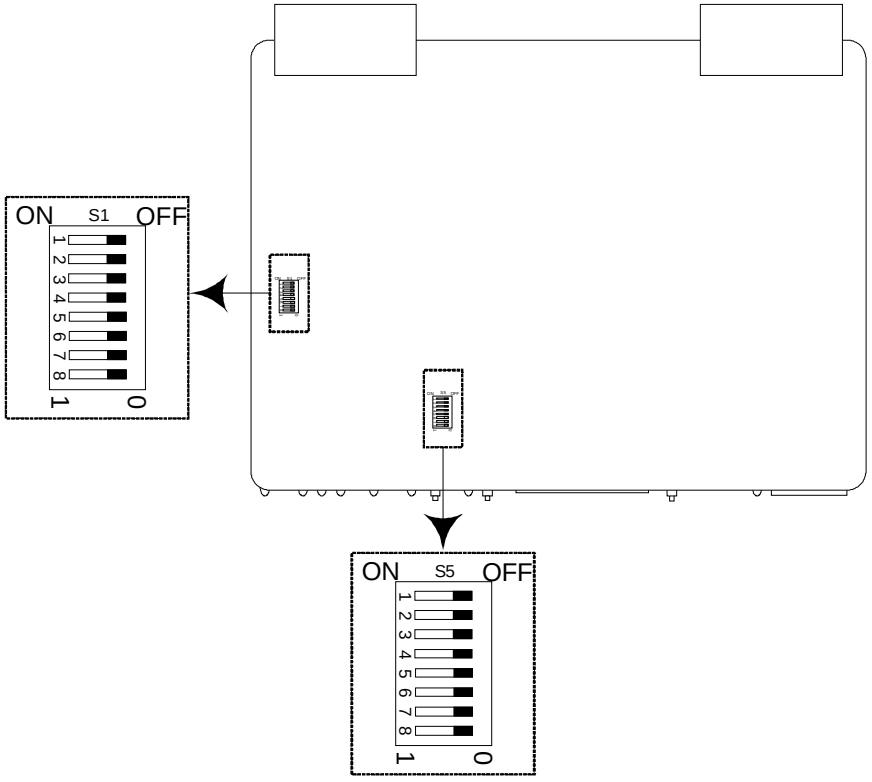


FIGURE 72: MFC Dipswitch Locations

11.9 REAR PANEL CONNECTORS

11.9.1 RS-232 Control Connectors COM 1 and COM 2

COM 1 and COM 2 (see Figure 73) are DB-9 Male connectors that provide RS-232 serial communication interfaces. Pinouts are shown in Table 36.

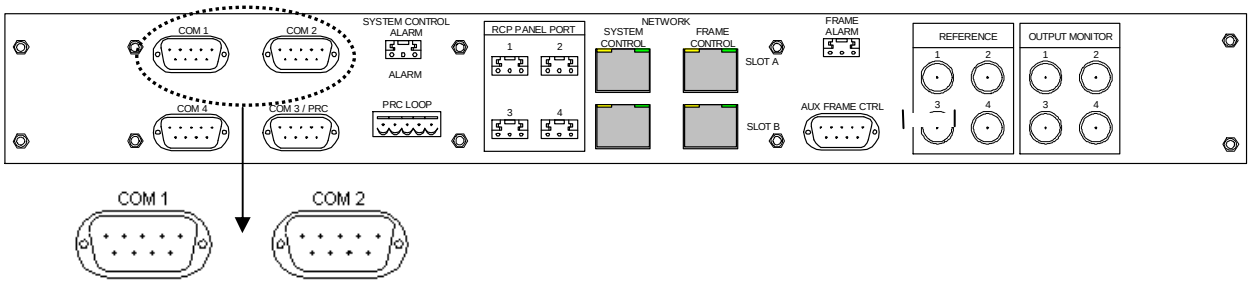


FIGURE 73: RS-232 Control Connectors

TABLE 36: 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 37 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 37: 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

11.9.2 RS-232 Control Connectors COM3/PRC and COM4

These DB-9 Male connectors (see Figure 74) provide RS-422 serial communication interfaces.

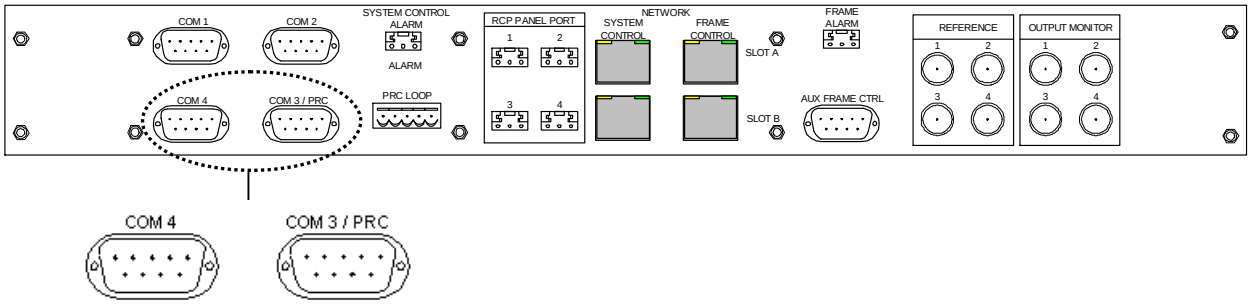


FIGURE 74: RS-232 COM 3/PRC and COM 4 Control Connectors

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 38 for pin assignments).

TABLE 38: 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)

COM 4 (refer to Table 39 for pin assignments) is an RS-422 CPU Link similar to the RS-232 CPU Link, except the cable may be up to and including 4,000 feet in length and an RS-422 interface card must be installed in the PC. COM 4 may be used with either of the protocols listed in the previous Table 38.

TABLE 39: COM4 Pin Assignments

Pin	Signal	In/Out
1	CTS+	Input
2	RX+	Input
3	TX-	Output
4	RTS-	Output
5	Ground	---
6	CTS-	Input
7	RX-	Input
8	TX+	Output
9	RTS+	Output

11.9.3 System Control Alarm Connector

This three-pin connector, illustrated in Figure 75, provides an interface for an external, customer-supplied, system control alarm (alarm contact locations are also shown). 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 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. **The customer-supplied circuitry must not exceed 12VDC @ 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)

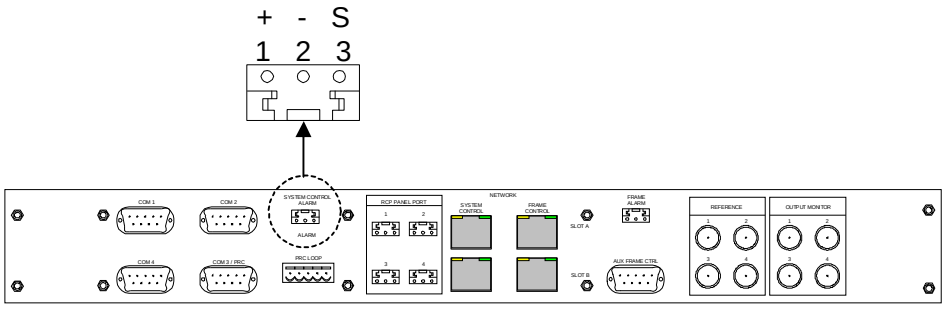


FIGURE 75: System Control Alarm Connector

The customer supplied external alarm circuit is connected with a cable constructed as shown in Figure 76.

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

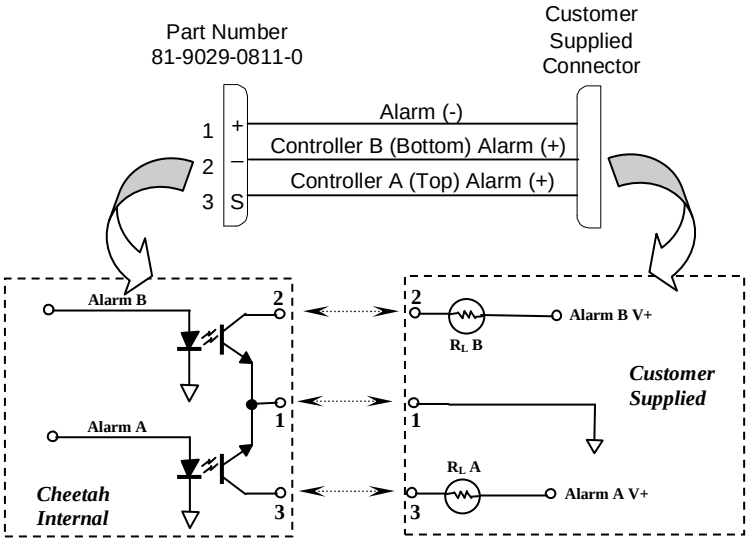


FIGURE 76: Alarm Cable Setting and Associated Schematic

11.9.4 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 77.

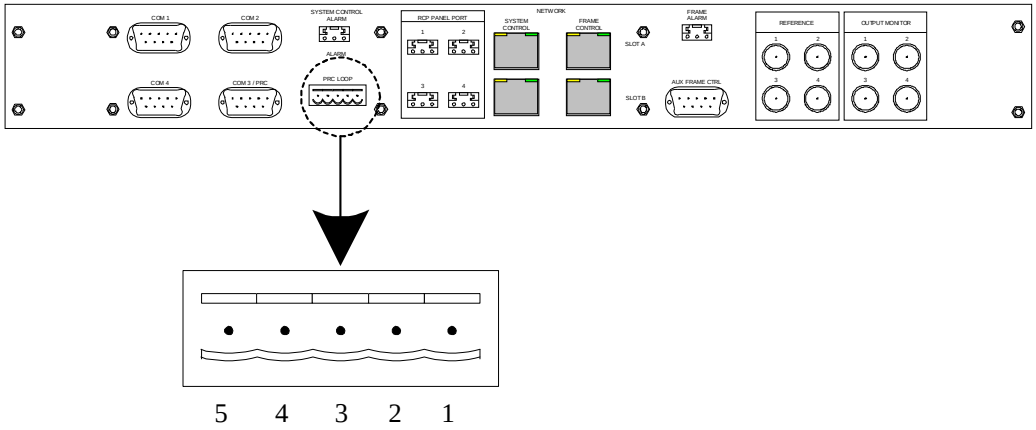


FIGURE 77: PRC Loop Connector

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 78.

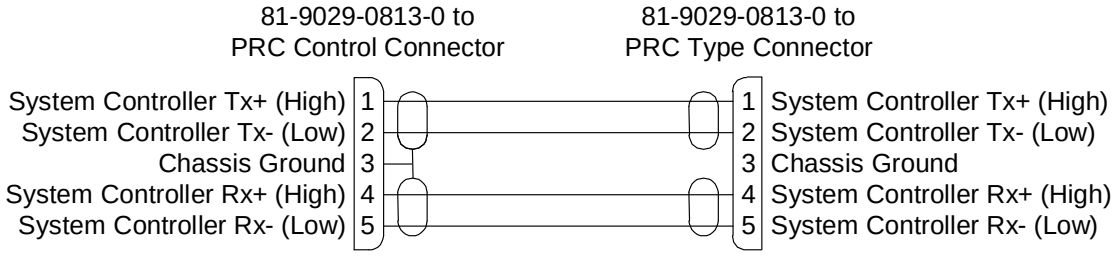


FIGURE 78: RS-422 System Expansion Cable

11.9.5 RCP Panel Port Connectors

Four RCP connectors, located on the rear of the unit and illustrated in Figure 79, provide RS-485 serial communication interfaces using the PESA RCP Protocol (Document No. 81-9062-0300-0).

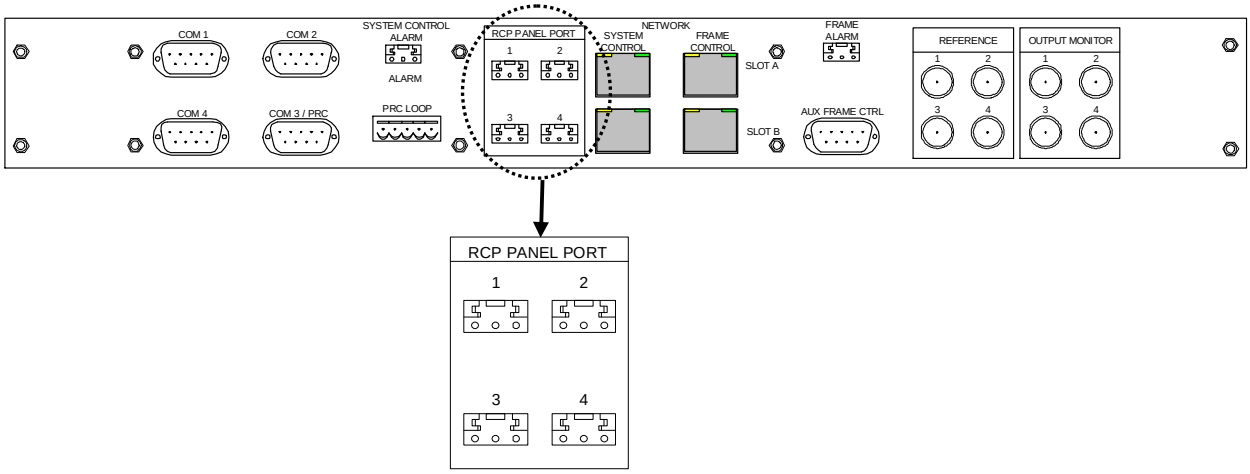
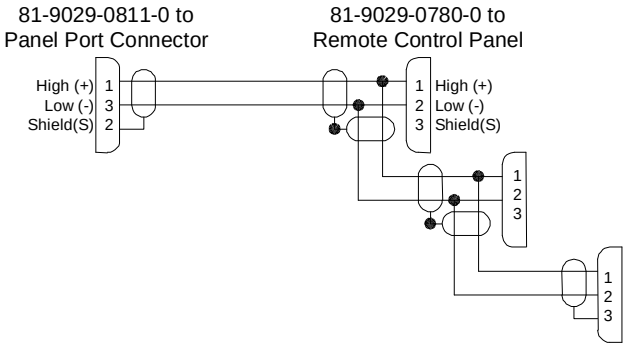


FIGURE 79: RCP Panel Port Connectors

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 80. 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 80: RS-485 Cable Construction

11.9.6 Network Connectors

The RJ-45 Ethernet connectors, illustrated in the Figure 81, connect the Matrix Frame Controllers to a 10 or 100Mb/s TCP/IP network. The System Control connectors are not used. Ethernet configuration options are detailed in Appendix A.

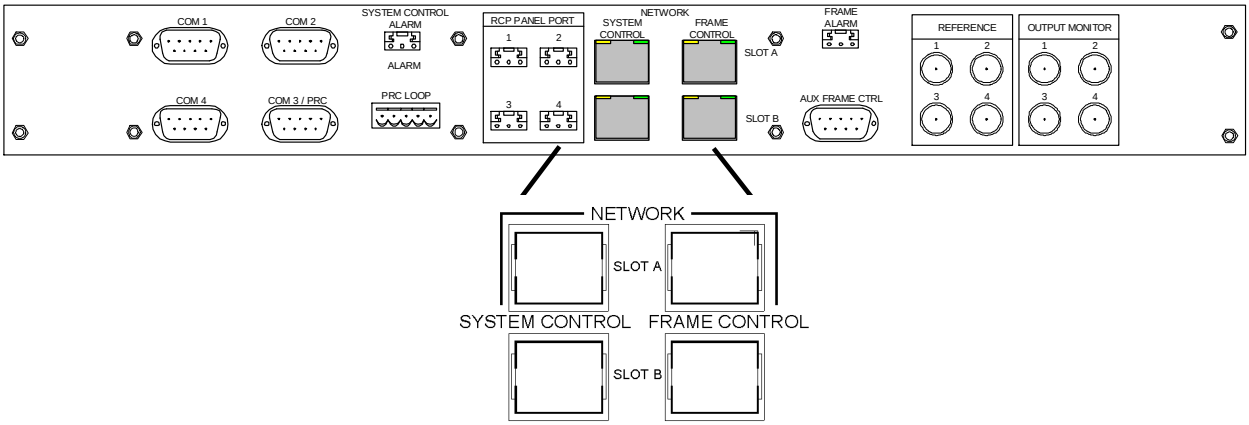


FIGURE 81: Network Connectors

LED indicators are provided as follows (see Figure 82 and refer to Table 40):

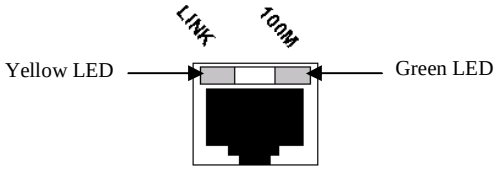


FIGURE 82: Ethernet Connector

TABLE 40 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 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 controller located in slot B (see Figure 83 for a typical location).

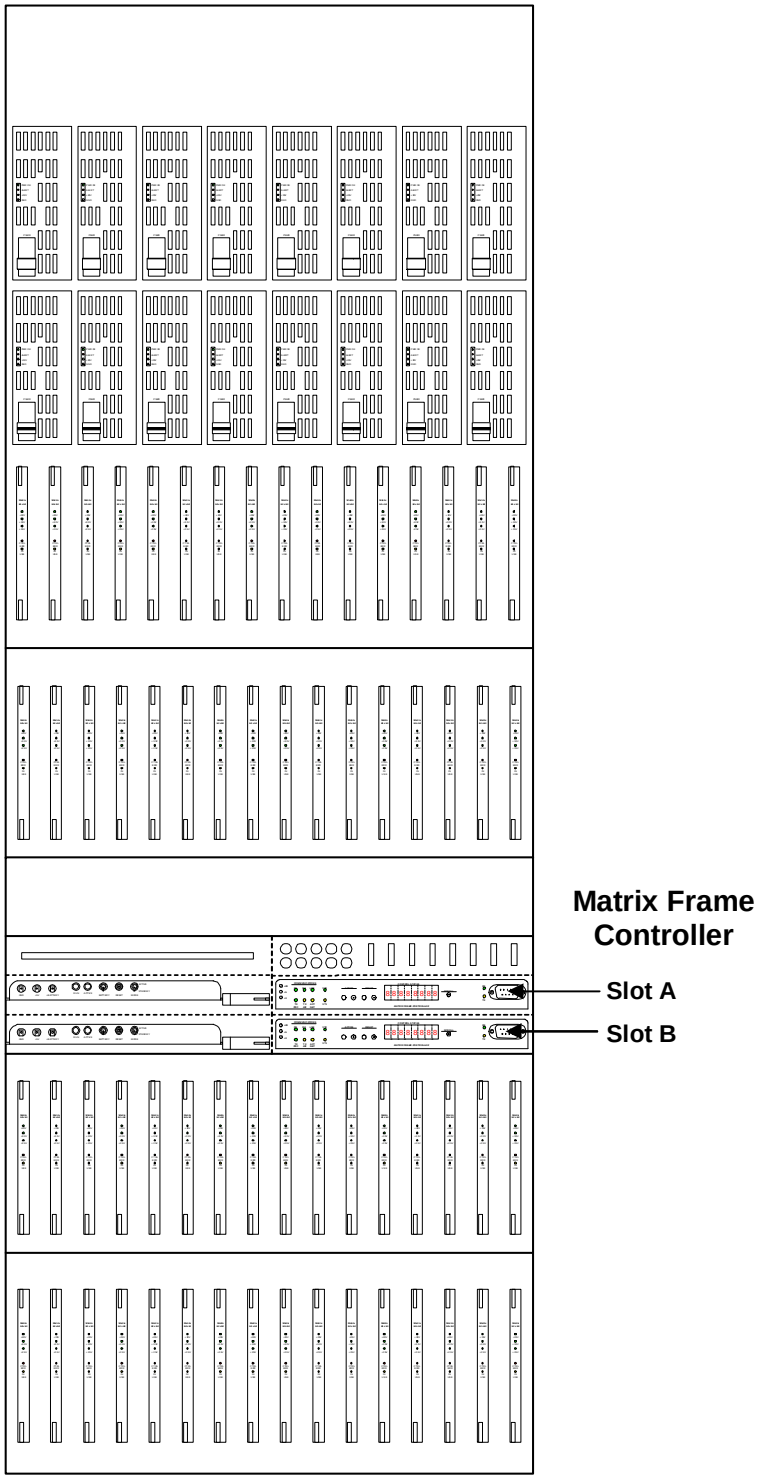


FIGURE 83: Typical Matrix Frame Controller Cards locations, Slot A And Slot B

11.9.7 Frame Alarm Connector

This three-pin connector, illustrated in Figure 84, provides an interface for an external, customer-supplied frame control alarm. The Matrix Frame Controller determines when a frame alarm condition is declared. Alarm contact location is illustrated in Figure 84. 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. The customer-supplied external alarm circuit is connected with a cable constructed as shown in Figure 85 (next page).

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

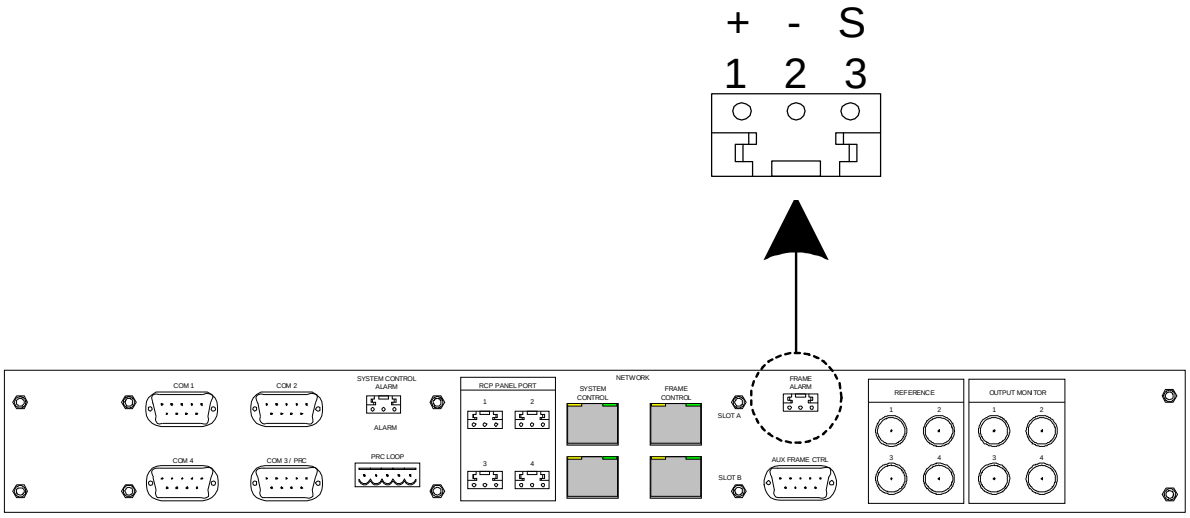


FIGURE 84: Frame Alarm Connector

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

- Finds a card (input, output, matrix, output monitor, power supply, or matrix frame controller) with a temperature out of range (above 114 ºF)
- Finds a fan's voltage out of range
- Finds 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.

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

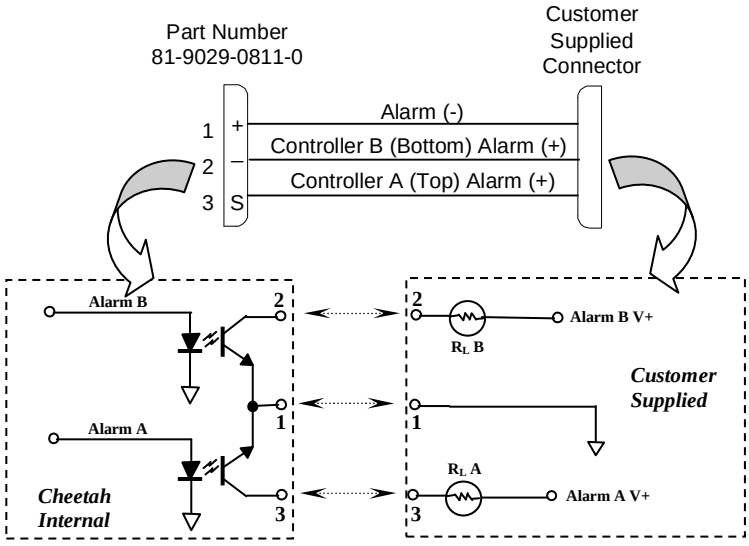


FIGURE 85: Alarm Cable Connection and Circuit Schematic

11.9.8 Auxiliary Frame Control Connector

This connector (see Figure 86 and refer to Table 41) is used for SNMP management of additional Cheetah switchers. Configuration and operation of the embedded SNMP agent is detailed in Appendix B.

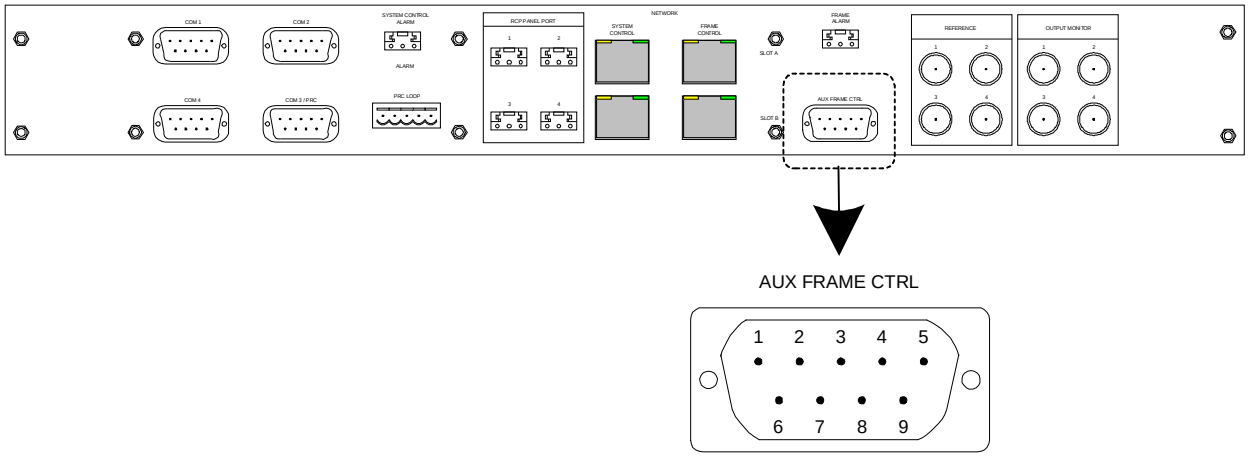


FIGURE 86: Auxiliary Frame Control Connector

TABLE 41: Auxiliary Frame Control Pin Assignments

Pin	Signal	In/Out
1	CTS+	Input
2	RX+	Input
3	TX-	Output
4	RTS-	Output
5	Ground	---
6	CTS-	Input
7	RX-	Input
8	TX+	Output
9	RTS+	Output

11.9.9 House Synchronization Input Connectors

These BNC coaxial connectors, illustrated in Figure 87, provide the interface for two, house (analog only) synchronization signals (i.e., NTSC, PAL, 1080i, 1080P, and 720P only). Each house sync input is a pair of BNC connectors wired in parallel (1 and 3 are a pair; 2 and 4 are a pair). The paralleling of these connectors allows the synchronization signal to be daisy-chained from one routing switcher to another.

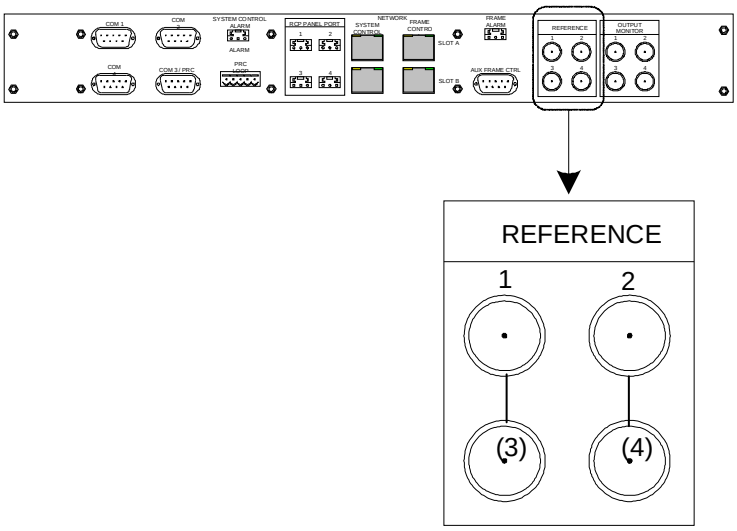


FIGURE 87: House Sync Input Connectors

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 synch assignment would be as follows:

Reference 1 is connected to an NTSC synch signal source and Reference 2 is connected to a PAL synch 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.

References 1 and 2 should be connected to the house sync source with coaxial cable and standard BNC connectors.

CAUTION	**Install 75Ω terminators on all unused connectors. Do not allow these connectors to float un-terminated.**

11.9.10 Output Monitor Connectors

These BNC coaxial connectors, illustrated in Figure 88, provide the interface for evaluating the output signals. Currently, connectors 1 and 2 are available. Connectors 3 and 4 are reserved for future use. You will generally use these for quality assurance or troubleshooting. For example, you would use these to monitor the quality of a specific output signal. You control the outputs you can monitor with the 3500 Series Control System software. Make sure the Output strobe is set correctly before using this option. Install 75Ω terminators on all unused connectors. Do not allow these connectors to float un-terminated.

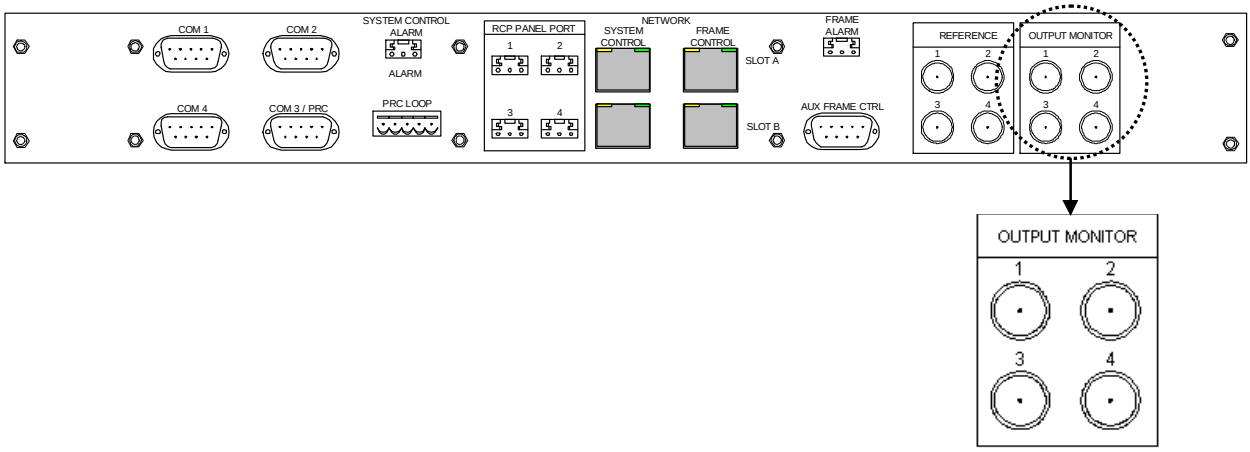


FIGURE 88: Output Monitor Connectors

Chapter 12: 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 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.***

12.1 MAINTENANCE

12.1.1 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.**

12.1.2 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).

12.1.3 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 each Cheetah Series chassis.

12.1.3.1 Cheetah 64x64 Fan Replacements

These switchers are equipped with two, surface-mounted fan assemblies (see Figure 89) that are easily removed from the rear exterior of the chassis.

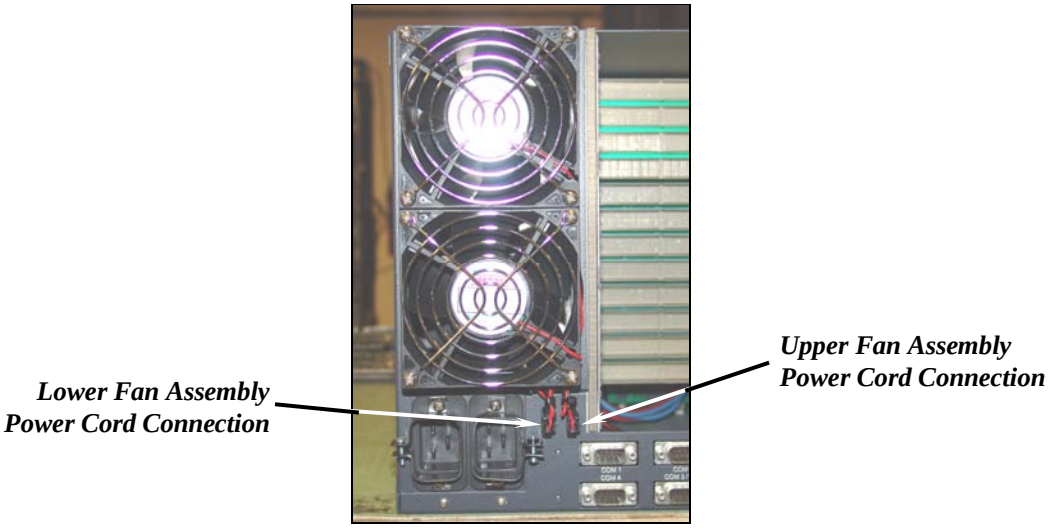


FIGURE 89: 64x64 Fan Assemblies and Associated Power Connections

Perform the following sequence to replace a faulty fan assembly:

1. Disconnect the fan power cord (see Figure 89) 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.

12.1.3.2 128x128 Chassis Fan Replacements

These switchers are equipped with three, surface-mounted fan assemblies (see Figure 90) that are easily removed from the rear exterior of the chassis.

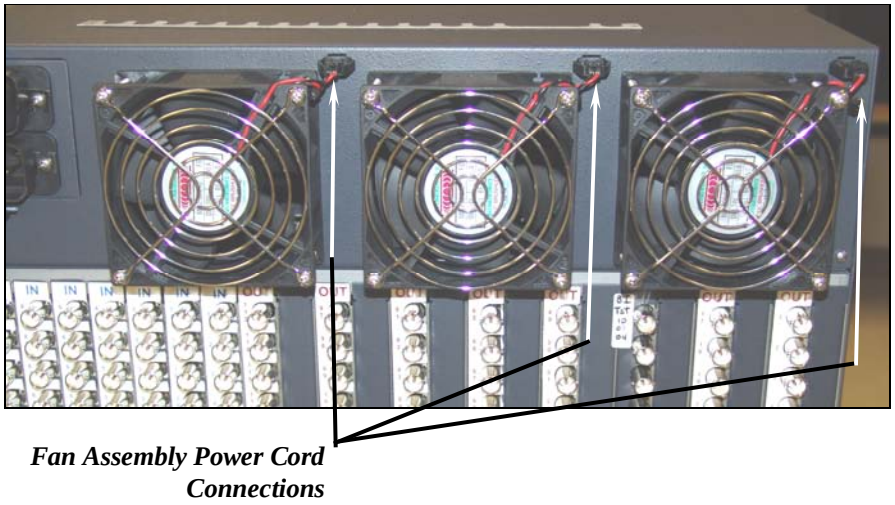


FIGURE 90: 128x128 Fan Assemblies and Associated Power Connections

Perform the following sequence to replace a faulty fan assembly:

1. Disconnect the fan power cord (see Figure 90) 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.

12.1.3.3 Cheetah 256x256 Chassis Fan Replacement

These switchers are equipped with flush-mounted fan assemblies that are only accessed and replaced from the front interior of the chassis (see Figure 91).

	**For the 256x256 switcher systems that remain energized during a fan replacement sequence, it is extremely important to remove all personal conductive materials (e.g., watches, rings, and bracelets) during the replacement sequence. Additionally, exercise extreme caution as to not drop any tools/parts that could reach the active components (DC bus, boards/cards, etc.) in the chassis.**

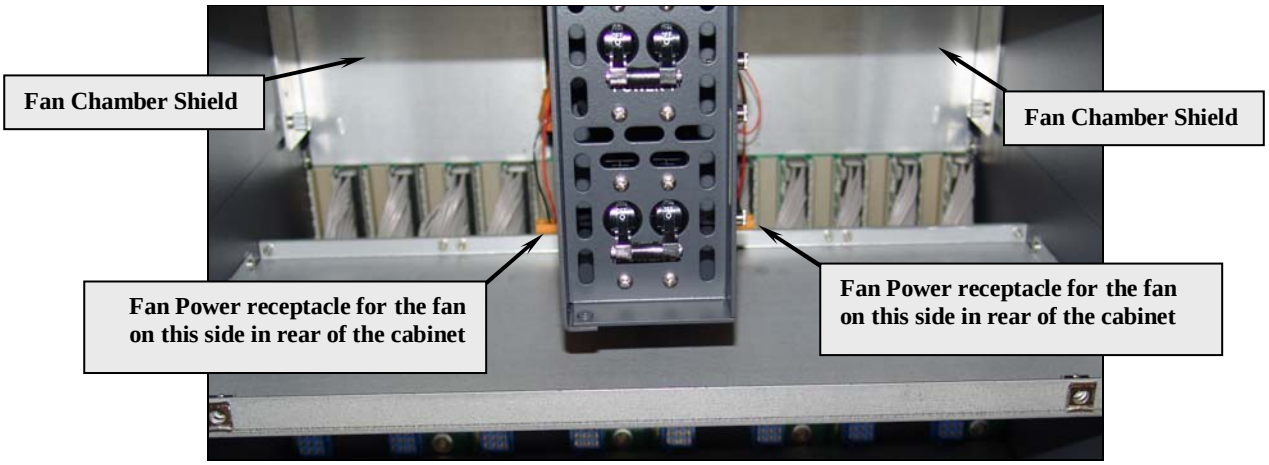


FIGURE 91: 256x256 Associated Power Connections and Fan Chamber Shields

Perform the following sequence to replace a faulty fan assembly (see Figure 91 while performing the following sequence):

1. Remove the filter/breaker panel to access the fan assembly from the front of the switcher.
2. Disconnect the fan power cord from the fan power receptacle.
3. Remove the fan chamber shield by loosening the two steel, associated shield thumbscrews.
4. Remove the two fan-assembly nylon-retaining thumbscrews and remove the fan assembly.
5. Replace the fan and secure with the two, fan-assembly nylon retaining thumbscrews.
6. Reinstall and secure the chamber shield with the two steel thumbscrews.

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

7. Reconnect the fan power cord to the fan power receptacle.
8. Reinstall the filter/breaker panel.

12.1.3.4 Cheetah 256x448 Chassis Fan Replacement

These switchers (see Figure 92) are equipped with two, flush-mounted, upper fan assemblies that are only accessed and replaced from the front interior of the chassis plus two, offset-mounted, internal fans that accessed from the rear of the chassis.

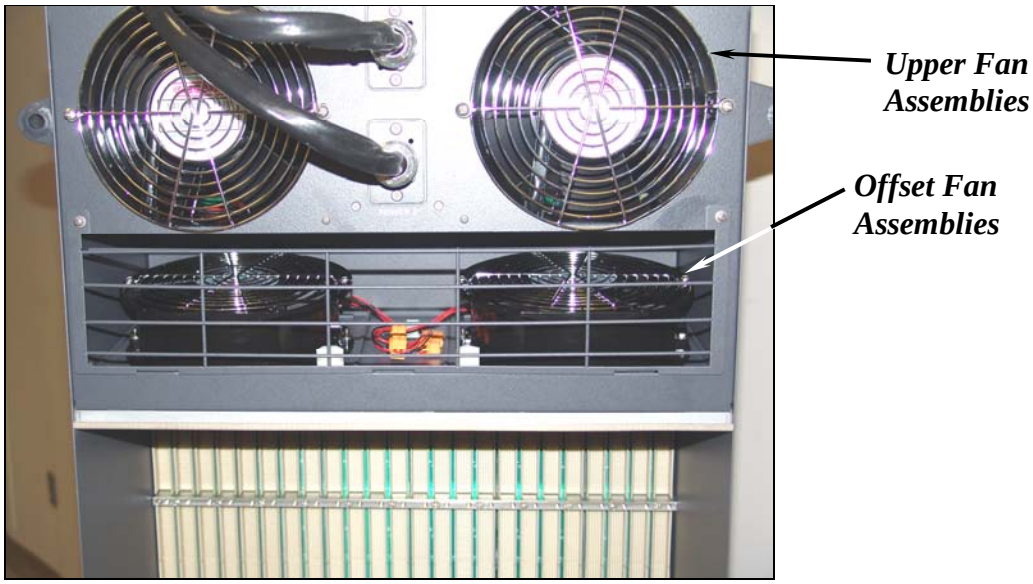


FIGURE 92: Cheetah 256x448 Chassis Fan Assemblies

- ***Cheetah 256x448 Upper Fan Replacement Procedure***

  Refer to Section 12.1.3.3 and perform the replacement sequence except there is no fan chamber shield to remove and reinstall.

- ***Cheetah 256x448 Offset Fan Replacement Procedure***

  To replace an offset fan assembly, perform the following sequence:

  1. Remove the protective chassis fan grill assembly by removing the two screws in each upper corner that secure the guard to the chassis and then, lift the assembly upward from the retaining slots and away from the chassis.
  2. Unplug the fan power cord from the power connector that is secured to the stationary fan mounting plate.
  3. Completely loosen the nylon thumbscrew that secures the fan assembly to the mounting plate.
  4. Lift and slide the assembly away from the mounting slots.
  5. Remove the fan mounting hardware, remove the old assembly, and position the new fan assembly in the bracket. Secure the new fan assembly to the fan bracket with the hardware.
  6. Return the new fan assembly to the mounting plate, slide it into the mounting slots until seated, and secure the fan assembly to the mounting plate with the nylon thumbscrew.

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

  7. Reconnect the fan power cord to the power connector.
  8. Reinstall the protective chassis fan grill assembly by aligning the assembly in the retaining slots and securing with the screws.

12.1.3.5 Cheetah 512x512 and 1024x256 Chassis Fan Replacement

These switchers include four upper, flush-mounted fan assemblies that are easily removed from the rear exterior of the chassis. Each of the four upper fan assemblies is retained by two, combination Philip-head thumbscrews (see Figure 93), which are tightened to a #6 screw torque setting (not more than 9.6 inch-pounds – non-lubricated). The two lower (mid-chassis) surface-mounted fan assemblies are secured with two, #8x32 retaining screws, which are tightened to not more than 17.8 inch-pounds (non-lubricated) torque setting.

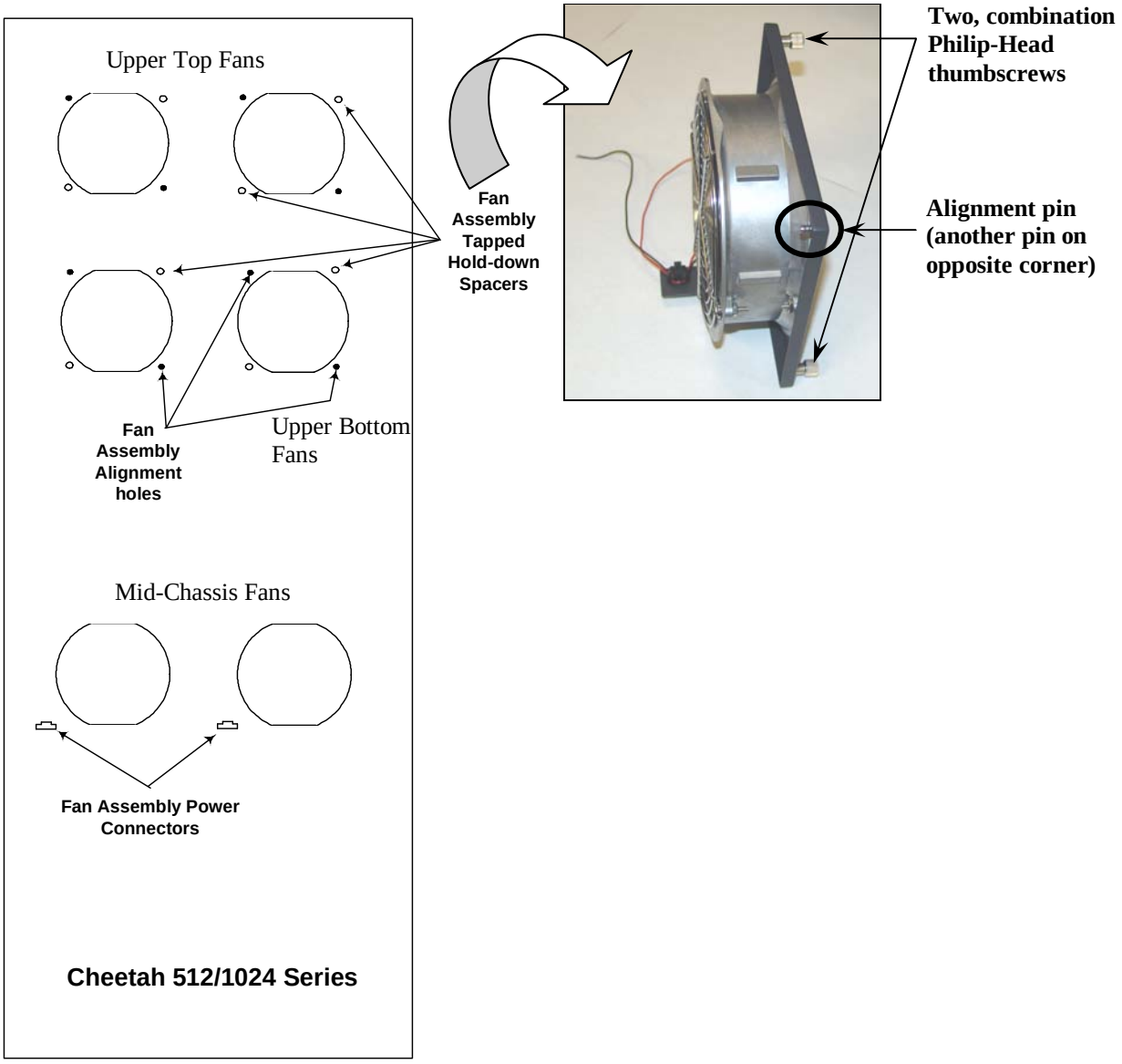


FIGURE 93: Cheetah 512/1024 Series Upper Fan Assemblies

- ***Cheetah 512 and 1024 Series Fan Assembly Replacement Procedure***

  Perform the following sequence to replace a faulty, upper fan assembly (see figure 93):

  1. Completely loosen the two thumbscrews that are securing the fan assembly.
  2. Carefully, remove the fan from it's mounting until the fan power cord can be accessed and disconnect the fan power cord from the fan power receptacle.

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

  3. Replace the fan and reconnect the fan power cord to the fan power receptacle.
  4. Align the alignment pins with their corresponding alignment holes and secure the thumbscrews with not more than 9.6 inch-pounds of torque.

  For the redesigned, surface-mounted fan assemblies, perform the following sequence to replace a faulty mid-chassis fan assembly:

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

	**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 fan power receptacle.

12.1.3.6 Earlier Design Cheetah 512 and 1024 Series

Earlier versions of the Cheetah 512 and 1024 Series switchers (see Figure 94) are equipped with flush-mounted, upper fan assemblies (4) that are replaceable from the front interior only. All power connections to either the upper fan assemblies and the lower, surface mounted mid-chassis fan assemblies (2) are to power connectors affixed to the chassis backplane and are also accessed from the front interior only.

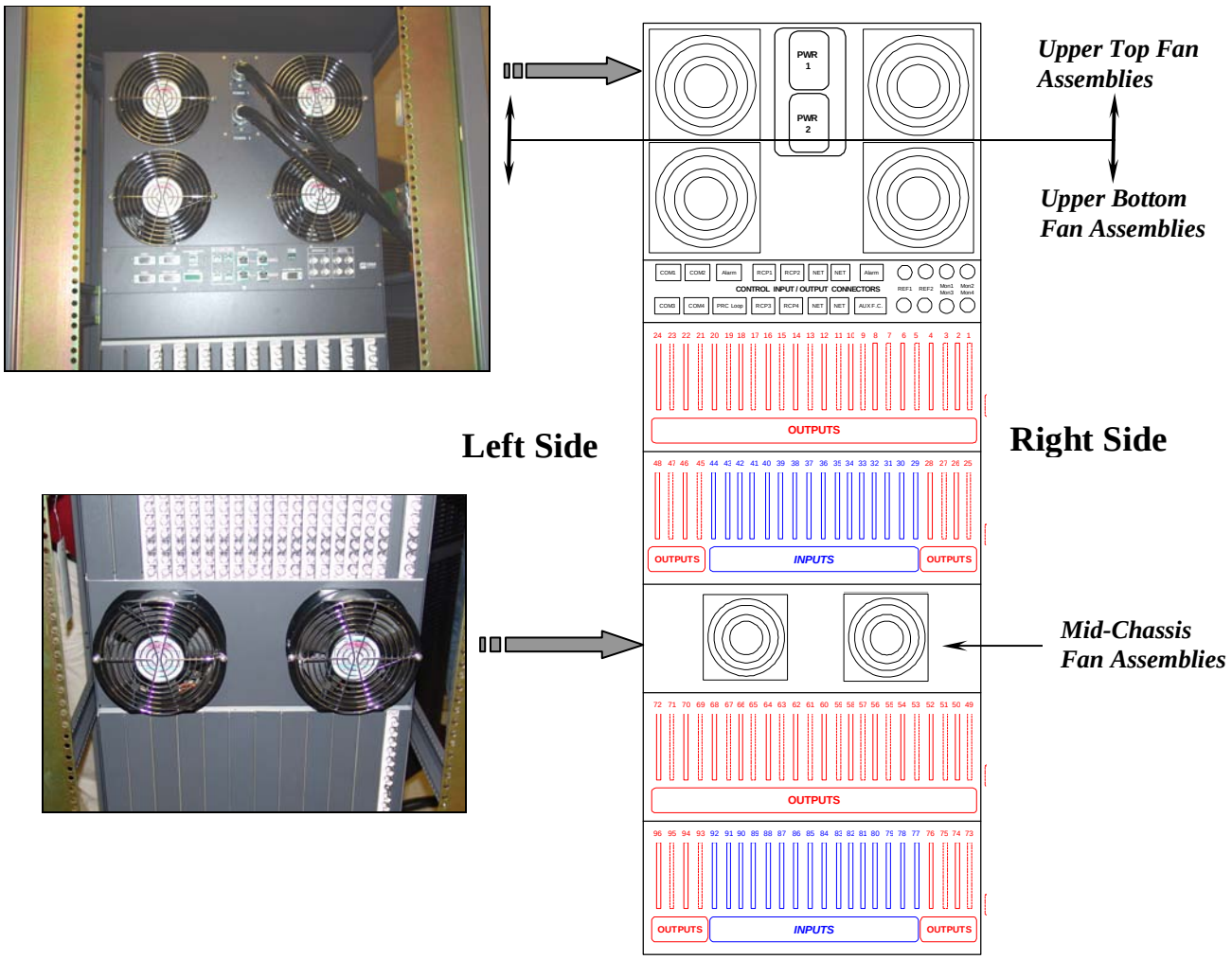


FIGURE 94: Cheetah 512 And 1024 Series Earlier Version Fan Placements (rear view)

- ***Earlier Design Cheetah 512 and 1024 Series Upper-Top Fan Replacement Procedure***

  Perform the following fan replacement procedure:

CAUTION	**For the earlier Design Cheetah 512 and 1024 Series switcher systems that are to remain energized during a fan replacement sequence, it is extremely important to remove all personal conductive materials (e.g., watches, rings, and bracelets) during the replacement sequence. Additionally, exercise extreme caution as to not drop any tools and/or parts that could reach the active components (DC bus, boards/cards, etc.) in the chassis.**

1. Remove the filter/breaker panel assembly to access the upper top fan power connections and fan assemblies (see Figure 95).

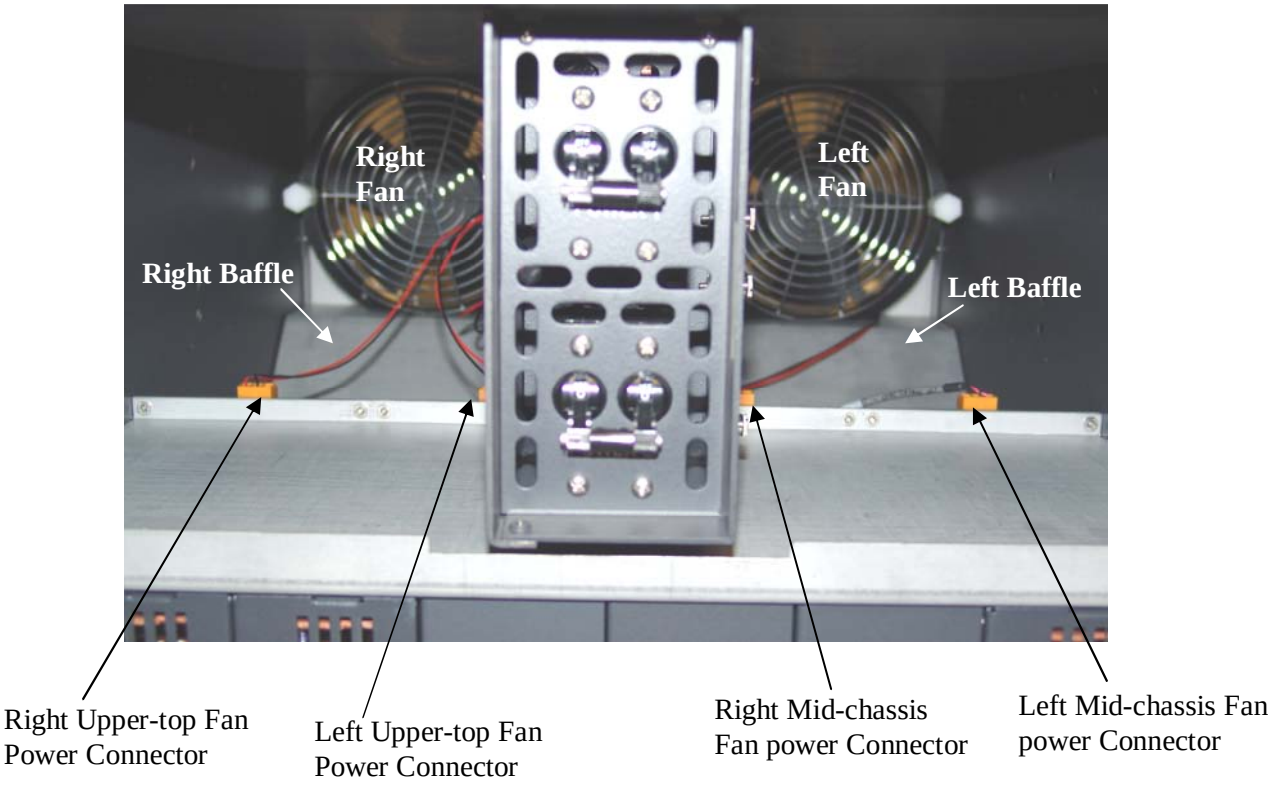


FIGURE 95: Earlier Cheetah Series Fan Power Disconnects

2. Disconnect the fan power cord from the corresponding power connector located in the left side of the filter/breaker chamber (see Figure 95).

3. Loosen the two, nylon-retaining thumbscrews that secure the fan to the chassis and carefully, remove the fan assembly.
4. Reinsert the new fan assembly and secure using the two, nylon-retaining thumbscrews.

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

5. Reconnect the fan power cord to the corresponding power connector (see Figure 95).
6. Reinstall and secure the filter/breaker panel assembly.

- ***Earlier Design Cheetah 512 and 1024 Series Upper-Bottom Fan Replacement Procedure***

  These fan assemblies are installed behind specific airflow baffles (see Figure 95) that direct the airflow for maximum efficiency. The baffles must be removed before you can access the fan assemblies for replacement.

  Perform the following sequence to replace a fan assembly:

	**For the Original Design Cheetah 512 and 1024 Series switcher systems that are to remain energized during a fan replacement sequence, it is extremely important to remove all personal conductive materials (e.g., watches, rings, and bracelets) during the replacement sequence. Additionally, exercise extreme caution as to not drop any tools and/or parts that could reach the active components (DC bus, boards/cards, etc.) in the chassis.**

1. Remove the filter/breaker panel assembly to access the upper bottom fan baffle plates and fan assemblies (see Figure 95).

	**For specific baffle removal instructions, contact a PESA Customer Service representative prior to attempting to remove either of the upper-bottom fan baffle assemblies.**

2. Remove the specific baffle assembly (see Figures 95 and 96) associated with the fan that is to be replaced by loosening the baffle assembly's retaining thumbscrew and carefully, direct the baffle assembly through the front of the chassis.

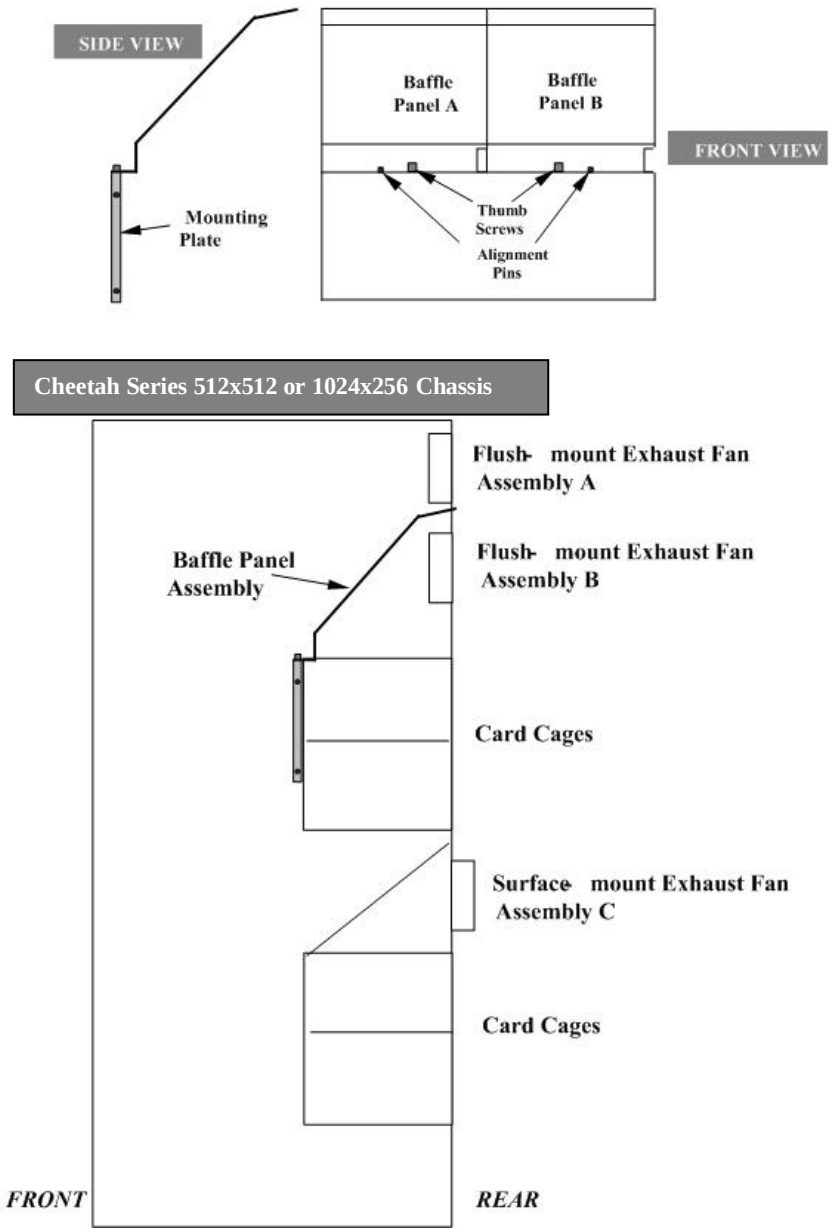


FIGURE 96: Earlier Cheetah 512 And 1024 Series Baffle Assembly

3. Disconnect the fan power cord from the corresponding power connector located in the baffle cavity behind the fan assembly.
4. Loosen the two, nylon-retaining thumbscrews that secure the fan to the chassis and carefully, remove the fan assembly.
5. Reinsert the new fan assembly and secure using the two, nylon-retaining thumbscrews.

6. Reconnect the fan power cord to the associated fan power connector located in the baffle cavity.

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

7. While routing the fan power cables through the specific routing holes, reinstall the baffle assembly and verify proper alignment. Secure the baffle assembly with the associated thumbscrew.
8. Reinstall the blank covers.
9. Reinstall the filter/breaker panel assembly.

- ***Earlier Design Cheetah 512 and 1024 Series Mid-Chassis Fan Replacement Procedure***

  Perform the following sequence to replace a fan assembly:

	**For the earlier design Cheetah 512 and 1024 Series switcher systems that are to remain energized during a fan replacement sequence, it is extremely important to remove all personal conductive materials (e.g., watches, rings, and bracelets) during the replacement sequence. Additionally, exercise extreme caution as to not drop any tools and/or parts that could reach the active components (DC bus, boards/cards, etc.) in the chassis.**

1. Remove the filter/breaker panel assembly to access the upper top fan power connections (see Figure 94).
2. Disconnect the fan power cord from the corresponding power connector located in the right side of the filter/breaker chamber (see Figure 95).
3. From the rear of the chassis, remove the two retaining screws and hardware from the fan assembly.
4. While holding the assembly close to the chassis, disconnect the fan's power cord connector to release the fan assembly.
5. Reconnect the new fan assembly's power cord to the system's associated fan power connector.

6. Reinstall the new fan assembly and secure with the retaining screws and hardware.

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

7. Reconnect the fan power cord from the corresponding power connector located in the right side of the filter/breaker chamber (see Figure 95).
8. Reinstall the filter/breaker panel assembly.

12.2 TROUBLE SHOOTING

12.2.1 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)
- Initial system inspection including use of personal senses (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.

12.2.2 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 42 through 45) 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 42: 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. 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 43: 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 44: 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 45: 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 45: 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

12.2.3 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 12.6 and on the front cover of this document.

12.3 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**

12.3.1 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.

12.3.2 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 12.6 and on the front cover of this document.

12.4 PESA CUSTOMER SERVICE

12.5 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

12.6 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, N.Y. 11768 - USA
  Tel: (631) 912-1301
  Toll-free: (800) 328-1008
  Fax: (631) 912-1302

APPENDIX A: ETHERNET CONFIGURATION

The Matrix Frame Controller supports a variety of interfaces via the Ethernet interface. These include NET PRC, HTTP (web browser), SNMP (Simple Network Management Protocol), and Telnet. To configure this access, the following items will need to be configured (refer to Table 46):

TABLE 46: 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
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'.

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.

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 back 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.

Response:

Comment:

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.

Comment:

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:

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

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:

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

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:

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

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:

- Refer to "Matrix Frame Controller Hardware Interface Protocol MFCHIP" to get specific information on the vertical trigger command. The vertical trigger command forces the cards in the system to use the specified port (A or B) as the primary data klink.

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 synch 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.

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