CHEETAH SERIES 512X1024 VIDEO MATRIX SWITCHER

Cheetah 512CX Frame
Using 128x128 Matrix CCA

Technical Addendum

Manual 81-9059-0588-0 Rev A
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Chapter 1 INTRODUCTION

1.1 PURPOSE OF TECHNICAL ADDENDUM

This Technical Addendum (TA) addresses the 512 Input by 1024 Output (512X1024) Routing Switcher (512CX) built by PESA Switching Systems, Inc., and how it differs from a "standard" Generation I (CH Series) product. It is assumed that the user has access to PESA Technical Manual 81-9059-0570-0, Rev. A entitled ***Cheetah Series Video Matrix Switchers***. It is also assumed that the user has a good understanding of the structure of a routing switcher and the top-level function of the various Circuit Card Assemblies (CCAs) and other modules used in the frame. With the exception of the 128X128 Matrix CCA, the hardware and components introduced and discussed in the Technical Manual apply to the 512CX switcher. The 512X1024 switcher is built using a Cheetah Generation I 512X, 41 RU frame, but incorporates the latest generation 128X128 Matrix Circuit Card Assembly (CCA). For the user who may be unfamiliar with the previous generation Cheetah Series, a brief background of the Generation I product and the differences this router introduces is presented in the following paragraphs.

Cheetah CH Series Routing Switcher Frames, currently referred to as Generation I Frames, offer a great deal of versatility and flexibility due to the modular concept of the component backplanes used to configure a system. When a Generation 1 Routing Switcher is built, a chassis frame of the proper size to accommodate the required number of CCAs, Modules and other system components is fitted with backplane assemblies that interface the Input and Output CCAs (mounted through the rear of the switcher frame) with the Matrix CCAs, Power and Control components located internal to the switcher frame. Likewise, the Matrix CCAs and other internal components attach to dedicated backplanes for power and signal distribution. The various types of backplanes (I/O and Matrix) used to configure a system are interconnected. Each backplane, and its associated CCA(s) or module(s), may be loosely thought of as a "building block" for a particular switcher configuration. A series of DIP switches and rotary switches on the various backplanes are factory set to assign the "personality" to each of the system components. This scheme of assigning identification to the backplane and interface ports allows full interchangeability between like CCAs in the system.

Of particular interest to this TA is the Matrix CCA and its associated backplane. Cheetah Generation I Series switchers are built around a 64X64 Matrix CCA that provides an array of 64 inputs and 64 outputs available on each card. With the exception of the Generation I 64X (64X64) Switcher, all other Generation I frames in the CH Series use a 128 input by 128 output Matrix Backplane that supports and provides interface functions to four 64X64 Matrix CCAs. This backplane is referred to as the 128 Backplane. Using the Generation I 128 Backplane and 64X64 Matrix CCAs, the largest array size that can be configured in a single 41RU Frame is 512X512, 1024X256 or 256X1024.

As product technology evolved, PESA Engineers developed a 128 Input by 128 Output (128X128) Matrix CCA. This latest, larger array card allows for a 256 input by 256 output Matrix Backplane, occupying the same frame space as the previous 128 Backplane. This backplane is referred to as the 256 Backplane and consists of 4 128X128 Matrix CCAs. The 256 Backplane is the same physical size and footprint as the 128 Backplane. While technically not a Cheetah Generation I Series CCA, the 128 Matrix card is perfectly adaptable to the Generation I frames (128X and larger). Thus, denser array matrices are possible using the same rack space as the Generation I Series frames.

Incorporating the 128X128 Matrix CCA(s) and the 256 Backplane into the Generation I 512X Frame easily accommodates the requirement for the 512X1024 Routing Switcher addressed by this TA. Eight 256 Backplane assemblies, populated with 32 128X128 Matrix CCAs provide the required I/O capacity. Cheetah Power Supply Modules, the System Controller CCA(s) and Frame Controller CCA(s) are also used in configuring the 512X1024 routing switcher.

Contained in this TA, as a supplement to the Cheetah Generation I Technical Manual, is an introduction to the 128 Matrix CCA; plus specifications, layout drawings, DIP and rotary switch settings, and card slot identification peculiar to the 512X1024 system configuration.

1.2   128X128 VIDEO (CROSSPOINT) MATRIX CARD

The 128x128 Video Matrix Card selects one of 128 inputs to each of 128 outputs. Input signals from the input buffer cards 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. A block diagram of the 128X128 Crosspoint CCA is shown in Figure 1-1.
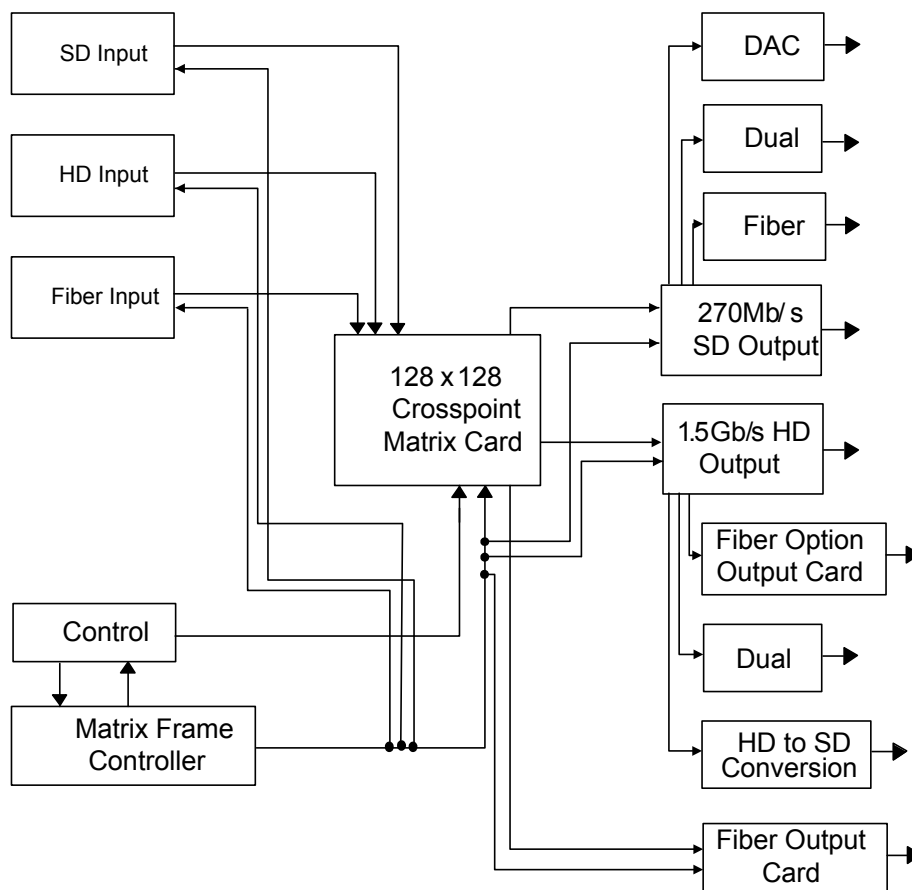
FIGURE 1-1: 128X128 VIDEO CROSSPOINT MATRIX CARD - BLOCK DIAGRAM

Six LED indicators are located on the 128x128 Matrix CCA faceplate, as illustrated in Figure 1-2 and described in Table 1.
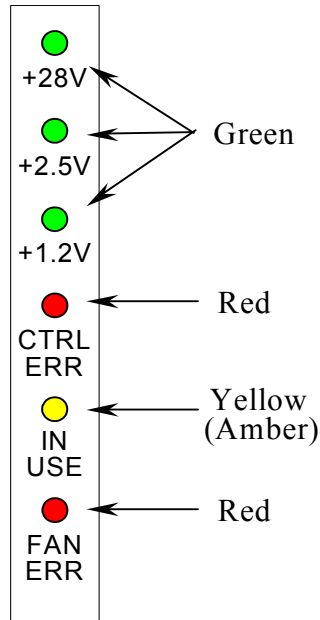
FIGURE 1-2: 128X128 VIDEO CROSSPOINT MATRIX CARD LED INDICATORS

TABLE 1: 128X128 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.
+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.
+1.2V	Green	**ON**	Indicates that the +1.2Vpower is stable and within normal operating parameters.
		OFF	Indicates that +1.2V is not stable; power supplies are not working.

Table continued on next page

TABLE 1: 128X128 VIDEO CROSSPOINT MATRIX CARD LED DESCRIPTIONS (CONTINUED)

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.
Fan ERR	Red	**ON**	Indicates a failure of the cooling fan on-board the crosspoint device. .

With the exception of the 128X128 Matrix CCA and the 256 Backplane, all other components used in the 512X1024 switcher configuration are the same as the Generation I components discussed in the Cheetah Technical Manual referenced in the first paragraph of this addendum. Please refer to that manual for information on the Generation I components.

There are 32 128X128 Matrix CCAs used in the 512X1024 configuration. A very basic sketch of the chassis layout is shown in Figure 1-3. This diagram identifies the location of the System Controller CCA(s), Frame Controller CCA(s), Power Supply Modules and the Matrix CCAs. Figure 1-4 provides a rear view of the rack frame with input and output connection points located.
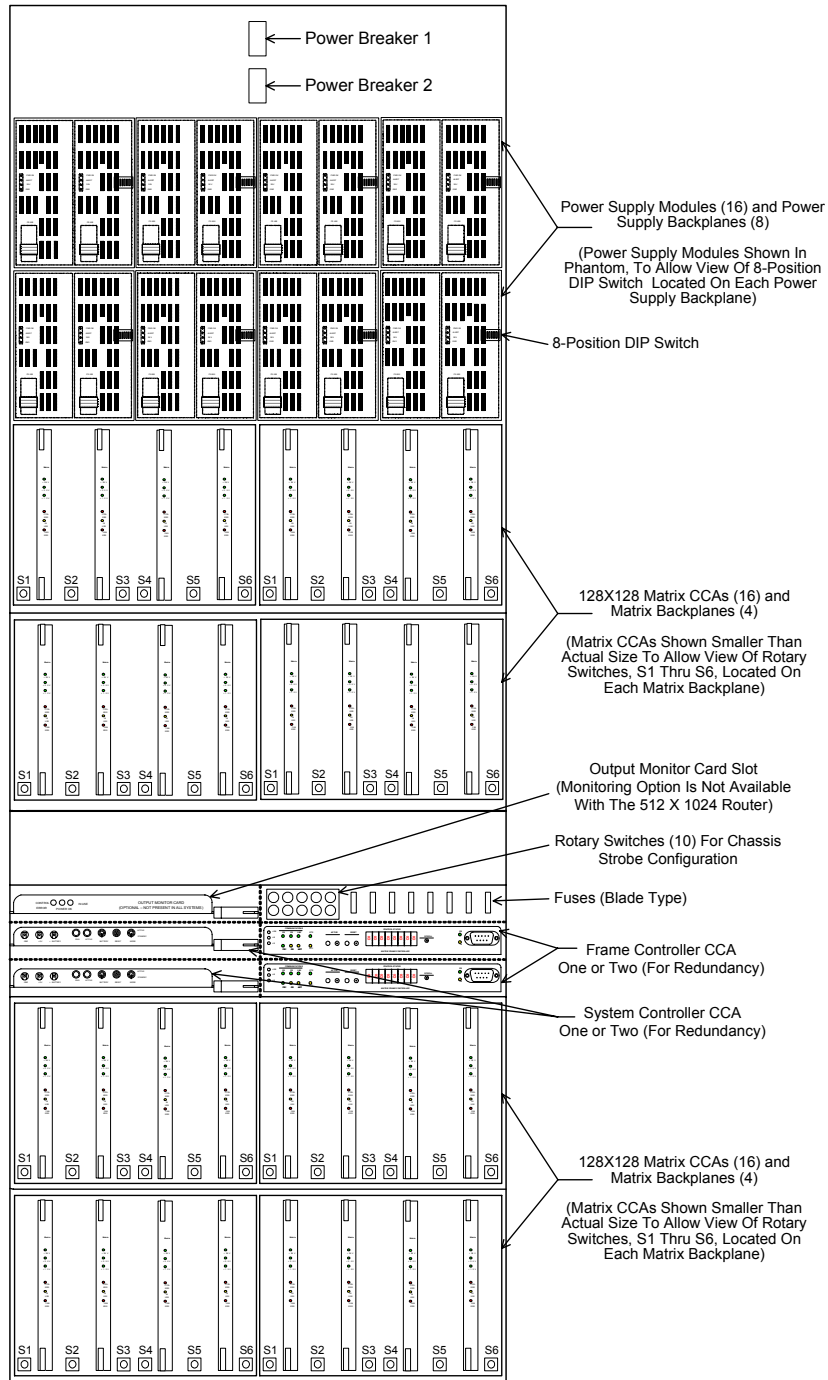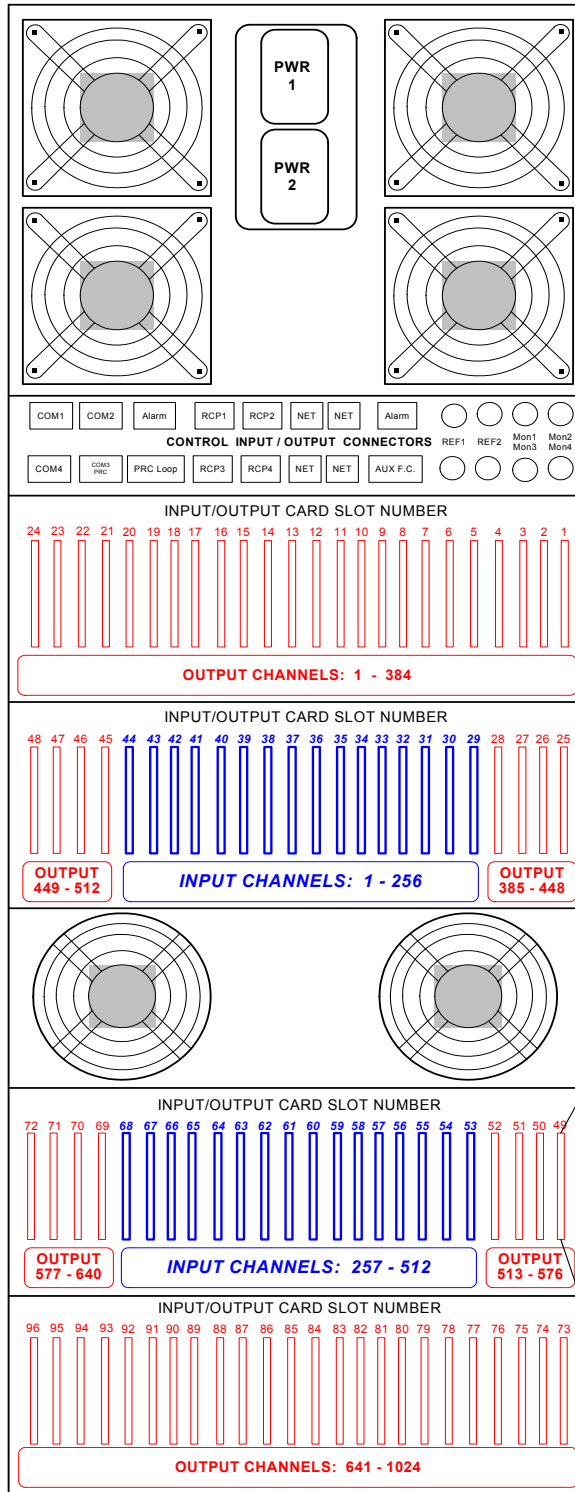
FIGURE 1-3: 512X1024 ROUTER CHASSIS (FRONT VIEW – DOOR OPEN)

CHEETAH   512 x 1024   FRAME - REAR VIEW

Quick Reference Chart
Input/Output Connector Channels By I/O Card Slot Number

OUTPUT CHANNELS

Input/Output Card Slot Number	Output Channels On Card	Input/Output Card Slot Number	Output Channels On Card	Input/Output Card Slot Number	Output Channels On Card
1	1 - 16	25	385 - 400	81	769 - 784
2	17 -32	26	401 - 416	82	785 - 800
3	33 - 48	27	417 - 432	83	801 - 816
4	49 - 64	28	433 - 448	84	817 - 832
5	65 - 80	45	449 - 464	85	833 - 848
6	81 - 96	46	465 - 480	86	849 - 864
7	97 - 112	47	481 - 496	87	865 - 880
8	113 - 128	48	497 - 512	88	881 - 896
9	129 - 144	49	513 - 528	89	897 - 912
10	145 - 160	50	529 - 544	90	913 - 928
11	161 - 176	51	545 - 560	91	929 - 944
12	177 - 192	52	561 - 576	92	945 - 960
13	193 - 208	69	577 - 592	93	961 - 976
14	209 - 224	70	593 - 608	94	977 - 992
15	225 - 240	71	609 - 624	95	993 - 1008
16	241 - 256	72	625 – 640	96	1009 - 1024
17	257 - 272	73	641 - 656		
18	273 - 288	74	657 - 672		
19	289 - 304	75	673 - 688		
20	305 - 320	76	689 - 704		
21	321 - 336	77	705 - 720		
22	337 - 352	78	721 - 736		
23	353 - 368	79	737 - 752		
24	369 - 384	80	753 - 768		

INPUT CHANNELS

<u>NOTE</u>
Input Card Slots are indicated by **BOLD** outlines and **_BOLD ITALICS_** text on the figure and in this chart.

Input/Output Card Slot Number	Input Channels On Card	Input/Output Card Slot Number	Input Channels On Card
29	**1 - 16**	**53**	**257 - 272**
30	**17 -32**	**54**	**273 - 288**
31	**33 - 48**	**55**	**289 - 304**
32	**49 - 64**	**56**	**305 - 320**
33	**65 - 80**	**57**	**321 - 336**
34	**81 - 96**	**58**	**337 - 352**
35	**97 - 112**	**59**	**353 - 368**
36	**113 - 128**	**60**	**369 - 384**
37	**129 - 144**	**61**	**385 - 400**
38	**145 - 160**	**62**	**401 - 416**
39	**161 - 176**	**63**	**417 - 432**
40	**177 - 192**	**64**	**433 - 448**
41	**193 - 208**	**65**	**449 - 464**
42	**209 - 224**	**66**	**465 - 480**
43	**225 - 240**	**67**	**481 - 496**
44	**241 - 256**	**68**	**497 - 512**

BNC Connector Numbering Detail

Top Connector (Lowest Channel Number) On Connector Board
Channel 1, 17, 33, 49,....1009

Bottom Connector (Highest Channel Number) On Connector Board
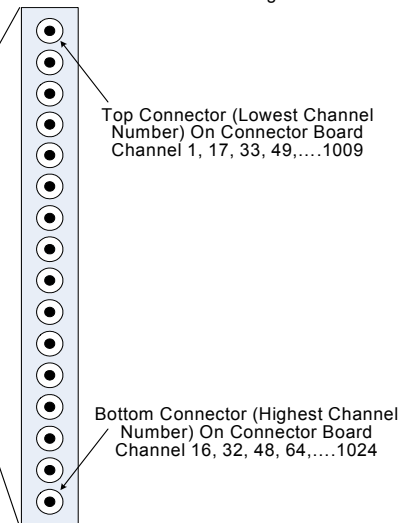Channel 16, 32, 48, 64,....1024

FIGURE 1-4: 512X1024 ROUTER CHASSIS (REAR VIEW)

Chapter 2   INSTALLATION

2.1   INITIAL INSTALLATION STEPS

With the exception of the rear panel connector arrangement, all installation steps for the 512X1024 Switcher are the same as for the Generation I product. Refer to the Cheetah Technical Manual referenced in the first paragraph of this addendum for initial unpacking, site preparation and installation steps.

Once the rack frame is mounted and all preliminary steps have been performed, connecting the video input and output signals and the sync reference pulse source is the next step. The rear panel arrangement of the 512X1024 Switcher is different than that called out in any configuration shown in the Technical Manual. Refer to Paragraph 2.2 of this addendum when completing the video I/O connections for proper identification of the I/O connector locations and channel numbering scheme.

2.2   VIDEO I/O CONNECTION

All connections to the 512X1024 router (other than video I/O) will be the same as outlined in the Cheetah Technical Manual. Follow the installation procedure identified in the technical manual when connecting power, sync reference and control cabling. When connecting video input and output signals follow the diagrams provided in this Technical Addendum. Figure 1-4 illustrates the entire rear panel of the router and features a quick reference guide to the input and output connector configuration. Figure 2-1 in this chapter provides a closer and more detailed view of the rear panel input and output connectors. Use these references when making video I/O connections to the 512X1024 router.
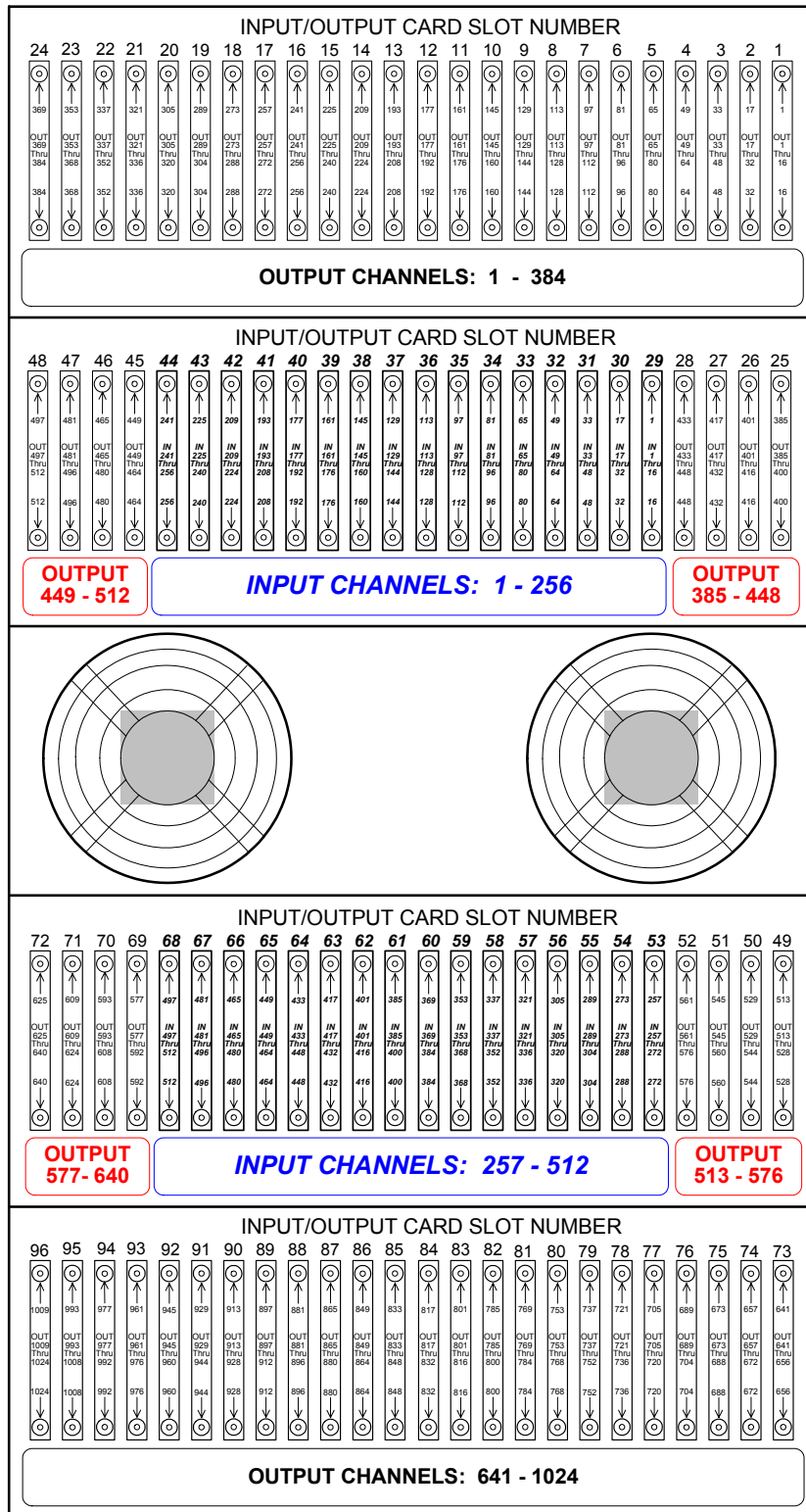
FIGURE 2-1: 512X1024 ROUTER INPUT/OUTPUT CONNECTOR ARRANGEMENT

Chapter 3   REFERENCE DATA

3.1   REFERENCE DATA INTRODUCTION

This section of the TA provides the user with reference data peculiar to the 512X1024 configuration of the Cheetah Gen I Matrix Switcher. In the following paragraphs you will find information that will prove useful in the event that system maintenance or repair should ever be required. Included are a diagram (Figure 3-1) showing the input and output channel assignments of all 32 matrix crosspoint CCAs, plus setting information for all DIP and rotary switches used to configure the switcher.

3.2   DIP SWITCH/ROTARY SWITCH SETTINGS FOR THE 512X1024 SYSTEM

There are numerous switches used in configuring the Cheetah Matrix Switcher for any particular input/output matrix combination. Switch settings define the operational parameters for the various CCAs and modules used in the switcher and assign the "personality" to each group of backplanes and their associated CCAs. Using the switch configuration scheme prevents any "card specific" functions, settings or jumpers and allows any input, output, or matrix CCA or power supply module to be "hot swapped" on the fly with any other card or module, of the same type. These switches are all preset at the factory and should never need any maintenance or adjustment. This information is provided as a reference so that in the event any switch setting should inadvertently be changed, it can be restored to its correct setting.

Switches are of two type: rotary or DIP. A small screwdriver can be used to make adjustments to the rotary switches. The tip of a small screwdriver or other small pointed object may be used to select the ON or OFF position of the DIP switches. Please note that the DIP switches are very small and each switch section is very delicate and can easily be damaged. Use extreme care if it is ever necessary to change the position of any section of the DIP switches.

The following paragraphs discuss the configuration switch settings listed below:

- Chassis Level Codes (Strobes) Rotary Switch Settings (Paragraph 3.2.1)
- Chassis Power Supply Backplane DIP Switch Settings (Paragraph 3.2.2)
- Chassis Input/Output Backplane DIP Switch Settings (Paragraph 3.2.3)
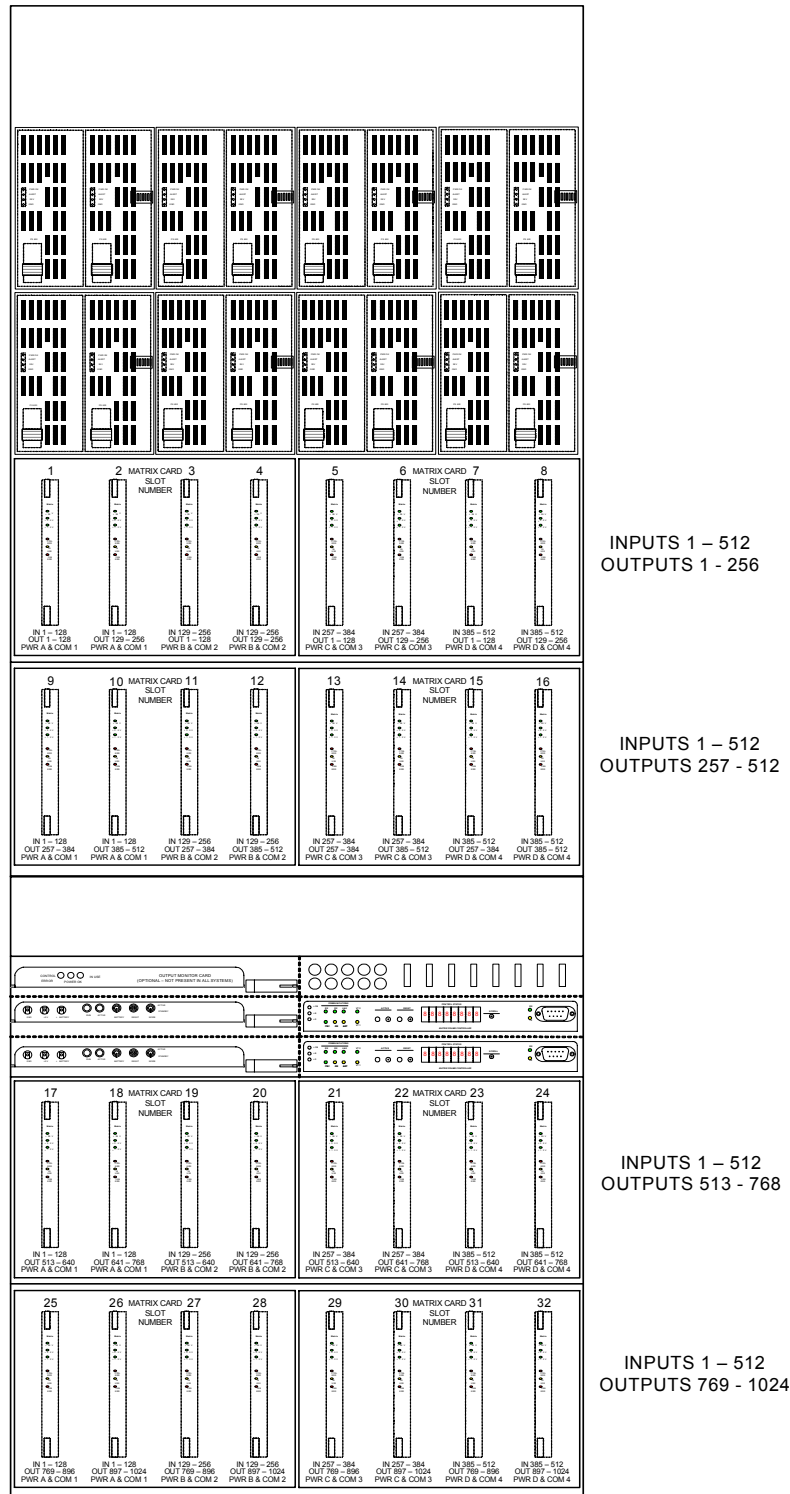- Chassis Matrix Backplane Rotary Switch Settings (Paragraph 3.2.4)

FIGURE 3-1: 128x128 MATRIX CROSSPOINT CCA I/O CHANNEL ASSIGNMENTS

3.2.1   Chassis Level Codes (Strobes) Rotary Switch Settings

Chassis Level Codes (Strobes) assign operational parameters to the switcher frame. There are ten rotary switches, located just above the frame controller card(s), used to set the chassis level code and other frame operational characteristics. Proper setting positions for these ten switches are shown in
Figure 3-2.

3.2.2   Chassis Power Supply Backplane DIP Switch Settings

Each Power Supply Backplane provides slots for up to two power supply modules. Located on the right side of each backplane is an eight position DIP switch used to assign identity data to the power supply module(s) installed on the backplane. Removing the power supply module installed on the right-hand side of the backplane allows access to this DIP switch. Proper setting positions for each switch section in the DIP package are shown in Figure 3-3. In this figure, the power supply modules are shown in dotted lines in order for the switch locations to be visible.

3.2.3   Chassis Input/Output CCA Backplane DIP Switch Settings

Each Input/Output CCA Backplane provides slots for up to four input or output CCAs. An eight-position DIP switch, located on the lower right-hand side of each backplane, assigns a unique identity to each backplane card. Among other functions, this switch setting allows the controller circuitry to assign the input or output channel number range to each I/O CCA – thus allowing any I/O card on the rear panel to be "hot swapped" with a card of like type. Proper setting positions for each switch section in the DIP package are shown in Figure 3-4. I/O CCAs must be removed from the backplane to gain access to the DIP switch. Figure 3-4 illustrates switch location and card slots on the backplanes with no I/O CCAs installed.

3.2.4   Chassis Matrix Backplane Rotary Switch Settings

Each Matrix CCA Backplane provides slots for up to four 128X128 matrix crosspoint CCAs. There are six rotary switches located along the bottom edge of each backplane. Settings of these switches assign a unique identity to each matrix backplane and the set of matrix CCAs installed in it. These settings allow the controller circuitry to assign the input and output channel number range to each matrix backplane and each matrix CCA. Figure 3-5 shows the location of each of the six switches on each backplane board. The matrix card image used in this figure is smaller than actual size to allow the backplane components to be shown. Setting positions for each switch are provided in Table 2 and listed by individual backplane boards.

SWITCH	DESCRIPTION	SETTING
S1	Level (MSB - Most Significant Bit)	According to customer configuration
S2	Level (LSB - Least Significant Bit)	
S3	Output (MSB)	
S4	Output (LSB)	
S5	Input (MSB)	
S6	Input (LSB)	
S7*	Frame (MSB)	1
S8*	Frame (LSB)	4
S9	Network (Fan Configuration Switch) (Switch Position 2 or 3 = 6 fans)	3
S10	Monitor – No Output Monitoring for this frame	N/A

*NOTE: The setting position of switches S7 and S8 assign the "frame type" parameter to the switcher. In this configuration, the frame is a "Type 20."
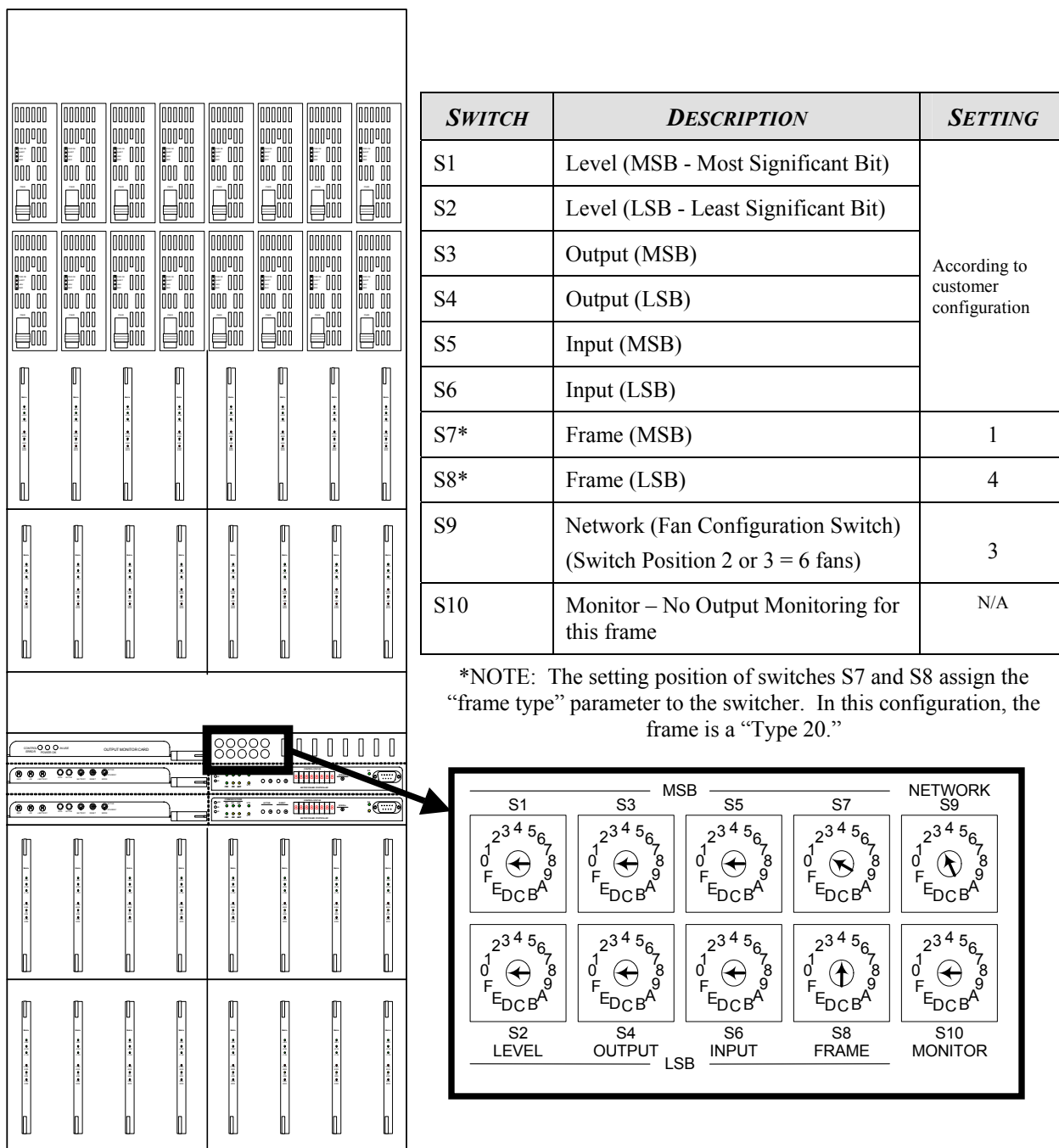

FIGURE 3-2: CHASSIS AND LEVEL CODE SWITCH SETTINGS
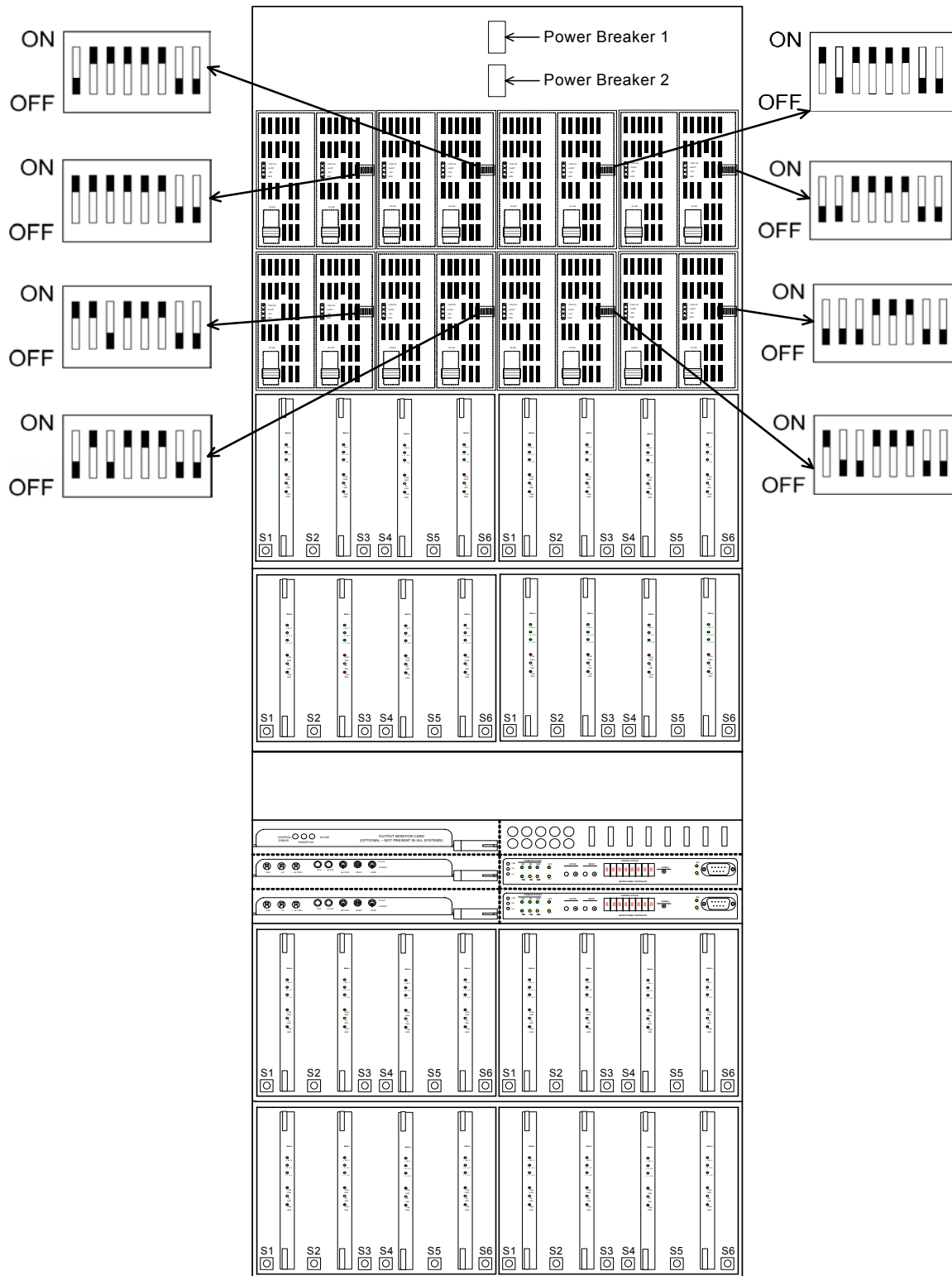
FIGURE 3-3: 512X1024 POWER SUPPLY BACKPLANE DIP SWITCH LOCATIONS AND SETTINGS (FRONT VIEW)

FIGURE 3-4: Input/Output Backplane DIP Switch Settings

Power Breaker 1

Power Breaker 2

Backplane 1
Card Slots 1 - 4

Backplane 2
Card Slots 5 - 8

Backplane 3
Card Slots 9 - 12

Backplane 4
Card Slots 13 - 16

Backplane 5
Card Slots 17 - 20

Backplane 6
Card Slots 21 - 24

Backplane 7
Card Slots 25 - 28

Backplane 8
Card Slots 29 - 32
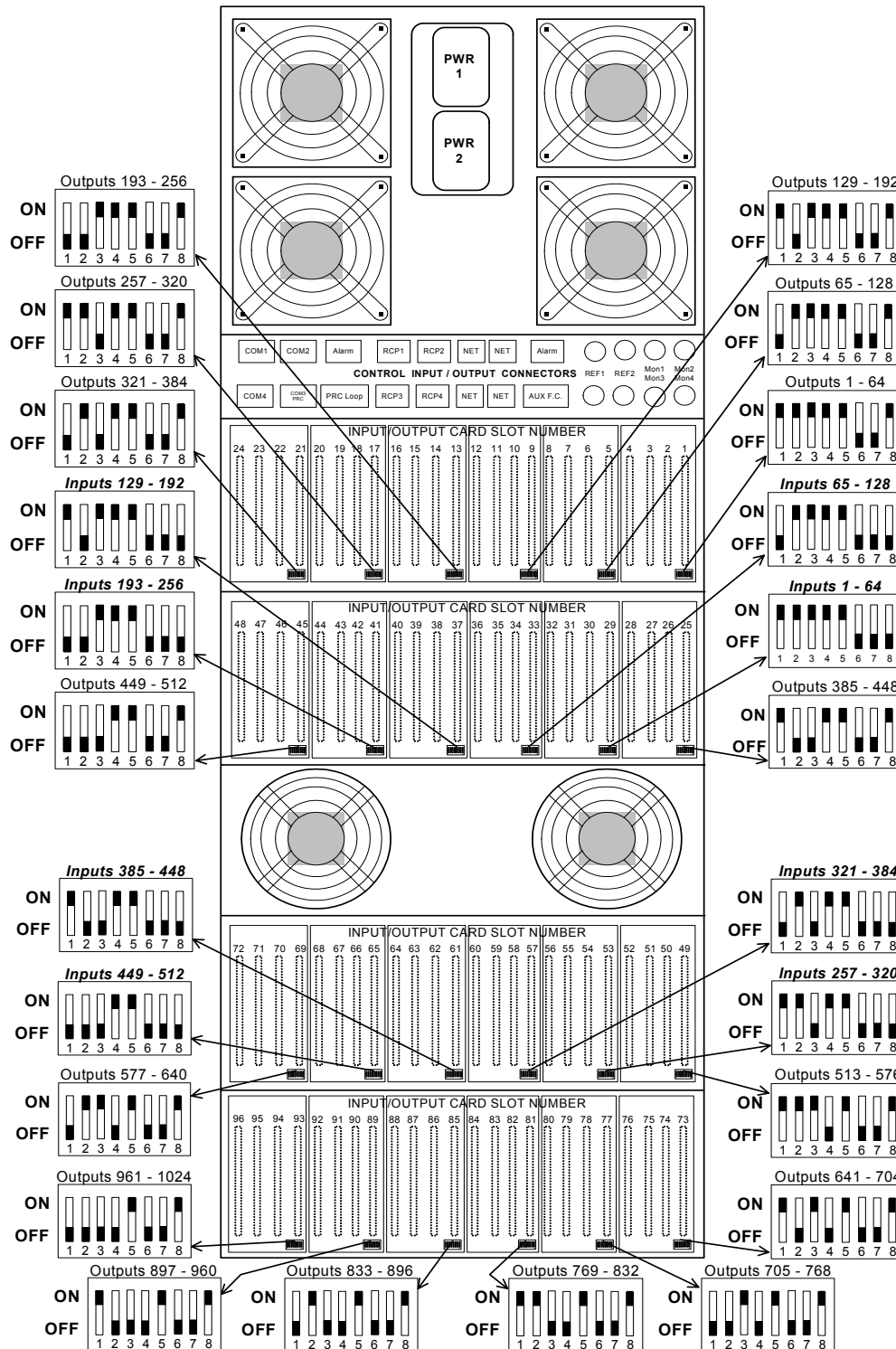
FIGURE 3-5: Matrix Backplane Rotary Switch Locations

TABLE 2: MATRIX BACKPLANE ROTARY SWITCH SETTINGS.

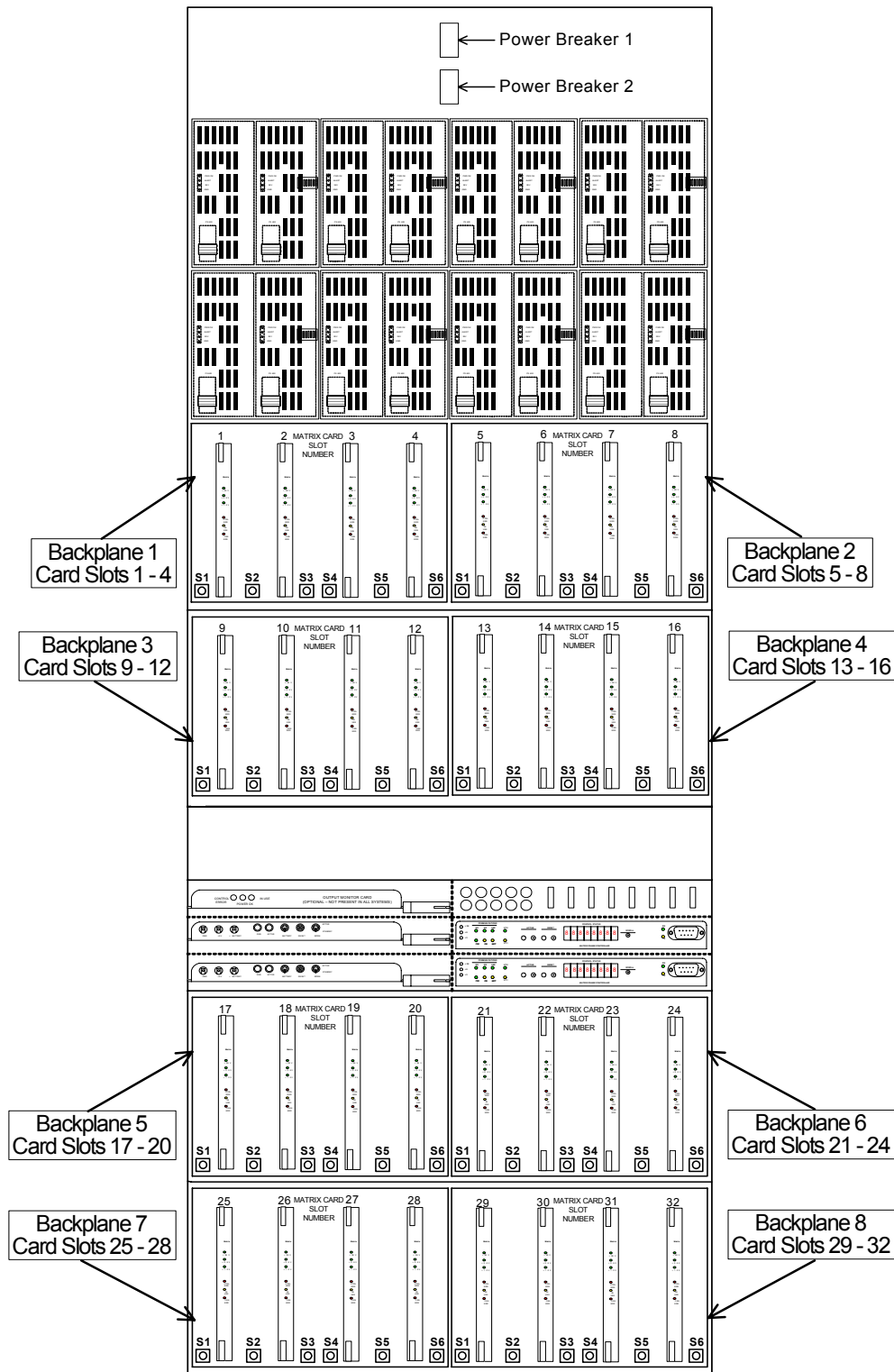| **MATRIX BACKPLANE 1** **CARD SLOTS 1-4**		
SWITCH	*SETTING*	*I/O*
S1	0	Outputs: 1-128
S2	0	Inputs: 1-128
S3	1	Outputs: 129-256
S4	0	Outputs: 1-128
S5	1	Inputs: 129-256
S6	1	Outputs: 129-256

MATRIX BACKPLANE 2 **CARD SLOTS 5-8**		
SWITCH	*SETTING*	*I/O*
S1	0	Outputs: 1-128
S2	2	Inputs: 257-384
S3	1	Outputs: 129-256
S4	0	Outputs: 1-128
S5	3	Inputs: 385-512
S6	1	Outputs: 129-256

MATRIX BACKPLANE 3 **CARD SLOTS 9-12**		
SWITCH	*SETTING*	*I/O*
S1	2	Outputs: 257-384
S2	0	Inputs: 1-128
S3	3	Outputs: 385-512
S4	2	Outputs: 257-384
S5	1	Inputs: 129-256
S6	3	Outputs: 385-512

MATRIX BACKPLANE 4 **CARD SLOTS 13-16**		
SWITCH	*SETTING*	*I/O*
S1	2	Outputs: 257-384
S2	2	Inputs: 257-384
S3	3	Outputs: 385-512
S4	2	Outputs: 257-384
S5	3	Inputs: 385-512
S6	3	Outputs: 385-512

MATRIX BACKPLANE 5 **CARD SLOTS 17-20**		
SWITCH	*SETTING*	*I/O*
S1	4	Outputs: 513-640
S2	0	Inputs: 1-128
S3	5	Outputs: 641-768
S4	4	Outputs: 513-640
S5	1	Inputs: 129-256
S6	5	Outputs: 641-768

MATRIX BACKPLANE 6 **CARD SLOTS 21-24**		
SWITCH	*SETTING*	*I/O*
S1	4	Outputs: 513-640
S2	2	Inputs: 257-384
S3	5	Outputs: 641-768
S4	4	Outputs: 513-640
S5	3	Inputs: 385-512
S6	5	Outputs: 641-768

TABLE 2: MATRIX BACKPLANE ROTARY SWITCH SETTINGS (CONTINUED)

MATRIX BACKPLANE 7 CARD SLOTS 25-28		
SWITCH	*SETTING*	*I/O*
S1	6	Outputs: 769-896
S2	0	Inputs: 1-128
S3	7	Outputs: 897-1024
S4	6	Outputs: 769-896
S5	1	Inputs: 129-256
S6	7	Outputs: 897-1024

MATRIX BACKPLANE 8 CARD SLOTS 29-32		
SWITCH	*SETTING*	*I/O*
S1	6	Outputs: 769-896
S2	2	Inputs: 257-384
S3	7	Outputs: 897-1024
S4	6	Outputs: 769-896
S5	3	Inputs: 385-512
S6	7	Outputs: 897-1024