CHEETAH SERIES 256X256R
FULLY REDUNDANT
VIDEO MATRIX SWITCHER

Cheetah 256CX Frame
Using 128x128 Matrix CCA

Technical Addendum

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Chapter 1 INTRODUCTION

1.1 PURPOSE OF TECHNICAL ADDENDUM

This Technical Addendum (TA) addresses the 256 Input by 256 Output Fully Redundant (256X256R) Routing Switcher built by PESA Switching Systems, Inc., and how it differs from a "standard" Cheetah 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 256CX switcher. The 256X256R switcher is built using a Cheetah Generation I 256X, 18 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 are 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. For purposes of this discussion, think of the backplane and its associated matrix CCAs as a modular unit providing 128 input channels and 128 output channels.

A single Generation I 256X Frame provides physical space and interface functions for up to two backplane "modules." Fitting this frame with two 128 Backplane modules does indeed provide a 256 input by 256 output matrix array. However, configuring a fully redundant matrix switcher requires two independent instances of the entire matrix configuration. Two 128 backplanes can not fulfill both the array size and the redundancy requirement for the switcher configuration addressed by this TA. Using the Generation I 128 Backplane and 64X64 Matrix CCAs, the largest fully redundant array size that can be configured in a single 18 RU Frame is 128X128.

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. It consists of 4 128X128 Matrix CCAs, and 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 256X Frame easily accommodates the requirement for the fully redundant 256X256 Routing Switcher addressed by this TA. In this application, two 256 Backplane "modules" are installed in the 256X frame. Each 256 Backplane assembly functions as a totally independent 256X256 matrix array, thus providing two instances of the matrix array required for redundancy. Two 256 Backplane assemblies, populated with eight 128X128 Matrix CCAs provide the required fully redundant I/O capacity. Cheetah Power Supply Modules, two System Controller CCAs and two Frame Controller CCAs are also used in configuring the 256X256R 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 256X256R 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.

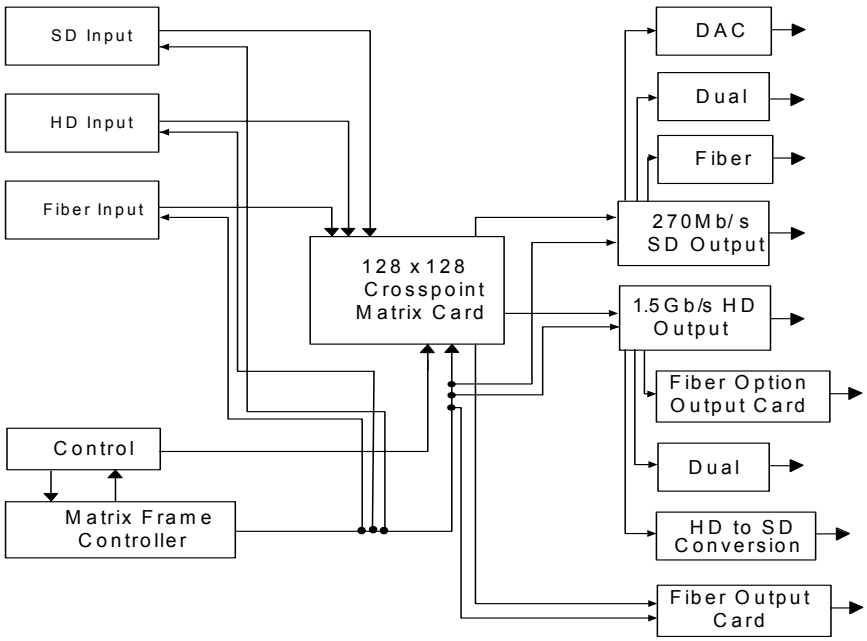


FIGURE 1-1: 128X128 VIDEO CROSSPOINT MATRIX CARD - BLOCK DIAGRAM

Six LED indicators are located on the 128x128 Matrix CCA faceplate, as illustrated in Figure 1-2 and described in Table 1.

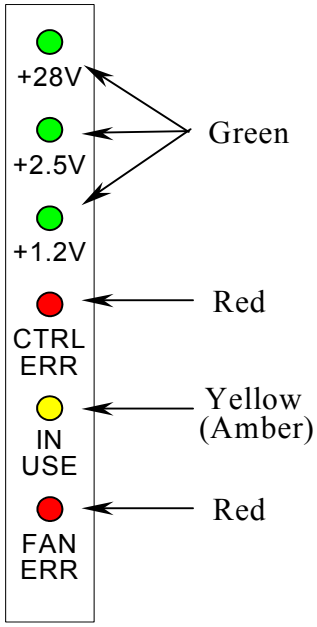


FIGURE 1-2: 128X128 VIDEO CROSSPOINT MATRIX CARD LED INDICATORS

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 256X256R 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 eight 128X128 Matrix CCAs used in the 256X256R configuration. A very basic sketch of the chassis layout is shown in Figure 1-3. This diagram identifies the location of the two (redundant) System Controller CCAs, two (redundant) Frame Controller CCAs, 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.

It should be noted that the frame addressed by this TA also incorporates the dual output option modules on the Output CCAs. When this option is incorporated, each output CCA in the system is fitted with an add-on board providing the circuitry and connectors to configure a second BNC output connector for each video output source. The add-on option card attaches to connectors on the output CCA and mounts in the card slot space right-hand adjacent to each output card. Looking at the rear of the frame, the odd-numbered output slots contain the dual output option modules and the even-numbered slots contain the output card. In every instance, the add-on dual output option card is in the slot to the right of the output card it resides on.

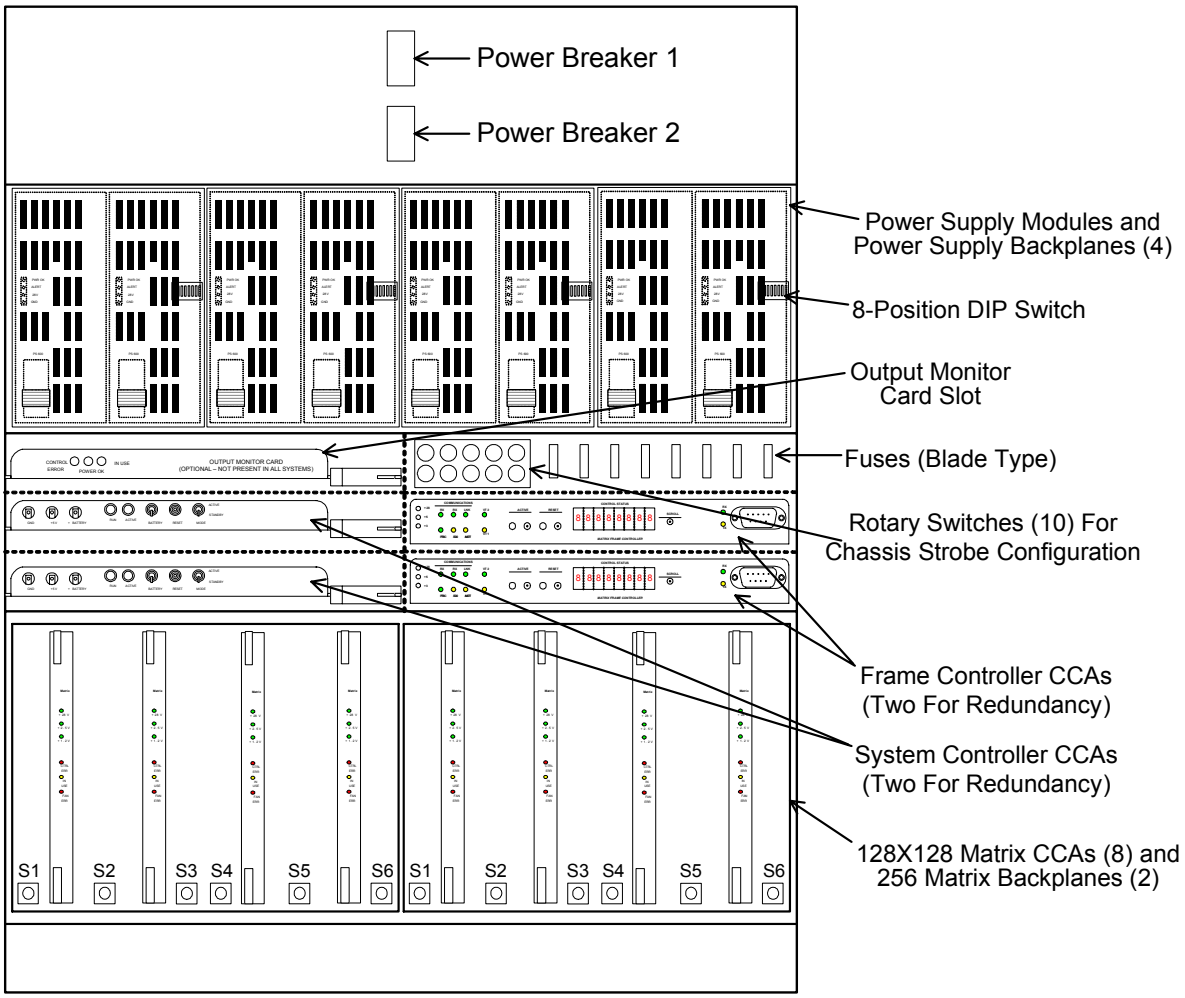
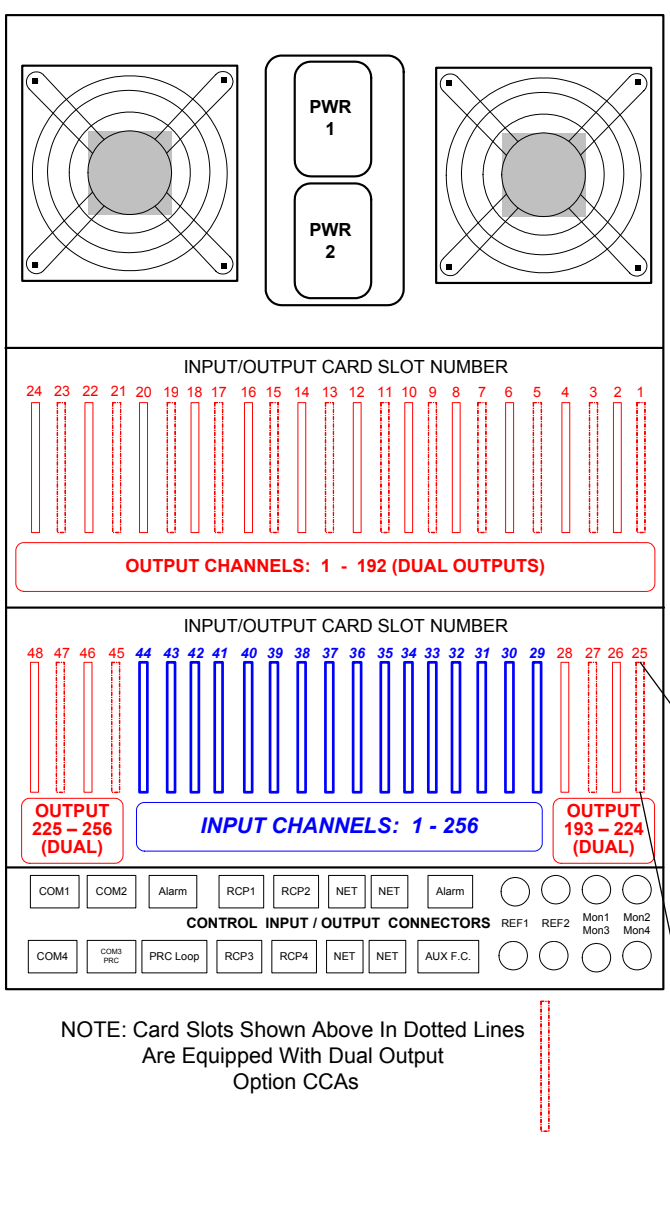


FIGURE 1-3: 256X256R ROUTER CHASSIS (FRONT VIEW – DOOR OPEN)



NOTE: Card Slots Shown Above In Dotted Lines Are Equipped With Dual Output Option CCAs

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 D	12	81 - 96	23	177 - 192 D
2	1 - 16	13	97 - 112 D	24	177 - 192
3	17 - 32 D	14	97 - 112	25	193 - 208 D
4	17 - 32	15	113 - 128 D	26	193 - 208
5	33 - 48 D	16	113 - 128	27	209 - 224 D
6	33 - 48	17	129 - 144 D	28	209 - 224
7	49 - 64 D	18	129 - 144	45	225 - 240 D
8	49 - 64	19	145 - 160 D	46	225 - 240
9	65 - 80 D	20	145 - 160	47	241 - 256 D
10	65 - 80	21	161 - 176 D	48	241 - 256
11	81 - 96 D	22	161 - 176		

NOTE: "D" Indicates Dual Output Option Slot

INPUT CHANNELS

NOTE

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***	***37***	***129 - 144***
30	***17 -32***	***38***	***145 - 160***
31	***33 - 48***	***39***	***161 - 176***
32	***49 - 64***	***40***	***177 - 192***
33	***65 - 80***	***41***	***193 - 208***
34	***81 - 96***	***42***	***209 - 224***
35	***97 - 112***	***43***	***225 - 240***
36	***113 - 128***	***44***	***241 - 256***

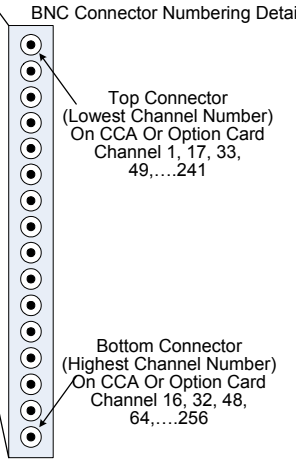


FIGURE 1-4: 256X256R ROUTER CHASSIS (REAR VIEW)

Chapter 2 INSTALLATION

2.1 INITIAL INSTALLATION STEPS

With the exception of the rear panel connector arrangement, all installation steps for the 256X256R 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 256X256R 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 256X256R 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 256X256R router.

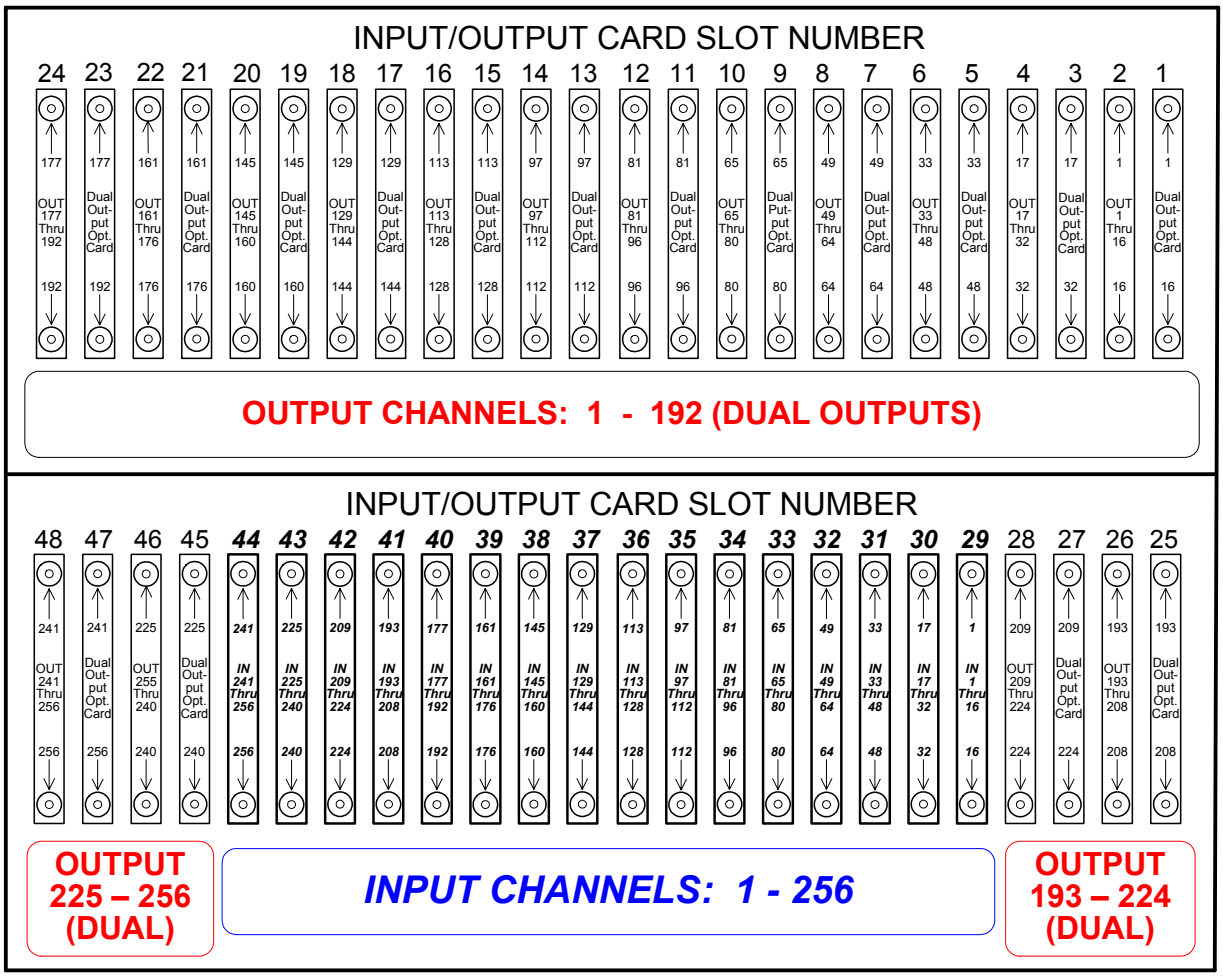


FIGURE 2-1: 256X256R ROUTER INPUT/OUTPUT CONNECTOR ARRANGEMENT

Chapter 3 REFERENCE DATA

3.1 REFERENCE DATA INTRODUCTION

This section of the TA provides the user with reference data peculiar to the 256X256R 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 the eight 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 256X256R SYSTEM

There are several switches used in configuring the Cheetah Matrix Switcher for a 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)

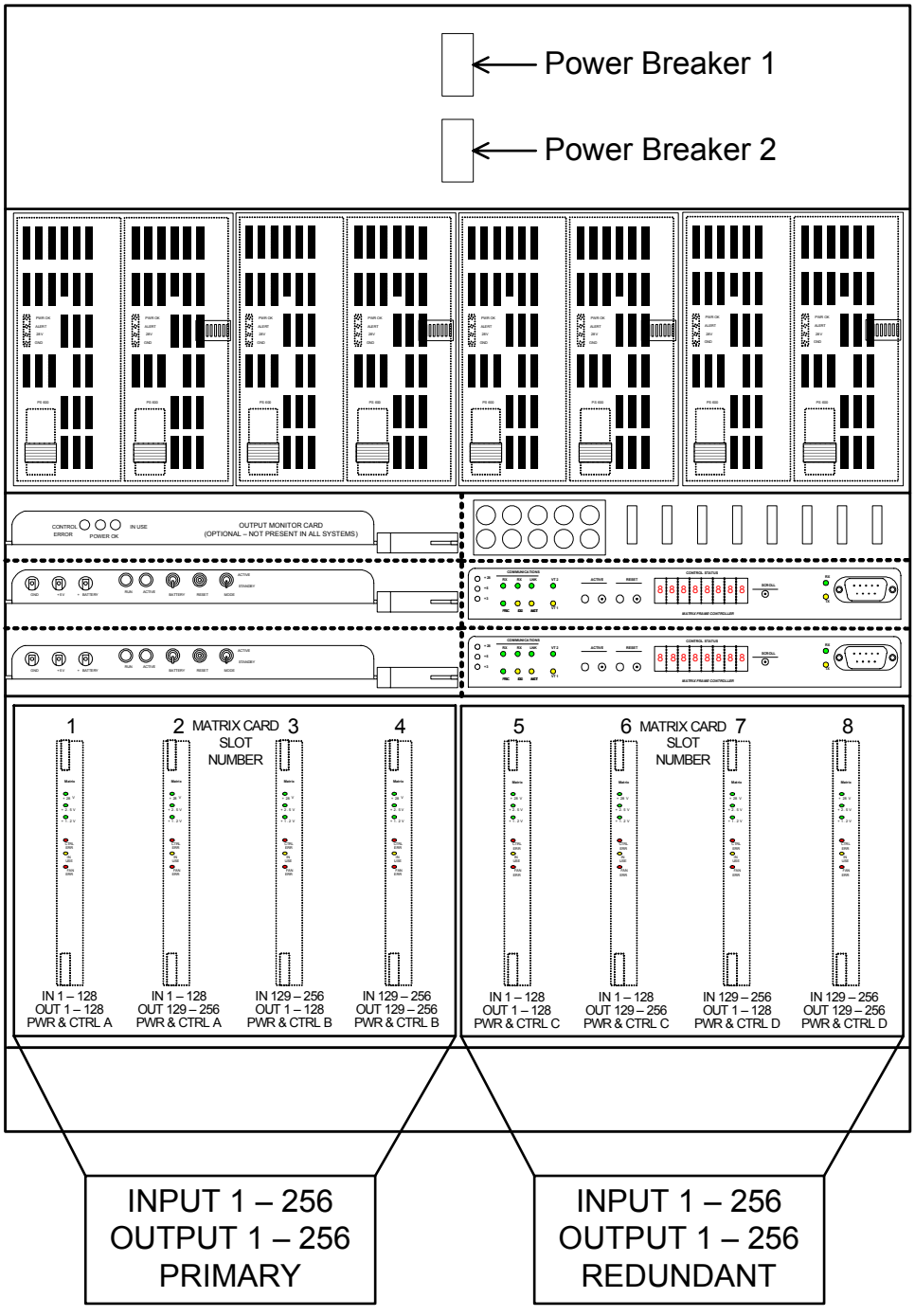


FIGURE 3-1: 128X128 MATRIX CROSSPOINT CCA I/O CHANNEL ASSIGNMENTS

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)	6
S9	Network (Fan Configuration Switch)	0
S10	Monitor	Customer Configuration
*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 22."		

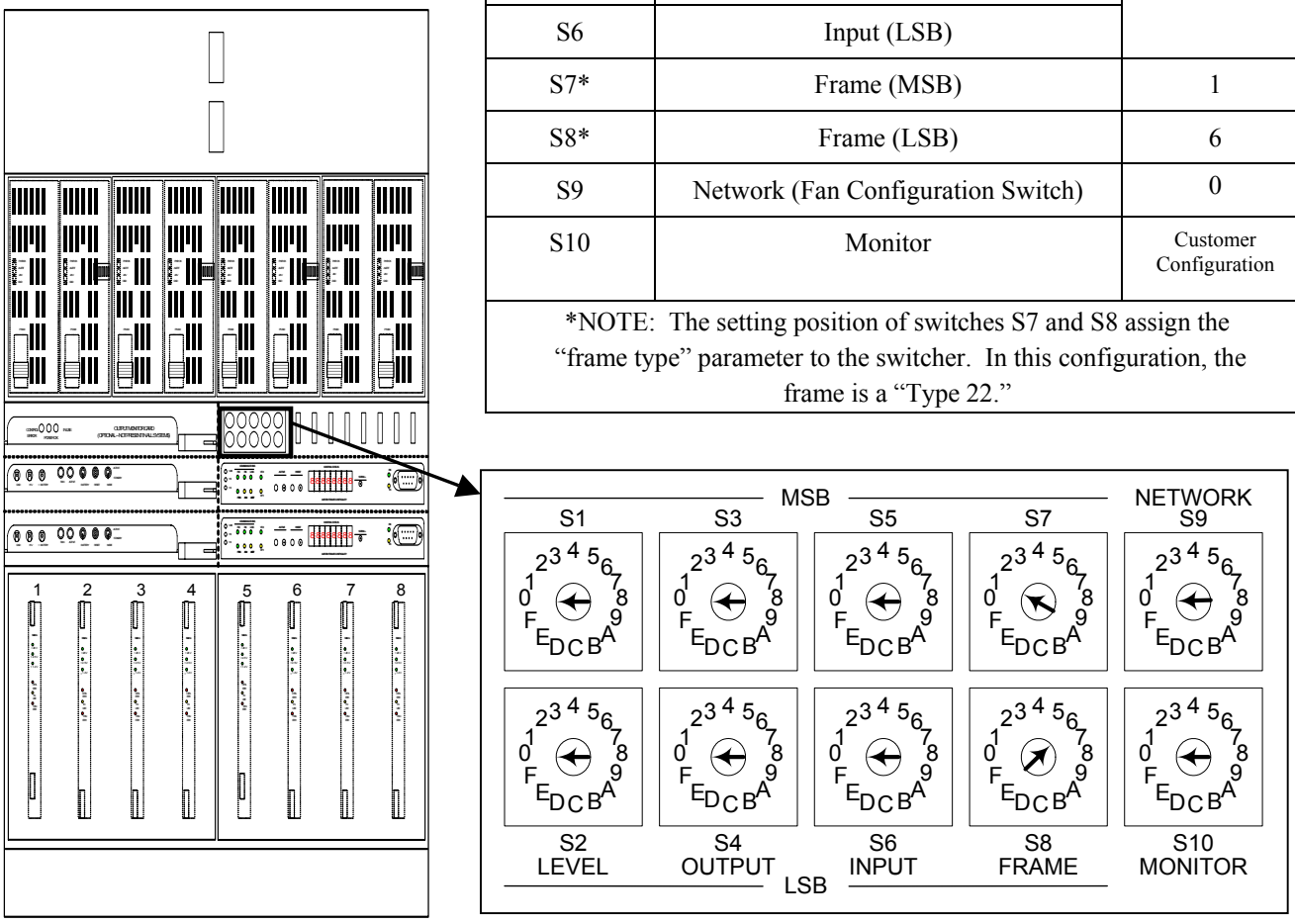


FIGURE 3-2: CHASSIS AND LEVEL CODE SWITCH SETTINGS

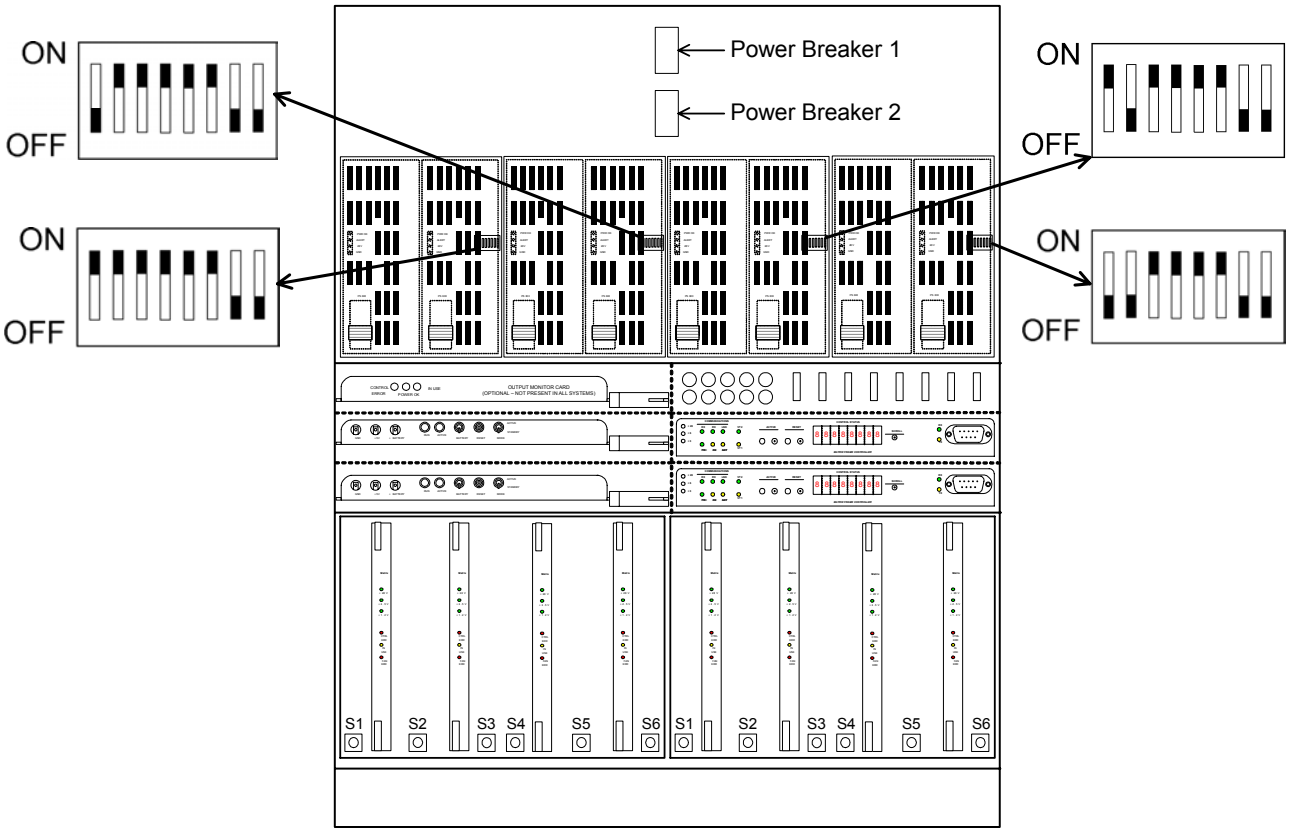


FIGURE 3-3: 256X256R POWER SUPPLY BACKPLANE DIP SWITCH LOCATIONS AND SETTINGS (FRONT VIEW)

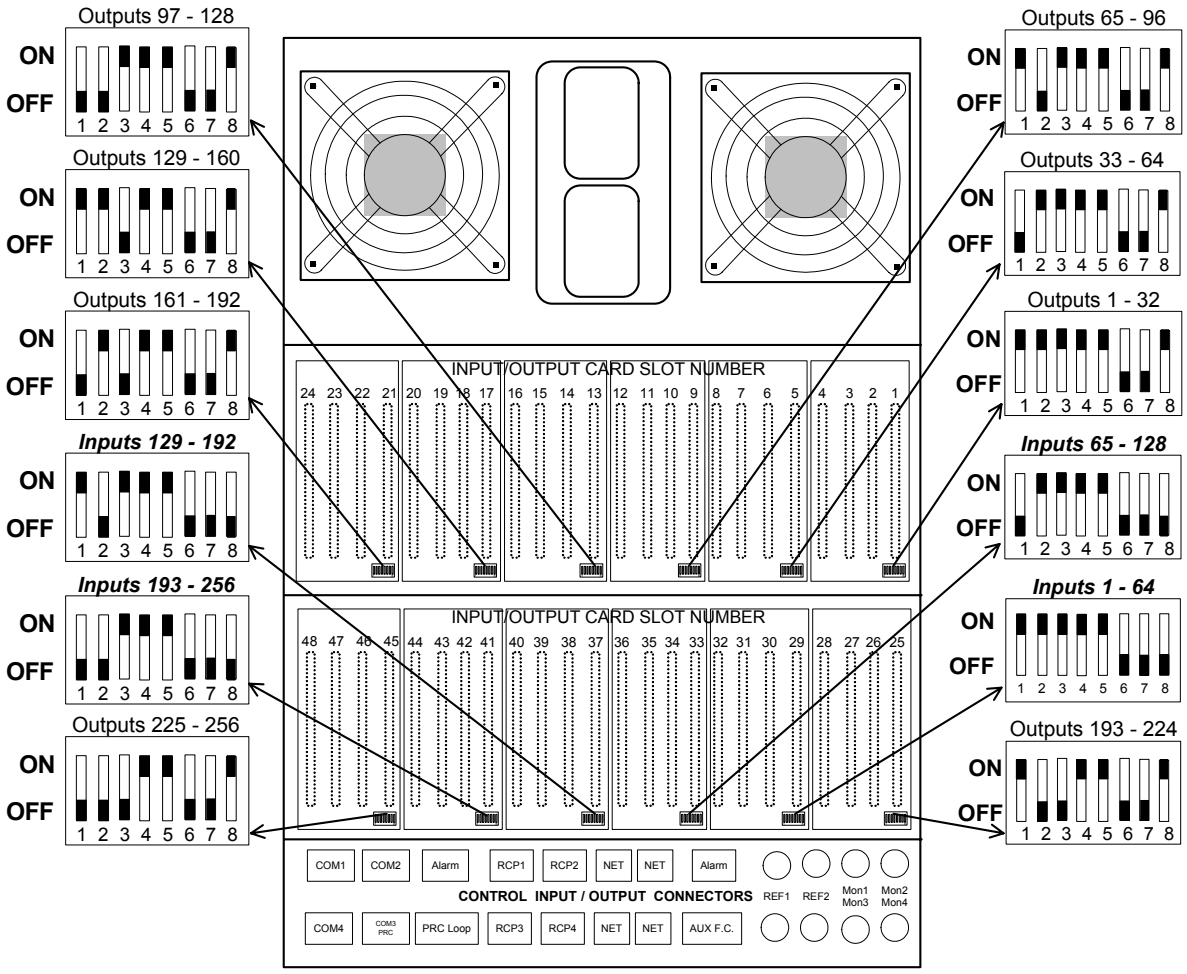


FIGURE 3-4: Input/Output Backplane DIP Switch Settings

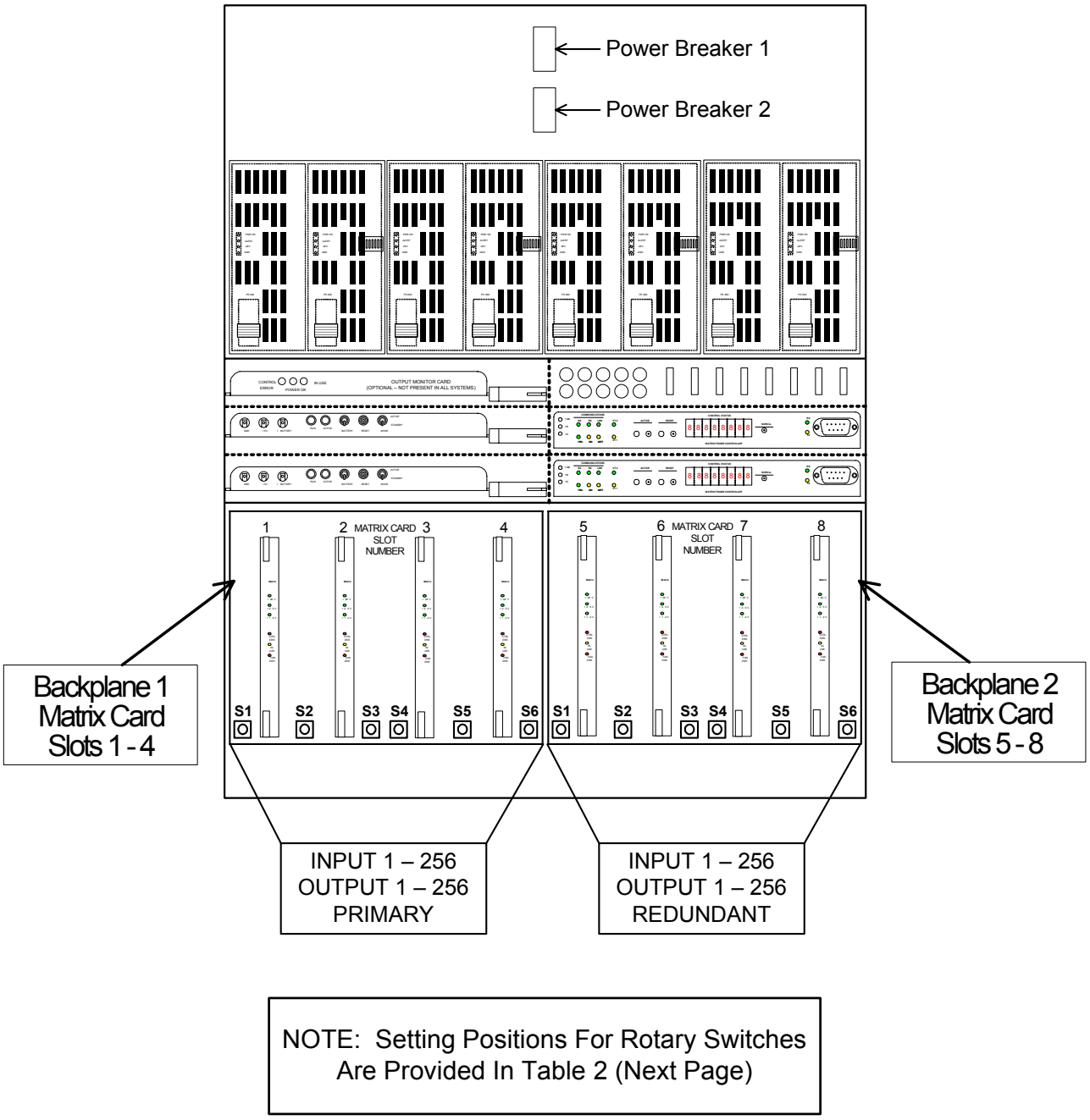


FIGURE 3-5: Matrix Backplane Rotary Switch Locations

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	2	Outputs: 1-128
S2	0	Inputs: 1- 128
S3	3	Outputs: 129-256
S4	2	Outputs: 1-128
S5	1	Inputs: 129-256
S6	3	Outputs: 129-256

*NOTE: Switch Settings For Redundant Matrix Backplane, Card Slots 5-8, Reflect Physical Outputs 257 - 512 Of The Matrix Cards