



## **ANALOG SWITCHERS 2100 SERIES**

HIGH PERFORMANCE ROUTING

OPERATORS MANUAL

Includes Module and Frame Information for:

<b>AUDIO</b>	<b>VIDEO</b>	<b>PULSE</b>
ASM-88	VSM-88	HPP-D44
ASM-168	VSM-168	HPP-88
ASM-1616	VSM-1616	HPP-168
ASM-2144	VSM-2144A	HPP-1616
ASM-2184	VSM-2184A	
ASM-21164	VSM-21164A	
HPA-88	HPV-88AC	
HPA-168	HPV-168AC	
HPA-1616	HPV-1616AC	

SIGMA ELECTRONICS, INC.  
P.O. Box 448  
1027 COMMERCIAL AVENUE  
EAST PETERSBURG, PA 17520-0448  
(717) 569-2681  
(MAR 04)

# 2100 SERIES

## TABLE OF CONTENTS

<b>SECTION 1</b>	<b>OPERATORS MANUAL</b>	
Specifications .....	Page 1,2,3	
Unpacking .....	Page 4	
Installation .....	Page 4	
Interconnect Wiring .....	Page 4	
Video Wiring .....	Page 4	
Pulse Wiring .....	Page 4	
Audio Wiring .....	Page 4	
Communication Line Wiring .....	Page 5	
Control Level Selection, ASM-2x & VSM-2x .....	Page 5	
Serial Port Connections .....	Page 5	
Sync. Reference Input .....	Page 5	
Redundant Power .....	Page 5	
Split Frame .....	Page 5	
2100 Series Compatibility .....	Page 6	
HPV-88 Level Selection .....	Page 7	
HPV-168 Level Selection.....	Page 8	
HPV-1616 Level Selection.....	Page 9	
HPA-88 Level Selection.....	Page 10	
HPA-168 Level Selection.....	Page 11	
HPA-1616 Level Selection.....	Page 12	
ASM-xx, VSM-xx & HPP Level Selection .....	Page 13	
System Block Diagram .....	Page 13	
Control Panel .....	Page 14	
Multi-Frame Systems .....	Page 14	
<b>SECTION 2</b>	<b>SYSTEM CONTROL INTERFACE</b>	
Table of Contents .....	Page 1	
Introduction to Protocol .....	Page 2	
RS-232 Serial Protocol .....	Page 3	
Special Commands Protocol .....	Page 5	
SCI-2188 Compatibility .....	Page 5	
RS-422 Serial Protocol .....	Page 6	
Salvo Commands Protocol .....	Page 6	
SCI DIP Switch Selection .....	Page 7	
SCI Jumper Selection .....	Page 8	
RS-422 Connector Wiring.....	Page 8	
RS-232 Pin Assignment.....	Page 9	
RS-232 Connector Wiring.....	Page 10	
<b>SECTION 3 (OPTIONAL)</b>	<b>CONTROL PANEL OPERATION</b>	
System Control Panel (Specific to control panel ordered) .....	Multiple Pages	
<b>SECTION 4</b>	<b>FRAME AND POWER SUPPLY</b>	
Modular Frame / Power Supply .....	Multiple Pages	
<b>SECTION 5 (OPTIONAL)</b>	<b>2100 SERIES OPTIONS</b>	
Descriptions for 2100 Series Options .....	Multiple Pages	

# MODULE SPECIFICATIONS

## VIDEO SWITCH MODULES:

### HPV-88, HPV-168, HPV-1616

Input Impedance .....	75Ω, terminated
Coupling .....	AC, DC optional
Input Return Loss .....	35dB minimum to 5MHz
Input DC Offset .....	±6.0V (AC coupled), ±0.3V (DC coupled)
Tilt, Field and line .....	1% maximum
Differential Phase .....	0.25° maximum, 10-90% APL
Differential Gain .....	0.25% maximum, 10-90% APL
Frequency Response .....	±0.1dB to 40 MHz ±0.5dB to 80 MHz
Bandwidth .....	160 MHz (175 MHz for HPV-168)
Input Gain Variation .....	0.15 dB maximum
Crosstalk .....	>55 dB @ 5 MHz
Hum and Noise .....	-80 dB rms., below 1Vp-p @ 10 MHz
Connectors .....	BNC

### VSM-2144A, VSM-2184A, VSM-21164A

Input Impedance .....	75Ω, terminated
Coupling .....	DC
Input Return Loss .....	35dB minimum to 10MHz
Input DC Offset .....	1V
Tilt, Field and line .....	1% maximum
Differential Phase .....	0.1° maximum, 10-90% APL
Differential Gain .....	0.1% maximum, 10-90% APL
Frequency Response .....	±0.1dB, 0.1 to 10 MHz ±0.5dB, to 100 MHz
Bandwidth .....	200 MHz (175 MHz for VSM-21164)
Input Gain Variation .....	0.15 dB maximum
Crosstalk .....	>55 dB @ 5 MHz
Hum and Noise .....	-70 dB rms., below 1Vp-p @ 10 MHz
Connectors .....	BNC

### VSM-88, VSM-168, VSM-1616

Input Impedance .....	75Ω, terminated
Coupling .....	AC
Input Return Loss .....	30dB minimum to 5MHz
Tilt, Field and line .....	1% maximum
Differential Phase .....	1° maximum, 10-90% APL
Differential Gain .....	0.5% maximum, 10-90% APL
Frequency Response .....	±0.5dB, 50 Hz to 5 MHz
Bandwidth .....	20 MHz
Input Gain Variation .....	±0.2dB
Crosstalk .....	>50 dB min. to 5 MHz
Hum and Noise .....	-70 dB rms., below 1Vp-p
Connectors .....	BNC

**AUDIO SWITCH MODULES:**

**HPA-88, HPA-168, HPA-1616**

Inputs / Outputs .....	Balanced
Input Level .....	+24 dBm, maximum, 600Ω
Input Impedance .....	High Z 50 kΩ, bridging
Output Level .....	+21 dBm, maximum, 600Ω
Output Impedance .....	300Ω, Indefinite short-circuit protection.
Frequency Response .....	±0.1 dB, 20 Hz to 100 kHz @ +10 dBm, 1 kHz ref.
Bandwidth (-3dB) .....	>150 kHz minimum
Distortion .....	0.025% maximum @ +10 and +21 dBm
Hum and Noise .....	-90 dBm maximum, 20 kHz bandwidth
Common Mode Rejection .....	70 dB minimum, 20 Hz to 2 kHz, 60 dB minimum, 2 kHz to 20 kHz
Crosstalk .....	80 dB minimum, worse case 20 Hz to 20 kHz
Gain .....	± 3 dB, Adjusted to Unity
Connectors .....	3 Pin Detachable terminals

**ASM-2144, ASM-2184, ASM-21164**

Inputs / Outputs .....	Balanced
Input Level .....	+24 dBm, maximum, 600Ω
Input Impedance .....	High Z 50 kΩ, bridging
Output Level .....	+21 dBm, maximum, 600Ω
Output Impedance .....	300Ω, Indefinite short-circuit protection.
Frequency Response .....	±0.1 dB, 20 Hz to 20 kHz
Bandwidth (-3dB) .....	>150 kHz minimum
Distortion .....	0.1% maximum @ +10dBm
Hum and Noise .....	-80 dBm maximum, 20 kHz bandwidth
Gain .....	± 3 dB, Adjusted to Unity
Connectors .....	3 Pin Detachable terminals

**ASM-88, ASM-168, ASM-1616**

Inputs / Outputs .....	Unbalanced
Input Level .....	+18 dBm, maximum
Input Impedance .....	High Z, 15 kΩ
Output Level .....	+21 dBm, max.into HiZ, +18 dBm into 600Ω
Frequency Response .....	±0.2 dB, 20 Hz to 100 kHz
THD .....	0.03% maximum @ +18dBm
Hum and Noise .....	-95 dBm maximum, 20 kHz bandwidth
Gain .....	± .2 dB, Adjusted to Unity into 600Ω
Connectors .....	RCA

**PULSE SWITCH MODULES:**

**HPP-D44, HPP-88, HPP-168, HPP-1616**

Input Impedance .....	75Ω, terminated
Input Level.....	4 V p-p nominal TTL compatible ref.(+2 V terminated,+4 V unterminated)
Coupling .....	DC
Input Return Loss .....	30dB minimum to 5MHz
Output Impedance .....	75Ω, source terminated
Tilt, Field and line .....	0.1% maximum
Transient Response .....	0.5% maximum overshoot, ringing
Input Gain Variation .....	±0.15 dB maximum, any input to one output
Crosstalk .....	>40 dB @ 5 MHz
Hum and Noise .....	-55 dB rms., below 1Vp-p @ 10 MHz
Electrical Length .....	14 nsec typical
Connectors .....	BNC

**SYSTEM CONTROL INTERFACE MODULE (SCI-2144)**

Data Transmission System .....	RS-232 & RS-422
Serial Port Baud Rate .....	4,800 9,600 19,200 38,400 baud
Control Levels .....	Four
Communication Line .....	Coaxial, up to 2000 feet
Control Panels .....	Up to 16 on Comm. Line
Protocol .....	Simple ASCII, supports Xon/Xoff
External Sync Reference .....	Composite Sync or Blackburst
Connectors .....	BNC for Comm. Line and Ext. Sync. 9 Pin "D" for Serial Port

**MECHANICAL**

Switch Frame	SS-2100-6 .....	1RU, 1.75" H x 19" W x 9.5" D
	SS-2100-16+ .....	3RU, 5.25" H x 19" W x 9.5" D
Master Control Panel	HSY-16S, RC-1640 .....	2RU, 3.48" H x 19" W x 1.75" D
	HSY-1616, RC-840, SYC-88 .....	1RU, 1.74" H x 19" W x 1.75" D
Single Bus Panels	HSB-16, SBC-16 .....	1RU, 1.74" H x 19" W x 1.75" D

**POWER REQUIREMENT**

Voltage (Specify at time of order) .....	115 VAC or 230 VAC, 50/60 Hz	
Power Consumption	1 RU Frame .....	40 W maximum, per frame
	3 RU Frame .....	100 W maximum, per frame
Supply model / Fuse	SS-2100-6 (120 VAC) .....	APA-2100-6 with WT-2100-6, 2A
	SS-2100-6 (230 VAC) .....	APA-2100-6 with WT-2101-6, 2A
	SS-2100-16+ (120 VAC) .....	FPS-2100, 2A
	SS-2100-16+ (230 VAC) .....	FPS-2101, 1A

Specifications are subject to change without notice.

## UNPACKING

Inspect your packages and equipment for any damage that might have occurred during shipping. Report any damages to both Sigma Electronics, Inc. and your shipping company. Costs of repair due to shipping damage are the responsibility of the shipper.

2100 Series frames are shipped fully loaded within the shipping carton. The frame includes the power supply and required system modules. Remove the fully loaded frame from the carton. The Operator's Manual is packed within the same carton as the frame. Systems configured within the SS-2100-6 frame will contain a wall transformer within the frame's carton. Systems configured within the SS-2100-16+ frame require two screws to be removed for proper operation of the frame's front panel.

Control Panels are shipped in separate cartons. The "Wall Mount" power supply for the control panel is in the same carton as the control panel.

## INSTALLATION

All frames and control panels are intended to be mounted in standard 19" EIA equipment racks. To allow frame installation into a rack, remove the front door. The SS-2100-16+ frame has two screws used to retain the front panel during shipping. Remove these screws before attempting to mount the frame into a rack. After mounting the frame into the rack, the front door is held into place by the ball stud hardware.

Frames are designed for maximum ventilation of normal operational heat build up. To assist the ventilation, leave 1RU (1.75") space between frames and other equipment within the rack.

The Master Frame, in multi-frame systems, is the frame containing the SCI-2144 System Control Interface Module. The position of the Master Frame may be anywhere within reach of the interconnect cable supplied with the system. Ease of wiring the video and audio cables may dictate position of each frame in multi-framed systems.

## INTERCONNECT WIRING

After racking the system, the Video and/or Audio signals must be wired into and out of the module connectors. Connections to the SCI-2144 will allow control of the router. All these connections are located at the rear of the frame. The following information is a guideline to perform the interconnect wiring.

## VIDEO WIRING

The video switch modules are available in terminating configuration only. If the application requests a looping configuration, use a distribution amplifier on the input signal to send the source signal to multiple devices. This provides the video source with proper 75Ω termination.

Simply connect the source video cables to corresponding input BNCs on the rear of the routing frame. Refer to module drawings for layout configuration of inputs and outputs. The source video cable connects to the video module inputs on the rear panel. The outputs of each module are connected to destination devices. Some devices may be both source and destination devices. Connect the source signal from the device's output to the router's input. The destination's input receives a signal from the router's output.

**NOTE:** Take a close look at the module input and output connector layout before wiring. The layout of the input and output rear panels differ somewhat between module models.

## PULSE ROUTING

Systems that require a Horizontal or Vertical drive pulse of 2Vp-p to 4Vp-p must use the HPP Series modules. These modules also are compatible with TTL pulses from computer sources. The pulse modules use BNC connectors for input and output. The Pulse Switch module has terminated inputs.

## AUDIO WIRING

Balanced Audio connections are provided by 3 position detachable terminal blocks. There is an individual connector assigned for each input and output. To achieve termination on the audio inputs, a 600Ω 1/2 watt load resistor may be added across the (+) and (-) terminals. Where audio signals need to be bridged from the audio switch module to another device, simply use bridging cables or audio distribution amplifiers.

## COMMUNICATIONS LINE WIRING

When referring to the control panel's communication line it is typically abbreviated to COMM Line. All of the control panels are connected to the System Control Interface SCI-2144 via a coaxial cable. There is one COMM Line BNC connector on the rear of the Master frame that houses the SCI-2144.

Installing the Master Control panel to a system is done by connecting a 75Ω coaxial cable between the COMM Line BNCs. Connect a coaxial cable between the COMM Line BNC of the SCI-2144 and the COMM connection on the rear of the control panel. Several control panels may be added to the COMM Line as system requirements dictate. Additional panels are added by installing "BNC T" connectors in the coax path. Short coax cables are used between the "T" and the new panel. Total coaxial cable paths are recommended to be within 2000 feet. This coaxial path should NOT be terminated in a 75Ω load.

## CONTROL LEVEL SELECTION

The 2100 Series of routers provide "4" levels of control, enabling different switch modules (or groups of modules) to be assigned different levels, allowing independent switching if desired.

VSM-21xx and ASM21xx modules, Levels are made on each switch module by connecting the W2 jumper between "C" and through-hole 1, 2, 3 or 4 on the circuit board, numbered for the respective level.

The HPV, HPA, HPP, VSM-xx and ASM-xx modules have switches on them for level selection, refer to the table of contents for the pages referring to level selection on these modules.

## CONTROL BUS WIRING

Systems with multiple frames use an SLC-2102 kit to transfer the control data between frames. The two modules interface via a ribbon cable with 9 Pin D-type connectors. There are two 9 Pin connectors on each card. Either connector may be used. Multi-frame systems will be provided with the SLC-2102 kit. The interface cable supplied is 18 inches in length. Frame placement within the racks will determine the required length of the bus cable. If the supplied cable does not meet the site requirements a straight pin to pin 9 Pin Sub-D custom cable may be used. For a minimal fee, special cable length requirements can be configured by Sigma Electronics Inc.

## SERIAL PORT CONNECTIONS

Sigma's custom RS-232 and RS-422 protocol may be used for external control of the system. This provides a method to allow computer control, modem control, or other third party control devices to communicate to the SCI-2144. The 9 Pin D-type Serial I/O connector is used for this purpose. It is located on the rear of the Master frame on the SCI-2144. The pin assignment and wiring information is provided in the SCI section of this manual.

## SYNC REFERENCE

Sync reference may be applied to the SCI-2144. The routing switcher will switch during the vertical interval of the reference signal when applied. This signal is applied to the SYNC input on the rear of the Master frame. The signal is not internally terminated and must be terminated if not looping through the system. This signal can be either Composite Video (1Vp-p) or Composite Sync Pulse (4Vp-p). A jumper, J4, is provided on the SCI-2144 to properly compensate for the sync reference signal level. Use the "Comp" position of J4 for 1Vp-p signals (jumper pins 2 and 3) and the "Drive" position for 4Vp-p signals (jumper pins 1 and 2).

If no signal is present on the Sync input BNC, the SCI-2144 will execute the switch as soon as it interprets the command. This may result in non-synchronous switching.

## REDUNDANT POWER

The 2100 Series can be configured with a 3RU frame (model SS-2100-12+) that contains a redundant power supply. The dual power supplies operate simultaneously. When the 3RU frame contains a redundant power supply the number of card slots available drops from seventeen to thirteen.

## SPLIT FRAME

The SS-2100-16+ frame has a switch in the center of the mother board. The switch provides the option to open the control bus. The open control bus partitions the frame into two separate switch systems within one frame. An SCI-2144 would be required for each system. One side of the frame allows eight card slots the other nine card slots. This makes the split frame configuration suitable for an 8x8 router of composite video with either mono or stereo audio.

## **2100 SERIES COMPATIBILITY**

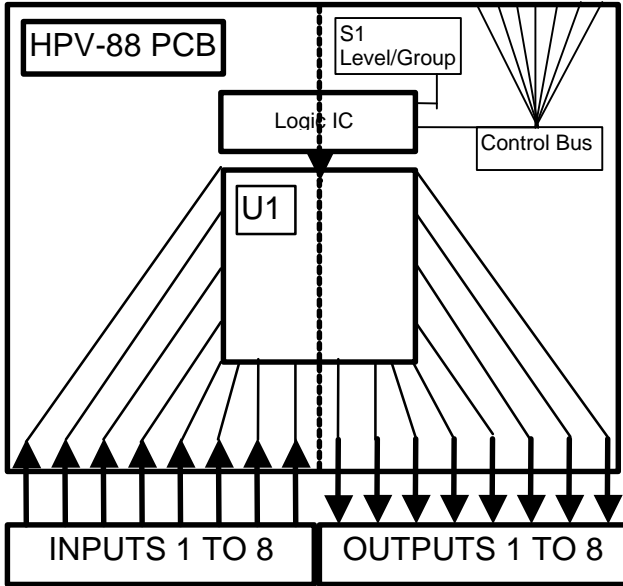
The 2100 Series frames are designed to hold any combination of 2100 Series modules. This allows the frame to support not only the routing modules but also modules for distribution of various signal formats, sync and pattern generators and signal transcoders, converters, encoders or decoders.

The flexibility of this frame design allows the router to mix routing modules. Matrix sizes of 4x4 to 16x16 can be combined under a common control scheme. This also allows balanced and unbalanced audio modules to be combined within a system. Any 2100 series routing module can be used to configure custom operating systems.

Control panels from any other 2100 Series system can be used to enhance or limit the control capabilities of multiple control locations. Panels with full X-Y control with or without breakaway capability are available. A panel with full output status of each output is available. Single bus panels with or without breakaway are also available. Panel addressing capabilities to allow up to sixteen control panels to interface to the router.

# HPV-88

Module block diagram



The 8x8 module is provided as a two card slot width module. Inputs are provided on the top half of the module. Outputs are located on the bottom half of the module. A single card (HPV-88) is attached to the back panel. This card plugs into the frame that supplies power and control data.

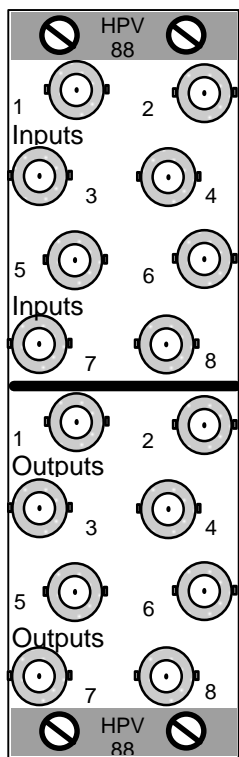
The Level / Group switch, S1, sets the control level and output group. The control level is typically defaulted to Level 1 for video. The output group on this card should be set to 1-8. Refer to the S1 switch chart for other settings.

Multiple HPV-88 modules may be present if the system is configured for YC or Component video. Use one module for all "Y" channel video and another module for all "C" channel video. Set the levels and output groups of each module to the same settings and they will switch in a follow mode.

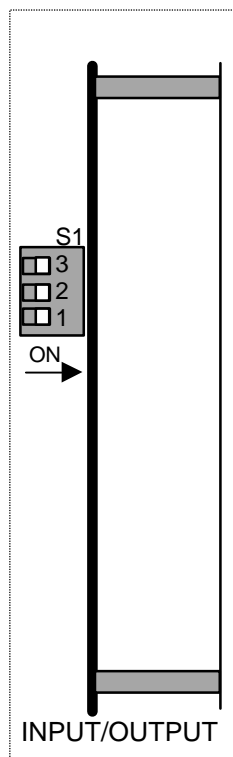
S1 Settings

Output Group and Control Level

Output Group	S1-1	Level #	S1-2	S1-3
1 to 8	ON	1	ON	ON
9 to 16	OFF	2	ON	OFF
		3	OFF	ON
		4	OFF	OFF



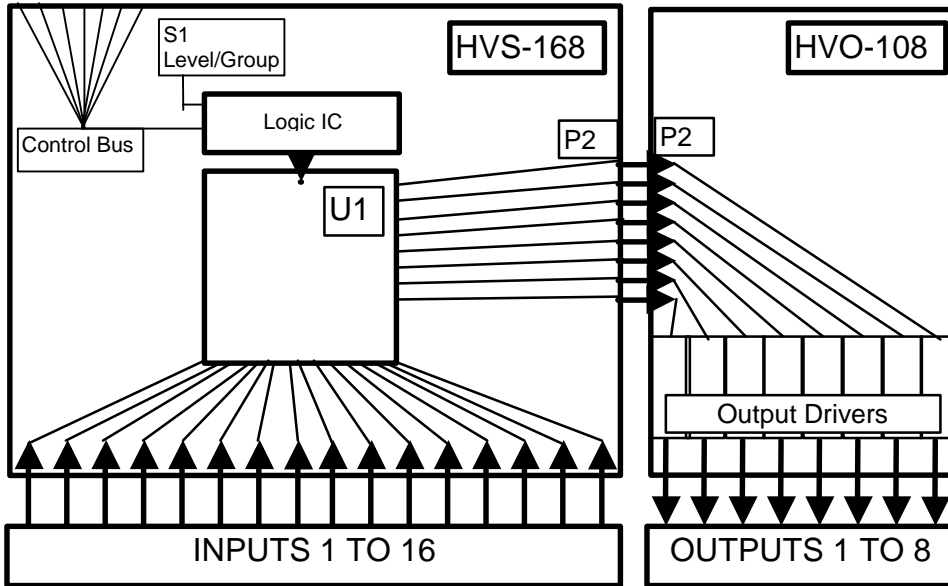
Rear View



Front View

# HPV-168

## Module Block Diagram



### S1 Settings

#### Output Group and Control Level

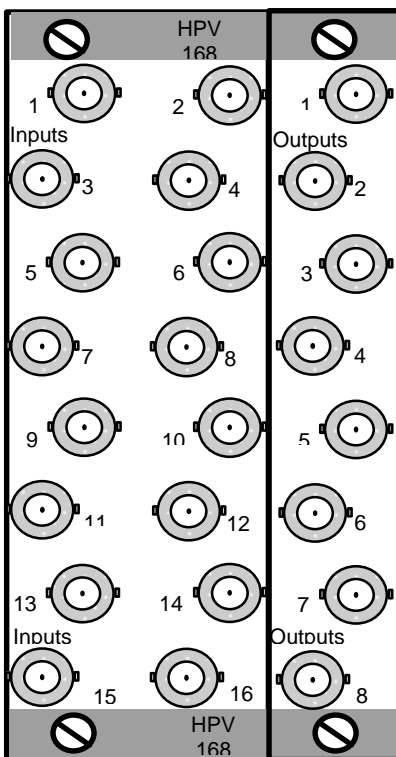
Output Group	S1-1	Level #	S1-2	S1-3
1 to 8	ON	1	ON	ON
9 to 16	OFF	2	ON	OFF
		3	OFF	ON
		4	OFF	OFF

The 16x8 video is provided in a three card slot width module. Inputs are provided on the left portion of the rear panel. Outputs are located on the right of the rear panel. Two cards attach to the back panels. An input card, HVS-168 receives power and all control data from the frame. The output card receives power only from the frame.

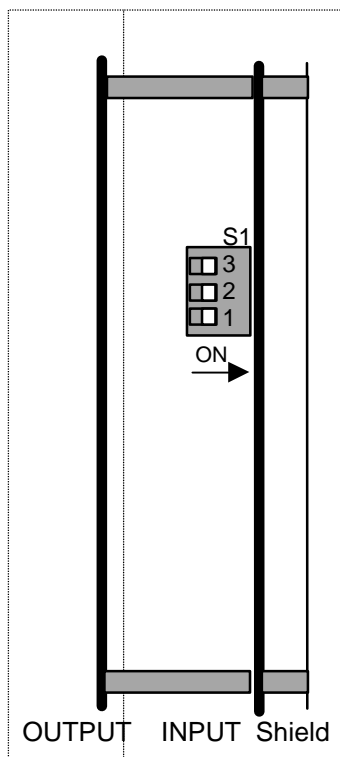
The Level / Group switch, S1, which sets the control level and output group is located on the HVS-168. The control level is typically defaulted to Level 1 for video. The output group on this card should be set to 1-8. Refer to the S1 switch chart for other settings.

Multiple modules may be present if the system is configured for YC or Component video. For example: Use a module for all "Y" channel video and another module for all "C" channel video. Set the levels and output groups of each module to the same settings and they will switch in a follow mode.

The output card provides adjustments for gain and frequency response. Each output has a dedicated gain adjustment. Factory settings provide unity gain. The adjustable capacitor provides frequency response control. Factory adjustment is maximized for flat response through the specified frequency range.



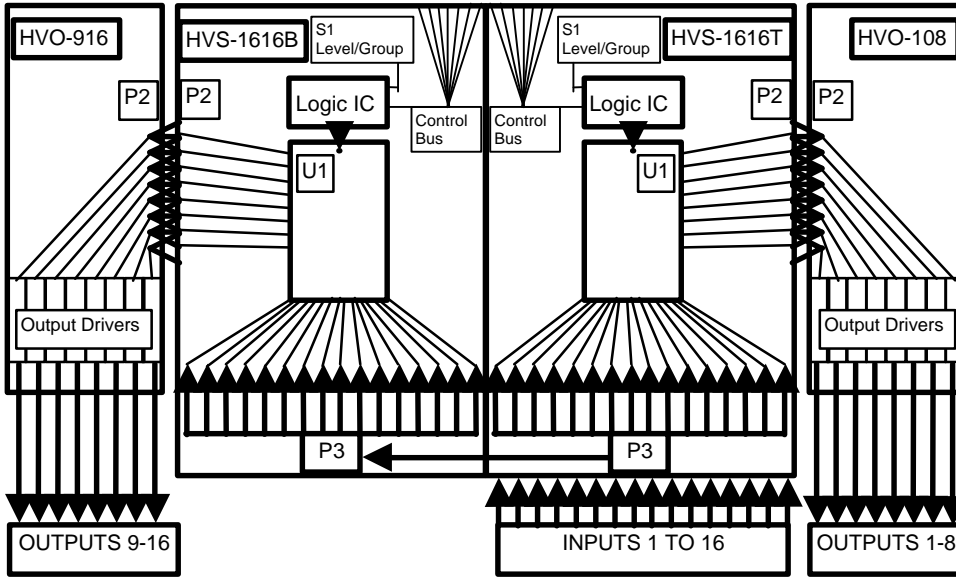
Rear View



Front View

# HPV-1616

## Module Block Diagram



The 16x16 module is provided in a four card slot width module. Inputs are provided on the center portion of the rear panel. Outputs are located on the left and right of the rear panel. Four cards are used to process the signals. Three of the four cards attach to the back panels. An input card, HVS-1616T, receives power and control data from the frame for output group 1-8. The output card, HVO-108 receives power only from the frame. The other input card, HVS-1616B, receives power and control data from the frame for output group 9-16. This card receives the video input signals from the HVS-1616T via P3. The output card, HVO-916, receives power only from the frame.

### S1 Settings

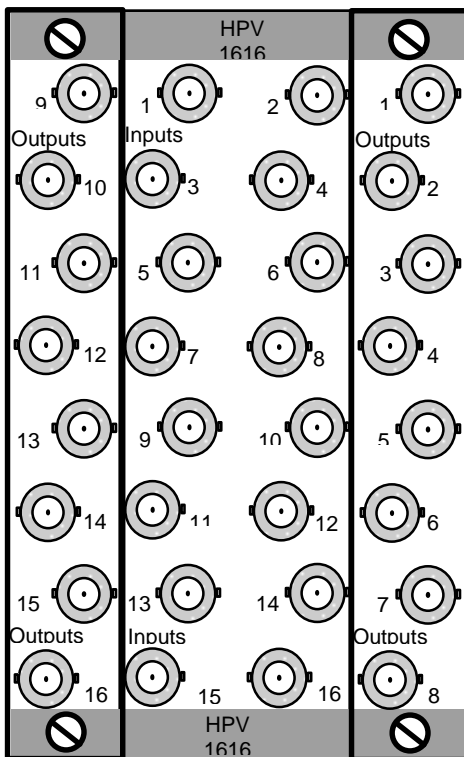
#### Output Group and Control Level

Output Group	S1-1	Level #	S1-2	S1-3
1 to 8	ON	1	ON	ON
9 to 16	OFF	2	ON	OFF
		3	OFF	ON
		4	OFF	OFF

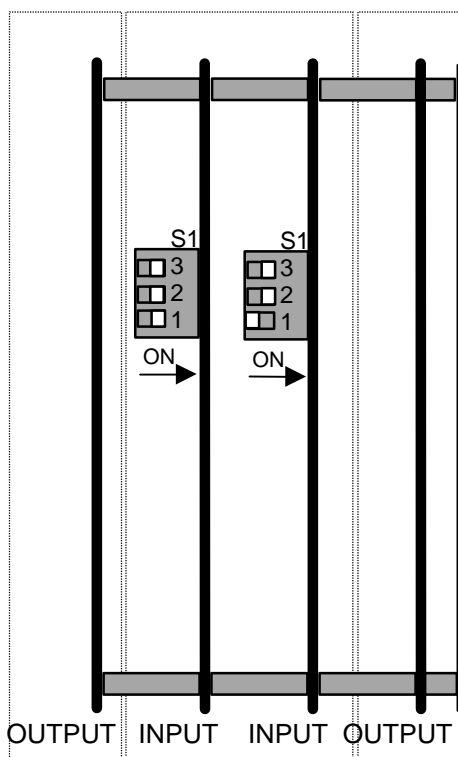
The Level / Group switch, S1, which sets the control level and output group is located on the input cards HVS-1616T and HVS-1616B. The control level is typically defaulted to Level 1 for video. The output group on the HVS-1616T card should be set to 1-8. The output group on the HVS-1616B card should be set to 9-16. Refer to the S1 switch chart for other settings.

Multiple modules may be present if the system is configured for YC or Component video. For example: Use a module for all "Y" channel video and another module for all "C" channel video. Set the levels of each module to the same settings and they will switch in a follow mode.

The output cards have adjustments for gain and frequency response. Each output has a dedicated gain adjustment. Factory settings provide unity gain. The adjustable capacitor provides frequency response control. Factory adjustment is maximized for flat response through the specified frequency range.



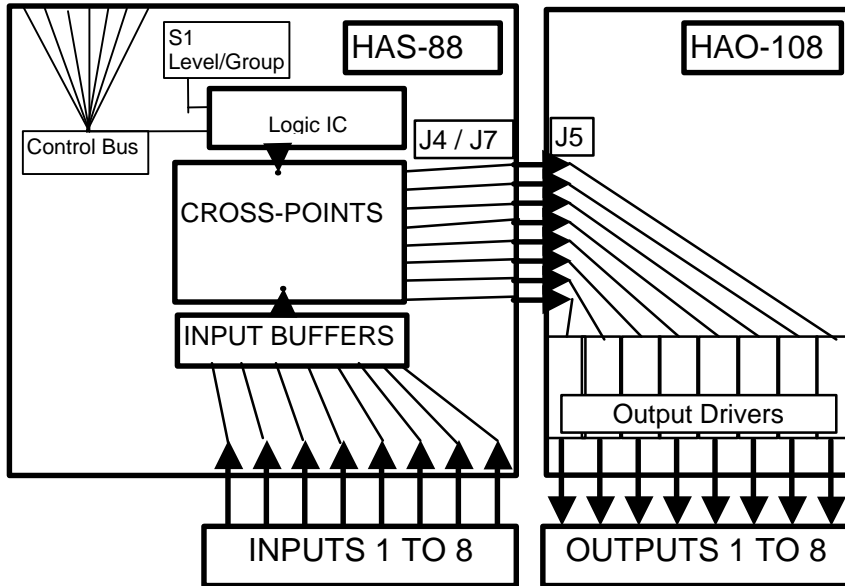
Rear View



Front View

# HPA-88

## Module Block Diagram



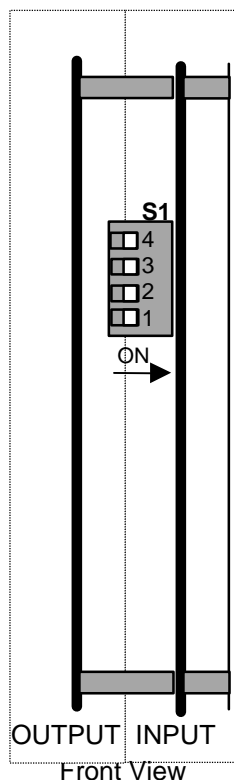
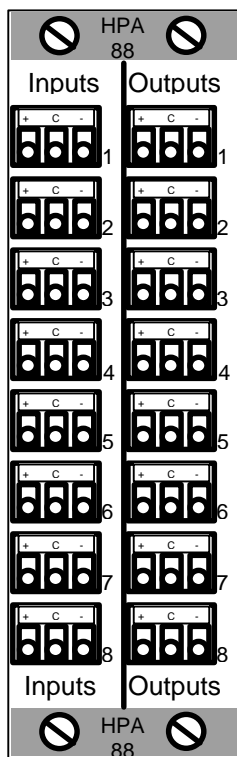
The 8x8 audio is provided as a two card slot width module. The rear panel has inputs on the left half of the module. The input / switch card, HAS-88, is attached to the input connector panel. This card plugs into the frame that supplies power and control data. Outputs are located on the right half of the rear panel. An output card HAO-88 is attached to the back panel.

The Level / Group switch, S1, sets the control level as well as the input and output group. The control level is typically defaulted to Level 2 for audio. The input group is normally set to 1-8. The output group on this card should be set to 1-8. Refer to the S1 switch chart to customize the settings for special applications.

Multiple HPA-88 modules may be present if the system is configured for Stereo Audio or Audio and Time Code. Use one module for all "Left" channel audio and another module for all "Right" channel audio. Set the levels and output groups of each module to the same settings and they will switch in a follow mode. Some applications require the audio channels to independently break-away. To allow break-away the levels of each audio module must be different. Typically one module would be set to level 2 (factory default) and the other module would be set to level 3. Refer to switch

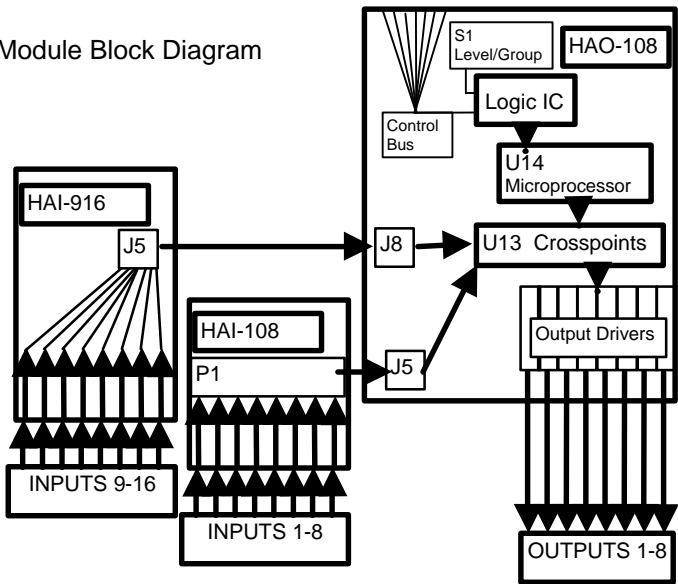
S1 Settings  
Output / Input Group and Control Level

Output Group	S1-1	Input Group	S1-2	Control Level #	S1-3	S1-4
1 to 8	ON	1 to 8	ON	1	ON	ON
9 to 16	OFF	9 to 16	OFF	2	ON	OFF
				3	OFF	ON
				4	OFF	OFF



# HPA-168

## Module Block Diagram



The 16x8 audio is provided in a three card slot width module. Inputs are provided on the center and left side of the rear panel. Outputs are located on the right side of the rear panel. Three cards are used to process the signals. The output card, HAO-108 receives power and control data from the frame for the whole module. The input cards, HAI-108 and HAI-916 receive power from the output card. The output card receives the audio input signals from the two input cards via P1, on the HAI-108 and J5 on the HAI-916. The output card performs the crosspoint switching function.

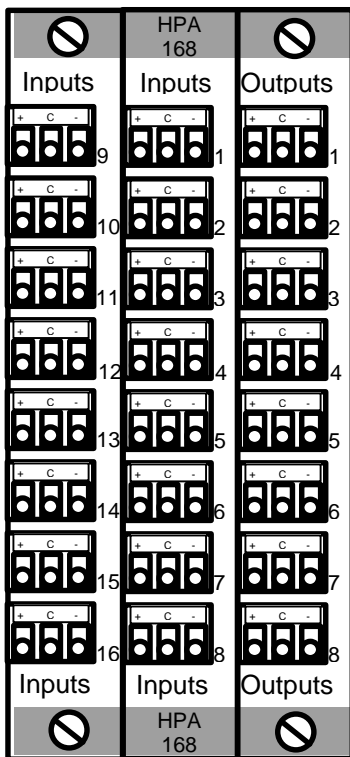
The Level / Input switch, S1, which sets the logical control level and selects input size, is located on the output card (HAO-108). The control level is typically defaulted to Level 2 for audio. The input size on the HAO-108 card should be set to 8. Refer to the S1 Settings chart for other control level settings.

Multiple modules may be present if the system is configured for Stereo or Time Code. For example: Use a module for all "Left" channel audio and another module for all "Right" channel audio. Set the levels of each module to the same settings and they will switch in a follow mode. For applications where audio channels select from different sources, the module's control levels must be different. Please note that video modules are typically defaulted to level 1. Do not use level 1 for audio unless audio is to follow the video source.

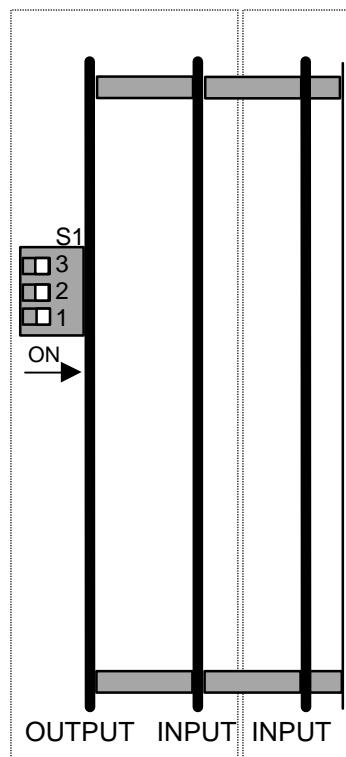
Each output has a dedicated gain adjustment. Factory settings provide unity gain. The input cards have adjustments for common mode noise rejection. Factory adjustment is maximized for best typical performance through the specified range.

S1 Settings  
Control Level and Input Size

Level	S1-1	S1-2	Input Size	S1-3
1	ON	ON	16 Inputs	ON
2	ON	OFF	8 Inputs	OFF
3	OFF	ON		
4	OFF	OFF		



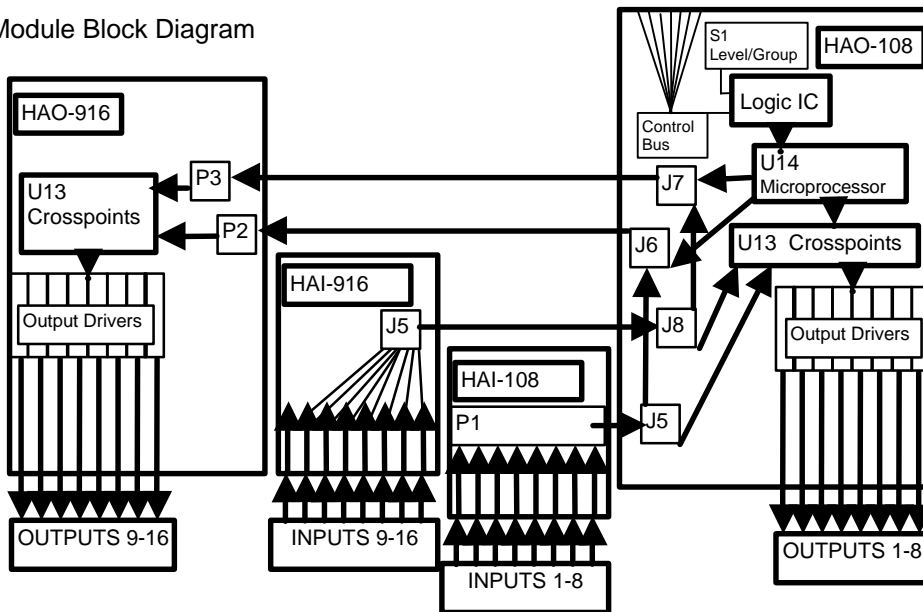
Rear View



Front View

# HPA-1616

## Module Block Diagram



The 16x16 audio is provided in a four card slot width module. Inputs are provided on the left side of the rear panel. Outputs are located on the right side of the rear panel. Four cards are used to process the signals. The output card, HAO-108 receives power from the frame to support all input circuitry and outputs 1 to 8. The output card HAO-916 receives power from the frame for output group 9 to 16. The HAO-108 receives control data from the frame for the whole module. The output cards receive the audio input signals from the two input cards via P1, on the HAI-108 and J5 on the HAI-916. The output card performs the crosspoint switching function.

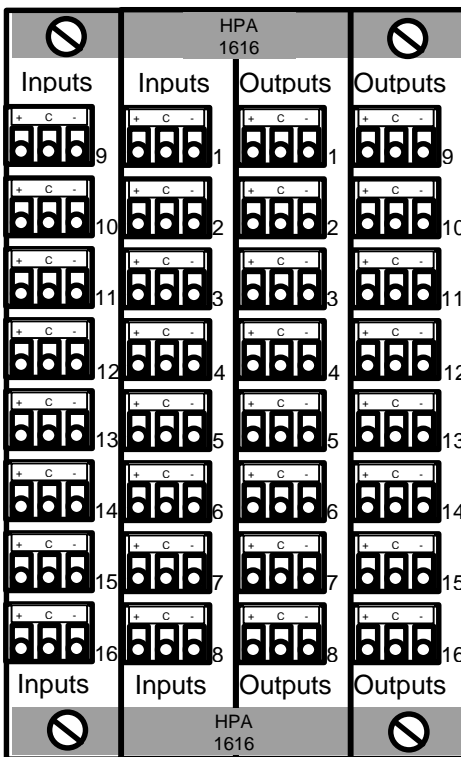
The Level / Input switch, S1, which sets the logical control level and selects input size, is located on the output card (HAO-108). The control level is typically defaulted to Level 2 for audio. The input size on the HAO-108 card should be set to 8. Refer to the S1 Settings chart for other control level settings.

Multiple modules may be present if the system is configured for Stereo or Time Code. For example: Use a module for all "Left" channel audio and another module for all "Right" channel audio. Set the levels of each module to the same settings and they will switch in a follow mode. For applications where audio channels select from different sources, the module's control levels must be different. Please note that video modules are typically defaulted to level 1. Do not use level 1 for audio unless audio is to follow the video source.

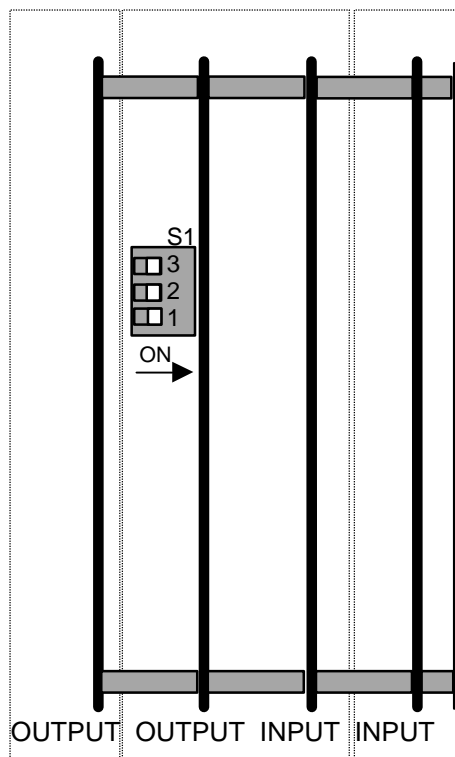
Each output has a dedicated gain adjustment. Factory settings provide unity gain. The input cards have adjustments for common mode noise rejection. Factory adjustment is maximized for best typical performance through the specified range.

S1 Settings  
Control Level and Input Size

Level	S1-1	S1-2	Input Size	S1-3
1	ON	ON	16 Inputs	ON
2	ON	OFF	8 Inputs	OFF
3	OFF	ON		
4	OFF	OFF		



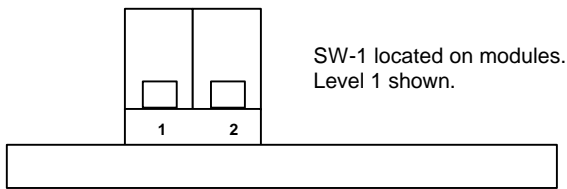
Rear View



Front View

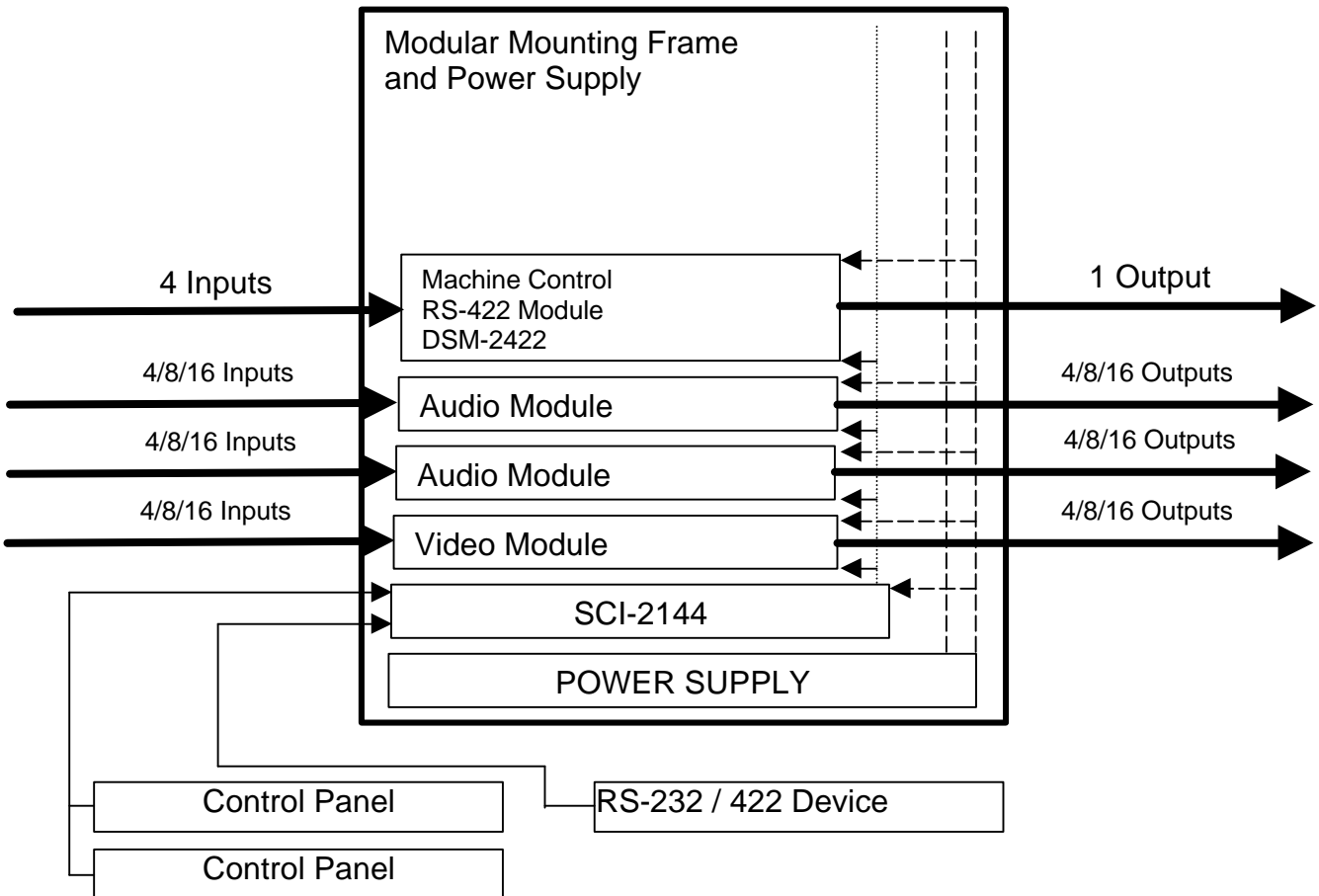
**LEVEL SETTING FOR MODULES:**

ASM-88, ASM-168, ASM-1616  
 VSM-88, VSM-168, VSM-1616  
 HPP-D44, HPP-88, HPP-168, HPP-1616



LEVEL	SW 1.1	SW1.2
1	DOWN	DOWN
2	DOWN	UP
3	UP	DOWN
4	UP	UP

**SYSTEM BLOCK DIAGRAM**



## Control Panels

The 2100 Series panels include those panels previously sold with the Small Matrix Series, HPX Series, Micro Series and Lite Series. Panels from any of the Series may be selected based on the desired function of the location in which the panel is to be applied.

The control panels have address switches that allow addressing from one (1) through sixteen (16). There may be as many as sixteen panels on each router system. The panels can be a mixture of Full X-Y master control panels or Single Bus panels that control only one selected output. Most panels offer the selection to operate in either a Preset or Auto-Take mode. The Preset mode allows the user to select a source and desired destination and hold that "preset" until the TAKE button is depressed. The Autotake mode will automatically perform the "take" function when the destination number is selected. Some panels allow the user to select the mode of operation via a switch on the rear panel. Other streamlined panels provide autotake mode only.

Refer to the Control Panel section of this manual for specific operation information for the supplied control panel(s).

The required control panel interface is 75 ohm coaxial cable. The total length of the cable should not exceed 2000 feet. If multiple panels are to be connected to the system, BNC 'T' connectors should be used to split the communication (COMM) line. The COMM line can be configured in either a daisy chain, star or mixture of both configurations. Cable lengths should be kept to a minimum for best system operation.

All control panels will be allowed the same priority on the router system. There are no user level priorities available to limit the control of any given panel. Some panels do allow the setting of control levels that would allow a panel to control video only or audio only.

## Multi-Frame Systems

When system configuration requires more than one frame to house the modules, the control data must be looped from the master frame, which contains the SCI-2144, to any additional frames. The control data contains the Control Level and Crosspoint information generated by the SCI-2144. The transfer of control data between frames requires an interface module in each frame with a flexible ribbon cable attached to each module.

When two frames are in a routing system the SLC-2102 kit is required. This kit contains two modules, one for each frame, and an interface cable. The cable is typically 18 inches as supplied by the factory. Longer cables may be used when the application does not allow the frames to be mounted together in the rack mount frame. The 9 Pin D connectors used on this cable are wired pin to pin. The modules supplied with the SLC-2102 have two connectors each. Either connector may be used. The alternative connector will be used for communicating to additional frames.

If more than two frames are used the additional frames require the SLV-2126 kit. This kit contains one single card slot module and a cable. The module mounts into the frame with the cable attached between the module and an available 9 Pin D connector on the SLC-2102 located in the first or second frame.

If 2100 Series frames are used for modules other than routing, there is not a need to interface the frames. This applies to frames which house analog or digital distribution amplifiers, transcoders, encoders, decoders and sync generator modules. The control data looping kits are required when multiple frames house routing modules.