

Concerto

ROUTING MATRIX

Instruction Manual



071813804
SEPTEMBER 2003

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Grass Valley Web Site

The www.thomsongrassvalley.com web site offers the following:

Online User Documentation — Current versions of product catalogs, brochures, data sheets, ordering guides, planning guides, manuals, and release notes in .pdf format can be downloaded.

FAQ Database — Solutions to problems and troubleshooting efforts can be found by searching our Frequently Asked Questions (FAQ) database.

Software Downloads — Software updates, drivers, and patches can be downloaded.

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Preface

About This Manual

This manual provides installation, operation, and service information specific to the Concerto Routing Matrix.

Additional Documentation

The Concerto Routing Matrix can be controlled by the Encore, Jupiter, or the SMS Series 7000 Control Systems. Configuration information required for using the Concerto Routing Matrix with a Control System is contained in the control system's documentation set. Concerto specific information is contained in this manual.

Electronic copies of all routing documentation is available on the documentation CD that came with your frame. A printed copy of the documentation set was provided with the system. Individual manuals may be ordered by contacting Customer Service.

For assistance and to access the current documentation that is available on our web site, see *Grass Valley Web Site* [on page 2](#).

Safety Summary

Read and follow the important safety information below, noting especially those instructions related to risk of fire, electric shock or injury to persons. Additional specific warnings not listed here may be found throughout the manual.

WARNING Any instructions in this manual that require opening the equipment cover or enclosure are for use by qualified service personnel only. To reduce the risk of electric shock, do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so.

Safety Terms and Symbols

Terms in This Manual

Safety-related statements may appear in this manual in the following form:

WARNING Warning statements identify conditions or practices that may result in personal injury or loss of life.

CAUTION Caution statements identify conditions or practices that may result in damage to equipment or other property, or which may cause equipment crucial to your business environment to become temporarily non-operational.

Terms on the Product

The following terms may appear on the product:

DANGER — A personal injury hazard is immediately accessible as you read the marking.

WARNING — A personal injury hazard exists but is not immediately accessible as you read the marking.

CAUTION — A hazard to property, product, and other equipment is present.

Symbols on the Product

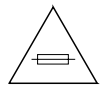
The following symbols may appear on the product:



Indicates that dangerous high voltage is present within the equipment enclosure that may be of sufficient magnitude to constitute a risk of electric shock.



Indicates that user, operator or service technician should refer to product manual(s) for important operating, maintenance, or service instructions.



This is a prompt to note fuse rating when replacing fuse(s). The fuse referenced in the text must be replaced with one having the ratings indicated.



Identifies a protective grounding terminal which must be connected to earth ground prior to making any other equipment connections.



Identifies an external protective grounding terminal which may be connected to earth ground as a supplement to an internal grounding terminal.



Indicates that static sensitive components are present which may be damaged by electrostatic discharge. Use anti-static procedures, equipment and surfaces during servicing.

Warnings

The following warning statements identify conditions or practices that can result in personal injury or loss of life.

Dangerous voltage or current may be present — Disconnect power and remove battery (if applicable) before removing protective panels, soldering, or replacing components.

Do not service alone — Do not internally service this product unless another person capable of rendering first aid and resuscitation is present.

Remove jewelry — Prior to servicing, remove jewelry such as rings, watches, and other metallic objects.

Avoid exposed circuitry — Do not touch exposed connections, components or circuitry when power is present.

Use proper power cord — Use only the power cord supplied or specified for this product.

Ground product — Connect the grounding conductor of the power cord to earth ground.

Operate only with covers and enclosure panels in place — Do not operate this product when covers or enclosure panels are removed.

Use correct fuse — Use only the fuse type and rating specified for this product.

Use only in dry environment — Do not operate in wet or damp conditions.

Use only in non-explosive environment — Do not operate this product in an explosive atmosphere.

High leakage current may be present — Earth connection of product is essential before connecting power.

Dual power supplies may be present — Be certain to plug each power supply cord into a separate branch circuit employing a separate service ground. Disconnect both power supply cords prior to servicing.

Double pole neutral fusing — Disconnect mains power prior to servicing.

Use proper lift points — Do not use door latches to lift or move equipment.

Avoid mechanical hazards — Allow all rotating devices to come to a stop before servicing.

Cautions

The following caution statements identify conditions or practices that can result in damage to equipment or other property

Use correct power source — Do not operate this product from a power source that applies more than the voltage specified for the product.

Use correct voltage setting — If this product lacks auto-ranging power supplies, before applying power ensure that the each power supply is set to match the power source.

Provide proper ventilation — To prevent product overheating, provide equipment ventilation in accordance with installation instructions.

Use anti-static procedures — Static sensitive components are present which may be damaged by electrostatic discharge. Use anti-static procedures, equipment and surfaces during servicing.

Do not operate with suspected equipment failure — If you suspect product damage or equipment failure, have the equipment inspected by qualified service personnel.

Ensure mains disconnect — If mains switch is not provided, the power cord(s) of this equipment provide the means of disconnection. The socket outlet must be installed near the equipment and must be easily accessible. Verify that all mains power is disconnected before installing or removing power supplies and/or options.

Route cable properly — Route power cords and other cables so that they are not likely to be damaged. Properly support heavy cable bundles to avoid connector damage.

Use correct power supply cords — Power cords for this equipment, if provided, meet all North American electrical codes. Operation of this equipment at voltages exceeding 130 VAC requires power supply cords which comply with NEMA configurations. International power cords, if provided, have the approval of the country of use.

Use correct replacement battery — This product may contain batteries. To reduce the risk of explosion, check polarity and replace only with the same or equivalent type recommended by manufacturer. Dispose of used batteries according to the manufacturer's instructions.

Troubleshoot only to board level — Circuit boards in this product are densely populated with surface mount technology (SMT) components and application specific integrated circuits (ASICs). As a result, circuit board repair at the component level is very difficult in the field, if not impossible. For warranty compliance, do not troubleshoot systems beyond the board level.

Regulatory Notices

Certifications and Compliances

FCC Emission Control

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. Changes or modifications not expressly approved by Grass Valley Group can affect emission compliance and could void the user's authority to operate this equipment.

Canadian EMC Notice of Compliance

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

EN55022 Class A Warning

For products that comply with Class A. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Canadian Certified Power Cords

Canadian approval includes the products and power cords appropriate for use in the North America power network. All other power cords supplied are approved for the country of use.

Canadian Certified AC Adapter

Canadian approval includes the AC adapters appropriate for use in the North America power network. All other AC adapters supplied are approved for the country of use.

Laser Compliance

Laser Safety Requirements

The device used in this product is a Class 1 certified laser product. Operating this product outside specifications or altering from its original design may result in hazardous radiation exposure, and may be considered an act of modifying or new manufacturing of a laser product under U.S. regulations contained in 21CFR Chapter 1, subchapter J or CENELEC regulations in HD 482 S1. People performing such an act are required by law to recertify and reidentify this product in accordance with provisions of 21CFR subchapter J for distribution within the U.S.A., and in accordance with CENELEC HD 482 S1 for distribution within countries using the IEC 825 standard.

Laser Safety

Laser safety in the United States is regulated by the Center for Devices and Radiological Health (CDRH). The laser safety regulations are published in the "Laser Product Performance Standard," Code of Federal Regulation (CFR), Title 21, Subchapter J.

The international Electrotechnical Commission (IEC) Standard 825, "Radiation of Laser Products, Equipment Classification, Requirements and User's Guide," governs laser products outside the United States. Europe and member nations of the European Free trade Association fall under the jurisdiction of the Comité Européen de Normalization Electrotechnique (CENELEC).

For the CDRH: The radiant power is detected through a 7 mm aperture at a distance of 200 mm from the source focused through a lens with a focal length of 100 mm.

For IEC compliance: The radiant power is detected through a 7 mm aperture at a distance of 100 mm from the source focused through a lens with a focal length of 100 mm.

FCC Emission Limits

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesirable operation. This device has been tested and found to comply with FCC Part 15 Class B limits for a digital device when tested with a representative laser-based fiber optical system that complies with ANSI X3T11 Fiber Channel Standard.

Certification

Category	Standard	Designed/tested for compliance with:
Safety	UL1950	Safety of Information Technology Equipment, including Electrical Business Equipment (Second edition, 1993).
	IEC 950	Safety of Information Technology Equipment, including Electrical Business Equipment (Second edition, 1991).
	CAN/CSA C22.2, No. 950-93	Safety of Information Technology Equipment, including Electrical Business Equipment.
	EN60950	Safety of Information Technology Equipment, including Electrical Business Equipment.

Physical Configuration

Concerto Routing Matrix is a multi-format routing switcher platform. The 7RU frame has four slots for modules. Analog (audio and video), Digital (AES audio, SD video, and HD video), and Data (TimeCode and Port) modules can be mixed in the same frame. The modules can be configured separately to create four matrices of 32x32 or combined in various ways to create matrices from 32x32 to 128x128. (The HD video modules can be used to create HD matrices from 32x32 to 96x96.)

The four module slots in the frame are not format sensitive. A module and associated backplane can be plugged in and secured in any slot. However it is very important that the module and the backplane are compatible.

CAUTION If a module is plugged into an incompatible backplane it will cause damage.

Two video reference inputs, allow assignment of both PAL and NTSC references to the same frame.

The frame is equipped with a 48 VDC external power connector.

System Physical Configuration

The Concerto Routing Matrix has four slots that are physically configured by plugging in any Concerto module and associated backplane into any slot. Each module is a complete 32x32 matrix containing inputs, outputs, and crosspoints. By inserting the modules in the frame in different configurations, such as two digital video modules in adjoining slots, matrices of 32x32 to 128x128 are created.

Mixed Module Matrices

The Analog Audio module has Analog to Digital and Digital to Analog converters built into the module. This allows the configuration of physical matrices that contain Analog Audio modules and Digital Audio modules. These mixed audio matrices work the same as regular matrices with all inputs available to all outputs.

When configuring a level or matrix that contains both Analog Audio modules and AES Digital Audio modules use settings for AES Digital Audio for all the modules in the grouping.

The Digital Video modules SD and HD can be combined into a physical matrix. All SD video signals can be routed through either module making SD video available to all inputs and outputs. The HD signal (1.485 Gbps) can only be routed through the HD module.

CAUTION The maximum number of HD modules that can be in a Concerto matrix is three and the fourth slot has to remain empty. If two HD modules are used then the other two slots can be loaded with any of the non HD modules.

When configuring a level or matrix that contains both SD and HD Digital Video modules use settings for SD Digital Video for all the modules in the grouping. The Analog Video module can not be mixed with Digital Video modules in the same level but can be in the same frame as a separate level.

The Port module can be used as either a TimeCode module or a Port module. TimeCode and Port cannot be mixed in the same level.

Controller Module Identification

Controller (CM) modules are used in the Concerto Routing Matrix. CMs are designed to work in pairs (one primary, one backup) to provide failure resistance. The primary CM provides all required functions; the backup is ready to take over should the primary unit fail. Control logic facilitates the orderly change of control between the two modules and ensures that only one module at a time controls the external serial busses.

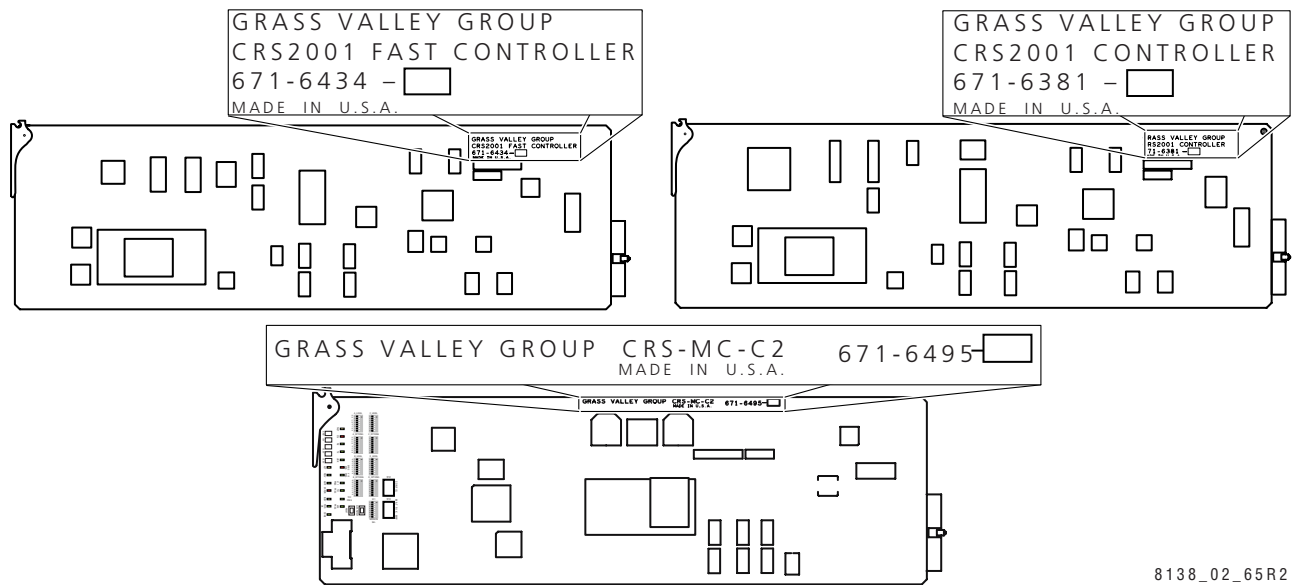
Control consists of the messages created and sent to the CM to set matrix crosspoints, and the return messages from the CM containing true tally status back to the control system.

The CMs can be inserted into a powered frame. To ensure that the system power supply is not disturbed, a pre-charge resistor is connected in series with one of the rear connector pins. The corresponding pin on the back-plane connector is longer than any of the other power pins. This allows the pre-charge pin to make connection before the others.

Vertical interval reference is required for crosspoint switching tasks. This is an analog video input which can be NTSC or PAL. This input is processed to extract vertical sync and odd/even field (if any) information. A pre-defined programmable logic device (PLD) is used to create a switching strobe that is offset into line 10 for NTSC or line 6 for PAL. A video presence detector interrupts the processor if the video reference is missing. If this reference is missing a fake sync is generated at a default asynchronous interval.

Concerto has three Controller modules. Two of the modules are Ethernet only. One Ethernet Controller is labeled **CRS2001 CONTROLLER 671-6381-xx** with an Ethernet interface of 10Base-T and the other is labeled **CRS2001 FAST CONTROLLER 671-6434-xx** with an Ethernet interface of 10/100Base-T. The third Controller is labeled **CRS-MC-C2 671-6495-xx** and can be set to allow either Ethernet or Crosspoint Bus interface control. Do not mix Controller types in a single matrix. See [Figure 1](#) for help in identifying Controllers.

Figure 1. Controller Module Identification

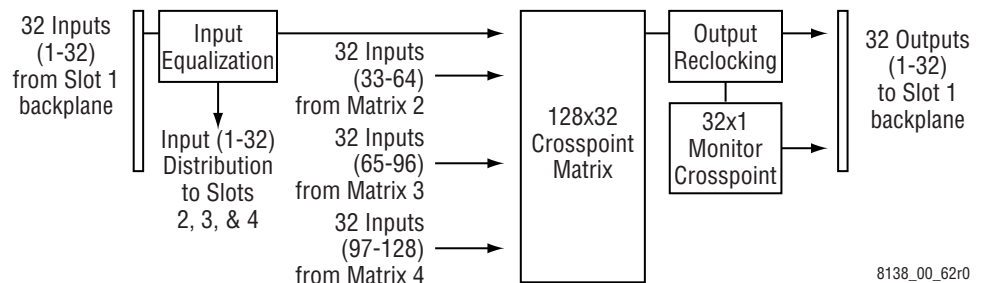


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Module Configuration

Each module receives 32 inputs from the backplane associated with the slot position of the module. Each module delivers 32 outputs to the backplane associated with the slot position of the module. In [Figure 2](#), the module in slot position 1 is receiving Inputs 1-32 from the backplane in slot position 1. Because [Figure 2](#) shows a 128x128 matrix, Inputs 33-128 are available to the module via the Interconnect module. The module can now deliver any of the Sources connected to Inputs 1-128 to the Output connectors 1-32 on the backplane in slot position 1.

Figure 2. Block Diagram for Module in Slot 1 in 128x128 Matrix



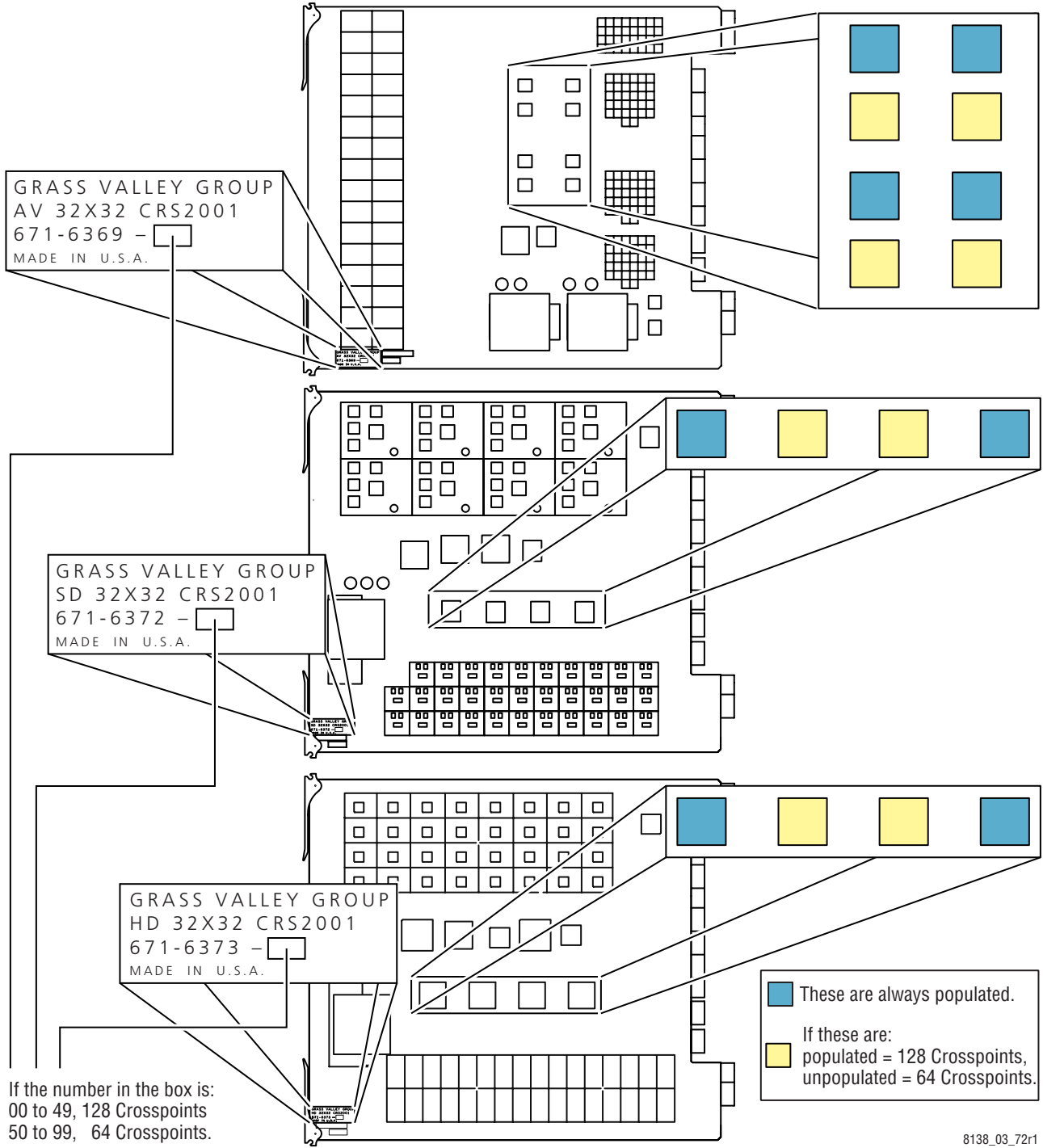
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The Analog Audio module has dual inputs and outputs to accommodate the left and right channels. These dual connections are labelled on the back-plane using a 1A/1B format. The inputs and outputs can be cabled and then software configured to pair the left and right channels as a stereo signal. The only cabling variation would be to block all the Left connections together and all the Right connections together. An example of this would be 1A is Left 1, 1B is Left 2, 2A is Left 3, continued to 16B is Left 32, then 17A is Right 1, 17B is Right 2, continued to 32B is Right 32.

Video Module Identification

The Digital and Analog video modules have either a 128x32 Crosspoint configuration or a 64x32 Crosspoint configuration. The 64x32 Crosspoint configuration will allow two modules to create a 64x64 matrix but will not allow larger matrices. The 128x32 Crosspoint configuration modules will have a number from 00 to 49 in the part number label on the module. The 64x32 Crosspoint configuration modules will have a number from 50 to 99 in the part number label on the module. See [Figure 3](#) for help in identifying Crosspoint configuration.

Figure 3. Video Module Crosspoint Identification

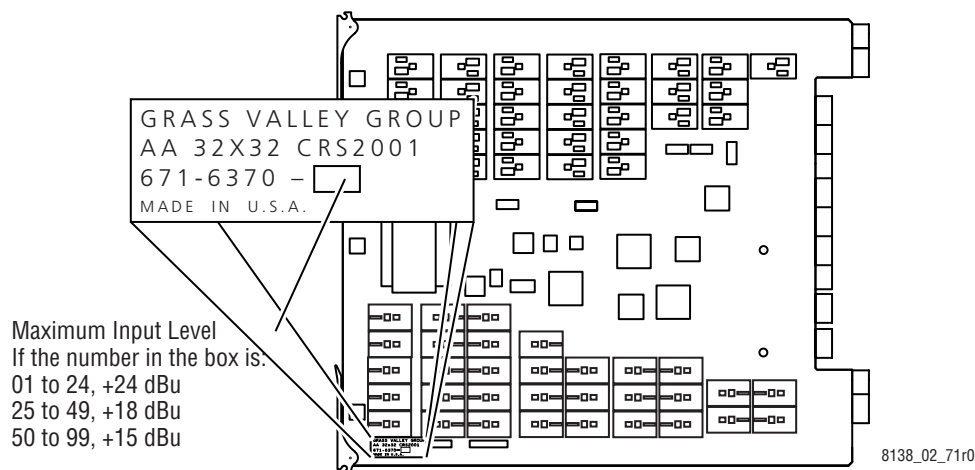


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Analog Audio Module Identification

The Analog Audio module has one of three Maximum Input Level specifications. To identify which Maximum Input Level applies to a module refer to the last two digits of the part number, see [Figure 4](#).

Figure 4. Analog Audio Maximum Input Level Identification



Optimum Matrix Configurations

Optimum performance is achieved by positioning the modules in the frame using the top to bottom priority shown in [Table 1](#). This hierarchy is required for interfacing to Jupiter Control Systems.

Table 1. Optimum Module Positions

Module	Abbreviation
Analog Video	AV
Digital Video (SD or HD)	DV
Analog Audio	AA
Digital Audio (AES)	DA
Data (TimeCode or Port)	TCP

CAUTION The maximum number of HD modules that can be in a Concerto matrix is three and the fourth slot has to remain empty. If two HD modules are used then the other two slots can be loaded with any of the non HD modules.

The following are general guidelines:

- All modules that are in the same level must be next to each other in the frame,
- The preferred hierarchy between SD and HD Video modules in the same frame is to place the SD modules before the HD modules. If you have a frame with two SD modules and two HD modules, place the SD modules in slots 1 and 2, and the HD modules in slots 3 and 4,
- There is no preferred hierarchy between TimeCode and Port modules in the same frame, and
- Empty slots need to be identified for their future use, such as HD Video,

32x32 and 96x96 Module Placement

Table 2 and Figure 5 show optimum module placement options for creating a single module 32x32 matrix and a three module 96x96 matrix. There are four variations shown (options 11 to 14) for a 96x96 matrix using mixed audio. Option 6 uses all audio modules but the inputs and outputs of the two types of audio are kept separate. In Figure 5 the Analog to Digital and Digital to Analog converters are shown in the mixed audio matrices. Additional combinations can be created using mixed audio, or mixed video, or mixed data modules,

Table 2. Examples of Optimum Configurations (32x32 and 96x96)

One 32x32 Matrix and One 96x96 Matrix								
Slot Position	Option 1 ^a Modules	Option 2 Modules	Option 3 Modules	Option 4 Modules	Option 5 Modules	Option 6 Modules	Option 7 Modules	Matrix Size
1	AV	AV	AV	AV	DV	DV	DV	32x32
2	DV	AA	DA	TCP	AA	DA	TCP	96x96
3	DV	AA	DA	TCP	AA	DA	TCP	
4	DV	AA	DA	TCP	AA	DA	TCP	

^a For this option 1 or 2 HD video modules can be used with SD video modules to create a 96x96 Digital Video matrix.

One 32x32 Matrix and One 96x96 Matrix								
Slot Position	Option 8 Modules	Option 9 Modules	Option 10 Modules	Option 11 Modules	Option 12 Modules	Option 13 Modules	Option 14 Modules	Matrix Size
1	AA	AA	DA	AV	DV	AV	DV	32x32
2	DA	TCP	TCP	AA	AA	AA	AA	96x96
3	DA	TCP	TCP	AA	AA	DA	DA	
4	DA	TCP	TCP	DA	DA	DA	DA	

Figure 5. One 32x32 and One 96x96 Module Configuration and Signal Flow

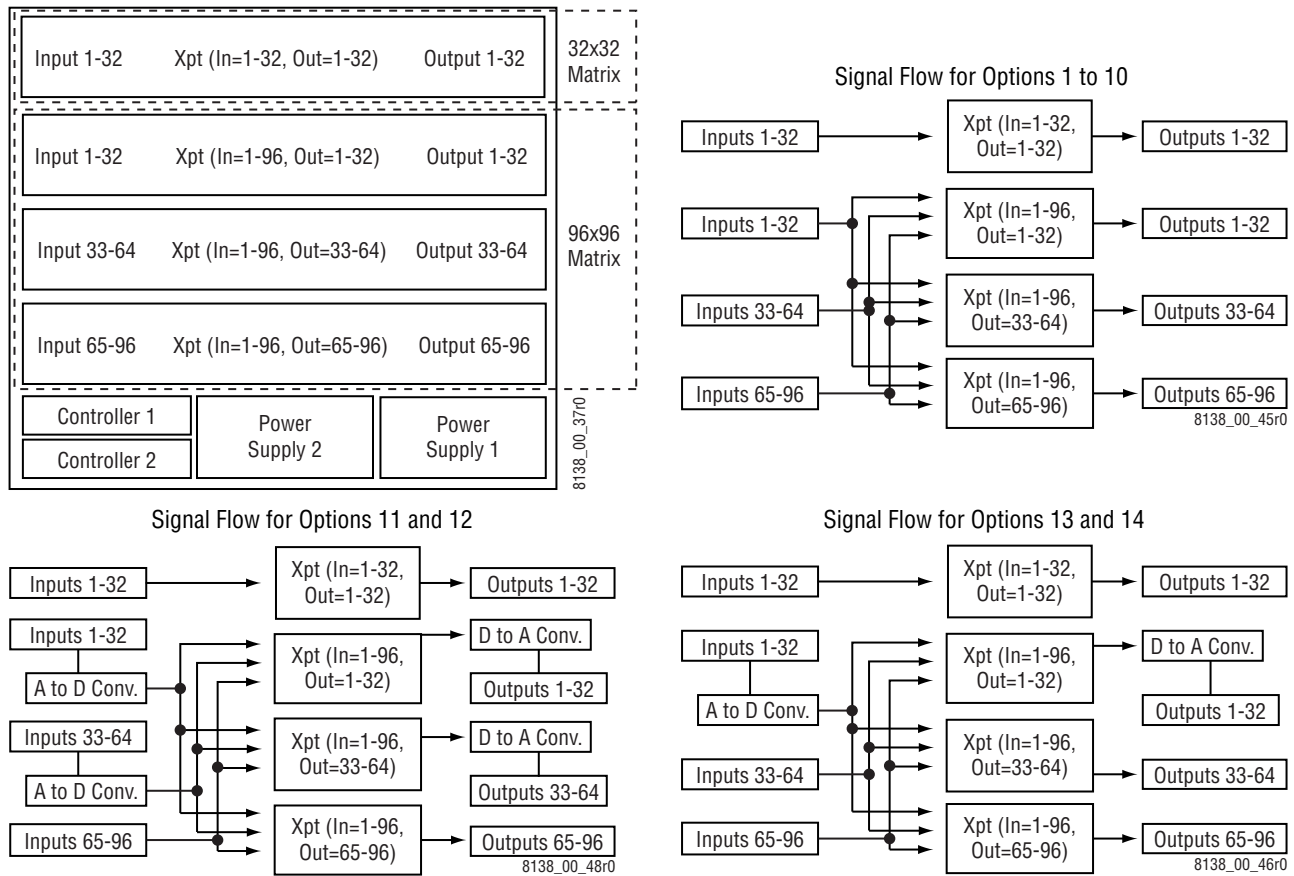


Table 3 shows the Jupiter interface settings. Options 11 to 14 use mixed modules AA and DA to create a 96x96 matrix level that is set as AES audio. The numbers shown for the DIP switch banks indicate which of the eight switches should be set in the **On** position.

Table 3. Rotary and DIP Switch Settings for Jupiter Interface

		Jupiter Settings for Options from Table 2													
Switch		1	2	3	4	5	6	7	8	9	10	11	12	13	14
	Rotary S12	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Rotary S13	0	3	3	7	3	3	7	4	A	A	3	3	3	3
	A_LEVEL	1	1	1	1	1, 2, 3	1, 2, 3	1, 2, 3	2	2	6	1	1, 2, 3	1	1, 2, 3
	A_OPTIONS	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	B_LEVEL	1, 2, 3	2	6	5	2	6	1, 2	6	5	1, 2	6	6	6	6
	B_OPTIONS	-	-	-	-	-	-	1	-	-	1	-	-	-	-
	C_LEVEL	1, 2, 3	2	6	5	2	6	1, 2	6	5	1, 2	6	6	6	6
	C_OPTIONS	-	-	-	-	-	-	1	-	-	1	-	-	-	-
	D_LEVEL	1, 2, 3	2	6	5	2	6	1, 2	6	5	1, 2	6	6	6	6
	D_OPTIONS	-	-	-	-	-	-	1	-	-	1	-	-	-	-

DIP Switches set to ON Position

64x64 and 64x64 Module Placement

Table 4 and Figure 6 show optimum module placement options for creating a pair of two module 64x64 matrices. There are two variations shown (options 5, and 9) for a lower 64x64 matrix using mixed audio. Option 9 uses all audio modules but the inputs and outputs of the two types of audio are kept separate. In Figure 6 the Analog to Digital and Digital to Analog converters are shown in the mixed audio matrices. Additional combinations can be created using mixed audio, or mixed video, or mixed data modules.

Table 4. Examples of Optimum Matrix Configurations (64x64 and 64x64)

Two 64x64 Matrices							
Slot Position	Option 1 Modules	Option 2 Modules	Option 3 Modules	Option 4 Modules	Option 5 Modules	Option 6 Modules	Matrix Size
1	AV	AV	AV	AV	AV	DV	64x64
2	AV	AV	AV	AV	AV	DV	
3	DV	AA	DA	TCP	AA	AA	64x64
4	DV	AA	DA	TCP	DA	AA	

Two 64x64 Matrices						
Slot Position	Option 7 Modules	Option 8 Modules	Option 9 Modules	Option 10 Modules	Option 11 Modules	Matrix Size
1	DV	DV	AA	AA	DA	64x64
2	DV	DV	AA	AA	DA	
3	DA	TCP	DA	TCP	TCP	64x64
4	DA	TCP	DA	TCP	TCP	

Figure 6. Two 64x64 Module Configuration and Signal Flow

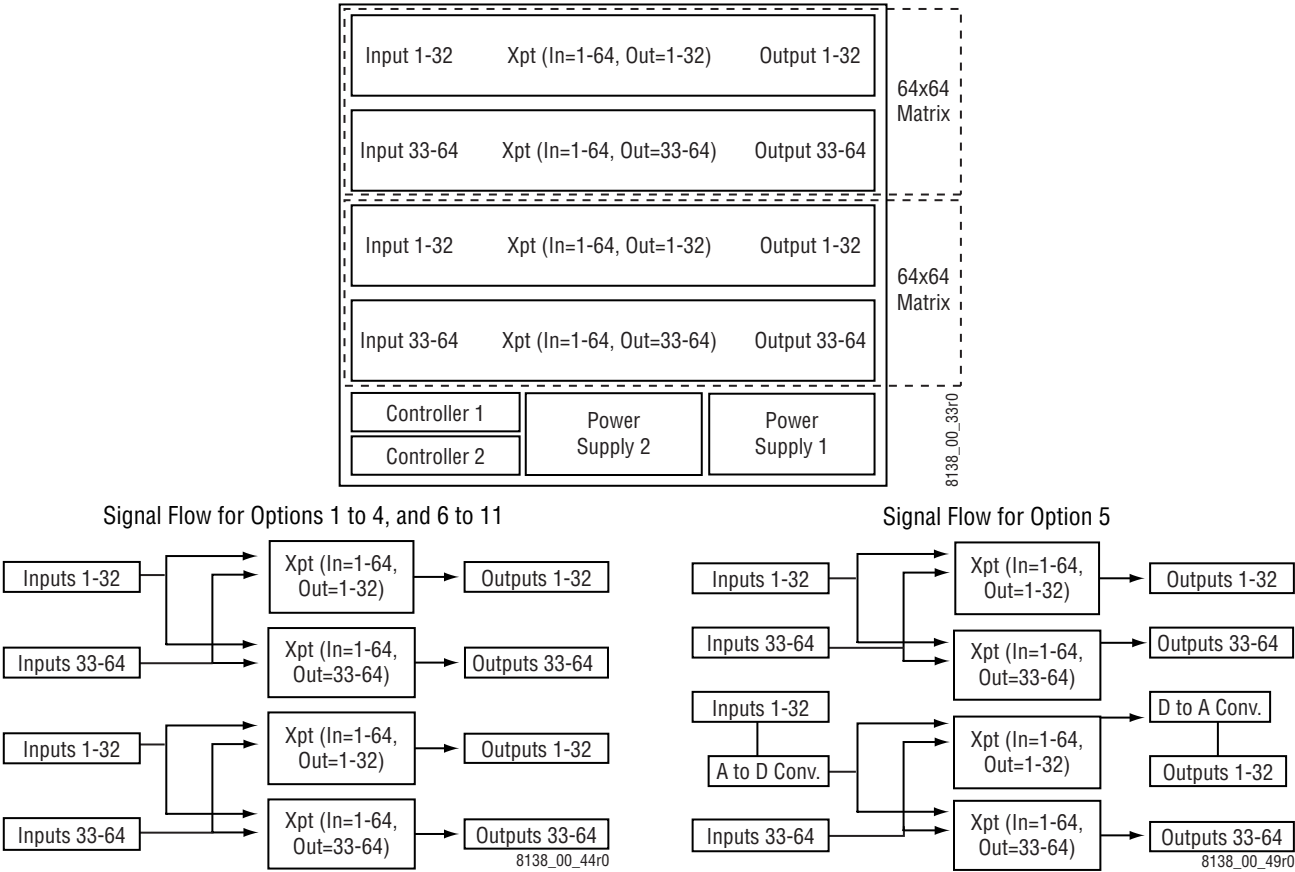


Table 5 shows the Jupiter interface settings. Options 4, 10, and 11 show settings for Port modules, and Option 8 shows the settings for TimeCode. The numbers shown for the DIP switch banks indicate which of the eight switches should be set in the **On** position.

Table 5. Rotary and DIP Switch Settings for Jupiter Interface

Jupiter Settings for Options from Table 4												
		1	2	3	4	5	6	7	8	9	10	11
Switches	Rotary S12	2	2	2	2	2	2	2	2	2	2	2
	Rotary S13	0	2	2	6	2	2	2	6	4	9	9
	A_LEVEL	1	1	1	1	1	1, 2, 3	1, 2, 3	1, 2, 3	2	2	6
	A_OPTIONS	-	-	-	-	-	-	-	-	-	-	-
	B_LEVEL	1	1	1	1	1	1, 2, 3	1, 2, 3	1, 2, 3	2	2	6
	B_OPTIONS	-	-	-	-	-	-	-	-	-	-	-
	C_LEVEL	1, 2, 3	2	6	5	6	2	6	1, 2	6	5	5
	C_OPTIONS	-	-	-	-	-	-	-	1	-	-	-
	D_LEVEL	1, 2, 3	2	6	5	6	2	6	1, 2	6	5	5
	D_OPTIONS	-	-	-	-	-	-	-	1	-	-	-
DIP Switches set to ON Position												

96x96 and 32x32 Module Placement

Table 6 and Figure 7 show optimum module placement options for creating a three module 96x96 matrix and a single module 32x32 matrix. Additional combinations can be created using mixed audio, or mixed video, or mixed data modules.

Table 6. Examples of Optimum Matrix Configurations (96x96 and 32x32)

One 96x96 Matrix and One 32x32 Matrix										
Slot Position	Option 1 Modules	Option 2 Modules	Option 3 Modules	Option 4 Modules	Option 5 ^a Modules	Option 6 ^a Modules	Option 7 ^a Modules	Option 8 Modules	Option 9 Modules	Matrix Size
1	AV	AV	AV	AV	DV	DV	DV	AA	AA	96x96
2	AV	AV	AV	AV	DV	DV	DV	AA	AA	
3	AV	AV	AV	AV	DV	DV	DV	AA	AA	
4	DV	AA	DA	TCP	AA	DA	TCP	DA	TCP	32x32

^a For this option 1 or 2 HD video modules can be used with SD video modules to create a 96x96 Digital Video matrix.

Figure 7. One 96x96 and One 32x32 Module Configuration and Signal Flow

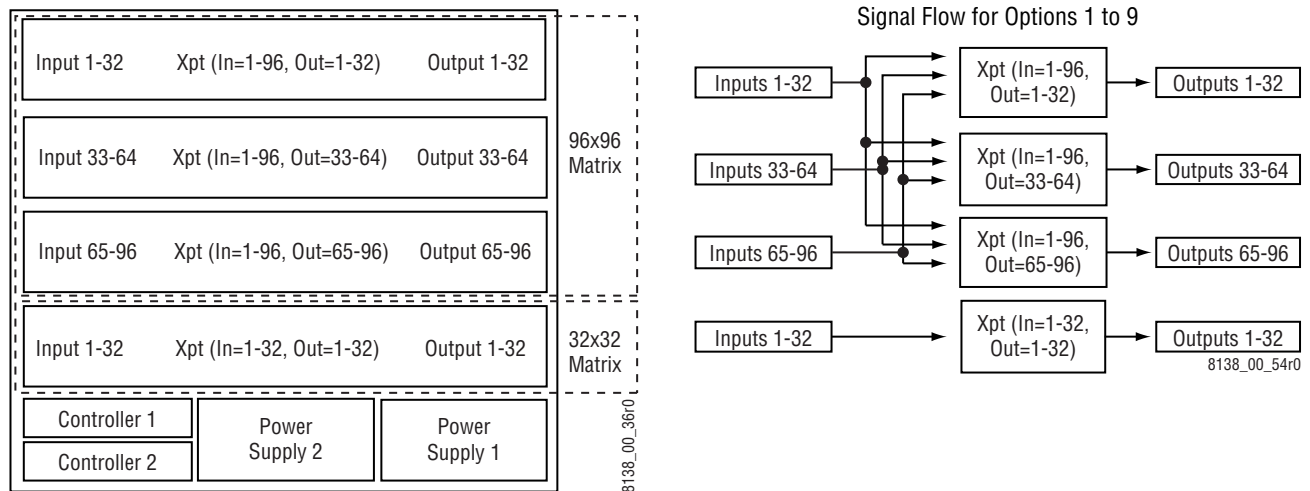


Table 7 shows the Jupiter interface settings. Options 4 and 9 show settings for Port modules, and Option 7 shows Timecode. The numbers shown for the DIP switch banks indicate which of the eight switches should be set in the **On** position.

Table 7. Rotary and DIP Switch Settings for Jupiter Interface

		Jupiter Settings for Options from Table 6								
		1	2	3	4	5	6	7	8	9
Switches	Rotary S12	3	3	3	3	3	3	3	3	3
	Rotary S13	0	1	1	5	1	1	5	4	8
	A_LEVEL	1	1	1	1	1, 2, 3	1, 2, 3	1, 2, 3	2	2
	A_OPTIONS	-	-	-	-	-	-	-	-	-
	B_LEVEL	1	1	1	1	1, 2, 3	1, 2, 3	1, 2, 3	2	2
	B_OPTIONS	-	-	-	-	-	-	-	-	-
	C_LEVEL	1	1	1	1	1, 2, 3	1, 2, 3	1, 2, 3	2	2
	C_OPTIONS	-	-	-	-	-	-	-	-	-
	D_LEVEL	1, 2, 3	2	6	5	2	6	1, 2	6	5
	D_OPTIONS	-	-	-	-	-	-	1	-	-

DIP Switches set to ON Position

128x128 Module Placement

Table 8 and **Figure 8** show optimum module placement options for creating a single four module 128x128 matrix. There are three variations shown (options 5 to 7) for a 128x128 matrix using mixed audio. In **Figure 8** the Analog to Digital and Digital to Analog converters are shown in the mixed audio matrices. Additional combinations can be created using mixed audio, or mixed video, or mixed data modules.

Table 8. Examples of Optimum Matrix Configurations (128x128)

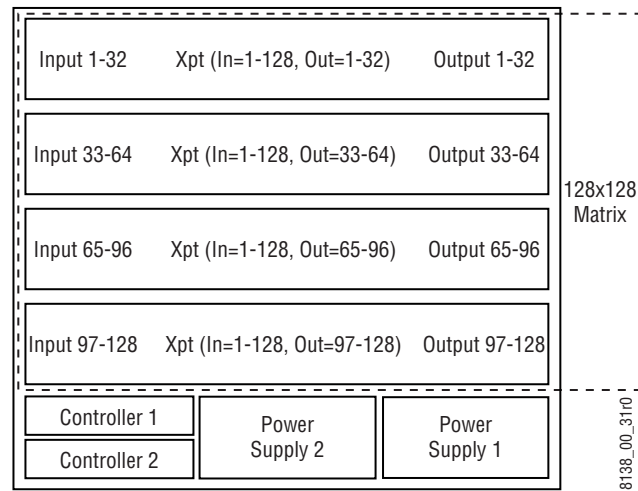
One 128x128 Matrix										
Slot Position	Option 1 Modules	Option 2 ^a Modules	Option 3 Modules	Option 4 Modules	Option 5 Modules	Option 6 Modules	Option 7 Modules	Option 8 ^b Modules	Option 9 ^c Modules	Matrix Size
1	AV	DV	AA	DA	AA	AA	AA	TCP	TCP	128x128
2	AV	DV	AA	DA	AA	AA	DA	TCP	TCP	
3	AV	DV	AA	DA	AA	DA	DA	TCP	TCP	
4	AV	DV	AA	DA	DA	DA	DA	TCP	TCP	

^a For this option 1 or 2 HD video modules can be used with SD video modules to create a 128x128 Digital Video matrix.

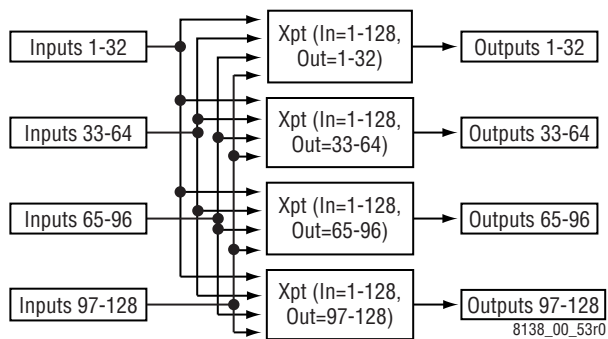
^b All modules are Timecode.

^c All modules are Port

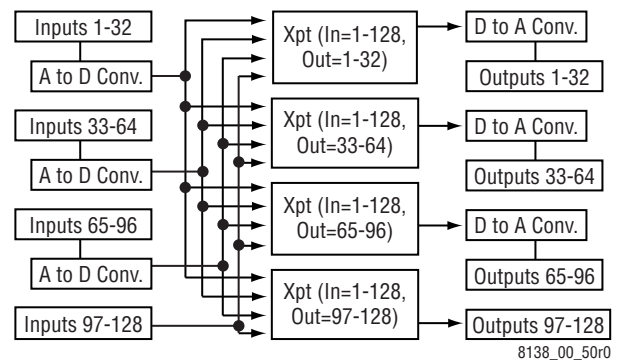
Figure 8. 128x128 Module Configuration and Signal Flow



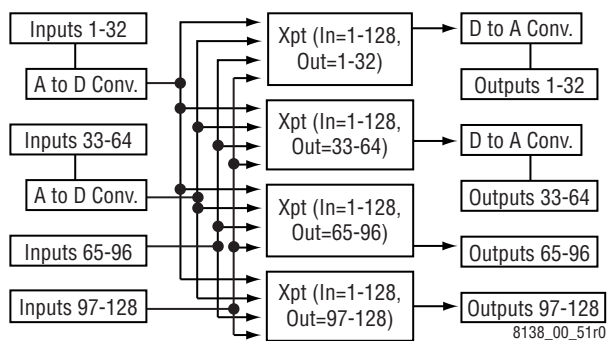
Signal Flow for Options 1 to 4, 8, 9



Signal Flow for Option 5



Signal Flow for Option 6



Signal Flow for Option 7

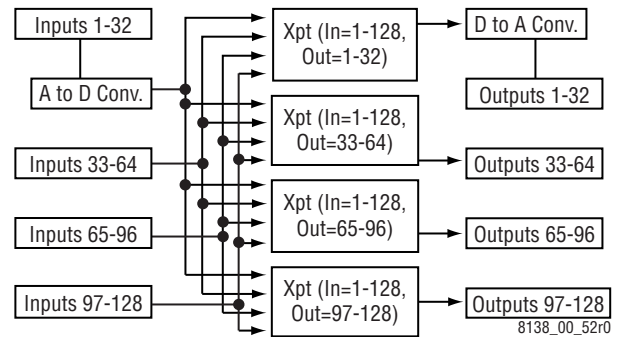


Table 9 shows the Jupiter interface settings. Option 8 shows settings for TimeCode modules, and Option 9 shows Port. The numbers shown for the DIP switch banks indicate which of the eight switches should be set in the **On** position.

Table 9. Rotary and DIP Switch Settings for Jupiter Interface

		Jupiter Settings for Options from Table 8								
		1	2	3	4	5^a	6^a	7^a	8^b	9^c
Switches	Rotary S12	0	0	0	0	0	0	0	0	0
	Rotary S13	0	0	4	4	4	4	4	E	E
	A_LEVEL	1	1, 2, 3	2	6	6	6	6	1, 2	5
	A_OPTIONS	-	-	-	-	-	-	-	1	-
	B_LEVEL	1	1, 2, 3	2	6	6	6	6	1, 2	5
	B_OPTIONS	-	-	-	-	-	-	-	1	-
	C_LEVEL	1	1, 2, 3	2	6	6	6	6	1, 2	5
	C_OPTIONS	-	-	-	-	-	-	-	1	-
	D_LEVEL	1	1, 2, 3	2	6	6	6	6	1, 2	5
	D_OPTIONS	-	-	-	-	-	-	-	1	-
DIP Switches set to ON Position										

^a Mixed Audio modules use AES Digital Audio as level.

^b All modules TimeCode.

^c All modules Port.

32x32, 32x32, and 64x64 Module Placement

Table 10 and Figure 9 show optimum module placement options for creating a two single module 32x32 matrices and a two module 64x64 matrix. There is one variation shown (option4) for a 64x64 matrix using mixed audio. In Figure 9 the Analog to Digital and Digital to Analog converters are shown in the mixed audio matrices. Additional combinations can be created using mixed audio, or mixed video, or mixed data modules.

Table 10. Examples of Optimum Matrix Configurations (32x32,32x32, and 64x64)

Two 32x32 Matrices and One 64x64 Matrix							Matrix Size
Slot Position	Option 1 Modules	Option 2 Modules	Option 3 Modules	Option 4 Modules	Option 5 Modules	Option 6 Modules	
1	AV	AV	AV	AV	AV	AV	32x32
2	DV	DV	DV	DV	AA	AA	32x32
3	AA	DA	TCP	AA	DA	TCP	64x64
4	AA	DA	TCP	DA	DA	TCP	

Two 32x32 Matrices and One 64x64 Matrix							Matrix Size
Slot Position	Option 7 Modules	Option 8 Modules	Option 9 Modules	Option 10 Modules	Option 11 Modules		
1	AV	DV	DV	DV	AA		32x32
2	DA	AA	AA	DA	DA		32x32
3	TCP	DA	TCP	TCP	TCP		64x64
4	TCP	DA	TCP	TCP	TCP		

Figure 9. Two 32x32 and One 64x64 Module Configuration and Signal Flow

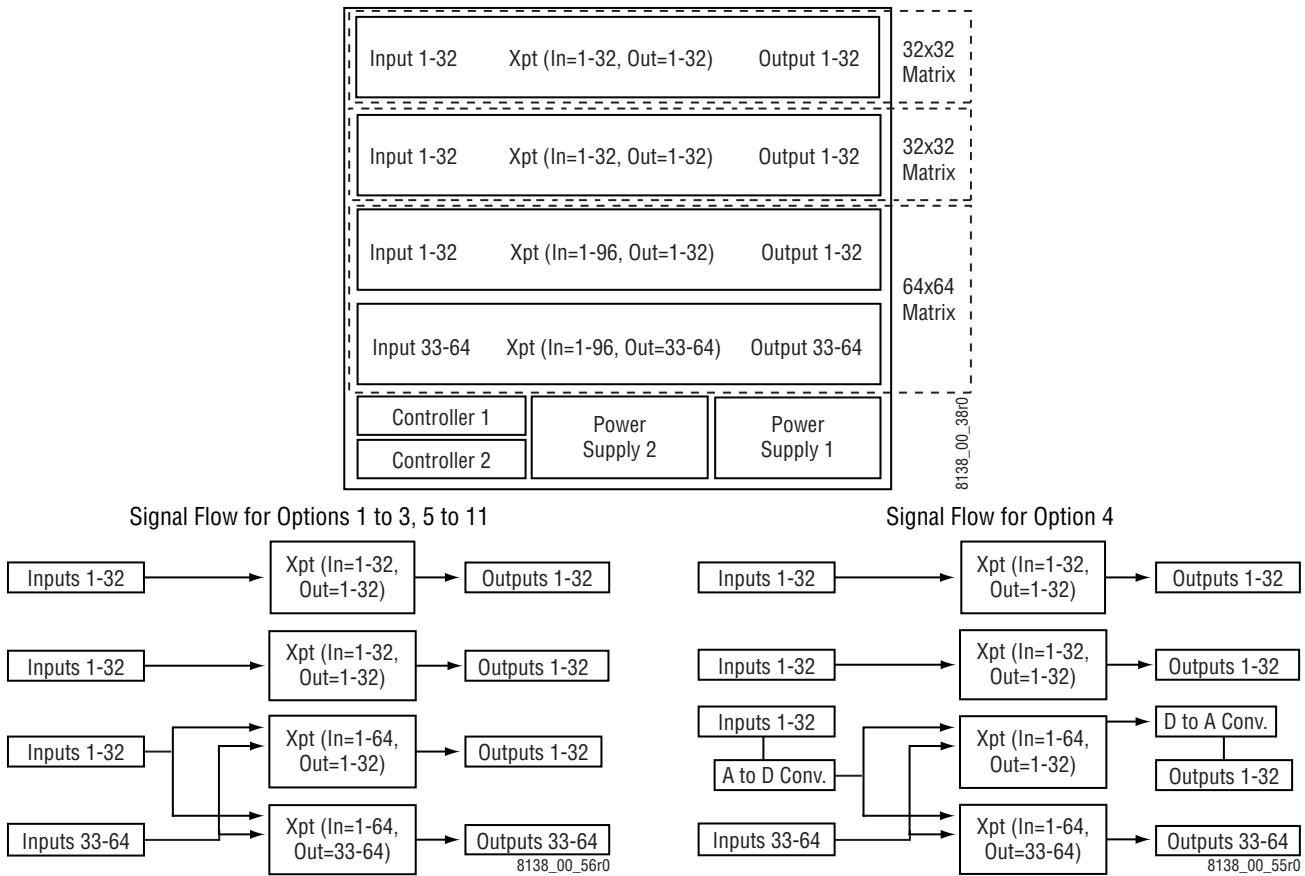


Table 11 shows the Jupiter interface settings. Options 3, 6, 10, and 11 show settings for Port modules, and Options 7 and 9 show the settings for Time-Code. The numbers shown for the DIP switch banks indicate which of the eight switches should be set in the **On** position.

Table 11. Rotary and DIP Switch Settings for Jupiter Interface

Jupiter Settings for Options from Table 10												
		1	2	3	4	5	6	7	8	9	10	11
Switches	Rotary S12	4	4	4	4	4	4	4	4	4	4	4
	Rotary S13	2	2	6	2	3	D	D	3	D	D	9
	A_LEVEL	1	1	1	1	1	1	1	1, 2, 3	1, 2, 3	1, 2, 3	2
	A_OPTIONS	-	-	-	-	-	-	-	-	-	-	-
	B_LEVEL	1, 2, 3	1, 2, 3	1, 2, 3	1, 2, 3	2	2	6	2	2	6	6
	B_OPTIONS	-	-	-	-	-	-	-	-	-	-	-
	C_LEVEL	2	6	5	2	6	5	1, 2	6	1, 2	5	5
	C_OPTIONS	-	-	-	-	-	-	1	-	1	-	-
	D_LEVEL	2	6	5	6	6	5	1, 2	6	1, 2	5	5
	D_OPTIONS	-	-	-	-	-	-	1	-	1	-	-
DIP Switches set to ON Position												

64x64, 32x32, and 32x32 Module Placement

Table 12 and Figure 10 show optimum module placement options for creating a two module 64x64 matrix and two single module 32x32 matrices. Additional combinations can be created using mixed audio, or mixed video, or mixed data modules.

Table 12. Examples of Optimum Matrix Configurations (64x64, 32x32, and 32x32)

One 64x64 Matrix and Two 32x32 Matrices										
Slot Position	Option 1 Modules	Option 2 Modules	Option 3 Modules	Option 4 Modules	Option 5 Modules	Option 6 Modules	Option 7 Modules	Option 8 Modules	Option 9 Modules	Matrix Size
1	AV	AV	AV	AV	AV	DV	DV	DV	AA	64x64
2	AV	AV	AV	AV	AV	DV	DV	DV	AA	
3	DV	DV	DV	AA	AA	AA	AA	DA	DA	32x32
4	AA	DA	TCP	DA	TCP	DA	TCP	TCP	TCP	32x32

Figure 10. One 64x64 and Two 32x32 Module Configuration and Signal Flow

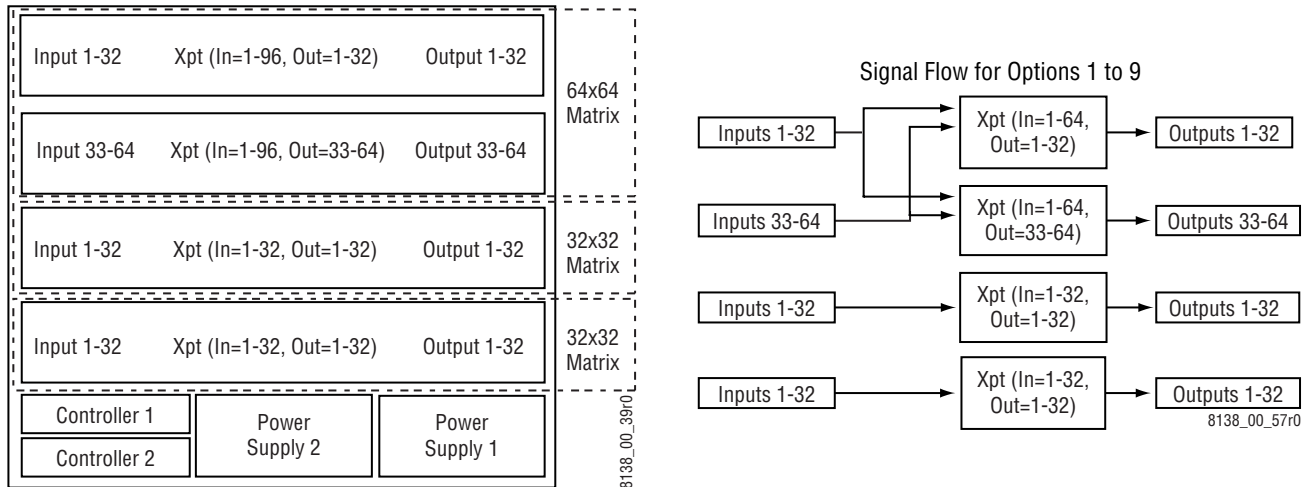


Table 13 shows the Jupiter interface settings. Options 3, 7, and 18 show settings for Port modules, and Options 5 and 9 show the settings for Time-Code. The numbers shown for the DIP switch banks indicate which of the eight switches should be set in the **On** position.

Table 13. Rotary and DIP Switch Settings for Jupiter Interface

		Jupiter Settings for Options from Table 12								
		1	2	3	4	5	6	7	8	9
Switches	Rotary S12	5	5	5	5	5	5	5	5	5
	Rotary S13	1	1	5	2	B	2	B	B	8
	A_LEVEL	1	1	1	1	1	1, 2, 3	1, 2, 3	1, 2, 3	2
	A_OPTIONS	-	-	-	-	-	-	-	-	-
	B_LEVEL	1	1	1	1	1	1, 2, 3	1, 2, 3	1, 2, 3	2
	B_OPTIONS	-	-	-	-	-	-	-	-	-
	C_LEVEL	1, 2, 3	1, 2, 3	1, 2, 3	2	2	2	2	6	6
	C_OPTIONS	-	-	-	-	-	-	-	-	-
	D_LEVEL	2	6	5	6	1, 2	6	5	5	1, 2
	D_OPTIONS	-	-	-	-	1	-	-	-	1
DIP Switches set to ON Position										

32x32, 64x64, and 32x32 Module Placement

Table 14 and Figure 11 show optimum module placement options for creating a single modules 32x32 matrix, a two module 64x64 matrix and a second single module 32x32 matrix. Additional combinations can be created using mixed audio, or mixed video, or mixed data modules.

Table 14. Examples of Optimum Matrix Configurations (32x32, 64x64, and 32x32)

One 32x32 Matrix, One 64x64 Matrix, & One 32x32 Matrix Options 1 to 6							
Slot Position	Option 1 Modules	Option 2 Modules	Option 3 Modules	Option 4 Modules	Option 5 Modules	Option 6 Modules	Matrix Size
1	AV	AV	AV	AV	AV	AV	32x32
2	DV	DV	DV	AA	AA	AA	64x64
3	DV	DV	DV	AA	AA	DA	
4	AA	DA	TCP	DA	TCP	TCP	32x32
One 32x32 Matrix, One 64x64 Matrix, & One 32x32 Matrix Options 7 to 12							
Slot Position	Option 7 Modules	Option 8 Modules	Option 9 Modules	Option 10 Modules	Option 11 Modules	Option 12 Modules	Matrix Size
1	AV	DV	DV	DV	DV	AA	32x32
2	DA	AA	AA	AA	DA	DA	64x64
3	DA	AA	AA	DA	DA	DA	
4	TCP	DA	TCP	TCP	TCP	TCP	32x32

Figure 11. One 32x32, One 64x64 and One 32x32 Module Configuration and Signal Flow

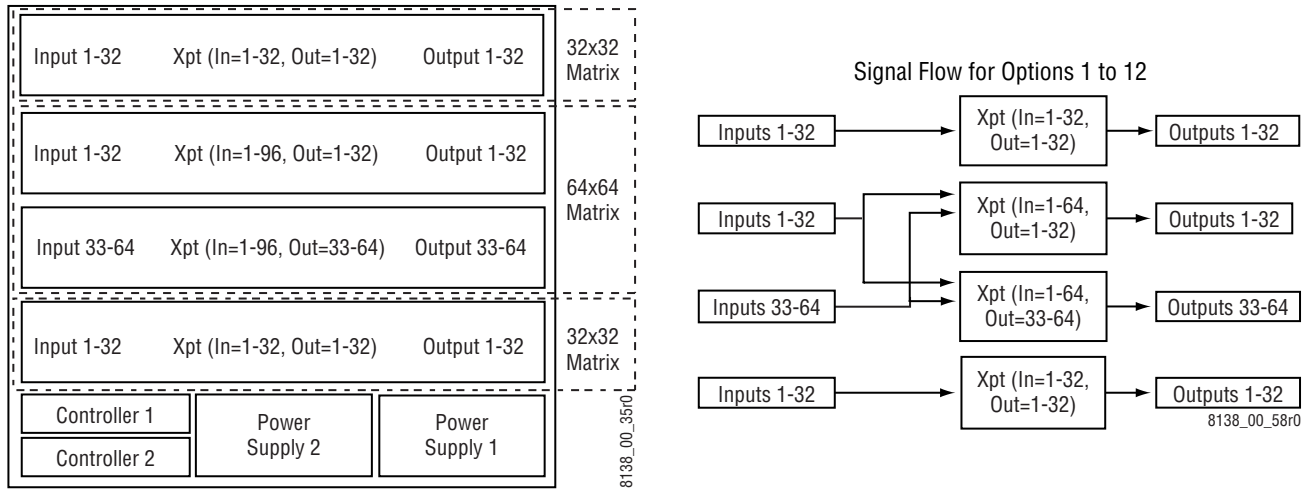


Table 15 shows the Jupiter interface settings. Options 3, 5, 6, 9, 11, and 12 show settings for Port modules, and Options 7 and 10 show Timecode. The numbers shown for the DIP switch banks indicate which of the eight switches should be set in the **On** position.

Table 15. Rotary and DIP Switch Settings for Jupiter Interface

		Jupiter Settings for Options from Table 14											
Switches		1	2	3	4	5	6	7	8	9	10	11	12
	Rotary S12	6	6	6	6	6	6	6	6	6	6	6	6
	Rotary S13	1	1	5	3	C	C	C	3	C	C	C	8
	A_LEVEL	1	1	1	1	1	1	1	1, 2, 3	1, 2, 3	1, 2, 3	1, 2, 3	2
	A_OPTIONS	-	-	-	-	-	-	-	-	-	-	-	-
	B_LEVEL	1, 2, 3	1, 2, 3	1, 2, 3	2	2	6	6	2	2	6	6	6
	B_OPTIONS	-	-	-	-	-	-	-	-	-	-	-	-
	C_LEVEL	1, 2, 3	1, 2, 3	1, 2, 3	2	2	6	6	2	2	6	6	6
	C_OPTIONS	-	-	-	-	-	-	-	-	-	-	-	-
	D_LEVEL	2	6	5	6	5	5	1, 2	6	5	1, 2	5	5
	D_OPTIONS	-	-	-	-	-	-	1	-	-	1	-	-
DIP Switches set to ON Position													

32x32, 32x32, 32x32, and 32x32 Module Placement

Table 16 and Figure 12 shows the optimum module placement for creating four single module 32x32 matrices. Additional combinations are created using mixed audio, or mixed video, or mixed data modules.

Table 16. Examples of Optimum Matrix Configurations (32x32, 32x32, 32x32, and 32x32)

Four 32x32 Matrices										
Slot Position	Option 1 Modules	Option 2 Modules	Option 3 Modules	Option 4 Modules	Option 5 Modules	Option 6 Modules	Option 7 Modules	Option 8 Modules	Option 9 Modules	Matrix Size
1	AV	AV	DV	AV	AV	AV	DV	DV	AA	32x32
2	DV	DV	AA	DV	DV	DV	DV	AA	DA	32x32
3	AA	AA	DA	DV	DV	DV	AA	TCP	TCP	32x32
4	DA	TCP	TCP	AA	DA	TCP	DA	TCP	TCP	32x32

Figure 12. Four 32x32 Module Configuration and Signal Flow

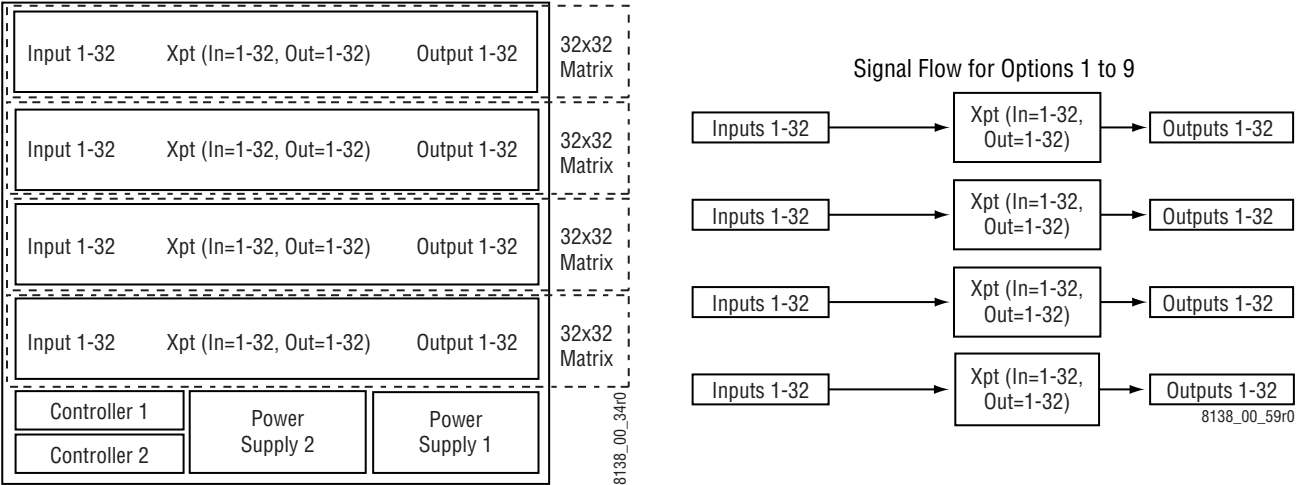


Table 17 shows the Jupiter interface settings. Options 3 to 7 show settings for SD Video and HD Video modules that are not combined. Options 8 and 9 show settings for matrices with both TimeCode and Port modules. The numbers shown for the DIP switch banks indicate which of the eight switches should be set in the **On** position.

Table 17. Rotary and DIP Switch Settings for Jupiter Interface

		Jupiter Settings for Options from Table 16								
		1	2	3	4	5	6	7	8	9
Switches	Rotary S12	7	7	7	7	7	7	7	7	7
	Rotary S13	2	B	C	1	1	5	2	D	D
	A_LEVEL	1	1	1, 2, 3	1	1	1	1, 2, 3	1, 4	2
	A_OPTIONS	-	-	-	-	-	-	-	-	-
	B_LEVEL	1, 2, 3	1, 2, 3	2	1, 2, 3	1, 2, 3	1, 2, 3	1, 2, 3	2	6
	B_OPTIONS	-	-	-	-	-	-	-	-	-
	C_LEVEL	2	2	6	1, 4	1, 4	1, 4	2	5	5
	C_OPTIONS	-	-	-	-	-	-	-	-	-
	D_LEVEL	6	5	5	2	6	5	6	1, 2	1, 2
	D_OPTIONS	-	-	-	-	-	-	-	1	1
DIP Switches set to ON Position										

Expansion Architecture

Two Concerto frames can be used to create Audio matrices of 160x160, 192x192, 224x224, or 256x256. Slots in the expansion frame that are not used by Audio modules can be used for other module types. The base frame must be loaded with four Audio modules.

A Time Division Multiplex (TDM) submodule is attached to one of the Audio modules in each frame. For redundancy, a TDM submodule can be attached to a second Audio module in each frame. Redundancy is supported in the 192x192, 224x224, and 256x256 matrix sizes.

The slot position of the Audio modules with the TDM submodules will depend on the architecture of the expansion frame. If you have put a Video module in slot 1 of the expansion frame and the module in slot 2 is an Audio module, then the Audio modules with the TDM submodules would go in slot 2 on both frames.

Note Audio expansion is supported with the Jupiter Control System.

256x256 Module Placement

In this configuration all modules in both frames are Audio modules.
Figure 13 shows the Signal Flow of a 256x256 matrix.

Figure 13. 256x256 Signal Flow

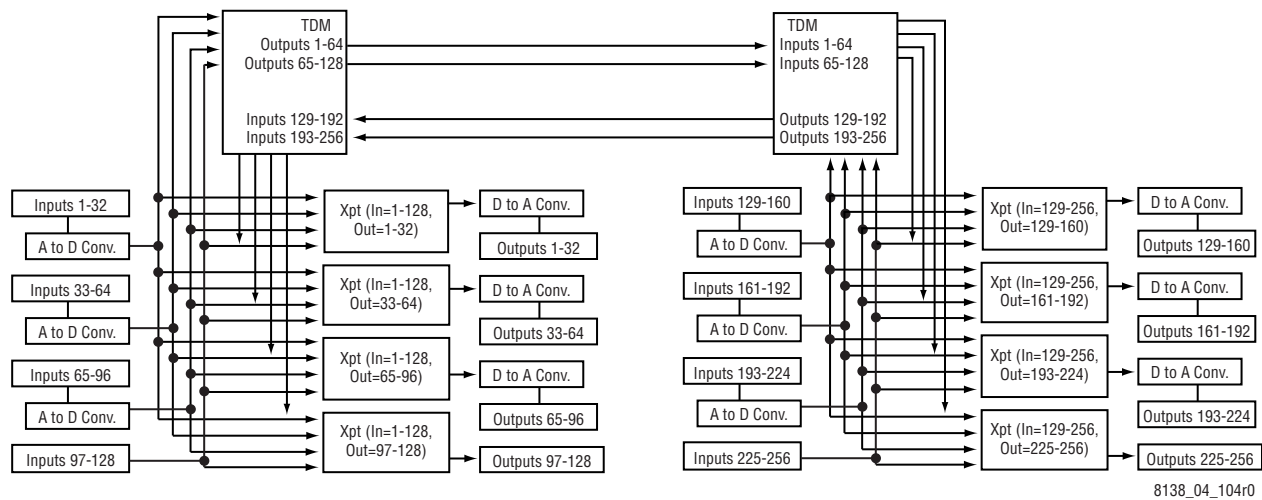


Figure 14 shows the configuration of the two frames with a single TDM submodule attached to the Audio modules in slots 1.

Figure 14. 256x256 Audio Non-Redundant

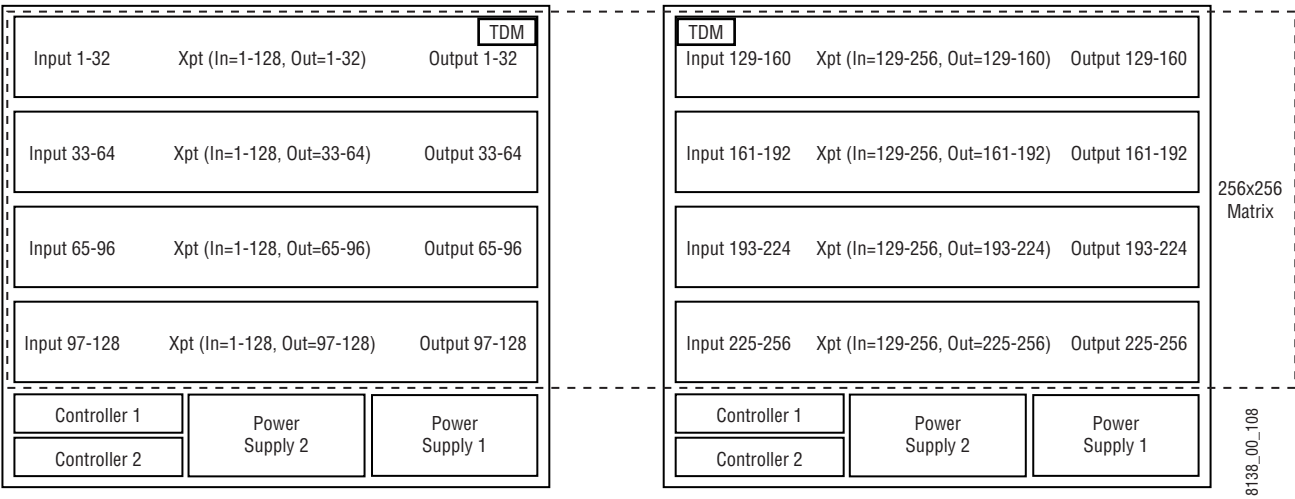


Figure 15 shows the configuration of the two frames with redundant TDM submodules. The Master TDM submodule is attached to the Audio module in slot 1 and the Redundant TDM is attached to the Audio module in slot 2.

Figure 15. 256x256 Audio Redundant

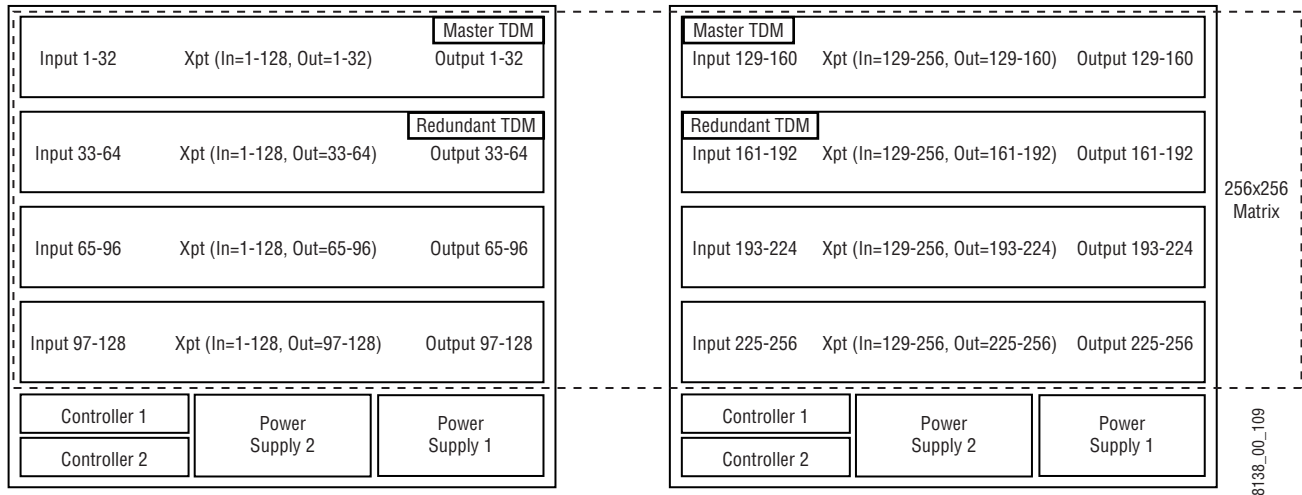
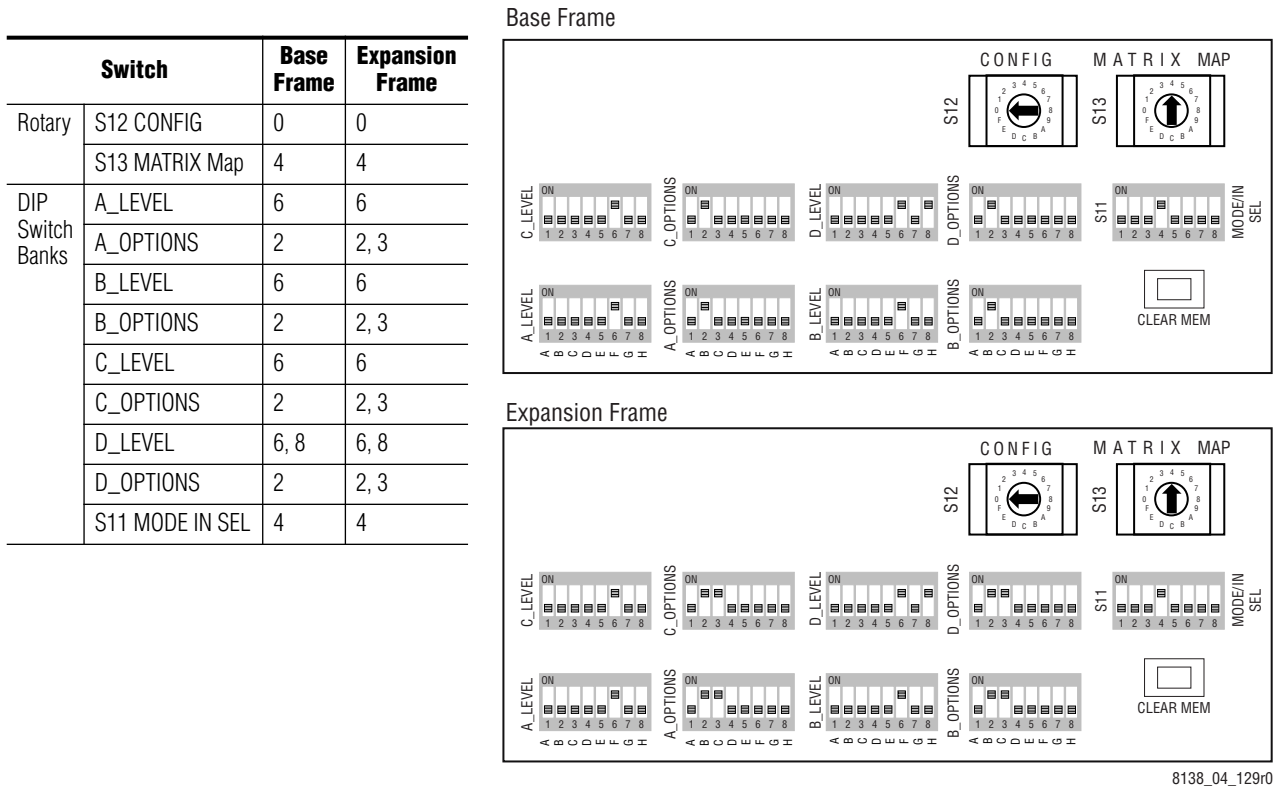


Figure 16 shows the Rotary and DIP switch settings on the CRS-MC-C2 Controller module for this configuration.

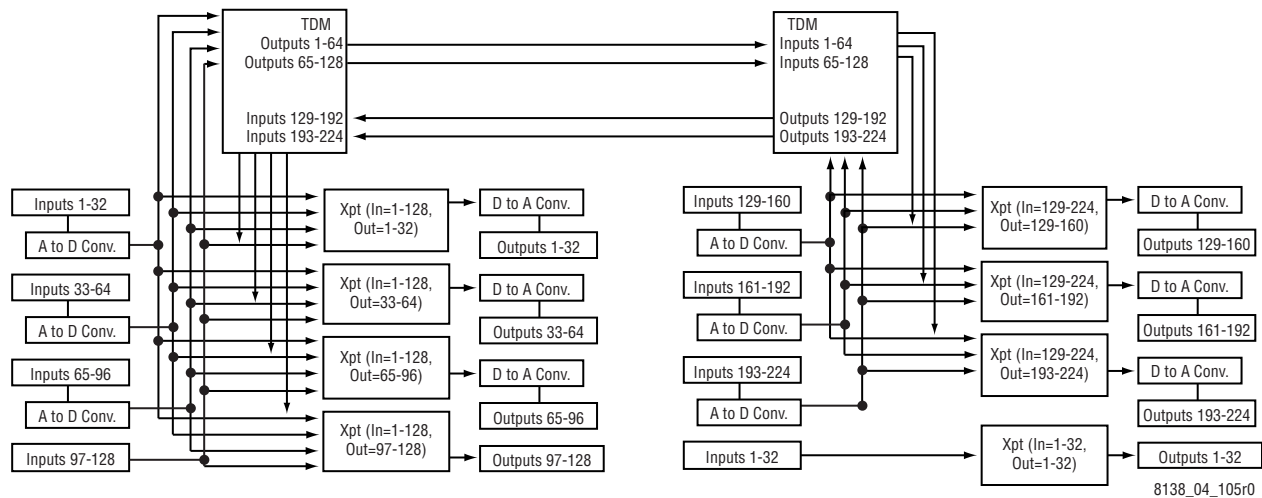
Figure 16. Switch Settings for 256x256



224x224 and 32x32 Module Placement

In this configuration one module in the expansion frame is not an Audio module. [Figure 17](#) shows the Signal Flow of a 224x224 and a 32x32 matrix. The Signal Flow is independent of the slot positions in the expansion frame. All modules in the base frame are Audio so slot 1 contains the Audio module for inputs 1-32. However, in the expansion frame the Audio module that has inputs 129-160 could be in slot 1 or it might be in a different slot. Inputs 129-160 will be associated with the Audio module in the expansion frame that is closest to slot 1.

Figure 17. 224x224 and 32x32 Signal Flow



[Figure 18](#) shows the configuration of the two frames with a single TDM submodule attached to the Audio modules in slots 1. A Data module is in slot 4 of the expansion frame.

Figure 18. 224x224 Audio and 32x32 Data Non Redundant

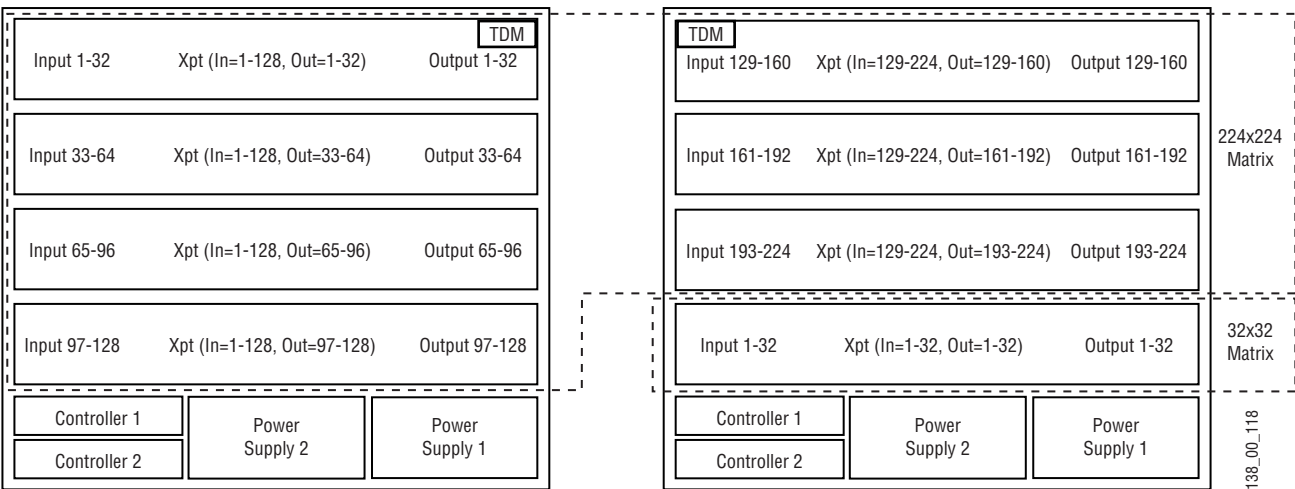


Figure 19 shows the configuration of the two frames with redundant TDM submodules. The Master TDM submodule is attached to the Audio module in slot 1 and the Redundant TDM is attached to the Audio module in slot 2.

Figure 19. 224x224 Audio and 32x32 Data Redundant

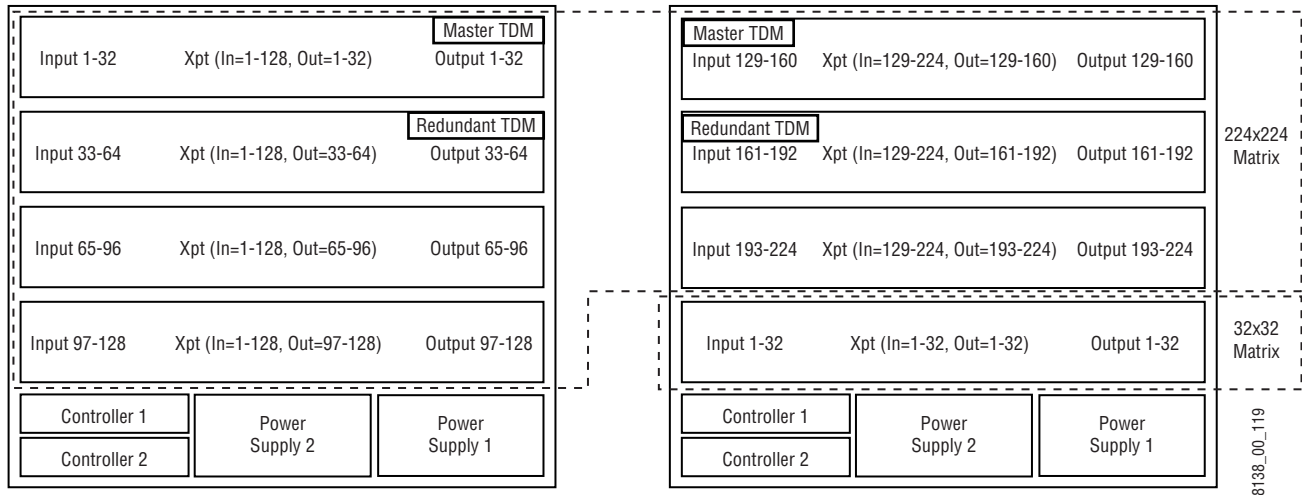


Figure 20 shows the Rotary and DIP switch settings on the CRS-MC-C2 Controller module for this configuration.

Figure 20. Switch Settings for 224x224 Audio and 32x32 Data

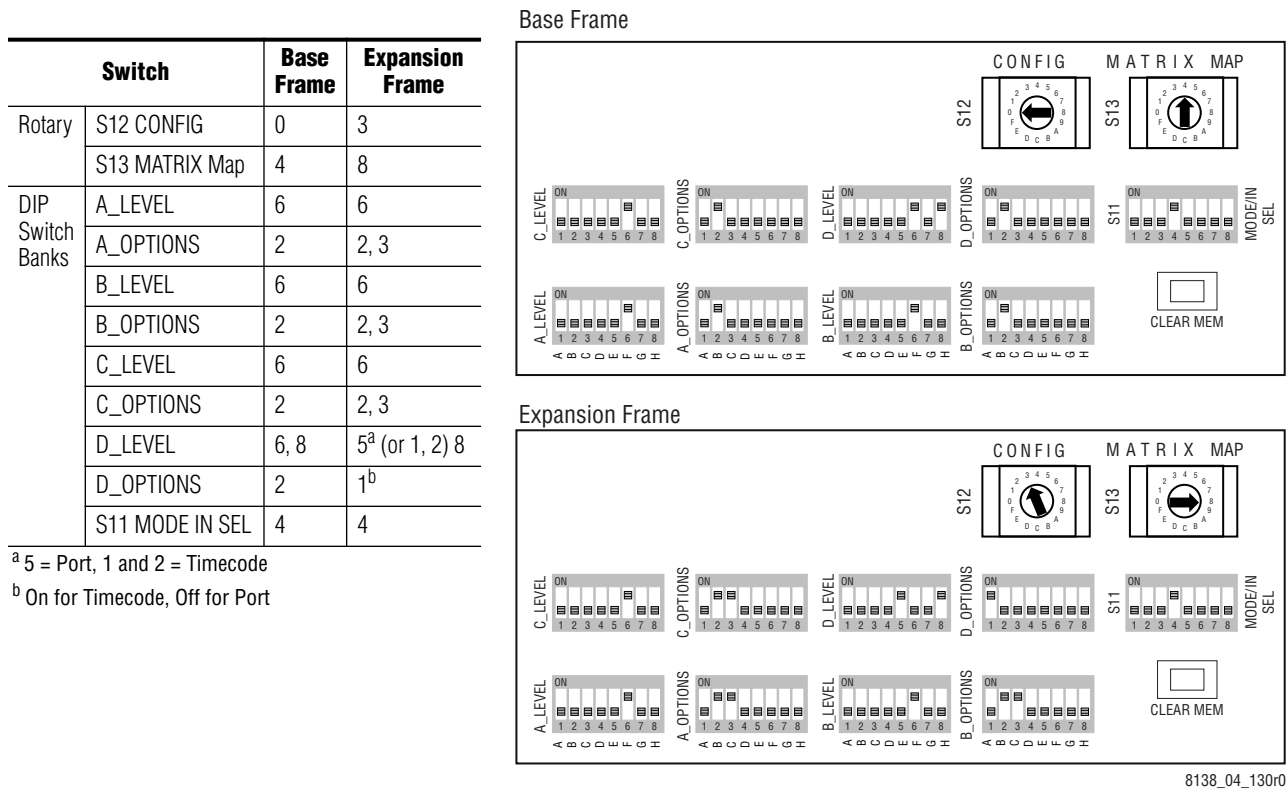


Figure 21 shows the configuration of the two frames with a single TDM submodule attached to the Audio modules in slots 2. A Video module is in slot 1 of the expansion frame.

Figure 21. 224x224 Audio and 32x32 Video Non Redundant

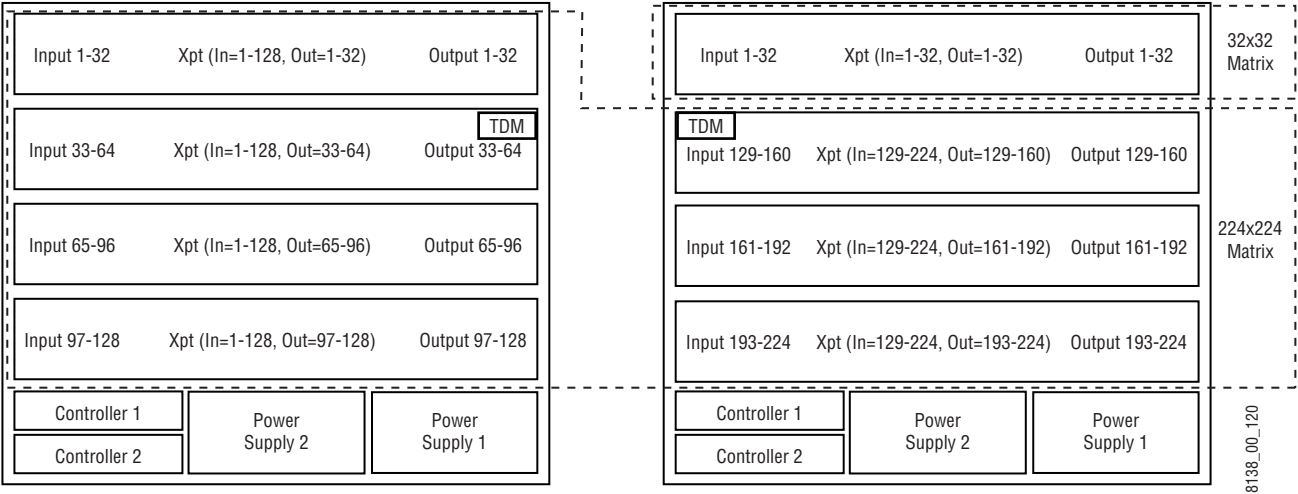


Figure 22 shows the configuration of the two frames with redundant TDM submodules. The Master TDM submodule is attached to the Audio module in slot 2 and the Redundant TDM is attached to the Audio module in slot 3.

Figure 22. 224x224 Audio and 32x32 Video Redundant

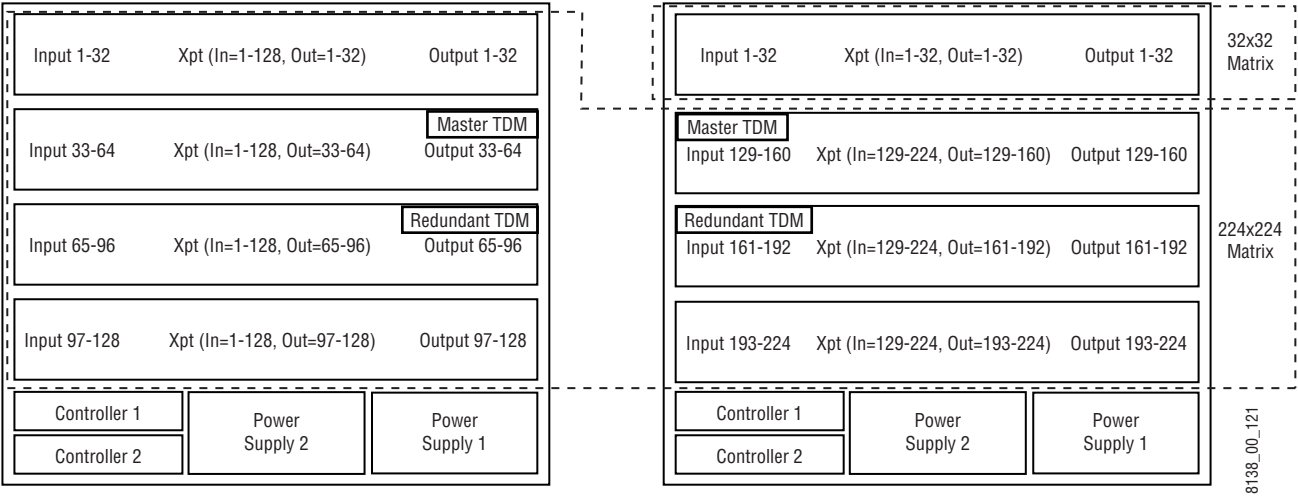


Figure 23 shows the Rotary and DIP switch settings on the CRS-MC-C2 Controller module for this configuration.

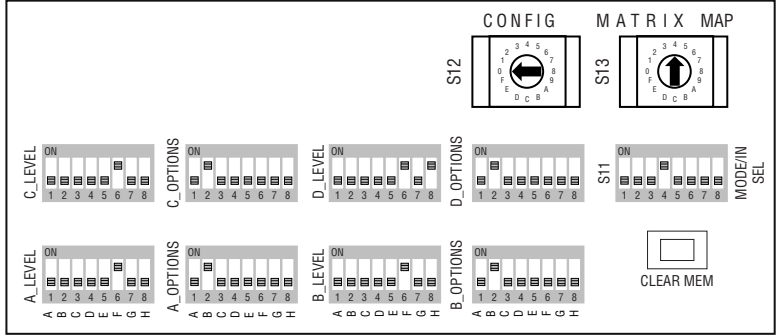
Figure 23. Switch Settings for 224x224 Audio and 32x32 Video

Base Frame			
Switch		Base Frame	Expansion Frame
Rotary	S12 CONFIG	0	1
	S13 MATRIX Map	4	3
DIP Switch Banks	A_LEVEL	6	1 = Analog 1, 2, 3 = SD 1, 4 = HD
	A_OPTIONS	2	1-4 ^a , 5-8 ^b
	B_LEVEL	6	6
	B_OPTIONS	2	2, 3
	C_LEVEL	6	6
	C_OPTIONS	2	2, 3
	D_LEVEL	6, 8	6, 8
	D_OPTIONS	2	2, 3
	S11 MODE IN SEL	4	4

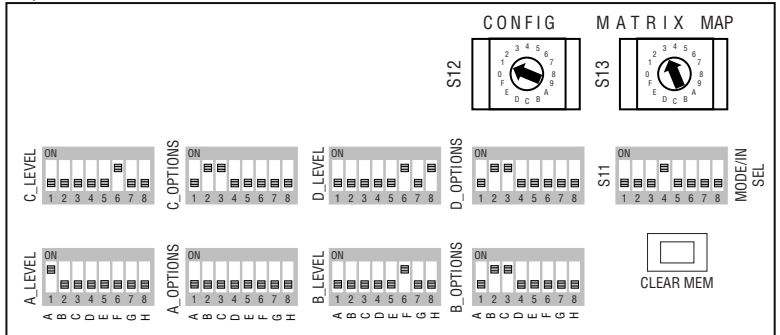
^a Off for Sync 1, On for Sync 2

^b Off for Reclocking, On for Forced Bypass

Base Frame



Expansion Frame



8138_04_131r0

192x192 and 64x64 Module Placement

In this configuration two modules in the expansion frame are not Audio modules. Figure 24 shows the Signal Flow of a 192x192 and a 64x64 matrix. The Signal Flow is independent of the slot positions in the expansion frame. All modules in the base frame are Audio so slot 1 contains the Audio module for inputs 1-32. However, in the expansion frame the Audio module that has inputs 129-160 could be in slot 1 or it might be in a different slot. Inputs 129-160 will be associated with the Audio module in the expansion frame that is closest to slot 1.

Figure 24. 192x192 and 64x64 Signal Flow

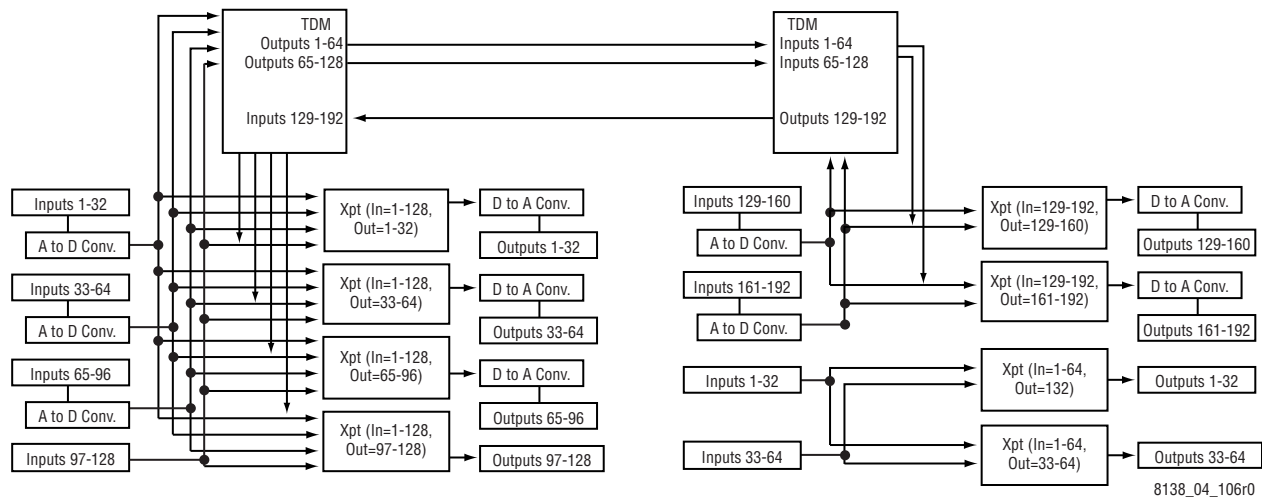


Figure 25 shows the configuration of the two frames with a single TDM submodule attached to the Audio modules in slots 1. Two Data modules are in slots 3 and 4 of the expansion frame.

Figure 25. 192x192 Audio and 64x64 Data Non Redundant

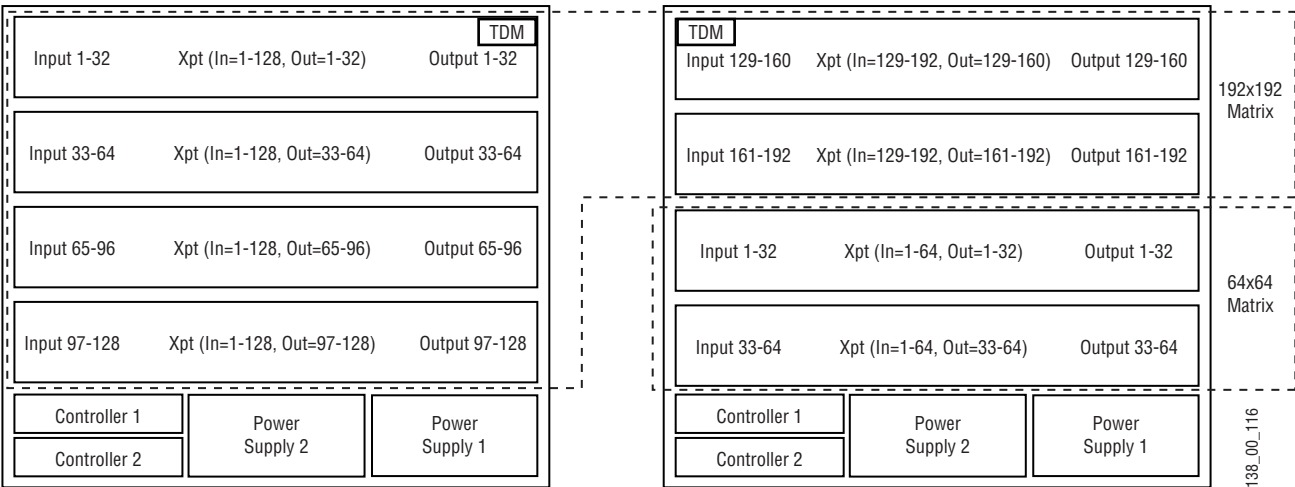


Figure 26 shows the configuration of the two frames with redundant TDM submodules. The Master TDM submodule is attached to the Audio module in slot 1 and the Redundant TDM is attached to the Audio module in slot 2.

Figure 26. 192x192 Audio and 64x64 Data Redundant

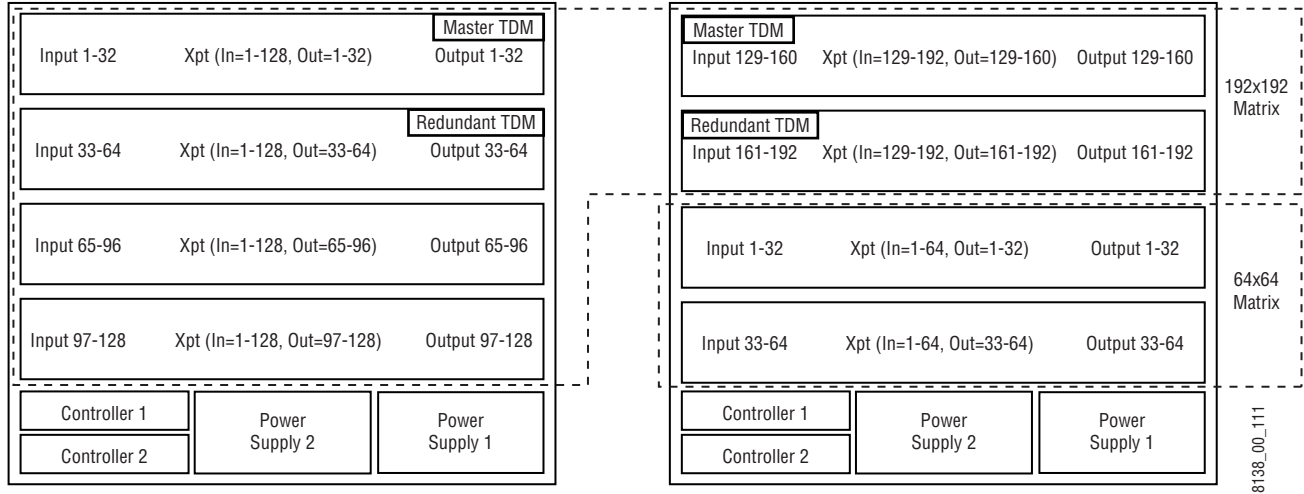


Figure 27 shows the Rotary and DIP switch settings on the CRS-MC-C2 Controller module for this configuration.

Figure 27. Switch Settings for 192x192 Audio and 64x64 Data

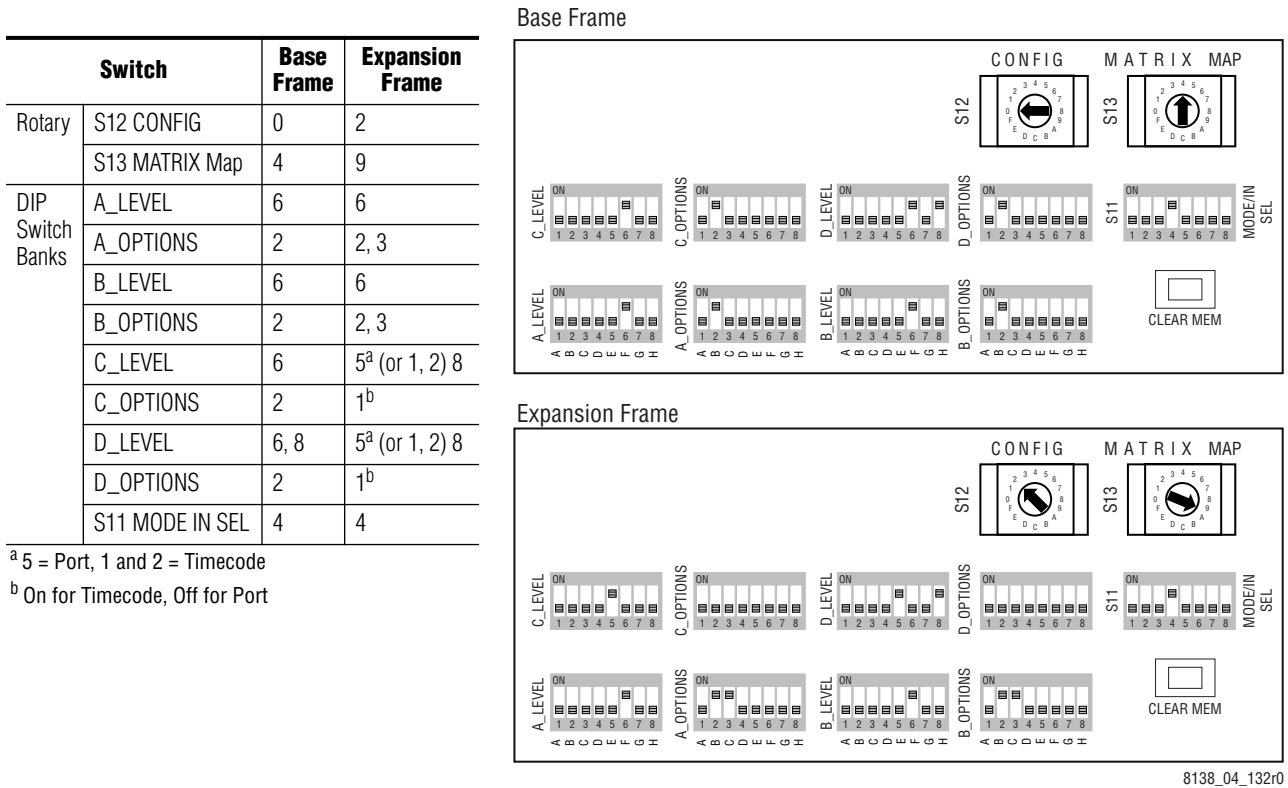


Figure 28 shows the configuration of the two frames with a single TDM submodule attached to the Audio modules in slots 3. Two Video modules are in slots 1 and 2 of the expansion frame.

Figure 28. 192x192 Audio and 64x64 Video Non Redundant

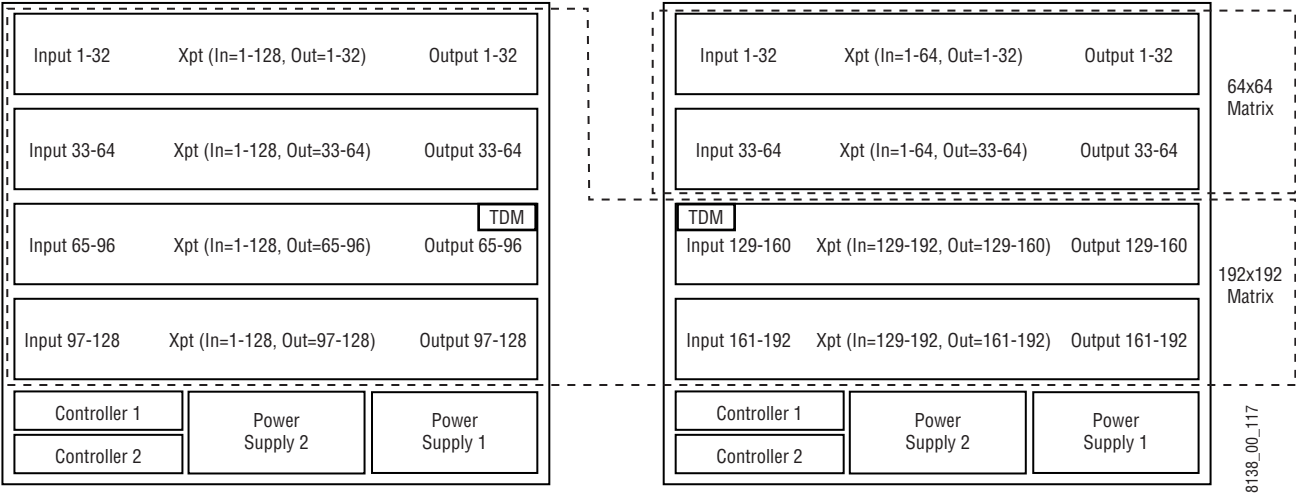


Figure 29 shows the configuration of the two frames with redundant TDM submodules. The Master TDM submodule is attached to the Audio module in slot 3 and the Redundant TDM is attached to the Audio module in slot 4.

Figure 29. 192x192 Audio and 64x64 Video Redundant

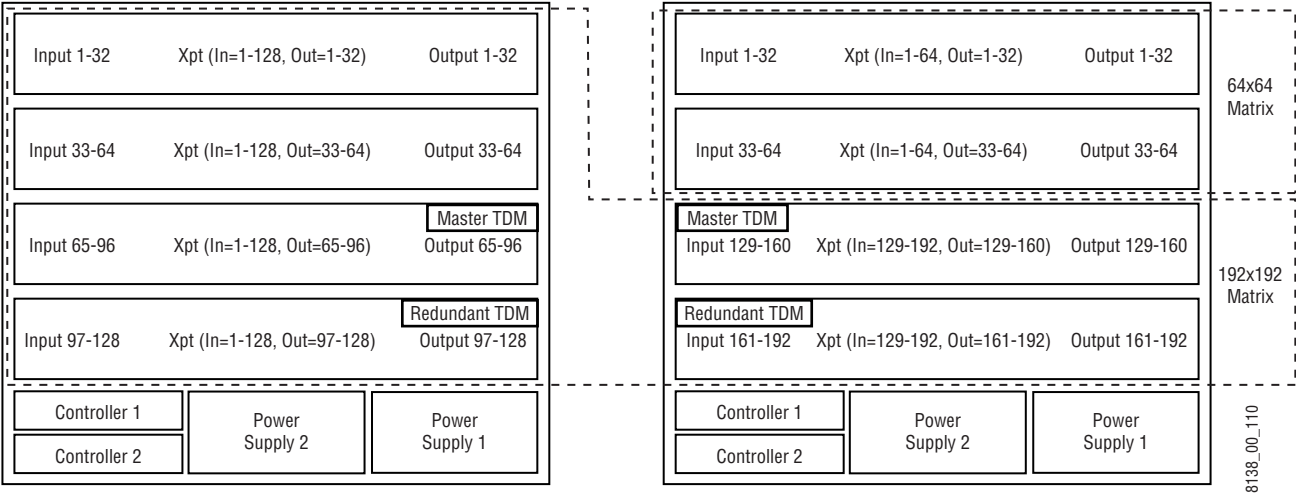


Figure 30 shows the Rotary and DIP switch settings on the CRS-MC-C2 Controller module for this configuration.

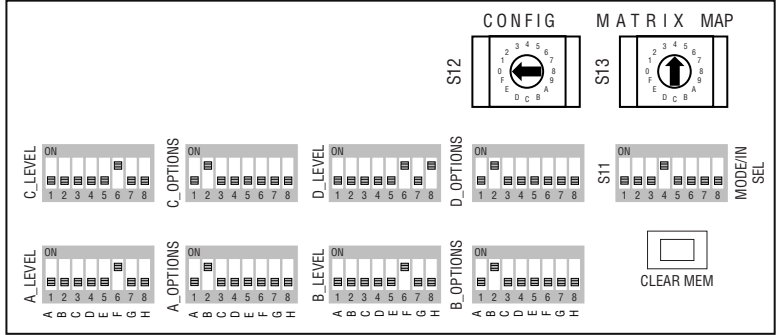
Figure 30. Switch Settings for 192x192 Audio and 64x64 Video

Base Frame			
Switch	Base Frame	Expansion Frame	
Rotary	S12 CONFIG	0	2
	S13 MATRIX Map	4	2
DIP Switch Banks	A_LEVEL	6	1 = Analog 1, 2, 3 = SD 1, 4 = HD
	A_OPTIONS	2	1-4 ^a , 5-8 ^b
	B_LEVEL	6	1 = Analog 1, 2, 3 = SD 1, 4 = HD
	B_OPTIONS	2	1-4 ^a , 5-8 ^b
	C_LEVEL	6	6
	C_OPTIONS	2	2, 3
	D_LEVEL	6, 8	6, 8
	D_OPTIONS	2	2, 3
	S11 MODE IN SEL	4	4

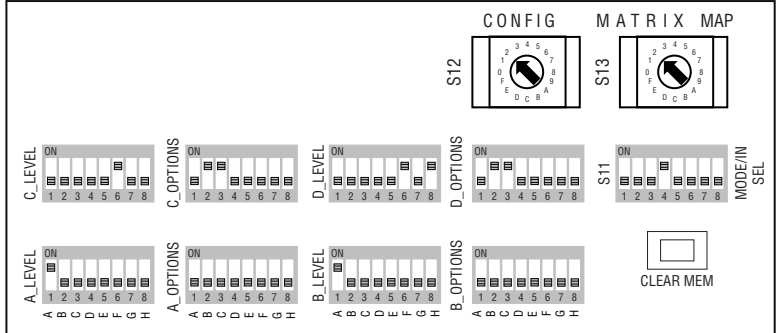
^a Off for Sync 1, On for Sync 2

^b Off for Reclocking, On for Forced Bypass

Base Frame



Expansion Frame



8138_04_133r0

160x160 and 96x96 Module Placement

In this configuration three modules in the expansion frame are not Audio modules. Figure 31 shows the Signal Flow of a 160x160 and a 96x96 matrix. The Signal Flow is independent of the slot positions in the expansion frame. All modules in the base frame are Audio so slot 1 contains the Audio module for inputs 1-32. However, in the expansion frame the Audio module that has inputs 129-160 could be in slot 1 or it might be in a different slot. Inputs 129-160 will be associated with the Audio module in the expansion frame that is closest to slot 1.

Figure 31. 160x160 and 96x96 Signal Flow

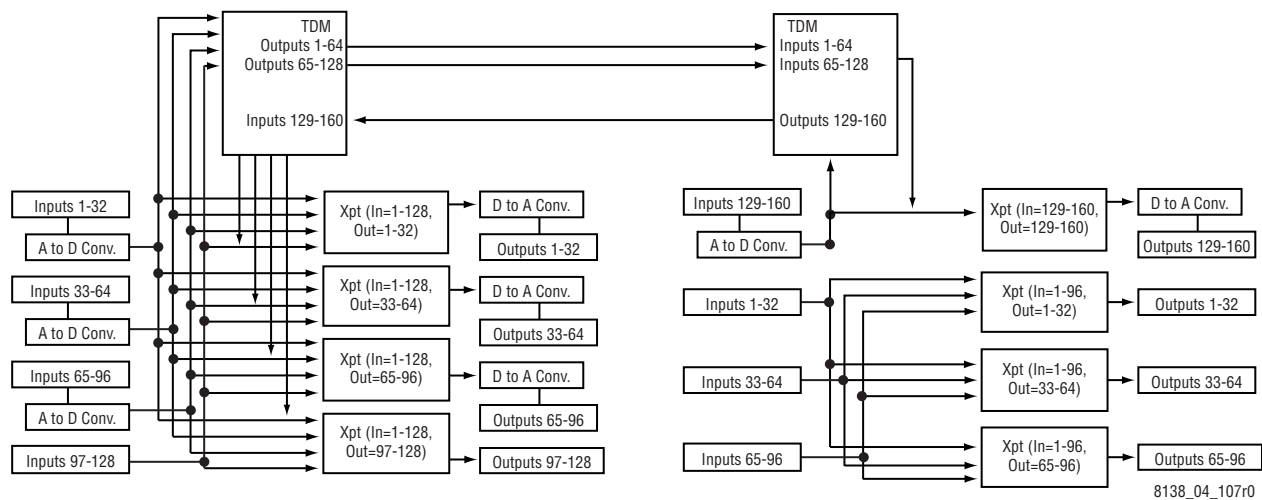


Figure 32 shows the configuration of the two frames with a single TDM submodule attached to the Audio modules in slots 1. Three Data modules are in slots 2, 3, and 4 of the expansion frame. This configuration does not support redundancy.

Figure 32. 160x160 Audio and 96x96 Data Non Redundant

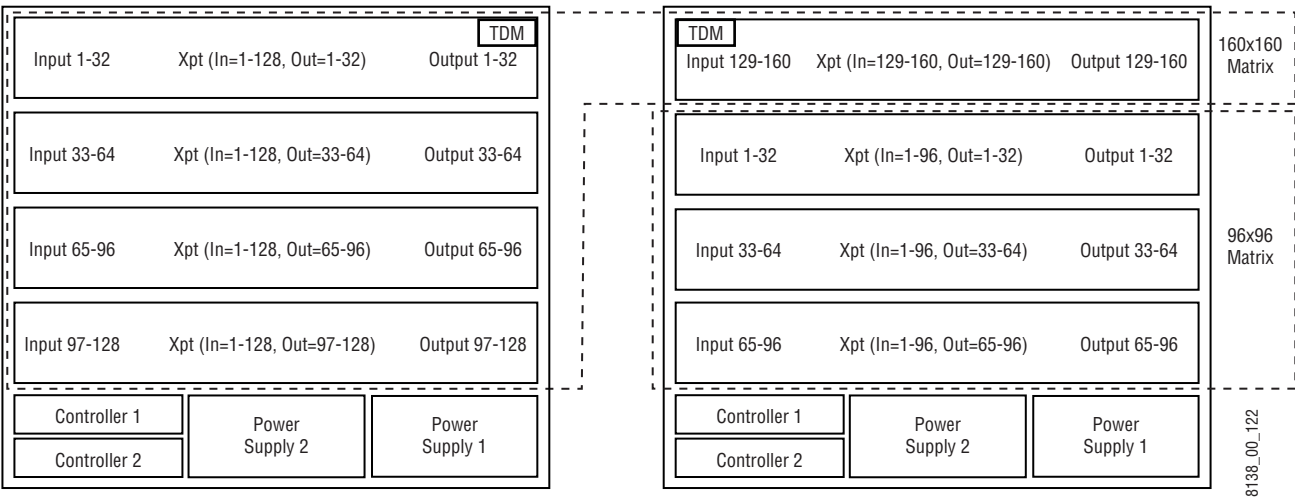


Figure 33 shows the Rotary and DIP switch settings on the CRS-MC-C2 Controller module for this configuration.

Figure 33. Switch Settings for 160x160 Audio and 96x96 Data

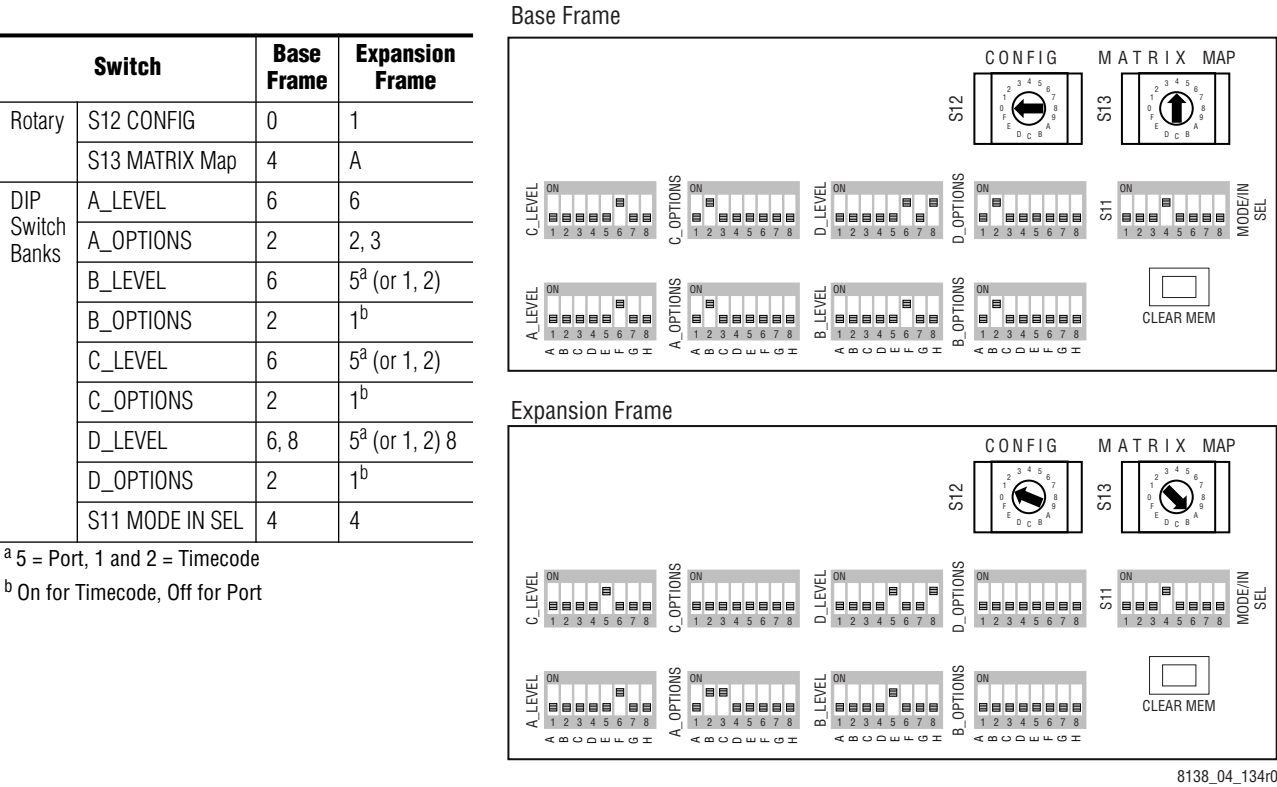


Figure 34 shows the configuration of the two frames with a single TDM submodule attached to the Audio modules in slots 4. Three Video modules are in slots 1, 2, and 3 of the expansion frame. This configuration does not support redundancy.

Figure 34. 160x160 Audio and 96x96 Video Non Redundant

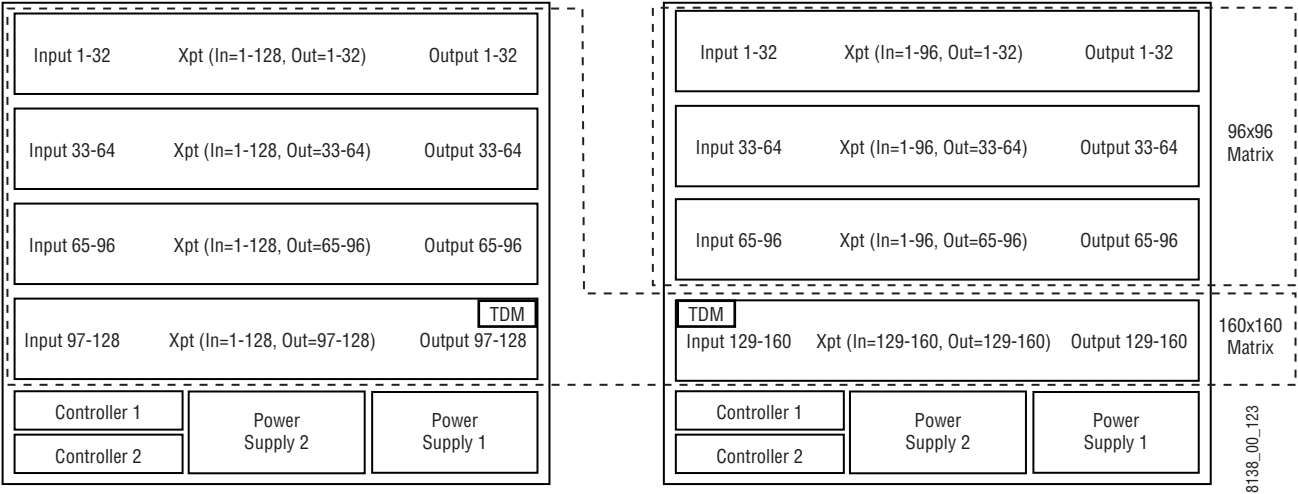
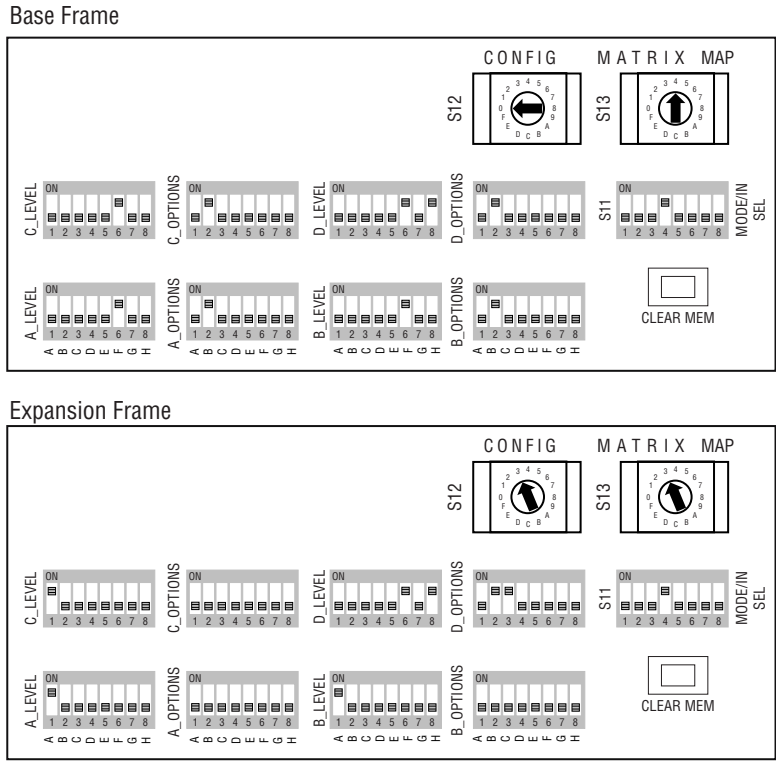


Figure 35 shows the Rotary and DIP switch settings on the CRS-MC-C2 Controller module for this configuration.

Figure 35. Switch Settings for 160x160 Audio and 96x96 Video

Base Frame			
Switch	Base Frame	Expansion Frame	
Rotary	S12 CONFIG	0	3
	S13 MATRIX Map	4	3
DIP Switch Banks	A_LEVEL	6	1 = Analog 1, 2, 3 = SD 1, 4 = HD
	A_OPTIONS	2	1-4 ^a , 5-8 ^b
	B_LEVEL	6	1 = Analog 1, 2, 3 = SD 1, 4 = HD
	B_OPTIONS	2	1-4 ^a , 5-8 ^b
	C_LEVEL	6	1 = Analog 1, 2, 3 = SD 1, 4 = HD
	C_OPTIONS	2	1-4 ^a , 5-8 ^b
	D_LEVEL	6, 8	6, 8
	D_OPTIONS	2	2, 3
	S11 MODE IN SEL	4	4

^a Off for Sync 1, On for Sync 2
^b Off for Reclocking, On for Forced Bypass

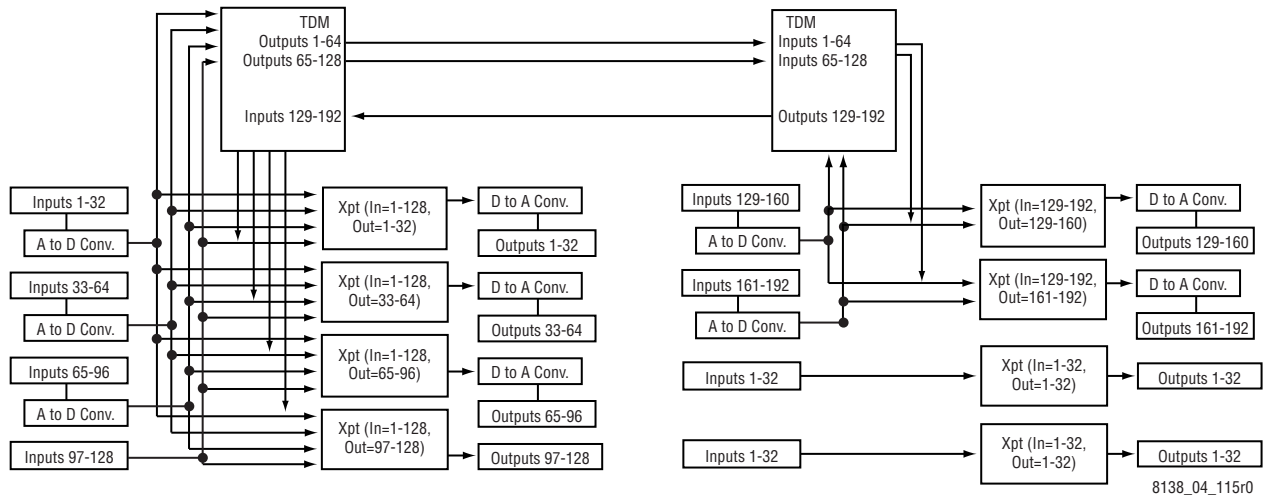


8138_04_135r0

192x192, 32x32, and 32x32 Module Placement

In this configuration two modules in the expansion frame are not Audio modules. [Figure 36](#) shows the Signal Flow of a 192x192, 32x32, and 32x32 matrix. The Signal Flow is independent of the slot positions in the expansion frame. All modules in the base frame are Audio so slot 1 contains the Audio module for inputs 1-32. However, in the expansion frame the Audio module that has inputs 129-160 could be in slot 1 or it might be in a different slot. Inputs 129-160 will be associated with the Audio module in the expansion frame that is closest to slot 1.

Figure 36. 192x192, 32x32, and 32x32 Signal Flow



[Figure 37](#) shows the configuration of the two frames with a single TDM submodule attached to the Audio modules in slots 1. A Video module is in slot 1 and a Data module is in slot 4 of the expansion frame.

Figure 37. 192x192 Audio, 32x32 Video, and 32x32 Data Non Redundant

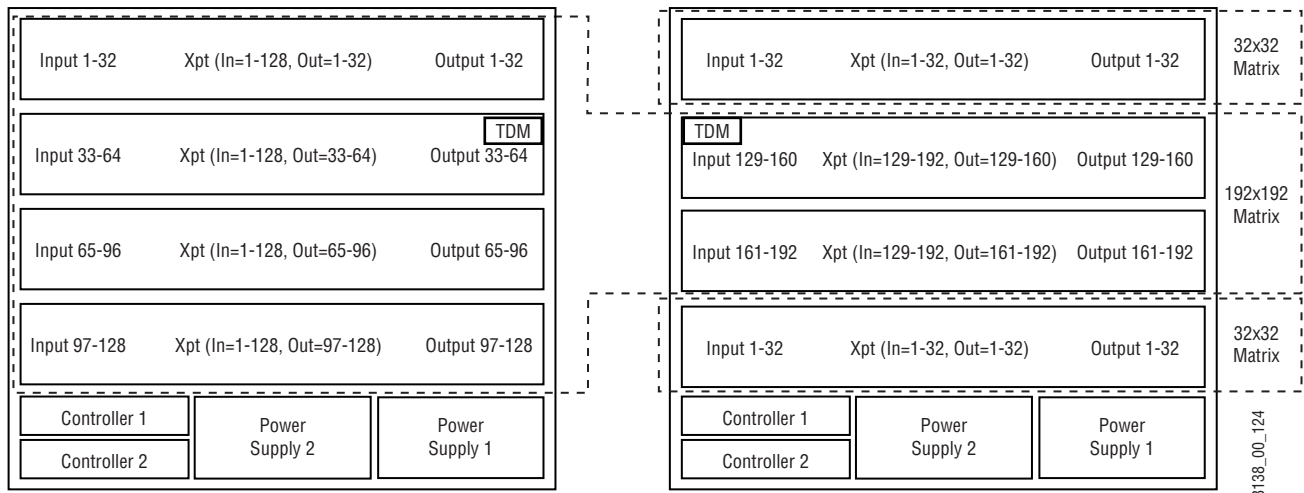


Figure 38 shows the configuration of the two frames with redundant TDM submodules. The Master TDM submodule is attached to the Audio module in slot 2 and the Redundant TDM is attached to the Audio module in slot 3.

Figure 38. 192x192 Audio, 32x32 Video, and 32x32 Data Redundant

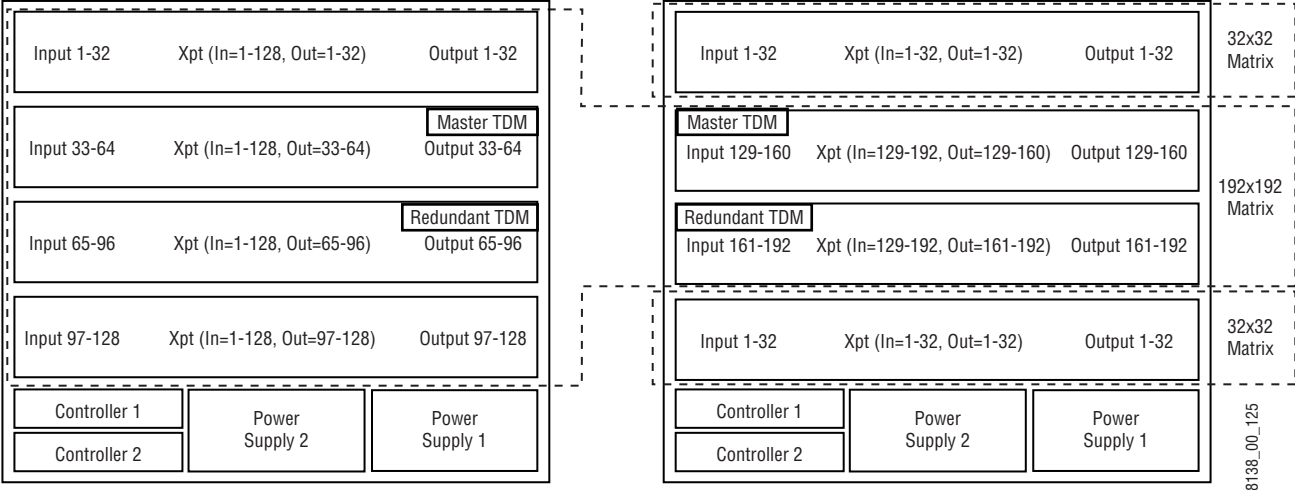


Figure 39 shows the Rotary and DIP switch settings on the CRS-MC-C2 Controller module for this configuration.

Figure 39. Switch Settings for 192x192 Audio, 32x32 Video, and 32x32 Data

	Switch	Base Frame	Expansion Frame
Rotary	S12 CONFIG	0	6
	S13 MATRIX Map	4	C
DIP Switch Banks	A_LEVEL	6	1 = Analog 1, 2, 3 = SD 1, 4 = HD
	A_OPTIONS	2	1-4 ^a , 5-8 ^b
	B_LEVEL	6	6
	B_OPTIONS	2	2, 3
	C_LEVEL	6	6
	C_OPTIONS	2	2, 3
	D_LEVEL	6, 8	5 ^c (or 1, 2) 8
	D_OPTIONS	2	1 ^d
	S11 MODE IN SEL	4	4

^a Off for Sync 1, On for Sync 2
^b Off for Reclocking, On for Forced Bypass
^c 5 = Port, 1 and 2 = Timecode
^d On for Timecode, Off for Port

Base Frame

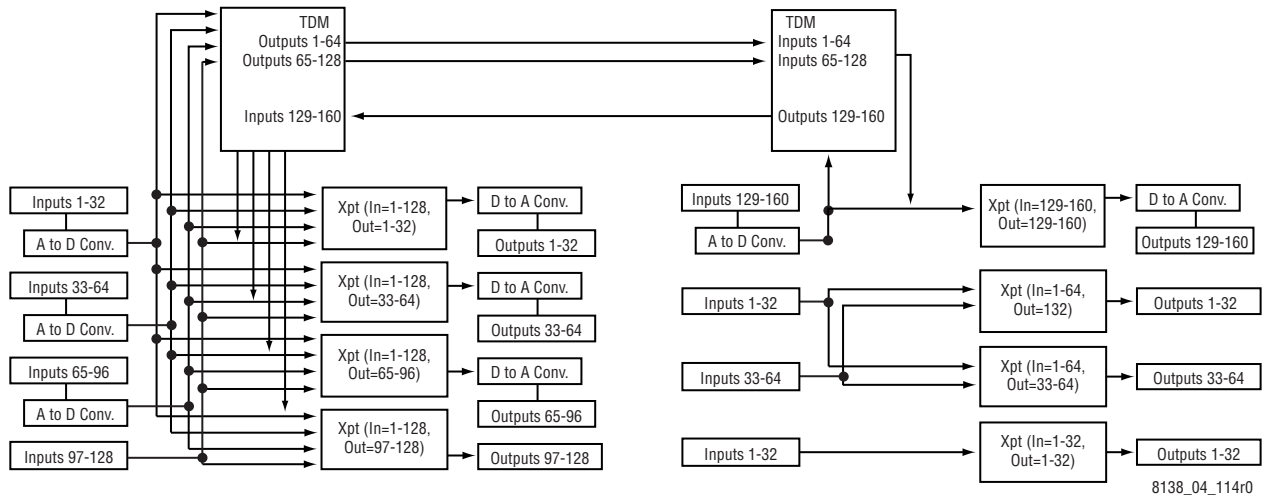
Expansion Frame

8138_04_136r0

160x160, 64x64, and 32x32 Module Placement

In this configuration three modules in the expansion frame are not Audio modules. [Figure 40](#) shows the Signal Flow of a 160x160, 64x64, and 32x32 matrix. The Signal Flow is independent of the slot positions in the expansion frame. All modules in the base frame are Audio so slot 1 contains the Audio module for inputs 1-32. However, in the expansion frame the Audio module that has inputs 129-160 could be in slot 1 or it might be in a different slot. Inputs 129-160 will be associated with the Audio module in the expansion frame that is closest to slot 1.

Figure 40. 160x160, 64x64, and 32x32 Signal Flow



[Figure 41](#) shows the configuration of the two frames with a single TDM submodule attached to the Audio modules in slots 2. One Video module is in slot 1 of the expansion frame and two Data modules are in slots 3 and 4. This configuration does not support redundancy.

Figure 41. 160x160 Audio, 32x32 Video, and 64x64 Data Non Redundant

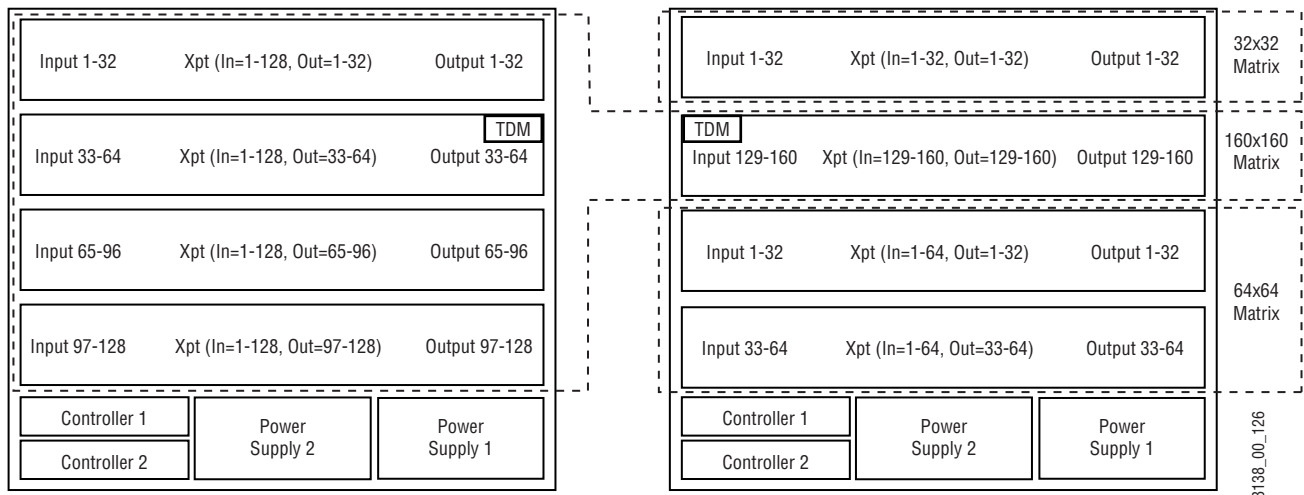


Figure 42 shows the Rotary and DIP switch settings on the CRS-MC-C2 Controller module for this configuration.

Figure 42. Switch Settings for 160x160 Audio, 32x32 Video, and 64x64 Data

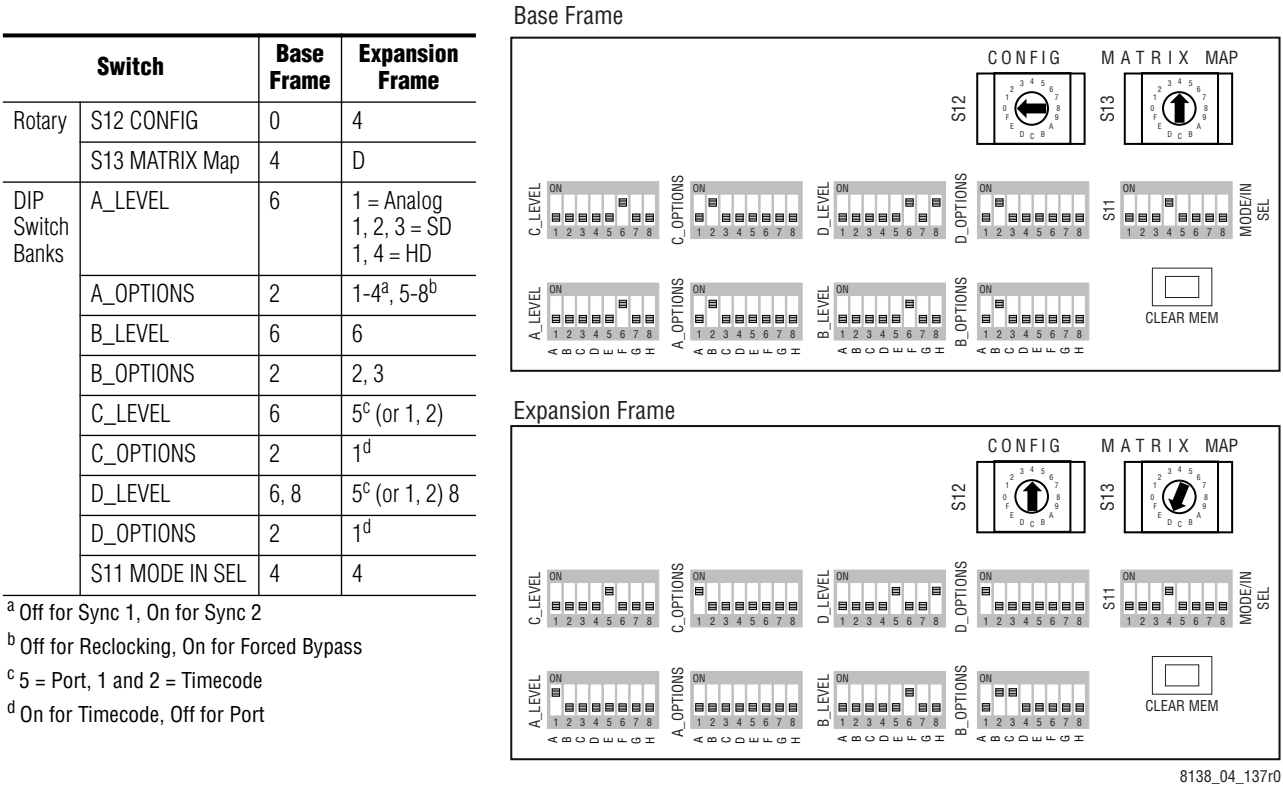


Figure 43 shows the configuration of the two frames with a single TDM submodule attached to the Audio modules in slots 2. Two Video modules are in slots 1 and 2 of the expansion frame and one Data module is in slot 4. This configuration does not support redundancy.

Figure 43. 160x160 Audio, 64x64 Video, and 32x32 Data Non Redundant

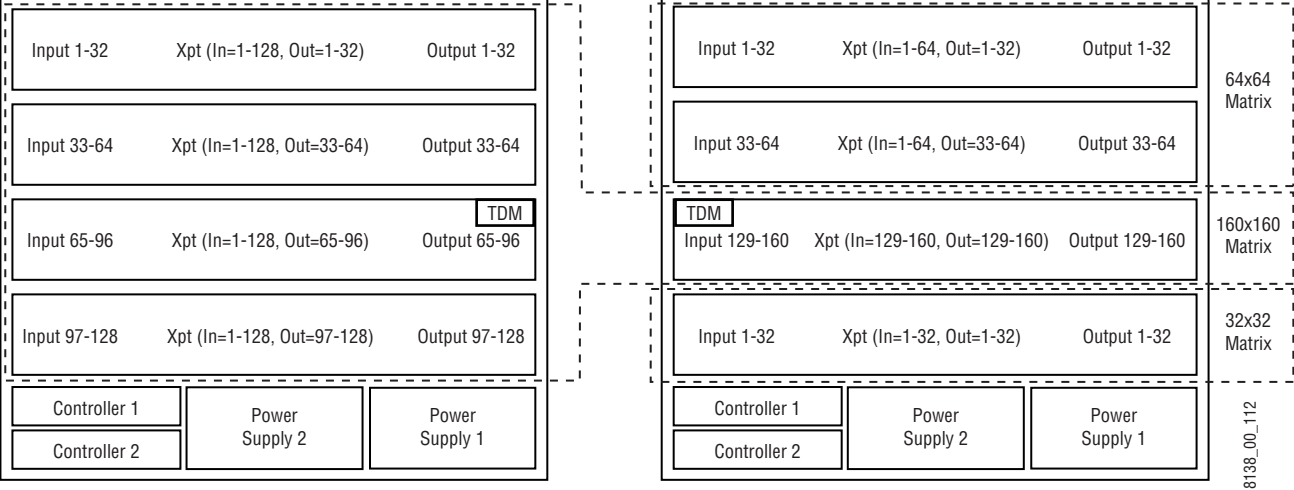


Figure 44 shows the Rotary and DIP switch settings on the CRS-MC-C2 Controller module for this configuration.

Figure 44. Switch Settings for 160x160 Audio, 64x64 Video, and 32x32 Data

Base Frame			
Switch	Base Frame	Expansion Frame	
Rotary	S12 CONFIG	0	5
	S13 MATRIX Map	4	B
DIP Switch Banks	A_LEVEL	6	1 = Analog 1, 2, 3 = SD 1, 4 = HD
	A_OPTIONS	2	1-4 ^a , 5-8 ^b
	B_LEVEL	6	1 = Analog 1, 2, 3 = SD 1, 4 = HD
	B_OPTIONS	2	1-4 ^a , 5-8 ^b
	C_LEVEL	6	6
	C_OPTIONS	2	2, 3
	D_LEVEL	6, 8	5 ^c (or 1, 2) 8
	D_OPTIONS	2	1 ^d
	S11 MODE IN SEL	4	4

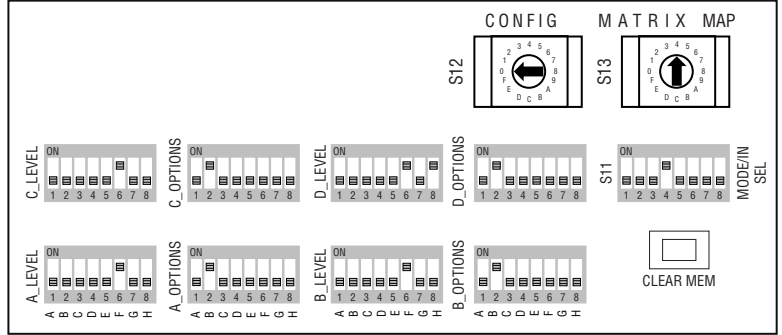
^a Off for Sync 1, On for Sync 2

^b Off for Reclocking, On for Forced Bypass

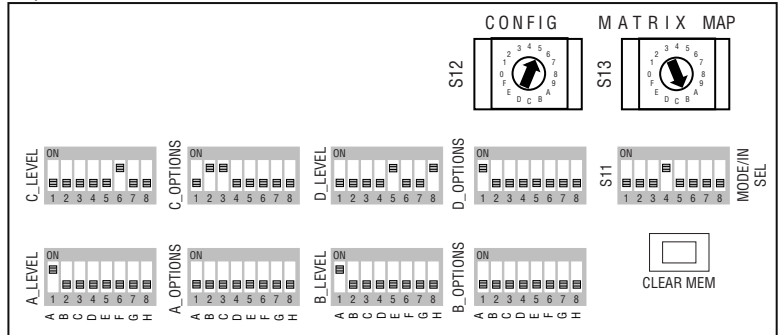
^c 5 = Port, 1 and 2 = Timecode

^d On for Timecode, Off for Port

Base Frame



Expansion Frame

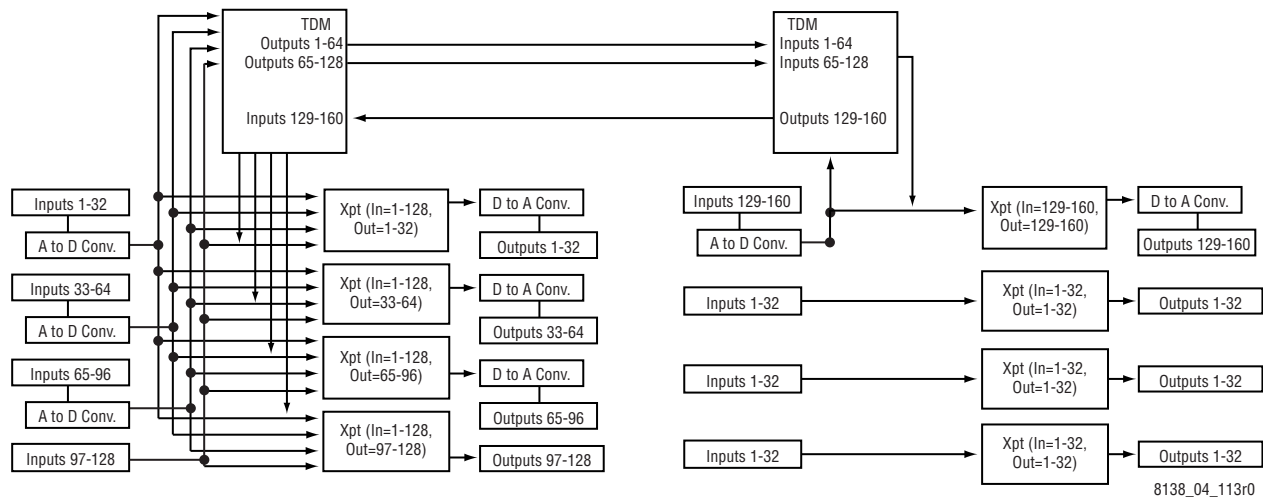


8138_04_138r0

160x160, 32x32, 32x32, and 32x32 Module Placement

In this configuration three modules in the expansion frame are not Audio modules. [Figure 45](#) shows the Signal Flow of a 160x160, 32x32, 32x32, and 32x32 matrix. The Signal Flow is independent of the slot positions in the expansion frame. All modules in the base frame are Audio so slot 1 contains the Audio module for inputs 1-32. However, in the expansion frame the Audio module that has inputs 129-160 could be in slot 1 or it might be in a different slot. Inputs 129-160 will be associated with the Audio module in the expansion frame that is closest to slot 1.

Figure 45. 160x160, 32x32, 32x32, and 32x32 Signal Flow



[Figure 46](#) shows the configuration of the two frames with a single TDM submodule attached to the Audio modules in slots 2. One Video module is in slot 1 of the expansion frame, one TimeCode module is in slot 3, and one Port module in slot 4. This configuration does not support redundancy.

Figure 46. 160x160 Audio, 32x32 Video, 32x32 TimeCode, and 32x32 Port Non Redundant

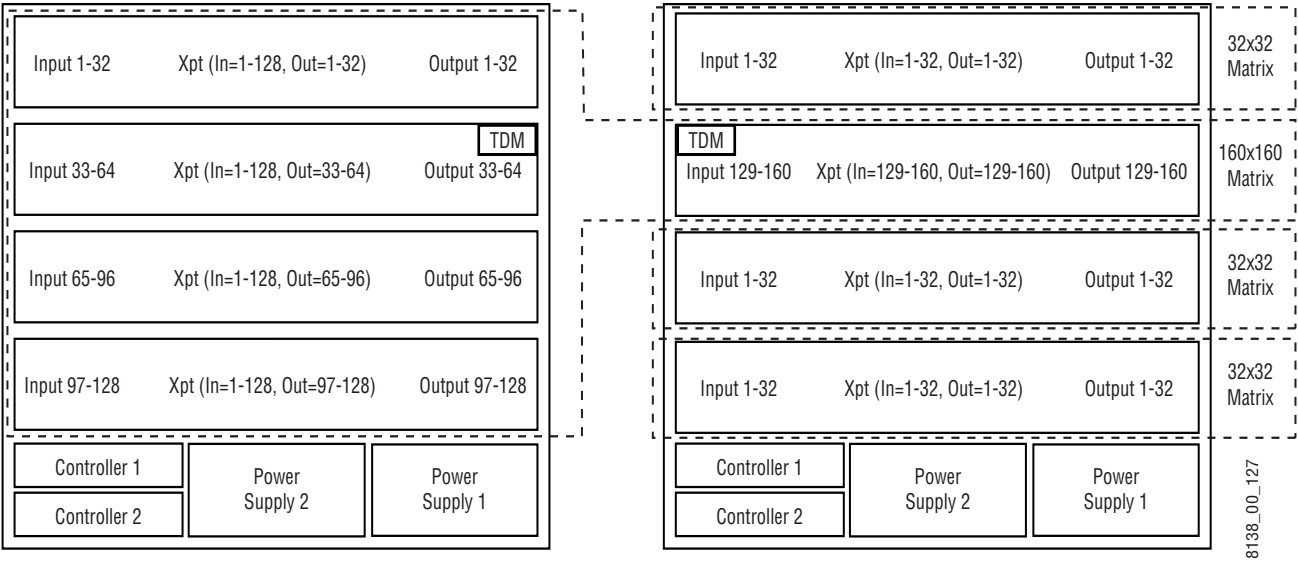


Figure 47 shows the Rotary and DIP switch settings on the CRS-MC-C2 Controller module for this configuration.

Figure 47. Switch Settings for 160x160 Audio, 64x64 Video, and 32x32 Data

	Switch	Base Frame	Expansion Frame
Rotary	S12 CONFIG	0	7
	S13 MATRIX Map	4	D
DIP Switch Banks	A_LEVEL	6	1 = Analog 1, 2, 3 = SD 1, 4 = HD
	A_OPTIONS	2	1-4 ^a , 5-8 ^b
	B_LEVEL	6	6
	B_OPTIONS	2	2, 3
	C_LEVEL	6	1, 2
	C_OPTIONS	2	1
	D_LEVEL	6, 8	5
	D_OPTIONS	2	-
	S11 MODE IN SEL	4	4

^a Off for Sync 1, On for Sync 2
^b Off for Reclocking, On for Forced Bypass

Base Frame

Expansion Frame

8138_04_139r0

Figure 48 shows the configuration of the two frames with a single TDM submodule attached to the Audio modules in slots 2. One HD Digital Video module is in slot 1 of the expansion frame, one SD Digital Video module is in slot 2, and one Data module is in slot 4. This configuration does not support redundancy.

Figure 48. 160x160 Audio, 32x32 HD Video, 32x32 SD Video, and 32x32 Data Non Redundant

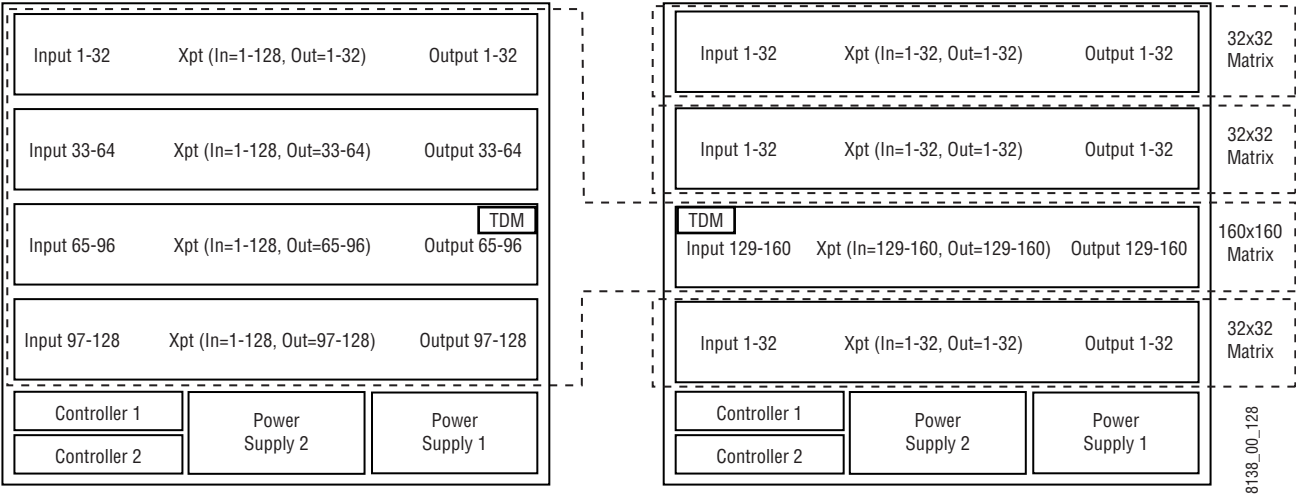


Figure 49 shows the Rotary and DIP switch settings on the CRS-MC-C2 Controller module for this configuration.

Figure 49. Switch Settings for 160x160 Audio, 64x64 Video, and 32x32 Data

Base Frame			
Switch		Base Frame	Expansion Frame
Rotary	S12 CONFIG	0	7
	S13 MATRIX Map	4	B
DIP Switch Banks	A_LEVEL	6	1, 4 = HD
	A_OPTIONS	2	1-4 ^a , 5-8 ^b
	B_LEVEL	6	1, 2, 3 = SD
	B_OPTIONS	2	1-4 ^a , 5-8 ^b
	C_LEVEL	6	6
	C_OPTIONS	2	2, 3
	D_LEVEL	6, 8	5 ^c (or 1, 2) 8
	D_OPTIONS	2	1 ^d
	S11 MODE IN SEL	4	4

^a Off for Sync 1, On for Sync 2

^b Off for Reclocking, On for Forced Bypass

^c 5 = Port, 1 and 2 = Timecode

^d On for Timecode, Off for Port

Base Frame

Expansion Frame

8138_04_140r0

Monitor Output Configuration

Monitor Output configuration allows a single Destination signal per configured matrix to be sent to external monitoring devices (speakers, headphones, signal meters, video monitors, etc.). The physical configuration of the Concerto frame will determine what type and how many monitoring devices can be connected. For cabling information see [Monitor Cabling on page 89](#).

Analog Audio, Digital Audio (AES), Analog Video, and Digital Video (SD and HD) signals can be monitored. TimeCode and Port signals are not monitored. The following tables will show the different supported configurations and how they affect monitoring.

Analog Video Monitor Configuration

Analog Video modules use a BNC backplane with a single set of **Monitor In** and **Monitor Out** BNC connectors, can not be combined with any other module type in a matrix, and they use internal bussing to support monitor functions, so all outputs in the matrix are available. The **Monitor In** connections are not used. One Destination signal is available to all the **Monitor Out** BNC connectors in the matrix. There is one Monitor connector per backplane, so in a 32x32 matrix there is one backplane, one connector, one monitoring device can be attached. In a 64x64 matrix there are two backplanes, two connectors, two monitoring devices can be attached. The same signal is sent to all the **Monitor Out** connectors in the matrix. For cabling information see [Analog Video Monitoring on page 89](#).

Table 18. Analog Video Monitoring Configuration

Matrix Size	Number of Modules	Backplane	Output Range	Total Monitor Outputs
128x128	4	BNC	1-128	4
96x96	3	BNC	1-96	3
64x64	2	BNC	1-64	2
32x32	1	BNC	1-32	1

Digital Video Monitor Configuration

Digital Video modules use BNC backplanes with a single set of **Monitor In** and **Monitor Out** BNC connectors per backplane, SD and HD modules can be combined in a matrix, and they use external cabling to support monitor functions, so all outputs in the matrix are available. All SD video signals can be routed through either module making SD video available to all outputs. The HD signal (1.485 Gbps) can only be routed through the HD module. Therefore, the SD modules should be before the HD modules in the frame.

One Destination signal is available to the last **Monitor Out** BNC connector in the matrix. The other connectors are used to cable the backplanes together. For cabling information see [Digital Video Monitoring on page 89](#).

Table 19. Digital Video Monitoring Configuration

Matrix Size	Digital Video Type ^a	Number of Modules	Backplane	Output Range	External Cable Looping	Total Monitor Outputs
128x128	SD	4	SD BNC	1-128	Yes	1
128x128	SD	3	SD BNC	1-128	Yes	1
	HD	1	HD BNC			
128x128	SD	2	SD BNC	1-128	Yes	1
	HD	2	HD BNC			
96x96	SD	3	SD BNC	1-96	Yes	1
96x96	SD	2	SD BNC	1-96	Yes	1
	HD	1	HD BNC			
96x96	SD	1	SD BNC	1-96	Yes	1
	HD	2	HD BNC			
64x64	SD	2	SD BNC	1-64	Yes	1
64x64	HD	2	HD BNC	1-64	Yes	1
64x64	SD	1	SD BNC	1-64	Yes	1
	HD	1	HD BNC			
32x32	SD	1	SD BNC	1-32	No	1
32x32	HD	1	HD BNC	1-32	No	1

^a The maximum number of HD modules that can be in a Concerto matrix is three and the fourth slot has to remain empty. If two HD modules are used then the other two slots can be loaded with any of the non HD modules.

Audio Monitor Configuration

Audio modules use five different backplanes, Analog and AES Digital modules can be combined in the same matrix, and they use internal bussing to support monitor functions, so all outputs in the matrix are available. The **Monitor In** connections are not used. One Destination signal is available to all the **Monitor Out** connectors in the matrix. All the backplanes have at least one **Monitor Out** connector. Two of the AES Audio backplanes have two **Monitor Out** connectors. On the AES Terminal Block backplane there is a terminal block **Monitor Out** connector and a BNC **Monitor Out** connector and on the AES 50 pin D backplane there is a 9 pin D **Monitor Out** con-

necter and a BNC **Monitor Out** connector. In [Table 20](#), the **Total Monitor Outputs** column displays the maximum number of **Monitor Out** connectors available based on the matrix configuration.

Table 20. Audio Monitoring Configurations

Matrix Size	Audio Module Type	Number of Modules	Backplane	Output Range	Total Monitor Outputs
128x128	Analog	4	Terminal Block	1-128	4
128x128	Analog	4	50 Pin D	1-128	4
128x128	AES Digital	4	Terminal Block	1-128	8
128x128	AES Digital	4	50 Pin D	1-128	8
128x128	AES Digital	4	BNC	1-128	4
128x128	Analog	3	Terminal Block	1-128	5
	AES Digital	1	Terminal Block		
128x128	Analog	3	50 pin D	1-128	5
	AES Digital	1	50 pin D		
128x128	Analog	3	Terminal Block	1-128	4
	AES Digital	1	BNC		
128x128	Analog	3	50 pin D	1-128	4
	AES Digital	1	BNC		
128x128	Analog	2	Terminal Block	1-128	6
	AES Digital	2	Terminal Block		
128x128	Analog	2	50 pin D	1-128	6
	AES Digital	2	50 pin D		
128x128	Analog	2	Terminal Block	1-128	4
	AES Digital	2	BNC		
128x128	Analog	2	50 pin D	1-128	4
	AES Digital	2	BNC		
128x128	Analog	1	Terminal Block	1-128	7
	AES Digital	3	Terminal Block		
128x128	Analog	1	50 pin D	1-128	7
	AES Digital	3	50 pin D		
128x128	Analog	1	Terminal Block	1-128	4
	AES Digital	3	BNC		
128x128	Analog	1	50 pin D	1-128	4
	AES Digital	3	BNC		
96x96	Analog	3	Terminal Block	1-96	3
96x96	AES Digital	3	Terminal Block	1-96	6
96x96	Analog	3	50 pin D	1-96	3
96x96	AES Digital	3	50 pin D	1-96	6
96x96	AES Digital	3	BNC	1-96	3
96x96	Analog	2	Terminal Block	1-96	4
	AES Digital	1	Terminal Block		

Table 20. Audio Monitoring Configurations - (continued)

Matrix Size	Audio Module Type	Number of Modules	Backplane	Output Range	Total Monitor Outputs
96x96	Analog	2	50 pin D	1-96	4
	AES Digital	1	50 pin D		
96x96	Analog	2	Terminal Block	1-96	3
	AES Digital	1	BNC		
96x96	Analog	2	50 pin D	1-96	3
	AES Digital	1	BNC		
96x96	Analog	1	Terminal Block	1-96	5
	AES Digital	2	Terminal Block		
96x96	Analog	1	50 pin D	1-96	5
	AES Digital	2	50 pin D		
96x96	Analog	1	Terminal Block	1-96	3
	AES Digital	2	BNC		
96x96	Analog	1	50 pin D	1-96	3
	AES Digital	2	BNC		
64x64	Analog	2	Terminal Block	1-64	2
64x64	AES Digital	2	Terminal Block	1-64	4
64x64	Analog	2	50 pin D	1-64	2
64x64	AES Digital	2	50 pin D	1-64	4
64x64	AES Digital	2	BNC	1-64	2
64x64	Analog	1	Terminal Block	1-64	3
	AES Digital	1	Terminal Block		
64x64	Analog	1	50 pin D	1-64	3
	AES Digital	1	50 pin D		
64x64	Analog	1	Terminal Block	1-64	2
	AES Digital	1	BNC		
64x64	Analog	1	50 pin D	1-64	2
	AES Digital	1	BNC		
32x32	Analog	1	Terminal Block	1-32	1
32x32	AES Digital	1	Terminal Block	1-32	2
32x32	Analog	1	50 pin D	1-32	1
32x32	AES Digital	1	50 pin D	1-32	2
32x32	AES Digital	1	BNC	1-32	1

Expanded Audio Monitor Configuration

Audio modules use five different backplanes, Analog and AES Digital modules can be combined in the same matrix, and they use external cabling to support expanded monitor functions, so all outputs in the matrix are available. The **Monitor In** and the **Monitor Out** connectors on one backplane in the base frame are cabled to the **Monitor In** and the **Monitor Out** connectors on one backplane in the expanded frame. For cabling information see [Monitor Cabling on page 89](#).

One Destination signal is available to all the **Monitor Out** connectors in the matrix. All the backplanes have at least one **Monitor Out** connector. Two of the AES Audio backplanes have two **Monitor Out** connectors. On the AES Terminal Block backplane there is a terminal block **Monitor Out** connector and a BNC **Monitor Out** connector and on the AES 50 pin D backplane there is a 9 pin D **Monitor Out** connector and a BNC **Monitor Out** connector. In [Table 21](#), the **Total Monitor Outputs** column displays the maximum number of **Monitor Out** connectors available based on the matrix configuration.

Table 21. Expanded Stereo^a Audio Monitoring Configurations

Matrix Size	Audio Module Type	Number of Modules	Backplane	Output Range	Total Monitor Outputs
256x256	Analog	8	Terminal Block	1-256	6
256x256	Analog	8	50 Pin D	1-256	6
256x256	AES Digital	8	Terminal Block	1-256	14
256x256	AES Digital	8	50 Pin D	1-256	14
256x256	AES Digital	8	BNC	1-256	6
256x256	Analog	7	Terminal Block	1-256	7
	AES Digital	1	Terminal Block		
256x256	Analog	7	50 pin D	1-256	7
	AES Digital	1	50 pin D		
256x256	Analog	7	Terminal Block	1-256	6
	AES Digital	1	BNC		
256x256	Analog	7	50 pin D	1-256	6
	AES Digital	1	BNC		
256x256	Analog	6	Terminal Block	1-256	8
	AES Digital	2	Terminal Block		
256x256	Analog	6	50 pin D	1-256	8
	AES Digital	2	50 pin D		
256x256	Analog	6	Terminal Block	1-256	6
	AES Digital	2	BNC		
256x256	Analog	6	50 pin D	1-256	6
	AES Digital	2	BNC		
256x256	Analog	5	Terminal Block	1-256	9
	AES Digital	3	Terminal Block		

Table 21. Expanded Stereo^a Audio Monitoring Configurations - (continued)

Matrix Size	Audio Module Type	Number of Modules	Backplane	Output Range	Total Monitor Outputs
256x256	Analog	5	50 pin D	1-256	9
	AES Digital	3	50 pin D		
256x256	Analog	5	Terminal Block	1-256	6
	AES Digital	3	BNC		
256x256	Analog	5	50 pin D	1-256	6
	AES Digital	3	BNC		
256x256	Analog	4	Terminal Block	1-256	10
	AES Digital	4	Terminal Block		
256x256	Analog	4	50 pin D	1-256	10
	AES Digital	4	50 pin D		
256x256	Analog	4	Terminal Block	1-256	6
	AES Digital	4	BNC		
256x256	Analog	4	50 pin D	1-256	6
	AES Digital	4	BNC		
256x256	Analog	3	Terminal Block	1-256	11
	AES Digital	5	Terminal Block		
256x256	Analog	3	50 pin D	1-256	11
	AES Digital	5	50 pin D		
256x256	Analog	3	Terminal Block	1-256	6
	AES Digital	5	BNC		
256x256	Analog	3	50 pin D	1-256	6
	AES Digital	5	BNC		
256x256	Analog	2	Terminal Block	1-256	12
	AES Digital	6	Terminal Block		
256x256	Analog	2	50 pin D	1-256	12
	AES Digital	6	50 pin D		
256x256	Analog	2	Terminal Block	1-256	6
	AES Digital	6	BNC		
256x256	Analog	2	50 pin D	1-256	6
	AES Digital	6	BNC		
256x256	Analog	1	Terminal Block	1-256	13
	AES Digital	7	Terminal Block		
256x256	Analog	1	50 pin D	1-256	13
	AES Digital	7	50 pin D		
256x256	Analog	1	Terminal Block	1-256	6
	AES Digital	7	BNC		
256x256	Analog	1	50 pin D	1-256	6
	AES Digital	7	BNC		
224x224	Analog	7	Terminal Block	1-224	5
224x224	Analog	7	50 Pin D	1-224	5

Table 21. Expanded Stereo^a Audio Monitoring Configurations - (continued)

Matrix Size	Audio Module Type	Number of Modules	Backplane	Output Range	Total Monitor Outputs
224x224	AES Digital	7	Terminal Block	1-224	12
224x224	AES Digital	7	50 Pin D	1-224	12
224x224	AES Digital	7	BNC	1-224	5
224x224	Analog	6	Terminal Block	1-224	6
	AES Digital	1	Terminal Block		
224x224	Analog	6	50 pin D	1-224	6
	AES Digital	1	50 pin D		
224x224	Analog	6	Terminal Block	1-224	5
	AES Digital	1	BNC		
224x224	Analog	6	50 pin D	1-224	5
	AES Digital	1	BNC		
224x224	Analog	5	Terminal Block	1-224	7
	AES Digital	2	Terminal Block		
224x224	Analog	5	50 pin D	1-224	7
	AES Digital	2	50 pin D		
224x224	Analog	5	Terminal Block	1-224	5
	AES Digital	2	BNC		
224x224	Analog	5	50 pin D	1-224	5
	AES Digital	2	BNC		
224x224	Analog	4	Terminal Block	1-224	8
	AES Digital	3	Terminal Block		
224x224	Analog	4	50 pin D	1-224	8
	AES Digital	3	50 pin D		
224x224	Analog	4	Terminal Block	1-224	5
	AES Digital	3	BNC		
224x224	Analog	4	50 pin D	1-224	5
	AES Digital	3	BNC		
224x224	Analog	3	Terminal Block	1-224	9
	AES Digital	4	Terminal Block		
224x224	Analog	3	50 pin D	1-224	9
	AES Digital	4	50 pin D		
224x224	Analog	3	Terminal Block	1-224	5
	AES Digital	4	BNC		
224x224	Analog	3	50 pin D	1-224	5
	AES Digital	4	BNC		
224x224	Analog	2	Terminal Block	1-224	10
	AES Digital	5	Terminal Block		
224x224	Analog	2	50 pin D	1-224	10
	AES Digital	5	50 pin D		

Table 21. Expanded Stereo^a Audio Monitoring Configurations - (continued)

Matrix Size	Audio Module Type	Number of Modules	Backplane	Output Range	Total Monitor Outputs
224x224	Analog	2	Terminal Block	1-224	5
	AES Digital	5	BNC		
224x224	Analog	2	50 pin D	1-224	5
	AES Digital	5	BNC		
224x224	Analog	1	Terminal Block	1-224	11
	AES Digital	6	Terminal Block		
224x224	Analog	1	50 pin D	1-224	11
	AES Digital	6	50 pin D		
224x224	Analog	1	Terminal Block	1-224	5
	AES Digital	6	BNC		
224x224	Analog	1	50 pin D	1-224	5
	AES Digital	6	BNC		
192x192	Analog	6	Terminal Block	1-192	4
192x192	Analog	6	50 Pin D	1-192	4
192x192	AES Digital	6	Terminal Block	1-192	10
192x192	AES Digital	6	50 Pin D	1-192	10
192x192	AES Digital	6	BNC	1-192	4
192x192	Analog	5	Terminal Block	1-192	5
	AES Digital	1	Terminal Block		
192x192	Analog	5	50 pin D	1-192	5
	AES Digital	1	50 pin D		
192x192	Analog	5	Terminal Block	1-192	4
	AES Digital	1	BNC		
192x192	Analog	5	50 pin D	1-192	4
	AES Digital	1	BNC		
192x192	Analog	4	Terminal Block	1-192	2
	AES Digital	2	Terminal Block		
192x192	Analog	4	50 pin D	1-192	2
	AES Digital	2	50 pin D		
192x192	Analog	4	Terminal Block	1-192	4
	AES Digital	2	BNC		
192x192	Analog	4	50 pin D	1-192	4
	AES Digital	2	BNC		
192x192	Analog	3	Terminal Block	1-192	7
	AES Digital	3	Terminal Block		
192x192	Analog	3	50 pin D	1-192	7
	AES Digital	3	50 pin D		
192x192	Analog	3	Terminal Block	1-192	4
	AES Digital	3	BNC		

Table 21. Expanded Stereo^a Audio Monitoring Configurations - (continued)

Matrix Size	Audio Module Type	Number of Modules	Backplane	Output Range	Total Monitor Outputs
192x192	Analog	3	50 pin D	1-192	4
	AES Digital	3	BNC		
192x192	Analog	2	Terminal Block	1-192	8
	AES Digital	4	Terminal Block		
192x192	Analog	2	50 pin D	1-192	8
	AES Digital	4	50 pin D		
192x192	Analog	2	Terminal Block	1-192	4
	AES Digital	4	BNC		
192x192	Analog	2	50 pin D	1-192	4
	AES Digital	4	BNC		
192x192	Analog	1	Terminal Block	1-192	9
	AES Digital	5	Terminal Block		
192x192	Analog	1	50 pin D	1-192	9
	AES Digital	5	50 pin D		
192x192	Analog	1	Terminal Block	1-192	4
	AES Digital	5	BNC		
192x192	Analog	1	50 pin D	1-192	4
	AES Digital	5	BNC		
160x160	Analog	5	Terminal Block	1-160	3
160x160	Analog	5	50 Pin D	1-160	3
160x160	AES Digital	5	Terminal Block	1-160	8
160x160	AES Digital	5	50 Pin D	1-160	8
160x160	AES Digital	5	BNC	1-160	3
160x160	Analog	4	Terminal Block	1-160	4
	AES Digital	1	Terminal Block		
160x160	Analog	4	50 pin D	1-160	4
	AES Digital	1	50 pin D		
160x160	Analog	4	Terminal Block	1-160	3
	AES Digital	1	BNC		
160x160	Analog	4	50 pin D	1-160	3
	AES Digital	1	BNC		
160x160	Analog	3	Terminal Block	1-160	5
	AES Digital	2	Terminal Block		
160x160	Analog	3	50 pin D	1-160	5
	AES Digital	2	50 pin D		
160x160	Analog	3	Terminal Block	1-160	3
	AES Digital	2	BNC		
160x160	Analog	3	50 pin D	1-160	3
	AES Digital	2	BNC		

Table 21. Expanded Stereo^a Audio Monitoring Configurations - (continued)

Matrix Size	Audio Module Type	Number of Modules	Backplane	Output Range	Total Monitor Outputs
160x160	Analog	2	Terminal Block	1-160	6
	AES Digital	3	Terminal Block		
160x160	Analog	2	50 pin D	1-160	6
	AES Digital	3	50 pin D		
160x160	Analog	2	Terminal Block	1-160	3
	AES Digital	3	BNC		
160x160	Analog	2	50 pin D	1-160	3
	AES Digital	3	BNC		
160x160	Analog	1	Terminal Block	1-160	7
	AES Digital	4	Terminal Block		
160x160	Analog	1	50 pin D	1-160	7
	AES Digital	4	50 pin D		
160x160	Analog	1	Terminal Block	1-160	3
	AES Digital	4	BNC		
160x160	Analog	1	50 pin D	1-160	3
	AES Digital	4	BNC		

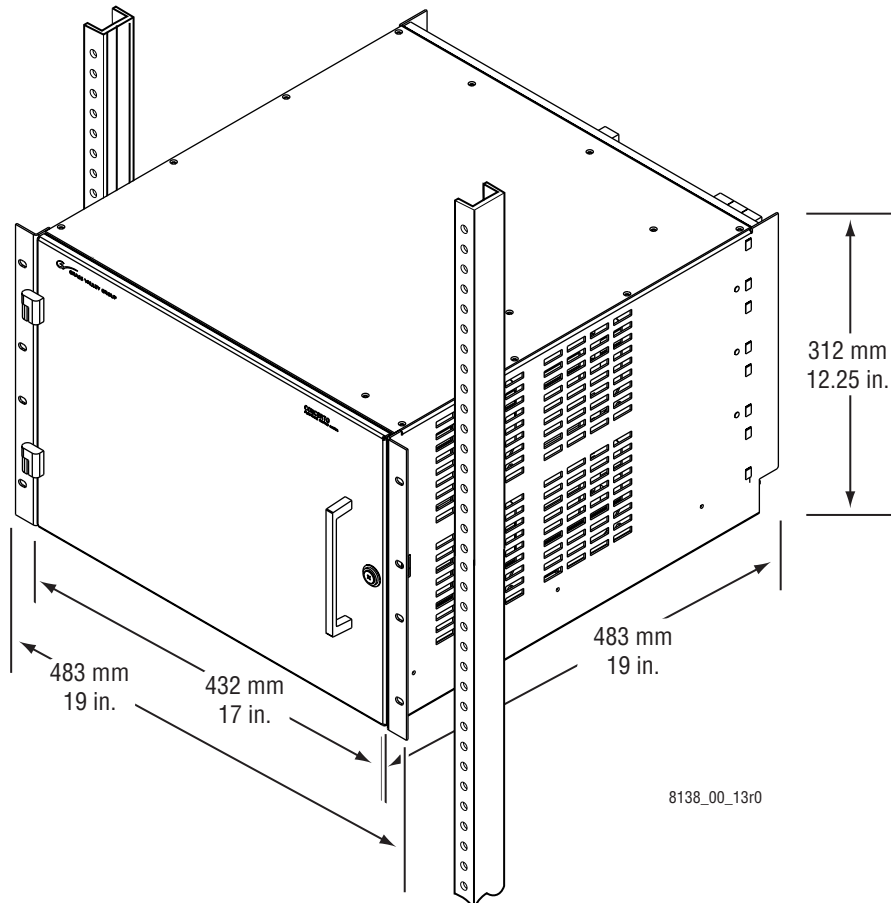
^a Expanded Stereo Audio configurations require the base frame to have four Audio modules.

Installation

Frame Installation

The Concerto Routing Matrix is installed in a standard 483 mm (19-inch) rack. Rear frame support is not required. The matrix occupies 7 rack-units. Cooling is by horizontal airflow using an internal fan unit. See [Figure 50](#).

Figure 50. Concerto Rack Installation Front View



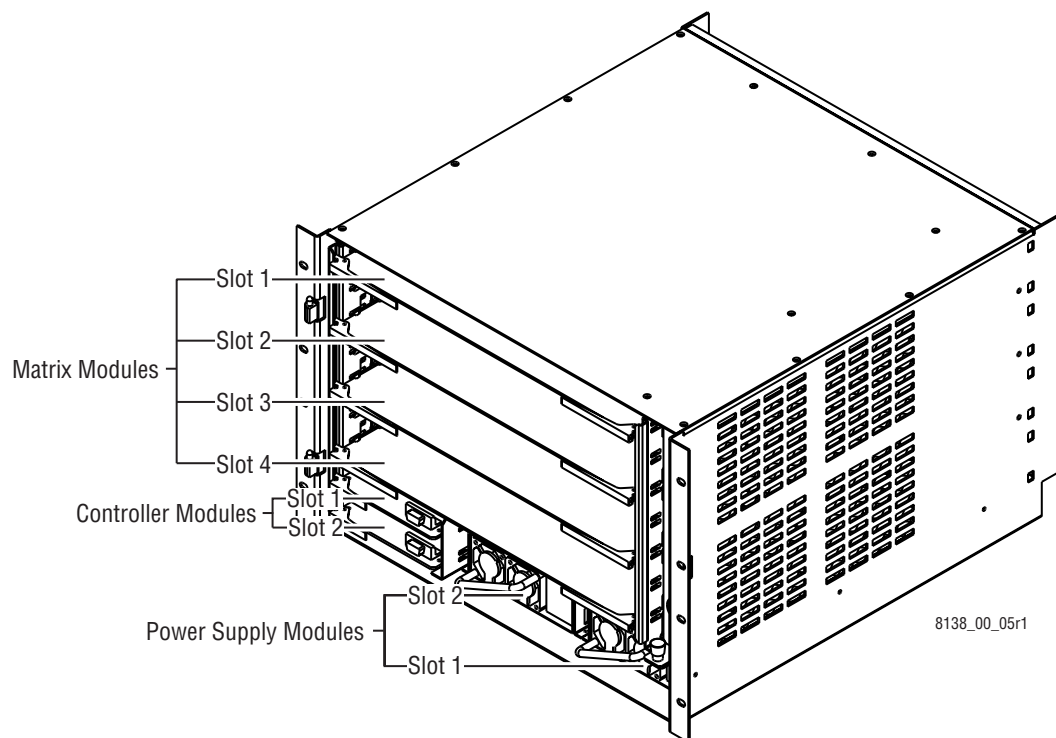
Note Your cover may be different from the one pictured. The installation dimensions are correct.

Module Installation

All the modules are horizontally oriented in the frames, and edge guides aid insertion and removal. Modules are oriented in the frame with the front (populated) side facing up. See [Figure 51](#).

CAUTION It is critical that the modules be oriented correctly to prevent bent pins. It is very important that the module and the backplane are compatible. If a module is plugged into an incompatible backplane, it will cause damage.

Figure 51. Module Configuration



Cabling

Table 22 contains a compilation of the connectors found on the Concerto Routing Matrix. Table 23 contains a compilation of the connectors and label variations found on the Matrix Module Backplanes. The Gender column indicates the gender of the connector found on the frame. The Details column contains information to assist in using the connector.

Table 22. Connectors Found on Concerto Frame

Label	Connector		Details
	Type	Gender	
AES REF	BNC	Female	Synchronous audio references use unbalanced 75 ohm connector, terminator, and coaxial cable. Loop-thru cabling supported.
ALARM	D-9 Pin	Female	Audio Alarm use serial/machine cable.
DC PWR	Terminal Block	Male	Use 12 AWG (3.31 mm ²) wire and a 3-pin terminal block connector to establish a DC power connection.
E-NET 1 and E-NET 2	RJ45	Female	Ethernet network communication interface is 10Base-T and 100Base-T compatible use Category 5 cable, 8 conductor twisted pair. All Ethernet connections need to be routed through switches.
EXT-COM1 and EXT-COM2	D-9 Pin	Female	External Control (factory use) use serial/machine cable.
VIDEO REF 1 and 2	BNC	Female	Video reference use unbalanced 75 ohm connector, terminator, and coaxial cable. Loop-thru cabling supported.

Table 23. Connectors Found on Module Backplanes

Label	Module ^a	Connector		Details
		Type	Gender	
EXP IN 1 and 2 EXP OUT 1 and 2	AA, DA	BNC	Female	Use unbalanced 75 ohm connector and coaxial cable.
INPUTS	AV, DA, DV	BNC	Female	Use unbalanced 75 ohm connector and coaxial cable.
	AA, DA, TC	50 Pin D	Female	Use balanced 110 ohm connector and shielded twisted pair cable.
	AA	Terminal Block	Male	Single wire compression for solid or stranded cable 28-20 AWG (.081 to .518 mm ²)
	DA, TC			Single wire compression for solid or stranded cable 28-20 AWG (.081 to .518 mm ²) Use balanced 110 ohm shielded twisted pair cable.
	PT	9 Pin D	Female	Use balanced 110 ohm connector and shielded twisted pair cable
MON IN, MON OUT, and MONITOR IN and OUT	AA, DA	9 Pin D	Female	Monitor input use balanced 110 ohm connector and shielded twisted pair cable
	AV, DA, DV	BNC	Female	Monitor input use an unbalanced 75 ohm connector and coaxial cable.
	AA	Terminal Block	Male	Single wire compression for solid or stranded cable 28-20 AWG (.081 to .518 mm ²)
	DA			Single wire compression for solid or stranded cable 28-20 AWG (.081 to .518 mm ²) Use balanced 110 ohm shielded twisted pair cable.
OUTPUTS	AV, DA, DV	BNC	Female	Use unbalanced 75 ohm connector and coaxial cable.
	AA, DA, TC	50 Pin D	Female	Use balanced 110 ohm connector and shielded twisted pair cable.
	AA	Terminal Block	Male	Single wire compression for solid or stranded cable 28-20 AWG (.081 to .518 mm ²)
	DA, TC			Single wire compression for solid or stranded cable 28-20 AWG (.081 to .518 mm ²) Use balanced 110 ohm shielded twisted pair cable.
	PT	9 Pin D	Female	Use balanced 110 ohm connector and shielded twisted pair cable

^a AA = Analog Audio, AV = Analog Video, DA = Digital Audio (AES), DV = Digital Video, TC = TimeCode, PT = Port

Backplane Cabling

Figure 52 shows the cabling for the Concerto Routing Matrix.

Figure 52. Concerto Frame Cabling

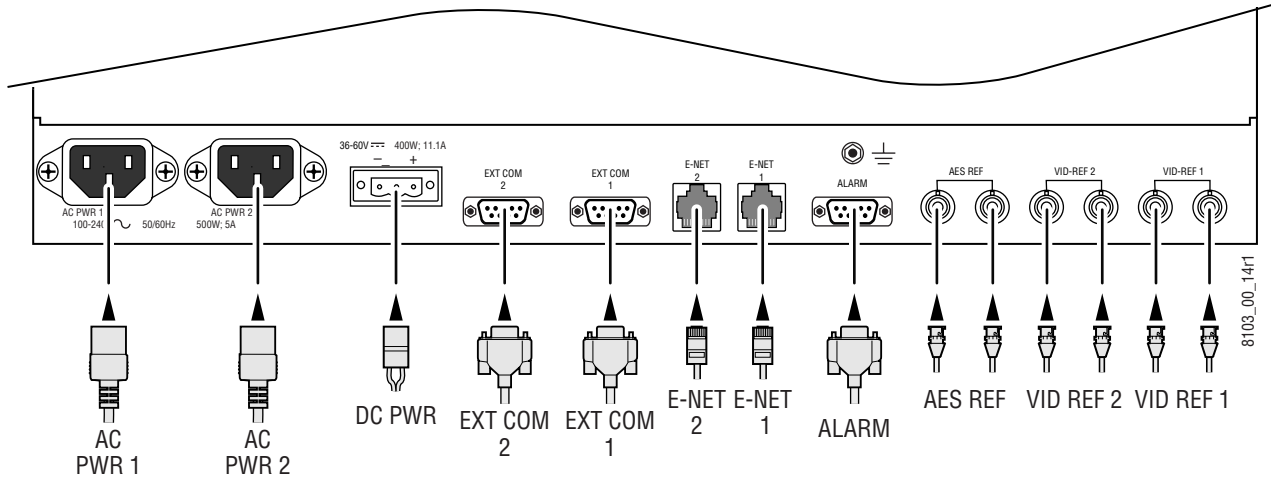


Figure 53 shows the cabling for the BNC backplane. This backplane is used by SD Digital Video, Analog Video, and Digital Audio (AES) modules. The **EXP IN** and **EXP OUT** BNC connectors are used by the Digital Audio module for expansion.

Figure 53. BNC Backplane Cabling

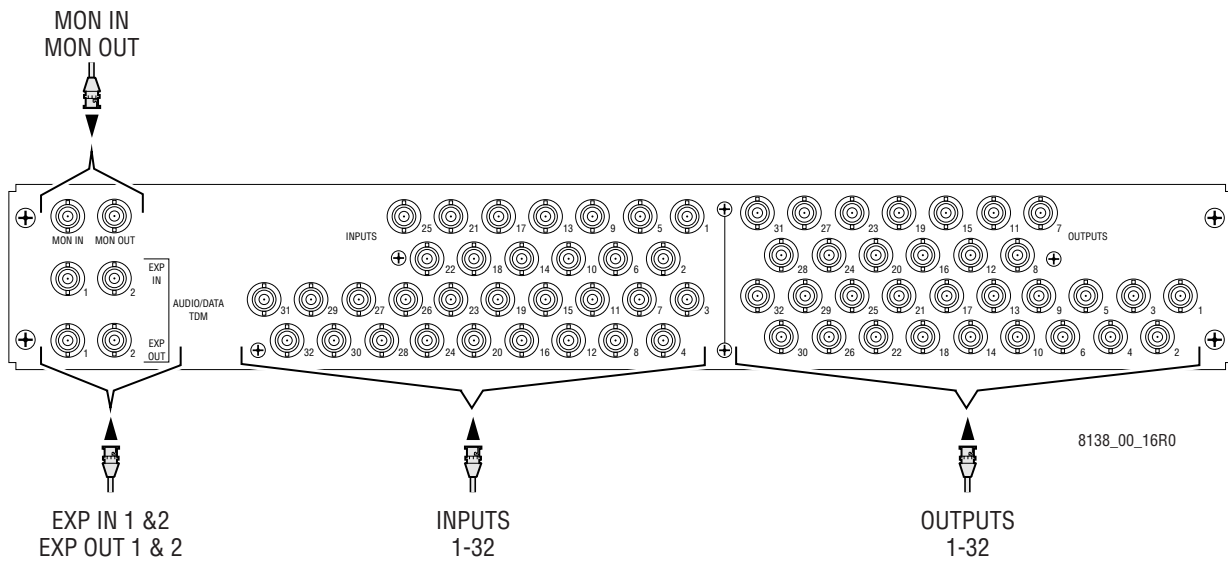


Figure 54 shows the cabling for the HD BNC backplane. This backplane is used by HD Digital Video modules.

CAUTION The maximum number of HD modules that can be in a Concerto matrix is three and the fourth slot has to remain empty.

Figure 54. HD Digital Video BNC Backplane Cabling

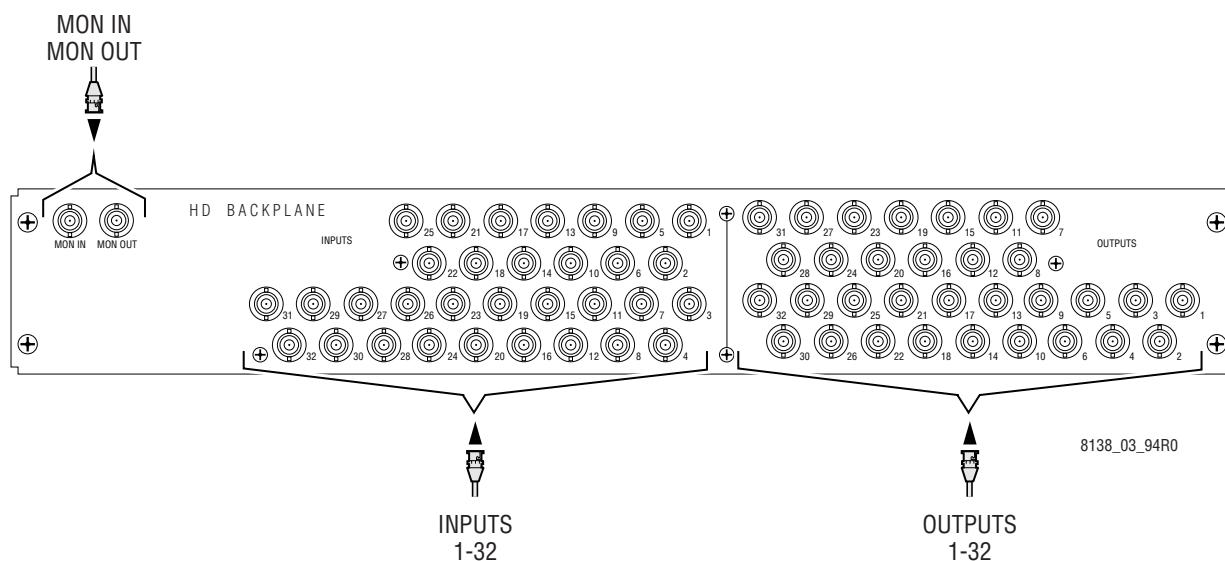


Figure 55 shows the cabling for the Analog Audio Balanced terminal block backplane. This backplane is used by the Analog Audio module.

Figure 55. Analog Audio Balanced Terminal Block Backplane Cabling

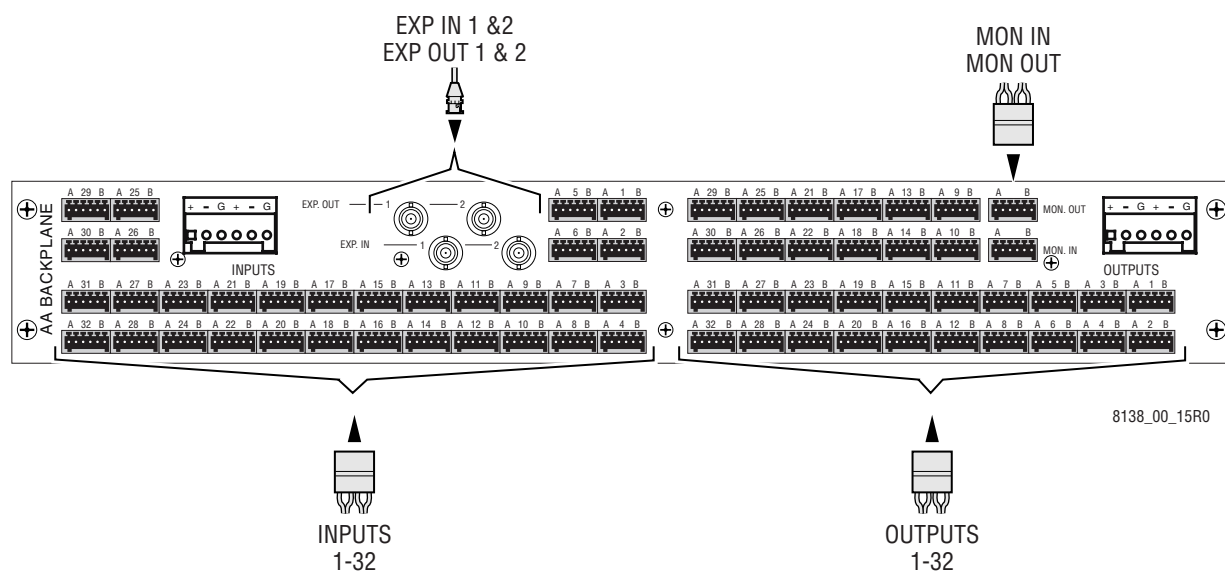


Figure 56 shows the cabling for the Analog Audio Balanced 50 pin D backplane. This backplane is used by the Analog Audio module.

Figure 56. Analog Audio 50 Pin D Backplane Cabling

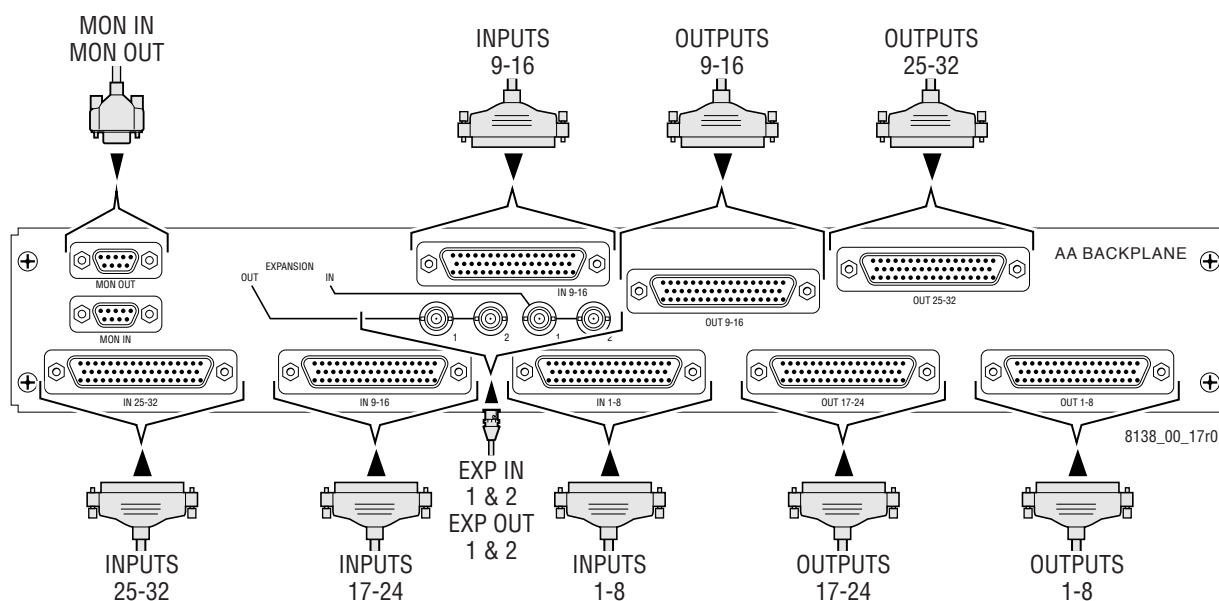


Figure 57 shows the cabling for the Digital Audio Balanced terminal block backplane. This backplane is used by the Digital Audio (AES) module and the TimeCode module.

Figure 57. Digital Audio Balanced Terminal Block Backplane Cabling

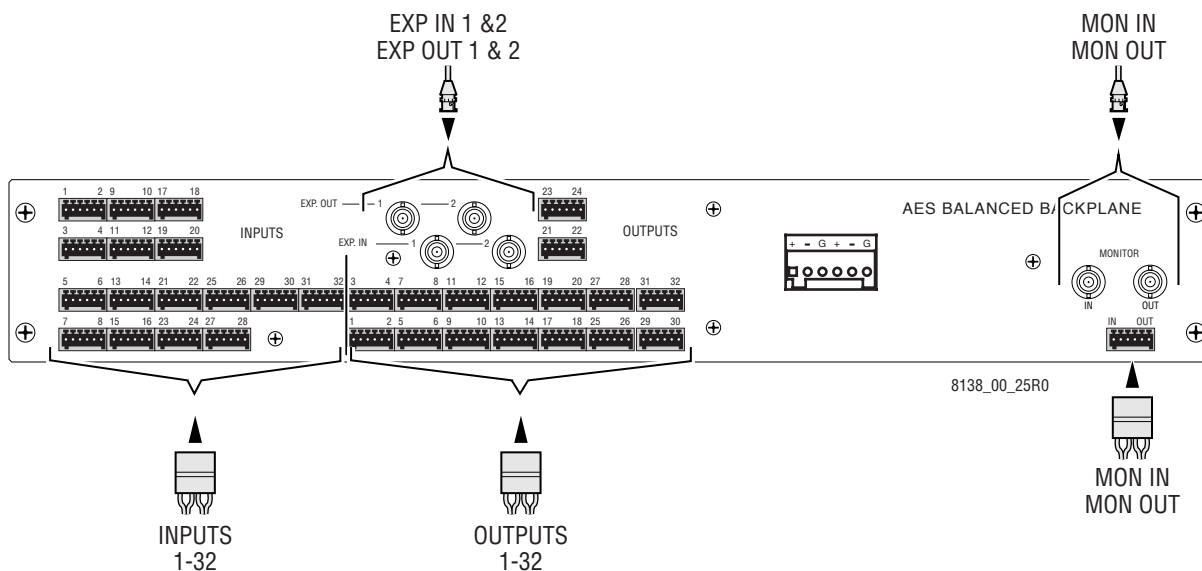


Figure 58 shows the cabling for the Digital Audio Balanced 50 pin D backplane. This backplane is used by the Digital Audio (AES) module and the TimeCode module.

Figure 58. Digital Audio 50 Pin D Backplane Cabling

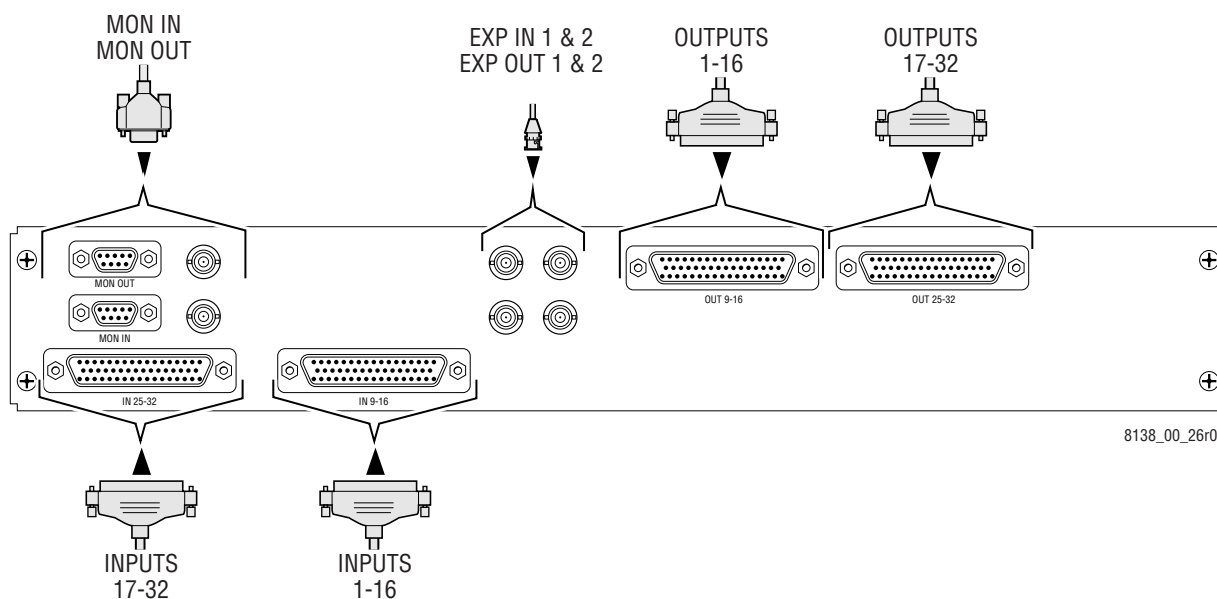
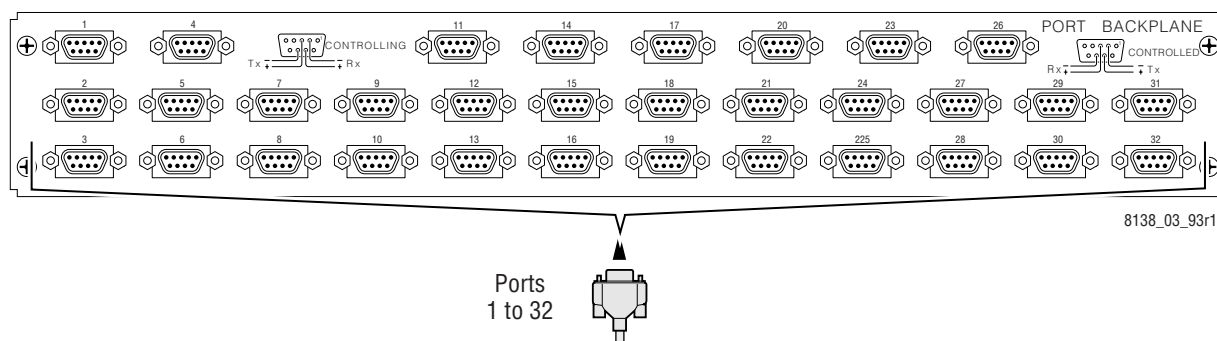


Figure 59 shows the cabling for the Port backplane. This backplane is used by the Port module.

Note This backplane meets the industry standard. To verify that you have the correct pinouts see [Table 27 on page 83](#), and the correct Port module see [Port Modules on page 123](#).

Figure 59. Port Backplane Cabling



Expansion Audio System Cabling

Two Concerto frames can be cabled to create Audio matrices of 160x160, 192x192, 224x224, or 256x256. For more information on supported frame configurations see [Expansion Architecture on page 37](#).

A Time Division Multiplex (TDM) submodule is attached to one of the Audio modules in each frame. For redundancy, a TDM submodule can be attached to a second Audio module in each frame. Redundancy is not supported in the 160x160 matrix.

If you ordered your Audio modules with the TDM submodules already installed, they will be attached to the bottom side of the Audio modules. Identify which of your Audio modules have TDM submodules and which don't. The cabling of the backplanes and the location of the TDM submodules must be in sync to work properly.

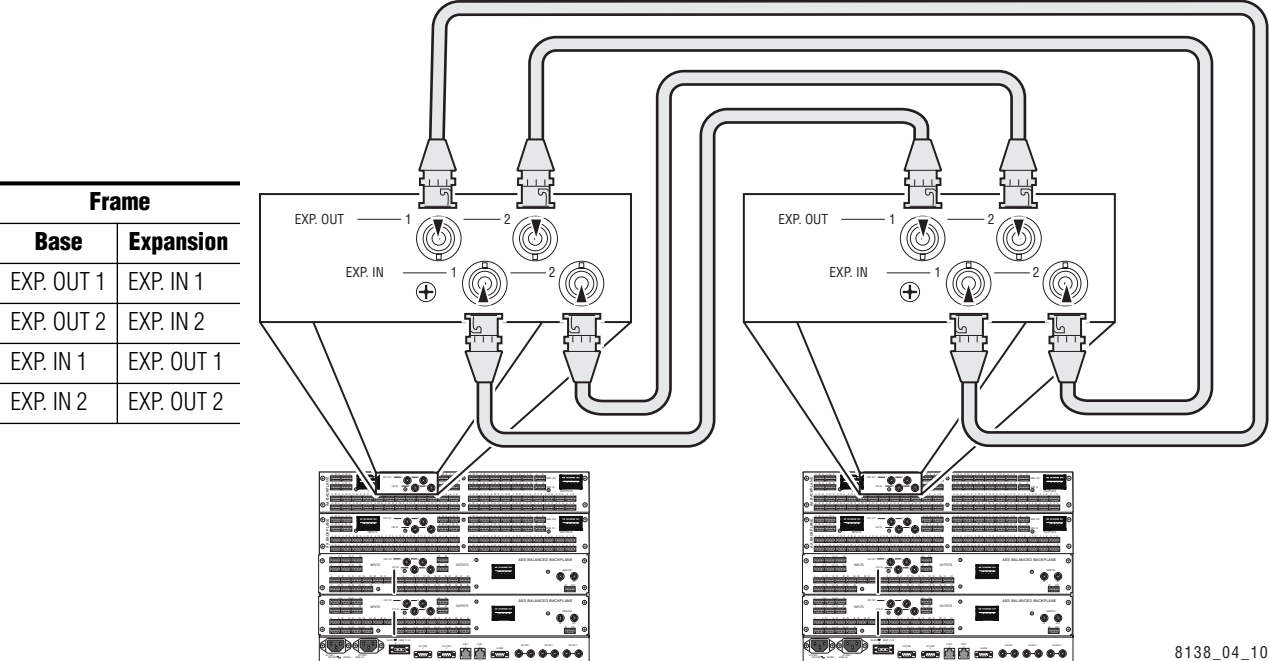
If you ordered the TDM submodule as an option to add to your existing Audio module see [Expansion TDM Submodule Installation on page 94](#) for installation instructions.

The base expansion frame must have four Audio modules and the expansion frame must have at least one Audio module. An Audio module with an attached TDM submodule should be inserted in the expansion frame in or as close to slot 1 as possible. If the expansion frame has Video modules they will fill slot 1, then slot 2, etc. If the expansion frame does not have any Video modules then an Audio module can go into slot 1.

The Audio module in the expansion frame that is in or closest to slot 1 will determine where the Audio module with the attached TDM will go in the base frame. If the TDM is in slot 1 on the expansion frame it needs to be in slot 1 on the base frame.

After verifying that the modules are in the correct slots, cable the two back-planes as shown in [Figure 60](#). **EXP. OUT 1** on the base frame is connected to **EXP. IN 1** on the expansion frame.

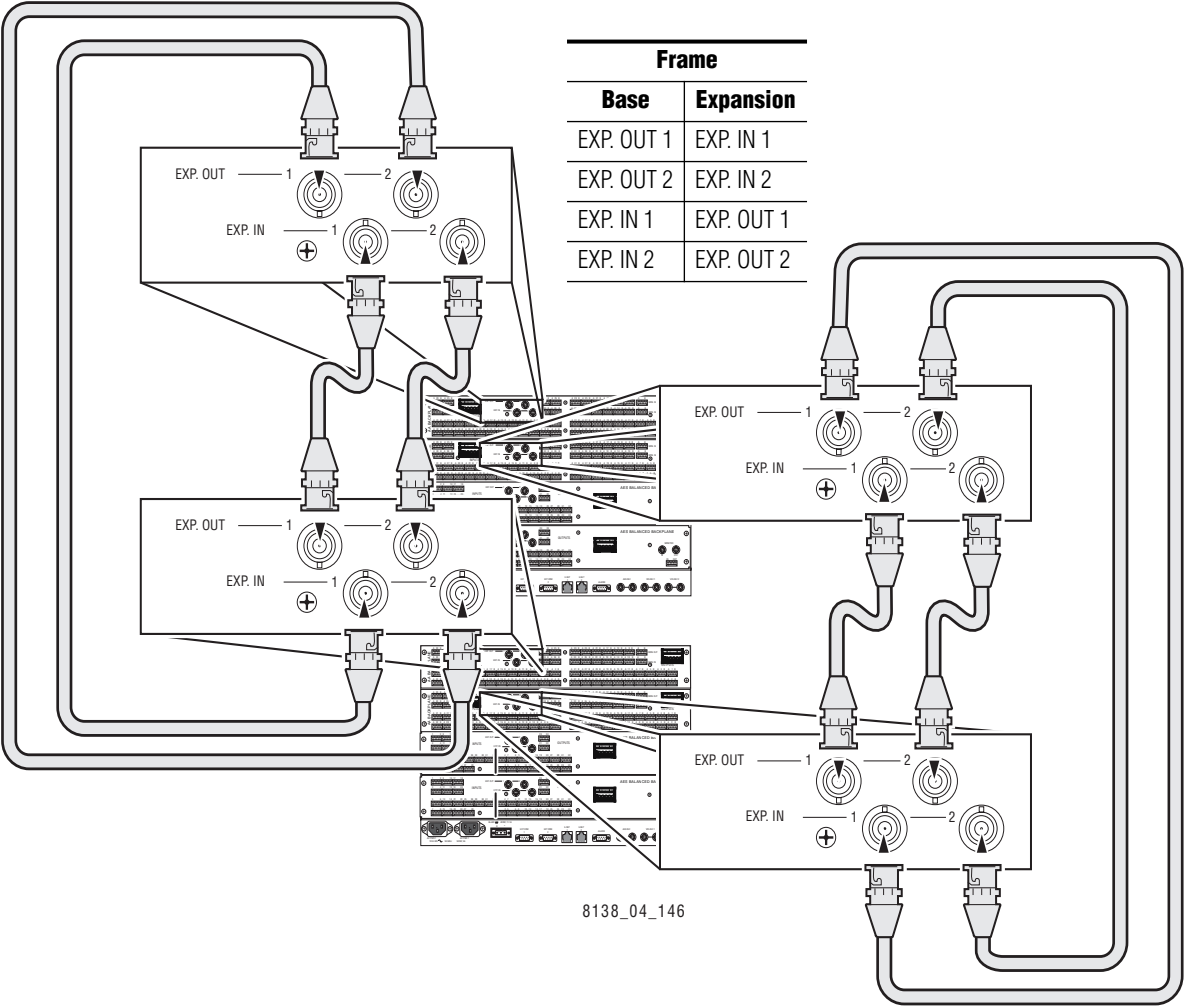
Figure 60. Non Redundant Expansion Audio System Cabling



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In [Figure 61](#), two Concerto frames are represented as stacked as they are in a rack. The cabling on the left shows the Master TDM in slot 1 on both frames. The redundant cabling is shown on the right, with the Redundant TDM in slot 2 on both frames. The Master TDM is always the one in or closest to slot 1 on the expansion frame and the Redundant TDM is always in the slot directly underneath the Master.

Figure 61. Redundant Expansion Audio System Cabling

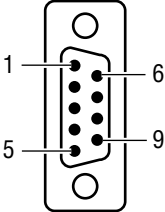
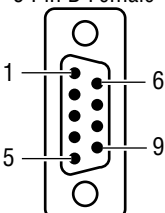
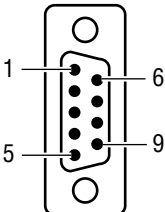


Pinouts

Concerto Routing Matrix

Table 24 contains pinout information for the D connectors on the Concerto Routing Matrix.

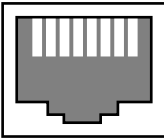
Table 24. Concerto Routing Matrix D Connector Pinouts

EXT-COM 1	Pin	Function	Pin	Function
9 Pin D Female 	1	GND	6	TX1_COM
	2	TX1-	7	TX1+
	3	RX1+	8	RX1-
	4	RX1_COM	9	GND
	5	-	-	-
EXT-COM 2	Pin	Function	Pin	Function
9 Pin D Female 	1	GND	6	TX2_COM
	2	TX2-	7	TX2+
	3	RX2+	8	RX2-
	4	RX2_COM	9	GND
	5	-	-	-
ALARM ^a	Pin	Function	Pin	Function
9 Pin D Female 	1	-	6	ALARM1_COM
	2	ALARM1_NO	7	-
	3	-	8	-
	4	ALARM2_COM	9	ALARM2_NO
	5	GND	-	-

^a Alarm contact closures are separate relay contacts.

Table 25 contains pinout information for the RJ45 Ethernet connectors.

Table 25. RJ45 Ethernet Pinouts

RJ45 Ethernet	Wire Color	Pin	Function
RJ45 Female 	Orange White	1	TX+
	Orange	2	TX-
	Green White	3	RX+
	Blue	4	-
	Blue White	5	-
	Green	6	RX-
	Brown White	7	-
	Brown	8	-

Matrix Backplanes

Table 26 contains pinout information for the monitor 9 Pin D connectors on the AES and Analog audio the Balanced 50 Pin D backplanes.

Table 26. Matrix Backplane Monitor D Connector Pinouts

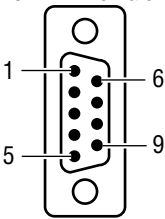
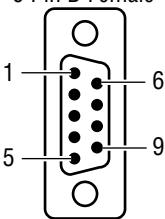
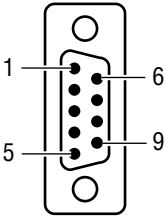
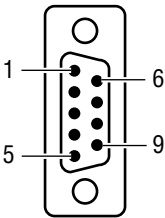
MONITOR IN AES	Pin	Function	Pin	Function
9 Pin D Female 	1	GND	6	EXT_MON_IN-
	2	EXT_MON_IN+	7	GND
	3	GND	8	GND
	4	-	9	-
	5	GND	-	-
MONITOR OUT AES	Pin	Function	Pin	Function
9 Pin D Female 	1	GND	6	EXT_MON_OUT-
	2	EXT_MON_OUT+	7	GND
	3	GND	8	GND
	4	-	9	-
	5	GND	-	-
MONITOR IN ANALOG AUDIO	Pin	Function	Pin	Function
9 Pin D Female 	1	GND	6	MON_IN-R
	2	MON_IN+R	7	GND
	3	GND	8	GND
	4	MON_IN-L	9	MON_IN+L
	5	GND	-	-
MONITOR OUT ANALOG AUDIO	Pin	Function	Pin	Function
9 Pin D Female 	1	GND	6	MON_OUT-R
	2	MON_OUT+R	7	GND
	3	GND	8	GND
	4	MON_OUT-L	9	MON_OUT+L
	5	GND	-	-

Table 27 contains pinout information for the 9 Pin D connectors on the Port 9 Pin D Backplanes.

Table 27. Matrix Port Backplane D Connector Pinouts

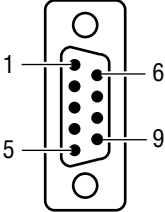
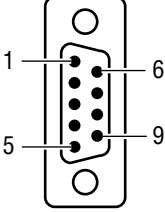
Controlled	Pin	Function	Pin	Function
9 Pin D Female 	1	GND	6	GND
	2	TX-	7	TX+
	3	RX+	8	RX-
	4	GND	9	GND-
	5	Not Used	-	-
Controlling	Pin	Function	Pin	Function
9 Pin D Female 	1	GND	6	GND
	2	RX-	7	RX+
	3	TX+	8	TX-
	4	GND	9	GND
	5	Not Used	-	-

Table 28 contains pinout information for the Input and Output connectors on the Balanced 50 Pin D Analog Audio Backplane.

Table 28. Analog Audio Input/Output 50 Pin D Connector Pinouts

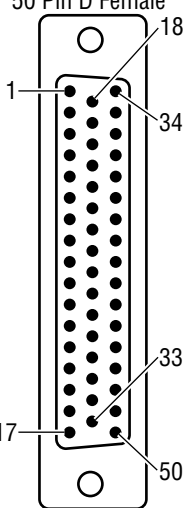
Input/Output D Connector Analog Audio	Pin	Function	Pin	Function	Pin	Function
50 Pin D Female 	1	Ground	18	1A-	34	1A+
	2	1B+	19	1B-	35	Ground
	3	Ground	20	2A-	36	2A+
	4	2B+	21	2B-	37	Ground
	5	Ground	22	3A-	38	3A+
	6	3B+	23	3B-	39	Ground
	7	Ground	24	4A-	40	4A+
	8	4B+	25	4B-	41	Ground
	9	Ground	26	5A-	42	5A+
	10	5B+	27	5B-	43	Ground
	11	Ground	28	6A-	44	6A+
	12	6B+	29	6B-	45	Ground
	13	Ground	30	7A-	46	7A+
	14	7B+	31	7B-	47	Ground
	15	Ground	32	8A-	48	8A+
	16	8B+	33	8B-	49	Ground
	17	-	-	-	50	-

Table 29 contains pinout information for the Input and Output connectors on the Balanced 50 Pin D Digital Audio (AES) Backplane.

Table 29. AES Audio Input/Output 50 Pin D Connector Pinouts

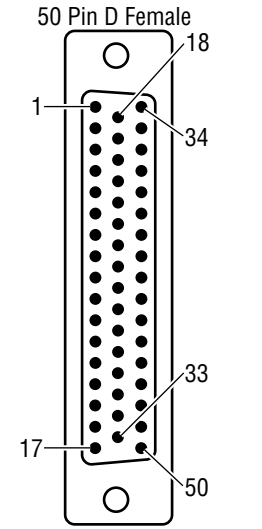
Input/Output D Connector AES Audio	Pin	Function	Pin	Function	Pin	Function
 Use 110 Ohm Shielded Twisted Pair Cable	1	Ground	18	1-	34	1+
	2	2+	19	2-	35	Ground
	3	Ground	20	3-	36	3+
	4	4+	21	4-	37	Ground
	5	Ground	22	5-	38	5+
	6	6+	23	6-	39	Ground
	7	Ground	24	7-	40	7+
	8	8+	25	8-	41	Ground
	9	Ground	26	9-	42	9+
	10	10+	27	10-	43	Ground
	11	Ground	28	11-	44	11+
	12	12+	29	12-	45	Ground
	13	Ground	30	13-	46	13+
	14	14+	31	14-	47	Ground
	15	Ground	32	15-	48	15+
	16	16+	33	16-	49	Ground
	17	-	-	-	50	-

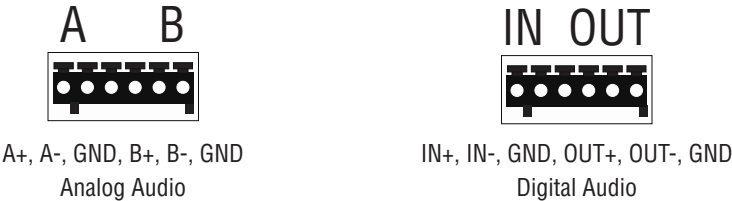
Figure 63 shows the pinouts for Inputs and Outputs using terminal block connectors on the Analog Audio and AES Audio backplanes.

Figure 62. Terminal Block Inputs and Outputs Pinouts



Figure 63 shows the pinouts for Monitoring using terminal block connectors on the Analog Audio and AES Audio backplanes.

Figure 63. Terminal Block Monitor Pinouts



Crosspoint Bus Communications

A Crosspoint Bus is used for communication between the Concerto Routing Matrix and a Jupiter Control System frame. Communications can be established using either **EXT COM 1** (to communicate with the Controller in slot 1) or **EXT COM 2** (to communicate with the Controller in slot 2). One connection can be used as a primary connection and the other can be used as a redundant connection.

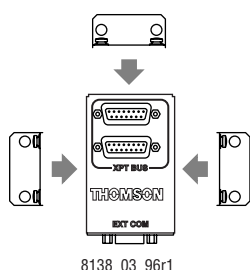
A Concerto matrix that is ordered with a single Crosspoint Bus Controller module will include the following:

- A 9 pin D to 9 pin D cable (for pinouts see [Table 24 on page 81](#)),
- A 9 pin D to 15 pin D adaptor box,

Note The adaptor box comes with a bracket that can be mounted in any of three positions on the box and is mounted on a rack support at the rear of the Concerto Matrix.

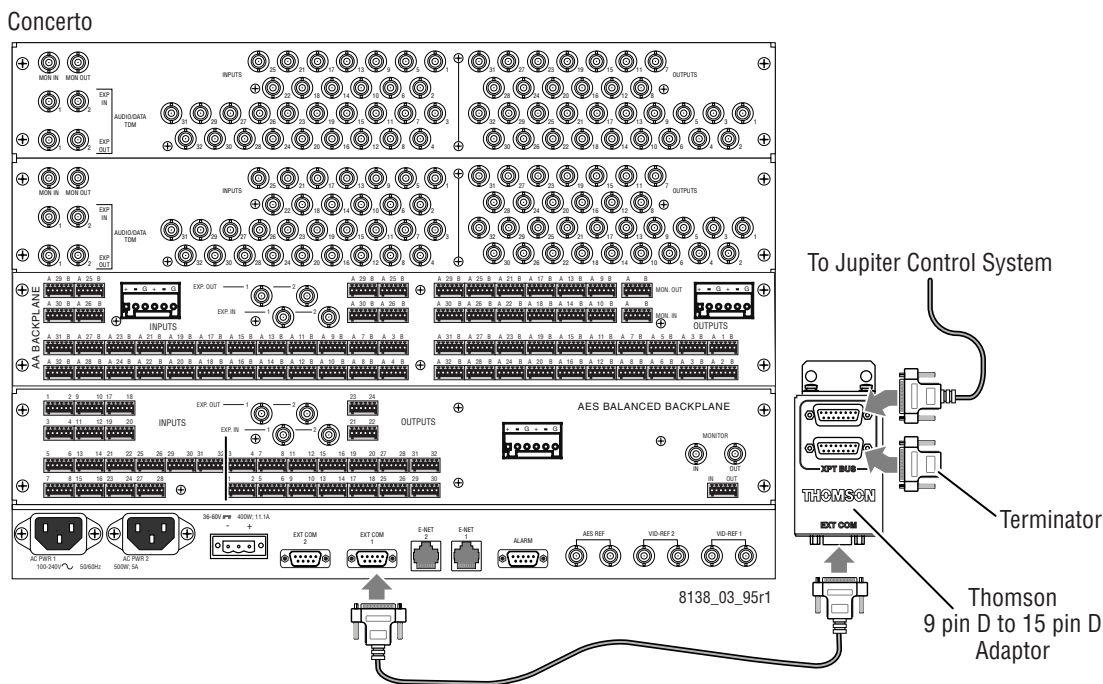
- A 15 pin D terminator, and
- A 15 pin D to 15 pin D cable.

See [Figure 64](#) for cabling of a single non-redundant Crosspoint Bus Controller matrix.



8138_03_96r1

Figure 64. Non-redundant Connection between Concerto and Jupiter



A second Crosspoint Bus Controller module ordered to provide redundancy will include the following:

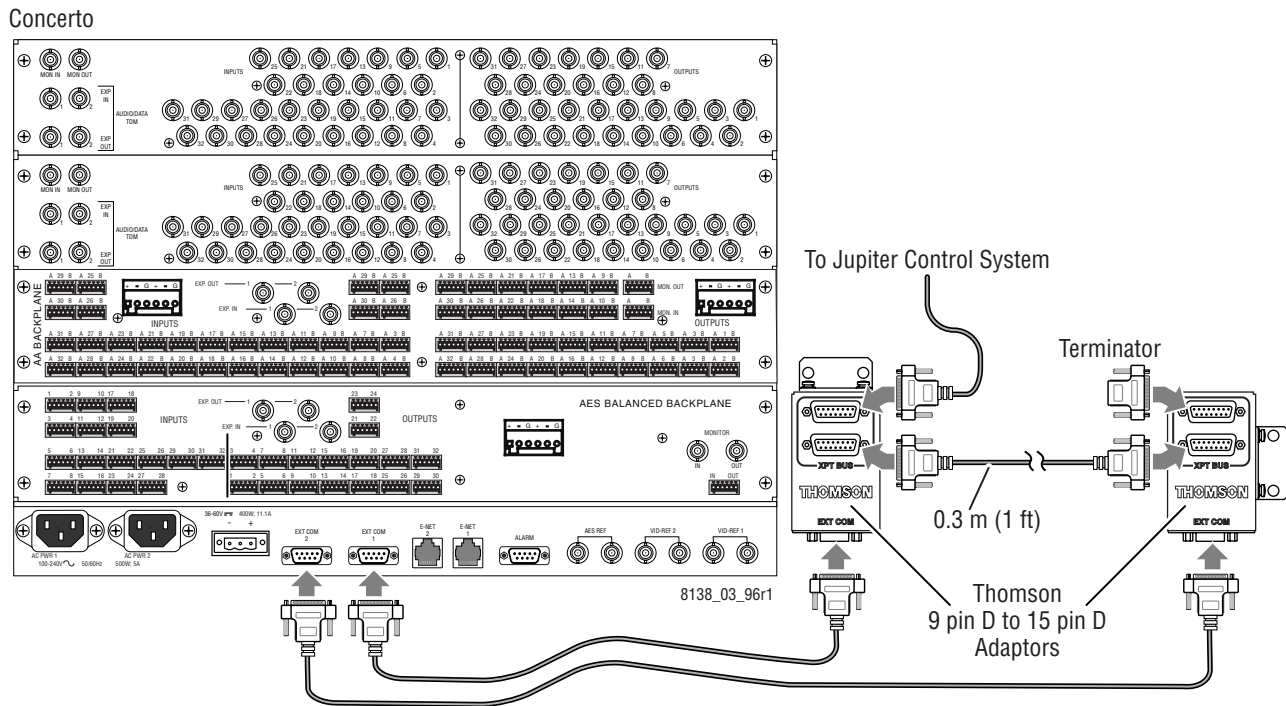
- A 9 pin D to 9 pin D cable (for pinouts see [Table 24 on page 81](#)),
- A 9 pin D to 15 pin D adaptor box, and

Note The adaptor box comes with a bracket that can be mounted in any of three positions on the box and is mounted on a rack support at the rear of the Concerto Matrix.

- A 15 pin D to 15 pin D cable.

See [Figure 65](#) for cabling of a redundant Crosspoint Bus Controller matrix.

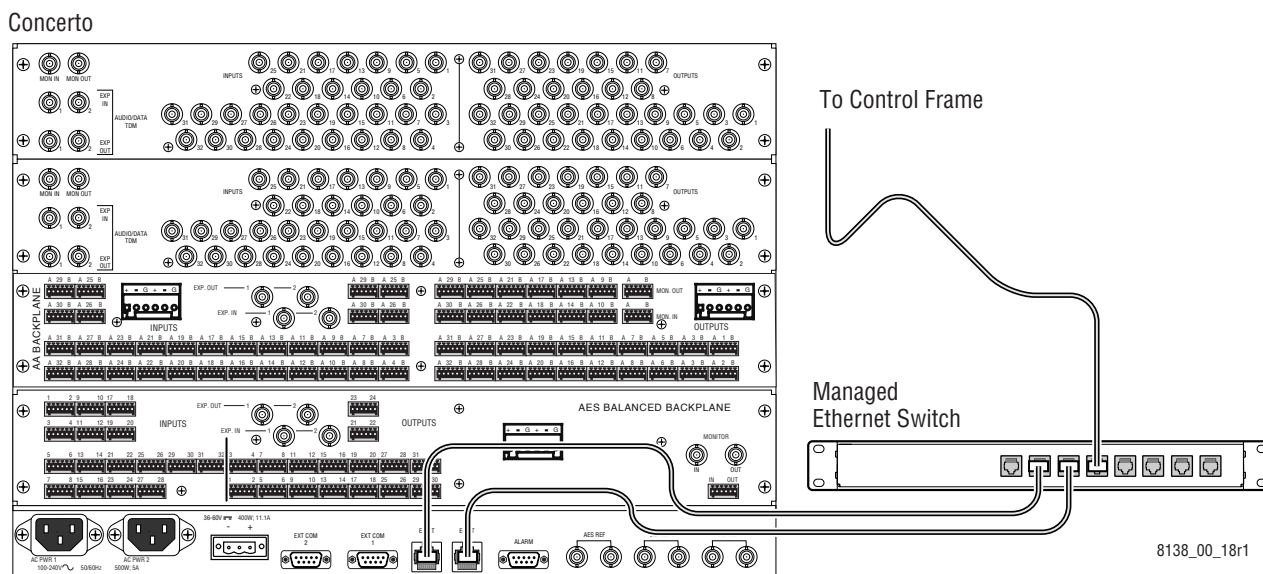
Figure 65. Redundant Connection between Concerto and Jupiter Control Frame



Ethernet Communications

Ethernet is used for communication between the Concerto Routing Matrix and either an Encore or SMS 7000 Control System frame. Communications can be established using either **E-NET 1** (to communicate with the Controller in slot 1) or **E-NET 2** (to communicate with the Controller in slot 2). One connection can be used as a primary connection and the other can be used as a redundant connection. See [Figure 66](#).

Figure 66. Network Connection between Concerto and Control Frame



References

Concerto requires a Video Reference. Most Composite Analog Video Sync signals will work with the exception of 4 Volt and 2 Volt discrete sync signals. Color Black is recommended. To allow time stamped deterministic switching, the Video Reference must contain an embedded Vertical Interval Time Code (VITC) signal.

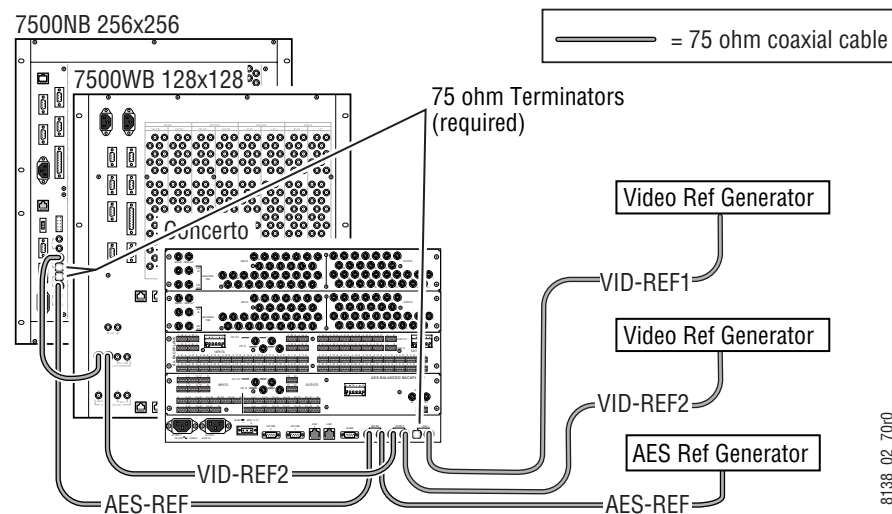
The AES sync reference loop-thru input provides a 48 kHz formatted signal for re-synchronization to frame and block boundaries. The signal is required for the Analog Audio and the Digital Audio (AES) modules to function properly. Lack of this signal will cause the router to add or drop samples.

The Concerto matrix supports multiple independent switch point reference signals. Multiple reference signals support synchronously switching groups of sources with different repetition rates (PAL/NTSC) or offset timing (delay from studios vs. direct feeds).

Reference signals can be routed via loop-thru daisy-chains. The signal originates at a generator. It can then either be directly fed into the Concerto matrix, or routed through a control frame or a matrix frame before connecting to Concerto. In Figure 67 two Video References and an AES Reference are routed to the Concerto frame. Video Reference 1 is terminated at the Concerto frame. Video Reference 2 continues from Concerto to the 7500WB and on to the 7500NB before being terminated at the end of the bus. The AES Audio Reference is routed to the 7500NB where it is terminated. All references used must be terminated at the end of the bus. Unused reference connectors do not need to be terminated.

Note If Concerto is configured with an Audio Module, an AES Audio Reference must be present. In an Audio Expansion Set both matrices have to use the same reference.

Figure 67. Reference Cabling



Monitor Cabling

Monitors are supported for Analog Audio, Digital Audio, Analog Video, and Digital Video modules. Port and TimeCode modules do not have monitor outputs. The physical configuration of the Concerto frame will determine how many and what type of monitoring devices can be connected.

Analog Video Monitoring

Analog Video modules have one backplane, use internal bussing for monitor outputs, and cannot be combined with any other module type. All outputs are available to all Analog Video modules in the same configured matrix. Each backplane has a single BNC **Mon Out**, so the number of modules in the configured matrix will determine the number of Mon Out connectors. A 32x32 configured matrix will have outputs 1-32 available to a single **Mon Out** BNC connector. A 64x64 configured matrix will have outputs 1-64 available to two **Mon Out** BNC connectors. Both outputs are the same and two monitoring devices can display the same Video signal. The **Mon In** connectors are not used. For more information on configured matrix sizes and number of **Mon Out** connectors per matrix see [Analog Video Monitor Configuration on page 60](#)

Digital Video Monitoring

There are two types of Digital Video modules a SD Digital Video and a HD Digital Video. Each of the two modules has its own BNC backplane. These modules use external loop cabling for monitor outputs and the two types of Digital Video can be combined into a configured matrix.

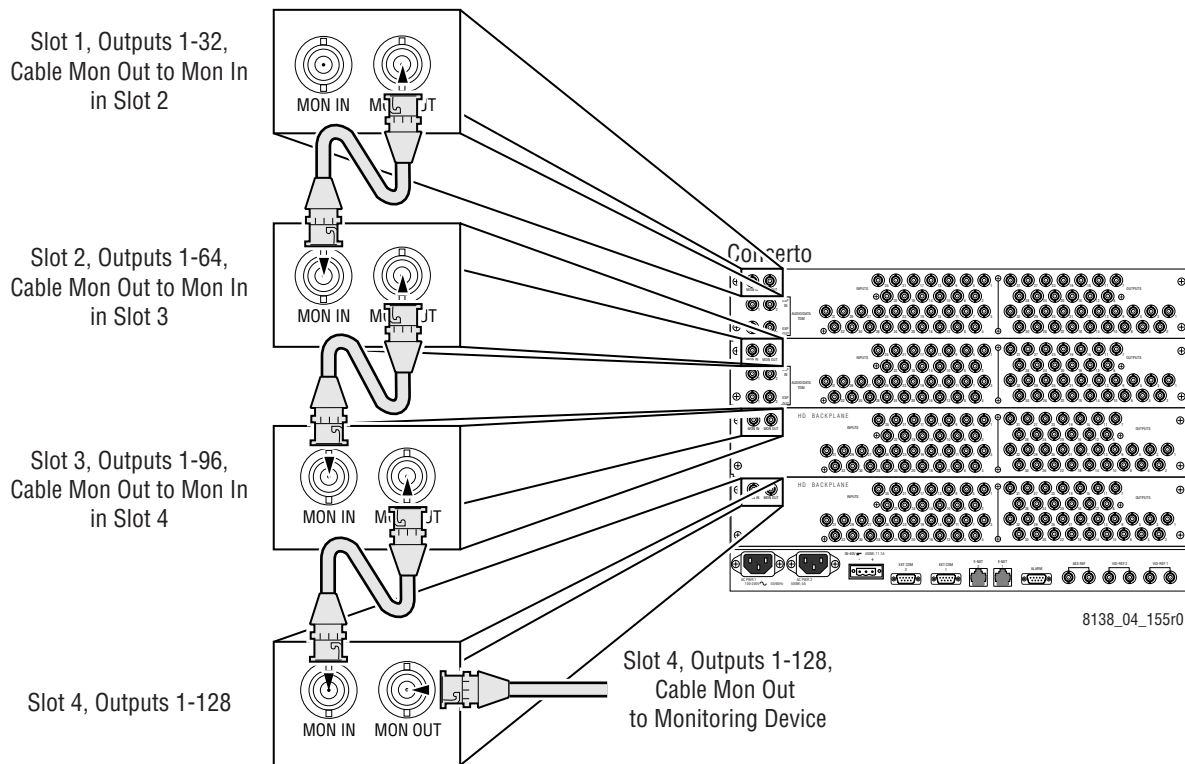
CAUTION The maximum number of HD modules that can be in a Concerto matrix is three and the fourth slot has to remain empty. If two HD modules are used then the other two slots can be loaded with any of the non HD modules.

The preferred hierarchy between SD and HD Video modules in the same configured matrix is to place the SD modules before the HD modules. If you have a frame with two SD modules and two HD modules, place the SD modules in slots 1 and 2, and the HD modules in slots 3 and 4. Then all the SD video signals (outputs 1-64) will be routed to the HD modules (outputs 65-128) making all outputs available to the **Mon Out** BNC connector on the backplane in slot 4. HD signals (1.485 Gbps) can only be routed through HD modules, so if the HD module is before a SD module it will break the chain.

[Figure 68](#) shows the external loop cabling for monitoring in a 128x128 Digital Video configured matrix with two SD modules and two HD modules. On the backplane in slot 1 the **Mon In** BNC connector is not used. A cable is looped from the **Mon Out** BNC connector on the backplane in slot 1 to the **Mon In** BNC connector on the backplane in slot 2. Then a cable is looped from the **Mon Out** BNC connector on the backplane in slot 2 to the **Mon**

In BNC connector on the backplane in slot 3. And a third cable is looped from the **Mon Out** BNC connector on the backplane in slot 3 to the **Mon In** BNC connector on the backplane in slot 4. A cable is then attached to the **Mon Out** BNC connector on backplane 4 and a monitoring device. For more information on configured matrix sizes see [Digital Video Monitor Configuration on page 60](#)

Figure 68. Digital Video External Cabling



Audio Monitoring

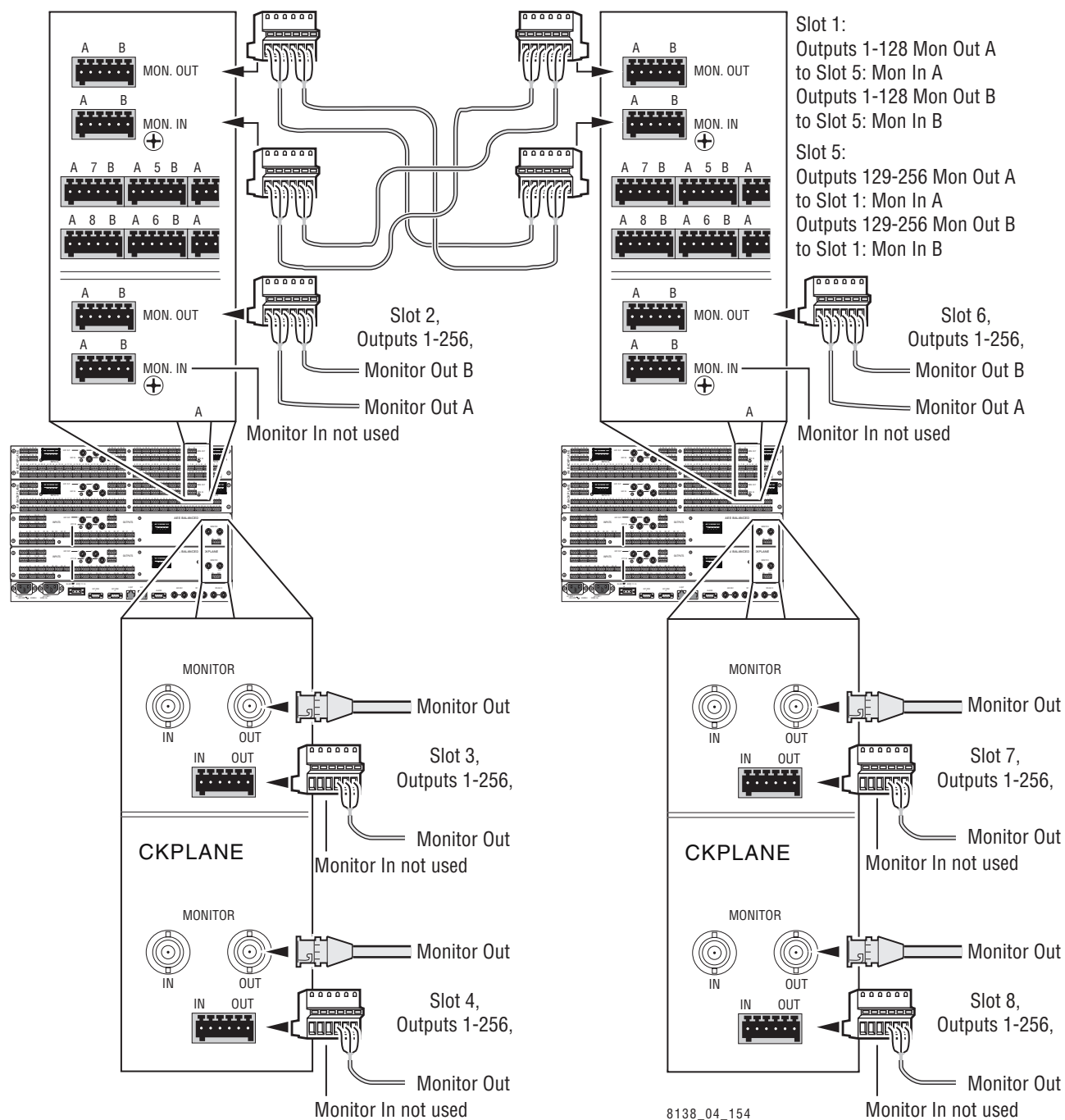
Analog and AES Digital modules can be combined in the same configured matrix, and they use internal bussing to support monitor functions, so all outputs in the matrix are available. **Monitor In** connections are not used. One Destination signal is available to all the **Monitor Out** connectors in the configured matrix. All the backplanes have at least one **Monitor Out** connector. Two of the AES Audio backplanes have two **Monitor Out** connectors. On the AES Terminal Block backplane there is a terminal block **Monitor Out** connector and a BNC **Monitor Out** connector and on the AES 50 pin D backplane there is a 9 pin D **Monitor Out** connector and a BNC **Monitor Out** connector. See [Table 26 on page 82](#) for the 9 pin D connector pinouts used on the 50 pin D backplanes. See [Figure 63 on page 84](#) for the terminal block connector pinouts used on the terminal block backplanes. For more information on configured matrix sizes and number of Mon Out connectors per matrix see [Audio Monitor Configuration on page 61](#)

Expanded Audio System Monitoring

Expanded Audio systems require external looped cables between the two frames for monitoring. You need to connect a cable from a **Monitor Out** connector on a backplane in the base frame to a **Monitor In** connector on a backplane in the expansion frame. And a second cable from the **Monitor Out** connector on the same backplane on the expansion frame to the **Monitor In** connector on the backplane in the base frame. You can use any of the available connector types and any of the available backplanes. [Figure 69](#) shows an expanded 256x256 system, using the terminal block connectors on the backplanes in slots 1 and 5. The connectors could be used on any of the backplanes. Since all Outputs are available to all monitor connectors on each frame it does not matter which two backplanes are used as long as it is one in the base frame and one in the expansion frame. It is recommended that you use the same backplanes to connect the two frames for monitoring as you use for the Master TDM. In [Figure 69](#) the recommended cabling is shown.

One Destination signal is available to all the **Monitor Out** connectors in the configured matrix. All the backplanes have at least one **Monitor Out** connector. Two of the AES Audio backplanes have two **Monitor Out** connectors. On the AES Terminal Block backplane there is a terminal block **Monitor Out** connector and a BNC **Monitor Out** connector and on the AES 50 pin D backplane there is a 9 pin D **Monitor Out** connector and a BNC **Monitor Out** connector. See [Table 26 on page 82](#) for the 9 pin D connector pinouts used on the 50 pin D backplanes. See [Figure 63 on page 84](#) for the terminal block connector pinouts used on the terminal block backplanes. For more information on configured matrix sizes and number of Mon Out connectors per matrix see [Expanded Audio Monitor Configuration on page 64](#).

Figure 69. Monitor Cabling in Expanded Audio Systems



Power

Frames may be powered using either an AC power source, or a 48V DC power source. It is also possible to cable a matrix using an AC power source and a 48V DC power source at the same time. If a matrix has both AC and DC power sources available it will use whichever power source has the higher voltage. So if the AC power source fails then the DC power source would feed the matrix, and if the DC power starts to fall the AC power would feed the matrix. AC and DC power sources are kept separate with no feedback, so the AC power source will not charge batteries used in a connected DC power source.

AC Connections

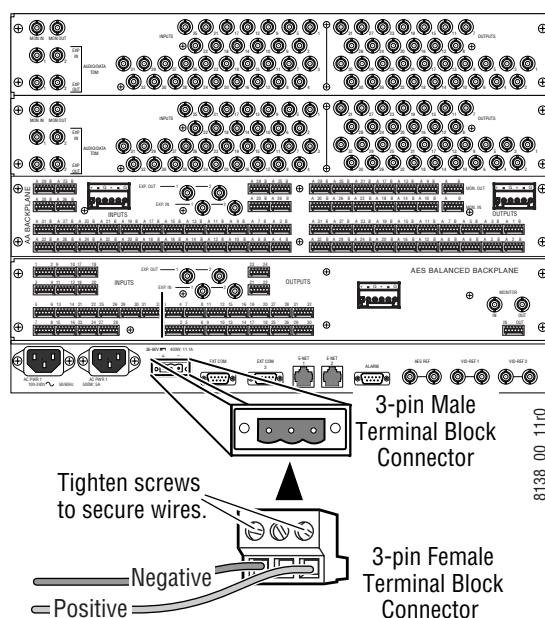
The matrix frame comes with one power supply. Redundancy is provided by adding an additional power supply.

48V DC Connections

WARNING Do not apply a 48V DC power source until all 48V DC connections on the matrices are complete and secure.

The 48V DC connection requires 12 AWG (3.31 mm²) wire and a 3-pin female terminal block connector. See [Figure 70](#).

Figure 70. 48V DC Connection



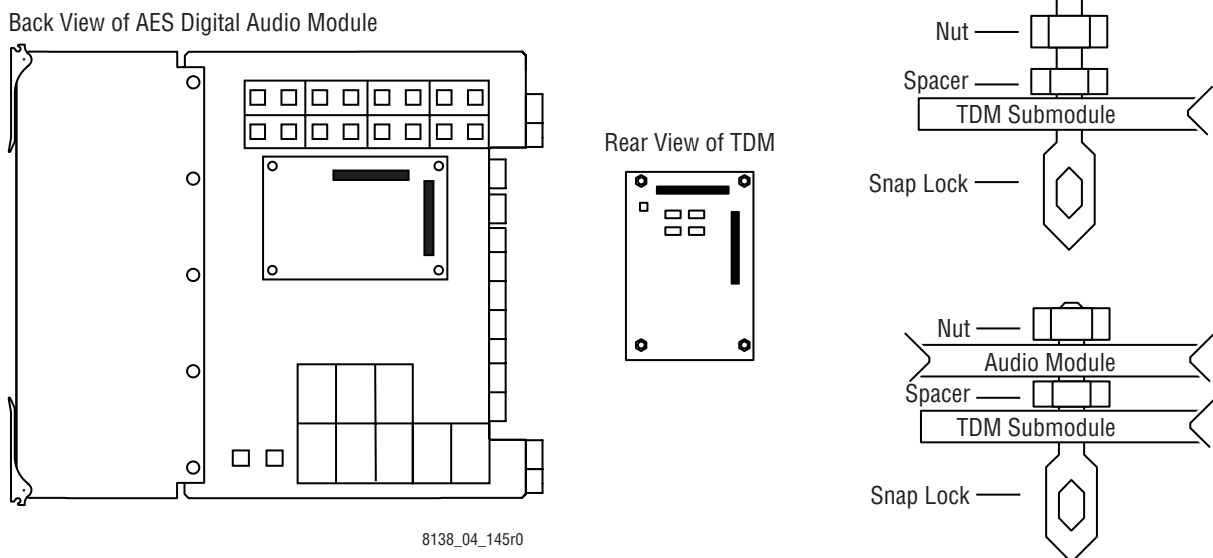
Option Installation

Expansion TDM Submodule Installation

If you want to add a TDM submodule to an Audio module that you already have, or you decide that you want to put the TDM submodule on an AES Digital Audio module instead of an Analog Audio module, or vice versa, use this installation procedure.

1. Inspect the TDM submodule.
2. Lift the ejector tabs on the front of the Audio module.
3. Pull the module gently to disengage it from the backplane.
4. Slide the module out of the frame.
5. Use anti-static precautions to protect the module.
6. Place the module on a padded surface, so that the back side of the module is facing up. See [Figure 71](#).
7. Remove the four nuts from the TDM submodule, set aside.
8. Seat the TDM on the Audio module by aligning the connectors on the back of the TDM submodule with the connectors on the back of the Audio module. See [Figure 71](#), the four plastic pins on the TDM submodule will match up with the four holes on the Audio module.

Figure 71. TDM Submodule Installation



Note The installation for Analog Audio and AES Digital Audio modules is the same.

- 9.** Secure the TDM submodule to the Audio module by finger tightening the four nuts to the submodule on the front side of the Audio module. See [Figure 71](#), the Audio module will be on the plastic pin between the spacer and the nut.
- 10.** Align the Audio module in the appropriate frame slot.
- 11.** Slide the module into the frame.
- 12.** Gently push the module to engage the backplane.
- 13.** Close the ejector tabs.

Repeat this procedure for installing each of your TDM submodules.

Control System Configuration

The Concerto Routing Matrix can connect to different control systems using either Crosspoint Bus or Ethernet buses. Control using a Crosspoint Bus interface requires DIP Switch and Rotary Switch settings. Control using an Ethernet interface requires IP address configuration.

This section covers the IP settings, switch settings, and specific configuration items that Concerto requires to be controlled. General configuration areas that apply to all matrices connected to a control system are covered in the User or Configuration Manuals for the control system.

Controllers

All of the Concerto Controllers can communicate via Ethernet. The CRS-MC-C2 module communicates via Ethernet or Crosspoint Bus based on the configuration of the Control **MODE/IN SEL** DIP Switch.

Control Mode/In Sel Setting

On the CRS-MC-C2 Controller module, DIP Switch bank S11 (**MODE/IN SEL**) determines the control system interface. If this bank is configured for Ethernet (field or frame switching rate) control, then all of the other DIP Switches and Rotary Switches are bypassed and the controller uses Ethernet to communicate. If this bank is set for Crosspoint Bus (field or frame switching rate) control, then all of the other DIP Switches and Rotary Switches are used to configure the Concerto matrix.

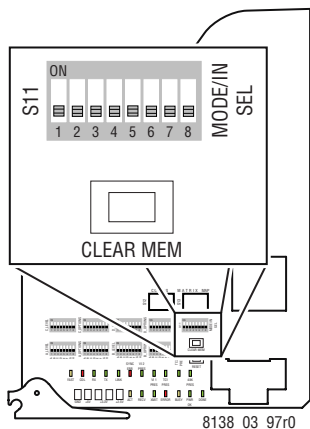


Table 30. Bank S11 DIP Switch Settings for Control Mode

Control Mode In	Control System	Switching Rate	Switch Settings ^a			
			#1	#2	#3	#4
Crosspoint Bus	Jupiter	Field	OFF	OFF	OFF	ON
		Frame	ON	OFF	OFF	ON
Ethernet	SMS 7000	Field	OFF	OFF	OFF	OFF
	Encore	Frame	ON	OFF	OFF	OFF

^a Switches #5 through #8 are for Factory Use and must be set to OFF for normal operation.

Ethernet Interface

Factory default IP addresses for either the 10Base-T controller or the 10/100Base-T Controller are set for Encore installations. For that reason, it's possible that you could configure a Concerto using the default IP addresses with an Encore Control System. The IP addresses have to be changed on the controllers before they will interface with the SMS 7000 Control System.

CAUTION If you are using a CRS-MC-C2 Controller module, the mode setting on DIP Switch bank S11 must be set correctly before it will communicate using Ethernet. See [Control Mode/In Sel Setting on page 97](#).

Before you change the IP addresses on Concerto, you should complete any software updates that are available for the control system you will be using to configure Concerto. You can update Concerto's software using Net-Config after the settings on Concerto are complete.

The following information is required:

- The IP address(es) you want for each Matrix Controller (and backup if you have one) so that they can be uniquely addressed on your network,
- The IP address of your gateway (if you have one), and
- The IP address of the Control System, (MCPU and backup MCPU for SMS 7000 or the System Control Processor for Encore).

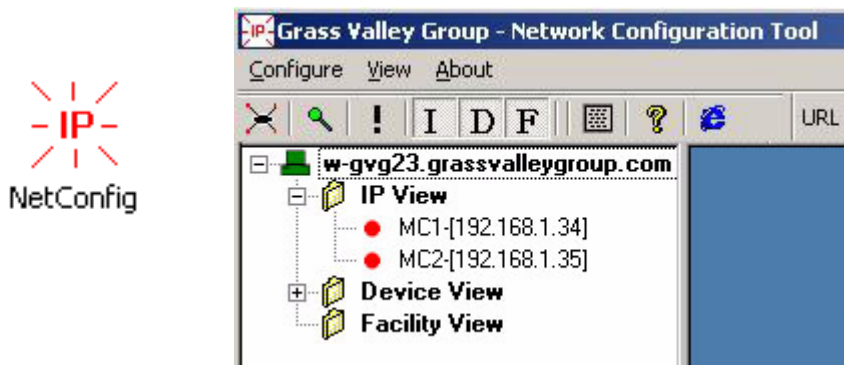
NetConfig

The NetConfig application is used to change IP addresses and load software to devices on a network.

IP Address Settings

1. Double-click on the NetConfig icon to launch NetConfig (see [Figure 72](#)). The main NetConfig window will appear.

Figure 72. Matrix Controllers IP Address



2. Select **Device IP Addresses** on the **Configure** menu to access the **Change IP Addresses** window.
3. Change Concerto's Controller Module IP setting(s) to the same subnet as your Control System (See [Figure 73](#)). For details on using NetConfig for these procedures, see the *NetConfig Instruction Manual*.

Figure 73. Change IP Addresses

Type	N...	IP Address	MAC Address	Subnet Mask	Gateway	Online?
☒	Matrix MC1	192.0.2.34	00-b0-09-00-3c-e6	255.255.255.0	192.0.2.1	NO
☐	Matrix MC2	192.168.1.35	00-b0-09-00-3c-e5	255.255.255.0	192.168.1.1	NO

After you've made these changes to Concerto IP settings you'll be able to communicate fully with the Concerto via Ethernet and able to make additional setting changes via NetConfig and/or the Control System.

You can review your Concerto settings or make any changes NetConfig supports by selecting your Concerto in NetConfig's IP or Device views and then using the pages in the Browser views illustrated in [Figure 74](#) and [Figure 75](#).

Figure 74. Read Only

Concerto Matrix Description	Matrix Controller Factory Defaults
Matrix System: Concerto	Matrix Device Name: Matrix1
Matrix Device Name: Matrix1	
Matrix Type: 67 Type Name: MCRT04_	
Matrix Programmed Type: 0	
Current Matrix Ethernet Status: Comm OK, Primary	
Controller Ethernet MAC address: 00:b0:09:00:3c:e5	
Matrix Application Software Version: V1.6.0a9 - Sep 18 5:21:00 2002	
Matrix Application Loader Software Version: 0.0.0 a not created yet	
Matrix Boot Software Version: 1.0.1 - 5272 mtrxC	
Matrix Hardware Information	
Controller Module Description:	
10/100BaseT ethernet	
MtxC 671-6434-00a1	
This is a read only page, however, the above "Matrix Device Name" can be revised on the following pages.	
	Factory Default Network Configuration
	Ethernet IP: 192.168.1.136
	Subnet Mask: 255.255.255.0
	Gateway IP: 192.168.1.1
	Host Server Ethernet IP: 192.168.1.2
	Host 2nd Server Ethernet IP: 0.0.0.0
	Server Port Number: 6050
	Server Port Type: UDP
	Max Router Hops (Multicast): 2
	Online Poll Time out seconds: 4
	Factory Default System Configuration
	Console Baud Rate: 115200
	EXT COM Serial Port Baud Rate: 115200
	EXT COM Serial Port Parity: 0

Matrix Description

Factory Default

Figure 75. Setting Views

Matrix Controller System Configuration	Concerto Matrix Network Configuration
Matrix Device Name: Matrix1	Matrix Device Name: Matrix1-104
Console Baud Rate: 115200 Range 9600 to 115200 (parity=none,databits=8,stopbits=1)	
EXT COM Serial Port Baud Rate: 115200 Range 300 to 115200	
EXT COM Serial Port Parity: 0 0=None, 1=Odd, 2=Even	
	Current Settings
	Ethernet IP: 192.0.2.104
	Subnet Mask: 255.255.255.0
	Gateway IP: 192.0.2.1
	Host Server Ethernet IP: 192.0.2.101
	Host 2nd Server Ethernet IP: 192.0.2.105
	Server Port Number: 6050
	Server Port Type: UDP
	Max Router Hops (Multicast): 2
	Online Poll Time out seconds: 4

Matrix System

Matrix Network

Software Updates

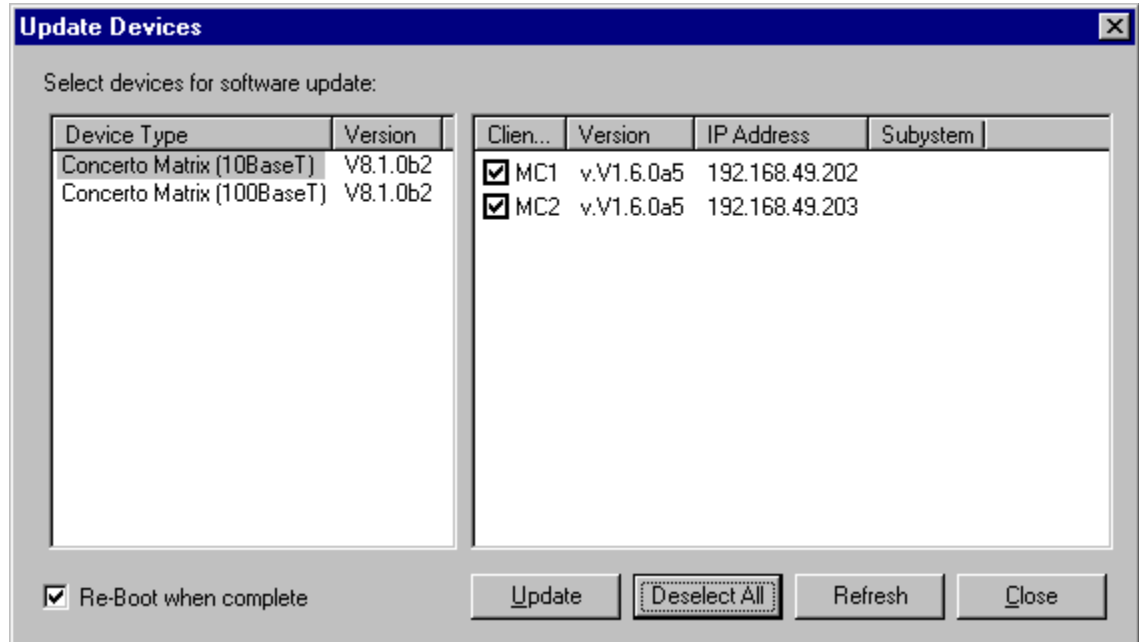
When you're ready to update Concerto's software, follow these steps.

CAUTION This procedure will take your Concerto(s) off line during the final step.

1. Ensure that the PC you're using is connected to the same network as your Concerto.
2. Launch NetConfig and select your Concerto in either the IP or Device view in the left pane of NetConfig's main window.

3. Choose **Update Device Software** on the **Configure** menu.
4. When the Update Devices dialog box (Figure 76) appears, select the appropriate Ethernet speed for your network and devices.

Figure 76. The Update Devices Dialog Box



5. When your Concerto(s) appear in the right pane, click the **Select All** button.

Note Unpredictable system behavior is likely if different versions of the software are running in your installation.

6. Ensure that the **Re-Boot when complete** checkbox is checked and click the **Update** button.
7. Verify that the correct software version is now loaded using the Concerto Matrix Description window. See [Figure 74 on page 100](#).
8. Exit NetConfig. Your Concerto changes are complete.

SMS 7000 Control System Configuration

Most of the Concerto configuration procedures are the same as for earlier Grass Valley matrices. This section covers only those procedures which are unique to, or required by Concerto. Concerto-specific procedures are covered here in the order you would create a configuration. See the *Series 7000 Configuration Manual* for details about the other configuration steps and procedures.

Configured Node Controller

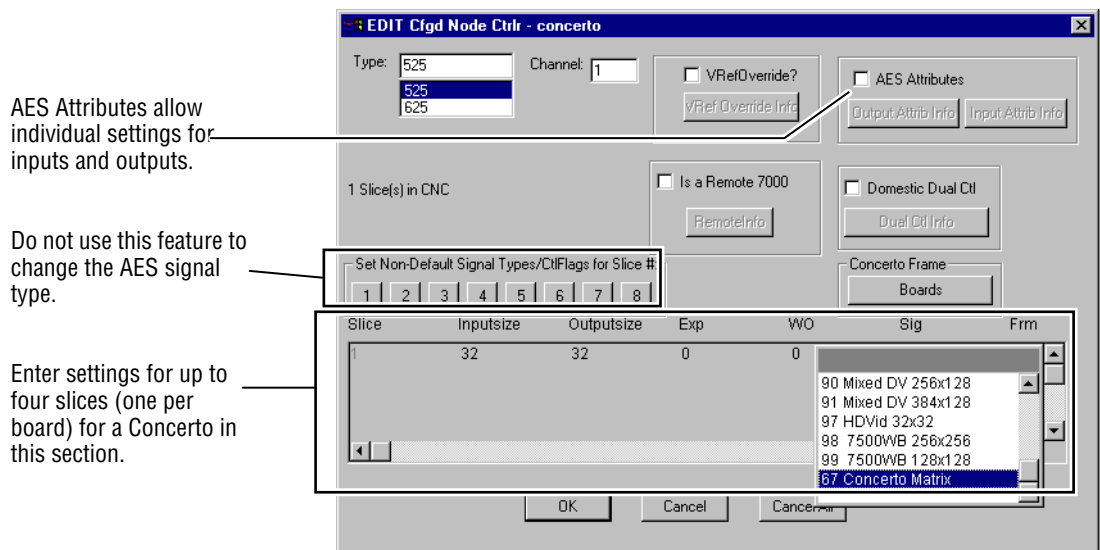
After setting **Enables** and **Limits**, begin configuring a Node Controller by choosing **Node Controllers** on the **Setup** menu. Step through the various settings documented in the Node Controller Configuration section of the *Series 7000 Configuration Manual*.

Only one configured node controller is used per frame, regardless of the number of signal types in that frame. Create a slice for each physical matrix. If you are creating a slice that contains Analog Audio and Digital Audio modules use the signal type of Digital Audio for the slice, then set the individual output signal type to Analog Audio for the analog outputs.

Remember that for the Concerto, **Inputsize** and **Outputsize** must be in multiples of 32 and can not exceed 128, **Exp** must always be set to 0 (no expansion), and **W/O** must always be set to 0 (outputs 1-128). Ensure that you specify a **Sig(nal)** type appropriate for the Concerto board(s) in the slice you're configuring.

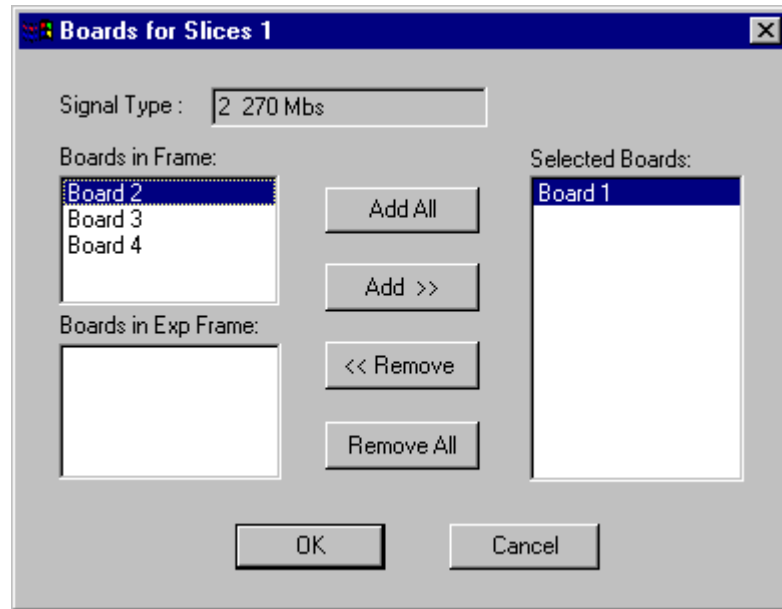
When choosing the Frame type for a Concerto, scroll to the bottom of the drop down list under the **Frm** column and double-click frame option **67 Concerto Matrix** (Figure 77). The drop down list may not be in numerical order.

Figure 77. Choosing the Concerto Frame



Specifying the Concerto Matrix frame type enables the **Concerto Frame Boards** button above the **Frm** column. Click the number in the **Slice** column to select the slice you're configuring. Then click the **Boards** button to open the **Boards for Slices *n*** dialog box (Figure 78).

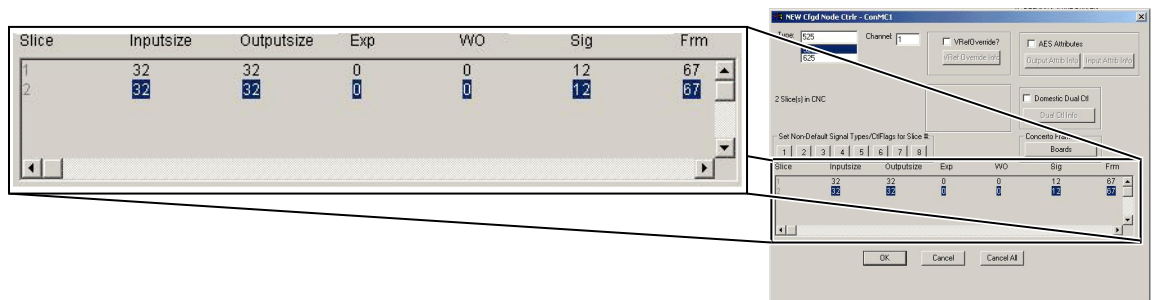
Figure 78. Boards for Slices Dialog



In the **Boards in Frame** column on the left, select the board(s) you want in this slice. All of the boards in a slice must be contiguous and compatible, but not necessarily identical (Analog Audio and Digital Audio modules can be in the same slice, also Digital Video and HD Video can be in the same slice). Click the **Add >>** button or use the **Add All** button as appropriate. For more information on slices and the types of boards that can be included in a slice, see [Optimum Matrix Configurations](#) on page 22. You can also use the **Remove** buttons to change your mind. The **Boards in Exp Frame** section of this dialog is reserved for future use. Click the **OK** button to finalize your choices.

A slice must be created for each signal type. To create additional slices click on the first column to highlight it (see Figure 79), then press **i** to insert a row, **a** to append a row, or **d** to delete a row.

Figure 79. Managing Slices



AES Attributes

This section contains information for the AES Attributes as they are configured using a SMS 7000 GUI. Encore settings are slightly different but the underlying principles are the same.

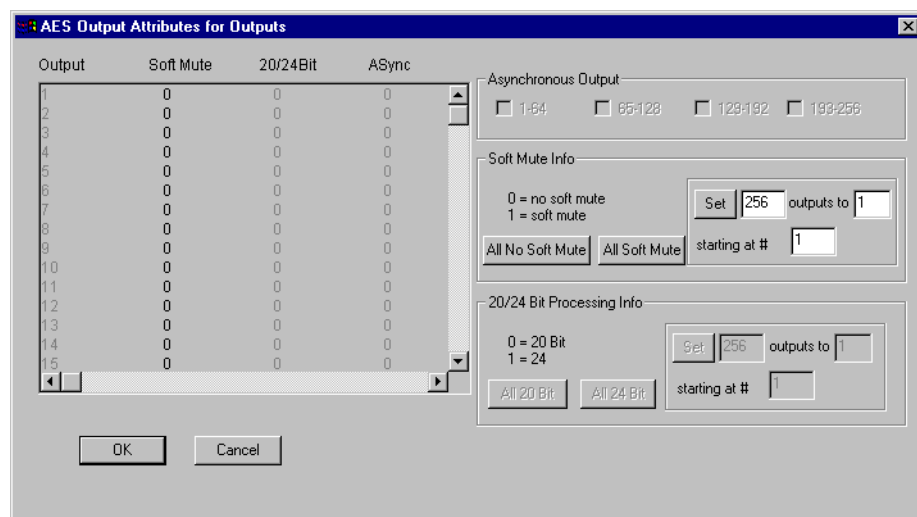
The **Output Attrib Info** and **Input Attrib Info** buttons are enabled when there is a check in the **AES Attributes** box. Some of these attributes require Concerto-specific settings.

AES Output Attributes

1. Click the **Output Attrib Info** button to access the settings for output attributes. Use this dialog to set the outputs individually or in groups.

Note **Asynchronous Output** (or input) is not supported by Concerto.

Figure 80. AES Output Attributes Dialog



Outputs can be assigned **Soft Mute/No Soft Mute** individually, in groups, or by using the **All** buttons. The **Soft Mute/No Soft Mute** attribute is a soft mute or alignment of one signal's amplitude to another signal's amplitude at switching. Some users call this audio dunking. Soft mute prevents a crack or pop at switching.

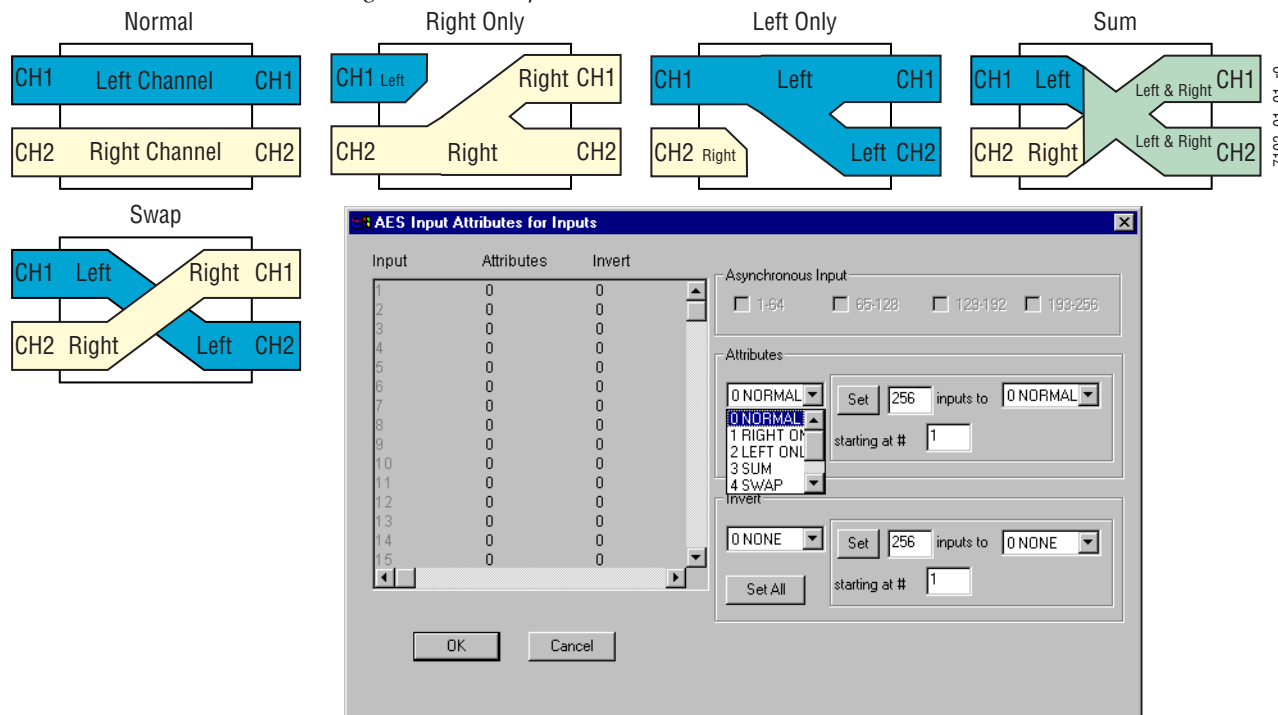
Note The 20/24 Bit attribute is not supported by Concertos controlled by SMS7000.

2. When you've finished assigning Output attributes click **Ok** to finalize your settings.

AES Input Attributes

1. Click the **Input Attrib Info** button to open the AES Input Attributes dialog.

Figure 81. AES Input Attributes



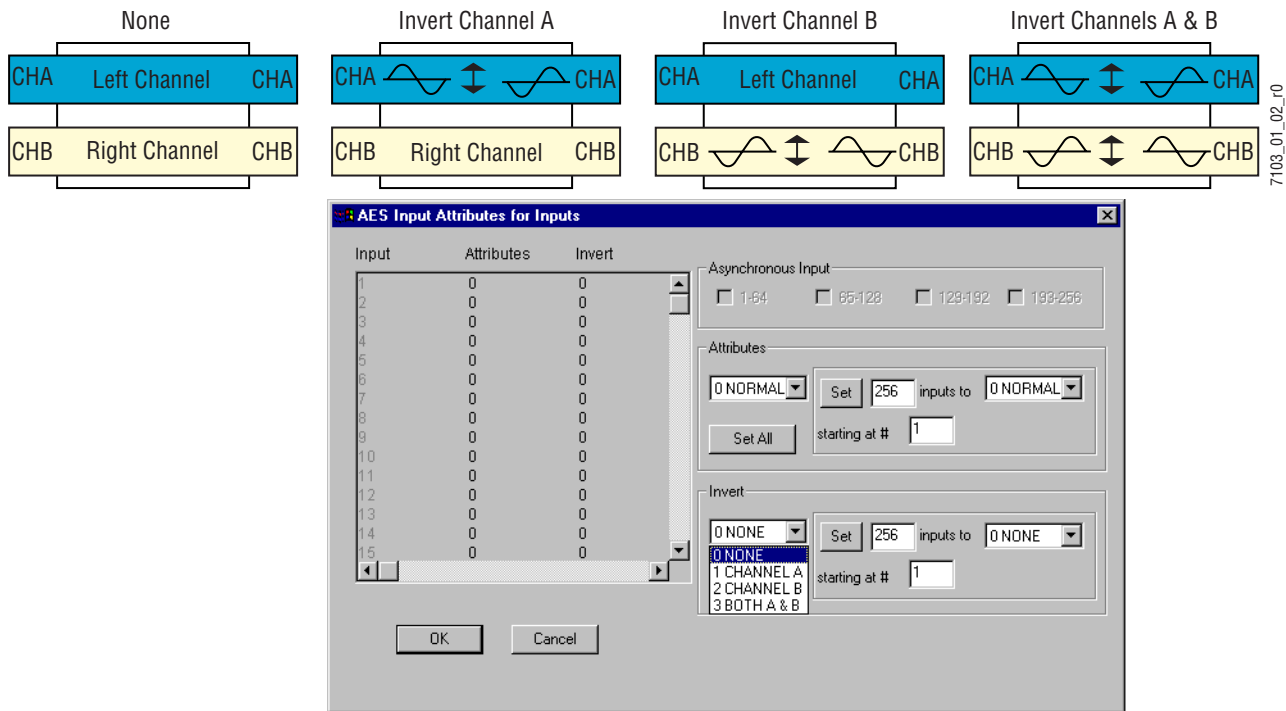
Use this dialog to assign Attribute and Invert options individually, in groups, or by using the **All** buttons. **Asynchronous Input** (or output) is not supported by Concerto.

Attributes affect the way signals are routed through a matrix. [Table 31](#) defines how each setting affects the signals.

Table 31. AES Input Attribute Options

Attribute	Definition	100 Hz (Right)	1000 Hz (Left)
0 Normal	Defaults are assigned to all Inputs.	100 Hz	1000 Hz
1 Right Only	Right Channel Audio will be routed to the assigned Input.	100 Hz	100 Hz
2 Left Only	Left Channel Audio will be routed to the assigned Input.	1000 Hz	1000 Hz
3 Sum	Frequencies of the Right and left Channel are added together.	1000 Hz +100 Hz	1000 Hz +100 Hz
4 Swap	Left and Right Channels are swapped.	1000 Hz	100 Hz
5 Bypass	Not supported by Concerto configurations.		
6 Async	Available only for 7500 matrices.		
7 Mute	AES silent output. Available only for Concerto.		

Figure 82. AES Input Inverts



Invert options assign the invert (opposite logic state) of the signal to an Input using the settings in [Table 32](#).

Table 32. AES Invert Options

Attribute	Definition
0 None	Signal is not changed.
1 Channel A	Channel A audio is inverted.
2 Channel B	Channel B audio is inverted.
3 Both A & B	Channel A and Channel B audio is inverted.
Async	Asynchronous signals are routed in 7500 matrices. Not supported by Concerto.

2. After assigning the Input attributes, click **OK** to finalize your settings.

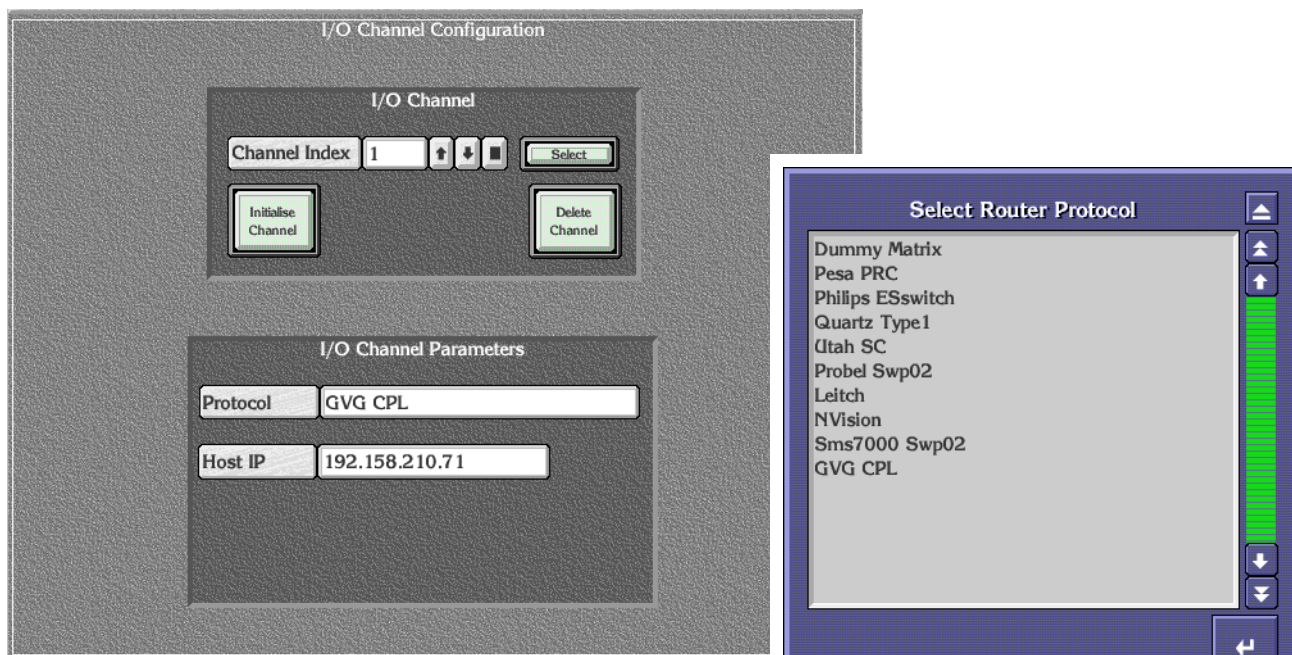
Encore Control System Configuration

Matrix configuration procedures are dependent upon how the matrix fits within its resident system and how that system is controlled. If you are using an Encore Control System you will generally need to follow the instructions for matrix configuration found in the *Encore User Manual*. In some cases, however, you must use specific settings. This section highlights those distinctions.

CAUTION If you are using a CRS-MC-C2 Controller module, the mode setting on DIP Switch bank S11 must be set correctly before it will communicate using Ethernet. See [Control Mode/In Sel Setting on page 97](#).

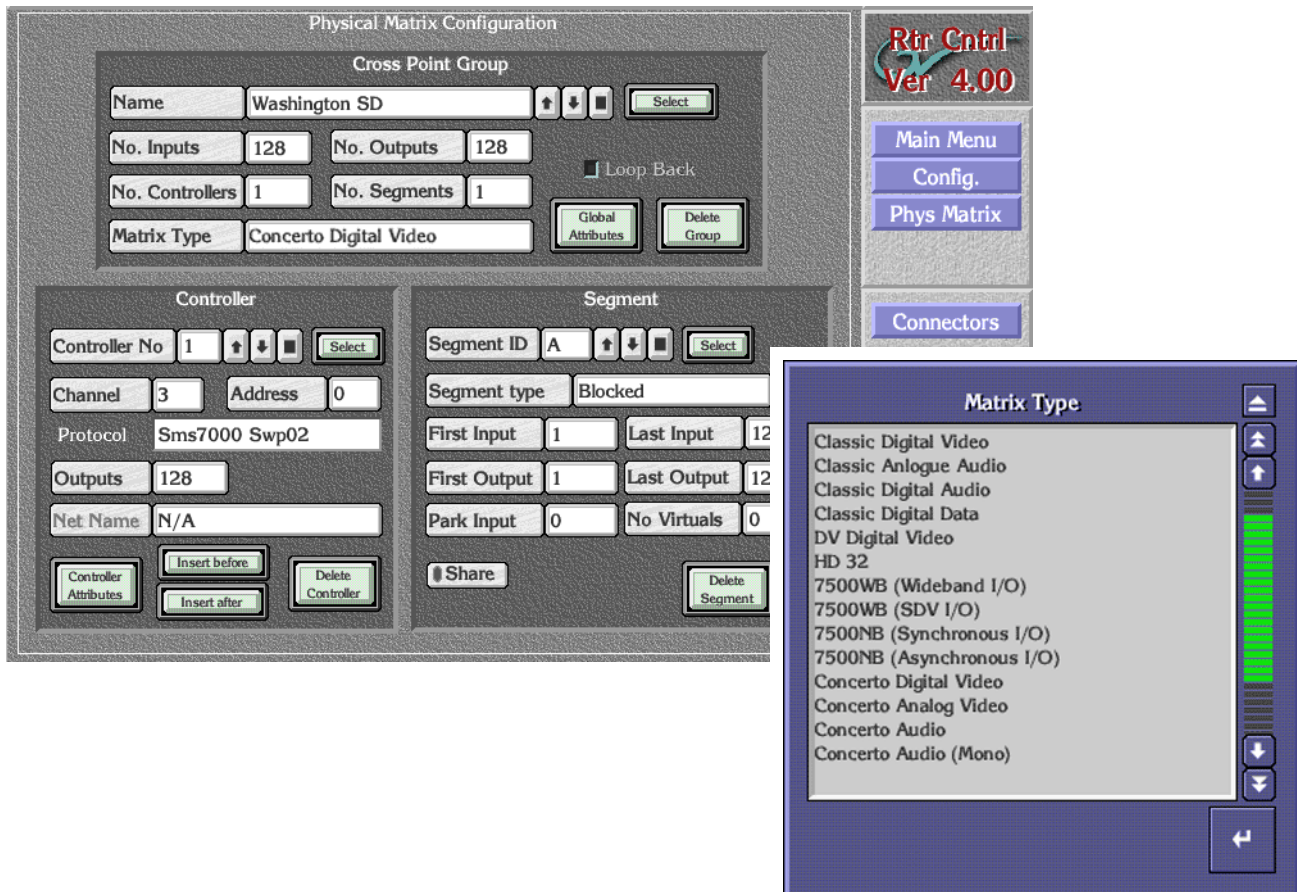
Use the GVG CPL Protocol for Concerto matrices.

Figure 83. Router Protocol



If a Concerto frame contains a mixed-format board set, a different Cross-point Group must be defined for each format. The same controller is used for all, but there are controller attributes that relate a specific Crosspoint Group to specific boards in the Concerto frame.

Figure 84. Matrix Type



Jupiter Crosspoint Bus Controller Configuration

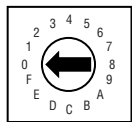
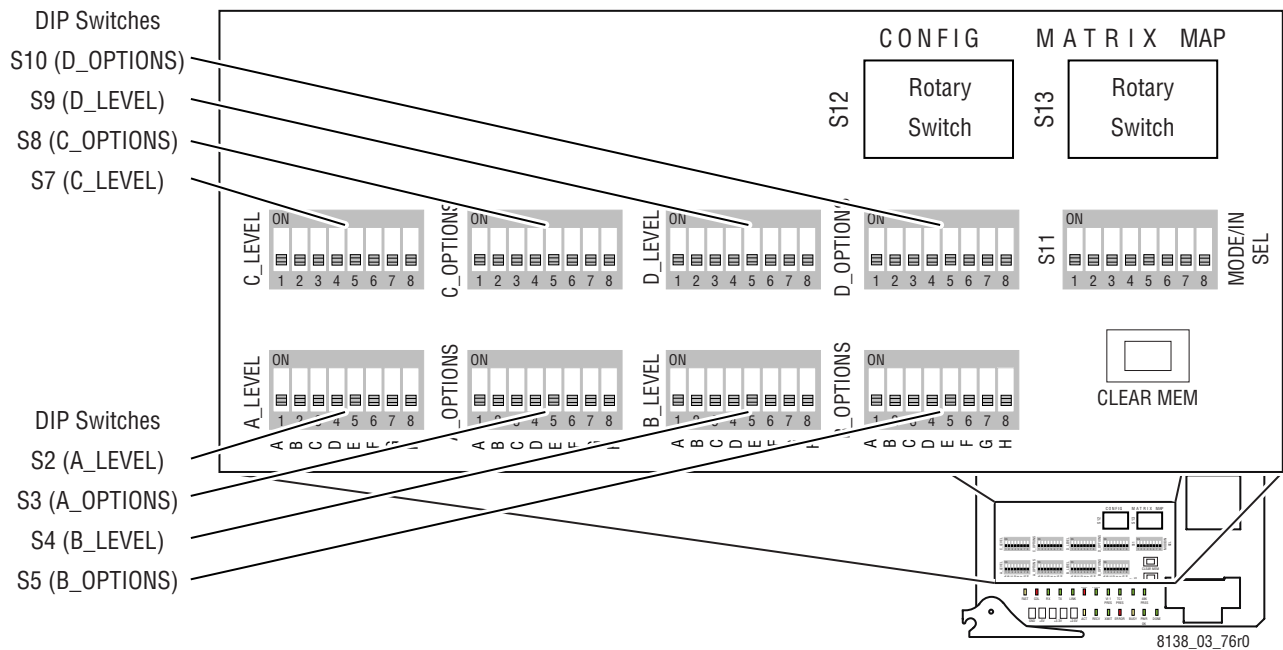
If you are using a Jupiter Control System you will need to follow the instructions for matrix configuration found in the *Jupiter Installation and Operating Manual*. The Crosspoint Bus Controller (CRS-MC-C2) requires specific settings. This section highlights those distinctions.

CAUTION If you are using a CRS-MC-C2 Controller module, the mode setting on DIP Switch bank S11 must be set correctly before it will communicate the Crosspoint Bus. See [Control Mode/In Sel Setting on page 97](#).

Crosspoint Bus Controller Settings

On the CRS-MC-C2 there are nine banks of DIP Switches (8 position with J leads) and two Rotary Switches, see [Figure 85](#).

Figure 85. Crosspoint Bus Controller Switch Locations



Each bank has 8 DIP Switches with On and Off settings. The banks are labelled with the DIP Switch position #1 through #8 and **ON**. There are only two settings for each position, On or Off. The Rotary Switches have sixteen positions #0 through #F which are labelled on the face of the switch. The Rotary Switches face toward the LEDs on the module.

Before you can configure the Rotary and DIP switches you need to determine the physical configuration of the Concerto Matrix. Refer to [Optimum Matrix Configurations on page 22](#) to identify supported module configurations.

CAUTION The maximum number of HD modules that can be in a Concerto matrix is three and the fourth slot has to remain empty. If two HD modules are used then the other two slots can be loaded with any of the non HD modules.

CRS-MC-C2 Configuration

- 1. Verify that DIP Switch bank S11 is configured for Jupiter Control, see [Control Mode/In Sel Setting on page 97](#).
- 2. Set Rotary Switch S12 for matrix size.

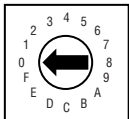


Table 33 identifies the setting for Rotary Switch S12. This setting identifies the number of levels and matrices per frame. If you want to have more inputs and outputs available then you would use fewer levels (128x128 video). If you want more levels then you would use smaller matrices (32x32 Audio Left and 32x32 Audio Right).

Table 33. S12 Rotary Switch Settings for Matrix Configuration

						Levels	# of Matrices	# of Modules	Matrix Size	Slot #	Setting ^a
CONFIG MATRIX MAP S12 S13 S7 S8 S9 S10 S11 S2 S3 S4 S5 CLEAR MEM	Single level						1	1	32x32	Any	7
								2	64x64	1 & 2	2 or 5
								2	64x64	2 & 3	6
								2	64x64	3 & 4	2 or 4
								3	96x96	1, 2, 3	3
								3	96x96	2, 3, 4	1
								4	128x128	All	0

Table 33. S12 Rotary Switch Settings for Matrix Configuration - (continued)

					Levels	# of Matrices	# of Modules	Matrix Size	Slot #	Setting ^a
CONFIG MATRIX MAP S12 S13 S7 S8 S9 S10 S11 S2 S3 S4 S5 CLEAR MEM Two levels					2	2	32x32	Any	7	
							32x32			
						3	32x32	1	6	
							64x64	2 & 3		
						3	32x32	1	4	
							64x64	3 & 4		
						3	32x32	2	4	
							64x64	3 & 4		
						3	64x64	1 & 2	5	
							32x32	3		
						3	64x64	1 & 2	5	
							32x32	4		
						3	64x64	2 & 3	6	
							32x32	4		
						4	64x64	1 & 2	2	
							64x64	3 & 4		
						4	32x32	1	1	
							96x96	2, 3, 4		
						4	96x96	1, 2, 3	3	
							32x32	4		
Three levels					3	3	32x32	Any	7	
							32x32	Any		
							32x32	Any		
						4	32x32	1	4	
							32x32	2		
							64x64	3 & 4		
						4	32x32	1	6	
							64x64	2 & 3		
							32x32	4		
						4	64x64	1 & 2	5	
							32x32	3		
							32x32	4		
Four levels					4	4	32x32	Any	7	
							32x32			
							32x32			
							32x32			

^a All Rotary Switch positions that are not listed in this column are undefined.

3. Set Rotary Switch S13 for format of each module to slot.

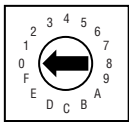


Table 34 identifies the setting for Rotary Switch S13. This setting identifies the format of the module in each of the four slots. If you have empty slots and know what module you will be using to fill the empty slots, then use the setting for that configuration.

Note If your configuration is not found in the table then your modules are not in a supported hierarchy. Refer to Table 1 on page 22 and *Optimum Matrix Configurations* on page 22.

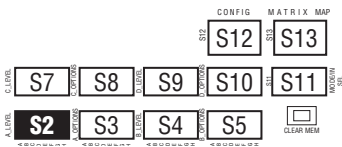
CAUTION The maximum number of HD modules that can be in a Concerto matrix is three and the fourth slot has to remain empty.

Table 34. S13 Rotary Switch Settings for Matrix Mapping^a

Setting		Format of Module in Slot			
		1	2	3	4
0	Video	Video	Video	Video	Video
1	Video	Video	Video	Video	Audio
2	Video	Video	Video	Audio	Audio
3	Video	Audio	Audio	Audio	Audio
4	Audio	Audio	Audio	Audio	Audio
5	Video	Video	Video	Video	Data
6	Video	Video	Video	Data	Data
7	Video	Data	Data	Data	Data
8	Audio	Audio	Audio	Audio	Data
9	Audio	Audio	Data	Data	Data
A	Audio	Data	Data	Data	Data
B	Video	Video	Audio	Data	Data
C	Video	Audio	Audio	Data	Data
D	Video	Audio	Data	Data	Data
E	Data	Data	Data	Data	Data
F	Undefined				

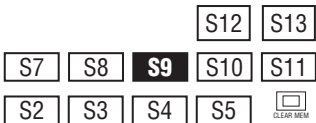
^a Video = Analog, SD, or HD; Audio = Analog or Digital; Data = Port or TimeCode

4. Set crosspoint bus type.



Select Super crosspoint bus type by setting DIP Switch number 8 of bank S2 to Off. On is for future use.

5. Set DIP Switch number 8 of bank S9 to designate Master Controller.



The Controller module in Controller Module slot 1 (CMS1) can be designated as the Master Controller by setting this switch to On.

If the setting for this switch is On:

- The Controller in CMS1 will take control as Master, or
- If the Controller in CMS1 fails, the Controller module in CMS2 will take over, or
- If the Controller in CMS1 is reset, the Controller module in CMS2 will take over until the Controller in CMS1 reboots at which time the Controller in CMS1 will take control, or
- If there is only one Controller module and it is in CMS2, it will be Master, or
- If there is one Controller module in CMS2, and a second Controller module is seated and booted in CMS1, the Controller module in CMS1 will take control.

If the setting for this switch is Off:

- When there are two Controller modules, whichever one boots the fastest will be the Master, or
- If there is only one Controller module and it is in either Controller module slot it will be the Master.

6. Set Level and Options for each slot.

Banks S2, S3, S4, S5, S7, S8, S9, and S10 are used to assign Levels and Options to the module slots. DIP Switch number 8 is not used on banks S4, S7, or S8. [Table 35](#) shows which banks and setting types are used for each slot.

Table 35. DIP Switch Bank and Module Slot Number

Module Slot #	DIP Switch Bank	Setting Type
1	S2	Level
	S3	Options
2	S4	Level
	S5	Options
3	S7	Level
	S8	Options
4	S9	Level
	S10	Options

[Table 36](#) shows the common default level settings used by matrices in the Jupiter Control System. You can set any of 127 possible levels, see [Appendix B-Reference Tables](#) for the complete set. The common levels shown are the ones supported by Concerto.

Note Audio modules are configured as stereo, one level. The Jupiter Control System will automatically apply the Left stereo channel to the single level assigned by Concerto, and then Jupiter will assign the same number plus 4 to the Right stereo channel (in this example Right audio would be physical level 6). Furthermore, stereo operation places restrictions on the physical level numbers that can be used; specifically, keep all levels that are plus 4 of an audio level free. For more information on the Jupiter Control System refer to the *Jupiter Getting Started Guide*, and the *Jupiter Installation and Operating Manual*.

Table 36. Default Physical Level Settings for DIP Switch Banks S2, S4, S7, and S9

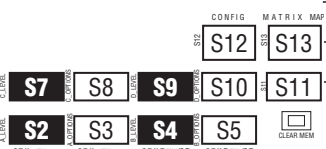
		Level	Physical Level #	DIP Switch Position Number						
				1	2	3	4	5	6	7
	Audio	Analog	2	OFF	ON	OFF	OFF	OFF	OFF	OFF
		Digital (AES)	32	OFF	OFF	OFF	OFF	OFF	ON	OFF
	Data	TimeCode	3	ON	ON	OFF	OFF	OFF	OFF	OFF
		Transmit/Receive	16	OFF	OFF	OFF	OFF	ON	OFF	OFF
	Video	Analog	1	ON	OFF	OFF	OFF	OFF	OFF	OFF
		Digital (SD)	7	ON	ON	ON	OFF	OFF	OFF	OFF
		Digital (HD)	9	ON	OFF	OFF	ON	OFF	OFF	OFF

Table 37 shows the option setting choices for Video modules.

Table 37. Video Option Settings for DIP Switch Banks S3, S5, S8, and S10

Outputs Range	DIP Switch #	Position	Condition
1 through 8	1	ON	Sync Ref 2
		OFF	Sync Ref 1
9 through 16	2	ON	Sync Ref 2
		OFF	Sync Ref 1
17 through 24	3	ON	Sync Ref 2
		OFF	Sync Ref 1
25 through 32	4	ON	Sync Ref 2
		OFF	Sync Ref 1
1 through 8	5	ON	Forced bypass
		OFF	Auto reclocking
9 through 16	6	ON	Forced bypass
		OFF	Auto reclocking
17 through 24	7	ON	Forced bypass
		OFF	Auto reclocking
25 through 32	8	ON	Forced bypass
		OFF	Auto reclocking

Table 38 shows the option setting choices for Audio modules.

Table 38. Audio Option Settings for DIP Switch Banks S3, S5, S8, and S10^a

DIP Switch #	Position	Condition
1	ON	Mono (not supported)
	OFF	Stereo (default)
2	ON	Expanded system - more than one Concerto frame
	OFF	Not Expanded - one Concerto frame
3	ON	If Switch # 2 is On, module is in expansion frame (I/O 129-256) If Switch # 2 is Off, this setting is invalid
	OFF	If Switch # 2 is On, module is in base frame of expanded system (I/O 1-128) If Switch # 2 is Off, single frame.
4	ON	24 bit processing
	OFF	20 bit processing

^a Switches 5 through 8 undefined.

Table 39 shows the option setting choices for Data modules.

Table 39. Data Options Settings for DIP Switch Banks S3, S5, S8, and S10^a

DIP Switch #	Position	Condition
1	ON	TimeCode
	OFF	Port

^a Switches 2 through 8 undefined.



7. Complete the configuration on the Jupiter Control System.

On the Jupiter Control System configuration a Concerto matrix is configured as a standard crosspoint bus control router using the Switcher Description, Input, and Output tables. On the Switcher Description table, select **Binary** as the Driver type.

The location (output number) of the Concerto Monitor output in non-expanded systems is the next output following the main matrix. For example, for a 64 x 64 router the Monitor output number would be **65**. For expanded systems, the Monitor is the next output following the main matrix, assuming that the expansion is fully populated. This is because the Base matrix has no knowledge of the size of the Expansion matrix, so it has to assume the maximum possible.

For more information on the Jupiter Control System configuration, refer to the *Jupiter Getting Started Guide*, and the *Jupiter Installation and Operating Manual*.

Maintenance and Troubleshooting

Field Replaceable Units

Modules and Power Supplies are not serviced in the field. Replace faulty modules and Power Supplies with spares. Return faulty units to a designated repair depot. Use the information located on the back of the title page to contact Customer Service.

The fan assembly can be replaced by a complete new assembly. The filter slides in and out of the frame for cleaning or replacement.

Modules

Modules can be inserted or removed from the frame without powering down the system.

To Remove Modules

1. Lift the ejector tabs on the front of the module.
2. Pull the module gently to disengage it from the backplane.
3. Slide the module out of the frame.
4. Use anti-static precautions to protect the module.

To Insert Modules

1. Align the module in the appropriate frame slot.
2. Slide the module into the frame.
3. Gently push the module to engage the backplane.

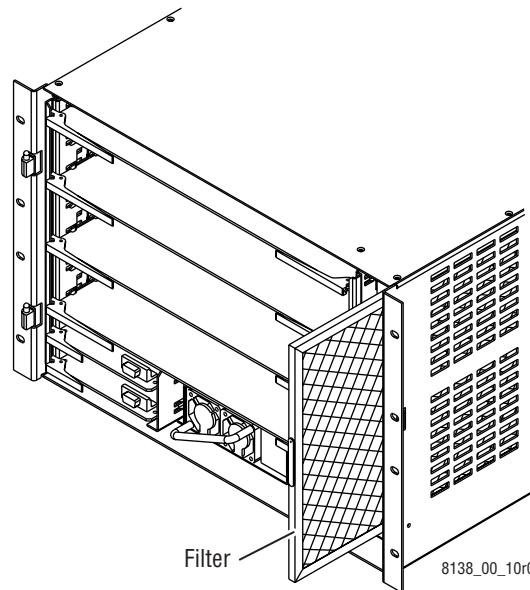
4. Close the ejector tabs. Replace the interconnect if removed, pin alignment is critical.

CAUTION Multi-pin module connectors can become misaligned and cause damage to the backplane and interconnect. Use caution when inserting modules. Do not force modules into slots. It is very important that the module and the backplane are compatible. If a module is plugged into an incompatible backplane it will cause damage.

Air Filter

The air filter slides in and out for easy replacement. It can be cleaned with a vacuum or rinsed with water and dried. Refer to [Figure 86](#).

Figure 86. Filter Replacement



Fan Assembly

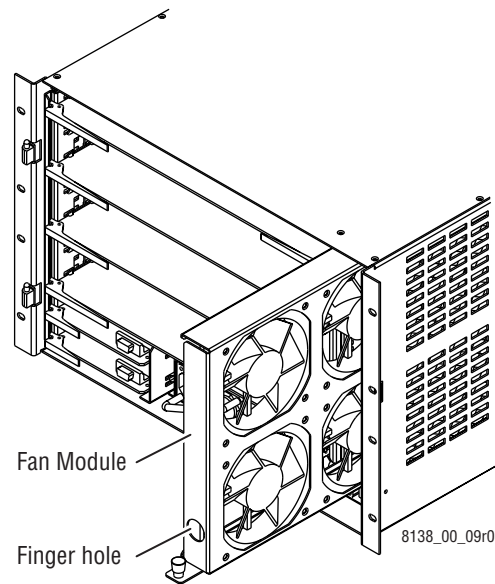
The Fan Assembly can be replaced as a complete unit.

To Replace a Fan Assembly

Refer to [Figure 87](#).

1. Pull the assembly out one half inch and wait for the fan blades to stop.
2. Slide the fan assembly out of the frame.
3. Slide the new fan assembly into the frame.

Figure 87. Fan Replacement



Controller Modules

Swapping a MCS-MC-C2 with a MCS-MC-C2

The following procedures are used to swap a MCS-MC-C2 with a replacement.

Encore Controlled Non-Redundant Systems

1. Inspect the new Controller module.
2. Set the DIP Switch bank S11 switch number 1 to **ON**. Switches 2 to 8 are set to **OFF**.
3. Remove the old Controller module.
4. Insert and seat the new Controller module.

The **PWR OK** (power OK) and **DONE** LED will light signifying the module is up and ready to receive commands. The next command sent from the control system will cause the **ACT** (active) LED to turn on.

The next command sent from the control system will cause the **ACT** LED to turn on. Continued commands cause the **ACT** LED to flash.

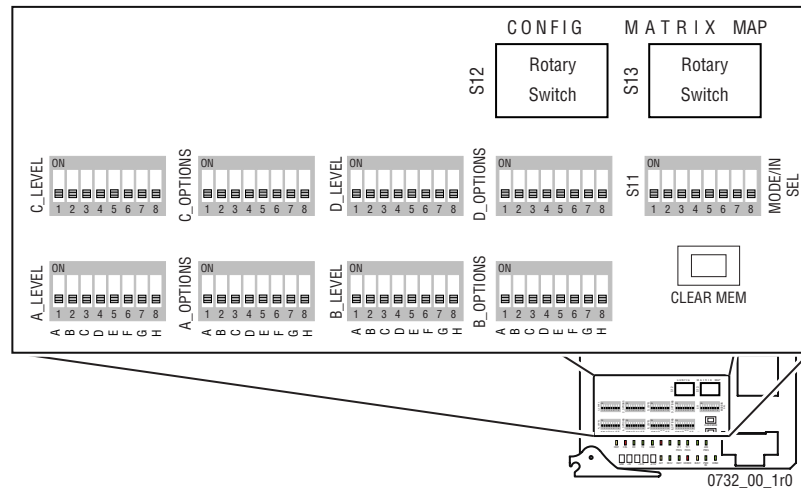
5. Send a switch command from the control system and verify that the switch was executed.

Jupiter Controlled Non-Redundant Systems

1. Inspect the new Controller module.
2. Set each of the 9 DIP switch settings and two rotary switch settings to match that of the currently installed Controller.

These can be viewed on the currently used module while it is active in the Concerto chassis. Note the status of the LEDs on the front edge of the module.

Figure 88. DIP Switches and Rotary Switches



3. Remove the old Controller module.
4. Insert and seat the new Controller module.

The **PWR OK** (power OK) and **DONE** LED will light signifying the module is up and ready to receive commands. The next command sent from the control system will cause the **ACT** (active) LED to turn on.

The next command sent from the control system will cause the **ACT** LED to turn on. Continued commands cause the **ACT** LED to flash.

5. Send a switch command from the control system and verify that the switch was executed.

Encore Controlled Redundant Systems

1. Inspect the new Controller modules.
2. Set the DIP Switch bank S11 switch number 1 to **ON**. Switches 2 to 8 are set to **OFF**.
3. Remove one old Controller module.

4. Insert and seat one new Controller module.

The **PWR OK** (power OK) and **DONE** LED will light signifying the new module is up and ready to receive commands.

5. Press the reset switch on the redundant old Controller, causing control to be handed off to the newly inserted Controller.

The next command sent from the control system will cause the **ACT** LED to turn on. Continued commands cause the **ACT** LED to flash.

6. Send and verify a switch command from the control system.

7. Remove the other old Controller module.

8. Insert and seat the other new Controller.

The **PWR OK** (power OK) and **DONE** LED will light signifying the new module is up and ready to receive commands.

9. The next command sent from the control system will cause the **ACT** LED to turn on.

10. Press reset on the Controller that is active to transfer control to the second new Controller.

The next command sent from the control system will cause the **ACT** LED to turn on. Continued commands cause the **ACT** LED to flash.

11. Send and verify a switch command from the control system.

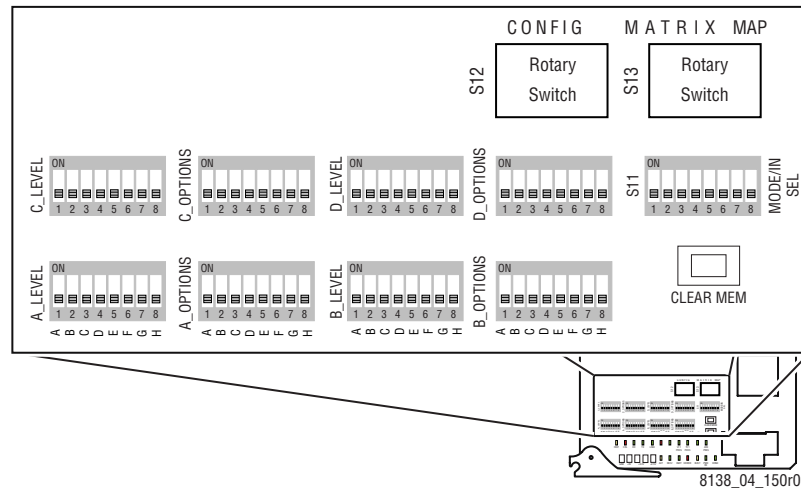
Jupiter Controlled Redundant Systems

1. Inspect the new Controller modules.

2. Set each of the 9 DIP switch settings and two rotary switch settings to match that of the currently installed Controllers.

These can be viewed on the currently used modules while they are active in the Concerto chassis. Note the status of the LEDs on the front edge of the modules.

Figure 89. DIP Switches and Rotary Switches



3. Remove one old Controller module.

4. Insert and seat one new Controller module.

The **PWR OK** (power OK) and **DONE** LED will light signifying the new module is up and ready to receive commands.

5. Press the reset switch on the redundant old Controller, causing control to be handed off to the newly inserted Controller.

The next command sent from the control system will cause the **ACT** LED to turn on. Continued commands cause the **ACT** LED to flash.

6. Send and verify a switch command from the control system.

7. Remove the other old Controller module.

8. Insert and seat the other new Controller.

The **PWR OK** (power OK) and **DONE** LED will light signifying the new module is up and ready to receive commands.

9. The next command sent from the control system will cause the **ACT** LED to turn on.

10. Press reset on the Controller that is active to transfer control to the second new Controller.

The next command sent from the control system will cause the **ACT** LED to turn on. Continued commands cause the **ACT** LED to flash.

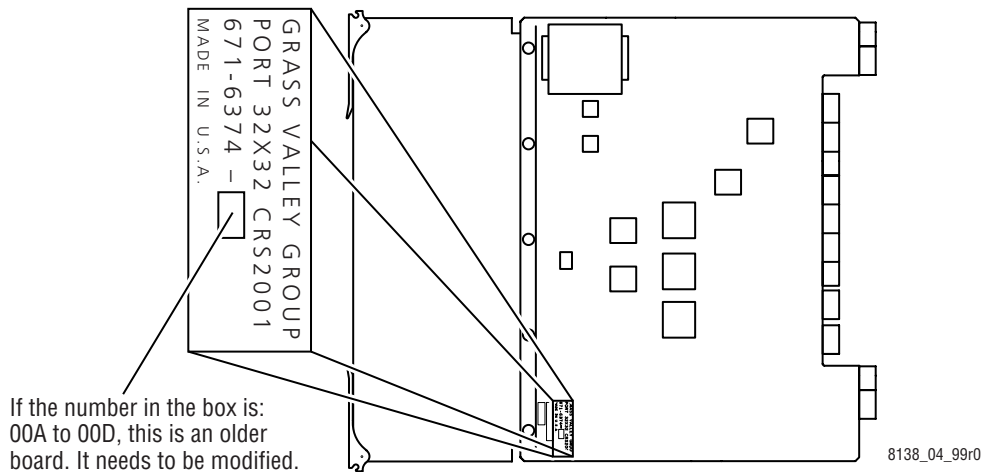
11. Send and verify a switch command from the control system.

Port Modules

The Port module was modified so that the interface between the module and the Port Backplane (9 pin D) adheres to the industry standard. This modification (FMN 0750731-00) applies to Port modules with part numbers of 671-6374-00D or earlier. If your Port modules need the modification, use *Contacting Grass Valley on page 2* to contact Customer Service. If your Port modules are 671-6374-00E or newer, your Port modules do not need to be modified.

Note Port modules that are used as TimeCode do not require this modification.

Figure 90. Part Number Location



Audio and Video Modules

Field Modification Note 0750705-00 corrects a problem on several Concerto modules. Crosspoints will not switch if one-shots time out during a slow sync. This applies only to Concerto modules identified in [Table 40](#). If your modules are at the **New Letter Version** shown in the table, or newer, then you do not need this modification. If your modules need the modification, use *Contacting Grass Valley on page 2* to contact Customer Service.

Table 40. Assembly Part Numbers and Letter Versions

Module	Part Number	Dash Number	Current Letter Version	New Letter Version
Analog Video	6716369	-00	A1 to C1	D1
		-01	A1	B1
		-50	A1 to C1	D1
		-51	A1	B1

Table 40. Assembly Part Numbers and Letter Versions

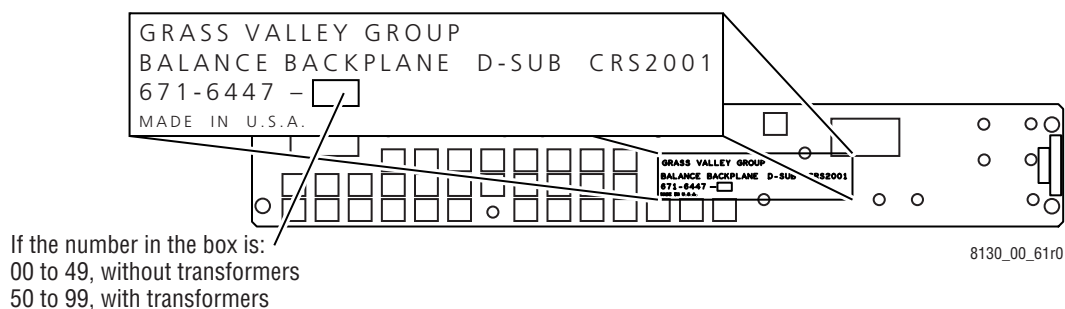
Module	Part Number	Dash Number	Current Letter Version	New Letter Version
Analog Audio	6716370	-01	A1	B1
		-25	A1	B1
		-50	A1	B1
Digital Audio	6716371	-00'	A1 to H1	J1
Digital Video (SD)	6716372	-00	A1 to E1	F1
		-50	A1 to D1	E1

Digital Audio Balanced Backplane Transformers

Digital Audio balanced backplanes can be purchased with or without Output transformers. [Figure 91](#) shows how to determine which backplane has transformers.

Note All Digital Audio modules have Input transformers.

Figure 91. Digital Audio Balanced Backplane Transformer Identification



Service and Replacement Parts

Replacement parts can be ordered. Use *Contacting Grass Valley* on [page 2](#) to contact Customer Service. They will provide the current part numbers, part availability, and ordering instructions.

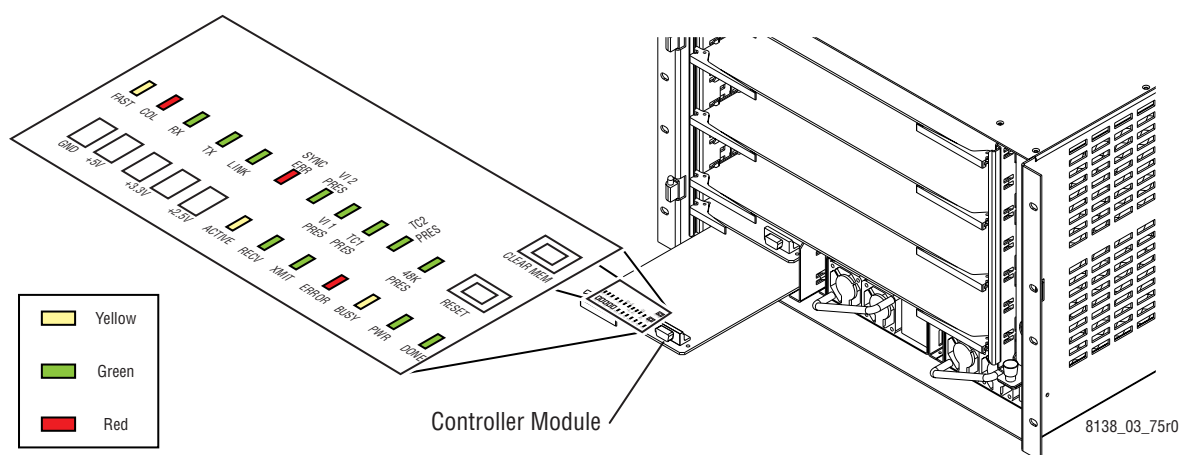
Troubleshooting

Each module has LEDs, testpoints, and switches along its front edge. The LEDs indicate the operating condition of the module. Testpoints are used to check voltages and ground. Switches are used to reset the module. Testpoint and switch markings are self-explanatory.

Matrix Controller LEDs

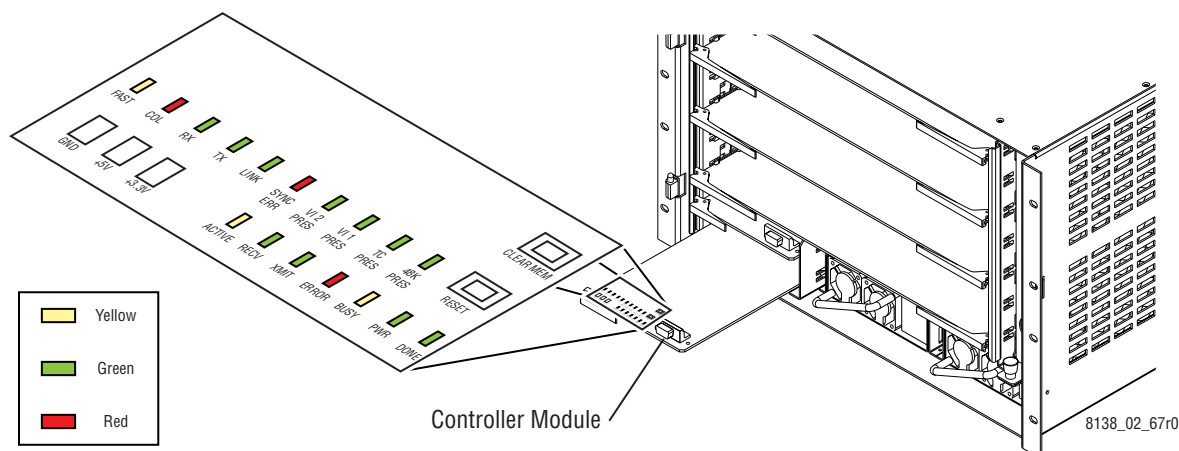
The location of the LEDs on the Ethernet/Crosspoint Bus Matrix Controller is shown in [Figure 92](#). See [Table 41](#) for LED usage.

Figure 92. Location of Ethernet/Crosspoint Bus Controller LEDs



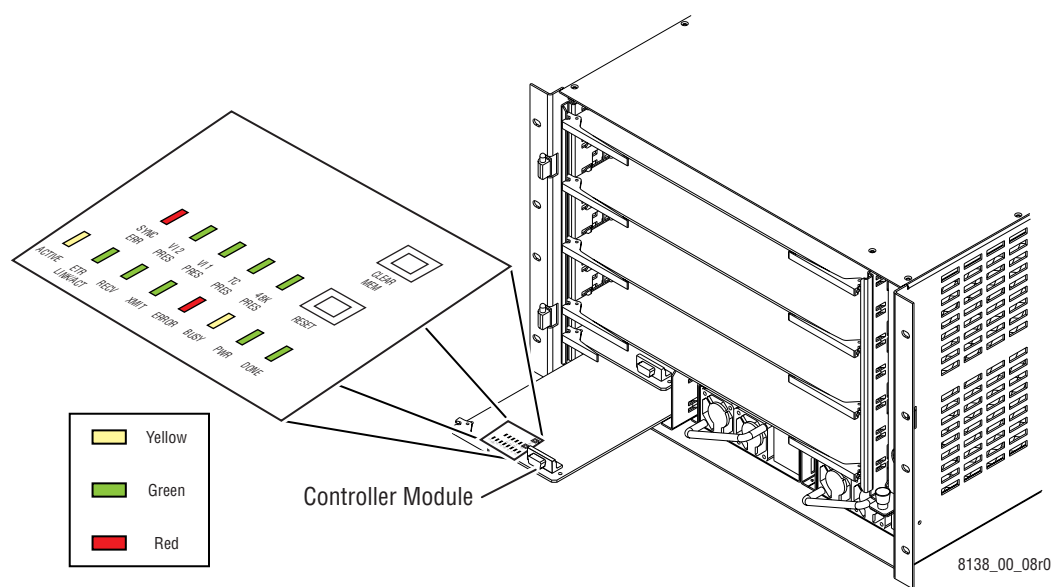
The location of the LEDs on the 10/100Base-T Matrix Controller is shown in [Figure 93](#). See [Table 42](#) for LED usage.

Figure 93. Location of 10/100Base-T Matrix Controller LEDs



The location of the LEDs on the 10Base-T Matrix Controller is shown in [Figure 94](#). See [Table 43](#) for LED usage.

Figure 94. Location of 10Base-T Matrix Controller LEDs



The LEDs found on the Ethernet/Crosspoint Bus Matrix Controller module are shown in [Table 41](#).

Table 41. Ethernet/Crosspoint Bus Matrix Controller LEDs

Group	Label	LED	Indication	Condition
Ethernet	FAST	D8 (yellow)	On	Ethernet active at 100Base-T
			Off	Ethernet inactive
	COL	D9 (red)	On	Ethernet collision
			Off	No collision
	RX	D10 (green)	On	Ethernet receiving
			Off	Not receiving
Reference	TX	D11 (green)	On	Ethernet transmitting
			Off	Not transmitting
	LINK	D12 (green)	On	Ethernet connected
			Off	No ethernet connection
	SYNC ERR	D13 (red)	On	AES Reference error
			Off	Normal
	VI2 PRES	D14 (green)	On	Video Reference 2 present
			Off	Not present
	VI1 PRES	D15 (green)	On	Video Reference 1 present
			Off	Not present
	TC2 PRES	D16 (green)	On	Time code 2 present
			Off	Not present
	TC1 PRES	D16 (green)	On	Time code 1 present
			Off	Not present
	48K PRES	D17 (green)	On	AES Present ^a
			Off	Not present
Activity and Power	ACT	D1 (yellow)	On	Normal - active control ^b
			Off	Standby
	RECV	D2 (green)	On	External com-receiving
			Off	Not receiving
	XMIT	D3 (green)	On	External com-transmitting
			Off	Not transmitting
	ERROR	D4 (red)	On	Circuit failure or reset ^c
			Off	Normal
Activity and Power	BUSY	D5 (yellow)	On	Active Controller indication ^d
			Off	Inactive
	PWR OK	D6 (green)	On	Chassis power at proper voltage
			Off	Bad or unseated module
Activity and Power	DONE	D7 (green)	On	FPGA loaded, module ready
			Off	Module not functional

^a Valid AES Reference generated from top Audio module distributed through matrix.

^b Controller module is in control of matrix.

^c Alarm conditions are; fan or power supply failure, TDM error, or Controller module reset.

^d Flashing indicates receiving communication from control system.

The LEDs found on the 10/100Base-T Matrix Controller module are shown in [Table 42](#).

Table 42. 10/100Base-T Matrix Controller LEDs

		Group	Label	LED	Indication	Condition																																																																																																																																									
Legend Yellow Green Red TP1 TP2 TP3 GND +5V +3.3V D8 FAST D9 COL D10 RX D11 TX D12 LINK D13 SYNC ERR D14 VI2 PRES D15 VI1 PRES D16 TC PRES D17 48K PRES D4 ERROR D5 BUSY D6 PWR D7 DONE CLEAR MEM S1 <tr><td rowspan="6">Ethernet</td><td>FAST</td><td>D8 (yellow)</td><td>On</td><td>Ethernet active at 100Base-T</td></tr> <tr><td></td><td></td><td>Off</td><td>Ethernet inactive</td></tr> <tr><td>COL</td><td>D9 (red)</td><td>On</td><td>Ethernet collision</td></tr> <tr><td></td><td></td><td>Off</td><td>No collision</td></tr> <tr><td>RX</td><td>D10 (green)</td><td>On</td><td>Ethernet receiving</td></tr> <tr><td></td><td></td><td>Off</td><td>Not receiving</td></tr> <tr><td></td><td>TX</td><td>D11 (green)</td><td>On</td><td>Ethernet transmitting</td></tr> <tr><td></td><td></td><td>Off</td><td>Not transmitting</td></tr> <tr><td></td><td>LINK</td><td>D12 (green)</td><td>On</td><td>Ethernet connected</td></tr> <tr><td></td><td></td><td>Off</td><td>No ethernet connection</td></tr> <tr><td rowspan="8">Reference</td><td>SYNC ERR</td><td>D13 (red)</td><td>On</td><td>AES Reference error</td></tr> <tr><td></td><td></td><td>Off</td><td>Normal</td></tr> <tr><td>VI2 PRES</td><td>D14 (green)</td><td>On</td><td>Video Reference 2 present</td></tr> <tr><td></td><td></td><td>Off</td><td>Not present</td></tr> <tr><td>VI1 PRES</td><td>D15 (green)</td><td>On</td><td>Video Reference 1 present</td></tr> <tr><td></td><td></td><td>Off</td><td>Not present</td></tr> <tr><td>TC PRES</td><td>D16 (green)</td><td>On</td><td>Time code present</td></tr> <tr><td></td><td></td><td>Off</td><td>Not present</td></tr> <tr><td></td><td>48K PRES</td><td>D17 (green)</td><td>On</td><td>AES Present^a</td></tr> <tr><td></td><td></td><td>Off</td><td>Not present</td></tr> <tr><td rowspan="12">Activity and Power</td><td>ACTIVE</td><td>D1 (yellow)</td><td>On</td><td>Normal - active control^b</td></tr> <tr><td></td><td></td><td>Off</td><td>Standby</td></tr> <tr><td>RECV</td><td>D2 (green)</td><td>On</td><td>External com-receiving</td></tr> <tr><td></td><td></td><td>Off</td><td>Not receiving</td></tr> <tr><td>XMIT</td><td>D3 (green)</td><td>On</td><td>External com-transmitting</td></tr> <tr><td></td><td></td><td>Off</td><td>Not transmitting</td></tr> <tr><td>ERROR</td><td>D4 (red)</td><td>On</td><td>Circuit failure or reset^c</td></tr> <tr><td></td><td></td><td>Off</td><td>Normal</td></tr> <tr><td>BUSY</td><td>D5 (yellow)</td><td>On</td><td>Active Controller indication^d</td></tr> <tr><td></td><td></td><td>Off</td><td>Inactive</td></tr> <tr><td>PWR</td><td>D6 (green)</td><td>On</td><td>Chassis power at proper voltage</td></tr> <tr><td></td><td></td><td>Off</td><td>Bad or unseated module</td></tr> <tr><td></td><td>DONE</td><td>D7 (green)</td><td>On</td><td>FPGA loaded, module ready</td></tr> <tr><td></td><td></td><td>Off</td><td>Module not functional</td></tr>	Ethernet	FAST	D8 (yellow)	On	Ethernet active at 100Base-T			Off	Ethernet inactive	COL	D9 (red)	On	Ethernet collision			Off	No collision	RX	D10 (green)	On	Ethernet receiving			Off	Not receiving		TX	D11 (green)	On	Ethernet transmitting			Off	Not transmitting		LINK	D12 (green)	On	Ethernet connected			Off	No ethernet connection	Reference	SYNC ERR	D13 (red)	On	AES Reference error			Off	Normal	VI2 PRES	D14 (green)	On	Video Reference 2 present			Off	Not present	VI1 PRES	D15 (green)	On	Video Reference 1 present			Off	Not present	TC PRES	D16 (green)	On	Time code present			Off	Not present		48K PRES	D17 (green)	On	AES Present ^a			Off	Not present	Activity and Power	ACTIVE	D1 (yellow)	On	Normal - active control ^b			Off	Standby	RECV	D2 (green)	On	External com-receiving			Off	Not receiving	XMIT	D3 (green)	On	External com-transmitting			Off	Not transmitting	ERROR	D4 (red)	On	Circuit failure or reset ^c			Off	Normal	BUSY	D5 (yellow)	On	Active Controller indication ^d			Off	Inactive	PWR	D6 (green)	On	Chassis power at proper voltage			Off	Bad or unseated module		DONE	D7 (green)	On	FPGA loaded, module ready			Off	Module not functional
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		LINK	D12 (green)	On	Ethernet connected																																																																																																																																										
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		VI1 PRES	D15 (green)	On	Video Reference 1 present																																																																																																																																										
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TC PRES		D16 (green)	On	Time code present																																																																																																																																											
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Activity and Power	ACTIVE	D1 (yellow)	On	Normal - active control ^b																																																																																																																																											
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	PWR	D6 (green)	On	Chassis power at proper voltage																																																																																																																																											
			Off	Bad or unseated module																																																																																																																																											
	DONE	D7 (green)	On	FPGA loaded, module ready																																																																																																																																											
		Off	Module not functional																																																																																																																																												

^a Valid AES Reference generated from top Audio module distributed through matrix.

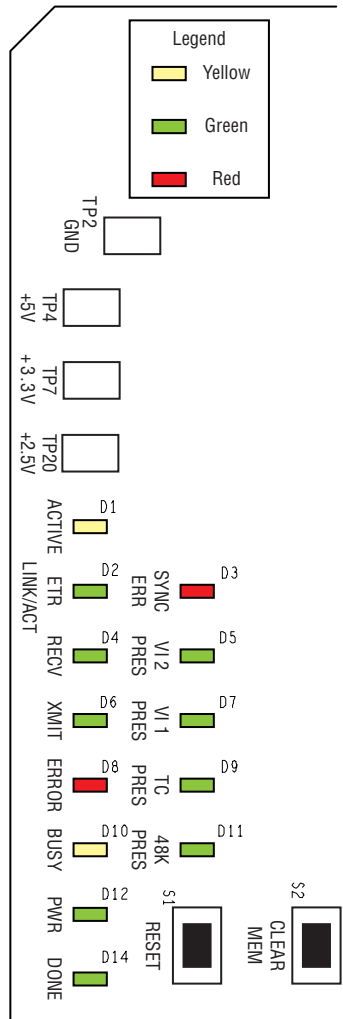
^b Controller module is in control of matrix.

^c Alarm conditions are; fan or power supply failure, TDM error, or Controller module reset.

^d Flashing indicates receiving communication from control system.

The LEDs found on the 10Base-T Matrix Controller module are shown in Table 43.

Table 43. 10Base-T Matrix Controller LEDs

	Group	Label	LED	Indication		Condition
				On	Off	
 Legend - Yellow - Green - Red TP2 GND TP4 +5V TP7 +3.3V TP20 +2.5V D1 ACTIVE D2 LINK/ACT D3 SYNC ERR D4 RECV D5 VI2 PRES D6 XMIT D7 VI1 PRES D8 ERROR D9 TC PRES D10 BUSY D11 48K PRES D12 PWR D14 DONE S1 RESET S2 CLEAR MEM	Activity and Power	ACTIVE	D1 (yellow)	On	Off	Normal - active control ^a Standby
		ETR LINK/ACT	D2 (green)	On	Off	Ethernet-link No Ethernet-link
		RECV	D4 (yellow)	On	Off	External com-receiving Not receiving
		XMIT	D6 (green)	On	Off	External com-transmitting Not transmitting
		ERR	D8 (red)	On	Off	Circuit failure or reset ^b Normal
		BSY	D10 (yellow)	On	Off	Active Controller indication ^c Inactive
		PWR	D12 (green)	On	Off	Chassis power at proper voltage Bad or unseated module
		DONE	D14 (green)	On	Off	FPGA loaded, module ready Module not functional
	Reference	SYNC ERR	D3 (red)	On	Off	AES Reference error Normal
		VI2 PRES	D5 (green)	On	Off	Video Reference 2 present Not present
		VI1 PRES	D7 (green)	On	Off	Video Reference 1 present Not present
		TC PRES	D9 (green)	On	Off	Time code present Not present
		48K PRES	D11 (green)	On	Off	AES Present ^d Not present

^a Controller module is in control of matrix.

^b Alarm conditions are; fan or power supply failure, TDM error, or Controller module reset.

^c Flashing indicates receiving communication from control system.

^d Valid AES Reference generated from top Audio module distributed through matrix.

Matrix Module LEDs

Matrix Module LEDs are identified in [Table 44](#).

Table 44. Matrix Modules LEDs

Analog & Digital Audio	Analog Video	Digital HD & SD Video	TimeCode Port	LEDs		
				Label	Indication	Condition
DIAG OVER TEMP PARITY ERROR ERROR BUSY POWER OK DONE AVI 1 AVI 2 AES REF LOOP LOCKED BOARD ENABLE	DIAG OVER TEMP PARITY ERROR ERROR BUSY PWR OK DONE AVI 1 AVI 2 BRD ENABLE	DIAG OVER TEMP PARITY ERROR ERROR BUSY POWER OK DONE VI 1 VI 2 BOARD ENABLE	DIAG OVER TEMP PARITY ERROR ERROR BUSY POWER OK DONE BOARD ENABLE	DIAG (red)	On	Diagnostic (factory use)
				Off	Normal	
				OVER TEMP (red)	On	Over temperature ^a
				Off	Normal	
				PARITY ERROR (red)	On	Parity error
				Off	Normal	
				ERROR (red)	On	Error.
				Off	Normal	
				BSY or BUSY (yellow)	On	Busy ^b
				Off	Standby	
				POWER OK or PWR OK (green)	On	Power on
				Off	Bad or unseated module	
				DONE (green)	On	Done
				Off	FPGA loaded, module ready	
				AVI 1 (green)	On	Audio reference 1 present
				Off	No reference 1	
				AVI 2 (green)	On	Audio reference 2 present
				Off	No reference 2	
				VI 1 (green)	On	Video Reference 1 present
				Off	No reference 1	
				VI 2 (green)	On	Video Reference 2 present
				Off	No reference 2	
				AES REF (green)	On	AES reference present
				Off	No AES reference	
				LOOP LOCKED (green)	On	Locked to AES reference
				Off	No lock to AES reference	
				BOARD ENABLE or BRD ENABLE (green)	On	Module is communicating with the Controller module ^c
				Off	Module is not communicating with the Controller module	

^a Check air intake and exhaust temperature, fans and air filter. Verify chassis ventilation slots are clear and door is closed.

^b Signifies that a switch has been activated.

^c Flashing indicates receiving communication.

TDM Submodule LEDs

The location of the LEDs on the TDM submodule is shown in [Figure 95](#). See [Table 45](#) for LED usage.

Figure 95. TDM Submodule LEDs Location

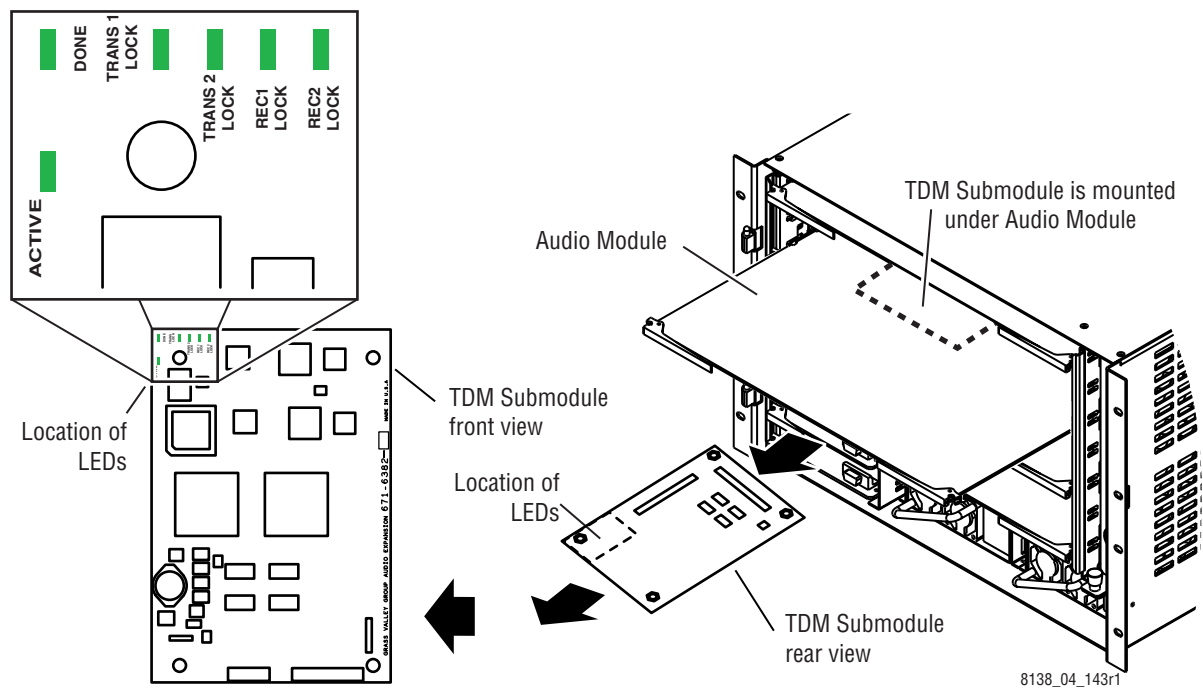
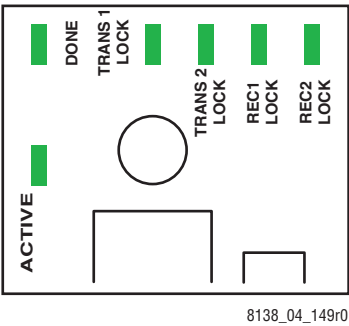


Table 45. TDM Submodule LEDs



LEDs		
Label	Indication	Condition
ACTIVE (green)	On	Active (Master) mode
	Off	Standby (Redundant) mode
DONE (green)	On	Normal
	Off	Problem ^a
TRANS 1 LOCK (green)	On	Locked to reference and transmitting signals to OUT 1
	Off	Problem ^b
TRANS 2 LOCK (green)	On	Locked to reference and transmitting signals to OUT 2
	Off	Problem ^b
REC 1 LOCK (green)	On	Locked to reference and receiving signals from IN 1
	Off	Problem ^b
REC 2 LOCK (green)	On	Locked to reference and receiving signals from IN 2
	Off	Problem ^b

^a Verify TDM is properly installed onto its host module and the host module is properly seated.

^b If Done is lit and this is off then there is a cabling problem, verify the cabling.

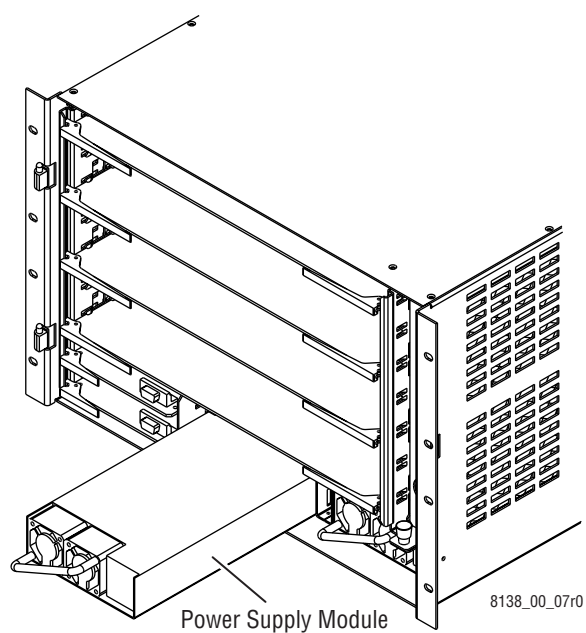
Power Supply Modules

Power Supply Module

The Concerto Power Supply module is a fully autoranging 400 W 48V DC Output module. LED indicators: **DC OK** (green light indicates satisfactory DC power when illuminated), **AC PRESENT** (yellow light indicates AC power present when illuminated). See [Figure 96](#).

Note If power supplies are not fully seated in the matrix, only the **AC Present** LED will be lit. If **DC OK** is not lit, verify that the supplies are fully seated.

Figure 96. Power Supply Module



Specifications

Performance and Environmental Specifications

Concerto Routing Matrix

Table 46 contains the specifications for the routing matrix.

Table 46. Concerto Routing Matrix

Power Requirements	
Frame (fully loaded)	500 W
Environmental	
Temperature	0 - 40 degrees Celsius
Humidity	10-90%, non-condensing
Reference Video Input	
Type	NTSC or PAL Color Black
Impedance/Connector	High, Looping – BNC
Return Loss	>25 dB (0.1 MHz-5 MHz) 75 ohm Termination
Audio Reference Inputs (AES Unbalanced)	
Type	SMPTE-276-M, unbalanced (audio black not necessary)
Impedance	High
Connector	BNC looping 75 ohm termination
Return Loss	>25 dB (0.1 Mhz-5Mhz) 75 ohm termination

Analog Video

Table 47 contains the specifications for the Analog Video module.

Table 47. Analog Video

General	
Matrix card	128x32
Inputs	
Connector	BNC
Impedance	75 ohm

Table 47. Analog Video - (continued)

Return loss		>40 dB DC to 4.43 MHz
Level	Nominal	1 V p-p
	Maximum	3 V p-p
Signal type		Terminating
Coupling		DC
Clamping		None
Cable equalization		None
Outputs		
Connector		BNC
Impedance		75 ohm
Return Loss		>40 dB DC to 4.43 MHz
Level	Nominal	1 V p-p
	Maximum	3 V p-p
Coupling		DC
Cable equalization		None
(QC) monitor		Yes
Performance		
Frequency response	DC to 10 MHz	+/- 0.15 dB
	10 MHz to 30 MHz	+ 0.5 dB, -2 dB
Differential	Phase	<0.15 deg. 3.58 MHz & 4.43 MHz
	Gain	<0.15% 3.58 MHz & 4.43 MHz
Minimum rise/fall time		<7.5 ns for 714 mV p-p
Signal-to-noise		<-70 dB unweighted
Crosstalk	DC to 4.43 MHz	<-60 dB typical
Delay scatter		+/- 1.0 deg. (any input to any one output)
Electrical length		<40 ns
Power Requirements		
128x32 Analog Video module		50 W (per module)
64 x64 Analog Video module		30 W (per module)

SD and HD Digital Video

Table 48 contains the specifications for the SD and HD Digital Video modules.

Table 48. SD and HD Digital Video

Inputs	
Type	Serial digital video conforming to SMPTE 259M or SMPTE 292M
Connector	BNC 75 ohm
Return loss	> 15dB (10 MHz-1.5GHz)
DC offset	0 V (AC coupled) $\pm$ 0.5 V
Impedance	75 ohms

Table 48. SD and HD Digital Video - (continued)

Cable equalization	SD	Automatic ≥ 300 meters of Belden 1694A or equivalent for data rate ≥360 Mbps
	HD	Automatic ≥ 100 meters of Belden 1694A or equivalent for data rate ≥ 1.5 Gbps
Outputs		
Type	Serial digital video conforming to SMPTE 259M or SMPTE 292M	
Connector	BNC 75 ohm	
Return loss	> 15dB (10 MHz-1.5GHz)	
Signal amplitude	800 mV ±10% when terminated into 75 ohm	
Impedance	75 ohms	
DC offset	0 V (AC coupled) ± 0.5 V	
Operational Modes		
Reclocking	Automatic or manual selection of 143 Mbps, 270 Mbps, 360 Mbps, 540 Mbps, & 1.485 Gbps	
Non-standard bit rates	Non-reclocked operation or bypass switched from 10 Mbps to 700 Mbps with signals that have a maximum ones/zeros ratio of 20:1	
Performance		
Input-to-output delay	128x128	27.5 nSec
	64x64	
	Match	±7nSec
Vertical interval switch	Reference 1 (normal single sync)	525 Line Standard Field switching Line 10 and Line 273. Middle of line 625 Line Standard Field switching: Line 6 and Line 319. Middle of line ±5 μsec.
	Reference 2 (dual sync switching)	525 Line Standard Field switching Line 10 and Line 273. Middle of line ±10 μsec. 625 Line Standard Field switching Line 6 and Line 319. Middle of line ±10 μsec.
Dual sync	Automatic vertical interval switched relative to the reference (software assignable on output-by-output basis)	
Monitor Input		
Signal source	Concerto monitor outputs only	
Type	Serial digital video conforming to SMPTE 259M or SMPTE 292M	
Connector	BNC 75 ohm	
Return loss	SD	> 15dB (10 MHz-360 MHz)
	HD	> 10dB (5 MHz-1.5GHz)
Connector	BNC 75 ohm	
Quantity	1 (per module)	
Cable length	HD	≤ 3meters of Belden 1694A
Monitor Outputs		
Type	Serial digital video conforming to SMPTE 259M or SMPTE 292M	
Connector	BNC 75 ohm	
Quantity	1 (per module)	
Return loss	SD	> 15dB (10 MHz-360 MHz)
	HD	> 10dB (10 MHz-1.5 GHz)
Signal amplitude	800 mV ±10% when terminated into 75 ohm	
DC offset	0 V (AC coupled)	

Table 48. SD and HD Digital Video - (continued)

Power Requirements		
128x32	SD	< 80 W (per module)
	HD	< 90 W (per module)
64x32	SD	< 50 W (per module)
	HD	< 70 W (per module)

Analog Audio

Table 49 contains the specifications for the Analog Audio module.

Table 49. Analog Audio

General		
Matrix card	128x32	Stereo
	256x64	Mono
Crosspoint type		Digital
Connectors	Terminal block	Single wire compression for solid or stranded cable: 20-28 AWG, One stereo pair per connector.
	50 pin D	Eight channel pairs per connector.
Output monitor		Analog
Time code		Bandwidth = 20 kHz
Inputs		
Input type		Balanced
Maximum input level	Last two digits of part # 00-24	+24 dBu
	Last two digits of part # 25-49	+18 dBu
	Last two digits of part # 50-99	+15 dBu
Input impedance		24 k ohm (bridging)
Input Common Mode Rejection Ratio		74 dB minimum (20 Hz-20 kHz), typical 90 dB
Common mode voltage range		28.5 V maximum input signal peak
Delay to AES output		0.8 µSec
Outputs		
Output type		Balanced
Maximum output level (balanced)		+24 dBu
Maximum load at rated specification (balanced)		10 k ohm (15nF) all channels loaded
Maximum load		600 ohm
Output impedance		100 ohm
Short circuit protection		Yes
Delay from AES inputs		0.6 µSec
Output Common Mode Rejection Ratio		46 dB (@ 1 kHz)
Performance		
Conversion Analog to Digital or Digital to Analog		24 bits
Analog signal delay through router		1.4 mSec
Frequency response		20 Hz to 20 kHz (±0.1 dB)
Gain accuracy		±0.1 dB at 1 kHz

Table 49. Analog Audio - (continued)

Gain adjustment for 600 ohm		Maximum level to +23.7 dBu
Crosstalk		-95 dB (20 Hz-20 kHz, source impedance 150 ohm)
Noise floor		-71 dBu maximum (20 Hz-20 kHz; -75 dBu typical)
Dynamic range	Analog in to Analog out	95 dB
	Analog to AES or AES to Analog	100 dB minimum (no weighting)
Static withstanding voltage		10 kV Human Body Model to inputs or outputs
Total harmonic distortion		≤0.025% (20 Hz-20 kHz) @ +24dBu
Switching transients		None – shaped edges (dunking)
Power Requirements		
128x32 Analog Audio module		65 W (per module)

Digital Audio AES

Table 50 contains the specifications for the Digital Audio module.

Table 50. Digital Audio AES

General		
Matrix card		128x32 AES streams
Connectors	BNC	75 ohm unbalanced
	Terminal block	110 ohm balanced, Single wire compression for solid or stranded cable: 20-28 AWG, Two AES streams per connector.
	50 pin D	110 ohm balanced, 16 inputs or outputs per connector.
Output monitor		Digital
AES status bits	AES source	Passed
	Analog source	Generated
Switching transients		No discontinuity, switching is frame synchronous.
Signal Format	Balanced	AES3-1992
	Unbalanced	AES-3id-1995, SMPTE-276-M (AES/EBU)
Input-to-output delay		64 µSec
Inputs		
Connectors	BNC	75 ohm unbalanced, transformers standard.
	Terminal block	110 ohm balanced, Single wire compression for solid or stranded cable: 20-28 AWG, Two AES streams per connector, transformers standard.
	50 pin D	110 ohm balanced, 16 inputs or outputs per connector, transformers standard.
Return loss unbalanced		25 dB (0.1 MHz – 6 MHz)
Differential voltage range		± 200mV – 7V p-p (loaded)
Sampling rate		48 kHz
Synchronizing		Yes
Reclocking		Yes
Common mode voltage range		±200 V, 2 kV peak instantaneous
Cable EQ		None
Jitter tolerance		± 0.2 UI

Table 50. Digital Audio AES - (continued)

Outputs (Including Monitors)		
Connectors	BNC	75 ohm unbalanced
	Terminal block	110 ohm balanced, Single wire compression for solid or stranded cable: 20-28 AWG, Two AES streams per connector, transformers optional.
	50 pin D	110 ohm balanced, 16 inputs or outputs per connector, transformers optional.
Rise time	Balanced	17 μ Sec (nominal)
	Unbalanced	
Common mode range		$\pm$ 200 V with transformer option
Return loss (Unbalanced)		25 dB (0.1 MHz-6 MHz)
Output voltage	Balanced	3 V (nominal)
	Unbalanced	1 V p-p (nominal)
Output jitter		<1 nSec
Power Requirements		
128x32 Digital Audio module		35 W (per module)

TimeCode and Port

Table 51 contains the specifications for the TimeCode and Port modules.

Table 51. TimeCode and Port

Power Requirements		
32x32 (per module)		< 30 W
Ports		
Format		RS-422/485
Voltage		1.5 V minimum with full 54 ohm loads
Connectors	TimeCode	Terminal Block and 50 pin D (on balanced, non-transformer backplanes)
	Port	9 pin D
Impedance	Port	120 ohms
Inputs		600 ohms
Outputs		120 ohms

Mechanical and Power Specifications

Table 52 contains the specifications for the physical matrix.

Table 52. Mechanical and Power Specifications Maximum Configuration

Component	Depth ^a	Width	Height	Weight	Rack Units	Voltage Input	Power Consumption (Maximum)
Concerto Routing Matrix	483 mm 19 in.	483 mm 19 in.	312 mm 12.25 in.	27.22 kg. 60 lbs.	7	100-240 V AC or 36-60 V DC	400 W

^a Allow a minimum of four inches behind the frames for cabling

Reference Tables

Physical Level Table

Table 53 is the complete table for setting Physical Levels on the DIP Switch banks S2, S4, S7, and S9 on the **CRS-MC-C2** Controller module.

Note Physical Level 0 is not used.

Table 53. Physical Level Settings for DIP Switches S2, S4, S7, and S9

	Physical Level	DIP Switch Position Number						
		1	2	3	4	5	6	7
	1	ON	OFF	OFF	OFF	OFF	OFF	OFF
	2	OFF	ON	OFF	OFF	OFF	OFF	OFF
	3	ON	ON	OFF	OFF	OFF	OFF	OFF
	4	OFF	OFF	ON	OFF	OFF	OFF	OFF
	5	ON	OFF	ON	OFF	OFF	OFF	OFF
	6	OFF	ON	ON	OFF	OFF	OFF	OFF
	7	ON	ON	ON	OFF	OFF	OFF	OFF
	8	OFF	OFF	OFF	ON	OFF	OFF	OFF
	9	ON	OFF	OFF	ON	OFF	OFF	OFF
	10	OFF	ON	OFF	ON	OFF	OFF	OFF
	11	ON	ON	OFF	ON	OFF	OFF	OFF
	12	OFF	OFF	ON	ON	OFF	OFF	OFF
	13	ON	OFF	ON	ON	OFF	OFF	OFF
	14	OFF	ON	ON	ON	OFF	OFF	OFF
	15	ON	ON	ON	ON	OFF	OFF	OFF
	16	OFF	OFF	OFF	OFF	ON	OFF	OFF
	17	ON	OFF	OFF	OFF	ON	OFF	OFF
	18	OFF	ON	OFF	OFF	ON	OFF	OFF
	19	ON	ON	OFF	OFF	ON	OFF	OFF
	20	OFF	OFF	ON	OFF	ON	OFF	OFF
	21	ON	OFF	ON	OFF	ON	OFF	OFF
	22	OFF	ON	ON	OFF	ON	OFF	OFF

Table 53. Physical Level Settings for DIP Switches S2, S4, S7, and S9 - (continued)

	Physical Level	DIP Switch Position Number						
		1	2	3	4	5	6	7
The hardware configuration includes DIP switches S7 through S11 and a matrix map for S12 and S13. - S7: ON - S8: OFF - S9: ON - S10: OFF - S11: OFF - S12: OFF - S13: OFF	23	ON	ON	ON	OFF	ON	OFF	OFF
	24	OFF	OFF	OFF	ON	ON	OFF	OFF
The hardware configuration includes DIP switches S2 through S5 and a CLEAR MEM button. - S2: ON - S3: OFF - S4: ON - S5: OFF	25	ON	OFF	OFF	ON	ON	OFF	OFF
	26	OFF	ON	OFF	ON	ON	OFF	OFF
	27	ON	ON	OFF	ON	ON	OFF	OFF
	28	OFF	OFF	ON	ON	ON	OFF	OFF
	29	ON	OFF	ON	ON	ON	OFF	OFF
	30	OFF	ON	ON	ON	ON	OFF	OFF
	31	ON	ON	ON	ON	ON	OFF	OFF
	32	OFF	OFF	OFF	OFF	OFF	ON	OFF
	33	ON	OFF	OFF	OFF	OFF	ON	OFF
	34	OFF	ON	OFF	OFF	OFF	ON	OFF
	35	ON	ON	OFF	OFF	OFF	ON	OFF
	36	OFF	OFF	ON	OFF	OFF	ON	OFF
	37	ON	OFF	ON	OFF	OFF	ON	OFF
	38	OFF	ON	ON	OFF	OFF	ON	OFF
	39	ON	ON	ON	OFF	OFF	ON	OFF
	40	OFF	OFF	OFF	ON	OFF	ON	OFF
	41	ON	OFF	OFF	ON	OFF	ON	OFF
	42	OFF	ON	OFF	ON	OFF	ON	OFF
	43	ON	ON	OFF	ON	OFF	ON	OFF
	44	OFF	OFF	ON	ON	OFF	ON	OFF
	45	ON	OFF	ON	ON	OFF	ON	OFF
	46	OFF	ON	ON	ON	OFF	ON	OFF
	47	ON	ON	ON	ON	OFF	ON	OFF
	48	OFF	OFF	OFF	OFF	ON	ON	OFF
	49	ON	OFF	OFF	OFF	ON	ON	OFF
	50	OFF	ON	OFF	OFF	ON	ON	OFF
	51	ON	ON	OFF	OFF	ON	ON	OFF
	52	OFF	OFF	ON	OFF	ON	ON	OFF
	53	ON	OFF	ON	OFF	ON	ON	OFF
	54	OFF	ON	ON	OFF	ON	ON	OFF
	55	ON	ON	ON	OFF	ON	ON	OFF
	56	OFF	OFF	OFF	ON	ON	ON	OFF
	57	ON	OFF	OFF	ON	ON	ON	OFF
	58	OFF	ON	OFF	ON	ON	ON	OFF
	59	ON	ON	OFF	ON	ON	ON	OFF
	60	OFF	OFF	ON	ON	ON	ON	OFF
	61	ON	OFF	ON	ON	ON	ON	OFF
	62	OFF	ON	ON	ON	ON	ON	OFF

Table 53. Physical Level Settings for DIP Switches S2, S4, S7, and S9 - (continued)

		Physical Level	DIP Switch Position Number						
			1	2	3	4	5	6	7
S7 S8 S9 S10 S11 S12 S13 CONFIG MATRIX MAP S2 S3 S4 S5 CLEAR MEM	103	ON	ON	ON	OFF	OFF	ON	ON	
	104	OFF	OFF	OFF	ON	OFF	ON	ON	
	105	ON	OFF	OFF	ON	OFF	ON	ON	
	106	OFF	ON	OFF	ON	OFF	ON	ON	
	107	ON	ON	OFF	ON	OFF	ON	ON	
	108	OFF	OFF	ON	ON	OFF	ON	ON	
	109	ON	OFF	ON	ON	OFF	ON	ON	
	110	OFF	ON	ON	ON	OFF	ON	ON	
	111	ON	ON	ON	ON	OFF	ON	ON	
	112	OFF	OFF	OFF	OFF	ON	ON	ON	
	113	ON	OFF	OFF	OFF	ON	ON	ON	
	114	OFF	ON	OFF	OFF	ON	ON	ON	
	115	ON	ON	OFF	OFF	ON	ON	ON	
	116	OFF	OFF	ON	OFF	ON	ON	ON	
	117	ON	OFF	ON	OFF	ON	ON	ON	
	118	OFF	ON	ON	OFF	ON	ON	ON	
	119	ON	ON	ON	OFF	ON	ON	ON	
	120	OFF	OFF	OFF	ON	ON	ON	ON	
	121	ON	OFF	OFF	ON	ON	ON	ON	
	122	OFF	ON	OFF	ON	ON	ON	ON	
	123	ON	ON	OFF	ON	ON	ON	ON	
	124	OFF	OFF	ON	ON	ON	ON	ON	
	125	ON	OFF	ON	ON	ON	ON	ON	
	126	OFF	ON	ON	ON	ON	ON	ON	
	127	ON	ON	ON	ON	ON	ON	ON	

Glossary

AES

Audio Engineering Society. AES represents any of the digital audio standards established by the Audio Engineering Society.

AES/EBU

Name for a digital audio standards established jointly by the Audio Engineering Society and European Broadcasting Union. The sampling frequencies for this standard vary depending on the format being used.

Alarm

A signal indicating major or minor alarm conditions. An alarm condition causes the alarm relay contact to close. Some common alarm conditions include, power supply failure, fan failure, or over temperature.

All-level Takes

Switch the same input number on all Levels, to the controlled Destination.

AANSI

American National Standards Institute.

Assignment

Assignment is an action that grants permission for exclusive control of a resource. Multiple devices may be assigned permission for exclusive control of a single device, however only one may exercise control at a specific point in time.

Control of particular sources and TieLines can be Assigned to destinations on a case-by-case basis.

Backplane (Rear connector channel, Mother-board)

The circuit board at the back of an electronics frame where modules (from the front) and cables (from the rear) are plugged-in.

BNC

Bayonet Neill-Concelman (BNC) connector. (Named for its inventors). A type of coaxial cable connector.

BPS

Button Per Source. Name given to a panel feature that performs a source take with the single push of a button.

Breakaway

A Take operation which is performed by accessing the control Levels of a Destination individually and selecting a different Source on at least one Level than that selected on the others. Breakaways allow a Destination to selectively utilize video and audio from different Sources.

BSY

Busy. This is commonly found on the modules to identify the yellow busy LED.

Bus

A signal path to which a number of inputs may be connected to feed one or more outputs. Also, a signal path used to communicate between devices such as the node bus or the Control Panel bus. the node bus is used to communicate between the MCPU and the Controller modules. The Control Panel bus is used to communicate between the MCPU and Control Panels.

Chop

A variation of a Take command that alternately connects each of two different Sources to a single Destination (flip-flopping) at a designated switching rate (the chop rate).

Coaxial Cable (coax)

A cable which has a metallic noise shield surrounding a signal-carrying conductor. In video, the cable impedance is typically 75 ohms. Ethernet coax is typically 50Ω impedance.

Cold Start

A boot from power off.

Component Video

The un-encoded output of a camera, video-tape recorder, etc., consisting of 3 primary color signals: Red, Green, and Blue (RGB) that together convey all necessary picture information. In some component video formats, these three components have been translated into a luminance signal and two color difference signals, e.g. Y, R-Y, B-Y.

Composite Video

An encoded video signal, such as NTSC or PAL video, that includes horizontal and vertical synchronizing information.

Control Device

Panel, computer, or other device that controls router crosspoint selections.

Controllers

Part of the control system, Controllers are circuit modules which interface between the control system and signal processing modules.

CPO

Clear Protected Output.

Crosspoint (XPT)

An electronic switch that allows a signal to pass from an input to an output when the switch is closed.

DA

Distribution Amplifier used to expand outputs.

Default

The setup condition existing when a device is first powered-up or after a system restart.

Destination (DEST or DST)

The point to which Source signals are routed. A Destination may include one or more outputs, across multiple Levels, with any connector number offset (user-defined in system configuration).

DGND

Digital Ground.

DST

See *Destination (DEST or DST)*.

A conversational slave to a host computer.

EC I/F

External Control Interface.

EMI

Electromagnetic interference.

ERR

Error. This is commonly found on the modules to identify the red error LED.

Ethernet

A local area network (LAN) technology capable of transmitting information between computers at speeds of 10 and 100 Mbps.

Exclusion

User-determined Sources excluded from routing to a particular Destination.

FC

Frame Controller.

FET

Field Effect Transistor.

First Come First Served (FCFS)

Timeline status where it is not necessary to create a reservation to use the specified Timeline.

Flag

A parameter that can be set in a control panel template to control how the panel operates.

Flip-Flopping

Alternately connecting each of two different Sources to a single Destination (at a designated switching rate (See: *Chop*)).

GBR (Green, Blue & Red)

The three primary colors used in video processing, often referring to the three un-encoded outputs of a color camera. The sequence of GBR indicates the mechanical sequence of the connectors in the SMPTE standard. *Also see: RGB.*

GPI

General Purpose Interface.

GSC

Global Serial Channel.

Hardware

1. Electrical devices connected through physical wiring. 2. Electronic programming technique using physical connections and therefore essentially unalterable.

HDTV

Television with a resolution approximately four times that of Conventional Definition Television and a 16:9 (H x V) picture aspect ratio.

Heartbeat

A health status message provided by networked frames that are polled by MCPUs.

Horizon

A Grass Valley line of routing switchers.

HX

Grass Valley Horizon Series Crosspoint Routing System.

IBOP

Interconnect /Break Out Panel. An option panel used to add BNC connectors to an audio matrix using 50-pin D connectors.

ID or IDENT

A software routine that identifies a device (e.g. a control panel). Includes such information as:

- controlled Destination
- active tally level
- panel name
- software version
- system name

I/O

Abbreviation for input/output. Typically refers to sending information or data signals to and from devices.

Input

A single physical, numerically designated connection point of an in-coming signal to a matrix. One or more inputs can be assigned to a Source name during System Configuration.

Input Offset

Unlike traditional multi-level systems, Sources do not have to use the same input connector number on each matrix Level (i.e. RGB inputs for one Source can use input #1 in one matrix for R, input #4 in another matrix for G, etc.) The offset of the input numbers used is logged in the System Configuration.

J Number

Jack Number.

Jumper

A short conductor used to manually bridge two contact points. Used in Series 7000 Alarm system. Also called a strap.

Kadenza

A Grass Valley Group digital video effects system.

Kaleidoscope

A Grass Valley Group digital video effects system.

KISS

Key Input Source Select. Used in configuring the Kscope Key Sources.

KScope

The collective name for Kadenza and Kaleidoscope.

Krystal

A Grass Valley Group digital video effects system.

LED

Light emitting Diode. In Grass Valley products, LEDs illuminate to indicate a specific state (such as normal, error, on-line, and so on).

Local

Local is used during configuration to identify local Sources and Destinations. Local Sources and Destinations are inputs and outputs physically connected to the System using the related configuration file.

Master

A module that controls a subordinate (slave) module.

Matrices

Plural of matrix.

Matrix

A configuration of potentially intersecting inputs and outputs. In routing switchers, signal switching hardware configured such that any input may be switched to any output.

MC

Matrix Controller.

MEC

Matrix Element Control. The MEC bus connects the control circuits of the various matrix modules in a frame section to the Node Controller. In some cases, when the MCPU and Node Controller reside in the same frame, these connections are all internal to the frame. More often, there are multiple Node Controllers in a system and a coaxial cable is run between Node Bus ports of each frame in the system. Only secondary systems and a particular compact configuration run external MEC buses.

MEDIC

Matrix Element Decode Integrated Circuit. Used as a communications bus between the MCPU and Controllers.

Mezzanine

A secondary printed circuit module consisting of a flat circuit board of insulating material with conductive circuits etched on and/or components mounted on its surface. These submodules generally plug into a primary module. Sometimes referred to as a submodule or daughter board.

Module

A single circuit board or assembly of circuit boards that can be readily removed from an electronics frame without first having to remove screws or other mounting hardware.

Multiformat

Ability to pass multiple signal types, such as serial digital, analog component, and analog composite.

Name(s)

Sources, Destinations, Levels, Salvos, Control Panels, Controllers, Mezzanine Boards, Tally Modules, and other components all have names. When system software sets out to perform a function, a Take for instance, it looks for the source name, determines the inputs involved, and Takes the Source to the Destination specified (by name). Names are important to operation and equally so to configuration.

NB (Narrow Band)

Identifies the AES Audio Matrices.

See [See ..](#)

NTSC

Standard for scanning television signals. Used in the U.S., Canada, and Japan.

OUI

Operator User Interface. Refers to the Configuration Editor software program used to configure the Encore System.

Output

A single physical, numerically designated connection point of an out-going signal from a matrix. One or more outputs can be assigned to a Destination name during System Configuration.

PAL

Standard for scanning television signals. Used in most European countries.

Panel Prefixes

A set of 1-to-8 printable ASCII character strings assigned to the 16-button or 24-button keypads on control panels. Used with suffixes to comprise a complete Source or Destination name. (Prefixes and 1-character suffixes are assigned to panel Keypad sets.)

Panel Suffix Set

A set of single printable ASCII characters usually the numbers 0-9 assigned to 10 buttons of a control panel 16-button or 24-button keypad. Pre-configured defaults exist for suffix sets.

Panel Template

Configuration data specifying control panel configuration; which includes items such as Tally Level, Destination, button assignments, and Flags restricting or allowing certain actions. Completed templates are downloaded to specific control panels.

PLD

Programmable Logic Device.

Port

A connector, usually bidirectional, through which one device communicates with others.

Preset

Selecting a Source in preparation to taking it to air; a tentative change to one or more crosspoints which has not yet been executed.

Protect (PROT)

A control function which prevents control panels or devices from changing the current Source selection for the specified Destination.

PROTOVRD

Protect Override.

PWR

Power. This is commonly found on the modules to identify the green power LED.

Rack

An equipment rack. A standard EIA equipment rack is 19 inches (48.26 cm) wide.

Rack Unit (RU)

Unit of measure of vertical space in an equipment rack. One rack unit is equal to 1.75 inches (44.5 mm). The height of a GVG electronics frame is typically specified in rack units.

RAM

Random access memory.

RAS

Remote Access Service.

Rear Connector Channel

See *Backplane (Rear connector channel, Motherboard)*.

Reboot (Reset)

To restart a computer, reloading the software.

Redundant Power Supply

Backup power supply which takes over immediately if the primary power supply fails.

Remote

Remote is used during configuration to identify remote Sources and Destinations. Remote Sources and Destinations are inputs and outputs not physically connected to the System using the related configuration file. These remote Sources and Destinations are controlled over a network.

Reserved

Timeline status where a reservation is required to use a specified Timeline. See *First Come First Served (FCFS)*.

Reset

See reboot.

Resource Group

A resource group is an association of machine control devices all within a single work area.

RGB (Red, Green & Blue)

The three primary colors used in video processing, often referring to the three un-encoded outputs of a color camera. See *GBR (Green, Blue & Red)*.

ROM

Read Only Memory.

Room

A group of Destinations (usually a physical studio or control room within a facility) to which machine control and tally assignments can be made by an automated facility control system or the GUI Assignments menu. An assignment made to one Destination in a room allows control by any of the Destinations in that room.

RS-232 or RS-232C

A serial data communications standard. RS-232C is a low-speed serial interface which uses a single-ended (unbalanced) interconnection scheme. Commonly used in telecommunications to connect computers and terminals to modems and other devices. The C suffix refers to the version of the RS-232 standard.

RS-485

A high-speed serial interface connection between data communications equipment. RS-485 specifies the characteristics of a balanced (differential) multipoint transceiver/receiver interface.

RU

Rack Unit. See *Rack Unit (RU)*.

Salvo (SVO)

A named, system-wide Preset which, when executed, may change crosspoints on one or more Destinations at the same time.

Salvo Elements

The individual take commands (Source to Destination connections) which comprise a Salvo.

SDV

Serial Digital Video.

SERIM

Serial Interface Module.

Slave

Component in a system that does not act independently, but only under the control of another component.

Slice

A group of inputs and outputs assigned to a Controller.

Source

Software defined, can be made up of one or more inputs on one or more Levels (i.e., a Source may consist of one input on the video Level and two inputs [left and right] on the audio Level). Two different Sources may share one or more inputs on one or more Levels. For example, if the Source **BARSTONE** (Bars, Tone) consists of a video and an audio input connected to a Color bar generator, BarsSil (Bars, Silent) can use the same video input.

SMPTE

Society of Motion Picture and Television Engineers.

SRC

Source. See [Source](#).

SS

Secondary Switch used to expand inputs.

Status

The current Source connected to a given Destination on a specific Level (usually the Tally level); sometimes referred to as the on air signal.

STB

Strobe.

Strap

A short conductor used to manually bridge two contact points. Used in Series 7000 Alarm system. Also called a jumper.

Submodule

A small circuit board designed to mount on a larger module. Also known as a mezzanine board.

SVO

See [Salvo \(SVO\)](#).

SVR

Server.

Take

Direct, immediate switching from one Source to another, occurring during the vertical interval for clean transition. The control operation which switches a Source or Sources to a Destination.

Tally

An acknowledgment returned to a control panel or terminal that an operation has been executed.

Tally Level, Active

Initially set to the default tally level, the active tally level will tally if the default tally level is not defined for the Destination assigned to a bus.

Tally Level, Default

Set during Configuration, this level is the default Level that will tally in panel displays if no other Level tally is activated by control panel operation.

Tally Modules

Circuit modules, housed in Grass Valley MAX Series frames, which use opto-isolated inputs and relay closure outputs to facilitate visual or aural tally indicators within a facility. For example, when a Source machine is selected on a Destination, the returned tally could light a lamp to let the machine operator know that a machine was in use.

TCI

Terminal Computer Interface.

Terminate, Termination

To complete a circuit by connecting a resistive load to it. A video termination is typically a male BNC connector which contains a 75-ohm resistive load.

TieLine

A physical connection used to give a Destination connected to the output of one matrix access to Source equipment connected to the input of another matrix. A signal which passes through 2 or more matrices; more specifically the path (consisting of 1 or more Tie Wires) which links a Destination of one matrix to a Source of another matrix. Tielines are established during system configuration.

TieLine Type

Is the Level created to be assigned to one end of a TieLine. Each TieLine must have two TieLine Types, one for each end.

Tie Wire

A physical cable which links the output of one matrix to the input of another matrix. One or more tie wires comprise a tie line.

Time Code

Timing code laid down on video tape to give each frame a unique number to ensure exact transitions during editing.

Timing Scatter

The temporal range of the different electrical lengths of router paths.

TLVL

Tally Level.

TM

Tally Module.

Toggle

To switch back and forth between two settings.

Twisted Pair

A cable composed of two small insulated conductors twisted together without a common covering.

UART

Universal Asynchronous Receiver Transmitter.

UMD

Under Monitor Display.

VI

Vertical Interval.

Virtual Matrix

Virtual Matrices can be used to fragment a Physical Matrix when a matrix such as Concerto is controlled by the SMS Series 7000 Control System. Inputs and Outputs within a Virtual Matrix need not be contiguous. Only Destinations with Outputs in a given Virtual Matrix will be able to directly, without using a TieLine, access the Sources within that Virtual Matrix. As an example of their functionality, Virtual Matrices, working with control Levels, allow you set up selected Inputs and

Outputs to handle R, G, B video signals by assigning each component to its own Virtual Matrix. Extending this example, if you assign the R, G, and B Virtual Matrices to the same control Level, they will always switch together as a married block; if you assign the R component Virtual Matrix to one Level, and the G and B Virtual Matrices to a second Level, you would then be able to break the R component away from the other two by selecting to control only the R Virtual Matrix associated Level at the control panel.

VISS

Video Input Source Select.

VITC

Vertical Interval Time Code.

VOM

Video Output Monitor

VSD

Visual Status Display.

VT100

A standard protocol for dumb terminals. VT100 terminals may be used for router diagnostics.

Warm Start

A boot from power on, where the CPU and peripherals are already powered up (warm).

A warm boot might be performed after a software crash or a hardware reset.'

WO

Which block of Outputs.

XPT

See Crosspoint.

YUV

A type of video which employs luminance (Y) and two color components (U [B-Y] and V [R-Y]).

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