Instruction Manual

Tektronix

Grass Valley Series 7000-HD Signal Management System

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Preface

About This Manual

This manual provides installation, operation, and service information specific to the Series 7000-HD Router Products.

Documentation Set

The Series 7000-HD Router Products are designed to work with a Series 7000 system, including matrices, control panels, and version 7.0 or later software.

The Series 7000 manual set contains information that is general to the operation of all Series 7000 devices including the HD routers. An electronic copy of the manual set is on the version 7.0 or later software CD ROM.

Conventions Used In This Manual

Menu selections, soft buttons, or other software generated items in the Series 7000 Configuration Editor GUI are shown in the following type:

- Click **OK**.
- Under **SETUP**, select **NODE CONTROLLERS** to access the Cfgd Node Ctrlr Actions window.

Labels printed on the Series 7000-HD frame are shown in the following type:

- Loop-through BNC connectors labeled **Reference Loop** are located on the back of the 32x32HD frame for sync input.

Important Safeguards

Please read and follow the important safety information listed below, noting especially those instructions related to risk of fire, electric shock or injury to persons. Additional specific warnings not listed here may also 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.**

Injury Precautions

Use Proper Power Cord

To avoid fire hazard, use only the power cord specified for this product.

Ground the Product

This product is grounded through the grounding conductor of the power cord. To avoid electric shock, the grounding conductor must be connected to earth ground. Before making connections to the input or output terminals of the product, ensure that the product is properly grounded.

Do Not Operate Without Covers

To avoid electric shock or fire hazard, do not operate this product with covers or panels removed.

Use Proper Fuse

To avoid fire hazard, use only the fuse type and rating specified for this product.

Do Not operate in Wet/Damp Conditions

To avoid electric shock, do not operate this product in wet or damp conditions.

Do Not Operate in an Explosive Atmosphere

To avoid injury or fire hazard, do not operate this product in an explosive atmosphere.

Avoid Exposed Circuitry

To avoid injury, remove jewelry such as rings, watches, and other metallic objects. Do not touch exposed connections and components when power is present.

Product Damage Precautions

Use Proper Power Source

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

Use Proper Voltage Setting

Before applying power, ensure that the line selector is in the proper position for the power source being used.

Provide Proper Ventilation

To prevent product overheating, provide proper ventilation.

Do Not Operate With Suspected Failures

If you suspect there is damage to this product, have it inspected by qualified service personnel.

Safety Terms and Symbols

Terms in This Manual

These terms may appear in this manual:

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

CAUTION ***CAUTION:*** Caution statements identify conditions or practices that can result in damage to the equipment or other property.

Terms on the Product

These terms may appear on the product:

DANGER indicates a personal injury hazard immediately accessible as one reads the marking.

WARNING indicates a personal injury hazard not immediately accessible as you read the marking.

CAUTION indicates a hazard to property including the product.

Symbols on the Product

DANGER. High voltage. Presence of dangerous voltage within the equipment enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

ATTENTION. Refer to manual. Presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

The fuse referenced in the text must be replaced with one having the ratings indicated.

Protective grounding terminal. Such a terminal must be connected to earth ground prior to making any other connections to the equipment.

External protective grounding terminal. Such a terminal may be connected to earth ground as a supplement to an internal grounding terminal.

Equipment contains static sensitive components. Use anti-static grounding equipment whenever handling or servicing modules and components. When circuit modules are removed from the frame, place them on a flat static controlled surface. Failure to follow this precaution can result in component damage due to electrostatic discharge.

Regulatory Notices

Certifications and Compliances

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.

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 Tektronix 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 present appareil numerique n'emet pas de bruits radioelectriques depassant les limites applicables aux appareils numeriques de la classe A prescrites dans le Reglement sur le brouillage radioelectrique edicte par le ministere des Communications du Canada.

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.

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.

Section 1

Overview

Introduction

The Series 7000-HD expands the multiformat routing capability of the Series 7000 Signal Management System to include routing of full bandwidth High Definition Television (HDTV) signals. Series 7000-HD components are compatiable with existing Series 7000 matrices and control panels.

High Definition Background

HDTV is a form of digital television, which for home delivery uses MPEG-2 compressed video and Dolby AC-3 compressed audio. HDTV contains at least twice the resolution of existing analog broadcast television (NTSC, PAL, and related formats) in both the horizontal and vertical directions (400% total increased resolution). HDTV is also presented at a 16:9 aspect ratio, compared to existing analog broadcast's 4:3 ratio, providing 33% more picture area.

Related to HDTV is HD serial digital video. For full resolution broadcast, HD serial digital video is fed to an encoder at the broadcast station which compresses the video, combines it with compressed audio, and passes the resultant digital signal to the transmitter for public consumption.

The biggest technical difference between standard definition (SD) serial digital video and HD serial digital video is the data rate. HD video has a data rate 5.5 times (1.485 GBits/sec) that of SD video. HD video interconnections use 75 ohm coax, like SD video, but the correct cables must be used and cable runs will be limited. Connectors and patch panels must be specially constructed for HD rates to minimize signal degradation.

Several different HD video resolution and frame rates exist. Probably the most widely supported formats are 1920x1080 interlaced at 30 frames per second (1080i) , and 1280x720 progressive (720p) at 60 frames per second.

32x32HD Router

The 32x32HD router has 32 inputs and 32 single outputs. It was designed to switch uncompressed serial digital SMPTE 292M at 1.485 Gbps rate and in non-reclocking mode to handle data rates from 10 Mbps to 700 Mbps.

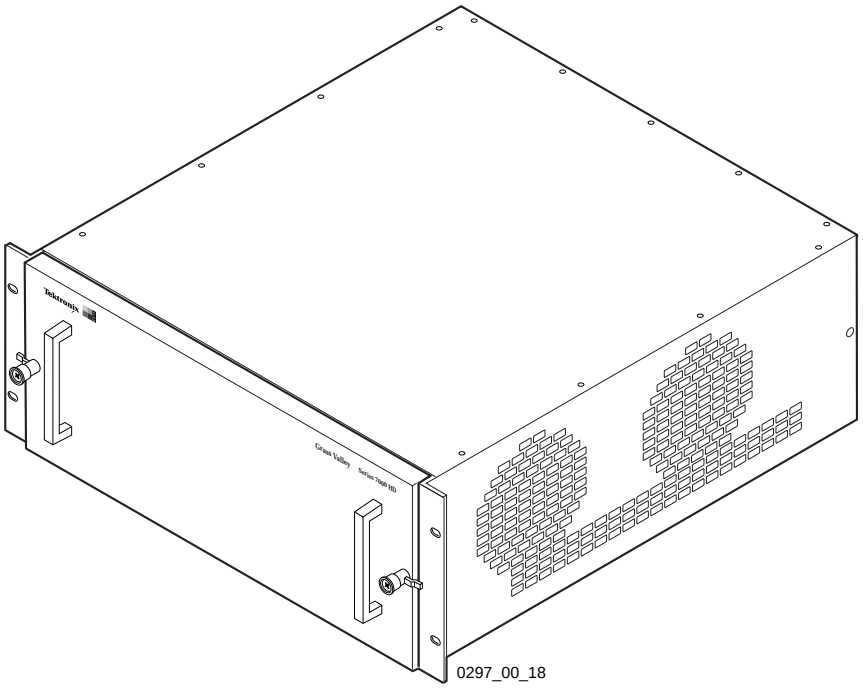

Figure 1-1. 32x32HD Router

System Level Architecture

System Level Architecture addresses the configuration of your system and how the signal flows.

32x32HD System Level Architecture

The 32x32HD router is configured with a controller module, a power supply module, two 16x16 video modules and an interconnect. Inputs and Outputs 1-16 are routed through the backplane to the upper video module. Inputs and Outputs 17-32 are routed through the backplane to the lower video module. The interconnect passes signals between the two video modules so that any single input is accessible to any output. The router has two controller module slots and two power supply module slots to allow for redundancy. Cooling is by horizontal airflow using a two fan vertically mounted module on the left side of the frame and an air filter on the right side.

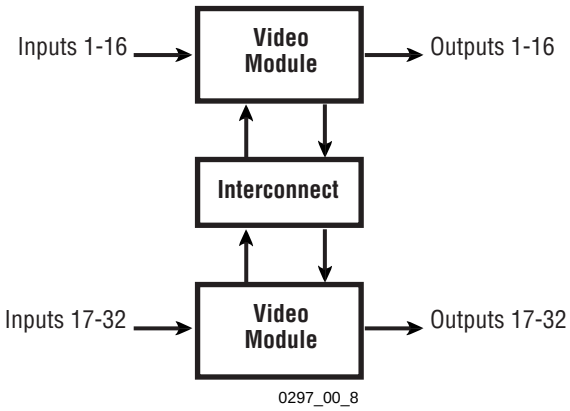

Figure 1-2. 32x32HD System Signal Flow

Specifications

Table 1-1 contains specifications for the 32x32HD router.

Table 1-1. 32x32HD Specifications

Video/Data Inputs	
Type	Serial Digital conforming to SMPTE 292M
Connector	75 Ohm BNC
Quantity	32
Return Loss (1MHz to 1500MHz)	15 dB minimum
Cable Equalization	Automatic for up to 100m of Belden 1694A @ 1.5 Gbps Automatic for up to 100m @ 270 Mbps
Video/Data Outputs	
Type	Serial Digital conforming to SMPTE 292M
Connector	75 Ohm BNC
Quantity	32
Return Loss (1MHz to 1500MHz)	10 dB minimum
Output Signal Amplitude	800 mV + 10% when terminated into 75 Ohms.
Output DC Offset	+ 0.5 V when terminated into 75 Ohms.
Rise/Fall times	<220 pS (measured from 20% to 80 %) when terminated into 75 Ohms.
Operational Modes/Performance	
Reclocked	1.485 Gbps
Reclocked Jitter	<100 pS
Non Reclocked	Operation from 10Mbit/s to 700Mbit/s with signals that have a maximum ones/zeros ratio of 20:1
Non Reclocked Jitter Addition	<150 pS
Input to Output delay	11nsec +/- 1.25nS, Reclocked. 10.34nsec +/- 1.25nS, Non Reclocked
Vertical Interval Switch	Software controlled, with respect to the Analog Reference Input
Reference Input	
Type	Analog PAL or NTSC Color Black.
Connectors	2 BNCs configured as Loop-Through.
Level	300mV +/- 100mV Sync Amplitude When terminated in 75 Ohms.
Return Loss	> 30 dB to 5MHz

Table 1-1. 32x32HD Specifications

Node Control (Node Bus)	
Type	1Mbit/s Serial Bus
Quantity	1 High Impedance Loop Through
Connector	BNC
Level	1Vpp to 8Vpp Pulse Amplitude
Return Loss	>20 dB to 1MHz
Consoles/Options	
Type	Dual Purpose; 2 RS232 console ports with Controller installed or MEDIC bus access via terminator module installed in place of the Controllers
Quantity	1
Connector	D Type, 25p
External Comm Ports	
Type	RS422 Serial Ports, Software determines usage (not specified)
Quantity	Total 3
Connector	D Type, 9p
Ethernet Ports	
Type	10 Base T
Quantity	Total 2
Connector	RJ-45
Frame Power	
Connector Type	IEC Filtered AC connector
Quantity	2
Voltages	90-240 VAC, converted to +24VDC internal bus.
Frame Power Consumption	120W
Fuses	
Video Module	7 amp 125V (F) F1 Fast
Controller Module	3 amp 125V (F) F1 Fast

Table 1-1. 32x32HD Specifications

Mechanical		
Dimensions		4RU Frame 18 x 43 x 49 cm (7“ H x 17“ W x 19.25“ D)
Weight	Configured 32x32	19.99 kg (44 lbs)
	Configured 16x16	17.69 kg (39 lbs)
Environmental		
Operating Temperature		0 to 40 degrees Centigrade ambient
Relative Humidity		0 to 90% non-condensing.

Section 2

Installation

Introduction

The Series 7000-HD routers are added to existing Series 7000 systems as new frames.

Rack Layout

The Series 7000-HD router is installed in a standard 48.26 cm (19″) equipment rack.

32x32HD Rack installation

The 32x32HD router is four rack-units high. Cooling is by horizontal air-flow using a two fan vertically mounted module on one side of the frame and an air filter on the other side. The video, controller, and power supply modules are mounted horizontally.

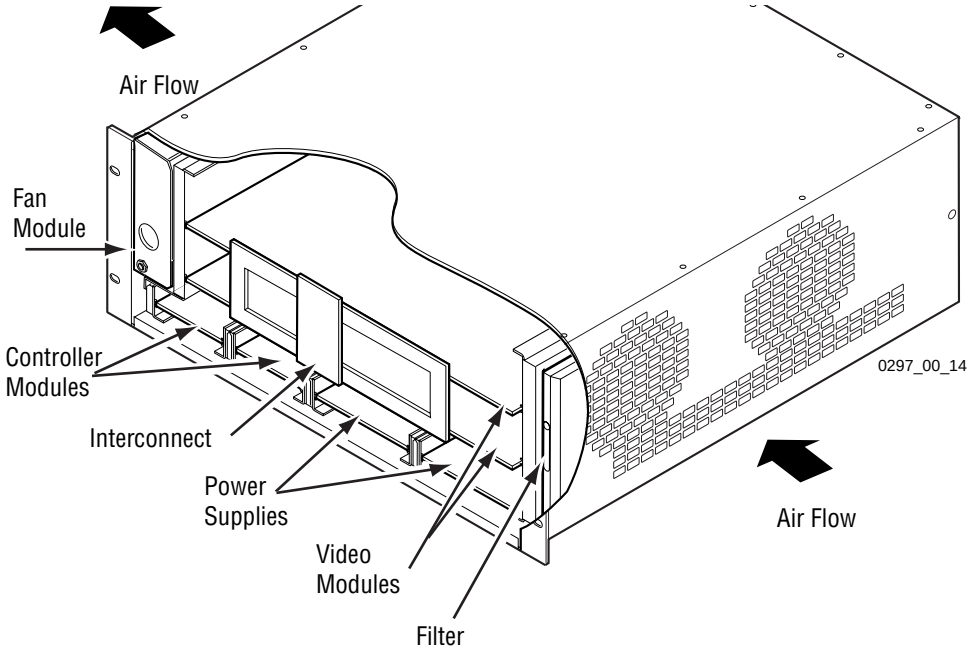

Figure 2-1. 32x32HD Router Module Configuration

When installing a 32x32HD router in a frame with other Series 7000 components keep the 32x32HD router out of the airflow path of the vertically cooled components.

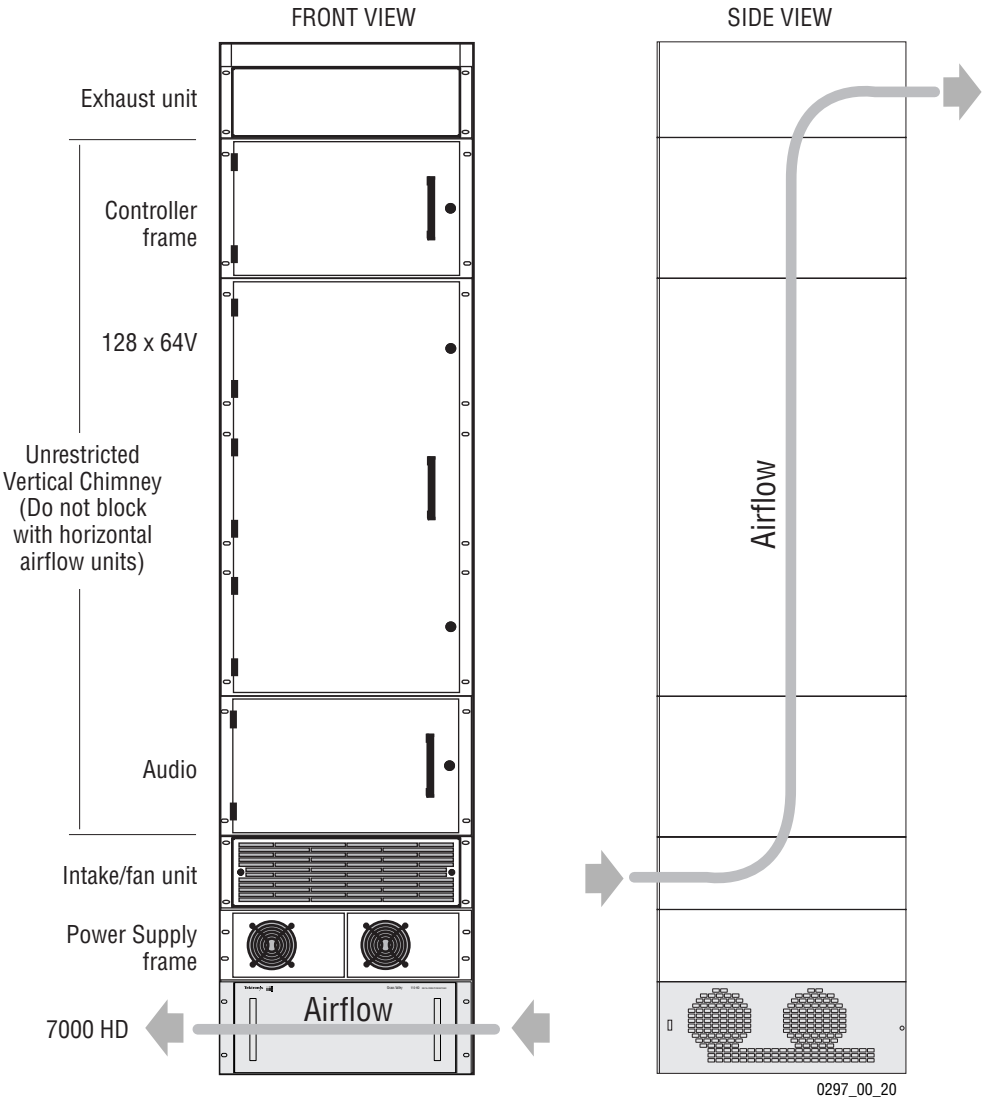

Figure 2-2. 32x32HD Installation Examples

Use screws specified by the rack manufacturer (not supplied) to secure the frame in the equipment rack. Place a screw in every mounting slot in the frame.

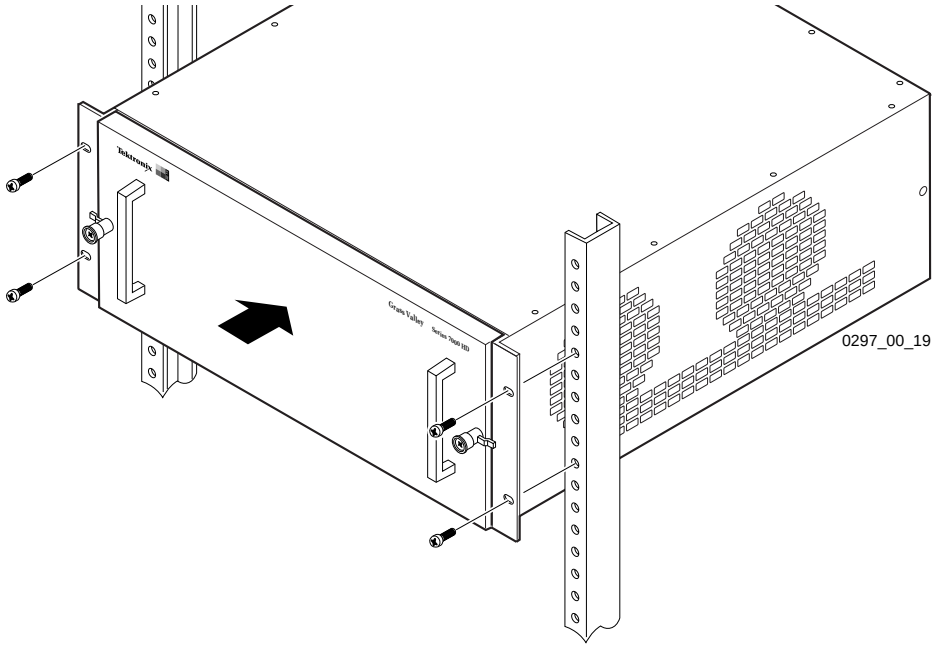

Figure 2-3. 32x32HD Rack Mount

Cabling

Series 7000-HD routers use various types of connectors to interface with other components in a system.

32x32HD Cabling

Control Interconnect Cabling

The 32x32HD router connects to a Series 7000 system via the **Node Bus Loop** connection. Use 75 ohm coax cable to connect the 32x32HD router to either a Series 7000 MCPU frame or a matrix in a Series 7000 system. The Node Bus can support matrices up to the limit configured for the Series 7000 system. The last matrix on the Node Bus must be terminated with a 75 ohm terminator.

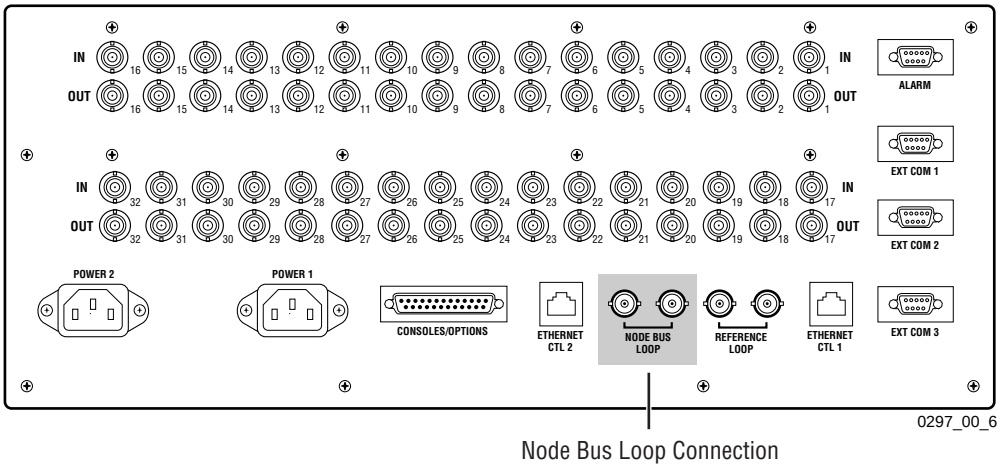

Figure 2-4. 32x32HD Node Bus Loop Connection

Video Reference

32x32HD routers use NTSC color black as the video reference input. The vertical interval switching point for HDTV will be determined by software in relation to the NTSC color sync reference.

Loop-through BNC connectors labeled **Reference Loop** are located on the back of the 32x32HD frame for sync input.

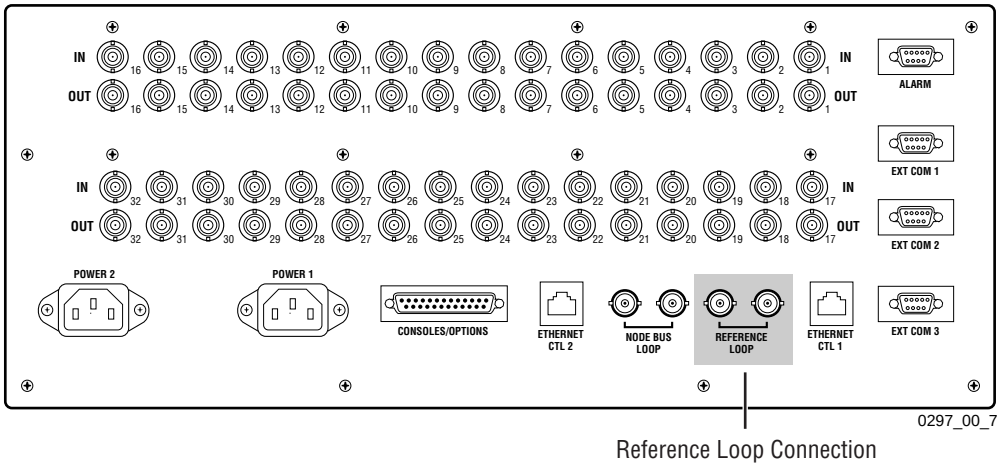

Figure 2-5. 32x32HD Reference Loop Connection

Matrix Cabling

32x32HD routers switch uncompressed serial digital SMPTE 292M HDTV signals at 1.485 Gbps. Data rates from 40 Mbps to 400 Mbps are switched in non-reclocked mode.

The 32x32HD frame has one matrix in a four rack-unit frame. The matrix can be sized as either a 16x16 or a 32x32. Figure 2-6 shows the location of the 32 Inputs and the 32 single Outputs.

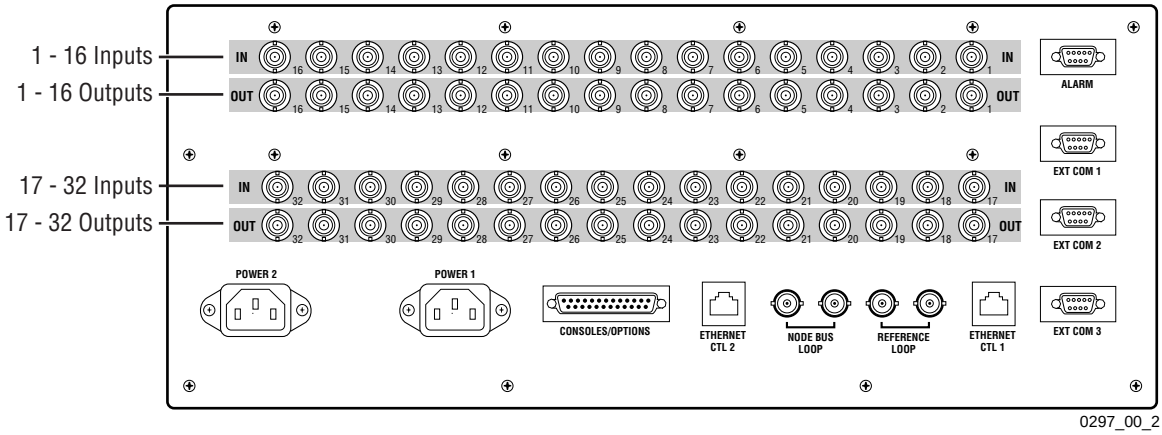

Figure 2-6. 32x32HD Input and Output Connections

Optional and Future Use Connectors

There are seven connectors on the back of the 32x32HD router that are to be used for options and future use development. Table 2-1 lists these connectors. The Alarm connector is not implemented and all alarm information is sent to the Controller module.

Table 2-1. Optional and Future Use Connectors

Connector	Type	Use
CONSOLE/OPTIONS	25-Pin Female D	Optional Interface with M2100 and Future Use
ALARM	9-Pin Female D	Future Use
EXT COM 1	9-Pin Female D	Future Use
EXT COM 2	9-Pin Female D	Future Use
EXT COM 3	9-Pin Female D	Future Use
ETHERNET CTL 1	Network	Future Use
ETHERNET CTL 2	Network	Future Use

Power

The 32x32HD router uses an internal 200W 24V power supply module that is auto ranging. Two power supply module slots are available for optional redundancy. The AC input range is 90 to 132 VAC and 180 to 260 VAC auto switching. Figure 2-7 shows the **AC IN** connections on the back of the 32x32HD frame.

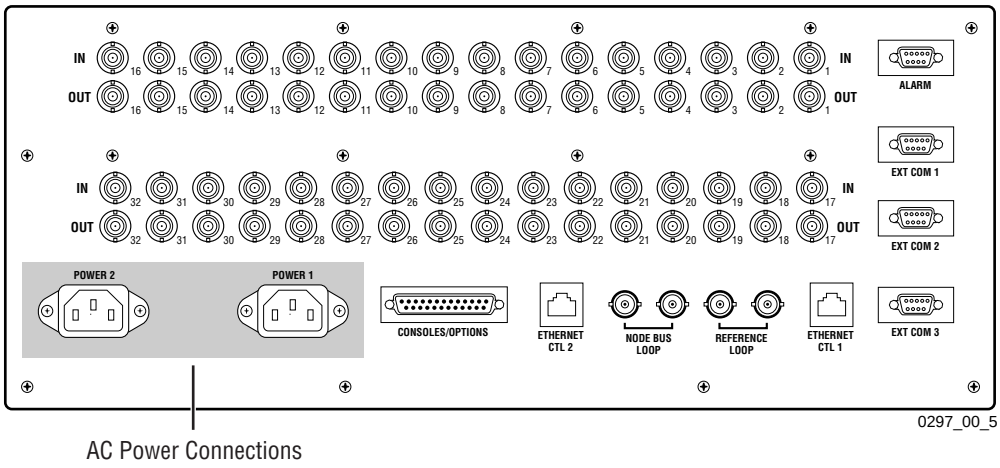

Figure 2-7. 32x32HD AC Power Connections

Section 3

Configuration

Introduction

The Series 7000-HD product line uses a matrix controller that is configured using the Configuration Editor Graphical User Interface (GUI).

Matrix Controller (Node Controller)

Refer to the *Configuration Manual* for more information on Node Controllers. The following procedure configures a 32x32HD router to work with a Series 7000 system.

To Configure a Series 7000-HD Matrix Controller:

1. Under the **SETUP** menu, select **NODE CONTROLLERS** to access the Cfgd Node Ctrlr Actions window.

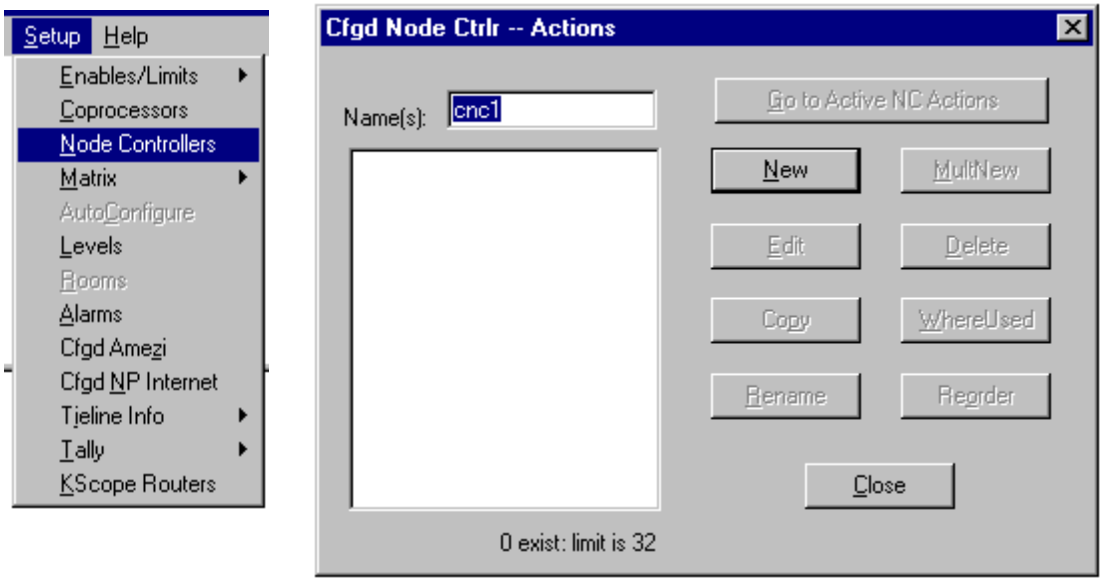

Figure 3-1. Node Controller Menu and Cfgd Node Ctrlr Actions Window

2. Enter a name.

3. Select **NEW**.

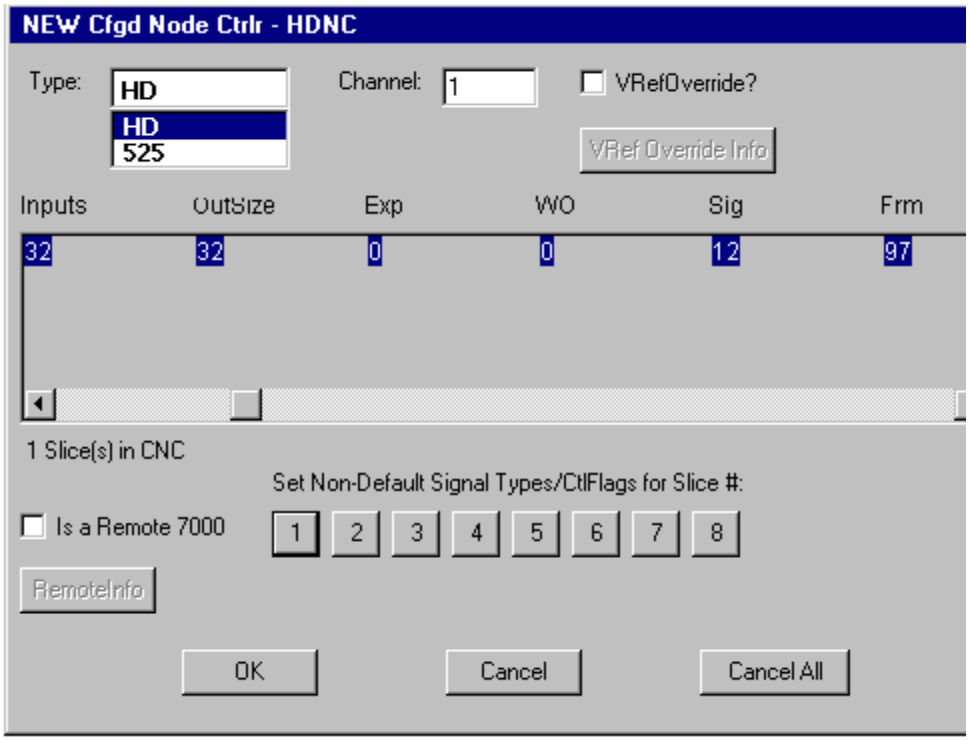

Figure 3-2. New Cfgd Node Ctrlr Window

4. Select HD for Type.

5. Enter 1 for Channel.

6. Enter the Slice Settings in Table 3-1. The Slice Info Window is a multi column window. 32x32HD router Node Controllers have only one slice.

Table 3-1. Slice Settings

Slice Setting	Entry
Inputs	32
Outsize	32
Exp	0
WO	0
Sig	12 (auto Reclocking) for HDTV 7 (bypass Reclocking) for SDTV
Frm	97

7. Ensure that the VRef Override check box is not checked.

8. Create a Physical Matrix, Virtual Matrices, Levels, Sources, and Destinations. Refer to the *Configuration Manual* for instructions.

SET NON-DEFAULT SIGNAL TYPES/CTLFLAGS is not used as there is only one slice and all signals should be set to the same signal type for HDTV.

Section 4

Functional Description

Introduction

The Series 7000-HD routers use Video, Controller, and Power Supply modules.

Video Module

Each Video module takes 16 SMPTE 292 inputs and 16 Positive Emitter Coupled Logic (PECL) SMPTE 292 inputs and switches them to any of the 16 outputs. One interconnect will allow two of these modules to operate as a 32 x32HD router. All SMPTE 292 outputs are reclocked. All other data rates are bypassed around the reclocker (non-reclocked).

LED Indicators

Each Video module has seven status LEDs (Figure 4-1). Three LEDs are along the front edge of the module and four LEDs are located along the right side of the module.

Table 4-1. Video Module LEDs

Location	LED	Color	Meaning
Front Row	CNTRL	Green	On when in normal mode.
	PWR	Green	On if all the voltages are healthy.
	BUSY	Yellow	Strobe on when module is reading or writing to a communication register.
Right Side Row	XIL DONE	Green	On after the Xilinx has been loaded from the serial eeprom.
	OVER TEMP	Red	On when module has over heated.
	INPUT_CD	Green	On if carrier is present on at least one input.
	OUTPUT_CD	Green	On if carrier is present on a least one output.

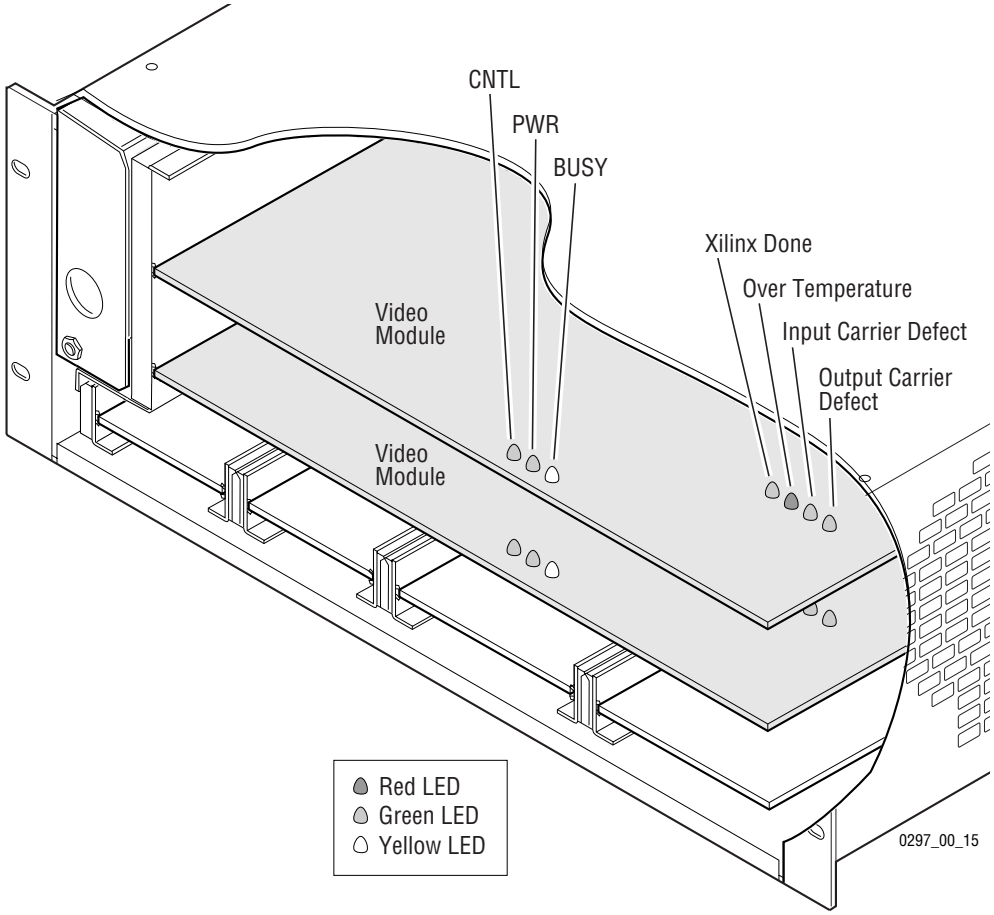

Figure 4-1. Video Module LEDs

Controller Module

The Controller module interfaces between the Master Control Processing Unit (MCPU) of a Series 7000 system and the Video module.

LED Indicators

Each module has 23 status LEDs (Figure 4-2).

Table 4-2. Controller Module LEDs

Location	LED	Color	Meaning
Front Row	Active	Green	Hardware communication output drivers are active (enabled). In a frame with redundant Controller modules only one module will have the LED turned on.
	Ethernet Group - Indicates status of ethernet communication hardware.		
	Xmit	Green	Normally off unless data is being transmitted from the ethernet port (i.e., flashes as data is transmitted).
	Rcv	Yellow	Normally off unless data is being received from the ethernet port (i.e., flashes as data is received).
	Coll	Red	Normally off unless collisions are detected on the ethernet bus (i.e., flashes when collision is detected).
	Comm 2 Group - Indicates status of the external communication 2 hardware.		
	Xmit	Green	Normally off unless data is being transmitted from the comm 2 port (i.e., flashes as data is transmitted).
	Rcv	Yellow	Normally off unless data is being received from the comm 2 port (i.e., flashes as data is received).
	Comm 3 Group - Indicates status of the external communication 3 hardware.		
	Xmit	Green	Normally off unless data is being transmitted from the comm 3 port (i.e., flashes as data is transmitted).
	Rcv	Yellow	Normally off unless data is being received from the comm 3 port (i.e., flashes as data is received).
	Ref Group - Indicates status of the video reference hardware.		
	VI Pres	Green	On when video reference (usually video color black) is present at the board video reference input.
	TC Pres	Green	On when SMPTE timecode is present at the module timecode input (VITC).
	System Group - General board status.		
	Error	Red	Normally off. It is turned on by the Controller software to indicate a board or software error.
	Busy	Yellow	On when the Controller is in control of the frame matrix hardware. In a frame with redundant Controllers only one Controller will have this LED turned on. This LED is controlled by software. Flashes when messages are received from control system.
	Power OK	Green	On any time power is applied to the board.

Table 4-2. Controller Module LEDs

Location	LED	Color	Meaning
Back Row	**Test Group - Used at Factory**		
	0-3	Red	Off factory use only
	4-5	Green	Off factory use only
	NBX Group - Indicates status of the Node Bus Executive processor.		
	0	Green	Watchdog-toggles 1/sec if operating normally.
	1	Green	Application debug - normally off.
	2	Red	Event indicator - on briefly when abnormal event or error occurs. Usually indicates a communication error.
	3	Green	Application debug - normally off.

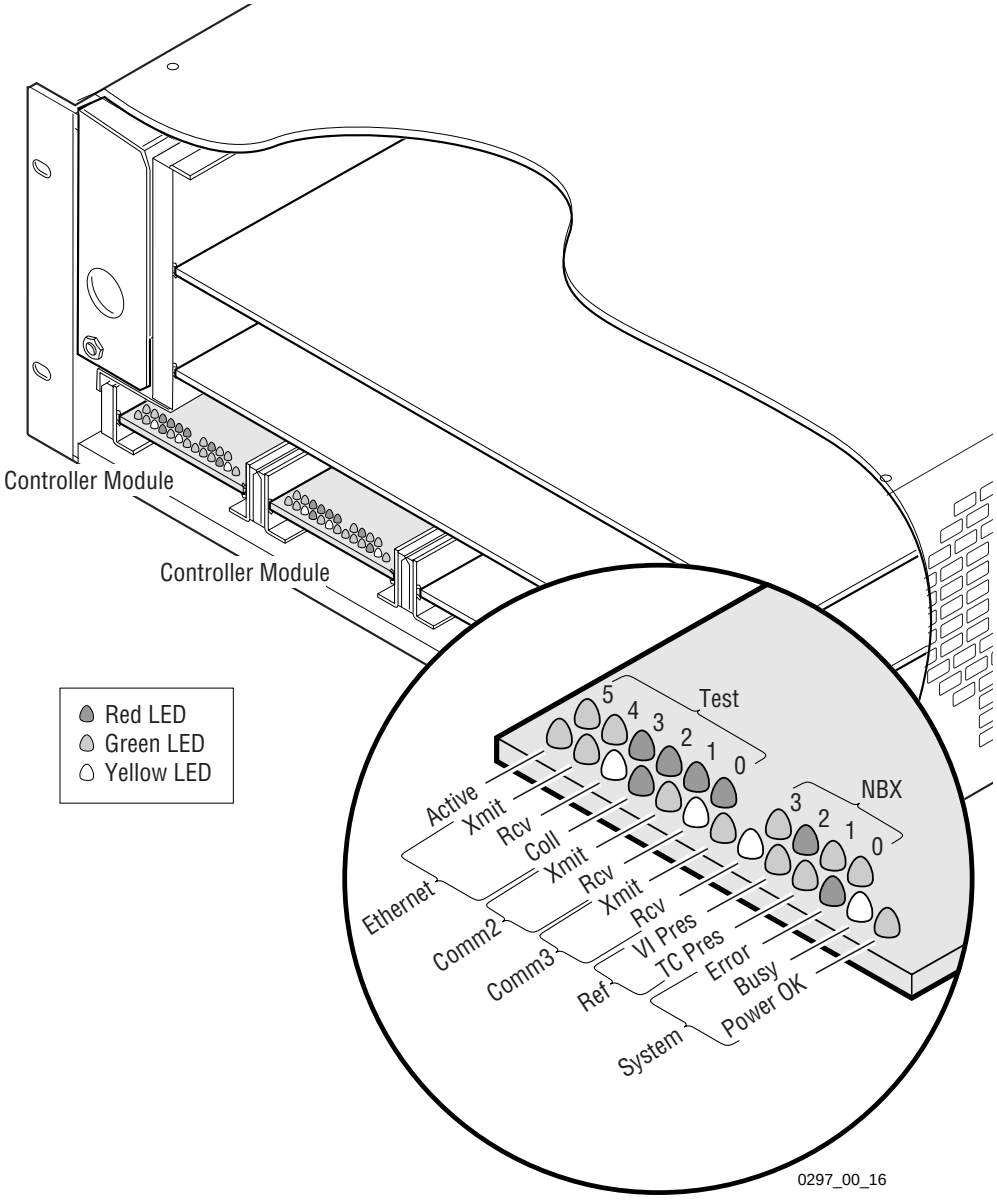

Figure 4-2. HD Video Module LED Indicators and Testpoints

Power Supply Module

Each Power Supply module is an 200W 24V module that is auto ranging.

Testpoints and LED Indicator

The two testpoints are GND and +24V. All AC to DC converter voltages are monitored for under voltage conditions. A green LED is illuminated if all the voltages are healthy.

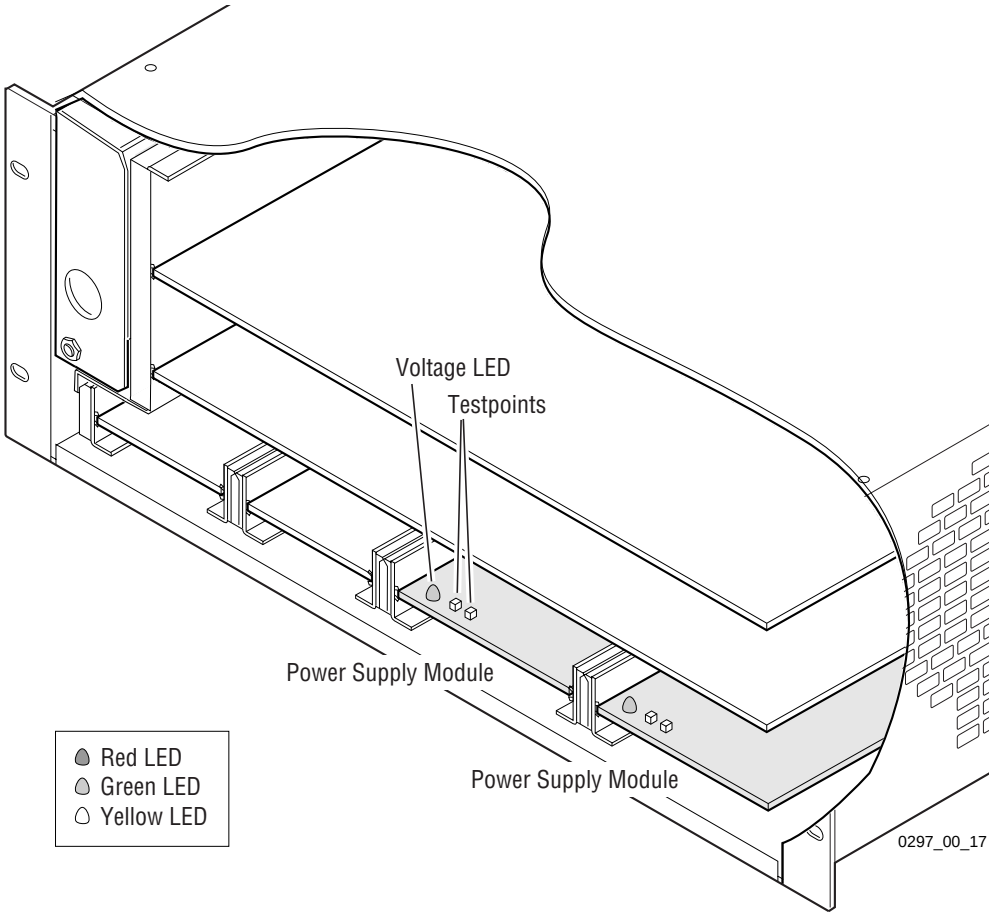

Figure 4-3. HD Power Supply ModuleTestpoints and LED Indicator

Section 5

Maintenance

Introduction

Series 7000-HD routers are designed to be used with Series 7000 systems. The information in *Section 2 Maintenance & Diagnostics* in the *Series 7000 Service Manual* applies to Series 7000-HD routers.

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.

32x32HD Field Replaceable Units

The 32x32HD router Video, Controller, and Power Supply modules can be removed and replaced by spares. The fan assembly can be replaced by a complete new assembly or one of the two fans can be replaced. The filter slides in and out for easy replacement.

Modules

Video or Controller modules can be inserted or removed from the frame without powering down the system. AC power cords must be removed before inserting or removing Power Supply modules.

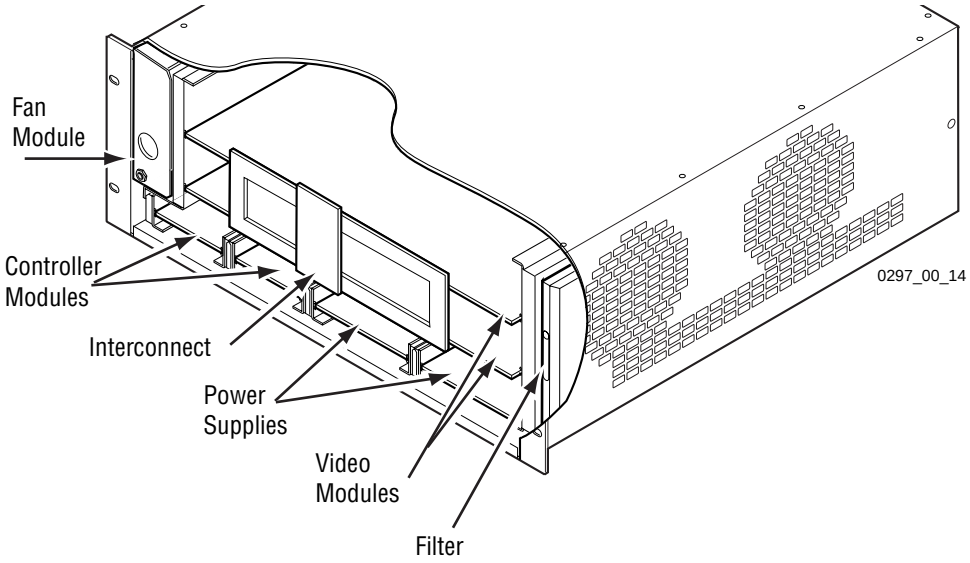

Figure 5-1. 32x32HD Module Placement

To Remove 32x32HD Modules:

1. Lift the ejector tabs on the front of the module. Remove the interconnect if replacing Video modules.
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 32x32HD 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. Use caution when inserting modules. Do not force modules into slots.

Fan Assembly

The Fan Assembly can be replaced as a complete unit or either of the two fans can be replaced within the assembly.

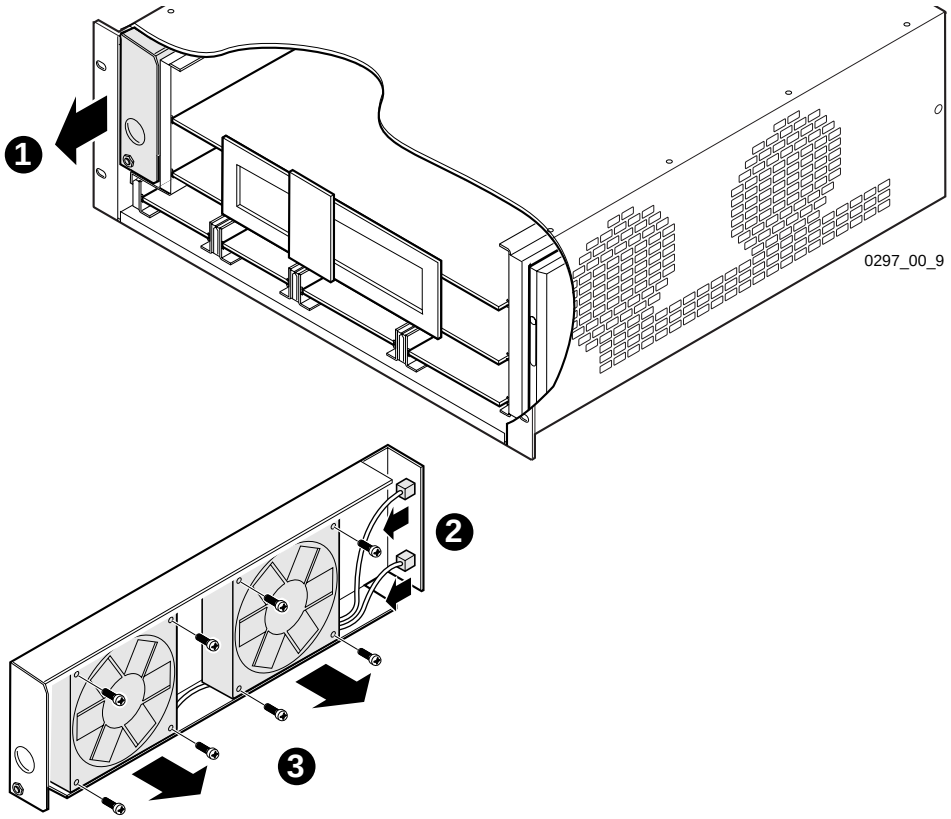

Figure 5-2. 32x32HD Fan Assembly

To Replace a Fan:

1. Loosen the bolt on the front of the fan assembly.
2. Slide the fan assembly out of the frame.
3. Remove the four screws on the defective fan,
4. Disconnect the wires from the defective fan.
5. Connect the wires to the new fan.
6. Place the new fan in the fan assembly and replace the four screws.
7. Slide the fan assembly into the frame.
8. Tighten the bolt on the front of the fan assembly.

Filter

The filter slides in and out for easy replacement.

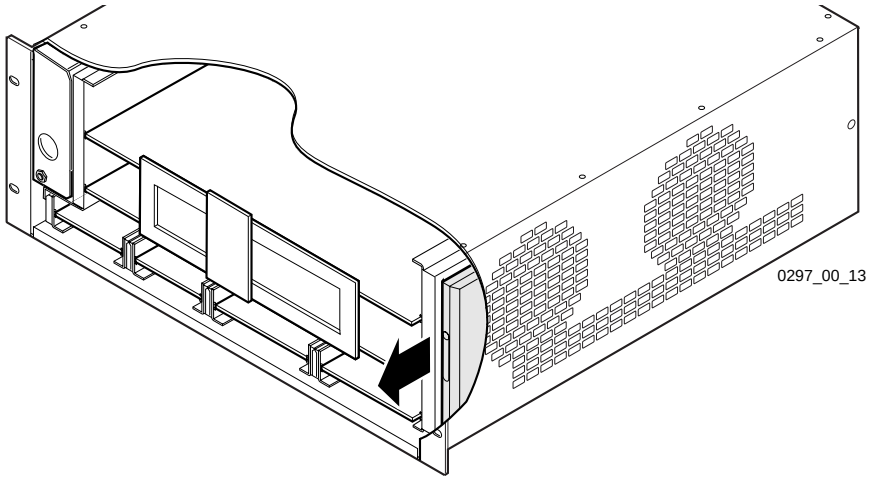

Figure 5-3. 32x32HD Filter

Service and Replacement Parts

Replacement parts can be ordered. Use the information on the back of the title page to contact Customer Service. They will provide the current part numbers, part availablity, and ordering directions.

Glossary

1080i

An abbreviated term for a high definition digital video signal as defined by SMPTE 274M. 1080i signals have 1920 horizontal pixels per line, 1080 active lines, and are interlace with two fields per frame.

720p

An abbreviated term for a high definition digital video signal as defined by SMPTE 296M. 720p signals have 1280 horizontal pixels per line, 720 active lines, and are progressive scan.

AC-3

A transport mechanism for multi-channel audio, as defined by ATSC specification A-52. AC-3 is used as the audio delivery system for DTV programs.

Analog

Use of a continuously variable signal to convey information. Conventional Definition Television (NTSC, PAL, etc.) is analog.

Aspect

The ratio of a picture's horizontal and vertical dimensions when correctly displayed (16:9 for example).

ATSC

Advanced Television Systems Committee, developer of the HDTV standards recommended to the FCC for adoption.

Auto Ranging

AC input range selections of 90 to 132 VAC and 180 to 260 VAC are automatic.

Bit Rate

The number of bits per second passed from one point to another.

Black Burst

See Color Black.

Color Black

An analog synchronizing signal consisting o f horizontal, vertical, and color synchronizing information. This signal produces a black screen on a Conventional Definition television monitor.

Component Video

A video signal that keeps color and luminance information separate. RGB; Y, R-Y, B-Y; and Y, Cr, Cb are examples of component video.

Composite Video

An encoded video signal that combines color information with luminance information. NTSC, PAL, and D-2 are examples of composite video.

Conventional Definition Television (CDTV)

The analog NTSC, PAL, SECAM, and related television systems.

Delegate

To assign panel controls to a particular operating function. Some panel controls (buttons, knobs, joystick) can affect more than one function. The operator can choose an alternative function by delegating the panel controls to that function (typically by pressing or holding down a panel button).

Deserializer

A device that converts serial digital information to parallel.

Digital

Use of discrete signal levels that correspond to logic 1 or 0 to convey information.

Digital Television (DTV)

The digital television broadcasting system that replaces analog television. DTV includes both HDTV and SDTV broadcast in digital form using MPEG-2 compression for video, AC-3 compression for multichannel audio, and 8-VSB modulation for digital terrestrial transmission.

Field

One scan of an interlaced video image. In interlace systems (1080i, for example) two fields are required to make a complete picture (video frame) because alternate lines are scanned. Note that on progressive systems (720p, for example), one scan contains all the image information, and so this single scan is called a frame rather than a field.

Field Replaceable Units

Components of a frame, matrix, switcher, etc. that can be removed and replaced with a spare. Field Replaceable Units are not repaired in the field and are sent to designated repair depots.

Frame

One complete scan of a video image. For progressive video, all the lines in a frame are scanned successively from top to bottom. For interlace video, alternate lines are scanned, and so a frame containing all the picture information consists of two fields.

Frame Rate

The number of frames presented per second. Note that for interlace systems the frame rate is half the field presentation rate.

Framestore

A device that captures, saves, and outputs a still video image.

GSC

Global Serial Channel

High Definition Television (HDTV)

Television with a resolution approximately twice that of Conventional Definition Television in both the horizontal (H) and vertical (V) dimensions and a picture aspect ratio (H x V) of 16:9.

Interlace

A system of video scanning where the odd and even numbered lines of a picture are presented consecutively as two separate interleaved fields. The two fields required to make a complete picture are called a frame.

Jitter

An undesirable variation in the timing of transitions in a digital signal.

MPEG-2

A video compression mechanism employed by DTV to fit the digital data into an existing 6 MHz bandwidth transmission channel.

Parallel Digital Video

(1) Passing multiple video data bits in parallel groups along a collection of wires (called a bus). High Definition parallel digital video (1080i and 720p) typically uses two parallel 10 bit buses (20 bits total) operating at 74.25 MHz. In comparison, Stan-

dard Definition parallel digital video employed within a device typically uses two 10 bit buses operating at 13.5 MHz.

(2) For parallel interfaces between devices using multi-pair cables (now obsolescent) the two buses are combined for Standard Definition video into one 27 MHz interface (SMPTE 125M). The two buses remain separate for High Definition parallel interfaces using multi-pair cables (SMPTE 274M).

Pixel

A picture element. A pixel is a digital sample of the color intensity values of a picture at a single point.

PECL

Positive Emitter Coupled Logic

Progressive

Scanning every line of a video picture in sequential order to create a complete picture. Each complete scan is a frame.

Reclocking

The process of clocking the data with a regenerated clock.

Serial Digital Video

Passing video data bits in serial form (one bit after another), along a single wire. High Definition serial digital (1080i and 720p as defined by SMPTE 292M) operates at 1.485 GHz (2 x 74.25 MHz x 10 bits). In comparison, Standard Definition serial digital video (SMPTE 259M) operates at 270 MHz (2 x 13.5 MHz x 10 bits).

Serializer

A device that converts parallel digital information to serial.

Standard Definition Television (SDTV)

A digital television system with quality approximately equivalent to that of NTSC.

Sync

(1) General term for a synchronizing signal or signal component. Digital systems generally employ an analog external timing reference signal (such as color black or tri-level sync) to synchronize different pieces of equipment. Within the digital signal itself, however, synchronizing information is carried by special digital codes inserted at the beginning and end of each active line.

(2) In analog television systems, sync is the portion of the video signal which occurs during blanking and is used to synchronize the operation of cameras, monitors, and other equipment. Horizontal sync occurs within the blanking period in each horizontal scanning line, and vertical sync occurs within the vertical blanking period. A color black signal is often used for synchronizing different pieces of analog equipment.

Television

An electric transmission and reception of transient visual images, usually together with associated sound. Television generally involves the broadcast of information from one location to many locations.

Tri-Level Sync

The synchronizing portion of the HDTV signal, as defined in SMPTE 240M. Tri-level sync signals (which are analog) can be used to synchronize different pieces of HDTV equipment.

Video

An electric signal that carries transient visual images. Video generally involves the movement of visual information from a single source location to a single destination, or to a small number of destinations. Many different types of analog and digital video signals exist.

VCO

Voltage Control Oscillator

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