Technical Reference Hardware

XT nano

Production & Playout Server

EVS

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IMPROVEMENT REQUESTS

Your comments will help us improve the quality of the user documentation. Do not hesitate to send improvement requests, or report any error or inaccuracy on this user manual by e-mail to doc@evs.tv.

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1. Overview

Welcome in the EVS range of products and thank you for using an EVS **XTnano** server. We will do our best to satisfy your video production needs and we look forward to continuing working with you.

The EVS XTnano servers are full digital in PAL (625i), NTSC (525i), 720p, or 1080i standards. These multi-channel, disk-based video servers are ideal for a wide range of broadcast applications, from sports and live production to playout and transmission.

1.1 XTNANO HIGH-RESOLUTION SERVER

The XTnano is a 4-channel HD/SD slow motion replay server from EVS. Optimized for multiple applications, such as ingestion of audio/video files, live feed recording, live slow motion and super motion, clipping and playlist playout control, XTnano offers a flexible configuration (2 cameras IN and 2 OUT for preview and program control, or 3 IN and 1 PGM). The new server natively supports DVCPRO HD and DVCPRO 50 codecs, and with its GigE networking capabilities, A/V files can be played and simultaneously transferred to other EVS servers, as well as all standard NLE and archive systems.

1.2 UNPACKING

On receipt of the equipment examine packing for obvious signs of damage. If damaged, do not unpack and inform the carrier immediately. Check thanks to the included packing list if all the items are present and if they show any mechanical damage. If yes, report damage or the missing parts to EVS or their appropriate representative.

1.3 DIMENSIONS

Video disk recorder Main frame 19 inches
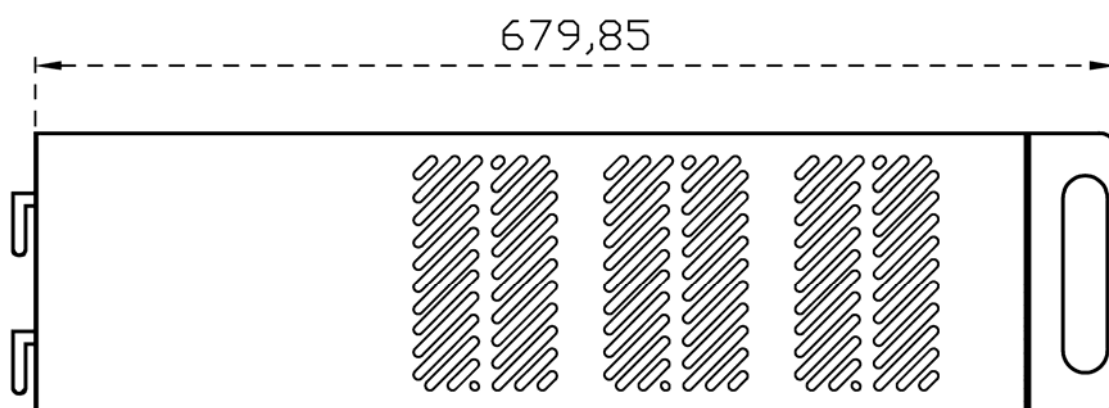
Rack mount 4U – Weight: 30 Kg/ 66.15 Lbs.

The following schemas show 2-D views of the XTnano server. The dimensions are specified in millimeters.

Front view

Left view

679,85

Right view

693,85

438,00

623,70

54,40

54,40

447,00
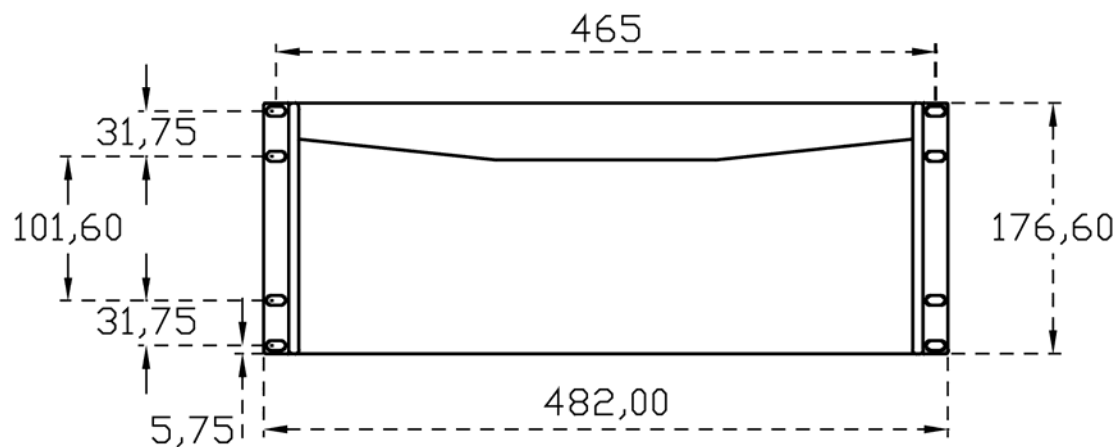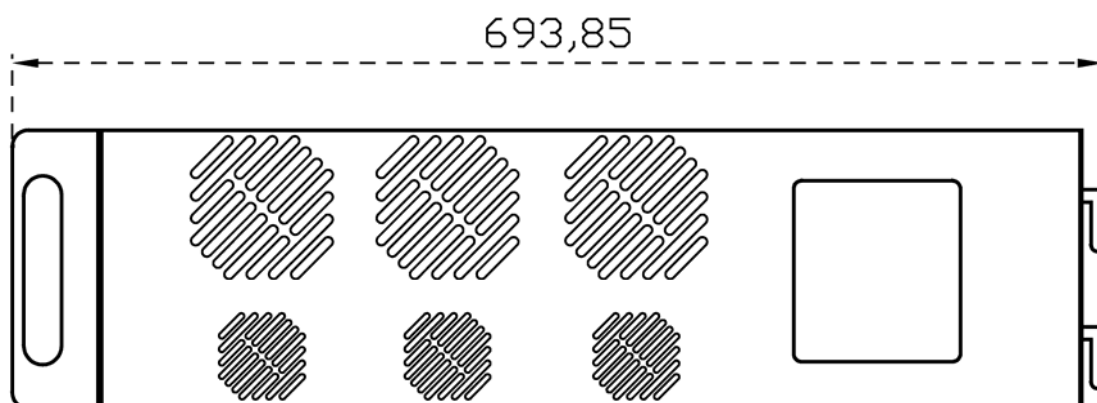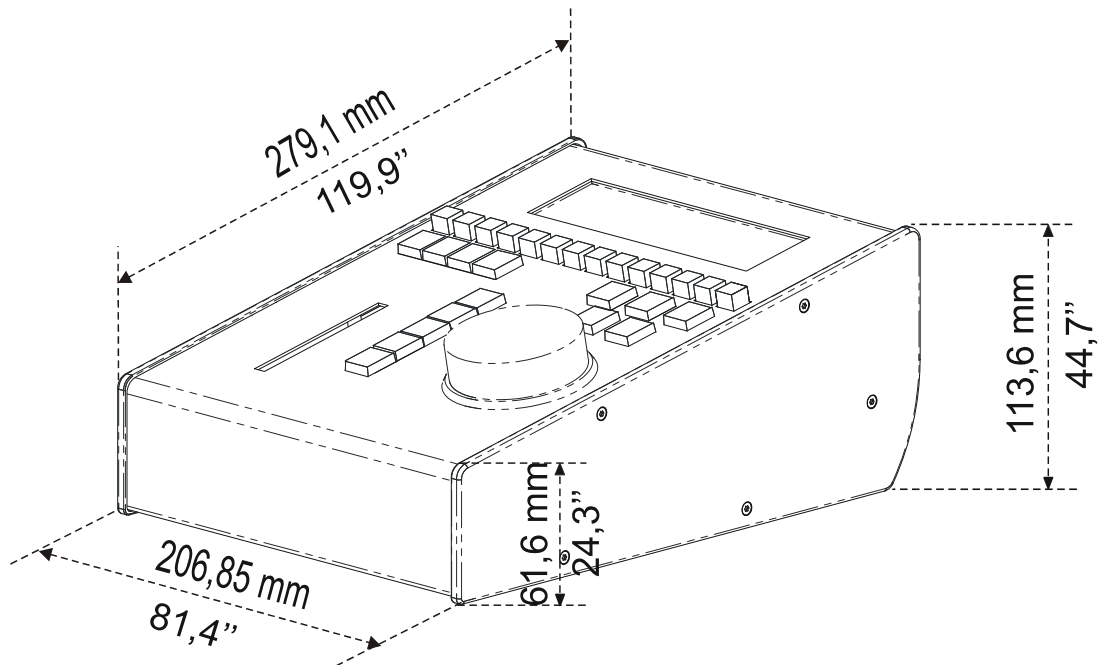
Top view
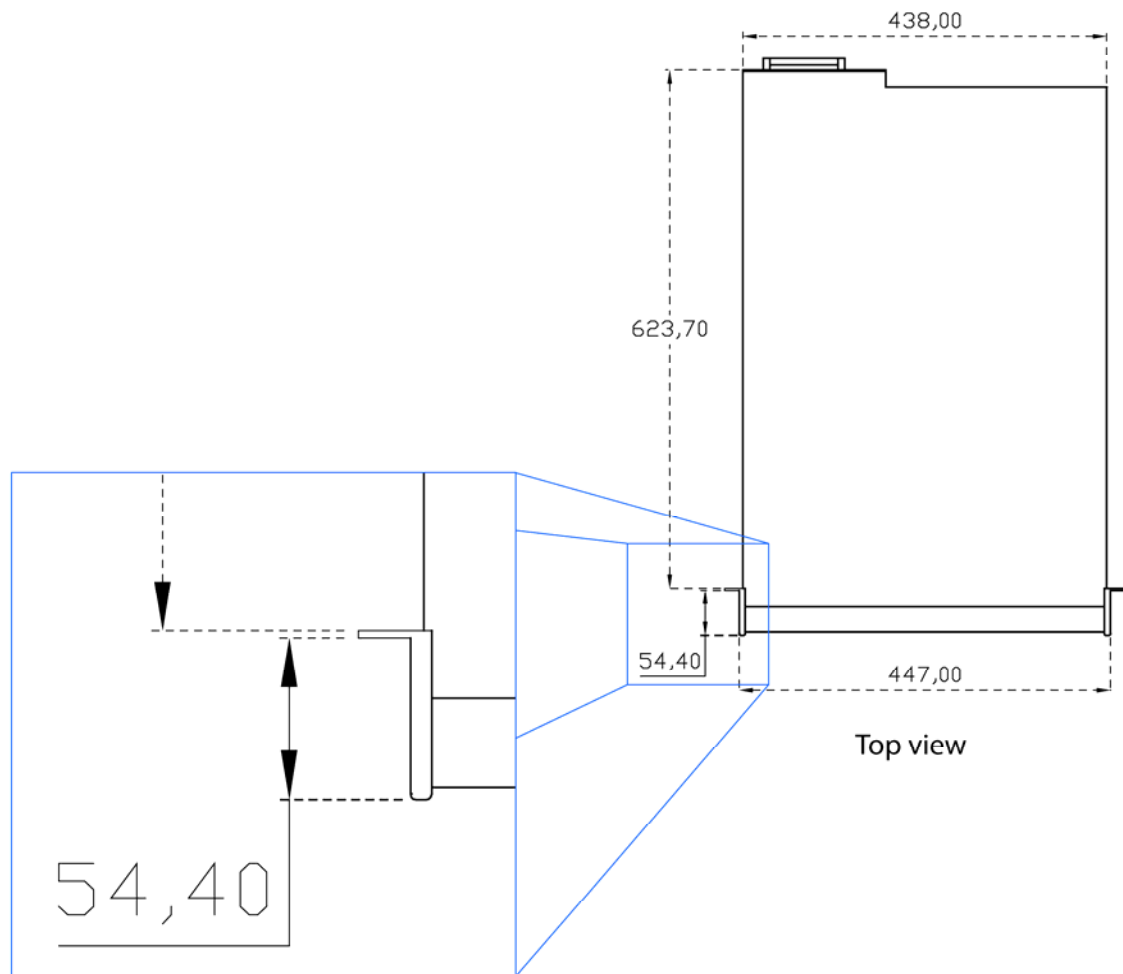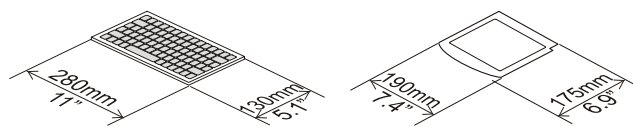
Remote Control Panel

Weight: 3.4 Kg / 7.5 Lbs.

279,1 mm
119,9"

113,6 mm
44,7"

206,85 mm
81,4"

61,6 mm
24,3"

Keyboard - Weight: 0.4 Kg / 0.9 Lbs.

Weight: 0.3 Kg / 6.6 Lbs. Ref: Wacom® CTF-430 Bamboo One

280mm
11"

130mm
5.1"

190mm
7.4"

175mm
6.9"

1.4 INSTALLATION

⚠ **Important**

Verify that the disk recorder unit has the correct voltage specifications for your power source prior to applying power.

(selectable 110/230 VAC on the rear panel of the power supply, or autoswitch, depending on the type of power supply unit installed)

Main power switch is located at the front side (lower right corner) of the unit.

Before turning on the power, open the front door of Video disk recorder unit to check that all boards are fitted into their guides. If a board is out of its guides, remove carefully the board and replace it properly in the same slot.

1.5 SAFETY, COMPLIANCE AND OPERATING CONDITIONS

1.5.1 SAFETY

This equipment has been designed and tested to meet the requirements of the following:

EN 60950	European	Safety of information technology equipment including business equipment.
IEC 950	International	Safety of information technology equipment including business equipment.

In addition, this equipment has been designed to meet the following:

UL 1950 - USA	USA	Safety of information technology equipment including business equipment

1.5.2   EMC STANDARDS

EN 55022	European	Emission Standard
EN 61000-3-2	European	Electromagnetic Compatibility (EMC) Part 3 (Limits); Section2 ; limits for harmonic current emissions (equipment input current <16A per phase)
EN 61000-3-3	European	European Electromagnetic Compatibility (EMC) Part 3 (Limits), Section 3; limitation of voltage fluctuation and flicker in low-voltage supply systems for equipment with rated current of 16 A.
EN 61000-4-3	European	European Electromagnetic Compatibility (EMC) Part 4 (Limits), Section 3; Testing and measurement techniques - Radiated, radio-Frequency, electromagnetic field immunity test.
EN 61000-4-4	European	European Electromagnetic Compatibility (EMC) Part 4 (Limits), Section 4; Testing and measurement techniques - Electrical fast transient/burst immunity test.
EN 61000-4-5	European	European Electromagnetic Compatibility (EMC) Part 4 (Limits), Section 5; Testing and measurement techniques - Surge immunity test.
EN 61000-4-6	European	European Electromagnetic Compatibility (EMC) Part 4 (Limits); Section 6 ; Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields.
EN 61000-4-7	European	European Electromagnetic Compatibility (EMC) Part 4 (Limits), Section 7; harmonics and interharmonics measurements and instrumentation, for power supply systems and equipment connected thereto.
EN 61000-4-11	European	European Electromagnetic Compatibility (EMC) Part 4 (Limits); Section 11 ; Voltage dips, short interruptions and voltage variations immunity tests.
EN 50082-1	European	European Generic Immunity Standard – Part 1: Domestic, commercial and light industry environment.
FCC	USA	Conducted and radiated emission limits for a Class A digital device, pursuant to the Code of Federal Regulations (CFR) Title 47 – Telecommunications, Part 15: Radio Frequency devices, subpart B-Unintentional Radiators.

1.5.3 EMC WARNING

Changes or modifications not expressly approved by the manufacturer for compliance could void the user's authority to operate the equipment. This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna

- Increase the separation between the equipment and receiver

- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected

- Consult the dealer or an experienced radio/TV technician for help

1.5.4 CE MARKING

The CE marking is affixed to indicate compliance with the following directives:

- 89/336//EEC of 3 May 1989 on the approximation of the laws of the Members States to electromagnetic compatibility.

- 73/23/EEC of 19 February 1973 on the harmonization of the laws of the Members States relating to electrical equipment designed for use within certain voltage limits.

- 1999/5/EC of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity.

1.5.5   POWER SUPPLY

COLD SWAP

This equipment is fitted with a wide-ranging power supply. It is suitable for supply voltages of 100 to 240 Vac -10%+6% at 50 or 60 Hz nominal.

Connection to supply: Pluggable equipment Type A (EN60950 §1.2.5): Equipment which is intended for connection to the building power supply wiring via a non-industrial plug and socket-outlet or a non-industrial appliance coupler or both. Correct mains polarity must always be observed. Do not use reversible power plugs with this equipment.

Class of equipment: Class 1 equipment (EN60950 § 1.2.5): electric shock protection by basic insulation and protective earth.

Rated voltage: 110 to 240Vac (single phase)

Rated frequency: 50/60 Hz

Related Current: 10 A (100 to 120 Vac range) 5 A (220 to 240 Vac range)

Input connector: CEE22/IEC 320 3-pin male receptacle

Environmental conditions

The equipment should be kept in the following environmental conditions:

Temperature: 0°C to +40°C (32°F to 104°F) ambient with free air flow

Relative humidity: 0% to 90% (non-condensing)

Cooling requirements: Forced air cooling air flow from front to back

Handling/movement: Designed for fixed use when in operation

Storage and transportation temperature: 0°C to +70°C (32°F to 158°F)

Storage and transportation relative humidity: 0% to 90% (non-condensing)

HOT SWAP

This equipment is fitted with a wide-ranging power supply. It is suitable for supply voltages of 115 to 240 Vac +/-10% at 47 or 63 Hz nominal.

Connection to supply: Pluggable equipment Type A (EN60950 §1.2.5): Equipment which is intended for connection to the building power supply wiring via a non-industrial plug and socket-outlet or a non-industrial appliance coupler or both. Correct mains polarity must always be observed. Do not use reversible power plugs with this equipment.

Class of equipment: Class 1 equipment (EN60950 § 1.2.5): electric shock protection by basic insulation and protective earth.

Rated voltage: 115 to 240Vac (single phase)

Rated frequency: 47/63 Hz

Related Current: 8 A (100 to 120 Vac range) 4 A (220 to 240 Vac range)

Input connector: CEE22/IEC 320 3-pin male receptacle

Environmental conditions

Temperature: 0°C to + 50°C (32°F to 104°F) ambient with free air flow

Relative humidity: 0% to 90% (non-condensing)

Cooling requirements: Forced air cooling air flow from front to back

Handling/movement: Designed for fixed use when in operation

Storage and transportation temperature: 0°C to +70°C (32°F to 158°F)

Storage and transportation relative humidity: 0% to 90% (non-condensing)

SECONDARY POWER SUPPLY

Cold swap 2nd Power Supply

A 2nd power supply (cold swap) for the disk recorder unit is available optionally. To connect this 2nd power supply in case of failure of the main one, remove the metal plate in the top right corner of the back panel, and swap the large electrical connector located inside this compartment.

This additional power supply should not be connected to mains when not in use.

Hot swap 2nd Power Supply

A 2nd power supply (hot swap) for the disk recorder unit is available optionally.

This additional power supply should be connected to mains to allow automatic power switching to the second power supply would the first one fail.

The remote panel, the touch screen and the external ADA rack are fitted with an AUTOSWITCH power supply.A 2nd power supply (hot swap) for the disk recorder unit is available optionally.

This additional power supply should be connected to mains to allow automatic power switching to the second power supply would the first one fail.

GROUNDING

Ensure the disk recorder unit is properly grounded at all times to avoid electrical shock hazard.

1.6 VENTILATION & RACK MOUNTING

Adequate ventilation is obviously required for optimum performance. As result of this consideration, ensure no other equipment is located close to the mainframe.

⚠ **Important**

- Remember that fans are used to air cool the equipment and protect it from overheating.

- Do not block fans intakes during operations.

Having regard to the weight of the XTnano chassis, support guides are required for this unit into the rack mount. The front ears of the XTnano unit are not designed to support its full weight. Applying full weight on these might result in bending the metal plate.

1.7 HARDWARE CONSUMPTION

Hardware Description	Current (A)	Power (W)
REMOTE	0,08	17,6
XTnano 4CH 5HDD (HOT SWAP PSU)	0.92	202.4

1.8 XTNANO SERVER MAIN SPECIFICATIONS

1.8.1 VIDEO

	XTnano Server	
	Standard Definition	High Definition
Video formats	525i 59.94 fps (NTSC) 625i 60 fps (PAL)	720p 50/59.94 fps 1080i 50/59.94 fps
Digital interface	10-bit 4:2:2 Serial (SMPTE259M). Full frame synchronizer at input.	10-bit 4:2:2 Serial (SMPTE292M). Full frame synchronizer at input.
Number of channels	4 channels, reversible REC/PLAY	4 channels, reversible REC/PLAY
Monitoring & down-converters	1 CVBS or SDI (software select) per channel, with OSD	1 dedicated HD SDI output with OSD per channel
Reference	Analogue Black Burst	Analogue Black Burst and HD Tri-Level Sync
Graphics board	n.a.	n.a.

1.8.2 AUDIO

- Up to 8+8 analogue balanced input & output channels.

- Up to 16+16 (8 pairs + 8 pairs) AES/EBU or Dolby E input & output channels.

- Up to 64 channels embedded audio (16 audio per video).

- 4 additional analogue balanced output channels for monitoring.

- All audio connectors on mainframe.

Audio Processing

- Uncompressed audio.

- 24 bit processing and storage.

- Sample rate converter from 25-55 kHz to 48 kHz.

- Audio scrub.

- Audio mix.

1.8.3 VIDEO CODECS & BITRATES

The EVS XTnano server uses an intra-frame video encoding technique. The XTnano server supports natively the following video codecs:

Codec	SD	HD	Code Protection
DVCPro HD	-	√	Code 8
DVCPro 50	√	-	Code 9

The target bitrate of the encoded video stream can be set by the user within the accepted range: 8 to 100 Mbps for standard definition and DVCPro codecs defined bitrates for high definition.

The code-protected codecs are solely available when the corresponding code is valid. Both these codecs are available by default.

1.8.4 RECORDING CAPACITY FOR XTNANO SERVERS

The following tables show the record duration for 1 record channel (i.e. 1 video + 2 stereo audio tracks in SD or 1 video + 4 stereo audio tracks in HD) with arrays of 300 GB disks compared with the different video bitrates & codecs. These tables are valid with the "Operational Disk Size" parameter set to 100%.

The drive arrangement uses an internal module (4 + 1) x 300 GB drives (total 1200 GB usable). In SD mode, with the DVCPro 50 codec, the recording capacity is 48h08 (PAL) or 48h03 (NTSC) while in HD mode, with the DVCPro HD codec, it is 23h42.

1.8.5 SUPPORTED SMPTE STANDARDS

The following standards are supported:

SD SDI	SMPTE 259M (525i 625i)
HD SDI	SMPTE 292M (720p 50 and 59.94 ; 1080i 50 and 59.94)
Embedded audio HD	SMPTE 299M
AES/EBU audio	SMPTE 272M
LTC	SMPTE 12M
D-VITC	SMPTE 266M
Ancillary TC in HD	RP 188
Vertical Ancillary Data	SMPTE 334M

1.8.6 MAXIMUM BITRATE VALUES

Those maximum values are valid for XTnano servers running Multicam version 08.00.xx or higher. They guarantee a smooth play and a browse at 100% speed on all channels simultaneously.

		2 ch	4 ch
DVCPro 50	PAL	50	50
	NTSC	50	50
DVCPro HD	PAL	100	100
	NTSC	100	100

1.8.7 RAID LEVEL: 3

The Video Raid uses striping process across 5 disk drives. The video and audio data is striped over the first 4 drives while the parity information is saved on the fifth drive. If one drive is damaged, the Video Raid can use the parity information to recover the missing information, so that operation can continue seamlessly without bandwidth loss.

For more information on online rebuild, refer to the section dedicated to this subject in the XTnano Technical Reference manual.

1.8.8 INTERPOLATION

The playing back of smooth slow motion pictures carries specific issues: since some fields must be repeated at regular interval to provide the video at the playback speed required by the operator, parity violation appears regularly on the output video signal. This issue is specific to interlaced formats (525i, 625i and 1080i) and does not concern progressive formats (720p).

If O and E represent respectively the odd and even fields of a standard video signal (50/60 Hz), we have:

The original video signal:

O E O E O E O E O E O E O E O E

The output video signal at 50% speed:

O **O** **E** E O O **O** **E** E O O **O** **E** E O O **O** **E** E

The output video signal at 33% speed:

O **O** O E **E** E O O **O** O E **E** E O O **O** O E

The output video signal at 25% speed :

O **O** O O **O** **E** E **E** **E** E O O **O** O O **O** **E** E **E** **E** E

Fields with parity violation are shown in bold, underlined letters. As it appears from the above table, whatever the playback speed (with the exception of the normal 100% playback speed), a number of fields violate the normal parity of the output signal. This parity violation induces a 1-line shift of the field, resulting in a

vertical jitter of the picture. The jitter frequency depends upon the chosen playback speed.

To avoid this phenomenon and provide a stable output picture, EVS developed 2 types of line interpolator: the 2-line and 4-line interpolators. The interpolation process can be enabled or disabled by the operator on all EVS slow motion systems.

2-LINE INTERPOLATOR

The 2-line interpolator actually generates a new field, when the original field is in parity violation. Each line of this new field is calculated by a weighted average of the 2 neighboring lines. This process solves the problem of parity violation and vertical jitter, but the drawback is a reduction of the vertical resolution on the interpolated fields, that appear unfocused. Another by-side effect is the alternation of original fields (perfectly focused) and interpolated fields (unfocused), resulting in a "pumping" video signal.

4-LINE INTERPOLATOR

The 4-line interpolator uses a more sophisticated calculation based on the 4 neighboring lines. By using suitable coefficients for the weight of each line in the resulting calculation, we apply this interpolation to all fields. The final result is a permanently, slightly unfocused picture. The advantage is a stable output signal with no jitter and no "pumping", but the vertical bandwidth is even more reduced.

The interpolator is of course always disabled at 100% playback speed, because there is no parity violation.

EVS uses the same techniques with the Super Slow Motion disk recorder, working with all models of Super Motion cameras (150/180 Hz). The only difference between the processing of Super Motion and normal scan (50/60 Hz) signals is that the interpolator is always disabled at 33% playback speed, because the Super Motion signal does not cause parity violation at this particular speed.

Whatever the choice, the resulting picture is thus always a compromise between stability and resolution. With EVS systems, the operator always has got the choice between any of the 3 above described techniques: no interpolation, 2-line interpolation or 4-line interpolation. Even if the operator chooses to use the interpolation, this process will be automatically disabled when not necessary (100% playback for 50/60 Hz signal, 33% and 100% playback for 150/180 Hz signal).
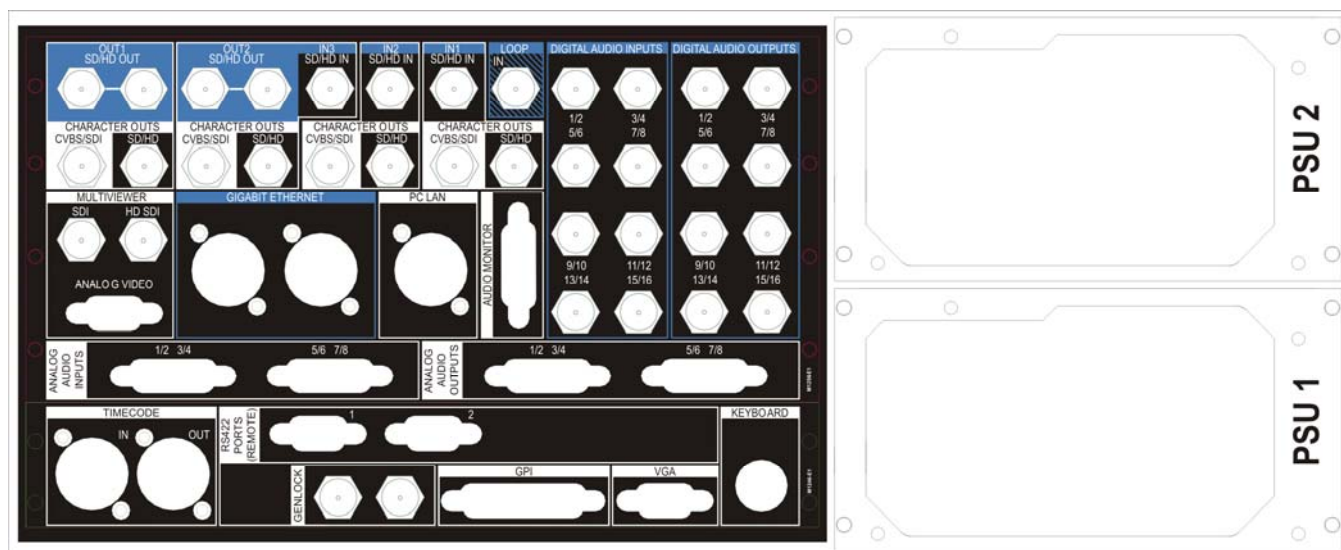
Note

All professional VTRs use line interpolation in PlayVar mode to avoid vertical jitters. Default value is interpolator off for all configurations except SuperLSM configuration in which 4-line interpolator mode is enabled.
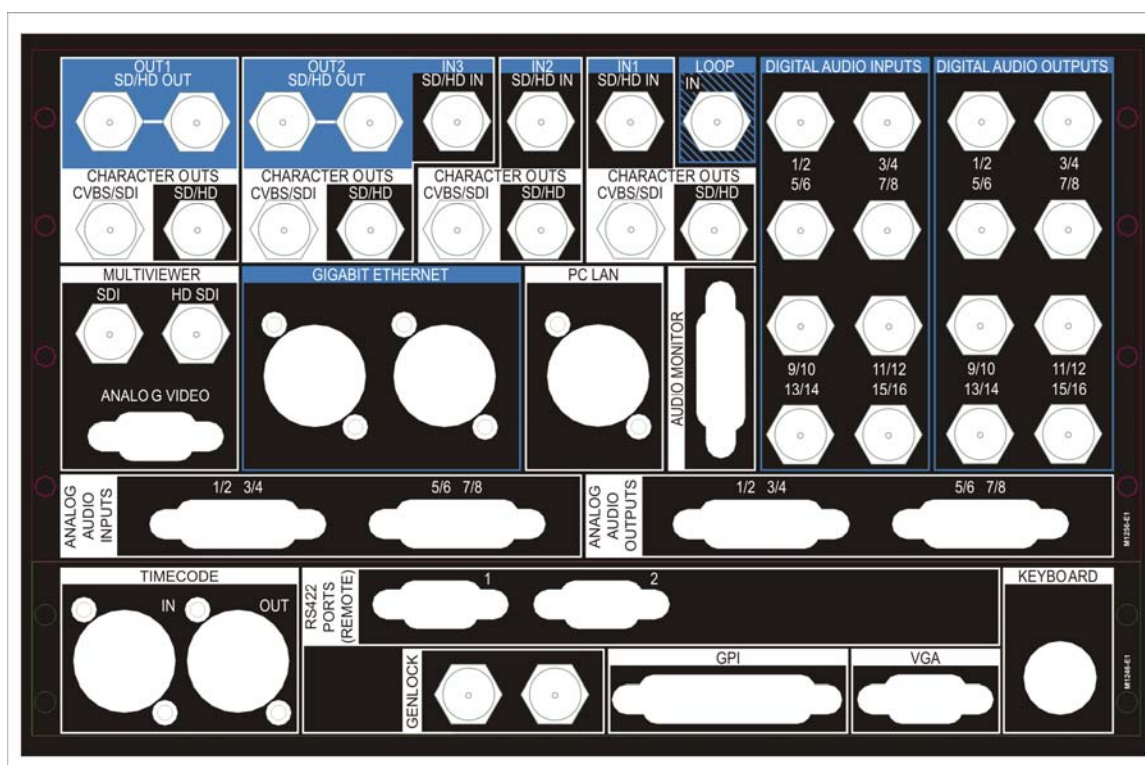
2. Cabling

2.1   XTNANO BACK PLANE

Full View

Connectors

2.2 GPI IN CONNECTIONS

Refer to the Multicam user manuals for the allocation of your XTnano server GPI triggers.

2.2.1 RELAY → OPTO INPUTS ON THE XTNANO SERVER (GPI INPUTS 1, 2, 3, 4)
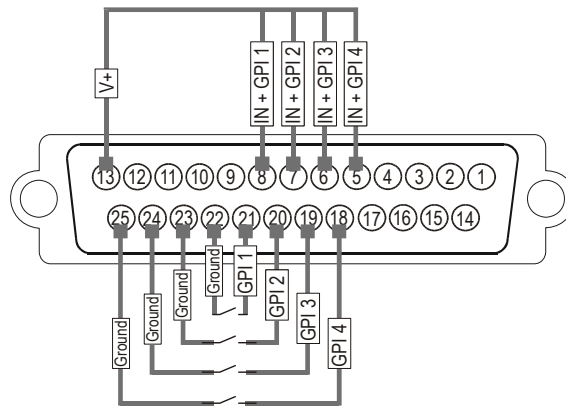
2.2.2 RELAY → TTL INPUTS ON THE XTNANO SERVER (GPI INPUTS 5, 6, 7, 8)
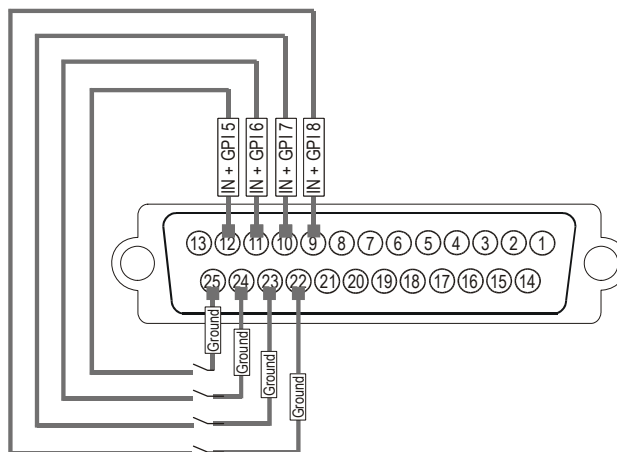
The relay must be connected between the ground and the corresponding TTL input on the DB25.

2.2.3 TTL → TTL INPUTS ON THE XTNANO SERVER (GPI INPUTS 5, 6, 7, 8)
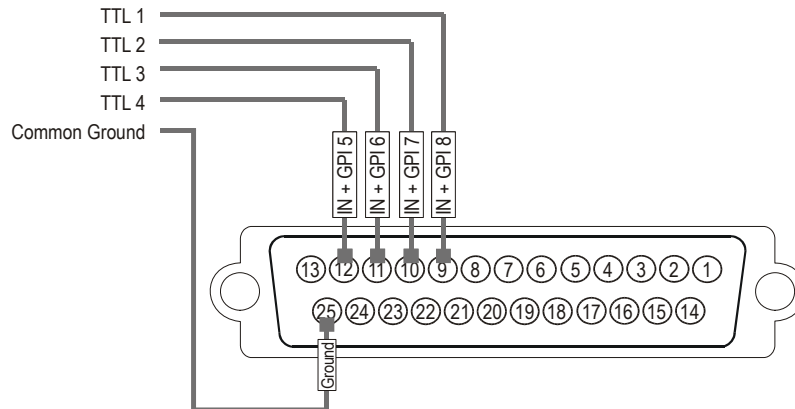
Each TTL input on the DB25 is directly connected to the pin of the TTL connector on the device triggering the GPI. The ground must be common between the DB25 connector of the XTnano and the external device.

2.3 GPI OUT CONNECTIONS

The user can define the functions, types and settings associated to the GPI outs in the following applications:

- Setup menu of the Remote Panel (pages 8.3 & 8.4)

- IP Director settings (GPI and Auxiliary Track tab)
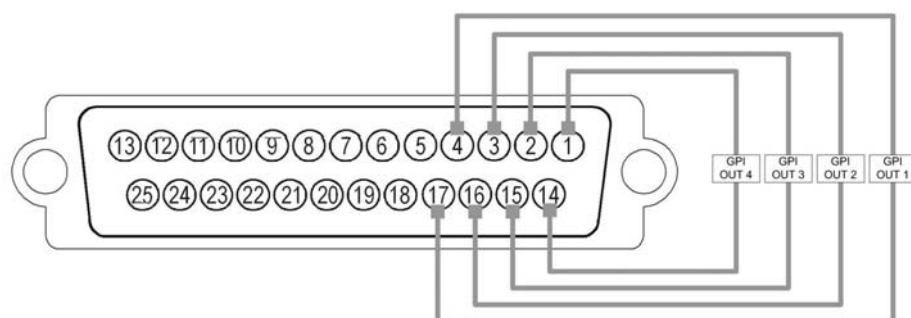
2.4   MTPC GPIO CONNECTOR

2.4.1   GPIO CONNECTOR: SUB-D 25-PIN MALE

1	Relay Out 4	14	Relay Out 4
2	Relay Out 3	15	Relay Out 3
3	Relay Out 2	16	Relay Out 2
4	Relay Out 1	17	Relay Out 1
5	IN + Opto 4	18	IN – Opto 4
6	IN + Opto 3	19	IN – Opto 3
7	IN + Opto 2	20	IN – Opto 2
8	IN + Opto 1	21	IN – Opto 1
9	I/O TTL 8	22	GND (Return I/O 8)
10	I/O TTL 7	23	GND (Return I/O 7)
11	I/O TTL 6	24	GND (Return I/O 6)
12	I/O TTL 5	25	GND (Return I/O 5)
13	+ 5 V 50 mA max.		

2.4.2 GPIO HARDWARE SPECIFICATION

4 X relay isolated output:

- Normally open contact (power off => open).

- Maximum 1 A.

- Maximum 50 Volts.

- Typical life time: 100.000.000 switching.

4 X opto isolated input:

- The input consists in an opto diode (VF @ 1.1 Volt) in series with a 470 ohm resistor.

- Typical switching point @ 1.4 mA, for secure operation:

o i = 0 to 0.5 mA => opto OFF.

o i = 2.5 to 30 mA => opto ON .

o imax = 30 mA.

- Direct connection to a TTL/CMOS signal is possible (pin opto – to GND and pin opto + to the TTL/CMOS signal).
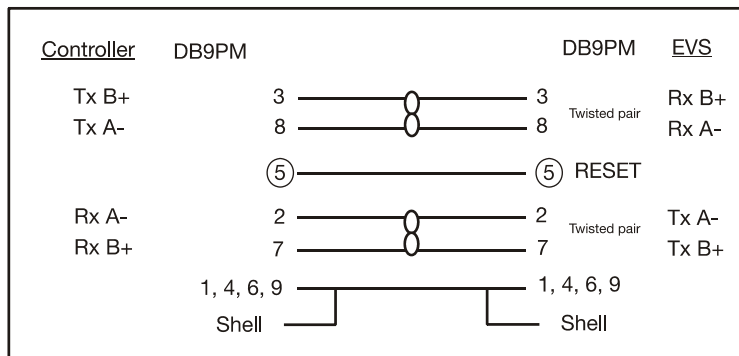
  Typical switching point @ 1.6 Volts, for secure operation:

o Vin < 0.8 Volts => opto OFF.

o Vin > 2.2 Volts @ 2 mA => opto ON.

o Vin max (without external resistor) = 15 Volts.

4 X CMOS input/output:

- Each pin can be individually configured as an output or an input.

- Internal 4K7 pull up resistor to +5 V.

- Low level Vi < 1.5 Volt (U12 = 74HC245).

- High level Vi > 3.5 Volt (U12 = 74HC245).

- Optional TTL compatible level (U12 = 74HCT245).

2.5 RS422 CONNECTOR OF THE REMOTE CONTROL PANEL

The RS-422 cable of the Remote control panel must be wired PIN TO PIN following the above diagram. Use shielded cable to avoid electromagnetic interference on long distances.

⚠️ **Important**

The Reset command from the Remote is sent through the Pin n°5 of RS-422 connector. This function should be disabled when the controller on RS-422 #1 is <u>not an EVS controller</u> (refer to the section 'MTPC Board' on page 38 of this manual).

The technical specifications for the RS-422 connector are the following:

- 19200 bauds

- No parity

- 8 data bits

- 1 stop bit

2.6 AUDIO CONFIGURATIONS

2.6.1 CODA FOR XTNANO

Internal Audio Module: Embedded + AES/EBU + Analogue Balanced

- Embedded Audio 24 stereo channels (input or output).

- AES/EBU Audio 8 stereo inputs + 8 stereo outputs (110 Ohm balanced on SUB-DB15, breakout cable with 4 XLR IN/OUT available optionally OR 75 Ohm unbalanced on BNC).

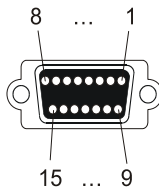- Analogue Balanced audio 4 stereo inputs + 4 stereo outputs (110 Ohm balanced on SUB-DB15, breakout cable with 4 XLR IN/OUT available optionally OR XLR).

- Audio monitoring: 4 analogue balanced mono outputs (XLR).

2.6.2 PIN ASSIGNMENT ON DB 15 CONNECTORS

AES DB15 Connectors

Pin #	DB 15 #1 Inputs 1-8 (mono)	DB 15 #2 Inputs 9-16 (mono)	DB 15 #3 Outputs 1-8 (mono)	DB 15 #4 Outputs 9-16 (mono)
1	GND	GND	GND	GND
2	AES input 1/2 +	AES input 9/10 +	AES output 1/2 +	AES output 9/10 +
3	GND	GND	GND	GND
4	AES input 3/4 +	AES input 11/12 +	AES output 3/4 +	AES output 11/12 +
5	GND	GND	GND	GND
6	AES input 5/6 +	AES input 13/14 +	AES output 5/6 +	AES output 13/14 +
7	GND	GND	GND	GND
8	AES input 7/8 +	AES input 15/16 +	AES output 7/8 +	AES output 15/16 +
9	AES input 1/2 -	AES input 9/10 -	AES output 1/2 -	AES output 9/10 -
10	GND	GND	GND	GND
11	AES input 3/4 -	AES input 11/12 -	AES output 3/4 -	AES output 11/12 -
12	GND	GND	GND	GND
13	AES input 5/6 -	AES input 13/14 -	AES output 5/6 -	AES output 13/14 -
14	GND	GND	GND	GND
15	AES input 7/8 -	AES input 15/16 -	AES output 7/8 -	AES output 15/16 -

Analogue DB15 Connectors

Pin #	DB 15 #1 Inputs 1-4 (mono)	DB 15 #2 Inputs 5-8 (mono)	DB 15 #3 Outputs 1-4 (mono)	DB 15 #4 Outputs 5-8 (mono)
1	GND	GND	GND	GND
2	Analogue input 1 +	Analogue input 5 +	Analogue output 1 +	Analogue output 5 +
3	GND	GND	GND	GND
4	Analogue input 2 +	Analogue input 6 +	Analogue output 2 +	Analogue output 6 +
5	GND	GND	GND	GND
6	Analogue input 3 +	Analogue input 7 +	Analogue output 3 +	Analogue output 7 +
7	GND	GND	GND	GND
8	Analogue input 4 +	Analogue input 8 +	Analogue output 4 +	Analogue output 8 +
9	Analogue input 1 -	Analogue input 5 -	Analogue output 1 -	Analogue output 5 -
10	GND	GND	GND	GND
11	Analogue input 2 -	Analogue input 6 -	Analogue output 2 -	Analogue output 6 -
12	GND	GND	GND	GND
13	Analogue input 3 -	Analogue input 7 -	Analogue output 3 -	Analogue output 7 -
14	GND	GND	GND	GND
15	Analogue input 4 -	Analogue input 8 -	Analogue output 4 -	Analogue output 8 -

2.7 GIGABIT NETWORK

2.7.1 FUNCTIONAL OVERVIEW
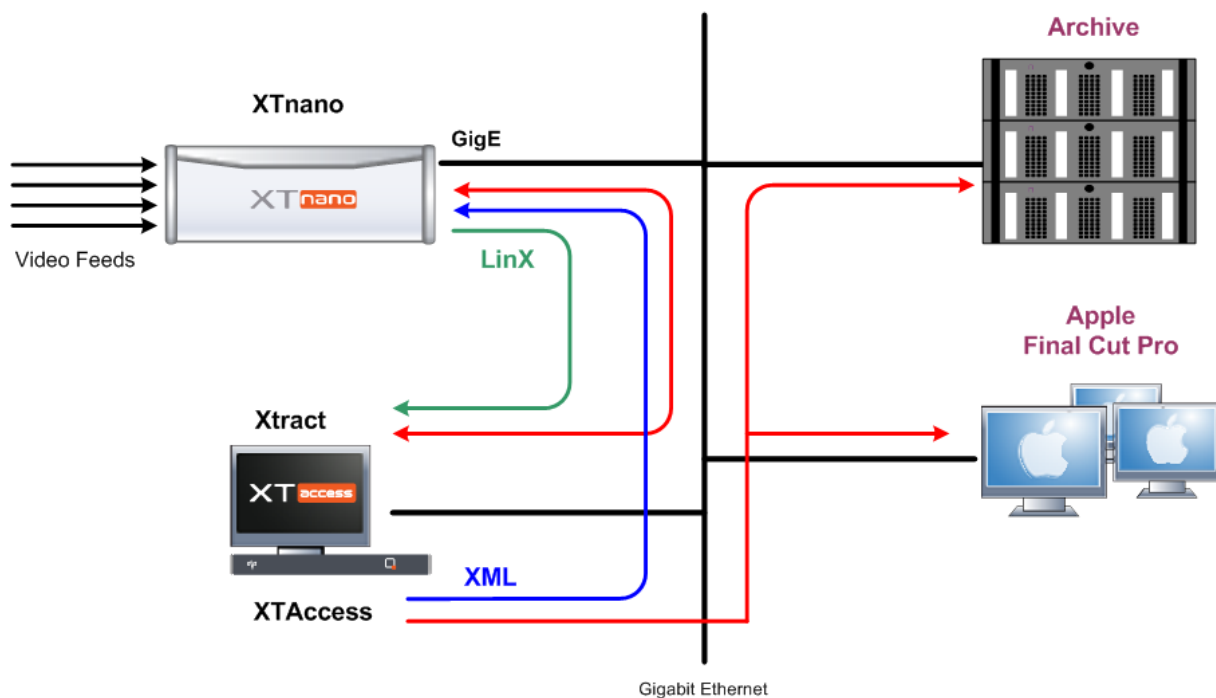
The Gigabit connection makes it possible to transfer video and audio material from the XTnano server to external systems via the TCP/IP network.

The external systems can be the following:

- A storage system or an archiving system, such as XStore.

- A non-linear editing system, such asApple Final Cut Pro .

However, the external systems cannot read the raw files coming from the XTnano servers. For this reason, XT Access is used as a "gateway" between the XTnano and the IT world.

Moreover, the XTnano is not able to directly send commands to the XTAccess. Consequently, a backup tool called Xtract is used as the interface to send commands to the XTAccess for file transfer operations and wrapping.

XT Access is directly connected to the XTnano servers through the Gigabit network. It runs on an XP workstation and is controlled, in this context, by Xtract via XML files.

The Gigabit connection fulfills the following functions in relation with the XTnano servers:

- Backup of clips from an XTnano server

- Restore of clips to an XTnano server

Please refer to the Xtract user manual for more information on the backup from and restore of clips to the XTnano, using the Gigabit network, in combination with Xtract and XTAccess.

2.7.2 SWITCHES

SUPPORTED SWITCHES

All switches used on the GigE networks of EVS systems need to support jumbo frames (Ethernet frames with more than 1,500 bytes of payload).

Three models of 19-inch Gigabit switches have been validated for use with EVS' workflows:

- HP Procurve 2510G-24

- Cisco Catalyst 2960G-24TC

- Cisco Catalyst 3750E-24TD/3750E-48TD

COMPARISON

The HP Procurve 2510G-24 and Cisco Catalyst 2960G-24TC can be used for small setups where no inter-VLAN routing is needed.

On larger setups, both GigE ports of the XTnano servers or/and several ports on the XF[2] are often used to increase the bandwidth or to allow redundancy. Since both GigE ports of an XTnano server cannot be used on the same sub-network, virtual LANs need to be created. To allow the transfer of packets between the virtual LANs, layer 3 switches are required. You need to select a layer 3 switch that is able to route jumbo frames.

A switch of the Cisco Catalyst 3750E series should be used on larger setups as they support jumbo frames, allow traffic to be routed between different VLANs and provide stacking capabilities.

The following table gives an overview on the supported switches:

Model	RU	Layer	Gb ports	SFP	10Gb (X2)	JF switching	JF routing	Stacking
HP Procurve 2510G-24	1	2	20(+4)	4	0	Y	N	N
Cisco Catalyst 2960G-24TC	1	2	20	4	0	Y	N	N
Cisco Catalyst 3750E-24TD	1	3	24	(up to 4)	2	Y	Y	Y
Cisco Catalyst 3750E-48TD	1	3	48	(up to 4)	2	Y	Y	Y

A layer 2 device can be used when all machines are configured to be on the same LAN, when another layer 3 device is present to do the routing if needed, or when no routing between VLANs is needed.

ADDITIONAL INFORMATION

HP switches have a lifetime guarantee with next-business-day advance replacement with no additional contract purchase.

HP switches are not compatible with Cisco's proprietary protocols (ISL, PagP, PVST, etc.) which could be a problem for integration in some legacy Cisco environment. However, such a case is quite unlikely to arise and most of the time workarounds can be found.

The stacking possibilities of the Cisco 3750E series permit to have fully active LACP teams for redundancy to the hosts.

3. Hardware Description

3.1 BOARDS AND SLOT CONFIGURATIONS

The EVS Disk Recorder contains all the EVS developed boards. The XTnano is available in a 4U frame with the following board configuration:

| Slot #	XTnano
6	Disk Array
5	HCTX
4	CODA (Audio Codec)
3	COHXnano #2
2	COHXnano #1 Genlock
1	MTPC

3.2 VIDEO AND REFERENCE BOARDS

3.2.1 COHXNANO BOARD

The COHXnano board is divided in 3 parts: COHXnano base (centre front and back), COD A module (front left), and COD B module (front right).

COD A and COD B modules are the actual CODEC modules, each of them being able to be configured by software either as an encoder (for a record channel) or as a decoder (for a play channel). There are 3 hardware versions of COD modules: SD only, HD only, or HD/SD. They are clearly identified by the sticker at the front of the board.

There are 2 versions of the COHXnano base: one with genlock, one without genlock. The genlock model can easily be identified by the presence of 3 quartz synthesizer at the back of the board, on the right-hand side, and by the presence of the GLK and PSU OK LEDs on either side of the DIN connector at the centre front of the board. Note that a COHXnano board with genlock must be installed as COHXnano #1 in first position (slot 2) in an XTnano system. A COHXnano board with genlock can never be installed in any other slot, and thus can not be used instead of COHXnano #2. Doing so will result in conflicting electrical signals inside the system.
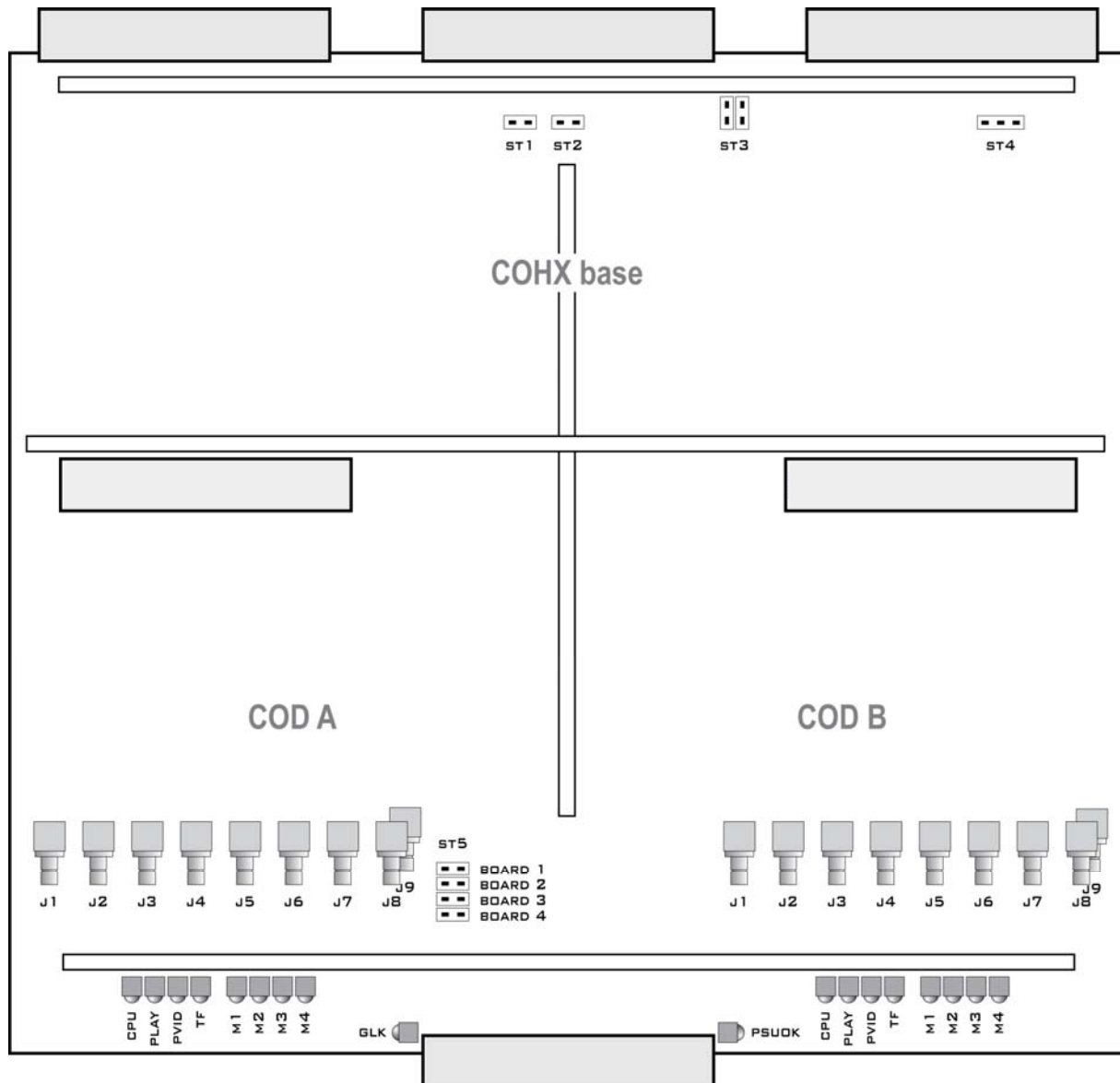
JUMPERS ON THE COHXNANO BASE MODULE

ST1, ST2:	These 2 jumpers <u>must</u> be installed on the COHXnano #2 board of the server.
ST3 (SPARE):	« parking » for jumpers for ST1 and ST2 when these are not used.
ST4 (only on COHXnano with genlock) :	It must be set to HiZ (or not installed). Note that the Genlock Loop connector on the back panel of the XTnano server <u>must always</u> be terminated with a 75 Ohm load if it is not used.
ST5 :	It defines the position of the board inside the server. It must be set to « 1 » for a COHXnano with genlock, and to « 2 » for a COHXnano board without genlock.

LEDS ON THE COHXNANO BASE MODULE WITH GENLOCK

GLK

Off	When the genlock module is not initialized.
Blinks green	When the genlock module is properly initialized, but no valid genlock signal is detected.
On, steady green	When the module is initialized and a valid genlock signal is detected.
Red (intermittent)	When there is a genlock problem.
Red (steady)	When a resync is needed.

PSU OK

On (green)	When all voltages are present and in the allowed range, otherwise the led is off.

LEDS ON THE COD A AND COD B MODULES (FROM LEFT TO RIGHT)

CPU

Blinks green	To indicate CPU activity.
On, steady green	When there is a problem with the processor of the COD module.

PLAY

On (green)	When the COD module is set by the software in play mode.
Off	When the COD module is set in record mode.

PVID

On (green)	When a valid video signal has been detected on the J8 connector (SD/HD SDI input), whether the COD module is in play or record mode.

TF (transfer)

Blinks green	During a data transfer between the COD module and the HCTX board
M1, M2, M3, M4	Not currently used.

CONNECTORS ON THE COD A AND COD B MODULES

Connector	SD mode	HD mode	Connector label on rear panel
J1	SDI/CVBS (*) monitoring output (SD)	SDI/CVBS(*) monitoring output (SD, down-converted)	Character Outs, CVBS/SDI
J4	SDI monitoring output (SD)	HD SDI monitoring output (HD)	Character Outs, SD/HD
J6	SDI program output (SD)	HD SDI program output (HD)	SD/HD Out
J7	SDI program output (SD, identical to J6)	HD SDI program output (HD, identical to J6)	SD/HD Out
J8	SDI input (SD)	HD SDI input (HD)	SD/HD In
J9	Alternate SDI input (SD, for hardware loop)	Alternate HD SDI input (HD, for hardware loop)	Used for loop in

(*) The switch between SDI and CVBS on J1 is done by software setting in the EVS Configuration menu.

The following schema shows the connector positions:

> **Note**
>
> Only front backplanes labelled BKP7 are compatible with COHX boards (4 slots for 4U frames, and 7 slots for 6U frames). The BKP7 backplanes (compatible with COHX boards) have 3 rows of soldering per slot, while the backplanes compatible with IO-E, COHD or COHU boards have 2 rows of soldering per slot. Note that the top slot of BKP7 backplanes must <u>always</u> be connected to the HCTX board.

CHANNEL ASSIGNMENT

## *XTnano Server (4-ch)*

Upper Codec (SLOT #4)

CAM B
or
PGM 3

CAM A
or
PGM4

Lower Codec (SLOT #2)

CAM D
or
PGM 1

CAM C
or
PGM2

3.3 AUDIO CODEC BOARD

The AUDIO CODEC board is the audio interface between the COHXnano boards and the HCTX board. VIDEO CODEC and AUDIO CODEC boards are tied to the HCTX board with one bus connector on the front side. Different audio configurations are available with the AUDIO CODEC board. For more information, see the section 2.6 'Audio configurations', on page 22.
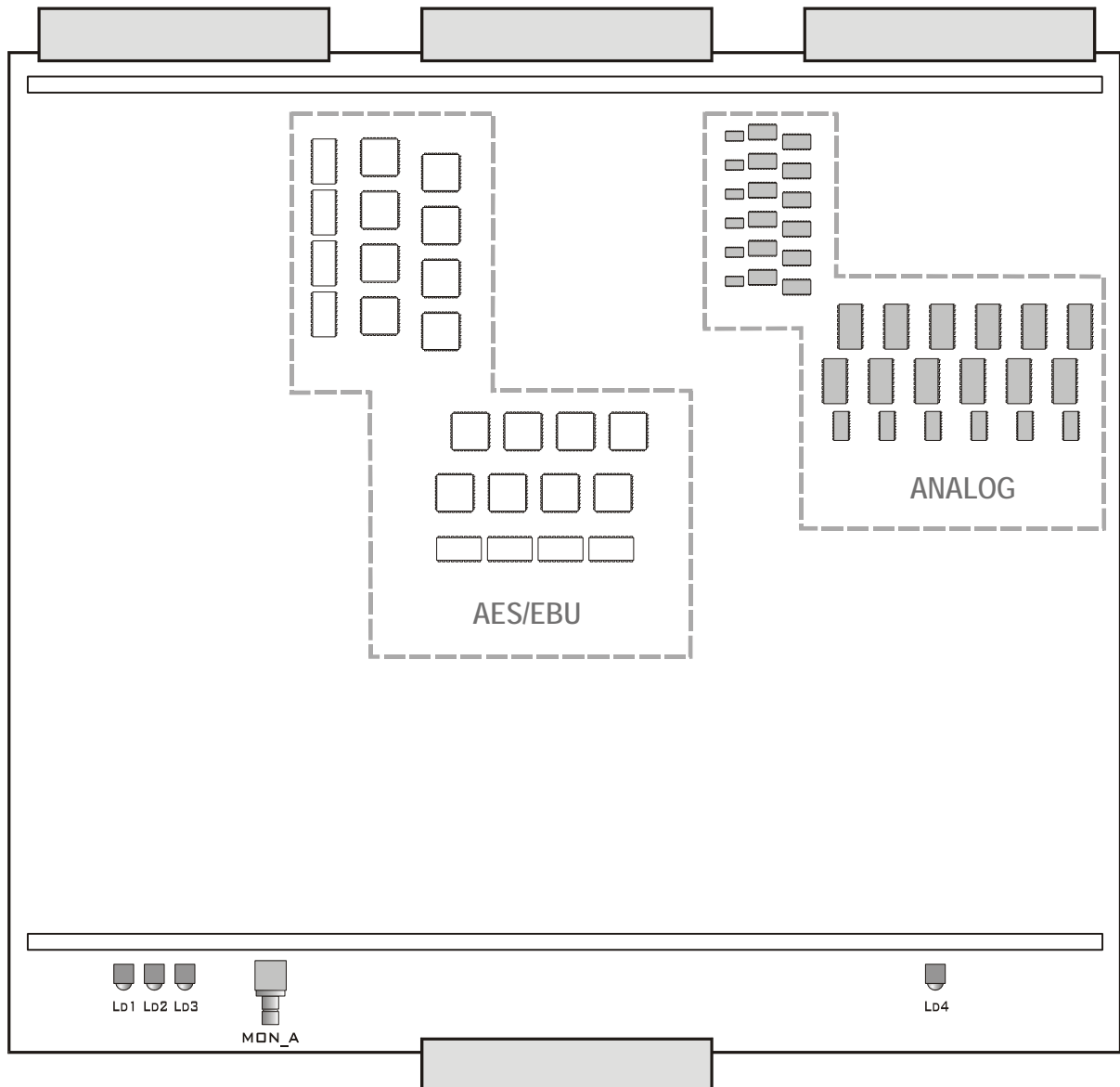
LED INFORMATION AND CONNECTOR

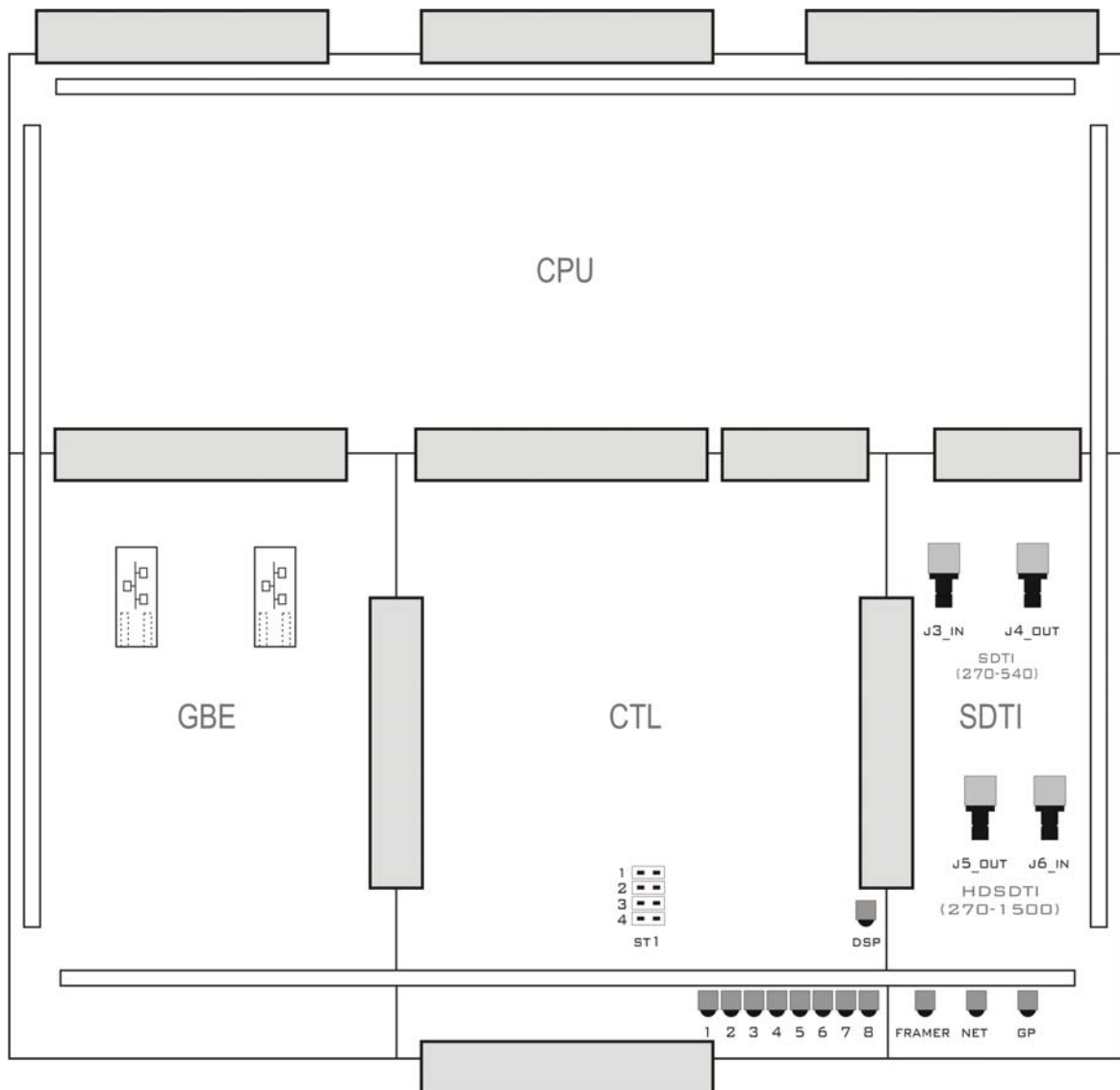LD1-3: Internal EVS information only.

LD 4: transfer activity to/from the HCTX board.

3.4 RAID CONTROLLER BOARDS

3.4.1 HCTX BOARD

The HCTX board is actually divided in 4 parts (3 in front, 1 in the back).

- Front left: GBE module.

- Front centre: CTL controller module.

- Front right: not installed (SDTI module).

- Back: CPU module.

JUMPERS

ST1-1 on controller module (front centre): jumper must be installed on ST1-1 only when the HCTX board is used with previous video codec boards (SD CODEC6, COHD, COHU). This jumper is automatically detected by the software application, and an error message is generated if it is not properly set

ST1-2, ST1-3 and ST1-4 on controller module are not used. No jumper must be installed on these

ST1 on CPU module (rear corner, left): for EVS internal tests only (used to reset the board). Never install that jumper, or the board will be in a permanent reset state!

LEDs

LEDs on the CTL controller module (centre), from left to right:

LED 1	Lights red when an error occurs while booting the HCTX board
LEDs 2 to 8	Display the boot sequence of the HCTX board (cfr note below)
DSP led	Blinks green to show DSP activity

LEDs on the GBE Gigabit module (left), from left to right:

LEDs CPU1/CPU2	Indicate that the processor is running. The LEDs blink alternately every 250 milliseconds
Other LEDs	The six other LEDs are for EVS internal use

Note

When booting the HCTX board, LEDs 1 to 8 will light according to the following sequence:

Hardware reset	→	All LEDs on (1 : red ; 2 to 7 : green)
Setup of CPU basic registers	→	LED 2 on (green)
Check of CPU/PC DPRAM	→	If error: LED 1 on (red) + LED 8 on (green)
	→	if check is successful: LED 3 on (green)
Polling for PC commands	→	LED 4 on (green)

Switching to enhanced mode	$\rightarrow$	LED 5 on (green)
Executing PC commands until execution requests end	$\rightarrow$	LED 6 on (green)

Jump to SDRAM and execute microcode

GIGABIT CONNECTORS

The two Gigabit connectors of the card are connected to the two Gigabit ports of the backplane.

The Gigabit connectors must be on a network that supports Jumbo Frames of (at least) 9014 bytes Ethernet frames. One of the tested switches belongs to the Cisco 3750 G family, for example the WS-C3750G-24T-S.

For more information, refer to the Software Technical Reference manual for setting up the IP addresses.

3.4.2 RTCL BOARD ON DISK ARRAY (WITH HCTX)

Disk arrays on systems with HCTX boards have a controller on the disk array board.
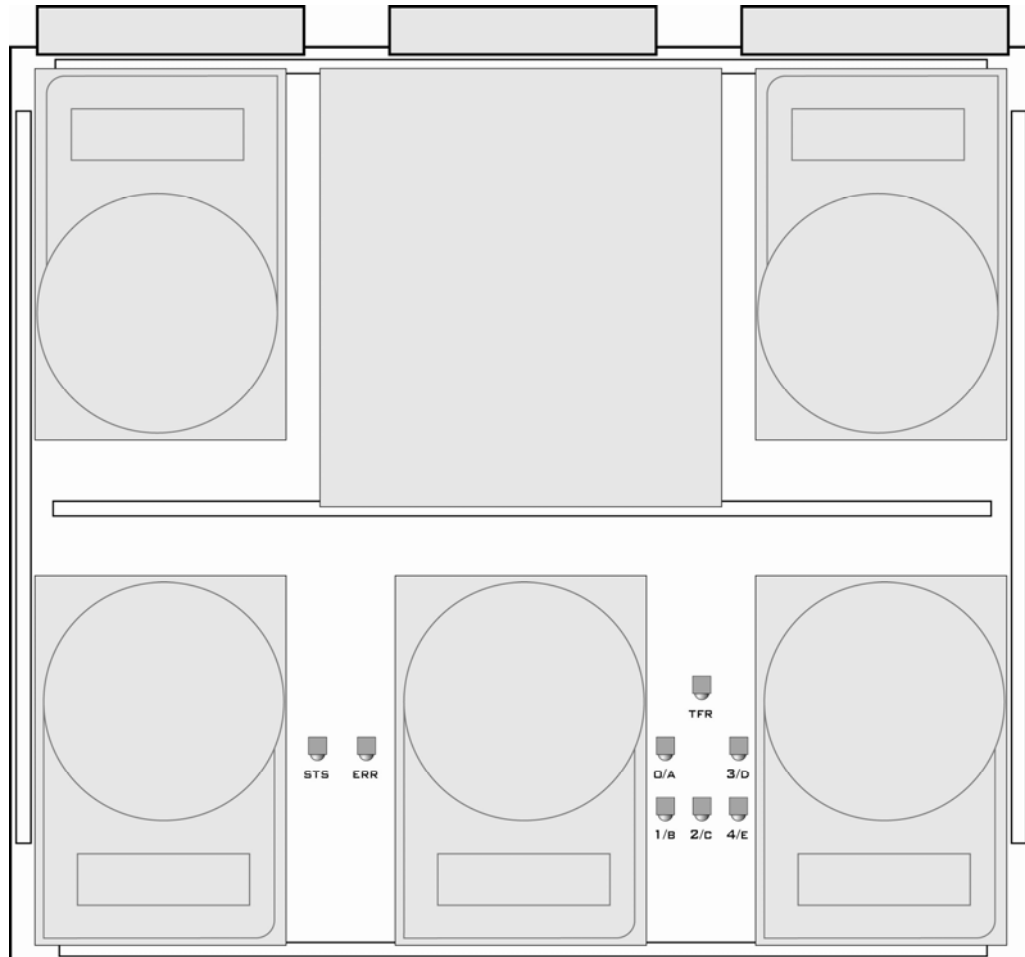
LEDs

0/A – 1/B – 2/C – 3/D – 4/E (between the 2nd and 3rd disk from left, in front):

These LEDs match the position of the disks on the board, i.e.:

0/A   RTCL   3/D

1/B   2/C   4/E

Disk LEDs

Off	The corresponding disk is not started (not spinning)
On, fast blinking (green)	The corresponding disk is starting (spinning)
On, steady (green)	The corresponding disk is started and used in the RAID array
On, slowly blinking (green)	The corresponding disk is started but not used in the RAID array

TF (just behind the 5 disks LEDs):

On (green)	When data is transferred between the RAID array and the HCTX board. If the led is nearly permanently on, it means that data is transferred almost all the time between the RAID array and the HCTX board, thus being close to the maximum bandwidth of the system.

STS (between the 1st and 2nd disk from left in front):

On (green)	When RCTL RAID controller is properly booted.

ERR (next to STS):

Lights red	When errors occur during the data transfer between the RAID controller and the disks

3.5 MTPC BOARD

3.5.1 INTRODUCTION

The function of the PC board is mainly the control of the video hardware via the software and the interfacing of the peripheral equipment (i.e. remote controller) with the video hardware.
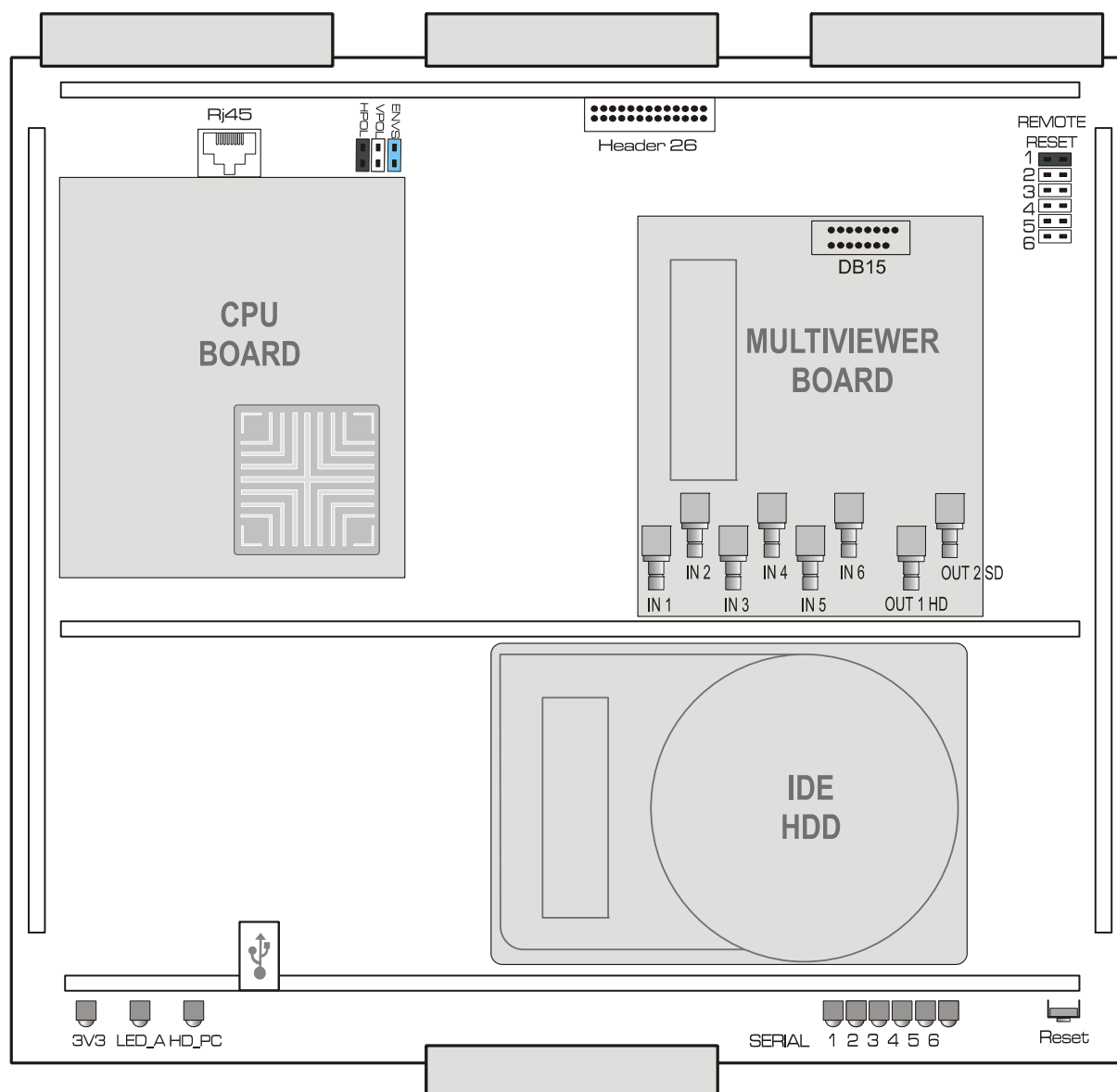
Two types of MTPC boards can be used:

- **A2/A3** with COMMEL HS870 motherboard (with bootable USB)

- **A2/A4** with COMMEL HS870 motherboard and a new time code management module (with bootable USB)

In standard configuration the PC hardware is composed of:

- One mounting PC board, with serial ports, LTC reader and generator, controlled by the motherboard.

- IDE System Hard disk: the IDE disk drive is used for storing the EVS software and the DOS operating system. Neither audio nor video data is saved on this disk. The capacity of this drive may vary depending on market availability, but the system partition is always set to 1 GB. The remaining capacity of this drive is not used.

- 64/128 MB modified SDRAM. The SDRAM used has been modified to suit the system requirements. Please contact EVS support for RAMs upgrade. Do not use standard PC RAM modules.

3.5.2   A2/A3 AND A2/A4 BOARD

MULTIVIEWER

The multiviewer board is an option on XTnano servers.

Connectors

IN	The J2 connectors from the CODEC modules of the COHX board are connected to the IN connectors of the multiviewer board.
OUT1 HD	The OUT HD connector of the multiviewer board is connected to the MULTIVIEWER HD SDI connector on the rear panel of the server.

Connectors

OUT2 SD	The OUT SD connector of the multiviewer board is connected to the MULTIVIEWER SD SDI connector on the rear panel of the server.
DB15	The DB15 connector of the multiviewer board is connected to the MULTI DB15 connector on the rear panel of the server.

LED INFORMATION

Internal EVS information

BOARD CONFIGURATION

HPOL, VPOL and ENVS are used to configure the composite sync generator used in LSM TV mode (no effect if LSM is only used with a VGA monitor).

The **HPOL jump**er inverts or not the VGA HS signal (Horizontal Sync) to generate the composite output signal (TV mode)

The **VPOL jump**er inverts or not the VGA VS signal (Vertical Sync) to generate the composite output signal (TV mode)

The **ENVS jump**er enables or not the presence of the VGA VS signal (Vertical Sync) in the composite output signal (TV mode)

If the LSM TV mode is used, these jumpers must be set-up according to EVS recommendations, which depend on LSM software version and CPU board model/revision:

With MPTC board A2/A3 or A2/A4, set up the jumpers as follows:

- HPOL = On; VPOL = Off; ENVS = On

REMOTE RESET jumpers are available to designate the remote(s) from which the RESET command can be sent.

This command resets the whole system: PC and video hardware.

In standard configuration only, remote one (on RS-422 port 1) is allowed to reset the system.

⚠ **Important**

This jumper should be removed if the device connected to the RS-422 port is NOT an EVS controller. Maximum voltage on pin 5 of an RS-422 port of the XTnano server should not exceed 5 Volt when the corresponding jumper is engaged. Applying a higher voltage on pin 5 when the corresponding jumper is engaged will result in permanent electronic damage to the board.

3.5.3   MEMORY HOLE ACTIVATION

The memory hole is disabled and the BIOS parameters are automatically adapted to the hardware.

Notes:

Regional Contacts

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