DISK RECORDER

Technical Reference

Issue 2.1 – JULY 2002

EVS BROADCAST EQUIPMENT

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Overview

Welcome in the EVS range of products and thank you for your interest in the Disk Recorder System. We will do our best to satisfy your video production needs and we look forward to continuing working with you.

Disk Recorder Main specifications

All EVS Disk recorder systems are full digital in PAL or NTSC standard with a Search function while recording live action, Clip Management and non-linear on line editing, instant playback. With the internal 10-bit digital keyer-mixer board, two synchronized clips can be displayed simultaneously in split screen mode and target tracking and painting features can be blended with recorded material.

VIDEO

STANDARD DEFINITION

- 4:2:2 SMPTE/CCIR 601 digital 10-bit
- NTSC: 525 lines / PAL: 625 lines
- Inputs: 1 to 6 channels – Full frame Synchronizer at each input.
- Outputs: 1 to 6 channels
- Monitoring: PAL/NTSC/SDI with On Screen Display
- Genlock: BlackBurst
- Internal 10-bit digital keyer–mixer board

HIGH DEFINITION

- 2x or 4x 1.485 Gb/s SMPTE 292 I/O
- Line rate: 1080i
- 50 and 59.94fps
- 8- or 10-bit input resolution (auto detect)
- 10-bit output resolution
- Full frame synchronizers on all inputs
- Down-converted monitoring outputs, SDI or CVBS, user-selectable.

AUDIO

- 8+8 analogue balanced input & output channels
- up to 16+16 (8 pairs + 8 pairs) AES/EBU input & output channels
- up to 24 channels embedded audio (2 stereo per video)
- 4 additional analogue balanced output channels for monitoring
- all audio connectors on mainframe
- supports up to 4 audio channels (2 stereo) per video channel

Audio Processing

- uncompressed audio
- 24 bit processing and storage
- sample rate converter from 25-55 kHz to 48KHz
- audio scrub
- audio mix

CAPACITY

User selectable video bit rate from 8 to 160 Mbps
Internal storage : up to 40 hours @ 25Mbps

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.

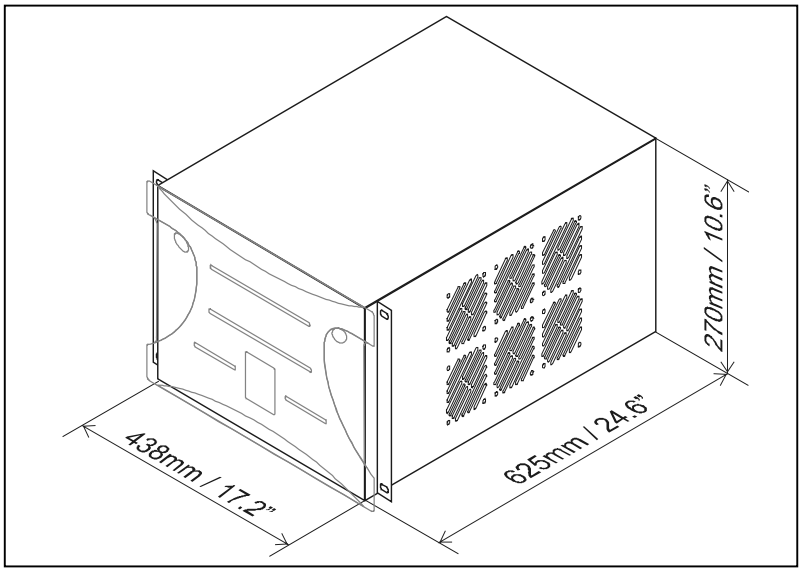
Chapter 1 : Technical Specifications

1.1 Unpacking

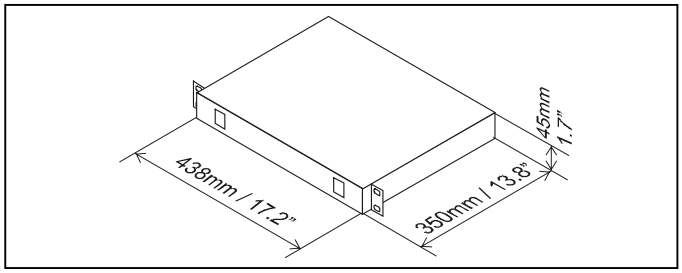
On receipt of the Equipment examine packing for obvious signs of damage. If damaged, do not unpack and inform the carrier immediately. Check thanks to the included packing list if all the items are present and if they show any mechanical damage. If yes, report damage or the missing parts to EVS or their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

1.2 Dimensions

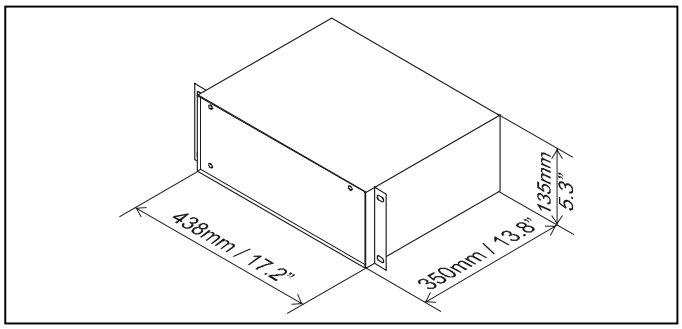
Video disk recorder Main frame 19 inches
Rackmount 6U – Weight: 32.5 Kg/ 71.5 Lbs.



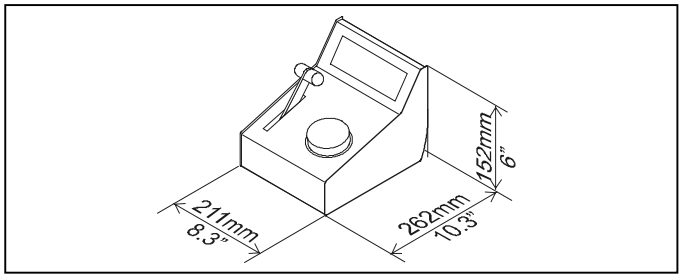
ADA Converter
Rackmount 1U (up to 6 boards) - Weight: 5.3 Kg / 11.6 Lbs.



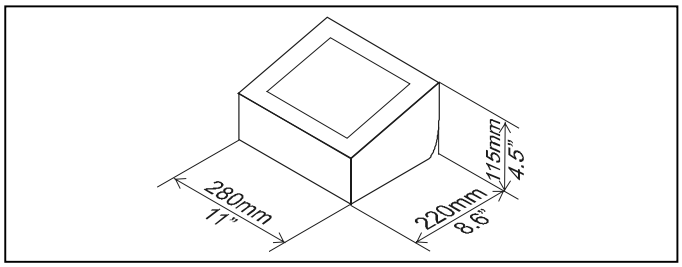
ADA Converter
Rackmount 3U (up to 16 boards) - Weight: 10.8 Kg / 23.9 Lbs.



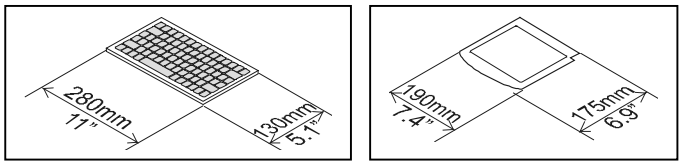
Remote control panel
Weight: 2.9 Kg / 6.3 Lbs.



Touch Screen Video Monitor
Weight: 3.6 Kg / 7.8 Lbs.



Keyboard - Weight: 0.4 Kg / 0.9 Lbs.
Tablet - Weight: 0.5 Kg / 1.2 Lbs. Ref: Wacom® GD0405R



1.3 Installation

Verify the Disk recorder unit has the correct voltage specifications for your power source prior to applying power.
(rear panel selectable 110/230 VAC)
NO SWITCH ON MAINFRAME

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

1.4 Operating conditions

POWER SUPPLY

The EVS Disk recorder system operates on 220 VAC +/- 5% or 100 VAC +/- 15% (rear panel selectable), 47-63Hz, 400W maximum.

The EVS Disk recorder unit is connected to PSU1.
A 2nd Power supply (cold swap) for the disk recorder unit is available optionally.

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

The remote panel, the touch screen and the external ADA rack are fitted with an AUTO SWITCH power supply.

GROUNDING

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

LOCATION

Avoid using the Disk recorder unit in areas having high humidity (operational range : less 90% non-condensing), high temperature (operational range : +5°C to +35°C / 41°F to 95°F), or excessive dust.

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 .

Remember that fans are used to air cool Equipment to protect from overheating,
do not block fans intakes during operations

Having regard to the weight of the LSM-XT chassis, support guides are required for this unit into the rack mount.

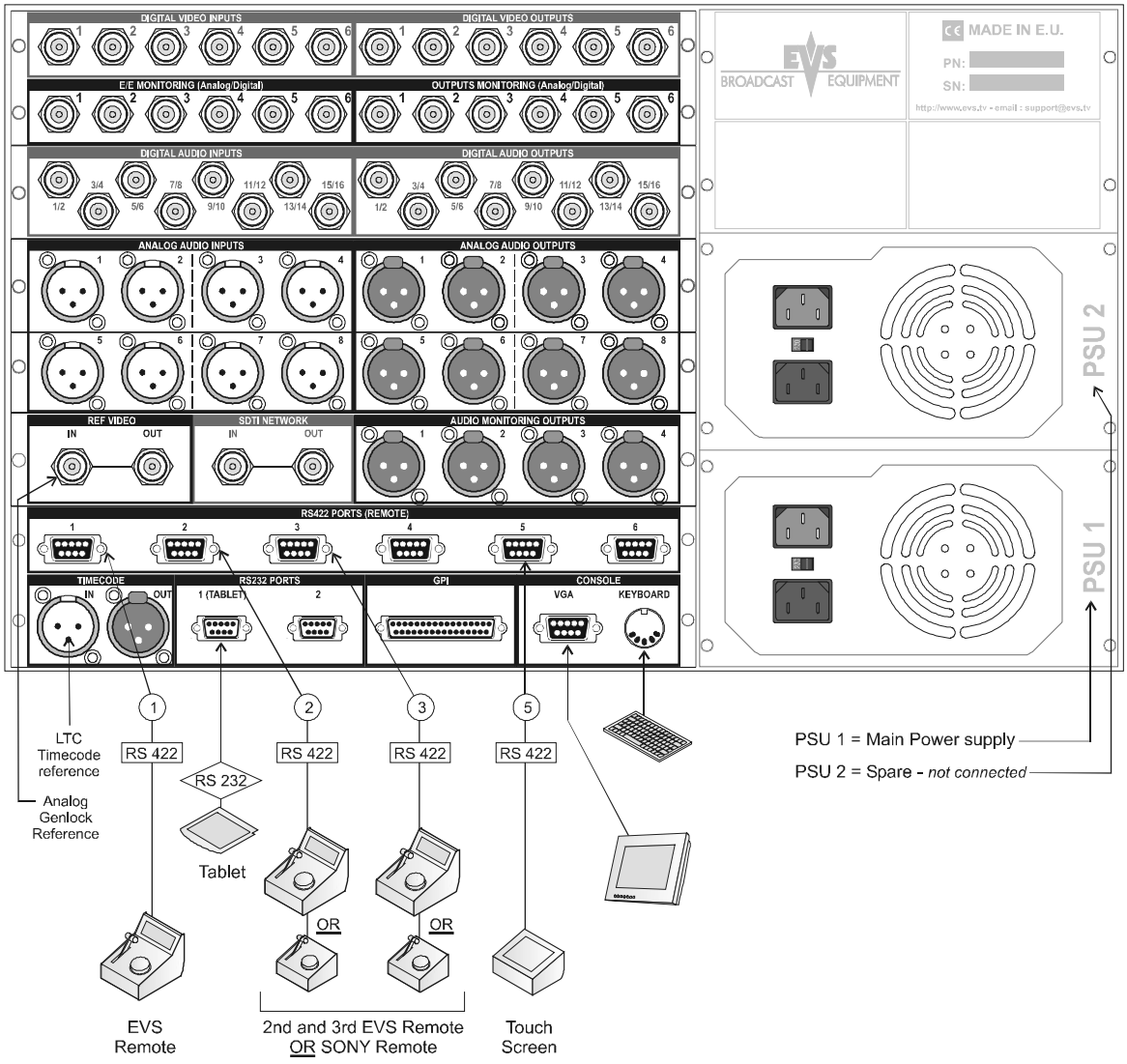
The front ears of the LSM-XT unit are not designed to support its full weight. Applying full weight on these might result in bending the metal plate.

COMPLIANCE

The EVS Disk recorder systems are in compliance with the Class A norm of the FCC rules and have been verified to comply with the electromagnetic compatibility standards of the European Directive 89/336/EEC particularly standards EN50081-1 and EN50082-2. All EVS applications and products are Year 2000 compliant.

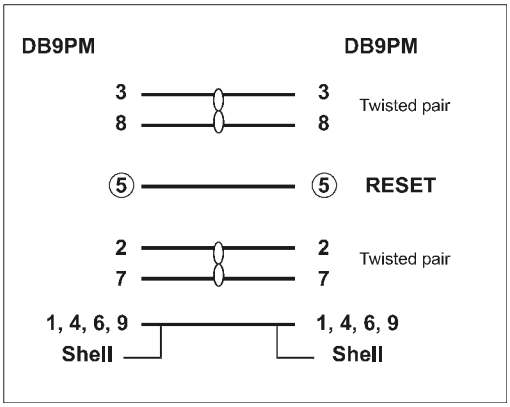
Chapter 2 : Cabling

Peripheral Equipment, Genlock and Timecode references



Comment : Genlock loop must be terminated if not used.

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 note: The Reset command from the Remote is sent through the Pin n°5 of RS422 connector.

Disk recorder unit cabling:

Video and audio cables are differently wired up depending on the operating software used. Pay attention to the cameras location on input connectors.

DIGITAL VIDEO INPUTS (REC) & MONITORING						DIGITAL VIDEO OUTPUTS (PLAY) & MONITORING						
1	2	3	4	5	6	1	2	3	4	5	6	
CAM A	CAM B	CAM C	CAM D			PGM1	PGM2 /PRV	PGM3 /PRV				LSM
CAM A Phase 1	CAM A Phase 2	CAM A Phase 3	CAM B	CAM C		PGM1	PGM2 /PRV	PGM3 /PRV				Super LSM

ANALOG AUDIO INPUTS				ANALOG AUDIO OUTPUTS				
1+2	3+4	5+6	7+8	1+2	3+4	5+6	7+8	
CAM A	CAM B	CAM C	CAM D	PGM1	PGM2 /PRV	PGM3	AUX CLIP	ANALOG Single Stereo Mode
CAM A Stereo 1	CAM B Stereo 1	CAM A Stereo 2	CAM B Stereo 2	PGM1 Stereo 1	PGM2/PRV Stereo 1	PGM1 Stereo 2	PGM2/PRV Stereo 2	ANALOG Dual Stereo Mode

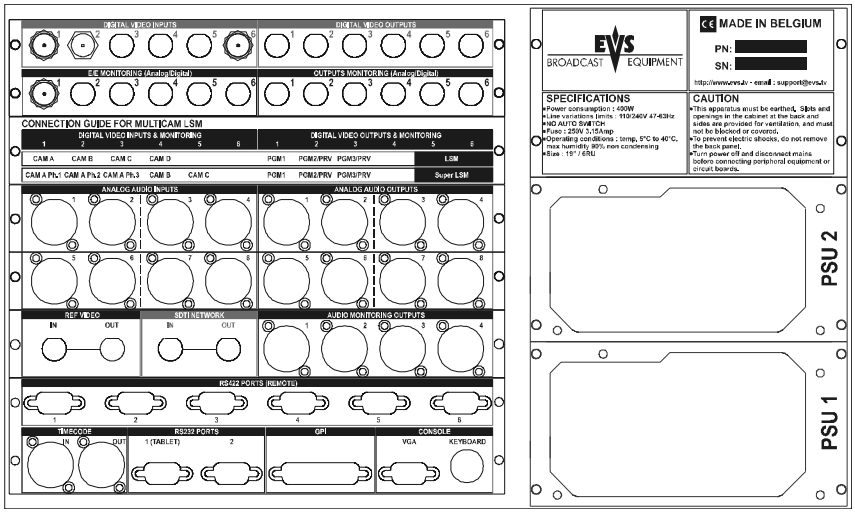
DIGITAL AUDIO INPUTS								DIGITAL AUDIO OUTPUTS								
1 / 2	3 / 4	5 / 6	7 / 8	9 / 10	11 / 12	13 / 14	15 / 16	1 / 2	3 / 4	5 / 6	7 / 8	9 / 10	11 / 12	13 / 14	15 / 16	
CAM A	CAM B	CAM C	CAM D					PGM1	PGM2 /PRV	PGM3 /PRV	AUX CLIP				AUX CLIP	AES/EBU Single Stereo Mode
CAM A Stereo 1	CAM B Stereo 1	CAM C Stereo 1	CAM D Stereo 1	CAM A Stereo 2	CAM B Stereo 2	CAM C Stereo 2	CAM D Stereo 2	PGM1 Stereo 1	PGM2/PRV Stereo 1	PGM3 Stereo 1	AUX CLIP	PGM1 Stereo 2	PGM2 Stereo 2	PGM3 Stereo 1	AUX CLIP Stereo 2	AES/EBU Dual Stereo Mode

Audio configurations:

CODA1

Internal Audio Module : Embedded + Analogue Balanced

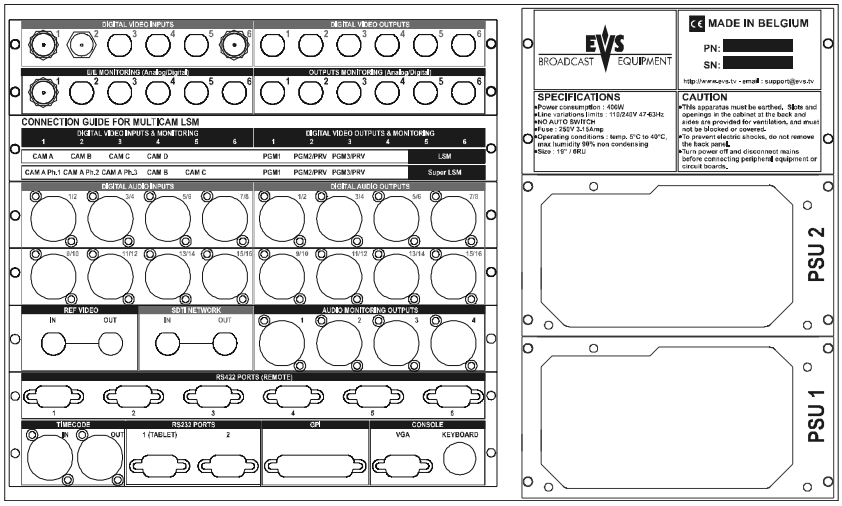
- Embedded Audio 12 stereo inputs + 12 stereo outputs
- Analogue balanced audio 4 stereo inputs + 4 stereo outputs (XLR)
- Audio monitoring : 4 analogue balanced mono outputs (XLR)



CODA2

Internal Audio Module : Embedded + AES/EBU

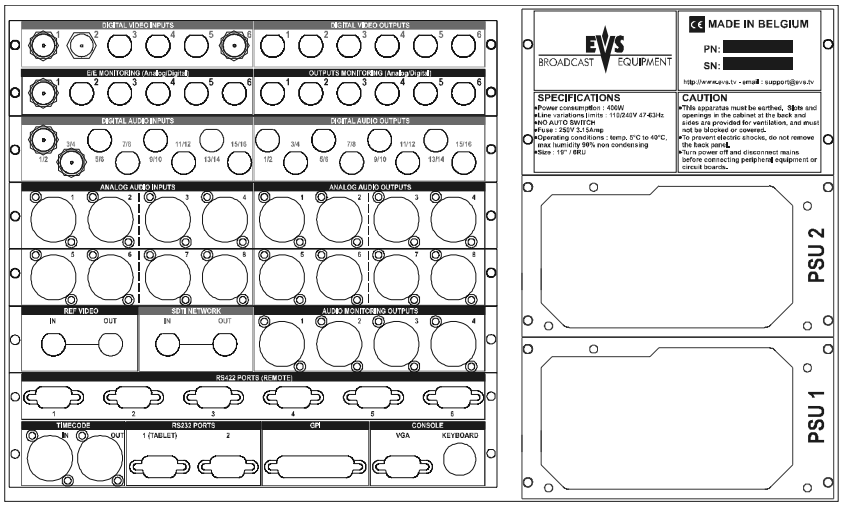
- Embedded Audio 12 stereo inputs + 12 stereo outputs
- AES/EBU Audio 8 stereo inputs + 8 stereo outputs (XLR)
- Audio monitoring : 4 analogue balanced mono outputs (XLR)



CODA3

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

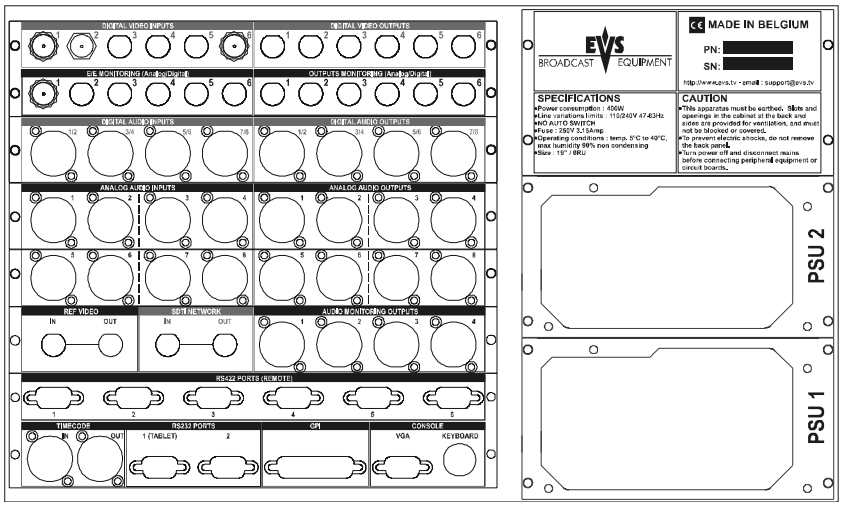
- Embedded Audio 12 stereo inputs + 12 stereo outputs
- AES/EBU Audio 8 stereo inputs + 8 stereo outputs (BNC)
- Analogue Balanced audio 4 stereo inputs + 4 stereo outputs (XLR)
- Audio monitoring : 4 analogue balanced mono outputs (XLR)



CODA4

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

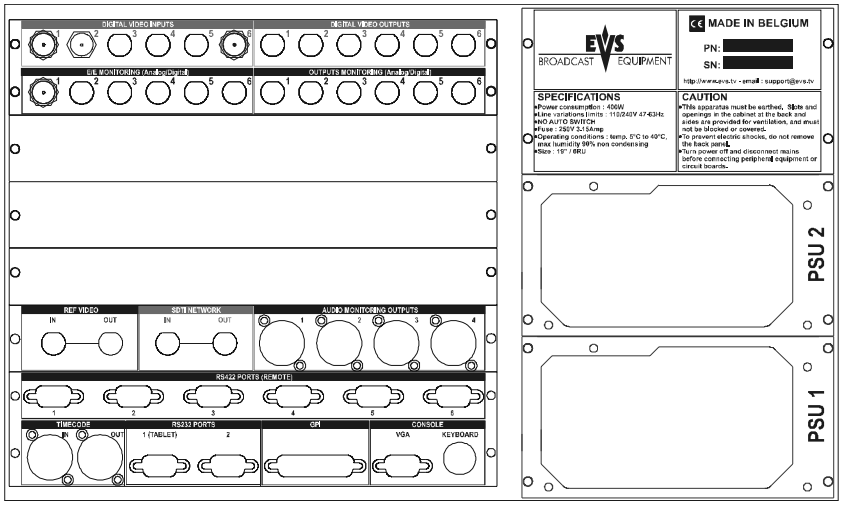
- Embedded Audio 12 stereo inputs + 12 stereo outputs
- AES/EBU Audio 8 stereo inputs + 8 stereo outputs (XLR)
- Analogue Balanced audio 4 stereo inputs + 4 stereo outputs (XLR)
- Audio monitoring : 4 analogue balanced mono outputs (XLR)



CODA0

Internal Audio Module : Embedded Audio only

- Embedded Audio 12 stereo inputs + 12 stereo outputs
- Audio monitoring : 4 analogue balanced mono outputs (XLR)



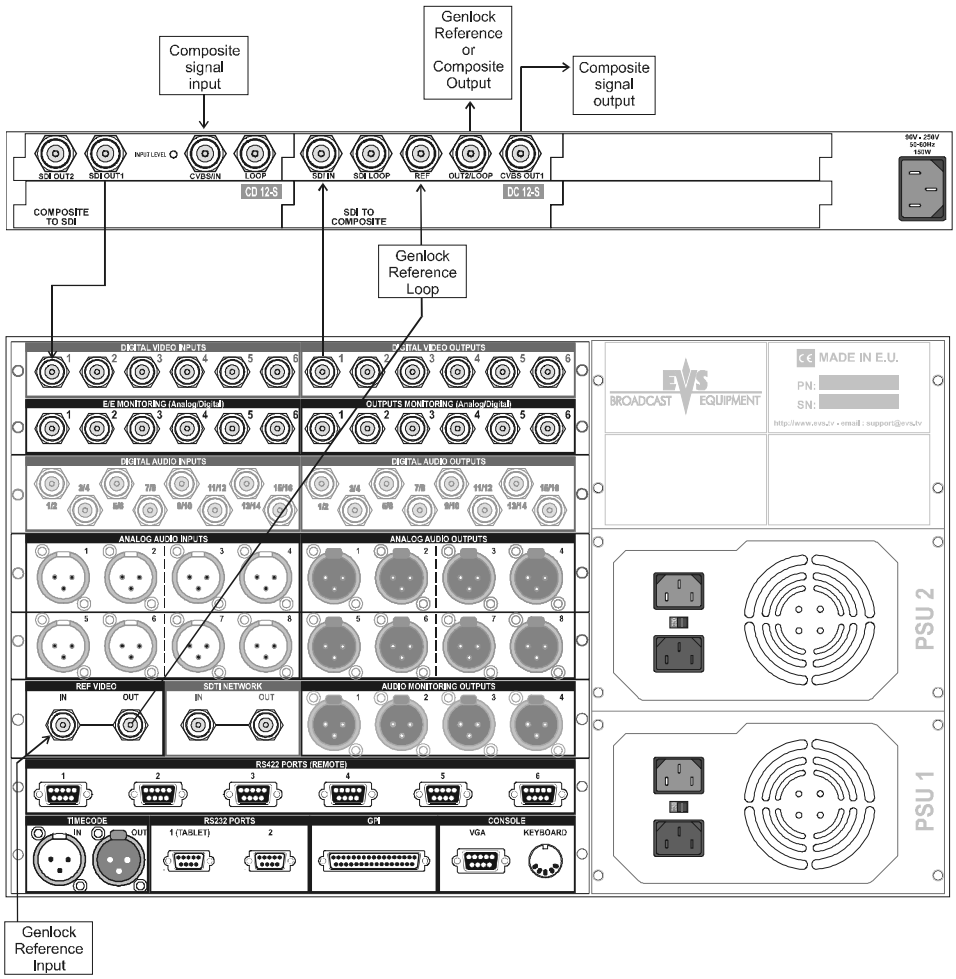
Note: A sixth configuration has been designed with no internal audio module, so no audio is available.

ADA converters:

The ADA converter boards are used as a stand alone unit device: boards are mounted horizontally in 1U height rack or vertically in 3U rack and combined according to the requirements of each application:

Board	Model	converts	To
Single	CD12-S	Composite	4:2:2 serial digital
Single	CD 11-S	Composite, Y/C, S-VHS	4:2:2 serial digital
Single	DC12-S	4:2:2 serial digital	Composite
Double	CD30/CD31-DS10	RGB/YUV	4:2:2 serial digital
Double	DC 30 -SD10	4:2:2 serial digital	RGB/YUV
Double	DC 32	4:2:2 serial digital	RGB/YUV, Composite

EXAMPLE OF VIDEO CABLING WITH ADA CONVERTERS:

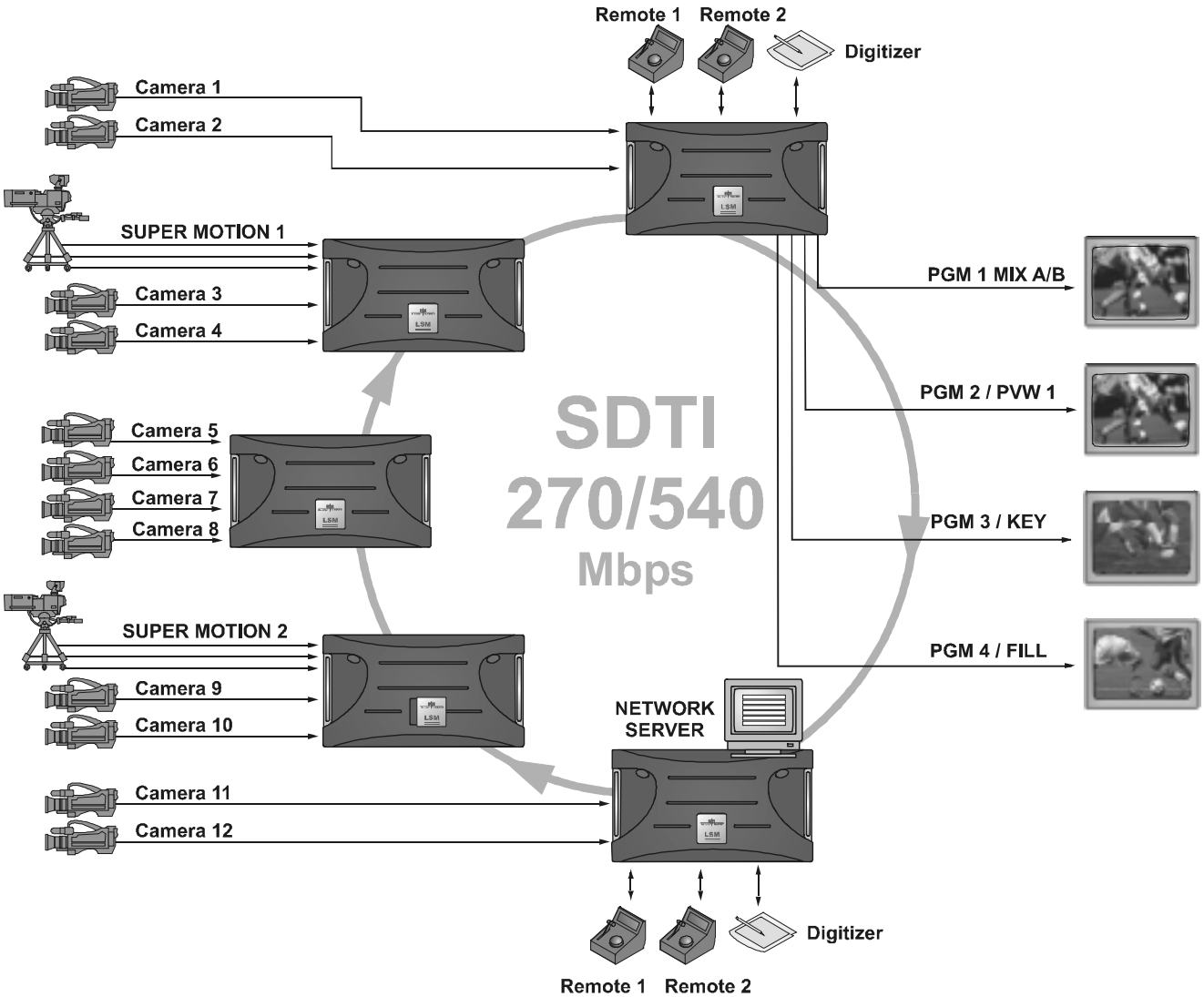


Connecting multiple LSM's on SportNet :

The Sportnet network is composed by several LSM-XT systems all connected with a 75-Ohm coaxial cable (BNC).

The exchange between systems is operated through the SDTI interface at 270 or 540 Mbps.

The Sportnet requires a network server dedicated to the management of the Database shared among all LSM-XTs. This is assigned to one of the LSM-XT systems on the network.



REQUIRED CONDITIONS TO SET UP AND RUN SPORTNET

1. All systems on the network must be LSM XTs

2. The SDTI basic option code must be validated in the options list.

3. They should all be running compatible software version (4.02.19 or higher)

4. The following parameters must be similar on all systems :
    a. Disk Blok Size (512K, from Advanced Parameters Menu)
    b. Teletext (normally 0, from Advanced Parameters Menu)
    c. SDTI Speed (normally 540Mbps, from Hardware Configuration Menu)
    d. Video standard

5. Network Type must be set to “Server” on 1 (and only 1 !) LSM on the network. The others must be set to either “Master” (to share clips and view others’ clips) or “Client” (to share clips only).

6. All LSM must be connected with a good quality BNC 75Ohm cable to form a closed loop. Connect the SDTI OUT connector of the first LSM to the SDTI IN connector of the second one, etc until the loop is closed by connecting the SDTI OUT connector of the last LSM to the SDTI IN connector of the first one.

7. Max. cable length without reclocking of the SDTI signal is 100m with RG59 cable and 200m with RG11 cable. As far as possible, use a single cable between 2 LSM’s on the network, rather then multiple short cables with intermediate connectors, since these can introduce jitter or otherwise decrease the signal quality.

STARTING SPORTNET

1. When all above conditions are fulfilled, turn on all “Masters” and “Clients” LSMs, and make sure the Multicam application is started on all of them. A message appears because they are looking for the “Server” LSM.

2. Turn on the “Server” LSM and start the Multicam application. The other LSMs should see the “Server” arriving on the network and will connect automatically. Connection takes a few seconds (usually between 2 and 5 sec) for each LSM.

SPORTNET PERFORMANCES & TROUBLESHOOTING

1. With the default settings, 4 real-time transfers can be achieved on the network with standard pictures, and 1.2 real-time transfer with super motion pictures. These performances are also limited by the disk bandwidth available from the LSM where the clips are stored. If the LSM "owning" the clips is searching in fast jog mode, or is doing multiple playbacks at the same time, freezes can occur on the remote LSM using those clips.

2. If the Server has switched to stand-alone mode for any reason, the entire network is disabled and will not recover automatically. The operator working on the Server must go to the network menu and press the 'B' key ("CONNECT") to try establishing the network again. The other users can not reconnect as long as the Server is working in stand-alone mode.

3. Note that when working at 540Mbps, only passive SDI routing equipment may be used. Even if the network is set to run at 270Mbps, the use of active SDI equipment should be avoided, because they could cause additional line delays and prevent the proper operation of SportNet.

4. If the start-up of the network at 540Mbps does not work properly and all machines are apparently configured properly and the Multicam is actually started on all of them, this can be due to the fact that the selected cables to connect all LSMs together are not suitable or too long to operate at such a speed. You can set all LSMs to work at 270Mbps and try working in this mode. The number of simultaneous real-time transfers you can achieve at 270Mbps is of course reduced.

Chapter 3 : Compression

Bit Rate Reduction - Table of quantization

The CODEC compression/decompression board uses 255 different quantization tables (Luminance and chrominance). Each table is numbered from 1 to 255.

Comment: Normal Quantization level is defined from 1 to 510. The CODEC uses level 2, 4, 6, and 8.... 506, 508, 510 to obtain 255 tables.

2 is a LOSSLESS table, which means that no quantization will be done after the DCT process. However, we know that this gives pictures with low compression like 2:1 or even less when the picture contains a lot of noise or high frequencies.

The 255th table has the maximum of quantization and might be used for a true noise picture. We know that if we increase the quantization, we increase the compression for a particular picture. It is then possible to select a quantization table, which gives a target compression ratio. The disk recorder automatically does this process.

The selection of the quantization table to use is done by linear interpolation process based on two values: quantization table and compression given by the two previous fields.

Each field is saved with its table number from 1 to 255. At playback, the controller will automatically decompress the picture with its own table. This allows almost constant compression ratio and thus constant capacity. It also allows the reading of fields recorded with various compression ratios.

So, in order to adjust the average compression ratio, the user must set the following parameter: *(see EVS software)*

VIDEO BITRATE : average video bitrate requested

If each disk provides a sustained rate of 10 Mbytes per second, four hard disks provide 40 Mbytes per second. If the application requires simultaneously 6 channels, each channel will have 6.7 Mbytes per second (53 Mbps) which is about 3.1:1.

RAM video buffer - Block size

The VIDEO RAID Hard disk controller board has a 256MB video RAM buffer to optimise disk access and search quality.

***Note**:* Do not use standard PC SIMM. Contact EVS if this component need to be replaced.

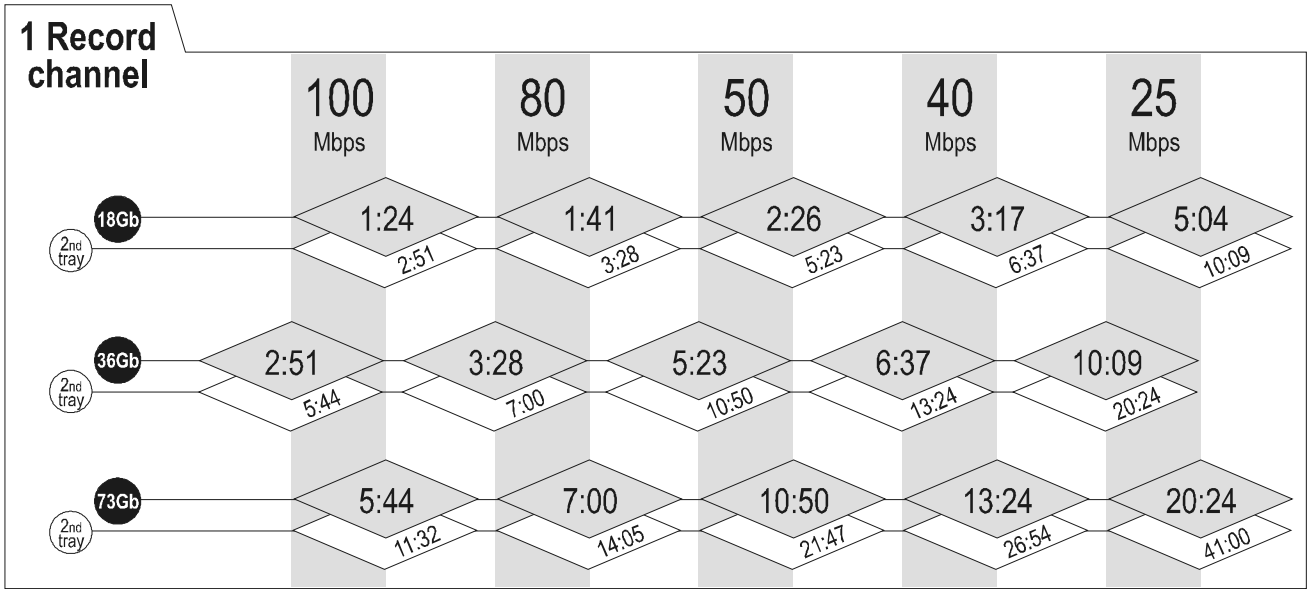
On record: The video buffer RAM is divided into different blocks, the number of blocks depends on the size of the video RAM buffer and of the size of each block. The compressed fields are stored in those blocks. As soon as a block is filled, it is transferred to the disks.

On play-back: The opposite processing is done. Blocks are sent one by one from the disks.

Working with large blocks is advised to improve the bandwidth of the disk in order to minimize the disk heads movements. However, large blocks are not agreeable when in search mode because it takes more time to load them. 512-KB blocks on disks are a good compromise. Therefore a block is 2 MB in RAM. If the compression is 4:1 (40Mbps) or about 100 KB per field, each block contains about 20 fields or 400 milliseconds of video (50Hz).

Disk duration and compression rate

The following schematic shows the record duration for 1 record channel (i.e. 1 video + 2 stereo audio tracks) with a tray of 18Gb, 36GB or 73Gb disks compared with the different video bitrates. The Operational Disk Size parameter is set to 100%.



Chapter 4 : 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.

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

The output video signal at 33% speed :

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

The output video signal at 25% speed :

O **O** O **O** **E** E **E** E O **O** O **O** **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: 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 neighbouring 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 neighbouring 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 use 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 do not cause parity violation at this particular speed.

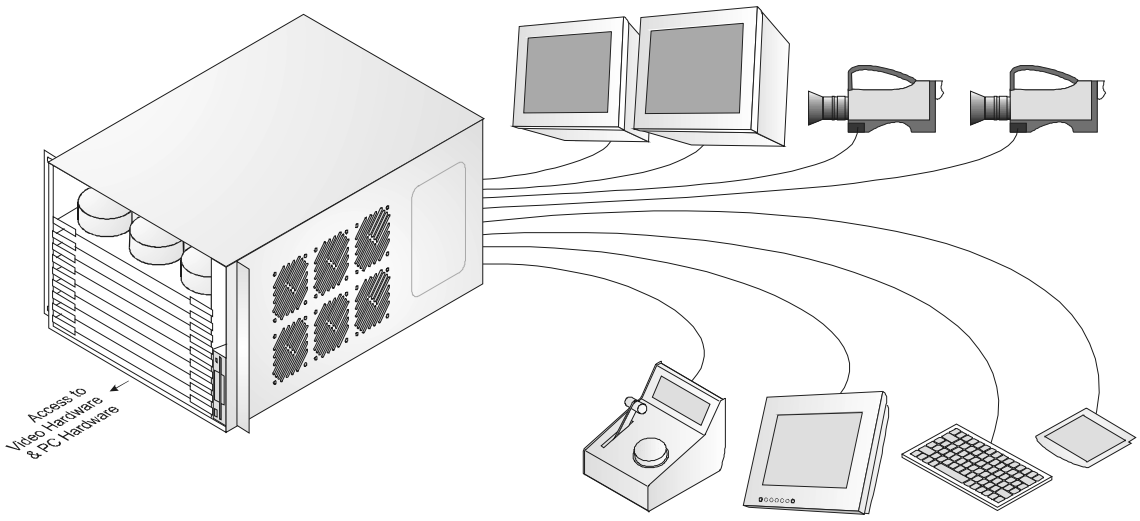
Whatever the choice, the resulting picture is thus always a compromise between stability and resolution. With EVS systems, the operator always has got the choice between any of the 3 above described techniques : no interpolation, 2-line interpolation or 4-line interpolation. Even if the operator chooses 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 VTR's 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 is enabled.

Chapter 5 : Hardware description

Physical Specifications



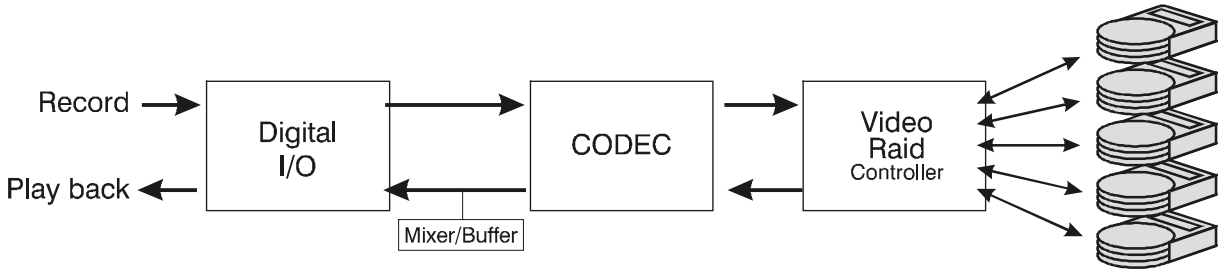
The EVS Disk Recorder is housed in a 19 " (485 mm) rack frame with extended depth and 6 rack unit (266 mm) height.
It contains all the EVS developed boards: namely, the digital video compression board and audio processing board (CODEC's), the VIDEO RAID board (save/re-call the digital video and audio data to/from hard disks) with 5 separate standard SCSI-2 busses, a Keyer / Mixer / Frame Buffer board and the Digital I/OE board (CCIR601).

The unit is controlled by an internally installed IBM compatible PC motherboard with its own separate floppy, IDE hard drive, VGA graphic output and keyboard.

Typically, five 18 GB hard disk drives, providing a capacity of 5h @ 25Mbps. The maximum capacity is reached with a double tray (10 disks) of 73Gb providing 40h @ 25Mbps.

The user interface is made through the keyboard and different menus rolling on the VGA monitor; one, two or three dedicated remote control panels with lever, jog-knob and LCD display; and tablet or touch screen for specials effects.

EVS boards:



The boards installed in the EVS Disk Recorder unit are:

1. **I/OE board** with 4:2:2 CCIR601 10-bit inputs (x2), outputs (x2) and 4 onboard monitoring outputs (PAL/NTSC/SDI) which provide T/C and other information readout on rear BNC video monitoring outputs.

2. **VIDEO CODEC** board – fitted with up to 6 modules in order to provide up to 6 channels - with parallel 601 input/output and software set quantization quality.

3. **AUDIO CODEC** board – handles analogue balanced, AES/EBU and Embedded audio. Audio is recorded 24-bit uncompressed.

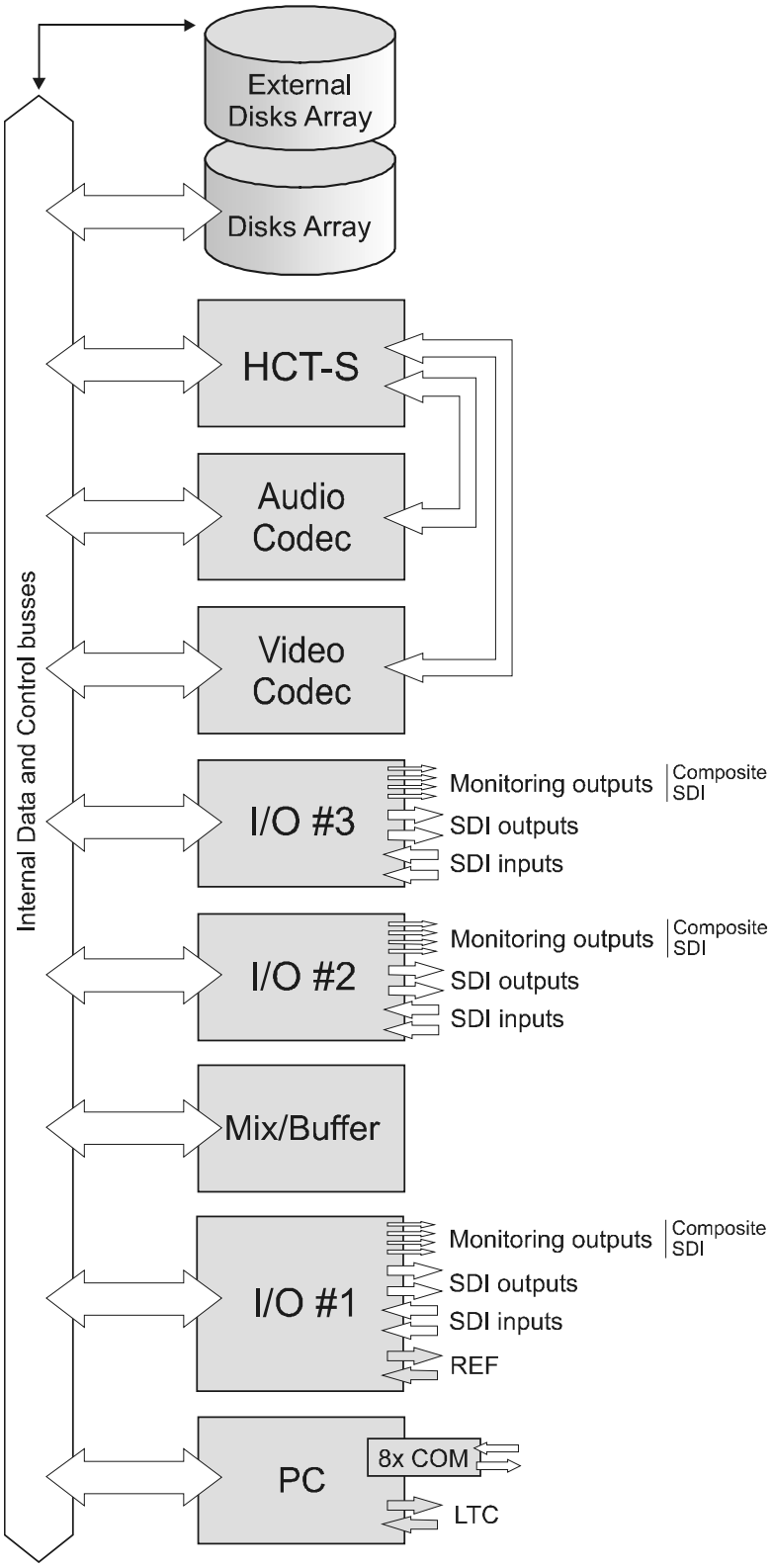
4. **RAID controller board** (HCTS) – offers very high capacities and fast data transfer rates.

5. **Digital mixer/buffer** board for target tracking/painting options.

6. **PC board** controls the operation of the Disk Recorder unit. The PC module is composed by one mounting PC board with serial ports,1 LTC reader and 1 LTC generator, and controlled by the motherboard.

All those EVS developed boards are plugged horizontally into a proprietary bus-board with 96-pin connectors.

BLOCK DIAGRAM



Multi-access - Drives capacity

The basic EVS disk recorder is a 2-channel unit with one recording channel and one independent play or search channel, built with one AUDIO CODEC board and one VIDEO CODEC board, one for handling AUDIO channels, and the second one to proceed with the VIDEO compression.

The maximum channel configuration is 6-channel. In this configuration, up to 5 record channels and/or up to 4 playback channels are available in LSM configurations.

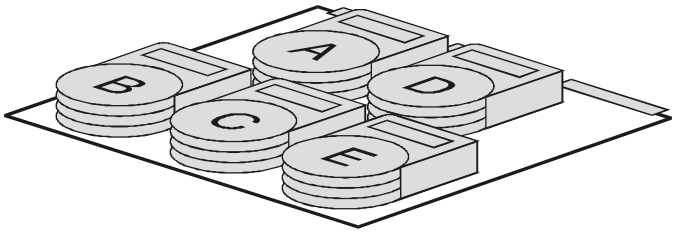
The different drive arrangements are:

Module (4 + 1) x 18 GB drives (total 90 GB) : 5 hours @ 25Mbps
Module (8 + 2) x 18 GB drives (total 180 GB) : 10 hours @ 25Mbps

Module (4 + 1) x 36 GB drives (total 180 GB) : 10 hours @ 25Mbps
Module (8 + 2) x 36 GB drives (total 360 GB) : 20 hours @ 25Mbps

Module (4 + 1) x 73 GB drives (total 365 GB) : 20 hours @ 25Mbps
Module (8 + 2) x 73 GB drives (total 730 GB) : 40 hours @ 25Mbps

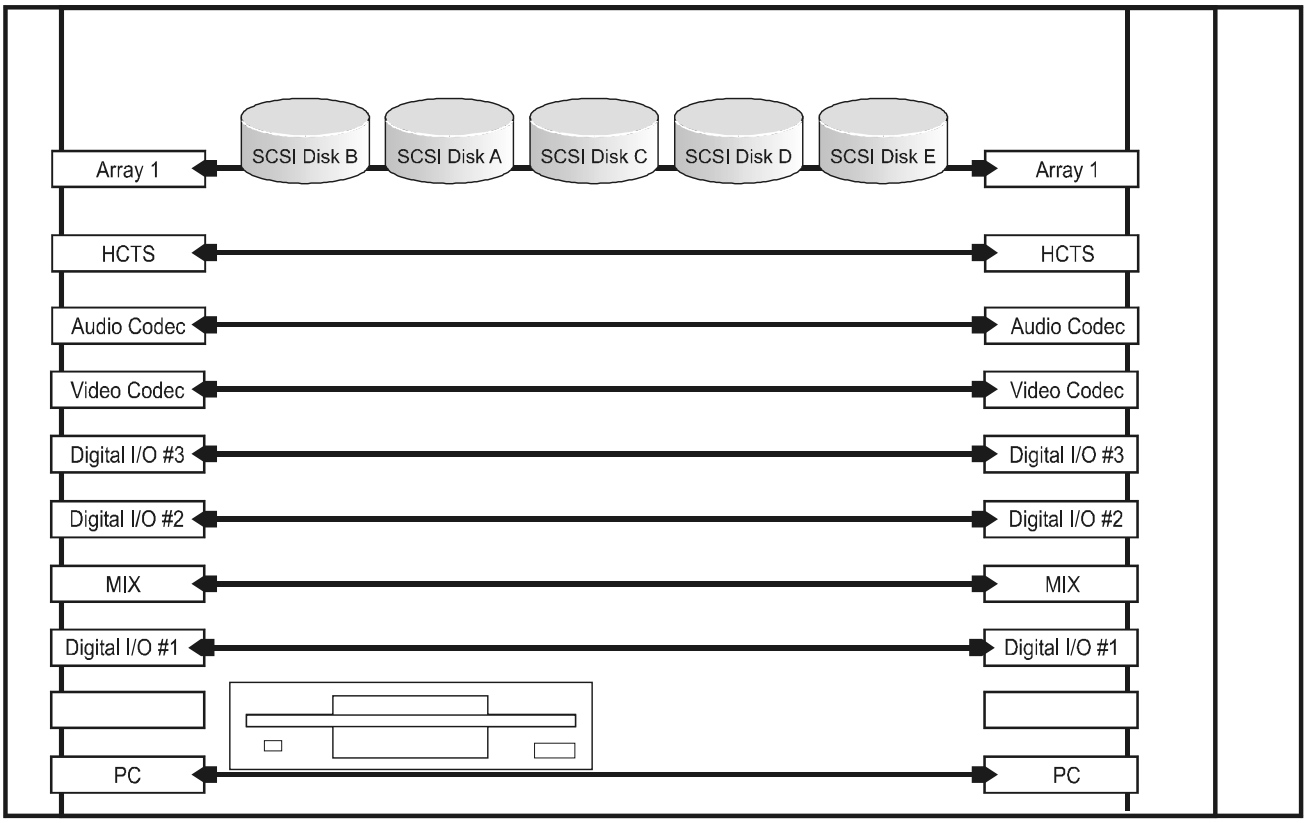
Comment: The Video Raid uses striping process across 5 disk drives. The video and audio data are striped over the first 4 drives (A, B, C, D) while the parity information is saved on the fifth drive (E). If one drive (A, B, C or D) is damaged, the Video Raid can use the parity information to recover the missing information.



Standard Definition
Video Hardware Presentation

This schematic describes the location of the electronic boards developed by EVS for its Video Disk Recorder.

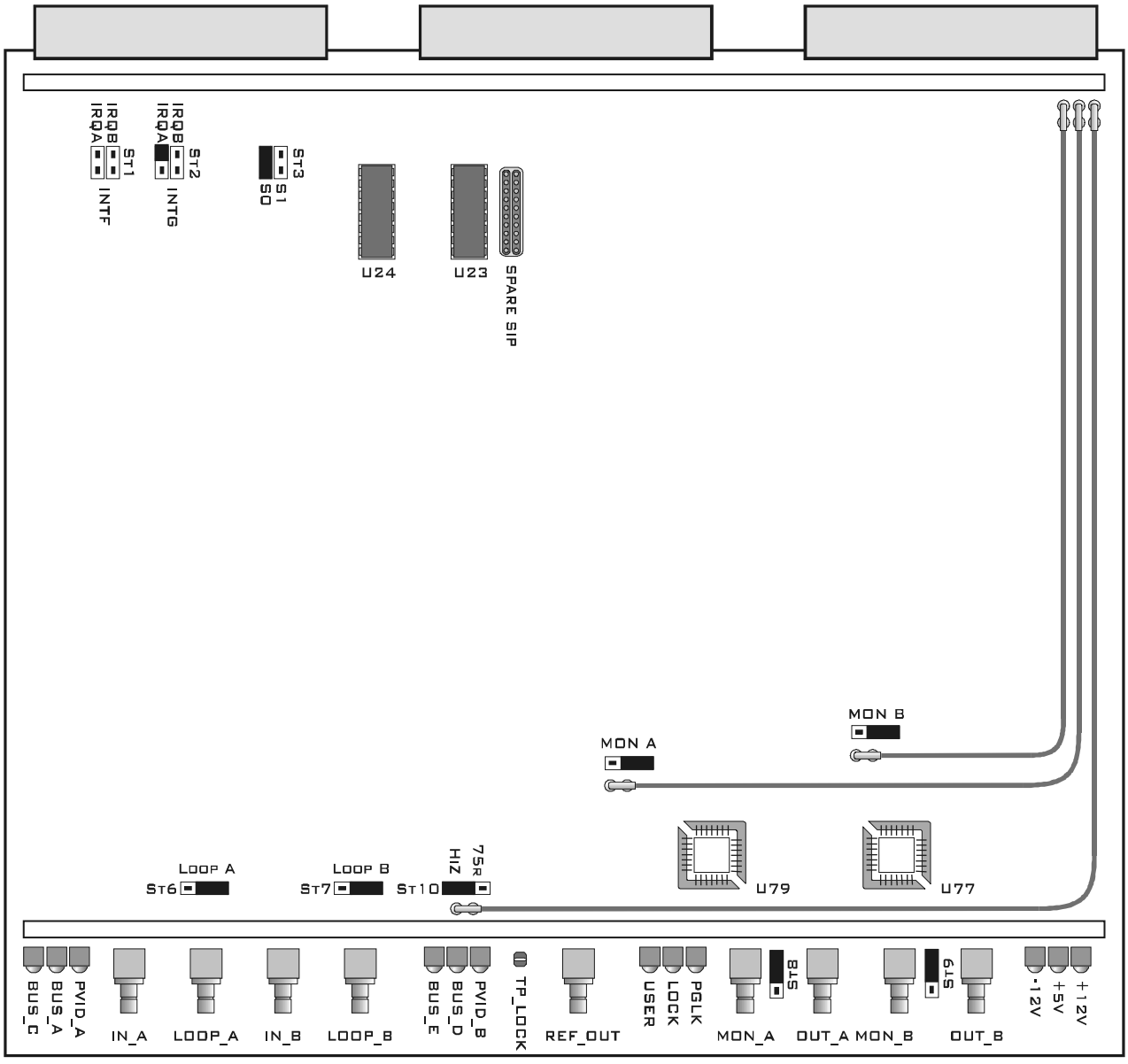
Important note: Each board has a fixed location. Connecting boards in wrong positions will prevent proper operation and might cause hardware damage if power is applied too long.



DIGITAL I/O E

The Digital I/O E boards manage the video inputs and outputs, and send/receive the video information to/from the VIDEO CODEC board. It is also used to multiplex/de-multiplex video and audio data when embedded audio standard is selected.

One digital I/O E board has two digital inputs, two digital outputs and 4 onboard monitoring PAL/NTSC/SDI outputs. Up to 3 digital I/O E boards can be installed into the LSM-XT chassis, depending on the number of video inputs and outputs required.



LED'S INFORMATION:

Bus_A/C/D/E:	shows whether the video input A is sent to bus A or C and the video input B is sent to bus D or E
PVID_ A/B:	shows the video signal is present on input A/B
USER:	
LOCK:	shows the unit is actually locked on the Reference signal.
PGLCK:	shows the presence of the reference signal
-12V, +5V, +12V:	show all voltages are OK.

CONNECTORS:

IN_A/B:	Serial Digital video inputs
LOOP_A/B:	Loop through (CVBS or SDI) of digital input A/B for E/E monitoring
REF_OUT:	Genlock output
MON_A/B:	*Optional:* Serial digital monitoring outputs (requires chips U79 and U77)
OUT_A/B:	Serial Digital video outputs

BOARD CONFIGURATION:

1. Adding an second and third Digital i/O E board

Make sure the system is turned off and mains is disconnected before moving/modifying any component !

Before adding a second and a third I/OE boards into the LSM-XT chassis, remove the INTG jumper (ST2) of IRQ A position from the second and third I/OE boards. But do not remove the INTG jumper from the first I/OE board.

Then refer to this schematic to change jumper position (ST3) on each I/OE board.

The three digital I/O boards have different jumper configurations depending on the location inside the mainframe.

2. Digital / Analogue monitoring:

Moving the MON_A and MON_B jumpers allows you to select analogue or digital monitoring from the Monitoring outputs BNC connectors on the rear panel.

MON A / B: 
The corresponding monitoring output from the rear panel is analogue.

Adding chips to U79 and U77 first,
then move MON A /B jumper to this position: 
The monitoring outputs from the rear panel are digital.

3. Digital / Analogue signal loop:

Moving the LOOP_A and LOOP_B jumpers allows to select analogue or digital input loop (IN1, IN2, IN3, IN4, IN5, IN6) from the BNC connectors of the rear panel:

LOOP A / B: 
The signal loop from the rear panel is analogue.

LOOP A / B: 
The signal loop from the rear panel is digital.

4. 75 Ohm Termination:

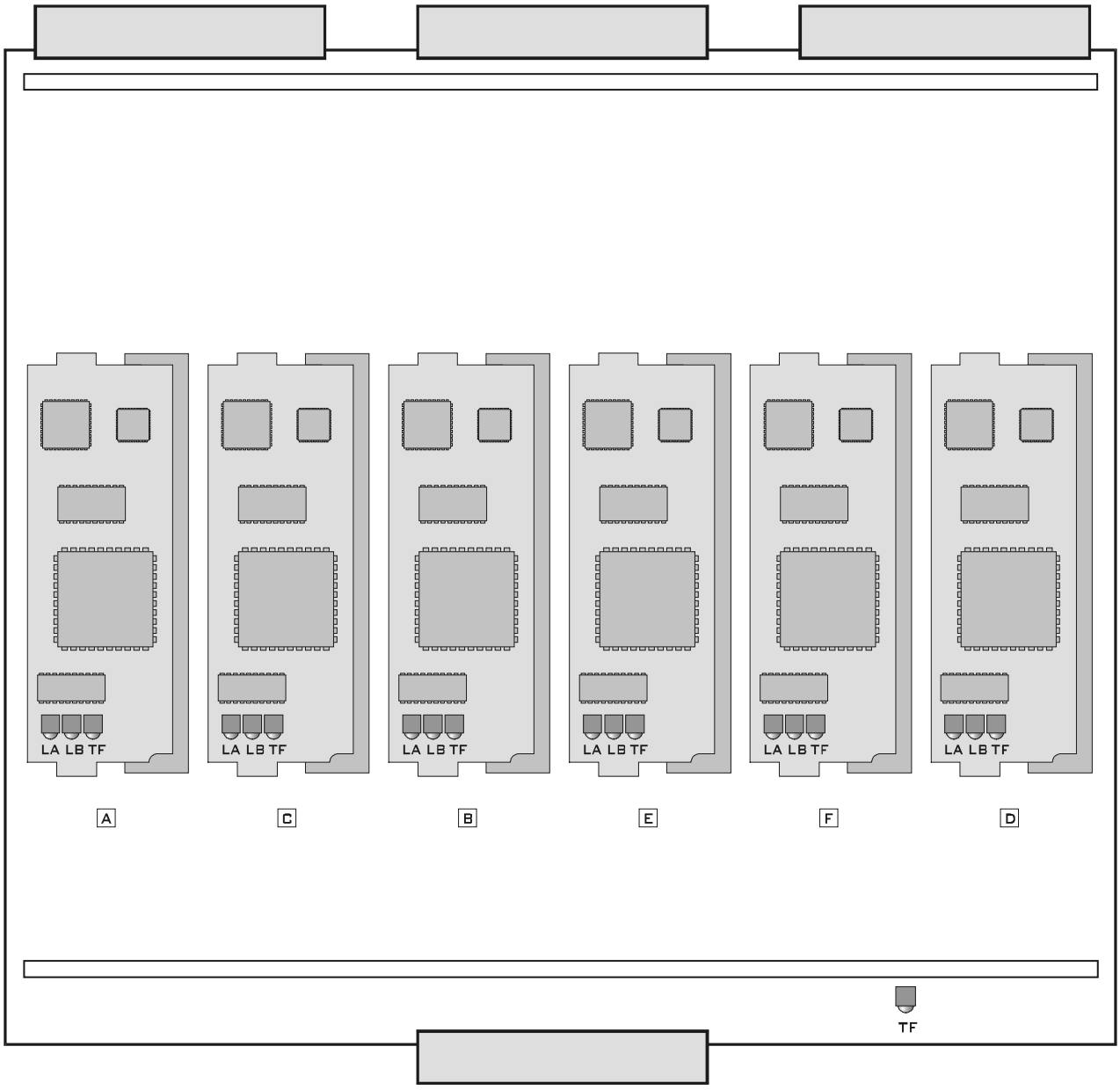
ST10 jumper has to be set on HIZ position

Important note: In all configurations, SPARE SIP resistor has to be removed. First releases of LSM-XT were delivered with this resistor, the next releases are delivered without the SPARE SIP resistor.

VIDEO CODEC BOARD

(VIDEO RAID CODEC 6)

The VIDEO CODEC board is the video interface between the I/O E board and the HCTS board. It manages the compression and the decompression processes. One VIDEO CODEC board can handle simultaneously from 2 to 6 video channels, either record or playback channels, and proceeds with the video compression and decompression in 4:2:2 quality. VIDEO CODEC and AUDIO CODEC boards are tied to the HCTS board with one bus connector on the front side.



One CODEC module provides one video channel. Up to 6 modules can be plugged onto the VIDEO CODEC board, so the maximum configuration is 6-channel.

The table below summarizes the assignment of CODEC channels on the CODEC6 board.

	A COD0	C COD4	B COD2	E COD3	F COD5	D COD1
2 Play + 0 Rec	Play 1					Play 2
1 Play + 1 Rec	Play 1					Rec 1
0 Play + 2 Rec	Rec 2					Rec 1
3 Play + 0 Rec	Play 1			Play 3		Play 2
2 Play + 1 Rec	Play 1			Play 2		Rec 1
1 Play + 2 Rec	Rec 2			Play 1		Rec 1
0 Play + 3 Rec	Rec 2			Rec 3		Rec 1
4 Play + 0 Rec	Play 1		Play 3	Play 2		Play 4
3 Play + 1 Rec	Play 1		Play 3	Play 2		Rec 1
2 Play + 2 Rec	Play 1		Rec 2	Play 2		Rec 1
1 Play + 3 Rec	Play 1		Rec 2	Rec 3		Rec 1
0 Play + 4 Rec	Rec 4		Rec 2	Rec 3		Rec 1
5 Play + 0 Rec	Play 1		Play 3	Play 4	Play 5	Play 2
4 Play + 1 Rec	Play 1		Play 2	Play 3	Play 4	Rec 1
3 Play + 2 Rec	Play 1		Rec 2	Play 2	Play 3	Rec 1
2 Play + 3 Rec	Play 1		Rec 2	Rec 3	Play 2	Rec 1
1 Play + 4 Rec	Rec 4		Rec 2	Rec 3	Play 1	Rec 1
0 Play + 5 Rec	Rec 4		Rec 2	Rec 3	Rec 5	Rec 1
6 Play + 0 Rec	Play 1	Play 5	Play 3	Play 4	Play 6	Play 2
5 Play + 1 Rec	Play 1	Play 4	Play 2	Play 3	Play 5	Rec 1
4 Play + 2 Rec	Play 1	Play 3	Rec 2	Play 2	Play 4	Rec 1
3 Play + 3 Rec	Play 1	Play 3	Rec 2	Rec 3	Play 2	Rec 1
2 Play + 4 Rec	Play 1	Rec 4	Rec 2	Rec 3	Play 2	Rec 1
1 Play + 5 Rec	Play 1	Rec 4	Rec 2	Rec 3	Rec 5	Rec 1
0 Play + 6 Rec	Rec 6	Rec 4	Rec 2	Rec 3	Rec 5	Rec 1

LED'S INFORMATION:

LA: flashes when the DSP program is running.

LB: lights when the channel is in use, either in record or in playback mode.

TF: flashes while data transfer is in process between the CODECs and the HCTS boards

One TF LED is also available from the front of the CODEC board. This LED summarizes the activity of all TF LED's present on each CODEC module.

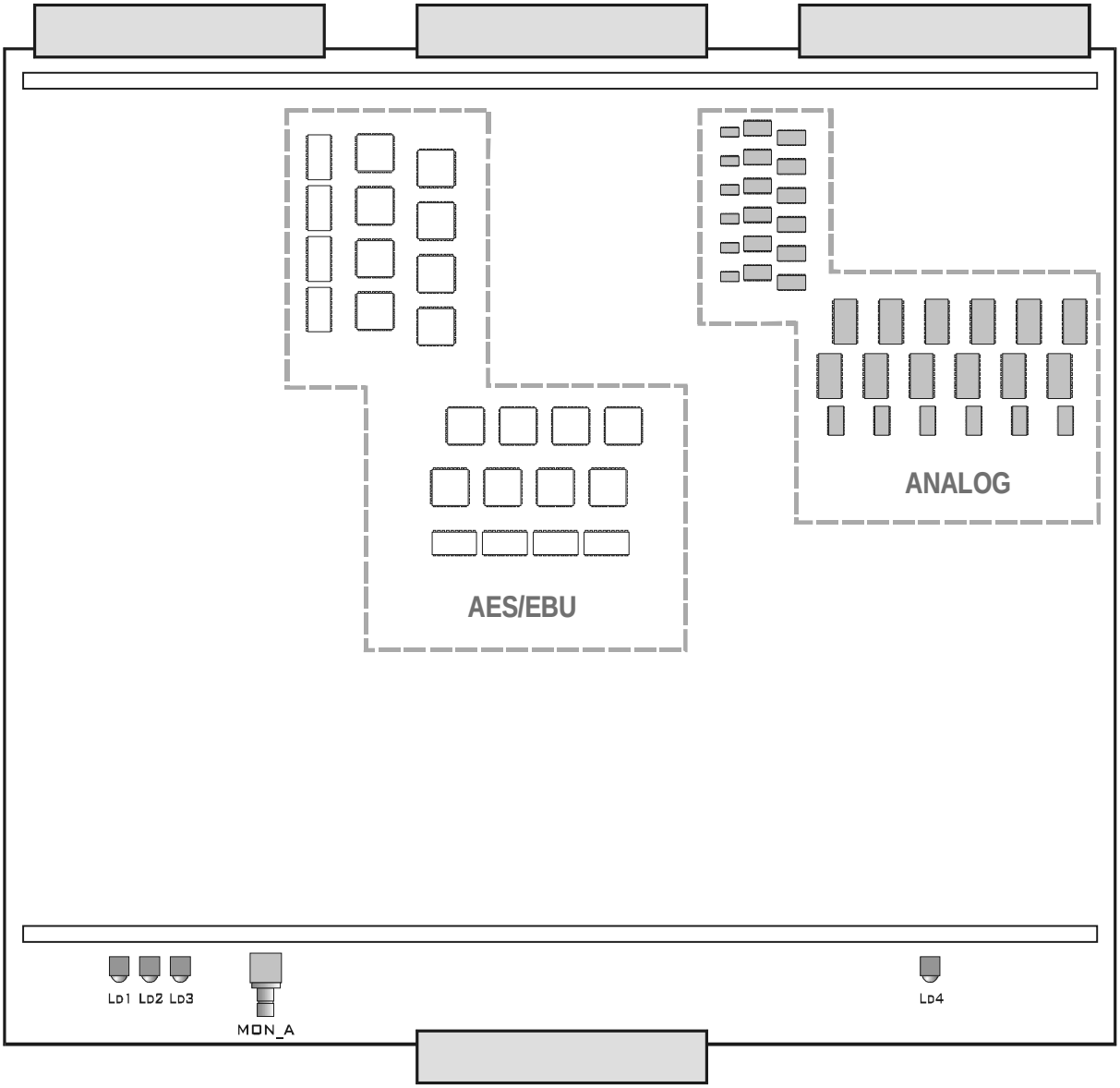
BOARD CONFIGURATION:

No modifications are required for this specific board.
Do not modify the jumpers positions.

AUDIO CODEC BOARD

(VIDEO RAID CODA)

The AUDIO CODEC board is the audio interface between the I/O E board and the HCTS board. VIDEO CODEC and AUDIO CODEC board are tied to the HCTS board with one Bus connector on the front side. Different audio configurations are available with the audio CODEC board. See Audio configurations in chapter 2 for details.



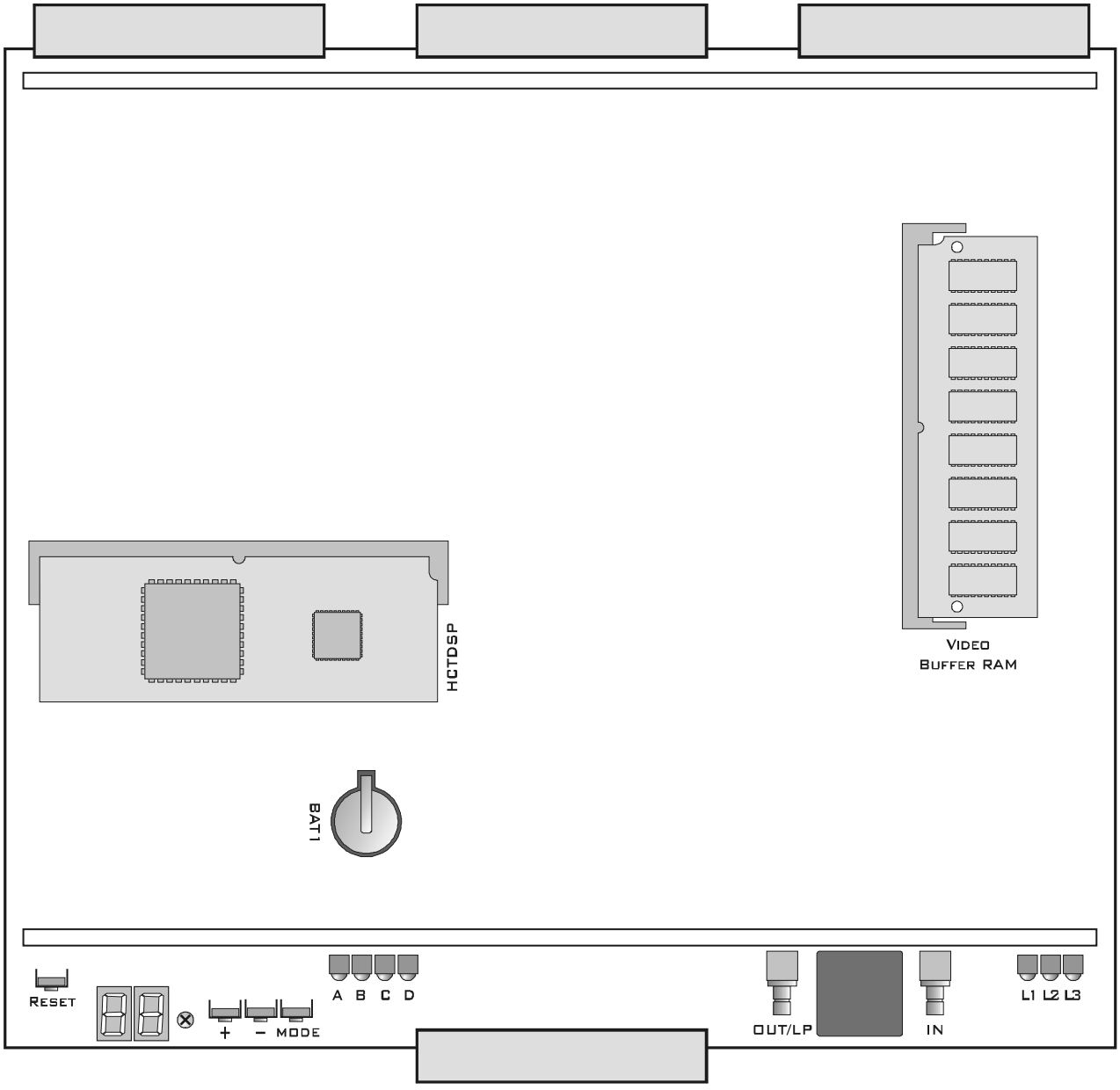
LED'S INFORMATION AND CONNECTOR:

Internal EVS information only

HCTS BOARD

(VIDEO RAID HCTS)

The HCTS board is a RAID controller that receives data from the CODEC boards in Record mode and sends data for storage to SCSI disks.
In Playback mode, the HCTS recalls the data from the disks and transfers it to the CODEC boards. The HCTS board manages both VIDEO CODEC and AUDIO CODEC boards.



Note: The RESET button resets the board itself and initialises the RAM Video Buffer.

7-SEGMENT DISPLAY:

This display notices the stages and errors of the system boot processing.

Left	Right	
0	0	OK
0	1	Communication RAM error
0	2	SDRAM Error
0	3	Restarted by watchdog

If an error 01, 02 or 03 occurs, the nearby LED lights RED

Note: The MODE buttons modify internal EVS parameters. Do not modify.

LED'S INFORMATION:

While the program is loading, LED's A, B, C and D give the following information about RAM SIMM's testing process:

A	B	C	D	
-	-	-	-	At start-up
-	-	-	ON	Testing communication RAM
-	-	ON	-	Clearing communication RAM
-	-	ON	ON	Polling basic user commands
-	ON	-	-	Testing the first 256KB SDRAM
-	ON	-	ON	256KB SDRAM is OK
ON	ON	ON	-	Communication RAM error
ON	ON	-	ON	SDRAM error

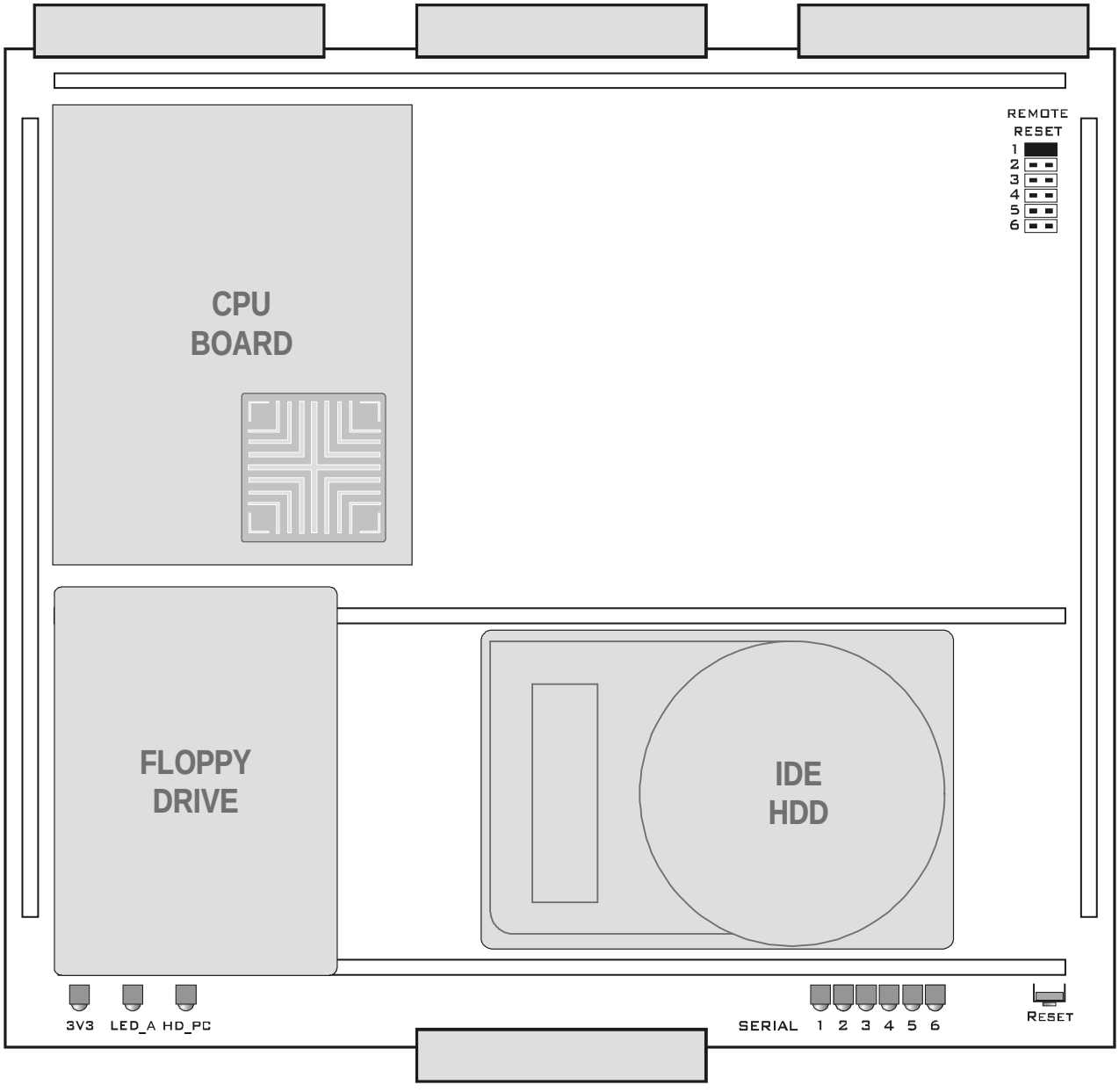
SDTI CONNECTORS:

IN: SDTI input
OUT/LP: SDTI output

When the LSM-XT is connected to the SDTI network, if L1 LED is ON, the system is in MASTER mode, and if L1 LED is OFF, the system is in SLAVE mode. The two other LEDs are not in use at the moment. 1 (and only 1) LSM on the SDTI network must operate in Master mode. Refer to the SDTI Network section for details.

PC BOARD

The function of the PC board is mainly the control of the Video hardware via the software and to interface the peripheral equipment (i.e. remote controller) with the Video hardware.



In standard configuration the PC hardware is composed by:

- One mounting PC board with serial ports and LTC reader and generator and controlled by the motherboard
- 20Gb 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.
- 8/32MB SDRAM modified. 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.

LED'S INFORMATION:

Internal EVS information

BOARD CONFIGURATION:

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

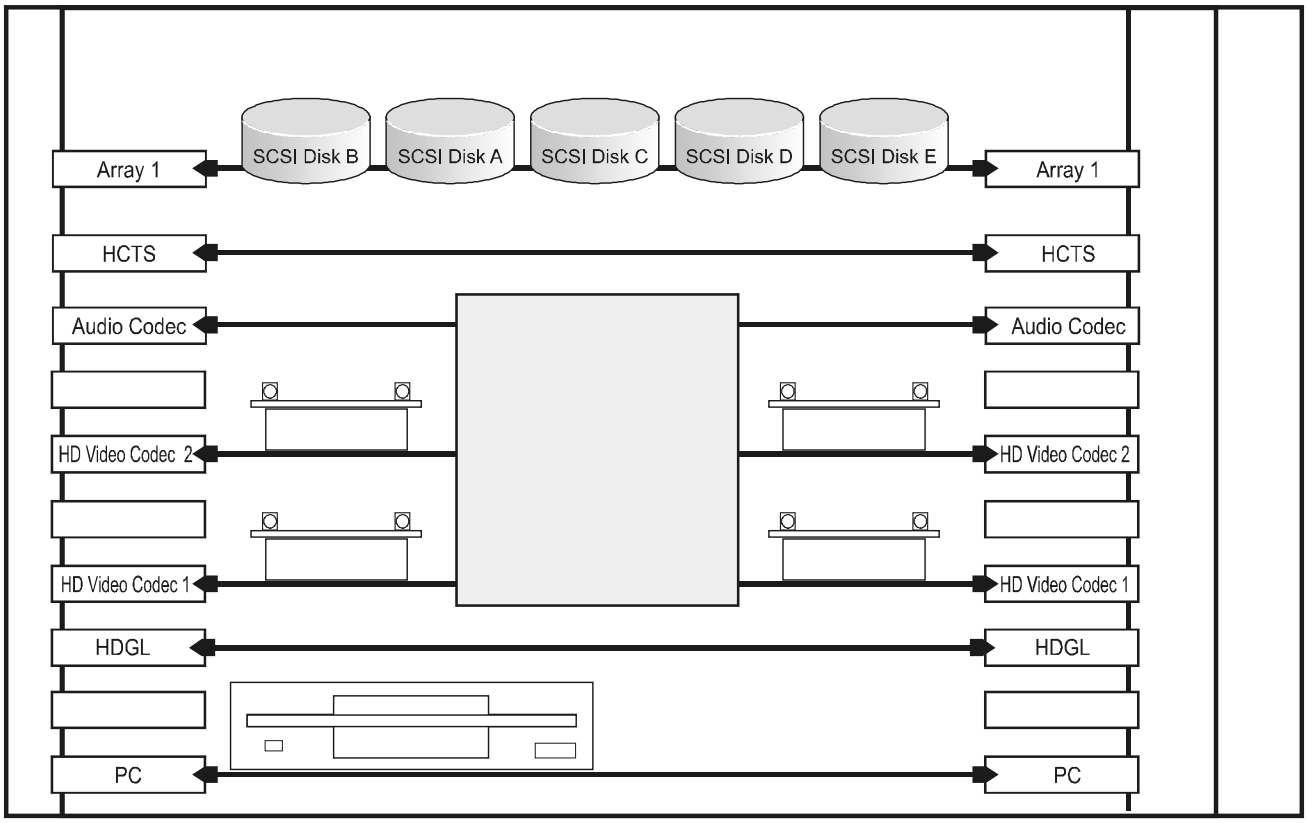
This command resets the whole system : PC and video hardware.

In standard configuration only Remote one (on RS422 port 1) is allowed to reset the system.

High Definition
Video Hardware Presentation

This schematic describes the location of the electronic boards developed by EVS for its HD-LSM.

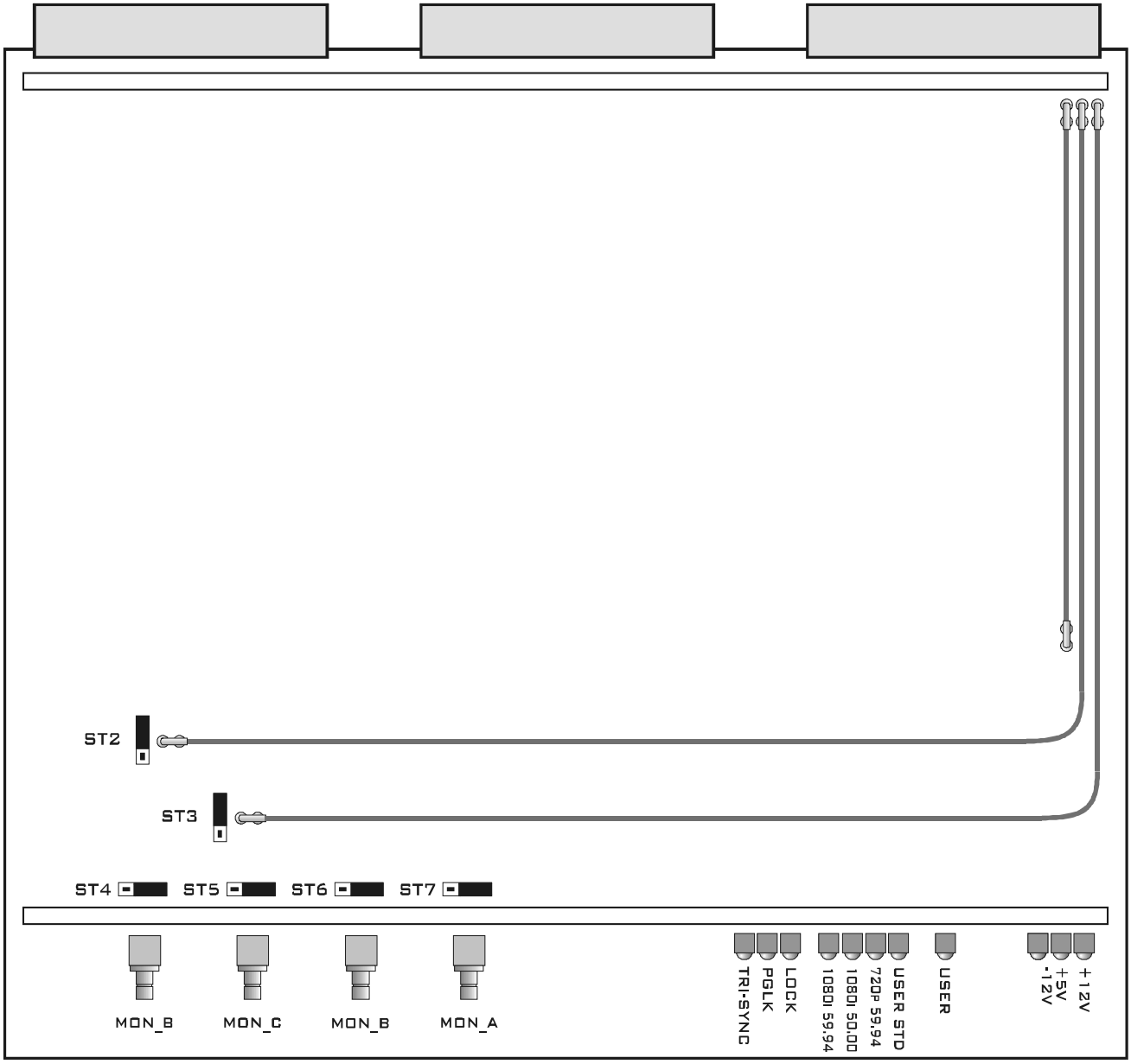
Important note: Each board has a fixed location. Connecting boards in wrong positions will prevent proper operation and might cause hardware damage if power is applied too long.



HCTS, AUDIO CODEC and PC boards, previously described, are common to both systems (SD and HD) Only HGDL and HD VIDEO CODEC boards are specific to HD-LSM systems.

HDGL BOARD

The HDGL board manages the video reference and the monitoring outputs of the HD LSM.
The HD output signals are down-converted to standard definition for monitoring and are SDI/CVBS switchable.
Two types of Genlock Reference are available: SD BlackBurst and Tri-level sync (software configureable, refer to EVS Menu section of this manual).



LED'S INFORMATION:

-12V, +5V, +12V: show all voltages are OK.

720p 59.94, 1080i 50.00, 1080i 59.94:
show the HD video format in use.

LOCK: shows the unit is actually locked on the Reference signal.
PGLCK: shows the presence of the reference signal
TRI-SYNC shows the unit is locked on the tri-level sync

CONNECTORS:

MON_A/B/C/D: SDI or CVBS monitoring outputs. See jumpers' positions

BOARD CONFIGURATION:

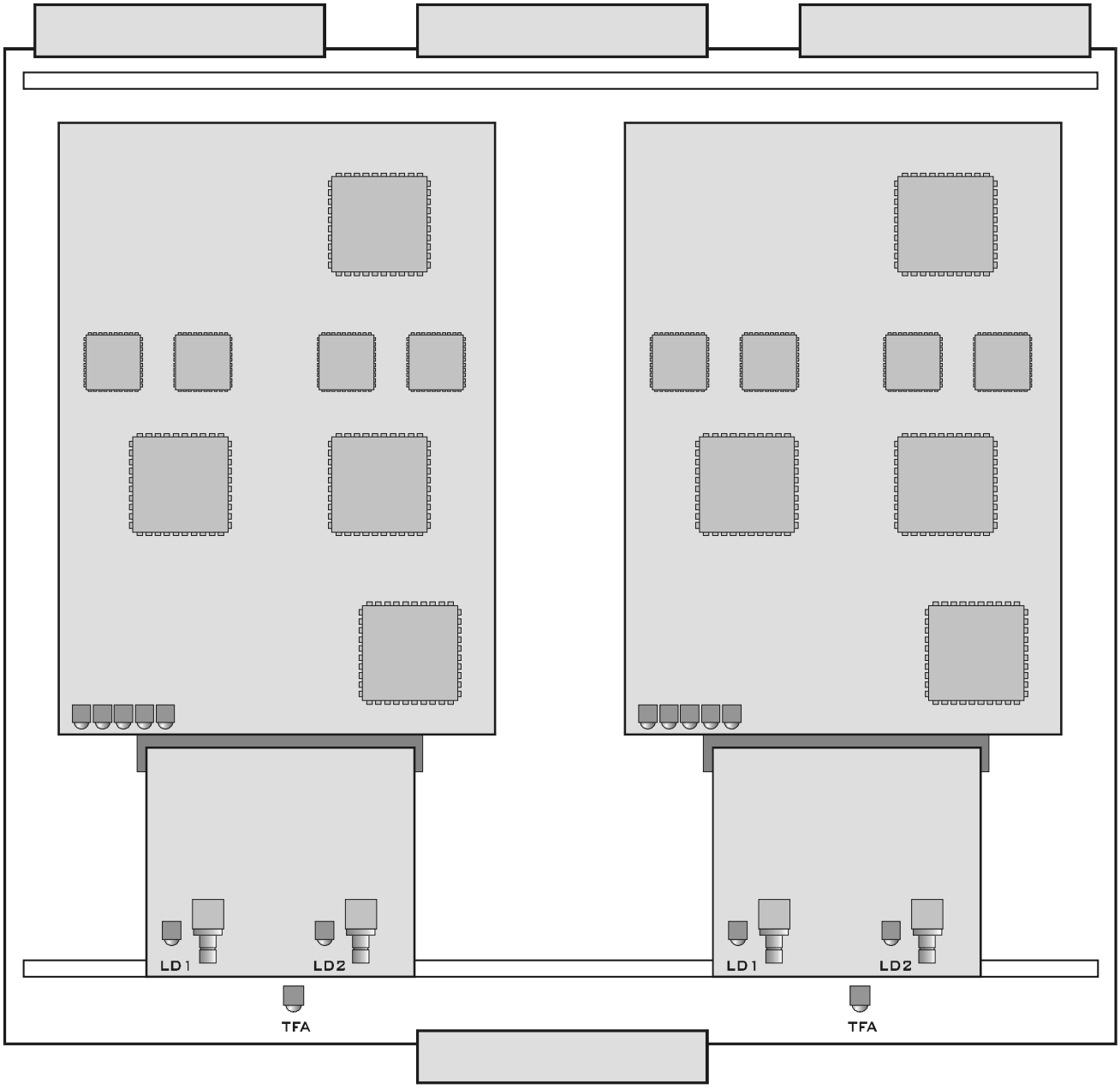
Moving the ST2 and ST3 jumpers allows you to select analogue or digital monitoring from the "Outputs Monitoring" BNC connectors on the rear panel (down-converted monitoring of PGM1 and PGM2/PRV).

Moving the ST4, ST5, ST6 and ST7 jumpers allows you to select analogue or digital monitoring from the "E/E Monitoring" BNC connectors on the rear panel (down-converted monitoring of inputs 1, 2, 3, 4).

HD VIDEO CODEC BOARD

The HD Video Codec board manages the HD video inputs and outputsm as well as the compression and decompression processes. It is also the video interface with the HCTS raid controller board

The HD Video Codec board takes up 2 slots in the mainframe, and handles 2 HD video channels (either inputs or outputs).



LED'S INFORMATION:

LD1, LD2: lights when the channel is in use, either in record or in playback mode.

TFA: flashes while data transfer is in process between the CODEC and the HCTS boards.

BOARD CONFIGURATION:

Do not modify the jumpers positions. Please call EVS for support.

CHANNEL ASSIGNEMNT:

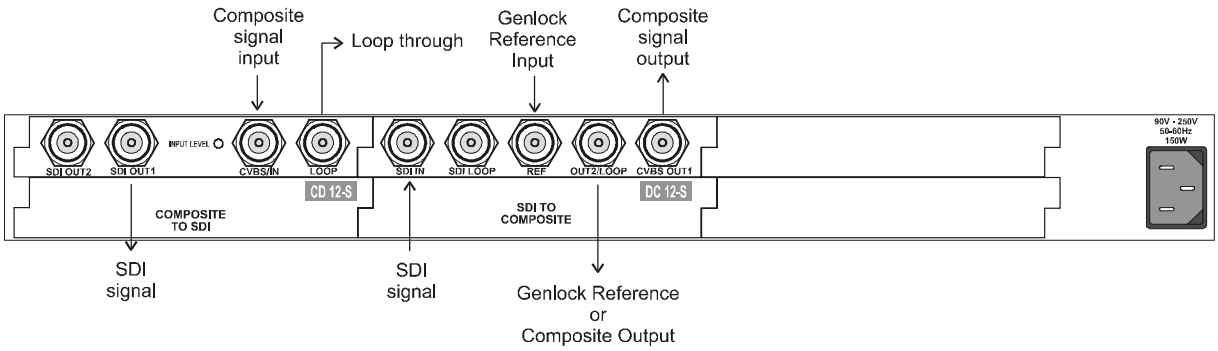
Upper HD Video Codec (#2)

Lower HD Video Codec (#1)

Chapter 6: ADA converters

The digital video inputs and outputs on the BNC connectors on the rear of the mainframe are standard CCIR601/656, 10-bit Serial Digital Interface, and 270 MHz. Separate analogue PAL/NTSC encoders are installed on the I/O board to provide monitoring outputs.

EVS has a range of cards, which perform conversion between analogue composite PAL/NTSC or analogue component and SDI serial digital component. These can be mounted in 1RU (up to 6 boards) or 3RU (up to 16 boards) frames. The cards are fitted with adjustments for video timing and TV standard (625 line/50Hz PAL or 525 line/59.94Hz NTSC) is set by push buttons.



Note: Loop must be terminated if not used

In some configuration, the second signal output could be assigned as a Genlock Reference output. Please refer to the ADA manual for jumpers' settings.

Chapter 7 : EVS software

Version 10.04

Introduction

The EVS software is used for configuration and maintenance operations. It is also used to select which application to run, since EVS disk recorders have the ability to run various dedicated applications (Video Server, Slow Motion, ...).

When turning on the EVS mainframe, the first step is the PC boot sequence, followed by the boot of the video I/O boards, and finally the EVS software is started.

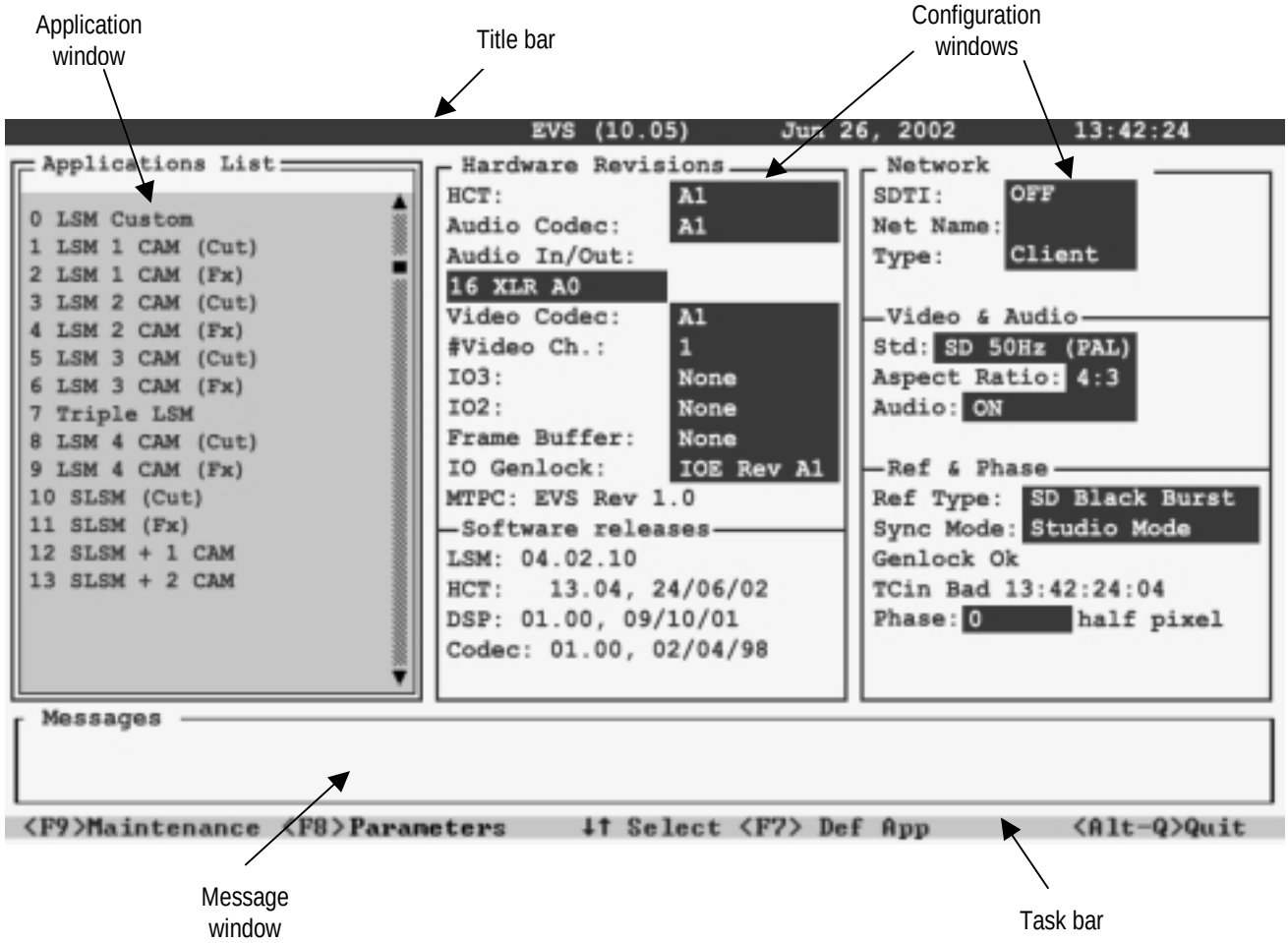
If a default application has been previously selected, this application will start automatically after a few seconds if no key is hit.

If a default application hasn't been defined or if the space bar is hit, the system will remain in the EVS main menu (see snapshot next page) and wait for the operator's next command.

1. VGA↔B&W Video Driver :

Between the PC boot and the I/O boot, the video driver is loaded and the display is automatically switched to B&W video mode, allowing the VGA screen to be displayed on a standard composite video monitor using the VGA↔BNC adapter provided with the unit.
If a VGA screen is directly connected to the VGA connector of the mainframe, press simultaneously **< ALT >** and **<Backspace>** on the keyboard to switch back to the VGA mode.
Pressing **< ALT >** and **<Backspace>** again will switch again to B&W video mode.

2. EVS Main Menu :



2.1 EVS SCREEN LAYOUT:

Title bar: the first line of the VGA screen is the title bar. It contains the EVS software revision and current date and time.

Task bar: the last line of the VGA screen is the task bar. It contains a summary of the keyboard controls available.

Application window: this window contains the list of all applications installed on the system.

Configuration windows: the windows show the hardware configuration of the system.

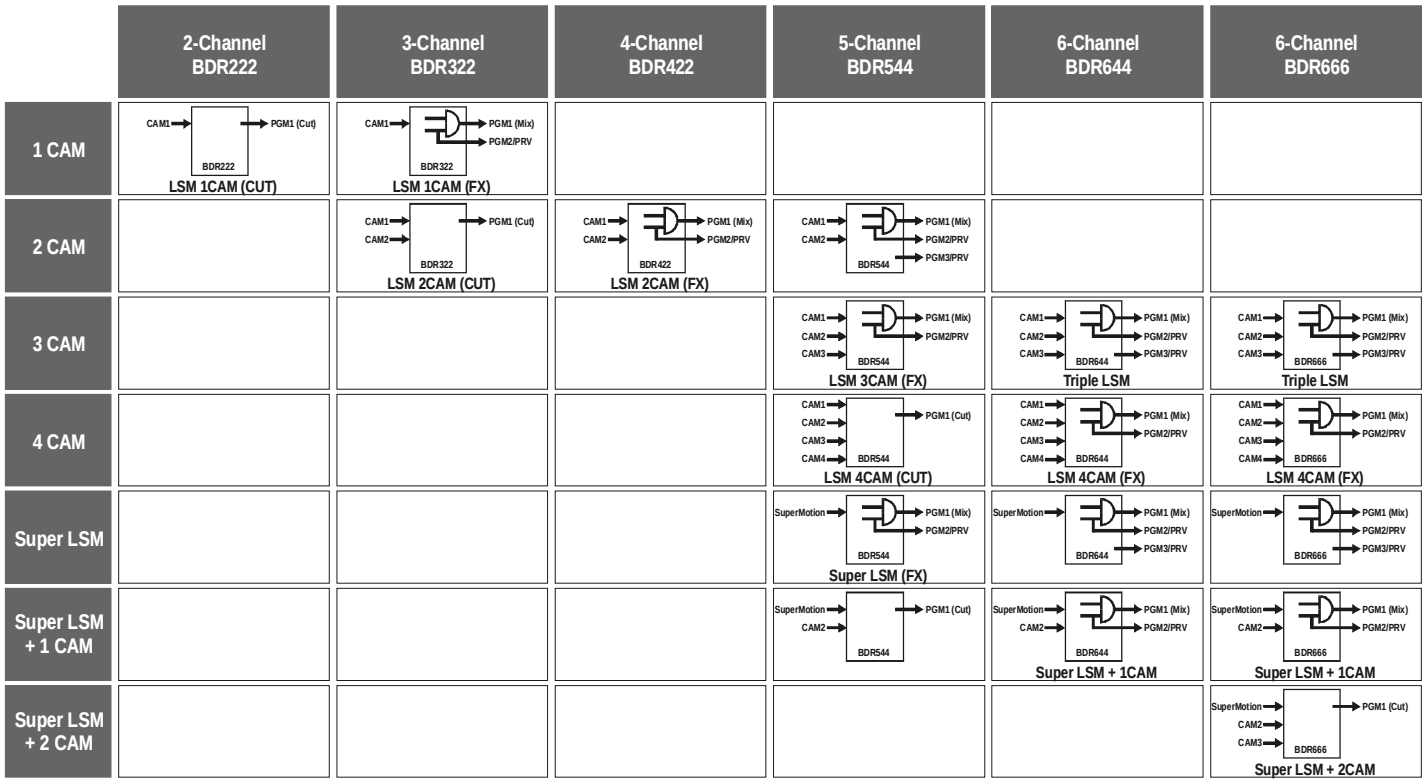
Message window: messages are displayed in this space to provide more information on the current selection.

2.2 TIPS TO MOVE INSIDE THE EVS SOFTWARE:

- The active window is always shown with a double frame.
- Use **<↑>**, **<↓>** and **<TAB>** keys to change the selection inside the active window.
- Use **<SPACE BAR>** to toggle between pre- defined values.
- Use **<ENTER>** to select an item or to confirm an entry.
- Use **<ESC>** to go back to the previous menu or to cancel an entry.

2.3 STARTING AN APPLICATION

Select the appropiate application from the Applications list, then press ENTER to confirm the selection.



Clips compatibility :
Clips are compatible across all Multicam configurations including SuperLSM. Record trains are also compatible as long as the number of record channels (cameras) is not increased.

Ex.: SuperLSM → 2CAM (Fx): Record trains are lost.
4CAM (Fx) → 3CAM (Cut) : Record trains are compatible.

2.4 COMMANDS AVAILABLE FROM THE MAIN MENU:

- The **<↑>** and **<↓>** keys of the keyboard can be used to select an application. The purple line shows the current selection. The black line shows the default application.

- The **<ENTER>** key is used to start the selected application.

- Press **<F7>** to make the application currently selected the new default application. The default application is automatically started every time the EVS program is entered. When the application currently selected is already the default application, pressing **<F7>** will disable the default application and the system will remain in the EVS Main Menu every time the EVS software is entered.

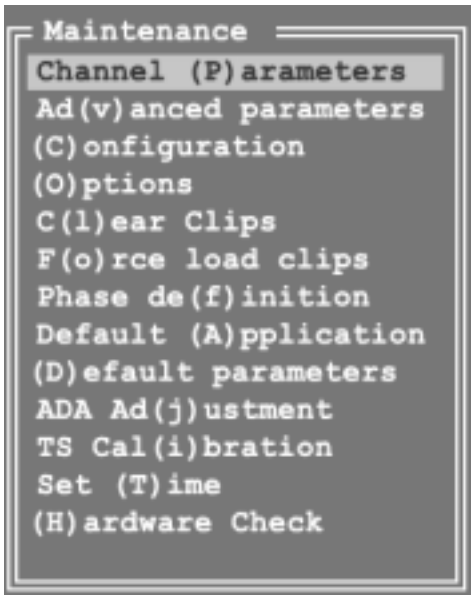
- Press **<F8>** to open immediately the Channel Parameters window related to the selected application. Press **<ALT + Q>** to come back to main menu.

- Press **<F9>** to enter the Maintenance Menu.

- To exit the EVS software and go back to the DOS prompt, press simultaneously **<ALT** + **Q>** and confirm with **<ENTER>**. To restart the EVS software from the DOS, simply type RUN.

3. Maintenance Menu :

The Maintenance Menu contains various options to configure and check the system. These options are described in details in the next sections.



To select an option, use the **<↑>** and **<↓>** keys of the keyboard to highlight the corresponding line and press **<ENTER>** or press the key corresponding to the character between brackets.

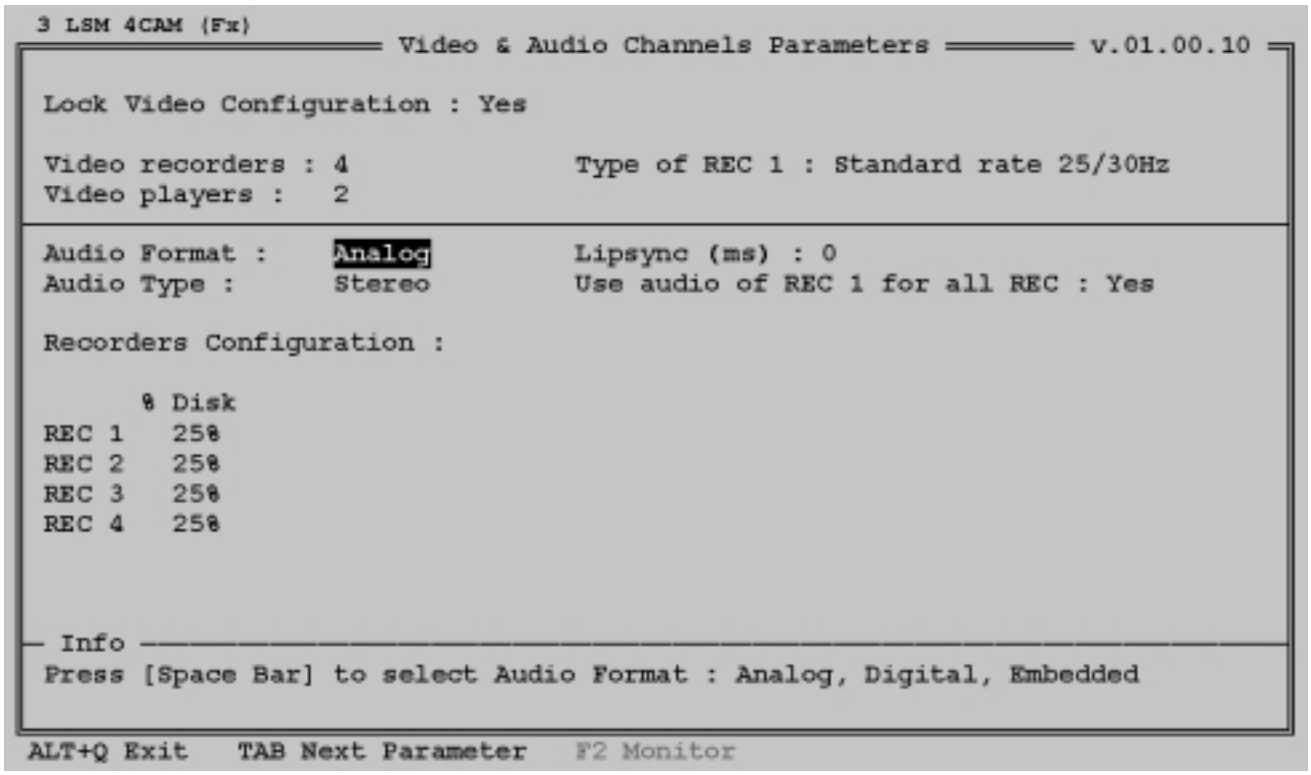
To go back to the Application window, press **<ESC>** on the keyboard.

3.1 CHANNEL PARAMETERS

Important note: Most parameters are factory preset, and should not be modified without advice of qualified EVS staff. Improper values for some parameters will prevent the proper operation of the system.
Please refer to the parameters' charts for correct values.
(See 3.9 Default parameters)

Every application has its own set of parameters. While selecting Parameters, the application list appears to select an application first, then V/A Channels Parameters window appears.

Parameters are used to define video & audio channels, type and configuration of recorders, audio format and audio-video synchronization parameter.



AUDIO & VIDEO PARAMETERS OVERVIEW:

Lock Video configuration:
Yes / No
This item enables/disables the access to the modifications of the next three items: Video Recorders, Type of REC and Video Players.
The Lock Video configuration item depends on the Permission code if added to Options menu. (see line 4: Authorize video configuration changes)

Video recorders:
Range: [1…4]
selects the number of RECORD channels of the application. The partition of the disk storage between these channels, and the associated audio channels are automatically updated.

Type of REC 1:
defines the type of recorder for the 1st record channel.
Three types of record are available:

- (1) Standard rate 50/60 Hz
- (2) SLSM Alternate Parity – EVS mode
- (3) SLSM Identical Parity

Video players:
Range: [1…4]
selects the number of PLAY channels of the application and the associated audio channels.

Audio format:
Range: [Analog or Digital or Embedded]
Selects the AUDIO format.

Note: AES = stereo or dual stereo
Embedded = dual stereo

Audio Type:
Range: [Mono or Stereo or Dual Stereo]
Selects the type of AUDIO.

Lipsync:
Range: [-40…0] Lipsync parameter is the delay (in ms) between video and audio signals. A positive value means video is ahead of audio. A negative value means audio ahead of video. This parameter is also available from the SETUP menu of the remote when the Multicam application is started. Changing the Lipsync value in the SETUP menu will update it in the EVS menu and vice versa.
Default: 0

Note:
1. This adjustment is done during the RECORD process. A new Lipsync value will apply for the next recorded pictures only.
2. When using a Philips/Thomson LDK23HS **Mk II** super motion camera, the lipsync should be set to -7 msec (PAL) or -6 msec (NTSC) for accurate A/V synchronisation.

Use Audio of REC 1 for all REC:
Range: [Yes or No]
All audio channels associated to REC1 (CAM A) will be automaticcally used for all other RECORD channels.

Recorders configuration: (% Disk)
Range [0...100]
Percentage of disk space allocated to each channel. Total of all values must not exceed 100%.

TO MODIFY A/V CHANNEL PARAMETER :

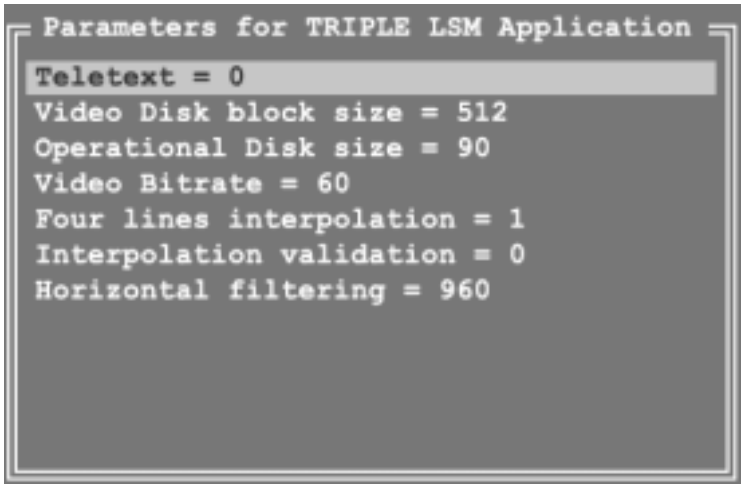
1. Press **<F9>** to open the Maintenance menu.
2. Select the 'Channel Parameters' item and press **<ENTER>**
3. Select the Application to configure and press **<ENTER>**
4. The Audio Video Channel Parameters window appears. Use the **<TAB>** key to move from one box to the next one. Some information about the current parameter is displayed in the INFO area.
5. When the desired box is selected, modify the parameter to its new value with **<SPACE BAR>** or by entering its numeric value and then press **<ENTER>** to validate.
6. Press **<ALT + Q>** to exit the A/V Channel parameters window.

OR:

1. From the 'Application List', select the application to configure and press **<F8>**
2. Then continue from Step 4.

3. 2 ADVANCED PARAMETERS:

Important note: Most parameters are factory preset, and should not be modified without advice of qualified EVS staff. Improper values for some parameters will prevent the proper operation of the system.
Please refer to the parameters' charts for correct values.
(See 3.9 Default parameters)



Teletext (Closed captioning):
Range: [0 or 1].
enables or disables the record/playback of teletext information.

Video Disk block size:
Range: [64…1024].
defines the size (in KB) of data blocks to be recorded to or read from the disks.

Operational disk size:
Range: [0…100].
percentage of the disks actually used to store the data. Restricting access to the centre part of the drives increases the performance of the system but decreases capacity.

Video bitrate:
Range: [8…160 Mbps]
is the bitrate of the compressed video stream that the system must reach.

Note: The dynamic compression management system modifies compression tables for each recorded field to keep the compression ratio as close as possible to the target. A higher bitrate means better picture quality and less storage capacity but a higher bandwidth is required. Improper values can lead to exceed disks performance, causing frozen pictures during playback.

Four lines interpolation:
Range: [0 or 1].
selects between 2-line and 4-line interpolation process. Select 0 for 2-line interpolation and 1 for 4-line interpolation. Refer to the next parameter for details.

Interpolation validation:
Range: [0 or 1].
enables or disables the interpolation process. Select 0 to disable the interpolation process, or 1 to enable the interpolation process selected by the 'Four lines interpolation' parameter. The interpolation process is aimed at reducing the vertical jitter of the pictures that is present during slow-motion replays.
This vertical jitter is actually caused by a violation of the frame parity when playing back the pictures at less than 100 % speed.
The process consists in re-building new frames to produce a more transparent result. These frames have to be interpolated - i.e. calculated by making suitably weighted averages of adjacent lines. There are 2 interpolation modes: the 2-line interpolator and the 4-line interpolator. Disadvantage of this method is that it reduces the vertical resolution. This is particularly true with the 4-line interpolator.

The user can choose between 3 modes:

- **no interpolation:** maximize the vertical bandwidth of the picture but a vertical jitter appears in “SloMo”. [set 'Interpolation validation' to 0, whatever the value of 'Four lines interpolation']

- **2-line interpolator:** reduce the vertical jitter but the vertical bandwidth is reduced. [set 'Four lines interpolation' to 0 and 'Interpolation validation' to 1]

- **4-line interpolator:** the picture is perfectly steady but the vertical bandwidth is even more reduced. [set 'Four lines interpolation' to 1 and 'Interpolation validation' to 1]


All VTRs use interpolation in PLAY VAR mode.

Horizontal filtering (HD LSM Only):
Value: [960, 1024, 1066,1152, 1200, 1280, 1372, 1440, 1536].

If 'Video Standard' is set to SD 50 Hz PAL, SD 59.94 NTSC or SD 59.94 NTSC J : the value can not be modified. The line 'Not in Use = 960' replaces 'Horizontal filtering' in the Advanced Parameters window.

If 'Video Standard' is set to HD 1080i 59.94 or HD 1080i 59.94 J, the values are 960, 1152, 1200, 1280, 1372, 1440.

If 'Video Standard' is set to HD 1080i 50Hz or HD 1080i 50 1250L, the possible values are 960, 1152, 1200, 1280, 1372, 1440, 1536.

If 'Video Standard' is set to HD 720p 59.94 or HD 720p 59.94 J, the possible values are 960, 1024, 1066.

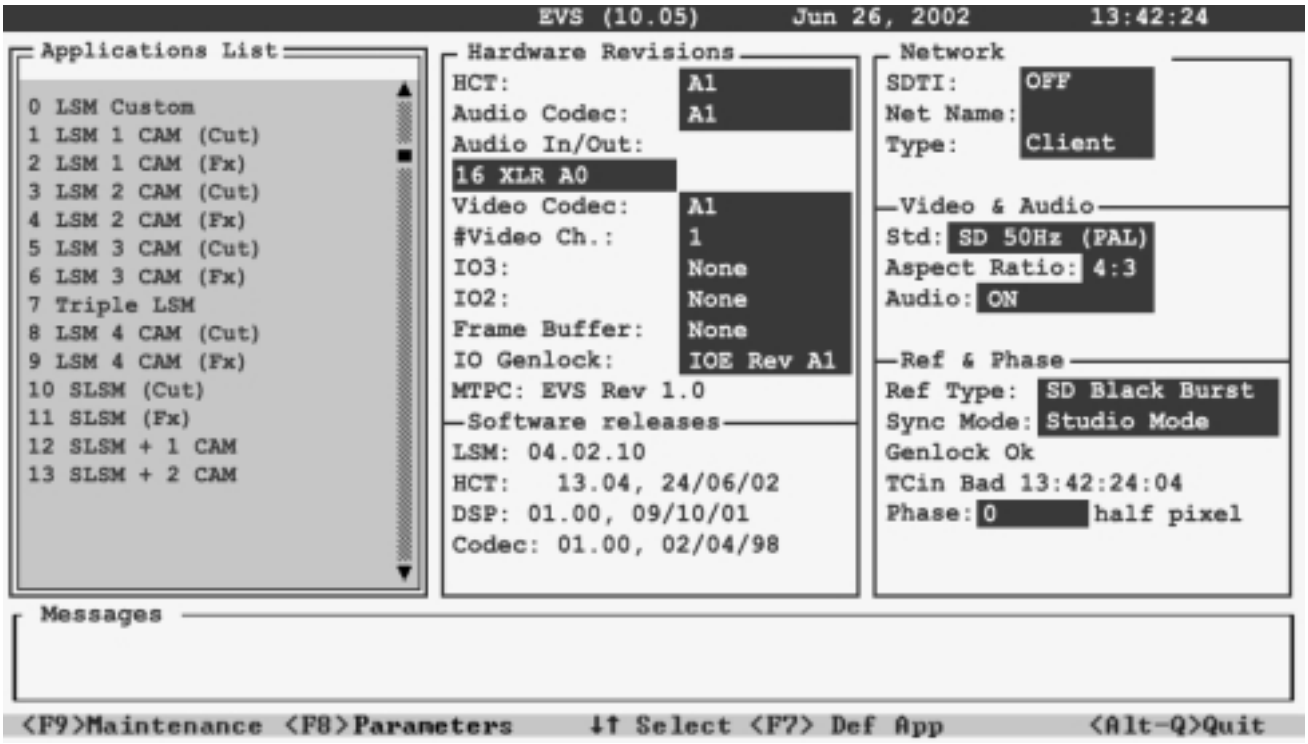
TO MODIFY ADVANCED PARAMETERS :

1. Press **<F9>** to open the Maintenance menu.
2. Select the 'Advanced Parameters' item and press **<ENTER>**
3. Use the **<↑>** and **<↓>** keys to select the parameter to modify and press **<ENTER>**
4. Enter the desired value, then press **<ENTER>**
5. When all parameters are set, press **<ESC>**
6. A confirmation message is displayed, press **<ENTER>**

3.3 CONFIGURATION

This function is used to set the hardware configuration of the system (boards release numbers, port settings,...).

Important notice: The configuration is factory preset, and should not be modified without advice of qualified EVS staff. Improper values for some parameters will prevent the proper operation of the system.



To enter the configuration window, press **<F9>** to open the Maintenance menu, select 'Configuration' and press **<ENTER>.** A double frame appears around the Configuration window, and the cursor blinks next to the 'HCT' label.

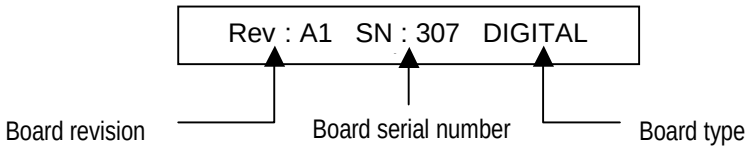
TO MODIFY AN ITEM IN THE CONFIGURATION WINDOW :

1. Use **<↑>**, **<↓>** or **<TAB>** keys to select the desired item.
2. Press **<SPACE BAR>** several times until the correct value appears.
3. Select another item to modify or press **<ESC>** to go back to the Maintenance Menu.

CONFIGURATION ITEMS OVERVIEW :

Hardware Revisions area

The order of the boards in this list is the same as inside the mainframe, from top to bottom. The revision of a board located in the front part of the mainframe is always written on a white label on the left front end of the board



HCT:
revision of the HCTS board (Video Raid controller). The HCT board is located immediately underneath the disk tray and is present on all systems.

AUDIO CODEC:
revision of the AUDIO CODEC board (immediately underneath the HCTS board).

AUDIO IN/OUT:
Defines the AUDIO inputs and outputs connectors available from the rear panel. Pre-defined items are available:

- 16 XLR Analog,
- 16 XLR Digital,
- 16 XLR Analog + 8 XLR Digital,
- 16 XLR Analog + 16 BNC Digital
- Embedded only

VIDEO CODEC:
revision of the VIDEO CODEC board (located underneath the AUDIO CODEC board). This board is present on all systems.

#VIDEO CHANNELS:
Range: [1 ... 6]
defines the number of video channels in operation. This parameter can not be modified if option 'CODE 4' (Authorize video configuration changes) is not present.

IO3:
revision of the third digital I/OE board. Not present on all systems.

IO2:
revision of the second digital I/OE board. Not present on all systems.

Frame Buffer:
revision of the Keyer / Mixer board (located between Digital I/O2 and Digital I/O1). This board is optional and is not present on all systems.

IO Genlock:
Range: [I/O for SD or HDGL for HD].
revision of the digital I/OE board. This board is present on all systems.
Video standards are available according to the type of I/O genlock board.

MTPC:
Revision of Mounting PC board. This board is present on all systems.

Software releases Area:

LSM: displays the version number of Multicam software installed.

HCT: displays the version number and release date of HCT microcode installed.

DSP: displays the version number and the release date of DSP microcode installed.

CODEC: displays the version number and the release date of CODEC microcode installed.

Network area:

SDTI :
(off / 270Mbps / 540Mbps)
Enables the SDTI option and select the bandwith of the network.

Note 1: The bandwidth must be identical on all LSM-XTs connected to the Sportnet. If one system is configured with a different bandwith, it will block the entire network.

Note 2: The Disk Block Size parameter and the video standard must be the same on all LSM-XTs

Net Name :
The Net name defines the machine name on the network. This name is user-defined but cannot exceed 8 characters. Entering a Network Name is not mandatory because a network number is automatically given to the system, but it is recommended to easyly identify all LSMs connected to Sportnet.

Type :
Range: [Client, Master, Server]
Defines the type of system. One and only one LSM-XT on the network must be set to SERVER type. If no server is defined, Sportnet will not be activated. If more than one server is defined, only the first one will be able to connect and conflicts may occur.
Other LSM-XTs on the network can be set either to MASTER type if they need to access clips from other LSMs, or to CLIENT type if their clips must be available on the network but they don't need to call clips from other LSMs.

Video & Audio area:

Std:
Selects the video standard:
- SD 50Hz (PAL) *(default for SD)*
- SD 59.94Hz (NTSC)
- SD 59.94Hz (NTSC Japan)
- HD 1080i 50Hz
- HD 1080i 59.94Hz *(default for HD)*
- HD 1080i 59.94 (Japan)
- HD 1080i 50 1250L
- HD 720p 59.94Hz
- HD 720p 59.94 (Japan)

Aspect Ratio :
Selects the format of the image for the downconverted outputs of the HD-LSM (not used for SD LSM)
- 4:3 → letterbox *(default)*
- 16:9 → anamorphic

Audio:
Range: [On or Off]
Enables or disables the Audio.

Ref & Phase area:

Ref Type:
Selects the genlock reference input between:
- SD Black Burst *(default)*
- HD Tri-Level Sync (HD LSM only)

Sync Mode:
Select the frame synchronizer mode between:
- Studio mode : should be used when the video input signals are synchronized. *(default)*
- Resync mode : should be used when the video input signals are not synchronized. In this case, they will be re-synchonized on the digital I/O board. This can cause a shift of up to 3 fields between the various video input signals.

Genlock:
Range:[OK or BAD] This information is automatically displayed.
Checks if the Genlock input is valid.

TC In:
Range:[OK or BAD] This information is automatically displayed.
Checks if the external Timecode input is valid.

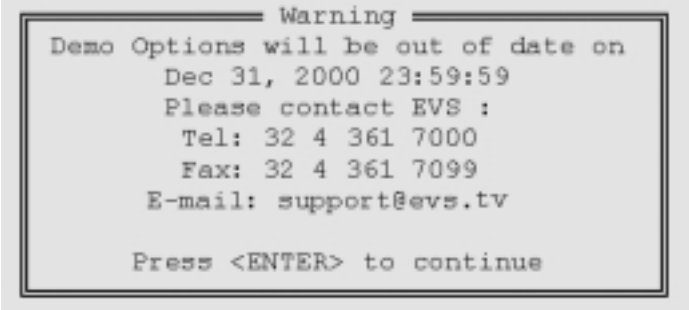
Phase:
This parameter is used to adjust the main phase of the digital video output. Refer to the 'Phase Definition' section for details.

3.3 OPTIONS

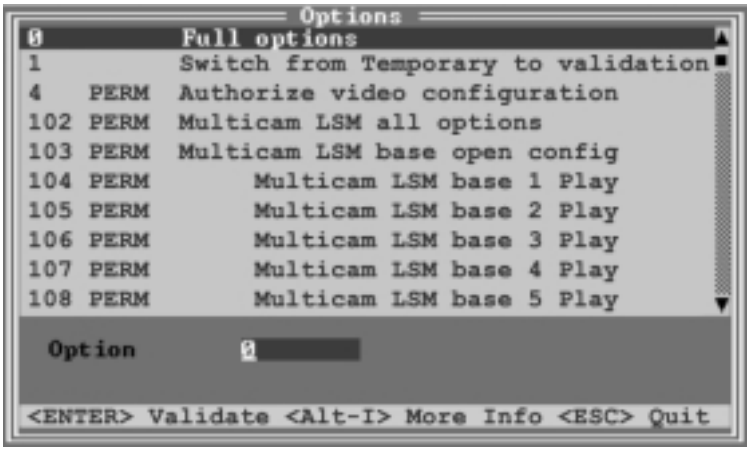
This function is used to manage software license codes for all applications. To run particular application software and/or specific software options, not only the software itself is required but also a license key, which is unique for every option on every system.

This license key can be temporary until a defined deadline for demonstration purposes, or permanent with no time limit.

When a temporary license key is about to expire, the system will warn the operator. The warning is displayed every time the EVS software starts, from 2 weeks before the expiration date. The following message appears:



To enter the Options menu, open the Maintenance Menu, then use the **<↑>** and **<↓>** keys to highlight the 'Options' line, and press **<ENTER>**. The Options window appears as shown below:



The highlighted lines show the valid options. The red line is the current line. Use the **<↑>** and **<↓>** keys to move inside the options list.
When temporary options are present, the limit time for these is shown in the lower part of the Options window.

To go back to the Maintenance Menu, press **<ESC>.**

EXAMPLE OF LINE FOR A PERMANENT OPTION:

104	**PERM**	**Multicam LSM Base 1 PLAY**

EXAMPLE OF LINE FOR A TEMPORARY OPTION:

109	**DEMO**	**Multicam LSM Base 6 PLAY**

TO ENTER NEW LICENSE CODES:

- Make sure the cursor blinks in the 'Option' box in the lower part of the Options windows.
- Type in the code corresponding to the desired option (license codes are sent by EVS Technical Support Dpt) and press **<ENTER>**.
- Repeat this operation for the next license code.
- You can check that the corresponding options are enabled by scrolling into the options list.

TO REMOVE A LICENSE CODE:

- Use the **<↑>** and **<↓>** keys to move inside the options list and select the option that must be removed.
- When the option is selected (white characters), press simultaneously **<CTRL+ DEL>** on the keyboard.
- Confirm the delete of the option with **<ENTER>** or cancel with **<ESC>.**

TO CHECK HARDWARE KEY (DONGLE) INFORMATION:

When the Options window is open, press simultaneously **<ALT + I>**
A new window 'Option Info' appears as shown below:

The following information is available:

System ID: ID code of the hardware key. This information is necessary for license code calculation

User: user's name. This information is a label and is for information only

Serial #: serial number of the mainframe. The S/N is also written on the back plate of the mainframe

Limit time: expiry date & time for temporary license codes. This line does not appear when the permanent codes are installed.

Key time: current date & time of the hardware key. This is the date used to determine whether limit time for temporary license codes has been reached or not.

Press **<ENTER>** to go back to the Options window

3.5 CLEAR CLIPS

This function is used to erase all clips and playlists of all applications present on the system. This will definitely delete all video and audio data, including protected clip and record trains.

- Use the **<↑>** and **<↓>** keys to select the 'Clear Clips' line and press **<ENTER>**
- You are asked to confirm **<ENTER>** or cancel **<ESC>** the command.

3.6 FORCE LOAD CLIPS

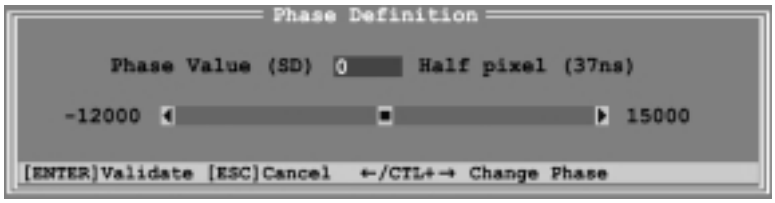
This function is used when swapping disks arrays between LSM's. If clips are saved to disks, this command forces the system to re-load the clips.

3.7 PHASE DEFINITION

This option is used to adjust the digital phase of the mainframe.

a. Standard Definition:

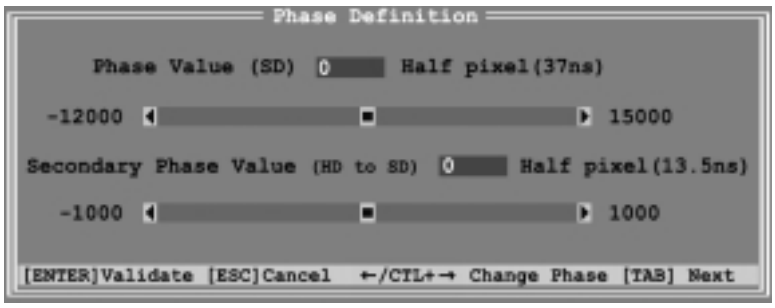
If the REF TYPE (see Configuration windows) is set to "SD BlackBurst", the phase definition window is as follows:



The phase value for SD can be adjusted between - 12000 ns and +15000 ns by 37 ns steps.

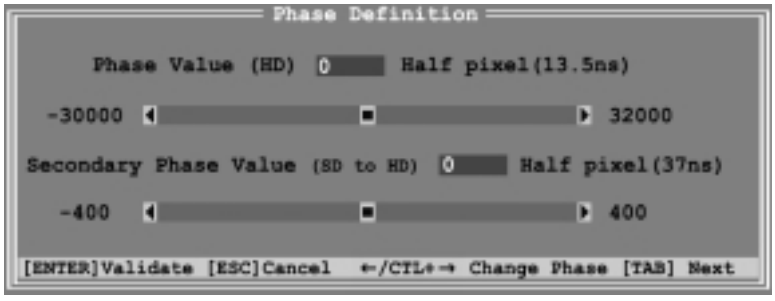
b. High Definition:

If the REF TYPE is set to “SD BlackBurst” and if the system is configured for HD, the phase definition window appears as follows:



The main phase value for SD can be adjusted between - 12000 ns and +15000 ns by 37 ns steps and the secondary phase value (HD to SD SDI) can be adjusted between - 1000 ns and +1000 ns by 13.5 ns steps

If the REF TYPE is set to “HD Tri-Level Sync” , the phase definition window is as follows:



The main phase value for HD can be adjusted between - 30000 ns and +32000 ns by 13.5 ns steps and the secondary phase value (SD SDI to HD) can be adjusted between - 400 ns and +400 ns by 37ns steps

COMMANDS:

- Use **<↑>** and **<↓>** keys to adjust the phase value by half pixel (i.e. SD: 37 ns or HD:13.5 ns) steps or type in the value in the "pahse value" box.

- Use **CTRL + <←>** and **<→>** keys to adjust the phase value by 1-line (i.e. 1440 in SD; 2880 half pixel in HD 720p; and 3840 half pixel in HD 1080i) steps.

- Use **<TAB>** key to toggle between "Main Phase" and "Secondary Phase" boxes.

- Press **<ENTER>** to save the new values and return to the Maintenance menu or press **<ESC>** to go back to the Maintenance menu without saving the changes.

Note 1: The SD phase is always adjusted according to the SDI outputs. Internal CVBS outputs have a delay of 48 x 37 nsec compared to the corresponding SDI outputs.

Note 2: The internal CVBS outputs can not be used to feed directly a vision mixer or any equipment performing video effects, since the phase of the chroma subcarrier is not adjustable internally.

3.8 DEFAULT APPLICATION:

This option is used to define the default application that is automatically started by the system. Every time the EVS software is entered, the default application is started a few seconds later. You can avoid the automatic start by pressing the **<SPACE BAR>** or the **<↑>** and **<↓>** keys immediately when entering the EVS software. If no default application has been defined, the system will remain in the EVS software.

The default application is shown with blue characters and a black background in the Application window.

TO DEFINE A DEFAULT APPLICATION:

- In the 'Application window', select the new default application using the **<↑>** and **<↓>** keys and press **<F7>**

OR:

- Call the Maintenance menu with **<F9>** and select "Default Application", select the defined application from the list, and press **<ENTER>**

→ If a default application was already defined, a message warns the operator that it will be disabled. The command can be confirmed with **<ENTER>** or cancelled with **<ESC>.**

→ If the command is confirmed, another message tells the operator that a new default application has just been defined.

TO REMOVE THE DEFAULT APPLICATION :

- In the 'Application window', select the application that is the current default application (blue characters with black background) using **<↑>** and **<↓>** keys, and press **<F7>**.

OR:

- Call the Maintenance menu with **<F9>** and select "Default Application". Then select the current default application from the list and press **<ENTER>**

→ a message warns the operator that the current default application will be disabled. The command can be confirmed with **<ENTER>** or cancelled with **<ESC>.**

3.9 DEFAULT PARAMETERS

This command erases all current parameters settings and restore the default factory settings for all applications. When selecting this option, you are asked to confirm the command or cancel it.

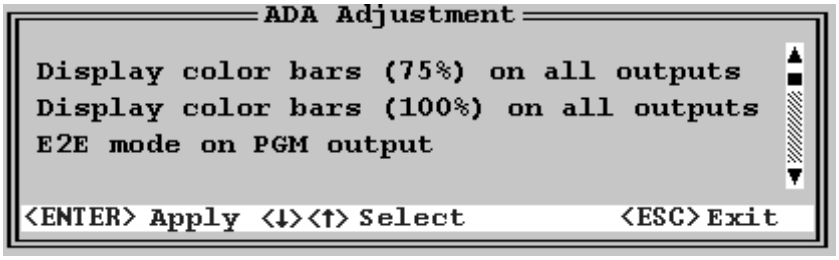
DEFAULT PARAMETERS FOR ALL APPLICATIONS:

Line	0	1	2	3	4	5	6	7	8	9	10	11	12	13
Application	**LSM Custom**	**LSM 1CAM Cut**	**LSM 1CAM FX**	**LSM 2CAM Cut**	**LSM 2CAM FX**	**LSM 3CAM Cut**	**LSM 3CAM FX**	**Triple LSM**	**LSM 4CAM Cut**	**LSM 4CAM FX**	**Super LSM Cut**	**Super LSM FX**	**Super LSM + 1CAM**	**Super LSM + 2CAM**
Video Recorders	1	1	1	2	2	3	3	3	4	4	1	1	1 + 1	1 + 2
Video Players	1	1	2	1	2	1	2	3	1	2	1	2	2	1
Type of REC 1	1	1	1	1	1	1	1	1	1	1	2	2	2	2
Recorders configuration (% Disk) *	100	100	100	50/50	50/50	33/33 /33	33/33 /33	33/33 /33	25/25 /25/25	25/25 /25/25	100	100	75/25	60/20 /20
Lipsync	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Teletext	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Disk Block Size	512	512	512	512	512	512	512	512	512	512	512	512	512	512
Operational Disk Size	90	90	90	90	90	90	90	90	90	90	90	90	90	90
Video Bitrate (SD)	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Video Bitrate (HD)	80	80	80	80	80	80	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
4-line interpolation	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Interpolation Validation	0	0	0	0	0	0	0	0	0	0	1	1	1	1

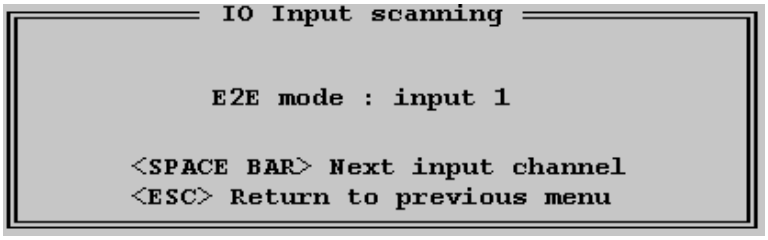
***** (% per channel)
Ex: 50/50 means 2 record channels, 50% of available storage for each channel.

3.10 ADA ADJUSTMENT

This command displays colour bars (75% and 100%) on all outputs. It is useful to adjust the luminance and chrominance of ADA converters.



The E2E mode (Live) displays one input on the PGM output. So the video signal passes through the disk recorder system and through the ADA converters.
To switch inputs, press **<SPACE BAR>** in the I/O INPUT SCANNING window:



Note: To perform properly the ADA adjustments, please refer the ADA user's manual.

3.11 TS CALIBRATION

When the Touch Screen option is installed, it can be calibrated using this command. If the Touch Screen is not installed, a warning message is displayed.

The Touch Screen does not auto-detect the video standard. Before calibrating the Touch Screen with a new video standard, exit EVS Menu and go to DOS.
To work in :

- PAL, type TS-PAL from the C:\ prompt.
- NTSC, type TS-NTSC from the C:\ prompt.
- NTSC Japan, type TS-NTSCJ from the C:\ prompt.

3.12 SET TIME

The Set Time command allows adjusting the system time & date.

Example of time format:

11:24:32a for 11 h 24 min 32 sec (a.m.)
10:58:00p for 10 h 58 min 00 sec (p.m.)

Example of date format:

10-24-1999 for October 24, 1999
03-15-2001 for March 15, 2001

3.13 HARDWARE CHECK / RAID REBUILD

The aim of this software is to check the hardware and to verify the validity of the data recorded on the video disk array. After the selection of this command from the Maintenance menu, the system automatically starts the test process.

One after the other, the different stages are displayed in the BOOT.HCTS window. The test process is complete when the HCTS board is initialized.

Hardware check is also used to rebuild the video and audio information after replacing a faulty disk.

When one disk of the video raid array has sustained errors, the Multicam automatically disconnect that disk and use the parity disk to rebuild the missing data and provide the video and audio data blocks to the application → the operator can continue working normally and the message "!Dsk" appears on all monitoring outputs.

When exiting the Multicam application, a warning will appear to remind the operator that one disk was disconnected, and invite him to perform a hardware check to repair the video raid:

```
1 Video disk disconnected.  Exit Multicam and
  run Hardware Check to rebuild Video RAID.
                Enter : OK
```

If the Multicam is restarted without the RAID being rebuilt, the following

message is blinking during the Bootwins : “SCSI Controller #C disconnected in operation !”. Then when entering the Multicam, another message appears :

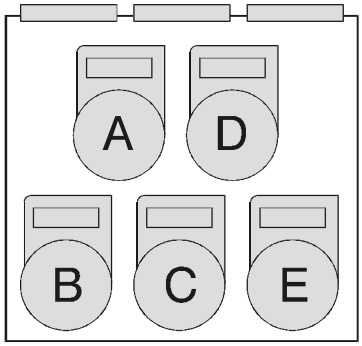
```
1 Video disk disconnected.  Exit Multicam and
run Hardware Check to rebuild Video RAID.
ESC : Exit        Enter : Continue
```

The operator can press enter and operate normally on 4 disks or exit the software and return to EVS Menu to run a Hardware Check.

From EVS Maintenance Menu, select the “Hardware Check” option. This allows the operator to identify the faulty disk. When the following message appears, turn off the system and replace the faulty drive :

```
REBUILD YOUR SYSTEM ?
SCSI Controller #C disconnected in operation !
Do you want to REBUILD your system on 5 disks ?
[Y]es  [N]o  [C]lear Clips
```

The faulty disk on the disk tray can be identified using the following diagram :



Then run Hardware Check again and answer “Yes” this time. **Rebuild time takes about 1h for 5x18GB disks, 2h for 5x36GB disks, 4h for 5x73GB disks**. A progress bar shows the rebuild status.

Note : If errors are detected during the rebuild process, a message appears after the rebuild is complete to warn the operator, and the raid is not considered as properly rebuilt. In this state, the system will keep working on 4 disks. If you want to run on 5 disks again, you can try replacing the disk again and perform another rebuild, or clear all clips.

If you don't need to retrieve the clips, you don't need to rebuild the RAID. In this case, select the "Clear All Clips" answer when the message with this option appears in the Hardware Check.

If you don't rebuild the RAID array or if you don't clear clips, the LSM will keep running on 4 disks only, and the operator will see a warning message appearing every time he starts or closes the multicam application. Normal operation can be achieved on 4 disks, but then, if another disk fails, the system will hang and all video and audio data will be definitely lost.

Europe, Africa & Middle East :
EVS Broadcast Equipment s.a.
Parc Scientifique du Sart Tilman - Rue Bois Saint-Jean 16 - 4102 Liege - BELGIUM
Tel : +32-4-361 7000 - Fax : +32-4-361 7099
e-mail : support@evs-broadcast.com

France : EVS France s.a.
Quai Carnot 47 - 92210 Saint-Cloud - FRANCE
Tel : +33-1-5557 3625 - Fax : +33-1-4112 9783
email : france@evs-broadcast.com

Italy : EVS Italia s.r.l.
Via Cipro 96 - 25124 Brescia - ITALY
Tel: +39-030 242 71 34 Fax: +39-030 2478182
e-mail : italy@evs-broadcast.com

The Americas : EVS Broadcast Equipment Inc.
9 Law Drive, Suite 200 – FAIRFIELD - NJ 07004 - USA
Tel : +1 (973) 575 7811 – Hotline: +1 (973) 575 7813 - Fax : +1 (973) 575 7812
e-mail : evsusa @ evs.tv

Asia - Pacific : EVS Broadcast Equipment s.a.
430 DB Plaza - Discovery Bay - HONG KONG
Tel : +852-2914 2501 - Fax : +852-2914 2505
e-mail : evshkg@netvigator.com

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BROADCAST EQUIPMENT