Model LTM-6000D User Manual

WORLD'S MOST ADVANCED TRANSCODER

INERTIA™

MULTIFORMAT SIGNAL TRANSCODER with DV/SDI & TIMECODE INSERTION

CE

LTM-6000D
ALL FORMAT TRANSCODER

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Warranty Information
Laird warrants your product to be free from malfunctions and defects in both materials and workmanship for one year from the date of purchase. Please see the enclosed warranty card for full details or your local dealer or Distributor for questions concerning the warranty.

Technical Support
Laird maintains a free user support web site to help with all of your technical support needs. Visit: **www.laird-support.com**

Getting Started
We recommend that you:

- Unpack the equipment carefully and save the original box and packaging materials for possible future shipments.
- Review the contents of this instruction manual.

In addition to the unit itself, the package should also contain:

- AC Adaptor 12 V, 4 Pin XLR
- Warranty Card
- 9-Pin RS232 Control Cable
- 9-Pin RS422 Control Cable
- 1 Power Line Cable - USA
- This Manual
- 4 Non-Slip Feet

SPECIFICATIONS

VIDEO INPUTS/OUTPUTS

DV 1394 I/O:	**DV25 8 bits:** IEEE1394a Full Duplex Isochronous AV 400Mbps
	DV25: DV/DV CAM / DVC Pro:
	DV,DVCAM: NTSC 4:1:1, PAL 4:2:0
	DVCPRO: NTSC-PAL 4:1:1
SMPTE259M:SDI:	**Digital Video I/O:** SDI: (BNC), 75 ohm, 10-bit resolution, 270 MBit/sec
	Inputs: 1 BNC SMPTE level digital
	Outputs: 2 BNC SMPTE level digital
Composite Video:	**Inputs:** 1 BNC 1.0V p-p into 75 ohms
	Outputs: 2 BNC 1.0V p-p into 75 ohms
S-Video:	**Inputs:** 1 4-Pin Mini DIN, 75 ohms, Y: 1.0V p-p, C: 627mV p-p
	Outputs: 2 4-Pin Mini DIN, 75 ohms, Y: 1.0V p-p, C: 627mV p-p
Component:	**Inputs:** 1 Set BNC x 3, 75 ohms, (Y, R-Y, B-Y), SMPTE level
	Outputs: 2 Sets BNC x 3, 75 ohms, (Y, R-Y, B-Y) SMPTE level

AUDIO INPUTS/OUTPUTS

AES/EBU:	**Input:** XLR: 2-7 V p-p across a 110 Ohm load 2 Channel 48 Khz/16 bit or 32 Khz/12 bit
	Output: XLR: 2-7 V p-p across a 110 Ohm load 2 Channel 48 Khz/16 bit or 32 Khz/12 bit
Analog:	**Inputs:** 1x 2-Channel Balanced XLR +0dBu nominal into 600 ohms
	Outputs: 2x 2-Channel Balanced XLR +0dBu nominal into 600 ohms

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SPECIFICATIONS

TIME CODE

Standard operation LTC/VITC over IEEE1394/RS422
Input locked to Reference Video: BNC connector
SMPTE LTC/VITC Time Code: Encode/Decoded to IEEE1394
LTC In / Out: BNC / BNC
RS422 In: RS422 Standard Sony Machine Control
VITC In: BNC external or over Composite, YC, or Component inputs
VITC Out: BNC 1.0V p-p into 75ohms. Line selection of 13/15,16/18 or 20/22

VIDEO

Analog Decoder: Analog Composite, Component, Y/C to Digital Video
Analog Encoder: Digital ITU-R 656 to Analog Output: Composite, Component, Y/C – 525i@59.94/60Hz - 625@50Hz
SDI Decoder: Equalizer, Descrambler, Deserializer – SMPTE 259 – 10-bit 4:2:2 Digital Video to 656 parallel output - 270Mbits
Embedded audio in SDI stream: EDH SDI control
SDI Encoder: Scrambler, serializer from 656 to SDI SMPTE 259 – 10-bit 4:2:2 SDI Cable driver for SDI cable
Internal Digital Video Buses: 656 Input Buses – 656 Output Bus DV 25Mbps over 1394 converted to 656 to video outputs

CONTROL/DATA

Genlock: Looping Genlock input using composite video or Blackburst 1Vp-p into 75ohms
Horizontal Phase Adjust Range: +/- 128 Pixels
Subcarrier Phase Adjust Range: 360°/256
Vertical Offset Adjust Range: 0-7 Lines
Compatibility Firmware: DVCAM, DVCPRO, WIN98/ME/2000/XP, FINAL CUT PRO, AVID XPRESS, PROAVID NEWS CUTTER
Machine Control: Standard Sony Machine RS422 control protocol Bi-directional over Firewire IEEE1394 6pin via 9pin DB9Female, using standard RS422 9pin cables
System Upgrades: Firmware upgrades via RS232 serial port DB9Male
Front Panel Control: Push-Button Switches and LCD select Main Menu Functions for all operations: BACK-NEXT-DOWN-UP
Audio Level Control: Front panel vary audio encode level with VU meter display.

POWER

Power Requirements: 12Volt DC @ 4A provided with product via 4PIN XLR connector Pin#1Ground, Pin#4 Hot. 1 Non-Captive UL/CE Linecords are provided with unit for 110/220 Volt AC Operation.
Certifications: Converter: FCC, CE External Power Unit: UL, CSA
Dimensions/Weight: 3.5"H (2RU) x 11"D x 19" W: EIA Rackmount; 8.5 Lbs. Less Shipping Carton

ENVIRONMENTAL

Operating Temp: +32°F to 110°F(0°C to 43°C)
Operating Humidity: 10% to 85%, Non-Condensing
Storage Temperature: -40°F to +150°F(-40°C to 65°C)

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FRONT PANEL FEATURES

You will notice that for such a powerful device, the front panel incorporates an efficient and uncluttered design. The LTM-6000D also features a powerful menu operating system. The use of high-speed digital logic and dedicated audio-video semiconductor technology allows the fast configuration of setups and equipment integration, which performs well in broadcast facilities. The audio and video signals are all buffered in and out to provide proper line drive and cable coupling. High quality A/V connectors are used for all input and output hardware connections.

1.) LCD Status Display

2.) Menu Back Button

3.) Menu Next Button

4.) Menu Down Button

5.) Menu Up Button

6.) Channel 1 LED Level Meter

7.) Channel 2 LED Level Meter

8.) Channel 1 Level Adjustment (BALANCED INPUT)

9.) Channel 2 Level Adjustment (BALANCED INPUT)

10.) Power On/Off Switch

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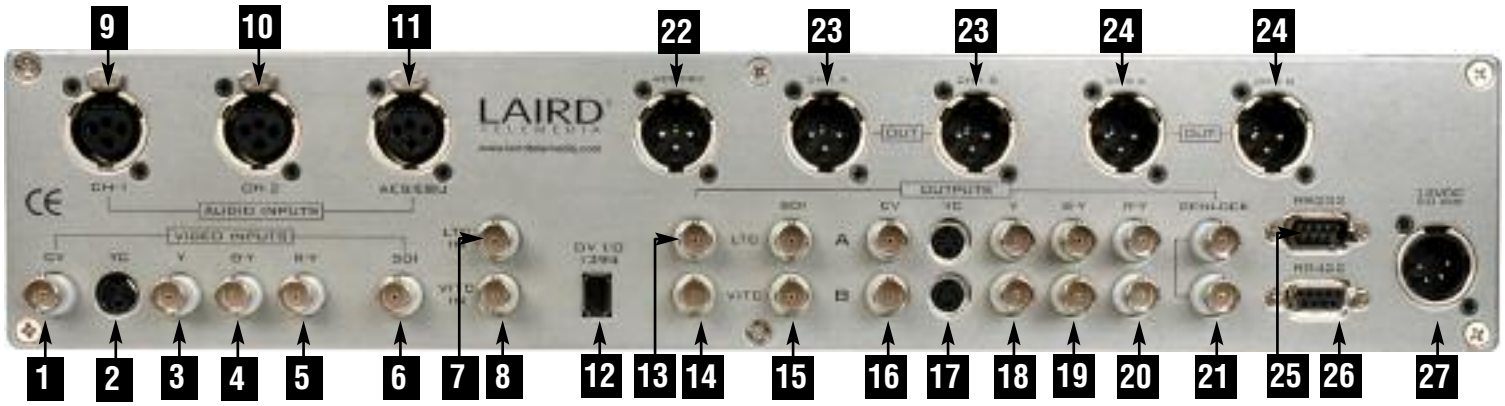
REAR PANEL FEATURES



1) Composite Video Input
2) YC Video Input
3) Component Y Input
4) Component B-Y Input
5) Component R-Y Input
6) SDI Signal Input
7) LTC Timecode Input
8) VITC Timecode Input
9) Balanced Audio Input Ch1
10) Balanced Audio Input Ch2
11) AES/EBU Audio Input
12) IEEE1394 DV Firewire I/O
13) LTC Timecode Output
14) VITC Timecode Output
15) SDI Signal Output (A/B)
16) Composite Video Output (A/B)
17) YC Video Output (A/B)
18) Component Y Output (A/B)
19) Component B-Y Output (A/B)
20) Component R-Y Output (A/B)
21) Looping Genlock Input
22) AES/EBU Audio Output
23) Balanced Audio Output Ch1 (A/B)
24) Balanced Audio Output Ch2 (A/B)
25) RS232 Remote Control and Update Port
26) RS422 Machine Control
27) 12V DC Power Input

POWER UP PROCEDURES:

To familiarize yourself with the menu functions it is advisable that you simply plug in the power supply and power up the unit without any devices connected. The LCD display will illuminate and then cycle through its internal diagnostic functions. After this is complete the factory default mode setting of DV DECODE will be displayed on the LCD.

By pressing the NEXT button, you will begin the function select operations. The LCD will display each function as you advance through the menu. Study the menu tree on the next page to familiarize yourself with the LTM-6000D functions. There are a few functions that merit special attention: PAL and NTSC have some special selections that are unique to each other. This is outlined in the menu tree. In GENLOCK ON, there are selections for three related operations: Horizontal Phase, Subcarrier and Vertical Offset.

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FAMILIARIZING YOURSELF WITH THE LAIRD LTM-6000D

The LAIRD LTM-6000D represents the finest in multi-format signal transcoding and conversion. Designed to fit seamlessly into any professional broadcast or post production media facility, the LTM-6000D will provide high quality performance and operation for years to come.

The product is designed as an integrated system to handle the demanding media environment where a variety of signal conversion and transcoding requirements exist. The LTM-6000D also provides a bridge between analog and digital equipment to create a hybrid solution to a fast moving evolution of signals from analog to digital.

The simple block diagram below is but a very basic representation of the technology operations that the LTM-6000D can perform. The unit is built around the latest powerful IEEE1394 DV CODEC. One of the most common functions of the LTM-6000D is to provide the easy bi-directional conversion of analog to DV (1394). The LTM-6000D is the final result of many years of research and provides a flexible solution as a signal bridge and beyond.

The LTM-6000D can also provide basic signal transcoding conversion between any standard analog and digital format signal. Thus, as a stand–alone unit it can serve as a signal format transcoder and provide a very wide variety of daily operations.

Software is the key to the smooth integration of the LTM-6000D. It is self-diagnosing and will perform a complete system check every time you power up the unit. The Operating System provides seamless navigation through the very flexible set-up and then goes one step further to use adaptive firmware to work with all computers and NLEs. Settings are available for Windows, 2000, NT, XP, and Macintosh systems. The LTM-6000D can also be configured to connect directly to any DV VTR or Camcorder. Firmware allows the unit to perfectly match any DV device so that a “no compromise” operation is provided.

Carefully read and study this operations manual. It will guide you through the many features and performance settings of the LTM-6000D.

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Cables and Wiring Guidelines

It is strongly recommended that you use only quality analog and digital cables for your connections to the LTM-6000D. The SDI on the LTM-6000D is standard SMPTE 259M-C and should be connected to digital coax for any distance over 6 feet. Use high quality true 75Ω BNC connectors and try to avoid using adapters of any kind.

The AES/EBU is provided via an XLR connector and is a transformer coupled 110Ω driver. To adapt this to a BNC AES/EBU you must use a 110-75Ω adapter such as the Connectronics AES/EBU1 or AES/EBU2. It is important to properly match the impedance of your signals.

Component (YUV) video signals should be wired with high-grade RG-59U shield cable using high-grade BNC connectors. Be certain to use exact equal lengths for R-Y (V), B-Y (U) and Y signals. It would be advisable to use color-coded cables for easy identification during cabling.

The LTM-6000D can be used as a desktop device or in a EIA Rack mounted system. The only limitation is that the front panel LCD display must be viewed for certain setup functions. For applications where the unit must be rack mounted away from operators RS232 Remote Control Software that runs in Windows can be used. The software also has signal processing functions that are only available by using this software package. The RS-232 remote software does have some operational limitations that will be covered later in this manual. The control software is available from the LAIRD TELEMEDIA website: www.lairdtelemedia.com.

Power Options

The LTM-6000D was designed to be powered by a high-grade in-line switching power supply with a regulated output of 12Volts DC@ 4 AMPS Maximum. The unit may be powered by any such quality power supply or 12 Volt Battery. The power entry is a standard 4pin XLR Male with pin#1 GROUND and Pin#4 POSITIVE (HOT). Using any other source of power is not recommend, as it may damage the unit or cause it to malfunction.

Environmental Conditions

A cool ventilated operating environment must be provided for the LTM-6000D. It is advised that the unit not be sandwiched between two heat-generating pieces of equipment. It would be wise to allow a 1RU space above and below the unit. **Do not** place the LTM-6000D directly above a VTR. Some VTRs emit a high level of RF from the head amplifier and this can be picked up by the LTM-6000D and cause interference. It is advisable that the unit be at least 4RU away from any such device. High level of RF in the environment such as certain medical or radio towers can cause interference. It is recommended that in such environments proper shielding be provided for the unit.

Extreme heat and cold can also cause the unit to malfunction. Be certain that the unit is not exposed to harsh temperature changes outside the specifications listed in this manual.

Dirt and ash can cause damage to any piece of precision equipment. Keep the unit in a clean, moisture and smoke free location. Follow the hazard warnings provided at the end of this manual.

Power-Up Procedures

It is recommended that you have all devices properly wired before any power up is performed. Based on the nature of DV and DV devices, the proper sequence must be followed: Power-up the LTM-6000D first and make sure it settles in its default mode: DV DECODE. Setup the LTM-6000D for the operation you require and then power up the other DV device. Computer based DV devices such as Non-Linear Editors(NLEs) have to “see” a live DV DEVICE in order to properly initialize the software. The LTM-6000D will be identified as a PHILLIPS DV DEVICE depending on your operating system and software. **DO NOT HOT CONNECT IEEE1394** (FireWire) devices. This can cause damage to your device and the LTM-6000D. Be certain that the device is turned off before inserting or removing connections. In the case of computer based NLEs it is advisable that the operating software such as edit software be offline or exited before any connections are made.

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Using The LTM-6000D with WINDOWS

Your DV equipment such as a PC may be equipped with an OHCI compatible FireWire card. Assuming all connections are proper, the PC will recognize the LTM-6000D as new hardware as soon as it is initialized. The LTM-6000D will be listed as a PHILLIPS DV Device. Make certain that you have entered the proper Windows system compatibility selection from your Menu for Windows 98, 2000, NT and XP.

To verify that your LTM-6000D is operating as a basic DV conversion device you can connect a video and audio analog signal to the LTM-6000D and follow the setup for DV ENCODE: Converting Analog to DV. from your Windows 2000 or XP desktop, double click on MY COMPUTER. The window will open and you should see the LTM-6000D as a "Phillips DV Device or Camcorder". This verifies that the LTM-6000D and the OHCI FireWire card are working properly and Windows is recognizing the connection properly. This does not mean that your software will automatically work. Some software requires that certain "templates" be loaded before the DV device is online. Study your software manual and follow any instructions provided for such operations.

Using The LTM-6000D with Apple/Macintosh

For Apple Mac based systems the LTM-6000D will be recognized as a DV DECK or VTR.

DV Decks and Camcorders

To interface with standard DV(IEEE1394)(FireWire) decks such as SONY DSR series, Panasonic DVCPRO and any other such device, simply select the proper DV MODE OS in the menu setups. Select DV DECK for interface requirements between analog equipment & DV VTRs.

Other DV Transcoders

If there is a need to interface the LTM-6000D with another DV transcoding device, always choose the DV DECK mode for this operation. The LTM-6000D was tested with several of the most popular DV transcoders for operation. If you should encounter a device that does not interface properly, please contact customer service.

Studio and Facility Integration

For system integration into larger facilities, it may be required to GENLOCK the LTM-6000D to provide system phasing to HOUSE REFERENCE. The LTM-6000D can be GENLOCKED to standard CVBS video BLACKBURST. Once this feature has been activated, the LTM-6000D can be horizontally and Subcarrier timed for perfect house lock. There is an additional provision for vertical offset compensation which is a typical problem found in digital processing equipment.

DV Systems

The LTM-6000D is a industry standard IEEE1394 system which operates in DV/DVCAM for NTSC and DVCPro25 for PAL.

RS422 Machine Control

A 9-Pin D-Sub machine control port is provided for NLE machine control via FireWire (IEEE1394). This system will provide standard SONY RS422 control protocol without the need for any external equipment. This control system is a pass-through protocol and simply passes the NLE commands that are on the FireWire port and converts them to RS422 serial. The standard list of RS422 commands which are translated are listed below:

STOP	**SLOW FORWARD(.2X)**	**CUE**
PLAY	**SLOW BACKWARD(.2X)**	**STEP FORWARD**
PAUSE	**FAST FORWARD(10X)**	**STEP BACKWARD**
REVIEW	**FAST REWIND(10X)**	**RECORD(EDIT)**
EJECT		**RECORD PAUSE**

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Time Code

The LTM-6000D will read and decode the time code stream from the RS422 data. Both LTC and VITC time code can be read, as well as, interpolated between both formats. An asterisk will display on the lower right corner of the LCD panel that confirms that Time Code is being read and processed.

RS232 Commands

A 9pin D-Sub port is provided for two functions. The first is the provision for system upgrades and firmware debugging. The LTM-6000D is designed with the very latest in on-board programmable software technology that allows updates, changes and re-programming via the RS232 port without having to open the device. This gives the product high field reliability and serviceability by reducing the need to return the unit to the manufacturer for compatibility upgrades and improvements.

The RS232 port is also used to remotely control the LTM-6000D and provide signal processing (PROC-AMP) features. The RS232 port uses standard 9pin computer serial cables and can be operated up to 100 feet with proper shielded serial cable. The control software runs in Windows and can be downloaded free of charge from the LAIRD website.

Stand-Along Signal Transcoding Operations

The LTM-6000D is designed around a highly advanced signal-processing block of technology. Utilizing the latest in firmware-based semi-conductors, the LTM-6000D is built to perform as a stand-alone signal processor and converter for analog and digital signals. There is no need to connect a DV signal or device to convert between SDI/AES and analog. The product is designed to output all formats once a particular format has been selected as the input signal. We refer to this as FULL-TIME CONVERSION. For example: If you choose to convert SDI and AES/EBU signals to component, then the LTM-6000D will also output Composite, YC, and Balanced Audio as well. The LTM-6000D will provide IEEE1394 (FireWire) bidirectional conversion in addition to all digital and analog format conversion functions.

Menu Navigation

Now that you are familiar with all the features and operational scenarios that are possible with the LTM-6000D, it is time to study and learn to navigate the MENU. Power-up your product and first study and use the menu to get familiar with its operation. It not required that you connect any equipment to the product in order to practice the menus.

The Menu Buttons

The four buttons located below the LCD menu display are used to navigate through the menu and adjust the settings of the LTM-6000D. This system has been designed to work very similar to a computer style menu. Before trying the menu buttons it is advisable that you carefully study the MENU TREE pages in this manual. It is important to know all the very various settings that the 6000D allows the user-operator to control in the setup of the LTM-6000D into a system.

BACK: Used to Back Out of a selection. This button will return you back to the previous level. If you have decided to not engage a function, this button will "back" you out of it.

NEXT: Used to advance to the next menu function level. The UP and DOWN buttons are used in conjunction with this button and act as a cursor to navigate the menu choices. Once you have arrived at a menu function choice, the NEXT button must be pressed again to SAVE the selected choice. Failure to press the NEXT button the second time (after the DOWN-UP buttons) will result in the function not being saved and you will be advanced to the next level of functions.

DOWN-UP: Used in conjunction with the NEXT button this button will advance your menu choices "down" the tree of functions for the main function selected by the NEXT button. If you pass a selection, simply press the UP button to move back to that function that was selected previously.

This manual provides a MENU graphic which shows in detail the entire menu entries and selections. It has been designed to make it easy to understand the flexibility of the LTM-6000D. Study this graphic with the unit powered up and try the functions. You will soon see how easy it is to use LTM-6000D.

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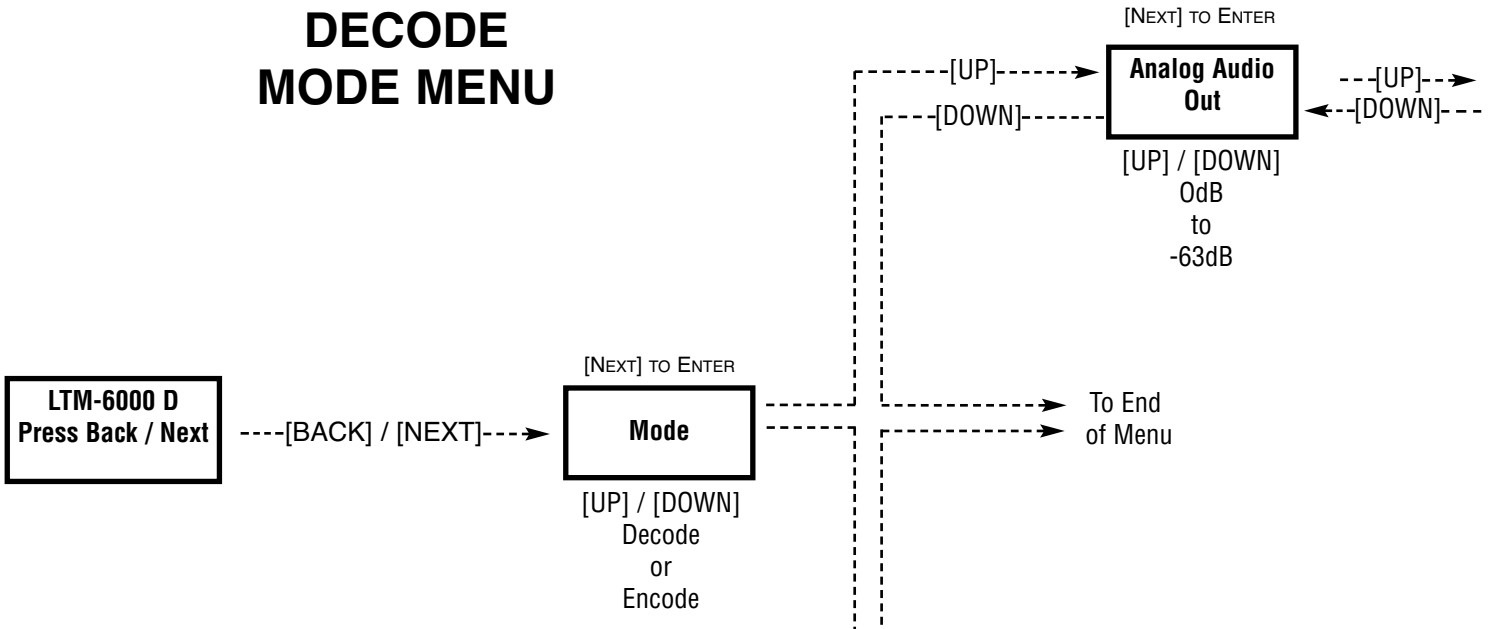
DECODE MODE MENU



ENCODE MODE MENU

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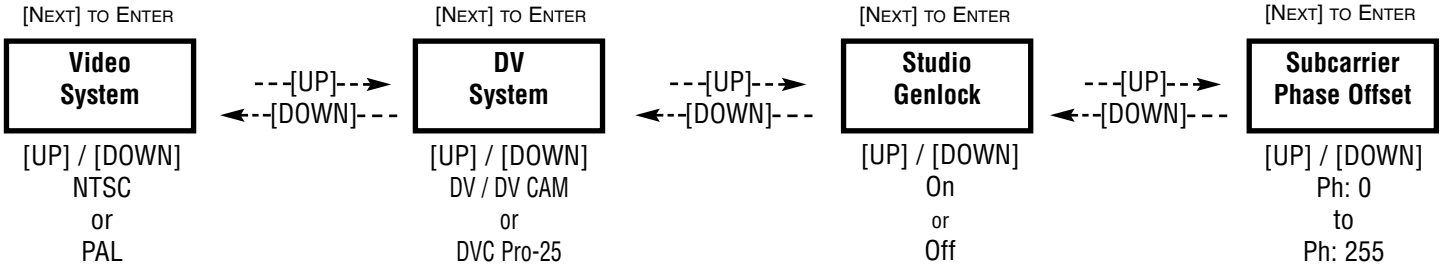
This option appears only when Studio Genlock is ON



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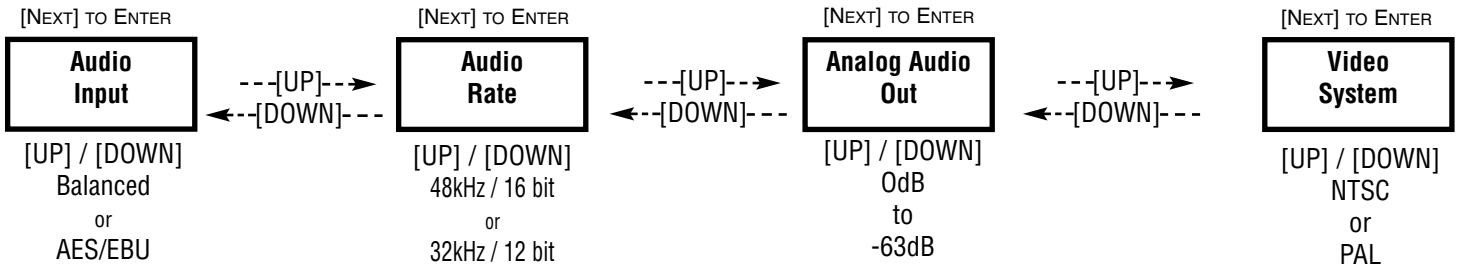

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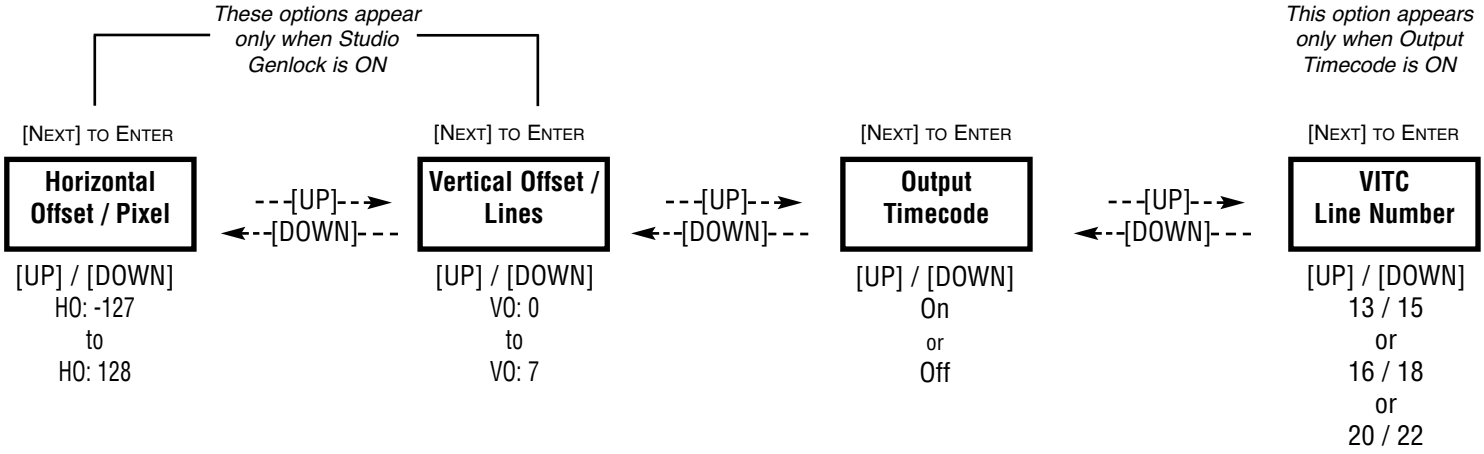

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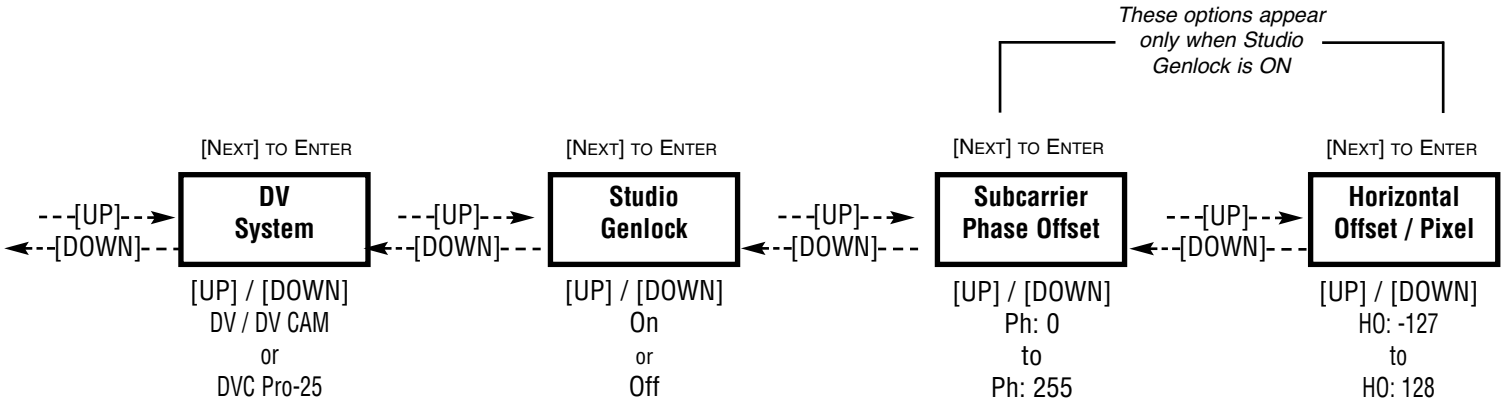

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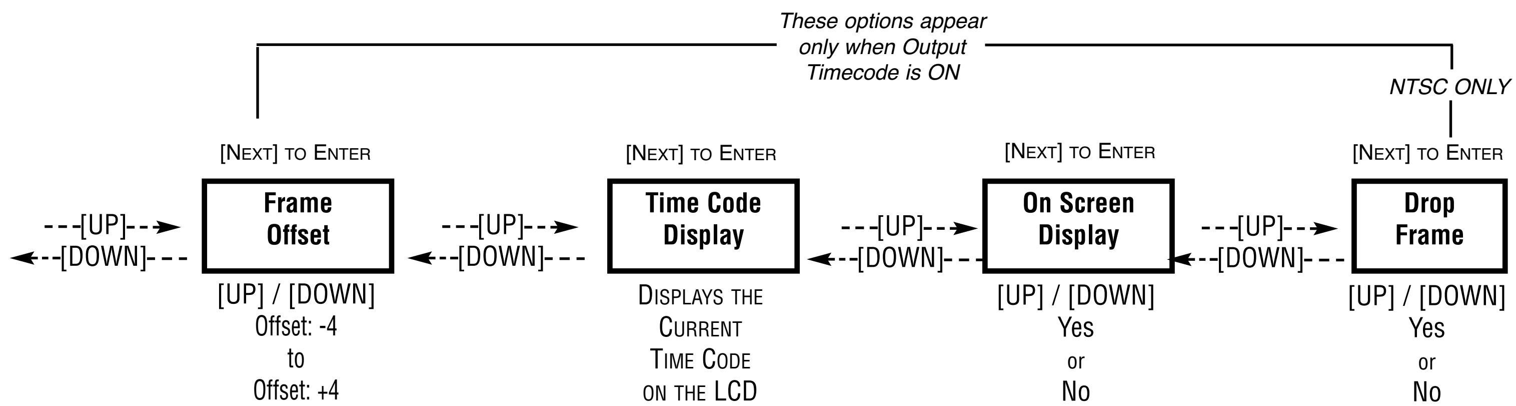

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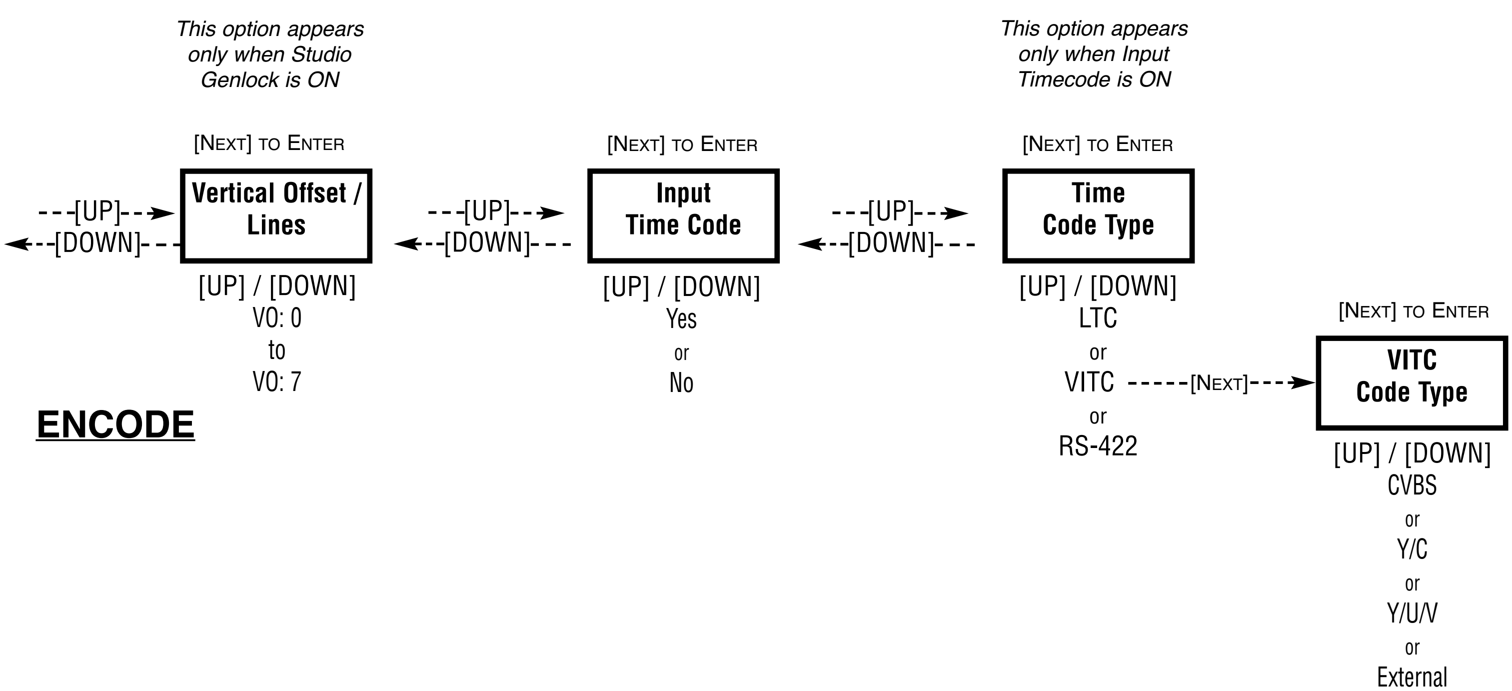

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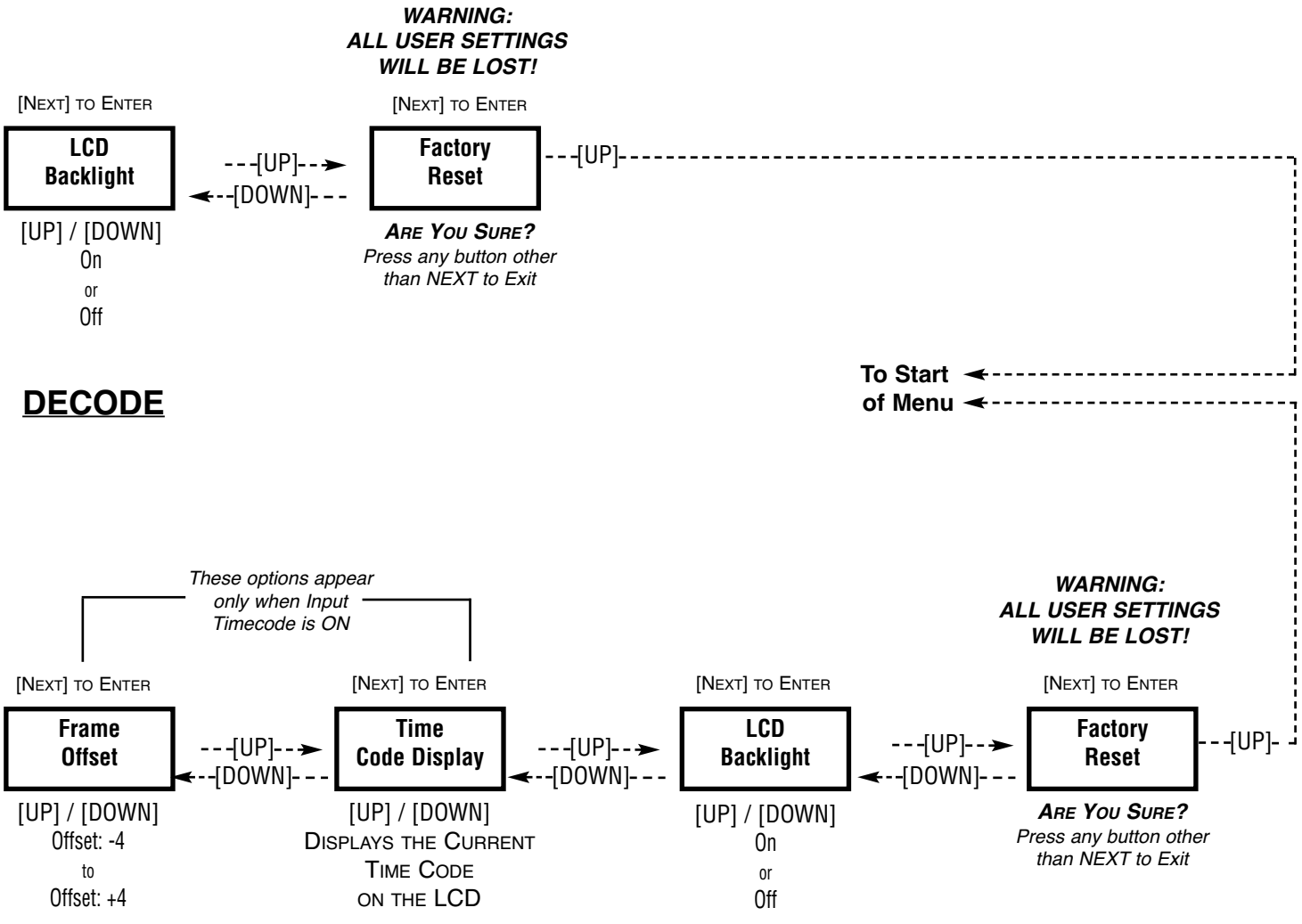

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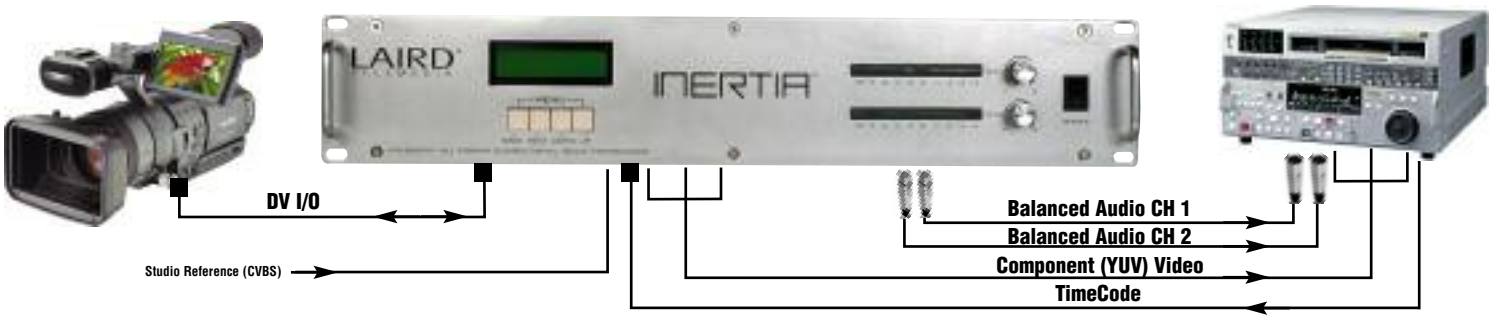
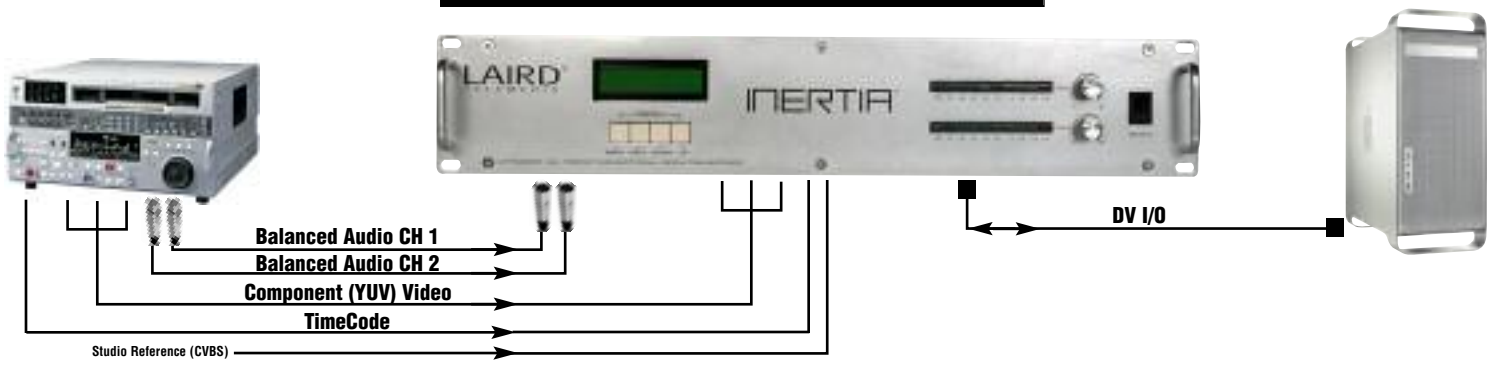
SYSTEM APPLICATION DRAWINGS

DV To Analog Connections



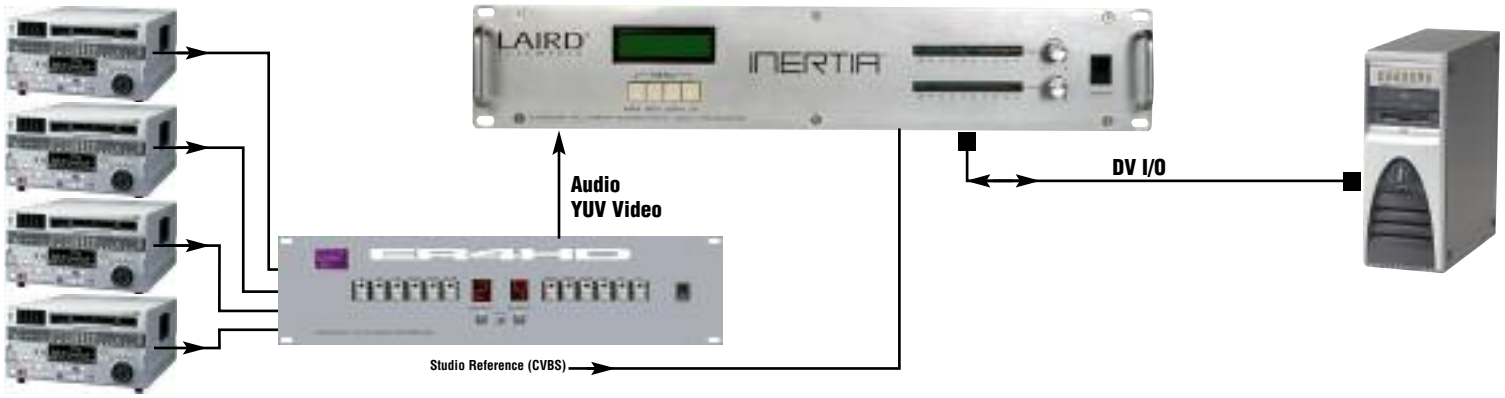
Analog To DV Connections



Using The LTM-6000D With Other Routing Equipment

The LTM-6000D provides a professional transcoding interface for the demanding multimedia environment of modern telecommunications facilities. Indicated below are a few application diagrams, which display the flexible and cost effective use of the LTM-6000D with other Laird products and various studio and production equipment.

Using Multiple Sources With The LTM-6000D



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Using The LTM-6000D with Avid Xpress DV 3.5.4

Note: Please be aware that this list has been compiled based on lab testing and user Feedback. It is not a document created by AVID or any official channel related to AVID TECHNOLOGIES.

1. Before starting the AVID application, the LTM-6000D should be set to its working settings, like Encode/Decode Mode or DVCam/DVCPro-25.
2. Switching the LTM-6000D On and Off while the AVID XPress DV application is running should be avoided as this can corrupt the driver and the connection integrity may be compromised.
3. **Do Not** switch between DVCam and DVCPro in Pal while the Xpress DV application is open.
4. Digital Cut: AVID XPress DV does not allow mixed clips coming from DVCam or DVCPro in one project, it comes up with an error message.
5. When controlling a VTR through RS-422 directly from AVID via a serial cable connected to the PC/MAC, the Firewire Control in the Deck Configuration MUST be disabled (deleting the Deck on the Firewire OHCI channel). The Conversion direction must be set manually directly at the converter. This must also be done, when using no deck control. Failure to do this will result in AVID changing the DECODE and ENCODE mode on the LTM-6000D.
6. During digital cut or previewing clips in the bin, the record Window must be closed. Otherwise AVID XPress DV tries to switch the device on the firewire port that is not available, this causes a delay from up to 5 seconds before the playback starts.
7. The desktop play delay should be set to 13-15 frames for Pal, depending on the speed of the computer.
8. Be certain to check in the Audio Tools of AVID XPress DV the direction of the Audio channels. During Record there must be an input and during Preview or Digital Cut there must be an output.

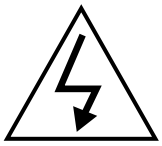
Using The LTM-6000D with Final Cut Pro HD Version 4.5

When using the LTM-6000D with Final Cut Pro HD Version 4.x, you must set the LTM-6000 OS setting to WINXP/98 rather than the instructed DV Deck setting when using Final Cut Pro Version 3.x.

TECHNICAL SUPPORT

For current support issues and answers to common questions, please visit the Laird support website at:
http://www.laird-support.com or call: 800-898-0759

Safety Precautions



1. To prevent fire or shock hazard, do not expose this equipment to the environment of Humidity and/or dust. Do not use this equipment in an unprotected outdoor installation or any area classified as a wet area.
2. The operating temperature of this product must be kept between -40°C and +95°C. Direct sunlight or an intense source of heat, direct or ambient, must not be introduced to the product either by induction or contact.
3. Always keep the product on a stable and secure base or enclosure. Do not drop the product or subject it to sudden heavy impact.
4. Provide adequate ventilation so that thermal characteristics do not cause an increase in product temperature to resulting in overheating.
5. Do not clean the unit by using electrically conductive or corrosive chemicals. Always be certain to unplug the unit from AC wall power before any major cleaning. Use a damp cloth only for cleaning.
6. Do not subject the product to electrical mains power over voltage: The product must be used at the rated supply voltages indicated on the product rear panel only.
7. Do not plug the product into an overloaded electrical outlet. This may result in fire or electrical shock.
8. Object Ingress and Liquid Entry: Never insert or push sharp metal objects into the product or use such devices for an attempt at opening or servicing the product. Servicing should be referred to a trained and qualified technician only. Do not allow liquid of any type to enter the unit. Do not allow the unit to be submersed in water as this may cause a shock hazard.
9. A trained qualified technician should perform all servicing of the unit. There are no serviceable components within the unit for user access.

NOTES

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