HDSD9155Q
HD/SD Afterburner

Instruction Manual

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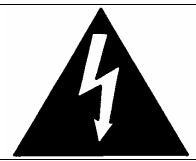
IMPORTANT SAFETY INSTRUCTIONS

	The lightning flash with arrowhead symbol within an equilateral triangle is intended to alert the user to the presence of un-insulated “Dangerous voltage” within the product’s enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.
	The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature ac-companying the product.

- Read this information.
- Keep these instructions.
- Heed all warnings.
- Follow all instructions.
- Do not use this apparatus near water.
- Clean only with dry cloth.
- Do not block any ventilation openings. Install in accordance with the manufacturer’s instructions.
- Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
- Do not defeat the safety purpose of the polarized or grounding type plug. A polarized plug has two blades with one wider than other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong is provided for your safety. If the plug provided does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
- Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles and the point where they exit from the apparatus.
- Only use attachments/accessories specified by the manufacturer.
- Unplug this apparatus during lightning storms or when unused for long periods of time.
- Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

WARNING TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS APPARATUS TO RAIN OR MOISTURE.
WARNING DO NOT EXPOSE THIS EQUIPMENT TO DRIPPING OR SPLASHING AND ENSURE THAT NO OBJECTS FILLED WITH LIQUIDS ARE PLACED ON THE EQUIPMENT.
WARNING TO COMPLETELY DISCONNECT THIS EQUIPMENT FROM THE AC MAINS, DISCONNECT THE POWER SUPPLY CORD PLUG FROM THE AC RECEPTACLE.
WARNING THE MAINS PLUG OF THE POWER SUPPLY CORD SHALL REMAIN READILY OPERABLE.

INFORMATION TO USERS IN EUROPE

NOTE

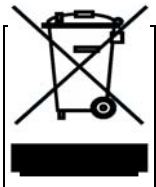
This equipment with the CE marking complies with both the EMC Directive (2004/108/EC) and the Low Voltage Directive (2006/95/EC) issued by the Commission of the European Community.

Compliance with these directives implies conformity to the following European standards:

- EN60065 Product Safety
- EN55103-1 Electromagnetic Interference Class A (Emission)
- EN55103-2 Electromagnetic Susceptibility (Immunity)

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to the European Union EMC directive. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

CE	EN60065 EN55103-1: 1996 EN55103-2: 1996	Safety Emission Immunity



EN504192 2005
Waste electrical products should not be disposed of with household waste. Contact your Local Authority for recycling advice

INFORMATION TO USERS IN THE U.S.A.

NOTE

FCC CLASS A DIGITAL DEVICE OR PERIPHERAL

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

WARNING

Changes or modifications not expressly approved by Evertz Microsystems Ltd. could void the user's authority to operate the equipment. Use of unshielded plugs or cables may cause radiation interference. Properly shielded interface cables with the shield connected to the chassis ground of the device must be used.

Evertz Microsystems Ltd FC For Commercial Use	Tested to comply with FCC Standards	This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: This device may cause harmful interference, and this device must accept any interference received, including interference that may cause undesired operation.

REVISION HISTORY

REVISION	DESCRIPTION	DATE
1.0	First release version	Mar 2007
1.1	Updated Menu items, Installing KeyLog Tracker section, System Parameters, Window Functions	May 2007
1.2	Updated to firmware build 3532, revised LTC IN & OUT drawings	May 2010

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TABLE OF CONTENTS

Figures

Tables

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CHAPTER 1: OVERVIEW

TABLE OF CONTENTS

Figures

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1. OVERVIEW

The HDSD9155Q Afterburner is a powerful device designed to facilitate the creation of off-line videotapes from telecine or field acquired 4:4:4 or 4:2:2 HDTV or 4:2:2 SDTV masters. The HDSD9155Q can be operated as a high quality downconverter or as a character inserter on the native HDTV or SDTV signal. Embedded audio present on the input video is reinserted on the serial digital outputs in time with the picture. The Afterburner can operate in a 'film mode' working with telecine masters or a 'video mode' working with field acquired HDTV.

As a high quality downconverter the Afterburner provides two clean (characters optional) SDI downconverted outputs with VITC, suitable for creation of high quality viewing copies, and two SDI and one analog monitoring output with VITC and characters suitable for monitoring or creation of tapes for non-linear editing systems. When the input video is in the 1080p/24sF format the Afterburner also creates a 2:3 pulldown on the output video to create a 30 Fps output. The Afterburner automatically generates video timecode for the standard definition VTR that is converted from 24 to 30 Fps, and delayed to match the complete A frame cycle of delay through the Afterburner. When outputting the native HDTV or SDTV input, the Afterburner provides two clean 4:2:2 program outputs (with optional characters for virtual slates, etc.) and two 4:2:2 monitor outputs with characters burned in.

In 'film mode', the Afterburner reads the RP215 VANC (HDTV) or RP201 3-line VITC (SDTV) Film transfer data that was recorded by the Evertz Film Footage Encoder during the telecine transfer, and makes burn-in windows. When operating as a downconverter, the essential timecode and KeyKode data is also converted into RP201 3-line VITC inserted on the SDTV outputs. The 2:3 cadence can be controlled from the VANC data or from the LTC. The 2:3 cadence can also be locked to an external 6 Hz reference where the Afterburner is directly reading the HD Film Footage Encoder output.

In 'video mode' the Afterburner reads the LTC or SMPTE 12M-2 ancillary timecode (ATC) and makes burn-in windows and new timecode that is in sync with the downconverted video. The original 24 Fps timecode numbers can be placed in the user bits of the VITC and displayed as a burned-in window. The 2:3 cadence can be controlled from the input video timecode, or by applying a 6 Hz reference pulse.

The HDSD9155Q can be easily configured using version 3 of Evertz popular KeyLog TRACKER™ software (included) using RS-232 or Ethernet communications. The Tracker graphical interface software allows the user to store multiple configurations for the HDSD9155Q. For stand alone applications the Afterburner can also be controlled from the local front panel using the built-in on screen menu system.

Features:

HDTV Video Inputs:

- Accepts 1.5 Gb/s SMPTE 292M or dual link SMPTE 372M 1080i/59.94, 1080i/50, 1080p/29.97sF, 1080p/25sF, 1080p/24sF, 1080p/23.98sF and 720p/59.94 serial digital video
- Downconverter mode - downconverts HDTV input to SDTV and creates VITC and window burns on SDI and analog outputs
- HDTV mode - creates window burns on HDSDI outputs
- Converts 4:4:4 RGB dual link HDSDI to 4:2:2 HDSDI or downconverts to SDI
- Reads RP215 VANC film transfer information in ‘Film mode’ and generates RP201 3-line VITC on SDTV outputs
- Reads RP188 ancillary timecode in ‘Video mode’ and generates SMPTE 12M VITC on SDTV outputs
- Decodes Panasonic ‘active picture flags’ in ATC user bits for downconverting 720P video
- Creates 2:3 pulldown when downconverting 1080p/23.98sF video to 525i/59.94 and NTSC
- 2:3 cadence is determined from a 6Hz pulse input, RP188 timecode or LTC

- High quality downconverter converts aspect ratio from 16:9 to 4:3 in anamorphic, letterbox or centre crop mode
- Embedded audio from input delayed and reinserted on outputs in time with picture
- Ability to send recovered VANC data to a computer using an RS-232 serial connection or Ethernet

SDTV Video Inputs:

- Accepts 270 Mb/s SMPTE 259M-C 525i/59.94 and 625i/50 SDTV serial digital video
- SDTV mode - creates window burns on SDI and analog outputs
- Reads RP201 3-line VITC film transfer information in 'Film mode' and creates window burns of Video, and audio time codes and KeyKode
- Reads SMPTE 12M VITC in 'Video mode' and creates timecode window burns
- Embedded audio from input delayed and reinserted on outputs in time with picture

General:

- LTC timecode reader and generator converts 24 Fps to 30 Fps and re-times the timecode to the output video
- Built in signal generator to aid in verifying signal path during installation
- Selectable outputs on loss of input video – blue or black with or without characters, or pass input
- Control from Evertz KeyLog TRACKER™ version 3.01 or later using RS-232 or Ethernet connection
- Multiple units can be ganged together using Ethernet – provides a simple way of configuring multiple units (e.g. multi- camera applications) to the same settings
- Control from integrated front panel using On screen display menus for stand alone applications
- Configurable virtual slate uses double height character windows to enhance visibility of important information
- Three user programmable text character windows and over 30 character displays to display VANC data.

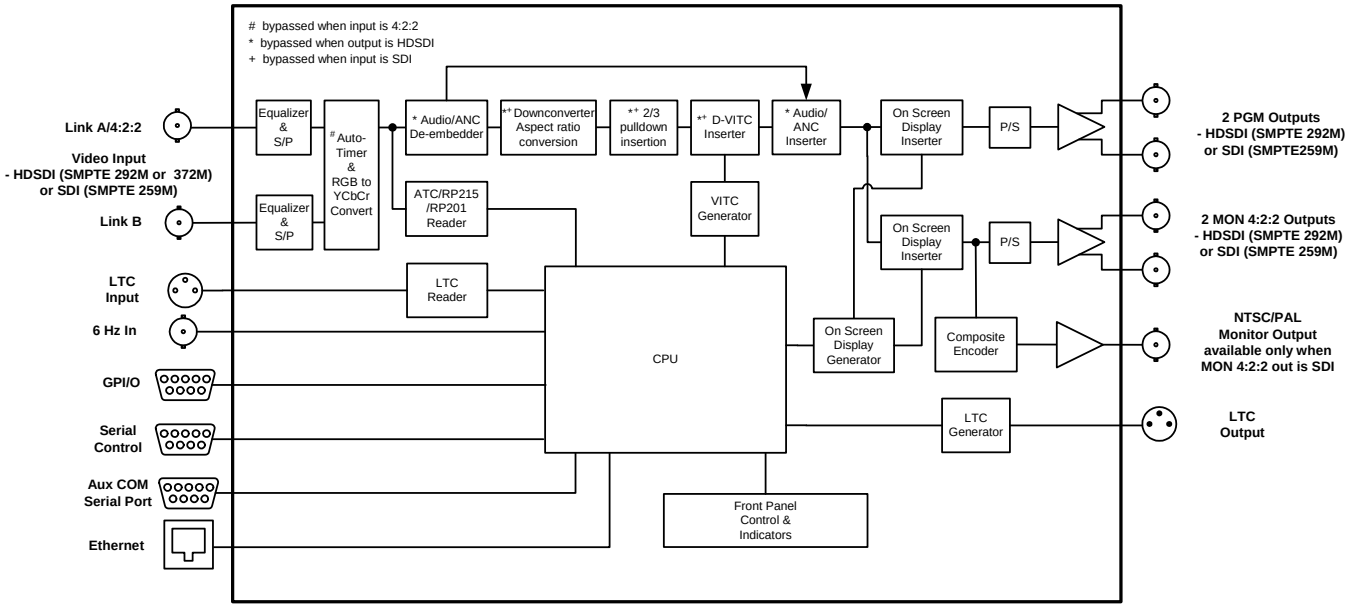


Figure 1-1: Block Diagram

1.1. HOW TO USE THIS MANUAL

This manual is organized into six chapters: Overview, Installation, Front Panel Operation, Configuring using KeyLog Tracker™, System Parameters, and Technical Description. This chapter contains a quick summary of the features and a glossary to define concepts and terms used throughout the remainder of the manual.

Chapter 2 provides a detailed description of the rear panel connectors, and how the unit should be connected into your system.

Chapter 3 provides a detailed description of the operation of the Afterburner using the front panel controls, starting with an overview of the pushbuttons and panel indicators. It includes a complete description of the On screen menu system.

Chapter 4 provides a detailed description of the operation of the Afterburner using the KeyLog Tracker™ software. It includes details on installing and connecting the KeyLog TRACKER™ software and detailed discussion of how to operate the Afterburner in conjunction with Film Footage encoders used in creating telecine masters.

Chapter 5 provides a discussion of how the default operation of the Production Afterburner can be changed using System Parameters. The system parameters can affect the system timing through the Production Afterburner, placement of characters on the raster, 2:3 cadence control, functions of parallel inputs and outputs, to name a few.

Chapter 6 provides the specifications, instructions on how to update the firmware in the unit and other technical issues.

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important safety related operating and maintenance (servicing) instructions in the literature accompanying the product.

This symbol is intended to alert the user to important operating instructions.

1.2. 2:3 PULLDOWN CREATION FROM 24P VIDEO

When an input video feed of 1080p/23.98sF is fed to the HD Afterburner, it inserts extra fields to create a 2:3 pulldown of the picture on the downconverted output resulting in a 525i/59.94 output. Determination of the output sequence of the fields is determined from a 6 Hz input pulse on the HD Afterburner parallel I/O connector, or from ancillary or LTC time code if it is present. Figure 1-2 shows the process of creating the 2:3 pulldown from the progressive video input.

A 6 Hz pulse applied to the HD Afterburner will normally identify the input frame that will become an A frame at the output (called the *A frame candidate*). This 6 Hz pulse must be coincident with the start of an input frame and can be generated using the Evertz 7700SRG-HD Slave Reference Generator module. The output of the *A frame candidate* frame will start four input frames later and will consist of two video fields.

In the absence of a 6 Hz input, video time code derived from film ancillary data present on the video input or LTC on the Video Time code In connector of the HD Afterburner can be used to control the pulldown cadence. Input video frames with frame numbers divisible evenly by 4 will normally identify the input frame that will become an A frame at the output (the *A frame candidate*). The output of the *A frame candidate* frame will start four input frames later and will consist of two video fields.

The 4 input frame (5 output frame) delay through the HD Afterburner ensures that A frames on the output are aligned with A frame candidates on the input. The HDSD9155Q Afterburner automatically reinserts the embedded audio from the input onto the delayed downconverted output, however this delay must be compensated for when calibrating the edit timing for the Standard definition VTR.

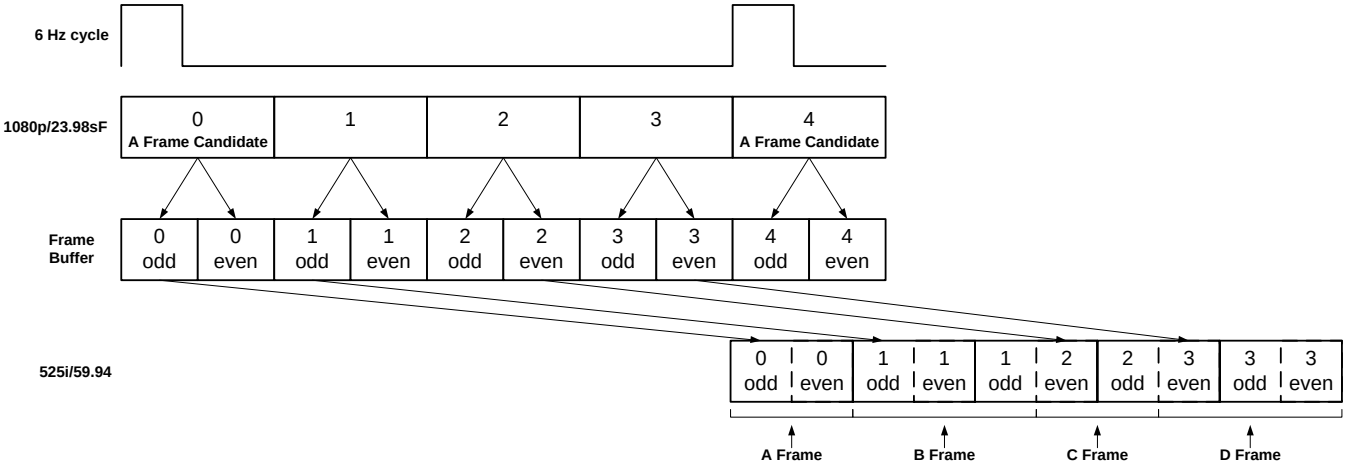


Figure 1-2: 3:2 Pulldown Creation

1.3. DEFINITIONS

2K: A Film image scanned into a computer file at a resolution of 2048 horizontal pixels.

2K: (DaVinci 2K) A colour corrector manufactured by DaVinci Systems. This colour corrector usually is accompanied with a TLC Edit Controller.

2:3 PULLDOWN: Film is typically viewed at 24 frames per second (Fps) while NTSC video is viewed at 30 Fps. To compensate for this difference in the frame rates, telecines use a 2:3 pulldown. Since each video frame is comprised of two video fields, video is viewed at 60 fields per second. Telecines can transfer 24 film frames to 60 video fields (30 video frames). The resulting ratio is 24:60 or 2:5, which means 2 film frames every 5 video fields. The 2:3 implies that one of the film frames is transferred to 2 video fields, the following film frame is transferred to 3 video fields, and so on.

24p: A progressively scanned high definition video format with 1920 pixels and 1080 lines. (See also description sF.)

3 Line VITC: A SMPTE recommended practice (RP201) for encoding Video and audio time code and KeyKode information into the vertical interval of a standard definition video signal. This method of encoding the information is intended for use in post production as a means of conveying the essential address elements that define the film to tape transfer. The encoded data is contained in a block of three consecutive lines of the vertical interval. The first line contains the video time code, the second line contains the KeyKode information, and the third line contains the audio time code.

4K: A Film image scanned into a computer file at a resolution of 4096 horizontal pixels. 4K is considered to be a full-resolution scan of 35mm film.

4 Fsc Composite Digital video as used in D2 and D3 VTRs. Stands for 4 times the Frequency of Subcarrier, which is the sampling rate used.

4:2:2: A commonly used term for a component digital video format. The details of the format are specified in the ITU-R601 standard. The numerals 4:2:2 denote the ratio of the sampling frequencies of the luminance channel to the two colour difference channels. For every four luminance samples, there are two samples of each colour difference channel.

4:4:4 A sampling ratio that has equal amounts of the luminance and both chrominance channels.

16x9 A wide screen television format in which the aspect ratio of the screen is 16 units wide by 9 high as opposed to the 4x3 of normal TV.

A-Frame Edit: A video edit which starts on the first frame of the 5 video frame (4 film frame) sequence created when 24 frame film is transferred to 30 frame video (see 3:2 pulldown). The A-frame is the only frame in the sequence where a film frame is completely reproduced on one complete video frame. Here is the full sequence. (The letters correspond to film frames.) A-frame = video fields 1&2 (AA), B-frame = video fields 1&2&1 (BBB), C-frame = video fields 2&1 (CC), D-frame = video fields 2&1&2 (DDD).

AES: Audio Engineering Society: A professional organisation that recommends standards for the audio industries.

AES-3: See AES/EBU.

AES/EBU: Informal name for a digital audio standard established jointly by the Audio Engineering Society and the European Broadcasting Union organisations. This audio standard is formally known as AES3-1992.

ANALOG: An adjective describing any signal that varies continuously as opposed to a digital signal that contains discrete levels representing digits 0 and 1.

ASPECT RATIO: The ratio of width to height in a picture. Theatre screens generally have an aspect ratio of 1.85 to 1, widescreen TV (16x9) is 1.77 to 1, and normal TV (4x3) is 1.33 to 1.

A-TO-D CONVERTER (ANALOG-TO-DIGITAL): A circuit that uses digital sampling to convert an analog signal into a digital representation of that signal.

BIT: A binary representation of 0 or 1. One of the quantized levels of a pixel.

BIT PARALLEL: Byte-wise transmission of digital video down a multi-conductor cable where each pair of wires carries a single bit. This standard is covered under SMPTE 125M, EBU 3267-E and CCIR 656.

BIT SERIAL: Bit-wise transmission of digital video down a single conductor such as coaxial cable. May also be sent through fiber optics. This standard is covered under SMPTE 259M and CCIR 656.

BIT STREAM: A continuous series of bits transmitted on a line.

BNC: Acronym for British Naval Connector or Bayonet Nut Connector or Bayonet Neill Concelman - a coaxial cable connector used extensively in professional television systems. These connectors have a characteristic impedance of 75 ohms and are standardised by the IEC 169-8 standard.

BYTE: A complete set of quantized levels containing all the bits. Bytes consisting of 8 to 10 bits per sample are typical in digital video systems.

CABLE EQUALIZATION: The process of altering the frequency response of a video amplifier to compensate for high frequency losses in coaxial cable.

CCIR: International Radio Consultative Committee: An international standards committee. (This organisation is now known as ITU.)

CCIR-601: (This document now known as ITU-R601).

CCIR-656: (This document now known as ITU-R656).

CLIFF EFFECT: (also referred to as the 'digital cliff') This is a phenomenon found in digital video systems that describes the sudden deterioration of picture quality due to a large number of bit errors, often caused by excessive cable lengths. The digital signal will be perfect even though one of its signal parameters is approaching or passing the specified limits. At a given moment however, the parameter will reach a point where the data can no longer be interpreted correctly, and the picture will be totally unrecognisable.

COMPONENT ANALOG: The non-encoded output of a camera, video tape recorder, etc., consisting of the three primary colour signals: red, green, and blue (RGB) that together convey all necessary picture information. In some component video formats these three components have been translated into a luminance signal and two colour difference signals, for example Y, B-Y, R-Y.

COMPONENT DIGITAL: A digital representation of a component analogue signal set, most often Y, B-Y, R-Y. The encoding parameters are specified by CCIR-601. CCIR-656 and SMPTE 125M specify the parallel interface.

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

COMPOSITE DIGITAL: A digitally encoded video signal, such as NTSC or PAL video that includes horizontal and vertical synchronizing information.

D1: A component digital video recording format that uses data conforming to the CCIR-601 standard. Records on 19 mm magnetic tape. (Often used incorrectly to refer to component digital video.)

D2: A composite digital video recording format that uses data conforming to SMPTE 244M. Records on 19 mm magnetic tape. (Often used incorrectly to refer to composite digital video.)

D3: A composite digital video recording format that uses data conforming to SMPTE 244M. Records on 1/2" magnetic tape.

D5: A component digital video recording format that uses data conforming to the ITU-R601 standard. Records on 1/2" magnetic tape.

HD-D5: A component digital video recording format that uses data conforming to the ITU-R709 standard. Records on 1/2" magnetic tape.

D-VITC: Digital Vertical Interval Time Code. A digitised version of SMPTE 12M-1 VITC standardised by SMPTE 266M that is used on 4:2:2 standard definition serial digital signals. See also SMPTE 12M-1

DARS (Digital Audio Reference Signal) A reference signal conforming to the format and electrical specification of the AES3-1992 standard, but often has only the preamble active. This signal is used for synchronization in digital audio studio applications. The recommended practice AES11-1997 gives further information on the use of a DARS reference.

dB - A symbol indicating that a measurement is made using a logarithmic scale similar to that of the decibel (see below) in that a difference of 10 dB- corresponds to a factor of 10. In each case, the actual measurement is compared to a fixed reference level r and the "decibel" value is defined to be 10 log10(a/r). Many units of this kind have been used and only a few of the more common ones are mentioned in the next entries. In each case the dB symbol is followed by a second symbol identifying the specific measurement. Often the two symbols are not separated (as in "dBA"), but the Audio Engineering Society recommends that a space be used (as in "dB A").

dB FS Abbreviation for "decibels full scale," a unit of power as measured by a digital device. A digital measurement has a maximum value M depending on the number of bits used. If the actual power measurement is p, the dB FS value displayed is 20·log10(p/M) dB FS. Since p cannot exceed M, this reading is always negative.

dB m, dB W Logarithmic units of power used in electronics. These units measure power in decibels above the reference level of 1 milliwatt in the case of dB m and 1 watt in the case of dB W. A power of n watts equals 10 log n dB W; conversely, a power of p dB W equals 10(p/10) watts. The same formulas link dB m to milliwatts. An increase of 10 dB m or 10 dB W represents a 10-fold increase in power. Since 1 watt = 1000 milliwatts, 0 dB W = 30 dB m.

dB u A logarithmic unit of power, similar to dB m but computed from voltage measurements. The reference level is 0.775 volts, the voltage which generates a power of 1 milliwatt across a circuit having an impedance of 600 ohms. A voltage of V volts corresponds to a power of 20·log10(V/0.775) dB u.

decibel (dB) A customary logarithmic measure most commonly used (in various ways) for measuring sound. The human ear is capable of detecting an enormous range of sound intensities. Furthermore, our perception is not linear. Experiment shows that when humans

perceive one sound to be twice as loud as another, in fact the louder sound is about ten times as intense as the fainter one. For this reason, sound is measured on logarithmic scales. Informally, if one sound is 1 bel (10 decibels) "louder" than another, this means the louder sound is 10 times louder than the fainter one. A difference of 20 decibels corresponds to an increase of 10 x 10 or 100 times in intensity. The beginning of the scale, 0 decibels, can be set in different ways, depending on exactly which aspect of sound is being measured. See also dB- (above).

DROP FRAME: A method of adjusting the nominal 30 frame per second counting rate of SMPTE 12M timecode to the actual counting rate of approximately 29.97 frames per second – a difference of 1 part in 1001. This correction drops 108 frames per hour by skipping frame counts 0 and 1 at the beginning of each minute, except minutes 0, 10, 20, 30, 40 and 50.

EBU (European Broadcasting Union) An organisation of European broadcasters that among other activities provides technical recommendations for the 625/50 line television systems.

EBU TECH 3267-E: The EBU recommendation for the parallel interface of 625 line digital video signal. This is a revision of the earlier EBU Tech 3246-E standard, which was in turn derived from CCIR-601.

EDH Error Detection and Handling (EDH) is defined in SMPTE RP-165 as a method of determining when bit errors have occurred along the digital video path. According to RP-165, two error detection checkwords are used, one for active picture samples, and the other on a full field of samples. Three sets of flags are used to convey information regarding detected errors, to facilitate identification of faulty equipment or cabling. One set of flags is associated with each checkword, and the third is used to evaluate ancillary data integrity. The checkwords and flags are combined into a special error detection data packet that is included as ancillary data in the serial digital signal.

EDGE NUMBER: The manufacturers of motion picture film stock print a frame identifying number along the edge of the film, during the manufacturing process. These numbers, also known as KEY NUMBERS, occur at one foot, or half-foot intervals, hence they have also become known as footage numbers. The film frames between the edge numbers are identified by interpolation from one edge number to the next. (Also see KeyKode)

Traditionally, these numbers have been only human-readable. The task of properly identifying the correct number is somewhat tedious, and prone to error, so much care must be taken in establishing the reference frame's number.

GEN LOCK: In order to derive the 6 Hz relationship between 23.98 Fps and 29.97 Fps frame boundaries, and to ensure that the time code to 6 Hz relationship is fixed, an NTSC colour black video reference must be supplied to the Film Metadata Encoder. Normally, the gen lock signal is the colour black system reference to which the 24p tri-level sync generator is gen locked. The gen lock reference is only necessary when the system video type is 1080p/23.98sF.

EMBEDDED AUDIO: Digital audio is multiplexed onto a serial digital video data stream according to the SMPTE 272M (standard definition) or SMPTE 299M (high definition) standards.

HANC: Horizontal Ancillary Data. Ancillary data recorded into the horizontal blanking portion (from EAV to SAV) of all lines a serial digital signal. Examples of data stored in this area includes SMPTE 272M and 299M Embedded audio, 12M-2 Ancillary Time Code.

HDSDI: High Definition Serial Digital Interface - a standardised interface for transmitting high definition digital television signals using a coaxial cable in serial form. Often used informally to refer to the 4:2:2 sampled high definition serial digital television signals as specified in SMPTE 292M.

INK NUMBER: An identifying number is stamped along the edge of the work print and the associated magnetic audio stock. These numbers, also known as ACMADE NUMBERS, occur at one foot intervals; hence they have also become known as footage numbers. The film frames between the edge numbers are identified by interpolation from one edge number to the next.

These Ink Numbers are typically used to keep the picture and sound in sync throughout the work print conforming process.

ITU: The United Nations regulatory body governing all forms of communications. ITU-R (previously CCIR) regulates the radio frequency spectrum, while ITU-T (previously CCITT) deals with the telecommunications standards.

ITU-R BT470: An international standard for the PAL composite analogue television system.

ITU-R601: An international standard for component digital television from which was derived SMPTE 125M and EBU 3246-E standards. ITUR-601 defines the sampling systems, matrix values and filter characteristics for both Y, B-Y, R-Y and RGB component digital television signals. This document was formerly known as CCIR-601.

ITU-R656: The physical parallel and serial interconnect scheme for ITU-R601. ITU-R656 defines the parallel connector pinout as well as the blanking, sync and multiplexing schemes used in both parallel and serial interfaces. It reflects definitions found in EBU Tech 3267 (for 625 line systems) and SMPTE 125M (parallel 525 line systems) and SMPTE 259M (serial 525 line systems). This document was formerly known as CCIR-656.

ITU-R709: An international standard for High definition component digital television from which was derived SMPTE 274M and SMPTE 296M standards. ITU-R709 defines the sampling systems, matrix values and filter characteristics for Y, B-Y, R-Y and RGB component digital television signals.

JAM SYNC: Refers to the operation of slaving the generator to data coming from the reader. Jam sync should be used when dubbing time code from one tape to another, as the quality of the time code signal deteriorates with each generation, and will become unusable after the third generation.

In the jam sync mode, the generator and reader times are compared with each other during each frame, automatically compensating for the decoding offsets. If for any reason they are not equal, the jam is bypassed, and the next frame number is substituted by the generator. If the number of consecutive jam bypass errors exceeds 5, the last valid reader time is jammed into the generator again. In the absence of valid reader data within the last 5 frames, the generator continues to increment normally until valid reader code resumes. At this time it will be re-jammed to the reader, thus repairing large dropouts on the reader tape.

KEYKODE: Machine readable bar-coded edge numbers introduced by Eastman Kodak in 1988, and subsequently standardised for all film manufacturers by the Society of Motion Picture and Television Engineers as SMPTE 254M (35mm), SMPTE 271M (16mm), SMPTE 270M (65mm – 80 perf repetition) and SMPTE 313M (65mm – 120 perf repetition). AGFA refers to it as BAR Code, and FUJI as MR Code. For the sake of consistency throughout this manual we shall refer to it as KeyKode.

KEY INFO: (also called KeyKode Prefix) The part of the KeyKode number that does not fit into the user bits of time code. The Key Info data normally consists of the film manufacturer ID, the film emulsion letter, and the first six KeyKode digits.

LETTERBOX: Placing a wide screen image on a conventional TV by placing black bands at the top and bottom of the screen.

LTC: (Linear Timecode or Longitudinal Timecode) This time and address control signal standardised by SMPTE 12M-1 has been in widespread use in the professional video and audio industries since 1975. It is typically written on a timecode or address track of a video recorder and provides an individual frame number for each video frame recorded. LTC is also commonly used to distribute time of day information to wall clocks, automation systems and other devices throughout a television facility. In regions of the world using the NTSC or similar non-integer (1/1.001) frame rates, LTC locked to the video frame rate does not maintain accurate time and must be corrected regularly when it is used convey time of day information. (See **DROP FRAME.**)

NTSC: National Television Standards Committee established the television and video standard in use in the United States, Canada, Japan and several other countries. NTSC video consists of 525 horizontal lines at a field rate of approximately 60 fields per second. (Two fields equal one complete Frame). Only 487 of these lines are used for picture. The rest are used for sync or extra information such as VITC and Closed Captioning.

PAL: Phase Alternating Line. The television and video standard in use in most of Europe. Consists of 625 horizontal lines at a field rate of 50 fields per second. (Two fields equal one complete Frame). Only 576 of these lines are used for picture. The rest are used for sync or extra information such as VITC and Teletext.

PIXEL: The smallest distinguishable and resolvable area in a video image. A single point on the screen. In digital video, a single sample of the picture. Derived from the words *picture element*.

PREFIX: The edge numbers are usually composed of a group of digits that remain constant throughout the length of the roll, and a count number, which increments every foot or half foot. The constant numbers, are referred to as the prefix. The count numbers are referred to as the footage number.

RESOLUTION: The number of bits (four, eight, ten, etc.) determines the resolution of the signal. Eight bits is the minimum resolution for broadcast television signals.

4 bits = a resolution of 1 in 16.
8 bits = a resolution of 1 in 256.
10 bits = a resolution of 1 in 1024.

RP 168: The SMPTE Recommended Practice for the definition of the vertical interval switching point for synchronous video switching. This recommended practice also defines a default alignment between standard definition and high definition synchronizing pulse signals.

RP 188: The SMPTE Recommended Practice for transmitting time code in the ancillary data space of serial digital television signals. This document was replaced by SMPTE 12M-2 in 2007. See SMPTE 12M-2

RP201: The SMPTE recommended practice for encoding film transfer information into standard definition video signals (see 3 Line VITC).

RP215: The SMPTE recommended practice for encoding film transfer information into vertical ancillary data space for high definition video signals (VANC).

SERIAL DIGITAL (SDI): (Serial Digital Interface) A standardised interface for transmitting digital television signals using a coaxial cable in serial form. Often used informally to refer to the 4:2:2 sampled standard definition serial digital television signals as specified in SMPTE 259M.

SMPTE (Society of Motion Picture and Television Engineers): A professional organisation that recommends standards for the film and television industries.

SMPTE 12M-1: The SMPTE standard for Time and address code. Formerly known as SMPTE 12M, SMPTE12M-1 was revised in 2007 and defines the parameters required for both linear (LTC) and vertical interval (VITC) time codes.

SMPTE 12M-2: The SMPTE standard for transmitting time code in the ancillary data space of serial digital television signals. This document was previously a recommended practice (RP188) and was revised and became a standard in 2007.

SMPTE 125M: The SMPTE standard for bit parallel digital interface for component video signals. SMPTE 125M defines the parameters required to generate and distribute component video signals on a parallel interface.

SMPTE 170M: The SMPTE standard for the NTSC Composite Analogue Television signals.

SMPTE 259M: The SMPTE standard for the serial digital interface for standard definition 10 bit 4:2:2 component and 4Fsc composite interfaces. (Often referred to as SDI.)

SMPTE 276M: The SMPTE standard for transmission of AES digital audio over coaxial cable.

SMPTE 274M: The SMPTE standard for HDTV 1920 x 1080 line scanning and analogue and parallel interfaces for multiple frame rates.

SMPTE 291M: The SMPTE standard for ancillary data packet formatting in serial digital video signals.

SMPTE 292M: The SMPTE standard for 1.5 Gb/s high definition serial digital component interfaces.

SMPTE 296M: The SMPTE standard for bit parallel digital interface for high definition component video signals with an active picture of 720 lines x 1280 pixels.

SMPTE 299M: The SMPTE standard for embedding audio in serial digital high definition (SMPTE 292M) video signals.

SMPTE 372M: The SMPTE standard for dual link 1.5 Gb/s serial digital high definition video interfaces.

TRS: Timing reference signals used in composite digital systems. (It is four words long).

TRS-ID: Abbreviation for "Timing Reference Signal Identification". A reference signal used to maintain timing in composite digital systems. (It is four words long.)

User bits: 32 bits in the time code are user assignable. They typically are used to contain reel numbers, scene and take numbers, or other user-oriented data.

VANC Vertical Ancillary Data. Ancillary data recorded into the active portion (from SAV to EAV) of lines during the vertical blanking region of a serial digital signal. Examples of data stored in this area includes RP215 Film Ancillary Data, SMPTE 334M Closed captions, SMPTE 2016 Active format Descriptor (AFD) and Pan-Scan, RP 2020 Audio Metadata to name a few.

VITC: **(Vertical interval time code)** A digital code used for timing and control purposes on video tape which is recorded in the vertical blanking interval of the standard definition video picture, and is referred to as VITC. Each 90 bit code word is associated with one television field, and consists of 26 time bits, 6 flag bits, 32 user bits, 18 sync bits, and an 8 bit error check (CRC) code. See also SMPTE 12M-1.

CHAPTER 2: INSTALLATION

TABLE OF CONTENTS

Figures

Tables

2. INSTALLATION

2.1. REAR PANEL OVERVIEW

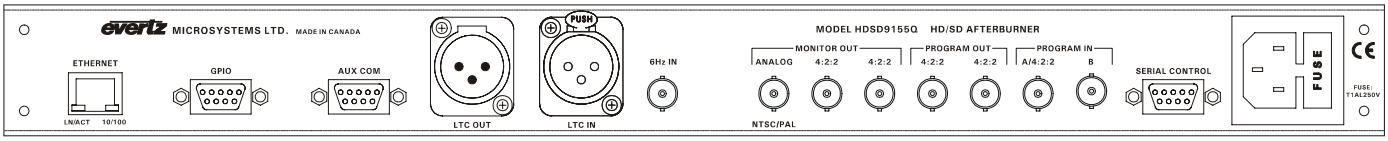


Figure 2-1: HDSD9155Q Rear Panel

Figure 2-1 shows the various connectors on the HDSD9155Q. Sections 2.1.1 to 2.1.7 describe the specific video, time code, and serial port signals that should be connected to the HDSD9155Q.

2.1.1. Video Input Connections

The two **PROGRAM IN** BNC connectors are used to connect the serial component program input video to the Afterburner. The HDSD9155Q is capable of working with the standard definition or high definition video formats as shown in Table 2-6. You must select the input and output operating mode for the Afterburner using KeyLog TRACKER™ or using the *MODE* menu item on the *VIDEO* menu.

A/4:2:2: This BNC is for connecting HDTV or SDTV 4:2:2 serial digital video signals compatible with the SMPTE 259M or SMPTE 292M Standard. If you are using dual link 10-bit 4:4:4 RGB serial digital video signals, compatible with the SMPTE 372M standard, connect the Link A signal to the **A/4:2:2** BNC.

B: This BNC is for connecting the B link of dual link 10-bit 4:4:4 RGB serial digital video signals, compatible with the SMPTE 372M standard. When using 4:2:2 video this input is not used.

2.1.2. Video Output Connections – Native HDTV or SDTV Output Mode

PROGRAM OUT 4:2:2: These two BNCs are used to output serial component video, compatible with the SMPTE 259M or SMPTE 292M standard. When the input video is dual link HDTV 4:4:4 these outputs will output a HDTV 4:2:2 version converted from the dual link 4:4:4 RGB input video. When the input video is HDTV or SDTV 4:2:2 they are a copy of the A/4:2:2 video input. These "clean" outputs can be programmed to have characters burned in continuously or momentarily at the beginning of a take. The characters can be enabled independently of "Monitor" outputs. These outputs are normally connected to a video recorder for creation of presentation quality viewing copies.

MONITOR OUT 4:2:2: These two BNCs are used to output serial component video, compatible with the SMPTE 259M or SMPTE 292M standard. When the input video is dual link HDTV 4:4:4 these outputs will output a HDTV 4:2:2 version converted from the dual link 4:4:4 RGB input video. When the input video is HDTV or SDTV 4:2:2 they are a copy of the A/4:2:2 video input. These "monitor" outputs can be programmed to have characters burned in continuously or momentarily at the beginning of a take. The characters can be enabled independently of "Program" outputs. These outputs are normally connected to a video monitor or video recorder for creation of offline editing copies.

MONITOR OUT ANALOG: In SDTV output mode, this BNC connector is a monitor grade composite analog output derived from the monitor SDI output video and is normally connected to an analog monitor or video recorder for creation of offline editing copies. This BNC connector is not used when the Afterburner is in HD output mode.

2.1.3. Video Output Connections – HD to SD Downconversion Mode

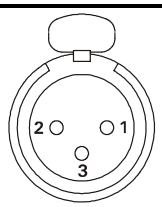
PROGRAM OUT 4:2:2: These two BNC connectors are used to output the downconverted input video as serial component video, compatible with the SMPTE 259M standard. When the input video format is 1080p/23.98sF, 3:2 pulldown will be inserted to generate the 29.97 Fps video output. These "clean" outputs normally have VITC inserted but can be programmed to also have characters. The characters can be enabled independently of the "Monitor" outputs. They are normally connected to a SDI video recorder for creation of presentation quality viewing copies.

MONITOR OUT 4:2:2: These two BNC connectors are used to output the downconverted input video as serial component video, compatible with the SMPTE 259M standard. When the input video format is 1080p/23.98sF, 3:2 pulldown will be inserted to generate the 29.97 Fps video output. These outputs normally have VITC and characters inserted and are normally connected to a SDI monitor or video recorder for creation of offline editing copies. The characters can be enabled independently of the "Program" outputs.

MONITOR OUT ANALOG: This BNC connector is a monitor grade composite analog output derived from the monitor SDI output video and is normally connected to an analog monitor or video recorder for creation of offline editing copies.

2.1.4. Timecode Connections

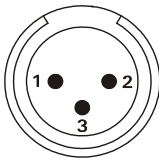
LTC IN: This 3 pin female XLR connector is a balanced input for SMPTE 12M-1 linear timecode. When using an unbalanced input source, the signal should be applied to pin 3 of the **LTC IN** connector. Normally, the unused input (pin 2) should be connected to ground (pin 1).



Pin #	Name	Description
1	GND	Signal Ground
2	LTC IN+	LTC In + input
3	LTC IN-	LTC In - input

Table 2-1: LTC In Pin Definitions

LTC OUT: This 3 pin female XLR connector is a balanced output for SMPTE 12M-1 linear timecode. This LTC is normally connected to a video recorder. Pin 1 of the XLR is ground, and pins 2 and 3 provide a balanced output. When using a VTR with an unbalanced input, the signal should be connected to Pin 3 of the **LTC OUT** XLR. Pin 2 should be left open.

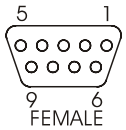


Pin #	Name	Description
1	GND	Signal Ground
2	LTC OUT+	LTC Out + output
3	LTC OUT-	LTC Out - output

Table 2-2: LTC Out Pin Definitions

2.1.5. Serial Port Connections

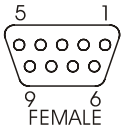
SERIAL CONTROL: A 9 pin female 'D' connector for connection to a computer running the KeyLog Tracker™ software. This port is also used for firmware upgrades to the HDSD9155Q. The pinout of this connector is such that a 'straight-thru' cable can be used to connect to the computer COM port. See section 2.7.1 for a cable wiring diagram and more information on connecting the AFTERBURNER to the computer. See section 6.2 for information on upgrading the firmware.



Pin #	Name	Description
Shield	GND	Chassis ground
1		
2	TxD	RS-232 Transmit Output
3	RxD	RS-232 Receive Input
4		
5	Sig Gnd	RS-232 Signal Ground
6		
7	RTS	RS-232 RTS Input
8	CTS	RS-232 CTS Output
9		

Table 2-3: COM1 Port Pinout

AUX COM: A 9-pin female 'D' connector for connection to a PC terminal program. This port is used to output troubleshooting messages to a PC and should only be used with the instruction of Evertz Factory personnel.

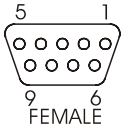


Pin #	Name	Description
1		
2	TxD	RS-232 Transmit Output
3	RxD	RS-232 Receive Input
4		
5	Sig Gnd	RS-232 Signal Ground
6		
7	RTS	RS-232 RTS Input
8	CTS	RS-232 CTS Output
9		

Table 2-4: AUX I/O Port Pinout

2.1.6. GPIO and 6 Hz Reference Connections

GPIO: This 9 pin female 'D' connector contains several general purpose parallel remote control inputs and outputs. Table 2-5 shows the default functions of the Parallel I/O connector pins. The functions of the pins shown are the power up defaults; however, the functions of pins 1, 4, 5, 8, and 9 may be changed by changing the default system parameter values. See chapter 5 for more information about modifying or changing the functions of the I/O connector pins by changing system parameters using the KeyLog Tracker™ software.



Pin #	Name	Description
1		Virtual State
2	Reserved	
3	Reserved	
4		Aspect Ratio
5	Vout SEQ	Output Video Sequence (3:2)
6	GND	Ground
7	Reserved	
8	VCGOnOFF	Characters On/Off
9	6 Hz	6 Hz Sequence Out

Table 2-5: Parallel I/O Connector Default Pin Definitions

6 Hz: This BNC connector is used to apply a 6 Hz reference to the Afterburner. The 6 Hz pulse output from the 7750SRG-HD or 5600MSC can be connected directly to this connector. If you are using another source for the 6 Hz pulse make sure that it is a TTL level signal that observes the timing shown in Figure 2-2. In order to use the 6 Hz input as the reference source you will have to select it using the *30 vs 24 Ref* menu item on the *Video* menu. If you are configuring the Afterburner using the KeyLog Tracker™ software you can select the reference source using the *24 Hz Reference* control on the *Video* tab of the configuration screen. (See section 3.4.8)

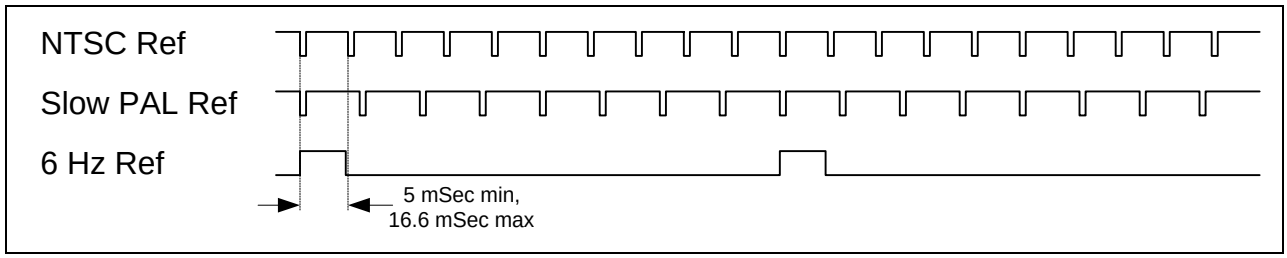


Figure 2-2: 6 Hz Reference Pulse Timing

2.1.7. Ethernet Network Connections

ETHERNET: This RJ-45 connector is an Ethernet port used for high speed FTP firmware upgrades, to connect to a computer running the KeyLog Tracker™ software and to network Afterburner units together. See section 2.5 for information on connecting to an Ethernet network. See section 3.6.3 for information on setting the I/P addresses for the system. See section 2.5 for more information on connecting the Afterburner to KeyLog Tracker™. See section 3.8 for information on networking Afterburners together. See section 6.2 for information on upgrading the firmware.

2.1.8. Power Connections

The Afterburner power supply operates on either 100-115 or 220-240 volts AC at 50 or 60 Hz and automatically senses the input voltage. Power should be applied by connecting a 3-wire grounding type power supply cord to the power entry module on the rear panel. The power cord should be a minimum of 18 AWG wire size; type SVT marked VW-1, maximum 2.5 m in length.

The IEC 320 power entry module combines a standard power inlet connector, two 5 x 20 mm fuse holders and an EMI line filter. See section 6.4.1 for information on changing the fuses.

CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK, GROUNDING OF THE GROUND PIN OF THE MAINS PLUG MUST BE MAINTAINED

2.1.9. Mounting

The Afterburner is equipped with rack mounting angles and fits into a standard 19 inch by 1.75 inch by 17.75 inch (483 mm x 45 mm x 451mm) rack space. The mounting angles may be removed if rack mounting is not desired.

2.2. TYPICAL CONNECTIONS

2.2.1. Afterburner as a Downconverter on the Set

Figure 2-3 shows the typical connections to the HDSD9155Q when it is used on the set. HDSDI video with embedded audio and RP188 timecode from the Camera is fed directly to the PROGRAM IN BNC of the HDSD9155Q. When dual link camera sources are used, both Link A and Link B must be connected. The *Video TM Source* in the *Timecode* inputs menu should be set to *ATC TM.*

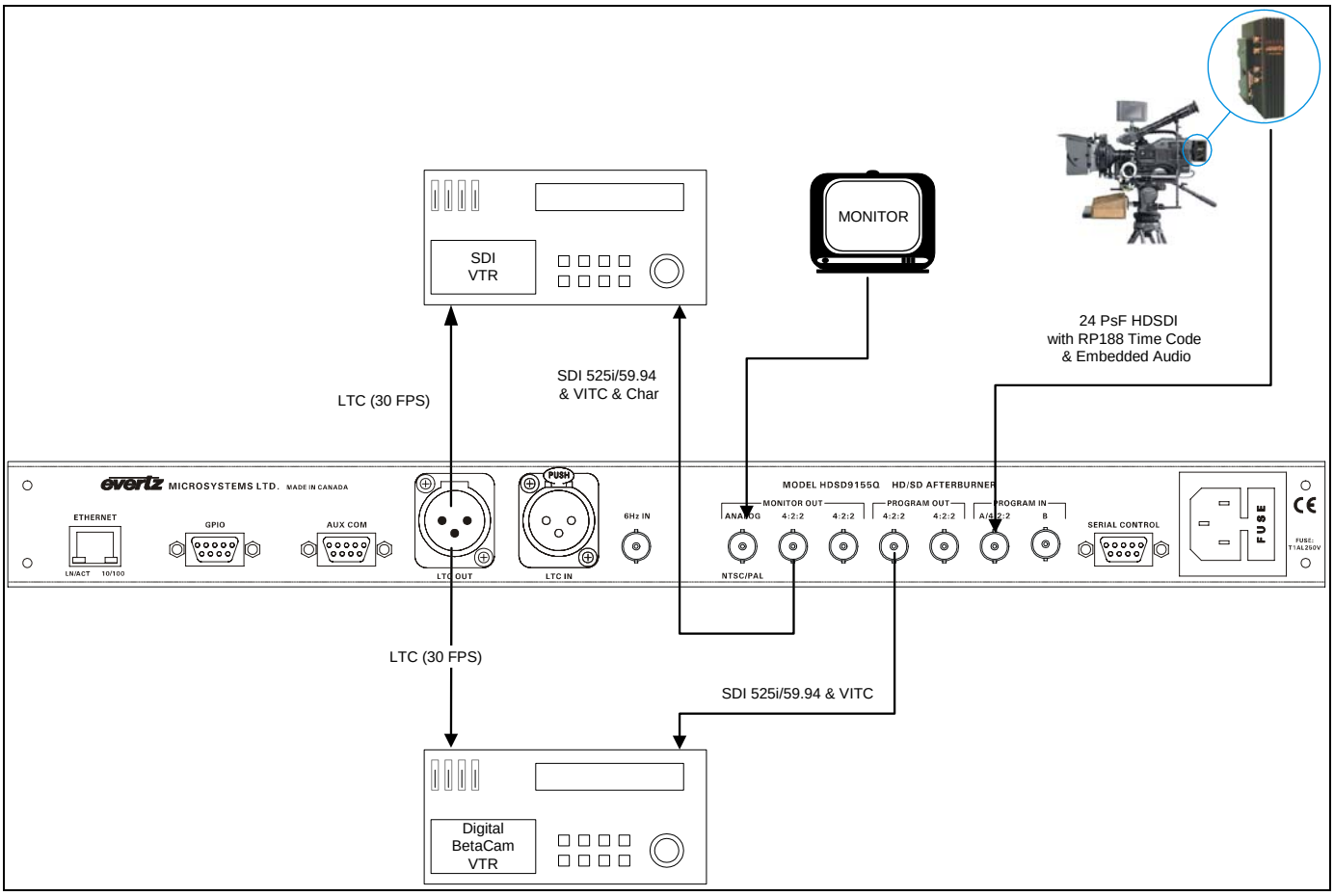


Figure 2-3: Downconversion "On the Set"

2.2.2. Afterburner in the HD Telecine Suite

Figure 2-4 shows the typical connections to the Afterburner when it is used in a HD telecine suite. HDSDI video with embedded audio and RP215 Film Ancillary Data from the HD Film Footage Encoder is fed directly to the PROGRAM IN BNC of the HDSD9155Q. The *Video TM Source* in the *Timecode/Inputs* menu should be set to *Film ANC VTM.*

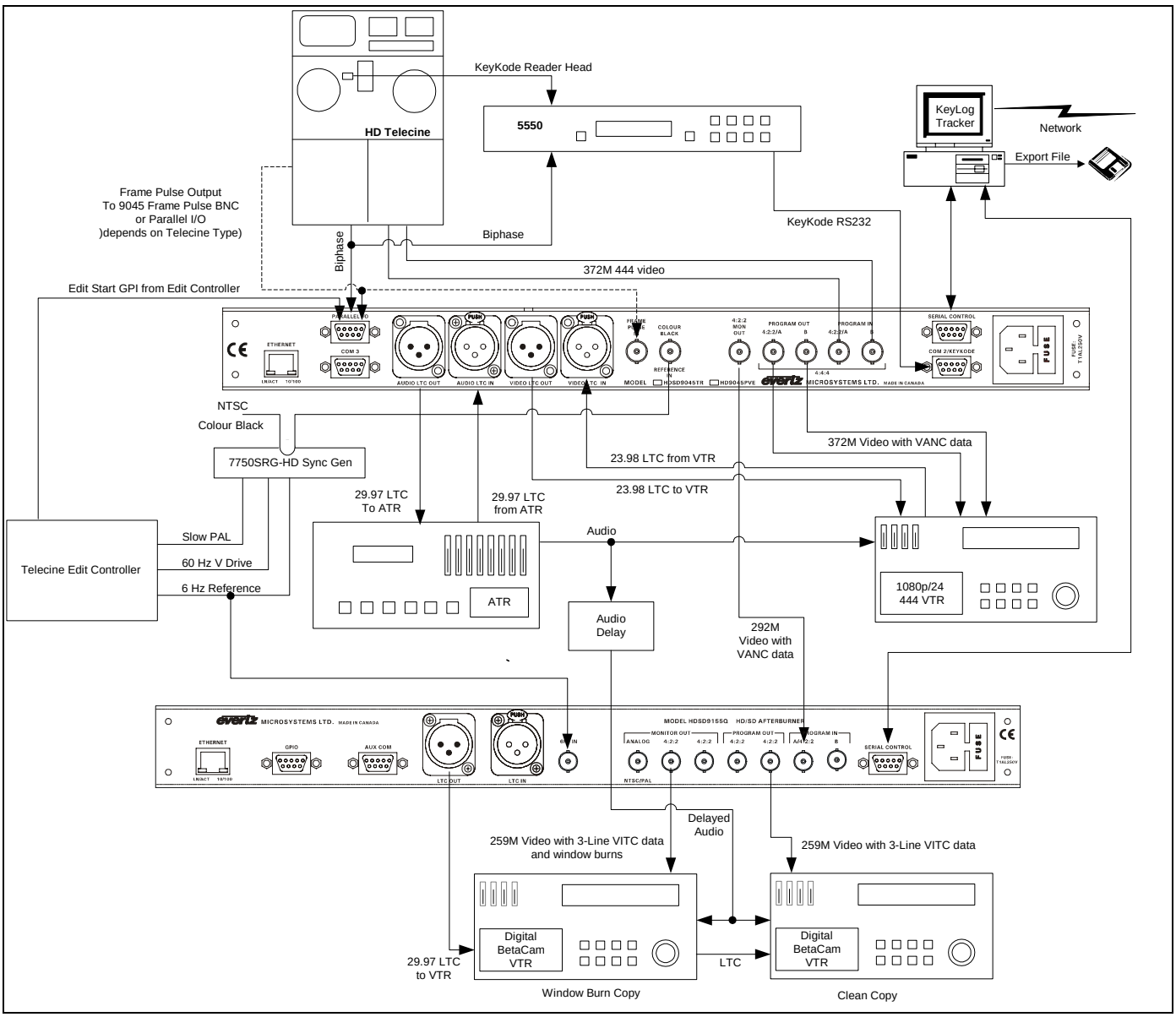


Figure 2-4: Afterburner in the Telecine Suite

The Afterburner decodes the RP215 and makes character burns on the standard definition video. When HD burn-ins are desired, set the Afterburner to one of its HD out modes and connect the output to a HD VTR. When dual link HD sources are connected to the Afterburner, it will output 4:2:2 HD feeds to the VTRs.

The downconverted outputs of the Afterburner are presentation quality. Two Program SDI outputs with VITC are "clean" of burned in characters and may be connected to an SDI VTR to create high quality viewing copies of the program material. There are also two SDI outputs and one composite analog (NTSC or PAL) output with VITC and Burned in characters that may be used for on the set monitoring or editing copies.

The Production Afterburner's LTC output contains 30 Fps timecode that is in time with the downconverted video and should be connected to the LTC input of the record VTR.

2.2.3. HD Input with Character Burns on an HD Output

Figure 2-5 shows the typical connections to the Afterburner when it is used to make character burn-ins on the native HD video. HDSDI video with embedded audio and RP188 timecode from the VTR is fed directly to the PROGRAM IN BNC of the HDSD9155Q. When dual link camera sources are used, both Link A and Link B must be connected. For applications with RP215 Film Ancillary Data, the *Video TM Source* in the *Timecode/Inputs* menu should be set to *Film ANC VTM Data.* For applications where the source contains RP188 Ancillary Timecode, the *Video TM Source* in the *Timecode/Inputs* menu should be set to *ATC TM.*

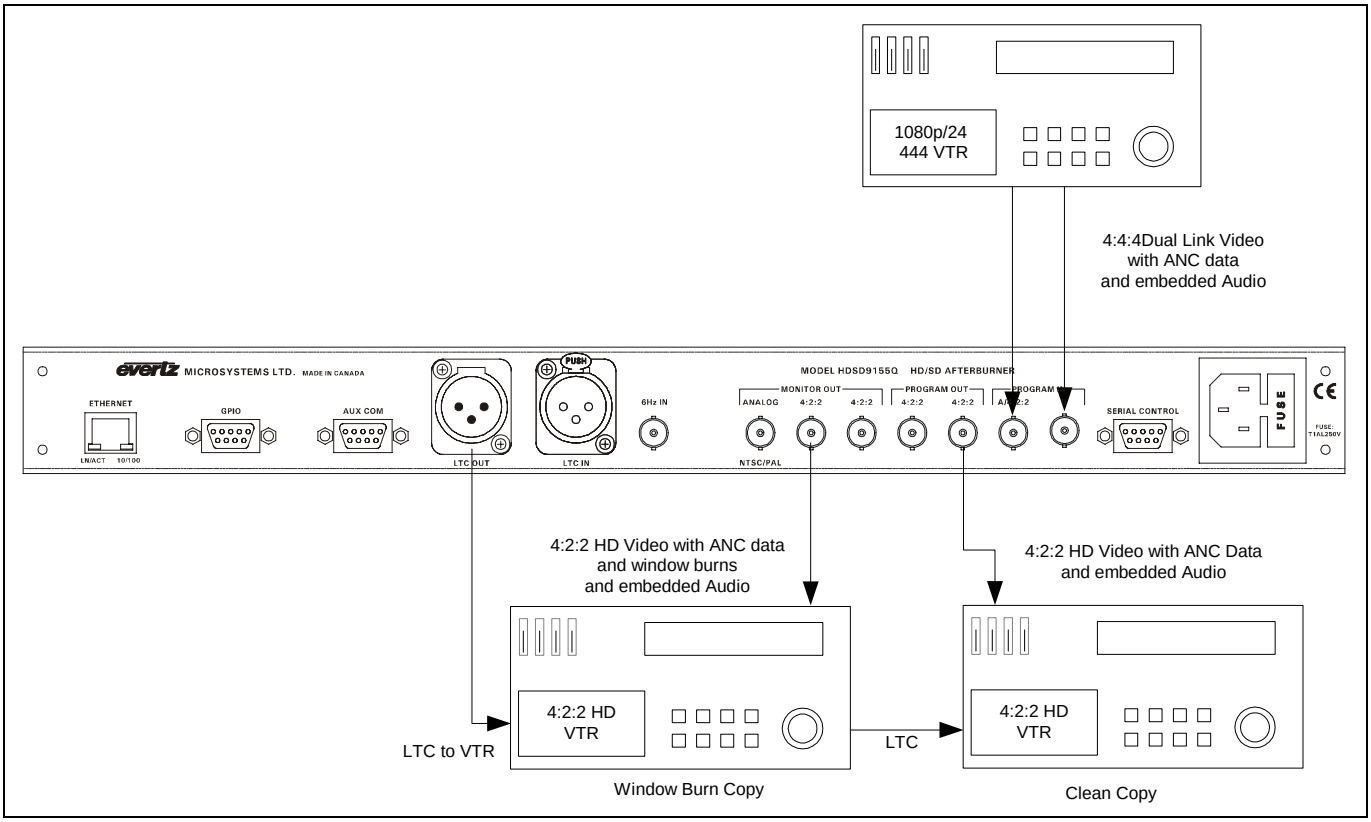


Figure 2-5: HD In – HD Out Typical Configuration

Two PROGRAM HDSDI outputs provide a 4:2:2 version of the HD video input which are generally "clean" of burned in characters but may have characters displayed momentarily at the beginning of a take or continuously. These outputs may be connected to a HDSDI VTR to produce viewing copies of the program material. There are also two 4:2:2 Monitor HDSDI outputs with Burned in characters that may be used for on the set monitoring or editing copies. The composite analog (NTSC or PAL) output is not used in this application and will have no signal on it. If the HD video tape has RP188 ancillary timecode there is no need to connect the LTC from the HD VTR.

2.2.4. SDI Input with Character Burns on an SDI Output

Figure 2-6 shows the typical connections to the Afterburner when it is used to make character burn-ins on the native SDI video. SDI video with embedded audio and 12M-1 VITC or RP201 3-line VITC from the VTR is fed directly to the PROGRAM IN BNC of the HDSD9155Q. The *Video TM Source* and *Video UB Source* menu items in the *Timecode/Inputs* menu should be set to *VITC* and *VITC UB* respectively. For applications with RP201 3-line VITC Film Transfer Data, the *Film Data, Audio TM Source* and *Audio UB Source* menu items should be set to *VITC-2, VITC-3* and *VITC-3 UB* respectively.

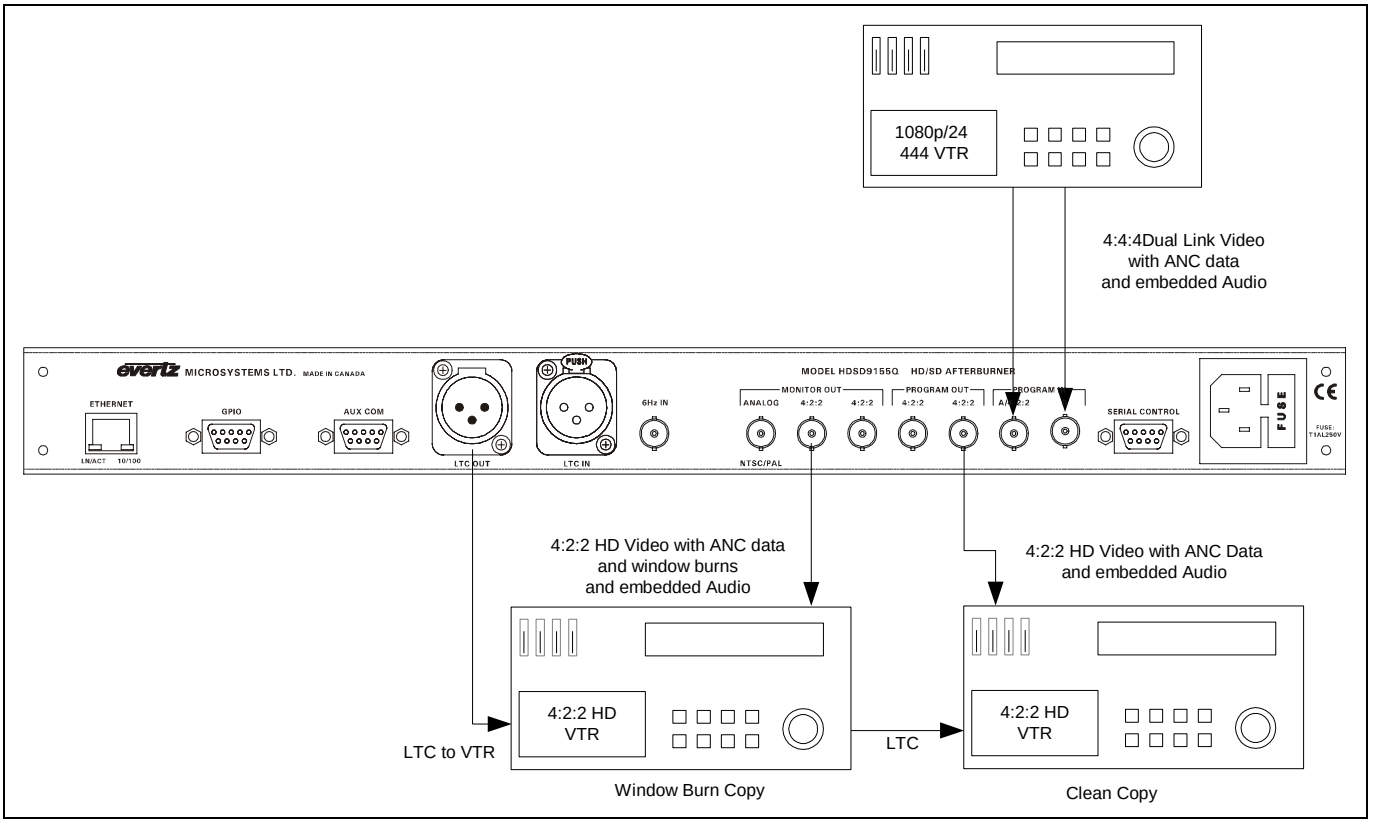


Figure 2-6: SDI In – SDI Out Typical Configuration

Two Program SDI outputs with VITC are "clean" of burned in characters or may have the essential timecodes burned in, and may be connected to an SDI VTR. There are also two SDI outputs and one composite analog (NTSC or PAL) output with both primary and virtual slate burned in characters that may be used for editing copies. If the SDI video tape has vertical interval timecode there is no need to connect the LTC from the VTR.

2.3. CONNECTING THE VIDEO

The Afterburner can be operated in a HD to SDI downconversion mode or in a native HD or SDI output mode. In both HD modes, the Afterburner can be used with single link 4:2:2 YCbCr or dual link 4:4:4 RGB video in the ITU Rec 709 colour space or with extended range dual link 4:4:4 RGB video. In the SDI modes, the Afterburner is used with single link 4:2:2 YCbCr video in the ITU Rec 601 colour space. The selection of operating mode and input video type is done using *Mode* item on the *Video* menu. (See section 3.4.3) If you are configuring the Afterburner using the KeyLog Tracker™ software you can select the input and output video types using the *Input Video Type* and *Output Video Type* controls on the *Video* tab of the configuration screen. (See chapter 4 for information on connecting KeyLog TRACKER™)

2.3.1. Video Input and output

The Afterburner requires that a serial digital video source be connected to the PROGRAM IN BNC connectors. The Afterburner will accept 4:2:2 YCbCr or 4:4:4 RGB high definition digital video or 4:2:2 YCbCr standard definition digital video in the formats shown in Table 2-6. The input video type must be set by the user as detailed above. Once the input video type is set, the Afterburner will auto detect the input video standard by default or may be set to specifically match the incoming video standard using the *Video Standard* menu item on the *Video* menu or using the *Input Video Standard* control on the video tab of the Configuration screen in the KeyLog Tracker™ software. The input program video will normally be connected to the video output of a HD video camera, HD or SD VTR, or to the output of a high definition or standard definition Film Footage Encoder. For 4:2:2 sources connect the input video to the **A/4:2:2** BNC. For 4:4:4 sources, connect the Link A and Link B signals to the **A/4:2:2** and **B** BNCs respectively. Embedded audio from the input video will be transferred to the outputs with the appropriate delays so it remains in time with the picture content.

Common Name	Pixels / Active Lines	Frame Rate	Progressive /Interlace	SMPTE Standard
525i/59.94	720 x 486	29.97 (30/1.001)	I	125M
625i/50	720 x 576	25	I	EBU Tech 3267
1080i/59.94	1920 x 1080	29.97 (30/1.001)	I	274M
1080i/50	1920 x 1080	25	I	274M
1080p/29.97sF	1920 x 1080	29.97 (30/1.001)	P (sF)	274M
1080p/25sF	1920 x 1080	25	P (sF)	274M
1080p/23.98sF	1920 x 1080	23.98 (24/1.001)	P (sF)	274M
720p/59.94	1280 x 720	59.94 (60/1.001)	P	296M

Table 2-6: Video Input Formats

In the native SD output mode, two **MONITOR SDI OUT** outputs provide a copy of the input video with burned in characters that may be used for on the set monitoring or editing copies. The **ANALOG OUT** output is a monitoring quality composite analog video (NTSC or PAL) output with the same information as the **MONITOR SDI OUT** output. The **PROGRAM SDI OUT** outputs normally contain VITC only. (The PROGRAM SDI outputs can be programmed to behave like the **MONITOR SDI OUT** outputs with VITC and characters – see section 3.4.5)

In the native HD output mode, two **MONITOR SDI OUT** outputs provide a 4:2:2 version of the input video with burned in characters which may be used for on the set monitoring or editing copies. The **ANALOG OUT** composite analog (NTSC or PAL) output is not used in this application and will have no signal on it. The two **PROGRAM SDI OUT** outputs provide a 4:2:2 version of the HD video input and are generally "clean" of burned in characters but may have characters displayed momentarily at the beginning of a take

or continuously. These outputs may be connected to a HDSDI VTR to produce viewing copies of the program material. (The **PROGRAM SDI OUT** outputs can be programmed to behave like the **MONITOR SDI OUT** outputs with characters – see section 3.4.5)

In the Downconversion mode the **MONITOR SDI OUT** outputs contain a high quality downconverted copy of the input video with VITC and optional characters keyed in. The **ANALOG OUT** output is a monitoring quality composite analog video (NTSC or PAL) output with the same information as the **MONITOR SDI OUT** output. The **PROGRAM SDI OUT** outputs normally contain VITC only. (The **PROGRAM SDI OUT** outputs can be programmed to behave like the **MONITOR SDI OUT** outputs with VITC and characters – see section 3.4.5) When the input video format is 1080p/23.98sF, 3:2 pulldown will be inserted to generate the 29.97 Fps video output. The cadence of the 3:2 is normally determined by the input video timecode contained on either the LTC or in the RP188 Ancillary timecode packets, but can also be controlled by connecting an external 6 Hz reference pulse to the **6 Hz** BNC connector. (See section 3.4.8 for information on controlling the 3:2 cadence)

2.4. CONNECTING THE VIDEO RECORDER TIMECODE

In SD video input applications, the Video timecode is normally extracted from vertical interval timecode on the incoming SDI video and will be at the same rate as the input video frame rate. In HD video input applications, the Video timecode is normally extracted from RP188 ATC packets on the incoming HD video and will be at the same rate as the input video frame rate. When the Afterburner is operating in the downconversion mode, the output VITC and LTC will be jam synced to this code and will be delayed by the downconverter delay. The *Timecode* menu items of the On Screen Menu system are used to control the use of the Video LTC reader and generator. The *Codes* and *Outputs* tabs of the configuration screens in the KeyLog TRACKER™ software also control the use of the Video LTC reader and generator.

2.4.1. Connecting the Video LTC Reader

Connect the LTC output from your video recorder to the Afterburner's LTC IN XLR connector. When using an unbalanced input to the reader, the signal should be applied to pin 3 of the reader input connector. Normally, the unused input (pin 2) should be connected to ground (pin 1). This input may be used to jam sync the Afterburner's Video LTC generator to the code previously recorded on tape.

2.4.2. Connecting the Video LTC Generator

The generator Video LTC output is available on the LTC OUT XLR connector at the rear panel. The output level of the generator is factory set to 1 volt peak to peak, but may be adjusted using the level adjustment located on the 9000TCIO circuit card.

The generator code output should be connected to the timecode input of your video recorder. Pin 1 of the XLR is ground, and pins 2 and 3 provide a balanced output. When using a machine with an unbalanced input the signal should be connected to Pin 3 of the generator output XLR. Pin 2 should be left open.

The LTC Generator output will be jam synced to either the Video or Audio Timecode source as set by the *LTC Output* menu item. The LTC output will be delayed from the incoming timecode by the same delay as the video. In addition, when the incoming timecode is counting 24 frames per second, and the Afterburner is operating in one of the HD Downconversion modes, the timecode output will be converted to 30 frames per second and will be synchronous with the 2:3 cadence of the output video. The 00 frames of each second of the incoming timecode will be aligned to the 00 frames of the output timecode unless the 2:3 cadence is altered by system parameter class #15 parameter #10. See Chapter 5 for more information about System parameters and how they affect the operation of the Afterburner.

2.5. CONNECTING THE AFTERBURNER TO AN ETHERNET NETWORK

The Afterburner is designed to be used with either 10Base-T (10 Mbps) or 100Base-TX (100 Mbps) also known as *Fast Ethernet*, twisted pair Ethernet cabling systems. When connecting for 10Base-T systems, category 3, 4, or 5 UTP cable as well as EIA/TIA – 568 100Ω STP cable may be used. When connecting for 100Base-TX systems, category 5 UTP cable is required. The cable must be "straight through" with a RJ-45 connector at each end. Make the network connection by plugging one end of the cable into the RJ-45 receptacle of the Afterburner and the other end into a port of the supporting hub. If you are connecting the Afterburner directly to a PC, then you will have to use a crossover cable.

The straight through RJ-45 cable can be purchased or can be constructed using the pinout information in Table 2-7. A colour code wiring table is provided in Table 2-7 for the current RJ 45 standards (AT&T 258A or EIA/TIA 258B colour coding shown). Also refer to the notes following the table for additional wiring guide information.

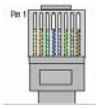
	Pin #	Signal	EIA/TIA 568A	AT&T 258A or EIA/TIA 568B	10BaseT or 100BaseT
Pin 1 	1	Transmit +	White/Green	White/Orange	X
	2	Transmit –	Green/White or White	Orange/White or Orange	X
	3	Receive +	White/Orange	White/Green	X
	4	N/A	Blue/White or Blue	Blue/White or Blue	Not used (required)
	5	N/A	White/Blue	White/Blue	Not used (required)
	6	Receive –	Orange/White or Orange	Green/White or Green	X
	7	N/A	White/Brown	White/Brown	Not used (required)
	8	N/A	Brown/White or Brown	Brown/White or Brown	Not used (required)

Table 2-7. Standard RJ45 Wiring Colour Codes

Note the following cabling information for this wiring guide:

- Only two pairs of wires are used in the 8-pin RJ 45 connector to carry Ethernet signals.
- Even though pins 4, 5, 7 and 8 are not used, it is mandatory that they be present in the cable.
- 10BaseT and 100BaseT use the same pins, a crossover cable made for one will also work with the other.
- Pairs may be solid colours and not have a stripe.
- Category 5 cables must use Category 5 rated connectors.

The maximum cable run between the Afterburner and the supporting hub is 300 ft (90 m). The maximum combined cable runs between any two end points (i.e. Afterburner and PC/laptop via network hub) is 675 feet (205 m).

Devices on the Ethernet network continually monitor the receive data path for activity as a means of checking that the link is working correctly. When the network is idle, the devices also send a link test signal to one another to verify link integrity. The Afterburner rear panel is fitted with two LEDs to monitor the Ethernet connection.

10/100: This amber LED is ON when a 100Base-TX link is last detected. The LED is OFF when a 10Base-T link is last detected (the LINK LED is ON). Upon power-up the LED is OFF as the last detected rate is not known and therefore defaults to the 10Base-T state until rate detection is completed.

LN/ACT: This dual purpose green LED indicates that the Afterburner has established a valid linkage to its hub, and whether the Afterburner is sending or receiving data. This LED will be ON when the Afterburner has established a good link to its supporting hub. This gives you a good indication that the segment is wired correctly. The LED will BLINK when the Afterburner is sending or receiving data. The LED will be OFF if there is no valid connection.

Once you have established a valid link you will have to set up the network I/P address for the Afterburner. See section 3.6.3. When you have set up the I/P addresses you should be able to 'ping' each of the devices in the system. See section 3.8 for more information on networking Afterburners together.

2.6. CONNECTING THE GENERAL PURPOSE INPUTS AND OUTPUTS

The 9 pin GPIO connector on the Afterburner has three programmable general purpose inputs (GPI) and two programmable general purpose outputs (GPO) as shown in Figure 2-7 and Figure 2-8. The schematic representation is in Figure 2-7.

2.6.1. Connecting the General Purpose Inputs

The GPI's are assigned to various functions using the *GPIO* sub-menu in the *UTILITY* menu. (See section 3.6.1.1.) The GPI inputs can be set to activate on high or low levels, or rising or falling edges using the *GPI Trigger* menu items. (See section 3.6.1.2.) When the GPI inputs are set to activate on low levels, this means a ground level on the input will trigger the GPI function. See Figure 2-7 and Figure 2-8.

2.6.2. Connecting the General Purpose Outputs

The Programmable GPOs are assigned to particular functions using the *GPIO* sub-menu in the *UTILITY* menu. (See section 3.6.1.3.) See Figure 2-7 and Figure 2-8.

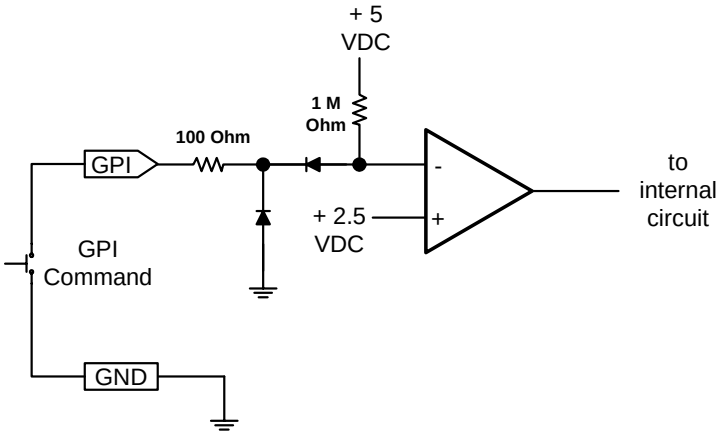


Figure 2-7: General Purpose Input Schematic

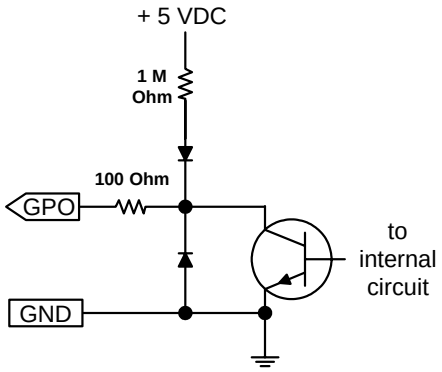


Figure 2-8: General Purpose Output Schematic

2.7. CONNECTING THE AFTERBURNER TO KEYLOG TRACKER™

In film or video dailies application, the Afterburner is usually controlled using version 3.1 or later of the Evertz Film system's Graphical User interface (GUI) KeyLog TRACKER™. The KeyLog TRACKER™ software is used to configure the Afterburner's hardware for different applications. Configuration sets can be saved and recalled to speed set-ups of the hardware. See chapter 4 for more information on installing and using the KeyLog TRACKER™ software

System requirements for running KeyLog TRACKER™:

- CPU: Pentium III
- Operating System: Win 2000, Win XPPro
- RAM: 256 Mb recommended
- mouse
- Video: 2 Mb, 800 x 600 minimum
- CD-ROM
- Hard Disk: 20 Mb Free
- Serial Ports: 2 available
- Ethernet (recommended)
- local or network printer for printing reports (recommended)
- sound card with speakers used to generate system sounds when logging (recommended)

2.7.1. Physical Connections

The HDSD9155Q can be connected to the computer running the KeyLog TRACKER™ software using either an RS-232 serial COM port, or using 10/100 Ethernet. (KeyLog TRACKER™ Version 3.1 or later is required for Ethernet control.) For information on connecting the Ethernet see section 2.5 and 3.8.

2.7.1.1. RS232 Serial Port

A nine pin sub-miniature 'D' connector **(SERIAL CONTROL)** is provided for connection to a computer running the Evertz Film system's Graphical User interface (GUI) KeyLog TRACKER™. This serial port provides a bi-directional RS-232-C data link at 57,600 baud.

In order to connect the HDSD9155Q to your computer make a cable as shown in Figure 2-9. Use this cable to connect the computer's COM port to the **SERIAL CONTROL** connector on the rear of the

Afterburner. The Afterburner's serial port does not have connections for the DTR, DSR, DCD and RI handshake lines. A standard 9-pin 'straight through' cable may work with some computers if the handshake lines are internally pulled to the active state.

HDSD9155Q End			Computer End	
9 pin D Male	Pin	Belden 9501	Pin	9 pin D Female
TxD	2	———————	2	RxD
RxD	3	———————	3	TxD
Sig Gnd	5	----drain-----	5	Sig Gnd
	7		7	RTS
	8		8	CTS
	4		4	DTR
			1	DCD
	6		6	DSR
	9		9	RI
Frame Gnd	Shield	----drain-----	Shield	Frame Gnd

Figure 2-9: Cable to Connect HDSD9155Q to PC Communications Port

In Film to tape applications where you are encoding KeyKode and other film transfer information in the telecine suite, you may also need to connect the a film footage encoder to a different COM port on the PC using a similar cable as shown in Figure 2-10. Using this method, the KeyLog TRACKER™ software can automatically switch the communications to the appropriate hardware device.

If your PC needs to have additional com ports added, make sure that they are configured so that each com port has its own interrupt.

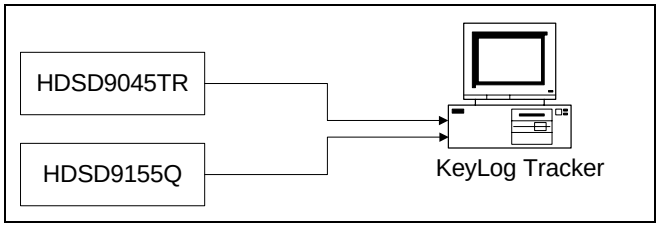


Figure 2-10: Connecting KeyLog TRACKER™ to HDSD9045TR and HDSD9155Q using 2 COM Ports

Once you have connected the HDSD9045TR to the computer using either a serial port or Ethernet connection, you can see the information in chapter 4 for information on installing and running the KeyLog TRACKER™ software.

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CHAPTER 3: HOW TO AFTERBURNER USING THE FRONT PANEL

TABLE OF CONTENTS

Figures

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3. HOW TO OPERATE THE AFTERBURNER USING THE FRONT PANEL

The Afterburner can operate in one of three modes. In the downconversion mode, it takes the input HDTV signals and downconverts them to SDI and analog standard definition signals with VITC and burned-in characters. In the Native HD mode, the Afterburner reads ancillary data from the input HDTV video and makes burned-in characters on native HDTV signal. In both modes, the Afterburner can be used with single link 4:2:2 YCbCr or dual link 4:4:4 RGB video in the ITU Rec. 709 colour space or with extended range dual link 4:4:4 RGB video. In the Native SD mode, the Afterburner reads vertical interval time code from the input SDTV video and makes burned-in characters on native SDTV signal.

The Afterburner can be configured using the front panel controls and On Screen menu or using version 3.0 of the KeyLog Tracker™ software that is distributed with Evertz Film Footage Encoders. This chapter describes the front panel operation. Chapter 4 describes the operation of the Afterburner with the KeyLog Tracker™ software.

3.1. AN OVERVIEW OF KEY AND DISPLAY FUNCTIONS

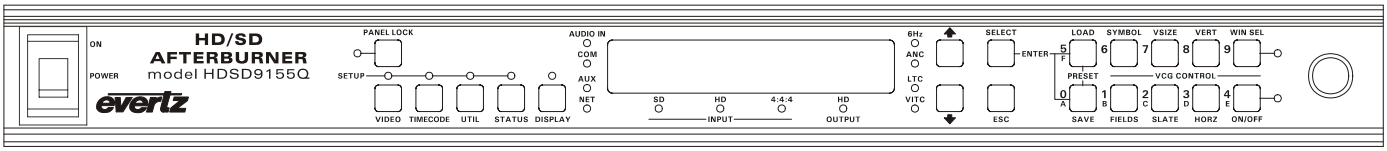

Figure 3-1: Front Panel Layout

The front panel controls consist of a 16 digit alphanumeric display, 20 LED status indicators, a 20 pushbutton keypad, and a shaft encoder knob. The front panel also contains a power switch.

The keypad is used to control the front panel *Setup* menu system, control of the front panel display and to control the character burn-in windows. The shaft encoder knob is used to navigate the front panel menu system and to adjust the position of the on screen character windows.

An On Screen *Setup* menu (also visible on the 16 digit alphanumeric display) provides a quick and simple method of configuring the Afterburner for your application. The remainder of section 3.1 gives an overview of the front panel controls. Sections 3.2 to 3.7 provide detailed information on the specific operations required to control the Afterburner.

3.1.1. The Setup Pushbutton Group

The Setup pushbutton group consists of the **VIDEO, TIMECODE, UTIL, STATUS, SELECT, ESC, ↑, ↓** keys and the **SHAFT ENCODER** knob and is used to navigate the *Setup* menu system.

VIDEO: Enters the top level of the *Video Setup* menu, which is used to configure the video functions of the Afterburner such as Overall mode, video standard, 24 Hz and 720P reference controls, Character window style controls (size, background, etc.), downconverter aspect ratio, etc. See section 3.4.

TIMECODE: Enters the top level of the *Timecode Setup* menu, which is used to configure the timecode input and output functions of the Afterburner. See section 3.5.

UTIL: Enters the top level of the *Utility Setup* menu, which is used to configure miscellaneous functions of the Afterburner such as IP address, System Unit address, GPIO functions, etc. See section 3.6.

STATUS: Enters the top level of the status setup menu which is used to select various status displays such as video status, audio status, tc in status, network status, reference status, etc. See section 3.7.

ESC: When you are in one of the *Setup* menus the **ESC** key is used to move to the next high sub-menu levels.

SELECT: When in one of the *Setup* menus the **SELECT** key is used to move to the next lower sub-menu levels or to select a menu parameter that is to be changed.

↑, ↓, SHAFT ENCODER: When in one of the *Setup* menus, the ↑ and ↓ arrow keys are used to move to various items in the menu system. Turning the **SHAFT ENCODER** knob clockwise (to the right) has the same effect as pressing the ↓ key. Turning the **SHAFT ENCODER** knob counter-clockwise (to the left) has the same effect as pressing the ↑ key (See also section 3.2)

3.1.2. The Display Button Group

The Display pushbutton group consists of the **DISPLAY** key and is used to select the information being displayed on the front panel when you are not in one of the *Setup* menus. After you press the **DISPLAY** key, you can use the **SHAFT ENCODER** knob or press the **DISPLAY** key again to select the *Status* or *Display* items.

DISPLAY: Allows you to quickly view the various times of the readers and generators, as well as other display data. (See section 3.2.1)

3.1.3. Panel Lock Key Functions

PANEL LOCK: Pressing this key while holding down the **SELECT** key will lock the front panel. The LED beside the **PANEL LOCK** key will light up indicating that the front panel keys are disabled. Pressing the **PANEL LOCK** key while holding down the **SELECT** key again will return the front panel keys to their normal functions and the **PANEL LOCK** LED will go Off. The *Auto Panel Lock* menu item on the *GENERAL* menu can be set so that the **PANEL LOCK** function will automatically activate after 10 minutes of inactivity on the front panel.

3.1.4. The Character Window Pushbutton Group

The Character Window pushbutton group consists of the **WIN SEL, ON/OFF, VERT, HORZ, VSIZE SLATE, SYMBOL** and **FIELDS** keys and is used to control the character generator functions.

WIN SEL: Initiates *VCG Window Select Mode* and highlights the Generator time VCG window. Hold the **HORZ** or **VERT** keys down while turning the **SHAFT ENCODER** to move the window, use the **ON/OFF** key to turn the selected window on or off. Rotate the **SHAFT ENCODER** without holding any keys down to select the next window and so on. Press The **WIN SEL** key to return to the normal VCG display mode.

ON/OFF: When not in the *VCG Window Select Mode* turns all the enabled character generator windows ON and OFF (turns off the character keyer). When in the *VCG Window Select Mode* the **ON/OFF** key is used to turn individual windows ON (window will be ON steady) and OFF.

HORZ: When in the *VCG Window Select Mode*, press this key and turn the **SHAFT ENCODER** knob to position the highlighted character window horizontally on the screen. (See also section 3.1.7)

When not in the *VCG Window Select Mode*, press this key and turn the **SHAFT ENCODER** knob to position all the character windows horizontally on the screen.

VERT: When in the *VCG Window Select Mode*, press this key and turn the **SHAFT ENCODER** knob to position the highlighted character window vertically on the screen. (See section 3.1.7)

When not in the *VCG Window Select Mode*, press this key and turn the **SHAFT ENCODER** knob to position all the character windows vertically on the screen.

VSIZE: When in the *VCG Window Select Mode* the **VSIZE** key is used to select whether the selected window will be displayed in normal vertical size or double vertical size. When not in the *VCG Window Select Mode,* this key has no function.

SLATE: When in the *VCG Window Select Mode* the **SLATE** key is used to select whether the selected window will be ON momentarily for the Virtual Slate duration only (window will be flashing), On all the time (window will be ON steady) or OFF all the time (window will remain Off). When not in the *VCG Window Select Mode,* this key has no function.

SYMBOL: When in the *VCG Window Select Mode,* the **SYMBOL** key is used to turn the character window symbol On and Off. When not in the *VCG Window Select Mode,* this key has no function.

FIELDS: When in the *VCG Window Select Mode* the **FIELDS** key is used to turn the timecode display's field character On and Off. For windows that do not have a field character this key has no function. When not in the *VCG Window Select Mode,* this key has no function.

3.1.5. The Preset Button Group (Not functional at time of writing)

The Preset pushbutton group consists of the **SAVE** and **LOAD** keys and, stores and recalls user presets. At the time of writing, this button group is not functional.

3.1.6. An Overview of the SHIFT Key functions

When the ↑ key is held down while another key is pressed, the meanings of some of the keys are modified, gaining quick access to a wider variety of functions. Following is a summary of the shifted key functions.

When you are entering user bits into the Generator, holding the ↑ key while you press the numeric keys 0 through 5 will change their entered values to the hexadecimal values A through F.

↑+VIDEO: Enables the Engineering items on the *VIDEO* menu
↑+TIMECODE: Enables the Engineering items on the *TIMECODE* menu
↑+UTIL: Enables the Engineering items on the *UTIL* menu

3.1.7. Shaft Encoder Knob

The shaft encoder's function is to select various menu items or change the value of a menu item's parameter.

SHAFT ENCODER: When in one of the *Setup* menus, the **SHAFT ENCODER** knob is used to move to various items in the menu system or change a menu item's parameter value. (See also section 3.2)

When in *VCG Window Select Mode*, the **SHAFT ENCODER** knob in conjunction with the **HORZ** and **VERT** keys is used to position the individual character windows. (See section 3.2) When not in *VCG Window Select Mode*, the SHAFT ENCODER knob in conjunction with the HORZ and VERT keys is used to position all the character windows.

When the *DISPLAY* LED is On, the **SHAFT ENCODER** knob is used to select what is displayed on the front panel display.

3.1.8. An Overview of the Status Indicators

There are 14 status indicators located on the front panel that show operational status of the 5600MSC at a glance.

Five status LEDs on the left side give operational status of items related to the menu system. The LEDs will blink when changes to menu items are being saved to the non-volatile memory.

VIDEO: This green LED will be On when you are in the *Video* menu. The front panel display will show various items in the *Video* menu.

TIMEDODE: This green LED will be On when you are in the *Timecode* menu. The front panel display will show various items in the *Timecode* menu.

UTIL: This green LED will be On when you are in the *Utility* menu. The front panel display will show various items in the *Utility* menu.

STATUS: This green LED will be On when you are in the *Status* menu and one of the status displays is being displayed on the On screen display.

DISPLAY: This green LED will be On when you are **not** in one of the *Setup* menus. See section 3.2.1 for a description of the various front panel displays that can be shown on the front panel display.

Four status LEDs underneath the dot matrix display show the input and out video formats of the Afterburner. Three of these LEDs indicate the input format and one LED indicates the output format.

SD INPUT: This green LED indicates that the Afterburner is receiving a 270 Mb/s SDI input signal compatible with SMPTE 259M-C when it is On. When it is blinking it indicates that it is programmed for SDI inputs but is not receiving a valid SDI input signal on the Link A input.

HD INPUT: This green LED indicates that the Afterburner is receiving a single link HDSDI input signal compatible with SMPTE 292M when it is On. When it is blinking it indicates that it is programmed for HDSDI inputs but is not receiving a valid HDSDI input signal on the Link A input.

4:4:4 INPUT: This green LED indicates that the Afterburner is receiving a dual link HDSDI input signal compatible with SMPTE 372M when it is On. When it is blinking it indicates that it is programmed for dual link HDSDI inputs but is not receiving a valid HDSDI input signal on the Link B input.

HD OUTPUT: This green LED indicates that the Afterburner is operating in a *HD In to HD out* mode and that the serial digital outputs are HDSDI signals compatible with SMPTE 292M when it is On. When the LED is Off the Afterburner is operating in a *HD In to SD out* downconversion mode or *SD In to SD out* and that the serial digital outputs are SDI signals compatible with SMPTE 259M-C.

Four status LEDs to the left of the dot matrix display show the presence of embedded audio on the input video as well as network and COM port activity.

AUDIO IN: This green LED will be On when there is embedded audio present on the video input of the Afterburner. This audio will be re-embedded on the serial digital outputs in time with the picture.

COM: This green LED will be On when there is activity on the SERIAL CONTROL port.

AUX: This green LED will be On when there is activity on the AUX COM port.

NET: This green LED will be On when there is activity on the Ethernet port.

Four status LEDs to the right of the dot matrix display show the presence of 6 Hz reference signal and the presence of timecode inputs.

6 Hz: This green LED will be On when there is a valid 6 Hz pulse connected to the 6 Hz reference input BNC.

ANC: This green LED will be On when there is Ancillary Timecode or RP215 Film Ancillary data on the input high definition video input.

LTC: This green LED will be On when there is Linear Timecode connected to the LTC IN XLR connector.

VITC: This green LED will be On when there is VITC present on the standard definition video Input.

Two status LEDs near the shaft encoder knob are used in conjunction with the character window controls.

WIN SEL: This green LED will be On when the Afterburner is in *VCG Window Select Mode*. See section 3.1.4.

ON/OFF: When the Afterburner is in *VCG Window Select Mode*, this green LED indicates that the selected character window is turned On. When the Afterburner is in not in *VCG Window Select Mode*, this green LED indicates that the character keyer is turned On. See section 3.1.4.

3.2. FRONT PANEL DISPLAY FUNCTIONS

3.2.1. Front Panel Displays

The **DISPLAY** key is used to select which data is being displayed in the alphanumeric display. After you press the **DISPLAY** key, you can use the shaft encoder knob to select the various *Display* items. The leftmost characters of the display indicate what is being displayed as follows:

`VTM: 12:34:56.00`	Video Timecode
`VUB: 12 34 56 78`	Video Timecode User Bits
`ATM: 12:34:56.00`	Audio Timecode
`AUB: 12 34 56 78`	Audio Timecode User Bits
`RLTM:12:34:56.00`	LTC Reader Time
`RLUB:12 34 56 78`	LTC Reader User Bits
`OLTM:12:34:56.00`	LTC Output Time
`OLUB:12 34 56 78`	LTC Output User Bits
`GTM: 12:34:56.00`	Timecode generator Time
`GUB: 12 34 56 78`	Timecode generator User Bits
`VOF: 00:00:00:00`	Video Timecode offset from LTC Reader Time
`AOF: 00:00:00:00`	Audio Timecode offset from LTC Reader Time
`SYSTEM ID: 1`	System ID
`123.456.789.123`	System IP Address
`IVa:1080p/23.98SF`	Input video Standard ('a' indicates auto video standard detect)
`OV:1080p/23.98SF`	Output video Standard

3.2.1.1. Special Front Panel Indicators

The following special indicators are used between the hours, minutes, seconds and frames digits of the front panel time display to identify non-drop frame and drop frame code when the timecode is counting at 29.97 frames per second.

Non Drop Frame	Colon (:)
Drop Frame	Period (;)

3.2.2. Setting the Generator Time

The Afterburner contains a free running timecode generator that you can use to output on the LTC output. You can set the generator time using the following procedure. Press the **DISPLAY** key and turn the **SHAFT ENCODER** knob to display the generator time if it is not already displayed. The display prompt will show `GTM` when generator time is being displayed. The **ENTER (SELECT)** and **ESC** keys are used in conjunction with the numeric keys to set the generator time.

If the Afterburner is under the control of KeyLog Tracker, you will get a message on the Tracker screen that the Afterburner is in Local Mode when the Afterburner is in Data Entry Mode.

Press the **ENTER** key to recall the last time that you entered into the generator. The display prompt at the left of the display will blink while data entry mode is active, and the dual functioned keys are now changed to their numeric values. If you want to re-enter this time press the **ENTER** key to complete the data entry into the generator time.

Pressing any numeric key will clear the previous value and place the new value into the numeric display, starting at the right. Un-entered digits are assumed to be zero, hence leading zero digits are not required.

When the required number of digits are entered, then press the **ENTER** key to complete the data entry into the generator time.

Attempts to enter too many digits, or make illegal entries, i.e. 65 minutes, will result in the display returning to the last valid time entry made. Re-enter the correct value and press the **ENTER** key. Pressing the **ESC** key will cancel the data entry mode without changing any data.

The numeric keys return to their normal display functions when the data entry has been completed by pressing **ENTER** or cancelled by pressing the **ESC** key. The display prompt will return to its steady On state when data entry mode has been completed.

Numeric entry mode must be terminated (GTM will be On steady) before any of the front panel keys will resume normal operation and before you can resume control from the KeyLog Tracker software.

3.2.3. Setting the Generator User Bits

You can set the generator user bits using the following procedure. Press the **DISPLAY** key and turn the **SHAFT ENCODER** knob to display the generator user bits if they are not already displayed. The display prompt will show GUB when user bits are displayed. The **ENTER (SELECT)** and **ESC** keys are used in conjunction with the numeric keys to set the generator user bits.

If the Afterburner is under the control of KeyLog Tracker, you will get a message on the Tracker screen that the Afterburner is in Local Mode when the Afterburner is in Data Entry Mode.

Press the **ENTER** key to recall the last User Bits that you entered into the generator. The display prompt at the left of the display will blink while data entry mode is active, and the dual functioned keys are now changed to their numeric values. If you want to re-enter these User Bits press the **ENTER** key to complete the data entry into the generator.

Pressing any numeric key will clear the previous value and place the new value into the numeric display, starting at the right. Pressing the ↑ key and the numeric keys 0 to 5 will enter the corresponding hexadecimal values A to F. Un-entered digits are assumed to be zero. When the required number of digits are entered, press the **ENTER** key to complete the data entry into the generator User Bits.

Attempts to enter too many digits will result in the display being blanked. Re-enter the correct value and press the **ENTER** key. Pressing the **ESC** key will cancel the data entry mode without changing any data.

The numeric keys return to their normal functions when the data entry has been completed by pressing the **ENTER** key or cancelled by pressing the **ESC** key. The display prompt will return to its steady On state when data entry mode has been completed.

Numeric entry mode must be terminated (GUB will be On steady) before any of the front panel keys will resume normal operation and before you can resume control from the KeyLog Tracker software.

3.2.4. Entering an Offset Value for the LTC Reader

When the Video or Audio time codes are assigned to come from the LTC reader input, two offset registers allow you to apply a continuous offset between the logical Video or Audio time codes and the LTC reader time. The value entered into the respective Offset register will be added to the LTC reader time before it is

entered into the Video or Audio timecode register. Positive offset values other than 00:00:00:00 indicate that the generator is leading the reader. Negative offset values indicate that the generator is lagging behind the reader. To access the *VOF* or *AOF* registers press the **DISPLAY** buttons one or more times or press the **DISPLAY** button and turn the **SHAFT ENCODER** until the display prompt shows V0F or A0F. You will be prompted first to enter the sign of the offset. Use the **SHAFT ENCODER** or arrow keys (↑, ↓) to select the desired sign and press the **SELECT** key. If the offset is a small number you can use the **SHAFT ENCODER** to set the offset. Turn the **SHAFT ENCODER** clockwise to increase the offset value and counter clockwise to decrease the offset value. If it rolls through 00:00:00:00 the sign will change accordingly. If the offset value you need to enter is a larger number, follow the procedure for entering the Generator time outlined in section 3.2.2.

3.3. AN OVERVIEW OF THE SETUP MENU SYSTEM

HDTV videotapes acquired directly in field video recorders have the original field timecode recorded as linear timecode (LTC) on an address track and as ancillary timecode (ATC) recorded in the HANC area of the digital video bitstream. The Afterburner can be used to downconvert video from material acquired by HDTV video cameras and makes burn-in windows and new 30 Fps timecode that is in sync with the downconverted video. The original 24 Fps timecode numbers can be placed in the user bits of the VITC and displayed as a burned-in window. The 2:3 cadence can be controlled from the ancillary timecode or from the LTC. The Afterburner can also be used to recover the ATC and make burn-in windows directly into the native HDTV digital video bitstream. When it is in SDTV mode the Afterburner can also be used to recover the 12M-1 VITC or RP201 3-line VITC and make burn-in windows directly into the SDTV digital video bitstream.

The Afterburner can be operated in 'Film Mode' to burn in film transfer metadata from material transferred from film using an Evertz Film Footage Encoder. In 'HDTV Film Mode' the Afterburner reads the film transfer metadata inserted in the VANC data space of the HD video according to RP215. When used as a downconverter, the 2:3 cadence is controlled from the pulldown flags in the RP215 VANC data. The Afterburner can also be used to recover the RP215 VANC data and make burn-in windows directly into the native HDTV digital video bitstream. In 'SDTV Film Mode' the Afterburner reads the film transfer metadata inserted in the 3-line VITC on the SD video according to RP201.

The key to the operational flexibility of the Afterburner lies in the *Setup* menu system which provides a quick, intuitive method of configuring the Afterburner, guiding you to the correct setup for your application. The Afterburner can also be controlled using the KeyLog TRACKER™ software (see chapter 4)

The *Setup* menu uses an On Screen Display (OSD) available on the *MON* video outputs and optionally on the *PGM* video outputs. Abbreviated copies of the menu items can also be viewed on the 16 digit front panel alphanumeric display if a video monitor is not available.

The *Setup* menu system consists of four main menus with several choices for each menu item. The **VIDEO, TIMECODE, UTIL** and **STATUS** keys allow you to quickly go to the top of each of the four main menus while the **SELECT, ESC,** arrow keys (↑, ↓) and **SHAFT ENCODER** knob are used to navigate the menu. See Figure 3-2 for an overview of the Setup menus

To enter the *VIDEO SETUP* menu, press the **VIDEO** key. Similarly you can enter the *TIMECODE SETUP,* the *UTIL SETUP* or *STATUS* menus by pressing the **TIMECODE, UTIL** and **STATUS** keys respectively. This will bring you to the respective main menu where you can use the arrow keys (↑, ↓) or turn the **SHAFT ENCODER** knob to move up and down the list of available top level menu items. In the OSD, a right pointing arrow (➢) moves up and down the left hand side of the menu items to indicate which item you are currently choosing. (The green LED above the respective button will illuminate to indicate that you are in one of the Setup menus.) This top level menu item is also displayed in UPPER CASE on the front panel. Once you have chosen the desired top level menu item, press the **SELECT** key to enter the next lower menu level. Sub-menu items are shown in Title Case (The First Letter Of Each Word Is Capitalized) on the front panel.

The top of the menu screen will show the *System Ident* followed by a colon. The *System Ident* is a letter or number allowing the user to distinguish multiple Afterburners. The *System Ident* is set in the *UTIL SETUP* menu. See section 3.6.4 for information on setting the *System Ident*. If the Afterburner is networked and is a member of a network control gang then the word *GANGED* will also show at the top of the menu screens to remind you that changing this Afterburner's menu settings will also affect other members of the gang. See section 3.6.6 for more information on ganged menu operation.

On all menus, there are two extra items: *Back* and *Exit*. Selecting *Back* is equivalent to pressing the **ESC** key at any time in the menu, and will take you to the previous menu (the one that was used to get into the current menu). Selecting *Exit* will exit the *Setup* menu and return the display to its normal operating mode. On the main menu, *BACK* and *EXIT* will both take you to the normal operating mode.

Once in a sub-menu, there may be another menu layer, or there may be a list of parameters to adjust. If there is another set of menu options, use the arrow keys (↑, ↓) or turn the **SHAFT ENCODER** knob to display the desired item within the sub-menu and press the **SELECT** key to get to the bottom of the menu tree where a list of parameters to be adjusted will be shown with an = symbol on the OSD and in Sentence case on the front panel. (The first letter of the parameter is capitalized.)

To adjust any parameter, use the arrow keys (↑, ↓) or turn the **SHAFT ENCODER** knob to move up or down to the desired parameter and press the **SELECT** key. On the OSD, a left pointing arrow (➢) will show on the right hand side of the line indicating that you can now adjust the parameter. On the front panel the active value for the parameter will be shown in Sentence case. Using the arrow keys (↑, ↓) or **SHAFT ENCODER** knob, adjust the parameter to its desired value.

When you are adjusting a parameter value you must accept the changes using the SELECT button before you can access other menu items. The ESC button does not do anything when you are adjusting the parameter values.

If the Afterburner is under the control of KeyLog Tracker, you will get a message on the Tracker screen that the Afterburner is in Local Mode when you are adjusting a parameter value at the bottom of the menu tree (when the arrow is at the right side of the OSD) Press the SELECT button to accept the changes and remove the Afterburner from Local Mode.

- VIDEO
  - WINDOWS
    - Slate Mode
    - Slate Duration
    - Style
    - Character size
    - H Adj
    - V Adj
  - SD OUTPUTS
    - Aspect
    - Scaler Mode
    - Scaler H Filter
    - Scaler V Filter
    - SD Out Pull-24Fr
    - NTSC Setup
    - Test Gen
  - Mode
  - Auto Video Detect
  - Video
  - Program Out
  - No Video In
  - 720P Ref
  - 30 vs 24 Ref
  - 30 vs 24 Offset
- TIMECODE
  - INPUTS
    - Video TM
    - Video UB
    - Audio TM
    - Audio UB
    - Film Data
    - Tag Data
    - ANC Source
    - ANC Fallback
  - Time Format
  - Video TC drop Frame
  - Audio TC Drop Frame
  - ANC Dump
  - LTC OUTPUT
    - LTC TM
    - LTC UB
    - Rate
    - Offset
  - VITC OUTPUT
    - VITC Mode
    - VITC Enable
    - Line 1 TM
    - Line 1 UB
    - Line 2
    - Line 3 TM
    - Line 3 UB
    - 525 VITC Lines
    - 625 VITC Lines
- UTILITY
  - GPIO
    - GPI1 Func
    - GPI1 Trigger
    - GPI2 Func
    - GPI2 Trigger
    - GPI3 Func
    - GPI3 Trigger
    - GPO1 Func
    - GPO2 Func
  - Ports
    - COM 1 Func
    - COM 1 Baud
    - Tracker Comm
    - COM 2 Func
    - COM 2 Baud
    - ANC Dump
  - System IP
    - Common 1st Octet
    - Common 2nd Octet
    - Common 3rd Octet
    - 9155 Address
    - Gateway Address
    - Syslog
    - Syslog Address
    - Tracker Address
    - Tracker Port
    - Announce
    - Mask 1st Octet
    - Mask 2nd Octet
    - Mask 3rd Octet
    - Mask 4th Octet
  - System Ident
  - Auto Panel Lock
  - Control Gang
  - Configuration
    - Send Config to
    - Get Config From
  - Reset Most
  - Factory Reset
- STATUS
  - Video Status
    - Mode
    - Auto Video
    - SDI Video In
    - B Link In
    - Locked For
    - SDI Video Out
    - Video Delay
  - Reference Status
    - Ref Source
    - Ref Status
    - Locked For
    - 6Hz Input
    - 6Hz BNC Phase
    - Ref in
    - VTC In
    - VTC Out
    - Pull Type
    - ATC In
    - ATC Ph
    - Int 6 Hz
  - Misc Status
    - Fan 1
    - Fan 2
    - GPI 1
    - GPI 2
    - GPI 3
    - GPI On
  - Audio Status
    - Group 1
    - Group 1 Activity
    - Group 2
    - Group 2 Activity
    - Group 3
    - Group 3 Activity
    - Group 4
    - Group 4 Activity
  - TC In Status
    - LTC In Status
    - ANC In Status
    - VITC1 In Status
    - VITC2 In Status
    - VITC3 In status
  - COM Status
    - Ctl Com Status
    - Com 2 Status
  - Network Status
    - Net Neighbours
    - HDSD9155Q
    - Gateway
    - Syslog
    - Tracker
    - Tracker Port
    - Subnet
    - MAC
    - Net Link
    - Net Activity
    - Net Speed
  - Versions
    - Version
    - H/W Rev
    - FPGA Rev
    - NETIF Version

Figure 3-2: On Screen Menu Overview

When you have selected the desired parameter value, press the **SELECT** key to make that value the active value. On the OSD, the arrow will move back to the left side of the parameter list. On the Front Panel the menu item will be shown again. Press the **ESC** key move back up to the next higher menu level. You can select other parameters from that sub-menu by using the use the arrow keys (↑, ↓) or turning the **SHAFT ENCODER** knob, followed by the **SELECT** key. Alternately you can move up one more menu level by pressing the **ESC** key.

Sections 3.4 to 3.7 provide detailed descriptions of the *Setup* menus. The tables in these sections are arranged in an indented structure to indicate the path taken to reach the control.

3.4. CONFIGURING THE VIDEO CONTROLS

The *VIDEO* menu items are used to configure parameters associated with the input and output video standards, the character windows, and is also used to configure the downconverter aspect ratio and pulldown. The chart below shows the items available in the *VIDEO* menu. Sections 3.4.1 to 3.4.8 provide detailed information about each menu item.

Windows	Menu to configure the character window parameters
SD Outputs	Menu used to configure the Downconverter
Mode	Configures the type of video inputs and outputs
Auto Video Detect	Selects the auto video standard detect mode
Video	Selects the video input and output standards when Auto Video Detect is disabled
Program Out	Selects whether the (HD)SDI Program outputs will have Characters burned in or not
No Video In	Selects the output behaviour when there is no input video
720P Ref	Selects the reference source when the video input is 720P
30 vs 24 Ref	Selects the reference source when the video picture content is 24 frames per second and the output video is 30 frames per second nominal
30 vs 24 Offset	Sets an offset from the frame selected by the 30 vs 24 Reference

3.4.1. Configuring the On Screen Character Burn-In Windows

The *Windows* sub-menu items are used to configure parameters that affect all the character burn-in windows. The chart below shows the items available in the *Windows* sub-menu. Sections 3.4.1.1 to 3.4.1.5 provide detailed information about each menu item. Attributes for the individual character windows (display On or Off, assigned as part of the Virtual Slate, position, vertical size, symbol On or Off, timecode fields On or Off) are controlled using the front panel buttons in the Character Window pushbutton group. See section 3.1.4.

Slate Mode	Sets the operating mode of the Virtual Slate
Slate Duration	Sets the duration that the Virtual Slate will be displayed after its trigger
Style	Sets the foreground and background style
Size	Sets the character font vertical size
H Adj	Fine adjustment of the horizontal position of the character raster
V Adj	Fine adjustment of the vertical position of the character raster
Error Indicators	Sets the mode for displaying asterisk (*) in the character windows indicating counting errors

3.4.1.1. Selecting the Virtual Slate Mode

VIDEO
Windows
Slate Mode
Off
Event Start
GPI Duration
Manual GPI
Between GPI

Character windows can be configured to be always Off, always On, or On only when the Virtual Slate is active. This control selects the trigger to turn on the Virtual Slate. (See 3.5.1.5 for more info about Events).
Virtual Slate is Off
Virtual Slate comes on for a duration at an Event Start.
Virtual Slate is comes on for a duration at a GPI closure.
Virtual Slate is turned On and Off by a GPI closure (see 3.6.1 for GPI info).
Virtual Slate is On while GPI is inactive and stays On for a duration after GPI becomes active.

3.4.1.2. Setting the Virtual Slate Duration

VIDEO
Windows
Slate Duration
0
0 to 999

This control sets the duration (in frames) the Virtual Slate will be on after its start trigger in *Event Start, Between GPI* and *GPI Duration* modes. (See section 3.4.1.1).

3.4.1.3. Selecting the Character Font Style

VIDEO
Windows
Style

White no bkgnd	White characters keyed in with no background
White on transp	White characters keyed in with transparent grey background
White on pale	White characters keyed in with pale grey background
White on dark	White characters keyed in with dark grey background
White on black	White characters keyed in with solid black background
Black no bkgnd	Black characters keyed in with no background
Black on transp	Black characters keyed in with transparent white background
Black on pale	Black characters keyed in with pale white background
Black on dark	Black characters keyed in with dark white background
Black on white	Black characters keyed in with solid white background
LGrey no bkgnd	*Light Grey* characters keyed in with no background
LGrey on transp	*Light Grey* characters keyed in with transparent grey background
LGrey on pale	*Light Grey* characters keyed in with pale grey background
LGrey on dark	*Light Grey* characters keyed in with dark grey background
LGrey on black	*Light Grey* characters keyed in with solid black background
Grey no bkgnd	*Grey* characters keyed in with no background
Grey on transp	*Grey* characters keyed in with transparent grey background
Grey on pale	*Grey* characters keyed in with pale grey background
Grey on dark	*Grey* characters keyed in with dark grey background
Grey on black	*Grey* characters keyed in with solid black background

This control selects the foreground and background style of the character windows.

3.4.1.4. Selecting the Character Font Vertical Size

VIDEO
Windows
Character Size
Tiny
Small

This control selects the vertical size of the character font. (You can double the height of this font for some windows using the **VSIZE** key. (See section 3.1.4)
Tiny size is 8 lines in SD
Small Size is 16 lines in SD

3.4.1.5. Adjusting the Character Raster Position

VIDEO
Windows
H Adj
0
-16 to +16

This control adjusts the horizontal position (in pixels) of the character raster.

VIDEO
Windows
V Adj
0
-5 to +5

This control adjusts the vertical position (in lines) of the character raster.

3.4.1.6. Controlling the Error Indcator Display Modes

The *Error Indicators* sub-menu items are used to configure parameters that affect whether error indicator asterisks (*) will be displayed in the dynamic (e.g. video time, audio time, keykode, etc.) character burn-in windows. The chart below shows the items available in the *Error Indicators* sub-menu. Sections 3.4.1.1 to 3.4.1.5 provide detailed information about each menu item.

*Win * Mode*	Sets the overall error indicator mode
*Orig VTC **	Selects whether the error indicator mode applies to the Original Video Timecode window
*VTC **	Selects whether the error indicator mode applies to the Output Video Timecode window
*ATC **	Selects whether the error indicator mode applies to the Audio Timecode window
*KK **	Selects whether the error indicator mode applies to the KeyKode window
*INK **	Selects whether the error indicator mode applies to the Ink number window

3.4.1.6.1. Controlling the Error Indcator Display Modes

VIDEO
- *Windows*
  - *Error indicators*
    - *Win * Mode*
      - *Always*
      - *Off*
      - *Range*
      - *GPI*
      - *TAG*
      - *Scene*

This control selects overall mode for the dynamic character window error indicators. This control affects each window that is set to *Modal*. Windows that are set to *Always* will have the error indicators ON all the time

Always indicate errors
Never indicate errors
Indicate small errors (<= 2 sec, or <= 3 feet), ignore big jumps
GPI active will ignore errors
Tag change will ignore errors
Scene/Take change will ignore errors

3.4.1.6.2. Controlling the Error Indcator in the Individual Windows

There are five controls that set the whether the *Win * Mode* will apply to the Original Video TC, Video TC, Audio TC, KeyKode and Ink number character windows. For the sake of simplicity in the manual only the Video Time Code window control will be described.

VIDEO
- *Windows*
  - *Error indicators*
    - *VTC **
      - *Always*
      - *Modal*

This control selects the mode of error indication for the Video Time Code window. is enabled mode for the dynamic character window error indicators.

Always indicate errors – regardless of setting of *Win * Mode*
Use *Win * Mode* setting to determine error indication display

3.4.1.7. Working with the Debug Character Window

There are three character windows that are used to display various debug information about the operation of the Afterburner. These windows can by used for operational status such as Video Standard. Other information would only be useful to a service technician and would not normally be displayed during operation.

Unlike most of the character windows, you can only select the vertical position of the three debug windows. The Horizontal position function is used to select the contents that will be shown in the debug window. To change the Debug window content, press the **WIN SEL** button. Turn the **SHAFT ENCODER** until the desired debug window name is shown on the front panel. Use the **ON/OFF** button to turn the window On. Press and hold the **VERT** button and turn the **SHAFT ENCODER** to position the window vertically. Press and hold the **HORZ** button and turn the **SHAFT ENCODER** to select what will be displayed in the debug window. As you turn the **SHAFT ENCODER** you will see the names of the various debug window displays shown in the window. See sections 6.3.1 to 6.3.26 for a description of the contents of the debug character windows.

3.4.2. Configuring the Standard Definition Outputs

The *SD Outputs* sub-menu items are used to configure parameters for the Standard Definition Video outputs. These menu items are only available when the *Mode* menu item is set to one of the modes with standard definition outputs. The chart below shows the items available in the *SD Outputs* sub-menu. Sections 3.4.2.1 to 3.4.1.7 provide detailed information about each menu item.

Aspect	Selects the aspect ratio of the downconverter output (HD video inputs)
Scaler Mode	Selects the downconverter scaling mode (HD Video inputs)
Scaler H Filter	Selects the downconverter horizontal filter sharpness (HD Video inputs)
Scaler V Filter	Selects the downconverter vertical filter sharpness (HD Video inputs)
SD Out Pull - 24Fr	Selects the pulldown cadence of the downconverter output (HD video inputs)
NTSC Setup	Sets whether the NTSC Setup pedestal will be on the MON NTSC/PAL video output
Test Gen	Selects the test signal for the internal video test generator

3.4.2.1. Setting the Output Aspect Ratio (HD inputs only)

VIDEO
SD Outputs
SD Aspect Ratio
4:3 Center Crop
4:3 Squeeze
16:9 Letterbox

SDTV monitors are usually 4:3, so there is a need for some simple aspect ratio conversion from the HDTV 16:9 format. With this control, you can set the aspect ratio of the down-converter output.

When set to *4:3 Center Crop*, the left and right sides of the picture are discarded.

When set to *4:3 squeeze*, the picture is compressed horizontally (becomes anamorphic), resulting in tall, thin people. The picture will be stretched again when viewed on a 16:9 standard definition monitor.

When set to *16:9 letterbox*, the whole picture is re-sized to occupy fewer lines. The unused lines at the top and bottom of the picture are left black.

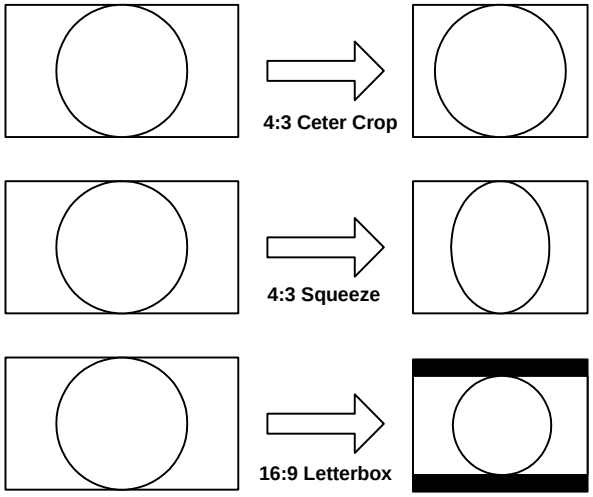

Figure 3-3: Aspect Ratio Conversions

3.4.2.2. Setting the Downconverter Scaler Mode (HD Inputs Only)

VIDEO
SD Outputs
Scaler Mode
Field
E Frame
2:2
2:3
Frame + I

This control determines how the downconverter scaler operates. Different modes may be used depending on the picture content of the high definition video.
Each input field/segment is converted to one output field
Field processing with temporal process
Each input frame is converted to an output frame
Redundant fields of 3:2 pulled video are replaced
Frame processing followed by interlacing (720P only)

3.4.2.3. Setting the Downconverter Scaler Filters (HD inputs only)

VIDEO
SD Outputs
Scaler H Filter
Default
9 Softer
…
9 Sharper

This control sets the sharpness of the scaler horizontal filter.

The default value is suitable for use with most video content.
You can select from a range of sharper or softer filters depending on your preference.

VIDEO
SD Outputs
Scaler V Filter
Default
9 Softer
…
9 Sharper

This control sets the sharpness of the scaler vertical filter.

The default value is suitable for use with most video content.
You can select from a range of sharper or softer filters depending on your preference.

3.4.2.4. Setting the Downconverter 2:3 Pulldown Type (HD inputs only)

VIDEO
SD Outputs
SD Out Pull - 24Fr
2:3:2:3
2:3:3:2

This control sets the pulldown sequence of the down-converter output. The pulldown sequence is required when downconverting 1080p/23.98 video to 525i/59.94.

When set to 2:3:2:3, the normal 2:3:2:3 field picture sequence is used for the downconverter. This sequence, shown in Figure 3-4 below, provides the minimum motion judder, and is suitable for videotape recording.

When set to 2:3:3:2, the two extra fields of the picture sequence are grouped into one video frame. This sequence, shown in Figure 3-5 below, provides some additional motion judder, but facilitates 2:3 pulldown removal while digitizing on some non linear edit stations

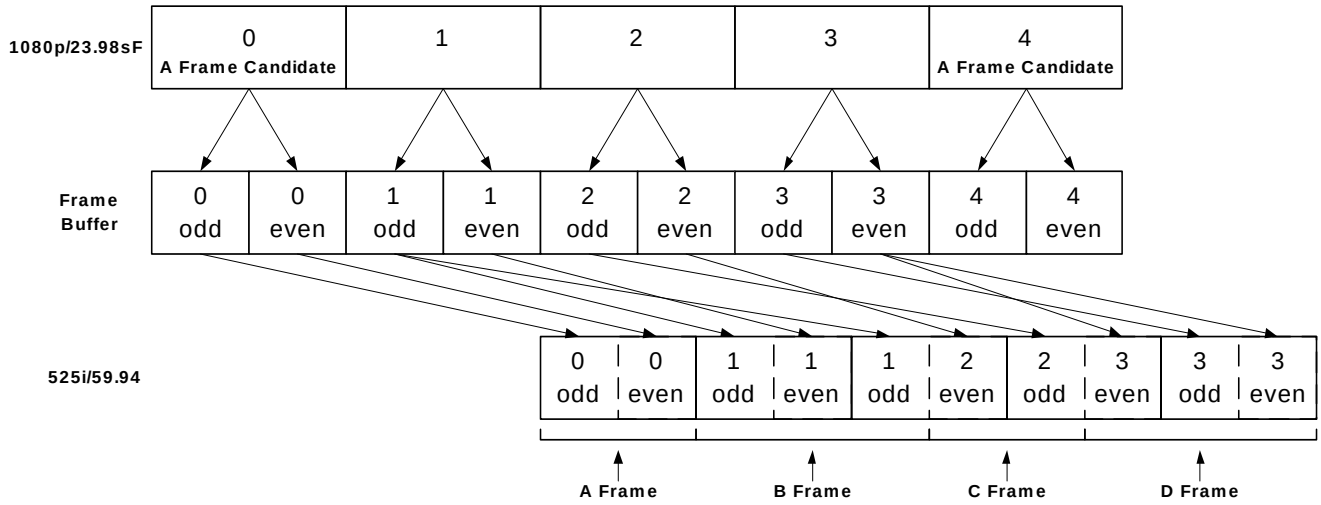

Figure 3-4: 2:3:2:3 Pulldown Sequence – 23.98 Fps Input Video

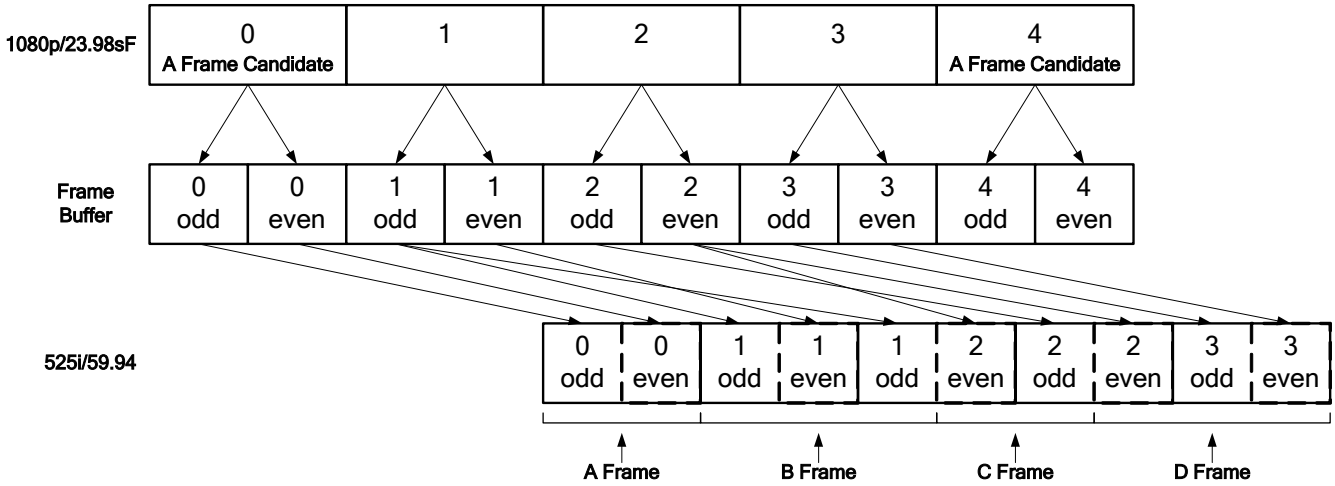

Figure 3-5: 2:3:3:2 Pulldown Sequence – 23.98 Fps Input Video

3.4.2.5. Setting the NTSC Setup Pedestal on the Analog Video Output

VIDEO
SD Outputs
NTSC Setup
Off
On

This control determines how the NTSC Setup Pedestal will be applied on the **ANALOG** video output. The NTSC Setup pedestal should not be present when operating in Japan.

3.4.2.6. Selecting the Video Test Signal

VIDEO
SD Outputs
Test Gen Signal
Off
Bars 100
Bars 75
Luma Ramp
Chroma Ramp
Black
Grey

This control is used to select a test signal that can be output for diagnostic purposes. It should be set to *Off* for normal operation

3.4.3. Setting the Video Operating Mode

VIDEO
Mode
SD In:SD Out
HD In:SD Out
HD In:HD Out
4:4:4 In:SD Out
4:4:4 In:HD Out
444FS In:SD Out
444FS In:HD Out

With this control, you can select the type of video inputs and outputs for the Afterburner.
4:2:2 SD in to SD out
4:2:2 HD in to SD out
4:2:2 HD in to 4:2:2 HD out
4:4:4 HD in to SD out
4:4:4 HD in to 4:2:2 HD out
Full scale 4:4:4 HD in to SD out
Full scale 4:4:4 HD in to 4:2:2 HD out

3.4.4. Selecting the Video Standard

There are two controls that are used to select the input and output video standard for the Afterburner. The output video standard is dependent on the setting of the *Mode* control. See section 3.4.3.

VIDEO
Auto Video Detect
On
Off

With this control, you can select whether the Afterburner will auto-detect the input video standard.

When set to *On,* the Afterburner will auto-detect the input video standard. When the *Mode* control is NOT set for one of the downconversion modes, the output video will be in the same standard as the input video. When the *Mode* control is set for one of the downconversion modes, the Afterburner will also attempt to select the best output video format for the down-converter based on the video input. The Video Standard menu will be greyed-out, but will show the detected video standard from the list shown below.

When set to *Off*, the user must set the video standard using the Video Standard menu item.

When set to *Auto,* the Afterburner cannot distinguish between *1080i/59.94* and *1080p/29.97sF* input video so it will be selected as *1080i/59.94*. Similarly *1080p/25sF* will be selected as *1080i/50*.

VIDEO
Video
525i/59.94
625i/50
1080i/59.94/525i
1080i/50/625i
1080p/23.98sF/525i
720p/59.94/525i
1080i/59.94
1080i/50
1080p/23.98sF
720p/59.94

With this control, you can set the input and output video standard for the Afterburner when the Auto Video Detect menu item is set to Off.
These Video standard combinations are available when the *Mode* control is set for SDTV Inputs and Outputs
525i/59.94 input and output
625i/50 input, and output

These Video standard combinations are available when the *Mode* control is set for HDTV Inputs and SDTV Outputs
1080i/59.94 input, NTSC output - also includes 1080p/29.97sF
1080i/50 input, PAL output- also includes 1080p/25sF
1080p/23.98sF input, NTSC output
720p/59.94 input, NTSC output

These Video standard combinations are available when the *Mode* control is set for HDTV Inputs and Outputs
1080i/59.94 input and output - also includes 1080p/29.97sF
1080i/50 input, and output - also includes 1080p/25sF
1080p/23.98sF input and output
720p/59.94 input and output

When you select one of the 1080 video formats you will also need to set the *24 vs 30 Pulldown Ref* menu item in order to properly determine the correct picture cadence on the downconverted output.

When you select one of the 720p video formats you will also need to set the *720P Pulldown Ref* menu item in order to properly determine the correct picture cadence on the downconverted output.

3.4.5. Selecting the Whether Characters will be Displayed on the Program Video Outputs

VIDEO
Program Out
Clean
Slate
Menus Only
Window On

With this control, you can select whether characters will be displayed on the Program Video Outputs.
Windows and menus never appear
Windows appear only when virtual slate is active. Menus appear when active
Only menus will display
Windows and menus are always on

3.4.6. Selecting the Output Video when there is no Input Video

VIDEO
No Video In
Pass
Blue+char
Blue
Black+char
Black

With this control, you can select the output when there is no video input.

Pass through input signal
Blue screen with message
Blue screen only
Black screen with message
Black screen only

3.4.7. Setting the Reference for the Downconverter Output for 720P Video Inputs Sources

VIDEO
720P Ref
Auto
Video In ATC
LTC

With this control, you can set the frame reference of the downconverter output when the video input is 720p/59.94. In 720P the Afterburner uses this reference source to determine which pair of input video frames to align the downconverted output standard definition frames.

When set to *Auto*, the Afterburner will select ancillary timecode first and if it is not present it will use LTC (if present on the LTC input)

When set to *Video In ATC*, the timecode embedded on the input video is used to align the output video.

When set to *LTC*, the timecode present at the LTC IN XLR is used to align the video.

Note that if the input video is from a source that changes between running and stopped timecode, the picture may break up momentarily each time the timecode starts and stops as the down-converter cadence relocks to the timecode.

3.4.8. Setting the 24 Hz Pulldown Cadence for the Downconverter Output (HD Inputs only)

The Afterburner uses a pulldown sequence (defined by the setting of the *SD Out Pull-24Fr* menu item on the *SD Outputs* menu) when it downconverts 1080p/23.98 video and 1080i/59.94 or 720p/59.94 with 24 frames per second picture content. The Reference determines where the selected sequence will start (i.e. where the A frames are). You can select the reference source using the *30 vs 24 Ref* menu item and you can offset the A frame from the reference using the *30 vs 24 Offset* menu item.

The *6 Hz* setting should be used when you are **switching** the downconverted output live and must have it aligned to other standard definition signals. Feed the 6 Hz reference to all downconverters. If you do not have a 6 Hz reference available then feed a common timecode signal to the LTC input of each Afterburner and use the *LTC* setting. This is the recommended setting when you are using an edit controller to dynamically synchronize the source, such as in a telecine transfer.

The *Freerun* setting should be used when you are using the downconverted output for monitoring purposes only and you are **not recording** the down-converted signal. The picture will remain stable as the source starts and stops.

When set to *ANC*, the ancillary timecode on the HD input will be used to derive the pulldown cadence. If there is RP215 Film Ancillary data then the video timecode values from the Film ANC will be used. When set to *LTC*, the timecode that is connected to the LTC IN XLR will be used to derive the pulldown cadence. These settings may be used when you are **recording** the downconverted output and must have it aligned to the source timecode. Note that the picture may break up momentarily each time the source starts and stops as the downconverter cadence relocks to the timecode.

The priority schemes allow the Afterburner to choose the reference from multiple sources depending on what signals are present and the chosen priority.

VIDEO

30 vs 24 Ref

With this control, you can set the frame reference pulldown sequence of the downconverter output.

6 Hz	6Hz Input signal – BNC or GPI input assigned to 6Hz In
ANC	Ancillary Data Timecode – 00 frame of each second
FILMANC Flg	Film Ancillary Data (RP215) Pulldown flags
LTC	LTC Input – 00 frame of each second
Freerun	Pulldown cadence will freerun
6Hz-LTC-ANC	Priority scheme, 6HZ highest priority
ANC-LTC-6HZ	Priority scheme, ANC highest priority
Other	Custom Priority scheme set by Tracker
6Hz-ANC	Priority scheme, 6HZ highest priority
6Hz-LTC	Priority scheme, 6HZ highest priority
ANC-LTC	Priority scheme, ANC highest priority
ANC-6HZ	Priority scheme, ANC highest priority
LTC-ANC	Priority scheme, LTC highest priority
LTC-6HZ	Priority scheme, LTC highest priority
ANC-6HZ-LTC	Priority scheme, ANC highest priority
6Hz-ANC-LTC	Priority scheme, 6HZ highest priority
LTC-ANC-6HZ	Priority scheme, LTC highest priority
LTC-6HZ-ANC	Priority scheme, LTC highest priority
VITC	VITC input – 00 frame of each second

VIDEO *30 vs 24 Offset* *A* *B* *C* *D* *A-B*	With this control, you can set the type of frame that occurs at the reference point in the pulldown sequence. Reference where A frame candidate is (frame that will become A frame) Reference where B frame candidate is (frame that will become B frame) Reference where C frame candidate is (frame that will become C frame) Reference where D frame candidate is (frame that will become D frame) Alternate methods of forcing B frame at reference. Only available in 2:3 scaler mode.

3.5. CONFIGURING THE CODE INPUTS AND OUTPUTS

The Afterburner has the ability to process input video timecode, audio timecode as well as film KeyKode and Ink numbers for film transfer applications. In addition, the Afterburner will generate RP201 3-line VITC or SMPTE 12M VITC on the downconverted outputs, as well as LTC. Each of these codes are abstracted internally as logical timecode sources and outputs. The *TIMECODE* menu items are used to map the logical inputs to the physical outputs, and to configure other parameters associated with the Afterburner timecode processing. The chart below shows the items available in the *TIMECODE* menu. Sections 3.5.1.1 to 3.5.5 provides detailed information about each menu item.

Inputs	Settings for the Timecode input mapping
LTC Output	Settings for the LTC Output
VITC Output	Settings for the VITC Output (SD outputs only)

3.5.1. Configuring the Timecode Inputs

The *Inputs* sub-menu items are used to map the logical inputs to the physical timecode input sources, (i.e. where does this timecode come from) and configure parameters associated with the input timecodes. The chart below shows the items available in the *Inputs* menu. Sections 3.5.1.1 to 3.5.5 provide detailed information about each menu items.

Video TM	Selects the source of the logical Video Timecode
Video UB	Selects the source of the logical Video user bits
Audio TM	Selects the source of the logical Audio Timecode
Audio UB	Selects the source of the logical Audio user bits
Audio Rate	Selects the rate of the Audio Timecode
Film Data	Selects the source of the logical Film KeyKode and Ink number data
Tag Data	Selects the source of the logical Tag data (used to trigger events for the virtual slate)
ANC Source	Shows the type of Ancillary data being read.
ANC Fallback	Selects whether the video timecode source automatically reverts to LTC when ANC data is not present
Time Format	Sets the style of punctuation for indicating Drop Frame Time code
Video TC Drop Frame	Sets the Drop Frame mode for the Video Time Generator
Audio TC Drop Frame	Sets the Drop Frame mode for the Audio Time Generator

3.5.1.1. Selecting the Source of Video Time and User Bits

TIMECODE
Inputs
Video TM
Film ANC VTM
ATC TM
LTC TM +VOF
VITC TM
Gen TM
Not used

With this control, you can select the source of Video timecode time information. This is the main timecode used in the Afterburner

RP215 Film Ancillary Data Video time (HDTV Video inputs only)
12M-2 (RP188) Ancillary Timecode time (HDTV Video inputs only)
LTC reader time adjusted by value of Video Offset (VOF) register
VITC (or RP201 3-Line VITC line 1) time (SDTV Video inputs only)
Video TC Generator Time
Video Time not being used

TIMECODE
Inputs
Video UB
Film ANC VUB
ATC UB
ATC TM
LTC UB
LTC TM+VOF
VITC UB
Gen UB
Gen TM
Not used

With this control, you can select the source of Video timecode user bits information. This is the user bits associated with the main timecode used in the Afterburner.
RP215 Film Ancillary Data Video user bits (HDTV Video inputs only)
12M-2 (RP188) Ancillary Timecode user bits (HDTV Video inputs only)
12M-2 (RP188) Ancillary Timecode time (HDTV Video inputs only)
LTC reader user bits
LTC reader time compensated by Video TC Offset
VITC (or RP201 3-Line VITC line 1) user bits (SDTV Video inputs only)
Generator user bits
Video TC Generator time
Video UB not being used

3.5.1.2. Selecting the Source of Audio Time and User Bits

TIMECODE	With this control, you can select the source of Audio timecode time information.
Inputs	
Audio TM	
Film ANC ATM	RP215 Film Ancillary Data Audio time (HDTV video inputs only)
ATC TM	12M-2 (RP188) Ancillary Timecode time (HDTV video inputs only)
LTC TM+AOF	LTC reader time adjusted by value of Audio Offset (AOF) register
VITC-3 TM	RP201 3-Line VITC – line 3 time(SDTV Video inputs only)
VITC UB	VITC (or RP201 3-Line VITC line 1) user bits (SDTV Video inputs only)
AGen TM	Audio TC Generator Time
Not used	Audio time not being used

TIMECODE	With this control, you can select the source of Audio timecode user bits information.
Inputs	
Audio UB	
Film ANC AUB	RP215 Film Ancillary Data Video user bits (HDTV video inputs only)
ATC UB	12M-2 (RP188) Ancillary Timecode user bits (HDTV Video inputs only)
ATC TM	12M-2 (RP188) Ancillary Timecode time (HDTV Video inputs only)
LTC UB	LTC reader user bits
LTC TM+AOF	LTC reader time adjusted by value of Audio Offset (AOF) register
VITC-3 UB	RP201 3-Line VITC – line 3 user bits (SDTV Video inputs only)
Gen UB	Generator user bits
AGen TM	Audio TC Generator Time
Not used	Audio UB not being used

3.5.1.3. Selecting the Frame Rate of Audio Time

TIMECODE	With this control, you can select the frame rate of Audio timecode time information.
Inputs	
Audio Rate	
30 FPS	Nominal 30 FPS – typically used with 23.98PsF, 59.94I and 59.94P video
24 FPS	Nominal 24 FPS – typically used with 23.98PsF video
25 FPS	25 FPS – typically used with 50I

3.5.1.4. Selecting the Source of Film KeyKode and Ink numbers

TIMECODE	With this control, you can select the source of KeyKode and Ink Number information. This source will also determine the source of production data such as scene, take, camera roll, etc.
Inputs	
Film Data	
Film ANC	RP215 Film Ancillary Data (HDTV video inputs only)
VITC-2	RP201 3-Line VITC – line 2 (SDTV video inputs only)
Not used	KeyKode and Ink numbers not being used

3.5.1.5. Selecting the Source of Tag data

TIMECODE	
Inputs	
Tag Data	
Auto	Automatically selects the best Tag source based on input codes
Film ANC TAG	RP215 Film Ancillary Data Tag
Scene	RP215 Film Ancillary Data Scene
ATC UB	12M-2 (RP188) Ancillary Timecode user bits (HDTV Video inputs only)
LTC UB	LTC reader user bits
Video UB	Logical Video User Bits (see section 3.5.1.1)
Audio UB	Logical Audio User Bits (see section 3.5.1.2)
Auto-Film ANC	Auto mode – Film ANC selected (status only)
Auto-ATC UB	Auto mode – Ancillary Timecode UB selected (status only – HDTV inputs)
Auto-LTC UB	Auto mode – LTC user bits (status only)
Auto-VITC UB	Auto mode – VITC User bits (status only – SDTV inputs)
Auto-None	Auto mode – Tag not being used (status only)

With this control, you can select the source of Tag information. Tag information is usually static throughout a shot but will change from shot to shot. A change in the Tag information triggers an Event Start that can be used to trigger the Virtual Slate character windows.

3.5.1.6. Selecting the Ancillary Source (HDTV Inputs only)

TIMECODE	
Inputs	
ANC Source	
ATC-LTC	12M-2 (RP188) Ancillary timecode (LTC packet type)
ATC-VITC	12M-2 (RP188) Ancillary timecode (VITC1 or VITC 2 packet type)
FILM ANC	RP215 Film Ancillary Data

Status display showing type of Ancillary data being read. (HDTV video inputs only) This item is not changeable.

3.5.1.7. Reverting to LTC when there is no Ancillary Data Input (HDTV Inputs only)

TIMECODE	
Inputs	
ANC Fallback	
On	Video timecode automatically reverts to LTC when ANC not present
Off	Video timecode uses only the programmed source

With this control, you can select whether the video timecode source automatically reverts to LTC when ANC data is not present.

3.5.1.8. Time Format

TIMECODE	
Inputs	
Time Format	
Normal	HH:MM:SS:FF.f normal, HH;MM;SS;FF.f drop frame
SMPTE	Formatted according to SMPTE 258M – punctuation shows field and DF
Legacy	HH:MM:SS:FF.f normal, HH:MM:SS.FF.f drop frame (Evertz legacy format)

With this control, you can select the display formats for the time code displays. HH=Hours, MM=Minutes, SS=Seconds, FF=Frames, f=fields.

3.5.1.9. Setting the Video Time Generator Drop Frame Mode

TIMECODE *Inputs* *Video TC Drop Frame* *Off* *On*	With this control, you can select whether the video time generator operates in the Drop frame or Non drop frame mode. Forced to non drop frame for non 29.97 rates. Video timecode generator counts in Non Drop Frame mode Video timecode generator counts in Drop Frame mode

3.5.1.10. Setting the Audio Time Generator Drop Frame Mode

TIMECODE *Inputs* *Audio TC Drop Frame* *Off* *On*	With this control, you can select whether the audio time generator operates in the Drop frame or Non drop frame mode. Forced to non drop frame for non 29.97 rates. Audio timecode generator counts in Non Drop Frame mode Audio timecode generator counts in Drop Frame mode

3.5.2. Configuring The LTC Output

The *LTC Output* sub-menu items are used to map the logical inputs to the LTC Output sources, (i.e. where does the LTC output timecode come from) and configure parameters associated with the LTC output timecode. The chart below shows the items available in the *LTC Output* menu. Sections 3.5.2.1 to 3.5.2.3 provide detailed information about each menu item.

LTC TM	Selects the source of the LTC output time
LTC UB	Selects the source of the LTC output user bits
Rate	Selects the frame rate of the LTC output timecode
Offset	Selects whether the LTC is in time with the video input or output

3.5.2.1. Selecting the Source of Timecode for the LTC Output

TIMECODE *LTC Output* *LTC TM* *Video TC TM* *Audio TC TM* *Gen TM* *AGen TM* *Not used*	With this control, you can select the source of the timecode that will be used for the LTC output. Logical Video Timecode time (Set by *Video TM* menu – see section 3.5.1.1) Logical Audio Timecode time (Set by *Audio TM* menu – see section 3.5.1.2) Video TC Generator Time Audio TC Generator Time LTC output not used

TIMECODE	With this control, you can select the source of the user bits that will be used for the LTC output.
LTC Output	
LTC UB	
Video TC UB	Logical Video Timecode UB (Set by *Video UB* menu – see section 3.5.1.1)
Audio TC UB	Logical Audio Timecode UB (Set by *Audio UB* menu – see section 3.5.1.2)
Video TC TM	Logical Video Timecode time (Set by *Video TM* menu – see section 3.5.1.1)
Audio TC TM	Logical Audio Timecode time (Set by *Audio TM* menu – see section 3.5.1.2)
Tag Data	Tag Information
Gen UB	Generator user bits
Not used	LTC output not used

3.5.2.2. Selecting the Frame Rate of the LTC Output

TIMECODE	With this control, you can select the frame rate of the LTC output timecode.
LTC Output	
Rate	
SD Video	Frame rate is the same as SD video output (SD video out modes only)
HD Video	Frame rate is the same as HD video output (HD video out modes only)

3.5.2.3. Selecting Whether the LTC is in Time with the Video Input or Output

TIMECODE	With this control, you can select whether the LTC output timecode will be in time with the video input or output.
LTC Output	
Offset	
-5 (Input)	LTC is in time with the video input (all modes except 1080p/23.98 Output)
-4 (Input)	LTC is in time with the video input (1080p/23.98 Output mode only)
0 (Output)	LTC is in time with the video output (all modes)

3.5.3. Configuring The VITC Output

The *VITC Output* sub-menu items are used to map the logical inputs to the VITC generator, (i.e. where does the VITC come from) and configure parameters associated with the VITC generator (line numbers, etc.). This menu item is only available when the Afterburner is configured for standard definition output video. The chart below shows the items available in the *VITC Output* menu. Sections 3.5.3.1 to 3.5.5 provide detailed information about each menu item.

VITC Mode	Selects 3-line (RP201) VITC for Film applications or SMPTE 12M VITC
VITC Enable	Enables/disables the VITC inserter
Line 1 TM	Selects the source of the first line of VITC – time bits
Line 1 UB	Selects the source of the first line of VITC – user bits
Line 2	Selects the source of the second line of VITC – Film data
Line 3 TM	Selects the source of the third line of VITC – time bits
Line 3 UB	Selects the source of the third line of VITC – user bits
525 VITC Lines	Sets the VITC insertion line on 525 line video outputs
625 VITC Line	Sets the VITC insertion line on 625 line video outputs

3.5.3.1. Selecting the VITC Mode

TIMECODE
VITC Output
VITC Mode
1 Line
3 line

With this control, you can select 3-line (RP201) VITC for Film applications or SMPTE 12M VITC.

Standard SMTPE 12M VITC for video applications
RP201 3 line VITC for film applications

3.5.3.2. Selecting Whether VITC will be Inserted on the SD Video Outputs

TIMECODE
VITC Enable
Off
On

This control determines whether vertical interval timecode (VITC) will be inserted on the SDI and Analog video outputs. The 525 VITC Line and 625 VITC Line menu items set the insertion line for the VITC.

When set to Off, the VITC inserter will be disabled.

When set to On, the VITC inserter will be enabled.

3.5.3.3. Selecting the Source of Timecode for the VITC Output

TIMECODE
VITC Output
Line 1 TM
Out Video TM

With this control, you can select the source of Video timecode time information for VITC Line 1.

Output Video Timecode time (Input video time converted to the output rate and in time with the output)

TIMECODE *VITC Output* *Line 1 UB* *In Video TM* *Video TC UB*	With this control, you can select the source of Video timecode user bits information for VITC Line 1. Input video time in time with the output Input video user bits
TIMECODE *VITC Output* *Line 2* *KeyKode* *Ink* *Not used*	With this control, you can select the source of Film number information for VITC Line 2. (available in 3 line VITC mode only) KeyKode information from Film ANC Ink number information from Film ANC Line 2 film data bits set to zero
TIMECODE *VITC Output* *Line 3 TM* *Out Audio TM* *Not used*	With this control, you can select the source of Production timecode time information for VITC Line 3. (available in 3 line VITC mode only) Output Audio Timecode time (Input audio time in time with the output) Line 3 time bits set to zero
TIMECODE *VITC Output* *Line 3 UB* *Audio TC UB* *Not used*	With this control, you can select the source of Production timecode user bits information for VITC Line 3. (available in 3 line VITC mode only) Input audio user bits Line 3 user bits set to zero

3.5.4. Setting the VITC Line for 525 Line Video Outputs

TIMECODE *VITC Output* *525 VITC Line* *14/16* *10/12 to 18/20*	This control determines the line numbers where VITC will be inserted in 525 video when the *VITC Mode* is set to 1 line.
TIMECODE *VITC Output* *525 VITC Line* *14.15.16* *10.11.12 to 18.19.20*	This control determines the line numbers where VITC will be inserted in 525 video when the *VITC Mode* is set to 3 line.

3.5.5. Setting the VITC Line for 625 Line Video Outputs

TIMECODE *VITC Output* *625 VITC Line* *19/21* *6/8 to 19/21*	This control determines the line numbers where VITC will be inserted in 625 video when the *VITC Mode* is set to 1 line.

TIMECODE *VITC Output* *625 VITC Line* *14.15.16* *6.7.8 to 19.20.21*	This control determines the line numbers where VITC will be inserted in 625 video when the *VITC Mode* is set to 3 line.

3.6. CONFIGURING MISCELLANEOUS ITEMS

The *UTIL* menu items are used to configure miscellaneous items such as IP addresses, GPI functions, etc. The chart below shows the items available in the *UTIL* menu. Most of the *UTIL* menu items are not necessary for day-to-day operation and must be accessed using the Engineering Shift Keys. Sections 3.6.1 to 3.6.9 provides detailed information about each menu item.

GPIO	Configures the general purpose input and output functions
Ports	Configures the Com Port Functions
System IP	Configures the network IP addresses
System Ident	Selects the identification number for this system
Auto Panel Lock	Turns the Auto panel lock on and off
Control Gang	Allows for ganged operation of menu controls to other Afterburners on the network
Configuration	Provides configuration controls to send and receive configurations for other Afterburners on the network
Reset Most	Resets most saved settings to factory default, but keeps network, ident, gang
Factory Reset	Resets the all saved settings to factory defaults

3.6.1. Configuring the General Purpose Inputs and Outputs

The *GPIO* sub-menu items are used to configure parameters associated with the general purpose inputs and outputs of the Afterburner. The chart below shows the items available in the *GPIO* menu. There are identical menu items that are used to configure each input and output. There are three GPI inputs and two GPO Outputs. For the sake of simplicity only the menu items for GPI1 and GPO1 are shown in the manual. Sections 3.6.1.1 to 3.6.1.3 provide detailed information about each menu item.

GPI1 Func	Selects the function of the GPI 1 input
GPI1 Trigger	Selects whether GPI1 will trigger on high or low levels or rising or falling edges
GPI2 Func	Selects the function of the GPI 2 input
GPI2 Trigger	Selects whether GPI2 will trigger on high or low levels or rising or falling edges
GPI3 Func	Selects the function of the GPI 3 input
GPI3 Trigger	Selects whether GPI3 will trigger on high or low levels or rising or falling edges
GPO1 Func	Selects the function of the GPO 1 output
GPO2 Func	Selects the function of the GPO 2 output

3.6.1.1. Selecting the Function of the GPI Inputs

UTIL
GPIO
GPI1 Func

This control is used to select the function of the GPI 1 input. The GPI1 Trigger menu item is used to select whether GPI1 will become active on high or low levels, or on rising or falling edges.

OSD Windows	Turn OSD windows On/Off
Aspect Ratio	Changes downconverter aspect ratio
Next Aspect	Cycles through all aspect ratio modes
Slate	Turn Slate windows On/Off
6Hz In	6Hz Reference Input
** Disable*	Disable * error indicators in dynamic character windows when active
None	No input function

3.6.1.2. Selecting the How the GPI Triggers

UTIL
GPIO
GPI1 Trigger
Active Close
Active Open
Toggle Open
Toggle Close

This control is used to select whether GPI1 will become active on opening or closing transitions or will toggle states when the GPI1 is operated. The function of the GPI1 input is set using the GPI1 Function menu item.

When set to *Active Close*, the selected GPI1 function will activate when the GPI1 input is closed to ground. For example, the OSD windows could be on when the input is closed to ground.

When set to *Active Open*, the selected GPI1 function will activate when the GPI1 input is opened (released from being closed to ground). For example, the OSD windows could be on when the input is not connected to ground.

When set to *Toggle Close*, the selected GPI1 function will change state when the GPI1 input is being closed to ground. For example, if the OSD windows are on, they will turn off when the input switches from opened to closed. Similarly, if the OSD windows are off, they will turn on when the input switches from opened to closed.

When set to *Toggle Open*, the selected GPI1 function will change state when the GPI1 input is being opened (released from being closed to ground). For example, if the OSD windows are on, they will turn off when the input switches from closed to opened. Similarly, if the OSD windows are off, they will turn on when the input switches from closed to opened.

3.6.1.3. Selecting the GPO Functions

UTIL
GPIO
GPO1 Func
None
Test
Test-on
Test-off
6HZ Ref Out
6HZ Ref Out Inv
6HZ Sq Out
6HZ Sq Out Inv
FRID Pull
Vid In Fld
Vid Out Fld

This control is used to select the function of the GPO1 relay output.

GPO disabled
GPO toggles on and off
GPO output on
GPO output off
Output 6Hz time base reference active high
Output 6Hz time base reference active low
Output 6Hz symmetrical active high
Output 6Hz symmetrical active low
FRID Style pulldown indicator toggles at each new picture
Input video fields
Output video fields

3.6.2. Configuring the Serial Ports

The *PORTS* sub-menu items are used to configure parameters associated with the serial ports of the Afterburner. The chart below shows the items available in the *PORTS* menu. Sections 3.6.1.1 to 3.6.1.3 provide detailed information about each menu item.

COM1 Func	Selects the function of the COM 1 serial port
COM1 Baud	Selects the baud rate of the COM 1 serial port
Tracker Comm	Shows whether Afterburner is communicating with Tracker using serial communication or Ethernet network protocol
COM2 Func	Selects the function of the COM 2 serial port
COM2 Baud	Selects the baud rate of the COM 2 serial port
TC Dump	Selects whether VITC/Ancillary data will be sent out Com port or Ethernet port

3.6.2.1. Selecting the Function of the COM 1 Serial Port

UTIL
PORTS
COM1 Func

None	Com 1 not used
Test	Sends out Test messages, echoes input characters
Tracker	Communicate with KeyLog Tracker™ - Sets *Tracker Comm* to *COM*
Debug	Sends out debug messages

This control is used to select the function of the COM 1 serial port.

3.6.2.2. Selecting the Baud Rate of the COM 1 Serial Port

UTIL
PORTS
COM1 Baud

57600	57600 baud, 8 bits, no parity
115200	115200 baud, 8 bits, no parity

This control is used to select the baud rate of the COM 1 serial port. When *COM 1 Func* is set to *Tracker* baud rate is fixed to 57600.

3.6.2.3. Determining whether KeyLog TRACKER™ Communicates using Serial Port or Ethernet

UTIL
PORTS
Tracker Comm

Comm	Com port mode – *COM 1 Func* must be set to *Tracker*.
Net	Network mode – *COM 1 Func* must NOT be set to *Tracker.*

Status display showing whether the Afterburner will communicate to KeyLog Tracker™ using Com port or Ethernet method set by the *COM 1 Func* menu item. (See section 3.6.2.1)

3.6.2.4. Selecting the Function of the COM 2 Serial Port

UTIL	This control is used to select the function of the COM 2 (AUX COM) serial port.
PORTS	
COM 2 Func	
None	Com 2 not used
Test	Sends out Test messages, echoes input characters
Debug	Sends out debug messages
ANC Dump	Send out ANC data when *ANC Dump* is set to *Comm*

3.6.2.5. Selecting the Baud Rate of the COM 2 Serial Port

UTIL	This control is used to select the baud rate of the COM 1 serial port. When *COM 2 Func* is set to *ANC Dump* baud rate is fixed to 115200.
PORTS	
COM 2 Baud	
38400	38400 baud, 8 bits, no parity
57600	57600 baud, 8 bits, no parity
115200	115200 baud, 8 bits, no parity

3.6.2.6. Logging the VITC or Ancillary Data to the Comm. Port or Network

TIMECODE	With this control, you can select whether the VITC (SDTV Inputs) or ancillary data (ATC or Film ANC on HTDV Inputs) will be sent to the AUX COMM port or Network interfaces.
Ports	
TC Dump	
Off	VITC/ANC data is not sent
Com 2	VITC/ANC data is sent once per frame to the **COM 2** port (115200 baud)
Net	VITC/ANC data is sent once per frame via UDP to the Gateway IP address
LTC+COM 2	LTC plus VITC/ANC data is sent to the **COM 2** port (115200 baud)
LTC+Net	LTC plus VITC/ANC data is sent via UDP to the Gateway IP address

3.6.3. Setting the System Network I/P Addresses

The Afterburner can be controlled over a TCP/IP connection using a good quality, straight-thru Ethernet cable, terminated at both ends with RJ-45 male connectors, as shown in section 2.5. Normally the Afterburner is connected to the network through an Ethernet switch. If connecting multiple Afterburners, take care to use different IP addresses for each.

The *System IP* sub-menu items on the *UTIL menu* allow the user to change the IP addresses to match the requirements of their network. Each network address consists of a set of four 'octets' separated by periods (e.g. 192.168.9.10). The first three octets are common to all addresses in the Afterburner. The remaining octet is unique to each address type. In a private network, typical network addresses could be identified as 192.168.9.XXX. The Subnet mask for this network is set to 255.255.255.0.

The "Gateway" item tells the Afterburner network interface the IP address of the "gateway" (commonly referred to as the "firewall"). In its simplest sense the gateway could be the PC directly connected to the afterburner and running the network application software. This gateway links to and communicates with other network gateways. In a private network, this gateway could be identified as 192.168.9.YYY. You should not need to change this item unless you change the upper three octets of the network IP address. If you are unsure how to configure the network addresses contact your network administrator.

Common 1st Octet	Sets the first octet of the system IP addresses – common to all devices
Common 2nd Octet	Sets the second octet of the system IP addresses – common to all devices
Common 3rd Octet	Sets the third octet of the system IP addresses – common to all devices
9155 Address	Sets the fourth octet of the Afterburner's IP address
Gateway Address	Sets the fourth octet of the Gateway IP address
Syslog	Sets the network Syslog level
Syslog Address	Sets the fourth octet of the network Syslog device IP address
Tracker Address	Shows the fourth octet of the PC running Tracker that you are communicating with (not implemented at time of writing)
Tracker Port	Shows the port number being used to communicate with KeyLog Tracker (not implemented at time of writing)
Announce	Turns on and off the IP announce function
Mask 1st Octet	Sets the first octet of the subnet mask
Mask 2ndt Octet	Sets the second octet of the subnet mask
Mask 3rdt Octet	Sets the third octet of the subnet mask
Mask 4th Octet	Sets the fourth octet of the subnet mask

3.6.3.1. Setting the IP Addresses

For the sake of simplicity only one of the IP addresses will be shown

UTIL *System IP* *9155 Address* *10* *0 to 255*	This control is used to set the fourth octet of the Afterburner's IP address. Use the SHAFT ENCODER to set the appropriate address.

3.6.3.2. Setting the System Logging Function

- *UTIL*
  - *System IP*
    - *Syslog*
      - *Off*
      - *Emergency*
      - *Alert*
      - *Critical*
      - *Error*
      - *Notice*
      - *Info*
      - *All*

This control is used to enable error logging on the network. Syslog messages are sent to the device at the Syslog Address.

Do not Log any messages
Log only emergency messages
Log only alert level or greater messages
Log only critical level or greater messages
Log error level or greater messages
Log Notice level or greater messages
Log Info level or greater messages
Log all messages

3.6.3.3. Setting the Network Discovery IP Announce

- *UTIL*
  - *System IP*
    - *Announce*
      - *Off*
      - *On*

This control is used to enable broadcast of the Afterburner's IP address to other Afterburners on the network.

Do not broadcast IP address
Broadcast IP address to the Broadcast IP Address

3.6.4. Setting the System ID Number

- *UTIL*
  - *System Ident*
    - *1 to 15, A to Z*

This control allows the user to assign a system ID number to the Afterburner. This ID is useful in applications where there are several units connected to the same network. The System ID will display at the top of each screen of the on-screen menus and may also be shown on the front panel using the DISPLAY button. The System ID number can also be used to identify Afterburners when updating firmware or when connecting from KeyLog Tracker.

3.6.5. Setting the Auto Panel Lock

- *UTIL*
  - *Auto Panel Lock*
    - *On*
    - *Off*

This control enables the Panel Lock function to automatically activate after 10 minutes of inactivity on the front panel.
Set to *On* to automatically enable panel lock after 10 minutes.
Set to *Off* to disable the automatic panel lock function.

3.6.6. Ganged Menu Control Operation

When the Afterburner is part of a Network Gang, changing its menu items will cause the menus of all the other member Afterburners in the same gang to follow the menu changes. Ganged operation is disabled while in Engineering mode. You can also send the Afterburner configuration to other gang members. (See section 3.6.7.1). When the Afterburner is part of a gang the word **GANGED** will be shown at the top of its menu screen to remind you that you are affecting other devices in the network. See section 3.8 for more information about networking large systems.

- *UTIL*
  - *Control Gang*
    - *None*
    - *1 to 5*

This control allows the user to configure other Afterburners in a specific gang when the menus of this Afterburner are operated.
Set to *None* if you do not want to control other gang members.
Select the gang number that you want to control from this Afterburner.

3.6.7. Sending and Retrieving Configurations from other Networked Afterburners

There are two menu items that allow you to load the Afterburner configuration from other Afterburners on the network, or to send this Afterburner's configuration to other Afterburners. In order to see these menu items the Afterburner must be networked to other Afterburners on a common subnet. See section 3.6.3 for information on setting the I/P addresses for the system. See section 3.8 for a more complete description of features available when Afterburners are networked.

3.6.7.1. Sending Configurations to Other Networked Afterburners

UTIL
Configuration
Send Config to
None
1 to 15, A to Z
Gang 1 to Gang 5

This control is used to send this Afterburner's configuration settings to other Afterburners on the network.

Do not send this configuration
Select individual Afterburners by their System ID number
Select groups of Afterburners by their Gang number

You will be prompted to confirm your choice as sending the Afterburners configuration will overwrite the settings in the target Afterburners.

3.6.7.2. Getting Configurations from other Networked Afterburners

UTIL
Configuration
Get Config from
None
1 to 15, A to Z
Gang 1 to Gang 5

This control is used to set this Afterburner's configuration settings from another Afterburner on the network.

Do not get any configuration
Select individual Afterburners by their System ID number
Select groups of Afterburners by their Gang number

You will be prompted to confirm your choice as getting the Afterburners configuration will overwrite the settings in these Afterburners.

3.6.8. Resetting the Most Common Afterburner Settings to Factory Defaults

UTIL
Reset Most
No
Yes

This control is used to reset most saved settings to the factory default, while still keeping the network, ident, and gang menu settings.

Select *Yes* to erase most user menu settings and reboot the unit.

This function is only available on the Engineering menus and should only be used by qualified personnel.

3.6.9. Resetting All the Afterburner Settings to Factory Defaults

UTIL
Factory Reset
No
Yes

This control is used to reset the Afterburner to its factory defaults.

Select *Yes* to erase all user menu settings and reboot the unit.

This function is only available on the Engineering menus and should only be used by qualified personnel. Using this function may result in the loss of network communication with the device.

3.7. DISPLAYING THE AFTERBURNER STATUS

The *STATUS* menu shows various status information about the Afterburner operation. The chart below shows the items available in the *STATUS* menu. Sections 3.7.1 to 3.7.10 provide detailed information about each menu item. These status displays are generally for engineering use only.

Video Status	Displays the video status
Reference Status	Displays reference status information
Misc Status	Displays miscellaneous status information
Audio Status	Displays the audio status
TC In Status	Displays status of the LTC, VITC and ANC timecode readers
Input Time Status	Displays the status of the input logical video and audio timecode, etc.
Output Time Status	Displays the status of the output logical video and audio timecode etc.
Com Status	Displays the communications status
Network Status	Displays the Ethernet interface status
Versions	Displays the Software version information

3.7.1. Displaying the Video Status Information

STATUS	This control allows the user to display the Video status displays.
Video Status	
Mode	Operating Mode
Auto Video	Auto Video Standard detection
SDI Video In	Status of SDI Input video
B Link In	Status of 4:4:4 B Input video
Locked for	Time since last video input lock
SDI Video Out	Status of SDI Output video
Video Delay	Video input to output delay, measured in HD frames

3.7.2. Displaying the Reference Status Information

STATUS	This control allows the user to display the Reference status displays.
Reference Status	
Ref Source	Reference Source
Ref Status	Reference Status
Locked for	Time since last relock of Reference
6HZ Input	Rate of 6HZ input signal
6HZ Phase	Phase of 6HZ BNC input signal relative to input video
Ref In	Reference input signal timing
Int 6 HZ	Internal 6 Hz time base

The last two items on the *Reference status* screen are used to give a visual timeline of the reference source, and how it is affecting the internal 6 Hz cycle. On the *Int 6 HZ* line, the "S" indicates the start of the internal 6 Hz cycle, and the colon ":" indicates the start of the next input video frame. For example, the status with an ANC reference would look like:

`REF SOURCE=`	`ANC`	Reference Source is ancillary time code
`REF STATUS=`	`LOCK`	Reference Status = reference is locked to ANC
`LOCKED FOR=`	`00:01:00`	Reference has been locked for 1 minute
`6HZ INPUT=`	`MISSING`	Rate of 6HZ input signal – it is not present
`6HZ PHASE=`	`- -`	6HZ BNC input signal is not present
`REF IN=`	`0000011111222233333`	Reference input timing – extracted from ANC Timecode
`INT 6 HZ=`	`S----:----:----:----`	Internal 6 Hz time base – S indicates start of cycle

3.7.3. Displaying the Miscellaneous Status Information

STATUS	This control allows the user to display the miscellaneous status displays.
Misc Status	
Fan 1	Status of cooling fan 1
Fan 2	Status of cooling fan 2
GPI 1	Status of Input #1, pin 1
GPI 2	Status of Input #2, pin 8
GPI 3	Status of Input #3, pin 4
GPI On	Video Time captured when Event GPI is activated

3.7.4. Displaying the Audio Status Information

STATUS	This control allows the user to display the Audio Status displays.
Audio Status	
Group 1	Audio Group status
Group 1 Activity	Audio Group activity
Group 2	Audio Group status
Group 2 Activity	Audio Group activity
Group 3	Audio Group status
Group 3 Activity	Audio Group activity
Group 4	Audio Group status
Group 4 Activity	Audio Group activity

3.7.5. Displaying the Timecode Input Status Information

The *TC In Status* sub-menu shows various status information about the LTC, VITC and ANC Timecode reader inputs. The chart below shows the items available in the *TC In Status* sub-menu. Sections 3.7.5.1 to 3.7.5.2 provide detailed information about each menu item. These status displays are generally for engineering use only.

LTC In Status	Displays the LTC Input status items
ANC In Status	Displays the ancillary data status information (HDTV Inputs only)
VITC 1 In Status	Displays the VITC 1 status information (SDTV inputs Only)
VITC 2 In Status	Displays the VITC 2 status information (SDTV inputs Only)
VITC 3 In Status	Displays the VITC 3 status information (SDTV inputs Only)

3.7.5.1. Displaying the LTC Input Status Information

STATUS	This control is used to show the LTC Input Status displays.
TC In Status	
LTC In Status	
LTC Read %	LTC Percent read indicator
Phase	LTC Phase indicator
LTC Delta Fr	LTC time change from previous read, in frames
LTC Dynamics	LTC average Dynamics
RAW LTC TC	LTC raw time value
RAW LTC UB	LTC raw user bits value
LTC Fr Rate	LTC time frame detected, frames per second
LTC Exp Rate	LTC time frame rate expected, frames per second
LTC Speed	LTC time per cent of play speed

3.7.5.2. Displaying the ANC Input Status Information (HDTV Inputs only)

STATUS	This control is used to show the Ancillary Time Code Input Status displays.
TC In Status	
ANC In Status	
ANC Aud TC	Status screens for Anc Audio Time code (See section 3.7.5.2.1)
ANC Read %	ANC Percent read indicator
ANC Selected	Preferred ANC packet type
ANC Source	ANC packet type
ANC F1	ANC Field 1 content
ANC F2	ANC Field 2 content
ANC Delta Fr	ANC time change from previous read, in frames
ANC Dynamics	ANC time average Dynamics
RAW ANC TM	ANC raw time value
RAW ANC UB	ANC raw user bits value
ANC Exp Fr Rate	ANC time frame rate expected, frames per second
ANC Fr Rate	ANC time frame rate detected, frames per second
ANC Speed	ANC time per cent of play speed
ANC Fld 1 Flag	Average value of field flag in ANC from field 1
ANC Fld 2 Flag	Average value of field flag in ANC from field 2
ANC Fld 1 Delta	Average value of delta frames field 1
ANC Fld 2 Delta	Average value of delta frames field 2

3.7.5.2.1. Displaying the ANC Audio TC Status Information (HDTV Inputs only)

STATUS	This control used to show the Audio Time Code Input Status displays when *Audio TM* is set to *Film ANC ATM*.
TC In Status	
ANC In Status	
ANC Aud TC	
Aud Delta Fr	Film ANC Audio TC change from previous read, in frames
Aud Dynamics	Film ANC Audio TC time average Dynamics
RAW Aud TC	Film ANC Audio TC raw time value
RAW Aud UB	Film ANC Audio TC raw user bits value
Aud Exp Fr Rate	Film ANC Audio TC time frame rate expected, frames per second
Aud Fr Rate	ANC Audio TC time frame rate detected, frames persecond
Aud Speed	ANC Audio TC time per cent of play speed
Aud Phase	ANC Audio TC phase per cent

3.7.5.3. Displaying the VITC 1 Input Status Information (SDTV Inputs only)

STATUS	This control is used to show the VITC (or RP201 3-Line VITC line 1) Video Time Code Input Status displays.
TC In Status	
VITC In Status	
V TC Read %	VITC Percent read indicator
V TC Line	VITC line
V TC Delta Fr	VITC time change from previous read, in frames
V TC Dynamics	VITC average Dynamics
RAW V TC TM	VITC raw time value
RAW V TC UB	VITC raw user bits value
V TC Fr Rate	VITC time frame rate detected, frames per second
V TC Exp Rate	VITC time frame rate expected, frames per second
V TC Speed	VITC time per cent of play speed

3.7.5.4. Displaying the VITC 2 Input Status Information (SDTV Inputs only)

STATUS	This control is used to show the RP201 3-Line VITC line 2 (VITC-2) Film data (KeyKode or Ink number) Status displays.
TC In Status	
VITC-2 In Status	
KK Read %	VITC-2 KeyKode info Percent read indicator
KK Line	VITC-2 Line detected
Film Gauge	VITC-2 Film Gauge detected
Film Rate	VITC-2 Film rate detected
KK Dynamics	VITC-2 KeyKode dynamics
RAW KK	VITC-2 KeyKode raw value

3.7.5.5. Displaying the VITC 3 Input Status Information (SDTV Inputs only)

STATUS	This control is used to show the RP201 3-Line VITC line 3 (VITC-3) Audio Time Code Input Status displays.
TC In Status	
VITC-3 In Status	
A TC Read %	VITC-3 Percent read indicator
A TC Line	VITC-3 Line
A TC Delta Fr	VITC-3 Audio time change from previous read, in frames
A TC Dynamics	VITC-3 Audio time average Dynamics
RAW A TC TM	VITC-3 raw time value
RAW A TC UB	VITC-3 raw user bits value
A TC Fr Rate	VITC-3 Audio time frame detected, frames per second
A TC Exp Rate	VITC-3 Audio time frame rate expected, frames per second
A TC Speed	VITC-3 Audio time per cent of play speed

3.7.6. Displaying the Logical Input Timecode Status Information

STATUS	This control allows the user to display the status of Input Timecodes near frame 00.
Input Time Status	
VTM In	Input Video Timecode frames LS Digit
VUB In	Input Video Timecode user bits LS Digit
ATM In	Input Audio Timecode frames LS Digit
AUB In	Input Audio Timecode user bits LS Digit
ATM Ph	Input Video Timecode phase relative to input video
KK In	Input KeyKode frames LS Digit
Pull	Pull Down Type of Film Data
Vid In	Input Video frame marker
LTC In	Input LTC frames LS Digit
LTC UB	Input LTC user bits LS Digit
V	Input Video Timecode Frames
VU	Input Video Timecode user bits LD digit pair
A	Input Audio Timecode frames
AU	Input Audio Timecode user bits LS Digit pair
KK	Input KeyKode frames
INK	Input Ink Number frames

The first few items on the *Input Time status* screen are used to give a visual timeline of the relastionships of the input video, audio time code and Keykode information. On the *Vid In* line, the "S" indicates the start of a input video frame, and the colon ":" indicates the start of the next input video frame. For example, with 1080p/24sF input video the Input time Status may look like:

VTM IN=	00000111112222233333	Input video timecode (24FPS) frames LS Digit
VUB IN=	88888888888888888888	Input video timecode UB LS digit (UB = 12 34 56 78)
ATM IN=	99999000001111133333	Input audio timecode (30 FPS) frames LS Digit
AUB IN=	00000000000000000000	Input audio timecode UB LS digit (UB = 08 04 08 30)
ATC PH=	-20 +0 +20 +40	Input audio timecode phase relative to input video
KK IN=	55555000001111122222	Input KeyKode frames LS Digit
PULL=	AAAABBBBBBCCCCDDDDDD	Input Pull Down Type
VID IN=	:----:----:----:----	Input video time base – : indicates start of frame
V=	… :00	Input video timecode frames
VU=	… :78	Input video timecode UB LS digits
A=	… :29	Input audio timecode frames
AU=	… :30	Input audio timecode UB LS digits
KK=	… +15	Input KeyKode frames
INK=	… +15	Input Ink Number frames

3.7.7. Displaying the Logical Output Timecode Status Information

STATUS	This control allows the user to display the status of Output Timecodes near frame 00.
Output Time Status	
V TM	Output Video Timecode frames LS Digit
V UB	Output Video Timecode user bits LS Digit
A TM	Output Audio Timecode frames LS Digit
A UB	Output Audio Timecode user bits LS Digit
KK Out	Output KeyKode frames LS Digit
Pull Type	Pull Down Type of Film Data
Vid Out	Output Video frame marker
LTC TM	Output LTC frames LS Digit
LTC UB	Output LTC user bits LS Digit
TR V	Tracker Video Timecode Frames
TR VU	Tracker Video Timecode user bits LD digit pair
TR A	Tracker Audio Timecode frames
TR AU	Tracker Audio Timecode user bits LS Digit pair
TR KK	Tracker KeyKode frames
TR INK	Tracker Ink Number frames

The first few items on the *Output Time status* screen are used to give a visual timeline of the relastionships of the output video, audio time code and Keykode information. On the *Vid Out* line, the "S" indicates the start of a input video frame, and the colon ":" indicates the start of the next output video frame. For example, with 1080p/24sF output video the output time Status may look like:

V TM=	00000111112222233333	Output video timecode (24FPS) frames LS Digit
V UB=	88888888888888888888	Output video timecode UB LS digit (UB=12 34 56 78)
A TM=	99999000001111133333	Output audio timecode (30 FPS) frames LS Digit
A UB=	00000000000000000000	Output audio timecode UB LS digit (UB=08 04 08 30)
KK OUT=	55555000001111122222	Output KeyKode frames LS Digit
PULL TYPE=	AAAABBBBBBCCCCDDDDDD	Output Pull Down Type
VID OUT=	:----:----:----:----	Output video time base – : indicates start of frame
TR VTM=	… :00	Tracker video Timecode frames
TR VUB=	… :78	Tracker video Timecode UB LS digits
TR ATM=	… :29	Tracker audio Timecode frames
TR AUB=	… :30	Tracker audio Timecode UB LS digits
TR KK=	… +15	Tracker KeyKode frames
TR INK=	… +15	Tracker Ink Number frames

3.7.8. Displaying the Communication Port Status Information

The *COM Status* sub-menu shows various status information about the serial ports. The chart below shows the items available in the *COM Status* sub-menu. Sections 3.7.5.1 to 3.7.5.2 provide detailed information about each menu item. These status displays are generally for engineering use only.

COM1 Status	Displays the Com 1/SERIAL CONTROL com port status items
COM2 Status	Displays the Com 2/AUX COM com port status items

3.7.8.1. Displaying the COM1/Serial Control Com port Status Information

STATUS
- *Comm Status*
  - *Com1 Status*
    - *Com1 Func*
    - *Com1 BPS*
    - *Com1 Settings*
    - *Com1 RX*
    - *Com1 RX Err*
    - *Com1 TX*

This control allows the user to display the Afterburner COM1/Serial Control communication Port status displays.

Serial Control port function
Serial Control port baud rate
Serial Control port parity and word size settings
Serial Control port receive data details
Serial Control port receive errors
Serial Control port transmit data details

3.7.8.2. Displaying the COM2 Com port Status Information

STATUS	This control allows the user to display the Afterburner COM2/AUX COM communication Port status displays.
Comm Status	
Com2 Status	
Com2 Func	Com 2 port function
Com2 BPS	Com 2 port baud rate
Com2 Settings	Com 2 port parity and word size settings
Com2 RX	Com 2 port receive data details
Com2 RX Err	Com 2 port receive errors
Com2 TX	Com 2 port transmit data details

3.7.9. Displaying the Network Status Information

STATUS	This control allows the user to display the Afterburner Network status displays.
Network Status	
Net Neighbours	Status of network Afterburner neighbours
HDSD9155Q	IP address of HDSD9155Q Control CPU
Gateway	IP address of Gateway
Syslog	IP address of System Logging destination
Tracker	IP address of PC running KeyLog TRACKER™
Tracker Port	Port number of KeyLog TRACKER™
Subnet	Ethernet Subnet Mask
MAC	Ethernet MAC Address
Net Link	Ethernet Link Status
Net activity	Ethernet Activity Status
Net Speed	Ethernet Link Speed

3.7.9.1. Network Neighbour Status

STATUS	This sub-menu allows the user to display a list of all Afterburners and Film Footage Encoders available on the subnet set by the *System IP* menu item. See section 3.6.3.
Network Status	
Net Neighbours	

The following example screen shows sample units on a network.

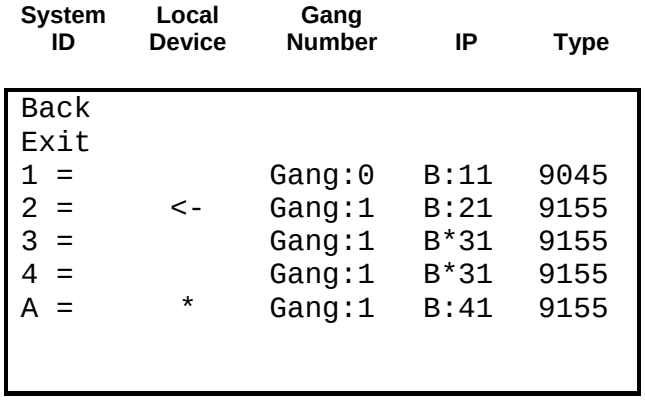

Figure 3-6: Network Neighbours Status Screen

System ID: The System ID of the Afterburner or Film Footage Encoder is shown in this column. All the information on this line relates to the device pair with this system ID
* will be shown in the **Local Device** column if there is more than one system with this System ID

Local Device: <- will be shown in this column if the device displaying the status screen is part of this system.

Gang Number: Shows the Gang number of the Afterburner of this system. Will show 0 if the Afterburner is not a part of any gang.

IP: Shows the fourth octet of the Afterburner IP address system. An asterisk (*) will be shown in place of the colon (:) when there is an IP conflict for this Afterburner.

Type: Shows the device type for this unit.

The Network Neighbours status screen may take several minutes to update completely after changes to the network configuration.

3.7.10. Displaying the Firmware Version Information

STATUS	This control allows the user to display the version information for the Afterburner.
Versions	
Version	Shows application firmware version
H/W Rev	Shows hardware version
FPGA Rev	Shows Afterburner FPGA version
NetIF Version	Shows Network Interface firmware version

3.8. NETWORKING MULTIPLE SYSTEMS TOGETHER

In large systems where there are many Afterburners it is often desirable to connect them to an Ethernet network. When networked together you can perform the following functions:

- Automatically control all the networked devices from one common point.
  - When you operate the menu system on one Afterburner you can have all the other devices in the group (gang) automatically controlled at the same time.
  - This facilitates making quick changes to settings on many devices.
  - You can set up to 5 gangs within the network
- Manually send the configuration of an Afterburner to other Afterburners on the network.
  - This allows you to have control over when the configuration of the devices will be updated
  - You can send the configuration to individual devices or to gangs.
- Manually get the configuration of an Afterburner from other Afterburners on the network.
  - This allows you to quickly update the configurations of new devices you add to the network.
  - You can get the configuration from individual devices or to gangs.

With the network version of KeyLog TRACKER™ you can also connect the network to a PC running KeyLog TRACKER™. (Network version of KeyLog TRACKER™ not available at time of writing) This will simplify control of multiple afterburners from one common location.

Firmware can be uploaded to multiple networked units easily using KeyLog TRACKER™ version 3.0 or later, or using the free Network upgrade utility program available on the Evertz Web Site.

- Load firmware to one or more Afterburners or Film Footage Encoders
  - Uses the free PostUpgrade utility program (see section 6.2.2) or FTP (see section 6.2.3)

In order to network multiple Afterburners together you must connect the Afterburners to each other using a network hub or switch. (See section 2.5) Next you must set the IP address for each system. (See section 3.6.3.)

If you wish to connect a PC into the system you will also have to set its IP address so they are on the same subnet as the Afterburner.

If connecting multiple Afterburners or Film Footage Encoders on the same network, take care to use different IP addresses for each. For example set the system addresses for System 1 to 10, and for system 2 to 20, etc.; that way the IP address will not overlap and will be easy to remember.

If there is an IP address conflict with other devices in the network the Front panel display of the Afterburner will display a flashing message

`IP CONFLICT`

After setting the IP addresses for each Afterburner you need to set unique System ID values for each Afterburner. (See section 3.6.4)

If the Afterburner has a System Ident conflict with other Afterburners in the network the Front panel display of the Afterburner will display a flashing message

`IDENT CONFLICT`

If you want the devices configured in one or more gangs you will also have to set the gang number in each Afterburner. (See section 3.6.6)

Once you have configured each system you will be able to see all the Afterburners and Film Footage Encoders connected to the network using the *Network Status* screen on one of the Afterburners.

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CHAPTER 4: CONTROLLING THE AFTERBURNER FROM KEYLOG TRACKER™

TABLE OF CONTENTS

Figures

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4. CONTROLLING THE AFTERBURNER FROM KEYLOG TRACKER™

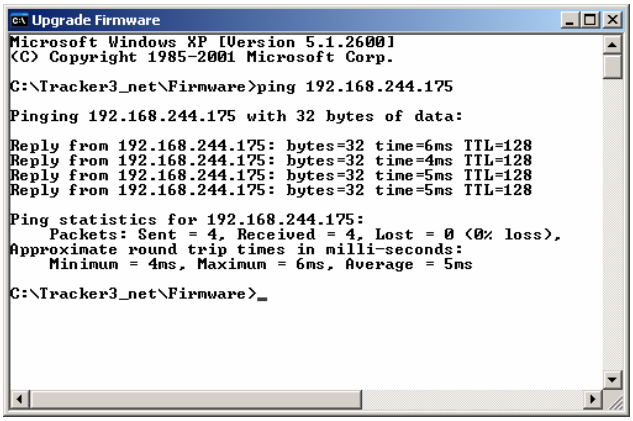
In post production applications the Afterburner is often controlled from the Evertz Film system's Graphical User Interface (GUI) KEYLOG TRACKER™. The software is used to configure the Afterburner's hardware for different applications. Configuration sets can be saved and recalled to speed setups of the hardware. In order to control the Afterburner you must use version 3.1 or later of the KeyLog TRACKER™ software. This version should have been shipped on a CD-ROM along with your Afterburner unit.

4.1. PHYSICAL CONNECTIONS

If you are connecting the Afterburner to the computer, that will be running the KeyLog TRACKER™ software, using a RS-232 serial port connection see section 2.7 for information on connecting your Afterburner. If you are connecting the Afterburner to the computer, that will be running the KeyLog TRACKER™ software, using an Ethernet connection see section 2.5 for information on connecting your Afterburner.

If you will be connecting to the Afterburner using a serial port connection set the *COM 1 Func* menu item (on the *Ports menu)* to *Tracker.* The *Tracker Comm* status item on the *Ports* menu should show *Comm.* (see section 3.6.2.1 and 3.6.2.3)

If you are using an Ethernet connection, then set the IP address and Net Mask in the unit using the *SYSTEM IP* menu items (see section 3.6.3). In order to identify multiple devices on the network, make sure that you have set a unique *System Ident* in each device. (see section 3.6.4) You will also need to set the *COM 1 Func* menu item (on the *Ports menu)* to *None (*or anything other than *Tracker)*. The *Tracker Comm* status item on the *Ports* menu should show *Net.* (see section 3.6.2.1 and 3.6.2.3). You should verify that your computer can see the device by 'pinging' it.



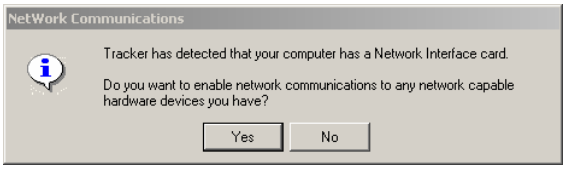
4.2. INSTALLING KEYLOG TRACKER™

Insert the KeyLog TRACKER™ CD-ROM into the PC's CD-ROM drive and click on the Start button and then click Settings. Click on the Control Panel, then ADD/Remove Programs. The KeyLog TRACKER™ installation program will guide you through the installation procedure.

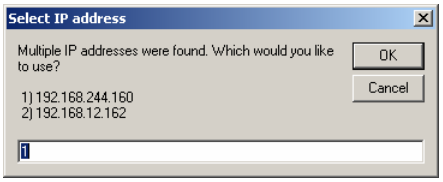
Once the installation is complete, click on the Start button and then click Programs. Select the "Evertz Products" program group and click on the KeyLog TRACKER™ icon.

You are presented with the KeyLog TRACKER™ Splash screen and the “Login” dialog box. Enter “user” as a user name, leave the password area blank and click the “OK” button.

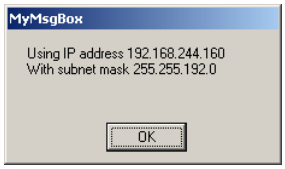
If KeyLog TRACKER™ detects that you have a network interface card (NIC) installed in the computer you will see the following dialog message:



Press “Yes” to enable network communications in KeyLog TRACKER™, press no to disable Network communications. If you choose to enable network communications KeyLog TRACKER™ will attempt to discover the IP address of the NIC in your computer. If there are multiple NICs in your computer you will see the following dialog message:



This dialog shows a list of the IP addresses in the various NICs of the computer. Choose the NIC that your devices are connected to by entering its number in the text box. Then press OK. When Tracker has identified a unique NIC and IP address if will show you the following message box:

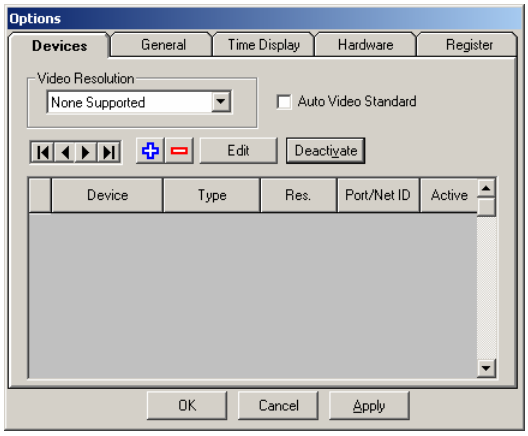


Make sure that your hardware devices are connected to the same subnet.

If you are running KeyLog TRACKER™ for the first time, you must select the devices you wish to control and how they are connected to the computer.

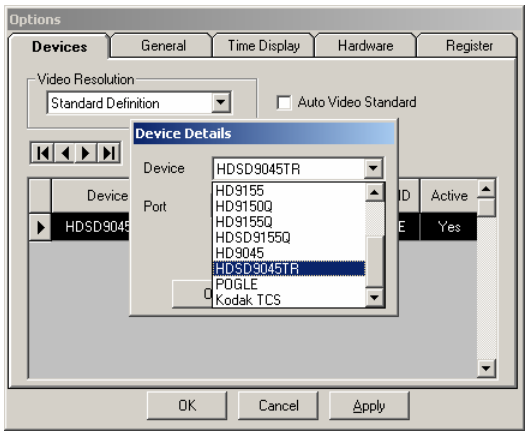
4.3. CONFIGURING HOW TRACKER COMMUNICATES TO THE HARDWARE DEVICES

The “Devices” tab of the Options dialog box is used to configure the devices you wish to control and how the computer will communicate with these devices.

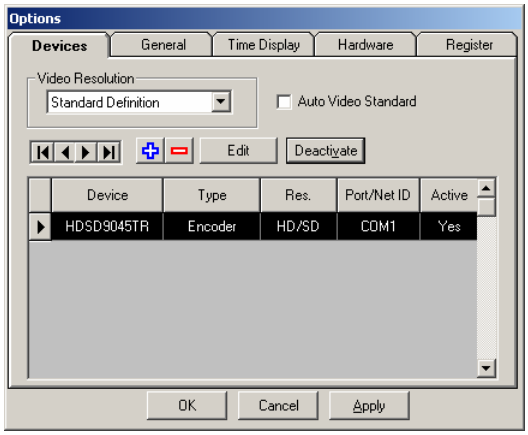


4.3.1. Communicating to the Devices Using a Serial Port

Press the  button to add the HDSD9155Q to the list of controlled devices. Click on the down arrow beside the *Device* dropdown and choose the HDSD9155Q with the mouse.

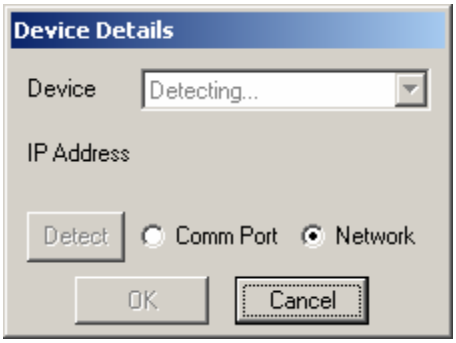


Click on the down arrow beside the *Port* dropdown and choose the COM port that you connected to the HDSD9155Q. If you check the "Activate Now" check box the HDSD9155Q will automatically become active when you close the screen. Press the Okay button to add the HDSD9155Q to the list of controlled devices. If you need to add a Film Footage Encoder to the controlled devices, repeat this procedure, selecting the correct device and COM port. Make sure each COM port selector is set to the correct COM port.

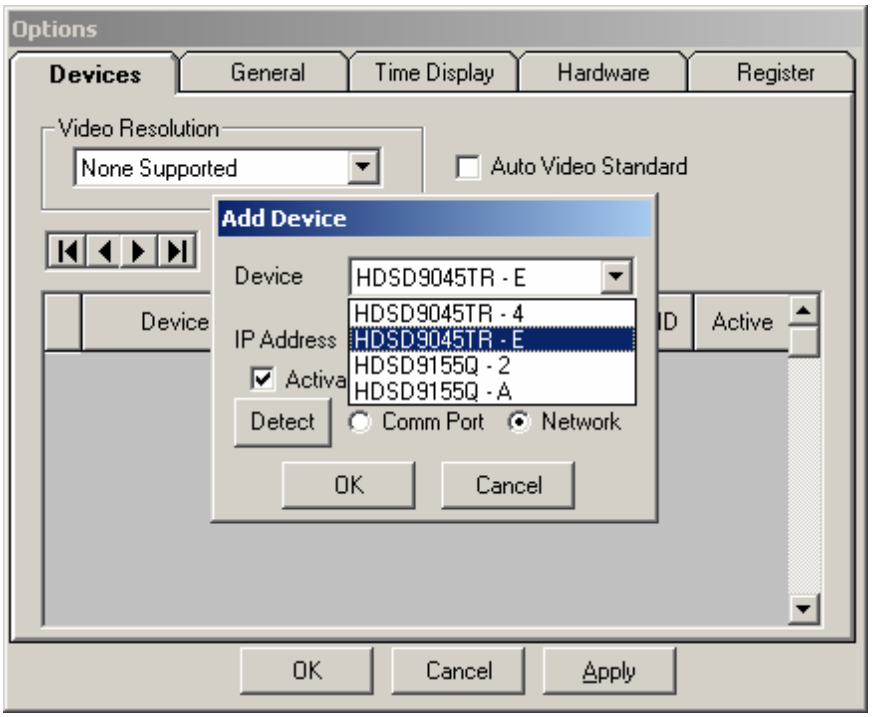


4.3.2. Communicating to the Devices Using Ethernet

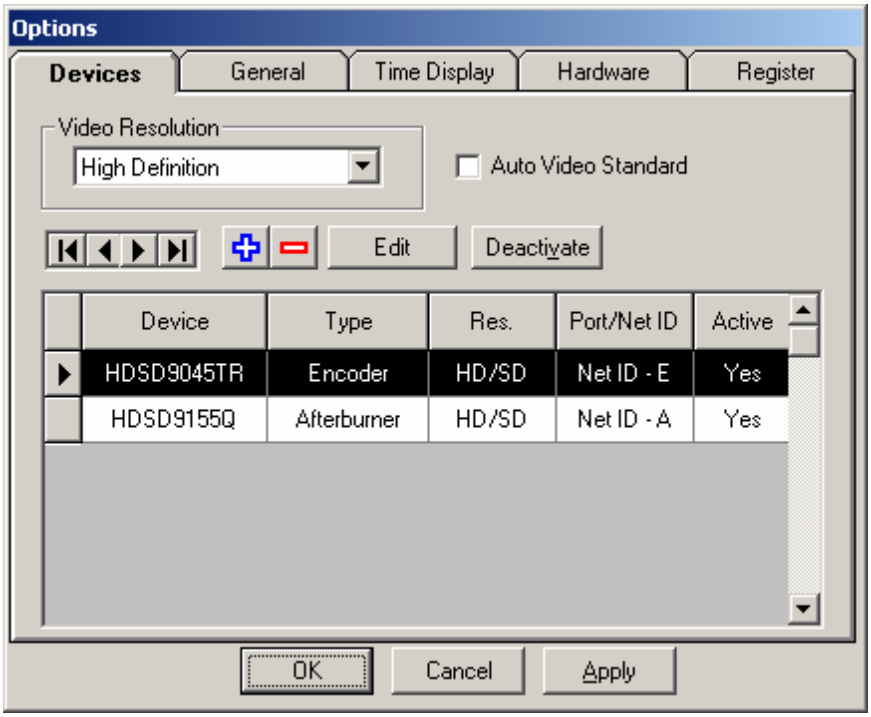
Press the  button to add the HDSD9155Q to the list of controlled devices. Press the Network radio Button for force Tracker to search the network for connected devices.



Click on the down arrow beside the *Device* dropdown and you will see a list of the detected devices and their System Ids. Choose the HDSD9155Q with the mouse. If there are no devices detected then check that you have properly connected the devices, and that their IP addresses and Subnet masks are set to match the computer's Subnet mask.

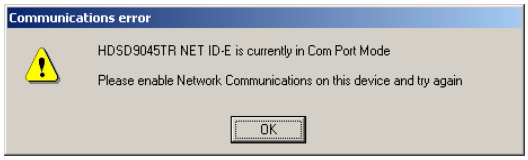


If you check the "Activate Now" check box the HDSD9155Q will automatically become active when you close the screen. Press the Okay button to add the HDSD9155Q to the list of controlled devices. If you need to add a Film Footage Encoder to the controlled devices, repeat this procedure, selecting the correct device.



The "Resolution" control allows you to configure if KeyLog TRACKER™ will be operating in the Standard Definition or High Definition mode. When the resolution control is set to the high definition mode, KeyLog TRACKER™ will *activate* the high definition capable devices. Only one encoder and one Afterburner device can be activated at any time. If the HDSD9155Q is not activated click on the HDSD9155Q line then press the Activate button. To verify communications with the HDSD9155Q, press the OK button once you have verified the device connection settings. Press the *Encoder* button on the toolbar. When you press the OK button, KeyLog TRACKER™ will attempt to communicate with the activated devices. If the KeyLog TRACKER™ is communicating with the HDSD9155Q using a serial port connection, the COM1 LED on the HDSD9155Q front panel should be On and there should also be a green indicator in the COMM Status Bar at the bottom of the KeyLog TRACKER™ screen. If the KeyLog TRACKER™ is communicating with the HDSD9155Q using an Ethernet connection, the NET LED on the HDSD9155Q front panel should be On and there should also be a green indicator in the COMM Status Bar at the bottom of the KeyLog TRACKER™ screen.

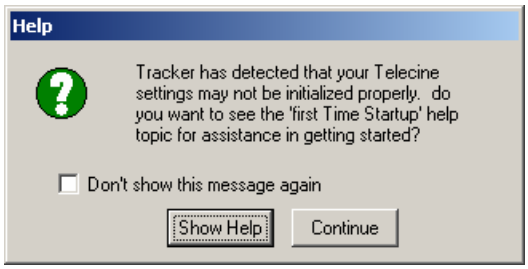
If the KeyLog TRACKER™ COMM indicator is red, that shows that the hardware is not responding. If you receive a "Communications Error" message box, check your cable connection and verify that you have selected the correct communications port on your computer. If you are trying to connect using Ethernet and the HDSD9155Q is in Com port mode, you will see the following dialog box.



You must change the HDSD9155Q to Network mode by setting the *COM 1 Func* menu item (on the *Ports menu)* to *None (*or anything other than *Tracker)*. The *Tracker Comm* status item on the *Ports* menu should be set to *Net.* (see section 3.6.2.1 and 3.6.2.3)

4.4. KEYLOG TRACKER™ FIRST TIME SETUP

The first time you run the KeyLog TRACKER™ software you will see a dialog box asking if you want to see the First Time Setup section of the Tracker online Help.



Press the *Show Help* button to view the help file. The first time setup section of the KeyLog TRACKER™ manual and online help file guides you through the steps required to configure the system. It also introduces you to some of the basic concepts of controlling the Afterburner and Film Footage Encoders from the KeyLog TRACKER™ software. We recommend that you read through this section before proceeding. The remainder of this chapter gives you additional information to configure the system timing in your telecine room, so that you can achieve consistent frame accurate transfers and VANC/VITC encoding.

Press the *Continue* button to proceed without opening the help file. Check the *Don't show this message again'* check box before pressing the *Continue* button if you do not want to see this message each time you start the KeyLog TRACKER™ software.

4.5. CONTROLLING THE 2:3 PULLDOWN IN FILM MODE

When the input video to the Afterburner is 1080p/23.98sF and the output video is set to standard definition, the Afterburner will insert 1 extra field every 4 fields to create a 29.97 Fps output video. This process, known as 2:3 pulldown can be controlled by one of three sources when the Afterburner is operating in Film mode.

- External 6 Hz Reference pulse applied to the Parallel I/O connector
- LTC Timecode being read by the LTC reader
- Video Timecode values being read from the Film ANC data packet encoded in the vertical ancillary data space of the incoming video.

If more than one source is present then the Afterburner uses the 6Hz pulse as the highest priority and the ANC data as the lowest priority. You can control the pulldown reference using the KeyLog TRACKER™ software or from the front panel using the *30 vs 24 Reference* menu option on the *Video* menu. (See section 3.4.8)

In the telecine bay, the 6Hz Pulse, being generated by the Evertz 7751SRG-HD or 5600MSC Sync Generator will be used by the Telecine Edit controller to make sure that the phase of all the sources is aligned. If the Afterburner is being used to provide the standard definition video for a slave recorder, then it is important that the Afterburner's video output also be referenced to the 6 Hz. If you use either of the timecode methods of determining the 2:3 cadence, then the Afterburner video output cadence will change as the telecine edit controller synchronizes the sources, lengthening the pre-roll time required.

If you are using the Afterburner in a dubbing area where there is no defined relationship of the incoming 1080p/23.98sF video to the system 6 Hz pulse then you should **NOT** reference the Afterburner to the 6 Hz

pulse, but use one of the timecode sources. Usually all you need is to use the Film ANC Video timecode that will be read directly from the incoming video. (See Figure 4-3)

If you use the Afterburner in both configurations (in the telecine bay and in the dubbing room) then you will need to create different configurations in KeyLog Tracker™ or use the *30 vs 24 Reference* menu item on on the *Video* menu.

The 6 Hz pulse output from the 7751SRG-HD or 5600MSC can be connected directly to the 6Hz BNC or to pin 1 of the Parallel I/O connector on the rear of the Afterburner. Pin 1 is the default input, other pins can be assigned to this function GPI FUNC menu items (see section 3.6.1.1) or by setting the appropriate system parameter value using Keylog KeyLog TRACKER™. If you are using another source for the 6 Hz pulse make sure that it is a TTL level signal that observes the timing shown in Figure 4-1. You need to configure the 6 Hz source using KeyLog Tracker™ or use the *30 vs 24 Reference* menu item on on the *Video* menu.

If you are using a pin on the GPIO connector, and controlling the Afterburner using KeyLog Tracker™, then you will need to set the appropriate system parameter value to the 6 Hz input function. Do not use the default value (zero) for pin 1 but set it explicitly to the 6 Hz input function.

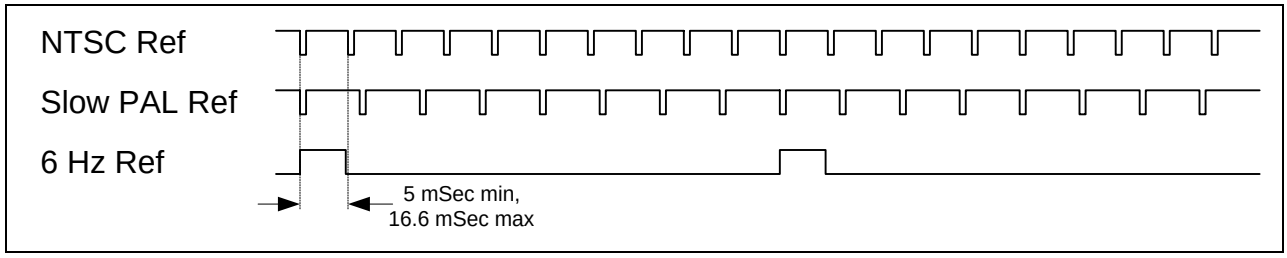


Figure 4-1: 6 Hz Reference Pulse Timing

To confirm that the Afterburner is being properly referenced to one of the 6 Hz Sources, you can turn on one of the Debug character generator windows and set the horizontal position to 11. You will see a display on the Afterburner Character generator that looks similar to the following:

```
REF: 6HZ 1 0 3
```

Consult section 6.3 for a more detailed description of how to use the debug character window and specific information on the Pulldown Reference Source Window.

For more detailed diagnostics you can use the you can use the *Reference Status* on screen display (see section 3.7.1).

Figure 4-2 shows the relationship between the incoming 1080p/24sF video and the outgoing 525i/59.94 video, with the A frames of the output video correctly aligned to the 6 Hz Pulse.

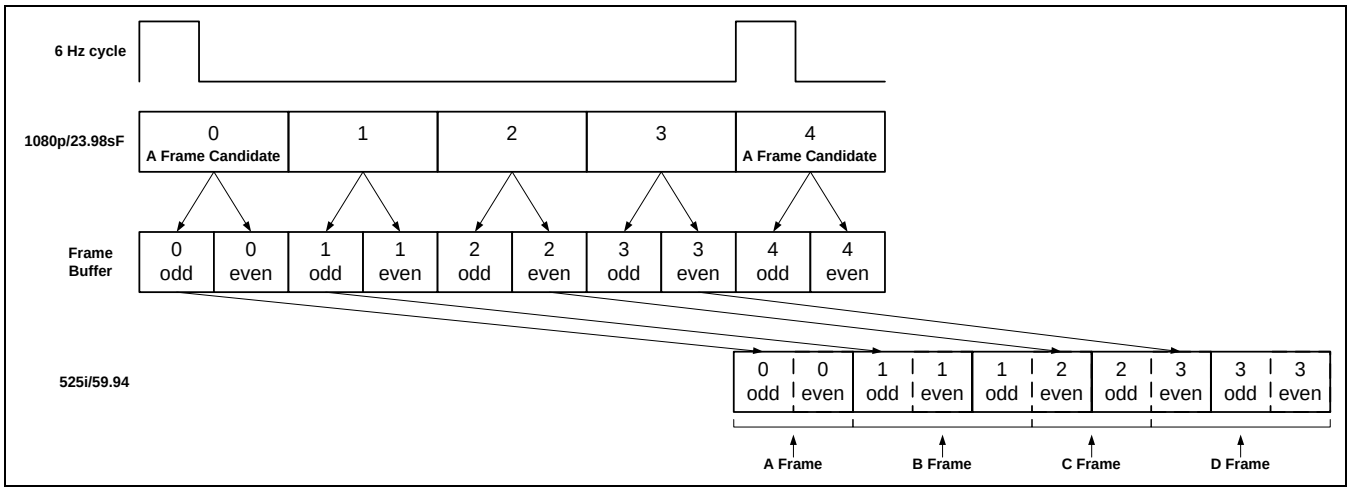


Figure 4-2: 6 Hz Referenced 2:3 Pulldown and Delay

Note that there is a 5 video frame (1/6th of a second) delay inside the Afterburner to allow for the correct A frame alignment of the output video.

Figure 4-3 shows the relationship between the incoming 1080p/24sF video and the outgoing 525i/59.94 video, with the A frames of the output video correctly aligned to the incoming timecode. Then the A frames will be aligned with the 0 frames of either the input LTC or input Film ANC video timecode.

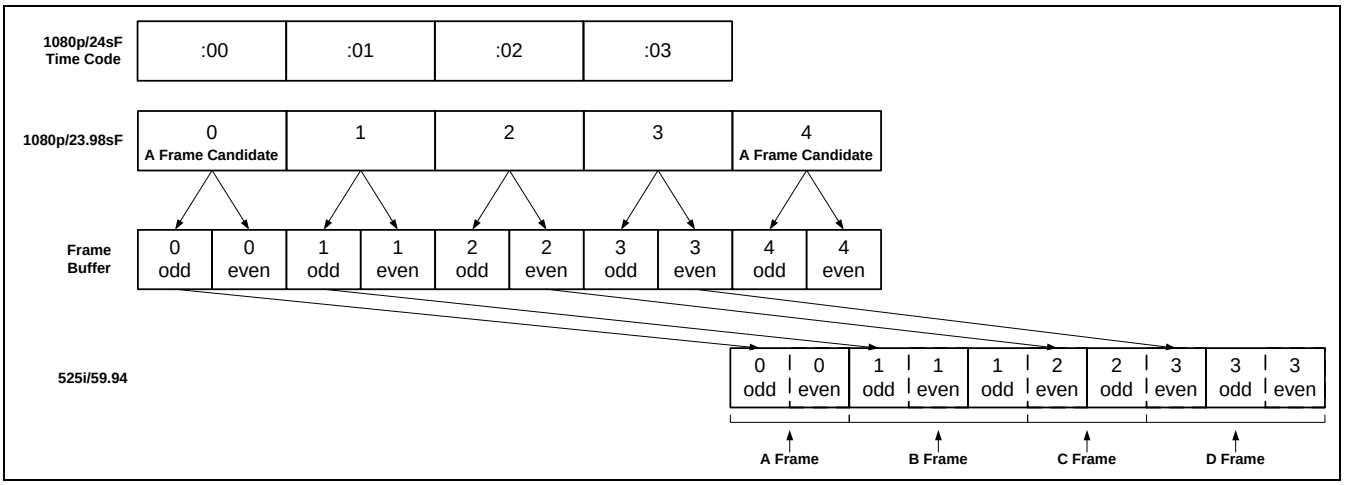


Figure 4-3: Timecode Referenced 2:3 Pulldown and Delay

CHAPTER 5: SYSTEM PARAMETERS

TABLE OF CONTENTS

Tables

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5. SYSTEM PARAMETERS

The Afterburner hardware allows the user to change the default behaviour of various functions by the use of system parameters. These parameters are grouped according to classes and can easily be changed using the KeyLog TRACKER™ software. Within each class a parameter number identifies parameters. Each parameter has a value with the default value for each parameter being zero. Parameters in class 15 apply to the Afterburner and will be described in this chapter. **Error! Reference source not found.** shows the currently defined parameters for each class with a brief description of what each parameter does. The parameter numbers shown in the tables below are decimal numbers. The following sections describe the operation of each parameter in detail.

Parameter	Name	Description
0	Afterburner Par Port Pin 1 Input Function	Input function for this pin
1	Afterburner Par Port Pin 8 Input Function	Input function for this pin
2	Afterburner Par Port Pin 4 Input Function	Input function for this pin
3	Afterburner Par Port Pin 9 Output Function	Output function for this pin
4	Afterburner Par Port Pin 5 Output Function	Output function for this pin
7	9155 Switch 1 Input Function	Input function for switch 1 (toggle 1)
8	9155 Switch 3 Input Function	Input function for switch 3 (toggle 2)
9	9155 Switch 5 Input Function	Input function for switch 5 (pushbutton)
11	Afterburner Output Video Offset	In/Out video offset
15	Afterburner LTC Smoothing Control	Bitmapped. Non-zero=smoothing in input LTC
16	Afterburner LTC Lock Delay	Lock Entry/Exit Delay before DLO
17	Afterburner TAG Change Delay	# of Fields of new TAG before TAG Chg DLO
23	Afterburner Debug Pulldown Output Enable	Non-zero enables debug pulldown o/p on video
24	Afterburner Color Space Conversion Disable	Non-zero disables color space conversion
26	Afterburner Auto Ink Frame Disable	Non-zero disables auto detection of Ink Frame # fo
27	Afterburner Alternate Audio TC Source	To be obsoleted
28	Afterburner Audio LTC Rate	Audio timecode Frame rate
29	Afterburner Alternate Audio TAG Source	To be obsoleted
30	Afterburner Character Horizontal Offset	Signed Horizontal pixel offset from default
31	Afterburner Character Vertical Offset	Signed Vertical scan line offset from default
32	9150PS Data Logging Enable	Non zero enables data logging and PS Functions
33	9150PS Delay and Advance Enable	Non zero enables Delay/Advance functions for DLO
34	9150PS Special functions	Bitmapped special function controls for 9150PS
36	Afterburner Audio Delay	+/- Num of samples of additional audio delay
37	Afterburner LTC Output Offset	+/- Num of frames of offset for LTC output

Table 5-1: Class 15 – Afterburner System Parameters

Parameter	Name	Description
10	Afterburner TC Reader Showall	Debug info for LTC and ANC Readers
18	Afterburner Debug DLO Map	DLO MAP (obsoleted by DLO maps command)
19	Afterburner Debug DLO Print	Non-Zero to enable Debug print of DLO data on Aux
20	Afterburner Debug Ram Display Addr	Display Address for WIN RAM display
25	Afterburner Debug Output Enable	Non-Zero to enable Debug o/p on KK port
26	Afterburner Font Test Enable	Non-Zero to display complete font
27	Afterburner Double Size Window Number	To be obsoleted soon
28	Afterburner Peeper Match	Match number and Mask for Peeper function
29	Afterburner Peeper Function Control	Controls peeper function
30	Afterburner Peeper Position	Controls position of Peeper Box
31	Afterburner Error Code Trace	
36	Afterburner Pretend RP188 enable	To be obsoleted
37	Afterburner LTC Auto Jitter Disable	>0 = disable LTC Tic cutoff shift, < 0 sets tic N

Figure 5-1: Class 28 – Afterburner Debug System Parameters

5.1. 9155 PARAMETERS (CLASS 15)

5.1.1. 9155 Parallel I/O Pin Functions

Parameters 0 to 2 of Class 15 control the functions of the three input pins on the Parallel I/O Connector. Parameters 3 and 4 of Class 15 control the functions of the two output pins on the Parallel I/O Connector. When the parameter value is set to zero (0) the default function of the I/O pin is selected as shown in Table 5-2.

The default pin functions are:

Pin	Signal Name	Description
1	Virtual Slate	GPI to control Virtual Slate visibility
4	Aspect Ratio	Alternate between Letterbox and Squeeze aspect ratios
5	DBUG_FRID	Output toggles with picture pulldown (FRID 3:2)
8	INP_FUNC_CHRONOFF	Falling edge -> Chars off, Rising edge -> Chars on
9	DBUG_SEQ_6HZ	Hi = start field of output video 6Hz cycle

Table 5-2: Default Afterburner I/O Pin Functions

To change the functions of the input pins change the respective parameter for the pin to the following values. (Negative values are input functions, and positive values are output functions).

Parameter Value	Signal Name	Description
0	INP_FUNC_DEFAULT	Functions as **default** input
-1	INP_FUNC_VSTD	Falling edge -> 1080i60, Rising edge -> 1080P24
-2	INP_FUNC_VSTD_INV	Falling edge -> 1080P24, Rising edge -> 1080i60
-11	INP_FUNC_CHRONOFF	Falling edge -> Chars off, Rising edge -> Chars on
-12	INP_FUNC_CHRONOFF_INV	Falling edge -> Chars on, Rising edge -> Chars off
-13	INP_FUNC_6HZREF	Rising edge -> Start of 6Hz reference cycle
-14	INP_FUNC_6HZREF_INV	Falling edge -> Start of 6Hz reference cycle
-15	INP_FUNC_CHRTOGL	pin toggles character on/off
-16	INP_FUNC_CHRTOGL_INV	Pin toggles character on/off inverted
-21	INP_FUNC_VDEF	Falling edge -> standard def, Rising edge -> Hi-def
-22	INP_FUNC_VDEF_INV	Falling edge -> Hi-def, Rising edge -> standard def

Table 5-3: Alternate Afterburner Input Pin Functions

Parameter Value	Signal Name	Description
0	DBUG_MISC_NONE	Functions as **default** input
30	DBUG_FRID	Output toggles with picture pulldown (FRID 3:2)
31	DBUG_FRAME	1 field active low pulse on new picture (FRAME)
32	DBUG_SEQ_6HZ	Hi = start field of output video 6Hz cycle
33	DBUG_UPDVOFLDDB	Active low Blip at start of each field
34	DBUG_ANCERR	Active low pulse on ANC errors
35	DBUG_ANCF1DUPERR	Active low pulse on ANC VTR TC field 1 error
36	DBUG_ANCF2DUPERR	Active low pulse on ANC VTR TC field 2 error
37	DBUG_VTRSTARERR	Active low pulse on VTR TC displays stars (errors)
38	DBUG_IO_SAMPLE	Toggles at each sampling of the inputs

Table 5-4: Alternate Afterburner Output Pin Functions

CHAPTER 6: TECHNICAL DESCRIPTION

TABLE OF CONTENTS

Tables

6. TECHNICAL DESCRIPTION

6.1. SPECIFICATIONS

6.1.1. Serial Digital Video Input

Standard:

HDTV Mode	1.485 Gb/sec 4:2:2 HDTV serial digital (SMPTE 292M) or 4:4:4 RGB dual link HDTV serial digital (SMPTE 372M) 1080i/59.94, 1080i/50, 1080p/29.97sF, 1080p/25sF, 1080p/23.98sF and 720p/59.94 - selectable or auto-detect
SDTV Mode	4:2:2 SDTV serial component 270 Mb/s (SMPTE 259M-C) 525i/59.94 and 625i/50 - selectable or auto-detect (feature not implemented at time of writing)
Connector:	1 BNC per IEC 60169-8 Amendment 2
Equalization:	Automatic to 300m @ 270Mb/s with Belden 8281 or equivalent cable Automatic to 130m @ 1.5Gb/s with Belden 1694 or equivalent cable
Embedded Audio:	SMPTE272M or SMPTE 299M – supports up to 4 groups

6.1.2. Serial Digital Video Output

Standards:	Same as input or 4:2:2 serial component 270 Mb/s (SMPTE 259M-C) 525i/59.94 if input is 720p/59.94, 1080i/59.94 or 1080p/23.98sF 625i/50 if input is 1080i/50
Connectors:	BNC per IEC 60169-8 Amendment 2
Number of outputs:	2 program, 2 monitor
Embedded Audio:	SMPTE 272M or SMPTE299M –up to 4 groups transferred from input video
Signal Level:	800mV nominal
DC Offset:	0V ±0.5V
Rise and Fall Time:	200ps (HD) or 470ps (SD) nominal
Overshoot:	<10% of amplitude
Return Loss:	> 15 dB
Wide Band Jitter:	< 0.2 UI

6.1.3. Analog Monitor Video Output

Standards:	Inactive if MON 4:2:2 outputs are HD video rate Analog composite NTSC if MON 4:2:2 outputs are 525i/59.94 Analog composite PAL if MON 4:2:2 outputs are 625i/50.94
Connectors:	BNC per IEC 60169-8 Amendment 2
Number of outputs:	1 monitor
Signal Level:	1 V p-p nominal, internally adjustable
DC Offset:	0V ±0.1V
Return Loss:	>35dB up to 5 MHz
Frequency Response:	0.8dB to 4 MHz
Differential Phase:	<0.9°(<0.6° typical)
Differential Gain:	<0.9% (<0.5 % typical)
SNR:	>56dB to 5 MHz (shallow ramp)
Impedance:	75 ohm

6.1.4. LTC Generator

Standard: SMPTE 12M
Frame Rate: 25 and 30 Fps nominal
Connector: 3 pin male XLR type connector.
Level: Adjustable, 0.5V to 4.5V p-p

6.1.5. LTC Reader

Standard: SMPTE 12M
Frame Rate: 24, 25 and 30 Fps nominal
Connector: 3 pin female XLR type connector
Level: 0.2 to 4V p-p, balanced or unbalanced

6.1.6. Ancillary Data Reader

Standard: SMPTE RP188 Ancillary Timecode or RP215 Film Transfer Data
Line Select: Autodetect valid lines in vertical interval
Frame Rate: 24, 25 and 30 Fps nominal

6.1.7. Ethernet

Network Type: Fast Ethernet 100 Base-TX IEEE 802.3u standard for 100 Mbps baseband CSMA/CD local area network
Ethernet 10 Base-T IEEE 802.3 standard for 10 Mbps baseband CSMA/CD local area network
Connector: RJ-45
Function: Firmware upgrades via FTP, control and monitoring

6.1.8. Serial Communications

Standard: RS-232, 57600 baud, 8 bits, no parity
Format: 8 data bits, no parity, 2 stop bits
Number or ports: 2
Connectors: 9 pin female “D”
Function:
- **Serial Control:** Control/monitoring using KeyLog TRACKER™ software
- **Aux COM:** Transmit VANC data packets, debug monitoring and control

6.1.9. General Purpose Inputs and Outputs

Number: 3 Inputs and 2 outputs
Type: High impedance, with 1 Mohm pull up to +5V
Open collector outputs, 1 Mohm pull up to +5V
menu selectable functions
Connector: 9 pin female “D”

6.1.10. Physical

Dimensions: 19“ W x 1.75” H x 18.75” D.
(483mm W x 45mm H x 477mm D)
Weight: 8 lbs. (3.5Kg)

6.1.11. Electrical

Power: Auto ranging 100-240 VAC 50/60 Hz, 40 Watts, ETL listed.
Complies with EU safety directive

EMI/RFI: Complies with FCC Part 15 Class A,
EU EMC Directive

6.2. UPGRADING FIRMWARE

The Afterburner contains application firmware that is contained in a FLASH EPROM device. From time to time firmware updates will be provided to add additional features to the unit. In addition the Afterburner contains a separate set of firmware for the network interface CPU.

Sometimes, updating the firmware in the unit will cause a reset of the non-volatile memory settings to their factory default values, including the IP addresses of the units. If this occurs, you may not be able to upgrade the firmware until you re-program your custom IP addresses back into the Afterburner. If you are operating the Afterburner in a stand-alone configuration (not using KeyLog TRACKER™ to configure the unit) it is advisable to save the current configuration before you update the firmware. If the non-volatile settings are reset during the firmware upgrade you will be able to restore them after you have restored the IP addresses of the Afterburner.

There are four methods of updating the firmware in the Afterburner: KeyLog TRACKER™ (serial communication or FTP), PostUpgrade Utility (FTP), manual File Transfer Protocol (FTP) and Serial communication upload. Due to the large size of the firmware binary files one of the FTP methods is the preferred method of updating the firmware. If you have KeyLog TRACKER™ connected to the Afterburner using an Ethernet connection then you can do a FTP firmware update using the KeyLog TRACKER™ software.

Prior to initiating the upgrade process:

- Download the new application code from the download section of the Evertz web site (www.evertz.com/download.php). Choose the firmware downloads section and type in `HDSD9155Q` in the model number entry box and press the "GO" button. Unzip the file into a working folder on your PC. If you are using the KeyLog TRACKER™ software you should place the file into the "Firmware" sub-folder of the Tracker installation folder (C:\Program Files\Evertz\Tracker by default). If you are using the PostUpgrade utility software you should place the file into the same folder (or a sub folder) as the PostUpgrade installation folder.

Set up the temporary working folder in the root of your c:\ drive with a maximum 8 character folder name. This will make it easier to navigate the file system from the command prompt that only allows 8 character file names in some operating systems.

Firmware file names use the following naming conventions. (xxxx is the build number)

Firmware File name	Description
HS9155Q_xxxx	Afterburner main application firmware
NETIF_xxxx	Afterburner Network interface CPU firmware

To update the firmware using the KeyLog TRACKER™ software follow the procedure outlined in section 6.2.1. To update the firmware using the PostUpgrade FTP utility software follow the procedure outlined in section 6.2.2. To update the firmware using the FTP upgrade process follow the procedure outlined in section 6.2.3. To update the firmware using the serial upgrade process follow the procedure outlined in section 6.2.4.

6.2.1. KeyLog TRACKER™ Method of Updating Firmware

You will need the following equipment in order to update the Firmware using the KeyLog TRACKER™ method:

- PC with KeyLog TRACKER™ software running
- PC connected to the Afterburner as described in section **Error! Reference source not found.**
- New firmware supplied by Evertz.

6.2.1.1. Step 1 – Configuring the Unit for Firmware Upgrades

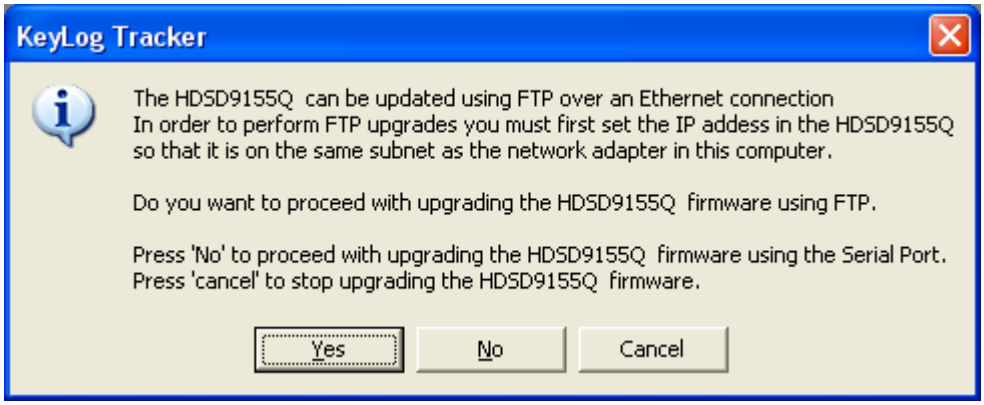
1. Power up the unit.

6.2.1.2. Step 2 – KeyLog TRACKER™ Setup

2. Start KeyLog TRACKER™

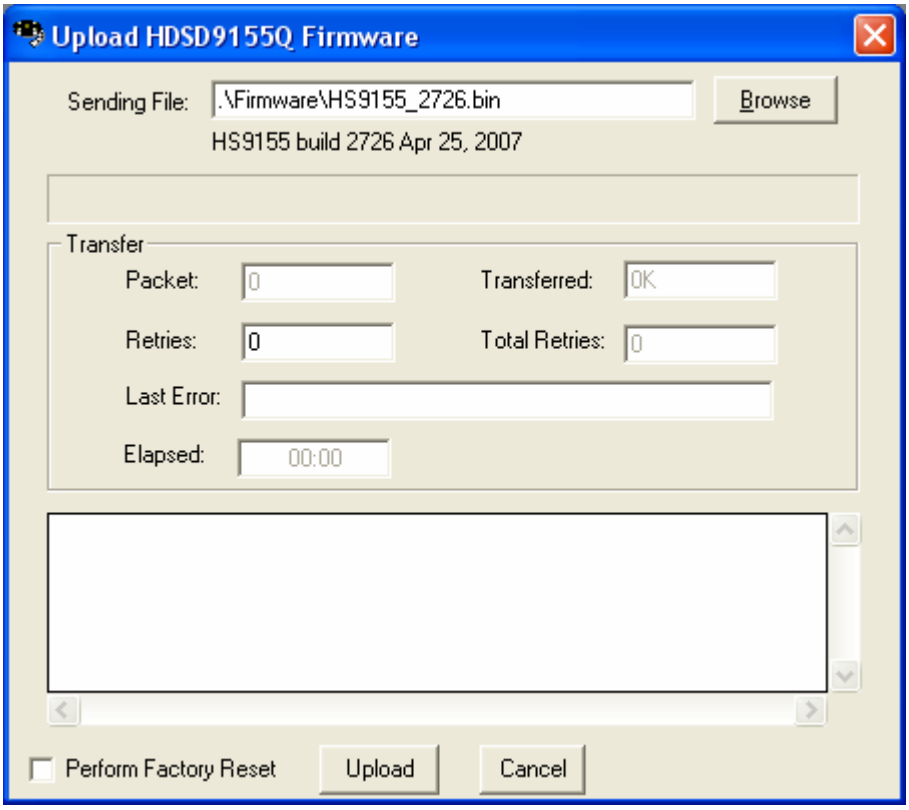
3. Confirm that you have established communications to the unit that you wish to upgrade. (A green COMM indicator will show at the bottom of the KeyLog TRACKER™ screen)

4. From the TOOLS menu of the KeyLog TRACKER™ choose the UPGRADE FIRMWARE option. A dialog box asking you to choose the serial port or FTP method will appear.



If you are connected to the Afterburner over a network (see section 6.2.2.1 for info about connecting the network) you can upgrade using the FTP method by pressing the “Yes” button. From here the procedure is similar to the PostUpgrade Utility. Follow the instructions starting in step 6 of section 6.2.2.2.

If you wish to upgrade using the serial port method press the “No” button. You will be presented with the following dialog box.



5. Use the BROWSE button to open the file dialog and choose the new firmware file. Typical filenames are shown above. The build version of the firmware will be shown in the dialog box.

6. Click the UPLOAD button at the bottom of the upgrade dialog. Tracker will begin upgrading the firmware showing the communications and progress of the upgrade. On successful completion of the upload the unit should now reboot. After the unit reboots successfully with the new firmware the 'Upload Firmware' dialog will disappear. You can then resume normal operations with the KeyLog TRACKER™ software.

7. If the upgrade is interrupted or cancelled before completion, then KeyLog TRACKER™ will not be able to communicate to the unit. In that case you will have to manually upload the firmware using the procedure outlined in section 6.2.4.

6.2.2. PostUpgrade FTP Utility Method of Updating Firmware

You will need the following equipment in order to update the Firmware using the PostUpgrade FTP utility software:

- PC with Ethernet network port
- Appropriate Ethernet cable as outlined in section 2.5
- PostUpgrade utility software downloaded from the Evertz web site. Install the utility on your PC by double clicking on the PostUpgrade.EXE file.
- New firmware downloaded from the Evertz web site as described in section 6.2. Unzip the firmware into the same folder where you installed the PostUpgrade utility software.

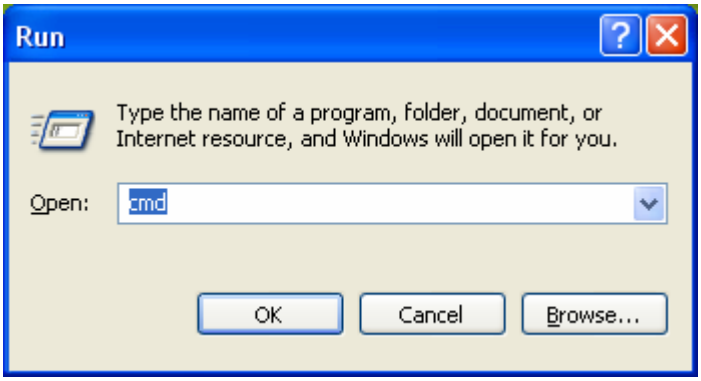
6.2.2.1. Step 1 – Establishing a Valid Network Connection

Before any FTP (file transfer protocol) upgrades can be initiated, the user must determine the IP address of the Afterburner. Both the PC/laptop and the units must be on the same subnet for the FTP upgrade to work properly. See section 3.6.3.

1. The *System IP* menu item allows the user to set the networking parameters of the unit. See section 3.6.3. If you are not sure how to set the network parameters, contact your networking/IT administrator.

   Once you return to the Main Menu wait for 30 seconds for the new network parameters to be saved in the Flash memory.
2. Connect a crossover network cable from the PC/laptop to the unit. If you are connecting through a hub then use a straight through network cable as shown in section 2.5.

3. On your PC, open a Command Prompt window. This can be accomplished by using the run command under the start button, type "cmd"; see figure below for an example:



4. "Ping" the IP addresses of both devices in the system. (Afterburner main CPU and network CPU) For example in the command window type:

```
C:\>ping 192.168.9.10 <Enter>
```

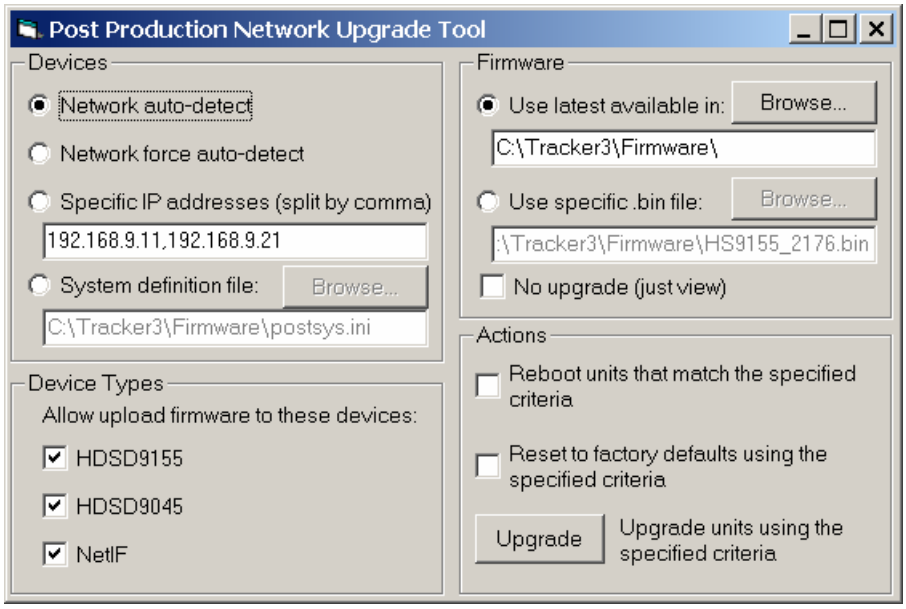
   If a proper network connection has been established to the device, a "reply" is displayed on the DOS window. If there is a faulty network connection, a "Destination Host Unreachable" message is provided. If this occurs, either the IP addresses of the nodes should be verified or the network (Ethernet) cable is faulty. For more information, please see section 2.5 of this manual.

   If you are unable to 'ping' the devices, you will have to use the serial port upgrade method outlined in section 6.2.4

6.2.2.2. Step 2 – Upgrading the Application Code

The firmware in the Afterburner main CPU and network CPU need to be in a matched set for proper operation of the system. If you are upgrading multiple firmware images you should upgrade the Afterburner main application code first, and the network CPU last. If you do not follow this order you may not be able to update some parts of the system using the FTP method.

5. Start the PostUpgrade Software



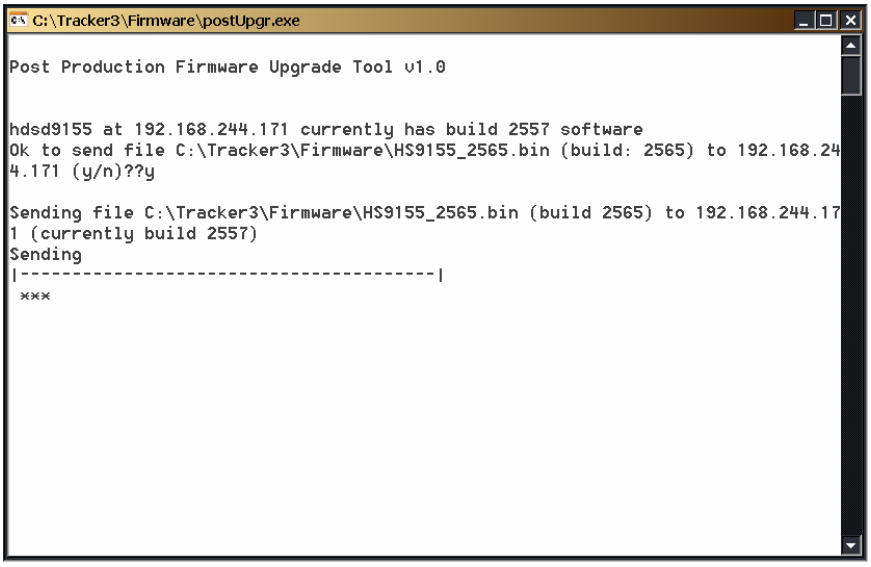
6. The Devices box allows you to choose how you are going to specify the units to be upgraded.
- If you have the *Network Announce* function turned on in your Afterburner the firmware utility can auto-detect your unit.
- If you have the *Network Announce* function turned off, you can force an auto-detect by checking the appropriate radio button.
- You can specify a list of valid IP addresses for units you wish to upgrade
- You can list the valid IP addresses in a “System Definition File” such as the *Postsys.ini* sample file provided with the PostUpgrade utility.

7. The Device Types box allows you to choose the device types you are upgrading.
- Check the type of device you are upgrading.
- If you want to upgrade the network interface CPU also check that box.

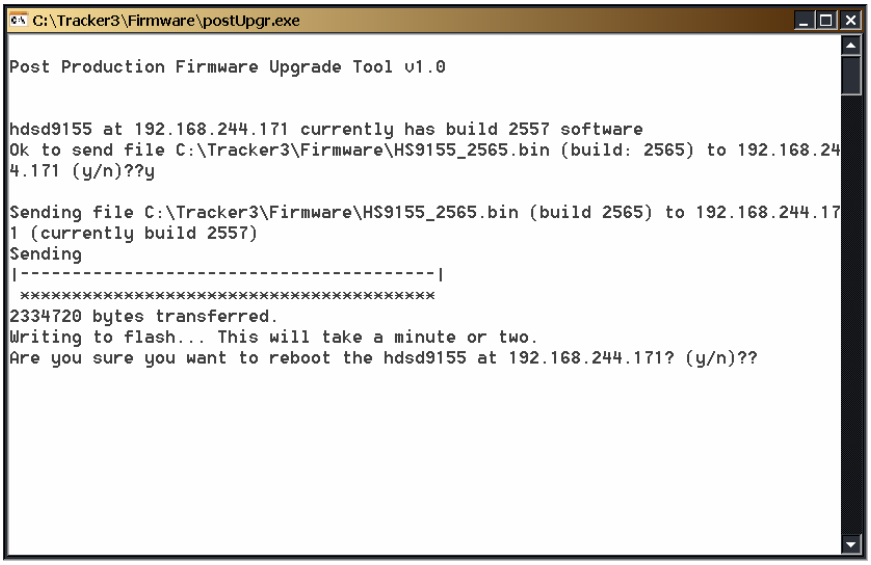
8. The Firmware box allows you to select the location of the firmware you will send.
- You can send the latest firmware in the specified folder
- You can send a specific firmware version from the specified location
- You can just run the utility to see what versions are installed in each unit.

9. The Action box allows you to determine what actions you will perform after the upgrade
- You can reboot the device after upgrading the firmware (recommended). The firmware you upload to the unit will not become active until after a reboot.
- You can reset the device back to its factory defaults. This action will cause the IP settings to revert to the factory default values, and therefore you may lose communications with the unit. Use the Factory Reset feature with caution. It is not normally required for firmware upgrades.

10. After you have selected the upgrade options that you want, press the "Upgrade” button. The PostUpgrade software will open an FTP session on your computer and begin communicating with each of the devices that you have specified. It will prompt you before upgrading or rebooting individual units. You will get a progress indicator as the firmware is sent to the unit.



11. After the firmware is transferred it will be written to the Flash memory of the unit – this will take a minute or two. The On screen display and the front panel will also provide some progress indicators during the upgrade. The screen below shows a sample of what you would expect when upgrading your Afterburner.



12. When the upgrade is complete the FTP session will end. You can close the PostUpgrade utility software.

6.2.3. Manual FTP (File Transfer Protocol) Method of Updating Firmware

You will need the following equipment in order to update the Firmware using the FTP process.

- PC with Ethernet network port
- Appropriate Ethernet cable as outlined in section 2.5.
- New firmware downloaded from the Evertz web site as described in section 6.2.

6.2.3.1. Step 1 – Establishing a Valid Network Connection

Before any FTP (file transfer protocol) upgrades can be initiated, the user must establish a valid network connection.

1. Follow the procedure in section 6.2.2.1 to establish a valid network connection.

The Network Interface CPU and the main CPU in the Afterburner share the same IP address. An FTP connection to the Afterburner using the default FTP port of 23 will FTP to the main CPU. In order to FTP to the Network CPU you must use port 50023. Note that some FTP client (including the standard one provided with Windows) will not allow you to FTP to port 50023. It is therefore recommended that you use the KeyLog TRACKER™ or the PostUpgrade utility if you need to update the network interface firmware.

6.2.3.2. Step 2 – Upgrading the Application Code

The firmware in the Afterburner main CPU and network CPU need to be in a matched set for proper operation of the system. If you are upgrading multiple firmware images you should upgrade the Afterburner main application code first, and the network CPU last. If you do not follow this order you may not be able to update some parts of the system using the FTP method.

2. In the Command window type: `ftp xxx.xxx.xxx.xxx` (IP address)

3. Press the <Enter> key when prompted for a "Username"

4. Press the <Enter> key when prompted for a "Password"

5. Type "`hash`" at the "`FTP>`" to turn on the progress indicator during the ftp upload.

6. At the "`FTP>`" prompt, type the following: `put "the name of the file.bin".`
   (For example: "`put hs9155q_1133.bin`")

7. If the application file is not local to where you are performing the ftp, then include the path with the name (For example: `put c:\firmware\hs9155q_2557.bin`)

8. The FTP screen displays a message indicating the successful opening of a data connection to the device.

9. The file transfer takes about 90 seconds during which time you will see the transfer progress indicated by # characters on the FTP screen. You will also see a progress indication on the On screen display and the Afterburner front panel.

10. When the # characters stop the unit will transfer the firmware to its Flash memory. During this process, which takes about 60 seconds, you will not see any activity on the FTP screen. The On screen display will show the progress of writing the application code to the Flash memory.

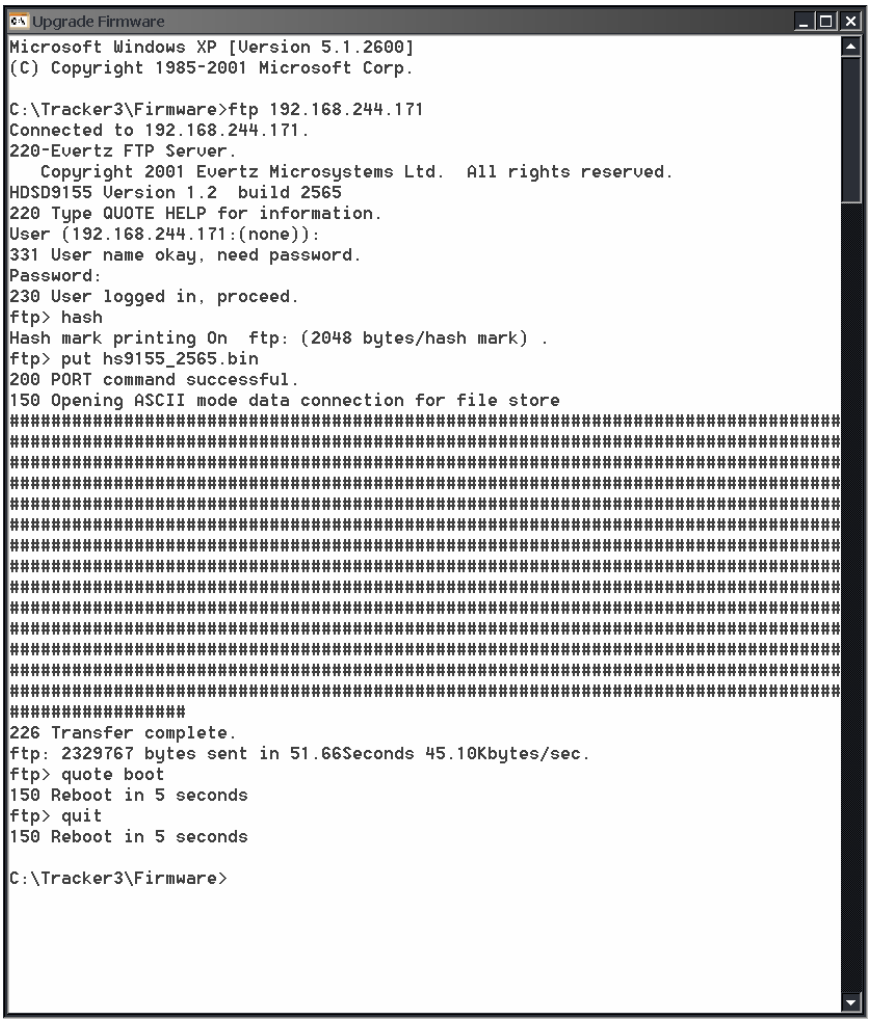
During this time it is mandatory that all power cycles of the unit be avoided.

11. You will see a 'Transfer complete' message when the firmware has been successfully written to the flash memory.

12. Type "`quote boot`" at the "FTP>" prompt to reboot the unit so that the new firmware will take effect. You will see a message indicating that the unit will reboot in 5 seconds.

13. Within 5 seconds type "`quit`" at the "FTP>" prompt to exit the FTP session for this unit before it reboots. If you do not quit the session before the reboot then the FTP session will freeze and you will have to type `<ctrl-C>` one or more times to terminate the FTP session.

The screen below shows a typical FTP session for upgrading the Afterburner main application code.



6.2.3.3. Step 3 – Completing the Upgrade

14. When you are done upgrading the Afterburner you can close the DOS window and disconnect the network cable.

6.2.4. Serial Port Method of Upgrading Application Firmware

You will need the following equipment in order to update the camera adapter or base station firmware.

- PC with available communications port. The communication speed is 57600 baud, therefore a PC capable of supporting this baud rate is required.
- "Straight-thru" serial extension cable (DB9 female to DB9 male)
- Terminal program that is capable of Xmodem file transfer protocol. (such as HyperTerminal)
- New firmware downloaded from the Evertz web site as described in section 6.2

6.2.4.1. Step 1 – Terminal Program Setup

1. Connect the serial cable to the **SERIAL CONTROL** DB9 connector.

2. Connect the 9 pin connector on the end of the serial update cable to the PCs' RS-232 communications port.

3. Start the terminal program.

4. Configure the port settings of the terminal program as follows:

Baud	**57600**
Parity	**no**
Data bits	**8**
Stop bits	**2**
Flow Control	**None**

5. Power up the Afterburner unit.

6.2.4.2. Step 2 – Invoke Upload Mode from the Terminal Program

7. Power up the unit. After the unit powers up, a banner with the boot code version information should appear in the terminal window. The cursor to the right of the word BOOT> should be spinning for about 5 seconds then the unit will continue to boot.

   For example:

```
EVERTZ MCF5407 MONITOR 2.3 BUILD 8
COPYRIGHT 1997, 1998, 1999, 2000, 2001, 2002 EVERTZ MICROSYSTEMS LTD.
28F160C3B FLASH DETECTED
MCF5407 COLD BOOT> |
```

8. The following is a list of possible reasons for failed communications:

   - Defective Serial Upgrade cable.
   - Wrong communications port selected in the terminal program.
   - Improper port settings in the terminal program. (Refer to step 7 for settings). Note that HyperTerminal will not change port settings while connected. Click on HyperTerminal's "Disconnect" Button then click the "Reconnect" button to activate changes to the port settings.
   - PC requires hardware flow control despite the HyperTerminal settings.

9. While the cursor is spinning press the <CTRL> and <X> keys on your computer keyboard at the same time, this should stop the cursor from spinning. The spinning prompt will only remain for about 5 seconds. You must press <CTRL-X> during this 5 second delay. If the unit continues to boot-up, simply cycle the power and repeat this step.

10. Hit the <ENTER> key on your computer once.

11. Type the word “upgrade”, without quotes, and hit the <ENTER> key once.

12. The boot code will ask for confirmation. Type "y", without quotes.

13. You should now see a prompt asking you to upload the file.

6.2.4.3. Step 3 – Uploading the New Firmware

14. Upload the “*.bin” file supplied using the X-Modem transfer protocol of your terminal program. If you do not start the upload within 10 minutes the unit’s Boot code will time out. You can restart the upgrade process by power cycling the unit.

15. The boot code will indicate whether the operation was successful upon completion of the upload.

For Example:

```
UPLOAD OKAY
MCF5407 COLD BOOT> |
```

16. The following is a list of possible reasons for a failed upload:

- If you get the message "transfer cancelled by remote" you must restart the terminal program and load the bin file, then remove and install the module again.
- The supplied “*.bin” file is corrupt.
- Wrong file specified to be uploaded.
- Wrong file transfer protocol used – make sure you specify Xmodem, not Xmodem 1K.
- The PCs’ RS-232 communications port cannot handle a port speed of 57600.
- Noise induced into the Serial Upgrade cable.

6.2.4.4. Step 4 – Completing the Upgrade

17. Type the word “boot”, without quotes, and hit the <ENTER> key once or power cycle the unit. The unit should now reboot.

18. You can now close the terminal program and disconnect the RS-232 serial cable from the PC.

6.3. DEBUG WINDOW DISPLAYS

The HDSD9155Q has 3 text windows called *DEBUG, DEBUG2* and *DEBUG3*. These windows can be controlled using the WINDOWS tab of the project or system configuration in the KeyLog TRACKER™ software or using the VCG Windows pushbutton group on the front panel. These windows can display additional diagnostic information on the output video. Changing the HORIZONTAL position value for the DEBUG window controls what information is displayed. (The window cannot be moved horizontally).

The format and content of the displays may change as the firmware evolves, but here are the current displays. Some content is intended for use only by the Evertz engineers, and is not documented.

Some displays show a line of @@@@@@@@@@@@@@@@@@@@ characters under specific conditions. These displays are designed to be visible on an oscilloscope that is monitoring the output video (usually in some analog form).

Hor Pos Value	Debug Window Name	Description
0	WIN HW	IN: binary i/o pins DIP: binary dip switch input
1	WIN TFPHASE	VTF: video to film phase ATF: audio to film phase
2	WIN TFPHASERR	VTFX: error of video to film phase w.r.t target phase
3	WIN VFLD2	@@@@@ on field 2 characters
4	WIN VPULL	@@@@@ on new picture (pulldown)
5	WIN F0	@@@@@ on kk frames == 0
6	WIN V0	@@@@@ on VTR timecode frames == 0
7	WIN A0	@@@@@ on ATR timecode frames == 0
8	WIN VAPHASE	VPH: video phase APH: audio phase
9	WIN PULLT	PULL: pull type of KK
10	WIN ILTC	ILTC: LTC reader input
11	WIN REF	REF: ref src valid phase lock count
12	WIN VIDEO	VID: input video type -> output video type
13	WIN ANC VTR	ANC Video timecode
14	WIN ANC ATR	ANC Audio timecode
15	WIN MODES	RP215 Film ANC encoded information
16	WIN POP UP ERRORS	POP UP ERRORS
17	WIN IDLE	Processor Idle Measurement
18	WIN DLO	Data Logging Output
19	WIN GPI	GPI input frame number
20	WIN PRESET STS	STATUS: USER CONFIGURATION
21	WIN OP1 STS	Output 1 - Parallel connecter Pin 9 status
22	WIN OP2 STS	Output 2 - Parallel connecter Pin 5 status
23	WIN SLTC	Smoothed LTC stats
24	WIN REV	FCYCLE
25	WIN VCYCLE	V CYCLE
26	WIN FAN	Fan Monitoring
27	WIN NONE	
28	WIN ANC VUB	ANC Video User Bits Status
29	WIN ANC AUB	ANC Audio User Bits Status
30	WIN LTCO	LTC Output Status
31	WIN DOLLYIF	PVE ANC Dolly Group Data
32	WIN CAMANC	PVE ANC Camera Group Data
33	WIN USER	PVE ANC User Data
34	WIN MATERIAL	PVE ANC Material Group Data
35	WIN LABEL	PVE ANC Label Group Data
36	WIN LUT	HDSD9155Q LUT Stats
37	WIN REV	Afterburner Firmware Revision
38	WIN RAM	Ram viewer values
Last	WIN RAM	00000000: ram viewer values

Table 6-1: Debug Window Functions

6.3.1. WIN HW (0) Hardware Display

```
IN: 011 DIP:11111110 SW:001
```

IN: 011	Real time display of parallel port inputs MSB (2) to LSB (0), including some internal inputs.
DIP:11111110	Real time display of DIP switch, MSB (8) to LSB (1), where 0 indicates switch is in the DOWN/ON position.
SW:001	Real time display of front panel switch inputs MSB () to LSB () - only displayed for HD9155 and HD9155AES.

6.3.2. WIN TFPHASE (1) Timecode to Film Phase Indicator

```
VTF:0000000.0 A:0000000.0
```

VTF:0000000.0	Video timecode abs frames extrapolated back to film abs frames 0.
A:0000000.0	Likewise for the audio timecode.

6.3.3. WIN TFPHASERR (2) Timecode to Film Phase Error Indicator

```
VTFX:0000000.0 ATFX:0000000.0
```

VTFX:00000000	Error between displayed video timecode absolute frames extrapolated back to film absolute frames 0 (video-tfphase) and expect video-tfphase computed from Film ANC data.
ATFX:00000000	Likewise for the audio timecode.

6.3.4. WIN VFLD2 (3) Video Field 2

@@@@@ on video field 2 characters

6.3.5. WIN VPULL (4) Video Pulldown

@@@@@ on new picture (pulldown)

6.3.6. WIN F0 (5) KeyKode Frames 0

@@@@@ on KeyKode frames == 0

6.3.7. WIN V0 (6) Video Timecode Frames 0

@@@@@ on VTR timecode frames == 0

6.3.8. WIN A0 (7) Audio Timecode Frames 0

@@@@@ on ATR timecode frames == 0

6.3.9. WIN VAPHASE (8) Timebase Phase

```
VPH:0.000 APH:0.000 3
```

VPH:0.000	Video timebase phase
APH:0.000	Audio timebase phase
3	Pulldown reference lock counter, 0=unlocked, 3=locked

6.3.10. WIN PULLT (9) Pulldown Type

```
PULL:K-A  V-A B A(L):+0
```

K-A	is the pulldown indicator (A, B, C, D) of KeyKode ffff+00 frames.
V-A	is the pulldown indicator (A, B, C, D) of video timecode hh:mm:ss:00 frames.
B	is the pulldown indicator (A, B, C, D) of the current picture field
A(L)	(L) indicates audio timecode derived from LTC input, otherwise from ANC input
:+0	phase of audio timecode at video frame 0.

6.3.11. WIN ILTC (10) LTC Reader Input Data

```
LTC:%100T0+1L23:59:59:23@24
```

':'	LTC threshold set at 50% of frame. or '.' LTC threshold set at 70% of frame.
%100	Valid read rate as a percentage of expected read rate
T0	Phase of LTC input (0-9) w.r.t video/audio timebase. T1 indicates LTC was complete somewhere between 0% and 10% of the frame.
+1	Numeric difference of timecode between successful reads
L	Dynamics flags L-locked, P-play, F-forward, S-stop, R-reverse
23:59:59:23	Raw, uncompensated timecode read (NOT LIKELY TO EXACTLY MATCH picture content!) ':' will be replaced by '*' when timecode not valid, or not readable or discontinuous
@24	Timecode counting rate. or shown as @24/30 timecode counting rate / expected rate

6.3.12. WIN REF (11) Pulldown Reference Source Indicator

```
REF:ANC 1 0 3 @24
```

ANC	Pulldown referenced to ANC/6HZ/LTC/NONE source
1	Valid indicator - 0 = not valid
0	Video Timecode frame number mod 4 w.r.t reference - 0,1,2,3
3	Pulldown reference Lock counter - 3 = locked, 0= unlocked
@24	Timecode rate of reference timecode

6.3.13. WIN VIDEO (12) Video Mode Indicator

```
VID:1080P/23.98SF->525i/59.94 AV
```

1080P/23.98SF->525i/59.94	Displays the current input and output video standards,
AV	Indicates auto-video standard switching is enabled

6.3.14. WIN ANC VTR (13) ANC Video Timecode

```
VAL:%100 F1 L23:59:59:23@24/24
```

L	Source type L=RP188LTC, 1=RP188VITC1, 2=RP188VITC2, F=RP215
%100	Valid read rate as a percentage of expected read rate
F1	Fields in which data is read - F12 indicates both field 1 and field 2
L	Dynamics flags L-locked, P-play, F-forward, S-stop, R-reverse
23:59:59:23	Raw, uncompensated timecode read - NOT LIKELY TO EXACTLY MATCH picture content! ':' will be replaced by '*' when timecode not valid, or not readable or discontinuous
@24/30	Timecode counting rate / expected rate
22	Timecode dynamics flags

6.3.15. WIN ANC ATR (14) ANC Audio Timecode

```
AAL:%100 F1 L23:59:59:23@24/24
```

L	Source type L=RP188LTC, 1=RP188VITC1, 2=RP188VITC2, F=RP215
%100	Valid read rate as a percentage of expected read rate
F1	Fields in which data is read - F12 indicates both field 1 and field 2
L	Dynamics flags L-locked, P-play, F-forward, S-stop, R-reverse
23:59:59:23	Raw, uncompensated timecode read - NOT LIKELY TO EXACTLY MATCH picture content! ':' will be replaced by '*' when timecode not valid, or not readable or discontinuous
@24/30	Timecode counting rate / expected rate
22	Timecode dynamics flags

6.3.16. WIN MODES (15) RP215 Film ANC Encoded Information

```
ENC:35MM-4P@24 1080P23.98
```

35MM-4P	Film gauge of transfer encoded in film ANC
@24	Film transfer rate encoded in film ANC
1080P23.98	Video standard at which transfer was recorded, encoded in film ANC

6.3.17. WIN ERRS (16) Pop up errors

Various error and warning messages will display briefly as they occur

6.3.18. WIN IDLE (17) Processor Idle Measurement

```
IDL: 374(73%) X:388 N:353 83
```

2737	Average Number of times through the task list per frame
(73%)	Average percentage of frame spent idling
X:388	Max idling
N:353	Min idling
83	Minimum microseconds to get through the task list

6.3.19. WIN DLO (18) Data Logging Output

```
DLO: NOT ENABLED
DLO:5 22:28:06:04@24 22:29:00:00
```

5	DLO Type Identifier
22:28:06:04	Video timecode value
@24	Video timecode counting rate
22:29:00:00	Audio timecode value

6.3.20. WIN GPI (19) GPI input frame number

```
GPI:12:59:59:23
```

Video timecode of frame number where GPI input is detected going from off to on

6.3.21. WIN PRESET STS (20) Preset status

```
USER CONFIG WRITE PENDING-20
```

Displays the above message and timer countdown until non-volatile settings are saved

6.3.22. WIN OP1 STS (21) Output 1 - Parallel Connector Pin 9 status

```
OP1H L22:00:00:22 H23:59:59:23
```

H	Current status of output pin H/L depends on function programmed for this output
L22:00:00:22	Output Video Timecode at which output pin last went low
H23:59:59:23	Output Video Timecode at which output pin last went high

6.3.23. WIN OP2 STS (22) Output 2 - Parallel Connector Pin 5 status

```
OP2H L22:00:00:22 H23:59:59:23
```

H	Current status of output pin H/L depends on function programmed for this output
L22:00:00:22	Output Video Timecode at which output pin last went low
H23:59:59:23	Output Video Timecode at which output pin last went high

6.3.24. WIN SLTC (23) Smoothed LTC Stats

```
STC:%100W1 N00E+1L23:59:59:23
STC:%100X12 N00E+1L23:59:59:23
```

':'	LTC threshold set at 50% of frame. or '.' LTC threshold set at 70% of frame.
%100	Valid read rate as a percentage of expected read rate
W1	Tolerance: number of frames of difference allowable between input LTC and smoothed LTC
X12	Tolerance delay count: counts down frames where tolerance must be 0. After delay count runs to zero, then non-zero tolerance (if any) is used.
N00	Jam error counter - counts number of frames where difference exceeds tolerance until jam counter reaches limit and smoothed LTC is jammed to input LTC
E+1	Difference between input LTC and smoothed LTC
L	Smoothed dynamics flags L-locked, P-play, F-forward, S-stop, R-reverse
23:59:59:23	Smoothed LTC - NOT LIKELY TO EXACTLY MATCH picture content! ':' will be replaced by '*' when timecode not valid, or not readable, or discontinuous
@24	Timecode counting rate or shown as @24/30 - timecode counting rate / expected rate

6.3.25. WIN REV (24) Firmware Revision

```
REV DE9150B2 09 3157 U 020315
```

DE9150B2	Firmware name
09	
3157	Firmware build number
U	R = Released. U = unreleased
020315	Firmware build date

6.3.26. WIN RAM (always the last display) Ram Display

```
40000000:4f001000 08000402 4003a4b4
```

40000000: Address, controlled by parameter 29-20, balance of line shows RAM contents for next 12 locations

6.4. SERVICING INSTRUCTIONS

CAUTION – These servicing instructions are for use by qualified service personnel only. To reduce risk of electric shock do not perform any servicing instructions in this section of the manual unless you are qualified to do so.

6.4.1. Changing the Fuses

The fuse holder is located inside the power entry module. To change the fuses, pull out the fuse holder from the power entry module using a small screwdriver. The fuse holder contains two fuses, one for the line and one for the neutral side of the mains connection. Pull out the blown fuse and place a fuse of the correct value in its place. Use slo blo (time delay) 5 x 20 mm fuses rated for 250 Volts with the current rating of 1 amp. Carefully reinsert the fuse holder into the power entry module.

Never replace with a fuse of greater value.

6.4.2. Changing DIP Switch Settings

At the front edge of the main module inside the unit there is an 8 position DIP switch, which is used to select various operational and diagnostic functions. The ON position is down or closest to the PCB. Most users will have no need to alter the factory switch settings.

DIP Switch	Function	Default Position
1	Down=Character output enabled	Down (On)
2	Down=FMTCON board is missing	Up (Off)
3	Down=Do not switch debug output to AUX port	Up (Off)
2 & 3	Both Down=DLI Calibrate mode	Both Up (Off)
4	Down=Reset all presets to factory values	Up (Off)
5	Down=ILM mode	Up (Off)
6	Down=9155 mode	Up (Off)
7	Down=Boot up in HD to HD mode	Up (Off)
8	Not used	Up (Off)

Table 6-2: DIP Switch Functions

To gain access to the DIP switches you will have to remove the top cover.

Before removing the top cover of the unit make sure that the power cord is disconnected from the mains.