MULTI SDI MONITOR

LV 5330

LEADER

HD-SDI

SD-SDI

2K
1920x1080 only

6.5 Inches

1.4 kg

CiNELiTE
INSIDE

CE
Upon request

Multi SDI Monitor

The LV 5330 is a compact and lightweight multi-SDI test monitor specifically designed for oncamera and portable applications. Picture, waveform, vector, audio and status screens can be displayed individually or in multi-screen representations. The instrument is also equipped with on-picture measurement functions, Cinelite and Cinezone, and helps facilitate measurements that are easily understood by both technical and operations personnel. High-accuracy measurement and monitoring facilities also include settable error level monitoring and alarms as well as extensive data analysis. A screen capture function facilitates communication between production and post production personnel and aids in project documentation.

FEATURES

- **Two Serial Digital Inputs**
  Two SDI input connectors (channels A and B) support HD-SDI and SD-SDI signals. The selected SDI input is passed through an SDI output connector to facilitate switched monitor output operation.
- **Display**
  A built-in 6.5-inch XGA TFT LCD (1,024x768) provides brilliant and clear representations of waveforms, vectors, pictures, audio level meters, status, etc. The multi-screen feature allows these displays to be shown simultaneously in tiled windows.
- **Picture display**
  Brightness, contrast, and saturation is adjustable and aspect ratio, safe action and safe title markers can be displayed. The edge enhancement feature provides visual assistance with focus.
- **Cinelite II (Cinelite and Cinezone)**
  The Cinelite on-picture measurement feature displays the luminance of any three user definable points and provides luminance measurements in %, RGB levels (or %) as well as in f-stops. The Cinezone feature uses false-colors to represent luminance values on the display enabling quick confirmation of the luminance distribution levels on the display.
- **Waveform Monitoring**
  Parade, overlay, Y CB CR, RGB, and pseudo-composite displays are available.
- **Vectorscope**
  Vectorscope display is available and accommodates both 75 % and 100 % saturation levels; pseudo-composite vectorscope display is also available.
- **5 Bar Display**
  The 5 Bar display enables simultaneous monitoring of component and composite gamut.
- **Line Selector**
  Selects any line of the video signal to be displayed and provides waveform, vector and 5-bar representations of the selected line. A line marker on the picture facilitates visual selection of the appropriate line.

- **Audio Level Meter**
  Up to 8 channels of embedded audio signals can be displayed using audio bar level meters.
  *The SD-SDI audio quantization precision is up to 20 bits.
- **Viewfinder**
  The camera's composite video output (in NTSC or PAL) can be shown on the picture display. The edge enhancement feature assists you in focusing the camera.
- **Screen Capture**
  The displayed screen can be captured and saved to internal memory or USB memory.
- **Extensive Analysis Features**
  · Various types of error detection
  · SDI signal event log
  · Digital data dump
- **Flexible Control**
  · Instrument can be remote controlled from a PC over an Ethernet network.
  · Internal memory holds up to 30 presets allowing quick access to your favorite instrument setups. Personalize your LV 5330 by loading your own custom presets via USB thumb-drive.
- **External Synchronization**
  Accepts tri-level sync or NTSC/PAL black burst signals.
- **Stereo Headphone Output**
  Extracts embedded audio signals and sends 2 user selectable audio channels to the headphone jack.
- **Panel LED Illumination**
  You can illuminate all of the panel keys; a useful feature when working in a dark environment.
- **Power Supply**
  XLR DC input connector is provided; accepts 12Vdc- 18Vdc.
  A V-mount battery adapter is also available as a factory option.
- **Tripod Mounting**
  A screw(1/4 in.) hole for attaching a camera tripod is provided on the bottom panel of the LV 5330

Battery Mount (Factory Option)
A battery adapter can be installed on the rear panel as a factory option.
• BATTERY MOUNT IDX (V-Mount)
• BATTERY MOUNT ANTON (AntonBauer)

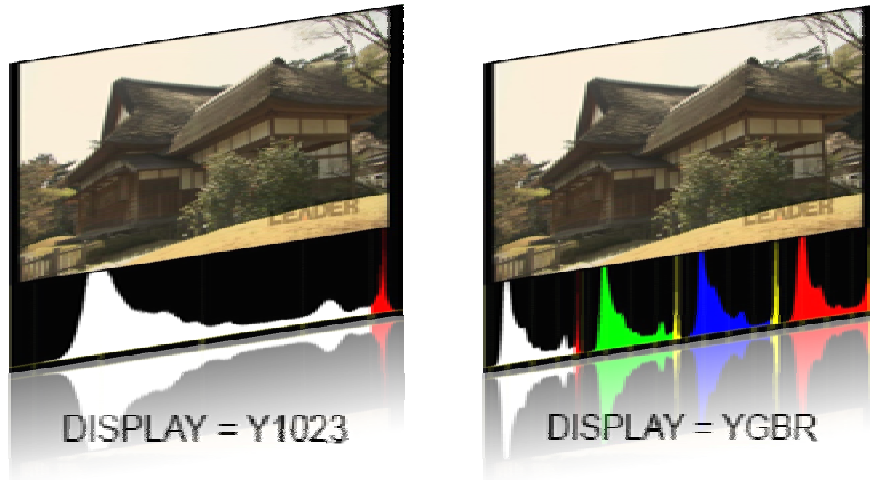| LV 5330SER01 HISTOGRAM & USER GAMMA DISPLAY (Option) |
|---|
| This software option enables you to show video signals on the LV 5330 histogram display. It also enables you to convert the user-defined gamma to ITU-R BT709 gamma and show the converted signal on the LV 5330 picture display. |

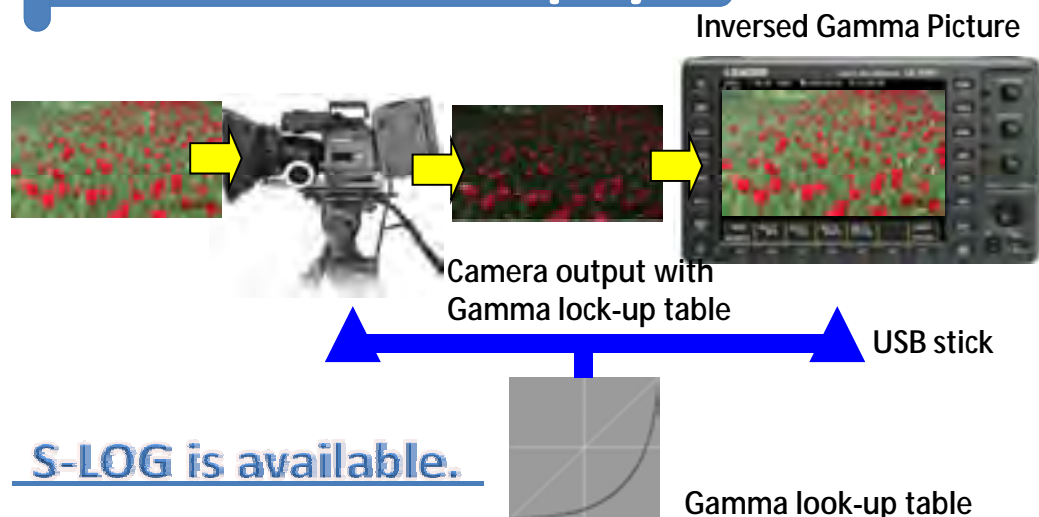| LV 5330SER02 GAMUT & LEVEL ERROR(Option) |
|---|
| This GAMUT & LEVEL ERROR option adds the following features to the LV 5330 · Area and time specification in gamut error detection · Detection of luminance and chrominance signal level errors |

LEADER

Video Formats and Corresponding Standards
Single Link System Video

Color System	Quantization	Format		Corresponding Standard
		Scanning	Frame (Field) Rates	
Y,C$_B$,C$_R$ 4:2:2	10 bit	1080i	60/59.94/50	SMPTE 274M SMPTE 292M
		1080p	30/29.97/25/24/23.98	
		1080PsF	30/29.97/25/24/23.98	SMPTE RP 211 SMPTE 292M
		720p	60/59.94/50/ 30/29.97/25/24/23.98	SMPTE 296M SMPTE 292M
		525i	59.94	SMPTE 259M
		625i	50	

Dual Link System Video

Color System	Quantization	Format		Corresponding Standard
		Scanning	Frame (Field) Rates	
GBR 4:4:4	10 bit	1080i	60/59.94/50	SMPTE 372M (1920× 1080)
		1080p	30/29.97/25/24/23.98	
		1080PsF	30/29.97/25/24/23.98	

Other Standards
Ancillary Data Standard	SMPTE 291M
Embedded Audio Standard	SMPTE 299M (HD-SDI), SMPTE 272M (SD-SDI)
Format Setting	
Format Setting	Auto or manual setting from the supported formats
Sampling Frequency	74.25 MHz (HDTV), 74.25/1.001 MHz (HDTV), 13.5 MHz (SDTV)
External Synchronization	Auto setting from supported formats

Input/Output Connectors
SDI Input	
Input Connector	2 BNC connectors (switching between A and B)
External Reference Input	
Input Signal	Tri-level sync or NTSC/PAL black burst
Input Connector	1 pair of BNC connectors (15 kΩ passive loop-through) *Phase difference accurary between external reference and internal signal is ±1 clock cycle.
SDI Output	
Output Connector	1 BNC connector (reclocks and transmits the selected SDI input signal)
Headphone Output	
Output Signal	Extracts and outputs the embedded audio signal.
Sampling Frequency	Supports 48 kHz (must be synchronized to the video signal)
Output Connector	1 stereo miniature jack, 32 Ω (16 to 600 Ω)
USB Memory	
Function	Stores screen captures, error logs, preset data, and data dumps, Also used for Firmware update.
Remote Control	
Function	Recalls presets, transmits errors, controls the tally indicator
Connector	D-sub 15-pin female
Ethernet	
Function	Enables remote control from an external computer and data transmission
Type	10BASE-T/100BASE-TX auto switching, one RJ-45 jack
Viewfinder Input	
Function	Monitors composite video signals, picture only.
Input Signal	NTSC/PAL VBS signal
Input Connector	1 BNC connector

Picture Display
HDTV Display	Displays by sampling pixels
SDTV Display	Displays by interpolating pixels
Display	Color or black and white selectable
Marker Display	Center marker, aspect marker, safe title marker, safe action marker
Color Temperature	3200 K, 6500 K, 9300 K or THROUGH

Cinelite Display
f-STOP	Measures relative brightness in f-stops
Measurement points	Three points specified using the cursor
Reference	Uses an object with an 18 % reflectance as reference
%DISPLAY	Displays luminance percentage (LEVEL%), RGB percentage (RGB%), and RGB numeric values
Measurement points	Three points specified using the cursor
Measurement areas	1x1, 3x3, 9x9
GAMMA	
0.45	Reference gamma
USER 1-3	User-defined gamma
USER A-E	Gamma downloaded from USB memory
On Picture Level Indicator	Switches the screen to black and white and displays the set luminance level in green

Cinezone Display
Screen	Maps colors based on luminance levels. Linear or step selectable.
UPPER	Can be set from -6.3 % to 109.4 %. Displays white when the level is above the set level.
LOWER	Can be set from -7.3 % to 108.4 %. Displays Black when the level is below the set level.

Display Form
Display Size	6.5-inch color XGA. Effective area 1024 x 768 dots
1 Screen Display	Picture display, Cinelite display, Cinezone display, waveform display, vectorscope display, status display,

2 Screen Display	viewfinder display Picture and waveform displays, waveform and vectorscope displays, waveform and picture displays, waveform and audio level displays, audio numeric and bar displays
4 Screen Display	Audio level display or status display selectable in addition to waveform display, vectorscope display, and picture display

Waveform Display
Waveform Operation	
Display Modes	Overlay and parade
Timing Display	Displays by calculating Y-C$_B$ and Y-C$_R$ Uses bowtie signals (authorized by Tektronix, Inc.)
EAV-SAV period	Show or hide selectable
GBR Conversion	Converts Y, C$_B$, C$_R$ signals into G, B, R and displays the result
Pseudo-Composite Display	Digitally converts component signals into composite signals and displays the result
Vertical Axis	
Gain	x1, x5, or variable selectable
Variable Gain	x0.2 to x2.0 at the x1 setting, x1.0 to x10.0 at the x5 setting
Amplitude Accuracy	≤ ±0.5 %
Horizontal Axis	
Line Magnification	x1, x10, x20, ACTIVE, or BLANK
Field Magnification	x1, x20, or x40 selectable
Cursor Measurement	
Amplitude Measurement	%, mV, R%, 3FF or 1023
Time Measurement	Measures in usec or msec
Frequency Display	Displays the frequency by assuming the interval between the cursors to be one period

Vectorscope Display
Gain	x1, x5, IQ-MAG, or variable selectable
Variable Gain	x0.2 to x2.0
Amplitude Accuracy	≤ ±0.5 %
IQ Axis	Show or hide selectable
Display Colors	7 colors to choose from
Pseudo-Composite Display	Digitally converts component signals into composite signals and displays the result

5 Bar Display
Bar Display	Displays the peak levels of Y, R, G, B, and composite

Phase Difference Display
Display	Displays the phase difference between an SDI signal and the external sync signal both numerically and graphically

Embedded Audio Display
Display Channels	8-channel simultaneous display
Meter	60 dB peak level or 90 dB peak level
Group Selection	Select any two groups from groups 1, 2, 3, and 4
Channel Mapping	Mapping to L, R, SL(S), SR, C, LFE, RL, RR

Viewfinder
Display Size	Full-screen display

Status
Data Dump Display	Dumps data by serial data sequence or by channel
Event log	Stores up to 1,000 events
Data output	To USB memory or over an Ethernet network

Error Detection
	CRC Error, EDH Error, Gamut Error, Composite Gamut Error, BCH Errors

Screen Capture
	Captures the displayed screen
Waveform Comparison	Superimposes the input signal over an image from memory.
Data Output	Screen captures can be saved as bitmap files to USB memory or to a PC over the Ethernet.
Data Input	Data Saved to USB memory can be loaded and displayed on the LV 5330

Presets
	30

Other Display Features
LCD	6.5-inch color LCD
Backlight brightness	High or low selectable
Screen Display	Format, color system, date, time
Panel LED Illumination	Illuminates all keys

Environmental Conditions
Operating Temperature	0 to 40 ºC
Operating Humidity Range	≤ 85 %RH (no condensation)
Operating Environment	Indoors, or outdoors with no rain
Overvoltage Category	I
Pollution Degree	2

Power Requirements
	12 VDC (10 to 18 V), 18 Wmax.

Dimensions and Weight
	215 (W) x128 (H) x 63 (D) mm (excluding projections), 1.4 kg 8 1/2 (W) x 5 3/64 (H) x 2 31/64(D) in. 2.9 lbs.

Accessories
	Instruction manual 1
	15-pin D-sub connector 1
	15-pin D-sub connector 1
	VESA spacer 1
	Ferrite core 1

Option Sold Separately
	AC adapter SPU40-105

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LV5330-OP01 Histogram

DISPLAY = Y1023

DISPLAY = YGBR

LV 5330SER01 HISTOGRAM & USER GAMMA DISPLAY (Option)

This software option enables you to show video signals on the LV 5330 histogram display. It also enables you to convert the user-defined gamma to ITU-R BT709 gamma and show the converted signal on the LV 5330 picture display.

Histogram Display	
Display Modes	YGBR, YRGB, Y1023
YGBR, YRGB	8-bit data processing
Y1023	10-bit data processing
Error Display	Values that are less than 0 % or greater than or equal to100.1 % are displayed as errors.
Error Display Colors	
Y	Red
GBR	Yellow
Histogram Brightness	-128 to 127
Scale Brightness	-8 to 7
Scale Unit	%, 3FF, 1023
Scale Color	White, yellow, cyan, green, magenta, red, blue
Picture Display with User-Defined Gamma	
User-Defined Gamma	Acquired with CAL in the CINELITE display. Selected with GAMMA (USER-A, USER-B, USER-C, USER-D, USER-E).
General Specifications	
Environmental Conditions	Same as the LV 5330
Contents	License key 1
	Instruction manual 1

LV5330-OP01 User Gamma Display

Inversed Gamma Picture

Camera output with Gamma lock-up table

USB stick

S-LOG is available.

Gamma look-up table

●Using User-defined Gamma in the Picture Display!

You can use a user-defined correction table specified in the CINELITE display to display the picture. A user-defined correction table is a table that you create on a PC and then load into a table on the LV5330.

LV5330-OP02
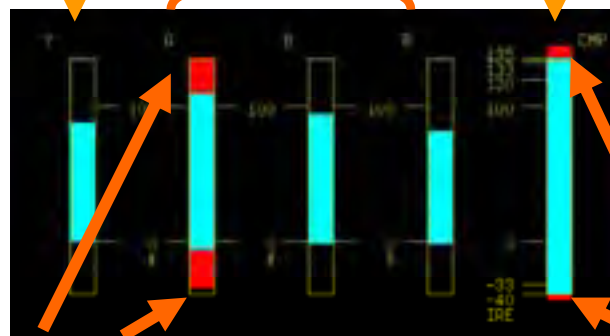# Gamut & Level Error

◎Red mesh pattern
[the upper limit over]

◎Black mesh pattern
[the lower limit over]

Gamut & Level Error on the Picture Display

LV 5330SER02 GAMUT & LEVEL ERROR(Option)

This GAMUT & LEVEL ERROR option adds the following features to the LV 5330
· Area and time specification in gamut error detection
· Detection of luminance and chrominance signal level errors
A dedicated license key is necessary for the installation of this option.

Gamut Error	
Error Detection	Detect by specifying area and time
Area Specification	0.0 to 5.0 % (specifying 0.0 % is equivalent to not specifying an area)
Time Specification	1 to 50 consecutive frames
Level Error	
Error Detection	Level errors in the luminance and chrominance signals are detected (not available in dual link mode)
Detection Level	
Luminance Signal	-7.2 to 109.4 %, -50.4 to 765.8 mV (for both upper and lower limits)
Chrominance Signal	-57.0 to 57.0 %, -399.0 to 399.0 mV (for both upper and lower limits)
General Specifications	
Environmental Conditions	Same as the LV 5330
Contents	License key 1
	Instruction manual 1

Y Display | G,B,R Gamut | Composite Gamut

Gamut Error

Gamut Error

5BAR Display Standard Function

```
SDI     SIGNAL       DETECT    FORMAT        NORMAL
        TRS          NORMAL
        LINE NUMBER  NORMAL
        CRC LUMA     NORMAL    CRC CHROMA    NORMAL

VIDEO   GAMUT        NORMAL    COMP.GAMUT    NORMAL
        LUMA         NORMAL    CHROMA        NORMAL
ANC     PARITY       NORMAL
        CHECKSUM     NORMAL
AUDIO   BCH          NORMAL

        CRC          NORMAL
        CHANNEL       1 , 2 , 3 , 4 , 5 , 6 , 7 , 8 ,
                     - , - , - , - , - , - , - , - ,

ETC

        ERROR COUNT      0      FROM RESET    00:07:54
        LOG MODE     LOG STOPPED
```

| LOG | DATA DUMP | AUDIO | ANC PACKET | ERROR CONFIG | ERROR RESET | |

■OPTION

LV 5330SER01 HISTOGRAM & USER GAMMA DISPLAY (Option)

This software option enables you to show video signals on the LV 5330 histogram display. It also enables you to convert the user-defined gamma to ITU-R BT709 gamma and show the converted signal on the LV 5330 picture display.

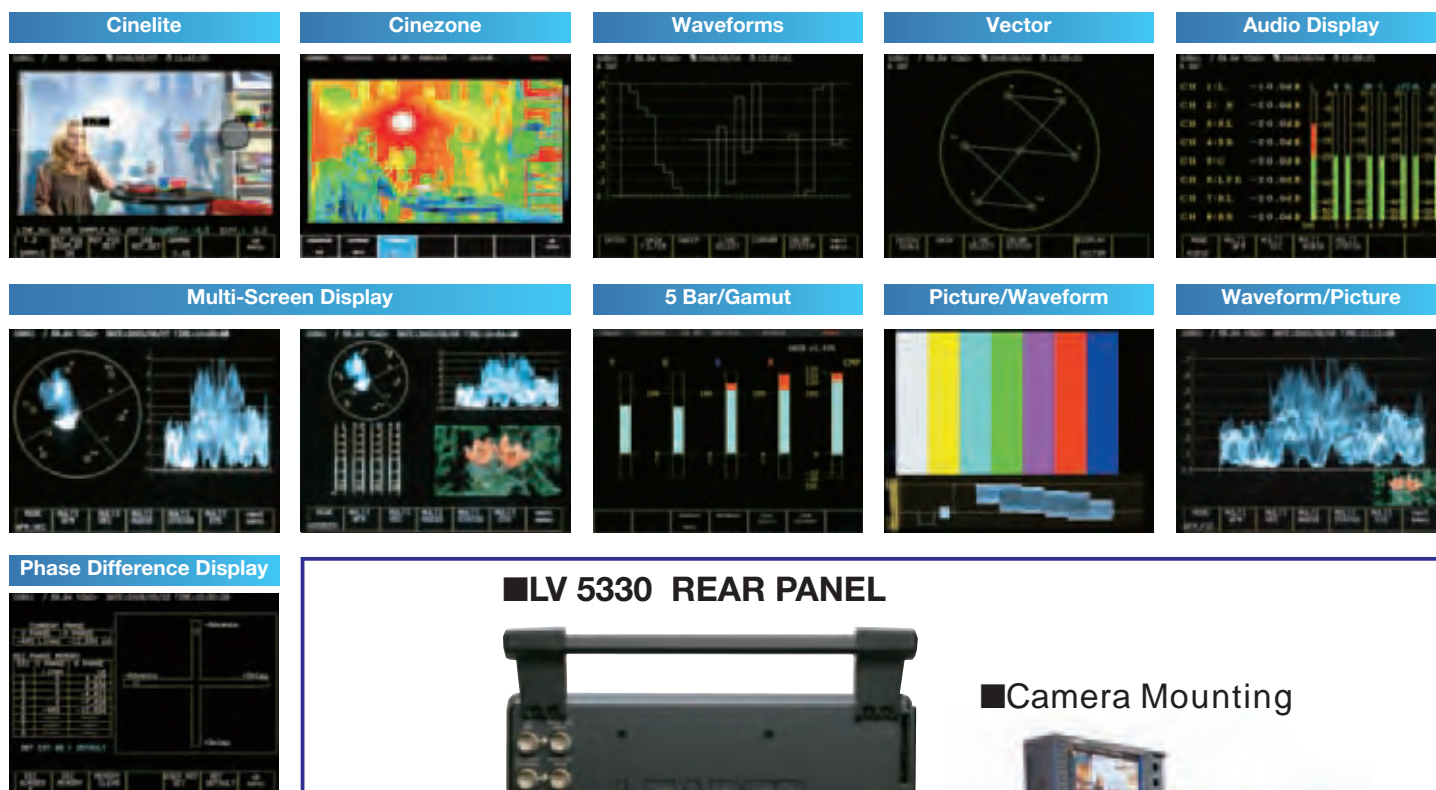|	
Histogram Display	
Display Modes	YGBR, YRGB, Y1023
YGBR, YRGB	8-bit data processing
Y1023	10-bit data processing
Error Display	Values that are less than 0 % or greater than or equal to100.1 % are displayed as errors.
Error Display Colors	
Y	Red
GBR	Yellow
Histogram Brightness	-128 to 127
Scale Brightness	-8 to 7
Scale Unit	%, 3FF, 1023
Scale Color	White, yellow, cyan, green, magenta, red, blue
Picture Display with User-Defined Gamma	
User-Defined Gamma	Acquired with CAL in the CINELITE display. Selected with GAMMA (USER-A, USER-B, USER-C, USER-D, USER-E).
General Specifications	
Environmental Conditions	Same as the LV 5330
Contents	License key 1
	Instruction manual 1

LV 5330SER02 GAMUT & LEVEL ERROR(Option)

This GAMUT & LEVEL ERROR option adds the following features to the LV 5330
· Area and time specification in gamut error detection
· Detection of luminance and chrominance signal level errors

Gamut Error	
Error Detection	Detect by specifying area and time
Area Specification	0.0 to 5.0 % (specifying 0.0 % is equivalent to not specifying an area)
Time Specification	1 to 50 consecutive frames
Level Error	
Error Detection	Level errors in the luminance and chrominance signals are detected (not available in dual link mode)
Detection Level	
Luminance Signal	-7.2 to 109.4 %, -50.4 to 765.8 mV (for both upper and lower limits)
Chrominance Signal	-57.0 to 57.0 %, -399.0 to 399.0 mV (for both upper and lower limits)
General Specifications	
Environmental Conditions	Same as the LV 5330
Contents	License key 1
	Instruction manual 1

■LV 5330 DISPLAY

Cinelite	Cinezone	Waveforms	Vector	Audio Display

Multi-Screen Display	5 Bar/Gamut	Picture/Waveform	Waveform/Picture

Phase Difference Display

■LV 5330 REAR PANEL

■Camera Mounting

■Rack Mounting

LR 2752
LV 5330 dual mount example

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New Measurement Method

LEADER's NEW "VISUAL" FEATURES PROVIDE EASY TO USE, INTUITIVE DISPLAYS

Professional video facilities are designed and maintained by engineers but the vast majority of the creative work is performed by non-technical operations staff. Recognizing this fact, Leader has developed and added a number of innovative "visual" displays allowing non-technical personnel access to test and measurement functions without having to use complex technical displays to get the answers. In the next 3 pages you will find a brief explanation of our most popular features; the popular 5-Bar display used to simplify color gamut monitoring; the simple Phase timing display allowing users to time a system without having to use waveform or vector displays; CINELITE on-picture measurements; CINEZONE false colors display; and CINESEARCH function which makes green-screen setups a snap.

Overview of the 5 Bar Display

5 Bar Display Enables the Simultaneous Observation of Digital Broadcasts and Composite Levels

In the 5 bar display, video signal peak levels can be displayed instead of vectors. Five different bars are used to simultaneously display five different levels: luminance (Y), green (G), blue (B), red (R), and composite (COMP). The 5 bar display functions as a mode of the vector display. It is viewable as an alternate display under the vectorscope menu.

The G, B, R, and COMP bars are converted from the SDI Y, C_B, and C_R signals using matrix calculation.
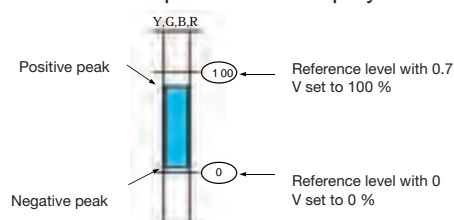
Bar Display Details

Contents of the 5 Bar Display
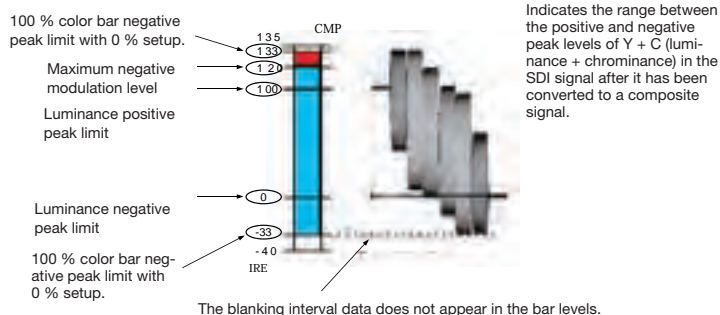
Y level bar — SDI Y signal level

GBR component gamut bars — The converted GBR levels of the SDI signal

Composite gamut bar — The combined luminance and chrominance signal level of the SDI signal after it has been converted to a composite signal.
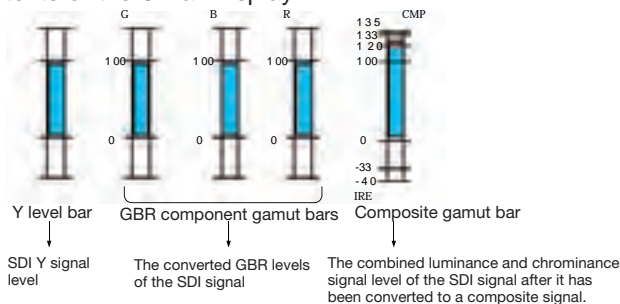
Contents of the Component Bar Display

Y,G,B,R

Positive peak

Reference level with 0.7 V set to 100 %

Negative peak

Reference level with 0 V set to 0 %

Indicates the range between the negative and positive peak levels

Contents of the Composite Bar Display

100 % color bar negative peak limit with 0 % setup.

Maximum negative modulation level

Luminance positive peak limit

Luminance negative peak limit

100 % color bar negative peak limit with 0 % setup.

Indicates the range between the positive and negative peak levels of Y + C (luminance + chrominance) in the SDI signal after it has been converted to a composite signal.

The blanking interval data does not appear in the bar levels.

Overview of the SDI-EXT REF Phase Difference Display

SDI-EXT REF Phase Difference Display

Overview
The SDI-EXT REF phase difference display shows the phase differences between an SDI signal and an external sync signal (EXT REF).

Features
Graphic and Numeric Displays of SDI and External Sync Signal (EXT REF) Phase Differences
Traditionally, the most common SDI phase adjustment method was to determine the phase difference by switching between an internal and external sync signal and observing the waveform shift. However, you can view phase differences and adjust phases more easily by using the SDI-EXT REF phase difference display.

Relative SDI Signal Phase Differences Are Displayable
By setting a particular SDI-EXT REF phase difference to zero, you can display relative SDI signal phase differences.

Store Up to Eight Different Phase Differences
You can store up to eight different phase differences. This allows you to store up to eight different switcher SDI signal phases.

SDI-EXT REF Phase Difference Display

A feature that shows the phase differences between SDI and external sync (EXT REF) signals.

Numeric Display
The current phase differences between the applied SDI and EXT REF signals are indicated numerically under CURRENT PHASE.

Phase Difference Log
You can store up to eight sets of measured values. This is useful in cases such as when you use a device such as a switcher to change inputs and match phases.
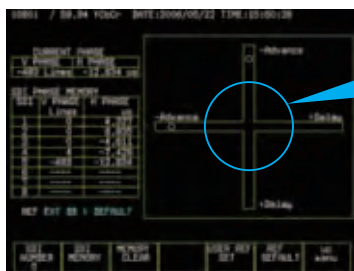
Graphic Center
The V marker turns from white to green when it is in the center. The H marker turns from white to green when it is within ± 3 clocks of the center.

You can readily determine the phase difference between an SDI and external sync (EXT REF) signal through graphic and numeric phase difference representations. You can also determine the phase differences between different SDI signals by setting the difference for one signal to zero.

You can record up to eight phase differences. You can quickly determine the phase differences between multiple inputs.

New Measurement Method

LEADER

CiNELiTE II   LEADER ELECTRONICS Brings You a New Way of Monitoring Waveforms

Patent pending

CINELITE   A feature that allows you to put the cros bars on any location of the picture display and view the luminance, RGB levels, and relative exposure at that point.

■ F-Stop Display Mode (relative exposure)

You can easily and accurately measure exposure values directly from the camera signal. This feature is fundamentally different from conventional spot measurement. It is especially useful for making lighting arrangements when filming.

F-stop display based on the active measured position and the 18 % reference set

Active Measured

Reference position

F-stop value display based on the reference position and the 18 % reference set

F-stop value display based on the difference between the reference position and the active measured position

■ RGB 255 Display

■ RGB % Display Mode

■ LUMINANCE % Display Mode

CINEZONE   You can achieve a flawless picture when filming. This feature is especially useful for making lighting arrangements. You can easily and accurately confirm dark areas with approximately 5 % luminance, areas with approximately 45 % of the luminance of the film subject, and bright areas with luminances of 80 % or more.

■ CINEZONE Display

■ Normal Display

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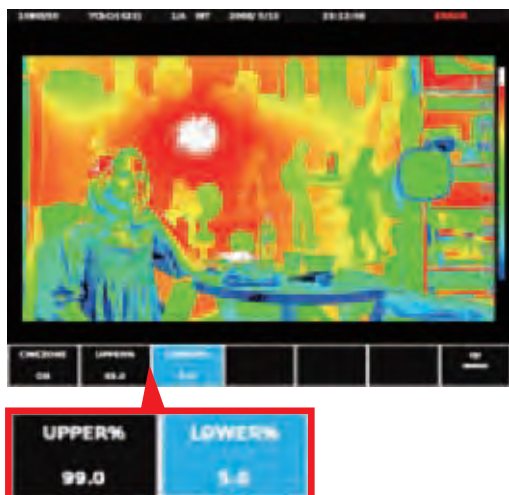
CINE SEARCH

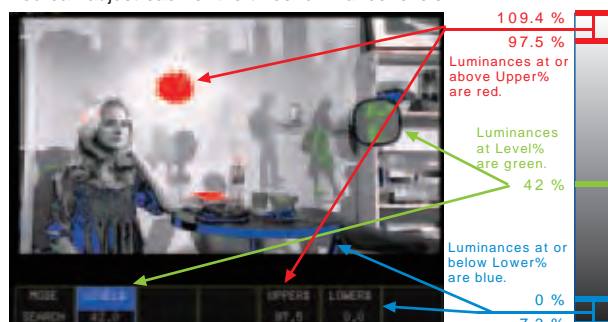Displays a specified luminance level ±0.5 % using green on an otherwise monochrome picture display.

Luminance Search Feature

Luminances at Level% are green.
Luminances at or above Upper% are red.
Luminances at or below Lower% are blue.

Searching for luminance levels is incredibly easy.

Luminance Search Feature (1)
You can adjust each of the three luminance levels.

109.4 %
97.5 %
Luminances at or above Upper% are red.

Luminances at Level% are green.

42 %

Luminances at or below Lower% are blue.

0 %
-7.3 %

Luminance Search Feature (2)
You can adjust each of the three luminance levels.

109.4 %
93.0 %
Luminances at or above Upper% are red.

70 %
Luminances at Level% are green.

Luminances at or below Lower% are blue.

20 %

-7.3 %
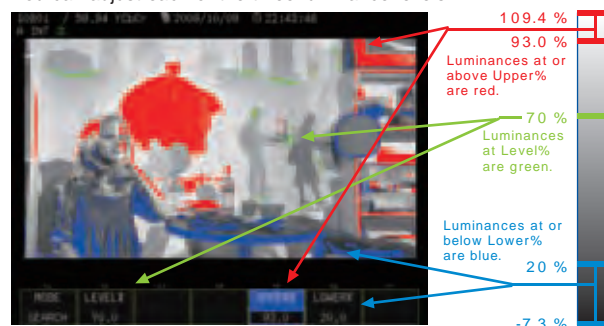
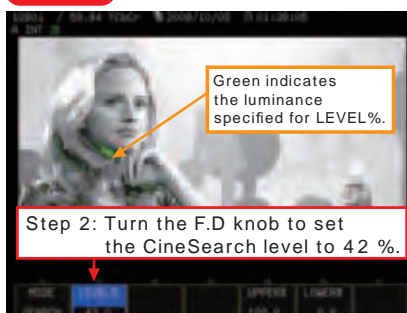## Adjusting the Luminance Level during Filming

STEP 1

Step 1: Switch to CineSearch mode.
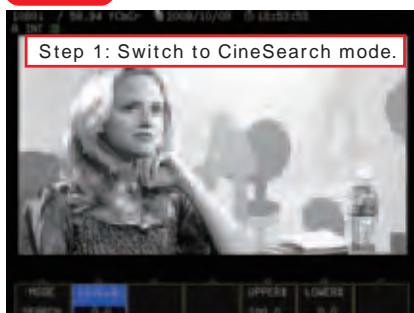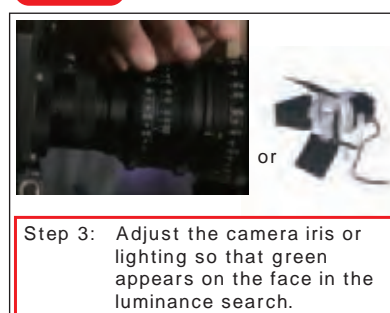
STEP 2

Green indicates the luminance specified for LEVEL%.

Step 2: Turn the F.D knob to set the CineSearch level to 42 %.

STEP 3

or

Step 3: Adjust the camera iris or lighting so that green appears on the face in the luminance search.

STEP 4

Step 4: The luminance of the green portion is 42 %.

In this manner, you can use CineSearch to easily adjust the luminance. This would not be possible on a picture or waveform monitor.

■ **Change Search level**

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