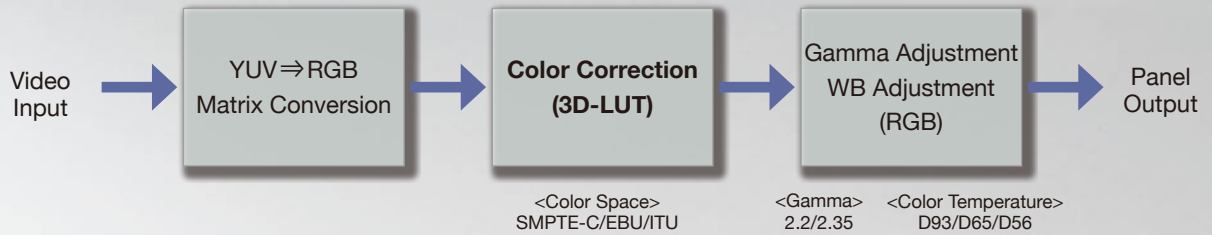
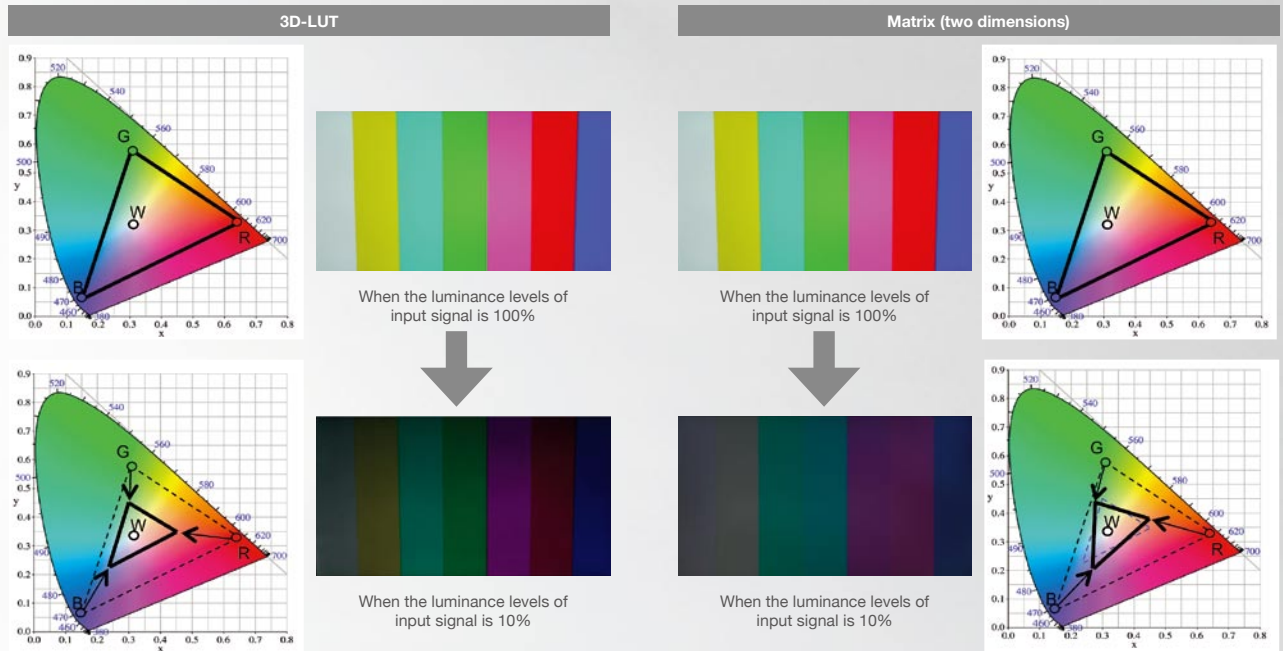


# Image Quality and Color Management Technologies in the LH Series LCD Monitors for Broadcasting Use



## 3D-LUT Color Correction Keeps Colors Faithful Even at Low Luminance Level



The color space on LCD displays tends to narrow when the luminance level drops, and it's often accompanied by color phase shifts that cause colors to drift. 3D-LUT (Look Up Table) Color Correction on the LH Series LCD monitors includes a look up table for each luminance level, and applies 10 bit

image processing to each RGB color to balance the six coordinate poles of the three primary colors (RGB) and their complementary colors (CMY). This solves the problem of color drifting at low luminance levels, and keeps colors vividly natural.

## 6-Poles (RGB/CMY) Coordinate Correction Produces Smooth Intermediate Colors



6-Poles (RGB/CMY) Coordinate Correction



3-Poles (RGB) Coordinate Correction

In addition to enhancing low luminance areas, 3D-LUT Color Correction helps to produce finely nuanced intermediate hues. Based on color measurements in the intermediate color parts of the image, this function applies smooth correction

processing while balancing the six coordinates of the three primary colors (RGB) and their complementary colors (CMY), resulting in beautifully smooth gradation. It keeps the intermediate shades of extremely fine colors vibrant and lifelike.

**[General]**

Power Supply:	AC 100 V-240 V, 50 Hz/60 Hz DC 12V (11V-17V)
Power Consumption:	AC 0.30 A-0.15 A DC 1.8 A
Operating Temperature:	5°C to 35°C (41 °F to 95 °F)
Operating Humidity:	20% to 80 % (no condensation)
Storage Temperature:	-20 °C to 60 °C (-4 °F to 140 °F)
Weight:	Approx. 7.0 kg (15.43 lb) (including tilt stand), Approx. 5.6 kg (12.35 lb) (monitor only, not including tilt stand)
Dimensions: (W x H x D)	479 mm x 390.7 mm x 240 mm (18-7/8 inches x 15-3/8 inches x 9-7/16 inches) (including tilt stand) 479 mm x 339 mm x 76.5 mm (18-7/8 inches x 13-3/8 inches x 3 inches) (monitor only, not including tilt stand)

**[LCD Panel]**

Panel Size:	47 cm (18.5 inches) (Effective display area)
Aspect Ratio:	16:9
Pixel Number:	1,366 x 768 (WXGA)
Display Colors:	Approx. 16,770,000 colors
View Angle:	170° horizontal, 160° vertical (contrast > 10:1)

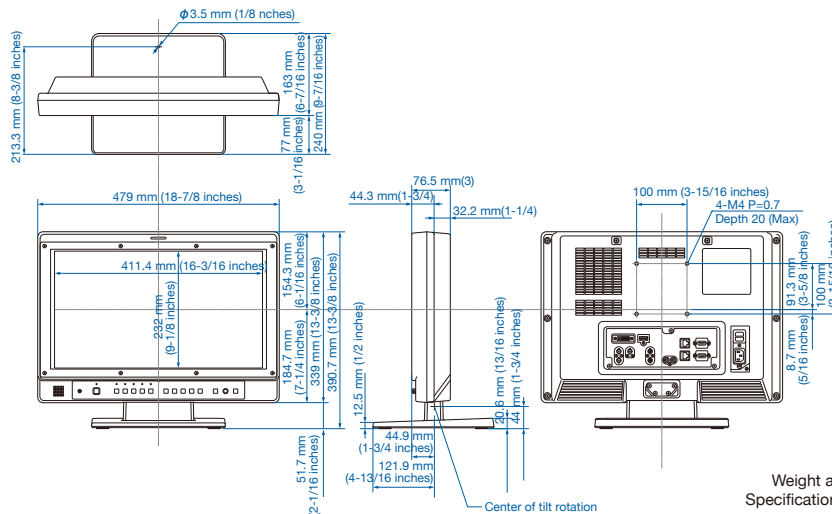
**[Connectors]**

VIDEO Input:	BNC x 1
SDI Input:	BNC x 2 SMPTE274/296M/259M-C/ITU-R BT.656-4 standard Embedded Audio supported HD SDI: SMPTE299M standard, 48 kHz, 8 CH SD SDI: SMPTE272M standard, 48 kHz, 4 CH
HDMI Input:	HDMI x 1 (Type A terminal) , HDCP supported, Embedded Audio supported, VIERA Link not supported
DVI-I Input:	DVI-I x 1 (single link)
Audio Input:	Pin jack x 2 (stereo) Input Signal Level: 0.31 Vrms
VIDEO Output:	BNC x 1 (through-out)
SDI Output:	BNC x 1 (switched out)
GPI:	D-SUB, 9 pins x 1
RS-232C:	D-SUB, 9 pins x 1
RS-485:	RJ-45 x 2 (input, output)
Headphones:	Stereo mini jack M3 x 1, 32 Ω, level adjustable

**[Other Input/Output Terminals]**

Speaker Output:	Monaural 0.5 W
Tally Output (Display):	Red , Green, Amber

**Dimensions**



Weight and dimensions shown are approximate. Specifications are subject to change without notice.

Please refer to the latest information, etc. at the following Panasonic web site.



<http://pro-av.panasonic.net/>

# Panasonic®

**[Countries and Regions]**

**Panasonic Corporation**  
**Business Solutions Business Group**  
 2-15 Matsuba-cho, Kadoma, Osaka 571-8503  
 Japan  
<http://pro-av.panasonic.net/>

Argentina	+54 1 308 1610
Australia	+61 (0) 2 9491 7400
Bahrain	+973 252292
Belgium	+32 (0) 2 481 04 57
Brazil	+55 11 3889 4035
Canada	+1 905 624 5010
China	+86 10 6515 8828
Hong Kong	+852 2313 0888
Czech Republic	+420 236 032 552/511
Denmark	+45 43 20 08 57
Egypt	+20 2 23938151
Finland, Latvia, Lithuania, Estonia	+358 (9) 521 52 53
France	+33 (0) 1 55 93 66 67
Germany, Austria, Switzerland	+49 (0) 611 235 459
Greece	+30 210 96 92 300
Hungary	+36 (1) 382 60 60
India	+91 120 247 1000
Indonesia	+62 21 385 9449
Iran (Vida)	+98 21 2271463
(Panasonic Office)	+98 2188791102
Italy	+39 02 6788 367
Jordan	+962 6 5859801
Kazakhstan	+7 727 298 0891
Korea	+82 2 2106 6641

Kuwait	+96 522431385
Lebanon	+96 11665557
Malaysia	+60 3 7809 7888
Mexico	+52 55 5488 1000
Netherlands	+31 73 64 02 577
New Zealand	+64 9 272 0100
Norway	+47 67 91 78 00
Pakistan	+92 5370320 (SNT)
Palestine	+972 2 2988750
Panama	+507 229 2955
Peru	+51 1 614 0000
Philippines	+63 2 633 6163
Poland	+48 (22) 338 1100
Portugal	+351 21 425 77 04
Puerto Rico	+1 787 750 4300
Romania	+40 21 211 4855
Russia & CIS	+7 495 6654205
Saudi Arabia	+96 626444072
Singapore	+65 6270 0110
Slovak Republic	+421 (0) 2 52 92 14 23
Slovenia, Albania, Bulgaria, Serbia, Croatia, Bosnia, Macedonia, Montenegro	+36 (1) 382 60 60
South Africa	+27 11 3131622
Spain	+34 (93) 425 93 00
Sweden	+46 (8) 680 26 41
Syria	+963 11 2318422/4

Taiwan	+886 2 2227 6214
Thailand	+66 2 731 8888
Turkey	+90 216 578 3700
U.A.E. (for All Middle East)	+971 4 8862142
Ukraine	+380 44 4903437
U.K.	+44(0)1344 70 69 13
U.S.A.	+1 877 803 8492
Vietnam	+848 38370280



JQA-0443



Factories of Business Solutions Business Group have received ISO14001:2004-the Environmental Management System certification. (Except for 3rd party's peripherals.)

**Panasonic**  
ideas for life

**BT-LH1850**  
LCD Video Monitor





High-Quality Images, Advanced Functions, Low Power Consumption  
and Excellent Cost-Performance.

A 47 cm (18.5 inches) LCD Monitor for Diverse Broadcasting Needs.

The Panasonic BT-LH1850 LCD Monitor offers high-end performance and functions for broadcasting use. With features like the 3D-LUT Color Correction, the high-quality image engine produces faithful color hues and smooth gradation, together with quick-response motion images. It's also packed with convenient broadcasting functions, like a waveform monitor for Y, R, G and B signals, SDI closed caption display, and a RS-485 serial remote. The new panel with an LED backlight provides remarkably low power consumption and high cost-performance. This versatile monitor meets a wide range of needs, from image production to broadcasting and business use.



Front Operation Panel

### Faithful Color Correction from the 3D-LUT

By using a three-dimensional LUT (Look Up Table) for each RGB color and applying precise 10 bit image processing, faithful colors are reproduced from low to high luminance levels and natural intermediate colors are attained. (See page 2 for details.)

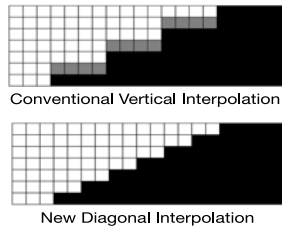
### I/P Conversion Circuit for Motion Response

A circuit delay time (not including panel delay) of approximately 5 msec\* is achieved by incorporating an I/P converter circuit that converts SD and HD interlace signals with high precision to generate progressive signals without causing field-length delay. Minimizing the delay between the input signal and monitor output enables the user to confirm footage without any incongruity.

\* Differs slightly depending on the signal format.

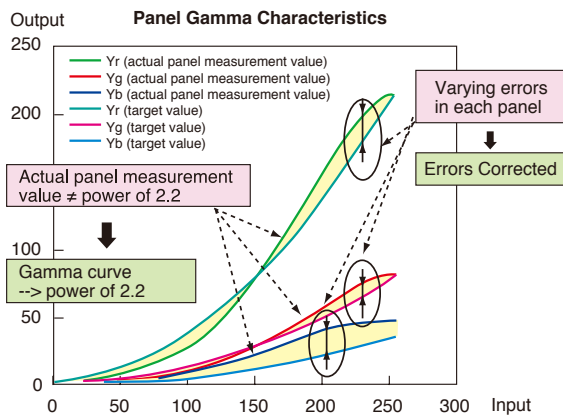
### Diagonal Line Compensation

Jagged noise on diagonal lines in moving images is a common problem. This LCD monitor solves this by detecting correlations in the diagonal direction, resulting in smooth, precise reproduction of moving images.



### Broadcast Settings for Gradation and Color Temperature

Individual RGB corrections are made on every monitor that is shipped, to ensure that rated gamma properties ( $\gamma = 2.2$ ) are reproduced, and gradation suitable for broadcasting is achieved. A color temperature of 9300 K/6500 K/5600 K, or 3000 K to 9300 K, can be selected with the variable setting.



### WFM (Y/R/G/B) Display

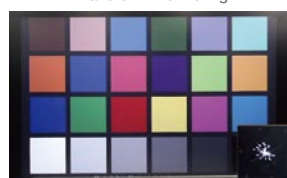
The built-in waveform monitoring function displays a waveform in a sub-screen. The display signal can be selected from Y, R, G and B.



Waveform Monitoring

### Vectorscope Display

All lines of the input signal via SDI are displayed as a vectorscope, and can be positioned in any of the four corners of the screen.



Vectorscope Display

### Various Markers

Various markers can be displayed in both 16:9 and 4:3 aspect ratios.

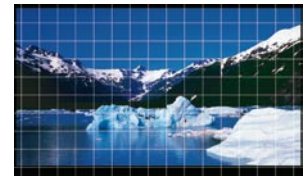
- **Aspect Marker (16:9):** 4:3, 13:9, 14:9, CNSCO2.39, CNSCO2.35, 2:1 or VISTA, with background brightness control of Black (0%), Half (50%) or Normal (100%).
- **Safe Area Marker (16:9/4:3):** 95%, 93%, 90%, 88%, 80% or VAR (variable setting).
- **Center Marker (16:9/4:3):** ON/OFF. The center marker can be displayed together with another marker, as shown in the example right.



Safe Area and Center Marker

### Cross Hatch Overlay

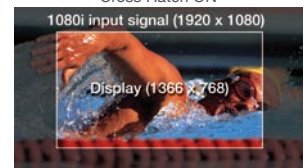
A simple cross hatch overlay can be displayed to check the tilt of the camera.



Cross Hatch ON

### Pixel-to-Pixel Display

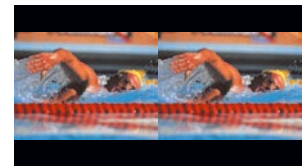
This function lets you display and confirm video pixels without any resizing. When displaying 1080i/p, you can choose from five display areas: center, right-top, right-bottom, left-top or left-bottom.



Pixel-to-Pixel Display Image (1080i, center mode)

### Still Frame Display

A frame of video can easily be frozen and displayed as a still image on the left side of the screen. This function can be used to match a live camera with a frame of video shot at an earlier time or with a different camera.



Still Video Monitor

### Audio Level Meter

The color audio level meter displays the input level of embedded audio (SDI, HDMI\*) or analog audio.\* The display mode can be selected from 2-channel, 4-channel, 8-channel or OFF. It is also equipped with reference point setting, peak hold and over-range display functions.

\* For HDMI or analog audio input, the level meter displays only two channels.



Audio Level Meter

### Time Code Display

With HD SDI input, this function displays the value of the VITC, LTC or UB time code.



Time Code Display

### Closed Caption Display

The BT-LH1850 can display closed captions with an SDI or VIDEO input. It supports the EIA/CEA-708 HD SDI closed captioning standard (EIA/CEA-608 SD-SDI closed captioning standard), and can display up to eight windows simultaneously.



Closed Caption Display

### HV Delay Display and Mono Mode

The HV Delay function that displays the video blanking period, and the Mono mode that switches the display to black-and-white, can be assigned to function keys for quick access.



Rear Connector Panel

(when AC Power Supply)

(when DC Power Supply)

### RS-485 Serial Remote

Up to 32 monitors connected in a loop-through configuration can each be designated and controlled by a distinct ID number. TSL commands allow text display (8 alphanumeric characters) and tally indication. The monitors also support unique Panasonic commands (equivalent to RS-232C).



TSL command display  
Tally display (Red, Green, Amber)  
Text display (up to 8)



### Calibration Function

The BT-LH1850 comes installed with software that allows it to be calibrated without using a PC, by simply connecting a manufacturer-designated display color analyzer and measurement probe to the monitor.



\* Konica Minolta CA-310 Display Color Analyzer with CA-PU32/PU35 or CA-PSU32/PSU35 Standard Measurement Probe. For more information about the Konica Minolta calibration system, please see the following website. <<http://www.konicaminolta.com/instruments/index.html>>.

### Cine-gamma and Black Mode

The BT-LH1850 is equipped with a cine-gamma (F-REC) compensation function and serves as a monitor for the Varicam camera recorder. The black mode also makes dark image areas in low-gradation scenes easier to see. It helps to produce movies as well as film-like HD programs and commercials.

### Function Keys

Each of the function keys on the front panel can be assigned a function selected from various display and switchover functions to enable one-touch display ON/OFF or mode change. These function buttons speed up operation and customize the functions to individual user needs.

### SDI, HDMI and DVI-I Inputs

Two SDI inputs (SDI1/SDI2) with an automatic HD/SD switching function are provided as standard equipment. They support embedded audio, and the channel for audio output to speakers and headphone can be selected.

The next-generation HD Link is featured to allow high-quality digital connection of a wide range of digital HD products with an HDMI terminal, such as BD/DVD players. Digital and analog DVI-I (Single Link) input is also provided.

### Low Power Consumption and Mercury-Free Design Help Protect the Environment

A thorough energy-saving design has achieved low power consumption of only 22 W (with DC input), which is a 54% reduction from our previous model (the BT-LH1710 (2009 model) / Power Consumption 48W (DC IN)). A mercury-free LED backlight is also gentle to the environment.

### Additional Features

- RS-485 (RJ-45), RS-232C (9-pin) and GPI (9-pin) remote input terminals.
- Tally lamp (red/green/amber).
- Key Lock function disables the front panel operation/control functions, except for Power switch, menu operation and sound level adjustment.
- Monaural speakers and headphone jack on the front panel.
- Fanless drive and its quiet operation make this model ideal for use in editing studios or MA rooms.
- Auto power down with no operation nor signal input for a certain period of time.
- Tilt Stand is included as standard (detachable).

### List of supported video input signal formats (√: Supported)

Input Signal Formats/Status	VIDEO	SDI 1/SDI 2	HDMI	DVI-I	
				ANALOG	DIGITAL
				YPbPr	VIDEO
NTSC	√				
PAL	√				
640×480 (59.94p)			√		
640×480 (60p)			√		
480/59.94i		√		√	√
480/59.94p			√	√	√
576/50i		√		√	√
576/50p			√	√	√
720/50p		√	√	√	√
720/59.94p		√	√	√	√
720/60p		√	√	√	√
1035/59.94i*1		√	√	√	√
1035/60i*2		√	√	√	√
1080/23.98PsF		√		√	
1080/24PsF		√		√	
1080/25PsF*3		√		√	
1080/50i		√	√	√	√
1080/59.94i		√	√	√	√
1080/60i		√	√	√	√
1080/23.98p		√	√	√	√
1080/24p		√	√	√	√
1080/25p		√	√	√	√
1080/29.97p		√	√	√	√
1080/30p		√	√	√	√
1080/50p			√		√
1080/59.94p			√		√
1080/60p			√		√

1: When 1035/59.94i signal is input, displayed as 1080/59.94i. Other various marker displays will also use the 1080/59.94i marker. \*2: When 1035/60i signal is input, displayed as 1080/60i. Other various marker displays will also use the 1080/60i marker. \*3: When 1080/25PsF signal is input, displayed as 1080/50i. Other various marker displays will also use the 1080/50i marker.

### List of supported PC input signal formats (√: Supported)

Input Signal Formats/Status	DVI-I	
	ANALOG	DIGITAL
	RGB-COMP.	COMP.
640×480 (60Hz)	√	√
800×600 (60Hz)	√	√
1024×768 (60Hz)	√	√
1280×768 (60Hz)	√	√
1366×768 (60Hz)	√	√