LEADER

LT 450
MULTIFORMAT PATTERN GENERATOR

INSTRUCTION MANUAL

LEADER
ELECTRONIC MEASURING INSTRUMENTS

TABLE OF CONTENTS

GENERAL SAFETY SUMMARY

■ To Avoid Personal Injury

It is recommended that only qualified personnel with technical knowledge use this instrument only after reading and fully understanding all functions of the instrument described this instruction manual.
This instrument is not designed and manufactured for consumers.
If you do not have enough knowledge on electricity, to avoid personal injury and prevent damage to this product, please be sure to use this product only under the supervision of an engineer who has sufficient knowledge about electronics.

■ Precautions on Contents

Should you find the contents in this manual and any of its technical terms confusing, please feel free to contact your local LEADER agent.

■ Symbols and Terms

Following terms and symbols indicate necessary warnings and cautions used in this manual and on the product are there for safe operation.

＜Symbol＞ ⚠	The sections where this symbol is marked in this manual or instrument, if not correctly performed or practiced, could result in personal injury or cause serious danger to the instrument. Misuse could also produce unintentional movement to create an operational impediment on the instrument or other products that might be connected to it. Be sure to refer to the safety precautions in this manual to safely use the part of the instrument where the symbol is marked.
＜Term＞ ⚠WARNING	Warning statements identify warning conditions that if disregarded or not correctly performed or adhered to, could result in serious personal injury or even loss of life.
＜Term＞ ⚠CAUTION	Caution statements identify caution conditions that if disregarded or not correctly performed or adhered to, could result in personal injury or damage to the instrument.

GENERAL SAFETY SUMMARY

Review the following safety precautions to avoid operator's injury and loss of life and prevent damage and deterioration to this instrument. To avoid potential hazards, use this product as specified.

⚠ WARNING

■ Warnings on the Cases and Panels of the Instrument

Operator should not remove any cases or panel for any reasons. If you touch inside the instrument it could result personal shock or fire hazard. Refrain from spilling any liquid on or inserting anything flammables or piece of metal into the ventilation of the instrument. Such actions could cause fire, shock, malfunction and be an accident hazard while the power is on.

■ Warnings on Power Line

Make sure to connect only to the rated power line voltage. Excess voltage may cause fire. Confirm the voltage of the commercial power line before connecting the AC power cord. The power frequency of the power line should be 50/60 Hz.

Warning on the Power Cord
Use only the optional power cord that is attached to this instrument. The use of the power cord other than that attached could cause fire hazard. If the attached cord is damaged, stop using it and contact your local LEADER agent. Should you use a damaged cord, it could cause a shock or create a fire hazard. When you pull out the cord be sure to hold it by plug and pull from the socket not by holding the cord wire.

■ Warning on Fuse

When the fuse is melted the instrument stops operation. If the fuse melted, turn off the power switch and disconnect the power plug from the socket. If you change the fuse while the cord is connected to the socket, it could cause a shock hazard. Only use the specified type and rated current and voltage fuses.

If the cause for melting fuse is unclear or if you suspect there is damage to the instrument or if you have no proper fuse at hand please contact your local LEADER agent.

GENERAL SAFETY SUMMARY

⚠ WARNING

■ Warning on Installation Environment

●About the Operating Temperature Range
Operate the instrument between the temperature range of 0 to 40 °C. Operating the instrument at higher temperatures could cause a fire hazard. Be sure not to obstruct air circulation.
Rapid changes of temperatures from cold to warm can create internal moisture or condensation and could damage the instrument. If there is a possibility of moisture condensation, allows the instrument to sit for 30 minutes without the power on.

●About the Operating Humidity Range
Operating humidity range is ≤ 85 % RH. (without condensation)
Do not operate the instrument with wet hands. This could cause a shock and fire hazard.

●About the Operation in the Presence of Gasses
Operating the instrument in and near the presence or storage locations of flammable, explosive gasses or fumes could create an explosion and fire hazard. Do not operate the instrument anywhere near such environments.

●Avoid Insertions
Do not insert metals or flammable objects or drop liquid on or into the instrument. To do so could cause fire, shock, malfunction and create a dangerous accident hazard.

■ Warning While Operating

While operating the instrument if smoke, fire, or a bad smell occurs, turn off the instrument at once for it could cause a fire hazard. When such a case occurs, turn off the power switch and pull the plug of the cord from the plug socket. Contact your local LEADER agent after confirming there is no fire.

■ Warning About Ground

The instrument has a ground terminal to avoid electric shock hazard and to protect the instrument from damage. Ensure that the product is properly grounded for safe operation.

■ Warnings Concerning the LCD Panel

Glass is used on the LCD panel. If you break the glass, the fragments may cause injury. Do not apply strong shock to the glass or damage the surface of the glass with sharp metal objects.

GENERAL SAFETY SUMMARY

⚠ CAUTION

■ Caution on Input/Output Terminals

Input terminals are rated with a maximum input. Do not supply an input over the specified rating in the standard section of the instruction manual. Also, do not supply external power to Output terminal, this could cause the instrument to malfunction.

■ Caution When Not Using the Instrument For a Long Time

Make sure to disconnect the power cord from the socket when you do not use the instrument for a long time.

■ Caution on Connection of the Instrument and a Display

While the instrument is being connected with a ground terminal of the display, connect or disconnect the signal cable.
By connecting the ground of the display with the instrument, the output part of the instrument becomes difficult to break easily.
Be careful especially, when you connect the display under development.

Connect the ground by the following method.
・The ground terminal of the instrument connects with the ground of the display.
・Ground the instrument through the power cord, and ground the display.

GENERAL SAFETY SUMMARY

■ Routine Maintenance

Remove the power cord plug from the socket when cleaning the instrument.
Avoid the use of thinner or benzene solvents for cleaning cases, panels and knobs since this might remove the paint or damage plastic surfaces.
Wipe cases, panels, and knobs lightly with a soft cloth damped with neutral detergent.
Do not allow water, detergent, or other foreign objects to enter the instrument while cleaning.
If a liquid or metal object enters the instrument, it can cause electric shock or fire.

■ EU WEEE Directive

The EU WEEE Directive applies to this product and its accessories. When disposing of this product or its accessories, follow the regulations in your country or region.
(WEEE Directive: Waste Electrical and Electronic Equipment)

・・・

Please conform to the above warnings and cautions for safe operation. There are cautions in each area of this instruction manual, so please conform to each caution.

If you have any questions about this manual, please feel free to contact your local LEADER agent.

1. INTRODUCTION

Thank you for purchasing LEADER's measuring instruments.
Please read this instruction manual carefully to ensure correct and safe operation.

If you have any difficulties or questions on how to use the instrument after you have read this manual, please feel free to contact your local LEADER agent.
After you have read the manual, keep the manual in a safe place for quick reference.

1.1   Scope of Warranty

This LEADER instrument has been manufactured under the strictest quality control guidelines. LEADER shall not be obligated to furnish free service during the warranty period under the following conditions.

1   Repair of malfunction or damages resulting from fire, natural calamity, or improper voltage applied by the user.
2   Repair of an instrument that has been improperly repaired, adjusted, or modified by personnel other than a factory-trained LEADER representative.
3   Repair of malfunctions or damages resulting from improper use.
4   Repair of malfunctions caused by devices other than this instrument.
5   Repair of malfunctions or damages without the presentation of a proof of purchase or receipt bill for the instrument.

1.2   Operating Precautions

1.2.1   Line Voltage and Fuse

⚠ WARNING

Confirm that the power line voltage is correct before connecting the power cord.
The voltage range and fuse rating are indicated on the rear panel.
The instrument must be connected to the rated line voltage and line frequency of 50 Hz to 60 Hz.
When replacing the fuse, turn the power switch off and disconnect the power cord from the outlet.
When replacing the fuse, use the correct fuse that matches the line voltage.

Table 1-1   Voltage range and fuse rating

Voltage Range	Fuse Rating	LEADER Parts Number
90 to 250 V	1.0A, time-lag	436 3565 017

1.2.2   Maximum Allowable Input Voltage

⚠ CAUTION

The maximum allowable input voltage to the input connectors is shown in the table 1-2 below. Do not apply excessive voltage to prevent damage to the instrument.

Table 1-2   Maximum allowable input voltage

Input Connector	Maximum Input Voltage
REMOTE (2 to 8p, 10 to 15p)	-0.7V to 5.7V
AUDIO COAXIAL INPUT	3.6V

1.2.3   Shorting the Output Connectors, Reverse Voltage

Do not short any output connectors to prevent damage the instrument.

Do not supply external power to Output terminal, this could cause the instrument to malfunction. Otherwise, you may damage the instrument or other property.

1.2.4   Mechanical Shock

Please be careful not to expose the instrument to other forms of severe mechanical shock as this product contains shock sensitive precise parts.

1.2.5   Damage Caused by Static Electricity

Electronic parts are susceptible to damage from electrostatic discharge (ESD). The core wire of the coaxial cable may be charged with static electricity. If you are connecting a coaxial cable that is not connected on either end to an input/output connector of the instrument, short the cable's core wire and external conductor beforehand.

1.2.6   About the Electric Shock Hazard etc.

When you perform an examination and adjustment of a television, VTR, and other related devices, refer to the service manual of each device.
When you connect this instrument to the inside of a device to be measured, be sure to remove that power cord from a socket, and an electric shock hazard should not occur. Especially when you connect this instrument to the device which contains high-voltage circuits, such as television, wears the glove which endures the high voltage and be careful of it not to get an electric shock.

1.2.7   About Preheating

To secure more accurate operation, turn on the power before about 30 minutes of use, and stabilize an internal temperature.

1.2.8   Trademark Acknowledgments

HDMI, the HDMI logo, and High-Definition Multimedia Interface are trademarks or registered trademarks of HDMI Licensing, LLC.

2. SPECIFICATIONS

2.1 General

The LT 450 is a DTV-compatible multiformat pattern signal generator equipped with analog component outputs, analog composite outputs, and digital outputs. It generates monoscope, color bar, ramp, crosshatch, multiburst, character, and other test patterns.
You can add additional digital outputs such as DVI-I and HDMI and analog outputs such as a SCART connector by ordering options.

2.2 Features

● **Multiformat Support**

With the formats available on the LT 450, you can test most video displays, including television sets, PC monitors, and projectors.
The LT 450 supports 19 component output formats that comply with the DTV formats of various countries including 1920×1080, 1280×720, 720×480, and 720×576. It supports 8 composite output formats: NTSC-M, NTSC-J, NTSC 4.43, PAL, PAL-M, PAL-N, PAL-60, and SECAM.
In addition, for PC monitors, the LT 450 supports five VESA MTS formats (VGA, SVGA, XGA, SXGA, and UXGA) and seven VESA CVT formats.

● **RGB and YPBPR Signal Outputs**

The analog and digital component video output signal formats can be switched between RGB and YPBPR.

● **S Output Connector**

Equipped with an S connector for Y/C separation signal output. An ID signal is superimposed on the C signal.

● **Sync Signal Outputs**

Equipped with sync signal connectors that transmit CS (tri-level or bi-level), HD, and VD signals.

● **Analog Audio Output**

You can set the frequency (400 Hz or 1 kHz) and turn the output on and off on the left and right channels separately.

● **Simple Motion Picture**

You can make any test pattern into a simple motion picture pattern by scrolling it vertically, horizontally, or diagonally.

● **Variable Output Level Feature**

You can set the video signal level and sync signal level from 0 to 100 %.

● **Closed Captioning and Teletext**

Supports closed captioning. (V-Chip, VBI Teletext, CGMS, and WSS are not supported.)

● **Remote Control via RS232C**

The LT 450 can be remotely controlled from a PC.

● **Preset/Recall Features**

Up to 100 panel settings of output formats and test patterns can be stored and recalled.

● **D Output Connector**

Equipped with a JEITA CP-4120 D5 output. ID signals (lines 1, 2, and 3) are supported.

● **RGB Output Connector**

Equipped with a mini D-sub 15-pin connector—an analog interface for PC monitors.

● **DVI-I Output**

Equipped with a DVI-I connector—a digital interface for PC monitors. Can be used to check HDCP-compliant copyright protection functions and to make simple checks on the DDC function.
You can use an adapter or a similar device to connect the output to an HDMI display. However, audio output and CEC features are not supported.

● **HDMI Output**

Equipped with an HDMI connector—a digital interface used in household televisions and set-top boxes. It can be used to check HDCP-compliant copyright protection functions and to make simple checks on CEC and DDC functions.

● **On-screen Display of HDCP and CEC Check Results**

The pass/fail results of checking the HDCP copyright protection functions and CEC functions on the DVI-I and HDMI outputs can be displayed on screen.

● **Output Unit Options**

You can add output units according to your objectives.
・ LT 45SER01 (DVI-I unit)
・ LT 45SER02 (HDMI unit)
・ LT 45SER03 (SCART unit)

● **TIMING AND PICTURE TOOL Option (LT 45SER04)**

You can transmit timing and picture data that was made on an external PC to the LT 450. You can then generate these timings and pictures from the LT 450.

2.3 Specifications

2.3.1 Output Formats

Output Formats	Component HDTV: 15 formats
	Component SDTV: 4 formats
	Component PC monitor: 12 formats
	Composite: 8 formats

*   For details on output formats, see Table 12-1, "List of output formats."

2.3.2 Output Signals

Analog Component Signal

Standards	
HDTV	SMPTE 274M, SMPTE 295M, SMPTE 296M, SMPTE RP 211
SDTV	ITU-R BT.601, ITU-R BT.1358
PC monitor	VESA MTS (Monitor Timing Specifications), VESA CVT
Video Signal Format	RGB or YP$_B$P$_R$ selectable
	Only RGB output is available for PC monitors (excluding VGA). Only YP$_B$P$_R$ output is available for xvYCC.
Data Quantization Bits	10 bits
Output Impedance	75 Ω
Output Connector	BNC
Number of Outputs	2
Sync Signal	ON/OFF selectable for RGB
HDTV	Tri-level sync added to G/Y, B/P$_B$, and R/P$_R$
SDTV	Bi-level sync added only to G/Y
PC monitor	Bi-level sync added only to G/Y (SYNC ON G)
Inversion	Available
Variable Output Levels	
Video Signal	The video signal levels for RGB and YP$_B$P$_R$ can be adjusted separately (linked to DVI-I and HDMI)
Sync Signal	HSYNC and VSYNC levels can be adjusted simultaneously.
Variable Range	0 to 100 % (in 1 % steps). The normal level is 100 %.

*   Unless specified otherwise, these specifications apply to HDTV, SDTV, and PC monitors.

Composite Signal and Y/C Separation Signal

Standards	SMPTE 170M, ITU-R BT.470
Y/C Separation	JEITA CPR-1201
Color Encoding	NTSC-M, NTSC-J, NTSC 4.43, PAL, PAL-M, PAL-N, PAL-60, SECAM
Data Quantization Bits	10 bits
Setup Level	
NTSC-M, PAL-M	7.5 % (with variable setup level feature)
NTSC-J, NTSC 4.43	0 %
PAL, PAL-N, PAL-60, SECAM	0 %
Output Impedance	75 Ω
Output Connectors	
Composite	BNC
Y/C Separation	S connector
Number of Outputs	1 each
Variable Output Levels	Can be adjusted simultaneously with the Y/C separation signal
Video Signal	The video signal level can be adjusted after encoding.
Sync Signal	HSYNC and VSYNC levels can be adjusted simultaneously.
Burst Signal	Amplitude can be adjusted.
Variable Range	0 to 100 % (in 1 % steps). The normal level is 100 %.
Aspect Ratio ID Signal	Superimposed on the C signal of Y/C separation signal only when NTSC-J is selected
DC Output Impedance	10 kΩ ± 3 kΩ
Signal Level	Fixed to 0 V for all formats except NTSC-J
S1 (squeeze)	5 V
S2 (Letterbox)	2.2 V
4:3	0 V
Inversion	Available
Closed Captioning and Teletext	Supports closed-captioning (V-Chip, VBI Teletext, CGMS, and WSS are not supported.)

Sync Signal

CS Output	
Output Impedance	75 Ω
Output Connector	BNC
Number of Outputs	1
HD and VD Outputs	
Level	TTL Level
Output Connector	BNC
Number of Outputs	1 each
Output Polarity	Negative, except the output for PC monitors (excluding VGA and XGA), which is positive Can be changed through the USER SETTING feature

Analog Audio Output

Frequency	You can switch between OFF, 400 Hz, and 1 kHz for the left and right channels separately.
Output Level	-5.23 dBm or 0 dBm (at 600 Ω termination)
Output Impedance	600 Ω
Output Connector	RCA jack
Number of Outputs	2 (L/R)

D Connector (D5-Compatible)

Standards	JEITA CP-4120(D1/D2/D3/D4/D5), RC-5237
Video Signal	Component
Hot Plug Detection	None (always output)
ID signals (Lines 1, 2, 3)	Supported. However, an LT 450 original output is used with formats not listed in JEITA CP-4120.
DC Output Impedance	10 kΩ ± 3 kΩ
Auxiliary Lines 1, 2, 3	Not used (not connected)
Connector	D connector (JEITA RC-5237 compliant)

RGB Connector

Video Signal	Component
Connector	Mini D-sub 15-pin

DVI-I

Standards	DVI 1.0, HDCP 1.2
Analog Signal	Component
TMDS	
Signal Format	RGB/YPBPR 4:4:4 8 bit and YPBPR 4:2:2 8/10/12bit Linked with the HDMI signal format. Fixed to GBR/YPBPR 4:4:4 8 bit when HDMI Deep Color is selected. Only RGB output is available for PC monitors (excluding VGA).
Link	Single
Variable Output Levels	
Video Signal	The video signal levels for RGB and YPBPR can be adjusted separately. (Linked to analog component and HDMI)
Variable Range	0 to 100 % (in 1 % steps). The normal level is 100 %.
HDCP	Includes a production key
Verification Result Display	PASS/FAIL (displayed on screen)
DDC	DDC2B
Hot Plug Detection	ON/OFF selectable using the menu
Connector	DVI-I

*   You can use an adapter or a similar device to connect the DVI-I connector to an HDMI display. However, audio output and CEC features are not supported.

HDMI

Standards	HDMI, HDCP 1.2
TMDS	
Signal Format	RGB/YPBPR 4:4:4 8 bit, YPBPR 4:2:2 8/10/12 bit
	Only RGB output is available for PC monitors
	(excluding VGA).
Deep Color	RGB/YPBPR 4:4:4 10/12 bit
Formats	1080p/59.94, 1080i/59.94, 1080i/50, 720p/59.94,
	720p/50, 480p/59.94, 480i/59.94, 576p/50,
	576i/50, VGA (640×480)
xvYCC	
Supported Formats	1080p/59.94, 1080i/59.94, 1080i/50, 720p/59.94,
	720p/50
Link	Single
Variable Output Levels	
Video Signal	The video signal levels for RGB and YPBPR can be
	varied separately.
	(Linked to analog component and DVI-I)
Variable Range	0 to 100 % (in 1 % steps). The normal level is 100 %.
Audio	
Internal	
Format	IEC 60958-3
CH	2
Output Level	0 dBm, -5.23 dBm
Frequency	You can switch between OFF, 400 Hz, and 1 kHz for
	the left and right channels separately.
Sampling Frequency	32 kHz, 44.1 kHz, 48 kHz
Quantization Bits	16 bits
External Input	SPDIF coaxial
InfoFrame	Supports AVI, SPD, AUDIO InfoFrame.
HDCP	Includes a production key.
Verification Result Display	PASS/FAIL (displayed on screen)
CEC	Checks connection using the "<Polling Message>"
	header block
Connection Check Result Display	PASS/FAIL (displayed on screen)
	Displays PASS if there is an ACK response to
	"<Polling Message>"
DDC	DDC2B
Hot Plug Detection	ON/OFF selectable using the menu.
Connector	HDMI Type A

2.3.3 Output Patterns

Output Patterns	Color bar, raster, ramp, step, convergence, crosshatch, multi-burst, character, window, monoscope, natural picture (option), and other patterns

*   For details on output patterns, see Table 12-2, "List of output patterns."

Simple Motion Picture

Simple Motion Picture	Pattern scroll
Scroll Directions	Up/down and left/right
Scroll Speed Settings	
Progressive	
Vertical	0 to 256 lines/frame (1-line steps)
Horizontal	0 to 256 dots/frame (4-dot steps)
Interlace	
Vertical	0 to 256 lines/field (2-line steps)
Horizontal	0 to 256 dots/field (4-dot steps)

Pattern Change

Function	Automatically switches pattern displays according to the specified format.
Switch interval	Approx. 2 s

2.3.4 External Interface

RS232C port

Function	Remotely control the LT 450 settings from an external PC via RS232C.
Connector	D-sub 9-pin (male)

USB Port (Front Panel)

Function	Transmit timing and picture data that was made on an external PC to the LT 450 through USB (option).
Connector	USB (B type)

USB Port (Rear Panel)

Function	Save and load preset data from USB memory.
Connector	USB (A type)

Ethernet

Function	Remotely control the LT 450 settings through Telnet

Remote

Function	Increment or decrement the recalled address through an external contact input.
Connector	XM4K-1542-112 (by Omron)

Option Slots (slots 1 to 3)

Function	Holds option output units
	(Output unit types can be selected freely.)

2.3.5 Preset/Recall

Function	Stores and recalls up to 100 panel settings (addresses 00 to 99).
Area Settings	You can set the range of consecutive addresses to be recalled from the 100 addresses.
BEGIN	Recall start address
END	Recall end address

2.3.6 Startup Memory

Function	Stores the panel settings at power-on to the internal memory

2.3.7 General Specifications

Environmental Conditions
Operating Temperature	0 to 40 ºC
Operating Humidity	≤ 85 % RH (without condensation)
Spec-Guaranteed Temperature	10 to 35 ºC
Spec-Guaranteed Humidity	≤ 85 % RH (without condensation)
Operating Environment	Indoors
Operating Altitude	≤ 2,000 m
Overvoltage Category	II
Pollution Degree	2

Power Requirements
Voltage	90 to 250 VAC
Frequency	50/60 Hz
Power Consumption	80 W max.
Dimensions	426 (W) × 88 (H) × 400 (D) mm (excluding projections)
Weight	5.7 kg
Accessories	Power cord 1
	Instruction Manual 1

2.4   LT 45SER01 (DVI-I unit)

2.4.1   General

The LT 45SER01 is a DVI-I output option that can be installed in an LT 450 option slot (1 to 3). It transmits test patterns according to the LT 450 settings.

2.4.2   Features

● **DVI-I Output**

This option is equipped with a DVI-I connector—a digital interface for PC monitors. It can be used to check HDCP-compliant copyright protection functions and to make simple checks on the DDC function.
You can use an adapter or a similar device to connect the output to an HDMI display. However, audio output and CEC features are not supported.

● **Multiformat Support**

This option can generate component signals in 19 formats, including 1920×1080, 1280×720, 720×480, and 720×576, that comply with the DTV formats of various countries.
In addition, for PC monitors, this option supports five VESA MTS formats (VGA, SVGA, XGA, SXGA, and UXGA) and seven VESA CVT formats.
This option does not generate signals when a composite format is selected.

2.4.3   Specifications

General Specifications

Power Supply	Supplied from the LT 450
Voltage	5 VDC
Power Consumption	3.5 W max.
Dimensions	29 (W) × 82 (H) × 222 (D) mm (excluding projections)
Weight	0.14 kg

*   Other specifications are the same as the LT 450 DVI-I output specifications.

*   Because this option's analog output is separate from the output circuit of the LT 450 DVI-I connector, their picture qualities will be different.

2.5 LT 45SER02 (HDMI unit)

2.5.1 General

The LT 45SER02 is an HDMI output option that can be installed in an LT 450 option slot (1 to 3). It is equipped with two HDMI output connectors and transmits test patterns according to the LT 450 settings.

2.5.2 Features

● **HDMI Output**

This option is equipped with two HDMI connectors—digital interfaces used in household televisions and set-top boxes. It can be used to check HDCP-compliant copyright protection functions and to make simple checks on CEC and DDC functions.

● **Multiformat Support**

This option can generate component signals in 19 formats, including 1920×1080, 1280×720, 720×480, and 720×576, that comply with the DTV formats of various countries.
In addition, for PC monitors, this option supports five VESA MTS formats (VGA, SVGA, XGA, SXGA, and UXGA) and seven VESA CVT formats.
This option does not generate signals when a composite format is selected.

2.5.3 Specifications

General Specifications

Power Supply	Supplied from the LT 450
Voltage	5 VDC
Power Consumption	3.5 W max.
Dimensions	29 (W) × 82 (H) × 222 (D) mm (excluding projections)
Weight	0.14 kg

* Other specifications are the same as the LT 450 HDMI output specifications.

2.6 LT 45SER03 (SCART unit)

2.6.1 General

The LT 45SER03 is a SCART connector option that can be installed in an LT 450 option slot (1 to 3). It transmits test patterns according to the LT 450 settings.

2.6.2 Features

● **SCART Connector**

This option is equipped with a PAL and SECAM compatible SCART connector. It can be used to adjust and inspect European AV equipment.
The option supports eight formats: NTSC-M, NTSC-J, NTSC 4.43, PAL, PAL-M, PAL-N, PAL-60, and SECAM.

2.6.3 Specifications

Analog Component Signal

Standards	ITU-R BT.601
Video Signal Format	RGB
Data Quantization Bits	10 bits
Output Impedance	75 Ω
Inversion	Available

Composite Signal and Y/C Separation Signal

Standard	ITU-R BT.470
Color Encoding	NTSC-M, NTSC-J, NTSC 4.43, PAL, PAL-M, PAL-N, PAL-60, SECAM
Data Quantization Bits	10 bits
Setup Level	
NTSC-M, PAL-M	7.5 % (with variable setup level feature)
NTSC-J, NTSC 4.43, PAL, PAL-N, PAL-60, SECAM	
	0 %
Output Impedance	75 Ω
Variable Output Levels	Linked to the LT 450
	Can be adjusted simultaneously with the Y/C separation signal
Video Signal	The video signal level can be adjusted after encoding.
Sync Signal	HSYNC and VSYNC levels can be adjusted simultaneously.
Burst Signal	Amplitude can be adjusted.
Variable Range	0 to 100 % (in 1 % steps). The normal level is 100 %.
Inversion	Available
Closed Captioning and Teletext	Supports closed captioning. (VBI Teletext, CGMS, and WSS are not supported.)

Analog Audio Output
    Frequency   You can switch between OFF, 400 Hz, and 1 kHz for the left and right channels separately.
    Output Level   Linked to the LT450
                                          -5.23 dBm or 0 dBm (at 600 Ω termination)
    Output Impedance   600 Ω
    Number of Outputs   2 (AUDIO OUT L/R)

Control Signal
    VIDEO STATUS
        OFF[1]   0.0 to 2.0 V   (typical value: 1.0 V)
        SQUEEZE, LETTER BOX   4.5 to 7.0 V   (typical value: 5.8 V)
        4:3   9.5 to 12.0 V (typical value: 10.8 V)
        Output Impedance   890 Ω
    RGB STATUS
        OFF   0.0 to 0.4 V   (typical value: 0.2 V)
        ON   1.0 to 3.0 V   (typical value: 1.5 V)
        Output Impedance   75 Ω

Connector   SCART connector

Output Mode   Selectable on the LT 450 menu screen
    Mode 1   RGB
    Mode 2   S-VHS
    Mode 3   Composite
    Mode 4   VBS/RGB

General Specifications
    Environmental Conditions   Same as the LT 450.
    Power Supply   Supplied from the LT 450
        Voltage   5 VDC
        Power Consumption   3 W max.
    Dimensions   29 (W) × 82 (H) × 222 (D) mm (excluding projections)
    Weight   0.14 kg

[1]   When a format that is not transmitted is selected.

3. PANEL DESCRIPTION

3.1 Front panel
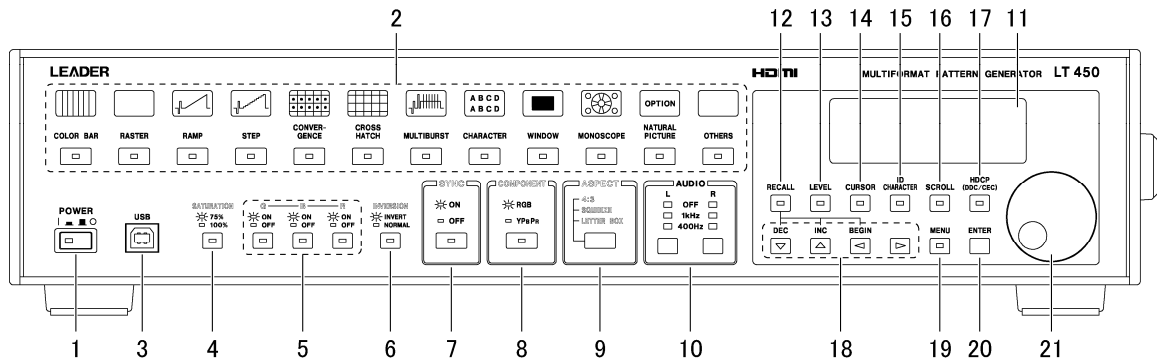
Figure 3-1   Front panel

1   Power switch

Turns the power on and off. Power is turned on when the button is depressed (|).

2   Pattern selection keys

These keys select output patterns. If there are multiple patterns assigned to one key, the pattern switches each time you press the key.

See section 6.1, "Selecting the Output Pattern" and section 6.5, "Output Pattern Description."

3   USB port

Can be used to transmit timing and picture data from a PC to the LT 450 (option).

See section 9.4, "Controlling the LT 450 through the Front Panel USB Port."

4   SATURATION key

When the output pattern is full field color bar or raster, this key sets the saturation to 75 % or 100 %.

See section 6.2, "Setting the Saturation."

5   (G, B, R) Keys

When the output format is raster, these key switch (G, B, R) on and off .

See section 6.3, "Setting the Output Signal (G, B, R)."

6   INVERSION key

Sets whether or not to invert the display when the output pattern is convergence, character, window, or monoscope.

See section 6.4, "Setting Inversion."

7   SYNC key

Pressing this key toggles between adding and not adding a sync signal when the output format is component, and the signal format is RGB.

See section 5.2, "Setting the Sync Signal."

8   COMPONENT key

Sets the signal format to RGB or YPBPR when the output format is component (HDTV or SDTV).

See section 5.3, "Selecting the Signal Format (COMPONENT)."

9   ASPECT key

Sets the aspect ratio to 4:3, SQUEEZE, or LETTER BOX when the output format is 480i, 576i, or composite.

See section 5.4, "Setting the Aspect Ratio (ASPECT)."

10   AUDIO key

Sets the frequency of the audio signal that is transmitted from the rear panel AUDIO OUTPUT, HDMI connectors (including those on options) and SCART connector (on option) to OFF, 1 kHz, or 400 Hz. If you select OFF, audio signals will not be transmitted. You can set the audio signal for the left and right channels separately.

See section 5.5, "Setting the Audio Signal."

11   LCD panel

Displays the output format, menu screen, etc.

12   RECALL key

Pressing the RECALL key will cause its LED to illuminate, and you will be able to recall a preset memory containing settings stored in the past. Set the recall range on the menu screen.

See section 8.6.2, "Recalling Panel Settings."

13   LEVEL key

Pressing the LEVEL key will cause its LED to illuminate, and you will be able to temporarily adjust the output level. The adjusted output level is only valid while the LEVEL key LED is on. If you want to transmit the adjusted output level continuously, set the level in the menu screen.

See section 8.5.1, "Setting Temporary Levels."

14   CURSOR key

Pressing the CURSOR key will cause its LED to illuminate and a cursor to appear. You can set the cursor position. Set the cursor level and line width in the menu screen.

See section 8.2.1, "Turning the Cursor On and Off" and section 8.2.2, "Cursor Position."

15   ID CHARACTER key

Pressing the ID CHARACTER key will cause its LED to illuminate and characters to appear. Set the characters, their display position, and other settings in the menu screen.

See section 8.3.1, "Turning ID Characters On and Off."

16   SCROLL key

Pressing the SCROLL key will cause its LED to illuminate and the output pattern to scroll. Set the scroll direction and speed in the menu screen.

See section 8.4.1, "Turning the Pattern Scroll Feature On and Off."

17 HDCP key

Pressing the HDCP key will cause its LED to illuminate and turn HDCP, CEC, and DDC on. This operation applies to both the HDMI and DVI-I connectors, including those on options.

See section 8.8.1, "Turning HDCP, CEC, and DDC On and Off," and section 8.9.1, "Turning HDCP and DDC On and Off," section 8.10.1, "Turning HDCP and DDC On and Off," and section 8.11.1, "Turning HDCP, CEC, and DDC On and Off."

18 Arrow keys

Used to select items. Also used to recall panel settings when combined with the DEC, INC, BEGIN, and RECALL keys.

19 MENU key

Pressing the MENU key will cause its LED to illuminate and the menu screen to appear. You use the menu screen to configure the settings. You can exit the menu screen regardless of the menu level you are at by pressing the MENU key.

See section 8.1, "Menu Screen."

20 ENTER key

Selects a setting or menu.

21 Jog dial

Selects the output format, sets a numeric value, etc.

3.2   Rear Panel
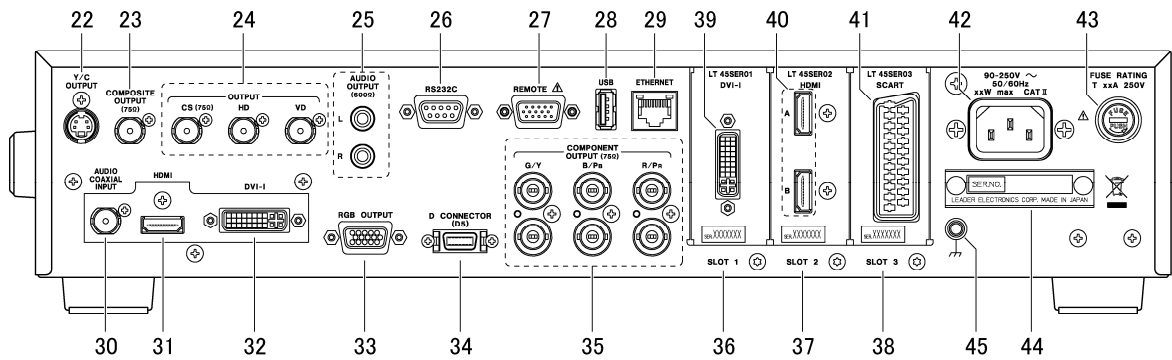
Figure 3-2   Rear panel

22 Y/C separation signal output connector

Transmits a Y/C separation signal when the output format is composite.

See section 7.7, "Y/C Separation Signal Output Connector."

23 Composite output connector

Transmits composite signals when the output format is composite.

See section 7.6, "Composite Output Connector."

24 Sync signal output connector

Transmits a composite sync signal (CS), a horizontal drive signal (HD), and a vertical drive signal (VD).

See section 7.9, "Sync Signal Output Connector."

25 Audio Signal Output Connector

Transmits an audio signal at the frequency set from the front panel. The signal is not transmitted if the frequency is set to OFF.

See section 7.10, "Audio Signal Output Connector" and section 8.15, "Configuring the Audio Signal."

26 RS232C port

The LT 450 settings can be controlled from a PC through this connector. Also, you can automatically set the output format and preset memory by connecting the LT 450 to the LG 226.

See section 9.1, "Controlling the LT 450 through the Ethernet or RS232C Port" and section 9.2, "Connecting to the LG 226 through the RS232C Port."

27 Remote connector

You can execute INC, DEC, and BEGIN preset memory commands by applying an external contact signal to the remote connector.

See section 9.3, "Controlling the Recall Address through the Remote Connector."

28 USB port

You can save preset memories to a USB memory device and recall preset memories from it.

See section 9.5, "Saving Preset Memories through the Rear Panel USB Port."

29 Ethernet port

The 10BASE-T Ethernet port. The LT 450 settings can be controlled from a PC through this connector.

See section 9.1, "Controlling the LT 450 through the Ethernet or RS232C Port."

30 Audio signal input connector

The audio signal applied here is transmitted from the HDMI connector. (AUDIO INPUT must be set to EXT in the HDMI output settings.)

See section 7.5, "HDMI Output Connector and Audio Signal Input Connector" and section 8.8.2, "Configuring the HDMI Output."

31 HDMI output connector

Transmits component signals when the output format is component.

See section 7.5, "HDMI Output Connector and Audio Signal Input Connector" and section 8.8, "Configuring the HDMI."

32 DVI-I output connector

Transmits component signals when the output format is component.

See section 7.4, "DVI-I Output Connector."

33 RGB output connector

Transmits component signals when the output format is component.

See section 7.3, "RGB Output Connector."

34 D Connector

A D5-compliant D output terminal that transmits analog component signals when the output format is component.

See section 7.2, "D Connector."

35 Component output connector

Transmits component signals when the output format is component.

See section 7.1, "Component Output Connectors."

36 Slot 1

An option slot. You can install any option. The LT 45SER01 (DVI-I unit) is installed in this example.

See section 10.1, "Installing an Option."

37 Slot 2

An option slot. You can install any option. The LT 45SER02 (HDMI unit) is installed in this example.

See section 10.1, "Installing an Option."

38 Slot 3

An option slot. You can install any option. The LT 45SER03 (SCART unit) is installed in this example.

See section 10.1, "Installing an Option."

39 DVI-I output connector on an option

A component signal output connector. Transmits a signal when the output format is component. The specifications are the same as those of the DVI-I connector on the LT 450.

See section 7.4, "DVI-I Output Connector" and section 8.10, "Configuring the DVI-I on an Option."

40 HDMI output connector on an option

A component signal output connector. Transmits a signal when the output format is component. The specifications are the same as those of the HDMI connector on the LT 450.

See section 7.5, "HDMI Output Connector and Audio Signal Input Connector" and section 8.11, "Configuring the HDMI on an Option."

41 SCART connector on an option

A composite signal output connector. Transmits signals when the output format is NTSC-M, NTSC-J, NTSC 4.43, PAL, PAL-M, PAL-N, PAL-60 or SECAM.

See section 7.8, "SCART Connector (option)" and section 8.12, "Configuring the SCART Connection on an Option."

42 Power input connector

43 Fuse

AC power supply fuse. Use a fuse with the correct rating. When replacing a fuse, be sure to turn off the power switch and to unplug the power cord from the outlet.

44 Serial number plate

The serial number is engraved on this plate. Tell the LEADER agent this number when making an inquiry.

45 Ground terminal

A ground terminal that is connected to the LT 450 case. Be sure to ground the LT 450 for safe operation.

4. OPERATING PROCEDURE

This chapter describes the basic operating procedures of the LT 450. Carry out the steps below to configure the output signal.
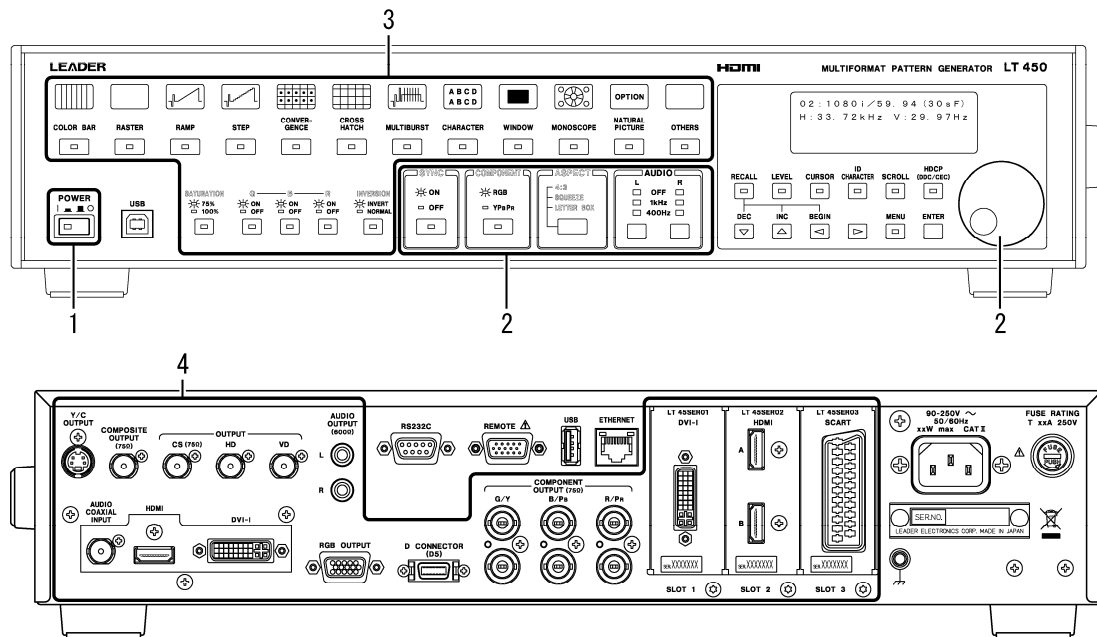
Figure 4-1   Operating procedure

1   Press the power switch to turn the LT 450 on.

Initialization starts when you press the power switch. The LT 450 will not transmit normal signals or accept key inputs until the initialization is complete. When initialization is complete, the LT 450 displays the output format.
The LT 450 does not store the panel settings when you turn off the power. The panel settings that are used at power-on are those that have been saved according to section 8.7.2, "Power-on Panel Settings."

2   Set the output format.

First, turn the jog dial to select the output format. Then, specify the SYNC, COMPONENT, and ASPECT settings. (The settings may not be available depending on the selected output format.)
See chapter 5, "Output Format."

3   Set the output pattern.

First, press the pattern selection key to select the output pattern. Then, specify the settings for SATURATION, GBR (YPBPR), and INVERSION. (These items may not be available depending on the selected output pattern.)
See chapter 6, "Output Pattern."

4   Connect a cable to the output connector and transmit the signal.

See chapter 7, "Output Connectors."

5. OUTPUT FORMAT

5.1 Selecting the Output Format

To select the output format, display the output format on the LCD as shown below, and then turn the jog dial.

If the output format is not displayed when any of the MENU, RECALL, LEVEL, or CURSOR key LEDs are illuminated, press the key that is illuminated to exit from the configuration screen. Then, you will be able to select the output format.
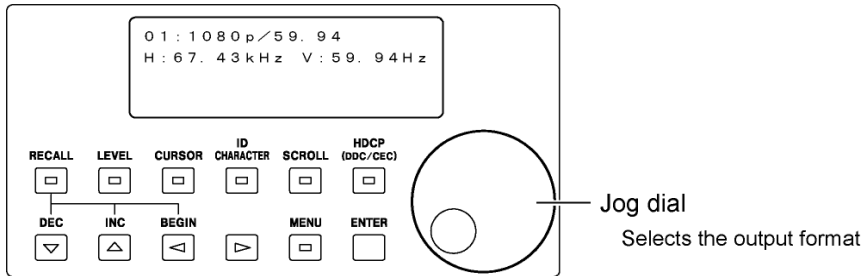
Figure 5-1　Output format selection

The output format screen displays the output format number, output format name, horizontal frequency, and frame frequency as shown below. (See Table 12-1, "List of output formats.")
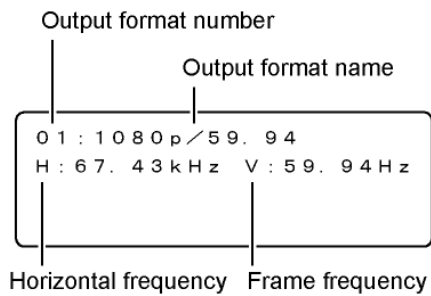
Figure 5-2　Output format screen

5.2 Setting the Sync Signal

When the output format is component, you can press SYNC to select whether or not to add a sync signal. A sync signal is added to all components, R, G, and B (Y, P_B, and P_R) when the output format is HDTV and only to the G (Y) component when the output format is SDTV or PC monitor.
You can carry out this procedure when the SYNC indicator is illuminated. If it is not illuminated, pressing the key produces no effect.

ON/OFF settable when illuminated

SYNC key
Selects whether or not to add a sync signal
When the LED is on, a sync signal is added.
When the LED is off, a sync signal is not added.
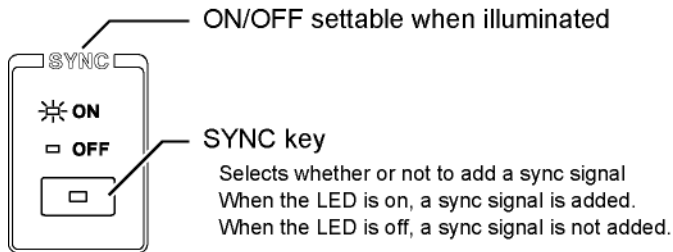
Figure 5-3   SYNC key

5.3 Selecting the Signal Format (COMPONENT)

When the output format is component, you can press COMPONENT to set the component signal format to RGB or YP_BP_R. The signal format is fixed to RGB when the output format is a PC monitor format (excluding VGA). Also, the signal format is fixed to YP_BP_R when the output pattern is xvYCC.
You can carry out this procedure when the word COMPONENT is illuminated. If it is not illuminated, pressing the key produces no effect.

Selectable when illuminated

COMPONENT key
Sets the signal format to RGB or YP_BP_R
When the LED is on, RGB is selected.
When the LED is off, YP_BP_R is selected.
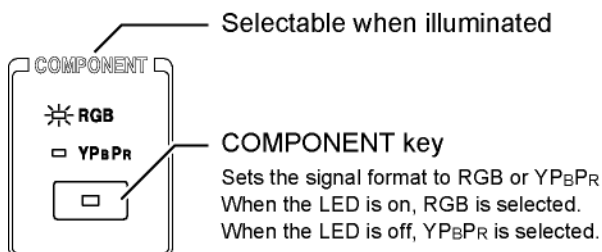
Figure 5-4   COMPONENT key

23

5.4   Setting the Aspect Ratio (ASPECT)

You can press ASPECT to set the aspect ratio to 4:3, SQUEEZE, or LETTER BOX. You can select the aspect ratio when the output format is set to certain SDTV component formats, or when the output format is set to any of the composite formats and certain patterns are selected. See Table 12-2, "List of output patterns."

You can carry out this procedure when the word ASPECT is illuminated. If it is not illuminated, pressing the key produces no effect.

Selectable when illuminated

LETTER BOX

SQUEEZE

4:3

The top and bottom of a 16:9 picture is matted out and transmitted with a 4:3 aspect ratio.

A 16:9 picture is reduced horizontally and transmitted with a 4:3 aspect ratio.
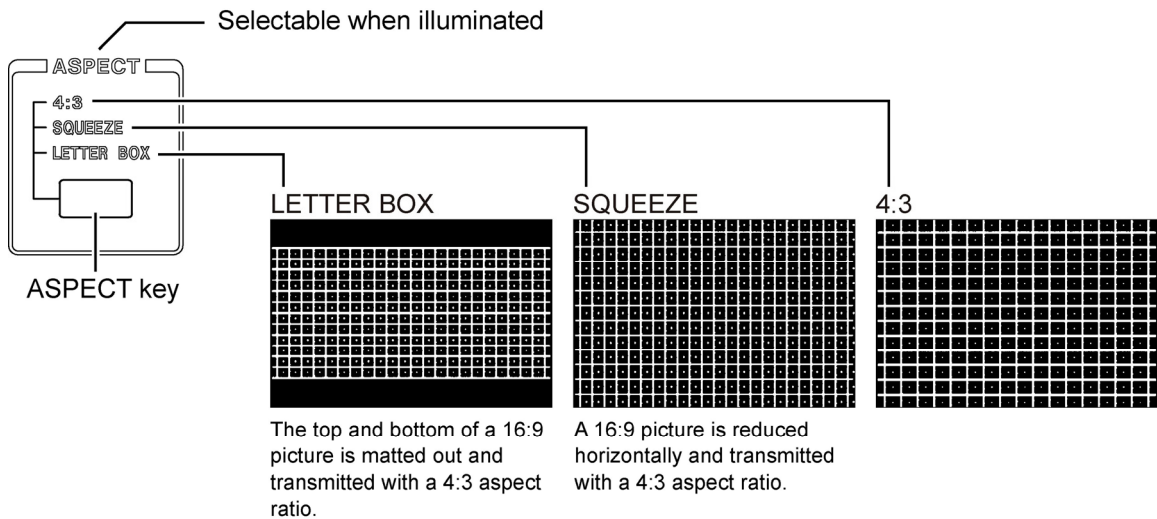
ASPECT key

Figure 5-5   ASPECT key

*   When the aspect ratio is not 4:3, SQUEEZE, or LETTER BOX, these indicators turn off.

5.5   Setting the Audio Signal

You can press AUDIO to set the audio signal frequency to OFF, 1kHz, or 400Hz for the left and right channels separately. If you select OFF, audio signals will not be transmitted.

The set audio signal is transmitted from the rear panel AUDIO output, HDMI connectors (including those on options), and SCART connector (on option).
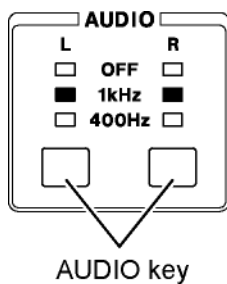
AUDIO key

Figure 5-6   AUDIO key

6. OUTPUT PATTERNS

6.1 Selecting the Output Pattern

To select the output pattern, press any of the pattern selection keys shown below. The selected key LED illuminates, and the signal is transmitted.

Some pattern selection keys have multiple patterns assigned to each key. For such keys, you can press the key repeatedly to switch the pattern.

For the relationship between the output pattern type and output format, see Table 12-2, "List of output patterns."

COLOR BAR	RASTER	RAMP	STEP	CONVER-GENCE	CROSS HATCH	MULTIBURST	CHARACTER	WINDOW	MONOSCOPE	NATURAL PICTURE	OTHERS
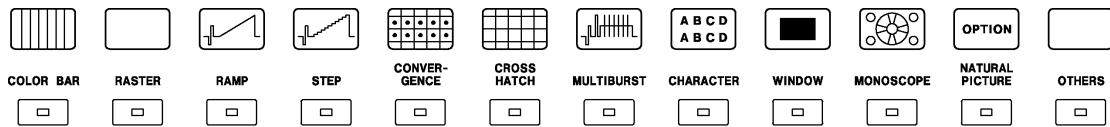
Figure 6-1   Pattern selection keys

The patterns that can be transmitted vary depending on the output format and aspect ratio. If you select a pattern that cannot be transmitted (for example, multiburst when component output for PC monitors is selected), the LCD panel displays "Not available" and black is transmitted.

```
20:VGA (640X480)
Not  available
```
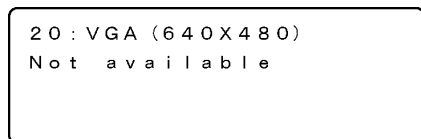
Figure 6-2   Not available

6.2 Setting the Saturation

When the output pattern is full field color bar or raster, you can press SATURATION to set the saturation to 75% or 100%. You can carry out this procedure when the SATURATION indicator is illuminated. If it is not illuminated, pressing the key produces no effect.

See section 6.5.1, "Color Bar" and section 6.5.2, "Raster."

Settable when illuminated

SATURATION key
Sets the saturation to 75 % or 100 %
When the LED is on, 75 % is selected.
When the LED is off, 100 % is selected.
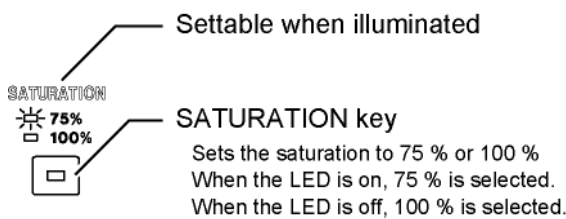
Figure 6-3   SATURATION key

6.3 Setting the Output Signal (G, B, R)

When the output pattern is raster, you can press the G, B, and R keys to turn G, B, and R on and off. When COMPONENT is YPBPR, the signals that corresond to GBR turn on and off. You can carry out this procedure when the G, B, R indicator is illuminated. If it is not illuminated, pressing the key produces no effect.

See section 6.5.2, "Raster" and section 5.3, "Selecting the Signal Format (COMPONENT)."
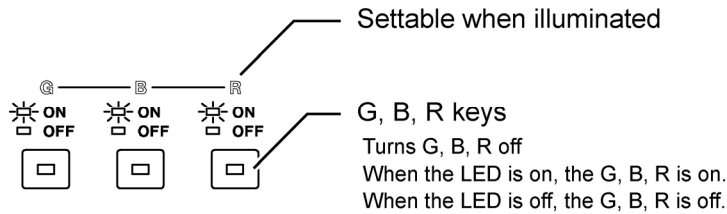
Figure 6-4   G, B, R keys

6.4 Setting Inversion

When the output pattern is convergence, character, window, or monoscope, you can press INVERSION to invert the output.
You can press INVERSION to invert the output. You can carry out this procedure when the INVERSION indicator is illuminated. If it is not illuminated, pressing the key produces no effect. The number of active lines in a frame in the analog output for the 480p/59.94, 480i/59.94, NTSC-M, NTSC-J, NTSC 4.43, PAL-M, and PAL-60 output formats varies depending on the INVERSION setting. For details, see Table 12-1, "List of output formats".
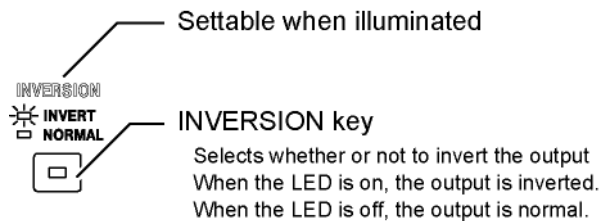
Figure 6-5   INVERSION key

6.5   Output Pattern Description

6.5.1   Color Bar

Each time you press COLOR BAR, the color bar type switches in the following order:
Full field color bar, multi format color bar, SMPTE color bar.
The color bar types that can be transmitted vary depending on the output format and aspect ratio (see Table 12-2, "List of output patterns").

Color bars are used to test the level, hue, and other parameters on video equipment and to adjust or test the hue, saturation, brightness, and contrast on monitors.
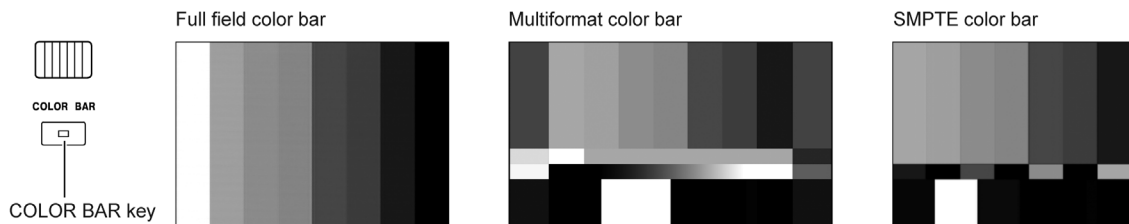
Figure 6-6   Color bars

● **Full field color bar**

Full field color bar can be transmitted in any format.
You can press SATURATION to set the saturation to 75% or 100%. If you select 75%, the LT 450 transmits 100/0/75/0 color bar. If you select 100%, the LT 450 transmits 100/0/100/0 color bar.
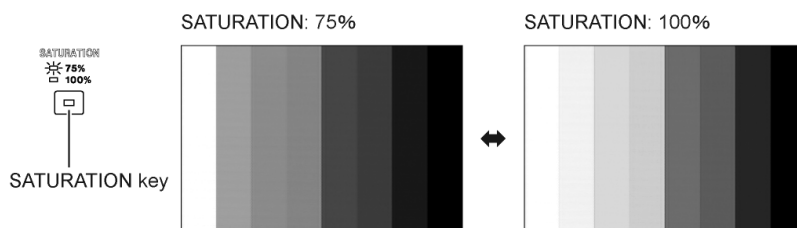
Figure 6-7   Saturations of full field color bar

● **Multiformat color bar**

Multiformat color bar is transmitted when the output format is HDTV component. If COMPONENT is set to RGB, the LT 450 transmits RGB color bar (LT450 original specifications).

● **SMPTE color bar**

The SMPTE color bar is transmitted when the output format is 480i/59.94, 576i/50, component (PC monitor), or composite. If COMPONENT is set to RGB, the LT 450 follows its original specifications and transmits the RGB color bar.

6.5.2   Raster

In any format, you can press RASTER to transmit raster waveforms.
The raster pattern is used to adjust and test purity, test uneven colors, and discover FPD defects. It is also used as a background for testing character display.
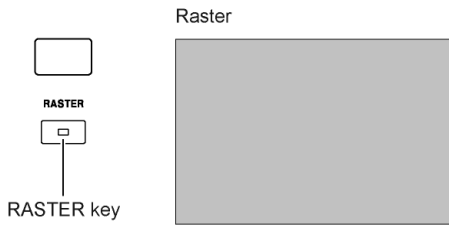
Figure 6-8   Raster

You can press SATURATION to set the saturation to 75% or 100%.
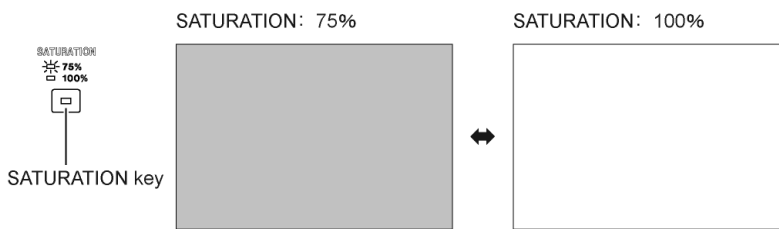
Figure 6-9   Raster saturation

You can press G, B, and R to turn the corresponding components on and off.
The raster display colors based on the GBR combinations are as indicated in the following table.
(The display colors below will appear even when COMPONENT is set to YPBPR, because the signals that correspond to GBR turn on and off.)

Table 6-1   Raster display colors

Color	G	B	R
Black	OFF	OFF	OFF
Red	OFF	OFF	ON
Blue	OFF	ON	OFF
Magenta	OFF	ON	ON
Green	ON	OFF	OFF
Yellow	ON	OFF	ON
Cyan	ON	ON	OFF
White	ON	ON	ON

6.5.3   Ramp

Each time you press RAMP, the ramp type switches between Ramp and Deep Color Ramp. The ramp types that can be transmitted vary depending on the output format and aspect ratio (see Table 12-2, "List of output patterns").

Ramps are used to adjust or test linearity, adjust gradation, and so on.
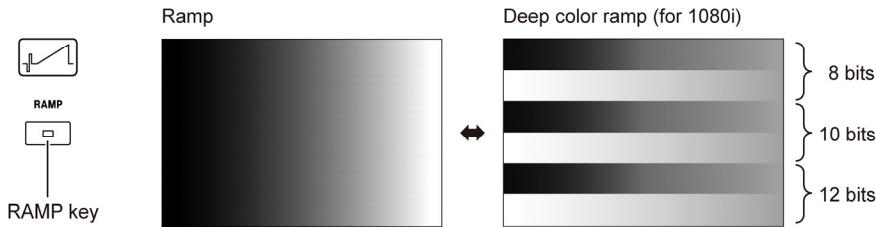
Figure 6-10   Ramp

When the component signal is YPBPR, you can turn PB and PR OFF, as explained in section 8.17.6, "USER SETTING Feature."

● **Ramp**

Transmitted in any format.

● **Deep Color Ramp**

Deep color ramp patterns are transmitted from the HDMI connectors on the LT 450 and its installed options when the output format is 1080p/59.94, 1080i/59.94(30sF), 1080i/50(25sF), 720p/59.94, 720p/50, 480p/59.94, 480i/59.94, 576p/50, 576i/50, or VGA(640×480).

Deep color ramp patterns are transmitted in the following order: 8 bits, 10 bits, and 12 bits. To transmit a deep color ramp pattern, set FORMAT to 4:4:4 and BIT WIDTH to 10 or 12 as explained in section 8.8.2, "Configuring the HDMI Output." (When BIT WIDTH is set to 10, the 12-bit section is displayed using 10 bits.)

Because all the gradations of the deep color ramp pattern cannot be displayed in a single line, the pattern is displayed over multiple lines. The number of lines used depends on the output format as shown below. (See the figure above for an example of the deep color ramp pattern when the output format is 1080i.)
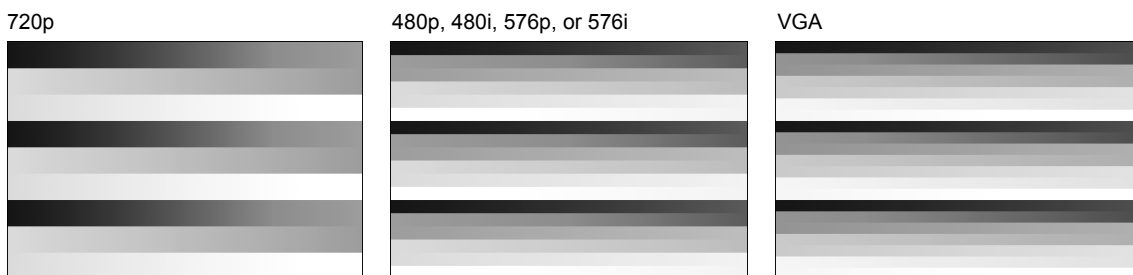
Figure 6-11   Deep Color Ramp

6.5.4   Step

Each time you press STEP, the step type switches in the following order: 10 Step, 15 Step, and 32 Step. These patterns can be transmitted in any format.
The step pattern is used to test the transmission system linearity, adjust gradation, and so on.
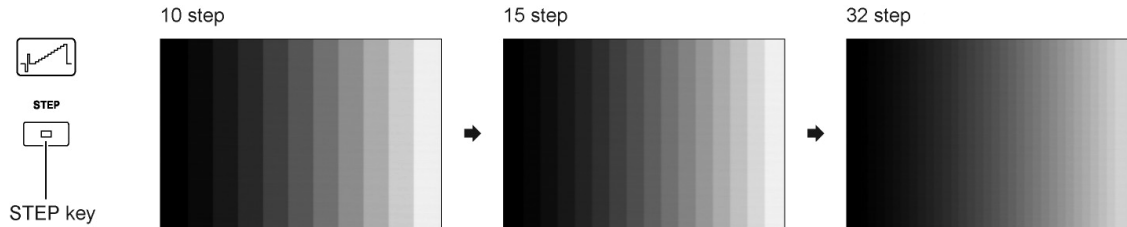
Figure 6-12   Step

When the component signal is YPBPR, you can turn PB and PR OFF, as explained in section 8.17.6, "USER SETTING Feature."

6.5.5   Convergence

In any format, you can press CONVERGENCE to transmit convergence waveforms.
The convergence pattern is used to test convergence, test for uneven colors (especially in the perimeter), and so on.
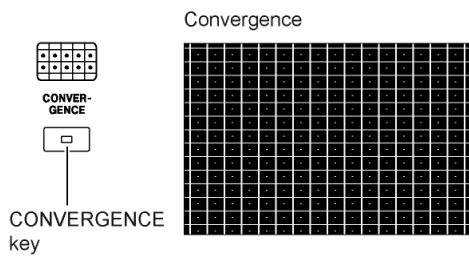
Figure 6-13   Convergence

You can press INVERSION to invert the display.
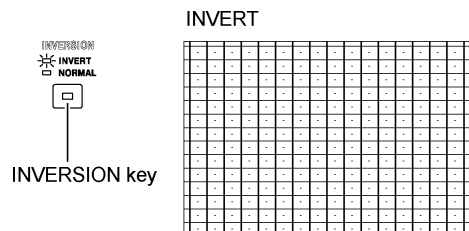
Figure 6-14   Inverted display of convergence

30

6.5.6 Crosshatch

In any format, you can press CROSS HATCH to transmit crosshatch waveforms.
The crosshatch pattern is used to test convergence, test for uneven colors (especially in the perimeter), and so on.
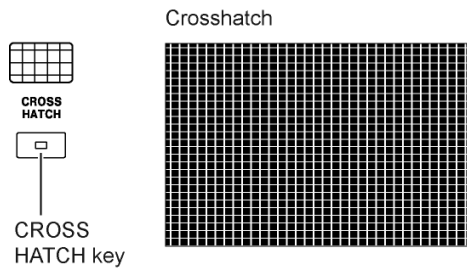
Figure 6-15   Crosshatch

6.5.7 Multiburst

In any format other than component for PC monitors, you can press MULTIBURST to transmit multiburst waveforms.
The multiburst pattern is used to test frequency characteristics of video equipment and transmission systems, check the monitor resolution, and so on.
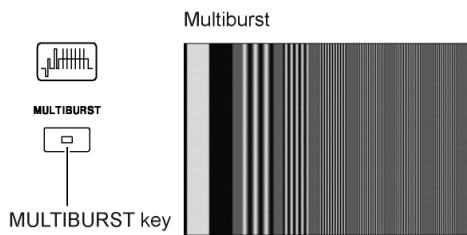
Figure 6-16   Multiburst

When the component signal is YPBPR, you can turn PB and PR OFF, as explained in section 8.17.6, "USER SETTING Feature."

6.5.8   Character

In any format, you can press CHARACTER to transmit characters.
The character pattern is used to test linearity, adjust or test focus, test sharpness using character edges, and so on.
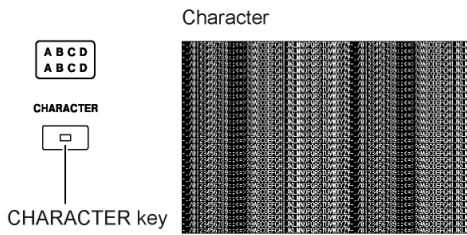
Figure 6-17   Character

You can press INVERSION to invert the display.
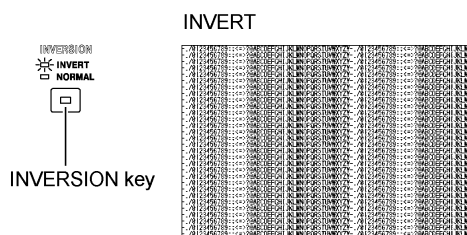
Figure 6-18   Inverted display of characters

6.5.9   Window

Each time you press WINDOW, the window type switches between 1/2 Window and 1/10 Window. These patterns can be transmitted in any format.

The window pattern is used to adjust or test video circuits, test high-voltage stability, test streaking, and so on.
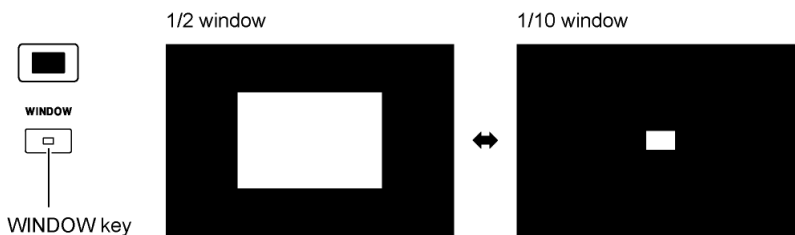
Figure 6-19   Window

You can press INVERSION to invert the display.
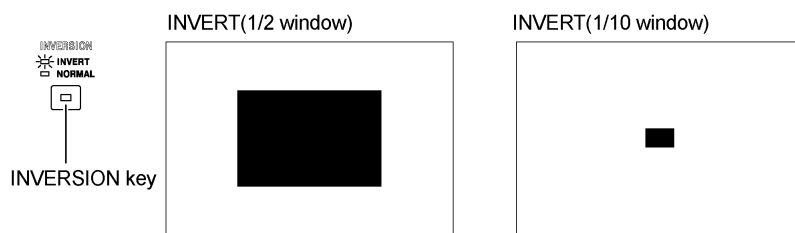
Figure 6-20   Inverted display of the window

6.5.10   Monoscope

In any format other than component for PC monitors, you can press MONOSCOPE to transmit monoscope waveforms.

The monoscope pattern is used to test for streaking and to determine resolution, focus, gradation, screen center, display linearity, and screen size.
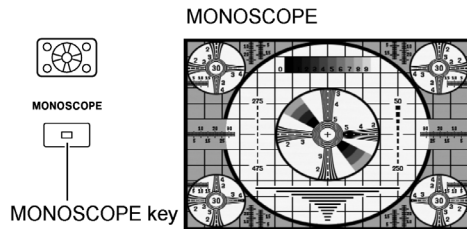
Figure 6-21   Monoscope

You can press INVERSION to invert the display.
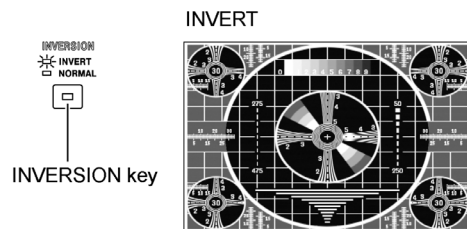
Figure 6-22   Inverted display of the monoscope

6.5.11   Natural Picture (option)

If you have specified a format that has a natural picture assigned to it and you press NATURAL PICTURE, the natural picture is transmitted. If multiple natural pictures are registered, you can switch from one picture to the next by pressing NATURAL PICTURE. For details, see the instruction manual for the LT 45SER04 (TIMING AND PICTURE TOOL).

6.5.12   Other Patterns

Each time you press OTHERS, the waveform type switches in the following order: Demodulation, ANSI Grayscale, Checker, and xvYCC. The waveform types that can be transmitted vary depending on the output format and aspect ratio (see Table 12-2, "List of output patterns").
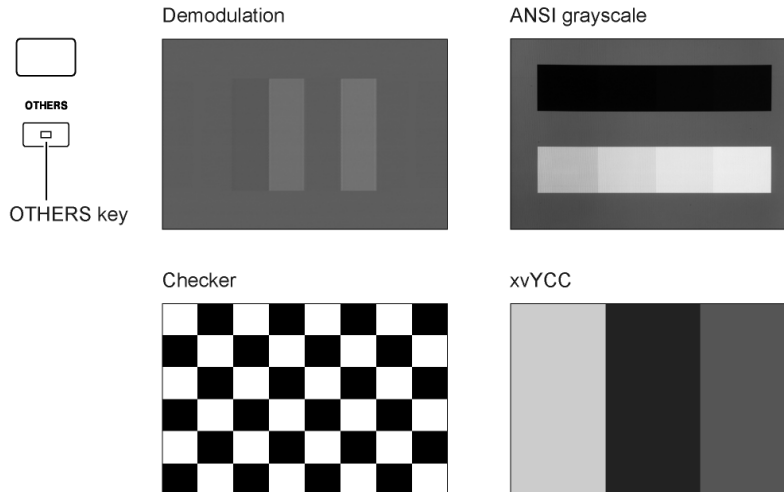
Figure 6-23   Other patterns

● **Demodulation**

Transmitted when the output format is PAL, PAL-M, PAL-N, or PAL-60.
The demodulation pattern is used to adjust or test a color monitor's TV chroma demodulator, adjust or test a Y/C separation circuit with a delay line, and so on. When the Y/C separation circuit is being adjusted, the bars on either side are gray. When it is not being adjusted, the bars appear in color.

● **ANSI Grayscale**

Transmitted when the output format is component for PC monitors.
The ANSI Grayscale pattern is used to adjust a projector's luminance, contrast, etc.

● **Checker**

Can be transmitted in any format.
The checker pattern is used to adjust focus, test horizontal and vertical linearities, and so on.

● **xvYCC**

Transmitted from the HDMI and DVI-I (digital) output connectors when the output format is 1080p/59.94, 1080i/59.94(30sF), 1080i/50(25sF), 720p/59.94, or 720p/50.
The output format is fixed to YPBPR. The COMPONENT key on the front panel is disabled.

7. I/O CONNECTORS

7.1 Component Output Connectors

BNC connectors for transmitting analog component signals. The top and button rows transmit the same signals when the output format is component (see Table 12-3, "List of output connectors").
The following figure shows the output connectors.
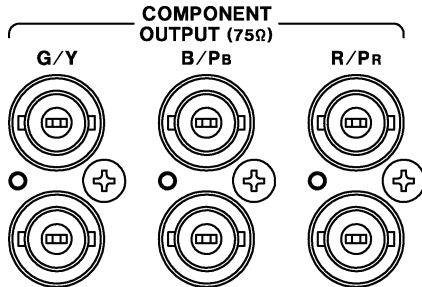
Figure 7-1   Component output connectors

Connect a 75-Ω coaxial cable to each component output connector, and terminate the other end of each cable with 75-Ω termination.

7.2 D Connector

D connector for transmitting analog component signals. The D connector transmits signals when the output format is component (see Table 12-3, "List of output connectors").
The output connector diagram and pin arrangement are given below.
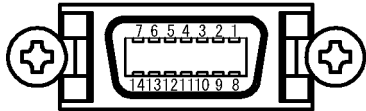
Figure 7-2   D connector

Table 7-1   D connector pin arrangement

Pin	Function	Pin	Function
1	G/Y	8	Line 1
2	G/Y_GND	9	Line 2
3	B/PB	10	Auxilary line 2[1]
4	B/PB_GND	11	Line 3
5	R/PR	12	Hot plug detection GND
6	R/PR_GND	13	Auxiliary line 3[1]
7	Auxilary line 1[1]	14	Hot plug detection[2]

[1]   Not connected inside the LT 450. Do not connect anything to this pin if the D connector cable is not connected.

[2]   Not connected inside the LT 450. Hot plug detection is not performed. The signal is transmitted regardless of whether or not a cable is connected.

Lines 1 to 3 in Table 7-1 transmit signals that identify the output format and aspect ratio as defined by JEITA. For formats not covered in JEITA, the LT 450 transmits signals according to its original specifications. The ID signal specifications are as follows:

Table 7-2   D connector ID signals

No.	Format	Aspect ratio	Line 1 Active lines [V]	Line 2 Scanning [V]	Line 3 Aspect ratio [V]
Component (HDTV)					
01	1080p/59.94	16:9	5.0	5.0	5.0
02	1080i/59.94(30sF)	16:9	5.0	0.0	5.0
03	1080p/29.97	16:9	5.0	2.2	5.0
04	1080p/23.98	16:9	5.0	2.2	5.0
05	1080PsF/23.98	16:9	5.0	0.0	5.0
06	1080p/50	16:9	5.0	5.0	5.0
07	1080p/25	16:9	5.0	2.2	5.0
08	1080i/50(25sF)	16:9	5.0	0.0	5.0
09	1080p/50(1250T)	16:9	5.0	2.2	5.0
10	1080i/50(1250T)	16:9	5.0	2.2	5.0
11	720p/59.94	16:9	2.2	5.0	5.0
12	720p/29.97	16:9	2.2	2.2	5.0
13	720p/23.98	16:9	2.2	2.2	5.0
14	720p/50	16:9	2.2	2.2	5.0
15	720p/25	16:9	2.2	2.2	5.0
Component (SDTV)					
16	480p/59.94	SQUEEZE	0.0	5.0	5.0
17	480i/59.94	4:3	0.0	0.0	0.0
		LETTER BOX	0.0	0.0	2.2
		SQUEEZE	0.0	0.0	5.0
18	576p/50	SQUEEZE	0.0	2.2	5.0
19	576i/50	4:3	0.0	2.2	0.0
		LETTER BOX	0.0	2.2	2.2
		SQUEEZE	0.0	2.2	5.0
Component (PC monitor)					
20 to 24	-	-	0.0	0.0	0.0
Composite					
25 to 32	-	-	0.0	0.0	0.0
Component (PC monitor)					
33 to 39	-	-	0.0	0.0	0.0

The D connector is defined by JEITA (Japan Electronics and Information Technology Industries Association) as a connector for connecting a digital tuner and television receiver. The LT 450 D connector is D5-compatible. The D connector signal format is set to YPBPR, but you can press the COMPONENT key on the front panel to switch to RGB. Select the appropriate signal format for your needs.

Use a dedicated cable for the D connector, and terminate the cable at the other end with 75-Ω termination.

7.3   RGB Output Connector

The RGB output connector is a Mini D-sub 15-pin connector used to transmit analog component signals. The connector transmits signals when the output format is component (see Table 12-3, "List of output connectors").
The output connector diagram and pin arrangement are given below.
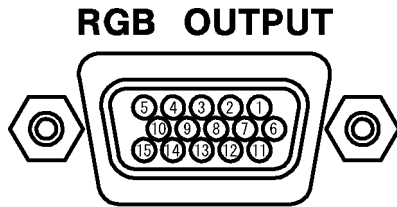
RGB OUTPUT

Figure 7-3   RGB output connector

Table 7-3   RGB output connector pin arrangement

Pin	Function	Pin	Function	Pin	Function
1	R/PR	6	R/PR GND	11	Reserved
2	G/Y	7	G/Y GND	12	Reserved
3	B/PB	8	B/PB GND	13	HD
4	Reserved	9	Reserved	14	VD
5	GND	10	SYNC GND	15	Reserved

Connect a commercially-sold VGA cable to the RGB output connector, and terminate the other end of the cable with 75-Ω termination. There are various types of VGA cables, such as those with a Mini D-sub 15-pin connector on either end and those with a Mini D-sub 15-pin connector on one end and a BNC connector on the other end. Select the appropriate cable for your needs.

7.4   DVI-I Output Connector

The DVI-I output connector is used to transmit analog and digital component signals. The connector transmits signals when the output format is component (see Table 12-3, "List of output connectors").
The output connector diagram and pin arrangement are given below.
Unless specified otherwise, the descriptions given here also apply to the DVI-I output connector on an option.
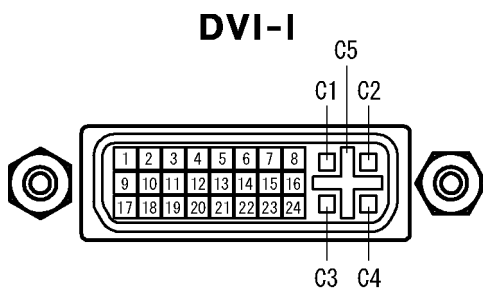
DVI-I

Figure 7-4   DVI-I output connector

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Table 7-4 DVI-I output connector pin arrangement

Pin	Function	Pin	Function
1	TMDS Data2-	16	No Connect
2	TMDS Data2+	17	TMDS Data0-
3	TMDS Data2 Shield	18	TMDS Data0+
4	NC	19	TMDS Data0 Shield
5	NC	20	NC
6	DDC Clock	21	NC
7	DDC Data	22	TMDS Clock Shield
8	Analog Vertical Sync	23	TMDS Clock+
9	TMDS Data1-	24	TMDS Clock-
10	TMDS Data1+	C1	Analog Red
11	TMDS Data1 Shield	C2	Analog Green
12	NC	C3	Analog Blue
13	NC	C4	Analog Horizontal Sync
14	+5VDC POWER	C5	Analog Ground (RGB return)
15	Ground (return for+5, Hsync, Vsync)		

The DVI-I output connector supports the signal formats indicated in the table below. If you specify a signal format that is not supported, the connector transmits 4:4:4 8-bit signals for both RGB and YPBPR.
Set the component signal format with the COMPONENT key on the front panel, and set the format and bit width on the menu screen as described in section 8.8.2, "Configuring the HDMI Output."

Table 7-5 DVI-I output connector signal formats

Component	Format	Bit Width		
		8	10	12
RGB	4:4:4	Yes	No	No
	4:2:2	No	No	No
YPBPR	4:4:4	Yes	No	No
	4:2:2	Yes	Yes	Yes

You can specify and view DVI-I output connector settings on the menu screen. For details, see section 8.9, "Configuring the DVI-I" and 8.10, "Configuring the DVI-I on an Option."

The DVI-I connector only supports RGB analog output. The signal is not transmitted if COMPONENT is set to YPBPR. Note that because the optional analog output has a different output circuit than the standard DVI-I output connector, their picture qualities will be different.

Connect a commercially-sold DVI-I cable to the DVI-I output connector. There are different types of DVI-I cables, such as those with a DVI-I connector on either end and those with a DVI-I connector on one end and a Mini D-sub 15-pin on the other end. Select the appropriate cable for your needs.
You can use an adapter or a similar device to connect the output to an HDMI display (audio output and CEC features are not supported). When using the HDMI display, turn DDC ON.

7.5 HDMI Output Connector and Audio Signal Input Connector

The HDMI output connector transmits digital component signals, and the audio signal input connector receives audio signals. The HDMI output connector transmits signals when the output format is component (see Table 12-3, "List of output connectors").
The connector diagram and pin arrangement are given below.
The description given in this section also applies to the HDMI output connector on an option.
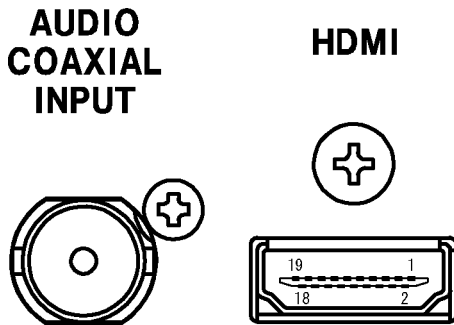
Figure 7-5   HDMI output connector and audio signal input connector

Table 7-6   HDMI output connector pin arrangement

Pin	Name	Pin	Name	Pin	Name
1	TMDS Data2+	8	TMDS Data0 Shield	14	Reserved
2	TMDS Data2 Shield	9	TMDS Data0-	15	SCL
3	TMDS Data2-	10	TMDS Clock+	16	SDA
4	TMDS Data1+	11	TMDS Clock Shield	17	DDC/CEC GND
5	TMDS Data1 Shield	12	TMDS Clock-	18	+5V Power
6	TMDS Data1-	13	TMDS CEC	19	Hot Plug Detect
7	TMDS Data0+				

The HDMI output connector supports the signal formats indicated in the following table. The word "deep" is used in the table to indicate deep color support. If you specify a signal format that is not supported, the connector transmits RGB 4:4:4 signals.
Set the component signal format with the COMPONENT key on the front panel, and set the format and bit width using the menu as described in section 8.8.2, "Configuring the HDMI Output."

Table 7-7   HDMI output connector signal formats

Component	Format	Bit Width		
		8	10	12
RGB	4:4:4	Yes	Yes (deep)	Yes (deep)
	4:2:2	No	No	No
YPBPR	4:4:4	Yes	Yes (deep)	Yes (deep)
	4:2:2	Yes	Yes	Yes

You can specify and view HDMI output connector settings on the menu screen. For details, see section 8.8, "Configuring the HDMI" and section 8.11, "Configuring the HDMI on an Option."

The HDMI output connector can transmit audio signals (internal or external) along with video signals. To receive an external audio signal, set AUDIO INPUT to EXT as described in section 8.8.2, "Configuring the HDMI Output," and then apply the audio signal to the audio signal input connector.

When using the HDMI output connector, connect a certified cable that has an HDMI logo on it.

7.6   Composite Output Connector

The composite output connector is a BNC connector used to transmit composite signals. The connector transmits signals when the output format is composite (see Table 12-3, "List of output connectors").
The following figure shows the output connector.
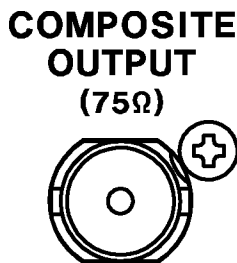
Figure 7-6   Composite Output Connector

Connect a 75-Ω coaxial cable to the composite output connector, and terminate the other end of the cable with 75-Ω termination.

7.7   Y/C Separation Signal Output Connector

The Y/C separation signal output connector is an S connector used to transmit composite signals. The connector transmits signals when the output format is composite (see Table 12-3, "List of output connectors").
The output connector diagram and pin arrangement are given below.
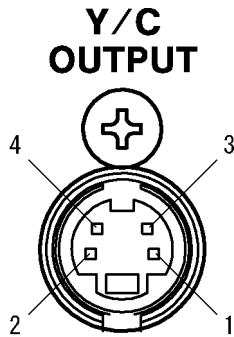
Figure 7-7   Y/C separation output connector

Table 7-8   Y/C separation output connector pin arrangement

Pin	Function
1	Luminance signal ground
2	Color signal ground
3	Luminance signal output
4	Color signal output

When the output format is NTSC-J, a DC voltage that indicates the aspect ratio, as defined by JEITA, is superimposed on the color signal output given in Table 7-8. The ID signal specifications are given below. The ID signal is fixed at 0 V when the output format is not NTSC-J.

Table 7-9   Y/C separation output connector ID signal

ID Voltage [V]	Aspect ratio
5.0	S1 (squeeze)
2.2	S2 (Letterbox)
0.0	4:3

Connect a commercially-sold S cable to the Y/C separation output connector, and terminate the other end of the cable with 75-Ω termination.

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7.8   SCART Connector (option)

The SCART connector transmits composite signals. The connector transmits signals when the output format is NTSC-M, NTSC-J, NTSC 4.43, PAL, PAL-M, PAL-N, PAL-60, or SECAM, and the aspect ratio is 4:3 (see Table 12-3, "List of output connectors").
The output connector diagram and pin arrangement are given below.
The SCART connector is an option. To use a SCART connector, install the LT 45SER03 (SCART unit).
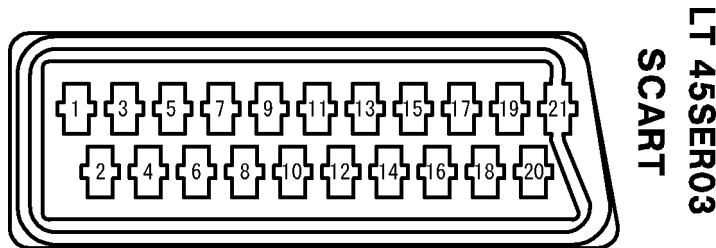
Figure 7-8   SCART connector

Table 7-10   SCART connector pin arrangement

Pin	Mode 1 (RGB)	Mode 2 (S-VHS)	Mode 3 (composite)	Mode 4 (VBS/RGB)
1	AUDIO OUT (R)	AUDIO OUT (R)	AUDIO OUT (R)	AUDIO OUT (R)
2	NC	NC	NC	NC
3	AUDIO OUT (L)	AUDIO OUT (L)	AUDIO OUT (L)	AUDIO OUT (L)
4	GND	GND	GND	GND
5	GND	GND	GND	GND
6	NC	NC	NC	NC
7	BLUE	NC	NC	BLUE
8	NC	VIDEO STATUS	VIDEO STATUS	VIDEO STATUS
9	GND	GND	GND	GND
10	NC	NC	NC	NC
11	GREEN	NC	NC	GREEN
12	NC	NC	NC	NC
13	GND	GND	GND	GND
14	GND	GND	GND	GND
15	RED	CHROMINANCE	NC	RED
16	RGB STATUS	NC	NC	RGB STATUS
17	GND	GND	GND	GND
18	GND	GND	GND	GND
19	SYNC (VBS)	LUMINANCE	VBS	VBS
20	NC	NC	NC	NC
21	GND	GND	GND	GND

The details of Table 7-10 are given below.

Mode

You can set the mode to a number from 1 to 4 using MODE in the menu screen. For details, see section 8.12.1, "SCART Output Mode on an Option."

AUDIO OUT

In modes 1 to 4, the AUDIO OUT (R) and (L) pins transmit audio signals that you specify with AUDIO on the front panel. For details, see section 5.5, "Setting the Audio Signal."

VIDEO STATUS

In modes 2 to 4, the VIDEO STATUS pins transmit the following control signals.

Table 7-11   VIDEO STATUS control signals

Control signal [V]	Typical value [V]	Condition
0.0 to 2.0	1.0	When video signals are not transmitted
4.5 to 7.0	5.8	When the aspect ratio is set to SQUEEZE or LETTER BOX
9.5 to 12.0	10.8	When the aspect ratio is set to 4:3

16-pin Output

In modes 1 to 4, the 16-pin connector transmits the following kinds of control signals. For information about the MODE, RGB STATUS, and VBS SYNC settings, see section 8.12, "Configuring the SCART Connection on an Option."

Table 7-12   16-pin control signals

MODE	VBS SYNC	RGB STATUS	Control Signal [V]	Normal Value [V]
Mode 1 (RGB)	VBS	RGB	1.0 to 3.0	1.5
		VBS	0.0 to 0.4	0.2
	SYNC	-	0.0 to 0.4	0.2
Mode 2 (S-VHS)	-	-	0.0 to 0.4	0.2
Mode 3 (COMPOSITE)	-	-	0.0 to 0.4	0.2
Mode 4 (VBS/RGB)	-	RGB	1.0 to 3.0	1.5
	-	VBS	0.0 to 0.4	0.2

*   A hyphen indicates that the values are the same regardless of the setting.

SYNC (VBS)

You can select the SYNC (VBS) pin in mode 1 from SYNC or VBS by using VBS SYNC in the menu screen. For details, see section 8.12.2, "SCART Sync Signal on an Option."

RGB signals

The RGB signals for mode 1 and mode 4 are generated from YPBPR signals. To adjust the RGB signal levels, set the Y_LEVEL, PB_LEVEL, and PR_LEVEL values in the COMPONENT LEVEL menu screen (see section 8.5.2, "Component Signal Levels").
You cannot temporarily adjust the RGB signal levels by pressing LEVEL (see section 8.5.1, "Setting Temporary Levels").

7.9　Sync Signal Output Connector

The sync signal output connector is a BNC connector that transmits composite sync signal (CS), horizontal drive signal (HD), and vertical drive signal (VD). The connector transmits signals in any format (see Table 12-3, "List of output connectors").
The following figure shows the output connector.
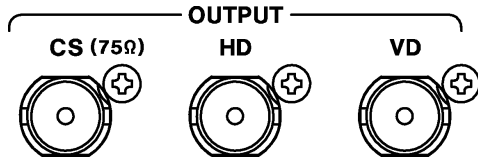
Figure 7-9　Sync signal output connector

You can set the polarities of the horizontal drive and vertical drive signals for each output format according to the procedures described in section 8.17.6, "USER SETTING Feature."
Connect a 75-Ω coaxial cable to the sync signal output connector.

7.10　Audio Signal Output Connector

The audio signal output connector is an RCA connector that transmits audio signals. The connector transmits audio signals that you set according to the procedures given in section 5.5, "Setting the Audio Signal."
The following figure shows the output connector.

Figure 7-10　Audio signal output connector

You can select the audio signal output level by setting AUD OUTPUT in the menu screen to 0dBm or -5.23dBM. For details, see section 8.15.1, "Audio Signal Level."

Connect a commercially-sold RCA cable to the audio signal output connector, and terminate the other end of the cable with 600-Ω termination.

8. CONFIGURATION

8.1 Menu Screen

Use the menu screen to configure the settings. Pressing the MENU key will cause its LED to illuminate and the menu screen to appear. Changes that you make on the menu screen are applied immediately. There is no cancel command for most settings.

You can change the output signal without leaving the menu screen by pressing any of the front panel keys except for RECALL, LEVEL, CURSOR, or the pattern selection keys. However, you cannot change the output format. To change the output format, you must exit from the menu screen.

The menu is hierarchical. For details, see Figure 12-1, "Menu tree."

● **Procedure**

To move to a submenu

Press the ENTER key.

To return to the previous menu

Select the UP MENU item at the bottom of a configuration screen, and press ENTER. (Some screens do not have UP MENU.)

To exit from the menu screen

Press MENU. The MENU key can be used in all levels. You can also press RECALL, LEVEL, CURSOR, or any pattern selection key to exit from the menu screen.
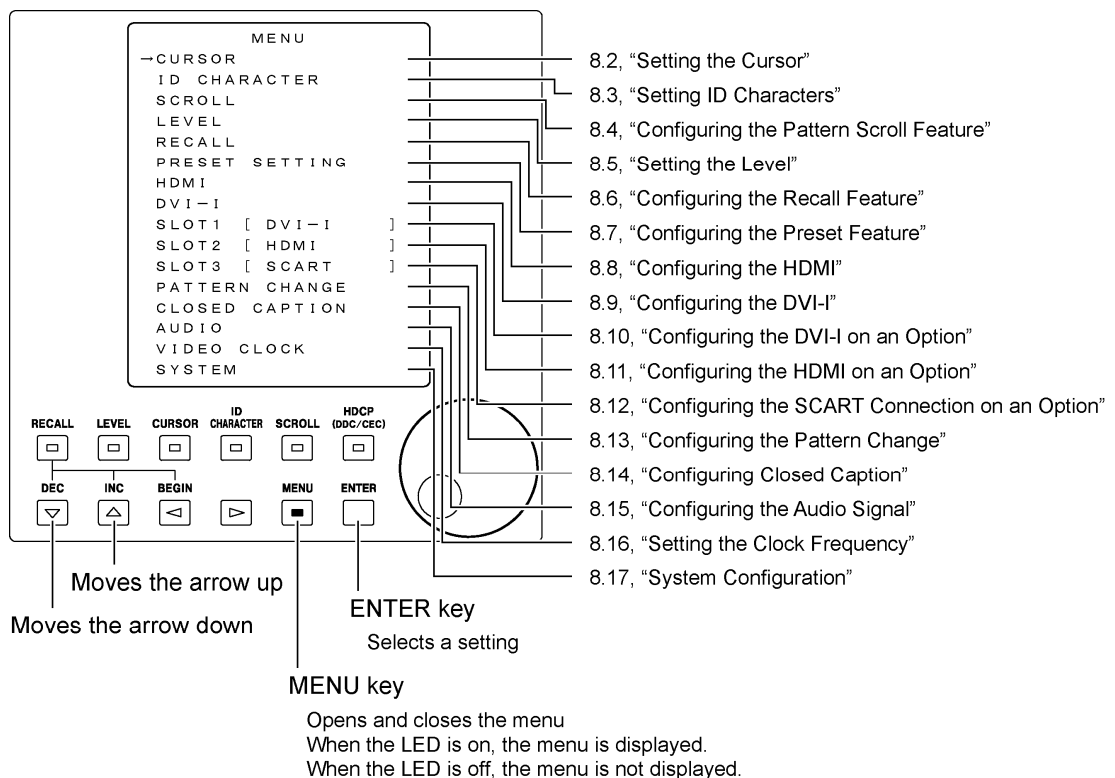
Figure 8-1   Menu screen

* The actual screen displays up to four lines.
* The names of the options that are installed appear next to SLOT 1 to 3. If there is no option installed in a slot, [NO BOARD] will appear.

8.2   Setting the Cursor

You can display a cursor at any position on the screen. Set the cursor by using the CURSOR key on the front panel and the CURSOR settings accessible from the menu screen.

● **Procedure**
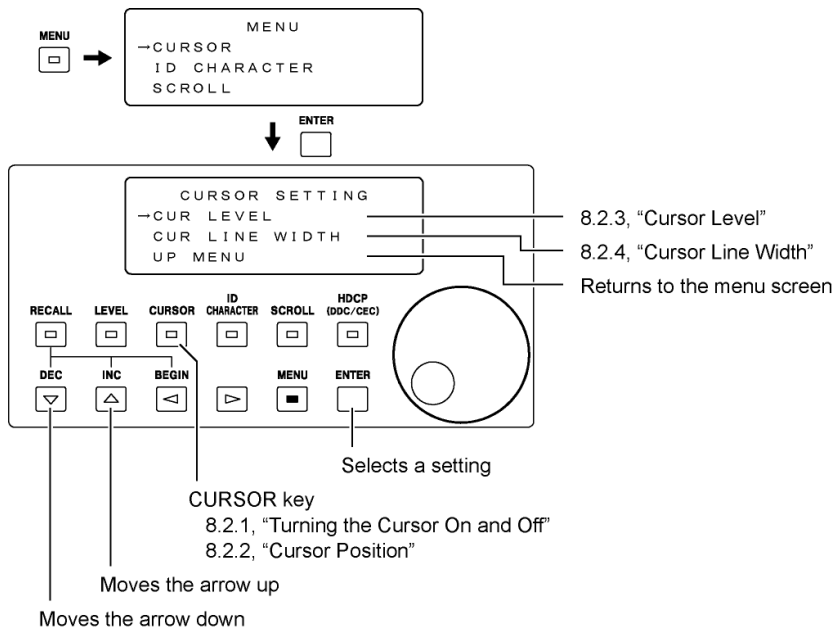
Figure 8-2   Cursor setting

8.2.1 Turning the Cursor On and Off

Pressing the CURSOR key will cause its LED to illuminate and a cursor to appear on the screen. When the cursor appears, the LCD panel displays "CURSOR POSITION," and you can set the cursor position.
If you press CURSOR again, the cursor will disappear, and the LED will turn off.

* When you turn the cursor on, the output signal's overshoot or undershoot may increase, depending on the cursor level and line width settings.

● **Settings**

CURSOR ON / <u>OFF</u>*[1]

*1 Hereafter, the factory default setting will be indicated by an underline.

● **Procedure**
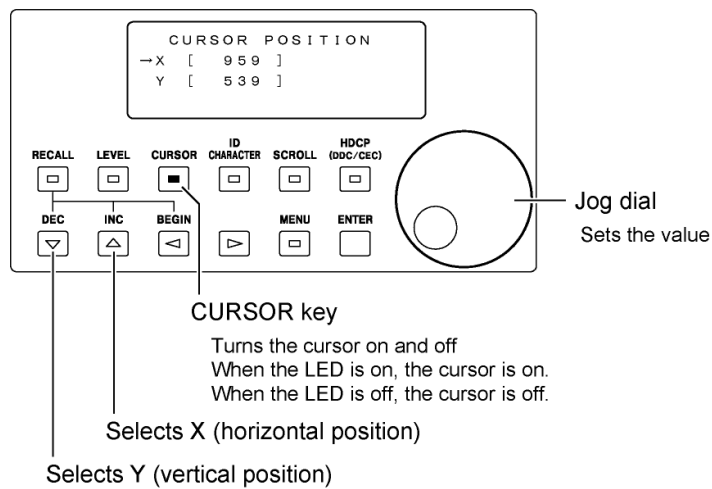
Figure 8-3 Cursor on/off

8.2.2 Cursor Position

Press CURSOR to set the cursor position. The LCD panel will display "CURSOR POSITION." Use the jog dial and △ and ▽ keys to set the position.

The selectable cursor position range varies depending on the output format. For details, see Table 8-1, "Selectable ranges for cursor and ID character positions." The factory default cursor position is X = 959, Y = 539. (If you switch to an output format that has a selectable range that doesn't contain X = 959, Y = 539, the cursor position will be adjusted automatically.)

● **Settings**

X   The horizontal position. The left edge of the screen is coordinate 0.
Y   The vertical position. The top edge of the screen is coordinate 0.

Table 8-1   Selectable ranges for cursor and ID character positions

No.	Format	X	Y
Component (HDTV)			
01	1080p/59.94	0 to 1919	0 to 1079
02	1080i/59.94(30sF)	0 to 1919	0 to 1079
03	1080p/29.97	0 to 1919	0 to 1079
04	1080p/23.98	0 to 1919	0 to 1079
05	1080PsF/23.98	0 to 1919	0 to 1079
06	1080p/50	0 to 1919	0 to 1079
07	1080p/25	0 to 1919	0 to 1079
08	1080i/50(25sF)	0 to 1919	0 to 1079
09	1080p/50(1250T)	0 to 1919	0 to 1079
10	1080i/50(1250T)	0 to 1919	0 to 1079
11	720p/59.94	0 to 1279	0 to 719
12	720p/29.97	0 to 1279	0 to 719
13	720p/23.98	0 to 1279	0 to 719
14	720p/50	0 to 1279	0 to 719
15	720p/25	0 to 1279	0 to 719
Component (SDTV)			
16	480p/59.94	0 to 719	0 to 479
17	480i/59.94	0 to 719	0 to 479
18	576p/50	0 to 719	0 to 575
19	576i/50	0 to 719	0 to 575
Component (PC monitor)			
20	VGA(640x480)	0 to 639	0 to 479
21	SVGA(800x600)	0 to 799	0 to 599
22	XGA(1024x768)	0 to 1023	0 to 767
23	SXGA(1280x1024)	0 to 1279	0 to 1023
24	UXGA(1600x1200)	0 to 1599	0 to 1199
Composite			
25	NTSC-M	0 to 719	0 to 479
26	NTSC-J	0 to 719	0 to 479
27	NTSC 4.43	0 to 719	0 to 479
28	PAL	0 to 719	0 to 575
29	PAL-M	0 to 719	0 to 479
30	PAL-N	0 to 719	0 to 575
31	PAL-60	0 to 719	0 to 479
32	SECAM	0 to 719	0 to 575
Component (PC monitor)			
33	0.38M9 800×480	0 to 799	0 to 479
34	0.98M9 1280×768	0 to 1279	0 to 767
35	1.02MA 1280×800	0 to 1279	0 to 799
36	1.04M9 1360×768	0 to 1359	0 to 767
37	1.30MA 1440×900	0 to 1439	0 to 899
38	1.47M3 1400×1050	0 to 1399	0 to 1049
39	1.76MA 1680×1050	0 to 1679	0 to 1049

8.2.3   Cursor Level

You can set the RGB or YPBPR cursor levels for each component separately in the
CURSOR LEVEL SET configuration screen. Use the jog dial and △ and ▽ keys to set the
level.

If the output format is component, either the YPBPR or GBR setting will be active, depending
on the signal format setting. Press COMPONENT to set the signal format.
When the output format is composite, the YPBPR setting is used.

*   When you turn the cursor on, the output signal's overshoot or undershoot may increase, depending on
     the cursor level and line width settings.

● **Settings**

CUR Y LEV	0 to <u>100</u>%
CUR PB LEV	-50 to <u>0</u> to 50%
CUR PR LEV	-50 to <u>0</u> to 50%
CUR G LEV	0 to <u>100</u>%
CUR B LEV	0 to <u>100</u>%
CUR R LEV	0 to <u>100</u>%

● **Procedure**

| MENU | → CURSOR → CUR LEVEL
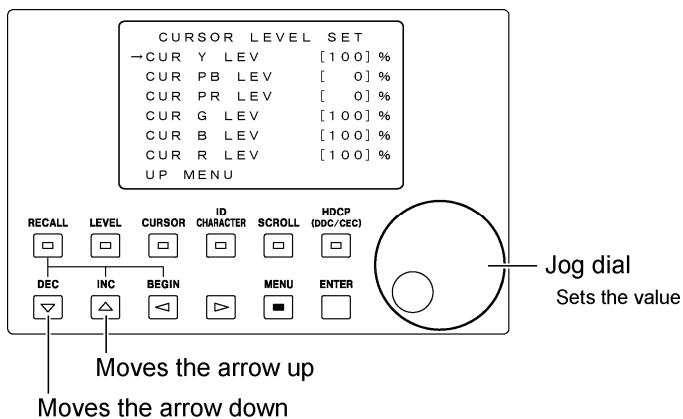
Figure 8-4   Cursor level settings

*   The actual screen displays up to four lines.

8.2.4   Cursor Line Width

You can set the horizontal and vertical cursor line widths separately in the CURSOR LINE
WIDTH configuration screen.
Use the jog dial and △ and ▽ keys to set the width.

*   When you turn the cursor on, the output signal's overshoot or undershoot may increase, depending on
the cursor line width and level settings.

● **Settings**

X LINE   1 to 32 lines
                              The horizontal line width.
Y LINE   1 to 32 dots
                              The vertical line width.

● **Procedure**

MENU → CURSOR → CUR LINE WIDTH
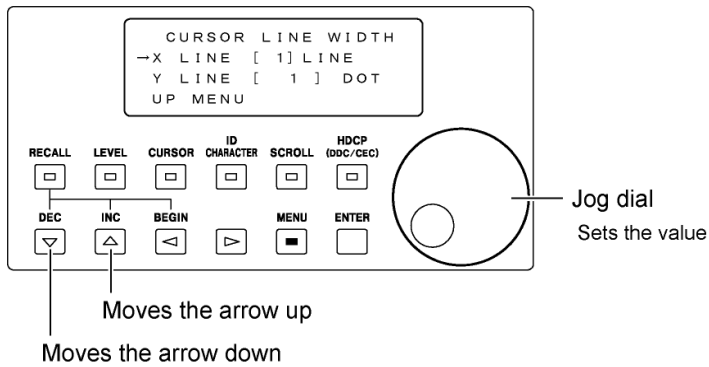
Figure 8-5   Cursor line width settings

8.3   Setting ID Characters

You can display characters at any position on the screen. Set the characters by using the ID CHARACTER key on the front panel and the ID CHARACTER settings accessible from the menu screen.

● **Procedure**
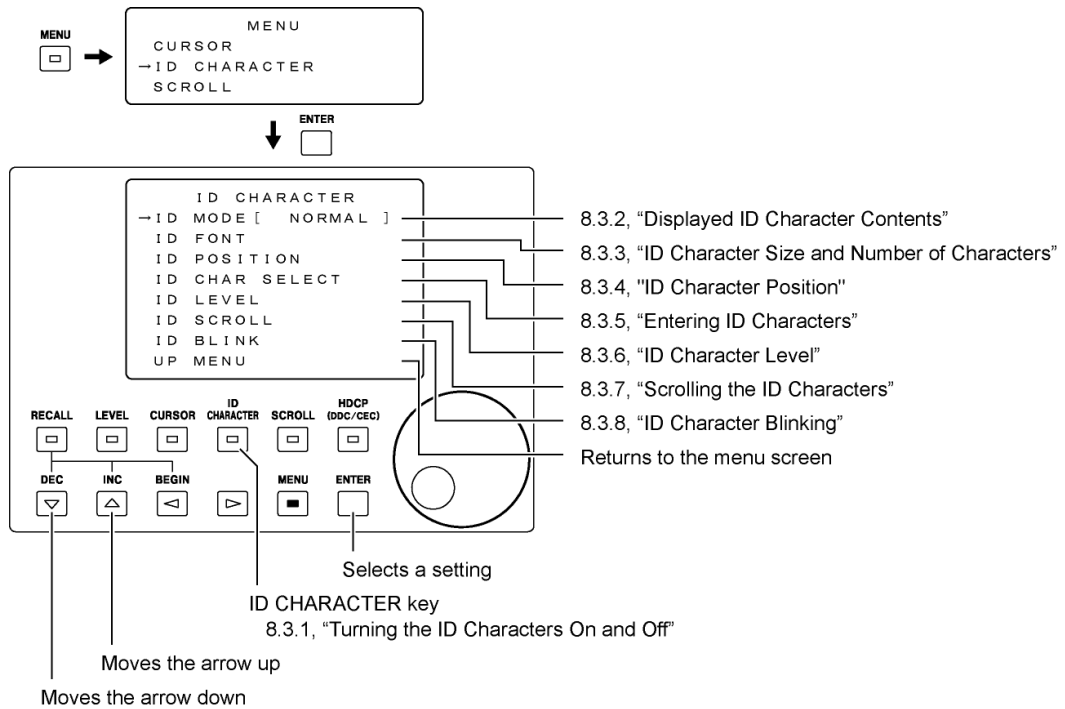
Figure 8-6   ID character settings

*   The actual screen displays up to four lines.

8.3.1   Turning ID Characters On and Off

Pressing ID CHARACTER will cause its LED to illuminate and characters to appear.
If you press ID CHARACTER again, characters will disappear, and the LED will turn off.

*   When you turn the ID characters on, the output signal's overshoot or undershoot may increase,
     depending on the ID character level.

● **Settings**

ID CHARACTER   ON / <u>OFF</u>

● **Procedure**
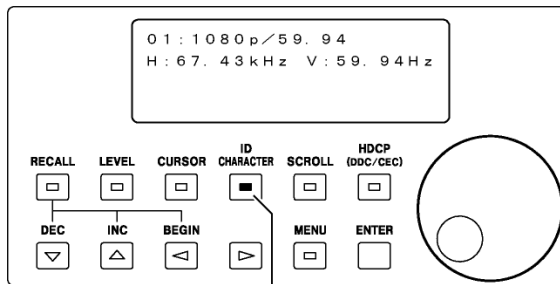
ID CHARACTER key

Turns the ID characters on and off
When the LED is on, the characters are displayed.
When the LED is off, the characters are not displayed.

Figure 8-7   Turning ID characters on and off

8.3.2   Displayed ID Character Contents

You can set the displayed ID characters to any characters or to HDMI/DVI-I information. Use
the jog dial and △ and ▽ keys to set the mode.

● **Settings**

ID MODE   HDMI_INFO / <u>NORMAL</u>
                       Selects the displayed character contents.
                       If you select NORMAL, the characters that you enter according to
                       the procedures given in section 8.3.5, "Entering ID Characters"
                       appear.
                       If you select HDMI_INFO, HDCP and CEC information for HDMI
                       and DVI-I appears. For details, see the next page.

If you set ID MODE to HDMI_INFO, the LT 450 displays HDCP and CEC information for HDMI and DVI-I (including those on options) in four lines as shown below. The following figure shows an example when an LT 45SER01 (DVI-I unit) is installed in slot 1, an LT 45SER02 (HDMI unit) is installed in slot 2, and an LT 45SER03 (SCART unit) is installed in slot 3.

```
        <HDCP/CEC INFORMATION>
HDMI DVI  S1A  S1B  S2A  S2B  S3A  S3B
PASS ---- OFF       PASS
                         FAIL
```

Figure 8-8   HDCP and CEC information

Each item is explained below.

Line 1

Contains the title.

Line 2

Indicates columns for the LT 450 HDMI, the LT 450 DVI-I, slot 1, slot 2, and slot 3. Slots 1 to 3 appear even if there is no option installed. The letters A and B are for the two connectors on the LT 45SER02 (HDMI unit) when it is installed.

Lines 3 and 4

Indicate whether the device connected to the LT 450 supports HDCP or CEC. The five available indications are PASS, FAIL, ----, OFF, and blank. FAIL appears in line 4, and all other indications appear in line 3. The following table describes each indication.
Set HOT PLUG, HDCP, and CEC according to the procedures given in section 8.8.2, "Configuring the HDMI Output," section 8.9.2, "Configuring the DVI-I Output," section 8.10.2, "Configuring the DVI-I Output on an Option," and section 8.11.2, "Configuring the HDMI Output on an Option."

Table 8-2   HDCP and CEC information

	HOT PLUG	HDCP, CEC	Display Conditions
PASS	ON	At least one is ON	When the connected device supports all items that are set to ON.
FAIL	ON	At least one is ON	When the connected device does not support any of the items that are set to ON.
----	ON	-	When a device is not connected. When HDMI OUTPUT or DVI OUTPUT is set to DIS.
OFF	OFF	Both are OFF	When HOT PLUG is OFF or when both HDCP and CEC are OFF.
Blank	When an option is not installed in the slot. When an option that does not support HDCP or CEC is installed. Under the "B" column when an LT 45SER01 (DVI-I unit) is installed in the slot.		

*   DVI-I does not have CEC.

8.3.3   ID Character Size and Number of Characters

You can set the ID character size and the number of characters in the ID FONT SET configuration screen. Use the jog dial and △ and ▽ keys to set them.

● **Settings**

ID FONT   16×32 / 32×64 / <u>64×128</u>
                            Sets the character size in dots.
ID CHAR   1 to <u>12</u> to 20
                            Sets the number of characters that will be displayed. The
                            characters that are displayed are those specified according to
                            the procedures given in section 8.3.5, "Entering ID Characters."
                            The background is black for the specified number of characters.
                            If HDMI_INFO is selected according to the procedures given in
                            section 8.3.2, "Displayed ID Character Contents," this setting will
                            not take effect.

● **Procedure**

MENU → ID CHARACTER → ID FONT
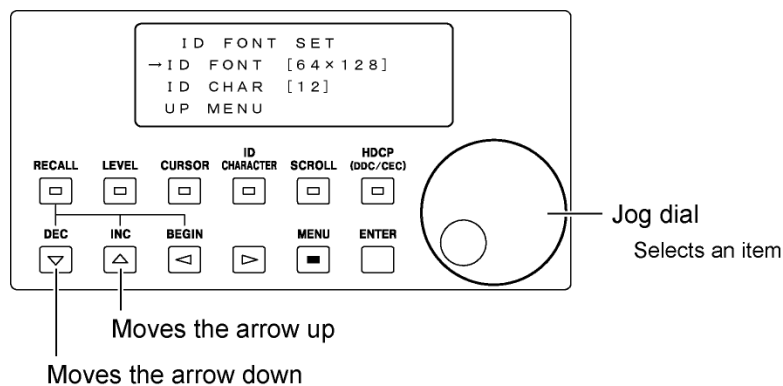
Figure 8-9   ID character size and number of characters

8.3.4   ID Character Position

You can set the ID character position in the ID POSITION SET configuration screen. Use the jog dial and △ and ▽ keys to set the position.

The selectable ID character position range varies depending on the output format. For details, see Table 8-1, "Selectable ranges for cursor and ID character positions." The factory default position is X = 50, Y = 50.

● **Settings**

ID X START   The horizontal position. The left edge of the screen is coordinate 0.

ID Y START   The vertical position. The top edge of the screen is coordinate 0.

● **Procedure**

MENU → ID CHARACTER → ID POSITION
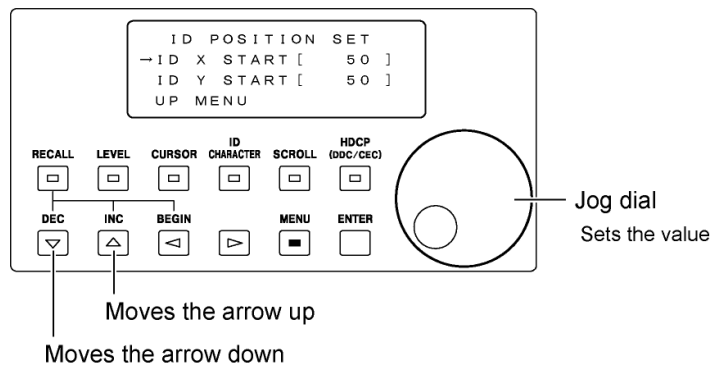
Figure 8-10   ID character position settings

8.3.5　Entering ID Characters

You can enter the desired ID characters in the ID CHAR SELECT configuration screen. Use the jog dial and △ and ▽ keys to enter the characters. When you are done entering the characters, press ENTER.

From the characters entered here, the specified number of characters set in section 8.3.3, "ID Character Size and Number of Characters" are displayed with a black background. For example, if you enter "LT450" and set the number of characters to 3, "LT4" will be displayed.

● **Settings**

You can select from the characters listed below by turning the jog dial. "LEADER_LT450" is the default setting.

!"#$%&'()*+,-./0123456789:;<=>?@
ABCDEFGHIJKLMNOPQRSTUVWXYZ[¥]^_→←

● **Procedure**

MENU → ID CHARACTER → ID CHAR SELECT
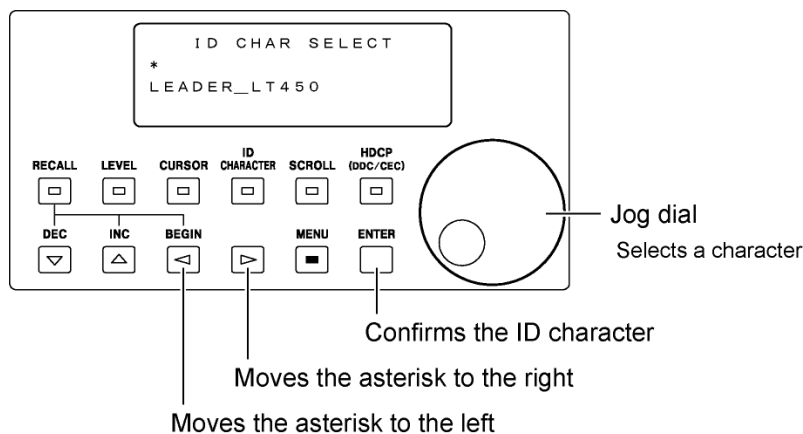
Figure 8-11　ID character entry

8.3.6　ID Character Level

You can set the RGB or YPBPR ID character levels for each component separately in the ID LEVEL SET configuration screen. Use the jog dial and △ and ▽ keys to set them.

If the output format is component, either the YPBPR or GBR setting will be active, depending on the signal format setting. Press COMPONENT to set the signal format.
When the output format is composite, the YPBPR setting is used.

* When you turn the ID characters on, the output signal's overshoot or undershoot may increase, depending on the ID character level.

● **Settings**

ID Y LEV	0 to <u>100</u>%
ID PB LEV	-50 to <u>0</u> to 50%
ID PR LEV	-50 to <u>0</u> to 50%
ID G LEV	0 to <u>100</u>%
ID B LEV	0 to <u>100</u>%
ID R LEV	0 to <u>100</u>%

● **Procedure**

MENU → ID CHARACTER → ID LEVEL


```
        I D   L E V E L   S E T
→ I D   Y     L E V   [ 1 0 0 ] %
  I D   P B   L E V   [     0 ] %
  I D   P R   L E V   [     0 ] %
  I D   G     L E V   [ 1 0 0 ] %
  I D   B     L E V   [ 1 0 0 ] %
  I D   R     L E V   [ 1 0 0 ] %
U P   M E N U
```

RECALL LEVEL CURSOR ID CHARACTER SCROLL HDCP (DDC/CEC)

DEC INC BEGIN MENU ENTER

Jog dial
Sets the value

Moves the arrow up

Moves the arrow down
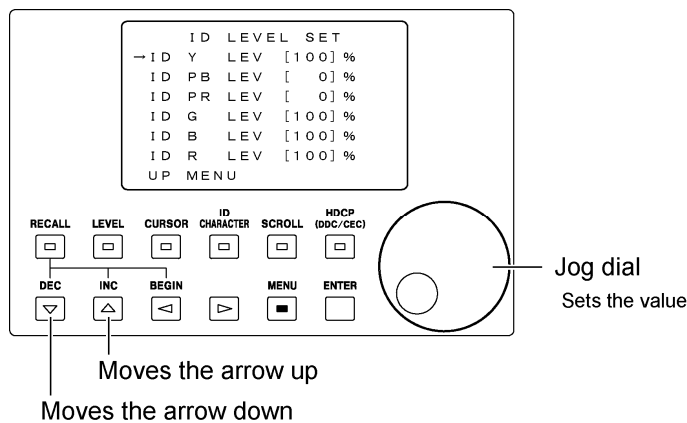
Figure 8-12　ID character level settings

* The actual screen displays up to four lines.

8.3.7　Scrolling the ID Characters

You can set ID character scrolling in the ID SCROLL SET configuration screen. The specified number of ID characters set in section 8.3.3, "ID Character Size and Number of Characters" scrolls from right to left. The characters are scrolled cyclically. The character at the left edge returns to the right edge. Use the jog dial and $\triangle$ and $\triangledown$ keys to set the value.

● **Settings**

CYCLE　　　　　　　0 to 4 Sec

Sets the time for scrolling a character in seconds.

The characters will not scroll if the time is set to 0.

● **Procedure**

MENU → ID CHARACTER → ID SCROLL

Figure 8-13　ID character scroll setting

8.3.8   ID Character Blinking

You can set ID character blinking in the ID CHARACTER BLINK configuration screen. Use the jog dial and $\triangle$ and $\triangledown$ keys to set the value.

● **Settings**

BLINK TIME   <u>0</u> to 4 Sec

Sets the blink interval. For example, if the interval is set to 2 s, the ID characters will appear for 2 seconds and then disappear for 2 seconds.

The characters will not blink if the interval is set to zero.

● **Procedure**

$\boxed{\text{MENU}}$ → ID CHARACTER → ID BLINK
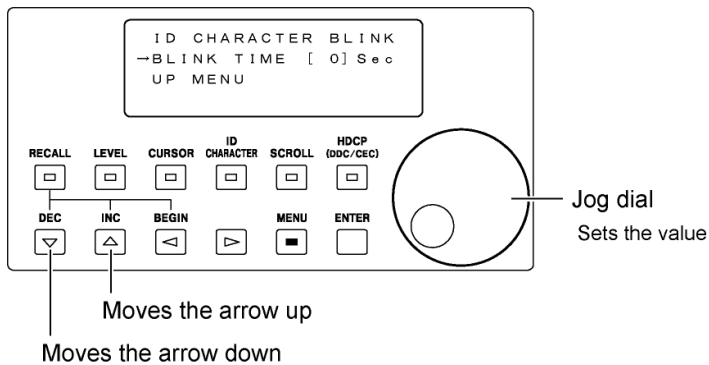
Figure 8-14   ID character blinking setting

8.4　Configuring the Pattern Scroll Feature

You can scroll the output pattern in the desired direction and speed. Configure the pattern scroll feature by using the SCROLL key on the front panel and the SCROLL settings available from the menu screen.

● **Procedure**
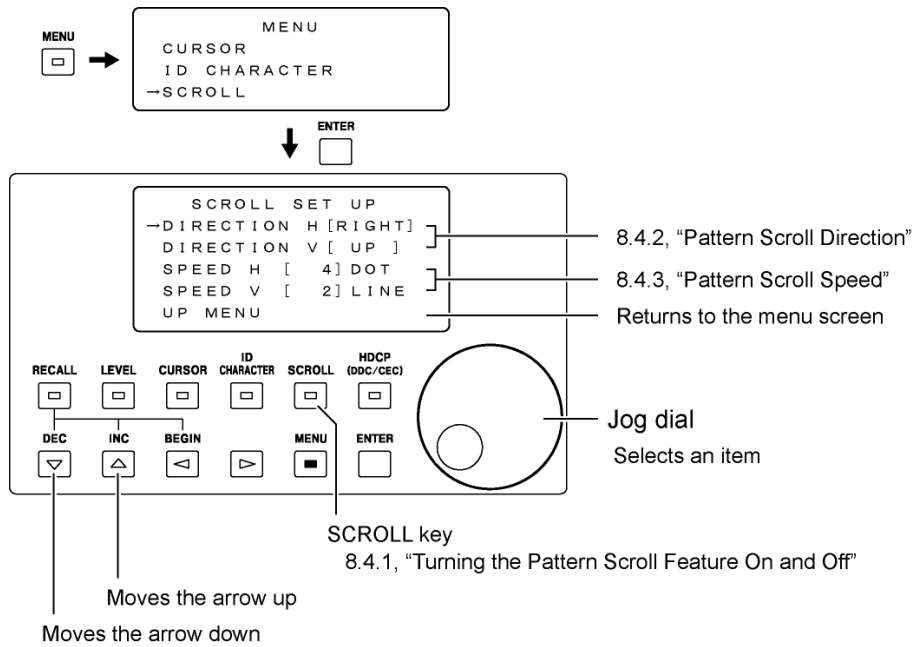
Figure 8-15　Pattern scroll settings

*　The actual screen displays up to four lines.

8.4.1   Turning the Pattern Scroll Feature On and Off

Pressing SCROLL will cause its LED to illuminate and the output pattern to scroll.
If you press SCROLL again, the output pattern will stop scrolling, and the LED will turn off.

● **Settings**

SCROLL   ON / <u>OFF</u>

● **Procedure**
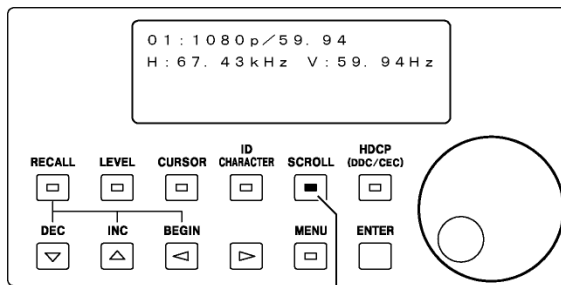
SCROLL key

Turns scrolling on and off
When the LED is on, scrolling is on.
When the LED is off, scrolling is off.

Figure 8-16   Pattern scroll on/off

8.4.2   Pattern Scroll Direction

You can set the output pattern scroll direction in the SCROLL SET UP configuration screen.
Use the jog dial and $\triangle$ and $\triangledown$ keys to set the direction.

● **Settings**

DIRECTION H   LEFT / <u>RIGHT</u>[1]
                    The horizontal pattern scroll direction.
DIRECTION V   <u>UP</u> / DOWN[1]
                    The vertical pattern scroll direction.

[1]   If you want to scroll only in the horizontal or vertical direction, set SPEED_H or SPEED_V to zero
       according to the procedures given in section 8.4.3, "Pattern Scroll Speed."

8.4.3　Pattern Scroll Speed

You can set the output pattern scroll speed in the SCROLL SET UP configuration screen. Use the jog dial and $\triangle$ and $\triangledown$ keys to set the speed.

● **Settings**

SPEED H　　　　　0 to 256 dots/frame, <u>4</u> by default, 4-dot steps[1]

0 to 256 dots/field, <u>4</u> by default, 4-dot steps[2]

The horizontal scroll speed. The pattern will not scroll if set to zero.

SPEED V　　　　　0 to 256 lines/frame, <u>2</u> by default, 1-line steps[1]

0 to 256 lines/field, <u>2</u> by default, 2-line steps[2]

The vertical scroll speed. The pattern will not scroll if set to zero.

[1]　When the output format is progressive.

[2]　When the output format is interlaced or segmented frame.

8.5　Setting the Level

You can adjust the output level of each signal in the component or composite signal. Set the output levels by using the SCROLL key on the front panel or LEVEL settings available from the menu screen.

● **Procedure**
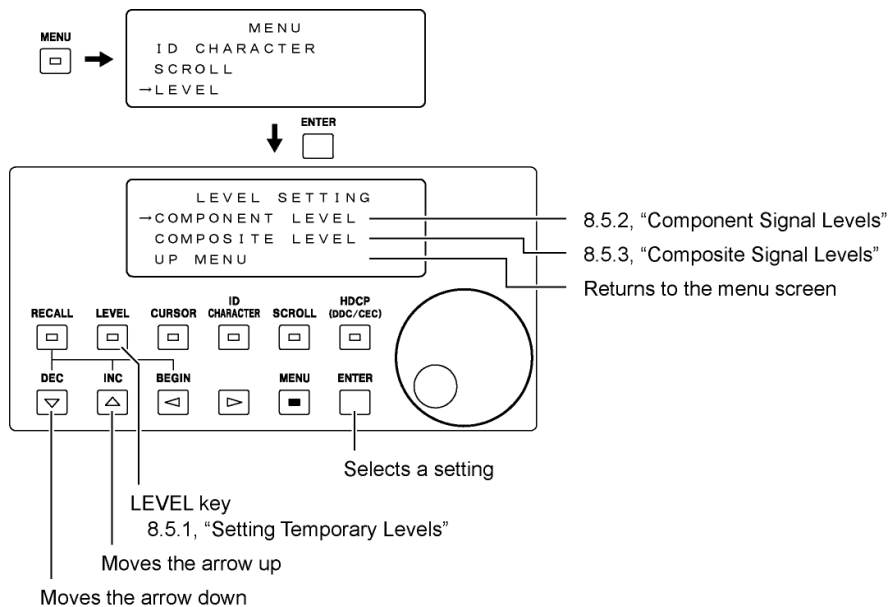
Figure 8-17　Level settings

8.5.1   Setting Temporary Levels

Press LEVEL. The LED will illuminate, and you will be able to temporarily adjust the level. The LCD panel displays "COMPONENT MODE" if the output format is component and "COMPOSITE MODE" if it is composite. Use the jog dial and $\triangle$ and $\triangledown$ keys to set each level.
If you press LEVEL again, the LED will turn off, and the output level will return to the level set according to the procedures in section 8.5.2, "Component Signal Levels" and 8.5.3, "Composite Signal Levels."

If the output format is component, either the YPBPR or GBR setting will be active depending on the signal format setting. Press COMPONENT to set the signal format.

The level that you specify here is not stored to preset memories or startup memory.

● **Settings**

COMPONENT MODE   COMPOSITE MODE*[1]

Y_LEVEL	0 to 100%	Y_LEVEL	0 to 100%
PB_LEVEL	0 to 100%	C_LEVEL	0 to 100%
PR_LEVEL	0 to 100%	SYNC_LEVEL	0 to 100%
G_LEVEL	0 to 100%	BURST_LEVEL	0 to 100%
B_LEVEL	0 to 100%	SETUP_LEVEL*[2]	0.00 to 7.50 to 10.00%
R_LEVEL	0 to 100%		
SYNC_LEVEL	0 to 100%		

*1   You cannot adjust the optional SCART connector's RGB signal levels on this screen.
*2   ・The levels are set in 1.25 % steps.
     ・Levels are only valid when the output format is NTSC-M or PAL-M.
      Even if you set these levels in other formats, the value will be fixed at 0.00 %.
     ・Y_LEVEL and C_LEVEL values will not be synchronized, if a value other than 7.50 % is specified.

● **Procedure**

COMPONENT MODE   COMPOSITE MODE
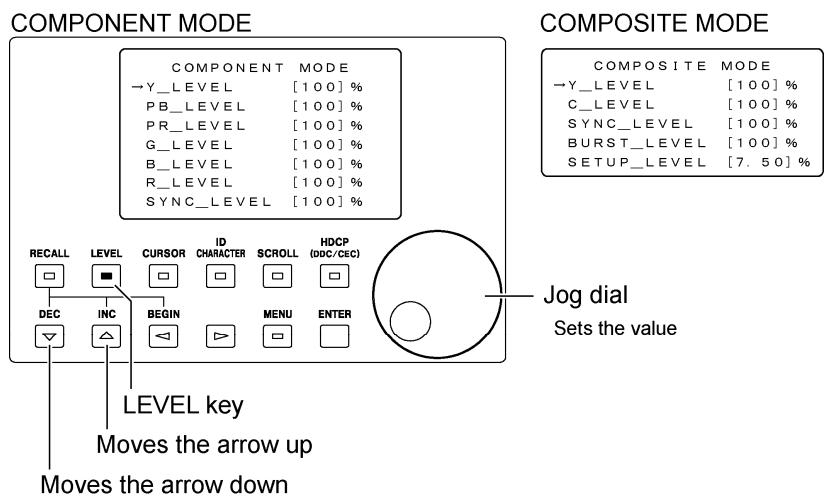
Figure 8-18   Temporary level settings

*   The actual screen displays up to four lines.

8.5.2   Component Signal Levels

You can set the signal levels for the component output format in the COMPONENT LEVEL configuration screen. Use the jog dial and △ and ▽ keys to set the levels.

Either the YPBPR or GBR output levels take effect depending on the signal format set with the COMPONENT key.

If the LEVEL key is on, the level specified using the LEVEL key takes precedence.

● **Settings**

Y_LEVEL	0 to 100%
PB_LEVEL	0 to 100%
PR_LEVEL	0 to 100%
G_LEVEL	0 to 100%
B_LEVEL	0 to 100%
R_LEVEL	0 to 100%
SYNC_LEVEL	0 to 100%

● **Procedure**

MENU → LEVEL → COMPONENT LEVEL
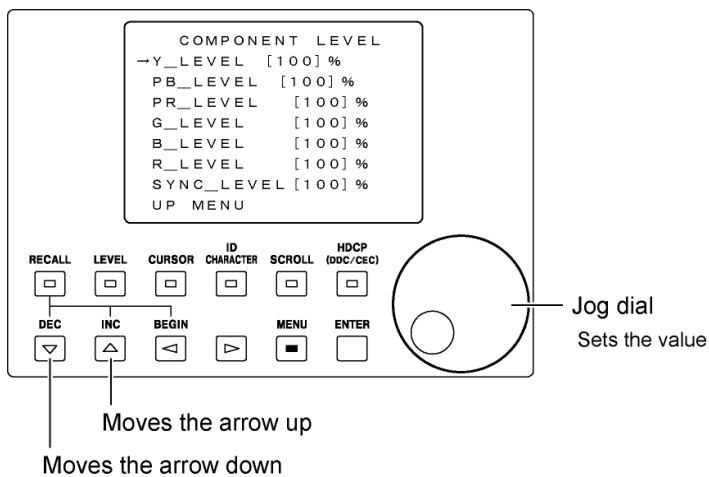
Figure 8-19   Component signal level settings

*   The actual screen displays up to four lines.

8.5.3   Composite Signal Levels

You can set the signal levels for the composite output format in the COMPOSITE LEVEL configuration screen. Use the jog dial and $\triangle$ and $\triangledown$ keys to set the levels.

If the LEVEL key is on, the level specified using the LEVEL key takes precedence.

● **Settings**

Y_LEVEL	0 to <u>100</u>%
C_LEVEL	0 to <u>100</u>%
SYNC_LEVEL	0 to <u>100</u>%
BURST_LEVEL	0 to <u>100</u>%
SETUP_LEVEL[*1]	0.00 to <u>7.50</u> to 10.00%

*1   · The levels are set in 1.25 % steps.
　　　· Levels are only valid when the output format is NTSC-M or PAL-M.
　　　 Even if you set these levels in other formats, the value will be fixed at 0.00 %.
　　　· Y_LEVEL and C_LEVEL values will not be synchronized, if a value other than 7.50 % is specified.

● **Procedure**

$\boxed{\text{MENU}}$ → LEVEL → COMPOSITE LEVEL
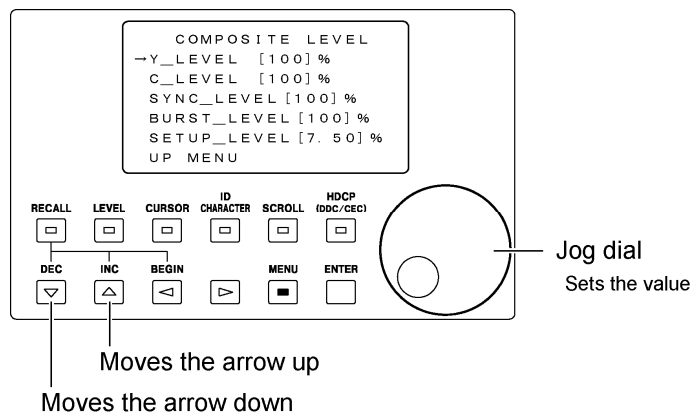
Figure 8-20   Composite signal level settings

*   The actual screen displays up to four lines.

8.6   Configuring the Recall Feature

The recall feature recalls up to 100 panel settings that have been stored according to the procedures given in section 8.7.1, "Saving the Panel Settings." You can specify a recall range by setting a BEGIN address and an END address.
Use the RECALL key on the front panel to recall settings. Use the RECALL settings accessible from the menu screen to specify the recall range.

● **Procedure**
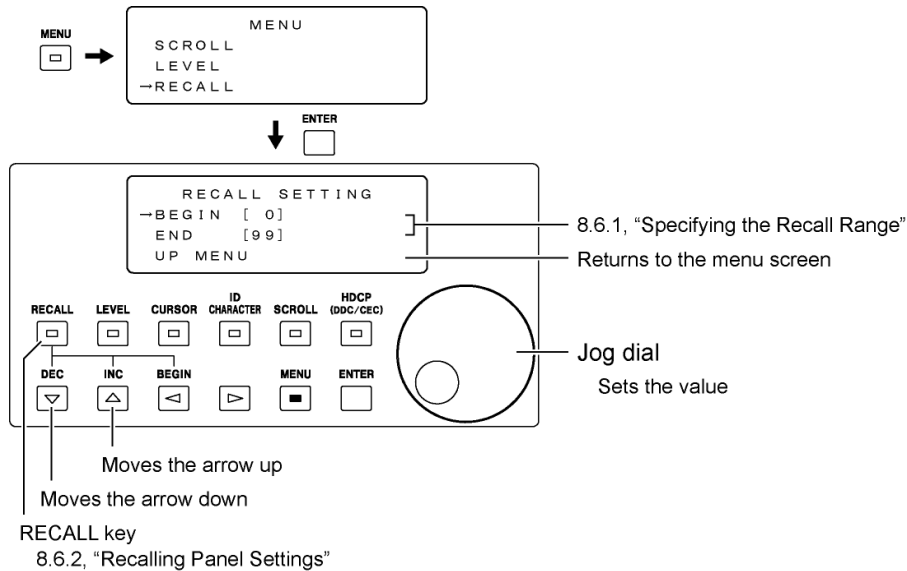
Figure 8-21   Recall settings

8.6.1   Specifying the Recall Range

You can specify a range of consecutive addresses to recall the settings in the RECALL SETTING configuration screen. Use the jog dial and △ and ▽ keys to set the direction.

The settings that you make here are not stored to preset memories.

● **Settings**

BEGIN	0 to 99
	Specifies the start address of the recall range. The panel settings at the address number specified here are recalled when you press RECALL or when you press ◁ (BEGIN) in the recall screen. This value must be less than or equal to END.
END	0 to 99
	Specifies the end address of the recall range. This value must be greater than or equal to BEGIN.

8.6.2   Recalling Panel Settings

Pressing RECALL will cause its LED to illuminate, and the recall screen to appear.*[1] Use the jog dial or △ and ▽ keys to recall panel settings that have been stored according to the procedures given in section 8.7.1, "Saving the Panel Settings."*[2]
You can also press ◁ (BEGIN) to recall the panel settings at the BEGIN address that has been specified according to the procedures given in section 8.6.1, "Specifying the Recall Range."

To exit from the recall screen, press RECALL again. The LED will turn off, and the recall screen will close.

The address number you specify here is not stored to preset memories.

*1   The panel settings at the BEGIN address are recalled when you press RECALL. Be careful, because all the previous settings will be lost.
*2   The address numbers that you can recall are those between and including the beginning and ending addresses.

● **Settings**

RECALL ADRS   0 to 99
                                Specifies the address number to recall from the panel settings.

● **Procedure**
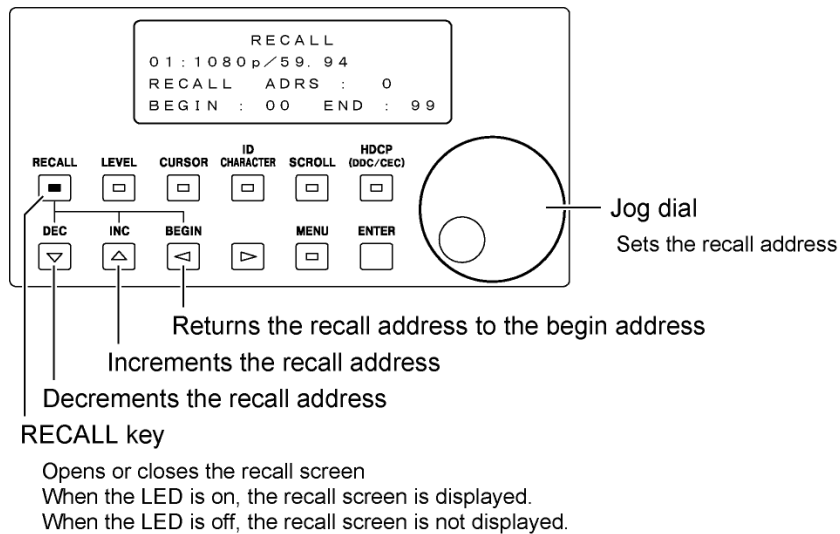
Figure 8-22   Recalling settings

8.7 Configuring the Preset Feature

The preset feature stores up to 100 panel settings. In addition, you can save the power-on panel settings in the START UP MEMORY configuration screen.
You can configure the preset feature in the PRESET SETTING configuration screen.

● **Procedure**
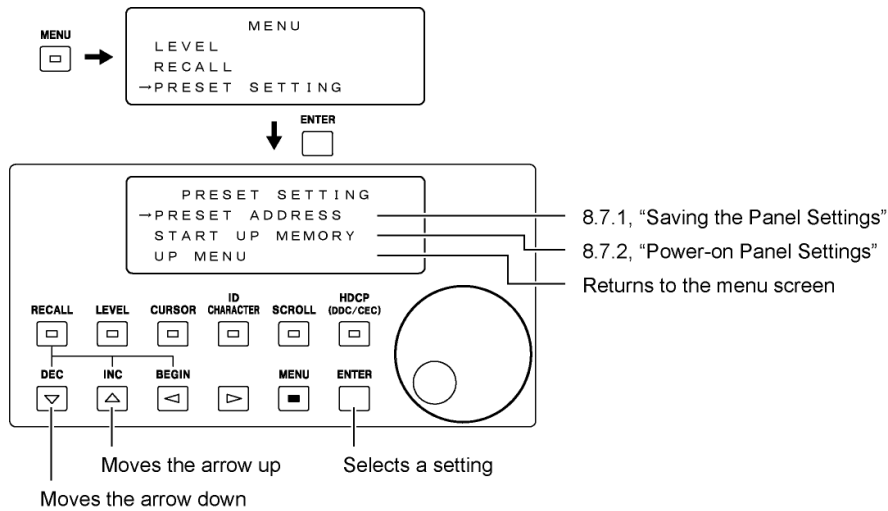
Figure 8-23 Preset settings

You can also save preset memories and startup memory to a USB memory device that is connected to the rear panel USB port. The USB memory folder structure is shown below. The "lt450" and "preset" folders are created automatically when you save the data if they do not exist on the USB memory device.

```
⛁ USB Memory
└ 🗀 lt450
        └ 🗀 preset
        ├ 🗋 lt450pset00.ini to lt450pset99.ini      Preset 00 to 99
        ├ 🗋 lt450psetStUpMem.ini                    Startup memory
        └ 🗋 preset_begin_end                        Startup memory (recall range)
```

8.7.1 Saving the Panel Settings

You can store up to 100 panel settings from the PRESET ADDRESS configuration screen. You can also save the stored panel settings to USB memory and load panel settings to the LT 450 from USB memory. For a list of the items that can be stored, see the "Preset" column in Table 12-4, "List of settings."
The address number you specify here is not stored to preset memories or startup memory.

● **Settings**

ADDRESS	0 to 99
	Use the jog dial to set the address number that the panel settings will be saved to.
PRESET TO LT450	Store the current panel settings to the LT 450 memory at the selected address. If there is already a preset stored at the selected address, it will be overwritten.
ALL COPY INT→USB	Save all of the presets that are stored in the LT 450 memory (No. 00 to 99) to USB memory. All existing presets saved on the USB memory device will be replaced with the new presets (No. 00 to 99).[1]
ALL COPY USB→INT	Load all of the presets that are saved on USB memory (No. 00 to 99) to the LT 450 memory. All existing presets that are stored in the LT 450 memory will be replaced with the new presets (No. 00 to 99).[1]

[1] Do not remove the USB memory or turn the LT 450 off while presets are being copied.
You cannot load presets that are saved on USB memory to the LT 450 memory if the presets were saved on an LT 450 whose firmware was 3.9 or earlier.

● **Procedure**

MENU → PRESET SETTING → PRESET ADDRESS
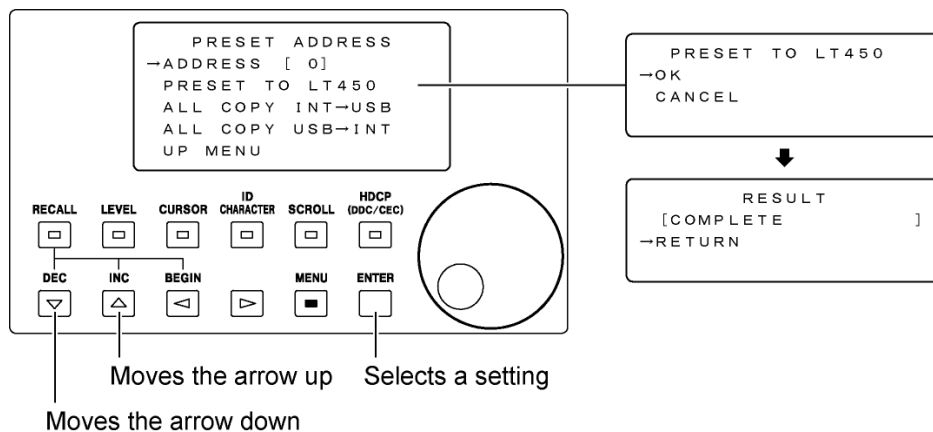
Figure 8-24 Panel settings storage

* The figure above shows an example of the screens that appear when you select PRESET TO LT450.
Similar screens appear when you select ALL COPY INT→USB or ALL COPY USB→INT.

8.7.2 Power-on Panel Settings

You can save the power-on panel settings in the START UP MEMORY configuration screen. For a list of the items that can be saved, see "Startup" in Table 12-4, "List of settings."
The LT 450 does not store the panel settings when you turn off the power. When you turn the LT 450 on, the panel settings that have been stored using the START UP MEMORY menu screen are recalled.

The panel settings you make here are not stored to preset memories. They are also not reset if you initialize the settings.

● **Settings**

STORE TO LT450   Store the current panel settings to the LT 450 memory. The next time the LT 450 is turned on, these settings will be loaded. If startup memory is already stored in the LT 450 memory, it will be overwritten.

COPY INT→USB   Save the startup memory that is stored in the LT 450 memory to USB memory. If startup memory is already saved on the USB memory device, it will be overwritten.[*1]

COPY USB→INT   Load the startup memory that is saved on USB memory to the LT 450 memory. If startup memory is already stored in the LT 450 memory, it will be overwritten.[*1]

*1   Do not remove the USB memory or turn the LT 450 off while startup memory is being copied.
You cannot load presets that are saved on USB memory to the LT 450 memory if the presets were saved on an LT 450 whose firmware was 3.9 or earlier.

● **Procedure**

MENU → PRESET SETTING → START UP MEMORY
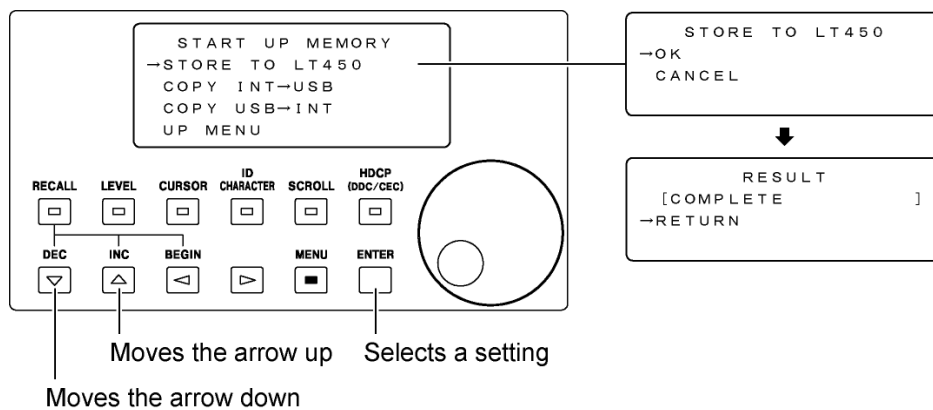
Figure 8-25   Power-on panel settings

*   The figure above shows an example of the screens that appear when you select STORE TO LT450.
Similar screens appear when you select COPY INT→USB or COPY USB→INT.

8.8　Configuring the HDMI

You can configure the signal that is transmitted from the rear panel HDMI connector. For instructions on how to configure the HDMI connector on an option, see section 8.11, "Configuring the HDMI on an Option." Configure the HDMI by using the HDCP key on the front panel and the HDMI settings accessible from the menu screen.

● **Procedure**
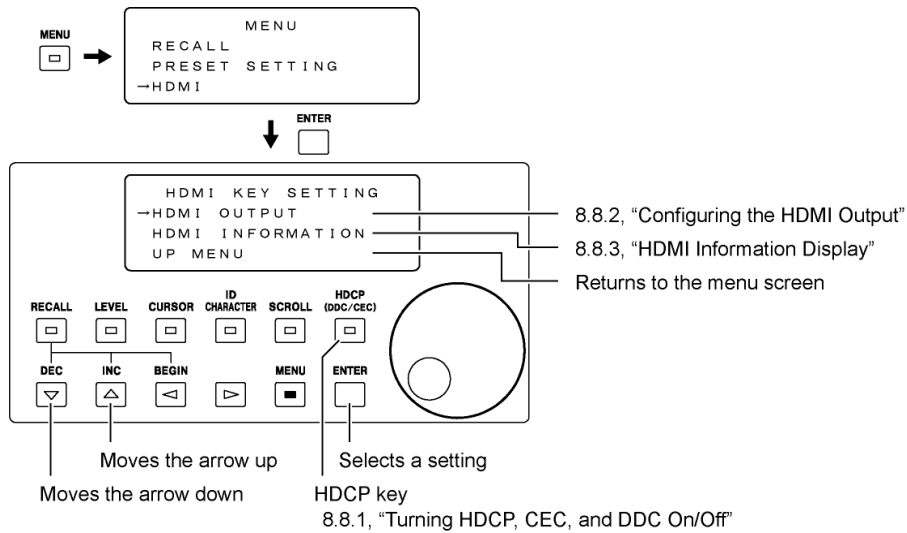
Figure 8-26　HDMI settings

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8.8.1   Turning HDCP, CEC, and DDC On and Off

Pressing HDCP will cause its LED to illuminate and turn the HDCP, CEC, and DDC settings on. If you press HDCP again, the HDCP, CEC, and DDC settings will be turned off, and the LED will turn off.

You can only turn HDCP, CEC, and DDC on and off using the HDCP key if HDCP, CEC, and DDC are set to PANEL. The HDCP key function applies to both HDMI connectors (including those options) and DVI-I connectors (including those on options).

● **Settings**

HDCP   ON / <u>OFF</u>

● **Procedure**
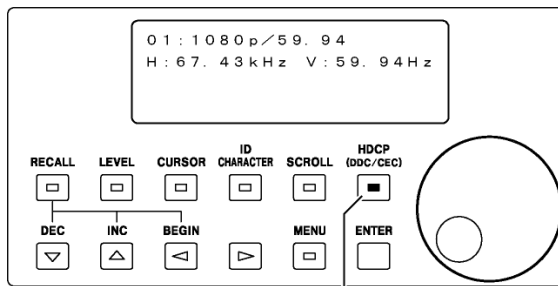
HDCP key

Turns HDCP, CEC, and DDC on and off
When the LED is on, they are on.
When the LED is off, they are off.

Figure 8-27   HDCP, CEC, and DDC On/Off

8.8.2   Configuring the HDMI Output

You can configure the signal that is transmitted from the HDMI connector in the HDMI OUTPUT SETTING configuration screen. Some settings specified here are applied to DVI-I connectors (including those on options) and the HDMI connectors on options. The table below shows the scope of each setting. For example, the AUDIO INPUT setting is applied to the HDMI connector on an option.

Table 8-3   Scope of HDMI output settings

Settings	HDMI connector		DVI-I connector	
	LT 450	Option	LT 450	Option
HDMI OUTPUT / HOT PLUG / HDCP / CEC / DDC	Yes	No	No	No
AUDIO INPUT / AUDIO SAMPLE	Yes	Yes	No	No
FORMAT / BIT WIDTH	Yes	Yes	Yes	Yes

● **Settings**

HDMI OUTPUT   <u>ENA</u> / DIS
    Enables or disables the HDMI connector output.

HOT PLUG   OFF / <u>ON</u>
    Turns the hot plug function on and off.

HDCP   <u>ON</u> / OFF / PANEL
    HDCP: High-bandwidth Digital Content Protection
    Sets whether or not to encrypt the output signal. If you select PANEL, you will be able to turn HDCP on and off using the HDCP key.

CEC   <u>ON</u> / OFF / PANEL
    CEC: Consumer Electronics Control
    Sets whether or not to perform CEC. If you select PANEL, you will be able to turn CEC on and off using the HDCP key.

DDC   <u>ON</u> / OFF / PANEL
    DDC: Display Data Channel
    Sets whether or not to retrieve DDC data. If you select PANEL, you will be able to turn retrieval on and off using the HDCP key. If you select OFF, the HDMI connector will be exclusive to HDMI displays. You will not be able to use an adapter or a similar device to connect to a DVI display.

FORMAT   4:4:4 / <u>4:2:2</u>
    Sets the output format. The format is fixed to 4:4:4 when the signal format is RGB. Even if you specify 4:2:2, signals will be transmitted using 4:4:4.

AUDIO INPUT   <u>INT</u> / EXT
    Sets the input audio signal to internal (INT) or external (EXT). If you specify INT, set the audio signal using AUDIO on the front panel. If you specify EXT, apply an external audio signal to the AUDIO COAXIAL INPUT connector on the rear panel. Each signal is superimposed on the output signal and transmitted from the HDMI connector.

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AUDIO SAMPLE	32K / <u>44.1K</u> / 48K
	Sets the audio signal sampling frequency. This setting is valid when the AUDIO INPUT setting mentioned above is set to INT.
BIT WIDTH	<u>8</u> / 10 / 12
	Sets the bit width for RGB or YPʙPR separately. If you set FORMAT to 4:4:4, the DVI-I connector is fixed to 8 bits. Even if you specify 10 or 12 bits, the output from the DVI-I connector will be 8 bits.

● **Procedure**

MENU → HDMI → HDMI OUTPUT
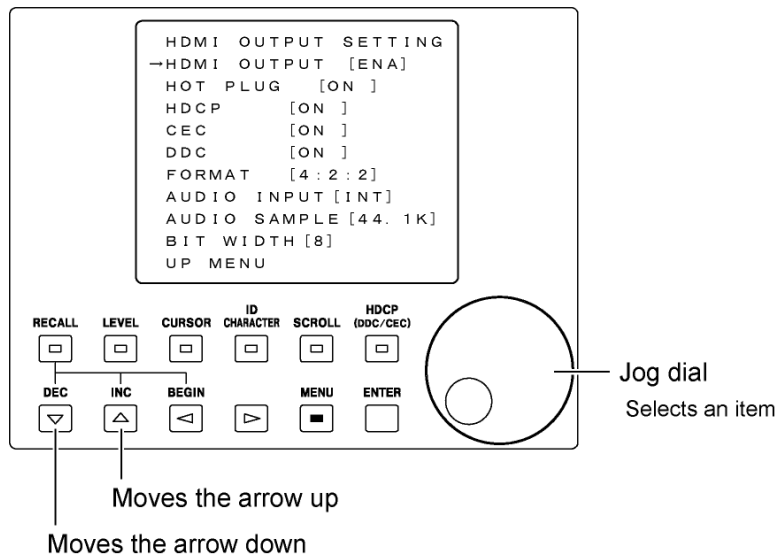
Figure 8-28   HDMI output settings

*   The actual screen displays up to four lines.

8.8.3   HDMI Information Display

You can display HDMI output information in the HDMI INFORMATION configuration screen. The information appears when you select HDMI INFORMATION on the menu screen. This screen is only for viewing. You cannot set values in this screen.

● **Display**

HOT PLUG	IN / OUT / DIS
	IN: Appears when a device is connected to the LT 450.
	OUT: Appears when a device is not connected to the LT 450.
	DIS: Appears when HOT PLUG is set to OFF in section 8.8.2, "Configuring the HDMI Output."

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HDCP   OK / NG / DISABLE

OK: Appears when the device connected to the LT 450 supports HDCP.

NG: Appears when the device connected to the LT 450 does not support HDCP.

DISABLE: Appears when HDCP is set to OFF using the procedure described in section 8.8.2, "Configuring the HDMI Output."

CEC   OK / NG / DISABLE

OK: Appears when the device connected to the LT 450 supports CEC.

NG: Appears when the device connected to the LT 450 does not support CEC.

DISABLE: Appears when CEC is set to OFF using the procedure described in section 8.8.2, "Configuring the HDMI Output."

EDID BASIC   EDID: Extended display identification data

EDID EXTEND   If you select EDID BASIC or EDID EXTEND and press ENTER, the EDID of the device connected to the LT 450 will be displayed. You can scroll through the information by pressing $\triangle$ and $\triangledown$ to move the arrow. If DDC is set to OFF in section 8.8.2, "Configuring the HDMI Output," the ENTER key will be disabled and the EDID that was retrieved previously will appear.
To exit from the EDID display screen, press MENU.

● **Procedure**

MENU → HDMI → HDMI INFORMATION
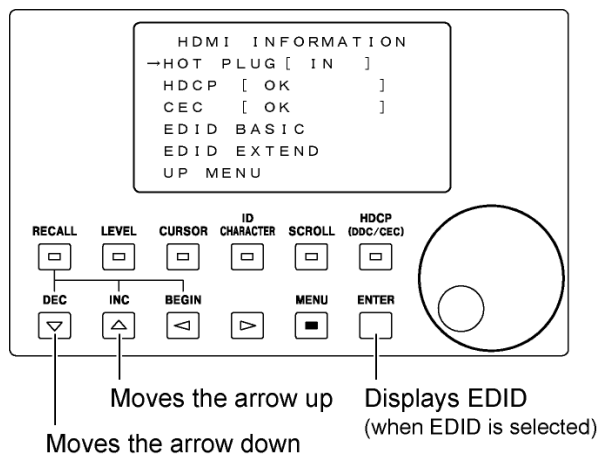
Figure 8-29   HDMI information display

*   The actual screen displays up to four lines.

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8.9　Configuring the DVI-I

You can configure the signal that is transmitted from the rear panel DVI-I connector. For instructions on how to configure the DVI-I connector on an option, see section 8.10, "Configuring the DVI-I on an Option." Configure the DVI-I by using HDCP on the front panel and DVI-I in the configuration screen.

● **Procedure**
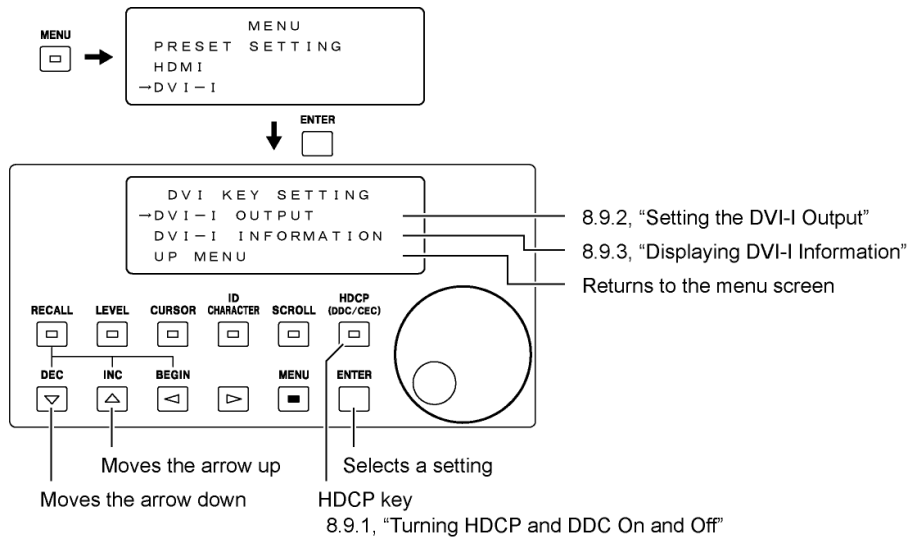
Figure 8-30　DVI-I settings

8.9.1　Turning HDCP and DDC On and Off

Pressing HDCP will cause its LED to illuminate and the HDCP and DDC settings to turn on. If you press HDCP again, the HDCP and DDC settings will be turned OFF, and the LED will turn OFF.

You can only turn HDCP and DDC on and off using the HDCP key if HDCP and DDC are set to PANEL. The HDCP key function applies to both HDMI connectors (including those on options) and DVI-I connectors (including those on options).

For information about the settings and procedures, see section 8.8.1, "Turning HDCP, CEC, and DDC On and Off."

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8.9.2   Configuring the DVI-I Output

You can set the signal that is transmitted from the DVI-I connector in the DVI-I OUTPUT SET configuration screen. The output format and bit width settings are shared with the HDMI connector. Follow the procedures in section 8.8.2, "Configuring the HDMI Output" to set them.

● **Settings**

DVI OUTPUT	<u>ENA</u> / DIS
	Enables or disables the DVI-I connector output.
HOT PLUG	OFF / <u>ON</u>
	Switches the hot plug function on and off.
HDCP	<u>ON</u> / OFF / PANEL
	HDCP: High-bandwidth Digital Content Protection
	Sets whether or not to encrypt the output signal. If you select PANEL, you will be able to turn HDCP on and off using the HDCP key.
DDC	<u>ON</u> / OFF / PANEL
	DDC: Display Data Channel
	Sets whether or not to retrieve DDC data. If you select PANEL, you will be able to turn DDC data retrieval on and off using the HDCP key. If you select OFF, the DVI-I connector will be exclusive to DVI displays. You will not be able to use an adapter or a similar device to connect to an HDMI display.

● **Procedure**

$\boxed{\text{MENU}}$ → DVI-I → DVI-I OUTPUT


```
    DVI—I  OUTPUT  SET
→DVI  OUTPUT  [ENA]
 HOT  PLUG      [ON ]
 HDCP           [ON ]
 DDC            [ON ]
 UP  MENU
```

Jog dial
Selects an item

Moves the arrow up

Moves the arrow down
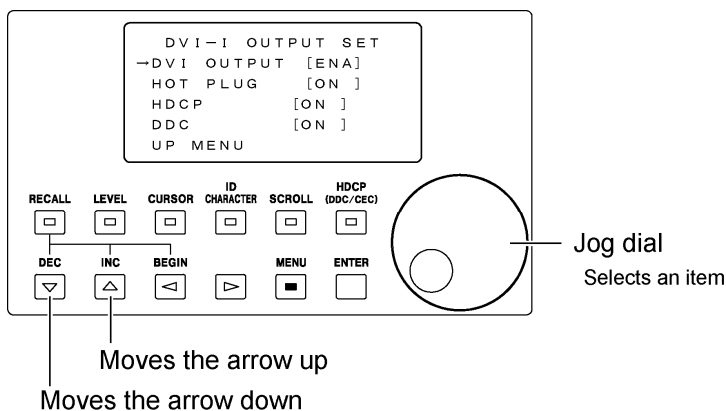
Figure 8-31   DVI-I output settings

*   The actual screen displays up to four lines.

8.9.3　Displaying DVI-I Information

You can display DVI-I output information in the DVI-I INFORMATION display screen. The information appears when you select DVI-I INFORMATION on the menu screen. This screen is only for viewing. You cannot set values in this screen.

● **Display**

HOT PLUG	IN / OUT / DIS

	IN:	Appears when a device is connected to the LT 450.
	OUT:	Appears when a device is not connected to the LT 450.
	DIS:	Appears when HOT PLUG is set to OFF using the procedure described in section 8.9.2, "Configuring the DVI-I Output."

HDCP	OK / NG / DISABLE

	OK:	Appears when the device connected to the LT 450 supports HDCP.
	NG:	Appears when the device connected to the LT 450 does not support HDCP.
	DISABLE:	Appears when HDCP is set to OFF using the procedure described in section 8.9.2, "Configuring the DVI-I Output."

EDID BASIC	EDID: Extended display identification data
EDID EXTEND	If you select EDID BASIC or EDID EXTEND and press ENTER, the EDID of the device connected to the LT 450 will be displayed. You can scroll through the information by pressing $\triangle$ and $\triangledown$ to move the arrow. If DDC is set to OFF in section 8.9.2, "Configuring the DVI-I Output," the ENTER key will be disabled and the EDID that was retrieved previously will appear. To exit from the EDID display screen, press MENU.

● **Procedure**

──────────────────────────────

　$\boxed{\text{MENU}}$ → DVI-I → DVI-I INFORMATION

──────────────────────────────


```
     D V I ─ I   I N F O R M A T I O N
   →HOT  PLUG [ IN   ]
    HDCP  [ OK      ]
    EDID  BASIC
    EDID  EXTEND
    UP  MENU
```

RECALL LEVEL CURSOR ID CHARACTER SCROLL HDCP (DDC/CEC)

DEC INC BEGIN MENU ENTER

Moves the arrow up　Displays EDID
(when EDID is selected)
Moves the arrow down
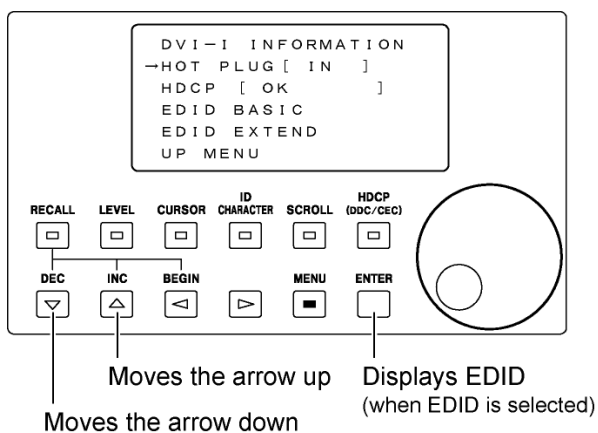
Figure 8-32　DVI-I information display

*　The actual screen displays up to four lines.

8.10 Configuring the DVI-I on an Option

You can configure the signal that is transmitted from the DVI-I connector on an option. As an example, this section will explain the settings for the LT 45SER01 (DVI-I unit) installed in slot 1. (The settings are the same if it is installed in slot 2 or 3.)   Configure the DVI-I by using the HDCP key on the front panel and the SLOT1 [DVI-I   ] settings available from the menu screen.

● **Procedure**
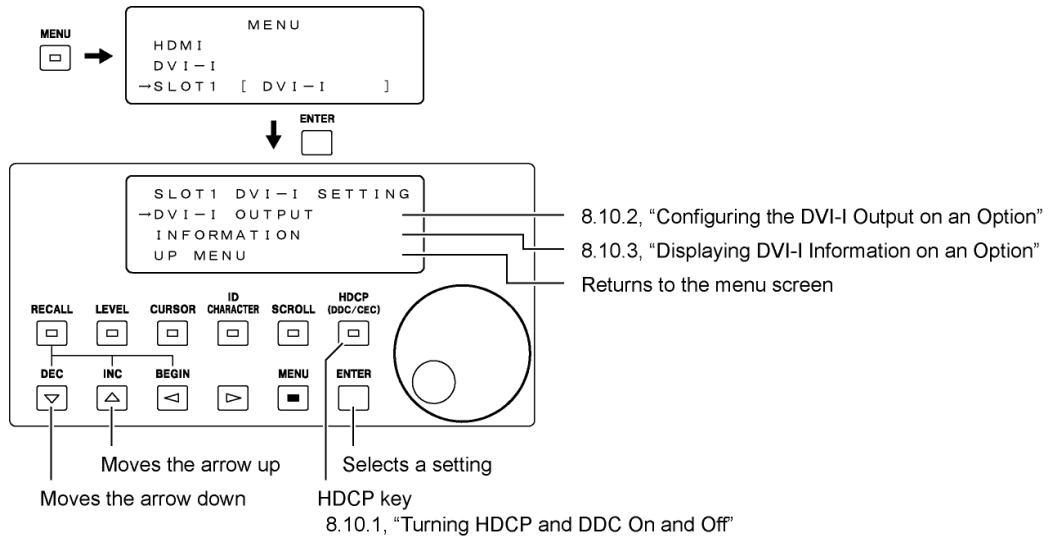
Figure 8-33   DVI-I settings on an option unit

8.10.1 Turning HDCP and DDC On and Off

Pressing HDCP will cause its LED to illuminate and the HDCP and DDC settings to turn on. If you press HDCP again, its LED will be turned off along with HDCP and DDC.

You can only turn HDCP and DDC on and off using the HDCP key if HDCP and DDC are set to PANEL. The HDCP key function applies to both HDMI connectors (including those on options) and DVI-I connectors (including those on options).

For information about the settings and procedures, see section 8.8.1, "Turning HDCP, CEC, and DDC On and Off."

8.10.2   Configuring the DVI-I Output on an Option

You can set the signal that is transmitted from the DVI-I connector on an option in the SLOT
1 DVI-I OUTPUT configuration screen. The output format and bit width settings are shared
with the HDMI connector. Follow the procedures in section 8.8.2, "Configuring the HDMI
Output" to set them.

● **Settings**

For a description of the settings, see section 8.9.2, "Configuring the DVI-I Output."

DVI OUTPUT	<u>ENA</u> / DIS
HOT PLUG	OFF / <u>ON</u>
HDCP	<u>ON</u> / OFF / PANEL
DDC	<u>ON</u> / OFF / PANEL

● **Procedure**

<u>MENU</u> → SLOT1 [DVI-I   ] → DVI-I OUTPUT
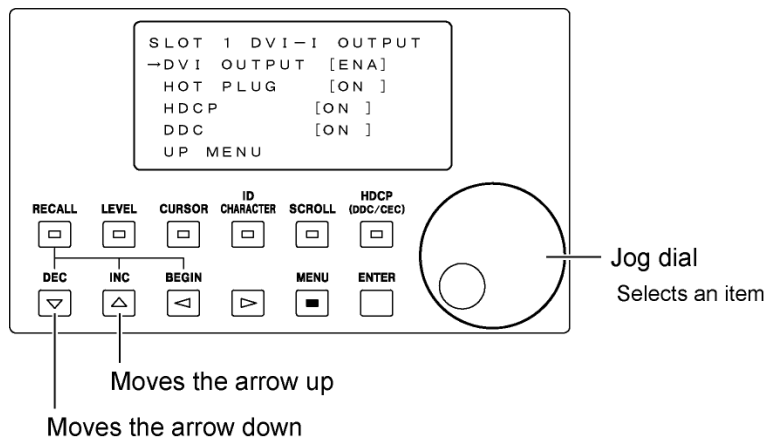
Figure 8-34   DVI-I output settings on an option unit

*   The actual screen displays up to four lines.

8.10.3   Displaying DVI-I Information on an Option

You can display information about the DVI-I output on an option in the SLOT1 DVI-I
INFORMATION display screen. The information appears when you select INFORMATION
on the menu screen. This screen is only for viewing. You cannot set values in this screen.

● **Display**

For a description of the displayed items, see section 8.9.3, "Displaying DVI-I
Information."

HOT PLUG   IN / OUT / DIS
HDCP   OK / NG / DISABLE
EDID BASIC   Displays EDID
EDID EXTEND   Displays EDID

● **Procedure**

MENU   →   SLOT1 [DVI-I   ]   →   INFORMATION
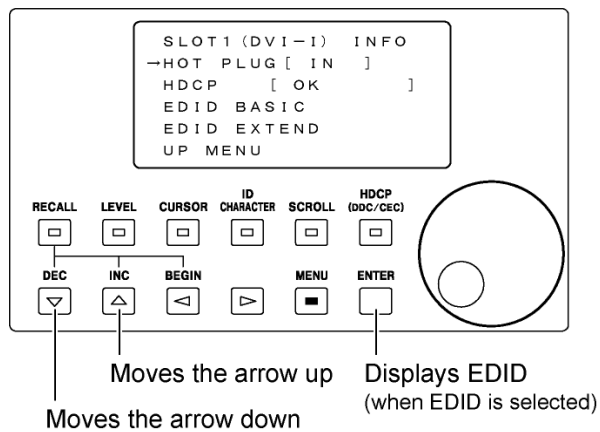
Figure 8-35   DVI-I information display for an option unit

*   The actual screen displays up to four lines.

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8.11　Configuring the HDMI on an Option

You can configure the signal that is transmitted from the HDMI connector on an option. As an example, this section will explain the settings for the LT 45SER02 (HDMI unit) installed in slot 2. (The settings are the same if it is installed in slot 1 or 3.)　Configure the HDMI by using the HDCP key on the front panel and the SLOT2 [HDMI　　] settings accessible from the menu screen.

● **Procedure**
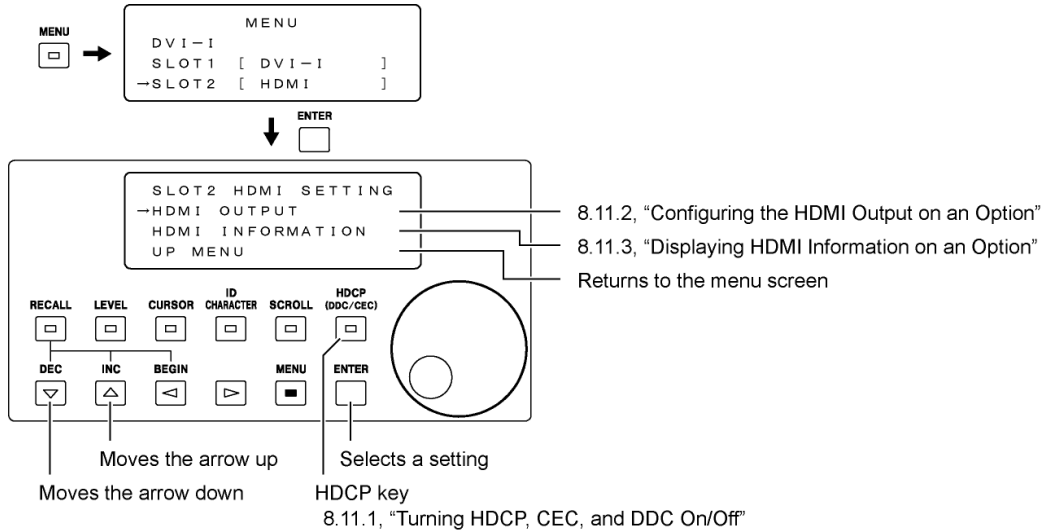
Figure 8-36　HDMI settings on an option unit

8.11.1　Turning HDCP, CEC, and DDC On and Off

Pressing HDCP will cause its LED to illuminate, and the HDCP, CEC, and DDC settings to turn on. If you press HDCP again, its LED will be turned off along with HDCP, CEC, and DDC.

You can only turn HDCP, CEC, and DDC on and off using the HDCP key if HDCP, CEC, and DDC are set to PANEL. The HDCP key function applies to both HDMI connectors (including those on options) and DVI-I connectors (including those on options).

For information about the settings and procedures, see section 8.8.1, "Turning HDCP, CEC, and DDC On and Off."

8.11.2   Configuring the HDMI Output on an Option

You can configure the signal that is transmitted from the HDMI A and B connectors of an option in the SLOT2 HDMI OUTPUT configuration screen. The output format, bit width, and audio signal settings are shared with the HDMI connector on the LT 450. Follow the procedures in section 8.8.2, "Configuring the HDMI Output" to set them.

● **Settings**

For a description of the settings, see section 8.8.2, "Configuring the HDMI Output."

HDMI OUTPUT*[1]	<u>ENA</u> / DIS
A HOT PLUG	OFF / <u>ON</u>
A HDCP	<u>ON</u> / OFF / PANEL
A CEC	<u>ON</u> / OFF / PANEL
A DDC	<u>ON</u> / OFF / PANEL
B HOT PLUG	OFF / <u>ON</u>
B HDCP	<u>ON</u> / OFF / PANEL
B CEC	<u>ON</u> / OFF / PANEL
B DDC	<u>ON</u> / OFF / PANEL

*   A and B above indicate top and bottom connectors, respectively (see Figure 3-2, "Rear panel").
*1   You cannot configure connectors A and B separately.

● **Procedure**

MENU → SLOT2 [HDMI   ] → HDMI OUTPUT
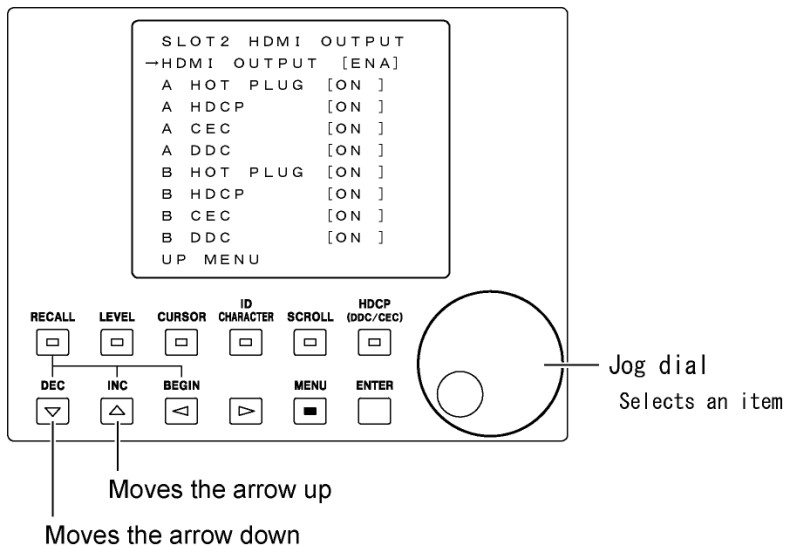
Figure 8-37   HDMI output settings on an option unit

*   The actual screen displays up to four lines.

8.11.3   Displaying an Option's HDMI Information

You can display an option's HDMI output information in the SLOT2(HDMI) INFO display screen. The information appears when you select HDMI INFORMATION on the menu screen. This screen is only for viewing. You cannot set values in this screen.

● **Display**

For a description of the displayed items, see section 8.8.3, "HDMI Information Display."

A HOT PLUG	IN / OUT / DIS
A HDCP	OK / NG / DISABLE
A CEC	OK / NG / DISABLE
A EDID BASIC	Displays the EDID
A EDID EXTEND	Displays the EDID
B HOT PLUG	IN / OUT / DIS
B HDCP	OK / NG / DISABLE
B CEC	OK / NG / DISABLE
B EDID BASIC	Displays the EDID
B EDID EXTEND	Displays the EDID

*   A and B above indicate top and bottom connectors, respectively (see Figure 3-2, "Rear panel").

● **Procedure**

MENU → SLOT2 [HDMI   ] → HDMI INFORMATION

Moves the arrow up   Displays EDID
(when EDID is selected)
Moves the arrow down
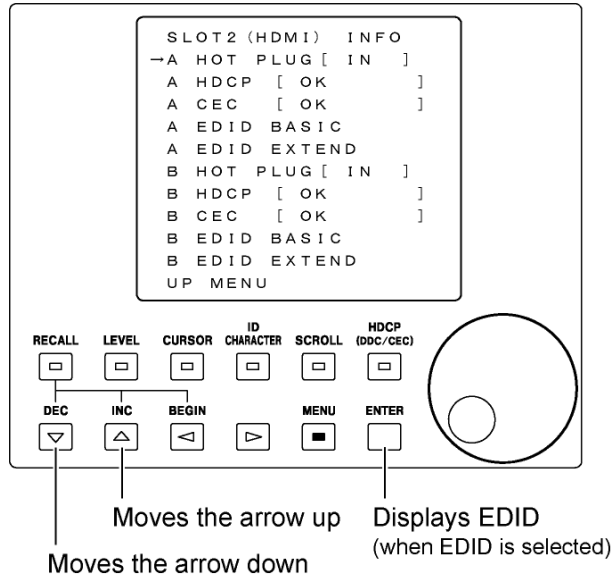
Figure 8-38   HDMI information display on an option unit

*   The actual screen displays up to four lines.

8.12 Configuring the SCART Connection on an Option

You can configure the signal that is transmitted from the SCART connector on an option. As an example, this section will explain the settings for the LT 45SER03 (SCART unit) installed in slot 3. (The settings are the same if it is installed in slot 1 or 2.) Configure the SCART connection using the SLOT3 [SCART] configuration screen.

● **Procedure**
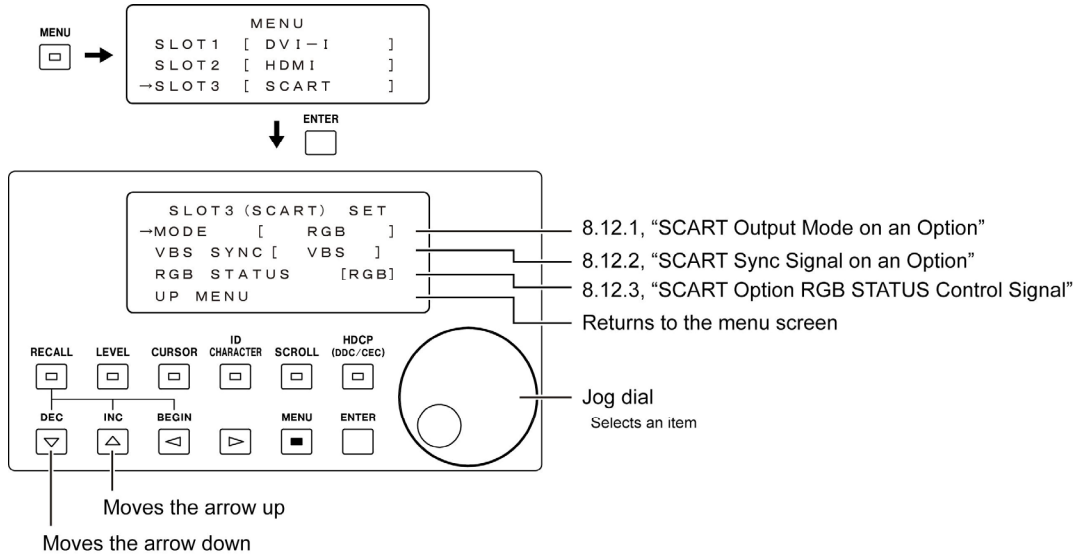
Figure 8-39   SCART settings on an option unit

*   The actual screen displays up to four lines.

8.12.1 SCART Output Mode on an Option

You can set the SCART connector output mode in the SLOT3(SCART) SET configuration screen. For details on the output mode, see Table 7-10, "SCART connector pin arrangement." Use the jog dial and △ and ▽ keys to set the mode.

● **Settings**

MODE   RGB / S-VHS / COMPOSITE / VBS / RGB

8.12.2   SCART Sync Signal on an Option

In the SLOT3 (SCART) SET configuration screen, you can set the 19-pin output signal when the SCART connector output mode is set to RGB. For the SCART connector pin arrangement, see Table 7-10, "SCART connector pin arrangement." Use the jog dial and $\triangle$ and $\triangledown$ keys to set the signal.

● **Settings**

VBS SYNC   <u>VBS</u> / SYNC

8.12.3   SCART Option RGB STATUS Control Signal

In the SLOT3 (SCART) SET menu screen, you can set the 16-pin control signal when the SCART connector output mode is set to RGB or VBS/RGB. (If the SCART connector output mode is set to RGB, the control signal setting is valid only when VBS SYNC is set to VBS.) For the SCART connector pin arrangement, see Table 7-10, "SCART connector pin arrangement." Use the jog dial and $\triangle$ and $\triangledown$ keys to set them.

● **Settings**

RGB STATUS   <u>RGB</u> / VBS

8.13　Configuring the Pattern Change

You can configure the pattern change in the PATTERN CHANGE configuration screen.

● **Procedure**
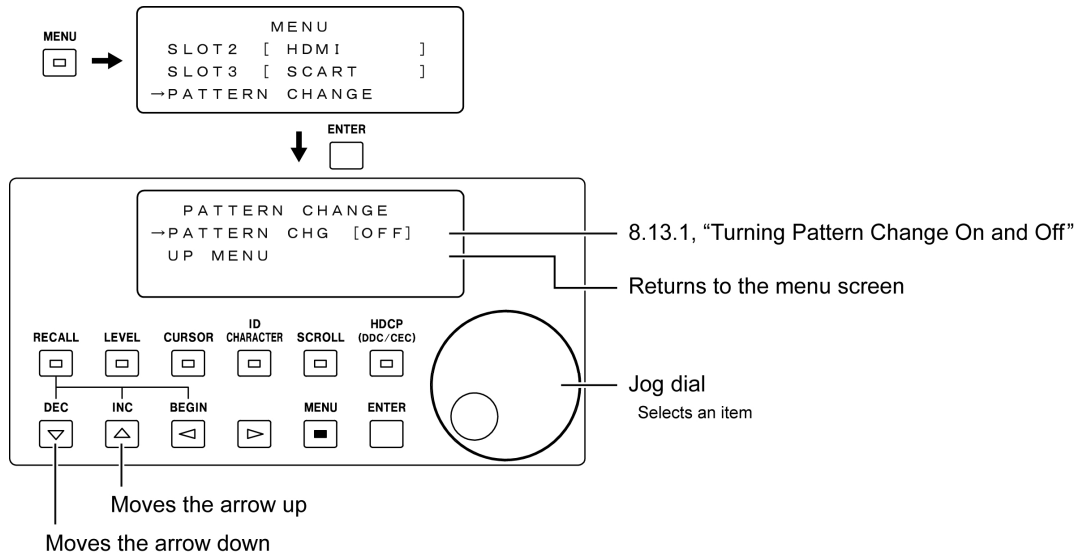
Figure 8-40　Pattern change settings

8.13.1　Turning Pattern Change On and Off

You can turn the pattern change function on and off in the PATTERN CHANGE menu screen. If you set it to on, the LT 450 will switch between the patterns marked as Yes in Table 12-2, "List of output patterns" at approximately 2-second intervals, in the current output format. Patterns marked as No or NA will be skipped.

The menu screen closes when you set the pattern change function to on. If you turn off the LT 450 or press any front panel key while the pattern change function is in progress, the function will be turned off.

Use the jog dial and △ and ▽ keys to turn the pattern change function on and off.

● **Settings**

PATTERN CHG　　　OFF / ON

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8.14 Configuring Closed Captioning

You can configure closed captioning in the CLOSED CAPTION configuration screen.

● **Procedure**
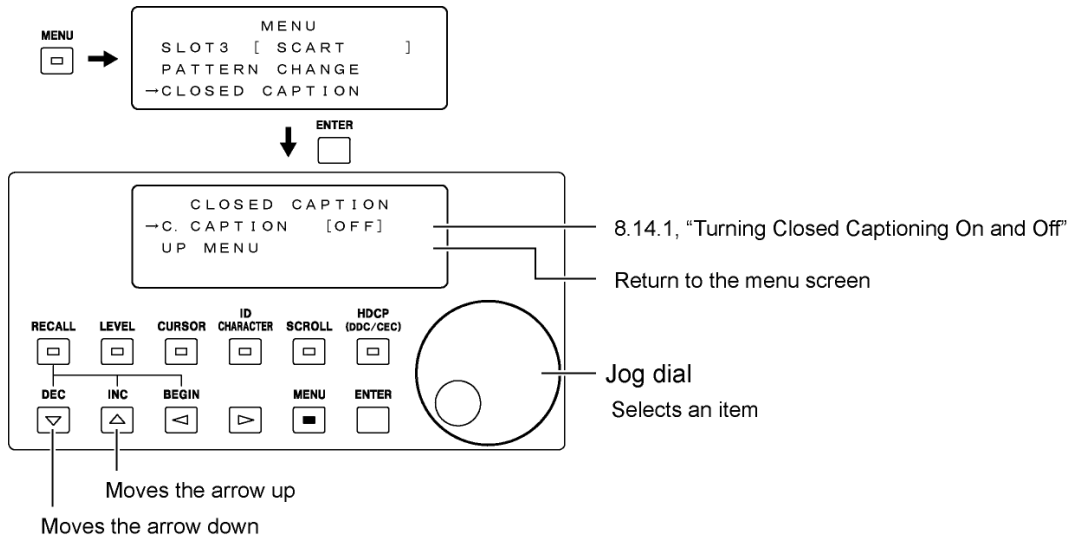
Figure 8-41   Closed captioning settings

8.14.1 Turning Closed Captioning On and Off

You can turn closed captioning on and off in the CLOSED CAPTION configuration screen using the jog dial and $\triangle$ and $\triangledown$ keys.

● **Settings**

C.CAPTION   OFF / ON

Closed captioning is transmitted when the output format is NTSC-M or NTSC-J.
The figure below shows the order and contents of the screens that are displayed. Field 1 and Field 2 are transmitted simultaneously. You cannot turn them on or off individually.
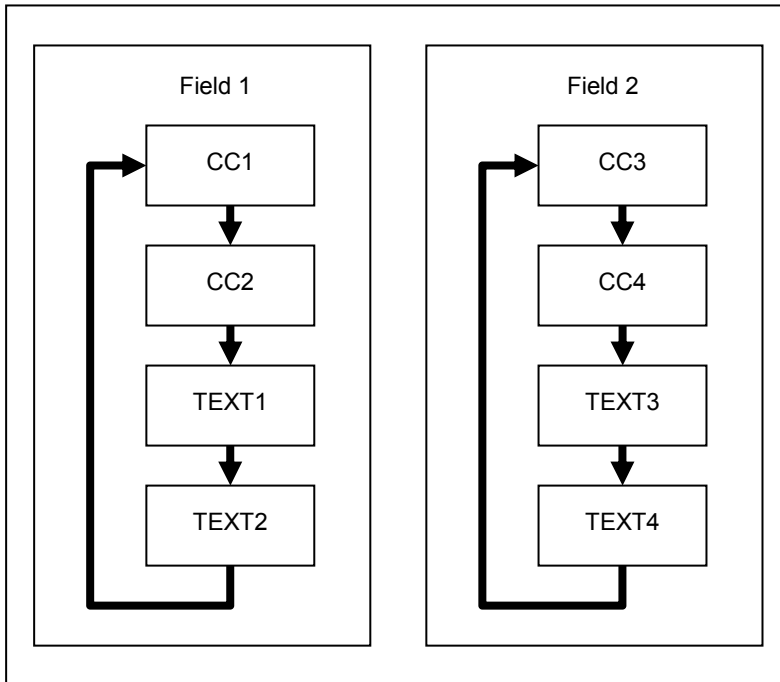
Figure 8-42   Closed captioning display order

Table 8-4 Displayed contents of CC1 to CC4

Row Number	Displayed Contents	Miscellaneous Command Codes	PAC (Preamble Access Codes)	Notes
-	-	RDC	-	Set to paint-on mode
1	LT450 Closed Caption CC*	-	White	* takes on a number from 1 to 4, which corresponds to CC1 to CC4
-	-	EDM	-	Erase display memory
1	ROW01 0123456789	-	White	
2	ROW02 ABCDEFGHIJKLMNOPQRSTUVWXYZ	-	White	
3	ROW03 abcdefghijklmnopqrstuvwxyz	-	White	
4	ROW04 ! " # $ % & ' ( ) + , - .	-	White	
5	ROW05 / : ; < = > ? @ [ ] ÷	-	White	
6	ROW06 0123456789	-	White	
6	ROW06	BS	-	Delete 0 to 9
6	ROW06 ABCDEFGHIJKLMNOPQRSTUVWXYZ	-	White	
6	ROW06 ABCDEFGHIJKLMNOPQRSTUVWXYZ	TO2	White Indent 4	Move the cursor to the "A" position
6	ROW06	DER	-	Delete all the characters from "A" to the end of the row
6	ROW06 abcdefghijklmnopqrstuvwxyz	-	White	
7	ROW07	-	White	
8	ROW08	-	White	
9	ROW09	-	White	
10	ROW10	-	White	
11	ROW11	-	White	
12	ROW12	-	White	
13	ROW13	-	White	
14	ROW14	-	White	
15	ROW15 LAST ROW	-	White	
-	-	EDM	-	Erase display memory
1	ROW01 WHITE	-	White	
2	ROW02 WHITE UNDERLINED	-	White Underlined	Underlined
3	ROW03 GREEN	-	Green	Green
4	ROW04 GREEN UNDERLINED	-	Green Underlined	Green and underlined
5	ROW05 BLUE	-	Blue	Blue
6	ROW06 BLUE UNDERLINED	-	Blue Underlined	Blue and underlined
7	ROW07 CYAN	-	Cyan	Cyan
8	ROW08 CYAN UNDERLINED	-	Cyan Underlined	Cyan and underlined
9	ROW09 RED	-	Red	Red
10	ROW10 RED UNDERLINED	-	Red Underlined	Red and underlined
11	ROW11 YELLOW	-	Yellow	Yellow
12	ROW12 YELLOW UNDERLINED	-	Yellow Underlined	Yellow and underlined
13	ROW13 MAGENTA	-	Magenta	Magenta
14	ROW14 MAGENTA UNDERLINED	-	Magenta Underlined	Magenta and underlined
15	ROW15 WHITE ITALICS	-	White Italics	Italics
-	-	EDM	-	Erase display memory
-	-	EOC	-	End caption

Table 8-5   Displayed contents of TEXT1 to TEXT4

Row Number	Displayed Contents	Miscellaneous Command Codes	PAC (Preamble Access Codes)	Notes
-	-	RTD	-	Set to text mode
1	LT450 Closed Caption TEXT*			* takes on a number from 1 to 4, which corresponds to TEXT1 to TEXT4
-	-	TR	-	Clear the text box and move the cursor to the upper left
1	ROW01 0123456789	-	-	
2	ROW02 ABCDEFGHIJKLMNOPQRSTUVWXYZ	-	-	
3	ROW03 abcdefghijklmnopqrstuvwxyz	-	-	
4	ROW04 ! " # $ % & ' ( ) + , - .	-	-	
5	ROW05 / : ; < = > ? @ [ ] ÷	-	-	
6	ROW06 0123456789	-	-	
6	ROW06	BS	-	Delete 0 to 9
6	ROW06 ABCDEFGHIJKLMNOPQRSTUVWXYZ	-	-	
6	ROW06 ABCDEFGHIJKLMNOPQRSTUVWXYZ	TO2	White Indent 4	Move the cursor to the "A" position
6	ROW06	DER	-	Delete all the characters from "A" to the end of the row
6	ROW06 abcdefghijklmnopqrstuvwxyz	-	-	
7	ROW07	-	-	
8	ROW08	-	-	
9	ROW09	-	-	
10	ROW10	-	-	
11	ROW11	-	-	
12	ROW12	-	-	
13	ROW13	-	-	
14	ROW14	-	-	
15	ROW15 LAST ROW	-	-	
-	-	TR	-	Clear the text box and move the cursor to the upper left
1	ROW01 WHITE	-	White	
2	ROW02 WHITE UNDERLINED	-	White Underlined	Underlined
3	ROW03 WHITE ITALICS	-	White Italics	Italics
4	ROW04 WHITE ITALICS UNDERLINED	-	White Italics Underlined	Italics and underlined
5	ROW05 INDENT 0	-	White Indent 0	Indent 0
6	ROW06 INDENT 0 UNDERLINED	-	White Indent 0 Underlined	Indent 0 and underlined
7	ROW07 INDENT 1	TO1	White indent 0	Indent 1
8	ROW08 INDENT 1 UNDERLINED	TO1	White Indent 0 Underlined	Indent 1 and underlined
9	ROW09 INDENT 2	TO2	White indent 0	Indent 2
10	ROW10 INDENT 2 UNDERLINED	TO2	White Indent 0 Underlined	Indent 2 and underlined
11	ROW11 INDENT 3	TO3	White indent 0	Indent 3
12	ROW12 INDENT 3 UNDERLINED	TO3	White Indent 0 Underlined	Indent 3 and underlined
13	ROW13 INDENT 4	-	White Indent 4	Indent 4
14	ROW14 INDENT 4 UNDERLINED	-	White Indent 4 Underlined	Indent 4 and underlined
15	ROW15 INDENT 5	TO1	White Indent 4	Indent 5
-	-	TR	-	Clear the text box and move the cursor to the upper left

8.15 Configuring the Audio Signal

You can configure the signal that is transmitted from the rear panel audio signal output connector. Configure the audio signal using the AUDIO configuration screen.

● **Procedure**
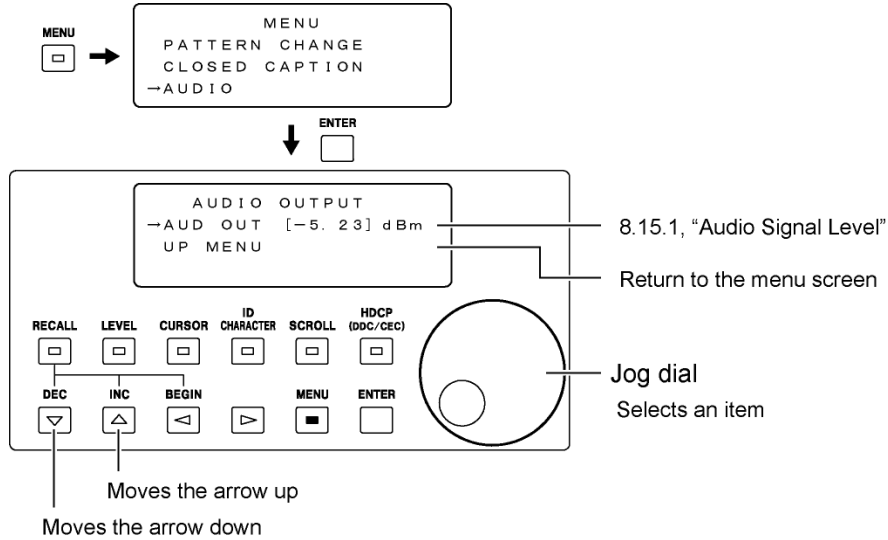
Figure 8-43 Audio signal settings

8.15.1 Audio Signal Level

Set the audio signal output level to 0dBm or -5.23dBm in the AUDIO OUTPUT configuration screen. Use the jog dial and △ and ▽ keys to set the level.

● **Settings**

AUD OUT   0dBm / <u>-5.23dBm</u>

8.16   Setting the Clock Frequency

You can set the clock frequency in the VIDEO CLOCK configuration screen.

● **Procedure**
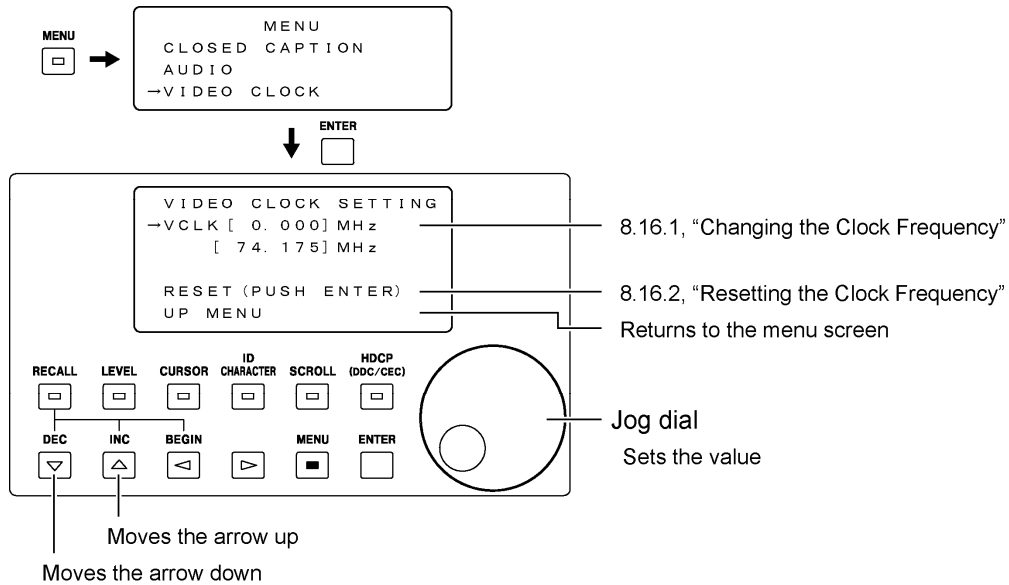
Figure 8-44   Clock frequency settings

8.16.1   Changing the Clock Frequency

You can change the clock frequency by changing VCLK.
Changing this setting changes the frequency of the LT450 system video clock. This means that when you change this setting, the clock frequencies of all output connectors (including those on options) change simultaneously. The clock frequency that you change here is only valid for the currently selected output format. Remember that when you change the output format, the clock frequency is reset.

● **Settings**

VCLK   -1.000 to 0.000 to +1.000 MHz, 0.001 MHz steps
                            Use the jog dial to specify the amount by which you want to
                            change the current frequency, and then press ENTER.
                            While you are adjusting the value, it is surrounded by
                            parentheses. After you confirm the value by pressing ENTER, it
                            is surrounded by square brackets. The setting does not change
                            until you press the ENTER key.
                            The result of adding the set value to the current clock frequency
                            is displayed on the third line.

After you have changed the clock frequency, a square flashes in the upper left of the screen as shown in the figure below. Also, in the output format screen, the clock frequency is displayed instead of the horizontal and frame frequencies.

```
 ☀■2:1080i／59.94(30sF)
  VAR  VCLK:  74.500MHz

```
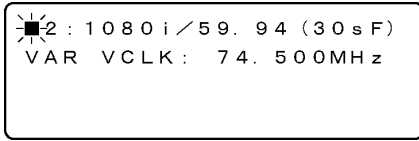
Figure 8-45   Output format screen

When the output format is composite and you change the clock frequency, the subcarrier frequency changes as indicated below.

$$\text{Amount of subcarrier frequency change [Hz]} = \frac{\text{Amount of clock frequency change [Hz]} \times \text{Subcarrier frequency [Hz]}}{13500000}$$

8.16.2   Resetting the Clock Frequency

Select RESET to reset the clock frequency to its default value. For the default values, see the "Interface sampling frequency" column in table 12-1, "List of output formats."

● **Settings**

RESET   When you move the cursor to RESET and press ENTER, the clock frequency is reset to its default value.

8.17   System Configuration

You can set the date and time and other system settings. The settings you make here are not stored to preset memories.

● **Procedure**
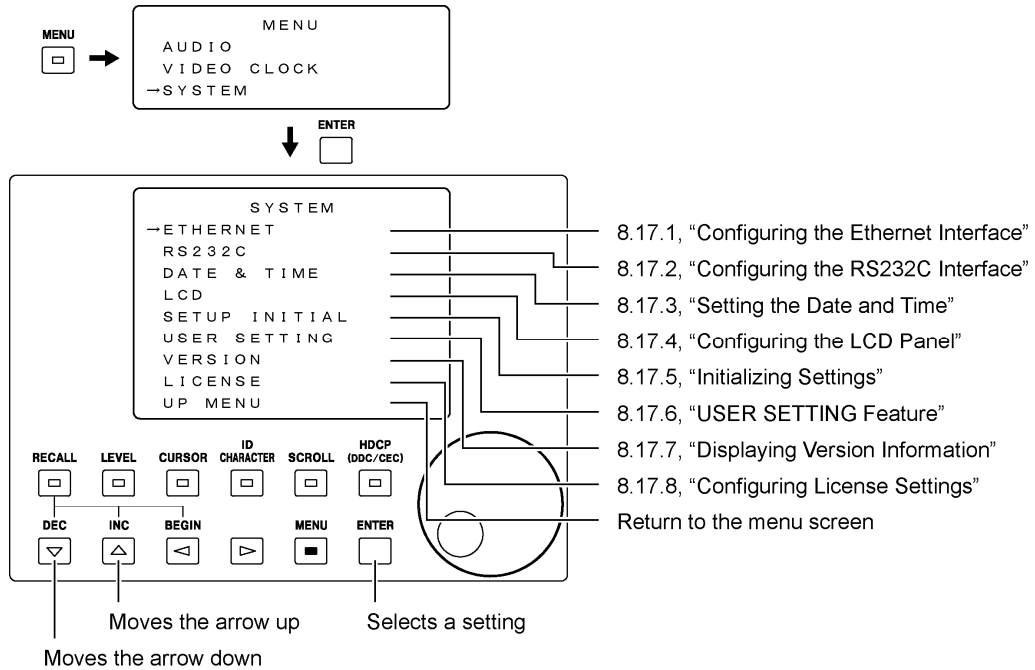
Figure 8-46   System settings

8.17.1   Configuring the Ethernet Interface

You can configure Ethernet settings in the ETHERNET SETTING configuration screen. Do this if you want to control the LT 450 settings from a PC through the Ethernet port.

The settings specified here will take effect when the LT 450 is restarted. The settings are stored in the LT 450 even when the power is turned off. They are not stored in the startup memory.

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● **Settings**

DHCP/IP SELECT	DHCP / <u>IP</u>
	If you select DHCP on a network with a DHCP server, the IP address, subnet mask, and default gateway will be set automatically. You must specify them manually if you select IP. Use the jog dial to make a selection, and then press ENTER.
IP ADDRESS SET	0 to 255 (<u> 0. 0. 0. 0</u>)
	Set the IP address when DHCP/IP SELECT is set to IP. Check with your network administrator for the appropriate value. Use the jog dial and △ and ▽ keys to set the value, and then press ENTER.
SUBNET MASK SET	0 to 255 (<u>255.255.255. 0</u>)
	Set the subnet mask when DHCP/IP SELECT is set to IP. Check with your network administrator for the appropriate value. Use the jog dial and △ and ▽ keys to set the value, and then press ENTER.
GATE WAY SET	0 to 255 (<u> 0. 0. 0. 0</u>)
	Set the default gateway when DHCP/IP SELECT is set to IP. Check with your network administrator for the appropriate value. Use the jog dial and △ and ▽ keys to set the value, and then press ENTER.
MAC ADDRESS DISP	Displays the LT 450 MAC address. This screen is only for viewing. You cannot set values in this screen. Press ENTER to return to the Ethernet configuration screen.

● **Procedure**

MENU → SYSTEM → ETHERNET
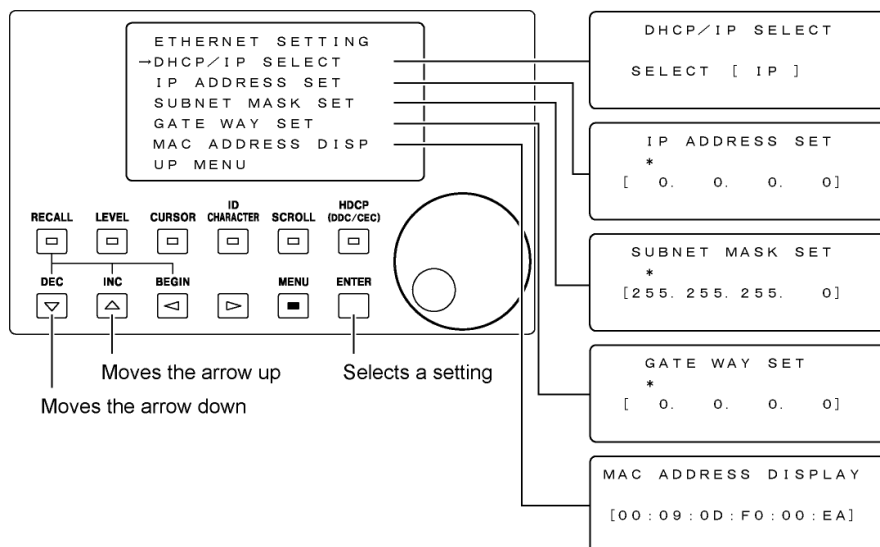
Figure 8-47   Ethernet settings

8.17.2 Configuring the RS232C Interface

You can configure the RS232C setting in the RS232C configuration screen. Select the appropriate value for this setting when you want to change the LT 450 settings through the RS232C port from an external device such as a PC or an LG 226.

The setting configured here is stored in the LT 450 memory and remains valid even if you turn the power off. This setting is not stored to the startup memory. It is also not reset if you initialize the settings.

● **Settings**

BAUD RATE	9600 / 19200 / <u>38400</u>
	Sets the baud rate. Use the jog dial to select a value, and press ENTER.
	Select 38400 when you want the LT 450 to communicate with an LG 226.

● **Procedure**

$\boxed{\text{MENU}}$ → SYSTEM → RS232C
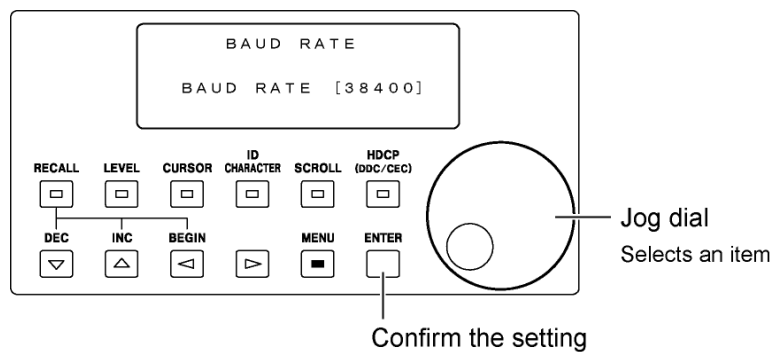
Figure 8-48   RS232C setting

8.17.3 Setting the Date and Time

You can set and view the date and time in the DATE & TIME configuration screen. The date and time you set here are not stored to the startup memory. They are also not reset if you initialize the settings.

● **Settings**

SETTING	Sets the date and time. Press $\triangleleft$ and $\triangleright$ to select a digit, use the jog dial to set the value, and then press ENTER to confirm the setting. If you want to cancel a setting, select CANCEL by pressing $\triangle$ and $\triangledown$, and then press ENTER.
DISPLAY	Displays the date and time. This screen is only for viewing. You cannot set values in this screen. Press ENTER to return to the date and time configuration screen.

● **Procedure**

MENU → SYSTEM → DATE & TIME
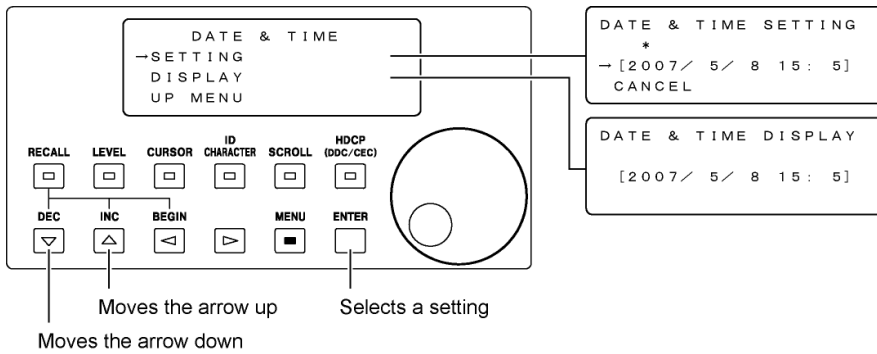
Figure 8-49   Date and time settings

8.17.4   Configuring the LCD Panel

You can set the LCD backlight and the contrast level in the LCD SETTING configuration screen. Use the jog dial and △ and ▽ keys to set them.

● **Settings**

LCD BACKLIGHT	ON / OFF
	Turns the backlight on and off.
LCD CONTRAST	-2 to 0 to 2
	Sets the contrast.

● **Procedure**

MENU → SYSTEM → LCD
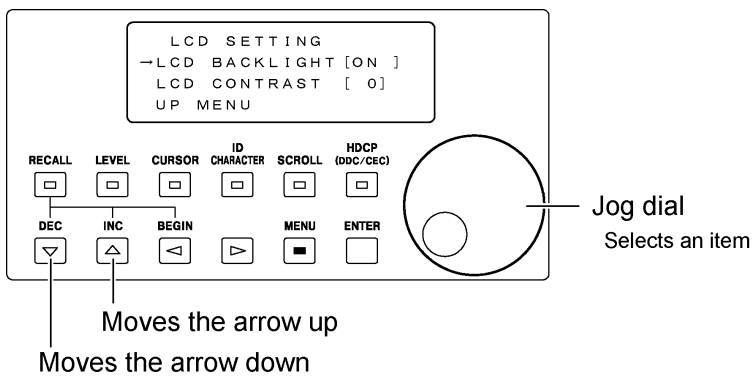
Figure 8-50   LCD settings

8.17.5   Initializing Settings

You can initialize the LT 450 settings in the Setup Initialize configuration screen. For information on what items are initialized, see "Initialization" in Table 12-4, "List of settings." The contents of preset memories and startup memory are not initialized. Select SETUP INIT, and then press ENTER to initialize the settings and close the configuration screen.

● **Procedure**

MENU → SYSTEM → SETUP INITIAL
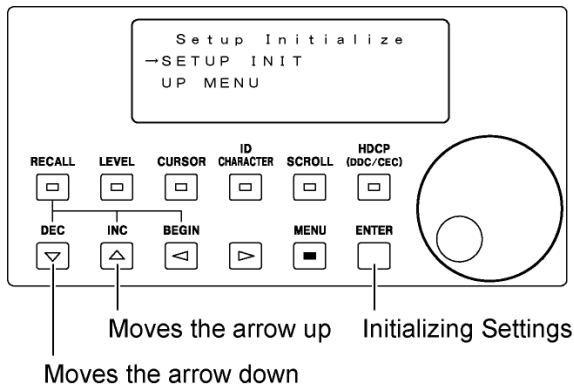
Figure 8-51   Initialization

8.17.6   USER SETTING Feature

In the USER SETTING screen, you can (1) turn PB and PR on or off when the output pattern is ramp, step, or multiburst and (2) set the polarities of the horizontal drive (HD) and vertical drive (VD) signals. Use the jog dial and △ and ▽ keys to set them.

These settings are retained until you change the settings again. They are not saved to startup memory. They are not reset when you initialize the settings.

● **Settings**

HV POLARITY   NEGA / POSI
                     Set the polarities of the horizontal drive (HD) and vertical drive (VD) signals for each output format. The factory default settings are POSI (positive) when the output format is a PC monitor format (excluding VGA and XGA), and NEGA (negative) in all other cases.
                     The settings specified here are also applied to the horizontal drive and vertical drive signals for RGB output connectors and DVI-I output connectors (including those on options).
PbPr ON/OFF   OFF / <u>ON</u>
                     Turn PB and PR on or off for each output pattern.

● **Procedure**

MENU → SYSTEM → USER SETTING
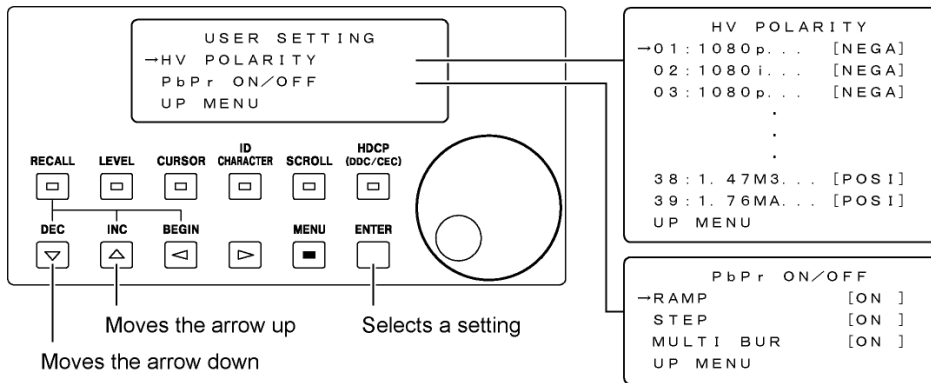
Figure 8-52   USER SETTING Feature

8.17.7   Displaying Version Information

You can view the LT 450 firmware version in the VERSION DISPLAY screen. This screen is only for viewing. You cannot set values in this screen. To exit from the version display screen, press MENU.

● **Procedure**

MENU → SYSTEM → VERSION
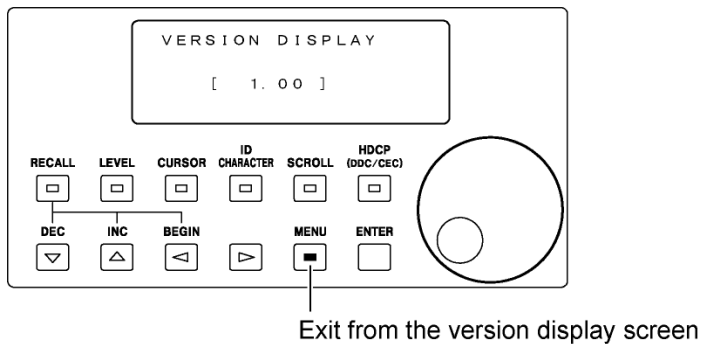
Figure 8-53   Version display

8.17.8　Configuring License Settings

You can configure the license settings on the LICENSE configuration screen. Configure these settings when you install an option that requires a license.

The settings configured here are stored in the LT 450 memory and remain valid even if you turn the power off. These settings are not stored to the startup memory. They are also not reset if you initialize the settings.

● **Settings**

OPTION　　　　　　SER04

Use the jog dial to select an option. You can then EDIT its license or view its license INFORMATION. Select an option and press ENTER to configure settings related to the option. For details, see the instruction manual for the option.

EDIT　　　　　　Enter the license key for the selected option. Press ◁ and ▷ to move the cursor (*), use the jog dial to set the value, and press ENTER to confirm the setting.

INFORMATION　　Displays the license information for the selected option. For details, see the instruction manual for the option.

● **Procedure**

MENU　→ SYSTEM → LICENSE
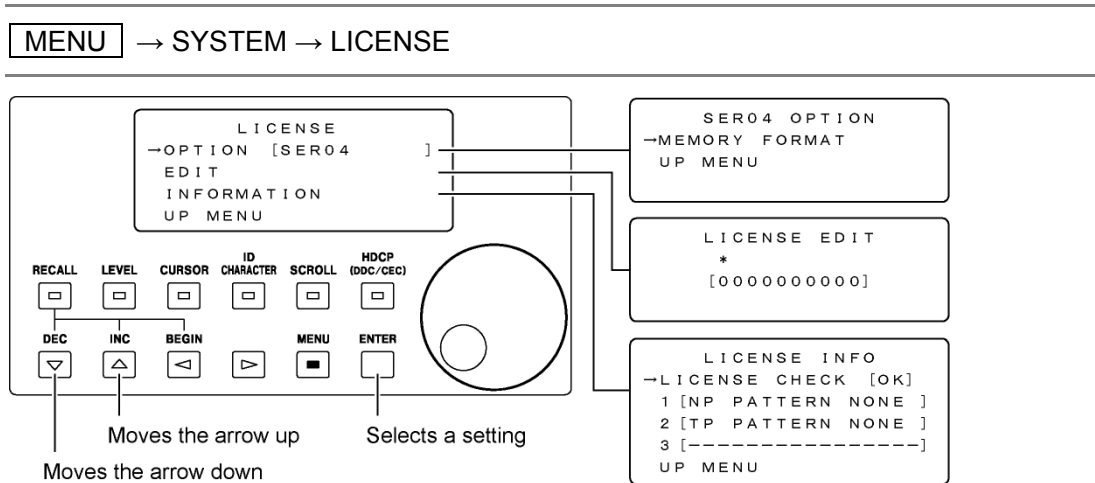
Figure 8-54　License settings

9. EXTERNAL INTERFACE

9.1 Controlling the LT 450 through the Ethernet or RS232C Port

You can control the LT 450 settings from a PC through the Ethernet or RS232C port. However, you cannot use these ports simultaneously.

9.1.1 Ethernet Port

● **Connector Specifications**

The following figure shows the connector diagram. The connector is 10BASE-T compatible.

ETHERNET
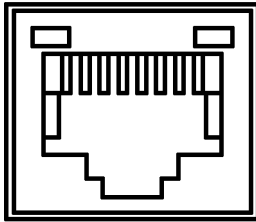
Figure 9-1   Ethernet port

● **Configuring the LT 450**

Carry out the procedures given in section 8.17.1, "Configuring the Ethernet Interface." The settings specified here will take effect when the LT 450 is restarted.

● **Connection**

Connect the LT 450 Ethernet port to a PC. If you are connecting the LT 450 directly to a PC, use a cross cable. If you are connecting via a hub, use a straight cable.
Telnet is used to control the LT 450 from the PC. For details on how to start Telnet, read the instruction manual of your PC.

The login name and password are shown below. You cannot change them.
LOGIN: LT450
PASSWORD: LT450

9.1.2 RS232C Port

● **Connector Specifications**

The following figure shows the connector diagram. It is a D-sub 9-pin connector.
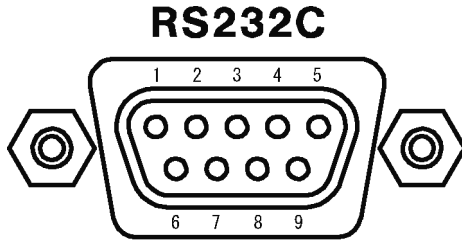
Figure 9-2   RS232C port

● **Connection**

Connect the LT 450 RS232C port and the PC using an RS232C cross cable. The following figure shows the RS232C cross cable specifications.

LT 450			PC	
D-Sub 9pin female			D-sub 9pin female	
Signal	Pin		Pin	Signal
RD	2		2	RD
TD	3		3	TD
RTS	7		7	RTS
CTS	8		8	CTS
DTR	4		4	DTR
DSR	6		6	DSR
GND	5		5	GND
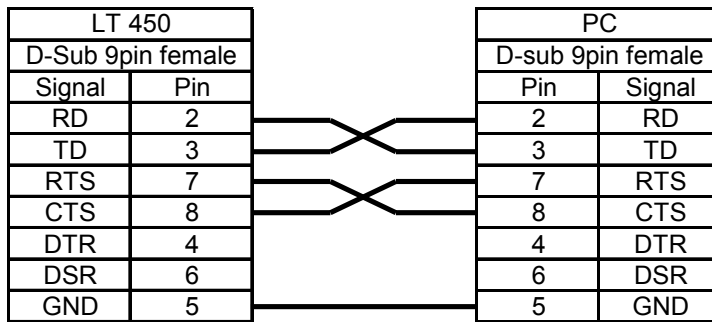
Figure 9-3   Connection between the LT 450 and PC

● **Communication Parameters**

The following table contains the RS232C communication parameters. You can select the baud rate by following the procedure described in section 8.17.2, "Configuring the RS232C Interface."

Table 9-1   Communication parameters

Transmission mode	Asynchronous start-stop
Baud rate	9600 / 19200 / 38400 bps
Data bits	8 bits
Stop bits	1 bit
Parity check	None
Flow control	Hardware (RTS/CTS)

9.1.3   Controlling the LT 450

● **Establishing a Connection**

To establish a connection, send the "@COM,1" command. Once the LT 450 receives this command, the connection is established. The following indication appears on the LCD panel. The front panel keys are disabled during the connection.

```
REMOTE  CONTROL
```

Figure 9-4   Screen during connection

● **Sending a Command**

To send a command to the LT 450, use ASCII codes in the following syntax. For a list of commands, see Table 9-3, "List of commands."

[Command] + [,] + [parameter 1] + [,] + [parameter 2] + [,] + ...
  + [parameter 7] + [CR+LF:]

- Type commands in all capital letters.
- A command is a four-character (four-byte) word that starts with an @.
- The number of parameters varies between 0 and 7 depending on the command.
  Separate each parameter with a comma.
- The terminator is the 2-byte code CR+LF (0DH+0AH).

● **Response**

When a command is sent to the LT 450, the LT 450 responds using ASCII codes in the following syntax. For a list of responses, see Table 9-4, "List of responses."

[Response] + [,] + [parameter 1] + [,] + [parameter 2] + [,] + ...
  + [parameter 18] + [CR+LF:]

- A response is a four-character (four-byte) word that starts with an @.
- There may be up to 18 parameters depending on the response.
  Each parameter is separated with a comma.
- The terminator is the 2-byte code CR+LF (0DH+0AH).

The following table contains the response to each command.

Table 9-2   Commands and their responses

Command		Response	
Command	Description	Response	Description
@LTR	Queries the settings	@LTR	LT 450 settings
@SIR	Queries the model name and version	@SIR	Model name and version
@ICR	Queries the HDCP and CEC information	@ICR	HDCP and CEC information
Other	-	@ERR	Error

● **Closing the Connection**

To close the connection, send the "@COM,0" command or turn the LT 450 off.

● **Communication Examples**

Example 1
Command: @TIM,0   Set the output format to 1080p/59.94
Response: @ERR,0   No error

Example 2
Command: @CUP,50,100   Set the cursor position to X = 50, Y = 100
Response: @ERR,0   No error

Example 3
Command: @SIR   Query the model name and version
Response: @SIR,LT450,01.00   Model name: LT450 Version: 1.00

Example 4
Command: @LTR   Query the LT 450 settings
Response: @LTR,1,0,0,1,1,0,1,1,1,1,1,1,0,0,0,0,0,0

Output format: 1080i/59.94(30sF)
Output pattern: FULL FIELD COLOR BAR
COMPONENT: YPʙPR   SYNC: ON
SATURATION: 75%   AUDIO(L): 1kHz
AUDIO(R): 1kHz   CURSOR: OFF
ID CHARACTER: OFF   SCROLL: OFF
LEVEL: OFF   HDCP: OFF
PATTERN CHANGE: OFF
(ASPECT, INVERSION, R, G, B values are undefined.)

Example 5
Command: @TIN,0   Set the output format to 1080p/59.94
Response: @ERR,1   Command error (spelling error)

Example 6
Command: @CUP,2000,1000   Set the cursor position to X = 2000, Y = 1000
Response: @ERR,2   Parameter error (outside the range)

Example 7
Command: @ASP,1   Set the aspect ratio when the output format is component (HDTV)
Response: @ERR,2   Parameter error

Example 8
Command: @ASP,0   Send a command before sending the connect command, @COM,1
Response: @ERR,4   Communication error

9.1.4   List of Commands

Table 9-3   List of commands

Communication control and queries

Setting	Command	Parameters		Description
Communication control	@COM	Parameter 1	0	Close connection
			1	Establish connection
Queries the settings	@LTR	-	-	-
Queries the model name and version	@SIR	-	-	-
Queries the HDCP and CEC information	@ICR	-	-	-

Front panel

Setting	Command	Parameters		Description
Output format*[1]	@TIM	Parameter 1	0	1080p/59.94
			1	1080i/59.94(30sF)
			2	1080p/29.97
			3	1080p/23.98
			4	1080PsF/23.98
			5	1080p/50
			6	1080p/25
			7	1080i/50(25sF)
			8	720p/59.94
			9	720p/29.97
			10	720p/23.98
			11	720p/50
			12	720p/25
			13	480p/59.94
			14	480i/59.94
			15	576p/50
			16	576i/50
			17	NTSC-M
			18	NTSC-J
			19	NTSC 4.43
			20	PAL
			21	PAL-M
			22	PAL-N
			23	PAL-60
			24	SECAM
			25	VGA(640x480)
			26	SVGA(800x600)
			27	XGA(1024x768)
			28	SXGA(1280x1024)
			29	UXGA(1600x1200)
			30	1080p/50(1250T)

Setting	Command	Parameters		Description
Output format*[1]	@TIM	Parameter 1	31	1080i/50(1250T)
			32	0.38M9 800×480
			33	0.98M9 1280×768
			34	1.02MA 1280×800
			35	1.04M9 1360×768
			36	1.30MA 1440×900
			37	1.47M3 1400×1050
			38	1.76MA 1680×1050
			99	TIMING
(Only when parameter 1 is 99)		Parameter 2	00-99	TIMING number
Output pattern*[1]	@PAT	Parameter 1	0	FULL FIELD COLOR BAR
			1	SMPTE COLOR BAR
			2	MULTI FORMAT COLOR BAR
			3	RASTER
			4	RAMP
			5	10 STEP
			6	15 STEP
			7	CONVERGENCE
			8	CROSS HATCH
			9	MULTIBURST
			10	CHARACTER
			11	1/2 WINDOW
			12	1/10 WINDOW
			13	DEMODULATION
			14	MONOSCOPE
			15	NATURAL PICTURE
			16	ANSI GRAY SCALE
			17	CHECKER
			20	32 STEP
			22	DEEP COLOR RAMP
			23	xvYCC
(Only when parameter 1 is 3)		Parameter 2	0-100	RASTER luminance
(Only when parameter 1 is 15)			0-15	NATURAL PICTURE number

*1   The order that the output formats and the output patterns are listed in the table is different from the order that they are listed on the LT 450.

Setting		Command	Parameters		Description
SATURATION		@SAT	Parameter 1	0	100%
				1	75%
G		@GRE	Parameter 1	0	OFF
				1	ON
B		@BLU	Parameter 1	0	OFF
				1	ON
R		@RED	Parameter 1	0	OFF
				1	ON
INVERSION		@INV	Parameter 1	0	NORMAL
				1	INVERT
SYNC		@SYC	Parameter 1	0	OFF
				1	ON
COMPONENT		@CMP	Parameter 1	0	YPBPR
				1	RGB
ASPECT		@ASP	Parameter 1	0	4:3
				1	SQUEEZE
				2	LETTER BOX
AUDIO	AUDIO(L)	@AUL	Parameter 1	0	400Hz
				1	1kHz
				2	OFF
	AUDIO(R)	@AUR	Parameter 1	0	400Hz
				1	1kHz
				2	OFF
	Set AUDIO (L) and AUDIO (R) at the same time	@AUD	Parameter 1	0	400Hz
				1	1kHz
				2	OFF
RECALL		@REC	Parameter 1	0-99	RECALL ADRS
				100	START UP MEMORY
LEVEL		@LEV	Parameter 1	0	OFF
				1	ON
	COMPONENT MODE	@CNP	Parameter 1	0-100	Y_LEVEL
			Parameter 2	0-100	PB_LEVEL
			Parameter 3	0-100	PR_LEVEL
			Parameter 4	0-100	G_LEVEL
			Parameter 5	0-100	B_LEVEL
			Parameter 6	0-100	R_LEVEL
			Parameter 7	0-100	SYNC_LEVEL
	COMPOSITE MODE	@CSP	Parameter 1	0-100	Y_LEVEL
			Parameter 2	0-100	C_LEVEL
			Parameter 3	0-100	SYNC_LEVEL
			Parameter 4	0-100	BURST_LEVEL
			Parameter 5	0.00-10.00	SETUP_LEVEL

Setting		Command	Parameters		Description
CURSOR		@CUR	Parameter 1	0	OFF
				1	ON
	CURSOR POSITION	@CUP	Parameter 1	0-1919	X
			Parameter 2	0-1079	Y
ID CHARACTER		@IDC	Parameter 1	0	OFF
				1	ON
SCROLL		@SCR	Parameter 1	0	OFF
				1	ON
HDCP		@HCP	Parameter 1	0	OFF
				1	ON

Menu Screen

Setting		Command	Parameters		Description
CURSOR	CUR LEVEL (When COMPONENT is YPBPR)	@CUL	Parameter 1	0-100	CUR Y LEV
			Parameter 2	-50-50	CUR PB LEV
			Parameter 3	-50-50	CUR PR LEV
	CUR LEVEL (When COMPONENT is RGB)	@CUL	Parameter 1	0-100	CUR G LEV
			Parameter 2	0-100	CUR B LEV
			Parameter 3	0-100	CUR R LEV
	CUR LINE WIDTH	@CUW	Parameter 1	1-32	X LINE
			Parameter 2	1-32	Y LINE
ID CHARACTER	ID MODE	@IDM	Parameter 1	0	NORMAL
				1	HDMI_INFO
	ID FONT	@IDF	Parameter 1	0	16×32
				1	32×64
				2	64×128
	ID CHAR	@IDA	Parameter 1	1-20	-
	ID POSITION	@IDS	Parameter 1	0-1919	ID X START
			Parameter 2	0-1079	ID Y START
	ID CHAR SELECT	@IDG	Parameter 1	20 characters	-
	ID LEVEL (When COMPONENT is YPBPR)	@IDL	Parameter 1	0-100	ID Y LEV
			Parameter 2	-50-50	ID PB LEV
			Parameter 3	-50-50	ID PR LEV
	ID LEVEL (When COMPONENT is RGB)	@IDL	Parameter 1	0-100	ID G LEV
			Parameter 2	0-100	ID B LEV
			Parameter 3	0-100	ID R LEV
	ID SCROLL	@IDI	Parameter 1	0-4	CYCLE
	ID BLINK	@IDB	Parameter 1	0-4	BLINK TIME

	Setting	Command	Parameters		Description
SCROLL	DIRECTION	@SCD	Parameter 1	0	LEFT
				1	RIGHT
			Parameter 2	0	UP
				1	DOWN
	SPEED	@SCS	Parameter 1	0-256	SPEED H
			Parameter 2	0-256	SPEED V
LEVEL	COMPONENT LEVEL	@CNL	Parameter 1	0-100	Y_LEVEL
			Parameter 2	0-100	PB_LEVEL
			Parameter 3	0-100	PR_LEVEL
			Parameter 4	0-100	G_LEVEL
			Parameter 5	0-100	B_LEVEL
			Parameter 6	0-100	R_LEVEL
			Parameter 7	0-100	SYNC_LEVEL
	COMPOSITE LEVEL	@CSL	Parameter 1	0-100	Y_LEVEL
			Parameter 2	0-100	C_LEVEL
			Parameter 3	0-100	SYNC_LEVEL
			Parameter 4	0-100	BURST_LEVEL
			Parameter 5	0.00-10.00	SETUP_LEVEL
RECALL	RECALL SETTING	@REA	Parameter 1	0-99	BEGIN
			Parameter 2	0-99	END
HDMI	HDMI OUTPUT	@HOU	Parameter 1	0	DIS
				1	ENA
	HOT PLUG	@HHP	Parameter 1	0	OFF
				1	ON
	HDCP	@HHC	Parameter 1	0	OFF
				1	ON
				2	PANEL
	CEC	@HCE	Parameter 1	0	OFF
				1	ON
				2	PANEL
	DDC	@HDD	Parameter 1	0	OFF
				1	ON
				2	PANEL
	FORMAT	@FMT	Parameter 1	0	4:4:4
				1	4:2:2
	AUDIO INPUT	@AUI	Parameter 1	0	INT
				1	EXT
	AUDIO SAMPLE	@AUS	Parameter 1	0	32K
				1	44.1K
				2	48K
	BIT WIDTH	@FBW	Parameter 1	0	8
				1	10
				2	12

Setting		Command	Parameters			Description
DVI-I	DVI OUTPUT	@DOU	Parameter 1		0	DIS
					1	ENA
	HOT PLUG	@DHP	Parameter 1		0	OFF
					1	ON
	HDCP	@DHC	Parameter 1		0	OFF
					1	ON
					2	PANEL
	DDC	@DDD	Parameter 1		0	OFF
					1	ON
					2	PANEL
SLOT1 [DVI-I]	DVI OUTPUT	@1DO	Parameter 1		0	DIS
					1	ENA
	HOT PLUG	@1DP	Parameter 1		0	OFF
					1	ON
	HDCP	@1DH	Parameter 1		0	OFF
					1	ON
					2	PANEL
	DDC	@1DD	Parameter 1		0	OFF
					1	ON
					2	PANEL
SLOT1 [HDMI]	HDMI OUTPUT	@1HO	Parameter 1		0	DIS
					1	ENA
	A HOT PLUG	@1AP	Parameter 1		0	OFF
					1	ON
	A HDCP	@1AH	Parameter 1		0	OFF
					1	ON
					2	PANEL
	A CEC	@1AC	Parameter 1		0	OFF
					1	ON
					2	PANEL
	A DDC	@1AD	Parameter 1		0	OFF
					1	ON
					2	PANEL
	B HOT PLUG	@1BP	Parameter 1		0	OFF
					1	ON
	B HDCP	@1BH	Parameter 1		0	OFF
					1	ON
					2	PANEL
	B CEC	@1BC	Parameter 1		0	OFF
					1	ON
					2	PANEL
	B DDC	@1BD	Parameter 1		0	OFF
					1	ON
					2	PANEL

Setting		Command	Parameters			Description
SLOT1 [SCART]	MODE	@1SV	Parameter 1		0	VBS/RGB
					1	COMPOSITE
					2	S-VHS
					3	RGB
	VBS SYNC	@1SS	Parameter 1		0	SYNC
					1	VBS
	RGB STATUS	@1ST	Parameter 1		0	RGB
					1	VBS
SLOT2 [DVI-I]	DVI OUTPUT	@2DO	Parameter 1		0	DIS
					1	ENA
	HOT PLUG	@2DP	Parameter 1		0	OFF
					1	ON
	HDCP	@2DH	Parameter 1		0	OFF
					1	ON
					2	PANEL
	DDC	@2DD	Parameter 1		0	OFF
					1	ON
					2	PANEL
SLOT2 [HDMI]	HDMI OUTPUT	@2HO	Parameter 1		0	DIS
					1	ENA
	A HOT PLUG	@2AP	Parameter 1		0	OFF
					1	ON
	A HDCP	@2AH	Parameter 1		0	OFF
					1	ON
					2	PANEL
	A CEC	@2AC	Parameter 1		0	OFF
					1	ON
					2	PANEL
	A DDC	@2AD	Parameter 1		0	OFF
					1	ON
					2	PANEL
	B HOT PLUG	@2BP	Parameter 1		0	OFF
					1	ON
	B HDCP	@2BH	Parameter 1		0	OFF
					1	ON
					2	PANEL
	B CEC	@2BC	Parameter 1		0	OFF
					1	ON
					2	PANEL
	B DDC	@2BD	Parameter 1		0	OFF
					1	ON
					2	PANEL

Setting		Command	Parameters			Description
SLOT2 [SCART　]	MODE	@2SV	Parameter 1		0	VBS/RGB
					1	COMPOSITE
					2	S-VHS
					3	RGB
	VBS SYNC	@2SS	Parameter 1		0	SYNC
					1	VBS
	RGB STATUS	@2ST	Parameter 1		0	RGB
					1	VBS
SLOT3 [DVI-I　]	DVI OUTPUT	@3DO	Parameter 1		0	DIS
					1	ENA
	HOT PLUG	@3DP	Parameter 1		0	OFF
					1	ON
	HDCP	@3DH	Parameter 1		0	OFF
					1	ON
					2	PANEL
	DDC	@3DD	Parameter 1		0	OFF
					1	ON
					2	PANEL
SLOT3 [HDMI　]	HDMI OUTPUT	@3HO	Parameter 1		0	DIS
					1	ENA
	A HOT PLUG	@3AP	Parameter 1		0	OFF
					1	ON
	A HDCP	@3AH	Parameter 1		0	OFF
					1	ON
					2	PANEL
	A CEC	@3AC	Parameter 1		0	OFF
					1	ON
					2	PANEL
	A DDC	@3AD	Parameter 1		0	OFF
					1	ON
					2	PANEL
	B HOT PLUG	@3BP	Parameter 1		0	OFF
					1	ON
	B HDCP	@3BH	Parameter 1		0	OFF
					1	ON
					2	PANEL
	B CEC	@3BC	Parameter 1		0	OFF
					1	ON
					2	PANEL
	B DDC	@3BD	Parameter 1		0	OFF
					1	ON
					2	PANEL

Setting		Command	Parameters			Description
SLOT3 [SCART]	MODE	@3SV	Parameter 1		0	VBS/RGB
					1	COMPOSITE
					2	S-VHS
					3	RGB
	VBS SYNC	@3SS	Parameter 1		0	SYNC
					1	VBS
	RGB STATUS	@3ST	Parameter 1		0	RGB
					1	VBS
PATTERN CHANGE	PATTERN CHG	@CHG	Parameter 1		0	OFF
					1	ON
CLOSED CAPTION	C.CAPTION	@CCS	Parameter 1		0	OFF
					1	ON
AUDIO	AUD OUT	@AUP	Parameter 1		0	0
					1	-5.23
VIDEO CLOCK	VCLK	@VCLK	Parameter 1		-1000-1000	kHz
	RESET	@VCLR	-		-	-

Table 9-4   List of responses

Response item	Response	Parameters		Description
LT 450 settings[1]	@LTR	Parameter 1	-	OUTPUT FORMAT[2] (see @TIM)
		Parameter 2	-	Output pattern[3] (see @PAT)
		Parameter 3	-	COMPONENT (see @CMP)
		Parameter 4	-	SYNC (see @SYC)
		Parameter 5	-	ASPECT (see @ASP)
		Parameter 6	-	INVERSION (see @INV)
		Parameter 7	-	SATURATION (see @SAT)
		Parameter 8	-	R (see @RED)
		Parameter 9	-	G (see @GRE)
		Parameter 10	-	B (see @BLU)
		Parameter 11	-	AUDIO(L) (see @AUL)
		Parameter 12	-	AUDIO(R) (see @AUR)
		Parameter 13	-	CURSOR (see @CUR)
		Parameter 14	-	ID CHARACTER (see @IDC)
		Parameter 15	-	SCROLL (see @SCR)
		Parameter 16	-	LEVEL (see @LEV)
		Parameter 17	-	HDCP (see @HCP)
		Parameter 18	-	PATTERN CHANGE (see @CHG)
Model name and version	@SIR	Parameter 1	-	Model name
		Parameter 2	-	Version

Response item	Response	Parameters		Description
HDCP and CEC information[4]	@ICR	Parameter 1	1	LT 450 HDMI information: PASS
			0	LT 450 HDMI information: FAIL
			-1	LT 450 HDMI information: ----
			-2	LT 450 HDMI information: OFF
			-3	LT 450 HDMI information: Blank
		Parameter 2	-	LT 450 DVI-I information (see parameter 1)
		Parameter 3	-	SLOT1(A) information (see parameter 1)
		Parameter 4	-	SLOT1(B) information (see parameter 1)
		Parameter 5	-	SLOT2(A) information (see parameter 1)
		Parameter 6	-	SLOT2(B) information (see parameter 1)
		Parameter 7	-	SLOT3(A) information (see parameter 1)
		Parameter 8	-	SLOT3(B) information (see parameter 1)
Error	@ERR	Parameter 1	0	No error
			1	Command error
			2	Parameter error
			4	Communication error
			8	Invalid[5]

*1   Parameters that cannot be specified using front panel keys are also returned, but the values of those parameters are undefined.

*2   TIMING-format numbers are not returned.

*3   RASTER luminance and natural picture numbers are not returned.

*4   The item is invalid when the output format is set to a number between P00 and P99.

*5   The LT 450 only returns a value when the output format is set to a number between P00 and P99.

9.2　Connecting to the LG 226 through the RS232C Port

You can automatically set the output format and recall address by connecting the LT 450 to the LG 226 (TV Signal Generator) through the RS232C port. For instructions on how to use the LG 226, see the LG 226 Instruction Manual.

● **Connection**

Connect the LT 450 RS232C port and the LG 226 RS232C port using an RS232C cable. Connect the LT 450 COMPOSITE OUTPUT connector to the LG 226 VIDEO INPUT connector using a 75-Ω BNC cable.
(The LG 226 RS232C port is designed exclusively for controlling the LT 450. Do not connect the port to other devices.)
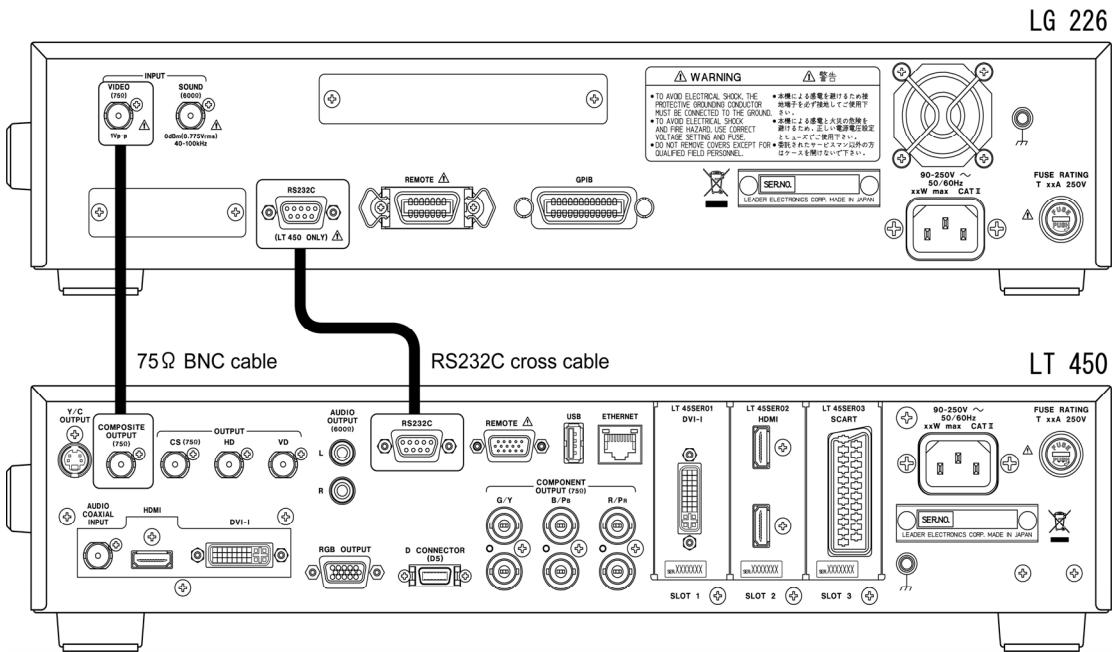
Figure 9-5　Connection between the LT 450 and LG 226

The following figure shows the RS232C cross cable specifications.

LT 450		LG 226	
D-Sub 9pin female		D-sub 9pin female	
Signal	Pin	Pin	Signal
RD	2	2	RD
TD	3	3	TD
RTS	7	7	RTS
CTS	8	8	CTS
DTR	4	4	DTR
DSR	6	6	DSR
GND	5	5	GND
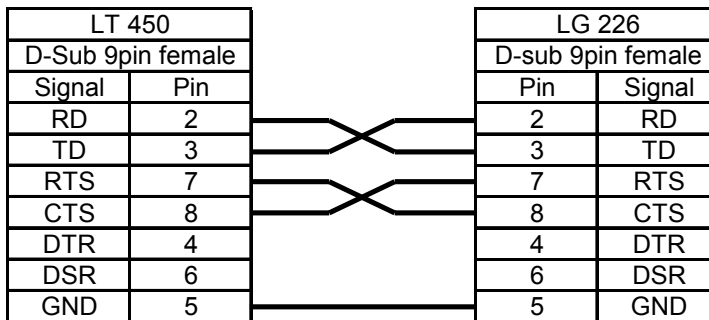
Figure 9-6　Connection between the LT 450 and LG 226

● **Configuring the LG 226**

Setting the video signal source

Press VIDEO and then select EXTERNAL.

```
◆ V I D E O : E X T E R N A L
  S O U N D : E X T E R N A L
```

Figure 9-7   VIDEO setting

Enabling the LT 450 remote control feature

Press UTILITY, select LT450 REMOTE, and select ON. If the LG 226 and LT 450 are not communicating properly, the word "err" appears at the lower right of the screen. If "err" appears, set LT450 REMOTE to OFF, check the communication between the LG 226 and the LT 450, and then set LT450 REMOTE to ON again.

```
  L T 4 5 0   R E M O T E
    : O N     ◆
```

Figure 9-8   LT 450 REMOTE setting

● **Configuring the LT 450**

Setting the baud rate

Press MENU, select SYSTEM and then RS232C, and select 38400.
(See section 8.17.2, "Configuring the RS232C Interface.")

```
    B A U D   R A T E

  B A U D   R A T E   [ 3 8 4 0 0 ]
```

Figure 9-9   Baud rate setting

● **Changing the Broadcasting System Settings**

Changing the LG 226 broadcasting system setting automatically changes the LT 450 output format in the manner shown below. To change the LG 226 broadcasting system setting, press COUNTRY (when in channel mode) or TV SYSTEM (when in frequency mode).

Table 9-5   Broadcasting system settings

LG 226 setting		LT 450 output format	
COUNTRY (in channel mode)	TV SYSTEM (in frequency mode)	No.	Format name
USA	NTSC-M	25	NTSC-M
JAPAN	NTSC-J	26	NTSC-J
-	NTSC-4.43	27	NTSC-4.43
ITUR / CHINA / GBR / HKG / IDN / AUS / ITALY	PAL	28	PAL
-	PAL-M	29	PAL-M
-	PAL-N	30	PAL-N
-	PAL-60	31	PAL-60
FRA	SECAM	32	SECAM

```
LG 226                                LT 450

◆TV  SYS:NTSC−J              26:NTSC−J
  FREQ:  91.25MHz            H:15.73kHz  V:29.97Hz
  S  CARRIER:＋4.5MHz
  LEVEL:  80dBuV
```
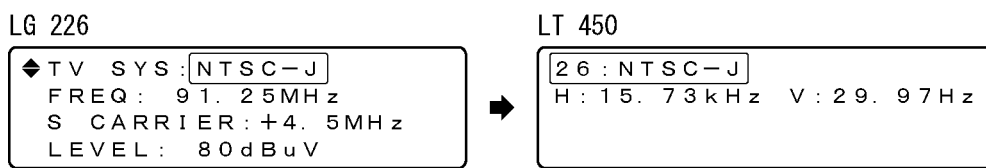
Figure 9-10   Changing the broadcasting system in frequency mode

● **Controlling the Recall Address**

When you recall a LG 226 memory preset, the memory preset at the same address is also recalled on the LT 450. If you change the address using INC, DEC, and RESET on the LG 226, the LT 450 address also changes in the same manner. The LT 450 displays "REMOTE CONTROL" while it is being remotely controlled, and you cannot view the recall address.

```
LG 226                                LT 450

  COUNTRY          [28]           REMOTE  CONTROL
  :JAPAN−V(NTSC−J)
  CH:   1( 91.25MHz)
  LEVEL:  80dBuV
```
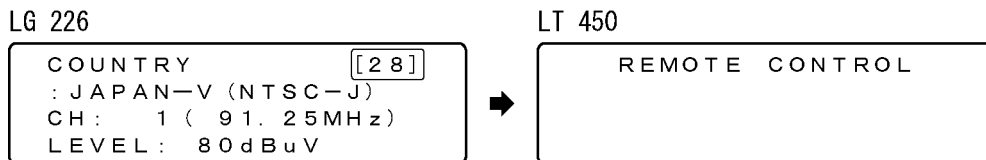
Figure 9-11   Controlling the preset memory

The LT 450 broadcasting system is not changed at the point when a preset memory is recalled on the LG 226. Align the broadcasting system settings in the preset memories between the LG 226 and the LT 450 according to Table 9-5 in advance.

```
LG 226                                LT 450

  COUNTRY          [28]                RECALL
  :JAPAN−V (NTSC−J)              26:NTSC−J
  CH:   1( 91.25MHz)            RECALL  ADRS  :  28
  LEVEL:  80dBuV                BEGIN :  00   END  :  99
```
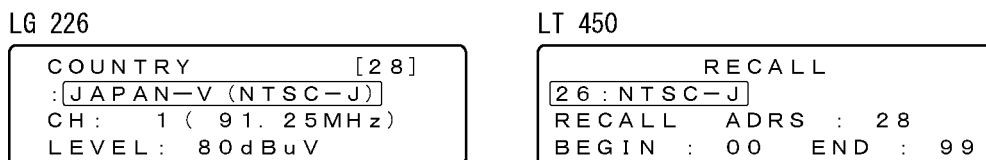
Figure 9-12   Broadcasting system settings in preset memories

9.3   Controlling the Recall Address through the Remote Connector

You can execute INC, DEC, and BEGIN preset memory commands by applying an external contact signal to the remote connector.

● **Connector Specifications**

The connector diagram and pin arrangement are given below. The connector is XM4K-1542-112 (by Omron).
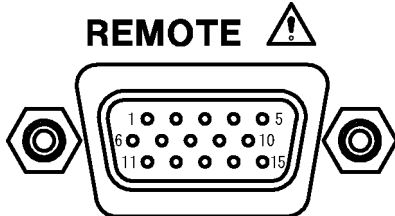
REMOTE ⚠

Figure 9-13   Remote connector

Table 9-6   Remote connector pin arrangement

Pin	Signal name	Function	Pin	Signal name	Function
1	GND	Ground	9	GND	Ground
2	EXKEY	Turns recall mode on/off	10	INC	Increments the recall address
3	DEC	Decrements the recall address	11	BEGIN	Returns the recall address to the begin address
4	RESERVE	Reserved			
5	RESERVE	Reserved	12	RESERVE	Reserved
6	RESERVE	Reserved	13	RESERVE	Reserved
7	RESERVE	Reserved	14	RESERVE	Reserved
8	RESERVE	Reserved	15	RESERVE	Reserved

● **Control Procedure**

Each function turns on when EXKEY, DEC, INC, or BEGIN is connected to ground for 100 ms or longer. The figure below shows an example of a control circuit.
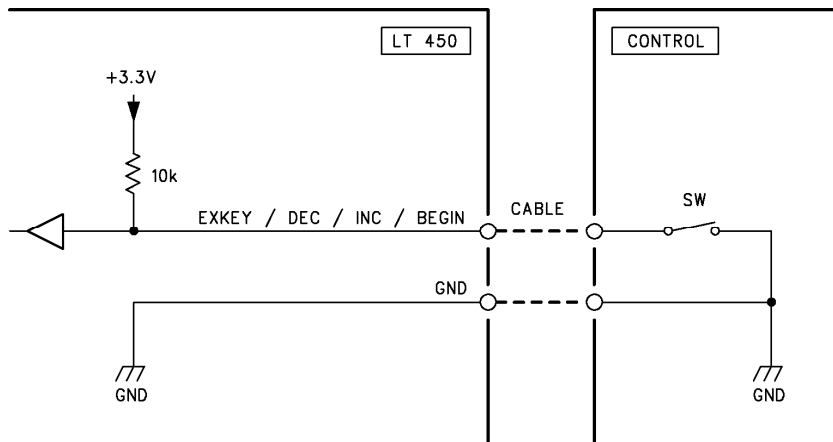
Figure 9-14   Control circuit example

To start controlling the recall address, first set EXKEY to on. The recall address can be controlled while EXKEY is on.
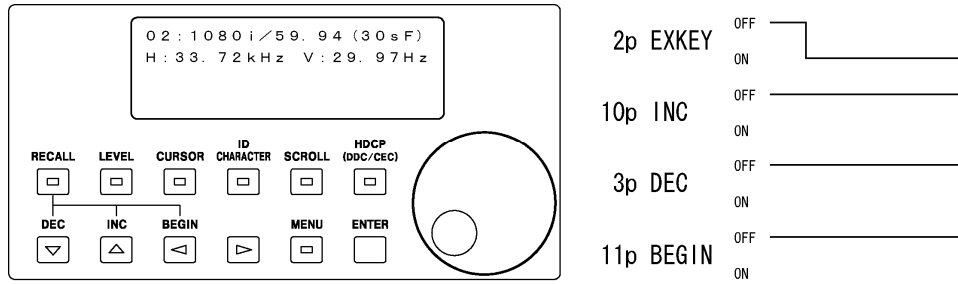
Figure 9-15　EXKEY operation to start controlling the recall address

If INC, DEC, or BEGIN is set to on while EXKEY is on, the RECALL key LED will illuminate, and the recall screen will appear. If you set INC to on, the recall address will be incremented. If you set DEC to on, the recall address will be decremented. If you set BEGIN to on, the recall address will be reset to the BEGIN address. Set INC, DEC, or BEGIN on for at least 100 ms.
(The panel settings are recalled when INC, DEC, or BEGIN is set to on. Be careful, because all the previous settings will be lost.)
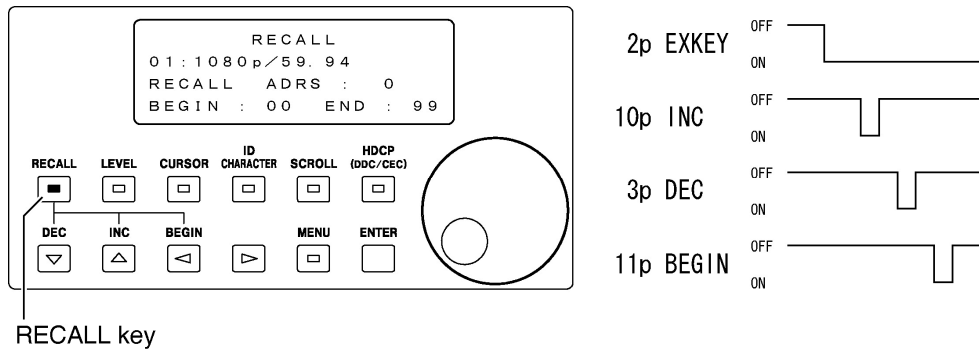
Figure 9-16　INC, DEC, and BEGIN operations

To stop controlling the recall address, first set EXKEY to off. The recall screen will remain even if EXKEY is set to off.
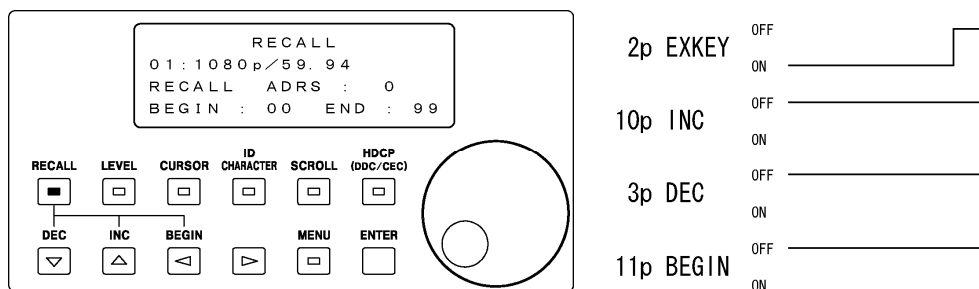
Figure 9-17　EXKEY operation to stop controlling the recall address

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9.4   Controlling the LT 450 through the Front Panel USB Port

You can transmit timing and picture data from an external device such as a PC to the LT 450 through the front panel USB port. For details, see the instruction manual for the LT 45SER04 (TIMING AND PICTURE TOOL).

9.5   Saving Preset Memories through the Rear Panel USB Port

You can connect a USB memory device to the rear panel USB port and save and recall preset memories from it.

See section 8.7, "Configuring the Preset Feature."

10. OPTIONS

10.1 Installing an Option

There are three slots on the LT 450 rear panel for installing options.
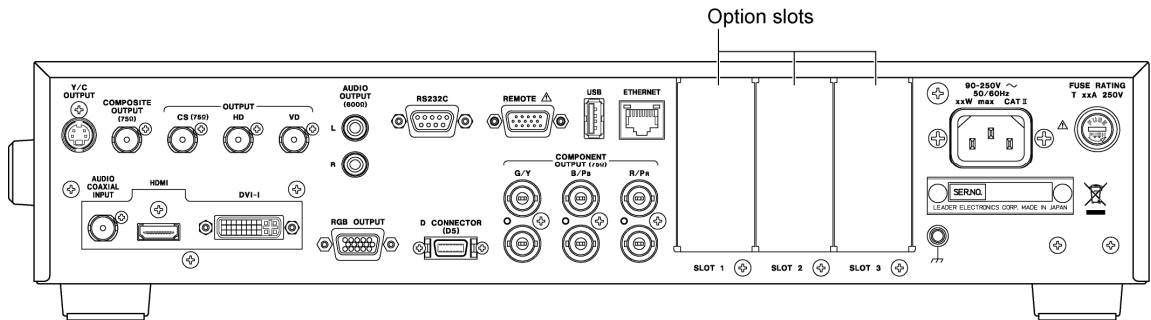
Option slots

Figure 10-1   Option slots

The following options are available. An option can be installed to any slot.

Table 10-1   Options

Model	Name	Number of connectors
LT 45SER01	DVI-I unit	1
LT 45SER02	HDMI unit	2
LT 45SER03	SCART unit	1

CAUTION

Follow the procedure described below when installing an option. It is the responsibility of the user to ensure safe installation. Damages caused by the user's inappropriate handling of the product will not be covered by the warranty.

- Unplug the power cord from the outlet.
- Do not install an option in an electrically charged environment.
- Wear an antistatic wrist band and gloves.
- Avoid touching internal circuitry.

As an example, the procedure to install the LT 45SER01 (DVI-I unit) to slot 1 will be explained below. (You can install other options in the same manner.)

1   Obtain the necessary tools.

The following tools are necessary to install an option.

- ・   Screwdriver for hexalobular socket screws (T10)
- ・   Gloves
- ・   Antistatic wrist band

2   Turn the front panel power switch off, and unplug the power cord from the outlet.

3   Remove the top cover and the cover plate.

Unfasten the 16 screws, and remove the top cover and the slot 1 cover plate.
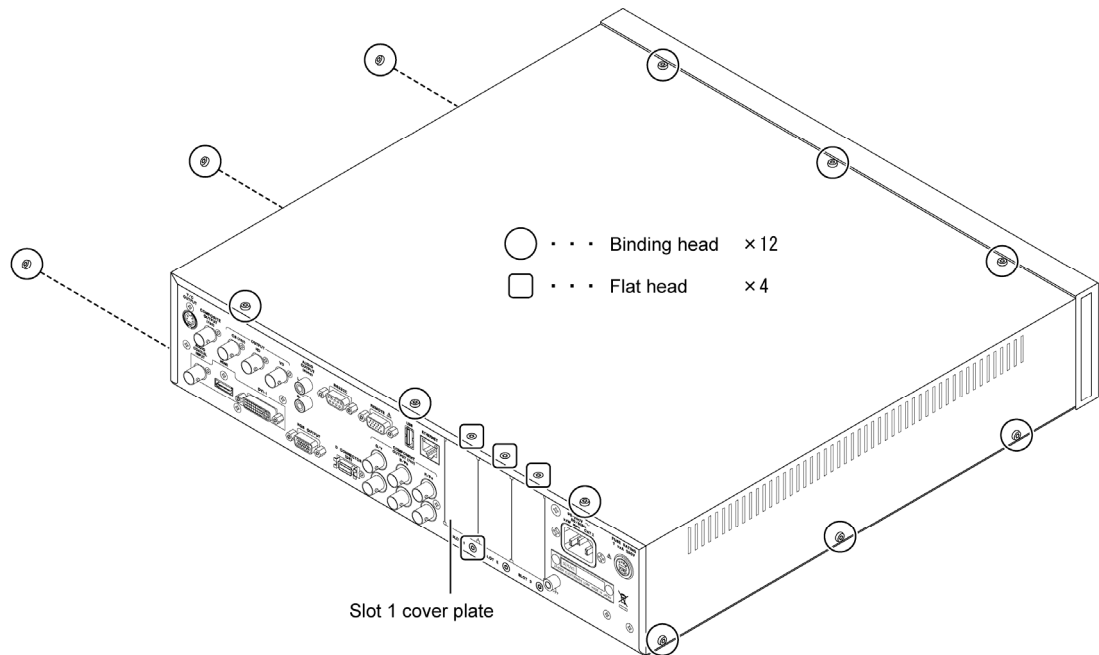
Figure 10-2   Removing the top cover

If there is another option installed in slot 1, remove it.

As shown below, pull up on the option's red ejector, and slowly pull the option upward.
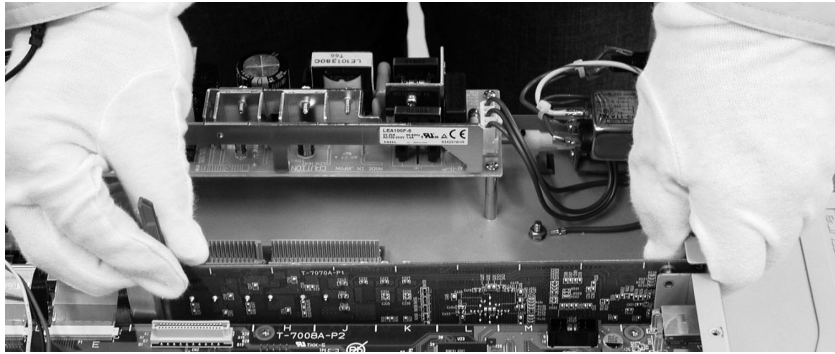
Figure 10-3   Removing an option

4   Attach the option.

Align the option with the guides, and insert the option's circuit board connector into the connector on the LT 450. Check that the option is aligned properly before firmly inserting it into the connector.
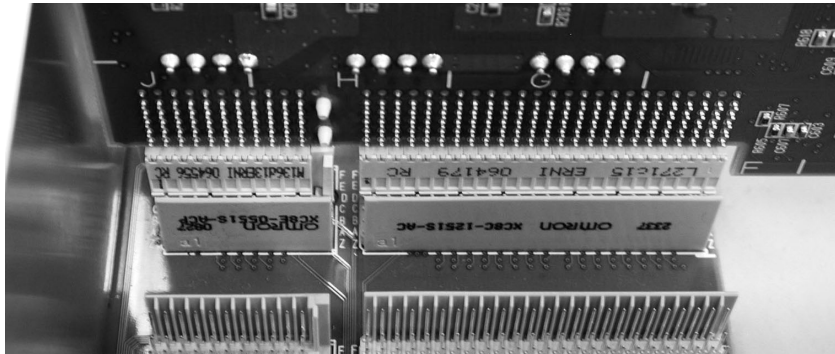
Figure 10-4   Option alignment
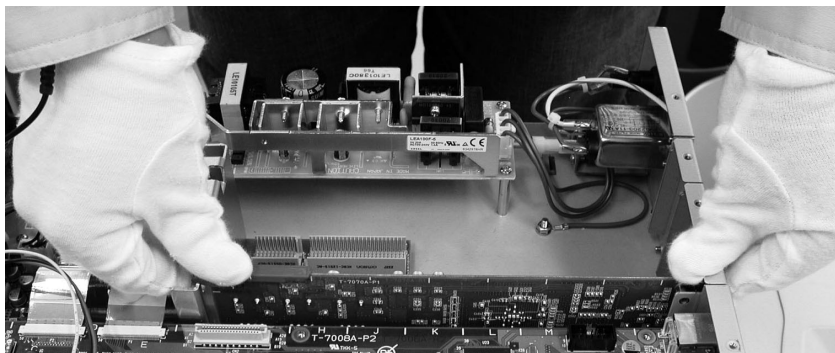
Figure 10-5   Option installation

5   Attach the top cover.

Refer to Figure 10-2 to fasten the 16 screws.

11. CALIBRATION AND REPAIRS

The performance of the instrument was tested under the strictest quality control specifications before it was shipped from the factory. However, due to aging of parts and other factors, the instrument's performance may change over time. We recommend periodic calibration so that the instrument's performance is maintained. If the instrument is not operating properly, a repair may be necessary. For information about calibration and repairs, contact your local LEADER agent.

12. REFERENCE

12.1 Output Signals

Table 12-1 List of output formats

No.	Format	Aspect ratio[1]	Horizontal Frequency [kHz]	Frame Frequency [Hz]	Standards[2]	Samples in an Active line	Active lines in a frame	Frame rate [Hz]	Scanning	Interface sampling frequency [MHz]	Samples in all lines [S/TL]	All lines in a frame
Component (HDTV)												
01	1080p/59.94	16:9	67.43	59.94	274M,861	1920	1080	60/1.001	Prog	148.5/1.001	2200	1125
02	1080i/59.94 (30sF)	16:9	33.72	29.97	274M,861	1920	1080	30/1.001	Int	74.25/1.001	2200	1125
					PR211	1920	1080	30/1.001	Prog(sF)	74.25/1.001	2200	1125
03	1080p/29.97	16:9	33.72	29.97	274M,861	1920	1080	30/1.001	Prog	74.25/1.001	2200	1125
04	1080p/23.98	16:9	26.97	23.98	274M,861	1920	1080	24/1.001	Prog	74.25/1.001	2750	1125
05	1080PsF/23.98	16:9	26.97	23.98	RP211	1920	1080	24/1.001	Prog(sF)	74.25/1.001	2750	1125
06	1080p/50	16:9	56.25	50.00	274M,861	1920	1080	50	Prog	148.5	2640	1125
07	1080p/25	16:9	28.13	25.00	274M,861	1920	1080	25	Prog	74.25	2640	1125
08	1080i/50 (25sF)	16:9	28.13	25.00	274M,861	1920	1080	25	Int	74.25	2640	1125
					RP211	1920	1080	25	Prog(sF)	74.25	2640	1125
09	1080p/50 (1250T)	16:9	62.50	50.00	295M	1920	1080	50	Prog	148.5	2376	1250
10	1080i/50 (1250T)	16:9	31.25	25.00	295M	1920	1080	25	Int	74.25	2376	1250
11	720p/59.94	16:9	44.96	59.94	296M,861	1280	720	60/1.001	Prog	74.25/1.001	1650	750
12	720p/29.97	16:9	22.48	29.97	296M	1280	720	30/1.001	Prog	74.25/1.001	3300	750
13	720p/23.98	16:9	17.98	23.98	296M	1280	720	24/1.001	Prog	74.25/1.001	4125	750
14	720p/50	16:9	37.50	50.00	296M,861	1280	720	50	Prog	74.25	1980	750
15	720p/25	16:9	18.75	25.00	296M	1280	720	25	Prog	74.25	3960	750
Component (SDTV)												
16	480p/59.94	S	31.47	59.94	861	720	480[3]	60/1.001	Prog	27.0	858	525
17	480i/59.94	4:3/L/S	15.73	29.97	601,861[5]	720	480[4]	30/1.001	Int	13.5	858	525
18	576p/50	S	31.25	50.00	1358,861	720	576	50	Prog	27.0	864	625
19	576i/50	4:3/L/S	15.63	25.00	601,861[5]	720	576	25	Int	13.5	864	625
Component (PC monitor)												
20	VGA (640×480)	4:3	31.47	59.94	MTS,861	640	480	59.940	Prog	25.175	800	525
21	SVGA (800×600)	4:3	37.88	60.32	MTS	800	600	60.317	Prog	40.000	1056	628
22	XGA (1024×768)	4:3	48.36	60.00	MTS	1024	768	60.004	Prog	65.000	1344	806
23	SXGA (1280×1024)	5:4	63.98	60.02	MTS	1280	1024	60.020	Prog	108.000	1688	1066
24	UXGA (1600×1200)	4:3	75.00	60.00	MTS	1600	1200	60.000	Prog	162.000	2160	1250
Composite												
25	NTSC-M	4:3/L/S	15.73	29.97	170M	720	480[4]	30/1.001	Int	13.5	858	525
26	NTSC-J	4:3/L/S	15.73	29.97	170M	720	480[4]	30/1.001	Int	13.5	858	525
27	NTSC 4.43	4:3/L/S	15.73	29.97	-	720	480[4]	30/1.001	Int	13.5	858	525
28	PAL	4:3/L/S	15.63	25.00	470	720	576	25	Int	13.5	864	625
29	PAL-M	4:3/L/S	15.73	29.97	470	720	480[4]	30/1.001	Int	13.5	858	525
30	PAL-N	4:3/L/S	15.63	25.00	470	720	576	25	Int	13.5	864	625
31	PAL-60	4:3/L/S	15.73	29.97	-	720	480[4]	30/1.001	Int	13.5	858	525
32	SECAM[6]	4:3/L/S	15.63	25.00	470	720	576	25	Int	13.5	864	625
Component (PC monitor)												
33	0.38M9 800×480	15:9	29.74	59.48	CVT	800	480	60	Prog	29.500	992	500
34	0.98M9 1280×768	15:9	47.78	59.87	CVT	1280	768	60	Prog	79.500	1664	798
35	1.02MA 1280×800	16:10	49.70	59.81	CVT	1280	800	60	Prog	83.500	1680	831
36	1.04M9 1360×768	16:9	47.72	59.80	CVT	1360	768	60	Prog	84.750	1776	798
37	1.30MA 1440×900	16:10	55.94	59.89	CVT	1440	900	60	Prog	106.500	1904	934
38	1.47M3 1400×1050	4:3	65.32	59.98	CVT	1400	1050	60	Prog	121.750	1864	1089
39	1.76MA 1680×1050	16:10	65.29	59.95	CVT	1680	1050	60	Prog	146.250	2240	1089

*1 L: Letterbox   S: Squeeze

*2 274M:SMPTE 274M   295M:SMPTE 295M   296M:SMPTE 296M
    170M:SMPTE 170M   RP211:SMPTE RP 211   601:ITU-R BT.601
    470:ITU-R BT.470   1358:ITU-R BT.1358   861:CEA-861-D
    MTS:VESA Monitor Timing Specifications   CVT:VESA CVT

*3 The analog output when INVERSION is set to INVERT is 483 lines.

*4 The analog output when INVERSION is set to INVERT is 486 lines.

*5 The interface sampling frequency for 861 (CEA-861-D) is doubled.

*6 The SECAM field color ID signal is not supported.
    Time and frequency values are typical values.

Table 12-2   List of output patterns

NO.	Format	Aspect ratio	Color bar				Ramp		10/15/32 step	Convergence	Crosshatch	Multiburst	Character	1/2, 1/10 window	Monoscope	Natural picture (option)	OTHERS			
			Full field*1	Multiformat*2	SMPTE*2	Raster*3	Ramp	Deep Color ramp									Demodulation	ANSI grayscale	Checker	xvYCC
Component (HDTV)																				
01	1080p/59.94	16:9	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes
02	1080i/59.94(30sF)	16:9	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes
03	1080p/29.97	16:9	Yes	Yes	No	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	No
04	1080p/23.98	16:9	Yes	Yes	No	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	No
05	1080PsF/23.98	16:9	Yes	Yes	No	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	No
06	1080p/50	16:9	Yes	Yes	No	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	No
07	1080p/25	16:9	Yes	Yes	No	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	No
08	1080i/50(25sF)	16:9	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes
09	1080p/50(1250T)	16:9	Yes	Yes	No	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	No
10	1080i/50(1250T)	16:9	Yes	Yes	No	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	No
11	720p/59.94	16:9	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes	Yes
12	720p/29.97	16:9	Yes	Yes	No	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes	No
13	720p/23.98	16:9	Yes	Yes	No	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes	No
14	720p/50	16:9	Yes	Yes	No	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes	Yes
15	720p/25	16:9	Yes	Yes	No	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes	No
Component (SDTV)																				
16	480p/59.94	S	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	No
17	480i/59.94	4:3	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		No	No	Yes	No
		S	No	No	No	No	No	No	No	Yes	No	No	No	No	No	Yes	No	No	No	No
		L	Yes	No	No	Yes	No	No	No	Yes	No	No	No	No	No		No	No	No	No
18	576p/50	S	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	No
19	576i/50	4:3	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		No	No	Yes	No
		S	No	No	No	No	No	No	No	Yes	No	No	No	No	No	Yes	No	No	No	No
		L	Yes	No	No	Yes	No	No	No	Yes	No	No	No	No	No		No	No	No	No
Component (PC monitor)																				
20	VGA(640×480)	4:3	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	NA	Yes	Yes	NA	Yes	No	Yes	Yes	No
21	SVGA(800×600)	4:3	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	NA	Yes	Yes	NA	Yes	No	Yes	Yes	No
22	XGA(1024×768)	4:3	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	NA	Yes	Yes	NA	Yes	No	Yes	Yes	No
23	SXGA(1280×1024)	5:4	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	NA	Yes	Yes	NA	Yes	No	Yes	Yes	No
24	UXGA(1600×1200)	4:3	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	NA	Yes	Yes	NA	Yes	No	Yes	Yes	No

NO.	Format	Aspect ratio	Color bar: Full field*1	Multiformat*2	SMPTE*2	Raster*3	Ramp	Deep Color ramp	10/15/32 step	Convergence	Crosshatch	Multiburst	Character	1/2, 1/10 window	Monoscope	Natural picture (option)	OTHERS: Demodulation	ANSI grayscale	Checker	xvYCC
Composite																				
25	NTSC-M	4:3	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes		No	No	Yes	No
		S	No	No	No	No	No	No	No	Yes	No	No	No	No	No	Yes	No	No	No	No
		L	Yes	No	No	Yes	No	No	No	Yes	No	No	No	No	No		No	No	No	No
26	NTSC-J	4:3	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes		No	No	Yes	No
		S	No	No	No	No	No	No	No	Yes	No	No	No	No	No	Yes	No	No	No	No
		L	Yes	No	No	Yes	No	No	No	Yes	No	No	No	No	No		No	No	No	No
27	NTSC 4.43	4:3	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes		No	No	Yes	No
		S	No	No	No	No	No	No	No	Yes	No	No	No	No	No	Yes	No	No	No	No
		L	Yes	No	No	Yes	No	No	No	Yes	No	No	No	No	No		No	No	No	No
28	PAL	4:3	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	No	Yes	No
		S	No	No	No	No	No	No	No	Yes	No	No	No	No	No	Yes	No	No	No	No
		L	Yes	No	No	Yes	No	No	No	Yes	No	No	No	No	No		No	No	No	No
29	PAL-M	4:3	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	No	Yes	No
		S	No	No	No	No	No	No	No	Yes	No	No	No	No	No	Yes	No	No	No	No
		L	Yes	No	No	Yes	No	No	No	Yes	No	No	No	No	No		No	No	No	No
30	PAL-N	4:3	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	No	Yes	No
		S	No	No	No	No	No	No	No	Yes	No	No	No	No	No	Yes	No	No	No	No
		L	Yes	No	No	Yes	No	No	No	Yes	No	No	No	No	No		No	No	No	No
31	PAL-60	4:3	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	No	Yes	No
		S	No	No	No	No	No	No	No	Yes	No	No	No	No	No	Yes	No	No	No	No
		L	Yes	No	No	Yes	No	No	No	Yes	No	No	No	No	No		No	No	No	No
32	SECAM	4:3	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes		No	No	Yes	No
		S	No	No	No	No	No	No	No	Yes	No	No	No	No	No	Yes	No	No	No	No
		L	Yes	No	No	Yes	No	No	No	Yes	No	No	No	No	No		No	No	No	No
Component (PC monitor)																				
33	0.38M9 800×480	15:9	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	NA	Yes	Yes	NA	Yes	No	Yes	Yes	No
34	0.98M9 1280×768	15:9	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	NA	Yes	Yes	NA	Yes	No	Yes	Yes	No
35	1.02MA 1280×800	16:10	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	NA	Yes	Yes	NA	Yes	No	Yes	Yes	No
36	1.04M9 1360×768	16:9	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	NA	Yes	Yes	NA	Yes	No	Yes	Yes	No
37	1.30MA 1440×900	16:10	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	NA	Yes	Yes	NA	Yes	No	Yes	Yes	No
38	1.47M3 1400×1050	4:3	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	NA	Yes	Yes	NA	Yes	No	Yes	Yes	No
39	1.76MA 1680×1050	16:10	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	NA	Yes	Yes	NA	Yes	No	Yes	Yes	No

*1   You can switch between SATURATION 100% (100/0/100/0) and 75% (100/0/75/0).

*2   LT 450 original specifications are used for RGB output.

*3   You can switch between SATURATION 100% and 75%. You can turn G, B, R on and off separately.

*   Yes: Transmitted. No: Not transmitted (skipped or not settable).
     NA: The LCD displays "Not available," and the LT 450 transmits black.

Table 12-3   List of output connectors

No.	Format	Component output connector	D conector	RGB output connector	DVI-I output connector (analog)	DVI-I output connector (digital)	HDMI output connector	Composite output connector	Y/C separation output connector	SCART connector (option)	HD, VD, CS output connectors
Component (HDTV)										
01	1080p/59.94	Yes	Yes	Yes	Yes	Yes	Yes				Yes
02	1080i/59.94 (30sF)	Yes	Yes	Yes	Yes	Yes	Yes				Yes
03	1080p/29.97	Yes	Yes	Yes	Yes	Yes	Yes				Yes
04	1080p/23.98	Yes	Yes	Yes	Yes	Yes	Yes				Yes
05	1080PsF/23.98	Yes	Yes	Yes	Yes	Yes	Yes				Yes
06	1080p/50	Yes	Yes	Yes	Yes	Yes	Yes				Yes
07	1080p/25	Yes	Yes	Yes	Yes	Yes	Yes				Yes
08	1080i/50 (25sF)	Yes	Yes	Yes	Yes	Yes	Yes				Yes
09	1080p/50 (1250T)	Yes	Yes	Yes	Yes	Yes	Yes				Yes
10	1080i/50 (1250T)	Yes	Yes	Yes	Yes	Yes	Yes				Yes
11	720p/59.94	Yes	Yes	Yes	Yes	Yes	Yes				Yes
12	720p/29.97	Yes	Yes	Yes	Yes	Yes	Yes				Yes
13	720p/23.98	Yes	Yes	Yes	Yes	Yes	Yes				Yes
14	720p/50	Yes	Yes	Yes	Yes	Yes	Yes				Yes
15	720p/25	Yes	Yes	Yes	Yes	Yes	Yes				Yes
Component (SDTV)										
16	480p/59.94	Yes	Yes	Yes	Yes	Yes	Yes				Yes
17	480i/59.94	Yes	Yes	Yes	Yes	Yes	Yes				Yes
18	576p/50	Yes	Yes	Yes	Yes	Yes	Yes				Yes
19	576i/50	Yes	Yes	Yes	Yes	Yes	Yes				Yes
Component (PC monitor)										
20	VGA(640×480)	Yes	Yes	Yes	Yes	Yes	Yes				Yes
21	SVGA(800×600)	Yes	Yes	Yes	Yes	Yes	Yes				Yes
22	XGA(1024×768)	Yes	Yes	Yes	Yes	Yes	Yes				Yes
23	SXGA(1280×1024)	Yes	Yes	Yes	Yes	Yes	Yes				Yes
24	UXGA(1600×1200)	Yes	Yes	Yes	Yes	Yes	Yes				Yes
Composite										
25	NTSC-M							Yes	Yes	Yes	Yes
26	NTSC-J							Yes	Yes	Yes	Yes
27	NTSC 4.43							Yes	Yes	Yes	Yes
28	PAL							Yes	Yes	Yes	Yes
29	PAL-M							Yes	Yes	Yes	Yes
30	PAL-N							Yes	Yes	Yes	Yes
31	PAL-60							Yes	Yes	Yes	Yes
32	SECAM							Yes	Yes	Yes	Yes
Component (PC monitor)										
33	0.38M9 800×480	Yes	Yes	Yes	Yes	Yes	Yes				Yes
34	0.98M9 1280×768	Yes	Yes	Yes	Yes	Yes	Yes				Yes
35	1.02MA 1280×800	Yes	Yes	Yes	Yes	Yes	Yes				Yes
36	1.04M9 1360×768	Yes	Yes	Yes	Yes	Yes	Yes				Yes
37	1.30MA 1440×900	Yes	Yes	Yes	Yes	Yes	Yes				Yes
38	1.47M3 1400×1050	Yes	Yes	Yes	Yes	Yes	Yes				Yes
39	1.76MA 1680×1050	Yes	Yes	Yes	Yes	Yes	Yes				Yes

12.2　Menu Tree

Figure 12-1 shows an example of the menu tree when the LT 45SER01 (DVI-I unit) is installed in slot 1, the LT 45SER02 (HDMI unit) is installed in slot 2, and the LT 45SER03 (SCART unit) is installed in slot 3.

Underlined items indicate factory default settings when the output format is set to No.02, the output pattern is set to COLOR BAR, and COMPONENT is set to YPBPR.

```
MENU ── CURSOR ──────── CUR LEVEL ─────── CUR Y LEV       ( 0 – 100 )

                                        ── CUR PB LEV      ( –50 – 0 – 50 )

                                        ── CUR PR LEV      ( –50 – 0 – 50 )

                                        ── CUR G LEV       ( 0 – 100 )

                                        ── CUR B LEV       ( 0 – 100 )

                                        ── CUR R LEV       ( 0 – 100 )

                                        ── UP MENU

                          ── CUR LINE WIDTH ── X LINE      ( 1 – 32 )

                                        ── Y LINE          ( 1 – 32 )

                                        ── UP MENU

                          ── UP MENU

          ── ID CHARACTER ── ID MODE       ( NORMAL / HDMI_INFO )

                          ── ID FONT ─────── ID FONT      ( 16×32 / 32×64 / 64×128 )

                                        ── ID CHAR         ( 1 – 12 – 20 )

                                        ── UP MENU

                          ── ID POSITION ─── ID X START   ( 0 – 50 – 1919 )

                                        ── ID Y START      ( 0 – 50 – 1079 )

                                        ── UP MENU

                          ── ID CHAR SELECT ── ID CHAR SELECT   ( LEADER_LT450 )

                          ── ID LEVEL ────── ID Y  LEV     ( 0 – 100 )

                                        ── ID PB LEV       ( –50 – 0 – 50 )

                                        ── ID PR LEV       ( –50 – 0 – 50 )

                                        ── ID G  LEV       ( 0 – 100 )

                                        ── ID B  LEV       ( 0 – 100 )

                                        ── ID R  LEV       ( 0 – 100 )

                                        ── UP MENU

                          ── ID SCROLL ───── CYCLE         ( 0 – 4 )

                                        ── UP MENU

                          ── ID BLINK ────── BLINK TIME    ( 0 – 4 )

                                        ── UP MENU

                          ── UP MENU

          ── SCROLL ─────── DIRECTION H     ( LEFT / RIGHT )

                          ── DIRECTION V     ( UP / DOWN )

                          ── SPEED H         ( 0 – 4 – 256 )

                          ── SPEED V         ( 0 – 2 – 256 )

                          ── UP MENU
```

```
├─ LEVEL          ─┬─ COMPONENT LEVEL ─┬─ Y_LEVEL      ( 0 - 100 )
│                  │                   ├─ PB_LEVEL     ( 0 - 100 )
│                  │                   ├─ PR_LEVEL     ( 0 - 100 )
│                  │                   ├─ G_LEVEL      ( 0 - 100 )
│                  │                   ├─ B_LEVEL      ( 0 - 100 )
│                  │                   ├─ R_LEVEL      ( 0 - 100 )
│                  │                   ├─ SYNC_LEVEL   ( 0 - 100 )
│                  │                   └─ UP MENU
│                  │
│                  ├─ COMPOSITE LEVEL ─┬─ Y_LEVEL      ( 0 - 100 )
│                  │                   ├─ C_LEVEL      ( 0 - 100 )
│                  │                   ├─ SYNC_LEVEL   ( 0 - 100 )
│                  │                   ├─ BURST_LEVEL  ( 0 - 100 )
│                  │                   ├─ SETUP_LEVEL  ( 0.00 - 7.50 - 10.00 )
│                  │                   └─ UP MENU
│                  │
│                  └─ UP MENU
│
├─ RECALL         ─┬─ BEGIN           ( 0 - 99 )
│                  ├─ END             ( 0 - 99 )
│                  └─ UP MENU
│
├─ PRESET SETTING ─┬─ PRESET ADDRESS ─┬─ ADDRESS          ( 0 - 99 )
│                  │                  │
│                  │                  ├─ PRESET TO LT450 ─┬─ OK ───── RESULT ( COMPLETE )
│                  │                  │                   │          └─ RETURN
│                  │                  │                   └─ CANCEL
│                  │                  │
│                  │                  ├─ ALL COPY INT→USB ─┬─ OK ───── RESULT ( COMPLETE / USB MOUNT FAILED /
│                  │                  │                    │                    FILE NOT FOUND / SAVE ERR (xx/yyy) )
│                  │                  │                    │          └─ RETURN
│                  │                  │                    └─ CANCEL
│                  │                  │
│                  │                  ├─ ALL COPY USB→INT ─┬─ OK ───── RESULT ( COMPLETE / USB MOUNT FAILED /
│                  │                  │                    │                    FILE NOT FOUND / LOAD ERR (xx/yyy) )
│                  │                  │                    │          └─ RETURN
│                  │                  │                    └─ CANCEL
│                  │                  │
│                  │                  └─ UP MENU
│                  │
│                  ├─ START UP MEMORY ─┬─ STORE TO LT450 ─┬─ OK ───── RESULT ( COMPLETE )
│                  │                   │                  │          └─ RETURN
│                  │                   │                  └─ CANCEL
│                  │                   │
│                  │                   ├─ COPY INT→USB ───┬─ OK ───── RESULT ( COMPLETE / USB MOUNT FAILED /
│                  │                   │                  │                    FILE NOT FOUND / SAVE ERR (00/001) )
│                  │                   │                  │          └─ RETURN
│                  │                   │                  └─ CANCEL
│                  │                   │
│                  │                   ├─ COPY USB→INT ───┬─ OK ───── RESULT ( COMPLETE / USB MOUNT FAILED /
│                  │                   │                  │                    FILE NOT FOUND )
│                  │                   │                  │          └─ RETURN
│                  │                   │                  └─ CANCEL
│                  │                   │
│                  │                   └─ UP MENU
│                  │
│                  └─ UP MENU
```

```
─ HDMI ─────── HDMI OUTPUT ─────── HDMI OUTPUT      ( ENA / DIS )
        │                    │
        │                    ├── HOT PLUG        ( OFF / ON )
        │                    │
        │                    ├── HDCP            ( ON / OFF / PANEL )
        │                    │
        │                    ├── CEC             ( ON / OFF / PANEL )
        │                    │
        │                    ├── DDC             ( ON / OFF / PANEL )
        │                    │
        │                    ├── FORMAT          ( 4:4:4 / 4:2:2 )
        │                    │
        │                    ├── AUDIO INPUT     ( INT / EXT )
        │                    │
        │                    ├── AUDIO SAMPLE    ( 32K / 44.1K / 48K )
        │                    │
        │                    ├── BIT WIDTH       ( 8 / 10 / 12 )
        │                    │
        │                    └── UP MENU
        │
        ├─── HDMI INFORMATION ─── HOT PLUG       ( IN / OUT / DIS )
        │                    │
        │                    ├── HDCP            ( OK / NG / DISABLE )
        │                    │
        │                    ├── CEC             ( OK / NG / DISABLE )
        │                    │
        │                    ├── EDID BASIC
        │                    │
        │                    ├── EDID EXTEND
        │                    │
        │                    └── UP MENU
        │
        └─── UP MENU

─ DVI-I ────── DVI-I OUTPUT ────── DVI OUTPUT      ( ENA / DIS )
        │                    │
        │                    ├── HOT PLUG        ( OFF / ON )
        │                    │
        │                    ├── HDCP            ( ON / OFF / PANEL )
        │                    │
        │                    ├── DDC             ( ON / OFF / PANEL )
        │                    │
        │                    └── UP MENU
        │
        ├─── DVI-I INFORMATION ── HOT PLUG       ( IN / OUT / DIS )
        │                    │
        │                    ├── HDCP            ( OK / NG / DISABLE )
        │                    │
        │                    ├── EDID BASIC
        │                    │
        │                    ├── EDID EXTEND
        │                    │
        │                    └── UP MENU
        │
        └─── UP MENU

─ SLOT1 [ DVI-I ] ── DVI-I OUTPUT ── DVI OUTPUT    ( ENA / DIS )
        │                    │
        │                    ├── HOT PLUG        ( OFF / ON )
        │                    │
        │                    ├── HDCP            ( ON / OFF / PANEL )
        │                    │
        │                    ├── DDC             ( ON / OFF / PANEL )
        │                    │
        │                    └── UP MENU
        │
        ├─── INFORMATION ─────── HOT PLUG       ( IN / OUT / DIS )
        │                    │
        │                    ├── HDCP            ( OK / NG / DISABLE )
        │                    │
        │                    ├── EDID BASIC
        │                    │
        │                    ├── EDID EXTEND
        │                    │
        │                    └── UP MENU
        │
        └─── UP MENU
```

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```
— SLOT2 [ HDMI ] — HDMI OUTPUT — HDMI OUTPUT      ( ENA / DIS )
                                — A HOT PLUG      ( OFF / ON )
                                — A HDCP          ( ON / OFF / PANEL )
                                — A CEC           ( ON / OFF / PANEL )
                                — A DDC           ( ON / OFF / PANEL )
                                — B HOT PLUG      ( OFF / ON )
                                — B HDCP          ( ON / OFF / PANEL )
                                — B CEC           ( ON / OFF / PANEL )
                                — B DDC           ( ON / OFF / PANEL )
                                — UP MENU
                  — HDMI INFORMATION — A HOT PLUG     ( IN / OUT / DIS )
                                     — A HDCP        ( OK / NG / DISABLE )
                                     — A CEC         ( OK / NG / DISABLE )
                                     — A EDID BASIC
                                     — A EDID EXTEND
                                     — B HOT PLUG    ( IN / OUT / DIS )
                                     — B HDCP        ( OK / NG / DISABLE )
                                     — B CEC         ( OK / NG / DISABLE )
                                     — B EDID BASIC
                                     — B EDID EXTEND
                                     — UP MENU
                  — UP MENU
— SLOT3 [ SCART ] — MODE          ( RGB / S-VHS / COMPOSITE / VBS/RGB )
                  — VBS SYNC      ( VBS / SYNC )
                  — RGB STATUS    ( RGB / VBS )
                  — UP MENU
— PATTERN CHANGE — PATTERN CHG    ( OFF / ON )
                 — UP MENU
— CLOSED CAPTION — C.CAPTION      ( OFF / ON )
                 — UP MENU
— AUDIO — AUD OUT                 ( 0 / -5.23 )
        — UP MENU
— VIDEO CLOCK — VCLK              ( -1.000 - 0.000 - +1.000 )
              — RESET
              — UP MENU
```

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```
└ SYSTEM        ┬ ETHERNET      ┬ DHCP/IP SELECT  ── SELECT           ( DHCP / IP )

                               ├ IP ADDRESS SET  ── IP ADDRESS SET   (  0.  0.  0.  0 )

                               ├ SUBNET MASK SET ── SUBNET MASK SET  ( 255.255.255.  0 )

                               ├ GATE WAY SET    ── GATE WAY SET     (  0.  0.  0.  0 )

                               ├ MAC ADDRESS DISP

                               └ UP MENU

               ├ RS232C        ─── BAUD RATE      ( 9600 / 19200 / 38400 )

               ├ DATE & TIME   ┬ SETTING         ┬ DATE & TIME SETTING

                               │                 └ CANCEL

                               ├ DISPLAY

                               └ UP MENU

               ├ LCD           ┬ LCD BACKLIGHT   ( ON / OFF )

                               ├ LCD CONTRAST    ( -2 - 0 - 2 )

                               └ UP MENU

               ├ SETUP INITIAL ┬ SETUP INIT

                               └ UP MENU

               ├ USER SETTING  ┬ HV POLARITY     ┬ 01:1080p...        ( NEGA / POSI )

                                                 ├ 02:1080i...        ( NEGA / POSI )

                                                 ├ 03:1080p...        ( NEGA / POSI )

                                                 ├ 04:1080p...        ( NEGA / POSI )

                                                 ├ 05:1080P...        ( NEGA / POSI )

                                                 ├ 06:1080p/50        ( NEGA / POSI )

                                                 ├ 07:1080p/25        ( NEGA / POSI )

                                                 ├ 08:1080i/50        ( NEGA / POSI )

                                                 ├ 09:1080p...        ( NEGA / POSI )

                                                 ├ 10:1080i...        ( NEGA / POSI )

                                                 ├ 11:720p/...        ( NEGA / POSI )

                                                 ├ 12:720p/...        ( NEGA / POSI )

                                                 ├ 13:720p/...        ( NEGA / POSI )

                                                 ├ 14:720p/50         ( NEGA / POSI )

                                                 ├ 15:720p/25         ( NEGA / POSI )

                                                 ├ 16:480p/60         ( NEGA / POSI )

                                                 ├ 17:480i/60         ( NEGA / POSI )

                                                 ├ 18:576p/50         ( NEGA / POSI )

                                                 ├ 19:576i/50         ( NEGA / POSI )

                                                 ├ 20:VGA(6...        ( NEGA / POSI )

                                                 ├ 21:SVGA(...        ( NEGA / POSI )

                                                 ├ 22:XGA(1...        ( NEGA / POSI )

                                                 ├ 23:SXGA(...        ( NEGA / POSI )

                                                 └ 24:UXGA(...        ( NEGA / POSI )
```

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```
                                        ┌─ 25:NTSC-M        ( NEGA / POSI )
                                        ├─ 26:NTSC-J        ( NEGA / POSI )
                                        ├─ 27:NTSC ...      ( NEGA / POSI )
                                        ├─ 28:PAL          ( NEGA / POSI )
                                        ├─ 29:PAL-M        ( NEGA / POSI )
                                        ├─ 30:PAL-N        ( NEGA / POSI )
                                        ├─ 31:PAL-60       ( NEGA / POSI )
                                        ├─ 32:SECAM        ( NEGA / POSI )
                                        ├─ 33:0.38M9...    ( NEGA / POSI )
                                        ├─ 34:0.98M9...    ( NEGA / POSI )
                                        ├─ 35:1.02MA...    ( NEGA / POSI )
                                        ├─ 36:1.04M9...    ( NEGA / POSI )
                                        ├─ 37:1.30MA...    ( NEGA / POSI )
                                        ├─ 38:1.47M3...    ( NEGA / POSI )
                                        ├─ 39:1.76MA...    ( NEGA / POSI )
                                        └─ UP MENU
                      ┌─ PbPr ON/OFF ─┬─ RAMP           ( OFF / ON )
                      │               ├─ STEP           ( OFF / ON )
                      │               ├─ MULTI BURST    ( OFF / ON )
                      │               └─ UP MENU
                      └─ UP MENU
      ┌─ VERSION
      ├─ LICENSE ─┬─ OPTION ( SER04 ) ─── MEMORY FORMAT ─┬─ RESULT ( COMPLETE )
      │           │                                      └─ RETURN
      │           ├─ EDIT          ─── LICENSE EDIT   ( 0000000000 )
      │           ├─ INFORMATION   ─┬─ LICENSE CHECK  ( OK / NG )
      │           │                 ├─ 1
      │           │                 ├─ 2
      │           │                 ├─ 3
      │           │                 └─ UP MENU
      │           └─ UP MENU
      └─ UP MENU
```
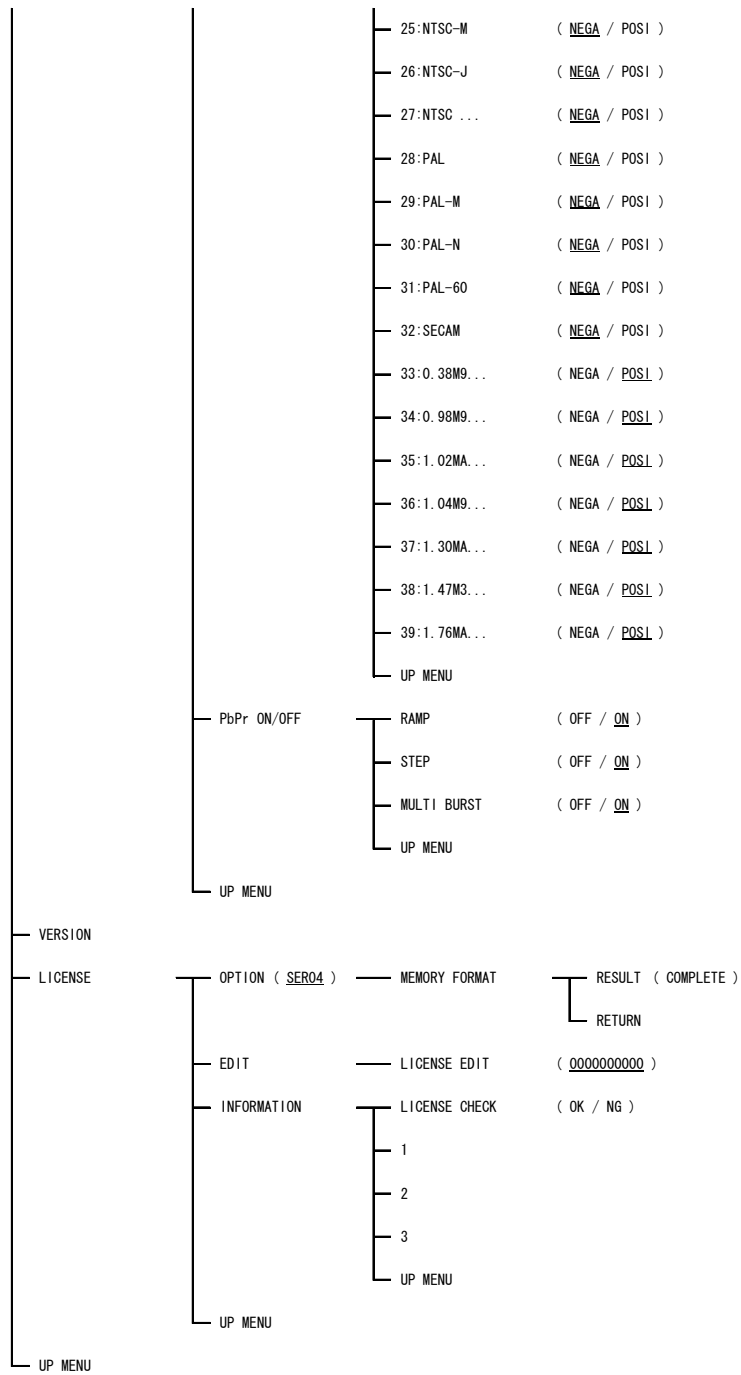
Figure 12-1　Menu tree

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12.3 List of Settings

Table 12-4 contains the list of settings when the LT 45SER01 (DVI-I unit) is installed in slot 1, the LT 45SER02 (HDMI unit) is installed in slot 2, and the LT 45SER03 (SCART unit) is installed in slot 3. The headings in the table are described below.

Factory default   Typical values when the output format is set to No.02, the output pattern is set to COLOR BAR, and COMPONENT is set to YPBPR.

Preset   Indicates whether the setting is saved when you save the panel settings according to the procedures given in section 8.7.1, "Saving the Panel Settings."

Startup   Indicates whether the setting is saved when you save the power-on panel settings according to the procedures given in section 8.7.2, "Power-on Panel Settings."

Init.   Indicates whether the setting is reset to the factory default value when you initialize the LT 450 according to the procedures given in section 8.17.5, "Initializing Settings."

Table 12-4   List of settings

● **Front panel**

Setting		Values	Factory default	Preset	Startup	Init.
Output format		01 - 39	02	Yes	Yes	Yes
Output pattern		COLOR BAR / RASTER / RAMP / STEP / CONVER-GENCE / CROSS HATCH / MULTIBURST / CHARACTER / WINDOW / MONOSCOPE / NATURAL PICTURE / OTHERS	COLOR BAR (FULL FIELD)	Yes	Yes	Yes
SATURATION		75% / 100%	75%	Yes	Yes	Yes
G		ON / OFF	ON	Yes	Yes	Yes
B		ON / OFF	ON	Yes	Yes	Yes
R		ON / OFF	ON	Yes	Yes	Yes
INVERSION		INVERT / NORMAL	NORMAL	Yes	Yes	Yes
SYNC		ON / OFF	ON	Yes	Yes	Yes
COMPONENT		RGB / YPBPR	YPBPR	Yes	Yes	Yes
ASPECT		OFF / 4:3 / SQUEEZE / LETTER BOX	OFF	Yes	Yes	Yes
AUDIO(L)		OFF / 1kHz / 400Hz	1kHz	Yes	Yes	Yes
AUDIO(R)		OFF / 1kHz / 400Hz	1kHz	Yes	Yes	Yes
RECALL		ON / OFF	OFF	No	No	Yes
RECALL	RECALL ADRS	0 - 99	0	No	Yes	*1
LEVEL		ON / OFF	OFF	No	No	Yes

*1   BEGIN address.

Setting		Values	Factory default	Preset	Startup	Init.
COMPONENT MODE	Y_LEVEL	0 - 100	100	No	No	Yes
	PB_LEVEL	0 - 100	100	No	No	Yes
	PR_LEVEL	0 - 100	100	No	No	Yes
	G_LEVEL	0 - 100	100	No	No	Yes
	B_LEVEL	0 - 100	100	No	No	Yes
	R_LEVEL	0 - 100	100	No	No	Yes
	SYNC_LEVEL	0 - 100	100	No	No	Yes
COMPOSITE MODE	Y_LEVEL	0 - 100	100	No	No	Yes
	C_LEVEL	0 - 100	100	No	No	Yes
	SYNC_LEVEL	0 - 100	100	No	No	Yes
	BURST_LEVEL	0 - 100	100	No	No	Yes
	SETUP_LEVEL	0.00 - 10.00	7.50	No	No	Yes
CURSOR		ON / OFF	OFF	No	No	Yes
CURSOR POSITION	X	0 - 1919	959	Yes	Yes	Yes
	Y	0 - 1079	539	Yes	Yes	Yes
ID CHARACTER		ON / OFF	OFF	Yes	Yes	Yes
SCROLL		ON / OFF	OFF	Yes	Yes	Yes
HDCP		ON / OFF	OFF	Yes	Yes	Yes
MENU		ON / OFF	OFF	No	No	Yes

● **Menu screen**

Setting		Values	Factory default	Preset	Startup	Init.
CURSOR LEVEL SET	CUR Y LEV	0 - 100	100	Yes	Yes	Yes
	CUR PB LEV	-50 - 50	0	Yes	Yes	Yes
	CUR PR LEV	-50 - 50	0	Yes	Yes	Yes
	CUR G LEV	0 - 100	100	Yes	Yes	Yes
	CUR B LEV	0 - 100	100	Yes	Yes	Yes
	CUR R LEV	0 - 100	100	Yes	Yes	Yes
CURSOR LINE WIDTH	X LINE	1 - 32	1	Yes	Yes	Yes
	Y LINE	1 - 32	1	Yes	Yes	Yes
ID MODE		NORMAL / HDMI_INFO	NORMAL	Yes	Yes	Yes
ID FONT SET	ID FONT	16×32 / 32×64 / 64×128	64×128	Yes	Yes	Yes
	ID CHAR	1 - 20	12	Yes	Yes	Yes
ID POSITION SET	ID X START	0 - 1919	50	Yes	Yes	Yes
	ID Y START	0 - 1079	50	Yes	Yes	Yes
ID CHAR SELECT		! ”#$%&’()*+,-./01234 56789:;<=>?@ABCD EFGHIJKLMNOPQR STUVWXYZ[¥]^_→← (20 characters)	LEADER_LT450	Yes	Yes	Yes
ID LEVEL SET	ID Y LEV	0 – 100	100	Yes	Yes	Yes
	ID PB LEV	-50 - 50	0	Yes	Yes	Yes
	ID PR LEV	-50 - 50	0	Yes	Yes	Yes
	ID G LEV	0 - 100	100	Yes	Yes	Yes
	ID B LEV	0 - 100	100	Yes	Yes	Yes
	ID R LEV	0 - 100	100	Yes	Yes	Yes
ID SCROLL SET	CYCLE	0 - 4	0	Yes	Yes	Yes
ID CHARACTER BLINK	BLINK TIME	0 - 4	0	Yes	Yes	Yes
SCROLL SET UP	DIRECTION H	LEFT / RIGHT	RIGHT	Yes	Yes	Yes
	DIRECTION V	UP / DOWN	UP	Yes	Yes	Yes
	SPEED H	0 - 256	4	Yes	Yes	Yes
	SPEED V	0 - 256	2	Yes	Yes	Yes
COMPONENT LEVEL	Y_LEVEL	0 - 100	100	Yes	Yes	Yes
	PB_LEVEL	0 - 100	100	Yes	Yes	Yes
	PR_LEVEL	0 - 100	100	Yes	Yes	Yes
	G_LEVEL	0 - 100	100	Yes	Yes	Yes
	B_LEVEL	0 - 100	100	Yes	Yes	Yes
	R_LEVEL	0 - 100	100	Yes	Yes	Yes
	SYNC_LEVEL	0 - 100	100	Yes	Yes	Yes

12. REFERENCE

Setting		Values	Factory default	Preset	Startup	Init.
COMPOSITE LEVEL	Y_LEVEL	0 - 100	100	Yes	Yes	Yes
	C_LEVEL	0 - 100	100	Yes	Yes	Yes
	SYNC_LEVEL	0 - 100	100	Yes	Yes	Yes
	BURST_LEVEL	0 - 100	100	Yes	Yes	Yes
	SETUP_LEVEL	0.00 - 10.00	7.50	Yes	Yes	Yes
RECALL SETTING	BEGIN	0 - 99	0	No	Yes	Yes
	END	0 - 99	99	No	Yes	Yes
PRESET ADDRESS	ADDRESS	0 - 99	0	No	No	No
HDMI OUTPUT SETTING	HDMI OUTPUT	ENA / DIS	ENA	Yes	Yes	Yes
	HOT PLUG	OFF / ON	ON	Yes	Yes	Yes
	HDCP	ON / OFF / PANEL	ON	Yes	Yes	Yes
	CEC	ON / OFF / PANEL	ON	Yes	Yes	Yes
	DDC	ON / OFF / PANEL	ON	Yes	Yes	Yes
	FORMAT	4:4:4 / 4:2:2	4:2:2	Yes	Yes	Yes
	AUDIO INPUT	INT / EXT	INT	Yes	Yes	Yes
	AUDIO SAMPLE	32K / 44.1K / 48K	44.1K	Yes	Yes	Yes
	BIT WIDTH	8 / 10 / 12	8	Yes	Yes	Yes
DVI-I OUTPUT SET	DVI OUTPUT	ENA / DIS	ENA	Yes	Yes	Yes
	HOT PLUG	OFF / ON	ON	Yes	Yes	Yes
	HDCP	ON / OFF / PANEL	ON	Yes	Yes	Yes
	DDC	ON / OFF / PANEL	ON	Yes	Yes	Yes
SLOT 1 DVI-I OUTPUT	DVI OUTPUT	ENA / DIS	ENA	Yes	Yes	Yes
	HOT PLUG	OFF / ON	ON	Yes	Yes	Yes
	HDCP	ON / OFF / PANEL	ON	Yes	Yes	Yes
	DDC	ON / OFF / PANEL	ON	Yes	Yes	Yes
SLOT2 HDMI OUTPUT	HDMI OUTPUT	ENA / DIS	ENA	Yes	Yes	Yes
	A HOT PLUG	OFF / ON	ON	Yes	Yes	Yes
	A HDCP	ON / OFF / PANEL	ON	Yes	Yes	Yes
	A CEC	ON / OFF / PANEL	ON	Yes	Yes	Yes
	A DDC	ON / OFF / PANEL	ON	Yes	Yes	Yes
	B HOT PLUG	OFF / ON	ON	Yes	Yes	Yes
	B HDCP	ON / OFF / PANEL	ON	Yes	Yes	Yes
	B CEC	ON / OFF / PANEL	ON	Yes	Yes	Yes
	B DDC	ON / OFF / PANEL	ON	Yes	Yes	Yes
SLOT3(SCART) SET	MODE	RGB / S-VHS / COMPOSITE / VBS/RGB	RGB	Yes	Yes	Yes
	VBS SYNC	VBS / SYNC	VBS	Yes	Yes	Yes
	RGB STATUS	RGB / VBS	RGB	Yes	Yes	Yes
PATTERN CHANGE	PATTERN CHG	OFF / ON	OFF	No	No	Yes
CLOSED CAPTION	C.CAPTION	OFF / ON	OFF	Yes	Yes	Yes
AUDIO OUTPUT	AUD OUT	0 / -5.23	-5.23	Yes	Yes	Yes
VIDEO CLOCK SETTING	VCLK	-1.000 - +1.000	0.000	Yes	Yes	Yes

Setting		Values	Factory default	Preset	Startup	Init.
ETHERNET SETTING	DHCP/IP SELECT	DHCP / IP	IP	No	No	Yes
	IP ADDRESS SET	0 - 255	0. 0. 0. 0	No	No	Yes
	SUBNET MASK SET	0 - 255	255.255.255. 0	No	No	Yes
	GATE WAY SET	0 - 255	0. 0. 0. 0	No	No	Yes
RS232C	BAUD RATE	9600 / 19200 / 38400	38400	No	No	No
DATE & TIME	SETTING	YYYY/MM/DD hh:mm	-	No	No	No
LCD SETTING	LCD BACKLIGHT	ON / OFF	ON	No	Yes	Yes
	LCD CONTRAST	-2 - 2	0	No	Yes	Yes
HV POLARITY	01:1080p...	NEGA / POSI	NEGA	No	No	No
	02:1080i...	NEGA / POSI	NEGA	No	No	No
	03:1080p...	NEGA / POSI	NEGA	No	No	No
	04:1080p...	NEGA / POSI	NEGA	No	No	No
	05:1080P...	NEGA / POSI	NEGA	No	No	No
	06:1080p/50	NEGA / POSI	NEGA	No	No	No
	07:1080p/25	NEGA / POSI	NEGA	No	No	No
	08:1080i/50	NEGA / POSI	NEGA	No	No	No
	09:1080p...	NEGA / POSI	NEGA	No	No	No
	10:1080i...	NEGA / POSI	NEGA	No	No	No
	11:720p/...	NEGA / POSI	NEGA	No	No	No
	12:720p/...	NEGA / POSI	NEGA	No	No	No
	13:720p/...	NEGA / POSI	NEGA	No	No	No
	14:720p/50	NEGA / POSI	NEGA	No	No	No
	15:720p/25	NEGA / POSI	NEGA	No	No	No
	16:480p/60	NEGA / POSI	NEGA	No	No	No
	17:480i/60	NEGA / POSI	NEGA	No	No	No
	18:576p/50	NEGA / POSI	NEGA	No	No	No
	19:576i/50	NEGA / POSI	NEGA	No	No	No
	20:VGA(6...	NEGA / POSI	NEGA	No	No	No
	21:SVGA(...	NEGA / POSI	POSI	No	No	No
	22:XGA(1...	NEGA / POSI	NEGA	No	No	No
	23:SXGA(...	NEGA / POSI	POSI	No	No	No
	24:UXGA(...	NEGA / POSI	POSI	No	No	No
	25:NTSC-M	NEGA / POSI	NEGA	No	No	No
	26:NTSC-J	NEGA / POSI	NEGA	No	No	No
	27:NTSC ...	NEGA / POSI	NEGA	No	No	No
	28:PAL	NEGA / POSI	NEGA	No	No	No
	29:PAL-M	NEGA / POSI	NEGA	No	No	No
	30:PAL-N	NEGA / POSI	NEGA	No	No	No
	31:PAL-60	NEGA / POSI	NEGA	No	No	No
	32:SECAM	NEGA / POSI	NEGA	No	No	No

Setting		Values	Factory default	Preset	Startup	Init.
HV POLARITY	33:0.38M9...	NEGA / POSI	POSI	No	No	No
	34:0.98M9...	NEGA / POSI	POSI	No	No	No
	35:1.02MA...	NEGA / POSI	POSI	No	No	No
	36:1.04M9...	NEGA / POSI	POSI	No	No	No
	37:1.30MA...	NEGA / POSI	POSI	No	No	No
	38:1.47M3...	NEGA / POSI	POSI	No	No	No
	39:1.76MA...	NEGA / POSI	POSI	No	No	No
PbPr ON/OFF	RAMP	OFF / ON	ON	No	No	No
	STEP	OFF / ON	ON	No	No	No
	MULTI BURST	OFF / ON	ON	No	No	No
LICENSE	OPTION	SER04	SER04	No	No	No
	EDIT	0000000000 - 9999999999	0000000000	No	No	No

12.4　Firmware Change History

The following numbers are LT 450 firmware version numbers.
To confirm the version, press the following: MENU → SYSTEM → VERSION.
This manual was written for version 5.0.

● **Ver. 5.0**

- Support for NTSC-M, NTSC-J, and NTSC-4.43 was added to the LT 45SER03.

● **Ver. 4.8**

- A feature for changing the clock frequency was added.

● **Ver. 4.5**

- The command @ICR (which queries the HDCP and CEC information) was added.

● **Ver. 4.4**

- The preset begin and end addresses are now saved as startup memory items.
- LT 45SER04 version 1.4 support was added (support for digital DVI outputs, etc.).

● **Ver. 4.2**

- xvYCC was added to the output patterns.

● **Ver. 4.0**

- The preset feature was modified to support USB memory.
- LT 45SER04 version 1.3 support was added (support for licenses, etc.).

● **Ver. 3.9**

- The license setting feature was added.
- Support was added for closed captioning that contains parity bits.

● **Ver. 3.8**

- LT 45SER04 version 1.2 support was added.

● **Ver. 3.7**

- A feature for switching between RS232C baud rates was added.

● **Ver. 3.6**

- Seven formats (No. 33 to 39) from the VESA CVT standard were added.
- 1080p/59.94 was added to the formats that support deep color ramp.

● **Ver. 2.44**

- The closed captioning feature was added.
- Remote commands that the LT 448 supports were added.
- The DEEP COLOR RAMP pattern was added.
- The USER SETTING feature was added.

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—U—

—V—

—W—

—Y—

所含有毒有害物质信息

部件号码：LT 450

此标志适用于在中国销售的电子信息产品, 依据2006年2月28日公布的《电子信息产品污染控制管理办法》以及SJ/T11364-2006《电子信息产品污染控制标识要求》，表示该产品在使用完结后可再利用。数字表示的是环境保护使用期限，只要遵守与本产品有关的安全和使用上的注意事项，从制造日算起在数字所表示的年限内，产品不会产生环境污染和对人体、财产的影响。
产品适当使用后报废的方法请遵从电子信息产品的回收、再利用相关法令。
详细请咨询各级政府主管部门。

产品中有毒有害物质或元素的名称及含量

部件名称 Parts	有毒有害物质或元素　Hazardous Substances in each Part					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(Ⅵ))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
实装基板	×	○	○	○	○	○
主体部	×	○	○	○	○	○
液晶显示模组	○	○	○	○	○	○
开关电源	×	○	○	○	○	○
风扇	×	○	○	○	○	○
线材料一套	○	○	○	○	○	○
外筐	○	○	○	○	○	○
附件	○	○	○	○	○	○
包装材	○	○	○	○	○	○
电池	○	○	○	○	○	○
插入单元						
45SER01	×	○	○	○	○	○
45SER02	×	○	○	○	○	○
45SER03	×	○	○	○	○	○
45SER04	×	○	○	○	○	○

备注）
○：表示该有毒有害物质在该部件所有均质材料中的含量均在SJ/T11363-2006 规定的限量要求以下。
×：表示该有毒有害物质或元素至少在该部件的某一均质材料中的含量超出SJ/T11363-2006 标准规定的限量要求。

所含有毒有害物质信息

部件号码: LT 45SER01/02/03/04

此标志适用于在中国销售的电子信息产品,依据2006年2月28日公布的《电子信息产品污染控制管理办法》以及SJ/T11364-2006《电子信息产品污染控制标识要求》,表示该产品在使用完结后可再利用。数字表示的是环境保护使用期限,只要遵守与本产品有关的安全和使用上的注意事项,从制造日算起在数字所表示的年限内,产品不会产生环境污染和对人体、财产的影响。
产品适当使用后报废的方法请遵从电子信息产品的回收、再利用相关法令。
详细请咨询各级政府主管部门。

产品中有毒有害物质或元素的名称及含量

部件名称 Parts	有毒有害物质或元素　Hazardous Substances in each Part					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
实装基板	×	○	○	○	○	○
主体部	×	○	○	○	○	○
附件	○	○	○	○	○	○
包装材	○	○	○	○	○	○

备注)
○：表示该有毒有害物质在该部件所有均质材料中的含量均在SJ/T11363-2006 规定的限量要求以下。
×：表示该有毒有害物质或元素至少在该部件的某一均质材料中的含量超出SJ/T11363-2006
标准规定的限量要求。

Ver.3

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