LEADER

LV 58SER07

EYE PATTERN

INSTRUCTION MANUAL

LEADER
ELECTRONIC MEASURING INSTRUMENTS

TABLE OF CONTENTS

1. INTRODUCTION

Thank you for purchasing this LEADER instrument. To use this instrument safely, read this instruction manual thoroughly, and make sure that you know how to use the instrument properly.

If some point about the operation of this instrument is still unclear after you have read this instruction manual, refer to the contact information on the back cover of the manual to contact LEADER, or contact your local LEADER agent.
After you have finished reading this manual, keep it in a convenient place so that you can refer to it when necessary.

1.1 Scope of Warranty

This LEADER instrument has been manufactured under the strictest quality control guidelines.

LEADER shall not be obligated to furnish the following free services during the warranty period.

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 Input Connectors

The maximum signal voltage that can be received through the input connectors is indicated below. Do not apply excessive voltage to the connectors. Doing so may damage the instrument or lead to injury.

Table 1-1 Maximum allowable input voltage

Input Connector	Maximum Allowable Input Voltage
INPUT	±2 V (DC + peak AC)

1.2.2 Output Connectors

The output connectors are designed to be connected to the LV 58SER06 input connectors. Connecting the output connectors to a different instrument or shorting them may damage the unit or the instrument that is connected to the unit.

1.2.3 Warming Up

To ensure more accurate measurements, turn on the instrument approximately 30 minutes before you intend to use it to allow its internal temperature to stabilize.

1.2.4 Included Cables

The included cables are designed to connect this unit to an LV 58SER06. Do not use them for any other purpose.

1.3 Notations Used in This Manual

The key and other operations explained in this manual apply to the LV 5800, but you can also perform similar operations on the LV 7800.

In this manual, abbreviations are used for procedures as shown below.
Colons are followed by a list of options or a range of settings. The default setting is underlined.

Procedure

EYE → F･2 MODE: EYE / JITTER

2. SPECIFICATIONS

2.1 General

Installing this unit in an LV 5800 or LV 7800 and using it together with an LV 58SER06 enables the measurement and observation of the eye pattern and jitter of SDI signals. It enables the measurement and observation of the physical characteristics of not only 3G-SDI signals but also HD-SDI and SD-SDI signals.

2.2 Features

- **Support for 3G-SDI, HD-SDI, and SD-SDI Signals**

  Combining this unit with an LV 58SER06 enables the LV 5800 or the LV 7800 to display eye patterns and jitter and perform automatic measurements for not only 3G-SDI signals (level A and B), but also for HD-SDI and SD-SDI signals.

- **Two Switchable SDI Inputs**

  The signal that is displayed on the screen can be switched from the front panel between the two input connectors, which support 3G-SDI, HD-SDI, and SD-SDI signals.

- **Eye-Pattern Display**

  Measurements of 3G-SDI signals have low noise and wide bandwidth characteristics thanks to the use of a new kind of circuit. The eye-pattern displays of timing jitter and alignment jitter can be displayed through the changing of the filter.

- **Jitter Display**

  Because a phase detection method is used, accurate jitter measurements can be performed even on degraded signals for which eye patterns would not be useful. Also, V rate and H rate sweep displays synchronized to the video signal are useful for analyzing jitter that originates in digital video data.

- **Simultaneous Eye-Pattern and Jitter Display**

  The eye-pattern and jitter waveforms of the selected SDI signal can be displayed simultaneously on the multi screen display.(*1)

- **Filter Settings**

  The measurement of the timing jitter and alignment jitter of an SDI signal can be performed through the switching of filters in the eye-pattern and jitter displays.

- **Automatic Measurement**

  An eye pattern’s amplitude, rise time, fall time, timing jitter, current jitter(*2), overshoot of the rising edge, and overshoot of the falling edge can be measured automatically.

- **Error Detection**

  An eye pattern’s amplitude, rise time, fall time, time difference between rise and fall times, timing jitter, current jitter, overshoot of the rising edge, and overshoot of the falling edge can be monitored, and when errors (values passing their thresholds) are detected, they can be displayed and logged to the event log screen(*3). The threshold values can be changed.

*1 Signals applied to different input connectors cannot be displayed simultaneously.
*2 The current jitter is the jitter value when the currently selected filter is applied.
*3 The event log display is enabled when one of the display areas is set to EYE mode. Error detection cannot be performed in the background.
* The LV 58SER07 is used in combination with a single LV 58SER06. It cannot be used in combination with the LV 58SER01A or the LV 58SER04. In addition, multiple LV 58SER07s cannot be installed in the same instrument, nor can the LV 58SER07 be installed in the same instrument with the LV 58SER02.

2.3 Specifications

2.3.1 Supported Formats

Standard	
3G-SDI	SMPTE 424M
HD-SDI	SMPTE 292M
SD-SDI	SMPTE 259M
Bit rate	
3G-SDI	2.970 Gbps or 2.970/1.001 Gbps
HD-SDI	1.485 Gbps or 1.485/1.001 Gbps
SD-SDI	270Mbps

2.3.2 Input Connectors

Function	Input of SDI signals for eye-pattern and jitter display
Input Connectors	2 BNC connectors 1 channel selectable from channels A and B (When in HD dual link mode, 1 link selectable from links A and B)
Input Impedance	75 Ω
Input Return Loss	15 dB or greater (5 MHz to 1.485 GHz) 10 dB or greater (1.485 to 2.97 GHz)
Maximum Input Voltage	±2V (DC + peak AC)
Supported Signals	3G-SDI / HD-SDI / SD-SDI

2.3.3 Output Connectors

Function	Dedicated output connectors for connecting to the LV 58SER06 INPUT connectors
Output Connectors	2 BNC connectors
Output Impedance	75 Ω

2.3.4 Installation Position and Unit to Combine With

Installation Position	
LV 5800	Input slot (UNIT 1 to 4)
LV 7800	Input slot (UNIT 1) or I/O slot (UNIT 3)
Unit to Combine With	LV 58SER06

2.3.5 Eye-Pattern Display

Display	Displays the input SDI waveform before equalizing
Method	Equivalent time sampling
Frequency Response	7 GHZ -3dB (converted from the rise time)
Amplitude Accuracy	800 mV ± 5 % (for 800 mV input)
Time Axis	
2 UI Display	
3G-SDI	50 ps/div
HD-SDI	100 ps/div
SD-SDI	550 ps/div
4 UI Display	
3G-SDI	100 ps/div
HD-SDI	200 ps/div
SD-SDI	1100 ps/div
16 UI Display	
3G-SDI	400 ps/div
HD-SDI	800 ps/div
SD-SDI	4400 ps/div
Time Axis Accuracy	±3 %
Jitter Filter	
10 Hz	HPF 10 Hz
100 Hz	HPF 100 Hz
1 kHz	HPF 1 kHz
100 kHz	HPF 100 kHz
TIMING	HPF 10 Hz
ALIGNMENT	
3G-SDI, HD-SDI	HPF 100 kHz
SD-SDI	HPF 1 kHz
Cursor Measurement	Amplitude measurement using Y cursors Time measurement using X cursors Rise time and fall time measurement using the Tr and Tf cursors

2.3.6 Automatic Eye-Pattern Measurement

Automatic Measurement	On or off
Measurable Items	Eye pattern’s amplitude Rise time (the time for the signal to rise from 20 to 80 % of its amplitude) Fall time (the time for the signal to fall from 80 to 20 % of its amplitude) Timing jitter Current jitter Overshoot of the rising edge Overshoot of the falling edge

2.3.7 Jitter Display

Display	Displays the jitter component of an SDI signal
Method	Phase detection method
Gain	×8 / ×2 / ×1
Measurement Range	
×8	0.00 to 1.20 UI
×2	1.20 to 4.80 UI
×1	4.80 to 9.60 UI
Frequency Response	
SD-SDI	600 kHz or more (with 0.2 UI input)
HD-SDI	2 MHz or more (with 0.2 UI input)
3G-SDI	2 MHz or more (with 0.3 UI input)
Time Axis	1H / 2H / 1V / 2V
Time Axis Accuracy	±3 %
Jitter Filter	
10 Hz	HPF 10 Hz
100 Hz	HPF 100 Hz
1 kHz	HPF 1 kHz
100 kHz	HPF 100 kHz
TIMING	HPF 10 Hz
ALIGNMENT	
3G-SDI, HD-SDI	HPF 100 kHz
SD-SDI	HPF 1 kHz
Cursor Measurement	Jitter value measurement through the use of cursors

2.3.8 Automatic Jitter Measurement

Automatic Measurement	Displays the jitter value in seconds (sec) and unit intervals (UI)
Measurable Items	Timing jitter, current jitter
Measurement Range	0.00 to 9.60 UI (differs depending on the gain)
Accuracy	Input jitter frequency: 1 kHz. Filter setting: 10 Hz, within measurement range
0 UI < automatic measured value ≤ 1 UI	±10 % + 0.05 UI
1 UI < automatic measured value ≤ 7 UI	±10 %

2.3.9 Error Detection

Error Detection	On or off per item
Error Threshold Settings	Settable separately for 3G-SDI, HD-SDI, and SD-SDI
Event Log	Events can only be logged when eye patterns or jitter are being displayed.
Threshold Values	100 % of the values in the SMPTE standard
Eye-Pattern Amplitude	
Upper Limit	80 to 140 % (640 to 1120 mV)
Lower Limit	40 to 100 % (320 to 800 mV)
Rise Time	
3G-SDI	40 to 140 % (54.0 to 189.0 ps)
HD-SDI	40 to 140 % (108.0 to 378.0 ps)
SD-SDI	40 to 140 % (0.60 to 2.10 ns)
Fall Time	
3G-SDI	40 to 140 % (54.0 to 189.0 ps)
HD-SDI	40 to 140 % (108.0 to 378.0 ps)
SD-SDI	40 to 140 % (0.60 to 2.10 ns)
Difference between the Rise and Fall Times	
3G-SDI	40 to 140 % (20 to 70 ps)
HD-SDI	40 to 140 % (40 to 140 ps)
SD-SDI	40 to 140 % (0.20 to 0.70 ns)
Timing Jitter	
3G-SDI	10 to 200 % (0.20 to 4.00 UI, 67.4 to 1348.0 ps)
HD-SDI	10 to 200 % (0.10 to 2.00 UI, 67.4 to 1348.0 ps)
SD-SDI	10 to 200 % (0.02 to 0.40 UI, 0.07 to 1.48 ns)
Current Jitter	
3G-SDI	10 to 200 % (0.03 to 0.60 UI, 10.1 to 202.5 ps)
HD-SDI	10 to 200 % (0.02 to 0.40 UI, 13.5 to 270.0 ps)
SD-SDI	10 to 200 % (0.02 to 0.40 UI, 0.07 to 1.48 ns)
Overshoot of the rising edge	
	0 to 200 % (0.0 to 20.0 %)
Overshoot of the falling edge	
	0 to 200 % (0.0 to 20.0 %)

2.3.10 General Specifications

Environmental Conditions	Same as the LV 5800/7800
Power Consumption	23 W max. from the LV 5800/7800
Weight	0.5 kg
Accessories	Cables (designed for connecting to an LV 58SER06) 2
	Instruction manual 1
	Precautions about installing an LV 58SER07 in an LV 7800 1

3. NAMES AND FUNCTIONS OF PARTS

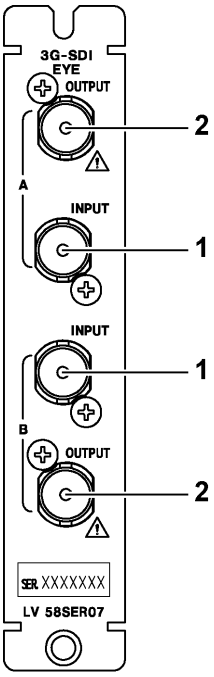


Figure 3-1 Rear panel

1 INPUT

SDI signal input connectors.
The signals that are applied to INPUT A and INPUT B cannot be displayed simultaneously. Switch between these signals to show the signal that you want to display.

2 OUTPUT

Use the included cables to connect these outputs to the input connectors on an LV 58SER06.

CAUTION

The output connectors are designed to be connected to the LV 58SER06 input connectors. Connecting the output connectors to a different instrument may damage the unit or the instrument that is connected to the unit.

4. MEASUREMENT BASICS

4.1 Unit Installation

Install this unit in an LV 5800 or LV 7800. To perform measurements, an LV 58SER06 must also be installed together with this unit.

- **Precautions**
  - You can only install one LV 58SER07 in an LV 5800 or LV 7800. You cannot install multiple LV 58SER07s.
  - You cannot install an LV 58SER07 and an LV 58SER02 in the same instrument.

- **When Installing in an LV 5800**

  This unit is an input unit. Refer to the LV 5800 instruction manual, and install the unit in a slot from 1 to 4.

- **When Installing in an LV 7800**

  Installation of units in the LV 7800 is performed as a factory option. You cannot install or uninstall units. Contact your local LEADER agent.

  The LV58SER07 can be installed in UNIT 1 or UNIT 3. If the LV 58SER07 is installed in UNIT 1, the LV 58SER06 must be installed in UNIT 2. If the LV 58SER07 is installed in UNIT 3, the LV 58SER06 must be installed in UNIT 4.

4.2 Applying the SDI Signal

- **Input Format**

  This unit supports 3G-SDI, HD-SDI (including dual-link), and SD-SDI signals. Apply signals that this unit supports to its input connectors.

- **Input Pattern**

  Use a color bar signal to measure the amplitude of an eye pattern and jitter values.

- **Cables**

  Because measured values are influenced greatly by the cable that is used, we recommend that you use a high-quality, low-loss 5C-FB or Belden 1694A cable. Before connecting the cables, check that the cable connectors are not dirty, deformed, or otherwise damaged.

  Especially if you are measuring the amplitude of eye patterns, rise time, fall time, overshoot of the rising edge, or overshoot of the falling edge of relay instruments, use one of the cables described above (1 meter in length).

  Static electricity build-up in the cables can cause damage to the input circuit. Discharge any built-up static electricity before you connect the cables.

- **Connectors**

  This unit’s input connectors are terminated internally at 75 Ω, so there is no need to connect terminators to them. Connect cables with a characteristic impedance of 75 Ω to the input connectors.

4.3 Measurement Procedure

To measure eye patterns, follow the procedure below.

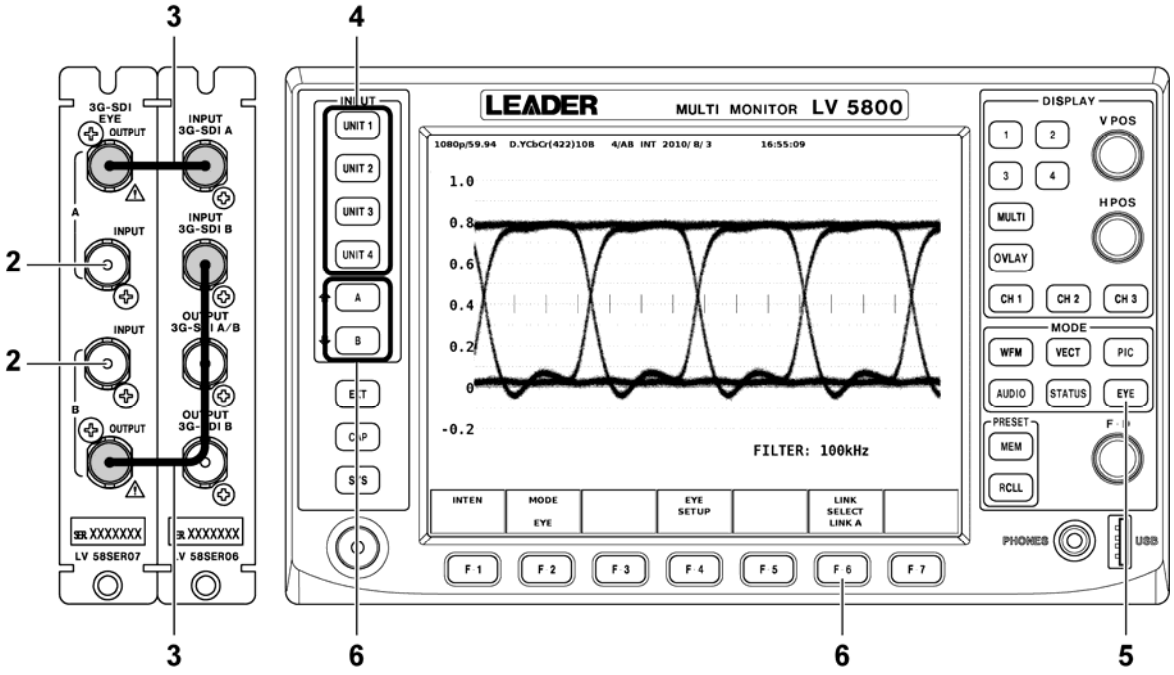


Figure 4-1 Measurement procedure

1. Set the Input Mode on the LV 58SER06's GENERAL SETUP tab.

If you want to measure a 3G-SDI signal or HD dual link signal, you have to set Input Mode to Single Input. For details, see the LV 58SER06 instruction manual.

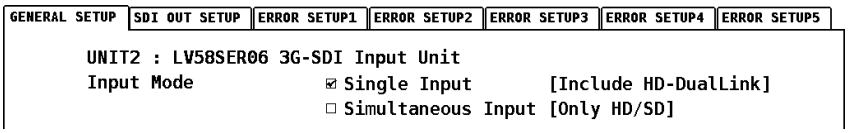


Figure 4-2 GENERAL SETUP (LV 58SER06)

2. Apply the SDI signal to the LV 58SER07's INPUT A or INPUT B connector.

The signals that are applied to INPUT A and INPUT B cannot be displayed simultaneously. Switch between these signals to show the signal that you want to display.

3. Use the included cables to connect the LV 58SER07 OUTPUT connectors to the LV 58SER06 INPUT connectors.

As shown in the figure above, connect OUTPUT A to INPUT A and OUTPUT B to INPUT B. Connect one LV 58SER07 to one LV 58SER06. Do not connect one LV 58SER07 to multiple LV 58SER06s.

4. Select the unit number of the slot that the LV 58SER06 (which is connected to the LV 58SER07) is installed in.

If you select the unit number of the slot that the LV 58SER07 is installed in, the message "This is an option board" will be displayed, and you will not be able to perform measurements.

5. Press EYE.

The eye pattern will be displayed.

6. Select the input channel.

When you are applying a single-link signal, use the A and B keys to select the input channel.
When you are applying a dual-link signal, use F•6 LINK SELECT to select the input channel.

4.4 Multi Screen Display

This unit has two display modes: the eye-pattern display and the jitter display. Press F•2 MODE to switch between these modes.
See section 5.4, “Selecting the Display Mode”

In addition, you can simultaneously display the eye-pattern and jitter waveforms each on their own screen on the multi screen display.
(You cannot display eye-pattern or jitter waveforms in multiple areas.)

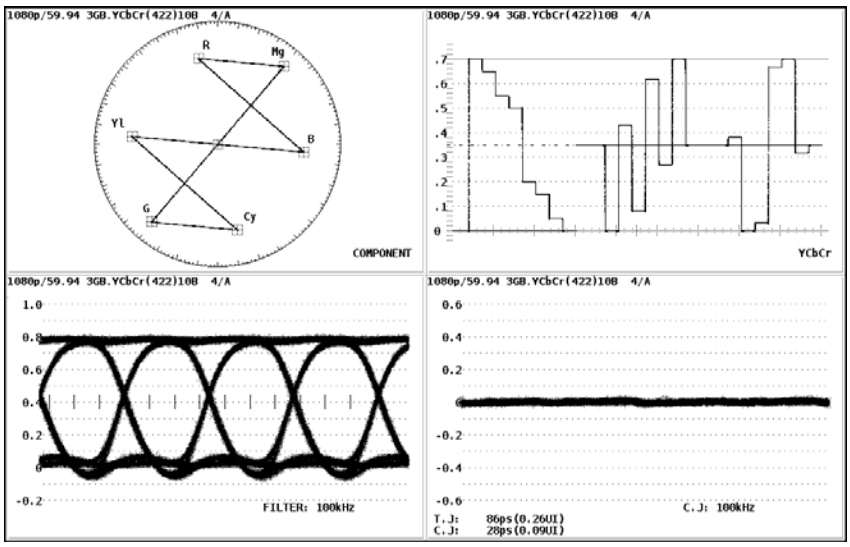


Figure 4-3 Multi screen display

- **Simultaneous display method**

  If you select EYE for two areas, an eye-pattern display will automatically be assigned to one area and a jitter display will automatically be assigned to the other.
  If you have already assigned an eye-pattern display to one area, a jitter display will be assigned to the second area that you select EYE for. If you have already assigned a jitter display to one area, an eye-pattern display will be assigned to the second area that you select EYE for.

- **Precautions**

  To perform this simultaneous display, both displays have to use the same input signal. Select the same unit number and the same channel (A or B) for both of the screens.

  Even if you set Input Mode on the LV 58SER06’s GENERAL SETUP tab to Simultaneous Input, you cannot simultaneously display the input from different channels on the eye-pattern display and jitter display.

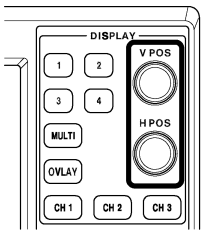
5. EYE-PATTERN AND JITTER DISPLAYS

This chapter explains the settings that are common to the eye-pattern display and jitter display.

5.1 Setting the Waveform Display Position

You can use the V POS and H POS knobs on the front panel to adjust the waveform display position.

LV 5800



LV 7800

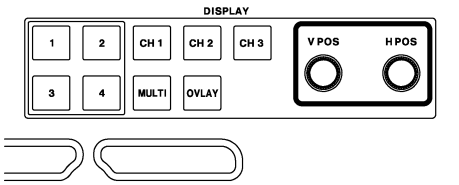


Figure 5-1 V POS and H POS knobs

- **V POS knob**

  Adjusts the vertical position of the waveform.
  Pressing the knob returns the waveform to its default position.

- **H POS knob**

  Adjusts the horizontal position of the waveform.
  Pressing the knob returns the waveform to its default position.

5.2 Adjusting the Waveform Intensity

To adjust the intensity of the eye-pattern waveform and jitter waveform, follow the procedure below. Turn the function dial (F•D) to perform the adjustment.
Press the function dial (F•D) to return the setting to its default value (32).

Procedure

EYE → F・1 INTEN → F・1 EYE INTEN: -128 to 32 to 127

5.3 Adjusting the Scale Intensity

To adjust the scale intensity, follow the procedure below. Turn the function dial (F•D) to perform the adjustment.
Press the function dial (F•D) to return the setting to its default value (4).

Procedure

EYE → F・1 INTEN → F・2 SCALE INTEN: -8 to 4 to 7

5.4 Selecting the Display Mode

To select the display mode, follow the procedure below.
You can simultaneously display the eye-pattern and jitter waveforms each on their own screen on the multi screen display.
See section 4.4, “Multi Screen Display.”

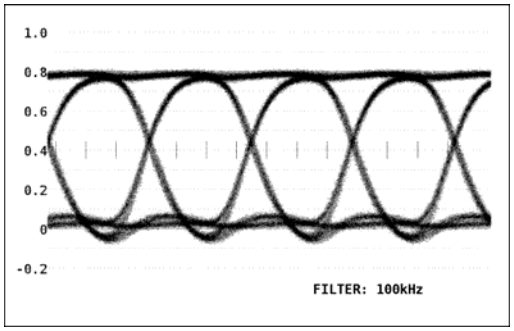
Procedure

EYE → F・2 MODE: EYE / JITTER

Settings

EYE:	The eye pattern display is shown.
JITTER:	The jitter waveform is shown.

MODE = EYE



MODE = JITTER

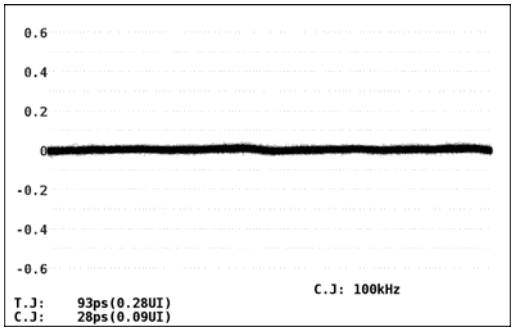


Figure 5-2 Selecting the display mode

5.5 Selecting Which Link to Display

When an HD dual link signal is being applied, you cannot display the link A and link B signals simultaneously. To select which waveform is displayed, follow the procedure below.
See section 4.3, “Measurement Procedure.”

Procedure

EYE → F・6 LINK SELECT: LINK A / LINK B

Settings

LINK A:	The link A waveform is shown.
LINK B:	The link B waveform is shown.

5.6 Event Log

If one of the errors whose detection has been set to ON (as explained in chapter 8, “UNIT SETUP”) occurs, the error is displayed on the LV 58SER06 event log screen. The names of the events that may be generated by this unit are shown below. For details about the event log, see the LV 58SER06 instruction manual.

* You can also use other units that have an event logging feature (such as the LV 58SER01A) to check the event log.
* The event log display is enabled when one of the display areas is set to EYE mode. Error detection cannot be performed in the background.

Table 5-1 Events

Event Name	Description
EYE_3G_AMP	3G-SDI Amplitude Error
EYE_3G_TR	3G-SDI Risetime Error
EYE_3G_TF	3G-SDI Falltime Error
EYE_3G_TR_TF	3G-SDI Deltatime Error
EYE_3G_T_JIT	3G-SDI Timing Jitter Error
EYE_3G_A_JIT	3G-SDI Current Jitter Error
EYE_3G_OR	3G-SDI OverShoot Rising Error
EYE_3G_OF	3G-SDI OverShoot Falling Error
EYE_HD_AMP	HD-SDI Amplitude Error
EYE_HD_TR	HD-SDI Risetime Error
EYE_HD_TF	HD-SDI Falltime Error
EYE_HD_TR_TF	HD-SDI Deltatime Error
EYE_HD_T_JIT	HD-SDI Timing Jitter Error
EYE_HD_A_JIT	HD-SDI Current Jitter Error
EYE_HD_OR	HD-SDI OverShoot Rising Error
EYE_HD_OF	HD-SDI OverShoot Falling Error
EYE_SD_AMP	SD-SDI Amplitude Error
EYE_SD_TR	SD-SDI Risetime Error
EYE_SD_TF	SD-SDI Falltime Error
EYE_SD_TR_TF	SD-SDI Deltatime Error
EYE_SD_T_JIT	SD-SDI Timing Jitter Error
EYE_SD_A_JIT	SD-SDI Current Jitter Error
EYE_SD_OR	SD-SDI OverShoot Rising Error
EYE_SD_OF	SD-SDI OverShoot Falling Error

6. EYE-PATTERN DISPLAY

This chapter explains the eye-pattern display.
To show the eye-pattern display, set F•2 MODE to EYE.

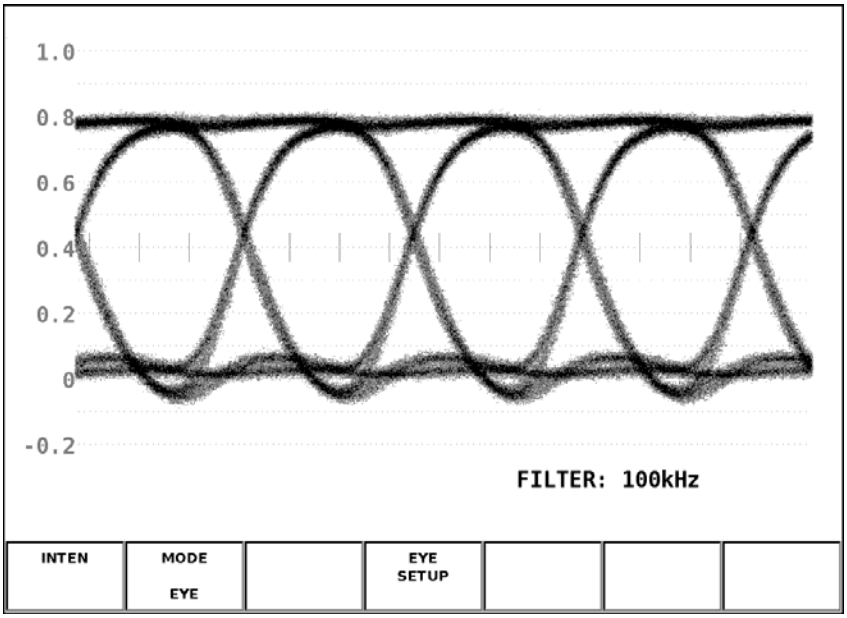


Figure 6-1 Eye-pattern display screen

- **Setting the eye-pattern display**

  To configure the eye-pattern-display settings, press F•4 EYE SETUP. F•4 EYE SETUP appears when F•2 MODE is set to EYE.

SYS → F·4 EYE SETUP →

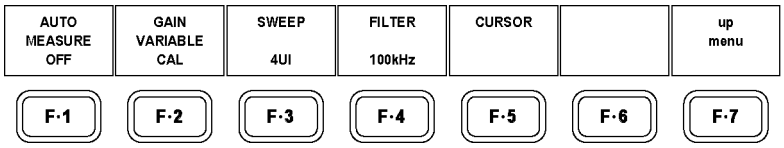


Figure 6-2 EYE SETUP menu

6.1 Turning Automatic Measurement On and Off

To automatically measure the amplitudes of eye patterns, jitter values, and other values, follow the procedure below.
When you set F•1 AUTO MEASURE to ON, the measured values are displayed in the bottom part of the screen. Measured values are normally displayed in white, but they are displayed in yellow until they stabilize and in red if they exceed the values that you have specified in unit setup. If automatic measurements cannot be performed, measured values are displayed as "----."

See chapter 8, "UNIT SETUP."

Procedure

EYE → F·4 EYE SETUP → F·1 AUTO MEASURE: ON / OFF

AUTO MEASURE = ON

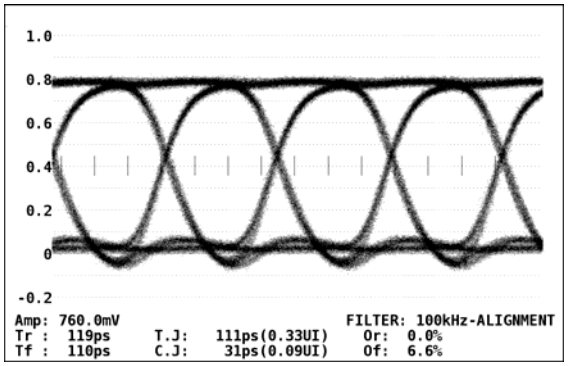


Figure 6-3 Automatic measurement

- **Measurement items**

The items that can be automatically measured are shown below.

Table 6-1 Measurement items

Symbol	Display Indication	Description
a	Amp	Eye-pattern amplitude
b	Tr	Rise time
c	Tf	Fall time (not shown in the following figure)
d	T.J	Timing jitter
e	C.J	Current jitter (jitter value when the currently selected filter is applied)
f	Or	Overshoot of the rising edge
g	Of	Overshoot of the falling edge

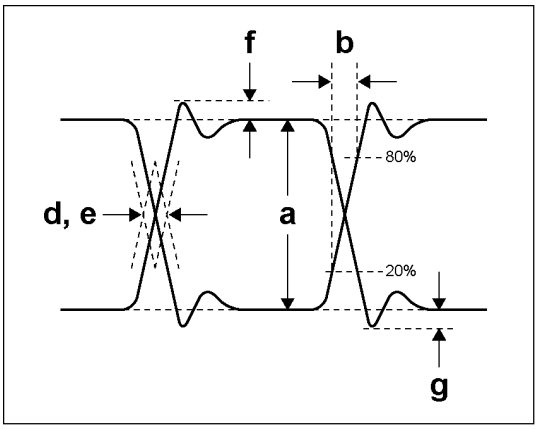


Figure 6-4 Explanation of measurement items

- **Unit interval**

  This unit uses unit intervals (UI) as jitter measurement units.
  One cycle of the eye pattern is 1 UI. The time that corresponds to 1 UI varies depending on the input signal, as shown below.

  Table 6-2 Time that corresponds to 1 UI

Input Signal	Bit Rate	Time That Corresponds to 1 UI
3G-SDI	2.970/1.001 Gbps	337.0 ps
	2.970 Gbps	336.7 ps
HD-SDI	1.485/1.001 Gbps	674.1 ps
	1.485 Gbps	673.4 ps
SD-SDI	270 Mbps	3.7 ns

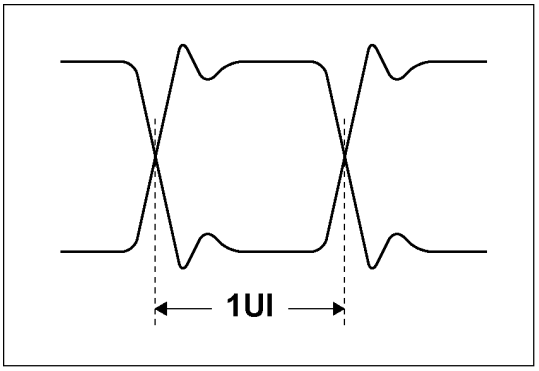


Figure 6-5 Unit interval

- **Precautions**

  The timing jitter and current jitter measurement items show the values that were measured in jitter display mode. The instrument uses a phase demodulator to perform these measurements.
  Other measurement items show the measured values calculated from the eye pattern waveform. Therefore, if the waveform degrades significantly, the difference between the automatically measured values and the cursor-measured values may become large.

  To obtain stable automatically measured values, set FILTER to ALIGNMENT.
  For details about the “FILTER” indication, see section 6.4, “Selecting the Filter.”

6.2 Adjusting the Gain

To adjust the eye-pattern gain, follow the procedure below.

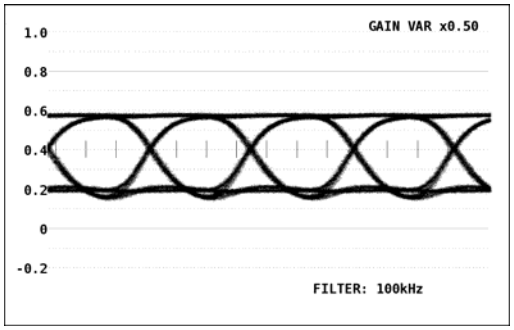
Procedure

EYE → F・4 EYE SETUP → F・2 GAIN VARIABLE: CAL / VARIABLE

Settings

CAL:	The eye pattern is shown without gain.
VARIABLE:	The eye pattern is shown with the specified gain (×0.50 to ×2.00). The gain value appears in the upper right of the screen. Turn the function dial (F•D) to adjust the gain. Press the function dial (F•D) to return the setting to its default value (×1.00).

GAIN VAR = ×0.50



GAIN VAR = ×2.00

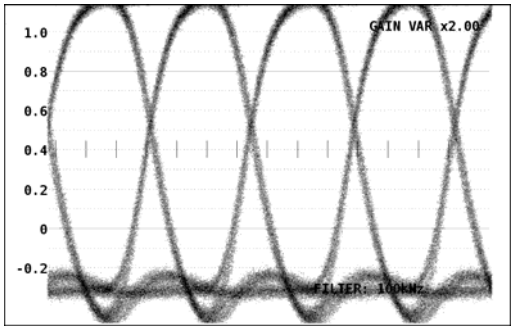


Figure 6-6 Adjusting the gain

6.3 Selecting the Sweep Time

To select the eye-pattern sweep time, follow the procedure below.

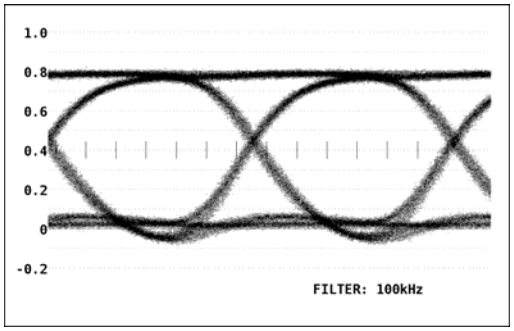
Procedure

EYE → F・4 EYE SETUP → F・3 SWEEP: 2UI / 4UI / 16UI

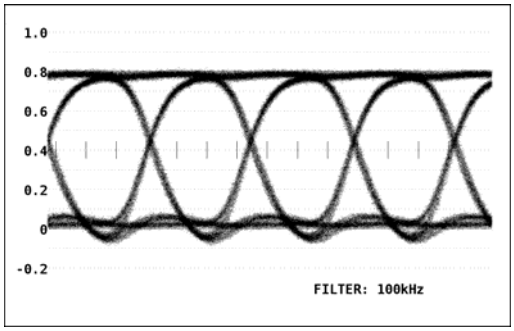
Settings

2UI:	Two cycles of the eye pattern are shown.
4UI:	Four cycles of the eye pattern are shown.
16UI:	Sixteen cycles of the eye pattern are shown.

SWEEP = 2UI



SWEEP = 4UI



SWEEP = 16UI

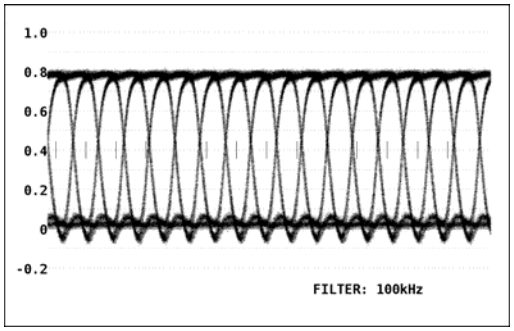


Figure 6-7 Selecting the sweep time

6.4 Selecting the Filter

To select the filter that is used during jitter measurement, follow the procedure below. The selected filter is indicated in the lower right of the display.
If you change this setting, the filter that you selected for jitter display mode also changes.
See section 7.4, “Selecting the Filter.”

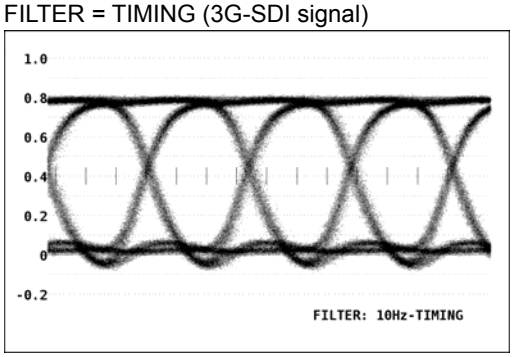
Procedure

EYE → F･4 EYE SETUP → F･4 FILTER: 100kHz / 1kHz / 100Hz / 10Hz / TIMING / ALIGNMENT

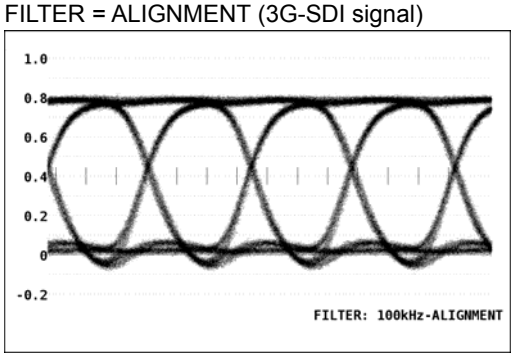
Settings

100kHz:	Jitter at 100 kHz or higher is measured.
1kHz:	Jitter at 1 kHz or higher is measured.
100Hz:	Jitter at 100 Hz or higher is measured.
10Hz:	Jitter at 10 Hz or higher is measured.
TIMING:	Timing jitter is measured. Jitter at 10 Hz or higher is measured.
ALIGNMENT:	Alignment jitter is measured. When the input signal is 3G-SDI or HD-SDI, jitter at 100 kHz or higher is measured. When the input signal is SD-SDI, jitter at 1 kHz or higher is measured.

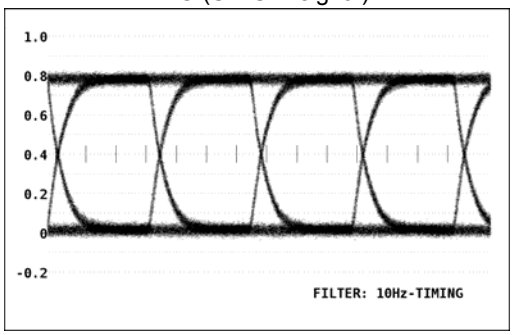
FILTER = TIMING (3G-SDI signal)



FILTER = ALIGNMENT (3G-SDI signal)



FILTER = TIMING (SD-SDI signal)



FILTER = ALIGNMENT (SD-SDI signal)

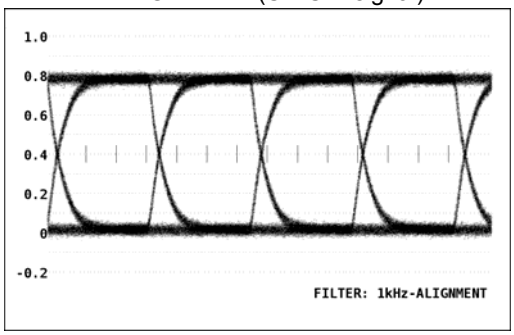


Figure 6-8 Selecting the filter

6.5 Configuring Cursor Settings

You can use cursors to measure time and amplitude. The measured values that you obtain by using the cursors and the automatically measured values may be different. See the precautions in section 6.1, “Turning Automatic Measurement On and Off.”

To configure cursor settings, press F•5 CURSOR on the EYE SETUP menu.

SYS → F·4 EYE SETUP → F·5 CURSOR →

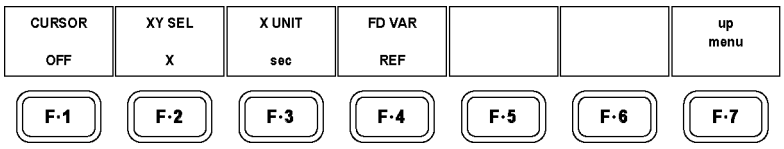


Figure 6-9 CURSOR menu

6.5.1 Turning Cursors On and Off

To turn cursors on and off, follow the procedure shown below.
When you set F•1 CURSOR to ON, the REF cursor is displayed in blue, and the DELTA cursor is displayed in green. The value of DELTA-REF appears as a measured value in the upper part of the screen.

Procedure

EYE → F·4 EYE SETUP → F·5 CURSOR → F·1 CURSOR: ON / OFF

CURSOR = ON

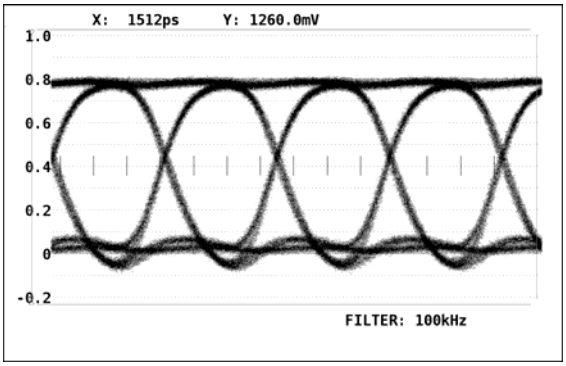


Figure 6-10 Cursor display

6.5.2 Selecting the Cursors

The X-axis and Y-axis cursors are displayed at the same time, but you can only use the function dial (F•D) to move one set of cursors at a time. To select the cursors that you want to move, follow the procedure below.

Procedure

EYE → F·4 EYE SETUP → F·5 CURSOR → F·2 XY SEL: X / Y / Tr,Tf

If you select Tr,Tf, you can measure the rise time (Tr) and fall time (Tf) by following the procedure below.

1. **Set F•2 XY SEL to Tr,Tf.**

   This selects the Y-axis cursors.

2. **Use the function dial (F • D) to align the cursors with the amplitude of the eye pattern.**

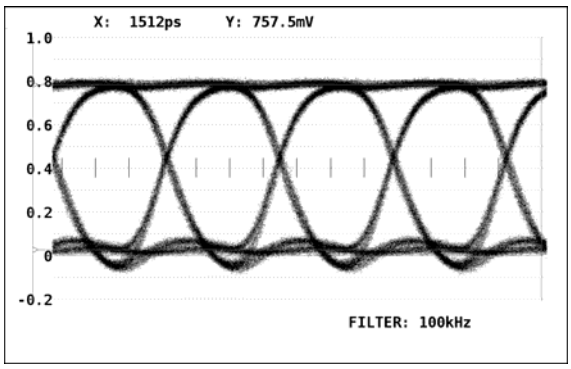


Figure 6-11 Tr,Tf measurement (1)

3. **Press F • 5 REF SET.**

   The Y-axis cursors move to the 20 % and 80 % positions of the amplitude, and then F•2 XY SEL is automatically set to X.

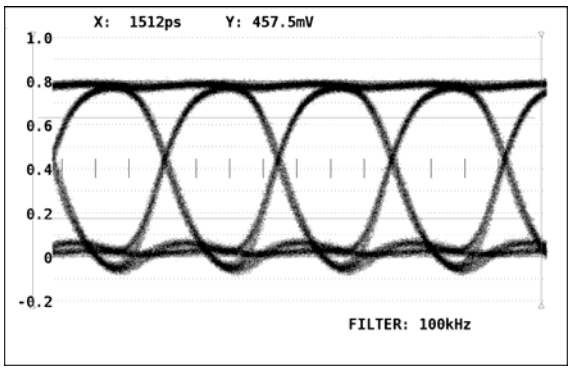


Figure 6-12 Tr,Tf measurement (2)

4. Align the X-axis cursors with the intersections of the Y-axis cursors and the eye pattern.

You can now measure the rise time and fall time. The measured value is displayed next to X in the upper part of the screen.

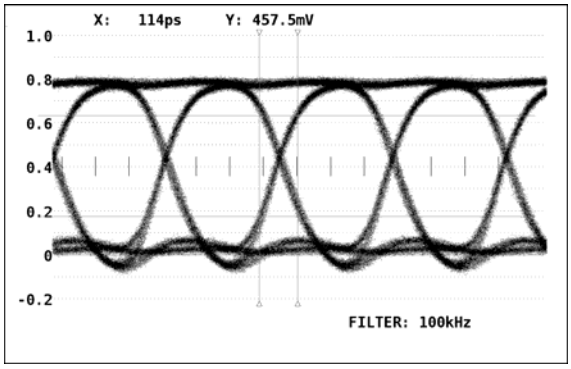


Figure 6-13 Tr,Tf measurement (3)

6.5.3 Selecting the X-Axis Measurement Unit

To select the units used in X-axis cursor measurement, follow the procedure below.
This setting appears when F•2 XY SEL is set to X.

Procedure

EYE → F·4 EYE SETUP → F·5 CURSOR → F·3 X UNIT: sec / Hz / UIp-p

Settings

sec:	The measurement unit is seconds.
Hz:	The measurement unit is hertz (frequency). The length of one period is the time between two cursors.
UIp-p:	The measurement unit is UIp-p. One UIp-p is one cycle of the eye pattern.

6.5.4 Selecting the Y-Axis Measurement Unit

To select the units used in Y-axis cursor measurement, follow the procedure below.
This setting appears when F•2 XY SEL is set to Y.

Procedure

EYE → F·4 EYE SETUP → F·5 CURSOR → F·3 Y UNIT: V / %

Settings

V:	The measurement unit is volts.
%:	The measurement unit is percentage. If you select %, F•5 REF SET appears. 100 % is set to the amplitude at the time when you press F•5 REF SET.

6.5.5 Moving Cursors

To move a cursor, follow the procedure shown below to select a cursor. Then, move the cursor by turning the function dial (F•D). Triangles appear on both ends of the selected cursor.

You can also select a cursor by pressing the function dial (F•D). Each time you press the function dial (F•D), the selected cursor switches from REF, to DELTA, to TRACK, and then back to REF.

Procedure

EYE → F･4 EYE SETUP → F･5 CURSOR → F･4 FD VAR: REF / DELTA / TRACK

Settings

REF:	The REF cursor (blue) is selected.
DELTA:	The DELTA cursor (green) is selected.
TRACK:	The REF cursor and DELTA cursor are both selected.

7. JITTER DISPLAY

This chapter explains the jitter display.
To show the jitter display, set F•2 MODE to JITTER.

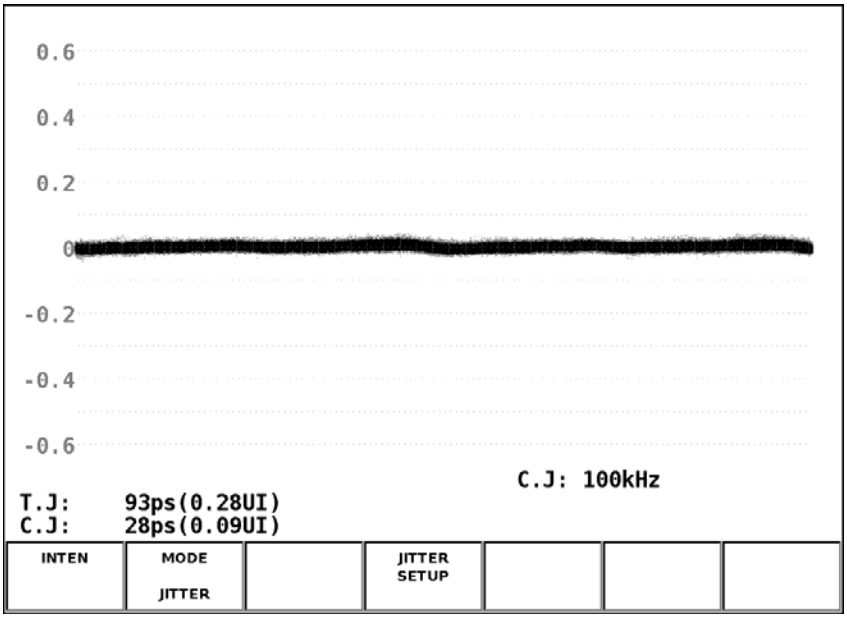


Figure 7-1 Jitter display screen

- **Explanation of the jitter display**

  In the jitter display mode, the jitter component is extracted from the input signal and plotted on a graph in which time is assigned to the Y axis. In this mode, the jitter can be measured accurately even when the eye pattern is not displayed or when jitter of 1 UI or greater is present.
  Also, because the length of the horizontal axis is equal to one line or field (frame) of the video signal, you can observe jitter that is synchronized with lines and fields (frames).

- **Automatic measurement on the jitter display**

  Timing jitter (T.J) and current jitter (C.J) are automatically measured and displayed on the jitter display screen.

  SMPTE defines two methods of measuring jitter. One method uses an eye pattern, and the other method uses a phase demodulator.
  The eye pattern method has disadvantages not only that measurements are difficult when the eye is not open but that measurements are prone to errors because the distinction between waveform distortion (such as noise and sags) and jitter is difficult.
  In contrast, the phase demodulator method makes jitter measurements with small errors possible even when the eye pattern is closed and even when the amount of jitter is 1 UI or more.
  The LV 58SER07 uses the phase demodulator method.

  Measured values are normally displayed in white, but they are displayed in red if they exceed the values that you have specified in unit setup.
  See chapter 8, “UNIT SETUP.”

- **Jitter display setup**

To configure the jitter-display settings, press F•4 JITTER SETUP. This setting appears when F•2 MODE is set to JITTER.

SYS → F·4 JITTER SETUP →

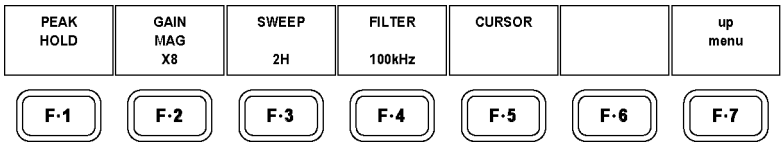


Figure 7-2 JITTER SETUP menu

7.1 Configuring the Peak Hold Settings

To configure the peak hold settings, press F•1 PEAK HOLD on the JITTER SETUP menu.

SYS → F·4 JITTER SETUP → F·1 PEAK HOLD →

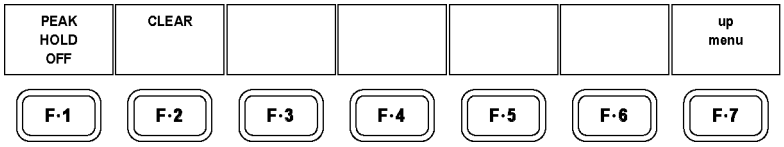


Figure 7-3 PEAK HOLD menu

7.1.1 Turning the Peak Hold On and Off

To measure the peak values of the timing jitter (T.J) and the current jitter (C.J), follow the procedure below.
When you set F•1 PEAK HOLD to ON, the peak values are displayed in the lower part of the screen next to “PEAK.” The peak values are retained until you press F•2 CLEAR. If a peak value exceeds a limit, “OVER” is displayed.
For details about the “OVER” indication, see section 7.2, “Selecting the Gain.”

Procedure

EYE → F·4 JITTER SETUP → F·1 PEAK HOLD → F·1 PEAK HOLD: ON / OFF

PEAK HOLD = ON

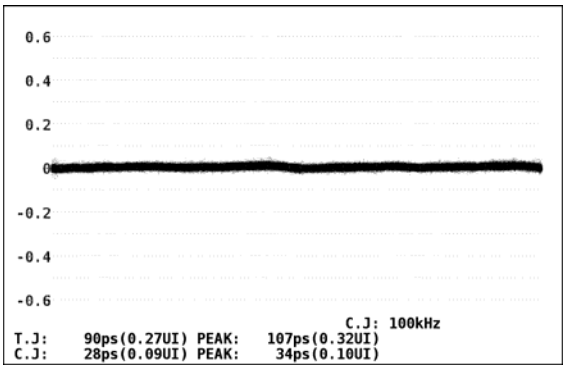


Figure 7-4 Peak hold display

7.1.2 Clearing the Peak Hold

To clear the peak values, follow the procedure below.

Procedure

EYE → F･4 JITTER SETUP → F･1 PEAK HOLD → F･2 CLEAR

7.2 Selecting the Gain

To select the jitter-waveform gain, follow the procedure below.

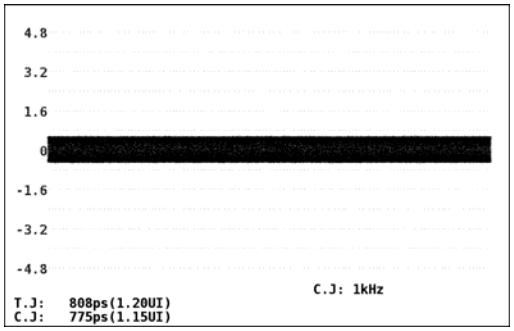
Procedure

EYE → F･4 JITTER SETUP → F･2 GAIN MAG:×1 / ×2 / ×8

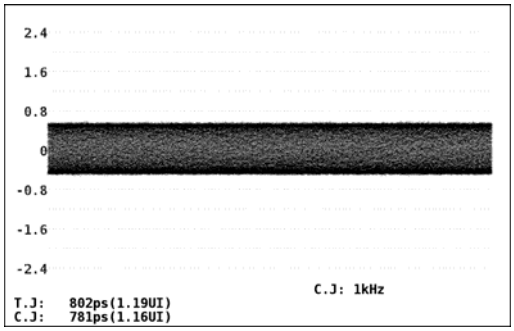
Settings

×1:	The jitter waveform is shown without gain.
×2:	The jitter waveform is shown with ×2 gain.
×8:	The jitter waveform is shown with ×8 gain.

GAIN MAG = ×1



GAIN MAG = ×2



GAIN MAG = ×8

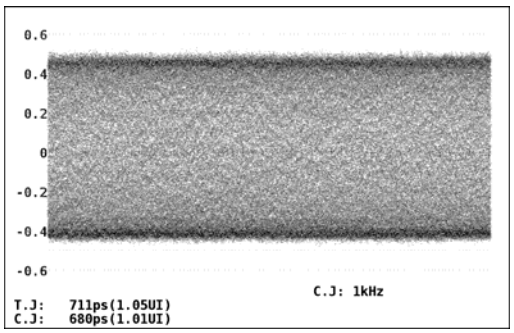


Figure 7-5 Selecting the gain

- **Measurement range**

  The measurement range and the various display conditions for each gain setting are shown below. Select an appropriate gain that matches the measured value that you want to obtain.

  Table 7-1 Measurement range

F·2 GAIN MAG	Measurement Range	*UNDER RANGE* Appears	OVER Appears
×1	4.80 to 9.60 UI	0.60 UI or less	10.01 UI or more
×2	1.20 to 4.80 UI	0.60 UI or less	5.21 UI or more
×8	0.00 to 1.20 UI	Does not appear	1.31 UI or more

- **UNDER RANGE display**

  When F•2 GAIN MAG is set to ×1 or ×2 and the measured jitter value is 0.60 UI or less, the measured value becomes yellow, and "*UNDER RANGE*" appears at the bottom left of the screen. If this happens, set F•2 GAIN MAG to ×8.

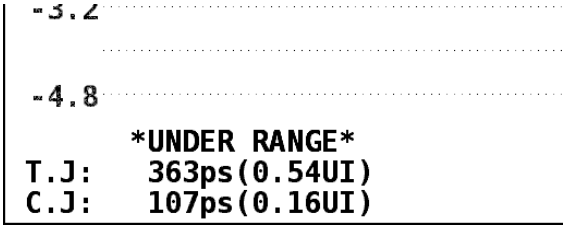


Figure 7-6 UNDER RANGE display

- **OVER display**

  If the measured jitter value exceeds its limit, "OVER" will appear in red as the measured value at the bottom left of the screen. If this happens, set F•2 GAIN MAG to ×8, ×2, and then ×1, in that order.

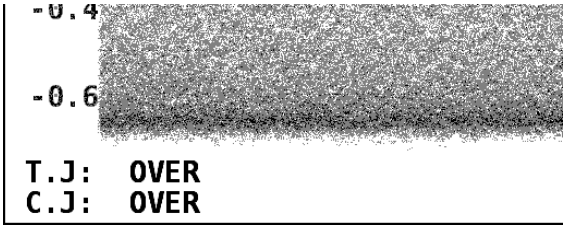


Figure 7-7 OVER display

7.3 Selecting the Sweep Time

To select the sweep time, follow the procedure below.

Procedure

EYE → F·4 JITTER SETUP → F·3 SWEEP: 1H / 2H / 1V / 2V

Settings

1H:	The jitter from a period of one line is shown.
2H:	The jitter from a period of two lines is shown.
1V:	When the input signal is interlace or segmented frame, the jitter from a period of one field is shown. When the input signal is progressive, the jitter from a period of one frame is shown.
2V:	When the input signal is interlace or segmented frame, the jitter from a period of one frame is shown. When the input signal is progressive, the jitter from a period of two frames is shown.

7.4 Selecting the Filter

To select the filter that is used during jitter measurement, follow the procedure below. The selected filter is indicated in the lower right of the display.
If you change this setting, the filter that you selected for eye-pattern-display mode also changes.

See section 6.4, “Selecting the Filter.”

Procedure

EYE → F·4 JITTER SETUP → F·4 FILTER: 100kHz / 1kHz / 100Hz / 10Hz / TIMING / ALIGNMENT

Settings

100kHz:	Jitter at 100 kHz or higher is measured.
1kHz:	Jitter at 1 kHz or higher is measured.
100Hz:	Jitter at 100 Hz or higher is measured.
10Hz:	Jitter at 10 Hz or higher is measured.
TIMING:	Timing jitter is measured. Jitter at 10 Hz or higher is measured.
ALIGNMENT:	Alignment jitter is measured. When the input signal is 3G-SDI or HD-SDI, jitter at 100 kHz or higher is measured. When the input signal is SD-SDI, jitter at 1 kHz or higher is measured.

7.5 Configuring Cursor Settings

You can use cursors to measure time and amplitude.
To configure cursor settings, press F•5 CURSOR on the JITTER SETUP menu.

SYS → F·4 JITTER SETUP → F·5 CURSOR →

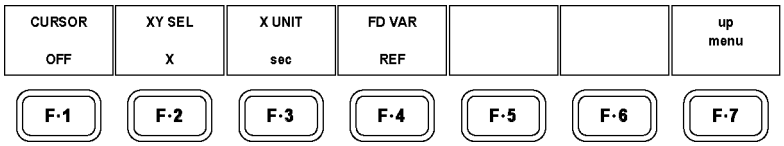


Figure 7-8 CURSOR menu

7.5.1 Turning Cursors On and Off

To turn cursors on and off, follow the procedure shown below.
When you set F•1 CURSOR to ON, the REF cursor is displayed in blue, and the DELTA cursor is displayed in green. The value of DELTA-REF appears as a measured value in the lower right of the screen.

Procedure

EYE → F・4 JITTER SETUP → F・5 CURSOR → F・1 CURSOR: ON / OFF

CURSOR = ON

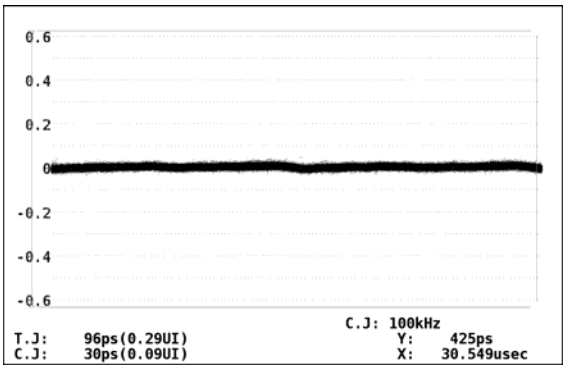


Figure 7-9 Cursor display

7.5.2 Selecting the Cursors

The X-axis and Y-axis cursors are displayed at the same time, but you can only use the function dial (F•D) to move one set of cursors at a time. To select the cursors that you want to move, follow the procedure below.

Procedure

EYE → F・4 JITTER SETUP → F・5 CURSOR → F・2 XY SEL: X / Y

7.5.3 Selecting the X-Axis Measurement Unit

To select the units used in X-axis cursor measurement, follow the procedure below.
This setting appears when F•2 XY SEL is set to X.

Procedure

EYE → F・4 JITTER SETUP → F・5 CURSOR → F・3 X UNIT: sec / Hz

Settings

sec:	The measurement unit is seconds.
Hz:	The measurement unit is hertz (frequency). The length of one period is the time between two cursors.

7.5.4 Selecting the Y-Axis Measurement Unit

To select the units used in Y-axis cursor measurement, follow the procedure below.
This setting appears when F•2 XY SEL is set to Y.

Procedure

EYE → F·4 JITTER SETUP → F·5 CURSOR → F·3 Y UNIT: sec / UIp-p

Settings

sec:	The measurement unit is seconds.
UIp-p:	The measurement unit is UIp-p. One UIp-p is one cycle of the eye pattern.

7.5.5 Moving Cursors

To move a cursor, follow the procedure shown below to select a cursor. Then, move the cursor by turning the function dial (F•D). Triangles appear on both ends of the selected cursor.

You can also select a cursor by pressing the function dial (F•D). Each time you press the function dial (F•D), the selected cursor switches from REF, to DELTA, to TRACK, and then back to REF.

Procedure

EYE → F·4 JITTER SETUP → F·5 CURSOR → F·4 FD VAR: REF / DELTA / TRACK

Settings

REF:	The REF cursor (blue) is selected.
DELTA:	The DELTA cursor (green) is selected.
TRACK:	The REF cursor and DELTA cursor are both selected.

8. UNIT SETUP

To configure error detection settings, use the UNIT SETUP menu in the system settings. The LV 58SER07 has two input channels (channels A and B), but the settings that you configure on the UNIT SETUP menu are applied to both channels. You cannot configure settings for each channel individually.

To display the UNIT SETUP menu, press F•1 UNIT SETUP on the system menu. Next, press the function key (F•1 to F•4) that corresponds to the unit number that the LV 58SER07 is installed in.

SYS → F·1 UNIT SETUP →

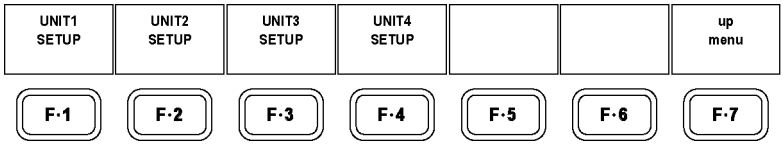


Figure 8-1 UNIT SETUP menu

8.1 Operating Tab Menus

You can usually use the function menu to change the settings, but the unit setup settings appear on a tab menu.
The list below explains how to perform different operations in the tab menu.

- **To Move the Cursor**

  Turn the function dial (F•D).

- **To Change the Tab**

  Press F•2 PREV or F•3 NEXT. Even if you switch to another tab, the settings are not confirmed until you press F•1 COMPLETE.

- **To Select a Check Box**

  Press the function dial (F•D).

- **To Enter a Value**

  When you push the function dial (F•D), the color of the cursor changes from blue to green, and you can set the value. Turn the function dial (F•D) to set the value. To confirm the value that you have set, press the function dial (F•D) again.

- **To Apply the Tab Settings**

  Press F•1 COMPLETE. All the tab settings are applied, and the previous menu is displayed.

- **To Cancel the Tab Settings**

  Press F•7 CANCEL. All the tab settings are cancelled, and the previous menu is displayed.

8.2 Configuring 3G-SDI Error Settings

Use the 3G-SDI ERR SETUP tab to configure error detection settings for 3G-SDI signals.

If one of the errors whose detection has been set to ON occurs, the corresponding measured value is displayed in red on the eye-pattern and jitter display screens. The error is also displayed on the event log screen.
The detection for all errors is initially set to OFF.

You can set the threshold values when you set the error detection to ON. Measured values given in SMPTE 424M are used as 100 %.

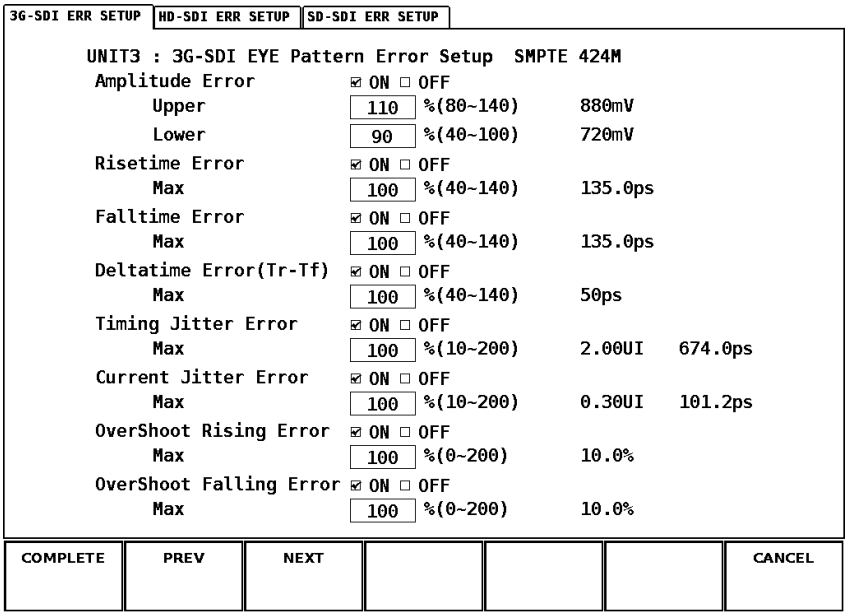


Figure 8-2 3G-SDI ERR SETUP tab

A configuration example showing threshold values that correspond to SMPTE 424M is given below.

Table 8-1 3G-SDI ERR SETUP configuration example

Item		Value	Corresponding Value
Amplitude Error	Upper	110 %	880 mV
	Lower	90 %	720 mV
Risetime Error	Max	100 %	135.0 ps
Falltime Error	Max	100 %	135.0 ps
Deltatime Error(Tr-Tf)	Max	100 %	50 ps
Timing Jitter Error	Max	100 %	2.00 UI (674.0 ps)
Current Jitter Error	Max	100 %	0.30 UI (101.2 ps)
OverShoot Rising Error	Max	100 %	10.0 %
OverShoot Falling Error	Max	100 %	10.0 %

- **Amplitude Error**

  Turns the eye pattern’s amplitude error detection on and off. When you select ON, you can set the upper and lower limits. You cannot set Lower to a value that is greater than Upper, even if the value is within the selectable range.

Upper:	80 to 140 % (640 to 1120 mV)
Lower:	40 to 100 % (320 to 800 mV)

- **Risetime Error**

  Turns the eye pattern's rise time (the time for the signal to rise from 20 to 80 % of its amplitude) error detection on and off. When you select ON, you can set the upper limit.

Max:	40 to 140 % (54.0 to 189.0 ps)

- **Falltime Error**

  Turns the eye pattern's fall time (the time for the signal to fall from 80 to 20 % of its amplitude) error detection on and off. When you select ON, you can set the upper limit.

Max:	40 to 140 % (54.0 to 189.0 ps)

- **Deltatime Error**

  Turns the eye pattern's time difference (between the rise and fall times) error detection on and off. When the measured values exceed the specified value, Tr and Tf are displayed in red.
  When you select ON, you can set the upper limit.

Max:	40 to 140 % (20 to 70 ps)

- **Timing Jitter Error**

  Turns the eye pattern and jitter waveform's timing jitter error detection on and off. When you select ON, you can set the upper limit.

Max:	10 to 200 % (0.20 to 4.00 UI, 67.4 to 1348.0 ps)

- **Current Jitter Error**

  Turns the eye pattern and jitter waveform's current jitter error detection on and off. When you select ON, you can set the upper limit.

Max:	10 to 200 % (0.03 to 0.60 UI, 10.1 to 202.5 ps)

- **OverShoot Rising Error**

  Turns the overshoot of the rising edge error detection on and off. When you select ON, you can set the upper limit.

Max:	0 to 200 % (0.0 to 20.0 %)

- **OverShoot Falling Error**

  Turns the overshoot of the falling edge error detection on and off. When you select ON, you can set the upper limit.

Max:	0 to 200 % (0.0 to 20.0 %)

8.3 Configuring HD-SDI Error Settings

Use the HD-SDI ERR SETUP tab to configure error detection settings for HD-SDI signals.

If one of the errors whose detection has been set to ON occurs, the corresponding measured value is displayed in red on the eye-pattern and jitter display screens. The error is also displayed on the event log screen.
The detection for all errors is initially set to OFF.

You can set the threshold values when you set the error detection to ON. Measured values given in SMPTE 292M are used as 100 %.

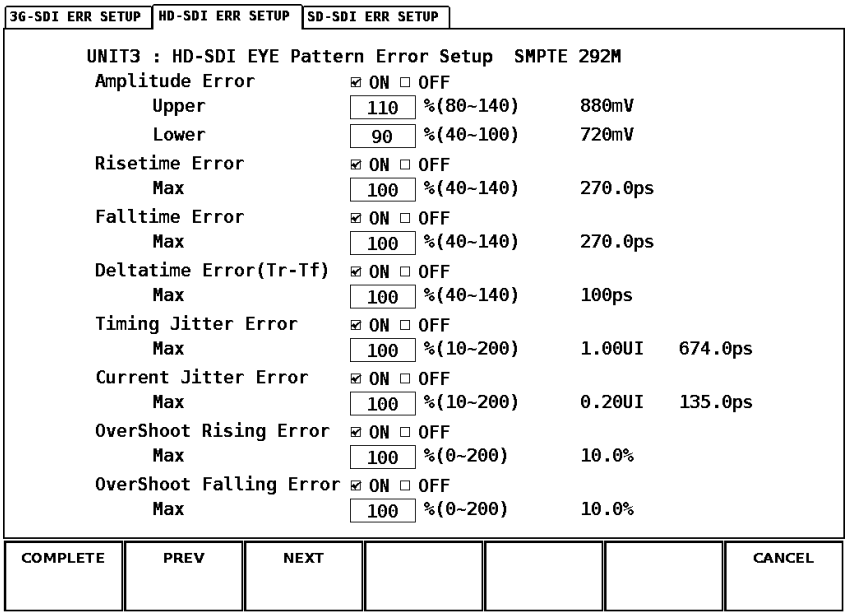


Figure 8-3 HD-SDI ERR SETUP tab

A configuration example showing threshold values that correspond to SMPTE 292M is given below.

Table 8-2 HD-SDI ERR SETUP configuration example

Item		Value	Corresponding Value
Amplitude Error	Upper	110 %	880 mV
	Lower	90 %	720 mV
Risetime Error	Max	100 %	270.0 ps
Falltime Error	Max	100 %	270.0 ps
Deltatime Error(Tr-Tf)	Max	100 %	100 ps
Timing Jitter Error	Max	100 %	1.00 UI (674.0 ps)
Current Jitter Error	Max	100 %	0.20 UI (135.0 ps)
OverShoot Rising Error	Max	100 %	10.0 %
OverShoot Falling Error	Max	100 %	10.0 %

- **Amplitude Error**

  Turns the eye pattern’s amplitude error detection on and off. When you select ON, you can set the upper and lower limits. You cannot set Lower to a value that is greater than Upper, even if the value is within the selectable range.

Upper:	80 to 140 % (640 to 1120 mV)
Lower:	40 to 100 % (320 to 800 mV)

- **Risetime Error**

  Turns the eye pattern's rise time (the time for the signal to rise from 20 to 80 % of its amplitude) error detection on and off. When you select ON, you can set the upper limit.

Max:	40 to 140 % (108.0 to 378.0 ps)

- **Falltime Error**

  Turns the eye pattern's fall time (the time for the signal to fall from 80 to 20 % of its amplitude) error detection on and off. When you select ON, you can set the upper limit.

Max:	40 to 140 % (108.0 to 378.0 ps)

- **Deltatime Error**

  Turns the eye pattern's time difference (between the rise and fall times) error detection on and off. When the measured values exceed the specified value, Tr and Tf are displayed in red.
  When you select ON, you can set the upper limit.

Max:	40 to 140 % (40 to 140 ps)

- **Timing Jitter Error**

  Turns the eye pattern and jitter waveform's timing jitter error detection on and off. When you select ON, you can set the upper limit.

Max:	10 to 200 % (0.10 to 2.00 UI, 67.4 to 1348.0 ps)

- **Current Jitter Error**

  Turns the eye pattern and jitter waveform's current jitter error detection on and off. When you select ON, you can set the upper limit.

Max:	10 to 200 % (0.02 to 0.40 UI, 13.5 to 270.0 ps)

- **OverShoot Rising Error**

  Turns the overshoot of the rising edge error detection on and off. When you select ON, you can set the upper limit.

Max:	0 to 200 % (0.0 to 20.0 %)

- **OverShoot Falling Error**

  Turns the overshoot of the falling edge error detection on and off. When you select ON, you can set the upper limit.

Max:	0 to 200 % (0.0 to 20.0 %)

8.4 Configuring SD-SDI Error Settings

Use the SD-SDI ERR SETUP tab to configure error detection settings for SD-SDI signals.

If one of the errors whose detection has been set to ON occurs, the corresponding measured value is displayed in red on the eye-pattern and jitter display screens. The error is also displayed on the event log screen.
The detection for all errors is initially set to OFF.

You can set the threshold values when you set the error detection to ON. Measured values given in SMPTE 259M are used as 100 %.

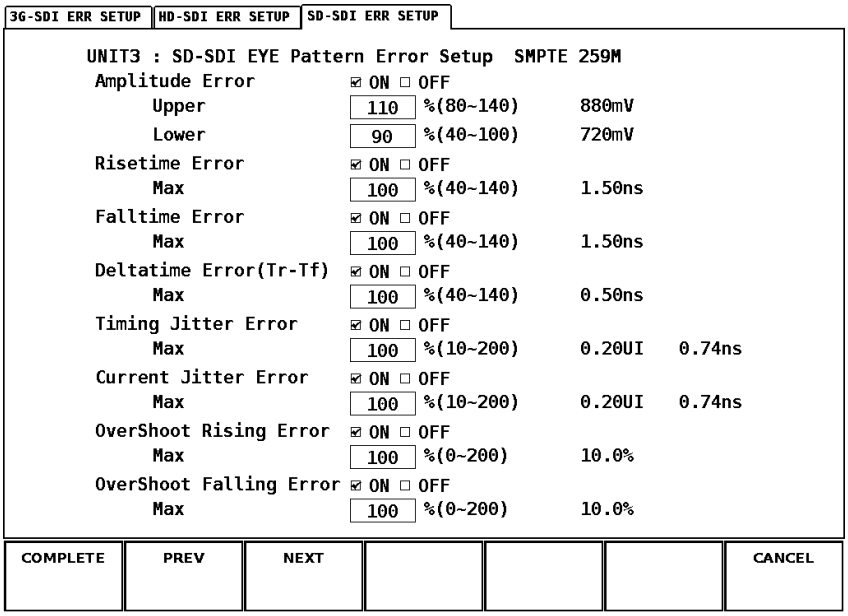


Figure 8-4 SD-SDI ERR SETUP tab

A configuration example showing threshold values that correspond to SMPTE 259M is given below.

Table 8-3 SD-SDI ERR SETUP configuration example

Item		Value	Corresponding Value
Amplitude Error	Upper	110 %	880 mV
	Lower	90 %	720 mV
Risetime Error	Max	100 %	1.50 ns
Falltime Error	Max	100 %	1.50 ns
Deltatime Error(Tr-Tf)	Max	100 %	0.50 ns
Timing Jitter Error	Max	100 %	0.20 UI (0.74 ns)
Current Jitter Error	Max	100 %	0.20 UI (0.74 ns)
OverShoot Rising Error	Max	100 %	10.0 %
OverShoot Falling Error	Max	100 %	10.0 %

- **Amplitude Error**

  Turns the eye pattern's amplitude error detection on and off. When you select ON, you can set the upper and lower limits. You cannot set Lower to a value that is greater than Upper, even if the value is within the selectable range.

Upper:	80 to 140 % (640 to 1120 mV)
Lower:	40 to 100 % (320 to 800 mV)

- **Risetime Error**

  Turns the eye pattern's rise time (the time for the signal to rise from 20 to 80 % of its amplitude) error detection on and off. When you select ON, you can set the upper limit.

Max:	40 to 140 % (0.60 to 2.10 ns)

- **Falltime Error**

  Turns the eye pattern's fall time (the time for the signal to fall from 80 to 20 % of its amplitude) error detection on and off. When you select ON, you can set the upper limit.

Max:	40 to 140 % (0.60 to 2.10 ns)

- **Deltatime Error**

  Turns the eye pattern's time difference (between the rise and fall times) error detection on and off. When the measured values exceed the specified value, Tr and Tf are displayed in red.
  When you select ON, you can set the upper limit.

Max:	40 to 140 % (0.20 to 0.70 ns)

- **Timing Jitter Error**

  Turns the eye pattern and jitter waveform's timing jitter error detection on and off. When you select ON, you can set the upper limit.

Max:	10 to 200 % (0.02 to 0.40 UI, 0.07 to 1.48 ns)

- **Current Jitter Error**

  Turns the eye pattern and jitter waveform's current jitter error detection on and off. When you select ON, you can set the upper limit.

Max:	10 to 200 % (0.02 to 0.40 UI, 0.07 to 1.48 ns)

- **OverShoot Rising Error**

  Turns the overshoot of the rising edge error detection on and off. When you select ON, you can set the upper limit.

Max:	0 to 200 % (0.0 to 20.0 %)

- **OverShoot Falling Error**

  Turns the overshoot of the falling edge error detection on and off. When you select ON, you can set the upper limit.

Max:	0 to 200 % (0.0 to 20.0 %)

9. REFERENCE MATERIAL

9.1 Menu Tree

The menu tree for the EYE key is shown below. The default values are underlined.

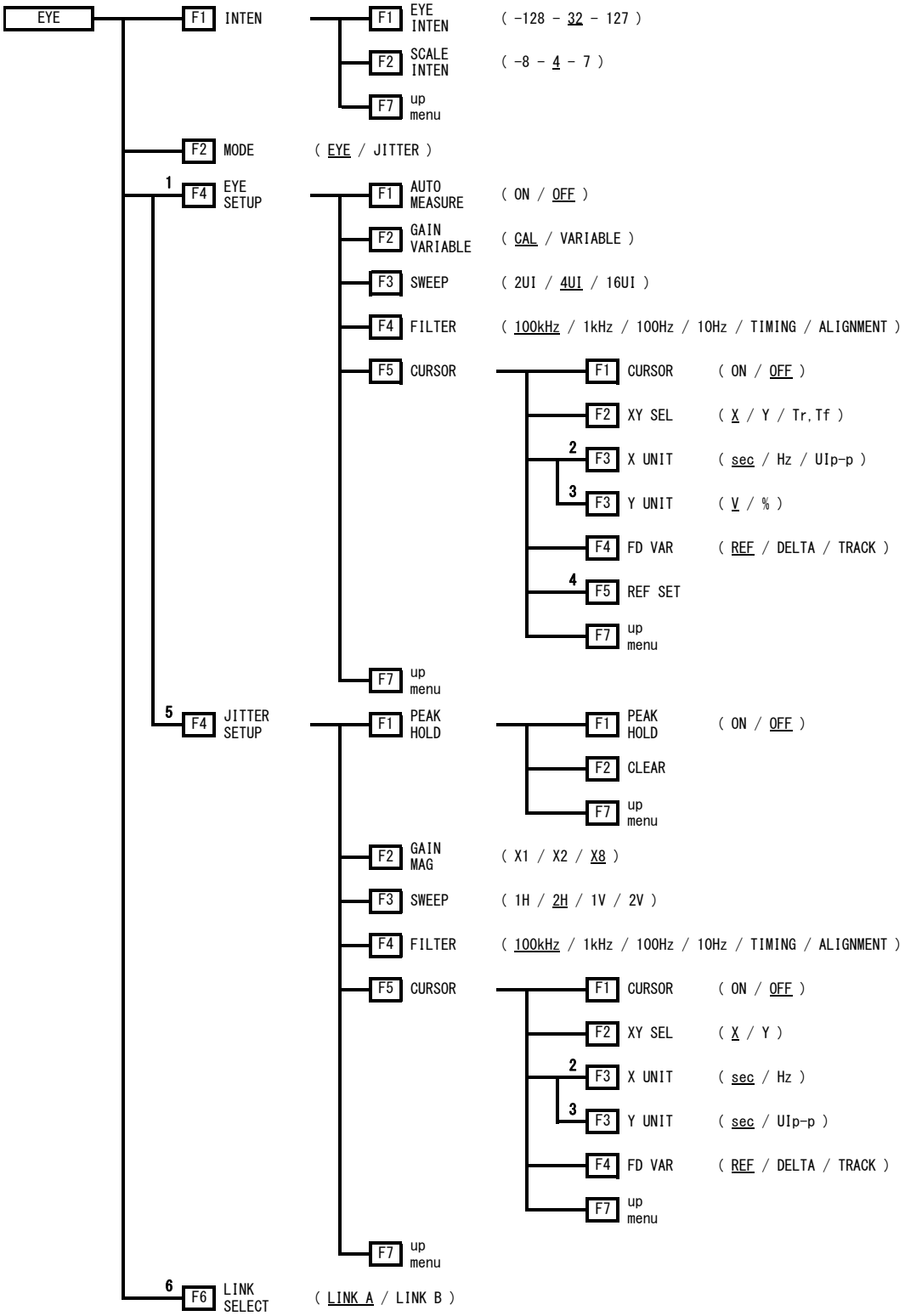


Figure 9-1 EYE menu

1 Appears when MODE is set to EYE.
2 Appears when XY SEL is set to X.
3 Appears when XY SEL is set to Y.
4 Appears when XY SEL is set to Tr,Tf or Y UNIT is set to %.
5 Appears when MODE is set to JITTER.
6 Appears when the input signal is HD dual link.

9.2 Change History of the Software

This manual was written for the following firmware versions:

- Ver 8.8 (LV 5800)
- Ver 3.4 (LV 7800)

To check the version number, press SYS and then F•5 SYSTEM INFORMATION.

Ver 6.6 (LV 5800) and Ver 1.4 (LV 7800)

- LV 58SER07 support has been added.

Index

Following information is for Chinese RoHS only

所含有毒有害物质信息

部件号码：LV 58SER07

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	×	○	○	○	○	○
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.1

LEADER ELECTRONICS CORP.
2-6-33 Tsunashima-Higashi, Kohoku-ku, Yokohama 223-8505, Japan
PHONE:81-45-541-2123 FAX:81-45-541-2823 http://www.leader.co.jp

Feb. 27, 2012 Ver.2 (FW Ver.8.8)