

LV 58SER02

EYE PATTERN UNIT

INSTRUCTION MANUAL

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1. INTRODUCTION

1.1 SDI Signal Measurement

When measuring SDI signals, keep the following points in mind.

Measurement Conditions

Be sure to use a color bar signal when measuring jitter and SDI signal eye pattern amplitude. When measuring the rise time (Tr), fall time (Tf), or eye pattern amplitude of a transmission device's output connector, use a high-quality 1-m 5C-FB or Belden 8281 cable.

Automatic Eye Pattern Measurement

The LV 58SER02 uses a histogram to automatically measure eye pattern amplitude, rise time (Tr), and fall time (Tf). Also, the LV 58SER02 algorithms are optimized for reducing overshoot, undershoot, and noise.

In automatic rise time (Tr) and fall time (Tf) measurement, the LV 58SER02 detects the points where the eye pattern crosses the 20 % and 80 % levels of the amplitude and measures the time difference.

The difference between automatic and manual measurement is small when measuring a relatively symmetrical waveform with no overshoot and undershoot and little noise. However, the difference between the two methods can become quite pronounced if there is a high degree of noise and jitter.

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 8281 cable. Before measuring, be sure to check the cable's connectors to make sure that they are clean and in good condition.

Automatic Jitter Measurement

SMPTE defines two methods of measuring jitter. One method uses an eye pattern, and the other method uses a phase modulator. LV 58SER02 automatic measurement uses the latter method.

These two methods can produce different measured values.

The method of measuring jitter from an eye pattern waveform can only be used when the amount of jitter is small, because in principle, measurement can only be carried out when the eyes in the pattern are open. Another shortcoming is that measurement is prone to errors, because it can be difficult to distinguish between jitter and waveform distortions such as noise and sag.

On the other hand, the phase modulator measurement method does not suffer from the shortcomings described above, and so is more suitable for making accurate measurements. In automatic measurement, the LV 58SER02 averages measured values so that they do not fluctuate minutely even when the jitter level does. The LV 58SER02 uses the optimum number of values for averaging.

1.2 Installing the Unit

- To the LV 5800 (MULTI MONITOR)

The LV 58SER02 is an input unit. Refer to the LV 5800 instruction manual, and install the LV 58SER02 in a slot from 2 to 4. You can only install one LV 58SER02 in the LV 5800.

- To the LV 7800 (MULTI RASTERRIZER)

For the LV 7800, the LV 58SER02 is a factory option. You cannot install or uninstall units. Contact your local LEADER agent.

You can only install one LV 58SER02 in the LV 7800.

- To the LV 7380 (MULTI SDI RASTERRIZER)

For the LV 7380, the LV 58SER02 is a factory option. You cannot install or uninstall units. Contact your local LEADER agent.

The LV 7380 cannot produce jitter output when the LV 58SER02 is installed in it.

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 and LV 7380.

2. PRODUCT SPECIFICATIONS

2.1 General

The LV 58SER02 is an optional unit for displaying eye patterns. It can be inserted into an LV 5800 (MULTI MONITOR) input slot or installed in the LV 7800 (MULTI RASTERIZER) or LV 7380 (MULTI SDI RASTERIZER).

When the LV 58SER02 is installed in the LV 7380 or used with the LV 58SER01A (SDI INPUT), it can display the eye patterns of SDI signals and measure their jitter. Also, when the LV 58SER02 is used with the LV 58SER04 (MPEG DECODER), it can display the eye patterns of DVB-ASI signals.

2.2 Features

- **Supported Formats**

Supports HD-SDI, SD-SDI, and DVB-ASI.

- **Capable of Displaying Eye Patterns and Measuring Jitter for Six Different Signals**

By using the LV 58SER02 with 3 input units and switching between input channels A and B, you can display eye patterns and measure jitter for up to six different signals. *1, *2

- **Eye Pattern Display**

You can display the eye patterns of both timing jitter and alignment jitter by switching filters.

- **Jitter Measurement**

Phase modulation jitter measurement allows you to accurately measure jitter even if an eye pattern is closed. You can switch the jitter filter to measure timing jitter and alignment jitter.

- **Jitter Output**

The detected jitter is output from the rear panel, and can be analyzed using a device such as an FFT analyzer. *3

- **Automatic Measurement**

The LV 58SER02 can automatically measure eye pattern amplitude, rise time, and fall time in the eye pattern display, and it can automatically measure timing jitter and alignment jitter using the phase modulation method. In the jitter display, the LV 58SER02 can automatically measure timing jitter and alignment jitter.

- **Simultaneous Multi-Screen Display**

You can display eye pattern waveforms and jitter waveforms simultaneously on multiple screens. *2

- **Jitter Display Using Video Sweep**

V rate and H rate sweep displays are available.

- **Alarm Monitoring**

In the eye pattern display, the LV 58SER02 can monitor the eye pattern amplitude, the timing jitter, the alignment jitter, the rise time (Tr), the fall time (Tf), and the difference between the rise time and the fall time (Tr-Tf). The LV 58SER02 will display an alarm when these measured values exceed their specified threshold values.

2. PRODUCT SPECIFICATIONS

- *1 You cannot install more than two LV 58SER02 units.
- *2 You cannot display the eye pattern waveforms and jitter waveforms of two different signal systems simultaneously.
- *3 Only the timing jitter is output (10 Hz or greater), regardless of the filter setting. The LV 7380 (MULTI SDI RASTERIZER) cannot produce jitter output when the LV 58SER02 is installed in it.
- * Jitter display is not available for DVB-ASI signal input.

2.3 Specifications

2.3.1 Supported Formats

Supported Standards

| | |
|---------|------------|
| HD-SDI | SMPTE292M |
| SD-SDI | SMPTE259M |
| DVB-ASI | EN 50083-9 |

Supported Data Rates

| | |
|---------|--------------------------------|
| HD-SDI | 1.485 Gbps or 1.485/1.001 Gbps |
| SD-SDI | 270 Mbps |
| DVB-ASI | 270 Mbps |

2.3.2 Eye Pattern Display Section

Display Displays the input waveform before equalizing

Method Equivalent time sampling

Frequency Characteristics -3 to 1 dB (50 kHz to 2.3 GHz)

Amplitude Accuracy 800 mV \pm 5 % (for 800 mV input)

Time Axis

2 UI Display

| | |
|----|------------|
| HD | 100 ps/div |
| SD | 550 ps/div |

4 UI Display

| | |
|----|-------------|
| HD | 200 ps/div |
| SD | 1100 ps/div |

16 UI Display

| | |
|----|-------------|
| HD | 800 ps/div |
| SD | 4400 ps/div |

Time Axis Accuracy

\pm 3 %

Filter

| | |
|-----------|-------------|
| 10 Hz | HPF 10 Hz |
| 100 Hz | HPF 100 Hz |
| 1 kHz | HPF 1 kHz |
| 100 kHz | HPF 100 kHz |
| TIMING *1 | HPF 10 Hz |

ALIGNMENT *1

| | |
|----|-------------|
| HD | HPF 100 kHz |
| SD | 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. PRODUCT SPECIFICATIONS

| | |
|----------------------------------|--|
| Automatic Measurement Settings | Can be switched on and off Eye pattern waveform amplitude, rise time, fall time, phase modulation timing jitter and current jitter *1 |
| Alarm Monitoring Monitored Items | Can be switched on and off. Threshold values can be set. Eye pattern waveform amplitude, rise time, fall time, difference between rise time and fall time, timing jitter, and current jitter *1 |

*1 The timing jitter and current jitter of a DVB-ASI signal input cannot be set, displayed, or measured.
The current jitter is the jitter value for the currently selected filter.

2.3.3 Jitter Display Section

| | |
|---------------------------|---|
| Display | Displays the jitter component of an SDI input signal |
| Method | Phase detection method |
| Gain | ×8/×2/×1 |
| Sensitivity | |
| ×8 | −0.6 to 0.6 UI |
| ×2 | −2.4 to 2.4 UI |
| ×1 | −4.8 to 4.8 UI |
| Amplitude Accuracy | ±10 % (typical value for when the input jitter is 1 UI, input jitter frequency is 10 kHz, the filter setting is 100 Hz, and the gain setting is ×8) |
| Frequency Characteristics | −3 to 1 dB (10 Hz to 1 MHz) |
| Time Axis | 1H, 2H, 1V and 2V rates |
| 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 | |
| HD | HPF 100 kHz |
| SD | HPF 1 kHz |
| Cursor Measurement | Jitter measurement using cursors |
| Automatic Measurement | Displays the amount of jitter in seconds (sec) and unit intervals (UIp-p) |
| Settings | Timing jitter, current jitter *1 |
| Alarm Monitoring | Can be switched on and off. Threshold values can be set. |
| Monitored Items | Timing jitter, current jitter *1 |

*1 The current jitter is the jitter value for the currently selected filter.

* Jitter display is not available for DVB-ASI signal input.

2. PRODUCT SPECIFICATIONS

2.3.4 Jitter Output

| | |
|------------------|--|
| Output Connector | 75 Ω BNC connector, 1 output |
| Output Level | 250 mV \pm 20 % (With a 75 Ω terminator, a jitter amplitude of 1 UI, and a jitter frequency of 10 kHz) |

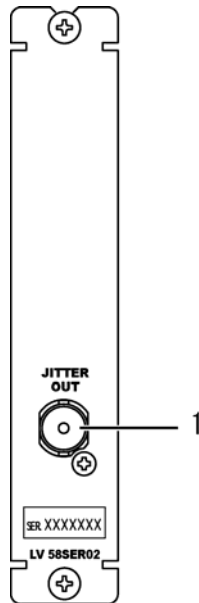
* The LV 7380 (MULTI SDI RASTERIZER) cannot produce jitter output when the LV 58SER02 is installed in it.

2.3.5 General Specifications

| | |
|--------------------------|--|
| Environmental Conditions | Same as the LV 5800/7800 |
| Power Consumption | Supplied from the LV 5800/7800 20 W max. |
| Weight | 0.4 kg |
| Accessories | Instruction Manual 1 Cable *1 1 |

*1 To display the eye patterns of multiple units, buy additional cables separately.

3. NAMES AND FUNCTIONS OF PARTS



1 Jitter Output

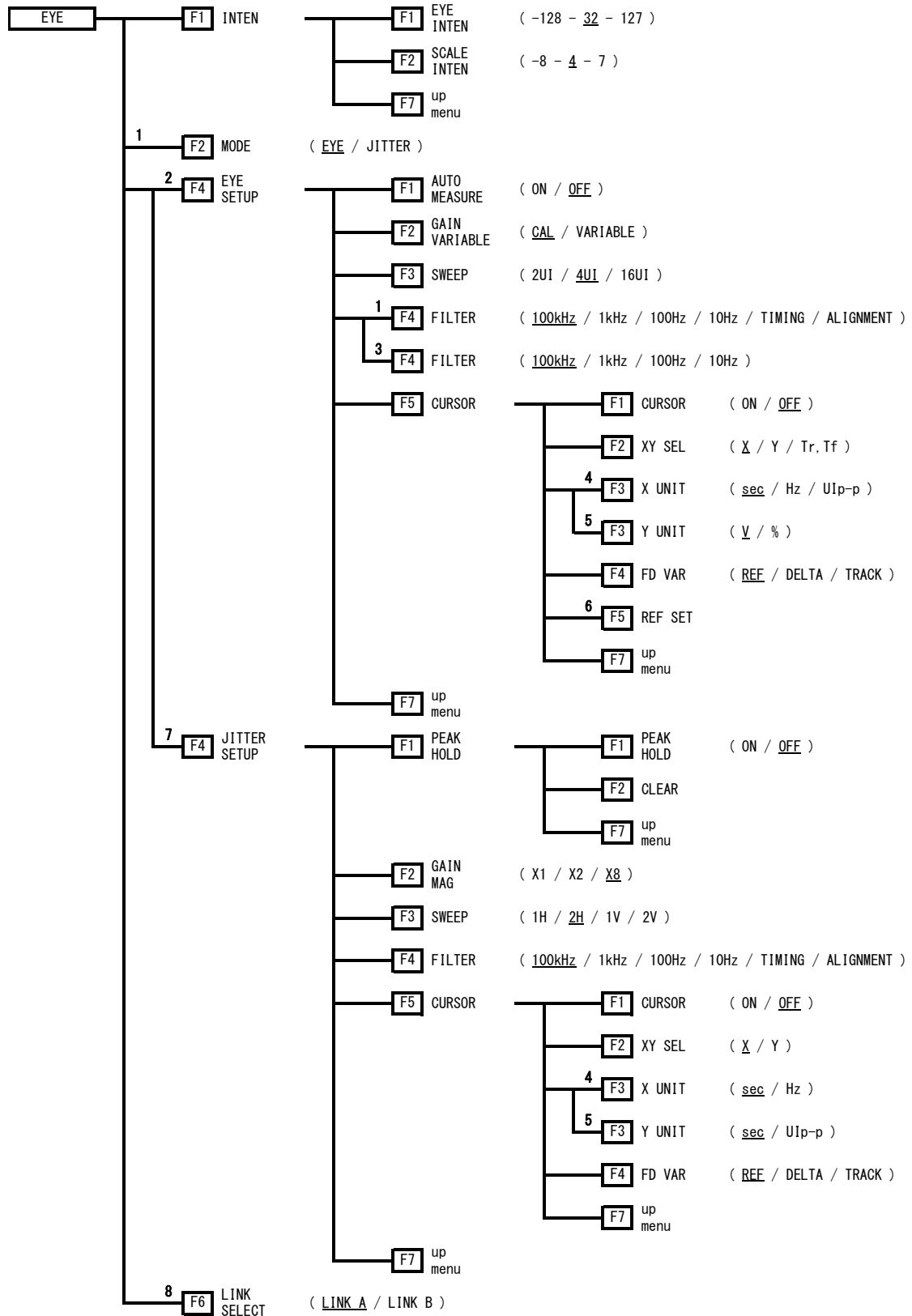
The jitter phase detection output of the SDI signal. Used to analyze the jitter component frequencies such as by connecting to an FFT analyzer.

Only the timing jitter is output (10 Hz or greater), regardless of the filter setting.

The LV 58SER02 does not have a JITTER OUT terminal when it is installed in the LV 7380 (MULTI SDI RASTERIZER)

4. MENU STRUCTURE

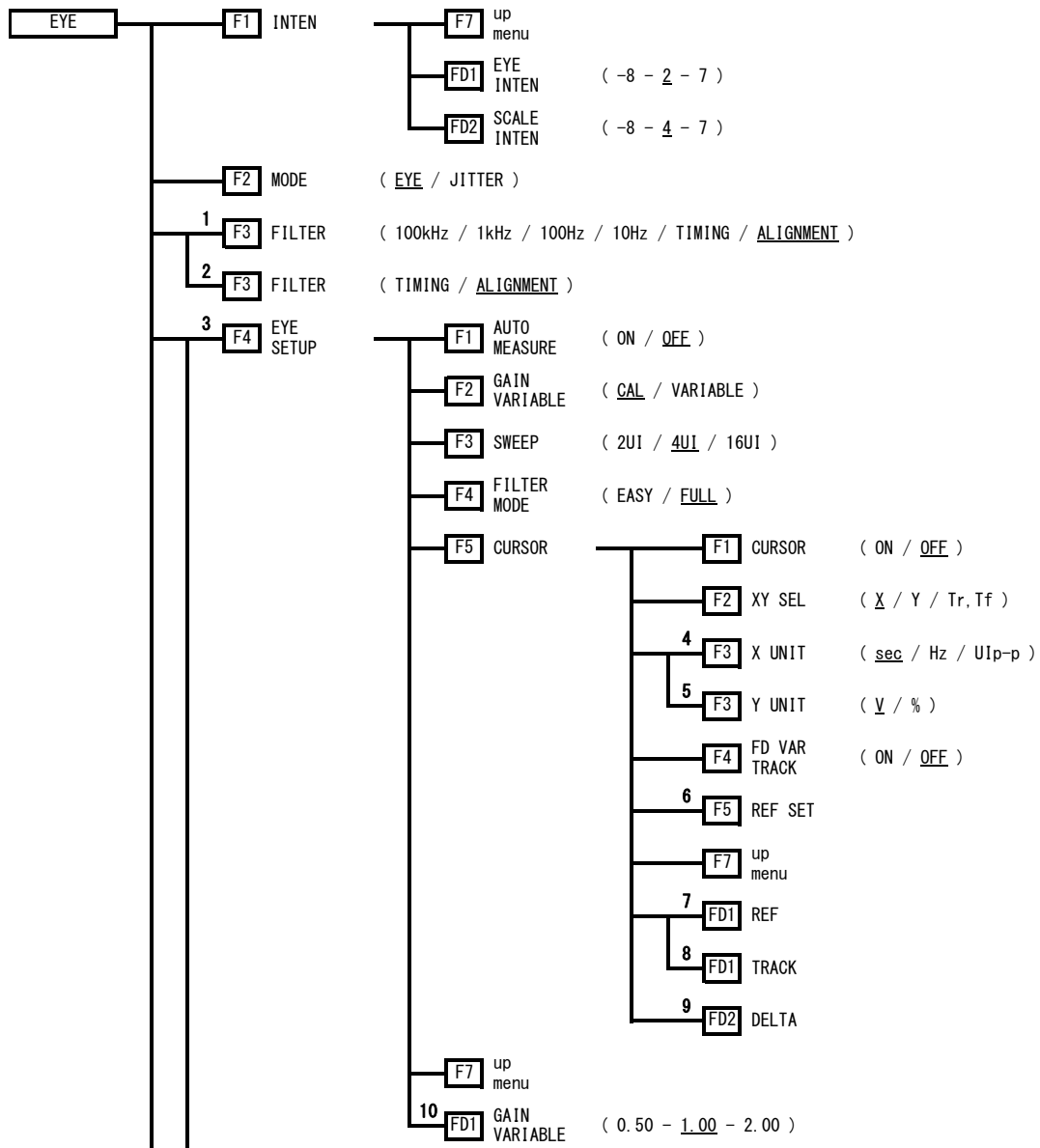
4.1 When the LV 58SER02 Is Installed In the LV 5800 or LV 7800



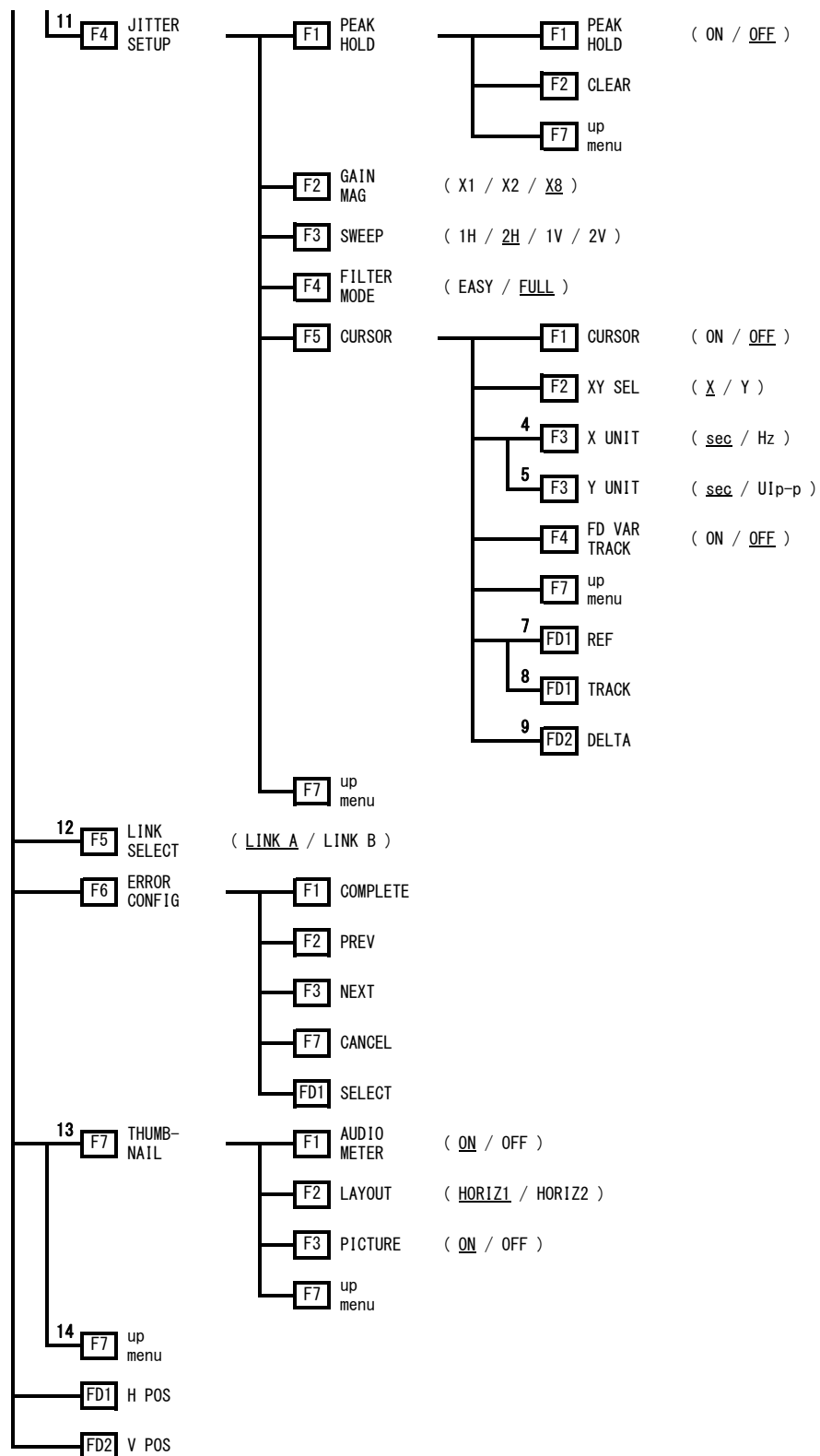
4. MENU STRUCTURE

- *1 Appears when a slot that contains the LV 58SER01A (SDI INPUT) is selected.
- *2 Displayed if MODE is set to EYE.
- *3 Appears when a slot that contains the LV 58SER04 (MPEG DECODER) is selected.
- *4 Displayed if XY SEL of the same level is X.
- *5 Displayed if XY SEL of the same level is Y.
- *6 Displayed if Y UNIT of the same level is % or if XY SEL of the same level is Tr,Tf.
- *7 Displayed if MODE is set to JITTER.
- *8 Appears when the link format is set to dual.

4.2 When the LV 58SER02 Is Installed In the LV 7380



4. MENU STRUCTURE



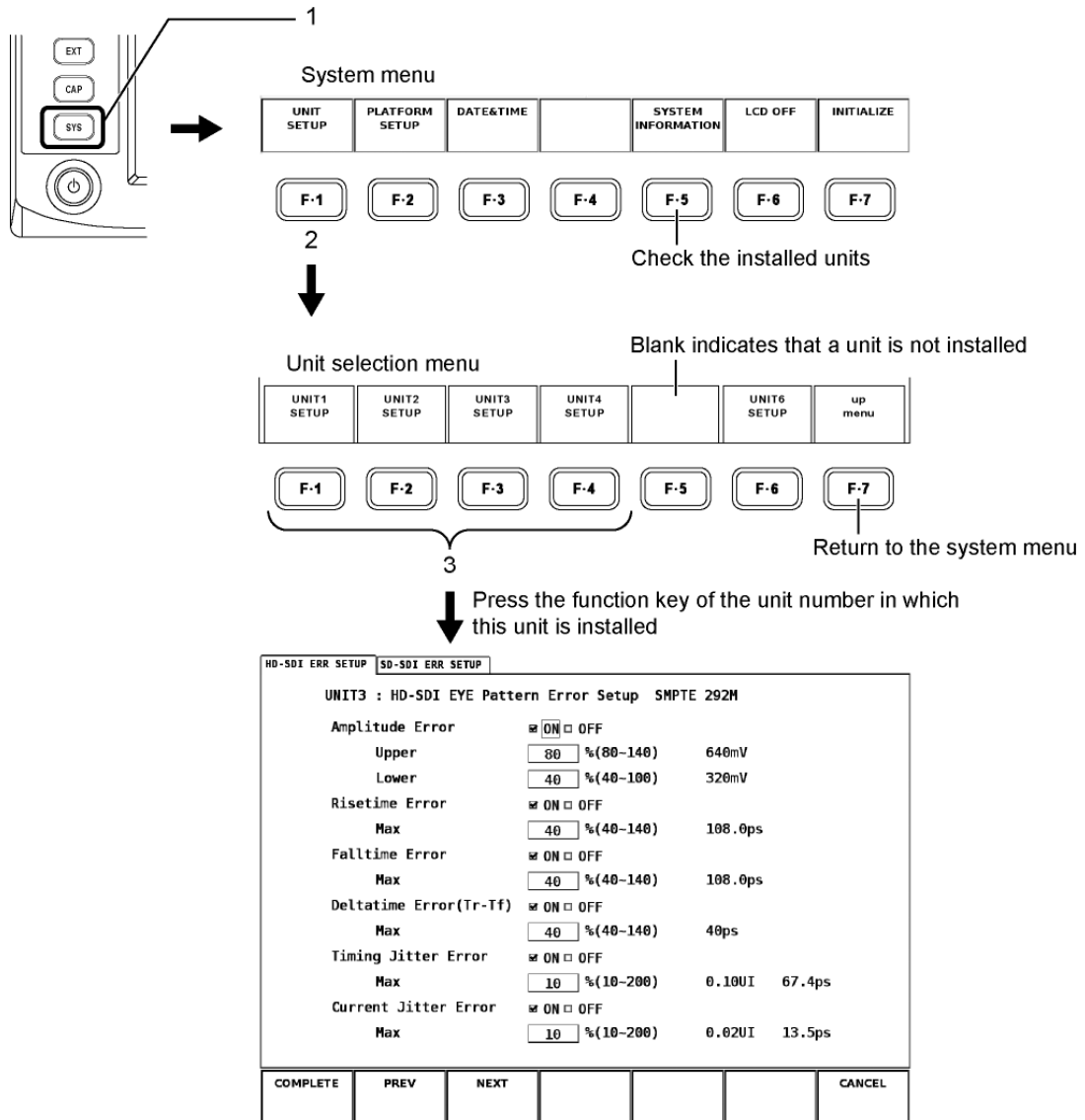
4. MENU STRUCTURE

- *1 Displayed if FILTER MODE is set to FULL.
- *2 Displayed if FILTER MODE is set to EASY.
- *3 Displayed if MODE is set to EYE.
- *4 Displayed if XY SEL of the same level is X.
- *5 Displayed if XY SEL of the same level is Y.
- *6 Displayed if Y UNIT of the same level is % or if XY SEL of the same level is Tr,Tf.
- *7 Appears when CURSOR (in the same menu level) is set to ON and FD VAR TRACK is set to OFF.
- *8 Appears when CURSOR (in the same menu level) is set to ON and FD VAR TRACK is set to ON.
- *9 Appears when CURSOR (in the same menu level) is set to ON.
- *10 Appears when GAIN VARIABLE is set to VARIABLE.
- *11 Displayed if MODE is set to JITTER.
- *12 Appears when the link format is set to dual.
- *13 Appears in the single-screen display.
- *14 Appears in the multi-screen display.

5. CONFIGURING ERROR DETECTION

This section explains how to configure the error detection settings of the LV 58SER02. If error detection is turned ON and the measured value exceeds the specified value, the measured value in the eye pattern display screen or jitter display screen is displayed in red.

- Key Operation to Display the Setup Screen (On the LV 5800 and LV 7800)**



- Key Operation to Display the Setup Screen (On the LV 7380)**

Press **EYE**, and then press **F.6** ERROR CONFIG.

- **Setup Items**

The setup items of each page are illustrated below.

HD-SDI ERR SETUP (HD-SDI Error Setup):

Sets eye pattern and jitter output errors for the case when the input signal is HD

→ Section 5.1, "HD-SDI Error Setup (HD-SDI ERR SETUP)"

SD-SDI ERR SETUP (SD-SDI Error Setup):

Sets eye pattern and jitter output errors for the case when the input signal is SD

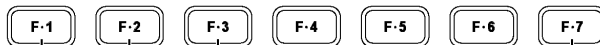
→ Section 5.2, "SD-SDI Error Setup (SD-SDI ERR SETUP)"

| HD-SDI ERR SETUP | | SD-SDI ERR SETUP | |
|---|---|------------------|--|
| UNIT3 : HD-SDI EYE Pattern Error Setup SMPTE 292M | | | |
| Amplitude Error | <input checked="" type="checkbox"/> ON <input type="checkbox"/> OFF | | |
| Upper | <input type="text" value="80"/> $\%$ (80~140) | 640mV | |
| Lower | <input type="text" value="40"/> $\%$ (40~100) | 320mV | |

5.1 HD-SDI Error Setup (HD-SDI ERR SETUP)

The HD-SDI ERR SETUP page is used to specify settings related to the error detection of the eye pattern waveform and jitter waveform for the HD input signal.

| HD-SDI ERR SETUP | | SD-SDI ERR SETUP | |
|---|---|------------------|--------|
| UNIT3 : HD-SDI EYE Pattern Error Setup SMPTE 292M | | | |
| Amplitude Error | <input checked="" type="checkbox"/> ON <input type="checkbox"/> OFF | | |
| Upper | <input type="text" value="80"/> $\%$ (80~140) | 640mV | |
| Lower | <input type="text" value="40"/> $\%$ (40~100) | 320mV | |
| Risetime Error | <input checked="" type="checkbox"/> ON <input type="checkbox"/> OFF | | |
| Max | <input type="text" value="40"/> $\%$ (40~140) | 108.0ps | |
| Falltime Error | <input checked="" type="checkbox"/> ON <input type="checkbox"/> OFF | | |
| Max | <input type="text" value="40"/> $\%$ (40~140) | 108.0ps | |
| Deltatime Error(Tr-Tf) | <input checked="" type="checkbox"/> ON <input type="checkbox"/> OFF | | |
| Max | <input type="text" value="40"/> $\%$ (40~140) | 40ps | |
| Timing Jitter Error | <input checked="" type="checkbox"/> ON <input type="checkbox"/> OFF | | |
| Max | <input type="text" value="10"/> $\%$ (10~200) | 0.10UI | 67.4ps |
| Current Jitter Error | <input checked="" type="checkbox"/> ON <input type="checkbox"/> OFF | | |
| Max | <input type="text" value="10"/> $\%$ (10~200) | 0.02UI | 13.5ps |
| COMPLETE | PREV | NEXT | CANCEL |



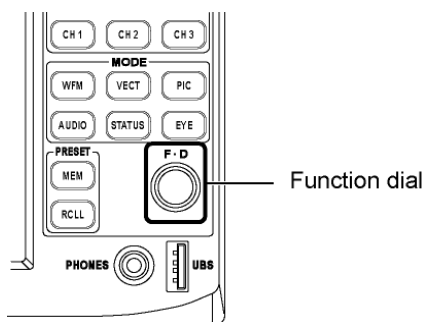
Change the settings and
return to the previous menu

Move to the SD-SDI ERR SETUP page

Return to the previous menu
without changing the settings

- **Setting the Items**

Use the function dial (F•D) at the front panel and place checks in the relevant setup items.



Checking the Setup Items

1. Turn the function dial (F•D) to move the cursor.
2. Press the function dial (F•D) at the relevant item.

A red check appears in the box of the selected item, and the check placed on the previously selected item clears.

Entering Values

1. Turn the function dial (F•D) to move the cursor.
2. Press the function dial (F•D).
3. Turn the function dial (F•D) to select the desired value.
4. Press the function dial (F•D).

On the LV 5800 and LV 7800, the text box turns yellow-green.

On the LV 7380, the cursor turns yellow.

The specified value appears in the input box.

Applying the Settings

1. Press **F•1** COMPLETE.

The settings are applied. After the settings are applied, the previous menu is displayed.

The settings are applied only if you carry out this step.

If you do not want to apply the settings, press **F•7** CANCEL. The settings are not applied, and the previous menu is displayed.

Applying the Setup Items at Once

You can also apply the settings all at once after specifying the settings for both tabs. To do so, after specifying the settings for the current tab, press **F•3** NEXT or **F•2** PREV to move between tabs and continue specifying the settings for the next tab, and then press **F•1** COMPLETE when you have finished.

* Press **F•7** CANCEL to not apply any of the specified settings.

- **Description of Setup Items**

- **Amplitude Error**

Controls the error detection related to the amplitude of the eye pattern waveform.

ON: Enables error detection

OFF: Disables error detection (initial setting)

If you specify ON, you can set the upper and lower limits.

The lower limit must be less than or equal to the upper limit.

Upper: Sets the upper limit (selectable range: 80 to 140 % (640 to 1120 mV))

Lower: Sets the lower limit (selectable range: 40 to 100 % (320 to 800 mV))

- **Risetime Error**

Controls the error detection related to the rise time of the eye pattern waveform.

ON: Enables error detection

OFF: Disables error detection (initial setting)

If you specify ON, you can set the upper limit.

Max: Sets the upper limit (selectable range: 40 to 140 % (108.0 to 378.0 ps))

- **Falltime Error**

Controls the error detection related to the fall time of the eye pattern waveform.

ON: Enables error detection

OFF: Disables error detection (initial setting)

If you specify ON, you can set the upper limit.

Max: Sets the upper limit (selectable range: 40 to 140 % (108.0 to 378.0 ps))

- **Deltatime Error**

Controls the error detection related to the difference between the rise time and the fall time of the eye pattern waveform. When the measured values exceed the specified value, Tr and Tf are both displayed in red.

ON: Enables error detection

OFF: Disables error detection (initial setting)

If you specify ON, you can set the upper limit.

Max: Sets the upper limit (selectable range: 40 to 140 % (40 to 140 ps))

- **Timing Jitter Error**

Controls the error detection related to the timing jitter of the eye pattern waveform and jitter waveform.

ON: Enables error detection

OFF: Disables error detection (initial setting)

If you specify ON, you can set the upper limit.

Max: Sets the upper limit (selectable range: 10 to 200 % (0.10 to 2.00 UI, 67.4 to 1348.0 ps))

- **Current Jitter Error**

Controls the error detection related to the current jitter of the eye pattern waveform and jitter waveform.

ON: Enables error detection

OFF: Disables error detection (initial setting)

If you specify ON, you can set the upper limit.

Max: Sets the upper limit (selectable range: 10 to 200 % (0.02 to 0.40 UI, 13.5 to 270.0 ps))

- **HD-SDI ERR SETUP Configuration Example**

To satisfy the SMPTE 292M measurement standards, set HD-SDI ERR SETUP as follows.

| Item | | Setting | Corresponding value |
|--------------------------|-------|---------|---------------------|
| Amplitude Error | Upper | 110 % | 880 mV |
| | Lower | 90 % | 720 mV |
| Rise Time Error | Max | 100 % | 270 ps |
| Fall Time Error | Max | 100 % | 270 ps |
| Delta Time Error (Tr-Tf) | Max | 100 % | 100 ps |
| Timing Jitter Error | Max | 100 % | 1.0 UI |
| Current Jitter Error * | Max | 100 % | 0.2 UI |

- * SMPTE 292M requires that the alignment jitter be measured. Set the LV 58SER02 filter to ALIGNMENT or 100 kHz, and then use the measured current jitter value to search for errors. (The current jitter is the jitter value for the currently selected filter.)

5.2 SD-SDI Error Setup (SD-SDI ERR SETUP)

The SD-SDI ERR SETUP page is used to specify settings related to the error detection of the eye pattern waveform and jitter waveform for the SD input signal.

UNIT3 : SD-SDI EYE Pattern Error Setup SMPTE 259M

| | | | | |
|------------------------|--|---|--------|--------|
| Amplitude Error | | <input checked="" type="checkbox"/> ON <input type="checkbox"/> OFF | | |
| Upper | <input type="text" value="80"/> % (80~140) | | 640mV | |
| Lower | <input type="text" value="40"/> % (40~100) | | 320mV | |
| Risetime Error | | <input checked="" type="checkbox"/> ON <input type="checkbox"/> OFF | | |
| Max | <input type="text" value="40"/> % (40~140) | | 0.60ns | |
| Falltime Error | | <input checked="" type="checkbox"/> ON <input type="checkbox"/> OFF | | |
| Max | <input type="text" value="40"/> % (40~140) | | 0.60ns | |
| Deltatime Error(Tr-Tf) | | <input checked="" type="checkbox"/> ON <input type="checkbox"/> OFF | | |
| Max | <input type="text" value="40"/> % (40~140) | | 0.20ns | |
| Timing Jitter Error | | <input checked="" type="checkbox"/> ON <input type="checkbox"/> OFF | | |
| Max | <input type="text" value="10"/> % (10~200) | | 0.02UI | 0.07ns |
| Current Jitter Error | | <input checked="" type="checkbox"/> ON <input type="checkbox"/> OFF | | |
| Max | <input type="text" value="10"/> % (10~200) | | 0.02UI | 0.07ns |

COMPLETE PREV NEXT [] [] [] CANCEL

F-1 F-2 F-3 F-4 F-5 F-6 F-7

Change the settings and return to the previous menu

Move to the HD-SDI ERR SETUP page

Return to the previous menu without changing the settings

• Setting the Items

[See also] Setting each item → Section 5.1, “HD-SDI Error Setup (HD-SDI ERR SETUP)”

• Description of Setup Items

• Amplitude Error

Controls the error detection related to the amplitude of the eye pattern waveform.

ON: Enables error detection

OFF: Disables error detection (initial setting)

If you specify ON, you can set the upper and lower limits.

The lower limit must be less than or equal to the upper limit.

Upper: Sets the upper limit (selectable range: 80 to 140 % (640 to 1120 mV))

Lower: Sets the lower limit (selectable range: 40 to 100 % (320 to 800 mV))

• Risetime Error

Controls the error detection related to the rise time of the eye pattern waveform.

ON: Enables error detection

OFF: Disables error detection (initial setting)

If you specify ON, you can set the upper limit.

Max: Sets the upper limit (selectable range: 40 to 140 % (0.60 to 2.10 ns))

• Falltime Error

Controls the error detection related to the fall time of the eye pattern waveform.

ON: Enables error detection

OFF: Disables error detection (initial setting)

If you specify ON, you can set the upper limit.

Max: Sets the upper limit (selectable range: 40 to 140 % (0.60 to 2.10 ns))

• Deltatime Error

Controls the error detection related to the difference between the rise time and the fall time of the eye pattern waveform. When the measured values exceed the specified value, Tr and Tf are displayed in red.

ON: Enables error detection

OFF: Disables error detection (initial setting)

If you specify ON, you can set the upper limit.

Max: Sets the upper limit (selectable range: 40 to 140 % (0.20 to 0.70 ns))

• Timing Jitter Error

Controls the error detection related to the timing jitter of the eye pattern waveform and jitter waveform.

ON: Enables error detection

OFF: Disables error detection (initial setting)

If you specify ON, you can set the upper limit.

Max: Sets the upper limit (selectable range: 10 to 200 % (0.02 to 0.40 UI, 0.07 to 1.48 ns))

• Current Jitter Error

Controls the error detection related to the current jitter of the eye pattern waveform and jitter waveform.

ON: Enables error detection

OFF: Disables error detection (initial setting)

If you specify ON, you can set the upper limit.

Max: Sets the upper limit (selectable range: 10 to 200 % (0.02 to 0.40 UI, 0.07 to 1.48 ns))

• SD-SDI ERR SETUP Configuration Example

To satisfy the SMPTE 259M measurement standards, set SD-SDI ERR SETUP as follows.

| Item | | Setting | Corresponding value |
|--------------------------|-------|---------|---------------------|
| Amplitude Error | Upper | 110 % | 880 mV |
| | Lower | 90 % | 720 mV |
| Rise Time Error | Max | 100 % | 1.5 ns |
| Fall Time Error | Max | 100 % | 1.5 ns |
| Delta Time Error (Tr-Tf) | Max | 100 % | 0.5 ns |
| Timing Jitter Error | Max | 100 % | 0.2 UI |
| Current Jitter Error * | Max | 100 % | 0.2 UI |

* SMPTE 259M requires that the alignment jitter be measured. Set the LV 58SER02 filter to ALIGNMENT or 1kHz, and then use the measured current jitter value to search for errors. (The current jitter is the jitter value for the currently selected filter.)

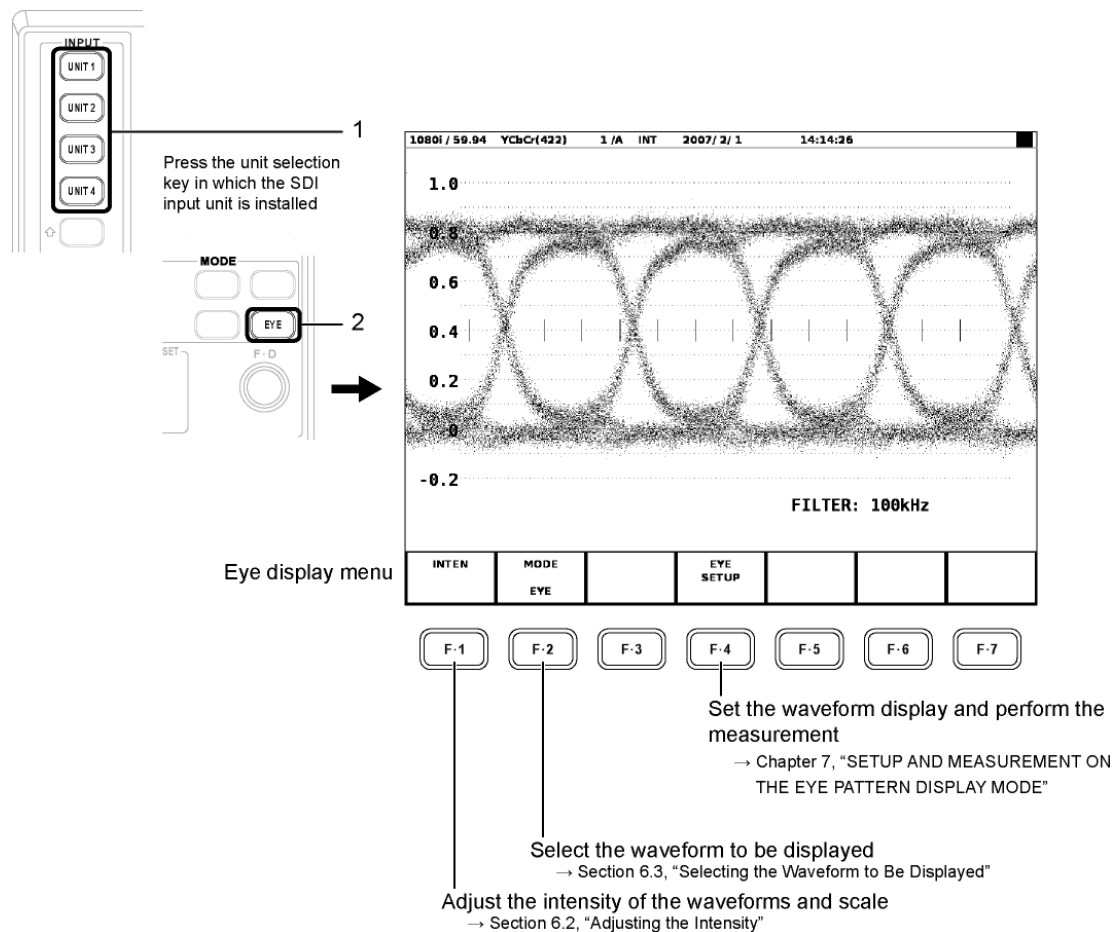
6. EYE PATTERN WAVEFORM AND JITTER WAVEFORM DISPLAY

The LV 58SER02 displays the eye pattern waveform and jitter waveform of the signal applied to the LV 58SER01A (SDI INPUT) or LV 58SER04 (MPEG DECODER) or LV 7380(MULTI SDI RASTERIZER) input. *1

On the LV 5800 or LV 7800, to display the eye pattern, press the unit selection key (UNIT1 to UNIT4) of the slot in which the LV 58SER01A (SDI INPUT) or LV 58SER04 (MPEG DECODER) is installed, and then press the EYE key. *2

On the LV 7380, all you have to do is press the EYE key to display the eye pattern.

Press the EYE key to display the eye pattern or jitter waveform and a menu. The eye pattern waveform display shows the eye display menu; the jitter waveform display shows the jitter display menu. Press **F·2** MODE to switch between the displayed waveforms.



*1 Jitter waveform display is not available for DVB-ASI signal input.

*2 If you press the unit selection key in which this unit is installed, and error message will be displayed.

• Simultaneous Display in the Multi Screen Display

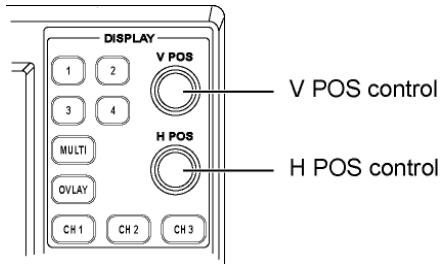
The maximum simultaneous displays are two displays consisting of the eye pattern display and jitter display.

If the selected area is set to eye pattern display in advance, the area selected later is set to the jitter display, and vice versa.

To perform simultaneous display, the input signal must be the same. Select the same unit number and same channel (A or B) for the two screens to be displayed simultaneously.

6.1 Setting the Waveform Display Position

On the LV 5800 and LV 7800, you can adjust the positions of eye-pattern and jitter waveforms using the V POS (vertical position) and H POS (horizontal position) knobs on the front panel.



On the LV 7380, you can adjust the position by using **F•D 1** H POS and **F•D 2** V POS in the eye display menu.

- **V POS Control**

Adjusts the vertical display position of the eye pattern or jitter waveform.

Press the control to reset the vertical display position of the waveform to the reference position.

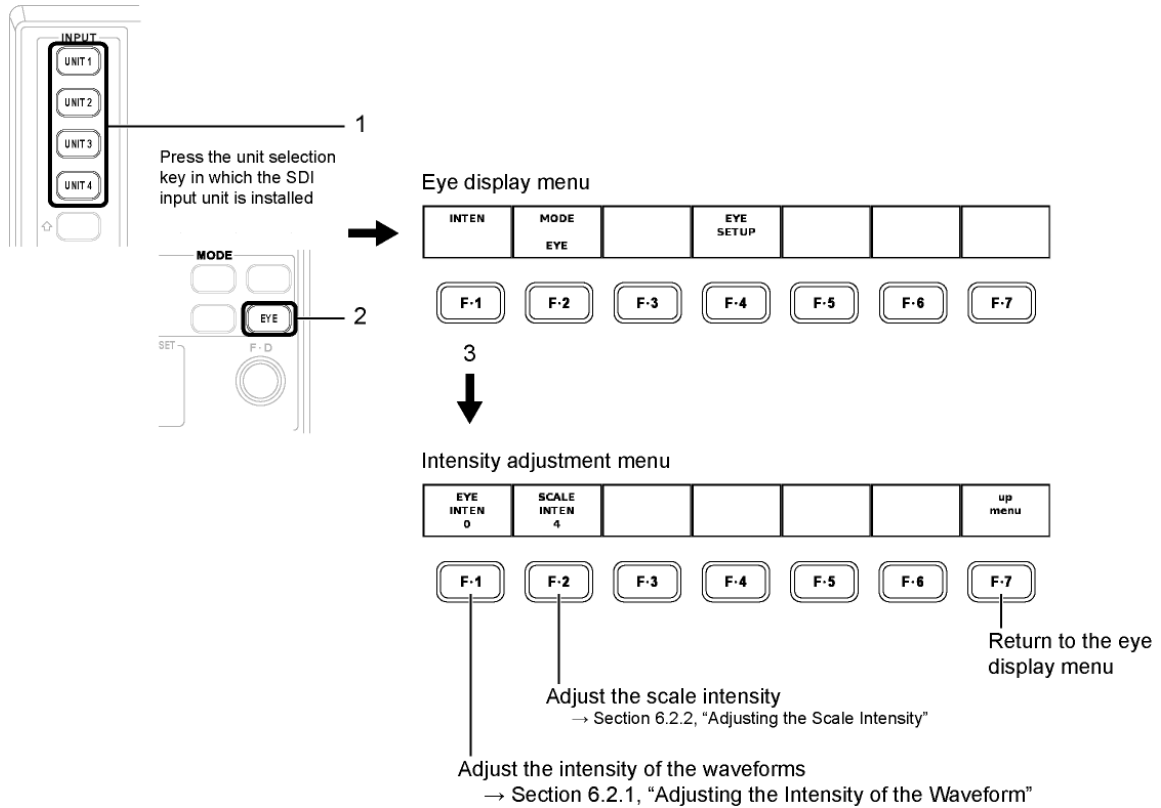
- **H POS Control**

Adjusts the horizontal display position of the eye pattern or jitter waveform.

Press the control to reset the horizontal display position of the waveform to the reference position.

6.2 Adjusting the Intensity

Carry out the procedure below to display the intensity adjustment menu for the eye pattern waveform and scale.



6.2.1 Adjusting the Intensity of the Waveform

Carry out the procedure below to adjust the intensity of the waveform.

Adjustment range: -128 to 127 (LV 5800, LV 7800)
-8 to 7 (LV 7380)

• Procedure

- For the LV 5800 and LV 7800
EYE → F.1 INTEN → F.1 EYE INTEN : -128 to 32 to 127
- For the LV 7380
EYE → F.1 INTEN → F.D 1 EYE INTEN:-8 to 2 to 7

After carrying out the procedure above, turn the function dial (F•D). Press the function dial (F•D) to return to the default value (32 or 2).

6.2.2 Adjusting the Scale Intensity

Carry out the procedure below to adjust the intensity of the scale.

Adjustment range: -8 to 7

• Procedure

-
-
- For the LV 5800 and LV 7800
`EYE` → `F•1` INTEN → `F•2` SCALE INTEN : -8 to 4 to 7
 - For the LV 7380
`EYE` → `F•1` INTEN → `F•D 2` SCALE INTEN : -8 to 4 to 7
-
-

After carrying out the procedure above, turn the function dial (F•D). Press the function dial (F•D) to return to the default value (4).

6.3 Selecting the Waveform to Be Displayed

Carry out the procedure below to select the waveform to be displayed. The `F•4` key menu varies depending on this selection.

This menu will not appear when the slot that contains the LV 58SER04 is selected.

• Procedure

`EYE` → `F•2` MODE : EYE / JITTER

If you set `F•2` MODE to EYE, `F•4` EYE SETUP appears. You can carry out various settings and measurement on the eye pattern waveform.

[See also] Setup and measurement on the eye pattern waveform display → Chapter 7, "SETUP AND MEASUREMENT ON THE EYE PATTERN DISPLAY MODE."

If you set `F•2` MODE to JITTER, `F•4` JITTER SETUP appears. You can carry out various settings and measurement on the jitter waveform.

[See also] Setup and measurement on the jitter waveform display → Chapter 8, "SETUP AND MEASUREMENT ON THE JITTER DISPLAY MODE."

6.4 Selecting Which Link to Display

When the link format is set to dual, carry out the procedure below to select whether to display the waveform of link A or link B.

• Procedure

-
-
- For the LV 5800 and LV 7800
`EYE` → `F•6` LINK SELECT : LINK A / LINK B
 - For the LV 7380
`EYE` → `F•5` LINK SELECT : LINK A / LINK B
-
-

6.5 Configuring Thumbnails (Only on the LV 7380)

In the LV 7380 eye pattern display, you can display thumbnails of the audio-meter and picture displays. You can set which thumbnails are displayed using the thumbnail configuration menu.

EYE → **F•7** THUMBNAIL →

| | | | | | | | | | | | | | |
|---|----------------------|---|------------------|---|---------------|---|------------|---|------------|---|------------|---|------------|
| 1 | AUDIO METER ON | 2 | LAYOUT HORIZ1 | 3 | PICTURE ON | 4 | | 5 | | 6 | | 7 | up menu |
| | F•1 | | F•2 | | F•3 | | F•4 | | F•5 | | F•6 | | F•7 |

6.5.1 Displaying the Audio Meter

To select whether to display the audio meter, carry out the procedure below.

• Procedure

EYE → **F•7** THUMBNAIL → **F•1** AUDIO METER : ON / OFF

6.5.2 Selecting the Audio Meter Display Format

To select the audio meter display format, follow the procedure below.

HORIZ1: 1st GROUP is displayed on the left side, and 2nd GROUP is displayed on the right side.

HORIZ2: 1st GROUP is displayed on the top two levels and 2nd GROUP is displayed on the bottom two levels.

• Procedure

EYE → **F•7** THUMBNAIL → **F•2** LAYOUT : HORIZ1 / HORIZ2

6.5.3 Picture Display

To select whether to display the picture, carry out the procedure below.

• Procedure

EYE → **F•7** THUMBNAIL → **F•3** PICTURE : ON / OFF

6.6 Event Log

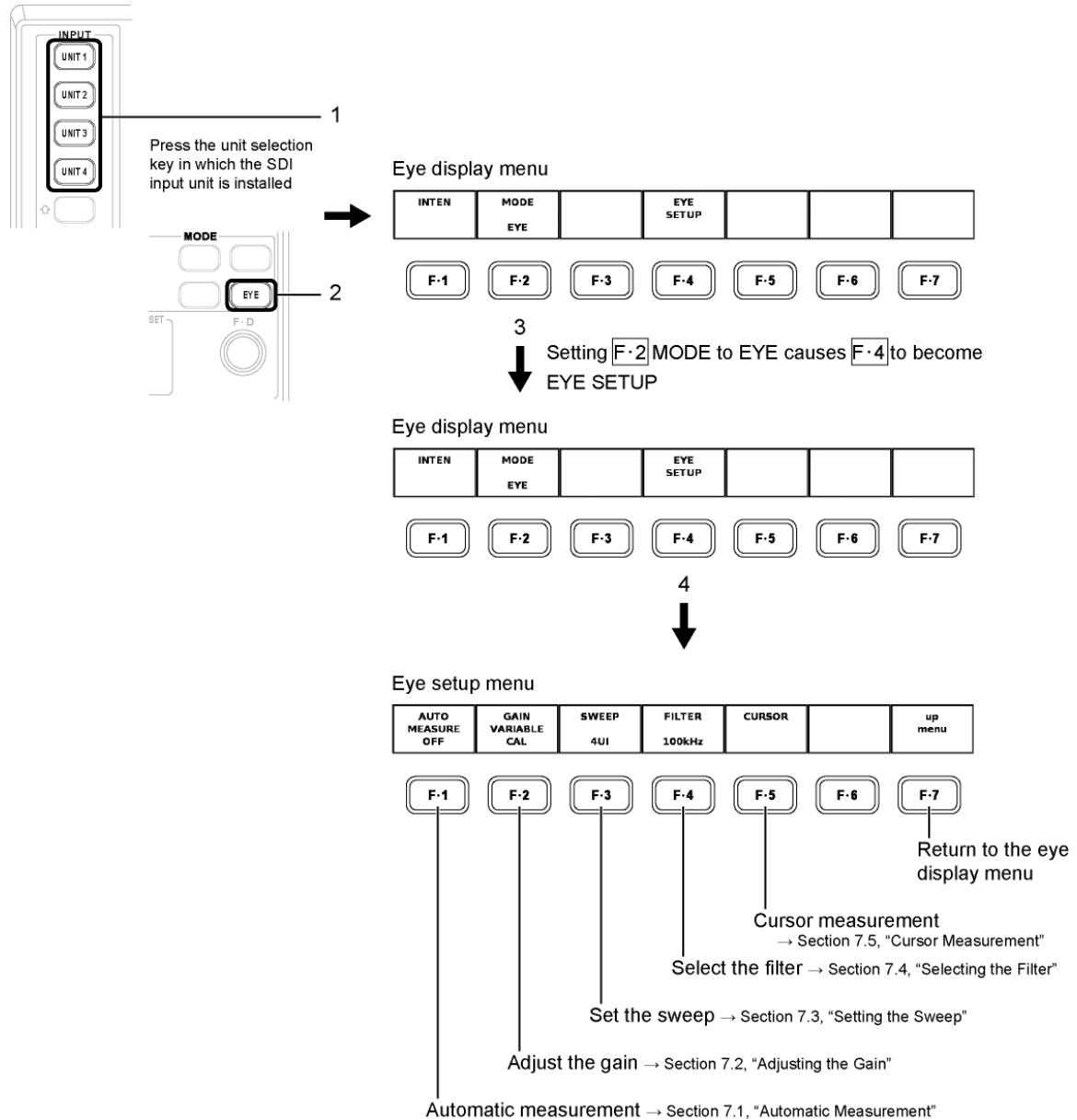
The event names that appear in the event logs of the LV 58SER01A(SDI INPUT), LV 58SER04(MPEG DECODER), and LV 7380(MULTI SDI RASTERIZER) are described below. Of the events listed below, only the items whose error detection you enabled in chapter 5, "Configuring Error Detection," are displayed.

For explanations of the event log, see the instruction manual for the device you are using.

| Event Name | Description |
|--------------|-----------------------------|
| 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_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 |

7. SETUP AND MEASUREMENT ON THE EYE PATTERN DISPLAY MODE

Carry out the procedure below to display the eye setup menu used to set and measure the eye pattern waveform.



7.1 Automatic Measurement

Automatically measures the amplitude, the rise time, the fall time, and the amount of jitter of the eye pattern.

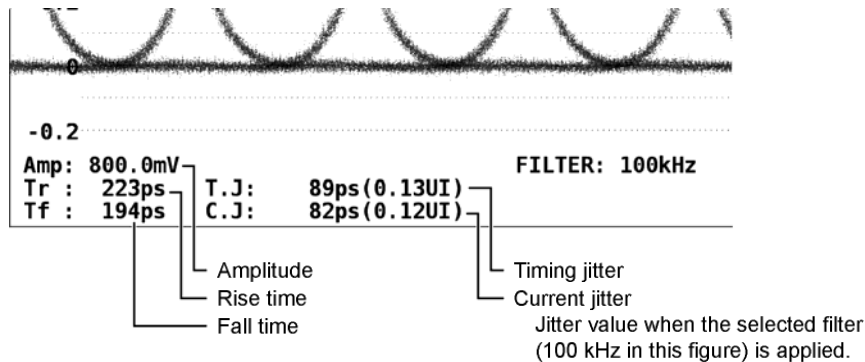
• Procedure

EYE → set **F•2** MODE to EYE → **F•4** EYE SETUP → **F•1** AUTO MEASURE : ON / OFF

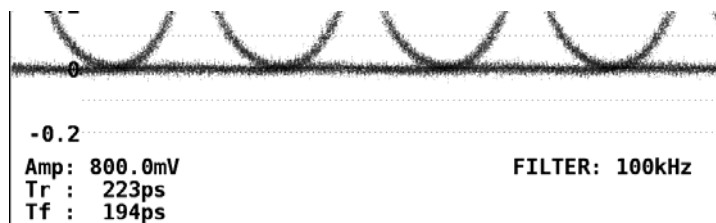
If automatic measurement is turned ON, the amplitude, the rise time (Tr), the fall time (Tf), and the amount of jitter are displayed numerically for the current eye pattern on the screen.

The automatic measurement values of the eye pattern (Amp, Tr, and Tf) are determined through image processing from the waveform data on the screen. This achieves correlation with the values obtained by measuring the eye pattern using a cursor.

In addition, the automatic measurement values of the jitter (T.J and C.J) display the values that are measured in the jitter display mode. The measurement method is phase modulator.



The timing jitter and current jitter values will not appear when the slot that contains the LV 58SER04 (MPEG DECODER) is selected.



7.2 Adjusting the Gain

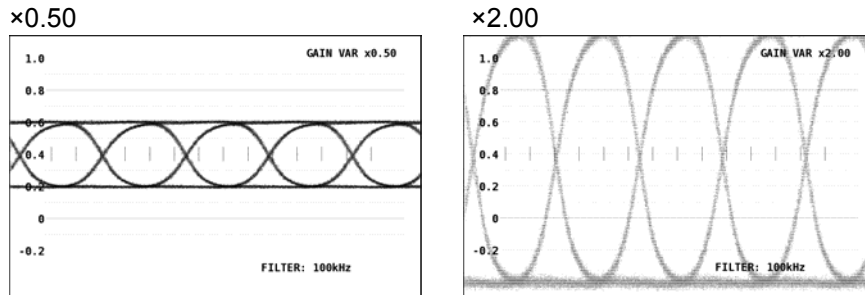
Carry out the procedure below to adjust the gain of the waveform display.

Adjustment range: $\times 0.50$ to $\times 2.00$

• Procedure

EYE → set **F•2** MODE to EYE → **F•4** EYE SETUP → **F•2** GAIN VARIABLE : CAL / VARIABLE

Turn the function dial (F•D) with **F•2** GAIN VARIABLE set to VARIABLE to change the waveform display magnification in the range of $\times 0.50$ to $\times 2.00$. Press the function dial (F•D) to return to the default value ($\times 1.00$). The magnification is displayed at the screen.



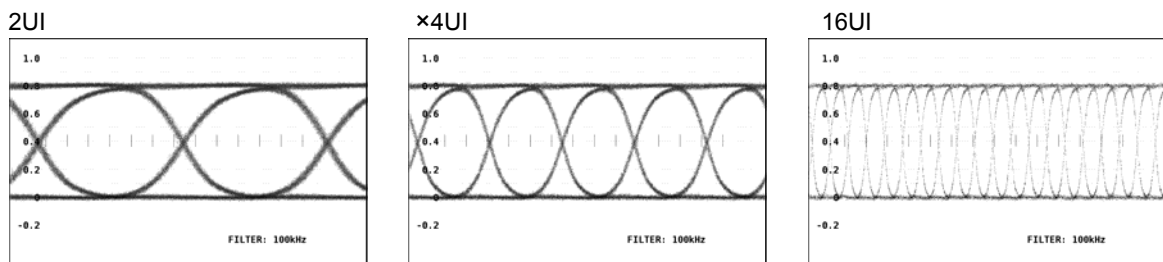
7.3 Setting the Sweep

Carry out the procedure below to set the display periods of the eye pattern.

- 2UI: Displays 2 eye pattern waveforms
- 4UI: Displays 4 eye pattern waveforms
- 16UI: Displays 16 eye pattern waveforms

• Procedure

EYE → set **F•2** MODE to EYE → **F•4** EYE SETUP → **F•3** SWEEP : 2UI / 4UI / 16UI



7.4 Selecting the Filter

Select the bandwidth for the jitter measurement of the SDI signal. This setting is linked to the filter setting in the jitter display mode.

[See also] Selecting the filter of the jitter display mode → Section 8.4, “Selecting the Filter”

- 100 kHz: Displays the jitter components for frequencies greater than or equal to 100 kHz
- 1 kHz: Displays the jitter components for frequencies greater than or equal to 1 kHz
- 100 Hz: Displays the jitter components for frequencies greater than or equal to 100 Hz
- 10 Hz: Displays the jitter components for frequencies greater than or equal to 10 Hz
- TIMING*: Displays the timing jitter (10 Hz or greater)
- ALIGNMENT*: Displays the alignment jitter (100 kHz or greater for HD, 1 kHz or greater for SD).

* Will not appear when a slot that contains the LV 58SER04 (MPEG DECODER) is selected.

• Procedure

- When a slot that contains the LV 58SER01A (SDI INPUT) is selected:
 $\boxed{\text{EYE}} \rightarrow \text{set } \boxed{\text{F}\cdot\text{2}} \text{ MODE to EYE} \rightarrow \boxed{\text{F}\cdot\text{4}} \text{ EYE SETUP} \rightarrow \boxed{\text{F}\cdot\text{4}} \text{ FILTER : } \underline{100\text{kHz}} / 1\text{kHz} / 100\text{Hz} / 10\text{Hz} / \text{TIMING} / \text{ALIGNMENT}$
- When a slot that contains the LV 58SER04 (MPEG DECODER) is selected:
 $\boxed{\text{EYE}} \rightarrow \text{set } \boxed{\text{F}\cdot\text{2}} \text{ MODE to EYE} \rightarrow \boxed{\text{F}\cdot\text{4}} \text{ EYE SETUP} \rightarrow \boxed{\text{F}\cdot\text{4}} \text{ FILTER : } \underline{100\text{kHz}} / 1\text{kHz} / 100\text{Hz} / 10\text{Hz}$
- On the LV 7380 when the filter mode is set to FULL
 $\boxed{\text{EYE}} \rightarrow \boxed{\text{F}\cdot\text{3}} \text{ FILTER : } 100\text{kHz} / 1\text{kHz} / 100\text{Hz} / 10\text{Hz} / \text{TIMING} / \underline{\text{ALIGNMENT}}$
- On the LV 7380 when the filter mode is set to EASY
 $\boxed{\text{EYE}} \rightarrow \boxed{\text{F}\cdot\text{3}} \text{ FILTER : } \text{TIMING} / \underline{\text{ALIGNMENT}}$

If you select 10 Hz, the eye pattern jitter over the entire bandwidth greater than or equal to 10 Hz is displayed. Likewise, if you select 100 kHz, only the jitter over the bandwidth greater than or equal to 100 kHz is displayed. The selected filter is displayed at the screen.

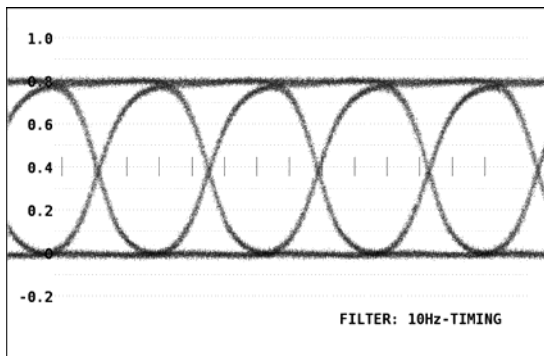
This setting enables you to determine the frequency components of the jitter of the SDI input signal.

In addition, SMPTE stipulates that the timing jitter and alignment jitter be measured.

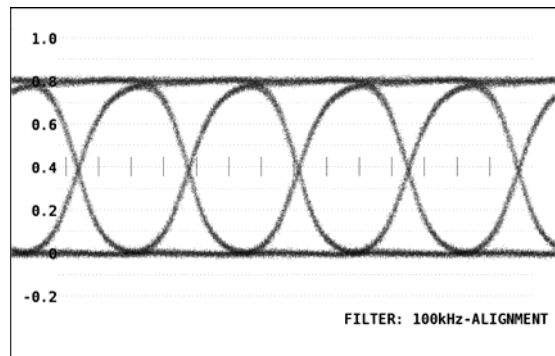
The filter setting for this case is 10 Hz if you select TIMING. If you select ALIGNMENT, the filter setting changes automatically according to the input signal. It is 100 kHz for HD-SDI and 1 kHz for SD-SDI.

If the input signal is HD

TIMING

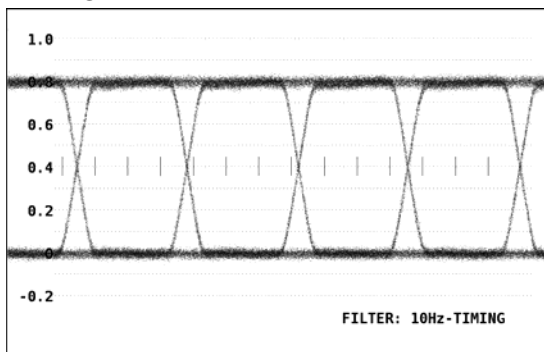


ALIGNMENT

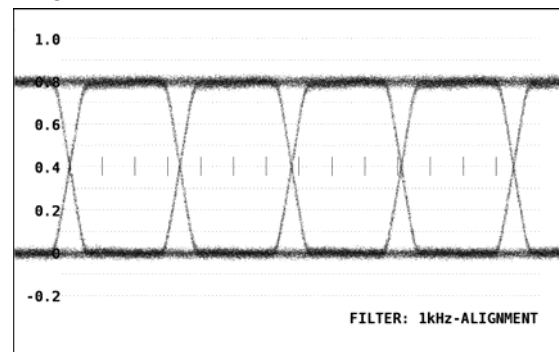


If the input signal is SD

TIMING



ALIGNMENT



7.5 Selecting the Filter Mode (Only on the LV 7380)

In section 7.4, "Selecting the Filter," set which filters to make selectable.

EASY: Only TIMING and ALIGNMENT can be selected.

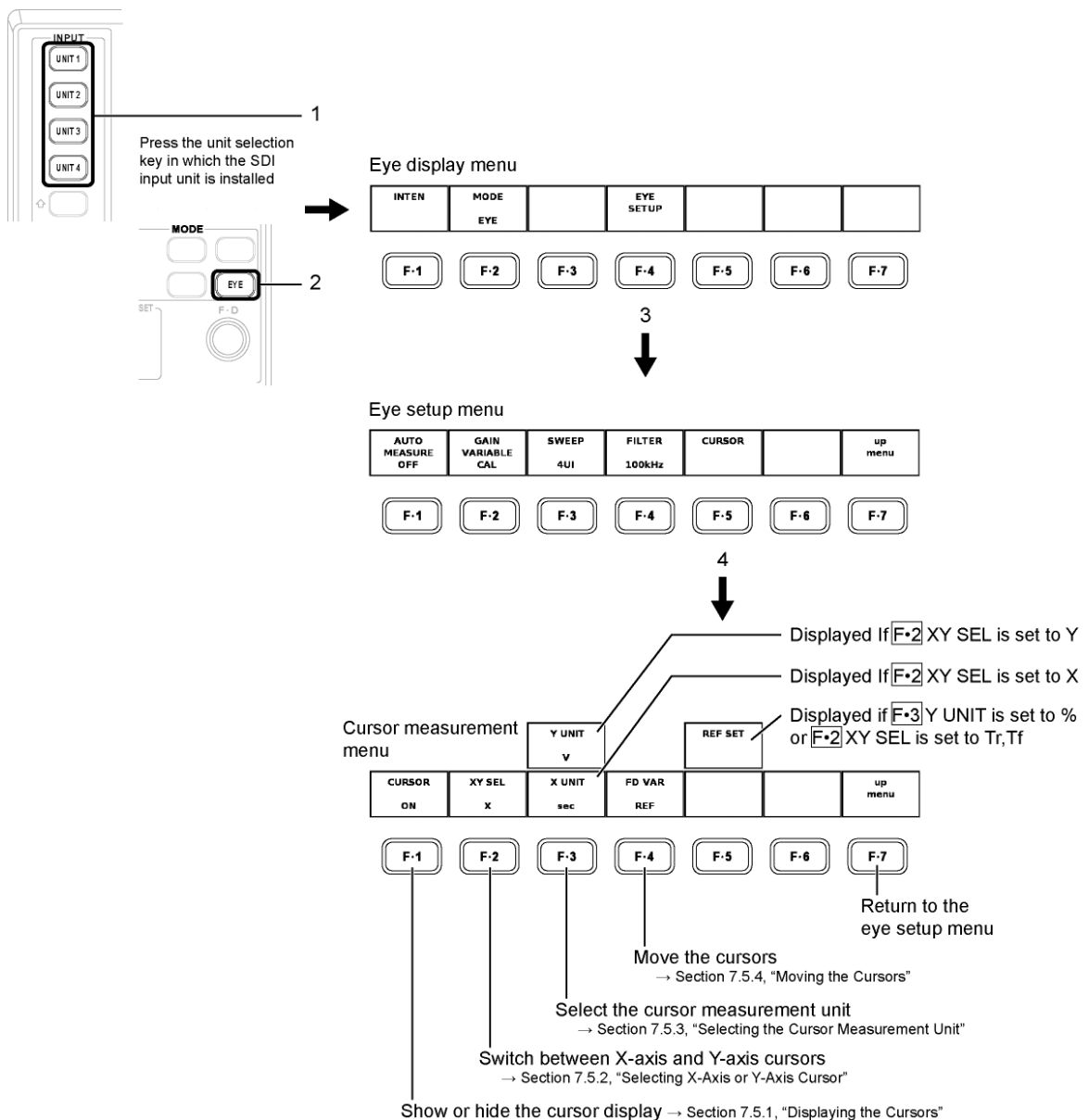
FULL: All filters can be selected.

• Procedure

EYE → set **F·2** MODE to EYE → **F·4** EYE SETUP → **F·4** FILTER MODE : EASY / FULL

7.6 Cursor Measurement

Cursor measurement is used to measure voltage, time, and other parameters. The REF and DELTA cursors are used to measure the voltage and time between two points on a waveform. Carry out the procedure below to display the cursor measurement menu used to perform cursor measurements.



7.6.1 Displaying the Cursors

Carry out the procedure below to show or hide the cursors.

ON: Shows the cursors

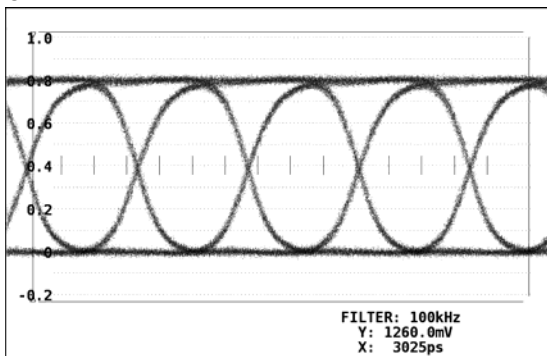
OFF: Hides the cursors

• **Procedure**

EYE → set **F•2** MODE to EYE → **F•4** EYE SETUP → **F•5** CURSOR → **F•1** CURSOR :
ON / OFF

Turn the function dial (F•D) to move the cursor to the measurement point on the waveform.
The measured value between the cursors is displayed at the lower right of the screen.

OK



7.6.2 Selecting X-Axis or Y-Axis Cursor

Carry out the procedure below to select the axis to perform the cursor measurement from X-axis (time) and Y-axis (amplitude).

Y: Y (amplitude) axis

X: X (time) axis

Tr, Tf: Rise or fall time

• **Procedure**

EYE → set **F•2** MODE to EYE → **F•4** EYE SETUP → **F•5** CURSOR → **F•2** XY SEL : X / Y
/ Tr, Tf

7.6.3 Selecting the Cursor Measurement Unit

Carry out the procedure below to select the unit for the cursor axis selected in “Selecting X-Axis or Y-Axis Cursor.”

X-Axis Cursor Unit

- sec: Displays seconds.
- Hz: Displays the frequency taking the interval between the cursors to be 1 period.
- Ulp-p: Displays using a unit where one eye pattern waveform is taken to be 1 Ulp-p.

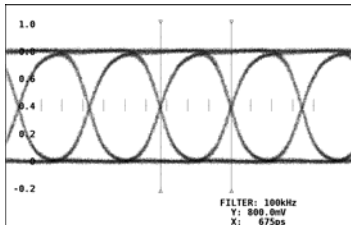
Y-Axis Cursor Unit

- V: Displays volts.
- %: Displays the ratio where the difference between two arbitrary points set by REF SET is taken to be 100 %.

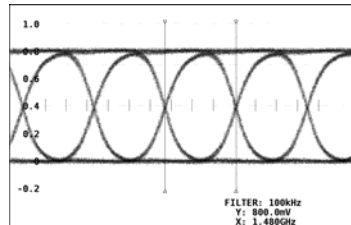
• Procedure

-
- If X is selected in “Selecting X-Axis or Y-Axis Cursor”
EYE → set **F•2** MODE to EYE → **F•4** EYE SETUP → **F•5** CURSOR → **F•2** XY SEL to select X → **F•3** X UNIT : sec / Hz / Ulp-p
 - If Y is selected in “Selecting X-Axis or Y-Axis Cursor”
EYE → set **F•2** MODE to EYE → **F•4** EYE SETUP → **F•5** CURSOR → **F•2** XY SEL to select Y → **F•3** Y UNIT : V / %
-

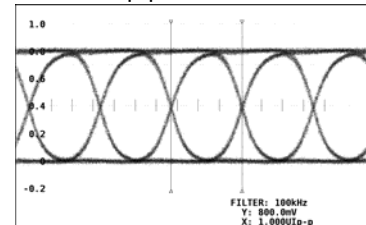
X UNIT: sec / Y UNIT: V



X UNIT: Hz / Y UNIT: V

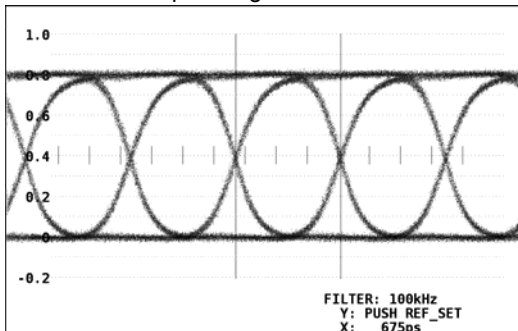


X UNIT: Ulp-p / Y UNIT: V

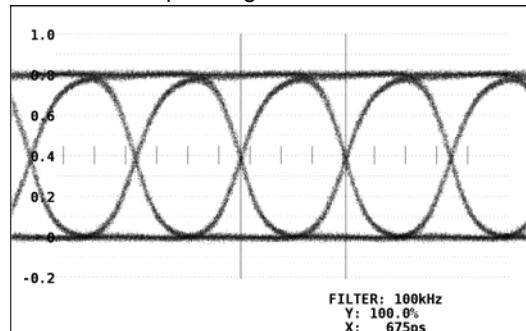


If you set **F•3** Y UNIT to %, **F•5** REF SET is displayed. Align the cursors with the waveform and press **F•5** REF SET to set that cursor range to 100 %.

Y UNIT: Before pressing % > REF SET



Y UNIT: After pressing % > REF SET



Unit interval (UI) refers to the width of 1 clock cycle. The value is displayed where 1 clock cycle is taken to be 100%. The unit is Ulp-p.

If the bit rate of the HD-SDI signal is 1.485/1.001 Gbps, 1 UI is as follows:

$$1 \text{ UI} = 1/1.4835 \text{ GHz} = 674.1 \text{ ps}$$

And, the measured jitter value (Ulp-p) is as follows:

$$\begin{aligned} \text{Jitter value (Ulp-p)} &= \text{measured value (ps)/width of 1 clock cycle (ps)} \\ &= \text{measured value (ps)/674.1 (ps)} \end{aligned}$$

If the bit rate of the HD-SDI signal is 1.485 Gbps, 1 UI is as follows:

$$1 \text{ UI} = 1/1.485 \text{ GHz} = 673.4 \text{ ps}$$

And, the measured jitter value (Ulp-p) is as follows:

$$\begin{aligned} \text{Jitter value (Ulp-p)} &= \text{measured value (ps)/width of 1 clock cycle (ps)} \\ &= \text{measured value (ps)/673.4 (ps)} \end{aligned}$$

The SD-SDI and DVB-ASI signal bit rates are 270 Mbps. Therefore, 1 UI is as follows:

$$1 \text{ UI} = 1/270 \text{ MHz} = 3.7 \text{ ns}$$

And, the measured jitter value (Ulp-p) is as follows:

$$\begin{aligned} \text{Jitter value (Ulp-p)} &= \text{measured value (ns)/width of 1 clock cycle (ns)} \\ &= \text{measured value (ns)/3.7 (ns)} \end{aligned}$$

7.6.4 Moving the Cursors

On the LV 5800 and LV 7800, to select the type of cursor to move, carry out the procedure below.

REF: REF cursor (Cyan)
 DELTA: DELTA cursor (Green)
 TRACK: REF and DELTA cursors

• Procedure

EYE → set **F•2** MODE to EYE → **F•4** EYE SETUP → **F•5** CURSOR → **F•4** FD VAR : REF
 / DELTA / TRACK

After carrying out the procedure above, turn the function dial (F•D) to move the selected cursor.

You can also press the function dial instead of pressing **F•4** FD VAR to select the cursor type. Each time you press the function dial, the cursor is selected in the following order: REF, DELTA, and TRACK.

On the LV 7380, carry out the procedure below to move the cursors.

REF cursor (Cyan): Set **F•4** FD VAR TRACK to OFF, and use **F•D 1** REF to move the cursor.
 DELTA cursor (Green): Use **F•D 2** DELTA.
 REF and DELTA cursors: Set **F•4** FD VAR TRACK to ON, and use **F•D 1** TRACK to move the cursor.

You can also change the setting of **F•4** FD VAR TRACK by pressing **F•D 1**. You can switch the positions of the REF and DELTA cursors by pressing **F•D 2**.

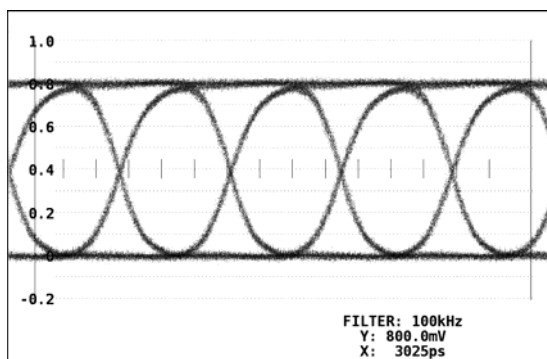
7.6.5 Measuring Using Cursors Sample

Measuring Amplitude (Amp) (On the LV 5800)

Perform the procedure below to measure the eye pattern amplitude (Amp) in volts.

1. Set **F•2** XY SEL to Y.
2. Set **F•3** Y UNIT to V.
3. Set **F•4** FD VAR to REF, and align the blue cursor with one of the peaks of the eye pattern.
4. Set **F•4** FD VAR to DELTA, and align the green cursor with the other peak of the eye pattern.

The eye pattern amplitude appears next to the Y at the bottom right of the screen (800.0 mV in the example below).



- **To Measure the Amplitude as a Percentage**

Press **F•3** Y UNIT, and select %. The amplitude will be measured as a percentage of the amplitude at the time when you pressed **F•5** REF SET.

- **To Switch between REF and DELTA Using the Function Dial (F•D)**

Each time you press the function dial (F•D), the movable cursor switches from REF (the blue cursor) to DELTA (the green cursor) to TRACK (both cursors) in that order. An upside down triangle appears next to the cursors that you can move.

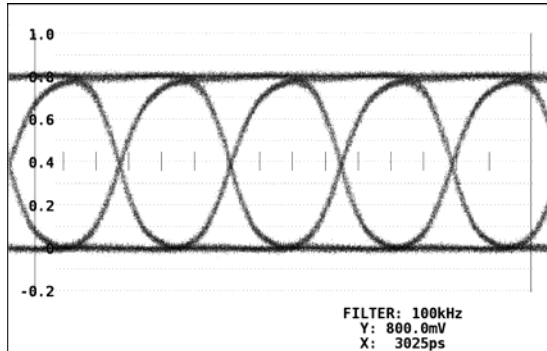
- **To Measure along the Time Axis (X-Axis)**

Press **F•2** XY SEL, and select X. The measured value between the cursors appears next to the X at the bottom right of the screen.

Measuring Rise Time (Tr) and Fall Time (Tf) (On the LV 5800)

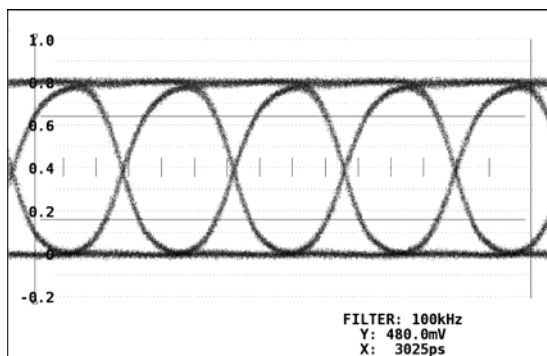
Perform the procedure below to measure the rise time (Tr) and fall time (Tf) of an eye pattern.

1. Set **F•2** XY SEL to Tr,Tf.
2. Using the Y cursors, align the REF and DELTA cursors to the eye pattern amplitude.



3. Press the **F•5** REF SET key.

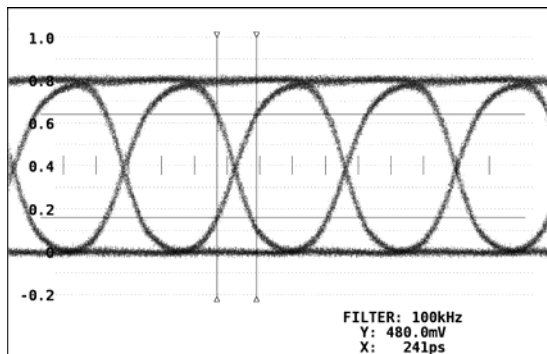
The Y cursors move to the 20 % and 80 % positions of the amplitude, and then **F•2** XY SEL is automatically set to X.



4. Align the X cursors to the cross points between 20 % and 80 % cursors and the waveform.

The Tr and Tf are measured.

The measured value between the cursors appears next to X at the bottom right of the screen.



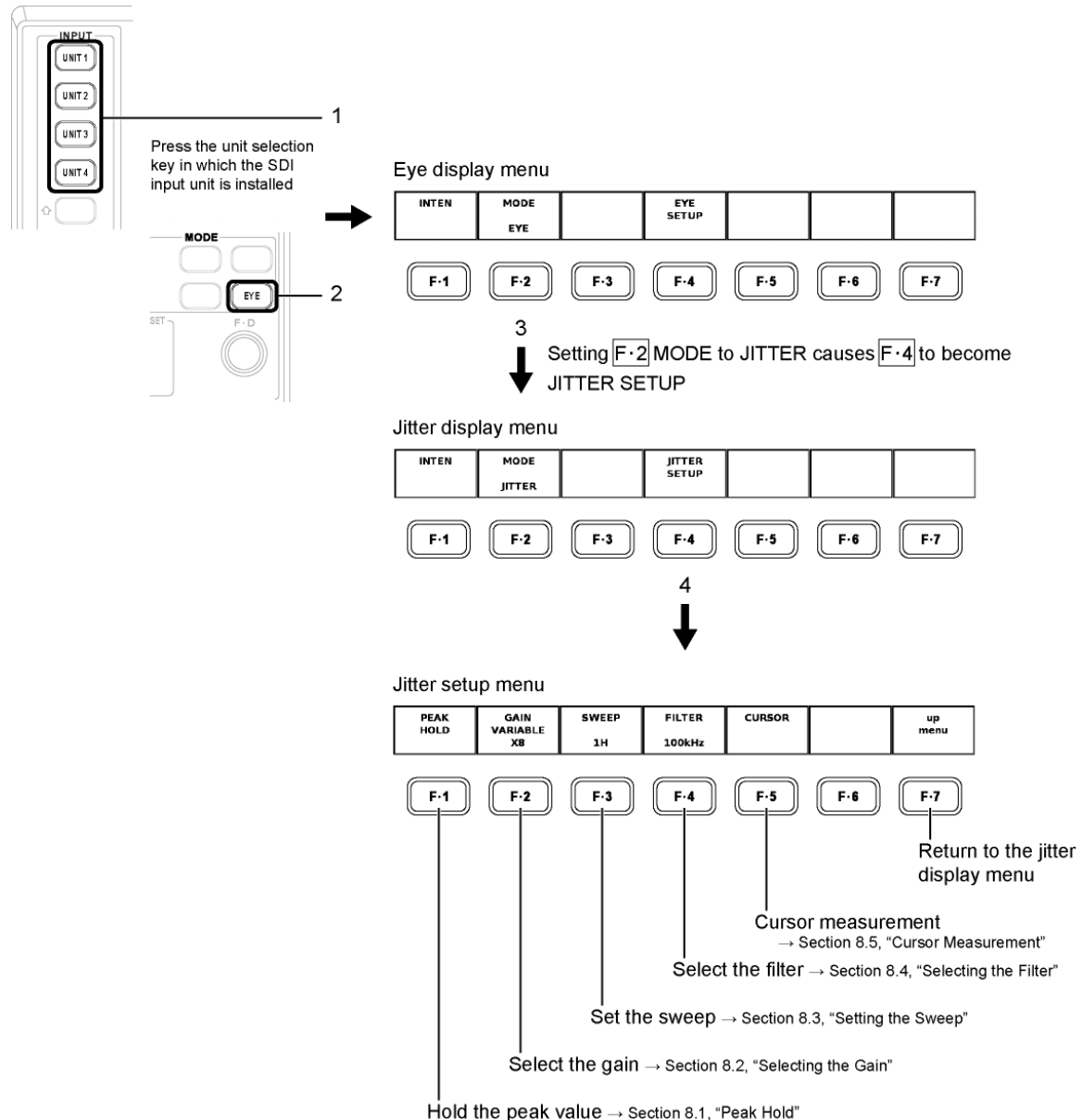
8. SETUP AND MEASUREMENT ON THE JITTER DISPLAY MODE

The jitter display mode is used to extract only the jitter components from the SDI signal using phase modulation and display the result on the time axis. In this mode, jitters can be accurately measured even if the eye pattern is not open after the signal is transmitted over a long cable or if a jitter of more than 1 Ulp-p is present.

Also, because the length of the horizontal axis is equal to one line or field of the video signal, you can observe jitter that is synchronized with lines and fields.

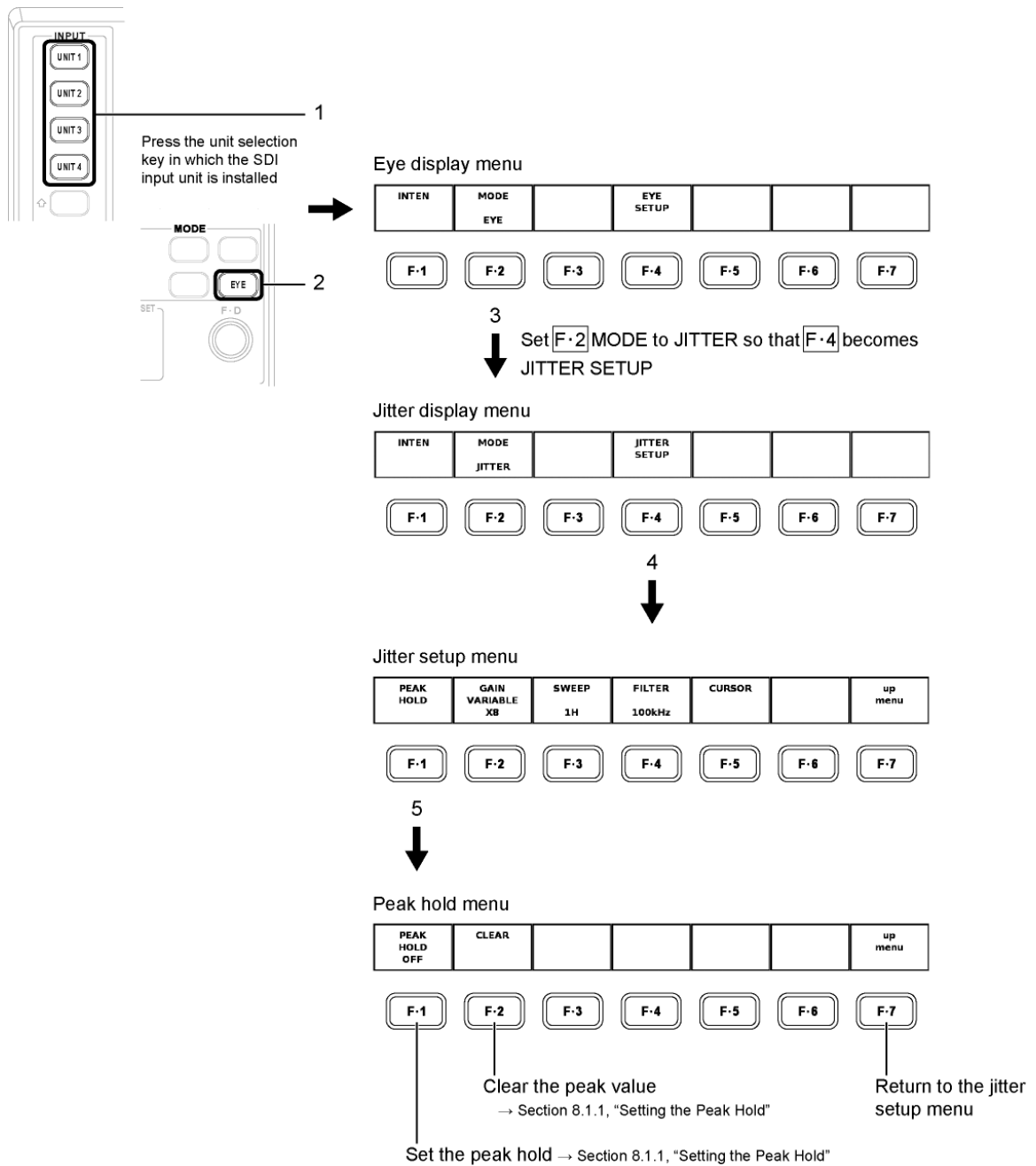
Carry out the procedure below to display jitter setup menu for the jitter waveform.

* Jitter waveform display is not available for DVB-ASI signal input.



8.1 Peak Hold

You can use the peak hold function of the jitter waveform to hold the maximum value (time) of the jitter. Carry out the procedure below to display the peak hold menu and specify the settings.



8.1.1 Setting the Peak Hold

Carry out the procedure below to set whether to measure the peak value of the jitter.

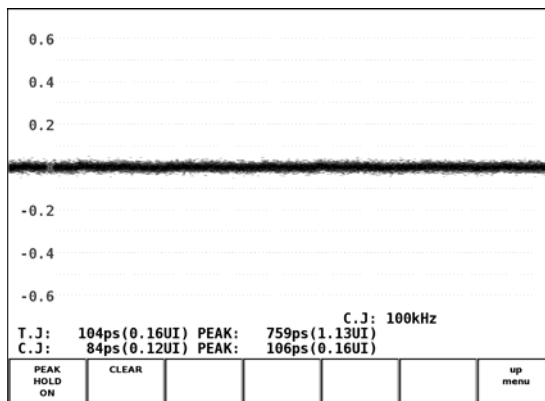
ON: Enables the measurement of the jitter peak value.

OFF: Disables the measurement of the jitter peak value.

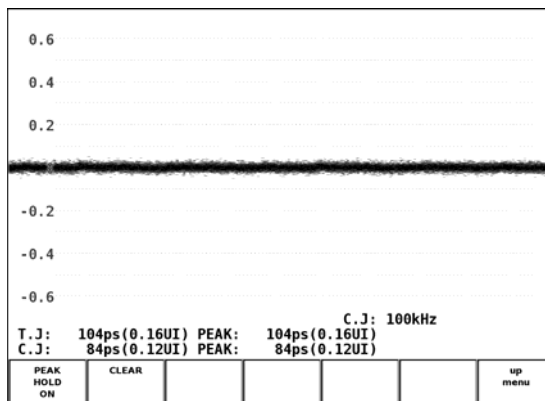
• **Procedure**

EYE → set **F•2** MODE to JITTER → **F•4** JITTER SETUP → **F•1** PEAK HOLD → **F•1**
 PEAK HOLD : ON / OFF

If you set **F•1** PEAK HOLD to ON, the peak value measurement will start. If the measured jitter value exceeds the measurable range, OVER will appear as the peak value. For information about the measurable range for jitter, see section 8.2, “Selecting the Gain.”



Press **F•2** CLEAR to clear the current peak value and restart the measurement.



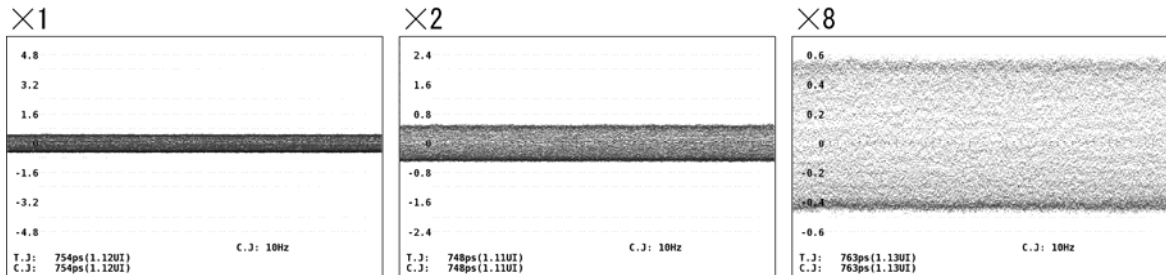
8.2 Selecting the Gain

Carry out the procedure below to select the gain of the jitter waveform.

- ×1: x1 gain
- ×2: x2 gain
- ×8: x8 gain

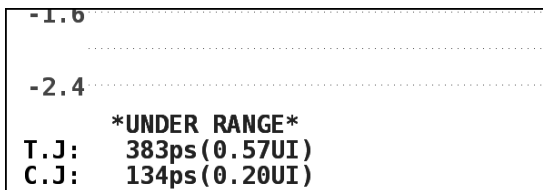
• Procedure

EYE → set **F•2** MODE to JITTER → **F•4** JITTER SETUP → **F•2** GAIN MAG : ×1 / ×2 / ×8



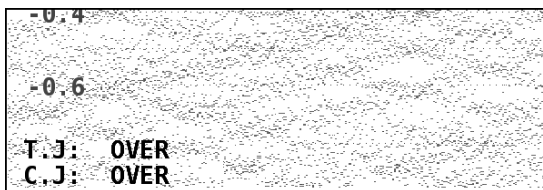
• About the *UNDER RANGE* Message

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



• About the OVER Message

If the measured jitter value exceeds the measurable range, OVER will appear in red as the measured value at the screen. If this happens, set **F•2** GAIN MAG to ×8 → ×2 → ×1, in that order.



The table below shows the measurable ranges for each gain setting.

| F•2 GAIN MAG | *UNDER RANGE* Appears | Measurable Range | OVER Appears |
|---------------------|-----------------------|------------------|---------------------|
| ×1 | 0.00 to 0.60 UI | 0.61 to 10.00 UI | 10.01 UI or greater |
| ×2 | 0.00 to 0.60 UI | 0.61 to 5.20 UI | 5.21 UI or greater |
| ×8 | Does not appear | 0.00 to 1.30 UI | 1.31 UI or greater |

8.3 Setting the Sweep

Carry out the procedure below to set the sweep time of the jitter waveform.

- 1H: Displays the jitter waveform for 1 line
- 2H: Displays the jitter waveform for 2 lines
- 1V: Displays the jitter waveform for 1 field
- 2V: Displays the jitter waveform for 2 fields

• **Procedure**

EYE → set F•2 MODE to JITTER → F•4 JITTER SETUP → F•3 SWEEP : 1H / 2H / 1V / 2V

8.4 Selecting the Filter

Carry out the procedure below to select the frequency bandwidth of the jitter to be displayed. This setting is linked to the filter setting in the eye pattern display mode.

[See also] Selecting the filter of the eye pattern display mode → Section 7.4, “Selecting the Filter”

- 100kHz: Displays the jitter components for frequencies greater than or equal to 100 kHz
- 1kHz: Displays the jitter components for frequencies greater than or equal to 1 kHz
- 100Hz: Displays the jitter components for frequencies greater than or equal to 100 Hz
- 10Hz: Displays the jitter components for frequencies greater than or equal to 10 Hz
- TIMING: Displays the timing jitter (10 Hz or greater)
- ALIGNMENT: Displays the alignment jitter (100 kHz or greater for HD, 1 kHz or greater for SD).

• **Procedure**

-
-
- On the LV 5800 and LV 7800
EYE → set F•2 MODE to JITTER → F•4 JITTER SETUP → F•4 FILTER : 100 kHz / 1 kHz / 100 Hz / 10 Hz / TIMING / ALIGNMENT
 - On the LV 7380 when the filter mode is set to FULL
EYE → F•3 FILTER : 100kHz / 1kHz / 100Hz / 10Hz / TIMING / ALIGNMENT
 - On the LV 7380 when the filter mode is set to EASY
EYE → F•3 FILTER : TIMING / ALIGNMENT
-
-

8.5 Selecting the Filter Mode (Only on the LV 7380)

In section 8.4, “Selecting the Filter,” set which filters to make selectable.

- EASY: Only TIMING and ALIGNMENT can be selected.
- FULL: All filters can be selected.

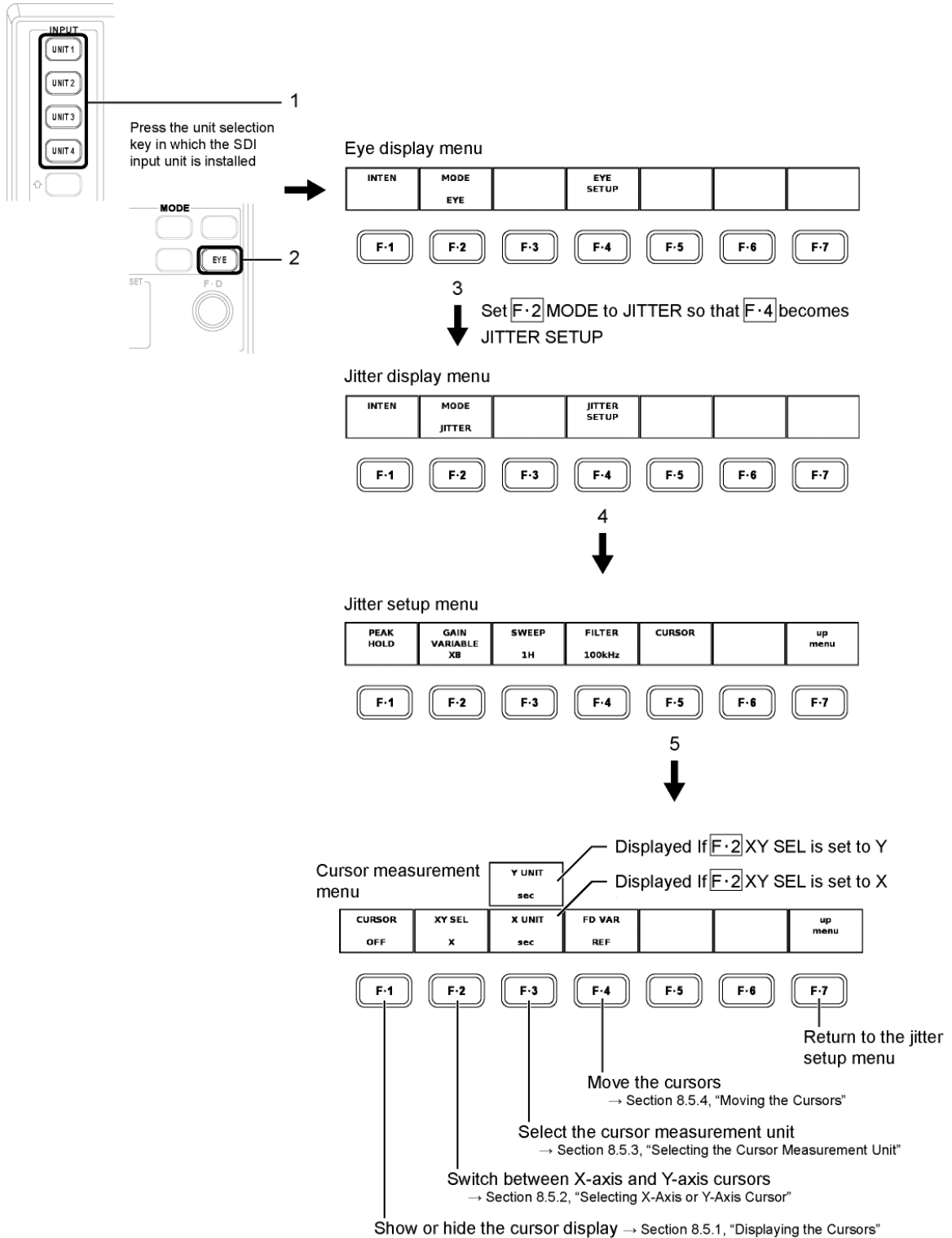
• **Procedure**

EYE → set F•2 MODE to JITTER → F•4 JITTER SETUP → F•4 FILTER MODE : EASY / FULL

8.6 Cursor Measurement

Cursor measurement is used to measure the jitter time. Cursors are used to measure the time between two points on the waveform.

Carry out the procedure below to display the cursor measurement menu used to perform cursor measurements.



8.6.1 Displaying the Cursors

Carry out the procedure below to show or hide the cursors.

ON: Shows the cursors

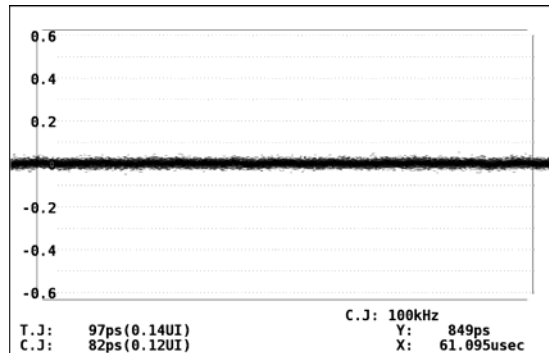
OFF: Hides the cursors

• **Procedure**

EYE → set **F•2** MODE to JITTER → **F•4** JITTER SETUP → **F•5** CURSOR → **F•1**
 CURSOR : ON / OFF

Turn the function dial (F•D) to move the cursor to the measurement point on the waveform.
 The measured value between the cursors is displayed at the lower right of the screen.

OK



8.6.2 Selecting X-Axis or Y-Axis Cursor

Carry out the procedure below to select the axis to perform the cursor measurement from X-axis (time) and Y-axis (amplitude).

X: X (time) axis

Y: Y (amplitude) axis

• **Procedure**

EYE → set **F•2** MODE to JITTER → **F•4** JITTER SETUP → **F•5** CURSOR → **F•2** XY
 SEL : X / Y

8.6.3 Selecting the Cursor Measurement Unit

Carry out the procedure below to select the unit for the cursor axis selected in “Selecting X-Axis or Y-Axis Cursor.”

X-Axis Cursor Unit

sec: Displays the time in seconds

Hz: Displays the frequency taking the interval between the cursors to be 1 period

Y-Axis Cursor Unit

sec: Displays the time in seconds

Ulp-p: Displays using a unit where one jitter waveform is taken to be 1 Ulp-p.

• Procedure

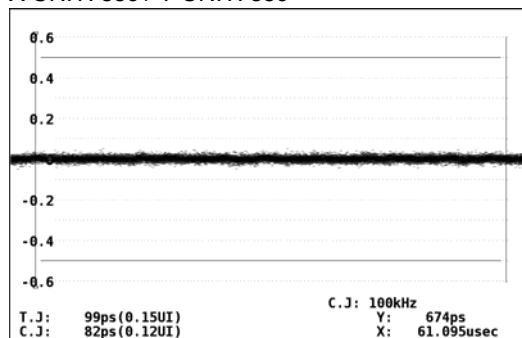
- If X is selected in “Selecting X-Axis or Y-Axis Cursor”

EYE → set **F•2** MODE to JITTER → **F•4** JITTER SETUP → **F•5** CURSOR → **F•2** XY
SEL to select X → **F•3** X UNIT : sec / Hz

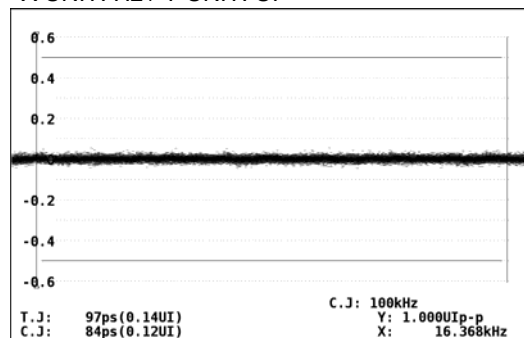
- If Y is selected in “Selecting X-Axis or Y-Axis Cursor”

EYE → set **F•2** MODE to JITTER → **F•4** JITTER SETUP → **F•5** CURSOR → **F•2** XY
SEL to select Y → **F•3** Y UNIT : sec / Ulp-p

X UNIT: sec / Y UNIT: sec



X UNIT: Hz / Y UNIT: UI



8.6.4 Moving the Cursors

On the LV 5800 and LV 7800, to select the type of cursor to move, carry out the procedure below.

REF: REF cursor (Cyan)
 DELTA: DELTA cursor (Green)
 TRACK: REF and DELTA cursors

• **Procedure**

EYE → set **F•2** MODE to JITTER → **F•4** JITTER SETUP → **F•5** CURSOR → **F•4** FD
 VAR : REF / DELTA / TRACK

After carrying out the procedure above, turn the function dial (F•D) to move the selected cursor.

You can also press the function dial instead of pressing **F•4** FD VAR to select the cursor type. Each time you press the function dial, the cursor is selected in the following order: REF, DELTA, and TRACK.

On the LV 7380, carry out the procedure below to move the cursors.

| | |
|------------------------|---|
| REF cursor (Cyan): | Set F•4 FD VAR TRACK to OFF, and use F•D 1 REF to move the cursor. |
| DELTA cursor (Green): | Use F•D 2 DELTA. |
| REF and DELTA cursors: | Set F•4 FD VAR TRACK to ON, and use F•D 1 TRACK to move the cursor. |

You can also change the setting of **F•4** FD VAR TRACK by pressing **F•D 1**. You can switch the positions of the REF and DELTA cursors by pressing **F•D 2**.

8.7 Jitter Output

In jitter display mode, the jitter component of the input signal is output from the JITTER OUT connector on the back of the LV 58SER02. Only the timing jitter is output (10 Hz or greater), regardless of the filter setting.

The output can also be connected to a spectrum analyzer to perform simplified frequency analysis of the jitter signal. The output can also be connected to an FFT analyzer to perform simplified frequency analysis of the jitter signal.

The output level is 250 mV ± 20 % (with a 75 Ω terminator, an input jitter amplitude of 1 UI, and an input jitter frequency of 10 kHz).

* The LV 7380 (MULTI SDI RASTERIZER) cannot produce jitter output when the LV 58SER02 is installed in it.

9. FIRMWARE REVISION HISTORY

This manual was written for the following firmware versions:

- Ver. 9.0 on the LV 5800
- Ver. 3.6 on the LV 7800
- Ver. 2.0 on the LV 7380

To check the version number, press **[SYS]** → **[F•5]** SYSTEM INFORMATION.

- **Ver. 2.0 on the LV 7380**

On the LV 58SER02, filter mode (EASY (TIMING and ALIGNMENT only) and FULL) has been added (only on the LV 7380).

- **Ver. 3.2 on the LV 5800**

On the LV 58SER02, raised eye pattern display intensity.

- **Ver. 2.5 on the LV 5800**

On the LV 58SER02, optimized T.J automatic measured values.

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Following information is for Chinese RoHS only

所含有毒有害物质信息

部件号码: LV 58SER02



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 | ○ | ○ | ○ | ○ | ○ | ○ |
| | | | | | | |
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| 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。 | | | | | | |

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