Leader

LV 5490SER01	SDI INPUT
LV 5490SER02	SDI INPUT / EYE
LV 5490SER03	DIGITAL AUDIO Dolby (Option)
LV 5490SER04	FOCUS ASSIST
LV 5490SER05	CIE DIAGRAM
LV 5490SER06	12G-SDI INPUT
LV 5490SER07	HDR
LV 5490SER08	IP (NMI)
LV 5490SER09	12G-SDI EYE
LV 5490SER10	VIDEO NOISE METER

FUNCTION MENU EXPLANATIONS

Thank you for purchasing.

Please carefully read this instruction manual and the included "GENERAL SAFETY SUMMARY".
Please use the product safely.

TABLE OF CONTENTS

1. INTRODUCTION

1.1 About This Manual

This manual explains the measurement menus that become available when any of the following units or option is installed in the LV 5490 (MULTI WAVEFORM MONITOR).
For the product specifications and details on how to operate the LV 5490, see the LV 5490 Instruction Manual.

- LV 5490SER01 (SDI INPUT), LV 5490SER02 (SDI INPUT / EYE), LV 5490SER06 (12G-SDI INPUT), or LV 5490SER08 (IP(NMI))
- LV 5490SER03 (DIGITAL AUDIO)
- LV 5490SER04 (FOCUS ASSIST)
- LV 5490SER05 (CIE DIAGRAM)
- LV 5490SER07 (HDR)
- LV 5490SER09 (12G-SDI EYE)
- Dolby option

1.2 About Trademarks and Licenses

The company and product names in this document are trademarks or registered trademarks of their respective holders.

1.3 About Terminology Used in this Manual

- **SER****

  LV 5490SER** is referred to as SER**.

- **Single Input Mode**

  This refers to the mode in which on the INPUT menu, F•7 DISPLAY is set to SINGLE.
  It is a mode for measuring a single input signal.

- **Simul Mode**

  This refers to the mode in which on the INPUT menu, F•7 DISPLAY is set to SIMUL.
  It is a mode for measuring multiple input signals simultaneously.

- **Multi Display**

  This refers to the mode in which the MULTI key is on.

- **About Underlining (_)**

  Underlined options indicate the default values.

- **Input Formats and Link Systems**

  The following names are used for the input formats and link systems.
  Multi link may be used as a collective term to refer to dual link and quad link.

  Table 1-1 Input formats and link systems

Name	Description	Link System
SD	SD-SDI	Single link
HD	HD-SDI	Single link
3G-A	3G-SDI level A	Single link
3G-B-DL	3G-SDI level B dual link mapping	Single link
3G-B-DS	3G-SDI level B dual stream mapping	Single link
12G	12G-SDI TYPE1	Single link
HD (DL)	HD-SDI dual link	Dual link
HD (QL)	HD-SDI quad link	Quad link
3G (DL)-2K	3G-A, 3G-B-DL dual link Resolution 1920(2048)×1080	Dual Link
3G (DL)-4K	3G-B-DS dual link Resolution 3840(4096)×2160	Dual Link
3G (QL)	3G-A, 3G-B-DL quad link	Quad link
3G	Collective name for 3G links	-
3G-B	Collective name for 3G-B-DL and 3G-B-DS	-
3G (DL)	Collective name for 3G (DL)-2K and 3G (DL)-4K	-
4K	Collective name for HD (QL), 3G (DL)-4K, 3G (QL) and 12G	-

1.4 About the LV 5480

This manual explains the LV 5490.
If you are using the LV 5480, refer to the LV 5490 vs. LV 5480 comparison table below, and read LV 5490 as LV 5480 in this manual.

Table 1-2 LV 5490 vs. LV 5480 comparison

Item	LV 5490	LV 5480
Supported units	LV 5490SER01 LV 5490SER02 LV 5490SER03 LV 5490SER06 LV 5490SER08	LV 5490SER01 LV 5490SER02 LV 5490SER03 LV 5490SER06 (*1) LV 5490SER08 (*1)
Supported options	LV 5490SER04 LV 5490SER05 LV 5490SER07 LV 5490SER09 (*2)	LV 5490SER04 LV 5490SER05 LV 5490SER07 LV 5490SER09 (*2) LV 5480SER20 LV 5480SER21
4K function	Standard support	Supported with LV 5480SER20 (*3)
Signal generation function	Standard support	Supported with LV 5480SER21 (*4)
USB save destination folder name	LV5490_USER	LV5480_USER
TELNET login and password	LV5490	LV5480
FTP login and password	LV5490	LV5480
SNMP MIB file name	lv5490.my	lv5490.my (*5)

*1 The LV 5480SER20 must be installed to install the LV 5490SER06 or LV 5490SER08.
*2 The LV 5490SER06 must be installed, to install LV 5490SER09.
*3 Installing the LV 5480SER20 enables you to select 4K 3G Quad Link, 4K 3G Dual Link, and 4K HD Quad Link for SDI System on the SDI IN tab.
*4 Installing the LV 5480SER21 enables you to select Test Signal for Mode on the SDI OUT tab.
*5 The MIB file is shared with the LV 5490, but the SNMP manager detects it as “LV5480.” The other aspects of the SNMP function are the same as those of the LV 5490.

2. VIDEO SIGNAL WAVEFORM DISPLAY

To display the video signal waveform, press WFM.

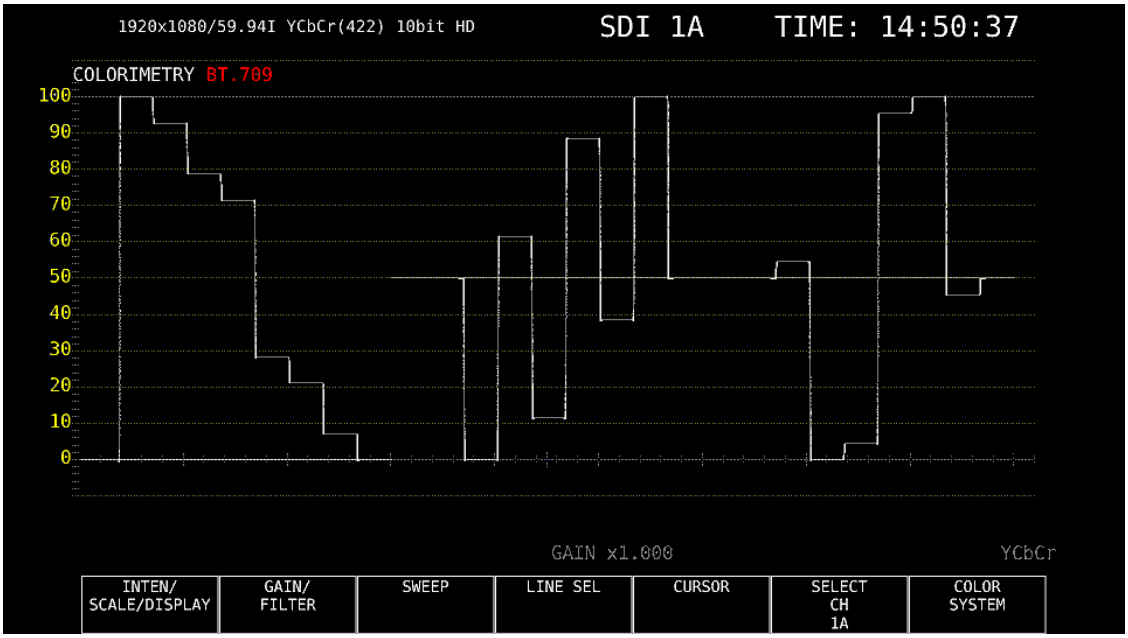


Figure 2-1 Video signal waveform display

- **Colorimetry**

  Normally, colorimetry is not displayed, but when the colorimetry alarm is set to on in the system settings and a colorimetry different from the one specified is received, the alarm is indicated in red in the upper left of the screen.

2.1 Setting the Waveform Display Position

Use the V POS and H POS knobs to adjust the display position of video signal waveforms. On the multi display, these are valid when you press F•2 MULTI WFM on the MULTI menu.

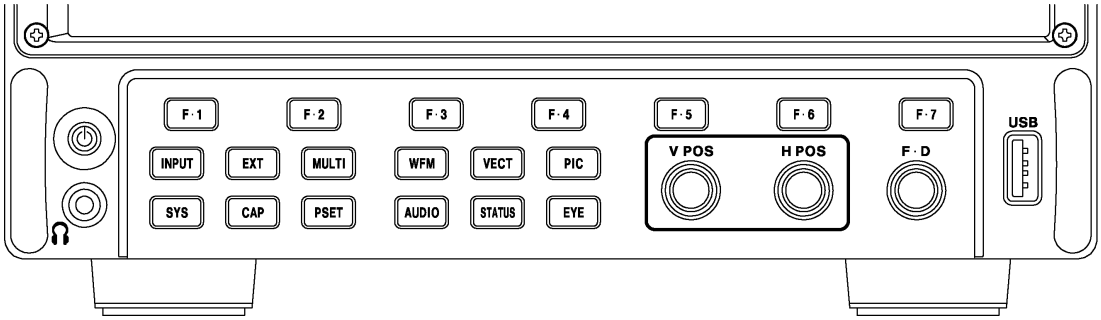


Figure 2-2 V POS and H POS knobs

- **V POS Knob**

  This knob adjusts the vertical position of the video signal waveform.
  Pressing the knob returns the waveform to its default position.

- **H POS Knob**

  This knob adjusts the horizontal position of the video signal waveform.
  Pressing the knob returns the waveform to its default position.

2.2 Configuring the Display Settings

To configure the display settings, press F•1 INTEN/SCALE/DISPLAY on the WFM menu.

WFM → F•1 INTEN/SCALE/DISPLAY →

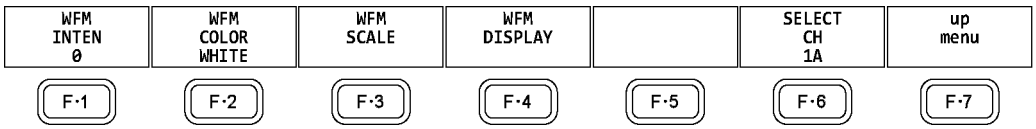


Figure 2-3 INTEN/SCALE/DISPLAY menu

2.2.1 Adjusting the Vector Intensity

To adjust the video signal waveform intensity, follow the procedure below.
Press the function dial (F•D) to return the setting to its default value (0).

Procedure

WFM → F•1 INTEN/SCALE/DISPLAY → F•1 WFM INTEN: -128 - 0 - 127

2.2.2 Selecting the Vector Color

To select the video signal waveform color, follow the procedure below.
On the multi display, the following colors are assigned to the video signal waveforms.

Y: white, Cb: cyan, Cr: magenta
G: green, B: blue, R: red
X: white, Y: white, Z: white
COMPOSIT: white

Procedure (when not measuring 3G-B-DS)

WFM → F•1 INTEN/SCALE/DISPLAY → F•2 WFM COLOR: WHITE / YELLOW / CYAN / GREEN / MAGENTA / RED / BLUE / MULTI

Procedure (when measuring 3G-B-DS)

WFM → F•1 INTEN/SCALE/DISPLAY → F•2 WFM COLOR
→ F•1 STREAM1 COLOR: WHITE / YELLOW / CYAN / GREEN / MAGENTA / RED / BLUE / MULTI
→ F•2 STREAM2 COLOR: WHITE / YELLOW / CYAN / GREEN / MAGENTA / RED / BLUE / MULTI

2.2.3 Adjusting the Scale Intensity

To configure the scale, press F•3 WFM SCALE on the INTEN/SCALE/DISPLAY menu.

WFM → F•1 INTEN/SCALE/DISPLAY → F•3 WFM SCALE →

Figure 2-4 WFM SCALE menu

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

Procedure

WFM → F•1 INTEN/SCALE/DISPLAY → F•3 WFM SCALE → F•1 SCALE INTEN: -8 - 4 - 7

2.2.4 Selecting the Scale Color

To select the scale color, follow the procedure below.

Procedure

WFM → F•1 INTEN/SCALE/DISPLAY → F•3 WFM SCALE → F•2 SCALE COLOR: WHITE / YELLOW / CYAN / GREEN / MAGENTA / RED / BLUE

2.2.5 Selecting the Scale Unit

To select the scale unit, follow the procedure below.

When COLOR MATRIX is set to XYZ, the scale unit is set to “HD%,SD%” or 150%.
When COLOR MATRIX is set to COMPOSIT and the composite display format is NTSC, this is fixed to HD%,SD%. When the composite display format is PAL, this is fixed to HDV,SDV.

Video signal white (100 %) becomes 0.7 V or 100 % on the scale.
Video signal black (0 %) becomes 0 V or 0 % on the scale.

Reference COLOR MATRIX → section 2.7.1, “Selecting the Color Matrix.”

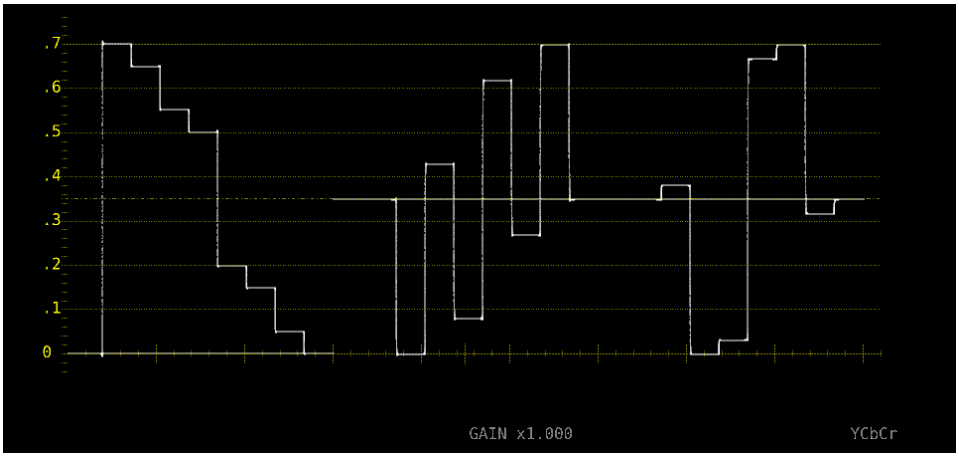
Procedure

WFM → F•1 INTEN/SCALE/DISPLAY → F•3 WFM SCALE → F•3 SCALE UNIT: HDV,SD% / HDV,SDV / HD%,SD% / 150% / 1023 / 1023,255 / 3FF

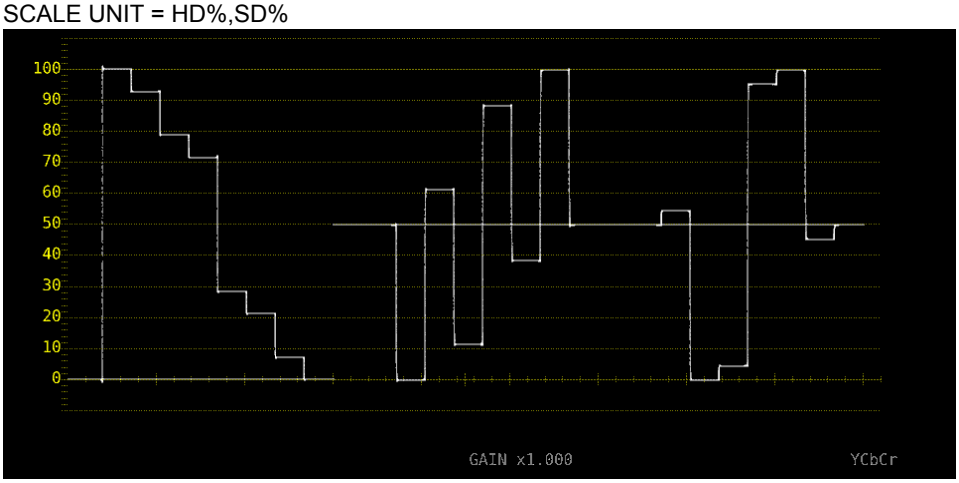
Settings

HDV,SD%:	The scale shows voltages when the input signal is not SD and percentages when the input signal is SD.
HDV,SDV:	The scale shows voltages.
HD%,SD%:	The scale shows percentages.
150%:	The scale shows percentages. (The scale starts from -50 %.)
1023:	0 to 100 % is displayed as 64 to 940 (YGBR) or 64 to 960 (CbCr).
1023,255:	0 to 100 % is displayed as 64 to 940 (YGBR) or 16 to 235 (YGBR).
3FF:	0 to 100 % is displayed as 040 to 3AC (YGBR) or 040 to 3C0 (CbCr).

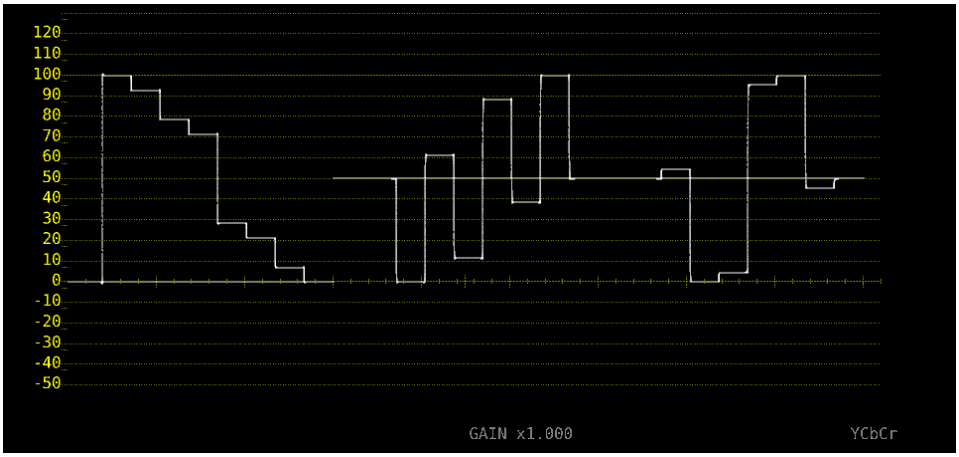
SCALE UNIT = HDV,SDV



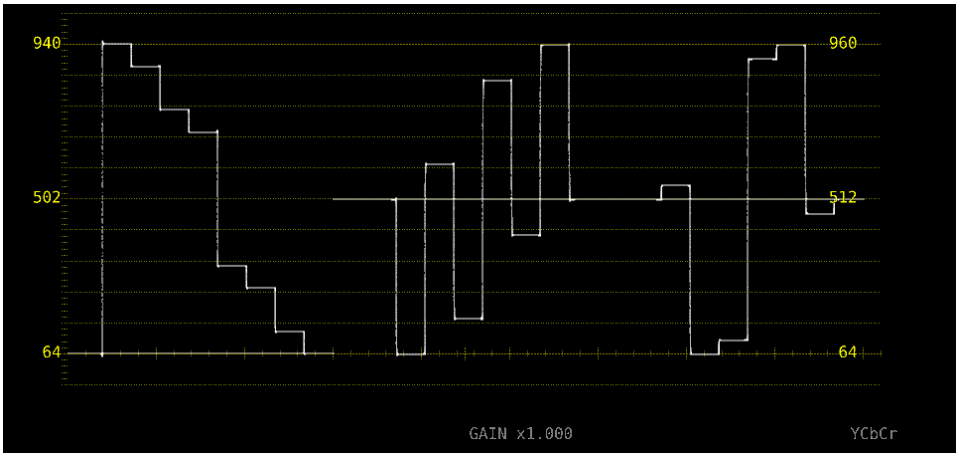
SCALE UNIT = HD%,SD%



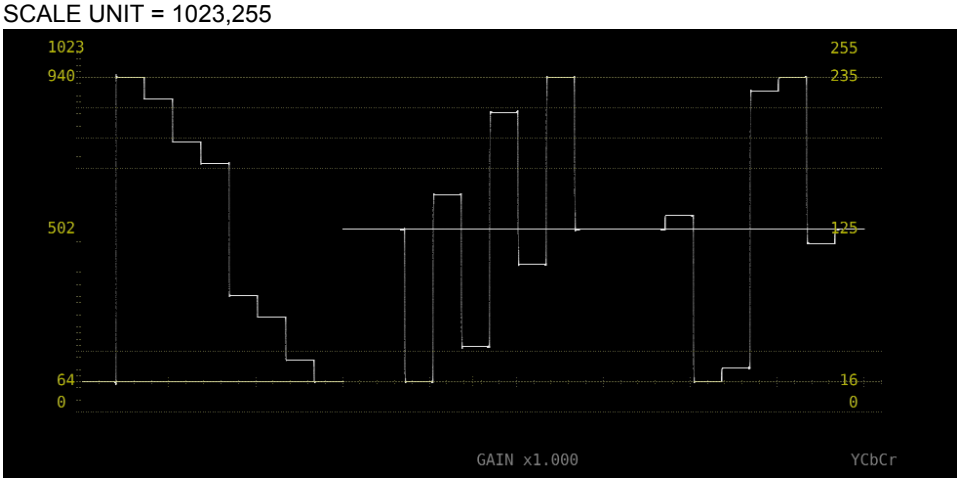
SCALE UNIT = 150%



SCALE UNIT = 1023



SCALE UNIT = 1023,255



SCALE UNIT = 3FF

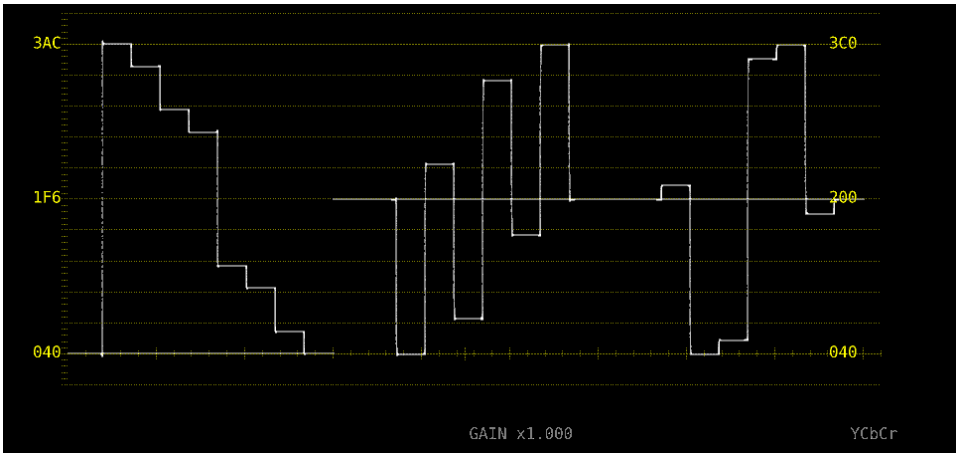


Figure 2-5 Selecting the scale unit

2.2.6 Displaying a Scale for 75 % Intensity Color Bars

When COLOR MATRIX is set to YCbCr, to display a scale that matches the peak levels of the color difference signals for 75 % intensity color bars, follow the procedure below.

Reference COLOR MATRIX → section 2.7.1, “Selecting the Color Matrix.”

Procedure

WFM → F•1 INTEN/SCALE/DISPLAY → F•3 WFM SCALE → F•4 75%COLOR SCALE: ON / OFF

75%COLOR SCALE = ON

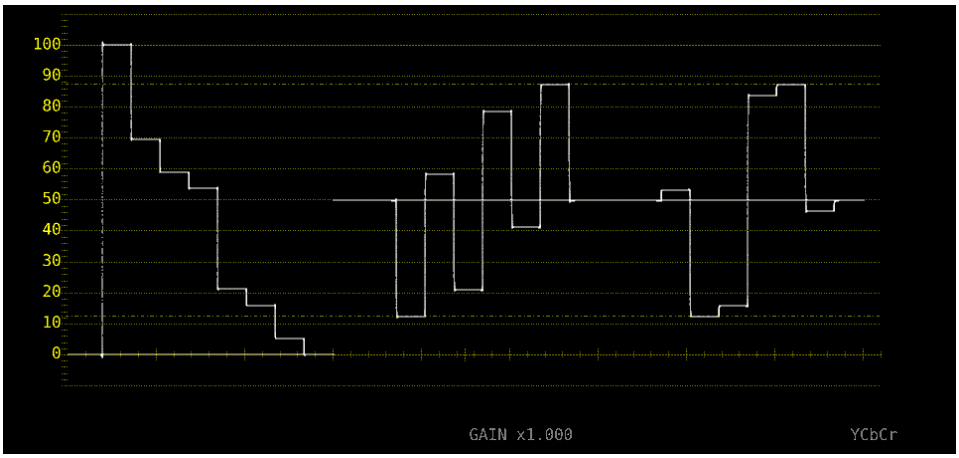


Figure 2-6 Displaying a scale for 75 % intensity color bars

2.2.7 Selecting the Display Mode

To configure the display, press F•4 WFM DISPLAY on the INTEN/SCALE/DISPLAY menu.

WFM → F•1 INTEN/SCALE/DISPLAY → F•4 WFM DISPLAY →

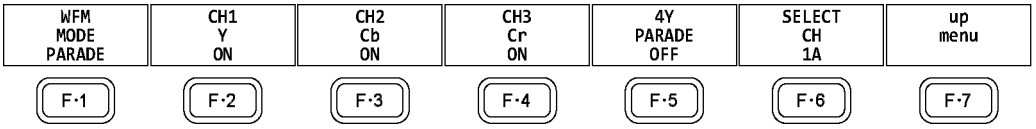


Figure 2-7 WFM DISPLAY menu

To select the video signal waveform display mode, follow the procedure below.
This setting is invalid when COLOR MATRIX is set to COMPOSIT.

Reference COLOR MATRIX → section 2.7.1, “Selecting the Color Matrix.”

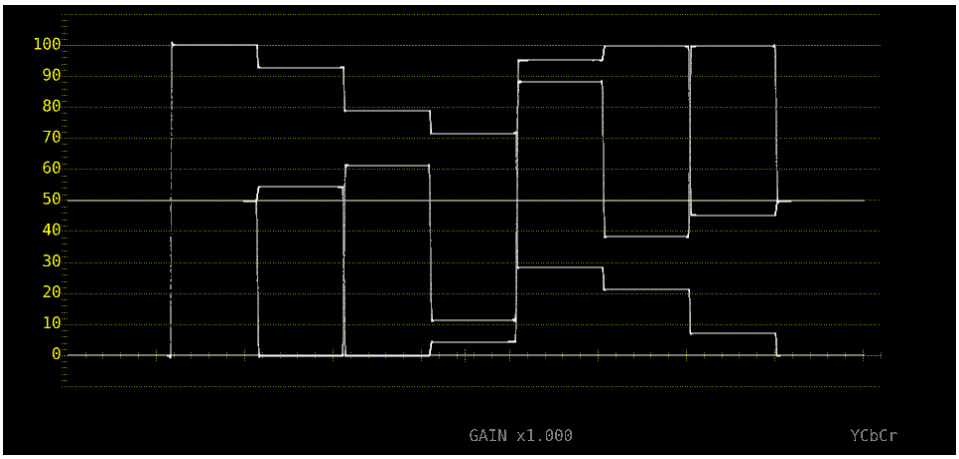
Procedure

WFM → F•1 INTEN/SCALE/DISPLAY → F•4 WFM DISPLAY → F•1 WFM MODE: OVERLAY / PARADE

Settings

OVERLAY:	Input signal is displayed on top of each other.
PARADE:	Input signal is displayed side by side.

WFM MODE = OVERLAY



WFM MODE = PARADE

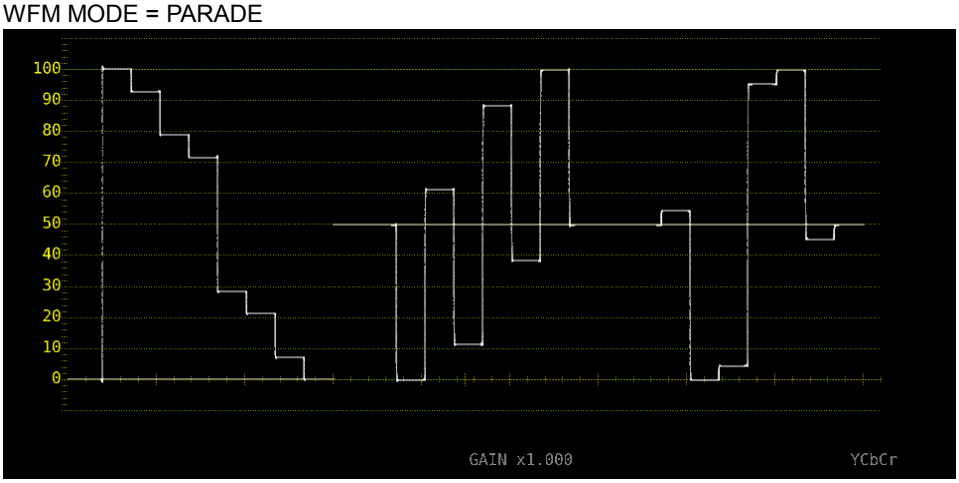


Figure 2-8 Selecting the display mode

2.2.8 Turning the Channels On and Off

To turn individual channels on and off, follow the procedure below.
You cannot turn off all the channels.
This menu item is not available when COLOR MATRIX is set to COMPOSIT or when YGBR or YRGB is set to ON.

Reference COLOR MATRIX → section 2.7.1, “Selecting the Color Matrix.”
YGBR, YRGB → section 2.7.2, “Turning Luminance Signals On and Off.”

Procedure

WFM → F•1 INTEN/SCALE/DISPLAY → F•4 WFM DISPLAY
→ F•2 CH1 Y / CH1 X / CH1 G / CH1 R: ON / OFF
→ F•3 CH2 Cb / CH2 Y / CH2 B / CH2 G: ON / OFF
→ F•4 CH3 Cr / CH3 Z / CH3 R / CH3 B: ON / OFF

2.2.9 4Y Parade Display

To extract the Y signals from channels A to D and display them side by side, follow the procedure below.

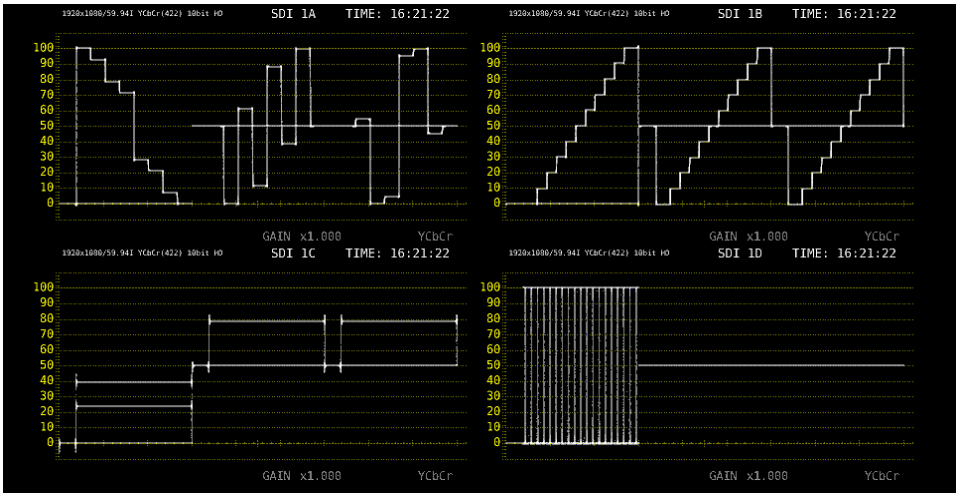
The conditions for displaying the 4Y parade display are listed below.
- Single link
- Simul mode
- F•7 COLOR SYSTEM → F•1 COLOR MATRIX on the WFM menu is set to YCbCr or COMPOSIT.
- F•6 OPERATE CH MODE on the INPUT menu is set to COM.
- The layout display mode is set to NORMAL.

Also, note the following points.
- Only the channels that have been set to ON on the INPUT menu are displayed.
- Option in layout will be hidden.
- Style in layout will be invalid.
- The scale jump function cannot be used.

Procedure

WFM → F•1 INTEN/SCALE/DISPLAY → F•4 WFM DISPLAY → F•5 4Y PARADE: ON / OFF

4Y PARADE = OFF



4Y PARADE = ON

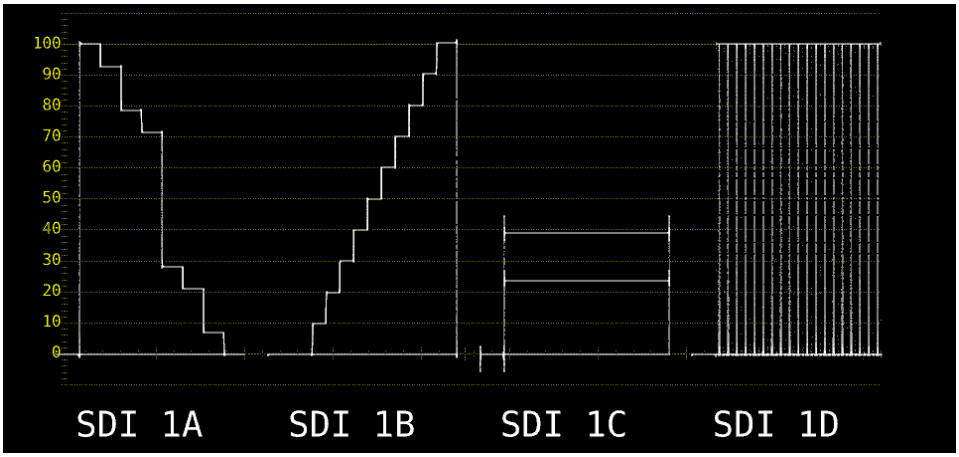


Figure 2-9 4Y parade display

2.2.10 Configuring the 3G-B-DS Display Settings

When measuring 3G-B-DS, to select the display mode, follow the procedure below.

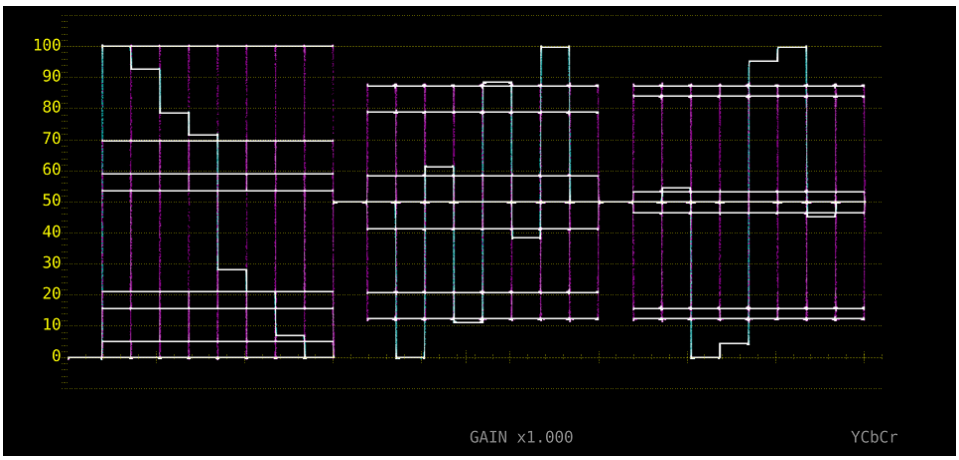
Procedure

WFM → F•1 INTEN/SCALE/DISPLAY → F•4 WFM DISPLAY → F•5 3G-B-DS DISPLAY: STREAM1 / STREAM2 / MIX / ALIGN

Settings

STREAM1:	Stream 1 is displayed.
STREAM2:	Stream 2 is displayed.
MIX:	Streams 1 and 2 are displayed on top of each other.
ALIGN:	Streams 1 and 2 are displayed side by side.

3G-B-DS DISPLAY = MIX



3G-B-DS DISPLAY = ALIGN

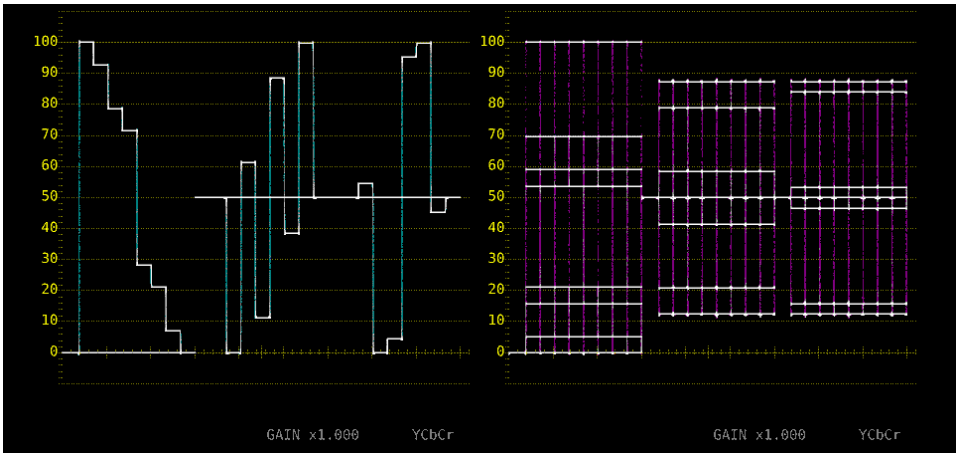


Figure 2-10 Configuring the 3G-B-DS display settings

2.3 Configuring the Gain and Filter Settings

To configure the gain and filter settings, press F•2 GAIN/FILTER on the WFM menu.

WFM → F•2 GAIN/FILTER →

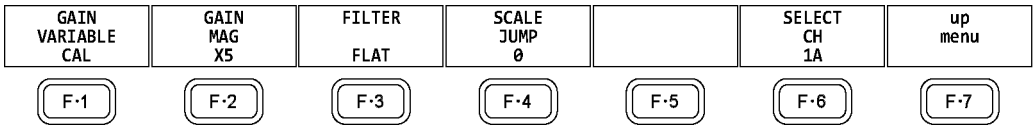


Figure 2-11 GAIN/FILTER menu

2.3.1 Selecting the Fixed Gain

To select the fixed video signal waveform gain, follow the procedure below.

Procedure

WFM → F•2 GAIN/FILTER → F•2 GAIN MAG: X1 / X5

2.3.2 Setting the Variable Gain

To set the variable video signal waveform gain, follow the procedure below.

Procedure

WFM → F•2 GAIN/FILTER → F•1 GAIN VARIABLE: CAL / VARIABLE

Settings

CAL:	The waveform gain is fixed.
VARIABLE:	You can adjust the waveform gain by turning the function dial (F•D). Press the function dial (F•D) to return the setting to its default value (1.000 or 5.000). The adjusted gain value (the combination of F•1 GAIN VARIABLE and F•2 GAIN MAG) appears at the bottom of the screen. 0.200 - 1.000 - 2.000 (for X1) 1.000 - 5.000 - 10.000 (for X5)

2.3.3 Selecting the Filter

To select the filter to apply to video signal waveforms, follow the procedure below.
The filters that you can select vary depending on the COLOR MATRIX setting.

Reference COLOR MATRIX → section 2.7.1, “Selecting the Color Matrix.”

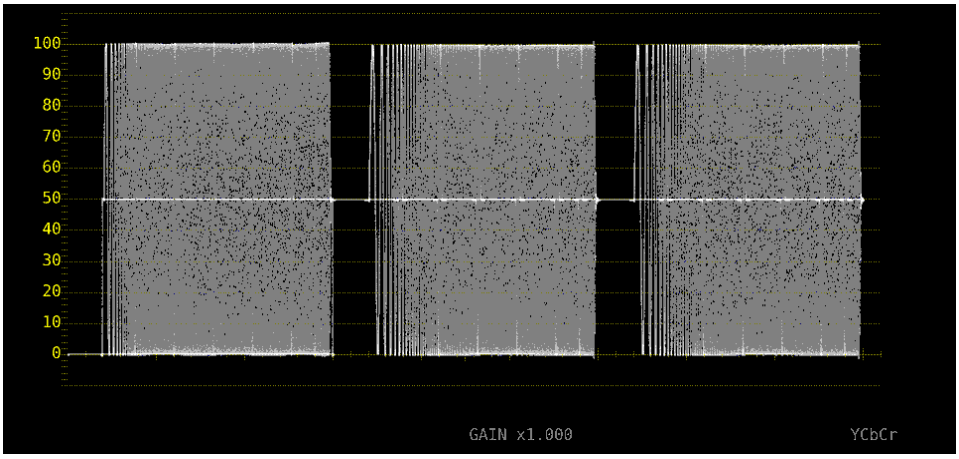
Procedure (When COLOR MATRIX is set to YCbCr, XYZ, GBR, or RGB)

WFM → F•2 GAIN/FILTER → F•3 FILTER: FLAT / LOWPASS

Settings

FLAT:	A filter with a flat frequency response over the entire bandwidth of the input signal is applied.
LOWPASS:	A low-pass filter with the following characteristics is applied. At 40 MHz, 20 dB attenuation or more (when the input signal is 1080/60P, 59.94P, or 50P) At 20 MHz, 20 dB attenuation or more (when the input signal is 3G, HD, or HD (DL) excluding 1080/60P, 59.94P, or 50P) At 3.8 MHz, 20 dB attenuation or more (when the input signal is SD)

FILTER = FLAT



FILTER = LOWPASS

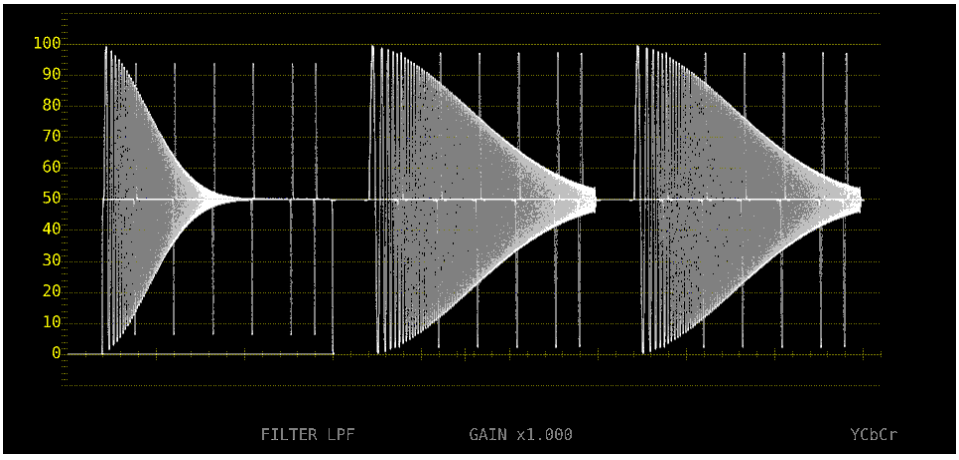


Figure 2-12 Selecting the filter (component)

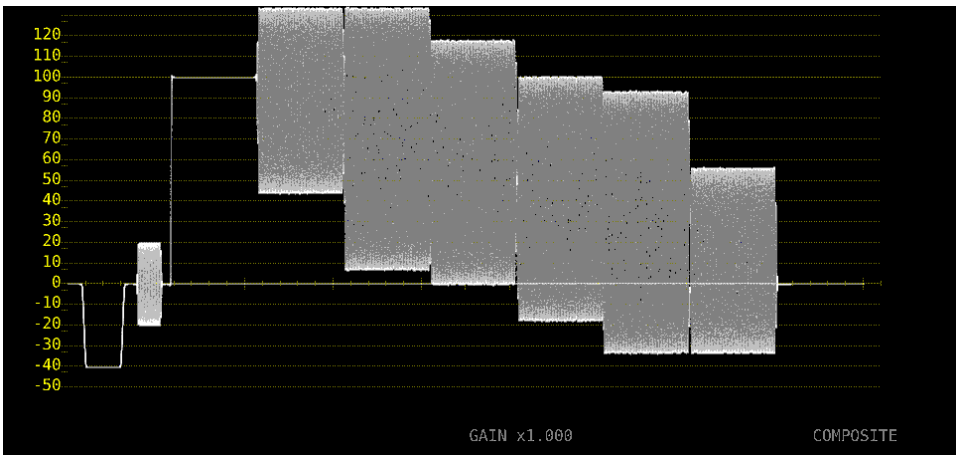
Procedure (When COLOR MATRIX is set to COMPOSIT)

WFM → F•2 GAIN/FILTER → F•3 FILTER: FLAT / LUM / FLAT+LUM / LUM+CRMA

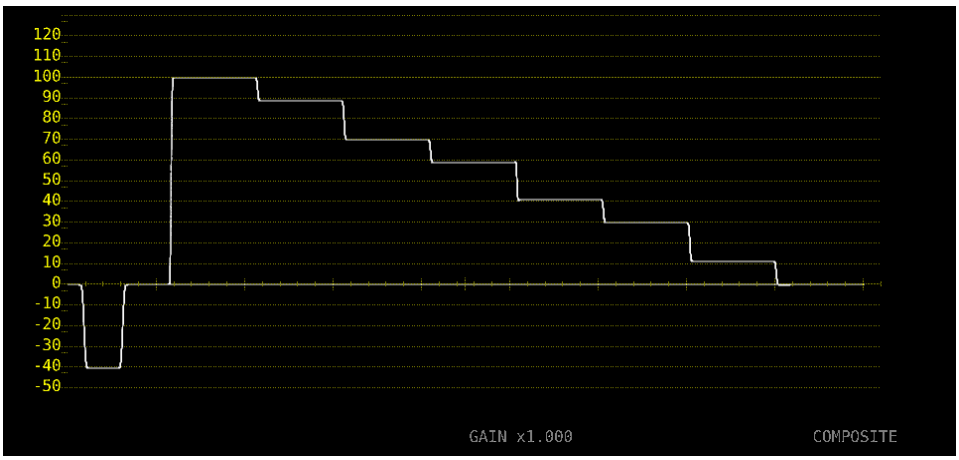
Settings

FLAT:	Only the pseudo-composite signal is displayed.
LUM:	Only the luminance signal is displayed.
FLAT+LUM:	The pseudo-composite and luminance signals are displayed side by side. A filter with an attenuation of 20 dB or more at 40 MHz is applied to the luminance signal.
LUM+CRMA:	The luminance and chrominance signals are displayed side by side. A filter with an attenuation of 20 dB or more at 40 MHz is applied to the luminance signal.

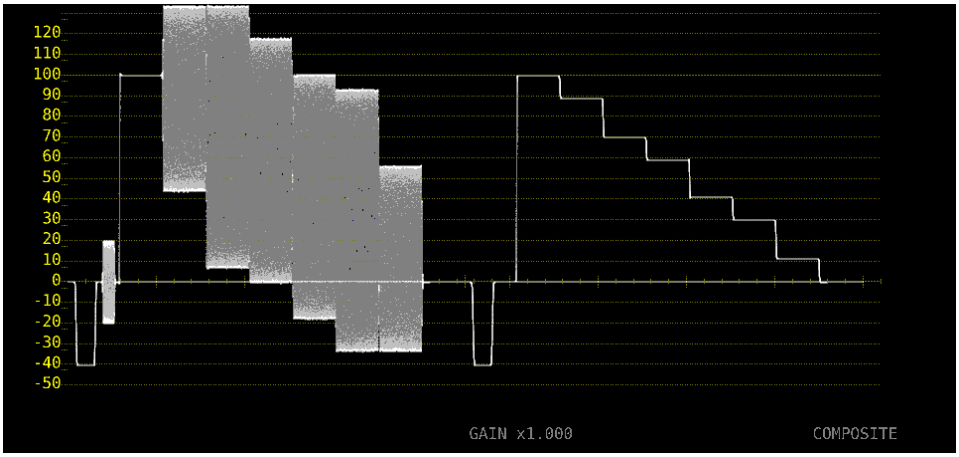
FILTER = FLAT



FILTER = LUM



FILTER = FLAT+LUM



FILTER = LUM+CRMA

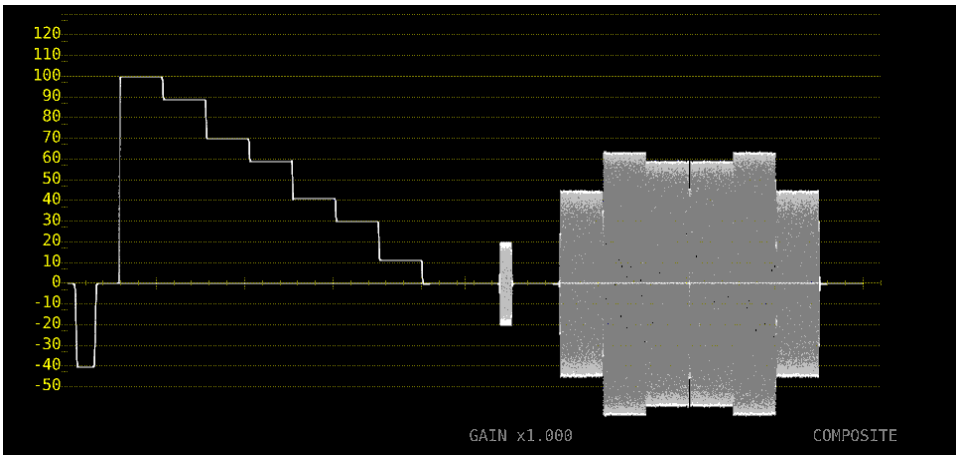


Figure 2-13 Selecting the filter (composite)

2.3.4 Setting the Scale Jump

If F•2 GAIN MAG is set to X5, the waveform is expanded five times in the Y-axis direction. To select the area you want to see expanded, follow the procedure below. You can view the area that is currently displayed with respect to the entire waveform on the scale shown on the right side of the screen.

This menu appears when F•1 GAIN VARIABLE is set to CAL. When set to VARIABLE, the value is fixed to 0, and the scale on the right side of the screen does not appear.

Procedure

WFM → F•2 GAIN/FILTER
→ F•4 SCALE JUMP: 0, 10, 20, 30, 40, 50, 60, 70, 80, 90, CURSOR (when the scale unit is not V)
→ F•4 SCALE JUMP: .0, .1, .2, .3, .4, .5, .6, .7, CURSOR (when the scale unit is V)

● **0 to 90**

The LV 5490 has 10 types of screens in the Y-axis direction, and 0 to 90 is used to switch between these screens.
For example, if the scale unit is % and YCbCr is displayed, selecting 0 displays the 0 to 20% range, selecting 10 displays the 10 to 30% range, and selecting 90 displays the 90 to 110% range.
The same holds true for .0 to .7.

● **CURSOR**

The scale jump function operates based on the Y-axis cursor, and the area near the currently selected cursor (▼ mark) is expanded.
An example operation is indicated below.

【Preparation】

1. On the CURSOR menu, set F•1 CURSOR to ON and F•2 XY SEL to Y.
2. On the GAIN/FILTER menu, set F•2 GAIN MAG to X5.
3. Set F•4 SCALE JUMP to CURSOR.

【Operation】

4. Set F•2 GAIN MAG to X1.
5. Move the Y-axis cursor to the area you want to display expanded. (You can move the cursor on the GAIN/FILTER menu. You can switch between REF, DELTA, and TRACK by pressing the function dial (F•D).)
6. Set F•2 GAIN MAG to X5 to expand the area near the Y-axis cursor.

SCALE JUMP = CURSOR

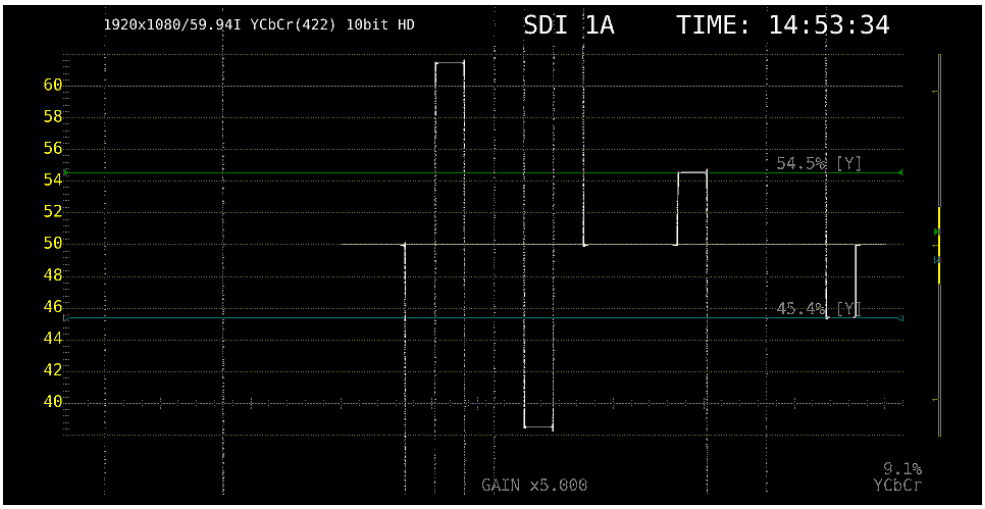


Figure 2-14　Setting the Scale Jump

2.4 Configuring Sweep Settings

To configure the sweep settings, press F•3 SWEEP on the WFM menu.

WFM → F•3 SWEEP →

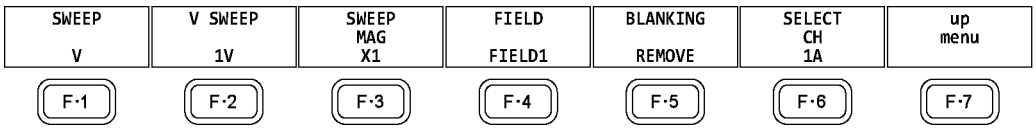


Figure 2-15 SWEEP menu

2.4.1 Selecting the Sweep Method

To select the video signal waveform sweep method, follow the procedure below.

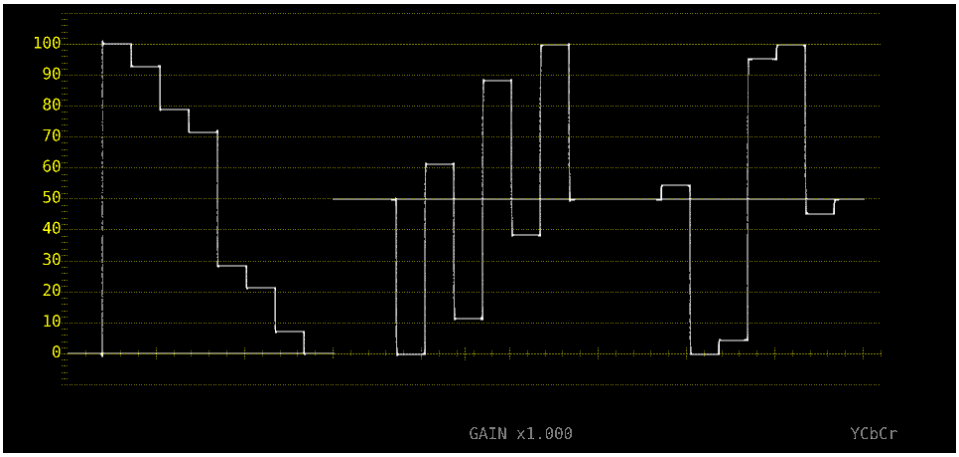
Procedure

WFM → F•3 SWEEP → F•1 SWEEP: H / V

Settings

H:	Lines are displayed.
V:	Fields or frames are displayed. Because the sampled data is downsampled, aliasing distortion occurs.

SWEEP = H



SWEEP = V

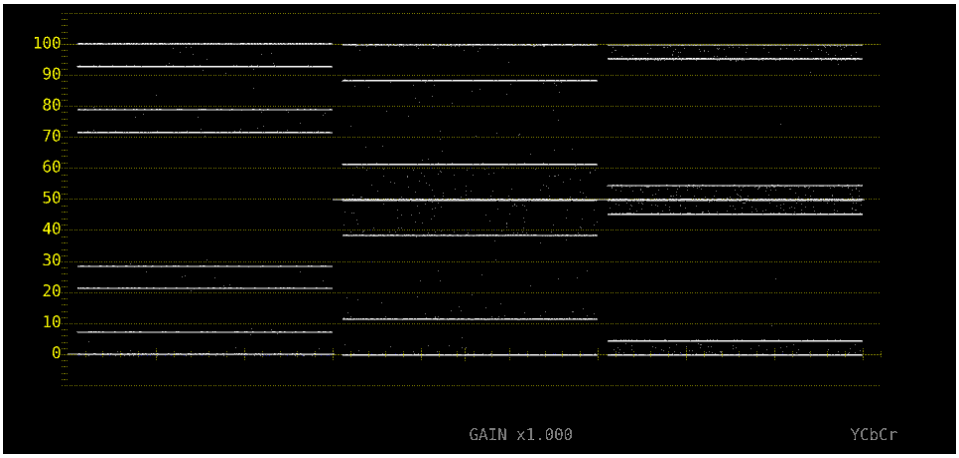


Figure 2-16 Selecting the sweep method

2.4.2 Selecting the Line Display Format

When F•1 SWEEP is set to H, to select the sweep time, follow the procedure below.

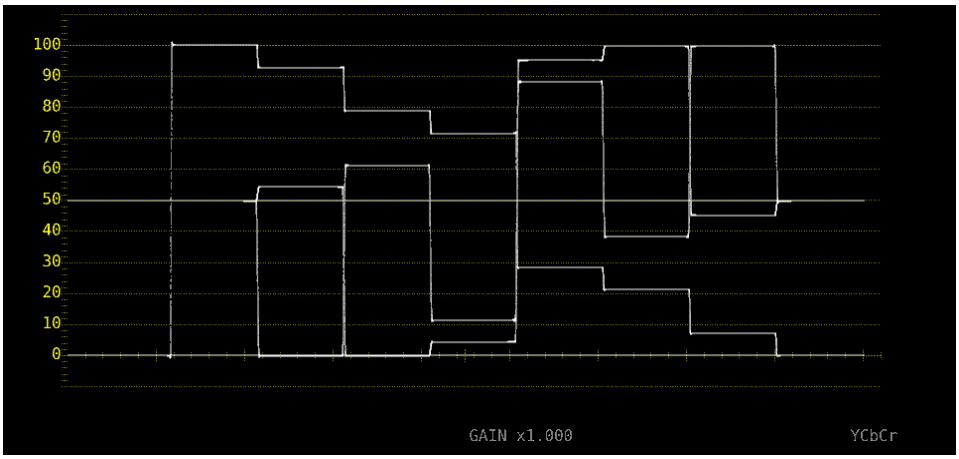
Procedure

WFM → F•3 SWEEP → F•2 H SWEEP: 1H / 2H

Settings

1H:	One line is displayed.
2H:	Two lines are displayed. This cannot be selected in the following situations. • When using 4K • When F•1 INTEN/SCALE/DISPLAY → F•4 WFM DISPLAY → F•1 WFM MODE is set to PARADE • When F•7 COLOR SYSTEM → F•1 COLOR MATRIX is set to COMPOSIT

H SWEEP = 1H



H SWEEP = 2H

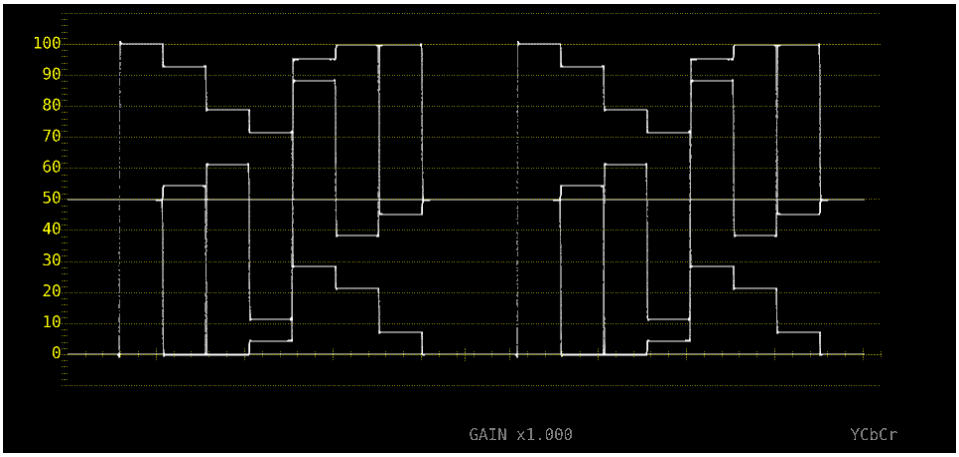


Figure 2-17 Selecting the line display format

2.4.3 Selecting the Field Display Format

When F•1 SWEEP is set to V, to select the sweep time, follow the procedure below.

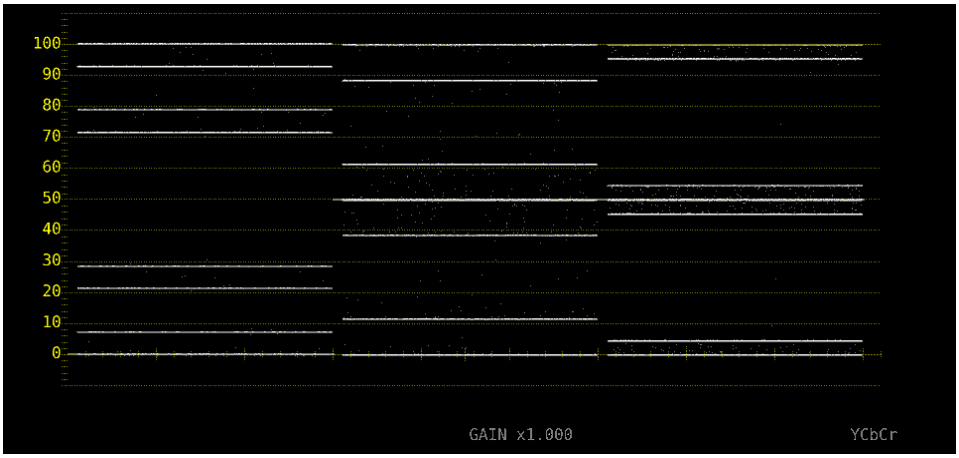
Procedure

WFM → F•3 SWEEP → F•2 V SWEEP: 1V / 2V

Settings

1V:	One field is displayed.
2V:	One frame is displayed. This option cannot be selected when the input signal is progressive.

V SWEEP = 1V



V SWEEP = 2V

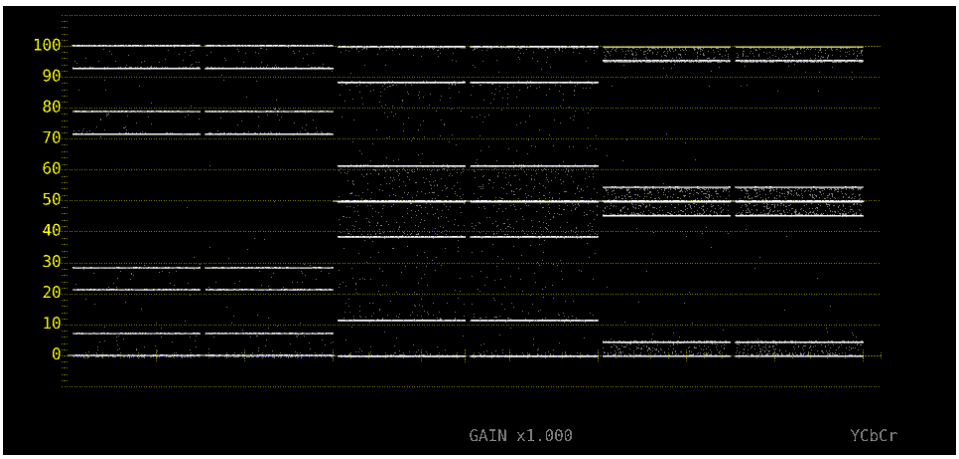


Figure 2-18 Selecting the field display format

Furthermore, when the input signal is interlace or segmented frame and F•2 V SWEEP is set to 1V, to select which field is displayed, follow the procedure below.

Procedure

WFM → F•3 SWEEP → F•4 FIELD: FIELD1 / FIELD2

2.4.4 Selecting the Horizontal Magnification

To select the horizontal magnification, follow the procedure below. The magnifications that you can select vary as shown below depending on settings such as COLOR MATRIX.

Reference COLOR MATRIX → section 2.7.1, “Selecting the Color Matrix.”

Table 2-1 Horizontal magnifications

F•1 SWEEP	COLOR MATRIX	F•2 H SWEEP	X1	X10	X20	X40	ACTIVE	BLANK
H	YCbCr, XYZ, GBR, RGB	1H	Yes	Yes	Yes	No	Yes	Yes
		2H	Yes	Yes	Yes	No	No	Yes
	COMPOSIT	-	Yes	Yes	Yes	No	Yes	No
V	-	-	Yes	No	Yes	Yes	No	No

(Yes: Settable. No: Not settable.)

Procedure

WFM → F•3 SWEEP → F•3 SWEEP MAG: X1 / X10 / X20 / X40 / ACTIVE / BLANK

Settings

X1: The video signal waveforms are displayed so that they fit on the screen.

X10: The video signal waveforms are magnified from the center of the display to 10 times the size of X1.

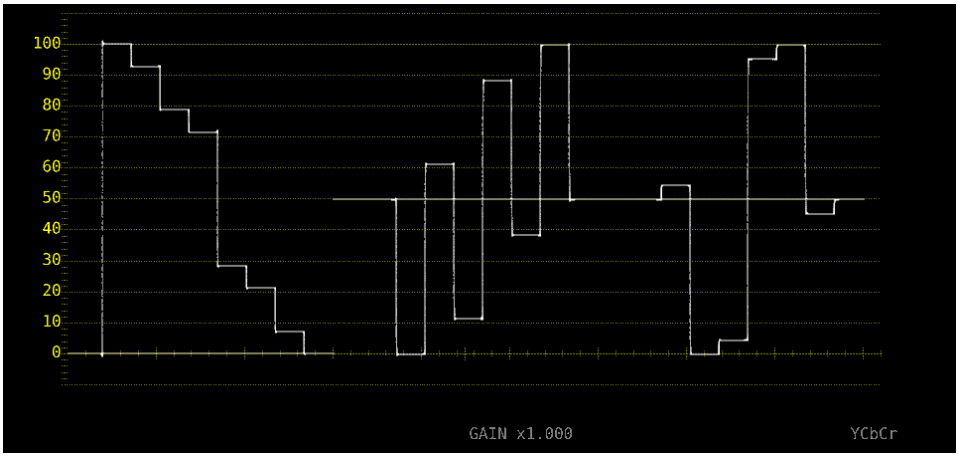
X20: The video signal waveforms are magnified from the center of the display to 20 times the size of X1.

X40: The video signal waveforms are magnified from the center of the display to 40 times the size of X1.

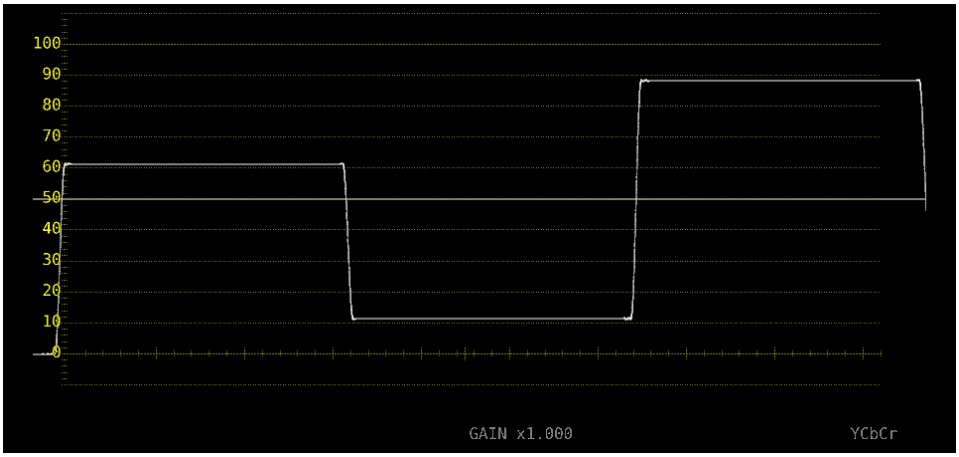
ACTIVE: Everything but the video signal waveform blanking interval is magnified.

BLANK: The video signal waveform blanking interval is magnified.
The vertical blanking interval is also displayed on the vector waveform display.

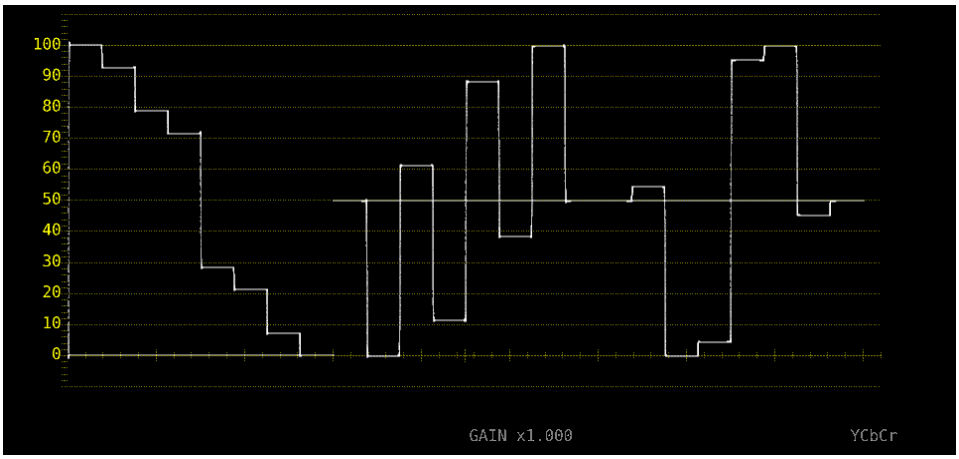
SWEEP MAG = X1



SWEEP MAG = X10



SWEEP MAG = ACTIVE



SWEEP MAG = BLANK

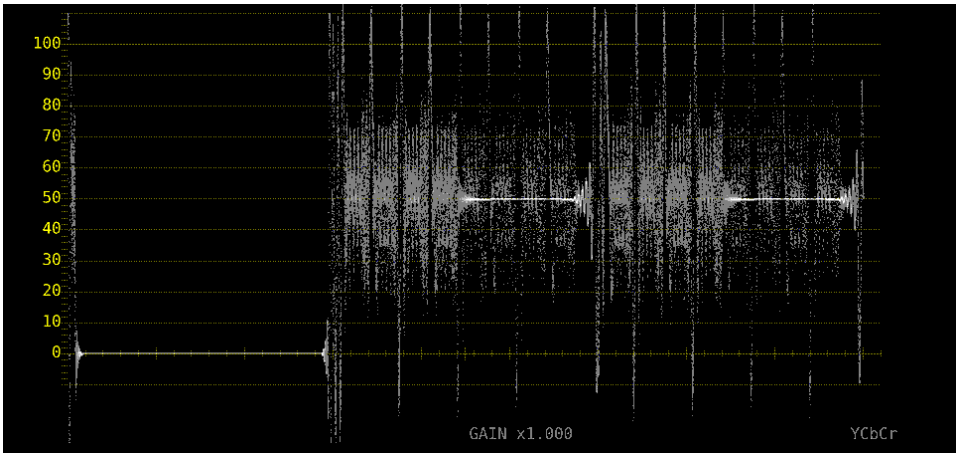


Figure 2-19 Horizontal magnifications

2.4.5 Displaying the Blanking Interval

To set how the waveforms in the blanking interval are displayed, follow the procedure below. If a setting other than REMOVE is selected, the vertical blanking interval is also displayed on the vector waveform display.

Reference COLOR MATRIX → section 2.7.1, “Selecting the Color Matrix.”

Procedure

WFM → F•3 SWEEP → F•5 BLANKING: REMOVE / V VIEW / H VIEW / ALL VIEW

Settings

REMOVE:	Only the active interval is displayed.
V VIEW:	The active interval and the vertical blanking interval are displayed.
H VIEW:	The active interval and the horizontal blanking interval are displayed. This option cannot be selected when COLOR MATRIX is set to COMPOSIT.
ALL VIEW:	The entire input signal is displayed. This option cannot be selected when COLOR MATRIX is set to COMPOSIT.

BLANKING = ALL VIEW

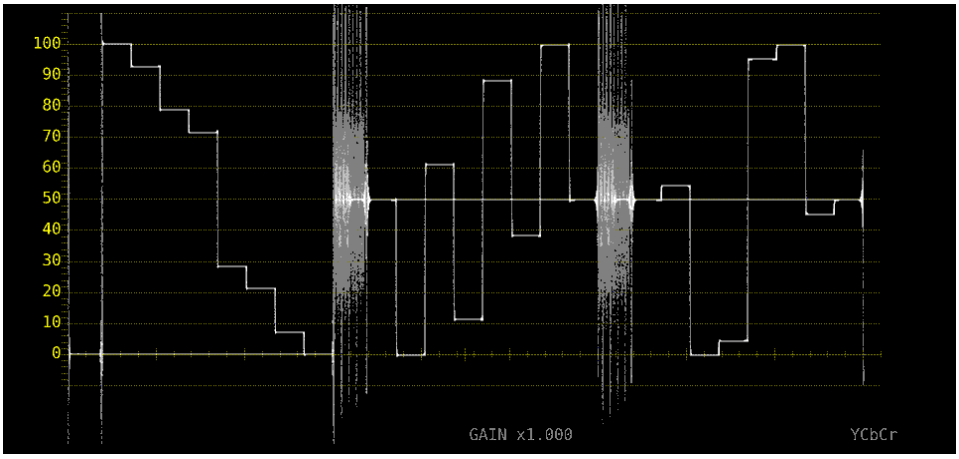


Figure 2-20 Displaying blanking intervals

2.5 Configuring Line Selection Settings

To configure line selection settings, press F•4 LINE SEL on the WFM menu.

WFM → F•4 LINE SEL →

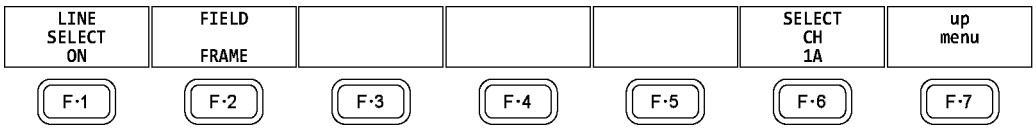


Figure 2-21 LINE SEL menu

2.5.1 Turning Line Selection On and Off

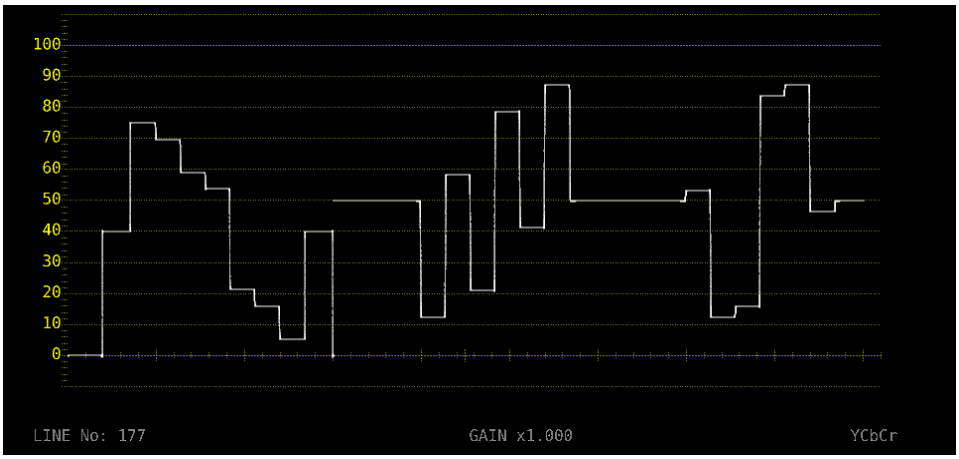
To display the vector of the selected line, follow the procedure below. You can use the function dial (F•D) to select a line. The number of the selected line appears in the lower left of the display.
Changing this setting will also change the vector-display and picture-display line selection settings.
This menu item does not appear when SWEEP is set to V.

Reference SWEEP → Section 2.4.1, “Selecting the Sweep Method”

Procedure

WFM → F•4 LINE SEL → F•1 LINE SELECT: ON / OFF

LINE SELECT = ON



LINE SELECT = OFF

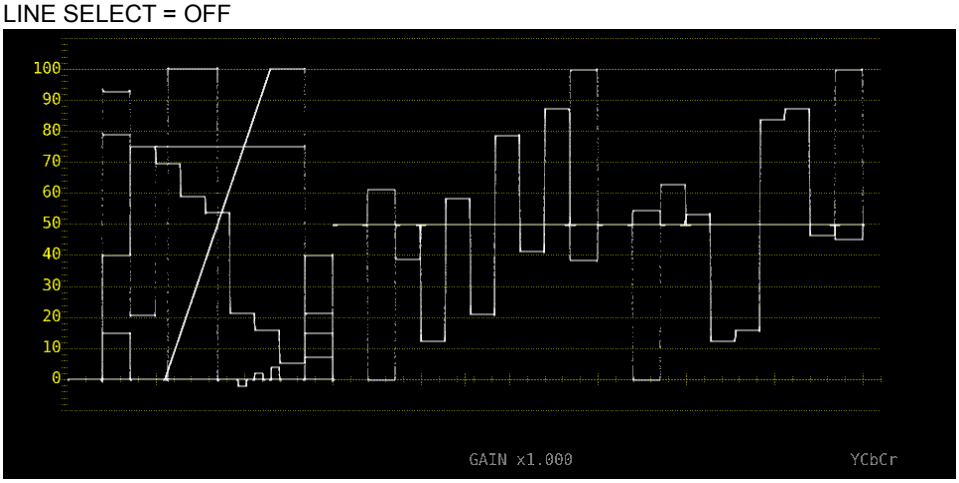


Figure 2-22 Turning line selection on and off

2.5.2 Setting the Line Selection Range

When F•1 LINE SELECT is set to ON and the input signal format is interlaced or segmented frame, to set the line selection range, follow the procedure below.
Changing this setting will also change the selected line on the vector, picture, and status (data dump) displays.

Procedure

WFM → F•4 LINE SEL → F•2 FIELD: FIELD1 / FIELD2 / FRAME

Settings

FIELD1:	A line from field 1 can be selected. (Example: 1 to 563)
FIELD2:	A line from field 2 can be selected. (Example: 564 to 1125)
FRAME:	All lines can be selected. (Example: 1 to 1125)

2.6 Configuring Cursor Settings

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

WFM → F•5 CURSOR →

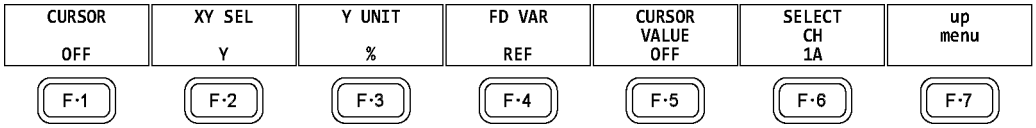


Figure 2-23 CURSOR menu

2.6.1 Turning Cursors On and Off

To turn cursors on and off, follow the procedure shown below.
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. (When F•3 Y UNIT is set to DEC or HEX, absolute values are displayed.)
If ON XY is selected, the X-axis cursors and Y-axis cursors are displayed simultaneously.

Procedure

WFM → F•5 CURSOR → F•1 CURSOR: ON / ON XY / OFF

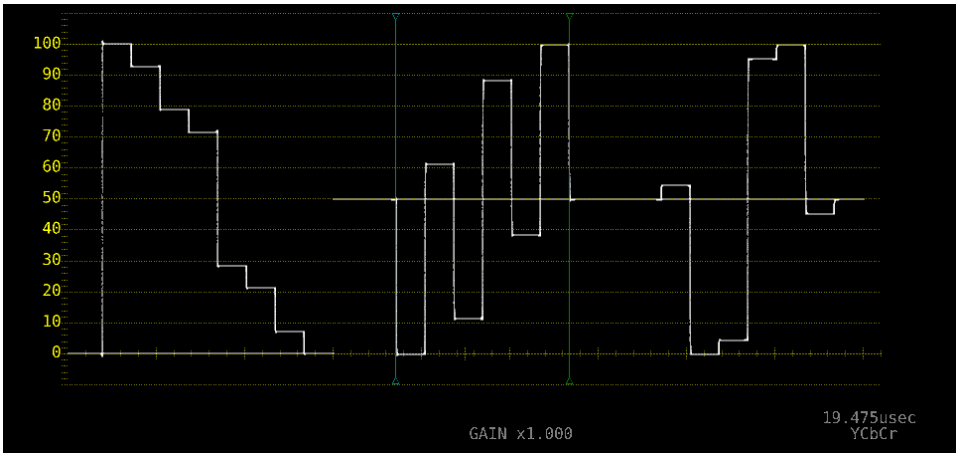
2.6.2 Selecting the Cursor

To select the X (time measurement) or Y (amplitude measurement) cursor, follow the procedure below.
If F•1 CURSOR is set to ON XY, select the cursor to move here.

Procedure

WFM → F•5 CURSOR → F•2 XY SEL: X / Y

XY SEL = X



XY SEL = Y

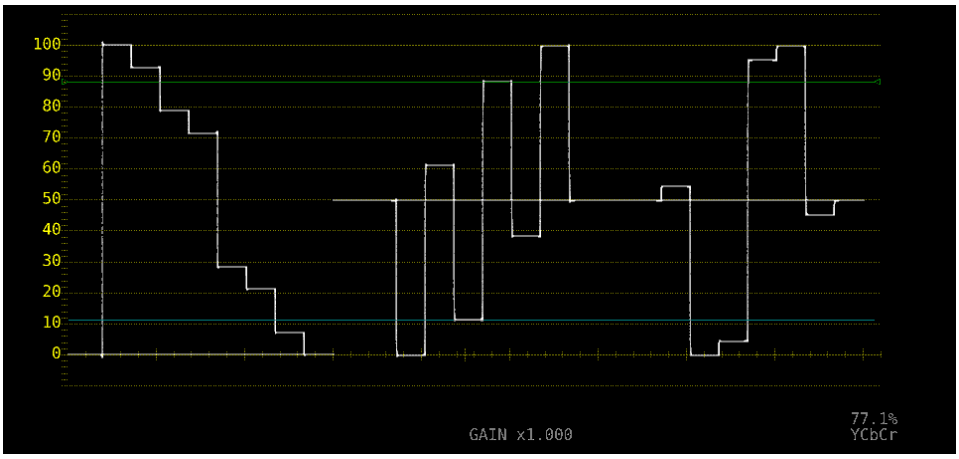


Figure 2-24 Selecting the cursor

2.6.3 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

WFM → F•5 CURSOR → F•4 FD VAR: REF / DELTA / TRACK

2.6.4 Selecting the Y-Axis Measurement Unit

When F•2 XY SEL is set to Y, to select the Y-axis cursor measurement unit, follow the procedure below.

Reference COLOR MATRIX → section 2.7.1, “Selecting the Color Matrix.”

Procedure

WFM → F•5 CURSOR → F•3 Y UNIT: mV / % / R% / DEC / HEX / HDR

Settings

mV:	The measurement unit is volts.
%:	The measurement unit is percentage. When the composite display format is NTSC, 714 mV is 100 %. When the composite display format is PAL, 700 mV is 100 %.
R%:	The amplitude will be measured as a percentage of the amplitude at the time when you pressed F•5 REFSET.
DEC:	Values are displayed in decimal with 0 to 100 % expressed as 64 to 940. This option cannot be selected when COLOR MATRIX is set to COMPOSIT. C_BC_R signal measurement is not supported.
HEX:	Values are displayed in hexadecimal with 0 to 100 % expressed as 040 to 3AC. This option cannot be selected when COLOR MATRIX is set to COMPOSIT. C_BC_R signal measurement is not supported.
HDR:	Values are displayed as a percentage or cd/m^2. You can select this option when SER07 is installed and when HDR signals are being measured. For details, see section 6.1.2, “Cursor Display.”

2.6.5 Selecting the X-Axis Measurement Unit

When F•2 XY SEL is set to X, to select the X-axis cursor measurement unit, follow the procedure below.

Procedure

WFM → F•5 CURSOR → F•3 X UNIT: sec / Hz

Settings

sec:	The measurement unit is seconds.
Hz:	The measurement unit is frequency, with the length of one period set to the distance between the two cursors.

2.6.6 Turning the Cursor Value Display On and Off

To display cursor values, follow the procedure shown below (except when F•3 Y UNIT is set to R%).
The display unit is the unit specified with F•3 Y UNIT or F•3 X UNIT.
If F•1 CURSOR is set to ON XY, the value is displayed on the cursor selected with F•2 XY SEL.

Procedure

WFM → F•5 CURSOR → F•5 CURSOR VALUE: ON / OFF

CURSOR VALUE = ON

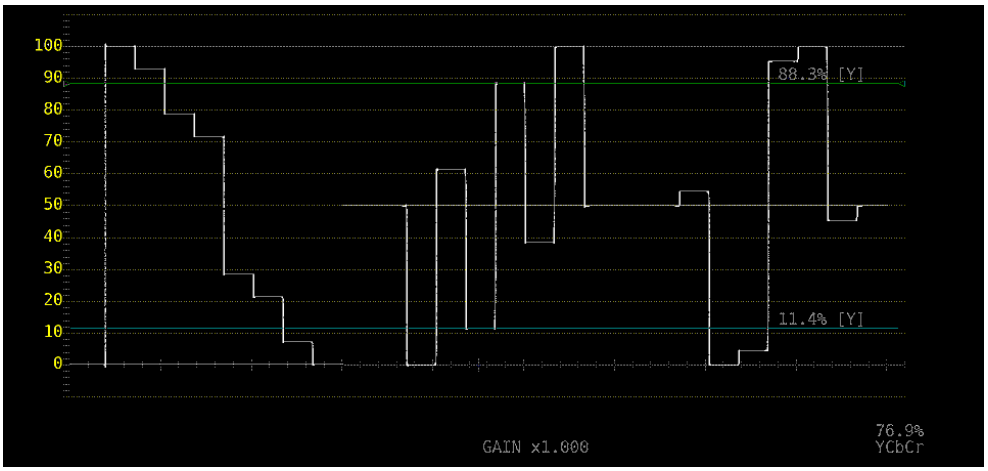


Figure 2-25 Turning the cursor value display on and off

2.7 Configuring the Color System Settings

To configure the color system settings, press F•7 COLOR SYSTEM on the WFM menu.

WFM → F•7 COLOR SYSTEM →

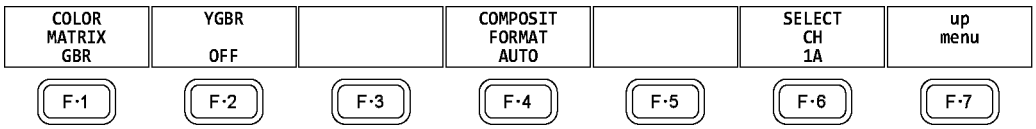


Figure 2-26 COLOR SYSTEM menu

2.7.1 Selecting the Color Matrix

The LV 5490SER01 or LV 5490SER02 performs a matrix conversion on a input signal to convert it into a GBR, RGB or pseudo-composite signal. To select the waveform display format, follow the procedure below. The selected display format is indicated in the lower right of the display.

Procedure

WFM → F•7 COLOR SYSTEM → F•1 COLOR MATRIX: YCbCr / XYZ / GBR / RGB / COMPOSIT

Settings

YCbCr: The YC_BC_R signal is displayed without changes.
This option cannot be selected when the input signal is RGB or XYZ.

XYZ: The XYZ signal is displayed without changes.
This option cannot be selected when the input signal is YC_BC_R or RGB.

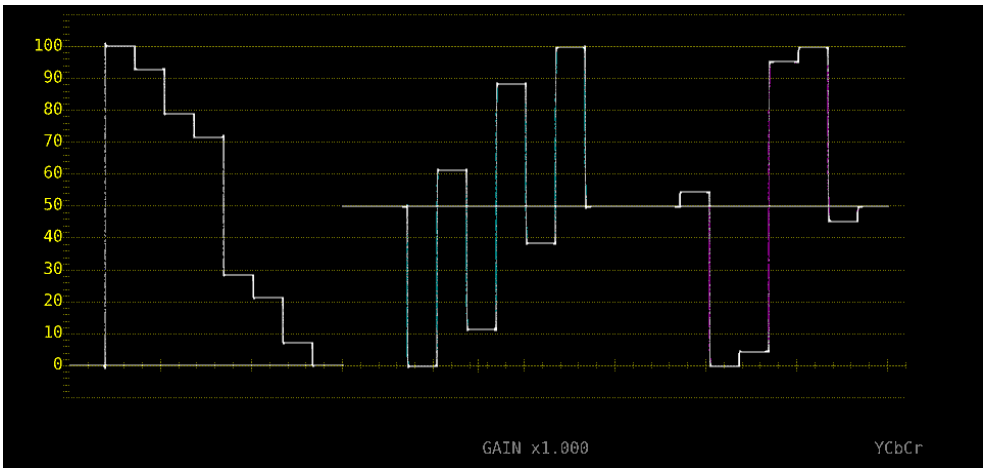
GBR: The input signal is converted into a GBR signal and displayed.

RGB: The input signal is converted into a RGB signal and displayed.

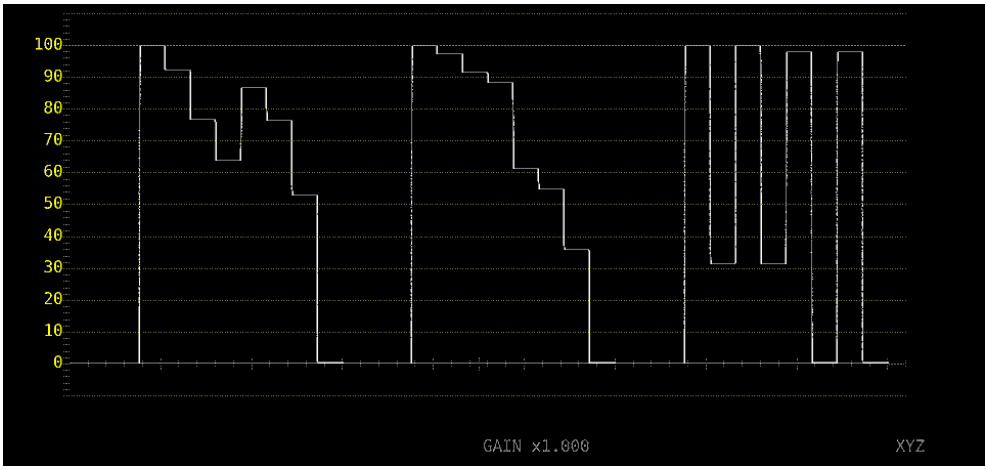
COMPOSIT: The input signal is converted into a pseudo NTSC or PAL composite signal and displayed.

- Color burst frequencies do not match those of PAL and NTSC.
- Color burst and sync signal widths and locations are different from those of PAL and NTSC.
- The signal bandwidth is that of the original signal.

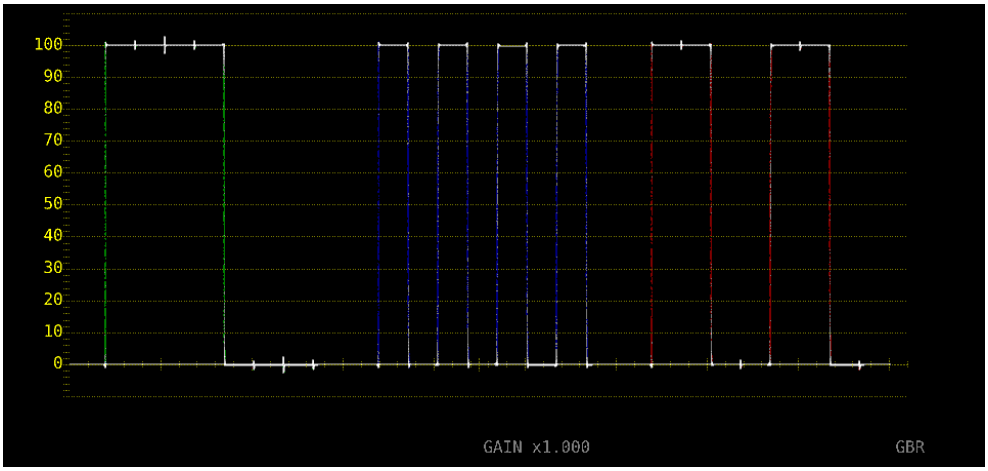
COLOR MATRIX = YCbCr



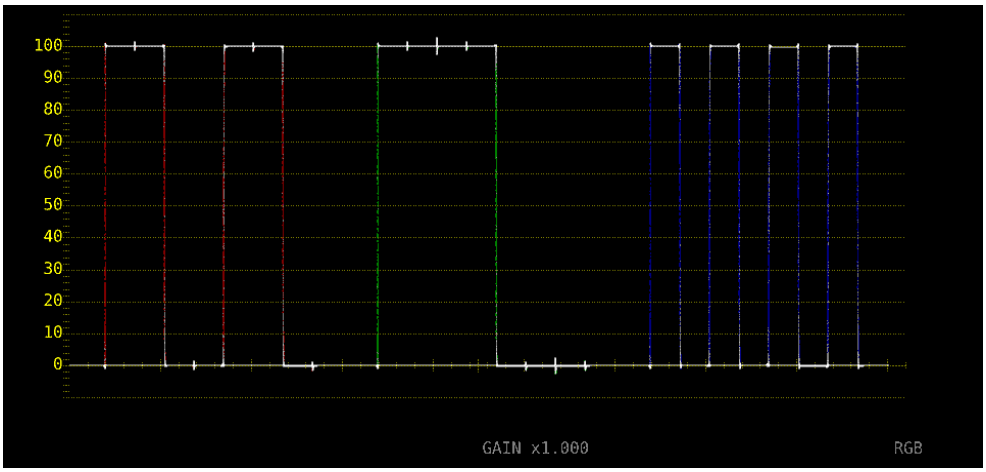
COLOR MATRIX = XYZ



COLOR MATRIX = GBR



COLOR MATRIX = RGB



COLOR MATRIX = COMPOSIT

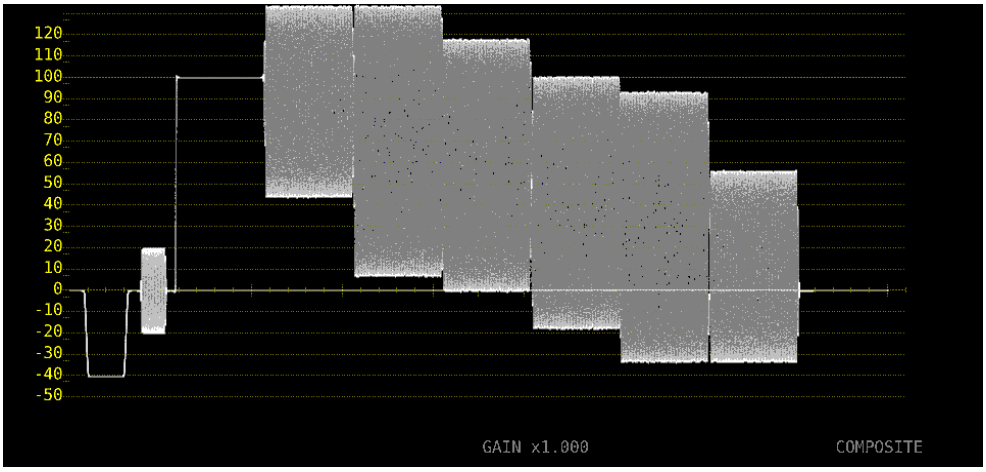


Figure 2-27 Selecting the color matrix

2.7.2 Turning the Luminance Signal On and Off

When F•1 COLOR MATRIX is set to GBR or RGB, to turn the luminance signal (Y) on and off, follow the procedure below.

Procedure

WFM → F•7 COLOR SYSTEM
→ F•2 YGBR: ON / OFF
→ F•2 YRGB: ON / OFF

YGBR = ON

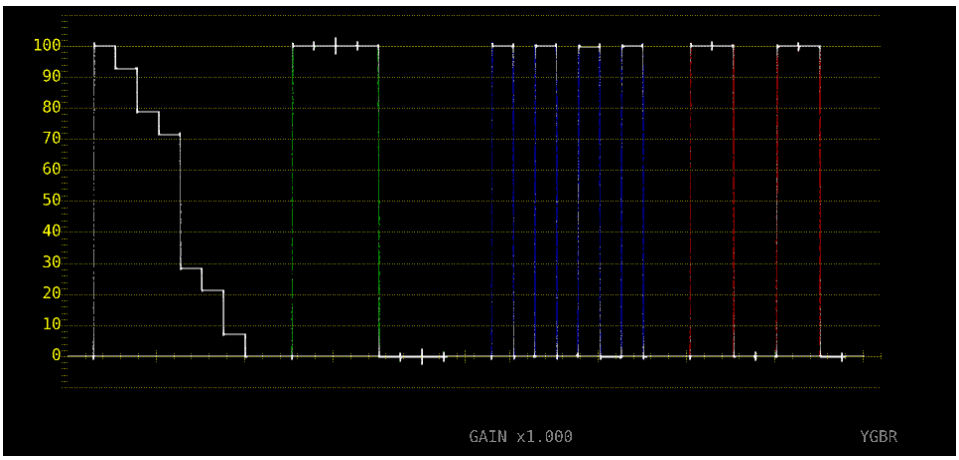


Figure 2-28 Turning the luminance signal on and off

2.7.3 Selecting the Composite Display Format

To select the composite display format, follow the procedure below.

Procedure

WFM → F•7 COLOR SYSTEM → F•4 COMPOSIT FORMAT: AUTO / NTSC / PAL

Settings

AUTO:	When the input signal frame rate is 25 Hz or 50 Hz, the format is PAL. Otherwise, the format is NTSC.
NTSC:	The format is NTSC. The scale is fixed to percentage.
PAL:	The format is PAL. The scale is fixed to V.

2.7.4 Selecting the Setup Level

When F•1 COLOR MATRIX is set to COMPOSIT, to select the setup level, follow the procedure below.
This menu does not appear if the composite display format is PAL.

Procedure

WFM → F•7 COLOR SYSTEM → F•5 SETUP: 0% / 7.5%

SETUP = 7.5%

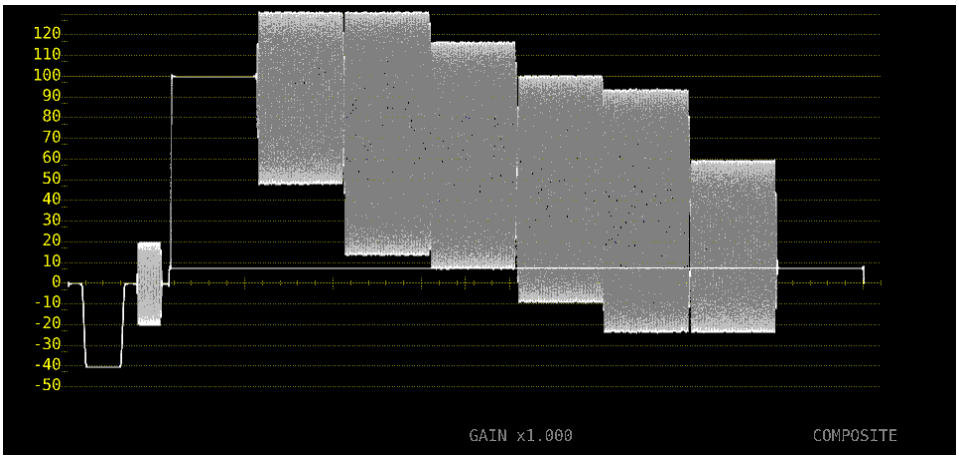


Figure 2-29 Selecting the setup level

3. VECTOR WAVEFORM DISPLAY

To display vectors, press VECT, F•5 DISPLAY, and then F•1 MODE to select VECTOR.

For an explanation when MODE is set to 5BAR, see section 3.7, “5-Bar Display.”
For an explanation when MODE is set to HISTOGRAM, see section 3.8, “Histogram Display.”
For an explanation when MODE is set to CIE DIAGRAM, see chapter 4, “CIE DIAGRAM DISPLAY (SER05).” You can select CIE DIAGRAM when SER05 is installed.

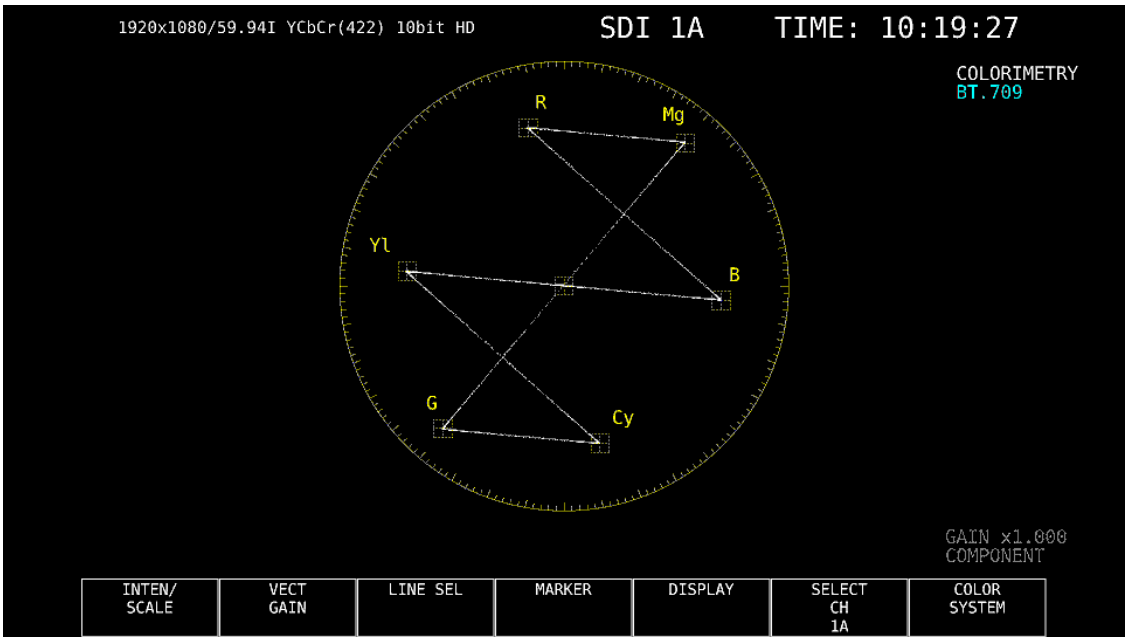


Figure 3-1 Vector waveform display

- **Vectors**

  Component signal vector displays are X-Y displays based on C_B (horizontal) and C_R (vertical). The vector display scale has the following qualities.

  Frame: ±5 % of the full scale value of 0.7 V (for component display)
  ±3 % of the full scale value of 0.7 V (for pseudo-composite display)
  Circle: +20 % with respect to green

- **Blanking interval**

  Normally, blanking interval is not displayed with vector waveforms, but if SWEEP MAG is set to BLANK on the WFM menu or BLANKING is set to REMOVE, it is displayed.

- **Colorimetry**

  The colorimetry selected in the system settings is displayed in cyan in the upper right of the screen.
  However, for 3G(DL)-4K and 3G(QL), the current applied colorimetry is displayed in yellow if the colorimetry information of all links specified by the payload ID are not matched.
  When the colorimetry alarm is set to on in the system settings, the alarm is indicated in red.

3.1 Configuring the Intensity and Scale Settings

To configure the intensity and scale settings, press F•1 INTEN / SCALE on the VECT menu.

VECT → F•1 INTEN/SCALE →

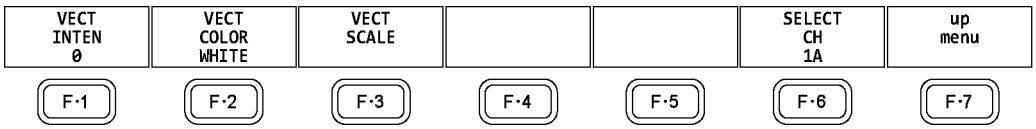


Figure 3-2 INTEN/SCALE menu

3.1.1 Adjusting the Vector Intensity

To adjust the vector intensity, follow the procedure below.
Press the function dial (F•D) to return the setting to its default value (0).

Procedure

VECT → F•1 INTEN/SCALE → F•1 VECT INTEN: -128 - 0 - 127

3.1.2 Selecting the Vector Color

To select the vector waveform color, follow the procedure below.

Procedure (when not measuring 3G-B-DS)

VECT → F•1 INTEN/SCALE → F•2 VECT COLOR: WHITE / YELLOW / CYAN / GREEN / MAGENTA / RED / BLUE

Procedure (when measuring 3G-B-DS)

VECT → F•1 INTEN/SCALE → F•2 VECT COLOR
→ F•1 STREAM1 COLOR: WHITE / YELLOW / CYAN / GREEN / MAGENTA / RED / BLUE
→ F•2 STREAM2 COLOR: WHITE / YELLOW / CYAN / GREEN / MAGENTA / RED / BLUE

3.1.3 Adjusting the Scale Intensity

To configure the scale, press F•3 VECT SCALE on the INTEN/SCALE menu.

VECT → F•1 INTEN/SCALE → F•3 VECT SCALE →

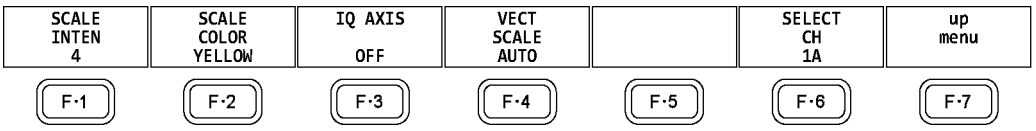


Figure 3-3 VECT SCALE menu

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

Procedure

VECT → F•1 INTEN/SCALE → F•1 SCALE INTEN: -8 - 4 - 7

3.1.4 Selecting the Scale Color

To select the scale color, follow the procedure below.

Procedure

VECT → F•1 INTEN/SCALE → F•2 SCALE COLOR: WHITE / YELLOW / CYAN / GREEN / MAGENTA / RED / BLUE

3.1.5 Turning the Display of the I and Q Axes On and Off

To turn the display of the I and Q axes on and off, follow the procedure below.
This menu item does not appear when VECT SCALE is set to DCI or BT.2020.
When the full scale value of 0.7 V is 100 %, the I and Q axes are displayed at the following values.

Table 3-1 Displaying the I and Q axes

	I Axis	Q Axis
G	44.559%	37.056%
B	27.865%	84.085%
R	69.120%	62.417%

Procedure

VECT → F•1 INTEN/SCALE → F•3 IQ AXIS: ON / OFF

IQ AXIS = ON

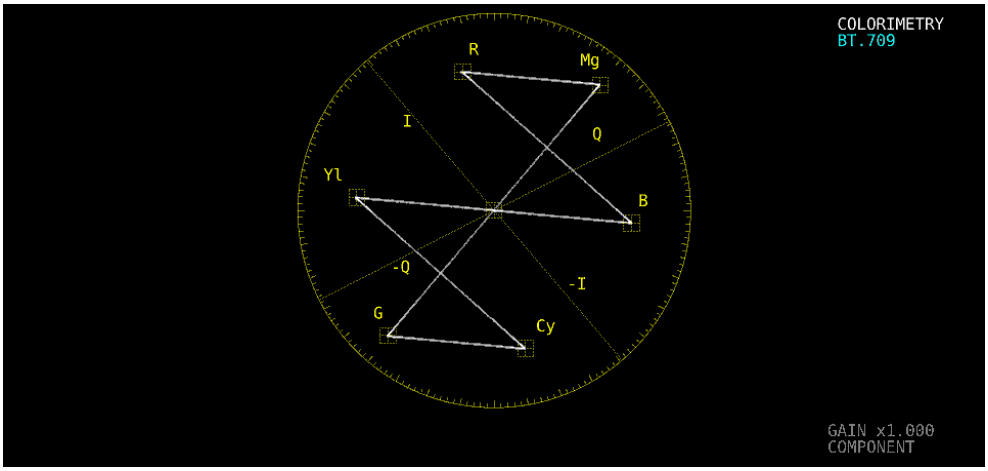


Figure 3-4 Turning the display of the I and Q axes on and off

3.1.6 Selecting the Scale

When COLOR MATRIX is set to COMPONEN, follow the procedure below to select the scale type.

Reference COLOR MATRIX → section 3.6.1, “Selecting the Color Matrix.”

Procedure

VECT → F•1 INTEN/SCALE → F•3 VECT SCALE → F•4 VECT SCALE: AUTO / BT.601 / BT.709 / DCI / BT.2020

Settings

AUTO:	A scale for the colorimetry selected in the system settings is displayed.
BT.601:	A scale defined in ITU-R BT.601 is displayed. When the input signal is SD and a 100 % color bar signal is being applied, the peak levels match the ends of the scale.
BT.709:	A scale defined in ITU-R BT.709 is displayed. When the input signal is HD and a 100 % color bar signal is being applied, the peak levels match the ends of the scale.
DCI:	A scale defined in DCI is displayed.
BT.2020:	A scale defined in ITU-R BT.2020 is displayed. When the input signal is 4K, the division transmission system is 2 sample interleave, and a 100% color bar signal is being applied, the peak levels match the ends of the scale.

3.2 Setting the Gain

To configure the gain settings, press F•2 VECT GAIN on the VECT menu.

VECT → F•2 VECT GAIN →

Figure 3-5 VECT GAIN menu

3.2.1 Selecting the Fixed Gain

To select the fixed vector gain, follow the procedure below.

Procedure

VECT → F•2 VECT GAIN → F•2 GAIN MAG: X1 / X5 / IQ-MAG

Settings

X1:	Vectors are displayed at x1 magnification.
X5:	Vectors are displayed at x5 magnification.
IQ-MAG:	Vectors are displayed using the following magnifications. x3.12 (for signals other than SD during component display; magnification that causes the I signal of the multiformat colorbar to lie on the circumference of the scale) x2.85 (for signals other than SD during pseudo-composite display; magnification that causes the I signal of the multiformat colorbar, which has gone through pseudo-composite conversion, to lie on the circumference of the scale) x2.92 (for SD signals during component display; magnification that causes the amplitude to lie on the circumference of the scale when the burst signal of the composite vector display is converted into component signals) x2.63 (for SD signals during pseudo-composite display; magnification that causes the -I and Q signals of the SMPTE colorbar, which has gone through pseudo-composite conversion, to lie on the circumference of the scale)

3.2.2 Setting the Variable Gain

To set the variable vector gain, follow the procedure below.

Procedure

VECT → F•2 VECT GAIN → F•1 GAIN VARIABLE: CAL / VARIABLE

Settings

CAL:	The waveform gain is fixed.
VARIABLE:	You can adjust the waveform gain by turning the function dial (F•D). Press the function dial (F•D) to return the setting to its default value. The adjusted gain value (the combination of F•1 GAIN VARIABLE and F•2 GAIN MAG) appears in the lower right of the screen. 0.200 - 1.000 - 2.000 (for X1) 1.000 - 5.000 - 10.000 (for X5) 0.620 - 3.120 - 6.240 (not IQ-MAG or SD, for component display) 0.570 - 2.850 - 5.700 (not IQ-MAG or SD, for pseudo-composite display) 0.580 - 2.920 - 5.840 (IQ-MAG or SD, for component display) 0.520 - 2.630 - 5.260 (IQ-MAG or SD, for pseudo-composite display)

3.3 Configuring Line Selection Settings

To configure line selection settings, press F•3 LINE SEL on the VECT menu.

VECT → F•3 LINE SEL →

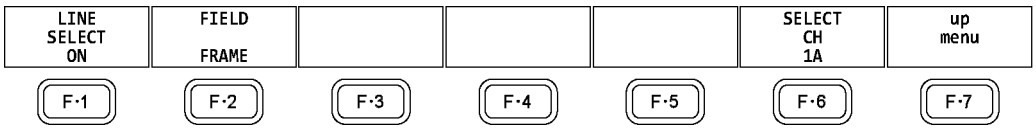


Figure 3-6 LINE SEL menu

3.3.1 Turning Line Selection On and Off

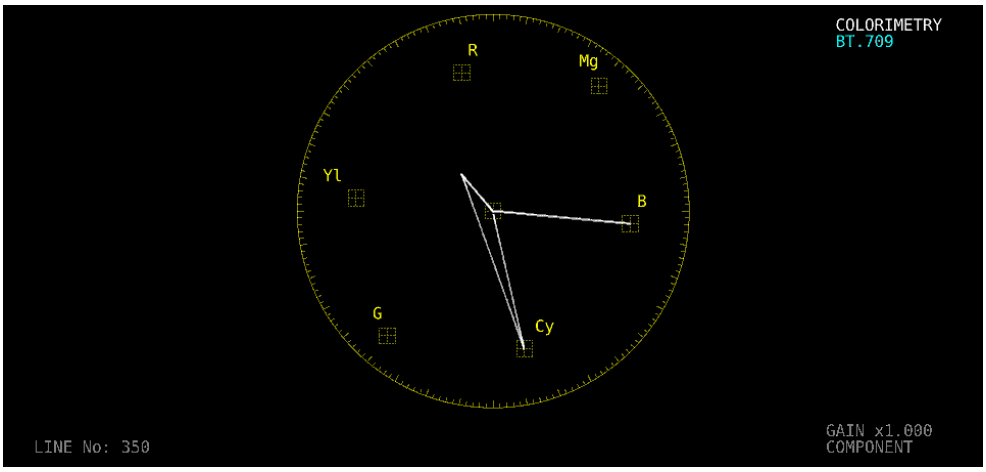
To display the vector of the selected line, follow the procedure below. You can use the function dial (F•D) to select a line. The number of the selected line appears in the lower left of the display.
Changing this setting will also change the video-signal-waveform-display and picture-display line selection settings.
This menu item does not appear when SWEEP on the WFM menu is set to V.

Reference SWEEP → Section 2.4.1, “Selecting the Sweep Method”

Procedure

VECT → F•3 LINE SEL → F•1 LINE SELECT: ON / OFF

LINE SEL = ON



LINE SEL = OFF

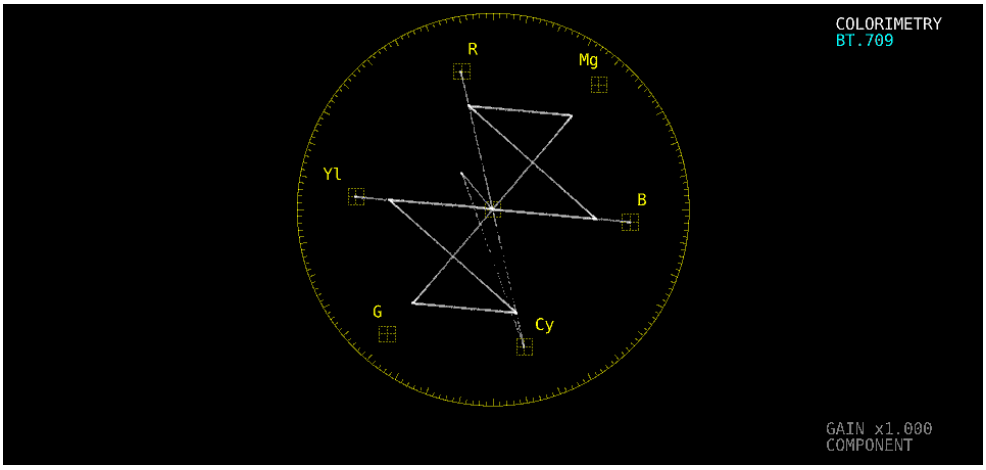


Figure 3-7 Turning line selection on and off

3.3.2 Setting the Line Selection Range

When F•1 LINE SELECT is set to ON and the input signal format is interlaced or segmented frame, to set the line selection range, follow the procedure below.
Changing this setting will also change the selected line on the video-signal-waveform, picture, and status (data dump) displays.

Procedure

VECT → F•3 LINE SEL → F•2 FIELD: FIELD1 / FIELD2 / FRAME

Settings

FIELD1:	A line from field 1 can be selected. (Example: 1 to 563)
FIELD2:	A line from field 2 can be selected. (Example: 564 to 1125)
FRAME:	All lines can be selected. (Example: 1 to 1125)

3.4 Configuring Marker Settings

To configure marker settings, press F•4 MARKER in the VECT menu.

VECT → F•4 MARKER →

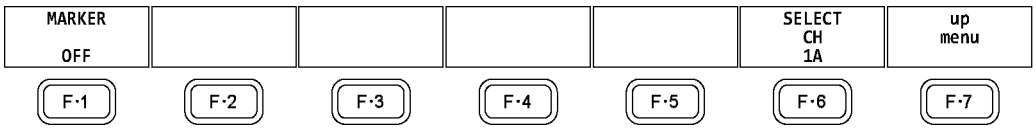


Figure 3-8 MARKER menu

3.4.1 Displaying the Vector Marker

To display a marker on the vector display, follow the procedure below.

You can move the marker horizontally using the H POS knob and vertically using the V POS knob. The measured values are displayed in the lower right of the display. Press the H POS knob to move the marker to the Cb = 0.0% position. Press the V POS knob to move the marker to the Cr = 0.0% position.

Measured values are displayed using the following references: Cb at position B = 100.0% and Cr at position R = 100.0%. The distance from the center is expressed as “d,” and hue is expressed as “deg.”
Normally, the marker is displayed in green. When if falls outside the display area, it blinks in red. If this occurs, “OVER” appears above the measured values.

Procedure

VECT → F•4 MARKER → F•1 MARKER: ON / OFF

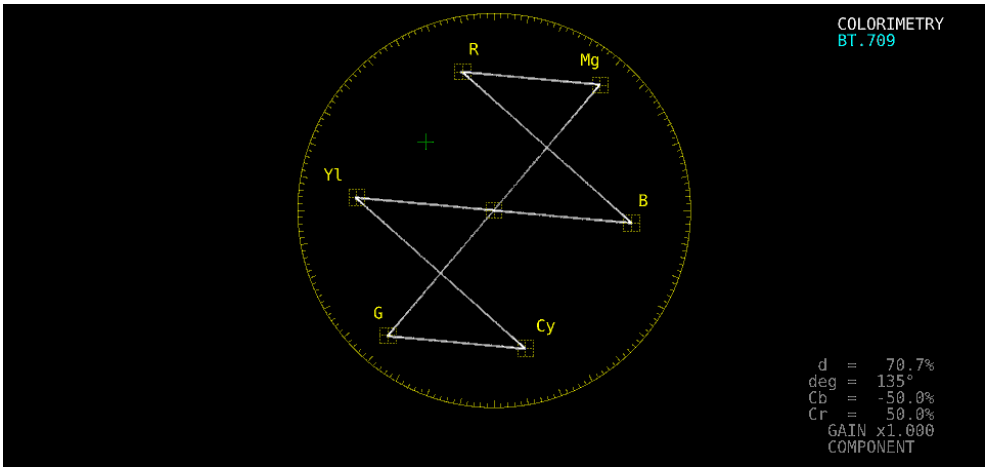


Figure 3-9 Displaying the vector marker

3.5 Configuring the Display Settings

To configure the display settings, press F•5 DISPLAY on the VECT menu.

VECT → F•5 DISPLAY →

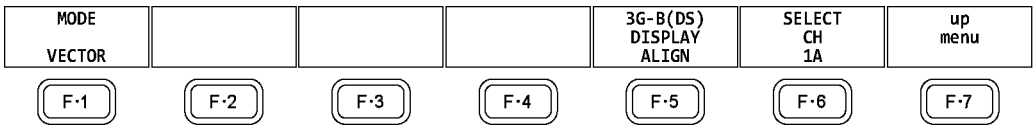


Figure 3-10 DISPLAY menu

3.5.1 Switching the Display Mode

To select the display mode, follow the procedure below.

Procedure

VECT → F•5 DISPLAY → F•1 MODE: VECTOR / 5BAR / HISTOGRAM / CIE DIAGRAM

Settings

VECTOR:	Vector waveforms are displayed.
5BAR:	5-Bar are displayed. For detail on 5 BAR, see section 3.7, “5-Bar Display.”
HISTOGRAM:	Histogram is displayed. For detail on histogram, see section 3.8, “Histogram Display.”
CIE DIAGRAM:	CIE diagram is displayed. This option can be selected when SER05 is installed. For detail on chromaticity diagram, see chapter 4, “CIE DIAGRAM DISPLAY (SER05).”

3.5.2 Configuring the 3G-B-DS Display Settings

When measuring 3G-B-DS, to select the display mode, follow the procedure below.

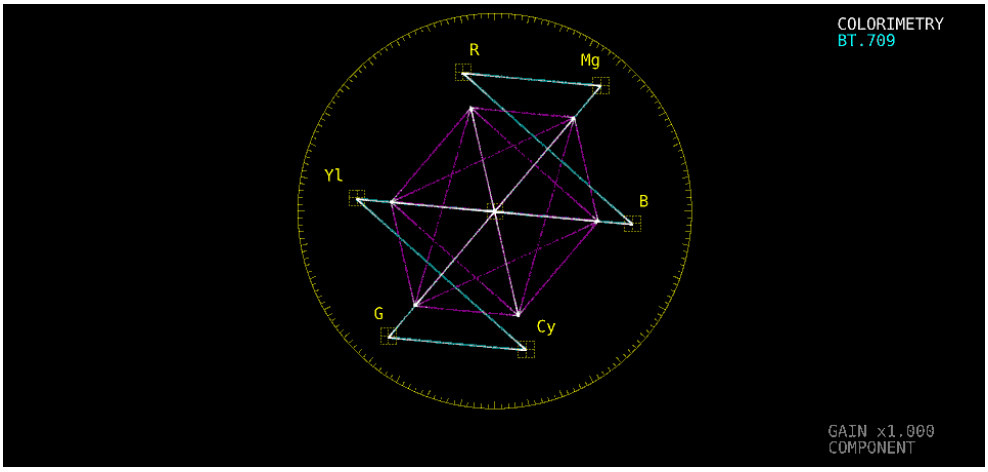
Procedure

VECT → F•5 DISPLAY → F•5 3G-B-DS DISPLAY: STREAM1 / STREAM2 / MIX / ALIGN

Settings

STREAM1:	Stream 1 is displayed.
STREAM2:	Stream 2 is displayed.
MIX:	Streams 1 and 2 are displayed on top of each other.
ALIGN:	Streams 1 and 2 are displayed side by side.

3G-B-DS DISPLAY = MIX



3G-B-DS DISPLAY = ALIGN

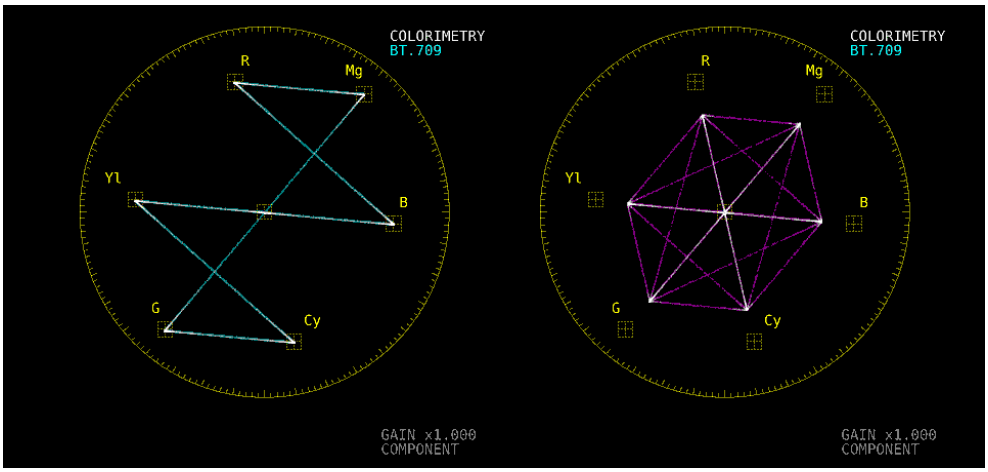


Figure 3-11 Configuring the 3G-B-DS display settings

3.6 Configuring the Color System Settings

To configure the color system settings, press F•7 COLOR SYSTEM on the VECT menu.

VECT → F•7 COLOR SYSTEM →

COLOR MATRIX COMPOSIT	COMPOSIT FORMAT AUTO	SETUP 0%	COLOR BAR 100%		SELECT CH 1A	up menu
F·1	F·2	F·3	F·4	F·5	F·6	F·7

Figure 3-12 COLOR SYSTEM menu

3.6.1 Selecting the Color Matrix

To select the vector display format, follow the procedure below. The selected display format is indicated in the lower right of the display.

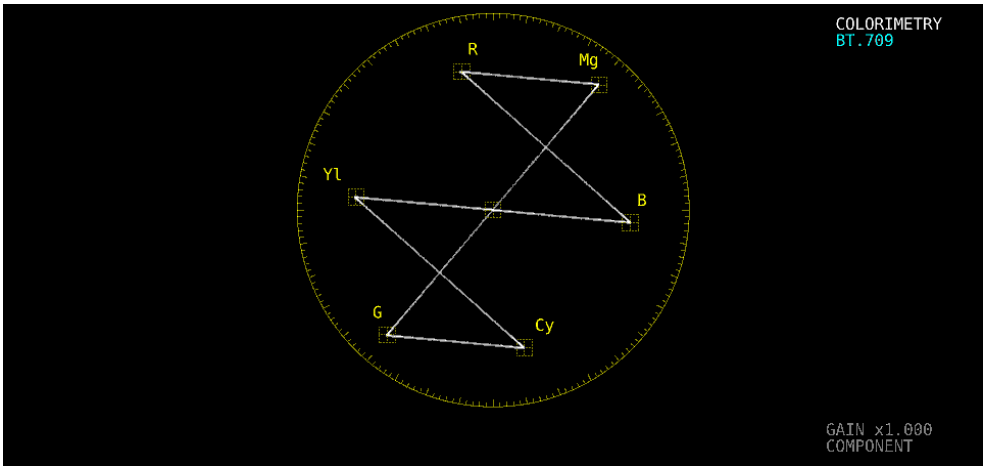
Procedure

VECT → F•7 COLOR SYSTEM → F•1 COLOR MATRIX: COMPONEN / COMPOSIT

Settings

COMPONEN:	The component chrominance signal is displayed on the X and Y axes.
COMPOSIT:	The component signal is converted into a pseudo-composite signal, and the pseudo-composite signal's chrominance signal is displayed on the X and Y axes.

COLOR MATRIX = COMPONEN



COLOR MATRIX = COMPOSIT

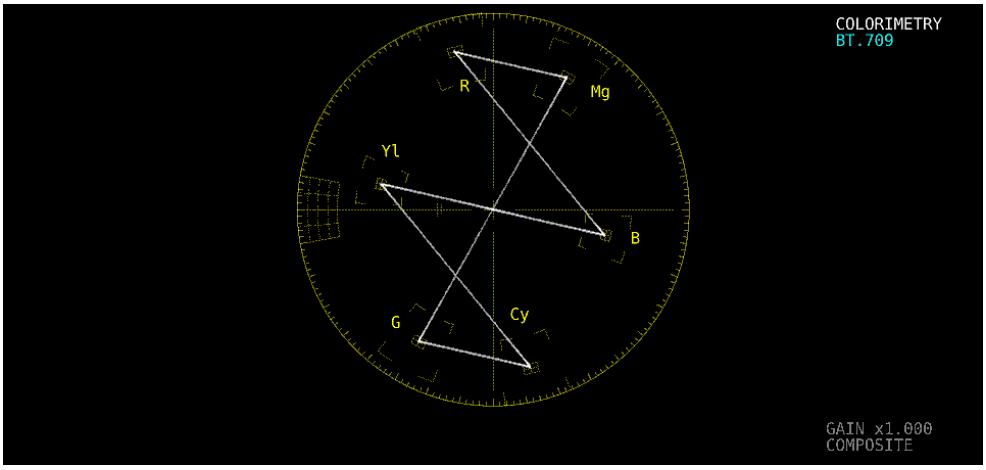


Figure 3-13 Selecting the color matrix

3.6.2 Selecting the Composite Display Format

To select the composite display format, follow the procedure below.

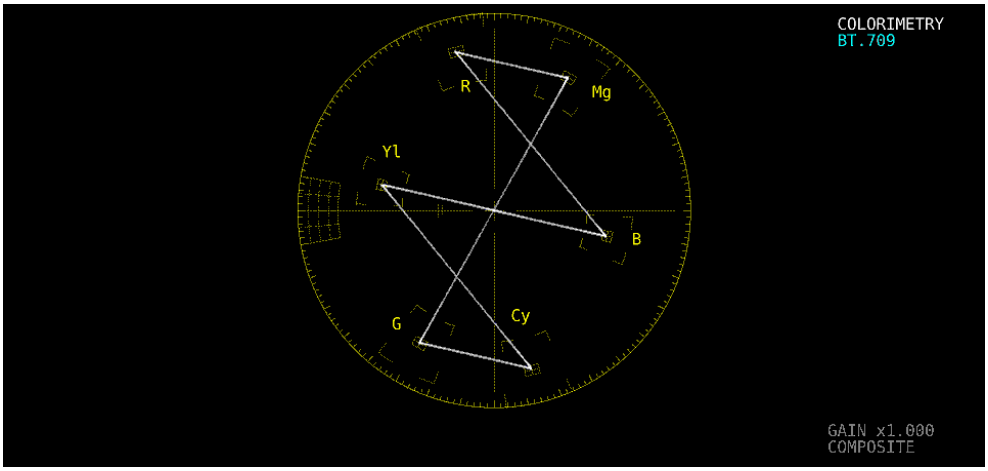
Procedure

VECT → F•7 COLOR SYSTEM → F•2 COMPOSIT FORMAT: AUTO / NTSC / PAL

Settings

AUTO:	When the input signal frame rate is 25 Hz or 50 Hz, the format is PAL. Otherwise, the format is NTSC.
NTSC:	The format is NTSC.
PAL:	The format is PAL.

COMPOSIT FORMAT = NTSC



COMPOSIT FORMAT = PAL

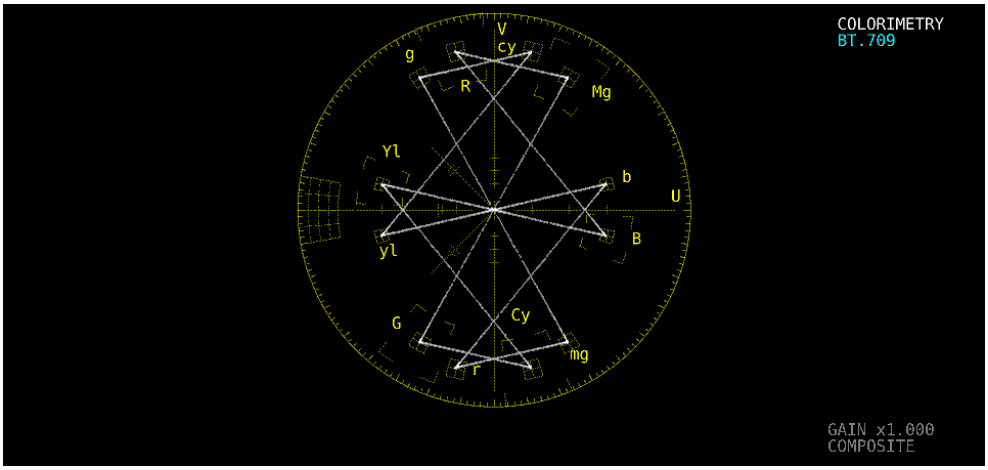


Figure 3-14 Selecting the composite display format

3.6.3 Selecting the Setup Level

When F•1 COLOR MATRIX is set to COMPOSIT, to select the setup level, follow the procedure below.
This menu does not appear if the composite display format is PAL.

Procedure

VECT → F•7 COLOR SYSTEM → F•3 SETUP: 0% / 7.5%

3.6.4 Displaying a Scale for 75 % Intensity Color Bars

To display a scale for 75 % intensity color bars, follow the procedure below.

Procedure

VECT → F•7 COLOR SYSTEM → F•4 COLOR BAR: 100% / 75%

Settings

100%:	A scale that matches the peak levels of 100 % intensity color bars is displayed.
75%:	A scale that matches the peak levels of 75 % intensity color bars is displayed.

COLOR BAR = 75%

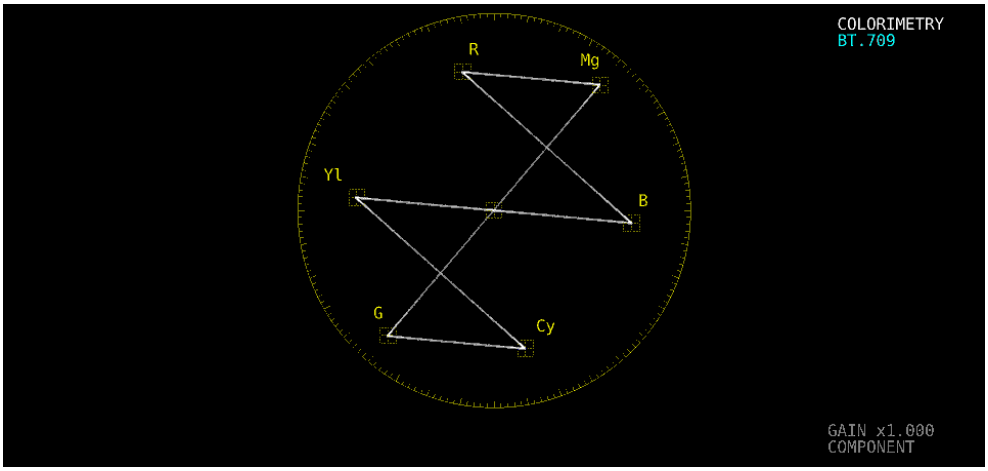


Figure 3-15 Displaying a scale for 75 % intensity color bars (when receiving a 75 % intensity color bar signal)

3.7 5-Bar Display

In the 5-bar display, the YC_BC_R signal is converted into a GBR or pseudo-composite signal, and the peak levels of the converted signal's Y, G, B, R, and CMP (composite) components are displayed simultaneously using five bars.

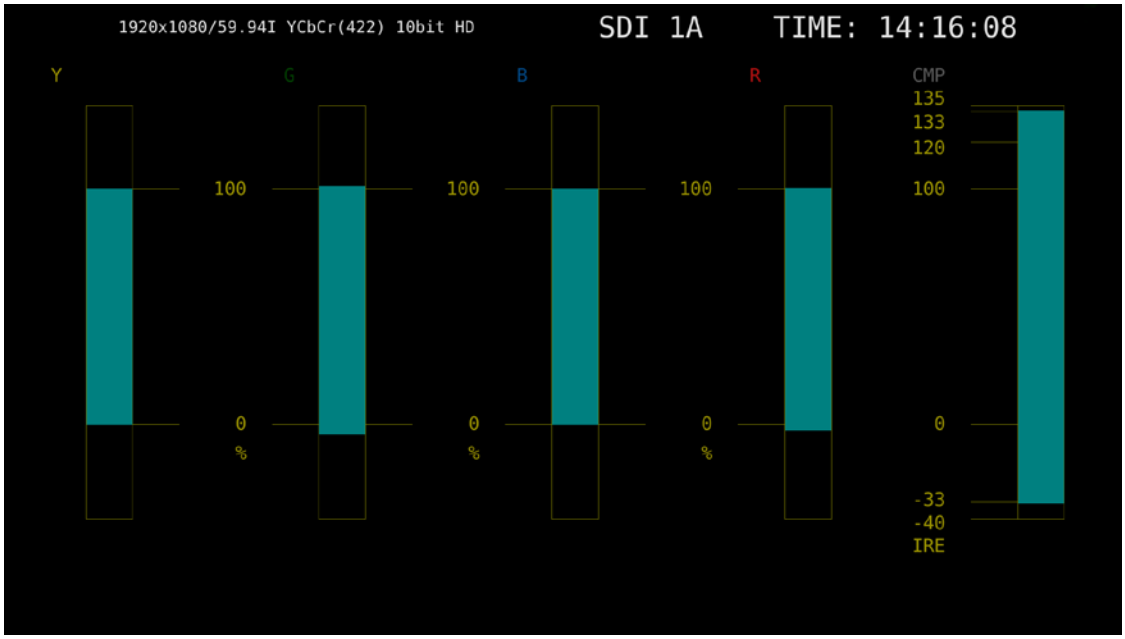


Figure 3-16 5-bar display

- **Y**

  Levels that fall outside of the range that you set using Luminance Upper and Luminance Lower on the status menu are displayed in red.

  Reference Luminance Upper/Lower → Section 8.2.4, “Error Setup 4”

- **GBR**

  Levels that fall outside of the range that you set using Gamut Upper and Gamut Lower on the status menu are displayed in red.

  Reference Gamut Upper/Lower → Section 8.2.3, “Error Setup 3”

- **CMP**

  Levels that fall outside of the range that you set using Composite Upper and Composite Lower on the status menu are displayed in red.

  Reference Composite Upper/Lower → Section 8.2.3, “Error Setup 3”

- **Menu**

  Use the vector menu to configure the 5-bar display settings.

VECT →

Figure 3-17 Vector menu

3.7.1 Selecting the Scale Unit

When MODE is set to 5BAR, to select the scale unit, follow the procedure below.

Reference MODE → Section 3.5.1, “Switching the Display Mode”, Section 3.6.2, “Selecting the Composite Display Forma”

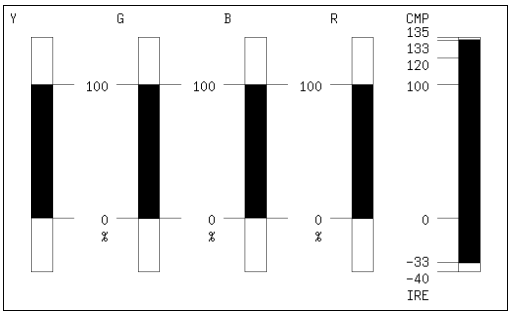
Procedure

VECT → F•1 5BAR SCALE: % / mV

Settings

%:	The display unit for YGBR is percentage, and the display unit for CMP is IRE.
mV:	The display unit is mV. Depending on the composite display format, the scale differs as follows: NTSC: 100 % = 700 mV (YGBR), 100IRE = 714 mV (CMP) PAL: 100 % (IRE) = 700 mV

5BAR SCALE = %



5BAR SCALE = mV

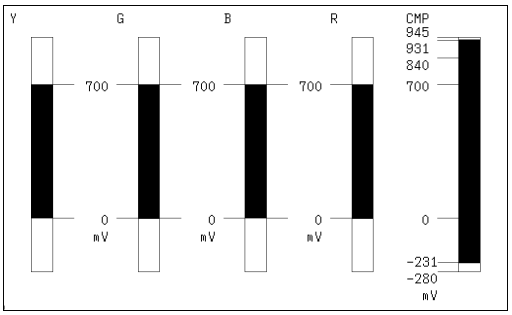


Figure 3-18 Selecting the scale unit

3.7.2 Selecting the Display Order

To select the 5-bar display order, follow the procedure shown below.

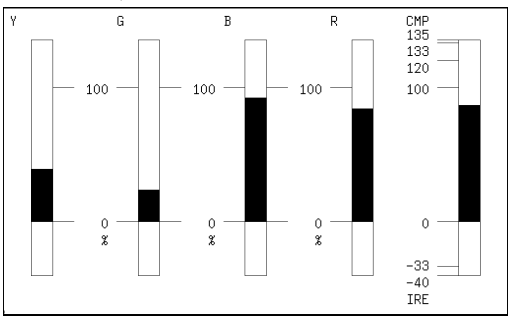
Procedure

VECT → F•2 5BAR SEQUENCE: GBR / RGB

Settings

GBR:	From the left, the signals are displayed in this order: Y, G, B, R, CMP.
RGB:	From the left, the signals are displayed in this order: Y, R, G, B, CMP.

5BAR SEQUENCE = GBR



5BAR SEQUENCE = RGB

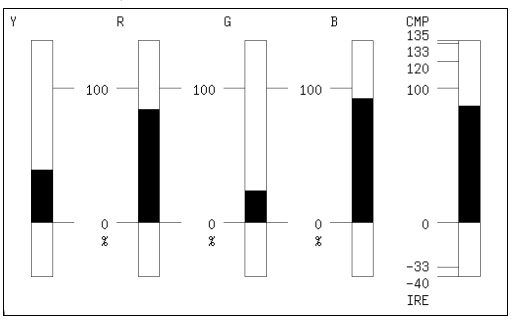


Figure 3-19 Selecting the display order

3.8 Histogram Display

To display histogram, press VECT, F•5 DISPLAY, and then F•1 MODE to select HISTOGRAM.

The histogram display shows the image data distribution by plotting the luminance level on the horizontal axis and the number of pixels at each luminance level on the vertical axis.

If SER07 is installed, you can change the horizontal scale. See section 6.2.1, “Histogram Display.”

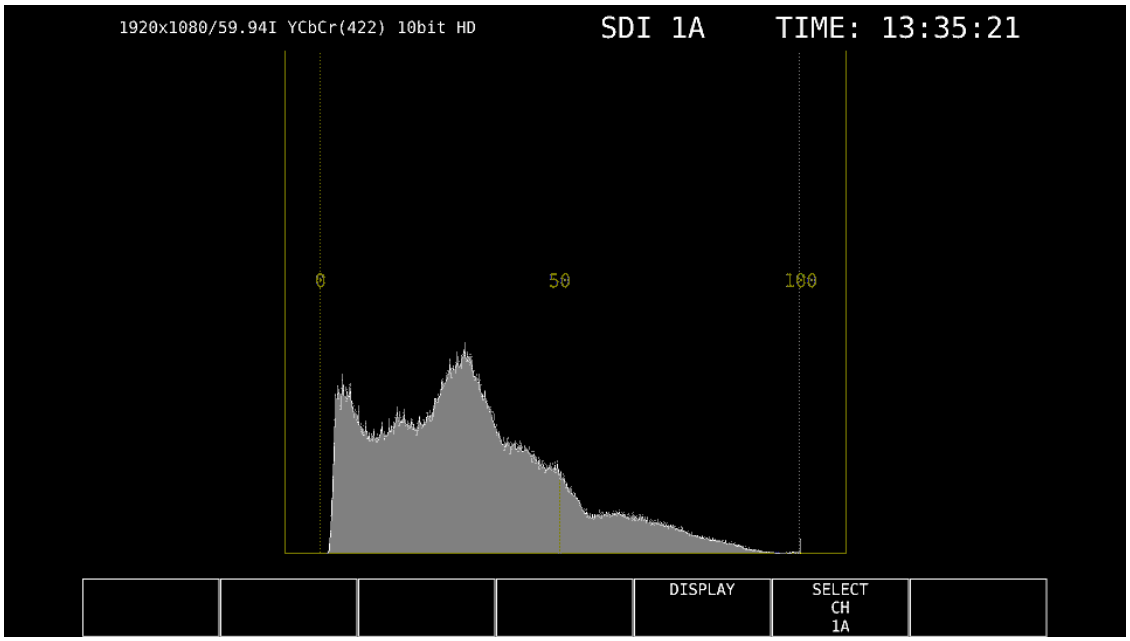


Figure 3-20 Histogram display

4. CIE DIAGRAM DISPLAY (SER05)

To display CIE chromaticity diagram, press VECT, F•5 DISPLAY, and then F•1 MODE to select CIE DIAGRAM.
For an explanation when MODE is set to VECTOR or HISTOGRAM, see chapter 3, “VECTOR WAVEFORM DISPLAY.”

MODE = CIE DIAGRAM

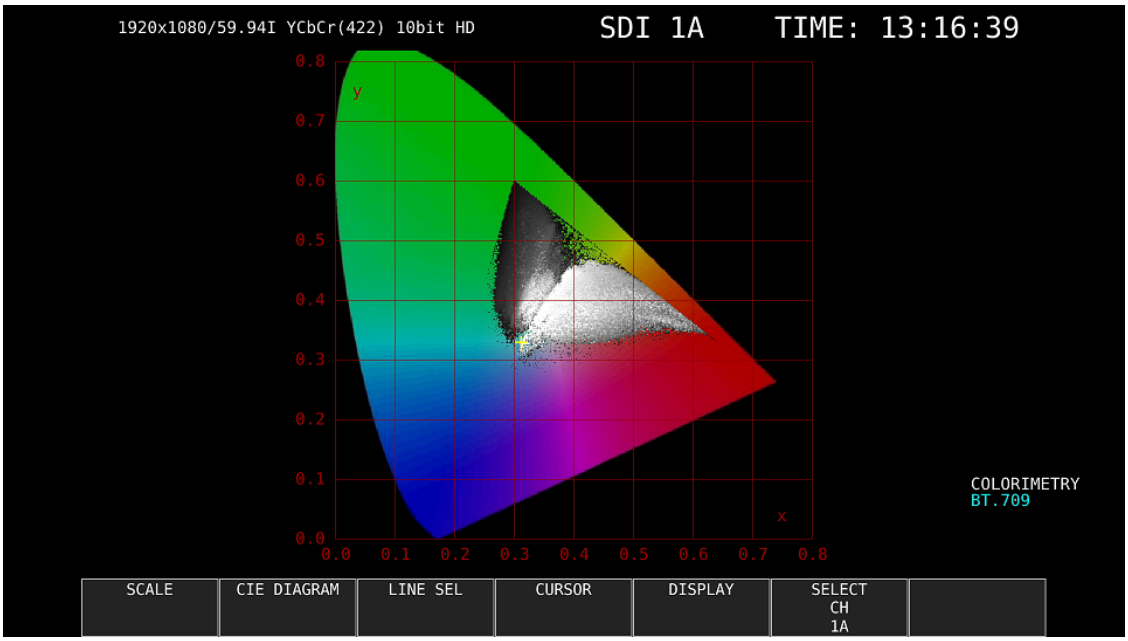


Figure 4-1 CIE diagram display

- **Colorimetry**

  The current colorimetry is displayed in cyan in the lower right of the CIE chromaticity diagram. However, for 3G (DL)-4K and 3G (QL), if you select a payload ID, the current applied colorimetry is displayed in yellow if the colorimetry information of all links are not matched.

4.1 Configuring the Scale Settings

To configure the scale settings, press F•1 SCALE on the VECT menu.
This menu item does not appear when DISP TYPE is set to TEMP.

Reference DISP TYPE → Section 4.2.1, “Selecting the Display Type”

VECT → F•1 SCALE →

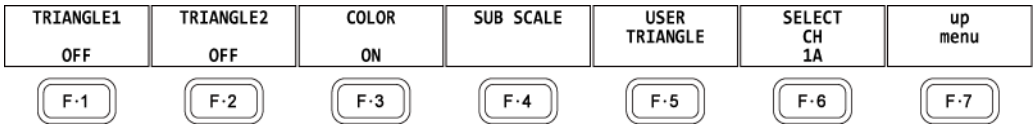


Figure 4-2 SCALE menu

4.1.1 Selecting the Triangle

To display up to three color triangles, follow the procedure below.

Procedure

VECT → F•1 SCALE
→ F•1 TRIANGLE1: BT.601(525) / BT.601(625) / BT.709 / DCI / BT.2020 / OFF
→ F•2 TRIANGLE2: BT.601(525) / BT.601(625) / BT.709 / DCI / BT.2020 / OFF
→ F•5 USER TRIANGLE → F•1 TRIANGLE: 1 / 2 / OFF

The color triangle vertex coordinates are shown below.
u’v’ coordinates are calculated from the xy coordinates.

Table 4-1 Color triangle vertex coordinates

F•1 TRIANGLE1 F•2 TRIANGLE2		CIE1931		CIE1976	
		x	y	u'	v'
BT.601(525)	R	0.630	0.340	0.433	0.526
	G	0.310	0.595	0.130	0.563
	B	0.155	0.070	0.176	0.178
BT.601(625)	R	0.640	0.330	0.451	0.523
	G	0.290	0.600	0.121	0.561
	B	0.150	0.060	0.175	0.158
BT.709	R	0.640	0.330	0.451	0.523
	G	0.300	0.600	0.125	0.563
	B	0.150	0.060	0.175	0.158
DCI	R	0.680	0.320	0.496	0.526
	G	0.265	0.690	0.099	0.578
	B	0.150	0.060	0.175	0.158
BT.2020	R	0.708	0.292	0.557	0.517
	G	0.170	0.797	0.056	0.587
	B	0.131	0.046	0.159	0.126

4.1.2 Setting the User-defined Triangle

To set the user-defined triangle, press F•5 USER TRIANGLE on the SCALE menu.
Up to two user-defined triangles can be specified. Press F•1 TRIANGLE to select 1 or 2.

VECT → F•1 SCALE → F•5 USER TRIANGLE →

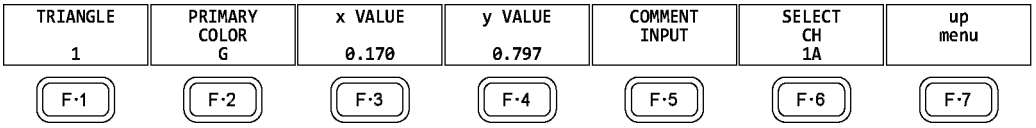


Figure 4-3 USER TRIANGLE menu

To change the vertex coordinates of the color triangle, follow the procedure below. Press F•2 PRIMARY COLOR to select the vertex you want to change, and then press F•3 x VALUE and F•4 y VALUE to set the coordinates. The default setting is equivalent to the BT.2020 coordinates.

Procedure

VECT → F•1 SCALE → F•5 USER TRIANGLE
→ F•2 PRIMARY COLOR: G / B / R
→ F•3 x VALUE: 0.000 - 1.000
→ F•4 y VALUE: 0.000 - 1.000

Press F•5 COMMENT INPUT to assign names of your choice to user-defined triangles.
Enter a file name using up to 8 characters.

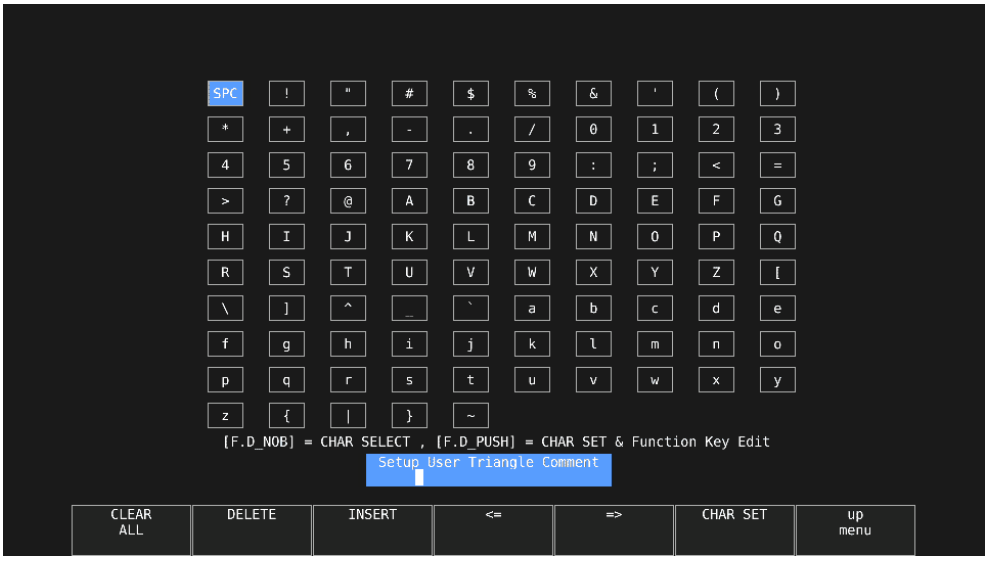


Figure 4-4 Triangle name input screen

The key operations that you can perform in the triangle name input display are as follows:

F•1 CLEAR ALL	: Deletes all characters
F•2 DELETE	: Deletes the character at the cursor
F•3 INSERT	: Inserts a character at the cursor
F•4 <=	: Moves the cursor to the left
F•5 =>	: Moves the cursor to the right
F•6 CHAR SET	: Enters the character
Function dial (F•D)	: Turn to select a character, and press to enter the character.

4.1.3 Selecting the Color Scale

To select the horseshoe-shaped color scale, follow the procedure below.

Procedure

VECT → F•1 SCALE → F•3 COLOR: B.G.COLOR / B.G.WHITE / B.G.BLACK

Settings

B.G.COLOR: The color scale is displayed. The background is black, and the waveform is displayed according to the luminance level.

B.G.WHITE: The color scale is not displayed. The background is white, and the waveform is displayed according to the picture color.

B.G.BLACK: The color scale is not displayed. The background is black, and the waveform is displayed according to the picture color.

COLOR = B.G.WHITE

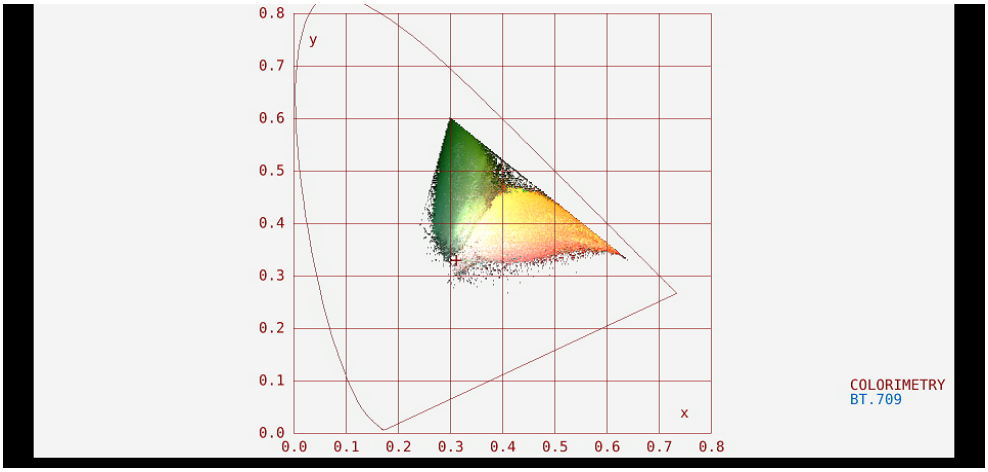


Figure 4-5 Selecting the color scale

4.1.4 Turning the Sub Scale On and Off

To set the sub scale, press F•4 SUB SCALE on the SCALE menu.

VECT → F•1 SCALE → F•4 SUB SCALE →

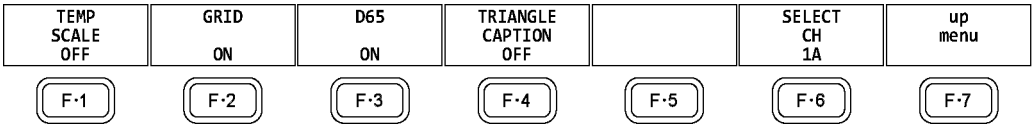


Figure 4-6 SUB SCALE menu

To turn on and off the color temperature curve, grid, white point (D65), or triangle name, follow the procedure below.

Procedure

VECT → F•1 SCALE → F•4 SUB SCALE
→ F•1 TEMP SCALE: ON / OFF
→ F•2 GRID: ON / OFF
→ F•3 D65: ON / OFF
→ F•4 TRIANGLE CAPTION: ON / OFF

TEMP SCALE = ON / GRID = ON / D65 = ON / TRIANGLE CAPTION = ON

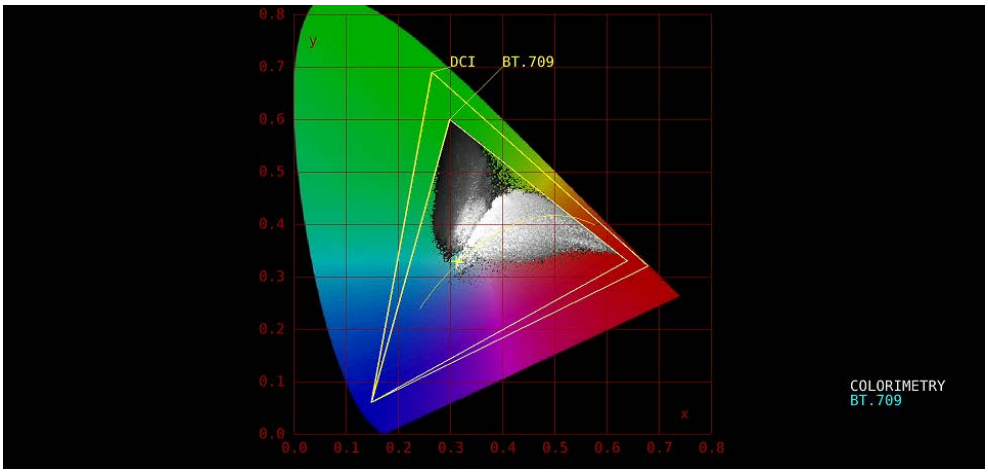


Figure 4-7 Turning the sub scale on and off

4.2 Setting the Chromaticity Diagram Mode

To set the chromaticity diagram mode, press F•2 CIE DIAGRAM on the VECT menu.

VECT → F•2 CIE DIAGRAM →

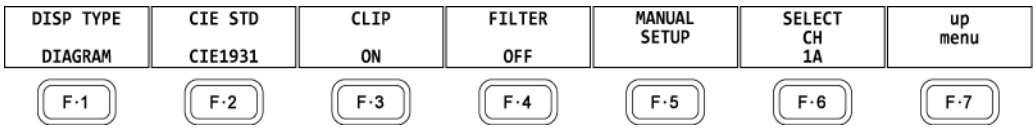


Figure 4-8 CIE DIAGRAM menu

4.2.1 Selecting the Display Type

To select the display type, follow the procedure below.

Procedure

VECT → F•2 CIE DIAGRAM → F•1 DISP TYPE: DIAGRAM / TEMP

Settings

DIAGRAM:	The chromaticity diagram is displayed.
TEMP:	The color temperature is displayed.

DISP TYPE = TEMP

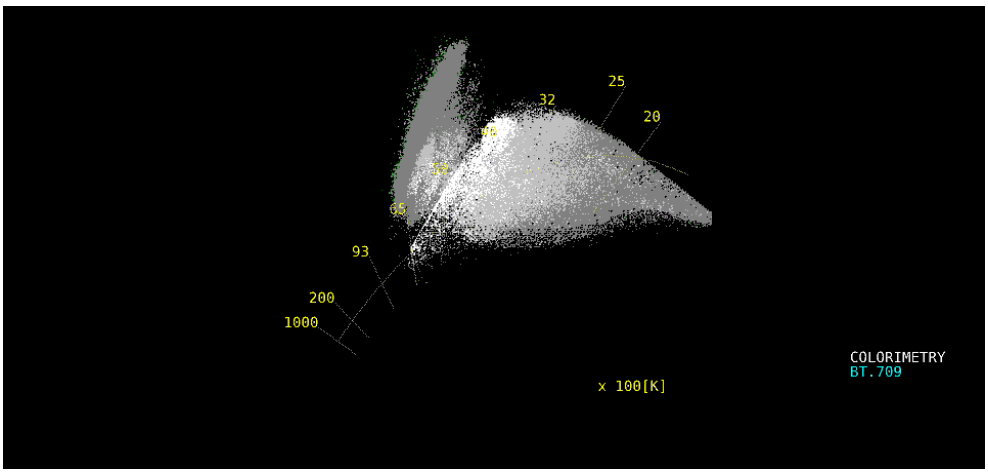


Figure 4-9 Selecting the display type

4.2.2 Selecting the Display Standard

To select the display standard, follow the procedure below.

Procedure

VECT → F•2 CIE DIAGRAM → F•2 CIE STD: CIE1931 / CIE1976

Settings

CIE1931:	Chromaticity diagram based on CIE 1931 is displayed.
CIE1976:	Chromaticity diagram based on CIE 1976 is displayed.

4.2.3 Turning Clipping On and Off

To turn clipping on and off, follow the procedure below.

Procedure

VECT → F•2 CIE DIAGRAM → F•3 CLIP: ON / OFF

Settings

ON:	Negative values of the input signal are clipped to zero.
OFF:	Negative values of the input signal are displayed according to BT.1361.

4.2.4 Turning the Filter On and Off

To turn the filter on and off, follow the procedure below.
When set to ON, data is averaged every two pixels and displayed.

Procedure

VECT → F•2 CIE DIAGRAM → F•4 FILTER: ON / OFF

4.2.5 Setting the Gamma Value

To set the gamma value, follow the procedure below.

Procedure

VECT → F•2 CIE DIAGRAM → F•5 MANUAL SETUP → F•1 MANUAL SETUP: ON / OFF

Settings

ON:	The gamma set with F•5 GAMMA SETUP(1.50 - 2.20 - 3.00) is used. However, this is not applied to the video-signal-waveform, vector, or picture display. The gamma calculation expression is (input signal level)^(gamma value). In addition, negative input signal values are clipped to zero, regardless of whether F•3 CLIP is set to on or off.
OFF:	The colorimetry standard selected in the system settings is used.

4.3 Configuring Line Selection Settings

To configure line selection settings, press F•3 LINE SEL on the VECT menu.
See section 3.3, “Configuring Line Selection Settings.”

4.4 Configuring Cursor Settings

To configure cursor settings, press F•4 CURSOR on the VECT menu.

VECT → F•4 CURSOR →

Figure 4-10 CURSOR menu

4.4.1 Displaying the Chromaticity Diagram Cursor

To display a cursor on the chromaticity diagram, follow the procedure shown below.
You can move the cursor horizontally using the H POS knob and vertically using the V POS knob. The measured values are shown in the upper right of the display. Press the H POS and V POS knobs to move the cursor to the following position.

Chromaticity diagram display: (x, y) = (u', v') = (0, 0)
Color temperature display: Lower left of the display

Procedure

VECT → F•4 CURSOR → F•1 CURSOR: ON / OFF

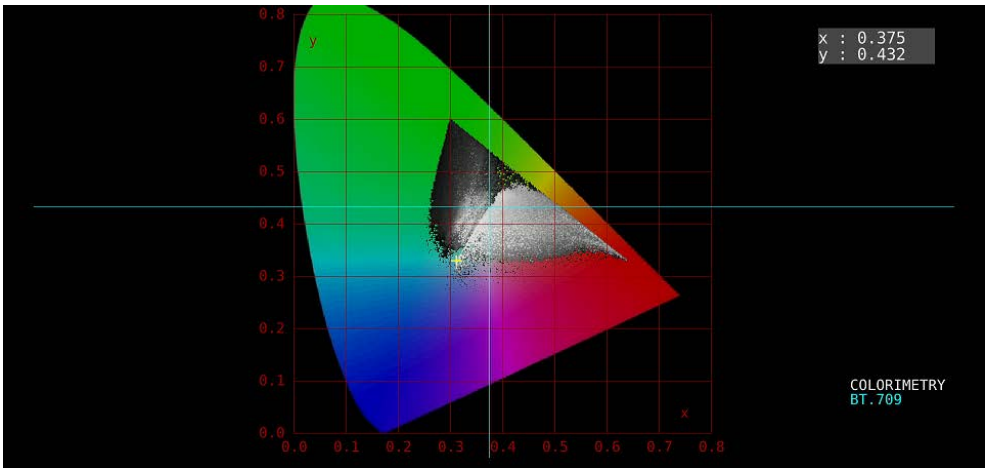


Figure 4-11 Displaying the chromaticity diagram cursor

4.5 Configuring the Display Settings

To configure the display settings, press F•5 DISPLAY on the VECT menu.
See section 3.5, “Configuring the Display Settings.”

5. PICTURE DISPLAY

To display the picture, press PIC.

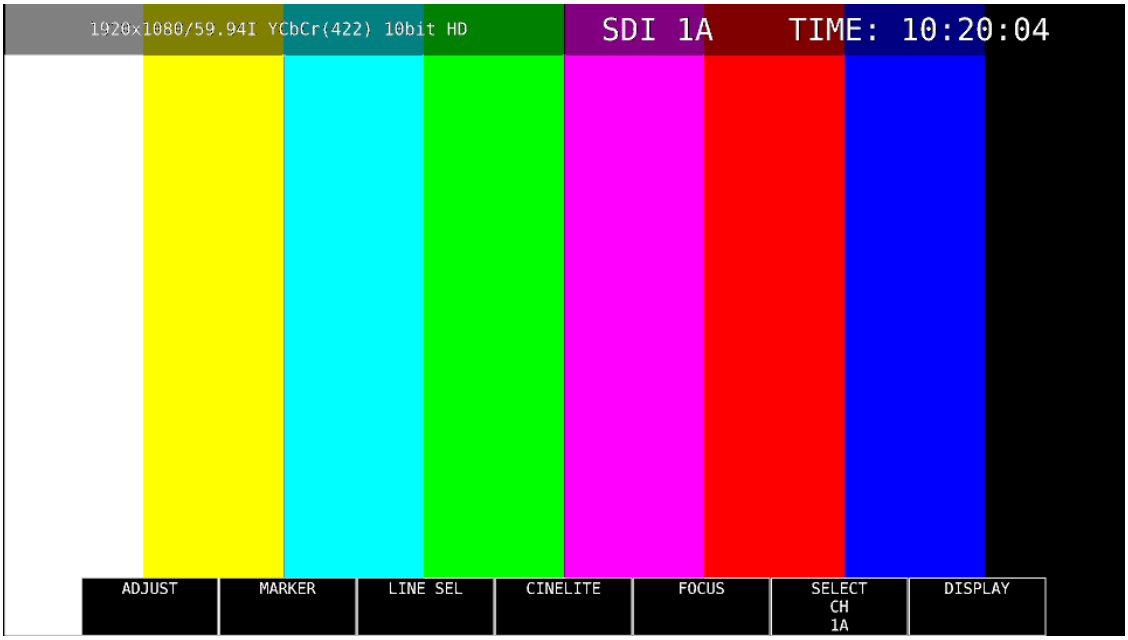


Figure 5-1 Picture display

5.1 Adjusting the Picture

To adjust the picture, press F•1 ADJUST in the PIC menu.

PIC → F•1 ADJUST →

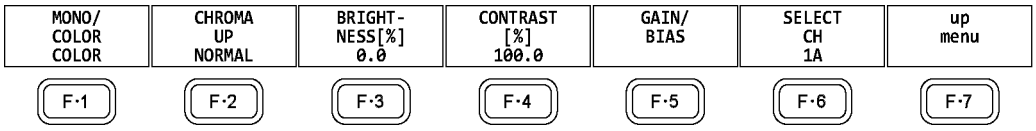


Figure 5-2 ADJUST menu

5.1.1 Switching between the Color and Monochrome Displays

To switch between the color and monochrome displays, follow the procedure below.

Procedure

PIC → F•1 ADJUST → F•1 MONO/COLOR: COLOR / MONO

5.1.2 Setting the Chroma Gain

To switch the chroma gain, follow the procedure below.

Procedure

PIC → F•1 ADJUST → F•2 CHROMA UP: NORMAL / UP

Settings

NORMAL:	The chroma gain is set to the value that you have set using F•5 GAIN/BIAS → F•1 GAIN.
UP:	The chroma gain is set to 2 (200.0 %).

5.1.3 Adjusting the Brightness

To adjust the brightness, follow the procedure below.
Press the function dial (F•D) to return the setting to its default value (0.0).

Procedure

PIC → F•1 ADJUST → F•3 BRIGHTNESS[%]: -50.0 - 0.0 - 50.0

5.1.4 Adjusting the Contrast

To adjust the contrast, follow the procedure below.
Press the function dial (F•D) to return the setting to its default value (100.0).

Procedure

PIC → F•1 ADJUST → F•4 CONTRAST[%]: 0.0 - 100.0 - 200.0

5.1.5 Adjusting the Gain

To adjust the gain, press F•1 GAIN on the GAIN/BIAS menu.

PIC → F•1 ADJUST → F•5 GAIN/BIAS → F•1 GAIN →

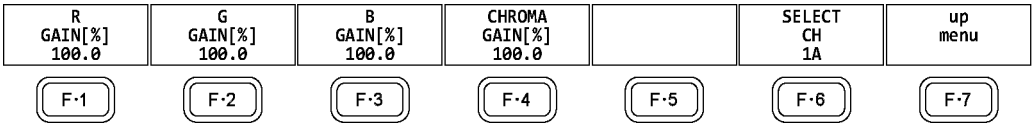


Figure 5-3 GAIN menu

To adjust the gain separately for the R, G, B, and chroma signals, follow the procedure below.
Press the function dial (F•D) to return the setting to its default value (100.0).
When F•2 CHROMA UP is set to UP, F•4 CHROMA GAIN does not appear. If is fixed at 200.0.

Procedure

PIC → F•1 ADJUST → F•5 GAIN/BIAS → F•1 GAIN
→ F•1 R GAIN[%]: 0.0 - 100.0 - 200.0
→ F•2 G GAIN[%]: 0.0 - 100.0 - 200.0
→ F•3 B GAIN[%]: 0.0 - 100.0 - 200.0
→ F•4 CHROMA GAIN[%]: 0.0 - 100.0 - 200.0

5.1.6 Adjusting the Bias

To adjust the bias, press F•2 BIAS on the GAIN/BIAS menu.

PIC → F•1 ADJUST → F•5 GAIN/BIAS → F•2 BIAS →

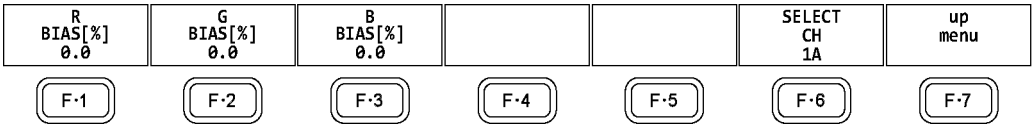


Figure 5-4 BIAS menu

To set the RGB signal bias separately for each color, follow the procedure below.
Press the function dial (F•D) to return the setting to its default value (0.0).

Procedure

PIC → F•1 ADJUST → F•5 GAIN/BIAS → F•2 BIAS
→ F•1 R BIAS[%]: -50.0 - 0.0 - 50.0
→ F•2 G BIAS[%]: -50.0 - 0.0 - 50.0
→ F•3 B BIAS[%]: -50.0 - 0.0 - 50.0

5.2 Configuring Marker Settings

To configure marker settings, press F•2 MARKER in the PIC menu.
This menu item does not appear when SIZE is set to a value other than FIT.

Reference SIZE → Section 5.8.1, “Selecting the Display Size”

PIC → F•2 MARKER →

Figure 5-5 MARKER menu

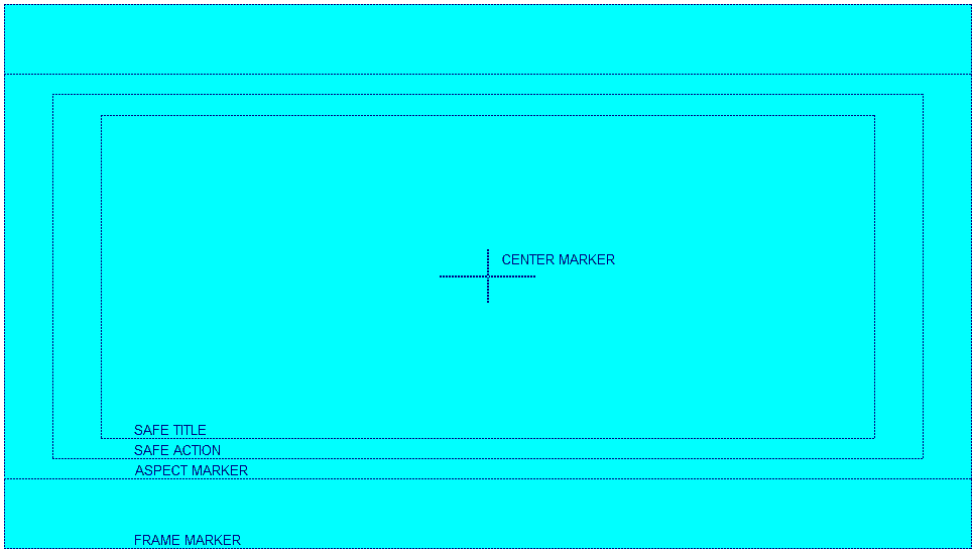


Figure 5-6 Horizontal marker display

5.2.1 Turning the Display of the Frame Marker On and Off

To turn the display of the frame marker on and off, follow the procedure below.

Procedure

PIC → F•2 MARKER → F•1 FRAME MARKER: ON / OFF

5.2.2 Turning the Display of the Center Marker On and Off

To turn the display of the center marker on and off, follow the procedure below.

Procedure

PIC → F•2 MARKER → F•2 CENTER MARKER: ON / OFF

5.2.3 Setting the Aspect Marker

To display the aspect marker, follow the procedure below.

Procedure

PIC → F•2 MARKER → F•3 ASPECT MARKER: OFF / 17:9 / 16:9 / 14:9 / 13:9 / 4:3 / 2.39:1 / AFD

Settings

OFF:	An aspect marker is not displayed.
17:9	A 17:9 aspect marker is displayed. This option cannot be selected when the input signal is a 17:9 frame signal or an SD signal.
16:9:	A 16:9 aspect marker is displayed. This option cannot be selected when the input signal is a 16:9 frame signal.
14:9:	A 14:9 aspect marker is displayed.
13:9:	A 13:9 aspect marker is displayed.
4:3:	A 4:3 aspect marker is displayed. This option cannot be selected when the input signal is SD.
2.39:1:	A 2.39:1 aspect marker is displayed. This option cannot be selected when the input signal is SD.
AFD:	The aspect marker included in the AFD (Active Format Description) packets is displayed. Also, abbreviations for SMPTE ST 2016-1-2007 standard AFD codes are displayed in the upper left of the screen. This option can be selected when the input signal is SD or HD.

The AFD codes that are displayed in the upper left of the screen are displayed as shown below according to the coded frame and the AFD code. If there are no AFD packets embedded in the input signal, "---------" is displayed.

Table 5-1 Displaying AFD

Displayed AFD	Coded Frame	AFD Code	Explanation
0000- UNDEFINED	0 (4:3)	0000	Undefined
0001- RESERVED	0 (4:3)	0001	Reserved
0010- 16:9LBTop	0 (4:3)	0010	Letterbox 16:9 image, at top of the coded frame
0011- 14:9LBTop	0 (4:3)	0011	Letterbox 14:9 image, at top of the coded frame
0100- >16:9LBox	0 (4:3)	0100	Letterbox image with an aspect ratio greater than 16:9, vertically centered in the coded frame
0101- RESERVED	0 (4:3)	0101	Reserved
0110- RESERVED	0 (4:3)	0110	Reserved
0111- RESERVED	0 (4:3)	0111	Reserved
1000- FullFrame	0 (4:3)	1000	Full frame 4:3 image, the same as the coded frame
1001- Full Frame	0 (4:3)	1001	Full frame 4:3 image, the same as the coded frame
1010- 16:9LBox	0 (4:3)	1010	Letterbox 16:9 image, vertically centered in the coded frame with all image areas protected
1011- 14:9LBox	0 (4:3)	1011	Letterbox 14:9 image, vertically centered in the coded frame
1100- RESERVED	0 (4:3)	1100	Reserved
1101-4:3Full14:9	0 (4:3)	1101	Full frame 4:3 image, with alternative 14:9 center
1110-16:9LB14:9	0 (4:3)	1110	Letterbox 16:9 image, with alternative 14:9 center
1111-16:9LB4:3	0 (4:3)	1111	Letterbox 16:9 image, with alternative 4:3 center
0000w UNDEFINED	1 (16:9)	0000	Undefined
0001w RESERVED	1 (16:9)	0001	Reserved
0010w Full Frame	1 (16:9)	0010	Full frame 16:9 image, the same as the coded frame
0011w 14:9Pillbox	1 (16:9)	0011	Pillarbox 14:9 image, horizontally centered in the coded frame
0100w >16:9LBox	1 (16:9)	0100	Letterbox image with an aspect ratio greater than 16:9, vertically centered in the coded frame
0101w RESERVED	1 (16:9)	0101	Reserved
0110w RESERVED	1 (16:9)	0110	Reserved
0111w RESERVED	1 (16:9)	0111	Reserved
1000w FullFrame	1 (16:9)	1000	Full frame 16:9 image, the same as the coded frame
1001w 4:3Pillbox	1 (16:9)	1001	Pillarbox 4:3 image, horizontally centered in the coded frame
1010w FullNoCrop	1 (16:9)	1010	Full frame 16:9 image, with all image areas protected
1011w14:9Pillbox	1 (16:9)	1011	Pillarbox 14:9 image, horizontally centered in the coded frame
1100w RESERVED	1 (16:9)	1100	Reserved
1101w4:3PB14:9	1 (16:9)	1101	Pillarbox 4:3 image, with alternative 14:9 center
1110wFul14:9Safe	1 (16:9)	1110	Full frame 16:9 image, with alternative 14:9 center
1111wFull4:3Safe	1 (16:9)	1111	Full frame 16:9 image, with alternative 4:3 center

5.2.4 Setting the Aspect Shadow

When F•3 ASPECT MARKER is set to a value other than OFF, to adjust the darkness of the aspect marker shadow, follow the procedure below. The larger the number, the darker the shadow. If you specify 0, the aspect marker will be indicated with a line.
Press the function dial (F•D) to return the setting to its default value (50).

Procedure

PIC → F•2 MARKER → F•4 ASPECT SHADOW[%]: 0 - 50 - 100

ASPECT SHADOW[%] = 50

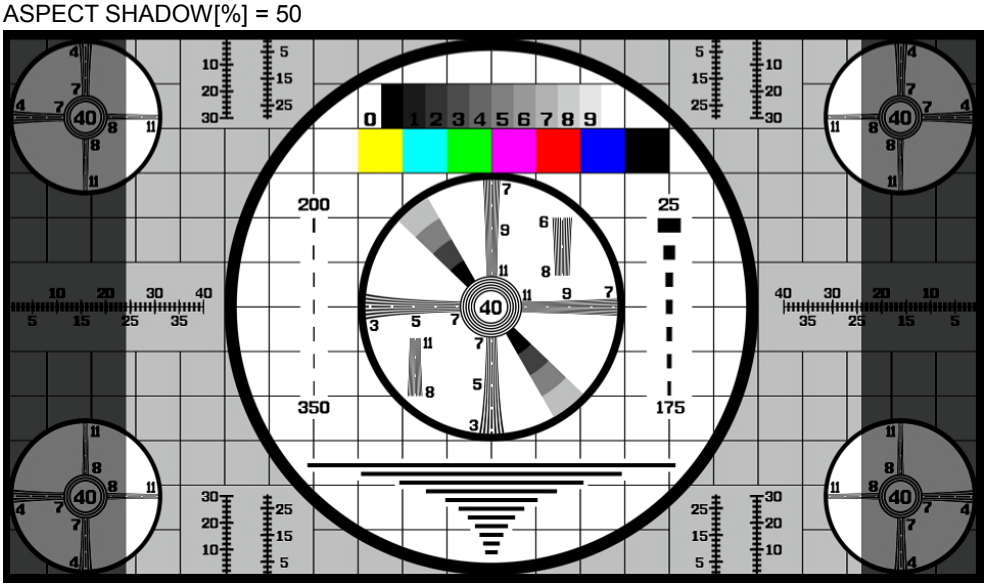


Figure 5-7 Setting the aspect shadow

5.2.5 Setting the Safe Action Marker

To configure safety marker settings, press F•5 SAFETY ZONE on the MARKER menu. This menu item does not appear when F•3 ASPECT MARKER is set to AFD.

PIC → F•2 MARKER → F•5 SAFETY ZONE →

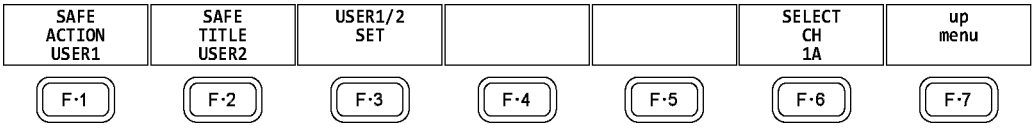


Figure 5-8 SAFETY ZONE menu

To display the safe action marker, follow the procedure below.
When an aspect marker is displayed, the safe action marker is displayed relative to the aspect marker.

Procedure

PIC → F•2 MARKER → F•5 SAFETY ZONE → F•1 SAFE ACTION: ARIB / SMPTE / USER1 / OFF

Settings

ARIB:	An ARIB TR-B4 safe action marker is displayed. This option cannot be selected when the input signal is 4K.
SMPTE:	An SMPTE RP-218 safe action marker is displayed. This option cannot be selected when the input signal is 4K.
USER1:	A marker that has been set with F•1 USER1 WIDTH[%] and F•2 USER1 HEIGHT[%] for F•3 USER1/2 SET is displayed.
OFF:	A safe action marker is not displayed.

5.2.6 Setting the Safe Title Marker

To display the safe title marker, follow the procedure below.
When an aspect marker is displayed, the safe action marker is displayed relative to the aspect marker.

Procedure

PIC → F•2 MARKER → F•5 SAFETY ZONE → F•2 SAFE TITLE: ARIB / SMPTE / USER2 / OFF

Settings

ARIB:	An ARIB TR-B4 safe title marker is displayed. This option cannot be selected when the input signal is 4K.
SMPTE:	An SMPTE RP-218 safe title marker is displayed. This option cannot be selected when the input signal is 4K.
USER2:	A marker that has been set with F•3 USER2 WIDTH[%] and F•2 USER2 HEIGHT[%] for F•3 USER1/4 SET is displayed.
OFF:	A safe title marker is not displayed.

5.2.7 Setting User Markers

By setting F•1 SAFE ACTION to USER1 and F•2 SAFE TITLE to USER2, you can display up to two user-defined markers.
To configure user-defined marker settings, press F•3 USER1/2 SET on the SAFETY ZONE menu.

PIC → F•2 MARKER → F•5 SAFETY ZONE → F•3 USER1/2 SET →

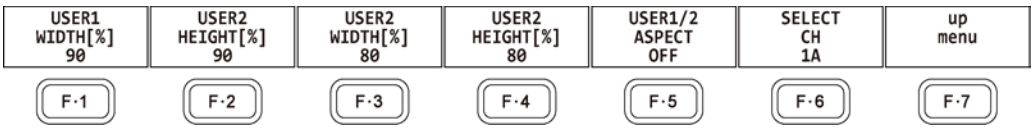


Figure 5-9 USER1/2 SET menu

To set the width and height of a user marker and turn the aspect ratio display on and off, follow one of the procedures below.
Press the function dial (F•D) to return the width and height settings to their default value.
The aspect ratio display on/off setting applies both to USER1 and USER2.

Procedure

PIC → F•2 MARKER → F•5 SAFETY ZONE → F•3 USER1/2 SET
→ F•1 USER1 WIDTH[%]: 0 - 90 - 100
→ F•2 USER1 HEIGHT[%]: 0 - 90 - 100
→ F•3 USER2 WIDTH[%]: 0 - 80 - 100
→ F•4 USER2 HEIGHT[%]: 0 - 80 – 100
→ F•5 USER1/2 ASPECT: ON / OFF

5.3 Configuring Line Selection Settings

To configure line selection settings, press F•3 LINE SEL on the PIC menu.
This menu item does not appear when SIZE is set to a value other than FIT.

Reference SIZE → Section 5.8.1, “Selecting the Display Size”

PIC → F•3 LINE SEL →

Figure 5-10 LINE SEL menu

5.3.1 Turning Line Selection On and Off

To display a marker on the selected line, follow the procedure below. You can use the function dial (F•D) to select a line. The number of the selected line appears in the upper left of the display.
Changing this setting will also change the video-signal-waveform-display and vector-display line selection settings.

Procedure

PIC → F•3 LINE SEL → F•1 LINE SELECT: ON / OFF

LINE SELECT = ON

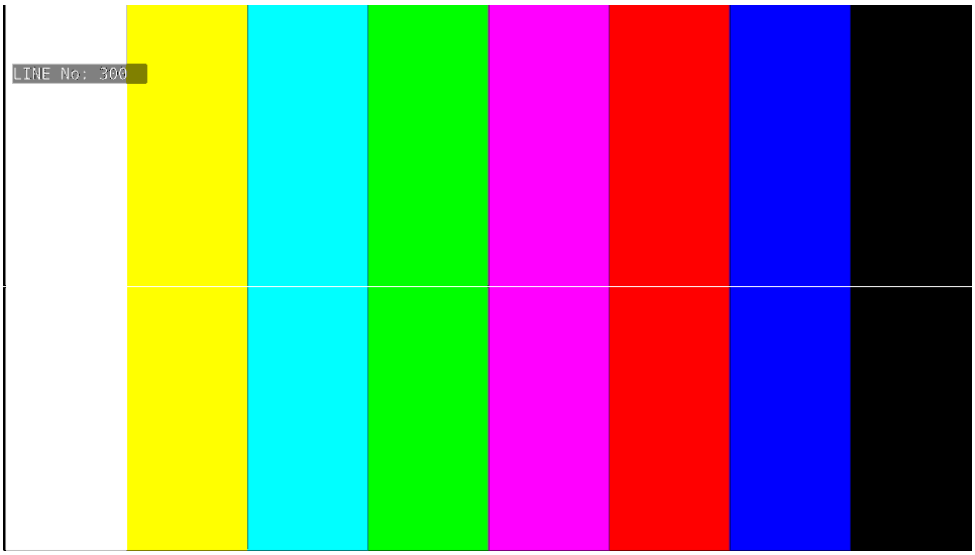


Figure 5-11 Turning line selection on and off

5.3.2 Setting the Line Selection Range

When F•1 LINE SELECT is set to ON and the input signal format is interlaced or segmented frame, to set the line selection range, follow the procedure below.
Changing this setting will also change the selected line on the video-signal-waveform, vector, and status (data dump) displays.

Procedure

PIC → F•3 LINE SEL → F•2 FIELD: FIELD1 / FIELD2 / FRAME

Settings

FIELD1:	A line from field 1 can be selected. (Example: 1 to 563)
FIELD2:	A line from field 2 can be selected. (Example: 564 to 1125)
FRAME:	All lines can be selected. (Example: 1 to 1125)

5.3.3 Setting the Lip Sync Measurement Range (SER03)

To set the lip sync measurement range, press F•3 AV PHASE on the LINE SELCT menu.

PIC → F·3 LINE SELECT → F·3 AV PHASE →

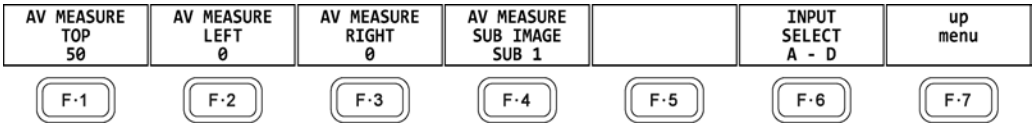


Figure 5-12 AV PHASE menu

To set the lip sync measurement range, follow the procedure below. Markers are displayed at the specified lines.
You can also set these using AV PHASE SETUP of the STATUS menu, but here you can set them while viewing the picture. For details on the settings, section 8.7.3, “Setting the Measurement Range.”

Procedure

PIC → F•3 LINE SEL → F•3 AV PHASE
→ F•1 AV MEASURE TOP: 0 - 50 - 100
→ F•2 AV MEASURE LEFT: 0 - 99
→ F•3 AV MEASURE RIGHT: 0 - 99
→ F•4 AV MEASURE SUB IMAGE: SUB 1 / SUB 2 / SUB 3 / SUB 4

5.4 Configuring CINELITE Settings

The CINELITE feature displays the luminance level of a video signal on the picture display. To show the CINELITE display, press F•4 CINELITE in the PIC menu.

PIC → F•4 CINELITE →

Figure 5-13 CINELITE menu

To switch to the CINELITE display, follow the procedure below.

Procedure

PIC → F•4 CINELITE → F•1 CINELITE DISPLAY: OFF / f Stop / %DISPLAY / CINEZONE

Settings

OFF:	A cinelite is not displayed.
f Stop:	The f Stop screen is displayed. This option cannot be selected in simul mode or 3G-B-DS.
%DISPLAY:	The %DISPLAY screen is displayed. This option cannot be selected in simul mode or 3G-B-DS.
CINEZONE:	The CINEZONE screen is displayed. This option cannot be selected in simul mode or 3G-B-DS.

5.4.1 f Stop Screen Explanation

To set f Stop, press F•1 CINELITE DISPLAY to select f Stop and then press F•2 f Stop SETUP.

On the f Stop screen, luminance levels are displayed using f-stop (exposure) values. The measured f Stop value for a group of measured points is typically displayed using white, but it will be displayed using yellow when it corresponds to a luminance level of 80 % or more. Additionally, f Stop values that correspond to luminance levels equal to or less than 0 % can not be measured. They are displayed in yellow as "****."

PIC → F•4 CINELITE → F•1 CINELITE DISPLAY → F•2 f Stop SETUP

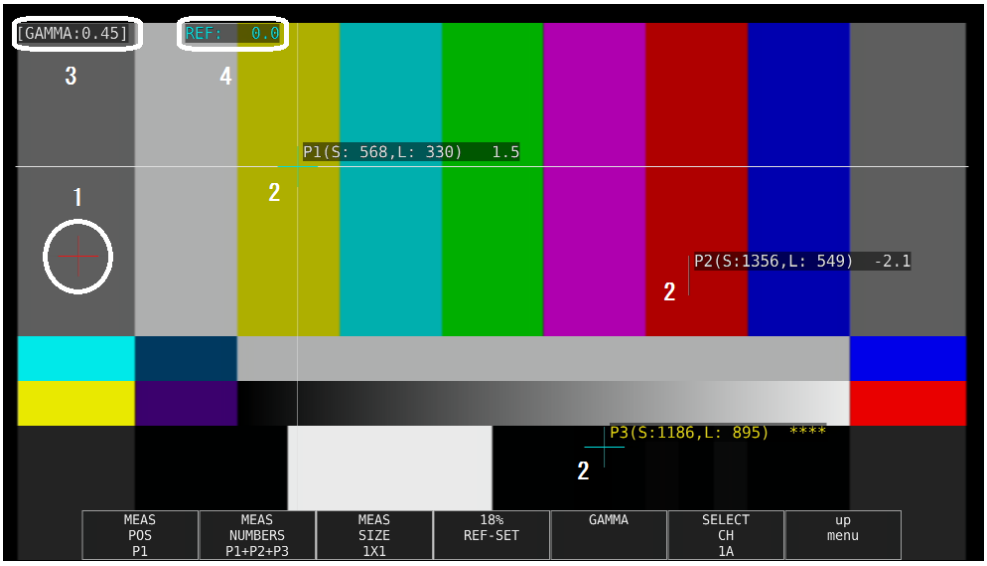


Figure 5-14 f Stop screen

1 Reference Position

The position where the cursors intersected when F•4 18% REF-SET was pressed is displayed in red. This is the reference position for f-stop measurement.

2 Cursor

You can set up to three measurement points. The cursor coordinates are indicated using sample numbers and line numbers. Additionally, The f Stop value relative to the reference point is displayed at each point.

3 Gamma Correction Value

The gamma correction value that you selected using F•5 GAMMA SELECT appears here.

4 Reference Value

The f Stop value at the reference position appears here. The value immediately after you have pressed F•4 18% REF-SET is zero, but it will change when the picture changes.

5.4.2 Procedure for Displaying the f Stop Screen

The following example shows how to display luminance levels as f Stop numbers relative to the luminance level of 18 % gray chart. Include an 18 % gray chart with the objects that you are filming.

1. **Press PIC.**
2. **Press F•4 CINELITE.**
3. **Press F•1 CINELITE DISPLAY to select f Stop.**
4. **Press F•2 f Stop SETUP.**
5. **Press F•5 GAMMA and then F•1 GAMMA SELECT to select the gamma correction table type.**

   The default gamma correction value is 0.45, but you can also use a user-defined gamma correction table that matches the gamma characteristics of the camera that you are using. For details, see section 5.4.7, “Configuring User-Defined Correction Tables.” The selected gamma correction value is indicated in the upper left of the display.
6. **Press F•7 up menu.**
7. **Make sure that the cursors are over the 18 % gray chart, and press F•4 18% REF-SET.**

   The f Stop value for 18 % gray chart becomes 0.0 and is displayed in the upper part of the screen next to “REF:.” The reference position is displayed with a red cursor.
8. **Use the cursors to set the measurement points.**

   The f Stop value relative to 18 % gray chart appears next to each measurement point. You can set up to three measurement points.

5.4.3 %DISPLAY Screen Explanation

To set %DISPLAY, press F•1 CINELITE DISPLAY to select %DISPLAY and then press F•2 %DISPLAY SETUP.

On the %DISPLAY screen, you can display luminance levels as Y percentages, RGB percentages, 255 RGB, using CODE VALUE levels, or using CODE VALUE DEC levels. Use F•4 UNIT SELECT to select the display format.
The measured values are typically displayed using white, but they are displayed using yellow when the luminance level is 80 % or more or 0 % or less.

- **Y% Display**

  Luminance levels are indicated as percentages.

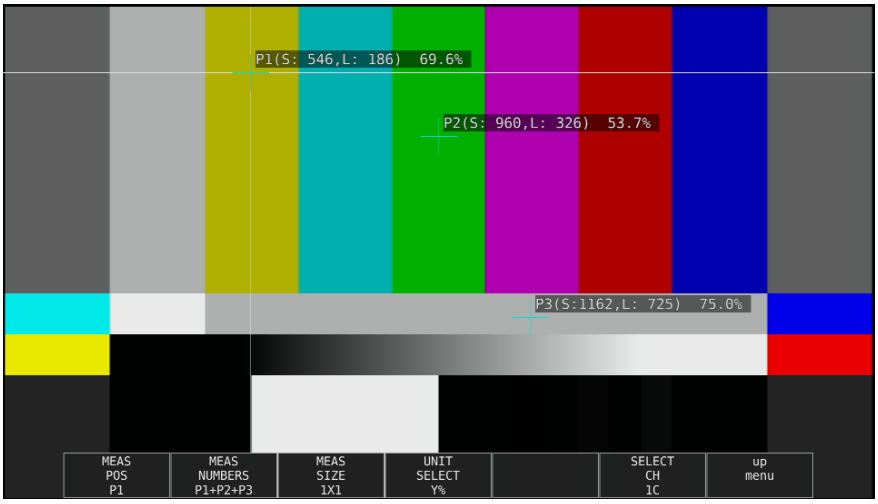


Figure 5-15 Y% display

- **RGB% Display**

  Each R, G, and B level is indicated using a percentage. The levels are also indicated using bars on the left side of the display (the order is R, G, and then B).

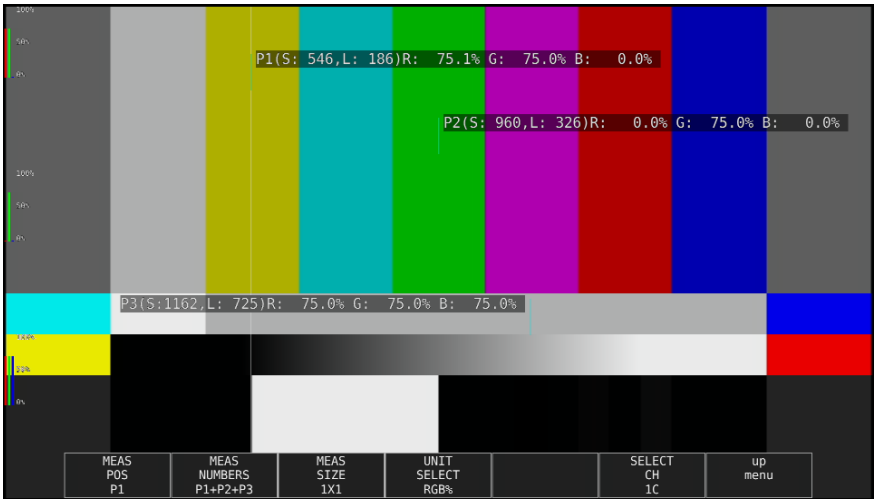


Figure 5-16 RGB% display

- **RGB255 Display**

  Each R, G, and B level is indicated using 256 steps from 0 to 255. The levels are also indicated using bars on the left side of the display (the order is R, G, and then B).
  The value of an RGB level that is 100 % or greater is 255. The value of an RGB level that is 0 % or less is 0.

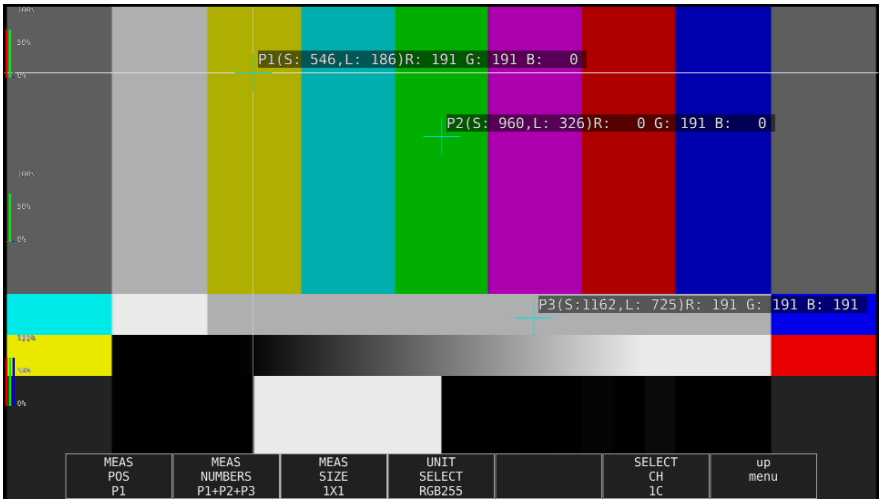


Figure 5-17 RGB255 display

- **CODE VALUE Display**

  The SDI signal video data is displayed in hexadecimal notation.
  If the input signal is YCbCr, the data is displayed in YCbCr. If the input signal is RGB, the data is displayed in RGB. If the input signal is XYZ, data is displayed using values converted into RGB (with black level offset added).
  You can select CODE VALUE when F•3 MEAS SIZE is 1×1.

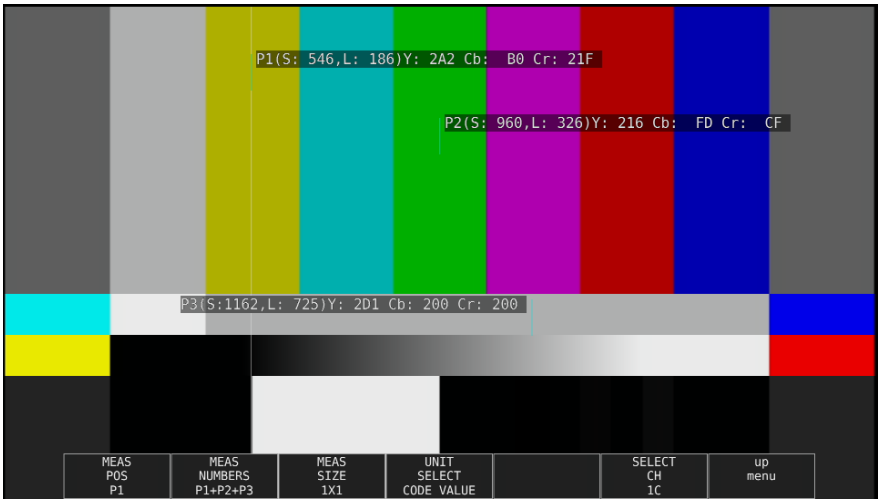


Figure 5-18 CODE VALUE display

- **CODE VALUE DEC Display**

  The SDI signal video data is displayed in decimal notation.
  If the input signal is YCbCr, the data is displayed in YCbCr. If the input signal is RGB, the data is displayed in RGB. If the input signal is XYZ, data is displayed using values converted into RGB (with black level offset added).
  You can select CODE VALUE DEC when F•3 MEAS SIZE is 1×1.

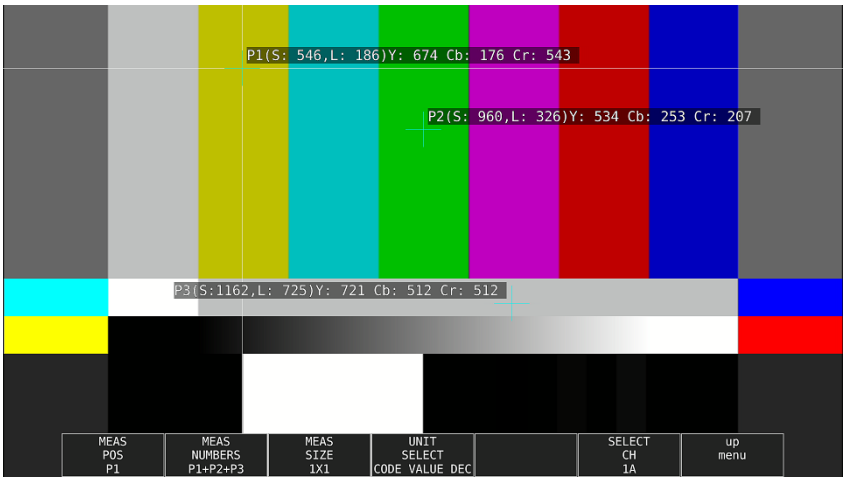


Figure 5-19　CODE VALUE DEC display

5.4.4 Selecting the Points to Display

You can set three points to measure: P1 to P3. To select the measured points that you want to display, follow the procedure below.

Procedure

PIC → F•4 CINELITE
→ F•2 f Stop SETUP → F•2 MEAS NUMBERS: P1 / P1+P2 / P1+P2+P3
→ F•2 %DISPLAY SETUP → F•2 MEAS NUMBERS: P1 / P1+P2 / P1+P2+P3

Settings

P1:	P1 is displayed.
P1+P2:	P1 and P2 are displayed.
P1+P2+P3:	P1 to P3 are displayed.

5.4.5 Setting Measurement Points

Follow the procedure below to select which measurement point to set with the cursors, and then move the X cursor by using the H POS knob and the Y cursor by using the V POS knob. Press the H POS and V POS knobs at the same time to move the cursors to the center of the picture.

The cursors are not displayed if they are within the blanking interval. To display cursors that do not appear, move them within the screen.
The measurement point settings made on the menus accessed by pressing fStop and %DISPLAY are the same.

Procedure

PIC → F•4 CINELITE
→ F•2 f Stop SETUP → F•1 MEAS POS: P1 / P2 / P3
→ F•2 %DISPLAY SETUP → F•1 MEAS POS: P1 / P2 / P3

5.4.6 Setting the Area of Luminance Measurement

To select the area of luminance measurement, follow the procedure below. This setting is applied to P1 to P3 and REF. The luminance measurement area settings made on the menus accessed by pressing fStop and %DISPLAY are the same.

Procedure

PIC → F•4 CINELITE
→ F•2 f Stop SETUP → F•3 MEAS SIZE: 1X1 / 3X3 / 9X9
→ F•2 %DISPLAY SETUP → F•3 MEAS SIZE: 1X1 / 3X3 / 9X9

Settings

1X1:	The single pixel at the intersection of the cursors is measured.
3X3:	The 3×3 area of pixels with its center at the intersection of the cursors is averaged and measured.
9X9:	The 9×9 area of pixels with its center at the intersection of the cursors is averaged and measured.

5.4.7 Configuring User-Defined Correction Tables

The default gamma correction value when measuring f Stop levels is 0.45, but you can also use a user-defined gamma correction table that matches the gamma characteristics of the camera that you are using.
There are two types of user-defined correction tables. The first type consists of tables that are created using the LV 5490 and is made up of the USER1 to USER3 tables. The second type consists of tables that have been created externally using a device such as a PC and is made up of the USER_A to USER_E tables. These tables are not deleted even if you initialize the LV 5490.

- **Creating User-Defined Correction Tables Using the LV 5490.**

You can create and store up to three user-defined correction tables on the LV 5490.
As an example, the following procedure shows how to create a user-defined correction table that matches a camera's gamma characteristics.
Set the camera's f Stop value to F5.6 beforehand, and put an 18 % gray chart in the area that you will film.

1. **Adjust the lighting so that the displayed luminance level of the 18 % gray chart is 45.0 % (for example) on a camera whose f Stop value is set to F5.6.**

   For details, see section5.4.3, “%DISPLAY Screen Description.”

2. **Press F•7 up menu.**
3. **Press F•1 CINELITE DISPLAY to select f Stop.**
4. **Press F•2 f Stop SETUP.**
5. **Press F•5 GAMMA and then F•1 GAMMA SELECT to select USER1.**

   In this example, explanation will be given for USER-1, but USER2 and USER3 can also be created in the same way.

6. **Press F•2 GAMMA CAL.**

   When you press F•2 GAMMA CAL, a user-defined correction table appears in the bottom left of the screen, and the luminance level appears as a 10-bit value (0 % is displayed as 64, and 100 % is displayed as 940) close to the cursor. This setting is available when F•1 GAMMA SELECT is set to an option from USER1 to USER3.

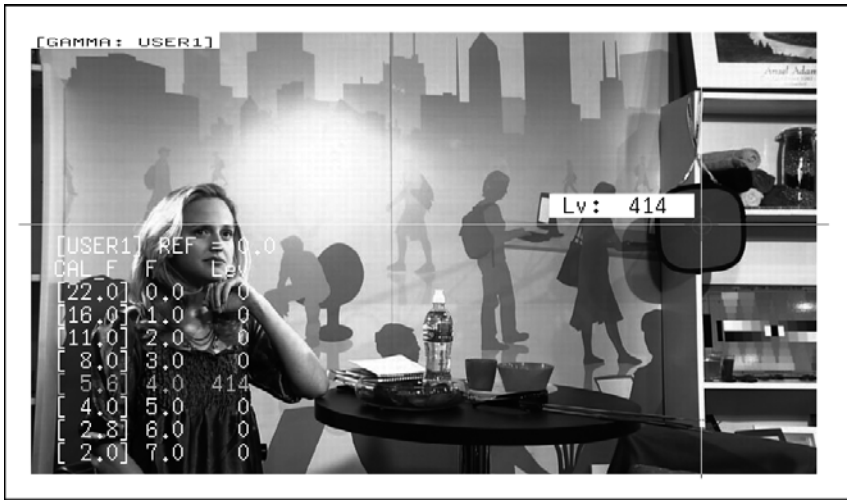


Figure 5-20 User-defined correction table creation screen

7. **Press F•1 TABLE CLEAR.**

   All the values in the user-defined correction table that is currently being edited are initialized. Be sure to initialize the values first when you create a new user-defined correction table.

8. **Press F•1 CLEAR YES.**

   To cancel the initialization of a user-defined correction table, press F•3 CLEAR NO.

9. **Place the cursors over the 18 % gray chart.**

10. **Press F•4 CAL F, and select 5.6.**

11. **Press F•3 CAL SET**

    The luminance level when the camera f Stop value is F5.6 is input into Lev in the user-defined correction table. To delete a line of data, press F•2 1 DATA CLEAR.

12. **Change F•4 CAL F and the camera f Stop value together in the following order: 4.0, 2.8, 2.0, 8.0, 11.0, 16.0, 22.0. Press F•3 CAL SET each time you change the value to input the luminance level for each value.**

    Do not change the lighting or the position of the 18 % gray chart.
    Also, make sure that the Lev value for f Stop values 22.0 to 2.0 increases linearly.

The REF value in the user-defined correction table is entered when you press F•4 18% REF-SET on the f Stop display.

For example, if you use the left-hand table shown below and press F•4 18% REF-SET when the luminance value at the intersection of the cursors is 416 (10-bit value), the f Stop value at that point (3.0) is displayed as the REF value.

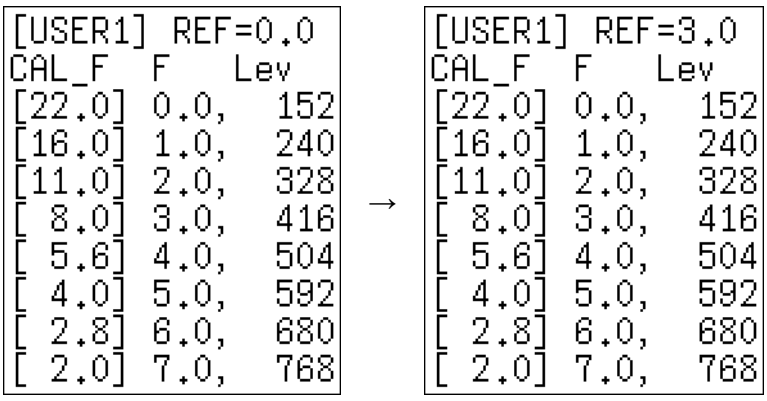


Figure 5-21 User-defined correction tables

When the above user-defined correction tables are used, f Stop values are indicated as shown below. The values between specified values are interpolated linearly.

When Lv = 152 f Stop = -3.0
When Lv = 240 f Stop = -2.0
When Lv = 328 f Stop = -1.0
When Lv = 416 f Stop = 0.0
When Lv = 504 f Stop = 1.0
When Lv = 592 f Stop = 2.0
When Lv = 680 f Stop = 3.0
When Lv = 768 f Stop = 4.0

- **Loading a User-Defined Correction Table into the LV 5490**

You can load up to five user-defined correction tables into the LV 5490.
To load a user-defined correction table into the LV 5490, follow the procedure below.

1. Create a user-defined correction table.

Example (TEST.CLT)

##################################			Comment
NAME:SAMPLE_1			Keyword
TYPE:0			Keyword
#Input	-7%	0	Comment
#	109%	4095	Comment
#Output	0%	0	Comment
#	1000%	65535	Comment
#Input	Output		Comment
##################################			Comment
0	0		Data
1	16		Data
2	32		Data
(Omitted)			
4093	65488		Data
4094	65504		Data
4095	65520		Data
# EOF			Comment

When you create a correction table, make sure that it conforms to the specifications listed below.

Overall File Specifications

File Type:	ASCII text file
Extension:	.CLT
End-of-Line Character:	CR+LF
Number of Lines:	5000 or less
Number of Characters per Line:	255 or less (including CR+LF)
File Name Length:	20 characters or less (excluding the extension)
Permitted File Name Characters:	Letters of the alphabet (A to Z; uppercase and lowercase), numerals (0 to 9), and underscores (_).

Comment Specifications

If you start a line with the number sign (#), the line is treated as a comment and does not affect operations. You can put comments anywhere.

Keyword Specifications

Be sure to put the keyword lines before the data lines and to enter a keyword without anything preceding it at the beginning of each keyword line.

NAME: The LV 5770A/7770 displays the eight characters that follow the separator (colon) as the name of the correction table. After the separator, enter the correction table name using letters of the alphabet (A to Z; uppercase and lowercase), numbers (0 to 9), and underscores (_). You can enter up to 10 characters.

TYPE: This is a code for identifying the file type. Enter a zero after the separator (colon).

Data Specifications

From the start of a line, enter the input value, a separator, and then the output value, in that order.

Input Value: Enter values from 0 to 4095 (12 bits), increasing the value by one for each line.
A luminance level of 100 % is defined as 940 (10 bits) × 4 = 3760 (12 bits).
A luminance level of 0 % is defined as 64 (10 bits) × 4 = 256 (12 bits).

Separator: Enter a single tab code.

Output Value: Enter a value from 0 to 65535 (16 bits).

2. **Save the user-defined correction table to USB memory, and connect the USB memory to the LV 5490.**

   Save the correction table in the following directory.

   USB memory
   └ LV5490_USER
   └ CLT
   └ TEST.CLT (for example)

3. **Press PIC.**
4. **Press F•4 CINELITE.**
5. **Press F•1 CINELITE DISPLAY to select f Stop.**
6. **Press F•2 f Stop SETUP.**
7. **Press F•5 GAMMA and then F•1 GAMMA SELECT to select USER_A.**

   In this example, a user-defined correction table is copied to USER_A, but user-defined correction tables can be copied to USER_B through USER_E in the same way.

8. **Press F•2 GAMMA FILE.**

   This setting is available when F•1 GAMMA SELECT is set to an option from USER_A to USER_E.

9. **Press F•1 FILE LIST.**

   The file list screen appears. This setting appears when USB memory is connected.
   To clear the table that has been copied to USER_A, press F•2 TABLE CLEAR.

10. Use function dial (F • D) to select the file to copy from the USB memory.

11. Press F • 3 FILE LOAD

The user-defined correction table that you selected is copied from the USB memory to USER_A. The copy operation is complete when the file list screen disappears and the display returns to the measurement screen.
If a file has already been stored to USER_A, an overwrite confirmation prompt appears. If you want to overwrite the current file, press F•1 OVER WR YES. Otherwise, press F•3 OVER WR NO.

After you have copied a user-defined correction table, you can select it by pressing F•1 GAMMA SELECT on the CINELITE menu. A loaded correction table is displayed using the name determined by its NAME keyword.

5.4.8 Displaying Synchronized Markers

To synchronize the markers on the vector display and video signal waveform display to measurement points P1 to P3 and REF that you specify on the CINELITE display, follow the procedure below. Synchronized markers can be displayed only when an f Stop screen or %DISPLAY screen is shown in the same multi-screen display.

Markers cannot be displayed on the video signal waveform display under the following conditions.
• When SWEEP is set to V or H SWEEP is set to 2H in the video signal waveform menu
• When COLOR MATRIX in the video signal waveform menu is COMPOSIT
Marker display will not work properly when waveforms are being displayed using an external sync signal.

Procedure

PIC → F•4 CINELITE → F•4 CINELITE ADVANCE: OFF / ON

CINELITE ADVANCE = ON

Figure 5-22 Displaying synchronized markers

5.5 Configuring CINEZONE Settings

The CINEZONE display has a gradation (step) display mode, in which the picture luminance levels are converted into RGB colors and displayed and a search display mode, in which the specified luminance level is displayed using green.
To set either of these modes, on the picture menu, press F•4 CINELITE and then F•2 CINEZONE SETUP.

Reference CINEZONE SETUP → section5.3.3, “Configuring CINELITE Settings.”

5.5.1 Gradation Display Mode

To display picture luminance levels through color gradation, follow the procedure below. In the gradation display mode, luminance levels are displayed using 1024 colors.
The picture is displayed such that luminance levels above F•2 UPPER are displayed using white, and levels below F•3 LOWER are displayed using black.
You can see what colors correspond to what luminance levels by looking at the scale on the right of the display.

If F•2 UPPER is 1 % greater than F•3 LOWER and you lower the value of F•2 UPPER, the value of F•3 LOWER is automatically lowered to maintain a difference of 1 % between the two values. In the same way, if you raise the value of F•3 LOWER, the value of F•2 UPPER is automatically raised to maintain a difference of 1 % between the two values.

F•2 UPPER and F•3 LOWER appear when you set F•1 CINEZONE FORM to GRADATE or STEP.

Procedure

PIC → F•4 CINELITE → F•1 CINELITE DISPLAY → F•2 CINEZONE SETUP → F•1 CINEZONE FORM to select GRADATE
→ F•2 UPPER: -6.3 - 100.0 - 109.4
→ F•3 LOWER: -7.3 - 0.0 - 108.4

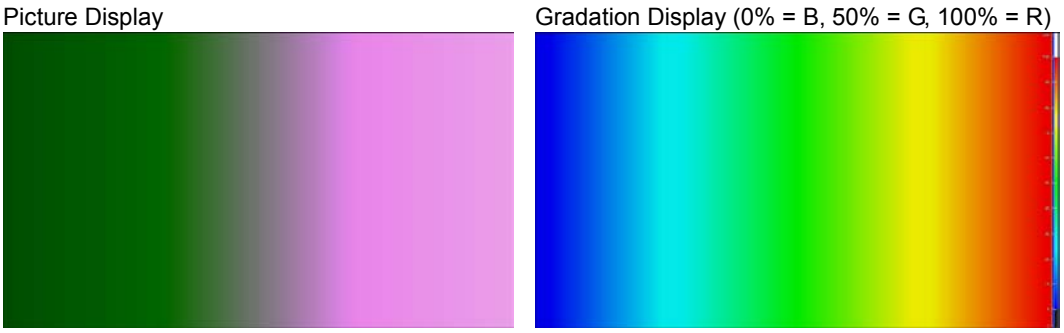


Figure 5-23 Gradation display

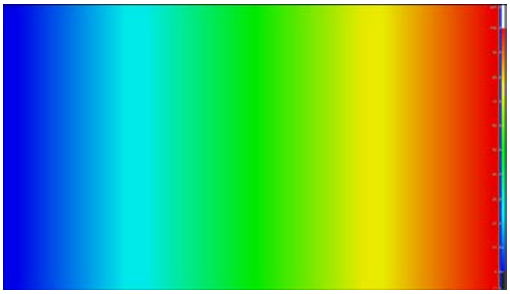
5.5.2 Step Display Mode

To display picture luminance levels in steps, follow the procedure below.
In the step display mode, luminance levels are divided into 10 % steps and assigned to 12 different colors. For information about F•2 UPPER and F•3 LOWER, see section 5.5.1, “Gradation Display Mode.”

Procedure

PIC → F•4 CINELITE → F•1 CINELITE DISPLAY → F•2 CINEZONE SETUP → F•1 CINEZONE FORM to select STEP
→ F•2 UPPER
→ F•3 LOWER

CINEZONE FORM = GRADATE



CINEZONE FORM = STEP

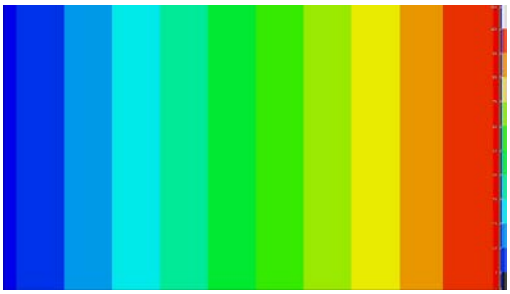


Figure 5-24 Step display

5.5.3 Search Display Mode

In the search display mode, the specified luminance level ±0.5 % is displayed using green on an otherwise monochrome picture display.
The picture is displayed such that luminance levels at and above F•2 UPPER are displayed using red, and levels below F•3 LOWER are displayed using blue.

To set the level that is displayed using green, follow the procedure below.
F•2 LEVEL appears when F•1 CINEZONE FORM is set to SEARCH.

F•2 UPPER and F•3 LOWER appear when F•1 CINEZONE FORM is set to GRADATE or STEP. For details, see section 5.5.1, “Gradation Display Mode.”

Procedure

PIC → F•4 CINELITE → F•1 CINELITE DISPLAY → F•2 CINEZONE SETUP → F•1 CINEZONE FORM to select SEARCH
→ F•2 LEVEL: -7.3 - 40.0 - 109.4

CINEZONE FORM = SEARCH

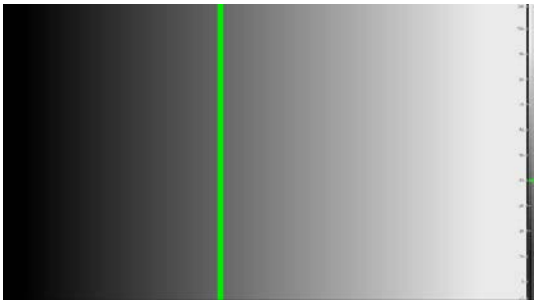


Figure 5-25 Search display

5.6 Focus Assist Display (SER04)

The focus assist display makes it easy to verify the focus by highlighting the image according to the amount of detected edges.

To configure the focus assist settings, press F•5 FOCUS on the PIC menu.
This menu item does not appear when SIZE is set to FULL FRM.

Reference SIZE → Section 5.8.1, “Selecting the Display Size”

PIC → F•5 FOCUS →

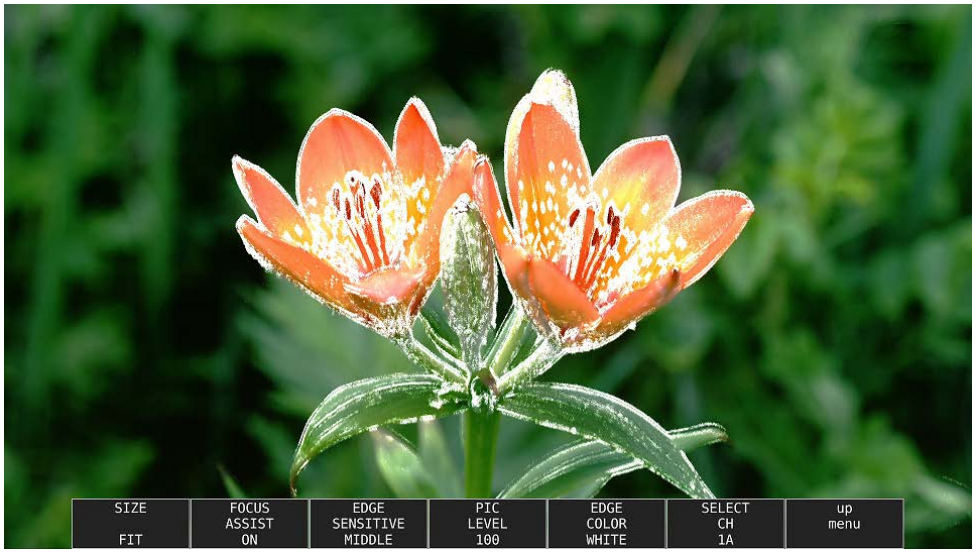


Figure 5-26 Focus assist display

5.6.1 Selecting the Display Size

To select the picture display size, follow the procedure shown below.
See section 5.8.1, “Selecting the Display Size.”

Procedure

PIC → F•5 FOCUS → F•1 SIZE: FIT / REAL / X2

5.6.2 Turning Focus Assist On and Off

To turn the focus assist display on and off, follow the procedure below.

Procedure

PIC → F•5 FOCUS → F•2 FOCUS ASSIST: ON / OFF

5.6.3 Selecting the Detection Sensitivity

When F•2 FOCUS ASSIST is set to ON, to select the edge detection sensitivity, follow the procedure below.

Procedure

PIC → F•5 FOCUS → F•3 EDGE SENSITIVE: LOW / MIDDLE / HIGH / V-HIGH / U-HIGH

5.6.4 Selecting the Luminance Level

When F•2 FOCUS ASSIST is set to ON, to select the picture luminance level as a percentage, follow the procedure below.
Select OFF to hide the picture. Select EMBOSS to emboss the edges.

Procedure

PIC → F•5 FOCUS → F•4 PIC LEVEL: OFF / EMBOSS / 25 / 50 / 75 / <u>100</u>

PIC LEVEL = OFF

PIC LEVEL = EMBOSS

Figure 5-27 Selecting the luminance level

5.6.5 Selecting the Highlight Color

When F•4 PIC LEVEL is 25, 50, 75, or 100, to select the edge display color, follow the procedure below.

Procedure

PIC → F•5 FOCUS → F•5 EDGE COLOR: <u>WHITE</u> / RED / GREEN / BLUE

5.7 Video Noise Meter (SER10)

The video noise meter measures the noise included in the Y, G, B, or R signal of the SDI signal applied to the LV 5490 and displays it on the picture.

To configure the video noise meter, press F•4 NOISE SETUP and F•5 NOISE STOP/START on the PIC menu.
This menu item does not appear when the SER10 is not installed.

PIC → F•3 LINE SEL / NOISE → F•4 NOISE SETUP →

PIC → F•3 LINE SEL / NOISE → F•5 NOISE STOP/START

Figure 5-28 Video Noise Meter

5.7.1 Turning Video Noise Meter On and Off

To turn the Video Noise Meter on and off, follow the procedure below.

Procedure

PIC → F•3 LINE SEL / NOISE → F•5 NOISE: STOP / START

Settings

STOP:	Indicates that the video noise meter is off. Press F•3 to turn on the video noise meter.
START:	Indicates that the video noise meter is on. Press F•3 to turn off the video noise meter.

5.7.2 Configuring the Measurement Window

To display a window for measuring video noise on the picture display, follow the procedure below. The size and area can be set in units of pixels and lines.
The green area defined by the diagonally opposite cursors A1 and A2 becomes the measurement window.
Set this with the video noise meter turned on.

Procedure

PIC → F•3 LINE SEL / NOISE → F•4 NOISE SETUP
→ F•1 CURSOR CH: A1 / A2 / TRACK / OFF

Settings

A1:	Select cursor A1 for setting the measurement window. Use the V POS and H POS knobs to adjust the position of the cursor.
A2:	Select cursor A2 for setting the measurement window. Use the V POS and H POS knobs to adjust the position of the cursor.
TRACK:	Moves the measurement window. Use the V POS and H POS knobs to adjust the positions of cursors A1 and A2 simultaneously.
OFF:	Turns off the cursor A1 and A2 display.

Figure 5-29 Measurement Window

* Set the measurement window in an area where the average video level is uniform. If you include dark areas in the video caused by the effect of the lens or areas where the video signal of the object is not flat, accurate video noise measurement may not be possible.

* There may be cases in which accurate video noise measurement is not possible due to overshooting, undershooting, or ringing occurring in the rising or falling edges of the waveform depending on the input video signal. If this happens, set the measurement window a few percent inside of the rising or falling section.

5.7.3 Selecting the Signal to Measure

To select the signal to measure, follow the procedure below.

Procedure

PIC → F•3 LINE SEL / NOISE → F•4 NOISE SETUP → F•2 SIGNAL: Y / G / B / R

5.7.4 Selecting the Filter

To set the cutoff frequencies of the low-pass filter and high-pass filter, follow the procedure below.

Procedure

PIC → F•3 LINE SEL / NOISE → F•4 NOISE SETUP → F•3 FILTER
→ F•1 LPF: 5.5MHz / 4.4MHz / 3.6MHz / 2.7MHz / 1.4MHz / 0.7MHz / THROUGH
→ F•1 LPF: 30MHz / 24MHz / 20MHz / 15MHz / 7.5MHz / 3.7MHz / THROUGH
→ F•1 LPF: 60MHz / 48MHz / 40MHz / 30MHz / 15MHz / 7.5MHz / THROUGH
→ F•1 LPF: 120MHz / 96MHz / 80MHz / 60MHz / 30MHz / 15MHz / THROUGH
→ F•1 LPF: 240MHz / 192MHz / 160MHz / 120MHz / 60MHz / 30MHz / THROUGH
→ F•1 LPF: 0.404 / 0.323 / 0.269 / 0.202 / 0.101 / 0.0505 / THROUGH (*1)
→ F•2 HPF: OFF / ON

*1 When the input format cannot be detected, a normalized frequency is displayed.
* The cutoff frequencies of the low-pass filter and high-pass filter vary depending on the input format. For details, see the LV 5490 instruction manual.

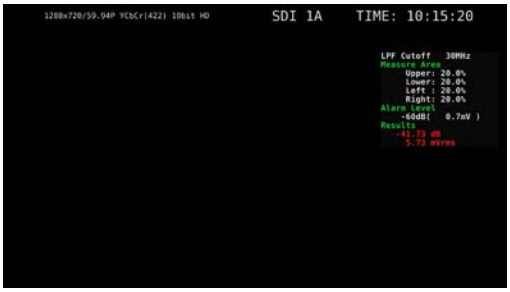
5.7.5 Selecting the Measurement Result Display Size

To select the measurement result display size, follow the procedure below.

Procedure

PIC → F•3 LINE SEL / NOISE → F•4 NOISE SETUP
→ F•4 RESULTS SIZE: SMALL / LARGE

RESULTS SIZE = SMALL



RESULTS SIZE = LARGE

Figure 5-30 Selecting the Measurement Result Display Size

5.7.6 Turning the Alarm Function On and Off

To turn the alarm function on and off, follow the procedure below.
When set to on, F•2 ALARM LEVEL appears, and you can set the threshold of the alarm function.

Procedure

PIC → F•3 LINE SEL / NOISE → F•4 NOISE SETUP
→ F•5 ALARM → F•1 ALARM UNIT: OFF / ON

5.7.7 Setting the Threshold of the Alarm Function

When the alarm function is on, to set the threshold of the alarm function, follow the procedure below.
When the measurement result is greater than or equal to the specified threshold, the measurement result display turns red.

Procedure

PIC → F•3 LINE SEL / NOISE → F•4 NOISE SETUP
→ F•5 ALARM → F•2 ALARM LEVEL: -80dB (0.1mV) – 0dB (700.0mV)

When the measurement result is less than the threshold

When the measurement result is greater than or equal to the threshold

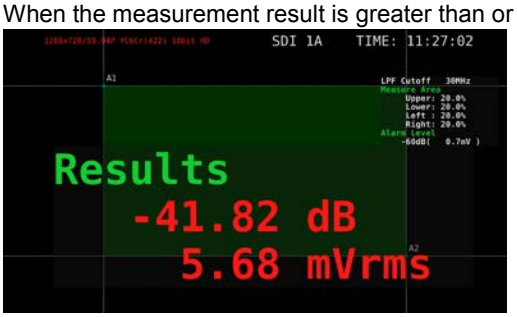


Figure 5-31 Alarm display

5.8 Configuring the Display Settings

To configure the display settings, press F•7 DISPLAY on the PIC menu.

PIC → F•7 DISPLAY →

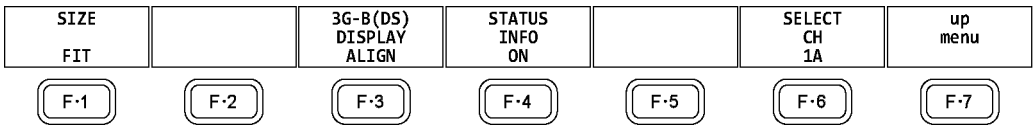


Figure 5-32 DISPLAY menu

5.8.1 Selecting the Display Size

To select the picture display size, follow the procedure shown below.

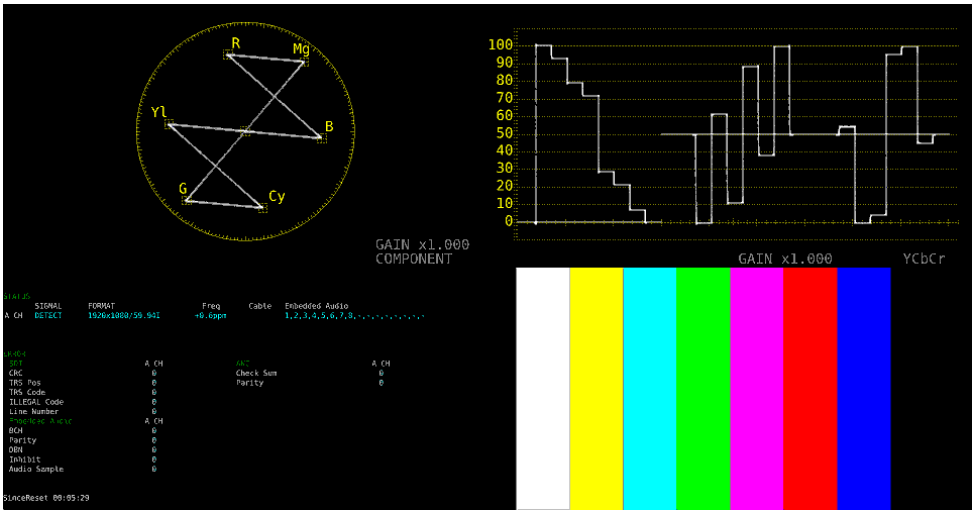
Procedure

PIC → F•7 DISPLAY → F•1 SIZE: FIT / REAL / X2 / FULL FRM

Settings

FIT:	The picture is displayed at the optimal size for the display area. Because the picture is enlarged or reduced, the display may become coarse or pixels may drop out. The LV 5490SER01 and LV 5490SER02 use simple filtering to enlarge and reduce the picture.
REAL:	A single sample of the video signal is displayed with a single pixel on the screen. If the picture is larger than the display area, use the V•POS and H•POS knobs to adjust the picture display position. Press a knob to return the picture to the corresponding default location.
X2:	A single sample of the video signal is displayed with 4 pixels (2 horizontal and 2 vertical pixels) on the screen. If the picture is larger than the display area, use the V•POS and H•POS knobs to adjust the picture display position. Press a knob to return the picture to the corresponding default location.
FULL FRM:	A single frame, including the blanking interval, is displayed.

SIZE = FIT



SIZE = REAL

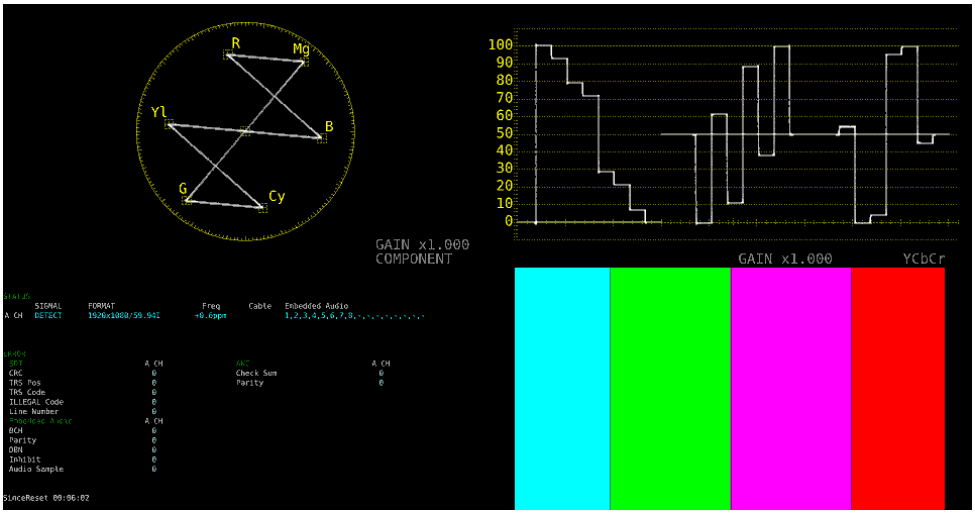


Figure 5-33 Selecting the display size

5.8.2 Gamut Error Display

To display the locations of gamut errors and luminance errors on the picture, follow the procedure below.
These errors are defined by the ranges that you specify by setting Gamut Upper and Gamut Lower, Composite Upper and Composite Lower, and Luminance Upper and Luminance Lower in the status menu. If Gamut Error, Composite Gamut Error, or Level Error is set to OFF, the corresponding errors are not displayed.

Reference Gamut Upper/Lower, Composite Upper/Lower → Section 8.2.3, “Error Setup 3”, Section 8.2.4, “Error Setup 4”

Procedure

PIC → F•7 DISPLAY → F•2 GAMUT ERR DISP: OFF / WHITE / RED / MESH

Settings

OFF:	Gamut errors are not displayed.
WHITE:	The picture intensity is halved, and gamut error are marked in white.
RED:	The picture intensity is halved, and gamut error are marked in red.
MESH:	Gamut errors are marked with a mesh pattern.

5.8.3 Turning the Information On and Off

To turn on and off the display of the following information that you arranged in the layout, follow the procedure below.
This setting is valid on the display that appears when PIC is pressed. For multi display and other displays, it is fixed to ON.

- Sub tab items (FORMAT, INPUT, TIME, DATE)
- Option tab options (Format, Input, Time)

Procedure

PIC → F•7 DISPLAY → F•4 STATUS INFO: ON / OFF

STATUS INFO = ON

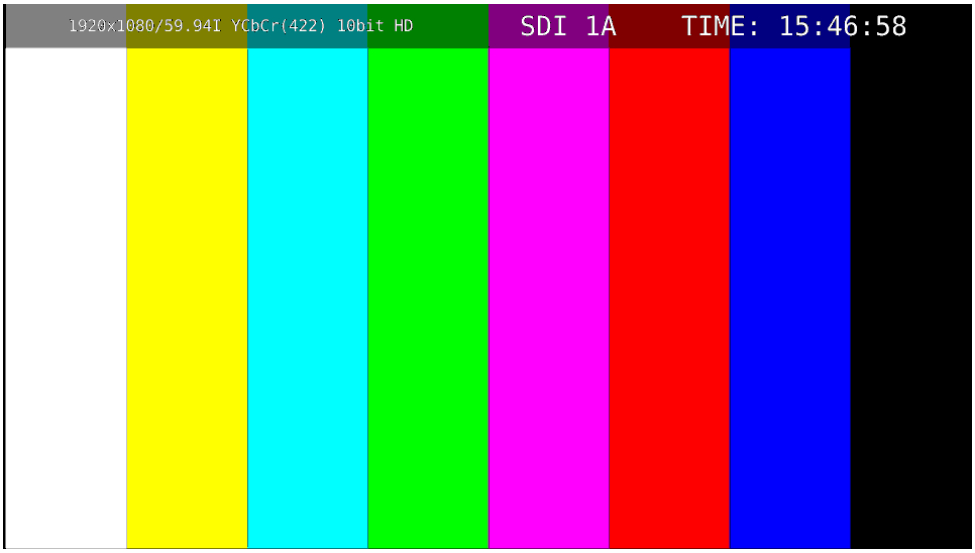


Figure 5-34 Turning the information on and off

5.8.4 Configuring the 3G-B-DS Display Settings

When measuring 3G-B-DS, to select the display mode, follow the procedure below.

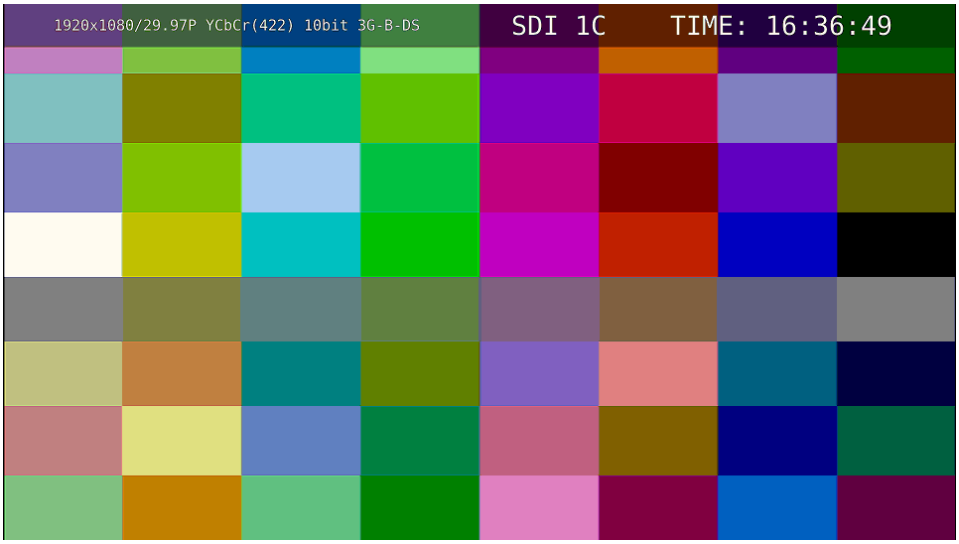
Procedure

PIC → F•7 DISPLAY → F•3 3G-B-DS DISPLAY: STREAM1 / STREAM2 / MIX / ALIGN

Settings

STREAM1:	Stream 1 is displayed.
STREAM2:	Stream 2 is displayed.
MIX:	Streams 1 and 2 are displayed on top of each other.
ALIGN:	Streams 1 and 2 are displayed side by side.

3G-B-DS DISPLAY = MIX



3G-B-DS DISPLAY = ALIGN

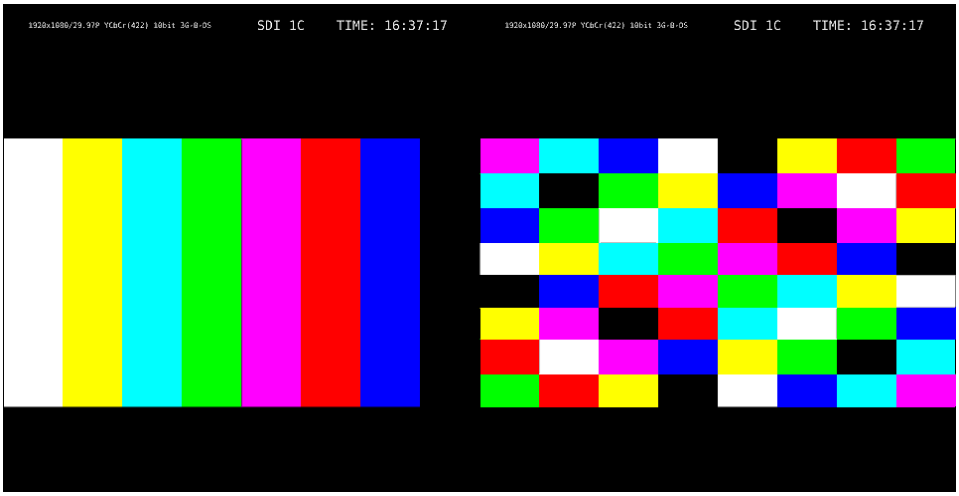


Figure 5-35 Configuring the 3G-B-DS display settings

6. HDR DISPLAY (SER07)

You can measure HDR signals by installing SER07. HDR signal measurement supports all formats except for SD and XYZ.
To measure HDR signals, on the SYS →F•1 SIGNAL IN OUT → HDR tab, set HDR MODE to ON. If necessary, set the STANDARD, HDR->SDR HIGH UPPER LIMIT, SYSTEM GAMMA and REFERENCE LEVEL parameters. For details, see the LV 5490 instruction manual.

When HDR measurement is turned on, the following occurs.
When 5-bar display, gamut error display on the picture, gamut error display on the status, composite gamut error display, luminance level error, or chrominance level error turns on, the SDR conversion format selection is reduced to DISABLE only. If the SDR conversion format is set to a value other than DISABLE, it is changed to DISABLE.

Figure 6-1 HDR tab

2. On the HDR tab, set HDR MODE to ON.

If necessary, set the STANDARD and HDR->SDR HIGH UPPER LIMIT parameters. For details, see the LV 5490 instruction manual.

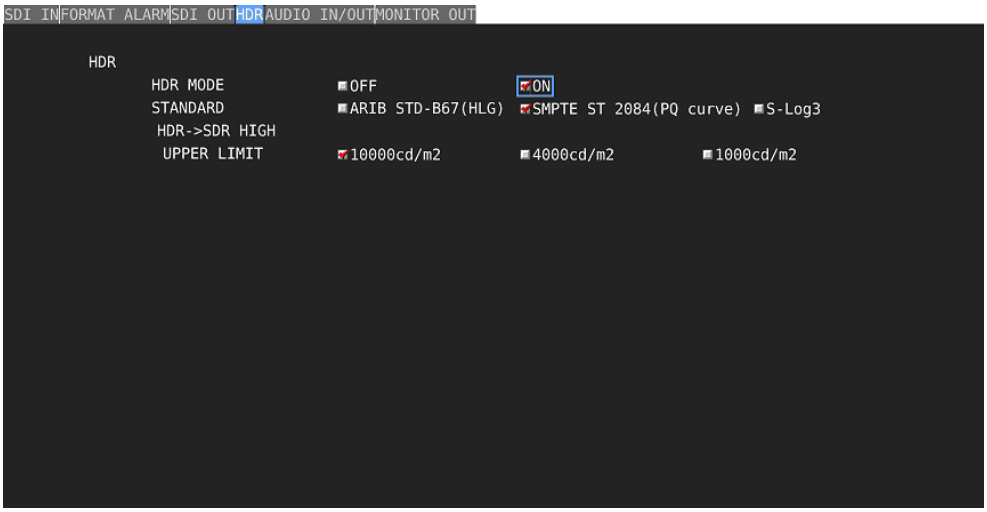


Figure 6-2 HDR tab

3. Press F•1 COMPLETE.

If you change the HDR MODE or STANDARD setting, a message “TONE CURVE SETUP” will be displayed for 10 to 20 seconds.

6.1 Video Signal Waveform Display

On the video signal waveform display, scales and cursors for HDR signals can be displayed.

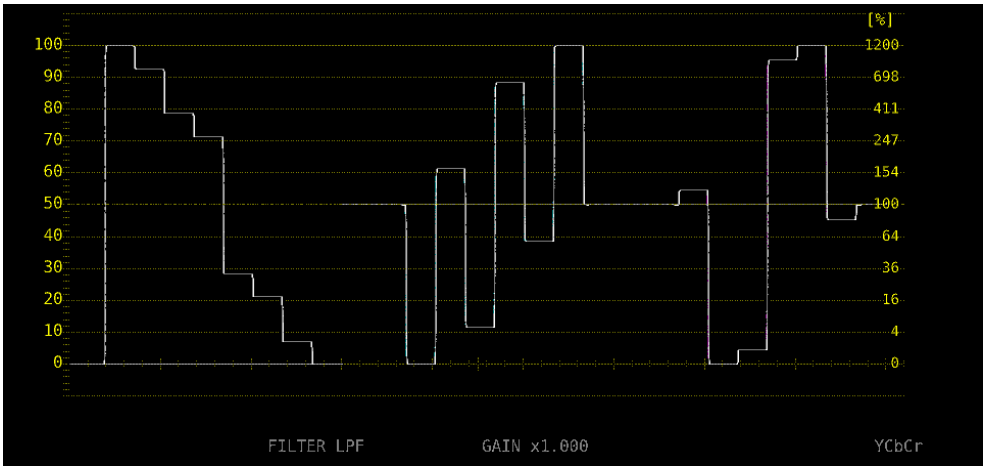
6.1.1 Scale Display

During HDR measurement, a scale corresponding to the HDR signal is displayed on the right side of the video signal waveform.
The scale on the right side varies as follows depending on the STANDARD and SYSTEM GAMMA parameters of the HDR tab.

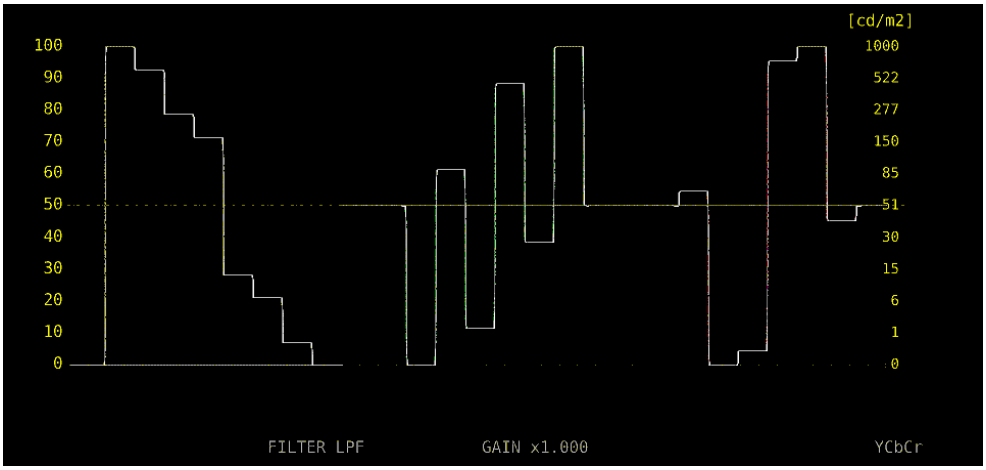
- When STANDARD is HLG and
  - SYSTEM GAMMA is OFF: 0 to 100 [%] is displayed as 0 to 1200 [%].
  - SYSTEM GAMMA is ON: 0 to 100 [%] is displayed as 0 to 1000 [cd/m^2].
- When STANDARD is PQ: 0 to 100 [%] is displayed as 0 to 10000 [cd/m^2].
  (If the scale unit is 1023,255 and 0 to 100 [%] is set to 64 to 940, 4 to 1019 is displayed as 0 to 10000 [cd/m^2])
- When STANDARD is S-Log3 and
  - SYSTEM GAMMA is OFF: If 0 to 100 [%] is set to 64 to 940, 95 to 940 is displayed as 0 to 2055 [%].
  - SYSTEM GAMMA is ON: 0 to 100 [%] is displayed as 0 to 3000 [cd/m^2].

If GAIN VARIABLE is set to VARIABLE or if COLOR MATRIX is set to COMPOSITE, the scale on the right side will not appear.

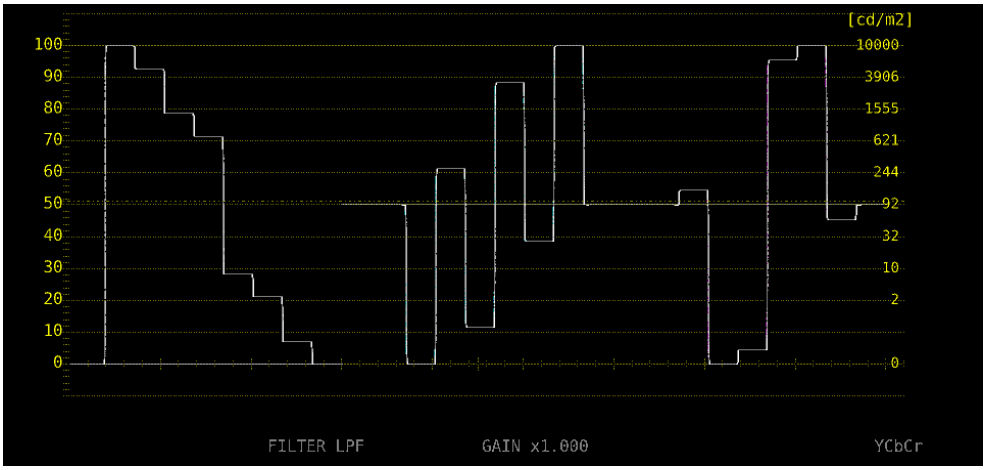
STANDARD = HLG, SYSTEM GAMMA = OFF



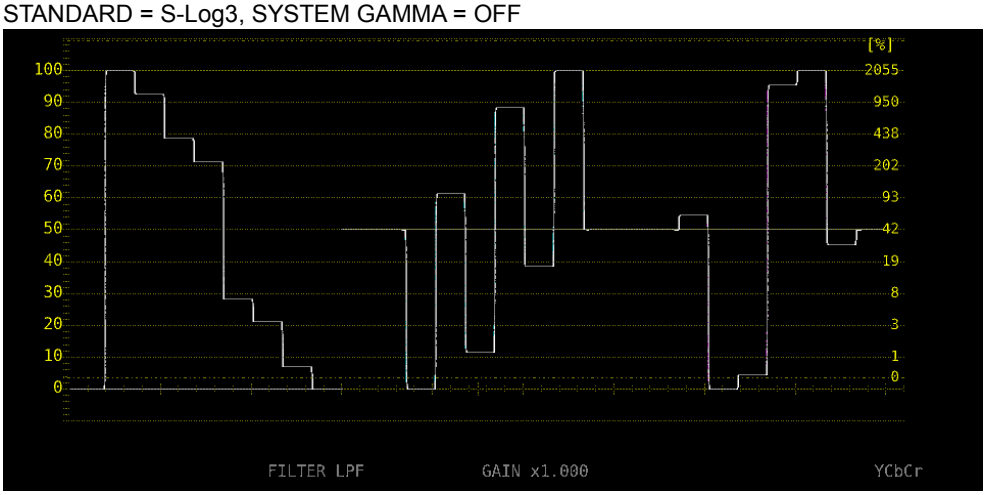
STANDARD = HLG, SYSTEM GAMMA = ON



STANDARD = PQ



STANDARD = S-Log3, SYSTEM GAMMA = OFF



STANDARD = S-Log3, SYSTEM GAMMA = ON

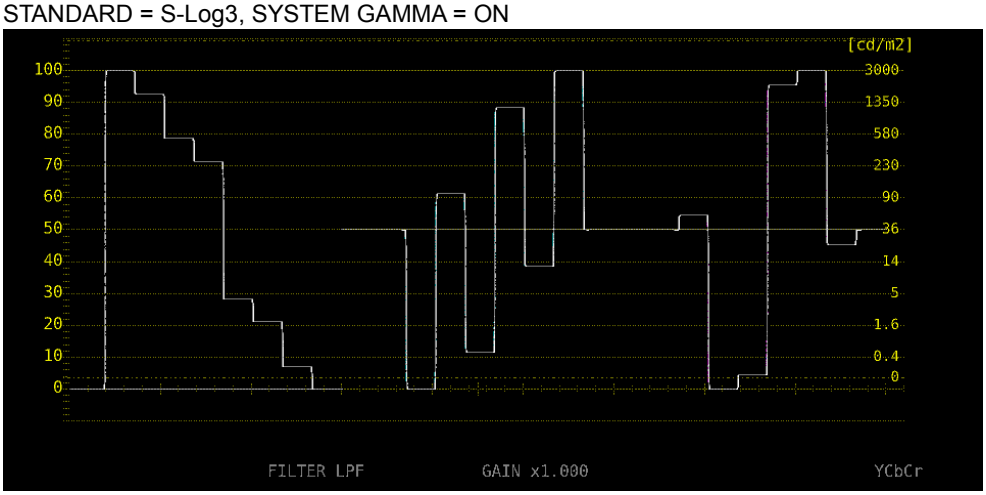


Figure 6-3 Scale display

6.1.2 Cursor Display

During cursor measurement, to display measured values for HDR signals, follow the procedure below.
The unit of measurement is % when on the HDR tab, STANDARD is HLG or S-Log3 and SYSTEM GAMMA is OFF and cd/m^2 when STANDARD is HLG or S-Log3 and SYSTEM GAMMA is ON or when STANDARD is PQ.
If GAIN VARIABLE is set to VARIABLE or if GAIN MAG is set to X5, measured values for HDR signals will not be displayed even when HDR is selected. The display will be the same as when Y UNIT is set to mV.

Procedure

WFM → F•5 CURSOR → F•3 Y UNIT: HDR

Y UNIT = HDR

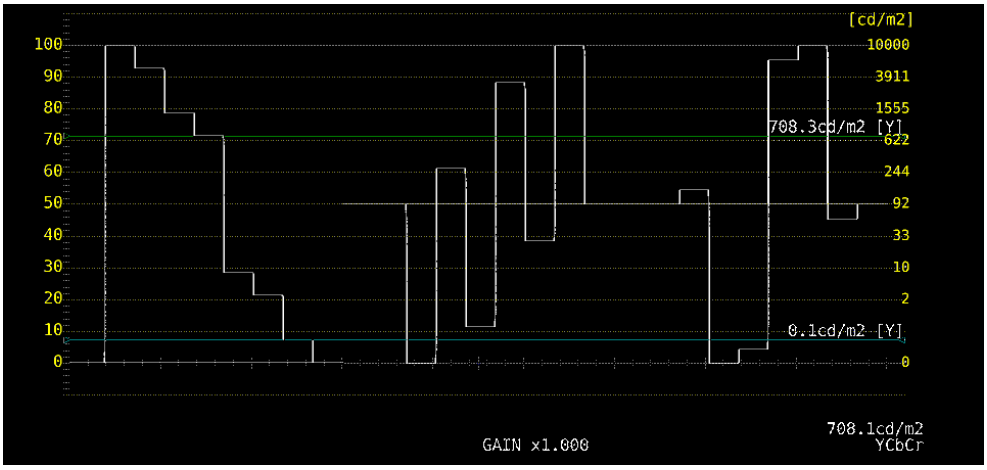


Figure 6-4 Cursor display (PQ)

6.2 Vector Waveform Display

On the vector display, a histogram for HDR signals can be displayed.

6.2.1 Histogram Display

During histogram display, to select the horizontal scale, follow the procedure below.

Procedure

VECT → F•1 SCALE → F•3 HIST SCALE: % / HDR

The scale when HDR is selected varies depending on the settings on the HDR tab and HDR->SDR of the PIC menu.

Table 6-1 Histogram scale

			HDR->SDR		
			NORMAL	HIGH	DISABLE
HDR tab	HLG		0 to 100 [%]	0 to 1200 [%]	0 to 1200 [%]
	PQ	10000cd/m2	0 to 100 [cd/m2]	0 to 10000 [cd/m2]	0 to 10000 [cd/m2]
		4000cd/m2	0 to 100 [cd/m2]	0 to 4000 [cd/m2]	0 to 10000 [cd/m2]
		1000cd/m2	0 to 100 [cd/m2]	0 to 1000 [cd/m2]	0 to 10000 [cd/m2]
	S-Log3		0 to 100 [%]	0 to 4000 [%]	0 to 2043 [%]

HIST SCALE = HDR

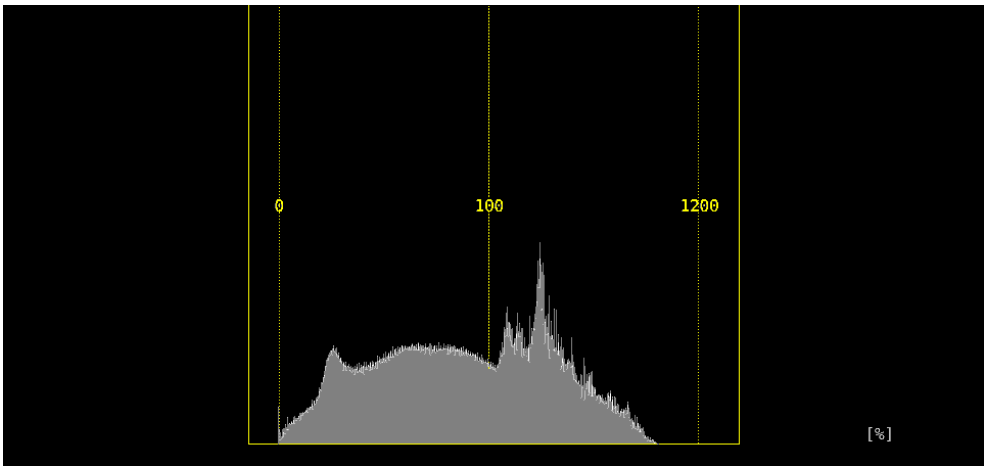


Figure 6-5 Histogram display (HLG)

6.3 Picture Display

On the picture display, CINELITE and CINEZONE for HDR signals can be displayed.
During HDR measurement F•4 CINELITE of the PIC menu changes to F•4 CINELITE/HDR.
You can use this to display CINELITE and CINEZONE.

PIC → F•4 CINELITE/HDR →

Figure 6-6 CINELITE/HDR menu

6.3.1 Turning Brightness Information On and Off

If ON is selected in the following procedure, the maximum brightness (MAX), minimum brightness (MIN), and average brightness (AVG) are displayed at the top of the screen. In addition, on the CINEZONE display, the HDR equivalents of the display color settings are displayed in the upper left corner of the screen.

Procedure

PIC → F•4 CINELITE/HDR
→ F•2 HDR->SDR SETUP → F•5 BRIGHTNESS INFO: OFF / ON (Normal display)
→ F•2 f Stop SETUP → F•5 BRIGHTNESS INFO: OFF / ON (f Stop screen)
→ F•2 %DISPLAY SETUP → F•5 BRIGHTNESS INFO: OFF / ON (%DISPLAY screen)
→ F•2 CINEZONE SETUP → F•5 BRIGHTNESS INFO: OFF / ON (CINEZONE display)

BRIGHTNESS INFO = ON

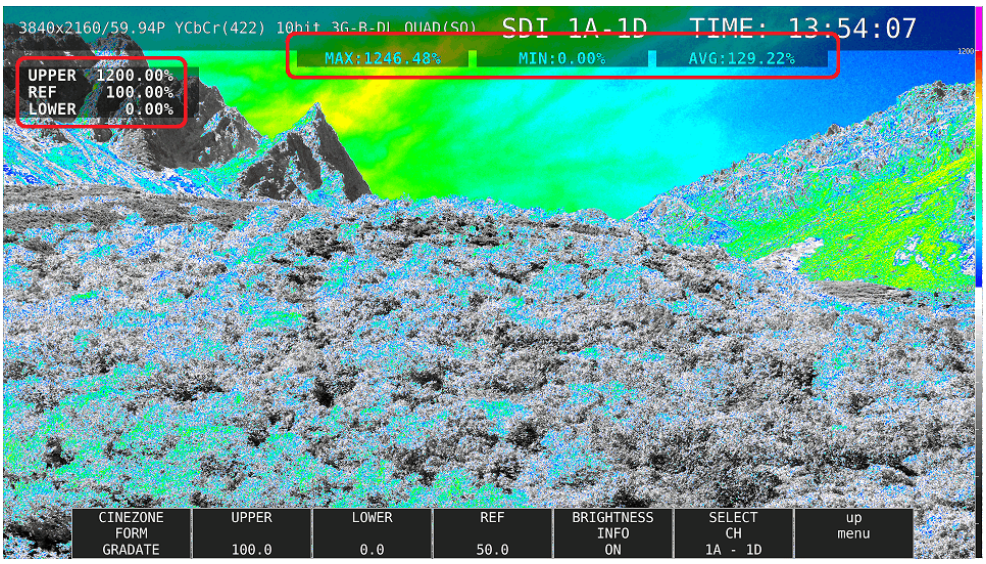


Figure 6-7 Turning brightness information on and off

6.3.2 Selecting the SDR Conversion Format

To select the conversion format for converting HDR signals to SDR signals, follow the procedure below.

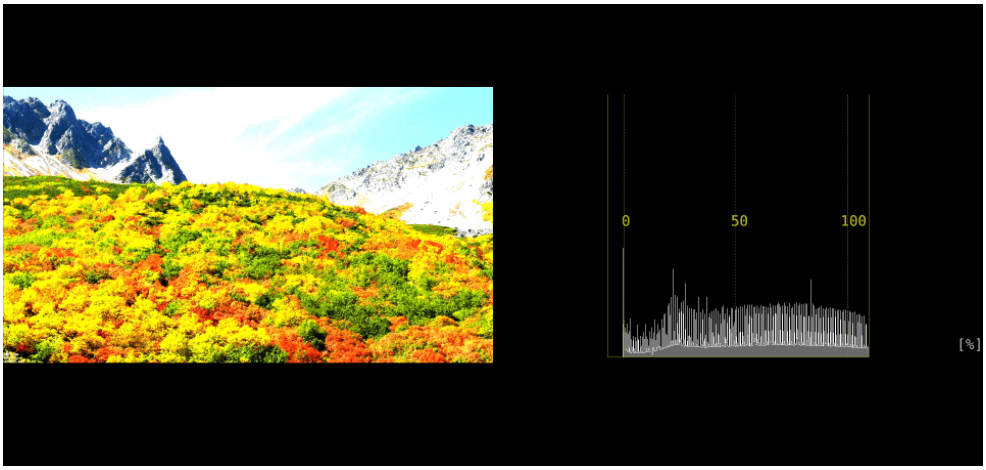
Procedure

PIC → F•4 CINELITE/HDR → F•3 HDR->SDR: NORMAL / HIGH / DISABLE

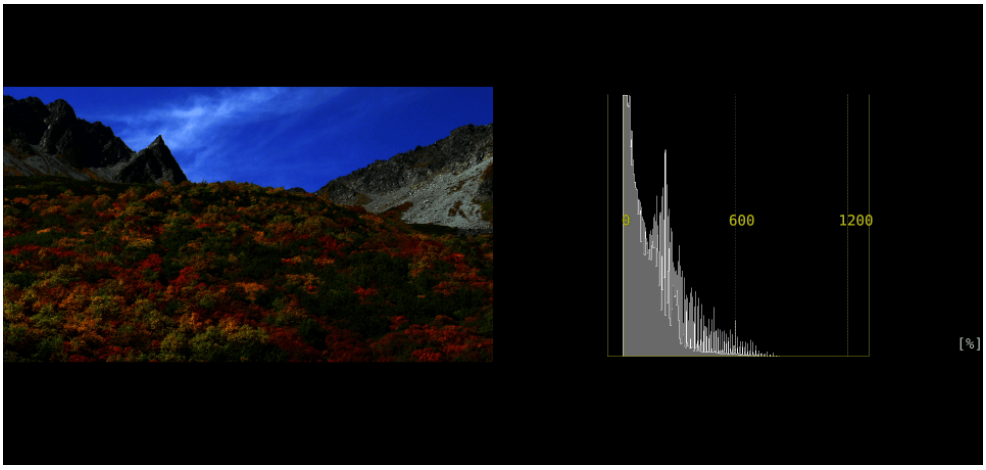
Settings

NORMAL:	HDR signals are converted into linear signals, and the SDR area is displayed. This option cannot be selected for CINEZONE display. This cannot be selected when 5-bar display, gamut error display on the picture, gamut error display on the status, composite gamut error display, luminance level error, or chrominance level error turns on.
HIGH:	HDR signals are converted into linear signals, and all areas are displayed. However, if STANDARD on the HDR tab is PQ, brightness up to the level specified by HDR->SDR HIGH UPPER LIMIT is displayed. This option cannot be selected for CINEZONE display. This cannot be selected when 5-bar display, gamut error display on the picture, gamut error display on the status, composite gamut error display, luminance level error, or chrominance level error turns on.
DISABLE:	The HDR signal is displayed as-is.

HDR->SDR = NORMAL



HDR->SDR = HIGH



HDR->SDR = DISABLE

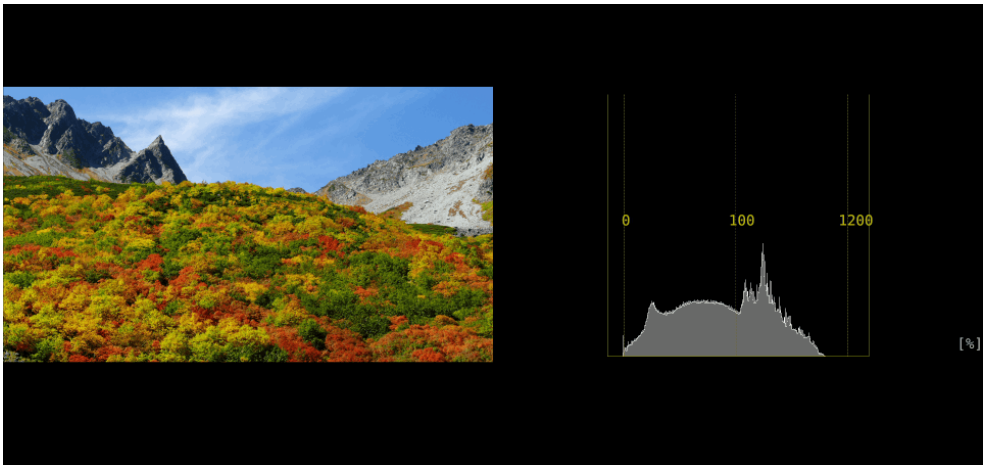


Figure 6-8 Selecting the SDR conversion format

6.3.3 f Stop Screen

In the f Stop display of HDR signal, HLG, PQ, or S-Log3 is displayed for GAMMA in the upper left corner of the screen depending on the standard selected with STANDARD on the HDR tab. In addition, even if the brightness level is 80% or higher, measured values are displayed in white, not yellow.

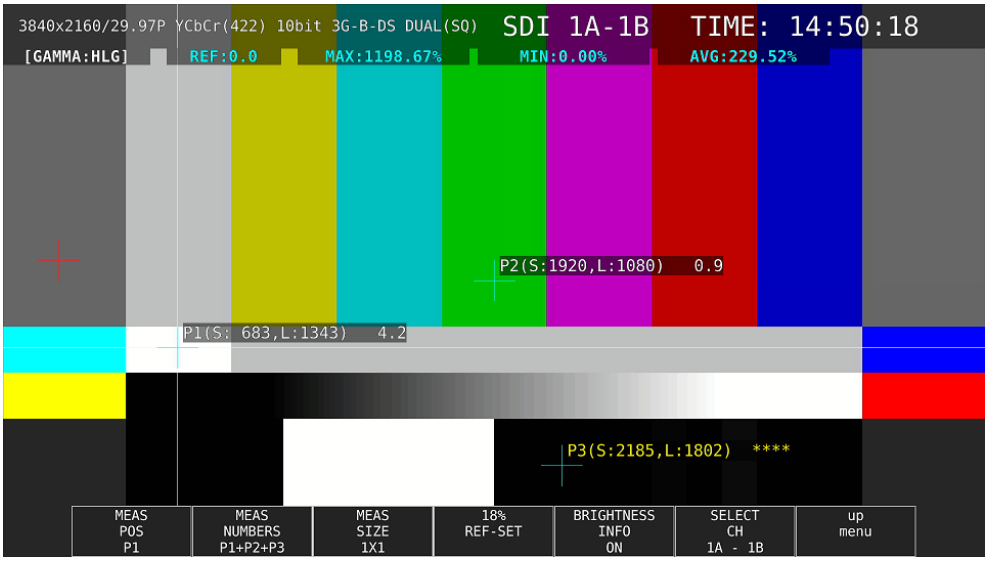


Figure 6-9 f Stop screen

6.3.4 %DISPLAY Screen

On the %DISPLAY of HDR signals, to display measured values for HDR signals, follow the procedure below. In addition, even if the brightness level is 80% or higher or 0% or lower, measured values are displayed in white, not yellow.

Procedure

PIC → F•4 CINELITE/HDR → F•2 %DISPLAY SETUP → F•4 UNIT SELECT: HDR

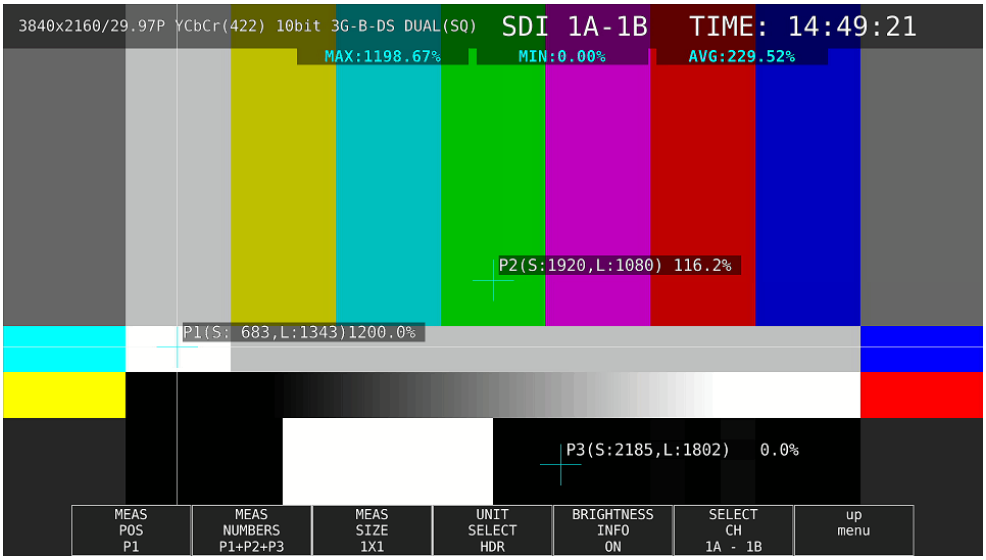


Figure 6-10 %DISPLAY screen

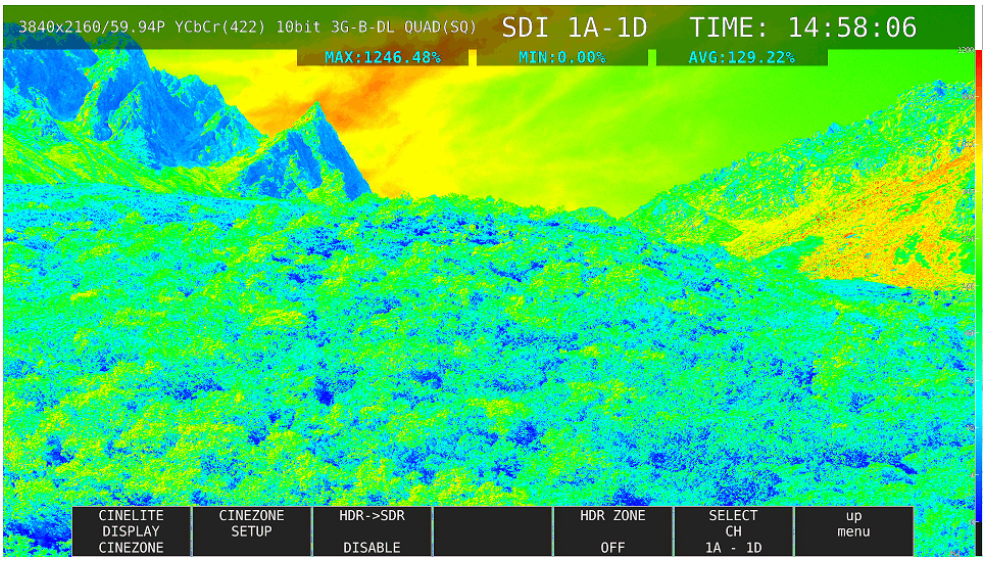
6.3.5 CINEZONE Display

On the CINEZONE display of HDR signals, to display the SDR area in monochrome and HDR area in color, follow the procedure below to select ON.
Note that if F•5 HDR ZONE is set to ON, STEP and SEARCH cannot be selected for F•1 CINEZONE FORM.

Procedure

PIC → F•4 CINELITE/HDR → F•5 HDR ZONE: ON / OFF

HDR ZONE = OFF



HDR ZONE = ON

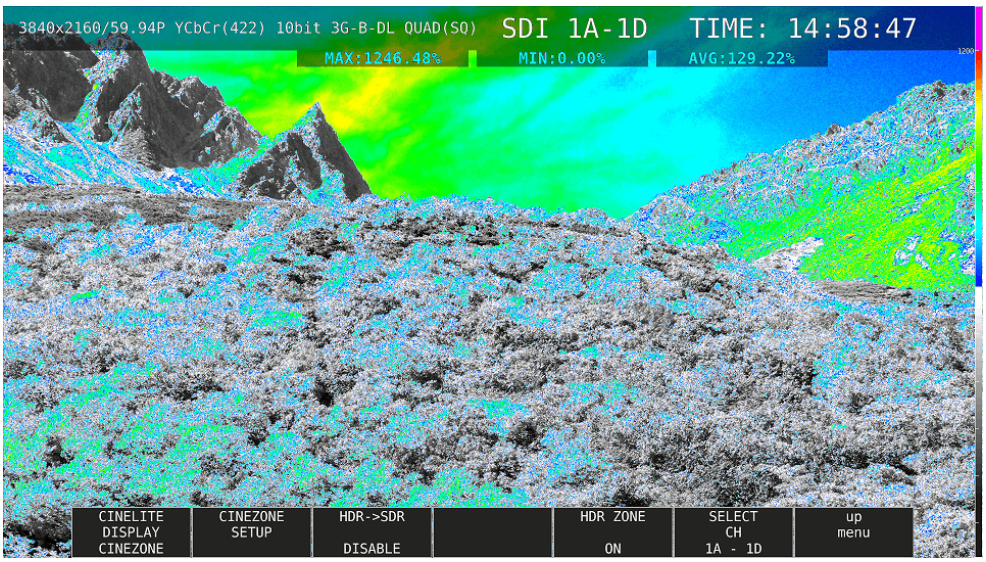


Figure 6-11 CINEZONE display

To set the display colors, follow the procedure below. If you set REF at boundary of the SDR area and HDR area, the SDR area can be displayed in monochrome and HDR area in color.

UPPER or higher:	magenta
REF or higher, UPPER or lower:	Gradation from blue to red
LOWER or higher, REF or lower:	monochrome
LOWER or lower:	black

Procedure

PIC → F•4 CINELITE/HDR → F•2 CINEZONE SETUP
→ F•2 UPPER
→ F•3 LOWER
→ F•4 REF

The values vary depending on the HDR tab settings as follows.
Set the values as percentages of the input video level. If F•5 BRIGHTNESS INFO is set to ON, HDR equivalent values are displayed in the upper left corner of the screen.

Table 6-2 Display color values

			Setting range	UPPER Default	LOWER Default	REF Default
HDR tab	HLG		0.0 to 100.0	100.0	0.0	50.0
	PQ	10000cd/m2	0.0 to 100.0	100.0	0.0	50.8
		4000cd/m2	0.0 to 100.0	90.0	0.0	50.8
		1000cd/m2	0.0 to 100.0	75.2	0.0	50.8
	S-Log3		3.5 to 109.4	100.0	3.5	61.0

7. AUDIO DISPLAY

To display audio, press AUDIO.

On the audio display, embedded audio signals applied to SDI INPUT and external audio signals applied to DIGITAL AUDIO INPUT can be measured. DIGITAL AUDIO INPUT can be used as output terminals by switching AUDIO IN/OUT in the system settings.

When measuring embedded audio, switching to simul mode enables SDI inputs A to D to be displayed in combination with the audio. (They can be displayed even if F•1 1A(2A) to F•4 1D(2D) on the INPUT menu are set to OFF.)

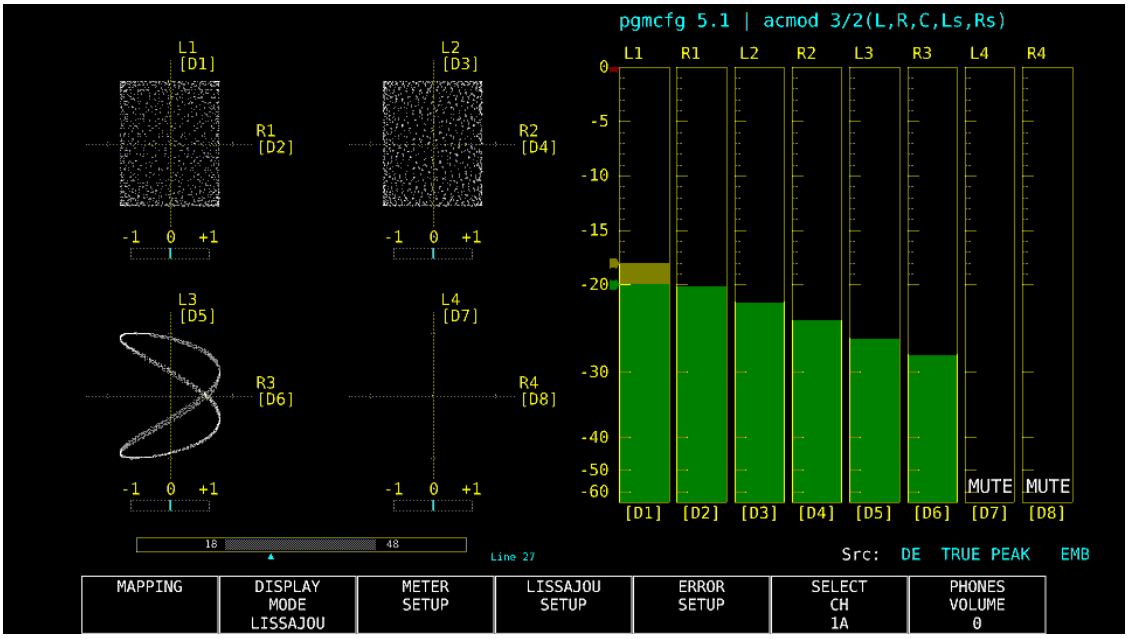


Figure 7-1 Audio display

- **Indicators (option)**

  During Dolby E measurement, set Dolby E LINE POSITION on the DOLBY SETTING tab to ON to display the frame location value with a line and ▲ below the Lissajous and surround displays. These are normally shown in cyan, but when the value exceeds the specified threshold, they turn red.

- **pgmcfg, acmod (option)**

  During Dolby measurement, the program configuration and audio configuration mode are displayed in the upper right of the screen.

- **Src**

  The Src line in the lower right of the display shows the following information in order from the left.

  Table 7-1 Src explanation

	Display	Description	Reference
1. Input signal display	AES	Dolby off	7.1
	DE	Dolby E (option)	
	DD	Dolby Digital (option)	
	DDP	Dolby Digital Plus (option)	
2. Meter response model display	TRUE PEAK / PPM(I) / PPM(II) / VU+TRUE / VU+PPM(I) / VU+PPM(II)	-	7.6.2
3. Measurement signal display	EMB	Embedded audio	7.1
	AES	External audio	

7.1 Setting the Signals to Measure

To set the signal to measure, follow the procedure below.
Here you can select input signals and assign channels.

Procedure

AUDIO → F•1 MAPPING

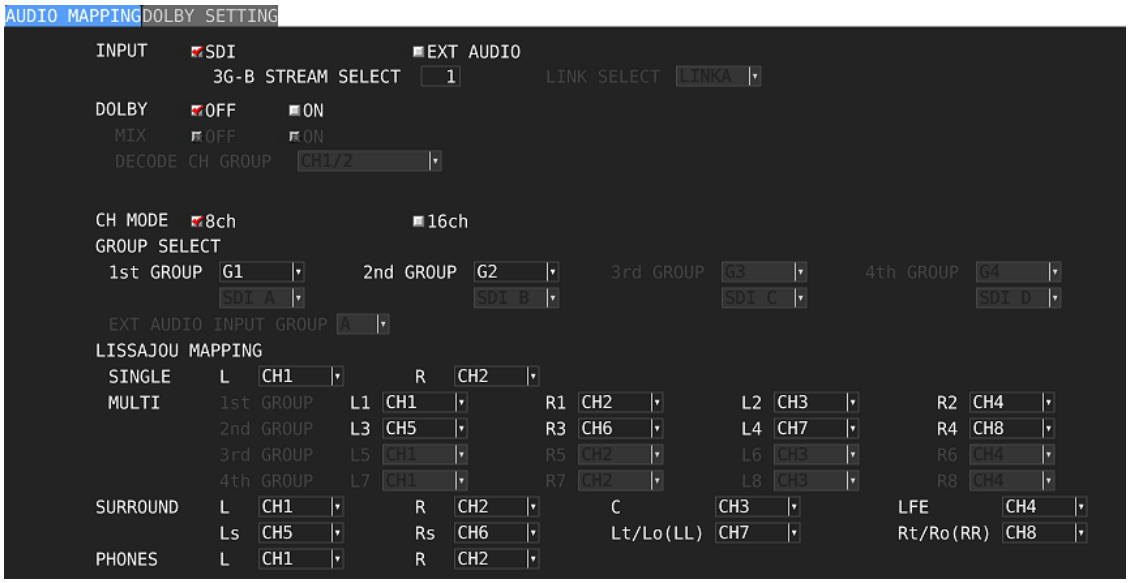


Figure 7-2 AUDIO MAPPING tab

Table 7-2 AUDIO MAPPING tab explanation

Item	Description
INPUT	Set the input signal to SDI or EXT AUDIO. If both Audio BNC settings are set to Output in the system settings, you cannot select EXT AUDIO. SDI: The embedded audio signal applied to SDI INPUT is measured. EXT AUDIO: The external audio signal applied to DIGITAL AUDIO INPUT is measured.
3G-B STREAM SELECT	If INPUT is set to SDI, select the 3G-B stream. This is invalid when the input signal is not 3G-B.
LINK SELECT	If INPUT is set to SDI and multi link or 12G is used, select the link.
DOLBY (option)	During single input mode, turn the Dolby signal measurement on or off. When turned on, Dolby E, Dolby Digital and Dolby Digital Plus are automatically detected and measured.
MIX (option)	When DOLBY is set to ON, turn mix mode on or off. For details, see the next section, “Mix mode.”
DECODE CH GROUP (option)	When DOLBY is set to ON, select the decode channel. If INPUT is set to SDI and MIX is set to OFF, CH9/10 to CH15/16 cannot be selected.
CH MODE	Select the number of measurement channels. If INPUT is set to EXT AUDIO and if either Audio BNC setting is set to Output in the system settings, you cannot select 16ch.

Item	Description
GROUP SELECT	Select the audio group. If INPUT is set to SDI in simul mode, also select the input channel. (G1: 1 to 4ch, G2: 5 to 8ch, G3: 9 to 12ch, G4: 13 to 16ch)
EXT AUDIO INPUT GROUP	If INPUT is set to EXT AUDIO and if both Audio BNC settings are set to Input in the system settings, select the input group.
LISSAJOU MAPPING	Assign channels from the audio group selected with GROUP SELECT and Lt and Rt (excluding some channels).
SURROUND	Assign channels from the audio group selected with GROUP SELECT.
PHONES	Assign channels from the audio group selected with GROUP SELECT and Lt and Rt (excluding some channels).

- **Mix mode**

  Mix mode is a feature that simultaneously displays the audio signal before decoding and the Dolby signal after decoding. The measurement signal varies as follows depending on the INPUT and MIX settings.

  - **When INPUT is set to SDI and MIX is set to OFF**

    Channels selected using DECODE CH GROUP are decoded and displayed as channels D1 to D8.

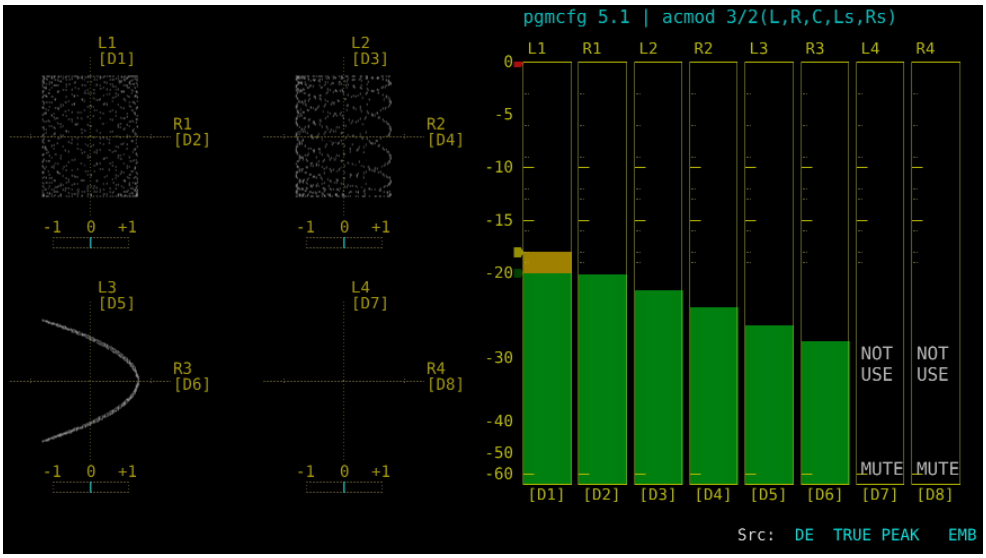


Figure 7-3 EMB Dolby display

- **When INPUT is set to SDI and MIX is set to ON**

  The left half shows the embedded audio signals of the channels selected with GROUP SELECT.
  The right half shows channels D1 to D8, which are the decoded signals of the channels selected using DECODE CH GROUP.

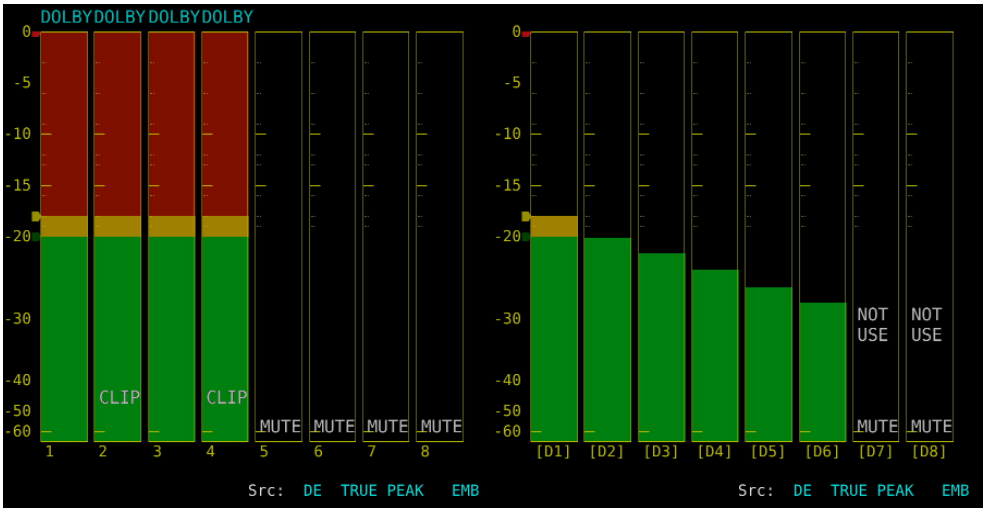


Figure 7-4 EMB Dolby display (MIX)

- **When INPUT is set to EXT AUDIO and MIX is set to OFF**

  Channels selected using DECODE CH GROUP are decoded and displayed as channels D1 to D8.

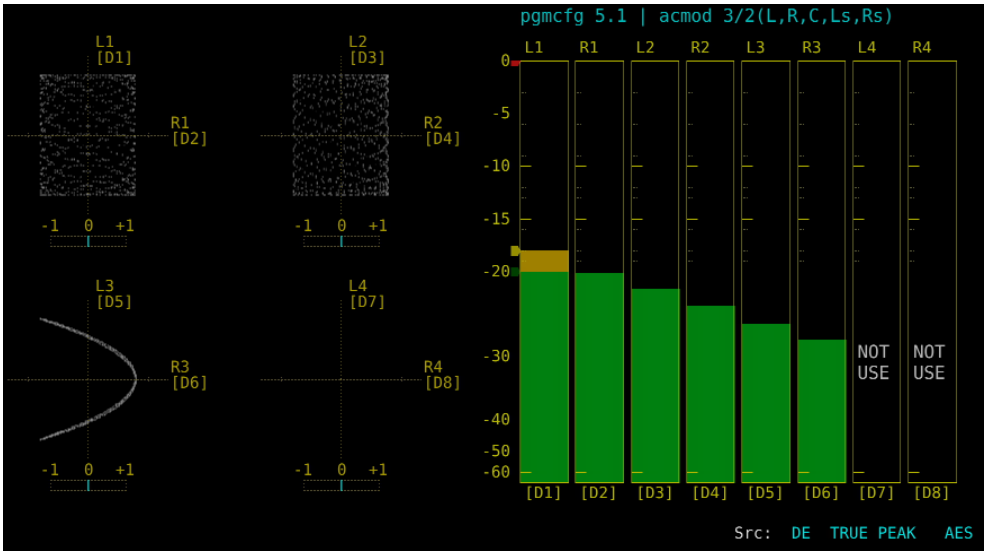


Figure 7-5 AES Dolby display

- **When INPUT is set to EXT AUDIO and MIX is set to ON**

  The left half shows the external audio signals of the group selected with EXT AUDIO INPUT GROUP.
  The right half shows channels D1 to D8, which are the decoded signals of the channels selected using DECODE CH GROUP.

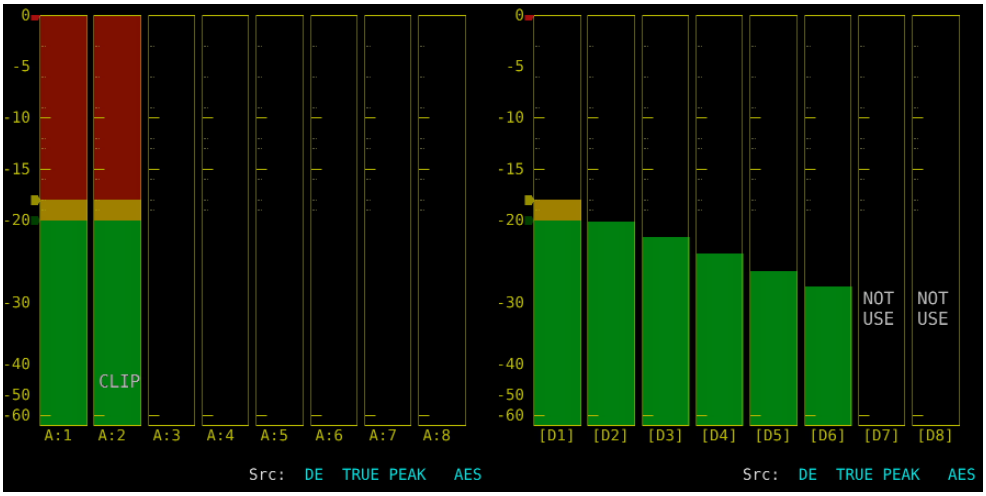


Figure 7-6 AES Dolby display (MIX)

7.2 Configuring the Dolby Settings (option)

When DOLBY is set to ON, to configure the Dolby settings, follow the procedure below.

Procedure

AUDIO → F•1 MAPPING → F•3 MAPPING

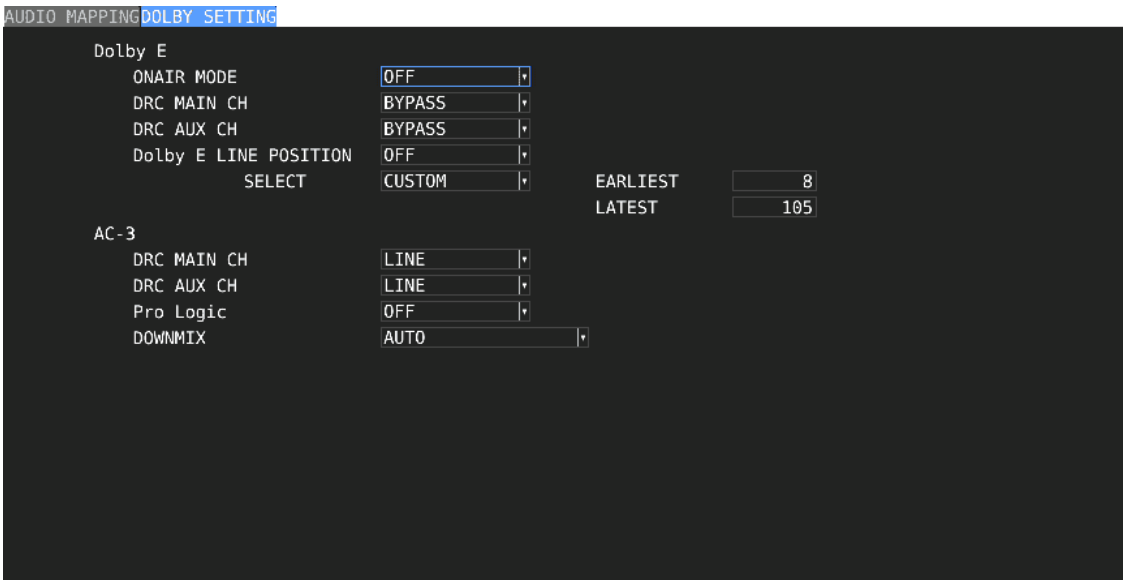


Figure 7-7 DOLBY SETTING tab

Table 7-3 DOLBY SETTING tab explanation

Item		Description
Dolby E	ONAIR MODE	Turn ONAIR MODE on or off.
	DRC MAIN CH	Select DRC.
	DRC AUX CH	Select auxiliary DRC.
	Dolby E LINE POSITION	Turns the frame location indicator display on and off.
	SELECT	Select the type of frame location threshold value. The lower limit (EARLIEST) and upper limit (LATEST) when VALID or IDEAL is selected automatically change depending on the format. If you select CUSTOM, you can specify a value between 8 and 105.
AC-3 (Dolby Digital)	DRC MAIN CH	Select DRC.
	DRC AUX CH	Select auxiliary DRC.
	Pro Logic	Turn Pro Logic II on or off.
	DOWNMIX	Select the downmix mode.

7.3 Selecting the Display Mode

To select the display mode, follow the procedure below.

Procedure

AUDIO → F•2 DISPLAY MODE: LISSAJOU / METER / SURROUND / STATUS

Settings

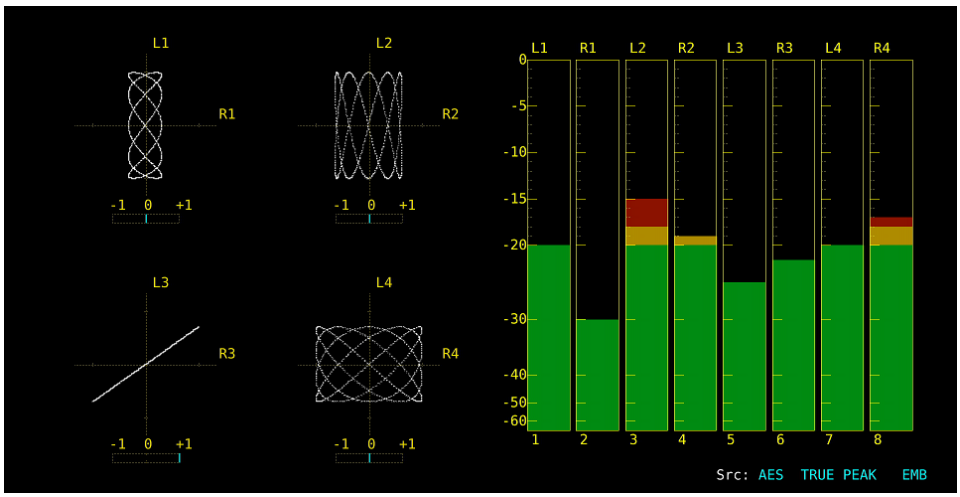
LISSAJOU: The Lissajous curves are displayed. During 8-channel measurement, audio meters are also displayed.

METER: The audio meters are displayed. This option cannot be selected during 8-channel measurement.

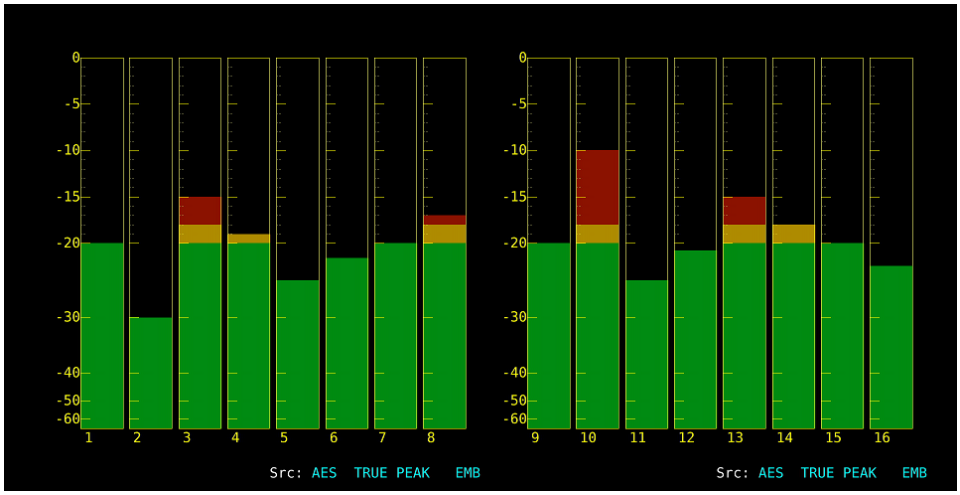
SURROUND: The surround display is shown on the left side of the screen, and the audio meter is displayed on the right side of the screen.
This option cannot be selected in simul mode when measuring 16 channels or embedded audio.

STATUS: The status is displayed. During 8-channel measurement, audio meters are also displayed.

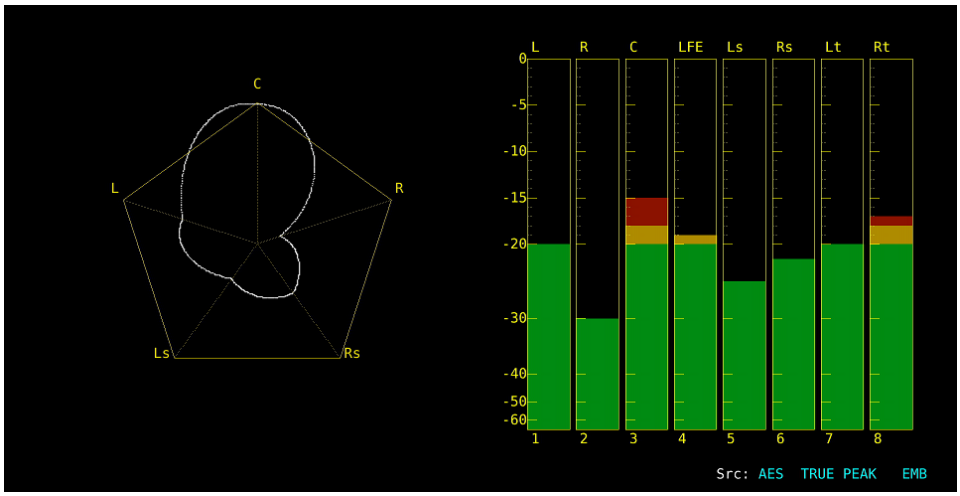
DISPLAY MODE = LISSAJOU



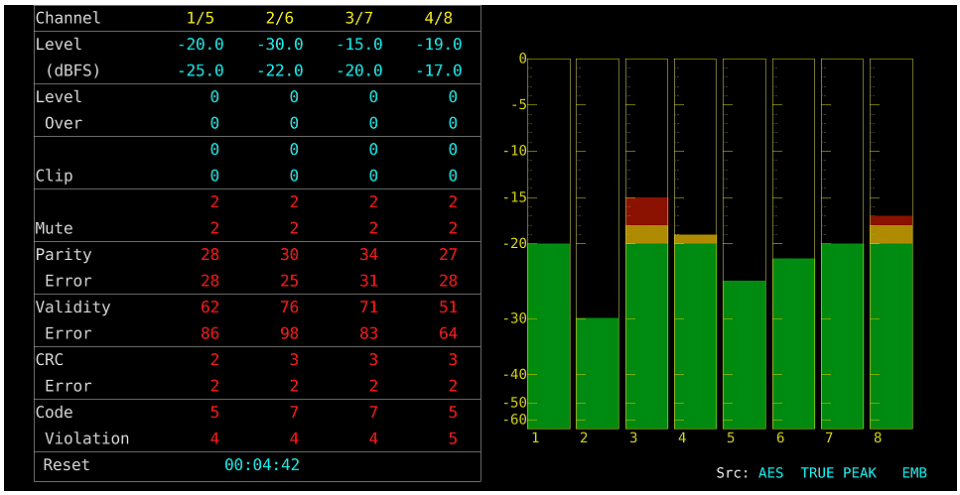
DISPLAY MODE = METER



DISPLAY MODE = SURROUND



DISPLAY MODE = STATUS



Channel	1/5	2/6	3/7	4/8
Level	-20.0	-30.0	-15.0	-19.0
(dBFS)	-25.0	-22.0	-20.0	-17.0
Level	0	0	0	0
Over	0	0	0	0
	0	0	0	0
Clip	0	0	0	0
	2	2	2	2
Mute	2	2	2	2
Parity	28	30	34	27
Error	28	25	31	28
Validity	62	76	71	51
Error	86	98	83	64
CRC	2	3	3	3
Error	2	2	2	2
Code	5	7	7	5
Violation	4	4	4	5
Reset	00:04:42			

Figure 7-8 Selecting the display mode

7.4 Configuring Error Detection Settings

To configure the error detection and meter display settings, follow the procedure below.

Procedure

AUDIO → F•5 ERROR SETUP

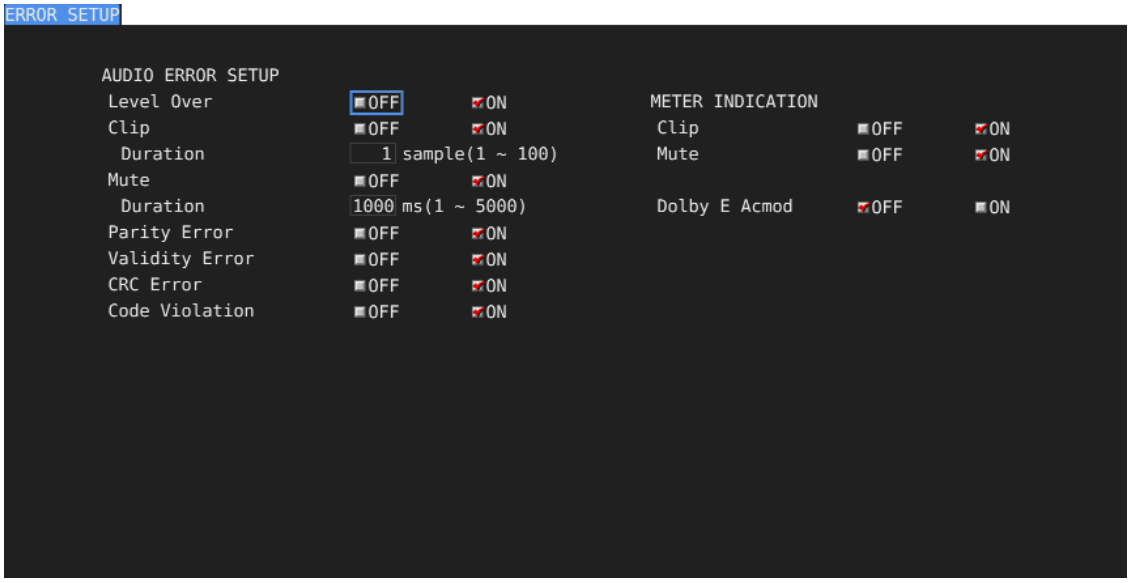


Figure 7-9 ERROR SETUP tab

Table 7-4 ERROR SETUP tab explanation

Item		Description
AUDIO ERROR SETUP		Turn the error detection on or off. When error detection is set to ON, the following actions are performed when an error occurs. • Counts errors on the status display • Displays errors in the event log of the status display
METER INDICATION	Clip	If Clip is set to ON, turn on or off the CLIP display that appears when errors occur.
	Mute	If Mute is set to ON, turn on or off the MUTE display that appears when errors occur.
	Dolby E Acmod (option)	During Dolby E measurement, turn on or off the NOT USE display that appears when LFEch is not used.

7.5 Adjusting the Volume

To adjust the headphone volume, follow the procedure below.
Press the function dial (F•D) to return the setting to its default value (0).

Procedure

AUDIO → F•7 PHONES VOLUME: 0 - 63

7.6 Meter Display

Meters are always displayed excluding the Lissajous display and status display during 16-channel management.
To configure meter display settings, press F•3 METER SETUP on the AUDIO menu.

AUDIO → F•3 METER SETUP →

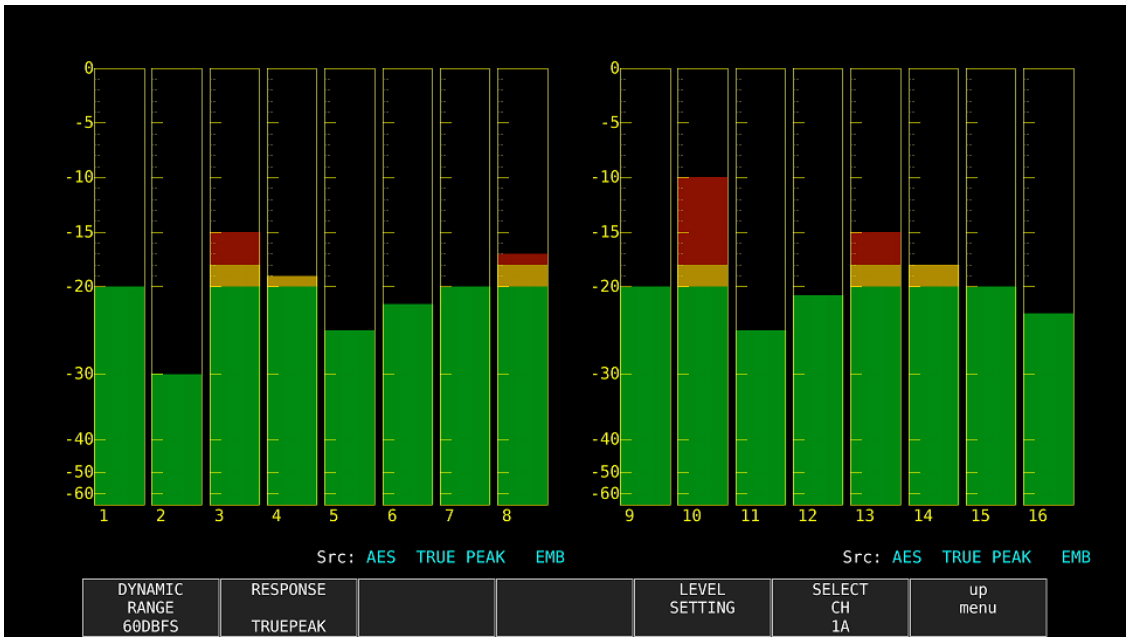


Figure 7-10 Meter display

7.6.1 Selecting the Scale

To select the meter's scale, follow the procedure below.

Procedure

AUDIO → F•3 METER SETUP → F•1 DYNAMIC RANGE: 60DBFS / 90DBFS / MAG

Settings

60DBFS:	The meter's scale is set to -60 to 0 (dBFS).
90DBFS:	The meter's scale is set to -90 to 0 (dBFS).
MAG:	The meter's scale is set to the level specified by F•5 LEVEL SETTING → F•3 REF dBFS ±3 dB.

7.6.2 Selecting the Response Model

To select the meter's response model, follow the procedure below. The selected response model is indicated in the lower right of the screen.

Procedure

AUDIO → F•3 METER SETUP
→ F•2 RESPONSE: TRUEPEAK / PPM / VU
→ F•3 PPM MODE: PPM(I) / PPM(II) (for PPM)
→ F•3 PEAK METER: TRUE / PPM(I) / PPM(II) (for VU)

The response model details are shown in the following table.

Table 7-5 Response model settings

F•2 RESPONSE	F•3 PPM MODE / F•3 PEAK METER	Display	Delay time (*1)	Return time (*2)	Average time
TRUEPEAK	-	TRUE PEAK	0 msec	1.7 sec	-
PPM	PPM(I)	PPM(I)	10 msec	1.7 sec	-
	PPM(II)	PPM(II)	10 msec	2.8 sec	-
VU	TRUE	VU+TRUE	-	-	300 msec
	PPM(I)	VU+PPM(I)	-	-	300 msec
	PPM(II)	VU+PPM(II)	-	-	300 msec

*1 The amount of time it takes for the meter to show -20 dBFS when a -20 dBFS/1 kHz sine-wave signal is applied with no input preceding it.

*2 The amount of time it takes for the meter to show -40 dBFS when a -20 dBFS/1 kHz sine-wave signal is removed from the input.

7.6.3 Setting the Peak Hold

When F•2 RESPONSE is set to VU, to set the peak hold time, follow the procedure below.
The unit is seconds. You can set the value in 0.5-second steps.
Press the function dial (F•D) to return the setting to its default value (0.5).

Procedure

AUDIO → F•3 METER SETUP → F•4 PEAK HOLD: 0.0 - 0.5 - 5.0 / HOLD

7.6.4 Setting the Reference Level

To set the reference level, press F•5 LEVEL SETTING on the METER SETUP menu.

AUDIO → F•3 METER SETUP → F•5 LEVEL SETTING →

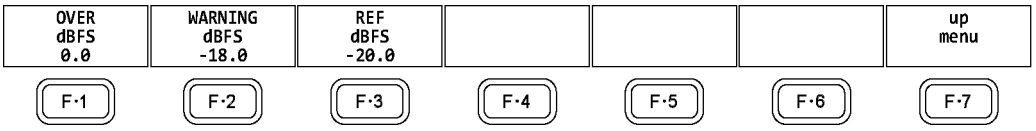


Figure 7-11 LEVEL SETTING menu

To set the meter reference level, follow the procedure below.

OVER dBFS: Set the threshold level for audio level errors.

WARNING dBFS: The portion of the meter that exceeds the level specified here is displayed in red. The portion of the meter below this level is displayed in yellow.

REF dBFS: The portion of the meter that exceeds the level specified here is displayed in yellow. The portion of the meter below this level is displayed in green.

Procedure

AUDIO → F•3 METER SETUP → F•5 LEVEL SETTING
→ F•1 OVER dBFS: -40.0 - 0.0
→ F•2 WARNING dBFS: -40.0 - -18.0 - 0.0
→ F•3 REF dBFS: -40.0 - -20.0 - 0.0

7.7 Lissajous Display

To display Lissajous curves, set F•2 DISPLAY MODE on the AUDIO menu to LISSAJOU. To configure the Lissajous display settings, press F•4 LISSAJOU SETUP. This setting is available when F•2 DISPLAY MODE is set to LISSAJOU.

AUDIO → set F•2 DISPLAY MODE to LISSAJOU → F•4 LISSAJOU SETUP →

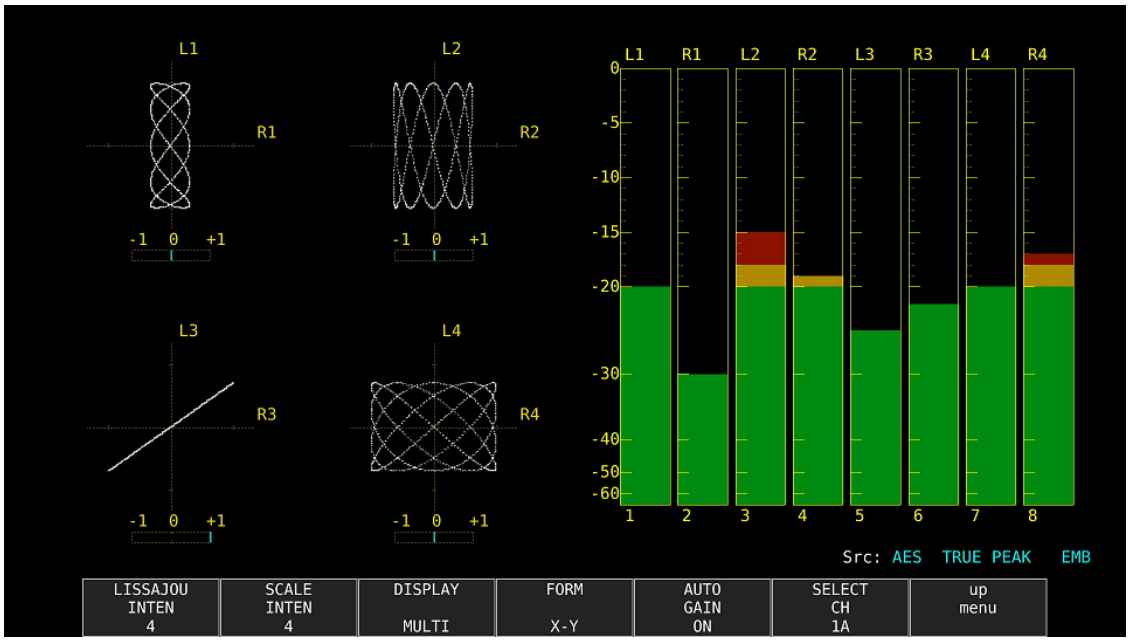


Figure 7-12 Lissajous display

- **Correlation Meter**

  The correlation meter indicates the phase difference between the two signals. A reading of +1 indicates that the signals are in-phase, a reading of -1 indicates that the signals are 180 ° out of phase, and a reading of 0 indicates that the signals are not correlated.

7.7.1 Adjusting the Lissajous Curve Intensity

To set the Lissajous curve intensity, follow the procedure below.
Press the function dial (F•D) to return the setting to its default value (0).

Procedure

AUDIO → F•4 LISSAJOU SETUP → F•1 LISSAJOU INTEN: -8 - 0 - 7

7.7.2 Adjusting the Scale Intensity

To adjust the intensity of the Lissajous and meter scales, follow the procedure below.
Press the function dial (F•D) to return the setting to its default value (4).

Procedure

AUDIO → F•4 LISSAJOU SETUP → F•2 SCALE INTEN: -8 - 4 - 7

7.7.3 Selecting the Lissajous Curve Display Format

To select the Lissajous curve display format, follow the procedure below.

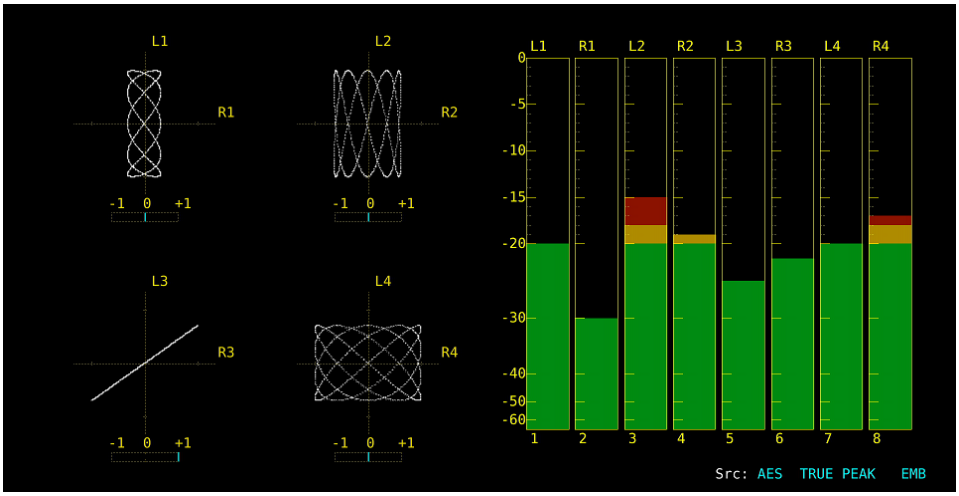
Procedure

AUDIO → F•4 LISSAJOU SETUP → F•3 DISPLAY: MULTI / SINGLE

Settings

MULTI:	Eight channels of Lissajous waveforms and eight channels of audio meters are displayed or 16 channels of Lissajous waveforms are displayed.
SINGLE:	Two channels of Lissajous waveforms and eight channels of audio meters are displayed. This option cannot be selected in simul mode or 16-channel measurement.

DISPLAY = MULTI



DISPLAY = SINGLE

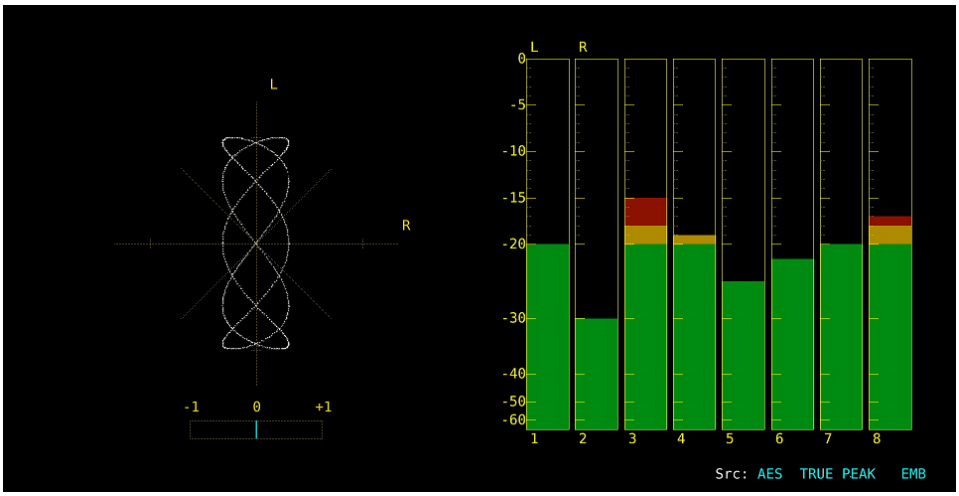


Figure 7-13 Selecting the Lissajous curve display format

7.7.4 Selecting the Scale Display Format

To select the scale display format, follow the procedure below.

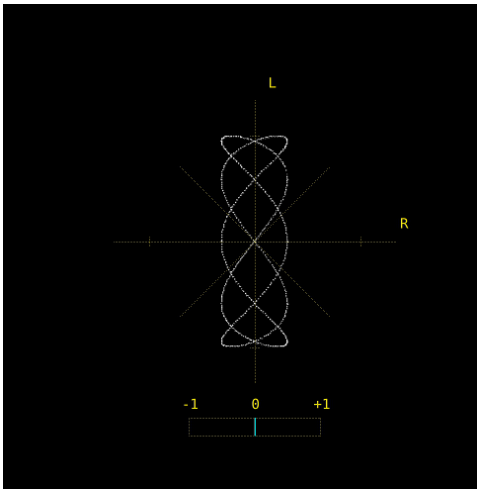
Procedure

AUDIO → F•4 LISSAJOU SETUP → F•4 FORM: X-Y / MATRIX

Settings

X-Y:	R is assigned to the X-axis (horizontal), and L is assigned to the Y-axis (vertical).
MATRIX:	The R and L axes are positioned at 45 ° angles to the X and Y axes.

FORM = X-Y



FORM = MATRIX

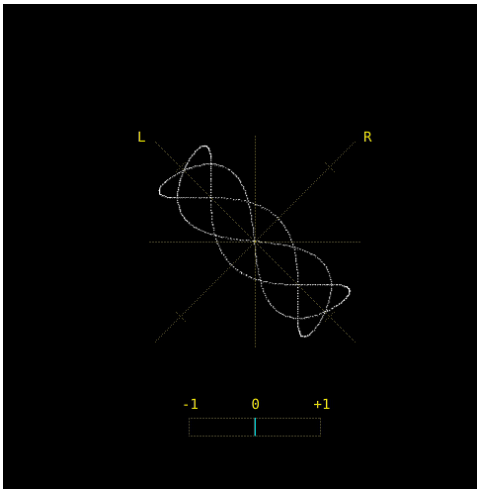


Figure 7-14 Selecting the scale display format

7.7.5 Setting the Lissajous Curve Gain

To select the Lissajous curve gain, follow the procedure below.

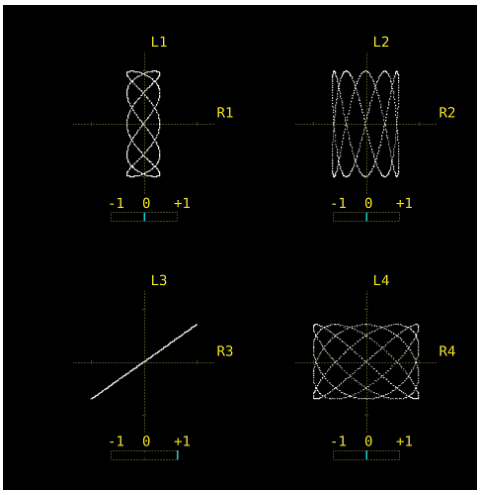
Procedure

AUDIO → F•4 LISSAJOU SETUP → F•5 AUTO GAIN: ON / OFF

Settings

ON:	The gain is automatically adjusted so that the waveform fits the scale.
OFF:	The waveform is displayed with a fixed gain.

AUTO GAIN = ON



AUTO GAIN = OFF

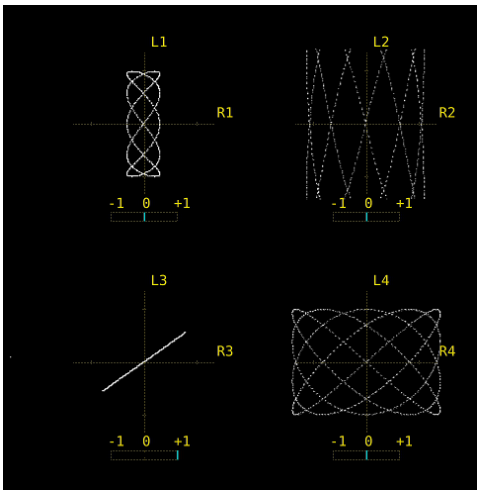


Figure 7-15 Setting the Lissajous curve gain

7.8 Surround Display

To show the surround display, set F•2 DISPLAY MODE on the AUDIO menu to SURROUND. To configure the surround display settings, press F•4 SURROUND SETUP. This setting is available when F•2 DISPLAY MODE is set to SURROUND.

AUDIO → set F•2 DISPLAY MODE to SURROUND → F•4 SURROUND SETUP →

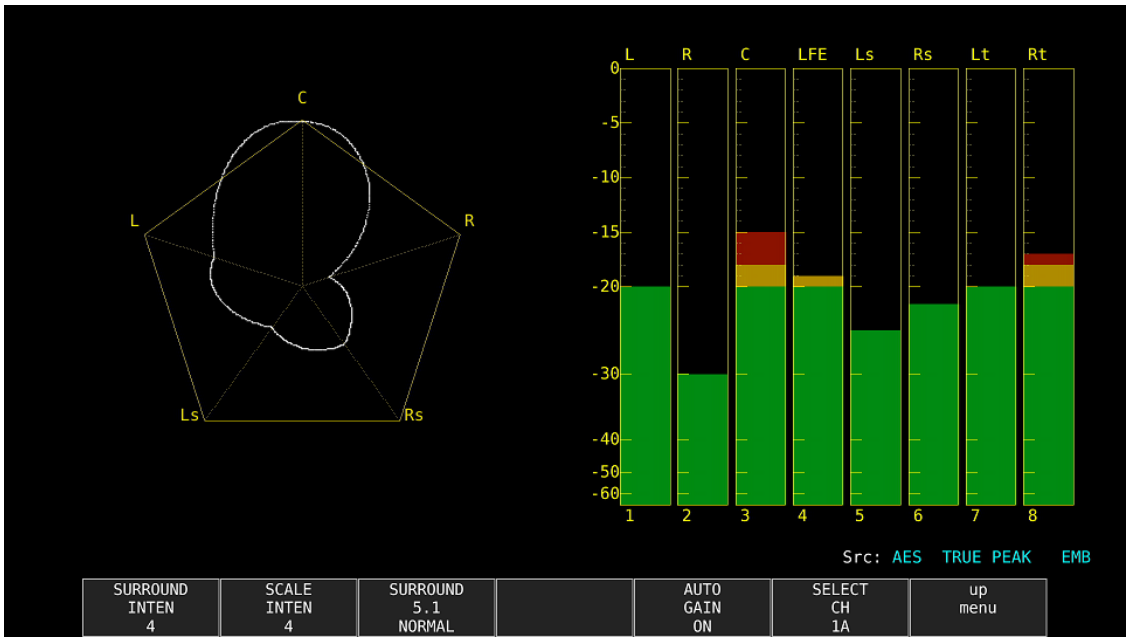


Figure 7-16 Surround display

7.8.1 Adjusting the Surround Waveform Intensity

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

Procedure

AUDIO → F•4 SURROUND SETUP → F•1 SURROUND INTEN: -8 - 4 - 7

7.8.2 Adjusting the Scale Intensity

To adjust the intensity of the surround and meter scales, follow the procedure below.
Press the function dial (F•D) to return the setting to its default value (4).

Procedure

AUDIO → F•4 SURROUND SETUP → F•2 SCALE INTEN: -8 - 4 - 7

7.8.3 Selecting the Surround Display Format

To select the surround display format, follow the procedure below.

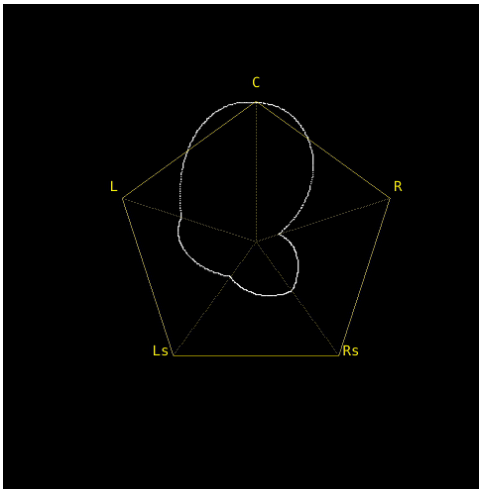
Procedure

AUDIO → F•4 SURROUND SETUP → F•3 SURROUND 5.1: NORMAL / PHANTOM

Settings

NORMAL:	A waveform that combines Lch, Rch, Lsch, Rsch, and Cch (hard center) is displayed.
PHANTOM:	A waveform that combines Lch, Rch, Lsch, Rsch, and phantom center and a Cch (hard center) waveform are displayed separately.

SURROUND 5.1 = NORMAL



SURROUND 5.1 = PHANTOM

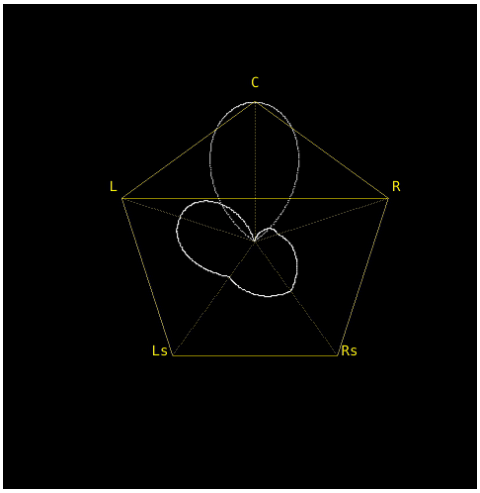


Figure 7-17 Selecting the surround display format

7.8.4 Setting the Surround Waveform Gain

To select the surround waveform gain, follow the procedure below.

Procedure

AUDIO → F•4 SURROUND SETUP → F•5 AUTO GAIN: ON / OFF

Settings

ON:	The gain is automatically adjusted so that the waveform fits the scale.
OFF:	The waveform is displayed with a fixed gain.

7.9 Status Display

To show the status display, set F•2 DISPLAY MODE on the AUDIO menu to STATUS.
To configure the status display settings, press F•4 STATUS SETUP. This setting is available when F•2 DISPLAY MODE is set to STATUS.

AUDIO → set F•2 DISPLAY MODE to STATUS → F•4 STATUS SETUP →

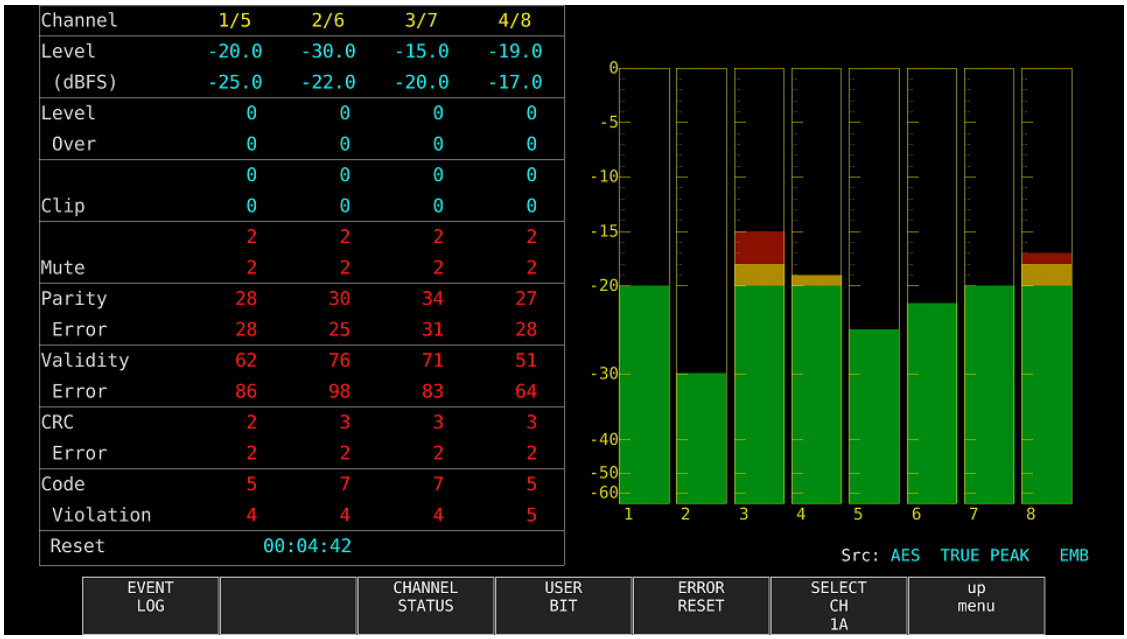


Figure 7-18 Status display

7.9.1 Status Display Explanation

On the status display, the levels and the number of detected errors are displayed for the selected channels (up to 9999). Errors are only detected for the items that have been set to ON in section 7.4, “Configuring Error Detection Settings.”

- **Channel**

  Displays audio channels. Each item below this item is displayed in two lines. The top line corresponds to the channel to the left of the slash, and the bottom line corresponds to the channel to the right of the slash.

- **Level (dBFS)**

  Display audio levels numerically.

- **Level Over**

  Displays the number of times the level is greater than equal to the OVER dBFS value set in section 7.6.4, “Setting the Reference Level.”

- **Clip**

  Displays the number of times that a received signal exceeds the maximum signal value for the number of consecutive samples specified in section 7.4, “Configuring Error Detection Settings.”

- **Mute**

  Displays the number of times that a mute signal exceeding the duration specified in section 7.4, “Configuring Error Detection Settings” is received.

- **Parity Error**

  Counts the number of times that the input signal’s parity bit and the recalculated parity bit differ.

- **Validity Error**

  Counts the number of times that the input signal’s validity bit is 1.

- **CRC Error**

  Counts the number of times that the CRC of the channel status bits and the calculated CRC are different.

- **Code Violation**

  Counts the number of times that the state of the input signal’s biphase modulation is abnormal.

- **Reset**

  The time that has elapsed since F•6 ERROR RESET was pressed is displayed here.

In Dolby signal measurements, Frame Location (header position and mode) is displayed in addition to the number of detected errors. During external digital audio measurements, H and mode are not displayed.

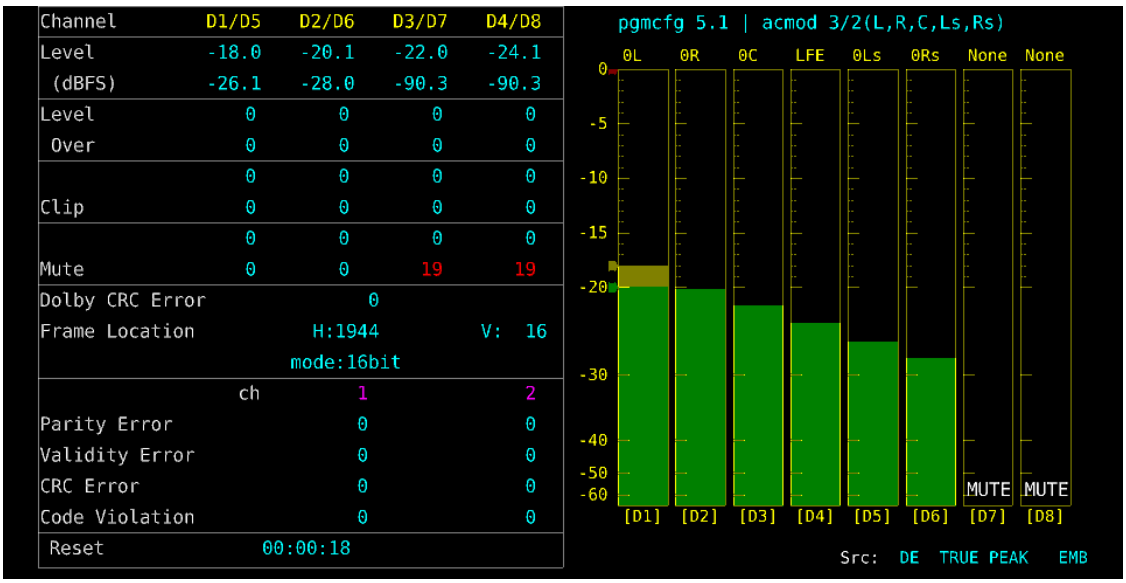


Figure 7-19 Status display (Dolby E)

7.9.2 Event Log Display

To view the event log, follow the procedure below.
This screen is the same as the event log screen of the status display. For details, see section 8.4, “Configuring Event Log Settings.”

Procedure

AUDIO → F•4 STATUS SETUP → F•1 EVENT LOG

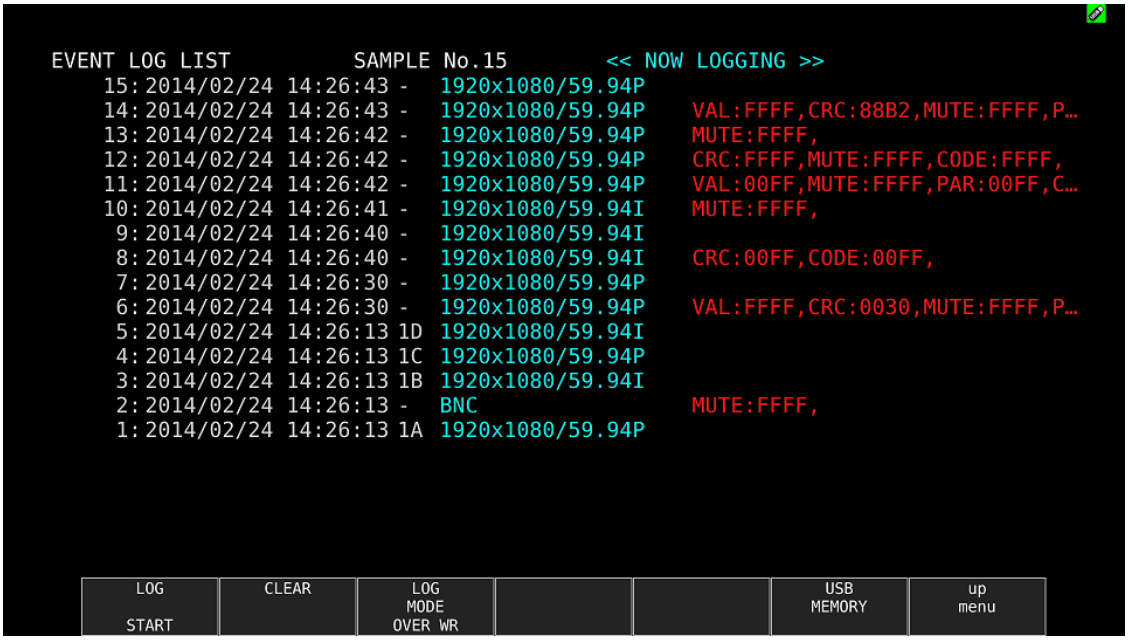


Figure 7-20 Event log

7.9.3 Metadata Display (Option)

- **Dolby E Metadata Display**

  During Dolby E measurement, to view the metadata of the selected program number, follow the procedure below. To select the program number, press F•1 DOLBY PROGRAM.

Procedure

AUDIO → F•4 STATUS SETUP → F•2 METADATA → F•1 DOLBY E METADATA

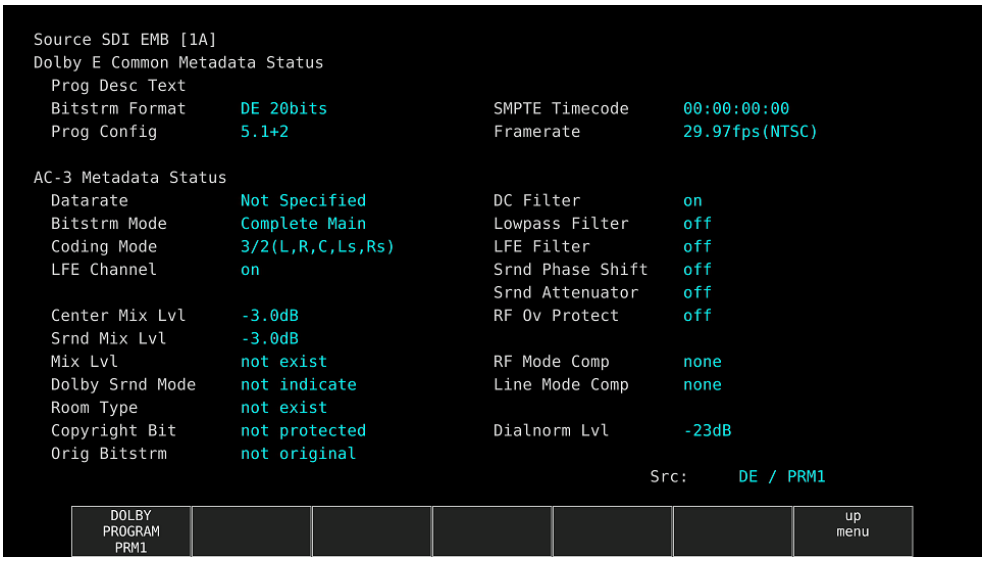


Figure 7-21 Dolby E metadata display

- **Dolby E EBI Metadata Display**

  During Dolby E measurement, to view the EBI (Extended Bitstream Info) metadata of the selected program number, follow the procedure below. To select the program number, press F•1 DISPLAY PROGRAM.

Procedure

AUDIO → F•4 STATUS SETUP → F•2 METADATA → F•2 EBI METADATA

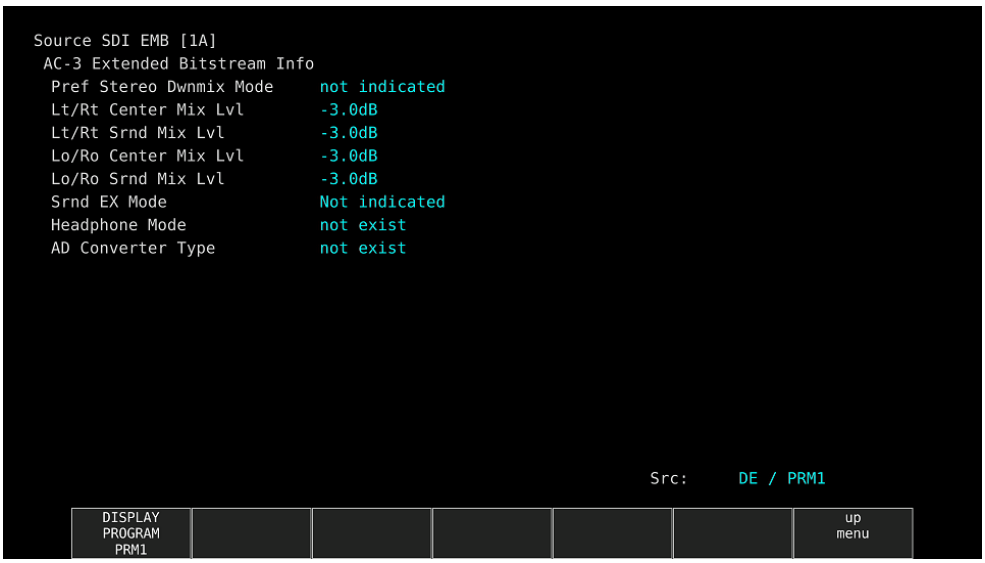


Figure 7-22 Dolby E EBI metadata display

- **Dolby Digital Metadata Display**

  During Dolby Digital measurement, to view the metadata, follow the procedure below.

Procedure

AUDIO → F•4 STATUS SETUP → F•2 METADATA → F•1 DOLBY D METADATA

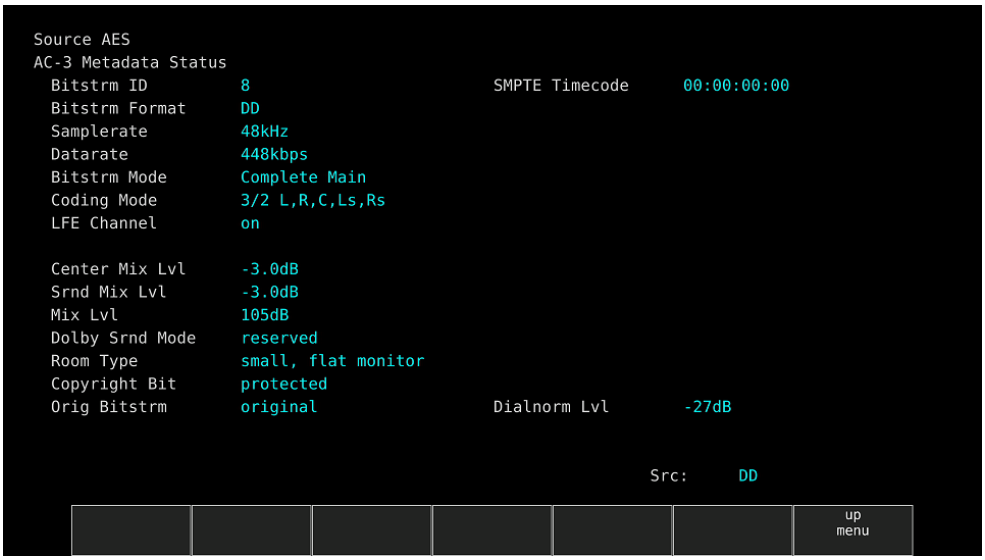


Figure 7-23 Dolby Digital metadata display

- **Dolby Digital EBI Metadata Display**

  During Dolby Digital measurement, to view the EBI (Extended Bitstream Info) metadata, follow the procedure below.

Procedure

AUDIO → F•4 STATUS SETUP → F•2 METADATA → F•2 EBI METADATA

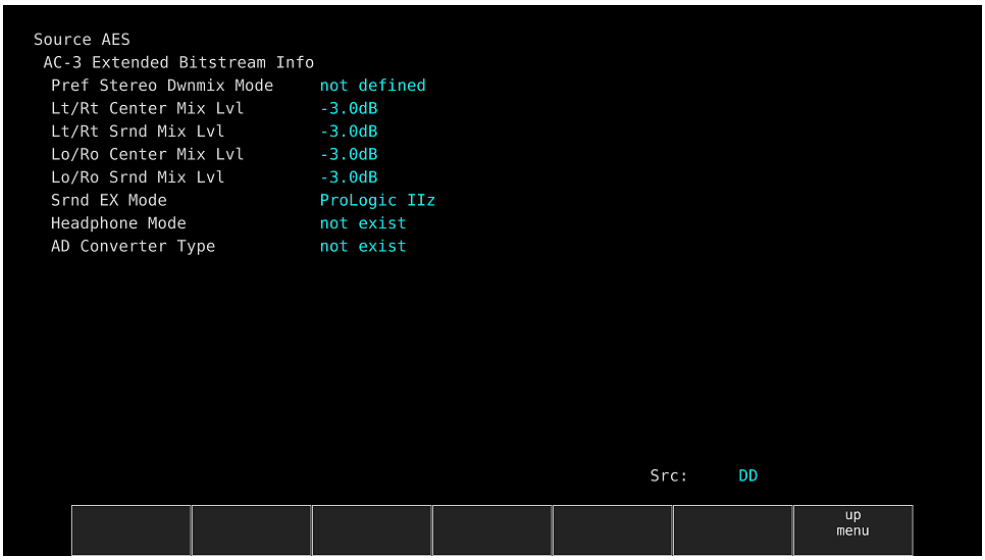


Figure 7-24 Dolby Digital EBI metadata display

- **Dolby Digital Plus Metadata Display**

  During Dolby Digital Plus measurement, to view the metadata, follow the procedure below.

Procedure

AUDIO → F•4 STATUS SETUP → F•2 METADATA → F•1 DOLBY D+ METADATA

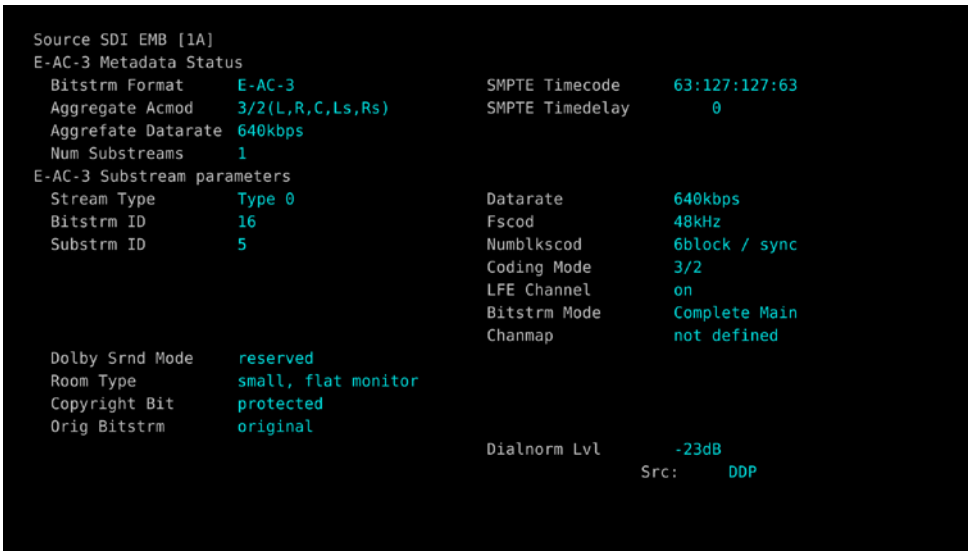


Figure 7-25 Dolby Digital Plus metadata display

- **Dolby Digital Plus EBI Metadata Display**

  During Dolby Digital Plus measurement, to view the EBI (Extended Bitstream Info) metadata, follow the procedure below.

Procedure

AUDIO → F•4 STATUS SETUP → F•2 METADATA → F•2 EBI METADATA

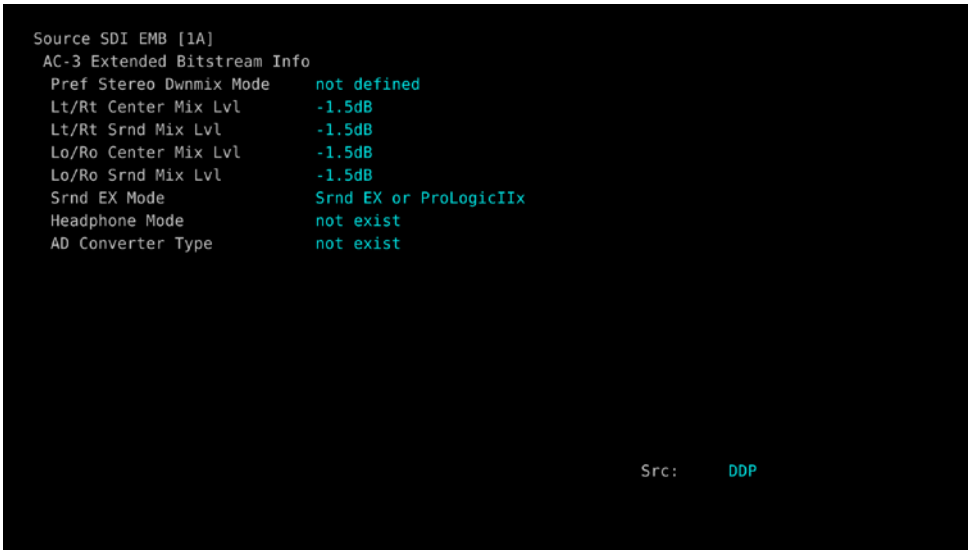


Figure 7-26 Dolby Digital Plus EBI metadata display

7.9.4 Displaying the Channel Status

To display the status of the selected channel, follow the procedure below.
Use F•1 DISPLAY CHANNEL to select the channel. You can also use F•2 ALIGN to select the bit order.

Procedure

AUDIO → F•4 STATUS SETUP → F•3 CHANNEL STATUS

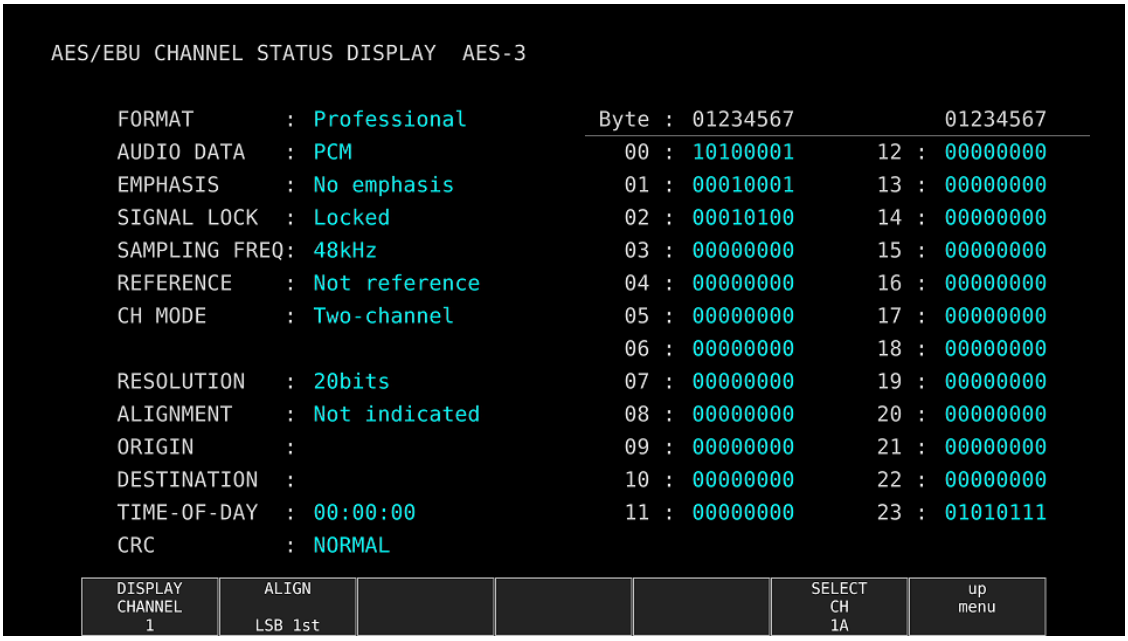


Figure 7-27 Channel status display

7.9.5 Displaying User Bits

To display the user bits of the selected channel, follow the procedure below.
Use F•1 DISPLAY CHANNEL to select the channel. You can also use F•2 ALIGN to select the bit order.

Procedure

AUDIO → F•4 STATUS SETUP → F•4 USER BIT

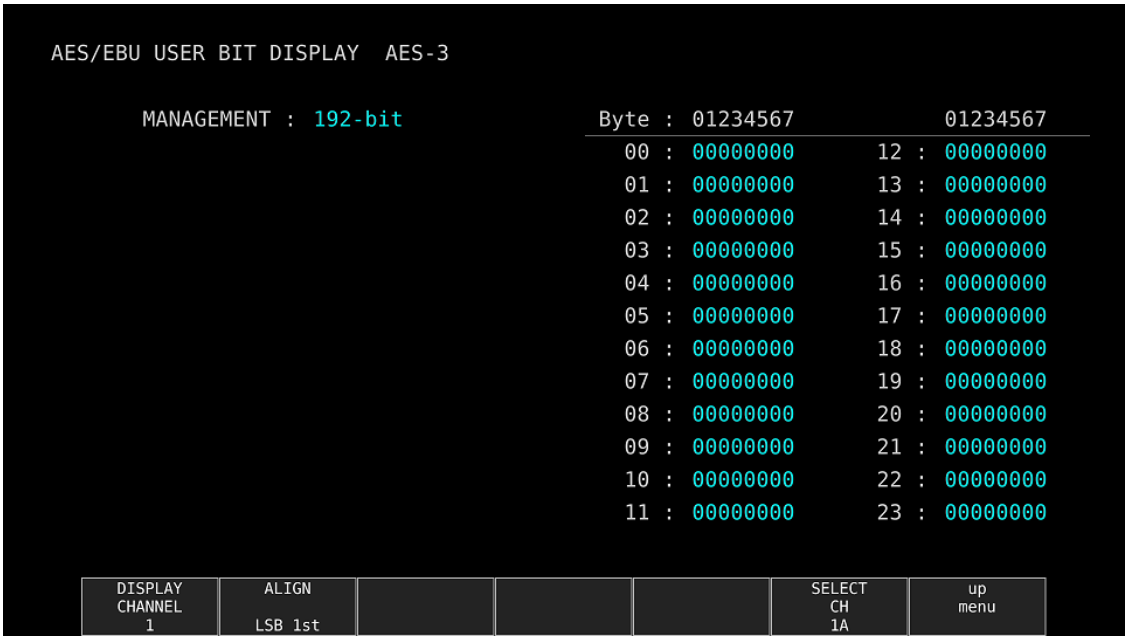


Figure 7-28 User bit display

7.9.6 Resetting Errors

To reset the error counts that appear on the audio status display to 0, follow the procedure below. Also, the Reset indication at the lower left of the screen will be reset to 00:00:00.

Procedure

AUDIO → F•4 STATUS SETUP → F•5 ERROR RESET

8. STATUS DISPLAY

To display the status, press STATUS.

If on the SDI IN tab in the system settings, SDI System is set to 4K NMI or NMI, pressing STATUS displays the IP (NMI) status.

Reference Section 8.10, “IP(NMI) Status Screen Explanation (SER08)”

To return to the normal status display from IP (NMI) status, press F•1 STATUS. To return to the IP (NMI) status again, press F•2 SDI ANALYSIS and then F•3 NMI INFO.

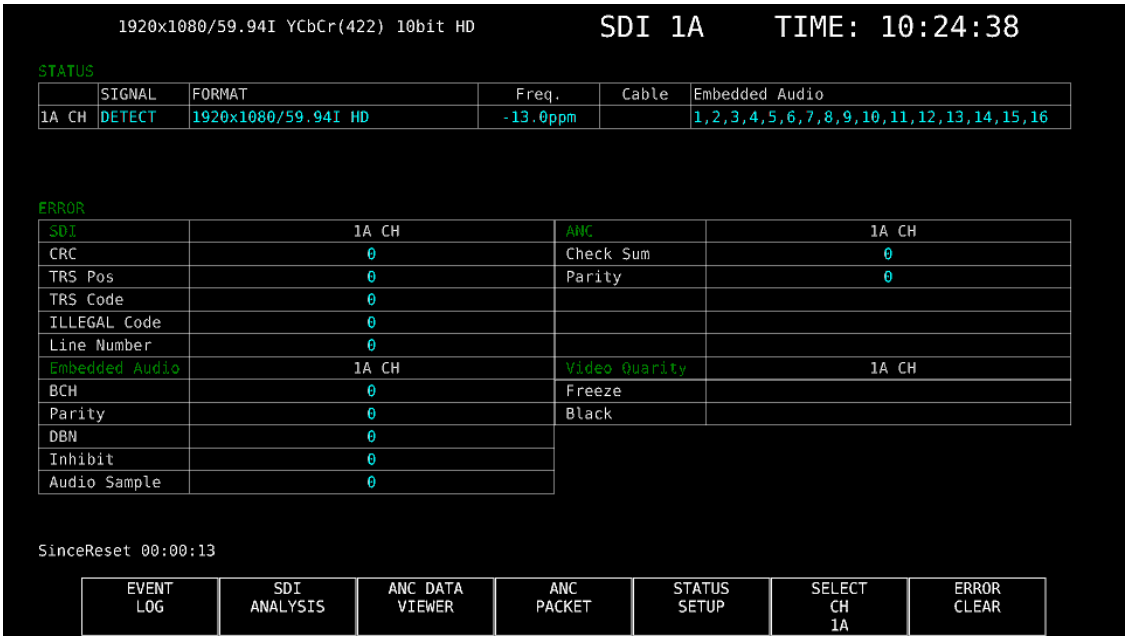


Figure 8-1 Status display

8.1 Status Screen Explanation

- **SIGNAL**

  If the LV 5490SER01 or LV 5490SER02 is receiving an SDI signal, “DETECT” is displayed. Otherwise, “NO SIGNAL” is displayed.
  If “NO SIGNAL” is displayed, the following items are not displayed.

- **FORMAT/SUB IMAGE FORMAT**

  The input signal format is indicated here. It is normally displayed in light blue, but if the input is not appropriate, it turns red.

- **Freq**

  The sampling frequency deviation is displayed.
  Normally, this is displayed in light blue. If Frequency Error on the ERROR SETUP1 tab is set to ON, the color changes to red when ±10 ppm is exceeded.
  The display range is “<-100 ppm, -100 to +100 ppm, >+100 ppm,” and the accuracy is ±2 ppm.

  Reference ERROR SETUP1 tab → section 8.2.1, “Error Setup 1”

- **Cable (1A to 1D on the SER01/SER02 only)**

  The input signal attenuation is converted into a cable length that you selected and displayed.
  Normally the value is displayed in light blue, but by setting Cable Error on the ERROR SETUP1 tab to ON, if the value exceeds the specified Warning value, it will change to yellow. If the value exceeds the Error value, it will change to red.
  The display range is shown below. The accuracy is ±20 m.

  3G: < 10 m, 10 to 105 m, > 105 m (5 m steps)
  HD: < 5 m, 5 to 130 m, > 130 m (5 m steps)
  SD: < 50 m, 50 to 300 m, > 300 m (5 m steps)

  Reference ERROR SETUP1 tab → section 8.2.1, “Error Setup 1”

- **Embedded Audio**

  The channels of the audio packets embedded in the input signal are displayed here.
  If the input signal is 3G-B-DL, only stream 1 is displayed. (When measuring 3G-B-DS, stream 2 is also displayed.)

- **ERROR**

  The counts of the errors for the items whose detection setting was set to ON with F•5 STATUS SETUP are displayed here. Errors are counted once per second or once per field.
  The maximum number of errors that can be counted is 999999.
  Switching video formats or input channels may cause disturbances in the signal that will cause errors to be detected.

  - **CRC (Other than SD)**

    An error is counted when the CRC embedded in the input signal is different from the CRC that the LV 5490 detects.

  - **EDH (SD only)**

    An error is counted when the EDH packet contains an ancillary data error flag, an active picture error flag, or a full-field error flag and when the CRC in the EDH packet is different from the CRC that the LV 5490 calculates from the video data.

  - **TRS Pos**

    Input signal TRS (Timing Reference Signal) errors are displayed here.
    An error is counted when the EAV (End of Active Video) and SAV (Start of Active Video) header word (3FFh, 000h, and 000h) locations are wrong and when the F, V, and H TRS protection bits do not conform to the video standard.

  - **TRS Code**

    Input signal TRS (Timing Reference Signal) protection bit errors are displayed here.
    An error is counted when the F, V, and H protection bits in the XYZ word in the EAV (End of Active Video) and SAV (Start of Active Video) packets and the response to the P3, P2, P1, and P0 error correction flags do not conform to the video standard.

- **ILLEGAL Code**

  An error is counted when the input signal data falls within the timing reference signal (TRS) range or 000h to 003h and 3FCh to 3FFh are detected in the data other than those specified by the ancillary data flag (ADF).
  In SDI signals, 10-bit levels 000h through 003h and 3FCh through 3FFh are reserved for the timing reference signal and the ancillary data flag, so they cannot be used for video signal data or ancillary data. When data other than TRS and ADF data is found in these bits, an error is counted.

- **Line Number (Other than SD)**

  An error is counted when the line number that is embedded in the input signal does not match the line number that has been counted by the LV 5490.

- **Check Sum**

  The LV 5490 uses the checksum in the input signal's ancillary data header to count errors.

- **Parity**

  The LV 5490 uses the parity bit in the input signal's ancillary data header to count errors.

- **BCH (Other than SD)**

  Errors in the BCH code in the input signal's embedded audio are displayed here.

- **Parity (Other than SD)**

  Parity errors in the input signal's embedded audio are displayed here.

- **DBN**

  Continuity errors in the input signal's embedded audio are displayed here.
  Embedded audio packets contain data block number (DBN) words that indicate the packet's continuity. Packets are cyclically numbered from 1 to 255. An error is counted when a packet's DBN is out of sequence.

- **Inhibit**

  An error is counted when embedded audio packets are found in lines where they should not be embedded.
  The embedding inhibit lines are as follows.
  However, for 3G-B-DL 60p, 59.94p, 50p, 48p, and 47.95p, the transmission scanning mode is interlace.

Table 8-1 Embedding Inhibit Lines

Format		Transmission Scanning Mode	
		Progressive	Interlace
HD/3G	1280×720	Line 8	-
	1920×1080	Line 8	Lines 8, 570
SD	720×487	-	Lines 11, 274
	720×576	-	Lines 7, 320

- **Audio Sample**

  An error is counted when audio that is asynchronous to the video is embedded. For the video and audio to be synchronized, there is a specific number of audio data samples that need to be embedded in a given number of video frames. If this rule is not met, it is considered an error.

- **Freeze**

  An error is counted when the video data is the same between video frames. Specify an area of the video to use for detection and the number of continuous frames that is required for the condition to be detected as an error.
  Video data is compared using checksums.

- **Black**

  An error is counted when the video luminance level is less than the specified value.
  Set the luminance level for detecting error pixels, the ratio of error pixels in a frame, and the number of continuous frames that is required for the condition to be detected as an error.

- **Gamut**

  Gamut errors are counted.
  Set the upper and lower limits for detecting errors, the ratio of error pixels in a frame, and the number of continuous frames that is required for the condition to be detected as an error.

- **Comp Gamut**

  Composite gamut errors are counted.
  Set the upper and lower limits for detecting errors, the ratio of error pixels in a frame, and the number of continuous frames that is required for the condition to be detected as an error.

- **Level Y**

  An error is counted when the luminance level is outside the specified range.
  Set the upper and lower limits for detecting errors.

- **Level C**

  An error is counted when the chrominance level is outside the specified range.
  Set the upper and lower limits for detecting errors.

- **SinceReset**

  The time that has elapsed since F•7 ERROR CLEAR was pressed, the LV 5490 was initialized, or the LV 5490 was restarted is displayed here.

8.2 Configuring Error Detection Settings

To configure the error detection settings, use F•5 STATUS SETUP.
When error detection is set to ON, the following actions are performed when an error occurs.

- Counts errors on the status display.
- Displays errors in the event log of the status display
- Displays “ERROR” in the upper-right of the display.
- Transmits a signal from the alarm output remote terminal

8.2.1 Error Setup 1

Use the ERROR SETUP1 tab to configure error detection settings for SDI signals.

STATUS → F•5 STATUS SETUP →

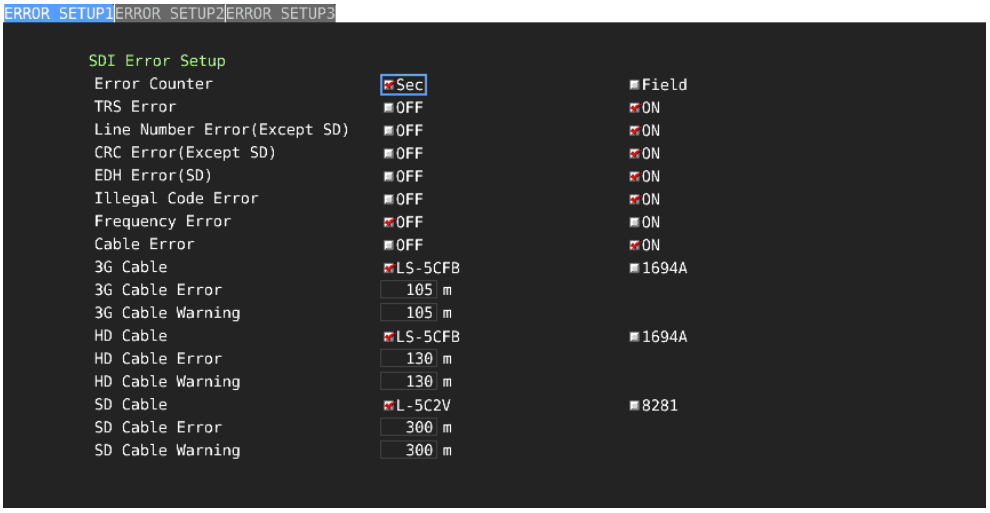


Figure 8-2 ERROR SETUP1 tab

- **Error Counter**

Sec:	Errors are counted in units of seconds. Even if multiple errors occur within the same second, only a single error is counted.
Field:	Errors are counted in units of fields (frames). Even if multiple errors occur within the same field (frame), only a single error is counted.

- **TRS Error**

Select whether to detect TRS Pos and TRS Code errors.

OFF / ON

- **Line Number Error(Except SD)**

Select whether to detect line number errors. This setting is valid when the input signal is not SD.

OFF / ON

- **CRC Error(Except SD)**

Select whether to detect CRC errors. This setting is valid when the input signal is not SD.

OFF / ON

- **EDH Error(SD)**

Select whether to detect EDH errors. This setting is valid when the input signal is SD.

OFF / ON

- **Illegal Code Error**

Select whether to detect illegal code errors.

OFF / ON

- **Frequency Error**

Select whether to detect frequency deviation errors.
Even when this is set to OFF, the frequency deviation is still shown in the status display.

OFF / ON

- **Cable Error**

Select whether to detect cable errors.
Even when this is set to OFF, the cable length is still shown in the status display.

OFF / ON

- **3G Cable**

Select the cable to use for cable length measurements when the input signal is 3G.

LS-5CFB / 1694A

- **3G Cable Error**

Set the upper limit for the cable error when the input signal is 3G. If this value is exceeded, an error will occur, and the measured value on the status display will be displayed in red.

10 - 105 m

- **3G Cable Warning**

Set the upper limit for the cable warning when the input signal is 3G. If this value is exceeded, a warning will occur, and the measured value on the status display will be displayed in yellow.

10 - 105 m

- **HD Cable**

Select the cable to use for cable length measurements when the input signal is HD.

LS-5CFB / 1694A

- **HD Cable Error**

Set the upper limit for the cable error when the input signal is HD. If this value is exceeded, an error will occur, and the measured value on the status display will be displayed in red.

5 - 130 m

- **HD Cable Warning**

Set the upper limit for the cable warning when the input signal is HD. If this value is exceeded, a warning will occur, and the measured value on the status display will be displayed in yellow.

5 - 130 m

- **SD Cable**

Select the cable to use for cable length measurements when the input signal is SD.

L-5C2V / 8281

- **SD Cable Error**

Set the upper limit for the cable error when the input signal is SD. If this value is exceeded, an error will occur, and the measured value on the status display will be displayed in red.

50 - 300 m

- **SD Cable Warning**

Set the upper limit for the cable warning when the input signal is SD. If this value is exceeded, a warning will occur, and the measured value on the status display will be displayed in yellow.

50 - 300 m

8.2.2 Error Setup 2

Use the ERROR SETUP2 tab to configure ancillary data and embedded audio error detection settings.

STATUS → F•5 STATUS SETUP → F•2 PREV TAB or F•3 NEXT TAB →

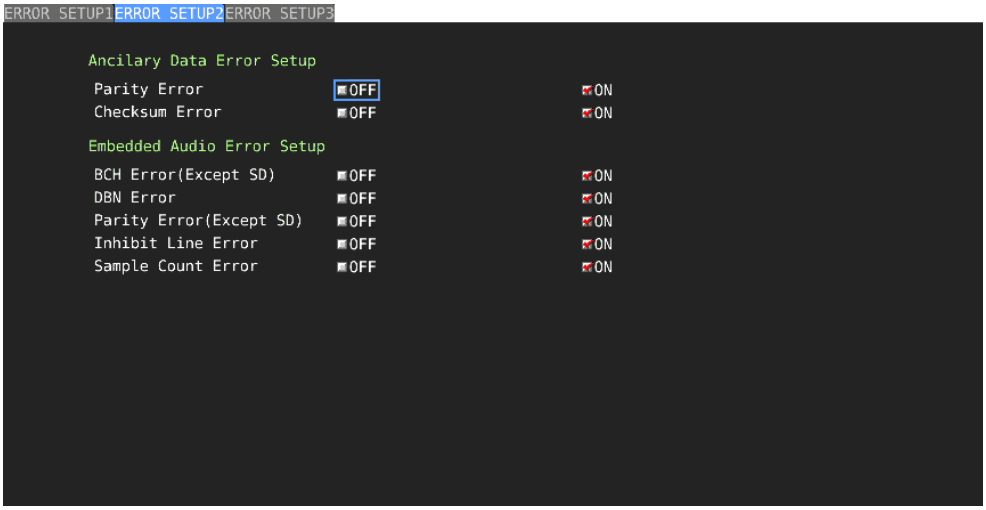


Figure 8-3 ERROR SETUP2 tab

- **Parity Error**

Select whether to detect parity errors in the ancillary data.

OFF / ON

- **Checksum Error**

Select whether to detect checksum errors in the ancillary data.

OFF / ON

- **BCH Error(Except SD)**

Select whether to detect BCH errors in the embedded audio. This setting is valid when the input signal is not SD.

OFF / ON

- **DBN Error**

Select whether to detect DBN errors in the embedded audio.

OFF / ON

- **Parity Error(Except SD)**

Select whether to detect parity errors in the embedded audio. This setting is valid when the input signal is not SD.

OFF / ON

- **Inhibit Line Error**

Select whether to detect embedding errors in the embedded audio.

OFF / ON

- **Sample Count Error**

Select whether to detect sample number errors in the embedded audio.
An error is counted when audio that is asynchronous to the video is embedded. If a certain number of audio data samples are not embedded in a certain number of video frames, it will be considered and error (as defined in SMPTE ST 299 and SMPTE ST 272).

OFF / ON

8.2.3 Error Setup 3

Use the ERROR SETUP3 tab to configure gamut error settings.

STATUS → F•5 STATUS SETUP → F•2 PREV TAB or F•3 NEXT TAB →

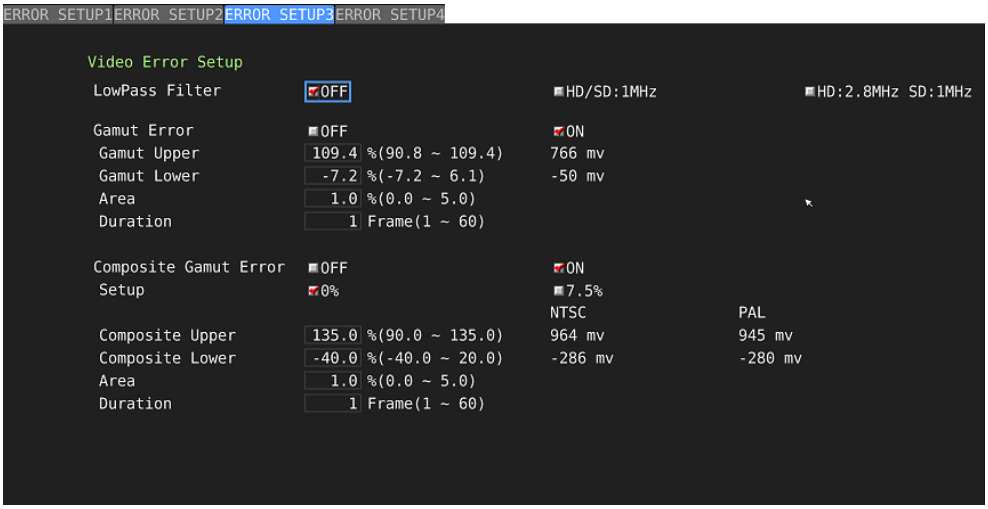


Figure 8-4 ERROR SETUP3 tab

- **LowPass Filter**

Select the frequency response of the low-pass filter used for gamut error and composite gamut error detection. Set this to remove transient errors caused by overshoot and other anomalies.

HD/SD:1MHz / HD:2.8MHz SD:1MHz / OFF

- **Gamut Error**

Select whether to detect gamut errors.

ON / OFF

- **Gamut Upper**

Set the gamut error upper limit. An error occurs when the input signal level exceeds the specified value.
In the 5-bar GBR display, levels that are greater than or equal to the specified value are displayed in red.

90.8 - 109.4 %

- **Gamut Lower**

Set the gamut error lower limit. An error occurs when the input signal level goes below the specified value.
In the 5-bar GBR display, levels that are less than or equal to the specified value are displayed in red.

-7.2 - 6.1 %

- **Area**

Specify the percentage of the active picture area over which errors must occur to be recognized as an error. You cannot configure this setting when Gamut Error is set to OFF.

0.0 - 1.0 - 5.0 %

- **Duration**

Set the number of consecutive video frames over which errors must occur to be recognized as an error. You cannot configure this setting when Gamut Error is set to OFF.

1 - 60 Frames

- **Composite Gamut Error**

Select whether to detect composite gamut errors.

ON / OFF

- **Setup**

Select the setup level to add when converting component signals to composite signals.

0%:	No setup level is added.
7.5%:	A setup level of 7.5 % is added.

- **Composite Upper**

Set the composite gamut error upper limit. An error occurs when the input signal level exceeds the specified value.
In the 5-bar CMP display, levels that are greater than or equal to the specified value are displayed in red.

90.0 - 135.0 %

- **Composite Lower**

Set the composite gamut error lower limit. An error occurs when the input signal level goes below the specified value.
In the 5-bar CMP display, levels that are less than or equal to the specified value are displayed in red.

-40.0 - 20.0 %

- **Area**

Specify the percentage of the active picture area over which errors must occur to be recognized as an error. You cannot configure this setting when Composite Gamut Error is set to OFF.

0.0 - 1.0 - 5.0 %

- **Duration**

Set the number of consecutive video frames over which errors must occur to be recognized as an error. You cannot configure this setting when Composite Gamut Error is set to OFF.

1 - 60 Frames

8.2.4 Error Setup 4

Use the ERROR SETUP4 tab to configure freeze error, black error and level error settings.

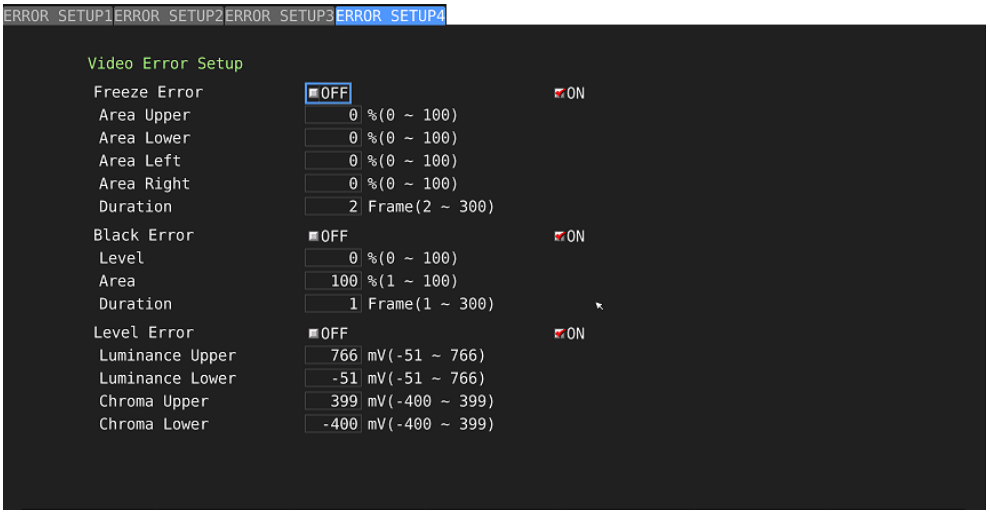


Figure 8-5 ERROR SETUP4 tab

- **Freeze Error**

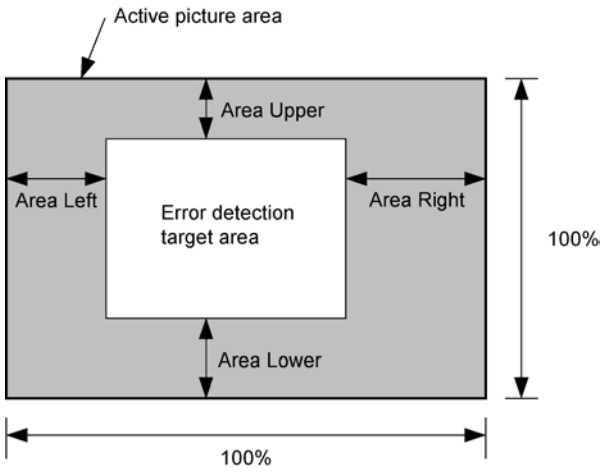
Select whether to detect freeze errors. If you set this to OFF, you cannot configure the following settings.

ON / <u>OFF</u>

- **Area Upper, Area Lower, Area Left, Area Right**

Set what percent of each active picture area (the upper, lower, left, and right areas) will not be subject to error detection.

<u>0</u> to 100 %



- **Duration**

Set the number of consecutive video frames over which errors must occur to be recognized as an error.

<u>2</u> to 300 frames

- **Black Error**

Select whether to detect black errors. If you set this to OFF, you cannot configure the following settings.

ON / OFF

- **Level**

Set the black error level. Any signals that are less than or equal to the specified value will be detected as errors.

0 to 100 %

- **Area**

Specify the percentage of the active picture area over which errors must occur to be recognized as an error.

1 to 100 %

- **Duration**

Set the number of consecutive video frames over which errors must occur to be recognized as an error.

1 to 300 frames

- **Level Error**

Select whether to detect level errors. If you set this to OFF, you cannot configure the following settings.

ON / OFF

- **Luminance Upper**

Set the luminance level error upper limit. An error occurs when the input signal level exceeds the specified value.
In the 5-bar Y display, levels that are greater than or equal to the specified value are displayed in red.

-51 – 766 mV

- **Luminance Lower**

Set the luminance level error lower limit. An error occurs when the input signal level goes below the specified value.
In the 5-bar Y display, levels that are less than or equal to the specified value are displayed in red.

-51 – 766 mV

- **Chroma Upper**

Set the chroma level error upper limit. An error occurs when the input signal level exceeds the specified value.

-400 – 399 mV

- **Chroma Lower**

Set the chroma level error lower limit. An error occurs when the input signal level goes below the specified value.

-400 – 399 mV

8.3 Clearing Error Counts

To clear the error counts and SinceReset, follow the procedure below.

Procedure

STATUS → F•7 ERROR CLEAR

8.4 Configuring Event Log Settings

To display the event log, follow the procedure below.
The event log displays a list of the events that have occurred.
The applicable event-detection channels are all channels in the selected group (1A to 1D or 2A to 2D). However, when measuring 3G-B-DS, 3G (DL)-4K, or 12G events are detected only on the currently displayed channel. During NMI measurement, events are detected only on the channels selected on the NMI IN tab.

Procedure

STATUS → F•1 EVENT LOG

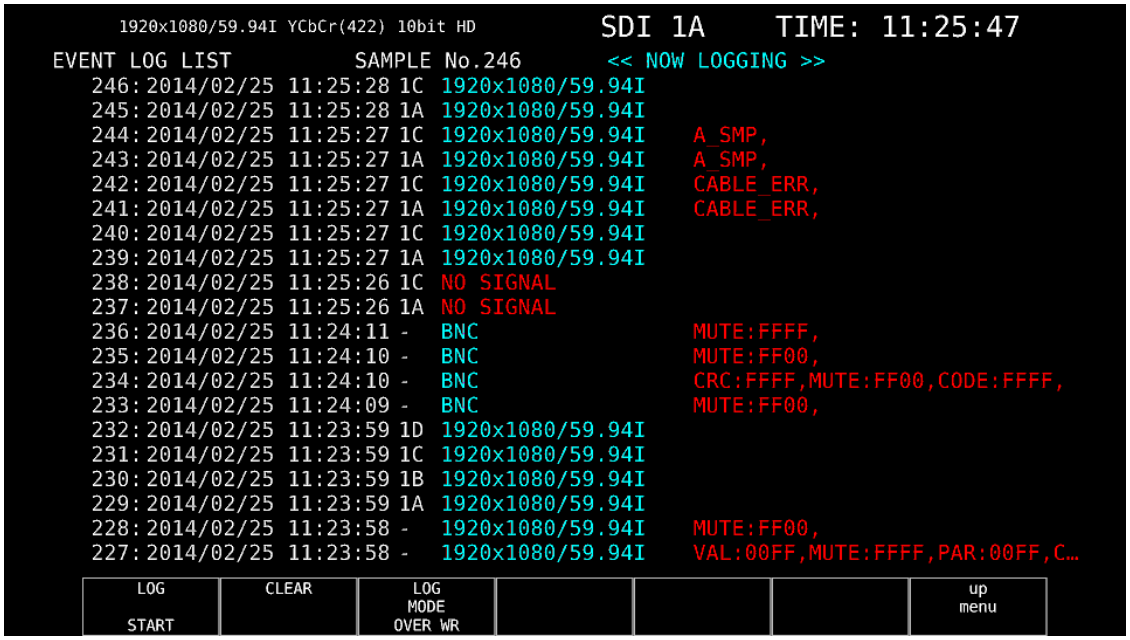


Figure 8-6 Event log display

8.4.1 Event Log Screen Explanation

Events are listed on the event log screen by the time of their occurrence.
Turn the function dial (F•D) to the right to scroll the screen and view older events in the log.
Press the function dial (F•D) to display the latest events.

- **Note**

- When the same event occurs successively and when multiple events occur at the same time, they are treated as a single event.
- When multiple events occur at the same time, you may not be able to check all the events on the screen. When this happens, you can view all the events by saving them to a USB memory device.
- The event display is cleared when you turn the power off.
- Switching video formats or input channels may cause disturbances in the signal that will cause errors to be displayed.

- **Time Display**

  The time is displayed in the format specified by Time that you select by pressing SYS and then F•2 SYSTEM SETUP.

- **Channel Display**

  The input channel is displayed.
  A “-” is displayed for audio events detected by SER03.
  “N1/N2•N3/N4” is displayed for IP (NMI) input signal events detected by the SER08.

- **Format Display**

  The input format is displayed.
  If there is no input signal, “NO SIGNAL” is displayed.
  “BNC” is displayed for external audio events detected by SER03.

- **Event Display**

  The events that are displayed in the event log are listed below.
  Of the items listed below, only those whose detection settings have been set to ON in FORMAT ALARM tab of the SYS menu, STATUS SETUP of the STATUS menu, ERROR SETUP of the EYE menu, and ERROR SETUP of the AUDIO menu are displayed.

  Table 8-2 Events

Applicable Unit	Event Name	Description
SER01/SER02/SER06/SER08	FORMAT_ALARM	Format Alarm
	TRS_P	TRS Position Error
	TRS_C	TRS Code Error
	LINE	Line Number Error(Except SD)
	CRC	CRC Error(Except SD)
	EDH	EDH Error(SD)
	ILLEGAL	Illegal Code Error
	FREQ	Frequency Error
	CABLE_ERR	Cable Error
	CABLE_WAR	Cable Warning
	PRTY	Ancillary Data Parity Error
	CHK	Ancillary Data Checksum Error
	A_BCH	Embedded Audio BCH Error(Except SD)
	A_DBN	Embedded Audio DBN Error
	A_PRTY	Embedded Audio Parity Error(Except SD)
	A_INH	Embedded Audio Inhibit Line Error
	A_SMP	Embedded Audio Sample Count Error
	GMUT	Gamut Error
	GMUT_ST1	Gamut Error Stream 1
	GMUT_ST2	Gamut Error Stream 2
	CGMUT	Composite Gamut Error
	CGMUT_ST1	Composite Gamut Error Stream 1
	CGMUT_ST2	Composite Gamut Error Stream 2
	FRZ	Freeze Error
	FRZ_ST1	Freeze Error Stream 1
	FRZ_ST2	Freeze Error Stream 2
	BLK	Black Error
	BLK_ST1	Black Error Stream 1
	BLK_ST2	Black Error Stream 2
	LVL_Y	Luminance Error
	LVL_Y_ST1	Luminance Error Stream 1
	LVL_Y_ST2	Luminance Error Stream 2
	LVL_C	Chroma Error
	LVL_C_ST1	Chroma Error Stream 1
	LVL_C_ST2	Chroma Error Stream 2
SER02/SER09	EYE_3G_AMP	3G Amplitude Error
	EYE_3G_TR	3G Risetime Error
	EYE_3G_TF	3G Falltime Error

Applicable Unit	Event Name	Description
	EYE_3G_TR_TF	3G Deltatime Error(Tr-Tf)
	EYE_3G_T_JIT	3G Timing Jitter Error
	EYE_3G_A_JIT	3G Current Jitter Error
	EYE_3G_OR	3G OverShoot Rising Error
	EYE_3G_OF	3G OverShoot Falling Error
	EYE_HD_AMP	HD Amplitude Error
	EYE_HD_TR	HD Risetime Error
	EYE_HD_TF	HD Falltime Error
	EYE_HD_TR_TF	HD Deltatime Error(Tr-Tf)
	EYE_HD_T_JIT	HD Timing Jitter Error
	EYE_HD_A_JIT	HD Current Jitter Error
	EYE_HD_OR	HD OverShoot Rising Error
	EYE_HD_OF	HD OverShoot Falling Error
	EYE_SD_AMP	SD Amplitude Error
	EYE_SD_TR	SD Risetime Error
	EYE_SD_TF	SD Falltime Error
	EYE_SD_TR_TF	SD Deltatime Error(Tr-Tf)
	EYE_SD_T_JIT	SD Timing Jitter Error
	EYE_SD_A_JIT	SD Current Jitter Error
	EYE_SD_OR	SD OverShoot Rising Error
	EYE_SD_OF	SD OverShoot Falling Error
SER09	EYE_12G_AMP	12G Amplitude Error
	EYE_12G_TR	12G Risetime Error
	EYE_12G_TF	12G Falltime Error
	EYE_12G_TR_TF	12G Deltatime Error(Tr-Tf)
	EYE_12G_T_JIT	12G Timing Jitter Error
	EYE_12G_A_JIT	12G Current Jitter Error
	EYE_12G_OR	12G Overshoot Rising Error
	EYE_12G_OF	12G Overshoot Falling Error
SER03	OVER	Level Over
	CLIP	Clip
	MUTE	Mute
	PAR	Parity Error
	VAL	Validity Error
	CRC	CRC Error
	CODE	Code Violation

- **Event Generation Channel Display (SER03)**

  For audio events detected by SER03, the channel on which the event occurred is displayed after the event name in hexadecimal notation.

  - **8-Channel Measurement**

    The 8 bits expressed by the hexadecimal number correspond to the following input channels.

INPUT	b8	b7	b6	b5	b4	b3	b2	b1
SDI (Single input mode)	2nd GROUP (G1 to G4)				1st GROUP (G1 to G4)			
SDI (Simul mode)	2nd GROUP (G1 to G4) (SDI A to SDI D)				1st GROUP (G1 to G4) (SDI A to SDI D)			
EXT AUDIO (*1)	A/B 8ch	A/B 7ch	A/B 6ch	A/B 5ch	A/B 4ch	A/B 3ch	A/B 2ch	A/B 1ch

*1 Corresponds to the channels selected using EXT AUDIO INPUT GROUP (A/B)

For example, if INPUT is set to SDI (simul mode), 1st GROUP is set to SDI B G3, and 2nd GROUP is set to SDI A G4, “48” indicates that events have occurred on B12ch and A15ch.

4				8			
0	1	0	0	1	0	0	0
A16ch	A15ch	A14ch	A13ch	B12ch	B11ch	B10ch	B9ch

  - **16-Channel Measurement**

    The 16 bits expressed by the hexadecimal number correspond to the following input channels.

INPUT	b16	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1
SDI (Single input mode)	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
SDI (Simul mode)	4th GROUP (G1 to G4) (SDI A to SDI D)				3rd GROUP (G1 to G4) (SDI A to SDI D)				2nd GROUP (G1 to G4) (SDI A to SDI D)				1st GROUP (G1 to G4) (SDI A to SDI D)			
EXT AUDIO	B8	B7	B6	B5	B4	B3	B2	B1	A8	A7	A6	A5	A4	A3	A2	A1

For example, when INPUT SELECT is set to EXT AUDIO, “1248” indicates that events have occurred on channels A4, A7, B2, and B5.

1				2				4				8			
0	0	0	1	0	0	1	0	0	1	0	0	1	0	0	0
B8	B7	B6	B5	B4	B3	B2	B1	A8	A7	A6	A5	A4	A3	A2	A1

8.4.2 Starting the Event Log

To start the event log, follow the procedure below.

Procedure

STATUS → F•1 EVENT LOG → F•1 LOG: START / STOP

Settings

START:	The event log is started. “NOW LOGGING” appears in the upper right of the event log.
STOP:	The event log is stopped. “LOGGING STOPPED” appears in the upper right of the event log.

8.4.3 Deleting the Event Log

To delete the event log, follow the procedure below.

Procedure

STATUS → F•1 EVENT LOG → F•2 CLEAR

8.4.4 Selecting the Overwrite Mode

Up to 1000 events can be displayed. To select the action to perform when more than 1000 events occur, follow the procedure below.

Procedure

STATUS → F•1 EVENT LOG → F•3 LOG MODE: OVER WR / STOP

Settings

OVER WR:	Oldest events are overwritten.
STOP:	Additional events are not recorded.

8.4.5 Saving to USB Memory

You can save the event log to a USB memory device as a text file.
To save a file with a name that you specify, follow the procedure below.

1. **Used to connect USB memory.**
2. **Press F•6 USB MEMORY.**

   The file list display appears.
   This setting appears when USB memory is connected.

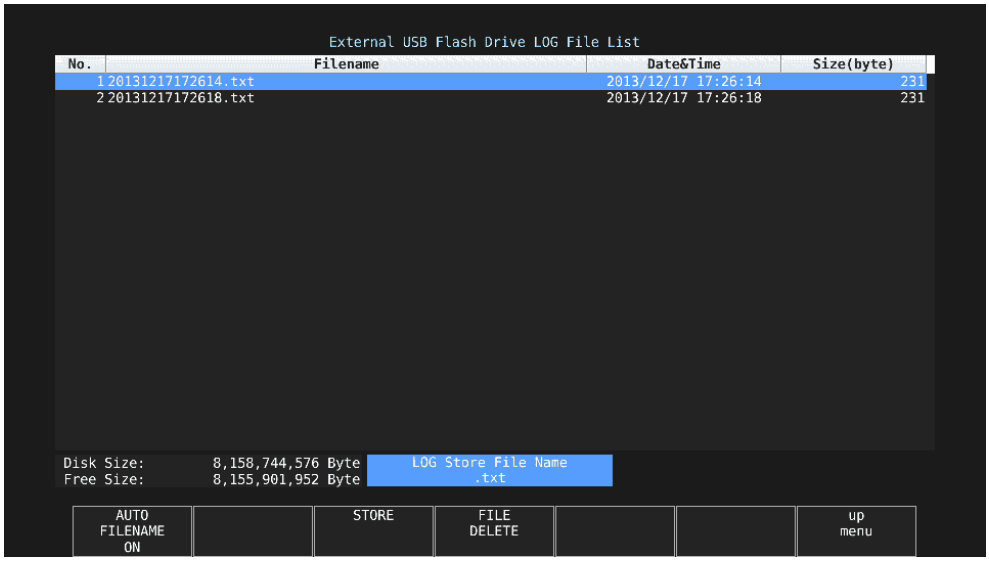


Figure 8-7 File list display

3. **Set F•1 AUTO FILENAME to OFF.**
4. **Press F•2 NAME INPUT.**

   The file name input display appears.

Figure 8-8 File name input screen

5. **Enter a file name using up to 14 characters.**

   The key operations that you can perform in the file name input display are as follows:

F•1 CLEAR ALL	Deletes all characters
F•2 DELETE	Deletes the character at the cursor
F•4 <=	Moves the cursor to the left
F•5 =>	Moves the cursor to the right
F•6 CHAR SET	Enters the character
Function dial (F•D)	Turn to select a character, and press to enter the character.

   You can also copy the file name of an already saved file. To copy a file name, move the cursor to the file in the file list whose name you want to copy, and then press the function dial (F•D).

6. **Press F • 7 up menu.**

7. **Press F • 3 STORE.**

   If a file with the same name that you have specified already exists on the USB memory device, an overwrite confirmation menu appears. To overwrite the current file, press F•1 OVER WR YES. To cancel the save operation, press F•3 OVER WR NO.

- **Deleting an Event Log**

  To delete an event log that has been saved to the USB memory device, select the log file on the file list display, and then press F•4 FILE DELETE. To delete the file, press F•1 DELETE YES. To cancel the delete operation, press F•3 DELETE NO.

- **Automatic File Name Generation**

  If you set F•1 AUTO FILENAME to ON, the file name will be generated automatically in the format “YYYYMMDDhhmmss” when you save the file. In this situation, F•2 NAME INPUT is not displayed.

- **USB Memory Device Folder Structure**

  Event logs are saved in the LOG folder.

  USB memory device
  └ LV5490_USER
    └ LOG
      └ YYYYMMDDhhmmss.txt

8.5 Configuring Data Dump Settings

To view the data dump, follow the procedure below.
In the data dump, the data of the selected line is listed. You can change the line number using the V POS knob and the sample number using the H POS knob. (You can also use the function dial (F•D).
Changing this setting will also change the selected line on the video-signal-waveform, vector, and picture displays (excluding some of the 4K settings).

Procedure

STATUS → F•2 SDI ANALYSIS → F•1 DATA DUMP

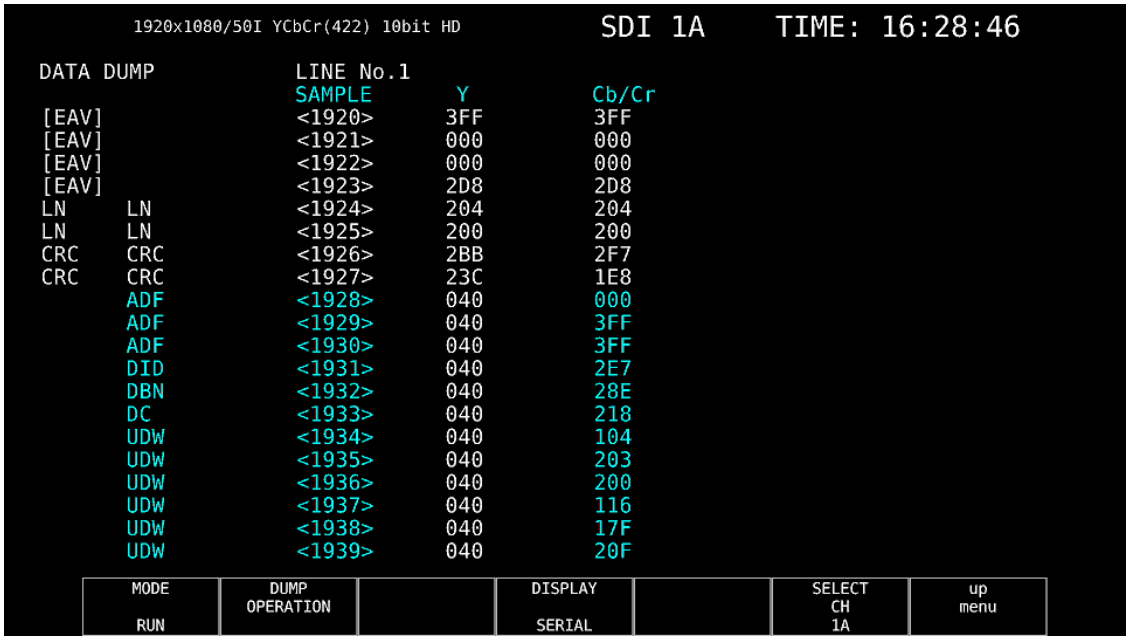


Figure 8-9 Data dump display

8.5.1 Data Dump Display Explanation

- **Detection Code Display**

The input signal's embedded ancillary data is detected, and the following detection codes are displayed.

Table 8-3 Detection code list

Detection Code	Color	Description
ADF	Cyan	Ancillary data flags (000h, 3FFh, and 3FFh)
DID	Cyan	Data identification (the data after ADF)
SDID	Cyan	Secondary data identification (the secondary format data when the DID is smaller than 80h)
DBN	Cyan	Data block numbers (the primary data format when the DID is larger than 80h)
DC	Cyan	Data count (the data after the SDID/DBN)
UDW	Cyan	User data words (the user data words of the data count length after ADF)
CS	Magenta	Checksum (the data immediately after UDW)
AP	Yellow	Active picture (the active picture from after the SAV to just before the EAV when the selected line is within the active video area)

- **Line Number Display**

Pictures sent in SDI signals are assigned line numbers as part of the transmission format. The line number is displayed in one of the following formats at the top of the screen.

Table 8-4 Line number display

Line number display	Description
LINE No.	The picture scan line numbers and the line numbers during transmission are matched.
I/F LINE No.	The picture scan line numbers and the line numbers during transmission are not matched. Line numbers during transmission are displayed.
PIC LINE No.	The picture scan line numbers and the line numbers during transmission are not matched. Picture scan line numbers are displayed.

Normally, the picture scan line numbers and the line numbers for storing those line numbers during transmission are matched. However, they do not match when the following format is received.
If this is the case, you can switch between the picture scan line number (PICTURE) and line numbers during transmission.

Table 8-5 Format

Format	Frame rate	Switching operation
3G-B-DL	60/59.94/50/48/47.95/P	F•4 DISPLAY (PICTURE/STREAM1/STREAM2)
HD (DL)	60/59.94/50/48/47.95/P	F•5 LINK (PICTURE/A/B)
3G (DL)-2K	60/59.94/50/48/47.95/P	F•5 LINK (PICTURE/1/2)

As an example, the switching procedure for setting the picture scan line number to 42 when 3G-B-DL (1920×1080/59.94P) is applied is shown below.

1. Display the data dump.
2. Set F•4 DISPLAY to PICTURE.
3. Use the V POS knob to set PIC LINE No. to 42.
4. Set F•4 DISPLAY to STREAM1.

The line number display changes to I/F LINE No.21.
This indicates that the line number in which the picture scan line number 42 is stored for transmission is 21.

The relationship of other 3G-B-DL line numbers is shown below.

Table 8-6 3G-B-DL line number relationship

Picture scan line number (PIC LINE No.)	Line number during transmission (I/F LINE No.)	
PICTURE	STREAM1	STREAM2
1	563	1125
2	1	563
n (odd number)	(n+1)/2+562	(n-1)/2
m (even number)	m/2	m/2+562

8.5.2 Selecting the Display Mode

To select the data dump display mode, follow the procedure below.

Procedure

STATUS → F•2 SDI ANALYSIS → F•1 DATA DUMP → F•1 MODE: RUN / HOLD / FRM CAP

Settings

RUN:	The input signal data is automatically updated and displayed.
HOLD:	The input signal data is displayed statically.
FRM CAP:	The frame data is displayed. If frame data has not been captured in the LV 5490, nothing is displayed. This setting can be selected in frame capture mode.

8.5.3 Selecting the Display Format

To select the data dump display format, follow the procedure below.
This menu does not appear when F•5 LINK or F•5 SUB is set to PICTURE.

Procedure

STATUS → F•2 SDI ANALYSIS → F•1 DATA DUMP → F•4 DISPLAY
: SERIAL / COMPO / BINARY (for HD, SD, 3G-A, HD (QL), 3G-A of 3G (QL), 12G)
: PICTURE / STREAM1 / STREAM2 (for 3G-B-DL, 3G-B-DL of 3G (QL))
: STREAM12 / STREAM1 / STREAM2 (for 3G-B-DL of 3G (DL)-2K)
: S1 SERIAL / S1 COMPO / S1 BINARY / S2 SERIAL / S2 COMPO / S2 BINARY (for 3G (DL)-4K, 3G-B-DS)

Settings

SERIAL:	The parallel converted data sequences are displayed.
COMPO:	The parallel converted data sequences are divided into each component and displayed.
BINARY:	The parallel converted data sequences are displayed in binary.
PICTURE:	Links or streams 1 and 2 are combined and displayed in a picture structure.
STREAM1:	Stream 1 is displayed.
STREAM2:	Stream 2 is displayed.
STREAM12:	Stream 1 and 2 are combined and displayed.
S1 SERIAL:	Stream 1 is displayed serially.
S1 COMPO:	Stream 1 is separated and displayed.
S1 BINARY:	Stream 1 is displayed in binary.
S2 SERIAL:	Stream 2 is displayed serially.
S2 COMPO:	Stream 2 is separated and displayed.
S2 BINARY:	Stream 2 is displayed in binary.

DISPLAY = SERIAL

```
DATA DUMP           LINE No.1
                    SAMPLE      Y         Cb/Cr
[EAV]               <1920>      3FF       3FF
[EAV]               <1921>      000       000
[EAV]               <1922>      000       000
[EAV]               <1923>      2D8       2D8
LN     LN           <1924>      204       204
LN     LN           <1925>      200       200
CRC    CRC          <1926>      2BB       2F7
CRC    CRC          <1927>      23C       1E8
       ADF          <1928>      040       000
       ADF          <1929>      040       3FF
       ADF          <1930>      040       3FF
       DID          <1931>      040       2E7
       DBN          <1932>      040       1B6
       DC           <1933>      040       218
       UDW          <1934>      040       21E
       UDW          <1935>      040       104
       UDW          <1936>      040       200
       UDW          <1937>      040       16B
       UDW          <1938>      040       1D5
       UDW          <1939>      040       20F
```

DISPLAY = COMPO

```
DATA DUMP           LINE No.1
                    SAMPLE      Y         Cb          Cr
[EAV]               <1920>      3FF       3FF
[EAV]               <1921>      000                   000
[EAV]               <1922>      000       000
[EAV]               <1923>      2D8                   2D8
LN     LN           <1924>      204       204
LN     LN           <1925>      200                   200
CRC    CRC          <1926>      2BB       2F7
CRC    CRC          <1927>      23C                   1E8
       ADF          <1928>      040       000
       ADF          <1929>      040                   3FF
       ADF          <1930>      040       3FF
       DID          <1931>      040                   2E7
       DBN          <1932>      040       17A
       DC           <1933>      040                   218
       UDW          <1934>      040       1E9
       UDW          <1935>      040                   102
       UDW          <1936>      040       200
       UDW          <1937>      040                   1AD
       UDW          <1938>      040       137
       UDW          <1939>      040                   20F
```

DISPLAY = BINARY

```
DATA DUMP           LINE No.1
                    SAMPLE      Y           Cb/Cr
[EAV]               <1920>      1111111111  1111111111
[EAV]               <1921>      0000000000  0000000000
[EAV]               <1922>      0000000000  0000000000
[EAV]               <1923>      1011011000  1011011000
LN     LN           <1924>      1000000100  1000000100
LN     LN           <1925>      1000000000  1000000000
CRC    CRC          <1926>      1010111011  1011110111
CRC    CRC          <1927>      1000111100  0111101000
       ADF          <1928>      0001000000  0000000000
       ADF          <1929>      0001000000  1111111111
       ADF          <1930>      0001000000  1111111111
       DID          <1931>      0001000000  1011100111
       DBN          <1932>      0001000000  1011011011
       DC           <1933>      0001000000  1000011000
       UDW          <1934>      0001000000  1000011110
       UDW          <1935>      0001000000  0100000100
       UDW          <1936>      0001000000  1000000000
       UDW          <1937>      0001000000  0101100001
       UDW          <1938>      0001000000  1001111000
       UDW          <1939>      0001000000  0110000000
```

Figure 8-10　Selecting the display format

8.5.4 Selecting the Displayed Information

When the link format is set to multi, to select which link to display the data dump of, follow the procedure below. Links or streams 1 and 2 are combined and displayed in a picture structure.

Procedure (Multi link)

STATUS → F•2 SDI ANALYSIS → F•1 DATA DUMP → F•5 LINK
: PICTURE / A[1A] / B[1B] / A[1C] / B[1D] / A[2A] / B[2B] / A[2C] / B[2D] (for HD (DL))
: PICTURE / 1[1A] / 2[1B] / 1[1C] / 2[1D] / 1[2A] / 2[2B] / 1[2C] / 2[2D] (for 3G (DL))
: PICTURE / 1[1A] / 2[1B] / 3[1C] / 4[1D] / 1[2A] / 2[2B] / 3[2C] / 4[2D] (for 3G (QL), HD(QL))

Procedure (12G)

STATUS → F•2 SDI ANALYSIS → F•1 DATA DUMP → F•5 SUB
: PICTURE / 1[1A] / 2[1B] / 3[1C] / 4[1D]

8.5.5 Moving the Display Position

To configure data dump operation settings, press F•2 DUMP OPERATION in the DATA DUMP menu.

STATUS → F•2 SDI ANALYSIS → F•1 DATA DUMP → F•2 DUMP OPERATION →

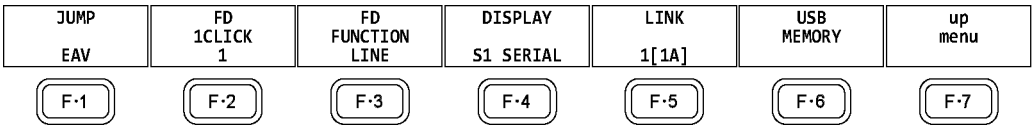


Figure 8-11 DUMP OPERATION menu

To move the data dump sample number to a specific location, follow the procedure below.

Procedure

STATUS → F•2 SDI ANALYSIS → F•1 DATA DUMP → F•2 DUMP OPERATION → F•1 JUMP
: EAV / SAV
: END / START (when the input signal is 4K and F•5 LINK or F•5 SUB is set to PICTURE)

Settings

EAV:	The display starts with the EAV sample number.
SAV:	The display starts with the SAV sample number.
END:	The last sample number is displayed.
START:	The display starts with sample number 0.

8.5.6 Selecting the Adjustment Step Resolution

To select the line or sample number adjustment step resolution for when the function dial (F•D) is turned, follow the procedure below.

Procedure

STATUS → F•2 SDI ANALYSIS → F•1 DATA DUMP → F•2 DUMP OPERATION → F•2 FD 1CLICK: 1 / 10 / 50

8.5.7 Selecting What the Function Dial Controls

To select whether the line number or sample number is controlled with the function dial (F•D), follow the procedure below. You can also change the line number using the V POS knob and the sample number using the H POS knob.

Procedure

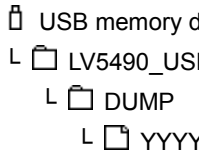
STATUS → F•2 SDI ANALYSIS → F•1 DATA DUMP → F•2 DUMP OPERATION → F•3 FD FUNCTION: LINE / SAMPLE

Settings

LINE:	Turning the function dial (F•D) changes the line number. If you press the function dial (F•D), the data of line number 0 or 1 is displayed.
SAMPLE:	Turning the function dial (F•D) changes the sample number. If you press the function dial (F•D), EAV or sample number 0 is displayed.

8.5.8 Saving to USB Memory

You can save the data dump to a USB memory device as a text file. The procedure to follow to save data is the same as the procedure that was given for the event log. See section 8.4.5, “Saving to a USB Memory Device.”
Data dumps are saved in the DUMP folder.



8.6 Configuring Phase Difference Measurement Settings

To show the phase difference measurement display, follow the procedure below.
You can use the phase difference measurement display to measure the phase difference between an SDI signal and an external sync signal or the phase difference between a pair of SDI signals.

Procedure

STATUS → F•2 SDI ANALYSIS → F•2 EXT REF PHASE

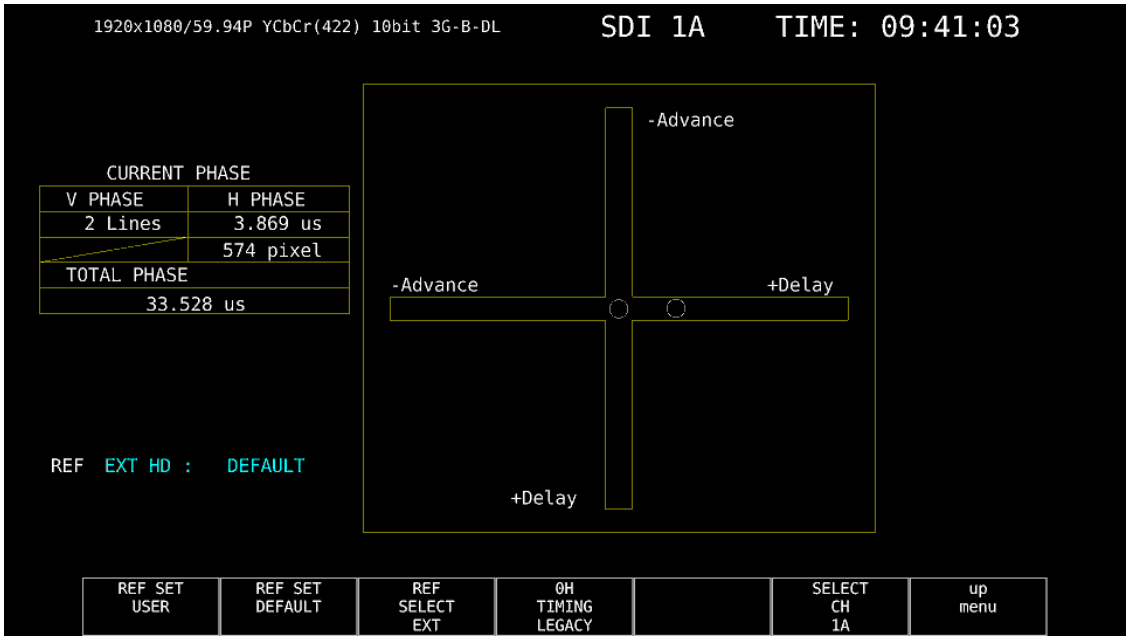


Figure 8-12 Phase difference measurement display

- **Measuring the Phase Difference between an SDI Signal and an External Sync Signal**

  You can measure the phase difference between an SDI signal and an external sync signal by setting F•3 REF SELECT to EXT. Apply the external sync signal.

  Note that the following input formats are not supported.
  • 3G's 720/30P, 720/29.97P, 720/25P, 720/24P, and 720/23.98P
  • Frame frequency 48P, 47.95P

- **Measuring the Phase Difference between SDI Signals**

  You can measure the phase difference between SDI signals by setting F•3 REF SELECT to SDI. This measurement is not possible when SDI System is set to 3G-B-DS on the SYS > F•1 SIGNAL IN OUT > SDI IN tab.
  The reference signal varies depending on the input signal as shown below.

Table 8-7 Reference signal

Input signal	Reference signal
SD, HD, 3G	A ch
HD (DL)	Link A
3G (DL)-2K, 3G (DL)-4K, 3G (QL), HD (QL)	Link 1

8.6.1 Phase Difference Measurement Display Explanation

- **CURRENT PHASE**

  V PHASE: The phase difference is displayed in units of lines.
  H PHASE: The phase difference is displayed in units of time and in units of pixels or dots. (*1)
  TOTAL PHASE: The total of the V PHASE and H PHASE differences is displayed here in units of time.

  *1 When the input signal is HD (DL) 1080/60P, 1080/59.94P, 1080/50P, or SD, the unit will be dots. Pixels are in units of the video's sampling frequency. Dots are in units of the parallel video's transmission clock frequency.

- **REF**

  This displays the reference signal as shown below.

  Table 8-8 REF indications

F•3 REF SELECT	Display Indication	Description
EXT	EXT BB : DEFAULT	Indicates that the external sync signal is BB and the phase difference is the default value.
	EXT BB : USER REF	Indicates that the external sync signal is BB and a user-defined reference is being used.
	EXT HD : DEFAULT	Indicates that the external sync signal is an HD tri-level sync signal and the phase difference is the default value.
	EXT HD : USER REF	Indicates that the external sync signal is an HD tri-level sync signal and a user-defined reference is being used.
	NO SIGNAL	Indicates that no external sync signal is being applied.
SDI	SDI 1A	Indicates that the input signal is SD, HD, or 3G and the reference signal is 1A
	SDI 2A	Indicates that the input signal is SD, HD, or 3G and the reference signal is 2A
	LINK A	Indicates that the input signal is HD (DL) and the reference signal is link A
	LINK 1	Indicates that the input signal is 3G (DL)-2K, 3G (DL)-4K, 3G (QL), or HD (QL) and the reference signal is link 1
	NO SIGNAL	Indicates that the reference SDI signal is not being received.

- **User-Defined References for the Phase Difference**

  When F•3 REF SELECT is set to EXT, you can set the current phase difference to zero by pressing F•1 REF SET USER. You can change the reference to match the system that you are using. (During multi link, the phase difference of link A or link 1 is set to zero.)

  To reset the phase difference to its default value (see below), press F•2 REF SET DEFAULT.

- **Default Phase Difference Setting**

  If the input signal is HD or SD and F•3 REF SELECT is set to EXT, you can use F•4 0H TIMING to select the reference where the phase difference is assumed to be zero. When using a LEADER signal generator that allows you to select LEGACY or SERIAL, this setting must be matched to the setting selected on the LV 5490. In addition, depending on the output accuracy of the signal generator and measurement accuracy of the LV 5490, there may be an offset of around 0 ± 4 clocks in the display.

  LEGACY: The phase difference is zero when the external sync signal without timing offset transmitted from a LEADER signal generator and an SDI signal are received.
  SERIAL: The phase difference is zero when the external sync signal and the SDI signal are received at the times defined in the signal standard.

- **Graphical Display**

  The vertical axis indicates the V phase difference in lines. The horizontal axis represents the H phase difference in time. When the circles that represent V and H overlap with each other in the center, there is no phase difference.

  The circles are normally displayed in white, but they will be displayed in green under the following circumstances.
  Horizontal: When the circle is within ±3 clocks of the center.
  Vertical: When the circle is within ±0 clocks of the center.

  When the signal is behind the reference signal, the circle is displayed on the Delay (+) side. When the signal is ahead of the reference signal, the circle is displayed on the Advance (-) side. For both the V and H axes, differences of up to approximately +1/2 frames from the center are displayed on the Delay axis and differences of up to approximately -1/2 frames from the center are displayed on the Advance axis. (See the table below.)

  When the phase difference between an SDI signal and an external sync signal is being measured, the H axis phase difference may vary within a range of ±1 clock in cases such as when the signal is switched. When the phase difference between SDI signals is being measured, the H difference may vary within a range of ±2 clock in cases such as when the signal is switched.

Table 8-9 Delay and Advance axis display ranges (3G-A, 3G-B, HD, SD)

3G-A, 3G-B, HD, SD Format		Displayed on the Advance Axis			Displayed on the Delay Axis				
		V PHASE [Lines]	H PHASE [us]		V PHASE [Lines]	H PHASE [us]		V PHASE [Lines]	H PHASE [us]
3G-A	1080/59.94P	-562	-14.822	to	0	0	to	562	0
	1080/60P	-562	-14.808	to	0	0	to	562	0
	1080/50P	-532	-17.771	to	0	0	to	562	0
3G-B	1080/59.94P	-1124	-14.822	to	0	0	to	1125	0
	1080/60P	-1124	-14.808	to	0	0	to	1125	0
	1080/50P	-1124	-17.771	to	0	0	to	1125	0
3G-A 3G-B HD	1080/59.94I, 1080/29.97P, 1080/29.97PsF	-562	-29.645	to	0	0	to	562	0
	1080/60I, 1080/30P, 1080/30PsF	-562	-29.616	to	0	0	to	562	0
	1080/50I, 1080/25P, 1080/25PsF	-562	-35.542	to	0	0	to	562	0
	1080/23.98P, 1080/23.98PsF	-562	-37.060	to	0	0	to	562	0
	1080/24P, 1080/24PsF	-562	-37.023	to	0	0	to	562	0
	720/59.94P	-375	0	to	0	0	to	374	22.230
	720/60P	-375	0	to	0	0	to	374	22.208
	720/50P	-375	0	to	0	0	to	374	26.653
	720/29.97P	-375	0	to	0	0	to	374	44.475
	720/30P	-375	0	to	0	0	to	374	44.430
	720/25P	-375	0	to	0	0	to	374	53.319
	720/23.98P	-375	0	to	0	0	to	374	55.597
	720/24P	-375	0	to	0	0	to	374	55.542
SD	525/59.94I	-262	-63.518	to	0	0	to	262	0
	625/50I	-312	-63.962	to	0	0	to	312	0

Table 8-10 Delay and Advance axis display ranges (12G)

12G Sub Image Format		Displayed on the Advance Axis			Displayed on the Delay Axis				
		V PHASE [Lines]	H PHASE [us]		V PHASE [Lines]	H PHASE [us]		V PHASE [Lines]	H PHASE [us]
12G	1080/59.94P	-562	-14.822	to	0	0	to	562	0
	1080/60P	-562	-14.808	to	0	0	to	562	0
	1080/50P	-532	-17.771	to	0	0	to	562	0
	1080/29.97P	-562	-29.645	to	0	0	to	562	0
	1080/30P	-562	-29.616	to	0	0	to	562	0
	1080/25P	-562	-35.542	to	0	0	to	562	0
	1080/23.98P	-562	-37.060	to	0	0	to	562	0
	1080/24P	-562	-37.023	to	0	0	to	562	0

8.7 Setting the Lip Sync Measurement (SER03)

To show the lip sync measurement screen, follow the procedure below.
By combining a Leader signal generator that supports lip syncing with this instrument, you can use the lip sync measurement screen to measure the offset between the video signal and the audio signal that occurs in the transfer route.

Procedure

STATUS → F·2 SDI ANALYSIS → F·4 AV PHASE

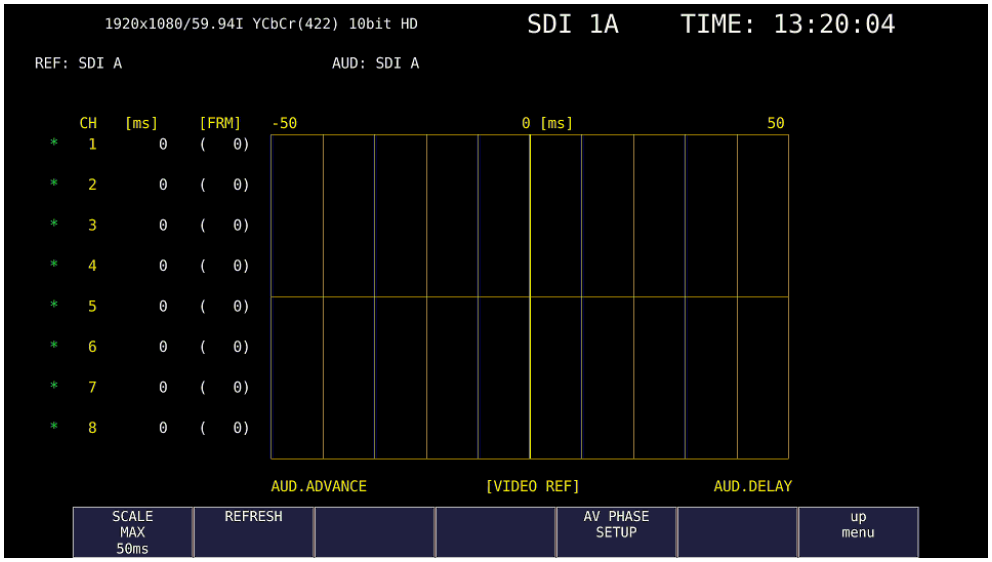


Figure 8-13 Lip sync measurement screen

As an example, we will show a procedure that uses the LT 4400 (the LT 4400SER01 must be installed) as the signal generator that supports lip syncing.

1. **Turn the LT 4400 lip sync feature on.**

   SDI SETTING→LIPSYNC to turn this feature on. For details, see the LT 4400 instruction manual.

2. **Send the signal generated from the LT 4400 SDI output connector to the transfer route. Apply the signal received from the transfer route to the SDI connector of this instrument.**

   If the output audio is external audio, apply the video signal to the SDI input connector and the audio signal to the digital audio I/O connector.

3. **Select the audio signal.**

   On the instrument's AUDIO → F•1 MAPPING →AUDIO MAPPING tab, set the audio signal to EMB AUDIO (for embedded audio) or EXT AUDIO (for digital audio I/O connector). For EXT AUDIO, EXTERNAL AUDIO on the AUDIO IN/OUT tab must be set to INPUT.

4. The lip sync measurement screen is displayed.

Press STATUS → F•2 SDI ANALYSIS → F•4 AV PHASE.

The time difference when the luminance level of the video signal (the G signal level when the input signal is RGB) exceeds the specified value or when the audio level signal exceeds the specified value is measured, and the results are displayed numerically and graphically for each channel.

The measured value is displayed in units of time and frames. If the audio signal cannot be detected, "UNLOCK" is displayed. If the audio signal cannot be measured correctly, "MISSING" is displayed. Further, when the measured value is updated, an asterisk is displayed next to the channel.

You can set the video signal measurement range, video signal luminance level, and audio signal level using F•5 AV PHASE SETUP.

8.7.1 Selecting the Measurement Range

To select the graph measurement range, follow the procedure below.

Procedure

STATUS → F•2 SDI ANALYSIS → F•4 AV PHASE → F•1 SCALE MAX: 50ms / 100ms / 500ms / 1.0s / 2.5s

8.7.2 Updating the Measurement Screen

To update the measurement screen, follow the procedure below.

Procedure

STATUS → F•2 SDI ANALYSIS → F•4 AV PHASE → F•2 REFRESH

8.7.3 Setting the Measurement Range

To set the measurement range, follow the procedure below. Use the AV PHASE SETUP tab to configure these settings.

Procedure

STATUS → F•2 SDI ANALYSIS → F•4 AV PHASE → F•5 AV PHASE SETUP

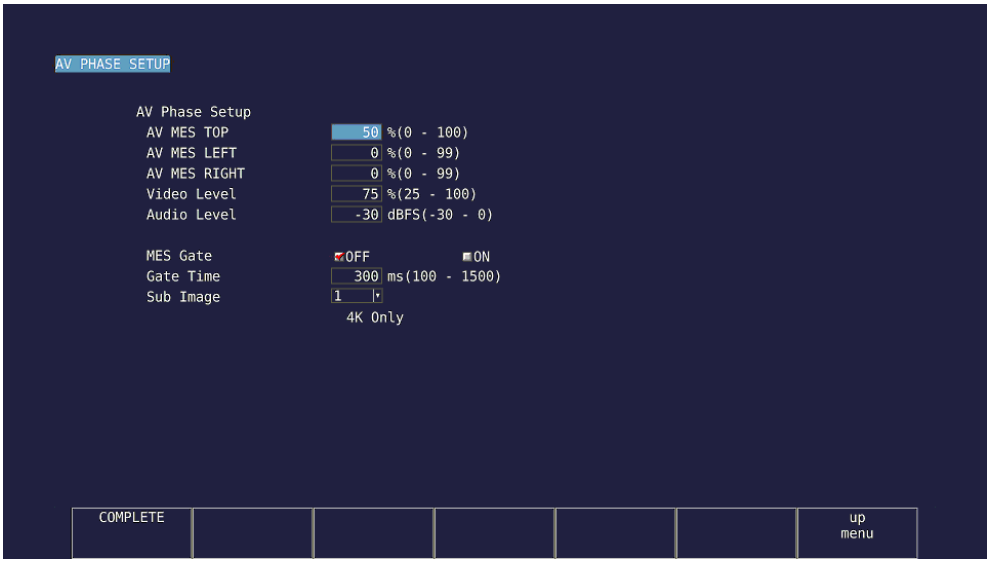


Figure 8-14 AV PHASE SETUP tab

- **AV MES TOP**

  Set the video signal measurement line with the top edge of the picture taken to be 0 % and the bottom edge to be 100 %.
  You can also set this using LINE SELECT on the PIC menu while viewing the picture.
  [See also] 5.3.3, “Setting the Lip Sync Measurement Range (SER03)”

  0 - 50 - 100%

- **AV MES LEFT**

  Set the video signal measurement range (left side) with the left edge of the picture taken to be 0 % and the right edge to be 100 %. You cannot set this to the right of the line set with AV MES RIGHT.
  You can also set this using LINE SELECT on the PIC menu while viewing the picture.
  [See also] 5.3.3, “Setting the Lip Sync Measurement Range (SER03)”

  0 - 99%

- **AV MES RIGHT**

  Set the video signal measurement range (right side) with the right edge of the picture taken to be 0 % and the left edge to be 100 %. You cannot set this to the left of the line set with AV MES LEFT.
  You can also set this using LINE SELECT on the PIC menu while viewing the picture.
  [See also] 5.3.3, “Setting the Lip Sync Measurement Range (SER03)”

  0 - 99%

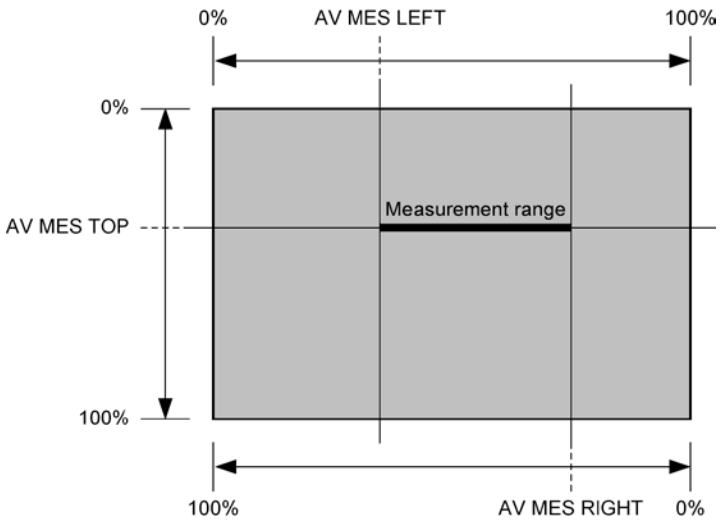


Figure 8-15 Setting the measurement range (video signal)

- **Video Level**

  Set the video signal luminance level. The time difference from the audio signal is measured when the luminance level of the measurement range specified with AV MES exceeds the level specified here.

  25 - 75 - 100%

- **Audio Level**

  Set the audio signal level. The time difference from the video signal is measured when the audio signal level exceeds the level specified here.

  -30 - 0dBFS

- **MES Gate**

  Select whether to specify the measurement range of the audio signal. Set this to ON such as when using a pattern containing multiple audio signals for a single video signal.

  OFF / ON

- **Gate Time**

  When MES Gate is set to ON, set the measurement range of the audio signal. The measurement range is “the rise time of the video signal ± the time set with Gate Time.”

  100 - 300 - 1500

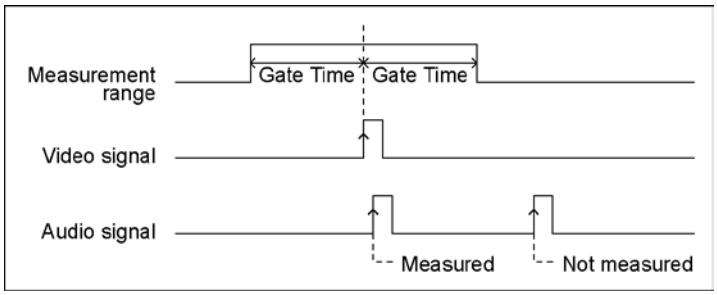


Figure 8-16 Setting the measurement range (audio signal)

- **Sub Image**

  When the input signal is 4K (both square format and 2 sample interleave format), select the sub image for setting the measurement range.

1 / 2 / 3 / 4

8.8 Displaying a List of Ancillary Data

To display a list of ancillary data, follow the procedure below.

Procedure

STATUS → F•4 ANC DATA VIEWER

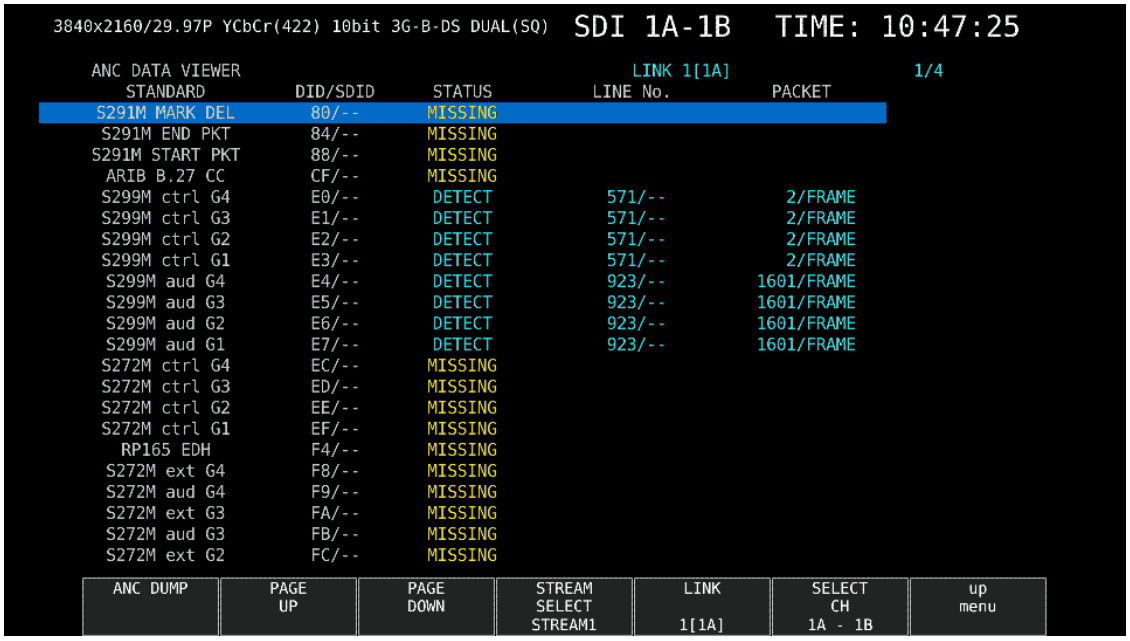


Figure 8-17 Ancillary data display

8.8.1 Ancillary Data Display Explanation

On the ancillary data display, data is displayed as a list for each standard. If data is detected, “DETECT” is displayed in the STATUS column. If data is not detected, “MISSING” is displayed in the STATUS column.

- **Data Viewing**

  By turning the function dial (F•D) to the right, you can scroll the screen to view all the data. You can also press F•2 PAGE UP and F•3 PAGE DOWN to move between pages. In the upper right of the screen, the “page number/total number of pages” is displayed. If you press the function dial (F•D), the cursor returns to the first data entry.

- **Selecting Which Stream to Display**

  When the input signal is 3G or 12G, you can use F•4 STREAM SELECT to set the data to display to STREAM1 or STREAM2.

- **Selecting the Displayed Information**

  When the input signal is multi link, you can use F•5 LINK to select displayed information. When the input signal is 12G, you can use F•5 SUB to select displayed information.

8.8.2 Displaying a Dump of Ancillary Data

To display a dump of the data that you have selected on the ancillary data display, follow the procedure below.
By turning the function dial (F•D) to the right, you can scroll the screen to view all the data.
If you press the function dial (F•D), the cursor returns to the first data entry.

Procedure

STATUS → F•3 ANC DATA VIEWER → F•1 ANC DUMP

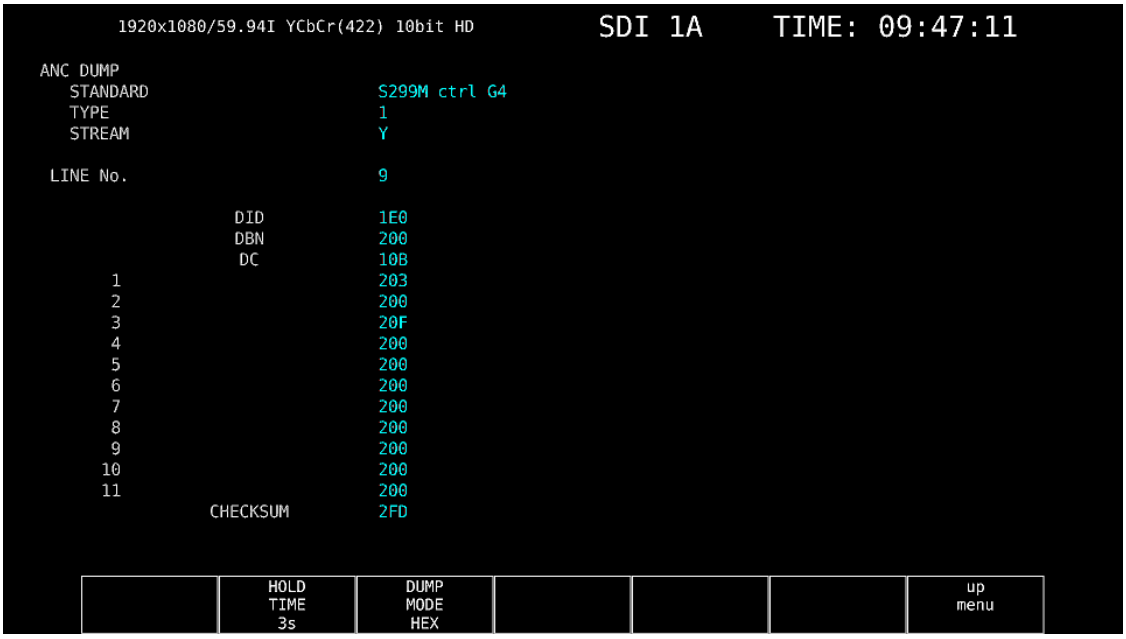


Figure 8-18 Ancillary dump display

8.8.3 Updating the Dump Display

When the selected data is embedded in multiple lines, the line number that is displayed on the ancillary dump display is switched at a regular interval. (However, the line numbers are switched at an irregular interval.)
To select the dump display update time, follow the procedure below.

Procedure

STATUS → F•3 ANC DATA VIEWER → F•1 ANC DUMP → F•2 HOLD TIME: HOLD / 1s / 3s

Setting

HOLD:	The screen is not updated.
1s:	The screen is updated once per second.
3s:	The screen is updated once every 3 seconds.

8.8.4 Selecting the Dump Mode

To select the dump mode, follow the procedure below.

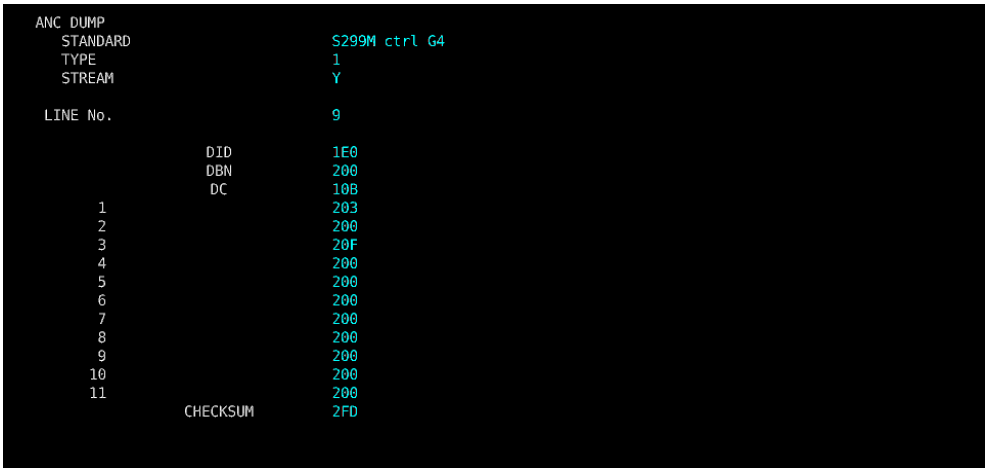
Procedure

STATUS → F•3 ANC DATA VIEWER → F•1 ANC DUMP → F•3 DUMP MODE: HEX / BINARY

Setting

HEX:	Data is displayed in hexadecimal format.
BINARY:	Data is displayed in binary format.

DUMP MODE = HEX



DUMP MODE = BINARY

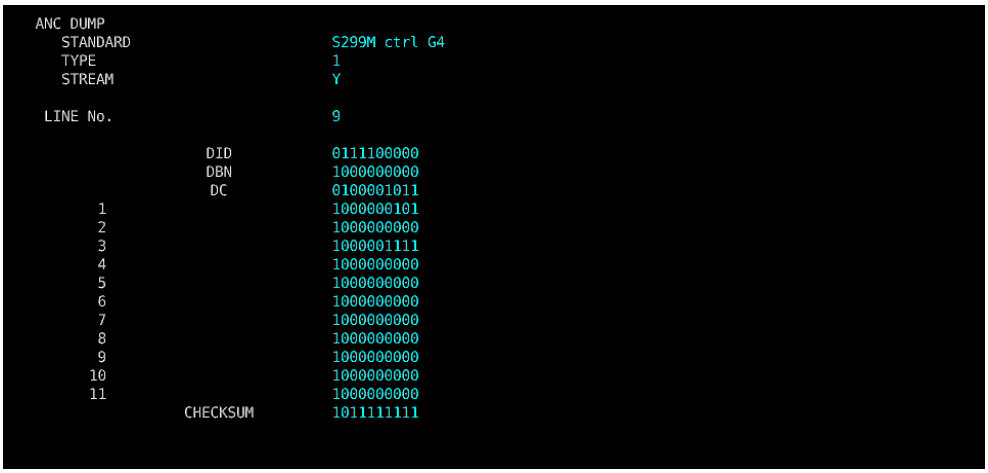


Figure 8-19 Selecting the dump mode

8.9 Detecting Ancillary Packets

To display the ancillary packet display, follow the procedure below.
If an ancillary packet is detected, “DETECT” appears. If not, “MISSING” appears. If a dummy packet is detected, “DUMMY” appears.

Procedure

STATUS → F•5 ANC PACKET

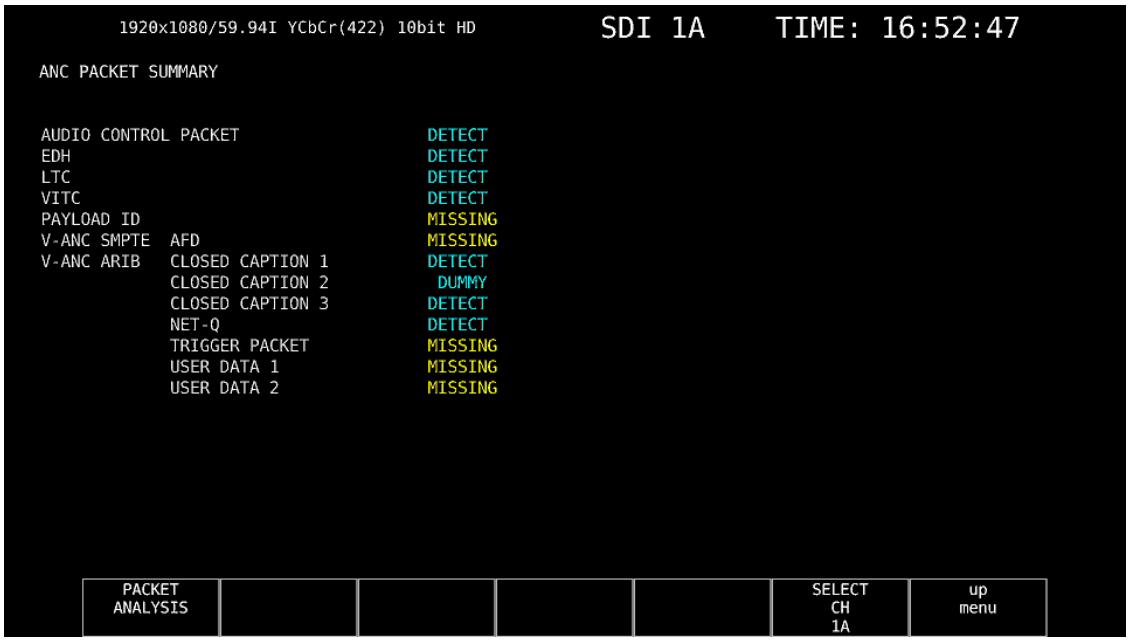


Figure 8-20 Ancillary packet display

8.9.1 Ancillary Packet Display Explanation

- **AUDIO CONTROL PACKET**

  The embedded audio consists of 4 groups that each contain 4 channels. This makes for a total of 16 channels. A single audio control packet is embedded in each group.

  Reference Section 8.9.4, “Displaying Audio Control Packets”

- **EDH (Error Detection and Handling) (for SD)**

  This packet is used for detecting transmission errors. When multiple devices are connected, this packet can be used to determine which device caused an error. Both full-field and active picture errors are detected.

  Reference Section 8.9.2, “Displaying EDH Packets”

- **LTC (Linear/Longitudinal Time Code)**

  This is a type of timecode. One is embedded per frame.

- **VITC (Vertical Interval Time Code)**

  This is a type of timecode. One is embedded per field.

- **PAYLOAD ID**

  This is a packet that is used to identify the video format. It conforms to SMPTE ST 352.

  Reference Section 8.9.3, “Displaying Payload IDs”

- **AFD**

  A packet embedded in the V-ANC area.

  Reference Section 8.9.11, “Displaying AFD Packets”

- **CLOSED CAPTION 1 to 3 (for HD or SD)**

  This is a closed caption information packet that is embedded in the V-ANC area. Up to three closed caption data entries can be embedded.

  Reference Section 8.9.6, “Displaying Closed Caption Packets”

- **NET-Q (for HD or SD)**

  This is the inter-stationary control signal.

  Reference Section 2.7.1, “Displaying the Inter-Stationary Control Signal”

- **TRIGGER PACKET (for HD or SD)**

  This is the data broadcast trigger signal.

  Reference Section 8.9.8, “Displaying the Data Broadcast Trigger Signal”

- **USER DATA 1 and 2 (for HD or SD)**

  Up to two packets of user data.

  Reference Section 8.9.9, “Displaying User Data”

8.9.2 Displaying EDH Packets

When the input signal is SD, to display EDH packets, follow the procedure below.

Procedure

STATUS → F•4 ANC PACKET → F•1 PACKET ANALYSIS → F•1 EDH

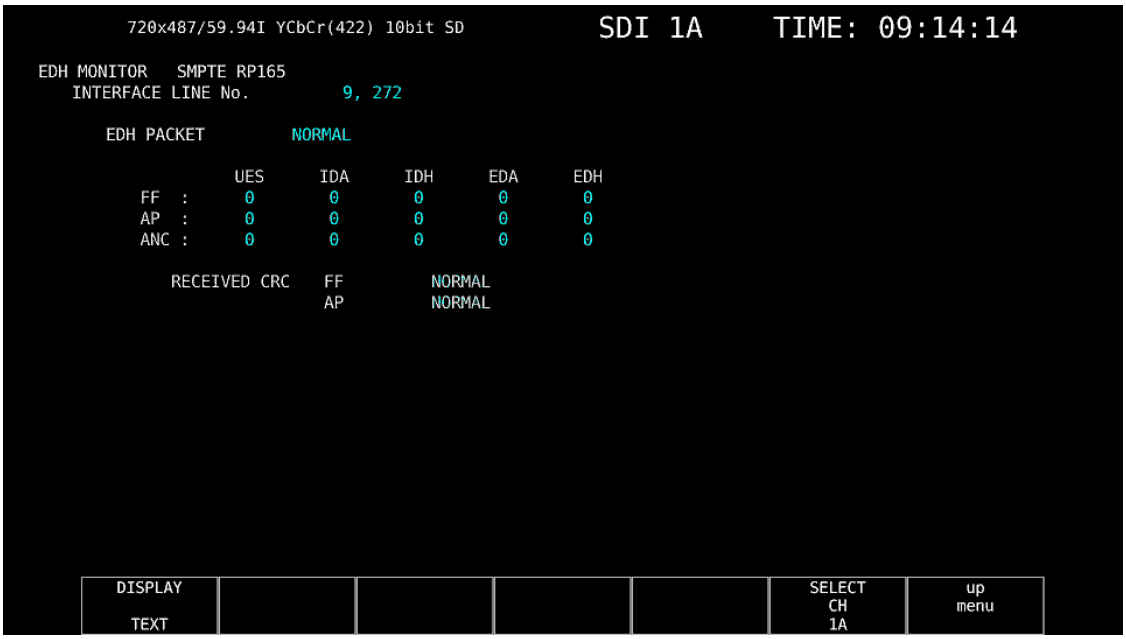


Figure 8-21 EDH packet display

- **Selecting the Display Format**

  You can use F•1 DISPLAY to set the display format to TEXT (text display) or DUMP (dump display).
  If you select DUMP, the dump display appears, and you can use the function dial (F•D) to view the entire data. If you press the function dial (F•D), the first data entry is displayed.

- **Selecting the Dump Mode**

  When F•1 DISPLAY is set to DUMP, you can use F•2 DUMP MODE to set the dump mode to HEX (hexadecimal display) or BINARY (binary display).

8.9.3 Displaying Payload IDs

To show the payload ID display, follow the procedure below.

Procedure

STATUS → F•4 ANC PACKET → F•1 PACKET ANALYSIS → F•2 PAYLOAD ID

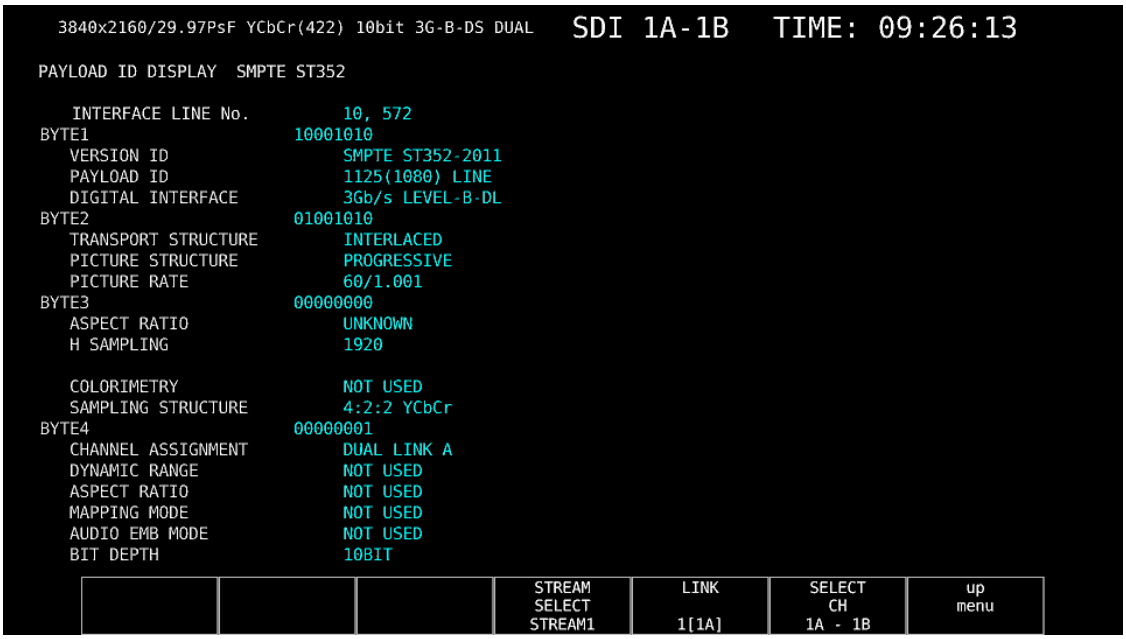


Figure 8-22 Payload ID display

- **Selecting Which Stream to Display**

  When the input signal is 3G or 12G, you can use F•4 STREAM SELECT to set the data to display to STREAM1 or STREAM2.

- **Selecting the Displayed Information**

  When the input signal is multi link, you can use F•5 LINK to select displayed information.
  When the input signal is 12G, you can use F•5 SUB to select displayed information.

8.9.4 Displaying Audio Control Packets

To display audio control packets, follow the procedure below.

Procedure

STATUS → F•4 ANC PACKET → F•1 PACKET ANALYSIS → F•3 CONTROL PACKET

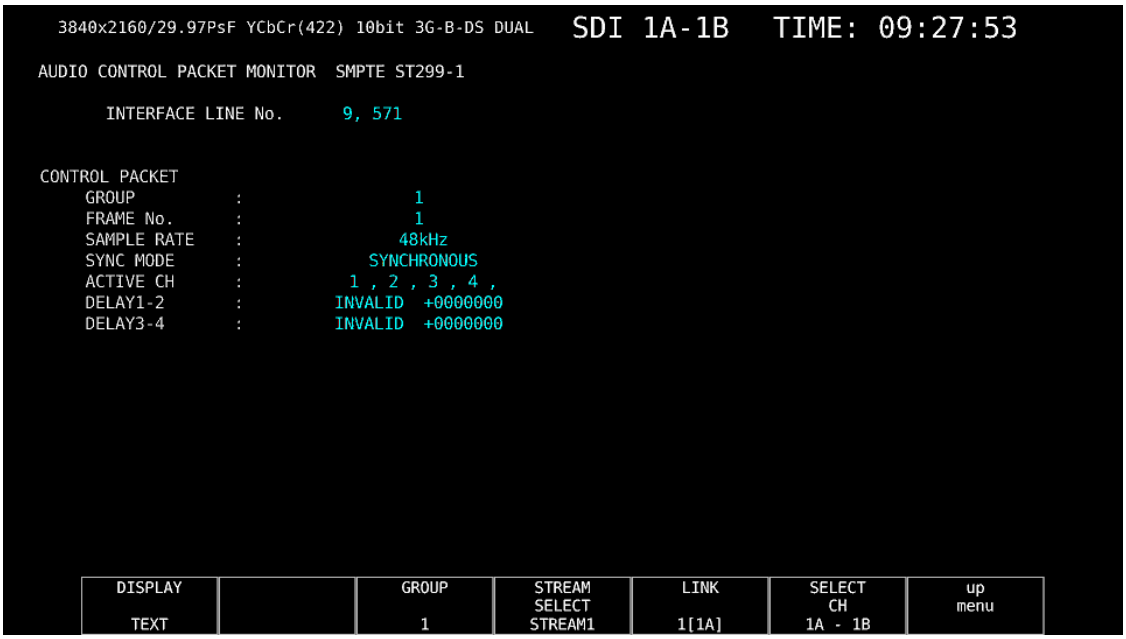


Figure 8-23 Audio control packet display

- **Selecting the Display Format**

  You can use F•1 DISPLAY to set the display format to TEXT (text display) or DUMP (dump display).
  If you select DUMP, the dump display appears, and you can use the function dial (F•D) to view the entire data. If you press the function dial (F•D), the first data entry is displayed.

- **Selecting the Dump Mode**

  When F•1 DISPLAY is set to DUMP, you can use F•2 DUMP MODE to set the dump mode to HEX (hexadecimal display) or BINARY (binary display).

- **Selecting the Group to Display**

  You can use F•3 GROUP to set the group to display to a group from groups 1 to 4. A single group in the audio signal consists of four channels.

- **Selecting Which Stream to Display**

  When the input signal is 3G-B, you can use F•4 STREAM SELECT to set the data to display to STREAM1 or STREAM2.

- **Selecting the Displayed Information**

  When the input signal is multi link, you can use F•5 LINK to select displayed information.
  When the input signal is 12G, you can use F•5 SUB to select displayed information.

8.9.5 V-ANC ARIB Display

To display the V blanking ancillary packets defined in the ARIB standard, use the ARIB menu. When the input signal is 3G or 12G, this menu item is not displayed.

STATUS → F•4 ANC PACKET → F•1 PACKET ANALYSIS → F•4 V-ANC → F•1 ARIB →

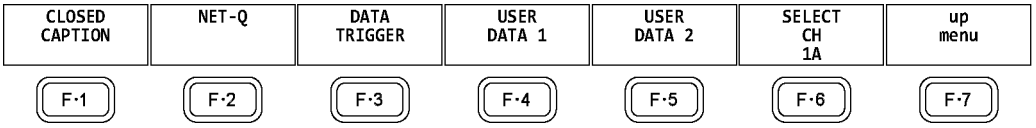


Figure 8-24 ARIB menu

8.9.6 Displaying Closed Caption Packets

To display closed caption packets, follow the procedure below.

Procedure

STATUS → F•4 ANC PACKET → F•1 PACKET ANALYSIS → F•4 V-ANC → F•1 ARIB → F•1 CLOSED CAPTION

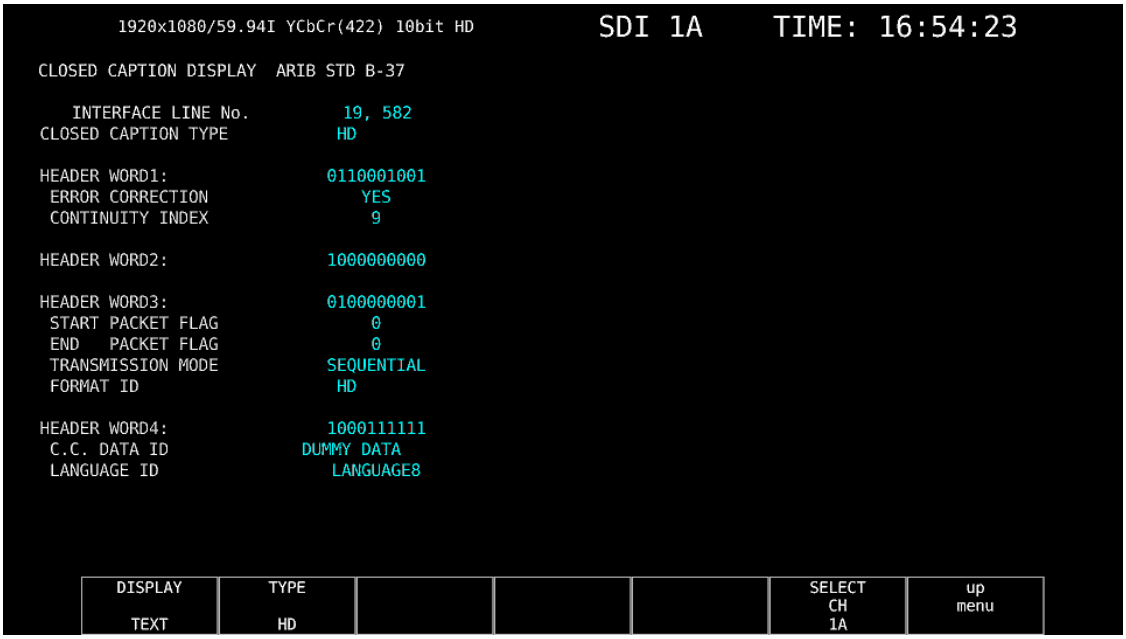


Figure 8-25 Closed caption packet display

- **Selecting the Closed Caption Type**

  You can use F•2 TYPE to set the closed caption type to HD, SD, ANALOG, or CELLULAR.

- **Selecting the Display Format**

  You can use F•1 DISPLAY to set the display format to TEXT (text display) or DUMP (dump display).
  If you select DUMP, the dump display appears, and you can use the function dial (F•D) to view the entire data. If you press the function dial (F•D), the first data entry is displayed.

- **Selecting the Dump Mode**

  When F•1 DISPLAY is set to DUMP, you can use F•2 DUMP MODE to set the dump mode to HEX (hexadecimal display) or BINARY (binary display).

- **Selecting the Displayed Information**

  When the input signal is HD(DL) or HD(QL), you can use F•5 LINK to select displayed information.

8.9.7 Displaying the Inter-Stationary Control Signal

To display the inter-stationary control signal, follow the procedure below.

Procedure

STATUS → F•4 ANC PACKET → F•1 PACKET ANALYSIS → F•4 V-ANC → F•1 ARIB → F•2 NET-Q

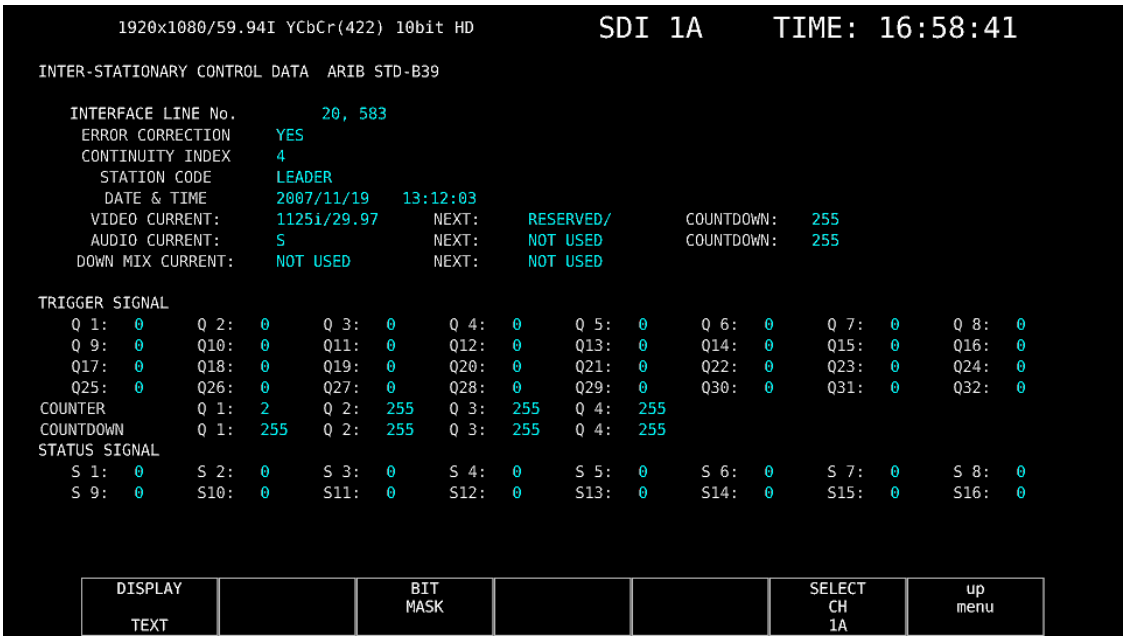
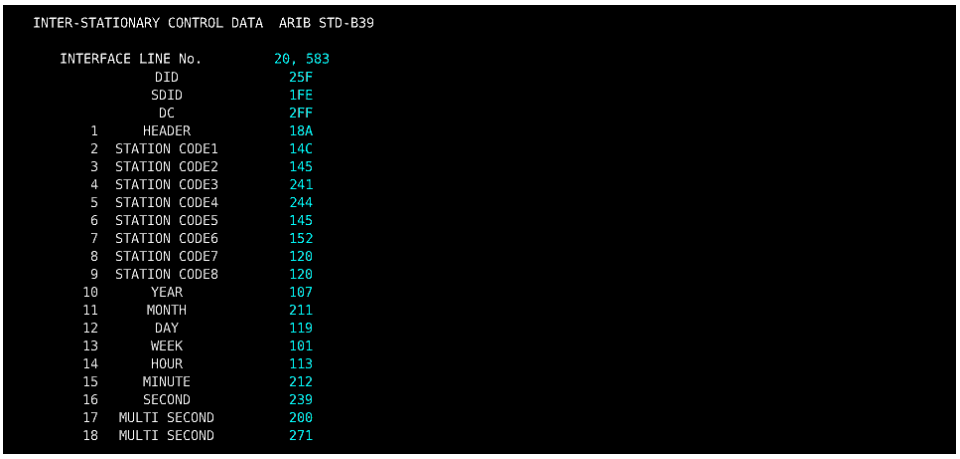


Figure 8-26 Inter-stationary control signal display

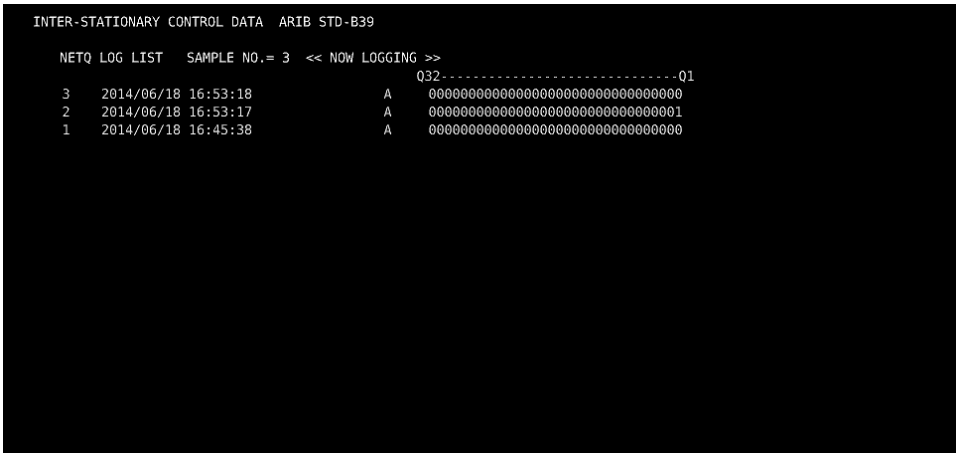
- **Selecting the Display Format**

  You can use F•1 DISPLAY to set the display format to TEXT (text display), DUMP (dump display), Q LOG (Q-signal log display), or FORMAT (format ID display).
  If you select DUMP, the dump display appears. If you select Q LOG, the log display appears. In either case, you can use the function dial (F•D) to view the entire data. If you press the function dial (F•D), the first data entry is displayed.

DISPLAY = DUMP



DISPLAY = QLOG



DISPLAY = FORMAT

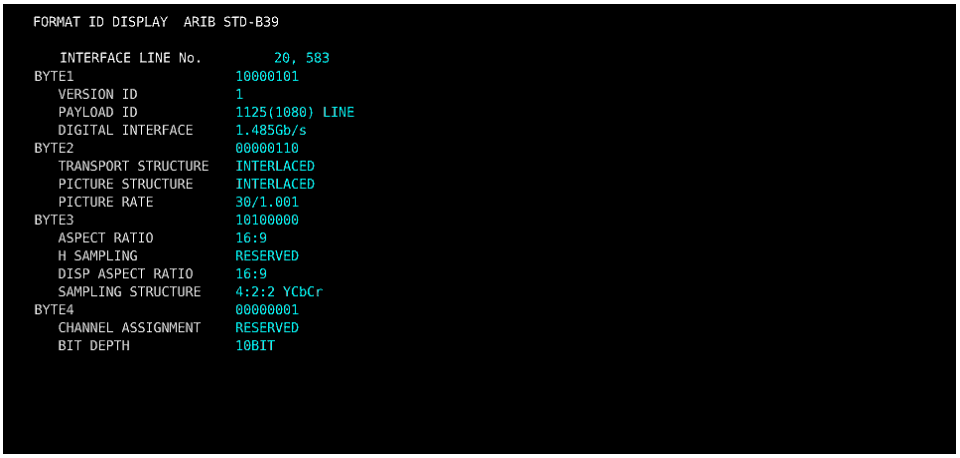


Figure 8-27 Selecting the display format

- **Selecting the Dump Mode**

  When F•1 DISPLAY is set to DUMP, you can use F•2 DUMP MODE to set the dump mode to HEX (hexadecimal display) or BINARY (binary display).

- **Clearing the Q-Signal Log**

  When F•1 DISPLAY is set to Q LOG, press F•2 Q LOG CLEAR to clear the Q-signal log.

- **Setting the Bit Mask**

  When F•1 DISPLAY is set to TEXT, you can use F•3 BIT MASK to mask the Q and status signals independently.
  Press F•4 ALL ON to set all the bit mask entries to ON. Press F•5 ALL OFF to set all the bit mask entries to OFF.

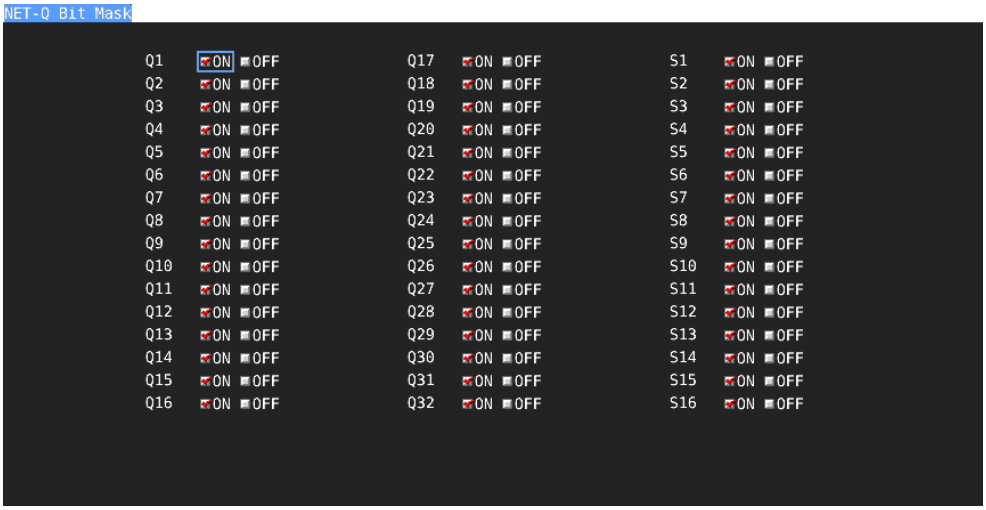


Figure 8-28 NET-Q Bit Mask tab

- **Selecting the Displayed Information**

  When the input signal is HD(DL) or HD(QL), you can use F•5 LINK to select displayed information.

- **Saving to USB Memory**

  If F•1 DISPLAY is set to Q LOG, you can press F•6 USB MEMORY to save the Q signal log to a USB memory device in CSV format. The procedure to follow to save data is the same as the procedure that was given for the event log. See section 8.4.5, “Saving to a USB Memory Device.”
  Q signal logs are saved in the NETQ folder.

USB memory device
└ LV5490_USER
  └ NETQ
    └ YYYYMMDDhhmmss.csv

8.9.8 Displaying the Data Broadcast Trigger Signal

To display the data broadcast trigger signal, follow the procedure below.

Procedure

STATUS → F•4 ANC PACKET → F•1 PACKET ANALYSIS → F•4 V-ANC → F•1 ARIB → F•3 DATA TRIGGER

Figure 8-29 Data broadcast trigger signal display

- **Selecting the Display Format**

  You can use F•1 DISPLAY to set the display format to TEXT (text display) or DUMP (dump display).
  If you select DUMP, the dump display appears, and you can use the function dial (F•D) to view the entire data. If you press the function dial (F•D), the first data entry is displayed.

- **Selecting the Dump Mode**

  When F•1 DISPLAY is set to DUMP, you can use F•2 DUMP MODE to set the dump mode to HEX (hexadecimal display) or BINARY (binary display).

- **Selecting the Displayed Information**

  When the input signal is HD(DL) or HD(QL), you can use F•5 LINK to select displayed information.

8.9.9 Displaying User Data

To display user data entries 1 and 2, follow the procedure below.
You can use the function dial (F•D) to view all the data. If you press the function dial (F•D), the first data entry is displayed.

Procedure

STATUS → F•4 ANC PACKET → F•1 PACKET ANALYSIS → F•4 V-ANC → F•1 ARIB
→ F•4 USER DATA 1
→ F•5 USER DATA 2

Figure 8-30 User data display

- **Selecting the Dump Mode**

  You can use F•2 DUMP MODE to set the dump mode to HEX (hexadecimal display) or BINARY (binary display).

- **Selecting the Displayed Information**

  When the input signal is HD(DL) or HD(QL), you can use F•5 LINK to select displayed information.

8.9.10 V-ANC SMPTE Display

To display the V blanking ancillary packets defined in the SMPTE standard, use the SMPTE menu.

STATUS → F•4 ANC PACKET → F•1 PACKET ANALYSIS → F•4 V-ANC → F•2 SMPTE →

Figure 8-31 SMPTE menu

8.9.11 Displaying AFD Packets

To display AFD packets, follow the procedure below.

Procedure

STATUS → F•4 ANC PACKET → F•1 PACKET ANALYSIS → F•4 V-ANC → F•2 SMPTE → F•5 AFD

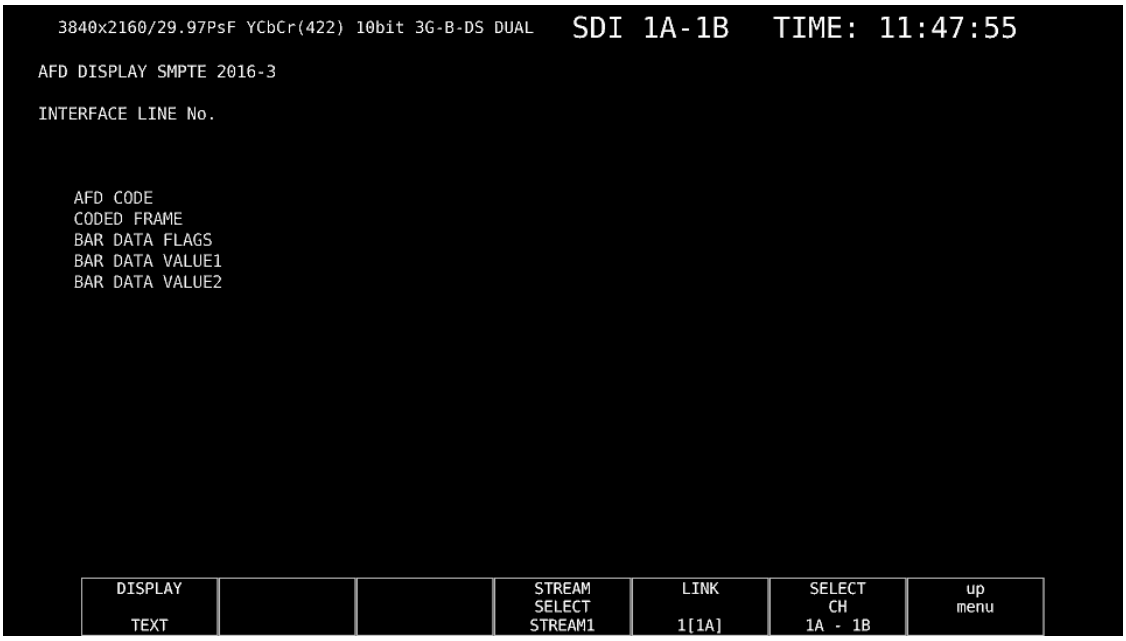


Figure 8-32 AFD packet display

- **Selecting the Display Format**

  You can use F•1 DISPLAY to set the display format to TEXT (text display) or DUMP (dump display).
  If you select DUMP, the dump display appears, and you can use the function dial (F•D) to view the entire data. If you press the function dial (F•D), the first data entry is displayed.

- **Selecting the Dump Mode**

  When F•1 DISPLAY is set to DUMP, you can use F•2 DUMP MODE to set the dump mode to HEX (hexadecimal display) or BINARY (binary display).

- **Selecting Which Stream to Display**

  When the input signal is 3G-B, you can use F•4 STREAM SELECT to set the data to display to STREAM1 or STREAM2.

- **Selecting the Displayed Information**

  When the input signal is multi link, you can use F•5 LINK to select displayed information.
  When the input signal is 12G, you can use F•5 SUB to select displayed information.

8.9.12 Performing Custom Searches

To show the custom search display, follow the procedure below.
You can use the function dial (F•D) to view all the data. If you press the function dial (F•D), the first data entry is displayed.

Procedure

STATUS → F•4 ANC PACKET → F•1 PACKET ANALYSIS → F•5 CUSTOM SEARCH

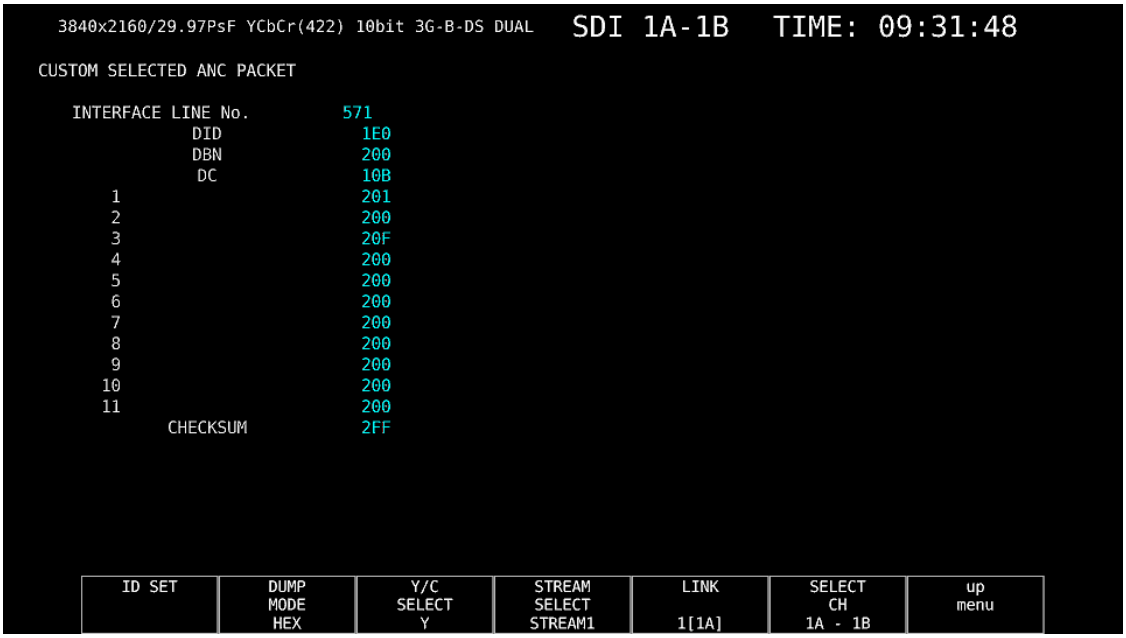


Figure 8-33 Custom search display

- **Detecting Ancillary Packets**

  You can search ancillary packets by using F•1 ID SET in the CUSTOM SEARCH menu.

  STATUS → F•4 ANC PACKET → F•1 PACKET ANALYSIS → F•5 CUSTOM SEARCH → F•1 ID SET →

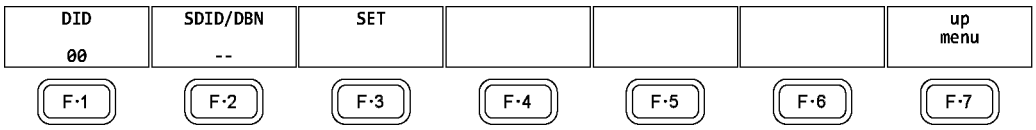


Figure 8-34 ID SET menu

Set F•1 DID and F•2 SDID/DBN to display ancillary packets on the basis of the combination of the DID and SDID/DBN.
You can set F•1 DID in the range of 00 to FF. Press the function dial (F•D) to return the setting to its default value (00).
You can set F•2 SDID/DBN in the range of 00 to FF or select "--" to not specify a value. Press the function dial (F•D) to return the setting to its default value (--).
Press F•3 SET to clear the blue cursor assigned to F•1 DID or F•2 SDID/DBN. Use this key when you want to view all the data using the function dial (F•D).

- **Selecting the Dump Mode**

  You can use F•2 DUMP MODE to set the dump mode to HEX (hexadecimal display) or BINARY (binary display).

- **Selecting Which Signal to Display**

  When the input signal is not SD, you can use F•3 Y/C SELECT to set the data to display to that of the Y signal or the C signal.

- **Selecting Which Stream to Display**

  When the input signal is 3G-B, you can use F•4 STREAM SELECT to set the data to display to STREAM1 or STREAM2.

- **Selecting the Displayed Information**

  When the input signal is multi link, you can use F•5 LINK to select displayed information.
  When the input signal is 12G, you can use F•5 SUB to select displayed information.

8.10 IP(NMI) Status Screen Explanation (SER08)

If on the SDI IN tab in the system settings, SDI System is set to 4K NMI or NMI, pressing STATUS displays the IP (NMI) status.
To return to the normal status display from IP (NMI) status, press F•1 STATUS.

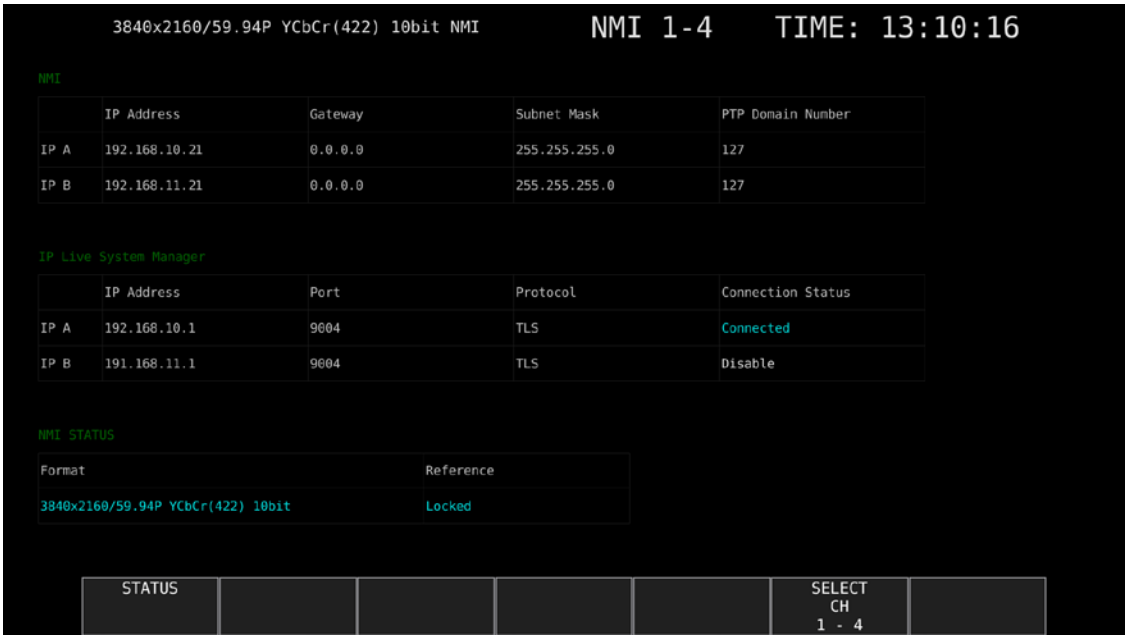


Figure 8-35 NMI Status screen

- **NMI**

・**IP Address / Gateway / Subnet Mask / PTP Domain Number**

These show the IP address, gateway address, subnet mask, and PTP domain number of NMI input connectors IP A and IP B on the rear panel.

- **IP Live System Manager**

・**IP Address / Port / Protocol**

These show the IP address, port, and protocol of IP Live System Manager connected to the NMI input connectors IP A and IP B on the rear panel.

・**Connection Status**

This shows the connection status of IP Live System Manager and the NMI input connectors IP A and IP B on the rear panel.

Displayed text	Color	Connection status
Connected	Cyan	Connected to IP Live System Manager
Connecting	White	Establishing connection to IP Live System Manager
Disable	White	Connection disabled

- **NMI STATUS**

・**Format**

This shows the format information. Normally the text is cyan, but if the format is not appropriate, it turns red.

・**Reference**

This shows the IP (NMI) network genlock status.

Displayed text	Color	Connection status
Locked	Cyan	Locked
Unlocked	Yellow	Not locked

9. EYE PATTERN DISPLAY (SER02/SER09)

To display the eye pattern, press EYE.

On the eye pattern display you can use F•2 MODE to display the eye pattern or jitter.

The channel that can be displayed is a single system selected with F•6 SELECT CH and F•5 LINK SELECT. Simul mode is not supported. In addition signals applied to 2A to 2D cannot be displayed.

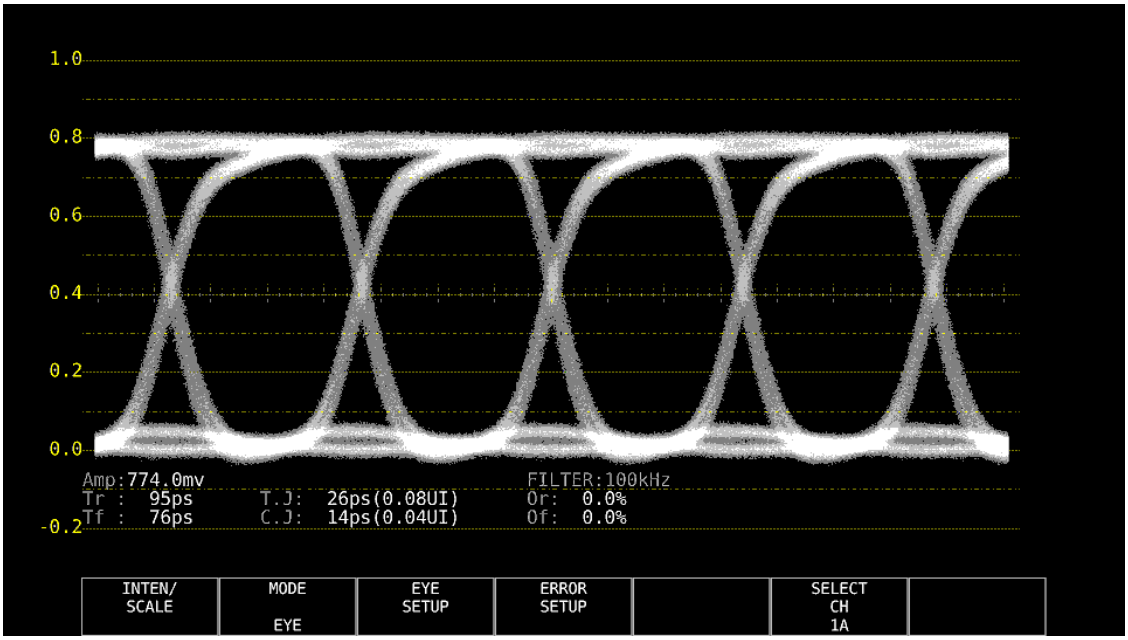


Figure 9-1 Eye pattern display

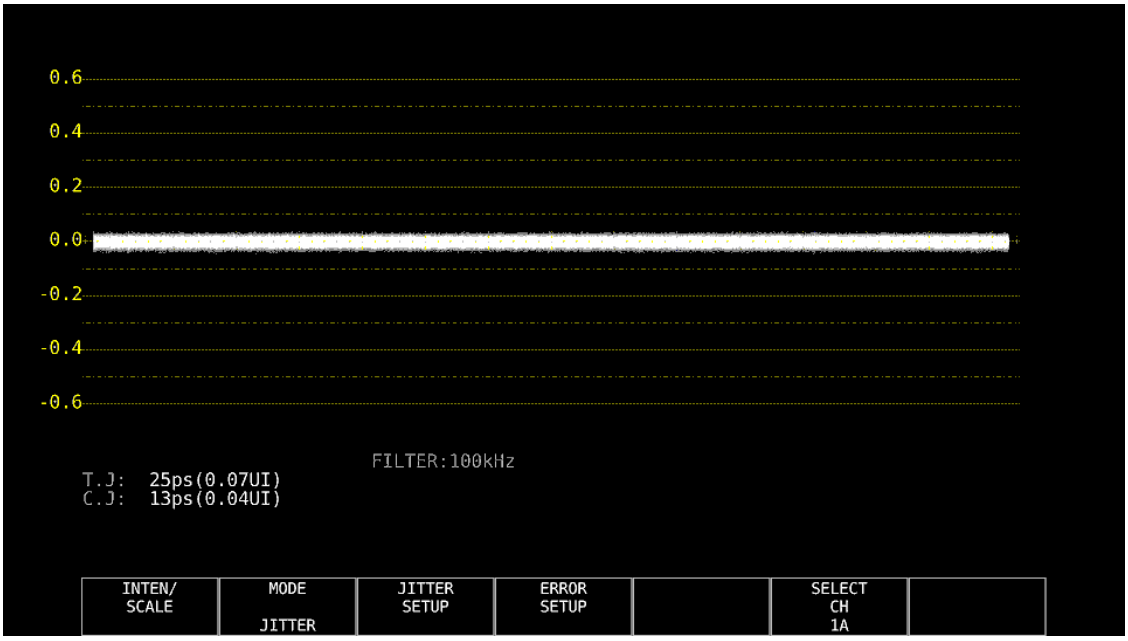


Figure 9-2 Jitter display

- **Displaying the Eye Pattern and Jitter Simultaneously**

  By using the layout feature, you can display the eye pattern and jitter simultaneously. For details, see the LV 5490 instruction manual.

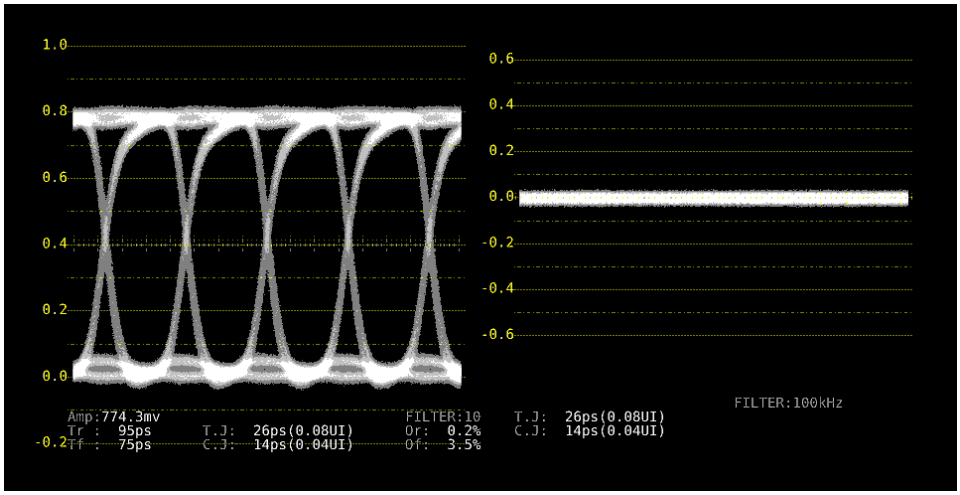


Figure 9-3 Eye pattern and jitter display

9.1 Eye Pattern Display Explanation

- **Automatic Measurement**

  On the eye pattern display, values such as the amplitude of the eye pattern and the jitter are measured automatically and displayed. 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 the error setup. If automatic measurements cannot be performed due to noise in the waveform or other reason, measured values are displayed as "----." If this occurs, use cursors to measure manually.

  Reference Section 9.9, “Configuring Error Detection Settings”

  The timing jitter and current jitter measurement items show the values that were measured in jitter display mode. The LV 5490SER02 use a phase detector 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.

- **Measurement items**

The items that can be automatically measured are shown below.

Table 9-1 Measurement items

Symbol	Display	Description
a	Amp	Eye-pattern amplitude
b	Tr	Rise time (time from 20% to 80% of amplitude)
c	Tf	Fall time (time from 80% to 20% of amplitude, and 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

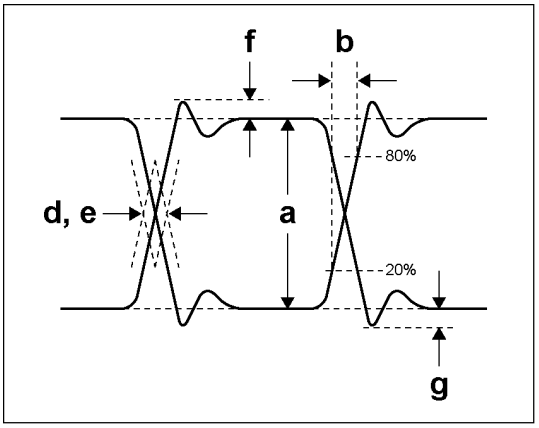


Figure 9-4 Explanation of measurement items

- **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 9-2 Time that corresponds to 1 UI

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

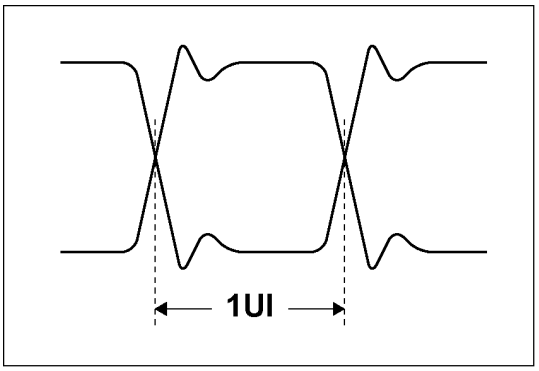


Figure 9-5 Unit interval

9.2 Jitter Display Explanation

- **Measurement**

  In the jitter display mode, the jitter component is extracted from the input signal and plotted on a time graph. The time (horizontal) axis can be displayed in different ways depending on the data interval of the lines, fields, or frames, which are being transmitted in the SDI signal.

- **Automatic Measurement**

  Timing jitter (T.J) and current jitter (C.J) are automatically measured and displayed on the jitter display screen. The measurement range is 0.00 to 9.60 UI.

  SMPTE defines two methods of measuring jitter. One method uses an eye pattern, and the other method uses a phase detector.
  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 detector 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 5490SER02 uses the phase detector method.

  Measured values are normally displayed in white, but they are displayed in red if they exceed the values that you have specified in the error setup. If 10.00 UI is exceeded, “OVER” is displayed.

  Reference Section 9.9, “Configuring Error Detection Settings”

9.3 Setting the Waveform Display Position

Use the V POS and H POS knobs to adjust the display position of the waveform.
On the multi display, these are valid when you press F•7 MULTI EYE on the MULTI menu.

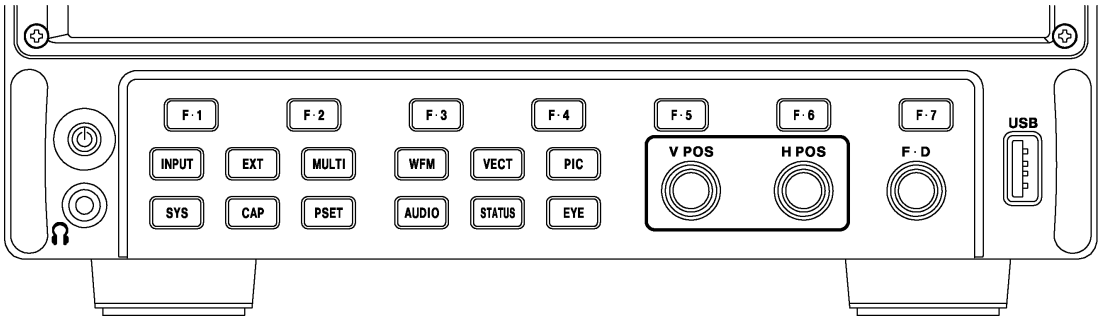


Figure 9-6 V POS and H POS knobs

- **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.

9.4 Switching between Eye Pattern and Jitter

To switch between eye pattern and jitter, follow the procedure below.

Procedure

EYE → F•2 MODE: EYE / JITTER

9.5 Selecting Which Link to Display

You cannot display eye patterns of multiple channels at the same time.
When the link format is set to multi, to select which link to display, follow the procedure below.
This menu appears in other menu hierarchies; you can select the link in the same manner.

Procedure (for HD (DL))

EYE → F•5 LINK SELECT: A[1A] / B[1B] or A[1C] / B[1D]

Procedure (for 3G (DL)-4K)

EYE → F•5 LINK SELECT: 1[1A] / 2[1B] or 1[1C] / 2[1D]

Procedure (for 3G (QL))

EYE → F•5 LINK SELECT: 1[1A] / 2[1B] / 3[1C] / 4[1D]

9.6 Configuring the Intensity and Scale Settings

To configure the intensity and scale settings, press F•1 INTEN / SCALE on the EYE menu. You can configure these settings separately for the eye pattern and jitter.

EYE → F•1 INTEN/SCALE →

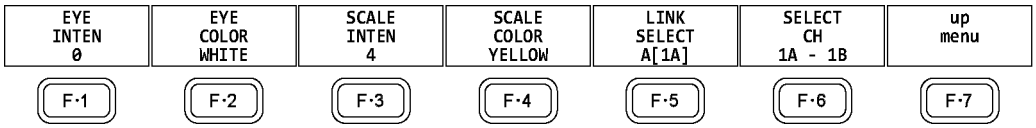


Figure 9-7 INTEN/SCALE menu

9.6.1 Adjusting the Waveform Intensity

To adjust the intensity of the eye pattern and jitter, follow the procedure below.
Press the function dial (F•D) to return the setting to its default value (0).

Procedure

EYE → F•1 INTEN/SCALE
→ F•1 EYE INTEN: -128 - 0 - 127
→ F•1 JITTER INTEN: -128 - 0 - 127

9.6.2 Selecting the Waveform Color

To select the color of the eye-pattern and jitter, follow the procedure below.

Procedure

EYE → F•1 INTEN/SCALE
→ F•2 EYE COLOR: WHITE / YELLOW / CYAN / GREEN / MAGENTA / RED / BLUE
→ F•2 JITTER COLOR: WHITE / YELLOW / CYAN / GREEN / MAGENTA / RED / BLUE

9.6.3 Adjusting the Scale Intensity

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

Procedure

EYE → F•1 INTEN/SCALE → F•3 SCALE INTEN: -8 - 4 - 7

9.6.4 Selecting the Scale Color

To select the scale color, follow the procedure below.

Procedure

EYE → F•1 INTEN/SCALE → F•4 SCALE COLOR: WHITE / YELLOW / CYAN / GREEN / MAGENTA / RED / BLUE

9.7 Configuring Eye Pattern Display Settings

To configure eye pattern display settings, press F•3 EYE SETUP on the EYE menu. This appears when F•2 MODE is set to EYE.

EYE → F•3 EYE SETUP →

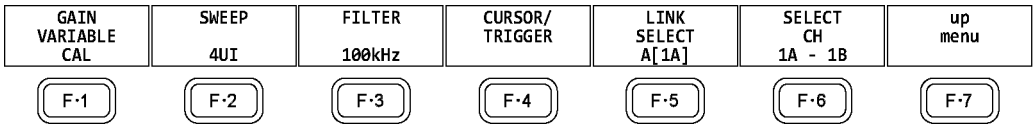


Figure 9-8 EYE SETUP menu

9.7.1 Adjusting the Gain

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

Procedure

EYE → F•3 EYE SETUP → F•1 GAIN VARIABLE: CAL / VARIABLE

Settings

CAL:	The eye pattern is shown without gain.
VARIABLE:	The eye pattern is shown with the specified gain (x0.50 to x2.00). 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 (x1.00).

9.7.2 Selecting the Sweep Time

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

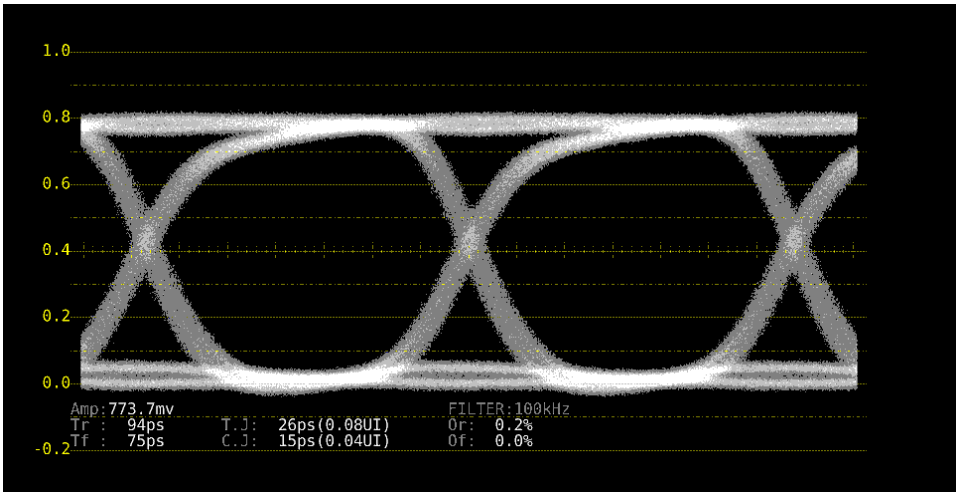
Procedure

EYE → F•3 EYE SETUP → F•2 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 = 16UI

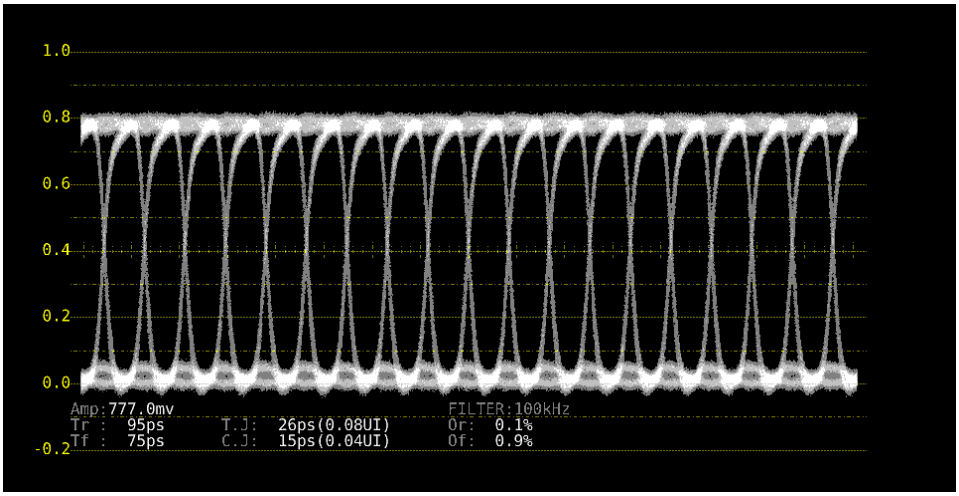


Figure 9-9 Selecting the sweep time

9.7.3 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 also changes.

Reference Section 9.8.3, “Selecting the Filter”

Procedure

EYE → F•3 EYE SETUP → F•3 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 not SD, jitter at 100 kHz and higher is measured. When the input signal is SD, jitter at 1 kHz and higher is measured.

9.7.4 Turning Cursors On and Off

To configure cursor settings, press F•4 CURSOR/TRIGGER on the EYE SETUP menu.

EYE → F•3 EYE SETUP → F•4 CURSOR/TRIGGER →

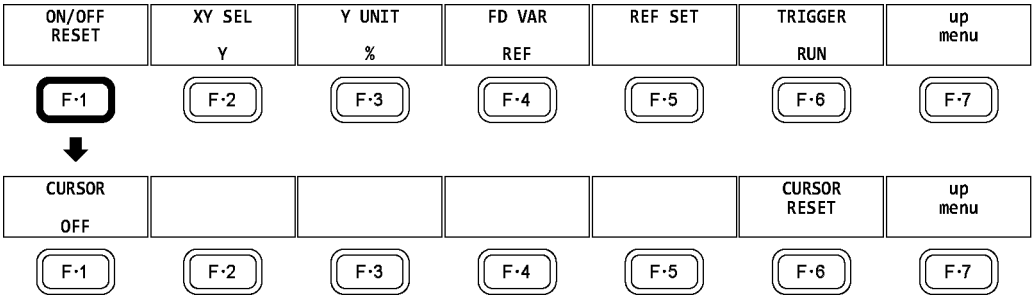


Figure 9-10 CURSOR/TRIGGER menu

To turn cursors on and off, follow the procedure shown below.
When the cursors are turned on, the REF cursors are displayed in yellow (X) and light blue (Y), and the DELTA cursors are displayed in purple (X) and green (Y). The values of DELTA-REF appear as measured values in the upper part of the screen.

Procedure

EYE → F•3 EYE SETUP → F•4 CURSOR/TRIGGER → F•1 ON/OFF RESET → F•1 CURSOR: ON / OFF

CURSOR = ON

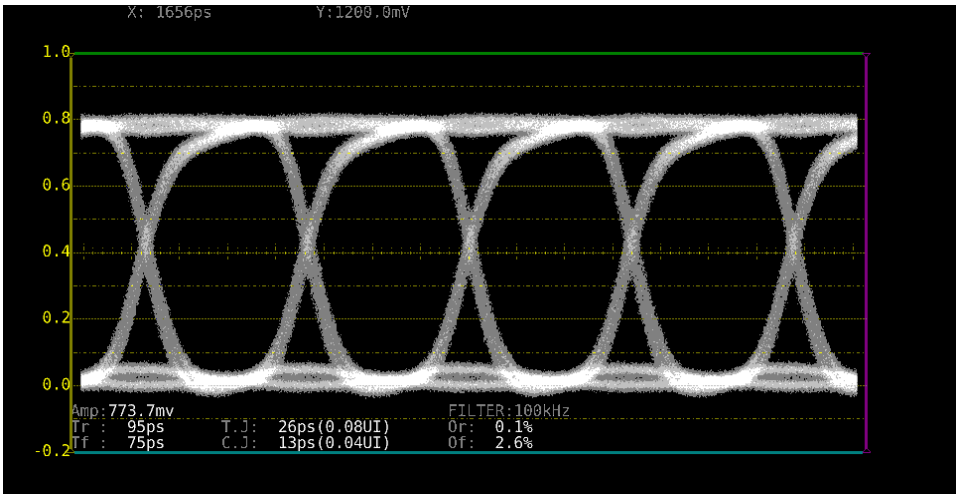


Figure 9-11 Cursor display

9.7.5 Selecting the Cursor

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 which cursors you want to move, follow the procedure below.

Procedure

EYE → F•3 EYE SETUP → F•4 CURSOR/TRIGGER → F•2 XY SEL: X / Y / Tr,Tf

If you select Tr,Tf, you can measure the rise time (Tr) and fall time (Tf). Follow 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.**

   This is the 100% amplitude position.

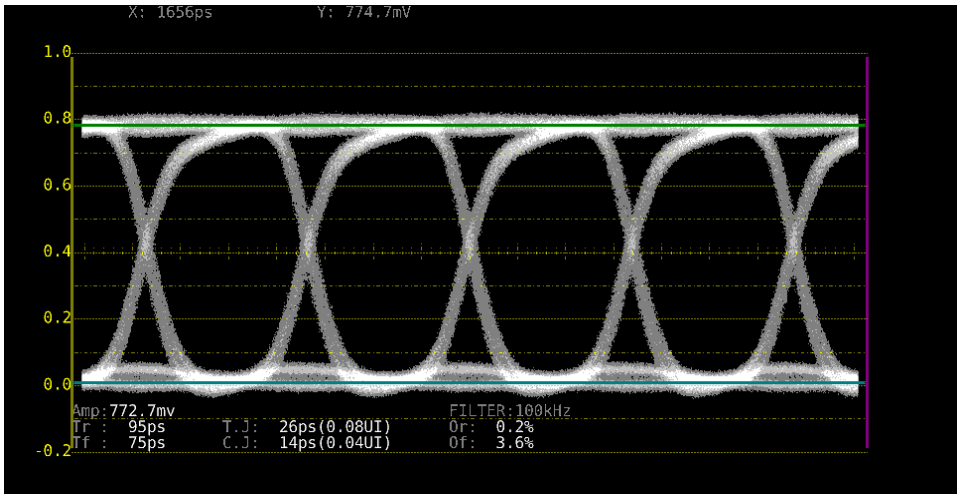


Figure 9-12 Tr,Tf measurement (1)

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.

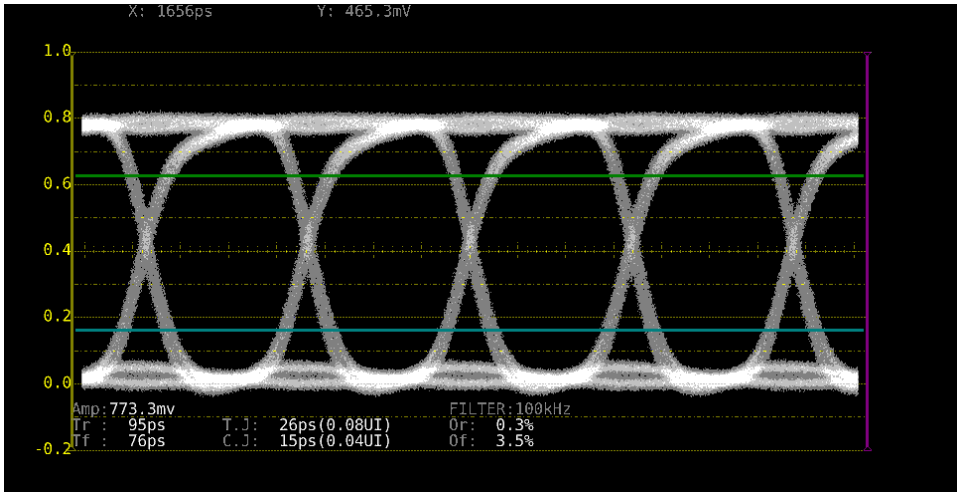


Figure 9-13 Tr,Tf measurement (2)

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

Align with the rising edge of the pattern to measure Tr and the falling edge to measure Tf. (Figure 9-14 is an example for Tr)
The measured value is displayed next to X in the upper part of the screen.

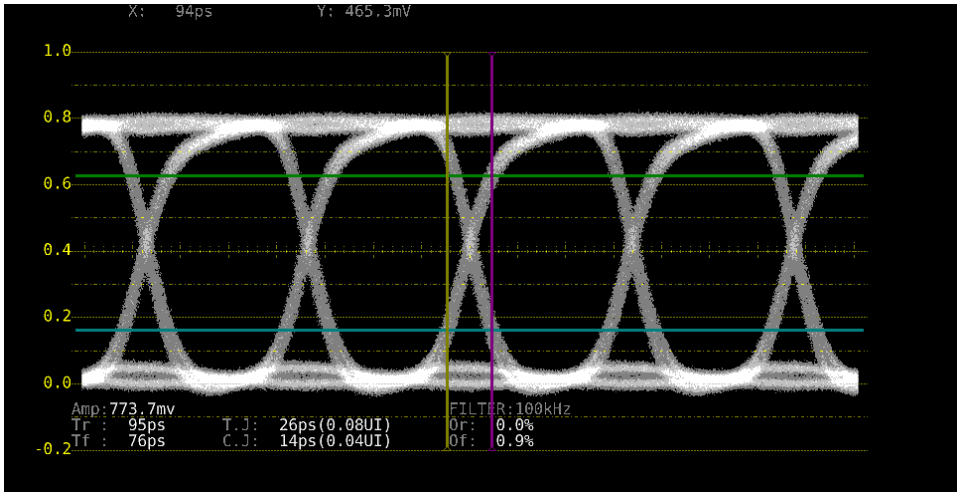


Figure 9-15 Tr,Tf measurement (3)

9.7.6 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•3 EYE SETUP → F•4 CURSOR/TRIGGER → F•4 FD VAR: REF / DELTA / TRACK

Settings

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

9.7.7 Selecting the X-Axis Measurement Unit

When F•2 XY SEL is set to X, to select the X-axis cursor measurement unit, follow the procedure below.

Procedure

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

Settings

sec:	The measurement unit is seconds.
Hz:	The measurement unit is frequency, with the length of one period set to the distance between the two cursors.
UIp-p:	The measurement unit is UIp-p, with one UIp-p set to one cycle of the eye pattern.

9.7.8 Selecting the Y-Axis Measurement Unit

When F•2 XY SEL is set to Y, to select the Y-axis cursor measurement unit, follow the procedure below.

Procedure

EYE → F•3 EYE SETUP → F•4 CURSOR/TRIGGER → F•3 Y UNIT: V / %

Settings

V:	The measurement unit is volts.
%:	The amplitude will be measured as a percentage of the amplitude at the time when you pressed F•5 REF SET.

9.7.9 Selecting the Display Mode

To select the eye pattern display mode, follow the procedure below.
If the eye pattern and jitter are displayed simultaneously, the setting specified here also applies to the jitter.

Procedure

EYE → F•3 EYE SETUP → F•4 CURSOR/TRIGGER → F•6 TRIGGER: RUN / STOP

Settings

RUN:	The input signal is automatically updated and displayed.
STOP:	The input signal is displayed statically. This is convenient for cursor measurement. Even if STOP is selected, if you change the measurement conditions, such as switching to jitter, the mode switches to RUN.

9.7.10 Resetting Cursors

To reset the cursor positions, follow the procedure below.

Procedure

EYE → F•3 EYE SETUP → F•4 CURSOR/TRIGGER → F•1 ON/OFF RESET → F•6 CURSOR RESET

9.8 Configuring the Jitter Display Settings

To configure jitter display settings, press F•3 JITTER SETUP on the EYE menu.
This setting appears when F•2 MODE is set to JITTER.

EYE → F•3 JITTER SETUP →

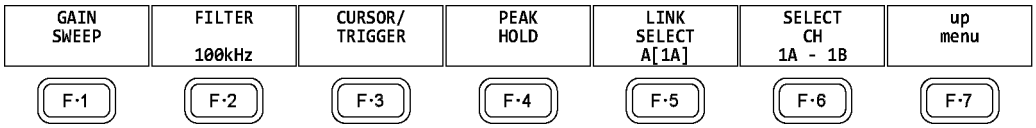


Figure 9-16 JITTER SETUP menu

9.8.1 Selecting the Magnification

To configure the gain and sweep settings, press F•1 GAIN SWEEP on the JITTER SETUP menu.

EYE → F•3 JITTER SETUP → F•1 GAIN SWEEP →

Figure 9-17 GAIN/SWEEP menu

To select the jitter magnification, follow the procedure below.

Procedure

EYE → F•3 JITTER SETUP → F•1 GAIN SWEEP → F•1 GAIN MAG
: x1 / x2 / x8 (excluding 12G)
: X1 / X2 / X4 / X16 (12G)

9.8.2 Selecting the Sweep Time

To select the sweep time, follow the procedure below.

Procedure

EYE → F•3 JITTER SETUP → F•1 GAIN SWEEP → F•2 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. This option cannot be selected when the input signal is progressive except for 60/59.94/50P of HD (DL).

9.8.3 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 the eye pattern display also changes.

Reference Section 9.7.3, “Selecting the Filter”

Procedure

EYE → F•3 JITTER SETUP → F•3 FILTER: 100kHz / 1kHz / 100Hz / 10Hz / TIMING / ALIGNMENT

9.8.4 Turning Cursors On and Off

To configure cursor settings, press F•3 CURSOR/TRIGGER on the JITTER SETUP menu.

EYE → F•3 JITTER SETUP → F•3 CURSOR/TRIGGER →

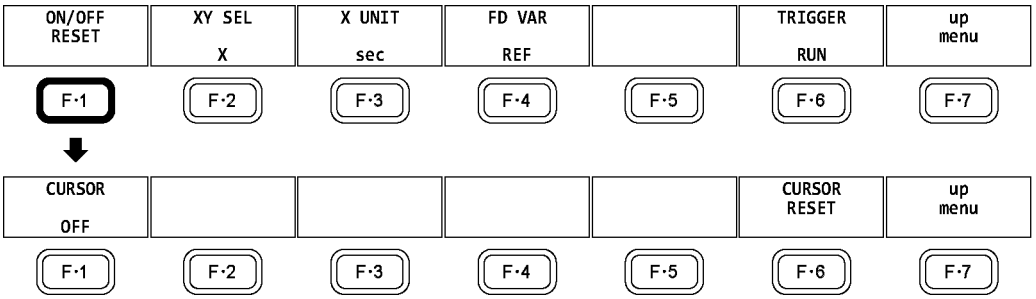


Figure 9-18 CURSOR/TRIGGER menu

To turn cursors on and off, follow the procedure shown below.
When the cursors are turned on, the REF cursors are displayed in yellow (X) and light blue (Y), and the DELTA cursors are displayed in purple (X) and green (Y). The values of DELTA-REF appear as measured values in the upper part of the screen.

Procedure

EYE → F•3 JITTER SETUP → F•3 CURSOR/TRIGGER → F•1 ON/OFF RESET → F•1 CURSOR: ON / OFF

CURSOR = ON

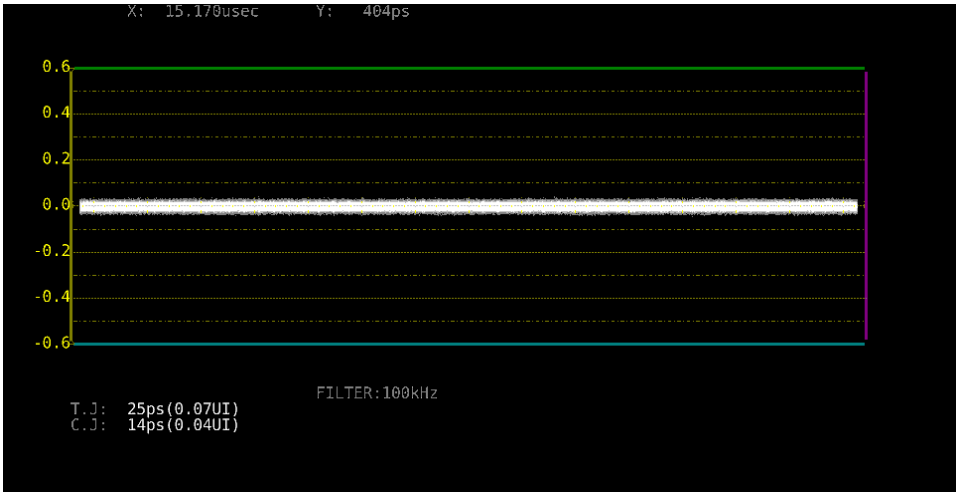


Figure 9-19 Cursor display

9.8.5 Selecting the Cursor

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 which cursors you want to move, follow the procedure below.

Procedure

EYE → F•3 JITTER SETUP → F•3 CURSOR/TRIGGER → F•2 XY SEL: X / Y

9.8.6 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•3 JITTER SETUP → F•3 CURSOR/TRIGGER → F•4 FD VAR: REF / DELTA / TRACK

Settings

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

9.8.7 Selecting the X-Axis Measurement Unit

When F•2 XY SEL is set to X, to select the X-axis cursor measurement unit, follow the procedure below.

Procedure

EYE → F•3 JITTER SETUP → F•3 CURSOR/TRIGGER → F•3 X UNIT: sec / Hz

Settings

sec:	The measurement unit is seconds.
Hz:	The measurement unit is frequency, with the length of one period set to the distance between the two cursors.

9.8.8 Selecting the Y-Axis Measurement Unit

When F•2 XY SEL is set to Y, to select the Y-axis cursor measurement unit, follow the procedure below.

Procedure

EYE → F•3 JITTER SETUP → F•3 CURSOR/TRIGGER → F•3 Y UNIT: sec / UIp-p

Settings

sec:	The measurement unit is seconds.
UIp-p:	The measurement unit is UIp-p, with one UIp-p set to one cycle of the eye pattern.

9.8.9 Selecting the Display Mode

To select the jitter display mode, follow the procedure below.
If the eye pattern and jitter are displayed simultaneously, the setting specified here also applies to the eye pattern.

Procedure

EYE → F•3 JITTER SETUP → F•3 CURSOR/TRIGGER → F•6 TRIGGER: RUN / STOP

Settings

RUN:	The input signal is automatically updated and displayed.
STOP:	The input signal is displayed statically. This is convenient for cursor measurement. Even if STOP is selected, if you change the measurement conditions, such as switching to eye pattern, the mode switches to RUN.

9.8.10 Resetting Cursors

To reset the cursor positions, follow the procedure below.

Procedure

EYE → F•3 JITTER SETUP → F•3 CURSOR/TRIGGER → F•1 ON/OFF RESET → F•6 CURSOR RESET

9.8.11 Turning the Peak Hold On and Off

To configure the peak hold settings, press F•4 PEAK HOLD on the JITTER SETUP menu.

EYE → F•3 JITTER SETUP → F•4 PEAK HOLD →

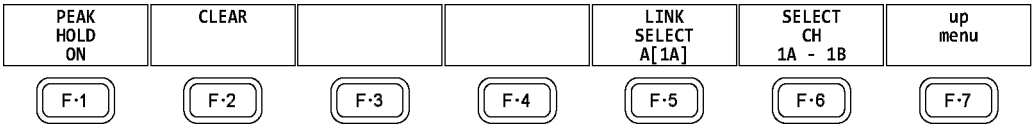


Figure 9-20 PEAK HOLD menu

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 10.00UI, “OVER” is displayed.

Procedure

EYE → F•3 JITTER SETUP → F•4 PEAK HOLD → F•1 PEAK HOLD: ON / OFF

PEAK HOLD = ON

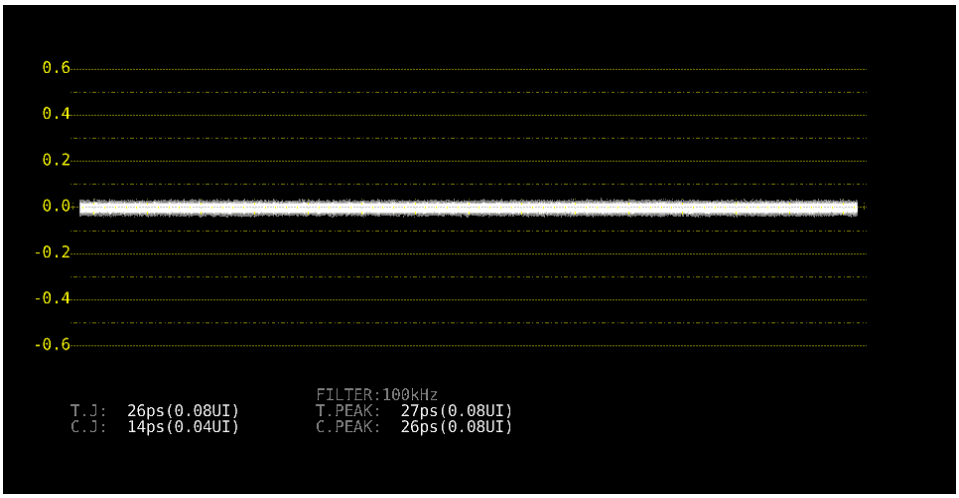


Figure 9-21 Peak hold display

9.8.12 Clearing the Peak Hold

When F•1 PEAK HOLD is set to ON, to clear the peak hold, follow the procedure below.

Procedure

EYE → F•3 JITTER SETUP → F•4 PEAK HOLD → F•2 CLEAR

9.9 Configuring Error Detection Settings

To configure the error detection settings, use F•4 ERROR SETUP.
When error detection is set to ON, the following actions are performed when an error occurs.

- Displays measured values on the eye pattern display and jitter display in red
- Displays errors in the event log of the status display
- Displays “ERROR” in the upper-right of the display.
- Transmits a signal from the alarm output remote terminal

Reference Section 8.4.1, “Event Log Screen Explanation”

9.9.1 Configuring 12G Error Settings

Use the 12G-SDI ERROR SETUP tab to configure error detection settings for 12G signals.

You can set the threshold values when you set the error detection to ON. Measured values given in SMPTE ST 2082-1 are used as 100 %.

EYE → F•4 ERROR SETUP →

Figure 9-22 12G-SDI ERROR SETUP tab

A configuration example showing threshold values that correspond to SMPTE ST 2082-1 is given below.

Table 9-3 12G-SDI ERROR SETUP configuration example

Item		Setting Example	Corresponding Value
Amplitude Error	Upper	110%	880mV
	Lower	90%	720mV
Risetime Error	Max	100%	45.0ps
Falltime Error	Max	100%	45.0ps
Deltatime Error(Tr-Tf)	Max	100%	18ps
Timing Jitter Error	Max	100%	8.00UI (672.0ps)
Current Jitter Error	Max	100%	0.30UI (25.2ps)
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.
  You cannot set Lower to a value that is greater than Upper, even if the value is within the selectable range.

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

- **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.

Max:	40 - 140％ (18.0 - 63.0ps)

- **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.

Max:	40 - 140％ (18.0 - 63.0ps)

- **Deltatime Error(Tr-Tf)**

  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.

Max:	40 - 140％ (7 - 25ps)

- **Timing Jitter Error**

  Turns the eye pattern and jitter's timing jitter error detection on and off.

Max:	10 - 200％ (0.80 - 16.00UI、67.2 - 1344.0ps)

- **Current Jitter Error**

  Turns the eye pattern and jitter's current jitter error detection on and off.

Max:	10 - 200％ (0.03 - 0.60UI、2.5 - 50.4ps)

- **OverShoot Rising Error**

  Turns the overshoot of the rising edge error detection on and off.

Max:	0 - 100 - 200％ (0.0 - 20.0％)

- **OverShoot Falling Error**

  Turns the overshoot of the falling edge error detection on and off.

Max:	0 - 100 - 200％ (0.0 - 20.0％)

9.9.2 Configuring 3G Error Settings

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

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

EYE → F•4 ERROR SETUP → F•2 PREV TAB or F•3 NEXT TAB →

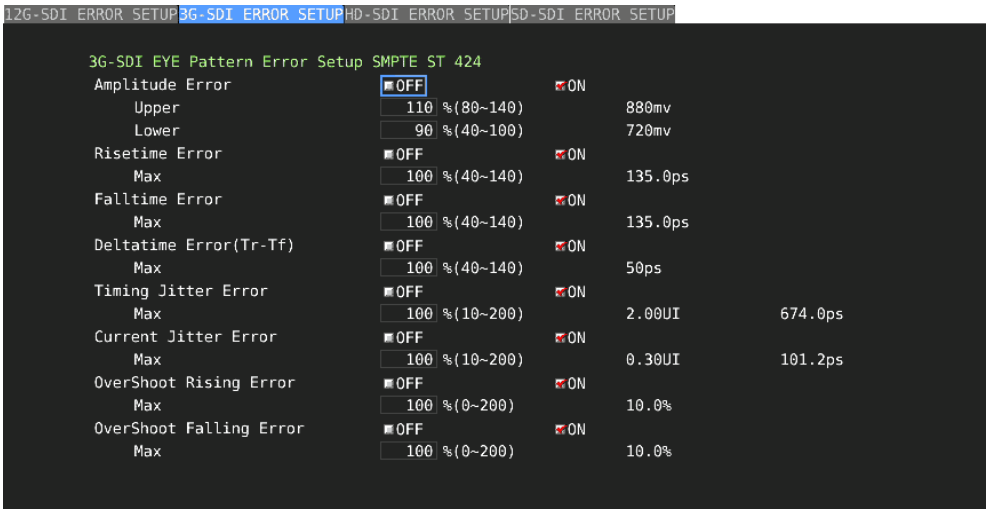


Figure 9-23 3G-SDI ERROR SETUP tab

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

Table 9-4 3G-SDI ERROR SETUP configuration example

Item		Setting Example	Corresponding Value
Amplitude Error	Upper	110%	880mV
	Lower	90%	720mV
Risetime Error	Max	100%	135.0ps
Falltime Error	Max	100%	135.0ps
Deltatime Error(Tr-Tf)	Max	100%	50ps
Timing Jitter Error	Max	100%	2.00UI (674.0ps)
Current Jitter Error	Max	100%	0.30UI (101.2ps)
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.
  You cannot set Lower to a value that is greater than Upper, even if the value is within the selectable range.

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

- **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.

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

- **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.

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

- **Deltatime Error(Tr-Tf)**

  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.

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

- **Timing Jitter Error**

  Turns the eye pattern and jitter's timing jitter error detection on and off.

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

- **Current Jitter Error**

  Turns the eye pattern and jitter's current jitter error detection on and off.

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

- **OverShoot Rising Error**

  Turns the overshoot of the rising edge error detection on and off.

Max:	0 - 100 - 200% (0.0 - 20.0%)

- **OverShoot Falling Error**

  Turns the overshoot of the falling edge error detection on and off.

Max:	0 - 100 - 200% (0.0 - 20.0%)

9.9.3 Configuring HD Error Settings

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

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

EYE → F•4 ERROR SETUP → F•2 PREV TAB or F•3 NEXT TAB →

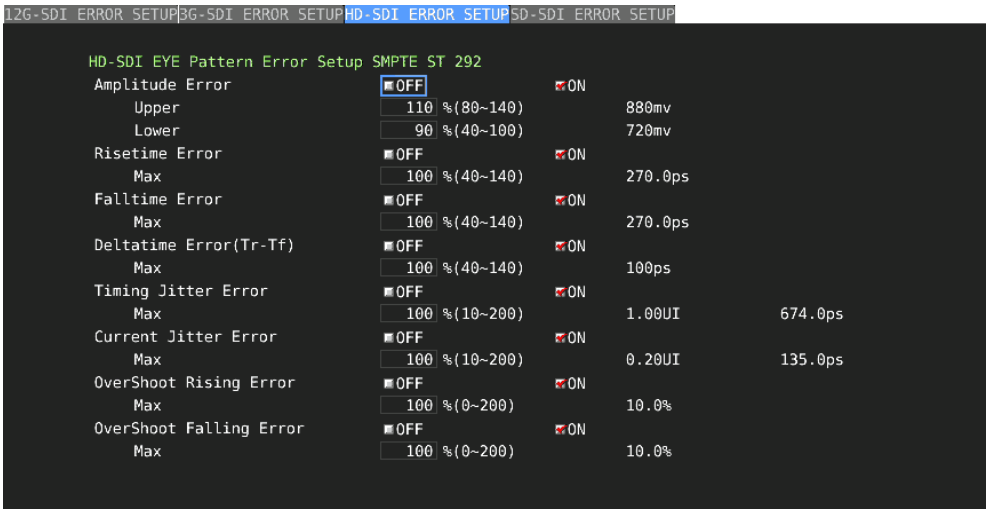


Figure 9-24 HD-SDI ERROR SETUP tab

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

Table 9-5 HD-SDI ERROR SETUP configuration example

Item		Setting Example	Corresponding Value
Amplitude Error	Upper	110%	880mV
	Lower	90%	720mV
Risetime Error	Max	100%	270.0ps
Falltime Error	Max	100%	270.0ps
Deltatime Error(Tr-Tf)	Max	100%	100ps
Timing Jitter Error	Max	100%	1.00UI (674.0ps)
Current Jitter Error	Max	100%	0.20UI (135.0ps)
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.
  You cannot set Lower to a value that is greater than Upper, even if the value is within the selectable range.

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

- **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.

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

- **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.

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

- **Deltatime Error(Tr-Tf)**

  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.

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

- **Timing Jitter Error**

  Turns the eye pattern and jitter's timing jitter error detection on and off.

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

- **Current Jitter Error**

  Turns the eye pattern and jitter's current jitter error detection on and off.

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

- **OverShoot Rising Error**

  Turns the overshoot of the rising edge error detection on and off.

Max:	0 - 100 - 200% (0.0 - 20.0%)

- **OverShoot Falling Error**

  Turns the overshoot of the falling edge error detection on and off.

Max:	0 - 100 - 200% (0.0 - 20.0%)

9.9.4 Configuring SD Error Settings

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

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

EYE → F•4 ERROR SETUP → F•2 PREV TAB or F•3 NEXT TAB →

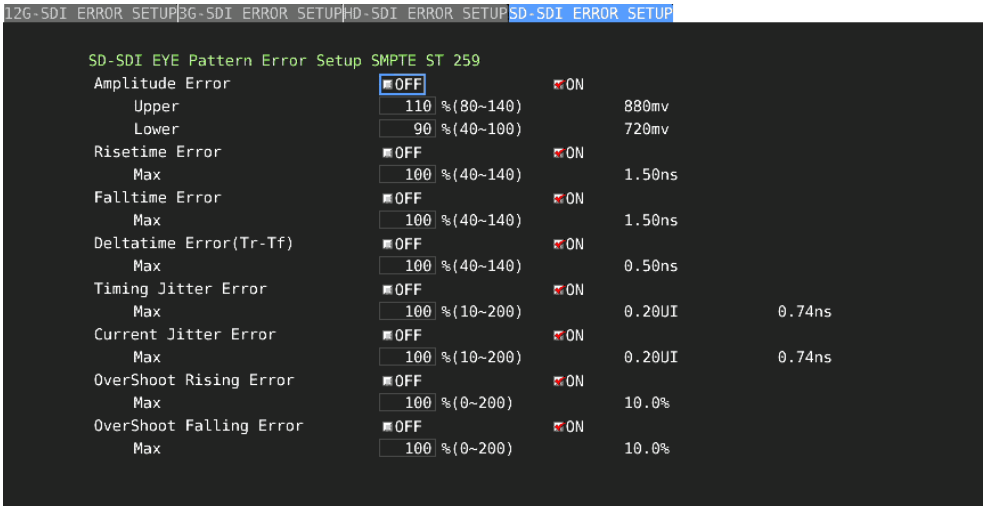


Figure 9-25 SD-SDI ERROR SETUP tab

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

Table 9-6 SD-SDI ERROR SETUP configuration example

Item		Setting Example	Corresponding Value
Amplitude Error	Upper	110%	880mV
	Lower	90%	720mV
Risetime Error	Max	100%	1.50ns
Falltime Error	Max	100%	1.50ns
Deltatime Error(Tr-Tf)	Max	100%	0.50ns
Timing Jitter Error	Max	100%	0.20UI (0.74ns)
Current Jitter Error	Max	100%	0.20UI (0.74ns)
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.
  You cannot set Lower to a value that is greater than Upper, even if the value is within the selectable range.

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

- **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.

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

- **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.

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

- **Deltatime Error(Tr-Tf)**

  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.

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

- **Timing Jitter Error**

  Turns the eye pattern and jitter's timing jitter error detection on and off.

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

- **Current Jitter Error**

  Turns the eye pattern and jitter's current jitter error detection on and off.

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

- **OverShoot Rising Error**

  Turns the overshoot of the rising edge error detection on and off.

Max:	0 - 100 - 200% (0.0 - 20.0%)

- **OverShoot Falling Error**

  Turns the overshoot of the falling edge error detection on and off.

Max:	0 - 100 - 200% (0.0 - 20.0%)

10. Installing the Plug-in (SER08)

To control the SER08 from IP Live System Manager, you need to install a plug-in.

Plug-in name: LEADERCorporation.LV5490SER08.V*.**.Jar

* The asterisks indicate the plug-in version.

To install the plug-in in IP Live System Manager, follow the procedure below.

1. **When you start IP Live System Manager, a login screen appears. Enter the user name in the top box and the password in the bottom box, and click !!! to log in.**

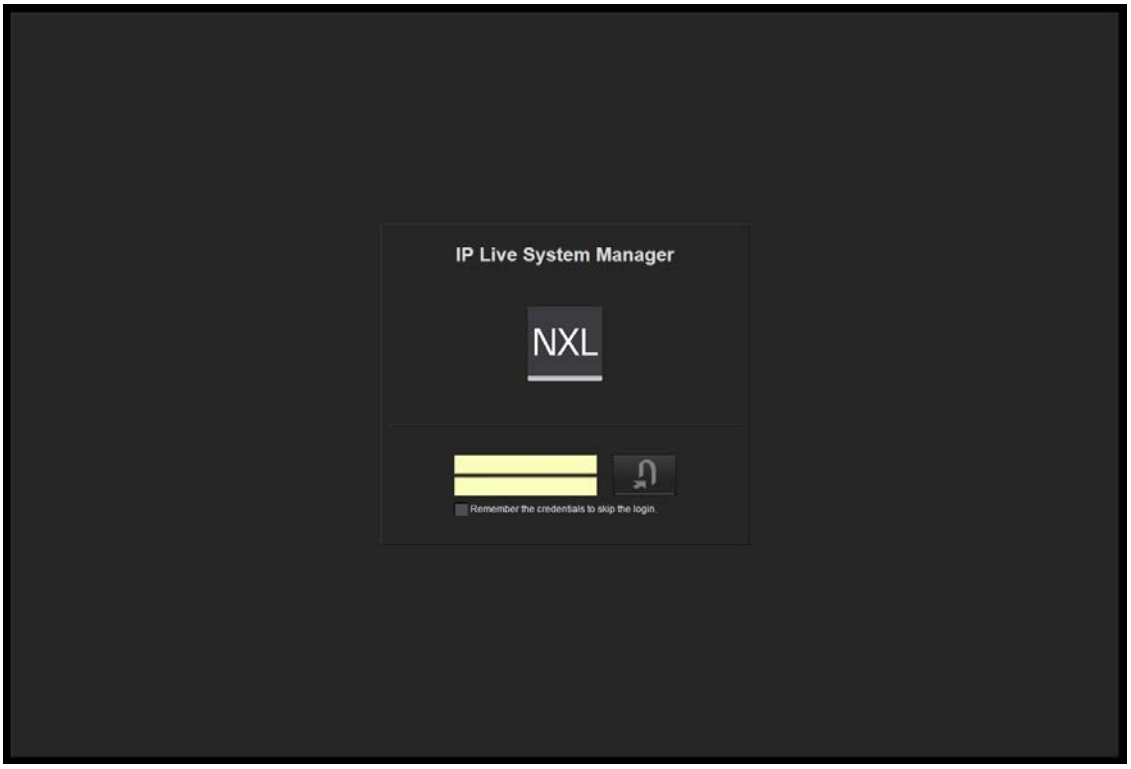


Figure 10-1 Login screen

2. The top screen appears. Click Plug-in in the second column on the left side.

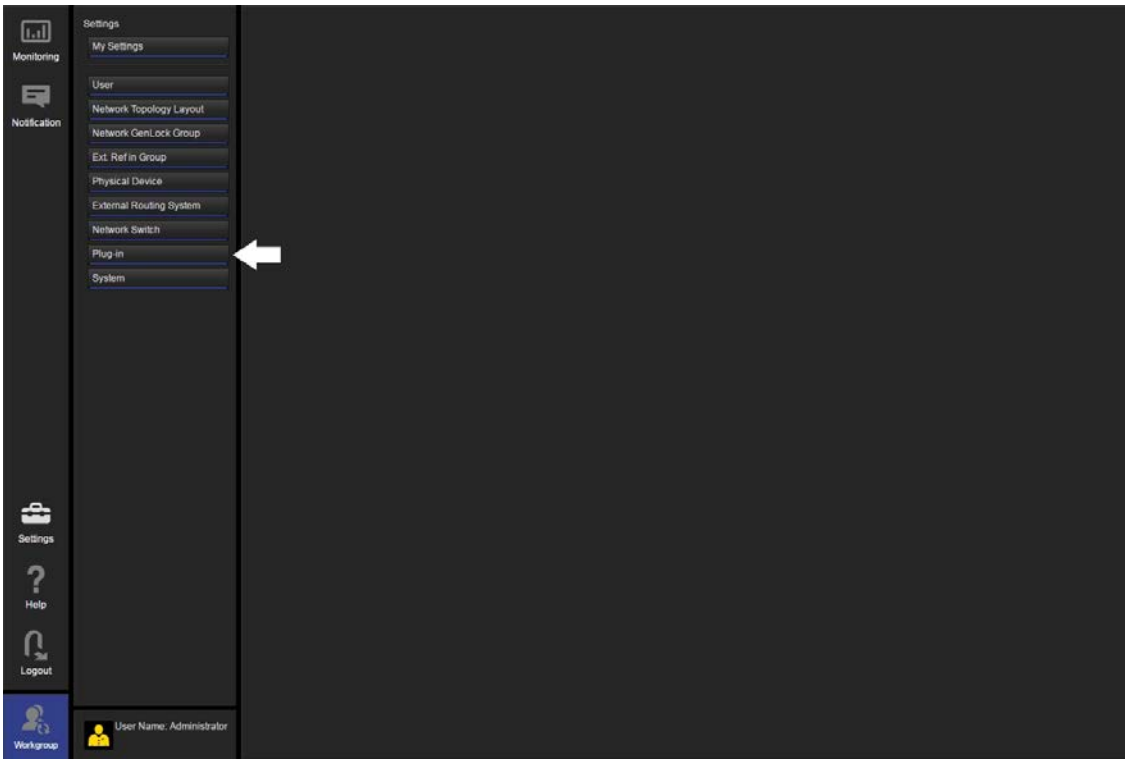


Figure 10-2 Top screen

3. A plug-in list appears. Click Install at the lower right.

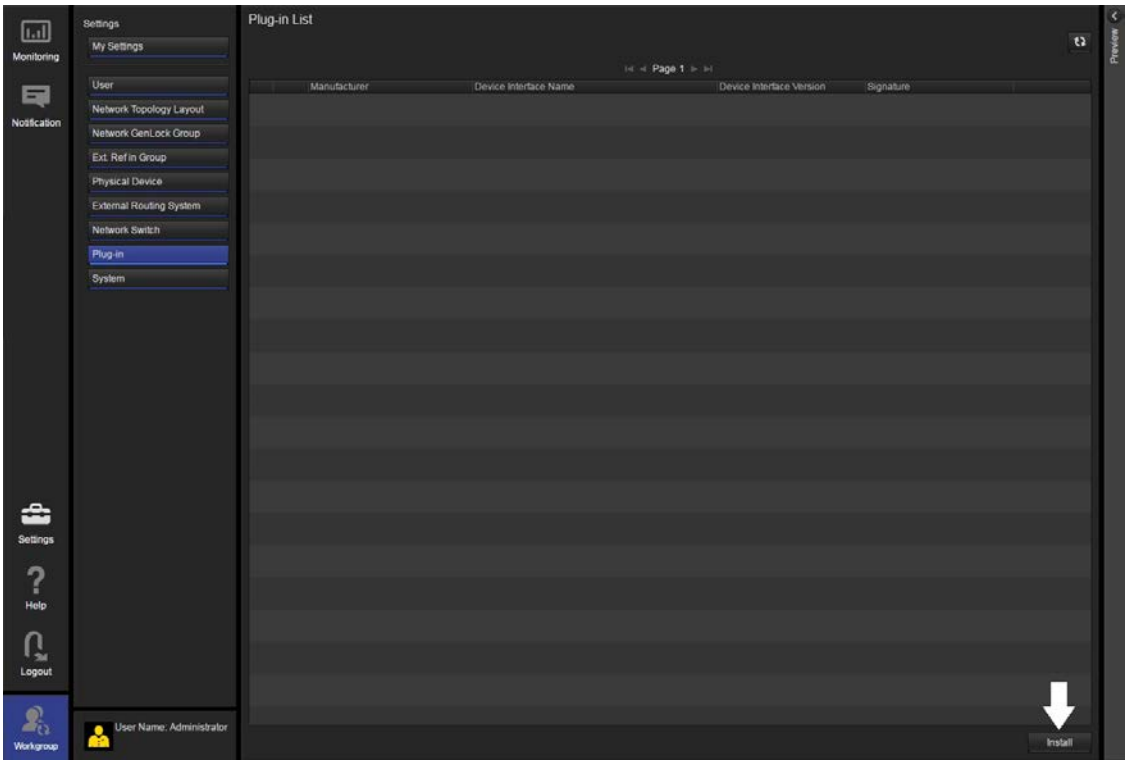


Figure 10-3 Plug-in list screen

4. **A Select Install File dialog box appears in the center of the screen. Click Browse on the right of the plug-in (LEADERCorporation.LV5490SER08.V*.**.Jar), select the plug-in, and click OK.**

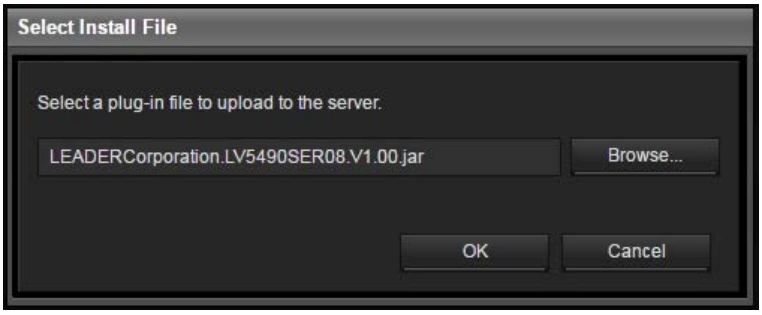


Figure 10-4 Select Install File dialog box

5. **If the installation is successful, “File upload is succeeded” appears in the Select Install File dialog box. Click OK to finish the installation.**

Figure 10-5 Select Install File dialog box

6. The plug-in list screen returns, and the installed plug-in appears under Plug-in List.

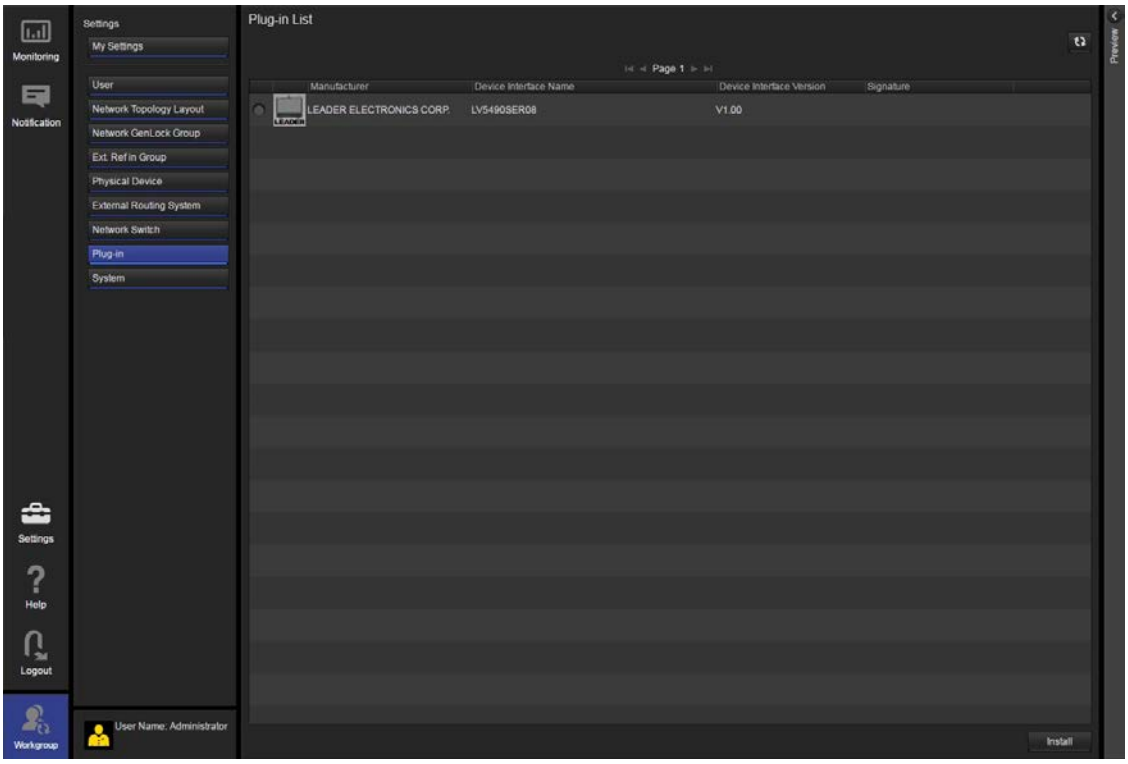
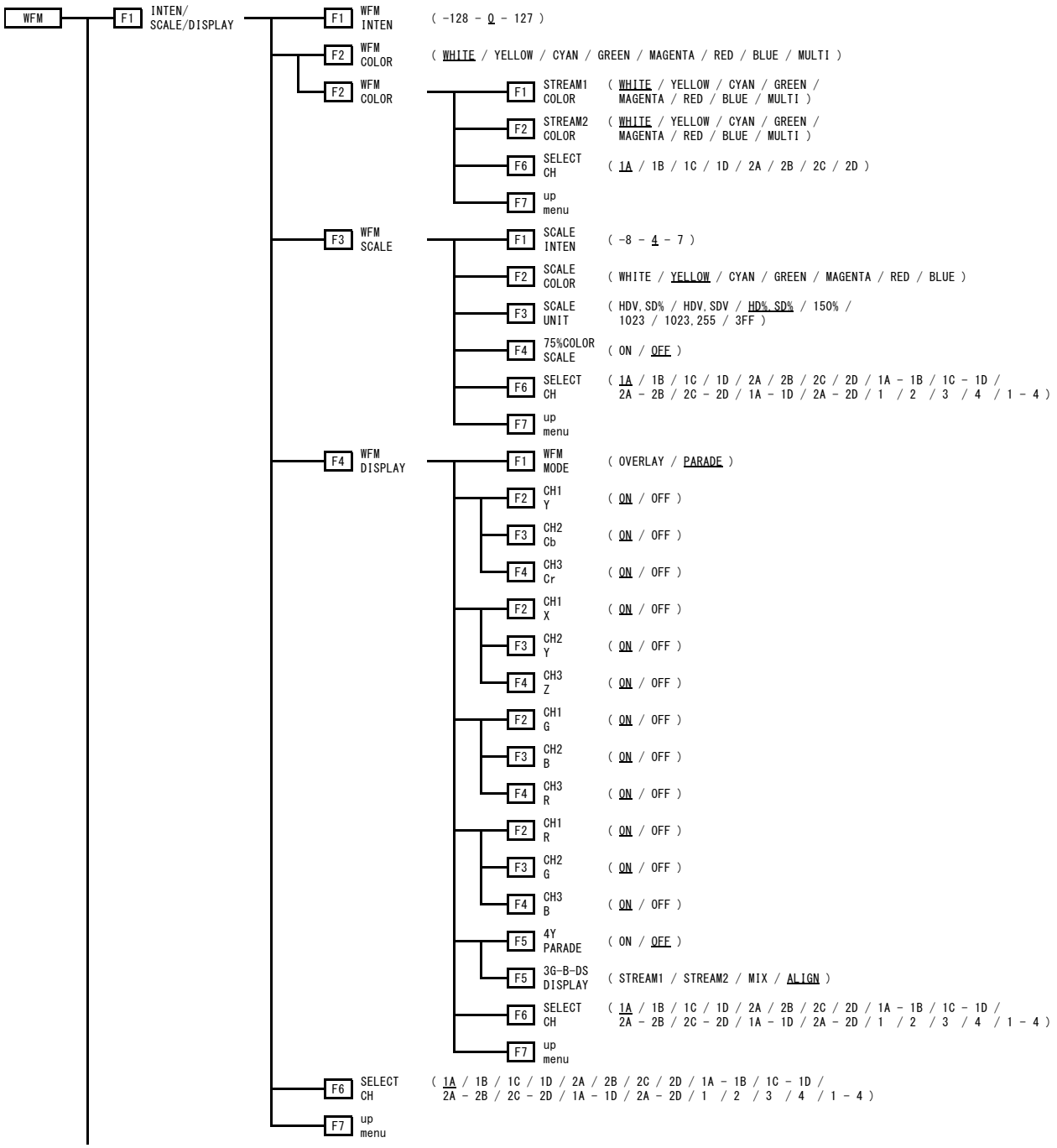


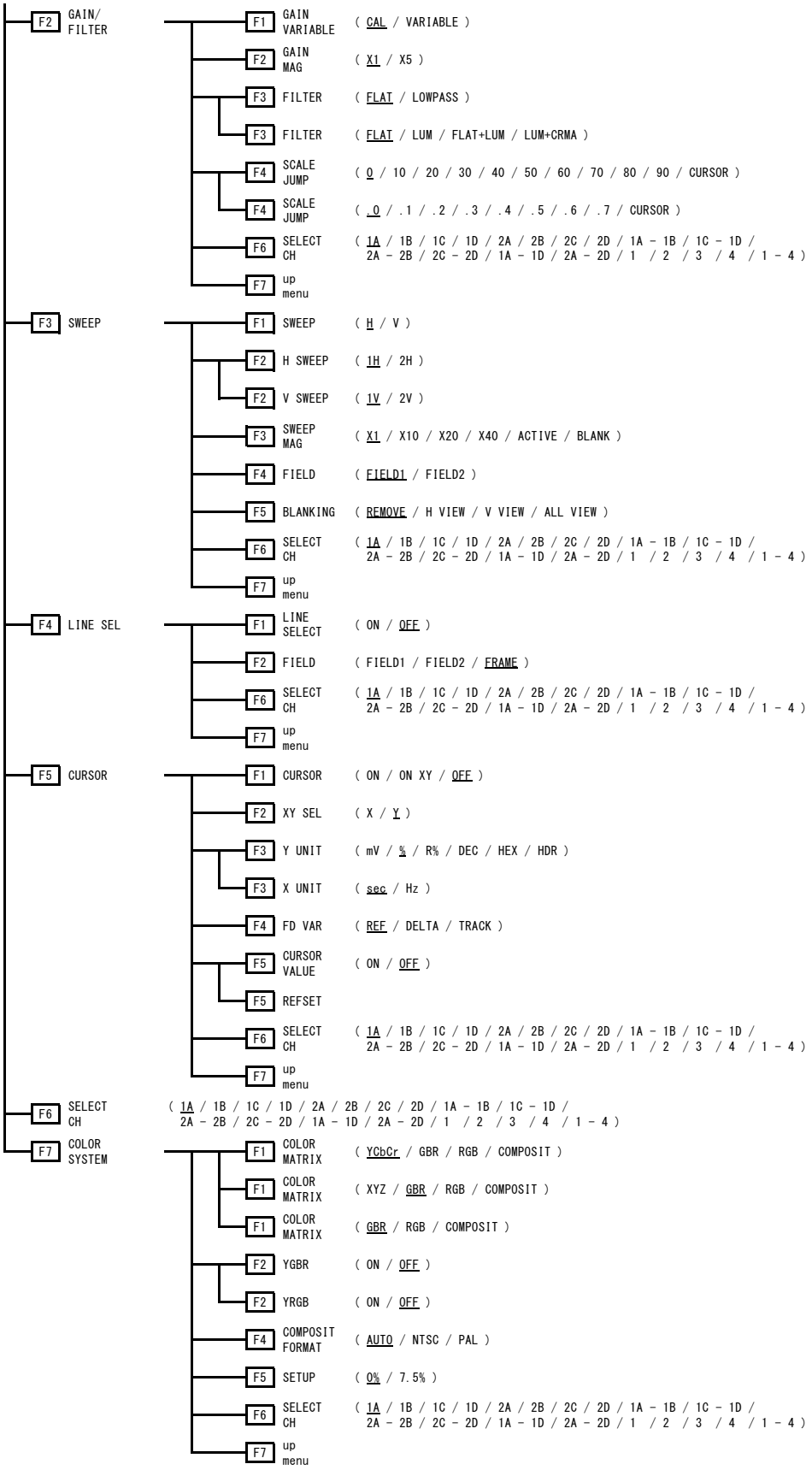
Figure 10-6 Plug-in list screen (after installation)

11. MENU TREE

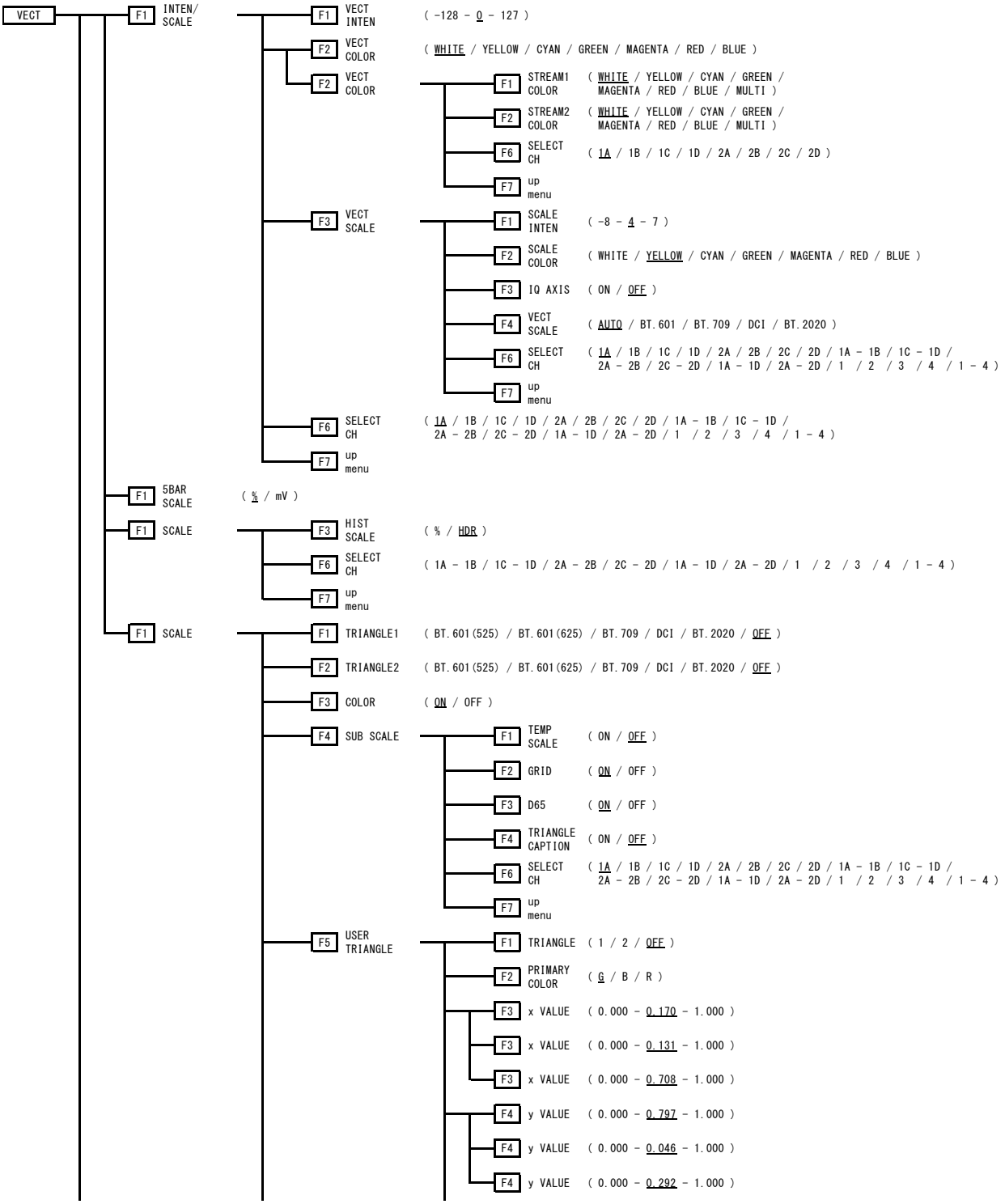
This chapter shows the menu trees that correspond to each key.
The default settings are underlined.
The menus that are displayed vary depending on the LV 5490 settings and whether a USB memory device is connected to the LV 5490.

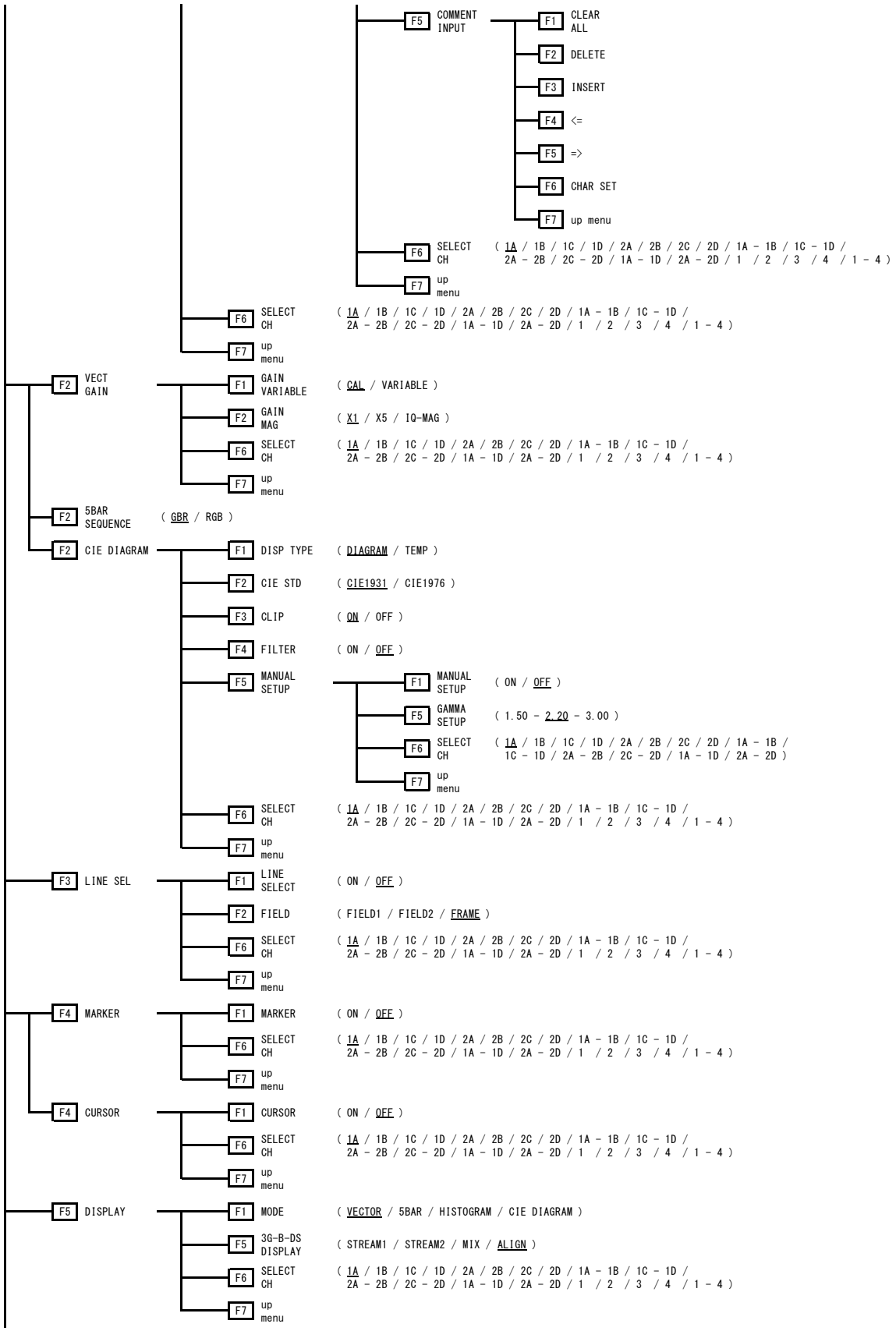
11.1 WFM Menu

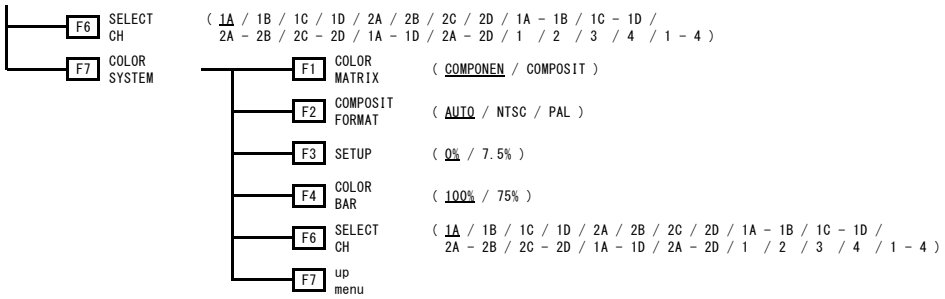



F2 GAIN/ FILTER
F1 GAIN VARIABLE (CAL / VARIABLE)
F2 GAIN MAG (X1 / X5)
F3 FILTER (FLAT / LOWPASS)
F3 FILTER (FLAT / LUM / FLAT+LUM / LUM+CRMA)
F4 SCALE JUMP (0 / 10 / 20 / 30 / 40 / 50 / 60 / 70 / 80 / 90 / CURSOR)
F4 SCALE JUMP (.0 / .1 / .2 / .3 / .4 / .5 / .6 / .7 / CURSOR)
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D / 1 / 2 / 3 / 4 / 1 - 4)
F7 up menu
F3 SWEEP
F1 SWEEP (H / V)
F2 H SWEEP (1H / 2H)
F2 V SWEEP (1V / 2V)
F3 SWEEP MAG (X1 / X10 / X20 / X40 / ACTIVE / BLANK)
F4 FIELD (FIELD1 / FIELD2)
F5 BLANKING (REMOVE / H VIEW / V VIEW / ALL VIEW)
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D / 1 / 2 / 3 / 4 / 1 - 4)
F7 up menu
F4 LINE SEL
F1 LINE SELECT (ON / OFF)
F2 FIELD (FIELD1 / FIELD2 / FRAME)
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D / 1 / 2 / 3 / 4 / 1 - 4)
F7 up menu
F5 CURSOR
F1 CURSOR (ON / ON XY / OFF)
F2 XY SEL (X / Y)
F3 Y UNIT (mV / % / R% / DEC / HEX / HDR)
F3 X UNIT (sec / Hz)
F4 FD VAR (REF / DELTA / TRACK)
F5 CURSOR VALUE (ON / OFF)
F5 REFSET
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D / 1 / 2 / 3 / 4 / 1 - 4)
F7 up menu
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D / 1 / 2 / 3 / 4 / 1 - 4)
F7 COLOR SYSTEM
F1 COLOR MATRIX (YCbCr / GBR / RGB / COMPOSIT)
F1 COLOR MATRIX (XYZ / GBR / RGB / COMPOSIT)
F1 COLOR MATRIX (GBR / RGB / COMPOSIT)
F2 YGBR (ON / OFF)
F2 YRGB (ON / OFF)
F4 COMPOSIT FORMAT (AUTO / NTSC / PAL)
F5 SETUP (0% / 7.5%)
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D / 1 / 2 / 3 / 4 / 1 - 4)
F7 up menu

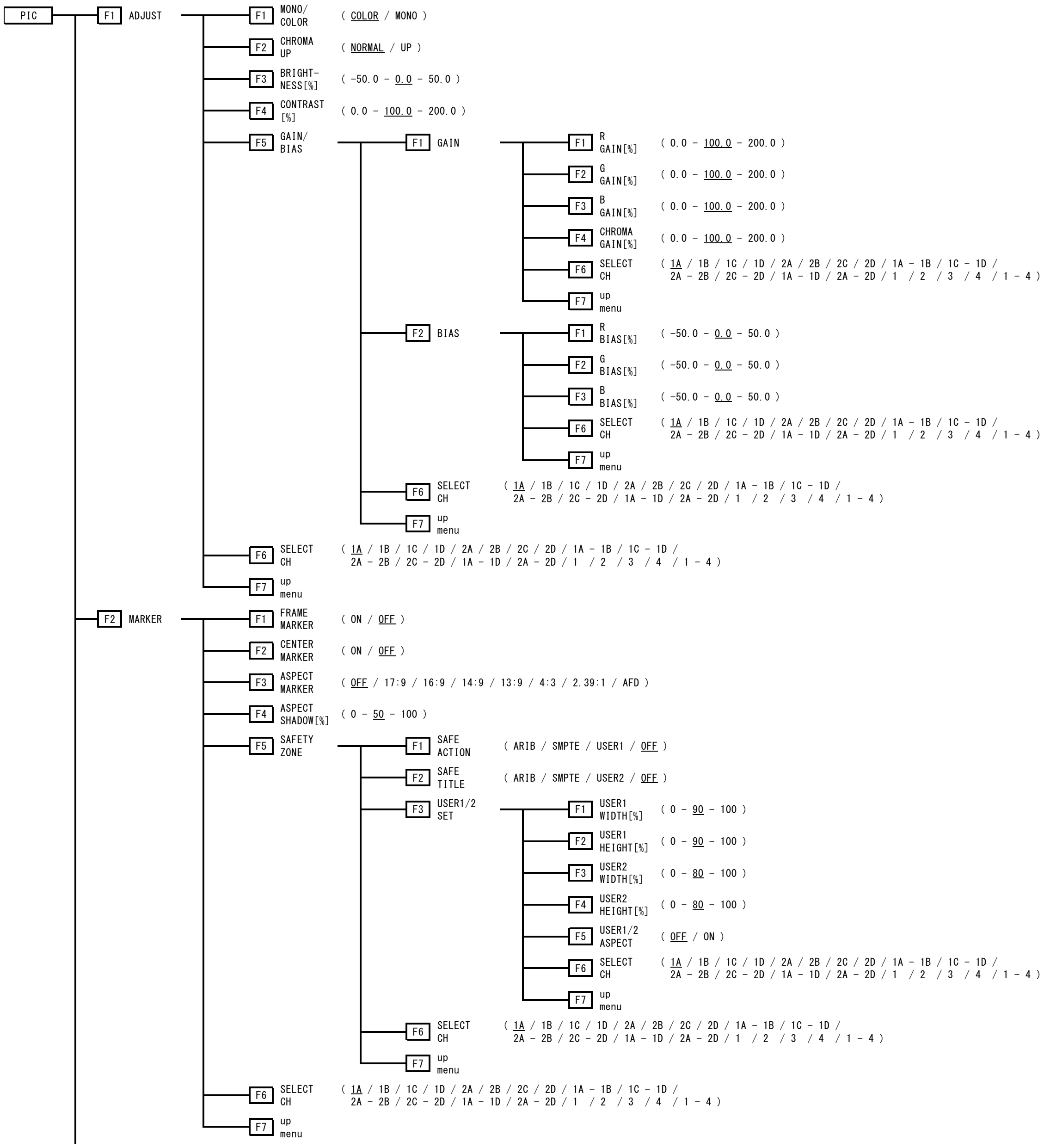
11.2 VECT Menu



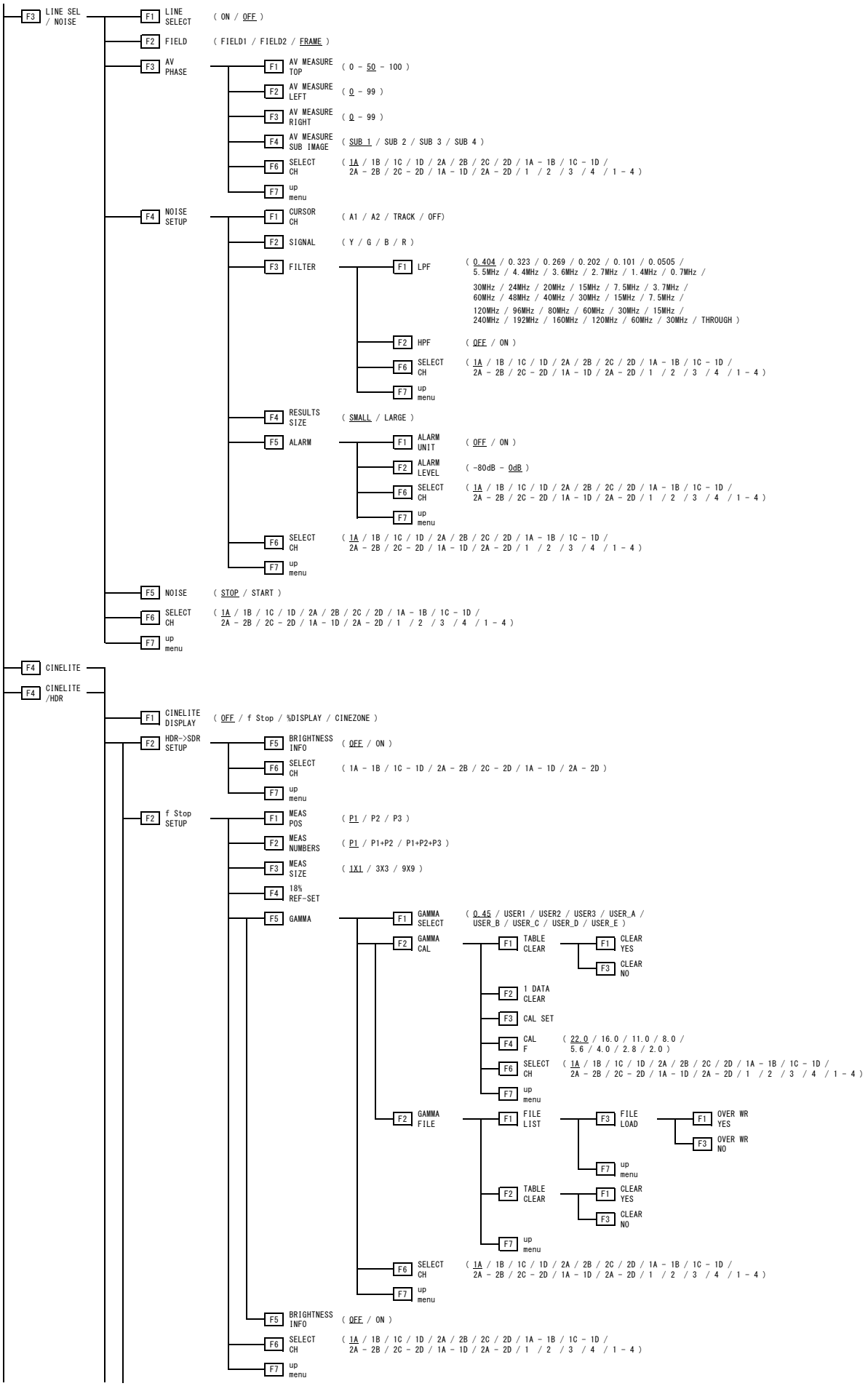

F5 COMMENT INPUT
F1 CLEAR ALL
F2 DELETE
F3 INSERT
F4 <=
F5 =>
F6 CHAR SET
F7 up menu
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D / 1 / 2 / 3 / 4 / 1 - 4)
F7 up menu
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D / 1 / 2 / 3 / 4 / 1 - 4)
F7 up menu
F2 VECT GAIN
F1 GAIN VARIABLE (CAL / VARIABLE)
F2 GAIN MAG (X1 / X5 / IQ-MAG)
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D / 1 / 2 / 3 / 4 / 1 - 4)
F7 up menu
F2 5BAR SEQUENCE (GBR / RGB)
F2 CIE DIAGRAM
F1 DISP TYPE (DIAGRAM / TEMP)
F2 CIE STD (CIE1931 / CIE1976)
F3 CLIP (ON / OFF)
F4 FILTER (ON / OFF)
F5 MANUAL SETUP
F1 MANUAL SETUP (ON / OFF)
F5 GAMMA SETUP (1.50 - 2.20 - 3.00)
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D)
F7 up menu
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D / 1 / 2 / 3 / 4 / 1 - 4)
F7 up menu
F3 LINE SEL
F1 LINE SELECT (ON / OFF)
F2 FIELD (FIELD1 / FIELD2 / FRAME)
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D / 1 / 2 / 3 / 4 / 1 - 4)
F7 up menu
F4 MARKER
F1 MARKER (ON / OFF)
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D / 1 / 2 / 3 / 4 / 1 - 4)
F7 up menu
F4 CURSOR
F1 CURSOR (ON / OFF)
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D / 1 / 2 / 3 / 4 / 1 - 4)
F7 up menu
F5 DISPLAY
F1 MODE (VECTOR / 5BAR / HISTOGRAM / CIE DIAGRAM)
F5 3G-B-DS DISPLAY (STREAM1 / STREAM2 / MIX / ALIGN)
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D / 1 / 2 / 3 / 4 / 1 - 4)
F7 up menu

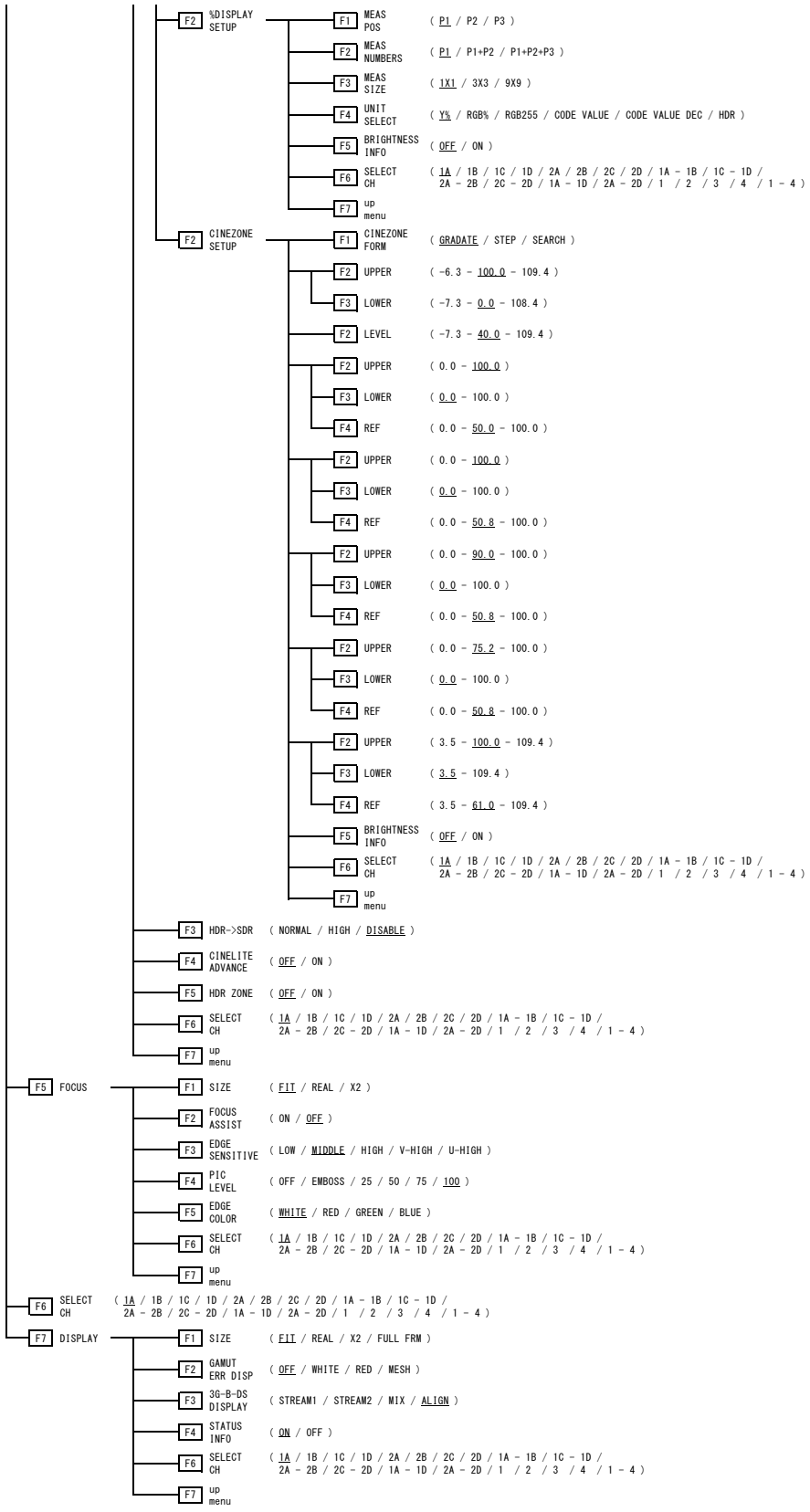

F6 SELECT CH
(1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D /
2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D / 1 / 2 / 3 / 4 / 1 - 4)
F7 COLOR SYSTEM
F1 COLOR MATRIX
(COMPONEN / COMPOSIT)
F2 COMPOSIT FORMAT
(AUTO / NTSC / PAL)
F3 SETUP
(0% / 7.5%)
F4 COLOR BAR
(100% / 75%)
F6 SELECT CH
(1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D /
2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D / 1 / 2 / 3 / 4 / 1 - 4)
F7 up menu

11.3 PIC Menu

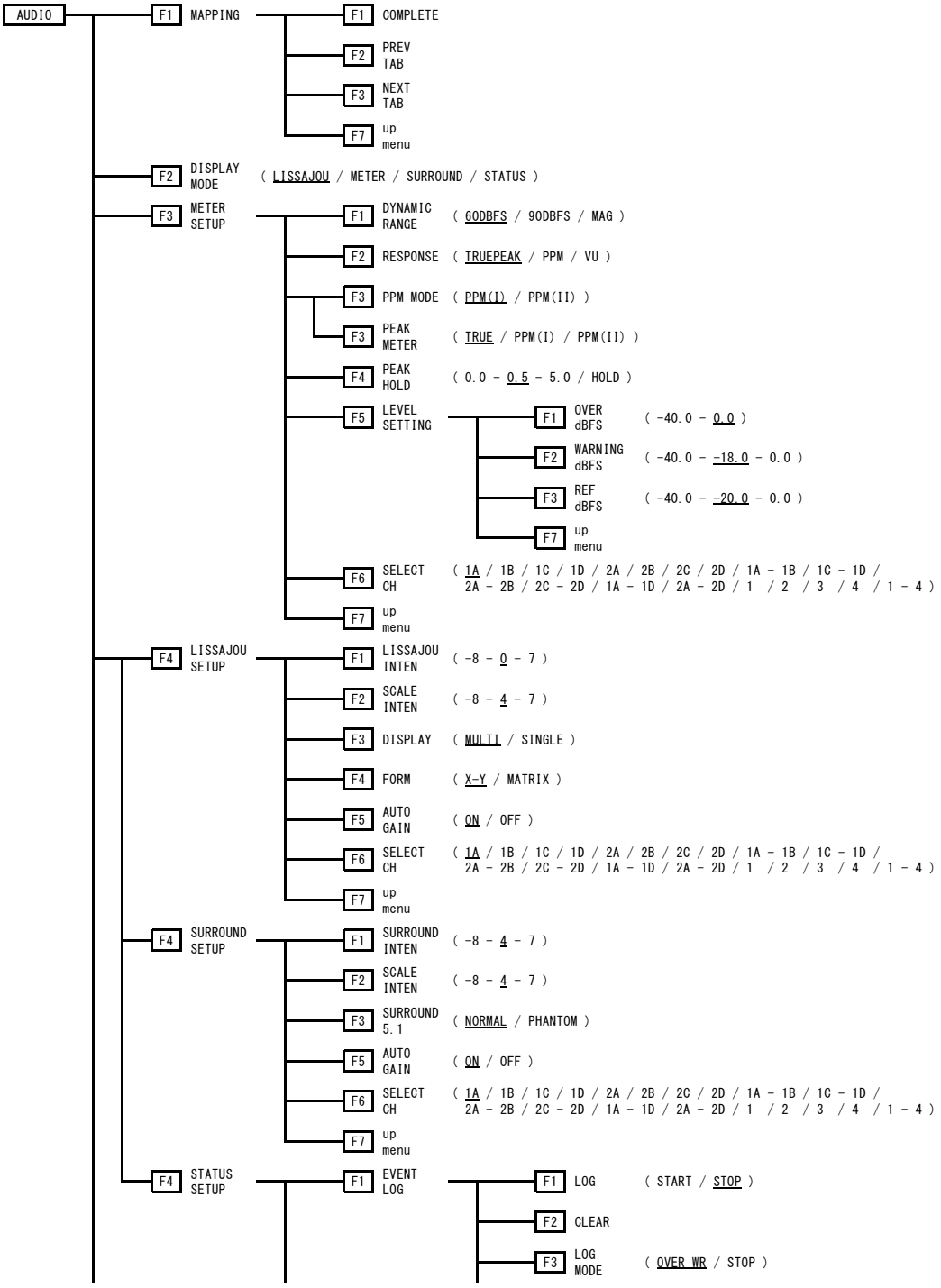


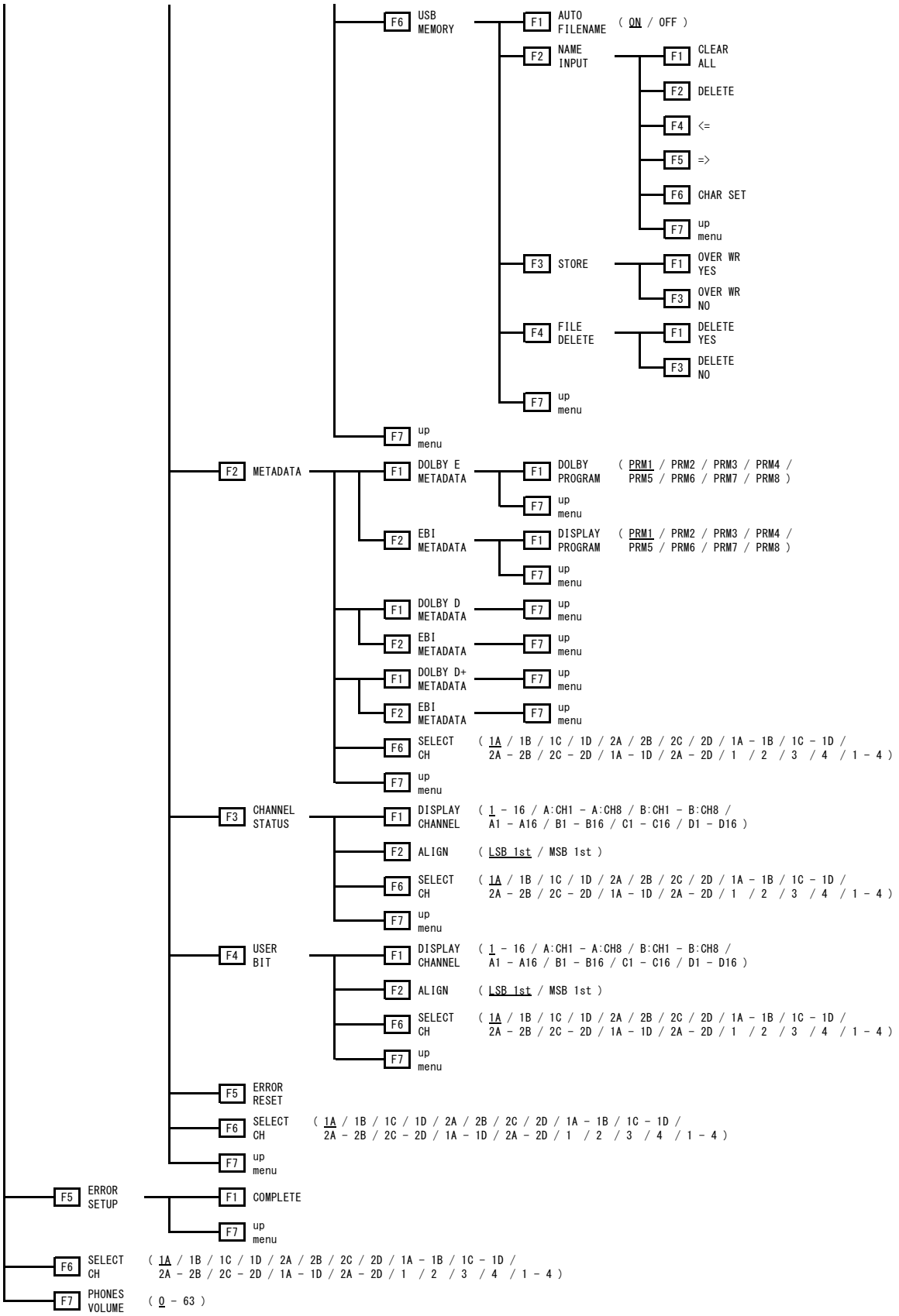
PIC
F1 ADJUST
F1 MONO/ COLOR (COLOR / MONO)
F2 CHROMA UP (NORMAL / UP)
F3 BRIGHT- NESS[%] (-50.0 - 0.0 - 50.0)
F4 CONTRAST [%] (0.0 - 100.0 - 200.0)
F5 GAIN/ BIAS
F1 GAIN
F1 R GAIN[%] (0.0 - 100.0 - 200.0)
F2 G GAIN[%] (0.0 - 100.0 - 200.0)
F3 B GAIN[%] (0.0 - 100.0 - 200.0)
F4 CHROMA GAIN[%] (0.0 - 100.0 - 200.0)
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D / 1 / 2 / 3 / 4 / 1 - 4)
F7 up menu
F2 BIAS
F1 R BIAS[%] (-50.0 - 0.0 - 50.0)
F2 G BIAS[%] (-50.0 - 0.0 - 50.0)
F3 B BIAS[%] (-50.0 - 0.0 - 50.0)
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D / 1 / 2 / 3 / 4 / 1 - 4)
F7 up menu
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D / 1 / 2 / 3 / 4 / 1 - 4)
F7 up menu
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D / 1 / 2 / 3 / 4 / 1 - 4)
F7 up menu
F2 MARKER
F1 FRAME MARKER (ON / OFF)
F2 CENTER MARKER (ON / OFF)
F3 ASPECT MARKER (OFF / 17:9 / 16:9 / 14:9 / 13:9 / 4:3 / 2.39:1 / AFD)
F4 ASPECT SHADOW[%] (0 - 50 - 100)
F5 SAFETY ZONE
F1 SAFE ACTION (ARIB / SMPTE / USER1 / OFF)
F2 SAFE TITLE (ARIB / SMPTE / USER2 / OFF)
F3 USER1/2 SET
F1 USER1 WIDTH[%] (0 - 90 - 100)
F2 USER1 HEIGHT[%] (0 - 90 - 100)
F3 USER2 WIDTH[%] (0 - 80 - 100)
F4 USER2 HEIGHT[%] (0 - 80 - 100)
F5 USER1/2 ASPECT (OFF / ON)
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D / 1 / 2 / 3 / 4 / 1 - 4)
F7 up menu
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D / 1 / 2 / 3 / 4 / 1 - 4)
F7 up menu
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D / 1 / 2 / 3 / 4 / 1 - 4)
F7 up menu


F3 LINE SEL / NOISE
F1 LINE SELECT (ON / OFF)
F2 FIELD (FIELD1 / FIELD2 / FRAME)
F3 AV PHASE
F1 AV MEASURE TOP (0 - 50 - 100)
F2 AV MEASURE LEFT (0 - 99)
F3 AV MEASURE RIGHT (0 - 99)
F4 AV MEASURE SUB IMAGE (SUB 1 / SUB 2 / SUB 3 / SUB 4)
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D / 1 / 2 / 3 / 4 / 1 - 4)
F7 up menu
F4 NOISE SETUP
F1 CURSOR CH (A1 / A2 / TRACK / OFF)
F2 SIGNAL (Y / G / B / R)
F3 FILTER
F1 LPF (0.404 / 0.323 / 0.269 / 0.202 / 0.101 / 0.0505 / 5.5MHz / 4.4MHz / 3.6MHz / 2.7MHz / 1.4MHz / 0.7MHz / 30MHz / 24MHz / 20MHz / 15MHz / 7.5MHz / 3.7MHz / 60MHz / 48MHz / 40MHz / 30MHz / 15MHz / 7.5MHz / 120MHz / 96MHz / 80MHz / 60MHz / 30MHz / 15MHz / 240MHz / 192MHz / 160MHz / 120MHz / 60MHz / 30MHz / THROUGH)
F2 HPF (OFF / ON)
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D / 1 / 2 / 3 / 4 / 1 - 4)
F7 up menu
F4 RESULTS SIZE (SMALL / LARGE)
F5 ALARM
F1 ALARM UNIT (OFF / ON)
F2 ALARM LEVEL (-80dB - 0dB)
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D / 1 / 2 / 3 / 4 / 1 - 4)
F7 up menu
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D / 1 / 2 / 3 / 4 / 1 - 4)
F7 up menu
F5 NOISE (STOP / START)
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D / 1 / 2 / 3 / 4 / 1 - 4)
F7 up menu
F4 CINELITE
F4 CINELITE /HDR
F1 CINELITE DISPLAY (OFF / f Stop / %DISPLAY / CINEZONE)
F2 HDR->SDR SETUP
F5 BRIGHTNESS INFO (OFF / ON)
F6 SELECT CH (1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D)
F7 up menu
F2 f Stop SETUP
F1 MEAS POS (P1 / P2 / P3)
F2 MEAS NUMBERS (P1 / P1+P2 / P1+P2+P3)
F3 MEAS SIZE (1X1 / 3X3 / 9X9)
F4 18% REF-SET
F5 GAMMA
F1 GAMMA SELECT (0.45 / USER1 / USER2 / USER3 / USER_A / USER_B / USER_C / USER_D / USER_E)
F2 GAMMA CAL
F1 TABLE CLEAR
F1 CLEAR YES
F3 CLEAR NO
F2 1 DATA CLEAR
F3 CAL SET
F4 CAL F (22.0 / 16.0 / 11.0 / 8.0 / 5.6 / 4.0 / 2.8 / 2.0)
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D / 1 / 2 / 3 / 4 / 1 - 4)
F7 up menu
F2 GAMMA FILE
F1 FILE LIST
F3 FILE LOAD
F1 OVER WR YES
F3 OVER WR NO
F7 up menu
F2 TABLE CLEAR
F1 CLEAR YES
F3 CLEAR NO
F7 up menu
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D / 1 / 2 / 3 / 4 / 1 - 4)
F7 up menu
F5 BRIGHTNESS INFO (OFF / ON)
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D / 1 / 2 / 3 / 4 / 1 - 4)
F7 up menu

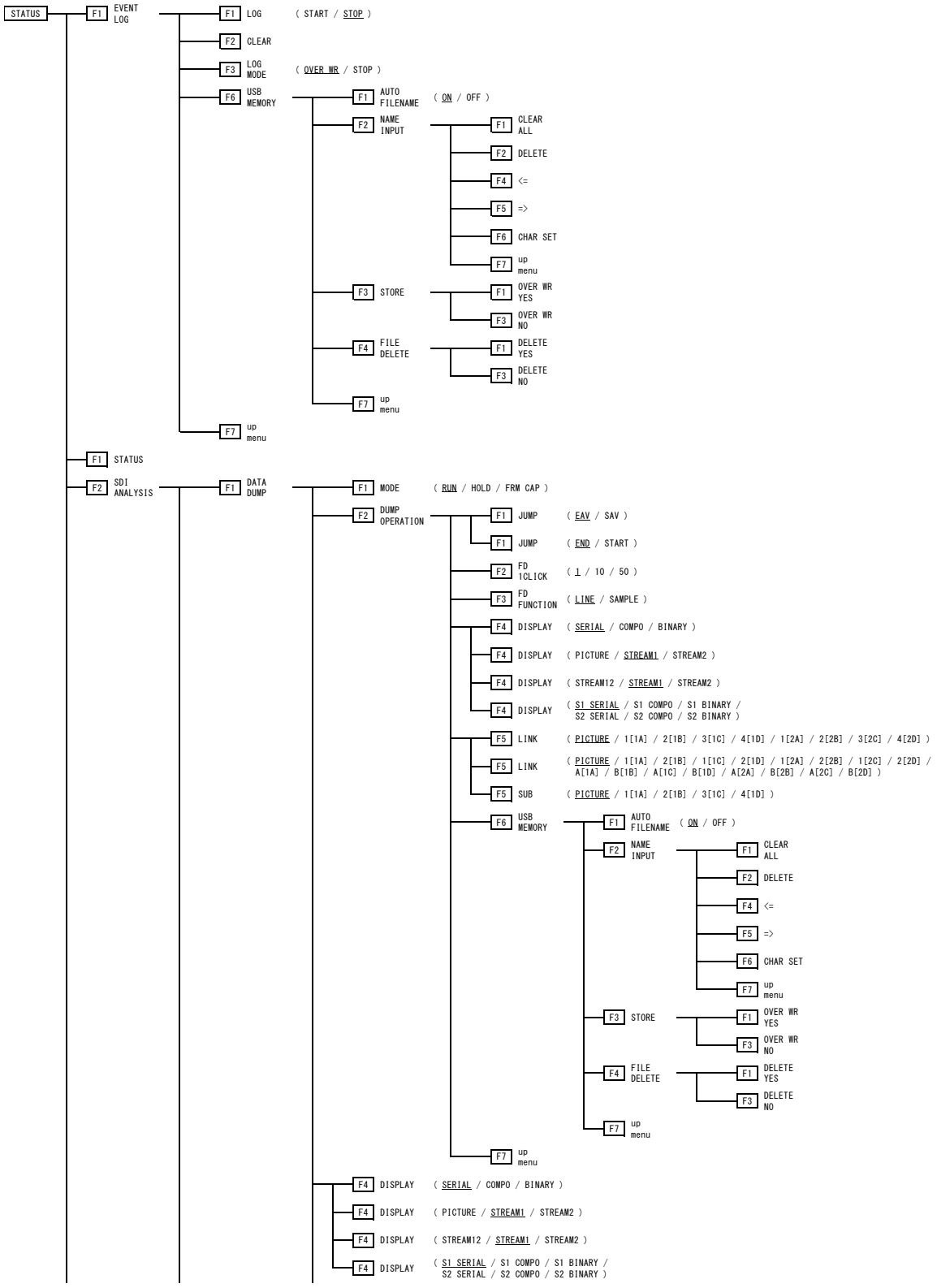

F2 %DISPLAY SETUP
F1 MEAS POS (P1 / P2 / P3)
F2 MEAS NUMBERS (P1 / P1+P2 / P1+P2+P3)
F3 MEAS SIZE (1X1 / 3X3 / 9X9)
F4 UNIT SELECT (Y% / RGB% / RGB255 / CODE VALUE / CODE VALUE DEC / HDR)
F5 BRIGHTNESS INFO (OFF / ON)
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D / 1 / 2 / 3 / 4 / 1 - 4)
F7 up menu
F2 CINEZONE SETUP
F1 CINEZONE FORM (GRADATE / STEP / SEARCH)
F2 UPPER (-6.3 - 100.0 - 109.4)
F3 LOWER (-7.3 - 0.0 - 108.4)
F2 LEVEL (-7.3 - 40.0 - 109.4)
F2 UPPER (0.0 - 100.0)
F3 LOWER (0.0 - 100.0)
F4 REF (0.0 - 50.0 - 100.0)
F2 UPPER (0.0 - 100.0)
F3 LOWER (0.0 - 100.0)
F4 REF (0.0 - 50.8 - 100.0)
F2 UPPER (0.0 - 90.0 - 100.0)
F3 LOWER (0.0 - 100.0)
F4 REF (0.0 - 50.8 - 100.0)
F2 UPPER (0.0 - 75.2 - 100.0)
F3 LOWER (0.0 - 100.0)
F4 REF (0.0 - 50.8 - 100.0)
F2 UPPER (3.5 - 100.0 - 109.4)
F3 LOWER (3.5 - 109.4)
F4 REF (3.5 - 61.0 - 109.4)
F5 BRIGHTNESS INFO (OFF / ON)
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D / 1 / 2 / 3 / 4 / 1 - 4)
F7 up menu
F3 HDR->SDR (NORMAL / HIGH / DISABLE)
F4 CINELITE ADVANCE (OFF / ON)
F5 HDR ZONE (OFF / ON)
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D / 1 / 2 / 3 / 4 / 1 - 4)
F7 up menu
F5 FOCUS
F1 SIZE (FIT / REAL / X2)
F2 FOCUS ASSIST (ON / OFF)
F3 EDGE SENSITIVE (LOW / MIDDLE / HIGH / V-HIGH / U-HIGH)
F4 PIC LEVEL (OFF / EMBOSS / 25 / 50 / 75 / 100)
F5 EDGE COLOR (WHITE / RED / GREEN / BLUE)
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D / 1 / 2 / 3 / 4 / 1 - 4)
F7 up menu
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D / 1 / 2 / 3 / 4 / 1 - 4)
F7 DISPLAY
F1 SIZE (FIT / REAL / X2 / FULL FRM)
F2 GAMUT ERR DISP (OFF / WHITE / RED / MESH)
F3 3G-B-DS DISPLAY (STREAM1 / STREAM2 / MIX / ALIGN)
F4 STATUS INFO (ON / OFF)
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D / 1 / 2 / 3 / 4 / 1 - 4)
F7 up menu

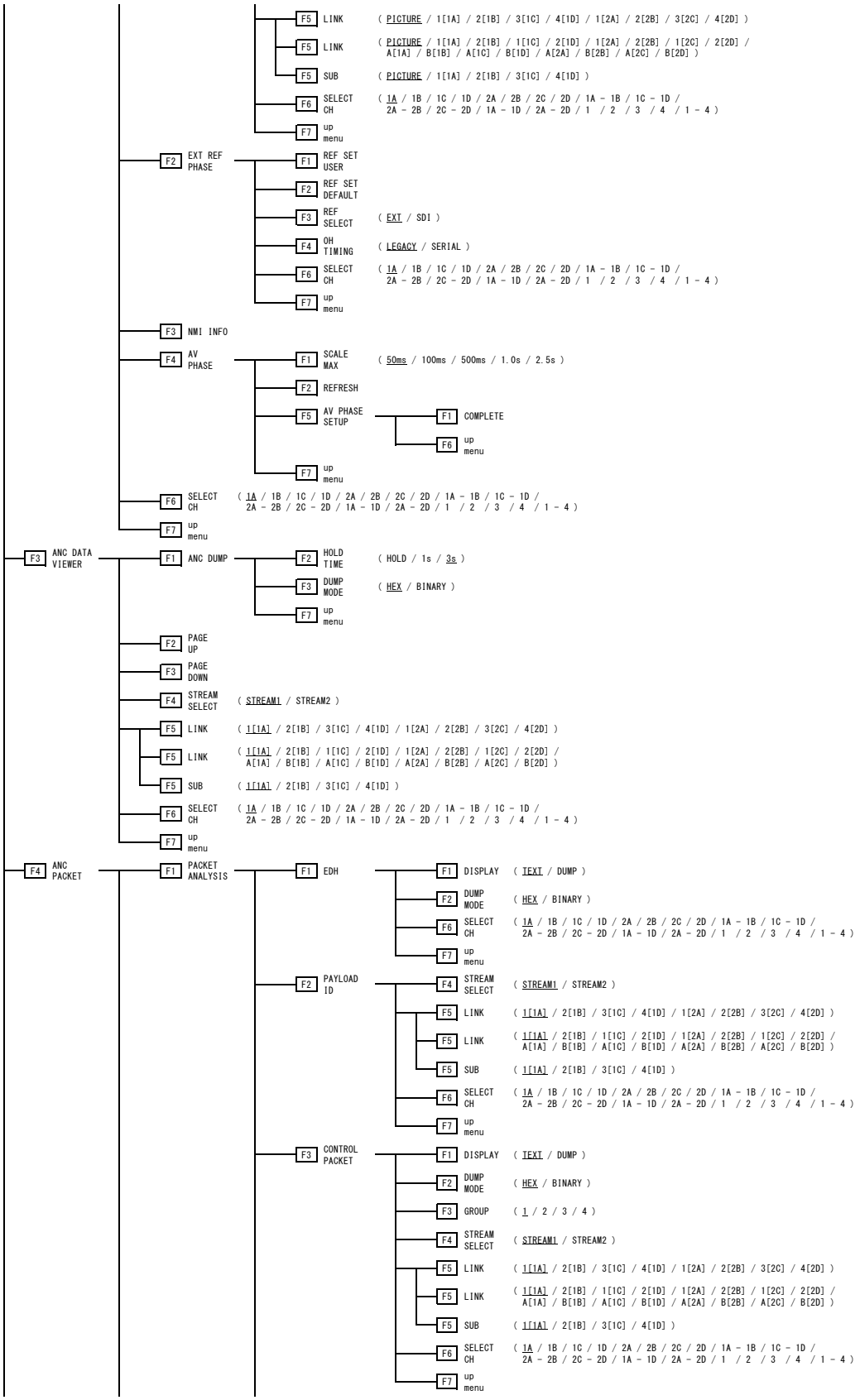
11.4 AUDIO Menu (SER03)

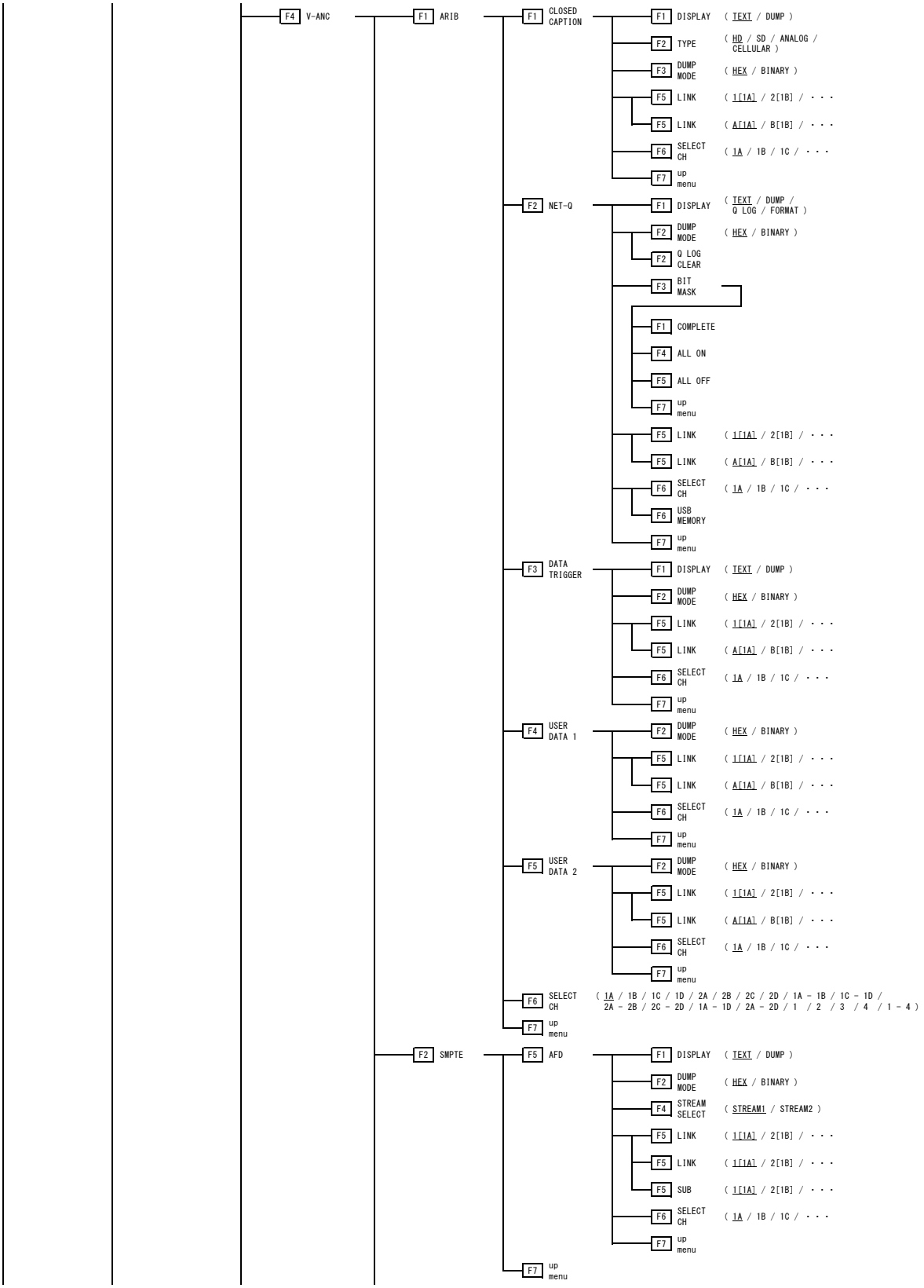


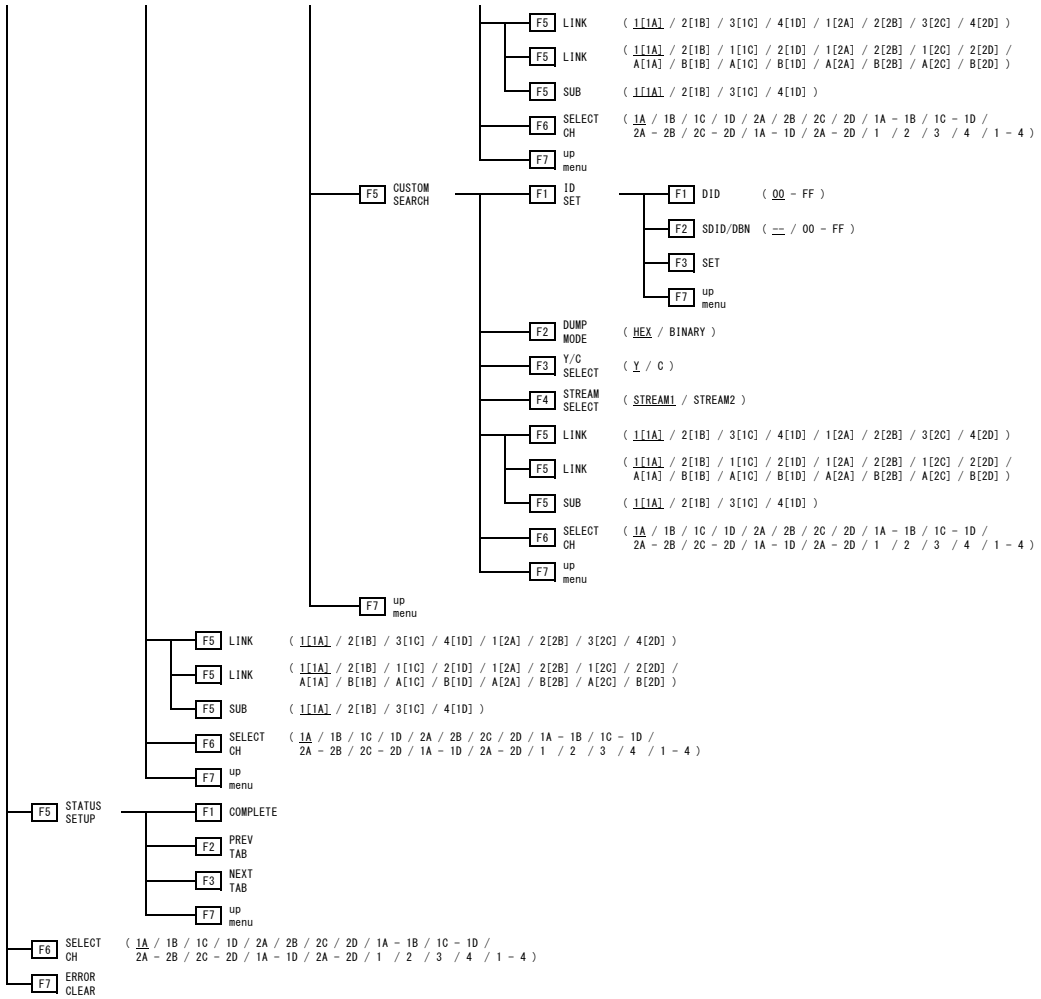

F6 USB MEMORY
F1 AUTO FILENAME (ON / OFF)
F2 NAME INPUT
F1 CLEAR ALL
F2 DELETE
F4 <=
F5 =>
F6 CHAR SET
F7 up menu
F3 STORE
F1 OVER WR YES
F3 OVER WR NO
F4 FILE DELETE
F1 DELETE YES
F3 DELETE NO
F7 up menu
F7 up menu
F2 METADATA
F1 DOLBY E METADATA
F1 DOLBY PROGRAM (PRM1 / PRM2 / PRM3 / PRM4 / PRM5 / PRM6 / PRM7 / PRM8)
F7 up menu
F2 EBI METADATA
F1 DISPLAY PROGRAM (PRM1 / PRM2 / PRM3 / PRM4 / PRM5 / PRM6 / PRM7 / PRM8)
F7 up menu
F1 DOLBY D METADATA
F7 up menu
F2 EBI METADATA
F7 up menu
F1 DOLBY D+ METADATA
F7 up menu
F2 EBI METADATA
F7 up menu
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D / 1 / 2 / 3 / 4 / 1 - 4)
F7 up menu
F3 CHANNEL STATUS
F1 DISPLAY CHANNEL (1 - 16 / A:CH1 - A:CH8 / B:CH1 - B:CH8 / A1 - A16 / B1 - B16 / C1 - C16 / D1 - D16)
F2 ALIGN (LSB 1st / MSB 1st)
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D / 1 / 2 / 3 / 4 / 1 - 4)
F7 up menu
F4 USER BIT
F1 DISPLAY CHANNEL (1 - 16 / A:CH1 - A:CH8 / B:CH1 - B:CH8 / A1 - A16 / B1 - B16 / C1 - C16 / D1 - D16)
F2 ALIGN (LSB 1st / MSB 1st)
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D / 1 / 2 / 3 / 4 / 1 - 4)
F7 up menu
F5 ERROR RESET
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D / 1 / 2 / 3 / 4 / 1 - 4)
F7 up menu
F5 ERROR SETUP
F1 COMPLETE
F7 up menu
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D / 1 / 2 / 3 / 4 / 1 - 4)
F7 PHONES VOLUME (0 - 63)

11.5 STATUS Menu

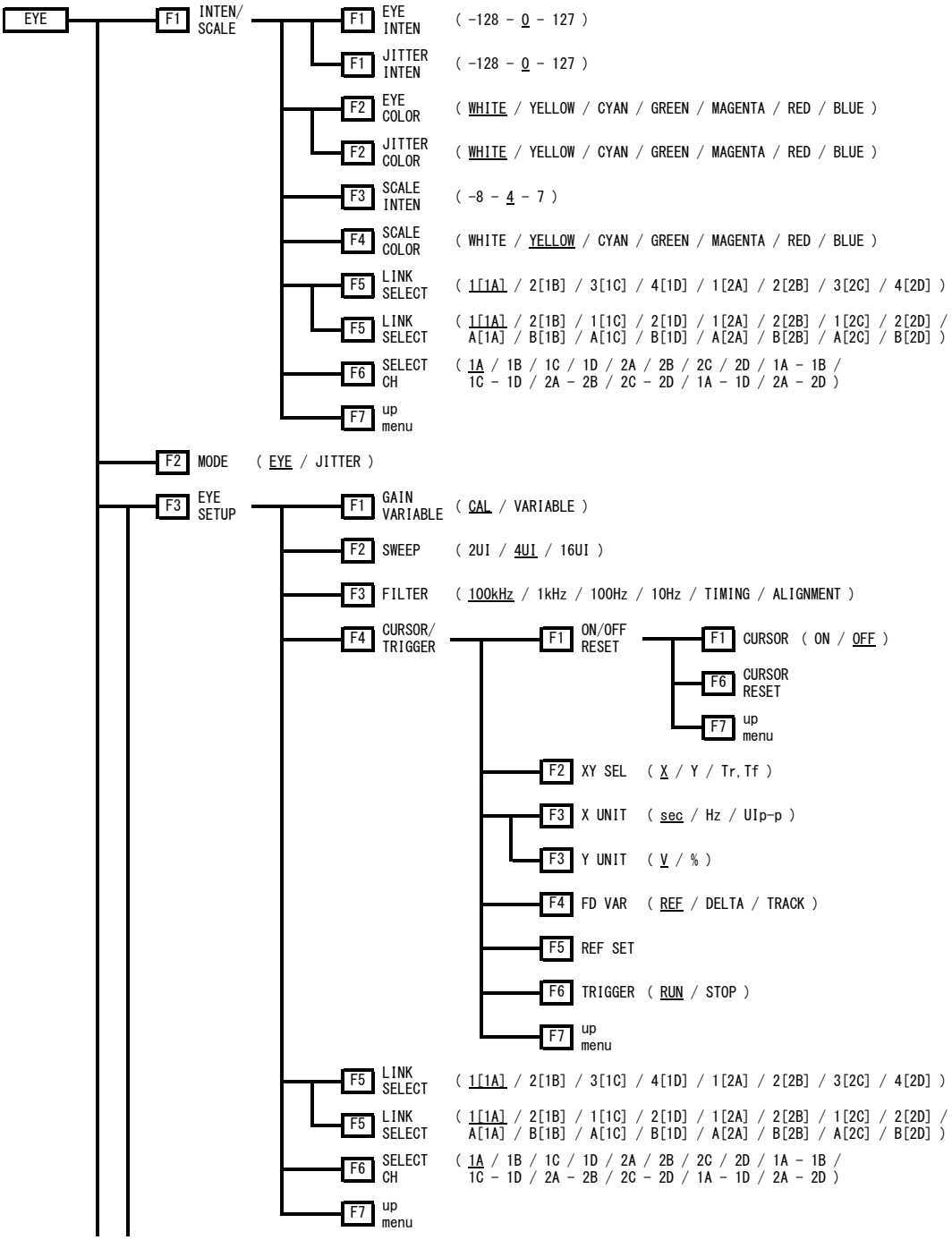


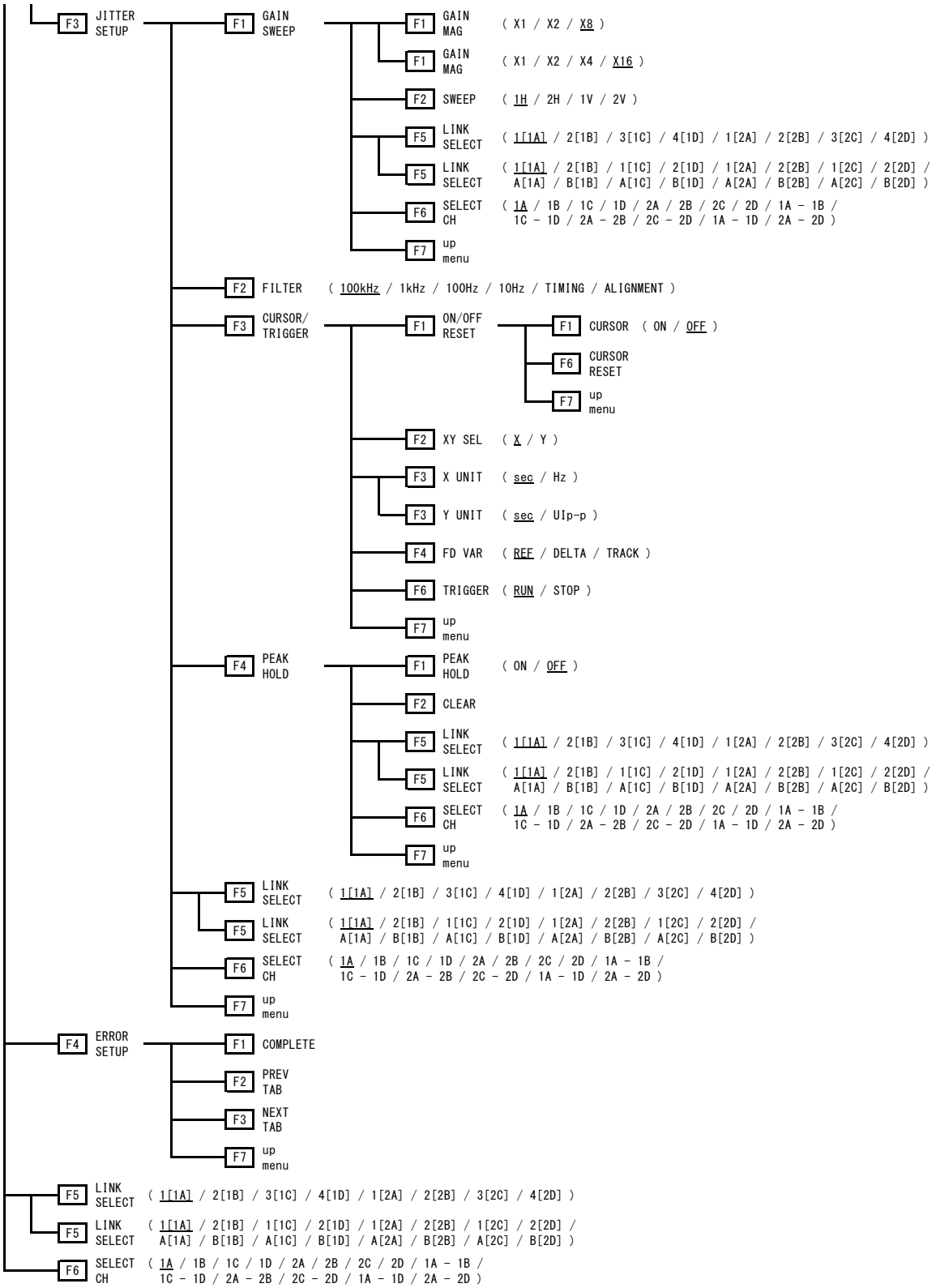

F5 LINK (PICTURE / 1[1A] / 2[1B] / 3[1C] / 4[1D] / 1[2A] / 2[2B] / 3[2C] / 4[2D])
F5 LINK (PICTURE / 1[1A] / 2[1B] / 1[1C] / 2[1D] / 1[2A] / 2[2B] / 1[2C] / 2[2D] / A[1A] / B[1B] / A[1C] / B[1D] / A[2A] / B[2B] / A[2C] / B[2D])
F5 SUB (PICTURE / 1[1A] / 2[1B] / 3[1C] / 4[1D])
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D / 1 / 2 / 3 / 4 / 1 - 4)
F7 up menu
F2 EXT REF PHASE
F1 REF SET USER
F2 REF SET DEFAULT
F3 REF SELECT (EXT / SDI)
F4 OH TIMING (LEGACY / SERIAL)
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D / 1 / 2 / 3 / 4 / 1 - 4)
F7 up menu
F3 NMI INFO
F4 AV PHASE
F1 SCALE MAX (50ms / 100ms / 500ms / 1.0s / 2.5s)
F2 REFRESH
F5 AV PHASE SETUP
F1 COMPLETE
F6 up menu
F7 up menu
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D / 1 / 2 / 3 / 4 / 1 - 4)
F7 up menu
F3 ANC DATA VIEWER
F1 ANC DUMP
F2 HOLD TIME (HOLD / 1s / 3s)
F3 DUMP MODE (HEX / BINARY)
F7 up menu
F2 PAGE UP
F3 PAGE DOWN
F4 STREAM SELECT (STREAM1 / STREAM2)
F5 LINK (1[1A] / 2[1B] / 3[1C] / 4[1D] / 1[2A] / 2[2B] / 3[2C] / 4[2D])
F5 LINK (1[1A] / 2[1B] / 1[1C] / 2[1D] / 1[2A] / 2[2B] / 1[2C] / 2[2D] / A[1A] / B[1B] / A[1C] / B[1D] / A[2A] / B[2B] / A[2C] / B[2D])
F5 SUB (1[1A] / 2[1B] / 3[1C] / 4[1D])
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D / 1 / 2 / 3 / 4 / 1 - 4)
F7 up menu
F4 ANC PACKET
F1 PACKET ANALYSIS
F1 EDH
F1 DISPLAY (TEXT / DUMP)
F2 DUMP MODE (HEX / BINARY)
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D / 1 / 2 / 3 / 4 / 1 - 4)
F7 up menu
F2 PAYLOAD ID
F4 STREAM SELECT (STREAM1 / STREAM2)
F5 LINK (1[1A] / 2[1B] / 3[1C] / 4[1D] / 1[2A] / 2[2B] / 3[2C] / 4[2D])
F5 LINK (1[1A] / 2[1B] / 1[1C] / 2[1D] / 1[2A] / 2[2B] / 1[2C] / 2[2D] / A[1A] / B[1B] / A[1C] / B[1D] / A[2A] / B[2B] / A[2C] / B[2D])
F5 SUB (1[1A] / 2[1B] / 3[1C] / 4[1D])
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D / 1 / 2 / 3 / 4 / 1 - 4)
F7 up menu
F3 CONTROL PACKET
F1 DISPLAY (TEXT / DUMP)
F2 DUMP MODE (HEX / BINARY)
F3 GROUP (1 / 2 / 3 / 4)
F4 STREAM SELECT (STREAM1 / STREAM2)
F5 LINK (1[1A] / 2[1B] / 3[1C] / 4[1D] / 1[2A] / 2[2B] / 3[2C] / 4[2D])
F5 LINK (1[1A] / 2[1B] / 1[1C] / 2[1D] / 1[2A] / 2[2B] / 1[2C] / 2[2D] / A[1A] / B[1B] / A[1C] / B[1D] / A[2A] / B[2B] / A[2C] / B[2D])
F5 SUB (1[1A] / 2[1B] / 3[1C] / 4[1D])
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D / 1 / 2 / 3 / 4 / 1 - 4)
F7 up menu


F4 V-ANC
F1 ARIB
F1 CLOSED CAPTION
F1 DISPLAY (TEXT / DUMP)
F2 TYPE (HD / SD / ANALOG / CELLULAR)
F3 DUMP MODE (HEX / BINARY)
F5 LINK (1[1A] / 2[1B] / ・・・
F5 LINK (A[1A] / B[1B] / ・・・
F6 SELECT CH (1A / 1B / 1C / ・・・
F7 up menu
F2 NET-Q
F1 DISPLAY (TEXT / DUMP / Q LOG / FORMAT)
F2 DUMP MODE (HEX / BINARY)
F2 Q LOG CLEAR
F3 BIT MASK
F1 COMPLETE
F4 ALL ON
F5 ALL OFF
F7 up menu
F5 LINK (1[1A] / 2[1B] / ・・・
F5 LINK (A[1A] / B[1B] / ・・・
F6 SELECT CH (1A / 1B / 1C / ・・・
F6 USB MEMORY
F7 up menu
F3 DATA TRIGGER
F1 DISPLAY (TEXT / DUMP)
F2 DUMP MODE (HEX / BINARY)
F5 LINK (1[1A] / 2[1B] / ・・・
F5 LINK (A[1A] / B[1B] / ・・・
F6 SELECT CH (1A / 1B / 1C / ・・・
F7 up menu
F4 USER DATA 1
F2 DUMP MODE (HEX / BINARY)
F5 LINK (1[1A] / 2[1B] / ・・・
F5 LINK (A[1A] / B[1B] / ・・・
F6 SELECT CH (1A / 1B / 1C / ・・・
F7 up menu
F5 USER DATA 2
F2 DUMP MODE (HEX / BINARY)
F5 LINK (1[1A] / 2[1B] / ・・・
F5 LINK (A[1A] / B[1B] / ・・・
F6 SELECT CH (1A / 1B / 1C / ・・・
F7 up menu
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D / 1 / 2 / 3 / 4 / 1 - 4)
F7 up menu
F2 SMPTE
F5 AFD
F1 DISPLAY (TEXT / DUMP)
F2 DUMP MODE (HEX / BINARY)
F4 STREAM SELECT (STREAM1 / STREAM2)
F5 LINK (1[1A] / 2[1B] / ・・・
F5 LINK (1[1A] / 2[1B] / ・・・
F5 SUB (1[1A] / 2[1B] / ・・・
F6 SELECT CH (1A / 1B / 1C / ・・・
F7 up menu
F7 up menu


F5 LINK (1[1A] / 2[1B] / 3[1C] / 4[1D] / 1[2A] / 2[2B] / 3[2C] / 4[2D])
F5 LINK (1[1A] / 2[1B] / 1[1C] / 2[1D] / 1[2A] / 2[2B] / 1[2C] / 2[2D] / A[1A] / B[1B] / A[1C] / B[1D] / A[2A] / B[2A] / A[2C] / B[2D])
F5 SUB (1[1A] / 2[1B] / 3[1C] / 4[1D])
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D / 1 / 2 / 3 / 4 / 1 - 4)
F7 up menu
F5 CUSTOM SEARCH
F1 ID SET
F1 DID (00 - FF)
F2 SDID/DBN (-- / 00 - FF)
F3 SET
F7 up menu
F2 DUMP MODE (HEX / BINARY)
F3 Y/C SELECT (Y / C)
F4 STREAM SELECT (STREAM1 / STREAM2)
F5 LINK (1[1A] / 2[1B] / 3[1C] / 4[1D] / 1[2A] / 2[2B] / 3[2C] / 4[2D])
F5 LINK (1[1A] / 2[1B] / 1[1C] / 2[1D] / 1[2A] / 2[2B] / 1[2C] / 2[2D] / A[1A] / B[1B] / A[1C] / B[1D] / A[2A] / B[2A] / A[2C] / B[2D])
F5 SUB (1[1A] / 2[1B] / 3[1C] / 4[1D])
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D / 1 / 2 / 3 / 4 / 1 - 4)
F7 up menu
F7 up menu
F5 LINK (1[1A] / 2[1B] / 3[1C] / 4[1D] / 1[2A] / 2[2B] / 3[2C] / 4[2D])
F5 LINK (1[1A] / 2[1B] / 1[1C] / 2[1D] / 1[2A] / 2[2B] / 1[2C] / 2[2D] / A[1A] / B[1B] / A[1C] / B[1D] / A[2A] / B[2A] / A[2C] / B[2D])
F5 SUB (1[1A] / 2[1B] / 3[1C] / 4[1D])
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D / 1 / 2 / 3 / 4 / 1 - 4)
F7 up menu
F5 STATUS SETUP
F1 COMPLETE
F2 PREV TAB
F3 NEXT TAB
F7 up menu
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D / 1 / 2 / 3 / 4 / 1 - 4)
F7 ERROR CLEAR

11.6 EYE Menu (SER02/SER09)




F3 JITTER SETUP
F1 GAIN SWEEP
F1 GAIN MAG (X1 / X2 / X8)
F1 GAIN MAG (X1 / X2 / X4 / X16)
F2 SWEEP (1H / 2H / 1V / 2V)
F5 LINK SELECT (1[1A] / 2[1B] / 3[1C] / 4[1D] / 1[2A] / 2[2B] / 3[2C] / 4[2D])
F5 LINK SELECT (1[1A] / 2[1B] / 1[1C] / 2[1D] / 1[2A] / 2[2B] / 1[2C] / 2[2D] / A[1A] / B[1B] / A[1C] / B[1D] / A[2A] / B[2B] / A[2C] / B[2D])
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D)
F7 up menu
F2 FILTER (100kHz / 1kHz / 100Hz / 10Hz / TIMING / ALIGNMENT)
F3 CURSOR/ TRIGGER
F1 ON/OFF RESET
F1 CURSOR (ON / OFF)
F6 CURSOR RESET
F7 up menu
F2 XY SEL (X / Y)
F3 X UNIT (sec / Hz)
F3 Y UNIT (sec / UIp-p)
F4 FD VAR (REF / DELTA / TRACK)
F6 TRIGGER (RUN / STOP)
F7 up menu
F4 PEAK HOLD
F1 PEAK HOLD (ON / OFF)
F2 CLEAR
F5 LINK SELECT (1[1A] / 2[1B] / 3[1C] / 4[1D] / 1[2A] / 2[2B] / 3[2C] / 4[2D])
F5 LINK SELECT (1[1A] / 2[1B] / 1[1C] / 2[1D] / 1[2A] / 2[2B] / 1[2C] / 2[2D] / A[1A] / B[1B] / A[1C] / B[1D] / A[2A] / B[2B] / A[2C] / B[2D])
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D)
F7 up menu
F5 LINK SELECT (1[1A] / 2[1B] / 3[1C] / 4[1D] / 1[2A] / 2[2B] / 3[2C] / 4[2D])
F5 LINK SELECT (1[1A] / 2[1B] / 1[1C] / 2[1D] / 1[2A] / 2[2B] / 1[2C] / 2[2D] / A[1A] / B[1B] / A[1C] / B[1D] / A[2A] / B[2B] / A[2C] / B[2D])
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D)
F7 up menu
F4 ERROR SETUP
F1 COMPLETE
F2 PREV TAB
F3 NEXT TAB
F7 up menu
F5 LINK SELECT (1[1A] / 2[1B] / 3[1C] / 4[1D] / 1[2A] / 2[2B] / 3[2C] / 4[2D])
F5 LINK SELECT (1[1A] / 2[1B] / 1[1C] / 2[1D] / 1[2A] / 2[2B] / 1[2C] / 2[2D] / A[1A] / B[1B] / A[1C] / B[1D] / A[2A] / B[2B] / A[2C] / B[2D])
F6 SELECT CH (1A / 1B / 1C / 1D / 2A / 2B / 2C / 2D / 1A - 1B / 1C - 1D / 2A - 2B / 2C - 2D / 1A - 1D / 2A - 2D)

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