LEADER

LV 58SER04
MPEG DECODER

INSTRUCTION MANUAL

LEADER
ELECTRONIC MEASURING INSTRUMENTS

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1. INTRODUCTION

1.1 Maximum Allowable Input Voltage

⚠ CAUTION

The table below indicates the maximum signal voltage that can be applied to the input connectors. Do not apply excessive voltage to the connectors. Doing so may damage the device or lead to injury.
Do not apply external voltage to the output connectors. Doing so may damage the device or lead to injury.

Table 1-1　Maximum input voltage

Input Connector	Maximum Input Voltage
DVB-ASI	±2 V (DC + peak AC)

1.2 Trademark Acknowledgments

Dolby is a trademark of Dolby Laboratories.

1.3 Notations Used in This Manual

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

2. SPECIFICATIONS

2.1 General

The LV 58SER04 is an input unit that receives MPEG-2 TS (DVB-ASI) audio and video signals, decodes them, and transfers them to the LV 5800 (MULTI MONITOR) or the LV 7800 (MULTI RASTERIZER) to be displayed. After a signal is decoded, its video signal waveforms, vectors, pictures, and audio signals can be displayed. The LV 58SER04A can also be used to monitor errors defined by ETSI ETR-290, to display PAT and PMT data, and to display TS bit rates and the bit rates for each PID. These features are ideal for continuous monitoring of MPEG-2 TS signals in broadcasting stations and similar facilities.

When combined with other units, the LV 58SER04 can also:

- Display eye patterns for DVB-ASI signals (when combined with the LV 58SER02)
- Display levels and Lissajous curves for audio signals (when combined with the LV 58SER40A)

2.2 Features

- DVB-ASI Input Connector

  The LV 58SER04 comes with one DVB-ASI input connector.

- Video Decoding

  The LV 58SER04 decodes compressed MPEG-2 TS video data (MPEG-2 Video 4:2:2, 4:2:0) and displays video signal waveforms, vectors, and pictures.[1]

- Audio Decoding

  The LV 58SER04 can be combined with the LV 58SER40A (DIGITAL AUDIO) to decode MPEG-2 TS audio data, show Lissajous curves, sound images, and sound levels, and transmit digital audio signals.[*1]

  The decodable audio data types are MPEG-2 AAC, Dolby Digital (AC-3), LPCM (SMPTE 302M), and MPEG-1 Layer 2.[*2]

- PID Search

  The LV 58SER04 can automatically search for the PID of audio and video data.

- Error Detection

  The LV 58SER04 monitors and displays ETSI ETR 290 priority 1 and 2 errors.[*3]

- Status Display

  The LV 58SER04 can display PID bitrates, PCR jitter, selected PID dumps, PAT, and PMT.

- Eye Pattern Display

  You can install the LV 58SER02 (EYE PATTERN unit) with the LV 58SER04 to display DVB-ASI eye patterns.[*4]

*1   The LV 58SER04 cannot descramble scrambled broadcasts, and it may not be able to decode all MPEG-2 formats.

      The LV 58SER04 can only decode one stream of audio and video data at a time. You cannot decode and display different audio and video data streams simultaneously on the multi display using only one MPEG-2 input unit. If you display the decoded data stream using the multi display and then change the decoded PID, the PID for every screen will change.

*2   To decode Dolby Digital (AC-3), the LV 58SER40A (DIGITAL AUDIO) must be equipped with the Dolby E option.

*3   There are some limitations on error detection.

*4   Jitter cannot be measured or displayed.

2.3   Specifications

2.3.1   Standards

Supported Standards	ISO/IEC 13818-1
Profile and Level	MP@HL, MP@ML, 422@ML, 422P@HL

2.3.2   DVB-ASI Input

Input Connector

Input Connector	BNC-R
Number of Input Connectors	1 connector, 75 Ω
Input Return Loss	-20 dB (5 to 270 MHz)
Maximum Input Voltage	±2 V (DC + peak AC)

Input Signal

Serial Clock	270 MHz
Transmission Mode	Packet/Burst
Maximum Bit Rate	66 Mbps
Supported Packet Sizes	188, 204, and 208 bytes
Packet Size Detection	Automatically detects supported packet sizes.

2.3.3   Decoding Capabilities

Video Formats	1920x1080i / 59.94, 60, 50 (4:2:0, 4:2:2)
	1440x1080i / 59.94, 60, 50 (4:2:0, 4:2:2)
	1280x 720p / 59.94, 60, 50 (4:2:0, 4:2:2)
	720x 480i / 59.94 (4:2:0, 4:2:2)
	720x 576i / 50 (4:2:0, 4:2:2)
Audio Signals*	MPEG-2 AAC, Dolby Digital (AC-3), LPCM (SMPTE 302M), MPEG-1 Layer 2

*   The LV 58SER40A (DIGITAL AUDIO) is necessary to display and output audio. To decode Dolby Digital (AC-3), the LV 58SER40A must be equipped with the Dolby E option.

2.3.4 Video Signal Waveform Display Features

Waveform Operations

Display Modes	Overlay display—displays component signals on top of each other.
	Parade display—displays component signals side by side.
YC_BC_R to GBR Conversion	Converts YC_BC_R signals into GBR signals and displays the results.
Pseudo-Composite Display	Displays component signals artificially as composite signals.
Channel Assignment	Channels can be displayed in GBR or RGB order (when displaying GBR converted signals).
Line Select	Displays the selected line.
Image Quality Adjustment	Adjusts the brightness.

Vertical Axis

Sensitivity

V Scale	0 to 0.7 V, -0.3 to 0.7 V
% Scale	0 to 100 %, -50 to 100 %
Decimal Scale	0 to 255
Hexadecimal Scale	00 to FF
Gain	×1, ×5, variable
Variable Gain	×0.2 to ×2
Amplitude Accuracy	±0.5 %

HDTV Frequency Characteristics

Y Signal	±0.5 % (1 to 30 MHz)
C_B, C_R Signals	±0.5 % (0.5 to 15 MHz)
Low-pass Attenuation	20 dB or more (at 20 MHz)

SDTV Frequency Characteristics

Y Signal	±0.5 % (1 to 5.75 MHz)
C_B, C_R Signals	±0.5 % (0.5 to 2.75 MHz)
Low-pass Attenuation	20 dB or more (at 3.8 MHz)

Horizontal Axis

Line Display

Display Modes	Overlay: 1H, 2H
	Parade: 1H, 2H, 3H
Magnification	×1, ×10, ×20, ACTIVE

Field Display

Display Modes	Overlay: 1V, 2V*
	Parade: 1V, 2V, 3V
Magnification	×1, ×20, ×40
Time Accuracy	±0.5 %

Cursor Measurement

   Composition

Horizontal Cursors	2 (REF and DELTA)
Vertical Cursors	2 (REF and DELTA)
Amplitude Measurement	Percentage and voltage displays
Time Measurement	Second display
Frequency Measurement	Computes and displays the frequency with the length of one cycle set to the time between two cursors.

*   2V display is not available if the input signal is progressive.

2.3.5   Vector Display

Scale	75 %, 100 % (for the color bars)
Gain	×1, ×5, IQ-MAG, variable
Variable Gain	×0.2 to ×2
Amplitude Accuracy	±0.5 %
IQ Axis	Show or hide
Pseudo-Composite Display	Converts component signals into composite signals with artificially added burst and displays the results. (The color matrix for HDTV signals is converted to SDTV.)
Image Quality Adjustment	Adjusts the brightness.

2.3.6   Picture Displays

HDTV Display	Achieved through pixel sampling.
SDTV Display	Achieved through pixel interpolation.
Marker Displays	Center marker display
	4:3 or 16:9 marker display
	Safe action marker display
	Safe title marker display
Line Select	Marks the selected line.
Display Sizes	Optimized display, actual size display
Histogram Display	Displays the luminance distribution.
Image Quality Adjustment	GBR level adjustment, contrast adjustment, brightness adjustment

2.3.7   Section and PCR Information

PAT

PAT Detection	Automatically identifies packets whose PID is 0000h as PATs.
Cycle Measurement[*]	Measures PAT cycles in milliseconds.
PAT Data Display	Dumps PAT contents.

PMT

PMT Detection	Select the PID of the PMT to be decoded.
Cycle Measurement[*]	Measures PMT cycles in milliseconds.
PMT Data Display	Dumps PMT contents.

NIT

NIT Detection	Automatically identifies packets whose PID is 0010h as NIT PIDs.
Cycle Measurement*	Measures NIT cycles in milliseconds.
NIT Data Display	Dumps NIT contents.

CAT

CAT Detection	Identifies packets whose PID is 0001h as CATs.
Cycle Measurement*	Measures CAT cycles in milliseconds.
CAT Data Display	Dumps CAT contents.

PCR

PCR Detection	Automatically detects packets with the PCR PID specified by the selected PMT.
Cycle Measurement*	Measures PCR cycles in milliseconds.
PCR jitter	Measures the PCR accuracy based on the internal reference clock.

* If a section is divided into multiple TS packets, the cycle of each section is measured.

2.3.8 Dump Display

Function	Dumps the PAT, PMT, CAT, NIT, SDT, BIT, and the selected packet.
Notation	Displays decimal and hexadecimal values and contents

2.3.9 Bit Rate Display

Function	Displays the bit rates and cycles of the main sections and PIDs.
Bar Display	Displays the occupied bandwidth with respect to the TS bit rate using bars
Displayed Sections	NIT, CAT, PAT, and PMT
Displayed Packets	All PIDs that can be detected

2.3.10 ISDB-T Display

Function	Analyzes and displays broadcast transport streams
TMCC Information Display	Analyzes and displays the syntax of IIP packets
SFN Information Display	Analyzes the SFN information of IIP packets and dumps the results

2.3.11 General Specifications

Environmental Conditions	Same as the LV 5800/7800
Power Supply	Supplied from the LV 5800/7800 20 W max.
Weight	0.3 kg
Accessories	Instruction Manual..............................1

3. COMPONENT NAMES AND FUNCTIONS
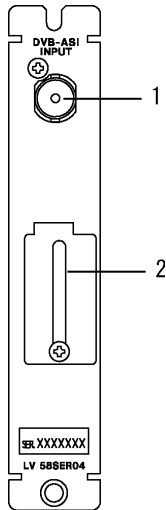
Figure 3-1   Rear panel

1   DVB-ASI INPUT

- The input is terminated internally at 75 Ω. You do not need to attach a terminator. Connect the input to a cable with a characteristic impedance of 75 Ω.
- Do not apply a signal with an amplitude greater than 800 mVp-p ±10 %.
- The LV 58SER04 does not have descrambling features. It can only decode unscrambled data.
- The LV 58SER04 cannot analyze a PAT with more than one TS_ID. A stream containing such a PAT will not be properly decoded.
- The LV 58SER04 only identifies PMTs by checking PID. It does not identify PMTs by checking the program_number field. If a PAT has two identical PMT PID with two different program_number fields, the LV 58SER04 will have no way of deciding which one to use when it decodes and analyzes a stream.
- The LV 58SER04 can decode streams with the following video formats:
  1920 x 1080i / 59.94, 60, 50   (4:2:0,4:2:2)
  1440 x 1080i / 59.94, 60, 50   (4:2:0,4:2:2)
  1280 x 720p / 59.94, 60, 50   (4:2:0,4:2:2)
   720 x 480i / 59.94   (4:2:0,4:2:2)
   720 x 576i / 50   (4:2:0,4:2:2)
- The LV 58SER04 can decode MPEG-2 AAC, Dolby Digital (AC-3), LPCM (SMPTE 302M), and MPEG-1 Layer 2 audio streams.
- When decoding an MPEG-2 sequence layer, the LV 58SER04 ignores the sequence end code. If a stream's video signal format, or some other sequence header information changes, but the PID remains the same, the stream may not be decoded properly.

⚠ CAUTION

Do not apply voltages over ±2 V (DC + peak AC) to the input. Doing so may damage the device.

2   Maintenance Port

This port is used for maintenance and repairs. Do not connect anything to it.

4.   MENU STRUCTURE

4.1   Video Signal Waveform Display Menu

```
WFM ─── F1  INTEN /     ─── F1  WFM          ( -128 - 0 - 127 )
            SCALE               INTEN

                         1 F2  WFM           ( WHITE / GREEN )
                               COLOR

                         2 F2  WFM           ( WHITE / GREEN / MULTI )
                               COLOR

                           F3  SCALE         ( -8 - 4 - 7 )
                               INTEN

                         3 F4  SCALE         ( HDV,SD% / HDV,SDV / HD%,SD% / 255 / FF )
                               UNIT

                         4 F4  SCALE         ( HDV,SD% / HDV,SDV / HD%,SD% / 150% / 255 / FF )
                               UNIT

                         5 F4  SCALE         ( HDV,SD% / HDV,SDV / HD%,SD% )
                               UNIT

                         3 F5  75%COLOR      ( ON / OFF )
                               SCALE

                           F6  SCALE         ( WHITE / YELLOW / CYAN / GREEN / MAGENTA / RED / BLUE )
                               COLOR

                           F7  up
                               menu

       F2  GAIN/         ─── F1  GAIN        ( CAL / VARIABLE )
           SWEEP                 VARIABLE

                           F2  GAIN          ( X1 / X5 )
                               MAG

                           F3  SWEEP         ( H / V )

                         6 F4  SWEEP         ( X1 / X10 / X20 )
                               MAG

                         7 F4  SWEEP         ( X1 / ACTIVE )
                               MAG

                         8 F4  SWEEP         ( X1 )
                               MAG

                         9 F4  SWEEP         ( X1 / X20 / X40 )
                               MAG

                        10 F5  H_SWEEP       ( 1H / 2H )

                        11 F5  V_SWEEP       ( 1V / 2V )

                        12 F6  FIELD         ( FIELD1 / FIELD2 )

                           F7  up
                               menu

    13 F3  LINE          ─── F1  LINE        ( ON / OFF )
           SELECT                SELECT

                        14 F2  FIELD         ( FIELD1 / FIELD2 / FRAME )

                           F7  up
                               menu

       F4  CURSOR        ─── F1  CURSOR      ( ON / OFF )

                           F2  XY SEL        ( X / Y )

                        15 F3  Y UNIT        ( mV / % / R% )

                        16 F3  Y UNIT        ( % )

                        17 F3  X UNIT        ( sec / Hz )
```

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4. MENU STRUCTURE

Figure 4-1   Video signal waveform display menu

* *1   Appears in the 2- and 4-screen multi displays.
* *2   Appears in the 1-screen display.
* *3   Appears when COLOR MATRIX is set to YCbCr.
* *4   Appears when COLOR MATRIX is set to GBR or RGB.
* *5   Appears when COLOR MATRIX is set to COMPOSITE.
* *6   Appears when COLOR MATRIX is set to YCbCr, GBR, or RGB, and SWEEP is set to H.
* *7   Appears when COLOR MATRIX is set to COMPOSITE, and H_SWEEP is set to 1H.
* *8   Appears when COLOR MATRIX is set to COMPOSITE and H_SWEEP is set to 2H.
* *9   Appears when SWEEP is set to V.
* *10   Appears when SWEEP is set to H and the OVLAY key is lighted.
* *11   Appears when SWEEP is set to V, the OVLAY key is lighted, and the input signal is interlaced.
* *12   Appears when V_SWEEP is set to 1V and the input signal is interlaced.
* *13   Appears when SWEEP is set to H.
* *14   Appears when the input signal is interlaced.
* *15   Appears when XYSEL is set to Y, and COLOR MATRIX is set to YCbCr, GBR, or RGB.
* *16   Appears when XY SEL is set to Y, and COLOR MATRIX is set to COMPOSITE.
* *17   Appears when XY SEL is set to X.
* *18   Appears when Y UNIT is set to R%.
* *19   Appears when COLOR MATRIX is set to YCbCr, GBR, or RGB.
* *20   Appears when COLOR MATRIX is set to GBR.
* *21   Appears when COLOR MATRIX is set to RGB.
* *22   Appears when COLOR MATRIX is set to COMPOSITE and the composite display format is NTSC.

4.2   Vector Display Menu

```
VECT ──┬─ F1  INTEN /    ──┬─ F1  VECTOR      ( −128 − 0 − 127 )
       │      SCALE        │      INTEN
       │                   │
       │                   ├─ F2  VECTOR      ( WHITE / GREEN )
       │                   │      COLOR
       │                   │
       │                   ├─ F3  SCALE       ( −8 − 4 − 7 )
       │                   │      INTEN
       │                   │
       │                   ├─ F4  IQ AXIS     ( ON / OFF )
       │                   │
       │                   ├─ F5  SCALE       ( WHITE / YELLOW / CYAN / GREEN / MAGENTA / RED / BLUE )
       │                   │      COLOR
       │                   │
       │                   └─ F7  up
       │                          menu
       │
       ├─ F2  GAIN      ──┬─ F1  GAIN        ( CAL / VARIABLE )
       │                  │      VARIABLE
       │                  │
       │                  ├─ F2  GAIN        ( X1 / X5 / IQ−MAG )
       │                  │      MAG
       │                  │
       │                  └─ F7  up
       │                         menu
       │
       ├─ F3  LINE      ──┬─ F1  LINE        ( ON / OFF )
       │      SELECT       │      SELECT
       │                   │    1
       │                   ├─ F2  FIELD       ( FIELD1 / FIELD2 / FRAME )
       │                   │
       │                   └─ F7  up
       │                          menu
       │
       ├─ F4  COLOR     ──┬─ F1  COLOR        ( COMPONENT / COMPOSITE )
       │      SYSTEM       │      MATRIX
       │                   │
       │                   ├─ F2  COMPOSITE    ( AUTO / NTSC / PAL )
       │                   │      FORMAT
       │                   │    2
       │                   ├─ F3  SETUP        ( 0% / 7.5% )
       │                   │
       │                   ├─ F4  COLOR        ( 100% / 75% )
       │                   │      BAR
       │                   │
       │                   └─ F7  up
       │                          menu
       │
       └─ F6  PERSISTENCE ─┬─ F1  PERSISTENCE ( ON / OFF / INFINIT )
                           │
                           ├─ F2  PERSIST
                           │      CLEAR
                           │
                           └─ F7  up
                                  menu
```
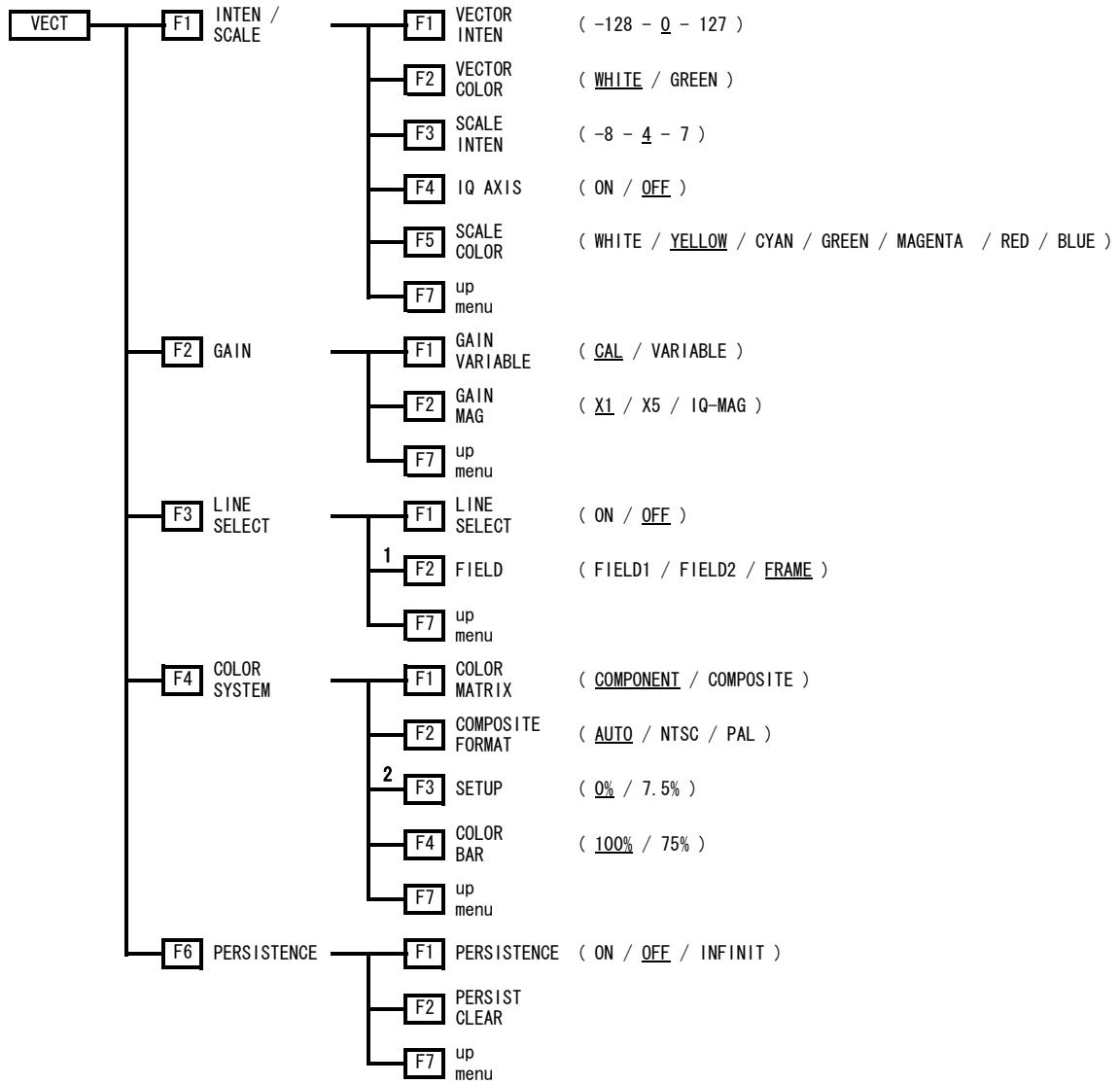
Figure 4-2   Vector display menu

*1   Appears when the input signal is interlaced.
*2   Appears when COLOR MATRIX is set to COMPOSITE and the composite display format is NTSC.

4.3　Picture Display Menu
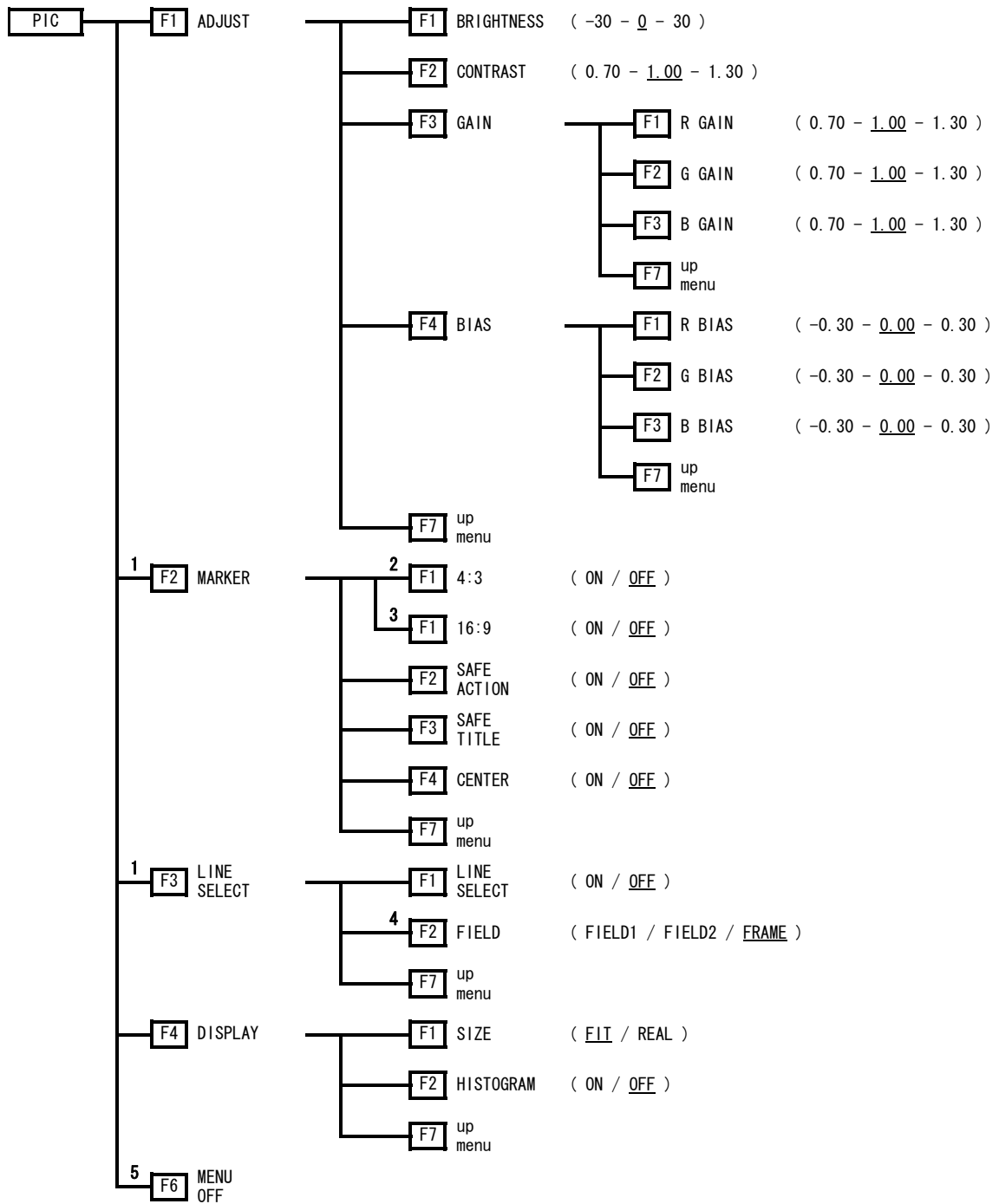

Figure 4-3　Picture display menu

*1　Appears when SIZE is set to FIT.
*2　Appears when the input signal is HD.
*3　Appears when the input signal is SD.
*4　Appears when the input signal is interlaced.
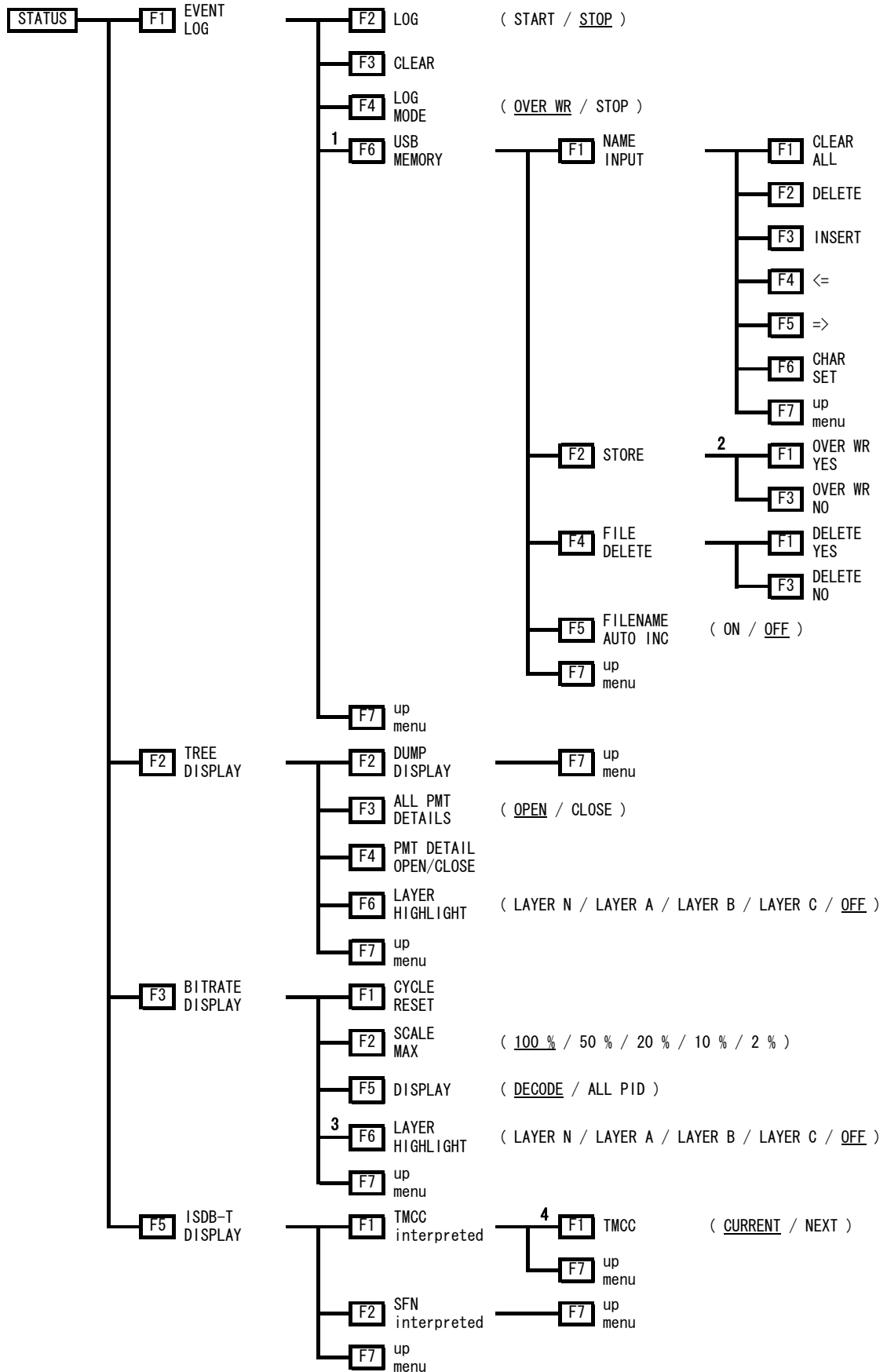*5　Appears in 1-screen display mode.

4.4 Status Display Menu

Figure 4-4   Status display menu

*1   Appears when USB memory is connected to the LV 5800/7800.

*2   Appears when a file with the same name already exists on the USB memory.

*3   Appears when DISPLAY is set to ALL PID.

*4   Appears in the 1- or 4-screen displays.
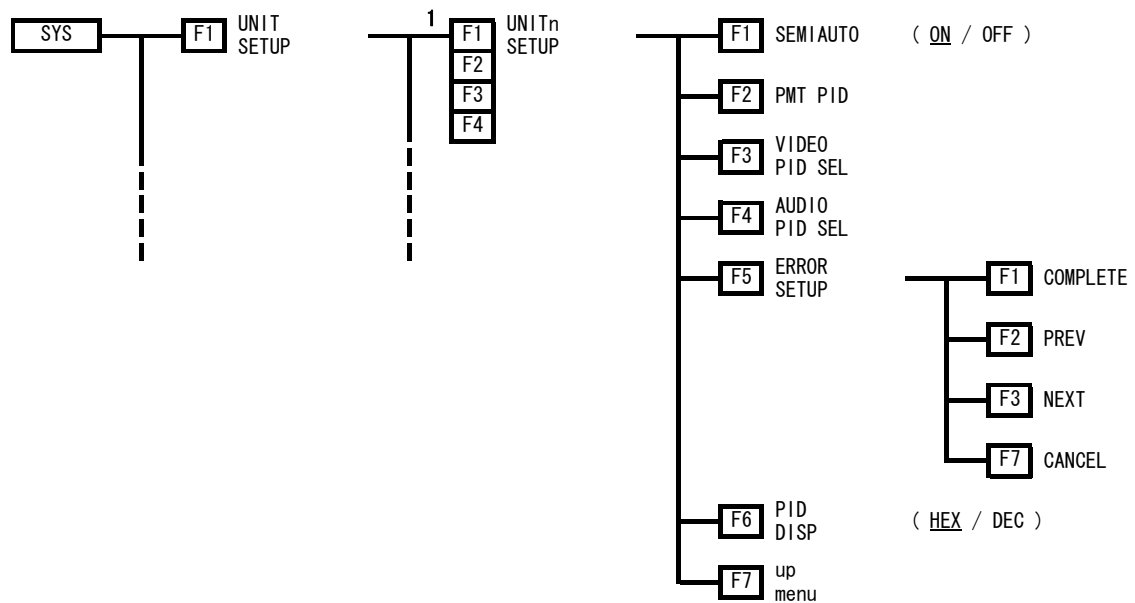
4.5   System Setup Menu

Figure 4-5   System setup menu

*1   Select the number of the slot that the LV 58SER04 is installed in.

5. BASIC OPERATIONS

5.1 Unit Installation

● To the LV 5800

The LV 58SER04 is an input unit. Refer to the LV 5800 instruction manual, and install the LV 58SER04 in a slot from 1 to 4. You can install up to four LV 58SER04 units.

● To the LV 7800

For the LV 7800, the LV 58SER04 is a factory option. You cannot install or uninstall units. For more information, contact your nearest LEADER agent.
You can install up to four LV 58SER04 units.

5.2 Display

When the LV 58SER04 is decoding an input signal properly, it will display the signal information as shown in the figure below. This section explains what kind of signal information is displayed.
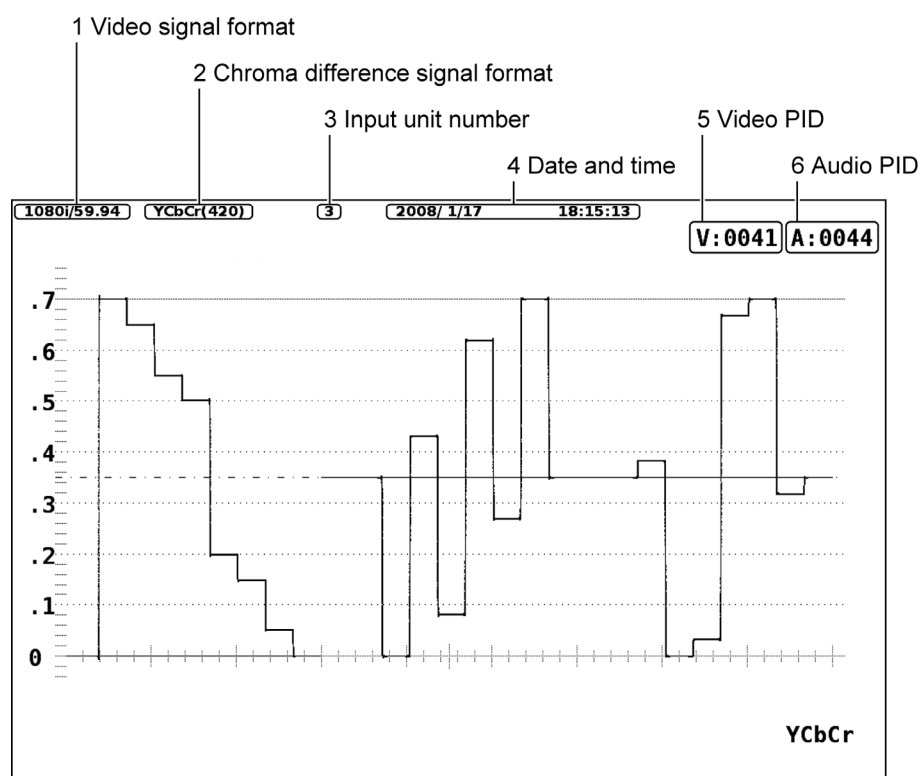

Figure 5-1   Decoded input signal information display

1   Video Signal Format

The LV 58SER04 analyzes the sequence layer encoded in the MPEG-2 data and displays the format of the video signal that it is decoding.
The following table lists the kinds of video formats that can be decoded, and how they are indicated on the display.

Table 5-1　Decodable video signal formats and how they are indicated on the display

Video Signal Format	Display Indication
1920 x 1080i / 60	1080i/60
1920 x 1080i / 59.94	1080i/59.94
1920 x 1080i / 50	1080i/50
1440 x 1080i / 60	1080i/60
1440 x 1080i / 59.94	1080i/59.94
1440 x 1080i / 50	1080i/50
1280 x 720p / 60	720p/60
1280 x 720p / 59.94	720p/59.94
1280 x 720p / 50	720p/50
720 x 480i / 59.94	525i/59.94
720 x 576i / 50	625i/50

2　Chroma Difference Signal Format

The chroma difference format information encoded in the sequence layer of the MPEG-2 data appears here. The LV 58SER04 can handle two chroma difference formats: YC_BC_R 4:2:2 and 4:2:0.

Table 5-2　Input chroma difference formats and how they are indicated on the display

Input Chroma Difference Format	Display Indication
YC_BC_R 4:2:2	YCbCr(422)
YC_BC_R 4:2:0	YCbCr(420)

3　Input Unit Number

The input unit number of the signal being decoded appears here.

4　Date and Time

The time according to the LV 5800/7800 clock appears here.

5　Video PID

The PID of the video signal being decoded appears in hexadecimal or decimal here.

Reference
　For more information, see section 6.1.5, "PID Display Format."

6　Audio PID

The PID of the audio signal being decoded appears in hexadecimal or decimal here.

5.3　Selecting an Input Signal

When an input signal contains multiple video and audio streams, and semiautomatic PID selection is set to ON, you can select which PID to decode by pressing the A and B keys.

Reference
　For more information, see section 6.1.1, "Semiautomatic PID Selection."

6.   LV 58SER04 SYSTEM SETUP

In the unit system setup, you can select the PID of the signal that you want to decode and configure features such as error detection. If there is more than one LV 58SER04 installed in the LV 5800/7800, you must set each LV 58SER04 individually.

• Procedure

SYS → F•1 UNIT SETUP → F•1 to F•4 SETUP (select the unit number that corresponds to the slot that the LV 58SER04 is installed in)
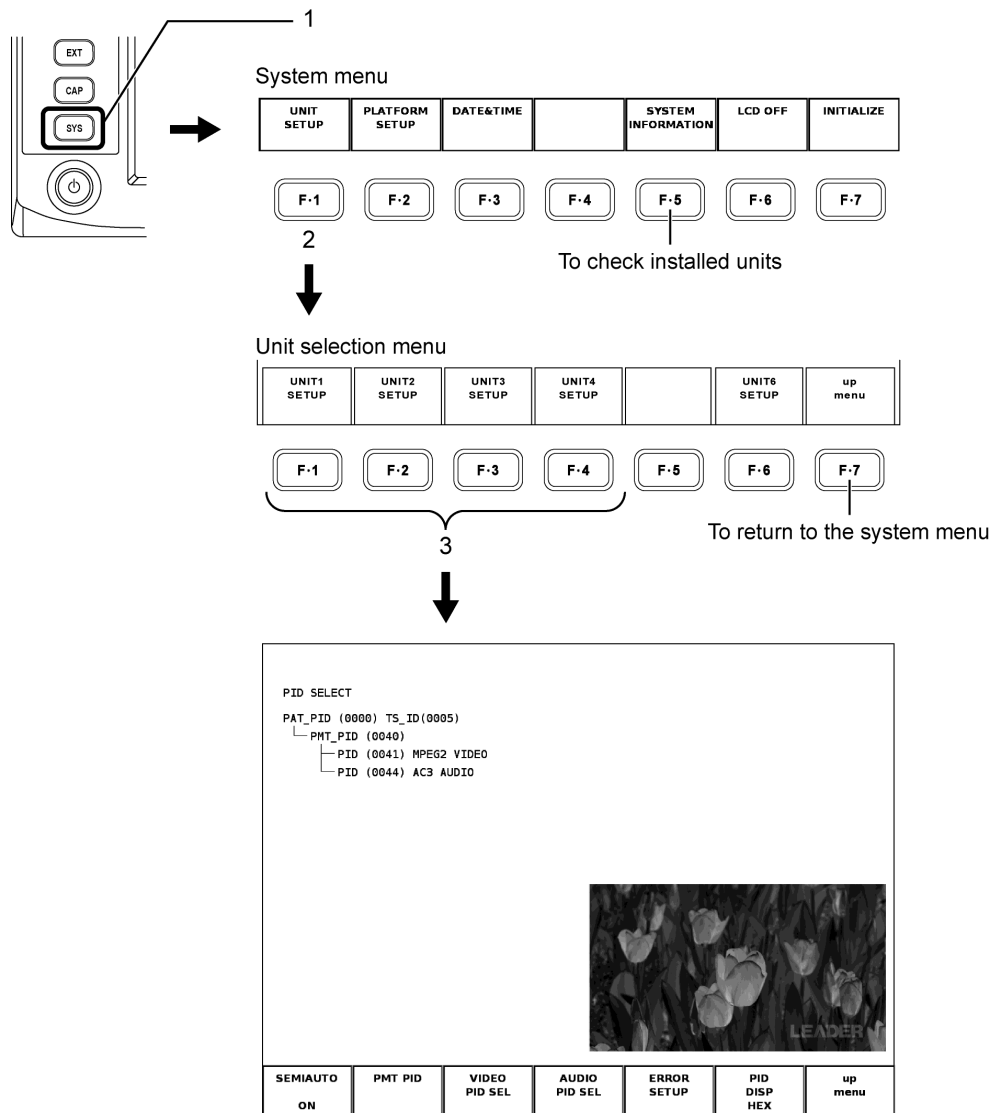

Figure 6-1   Unit setup menu

• System Setup Display and Settings

The following figure explains the system setup display and its settings.

The (16-bit) PAT transport stream ID
appears in hexadecimal or decimal.

```
PID SELECT

PAT_PID (0000) TS_ID(0005)
   └ PMT_PID (0040)
        ├ PID (0041) MPEG2 VIDEO
        └ PID (0044) AC3 AUDIO
```

To decode a PMT, select its PID and
press F·2. The PMT will be selected
as the program to be decoded, and
the LV 5800/7800 will display the
PIDs listed in the PMT.

VIDEO or AUDIO appears
next to decodable streams.

All PIDs are displayed
in hexadecimal or decimal.

Displays the picture of →
the video signal being
decoded.

| SEMIAUTO | PMT PID | VIDEO | AUDIO | ERROR | PID | up |
| ON | | PID SEL | PID SEL | SETUP | DISP HEX | menu |

| F·1 | F·2 | F·3 | F·4 | F·5 | F·6 | F·7 |

To return to the unit selection menu.

To configure PID display.
See section 6.1.5, "PID Display Format"

To configure error detection.
See section 6.2 and 6.3, "Error Detection Setup 1"
and "Error Detection Setup 2"

To specify the PID of the audio data to be decoded.
See section 6.1.4, "Selecting an Audio PID"

To specify the PID of the video data to be decoded.
See section 6.1.3, "Selecting a Video PID"

To specify the PID of the program to be decoded.
See section 6.1.2, "Manual PID Selection"

To choose the method of selecting the PID of the program to be decoded.
See section 6.1.1, "Semiautomatic PID Selection"
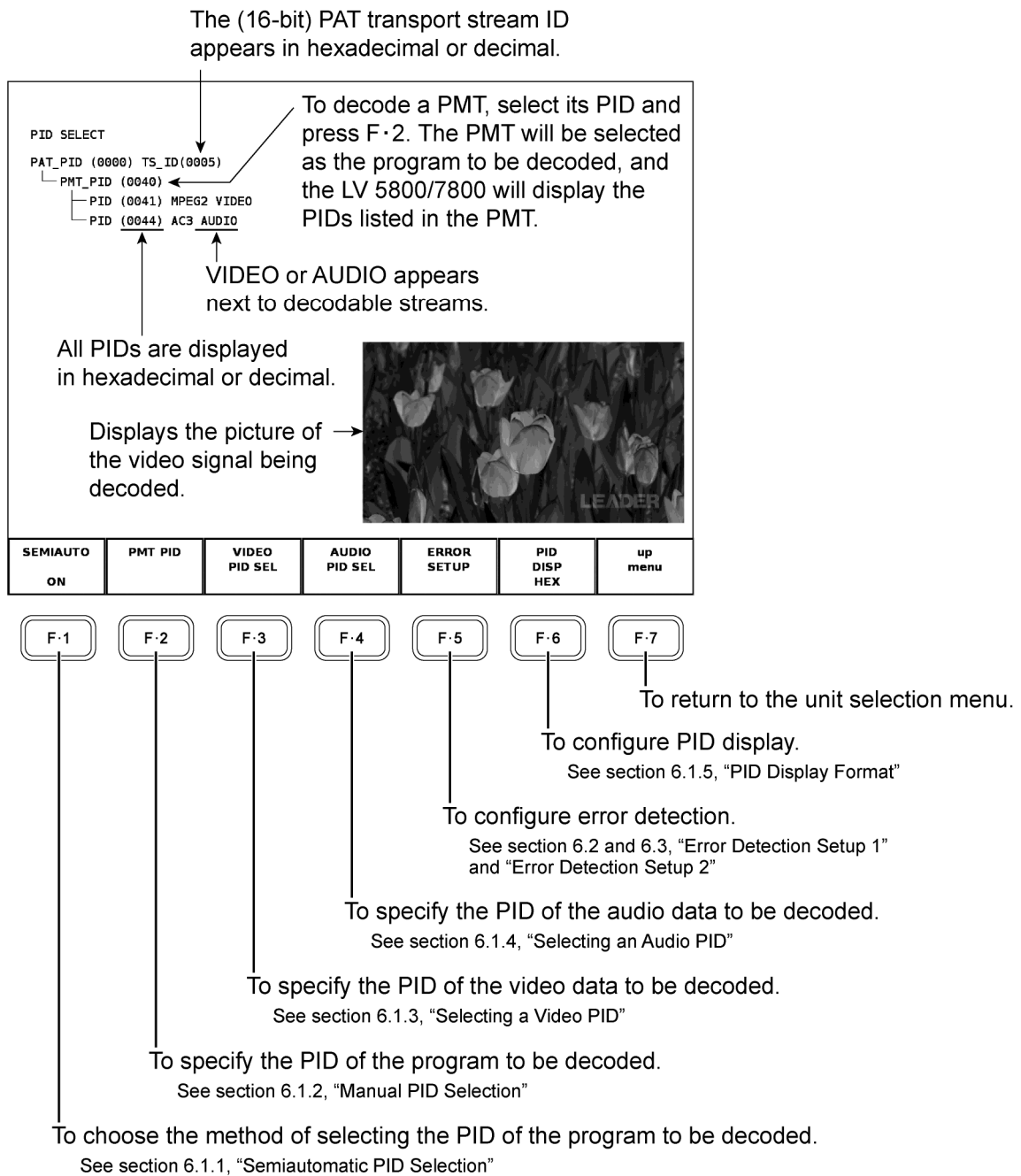
Figure 6-2   PID selection display

6.1 Setting the PIDs

To decode and display the input MPEG-2 TS signal, you must set the video signal and audio signal PIDs. This section explains how to set the PIDs.

6.1.1 Semiautomatic PID Selection

You can set the PID of the signal to be decoded automatically or manually.
To automatically set the PID of the signal to be decoded, press F•1 to set SEMIAUTO to ON. If you switch SEMIAUTO off, you have to manually set the PID of the signal to be decoded.

• Procedure

SYS → F•1 UNIT SETUP→ F•1 to F•4 SETUP (select the unit number that corresponds to the slot that the LV 58SER04 is installed in) → F•1 SEMIAUTO：ON / OFF

Automatic PID selection follows this process:

1 The LV 58SER04 searches the PAT for PMT PIDs and sets the program of the first listed PMT PID as the program to be decoded.
2 Referring to the PMT of the PID set in step 1, the LV 58SER04 searches for video and audio PIDs. If even one decodable video or audio PID is listed in the PMT, it will be set as the PID of the stream to be decoded.
3 If there are no video or audio PID listed in the PMT, the LV 58SER04 will set the PID of the PMT listed next in the PAT as the decode program and repeat step 2.
4 Decoding will not take place if the LV 58SER04 reaches the end of the PAT without finding a PID to decode.

You can manually set the PID in the MPEG-2 TS to be decoded even when semiautomatic PID selection is enabled. When the automatically set PID does not match that of the stream that you want to decode, you can select a PID manually while leaving the semiautomatic PID selection feature enabled. In this case, once the PID being decoded from the MPEG-2 TS is no longer detected, the LV 58SER04 will automatically resume searching for the PID.

Automatically selected PIDs are displayed next to "V:" and "A:" at the top of the screen. They are also displayed in F•2 PMT PID, F•3 VIDEO PID SEL, and F•4 AUDIO PID SEL. The selected video PID is displayed in green and the selected audio PID is displayed in light blue.
The PIDs for the audio and video streams that the LV 58SER04 decodes must be listed on the same PMT. You cannot set separate PMTs for audio and video.

• Quick PID Selection

There is a quick and easy way to select which stream to decode when an MPEG-2 TS contains multiple video and audio streams, and semiautomatic PID selection is on.
To select the PID of the stream to be decoded, use the A and B keys. Pressing the B key will select the PMT PID that is listed in the PAT after the PMT PID that is currently selected. Pressing the A key will select the PMT PID that is listed in the PAT before the PMT PID that is currently selected.

Quick PID selection does not allow you to switch between multiple PIDs listed in the same PMT. To select from among multiple PIDs listed in the same PMT, see section 6.1.2, "Manual PID Selection."
You cannot use the A and B keys while in the system menu.

6.1.2 Manual PID Selection

To select the PIDs of the MPEG-2 TS audio and video streams to be decoded, specify the program to be decoded by selecting a PMT PID from the PAT. Then, select the PIDs of the audio and video streams to be decoded from the PMT.
The information listed in the PAT appears in a data tree in the PID selection display.
Turn the function dial (F•D) to move the cursor to the PID of the desired PMT on the tree. Then, press F•2 PMT PID to select the PID of the PMT to be decoded. All of the PID listed in the PMT branch out below it. VIDEO and AUDIO appear next to decodable streams.
The PIDs for the audio and video streams that the LV 58SER04 decodes must be listed in the same PMT. You cannot set separate PMTs for audio and video.

• Procedure

SYS → F•1 UNIT SETUP → F•1 to F•4 SETUP (select the unit number that corresponds to the slot that the LV 58SER04 is installed in) → F•2 PMT PID

6.1.3 Selecting a Video PID

To select the PID of the video stream that you want to decode, perform the procedure described in section 6.1.1, "Semiautomatic PID Selection," or in section 6.1.2, "Manual PID Selection," and then select a PID for a decodable video stream from among the PIDs listed in the PMT. The PID for the video data that you select will be displayed in green.
When you select a PID for a PMT in the PID selection display, the PID listed in the PMT appear. Turn the function dial (F•D) to move the cursor to a PID for decodable video data. VIDEO is displayed to the right of PIDs for decodable video data. Press F•3 VIDEO PID SEL to select the PID of the video data to be decoded. You cannot select PIDs that do not have VIDEO displayed to their right, even if you move the cursor to them and press F•3 VIDEO PID SEL.

• Procedure

SYS → F•1 UNIT SETUP → F•1 to F•4 SETUP (select the unit number that corresponds to the slot that the LV 58SER04 is installed in) → F•3 VIDEO PID SEL

6.1.4   Selecting an Audio PID

To select the PID of the audio stream that you want to decode, perform the procedure described in section 6.1.1, "Semiautomatic PID Selection," or in section 6.1.2, "Manual PID Selection," and then select a PID for a decodable audio stream from among the PIDs listed in the PMT. The PID for the audio data that you select will be displayed in light blue. When you select a PID for a PMT in the PID selection display, the PIDs listed in the PMT appear. Turn the function dial (F•D) to move the cursor to a PID for decodable audio data. AUDIO is displayed to the right of PIDs for decodable audio data. Press F•4 AUDIO PID SEL to select the PID of the audio data to be decoded. You cannot select PIDs that do not have AUDIO displayed to their right, even if you move the cursor to them and press F•4 AUDIO PID SEL.

• Procedure

SYS → F•1 UNIT SETUP → F•1 to F•4 SETUP (select the unit number that corresponds to the slot that the LV 58SER04 is installed in) → F•4 AUDIO PID SEL

6.1.5   PID Display Format

The PID that appears in the unit setup display and various other displays is initially displayed in hexadecimal (HEX), but you can switch the display to decimal (DEC) by following the procedure below.

• Procedure

SYS → F•1 UNIT SETUP → F•1 to F•4 SETUP (select the unit number that corresponds to the slot that the LV 58SER04 is installed in) → F•6 PID DISP：HEX / DEC

HEX

```
PID SELECT

PAT_PID (0000) TS_ID(7FE1)
   ┌ PMT_PID (0050)
   │    ┌ PID (0100) MPEG2 VIDEO
   │    └ PID (0200) AAC AUDIO
   └ PMT_PID (1FC8)
```

DEC

```
PID SELECT

PAT_PID ( 0 ) TS_ID( 32737 )
   ┌ PMT_PID ( 80 )
   │    ┌ PID ( 256 ) MPEG2 VIDEO
   │    └ PID ( 512 ) AAC AUDIO
   └ PMT_PID ( 8136 )
```

Figure 6-3   PID display format

6.1.6   When the LV 58SER04 Cannot Find a PAT or PMT

As discussed earlier, the PIDs of the streams to be decoded are selected using a PMT whose PID is listed in the PAT. The LV 58SER04 refreshes the PAT contents approximately every second. If the LV 58SER04 does not receive the PAT within one of these intervals, it will determine that the PAT is missing. When the PAT is missing, the display shown in the figure below appears. As long as the PAT is missing, the LV 58SER04 will be unable to set a PID to be decoded.

```
PID SELECT
PAT MISSING.




                                                                                              
SEMIAUTO    PMT PID    VIDEO      AUDIO      ERROR      PID        up
                       PID SEL    PID SEL    SETUP      DISP       menu
ON                                                      HEX
```
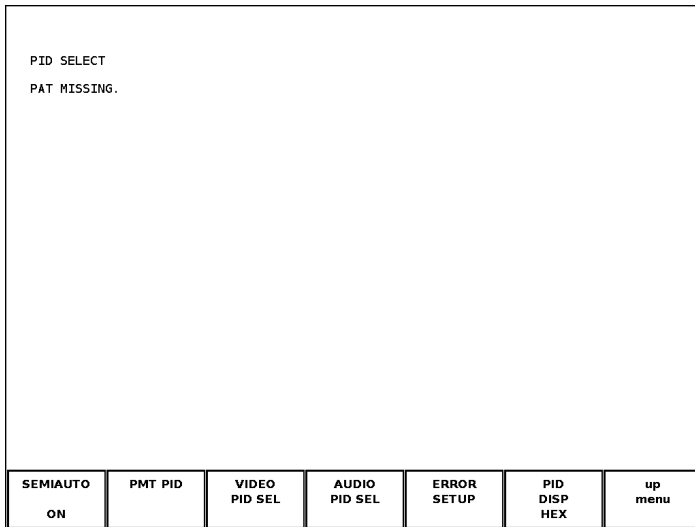
Figure 6-4   Display when a PAT cannot be found

The LV 58SER04 also refreshes the list of PIDs in the selected PMT approximately every second. If semiautomatic PID selection is enabled and the selected PMT is not received within the PID refresh interval, the LV 58SER04 will start decoding based on a different PMT. Decoding will stop when the LV 58SER04 switches PMTs.
The LV 58SER04 can only decode properly if the PMT to be decoded and the PAT are received at least once every second.

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6.2　Error Detection Setup 1

From the LV 58SER04 unit setup menu, press F•5 ERROR SETUP to display a tab menu for setting up the error detection feature. Using this menu, you can switch detection on and off and adjust the threshold values for errors defined as priority 1 by ETSI ETR 290.
For more information about individual errors, see section 10.1.1, "Priority 1 Errors."

• Procedure

SYS → F•1 UNIT SETUP → F•1 to F•4 SETUP (select the unit number that corresponds to the slot that the LV 58SER04 is installed in) → F•5 ERROR SETUP

Figure 6-5　Error detection setup 1

- Settings

  - Sync Byte Error

    Switches Sync Byte error detection on and off. Default setting: ON

  - Continuity Error

    Switches Continuity Counter error detection on and off. Default setting: ON

  - PAT Error

    Switches PAT error detection on and off. Default setting: ON

  - PAT Cycle

    Sets the PAT repetition interval used to determine PAT errors.
    This setting cannot be configured unless PAT Error is set to ON.
    The PAT cycle can be set in the range of 100 to 800 ms, in 10-ms steps. The default setting is 500 ms.

  - PMT Error

    Switches PMT error detection on and off. Default setting: ON

  - PMT Cycle

    Sets the PMT repetition interval used to determine PMT errors.
    This setting cannot be configured unless PMT Error is set to ON.
    The PMT cycle can be set in the range of 100 to 800 ms, in 10-ms steps. The default setting is 500 ms.

  - PID Error

    Switches PID error detection on and off. Default setting: ON

  - PID Cycle

    The LV 58SER04 will declare an error after it receives the PMT to be decoded for a set number of times, but the packet for the PID that the PMT lists does not exist. Here you can set the number of times that the PMT must be received before an error is declared.
    This setting cannot be configured unless PID Error is set to ON.
    Range: 1 to 20; Resolution: 1; Default Setting: 10
    With the default setting, the LV 58SER04 will declare an error if it receives the PMT to be decoded 10 times but the packet of the PID listed in the PMT does not exist in the MPEG-2 TS.

6.3   Error Detection Setup 2

From the LV 58SER04 unit setup menu, press F•5 ERROR SETUP and then F•3 NEXT to display a tab menu for setting up the error detection feature. Using this menu, you can switch detection on and off and adjust the threshold values for errors defined as priority 2 by ETSI ETR 290.
For more information about individual errors, see section 10.1.2, "Priority 2 Errors."

• Procedure

SYS → F•1 UNIT SETUP → F•1 to F•4 SETUP (select the unit number that corresponds to the slot that the LV 58SER04 is installed in) → F•5 ERROR SETUP → F•3 NEXT
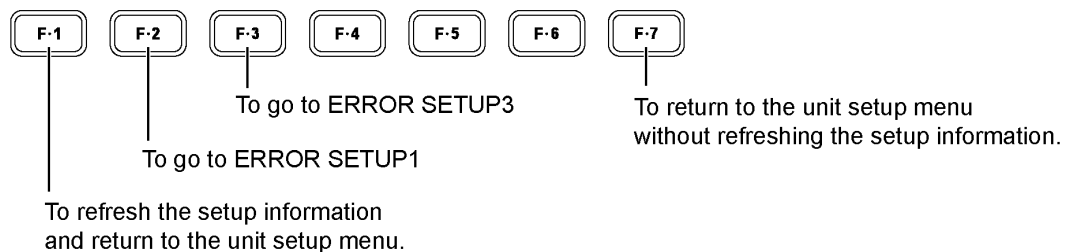

Figure 6-6   Error detection setup 2

- Settings

  - Transport Error

    Switches transport error detection on and off. Default setting: ON

  - CRC Error

    Switches CRC error detection on and off. Default setting: ON

  - PCR Error

    Switches PCR error detection on and off. Default setting: ON

  - PCR Cycle

    Sets the PCR repetition interval used to determine PCR errors.
    This setting cannot be configured unless PCR Error is set to ON.
    The PCR cycle can be set in the range of 10 to 200 ms, in 10-ms steps. The default setting is 100 ms.

  - PCR Accuracy Error

    Switches PCR accuracy error detection on and off. Default setting: ON

  - PTS Error

    Switches PTS error detection on and off. Default setting: ON

  - PTS Cycle

    Sets the PTS repetition interval used to determine PTS errors.
    This setting cannot be configured unless PTS Error is set to ON.
    The PTS cycle can be set in the range of 100 to 800 ms, in 10-ms steps. The default setting is 700 ms.

  - CAT Error

    Switches CAT error detection on and off. Default setting: ON

  - CAT Cycle

    Sets the CAT repetition interval used to determine CAT errors.
    This setting cannot be configured unless CAT Error is set to ON.
    The CAT cycle can be set in the range of 0.1 to 20.0 s, in 0.1-s steps. The default setting is 10.0 s.

6.4 Error Detection Setup 3

From the LV 58SER04 unit setup menu, press F•5 ERROR SETUP and then F·2 PREV to display a tab menu for setting up the error detection feature. Use this tab menu to turn the ISDB-T broadcast TS error detection on and off.
For information on these errors, see section 10.5, "Displaying ISDB-T Broadcast Transport Streams."

• Procedure

SYS → F·1 UNIT SETUP → F·1 ～ F·4 SETUP (select the unit number that corresponds to the slot that the LV 58SER04 is installed in) → F·5 ERROR SETUP → F·2 PREV
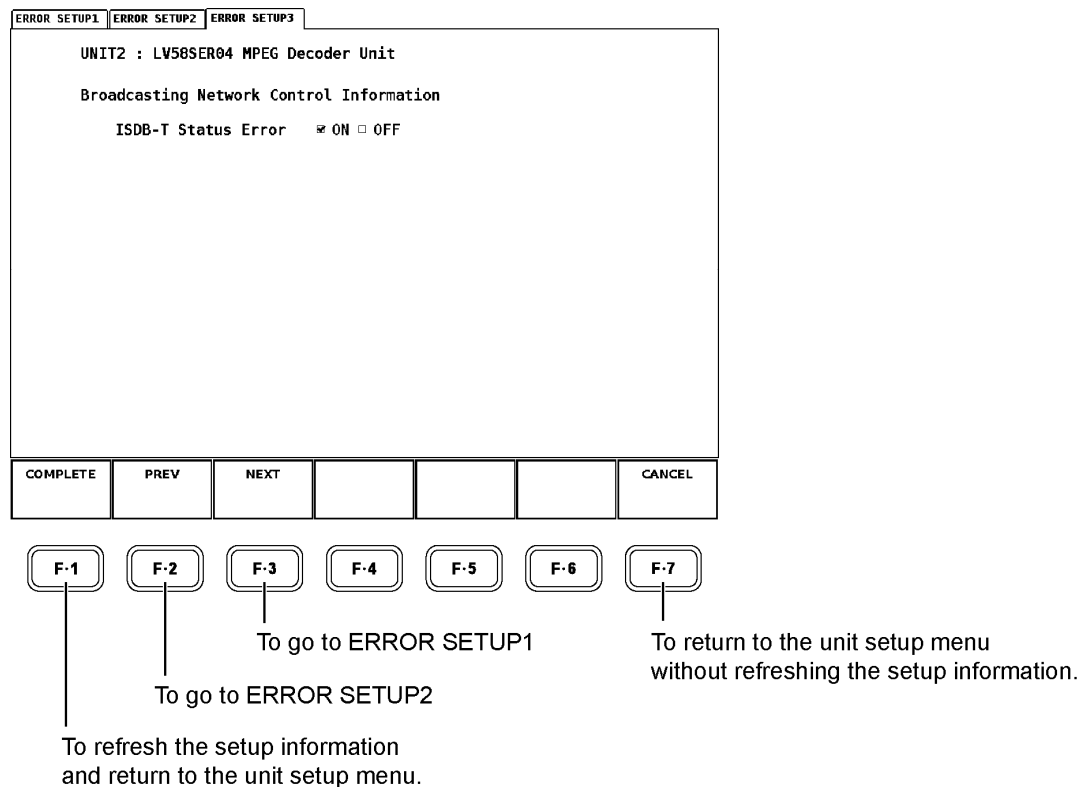

Figure 6-7   Error detection setup 3

• Settings

  • ISDB-T Status Error

    Turns detection of ISDB-T errors—Number of Packets errors, Frm Continuity errors, and CRC errors—on and off.
    Default setting: ON

7. VIDEO SIGNAL WAVEFORM DISPLAY

When you press WFM (the video signal waveform display) on the LV 5800 key panel, the decoded MPEG-2 TS video signal waveform, a scale, and the video signal waveform display menu appear.
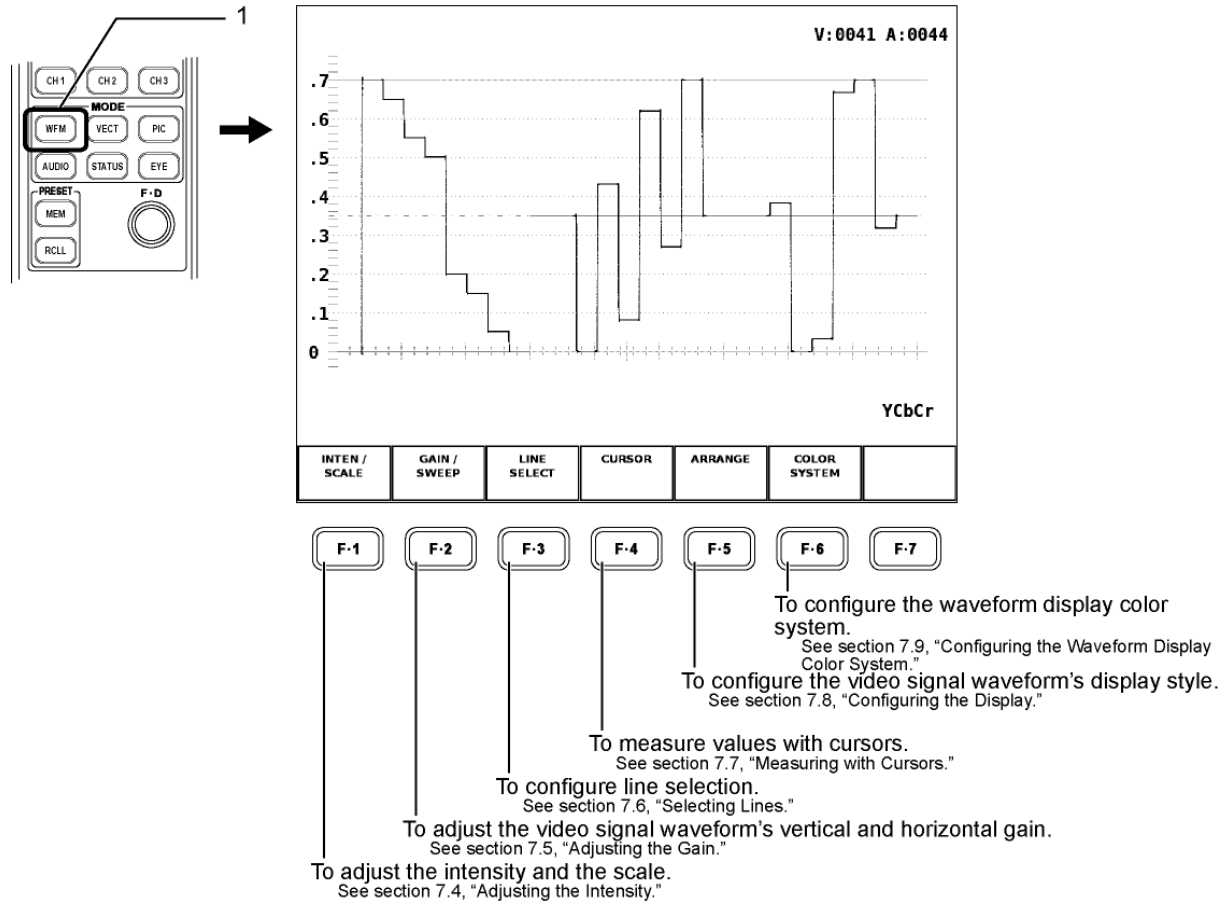

Figure 7-1　Video signal waveform display menu

> *　When you display a video signal waveform using the LV 58SER04, the EXT key on the LV 5800/7800 does not work, and the external synchronization mode cannot be used.

7.1　Adjusting the Waveform Display Position

Use the V POS (vertical position adjustment) and H POS (horizontal position adjustment) knobs to adjust the video signal waveform display position in the selected display area.
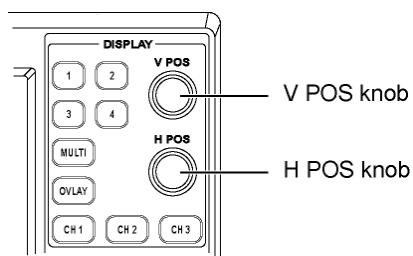

V POS knob

H POS knob

Figure 7-2　V POS and H POS knobs

- V POS Knob

  Use to vertically adjust the video signal waveform's position.
  You can push the knob to return the video signal waveform to its default vertical position.

- H POS Knob

  Use to horizontally adjust the video signal waveform's position.
  You can push the knob to return the video signal waveform to its default horizontal position.

7.2   Setting the Waveform Display Mode

To switch between the overlay and parade displays, press the OVLAY key on the front panel. The overlay display shows the waveforms in the selected display area on top of each other. The parade display shows the waveforms in the selected display area side by side. The OVLAY key is lighted when the overlay display is selected, and it is not lighted when the parade display is selected.
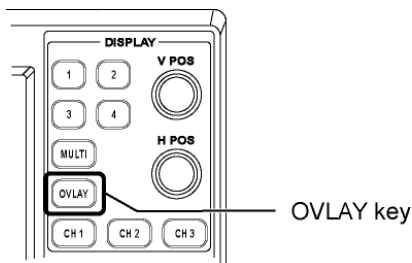

Figure 7-3   OVLAY key

- Overlay Display

  In the overlay display, the waveforms selected according to the procedure described in section 7.3, "Selecting Waveform Display Channels," are displayed on top of each other.
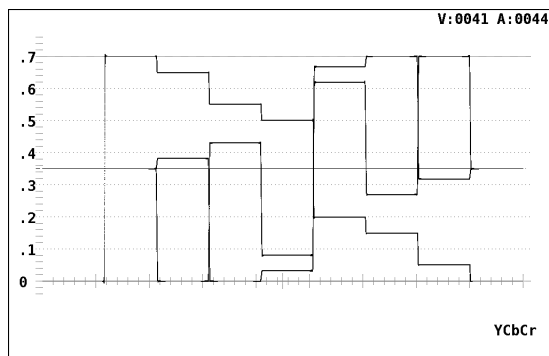

Figure 7-4   Overlay Display

● Parade Display

In the parade display, the waveforms selected according to the procedure described in section 7.3, "Selecting Waveform Display Channels," are displayed side by side.
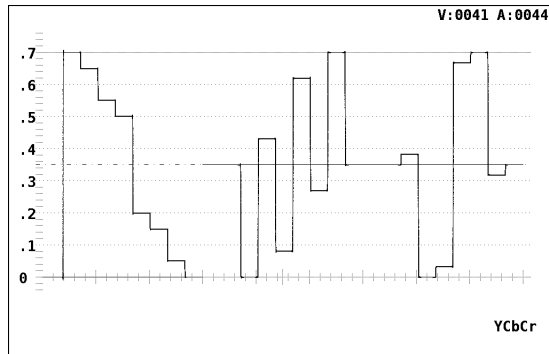

Figure 7-5   Parade display

7.3   Selecting Waveform Display Channels

Press CH1 to CH3 to switch the displays for the component video waveforms of channels 1 to 3 on and off.
The CH1 to CH3 keys are lighted when the waveforms assigned to them are displayed. They are not lighted when the waveforms assigned to them are not displayed.

To select and deselect channels 1 to 3.

Figure 7-6   Channel selection keys
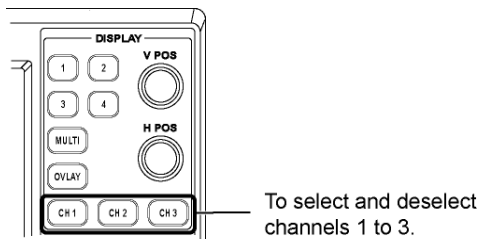
The waveforms assigned to the CH1 to CH3 keys vary according to the color matrix setting (which is described in section 7.9.1, "Setting the Waveform Display Color Matrix") as shown in the table below.

Table 7-1   Waveforms assigned to each channel

COLOR MATRIX	CH1	CH2	CH3
YCbCr	Y	Cb	Cr
GBR	G	B	R
RGB	R	G	B
COMPOSITE	-	-	-

7.4　Adjusting the Intensity

Follow the procedure shown in the figure below to access a menu that allows you to set items such as the scale unit and the intensity of the video signal waveform and scale.
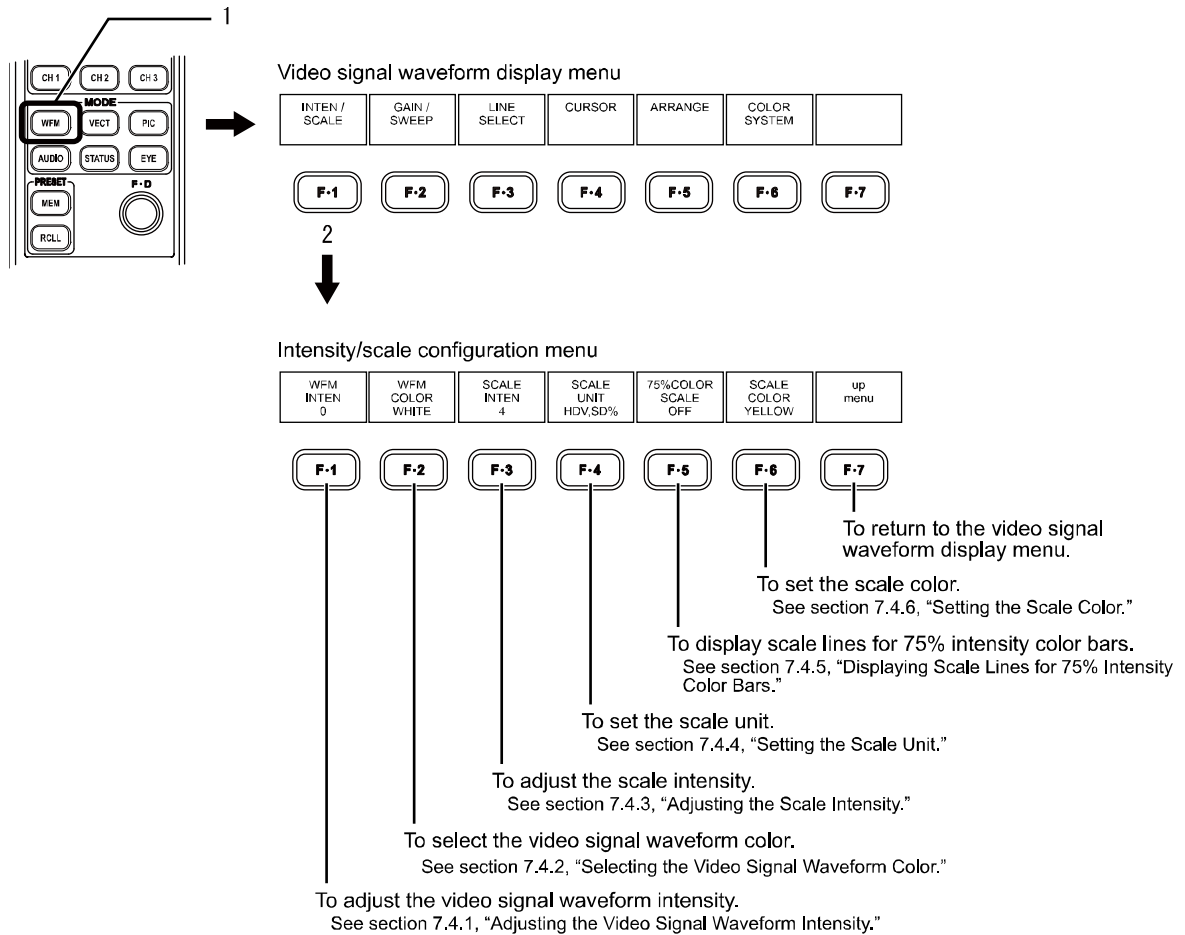
Figure 7-7　Intensity/scale configuration menu

7.4.1　Adjusting the Video Signal Waveform Intensity

You can adjust the video signal waveform intensity by following the procedure below.
Adjustable range: -128 to 127

- Procedure

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

After performing the procedure described above, turn the function dial (F•D). Press the function dial (F•D) to return the intensity to its default value (0).

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7.4.2 Selecting the Video Signal Waveform Color

To select the video signal waveform color from one of the two options below, follow the procedure below.

WHITE
GREEN
MULTI: The following colors are assigned to YCbCr and GBR and displayed.
Y: Yellow, Cb: Cyan, Cr: Magenta, G: Green, B: Blue, and R: Red.
Displayed in white on the pseudo-composite display.
This option is not selectable when the multi screen display is in use.

• Procedure

WFM → F•1 INTEN/SCALE → F•2 WFM COLOR:<u>WHITE</u> / GREEN / MULTI

7.4.3 Adjusting the Scale Intensity

You can adjust the scale intensity by following the procedure below.
Adjustable range: -8 to 7

• Procedure

WFM → F•1 INTEN/SCALE → F•3 SCALE INTEN:-8 to <u>4</u> to 7

After performing the procedure described above, turn the function dial (F•D). Press the function dial (F•D) to return the intensity to its default value (4).

7.4.4 Setting the Scale Unit

To change the scale units, follow the procedure below. This setting is valid when COLOR MATRIX is not set to COMPOSITE.
You can select one of the following settings for the scale unit.

HD V, SD %: The scale unit is V (volt) for HDTV and % for SDTV.
HD V, SD V: The scale unit is V (volt) for both HDTV and SDTV.
HD %, SD %: The scale unit is % for both HDTV and SDTV.
255: 0 to 100 % is displayed as 0 to 255.
FF: 0 to 100 % is displayed as 00 to FF (hexadecimal).

When COLOR MATRIX is set to GBR or RGB, the following settings are also available:
150%: The scale unit is %, and the display starts at -50 %.

A white 100 % video signal value falls on the scale line for 0.7 on the volt scale and on the scale line for 100 on the % scale. A black 0 % video signal falls on the scale line for zero on both the volt and % scales.

• Procedure

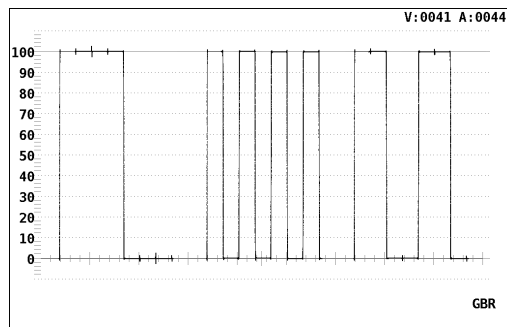• When COLOR MATRIX is set to YCbCr

WFM → F•1 INTEN/SCALE → F•4 SCALE UNIT: <u>HDV,SD%</u> / HDV,SDV / HD%,SD% / 255 / FF

• When COLOR MATRIX is set to GBR or RGB.

WFM → F•1 INTEN/SCALE → F•4 SCALE UNIT: <u>HDV,SD%</u> / HDV,SDV / HD%,SD% / 150% / 255 / FF

% scale

V scale
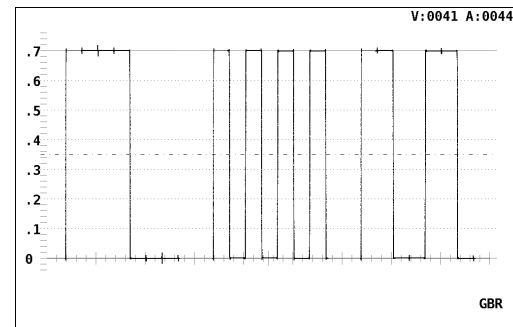
150% scale
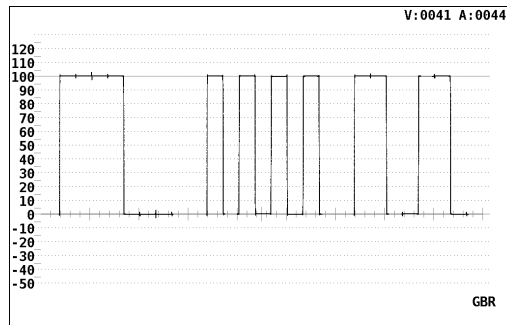
255 scale
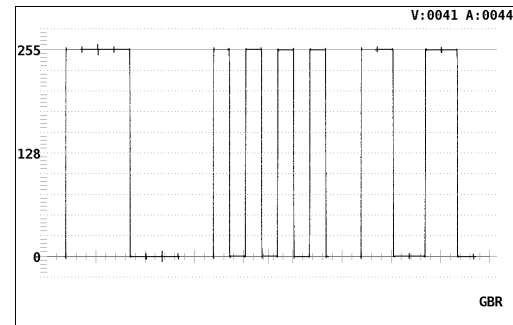
FF scale
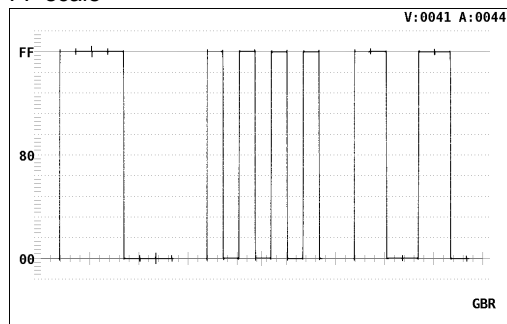
Figure 7-8   Scale units

7.4.5   Displaying Scale Lines for 75% Intensity Color Bars

Follow the procedure below to display a scale that corresponds to the chroma difference signal peak levels for waveform displays of 75% intensity color bars. The scale is displayed when you set 75%COLOR SCALE to ON.
This setting only appears when COLOR MATRIX is set to YCbCr.

• Procedure

WFM → F•1 INTEN/SCALE → F•5 75%COLOR SCALE:OFF / ON
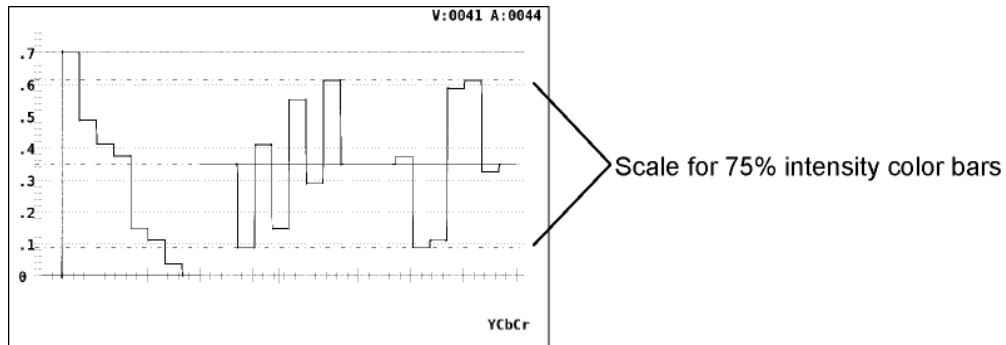
Figure 7-9   Scale lines for 75% intensity color bars

7.4.6   Setting the Scale Color

You can set the scale to one of the following 7 colors.
   WHITE
   YELLOW
   CYAN
   GREEN
   MAGENTA
   RED
   BLUE

• Procedure

WFM → F•1 INTEN/SCALE → F•6 SCALE COLOR:WHITE / YELLOW / CYAN / GREEN / MAGENTA / RED / BLUE

7.5 Adjusting the Gain

Follow the procedure shown in the figure below to display a menu for adjusting the video signal waveform vertical and horizontal gains.
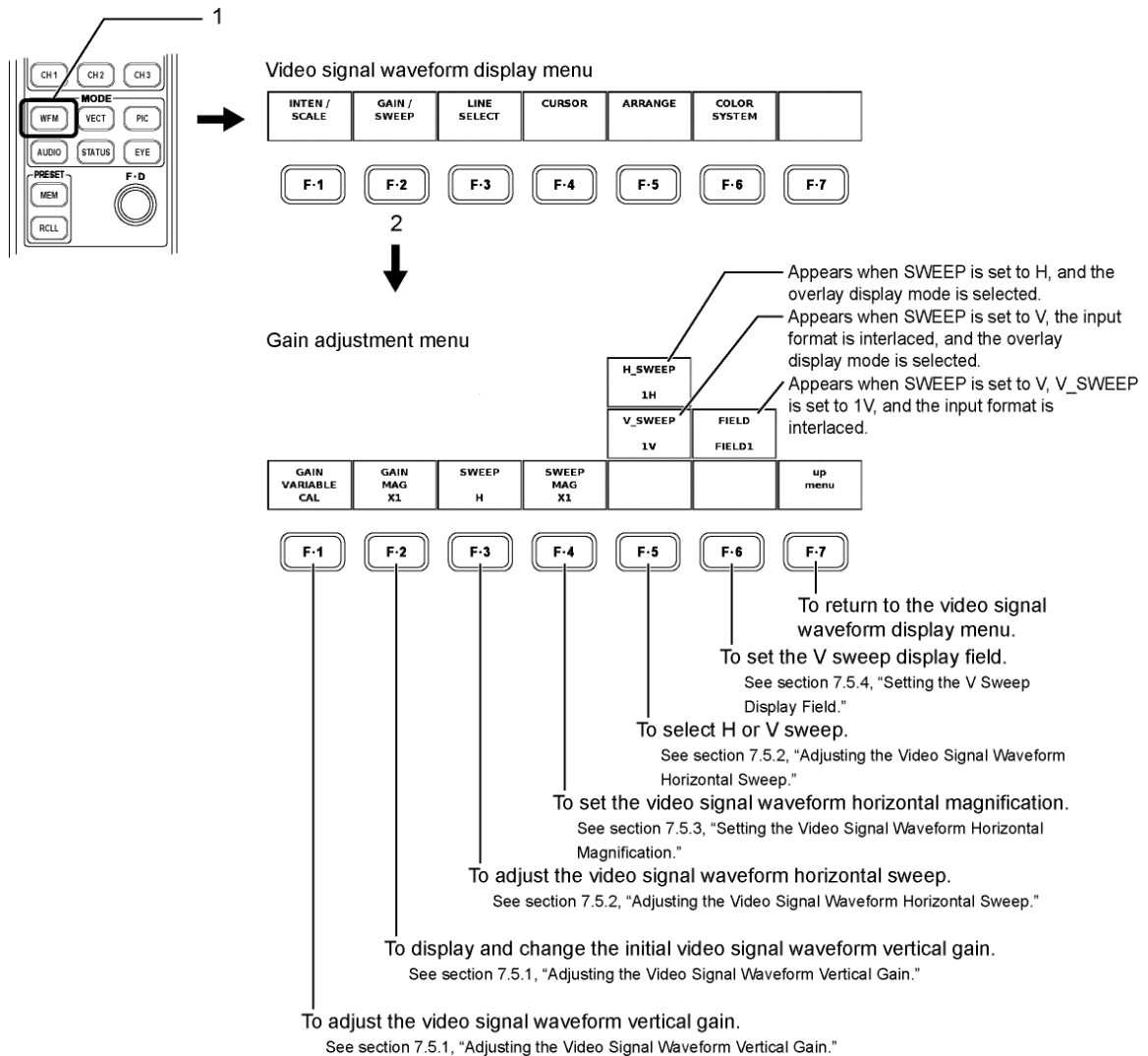
Figure 7-10   Gain adjustment menu

7.5.1   Adjusting the Video Signal Waveform Vertical Gain

You can adjust the video signal waveform's vertical gain by following the procedure below. Set the gain by using ⊡F•1⊡ GAIN VARIABLE and ⊡F•2⊡ GAIN MAG.

● ⊡F•1⊡ GAIN VALIABLE

CAL: ×1
VARIABLE： ×0.200 to ×2.000
                 You can adjust the gain variable by turning the function dial (F•D). Press
                 the function dial (F•D) to return the gain variable to its default value (×1.00).

● ⊡F•2⊡ GAIN MAG

×1:   ×1
×5:   ×5

The table below shows the gain ranges that can be set by using ⊡F•1⊡ GAIN VARIABLE and ⊡F•2⊡ GAIN MAG.

Table 7-2   Video signal waveform vertical gain adjustable ranges

		GAIN VARIABLE	
		CAL	VARIABLE
GAIN MAG	×1	×1	×0.200 to × 2.000
	×5	×5	×1.000 to ×10.000

• Procedure

• ⊡WFM⊡ → ⊡F•2⊡ GAIN/SWEEP → ⊡F•1⊡ GAIN VARIABLE:<u>CAL</u> / VARIABLE
• ⊡WFM⊡ → ⊡F•2⊡ GAIN/SWEEP → ⊡F•2⊡ GAIN MAG:<u>×1</u> / ×5

7.5.2   Adjusting the Video Signal Waveform Horizontal Sweep

You can adjust the video signal waveform's horizontal sweep by following the procedure below.

• Selecting the Sweep

Follow the procedure below and choose one of these settings:
   H: Line display
   V: Field display (when the signal is interlaced)
           Frame display (when the signal is progressive)

• Procedure

⊡WFM⊡ → ⊡F•2⊡ GAIN/SWEEP → ⊡F•3⊡ SWEEP:<u>H</u> / V

• Selecting H Sweep

If SWEEP is set to H (line display) and the display mode is overlay, you can select the display method by following the procedure below. When the display mode is parade, this setting will be fixed at 1H, and this menu will not appear.

   1H: One-line display

   2H: Two-line display

• Procedure

WFM → F•2 GAIN/SWEEP → F•5 H_SWEEP:1H / 2H

1H overlay display

2H overlay display

1H parade display
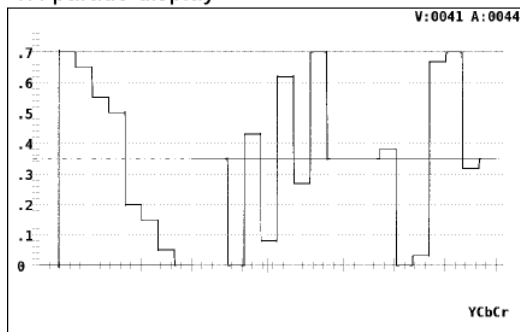
Figure 7-11   Examples of the H sweep display

- Selecting V Sweep

  If SWEEP is set to V (field display/frame display) and the display mode is overlay, you can select the display method by following the procedure below. When the display mode is parade, or when the input signal is progressive, this setting will be fixed at 1V, and this menu will not appear.

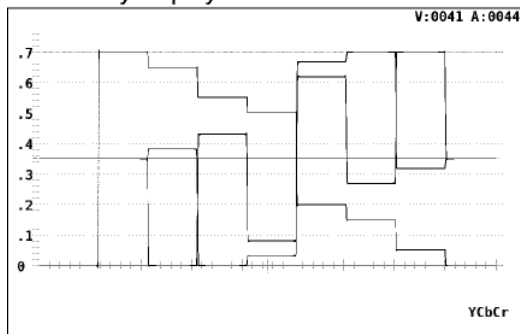 | | |
  |---|---|
  | 1V: | One-frame display (when the input signal is progressive) |
  | | One-field display (when the input signal is interlaced) |
  | 2V: | One-frame display |

- Procedure
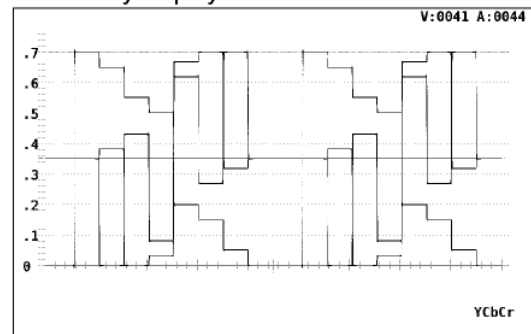
  WFM → F•2 GAIN/SWEEP → F•5 V_SWEEP:1V / 2V

1V overlay display
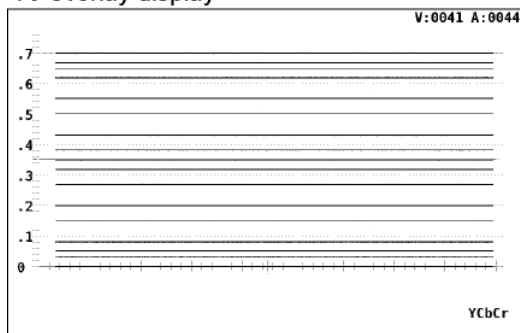
2V overlay display
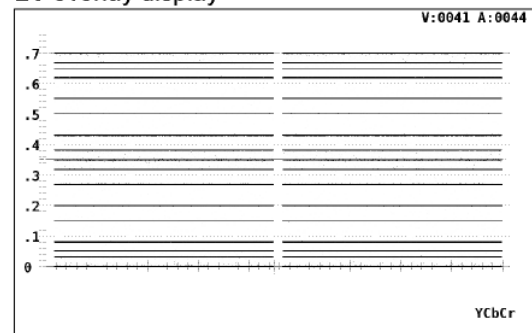
1V parade display
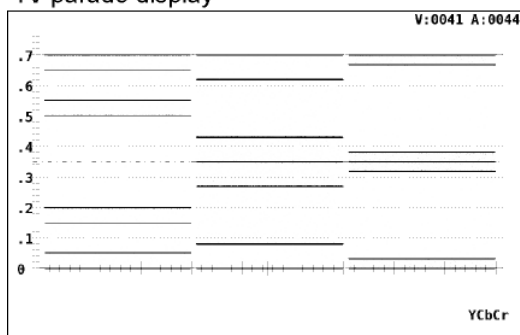
Figure 7-12   Examples of the V sweep display

7.5.3   Setting the Video Signal Waveform Horizontal Magnification

This section explains how to set the video signal waveform's horizontal sweep magnification.

• When F•3 SWEEP is set to H

You can follow the procedure described below to set the magnification to one of these values:

×1:	The video signal waveform is displayed so that it fits in the screen.
×10 / ×20:	The video signal waveform sweep is magnified. Magnification is centered on the zoom focus line on the 0 V scale line. This setting is not valid when COLOR MATRIX is set to COMPOSITE.
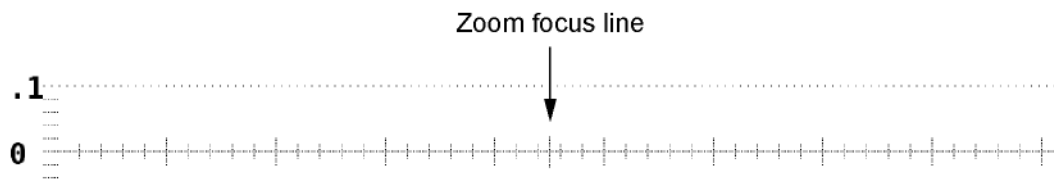
Figure 7-13   Zoom focus line on the 0 V scale line

ACTIVE:	Displays waveforms expanded, excluding the H blanking interval of the input video signal. This option is not displayed when COLOR MATRIX is not set to COMPOSITE or when H_SWEEP is 2H.

• Procedure

WFM → F•2 GAIN/SWEEP → F•4 SWEEP MAG:×1 / ×10 / ×20 / ACTIVE

• When F•3 SWEEP is set to V

You can follow the procedure described below to set the magnification to one of these values:

×1:	The video signal waveform is displayed so that it fits in the screen.
×20 / ×40:	The video signal waveform sweep is magnified. Magnification is centered on the zoom focus line on the 0 V scale line.
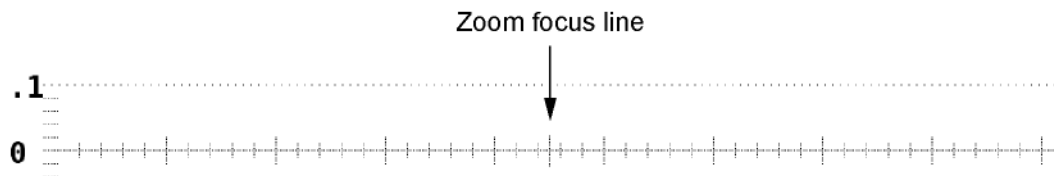
Figure 7-14   Zoom focus line on the 0 V scale line

• Procedure

WFM → F•2 GAIN/SWEEP → F•4 SWEEP MAG:×1 / ×20 / ×40

7.5.4   Setting the V Sweep Display Field

Follow the procedure described below to select the field when SWEEP is set to V (field display/frame display). This menu appears when the input signal is interlaced and V_SWEEP is set to 1V.

FIELD1:   The video signal waveform for field 1 appears.
FIELD2:   The video signal waveform for field 2 appears.

• Procedure

WFM → F•2 GAIN/SWEEP → F•6 FIELD:FIELD1 / FIELD2

7.6   Selecting Lines

Follow the procedure described below to display the menu for setting up the line select feature. This menu does not appear when SWEEP is set to V.
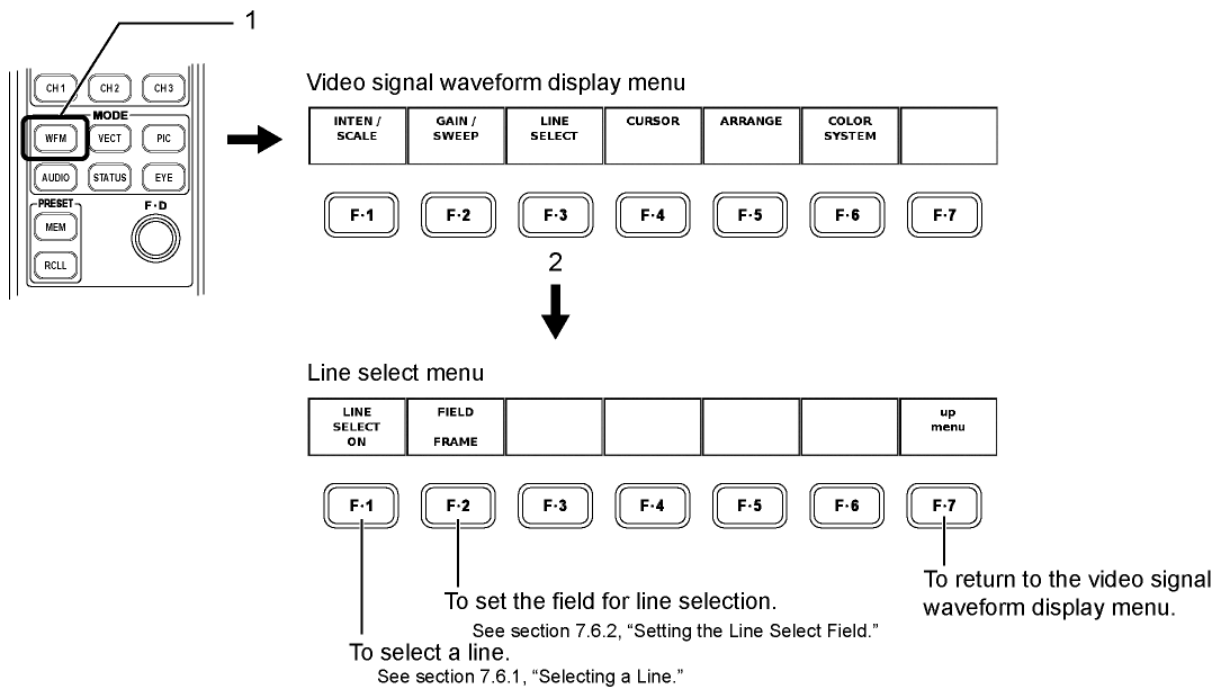
Figure 7-15   Line select menu

7.6.1   Selecting a Line

When the video signal waveform is displayed using line display, follow the procedure below to select the line number.

• Procedure

WFM → F•3 LINE SELECT → F•1 LINE SELECT:OFF / ON

After following the procedure above and selecting ON, turn the function dial (F•D) to select a line number.
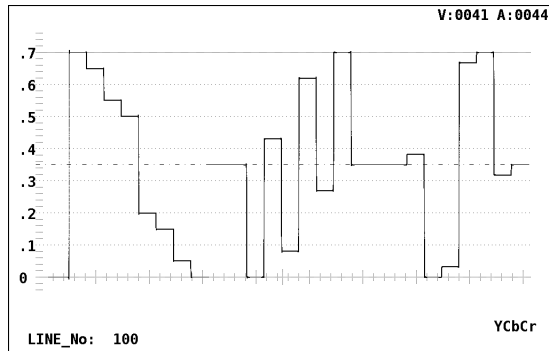
Figure 7-16   Line number selection

7.6.2   Setting the Line Select Field

Follow the procedure below to set the line selection range. This menu does not appear when the input signal is progressive. You can set the line selection range to:

FIELD1:   The line selection range is limited to the fundamental signal of field 1.
FIELD2:   The line selection range is limited to the fundamental signal of field 2.
FRAME: The line selection range is not limited.

• Procedure

WFM → F•3 LINE SELECT → F•2 FIELD:FIELD1 / FIELD2 / FRAME

7.7 Measuring with Cursors

Follow the procedure shown in the figure below to access a menu that allows you to set up the cursor, which is used to measure voltages and time.
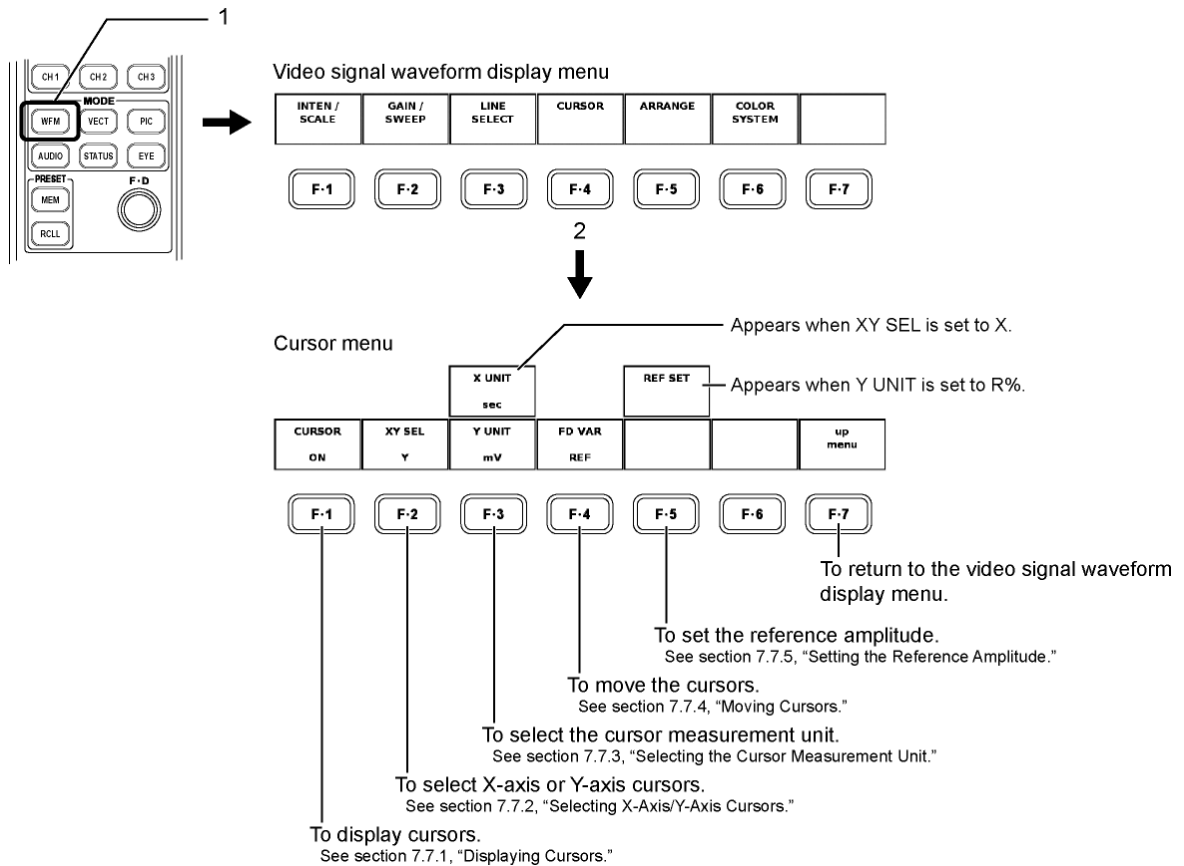
Figure 7-17   Cursor setup menu

7.7.1 Displaying Cursors

Follow the procedure below and select ON to display the cursor. The REF cursor is blue, and the DELTA cursor is green. Select OFF to hide the cursor.

• Procedure

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

7.7.2 Selecting X-Axis/Y-Axis Cursors

Follow the procedure below to choose to measure along either the X-axis (time) or the Y-axis (amplitude). Measurement only takes place along the Y-axis when COLOR MATRIX is set to COMPOSITE; selecting X will have no effect.

• Procedure

$\boxed{\text{WFM}}$ → $\boxed{\text{F•4}}$ CURSOR → $\boxed{\text{F•2}}$ XY SEL:X / $\underline{\text{Y}}$
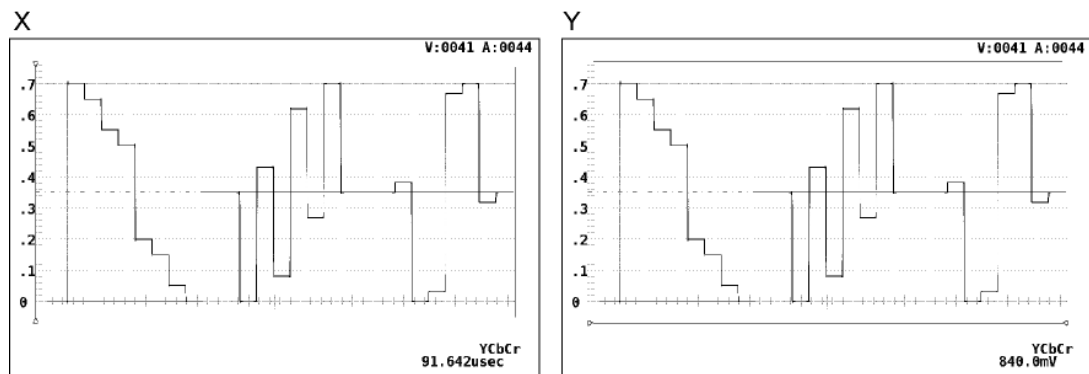
Figure 7-18   X-axis and Y-axis cursors

7.7.3 Selecting the Cursor Measurement Unit

Follow the procedure below to set the cursor to one of the following units. The measured value from the REF cursor to the DELTA cursor appears in the lower right of the display, in the type of unit that you select here.

Y-axis units

mV: The voltage is displayed.
%: In component display, the percentage of 700 mV is displayed.
In pseudo-composite display, the percentage of 714 mV is displayed.
R%: The percentage of the reference amplitude set by pressing REF SET is displayed (see "Setting the Reference Amplitude" for more information).
The unit is fixed to % when COLOR MATRIX is set to COMPOSITE.

X-axis units

sec: Time
Hz: The frequency when one cycle is equal to the distance between two cursors.

• Procedure

• When XY SEL is set to Y, and COLOR MATRIX is set to YCbCr, GBR, or RGB.

$\boxed{\text{WFM}}$ → $\boxed{\text{F•4}}$ CURSOR → $\boxed{\text{F•3}}$ Y UNIT:$\underline{\text{mV}}$ / % / R%

• When XY SEL is set to Y, and COLOR MATRIX is set to COMPOSITE.

$\boxed{\text{WFM}}$ → $\boxed{\text{F•4}}$ CURSOR → $\boxed{\text{F•3}}$ Y UNIT:$\underline{\%}$

• When XY SEL is set to X

$\boxed{\text{WFM}}$ → $\boxed{\text{F•4}}$ CURSOR → $\boxed{\text{F•3}}$ X UNIT:$\underline{\text{sec}}$ / Hz

7.7.4   Moving Cursors

Follow the procedure below, and select:

REF   To move the reference cursor.

DELTA   To move the DELTA cursor.

TRACK   To move both the REF and DELTA cursors.

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 so on. The selected cursor is indicated by a ▽ that appears at its end. Move the cursor by turning the function dial (F•D).

• Procedure

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

REF

DELTA

TRACK
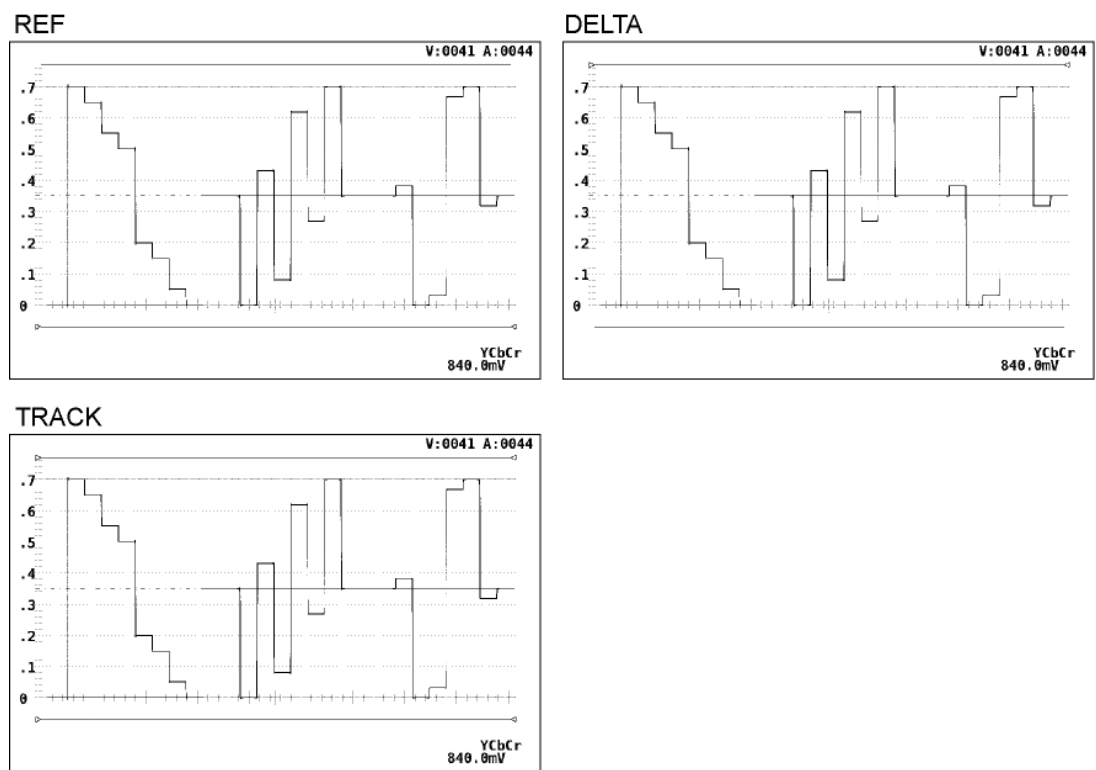
Figure 7-19   Cursor selection

7.7.5 Setting the Reference Amplitude

When Y UNIT is set to R%, the amplitude when $\boxed{\text{F•5}}$ REF SET is pressed is 100 %. This menu does not appear when XY SEL is set to X, or when Y UNIT is set to something besides R%.

• Procedure

WFM → $\boxed{\text{F•4}}$ CURSOR → $\boxed{\text{F•5}}$ REF SET
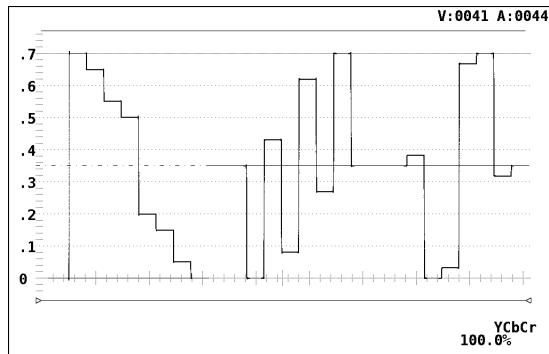
Figure 7-20   Setting the reference amplitude

7.8 Configuring the Display

Follow the procedure shown in the figure below to access a menu that allows you to set the filter and the waveform persistence.
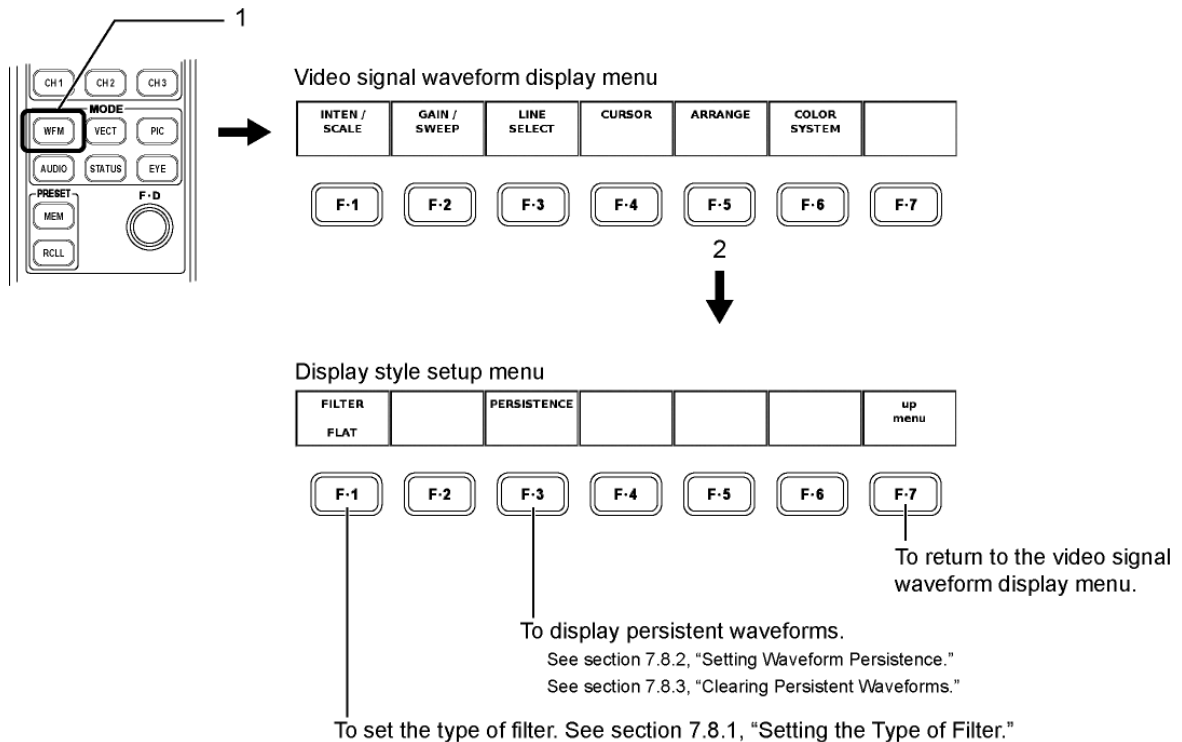
Figure 7-21　Display style setup menu

7.8.1 Setting the Type of Filter

When COLOR MATRIX is not set to COMPOSITE, follow the procedure below to select one of these video signal filters:

FLAT:　　　　A filter with a flat frequency response over the entire bandwidth of the input signal.

LOW PASS：　Frequency responses:
　　　　　　Attenuation of 20 dB or more at 20 MHz (HD)
　　　　　　Attenuation of 20 dB or more at 3.8 MHz (SD)

• Procedure

WFM → F•5 ARRANGE → F•1 FILTER:FLAT / LOW PASS

FLAT

LOW PASS
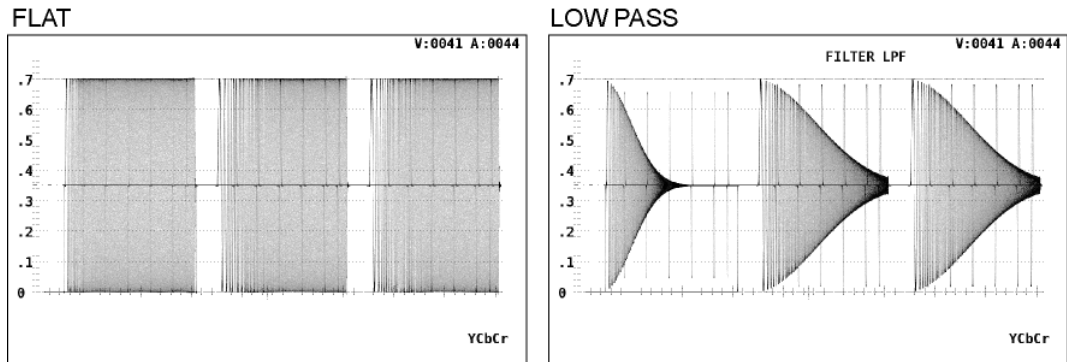
Figure 7-22　Filtered waveform displays

When COLOR MATRIX is set to COMPOSITE, you can display the pseudo-composite waveform side by side with the pseudo-composite luminance signal, or the pseudo-composite luminance signal side by side with the chroma difference signal.

FLAT:　　　　　　Only displays the pseudo-composite signal waveform

FLAT+LUM:　　　Displays the pseudo-composite signal waveform and the luminance signal side by side.

LUM+CHROMA:　Displays the pseudo-composite luminance signal and the chroma difference signal side by side.

• Procedure

WFM → F•5 ARRANGE → F•1 FILTER:FLAT / FLAT+LUM / LUM+CHROMA

FLAT

FLAT+LUM

LUM+CHROMA
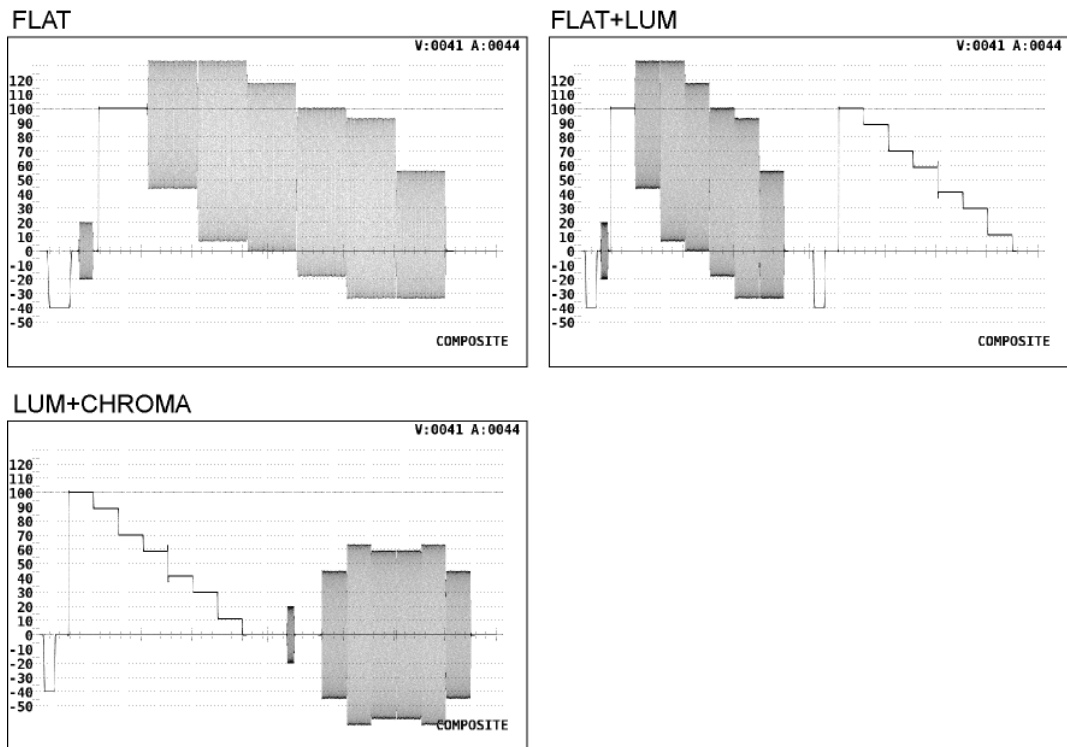
Figure 7-23　Pseudo-composite signal waveform display and other signal waveform displays

7.8.2   Setting Waveform Persistence

You can change the persistence of displayed waveforms. By making waveforms persistent, you can display past waveforms and present waveforms at the same time. Follow the procedure below and choose one of these settings:

ON: Waveforms are persistent.
OFF: Waveforms are not persistent.
INFINIT: Waveforms persist until they are cleared or until the screen display mode is changed.

• Procedure

WFM → F•5 ARRANGE → F•3 PERSISTENCE → F•1 PERSISTENCE:ON / OFF / INFINIT

7.8.3   Clearing Persistent Waveforms

When PERSISTENCE is set to INFINIT, you can clear accumulated persistent waveforms. After the waveforms are cleared, persistent waveforms will begin accumulating again.

• Procedure

WFM → F•5 ARRANGE → F•3 PERSISTENCE → F•2 PERSIST CLEAR

7.9 Configuring the Waveform Display Color System

Follow the procedure shown in the figure below to access a menu that allows you to set color system configuration items such as the video signal waveform display color matrix.
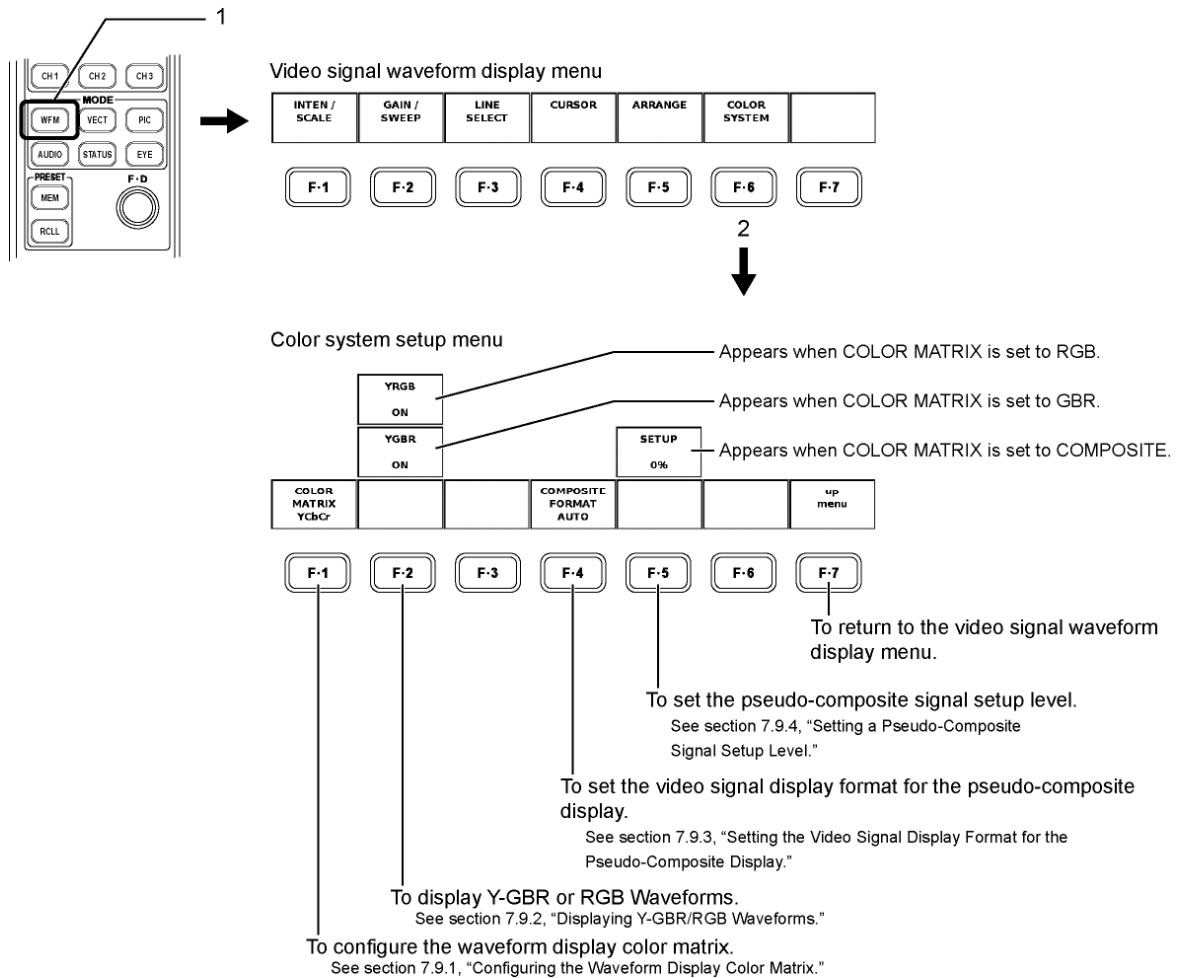
Figure 7-24 Color system setup menu

7.9.1 Configuring the Waveform Display Color Matrix

When the LV 58SER04 receives luminance and chrominance signals, it can use matrix calculation to display a YCBCR signal as a GBR or RGB signal.
The signals are assigned to CH1 to CH3, and can be turned on and off.

Reference

For information on the waveforms assigned to CH1 to CH3, see section 7.3, "Selecting Waveform Display Channels."

Component signals can also be displayed artificially as composite signals.

Follow the procedure below to choose a display format. The selected display format is indicated in the lower right of the display.

YCbCr: Displays the luminance and chroma difference signal waveform as is.

GBR: Converts the YC_BC_R signal into a GBR signal and displays the GBR waveform.

RGB: Converts the YC_BC_R signal into an RGB signal and displays the RGB waveform.

COMPOSITE*: Displays a component signal artificially as a NTSC or PAL composite signal.

* 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.

Pressing the CH1 to CH3 keys has no effect.

• Procedure

WFM → F•6 COLOR SYSTEM → F•1 COLOR MATRIX:YCbCr / GBR / RGB / COMPOSITE
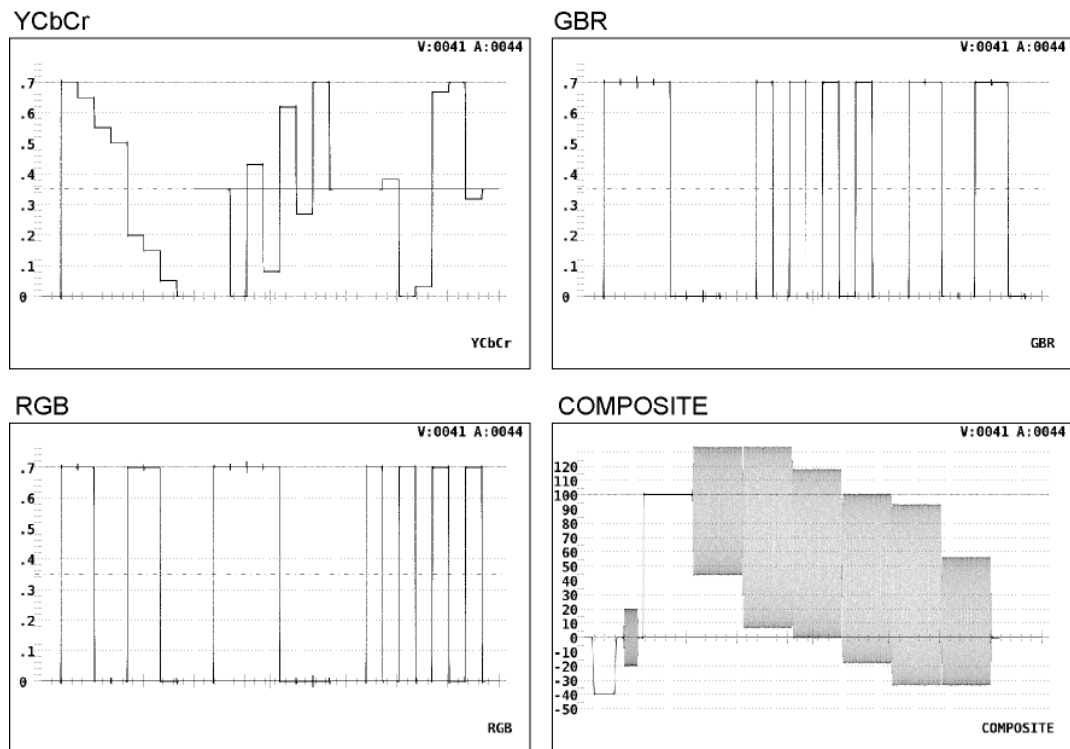
Figure 7-25 Waveform displays when the LV 58SER04 receives luminance and chroma difference signals

7.9.2 Displaying Y-GBR/RGB Waveforms

If COLOR MATRIX is set to GBR or RGB, and you follow the procedure below and select ON, the luminance signal (Y) will be displayed simultaneously with the GBR or RGB signal obtained through matrix calculation. In the procedure below, when COLOR MATRIX is set to GBR, YGBR appears, and when COLOR MATRIX is set to RGB, YRGB appears. After you select YGBR or YRGB, pressing the CH1 to CH3 keys has no effect.

• Procedure

When GBR is selected

WFM → F•6 COLOR SYSTEM → F•2 YGBR:ON / OFF

When RGB is selected

WFM → F•6 COLOR SYSTEM → F•2 YRGB:ON / OFF
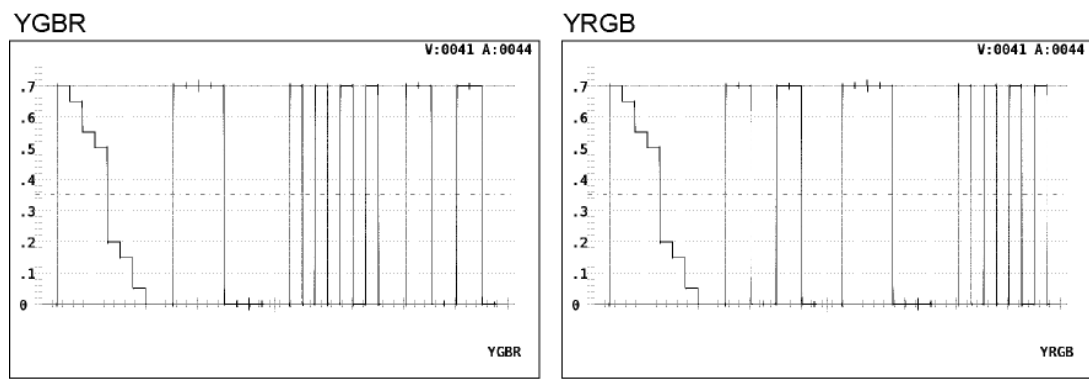
Figure 7-26　The Y-GBR/RGB displays

7.9.3 Setting the Video Signal Display Format for the Pseudo-Composite Display

When you have selected pseudo-composite display, follow the procedure below to set the display to NTSC or PAL. You can also choose to let the LV 58SER04 select the format automatically.

NTSC: Converts all video signal formats to NTSC pseudo-composite signals.
The scale unit is % regardless of the SCALE UNIT setting.

PAL: Converts all video signal formats to PAL pseudo-composite signals.
The scale unit is V regardless of the SCALE UNIT setting.

AUTO: When the field frequency of a video signal is 50 Hz, or the frame frequency is 25 or 50 Hz, the signal is converted into a PAL pseudo-composite signal; otherwise it is converted into an NTSC pseudo-composite signal.

• Procedure

WFM → F•6 COLOR SYSTEM → F•4 COMPOSITE FORMAT:NTSC / PAL / AUTO
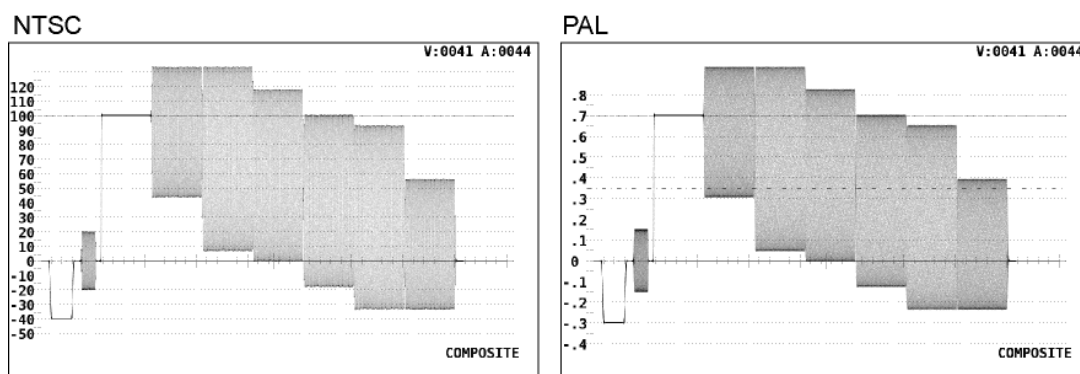
Figure 7-27   Pseudo-composite displays of NTSC and PAL

7.9.4   Setting a Pseudo-Composite Signal Setup Level

Follow the procedure below to select one of these pseudo-composite signal setup levels: You can only select a setup level when displaying an NTSC pseudo-composite signal. This setting is not available when a component or PAL signal is displayed.

0%:   No setup
7.5%:   Adds a setup of 7.5%.

• Procedure

WFM → F•6 COLOR SYSTEM → F•5 SETUP:0% / 7.5%
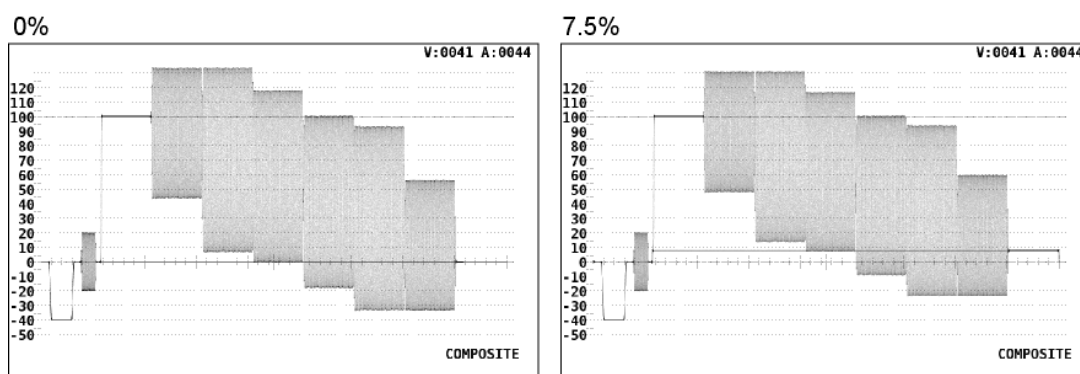
Figure 7-28   Pseudo-composite signal displays with and without setup

8. VECTOR WAVEFORM DISPLAY

8.1 Displaying Vector Waveforms

When you press the VECT (vector) key on the LV 5800 panel, a vector waveform, scale, and vector display menu appear.

Component signal vector waveform displays are X-Y displays based on C_B (horizontal) and C_R (vertical).
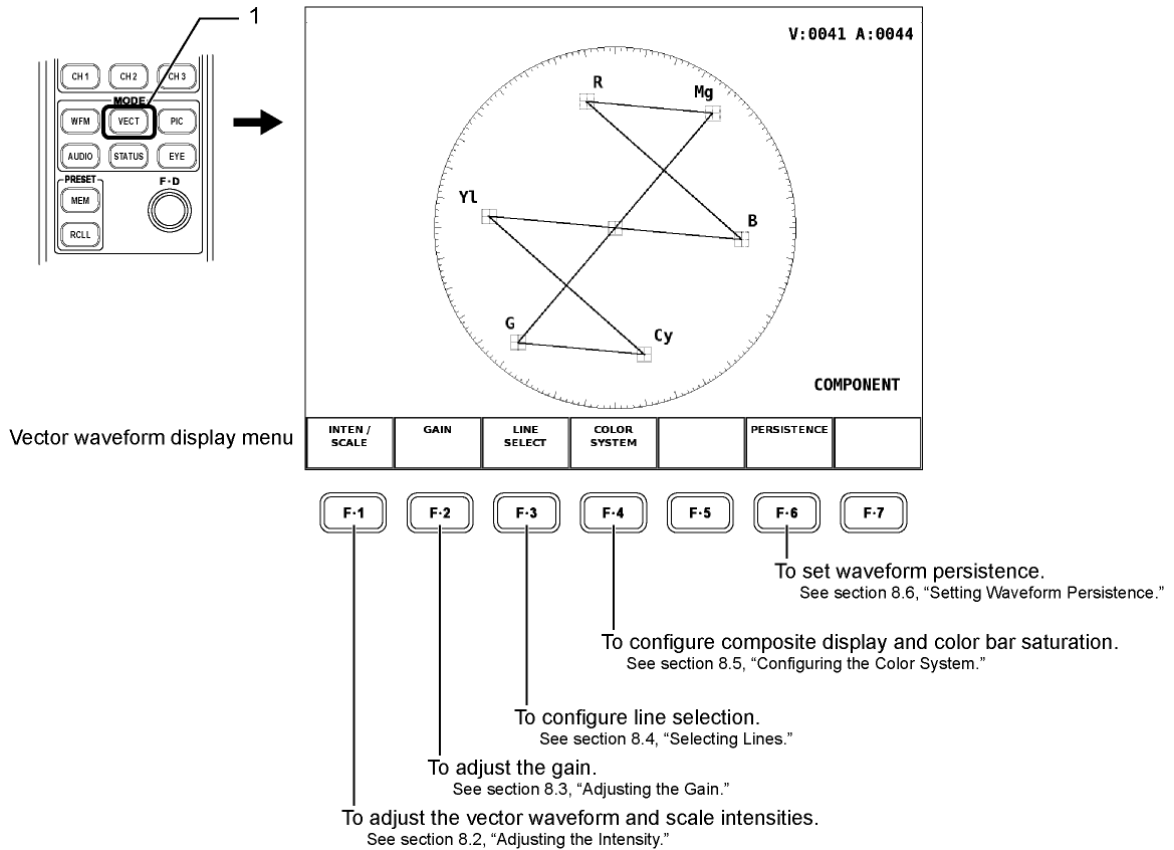
Figure 8-1 Vector display menu

Table 8-1 Video signal formats and compatible colorimetry standards

Scale	Video Signal Format Settings	Compatible Colorimetry Standards
1	1080i/60, 59.94, 50 720p/60, 59.94, 50	SMPTE 274M, 296M
2	525i/60 625i/50	SMPTE 125M

Frame: The full scale value of 0.7 V ± 3 %

Circle: The maximum green color amplitude value + 20 % (for scale 1)
The maximum red color amplitude value + 20 % (for scale 2)

8.2 Adjusting the Intensity

Follow the procedure shown in the figure below to access a menu that allows you to set items such as the vector waveform and scale intensity, the scale color, and the I and Q axes.
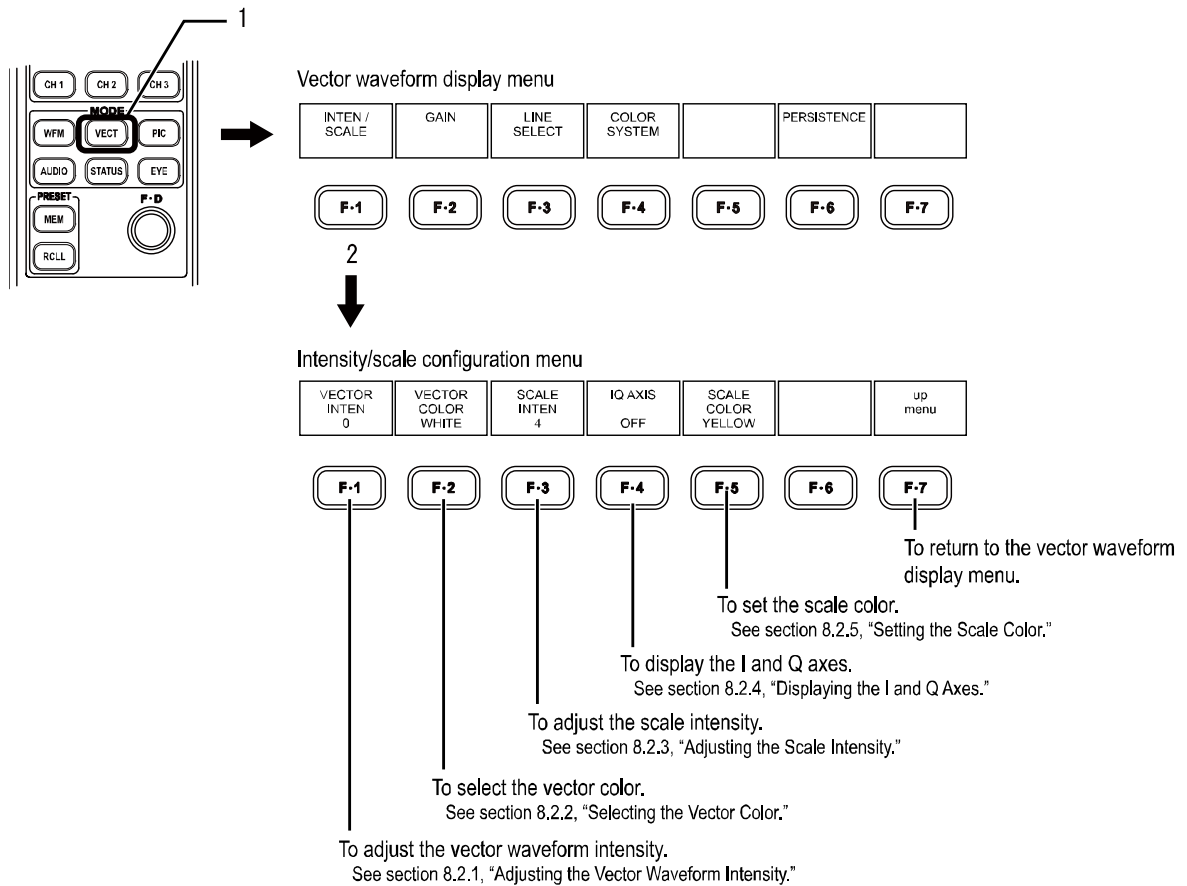
Figure 8-2   Intensity/scale configuration menu

8.2.1 Adjusting the Vector Waveform Intensity

You can adjust the vector waveform intensity by following the procedure below.

• Procedure

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

After following the procedure above and pressing F•1 VECTOR INTEN, turn the function dial (F•D). Press the function dial (F•D) to return the vector intensity to its default value (0).

8.2.2 Selecting the Vector Waveform Color

To select the vector waveform color from one of the two options below, follow the procedure below.

WHITE
GREEN

• Procedure

VECT → F•1 INTEN / SCALE → F•2 VECTOR COLOR: <u>WHITE</u> / GREEN

8.2.3 Adjusting the Scale Intensity

You can adjust the scale intensity by following the procedure below.

• Procedure

VECT → F•1 INTEN / SCALE → F•3 SCALE INTEN:-8 to <u>4</u> to 7

After following the procedure above and pressing F•3 SCALE INTEN, turn the function dial (F•D). Press the function dial (F•D) to return the vector intensity to its default value (4).

8.2.4   Displaying the I and Q Axes

Follow the procedure below to show or hide the I and Q axes.
The I and Q axes cannot be displayed when the video signal format is 625i/50.
The I and Q axes are displayed with the following values when you display an HDTV signal
(the full scale value of 0.7 V is set at 100 %).

  I-axis G = 44.559 %   Q-axis G = 37.056 %
             B = 27.865 %   B = 84.085 %
             R = 69.120 %   R = 62.417 %

• Procedure

VECT → F•1 INTEN / SCALE   → F•4 IQ AXIS:ON / OFF
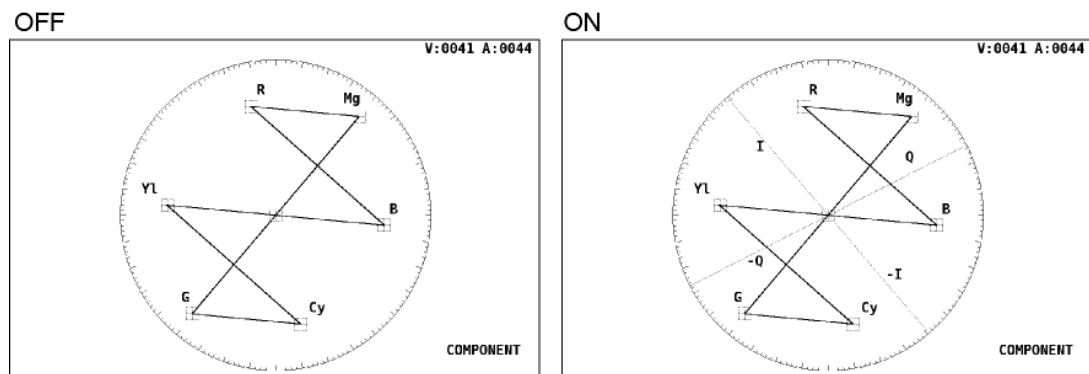
Figure 8-3   Displays with and without the I and Q axes

8.2.5   Setting the Scale Color

You can set the scale to one of the following 7 colors.
  WHITE
  YELLOW
  CYAN
  GREEN
  MAGENTA
  RED
  BLUE

• Procedure

VECT → F•1 INTEN / SCALE → F•5 SCALE COLOR:WHITE / YELLOW / CYAN /
GREEN / MAGENTA / RED / BLUE

8.3 Adjusting the Gain

Follow the procedure shown in the figure below to display a menu for adjusting the vector waveform gain.
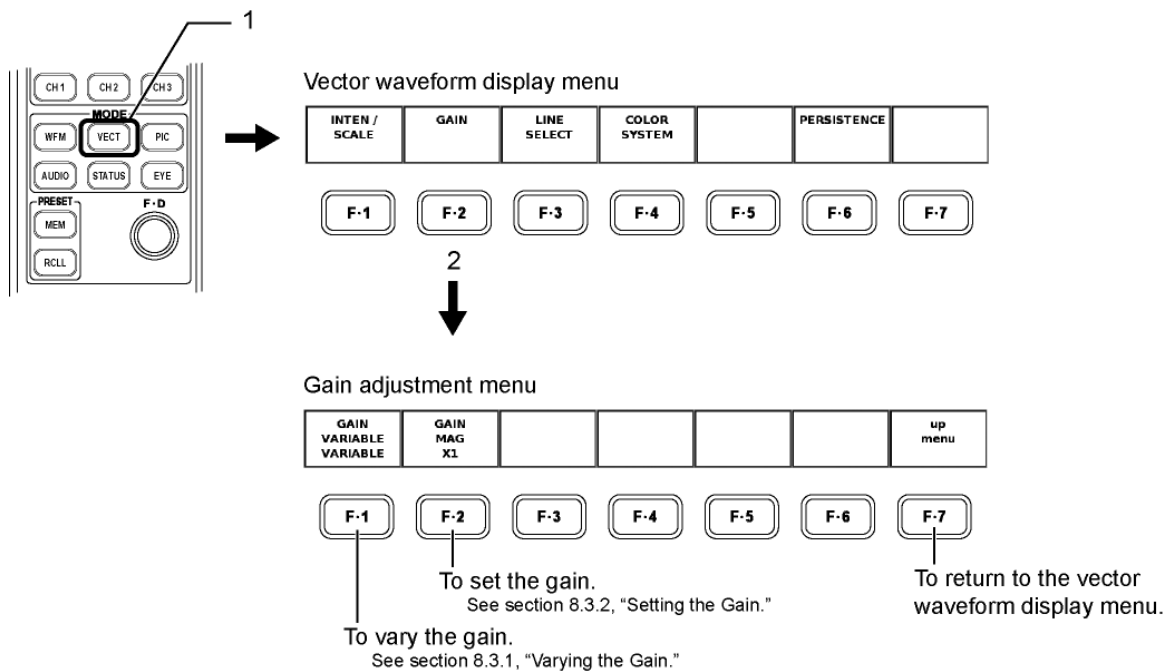
Figure 8-4　Gain adjustment menu

8.3.1 Varying the Gain

You can continuously vary the gain.
To adjust the gain, follow the procedure below and choose one of these settings:

CAL:　　　×1
VARIABLE:　×0.200 to ×2.000
　　　　　　You can adjust the gain by turning the function dial (F•D). The value appears in the upper right of the screen. Press the function dial (F•D) to return the gain to its default value (×1.00).

• Procedure

VECT → F•2 GAIN→ F•1 GAIN VARIABLE:CAL / VARIABLE
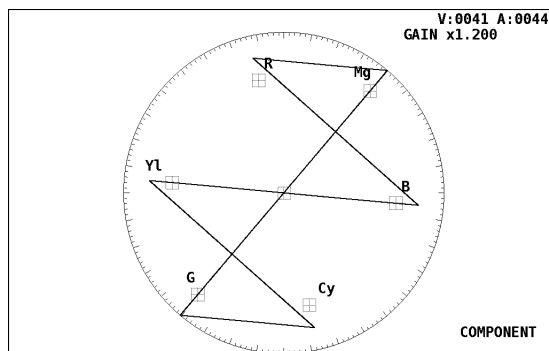
Figure 8-5　Display with adjusted vector waveform gain

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8.3.2　Setting the Gain

Follow the procedure below and choose one of these gain values:

×1:　　　　×1

×5:　　　　×5

IQ-MAG:　Sets the gain so that the SMPTE color bar I signal fits into the vector scale circle (the LV 58SER04 sets the gain at ×3.140 when it receives an SMPTE color bar signal).

• Procedure

VECT → F•2 GAIN→ F•2 GAIN MAG:x1 / ×5 / IQ-MAG

8.4　Selecting Lines

You can use the vector waveform display line select function to select and observe a specific line number. Follow the procedure shown in the figure below to access the line select menu and configure the line select feature.
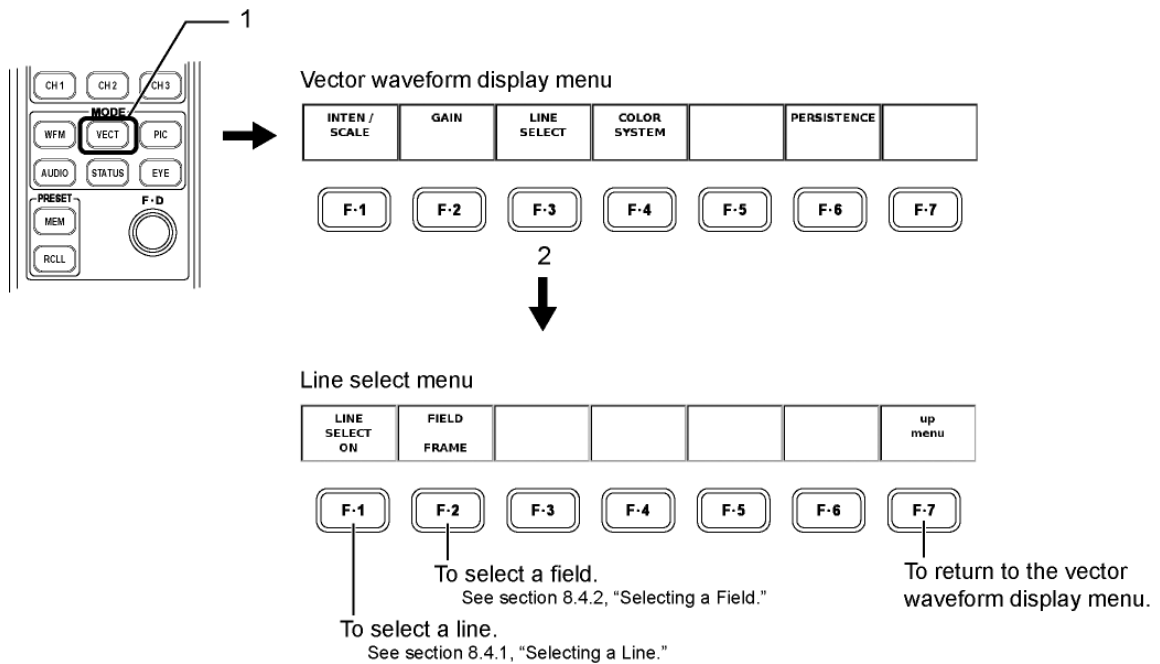
Figure 8-6　Line select menu

8.4.1   Selecting a Line

To select and display a specific line in the vector waveform display, follow the procedure below and select ON. If you select OFF, the line select feature will be disabled and all lines will appear.

• Procedure

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

After following the procedure above and selecting ON, turn the function dial (F•D) to select a line number. The selected line number is indicated in the lower left of the display.
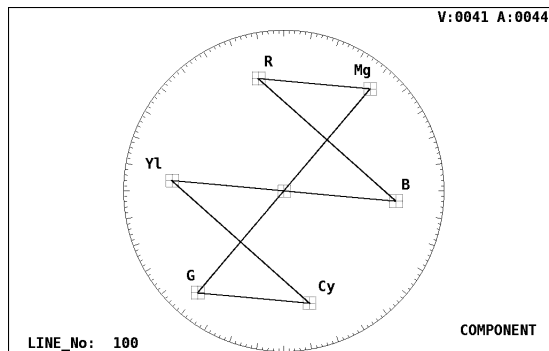
Figure 8-7   Vector waveform display when the line select feature is enabled

8.4.2   Selecting a Field

Follow the procedure below to select the range of values from which lines can be selected through the turning of the function dial (F•D) in the vector waveform display.
You cannot select a field when the video signal format is progressive.

FIELD1:   Limits line selection to field 1.
FIELD2:   Limits line selection to field 2.
FRAME: Any line in the frame can be selected.

• Procedure

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

8.5 Configuring the Color System

The component signal vector display is an X-Y display based on the chroma difference signal, but you can display pseudo-composite signal vectors by converting the signal into a pseudo-composite signal.
You can also set the setup value and the color bar saturation.
Follow the procedure shown in the figure below to access the color system setup menu and configure these settings.
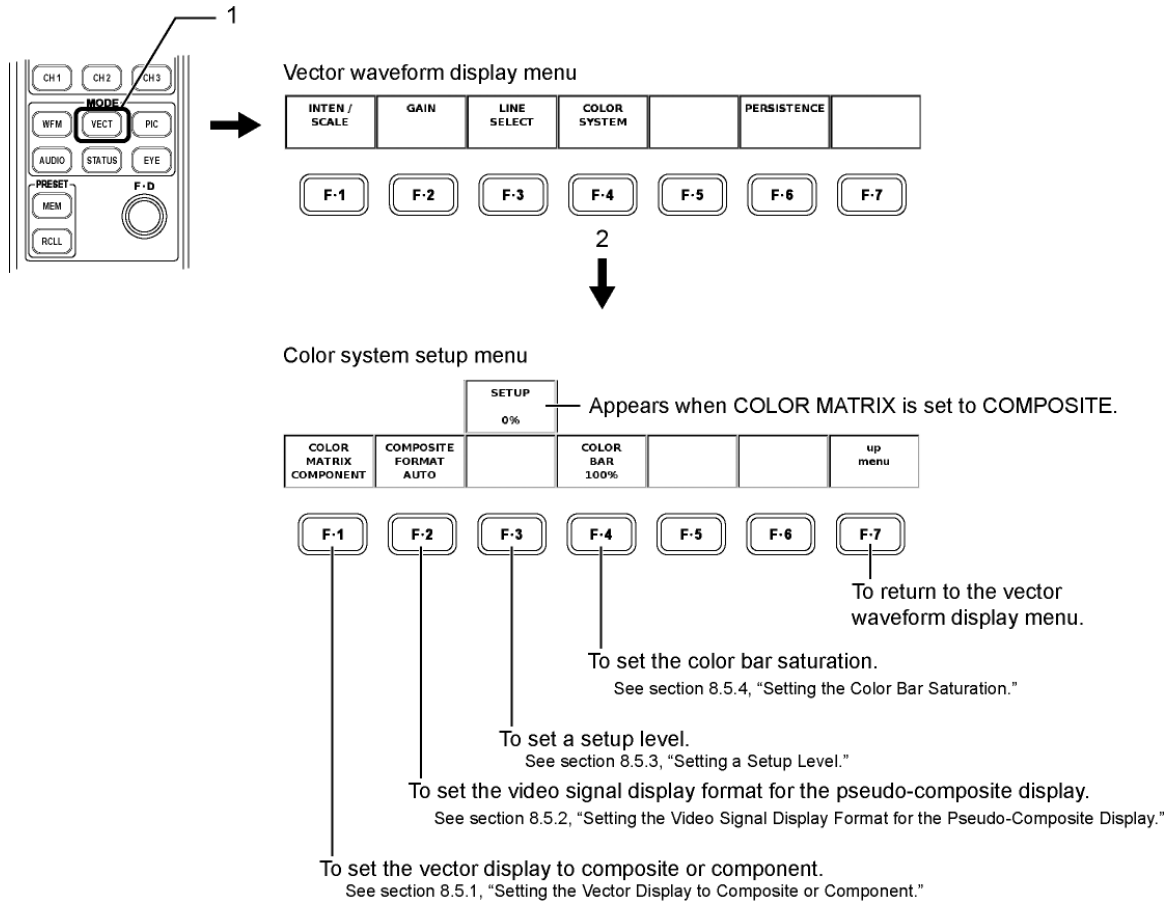
Figure 8-8   Color system configuration procedure

8.5.1   Setting the Vector Display to Composite or Component

Follow the procedure below to set the vector waveform display to show a
pseudo-composite signal converted from a component signal or to show a chroma
difference signal vector display. The selected display format is indicated in the lower right of
the display.

COMPONENT: Displays a component signal's chroma difference signal in an X-Y vector
display.

COMPOSITE: Shows a vector display of a pseudo-composite signal converted from a
component signal.

• Procedure

VECT → F•4 COLOR SYSTEM → F•1 COLOR MATRIX:COMPONENT / COMPOSITE

COMPONENT
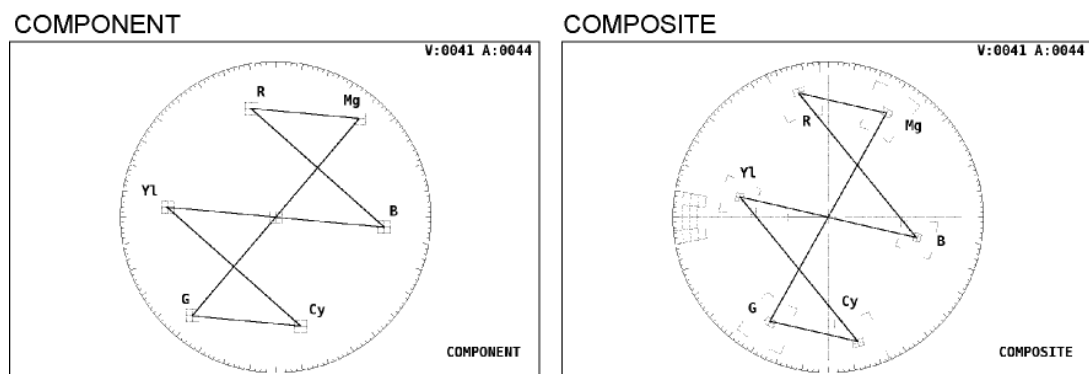
COMPOSITE

Figure 8-9   Component and composite displays

8.5.2   Setting the Video Signal Display Format for the Pseudo-Composite Display

When you have selected pseudo-composite display, follow the procedure below to set the
display to NTSC or PAL. You can also choose to let the LV 58SER04 select the format
automatically.

NTSC: Converts all video signal formats to NTSC pseudo-composite signals

PAL: Converts all video signal formats to PAL pseudo-composite signals.

AUTO: When the field frequency of a video signal is 50 Hz, or the frame frequency is 25
or 50 Hz, the signal is converted into PAL; otherwise it is converted into NTSC.

• Procedure

VECT → F•4 COLOR SYSTEM → F•2 COMPOSITE FORMAT:AUTO / NTSC / PAL
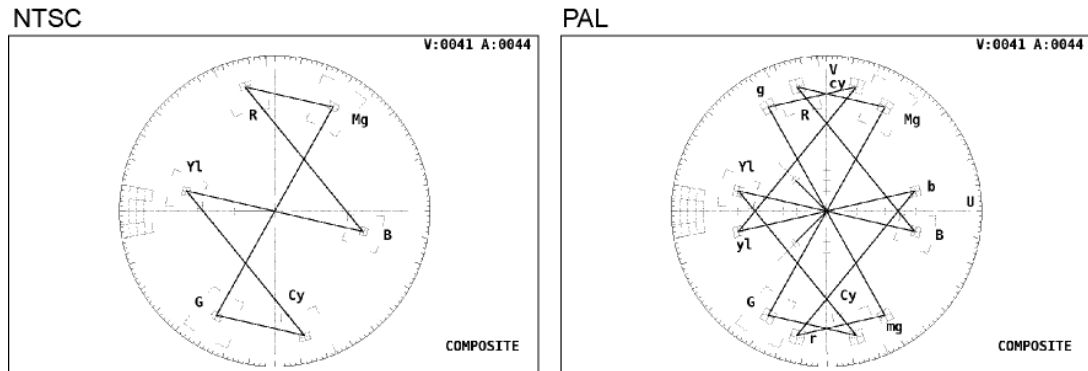
Figure 8-10   Pseudo-composite video signal displays

8.5.3   Setting a Setup Level

Follow the procedure below to select a pseudo-composite signal setup level for the vector waveform display. You can only select a setup level when displaying an NTSC pseudo-composite signal. This setting is not available when a component or PAL signal is displayed.

0 %:   No setup
7.5 %:   Adds a setup of 7.5 %.

• Procedure

VECT → F•4 COLOR SYSTEM → F•3 SETUP:0% / 7.5%

8.5.4   Setting the Color Bar Saturation

If you follow the procedure below and select 75 %, the LV 58SER04 will display a scale that matches the peak level of a 75 % color bar signal.

• Procedure

VECT → F•4 COLOR SYSTEM → F•4 COLOR BAR:100% / 75%
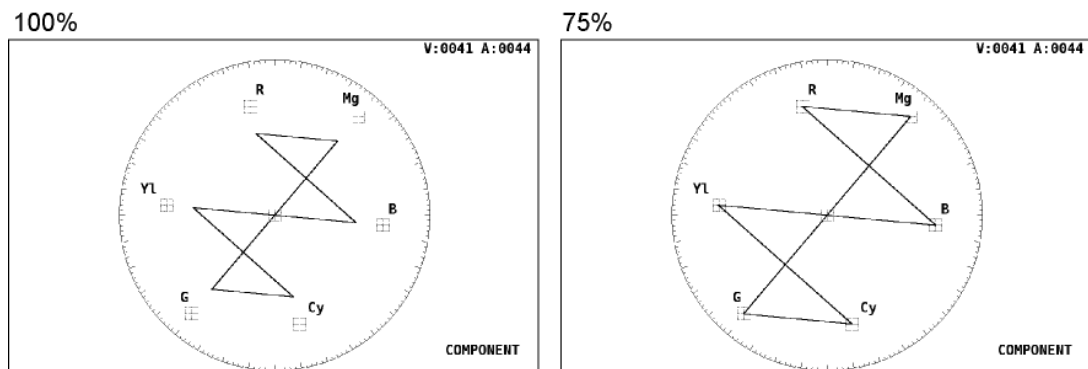
Figure 8-11   100 % and 75 % color bar vector waveform displays

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8.6   Setting Waveform Persistence

Follow the procedure in the figure below to display a menu for configuring the persistence of vector display waveforms.
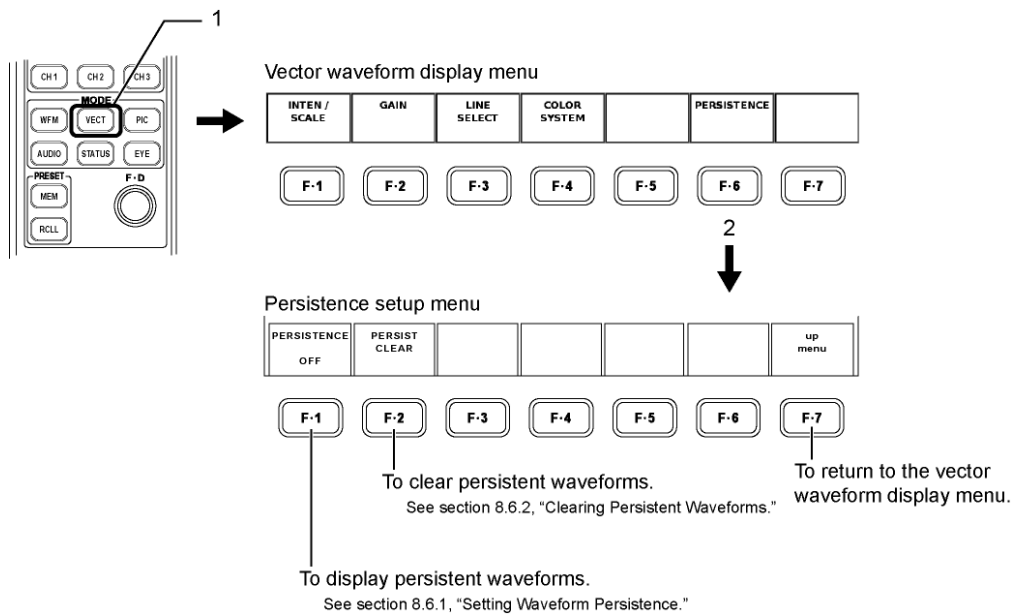
Figure 8-12   Persistence setup menu

8.6.1   Setting Waveform Persistence

You can change the persistence of displayed vector waveforms. By making waveforms persistent, you can display past waveforms and present waveforms at the same time.
Follow the procedure below and choose one of these settings:

ON: Waveforms are persistent.
OFF: Waveforms are not persistent.
INFINIT: Waveforms persist until they are cleared or until the screen display mode is changed.

• Procedure

VECT → F•6 PERSISTENCE → F•1 PERSISTENCE:ON / OFF / INFINIT

8.6.2   Clearing Persistent Waveforms

When PERSISTENCE is set to INFINIT, you can clear accumulated persistent waveforms. After the waveforms are cleared, persistent waveforms will begin accumulating again.

• Procedure

VECT → F•6 PERSISTENCE → F•2 PERSIST CLEAR

9.   PICTURE DISPLAY

Press the PIC key on the LV 5800 panel to access the picture display and the picture display menu.
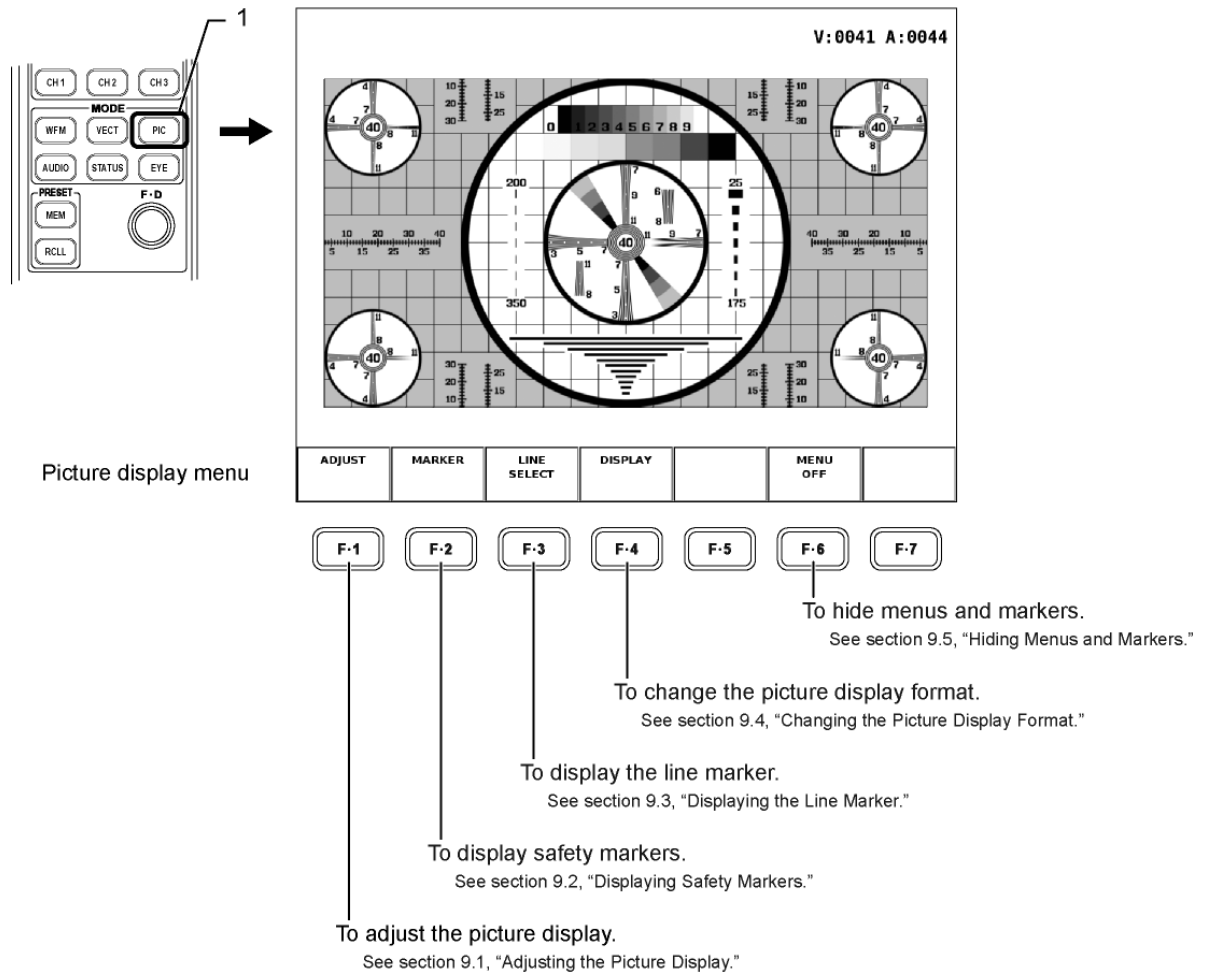
Figure 9-1   Picture display procedure

*   The picture display may not display the two lines of pixels farthest to the left, right, top and bottom, depending on the picture processing circumstances.

9.1 Adjusting the Picture Display

You can adjust the brightness, contrast, RGB gain, and RGB bias of the picture display. To make these adjustments, access the picture adjustment menu by following the procedure shown in the figure below.
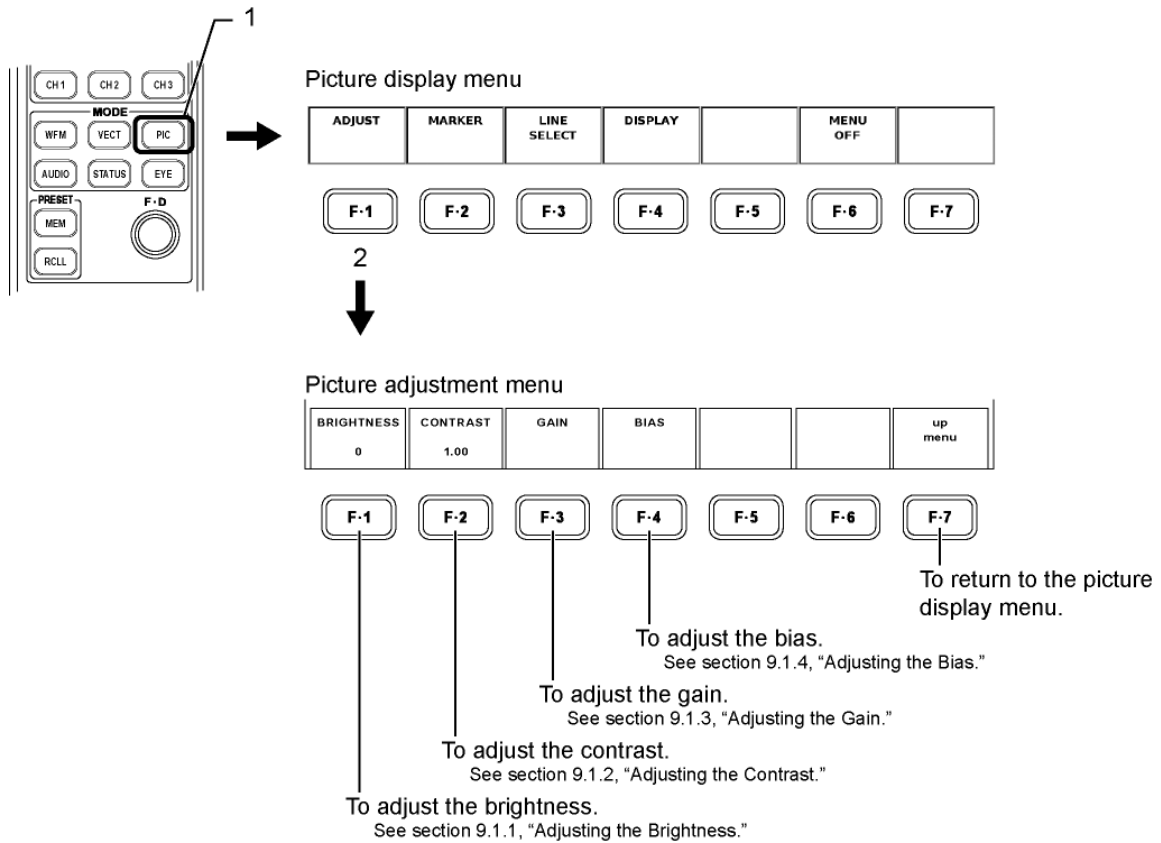
Figure 9-2   Picture display adjustment procedure

9.1.1 Adjusting the Brightness

Follow the procedure below to adjust the picture display brightness.
You can adjust the brightness within the range of -30 to 30 %.

• Procedure

PIC → F•1 ADJUST → F•1 BRIGHTNESS:-30 to 0 to 30

After performing the procedure described above, turn the function dial (F•D) to adjust the brightness. Press the function dial (F•D) to return the brightness to its default value (0).

9.1.2 Adjusting the Contrast

Follow the procedure below to adjust the picture display contrast.
You can adjust the contrast within the range of ×0.70 to ×1.30.

- Procedure

$\boxed{\text{PIC}} \rightarrow \boxed{\text{F•1}}$ ADJUST $\rightarrow \boxed{\text{F•2}}$ CONTRAST:0.70 to <u>1.00</u> to 1.30

After performing the procedure described above, turn the function dial (F•D) to adjust the contrast.
Press the function dial (F•D) to return the brightness to its default value (1.00).

9.1.3 Adjusting the Gain

Follow the procedure below to select a color and adjust its picture display gain.
You can adjust the gain of each color, R, G, and B, within the range of ×0.70 to ×1.30.

- Procedure

- $\boxed{\text{PIC}} \rightarrow \boxed{\text{F•1}}$ ADJUST $\rightarrow \boxed{\text{F•3}}$ GAIN $\rightarrow \boxed{\text{F•1}}$ R GAIN:0.70 to <u>1.00</u> to 1.30
- $\boxed{\text{PIC}} \rightarrow \boxed{\text{F•1}}$ ADJUST $\rightarrow \boxed{\text{F•3}}$ GAIN $\rightarrow \boxed{\text{F•2}}$ G GAIN:0.70 to <u>1.00</u> to 1.30
- $\boxed{\text{PIC}} \rightarrow \boxed{\text{F•1}}$ ADJUST $\rightarrow \boxed{\text{F•3}}$ GAIN $\rightarrow \boxed{\text{F•3}}$ B GAIN:0.70 to <u>1.00</u> to 1.30

After performing the procedure described above, turn the function dial (F•D) to adjust the gain.
Press the function dial (F•D) to return the gain to its default value (1.00).

9.1.4 Adjusting the Bias

Follow the procedure below to select a color and adjust its picture display bias.
You can adjust the bias of each color, R, G, and B, within the range of -0.30 (-30 %) to 0.30 (30 %).

- Procedure

- $\boxed{\text{PIC}} \rightarrow \boxed{\text{F•1}}$ ADJUST $\rightarrow \boxed{\text{F•4}}$ BIAS $\rightarrow \boxed{\text{F•1}}$ R BIAS:-0.30 to <u>0.00</u> to 0.30
- $\boxed{\text{PIC}} \rightarrow \boxed{\text{F•1}}$ ADJUST $\rightarrow \boxed{\text{F•4}}$ BIAS $\rightarrow \boxed{\text{F•2}}$ G BIAS:-0.30 to <u>0.00</u> to 0.30
- $\boxed{\text{PIC}} \rightarrow \boxed{\text{F•1}}$ ADJUST $\rightarrow \boxed{\text{F•4}}$ BIAS $\rightarrow \boxed{\text{F•3}}$ B BIAS:-0.30 to <u>0.00</u> to 0.30

After performing the procedure described above, turn the function dial (F•D) to adjust the bias.
Press the function dial (F•D) to return the bias to its default value (0.00).

9.2 Displaying Safety Markers

Follow the procedure shown in the figure below to access the marker display menu and display various kinds of markers. Safety markers appear when SIZE is set to FIT and MENU is not set to OFF.
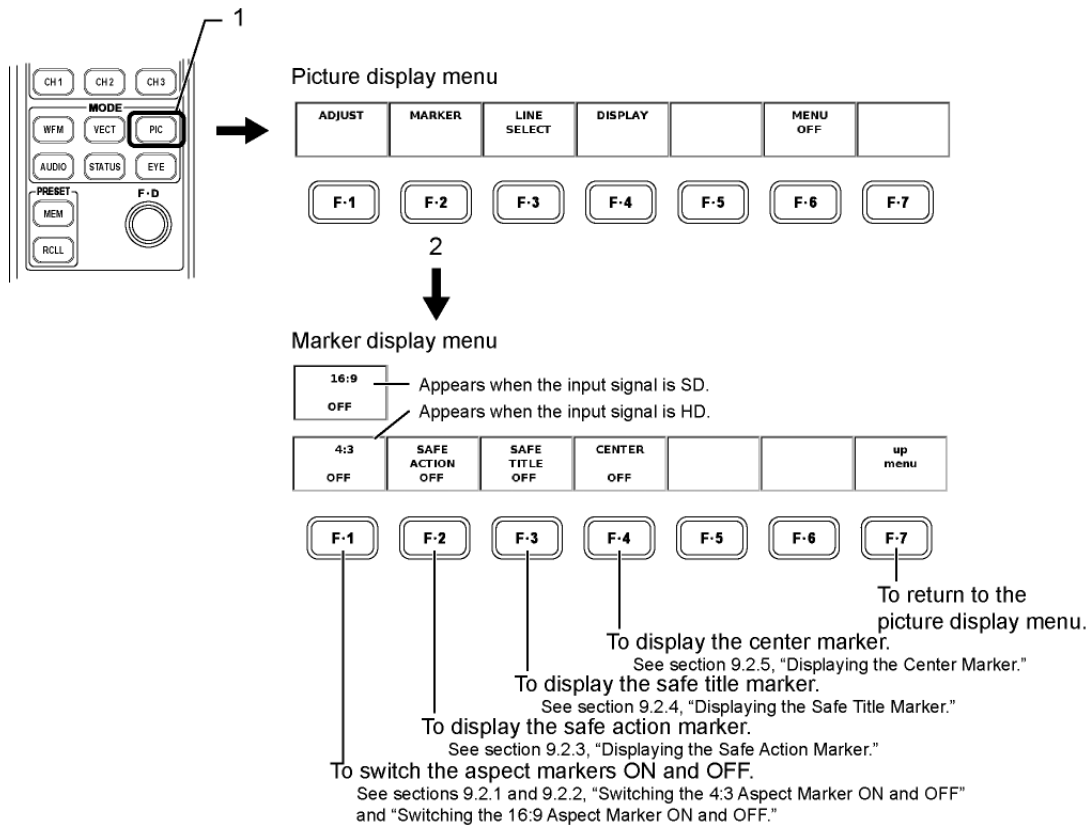
Figure 9-3 Marker display menu

There are four different marker sizes, which vary depending on the input signal and aspect marker.
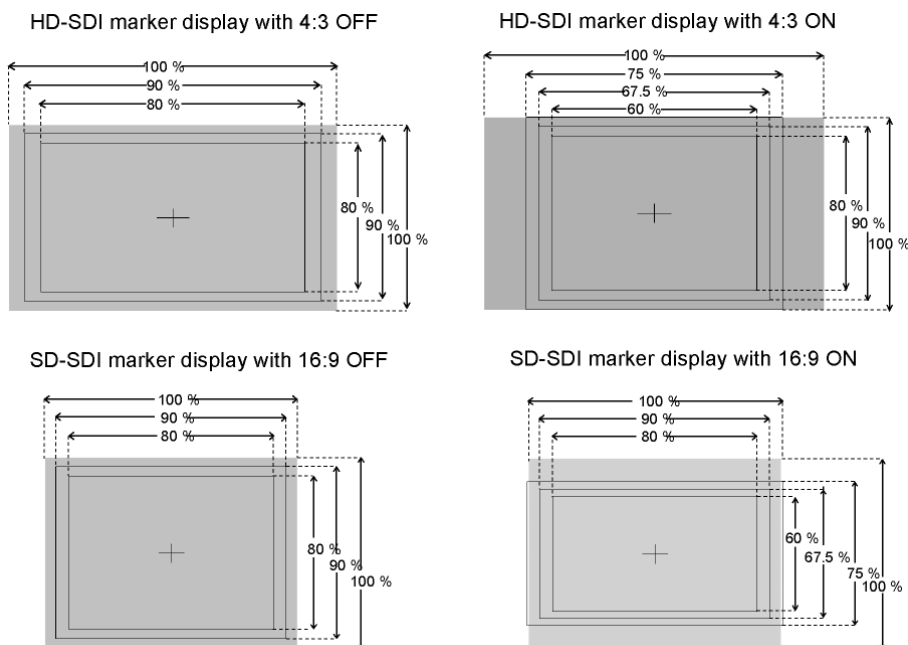
Figure 9-4 Types of marker sizes

9.2.1   Switching the 4:3 Aspect Marker ON and OFF

When the LV 58SER04 displays an HD signal with an aspect ratio of 16:9, it can display a
marker that corresponds to an aspect ratio of 4:3. Turning the 4:3 aspect marker on and off
changes the sizes of the safe action marker and the safe title marker.
To turn the 4:3 aspect marker on or off, follow the procedure below.

• Procedure

PIC → F•2 MARKER → F•1 4:3:ON / OFF

9.2.2   Switching the 16:9 Aspect Marker ON and OFF

When the LV 58SER04 displays an SD signal with an aspect ratio of 4:3, it can display a
marker that corresponds to an aspect ratio of 16:9. Turning the 16:9 aspect marker on and
off changes the sizes of the safe action marker and the safe title marker.
To turn the 16:9 aspect marker on or off, follow the procedure below.

• Procedure

PIC → F•2 MARKER → F•1 16:9:ON / OFF

9.2.3   Displaying the Safe Action Marker

You can display a safe action marker with a width and length that are 90 % of those of the
picture display active area.
When the aspect marker is displayed, the width and length of the safe action marker are
90 % of those of the aspect marker.
To turn the safe action marker on or off, follow the procedure below.

• Procedure

PIC → F•2 MARKER → F•2 SAFE ACTION:ON / OFF

9.2.4   Displaying the Safe Title Marker

You can display a safe title marker with a width and length that are 80 % of those of the
picture display active area.
When the aspect marker is displayed, the width and length of the safe title marker are 80 %
of those of the aspect marker.
To turn the safe title marker on or off, follow the procedure below.

• Procedure

PIC → F•2 MARKER → F•3 SAFE TITLE:ON / OFF

9.2.5 Displaying the Center Marker

You can display a crosshair at the center of the picture display.
To turn the center marker on or off, follow the procedure below.

• Procedure

PIC → F•2 MARKER → F•4 CENTER:ON / OFF

9.3 Displaying the Line Marker

You can use the picture display line select feature to confirm the location of a specific line number. The line marker appears when SIZE is set to FIT and MENU is not set to OFF. Follow the procedure shown in the figure below to access the line select menu and configure the line select feature.
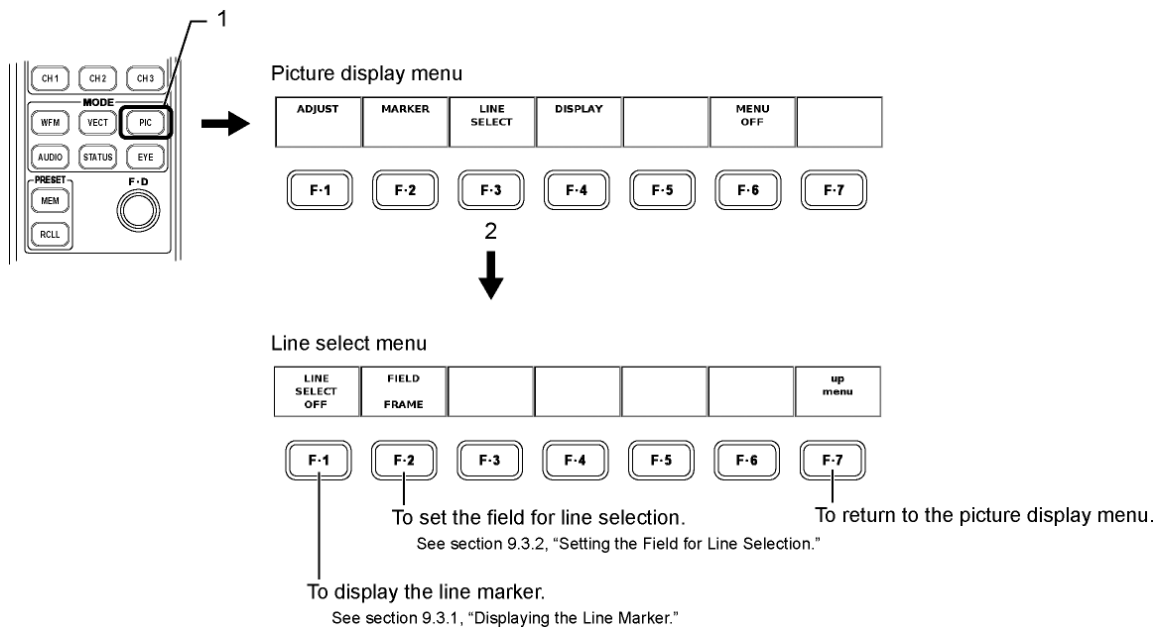
Figure 9-5   Line marker display procedure

9.3.1 Displaying the Line Marker

When you use the line select feature, the selected line is highlighted on the picture display. You can only select a line in the active picture area. The selected line will not appear during blanking intervals.
Follow the procedure below to select a line.

- Procedure

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

After following the procedure above and selecting ON, turn the function dial (F•D) to select a line.
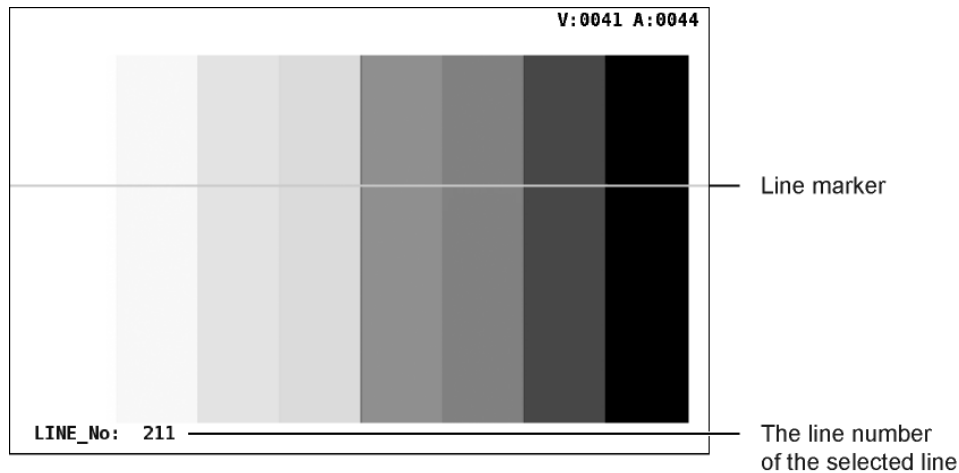
Figure 9-6   Line marker display

9.3.2 Setting the Field for Line Selection

Follow the procedure below to select a line selection range within the picture display. You cannot select a field when the video signal format is progressive.

FIELD1:   The line selection range is limited to the reference signal of FIELD 1.
FIELD2:   The line selection range is limited to the reference signal of FIELD 2.
FRAME: The line selection range is only limited to active video lines.

*   When you display an interlaced signal using the picture display, each field is converted to the XGA rate. Because the actual interlaced signal is not displayed, even if you change the line selection field, the line marker location will not change.

- Procedure

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

9.4   Changing the Picture Display Format

In the picture display, you can change the display size and display a histogram.
To perform these operations, access the picture display format setup menu by following the
procedure shown in the figure below.
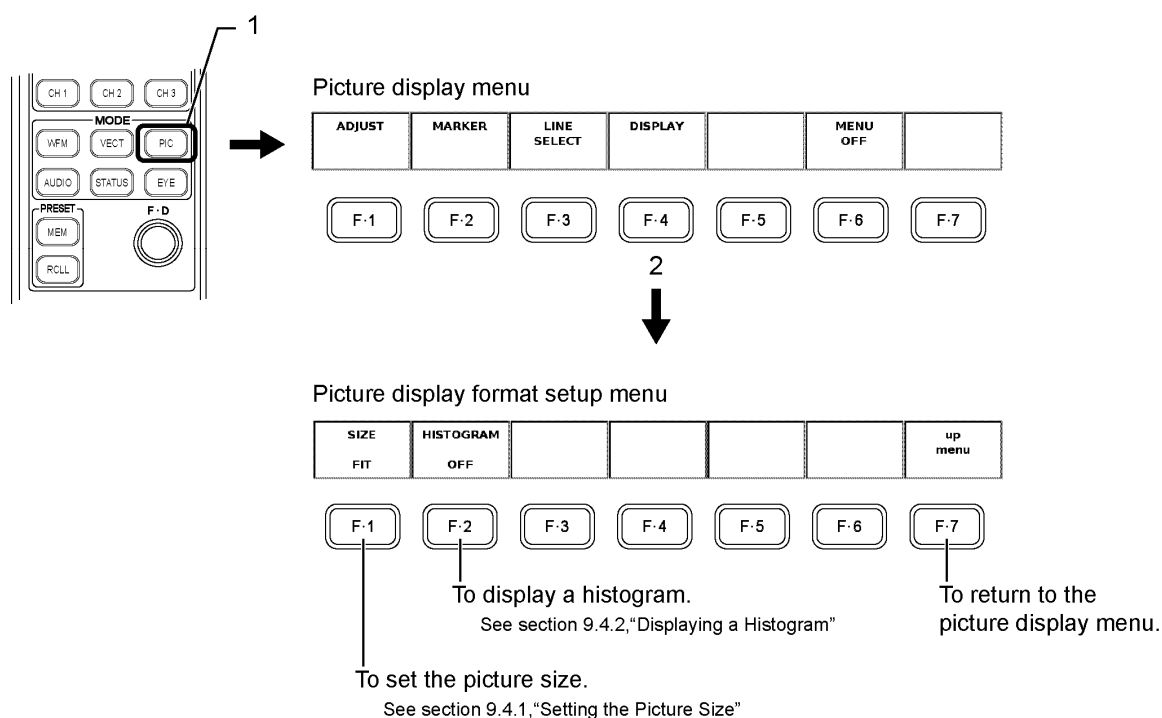
Figure 9-7   Picture display format setup menu

9.4.1   Setting the Picture Size

There are two picture size settings that you can choose from. The default setting is FIT. In
this setting, the picture size is adjusted to fit into the display. You can also set the picture
size so that one pixel from the video signal is displayed using one pixel on the LCD. Follow
the procedure below to access the picture display format menu and choose one of these
settings:

FIT: The picture size is adjusted to match the display.
            Expansion and shrinking are accomplished through simple image
            filtering.
REAL: One pixel from the video signal is displayed using one pixel on the
            LCD.
            No image filtering takes place.

*   If you display an HDTV signal using REAL, it will not fit into the LCD screen.
        You can scroll the image using the HPOS and VPOS knobs.

*   The picture display may not display the two lines of pixels farthest to the left, right, top and bottom,
        depending on the picture processing circumstances.

• Procedure

PIC → F•4 DISPLAY → F•1 SIZE:FIT / REAL
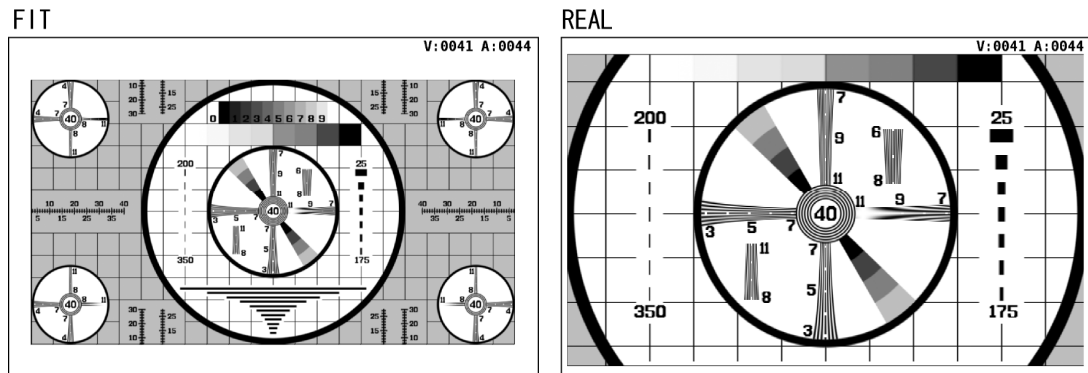
Figure 9-8   Picture sizes

9.4.2   Displaying a Histogram

To display a histogram in the bottom right of the picture display, follow the procedure shown below, and select ON.
The histogram shows the distribution of the image data by plotting brightness on the horizontal axis and the number of pixels at each brightness level on the vertical axis. Dark points are displayed on the left of the histogram and bright points are displayed on the right.

• Procedure

PIC → F•4 DISPLAY → F•2 HISTOGRAM:ON / OFF
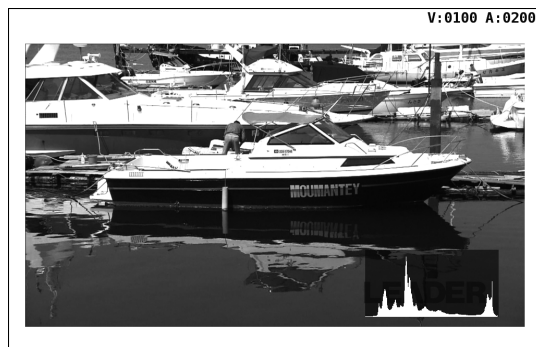
Figure 9-9   Histogram display

9.5   Hiding Menus and Markers

In 1-screen display, follow the procedure below and press MENU OFF to hide the function menu, the line marker, and the safety marker. In the 2- and 4-screen multi displays, this menu does not appear.
Press any key to make the hidden items reappear.

• Procedure

PIC → F•6 MENU OFF

10. STATUS DISPLAY

The status information that can be displayed for the LV 58SER04 is listed below. For information on how to display the information, see the sections that follow.

Error status display	Bit rates
Event log display	ISDB-T TS status display
PID tree	TMCC display
Dumps	SFN display

10.1 Displaying the Error Status

The first status display that appears when you press STATUS key is the error status display. When you press STATUS key, the function menu becomes the status display menu. You can access and configure all of the status displays from the status display menu.

The figure below shows the status display menu and a sample error status display. Table 10-1 explains the meanings of the error messages that appear in error status display.
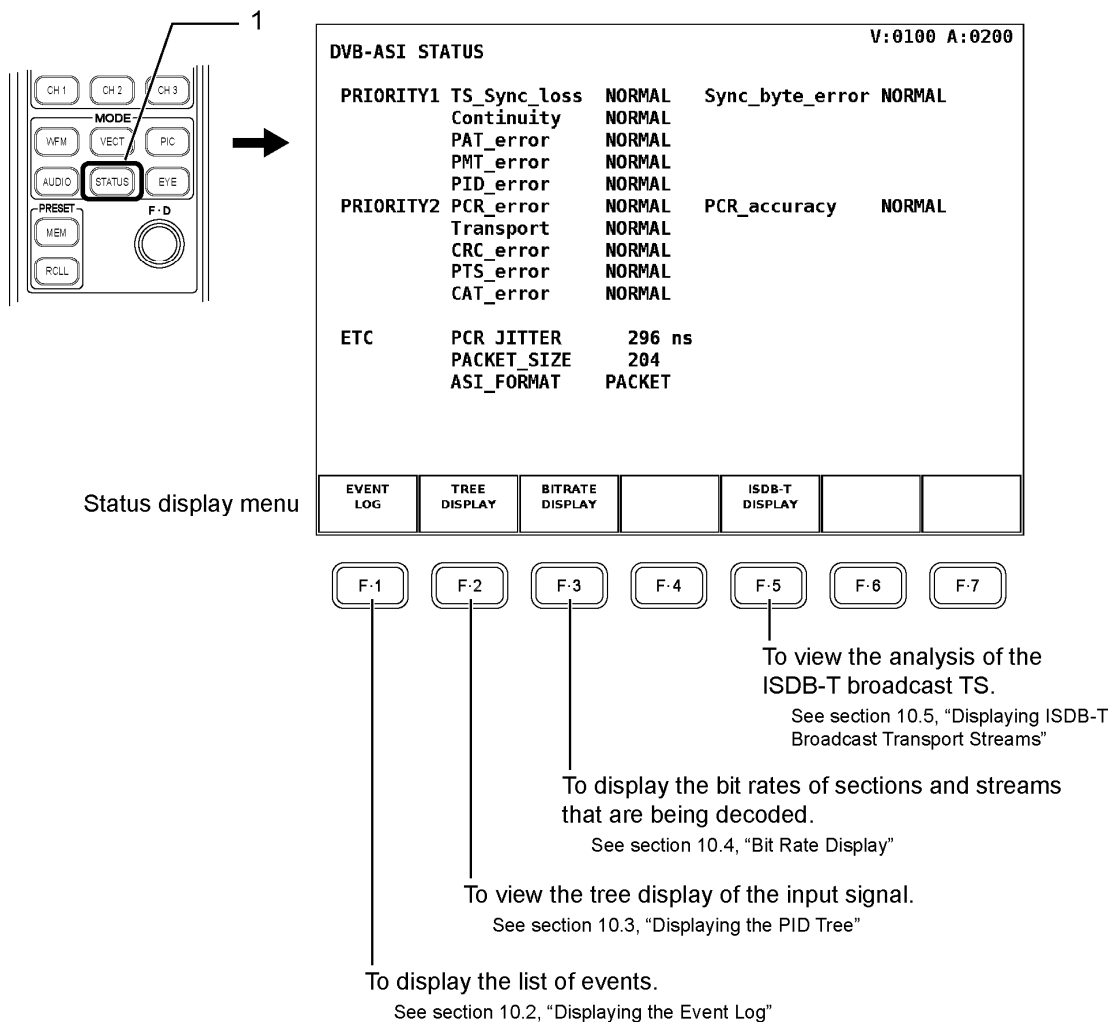
Figure 10-1   The error status display and the status display menu

Table 10-1   Explanations of errors that can be checked using the error status display.

Message		Explanation
PRIORITY1		Errors defined as priority 1 by ETR 290
	TS_Sync_loss	This error occurs when a synchronization word is not detected in the input signal for a set period of time.
	Sync_byte_error	This error occurs when a synchronization disturbance has been detected.
	Continuity	This error occurs when discontinuity has been detected in the continuity counter.
	PAT_error	Checks for a number of different PAT errors.
	PMT_error	Checks for a number of different PMT errors.
	PID_error	This error occurs when the packets of the PIDs specified by the PMT for the program to be decoded have not been found.
PRIORITY2		Errors defined as PRIORITY 2 by ETR 290
	PCR_error	Checks for PCR transmission interval errors.
	PCR_accuracy	Checks for PCR time accuracy errors.
	Transport	Checks for errors in the Transport_error_indicator contained in the TS header.
	CRC_error	This error occurs when there is a disparity between the CRC attached to a packet and the CRC calculated by the LV 58SER04.
	PTS_error	Checks for PTS transmission interval errors.
	CAT_error	Checks for CAT errors.
ETC		Items that are not defined by ETR 290
	PCR JITTER	The amount of PCR jitter with respect to the reference clock.

10.1.1   Priority 1 Errors

This section explains the errors in the error status display that are defined as priority 1 by ETSI ETR 290. All priority 1 errors, except for TS_Sync_loss, are only displayed when their detection is set to ON in error detection setup 1, which can be accessed from the unit setup menu.

Reference

For more information on error detection setup 1, see section 6.2, "Error Detection Setup 1."

● TS_Sync_loss

The LV 58SER04 monitors the synchronization bytes in the MPEG-2 TS stream and displays the result next to TS_Sync_loss. The LV 58SER04 considers synchronization successful if it detects 5 or more consecutive synchronization bytes in the MPEG-2 TS. The LV 58SER04 indicates a TS_sync_loss error when two or more consecutive synchronization bytes are missing.

You cannot switch TS_Sync_loss detection on and off. When a TS_Sync_loss error is detected, all other error detection functions stop working.

The synchronization byte is the first byte in a MPEG-2 TS packet header. It is transmitted every 188, 204, or 208 bytes, and its value is fixed at 47 (in hexadecimal).

● Sync_byte_error

The LV 58SER04 monitors the synchronization bytes in the MPEG-2 TS and displays the result next to Sync_byte_error. The LV 58SER04 indicates a Sync_byte_error when synchronization is achieved, but one synchronization byte is missing from the MPEG-2 TS.

● Continuity

The LV 58SER04 monitors the continuity of the continuity_counter in the MPEG-2 TS packet headers and displays the result next to Continuity. The value of continuity_counter should continually increase, but if it doesn't, the LV 58SER04 indicates a Continuity error.
The continuity_counter value only increases when the value of adaptation_field_control is 01 or 11 (in binary). Any other values of adaptation_field_control indicate that there is no payload in the packet, so continuity_counter does not increase. If continuity_counter increases when the value of adaptation_field_control is not 01 or 11 (in binary), the LV 58SER04 will indicate a Continuity error.

* The MPEG-2 TS protocol allows the same packet to be sent twice in a row. Even in this case, because the continuity_counter of each packet is the same, the LV 58SER04 will indicate a continuity error.

● PAT_error

The LV 58SER04 monitors the condition of received PATs and displays the result next to PAT_error. The LV 58SER04 indicates a PAT error if:
- A packet with a PID of 0000 (in hexadecimal) is not detected within the set time. (To set the time, adjust the PAT Cycle setting in error detection setup 1. The default time is 500 ms.)
- The section table_id in a packet with a PID of 0000 is not 00 (in hexadecimal).
- The Scrambling_control_field in a packet with a PID of 0000 (in hexadecimal) is not 00 (in binary).

● PMT_error

The LV 58SER04 monitors the condition of received PMTs and displays the result next to PMT_error. The LV 58SER04 indicates a PMT error if:
- The PMT listed in the PAT is not detected within the set time. (To set the time, adjust the PMT Cycle setting in error detection setup 1. The default time is 500 ms.)
- The table_id of a PMT listed in the PAT is not 02 (in hexadecimal).
- Not all of the Scrambling_control_field values in sections whose table_id is 02 (in hexadecimal) are 00 (in binary).

● PID_error

The LV 58SER04 monitors the packets of the PID listed in the PMT to be decoded and displays the result next to PID_error.

The LV 58SER04 indicates a PID_error if the PID of all streams are listed in the PMT, but the packets for those PID are not detected in the MPEG-2 TS after the PMT has been received a set number of times. The LV 58SER04 only monitors the PMT that has been set as the PMT to be decoded. It does not monitor all PMTs.

To set the number of times that a PMT must be received before the LV 58SER04 counts a PID_error, adjust the PID Cycle setting in error detection setup 1.

10.1.2   Priority 2 Errors

This section explains the errors in the error status display that are defined as priority 2 by ETSI ETR 290. Priority 2 errors are only displayed when their detection is set to ON in error detection setup 2, which can be accessed from the unit setup menu.

Reference

For more information on error detection setup 2, see section 6.3, "Error Detection Setup 2."

● PCR_error

The LV 58SER04 monitors the PCR repetition interval and displays the result next to PCR_error. The LV 58SER04 indicates a PCR_error if the PCR repetition interval exceeds the specified time. The only PCRs that are monitored for repetition are those listed in the PMT to be decoded. PCRs not listed in the PMT to be decoded are not monitored.

To specify the repetition interval time, adjust the PCR Cycle setting in error detection setup 2. The default time is 100 ms.

● PCR_accuracy

The LV 58SER04 monitors the time accuracy of PCRs using the internal reference clock and displays the result next to PCR_accuracy. The LV 58SER04 indicates a PCR_accuracy error if the PCR time accuracy falls outside of ±500 ns. The only PCRs that are monitored for time accuracy are those listed in the PMT to be decoded. The PCR accuracy of PCRs not listed in the PMT to be decoded is not monitored.

● Transport

The LV 58SER04 monitors the TS header transport error indicator bits in all MPEG-2 TS packets and displays the result next to Transport. The LV 58SER04 indicates a Transport error if the value of a transport error indicator bit is 1.

● CRC_error

The LV 58SER04 searches for CRC code errors in sections and displays the result next to CRC_error. The LV 58SER04 indicates a CRC_error when it finds an error in a CRC. The LV 58SER04 searches for CRC code errors in the PAT, the PMT to be decoded, the NIT, and the CAT. The LV 58SER04 does not search for CRC errors in other sections.

● PTS_error

The LV 58SER04 monitors PTS intervals and displays the result next to PTS_error. The LV 58SER04 indicates a PTS_error if the PTS repetition interval exceeds the specified time. The only PTSs that are monitored for repetition are those in the stream being decoded. The LV 58SER04 does not monitor the PTSs of other streams.
To specify the repetition interval time, adjust the PTS Cycle setting in error detection setup 2. The default time is 700 ms.

● CAT_error

The LV 58SER04 monitors the condition of received CATs and displays the result next to CAT_error. The LV 58SER04 indicates a CAT_error if:
 ·   If no packets have CAT PIDs (0001h), but there are packets with Scrambling_control values other than 00 (in binary).
 ·   The table_id in a section with a CAT PID (0001h) is not 01 (in hexadecimal).
 ·   The CAT repetition interval exceeds the specified time.
      (To set the time, adjust the CAT Cycle setting in error detection setup 2. The default time is 10.0 sec.)

10.1.3   Other Status Indications

● PCR JITTER

The LV58SER04 compares the input stream PCR value with the internal clock and displays the time fluctuation as the jitter value. Only the PCR jitter value for the stream being decoded is displayed.
Measurements are made to the nearest multiple of 37 ns and have a ±37 ns margin of error.

● PACKET_SIZE

The LV 58SER04 indicates the number of bytes in the TS 1 packet by displaying 188, 204, or 208.

● ASI_FORMAT

The LV 58SER04 indicates the TS packet format by displaying PACKET or BURST. PACKET indicates that the TS packet format is for sending one packet at a time. BURST indicates that the TS packet format is for sending packets in one byte bursts with stuffing data embedded between them.

10.2 Displaying the Event Log

If you press F•1 EVENT LOG on the status display menu, a log of events that have occurred on all units will be displayed.

• Procedure

STATUS → F·1 EVENT LOG

```
                                                V:0100 A:0200
    ERROR LOG LIST  SAMPLE No.=   46   << NOW LOGGING >>

    8: 2010/06/22 11:07:03 2,- NO_SIGNAL
    7: 2010/06/22 11:07:03 2,- 1080i/59.94 PCR,
    6: 2010/06/22 11:07:03 2,- 1080i/59.94
    5: 2010/06/22 11:07:02 2,- 1080i/59.94 ISDB-T_PKT_FRM,ISDB-
    4: 2010/06/22 11:06:52 3,- 1080i/59.94
    3: 2010/06/22 11:06:52 2,- 1080i/59.94
    2: 2010/06/22 11:06:52 1,B NO_SIGNAL
    1: 2010/06/22 11:06:52 1,A 1080i/59.94
```

Event number | Event date and time | Input unit | Format | Event

| | LOG START | CLEAR | LOG MODE OVER WR | | USB MEMORY | up menu |

F·1 F·2 F·3 F·4 F·5 F·6 F·7

To return to the status display menu.

To save the event log to USB memory.
See section 10.2.4, "Saving the Event Log to USB Memory"

To select the overwrite mode.
See section 10.2.3, "Setting the Event Log Overwrite Mode"

To delete the event log. See section 10.2.2, "Deleting the Event Log"

To start the event log. See section 10.2.1, "Starting Event Logging"
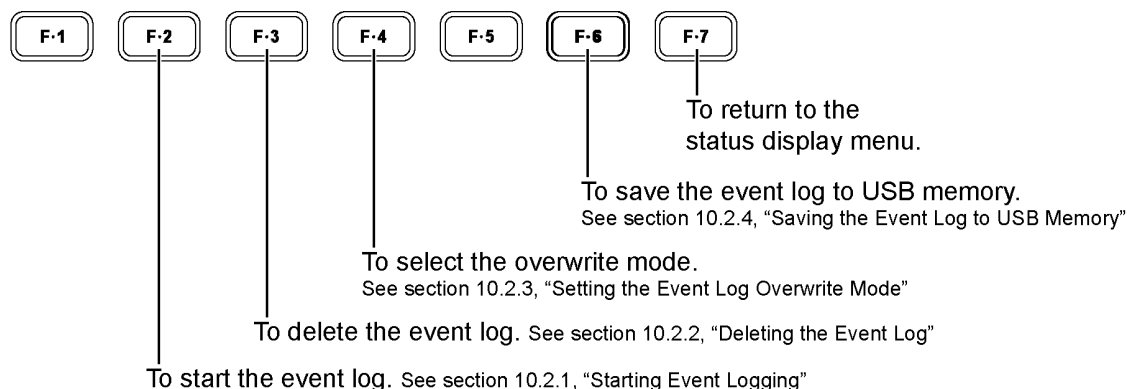
Figure 10-2   Event log menu

• General Event Log Explanation

Events are listed on the event log screen by the time of their occurrence.
By turning the function dial (F•D) to the right, you can scroll the screen to view older events in the log. Also, by pressing the function dial (F•D), you can display the latest events in the log.

• Event type

The events that are displayed on the event log screen are listed below. Of the events listed below, only the events whose error detection has been set to ON in the unit setup of the system settings are displayed.

Reference

See section 6.2, "Error Detection Setup 1," section 6.3, "Error Detection Setup 2," section 6.4, "Error Detection Setup 3."

Table 10-2   Event type

Event Name	Description
SYNC_LOSS	A TS_Sync_loss error has occurred.
SYNC_BYTE	A Sync_byte error has occurred.
CONT	A Continuity error has occurred.
PAT	A PAT error has occurred.
PMT	A PMT error has occurred.
PID	A PID error has occurred.
PCR	A PCR error has occurred.
PCR_ACC	A PCR_accuracy error has occurred.
TRANS	A Transport error has occurred.
CRC	A CRC error has occurred.
PTS	A PTS error has occurred.
CAT	A CAT error has occurred.
ISDB-T_PKT_FRM	NG has been displayed for the result of Number of Packets Frm detection.
ISDB-T PKT_N	NG has been displayed for the result of Number of Packets LN detection.
ISDB-T PKT_A	NG has been displayed for the result of Number of Packets LA detection.
ISDB-T PKT_B	NG has been displayed for the result of Number of Packets LB detection.
ISDB-T PKT_C	NG has been displayed for the result of Number of Packets LC detection.
IIP_CRC(TMCC)	NG has been displayed for the result of CRC error (TMCC) detection.
IIP_CRC(Branch)	NG has been displayed for the result of CRC error (Branch) detection.
IIP_FRM_CONT	NG has been displayed for the result of Frm Continuity detection.

• Note

• Even if multiple units are installed in the LV 5800/7800, there is only one log file.
• 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 USB memory.
• The event display is cleared when you initialize the system settings or turn the power on and off.
• Switching video formats or the signal that you are decoding may cause disturbances in the signal. This will cause errors to be displayed.

10.2.1   Starting Event Logging

Set $\boxed{\text{F•2}}$ LOG to START on the event log screen to start the event log.

• Procedure

$\boxed{\text{STATUS}}$ → $\boxed{\text{F·1}}$ EVENT LOG → $\boxed{\text{F·2}}$ LOG : START / <u>STOP</u>

10.2.2   Deleting the Event Log

Press $\boxed{\text{F•3}}$ CLEAR on the event log screen to delete the event log.

• Procedure

$\boxed{\text{STATUS}}$ → $\boxed{\text{F·1}}$ EVENT LOG → $\boxed{\text{F·3}}$ CLEAR

10.2.3   Setting the Event Log Overwrite Mode

The LV 5800/7800 can display up to 5000 events. Carry out the procedure below to select the action to perform when more than 5000 events occur.

OVER WR: Events after the 5000th event are written over the oldest logged events.
STOP: Events after the 5000th event are not logged.

• Procedure

$\boxed{\text{STATUS}}$ → $\boxed{\text{F·1}}$ EVENT LOG → $\boxed{\text{F·4}}$ LOG MODE : <u>OVER WR</u> / STOP

10.2.4   Saving the Event Log to USB Memory

To save the event log in text format to USB memory, follow the procedure below.

1.   Connect a USB memory device to the USB port.

2.   Press F•6 USB MEMORY.

The file list screen appears.
This command appears when the LV 5800 has USB memory connected to it.

```
External USB DEVICE LOG FILE LIST

     No. FileName              Date        Time      Size(Byte)
      1  log01.txt            2009/ 9/ 8   11:11:13   1172
      2  log01.txt            2009/ 9/ 8   11:11:17   1172
      3  log02.txt            2009/ 9/ 8   11:11:20   1172
      4  log03.txt            2009/ 9/ 8   11:11:26   1172




     MAX SIZE:    251906 kB
     FREE SIZE:   28096 kB

     LOG.TXT
```

| NAME
INPUT | STORE | | FILE
DELETE | FILENAME
AUTO INC
OFF | | up
menu |

Figure 10-3   File list screen

3.   Press F•1 NAME INPUT.

The file name input screen appears.

```
        0  1  2  3  4  5  6  7  8  9

        A  B  C  D  E  F  G  H  I  J

        K  L  M  N  O  P  Q  R  S  T

        U  V  W  X  Y  Z  _

        [F.D NOB] = CHAR SELECT , [F.D PUSH] = CHAR SET
        & Function Key EDIT

        LOG    STORE FILE NAME
        LOG                        . TXT
```

| CLEAR
ALL | DELETE | INSERT | <= | => | CHAR
SET | up
menu |

Figure 10-4   File name input screen

4. Enter a file name using up to 20 characters.

The key operations that you can perform on the file name input screen are as follows: Spaces are invalid. The spaces that you enter are ignored.

F·1	CLEAR ALL	:Deletes all characters
F·2	DELETE	:Deletes the character at the cursor
F·3	INSERT	:Inserts an underscore at the cursor position
F·4	<=	:Moves the cursor to the left
F·5	=>	:Moves the cursor to the right
F·6	CHAR SET	:Enters the character
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). If F•5 FILENAME AUTO INC is set to ON, a two-digit number will automatically be added to the end of the copied file name.

5. Press F•7 up menu.

6. Press F•2 STORE.

When the message "Saving file - Please wait." disappears, the file has been successfully saved.
If a file with the same name that you have specified already exists on the USB memory device, an overwrite confirmation menu appears. If you want to overwrite the existing file, press F•1 OVER WR YES. Otherwise, press F•3 OVER WR NO.

• Deleting an Event Log

To delete an event log that has been saved to USB memory, select the log file on the file list screen, 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.

• Setting File Numbering

When you set F•5 FILENAME AUTO INC on the file list screen to ON, a two-digit number (starting with 00) is automatically added to the end of the entered file name. (The default value is OFF.)
This number returns to 00 if you initialize the settings or restart the LV 5800/7800.

• USB Memory Folder Structure

Event logs are saved in the LOG folder. If there is no LOG folder on the USB memory device, the LV 5800/7800 will create a folder automatically.

🗋 USB memory
└ 🗀 LOG
　　└ 🗋 ****.TXT

10.3   Displaying the PID Tree

Press F•2 TREE DISPLAY in the status display menu to display the hierarchy of the multiplexed data in an MPEG-2 TS. This tree display does not show all of the data contained in an MPEG-2 TS. It only shows the data contained in the PAT and PMTs.

· Decoded PIDs are displayed in green.
· Up to 544 multiplexed data entries and 1024 lines can be displayed. Any additional data entries are not displayed.
· If all the data entries do not fit on one screen, you can scroll through them using the function dial (F•D). Also, if you press the function dial (F•D), the first data entry is displayed.

• Procedure

STATUS → F•2 TREE DISPLAY

```
                                              V:0100 A:0200
PID TREE DISPLAY

  ┌DVB-ASI TS-ID (7FE1)┐
  │   ├─ PAT PID (0000)              Layer( B )
  │   │   ├─ NIT PID (0010)          Layer( A )
  │   │   ├─ PMT PID (0050) Prog(0408)   Layer( B )
  │   │   │   ├─ PID (0100) MPEG2 VIDEO   Layer( B )
  │   │   │   ├─ PID (0200) AAC AUDIO     Layer( B )
  │   │   │   ├─ PID (0140) DSM-CC type D Layer( B )
  │   │   │   └─ PCR (0300)          Layer( B )
  │   │   └─ PMT PID (1FC8) Prog(0588)   Layer( A )
  │   │       ├─ PID (0400) H.264 VIDEO   Layer( A )
  │   │       ├─ PID (0500) AAC AUDIO     Layer( A )
  │   │       ├─ PID (026C) DSM-CC type D Layer( A )
  │   │       └─ PCR (0600)          Layer( A )
  │   ├─ SDT PID (0011)             Layer( A )
  │   └─ H-EIT PID (0012)           Layer( B )
```

	DUMP DISPLAY	ALL PMT DETAILS OPEN	PMT DETAIL OPEN/CLOSE		LAYER HIGHLIGHT OFF	up menu
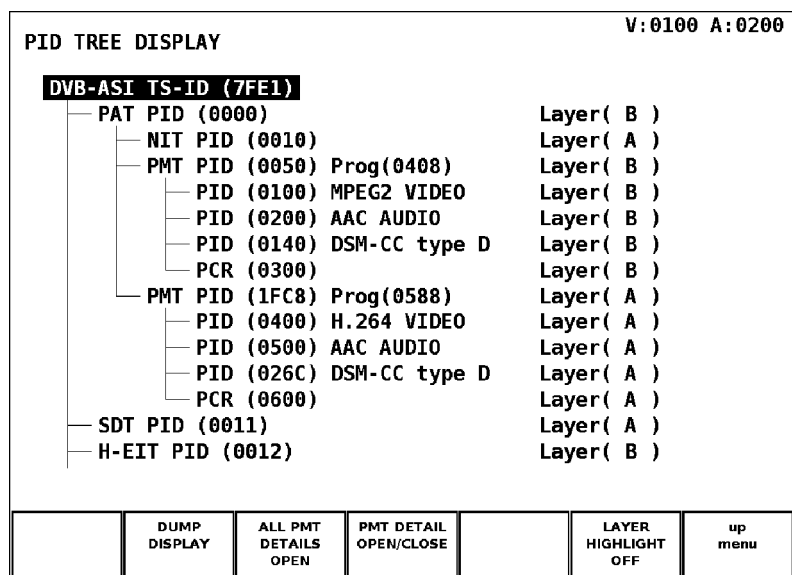
F•1   F•2   F•3   F•4   F•5   F•6   F•7

To display PMT information.
See section 10.3.2, "Displaying PMT Information."

To return to the status display menu.

To display dumped information.
See section 10.3.1, "Displaying PMT Information."

To highlight the selected layer.
See section 10.3.3, "Highlighting the Selected Layer"

Figure 10-5   PID tree display

10.3.1   Dump Display

In the PID tree display, to dump the contents of a PAT, PMT, CAT, NIT, SDT, BIT, or other packet, use the function dial (F•D) to select the packet, and then press F•2 DUMP DISPLAY.

The figure below shows an example of dumped PAT data.
The dump display is based on IEC 13818-1. If the dumped information does not fit into one screen, you can scroll through it using the function dial (F•D). Even with scrolling, you can only display up to 200 lines of dumped information.
You cannot display dumps from different sections and packets using the multi-screen display.

• Procedure

STATUS → F•2 TREE DISPLAY → F•2 DUMP DISPLAY
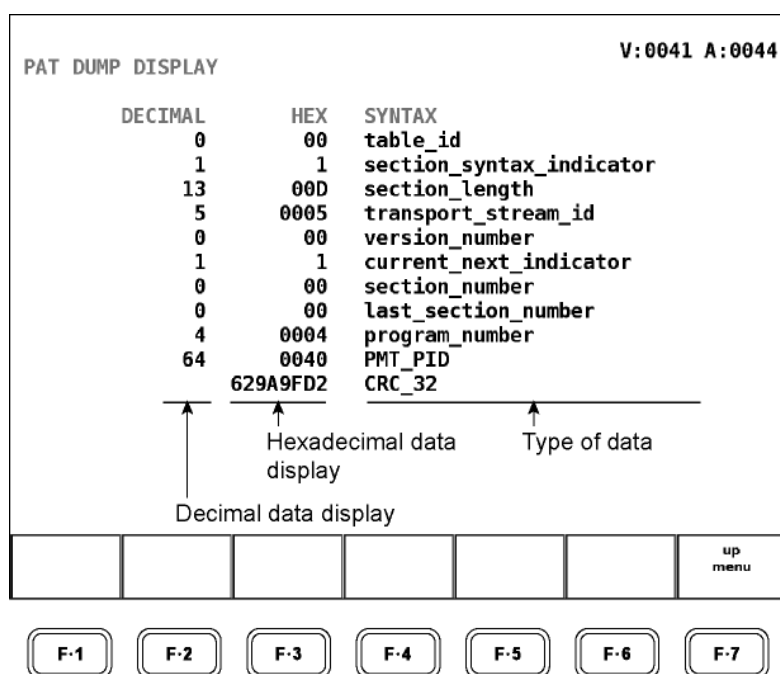
Figure 10-6   Dumped PAT data.

10.3.2 Displaying PMT Information

In the PID tree display, you can expand and display the information that is written in PMT packets (the PID and the stream type).

On the tree display screen, set F•3 ALL PMT DETAILS to OPEN to expand and display the information that is written in all PMT packets. Set it to CLOSE to collapse the information that is written in all PMT packets.

• Procedure

STATUS → F•2 TREE DISPLAY → F•3 ALL PMT DETAILS: <u>OPEN</u> / CLOSE

OPEN
```
                                        V:0100 A:0200
 PID TREE DISPLAY
  DVB-ASI TS-ID (7FE1)
   ├─ PAT PID (0000)              Layer( B )
   │   ├─ NIT PID (0010)          Layer( A )
   │   ├─ PMT PID (0050) Prog(0408)   Layer( B )
   │   │   ├─ PID (0100) MPEG2 VIDEO   Layer( B )
   │   │   ├─ PID (0200) AAC AUDIO     Layer( B )
   │   │   ├─ PID (0140) DSM-CC type D Layer( B )
   │   │   └─ PCR (0300)          Layer( B )
   │   └─ PMT PID (1FC8) Prog(0588)   Layer( A )
   │       ├─ PID (0400) H.264 VIDEO  Layer( A )
   │       ├─ PID (0500) AAC AUDIO    Layer( A )
   │       ├─ PID (026C) DSM-CC type D Layer( A )
   │       └─ PCR (0600)          Layer( A )
   ├─ SDT PID (0011)              Layer( A )
   ├─ H-EIT PID (0012)            Layer( B )
```

CLOSE
```
                                        V:0100 A:0200
 PID TREE DISPLAY
  DVB-ASI TS-ID (7FE1)
   ├─ PAT PID (0000)              Layer( B )
   │   ├─ NIT PID (0010)          Layer( A )
   │   ├─ PMT PID (0050) Prog(0408)   Layer( B )
   │   └─ PMT PID (1FC8) Prog(0588)   Layer( A )
   ├─ SDT PID (0011)              Layer( A )
   ├─ H-EIT PID (0012)            Layer( B )
   ├─ TOT PID (0014)              Layer( A )
   ├─ BIT PID (0024)              Layer( A )
   ├─ L-EIT PID (0027)            Layer( A )
   ├─ IIP PID (1FF0)              Layer( N )
   └─ NULL PID (1FFF)             Layer( N )
```

Figure 10-7   Expanded display of PMT packets

If you want to expand and display the information that is written in a single PMT packet, use the function dial (F•D) to select the PMT packet, and then press F•4 PMT DETAIL OPEN / CLOSE. Each press of this key toggles the state of the information between expanded and collapsed.

• Procedure

STATUS → F•2 TREE DISPLAY → F•4 PMT DETAIL OPEN / CLOSE

OPEN
```
                                        V:0100 A:0200
 PID TREE DISPLAY
  DVB-ASI TS-ID (7FE1)
   ├─ PAT PID (0000)              Layer( B )
   │   ├─ NIT PID (0010)          Layer( A )
   │   ├─ PMT PID (0050) Prog(0408)   Layer( B )
   │   │   ├─ PID (0100) MPEG2 VIDEO   Layer( B )
   │   │   ├─ PID (0200) AAC AUDIO     Layer( B )
   │   │   ├─ PID (0140) DSM-CC type D Layer( B )
   │   │   └─ PCR (0300)          Layer( B )
   │   └─ PMT PID (1FC8) Prog(0588)   Layer( A )
   ├─ SDT PID (0011)              Layer( A )
   ├─ H-EIT PID (0012)            Layer( B )
   ├─ TOT PID (0014)              Layer( A )
   ├─ BIT PID (0024)              Layer( A )
   ├─ L-EIT PID (0027)            Layer( A )
   ├─ IIP PID (1FF0)              Layer( N )
```

CLOSE
```
                                        V:0100 A:0200
 PID TREE DISPLAY
  DVB-ASI TS-ID (7FE1)
   ├─ PAT PID (0000)              Layer( B )
   │   ├─ NIT PID (0010)          Layer( A )
   │   ├─ PMT PID (0050) Prog(0408)   Layer( B )
   │   └─ PMT PID (1FC8) Prog(0588)   Layer( A )
   ├─ SDT PID (0011)              Layer( A )
   ├─ H-EIT PID (0012)            Layer( B )
   ├─ TOT PID (0014)              Layer( A )
   ├─ BIT PID (0024)              Layer( A )
   ├─ L-EIT PID (0027)            Layer( A )
   ├─ IIP PID (1FF0)              Layer( N )
   └─ NULL PID (1FFF)             Layer( N )
```

Figure 10-8   Expanded display of an individual PMT packet

10.3.3   Highlighting the Selected Layer

If an ISDB-T signal is being applied, the layer that the data is multiplexed in (Layer A, B, C, or N) is shown on the PID tree display. Follow the procedure below to highlight all the entries that are from the same layer as the layer that you have selected. (All entries from other layers will be displayed in gray.)

• Procedure

STATUS → F•2 TREE DISPLAY → F•6 LAYER HIGHLIGHT: LAYER N / LAYER A /
LAYER B / LAYER C / OFF

```
                                          V:0100 A:0200
PID TREE DISPLAY
                              Hilight Layer( A )
    DVB-ASI TS-ID (7FE1)
      ─ PAT PID (0000)              Layer( B )
          ─ NIT PID (0010)          Layer( A )
          ─ PMT PID (0050) Prog(0408)   Layer( B )
              ─ PID (0100) MPEG2 VIDEO  Layer( B )
              ─ PID (0200) AAC AUDIO    Layer( B )
              ─ PID (0140) DSM-CC type D  Layer( B )
              ─ PCR (0300)          Layer( B )
          └─ PMT PID (1FC8) Prog(0588)   Layer( A )
              ─ PID (0400) H.264 VIDEO  Layer( A )
              ─ PID (0500) AAC AUDIO    Layer( A )
              ─ PID (026C) DSM-CC type D  Layer( A )
              └─ PCR (0600)          Layer( A )
      ─ SDT PID (0011)              Layer( A )
      ─ H-EIT PID (0012)            Layer( B )
```

Figure 10-9   Highlighted display of Layer A

10.4 Bit Rate Display

Press F•3 BITRATE DISPLAY in the status display menu to display the bit rate and transmission intervals of a section or of the stream. You can display the bit rat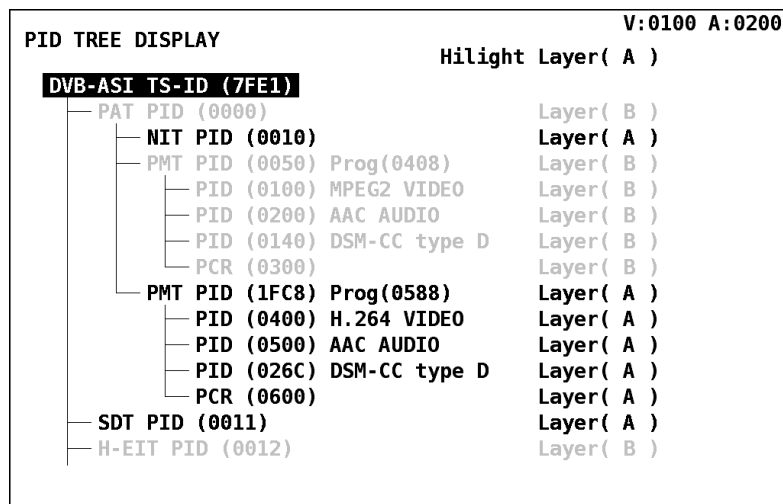es for the NIT, the CAT, the PAT, or the PMT. You can also display the bit rates of the TS, null packets, and packets that contain PCRs. All bit rates are displayed in a numeric display and in a bar graph display on the right side of the screen. The bar graph shows bit rates as a percentage of the TS bit rate.

The bit rate display also contains the maximum and average intervals between various kinds of packets, such as those contained in sections and PCRs. The intervals between null packets and the intervals of the audio and video streams being decoded are not displayed.

• Procedure

STATUS → F•3 BITRATE DISPLAY

Maximum section and PCR transmission intervals

Average section and PCR transmission intervals

PID bit rates

```
                                              V:0100 A:0200
BIT RATE DISPLAY (DECODE COMPONENT)

               CYCLE    CYCLE      BIT RATE      50%      100%
               MAX(ms)  AVE(ms)    (Mbps)
TS                                 32.5078
NULL   (1FFF)                      17.6705
NIT    (0010)   1013     1000       0.0016
CAT    (----)                                  Bar graph
PAT    (0000)    104      100        0.0163    of bit rates

(DECODE)
PMT    (0050)    104       99        0.0163
PCR    (0300)     68       66        0.0245
VIDEO  (0100)                       14.0686
AUDIO  (0200)                        0.2381
```

Section and stream PIDs (in hexadecimal or decimal)

Type of section or stream

CYCLE RESET	SCALE MAX 100 %			DISPLAY DECODE	LAYER HIGHLIGHT OFF	up menu

F·1 F·2 F·3 F·4 F·5 F·6 F·7

To select the bit rate scale.
See section 10.4.2, "Selecting the Bit Rate Scale"

To return to the status display menu.

To highlight the selected layer.
(This setting is available when DISPLAY is set to ALL PID.)
See section 10.4.4, "Highlighting the Selected Layer"

To initialize interval measurement.
See section 10.4.1, "Initializing Interval Measurement"

To select the bit rates that are displayed.
See section 10.4.3, "Selecting the Bit Rates That Are Displayed"

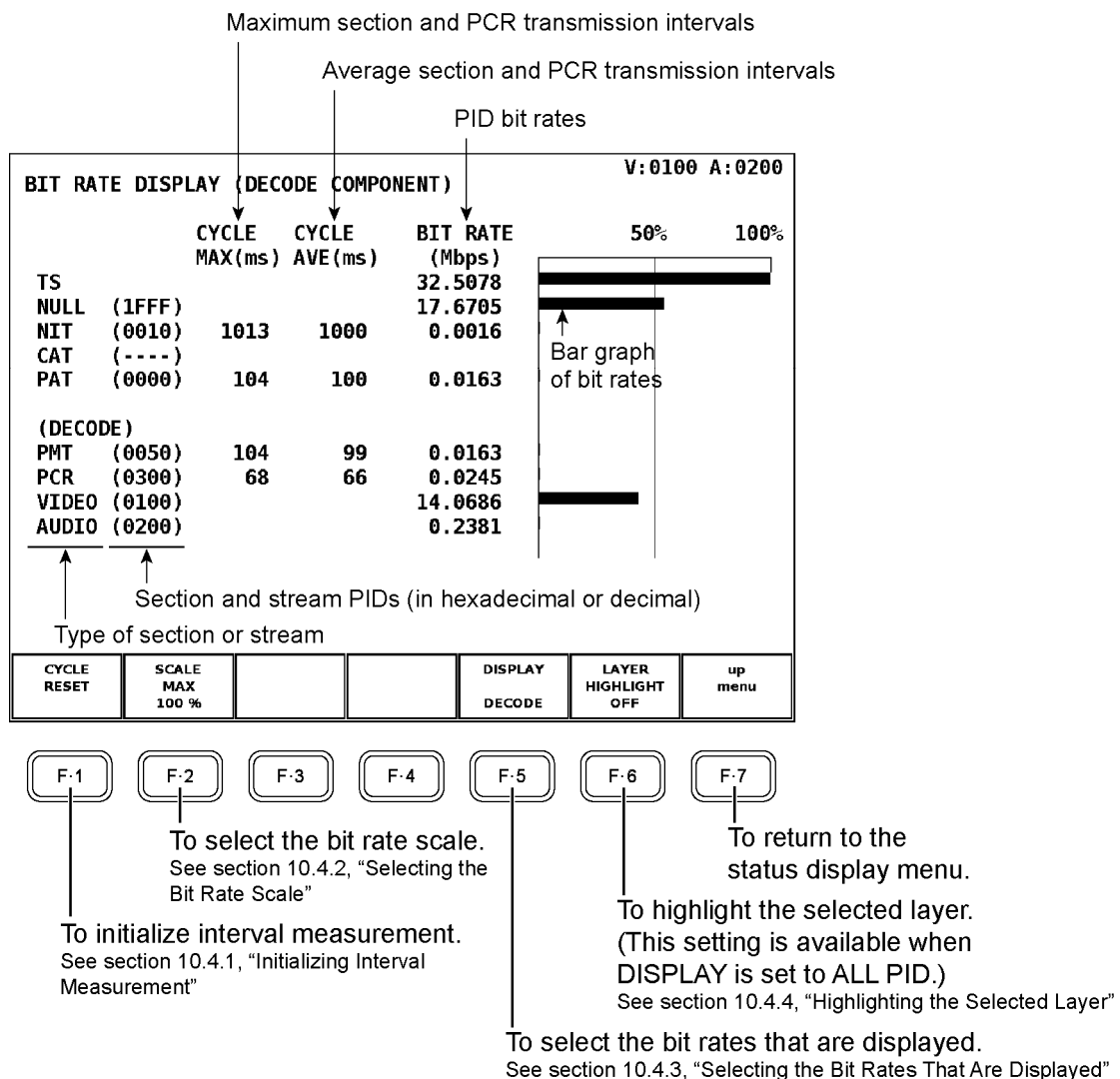Figure 10-10   Bit rate display

10.4.1 Initializing Interval Measurement

Press F•1 CYCLE RESET in the bit rate display to initialize interval measurement.

• Procedure

STATUS → F•3 BIT RATE DISPLAY → F•1 CYCLE RESET

10.4.2 Selecting the Bit Rate Scale

The bit rate bar graph shows values as a percentage of the TS bit rate. You can change the scale of the bar graph so that, even when the bit rates are low, you can see the approximate values from the bar graph. To change the scale, follow the procedure below. The bar graph is normally displayed in green, but any bars whose values exceed the upper limit of the scale are displayed in red.

• Procedure

STATUS → F•3 BITRATE DISPLAY → F•2 SCALE MAX: <u>100%</u> / 50% / 20% / 10% / 2%

```
100%                                          2%
                          V:0100 A:0200                               V:0100 A:0200
BIT RATE DISPLAY (DECODE COMPONENT)           BIT RATE DISPLAY (DECODE COMPONENT)

           CYCLE   CYCLE    BIT RATE  50%  100%              CYCLE   CYCLE    BIT RATE   1%    2%
           MAX(ms) AVE(ms)  (Mbps)                           MAX(ms) AVE(ms)  (Mbps)
TS                          32.5078               TS                          32.5078
NULL (1FFF)                 17.6705               NULL (1FFF)                 17.6982
NIT  (0010)  1013    1000    0.0016               NIT  (0010)  1020    1001    0.0016
CAT  (----)                                       CAT  (----)
PAT  (0000)   104     100    0.0163               PAT  (0000)   105      99    0.0163

  (DECODE)                                          (DECODE)
PMT  (0050)   104      99    0.0163               PMT  (0050)   106     100    0.0163
PCR  (0300)    68      66    0.0245               PCR  (0300)    69      66    0.0245
VIDEO (0100)                14.0686               VIDEO (0100)                14.0685
AUDIO (0200)                 0.2381               AUDIO (0200)                 0.2337
```
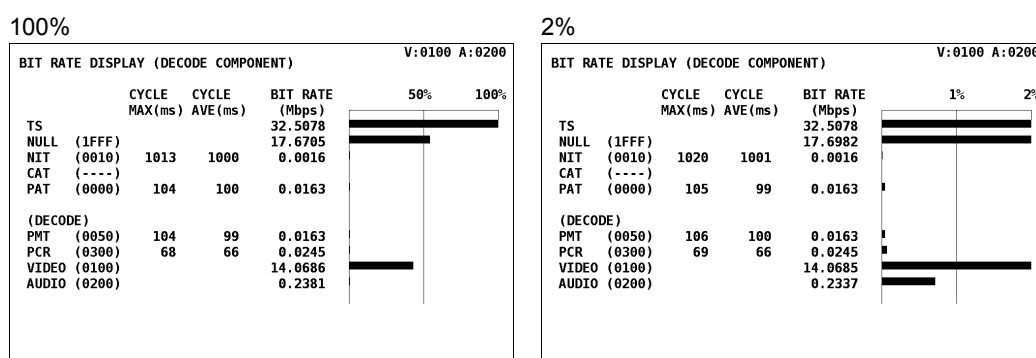
Figure 10-11   Bar graph display

10.4.3 Selecting the Bit Rates That Are Displayed

Follow the procedure below to display the bit rates of the PIDs that are being decoded or the bit rates of all the PIDs. When you select to display the bit rates of all the PIDs:
· The transmission interval is not displayed.
· Decoded PIDs are displayed in green.
· Up to 128 lines of data entries can be displayed in order by PID. Any additional data entries are not displayed.
· If all the data entries do not fit on one screen, you can scroll through them using the function dial (F•D). Also, if you press the function dial (F•D), the first data entry is displayed.

• Procedure

STATUS → F•3 BITRATE DISPLAY → F•5 DISPLAY: <u>DECODE</u> / ALL PID

DECODE

```
BIT RATE DISPLAY (DECODE COMPONENT)         V:0100 A:0200

                CYCLE   CYCLE    BIT RATE     50%    100%
               MAX(ms) AVE(ms)   (Mbps)
TS                              32.5078
NULL  (1FFF)                    17.6705
NIT   (0010)   1013    1000      0.0016
CAT   (----)
PAT   (0000)    104     100      0.0163

(DECODE)
PMT   (0050)    104      99      0.0163
PCR   (0300)     68      66      0.0245
VIDEO (0100)                    14.0686
AUDIO (0200)                     0.2381
```

ALL PID

```
                                            V:0100 A:0200
BIT RATE DISPLAY (ALL PID)

PID    TYPE            BIT RATE     50%    100%
                       (Mbps)
       TS              32.5078
1FFF   NULL            17.6119

0000   PAT              0.0163
0010   NIT              0.0016
0011   SDT              0.0008
0012   H-EIT            0.0073
0014   TOT              0.0003
0024   BIT              0.0016
0027   L-EIT            0.0055
0050   PMT              0.0163
0100   MPEG2 VIDEO     14.0673
0140   DSM-CC type D    0.1157
0200   AAC AUDIO        0.2368
```

Figure 10-12   Selecting the bit rates that are displayed

10.4.4   Highlighting the Selected Layer

If an ISDB-T signal is being applied and [F•5] DISPLAY is set to ALL PID, follow the procedure below to highlight the layer that you have selected. (All entries from other layers will be displayed in gray.)
This menu does not appear when [F•5] DISPLAY is set to DECODE.

• Procedure

[STATUS] → [F•3] BITRATE DISPLAY → [F•6] LAYER HIGHLIGHT: LAYER N / LAYER A / LAYER B / LAYER C / OFF

```
                                         V: 256 A: 512
BIT RATE DISPLAY (ALL PID)

PID    TYPE            BIT RATE      50%        100%
Hilight Layer( A )     (Mbps)
       TS              32.5078
8191   NULL            17.6551

   0   PAT              0.0163
  16   NIT              0.0016
  17   SDT              0.0008
  18   H-EIT            0.0078
  20   TOT              0.0003
  36   BIT              0.0013
  39   L-EIT            0.0054
  80   PMT              0.0163
 256   MPEG2 VIDEO     14.0683
 320   DSM-CC type D    0.0756
 512   AAC AUDIO        0.2324
```

Figure 10-13   Highlighted display of Layer A

10.5   Displaying ISDB-T Broadcast Transport Streams

From the status display menu, press F•5 ISDB-T DISPLAY to analyze and display ISDB-T broadcast transport streams. The input signal must meet the standards listed in the following table for analysis and display to be carried out successfully. Any values in the input signal that are outside of the standards are displayed in yellow.
If you do not turn error detection on for Number of Packets, Frm Continuity, and CRC errors on the unit setup's ERROR SETUP3 tab, the results—OK or NG (no good; displayed when an error is detected)—are not displayed.

Reference

   For more information on error detection setup 3, see section 6.4, "Error Detection Setup 3."

• Procedure

STATUS → F•5 ISDB-T DISPLAY

```
                                          V:0100 A:0200
 ISDB-T TS STATUS
                            < Number of Packets >
  Packet Size   204 Byte    Frm Packets   (4608)  OK
  TS Bit Rate   32.5078 Mbps LA Packets   (  64)  OK
                            LB Packets    (2592)  OK
  IIP Packet    Detected     LC Packets   (   0)  OK
  ISDB-T Info   Detected     LN Packets   (1952)  OK

                            Frm Continuity        OK
                            CRC error (TMCC)       OK
                            CRC error (Branch)     OK




   ┌──────────┬──────────┬──────┬──────┬──────┬──────┬──────────┐
   │   TMCC   │   SFN    │      │      │      │      │    up    │
   │interpreted│interpreted│     │      │      │      │   menu   │
   └──────────┴──────────┴──────┴──────┴──────┴──────┴──────────┘
```

(F·1) (F·2) (F·3) (F·4) (F·5) (F·6) (F·7)

To display the SFN information.   To return to the
See section 10.5.2, "Displaying SFN Information"   status display menu.

To display the TMCC information.
See section 10.5.1, "Displaying TMCC Information"
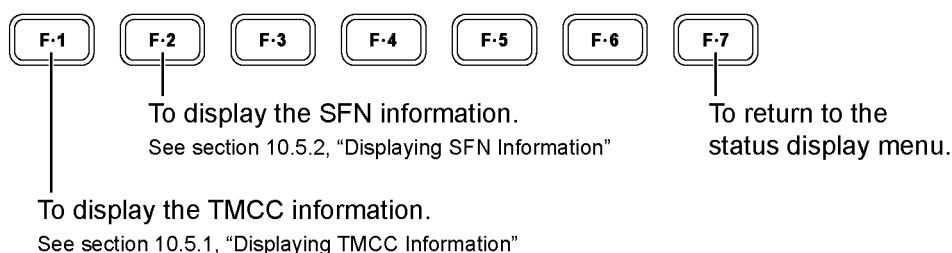
Figure 10-14   ISDB-T TS display

Table 10-3　Explanation of the ISDB-T TS screen

Item	Standards	Description
Packet Size	204 Byte	Displays the packet size.
TS Bit Rate	32.5079±0.0005 Mbps	Displays the ISDB-T TS bit rate.
IIP Packet	1ff0h	Displays the IIP packet detection result.
ISDB-T Info	-	Displays the ISDB-T information detection result.
Frm Packets	-	The value in the parentheses represents the number of packets
LA Packets	-	in a single frame. It is displayed for each layer. This number of
LB Packets	-	packets is a theoretical value that is calculated from the input
LC Packets	-	signal. If this value matches the actual number of packets that
LN Packets	-	are counted by the LV 58SER04, OK is displayed.
Frm Continuity	-	The LV 58SER04 examines the continuity of the ISDB-T information section's TSP counter. If it is not continuous, NG is displayed.
CRC error (TMCC)	-	Displays the result of checking the CRC of the IIP packet's TMCC information section.
CRC error (Branch)	-	Displays the result of checking the CRC of the IIP packet's network synchronization section.

10.5.1　Displaying TMCC Information

Follow the procedure below to analyze and display the syntax of IIP packets.
Press F•1 TMCC to switch the displayed information between the current information and the next information. When you are using the 2-screen display, both the current and next information are displayed at the same time. In this situation, F•1 TMCC is not available.

• Procedure

STATUS → F•5 ISDB-T DISPLAY → F•1 TMCC interpreted → F•1 TMCC: <u>CURRENT</u> / NEXT

```
    IIP INTERPRETED DISPLAY                    V:0100 A:0200
     modulation control configuration


       Syntax              Layer A     Layer B     Layer C

    TMCC(current)
      Partial Reception               ON
      Mode                            3
      Guard Interval                  1/8

      Modulation Scheme   QPSK        64QAM       Reserved
      Coding Rate         2/3         3/4         Reserved
      Interleave           4           2          Reserved
      Segments             1          12          Reserved

      AC Data Pos                     Dummy Byte Area
      Systsm Identifier               Television
      Sw On Ctrl Flag                 OFF
      CRC32                           EF2FF7A5




     TMCC                                         up
                                                  menu
     CURRENT
```

Figure 10-15　TMCC information display

Table 10-4 Explanation of the TMCC screen

Item	Description
Partial Reception	Displays whether partial reception is ON or OFF
Mode	Displays the mode
Guard Interval	Displays the guard interval
Modulation Scheme	Displays the carrier modulation scheme for each layer
Coding Rate	Displays the convolutional code rate for each layer
Interleave	Displays the time-interleaving length for each layer
Segments	Displays the number of segments for each layer
AC Data Pos	Displays the position where AC data is multiplexed
System Identifier	Displays the TMCC identifier
Sw On Ctrl Flag	Displays whether the emergency broadcast system flag is ON or OFF
CRC32	Displays the CRC value that is used in ISO/IEC13818-1

10.5.2 Displaying SFN Information

Follow the procedure below to analyze the SFN information of the IIP packet and display the dump of the result. If all the data entries do not fit on one screen, you can scroll through them using the function dial (F•D). Also, if you press the function dial (F•D), the first data entry is displayed.

• Procedure

STATUS → F•5 ISDB-T DISPLAY → F•2 SFN interpreted

```
                                      V:0100 A:0200
   IIP INTERPRETED DISPLAY
    network synchronization information

      Branch No.                   0
      Last Branch No.              0
      Equip Info Count            29
      Sync ID                     00
      Sync Time Stamp       785.7075 ms
      Max Delay             500000000 ns
      Equip ID                     1
      Renewal Flag                 1
      Static Delay Flag           ON
      Time Offset Polarity    NEGATIVE
      Time Offset             0.0014 ms
      Equip ID                     2
      Renewal Flag                 1
      Static Delay Flag           ON
      Time Offset Polarity    NEGATIVE




                                              up
                                             menu
```

Figure 10-16   TMCC information display

11. FARMWARE REVISION HISTORY

This manual was written for the following firmware versions:
• Ver. 6.8 on the LV 5800
• Ver. 1.4 on the LV 7800
To check the version number, press $\boxed{\text{SYS}}$ → $\boxed{\text{F•5}}$ SYSTEM INFORMATION.

● Ver. 6.5 on the LV 5800 / Ver. 1.4 on the LV 7800
  • An event log feature has been added to the LV 58SER04.

  * If your LV 58SER04 is installed in an LV 5800 or LV 7800, you must have LEADER update the firmware.
  Contact your local LEADER agent.

● Ver. 6.3 on the LV 5800 / Ver. 1.3 on the LV 7800
  • Added a feature to the LV 58SER04 that enables the TS tree structure to display up to 544 entries.
  • Added an ISDB-T broadcast TS analysis feature to the LV 58SER04.
  • Added a bit rate measurement feature for all PIDs (up to 128 PIDs) to the LV 58SER04.
  • Added ECM and EMM analysis features to the LV 58SER04.

● Ver. 5.9 on the LV 5800 / Ver. 1.1 on the LV 7800
  • The LV 58SER04 can now display PIDs in decimal (DEC).
  • A histogram display feature has been added to the picture display of the LV 58SER04.
  • PACKET_SIZE has been added to the LV 58SER04 status display.
  • ASI_FORMAT has been added to the LV 58SER04 status display.
  (for LV 58SER04 FPGA versions 0121 and later, CPU(D) versions 0102 and later, and CPU(A) versions 0104 and later).

● Ver. 5.4 on the LV 5800
  • MULTI has been added to the waveform colors for the video signal waveform display for the LV 58SER04 (when using the single display).
  • ACTIVE has been added to SWEEP MAG for the video signal waveform display for the LV 58SER04 (when using the pseudo-composite display).

● Ver. 4.7 on the LV 5800
  • Added the ability to set the LV 58SER04 video signal waveform and vector display colors to WHITE or GREEN.
  • Added five types of scales for the LV 58SER04 that you can select when the video signal waveform is displayed using RGB or GBR. The added scales are:
  1. 150 % full scale
  2. 8-bit decimal scale with a maximum value of 255
  3. 8-bit hexadecimal scale with a maximum value of FF
  4. 10-bit decimal scale with a maximum value of 1023
  5. 10-bit hexadecimal scale with a maximum value of 3FF

● Ver. 3.7 on the LV 5800
  • Added LV 58SER04 compatibility.

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所含有毒有害物质信息

部件号码：LV 58SER04

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

产品中有毒有害物质或元素的名称及含量

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

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

Ver.2