ASTRO

Programmable Video Signal Generator

VG-880

Instruction Manual

Ver 1.10

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ASTRODESIGN,Inc

CONTENTS

BEFORE OPERATION

INTRODUCTION

Thank you very much for purchasing this model VG-880 video signal generator.

This manual contains details on the operation procedures to be followed when the VG-880 is used, the checkpoints and precautions to be observed, and so on. Improper handling may result in malfunctioning so before using the VG-880, please read through these instructions to ensure that you will operate the generator correctly.
After reading through the manual, keep it in a safe place for future reference.

SAFETY PRECAUTIONS

⚠ WARNING

Concerning the generator

- **Do not subject the generator to impact or throw it. Doing so may cause the generator to malfunction, explode or generate abnormally high levels of heat, possibly resulting in a fire.**
- **Do not use the generator where there is a danger of ignition or explosions.**
- **Do not place the generator inside a microwave oven or other heating kitchen appliance or inside a high pressure vessel. Doing so may heat up the generator to abnormally high levels, cause smoking, running the risk of the generator's catching fire and/or damaging the circuit components.**
- **This generator contains some high-voltage parts. If you touch them, you may receive an electric shock and burn yourself so do not attempt to disassemble, repair or remodel the generator.**
- **If there is a thunderstorm while the generator is being used outdoors, immediately turn off its power, disconnect the power cable from the main unit, and move the generator to a safe place.**

Concerning the power cord

- **Always take hold of the molded part of the plug when disconnecting the power cord.**
- **Do not use force to bend the power cord or bunch it up for use. Doing so may cause a fire.**
- **Do not place heavy objects on top of the power cord. Doing so may damage the cord, causing a fire or electrical shock.**

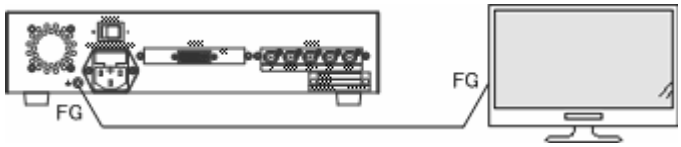
Concerning foreign matter

- **Do not spill liquids inside the generator or drop inflammable objects or metal parts into it. Operating the generator under these conditions may cause a fire, electric shocks and/or malfunctioning.**

⚠ CAUTION

Concerning the generator

- **When connecting the VG-880 to a display unit, use the FG cable provided to connect the frame ground (FG) terminal on the VG-880 to the frame ground terminal on the display unit. If the FG cable is not connected at both ends, the extremely high-cost parts (such as the output digital-to-analog converter) of the VG-880 may fail. Take special care when connecting the generator to a display unit which is under development.**



- **When disconnecting the VG-880 from the display unit, first disconnect the connecting cables, and then disconnect the FG cable.**
- **When the generator's power is to be turned ON or OFF, be absolutely sure to use the POWER switch on the rear panel. Turning the power on and off by plugging in and unplugging the AC power cable may damage the CF card.**
- **When priority is to be given to accuracy, do not start using the generator straight away: instead, turn on the power of the VG-880 and allow it to warm up for about 10 to 15 minutes before use so as to ensure that the VG-880 is ready to operate stably.**

Concerning impact

- **This is a precision instrument and, as such, subjecting it to impact may cause malfunctioning. Take special care when moving the generator.**
- **Do not drop the generator.**

Concerning installation

- **Install the generator in a stable location. Do not stand it on either of its side panels. Doing so may cause the generator's temperature to rise due to heat generation, possibly resulting in malfunctioning.**

When trouble or malfunctioning has occurred

- **In the unlikely event that trouble or malfunctioning should occur, disconnect the generator's power cable, and contact your dealer or an ASTRODESIGN sales representative.**

CONCERNING THE CONFIGURATION OF THIS MANUAL

This manual is the instruction manual for the VG-880. In the configuration presented below, it contains details on the operating procedures, checkpoints, etc. Please take the time to read through the manual prior to use to ensure that the generator will be operated properly.

● Please read this first!

BEFORE OPERATION
This section contains the safety precautions, and a description of how the manual is configured and what is packed with the generator.

Chapter 1 CONCERNING THE VG-880
A general description of the VG-880 is given in this chapter.

Chapter 2 OPERATING PROCEDURES
The basic operation procedures using the VG-880 main unit are given in this chapter.

● Detailed settings (timing data, pattern data)

Chapter 3 TIMING DATA CONFIGURATION AND SETTING PROCEDURES
This chapter gives an outline of the timing data.

Chapter 4 PATTERN DATA CONFIGURATION AND SETTING PROCEDURES
This chapter gives an outline of the pattern data.

● Other

Chapter 5 GENERAL DESCRIPTION OF SP-8870 SOFTWARE
A general description of the SP-8870 software is given in this chapter.

Chapter 6 REMOTE CONTROL
The RB-614C, RB-649 and RB-1848 remote control boxes are described in this chapter.

Chapter 7 REFERENCE
This chapter provides details on the internal data and other reference information.

Chapter 8 SPECIFICATIONS AND CHECKPOINTS
The VG-880's specifications and checkpoints are contained in this chapter.

Chapter 9 LIST OF ERROR MESSAGES
Tables of the VG-880 error messages are given in this chapter.

What is packed with the generator

The generator comes with the following items.

Be absolutely sure to use only the genuine accessories which are supplied with this generator since the use of any non-designated items may cause malfunctioning.

■ Standard accessories

- VG-880 main unit
- VG-880 instruction manual (what you are now reading): 1 copy
- CompactFlash (CF) card: 1 pc
- SP-8870 software installation CD (for Windows): 1 pc
- SP-8870 instruction manual: PDF version (packed with the SP-8870 software installation CD)
- Power cable: 1 pc
- FG cable (1.5 meters long): 1 pc

■ Optional accessories

- RB-1848
- RB-614C
- RB-649
  Remote control box used with the VG series
  When one of these boxes is connected to the VG-880, programs can be called by their numbers, the character, dot, crosshatch and other pattern data can be turned ON or OFF, and the RGB signals can be switched ON or OFF.
- VG series terminal command instruction manual
  The generators in the VG series can be operated using the dedicated terminal commands from an external computer (such as a PC). The commands and data are received and sent though the RS-232C interface.

1 CONCERNING THE VG-880

1.1 General description

The VG-880 portable video signal generator designed for digital TV applications can be used to best advantage in many different areas of the test and measurement of displays. Not only can it supply DVI outputs, LVDS outputs and analog component outputs (BNC connectors) but it can also output ramp patterns up to 16 bits each for R, G and B. Color difference signals and tri-level sync signals are also supported for the analog component outputs. The output signals which support CRT, LCD, PDP, digital TV and many other kinds of displays can be used for the development of technology, on production lines and for inspection, maintenance and other such purposes related to video-related equipment.

Timing, patterns and other data can be edited and set using the SP-8870 application software. It is also possible for users to create their own special patterns and register natural images.

1.2 Features

- **All-in-one model**
  The DVI outputs, LVDS outputs and analog component outputs can all be supplied from this generator with a compact body. There is no need for any adapters, etc.

- **Wide dot clock frequency range**
  Dot clock frequencies are supported from 25 to 165 MHz for DVI Single Link outputs, 50 to 300 MHz--or 25 to 150 MHz during 9-bit to 16-bit output--for DVI Dual Link outputs, 8 to 160 MHz for LVDS Single Link outputs, 16 to 300 MHz for LVDS Dual Link outputs, and 5 to 165 MHz for analog component outputs.

- **Speedy support for new interfaces**
  The hardware configuration features individual slots so that new interfaces can be supported speedily. (Up to two output slots are provided as the standard specification when the generator is shipped.)

- **Program data registered on a CF card or in the main unit's internal memory**
  Up to 1,000 sets of program data can each be registered on a CF card or in the main unit's internal memory. PC screens or natural images can also be registered. On a notebook PC or other PC equipped with a PC card slot, the data can be copied using Explorer provided with Windows 2000 or Windows XP.

- **Creation of optional patterns**
  In addition to the conventional basic patterns (15 types including character, crosshatch, color bar and gray scale) and optional patterns (up to 200 types can be incorporated), a function that allows users to create their own optional patterns has been added. This function makes it possible to create the optional patterns which are useful for developing and evaluating the next-generation displays.

- **Sample data incorporated inside**
  A total of 1000 types of timing data and 1000 types of pattern data are registered inside the VG-880 as sample data. They can be combined in any way, and the resulting signals output. They come in handy when a CF card is not being used. The sample data can also be used when editing program data.

- **Windows-compatible editing and registration software (SP-8870) provided as standard accessory**
  This software, which runs in Windows, can be used to edit and register the program data and exercise control over the signal output.
  For details of the operating environment, refer to "5.2 Operating environment."

1.3 Data configuration

The data output by the VG-880 is managed by the program data.

The program data consists of the pattern data which is used to set the data relating to the output images and the timing data which is used to set the data relating to all other output timing data and output conditions.

Table 1.3.1 Program data block configuration

Block		Description
Valid/invalid		Program data valid/invalid
Timing data	H-Timing	Horizontal timing
	V-Timing	Vertical timing
	OUTPUT	Output condition
	Program NAME	Program name
Pattern data	Pattern Select	Pattern select
	Graphic Color	Graphic color
	CHARA	Character pattern
	CROSS	Crosshatch pattern
	DOTS	Dot pattern
	CIRCLE	Circle pattern
	COLOR	Color bar pattern
	GRAY	Gray scale pattern
	BURST	Burst pattern
	WINDOW	Window pattern
	OPT	Optional pattern
	CURSOR	Cursor pattern
	Pattern NAME	Pattern name
	ACTION	Pattern action

Several types of program data, optional patterns and user character patterns are contained in the VG-880 main unit as sample data.

These types of data can be output as is for use or they can be used as the source data when data is to be registered on a CF card. (* The internal data can be changed temporarily, but the changes cannot be saved. On the other hand, data copied onto a CF card can be edited or saved.)

Table 1.3.2 Number of internal sample data

	Number of data
Program data	580 (1001 to 2000) For further details, refer to “7.1.1 Program data.”
Optional patterns	65 (1 to 65)
User character patterns	16 (F0H to FFH)

Table 1.3.3 Number of data which can be registered on a CF card

	Number of data	
Program data	1000 (1 to 1000)	
Optional patterns	200 (1 to 200)	
Optional patterns (image data)	200 (1 to 200) * Number of data depends on the image data size and card capacity.	
User character patterns	16 (E0H to EFH)	
Number of characters in program names	20 characters	
Number of groups	99 (1 to 99)	* For details on groups, refer to “1.4 Concerning groups”
Number of group data	98 (1 to 98)	
Number of characters in group names	20 characters	

*1: When a CF card has been inserted, the data registered on that card becomes valid, and the data registered in the internal memory becomes invalid. In the case of image data, both the data on a CF card and the data in the internal memory can be made valid. For further details, refer to “7.1.10 Image priority settings” in the operating instructions of the SP-8870 application software.

1.4 Concerning groups

A “group” refers to a program data table in which the user can register any program data. It is also possible to select data of one program number for the timing data and another program number for the pattern data.

The data is output on a group by group basis, and so by registering only the data required, operating ease is enhanced in cases where multiple program data is to be output.

The data relating to groups is stored on the PC cards.

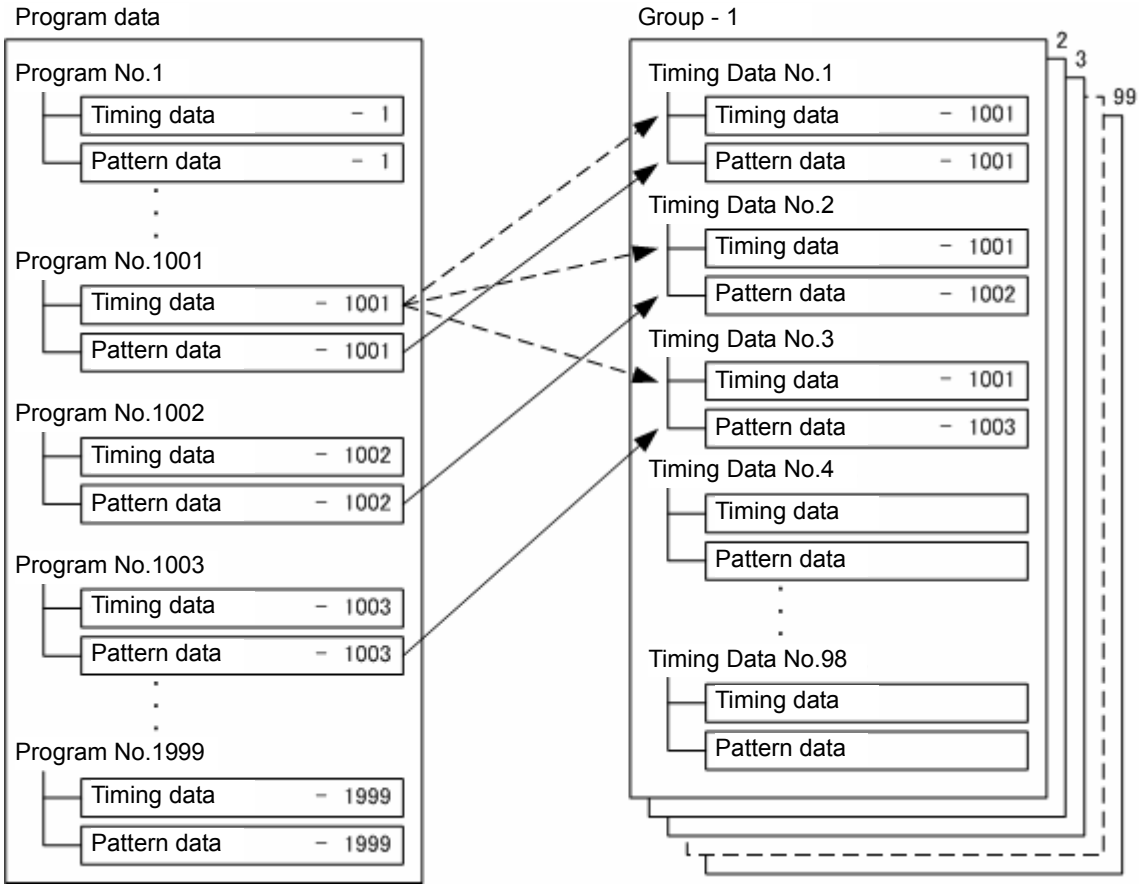
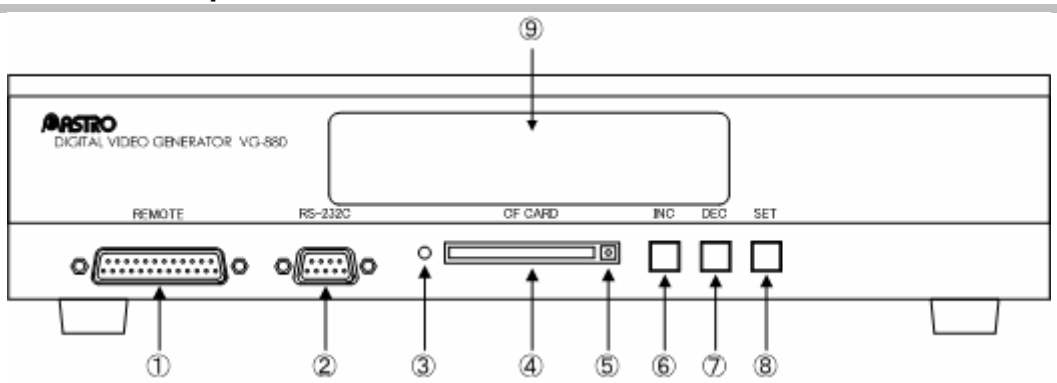


Fig. 1.4.1 Configuration of a group

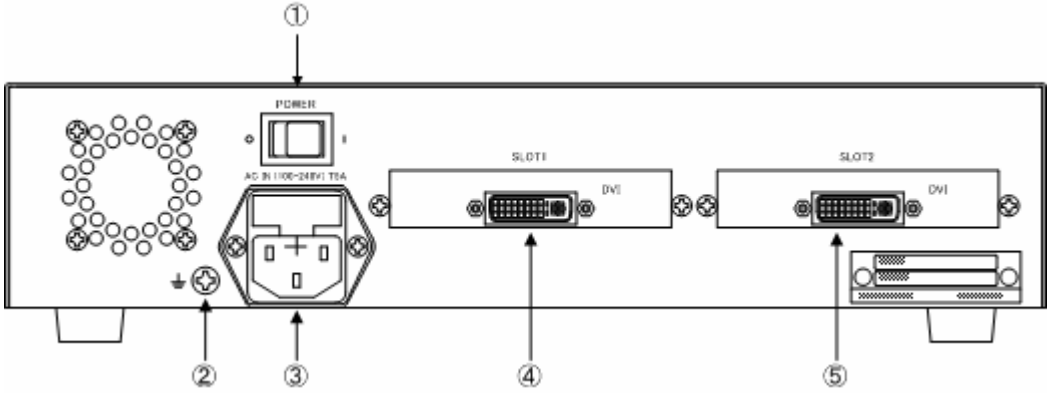
1.5 Panel parts and their functions

1.5.1 VG-880 front panel



(1)	Remote connector (25-pin female)	This is used to connect an optional remote control box (RB-1848, RB-649 or RB-614C) to operate the generator by remote control.
(2)	RS-232C connector (9-pin male)	This is used to connect a personal computer using an RS-232C cable.
(3)	LED	This lights when a CF card is inserted, and it goes off when the card is ejected. It blinks while the data on a CF card is being accessed.
(4)	CF card slot	Insert the CF card here. To eject it, press the EJECT button on the right of the slot.
	CAUTION Always handle the CF cards very carefully. When inserting or ejecting a CF card, follow the steps in “2.11 How to insert and eject the CF cards.” If the wrong steps are taken, the data on the CF card may be destroyed, and the CF card may no longer be recognized even when it is re-inserted.	
(5)	EJECT button	Use this to eject the CF card.
(6)	[INC] key	This increments the program numbers by 1 (+1).
(7)	[DEC] key	This decrements the program numbers by 1 (-1).
(8)	[SET] key	This key is used to execute the functions and program data.
(9)	LCD	The menu settings, program numbers, timing data, etc. appear here. (Two lines each containing 24 characters are displayed.)

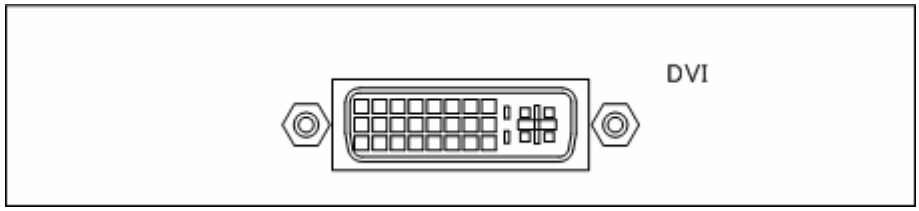
1.5.2 VG-880 rear panel



(1)	POWER switch	Use this to turn the generator's power ON and OFF.
(2)	Frame ground (FG)	Connect this frame ground terminal to the frame ground terminal of the unit which is connected to the VG-880.
(3)	AC input socket	One end of the power cable is connected here. A voltage from 100 V to 120 V or 200 V to 240 V is supported.
	CAUTION The POWER switch must always be used to turn the generator's power on and off. Turning the power on and off by plugging in and unplugging the AC power cable may damage the PC card.	
(4)	Output I/F (slot 1)	Select whether the DVI output or analog component output is to be supplied to each of these slots. * In the example shown in the figure, both slot 1 and slot 2 are used for DVI outputs.
(5)	Output I/F (slot 2)	

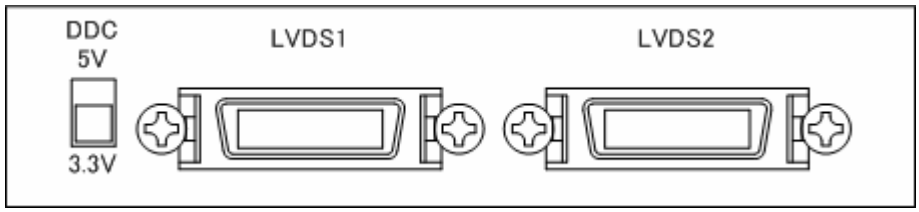
1.6 Output interfaces of VG-880 series

1.6.1 DVI output



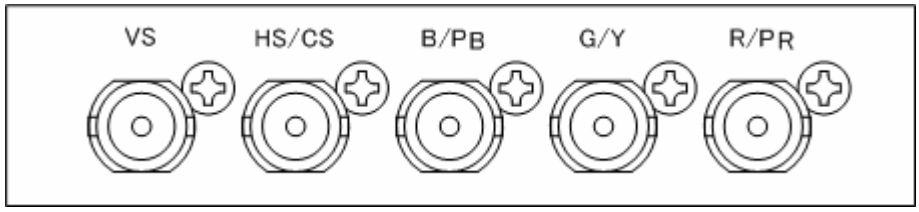
DVI-D output connector	Only digital signals can be output through this connector. Dual Link is supported. (HDCP is not supported.)

1.6.2 LVDS output



LVDS output connectors	Only digital signals can be output through these connectors. Dual Link is supported.

1.6.3 Analog component output



Analog component output connectors	Switching between RGB and color difference (YPbPr) signals is possible, and the selected signals can be output through these connectors. H and V separate sync signals, CS (composite sync) and Video-On-Sync signals can also be output.

2 OPERATING PROCEDURES

2.1 Concerning the VG-880's functions

The **VG-880** provides the user with five functions including video signal output and output data copy & delete functions.

Each function FUNC is selected by pressing the [FUNC] key, the number key which corresponds to the function number, and the [SET] key in this order.

A list of these functions is provided below.

Table 2.1.1 List of functions

No.	Function	Description	Main applications	Reference page
0	Direct Display	This executes the direct display mode (for outputting the video signals of the data in the program whose number has been selected) or the group display mode (for outputting the video signals of the data in the group whose number has been selected).	Adjustments and inspections on production lines	p.10
1	Auto Display	This sets or executes the auto display mode (for automatically outputting the video signals of the data in the program or group whose number has been selected in accordance with the specified delay time).	Demonstrations, service life tests	p.19
2	Output State	This checks the states of the output interfaces.		p.21
3	Data Copy & Delete	This copies data from a CF card to the internal ROM and vice versa, and it deletes data.		p.22
4	Communication Setting	This establishes the RS-232C communication parameter settings.		p.25
9	Maintenance Mode	Maintenance mode (version checks, key checks, analog output level adjustments are performed)	Adjustment and inspection of VG-880 main unit.	p.27

2.2 Output of video signals (Direct Display FUNC 0)

The video signals of the program data stored internally or registered on PC cards are output using the direct display FUNC0.

In addition, the program data settings can be changed (but not saved) while the signals are being output.

2.2.1 Direct output (direct display mode)

(1) Press the [FUNC] key, [0] key and [SET] key.

The direct display mode appears on the LCD display.

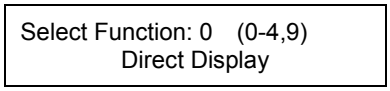


Fig. 2.2.1 Selecting the function

(2) Use the number keys to input the program number. (Example: "0001")

*** The number of digits which make up the program numbers can be changed to 1, 2, 3 or 4. For further details, refer to "2.9 Concerning the VG-880 equipment settings (config data)."**

· Program numbers 0001 to 1000 are used for CF cards; program numbers 1001 to 2000 are used for the internal data.

*** For details on the internal data, refer to "7.1.1 Program data"**

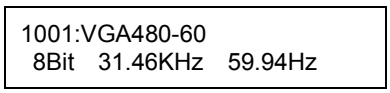


Fig. 2.2.2 Inputting the program number

· One-, 2- or 3-digit numbers (1 to 999) can be input using the number key(s) followed by the [SET] key. (Example: [1] key → [SET] key)

· Program numbers can also be selected using the [INC] key (+1) (or [DEC] key (-1)) followed by the [SET] key. Numbers which have not been registered and program numbers with "invalid" set for the data are ignored.

*** In the case of the RB remote control box, the program numbers can be selected using only the [INC] key (+1) (or [DEC] key (-1)).**

* Normally, this screen appears when the VG-880 starts up as well.

(3) The video signals of the program whose number was selected are now output.

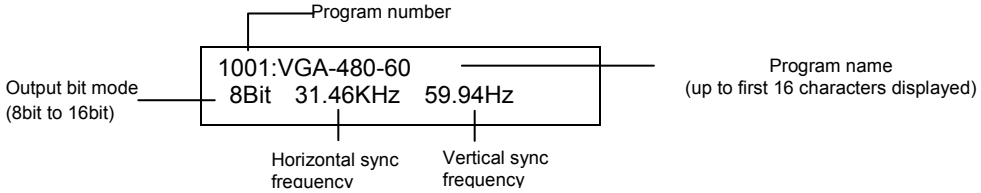


Fig. 2.2.3 Outputting the video signals

CAUTION

The horizontal sync frequency and vertical sync frequency of LCD screens are displayed using the last two digits (rounded up).

● How to switch to another program

Proceed with the operation in step (2).

● Operations can be performed and changes made while the signals are being output.

Refer to "2.2.4 Switching the output patterns" (p.13) to "2.2.7 Changing the video output levels" (p.17).

2.2.2 Group data output (group display mode)

- Any numbers from 1 to 99 can be set for the numbers of the groups which are to be output. (This is done by following “2.2.3 Changing the group numbers.”)
- Group data is registered using the SP-8870 application software.

(1) Press the [Group] key.

*** Only the RB-649 remote control box comes equipped with the [Group] key. When the RB-614C is used, press the [H-T] key; when the RB-1848 is used, press the [MUTE] key.**

< Group No Set >
Group No : 0 (0-99)

Fig. 2.2.4 Inputting the group number

The group display mode appears on the LCD screen.

(2) Use the number keys to input the group data number (2 digits). (Example: “99”)

- A number with only one digit (1 to 9) can be input using the number key followed by the [SET] key. (Example: [1] key → [SET] key)
- Group data numbers can also be selected using the [INC] key (+1) and [DEC] key (-1). Numbers for group data which has not been registered are ignored.

< Group No Set >
Group No : 99 (0-99)

Fig. 2.2.5 Inputting the group data number

(3) The video signals of the group data whose number was selected are now output.

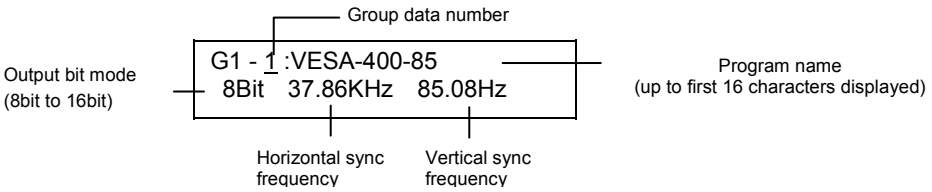


Fig. 2.2.6 Outputting the video signals

CAUTION

The horizontal sync frequency and vertical sync frequency of LCD screens are displayed using the last two digits (two decimal places rounded off).

- **How to switch to other group data**

  Proceed with the operation in step (2).

- **How to switch to another group**

  Refer to “2.2.3 Changing the group numbers” (p.13).

- **Operations can be performed and changes made while the data signals are being output.**

  Refer to “2.2.4 Switching the output patterns” (p.13) to “2.2.7 Changing the video output levels” (p.17).

2.2.3 Changing the group numbers

(1) Use the number keys to input the group number.

The group number can also be selected one at a time using the [INC] key and [DEC] key.

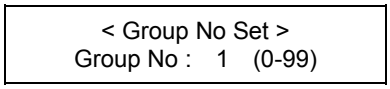


Fig. 2.2.7 Changing the group number

(2) Press the [SET] key.

The group number is changed, and either the direct display mode or group display mode appears on the LCD screen.

2.2.4 Switching the output patterns

Use the following as a reference, and press the applicable key among the keys listed below.

The LED of the selected key lights, and the pattern data is output.

*** No LEDs are provided on the RB-614C remote control box.**

Table 2.2.1 Pattern data to be output

Key	Pattern data to be output	Remarks
CHARA	Character pattern	
CROSS	Crosshatch pattern	
DOTS	Dot pattern	
CIRCLE	Circle pattern	
＋	Center marker pattern	
□	Edge marker pattern	
×	Diagonal line pattern	
CURSOR	Cursor pattern	Refer to “2.2.5 Cursor operations.”
COLOR	Color bar pattern	
GRAY	Gray scale pattern	
BURST	Burst pattern	
WINDOW	Window pattern	
OPT	Optional pattern	
NAME	Program name, pattern name	Program names, pattern names, dot clock frequencies, etc. are displayed.

2.2.5 Cursor operations

■ Displaying the cursor pattern

The cursor pattern is displayed when the [CURSOR] key is pressed. The LED of the [CURSOR] key lights, and the cursor coordinates are displayed on the LCD screen.

*** Only the RB-1848 remote control box comes equipped with the [CURSOR] keys. Cursor patterns cannot be selected from either the RB-649 or RB-614C remote control box.**

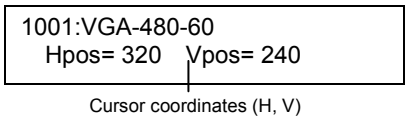


Fig. 2.2.8 Cursor pattern position

■ Cursor pattern function keys

The number keys are used for cursor pattern operations. These keys and the operations they perform are shown below.

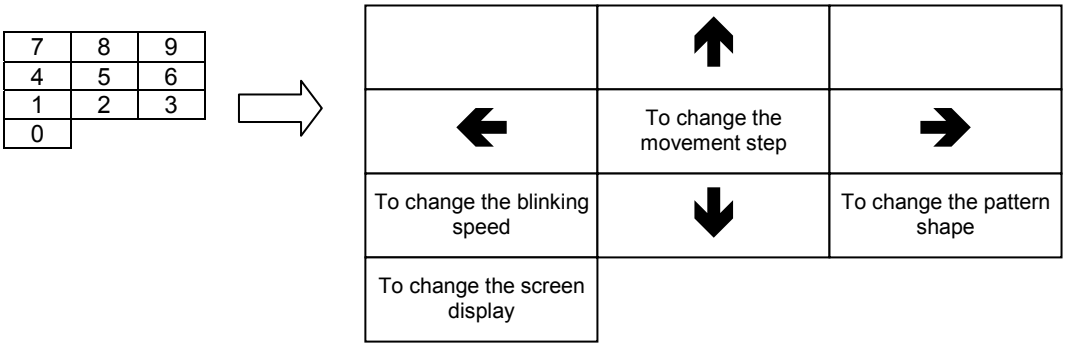


Fig. 2.2.9 Operations performed by cursor keys and key positions

Table 2.2.2 Cursor pattern function keys

Key	Function
0	This changes the method used to display the coordinates and steps on the screen. (No display → Normal 1 mode → Normal 2 mode → Reverse 1 mode → Reverse 2 mode)
1	This changes the blinking speed. (No blinking → once in 1 V → ... → once in 64 V)
2	This moves the cursor downward.
3	This changes the pattern shape and switches the normal mode to the sub-pixel mode or vice versa. Normal mode (Cross → V-Line) → Sub-pixel mode (5×5 → Cross → V-Line) → Normal mode (5×5) ... hereafter repeated. Normal mode: The cursor moves in pixel increments. (The cursor is displayed in the color which has been set.) Sub-pixel mode: The cursor moves in increments of R, G and B with which the pixels are configured. The cursor color is displayed in the sequence of red → green → blue when it moves to the right and blue → green → red when it moves to the left.
4	This moves the cursor to the left.
5	This changes the movement step. (10 dots → 1 dot → 100 dots)
6	This moves the cursor to the right.
8	This moves the cursor upward.

CAUTION

While the cursor pattern is being moved, no operations involving the use of the number keys (such as the input of program numbers) can be performed.

■ Moving the cursor

The cursor is moved using the [2], [4], [6] and [8] number keys.

When it moves, the screen display and the values of the cursor coordinates displayed on the LCD screen change.

Table 2.2.3 Cursor movements

Key	Movement direction
2	🡻: Downward
4	🡸: Toward the left
6	🡺: Toward the right
8	🡹: Upward

* When the Reverse 1 or Reverse 2 mode is used as the screen display method, the top and bottom of the display will be reversed, and in anticipation of this, therefore, the directions in which the cursor is moved by the keys will be reversed under normal circumstances. (Key 2: 🡹, key 4: 🡺, key 6: 🡸, and key 8: 🡻.)

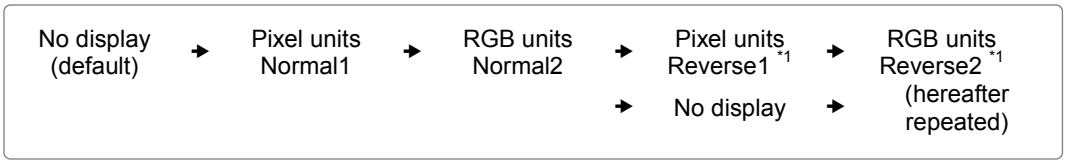
■ Switching the screen display method

The screen display method is switched using the [0] number key.

Table 2.2.4 Screen display method

Display method	Display	Description of display
No display		
Pixel units: Normal 1 or Reverse 1 mode	(0, 0 : STEP10)	(Horizontal H coordinate, vertical V coordinate: movement steps) * The top left of the display serves as the home point (H = 0, V = 0) of the coordinates.
RGB units: Normal 2 or Reverse 2 mode	(GATE = 1 : STEP10) (R = 1 G = 2 B = 3)	(Vertical gate coordinate: movement steps) (R color, G color, B color) horizontal coordinate * The top left of the display serves as the home point (Gate = 1, R = 1, G = 2, B = 3) of the coordinates.

Each time the [0] number key is pressed, the display method is switched by one setting in the following sequence. “No display” is the default method.



*1: “Reverse” is the Normal display with its characters rotated 180° so that its position is reversed at the top and bottom.

■ Switching the cursor blinking speed

The blinking speed of the cursor is changed using the [1] number key.

Each time the [1] key is pressed, the speed is changed by one setting in the following sequence. “No blinking” is the default speed.

No blinking → Blinking once in 1 V → Blinking once in 2 V → Blinking once in 4 V → Blinking once in 8 V → Blinking once in 16 V → Blinking once in 32 V → Blinking once in 64 V → (hereafter repeated)

■ Changing the cursor shape

The shape of the cursor is changed using the [3] number key.

Each time the [3] key is pressed, the shape is changed by one setting in the following sequence. “Cross-shaped cursor” is the default shape.

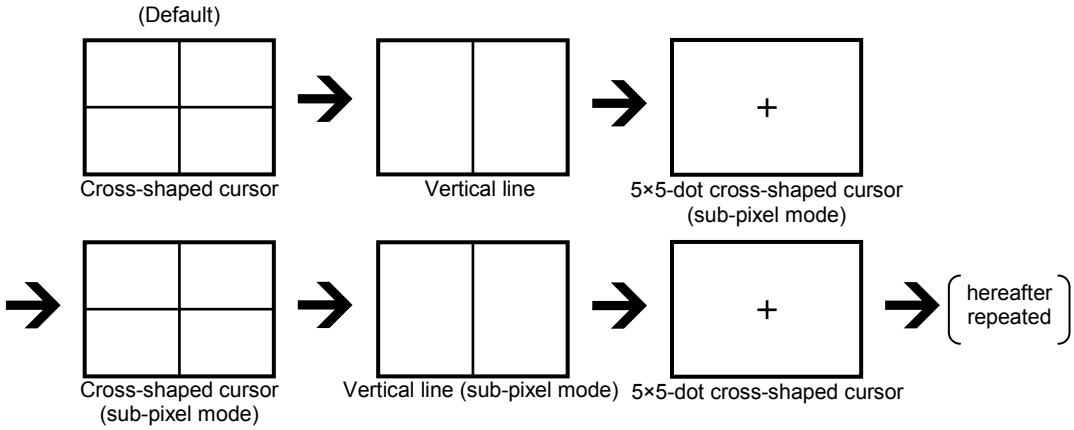


Fig. 2.2.10 Cursor shapes

■ Switching the movement steps of the cursor

The step amount of the cursor when any of the cursor movement keys has been operated is changed using the [5] number key.

Each time the [5] key is pressed, this amount is changed by one setting in the following sequence. “10 dots” is the default amount.

10 dots (default) → 1 dot → 100 dots → 10 dots → (hereafter repeated)

2.2.6 Switching the output video signals and sync signals

Use the following as a reference, and press the applicable key among the keys listed below. The LED of the selected key lights, and the signals are switched.

Table 2.2.5 Video and sync signals to be output

Key	Signals output
R, G, B	R/G/B (or R-Y/Y/B-Y signals)
INV	Output inversion of R/G/B (or R-Y/Y/B-Y signals)
HS, VS, CS (polarity is inverted by pressing the [SHIFT] key)	HS, VS and CS signals

2.2.7 Changing the video output levels

(1) Press the [LEVEL] key.

The LED of the [LEVEL] key lights, and the video output level is displayed on the LCD screen. The level can be set separately for R, G and B.

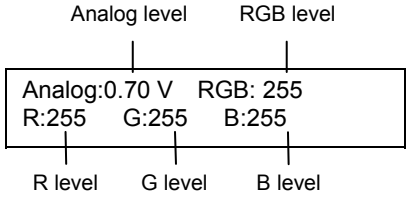


Fig. 2.2.11 Video output level

*** Only the RB-1848 remote control box comes equipped with the [LEVEL] key. When the RB-649 is used, press the [H-T] key. The video output levels cannot be changed using the RB-614C.**

(2) Input the value using the number keys, and press the [SET] key. Alternatively, the value can be incremented or decremented by 1 each time the [INC] or [DEC] key, respectively, is used.

* Any changes made to the value are reflected in the output at once.

Table 2.2.6 Changing the video output level

Item	Variable range		
Analog video output level	0.30 to 1.20 [V] * The level is reflected in the analog outputs only.		
Digital video output level * The level is reflected in both analog and digital outputs.	Number of output bits	When 8 bits are output: When 9 bits are output: When 10 bits are output: When 11 bits are output: When 12 bits are output: When 13 bits are output: When 14 bits are output: When 15 bits are output: When 16 bits are output :	0 to 255 0 to 511 0 to 1023 0 to 2047 0 to 4095 0 to 8191 0 to 16383 0 to 32767 0 to 65535

(3) When the RB-1848 remote control box is used, the output level can be set separately for R, G and B by using the [▶] and [◀] keys.

* If the output level setting is changed to the RGB simultaneous setting after it was changed to a separate setting each R, G and B, it will be masked at the **level which is the highest** among the RGB settings.

(4) When the RB-649 remote control box is used, the output level can be set separately for R, G and B by using the [H-T] key.

* If the output level setting is changed to the RGB simultaneous setting after it was changed to a separate setting each R, G and B, it will be masked at the **level which is the highest** among the RGB settings.

Each time the [H-T] key is pressed, the items which can be set are selected in turn as shown below.

Default screen (Fig. 2.2.3) → Analog level → RGB level → R level → G level → B level → (hereafter repeated)

(5) Press the [LEVEL] key.

The original display is now restored.

2.3 Automatic output of video signals (Auto Display FUNC 1)

The auto display mode is set and executed using auto display FUNC1.

In this mode, the video signals of the program data in the group or program whose number has been selected are automatically output in accordance with the specified delay time.

(1) Press the [FUNC] key, [1] key and [SET] key.

```
Select Function: 1   (0-4,9)
          Auto Display
```

Fig. 2.3.1 Selecting the function

The auto display mode appears on the LCD screen.

(2) Input the execution mode and execution interval using the number keys.

```
Mode : Program      (0-1)
Interval Time :     1sec
```

Fig. 2.3.2 Selecting the execution mode

When “0” is set, the auto display mode based on the program data is established; when “1” is set, the auto display mode based on the group data is established.

2.3.1 Settings selected when the program mode is established

(1) Press the [DEC] key to move to the next screen. Press the [INC] key to return to the previous screen.

(2) Use the [▶] and [◀] keys to move to the location to be edited, and use the number keys to input the program number.

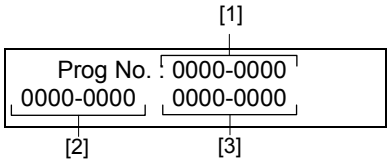


Fig. 2.3.3 Inputting the program number

Program number: XXXX - YYYY

- Input this using 4 digits. (Example: “0001”)
- Numbers XXXX to YYYY are output in sequence.
- The three numbers of [1], [2] and [3] can be registered, and the programs are executed in the sequence of [1] → [2] → [3].
- When “0000” has been set for XXXX or YYYY, the program with this number setting will not be executed.

(3) Press the [SET] key.

The auto display mode operations are executed.

- To abort the output, press the [FUNC] key. The output is aborted, and operation returns to the setting screen. When the RB-1848 remote control box is used, the output can also be aborted using the [ESC] key.
- Execution in the auto display mode is possible also by turning on the power while holding down the [SET] key. (The operations are executed in the program mode.)

2.3.2 Settings selected when the group mode is established

(1) Press the [DEC] key to move to the next screen. Press the [INC] key to return to the previous screen.

(2) Use the number keys to input the group number.

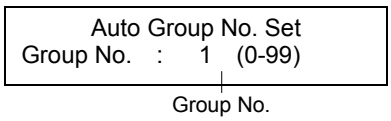


Fig. 2.3.4 Inputting the group number

(3) Press the [SET] key.

The auto display mode operations are executed.

- To abort the output, press the [FUNC] key. The output is aborted, and operation returns to the setting screen. When the RB-1848 remote control box is used, the output can also be aborted using the [ESC] key.

2.4 Output interface checks (Output State FUNC 2)

The output interfaces are checked using output state FUNC 2.

In this mode, the video signals of the program data in the group or program whose number has been selected are automatically output with the specified delay time.

(1) Press the [FUNC] key, [2] key and [SET] key.

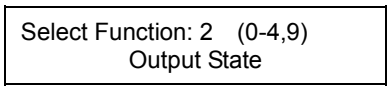


Fig. 2.4.1 Selecting the function

The output state mode appears on the LCD screen.

(2) The output interface of slot 1 is displayed.

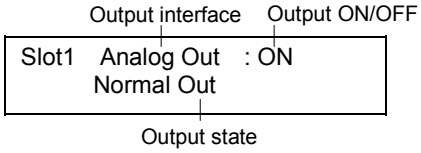


Fig. 2.4.2 Output interface of slot 1

(3) When the [DEC] key is pressed, the next screen is displayed, and the output interface of slot 2 is shown.

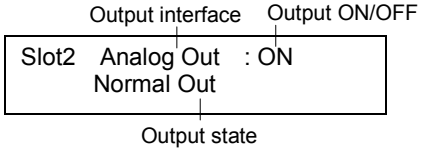


Fig. 2.4.3 Output interface of slot 2

Table 0.1 Output interface screen display

Item	Display	Description of display
Output interface	DVI Out	The DVI output has been selected.
	LVDS12 Out	The LVDS output has been selected.
	Analog Out	The analog component output has been selected.
	Not Insert	The output interface has not been selected.
Output ON/OFF	ON	The output is ON.
	OFF	The output is OFF. (This is set using the SP-8870 application software.)
	---	This is displayed when the output interface has not been selected.
Output state	Normal Out	This is the normal output state.
	Data Set of Output Off	No output. (This is set using the SP-8870 application software.)
	Dotclock Error	The dot clock frequency is outside the specified range. (For details, refer to “8.1 Main specifications.”)
	H Period DOT Error	These errors are displayed when the dot clock frequency is more than 150.001 [MHz] and the respective items have been set to an odd number. (This is set using the SP-8870 application software.)
	H Disp DOT Error	
	H Sync DOT Error	
	H Backporch DOT Error	

(3) When the [INC] key is pressed, the previous screen is restored.

2.5 Copying and deleting data (Data Copy & Delete FUNC3)

Using data copy & delete FUNC 3, program data can be copied from the CF card to internal flash ROM and vice versa, data on either the card or in the internal flash ROM can be deleted, and CF cards can be formatted.

(1) Press the [FUNC] key, [3] key and [SET] key.

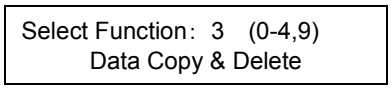


Fig. 2.5.1 Selecting the function

The Data Copy & Delete mode is displayed on the LCD screen.

(2) Select the item using the number keys, and press the [SET] key.

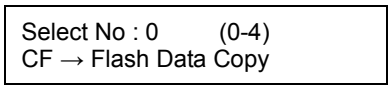


Fig. 2.5.2 Selecting the item

Table 2.5.1 Items to be selected

Key	LCD display	Description
0	CF → Flash Data Copy	All the program data on the CF card is copied to the internal flash ROM whose existing data is overwritten in the process. (Overwrite-copy)
1	Flash → CF Data Copy	All the program data in the internal flash ROM is copied to the CF card whose the existing data is overwritten in the process. (Overwrite-copy)
2	CF Data All Delete	All the program data on the CF card is deleted.
3	Flash Data All Delete	All the program data in the internal flash ROM is deleted.
4	CF Card Format	The CF card is formatted.

2.5.1 Overwrite-copying all the program data on the CF card to the internal flash ROM

(1) Press the [0] key and [SET] key.

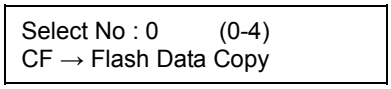


Fig. 2.5.3 Selecting the item

(2) When the [SET] key is pressed, all the program data is copied and the existing data in the internal flash ROM is overwritten. When the [ESC] key is pressed, the previous screen is restored.

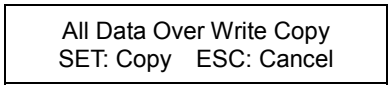


Fig. 2.5.4 Executing or canceling overwrite-copy

2.5.2 Overwrite-copying all the program data in the internal flash ROM to the CF card

(1) Press the [1] key and [SET] key.

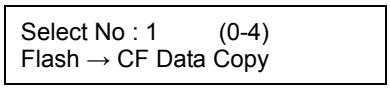


Fig. 2.5.5 Selecting the item

(2) When the [SET] key is pressed, all the program data is copied and the existing data on the CF card is overwritten. When the [ESC] key is pressed, the previous screen is restored.

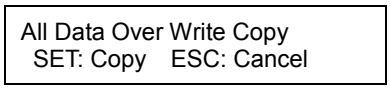


Fig. 2.5.6 Executing or canceling overwrite-copy

2.5.3 Deleting all the program data on the CF card

(1) Press the [2] key and [SET] key.

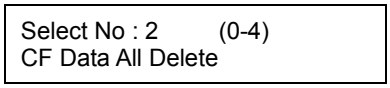


Fig. 2.5.7 Selecting the item

(2) When the [SET] key is pressed, all the program data on the CF card is deleted. When the [ESC] key is pressed, the previous screen is restored.

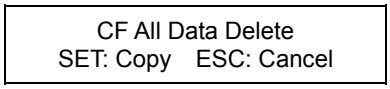


Fig. 2.5.8 Executing or canceling program data deletion

2.5.4 Deleting all the program data in the internal flash ROM

(1) Press the [3] key and [SET] key.

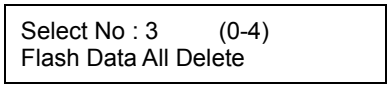


Fig. 2.5.9 Selecting the item

(2) When the [SET] key is pressed, all the program data in the internal flash ROM is deleted. When the [ESC] key is pressed, the previous screen is restored.

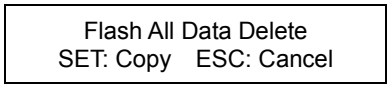


Fig. 2.5.10 Executing or canceling program data deletion

2.5.5 Formatting CF cards

(1) Press the [4] key and [SET] key.

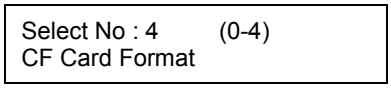


Fig. 2.5.11 Selecting the item

(2) When the [SET] key is pressed, the CF card is formatted. When the [ESC] key is pressed, operation returns to step (1).

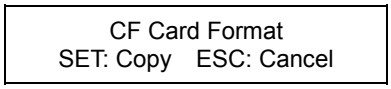


Fig. 2.5.12 Executing or CF card formatting

2.6 Setting the RS-232C communication parameters (Communication Setting FUNC4)

The RS-232C communication parameters are set using communication setting FUNC 4.

(1) Press the [FUNC] key, [4] key and [SET] key.

```
Select Function: 4   (0-4)
     Communication Setting
```

Fig. 2.6.1 Selecting the function

The Communication Setting mode is displayed on the LCD screen.

(2) Press the number keys and [SET] key to set the RS-232C baud rate and number of data bits.

```
Baud Rate     : 38400   (0-4)
Data Bits     : 8Bit    (0/1)
```

Fig. 2.6.2 Setting the baud rate

Table 2.6.1 Baud rate settings

Key	LCD display	Description
0	9600	The baud rate is set to 9600 bps.
1	19200	The baud rate is set to 19200 bps.
2	38400	The baud rate is set to 38400 bps. (Factory setting)
3	57600	The baud rate is set to 57600 bps.
4	115200	The baud rate is set to 115200 bps.

Table 2.6.2 Data bit settings

Key	LCD display	Description
0	7Bit	The number of data bits is set to 7.
1	8Bit	The number of data bits is set to 8. (Factory setting)

(3) Press the [DEC] key to move to the next screen, and press the number keys and [SET] key to set the parity and number of stop bits. (Use the [▶] and [◀] keys to move from one location to be edited to the next.)

```
Parity        : None    (0-2)
Stop Bits     : 1Bit    (1/2)
```

Fig. 2.6.3 Setting the item

Table 2.6.3 Parity settings

Key	LCD display	Description
0	None	The parity is set to “none.” (Factory setting)
1	Even	The parity is set to an even number.
2	Odd	The parity is set to an odd number.

Table 2.6.4 Stop bit settings

Key	LCD display	Description
1	1Bit	The number of stop bits is set to 1. (Factory setting)
2	2Bit	The number of stop bits is set to 2.

(4) When the [INC] key is pressed, the previous screen is restored.

CAUTION

When the [SET] key is pressed, the settings are stored in the internal flash ROM which means that the setting will be retained even after the power is turned off and then turned back on.

2.7 Maintenance (Maintenance Mode FUNC 9)

Version checks, key checks, analog output level adjustments are performed in the maintenance mode FUNC9.

(1) Press the [FUNC] key, [9] key and [SET] key.

```
Select Function: 9   (0-4,9)
      Maintenance Mode
```

Fig. 2.7.1 Selecting the function

The maintenance mode is displayed on the LCD screen.

(2) Use the number keys to be select the item, and press the [SET] key.

```
Select Item : 0      (0-2)
        Information
```

Fig. 2.7.2 Selecting the item

Table 2.7.1 Items to be selected

Key	LCD display	Description
0	Information	The versions of the VG generator main unit, output ports, etc. are checked.
1	Key Check	The VG-880 generator's front panel keys and LEDs are checked.
2	Analog Output Adjustment *	The analog output levels are adjusted. (This item appears and can be selected only when analog output has been selected.)

2.7.1 Checking the versions

(1) Press the [0] key and [SET] key.

```
Select Item : 0      (0-2)
        Information
```

Fig. 2.7.3 Selecting the item

The version information is displayed in the following sequence: VG-880 → Firmware → Main Board + Serial No. → FPGA1 → FPGA2 → Out1 → Out2.

When the [DEC] key is pressed, the information is displayed in sequence as indicated by the arrow; to display the information in the reverse sequence, press the [INC] key.

*** "N.C" is displayed for "Type" when the corresponding output board is not installed.**

* When the [ESC] key or [FUNC] key is pressed at any point during a check, the check is aborted, and the screen on which to select the check item is restored.

(2) VG generator main unit version

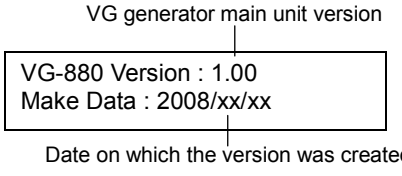


Fig. 2.7.4 VG generator main unit version

(3) Firmware version

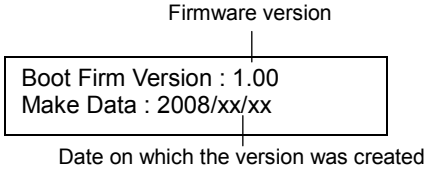


Fig. 2.7.5 Firmware version

(4) Main board version and serial number

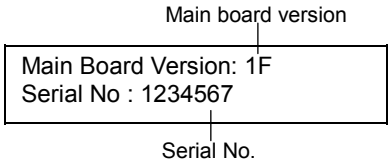


Fig. 2.7.6 Main board version and serial number

(5) FPGA1 version

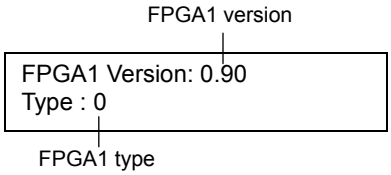


Fig. 2.7.7 FPGA1 version

(6) FPGA2 version

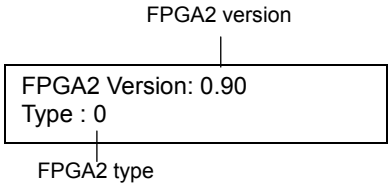


Fig. 2.7.8 FPGA2 version

(7) Slot 1 version

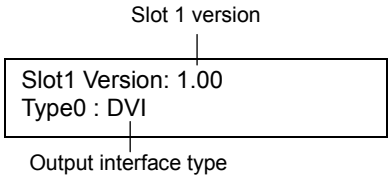


Fig. 2.7.9 Slot 1 version

(8) Slot 2 version (* when a board has not been connected)

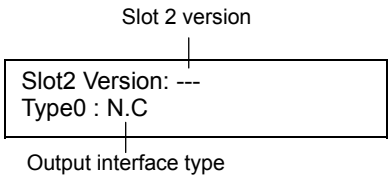


Fig. 2.7.10 Slot 2 version

2.7.2 Checking the keys

(1) Press the [1] key and [SET] key.

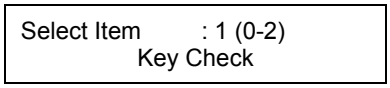


Fig. 2.7.11 Selecting key check

(2) Press the key to be checked.

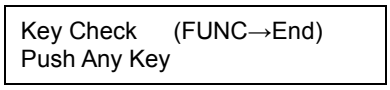


Fig. 2.7.12 Selecting the key

The pressed key now appears on the LCD screen. (Example: [INC] key on the front panel)

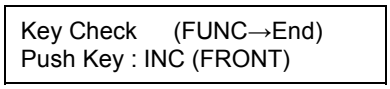


Fig. 2.7.13 Displaying the results

When a key on the VG-880 main unit has been pressed, (FRONT) is displayed; when a key on the RB remote control box has been pressed, (RB) and the key which was pressed are displayed.

* When the [FUNC] key is pressed at any point during a check, the check is aborted, and the screen on which to select the check item is restored.

2.7.3 Adjusting the analog output levels

(1) Press the [2] key and [SET] key.

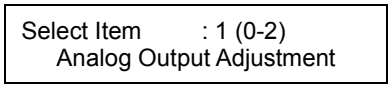


Fig. 2.7.14 Selecting the analog output level adjustments

(2) Select the slot number (when analog output × 2 has been selected), and adjust the output level separately for R, G and B.

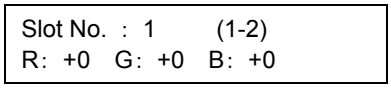


Fig. 2.7.15 Adjusting the analog output levels

Use the [INC] and [DEC] keys to adjust the output level. The adjustment range extends from -255 to +255.

To select the slot, enter the number directly using the number keys.

(3) Press the [SAVE] key to save the adjustment values

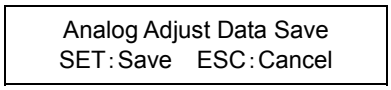


Fig. 2.7.16 Saving the adjustment values

When the [SET] key is pressed, the new data is copied and the existing data is overwritten in the process. When the [ESC] key is pressed, the previous screen is restored.

CAUTION

If the step to save the adjustment data is not taken, the output levels will be adjusted temporarily, but when the power is turned off and turned back on, the data will not be saved.

2.8 Editing and registering the program data

All the editing and registering of the program data for the VG-880 are performed using the SP-8870 application software.

For further details on operation, refer to the SP-8870 operating instructions.

2.9 Concerning the VG-880 equipment settings (config data)

The following items are contained in the VG-880 equipment settings (config data).

All the settings with the exception of the RS-232C settings are performed using the SP-8870 application software.

For further details on the settings, refer to the SP-8870 operating instructions.

Table 2.9.1 Table of equipment settings (General/KeyLock)

Setting item	Description
Beep	This is used to set whether a beep tone is to be sounded when the keys on the VG-880 main unit or RB remote control box are operated.
KeyLock	This is used to select the key lock mode for preventing operations from being performed in error.
INC/DEC Continuity	This is used to set whether the program number is to be changed when the INC or DEC key has been held down.
INC/DEC Interval	This is used to set the interval for executing the program data when the INC or DEC key has been held down.
Color Depth	This is used to set the default number of output bits. When the “refer program” setting has been established, the number of output bits set in the program data is referenced.
Image Priority	This is used to specify the priority of the devices which load the image data.
Message Display Time	This is used to set the time during which messages are to be displayed.
Program No Digits	This is used to set the number of digits of the program numbers to be input from the RB remote control box.
Image Position	This is used to select the image display position.

Table 2.9.2 Table of equipment settings (RS-232C)

Setting item	Description
Baud Rate	This is used to select the baud rate.
Data Bits	This is used to select the number of data bits.
Parity	This is used to select the parity bit.
Stop Bits	This is used to select the number of stop bits.

Table 2.9.3 Table of equipment settings (Power-On Program)

Setting item	Description
Reference	This is used to set whether the program data is to be executed at the same time as the power is turned on. The items displayed differ depending on the setting.
Type *1	This is used to set whether the program data is to be executed when the power is turned on. The items displayed differ depending on the setting.
Sample Tim No. *2	This is used to set the number of the internal timing data. The timing data whose number has been set will be output when the power is turned on.
Sample Pat No. *2	This is used to set the number of the internal pattern data. The pattern data whose number has been set will be output when the power is turned on.
User Program No. *3	This is used to set the number of the program data registered on the CF card. The data of the program whose number has been set will be output when the power is turned on.
Group No. *4	This is used to set the group number. The data of the group whose number has been set will be output when the power is turned on.

*1: This item is set when Configuration has been selected as the Reference setting.
*2: This item is set when Sample Tim/Pat has been selected as the Type setting.
*3: This item is set when UserProgram has been selected as the Type setting.
*4: This item is set when Group has been selected as the Type setting.

2.10 Operating mode when the generator's power is just turned on

The VG-880 allows the operating mode to be switched by a key operation performed when the generator's power is turned on.

Table 2.10.1 Operating mode and key operation when the power is just turned on

Key operation	Operating mode
When the POWER switch is set to ON	The VG-880 starts up in the direct display mode.
When the POWER switch is set to ON while the SET key is held down *1	The VG-880 starts up in the auto display mode.
When the POWER switch is set to ON while the [INC] key is held down *1	Maintenance mode *2

***1: After turning on the power using the POWER switch, hold down the SET key until the buzzer sounds.**
***2: Analog Output Adjustment cannot be executed.**

2.11 How to insert and eject the CF cards

2.11.1 How to insert the CF card

(1) Insert the CF card into the slot in the direction indicated by the arrow on the card's top surface.

Insert the card firmly as far as it will go.

A beep tone is heard.

When the CF card is locked properly, a beep tone sounds, and the LED lights up green.

2.11.2 How to eject the CF card

(1) Lightly press the EJECT button to the right of the card slot.

The EJECT button pops out.

(2) Firmly press the EJECT button to eject the card.

The LED now goes off.

CAUTION

1) Use the CF card which comes with the generator. The generator's warranty does not cover any problems in operation which are caused by the use of any other type of card or adapter.

2) Be absolutely sure to follow the above steps to insert and eject CF cards. Taking any other steps may damage the data on the CF card and make it impossible for the CF card to be recognized even when it is re-inserted.

3) The LED at the side of the card slot blinks while data on the CF card is being accessed. Under no circumstances must the card be ejected while the LED is blinking. Doing so will cause malfunctioning.

3 TIMING DATA CONFIGURATION AND SETTING PROCEDURES

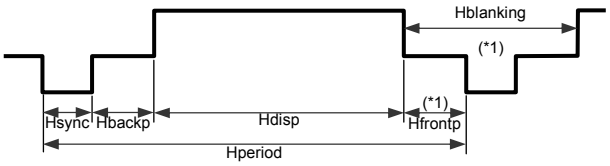
3.1 Configuration of timing data and basic operations

The timing data consists of the horizontal timing data, vertical timing data and output conditions.

3.1.1 Basic operations for settings

All the editing and setting of the timing data are performed using the SP-8870 application software.

3.1.2 Horizontal timing data configuration list



Horizontal sync frequency: 10 to 300 KHz

Timing data	Setting item	Setting range	All bit modes	Remarks	
Horizontal timing	Input mode	us/ dot			
	Dot clock frequency	-	0.100 to 300.000 MHz	1 kHz increments	
	Hperiod	0.00 to 99.99 us	128 to 8192 dots		
	Hdisp	0.00 to 99.99 us	48 to 4096 dots		
	Hsync	0.00 to 99.99 us	0 to 4096 dots		*2
	Hbackp	0.00 to 99.99 us	0 to 4096 dots		
	Hfrontp	(0.00 to 99.99 us)	(0 to 4096 dots)		*1, 3, 4
	Hblanking	(40 to 4096 dot)			*1

*1: Hfrontp and Hblanking are calculated from the values of other setting items.
- Hfrontp = Hperiod - Hdisp - Hsync - Hbackp
- Hblanking = Hperiod - Hdisp

*2: Set 2 dots or more for Hsync when '0' is set for Hfrontp.

*3: Set a number of dots for Hfrontp in the range of 64 to 4096 dots.

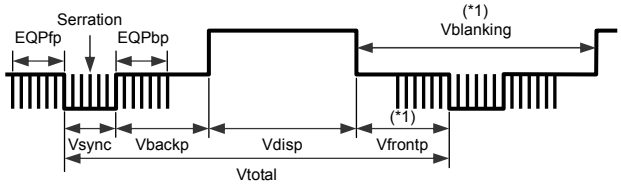
*4: Set 2 dots or more for Hfrontp in the interlace mode. '0' cannot be set.

* The dot clock frequency setting range and setting units used by the items differ depending on the "output mode" setting.

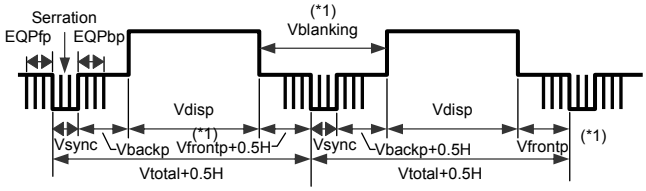
☞ Refer to "3.1.5 Timing restrictions."

3.1.3 Vertical timing data configuration list

● **Progressive scanning**



● **Interlace scanning**



Vertical sync frequency: 10 to 150 Hz

Timing data	Setting item	Setting range	Common to all bit modes	Remarks	
Vertical timing	Input mode	H / ms			
	Scanning mode	Progressive, interlace (sync), interlace			
	Vtotal	6.667 to 99.999 ms	Progressive scanning 4 to 4096 H	1H increments	
			Interlace scanning 4 to 2048 H		
	Vdisp	0.000 to 99.999 ms	1 to 2048 H		
	Vsync	0.000 to 99.999 ms	1.0 to 99.0 H	0.5H increments	
	Vbackp	0.000 to 99.999 ms	0 to 4096 H	1H increments	
	Vfrontp	(0.000 to 99.999 ms)	(0 to 4096 H)		*1
	EQPfp	0.000 to 99.999 ms	0.0 to 99.0 H	0.5H increments	*2
	EQPbp				
	Serration	OFF / 0.5H / 1H / EXOR			
	EQP (on / off)	OFF / ON			
	Vblanking	(2H or more)			*1

*1: Vfrontp and Vblanking are calculated from the values of other setting items.
- Vfrontp = Vtotal - Vdisp - Vsync - Vbackp
- Vblanking = Vtotal - Vdisp (only in progressive scanning mode; in the interlace scanning mode, refer to the figure above.)

*2: Neither OFF nor EXOR can be set for Serration if the CS output is a tri-level sync output.

*3: Settings other than the default settings cannot be selected for program no.1453 (SMPTE295Mi), 1454 (SMPTE295Mp), 1455 (AUS 1152i) and 1456 (AUS 1080i).

3.1.4 Output condition data configuration list

Timing data	Setting item		Setting range
Output condition	HS (horizontal sync signal)		Nega / Posi / OFF
	VS (vertical sync signal)		Nega / Posi / OFF
	CS (composite sync signal)		Nega / Posi / OFF
	Video output level		0.30 to 1.20 V (in 0.01 V increments)
	Setup level		0.00 to 0.25 V (in 0.01 V increments)
	Sync signal level		0.00 to 0.60 V (in 0.01 V increments)
	RGB / YPbPr		RGB / YPbPr
	DVI output		OFF / ON
	LVDS output		
	Analog component output		
	DVI output mode		Single Link / Dual Link / multi gray scale mode
	Number of DVI output bits		8 to 16bit
	DVI output bits ON/OFF	R0 to R15	OFF / ON
		G0 to G15	
		B0 to B15	
	LVDS output mode		Single Link / Dual Link
	Number of LVDS output bits		8 to 12bit
	LVDS output bits ON/OFF	R0 to R11	OFF / ON
		G0 to G11	
		B0 to B11	

3.1.5 Timing restrictions

3.1.5.1 Table of dot clock frequency setting ranges

Output	Mode	Output bit modes	
		8 bits	~16 bits
DVI	Single Link	25 to 165 MHz	-
	Dual Link	50 to 300 MHz	-
	Multi gray scale mode *1	-	25 to 150 MHz
LVDS	Single Link	8 to 110 MHz *2	
	Dual Link	16 to 220 MHz *2	
Analog		5 to 165 MHz *3	

*1: The multi gray scale mode is established with outputs of 9 or more bits.

*2: This mode is supported up to 12 bits.

*3: The resolution is supported up to 10 bits.

3.1.5.2 Restrictions on the dot clock frequency setting ranges and increments used for setting the horizontal timing data

The dot clock frequency setting ranges and increments in which the horizontal timing data is set differ depending on the output bit mode and output mode (such as Single Link or Dual Link).

Further details are provided below.

- DVI output 8-bit mode

  In the 8-bit mode, the restriction values are determined by the “priority output” setting and the “mode” setting of the output concerned which has been set.

Single Link

Output		Frequency setting [MHz]
DVI	Single Link	25 to 165
Increment for setting horizontal timing data		1 dot (0.1 to 165) / 2 dots (165 to 300)

Dual Link

Output		Frequency setting [MHz]
DVI	Dual Link	50 to 300
Increment for setting horizontal timing data		2 dots (0.2 to 300)

- DVI output multi gray scale mode

Output		Frequency setting [MHz]
DVI	multi gray scale mode	25 to 150
Increment for setting horizontal timing data		2 dots (0.1 to 150)

- LVDS output

Single Link

Output		Frequency setting [MHz]							
			0.1	25	100	150	160	200	300
LVDS	Single Link	25 to 160		25			160		
Increment for setting horizontal timing data			1 dot					2 dots	

Dual Link

Output		Frequency setting [MHz]					
			0.2	50	100	200	300
LVDS	Dual Link	50 to 300		50			300
Increment for setting horizontal timing data			2 dots				

- Analog component output

Output		Frequency setting [MHz]						
			0.1	5	50	100	150	165
Analog		5 to 165		5			150	165
Increment for setting horizontal timing data			1 dot					2dot

CAUTION

The output shuts down if there are any items with odd-number settings in the H timing parameters when the frequency is set with the 2-dot restriction applying to the horizontal timing setting increments.

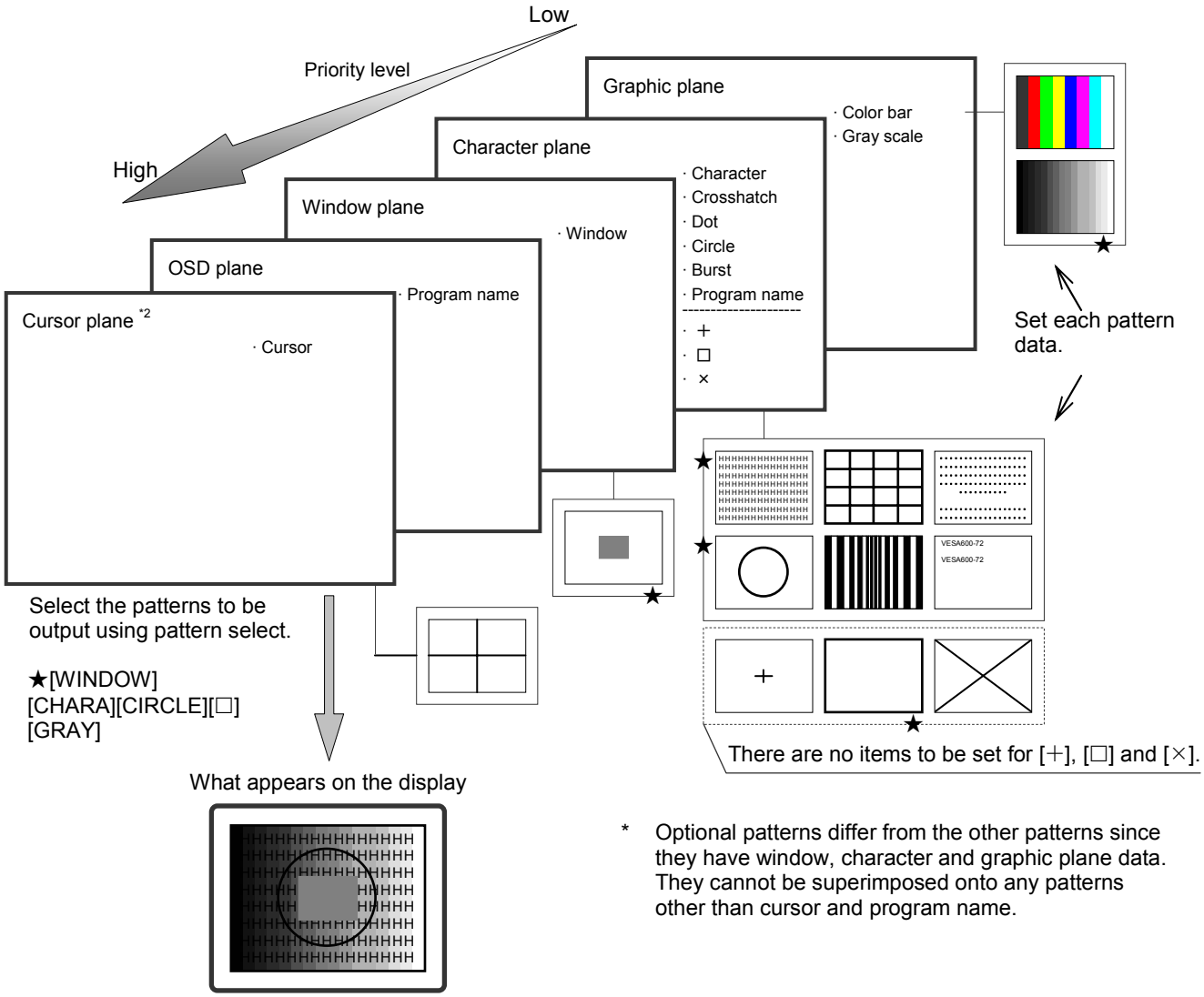
4 PATTERN DATA CONFIGURATION AND SETTING PROCEDURES

4.1 Configuration of pattern data and basic operations

4.1.1 Configuration of pattern data

The pattern data consists of a total of 15 data, namely, the patterns such as character and crosshatch, graphic color which sets the colors of the patterns, pattern select [*1] which sets the patterns to be output, and the pattern action which set the scroll, flicker and other pattern movements.

All the patterns selected by pattern select are superimposed onto one another and displayed on the pattern display. Patterns are divided into five planes. When patterns are superimposed and displayed, the planes with the higher priority levels are displayed in the foreground.



* Optional patterns differ from the other patterns since they have window, character and graphic plane data. They cannot be superimposed onto any patterns other than cursor and program name.

Fig. 0.1 Configuration of pattern data

4.1.2 Concerning the patterns

The editing and setting of the pattern data are performed using the SP-8870 application software. However, some pattern data can be operated and executed from the RB remote control box.

Table 4.1.1 Output patterns and reference pages giving further details

Pattern data	Supplementary description	Reference page
Pattern select	· Pattern output ON/OFF can be executed using the RB-649 or RB-1848 remote control box.	p.43
Foreground color		p.43
Background color		
Character pattern		p.44
Crosshatch pattern		p.46
Dot pattern		p.48
Circle pattern		p.50
Color bar pattern		p.52
Gray scale pattern		p.54
Burst pattern		p.56
Window pattern		p.57
Optional pattern		p.61
Cursor pattern	· The cursor can be operated using the RB-1848 remote control box. · The cursor can be operated using the RB-649 or RB-614C remote control box provided that the cursor is output.	p.62
Name		p.65
Pattern action		p.67

4.2 Concerning pattern selection

(1) Select the pattern which is to be output.

- Patterns: CHARA, CROSS, DOTS, CIRCLE, ＋, □, ×, COLOR, GRAY, BURST, NAME, OPT, WINDOW, CURSOR
- Output control: R, G, B, INV

4.3 Concerning the foreground and background colors

The setting for the color data on the character plane is used as the foreground color data.

(1) Foreground color

Table 4.3.1 Foreground color setting range

No. of output bits	Setting range
8 bits	0 to 255
9 bits	0 to 511
10 bits	0 to 1023
11 bits	0 to 2047
12 bits	0 to 4095
13 bits	0 to 8191
14 bits	0 to 16383
15 bits	0 to 32767
16 bits	0 to 65535

(2) Background color

Table 4.3.2 Background color setting range

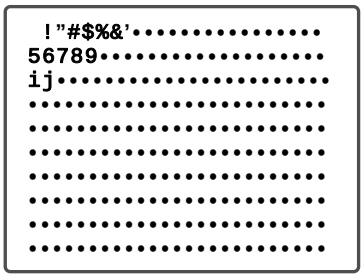
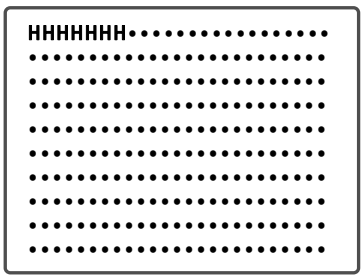
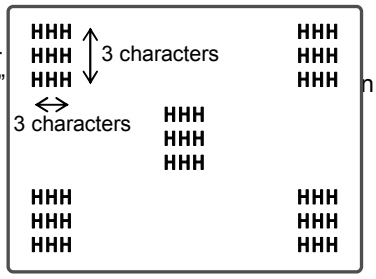
No. of output bits	Setting range
8 bits	0 to 255
9 bits	0 to 511
10 bits	0 to 1023
11 bits	0 to 2047
12 bits	0 to 4095
13 bits	0 to 8191
14 bits	0 to 16383
15 bits	0 to 32767
16 bits	0 to 65535

4.4 Concerning the character patterns

The following items are set for the character pattern data.

- **Format, font, character code and cell size**

Table 4.4.1 Concerning the character pattern setting data

Setting item	Description	
Code	This is used to set the character pattern to be displayed using the “all 1 character” or “corner & center” format. Setting range: 20 to FF	
Format	Character list The character pattern (20H to DFH) specified by “Font” is repeatedly displayed. 	
	All one character The character pattern (character pattern or user character pattern) specified by “Character code” is repeatedly displayed. 	
	Corner & center The character pattern (character pattern or user character pattern) specified by “Character code” is displayed in the order shown in the figure on the right. 	
Font	5×7	The character pattern set (20H to DFH) to be used is selected. ☞ “7.1.4 Character pattern data”
	7×9	
	16×16	
Cell Size H*V	This is used to set the display size for one character. Setting range: 1 to 255 [dot]	

● Correlation between the font and cell size

<Example with 7 × 9 font and 16 × 16 cell size>

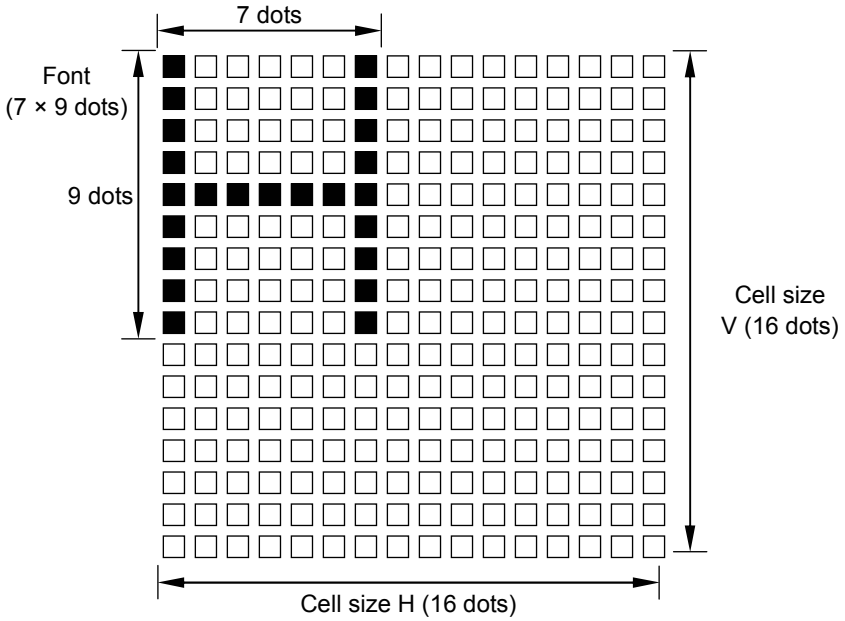


Fig. 4.4.1 Correlation between font and cell size

4.5 Concerning the crosshatch patterns

The following items are set for the crosshatch pattern data.

- **Mode, format, interval and line width**

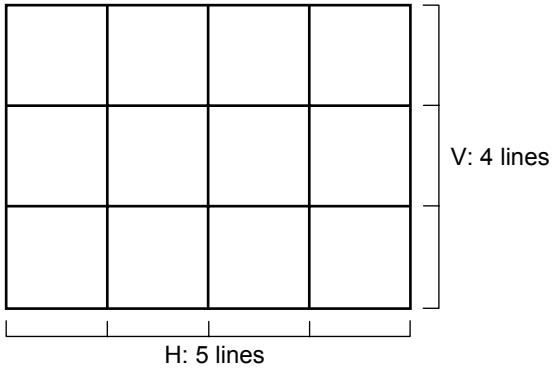
Table 4.5.1 Concerning the crosshatch pattern setting data

Setting item	Description	
Format	from Center	In the dot mode, the point to start the drawing is selected. (This item is invalid in the line mode.)
	from Left-Top	
Mode	Line	A number of crosshatch lines is used to specify the interval increment.
	Dot	The number of dots between the crosshatches is used to specify the interval increment.
Interval H, V	In the line mode, the number of crosshatch lines is set. In the dot mode, the number of dots between the crosshatches is set. Setting range: 0 to 9999 *1	
Line Width H, V	Setting range: 1 to 255 [dot]	

*1: The crosshatch in the H (or V) direction is not displayed if “0” is set for the H (or V) interval.

● **Correlation between interval and mode**

<Example 1>
Line mode
Interval H=5/V=4



<Example 2>
Dot mode
Interval H=300/V=250
Format: From top left

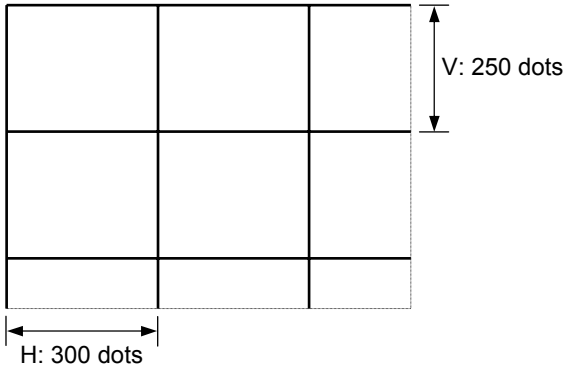


Fig. 4.5.1 Correlation between interval and mode

● **When interval H and V are set to "0:1", "1:0" and "1:1"**

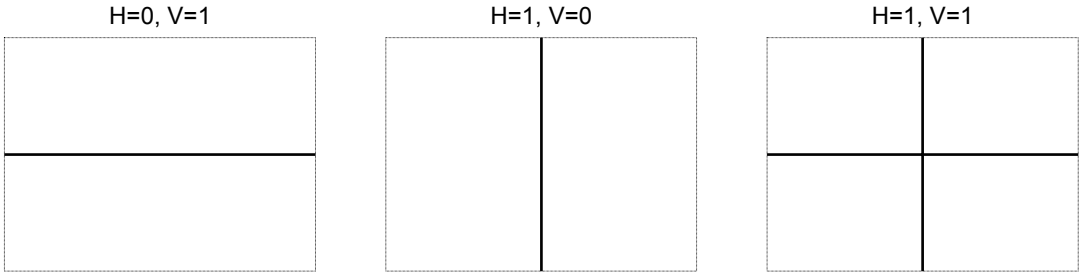


Fig. 4.5.2 Correlation between interval H and interval V

● **Concerning the screen center**

When "from center" is set as the format in the dot mode, the crosshatch pattern is displayed after the screen center is calculated. When both the number of dots and number of lines to be displayed are set to odd numbers, the screen center can be calculated, but when they are set to even numbers, the point which is the first dot to the right of the center and the first line below it is used as the actual screen center.

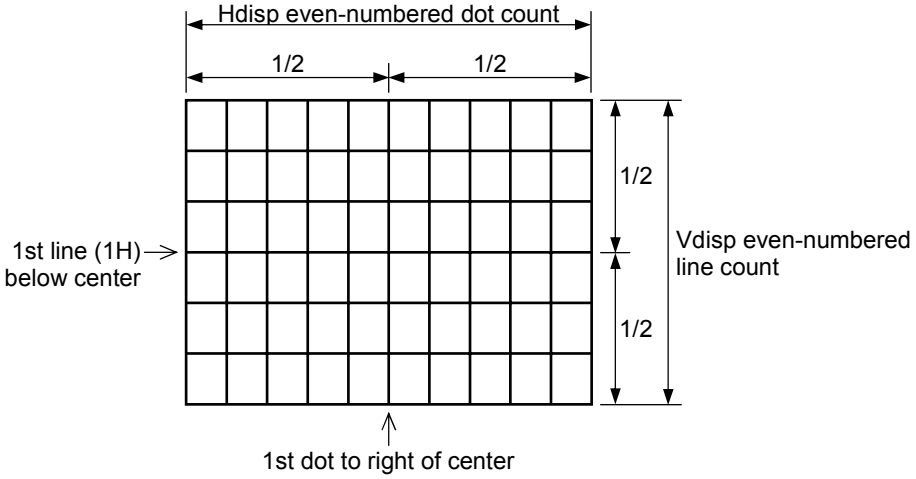


Fig. 4.5.3 Screen center

4.6 Concerning the dot patterns

The following items are set for the dot pattern data.

- **Mode, format, interval, dot size and dot type**

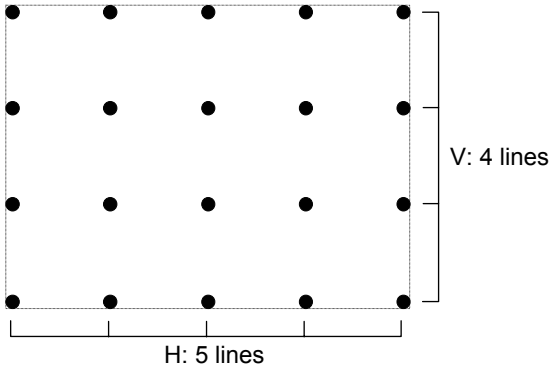
Table 4.6.1 Concerning the dot pattern setting items

Setting item	Description	
Format	from Center	In the dot mode, the point to start the drawing is selected. (This item is invalid in the line mode.)
	from Left-Top	
Mode	Line	A number of dot pattern lines is used to specify the interval increment.
	Dot	The number of dots between the dots is used to specify the interval increment.
Interval H, V	Line mode: The number of dot pattern lines is set. Dot mode: The number of dots between the dots is set. Setting range: 0 to 9999 *1	
Size	Setting range: 1 to 15 [dot]	
Sharp	This draws dots in the shape of a circle whose diameter is the designated size.	
	This draws dots in the shape of a square, one side of which is the designated size.	

*1: The dot pattern is not displayed if “0” is set for H or V.

● **Correlation between interval and mode**

<Example 1>
Line mode
Interval H=5/V=4



<Example 2>
Dot mode
Interval H=300/V=250
Format:from LeftTop

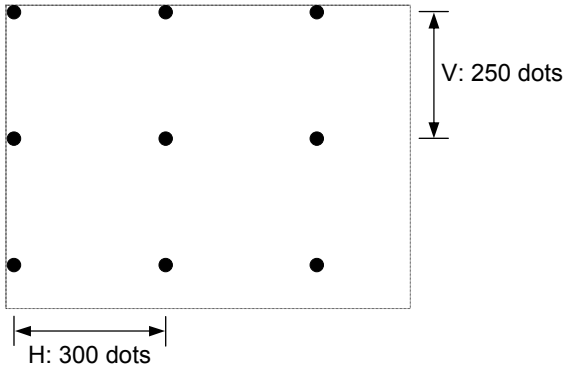


Fig. 4.6.1 Correlation between interval and mode

● **When interval H and V are set to "1:1"**

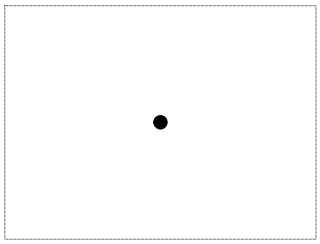


Fig. 4.6.2 Correlation between interval H and interval V

● **Concerning the screen center**

When "from center" is set as the format in the dot mode, the crosshatch pattern is displayed after the screen center is calculated. When both the number of dots and number of lines to be displayed are set to odd numbers, the screen center can be calculated, but when they are set to even numbers, the point which is the first dot to the right of the center and the first line below it is used as the actual screen center.

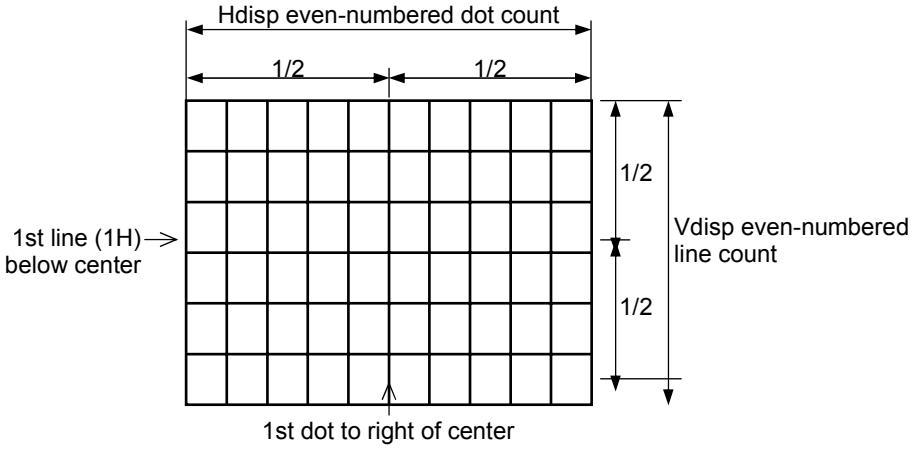


Fig. 4.6.3 Screen center

4.7 Concerning the circle patterns

The following items are set for the circle pattern data.

- **Format**

Table 4.7.1 Concerning the circle pattern setting items

Setting item	Description
Format	Format: 0 · Single circle · Center: 1/2H, 1/2V · Radius: 1/3V
	Format: 1 · Concentric circles 1 · Center: 1/2H, 1/2V · Radius (from center): 1/6V, 1/3V, 1/2V, 1/2H
	Format: 2 · Format 1 + (4 circles with 1/6V radius)
	Format: 3 · Concentric circles 2 · Center: 1/2H, 1/2V · Radius (from center): addition of other circles inside 1/6V, 1/3V, 1/2V circles whose radii are 1/2 of the original 3
	Format: 4 · Consecutive circles with 1/6V radius · Circles are displayed symmetrically both horizontally and vertically with the center (1/2H, V/2V) serving as the reference.
	Format: 5 · Single circle painted out · Center: 1/2H, 1/2V · Radius: 1/3V
	Format: 6 · 5 circles with 1/6V radius painted out

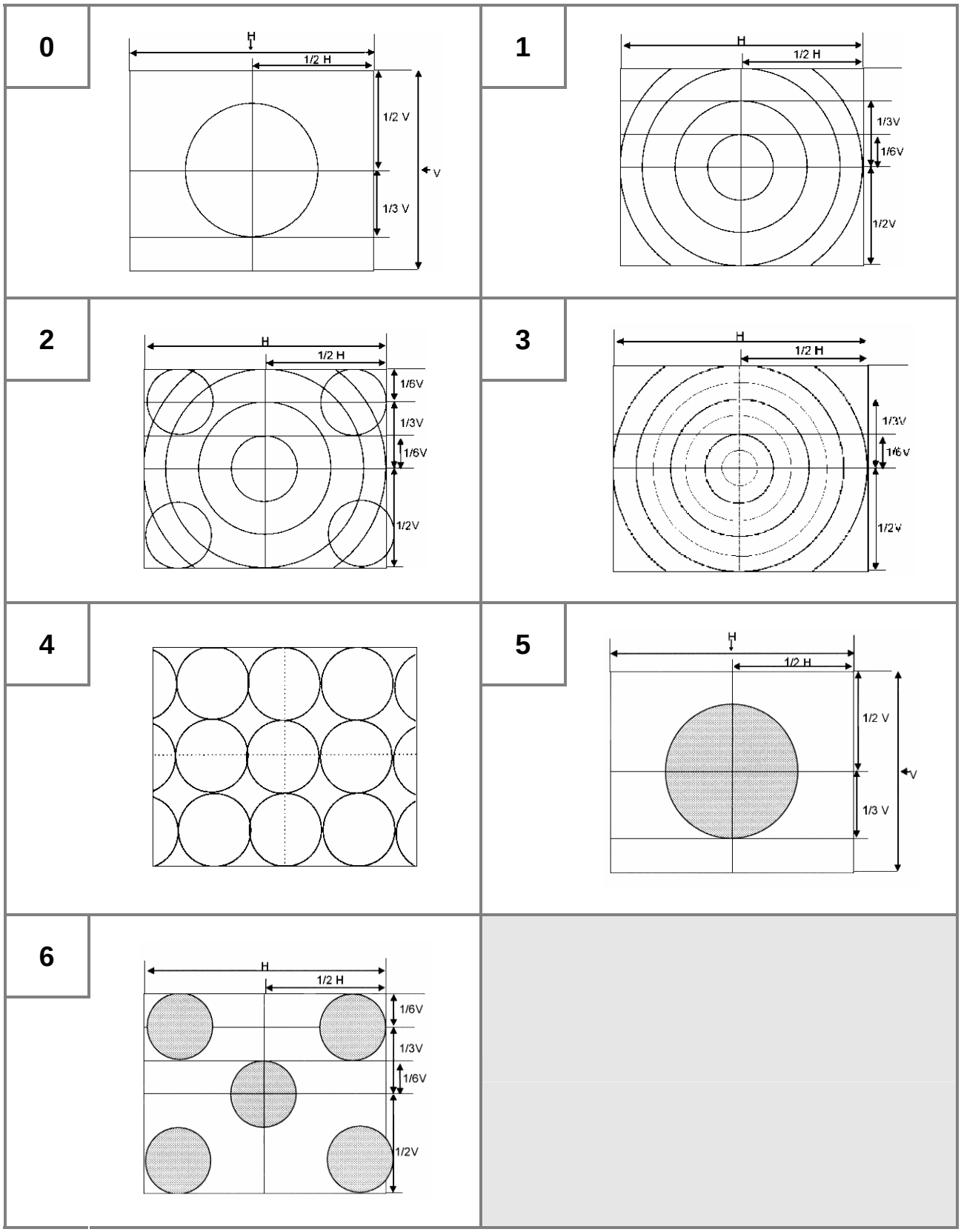


Fig. 4.7.1 Formats

4.8 Concerning the color bar patterns

The following items are set for the color bar pattern data.

- **Mode, type, direction, number of repetitions, interval, color layout, level**

Table 4.8.1 Concerning the color bar pattern setting items [1]

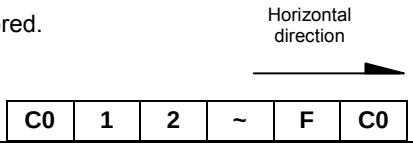
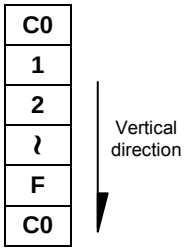
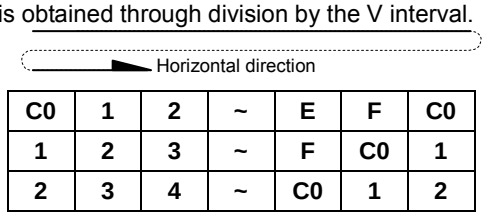
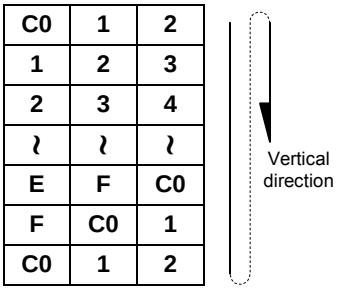
<table>
<tr><th>Setting item</th><th>Description</th></tr>
<tr><td>Type</td><td>Custom: The color bar parameters are referenced, and the color bars are displayed.
100/100-H: 100% color bars are displayed.
100/75-H: 100%/75% color bars are displayed.
75/75-H: 75% color bars are displayed.
SMPTE: SMPTE color bars are displayed.</td></tr>
<tr><td rowspan="4">Format</td><td>The pattern is repeated in the designated direction in accordance with the settings for “number of repetitions,” “interval” and “color layout.”</td></tr>
<tr><td>Horizontal direction
* The V interval is ignored.
 
</td></tr>
<tr><td>Vertical direction
* The H interval is ignored.
 
</td></tr>
<tr><td>The pattern is repeated horizontally, and when the corner is reached, it is continued onto the next line which is obtained through division by the V interval.
 
</td></tr>
<tr><td>The pattern is repeated vertically, and when the corner is reached, it is continued onto the next column which is obtained through division by the H interval.
 
</td></tr>
</table>

Table 4.8.2 Concerning the color bar pattern setting items [2]

Setting item	Description	
Repeat	This sets the number of colors. Setting range: 1 to 16	
Interval	Mode	% mode: A percentage is specified for the interval increment.
		Dot mode: A number of dots is specified for the interval increment.
	H , V	In the % mode Setting range: 0.1 to 100.0 [%]
		In the dot mode Setting range: 1 to 9999 [dot]

<Example: For direction 2 (H & V)>

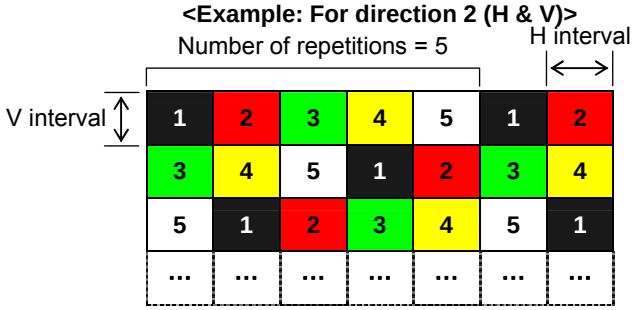


Table 4.8.3 Concerning the color bar pattern setting items [3]

Setting item	Color
Color (Color layout) 1 to 16	None
	Red
	Green
	Red, green
	Blue
	Red, blue
	Green, blue
	Red, green, blue
Level	0.0 to 100.0%

4.9 Concerning the gray scale patterns

The following items are set for the gray scale pattern data.

- **Type, mode, direction, number of repetitions, interval, level layout**

Table 4.9.1 Concerning the gray scale pattern setting items [1]

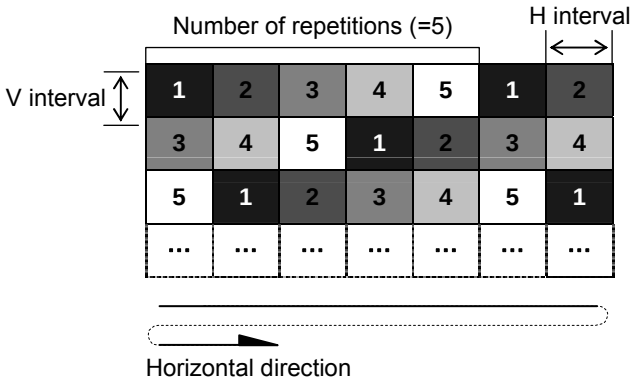
Setting item	Description	
Type	Custom:	The gray parameters are referenced, and the gray scale is displayed.
	8STEP-H:	The horizontal 8-step gray scale is displayed.
	16STEP-H:	The horizontal 16-step gray scale is displayed.
	32STEP-H:	The horizontal 32-step gray scale is displayed.
	8STEP-V:	The vertical 8-step gray scale is displayed.
	16STEP-V:	The vertical 16-step gray scale is displayed.
	32STEP-V:	The vertical 32-step gray scale is displayed.
Format	The pattern is repeated in the designated direction according to the settings for the number of repetitions, intervals and level layout.	
	The pattern is repeated in the horizontal direction, and when it arrives at a corner, it continues on the next line which has been divided by the V interval.	
	The pattern is repeated in the vertical direction, and when it arrives at a corner, it continues on the next column which has been divided by the H interval.	
Repeat	The number of levels is set. Setting range: 1 to 16	
Interval	Mode	% mode: The interval increment is designated as a percentage.
		Dot mode: The intervalincrement is designated as a number of dots.
	H , V	In the % mode Setting range: 0.1 to 100.0 [%]
		In the dot mode Setting range: 1 to 9999 [dot]

Table 4.9.2 Concerning the gray scale pattern setting items [2]

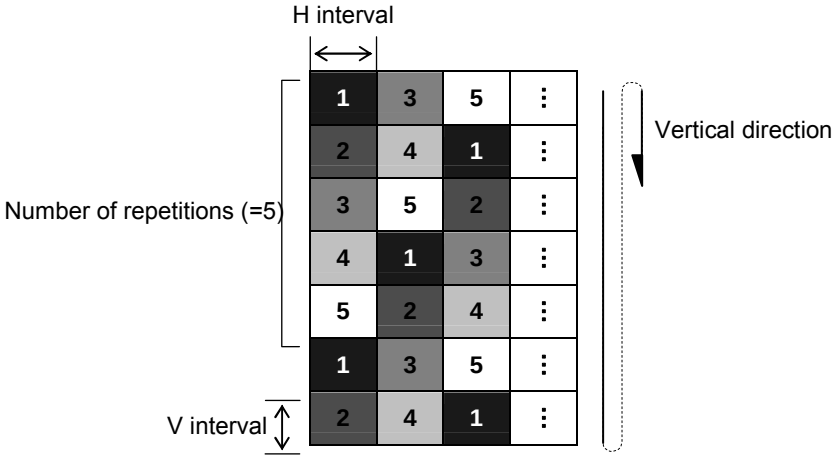
Setting item	Setting range		
Level layout 1 to 16	No. of output bits	When 8 bits are output: When 9 bits are output: When 10 bits are output: When 11 bits are output: When 12 bits are output: When 13 bits are output: When 14 bits are output: When 15 bits are output: When 16 bits are output:	0 to 255 0 to 511 0 to 1023 0 to 2047 0 to 4095 0 to 8191 0 to 16383 0 to 32767 0 to 65535

- Relationship between directions, number of repetitions and intervals

<Example 1: When “0” (Hor) is set for the direction>



<Example 2: When “1” (Ver) is set for the direction>



4.10 Concerning the burst patterns

The following items are set for the burst pattern data:

- **Format, interval, step**

Table 4.10.1 Concerning the burst pattern setting items

Setting item	Description
Format	L->R: The pattern is increased from left to right. L<-R: The pattern is increased from right to left. L<-C->R: The pattern is increased from the center to the left and right. L->C<-R: The pattern is increased from the left and right to the center. T->B: The pattern is increased from top to bottom. T<-B: The pattern is increased from bottom to top. T<-C->B: The pattern is increased from the center to the top and bottom. T->C<-B: The pattern is increased from the top and bottom to the center.
Number of Lines	This is the number of vertical lines with same thickness which are to be displayed. Setting range: 1 to 99 [dot]
Step	This is the increment by which the line thickness is to be increased is set. Setting range: 0 to 99 [dot]

<Example: When 0 is set for the format, 5 for the interval and 1 for the step>

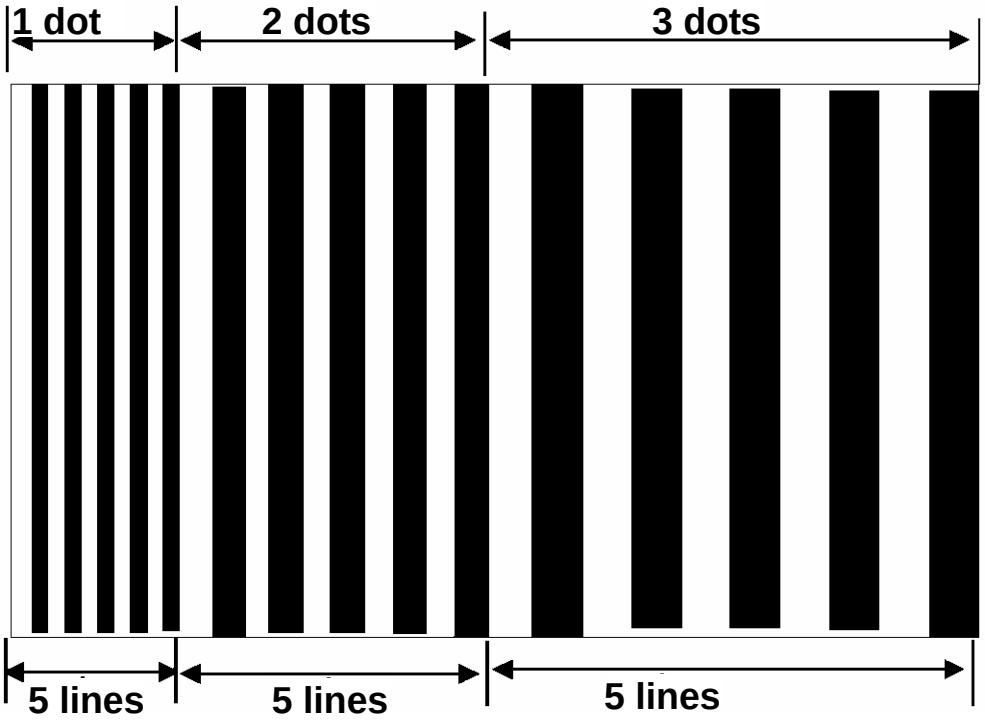


Fig. 4.10.1 Example of burst pattern setting

4.11 Concerning the window patterns

The following items are set for the window pattern data.

- Mode, format, width, window color, format-related items (flicker interval, scrolling speed, level change speed), window center position, display time and RGB level (only when flicker interval “8 (4LEVEL)” has been selected for formats 0-7 or E)

Table 4.11.1 Concerning the window pattern setting items [1]

Setting item	Description
Format	The window pattern is divided into the designated number. The flicker operation can be set.
	1 WINDOW: 1 window
	4 WINDOW: 4 windows (2×2)
	9 WINDOW: 9 windows (3×3)
	16 WINDOW: 16 windows (4×4)
	25 WINDOW: 25 windows (5×5)
	64 WINDOW: 64 windows (8×8)
	V3 WINDOW: 3 windows in a vertical row (1×3)
	H3 WINDOW: 3 windows in a horizontal row (3×1)
	User PosCenter: The position of the window can be designated.
	User PosCorner: The position of the window can be designated.

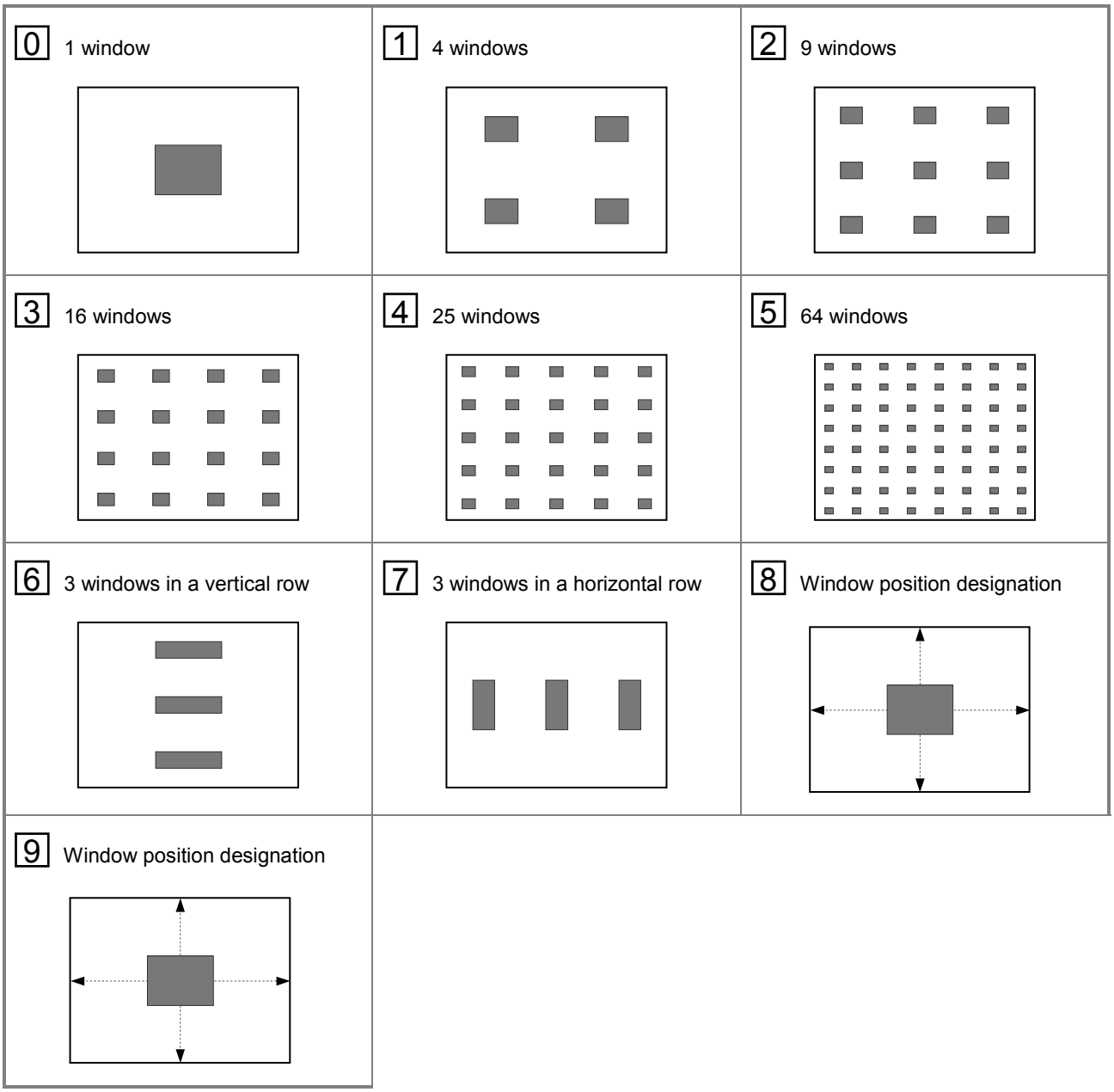


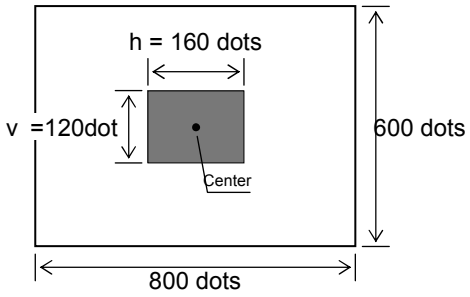
Fig. 4.11.1 Formats

Table 4.11.2 Concerning the window pattern setting items [2]

Setting item	Setting range	
Size	Mode	% mode: A percentage is set as the width (horizontal, vertical) increment.
		Dot mode: A number of dots is set as the width (horizontal, vertical) increment..
	H , V	In the % mode: 0.0 to 100.0[%]
		In the dot mode: 1 to 9999[dot]
Window color R, G, B	No. of output bits	When 8 bits are output: 0 to 255 When 9 bits are output: 0 to 511 When 10 bits are output: 0 to 1023 When 11 bits are output: 0 to 2047 When 12 bits are output: 0 to 4095 When 13 bits are output: 0 to 8191 When 14 bits are output: 0 to 16383 When 15 bits are output: 0 to 32767 When 16 bits are output: 0 to 65535

- **Examples of H, V width settings (when H width = 160 dots or 20%, V width = 120 dots or 20%)**

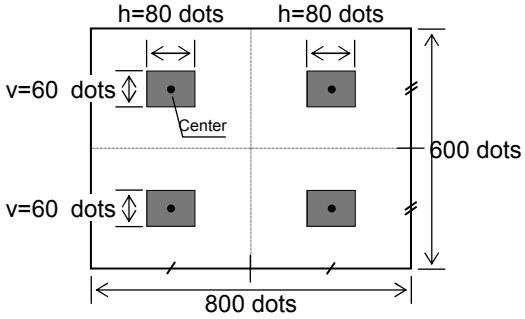
<Example 1: When format 0 (1 window) is used>



In the dot mode
H width = h = 160 [dots]
V width = v = 120 [dots]

In the % mode
H width = (h / 800) × 100 = 20 [%]
V width = (v / 600) × 100 = 20 [%]

<Example 2: When format 1 (4 windows) is used>



In the dot mode
H width = h × 2 = 160 [dots]
V width = v × 2 = 120 [dots]

In the % mode
H width = (h × 2 / 800) × 100 = 20 [%]
V width = (v × 2 / 600) × 100 = 20 [%]

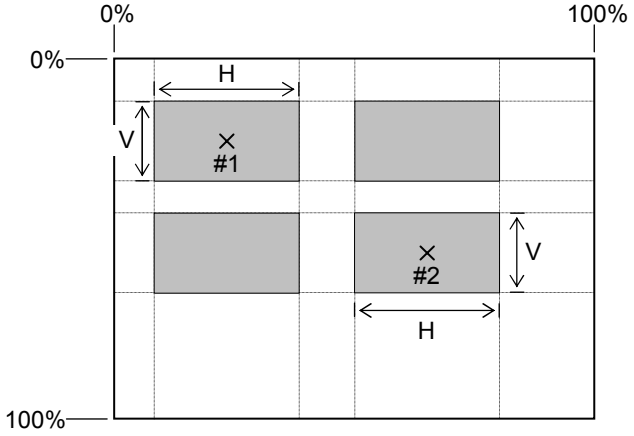
* When the window is to be divided, the total for all the windows is set.

Table 4.11.3 Concerning the window pattern setting items [3]

Setting item	Description
Window center position (Format-User Pos) 1, #2(H, V)	The window center position is designated. Setting range: 0.0 to 100.0 [%] *1: When (0,0) has been set for #2, one window with #1 serving as the center position is displayed.

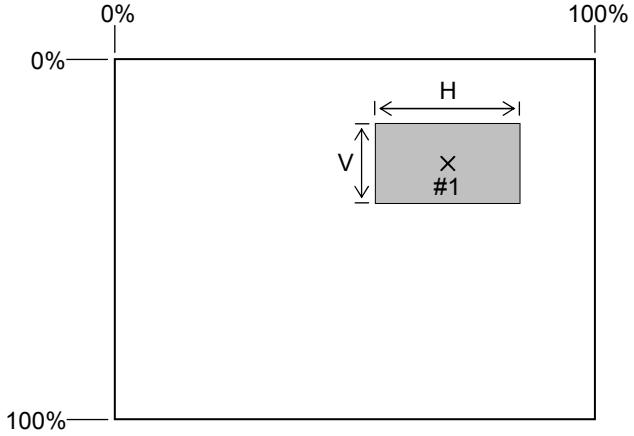
● **When #2 is not (0,0)**

Windows are formed from the sections produced by AND-ing the area bounded by the widths of the H and V settings with #1 serving as the center position with the area bounded by the widths of the H and V settings with #2 serving as the center position.



● **When #2 is (0,0)**

A window is formed from the area bounded by the widths of the H and V settings with #1 serving as the center position.



4.12 Concerning the optional patterns

CAUTION

Optional patterns cannot be combined with any other patterns.

The “optional pattern No.” is set for the optional pattern data.

Table 4.12.1 Concerning the optional pattern setting items

Setting item	Setting range
Type	Image-User: Image data registered on the CF card OPT-Sample: Internal optional pattern data OPT-User: User option data registered on the CF card
Optional pattern No.	1 to 200 *1

*1: Internal image data: 1~

Internal optional pattern: 1 to 65

For details on the internal optional patterns (1 to 65), refer to the “7.1.2 Optional pattern data” list (p.101).

* For the optional patterns created by the user, source codes are created using a grammar similar to C language, and they are compiled and registered using the Windows software application (SP-8870) provided with the generator. The image data created by any tool is registered in the optional pattern numbers as the image data using the SP-8870. For further details, refer to the SP-8870 operating instructions or Help.
* Internal image data and optional pattern data cannot be edited or copied.

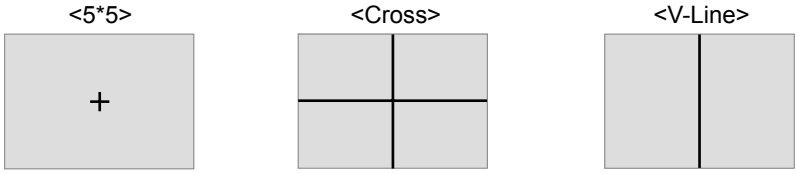
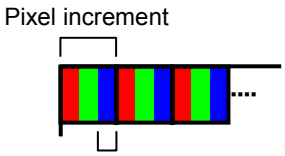
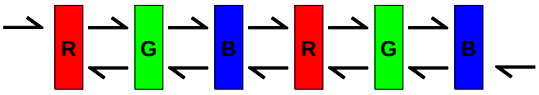
4.13 Concerning the cursor patterns

The following items are set for the cursor pattern data.

- Format, position display mode, flicker interval, movement step, cursor color and background color

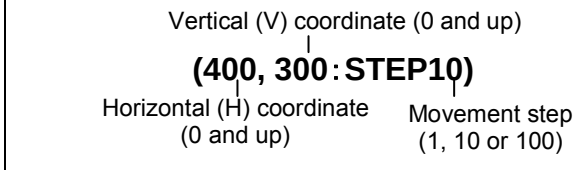
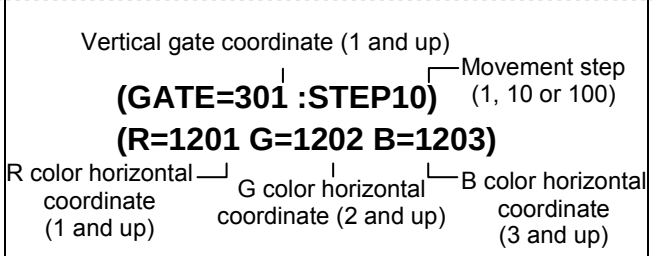
---

Table 4.13.1 Concerning the cursor pattern setting items [1]

<table>
<tr><th>Setting item</th><th colspan="3">Description</th></tr>
<tr><td>Format</td><td colspan="3">5*5: For setting a cross-shaped cursor consisting of 5 horizontal dots and 5 vertical dots.
Cross: For setting a cross-shaped cursor which fills the entire screen.
V-Line: For setting a vertical line as the cursor.</td></tr>
<tr><td colspan="4">Cursor shapes
 
</td></tr>
<tr><td colspan="4"> 
</td></tr>
<tr><td>Normal mode:</td><td colspan="3">The cursor moves in 1-pixel increments.
The cursor color is displayed in the color which has been set.</td></tr>
<tr><td>Sub-pixel mode:</td><td colspan="3">The cursor moves in the RGB increments which make up the individual pixels.
The cursor color is displayed in the sequence of R→G→B when the cursor moves toward the right and in the sequence of B→G→R when the cursor moves toward the left.</td></tr>
<tr><td colspan="4">Movement toward the right 

Movement toward the left</td></tr>
<tr><td rowspan="3">Step</td><td>1 dot</td><td>1 dot</td><td rowspan="3">The cursor moves in increments of the designated number of dots.</td></tr>
<tr><td>10 dots</td><td>10 dots</td></tr>
<tr><td>100 dots</td><td>100 dots</td></tr>
</table>

Table 4.13.2 Concerning the cursor pattern setting items [2]

Setting item	Description	
Position display mode (Coordinate)	OFF	The cursor position does not appear on the display.
	Normal1	Normal 1 mode: The coordinates (H, V) in pixel increments and the movement step are displayed. 
	Normal2	Normal 2 mode: The coordinates (GATE, R, G, B) in RGB increments and the movement step are displayed. 
	Reverse1	Reverse 1 mode: The coordinates (H, V) in pixel increments and the movement step are displayed. The characters in the Normal 1 mode are rotated by 180 degrees. If the display is placed upside down, what will appear will be the same as in the Normal 1 mode. (400, 300:STEP10)
	Reverse2	Reverse 2 mode: The coordinates (GATE, R, G, B) in RGB increments and the movement step are displayed. The characters in the Normal 2 mode are rotated by 180 degrees. If the display is placed upside down, what will appear will be the same as in the Normal 2 mode. (R=1201 G=1202 B=1203) (GATE=301 :STEP10)

- **Home point coordinates**

  The top left of the display serves as the home point.

  Normal 1, Reverse 1 mode: (H=0, V=0)

  Normal 2, Reverse 2 mode: (GATE=1, R=1, G=2, B=3)

- **Concerning the gate, R, G, B coordinates in RGB increments**

  The horizontal coordinates (R, G, B) are obtained by multiplying the coordinate (H) in pixel increments by 3 and adding a further 1 for R, 2 for G and 3 for B.

  The vertical coordinate (gate) is obtained by adding 1 to the vertical coordinate (V) in pixel units.

- **Concerning the cursor movement in the Reverse 1 and 2 modes**

  In these modes, it is assumed that a display whose top and bottom are reversed will be used. Under normal circumstances, therefore, the direction in which the cursor moves will be reversed.

Table 4.13.3 Concerning the cursor pattern setting items [3]

Setting item	Description		
Blink	0 (None)	No flicker	
	1 (1 V)	1 V (once per V period)	Flicker occurs at the designated interval.
	2 (2 V)	2 V	
	3 (4 V)	4 V	
	4 (8 V)	8 V	
	5 (16 V)	16 V	
	6 (32 V)	32 V	
	7 (64 V)	64 V	
Sub Pixel	OFF: Sub-pixel mode OFF ON: Sub-pixel mode ON		
Overlay	OFF: The background color is displayed in the background. ON: Another selected pattern is displayed in the background.		
Intersection	Normal: Black is not selected as the color. Space: Black is selected as the color.		
Cursor color Background color	No. of output bits	When 8 bits are output:	0 to 255
		When 9 bits are output:	0 to 511
		When 10 bits are output:	0 to 1023
		When 11 bits are output:	0 to 2047
		When 12 bits are output:	0 to 4095
		When 13 bits are output:	0 to 8191
		When 14 bits are output:	0 to 16383
		When 15 bits are output:	0 to 32767
		When 16 bits are output:	0 to 65535

4.14 Setting the name data

The setting items for the name data are display type, display format, display position, font, overscanning amount, program name and pattern name.

4.14.1 Name/list setting items

Table 4.14.1 Concerning the name data setting items

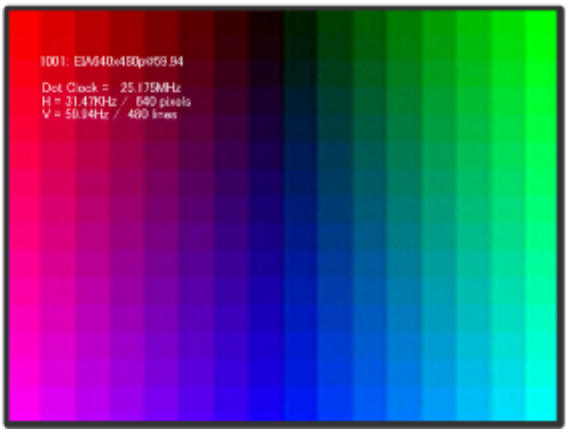
Setting item	Description		
Type	Name		This displays the program name and pattern name.
Style	Format	No. + Program	This displays the program number and program name.
		No. + Pattern	This displays the program number and pattern name.
		No. + Program + Pattern	This displays the program number, program name and pattern name.
		No. + Program + Freq. + Disp + Dot Clock	This displays the program name, dot clock frequency, H and V frequencies, and H and V display sizes.
	Position	Center of the screen	This selects where on the screen the program name is to be displayed.
		Top left of the screen	
		Bottom left of the screen	
		Top right of the screen	
		Bottom right of the screen	
		Top center of the screen	
		Bottom center of the screen	
	Font	5×7	This selects the character pattern used for display. ☞ “7.1.4 Character pattern data”
		7×9	
		16×16	
Over Scan	0 to 20%		This is used to set the overscanning amount of the name data to be displayed.
Program name	Max 20 characters		
Pattern name	Max 20 characters		

- **Display example (when “Name” is selected for display type and “ProgramName, Freq.” is selected for display format**

Display position: Top left of the screen
Overscanning amount: H = 5%, V = 5%

Program name

Dot Clock = Dot clock frequency
H = Horizontal sync frequency/Hdisp
V = Vertical sync frequency/Vdisp



4.14.2 EDIT setting item

Table 4.14.2 Concerning the EDID data setting item

Setting item	Description	
Port	DVI (fixed)	The EDID data is output from the DVI port.

4.15 Setting pattern action

Graphic plane scrolling, character plane scrolling and window plane scrolling and flicker can be executed by setting the pattern action data.

4.15.1 Graphic plane action setting items

Table 4.15.1 Graphic plane setting items

Setting item		Setting range
Graphic plane Scrolling ON/OFF		ON: Scrolling is executed.
		OFF: Scrolling is not executed.
Direction		Left, Right, Up, Down, Left Up, Left Down, Right Up, Right Down, SimpleAnimation
Mode		User 60i->60i 24p->60i (2-3 pull-down) 25p->50i 30p->60i
Execution interval	Interval1	1 to 255
	Interval2, 3, 4	0 to 255 (0: when no interval is going to be used)
Scroll step H direction, V direction	Step1	H: 1 to 4095 [dot] V: 1 to 4095 [H]
	Step2, 3, 4	H: 0 to 255 [dot] (0: when no direction settings are going to be used) V: 0 to 255 [H]
Repeat H, V		1 to 15 * This setting takes effects when “SimpleAnimation” is used as the Direction setting.

* When the Intervals 2-4 are used for either direction, the set conditions are repeated in sequence from 1.
(Example: Interval 1 → 2 → 3 → 1 → 2 → 3 → ... when a setting other than “0” is selected for graphic plane Intervals 2 and 3)
In this way, 2-3 pull-down and scrolling using other types of settings can be achieved artificially.
For normal scrolling, select “0” as the Interval 2-4 item setting.
When using Interval 2-4, select settings for Step 2-4 as well.
For normal scrolling, select “0” as the Step 2-4 item setting.

Pull-down scrolling: Using the scrolling function, 2-3 pull-down and other types of scrolling can be achieved artificially.

● What is 2-3 pull-down?

This is a system of conversion for ensuring consistency between 24 frames per second films and 30 frames per second/60-field NTSC signals when using telecine conversion (into video signals) for regular movies and other film sources. The first frame of the film is converted into the equivalent of two fields and the second frame into the equivalent of three fields, and these five fields are repeated for every two frames of the film so that 24 frames are made the equivalent of 60 fields.

4.15.2 Character plane action setting items

Table 4.15.2 Character plane setting items

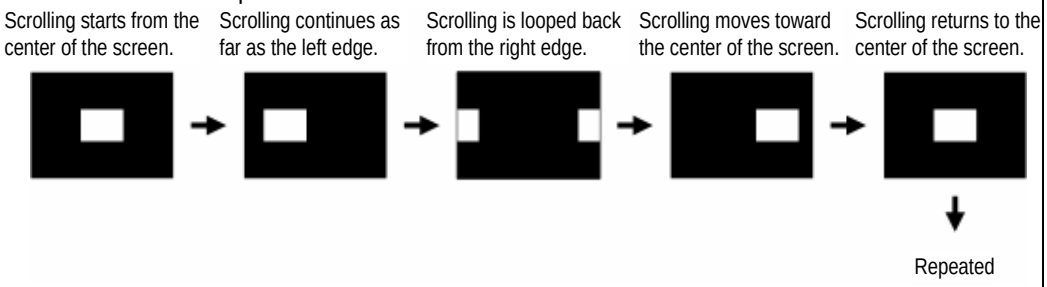
Setting item		Setting range
Character plane Scrolling ON/OFF		ON: Scrolling is executed.
		OFF: Scrolling is not executed.
Direction		Left, Right, Up, Down, Left Up, Left Down, Right Up, Right Down
Mode		User 60i->60i 24p->60i (2-3 pull-down) 25p->50i 30p->60i
Execution interval	Interval1	1 to 255
	Interval2, 3, 4	0 to 255 (0: when no interval is going to be used)
Scroll step H direction, V direction	Step1	H: 1 to 4095 [dot] V: 1 to 4095 [H]
	Step2, 3, 4	H: 0 to 255 [dot] (0: when no direction settings are going to be used) V: 0 to 255 [H]

* When the Intervals 2-4 are used for either direction, the set conditions are repeated in sequence from 1.
(Example: Interval 1 → 2 → 3 → 1 → 2 → 3 → ... when a setting other than “0” is selected for graphic plane Intervals 2 and 3)
In this way, 2-3 pull-down and scrolling using other types of settings can be achieved artificially.
For normal scrolling, select “0” as the Interval 2-4 item setting.
When using Interval 2-4, select settings for Step 2-4 as well.
For normal scrolling, select “0” as the Step 2-4 item setting.

Pull-down scrolling: Using the scrolling function, 2-3 pull-down and other types of scrolling can be achieved artificially.

4.15.3 Window plane action setting items

Table 4.15.3 Window plane setting items [1]

<table>
<tr><th colspan="2">Setting item</th><th>Setting range</th></tr>
<tr><td colspan="2" rowspan="2">Window plane
Scrolling ON/OFF</td><td>ON: Scrolling is executed.</td></tr>
<tr><td>OFF: Scrolling is not executed.</td></tr>
<tr><td colspan="2" rowspan="2">Flicker</td><td>ON: Flicker is executed.</td></tr>
<tr><td>OFF: Flicker is not executed.</td></tr>
<tr><td colspan="2">Direction</td><td>Left, Right, Up, Down, Left Up, Left Down, Right Up, Right Down, Random</td></tr>
<tr><td colspan="3">* The movements are as shown in the figure below if optional pattern linear ramp (OPT No.44, 45, 57, 58 or 59) and a window pattern are superimposed and drawn and then window scrolling is executed when a number other than 8 bits has been selected as the number of output bits.
Example: 1 window, left scrolling
When 8 bits are output
 

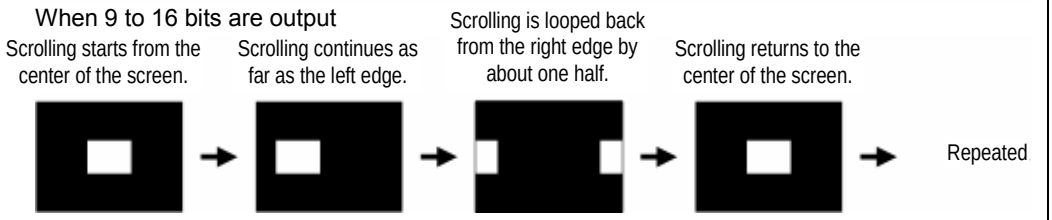
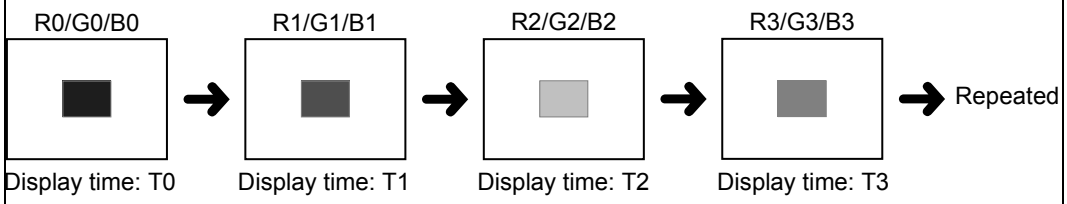
When 9 to 16 bits are output
 
</td></tr>
<tr><td colspan="2">Mode</td><td>User
60i->60i
24p->60i (2-3 pull-down)
25p->50i
30p->60i</td></tr>
<tr><td rowspan="2">Execution interval</td><td>Interval1</td><td>1 to 255</td></tr>
<tr><td>Interval2, 3, 4</td><td>0 to 255 (0: when no interval is going to be used)</td></tr>
<tr><td rowspan="2">Scroll step
H direction, V direction</td><td>Step1</td><td>H: 1 to 4095 [dot]
V: 1 to 4095 [H]</td></tr>
<tr><td>Step2, 3, 4</td><td>H: 0 to 255 [dot] (0: when no step settings are going to be used)
V: 0 to 255 [H]</td></tr>
<tr><td colspan="3">* While the scrolling direction is set to Left, Right, Up, Down or Random, scrolling is not executed when a step value exceeding the timing Disp value setting has been set. When the value has been set during scrolling, the scrolling operation stops.</td></tr>
<tr><td colspan="2" rowspan="2">Window level variation</td><td>ON: The level is varied.</td></tr>
<tr><td>OFF: The level is not varied.</td></tr>
</table>

Table 4.15.4 Window plane setting items [2]

Setting item		Setting range	
Level Up / Down	ON / OFF	ON: The level is varied.	
		OFF: The level is not varied.	
	Direction	low→high, high→low	
	Interval (V)	1 to 255	
	Step	1 to 255	
Level Sequence	ON / OFF	ON: The level flicker sequence is executed.	
		OFF: The level flicker sequence is not executed.	
	Number	1 to 16	
	Time (V) #1 to 16	0 to 255	
	RGB level #1 to 16	No. of output bits	When 8 bits are output: 0 to 255 When 9 bits are output: 0 to 511 When 10 bits are output: 0 to 1023 When 11 bits are output: 0 to 2047 When 12 bits are output: 0 to 4095 When 13 bits are output: 0 to 8191 When 14 bits are output: 0 to 16383 When 15 bits are output: 0 to 32767 When 16 bits are output: 0 to 65535

Example: Number of settings: 4



4.16 Setting the scrolling sequences

By setting the scrolling sequences, scrolling can be executed for each plane with up to 16 sequences.

Setting item	Setting range	
ON / OFF	ON: The scrolling sequence for each plane is executed.	
	OFF: The scrolling sequence for each plane is not executed.	
Return Mode	1Sequence:	The scroll position is restored for each sequence.
	All Sequence:	The scroll position is restored for all the sequences.
Number	1 to 16	
Direction	Left, Right, Up, Down, Left Up, Left Down, Right Up, Right Down	
Interval	1 to 255 V	
H Step	1 to 255 dots	
V Step	1 to 255 H	
Time	1 to 999 v	

5 GENERAL DESCRIPTION OF SP-8870 SOFTWARE

5.1 Outline

The VG-880 generator itself does not come with editing functions. The SP-8870 application software is used to edit or add program data. It can control the VG-880 from the Windows operating system.

Using GUI, the operational ease of Windows can be incorporated to enable program, config and other data to be easily edited and executed.

The edited data can be stored and managed using a personal computer.

The following main functions can be implemented by SP-8870.

- Program data editing and execution
- VG-880 config data editing and execution
- User options and image data editing and execution
- Program data list displays

*** For further details on the SP-8870 operation, refer to the operating instructions of the SP-8870 application software.**

5.2 Operating environment

Processor:	Pentium4 1 GHz or faster recommended
Memory:	256 MB or more recommended
Hard disk free space:	At least 100 MB
Display resolution:	1024 × 768 or above recommended

Operating System

Windows 2000, Japanese-language version
Windows XP, Japanese-language version
Windows Vista, Japanese-language version

5.3 Installing the software application (Windows2000/XP)

This section describes how to install the files for operating SP-8870 in Windows.

The description given here applies to the following disk.

Windows SP-8870 installation disk: ×1

5.3.1 Installing SP-8870

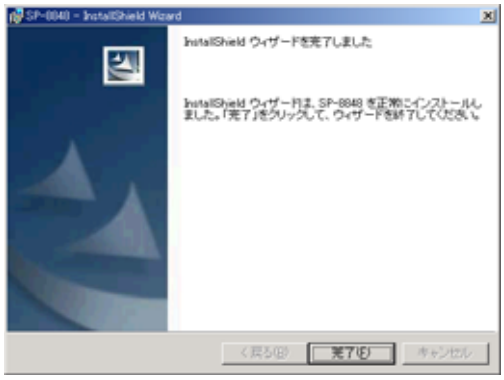
[1] Install the SP-8870 installation disk in the CD drive. In Windows, select [start] → [Settings] → [Control Panel] → [Install or remove programs] → [Install]. The installer starts up, and setup begins.

[2] First, the “Welcome” dialog screen is displayed. When the [Next] button is clicked, the setup advances to the next step; when the [Back] button is clicked, it returns to the previous step. The [Cancel] button is used to abort the setup. Click the [Next] button.

[3] On the “Select installation destination” dialog screen, select the directory into which the files will be copied. As the default, the “ASTRO¥SP-8870” directory is created in the ProgramFiles root directory of the C drive, and the files are copied into this directory. Users can change the copy destination directory to the directory of their choice. Click the [Browse] button, and set the directory.

[4] Select the [Install] button. The file installation dialog screen is displayed, and installation begins.

[5] Setup is now completed. Press the [Finish] button.



[6] Installation is now completed. In Windows, select [start] → [Programs] → [SP-8870] → [SPLaunch] to launch the software.

5.3.2 Uninstalling the software application

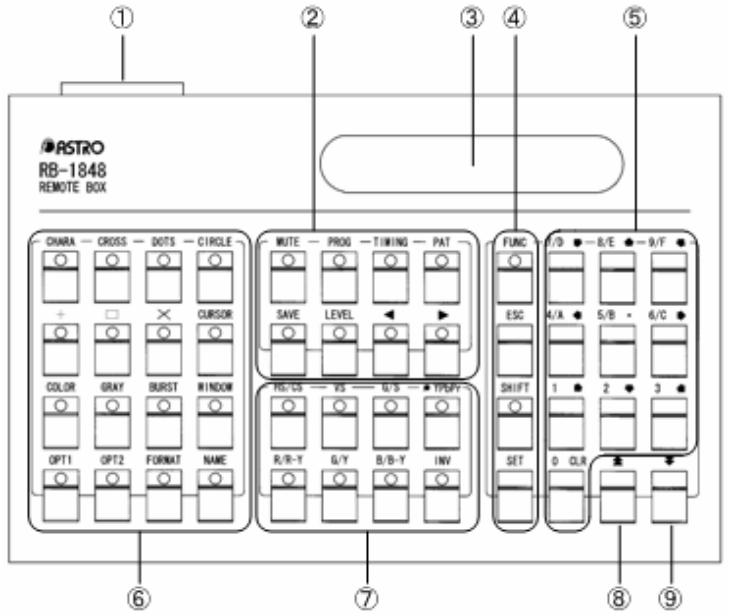
In Windows, select [start] → [Settings] → [Control Panel] → [Install or remove programs], and then select SP-8870 and delete it.

To re-install the software application, first delete the files and registry setting by uninstalling the application, and then proceed. Windows may not operate correctly if past files are left in place.

The data files in the SampleData directory are read-only files and therefore cannot be deleted by uninstallation. Delete them separately.

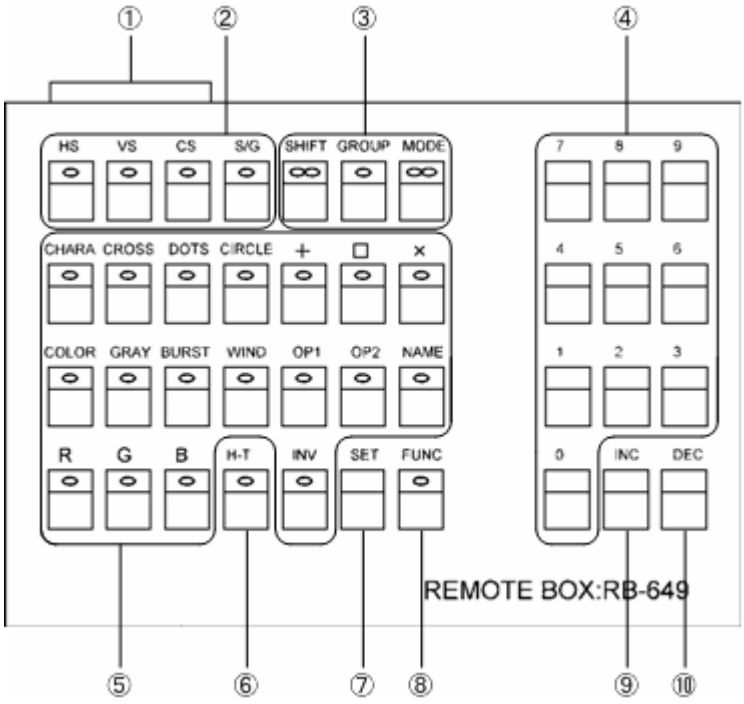
6 REMOTE CONTROL

6.1 RB-1848



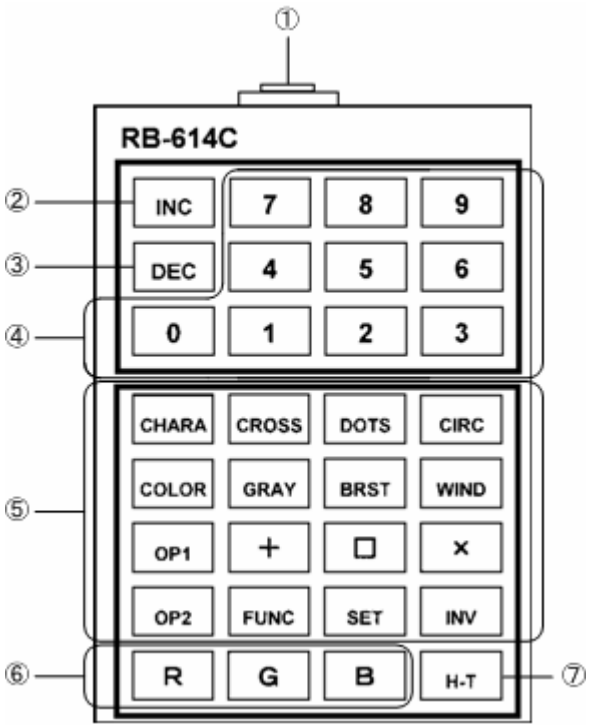
①	VG series connector	Connector used to connect the remote control box to the VG series generator.
②	The keys listed below are used for program data operations. When a key is selected, its LED lights.	
	[MUTE] key	This is used to select the group data number.
	[PROG] key	This is used to select the program data.
	[TIMING] key	This is used to select the timing data.
	[PAT] key	This is used to select the pattern data.
	[SAVE] key	This is used to save the settings.
	[LEVEL] key	This is used for adjusting the output level or displaying the character input screen from the display, etc.
	[◀] key	This is used to move the previous item. (LCD screen)
	[▶] key	This is used to move the next item. (LCD screen)
③	LCD	This displays (using 24 characters on 2 lines) the setting menus, program numbers, timing data, etc.
④	The keys listed below are used to execute program data, cancel program numbers input and select inputs.	
	[FUNC] key	This is pressed first when a function is to be selected. When it is selected, its LED lights.
	[ESC] key	This is used to cancel the input of program numbers.
	[SHIFT] key	This is used to select NEGA or POSI for HS and VS.
	[SET] key	This is used to execute the program data.
⑤	Number keys	These are used for data input.
⑥	Pattern keys	These are used to select patterns or switch outputs. When a key is selected, its LED lights.
⑦	Output control key	These are used to switch the output. When a key is selected, its LED lights. ☞ Refer to “2.2.6 Switching the output video signals and sync signals.”
⑧	[▲▲] key	This is used to increment the program number by 1.
⑨	[▼▼] key	This is used to decrement the program number by 1.

6.2 RB-649



①	VG series connector	Connector used to connect the remote control box to the VG series generator.
②	Output control key	These are used to switch the output. When a key is selected, its LED lights. ☞ Refer to “2.2.6 Switching the output video signals and sync signals.”
③	The keys listed below are used while the program data is being executed or edited. When a key is selected, its LED lights.	
	[SHIFT] key	This is used to select NEGA or POSI for HS and VS.
	[GROUP] key	This is used to set the group numbers.
	[SET] key	This is used to execute the program data.
④	Number keys	These are used for data input.
⑤	Pattern keys	These are used to select patterns or switch outputs. When a key is selected, its LED lights.
⑥	H-T key	This is used to change the output level.
⑦	SET key	This is used to execute the program data.
⑧	FUNC key	This is pressed first when a function is to be selected. When it is selected, its LED lights.
⑨	INC key	This is used to increment the program number by 1.
⑩	DEC key	This is used to decrement the program number by 1.

6.3 RB-614C



①	VG series connector	Connector used to connect the remote control box to the VG series generator.
②	INC key	This is used to increment the program number by 1.
③	DEC key	This is used to decrement the program number by 1.
④	Number keys	These are used for data input.
⑤	Pattern keys	These are used to select patterns or switch outputs. When a key is selected, its LED lights.
⑥	Output control key	These are used to switch the output. When a key is selected, its LED lights. ☞ Refer to “2.2.6 Switching the output video signals and sync signals.”
⑦	H-T key	This is used to change the output level.

6.4 Connections

Connect the connecting cable of the RB-1848, RB-649 or RB-614C remote control box to the remote connector on the front panel of the VG-880 generator.

7 REFERENCE

This chapter contains information on the following subjects.

7.1 Internal data

7.1.1 Program data

Commentary

* The blank parts of the timing data are undefined (blank) data.
* The blank parts of the pattern data are undefined (blank) data.
* The default timing and default pattern data are set in the numbers not given.
* “N” and “P” used for sync polarity denote negative and positive, respectively.
* The value calculated for two fields is displayed on the LCD screen as the vertical frequency during interlace scanning. The value calculated for one field is used in this manual.

Program No.1001 to 1035

Program No.	Horizontal frequency [KHz]	Vertical frequency [Hz]	Dot clock frequency [MHz]	Number of display dots (H×V)	Int / Prog	Sync polarity		SyncType	Color difference	Timing data name	Pattern data name
						H	V				
1001	31.47	59.94	25.175	640×480	Prog	N	N	ANALOG	RGB	EIA640×480p@59.94	Color Bar 100/100-H
1002	31.50	60.00	25.200	640×480	Prog	N	N	ANALOG	RGB	EIA640×480p@60	Color Bar 100/75-H
1003	31.47	59.94	27.000	720×480	Prog	N	N	ANALOG	YPbPr	EIA720×480p@59.94	Color Bar 75/75-H
1004	31.50	60.00	27.027	720×480	Prog	N	N	ANALOG	YPbPr	EIA720×480p@60	Color Bar SMPTE
1005	31.47	59.94	27.000	720×480	Prog	N	N	ANALOG	YPbPr	EIA720×480pW@59.94	Color Bar RGBW-V
1006	31.50	60.00	27.027	720×480	Prog	N	N	ANALOG	YPbPr	EIA720×480pW@60	Color Bar xvYCC 4%
1007	44.96	59.94	74.176	1280×720	Prog	P	P	HDTV720	YPbPr	EIA1280×720p@59.94	Color Bar xvYCC 8%
1008	45.00	60.00	74.250	1280×720	Prog	P	P	HDTV720	YPbPr	EIA1280×720p@60	Color Bar xvYCC 12%
1009	33.72	59.94	74.176	1920×1080	Int	P	P	HDTV1080	YPbPr	EIA1920×1080i@59.94	Color Bar 00/100-H2
1010	33.75	60.00	74.250	1920×1080	Int	P	P	HDTV1080	YPbPr	EIA1920×1080i@60	
1011	15.73	59.94	27.000	1440×480	Int	N	N	ANALOG	YPbPr	EIA1440×480i@59.94	
1012	15.75	60.00	27.028	1440×480	Int	N	N	ANALOG	YPbPr	EIA1440×480i@60	
1013	15.73	59.94	27.000	1440×480	Int	N	N	ANALOG	YPbPr	EIA1440×480iW@59.94	
1014	15.75	60.00	27.028	1440×480	Int	N	N	ANALOG	YPbPr	EIA1440×480iW@60	
1015	15.73	60.05	27.000	1440×240	Prog	N	N	ANALOG	YPbPr	EIA1440×240p@59.94	
1016	15.75	60.12	27.028	1440×240	Prog	N	N	ANALOG	YPbPr	EIA1440×240p@60	
1017	15.73	59.83	27.000	1440×240	Prog	N	N	ANALOG	YPbPr	EIA1440×240p@59.94	
1018	15.75	59.89	27.028	1440×240	Prog	N	N	ANALOG	YPbPr	EIA1440×240p@60	
1019	15.73	60.05	27.000	1440×240	Prog	N	N	ANALOG	YPbPr	EIA1440×240pW@59.94	
1020	15.75	60.12	27.028	1440×240	Prog	N	N	ANALOG	YPbPr	EIA1440×240pW@60	
1021	15.73	59.83	27.000	1440×240	Prog	N	N	ANALOG	YPbPr	EIA1440×240pW@59.94	
1022	15.75	59.89	27.028	1440×240	Prog	N	N	ANALOG	YPbPr	EIA1440×240pW@60	
1023	15.73	59.94	54.000	2880×480	Int	N	N	ANALOG	YPbPr	EIA2880×480i@59.94	
1024	15.75	60.00	54.054	2880×480	Int	N	N	ANALOG	YPbPr	EIA2880×480i@60	
1025	15.73	59.94	54.000	2880×480	Int	N	N	ANALOG	YPbPr	EIA2880×480iW@59.94	
1026	15.75	60.00	54.054	2880×480	Int	N	N	ANALOG	YPbPr	EIA2880×480iW@60	
1027	15.73	60.05	54.000	2880×240	Prog	N	N	ANALOG	YPbPr	EIA2880×240p@59.94	
1028	15.75	60.11	54.054	2880×240	Prog	N	N	ANALOG	YPbPr	EIA2880×240p@60	
1029	15.73	59.83	54.000	2880×240	Prog	N	N	ANALOG	YPbPr	EIA2880×240p@59.94	
1030	15.75	59.89	54.054	2880×240	Prog	N	N	ANALOG	YPbPr	EIA2880×240p@59.94	
1031	15.73	60.05	54.000	2880×240	Prog	N	N	ANALOG	YPbPr	EIA2880×240pW@59.94	Gray Scale H-4step
1032	15.75	60.11	54.054	2880×240	Prog	N	N	ANALOG	YPbPr	EIA2880×240pW@60	Gray Scale H-8step
1033	15.73	59.83	54.000	2880×240	Prog	N	N	ANALOG	YPbPr	EIA2880×240pW@59.94	Gray Scale H-16step
1034	15.75	59.89	54.054	2880×240	Prog	N	N	ANALOG	YPbPr	EIA2880×240pW@60	Gray Scale H-32step
1035	31.47	59.94	54.000	1440×480	Prog	N	N	ANALOG	YPbPr	EIA1440×480p@59.94	Gray Scale H-64step

Program No.1036 to 1070

Program No.	Horizontal frequency [KHz]	Vertical frequency [Hz]	Dot clock frequency [MHz]	Number of display dots (H×V)	Int / Prog	Sync polarity		SyncType	Color difference	Timing data name	Pattern data name
						H	V				
1036	31.50	60.00	54.054	1440×480	Prog	N	N	ANALOG	YPbPr	EIA1440×480p@60	Gray Scale H-128step
1037	31.47	59.94	54.000	1440×480	Prog	N	N	ANALOG	YPbPr	EIA1440×480pW@59.94	Gray Scale H-256step
1038	31.50	60.00	54.054	1440×480	Prog	N	N	ANALOG	YPbPr	EIA1440×480pW@60	Gray Scale V-4step
1039	67.43	59.94	148.352	1920×1080	Prog	P	P	HDTV1080	YPbPr	EIA1920×1080p@59.94	Gray Scale V-8step
1040	67.50	60.00	148.500	1920×1080	Prog	P	P	HDTV1080	YPbPr	EIA1920×1080p@60	Gray Scale V-16step
1041	31.25	50.00	27.000	720×576	Prog	N	N	ANALOG	YPbPr	EIA720×576p@50	Gray Scale V-32step
1042	31.25	50.00	27.000	720×576	Prog	N	N	ANALOG	YPbPr	EIA720×576pW@50	Gray Scale V-64step
1043	37.50	50.00	74.250	1280×720	Prog	P	P	HDTV720	YPbPr	EIA1280×720p@50	Gray Scale V-128step
1044	28.13	50.00	74.250	1920×1080	Int	P	P	HDTV1080	YPbPr	EIA1920×1080i@50	Gray Scale V-256step
1045	15.63	50.00	27.000	1440×576	Int	N	N	ANALOG	YPbPr	EIA1440×576i@50	Ramp Linear-H
1046	15.63	50.00	27.000	1440×576	Int	N	N	ANALOG	YPbPr	EIA1440×576iW@50	Ramp Linear-V
1047	15.63	50.08	27.000	1440×288	Prog	N	N	ANALOG	YPbPr	EIA1440×288p@50	Ramp Linear-HV
1048	15.63	49.92	27.000	1440×288	Prog	N	N	ANALOG	YPbPr	EIA1440×288p@50	NOT IMPLEMENTED
1049	15.63	49.76	27.000	1440×288	Prog	N	N	ANALOG	YPbPr	EIA1440×288p@50	NOT IMPLEMENTED
1050	15.63	50.08	27.000	1440×288	Prog	N	N	ANALOG	YPbPr	EIA1440×288pW@50	NOT IMPLEMENTED
1051	15.63	49.92	27.000	1440×288	Prog	N	N	ANALOG	YPbPr	EIA1440×288pW@50	Ramp-H 1Level/dot
1052	15.63	49.76	27.000	1440×288	Prog	N	N	ANALOG	YPbPr	EIA1440×288pW@50	
1053	15.63	50.00	54.000	2880×576	Int	N	N	ANALOG	YPbPr	EIA2880×576i@50	NOT IMPLEMENTED
1054	15.63	50.00	54.000	2880×576	Int	N	N	ANALOG	YPbPr	EIA2880×576iW@50	NOT IMPLEMENTED
1055	15.63	50.08	54.000	2880×288	Prog	N	N	ANALOG	YPbPr	EIA2880×288p@50	NOT IMPLEMENTED
1056	15.63	49.92	54.000	2880×288	Prog	N	N	ANALOG	YPbPr	EIA2880×288p@50	NOT IMPLEMENTED
1057	15.63	49.76	54.000	2880×288	Prog	N	N	ANALOG	YPbPr	EIA2880×288p@50	NOT IMPLEMENTED
1058	15.63	50.08	54.000	2880×288	Prog	N	N	ANALOG	YPbPr	EIA2880×288pW@50	NOT IMPLEMENTED
1059	15.63	49.92	54.000	2880×288	Prog	N	N	ANALOG	YPbPr	EIA2880×288pW@50	Ramp 128 R->L L->R
1060	15.63	49.76	54.000	2880×288	Prog	N	N	ANALOG	YPbPr	EIA2880×288pW@50	Ramp 256 R->L L->R
1061	31.25	50.00	54.000	1440×576	Prog	N	N	ANALOG	YPbPr	EIA1440×576p@50	
1062	31.25	50.00	54.000	1440×576	Prog	N	N	ANALOG	YPbPr	EIA1440×576pW@50	
1063	56.25	50.00	148.500	1920×1080	Prog	P	P	HDTV1080	YPbPr	EIA1920×1080p@50	
1064	26.97	23.98	74.176	1920×1080	Prog	P	P	HDTV1080	YPbPr	EIA1920×1080p@23.97	
1065	27.00	24.00	74.250	1920×1080	Prog	P	P	HDTV1080	YPbPr	EIA1920×1080p@24	
1066	28.13	25.00	74.250	1920×1080	Prog	P	P	HDTV1080	YPbPr	EIA1920×1080p@25	
1067	33.72	29.97	74.176	1920×1080	Prog	P	P	HDTV1080	YPbPr	EIA1920×1080p@29.97	
1068	33.75	30.00	74.250	1920×1080	Prog	P	P	HDTV1080	YPbPr	EIA1920×1080p@30	
1069	31.47	59.94	108.000	2880×480	Prog	N	N	ANALOG	YPbPr	EIA2880×480p@59.94	
1070	31.50	60.00	108.108	2880×480	Prog	N	N	ANALOG	YPbPr	EIA2880×480p@60	

Program No.1071 to 1105

Program No.	Horizontal frequency [KHz]	Vertical frequency [Hz]	Dot clock frequency [MHz]	Number of display dots (H×V)	Int / Prog	Sync polarity		SyncType	Color difference	Timing data name	Pattern data name
						H	V				
1071	31.47	59.94	108.000	2880×480	Prog	N	N	ANALOG	YPbPr	EIA2880×480pW@59.94	Ramp Linear-H Scroll
1072	31.50	60.00	108.108	2880×480	Prog	N	N	ANALOG	YPbPr	EIA2880×480pW@60	Ramp Linear-V Scroll
1073	31.25	50.00	108.000	2880×576	Prog	N	N	ANALOG	YPbPr	EIA2880×576p@50	Ramp Linear-HV Scrol
1074	31.25	50.00	108.000	2880×576	Prog	N	N	ANALOG	YPbPr	EIA2880×576pW@50	
1075	31.25	50.00	72.000	1920×1080	Int	P	N	HDTV1250(AUS)	YPbPr	EIA1920×1080i@50	
1076	56.25	100.00	148.500	1920×1080	Int	P	P	HDTV1080	YPbPr	EIA1920×1080i@100	
1077	75.00	100.00	148.500	1280×720	Prog	P	P	HDTV720	YPbPr	EIA1280×720p@100	
1078	62.50	100.00	54.000	720×576	Prog	N	N	ANALOG	YPbPr	EIA720×576p@100	
1079	62.50	100.00	54.000	720×576	Prog	N	N	ANALOG	YPbPr	EIA720×576pW@100	
1080	31.25	100.00	54.000	1440×576	Int	N	N	ANALOG	YPbPr	EIA1440×576i@100	
1081	31.25	100.00	54.000	1440×576	Int	N	N	ANALOG	YPbPr	EIA1440×576iW@100	
1082	67.43	119.88	148.352	1920×1080	Int	P	P	HDTV1080	YPbPr	EIA1920×1080i@119.88	
1083	67.50	120.00	148.500	1920×1080	Int	P	P	HDTV1080	YPbPr	EIA1920×1080i@120	
1084	89.91	119.88	148.352	1280×720	Prog	P	P	HDTV720	YPbPr	EIA1280×720p@119.88	
1085	90.00	120.00	148.500	1280×720	Prog	P	P	HDTV720	YPbPr	EIA1280×720p@120	
1086	62.94	119.88	54.000	720×480	Prog	N	N	ANALOG	YPbPr	EIA720×480p@119.88	
1087	63.00	120.00	54.054	720×480	Prog	N	N	ANALOG	YPbPr	EIA720×480p@120	
1088	62.94	119.88	54.000	720×480	Prog	N	N	ANALOG	YPbPr	EIA720×480pW@119.88	
1089	63.00	120.00	54.054	720×480	Prog	N	N	ANALOG	YPbPr	EIA720×480pW@120	
1090	31.47	119.88	54.000	1440×480	Int	N	N	ANALOG	YPbPr	EIA1440×480i@119.88	
1091	31.50	120.00	54.054	1440×480	Int	N	N	ANALOG	YPbPr	EIA1440×480i@120	
1092	31.47	119.88	54.000	1440×480	Int	N	N	ANALOG	YPbPr	EIA1440×480iW@119.88	
1093	31.50	120.00	54.054	1440×480	Int	N	N	ANALOG	YPbPr	EIA1440×480iW@120	
1094	125.00	200.00	108.000	720×576	Prog	N	N	ANALOG	YPbPr	EIA720×576p@200	
1095	125.00	200.00	108.000	720×576	Prog	N	N	ANALOG	YPbPr	EIA720×576pW@200	
1096	62.50	200.00	108.000	1440×576	Int	N	N	ANALOG	YPbPr	EIA1440×576i@200	
1097	62.50	200.00	108.000	1440×576	Int	N	N	ANALOG	YPbPr	EIA1440×576iW@200	
1098	125.87	239.76	108.000	720×480	Prog	N	N	ANALOG	YPbPr	EIA720×480p@239.76	
1099	126.00	240.00	108.108	720×480	Prog	N	N	ANALOG	YPbPr	EIA720×480p@240	
1100	125.87	239.76	108.000	720×480	Prog	N	N	ANALOG	YPbPr	EIA720×480pW@239.76	
1101	126.00	240.00	108.108	720×480	Prog	N	N	ANALOG	YPbPr	EIA720×480pW@240	Multi Burst 100%
1102	62.94	239.76	108.000	1440×480	Int	N	N	ANALOG	YPbPr	EIA1440×480i@239.76	Multi Burst 50%
1103	63.00	240.00	108.108	1440×480	Int	N	N	ANALOG	YPbPr	EIA1440×480i@240	Sweep
1104	62.94	239.76	108.000	1440×480	Int	N	N	ANALOG	YPbPr	EIA1440×480iW@239.76	NOT IMPLEMENTED
1105	63.00	240.00	108.108	1440×480	Int	N	N	ANALOG	YPbPr	EIA1440×480iW@240	

Program No.1111 to 1159

Program No.	Horizontal frequency [KHz]	Vertical frequency [Hz]	Dot clock frequency [MHz]	Number of display dots (H×V)	Int / Prog	Sync polarity		SyncType	Color difference	Timing data name	Pattern data name
						H	V				
1111											SMPTE RP-133
1112											SMPTE RP-133+Color
1113											Monoscope
1114											Philips
1115											NOT IMPLEMENTED
1121											Raster White
1122											Raster Red
1123											Raster Green
1124											Raster Blue
1125											Raster Black
1126											Raster 50%Gray
1127											Raster Magenta
1128											Raster Cyan
1129											Raster Yellow
1141											Over Scan
1142											AFD 4:3 Type0
1143											AFD 4:3 Type1
1144											AFD 4:3 Type2
1145											AFD 4:3 Type3
1146											AFD 4:3 Type4
1147											AFD 4:3 Type5
1148											AFD 4:3 Type6
1149											AFD 4:3 Type7
1150											AFD 4:3 Type8
1151	31.47	59.94	27.000	720×480	Prog	N	N	ANALOG	YPbPr	EIA480p59-YCC-12	AFD 4:3 Type9
1152	33.72	59.94	74.176	1920×1080	Int	P	P	HDTV1080	YPbPr	EIA1080i59-YCC-12	AFD 4:3 Type10
1153	44.96	59.94	74.176	1280×720	Prog	P	P	HDTV720	YPbPr	EIA720p59-YCC-12	AFD 4:3 Type11
1154	31.47	59.94	25.175	640×480	Prog	N	N	ANALOG	RGB	EIA480p59-YCC-12	AFD 4:3 Type12
1155	67.43	59.94	148.352	1920×1080	Prog	P	P	HDTV1080	YPbPr	EIA1080p59-YCC-12	AFD 16:9 Type0
1156	15.73	59.94	27.000	1440×480	Int	N	N	ANALOG	YPbPr	EIA480i59-YCC-12	AFD 16:9 Type1
1157	27.00	24.00	74.250	1920×1080	Prog	P	P	HDTV1080	YPbPr	EIA1080p24-YCC-12	AFD 16:9 Type2
1158	31.25	50.00	27.000	720×576	Prog	N	N	ANALOG	YPbPr	EIA576p50-YCC-12	AFD 16:9 Type3
1159	28.13	50.00	74.250	1920×1080	Int	P	P	HDTV1080	YPbPr	EIA1080i50-YCC-12	AFD 16:9 Type4

Program No.1160 to 1203

Program No.	Horizontal frequency [KHz]	Vertical frequency [Hz]	Dot clock frequency [MHz]	Number of display dots (H×V)	Int / Prog	Sync polarity		SyncType	Color difference	Timing data name	Pattern data name
						H	V				
1160	37.50	50.00	74.250	1280×720	Prog	P	P	HDTV720	YPbPr	EIA720p50-YCC-12	AFD 16:9 Type5
1161	56.25	50.00	148.500	1920×1080	Prog	P	P	HDTV1080	YPbPr	EIA1080p50-YCC-12	AFD 16:9 Type6
1162	15.63	50.00	27.000	1440×576	Int	N	N	ANALOG	YPbPr	EIA576i50-YCC-12	AFD 16:9 Type7
1163	28.13	25.00	74.250	1920×1080	Prog	P	P	HDTV1080	YPbPr	EIA1080p25-YCC-12	AFD 16:9 Type8
1164											AFD 16:9 Type9
1165											AFD 16:9 Type10
1166											AFD 16:9 Type11
1167											AFD 16:9 Type12
1171	31.47	59.94	27.000	720×480	Prog	N	N	ANALOG	YPbPr	EIA480p59-RGB-12	
1172	33.72	59.94	74.176	1920×1080	Int	P	P	HDTV1080	YPbPr	EIA1080i59-RGB-12	
1173	44.96	59.94	74.176	1280×720	Prog	P	P	HDTV720	YPbPr	EIA720p59-RGB-12	
1174	31.47	59.94	25.175	640×480	Prog	N	N	ANALOG	RGB	EIA480p59-RGB-12	
1175	67.43	59.94	148.352	1920×1080	Prog	P	P	HDTV1080	YPbPr	EIA1080p59-RGB-12	
1176	15.73	59.94	27.000	1440×480	Int	N	N	ANALOG	YPbPr	EIA480i59-RGB-12	
1177	27.00	24.00	74.250	1920×1080	Prog	P	P	HDTV1080	YPbPr	EIA1080p24-RGB-12	
1178	31.25	50.00	27.000	720×576	Prog	N	N	ANALOG	YPbPr	EIA576p50-RGB-12	
1179	28.13	50.00	74.250	1920×1080	Int	P	P	HDTV1080	YPbPr	EIA1080i50-RGB-12	
1180	37.50	50.00	74.250	1280×720	Prog	P	P	HDTV720	YPbPr	EIA720p50-RGB-12	
1181	56.25	50.00	148.500	1920×1080	Prog	P	P	HDTV1080	YPbPr	EIA1080p50-RGB-12	
1182	15.63	50.00	27.000	1440×576	Int	N	N	ANALOG	YPbPr	EIA576i50-RGB-12	
1183	28.13	25.00	74.250	1920×1080	Prog	P	P	HDTV1080	YPbPr	EIA1080p25-RGB-12	
1191	33.72	59.94	74.176	1920×1080	Int	P	P	HDTV1080	YPbPr	EIA1080i59-YCC-12-xv	
1192	44.96	59.94	74.176	1280×720	Prog	P	P	HDTV720	YPbPr	EIA720p59-YCC-12-xv	
1193	67.43	59.94	148.352	1920×1080	Prog	P	P	HDTV1080	YPbPr	EIA1080p59-YCC-12-xv	
1194	27.00	24.00	74.250	1920×1080	Prog	P	P	HDTV1080	YPbPr	EIA1080p24-YCC-12-xv	
1195	28.13	50.00	74.250	1920×1080	Int	P	P	HDTV1080	YPbPr	EIA1080i50-YCC-12-xv	
1196	37.50	50.00	74.250	1280×720	Prog	P	P	HDTV720	YPbPr	EIA720p50-YCC-12-xv	
1197	56.25	50.00	148.500	1920×1080	Prog	P	P	HDTV1080	YPbPr	EIA1080p50-YCC-12-xv	
1198	28.13	25.00	74.250	1920×1080	Prog	P	P	HDTV1080	YPbPr	EIA1080p25-YCC-12-xv	
1201											Checker 1dot*1dot
1202											Checker 2dot*1dot
1203											Checker 4dot*1dot

Program No.1204 to 1283

Program No.	Horizontal frequency [KHz]	Vertical frequency [Hz]	Dot clock frequency [MHz]	Number of display dots (H×V)	Int / Prog	Sync polarity		SyncType	Color difference	Timing data name	Pattern data name
						H	V				
1204											Checker 4*4
1205											Checker 8*8
1206											SubPixel
1221											Character List 7*9
1222											Character all H5*7
1223											Character all H7*9
1224											Character all H16*16
1225											Chara Cor&Cen H5*7
1226											Chara Cor&Cen H7*9
1227											Chara Cor&Cen H16*16
1228											Chara all Chinese
1229											Chara all me
1230											Chara all me(VESA)
1241											Cross Hatch
1251											Dot H=20,V=20
1252											Dot H=60,V=60
1261											Edge Marker
1262											Diagonal Line
1263											Center Marker
1271											Circle Format0
1272											Circle Format1
1273											Circle Format2
1274											Circle Format3
1275											Circle Format4
1276											Circle Format5
1277											Circle Format6
1281											Burst L->R
1282											Burst L<-R
1283											Burst L<-C->R

Program No.1284 to 1329

Program No.	Horizontal frequency [KHz]	Vertical frequency [Hz]	Dot clock frequency [MHz]	Number of display dots (H×V)	Int / Prog	Sync polarity		SyncType	Color difference	Timing data name	Pattern data name
						H	V				
1284											Burst L->C<-R
1285											Burst T->B
1286											Burst T<-B
1287											Burst T<-C->B
1288											Burst T->C<-B
1301											1 Window
1302											4 Window
1303											9 Window
1304											16 Window
1305											25 Window
1306											64 Window
1307											3 Window in V Row
1308											3 Window in H Row
1309											User pos-Center
1310											User pos-Corner
1311											Window Scroll: Left
1312											Window Scroll: Right
1313											Window Scroll: Up
1314											Window Scroll: Down
1315											Window Scroll: s Up
1316											Window Scroll: L Down
1317											Window Scroll: R Up
1318											Window Scroll: R Down
1319											Window Scroll: L<->R
1320											Window Scroll: Up<->D
1321											Window Scroll: Random
1322											Window & Monoscope
1323											Window 2-3pull down
1324											Window HV Size 0%
1325											Window HV Size 5%
1326											Window HV Size 10%
1327											Window HV Size 20%
1328											Window HV Size 30%
1329											Window HV Size 40%

Program No.1330 to 1422

Program No.	Horizontal frequency [KHz]	Vertical frequency [Hz]	Dot clock frequency [MHz]	Number of display dots (H×V)	Int / Prog	Sync polarity		SyncType	Color difference	Timing data name	Pattern data name
						H	V				
1330											Window HV Size 50%
1331											Window HV Size 60%
1332											Window HV Size 70%
1333											Window HV Size 80%
1334											Window HV Size 90%
1335											Window HV Size 100%
1336											Window Flicker 1V
1337											Window Flicker 2V
1338											Window Flicker 3V
1339											Window Flicker 4V
1340											Window Auto Level
1341											Moving Bar
1401	31.47	59.94	27.000	720×483	Prog	N	N	ANALOG	YPbPr	NTSC PROG.	256-Color Block
1402	31.47	59.94	27.000	720×483	Prog	N	N	ANALOG	YPbPr	NTSC PROG. W	64Gray Block White->
1403	31.47	59.94	27.000	720×483	Prog	N	N	ANALOG	YPbPr	NTSC PROG. LB	64Gray Block Black->
1404	33.72	59.94	74.176	1920×1080	Int	P	P	HDTV1080	YPbPr	1920×1080@59.94i	8-Color & 16-Gray
1405	33.75	60.00	74.250	1920×1080	Int	P	P	HDTV1080	YPbPr	1920×1080@60i	Gray & Cross Hatch
1406	67.43	59.94	148.352	1920×1080	Prog	P	P	HDTV1080	YPbPr	1920×1080@59.94p	Color & Cross Hatch
1407	67.50	60.00	148.500	1920×1080	Prog	P	P	HDTV1080	YPbPr	1920×1080@60p	Color Temperature
1408	44.96	59.94	74.176	1280×720	Prog	P	P	HDTV720	YPbPr	1280×720@59.94p	Pairing
1409	45.00	60.00	74.250	1280×720	Prog	P	P	HDTV720	YPbPr	1280×720@60p	Cross & Circle & Gray
1410	15.73	59.94	13.500	712×484	Int	N	N	NTSC	YPbPr	NTSC-J 4:3	Cross&Circle&Color & H
1411											Circle & Line
1412											H-Character Line
1413											O-Character Line
1414											Cross Talk W=90%
1415											Sign Wave Scroll
1416	31.25	50.00	27.000	720×576	Prog	N	N	ANALOG	YPbPr	PAL PROG.	1/10MHz×10step
1417	31.25	50.00	27.000	720×576	Prog	N	N	ANALOG	YPbPr	PAL PROG. W	Gamma Ramp r=2.5
1418	31.25	50.00	27.000	720×576	Prog	N	N	ANALOG	YPbPr	PAL PROG. LB	Gamma Ramp r=2.0
1419	28.13	50.00	74.250	1920×1080	Int	P	P	HDTV1080	YPbPr	1920×1080@50i	Gamma Ramp r=0.5
1420	56.25	50.00	148.500	1920×1080	Prog	P	P	HDTV1080	YPbPr	1920×1080@50p	SMPTE RP-27.1
1421	37.50	50.00	74.250	1280×720	Prog	P	P	HDTV720	YPbPr	1280×720@50p	ITC 9-Window
1422	15.63	50.00	13.500	702×574	Int	N	N	PAL	YPbPr	PAL 4:3	ITC Cross & Marker

Program No.1423 to 1507

Program No.	Horizontal frequency [KHz]	Vertical frequency [Hz]	Dot clock frequency [MHz]	Number of display dots (H×V)	Int / Prog	Sync polarity		SyncType	Color difference	Timing data name	Pattern data name
						H	V				
1423											ITC H-Character
1424											64-Gray & RGBW-Color
1425											Gray & Circle
1426	33.72	29.97	74.176	1920×1080	Prog	P	P	HDTV1080	YPbPr	1920×1080@29.97p	Corner & Center Marker
1427	33.75	30.00	74.250	1920×1080	Prog	P	P	HDTV1080	YPbPr	1920×1080@30p	Cross Talk W=60%
1428	26.97	23.98	74.176	1920×1080	Prog	P	P	HDTV1080	YPbPr	1920×1080@23.98p	SpeakerCheck / Youth
1429	27.00	24.00	74.250	1920×1080	Prog	P	P	HDTV1080	YPbPr	1920×1080@24p	Cross & Marker 1
1430	28.13	25.00	74.250	1920×1080	Prog	P	P	HDTV1080	YPbPr	1920×1080@25p	256-Color <Color>
1431	33.72	59.94	74.176	1920×1080	Int	P	P	HDTV1080	YPbPr	1920×1080@29.97sf	256-Color Random
1432	33.75	60.00	74.250	1920×1080	Int	P	P	HDTV1080	YPbPr	1920×1080@30sf	NOT IMPLEMENTED
1433	26.97	47.96	74.176	1920×1080	Int	P	P	HDTV1080	YPbPr	1920×1080@23.98sf	Corner & Center Window
1434	27.00	48.00	74.250	1920×1080	Int	P	P	HDTV1080	YPbPr	1920×1080@24sf	3gray-Window
1435	28.13	50.00	74.250	1920×1080	Int	P	P	HDTV1080	YPbPr	1920×1080@25sf	Cross & Marker 2
1436	22.48	29.97	74.176	1280×720	Prog	P	P	HDTV720	YPbPr	1280×720@29.97p	Circle & Cross Hatch
1437	22.50	30.00	74.250	1280×720	Prog	P	P	HDTV720	YPbPr	1280×720@30p	1dotChecker & Window
1438	17.98	23.98	74.176	1280×720	Prog	P	P	HDTV720	YPbPr	1280×720@23.98p	ANSI Setup
1439	18.00	24.00	74.250	1280×720	Prog	P	P	HDTV720	YPbPr	1280×720@24p	ANSI Contrast
1440	18.75	25.00	74.250	1280×720	Prog	P	P	HDTV720	YPbPr	1280×720@25p	ANSI 9-Point
1441											ANSI H-Resolution
1442											ANSI V-Resolution
1451	33.72	59.94	74.176	1920×1035	Int	P	P	HDTV1080	YPbPr	1920×1035@59.94i	
1452	33.75	60.00	74.250	1920×1035	Int	P	P	HDTV1080	YPbPr	1920×1035@60i	
1453	31.25	50.00	74.250	1920×1080	Int	N	N	HDTV1250	YPbPr	SMPTE295Mi	
1454	62.50	50.00	148.500	1920×1080	Prog	N	N	HDTV1250	YPbPr	SMPTE295Mp	
1455	31.25	50.00	48.000	1280×1152	Int	P	P	HDTV1152(AUS)	YPbPr	AUS 1152i	
1456	31.25	50.00	72.000	1920×1080	Int	P	N	HDTV1250(AUS)	YPbPr	AUS 1080i	
1501	15.73	59.94	13.500	712×484	Int	N	N	NTSC	YPbPr	NTSC-J 4:3	Timing Data
1502	15.73	59.94	13.500	712×484	Int	N	N	NTSC	YPbPr	NTSC-J 16:9	
1503	15.73	59.94	13.500	712×484	Int	N	N	NTSC	YPbPr	NTSC-J LB	
1504	15.63	50.00	13.500	702×574	Int	N	N	PAL	YPbPr	PAL 4:3	
1505	15.63	50.00	13.500	702×574	Int	N	N	PAL	YPbPr	PAL 16:9	
1506	15.63	50.00	13.500	702×574	Int	N	N	PAL	YPbPr	PAL LB	
1507	15.63	50.00	13.500	702×574	Int	N	N	SECAM	YPbPr	SECAM 4:3	

Program No.1508 to 1552

Program No.	Horizontal frequency [KHz]	Vertical frequency [Hz]	Dot clock frequency [MHz]	Number of display dots (H×V)	Int / Prog	Sync polarity		SyncType	Color difference	Timing data name	Pattern data name
						H	V				
1508	15.63	50.00	13.500	702×574	Int	N	N	SECAM	YPbPr	SECAM 16:9	
1509	15.63	50.00	13.500	702×574	Int	N	N	SECAM	YPbPr	SECAM LB	
1510	15.73	59.94	13.500	712×484	Int	N	N	NTSC-M	YPbPr	NTSC-M	
1511	15.73	59.94	13.500	712×484	Int	N	N	NTSC-443	YPbPr	NTSC-443	Timing Data
1512	15.73	59.94	13.500	712×484	Int	N	N	PAL-M	YPbPr	PAL-M	
1513	15.73	59.94	13.500	712×484	Int	N	N	PAL-60	YPbPr	PAL-60	
1514	15.63	50.00	13.500	718×572	Int	N	N	PAL-N	YPbPr	PAL-N	
1515	15.63	50.00	13.500	702×574	Int	N	N	PAL-Nc	YPbPr	PAL-Nc	
1521	15.73	59.94	13.500	712×484	Int	N	N	NTSC-M	YPbPr	Closed Caption CC1	Timing Data
1522	15.73	59.94	13.500	712×484	Int	N	N	NTSC-M	YPbPr	Closed Caption CC2	
1523	15.73	59.94	13.500	712×484	Int	N	N	NTSC-M	YPbPr	Closed Caption Text1	
1524	15.73	59.94	13.500	712×484	Int	N	N	NTSC-M	YPbPr	Closed Caption Text2	
1525	15.73	59.94	13.500	712×484	Int	N	N	NTSC-M	YPbPr	V Chip MPAA G	
1526	15.73	59.94	13.500	712×484	Int	N	N	NTSC-M	YPbPr	V Chip MPAA X	
1527	15.73	59.94	13.500	712×484	Int	N	N	NTSC-M	YPbPr	V Chip US TV-Y	
1528	15.73	59.94	13.500	712×484	Int	N	N	NTSC-M	YPbPr	V Chip US TV-MA-VSL	
1531	15.63	50.00	13.500	702×574	Int	N	N	PAL	YPbPr	PAL TELETEXT	EDID DVI1
1532											EDID DVI1(HEX)
1533											EDID DVI2
1534											EDID DVI2(HEX)
1535											EDID HDMI1
1536											EDID HDMI1(HEX)
1537											EDID HDMI2
1538											EDID HDMI2(HEX)
1539											EDID PC-DVI
1540											EDID PC-DVI(HEX)
1541	15.73	59.94	13.500	712×484	Int	N	N	NTSC	YPbPr	Mac NTSC-J DVD Type1	EDID PC-VGA
1542	15.73	59.94	13.500	712×484	Int	N	N	NTSC	YPbPr	Mac NTSC-J DVD Type2	EDID PC-VGA(HEX)
1543	15.73	59.94	13.500	712×484	Int	N	N	NTSC	YPbPr	Mac NTSC-J DVD Type3	EDID TV-VGA
1544	15.63	50.00	13.500	702×574	Int	N	N	PAL	YPbPr	Mac PAL DVD	EDID TV-VGA(HEX)
1551	15.63	50.00	13.500	702×574	Int	N	N	PAL	YPbPr	SCART PAL VBS 4:3	
1552	15.63	50.00	13.500	702×574	Int	N	N	PAL	YPbPr	SCART PAL Y/C 4:3	

Program No.1553 to 1609

Program No.	Horizontal frequency [KHz]	Vertical frequency [Hz]	Dot clock frequency [MHz]	Number of display dots (H×V)	Int / Prog	Sync polarity		SyncType	Color difference	Timing data name	Pattern data name
						H	V				
1553	15.63	50.00	13.500	702×574	Int	N	N	PAL	YPbPr	SCART PAL RGB 4:3	
1554	15.63	50.00	13.500	702×574	Int	N	N	PAL	YPbPr	SCART PAL VBS 16:9	
1555	15.63	50.00	13.500	702×574	Int	N	N	PAL	YPbPr	SCART PAL TELETEXT	
1561											Timing Data
1562											Timing Data
1563											Timing Data
1564											Timing Data
1565											Timing Data
1566											Timing Data
1567											Timing Data
1568											Timing Data
1569											Timing Data
1570											Timing Data
1571											Timing Data
1572											Timing Data
1573											Timing Data
1574											Timing Data
1575											Timing Data
1576											Timing Data
1577											Timing Data
1578											Timing Data
1579											Timing Data
1580											Timing Data
1581											Timing Data
1601	37.86	85.08	31.500	640×350	Prog	P	N	ANALOG	RGB	VESA640×350@85	
1602	37.86	85.08	31.500	640×400	Prog	N	P	ANALOG	RGB	VESA640×400@85	
1603	37.93	85.04	35.500	720×400	Prog	N	P	ANALOG	RGB	VESA720×400@85	
1604	31.47	59.94	25.175	640×480	Prog	N	N	ANALOG	RGB	VESA640×480@60	
1605	37.86	72.81	31.500	640×480	Prog	N	N	ANALOG	RGB	VESA640×480@72	
1606	37.50	75.00	31.500	640×480	Prog	N	N	ANALOG	RGB	VESA640×480@75	
1607	43.27	85.01	36.000	640×480	Prog	N	N	ANALOG	RGB	VESA640×480@85	
1608	35.16	56.25	36.000	800×600	Prog	P	P	ANALOG	RGB	VESA800×600@56	
1609	37.88	60.32	40.000	800×600	Prog	P	P	ANALOG	RGB	VESA800×600@60	

Program No.1610 to 1644

Program No.	Horizontal frequency [KHz]	Vertical frequency [Hz]	Dot clock frequency [MHz]	Number of display dots (H×V)	Int / Prog	Sync polarity		SyncType	Color difference	Timing data name	Pattern data name
						H	V				
1610	48.08	72.19	50.000	800×600	Prog	P	P	ANALOG	RGB	VESA800×600@72	
1611	46.88	75.00	49.500	800×600	Prog	P	P	ANALOG	RGB	VESA800×600@75	
1612	53.67	85.06	56.250	800×600	Prog	P	P	ANALOG	RGB	VESA800×600@85	
1613	76.30	119.97	73.250	800×600	Prog	P	N	ANALOG	RGB	VESA800×600@120CVT	
1614	31.02	60.00	33.750	848×480	Prog	P	P	ANALOG	RGB	VESA848×480@60	
1615	35.52	86.96	44.900	1024×768	Int	P	P	ANALOG	RGB	VESA1024×768@43	
1616	48.36	60.00	65.000	1024×768	Prog	N	N	ANALOG	RGB	VESA1024×768@60	
1617	56.48	70.07	75.000	1024×768	Prog	N	N	ANALOG	RGB	VESA1024×768@70	
1618	60.02	75.03	78.750	1024×768	Prog	P	P	ANALOG	RGB	VESA1024×768@75	
1619	68.68	85.00	94.500	1024×768	Prog	P	P	ANALOG	RGB	VESA1024×768@85	
1620	97.55	119.99	115.500	1024×768	Prog	P	N	ANALOG	RGB	VESA1024×768@120CVT	
1621	67.50	75.00	108.000	1152×864	Prog	P	P	ANALOG	RGB	VESA1152×864@75	Timing Data
1622	47.40	59.99	68.250	1280×768	Prog	P	N	ANALOG	RGB	VESA1280×768@60	Timing Data
1623	47.78	59.87	79.500	1280×768	Prog	N	P	ANALOG	RGB	VESA1280×768@60	Timing Data
1624	60.29	74.89	102.250	1280×768	Prog	N	P	ANALOG	RGB	VESA1280×768@75	Timing Data
1625	68.63	84.84	117.500	1280×768	Prog	N	P	ANALOG	RGB	VESA1280×768@85	Timing Data
1626	97.40	119.80	140.250	1280×768	Prog	P	N	ANALOG	RGB	VESA1280×768@120CVT	Timing Data
1627	49.31	59.91	71.000	1280×800	Prog	P	N	ANALOG	RGB	VESA1280×800@60CVT	
1628	49.70	59.81	83.500	1280×800	Prog	N	P	ANALOG	RGB	VESA1280×800@60	
1629	62.79	74.93	106.500	1280×800	Prog	N	P	ANALOG	RGB	VESA1280×800@75	
1630	71.55	84.88	122.500	1280×800	Prog	N	P	ANALOG	RGB	VESA1280×800@85	
1631	101.56	119.91	146.250	1280×800	Prog	P	N	ANALOG	RGB	VESA1280×800@120CVT	
1632	60.00	60.00	108.000	1280×960	Prog	P	P	ANALOG	RGB	VESA1280×960@60	
1633	85.94	85.00	148.500	1280×960	Prog	P	P	ANALOG	RGB	VESA1280×960@85	
1634	121.88	119.84	175.500	1280×960	Prog	P	N	ANALOG	RGB	VESA1280×960@120CVT	
1635	63.98	60.02	108.000	1280×1024	Prog	P	P	ANALOG	RGB	VESA1280×1024@60	
1636	79.98	75.02	135.000	1280×1024	Prog	P	P	ANALOG	RGB	VESA1280×1024@75	
1637	91.15	85.02	157.500	1280×1024	Prog	P	P	ANALOG	RGB	VESA1280×1024@85	
1638	130.03	119.96	187.250	1280×1024	Prog	P	N	ANALOG	RGB	VESA1280×1024@120CVT	
1639	47.71	60.02	85.500	1360×768	Prog	P	P	ANALOG	RGB	VESA1360×768@60	
1640	97.53	119.97	148.250	1360×768	Prog	P	N	ANALOG	RGB	VESA1360×768@120CVT	
1641	64.74	59.95	101.000	1400×1050	Prog	P	N	ANALOG	RGB	VESA1400×1050@60	
1642	65.32	59.98	121.750	1400×1050	Prog	N	P	ANALOG	RGB	VESA1400×1050@60	
1643	82.28	74.87	156.000	1400×1050	Prog	N	P	ANALOG	RGB	VESA1400×1050@75	
1644	93.88	84.96	179.500	1400×1050	Prog	N	P	ANALOG	RGB	VESA1400×1050@85	

Program No.1645 to 1851

Program No.	Horizontal frequency [KHz]	Vertical frequency [Hz]	Dot clock frequency [MHz]	Number of display dots (H×V)	Int / Prog	Sync polarity		SyncType	Color difference	Timing data name	Pattern data name
						H	V				
1645	133.33	119.90	208.000	1400×1050	Prog	P	N	ANALOG	RGB	VESA1400×1050@120CVT	
1646	55.47	59.90	88.750	1440×900	Prog	P	N	ANALOG	RGB	VESA1440×900@60CVT	
1647	55.93	59.89	106.500	1440×900	Prog	P	N	ANALOG	RGB	VESA1440×900@60	
1648	70.64	74.98	136.750	1440×900	Prog	N	P	ANALOG	RGB	VESA1440×900@75	
1649	80.43	84.84	157.000	1440×900	Prog	N	P	ANALOG	RGB	VESA1440×900@85	
1650	114.22	119.85	182.750	1440×900	Prog	P	N	ANALOG	RGB	VESA1440×900@120CVT	
1651	75.00	60.00	162.000	1600×1200	Prog	P	P	ANALOG	RGB	VESA1600×1200@60	
1652	81.25	65.00	175.500	1600×1200	Prog	P	P	ANALOG	RGB	VESA1600×1200@65	
1653	87.50	70.00	189.000	1600×1200	Prog	P	P	ANALOG	RGB	VESA1600×1200@70	
1654	93.75	75.00	202.500	1600×1200	Prog	P	P	ANALOG	RGB	VESA1600×1200@75	
1655	106.25	85.00	229.500	1600×1200	Prog	P	P	ANALOG	RGB	VESA1600×1200@85	
1656	152.41	119.92	268.250	1600×1200	Prog	P	N	ANALOG	RGB	VESA1600×1200@120CVT	
1657	64.67	59.88	119.000	1680×1050	Prog	P	N	ANALOG	RGB	VESA1680×1050@60CVT	
1658	65.29	59.95	146.250	1680×1050	Prog	N	P	ANALOG	RGB	VESA1680×1050@60	
1659	82.31	74.89	187.000	1680×1050	Prog	N	P	ANALOG	RGB	VESA1680×1050@75	
1660	93.86	84.94	214.750	1680×1050	Prog	N	P	ANALOG	RGB	VESA1680×1050@85	
1661	133.42	119.99	245.500	1680×1050	Prog	P	N	ANALOG	RGB	VESA1680×1050@120CVT	
1662	83.64	60.00	204.750	1792×1344	Prog	N	P	ANALOG	RGB	VESA1792×1344@60	
1663	106.27	75.00	261.000	1792×1344	Prog	N	P	ANALOG	RGB	VESA1792×1344@75	
1664	170.72	119.97	333.250	1792×1344	Prog	P	N	ANALOG	RGB	VESA1792×1344@120CVT	
1665	86.33	60.00	218.250	1856×1392	Prog	N	P	ANALOG	RGB	VESA1856×1392@60	
1666	112.50	75.00	288.000	1856×1392	Prog	N	P	ANALOG	RGB	VESA1856×1392@75	
1668	74.04	59.95	154.000	1920×1200	Prog	P	N	ANALOG	RGB	VESA1920×1200@60	
1669	74.56	59.88	193.250	1920×1200	Prog	N	P	ANALOG	RGB	VESA1920×1200@60	
1670	94.04	74.93	245.250	1920×1200	Prog	N	P	ANALOG	RGB	VESA1920×1200@75	
1671	107.18	84.93	281.250	1920×1200	Prog	N	P	ANALOG	RGB	VESA1920×1200@85	
1672	152.40	119.91	317.000	1920×1200	Prog	P	N	ANALOG	RGB	VESA1920×1200@120CVT	
1673	90.00	60.00	234.000	1920×1440	Prog	N	P	ANALOG	RGB	VESA1920×1440@60	
1674	112.50	75.00	297.000	1920×1440	Prog	N	P	ANALOG	RGB	VESA1920×1440@75	
1676	98.71	59.97	268.500	2560×1600	Prog	P	N	ANALOG	RGB	VESA2560×1600@60CVT	
1850	37.86	85.08	31.500	640×400	Prog	N	P	ANALOG	RGB	VESA400-85	Character List
1851	37.86	72.81	31.500	640×480	Prog	N	N	ANALOG	RGB	VESA480-72	Words

Program No.1852 to 1886

Program No.	Horizontal frequency [KHz]	Vertical frequency [Hz]	Dot clock frequency [MHz]	Number of display dots (H×V)	Int / Prog	Sync polarity		SyncType	Color difference	Timing data name	Pattern data name
						H	V				
1852	37.50	75.00	31.500	640×480	Prog	N	N	ANALOG	RGB	VESA480-75	H Character 1
1853	35.16	56.25	36.000	800×600	Prog	P	P	ANALOG	RGB	VESA600-56	H Character 2
1854	37.88	60.32	40.000	800×600	Prog	P	P	ANALOG	RGB	VESA600-60	H Character 3
1855	48.08	72.19	50.000	800×600	Prog	P	P	ANALOG	RGB	VESA600-72	H Character 4
1856	48.36	60.00	65.000	1024×768	Prog	N	N	ANALOG	RGB	VESA768-60	H Character 5
1857	56.48	70.07	75.000	1024×768	Prog	N	N	ANALOG	RGB	VESA768-70	H Character 6
1858	60.02	75.03	78.750	1024×768	Prog	P	P	ANALOG	RGB	VESA768-75	@ Character
1859	79.98	75.02	135.000	1280×1024	Prog	P	P	ANALOG	RGB	VESA1024-75	Chinese Chara1
1860	91.15	85.02	157.500	1280×1024	Prog	P	P	ANALOG	RGB	VESA1024-85	Chinese Chara2
1861	75.00	60.00	162.000	1600×1200	Prog	P	P	ANALOG	RGB	VESA1200-60	Chinese Chara3
1862	81.25	65.00	175.500	1600×1200	Prog	P	P	ANALOG	RGB	VESA1200-65	1 dot ON/OFF
1863	87.50	70.00	189.000	1600×1200	Prog	P	P	ANALOG	RGB	VESA1200-70	me Character 1
1864	93.75	75.00	202.500	1600×1200	Prog	P	P	ANALOG	RGB	VESA1200-75	me Character 2
1865	100.00	80.00	216.000	1600×1200	Prog	P	P	ANALOG	RGB	VESA1200-80	H Character Line
1866	106.25	85.00	229.500	1600×1200	Prog	P	P	ANALOG	RGB	VESA1200-85	O Character Line
1867	98.21	70.05	236.500	1800×1350	Prog	N	P	ANALOG	RGB	VESA1350-70	
1868	18.44	49.83	16.260	720×350	Prog	N	N	ANALOG	RGB	MDA	1line Cross5×5
1869	15.75	60.10	14.360	640×200	Prog	N	N	ANALOG	RGB	CGA	2line Cross5×5
1870	21.85	59.71	16.260	640×350	Prog	N	N	ANALOG	RGB	EGA	NOT IMPLEMENTED
1871	30.48	60.00	24.870	640×400	Prog	N	N	ANALOG	RGB	PGA	2line Cross8×8
1872	31.47	50.03	28.320	720×350	Prog	N	N	ANALOG	RGB	VGA-TEXT350-50	1line Cross10×8
1873	31.47	59.94	28.320	720×350	Prog	N	N	ANALOG	RGB	VGA-TEXT350-60	2line Cross10×8
1874	31.47	70.08	28.320	720×350	Prog	N	N	ANALOG	RGB	VGA-TEXT350-70	1line Cross16×12
1875	31.47	50.03	28.320	720×400	Prog	N	N	ANALOG	RGB	VGA-TEXT400-50	2line Cross16×12
1876	31.47	59.94	28.320	720×400	Prog	N	N	ANALOG	RGB	VGA-TEXT400-60	
1877	31.47	70.08	28.320	720×400	Prog	N	N	ANALOG	RGB	VGA-TEXT400-70	Burst 1
1878	31.47	50.03	25.175	640×350	Prog	N	N	ANALOG	RGB	VGA350-50	Burst 2
1879	31.47	59.94	25.175	640×350	Prog	N	N	ANALOG	RGB	VGA350-60	Burst 3
1880	31.47	70.09	25.175	640×350	Prog	N	N	ANALOG	RGB	VGA350-70	Burst 4
1881	31.47	50.03	25.175	640×400	Prog	N	N	ANALOG	RGB	VGA400-50	
1882	31.47	59.94	25.175	640×400	Prog	N	N	ANALOG	RGB	VGA400-60	Sign Wave Scroll
1883	31.47	70.09	25.175	640×400	Prog	N	N	ANALOG	RGB	VGA400-70	Multi Burst
1884	31.47	50.03	25.175	640×480	Prog	N	N	ANALOG	RGB	VGA480-50	1/10MHz×10step
1885	31.47	59.94	25.175	640×480	Prog	N	N	ANALOG	RGB	VGA480-60	Circle 1
1886	35.16	56.16	36.000	800×600	Prog	N	N	ANALOG	RGB	S-VGA-56	Circle 2

Program No.1852 to 1886

Program No.	Horizontal frequency [KHz]	Vertical frequency [Hz]	Dot clock frequency [MHz]	Number of display dots (H×V)	Int / Prog	Sync polarity		SyncType	Color difference	Timing data name	Pattern data name
						H	V				
1852	37.50	75.00	31.500	640×480	Prog	N	N	ANALOG	RGB	VESA480-75	H Character 1
1853	35.16	56.25	36.000	800×600	Prog	P	P	ANALOG	RGB	VESA600-56	H Character 2
1854	37.88	60.32	40.000	800×600	Prog	P	P	ANALOG	RGB	VESA600-60	H Character 3
1855	48.08	72.19	50.000	800×600	Prog	P	P	ANALOG	RGB	VESA600-72	H Character 4
1856	48.36	60.00	65.000	1024×768	Prog	N	N	ANALOG	RGB	VESA768-60	H Character 5
1857	56.48	70.07	75.000	1024×768	Prog	N	N	ANALOG	RGB	VESA768-70	H Character 6
1858	60.02	75.03	78.750	1024×768	Prog	P	P	ANALOG	RGB	VESA768-75	@ Character
1859	79.98	75.02	135.000	1280×1024	Prog	P	P	ANALOG	RGB	VESA1024-75	Chinese Chara1
1860	91.15	85.02	157.500	1280×1024	Prog	P	P	ANALOG	RGB	VESA1024-85	Chinese Chara2
1861	75.00	60.00	162.000	1600×1200	Prog	P	P	ANALOG	RGB	VESA1200-60	Chinese Chara3
1862	81.25	65.00	175.500	1600×1200	Prog	P	P	ANALOG	RGB	VESA1200-65	1 dot ON/OFF
1863	87.50	70.00	189.000	1600×1200	Prog	P	P	ANALOG	RGB	VESA1200-70	me Character 1
1864	93.75	75.00	202.500	1600×1200	Prog	P	P	ANALOG	RGB	VESA1200-75	me Character 2
1865	100.00	80.00	216.000	1600×1200	Prog	P	P	ANALOG	RGB	VESA1200-80	H Character Line
1866	106.25	85.00	229.500	1600×1200	Prog	P	P	ANALOG	RGB	VESA1200-85	O Character Line
1867	98.21	70.05	236.500	1800×1350	Prog	N	P	ANALOG	RGB	VESA1350-70	
1868	18.44	49.83	16.260	720×350	Prog	N	N	ANALOG	RGB	MDA	1line Cross5×5
1869	15.75	60.10	14.360	640×200	Prog	N	N	ANALOG	RGB	CGA	2line Cross5×5
1870	21.85	59.71	16.260	640×350	Prog	N	N	ANALOG	RGB	EGA	NOT IMPLEMENTED
1871	30.48	60.00	24.870	640×400	Prog	N	N	ANALOG	RGB	PGA	2line Cross8×8
1872	31.47	50.03	28.320	720×350	Prog	N	N	ANALOG	RGB	VGA-TEXT350-50	1line Cross10×8
1873	31.47	59.94	28.320	720×350	Prog	N	N	ANALOG	RGB	VGA-TEXT350-60	2line Cross10×8
1874	31.47	70.08	28.320	720×350	Prog	N	N	ANALOG	RGB	VGA-TEXT350-70	1line Cross16×12
1875	31.47	50.03	28.320	720×400	Prog	N	N	ANALOG	RGB	VGA-TEXT400-50	2line Cross16×12
1876	31.47	59.94	28.320	720×400	Prog	N	N	ANALOG	RGB	VGA-TEXT400-60	
1877	31.47	70.08	28.320	720×400	Prog	N	N	ANALOG	RGB	VGA-TEXT400-70	Burst 1
1878	31.47	50.03	25.175	640×350	Prog	N	N	ANALOG	RGB	VGA350-50	Burst 2
1879	31.47	59.94	25.175	640×350	Prog	N	N	ANALOG	RGB	VGA350-60	Burst 3
1880	31.47	70.09	25.175	640×350	Prog	N	N	ANALOG	RGB	VGA350-70	Burst 4
1881	31.47	50.03	25.175	640×400	Prog	N	N	ANALOG	RGB	VGA400-50	
1882	31.47	59.94	25.175	640×400	Prog	N	N	ANALOG	RGB	VGA400-60	Sign Wave Scroll
1883	31.47	70.09	25.175	640×400	Prog	N	N	ANALOG	RGB	VGA400-70	Multi Burst
1884	31.47	50.03	25.175	640×480	Prog	N	N	ANALOG	RGB	VGA480-50	1/10MHz×10step
1885	31.47	59.94	25.175	640×480	Prog	N	N	ANALOG	RGB	VGA480-60	Circle 1
1886	35.16	56.16	36.000	800×600	Prog	N	N	ANALOG	RGB	S-VGA-56	Circle 2

Program No.1887 to 1921

Program No.	Horizontal frequency [KHz]	Vertical frequency [Hz]	Dot clock frequency [MHz]	Number of display dots (H×V)	Int / Prog	Sync polarity		SyncType	Color difference	Timing data name	Pattern data name
						H	V				
1887	48.08	72.19	50.000	800×600	Prog	N	N	ANALOG	RGB	S-VGA-72	Circle 3
1888	46.88	75.00	49.500	800×600	Prog	N	N	ANALOG	RGB	S-VGA-75	Circle 4
1889	48.08	59.80	65.000	1024×768	Prog	N	N	ANALOG	RGB	XGA-60	Circle 5
1890	53.95	66.11	71.640	1024×768	Prog	N	N	ANALOG	RGB	XGA-66	Circle 6
1891	56.48	70.07	75.000	1024×768	Prog	N	N	ANALOG	RGB	XGA-70	Circle 7
1892	60.68	57.03	100.000	1280×1024	Prog	N	N	ANALOG	RGB	SXGA-57	
1893	63.5	59.68	106.930	1280×1024	Prog	N	N	ANALOG	RGB	SXGA-60A	Window 1
1894	63.75	59.75	110.160	1280×1024	Prog	N	N	ANALOG	RGB	SXGA-60B	Window 2
1895	63.72	60.00	109.470	1280×1024	Prog	N	N	ANALOG	RGB	SXGA-60C	Window 3
1896	78.91	74.16	132.880	1280×1024	Prog	N	N	ANALOG	RGB	SXGA-70	Window 4
1897	74.63	59.94	160.000	1600×1200	Prog	N	N	ANALOG	RGB	UXGA1200-60	Window 5
1898	107.42	85.05	220.000	1600×1200	Prog	N	N	ANALOG	RGB	UXGA1200-85A	Window 6
1899	106.48	85.05	230.000	1600×1200	Prog	N	N	ANALOG	RGB	UXGA1200-85B	Moving Window 1
1900	107.42	80.05	220.000	1600×1280	Prog	N	N	ANALOG	RGB	UXGA1280-80A	Moving Window 2
1901	106.48	80.06	230.000	1600×1280	Prog	N	N	ANALOG	RGB	UXGA1280-80B	Moving Window 3
1902	106.4	80.00	238.340	1600×1280	Prog	N	N	ANALOG	RGB	UXGA1280-80C	Window Level
1903	109.82	80.40	246.000	1600×1280	Prog	N	N	ANALOG	RGB	UXGA1280-82	Flicker Window 1
1904	35.52	86.96	44.900	1024×768	Int	N	N	ANALOG	RGB	IBM 8514A	Flicker Window 2
1905	63.36	60.00	89.210	1024×1024	Prog	N	N	ANALOG	RGB	IBM 5080	Flicker Window 3
1906	29.58	73.14	24.020	640×754	Int	N	N	ANALOG	RGB	IBM 5550	Flicker Window 4
1907	63.36	60.00	111.520	1280×1024	Prog	N	N	ANALOG	RGB	IBM 6000	
1908	15.71	59.98	6.380	323×246	Prog	N	N	ANALOG	RGB	NAVIGATION	Color Bar 1
1909	35	66.67	30.240	640×480	Prog	N	N	ANALOG	RGB	Mac 480-66A	Color Bar 2
1910	34.97	66.60	31.330	640×480	Prog	N	N	ANALOG	RGB	Mac 480-66B	Color Bar 3
1911	48.83	66.89	50.000	800×600	Prog	N	N	ANALOG	RGB	Mac 600-66	Color Bar 4
1912	49.72	74.55	57.280	832×624	Prog	N	N	ANALOG	RGB	Mac 624-57	Color Bar 5
1913	48.78	59.56	64.000	1024×768	Prog	N	N	ANALOG	RGB	Mac 768-60	Color Bar 6
1914	60.24	74.93	80.000	1024×768	Prog	N	N	ANALOG	RGB	Mac 768-75	Color Temp.
1915	68.68	75.06	100.000	1152×870	Prog	N	N	ANALOG	RGB	Mac 870-75	Random 256 Color
1916	24.82	56.42	21.050	640×400	Prog	N	N	ANALOG	RGB	NEC PC9801	256 Color Chara
1917	32.86	79.84	47.840	1120×750	Int	N	N	ANALOG	RGB	NEC PC9801XL	256 Block Color
1918	50.02	60.05	78.430	1120×750	Prog	N	N	ANALOG	RGB	NEC 768-60A	8Color & 16Gray
1919	56.48	70.07	75.000	1024×768	Prog	N	N	ANALOG	RGB	NEC 768-70	Gray 4 step
1920	64.6	59.93	107.500	1280×1024	Prog	N	N	ANALOG	RGB	NEC 1024-60	Gray 8 step(H)
1921	74.88	69.85	127.000	1280×1024	Prog	N	N	ANALOG	RGB	NEC 1024-70	Gray 16 step(H)

Program No.1922 to 1956

Program No.	Horizontal frequency [KHz]	Vertical frequency [Hz]	Dot clock frequency [MHz]	Number of display dots (H×V)	Int / Prog	Sync polarity		SyncType	Color difference	Timing data name	Pattern data name
						H	V				
1922	78.86	74.11	135.000	1280×1024	Prog	N	N	ANALOG	RGB	NEC 1024-75	Gray 32 step(H)
1923	48.36	60.08	65.000	1024×768	Prog	N	N	ANALOG	RGB	NEC 768-60B	Gray 64 step(H)
1924	61.8	65.95	92.940	1152×900	Prog	N	N	ANALOG	RGB	SUN 900-66	Gray256 step(H)
1925	71.73	76.07	105.590	1152×900	Prog	N	N	ANALOG	RGB	SUN 900-76	Gray 8 step(V)
1926	70.84	84.03	92.940	1024×800	Prog	N	N	ANALOG	RGB	SUN 800-84	Gray 16 step(V)
1927	81.13	76.11	135.000	1280×1024	Prog	N	N	ANALOG	RGB	SUN 1024-76	Gray 32 step(V)
1928	63.38	60.02	107.500	1280×1024	Prog	N	N	ANALOG	RGB	SONY NEWS	Gray 64 step(V)
1929	78.86	74.11	135.000	1280×1024	Prog	N	N	ANALOG	RGB	SONY 1024-74	Gray256 step(V)
1930	78.86	74.11	135.000	1280×1024	Prog	N	N	ANALOG	RGB	SONY 1024-74	Gray 64 Block 1
1931	48.48	59.64	64.000	1024×768	Prog	N	N	ANALOG	RGB	SGI Indigo768-60	Gray 64 Block 2
1932	77.01	72.38	130.000	1280×1024	Prog	N	N	ANALOG	RGB	SGI Indigo1024-72	Circle & Cross
1933	63.9	60.00	107.350	1280×1024	Prog	N	N	ANALOG	RGB	SGI IRIS4D	Cross Talk 90%
1934	63.33	59.97	108.170	1280×1024	Prog	N	N	ANALOG	RGB	HP 9000t1	Cross Talk 60%
1935	78.13	72.00	135.000	1280×1024	Prog	N	N	ANALOG	RGB	HP 9000t2	Black
1936	54	60.00	69.120	1024×864	Prog	N	N	ANALOG	RGB	VAX 768-60	RGB
1937	70.66	66.47	119.840	1280×1024	Prog	N	N	ANALOG	RGB	VAX 1024-66	R
1938	60.05	75.06	78.780	1024×768	Prog	N	N	ANALOG	RGB	Fujitsu FMV 1024-75	G
1939	80.66	100.83	108.410	1024×768	Prog	N	N	ANALOG	RGB	Fujitsu FMV 1024-100	B
1940	79.7	74.83	134.370	1280×1024	Prog	N	N	ANALOG	RGB	Fujitsu FMV5166	R-B
1941	80.38	75.12	135.040	1280×1024	Prog	N	N	ANALOG	RGB	Fujitsu FMV5133	R-G
1942	63.74	60.02	108.100	1280×1024	Prog	N	N	ANALOG	RGB	Fujitsu SIGMA	G-B
1943	78.16	71.64	135.060	1280×1024	Prog	N	N	ANALOG	RGB	HITACHI SXGA	Dot H20 / V20
1944	26.35	59.90	22.770	640×400	Prog	N	N	ANALOG	RGB	Panasonic M550	Dot H60 / V60
1945	46.88	75.00	49.500	800×600	Prog	P	P	ANALOG	RGB	VESA600-75	256 Block Color
1946	31.47	59.94	25.175	640×480	Prog	N	N	ANALOG	RGB	VGA480-60	Total Test
1947	31.47	59.95	28.640	746×471	Prog	N	N	ANALOG	RGB	ASTRO SC-2025	SMPTE RP133 COL
1948	64	59.98	115.200	1400×1050	Prog	N	N	ANALOG	RGB	SXGA+	Window & Edge
1949	94.64	59.60	265.000	2048×1536	Prog	N	N	ANALOG	RGB	QXGA	Circle & Line
1950	15.73	59.94	13.500	712×484	Int	N	N	NTSC	YPbPr	NTSC	Window Scroll: Left
1951	33.75	60.00	74.250	1920×1080	Int	N	N	HDTV1080	YPbPr	1080i	Window Scroll: Left
1952	31.47	59.94	25.175	640×480	Prog	N	N	ANALOG	RGB	VGA480-60	Black
1953	31.47	59.94	25.175	640×480	Prog	N	N	ANALOG	RGB	VGA480-60	RGB
1954	31.47	59.94	25.175	640×480	Prog	N	N	ANALOG	RGB	VGA480-60	R
1955	31.47	59.94	25.175	640×480	Prog	N	N	ANALOG	RGB	VGA480-60	G
1956	31.22	49.98	46.200	1170×1168	Int	N	N	ANALOG	RGB	MEDICAL-1I	B

Program No.1957 to 1991

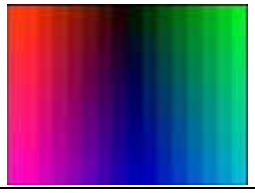
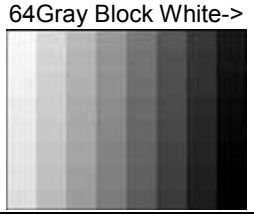
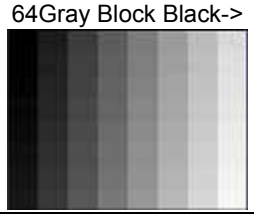
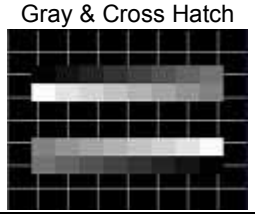
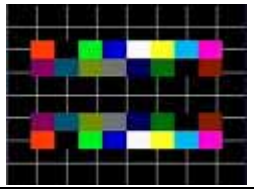
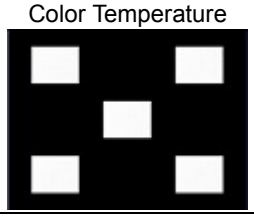
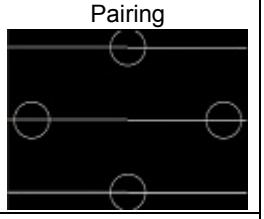
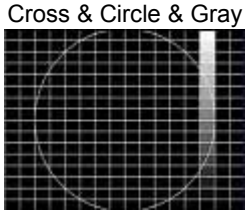
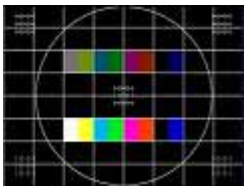
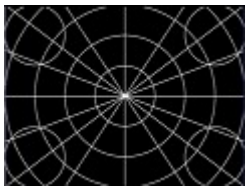
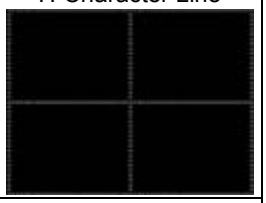
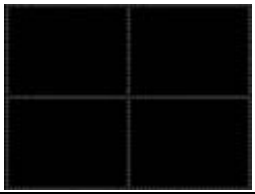
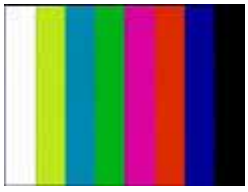
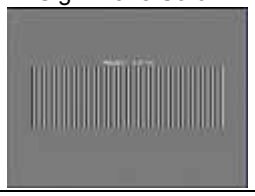
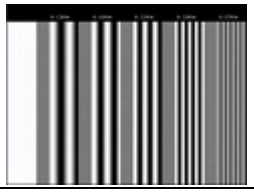
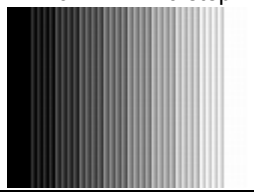
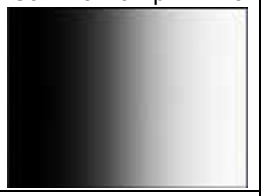
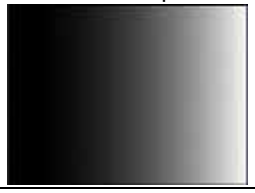
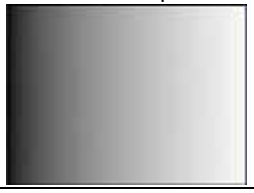
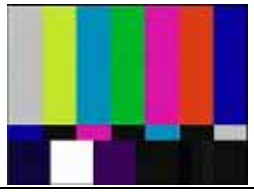
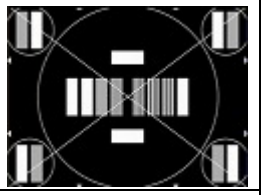
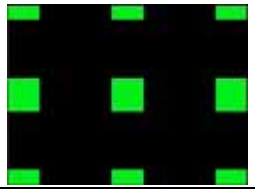
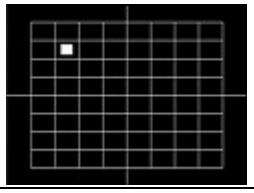
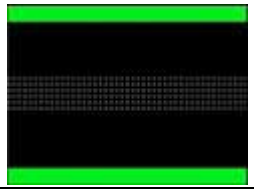
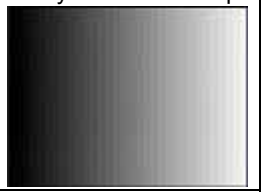
Program No.	Horizontal frequency [KHz]	Vertical frequency [Hz]	Dot clock frequency [MHz]	Number of display dots (H×V)	Int / Prog	Sync polarity		SyncType	Color difference	Timing data name	Pattern data name
						H	V				
1957	31.22	50.03	46.200	1170×584	Prog	N	N	ANALOG	RGB	MEDICAL-1N	R-B
1958	30.69	60.00	36.830	947×946	Int	N	N	ANALOG	RGB	MEDICAL-2I	R-G
1959	30.69	60.06	36.830	947×473	Prog	N	N	ANALOG	RGB	MEDICAL-2N	G-B
1960	37.93	85.04	35.500	720×400	Prog	N	P	ANALOG	RGB	VESA400-88	256 Block Color
1961	112.5	90.00	243.000	1600×1200	Prog	N	N	ANALOG	RGB	1200-90	ITC H Character
1962	31.47	59.94	25.175	640×480	Prog	N	N	ANALOG	RGB	VGA480-60	ITC 9 Window
1963	63.98	60.02	108.000	1280×1024	Prog	P	P	ANALOG	RGB	VESA1024-60	ITC Cross & Marker
1964	15.63	50.00	13.500	702×574	Int	N	N	SECAM	YPbPr	SECAM	NTSC Color Bar
1965	31.47	59.94	34.240	864×480	Prog	N	N	ANALOG	RGB	W-VGA	Color & Cross
1966	37.88	60.32	53.940	1072×600	Prog	N	N	ANALOG	RGB	W-SVGA	Pairing
1967	48.36	60.00	87.440	1376×768	Prog	N	N	ANALOG	RGB	W-XGA	Cross & Circle
1968	15.73	59.94	13.500	712×484	Int	N	N	NTSC	YPbPr	NTSC	NTSC Color Bar
1969	15.63	50.00	13.500	702×574	Int	N	N	PAL	YPbPr	PAL	NTSC Color Bar
1970	67.5	60.00	148.500	1920×1080	Prog	N	N	HDTV1080	YPbPr	1080P	Gamma Ramp 1
1971	67.43	59.94	148.352	1920×1080	Prog	N	N	HDTV1080	YPbPr	1080P	Gamma Ramp 2
1972	33.75	60.00	74.250	1920×1080	Int	N	N	HDTV1080	YPbPr	1080i	Gamma Ramp 3
1973	33.72	59.94	74.176	1920×1080	Int	N	N	HDTV1080	YPbPr	1080i	SMPTE PR27.1
1974	33.75	60.00	74.250	1920×1035	Int	N	N	HDTV1080	YPbPr	1035i	SMPTE RP133 MONO
1975	33.72	59.94	74.176	1920×1035	Int	N	N	HDTV1080	YPbPr	1035i	SMPTE RP133 COL
1976	45	60.00	74.250	1280×720	Prog	N	N	HDTV720	YPbPr	720P	64 Gray & Color
1977	44.96	59.94	74.176	1280×720	Prog	N	N	HDTV720	YPbPr	720P	Gray & Circle
1978	31.47	59.94	27.000	720×483	Prog	N	N	ANALOG	YPbPr	483P	Cross & Marker
1979	31.25	50.00	27.000	720×576	Prog	N	N	ANALOG	YPbPr	PAL*2	SMPTE RP133 COL
1980	83.64	60.00	204.750	1792×1344	Prog	N	P	ANALOG	RGB	VESA1344-60	1dot ON/OFF
1981	83.64	60.00	204.750	1792×1344	Prog	N	P	ANALOG	RGB	VESA1344-60	
1982	86.33	60.00	218.250	1856×1392	Prog	N	P	ANALOG	RGB	VESA1392-60	D.Y.Test
1983	86.33	60.00	218.250	1856×1392	Prog	N	P	ANALOG	RGB	VESA1392-60	TTL test
1984	90	60.00	234.000	1920×1440	Prog	N	P	ANALOG	RGB	VESA1440-60	SMPTE Color Bar
1985	90	60.00	234.000	1920×1440	Prog	N	P	ANALOG	RGB	VESA1440-60	Timing Chart
1986	31.47	59.94	25.175	640×480	Prog	N	N	ANALOG	RGB	VGA480-60	
1987	31.47	59.94	25.175	640×480	Prog	N	N	ANALOG	RGB	VGA480-60	Center & Edge
1988	31.47	59.94	25.175	640×480	Prog	N	N	ANALOG	RGB	VGA480-60	Diagonal & Edge 1
1989	31.47	59.94	25.175	640×480	Prog	N	N	ANALOG	RGB	VGA480-60	Diagonal & Edge 2
1990	31.47	59.94	25.175	640×480	Prog	N	N	ANALOG	RGB	VGA480-60	Display Position
1991	31.47	59.94	25.175	640×480	Prog	N	N	ANALOG	RGB	VGA480-60	256 Block Color

Program No.1992 to 1999

Program No.	Horizontal frequency [KHz]	Vertical frequency [Hz]	Dot clock frequency [MHz]	Number of display dots (H×V)	Int / Prog	Sync polarity		SyncType	Color difference	Timing data name	Pattern data name
						H	V				
1992	31.47	59.94	25.175	640×480	Prog	N	N	ANALOG	RGB	VGA480-60	
1993	31.47	59.94	25.175	640×480	Prog	N	N	ANALOG	RGB	VGA480-60	
1994	15.73	59.94	13.500	712×484	Int	N	N	NTSC-M	YPbPr	NTSC-M	NTSC Color Bar
1995	31.47	59.94	25.175	640×480	Prog	N	N	ANALOG	RGB	VGA480-60	
1996	31.47	59.94	25.175	640×480	Prog	N	N	ANALOG	RGB	VGA480-60	IMG Disp #1
1997	48.08	72.19	50.000	800×600	Prog	P	P	ANALOG	RGB	VESA600-72	IMG Disp #2
1998	56.48	70.07	75.000	1024×768	Prog	N	N	ANALOG	RGB	VESA768-70	IMG Disp #3
1999	79.98	75.02	135.000	1280×1024	Prog	P	P	ANALOG	RGB	VESA1024-75	IMG Disp #4

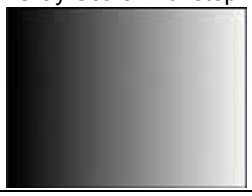
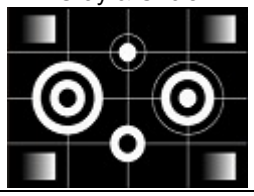
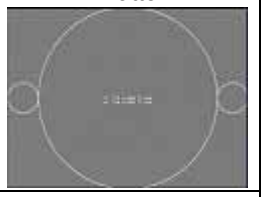
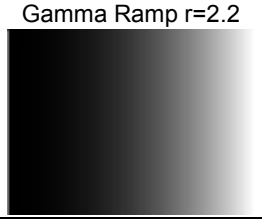
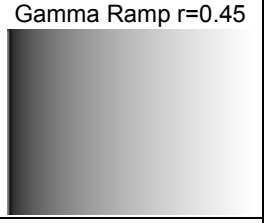
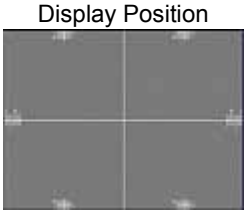
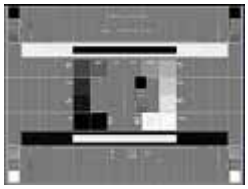
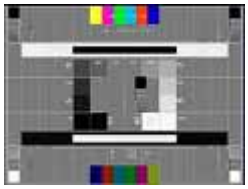
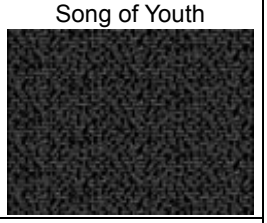
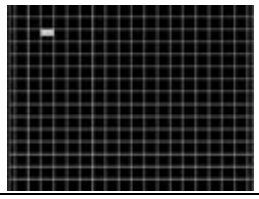
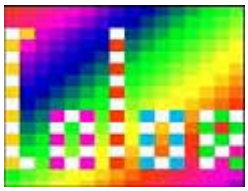
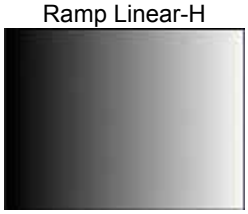
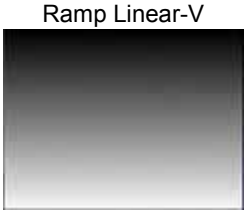
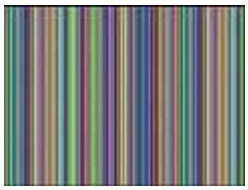
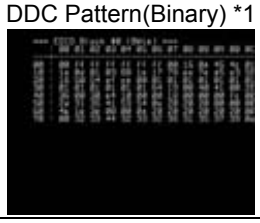
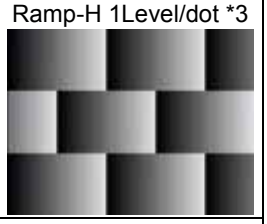
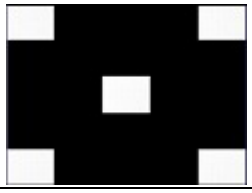
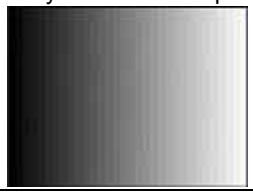
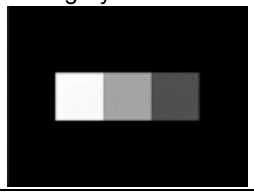
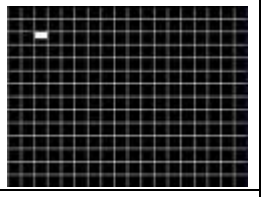
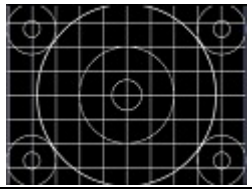
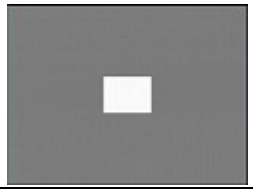
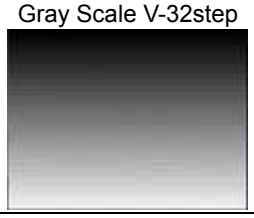
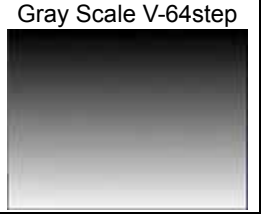
7.1.2 Optional pattern data

■ **Optional patterns 1 to 28 (1/3)**

No.	Pattern Name	No.	Pattern Name	No.	Pattern Name	No.	Pattern Name
1	256-Color Block 	2	64Gray Block White-> 	3	64Gray Block Black-> 	4	8-Color & 16-Gray 
5	Gray & Cross Hatch 	6	Color & Cross Hatch 	7	Color Temperature 	8	Pairing 
9	Cross & Circle & Gray 	10	Cross&Circle&Color&H 	11	Circle & Line 	12	H-Character Line 
13	O-Character Line 	14	Cross Talk W=90% 	15	DDC Pattern *1 	16	NTSC Color Bar 
17	Sign Wave Scroll 	18	Multi Burst 100% 	19	1/10 MHz × 10 step 	20	Gamma Ramp wr=2.5 
21	Gamma Ramp r=2.0 	22	Gamma Ramp r=0.5 	23	SMPTE Color Bar 	24	SMPTE RP-27.1 
25	ITC 9-Window 	26	ITC Cross & Marker 	27	ITC H-Character 	28	Gray Scale H-32step 

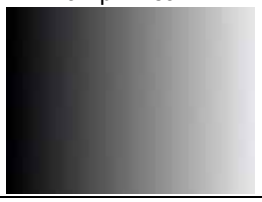
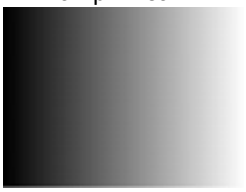
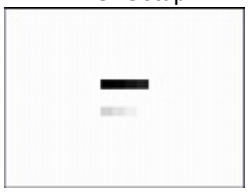
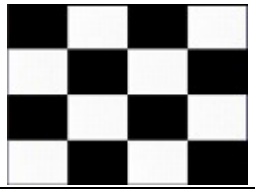
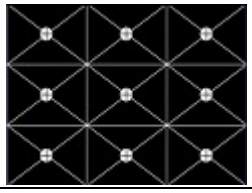
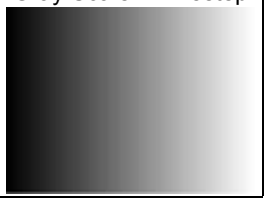
*1: Refer to “7.1.2.1 Concerning the DDC patterns (No.15, 47).”

■ Optional patterns 29 to 56 (2/3)

No.	Pattern Name	No.	Pattern Name	No.	Pattern Name	No.	Pattern Name
29	Gray Scale H-64step 	30	64-Gray &RGBW-Color 	31	Gray & Circle 	32	AFD Pattern *2 
33	Corner&Center Marker 	34	Cross Talk W=60% 	35	Gamma Ramp r=2.2 	36	Gamma Ramp r=0.45 
37	Display Position 	38	SMPTE RP-133 	39	SMPTE RP-133+Color 	40	Song of Youth 
41	Timing Data 	42	Cross & Marker1 	43	256-Color <Color> 	44	Ramp Linear-H 
45	Ramp Linear-V 	46	256-Color Random 	47	DDC Pattern(Binary) *1 	48	Ramp-H 1Level/dot *3 
49	Corner&Center Window 	50	Gray Scale H-32step-2 	51	3gray-Window 	52	Cross & Marker 2 
53	Circle & Cross Hatch 	54	1dotChecker & Window 	55	Gray Scale V-32step 	56	Gray Scale V-64step 

*1: Refer to “7.1.2.2 Concerning the FD pattern (No.32).”
*2: Refer to “7.1.2.3 Concerning the Ramp-H 1Level/dot pattern (No.48).”

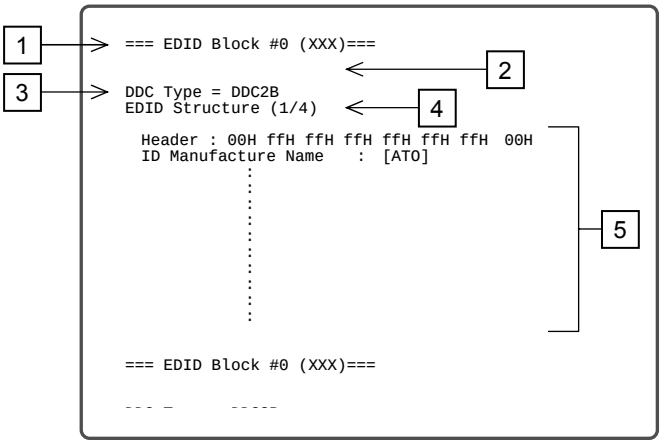
■ Optional patterns 57 to 65 (3/3)

No.	Pattern Name	No.	Pattern Name	No.	Pattern Name	No.	Pattern Name
57	Ramp Linear-H 	58	Ramp Linear-V 	59	Ramp Linear-HV 	60	ANSI Setup 
61	ANSI Contrast 	62	ANSI 9-Point 	63	ANSI H-Resolution 	64	ANSI V-Resolution 
65	Gray Scale H-128step 						

7.1.2.1 Concerning the DDC patterns (No.15, 47)

When a DDC pattern is executed, the EDID is acquired from the receiver (such as a display) which is connected to the VG-880, and displayed.

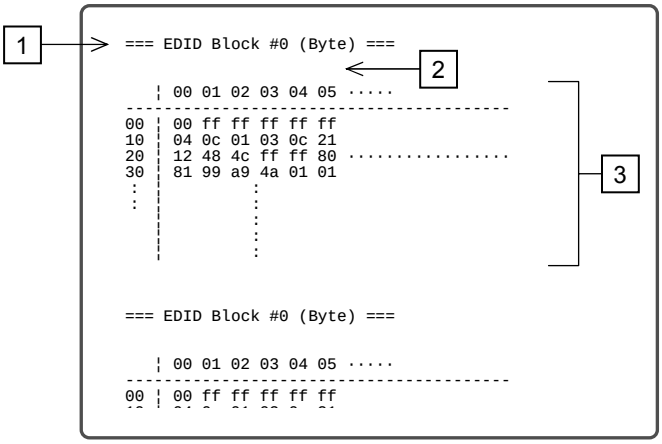
● GUI display of EDID (optional pattern No.15)



No.	Description of display
1	Block number of EDID
2	Details of EDID error (appears only when an error has occurred)
3	DDC type
4	Number of pages in block indicated at 1
5	Contents of EDID (GUI display)

* Switch between the pages using the [►] and [◄] keys.

● Hexadecimal display of EDID (optional pattern No.47)



No.	Description of display
1	Block number of EDID
2	Details of EDID error (appears only when an error has occurred)
3	Contents of EDID (hexadecimal display)

* Switch between the pages using the [►] and [◄] keys.

* If it is not possible to obtain the EDID because the receiver was not connected to the specified port or for some other reason, the above displays do not appear, and “EDID Read Error” is indicated at the top left of the display instead.

7.1.2.2 Concerning the FD pattern (No.32)

Optional pattern No.32 is an AFD pattern used for aspect ratio evaluation under the EIA/CEA-861B standard.

■ Concerning the AFD pattern used for aspect ratio evaluation

Optional pattern No.32 is an AFD pattern used for aspect ratio evaluation under the EIA/CEA-861B standard.

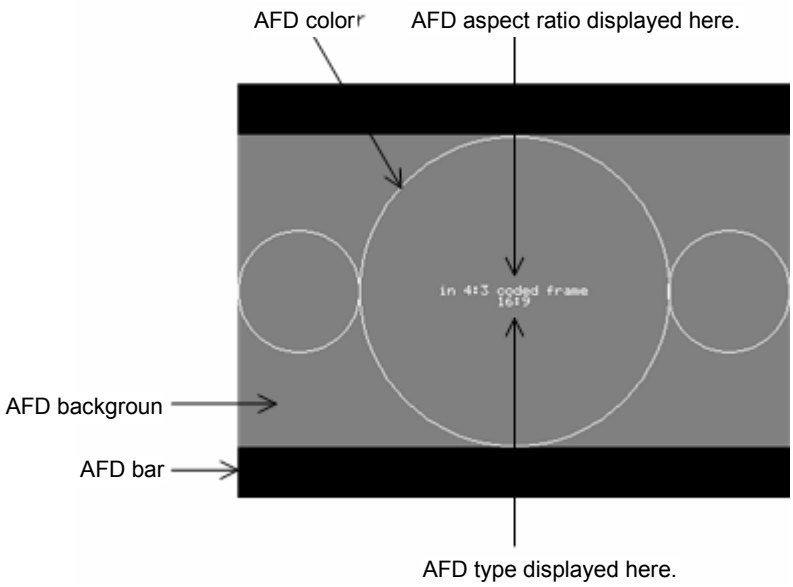
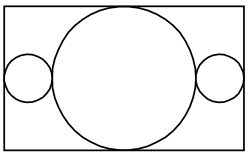
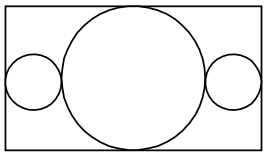
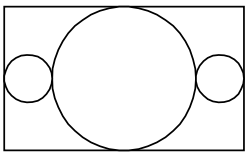
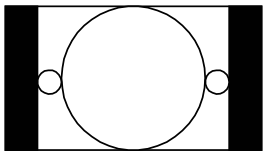
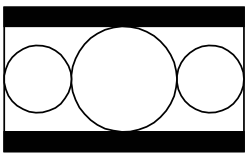
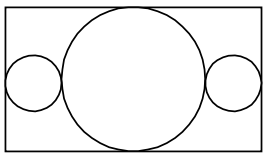
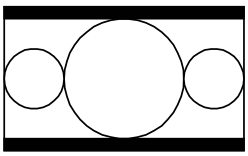
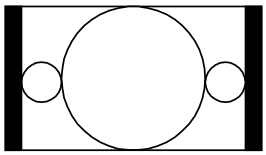
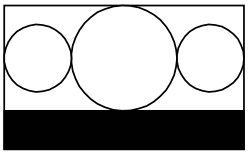
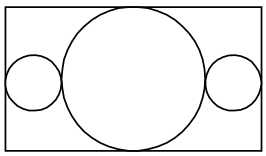
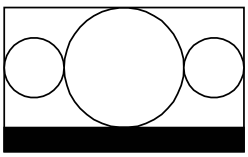
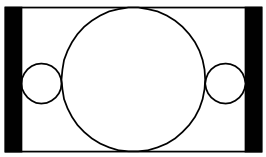
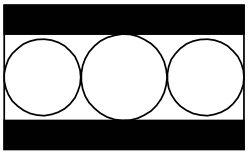
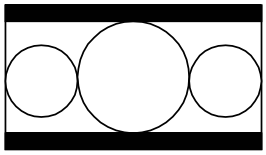
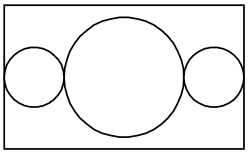
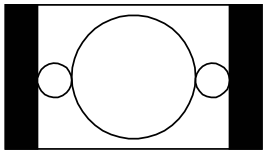
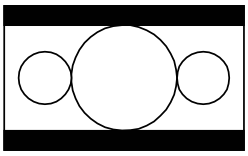
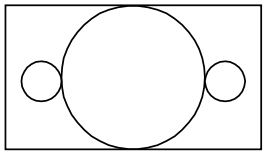
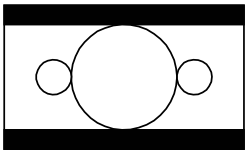
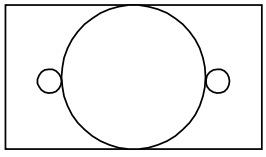


Fig. 7.1.2.1 Example of optional pattern No.32 display

Table 7.1.1 AFD type details

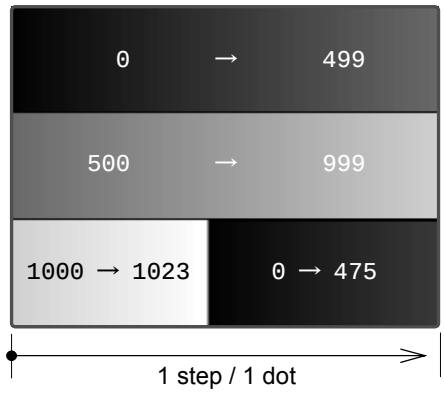
AFD Type		AFD Aspect	
Value	Description	4:3	16:9
0	as the coded frame		
1	4:3 (center)		
2	16:9 (center)		
3	14:9 (center)		
4	box 16:9 (top)		
5	box 14:9 (top)		
6	box 13:7 (center)		
7	box 2:1 (center)		
8	box 11:5 (center)		
9	box 12:5 (center)		
10	4:3 (with shoot & protect 14:9 center)		
11	16:9 (with shoot & protect 14:9 center)		
12	16:9 (with shoot & protect 4:3 center)		

7.1.2.3 Concerning the Ramp-H 1Level/dot pattern (No.48)

Optional pattern No.48 is output linearly in accordance with the output bit mode.

The figure below shows the level changes using the 10-bit mode as an example.

(When the 500-dot setting is used for Hdisp)

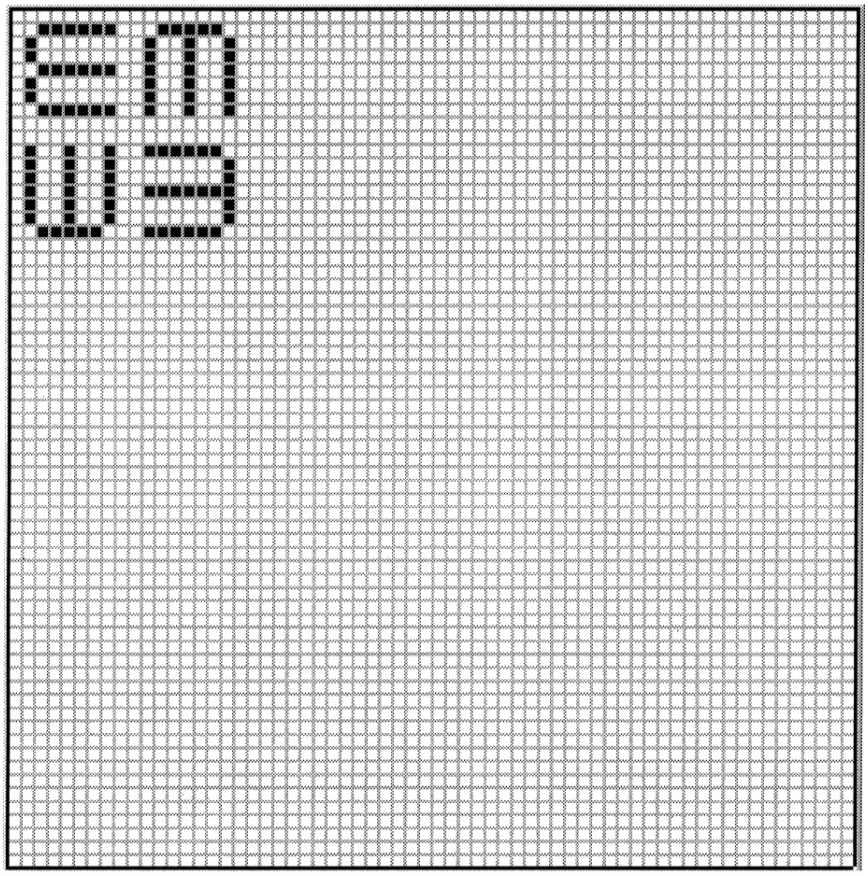


7.1.3 User character pattern data

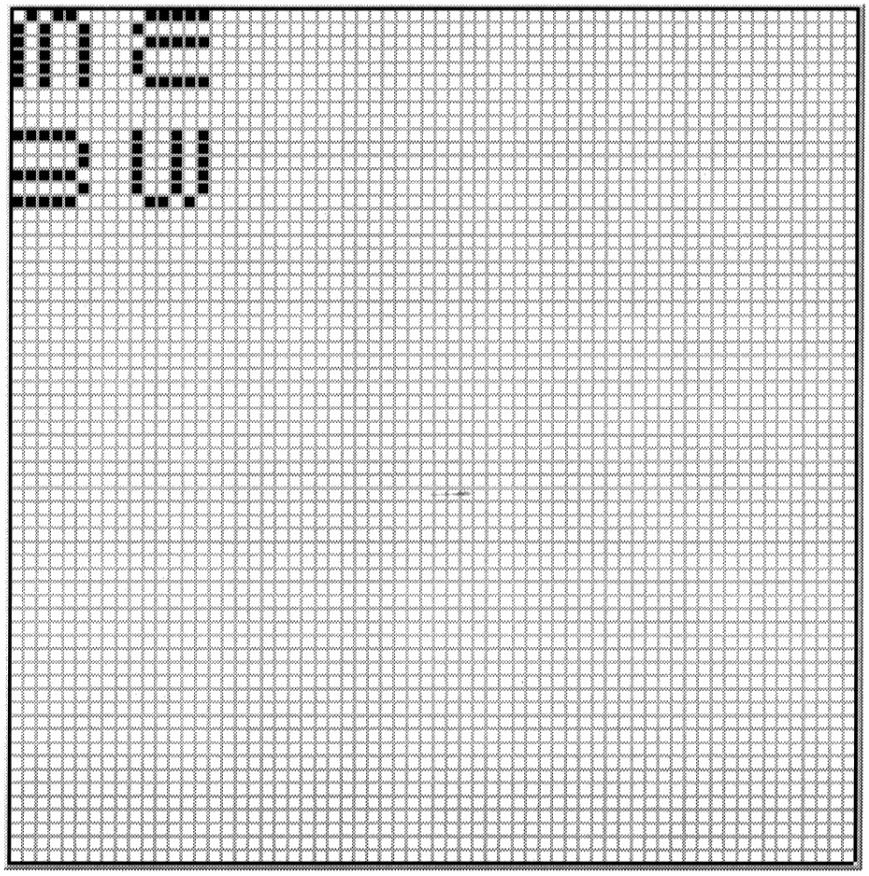
Code (H)	Description	Cell size	Reference page
F0	Letters “me” #1	18 × 18	p.109
F1	Letters “me” #2 (VESA specifications)	18 × 18	p.109
F2	Chinese character “AI”	64 × 64	p.110
F3	Chinese character “BI”	64 × 64	p.110
F4	Chinese character “TAKA”	32 × 32	p.111
F5	Chinese character “KIRI”	32 × 32	p.111
F6	Chinese character “KEN”	32 × 32	p.112
F7	Burst	64 × 64	p.112
F8			
F9			
FA			
FB			
FC			
FD			
FE			
FF			

■ F0H [letters “me” #1]/F1H [letters “me” #2 (VESA specifications)]

F0H

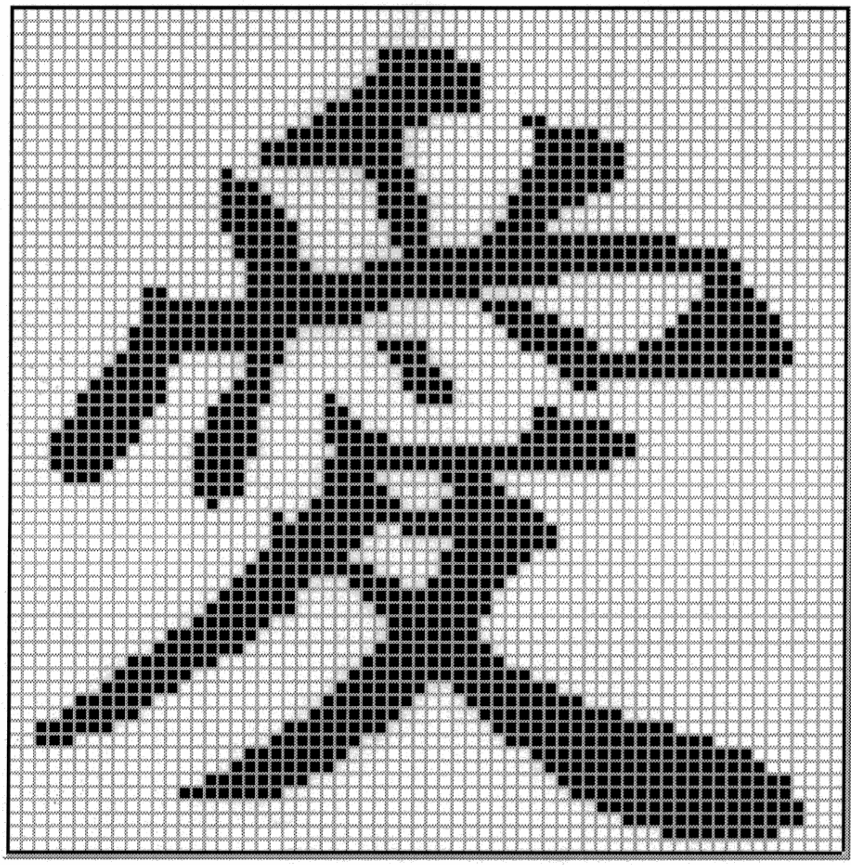


F1H

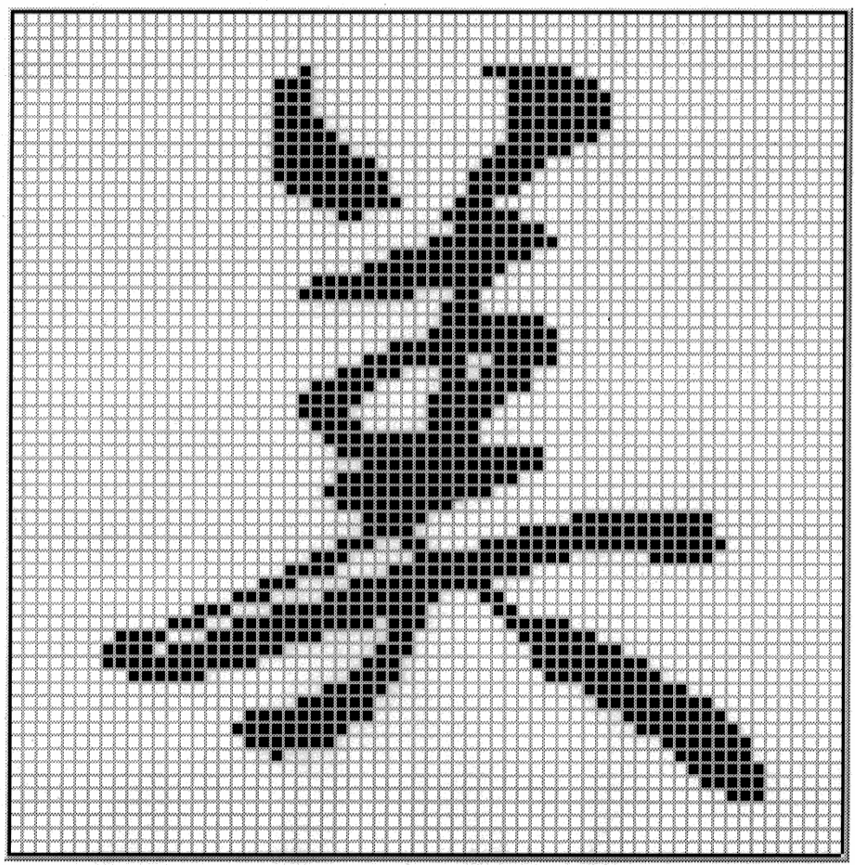


■ **F2H [Chinese character “AI”]/F3H [Chinese character “BI”]**

F2H

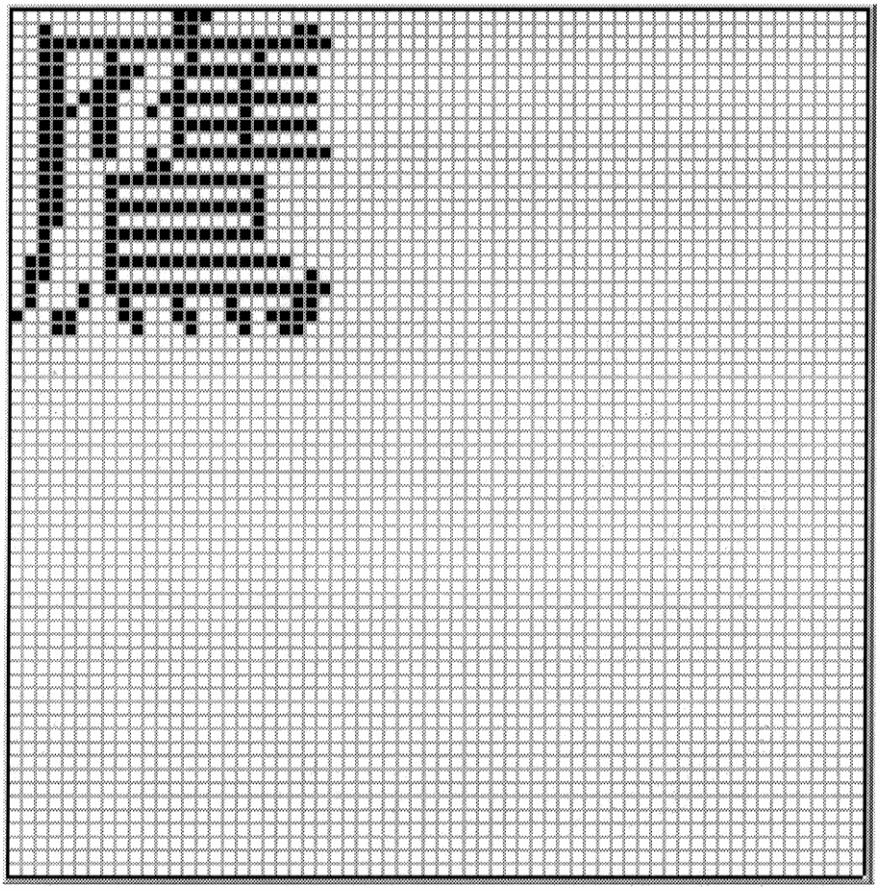


F3H

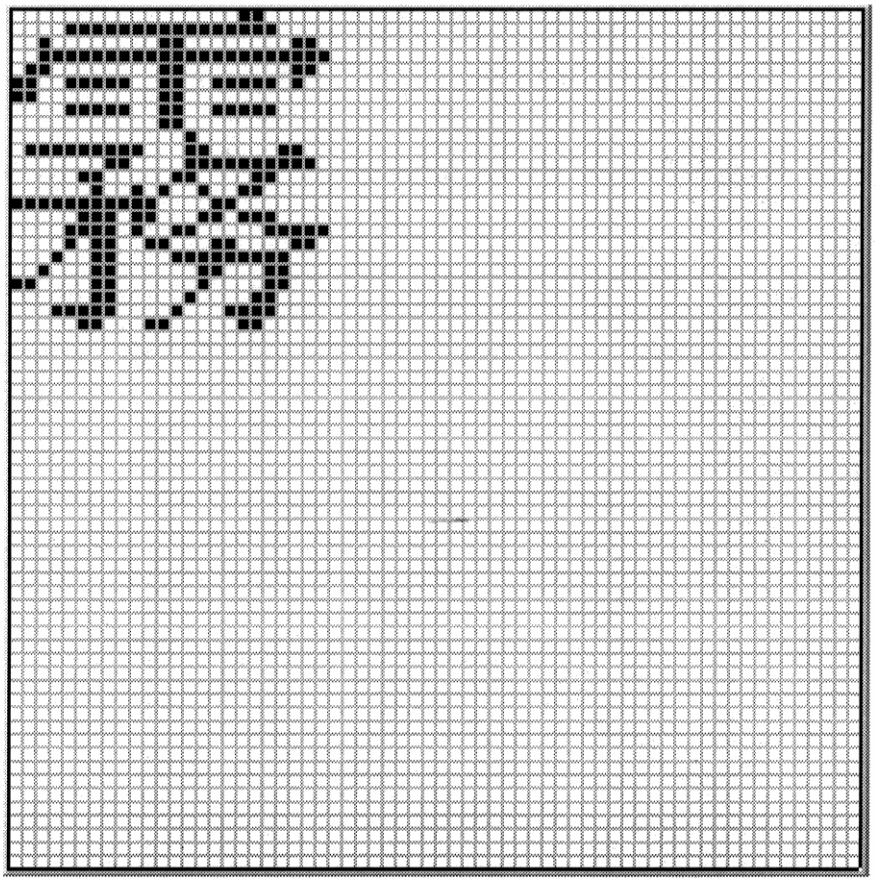


■ F4H [Chinese character “TAKA”]/F5H [Chinese character “KIRI”]

F4H

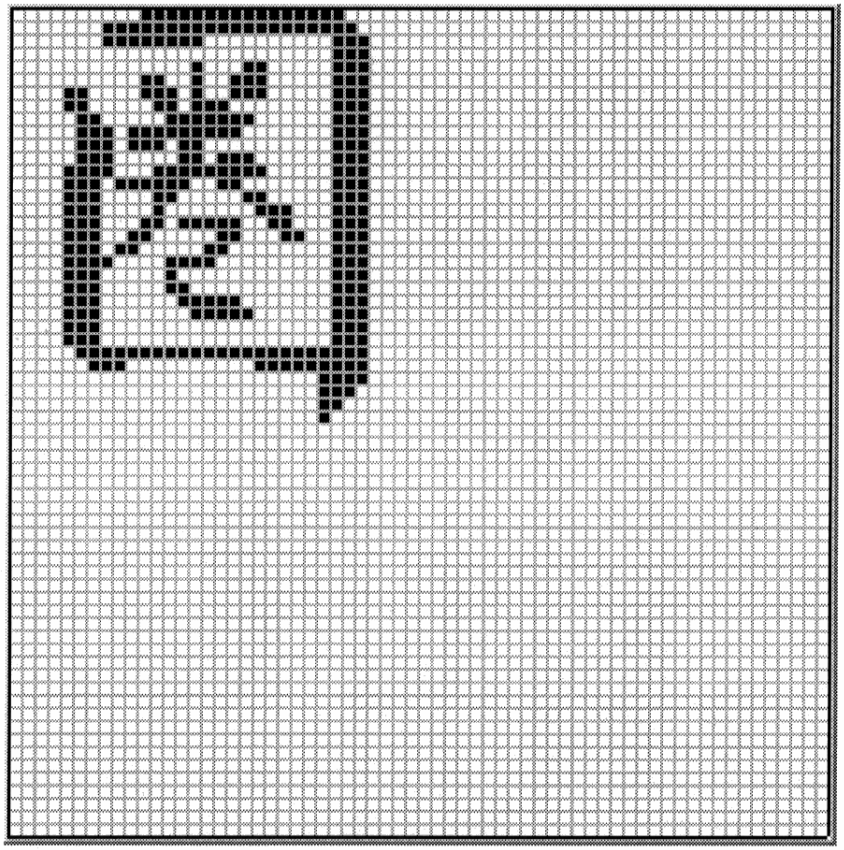


F5H

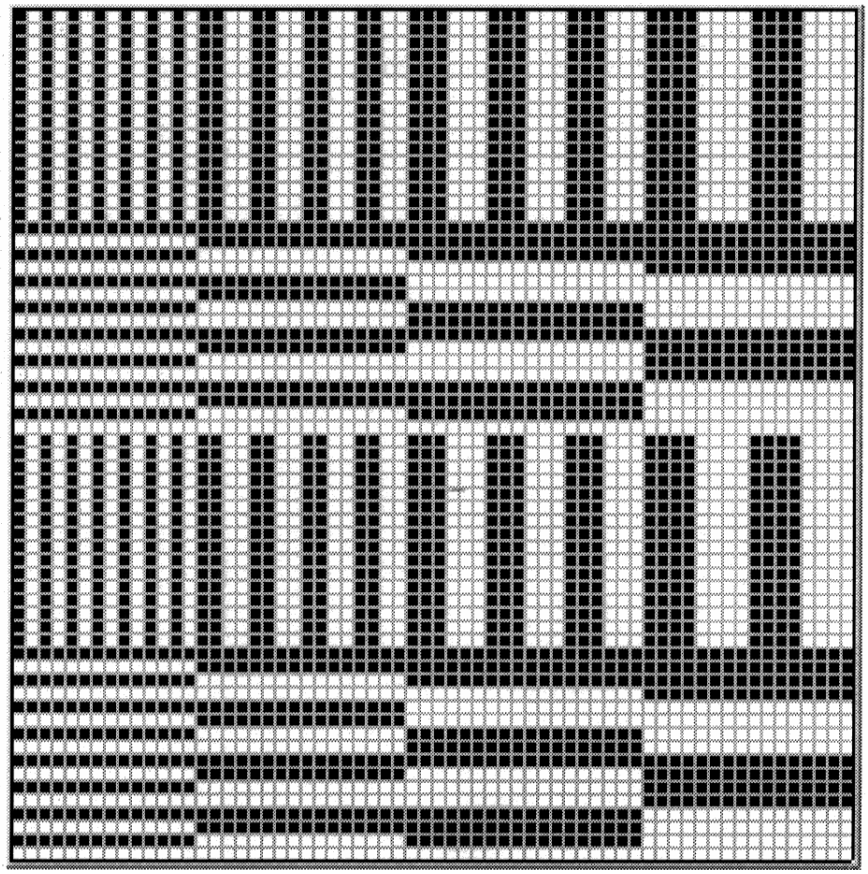


■ F6H [Chinese character “KEN”]/F7H [Burst]

F6H

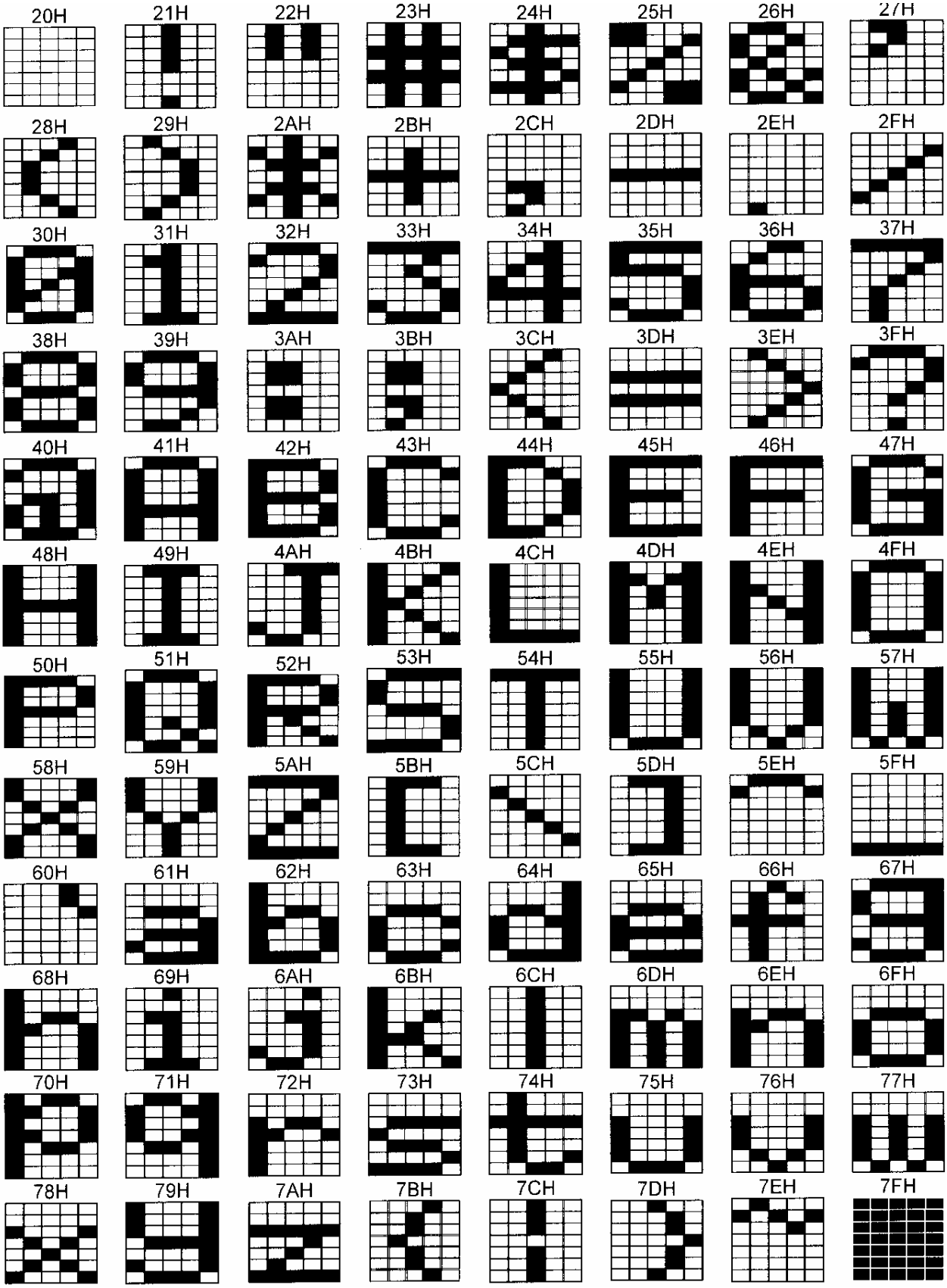


F7H

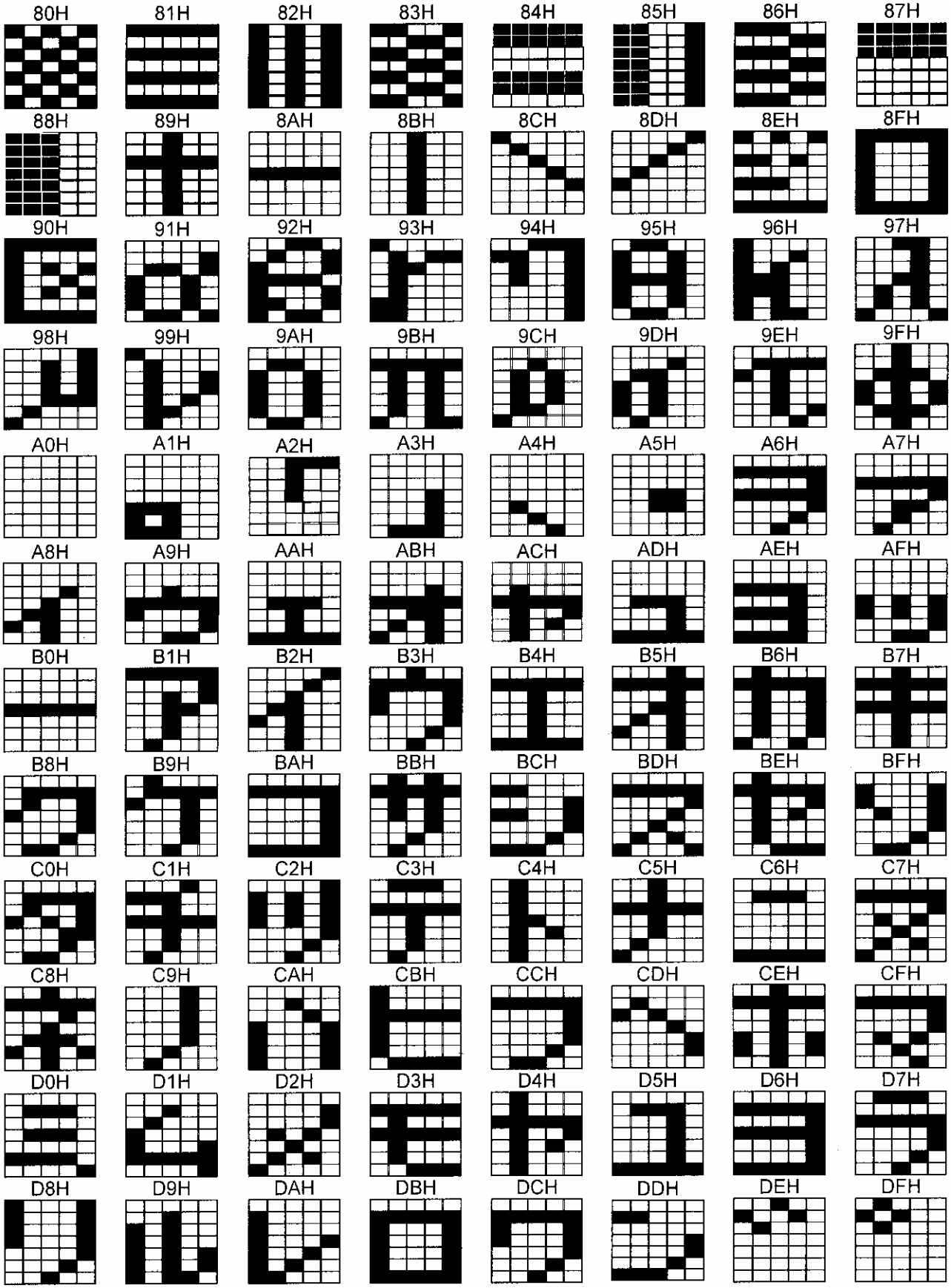


7.1.4 Character pattern data

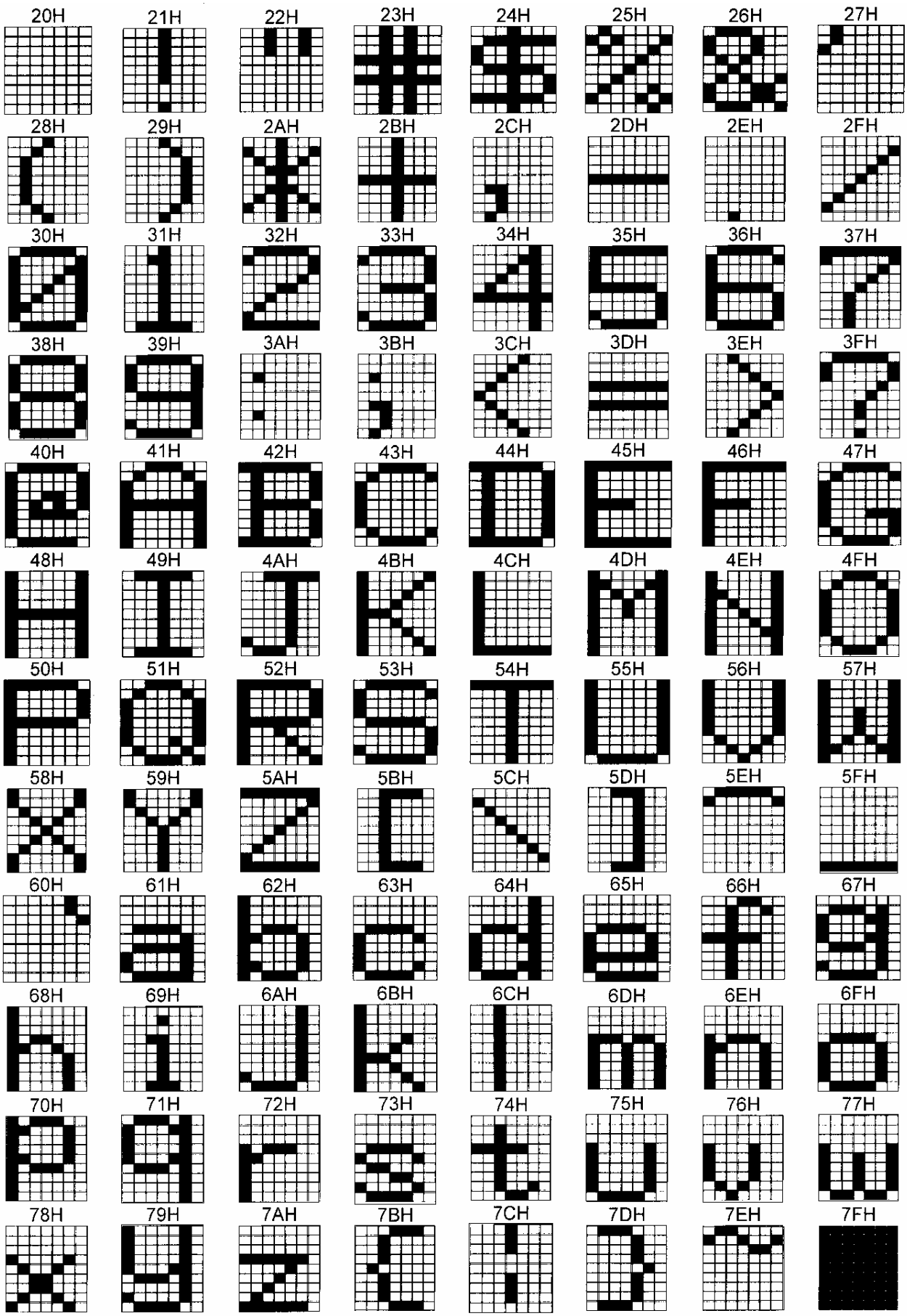
■ **5 × 7 character pattern table (1 of 2)**



■ 5 × 7 character pattern table (2 of 2)

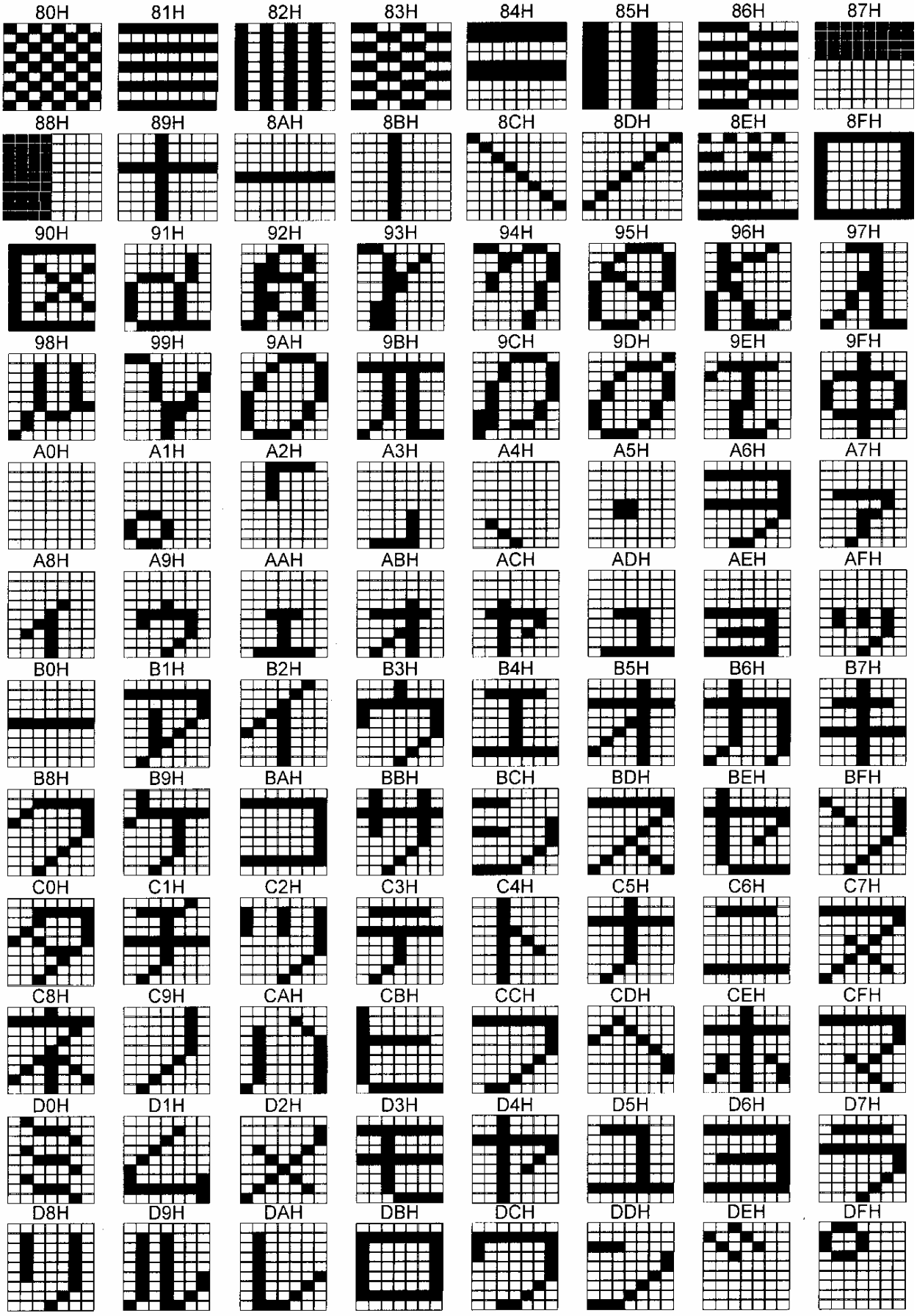


■ 7 × 9 character pattern table (1 of 2)

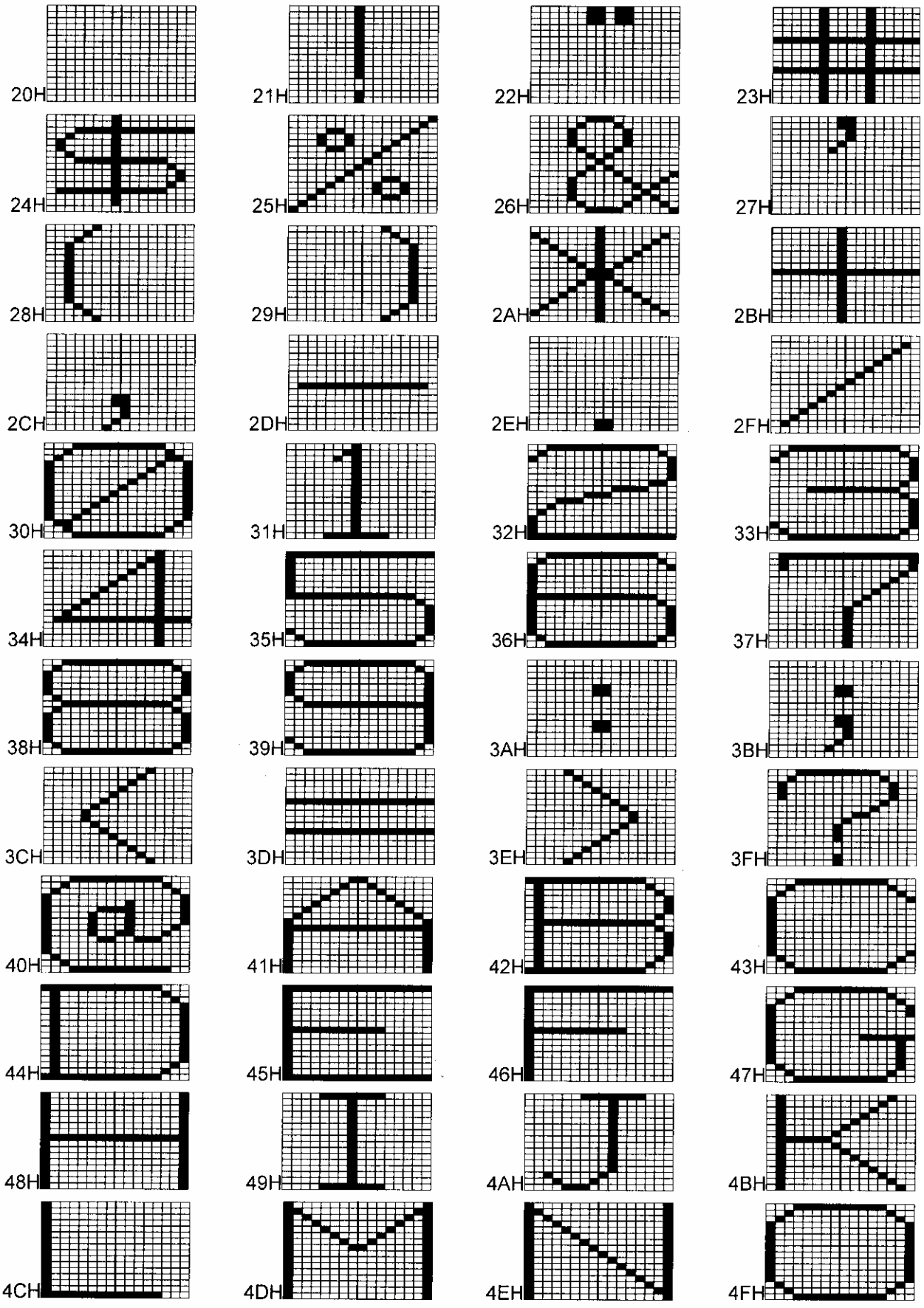


■ 7 × 9 character pattern table (2 of 2)

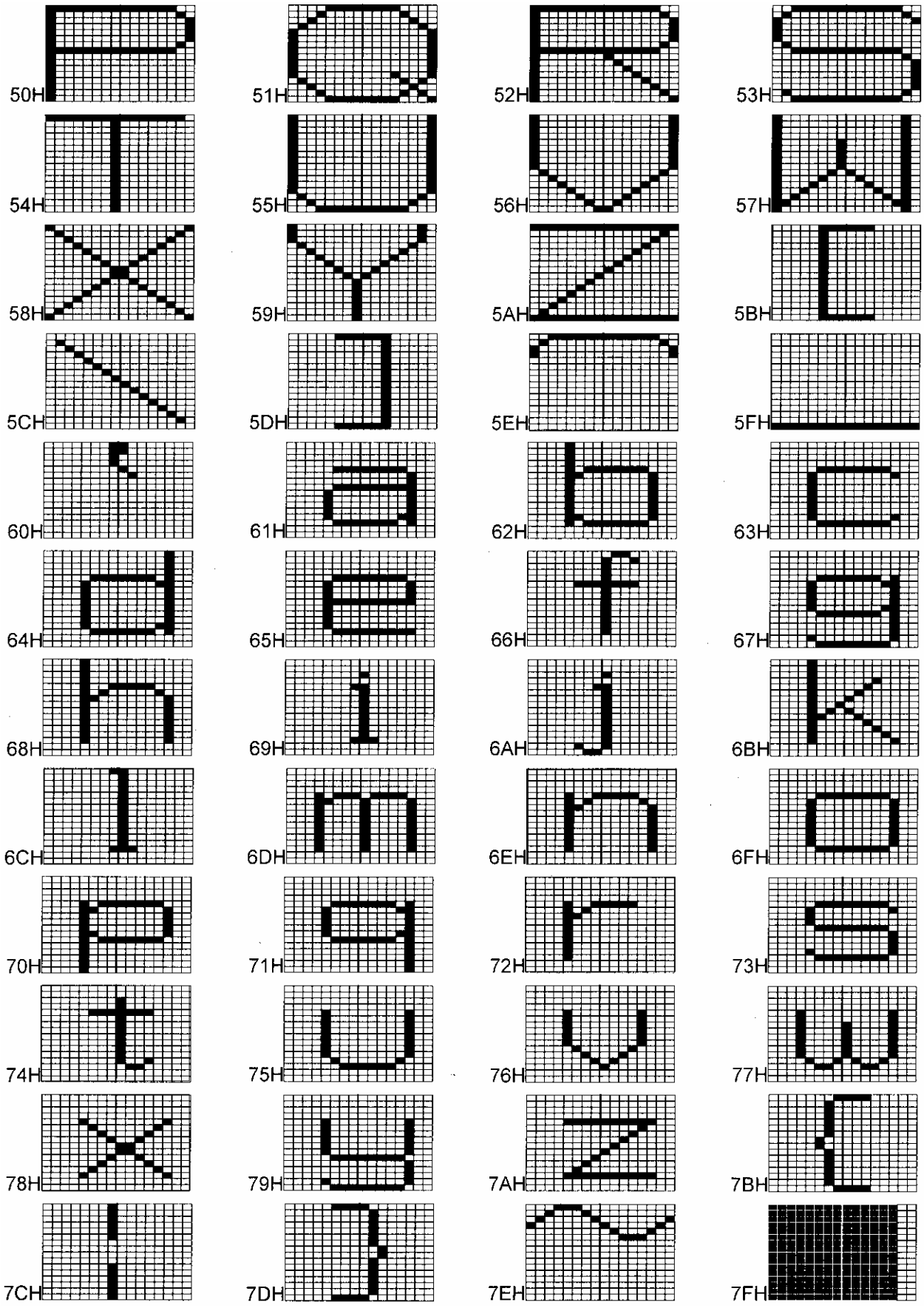
* 8 × 9 dots are used for 80H to 8FH.



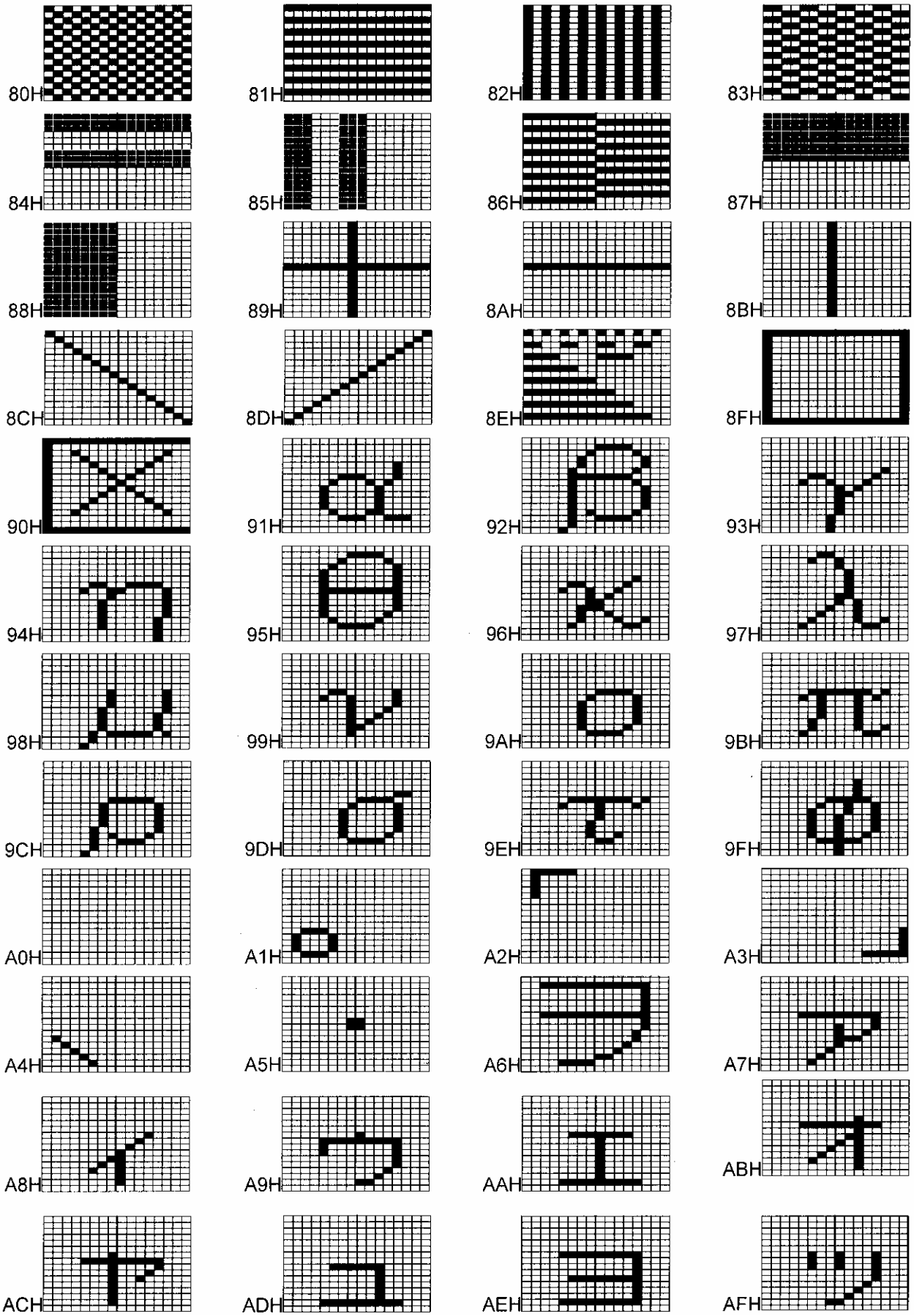
■ 16 × 16 character pattern table (1 of 4)



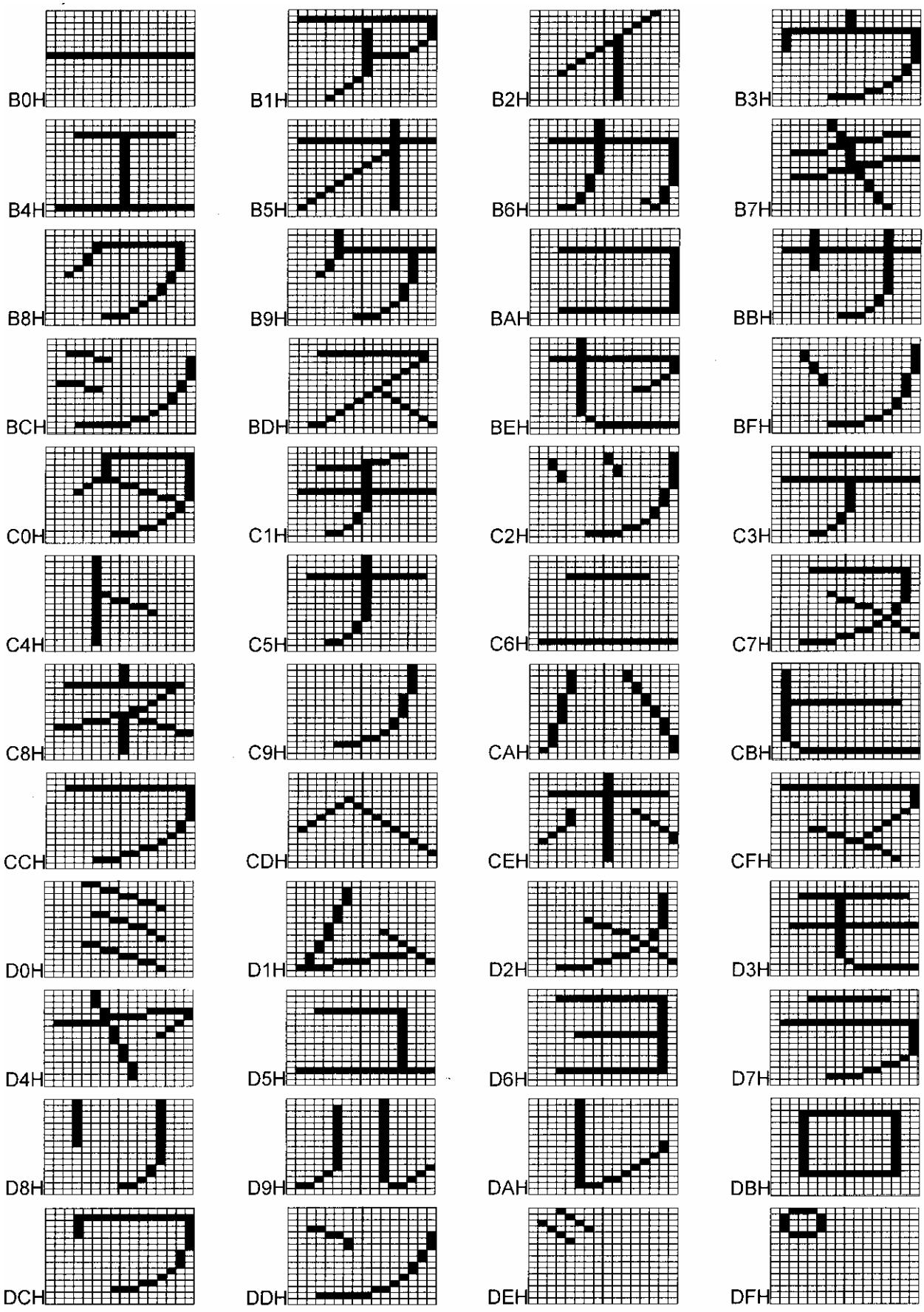
■ 16 × 16 character pattern table (2 of 4)



■ 16 × 16 character pattern table (3 of 4)



■ 16 × 16 character pattern table (4 of 4)



7.2 Concerning CF cards

7.2.1 CF cards which can be used

Use the CF card which comes with the generator. Any trouble or malfunctioning in operation caused by the use of any other cards is not covered by the warranty.

CAUTION

PC cards come with many different specifications. Use of a PC card whose operation has not been verified, therefore, may result in a failure or instability in read/write operations.

7.2.2 Data registration formats

The format used for registering data on a CF card differs from data to data as indicated below.

■ Program data

- When edited program data is registered on a CF card, a “prg4” folder is created, and the data files are created inside this folder.
- Data files are created in sequence with the following filenames: prg0001.vgd, prg0002.vgd, prg0003.vgd, and so on.

■ Character data

- When edited character data is registered on a CF card, a file is created on its own.
- Data files are created in sequence with the following filenames: uchardata0E0.vgd, uchardata0E1.vgd, uchardata0E2.vgd, and so on.

■ Group data

- When the edited data is registered on the CF card, the “Group4” folder is created, and the files are generated inside this folder.
- Data files are created in sequence with the following filenames: group001.vgd, group002.vgd, group003.vgd, and so on.

■ Auto display data

- When edited auto display data is registered on a CF card, a file is created on its own.
- Data files are created with the filename of autodisp.vgd.

■ Bitmap data

- When edited bitmap data is registered on a CF card, a “bmp4” folder is created, and the data files are created inside this folder.
- Data files are created in sequence with the following filenames: bitmap001.vgd, bitmap002.vgd, bitmap003.vgd, and so on.
- Every time a data file is created, a name file (such as bitmapname001.vgd) is simultaneously created for the file created.

■ Optional pattern data

- When the edited data is registered on the CF card, the “opt4” folder is created, and the files are generated inside this folder.
- Data files are created in sequence with the following filenames: opt001.vgd, opt002.vgd, opt003.vgd, and so on.
- Every time a data file is created, a name file (such as optname001.vgd) is simultaneously created for the file created.

7.2.3 Examples of the data registered on a CF card

```
CF card
 |
 ├ bmp4 (folder)                :Bitmap data folder
 |
 |   ├ bitmap001.vgd            :Bitmap data
 |   |
 |   ├ bitmap002.vgd            :Bitmap data
 |   |
 |   ├ bitmap003.vgd            :Bitmap data
 |   |
 |   ├ bitmapname001.vgd        :Bitmap name data
 |   |
 |   ├ bitmapname002.vgd        :Bitmap name data
 |   |
 |   └ bitmapname003.vgd        :Bitmap name data
 |
 ├ grp4 (folder)                :Group data folder
 |
 |   ├ group001.vgd             :Group data
 |   |
 |   ├ group002.vgd             :Group data
 |   |
 |   └ group003.vgd             :Group data
 |
 ├ opt4 (folder)                :Optional pattern data folder
 |
 |   ├ opt001.vgd               :Optional pattern data
 |   |
 |   ├ opt002.vgd               :Optional pattern data
 |   |
 |   ├ opt003.vgd               :Optional pattern data
 |   |
 |   ├ opt016.vgd               :Optional pattern data
 |   |
 |   ├ optname001.vgd           :Optional pattern name data
 |   |
 |   ├ optname002.vgd           :Optional pattern name data
 |   |
 |   └ optname003.vgd           :Optional pattern name data
 |
 ├ prg4 (folder)                :Program data folder
 |
 |   ├ prg001.vgd               :Program data
 |   |
 |   ├ prg002.vgd               :Program data
 |   |
 |   └ prg003.vgd               :Program data
 |
 ├ autodisp.vgd                 :Auto display data
 |
 ├ uchardata0E0.vgd             :Character data
 |
 ├ uchardata0E1.vgd             :Character data
 |
 └ uchardata0E2.vgd             :Character data
```

7.2.4 Copying and deleting registered data

Data registered on CF card can be copied or deleted using Explorer in Windows 2000 or Windows XP in a PC equipped with a PC card slot.

8 SPECIFICATIONS AND CHECKPOINTS

8.1 Main specifications

8.1.1 Output

			Output bit mode	
			8 bits	~16bits [*1]
Dot clock frequency			5 to 300 MHz (1 kHz increments)	5 to 165 MHz (1 kHz increments)
	DVI	Single Link	25 to 165 MHz	-
		Dual Link	50 to 300 MHz	-
		Multi gray scale mode	-	25 to 150 MHz
	LVDS	Single Link	8 to 160 MHz * Supported up to 12 bits	
		Dual Link	16 to 300 MHz * Supported up to 10 bits	
	ANALOG		5 to 165 MHz	
Horizontal frequency			10 to 300 KHz Max. 8192 dots	10 to 300 KHz Max. 4096 dots
Vertical frequency			10 to 150 Hz Max. 8192 lines (progressive) 4096 lines (interlace)	10 to 150 Hz Max. 8192 lines (progressive) 4096 lines (interlace)
Video memory			4096 dots × 2048 lines	4096 dots × 2048 lines
Number of colors which can be generated			24-bit output (256-step gradation×RGB)	48-bit output (65535-step gradation×RGB)
Scanning			Progressive, interlace (sync), interlace	
Other				Palette scrolling is not possible with linear gray scale ramp optional patterns. [*2]

*1: Natural images have 256 colors regardless of the output bit mode.
*2: Palette scrolling is not possible with optional pattern No.44 (Ramp Linear-H) or No.45 (Ramp Linear-V).
*3: When two LVDS boards are installed, up to 12 bits are supported by Dual Link.

8.1.2 External interfaces

Remote connector (25-pin)
RS-232C (9-pin)

8.1.3 General ratings

Supply voltage	AC100 to 240 V
Power line frequency	50 Hz / 60 Hz
Power consumption	28 VA MAX
Dimensions	307 (W) × 66 (H) × 243 (D) mm (excluding protrusions)
Weight	Approx. 3 kg
Operating temperature	5 to 40°C
Storage temperature	-10 to 60°C
Humidity	30 to 85% RH (no condensation)

8.2 Concerning the DDC power supply

DDC power is supplied to the DVI output of the VG-880.

The maximum current levels supplied by DDC power supply are as follows:
- DVI output ..... 0.5 A
- LVDS output ..... 0.5 A total for channels 1 and 2, and Max 0.5 A per channel

The DCC power is output as shown below.

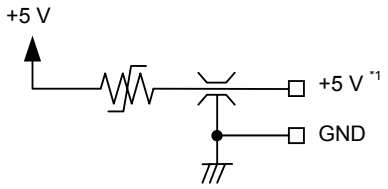


Fig. 8.2.1 DDC power supply output circuit

- DVI output ..... Fixed at 5 V
- LVDS output ..... 5 V / 3.3 V switchable using a switch on the rear panel

CAUTION

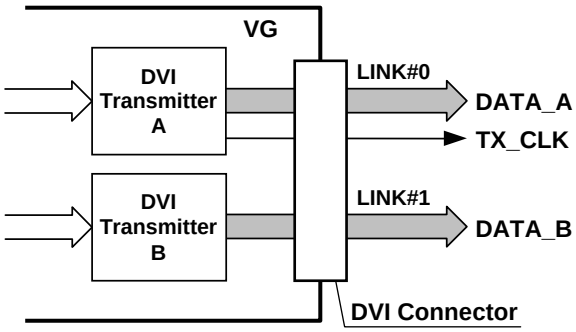
- Although an overcurrent protection device is installed in the DDC power supply, avoid using the generator at a current level which exceeds the rating.
- Under no circumstances must power be supplied as the DDC power from the device connected to the generator. If a device is connected, both the VG-880 and the device connected to it may malfunction.

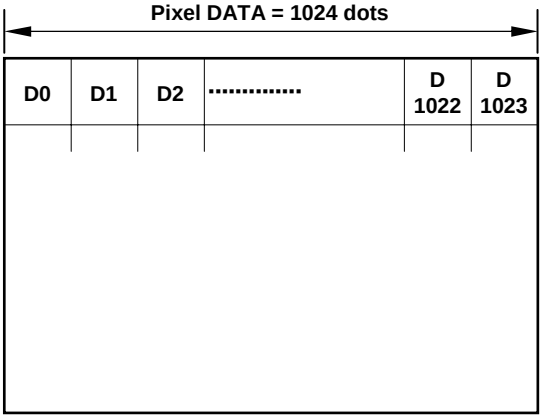
8.3 DVI output specifications

8.3.1 DVI output

8.3.1.1 Data transfer methods

The data transfer method at the DVI output is described here using a resolution of 1024 × 768 and a dot clock frequency of 75 MHz as an example.



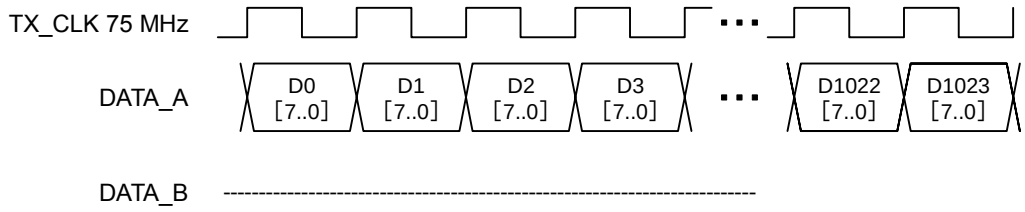


* The timing diagrams below are graphical representations of the data transfer.

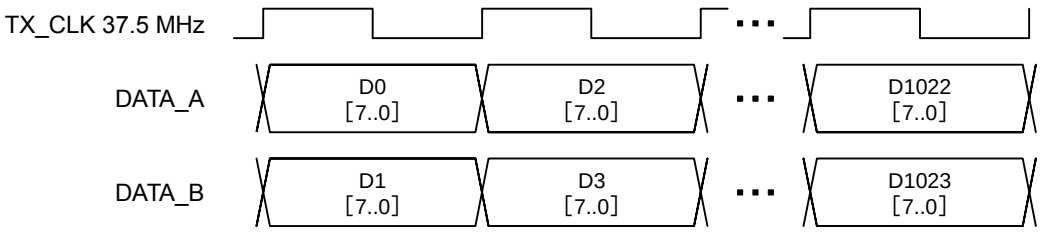
8-bit mode

The data is transferred using the regular Panel Link method.

Single Link



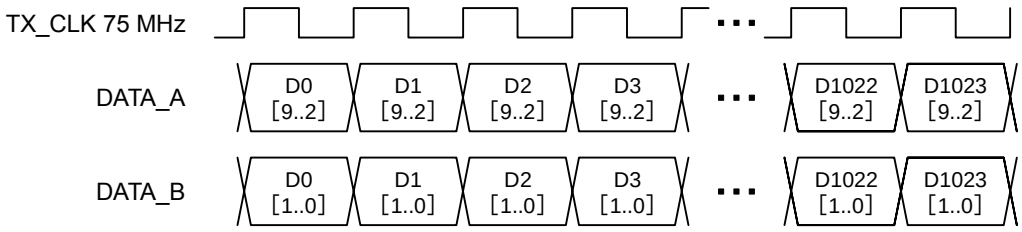
Dual Link



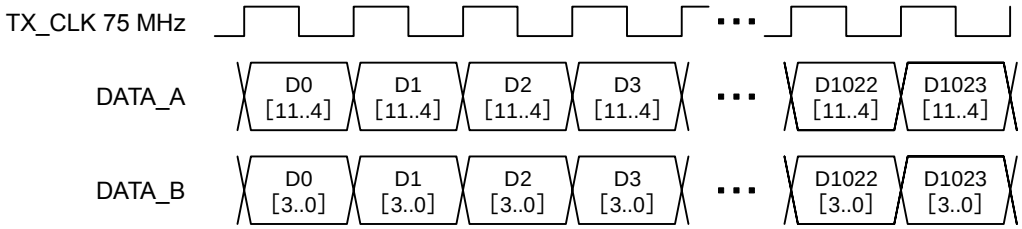
Multi gray scale mode

The multi gray scale data is transferred using Dual Link. The 8 higher bits are sent from LINK#0; the remaining lower bits are sent from LINK#1.

When the 10-bit output mode is established



When the 12-bit output mode is established



8.3.1.2 Data array

	8 bits		~16 bits
	Single Link	Dual Link	Multi gray scale mode
LINK#0	BIT7	BIT7 (EVEN)	BIT15 (MSB)
	BIT6	BIT6 (EVEN)	BIT14
	BIT5	BIT5 (EVEN)	BIT13
	BIT4	BIT4 (EVEN)	BIT12
	BIT3	BIT3 (EVEN)	BIT11
	BIT2	BIT2 (EVEN)	BIT10
	BIT1	BIT1 (EVEN)	BIT9
	BIT0	BIT0 (EVEN)	BIT8
LINK#1	-	BIT7 (ODD)	BIT7
	-	BIT6 (ODD)	BIT6
	-	BIT5 (ODD)	BIT5
	-	BIT4 (ODD)	BIT4
	-	BIT3 (ODD)	BIT3
	-	BIT2 (ODD)	BIT2
	-	BIT1 (ODD)	BIT1
	-	BIT0 (ODD)	BIT0 (LSB)

8.3.1.3 Connector pin layout

- Connector: DVI-I (74320-1004) made by Morex
- Output: TMDS

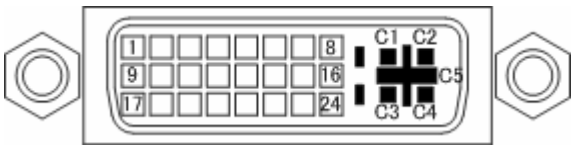


Fig. 8.3.1 Pin layout

Table 8.3.1 Pin numbers

Pin.No	Input/output signal		Pin.No	Input/output signal	Pin.No	Input/output signal
1	TMDS DATA2-		9	TMDS DATA1-	17	TMDS DATA0-
2	TMDS DATA2+		10	TMDS DATA1+	18	TMDS DATA0+
3	TMDS DATA2/4 G		11	TMDS DATA1/3 G	19	TMDS DATA0/5 G
4	TMDS DATA4-		12	TMDS DATA3-	20	TMDS DATA5-
5	TMDS DATA4+		13	TMDS DATA3+	21	TMDS DATA5+
6	DDC CLK		14	+5V (DDC power) *2	22	TMDS CLK G
7	DDC DATA		15	Ground	23	TMDS CLK+
8	N.C		16	SENSE	24	TMDS CLK-
C1	N.C					
C2	N.C	*1				
C3	N.C					
C4	N.C					
C5	Ground					

*1: Analog outputs are not supported.
*2: The maximum supply current of the DDC power supply is 0.5A. Refer to “8.2 Concerning the DDC power supply.”

8.4 LVDS output specifications

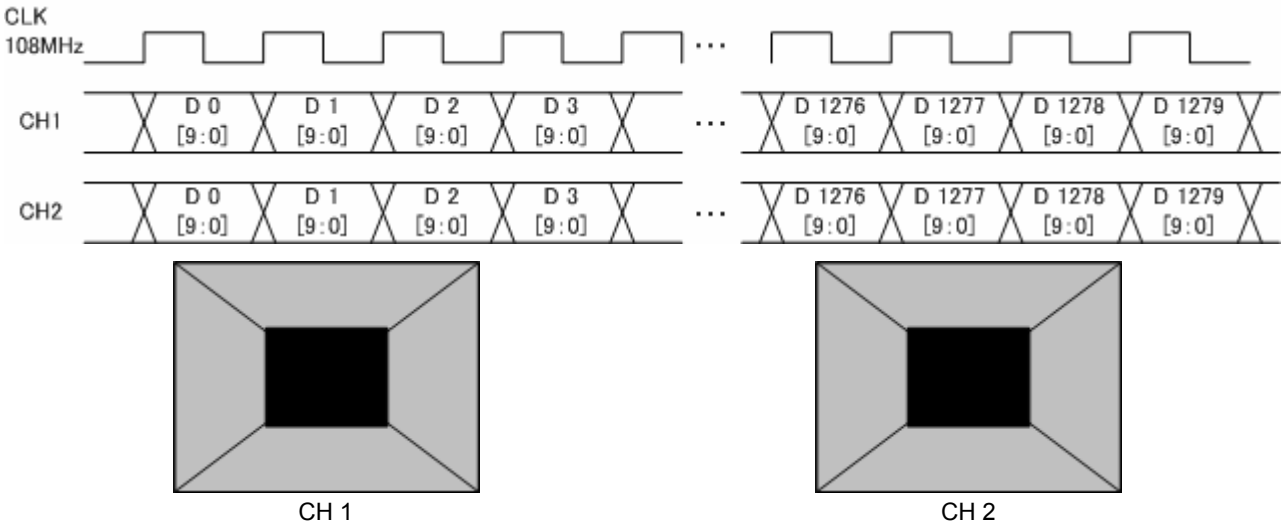
8.4.1 LVDS output

8.4.1.1 Data transfer methods

- Single Link (8- to 10-bit output)

  The same image is output to CH1 and CH2.

  The explanation below uses the example of a 1280 × 1024 resolution, 108 MHz dot clock frequency and 10-bit output gray scale.

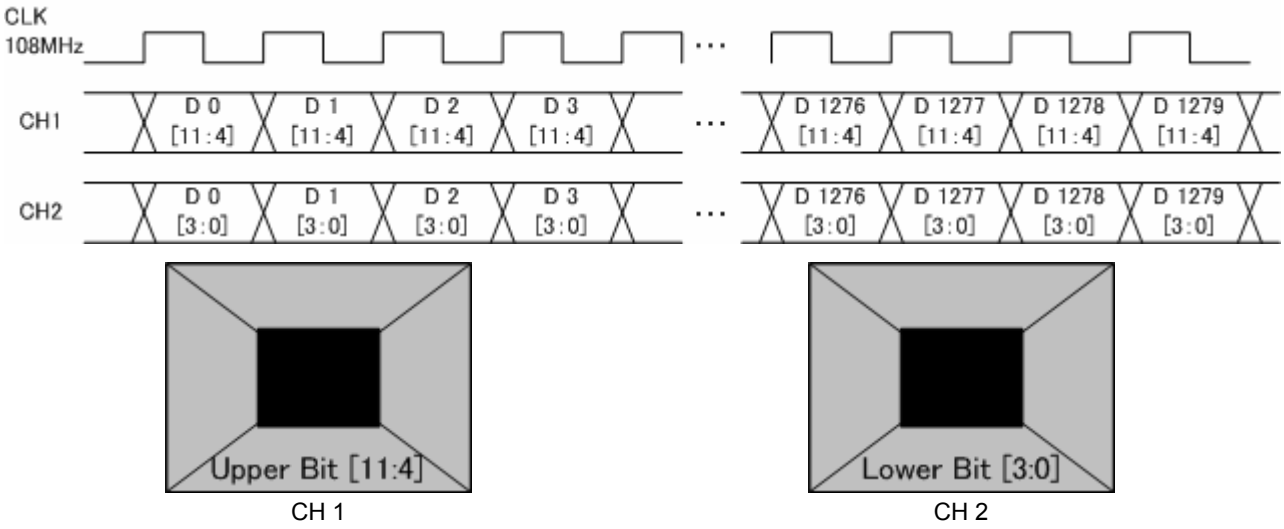


CH 1 CH 2

- Single Link (11 or 12 bits)

  The higher bits are output from CH1, and the lower bits are output from CH2.

  The explanation below uses the example of a 1280 × 1024 resolution, 108 MHz dot clock frequency and 12-bit (8 + 4 bits) output gray scale.



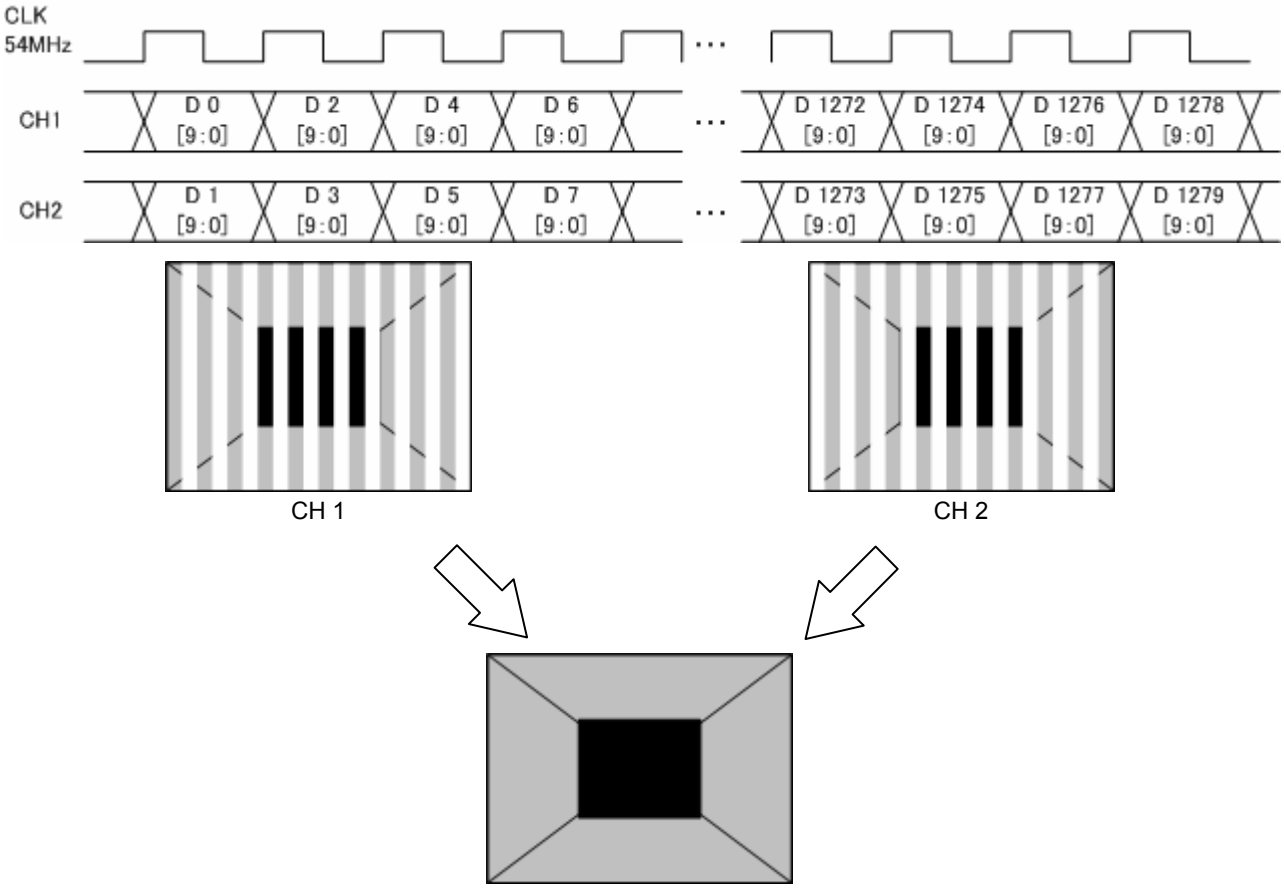
CH 1 CH 2

- Dual Link

  The image is output using CH1 and CH2 as a pair.

  Any output gray scale of 8 or 10 bits is used.

  The explanation below uses the example of a 1280 × 1024 resolution, 108 MHz dot clock frequency and 10-bit output gray scale.

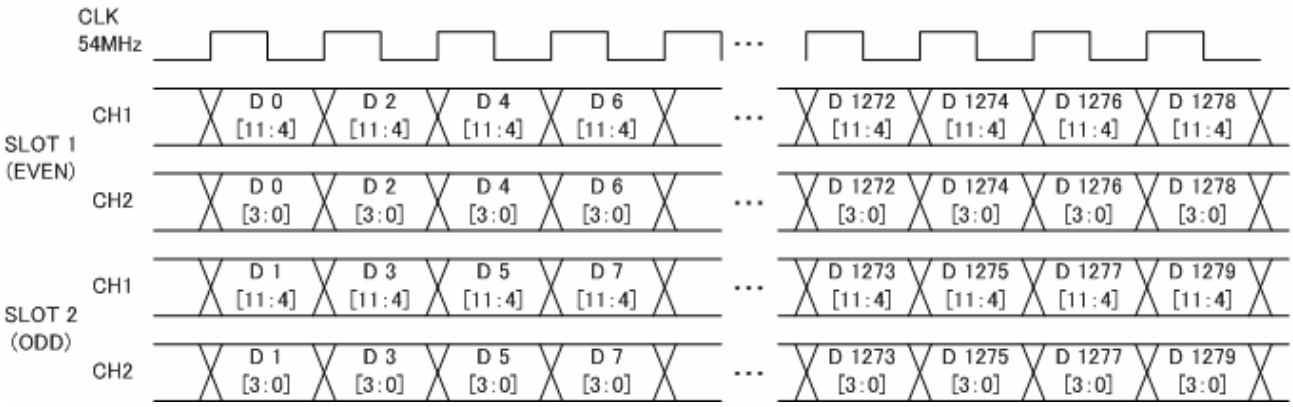


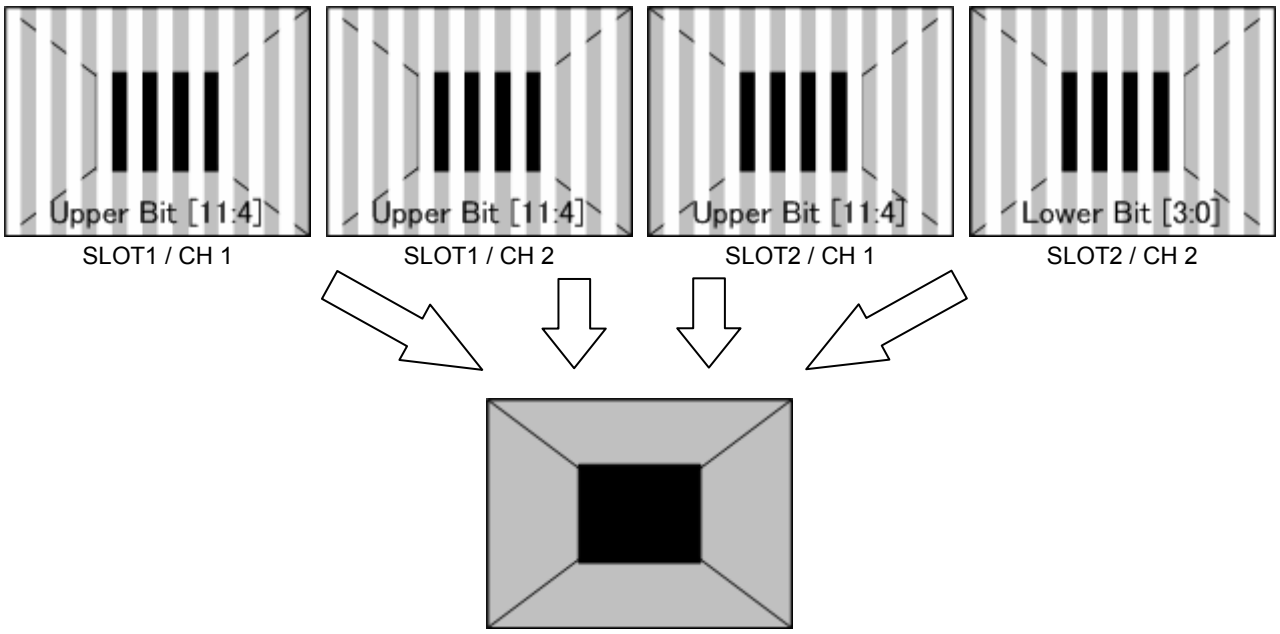
- Dual Link (12-bit output)

  When the LVDS output has been selected for slot 1 and slot 2, an output gray scale of up to 12 bits can be output using Dual Link.

  The image is output using slot 1 (even) and slot 2 (odd) as a pair.

  The explanation below uses the example of a 1280 × 1024 resolution, 108 MHz dot clock frequency and 12-bit (8 + 4 bits) output gray scale.





8.4.1.2 Data array

- **Bit array with 8 or 10 bits**

Data No.	8-bit mode			10-bit mode		
	DEF1 (DISM)	DEF2 (OpenLDI)	USER	DEF1 (DISM)	DEF2 (OpenLDI)	USER
TA0	R2	R0	R(X)	R4	R0	R(X)
TA1	R3	R1	R(X)	R5	R1	R(X)
TA2	R4	R2	R(X)	R6	R2	R(X)
TA3	R5	R3	R(X)	R7	R3	R(X)
TA4	R6	R4	R(X)	R8	R4	R(X)
TA5	R7	R5	R(X)	R9	R5	R(X)
TA6	G2	G0	G(X)	G4	G0	G(X)
TB0	G3	G1	G(X)	G5	G1	G(X)
TB1	G4	G2	G(X)	G6	G2	G(X)
TB2	G5	G3	G(X)	G7	G3	G(X)
TB3	G6	G4	G(X)	G8	G4	G(X)
TB4	G7	G5	G(X)	G9	G5	G(X)
TB5	B2	B0	B(X)	B4	B0	B(X)
TB6	B3	B1	B(X)	B5	B1	B(X)
TC0	B4	B2	B(X)	B6	B2	B(X)
TC1	B5	B3	B(X)	B7	B3	B(X)
TC2	B6	B4	B(X)	B8	B4	B(X)
TC3	B7	B5	B(X)	B9	B5	B(X)
TC4	HS	HS	HS	HS	HS	HS
TC5	VS	VS	VS	VS	VS	VS
TC6	DE	DE	DE	DE	DE	DE
TD0	R0	R6	R(X)	R2	R6	R(X)
TD1	R1	R7	R(X)	R3	R7	R(X)
TD2	G0	G6	G(X)	G2	G6	G(X)
TD3	G1	G7	G(X)	G3	G7	G(X)
TD4	B0	B6	B(X)	B2	B6	B(X)
TD5	B1	B7	B(X)	B3	B7	B(X)
TD6	L	L	L	L	L	L
TE0	L	L	L	R0	R8	R(X)
TE1	L	L	L	R1	R9	R(X)
TE2	L	L	L	G0	G8	G(X)
TE3	L	L	L	G1	G9	G(X)
TE4	L	L	L	B0	B8	B(X)
TE5	L	L	L	B1	B9	B(X)
TE6	L	L	L	L	L	L

● **Bit array with 12 bits (8 + 4 bits)**

Name of operation signal	Data No.	12-bit mode					
		DEF1 (DISM)		DEF2 (OpenLDI)		USER	
		1CH	2CH	1CH	2CH	1CH	2CH
TA	TA0	R6	L	R4	L	R(X)	L
	TA1	R7	L	R5	L	R(X)	L
	TA2	R8	R0	R6	L	R(X)	R(X)
	TA3	R9	R1	R7	L	R(X)	R(X)
	TA4	R10	R2	R8	R0	R(X)	R(X)
	TA5	R11	R3	R9	R1	R(X)	R(X)
	TA6	G6	L	G4	L	G(X)	L
TB	TB0	G7	L	G5	L	G(X)	L
	TB1	G8	G0	G6	L	G(X)	G(X)
	TB2	G9	G1	G7	L	G(X)	G(X)
	TB3	G10	G2	G8	G0	G(X)	G(X)
	TB4	G11	G3	G9	G1	G(X)	G(X)
	TB5	B6	L	B4	L	B(X)	L
	TB6	B7	L	B5	L	B(X)	L
TC	TC0	B8	B0	B6	L	B(X)	B(X)
	TC1	B9	B1	B7	L	B(X)	B(X)
	TC2	B10	B2	B8	B0	B(X)	B(X)
	TC3	B11	B3	B9	B1	B(X)	B(X)
	TC4	HS	HS	HS	HS	HS	HS
	TC5	VS	VS	VS	VS	VS	VS
	TC6	DE	DE	DE	DE	DE	DE
TD	TD0	R4	L	R10	R2	R(X)	L
	TD1	R5	L	R11	R3	R(X)	L
	TD2	G4	L	G10	G2	G(X)	L
	TD3	G5	L	G11	G3	G(X)	L
	TD4	B4	L	B10	B2	B(X)	L
	TD5	B5	L	B11	B3	B(X)	L
	TD6	L	L	L	L	L	L
TE	TE0	L	L	L	L	L	L
	TE1	L	L	L	L	L	L
	TE2	L	L	L	L	L	L
	TE3	L	L	L	L	L	L
	TE4	L	L	L	L	L	L
	TE5	L	L	L	L	L	L
	TE6	L	L	L	L	L	L

● **Bit array with 12 bits (10 + 2 bits)**

Name of operation signal	Data No.	12bit mode					
		DEF1 (DISM)		DEF2 (OpenLDI)		USER	
		1CH	2CH	1CH	2CH	1CH	2CH
TA	TA0	R6	L	R2	L	R(X)	L
	TA1	R7	L	R3	L	R(X)	L
	TA2	R8	L	R4	L	R(X)	L
	TA3	R9	L	R5	L	R(X)	L
	TA4	R10	R0	R6	R0	R(X)	R(X)
	TA5	R11	R1	R7	R1	R(X)	R(X)
	TA6	G6	L	G2	L	G(X)	L
TB	TB0	G7	L	G3	L	G(X)	L
	TB1	G8	L	G4	L	G(X)	L
	TB2	G9	L	G5	L	G(X)	L
	TB3	G10	G0	G6	G0	G(X)	G(X)
	TB4	G11	G1	G7	G1	G(X)	G(X)
	TB5	B6	L	B2	L	B(X)	L
	TB6	B7	L	B3	L	B(X)	L
TC	TC0	B8	L	B4	L	B(X)	L
	TC1	B9	L	B5	L	B(X)	L
	TC2	B10	B0	B6	B0	B(X)	B(X)
	TC3	B11	B1	B7	B1	B(X)	B(X)
	TC4	HS	HS	HS	HS	HS	HS
	TC5	VS	VS	VS	VS	VS	VS
	TC6	DE	DE	DE	DE	DE	DE
TD	TD0	R4	L	R8	L	R(X)	L
	TD1	R5	L	R9	L	R(X)	L
	TD2	G4	L	G8	L	G(X)	L
	TD3	G5	L	G9	L	G(X)	L
	TD4	B4	L	B8	L	B(X)	L
	TD5	B5	L	B9	L	B(X)	L
	TD6	L	L	L	L	L	L
TE	TE0	R2	L	R10	L	R(X)	L
	TE1	R3	L	R11	L	R(X)	L
	TE2	G2	L	G10	L	G(X)	L
	TE3	G3	L	G11	L	G(X)	L
	TE4	B2	L	B10	L	B(X)	L
	TE5	B3	L	B11	L	B(X)	L
	TE6	L	L	L	L	L	L

8.4.1.3 Connector pin layout

- Connector: MDR 10226-1210-VE made by 3M

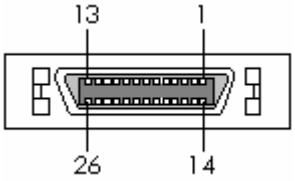


Fig. 8.4.1 Pin layout

Table 8.4.1 Pin numbers

Pin.No	Input/output signal	Pin.No	Input/output signal
1	GND	14	TA-
2	TAG	15	TA+
3	EXT_SIGNAL	16	GND
4	TB-	17	TBG
5	TB+	18	DDC_SDA
6	TC-	19	TCG
7	TC+	20	TE-
8	TEG	21	TE+
9	DDC_SCL	22	TCLK-
10	TCLKG	23	TCLK+
11	+5 V / +3.3 V (DDC power)	24	+5 V / +3.3 V (DDC power)
12	TD-	25	TDG
13	TD+	26	GND

8.5 External interface connector pin layouts

8.5.1 Remote (D-Sub 25-pin female) connector

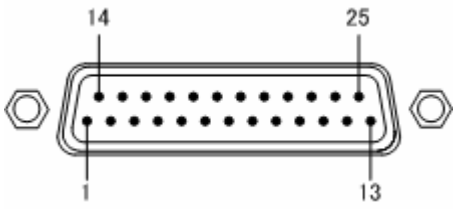


Fig. 8.5.1 Pin layout

Table 8.5.1 Pin numbers

Pin No.	I/O *1	Signal	Pin No.	I/O *1	Signal
1	I	KX7	14	I	KX6
2	O	KY2	15	O	KY3
3	O	KY4	16	O	KY1
4	O	KY5	17	I	KX4
5	I	KX5	18	O	KY0
6	I	KX3	19	I	KX2
7	I	KX1	20	I	KX0
8	-	GND	21	-	ID *3
9	O	RMT_RST *2	22	O	RMT_CLK *2
10	O	RMT_LAT *2	23	O	+5 V
11	-	GND	24	-	GND
12	O	RMT_DIN *2	25	O	+5 V
13	O	RMT_EN *2			

*1: “I” or “O” is input to or output from the VG-880.
*2: The control signals of these pins are used by Astrodesign. Under no circumstances must any connections be made to these pins.
*3: When fabricating a remote control unit, ground pin 21, and use the key matrix of the RB-614C.

As shown on the next page, the signals and remote control box (RB-1848, RB-614C, RB-649: optional accessory) key contacts are arranged in the form of a matrix.

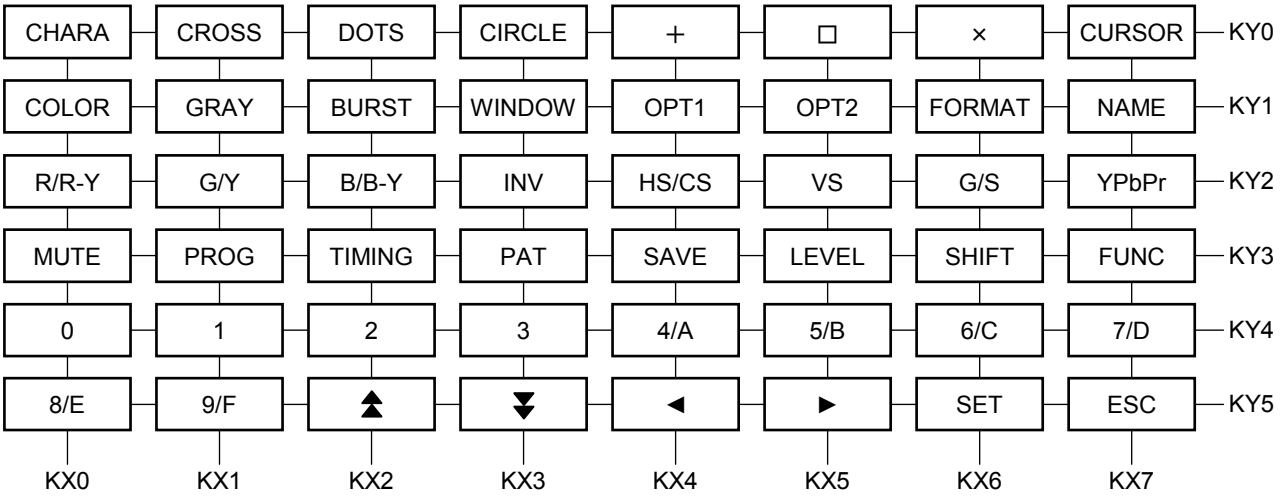


Fig. 8.5.2 RB-1848 key matrix

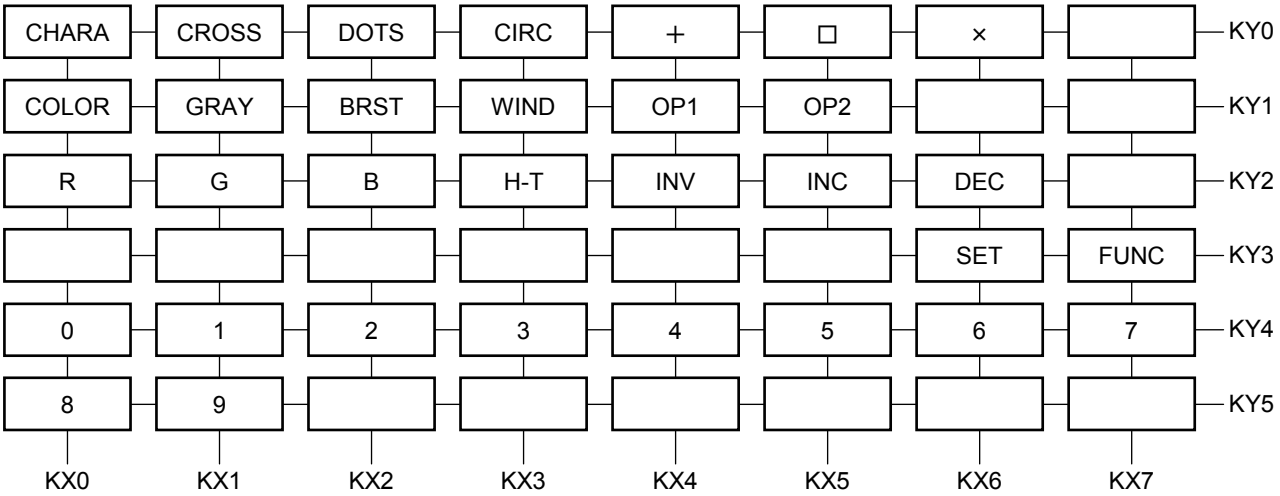


Fig. 8.5.3 RB-614C key matrix

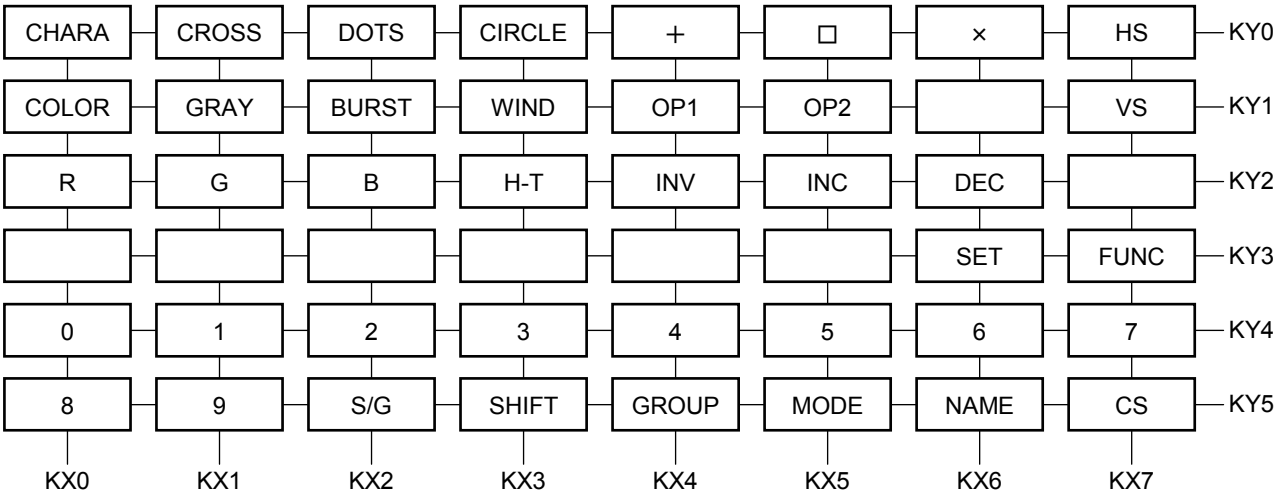


Fig. 8.5.4 RB-649 key matrix

8.5.2 RS-232C (D-Sub 9-pin male) connector

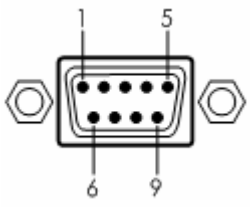


Fig. 8.5.5 Pin layout

Table 8.5.2 Pin numbers

Pin No.	I/O	Signal
1	-	NC
2	O	TXD (transmitted data)
3	I	RXD (received data)
4	-	Shorted with pin 6
5	-	FG (frame ground)
6	-	Shorted with pin 4
7	I	CTS (clear to send)
8	O	RTS (request to send)
9	-	NC

8.6 Checkpoints

8.6.1 Differences between models (VG-827 and 880)

The VG-827 and VG-880 models differ as follows.

Item			VG-827	VG-880
Output gray scale			256 colors	65536 × RGB
Bitmap support			Not provided	256 colors
Resolution			2 k × 2 k	4 k × 2 k
Restrictions on dot clock frequency for DVI output	8 bits	Single Link	25 to 65 MHz	25 to 165 MHz
		Dual Link	50 to 130 MHz	50 to 300 MHz
	~16 bits	Multi gray scale mode	Not provided	25 to 150 MHz
Restrictions on dot clock frequency for LVDS output	Single Link		20 to 65 MHz	8 to 160 MHz
	Dual Link		40 to 130 MHz	16 to 300 MHz
Restrictions on dot clock frequency for analog component output			5 to 150 MHz	5 to 165 MHz
Remote control boxes supported			RB-614C RB-649	RB-614C RB-649 RB-1848
Data storage			Panel ROM	CF card

*1: Contact an ASTRODESIGN sales representative for more details on how to support these options.

9 LIST OF ERROR MESSAGES

9.1 Media-related errors

Code (HEX)	Error message	Description
217	Flash ROM(User) Full	There is not enough free space in the internal memory.
228	No CF-Card	The CF card has not been installed
229	CF-Card Unformatted	The CF card is not formatted.
22A	CF-Card Full	There is not enough free space on the CF card.
22C	OPT Data File Error	There is an error in the optional pattern data.
22F	Image Data File Error	There is an error in the image data.

9.2 General errors

Code (HEX)	Error message	Description
302	'H-Timing DotClock' Over Limit	Dot clock in the horizontal timing data is outside the setting range.
303	'H-Timing Frontp' Over Limit	Hfrontp in the horizontal timing data is outside the setting range.
305	'H-Timing HD' Over Limit	HDstart + HDwidth in the horizontal timing data is outside the setting range.
307	'H-Timing Period' Over Limit	Period in the horizontal timing data is outside the setting range.
308	'H-Timing Disp' Over Limit	Disp in the horizontal timing data is outside the setting range.
309	'H-Timing Sync' Over Limit	Sync in the horizontal timing data is outside the setting range.
30A	'H-Timing Backp' Over Limit	Backp in the horizontal timing data is outside the setting range.
30B	'H-Timing Blanking' Over Limit	Blanking in the horizontal timing data is outside the setting range.
30C	H-Frequency Over Limit	The horizontal sync frequency in the horizontal timing data is outside the setting range.
30D	'H-Timing' Data Error	Error other than those described above in the horizontal timing data.
310	'Output' Data Error"	Error in the output conditions.
311	'Character' Data Error"	Error in the character data.
312	'Cross Hatch' Data Error"	Error in the crosshatch data.
313	'Dot' Data Error"	Error in the dot data.
314	'Circle' Data Error"	Error in the circle data.
315	'Burst' Data Error"	Error in the burst data.
316	'Window' Data Error"	Error in the window data.
317	'Color Bar' Data Error"	Error in the color bar data.
318	TERMINAL) Parameter Error	Error in a parameter in the terminal mode.
319	TERMINAL) Data Error	Error in the data in the terminal mode.

Code (HEX)	Error message	Description
31E	TERMINAL) Communication Timeout	Time-out has occurred in the data during communication in the terminal mode.
31F	TERMINAL) Undefined Command	An undefined command was received in the terminal mode.
321	‘Program No.’ Error”	Error in the program number.
322	‘Group No.’ Error”	Error in the group number.
323	‘Character Code’ Error”	Error in a user character code.
32B	‘OPT No.’ Error”	Error in the optional pattern number.
32D	OPT Data File Not Found”	The optional pattern has not been registered.
32E	‘Image No.’ Error”	Error in the image pattern number.
330	Image Data File Not Found”	The image pattern has not been registered.
333	CURSOR Not Selected	The cursor pattern has not been selected (when SP-8870 CurTool is used).
334	EDID Read Port Not Found	The EDID read port was not found. (The unit has not been installed.)
338	‘Gray Scale’ Data Error	Error in the gray scale data.
339	‘OPT/Image’ Data Error”	Error in the optional or image pattern data.
33B	‘Cursor’ Data Error	Error in the cursor data.
33C	‘Program Name’ Data Error	Error in the program name data.
33D	‘□×[ABC] Color’ Data Error	Error in the □ × [ABC] color data.
33E	‘Action’ Data Error”	Error in the action data.
340	‘V-Timing Total’ Over Limit	Total in the vertical timing data is outside the setting range.
341	‘V-Timing Disp’ Over Limit”	Disp in the vertical timing data is outside the setting range.
342	‘V-Timing Sync’ Over Limit	Sync in the vertical timing data is outside the setting range.
343	‘V-Timing Backp’ Over Limit	Backp in the vertical timing data is outside the setting range.
344	‘V-Timing Frontp’ Over Limit	Frontp in the vertical timing data is outside the setting range.
345	‘V-Timing Blanking’ Over Limit	Blanking in the vertical timing data is outside the setting range.
346	V-Frequency Over Limit	The V sync freq in the vertical timing data is outside the setting range.
347	‘V-Timing VD’ Over Limit	VDstart + VDline in the vertical timing data is outside the setting range.
348	‘V-Timing EQP-Fp’ Over Limit	EQP-FP in the vertical timing data is outside the setting range.
349	‘V-Timing EQP-Bp’ Over Limit	EQP-BP in the vertical timing data is outside the setting range.
34A	‘V-Timing’ Data Error	Error other than those described above in the vertical timing data.
34E	DDC2 Line Error	ACK was not received in DDC2.
352	EDID Header Error	Error in the EDID header.
353	EDID Check Sum Error	EDID checksum error.
354	EDID Header & Check Sum Error	Error in the EDID header and check sum.
355	User YPbPr Coefficient Error	Error in the color difference coefficient.
360	Image License Error	The image data license has not been input.
361	Data File Not Found	The data (other than the optional pattern and image data) cannot be found.
362	Copy Condition Error	· The copy source data and copy destination data are identical. · The number of the copy source data and number of the copy destination data do not match.

9.3 User optional pattern-related errors

Code (HEX)	Error message	Description
501	OPT Program Not Found	The user optional pattern cannot be found.
502	Variables Stack Error	Variable stack error.
503	Register Stack Error	Register stack error.
504	Call Stack Error	Function stack error.
505	Illegal Instruction Code	Illegal instruction code.
506	Divide by Zero	An attempt was made to divide a number by zero.
539	OPT-USER License Error	The user optional pattern license has not been input.

VG-880 Instruction Manual

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