VG-828

INSTRUCTION MANUAL

Ver. 1.0

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Astrodesign, Inc.

CONTENTS

FOREWORD

Thank you for purchasing the model VG-828 video signal generator.

This manual provides details on how to operate the VG-828 and the precautions to be heeded when doing so.

Since improper handling may lead to accidents, we recommend that you take the time to read through this manual without fail before attempting to operate the VG-828: the information provided will ensure that you will operate the VG-828 properly.

After reading through the manual, keep it in a safe place for future reference.

SAFETY PRECAUTIONS

⚠ WARNING

- 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 bundle it with other cords for use. This may cause a fire.
  - Do not place heavy objects on top of the power cord.
    This 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, electrical shock or malfunctioning.

⚠ CAUTION

- Concerning the Installation and Operating Locations
  - Install the generator in a stable location.
    (Using the generator installed perpendicularly may generate heat which will cause the generator's temperature to rise and which, in turn, may give rise to trouble.)

- Concerning Impact
  - This is a precision instrument and, as such, subjecting it to impact may cause malfunctioning. Take special care when moving the generator.

- Before Connecting the VG-828 to the Display
  - Connect the frame grounds on both the VG-828 and display before connecting the two units using the signal cables. (Use the accessory FG cable.)

  * See figure below

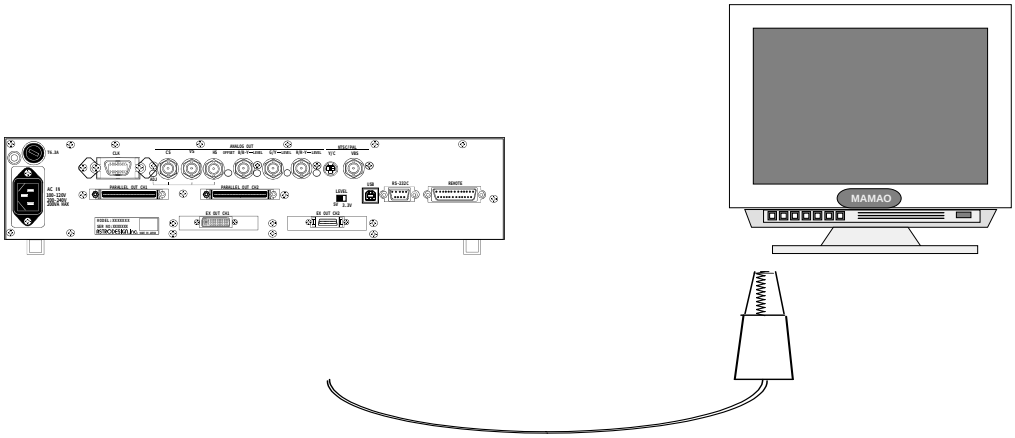


Fig. 0-1

Connect to the frame ground on the VG-828.

Use an alligator clip for the connection to the frame ground on the display.

Connection between the frame grounds makes the output D/A converter and other extremely costly parts of the VG-828 less susceptible to damage. Taking this precaution is particularly important when the display is a newly developed model.

- When Disconnecting the VG-828 from the Display
  - First disconnect the connecting cables, and disconnect the frame ground last.

- Handling the Memory Cards/Panel ROMs
  - The POWER switch on the front panel must be used to turn on the power of the VG-828 when a memory card or panel ROM has already been installed. Turning on the power by plugging in the AC power cord may damage the memory card or panel ROM.

- When Accuracy is a Particularly Important Issue
  - When accuracy is a particularly important issue, leave the VG-828 standing for 10 to 15 minutes after having turned on the power in order to allow the VG-828 to stabilize before operating it.

- When Trouble or Malfunctioning Occurs
  - In the unlikely event that trouble or malfunctioning should occur, first disconnect

the power cord and contact your dealer or an Astrodesign sales representative.

CHAPTER 1 OVERVIEW OF VG-828

1･4 Introduction

The VG-828 is a programmable video signal generator which features RGB analog outputs, RGB digital parallel outputs up to 8 bits, low-voltage serial digital (panel link or LVDS) outputs and NTSC/PAL outputs.

Its analog outputs support even color difference signals and tri-level sync signals. Use of the Windows 95/98-compatible software program provided as a standard accessory facilities the setting and entry of the timing data and pattern data while the generator comes with functions for creating special patterns of the user's choice, entering natural images, etc.

The generator is also capable of full-color bitmap displays with up to 16.77 million colors.

The provision of many different types of output facilities enables output signals to be delivered not only for CRTs but to LCDs, PDPs and all other kinds of display units. All in all, the generator can be used for an extremely wide range of applications including production lines, various inspections and maintenance conducted as well as the operations performed by those involved in the development of technology for video-related equipment.

1･2 Features

(1) All-in-One Model

This generator houses a full complement of output facilities--analog outputs, digital parallel outputs, digital serial outputs and NTSC/PAL outputs--in a compact body without the need for adapters, etc.

(2) Ultra-Wide Frequency Range for Dot Clock Signals

The VG-828 supports the 5 to 250 MHz frequency range for analog outputs and the 5 to 100 MHz and 10 to 200 MHz ranges for digital parallel outputs in the 1/1 output mode and 1/2 output mode respectively for its dot clock signals.

(3) Support for Full-Color Output

This generator is capable of full-color displays with up to 16.77 million colors.

(4) Compatible with Existing Models in the VG Series

The VG-828 is compatible with the existing models in the VG series in terms of the panel ROMs and operation methods used. This means that, using the panel ROMs

of existing models, it is ready for immediate action.

(5) Special Pattern Preparation Function: A Useful New Weapon

Over and above the existing basic patterns (11 patterns including character, crosshatch, color bar and gray scale) and the special patterns (up to 64 patterns can be incorporated), this new function enables special patterns to be created exactly as desired by the user. The function serves as a powerful ally in developing and evaluating next-generation displays and in creating special patterns which are useful for automatic machines.

(6) Memory Cards Used to Store Program Data

In addition to the conventional panel ROMs, memory cards are provided as a standard feature. A total of 850 programs can be entered on each memory card. Computer screen displays and natural images can also be stored.

(7) Internal Sample Data

A total of 150 kinds of timing data and 150 kinds of pattern data are entered as sample data inside the VG. They can be combined in any way for outputting signals. This function comes in handy when no panel ROMs or memory cards are available. It also makes it possible to use the sample data when program data is to be edited.

(8) Editing and Entry Software Program (SP-8024) Compatible with Windows 95/98 Provided as Standard Feature

Program data can be edited and entered and signals can be output using Windows 95 or 98.

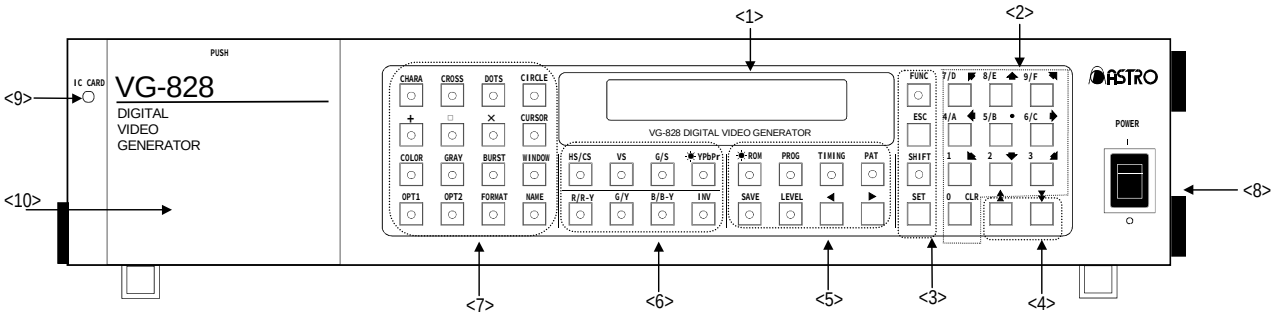
(9) Wide Range of Functions Related to Operation

- Sync signals can be set ON or OFF manually using a panel key.
- The optional RB-614C or RB-649 may be used as a remote control box.
- An EEPROM (64 Kbit, 256 Kbit, 512 Kbit: AH-3000) or EPROM (64 Kbit) can be used as the panel ROM.
- Group display and auto display functions are available.
- The RS-232C and USB interfaces enable the generator to be controlled from an external computer and make it possible to send data to or receive it from the computer.

1•3 Panel Parts and Their Functions

1•3•1 Front Panel

Fig. 1-1



<1>	VG-828 DIGITAL VIDEO GENERATOR LCD (liquid crystal) display (24 characters × 2-line display)	The setting menus, program numbers, timing data, etc. appear on this display.
<2>	7/D 8/E 9/F 4/A 5/B 6/C 1 2 3 0 CLR Keys	The ten number keys are used to input data. Using them in conjunction with the SHIFT key enables hexadecimal input from A to F. Depending on the setting item, the keys may have functions other than inputting numbers.
<3>	FUNC Key	Press this to change the function.
	ESC Key	Press this to abort the current processing.
	SHIFT Key	Press this to switch the number key input from decimal to hexadecimal. When the LED is lighted, hexadecimal input from A to F is enabled.
	SET Key	Press this to execute a function or program data. When editing program data, it is used to execute the set program data.
<4>	▲ Key	This increments by 1 the program number in the direct display or group display mode. When program data or pattern data is edited, press it to return the LCD display menu to the previous page.
	▼ Key	This decrements by 1 the program number in the direct display or group display mode. When program data or pattern data is edited, press it to advance the LCD display menu to the next page.

<5>	ROM	Key	Use this to select the memory card or panel ROM during execution or editing of the program data, etc. When the LED is lighted, the panel ROM is selected.
	PROG	Key	Press this to execute all the program data (timing and pattern data) in the direct display mode.
	TIMING	Key	Press this to execute only the timing data in the direct display mode. During editing, press it to edit the horizontal/vertical timing and output condition data.
	PAT	Key	Press this to execute only the pattern data in the direct display mode. During editing, press it to edit the pattern data.
	SAVE	Key	Press this to save the edited data in the memory card or panel ROM during the editing processes.
	LEVEL	Key	Press this to change the video signal output level in the direct display mode.
	▶	Key	Use this to move the cursor on the LCD to the next item.
	◀	Key	Use this to move the cursor on the LCD to the previous item.

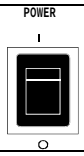
Output Control Keys

<6>	HS/CS	Key	This is used to set the HS and CS signal outputs to ON or OFF (they are ON when the LED is lighted). At OFF, the output is high or low depending on the DSW4 setting. SHIFT + When the LED is lighted + HS/CS: The polarity is reversed by pressing the HS/CS key (negative when the LED is lighted).
	VS	Key	This is used to set the VS signal output to ON or OFF (it is ON when the LED is lighted). SHIFT + When the LED is lighted + VS: The polarity is reversed by pressing the VS key (negative when the LED is lighted).
	G/S	Key	This is used to set the Green on Sync signal output to ON or OFF (it is ON when the LED is lighted).
	YPbPr	Key	This is used to switch between the RGB and YPbPr signals (the YPbPr signals are selected when the LED is lighted).
	R	Key	This is used to set the R signal output to ON or OFF (it is ON when the LED is lighted).
	G	Key	This is used to set the G signal output to ON or OFF (it is ON when the LED is lighted).
	B	Key	This is used to set the B signal output to ON or OFF (it is ON when the LED is lighted).
	INV	Key	This is used to invert the R/G/B signal output (it is inverted when the LED is lighted).

Pattern Keys

Press these keys to set the pattern outputs to ON or OFF.
They are also used to select patterns during panel ROM data editing.

<7>	CHARA Key		Character	COLOR Key		Color bar
	CROSS Key		Crosshatch	GRAY Key		Gray scale (or half tone)
	DOTS Key		Dot	BURST Key		Burst
	CIRCLE Key		Circle	WINDOW Key		Window
	+ Key		Center marker	OPT1 Key		Optional pattern 1
	□ Key		Edge marker	OPT2 Key		Optional pattern 2
	× Key		Diagonal line	FORMAT Key		Press this to change the contents of the pattern data selected by NAME from CHARA.
	CURSOR Key		Cursor	NAME Key		Program name

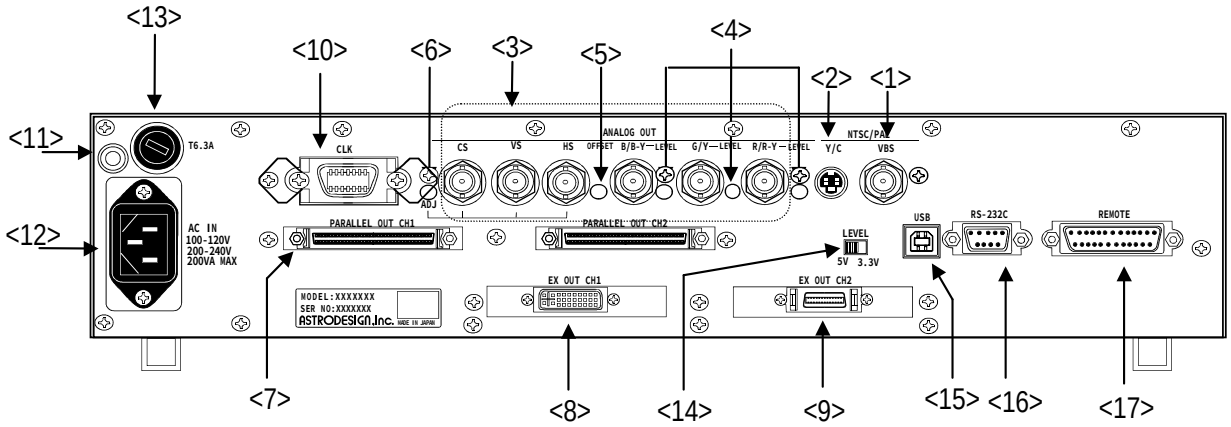
<8>	POWER Switch 	* The POWER switch on the front panel must always be used to turn on the generator's power. Turning on the power by plugging in the AC power cord may damage the memory card or panel ROM.
<9>	IC CARD	This lights while memory card data is being accessed. Do not insert or remove the memory card while it is lighted. Otherwise, the memory card may be damaged.

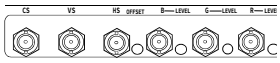
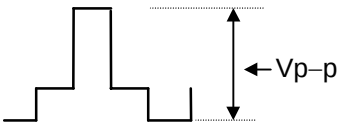
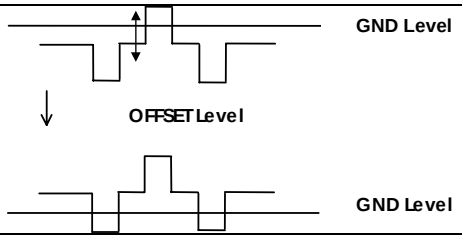
<10> The lid opens when the top area is pressed.
The panel ROM socket, memory card slot and DIP switches are found inside.

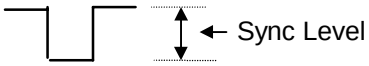
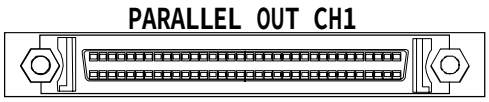
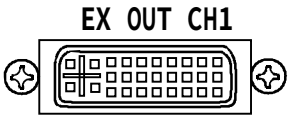
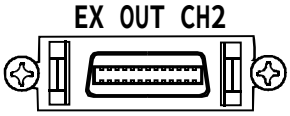
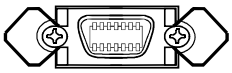
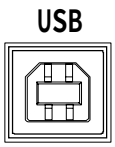
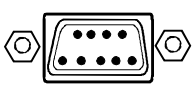
Panel ROM Socket	To install a panel ROM, pull the lever toward you, check the panel ROM direction, insert the panel ROM and push the lever back in. The panel ROM may be damaged if it is inserted the wrong way round.
Memory Card Slot	Insert the memory card in the direction indicated by the arrow on the top of the card. Insert it firmly until it is completely inserted.
DIP Switches	Refer to 3-2-2 for the DIP switch settings.

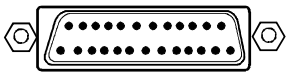
1•3•2 Rear Panel

Fig. 1-2



<1>	VBS 	NTSC/PAL composite video output connector			
<2>	Y/C 	NTSC/PAL Y/C video output connector			
<3>	 Analog output connectors (BNC)	R	Video signal, red	HS	Horizontal sync signal
		G	Video signal, green	VS	Vertical sync signal
		B	Video signal, blue	CS	Composite sync signal
<4>	Rear Panel Trimmers Use this to adjust the HS/VS/CS level.	When the trimmer is turned, the sync level shown in the figure below changes. 			
<5>	Rear Panel Trimmer Use this to adjust the RGB output offset.				

<6>	Rear Panel Trimmer Use this to adjust the HS/VS/CS level.	When the trimmer is turned, the sync level shown in the figure below changes. 
<7>		Digital Parallel Output Connector CH1, CH2 (68-pin connectors) Refer to "9-5 Connector pin layouts" for details on the pin layout.
<8>		DVI Digital Serial Output Connector CH1 Refer to "9-5 Connector pin layouts" for details on the pin layout.
<9>		DFP Digital Serial Output Connector CH2 (26-pin connector) Refer to "9-5 Connector pin layouts" for details on the pin layout.
<10>		Clock Output Connector (57 series, 14-pin connector) Refer to "9-5 Connector pin layouts" for details on the pin layout.
<11>		Frame Ground (FG) Connect this frame ground to the frame ground of the unit which is connected to the VG-828.
<12>		AC Input Socket This supports a voltage from 100V to 120V or 200V to 240V.
<13>		Fuse A slow-blow 6.3A 250V fuse is used.
<14>		Digital Output Level Selector Switch This is used to switch the digital output level from 5V to 3.3V or vice versa.
<15>		USB Connector This is used to control the VG-828 from an external computer (personal computer, etc.). (This is supported by Windows 98 only.)
<16>		RS-232C Connector (9-pin female) This is used to control the VG-828 from an external computer (personal computer, etc.). Refer to "9-5 Connector pin layouts" for details on the pin layout.

<17>		Remote Connector (25-pin female) This is used to connect an optional remote control box (RB-649 or RB-614C) to operate the generator by remote control. Refer to "9-5 Connector pin layouts" for details on the pin layout.

1･4 Description of Abbreviations

(1) Abbreviations related to output signals

HS	Horizontal sync signal
VS	Vertical sync signal
CS	Composite sync signal
HT	Half-tone
RHT, GHT, BHT	Red, green, blue half-tone
CLK	Dot clock
EQP (EQ−PULSE)	Equalizing pulse
SERR	Serrated pulse
CV	Composite video sync signal
HD	Horizontal direct drive pulse
VD	Vertical direct drive pulse

(2) Abbreviations related to operation

PROG	Program
PAT SEL	Pattern select
OUTPUT	Output condition
PAT	Pattern
FUNC	Function

1･5 Main Differences from Existing Models

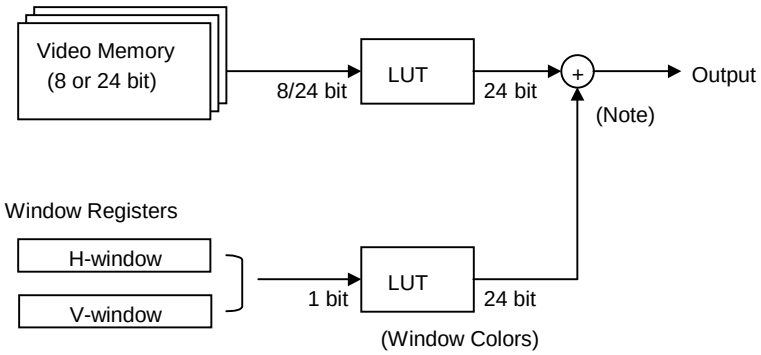
Item	Description	
Internal Optional Patterns (Note 1)	Existing Models	The OPT1 and OPT2 optional patterns are in separate groups. Patterns 00 to 1F are selected in each group.
	VG-828	The OPT1 and OPT2 optional patterns are in the same group. Patterns 00 to 3F are selected. (Refer to "10-2 Internal optional patterns.")
Internal User Characters	Existing Models	None
	VG-828	Patterns F0 to FF are selected. (Refer to "10-3 Internal user character data".)
Remote Control Box	Existing Models	Data can be edited for some models only using the RB-649.
	VG-828	Data cannot be edited using the RB-649 or RB-614C.
TTL Output (R/G/B, RH/GH/BH)	Video signal TTL output is not supported by the VG-828. It can be set in the program data to ensure compatibility with an existing model but it will be ignored when the program is executed by the VG-828. (Refer to 4-4.)	

NRZ/RZ	This is not supported by the VG-828. It can be set in the program data to ensure compatibility with an existing model but it will be ignored when the program is executed by the VG-828. (Refer to 4-4.)	
External Control (Note 2)	Existing Models	Possible with RS-232C only. (9600 bps, data length = 7 bits, stop bit = 1, parity = none)
	VG-828	Both RS-232C and USB interfaces can be used. Selection is made using the DIP switches. (Refer to "3-2-2 Operating modes established by DIP switch settings.") The RS-232C baud rate and other parameters can be set by Func-5. (Refer to "3-3-6 Config edit function.")
CPC Function	This is not supported by the VG-828. It must be re-created by an optional pattern prepared by the user.	
Group data/auto display data when panel ROM (58C65P) is used	Only data in programs with 2-digit program numbers can be saved in the panel ROM (58C65P). If a 3-digit program number is entered, the first digit will be ignored.	

Note 1	Optional pattern numbers are not interchangeable. Care is required when using an existing panel ROM.
Note 2	The terminal commands of existing models can be used but the expanded functions cannot be used for the VG-828. All terminal commands can be called from the C program by using the library in the software program provided.

1･6 Concerning Video Memory and LUT

The video memory and LUT in the VG-828 are configured as below.



The video memory consists of a 8- or 24-bit VRAM and window registers.

VRAM	Types of Patterns	Description
Video Memory	CHARA, CROSS, DOTS, CIRCLE, +, □, ×, CURSOR, BURST, NAME COLOR, GRAY, Image data display	This operates as a regular 8-bit VRAM. With full-color image displays, it operates as a 24-bit RAM.
Window Line Buffer	WINDOW	Only one window is provided by the hardware. The window pattern functions are subject to restrictions.

Note: The sequence of priority for the VRAM and window output is shown below.
<1> Window
<2> VRAM
The output color is determined in accordance with the above sequence of priority for areas where there is an overlap.

1･7 Concerning NTSC/PAL Timing Data

The NTSC and PAL timing data are contained in the following program numbers.

NTSC	946
PAL	949

To output the NTSC or PAL timing data, execute the program whose number is given above using the direct display function (Func-0) or copy the data onto a memory card for use.

Note: NTSC/PAL timing data should not be edited.

1･8 Concerning Full-Color Displays

Full-color patterns are contained in one of the optional patterns (#2F). Full-color images can be displayed by entering full-color images on a memory card using the SP-8024 editing software program.

Note:	For details on how to enter these image, refer to the SP-8024 on-line help.

CHAPTER 2 MEMORY CARDS / PANEL ROMS

2･1 VG-828 Internal Data

The following data is contained in the E-PROM inside the main unit of the VG-828.

	Internal E-PROM of VG-828
Number of Program Data	150 (850 to 999)
Number of User Characters	16 (F0H to FFH)
Number of Optional Patterns	64 (00H to 3FH)

As with the memory card data, this data can be used as execution data or as edit/copy source data. For further details on this data, refer to the section on internal data.

2･2 Workings of the Memory Card/Panel ROM

Program data, group data, user characters and auto display data can be entered or edited on the memory card and panel ROM. Furthermore, user-created optional patterns and image data can be entered on the memory card.

Program data (×150: #850 to #999) has been entered in the E-PROM inside the main unit of the VG-828 but this data cannot be edited and saved.

Customized timing and pattern data can be prepared by editing and entering data on the memory card and panel ROM.

The panel ROM data is compatible with the data of panel ROMs in existing VG models. Panel ROMs with data already entered can be used as is.

However, with functions (data) which were expanded from a model in the existing VG series, the data cannot be entered into the panel ROM of the VG-828.

It is recommended that the memory card be used so that the functions of the VG-828 will be used to the full.

Note:	Unless otherwise noted, any mention of "memory card" includes the panel ROM as well. The phrase "memory card" should actually be read as "memory card and panel ROM" in these instructions.

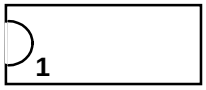
2・3 Memory Card/Panel ROM Types and Main Differences

(1) Types of Memory Cards/Panel ROMs

The following 10 types of memory cards can be used with the VG-828.

Flash memory cards made by Fujitsu:	MB98A81063-15 (1 MB), MB98A81183-15 (2 MB), MB98A81273-15 (4 MB), MB98A81373-15 (8 MB), MB98A81473-15 (16 MB), MB98A81573-15 (32 MB)

The following three types of panel ROMs can be used with the VG-828.



Insert the panel ROM (EEPROM or EPROM) in the direction shown on the left.

EEPROM: ·····HN58C65P-10 (64 Kbit, 100 ns standard panel ROM) made by Hitachi

HN58C256P-10 (256 Kbit, 200 ns standard panel ROM exclusively designed for VG-822, 823) made by Hitachi

HN58C256P-20 (256 Kbit, 200 ns standard panel ROM) made by Hitachi

E-PROM: ·····2764 (64 Kbit, 250 ns) made by different companies

EEPROM: ·····Optional AH-3000 (512 Kbit, 250 ns expansion panel ROM) made by Astrodesign

(2) Main Differences between Memory Cards/Panel ROMs

Table 2-1

	HN58C65P-10 2764 (*1)	HN58C256P	AH-3000	Memory Card
Number of programs which can be entered	40 (1 to 40)	160 (See next section)	320 (See next section)	849 (1 to 849)
Number of characters in a program name	8	8	8	20
Number of user characters which can be entered	4 (E0H to E3H)	8 (E0H to E7H)	15 (E0H to EEH)	16 (E0H to EFH)
Number of groups which can be entered (*2)	2 (1 to 2)	40 (1 to 40)	8 (1 to 8)	32 (1 to 32)
Number of characters in a group name	--	--	--	20
Number of user-created optional patterns which can be entered	--	--	--	64 (40H to 7FH)
Number of image data which can be entered (*3)	--	--	--	Depends on card capacity (*3)

*1) Since data cannot be written into the 2764 (EPROM) by the VG-828, use the

	HN58C65P-25 as the master to write the data with a ROM writer.
*2)	As regards the number of groups, refer to the section on the group data edit function in Chapter 3. Only data in programs with 2-digit program numbers can be saved in the panel ROM (58C65P).
*3)	The number of image data which can be entered is calculated as follows. Number of sectors usable as image data = card capacity / 128 KB − 3 (1 sector = 128 KB, 3 of the sectors cannot be used for images) Number of sectors used for the data of one image = (Number of horizontal dots × number of vertical lines of image + 784 + 131071) / 131072 (decimal places rounded off)
*4)	Users can prepare and enter any patterns by using the SP-8020 (VG-828 editing software program). For further details, refer to the SP-8020 on-line help and "how to prepare user optional patterns."
*5)	The image data is displayed by executing OPT-80 to BF. OPT-80 -- Image data #1 is displayed. OPT-81 -- Image data #2 is displayed. ... ... OPT-BF -- Image data #64 is displayed.

2･4 Precautions for using AH-3000/HN58C256P

(1) AH-3000 program numbers

The AH-3000 has a capacity which enables 320 programs to be entered. It is divided into 1) an area equivalent to 40 programs of the standard panel ROM and 2) an expansion area equivalent to the remaining 280 of the 320 programs. As for the program numbers applying when the AH-3000 is installed as the panel ROM, numbers 001 to 040 apply for the programs in the standard area and numbers 500 to 779 apply for the programs in the expansion area.

(2) HN58C256P program numbers

The HN58C256P panel ROM has a capacity which enables 160 programs to be entered. It is divided into 1) an area equivalent to 40 programs of the standard panel ROM and 2) an expansion area equivalent to the remaining 120 of the 160 programs. As for the program numbers applying when the HN58C256P is installed as the panel ROM, numbers 001 to 040 apply for the programs in the standard area and numbers 501 to 540, 601 to 640, and 701 to 740 apply for the programs in the expansion area.

2･5 Configuration of Program Data

The data of one program is divided into the blocks listed in Table 2-2.

Table 2-2

Valid / Invalid	Denotes whether program data is valid or invalid.	
Timing data	H-Timing	Horizontal timing data
	V-Timing	Vertical timing data
	OUTPUT	Output condition data
Pattern data	Pattern Select	Pattern select data
	Graphic Color	Graphic color data
	CHARA	Character pattern data
	CROSS	Crosshatch pattern data
	DOTS	Dot pattern data
	CIRCLE	Circle pattern data
	COLOR	Color bar pattern data
	GRAY	Gray scale pattern data
	BURST	Burst pattern data
	WINDOW	Window pattern data
	OPT1	Optional pattern #1 data
	OPT2	Optional pattern #2 data
	CURSOR	Cursor pattern data
	NAME	Program name data
	ACTION	Pattern action

Each of some of the blocks is divided into a number of pages, and each page has a number of data items. One page corresponds to one screen display of the VG-828. Use the ⏬ key to display the next page and the ⏫ key to display the previous page. Use the ◀ and ▶ keys to select the data items. The cursor on the LCD display is moved by pressing the ◀ and ▶ keys.

Note:	The cursor does not move when there is only one item. When items cover only one page, the display will not change either even when the ⏫ or ⏬ key is pressed.

2･6 Differences in Program Data between Memory Card and Panel ROM

The program data on the memory card is an expanded version of the panel ROM data, as is shown below.

Table 2-3

Pattern Data	Memory Card (same as an internal memory)	Panel ROM
Background color	New addition, 0--255 designated each for R/G/B.	R/G/B each processed as 0 or 1.
Character pattern	Code: 20--FF Cell size: 1--255	Code: 20--EE Cell size: 1--64
Crosshatch	Mode, format and line width added	----
Dot	Mode, format, size and shape added	----
Circle	Monitor aspect ratio added	----
OPT1/OPT2	00--7F designated, no OPT1 and OPT2 groups	0--1F designated, separate groups for OPT1 and OPT2
Color bars	Number of repetitions added	----
Gray scale	Mode and interval separated from color bar; number of repetitions added	Mode and interval in common with color bar
Cursor	New addition	----
Program name	Display position and font size added; max. number of characters: 20	Display position and font size not added; max. number of characters: 8
Pattern Action	New addition	----

Note:	When the memory card (or internal memory) program data is copied into the panel ROM, the expanded data is discarded (or an error results when an attempt is made to execute the data, such as OPT1/2). When data is copied from the panel ROM to the memory card, the expanded parts are set to the default values.

CHAPTER 3 SOFTWARE CONFIGURATION AND OPERATION

3･1 Software Configuration

The software used to operate this unit consists of the following functions. Each function is established by pressing the [FUNC] key, a number key from [0] to [9] and the [SET] key in this order.

Table 3-1 Operation Software

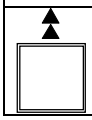
Function No.	Name of function	Description and use
0	Direct display	When a program number is input, signals are output in accordance with the data contained in the program. (*1)
		This function is used for adjustments and inspections conducted on production lines, etc.
1	Auto display	Programs are executed repeatedly and automatically in accordance with the delay times and program number setting sequence entered in the memory card/panel ROM.
		This function is used for demonstrations and service life testing.
2	Program edit	The program data is changed temporarily, and signals are output according to the changed data. (The changes cannot be saved.)
		This function is used for testing and evaluation by personnel in development or engineering divisions.
3	Card/ROM edit	The program data is edited and entered.
		This function is used when preparing memory card/panel ROM data.
4	Card/ROM copy	Data on the memory card or panel ROM is copied. Copying between cards or ROMs is also possible.
		This function is used when preparing memory card/panel ROM data.
5	Config edit	This function is used to set the execution mode, etc. of the VG-828.
6	Group data edit	Group numbers and program numbers are entered in the memory card/panel ROM.
		This function is used to enter group display data.
8	Character edit	User character data is edited and entered.
		This function is used for testing and evaluation by personnel in development or engineering divisions.
9	List display	The data which has been entered appears on a display.
		This function is used for testing and evaluation by personnel in development or engineering divisions.
A	YPbPr coefficient table edit	The tables of the coefficient related to YPbPr output are edited.

(*1) The group display execution mode is established when the group number has been set using config edit (Func-5).

3•2 Operating Modes when the Power is Switched On

3•2•1 Operating Modes Established by Key Operation

Which operating mode is established when the VG-828 unit's power is turned on differs depending on how the power was turned on.

Key operation	Operating mode established
Power is turned on with no keys pressed	Normal mode. The direct display or group display function is executed.
 Power is turned on while the [SET] key is pressed	The auto display function is executed. The auto display data is read from the device (memory card or panel ROM) in which the data was entered using config edit (Func-5), and executed.
 Power is turned on while the [▲▲] key is pressed	The unit is started up in the self-diagnosis mode.

3•2•2 Operating Modes Established by DIP Switch Settings

- The highlighted areas in the table below denote the factory settings of the DIP switches.
- To change a setting, be sure to turn off the power first, select a setting listed in the table, and turn the power back on.
  (Changes made to the DIP switch settings after the power has been turned on may be ignored.)

Table 3-1

Switch No.	Function	ON/OFF operation	
SW1	Terminal mode port selection	ON	: The terminal mode is executed at the RS-232C port.
		OFF	: The terminal mode is executed at the USB port.
SW2	Analog/digital/TV output individual ON/OFF function selection *1	ON	: The output individual ON/OFF function is turned off.
		OFF	: The output individual ON/OFF function is turned on.
SW3	Selection of panel link board restriction in 1/1 clock mode *2	ON	: Output in 1/1 mode with dot clock frequency ranging from 130 to 165 MHz; output in 1/2 mode with dot clock frequency above 165 MHz.
		OFF	: Output in 1/2 mode with dot clock frequency above 130 MHz.
SW4	Level selection when HS/VS/CS are off	ON	: Low level
		OFF	: High level
SW5	Panel ROM mode selection	ON	: Panel ROM is used in the analog mode.
		OFF	: Panel ROM is used in the digital mode.
SW6	HS/CS key operation mode selection	ON	: HS/CS are coupled.
		OFF	: HS/CS is set ON/OFF when the switch is used together with the SHIFT key. HS is set ON/OFF when SHIFT key lamp is off. CS is set ON/OFF when SHIFT key lamp is lighted. (Polarity changes cannot be made at this time.)
SW7	Reserved	ON	: Leave this switch at the factory setting.
		OFF	
SW8	Reserved	ON	: Leave this switch at the factory setting.
		OFF	

*1) For further details on the analog/digital/TV output individual ON/OFF function, refer to (10) in "4-4 Analog output condition data editing" or (13) in "4-5 Digital output condition data editing"

*2) When 1/2 is established as the clock mode for the digital output condition data, the signals are always output in the 1/2 mode.

3･3 Operation of Functions

3･3･1 Direct Display Function (Func-0)

The program data inside the VG-828 or the program data entered in the memory card/panel ROM is executed simply by inputting the number of the program containing the data.

(1) Function selection display

Fig. 3-1

```
Select Function: 0 (0-A)
Direct Display
```

<<Key operations>> **FUNC** **0** **SET**

Note:	If a group number other than 0 has been set in the config setting, the group display function is established. (Refer to the group display and config settings.)

(2) Initial display

Fig. 3-2

```
Prg:  0:
```

(3) Once this function has been established, the designated program data is executed simply by using the number keys to input the program number (3 digits).

The program number can also be selected using the ⏫ (increment) key or ⏬ (decrement) key.

This function is automatically established when the unit's power is turned on.

<<Key operations>> Example: 850 (or ⏫ (increment) key)

<Display after program execution>

Fig. 3-3

```
Prg:850: VESA-400-84
31.50 MHz 37.86 KHz 83.40 Hz
```

Description of LCD displays

850	Number of program executed.
VESA-400-84	Program name (first 16 characters only are displayed)
31.50 MHz	Dot clock frequency
37.86 KHz	Horizontal frequency
83.40 Hz	Vertical frequency

(4) Executing program data, executing time data only and executing pattern data only

The execution mode is switched as shown below using the **PROG**, **TIMING** or **PAT** key.

The key functions are the same as those described above.

PROG ○ Key	The PROG-LED lights. All the program data (timing + pattern data) is executed.
TIMING ○ Key	The TIMING-LED lights. Only the timing data is executed.
PAT ○ Key	The PAT-LED lights. Only the pattern data is executed.

(5) Selecting patterns using the pattern keys

Using the pattern keys from **CHARA** through **NAME**, it is possible to switch only the display patterns while keeping the timing data the same.

The pattern which is output is the pattern which has been set in the executed program data.

CHARA ○ Key	Characters
CROSS ○ Key	Crosshatch
DOTS ○ Key	Dots
CIRCLE ○ Key	Circle
+ ○ Key	Center marker
□ ○ Key	Edge marker
× ○ Key	Diagonal line
CURSOR ○ Key	Cursor

COLOR ○	Key	Color bar
GRAY ○	Key	Gray scale
BURST ○	Key	Burst
WINDOW ○	Key	Window
OPT1 ○	Key	Optional pattern 1
OPT2 ○	Key	Optional pattern 2
NAME ○	Key	Program name

(6) R/G/B output on/off, inversion, HS/VS/CS/GS output on/off and RGB/YPbPr selection

The output can be selected using the keys shown below.

R ○ G ○ B ○	Keys	R/G/B or R-Y/Y/B-Y signal output on/off (output on when LED lights).
INV ○	Key	R/G/B or R-Y/Y/B-Y signal output inversion (output inverted when LED lights).
HS/CS ○ VS ○	Keys	HS/CS and VS signal output on/off (output on when LED lights); polarity is inverted when SHIFT-LED lights (negative when LED lights).
G/S ○	Key	Green on Sync signal output on/off (output on when LED lights).
YPbPr ○	Key	RGB changed to YPbPr or vice versa (YPbPr when LED lights).

(7) Selecting the memory card/panel ROM

The memory card or panel ROM is selected using the **ROM** key.

When the ROM-LED is off	Program data is read from the memory card.
When the ROM-LED is on	Program data is read from the panel ROM.

(8) Changing the output video level

When the [LEVEL] key is pressed, the LEVEL-LED lights, the LCD display changes to what is shown below, and the output video level is displayed.

Fig. 3-4

```
Prg: 850: LEVEL=0.70V: 255
31.50 MHz 37.86 KHz 83.40 Hz
```

<1> The analog output video level can be set with 3 digits using the number keys.
The output video level can also be changed using the ▲ (increment) key or ▼ (decrement) key. The variable range is from 0.00V to 1.20V.

<2> When the ▶ key is pressed and the cursor moved to the 255 position, the digital output video level can be set.
The setting method is the same as for analog output video level.
The variable range is from 0 to 255.

Note 1:	The analog output video level setting (0.00V to 1.20V) is reflected for analog outputs only.
Note 2:	The digital output video level setting (0 to 255) is reflected for both digital and analog outputs. If, for instance, the digital output video level is set to 0, the analog output level will be 0 regardless of the analog output video level setting.

(9) Changing the current pattern data

When the [FORMAT] key is pressed, the FORMAT-LED lights, and the data of the currently selected pattern can be changed. When one of the pattern keys is pressed while the [FORMAT] LED is lighted, the display changes to the edit screen of the pattern data concerned. When the [ ] key is pressed, the display switches to the pattern action edit screen; when the X key is pressed, it switches to the graphic color edit screen.

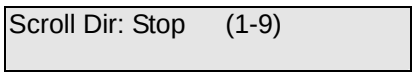
For details on the LCD displays/operations, refer to Section "5-2 Pattern data editing."

Note:	Editing using the FORMAT key has an effect on the current pattern data status: it does not affect the contents program data. Data edited using the FORMAT key remains valid until a program is executed using direct display (Func-0) or some other function or until program data is edited using Func-2 or Func-3.

(10) Graphic scroll shortcuts

When the **FORMAT** key and then the + key are pressed, the LCD display changes as follows, and any pattern can be scrolled using one key in 8 directions.

Fig. 3-5



When one of the [1] to [9] number keys is pressed, the pattern is scrolled in the direction corresponding to the key.

1	L-D	The pattern is scrolled toward the bottom left.
2	D	The pattern is scrolled downward.
3	R-D	The pattern is scrolled toward the bottom right.
4	L	The pattern is scrolled toward the left.
5	Stop	The scrolling stops and the original position is restored.
6	R	The pattern is scrolled toward the right.
7	L-U	The pattern is scrolled toward the top left.
8	U	The pattern is scrolled upward.
9	R-U	The pattern is scrolled toward the top right.

Note:	The action pattern data settings in the program are reflected in the movement amounts in the horizontal and vertical scrolling directions and intervals (time in V units). For further details, refer to "5-2 Pattern data editing."

3•3•2 Group Display Mode

In the group display mode, signal output is executed in the same way as with direct display on the basis of the group information entered in the memory card/panel ROM.

Note:	Use function 6 for the setting to enter the data.

(1) Function selection display

Fig. 3-6

```
Select Function 0: (0-A)
Direct Display
```

<<Key operations>> **FUNC** **0** **SET**

Note:	Operation is executed in exactly the same way as with direct display (that is, using Func-0). If a group number other than 0 has been set in the config setting, the group number designated by the above operation is executed in the group display mode.
Note:	The group data is read out from the memory card or panel ROM, whichever is selected using the ROM key, and this data is executed. Group display does not function if there is no memory card or panel ROM.

(2) Initial display

Fig. 3-7

```
G01:  1
```

(3) Once this function has been established, the program data entered as the designated group data is executed simply by using the number keys to input the group data number (3 digits).
The group data number can also be selected using the ▲▲ (increment) key or ▼▼ (decrement) key.

<<Key operations>> Example: 001 (or ▲▲ (increment) key)

<Display after program execution>

Fig. 3-8

```
G01:  1: VESA-400-84
31.50 MHz 37.86 KHz 83.40 Hz
```

Description of LCD displays

G01	Number of group selected by config setting; this indicates that the group display mode is now established.
1	Executed group data No.
VESA-400-84	Program name (first 16 characters only are displayed)
31.50 MHz	Dot clock frequency
37.86 KHz	Horizontal frequency
83.40 KHz	Vertical frequency

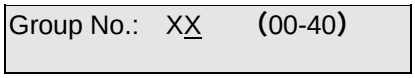
(4) Other functions

The other functions are the same as for direct display.

(5) Changing the group number

The following display appears when the **ESC** key is pressed during direct display or group display execution.

Fig. 3-9

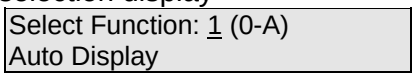


The data of the group whose number was designated by inputting the 2-digit group number and pressing the **SET** key is executed.
The group number can also be selected using the ▲ (increment) key or ▼ (decrement) key instead of inputting the group number.

3•3•3 Auto Display Function (Func-1)

(1) Function selection display

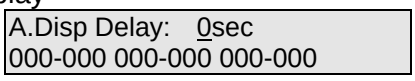
Fig. 3-10



<<Key operations>> **FUNC** **1** **SET**

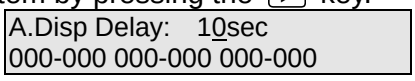
(2) Initial display

Fig. 3-11



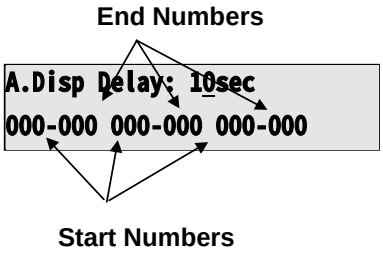
(3) First, the delay time is set.Use the **0** to **9** number keys to input a number with up to 3 digits (0 to 999).
Up to 999 seconds (16 min. 39 sec.) can be set. The cursor is moved to the next item by pressing the ▶ key.

Fig. 3-12



(4) Next, the numbers of the programs to be executed by auto display are set. Since these programs are divided into 3 blocks, the parts to be executed continuously can be divided into three. Auto display execution is ignored if zeros are input for the start or end number.

Fig. 3-13



Note 1: When the AH-3000 is used, 01 to 40 and 500 to 779 can be set as the program numbers.

Note 2: When the HN58C256P is used, 01 to 40, 501 to 540, 601 to 640 and 701 to 740 can be set as the program numbers.

(5) Auto display is executed by pressing the **SET** key.

(6) To abort auto display
Auto display is aborted by pressing the **ESC** key at any time during execution, and the display shown in Fig. 3-12 is restored.

(7) Saving the auto display data
When the **SAVE** key is pressed while the auto display data is edited, the SAVE-LED lights, and the auto display data is saved.
Upon completion of the data saving, the SAVE-LED goes off.

3•3•4 Card/Panel ROM Edit Function (Func-3)

(Same operations apply for the program edit function (Func-2).)

(1) Function selection display

Fig. 3-14

```
Select Function: 3 (0-A)
Card/ROM Edit
```

or

```
Select Function: 2 (0-A)
Program Edit
```

<<Key operations>> The initial display of function 3 appears when the **FUNC** **3** **SET** keys are pressed.

(2) Initial display

Fig. 3-15

```
Prog No:  1 Enable (0/1)
ASTRO AK
```

(3) Selecting the program number

Input the number of the program to be edited in this status.

<1> Input a 3-digit number from 001 to 999 using the **0** to **9** number keys. (Input "001" for program No. 01.)

When the AH-3000 is used, input a number from 001 to 040 or 500 to 779.

When the HN58C256P is used, input a number from 001 to 040, 501 to 540, 601 to 640 or 701 to 740.

Note 1:	Input can be completed using the **SET** key when the program number is less than 3 digits.
Note 2:	The error buzzer sounds when a memory card with no data entered is installed and a program number is input.
Note 3:	The data is read out from the device (memory card or panel ROM) selected by the **ROM** key.

<2> When the program number is input, the name of the program whose number has been input and "Enable" are displayed.

<3> When the ▶ key is pressed to move the cursor to the "Enable" position, the Enable/Disable status can be changed using the **1** (Enable) or **0** (Disable) key.

Note:	"Disable" is set to prohibit the use of a specific program number in the memory card. Normally, "Enable" is set.

(4) Entering the program name

The name of a program can be input by pressing the ▶ key to move the cursor to the line below.

To input characters, the cursor is then moved using the ▲ (increment) key or ▼ (decrement) key to input the character code which is set one character at a time.

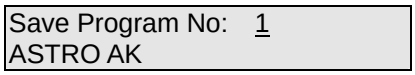
(Up to 20 characters can be input but only the first 8 characters will be entered in the panel ROM.)

* Characters can also be input from the display screen. For details, refer to Section 3-3-10.

(5) Entering the program data

After setting enable/disable for the program and setting the program name (or leaving the settings unchanged), press the **SAVE** key.
The SAVE-LED flashes, and the following display appears on the LCD.

Fig. 3-16



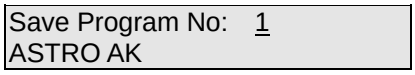
When the number and name of the program to be saved are set and the **SAVE** key is pressed again, the data of this program is saved in the memory card. (The LED goes off once the data has been saved.)

Note 1:	Program data entry can be called on the screens of this edit function.
Note 2:	Data cannot be entered using the program edit function (Func-2).
Note 3:	The data is saved in the device (memory card or panel ROM) selected by the **ROM** key.

(6) To enter the timing or pattern data edit mode

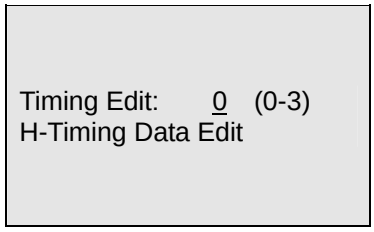
Display which appears when program data is called using the **TIMING** or **PAT** key

Fig. 3-16



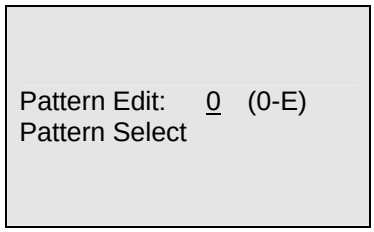
When the **TIMING** key is pressed while the Fig. 3-14 display is shown, the display shown on the right appears instead, and the timing data edit mode is established.
Refer to Chapter 4 for the subsequent operations.

Fig. 3-17 →



When the **PAT** key is pressed while the Fig. 3-14 display is shown, the display shown on the right appears instead, and the pattern data edit mode is established.
Refer to Chapter 5 for the subsequent operations.

Fig. 3-18 →



Note:	The respective edit mode can be established as desired by pressing the **TIMING** or **PAT** key while the Fig. 3-14 display is shown.

(7) Checking the operation of the data set
When the [SET] key is pressed on the timing or pattern edit screens, the data set is executed.
(Operation can be checked if a CRT, LCD or other display has been connected.)

(8) To edit the data in another program, press the [PROG] key after editing and saving the data in one program, restore the Fig. 3-7 status, and repeat the same operations.

3•3•5 Card/Panel ROM Copy Function (Func-4)

(1) Function selection display

Fig. 3-19

```
Select Function: 4 (0-A)
Card/ROM Copy
```

<<Key operations>> The initial display of function 4 appears when the [FUNC] [4] [SET] keys are pressed.

(2) Initial display

Fig. 3-20

```
Card/ROM Copy Sel: 0 (0-A)
All Copy
```

(3) Select the type of copying operation to be performed using the [0] to [A] keys.

[0]	All Copy	For copying all the data in the memory card or panel ROM.
[1]	1 Prog Data Copy	For copying program data in 1-program increments.
[2]	1 Prog Tim Data Copy	For copying timing data in 1-program increments.
[3]	1 Prog Pat Data Copy	For copying pattern data in 1-program increments.
[4]	BLK Prog Data Copy	For copying program data in increments of multiple blocks.
[5]	CHR Data Copy	For copying user character data in 1-character increments.
[6]	IMG Data Copy	For copying image data in 1-data increments.
[7]	OPT Data Copy	For copying user optional pattern data in 1-data increments.
[8]	Group Data Copy	For copying group data in 1-group increments.
[9]	Auto Data Copy	For copying auto display data.
[A]	Card/ROM Erase	For erasing all the data in the memory card or panel ROM. (Note)

Note:	Memory cards are formatted using the **A** key. *Perform this operation before using a new memory card.*

(4) Copying internal sample timing data

When using the PRG or BLK copying function, a program number from 850 to 999 can be designated as the copy source, and the data can be copied in the memory card accordingly.

Note 1:	An error occurs when a program number from 850 to 999 is designated as the copy destination.

(5) When ALL copy has been selected

All the data can be copied between memory cards or panel ROMs of the same type.

(5-1) Copying all the data between panel ROMs of the same type

<1> Press the **ROM** key to turn on the ROM-LED.

<2> Install the ROM serving as the copy source into the socket, and press the **SET** key.

Fig. 3-21

```
ROM   All Copy        [1/1]
 Set Source & Push SET
```

All the data in the copy source panel ROM is read into the RAM inside the VG-828.

<3> When the following display appears, install the panel ROM serving as the copy destination, and press the SET key.

Fig. 3-22

```
ROM   All Copy        [1/1]
 Set Dist. & Push SET
```

The data is now written into the copy destination.
(The "Writing" display appears. It takes several minutes for the copying to be completed.)

<4> When the display shown in Fig. 3-21 appears, copying is completed.
The data of another memory card can now be copied.

(5-2) Copying all the data between memory cards of the same type

<1> Press the **ROM** key and turn off the ROM-LED.

<2> Install the memory card serving as the copy source, and press the **SET** key.

Fig. 3-23

```
Card All Copy        [1/1]
 Set Source & Push SET
```

All the data in the copy source memory card is read into the RAM inside the VG-828.

<3> When the following display appears, install the memory card serving as the copy destination into the socket, and press the **SET** key.

Fig. 3-24

```
Card All Copy        [1/1]
 Set Dist. & Push SET
```

The data is now written into the copy destination.
(The "Writing" display appears. It takes several minutes for the copying to be completed.)

<4> When the display shown in Fig. 3-23 appears, copying is completed.
The data of another memory card can now be copied.

Note:	[1/1], [1/2], etc. denote the "current copy session/total number of copy sessions." With a 16MB or larger memory card, copying is divided into 2 or 3 sessions.

(6) When PRG copy is selected (same for timing data and pattern data copying)

<1> Input the number of the program serving as the copy source, and press the **SET** key.

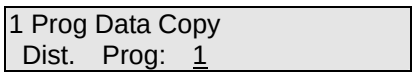
Fig. 3-25

```
1 Prog Data Copy
 Source Prog:  1
```

Note:	The internal program data in program numbers 850 to 999 can be designated.

<2> Designate the number of the program serving as the copy destination, and press the **SET** key.
(When copying data into another memory card/panel ROM, change over to the memory card/panel ROM serving as the copy destination, and press the **SET** key.)
The data is now written into the copy destination.

Fig. 3-26



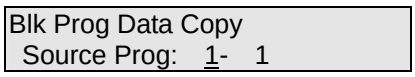
<3> Copying is completed when the display shown in Fig. 3-23 is restored.
The data in another program number can now be copied.

Note: Data can be copied from a memory card to panel ROM or vice versa. Before pressing the **SET** key, press the **ROM** key to select memory card or panel ROM.

(7) When BLK copy is selected

<1> Input the range of the program numbers serving as the copy source, and press the **SET** key.

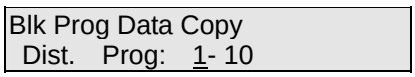
Fig. 3-27



Note: The internal program data in program numbers 850 to 999 can be designated.

<2> Designate the range of the program numbers serving as the copy destination, and press the **SET** key.
(When copying data into another memory card/panel ROM, change over to the memory card/panel ROM serving as the copy destination, and press the **SET** key.)
The data is now written into the copy destination.

Fig. 3-28



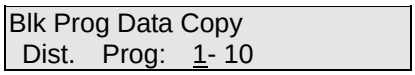
<3> Copying is completed when the display shown in Fig. 3-27 is restored.
The data in another program number can now be copied.

Note: Data can be copied from a memory card to panel ROM or vice versa. Before pressing the **SET** key, press the **ROM** key to select memory card or panel ROM.

(8) When CHR copy is selected

<1> Input the user character code (E0H--EFH, F0H--FFH) of the copy source, and press the **SET** key.

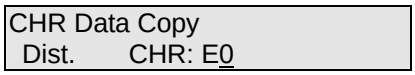
Fig. 3-29



Note:	The internal user character data within the F0H to FFH range can be designated.

<2> Designate the user character code (E0H--EFH) of the copy destination, and press the **SET** key.
(When copying data into another memory card/panel ROM, change over to the memory card/panel ROM serving as the copy destination, and press the **SET** key.)
The data is now written into the copy destination.

Fig. 3-30



Note:	The internal character data within the F0H to FFH range cannot be designated as the copy destination.

<3> Copying is completed when the display shown in Fig. 3-29 is restored.
Another user character can now be copied.

Note:	Data can be copied from a memory card to panel ROM or vice versa. Before pressing the **SET** key, press the **ROM** key to select memory card or panel ROM.

(9) When IMG copy is selected

<1> Input the image number (1 to 64) of the copy source, and press the **SET** key.

Fig. 3-31

```
IMG Data Copy
 Source     IMG: 1
```

<2> Designate the image number (1 to 64) of the copy destination, and press the **SET** key.
(When copying image data into another memory card, change over to the memory card serving as the copy destination, and press the **SET** key.)
The image is now written into the copy destination.

Fig. 3-32

```
IMG Data Copy
 Dist     IMG: 2
```

<3> Copying is completed when the display shown in Fig. 3-31 is restored.
Other image data can now be copied.

Note:	Image data can be copied only from one memory card to another memory card.

(10) When OPT copy is selected

<1> Input the optional pattern data number (40H to 7FH) of the copy source, and press the **SET** key.

Fig. 3-33

```
OPT Data Copy
 Dist     OPT: 40
```

<2> Designate the optional pattern data (40H to 7FH) of the copy destination, and press the **SET** key.
(When copying the data into another memory card, change over to the memory card serving as the copy destination, and press the **SET** key.)
The pattern data is now written into the copy destination.

Fig. 3-34

```
OPT Data Copy
 Source     OPT: 41
```

<3> Copying is completed when the display shown in Fig. 3-33 is restored.
Other optional pattern data can now be copied.

Note:	Optional pattern data can be copied only from one memory card to another memory card.
Note:	Internal optional pattern data (00H to 3FH) cannot be copied.

(11) When group copy is selected

<1> Input the group number of the copy source, and press the **SET** key.

Fig. 3-35

```
Group Data Copy
 Source Group: 1
```

<2> Designate the group number of the copy destination, and press the **SET** key.
(When copying group data into another memory card/panel ROM, change over to the memory card/panel ROM serving as the copy destination, and press the **SET** key.)
The group data is now written into the copy destination.

Fig. 3-36

```
Group Data Copy
 Dist.   Group: 2
```

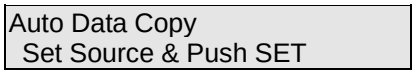
<3> Copying is completed when the display shown in Fig. 3-35 is restored.
Other group number data can now be copied.

Note:	Data can be copied from a memory card to panel ROM or vice versa. Before pressing the **SET** key, press the **ROM** key to select memory card or panel ROM.

(12) When auto copy is selected

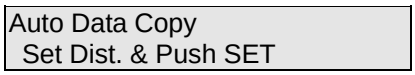
<1> Install the memory card (or panel ROM) serving as the copy source, and press the **SET** key.

Fig. 3-37



<2> Install the memory card (or panel ROM) serving as the copy destination, and press the **SET** key.
(When copying data into another memory card/panel ROM, change over to the memory card/panel ROM serving as the copy destination, and press the **SET** key.)
The data is now written into the copy destination.

Fig. 3-38



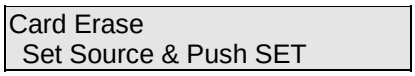
<3> Copying is completed when the display shown in Fig. 3-37 is restored.

Note:	Data can be copied from a memory card to panel ROM or vice versa. Before pressing the **SET** key, press the **ROM** key to select memory card or panel ROM.

(13) When card/ROM erase is selected

<1> Install the memory card (or panel ROM) whose data is to be erased, and press the **SET** key.

Fig. 3-39



<2> The "Writing" display appears, and erasure is commenced.
(It takes several minutes to erase all the data.)

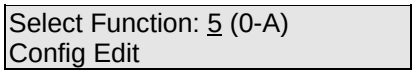
<3> Erasing is completed when the display shown in Fig. 3-39 is restored.

Note 1:	Select card/ROM erase by pressing the **ROM** key before the **SET** key is pressed.
Note 2:	The memory card erasure procedure also includes the formatting of the card. Before using a new card for the first time, format it by following the above procedure.

3•3•6 Config Edit Function (Func-5)

(1) Function selection display

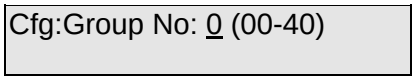
Fig. 3-40



<<Key operations>> **FUNC** **5** **SET**

(2) Initial display

Fig. 3-41



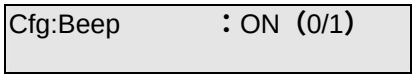
(3) Set the group number.

Input using **0** to **9** number keys	Setting range
Group No.	0--40 (factory setting: 0)

When "0" is selected, direct display is executed by Func-0.
When a group number other than "0" is selected, the group concerned is executed in the group display mode by Func-0.

(4) Select ON or OFF for the warning beep.
Move to the screen below using the [down] key.

Fig. 3-42



0	OFF	The beep is not sounded.
1	ON	The beep is sounded. (Factory setting)

(5) Select the Disp Mode (pattern display mode).
Move to the screen below using the ⏬ key. Select the pattern display mode.

Fig. 3-43

```
Cfg:Disp Mode   : 0 (0/1)
Single Pattern
```

0	Single Pattern	Only one pattern can be selected when the pattern keys on the VG-828's front panel are used to select a pattern. (When CROSS is selected while CHARA is already selected, the CHARA selection is released.)
1	Multi Pattern	Multiple patterns can be selected when the pattern keys on the VG-828's front panel are used to select patterns. (Factory setting) (When CROSS is selected while CHARA is already selected, both patterns are superimposed and displayed.)

(6) Select Data Device (default data device).
Move to the screen below using the ⏬ key. Select the default data device.

Fig. 3-44

```
Cfg:Data Device: 0 (0/1)
Memory Card
```

0	Memory Card	The memory card is the device which is selected when the VG-828's power is turned on. (Factory setting)
1	Panel-ROM	The panel ROM is the device which is selected when the VG-828's power is turned on.

Note: The data device can be changed using the **ROM** key after the power has been turned on.

(7) Select the MemCard Mode (memory card readout mode).
Move to the screen below using the ⏬ key. Select how the output condition data is to be handled when program data on the memory card is read.

Fig. 3-45

```
Cfg:MemCard Mode: 0 (0-2)
Analog & Digital
```

0	Analog & Digital	The analog-only and digital-only items are both set as per the data on the memory card. (Factory setting)
1	Analog	The analog-only items are set as per the data on the memory card, and the digital-only items are set to their default values. (*1).
2	Digital	The digital-only items are set as per the data on the memory card, and the analog-only items are set to their default values. (*2).

Basically, the VG-828 outputs the same images in both the analog and digital modes. This means that the digital output condition data settings are also reflected in the analog output and vice versa.
With, for instance, program data on a memory card created by an analog-only VG generator, the contents of the digital output condition data remain undefined so that when such program data is executed by the VG-828, the same output as the analog-only VG generator may not be obtained. In a case like this, set the above item to "Analog."

(*1) When "Analog" has been set in Fig. 3-45, the digital-only output condition data which will be initialized is as follows.

Item	Default value
1CH, 2CH RGB	1CH=Posi, 2CH=Posi
Clock Out	All
Out Bit	8 (bit)
Bit Mask R, G, B	R0 to R7=ON, G0 to G7=ON, B0 to B7=ON
1CH, 2CH Out OE	1CH=ON, 2CH=ON
1CH, 2CH Clock OE	1CH=ON, 2CH=ON

(*2) When "Digital" has been set in Fig. 3-45, the analog-only output condition data which will be initialized is as follows.

Item	Default value
Video	0.70 (V)
Setup	0.00 (V)
Sync	0.30 (V)
RGB/YPbPr	RGB
YPbPr No.	0

(8) Select RS-Speed (RS-232C baud rate).
Move to the screen below using the ⏬ key. Select the RS-232C baud rate.

Fig. 3-46

```
Cfg:RS-Speed: 38400 (0-2)
    RS-Dlen : 8       (0/1)
```

0	9600	The RS-232C baud rate is set to 9600 bps.
1	19200	The RS-232C baud rate is set to 19200 bps.
2	38400	The RS-232C baud rate is set to 38400 bps. (Factory setting)

(9) Select the RS-Dlen (RS-232C data length).

0	7	The RS-232C data length is set to 7 bits.
1	8	The RS-232C data length is set to 8 bits. (Factory setting)

(10) Select the RS-Parity (RS-232C parity).
Move to the screen below using the ⏬ key. Select the RS-232C parity.

Fig. 3-47

```
Cfg:RS-Parity: NONE (0-2)
    RS-Stop   : 1    (0/1)
```

0	NONE	The RS-232C parity is set to none. (Factory setting)
1	EVEN	The RS-232C parity is set to even.
2	ODD	The RS-232C parity is set to odd.

(11) Select the RS-Stop (RS-232C stop bit length).

0	1	The RS-232C stop bit length is set to 1 bit. (Factory setting)
1	2	The RS-232C stop bit length is set to 2 bits.

(12) Set the Start PrgNo. (number of the program to be executed when the power is turned on).
Move to the screen below using the ⏬ key. Set the number of the program which is to be executed when the power is turned on.

Fig. 3-48

```
Cfg: Start Prg No TIM: 850
                       PAT: 850
```

The program whose number is set above is executed if direct display is executed when the power is turned on.
Set the numbers of the timing program and pattern program in separate items.
Set "0" for both items if no program is to be executed when the power is turned on. (Factory setting: 0,0)

(13) Select enable/disable for the DDC optional pattern (0E).
Move to the screen below using the ⏬ key. Select enable or disable for the DDC optional pattern (0E).

Fig. 3-49

```
OPT Pattern #0E (DDC):
              Disable (0/1)
```

0	Disable	Disable (factory setting)
1	Enable	Enable

When optional pattern #0E is executed, the DDC data is captured from the monitor, etc. connected to the serial port, and displayed. If data capture fails, no further operations will be acknowledged for about 30 seconds since data capture is retried.
When "Disable" is selected as the setting for the above item, the DDC data is not captured and the pattern is not displayed either.
Use this setting when the equipment connected does not support DDC.

(14) Saving the config data
When the **SAVE** key is pressed on the screens appearing during config data editing, the SAVE-LED flashes, and the following LCD display appears.

Fig. 3-50

```
Save Cfg. Data ?
   (SAVE or ESC)
```

When the **SAVE** key is pressed again, the config data is saved, and the SAVE-LED goes off. If the **ESC** key is pressed instead, the data is not saved, and the original screen is restored.

3•3•7 Group Data Edit Function (Func-6)

(1) Concerning group data

With the direct display function, programs are executed in numerical sequence such as 01 → 02 → 03, etc. or 01 → 40 → 39, etc. using the ▲ (increment) key or ▼ (decrement) key. In contrast, with the group display function, the programs are executed in the numerical sequence in which the programs (group data) were entered using the group data edit function.

The group data consists of the timing program numbers and pattern program numbers.

Example

Group data No.	Timing program No.	Pattern program No.
1	850	900
2	851	901
:	:	:

In the example given above, when group data #1 is executed, the pattern in program No.900 is executed at the program No.850 timing.

Note:	When the existing panel ROM is used, the group data consists of program numbers only (these are not divided into timing and pattern data programs). When group data is entered in the panel ROM, the pattern program numbers are ignored, and only the timing programs numbers are entered.

(2) Function selection display

Fig. 3-51

```
Select Function: 6 (0-A)
Group Edit
```

<<Key operations>> The initial display of function 6 appears when the **FUNC** **6** **SET** SET keys are pressed in this order.

(3) Initial display

Fig. 3-52

```
Group No: 1
```

(4) Select the group number.

• Memory card	…….	32 groups can be entered.
• Standard (40-program type of) panel ROM	…….	2 groups can be entered.
• AH-3000	…….	groups can be entered.
• HN58C256P	…….	40 groups can be entered.

Select the number of the group to be entered, and press the **SET** key.

(5) Set the group data SW (general-purpose) signal outputs.

Fig. 3-53

```
GSW   #0 Sta=OFF End=OFF
(01) #1 Sta=OFF End=OFF
```

Select ON or OFF for GSW0 and GSW1 (general-purpose) signals.

Item	Description
Sta	Status when (immediately before) group data execution is commenced
End	Status when (immediately after) group data execution is ended

0	OFF	Off
1	ON	On

Note: This setting is valid when GSW0 or GSW1 has been selected with the SW0-3 output selection.
It is valid only when group data on a memory card is executed.

(6) Set the group data.
Move the cursor and set the program number.

Fig. 3-54

```
GEdit 01: Tim=850 Pat=900
(01)   02: Tim=851 Pat=901
```

The display changes to the next page when the ▼▼ key is pressed.

Fig. 3-55

```
GEdit 03: Tim=850 Pat=902
(01)   04: Tim=851 Pat=903
```

Up to 58 group data can be set but only the first 20 data will be entered in the panel ROM.

• Memory card	……	58 data can be entered.
• Standard (40-program type of) panel ROM	……	20 data can be entered.

Not all the data need be set: zeros can be placed instead.
When zeros are used for both the Tim and Pat items, the data will not be executed when the group display function is executed.
(They will be skipped when the ▲▲ key or ▼▼ key is pressed.)
If zero is entered for either the timing or pattern data, only the data in the item which is not zero will be executed when the group display function is executed.
(When zero is entered for the Tim item, only the pattern data is executed while the timing data remain in the previous status.)

(7) Selecting the group data setting mode

The setting mode is switched as shown below using the **PROG** or **TIMING** / **PAT** keys.

PROG Key	The PROG-LED lights. The mode for setting program numbers only is established. (See figure below) This mode is compatible with existing panel ROMs.
TIMING Key **PAT** Key	The TIMING-LED and PAT-LED light. The timing data and pattern data are set separately.

When the mode for setting program numbers only is established, the display shown below appears.

Fig. 3-56

```
GEdit 01: Prg=850
(01)   02: Prg=851
```

(8) Saving group data

When the **SAVE** key is pressed on the screens appearing during group data editing, the SAVE-LED flashes, and the following LCD display appears.

Fig. 3-57

```
Save Group No.: 1
xxxxxxxxxxxxxxxx
```

<1> Setting the group number

Use the number keys to set the number of the group to be saved. (For the range of groups, refer to "Selecting the group number" in (4).)

<2> Setting the group name

Use the ▶ key to move the cursor to the bottom line, and input the group name in hexadecimal format.

(Up to 20 characters can be entered as the group name.)

* Characters can also be input from the display screen.

For details, refer to Section 3-3-10.

Note:	Group names can be entered on memory cards only. They cannot be entered on panel ROMs.

When the **SAVE** key is pressed again, the group data is saved, and the SAVE-LED goes off.

If the **ESC** key is pressed instead, the data is not saved, and the original screen is restored.

3•3•8 Character Edit Function (Func-8)

(1) Function selection display

Fig. 3-58

```
Select Function: 8 (0-A)
Character Edit
```

<<Key operations>> **FUNC** **8** **SET**

Note:	The character edit function makes the character patterns appear on the display for editing. Before proceeding with editing, connect a display to the VG-828 so that the display patterns will appear properly on the display.

(2) Initial display

Fig. 3-59

```
CHR Edit : E0   (E0-FF)
```

(3) Setting the character codes

Set the character code first. Input a 2-digit code from E0 to FF using the **0** to **F** keys.

When the character code is input, the corresponding character pattern appears on the display.

Note 1:	The F0 to FF codes are the VG-828's own internal character codes. They can be read but not entered.
Note 2:	The E0 to EF codes are subject to restrictions imposed by the memory card/panel ROM used. (See 2-3)

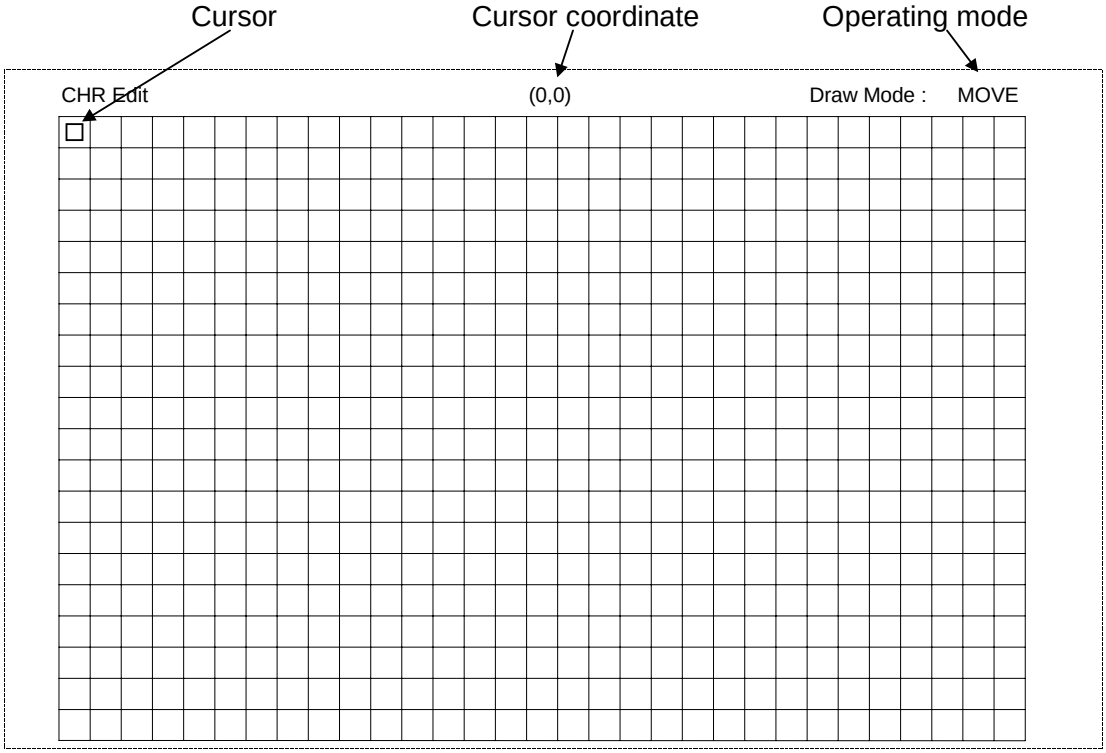
(4) Editing the data

When the **SET** key is pressed, the following appears on the LCD display.

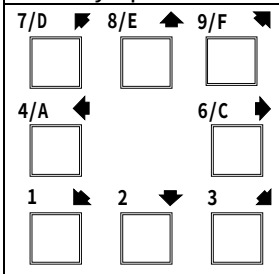
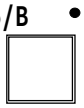
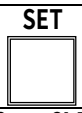
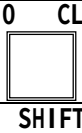
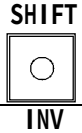
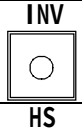
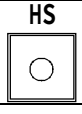
Fig. 3-60

```
CHR Edit : E0
     Editing on Display
```

The character data (64 × 64 dots) is shown on the display as below.



The key functions during data editing are described below.

Key operation	Function
	<1> For moving the cursor and drawing dots Depending on the drawing mode, the cursor is moved while dots are set or cleared. (Dots are not drawn in the movement mode.) <2> In the shift mode The character pattern is shifted in the designated direction.
	For switching the drawing mode. This changes the mode in sequence: dot set (SET) ⇒ dot clear (CLR) ⇒ move (MOVE). (The drawing mode display changes.)
	For setting or clearing the dot at the cursor position.
	For clearing all the dots in a cell.
	For turning the dot pattern shift mode on or off. (At "on," the draw mode display changes to SHIFT.)
	For inverting the dots in a cell.
	For returning the cursor position to the left or right home point (moved between the far left and far right by toggling).

VS ○	For returning the cursor position to the top or bottom home point (moved between the extreme top or extreme bottom by toggling).
ESC □	For aborting data editing and restoring the character code setting screen.

(5) Saving character data

When the [SAVE] key is pressed on the screens appearing during character data editing, the SAVE-LED flashes, and the following LCD display appears.

Fig. 3-61

```
Save CHR: E0   (E0-EF)
```

<1> Setting the character code

Set the character code to be saved.

Input the 2-digit code from E0 to EF using the [0] to [F] keys.

Note:	The E0 to EF codes are limited by the restrictions imposed by the memory card/panel ROM which is used.

When the [SAVE] key is pressed again, the character data is saved, and the SAVE-LED goes off.

If the [ESC] key is pressed instead, the data is not saved, and the original screen is restored.

3•3•9 List Display Function (Func-9)

(1) Function selection display

Fig. 3-62

```
Select Function: 9 (0-A)
Lists
```

<<Key operations>> [FUNC] [9] [SET]

Note:	The list display function makes the lists appear on the display. Before proceeding, connect a display to the VG-828 so that the display patterns will appear properly on the display.

(2) Initial display

Fig. 3-63

```
Select Type: 0   (0-4)
Program Data List
```

(3) Selecting the data to be displayed

0	Program Data List	The program data--H-Timing, V-Timing and OUTPUT data--is displayed.
1	Program Name List	A list of the program names is displayed.
2	Group Name List	A list of the group names is displayed.
3	OPT Name List	A list of the optional pattern names is displayed.
4	IMG Name List	A list of the image data names is displayed.

(4) Program Data List

Select "Program Data List" as the data to be displayed, and press the SET key.

The following LCD display appears.

Fig. 3-64

```
Select Prg.No (850)
Program Data List
```

When the 3-digit number of the program to be displayed is input using the number keys, the data on that program is displayed.

Press the ESC key to return to (3).

A display resembling the following one appears.

```
PROG-NO.850  NAME=VESA400-84              H= 37.86KHz V= 83.40Hz  ENABLE
MODE    : dot                             MODE      : H
CLOCK   : 31.50MHz                        VTOTAL    : 11.991ms   454H
HPERIOD : 26.41us   832dot                VDISP     : 10.565ms   400H
HDISP   : 20.32us   640dot                VSYNC     :  0.790ms   3.0H
HSYNC   :  1.27us    40dot                VBACKP    :  1.004ms    38H
HBACKP  :  4.06us   128dot                EQP FP    :  0.000ms   0.0H
HDSTART :  0.00us     0dot                EQP BP    :  0.000ms   0.0H
HDWIDTH :  0.00us     0dot                SERRATION : OFF
                                          EQP       : OFF
                                          VDSTART   :  0.000ms   0.0H
NRZ/RD   : NRZ      CLKMODE : 1/1         VDLINE    :  0.000ms   0.0H
HS       : NEGA     CLKOUT  : ALL         SCAN      : NON INTER
VS       : NEGA     1CH     : POSI
CS       : NEGA     2Ch     : POSI
HD       : NEGA     OSW0    : OFF
VD       : NEGA     OSW1    : OFF
CLOCK    : NEGA     RGB0    : 8 bit
DISP     : NEGA     R(7-0)  : 11111111
                    G(7-0)  : 11111111
ANA/TTL  : 1080Sync B(7-0)  : 11111111
SYNC ON  : RGB      DELAY   : OFF
VIDEO    : 0.70 V   CLKDELAY: 4 nsec
SYNC     : 0.30 V   1ch OUT : Hi-Z
SETUP    : 0.00 V       CLK : ON
RGB/TPbPr: RGB      2ch OUT : ON
YPbPr No.: 0            CLK : Hi-Z
```

(5) Program Name List

Select "Program Name List" as the data to be displayed, and press the **SET** key.

The following LCD display appears.

Fig. 3-65

```
Select Prg.No (Top=850)
Program Name List
```

When the 3-digit number of the first of the programs to be displayed is input using the number keys, the data starting with the data on that program is displayed.

Press the **ESC** key to return to (3).

A display resembling the following one appears.

```
Program Name List
Prg E/D DotClock   H-Freq      V-Freq     Name
850   E   31.50MHz   37.86KHz   83.40Hz   VESA400-84
851   E   31.50MHz   37.86KHz   72.82Hz   VESA400-72
                          :
                          :
```

(6) Group Name List

Select "Group Name List" as the data to be displayed, and press the **SET** key.

The following LCD display appears.

Fig. 3-66

```
Select Grp.No (Top= 1)
Group Name List
```

When the 2-digit number of the first of the groups to be displayed is input using the number keys, the data starting with the data on that group is displayed.

Press the **ESC** key to return to (3).

A display resembling the following one appears.

```
Group Name List
NO   Name
 1   Group Data #1
 2   Group Data #2
                :
                :
```

Note: The memory card or panel ROM must be installed in order for the Group Name List data to be displayed.

(7) OPT Name List

Select "OPT-PTN Name List" as the data to be displayed, and press the **SET** key.

The following LCD display appears.

Fig. 3-67

```
Select Opt.No (Top=40)
OPT Name List
```

When the 2-digit number of the first of the optional patterns to be displayed is input using the **0** to **F** keys, the data starting with the data on that pattern is displayed.

Press the **ESC** key to return to (3).

A display resembling the following one appears.

```
OPT Pattern List   Page(Used=xx, Unused=xx)
NO   SIZE      Name
40    506    256 Block Color
41    255    64B-GRAY
                    :
                    :
```

Note:	The memory card must be installed in order for the OPT-PTN Name List data to be displayed.
Note:	"SIZE" denotes the number of optional pattern data bytes.
Note:	"Used/Unused" denotes the already used pages/unused pages in the memory card (in 1KB units).

(8) IMG Name List

Select "IMG Name List" as the data to be displayed, and press the **SET** key.

The following LCD display appears.

Fig. 3-68

```
Select IMG.No (Top= 1)
IMG Name List
```

When the 2-digit number of the first of the optional patterns to be displayed is input using the **0** to **F** keys, the data starting with the data on that pattern is displayed.

Press the **ESC** key to return to (3).

A display resembling the following one appears.

```
IMG data List   Sector(Used=xx, Unused=xx)
NO    OPT-NO        SIZE          Col         NAME
 1        80     ( 1024,  768)   1024x768    Image #1
 2        81     (  640,  480)   640x480     Image #2
                      :
                      :
```

Note:	The memory card must be installed in order for the IMG-data Name List data to be displayed.
Note:	"SIZE" denotes the size of the image data (number of horizontal dots and number of vertical lines).
Note:	"Used/Unused" denotes the already used pages/unused pages in the memory card (in 128KB units).
Note:	"OPT-NO" is the number of the optional pattern whose image data is to be displayed.

3•3•10 YPbPr Coefficient Table Edit Function (Func-A)

(1) Function selection display

Fig. 3-69

```
Select Function : A (0-A)
YPbPr  Edit
```

<<Key operations>> The initial display of function A appears when the [FUNC] [A] [SET] keys are pressed in this order.

(2) Initial display

Fig. 3-70

```
YPbPr  No. :        0 (0-9)
SMPTE  274M, 296M, RP-177
```

The name corresponding to the coefficient is displayed on the bottom line.

(3) Selecting the table number

Select the table number (0 to 9) using the [0] to [9] number keys or [▲▲] and [▼▼] keys, and press the [SET] key.

(4) Editing YPbPr (color difference) coefficients

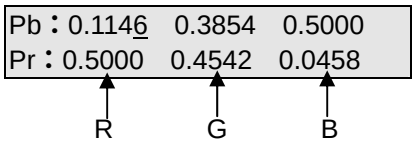
When the [SET] key is pressed in (3), the following LCD display appears.

Fig. 3-71

```
Y : 0.2126  0.7152  0.0722
      ↑       ↑       ↑
      R       G       B
```

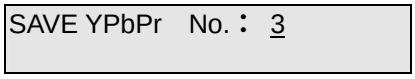
Coefficients up to 5 digits (0 to 1.0000) can be input using the [0] to [9] number keys.
When the [▶] key is pressed, the cursor moves to the next item.
When the [▼▼] key is pressed, the display changes to the next page.

Fig. 3-72



(5) Saving YPbPr (color difference) coefficients
When the [SAVE] key is pressed on the screens appearing during YPbPr coefficient editing, the SAVE-LED flashes, and the following LCD display appears.

Fig. 3-73



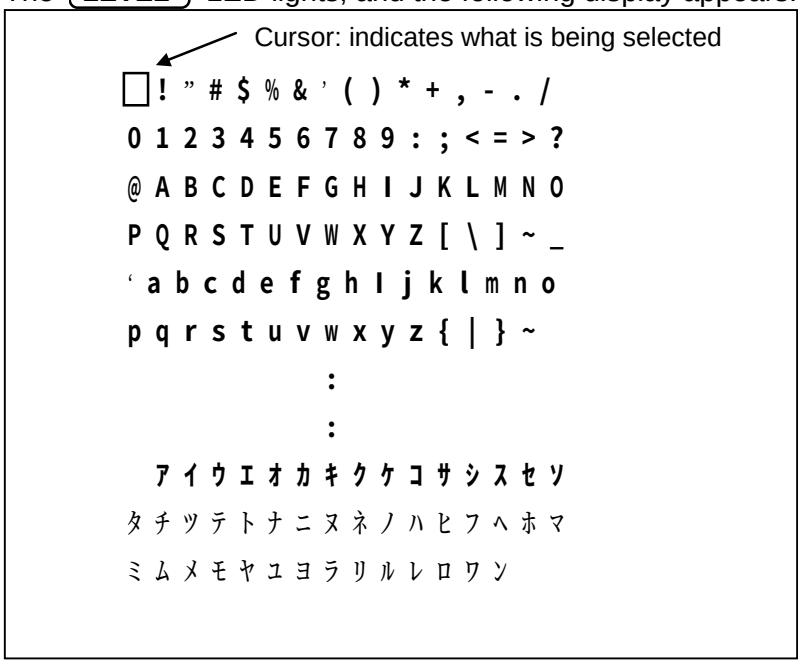
Select the number of the table (0 to 9) as the destination for saving the coefficients using the [0] to [9] number keys.
When the [SAVE] key is pressed again, the YPbPr coefficients are saved, and the SAVE-LED goes off.
If the [ESC] key is pressed instead, the coefficients are not saved, and the original screen is restored.

Note:	Since the coefficients in table numbers 0, 1 and 2 are used by the program data inside the VG-828, do not overwrite them by saving new coefficients under these table numbers. To save coefficients, select a table number from 3 to 9 as the save destination. If the coefficients in table numbers 0, 1 and 2 have been overwritten by mistake, initialize the internal EEPROM (refer to 8.3.10). The coefficient tables will be returned to the factory status.
Note:	For a description of the color difference coefficients, refer to "10-4 Concerning color difference coefficients."

3•3•11 How to Input Character Codes from the Display

When the character codes of program names, group names and CHARA patterns are to be input, the character codes can be selected from the display by conducting the operations described below. However, the VG-828's timing data must be set in such a way that they appear properly on the display.

(1) Move the cursor on the LCD to the character code input position, and press the **LEVEL** key.
The **LEVEL** LED lights, and the following display appears.



(2) Use the number keys to perform the following operations.

Key operation	Function
7/D 8/E 9/F 4/A 6/C 1 2 3	For moving the cursor. The cursor on the display moves in the direction of the arrow.
5/B	For entering one character for input. The entered characters are displayed on the display.

(3) When the **LEVEL** key is pressed again, the **LEVEL** LED goes off, and the hexadecimal input status is restored.

CHAPTER 4 TIMING DATA EDITING

4･1 Timing Data Configuration

The timing data is configured by the items shown in Table 4-1.

Table 4-1

Horizontal timing data	Input Mode (0, 1) Dot Clock	0: μs 1: dot _ _. _ _ MHz
	H period H disp	_ _. _ _ μsec _ _ _ _ dot _ _. _ _ μsec _ _ _ _ dot
	H sync H backp	_ _. _ _ μsec _ _ _ _ dot _ _. _ _ μsec _ _ _ _ dot
	HD start HD width	_ _. _ _ μsec _ _ _ _ dot _ _. _ _ μsec _ _ _ _ dot
Vertical timing data	Input Mode (0, 1) Scan Mode (0 to 2)	0: H 1: ms 0: NON INTERLACE 1: INTERLACE & SYNC 2: INTERLACE & VIDEO
	V total V disp	_ _. _ _ _ msec _ _ _ _ H _ _. _ _ _ msec _ _ _ _ H
	V sync V backp	_ _. _ _ _ msec _ _. _ H _ _. _ _ _ msec _ _ _ _ H
	EQP fp EQP bp	_ _. _ _ _ msec _ _. _ H _ _. _ _ _ msec _ _. _ H
	Serration (0 to 3) EQP (0, 1)	0: OFF 1: 0.5H 2: 1H 3: XOR 0: OFF 1: ON
	VD start VD line	_ _. _ _ _ msec _ _ _ _. _ H _ _. _ _ _ msec _ _ _ _. _ H

Analog output condition data	Output Mode (0 to 5) NRZ/RZ (0, 1)	0: ANALOG 1: TTL 2: TRI-1080 3: TRI-1035 4: TRI-720 5: TRI-483 0: NRZ 1: RZ
	CV (0 to 7) HS VS CS HD VD RGB RGB HT Clock	0: None 1: R 2: G 3: RG 4: B 5: RB 6: GB 7: RGB 0: Nega 1: Posi 0: Nega 1: Posi 0: Nega 1: Posi 0: Nega 1: Posi 0: Nega 1: Posi 0: Nega 1: Posi 0: Nega 1: Posi 0: Nega 1: Posi
	Video Set up Sync RGB/YPbPr YPbPr No.	_ . _ _ V _ . _ _ V _ . _ _ V 0: RGB 1: YPbPr (0 to 9)

Digital output condition data	NRZ/RZ (0, 1)	0: NRZ 1: RZ (*1)
	HS	0: Nega 1: Posi (*1)
	VS	0: Nega 1: Posi (*1)
	CS	0: Nega 1: Posi (*1)
	HD	0: Nega 1: Posi (*1)
	VD	0: Nega 1: Posi (*1)
	DISP	0: Nega 1: Posi
	1CH RGB	0: Nega 1: Posi
	2CH RGB	0: Nega 1: Posi
	Clock	0: Nega 1: Posi (*1)
	OSW0	0: OFF 1: ON
	OSW1	0: OFF 1: ON
	Clock Out	0: Disp 1: All
	Clock Delay	0: OFF 1: ON
	Clock Mode	0: 1/1 1: 1/2
	Out Bit (0 to 8) Delay Time (0 to 31)	_ bit _ _ nsec
	Bit Mask R0 to R7 G0 to G7 B0 to B7	0: OFF 1: ON 0: OFF 1: ON 0: OFF 1: ON
	1CH Out OE	0: ON 1: Hi-Z
	1CH Clock OE	0: ON 1: Hi-Z
	2CH Out OE	0: ON 1: Hi-Z
	2CH Clock OE	0: ON 1: Hi-Z
	SW0 Select SW1 Select SW2 Select SW3 Select	0: CS 1: VD 2: HD 3: OSW0 4: OSW1 5: GSW0 6: GSW1 0: CS 1: VD 2: HD 3: OSW0 4: OSW1 5: GSW0 6: GSW1 0: VS 1: VD 2: HD 3: OSW0 4: OSW1 5: GSW0 6: GSW1 0: HS 1: VD 2: HD 3: OSW0 4: OSW1 5: GSW0 6: GSW1

(*1) The same values apply to the analog output condition data as well.

(1) Selecting the timing data

When the [TIMING] key is pressed while the display in Fig. 3- in Section 3-3-4 appears or while editing is underway, the TIMING-LED flashes, and the following display appears.

Fig. 4-1

```
Timing Edit:   0   (0-3)
H-Timing Data Edit
```

Select the data to be edited in accordance with the table below, and press the [SET] key to display one of the editing screens.
(The TIMING-LED stops flashing and remains lighted.)

Table 4-2

Display	Key	Data	Setting item
H-Timing Data Edit	0	Horizontal timing data	See Table 4-1.
V-Timing Data Edit	1	Vertical timing data	See Table 4-1.
Analog Output Condition	2	Analog output condition data	See Table 4-1.
Digital Output Condition	3	Digital output condition data	See Table 4-1.

(2) Timing data setting ranges

<1> Frequencies

Dot clock frequency	5.00 to 260.00 MHz	10 KHz increments
Horizontal sync frequency	More than 10 KHz	
Vertical sync frequency	More than 15.6 Hz	

<2> Horizontal timing data

H PERIOD	0.00 to 99.99 μsec	128 to 8192 dot	1-dot increments
H DISP	0.00 to 99.99 μsec	48 to 4096 dot	1-dot increments
H SYNC	0.00 to 99.99 μsec	0 to 4096 dot	1-dot increments
H BACK P H FRONT P	0.00 to 99.99 μsec	0 to 4096 dot	1-dot increments
HD START HD WIDTH (Note 1)	0.00 to 99.99 μsec	0 to 4096 dot	1-dot increments
H BLANKING	Automatically calculated	48 to 4096 dot	1-dot increments

Note 1: The sum of HD-start and HD-width cannot be set in excess of H-period. Set it within the following range:

(HD-start + HD-width) <= H-period

<3> Vertical timing data

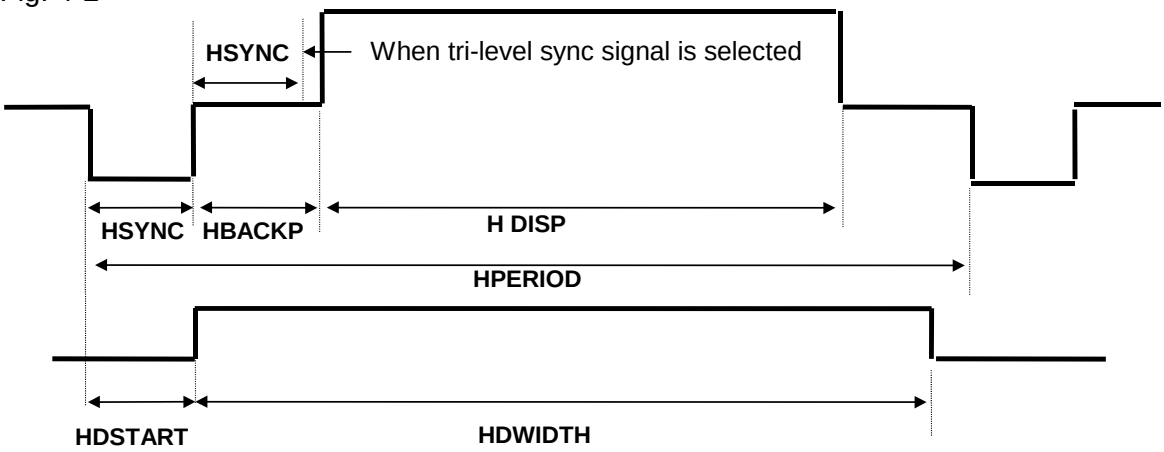
V TOTAL	0.000 to 99.999 ms	4 to 8192 H	Non-interlace	1 H increments
		4 to 4096 H	Interlace & video, interlace & sync	
V DISP	0.000 to 99.999 ms	1 to 4093 H		
V BACK P V front P	0.000 to 99.999 ms	0 to 4000 H		
V SYNC	0.000 to 99.999 ms	1.0 to 99.0 H		0.5 H increments
EQP FP EQP BP	0.000 to 99.999 ms	0.0 to 99.0 H		
VD START VD Line (Note 1)	0.000 to 99.999 ms	0.0 to 4095.0 H		
V BLANKING		More than 2 H		

Note 1: The sum of VD-start and VD-line cannot be set in excess of V-total. Set it within the following range:

(VD-start + VD-Line) <= V-total

4･2 Horizontal Timing Data Editing

Fig. 4-2



(1) How to establish the horizontal timing data editing mode

When "H-Timing Data Edit" is selected in Section 4-1, the following display appears.

Fig. 4-3

```
H-Input Mode: dot     (0/1)
  Dot Clock : 74.97 MHz
```

(2) Inputting the input mode and dot clock frequency

<1> Select the data input mode.

0	μS	For inputting the data in microseconds. When this mode is selected, dots can no longer be input for H-sync, H-back-porch, HD-start and HD-width
1	dot	For inputting the data in dots. When this mode is selected, the microsecond data is displayed only.

<2> Input the dot clock frequency.

Input using 0 to 9 number keys	Setting range	Fixed mode
Dot clock frequency	5.00 to 260.00 (MHz)	Fixed to dot input using 'C' key. (See Note)

Note: When the fixed mode is set to ON, '*' appears, and the setting is fixed.

(3) Inputting H-period and H-disp

Use the ⏬ key to move to the screen below.

Fig. 4-4

```
Hperiod: 15.70 μS 1177dot
Hdisp  : 11.80 μS  885dot
```

Input using **0** to **9** number keys	Setting range	Fixed mode
H-period	0.00 to 99.99 (μs) 128 to 4096 (dot)	Fixed to microsecond input using 'E' key. Fixed to dot input using 'F' key. (See Note)
H-disp	0.00 to 99.99 (μs) 48 to 4096 (dot)	Fixed to microsecond input using 'B' key. Fixed to dot input using 'C' key. (See Note)

*: Even when values are set in microseconds, the setting ranges for the number of dots given above must not be exceeded.
Note: When the fixed mode is set to ON, '*' appears, and the setting is fixed.

(4) Inputting H-sync and H-back-porch

Use the ⏬ key to move to the screen below.

Fig. 4-5

```
Hsync  : 1.60 μS  120dot
Hbackp : 2.00 μS  150dot
```

Input using **0** to **9** number keys	Setting range
H-sync	0.00 to 99.99 (μs) 0 to 4096 (dot)
H-backp	0.00 to 99.99 (μs) 0 to 4096 (dot)

*: Even when values are set in microseconds, the setting ranges for the number of dots given above must not be exceeded.
Note: H-front-porch is automatically calculated from H-period, H-disp, H-sync and H-back-porch.
It must be within the same range as H-back-porch.

(5) Inputting HD-start and HD-width

Use the ⏬ key to move to the screen below.

Fig. 4-6

```
HDstart: 0.00 μS      0dot
HDwidth: 0.00 μS      0dot
```

Input using **0** to **9** number keys	Setting range
HDstart	0.00 to 99.99 (μs) 0 to 4096 (dot)
HDwidth	Same as above

Note: The sum of HD-start and HD-width cannot be set in excess of H-period.
Set it within the following range:
(HD-start + HD-width) <= H-period

[Supplementary Note] Concerning differences in operation by the input mode

(1) When the dot input mode has been selected:

The microsecond settings are re-calculated without changing the dot item of each data.

Dot clock frequency input	The microsecond setting items are re-calculated without changing the dot item of each data.
Input of other items	The microsecond setting items are re-calculated on the basis of the dot items of the input data.

(2) When the microsecond input mode has been selected:

Basically, the dot items are calculated in such a way that the microsecond item of each data remains unchanged. The microsecond settings are then re-calculated from the number of dots and dot clock frequency obtained.

Dot clock frequency input	The number of dots for each item is calculated in such a way that the microsecond settings of each item remains unchanged. The microsecond setting for each item is then re-calculated from the number of dots obtained. (The dot clock frequency is compensated for in such a way that the Hperiod microsecond setting remains unchanged.)
Input of other items	The corresponding dot items are calculated on the basis of the microsecond items of the input data. The microsecond items are then re-calculated on the basis of the dot items obtained. (The dot clock frequency is compensated for in such a way that Hperiod and Hdisp are set optimally for the input microsecond settings.)

[Supplementary note] Concerning fixed modes

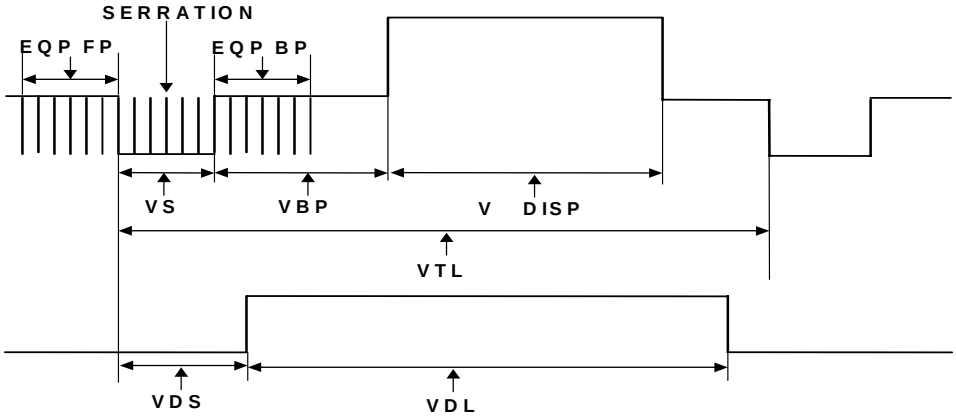
In (1) and (2) above, the timing data is re-calculated but the DotClock, Hperiod and Hdisp settings can be fixed.

When the fixed mode is set to ON, the settings concerned are fixed and this takes precedence over (1) and (2) above.

4･3 Vertical Timing Data Editing

* With non-interlacing

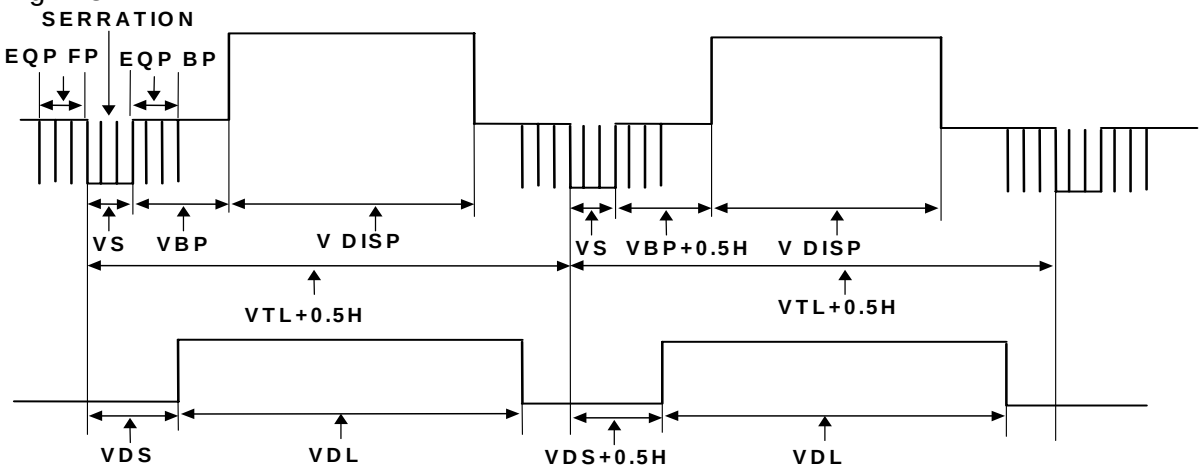
Fig. 4-7



VTL	V TOTAL
VS	V SYNC
VBP	V BACKP
EQP FP	EQP FP
EQP BP	EQP BP
VDISP	V DISP
VDS	VD START
VDL	VD LINE

* With interlacing

Fig. 4-8



• Even-numbered field • Odd-numbered field

VTL	V TOTAL
VS	V SYNC
VBP	V BACKP
EQP FP	EQP FP
EQP BP	EQP BP
VDISP	V DISP
VDS	VD START
VDL	VD LINE

(1) How to establish the vertical timing data editing mode

When "V-Timing Data Edit" is selected in Section 4-1, the following display appears.

Fig. 4-9

```
V-Input Mode: H       (0/1)
 Scan: Non Interlace (0-2)
```

(2) Inputting the input mode and scanning mode

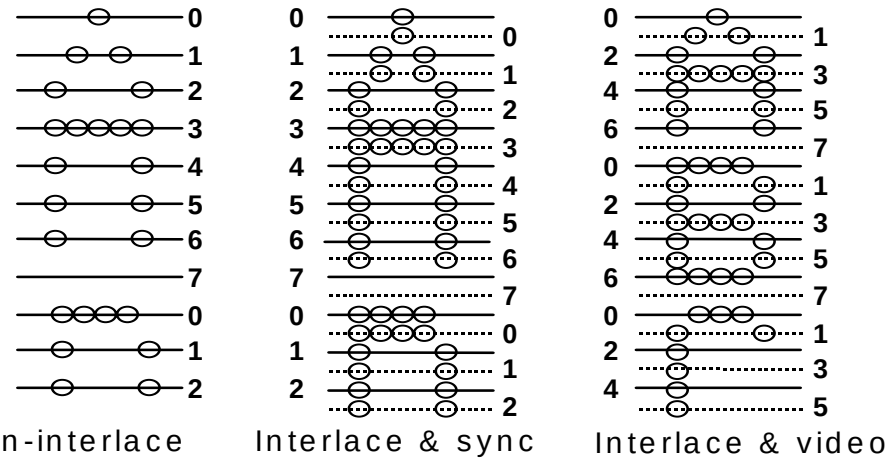
<1> Select the data input mode.

0	H	For inputting the data in H increments. When this mode is selected, the microsecond data is displayed only.
1	mS	For inputting the data in microseconds. When this mode is selected, the H data is displayed only.

<2> Input the scanning mode.

0	Non Interlace	Non-interlace
1	Inter & Sync	Interlace & sync
2	Inter & Video	Interlace & video

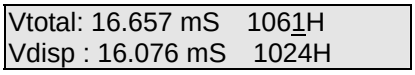
Fig. 4-10



(3) Inputting V-total-line and V-disp-line

Use the ⏬ key to move to the screen below.

Fig. 4-11



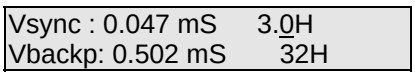
Input using 0 to 9 number keys	H setting range		Fixed mode
V−total−linec	With non-interlacing	100 to 8192 (1 H increments)	Fixed to microsecond input using 'E' key. Fixed to H input using 'F' key. (See note)
	With interlacing	100 to 4096 (1 H increments)	
V−disp−line		16 to 4000 (1 H increments)	Fixed to microsecond input using 'B' key. Fixed to H input using 'C' key. (See note)

Note:	When the fixed mode is set to ON, '*' appears, and the setting is fixed.
Note:	When INT&S (interlace & sync) or INT&V (interlace & video) has been selected for the SCAN item, set the number of scanning lines per field for the V timing data concerned.

(4) Inputting V-sync and V-back-porch

Use the ⏬ key to move to the screen below.

Fig. 4-12



Input using 0 to 9 number keys	H setting range
V–sync	1.0 to 99.0 (0.5 H increments)
V–back–porch	0 to 4000 (1 H increments)

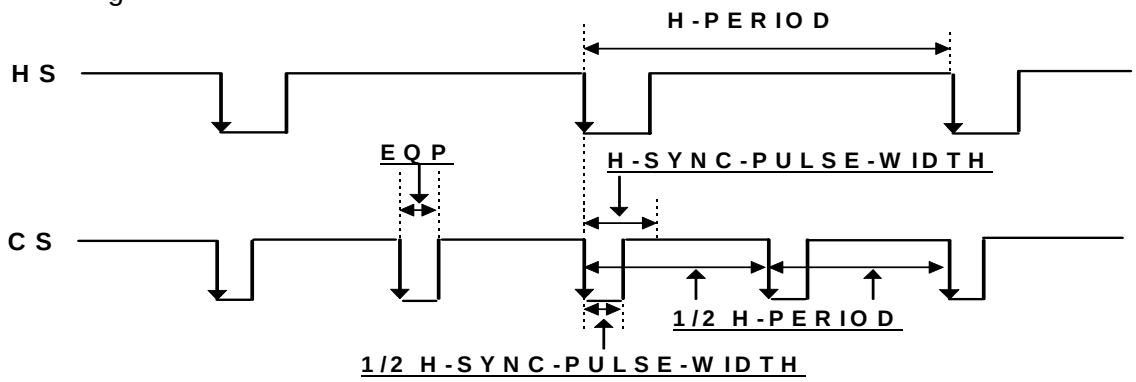
(5) Inputting the equalizing pulse, etc.

Use the ⏬ key to move to the screen below.

Input using 0 to 9 number keys	H setting range
EQPfp (input range of equalizing pulse within front porch)	0.0 to 99.0 (0.5 H increments)
EQPbp (input range of equalizing pulse within back porch)	0.0 to 99.0 (0.5 H increments)

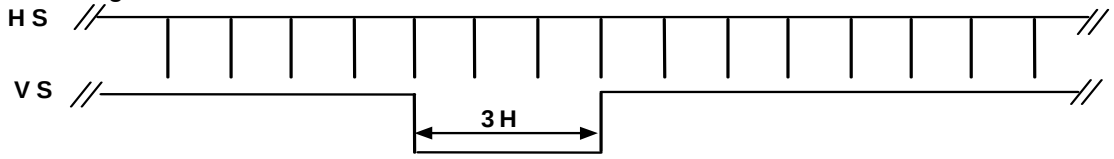
<<Example 1>> EQP phase relationship

Fig. 4-14



<<Example 2>> Examples of EQP settings

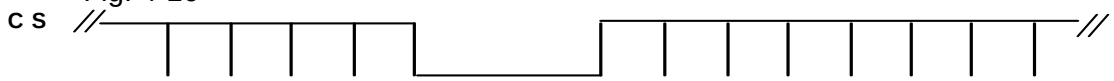
Fig. 4-15



<<Example 2-1>>

EQP–FP	→	0H
EQP–BP	→	0H
EQP	→	OFF
SERRATION	→	OFF

Fig. 4-16



<<Example 2-2>>

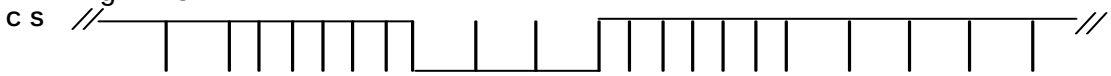
EQP–FP	→	0H
EQP–BP	→	0H
EQP	→	OFF
SERRATION	→	0.5H

Fig. 4-17

<<Example 2-3>>

EQP–FP	→	3H
EQP–BP	→	3H
EQP	→	ON
SERRATION	→	1H

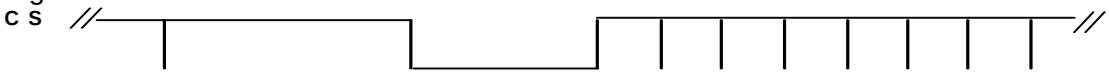
Fig. 4-18



<<Example 2-4>>

EQP–FP	→	3H
EQP–BP	→	0H
EQP	→	OFF
SERRATION	→	OFF

Fig. 4-19



(6) Selecting the equalizing and serrated pulses

Use the ⏬ key to move to the screen below.

Fig. 4-20

```
Serration     : OFF    (0-3)
EQP (on/off): OFF    (0/1)
```

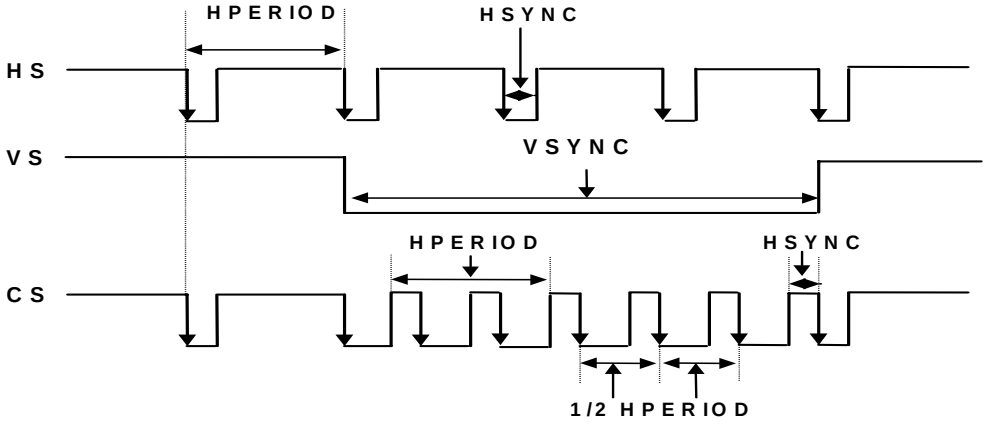
<1> Select "Serration."

0	OFF	OFF
1	0.5 H	See figure below.
2	1 H	
3	EXOR	See figure below.

<<Example 1>> Serrated pulse phase relationship

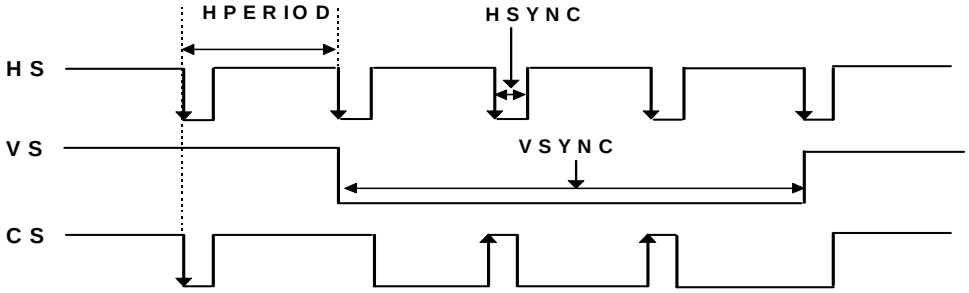
With the 0.5H setting

Fig. 4-21



With the XOR setting

Fig. 4-22



<2> Select ON or OFF for EQP.

0	OFF	EQP off
1	ON	EQP on

(7) Inputting VD-Startline and VD-Line

Use the ⏬ key to move to the screen below.

Fig. 4-23

```
VDstart: 0.000 mS     0.0H
VDline : 0.000 mS     0.0H
```

Input using 0 to 9 number keys	H setting range
VD−startline	0.0 to 4095.0 (0.5H increments) (Must be less than V-total - 1H)
VD−line	0.0 to 4095.0 (0.5H increments) (Must be less than V-total)

Note: The sum of VD-start and VD-line cannot be set in excess of V-total.
Set it within the following range:
(VD-start + VD-Line) <= V-total

Note: When interlace & sync or interlace & video has been selected, set the number of scanning lines per field.
The same applies to V-sync through VD-Line.

[Supplementary Note] Concerning differences in operation by the input mode

(1) When the H input mode has been selected:
The microsecond settings are re-calculated without changing the H item of each data.

(2) When the microsecond input mode has been selected:
Basically, the H items are calculated in such a way that the microsecond item of each data remains unchanged. The microsecond settings are then re-calculated from the H number and horizontal period obtained.

[Supplementary note] Concerning fixed modes
In (1) and (2) above, the timing data is re-calculated but the Vtotal and Vdisp settings can be fixed.
Once the fixed mode is set to ON, the settings concerned are fixed when the horizontal timing data Hperiod has been changed, and the fixed settings are given precedence over (1) and (2) above.

4･4 Analog Output Condition Data Editing

(1) How to establish the output condition data editing mode

When "Analog Output Condition" is selected in Section 4-1, the following display appears.

Fig. 4-24

```
Output Mode: ANALOG (0-5)
   NRZ/RZ   : NRZ      (0/1)
```

(2) Selecting the output mode and NRZ/RZ

<1> Select the output mode.

0	ANALOG	For setting the analog output mode.
1	TTL/ECL	For setting the TTL mode. The TTL mode is not available with the VG-828 (it will be ignored if this is set).
2	TRI-1080	For setting the tri-level sync signal output mode (1080p, 1080i).
3	TRI-1035	For setting the tri-level sync signal output mode (1035i).
4	TRI-720	For setting the tri-level sync signal output mode (720p).
5	TRI-483	For setting the tri-level sync signal output mode (483p).

<2> Select NRZ or NZ.

0	NRZ	NRZ (normal setting: non return zero)
1	RZ	RZ (no dots: return zero) This setting is ignored by the VG-828.

(3) Selecting CV and the output polarities

Use the ⏬ key to move to the screen below.

Fig. 4-25

```
CV: RGB (0-7)   CS: N (0-4)
HS: N    (0-2)  VS: N (0-2)
```

<1> Select CV (composite video).

0		OFF
1	R	Composite sync is carried on R.
2	G	Composite sync is carried on G.
3	R G	Composite sync is carried on R/G.
4	B	Composite sync is carried on B.
5	R B	Composite sync is carried on R/B.
6	G B	Composite sync is carried on G/B.
7	R G B	Composite sync is carried on R/G/B.

<2> Select the HS and VS polarities.

0	N	Negative
1	P	Positive
2	-	OFF

<3> Select the CS polarity.

0	N	Negative
1	P	Positive
2	-	OFF
3	HS	Only HS is output from the CS connector.
4	VS	Only VS is output from the CS connector.

Note: Concerning the polarity settings
There are five items to be set for CS, and each has its own address inside the VG-828. When the polarity has been set to "N" or "P," the CS polarity is set to negative or positive. To set the polarity when HS or VS is to be output from the CS connector, select the polarity (N or P) and then set HS or VS. This enables a negative or positive HS or VS signal to be output.

Reference example: Changing the output from the CS connector from CS/negative to HS/positive

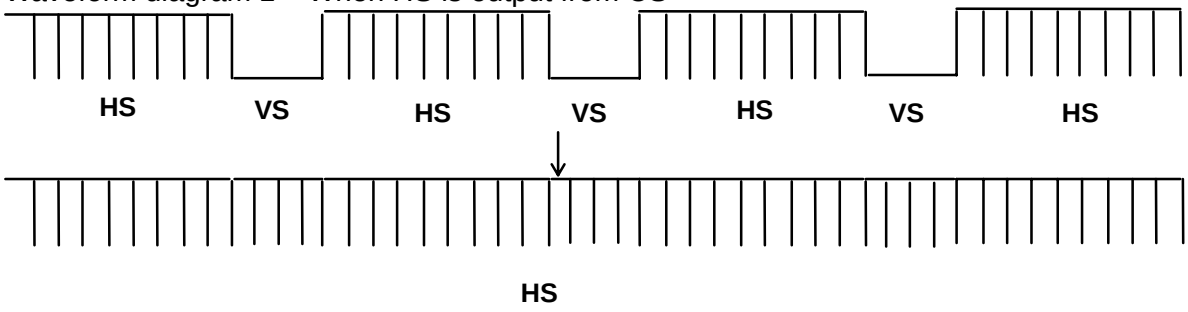
The procedure is described using Fig. 4-22 as a reference.

1. Use the ▶ key to move the cursor to "CS:".
2. Press the 1 key to change the setting from the current "N" to "P".
3. Press the SET key to set the polarity.
4. Press the 3 key again to change the display to "HS".
5. Press the SET key to complete the setting.

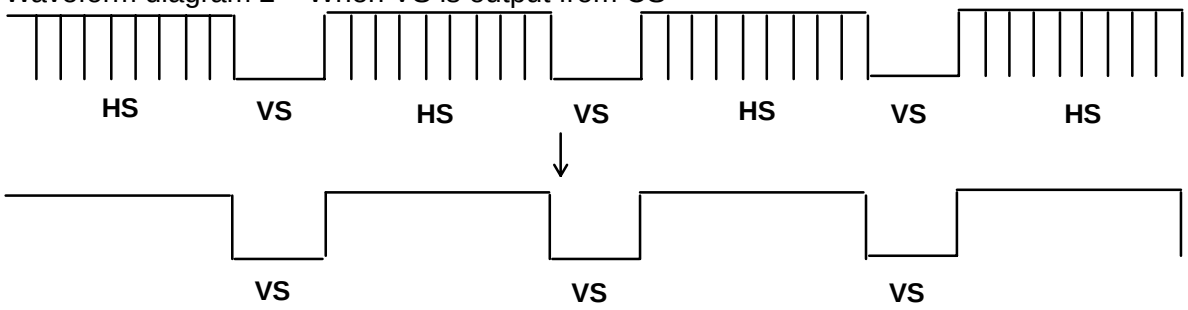
A positive HS signal is output from the CS connector.

Waveforms in the figure below
Waveform diagram 1 applies for an HS setting. (Reference example)
Waveform diagram 2 applies for a VS setting.

Waveform diagram 1 When HS is output from CS



Waveform diagram 2 When VS is output from CS



(4) Selecting the HD, VD, RGB (TTL) video signal, HT (TTL) half-tone signal and CLK polarities
Use the ⏬ key to move to the screen below.

Fig. 4-26

HD: N	VD: N	RGB: N	(0/1)
HT: N	CLK: N		(0/1)

<1> Select the HD and VD polarities.

0	N	Negative
1	P	Positive

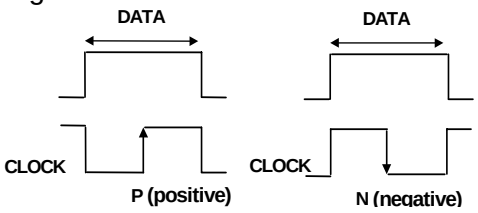
<2> Select the RGB (TTL) video signal and HT (TTL) half-tone signal polarities.

0	N	Negative
1	P	Positive

<3> Select the CLK (clock) polarity.

0	N	Negative
1	P	Positive

Fig. 4-27



(5) Setting the video signal, sync signal and setup levels

Use the ⏬ key to move to the screen below.

Fig. 4-28

```
Video: 0.70V Set-up: 0.00V
 Sync: 0.30V
```

<1> Input the video signal level.

Input using [0] to [9] number keys	Setting range
Video signal level	0.00 to 1.20 V (0.01 V increments)

<2> Input the sync (G on sync) signal level.

Input using [0] to [9] number keys	Setting range
G on Sync signal level	0.00 to 0.60 V (0.01 V increments)

<3> Input the setup level.

Input using [0] to [9] number keys	Setting range
Setup level	0.00 to 0.25 V (0.01 V increments)

(6) Selecting the RGB/YPbPr (color difference) output

Use the ⏬ key to move to the screen below.

Fig. 4-29

```
RGB/YPbPr: YPbPr      (0/1)
RGB
```

<1> Select RGB or YPbPr (color difference) for output.

[0]	RGB	RGB is selected for output.
[1]	YpbPr	YPbPr (color difference) is selected for output.

(7) Setting the YPbPr table number.

Use the ⏬ key to move to the screen below.

Fig. 4-30

```
YPbPr No.:          0 (0-9)
SMPTE 274M, 296M, RP-177
```

<2> Select YPbPr output coefficient table.

0	SMPTE 274M ,296M ,RP-177
1	240M
2	293M
3 to 9	User settings

Note: For details on the user settings for the YPbPr output coefficient table, refer to "3.3.10 YPbPr coefficient table edit function (FUNC-A)."

(8) Setting the D connector line 1

Use the ⏬ key to move to the screen below.

Fig. 4-31

```
D-Connector
Line1: 1080          (0-2)
```

Select the D connector line 1 identification signal.

0	480	Number of effective scanning lines: 480 (identification voltage 0 V)
1	720	Number of effective scanning lines: 720 (identification voltage 2.2 V)
2	1080	Number of effective scanning lines: 1080 (identification voltage 5 V)

(9) Setting the D connector line 2, line 3

Use the ⏬ key to move to the screen below.

Fig. 4-32

```
Line2: Interlace     (0/1)
Line3: 4:3LB         (0-2)
```

<1> Select the D connector line 2 identification signal.

0	Interlace	Interlace (identification voltage 0 V)
1	Progressive	Progressive (identification voltage 5 V)

<2> Select the D connector line 3 identification signal.

0	4:3	Aspect ratio 4:3 (identification voltage 0 V)
1	4:3LB	Letterbox aspect ratio 4:3LB (identification voltage 2.2 V)
2	16:9	Aspect ratio 16:9 (identification voltage 5 V)

Note: The above operations are valid when the D connector cable (option) is used. (See Section 9.6.)
Ignore these settings if the cable is not going to be used.

(10) Setting each of the analog, digital and TV outputs ON or OFF
Use the ⏬ key to move to the screen below.

Fig. 4-33

Analog: ON	Digital: ON
TV-Out: ON	(0/1)

<1> Select ON or OFF for the analog output.

0	OFF	Output OFF
1	ON	Output ON

<2> Select ON or OFF for the digital output.

0	OFF	Output OFF
1	ON	Output ON

<3> Select ON or OFF for the TV output.

0	OFF	Output OFF
1	ON	Output ON

Note:	The ON or OFF setting for each output will be ignored when DIP switch SW2 is set to ON (factory setting). To perform the above operations, set this switch to OFF.

Note:	The digital setting is reflected for the serial output only. The TV-Out setting is valid only when NTSC or PAL timing data is executed.

* The same screens appear for the digital output condition data edit menus, and the same settings can be performed.

4･5 Digital Output Condition Data Editing

(1) How to establish the output condition data editing mode

When "Digital Output Condition" is selected in Section 4-1, the following display appears.

Fig. 4-34

```
Output Mode: LCD
   NRZ/RZ   : NRZ      (0/1)
```

(2) Selecting the output mode and NRZ/RZ (* same as for analog output condition data)

Select NRZ or NZ.

0	NRZ	NRZ (normal setting: non return zero)
1	RZ	RZ (no dots: return zero) This setting is ignored by the VG-828.

(3) Selecting the output polarities 1

Use the ⏬ key to move to the screen below.

Fig. 4-35

```
HS: N    VS: N    CS: N (0/1)
HD: N    VD: N          (0/1)
```

Select the HS, VS, CS, HD and VD polarities (* same as for analog output condition data).

0	N	Negative
1	P	Positive

(4) Selecting the output polarities 2

Use the ⏬ key to move to the screen below.

Fig. 4-36

```
1CH: N   2CH: N   CLK: P (0/1)
DISP: P CLKOUT: ALL      (0/1)
```

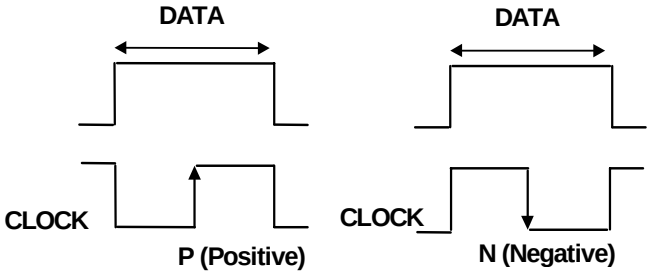
<1> Select the 1CH and 2CH RGB (video) signal polarities.

0	N	Negative
1	P	Positive

<2> Select the CLK (clock) polarity.

0	N	Negative
1	P	Positive

Fig. 4-37



<3> Select the DISP polarity.

0	N	Negative
1	P	Positive

<4> Select the clock output area at CLKOUT.

0	N	Negative
1	P	Positive

(5) Selecting the OE (output enable)

Use the ⏬ key to move to the screen below.

Fig. 4-38

```
1CH: OUT: HiZ CLK: HiZ (0/1)
2CH: OUT: HiZ CLK: HiZ (0/1)
```

Select the 1CH and 2CH and clock OE (output enable).

0	HiZ	High impedance
1	ON	ON (normal setting)

(6) Setting the number of video signal bits and SW (general-purpose) signal ON/OFF

Use the ⏬ key to move to the screen below.

Fig. 4-39

```
RGB: 8 Bit                (1-8)
OSW0: ON   OSW1: OFF   (0/1)
```

<1> Select the number of RGB (video) signal bits (high order).

Key	No. of bits	RGB signal value
1	1	0, 128
2	2	0, 64, 128, 192
3	3	0, 32, 64, 96, 128, 160, 192, 224
4	4	0, 16, 32, 48, …192, 208, 224, 240
5	5	0, 8, 16, 24, 32, …224, 232, 240, 248
6	6	0, 4, 8, 12, 16, 20, …240, 244, 248, 252
7	7	0, 2, 4, 6, 8, 10, 12, …248, 250, 252, 254
8	8	0, 1, 2, 3, 4, 5, 6, 7, 8, …252, 253, 254, 255

<2> Select ON or OFF for OSW0 and OSW1 (general-purpose signals).

0	OFF	Off
1	ON	On

This setting is valid when OSW0 or OSW1 has been selected as the SW0-3 output setting.

(7) Selecting the SW0 and SW1 outputs.
Use the ⏬ key to move to the screen below.

Fig. 4-40

```
SW0SEL: OSW0        (0-6)
SW1SEL: OSW1        (0-6)
```

<1> Select the SW0 output.

0	CS	CS is output.
1	VD	VD is output.
2	HD	HD is output.
3	OSW0	The SW0 fixed output is output in accordance with the OSW0 setting. (See Note 1)
4	OSW1	The SW0 fixed output is output in accordance with the OSW1 setting. (See Note 1)
5	GSW0	The SW0 fixed output is output in accordance with the GSW0 setting. (See Note 2)
6	GSW1	The SW0 fixed output is output in accordance with the GSW1 setting. (See Note 2)

Note 1:	Refer to section (6) above on the ON or OFF setting for the SW (general-purpose) signals.
Note 2:	Refer to the section describing the group data edit function (Func-6).

<2> Select the SW1 output.

0	CS	CS is output.
1	VD	VD is output.。
2	HD	HD is output.
3	OSW0	Same as for SW0.
4	OSW1	Same as for SW0.
5	GSW0	Same as for SW0.
6	GSW1	Same as for SW0.

(8) Selecting the SW2 and SW3 outputs.

Use the ⏬ key to move to the screen below.

Fig. 4-41

```
SW2SEL: VD          (0-6)
SW3SEL: HD          (0-6)
```

<1> Select the SW2 output.

0	VS	VS is output.
1	VD	VD is output.
2	HD	HD is output.
3	OSW0	Same as for SW0.
4	OSW1	Same as for SW0.
5	GSW0	Same as for SW0.
6	GSW1	Same as for SW0.

<2> Select the SW3 output.

0	HS0	HS is output.
1	VD	VD is output.
2	HD	HD is output.
3	OSW0	Same as for SW0.
4	OSW1	Same as for SW0.
5	GSW0	Same as for SW0.
6	GSW1	Same as for SW0.

(9) Setting the clock

Use the ⏬ key to move to the screen below.

Fig. 4-42

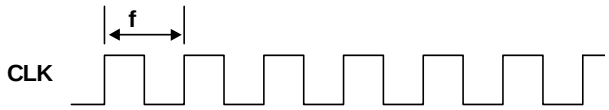
```
CLKMode: 1/1 Delay: OFF
CLKDelay: 0 nsec     (0-31)
```

<1> Select the clock mode (clock output mode).

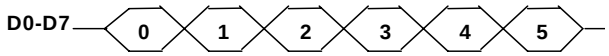
0	1/1	1/1 clock mode
1	1/2	1/2 clock mode

Fig. 4-43 In the 1/1 clock mode

- CLOCK



- 1 channel data

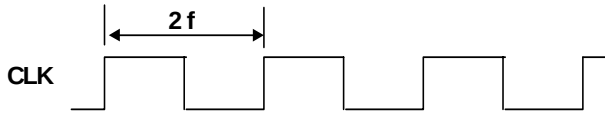


- 2 channel data

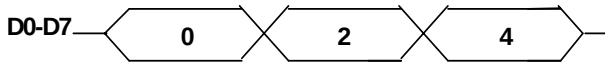
  Invalid

Fig. 4-44 In the 1/2 clock mode

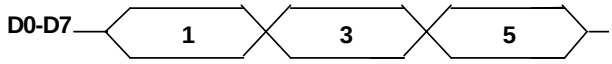
- CLOCK



- 1 channel data



- 2 channel data



Note: In the 1/2 clock mode, the horizontal timing input setting is performed in 2-dot increments.

<2> Select ON or OFF for the Clock Delay (clock signal delay).

0	OFF	Clock delay OFF
1	ON	Clock delay ON

<3> Input the Clock Delay (clock signal delay) time.

Input using 0 to 9 number keys	Setting range
Clock Delay time	0 nsec to 31 nsec（1 ns increment）

(10) Setting ON or OFF for the R (video) signal bits
Use the ⏬ key to move to the screen below.

Fig. 4-45

```
R7: ON R6: -- R5: ON R4: ON
R3: -- R2: ON R1: -- R0: ON
```

Select ON or OFF for the R signal bits.

0	--	Bit OFF
1	ON	Bit ON

(11) Setting ON or OFF for the G (video) signal bits
Follow the same setting method as for the R signal.

(12) Setting ON or OFF for the B (video) signal bits
Follow the same setting method as for the R signal.

(13) Setting each of the analog, digital and TV outputs ON or OFF
Use the ⏬ key to move to the screen below.

Fig. 4-46

```
Analog: ON   Digital: ON
TV-Out: ON              (0/1)
```

<1> Select ON or OFF for the analog output.

0	OFF	Output OFF
1	ON	Output ON

<2> Select ON or OFF for the digital output.

0	OFF	Output OFF
1	ON	Output ON

<3> Select ON or OFF for the TV output.

0	OFF	Output OFF
1	ON	Output ON

Note: The ON or OFF setting for each output will be ignored when DIP switch SW2 is set to ON (factory setting).
To perform the above operations, set this switch to OFF.

Note: The digital setting is reflected for the serial output only.
The TV-Out setting is valid only when NTSC or PAL timing data is executed.

* The same screens appear for the analog output condition data edit menus, and the same settings can be performed.

CHAPTER 5 PATTERN DATA EDITING

5･1 Pattern Data Selection

When the [PAT] key is pressed while the display in Fig. 3-8 in Section 3-3-1 appears or while editing is underway, the PAT-LED flashes, and the display shown in Fig. 5-1 appears.

Fig. 5-1

```
Pattern Edit:   0   (0-D)
Pattern Select
```

Select the data to be edited in accordance with the table below, and press the [SET] key to display the editing screens. (The PAT-LED stops flashing and remains lighted.)

Table 5-1

Display	Key	Data	Setting item
Pattern Select	0	Pattern select	Pattern select data
Graphic Color	1	Graphic color	Graphic color, background
CHARA Data Edit	2 CHARA	Character pattern	Display format, character code, font size, cell size
CROSS Data Edit	3 CROSS	Crosshatch pattern	Horizontal direction interval, vertical direction interval
DOTS Data Edit	4 DOTS	Dot pattern	Horizontal direction interval, vertical direction interval
CIRCLE Data Edit	5 CIRCLE	Circle pattern	Display format
COLOR Data Edit	6 COLOR	Color bar pattern	Horizontal direction and vertical direction intervals, layout direction, color layout
GRAY Data Edit	7 GRAY	Gray scale pattern	(Horizontal direction and vertical direction intervals common to color bar pattern) Layout direction, level
BURST Data Edit	8 BURST	Burst pattern	Display format, step, interval
WINDOW Data Edit	9 WINDOW	Window pattern	Horizontal direction, vertical size, display color, display format, flicker interval
OPT1 Data Edit	A OPT1	Optional pattern 1	Optional pattern No.
OPT2 Data Edit	B OPT2	Optional pattern 2	Optional pattern No.
CURSOR Data Edit	C CURSOR	Cursor pattern	Display format, position display mode, flicker interval, movement step, cursor color, background color
NAME Data Edit	D NAME	Program name	Display position, font size
ACTION Data Edit	E NAME	Pattern action	Graphic scroll, window scroll/flicker, palette scroll

Note 1	In order to enter the data on the memory card, the [SAVE] key must be pressed to save the data after any changes have been made in the pattern setting data.

5･2 Pattern Data Editing

(1) Pattern select data editing

When "Pattern Select" is selected in Section 5-1, the following display appears.

Fig. 5-2

```
Pattern Select
 (CHARA-NAME, R/G/B/INV)
```

Select the pattern to be output by pressing the pattern key concerned (CHARA to NAME) and R/G/B/INV key. (The pattern shown by the lighted LED is the one selected.)

Note:	When the [SET] key is pressed, the selected pattern is displayed.

(2) Graphic color editing

When "Graphic Color" is selected in Section 5-1, the following display appears.

Fig. 5-3

```
Graph.Color   BG: OFF (0/1)
R: 255 G: 255 B: 255
```

<1> Select the background.

When the background is set to ON, the dots of the character, crosshatch and dot patterns are displayed with the level and colors designated by the color bars and gray scale.

Select background ON or OFF using the [0] or [1] key.

[0]	OFF
[1]	ON

Note:	If patterns are to be displayed with the level and colors designated by the color bars and gray scale while background is ON, select "0" for all the "Graphic Color" settings.

<2> When ANALOG has been selected as the output mode of the output conditions, select one of 16.77 million colors.

Use the [⏬] key to move to the screen below.

Set the background color.

Fig. 5-4

```
BG   Color
R:     0 G:     0 B:     0
```

Input the settings for R, G and B using the [0] to [9] number keys.
The setting range is as shown below.

Input using [0] to [9] number keys	Setting range
R, G, B	0 to 255

<3> When TTL has been selected as the output mode of the output conditions, select one of 64 colors.

Fig. 5-5

```
Graph.Color   BG: OFF (0/1)
Video:        HT:
```

Input the colors of the video signals and half-tone signals using the [0] to [7] number keys.

[0]	
[1]	R r
[2]	G g
[3]	R G r g
[4]	B b
[5]	R B r b
[6]	G B g b
[7]	R G B r g b

(3) Character pattern data editing

When "CHARA Data Edit" is selected in Section 5-1, the following display appears.

Fig. 5-6

```
Format: Chara List   (0-2)
Font:
```

<1> Select the format number.

Input the number using [0], [1] or [2] key.

[0] ..... Character list (Chara List)

```
!"#$%&'··························
56789·····························
ij·································
···································
···································
···································
···································
···································
···································
```

Fig. 5-7

[1] ..... All one character (All 1 Chara)

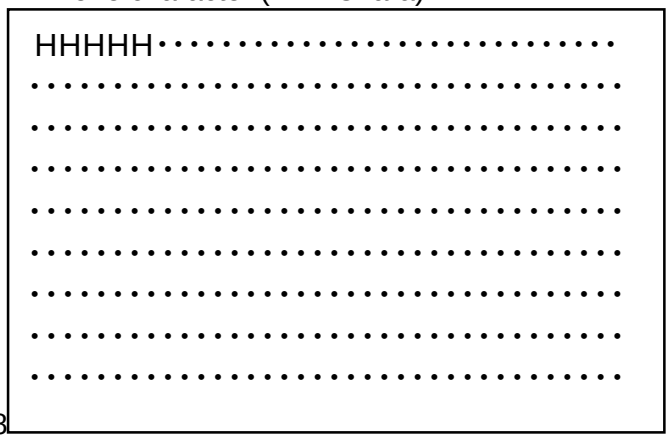


Fig. 5-8

[2] ..... Corners and center (Corner & Center)

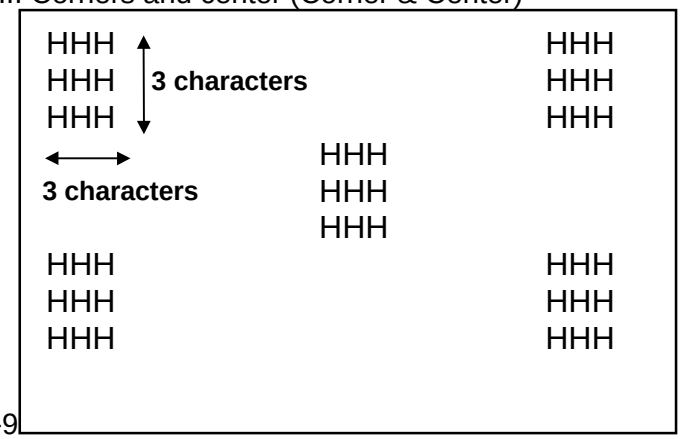


Fig. 5-9

<2> Select the font.

Move the cursor to the "Font" position, and input the number using [0], [1] or [2] key.

[0]	••••••••••••••••••	5×7
[1]	••••••••••••••••••	7×9
[2]	••••••••••••••••••	16×16

<3> Select the character code.

Fig. 5-10

Code: 48 [H]	(20H-FFH)
Cell: 16* 16	(1-255)

Use the [▼▼] key to move to the screen above.

A character code in the range shown below is set in hexadecimal notation.

Setting range	20 to FF

* Characters can be input on the display screen.

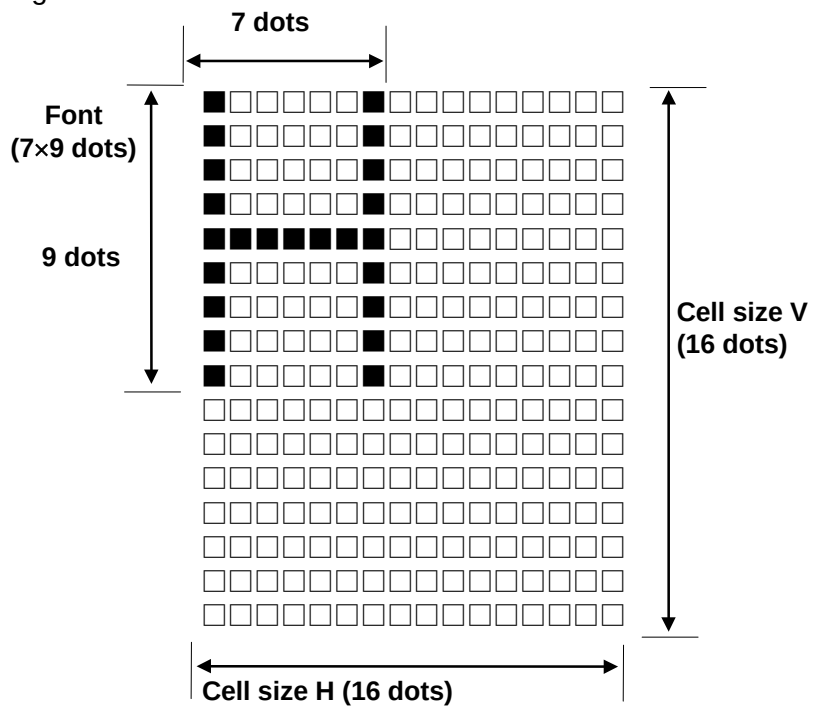
For further details, refer to Section 3-3-10.

<4> Input the cell sizes (horizontal and vertical).
Input the sizes for R, G and B each using the [0] to [9] number keys.
The setting range is as shown below.

Input using [0] to [9] number keys	Setting range
Cell size (horizontal)	1 to 255
Cell size (vertical)	1 to 255

* The correlation between the font and cell size is shown below.

<Example with 7x9 font and 16x16 cell size>
Fig. 5-11



(4) Crosshatch pattern data editing
When "CROSS Data Edit" is selected in Section 5-1, the following display appears.

Fig. 5-12

```
Mode: Line          (0/1)
Format: from center (0/1)
```

<1> Select the mode.
Input the mode using the [0] or [1] key.

[0]	Line	For designating the number of lines (in which case the interval is the number of crosshatch lines).
[1]	Dot	For designating the number of dots (in which case the interval is the number of dots between the crosshatch patterns).

<2> Select the format number.

Input the mode using the [0] or [1] key.

[0]	from center	For drawing with the screen center serving as the start point.
[1]	from LeftTop	For drawing with the top left of screen serving as the start point.

<3> Set the interval.

Use the [▼▼] key to move to the screen below.

Input the H/V interval using the number keys.

Fig. 5-13

```
Interval: H=   20 V=   20
Width: H=      1 V=    1
```

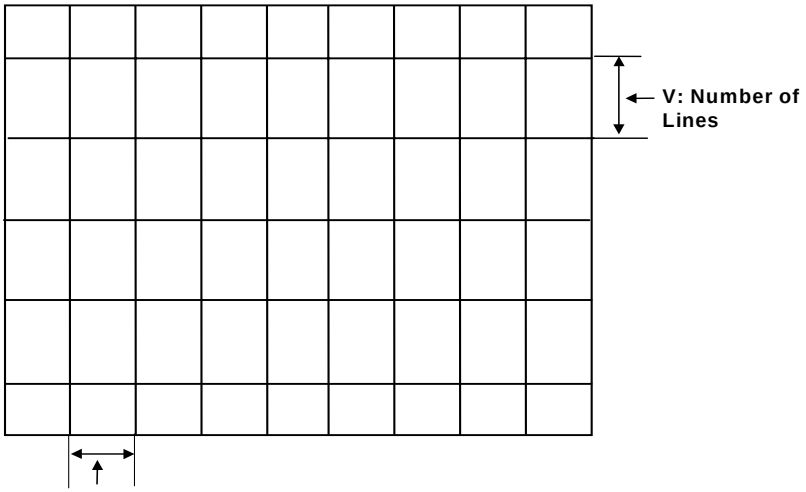


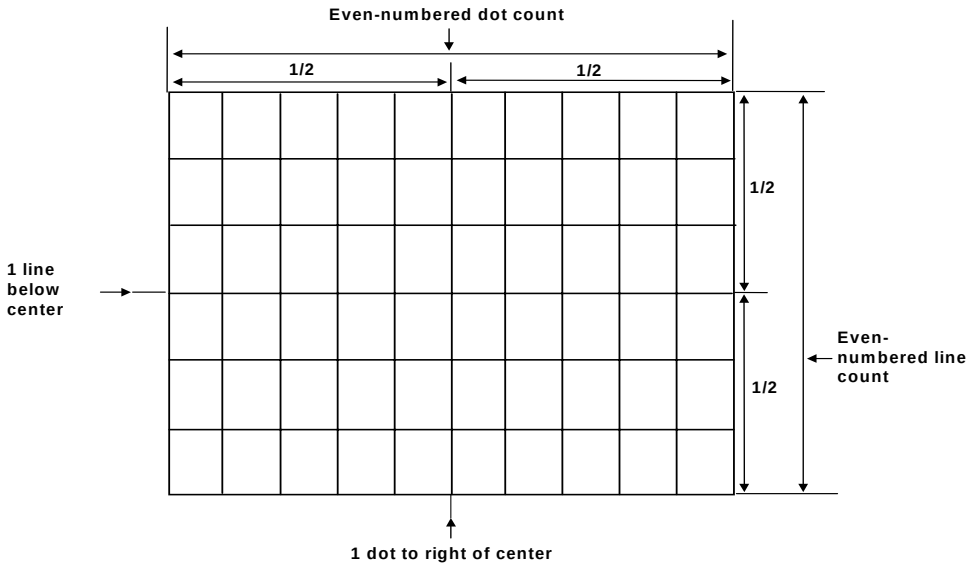
Fig. 5-14

Input the H and V intervals.

Input using [0] to [9] number keys	Setting range
H, V interval	0 to 9999 lines/dot

Note:	The crosshatch in the H (or V) direction is not displayed if "0" is set for the H (or V) interval.

When "from center" is set for "Format," the crosshatch pattern is displayed only 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 one dot to the right of the center and one line below it is used as the actual screen center.



* Examples when "0 and 1", "1 and 0" and "1 and 1" settings are used for H: and V: are shown below.

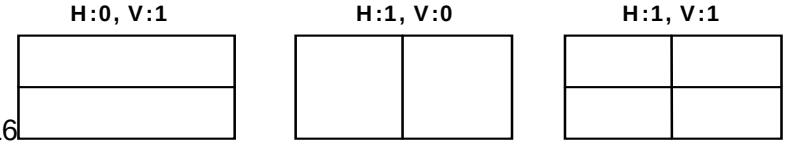


Fig. 5-16

<4> Set the width.

Input the line width for H and V.

Input using [0] to [9] number keys	Setting range
H, V line width	1 to 255 dots

(5) Dot pattern data input

When "DOTS Data Edit" is selected in Section 5-1, the following display appears.

Fig. 5-17

```
Mode: Line          (0/1)
Format: from center (0/1)
```

<1> Select the mode.

Input the mode using the [0] or [1] key.

[0]	Line	For designating the number of lines (in which case the interval is the number of dot pattern lines).
[1]	Dot	For designating the number of dots (in which case the interval is the number of dots between the dots).

<2> Select the format number.

Input the mode using the [0] or [1] key.

[0]	from center	For drawing with the screen center serving as the start point.
[1]	from Left Top	For drawing with the top left of screen serving as the start point.

<3> Set the interval.

Use the [▼▼] key to move to the screen below.

Input the H/V interval using the number keys.

Fig. 5-18

```
Interval: H=  20 V=  20
Size: 1dot Type: Rect (0/1)
```

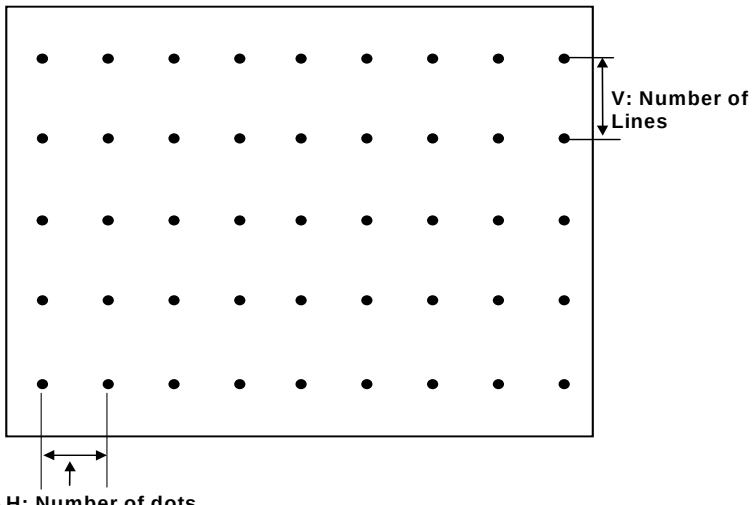


Fig. 5-19

Input the H and V intervals.

Input using [0] to [9] number keys	Setting range
H, V interval	0 to 9999 lines/dot

Note: As with the crosshatch pattern, the dot pattern is displayed only after the screen center is calculated.

* If "1" or "0" is set for both H: and V:, the display shown in the figure below will appear.

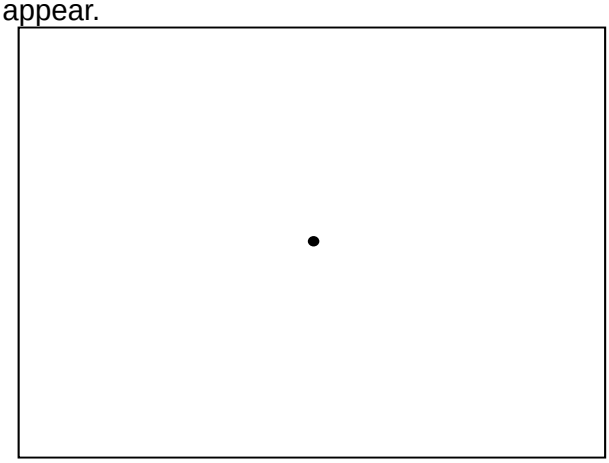


Fig. 5-20

<4> Set the size.

Input the size of the dot pattern.

Input using [0] to [9] number keys	Setting range
Size	1 to 15 dots

<5> Input the type.

Input the mode using the [0] or [1] key.

[0]	Crcl	For drawing dots in the shape of a circle whose diameter is the designated size.
[1]	Rect	For drawing dots in the shape of a square, one side of which is the designated size.

(6) Circle pattern data input

When "CIRCLE Data Edit" is selected in Section 5-1, the following display appears.

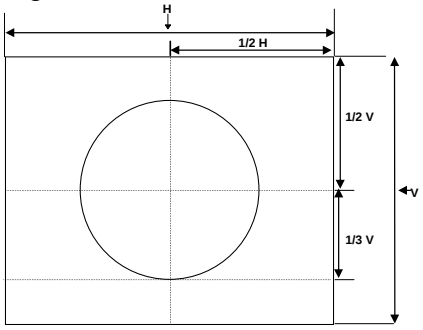
Fig. 5-21

```
Format: 0      (0-6)
Aspect: H=   0   V=   0
```

<1> Select the format number.

Input the format number using one of **0** to **6** keys.

Fig. 5-22

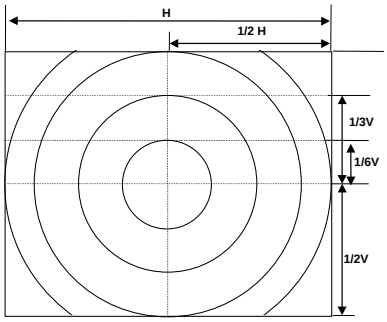


Format **0**

Single circle

Center: 1/2 H, 1/2 V

Radius: 1/3 V

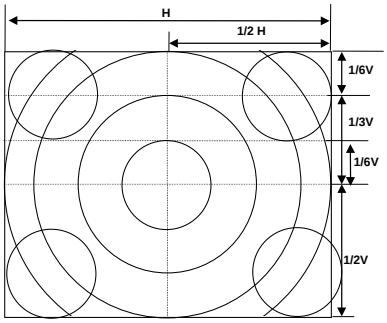


Format **1**

Concentric circles (1)

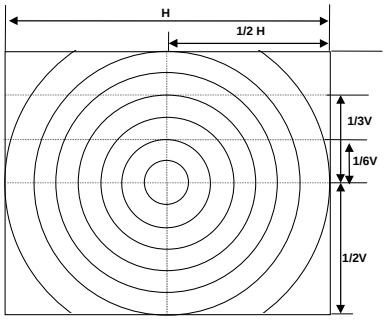
Center: 1/2 H, 1/2 V

Radius (from center): 1/6 V, 1/3 V, 1/2 V, 1/2 H



Format **2**

Format **1** + (4 circles with 1/6 V radius)

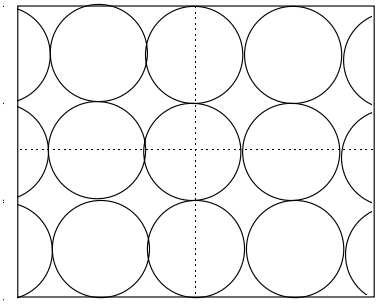


Format **3**

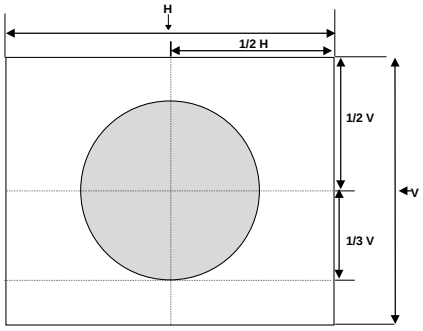
Concentric circles (2)

Center: 1/2 H, 1/2 V

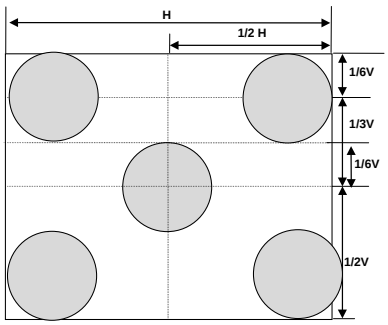
Radius (from center): addition of other circles inside 1/6 V, 1/3 V, 1/2 V circles; addition of 1/2 radius



Format 4
Consecutive circles with 1/6 V radius
Circles are displayed symmetrically both horizontally and vertically with the center (1/2 H, 1/2 V [V/2 V]) serving as the reference.



Format 5
Single circle painted out
Center: 1/2 H, 1/2 V
Radius: 1/3 V



Format 6
5 circles with 1/6 V radius painted out

<2> Set the aspect ratio (H:V).

Input using 0 to 9 number keys	Setting range
H:V aspect ratio	0 to 255

Perfectly round circles are always displayed by setting the aspect ratio of the monitor regardless of the display resolution.
Example:
H=4, V=3 for an NTSC monitor
H=16, V=9 for an HDTV monitor
Perfectly round circles will not be drawn if "0" is set for H or V.
(This is compatible with Astro's existing VG generators.)

(7) Color bar pattern data input

When "Color Data Edit" is selected in Section 5-1, the following display appears.

Fig. 5-23

```
Mode: %          (0/1)
Direction: Hor   (0-3)
```

<1> Select the mode.

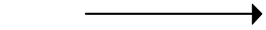
0	%	For designating the interval as a percentage.
1	Dot	For designating the interval as a number of dots.

<2> Select the direction.

Input the layout direction using the [0], [1], [2] or [3] keys.

Fig. 5-24

0: Horizontal direction



C0	1	2	to	F	C0

The colors from color "C0" to the color of the designated "repeat number" (color "CF" when 16 is designated) in the designated color layout are repeated horizontally.

* The V interval is ignored.

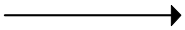
1: Vertical direction

C0
1
2
:
F
C0

The colors from color "C0" to the color of the designated "repeat number" (color "CF" when 16 is designated) in the designated color layout are repeated vertically.

* The H interval is ignored.

2: Horizontal direction



C0	1	2	to	F	C0
1	2	3	to	C0	1
2	3	4	to	1	2
3	4	5	to	2	3
4	5	6	to	3	4
5	6	7	to	4	5

The colors from color "C0" to the color of the designated "repeat number" (color "CF" when 16 is designated) in the designated color layout are repeated horizontally, and when they reach the corner, they are continued onto the next line which is determined by the V interval.

3: Vertical direction

C0	1	2	3	4	5
1	2	3	4	5	6
2	3	4	5	6	7
:	:	:	:	:	:
F	C0	1	2	3	4
C0	1	2	3	4	5

The colors from color "C0" to the color of the designated "repeat number" (color "CF" when 16 is designated) in the designated color layout are repeated vertically, and when they reach the corner, they are continued onto the next row which is determined by the H interval.

<3> Set the repeat number.

Use the [down] key to move to the screen below.

Input the repeat number using the number keys.

Fig. 5-25

```
Repeat      : 16          (1-16)
Interval: H=   6.3 V=   6.3
```

Input using [0] to [9] number keys	Setting range
Repeat number	1 to 16

<4> Input the H and V intervals.

The setting ranges are as shown below.

Input using [0] to [9] number keys	Dot setting range	% setting range
H interval	1 to 9999 dots	0.0 to 100.0%
V interval	1 to 9999 dots	0.0 to 100.0%

<5> Press the [▼▼] key to display the menu shown in the figure below, and input the color bar color layout.

There are 16 colors to be set for the layout ranging from C0 to CF.

Fig. 5-26

```
C0:_    1:      2: R    3: R
C4: G   5: G    6: RG   7: RG
```

Fig. 5-27

```
C8:_ B 9:   B A: R B B: R B
CC: GB D: GB E: RGB F: RGB
```

Input one of the eight colors using the [0] to [7] number keys.

[0]	
[1]	R
[2]	G
[3]	R G
[4]	B
[5]	R B
[6]	G B
[7]	R G B

(8) Gray scale (half-tone) pattern data input

When "Gray Data Edit" is selected in Section 5-1, the following display appears.

Fig. 5-28

```
Mode: %              (0/1)
Direction: Hor       (0/1)
```

<1> Select the mode.

[0]	%	For designating the interval as a percentage.
[1]	Dot	For designating the interval as a number of dots.

<2> Select the direction.

Input the direction using the [0] or [1] number key.

[0]	Hor	"LO" to the designated "repeat number" level in the designated level layout is repeated in the horizontal direction.
[1]	Ver	"LO" to the designated "repeat number" level in the designated level layout is repeated in the vertical direction.

<3> Select the repeat number.
Use the ▼▼ key to move to the screen below.
Input the repeat number using the number keys.

Fig. 5-29

```
Repeat   : 16          (1-16)
Interval: H=   6.3 V=   6.3
```

Input using 0 to 9 number keys	Setting range
Repeat number	1 to 16

<4> Input the H and V intervals.
The setting ranges are as shown below.

Input using 0 to 9 number keys	Dot setting range	% setting range
H interval	1 to 9999 dots	0.0 to 100.0%
V interval	1 to 9999 dots	0.0 to 100.0%

<5> Press the ▼▼ key to display the menu shown in the figure below, and input the gray scale level layout.
There are 16 levels to be set for the layout ranging from L0 to LF.

Fig. 5-30

```
L0:   0 1: 17 2: 34 3: 51
L4: 68 5: 85 6: 102 7: 119
```

Fig. 5-31

```
L8: 136 9: 153 A: 170 B: 187
LC: 204 D: 221 E: 238 F: 255
```

Input the gray scale level using the 0 to 9 number keys.
The setting range is as shown below.

Input using 0 to 9 number keys	Setting range
Gray scale level	0 to 255

Note: When TTL was selected as the output mode, input the half-tone colors in <5>.

Fig. 5-32

```
H0:_    1:      2: R    3: R
H4: G   5: G    6: RG   7: RG
```

Fig. 5-33

```
H8:_ B 9:   B A: R B B: R B
HC: GB D: GB E: RGB F: RGB
```

Input one of the eight colors using the [0] to [7] number keys.

[0]	
[1]	R
[2]	G
[3]	R G
[4]	B
[5]	R B
[6]	G B
[7]	R G B

(9) Burst pattern data editing

When "BURST Data Edit" is selected in Section 5-1, the following display appears.

Fig. 5-34

```
Format: L→R              (0-3)
Interval: 1   Step: 2 dot
```

<1> Select the format.

[0]	L→R	The pattern is increased from left to right.
[1]	L←R	The pattern is increased from right to left.
[2]	L←C→R	The pattern is increased from the center to left and right.
[3]	L→C←R	The pattern is increased from left and right to the center.

<2> Input the step and interval.

The step is the increment by which the line thickness is to be increased.
The interval is the number of lines with same thickness which are to be displayed.

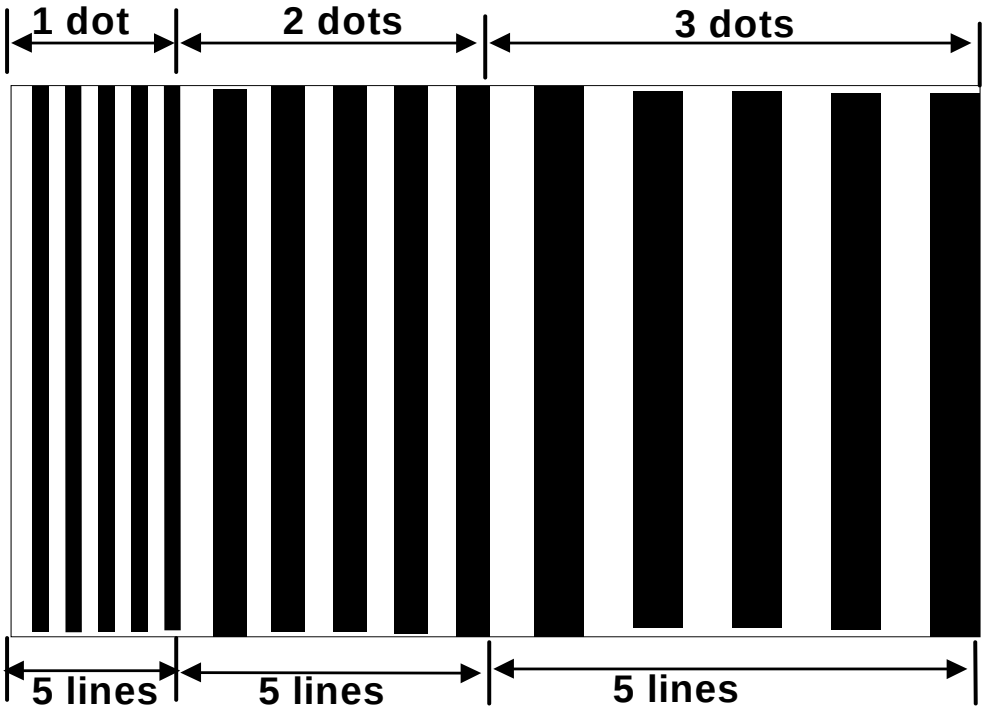
The setting range is as shown below.

Input using [0] to [9] number keys	Setting range
Step	1 to 99 dots
Interval	1 to 99 dots

[Setting example 1]

Format 0, step 1, interval 5

Fig. 5-35



(10) Window pattern data editing

When "WINDOW Data Edit" is selected in Section 5-1, the following display appears.

Fig. 5-36

Mode: % (0/1)
Format: 1 WINDOW (0-F)

<1> Select the mode.

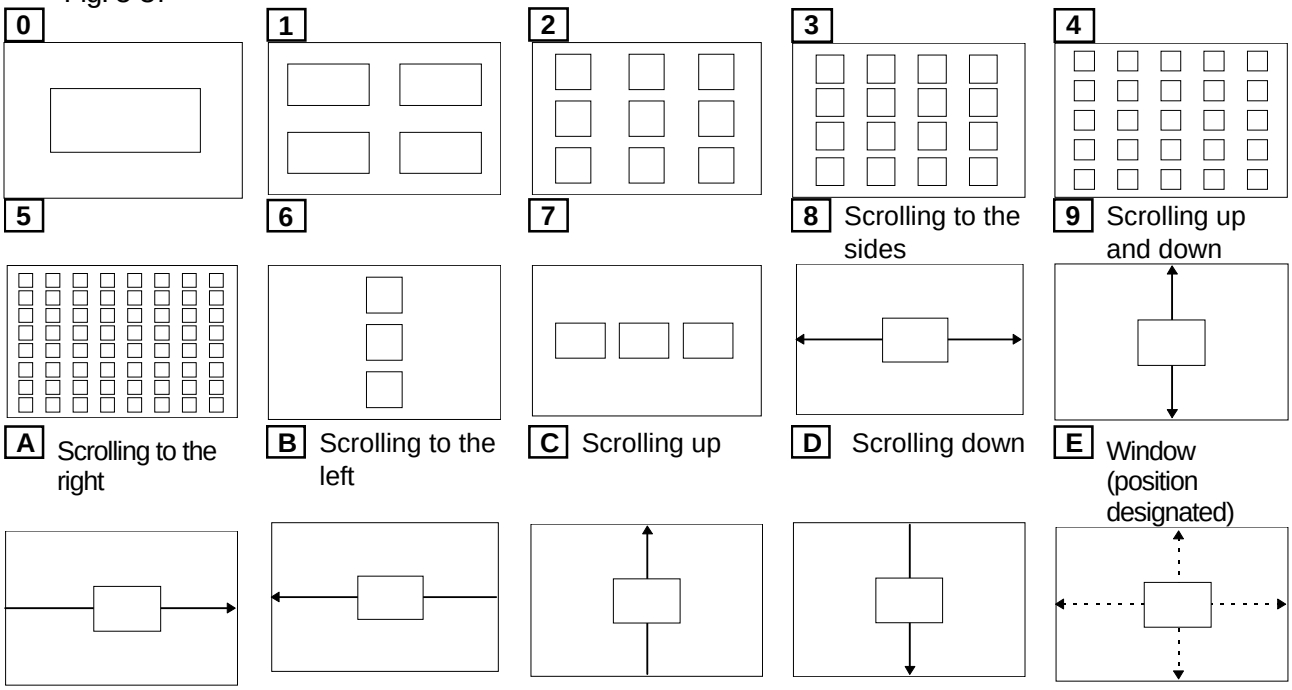
0	%	For setting the widths (horizontal, vertical width) as a percentage.
1	Dot	For setting the widths (horizontal, vertical width) as a number of dots.

<2> Select the format.

The setting range is as shown below.

Input using 0 to F keys	Setting range
Window format	0 to F

Fig. 5-37



Note: Format F

The window RGB level can be varied automatically in the direct display mode.

The window display is the same as format 0.

<3> Set the widths (horizontal and vertical width).

Use the ⏬ key to move to the screen below.

Input the horizontal and vertical widths using the number keys.

Fig. 5-38

Width: H= 20.0 V= 20.0 R: 255 G: 255 B: 255

The setting range is as shown below.

Input using 0 to 9 number keys	Dot setting range	% setting range
Hwidth	1 to 9999 dots	0.1 to 100.0%
Vwidth	1 to 9999 dots	0.1 to 100.0%

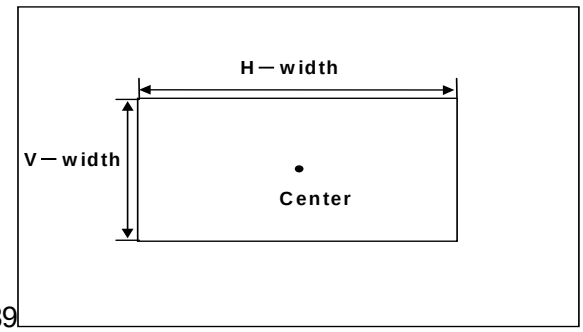


Fig. 5-39

Note:	The window is displayed between the background (color bar, gray scale) and graphic pattern (characters, etc.).

<4> Set R/G/B (window color).

Input one of 16.77 million colors using the [0] to [9] number keys.

The setting range is as shown below.

Input using [0] to [9] number keys	Setting range
Window color	0 to 255

Note:	The following screen appears when TTL was selected as the output mode.

Fig. 5-40

```
Width: H= 20.0 V= 20.0
Video: RGB      HT: rgb
```

Set the video signal and half-tone signal colors.

Input the color using the [0] to [7] keys.

[0]	
[1]	R
[2]	G
[3]	R G
[4]	B
[5]	R B
[6]	G B
[7]	R G B

<5> Select the flicker (flicker interval) for a window format from 0 to 7 or E.

Use the [▼▼] key to move to the screen below.

Select the flicker interval.

Fig. 5-41

```
Flicker: 0 (NONE)      (0-7)
```

[0]	0 (NONE)	No flicker。
[1]	1 (1 V)	Flicker occurs every V period.
[2]	2 (2 V)	Flicker occurs every 2 V periods.
[3]	3 (4 V)	Flicker occurs every 4 V periods.
[4]	4 (8 V)	Flicker occurs every 8 V periods.
[5]	5 (16 V)	Flicker occurs every 16 V periods.
[6]	6 (32 V)	Flicker occurs every 32 V periods.
[7]	7 (64 V)	Flicker occurs every 64 V periods.

Note:	The flicker cannot be set for a window in a format from 8 to D.

<6> Select the scroll speed for a window in a format 8 to D.

The window is scrolled in formats 8 to D.

The scroll speed can be changed by setting one of the following numbers in "Flicker Interval."

0	1 V: 1 dot	Window is scrolled by 1 dot every blanking period.	(Slow)
1	1 V: 2 dots	Window is scrolled by 2 dots every blanking period.	
2	1 V: 3 dots	Window is scrolled by 3 dots every blanking period.	
3	1 V: 4 dots	Window is scrolled by 4 dots every blanking period.	↓
4	1 V: 4 dots	Window is scrolled by 4 dots every blanking period.	↓
5	1 V: 4 dots	Window is scrolled by 4 dots every blanking period.	
6	1 V: 4 dots	Window is scrolled by 4 dots every blanking period.	
7	1 V: 4 dots	Window is scrolled by 4 dots every blanking period.	(Fast)

<7> Select the level variation speed for window format F.

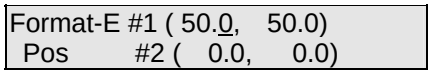
The window RGB level is automatically varied for format F.

The speed at which the window level is varied can be changed by setting one of the following numbers in "Flicker Interval."

0	1 V: 1 Level	Window is changed by 1 level every blanking period.	(Fast)
1	2 V: 1 Level	Window is changed by 1 level every 2 blanking periods.	
2	3 V: 1 Level	Window is changed by 1 level every 3 blanking periods.	
3	4 V: 1 Level	Window is changed by 1 level every 4 blanking periods.	↓
4	5 V: 1 Level	Window is changed by 1 level every 5 blanking periods.	↓
5	6 V: 1 Level	Window is changed by 1 level every 6 blanking periods.	
6	7 V: 1 Level	Window is changed by 1 level every 7 blanking periods.	
7	8 V: 1 Level	Window is changed by 1 level every 8 blanking periods.	(Slow)

<8> Set the "Format-E" positions (format E window position). (For format E only)
Use the [down] key to move to the screen shown below.
Set the window center positions #1 and #2 (by percentage).

Fig. 5-42



The setting range is as shown below.

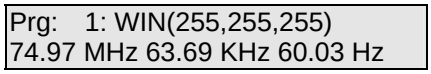
Input using [0] to [9] number keys	Setting range
Window center position #1 (h, v)	0.0% to 100.0%
Window center position #2 (h, v)	0.0% to 100.0%

Note: The #2 window is not displayed when "0,0" is selected for window center position #2 setting.

(10-1) Level changing operation in direct display mode
The window level can be changed under the following conditions:
<1> When window format F has been selected
<2> When one of the window formats from 0 to 7 has been selected and the flicker interval has been set to "0"
(the speed of the change is fixed (1 V: 1 level))

The following LCD display appears when a window pattern is selected in the direct display mode and the above conditions have been satisfied.
(WIN: RGB level display)

Fig. 5-43



Proceed with the following operations using the [A] to [F] keys.

[A] Key	This increases the level automatically at the speed set for the flicker interval.
[B] Key	This decreases the level automatically at the speed set for the flicker interval.
[C] Key	This stops the automatic change. It stops at the level applying when the key was pressed.
[E] Key	Each time this is pressed, the level is incremented by 1.
[F] Key	Each time this is pressed, the level is decremented by 1.

(11) Optional pattern number setting

When "OPT1 Data Edit" or "OPT2 Data Edit" is selected in Section 5-1, the following display appears.

Fig. 5-44

```
OPT1-NO: 0          (00-BF)
```

Fig. 5-45

```
OPT2-NO: 0          (00-BF)
```

The setting range is as shown below.

Input using [0] to [9] number keys	Setting range
Optional pattern number	00 to BF

Note 1	When an optional pattern is selected, it cannot be superimposed onto any other pattern.
Note 2:	Optional patterns 00 to 3F are internal optional patterns. Patterns 40 to 7F are user-generated optional patterns, and patterns 80 to BF are image displays (#1 to #64). Patterns 40 to BF cannot be used when the panel ROM is used.

(12) Cursor pattern data editing

When "CURSOR Data Edit" is selected in Section 5-1, the following display appears.

Fig. 5-46

```
Format: Cross       (0-2)
Pos.Disp: OFF       (0-2)
```

<1> Select the format.

[0]	5*5	For setting a cross-shaped cursor consisting of 5 horizontal dots and 5 vertical dots.
[1]	Cross	For setting a cross-shaped cursor which fills the entire screen.
[2]	V-Line	For setting a vertical line as the cursor.
[3]	5*5 (RGB)	For setting a cross-shaped cursor consisting of 5 horizontal dots and 5 vertical dots. (RGB)
[4]	Cross (RGB)	For setting a cross-shaped cursor which fills the entire screen. (RGB)
[5]	V-Line (RGB)	For setting a vertical line as the cursor. (RGB)

When [3], [4] or [5] is selected, the color changes color from white → red → green → blue when it moves.

<2> Select PosDisp (position display mode).

0	OFF	The cursor position does not appear on the display.
1	Normal 1	The cursor position is displayed on the display in the following format. (H-pos, V-pos: STEP xx) H-pos: Horizontal coordinate (1 to) V-pos: Vertical coordinate (1 to) STEP: Movement step (1/10/100) * "1,1" serves as the coordinates for the top left of the display.
2	Normal 2	The cursor position is displayed on the display in the following format. (GATE=gate: STEP xx) (R=rrr, G=ggg, B=bbb) gate: Vertical coordinate (1 to) rrr: R color horizontal coordinate (1 to) ggg: G color horizontal coordinate (2 to) bbb: B color horizontal coordinate (3 to) STEP: Movement step (1/10/100) * "1,1" serves as the coordinates for the top left of the display. As the horizontal coordinates, the coordinates on the display are trebled and the +1, +2 and +3 values are displayed for R, G and B, respectively.
3	Reverse 1	The contents are the same as with Normal 1 but both the characters and coordinates are rotated by 180 degrees. If this display is inverted, the display will be the same as with Normal 1. * "1,1" serves as the coordinates for the bottom right of the display.
4	Reverse 2	The contents are the same as with Normal 2 but both the characters and coordinates are rotated by 180 degrees. If this display is inverted, the display will be the same as with Normal 2. * "1,1" serves as the coordinates for the bottom right of the display.

<3> Select the flicker (flicker interval).
Use the ⏬ key to move to the screen below.
Select the flicker interval.

Fig. 5-47

```
Flicker: 0 (NONE)      (0-7)
Step     : 10 dot      (0-2)
```

0	0 (NONE)	No flicker
1	1 (1 V)	Flicker occurs every V period.
2	2 (2 V)	Flicker occurs every 2 V periods.
3	3 (4 V)	Flicker occurs every 4 V periods.
4	4 (8 V)	Flicker occurs every 8 V periods.
5	5 (16 V)	Flicker occurs every 16 V periods.
6	6 (32 V)	Flicker occurs every 32 V periods.
7	7 (64 V)	Flicker occurs every 64 V periods.

<4> Select the step (movement step).

0	1 dot	Movement is made in 1-dot increments.
1	10 dots	Movement is made in 10-dot increments.
2	100 dots	Movement is made in 100-dot increments.

<5> Set R/G/B (cursor color) and BR/BG/BB (background color).
Use the ⏬ key to move to the screen below.
Select the cursor color and background color.

Fig. 5-48

```
R: 255    G: 255    B: 255
BR: 127   BG: 127   BB: 127
```

The setting range is as shown below.

Input using 0 to 9 number keys	Setting range
Cursor color	0 to 255
Background color	0 to 255

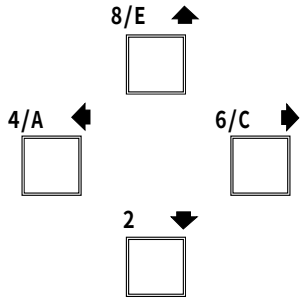
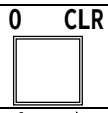
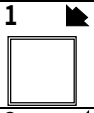
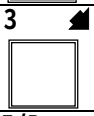
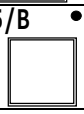
(12-1) Cursor pattern operations in direct display mode

In the direct display mode, the following LCD display appears when the cursor pattern is selected. (H/V: cursor coordinates displayed)

Fig. 5-49

```
Prg:  1:    H= 442 V= 512
74.97 MHz 63.69 KHz 60.03 Hz
```

Perform the operations shown below using the [0] to [9] number keys.

Key operation	Function
	For moving the cursor pattern on the display in the designated direction. For indicating the cursor coordinate position (H/V) on the LCD.。
 Key	For changing the coordinate display. (No display → Type 1 → Type 2)
 Key	For changing the flashing speed. (No flashing → once in 1V → ... → once in 64V)
 Key	For changing the cursor shape. (5*5 → Cross → V-line)
 Key	For changing the movement step. (100 dots → 10 dots → 1 dot)

Note: Program numbers cannot be input at this time using the number keys.

(13) Program name data editing

When "NAME Data Edit" is selected in Section 5-1, the following display appears.

Fig. 5-50

```
Pos: L-T       Font: 5*7
Astro xxx
```

<1> Select the display position ("Pos").

[0]	Cntr	The program name is displayed in the center of the screen.
[1]	L-T	The program name is displayed at the top left of the screen.
[2]	L-B	The program name is displayed at the bottom left of the screen.
[3]	R-T	The program name is displayed at the top right of the screen.
[4]	R-B	The program name is displayed at the bottom right of the screen.

<2> Select the font.

0	5*7	5×7 font
1	7*9	7×9 font
2	16*16	16×16 font

<3> Input the program name.
Move the cursor to the bottom line and input the program name in hexadecimal notation.
Up to 20 characters can be used for a program name.

* Characters can be input on the display screen. For further details, refer to Section 3-3-10.

(14) Pattern action editing

When "Action Edit" is selected in Section 5-1, the following display appears.

Fig. 5-51

```
Action Interval: xxxV
                 (1-999)
```

<1> Select V-interval.

The setting range is as shown below.

Input using 0 to 9 number keys	Setting range
Execution interval (in V increments)	0 to 999

The following display appears when the [down] key is pressed.

Fig. 5-52

```
G-SCR: OFF          (0/1)
G-Dir: L-D          (0-9)
```

<2> Select ON or OFF for G-SCR (8-bit plane scrolling).

0	OFF	8-bit plane scrolling is not executed. (Default)
1	ON	8-bit plane scrolling is executed.

<3> Select G-Dir (direction of 8-bit plane scrolling).

0	Mov	The display start coordinates are moved, and simple moving picture is executed.
1	L-D	The pattern is scrolled toward the bottom left.
2	D	The pattern is scrolled downward.
3	R-D	The pattern is scrolled toward the bottom right.
4	L	The pattern is scrolled toward the left.
6	R	The pattern is scrolled toward the right.
7	L-U	The pattern is scrolled toward the top left.
8	U	The pattern is scrolled upward.
9	R-U	The pattern is scrolled toward the top right.

Note: For details on the simple moving picture, refer to "(14-1) Simple moving picture function."

The following display appears when the ▼▼ key is pressed.

Fig. 5-53

```
G-Step:
H=xxxx, V=xxxx    (1-4095)
```

<4> Set the step (8-bit scroll step).

The setting range is as shown below.

Input using 0 to 9 number keys	Setting range
Step (dots) in horizontal direction	1 to 4095
Step (V) in vertical direction	1 to 4095

The following display appears when the ▼▼ key is pressed.

Fig. 5-54

```
G-Repeat:
H=xx, V=xx          (1-15)
```

<5> Set Repeat (number of simple moving picture repetitions).

The setting range is as shown below.

Input using 0 to 9 number keys	Setting range
Number of repetitions in horizontal direction	1 to 15
Number of repetitions in vertical direction	1 to 15

Note: This item is valid only when "Mov" has been set for G-Dir.

The following display appears when the ▼▼ key is pressed.

Fig. 5-55

```
WDSR: OFF WDFL: OFF    (0/1)
P-SCR: OFF
```

<6> Select ON or OFF for WDSR (window scrolling).

0	OFF	Window scrolling is not executed. (Default)
1	ON	Window scrolling is executed.

<7> Select ON or OFF for WDFL (window flicker).

0	OFF	Window flicker is not executed. (Default)
1	ON	Window flicker is executed.

<8> Select ON or OFF for PLSR (palette scrolling).

0	OFF	Palette scrolling is not executed. (Default)
1	ON	Palette scrolling is executed.

The following display appears when the ▼▼ key is pressed.

Fig. 5-56

```
W-Dir : R-D          (1-9)
W-Step: xxx          (1-255)
```

<9> Select Dir (direction) for window scrolling.

1	L-D	The pattern is scrolled toward the bottom left.
2	D	The pattern is scrolled downward.
3	R-D	The pattern is scrolled toward the bottom right.
4	L	The pattern is scrolled toward the left.
6	R	The pattern is scrolled toward the right.
7	L-U	The pattern is scrolled toward the top left.
8	U	The pattern is scrolled upward.
9	R-U	The pattern is scrolled toward the top right.

<10> Set the step for window scrolling.

The setting range is as shown below.

Input using 0 to 9 number keys	Setting range
Step in horizontal and vertical direction (common setting)	1 to 255

The following display appears when the ▼▼ key is pressed.

Fig. 5-57

```
P-Step: -(0/1) xxx (0-128)
P-Stt: xxx End: xxx (0-255)
```

<11> Set the palette scrolling step sign and value.

0	–	Used for setting negative value.
1	+	Used for setting positive value.

The setting range is as shown below.

Input using 0 to 9 number keys	Setting range
Step	1 to 128

<12> Set Start (start position) and End (end position) for palette scrolling.
The setting range is as shown below.

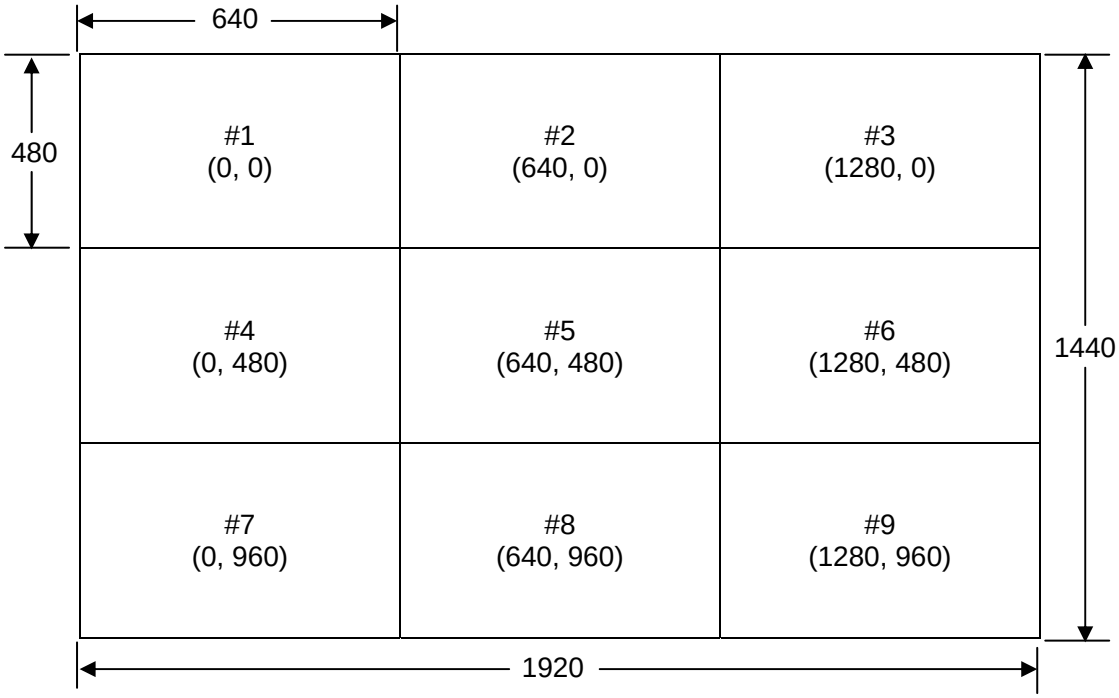
Input using 0 to 9 number keys	Setting range
Start position, end position	0 to 255

(14-1) Simple moving picture function

This function achieve simple moving pictures by drawing a multiple number of pictures in the drawing area and moving the display start coordinates. Provided as an example is a description of the method used to execute 9-frame simple moving picture using a 1920×1440 composite image consisting of three 640×480 images stacked vertically and three 640×480 images placed side by side horizontally.

<1> On the screen shown in Fig. 5-52, set "ON" (1) for G-SCR and "Mov" (0) for G-Dir.
<2> On the screen shown in Fig. 5-53, set H=640 and V=480 for Step.
<3> On the screen shown in Fig. 5-54, set H=3 and V=3 for Repeat.

As a result of the above operations, the display start coordinates move in the sequence of #1 through #9 shown in the figure below.



* The figures in parentheses denote the display start coordinates.

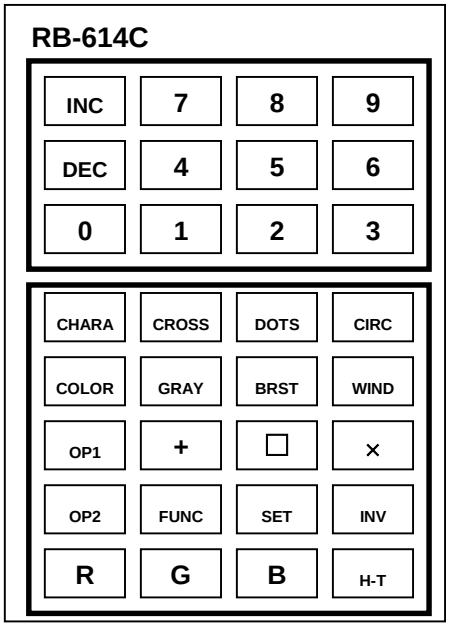
Note:	The composite 1920x1440 images must be created and edited by the user.

CHAPTER 6 OPERATIONS USING RB-614C

6･1 Connections with VG-828

The RB-614C cable is connected to the REMOTE connector on the rear panel of the VG-828.

6･2 Overview



6･3 Operations

The keys of the RB-614C listed in the table below can be used in place of the corresponding VG-828 keys.

RB-614C	VG-828
INC Key	▲ Key
DEC Key	▼ Key
0 to **9** Keys	**0** to **9** Keys
CHARA to **OP2** Keys	**CHARA** to **OPT2** Keys
FUNC Key	**FUNC** Key
SET Key	**SET** Key
INV Key	**INV** Key
R to **B** Keys	**R** to **B** Key
H-T Key	No operation possible

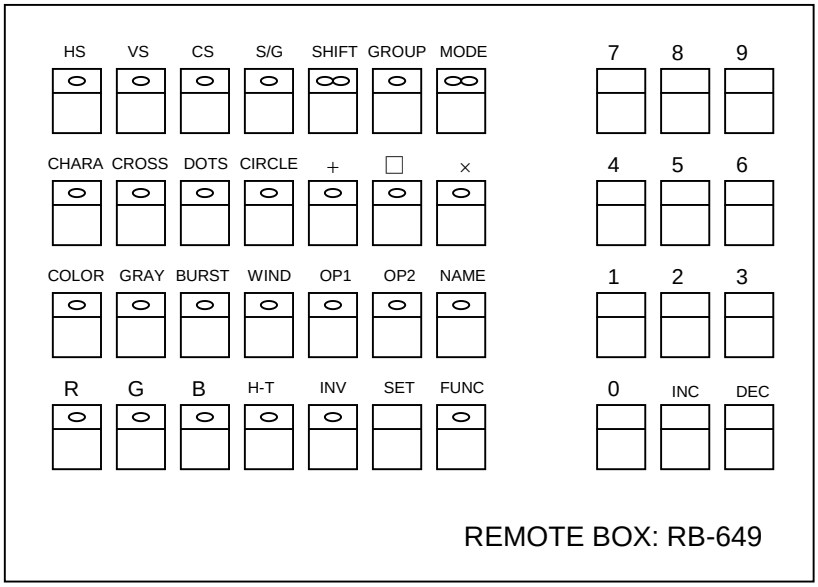
Note: Program data, etc. cannot be edited using the RB-614C.
(Only functions 0, 4 and 9 can be executed.)

CHAPTER 7 OPERATIONS USING RB-649

7･1 Connections with VG-828

The RB-649 cable is connected to the REMOTE connector on the rear panel of the VG-828.

7･2 Overview



7･3 Operations

The keys of the RB-649 listed in the table below can be used in place of the corresponding VG-828 keys.

RB-649	VG-828
HS to **S/G** Keys	**HS/CS** to **YPbPr** Keys
SHIFT Key	**SHIFT** Key
GROUP Key	Used to select the number of the group to be executed. It functions in the same way as the **ESC** key. *
MODE Key	The functions in Func-0 are as follows. Red line lighted: All program data is executed. Red dot lighted: Timing data only is executed. Green dot lighted: Pattern data only is executed.
CHARA to **NAME** Keys	**CHARA** to **NAME** Keys
R to **B** Keys	**R** to **B** Keys
H-T Key	**CURSOR** Key
INV Key	**INV** Key
SET Key	**SET** Key
FUNC Key	**FUNC** Key
0 to **9** Keys	**0** to **9** Keys
INC Key	▲ Key
DEC Key	▼ Key

Note: Program data, etc. cannot be edited using the RB-649.
(Only functions 0, 4 and 9 can be executed.)

* Refer to (5) in Section 3-3-2.

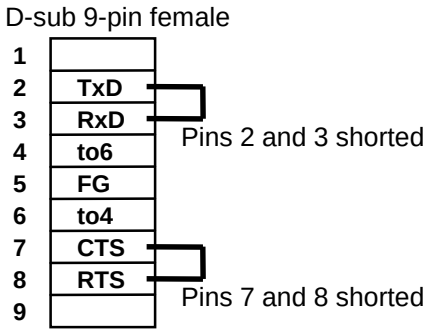
CHAPTER 8 SELF-DIAGNOSIS MODE

8･1 Introduction

The self-check functions of the VG-828 check the hardware devices of the VG-828.

8･2 What is Required for Checking

<1> Connector used for checking RS-232C



8･3 Operation Method

8･3･1 Startup Method

Switch on the power of the VG-828 while pressing the ⏫ key.

The buzzer sounds, all the LEDs on the operation panel of the VG-828 generator light, and the following LCD display appears.

Fig. 8-1

VG-828 Self Check Mode

After another 5 seconds the buzzer sounds again, and the check item selection screen appears on the LCD display.

Fig. 8-2

Select Item.: 0 (0-7) Key Check

8･3･2 Selecting the Check Items

Using the [0] to [7] number keys, select the items to be checked on the check item selection screen described above.

[0]	Key Check	For checking the keys and LEDs on the VG-828's operation panel.
[1]	RAM Check	For checking the graphic RAM (8-bit VRAM).
[2]	Mem-Card Check	For checking the memory card.
[3]	Panel-ROM Check	For checking the panel ROM.
[4]	RS232C(LoopBack)	For checking the RS-232C loopback.
[6]	Flash-ROM Check	For checking the internal flash ROM.
[7]	Flash-ROM Init.	For initializing the internal flash ROM.

8•3•3 Key Check

(1) Selecting the check item

Fig. 8-3

```
Select Item.: 0 (0-7)
Key Check
```

<<Key operations>> [0] (SET)

(2) Initial display

Fig. 8-4

```
Key Check (ESC=end)
Push Any Key
```

(3) Checking the keys

When each key from (CHARA) to [▼▼] is pressed, the pressed key is displayed on the bottom line of the LCD.

When (ESC) is pressed, the key check is completed, and the check item selection screen is restored.

8•3•4 RAM Check

(1) Selecting the check item

Fig. 8-4

```
Select Item.: 1 (0-7)
RAM Check
```

<<Key operations>> [1] (SET)

(2) Checking the RAM

When the (SET) key is pressed in (1), the RAM check is commenced in the following sequence.

<1> Graphic RAM write

Fig. 8-6

```
GRAPH-E RAM Write
ADR=aaaaaaaa W=wwwwwwww
```

aaaaaaaa = write address
wwwwwwww = write data (hexadecimal display)

<2> Graphic RAM verify

Fig. 8-7

```
GRAPH-E RAM Verify
ADR=aaaaaaaa R=rrrrrrrr
```

aaaaaaaa = read address
rrrrrrrr = read data (hexadecimal display)

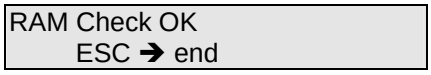
Note:	If an error has been discovered, the error buzzer sounds, the following display appears, and the check is stopped.

Fig. 8-8

aaaaaaaa = read address
rrrrrrrr = read data
wwwwwwww = write data (hexadecimal display)

<3> If no errors at all have been discovered, the following display appears upon completion of the checks, and the check item selection screen is restored three seconds later (or by pressing the ESC key).

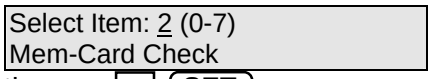
Fig. 8-9



8•3•5 Memory Card Check

(1) Selecting the check item

Fig. 8-10

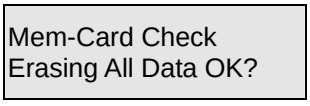


<<Key operations>> **2** **SET**

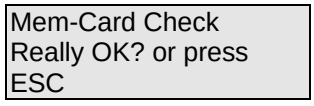
Note:	This check requires a memory card. Install the card properly before proceeding. Bear in mind that all the data on the memory card will be erased when this check is conducted. Once a memory card has been used for this check, it will not be possible to use it to enter the VG-828 data without first formatting it. Use function 4 (Card/ROM Erase) to format the card before re-using it.

(2) Initial display

Fig. 8-11



→ Fig. 8-12



The screen shown in Fig. 8-12 appears when the **SET** key is pressed. When the **SET** key is pressed again, the check is commenced. If the **ESC** key is pressed instead, the check is aborted, and the check item selection screen is restored.

(3) Checking the memory card

When the [SET] key is pressed in (2), the memory card check is commenced in the following sequence.

<1> Memory card write

Fig. 8-13

```
Mem-Card Check : Write
Sector : ss
```

ss = Write sector number

<2> Graphic RAM verify

Fig. 8-14

```
Mem-Card Check : Verify
Sector : ss OK
```

ss = Read sector number

Note:	If an error has been discovered, the error buzzer sounds, the following display appears, and the check is stopped.

Fig. 8-15

```
Mem-Card Check : Verify
adr=ss:aaa R=rr W=ww
```

ss = Read sector number
aaa = address in sector
rr = read data
ww = write data (hexadecimal display)

<3> If no errors at all have been discovered, the following display appears upon completion of the checks, and the check item selection screen is restored three seconds later (or by pressing the ESC key).

Fig. 8-16

```
MemCard Check OK
      ESC ➔ end
```

8•3•6 Panel ROM Check

(1) Selecting the check item

Fig. 8-17

```
Diag:Select NO.: 3 (0-7)
Panel-ROM Check
```

<<Key operations>> **3** **SET**

Note:	This check requires a panel ROM. Install the panel ROM properly before proceeding. Bear in mind that all the data on the panel ROM will be erased when this check is conducted.

(2) Initial display

Fig. 8-18

```
Panel-ROM Check
Erasing All Data OK?
```

→ Fig. 8-19

```
Panel-ROM Check
Really OK? or press ESC
```

The screen shown in Fig. 8-19 appears when the **SET** key is pressed. When the **SET** key is pressed again, the check is commenced. If the **ESC** key is pressed instead, the check is aborted, and the check item selection screen is restored.

(3) Checking the panel ROM

When the **SET** key is pressed in (2), the memory card check is commenced in the following sequence.

<1> Memory card write

Fig. 8-20

```
Panel-ROM Check : Write
Adr : aa
```

aa = Write address

<2> Panel ROM verify

Fig. 8-21

```
Panel-ROM Check : Verify
Adr : aa OK
```

aa = Read address

Note:	If an error has been discovered, the error buzzer sounds, the following display appears, and the check is stopped.

Fig. 8-22

```
Panel-ROM Check : Verify
adr=aaa R=rr W=ww
```

aaa = read address
rr = read data
ww = write data (hexadecimal display)

<3> If no errors at all have been discovered, the following display appears upon completion of the checks, and the check item selection screen is restored three seconds later (or by pressing the ESC key).

Fig. 8-23

```
Panel-ROM Check OK
      ESC ➔ end
```

Note:	The address display appears as shown below when the AH-3000 is used for the panel ROM.

Adr = b : aa
b = bank no.
aa = read address

8•3•7 RS-232C Check

(1) Selecting the check item

Fig. 8-24

```
Diag:Select NO.: 4 (0-7)
RS-232C (LoopBack)
```

<<Key operations>> **4** **SET**

Note:	The connector used for checking is required for this check. Install the connector properly before proceeding.

(2) Starting the check

Fig. 8-25

```
RS-232C Check
OK   : R=rr W=ww
```

rr = read data, ww = write data (hexadecimal display)

Note:	If an error has been discovered, the error buzzer sounds, the following display appears, and the check is stopped.

Fig. 8-26

```
RS-232C Check
ERR : R=rr W=ww
```

* Codes 20H to 7FH are checked.
If no errors at all have been discovered, the following display appears upon completion of the checks, and the check item selection screen is restored three seconds later (or by pressing the ESC key).

Fig. 8-27

```
S-232C Check OK
      ESC ➔ end
```

8•3•8 Internal Flash ROM Check

(1) Selecting the check item

Fig. 8-28

```
Diag:Select NO.: 6 (0-7)
Flash-PROM Check
```

<<Key operations>> **6** **SET**

(2) Initial display

Fig. 8-29

```
Flash-PROM check
Press SET or ESC
```

When the **SET** key is pressed, the check is commenced as follows. If the **ESC** key is pressed instead, the check is aborted, and the check item selection screen is restored.

(3) Checking the internal flash ROM
When the **SET** key is pressed in (2), the internal flash ROM check is commenced in the following sequence.

<1> Internal flash ROM write

Fig. 8-30

```
Flash-PROM Chk : Write
Sector No. : aa
```

aa = write sector number

<2> Internal flash ROM verify

Fig. 8-31

```
Flash-PROM Chk : Verify
Sector No. : aa OK
```

aa = read sector number

Note:	If an error has been discovered, the error buzzer sounds, the following display appears, and the check is stopped.

Fig. 8-32

```
Flash-PROM Chk : Verify
Error Message
```

<2> If no errors at all have been discovered, the following display appears upon completion of the checks, and the check item selection screen is restored three seconds later (or by pressing the ESC key).

Fig. 8-33

```
Flash-PROM Check OK
      ESC ➔ end
```

8•3•9 Internal Flash ROM Initialization

(1) Selecting the check item

Fig. 8-34

```
Select Item        : 7 (0-7)
Flash-PROM Init.
```

<<Key operations>> [7] [SET]

Note:	When these operations are performed, the contents of the internal flash ROM are initialized to the factory setting.

(2) Initial display

Fig. 8-35

```
Flash-PROM Init.
All Data is Erased.   OK?
```

When the [SET] key is pressed, initialization is commenced.
If the [ESC] key is pressed instead, initialization is aborted, and the check item selection screen is restored.

(3) Initializing the internal flash ROM
When the [SET] key is pressed in (2), the initialization of the internal flash ROM check is commenced.
If no errors at all have been discovered, the following display appears upon completion of the checks, and the check item selection screen is restored three seconds later (or by pressing the ESC key).

Fig. 8-36

```
Flash-PROM Init. OK
      ESC ➔ end
```

CHAPTER 9 MAIN SPECIFICATIONS

9･1 Error Messages

Error message	Code (H)	Description
Panel ROM Unsetted	00	The EEPROM has not been installed in the panel ROM socket or the memory card has not been installed.
Prog No Disabled	01	The number of the program which was input was set to "Disable," disabling the attempt to initiate direct display or execute the program concerned.
DotClk over	02	The dot clock in the horizontal timing data is outside the specified range.
Hfp over	03	The front porch in the horizontal timing data is outside the specified range. (Hperiod ≥ Hsync + Hbackp + Hdisp)
HD over	05	HDStart + HDWidth in the horizontal timing data is outside the specified range. (Hperiod ≥ HDstart + HDwidth)
Hperiod over	07	HPeriod in the horizontal timing data is outside the specified range.
Hdisp over	08	Hdisp in the horizontal timing data is outside the specified range.
Hsync over	09	Hsync in the horizontal timing data is outside the specified range.
Hbp over	0A	Hbackp in the horizontal timing data is outside the specified range.
Hblank over	0B	The blanking period in the horizontal timing data is outside the specified range.
Hfreq over	0C	The horizontal frequency in the horizontal timing data is outside the specified range.
H-TIM data NG	0D	Error other than those described above in the horizontal timing data.
OUTPUT data error	10	Error in the output condition data.
CHR data error	11	Error in the character pattern data.
CROSS data error	12	Error in the crosshatch pattern data.
DOTS data error	13	Error in the dot pattern data.
CRCL data error	14	Error in the circle pattern data.
BRST data error	15	Error in the burst pattern data.
WIND data error	16	Error in the window pattern data.
COLBAR data error	17	Error in the color bar pattern data.
PARAMETER error	18	Error in a parameter in the terminal mode.
DATA error	19	Error in the data in the terminal mode.
SYNC data error	1A	The sync signal has not been supplied.
COMM. Timeout	1E	Time-out has occurred during communication in the terminal mode.
Undef Command	1F	An undefined command was received in the terminal mode.

Error message	Code (H)	Description
V-Sync Timeout	20	Time-out has occurred during V sync interrupt wait.
Prog-NO error	21	Error in the program number.
Group-NO error	22	Error in the group number.
User-CHR code error	23	Error in a user character code.
EEPROM write error	24	An EEPROM write error has occurred.
M-Card Type error	25	The memory card is not the correct type.
M-Card Write error	26	A memory card write error has occurred.
M-Card W-Protected	27	The memory card has been set to the write protect status.
M-Card Not Set	28	The memory card has not been installed.
M-Card UnFormated	29	The memory card has not been formatted.
M-Card Full	2A	There is no free space on the memory card.
OPT PTN No error	2B	Error in the optional pattern number.
OPT PTN FAT error	2C	Error in user-generated optional pattern FAT.
OPT PTN Not Registed	2D	The user-generated optional pattern has not been entered.
BMP data No error	2E	Error in the image data number.
BMP data FAT error	2F	Error in image data FAT.
BMP data Not Registed	30	Image data has not been entered.
Cur-DEV Incorrect	31	Illegal current data device (memory card or EEPROM).
Key Not Available	32	The function cannot be used because the key lock function is activated.
CURSOR Not Selected	33	The cursor pattern has not been selected (when CurTool is used).
OPT-0E(DDC) Disabled	34	The DDC option data (#OE) is invalid.
Flash ROM write error	35	A flash ROM write error has occurred.
GRAY data error	38	Error in gray scale pattern data.
OPT-PTN data error	39	Error in optional pattern data.
HALFTONE data error	3A	Error in half-tone pattern data.
CURSOR data error	3B	Error in cursor pattern data.
PrgName data error	3C	Error in program name data.
GCOLOR data error	3D	Error in graphic color data.

Error message	Code (H)	Description
Vtotal over	40	Vtotal in the vertical timing data is outside the specified range.
Vdisp over	41	Vdisp in the vertical timing data is outside the specified range.
Vsync over	42	Vsync in the vertical timing data is outside the specified range.
Vbp over	43	Vbackp in the vertical timing data is outside the specified range.
Vfp over	44	The front porch in the vertical timing data is outside the specified range. (Vtotal ≥ Vsync + Vbackp + Vdisp)
Vblank over	45	The blanking period in the vertical timing data is outside the specified range.
Vfreq over	46	The vertical frequency in the vertical timing data is outside the specified range.
VD over	47	VDStart + VDline in the vertical timing data is outside the specified range. (Vtotal ≥ VDstart + VDline)
EQPfp over	48	EQPfp in the vertical timing data is outside the specified range.
EQPbp over	49	EQPbp in the vertical timing data is outside the specified range.
V-TIM data NG	4A	Error other than those described above in the vertical timing data.
DDC1 Timeout	4B	A timeout occurred at DDC1.
DDC1 ACK error	4C	ACK could not be received at DDC1.
DDC2 ACK error	4E	ACK could not be received at DDC2.

Listed below are the errors which may occur when user-generated optional patterns are executed.

Error message	Code (H)	Description
OPT-Prog. not Exist	81	No user-generated optional patterns exist.
Variables Stack Err	82	Variable stack error.
Register Stack Err	83	Register stack error.
Call Stack Error	84	Function stack error.
Illegal Instruction	85	Illegal instruction code.
Divide by Zero	86	An attempt was made to divide by zero.
Math Error	87	An error has occurred in a floating decimal point calculation.

9･2 Ratings and Specifications

9･2･1 Specifications

Dot clock frequency	Analog	5.00 to 250.00 MHz
	Digital	Parallel output (TTL, LVTTL) 1/1, 5.0 to 100 MHz Parallel output (TTL, LVTTL) 1/2, 10.0 to 200 MHz Serial output (Panel Link) 1/1, 20.0 to 165 MHz Serial output (Panel Link) 1/2, 40.0 to 260 MHz Serial output (LVDS) 1/1, 20.0 to 86 MHz *1 (Up to 130 MHz supported) Serial output (LVDS) 1/2, 40.0 to 172 MHz *1 (Up to 130 MHz × 2 supported)
Horizontal frequency		10 to 300 KHz, max. 8192 dots
Number of vertical scanning lines		Max. 4096 lines
Video memory		4096 dots × 4096 dots
Video signal output level		0.30 V to 1.00 V
Sync signal (HS, VS, CS) output level		More than 2 V (75 ohms)
Equalizing pulse (EQP)		ON/OFF selectable
Serrated pulse (SERRATION)		OFF/0.5 H/1 H/XOR selectable
Composite video sync signal		ON/OFF selectable each for R/G/B
Scanning		Non-interlace, interlace & sync, interlace & video
Analog output (BNC)		R, G, B, HS, VS, CS
Analog output fine control (trimmer)		Offset level (RGB coupled), video level (RGB separate)
Parallel digital output (CH1, CH2) (half-pitch 68 pins × 2)		8 bits each for RGB; HS, VS, DISP, CLK, SW0, SW1, SW2, SW3 VCC (output level, 5V or 3.3V selectable for VCC)
Serial digital output (CH1, CH2) (MDR 26 pins × 2)		8 bits each for RGB; HS, VS, DISP, CLK, SW0, SW1
Output control	Analog	RGB ON/OFF and inverse HS, VS, CS ON/OFF and negative/positive HD, VD, CLK negative/positive
	Digital	Video data: Polarity reversal, OE function *2 Clock: Polarity reversal, OE function *2 Delay 0 to 31 ns (1 ns increments)
External interface		Remote connector (25-pin)
		RS-232C (9-pin)
		USB (USB standard)

*1: Either Panel Link is LVDS is selected as the factory setting for the serial output.

*2: Even when the output is disabled by OE, a voltage in excess of VCC cannot be applied to the output.

9•2•2 Ratings

Supply voltage	AC 100--120V, AC 200--240V
Power line frequency	50/60 Hz
Power consumption	Max. 200 VA
Dimensions	430 (W) × 88 (H) × 430 (D) mm (excluding protrusions)
Weight	Approx. 10 kg
Ambient operating temperature	+5 to +40 °C
Ambient storage temperature	10 to +60 °C
Humidity	30 to 85% RH (no condensation)

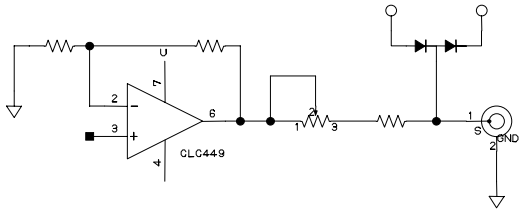
9•3 Accessories

Instruction manual	1
Memory card (4MB)	1
SP-8024 (Windows version editing software program)	1 set
SP-8024 software program installation manual	1
Power cable	1
FG cable (1.5 meters)	1
AC 2P-3P conversion adapter	1
Fuse (slow-blow type, 6.3A, 250V)	2

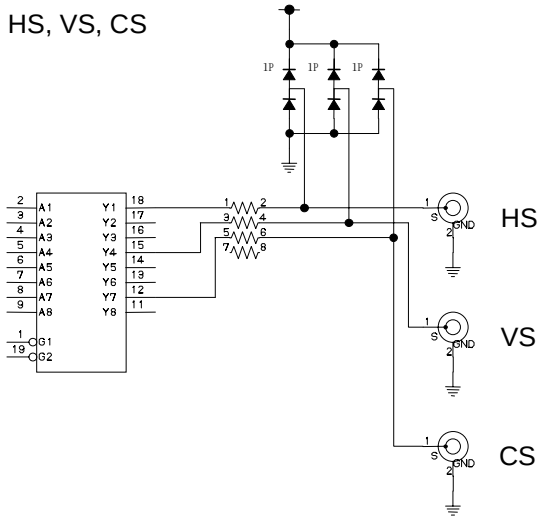
Note:	The above connecting cables are for the exclusive use of the VG-828 only. Use of any other accessories may cause trouble: always use only the designated accessories.

9･4 Output Circuit Diagrams

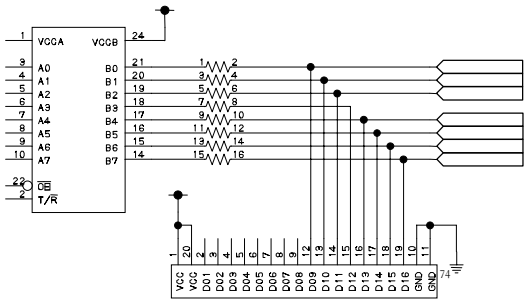
Analog R, G, B



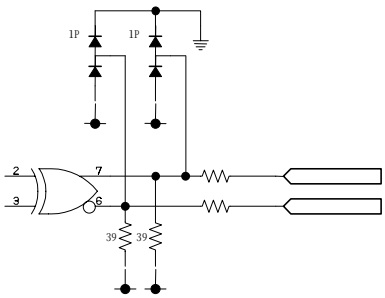
Analog HS, VS, CS



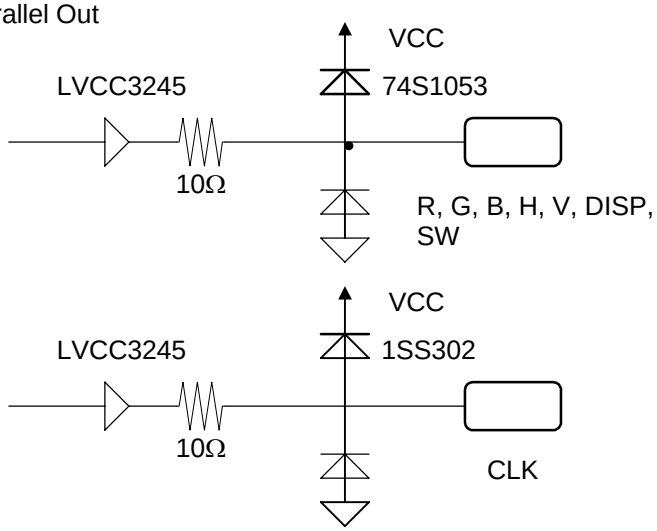
TTL OUT



CLK OUT

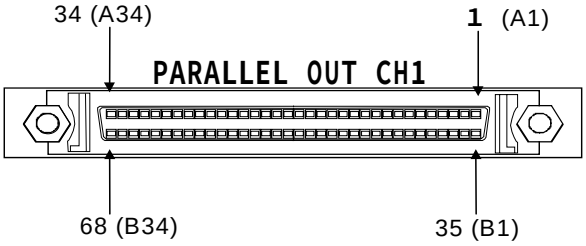


Parallel Out



9･5 Connector Pin Layouts

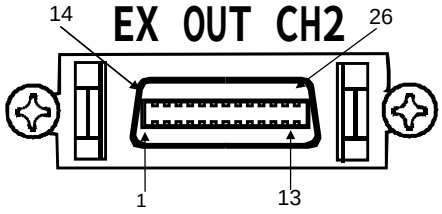
(1) Digital parallel output (half-pitch 68 pins)



1 CH				2 CH			
Pin No.	Signal	Pin No.	Signal	Pin No.	Signal	Pin No.	Signal
1	(GND)	35	RA0	1	(GND)	35	RB0
2	(GND)	36	RA1	2	(GND)	36	RB1
3	(GND)	37	RA2	3	(GND)	37	RB2
4	(GND)	38	RA3	4	(GND)	38	RB3
5	(GND)	39	RA4	5	(GND)	39	RB4
6	(GND)	40	RA5	6	(GND)	40	RB5
7	(GND)	41	RA6	7	(GND)	41	RB6
8	(GND)	42	RA7	8	(GND)	42	RB7
9	(GND)	43	GA0	9	(GND)	43	GB0
10	(GND)	44	GA1	10	(GND)	44	GB1
11	(GND)	45	GA2	11	(GND)	45	GB2
12	(GND)	46	GA3	12	(GND)	46	GB3
13	(GND)	47	GA4	13	(GND)	47	GB4
14	(GND)	48	GA5	14	(GND)	48	GB5
15	(GND)	49	GA6	15	(GND)	49	GB6
16	(GND)	50	GA7	16	(GND)	50	GB7
17	VCC	51	VCC	17	VCC	51	VCC
18	VCC	52	VCC	18	VCC	52	VCC
19	GND	53	GND	19	GND	53	GND
20	GND	54	GND	20	GND	54	GND
21	(GND)	55	HS	21	(GND)	55	(SW3)
22	(GND)	56	VS	22	(GND)	56	(SW2)
23	(GND)	57	DISP	23	(GND)	57	DISP
24	(GND)	58	SW0	24	(GND)	58	SW1
25	(GND)	59	BA0	25	(GND)	59	BB0
26	(GND)	60	BA1	26	(GND)	60	BB1
27	(GND)	61	BA2	27	(GND)	61	BB2
28	(GND)	62	BA3	28	(GND)	62	BB3
29	(GND)	63	BA4	29	(GND)	63	BB4
30	(GND)	64	BA5	30	(GND)	64	BB5
31	(GND)	65	BA6	31	(GND)	65	BB6
32	(GND)	66	BA7	32	(GND)	66	BB7
33	GND	67	GND	33	GND	67	GND
34	(GND)	68	CLK	34	(GND)	68	CLK

Note 1:	0 is the LSB for each bit.
Note 2:	This pin layout is not compatible with the 57 connector used to date. (To derive the most from the characteristics, "1:1" was adopted for GND pins.)

(2) Digital serial output (MDR 26-pin made by 3M)
Output: PANEL LINK or LVDS FPDLINK(TM), FLAT LINK(TM) compatible



Connector pin no.	PANEL LINK transmitter output		LVDS 8-bit transmitter output	
	CH 1 (A)	CH 2 (B)	CH 1 (A)	CH 2 (B)
1	GND	GND	GND	GND
14	TX2+	TX2+	TxOUT/RxIN0–	TxOUT/RxIN0–
2	TX2G	TX2G	TxOUT/RxIN0G	TxOUT/RxIN0G
15	TX2–	TX2–	TxOUT/RxIN0+	TxOUT/RxIN0+
3	NC	NC	NC	NC
16	GND	GND	GND	GND
4	TX1+	TX1+	TxOUT/RxIN1–	TxOUT/RxIN1–
17	TX1G	TX1G	TxOUT/RxIN1G	TxOUT/RxIN1G
5	TX1–	TX1–	TxOUT/RxIN1+	TxOUT/RxIN1+
18	DDCSDA	NC	DDCSDA	NC
6	NC	NC	TxOUT/RxIN2–	TxOUT/RxIN2–
19	NC	NC	TxOUT/RxIN2G	TxOUT/RxIN2G
7	NC	NC	TxOUT/RxIN2+	TxOUT/RxIN2+
20	NC	NC	NC	NC
8	NC	NC	NC	NC
21	NC	NC	NC	NC
9	DDCSCL	NC	DDCSCL	NC
22	TX0+	TX0+	TxCLKOUT/RxCLKIN–	TxCLKOUT/RxCLKIN–
10	TX0G	TX0G	TxCLKOUT/RxCLKING	TxCLKOUT/RxCLKING
23	TX0–	TX0–	TxCLKOUT/RxCLKIN+	TxCLKOUT/RxCLKIN+
11	+5V	+5V	+5V	+5V
24	+5V	+5V	+5V	+5V
12	TXC+	TXC+	TxOUT/RxIN3–	TxOUT/RxIN3–
25	TXCG	TXCG	TxOUT/RxIN3G	TxOUT/RxIN3G
13	TXC–	TXC–	TxOUT/RxIN3+	TxOUT/RxIN3+
26	GND	GND	GND	GND

Note 1:	It is not possible to set the clock delay with the LVDS output.
Note 2:	When signals are to be input to a 6-bit LVDS device, operation is enabled by connecting the TXA0, TXA1, TXA2 and TXACK differential pair lines for CH1. The same applies for CH2.

(3) DFP digital serial output

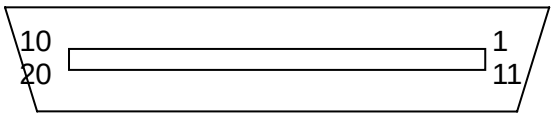
<1> Connector with 20 pins made by HRS

<2> Panel Link output

Pin layout

Connector pin no.	I/O signal
1	TX1+
2	TX1–
3	TX1G
4	TXCG
5	TXC+
6	TXC–
7	GND
8	+5V
9	NC
10	NC
11	TX2+
12	TX2–
13	TX2G
14	TX0G
15	TX0+
16	TX0–
17	NC
18	SENSE
19	DDC DATA
20	DDC CLK

Pin layout as seen from panel



Note: It is not possible to set the clock delay with the PANEL LINK output.
At 1:2, only even data is output.

(4) DVI digital serial output

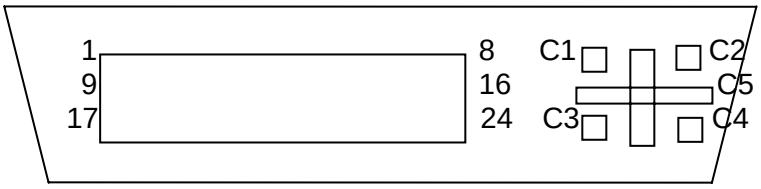
<1> Connector with 24 pins + 5 terminals (analog): DVI-1 (74320-1000) or DVI-D (74320-4000) with 24 pins made by Morex

<2> Panel Link output

Pin layout

Connector pin no.	I/O signal
1	TMDS DATA2–
2	TMDS DATA2+
3	TMDS DATA2/4 G
4	TMDS DATA4–
5	TMDS DATA4+
6	DDC CLK
7	DDC DATA
8	NC
9	TMDS DATA1–
10	TMDS DATA1+
11	TMDS DATA1/3 G
12	TMDS DATA3–
13	TMDS DATA3+
14	+5v
15	GND
16	SENSE
17	TMDS DATA0–
18	TMDS DATA0+
19	TMDS DATA0/5 G
20	TMDS DATA5–
21	TMDS DATA5+
22	TMDS CLK G
23	TMDS CLK+
24	TMDS CLK–

Pin layout as seen from panel



Note: It is not possible to set the clock delay with the PANEL LINK output.

The 1:1 Panel Link signals are output from one connector. At 1:2, only even data is output.

When DVI-1 (74320-1000) is used, analog signals are not output, and analog terminal C5 is connected to GND.

DVI-D (74320-4000) does not have terminals C1 to C5 shown in the above figure.

Pin 14 (+5V) has a maximum amperage of 0.5A.

<1> Panel Link device input pin correspondence table

Panel Link device: Made by Sil

Transmitter: Sil160 (165 MHz supported)

Input pin	Panel Link 8 bits	
	1 CH	2 CH In 1/2 clock mode
D0	BA0 (LSB)	BB0 (LSB)
D1	BA1	BB1
D2	BA2	BB2
D3	BA3	BB3
D4	BA4	BB4
D5	BA5	BB5
D6	BA6	BB65
D7	BA7 (MSB)	BB7 (MSB)
D8	GA0 (LSB)	GB0 (LSB)
D9	GA1	GB1
D10	GA2	GB2
D11	GA3	GB3
D12	GA4	GB4
D13	GA5	GB5
D14	GA6	GB6
D15	GA7 (MSB)	GB7 (MSB)
D16	RA0 (LSB)	RB0 (LSB)
D17	RA1	RB1
D18	RA2	RB2
D19	RA3	RB3
D20	RA4	RB4
D21	RA5	RB5
D22	RA6	RB6
D23	RA7 (MSB)	RB7 (MSB)
DE	DISP	DISP
HSYNC	HS	HS
VSYNC	VS	VS
CTL1	SW0	SW3
CTL2	RSV0	SW2
CTL3	RSV1	SW1

Note 1:	The connections of the CTL signals for this bitmap have been changed from the bitmap of the conventional VG-826A and VG-827. No changes have been made to parts relating to the R, G and B signals.
Note 2:	Bear in mind that the names used for LSB and MSB of R, G and B differ depending on the equipment manufacturer.

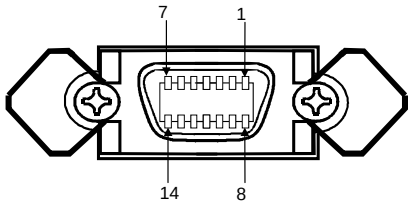
<2> LVDS device input pin correspondence table

LVDS device	NS	THINE
Transmitter	DS90C384	THC63LVDM83A

Input pin		LVDS 8 bits	
THINE	NS	1 CH	2 CH In 1/2 clock mode
T(R)A0	TxIN/RxOUT 0	RA2	RB2
TA1	TxIN/RxOUT 1	RA3	RB3
TA2	TxIN/RxOUT 2	RA4	RB4
TA3	TxIN/RxOUT 3	RA5	RB5
TA4	TxIN/RxOUT 4	RA6	RB6
TA5	TxIN/RxOUT 6	RA7 (MSB)	RB7 (MSB)
TA6	TxIN/RxOUT 7	GA2	GB2
TB0	TxIN/RxOUT 8	GA3	GB3
TB1	TxIN/RxOUT 9	GA4	GB4
TB2	TxIN/RxOUT 12	GA5	GB5
TB3	TxIN/RxOUT 13	GA6	GB6
TB4	TxIN/RxOUT 14	GA7 (MSB)	GB7 (MSB)
TB5	TxIN/RxOUT 15	BA2	BB2
TB6	TxIN/RxOUT 18	BA3	BB3
TC0	TxIN/RxOUT 19	BA4	BB4
TC1	TxIN/RxOUT 20	BA5	BB5
TC2	TxIN/RxOUT 21	BA6	BB6
TC3	TxIN/RxOUT 22	BA7 (MSB)	BB7 (MSB)
TC4	TxIN/RxOUT 24	HS	SW3
TC5	TxIN/RxOUT 25	VS	SW2
TC6	TxIN/RxOUT 26	DISP	DISP
TD0	TxIN/RxOUT 27	RA0 (LSB)	RB0 (LSB)
TD1	TxIN/RxOUT 5	RA1	RB1
TD2	TxIN/RxOUT 10	GA0 (LSB)	GB0 (LSB)
TD3	TxIN/RxOUT 11	GA1	GB1
TD4	TxIN/RxOUT 16	BA0 (LSB)	BB0 (LSB)
TD5	TxIN/RxOUT 17	BA1	BB1
TD6	TxIN/RxOUT 23	SW0	SW1

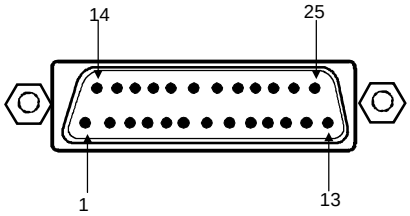
Note 1:	This bitmap has nothing in common with the 8-bit and 6-bit bitmaps of the conventional VG-826A, VG-827 and LV-16000.
Note 2:	Bear in mind that the names used for LSB and MSB of R, G and B differ depending on the equipment manufacturer.
Note 3:	The pin layout is compatible with THINE, NS and TI devices

<3> Clock output (57 connector 14-pin)



Pin No.	Signal	Pin No.	Signal
1	CLK+	8	GND
2	CLK-	9	GND
3	NC	10	GND
4	NC	11	GND
5	NC	12	GND
6	NC	13	GND
7	NC	14	GND

<4> Remote connector (D-sub 25-pin, female)



Pin No.	I/O	Signal	Pin No.	I/O	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	-	GND
9	O	*RMT_RST	22	O	*RMT_CLK
10	O	*RMT_LAT	23	O	+5V
11	-	GND	24	-	GND
12	O	*RMT_DIN	25	O	+5V
13	O	*RMT_EN			

* The pins marked with an asterisk must NOT be connected by the user since they are already used by Astrodesign for control signals.

Note: "I" or "O" is the designation as seen from the VG generator end.

As shown in the figure below, the signals and remote control box (RB-649 or RB-614C: option) key contacts are arranged in the form of a matrix.

Fig. 9-1 RB-649 Key Matrix

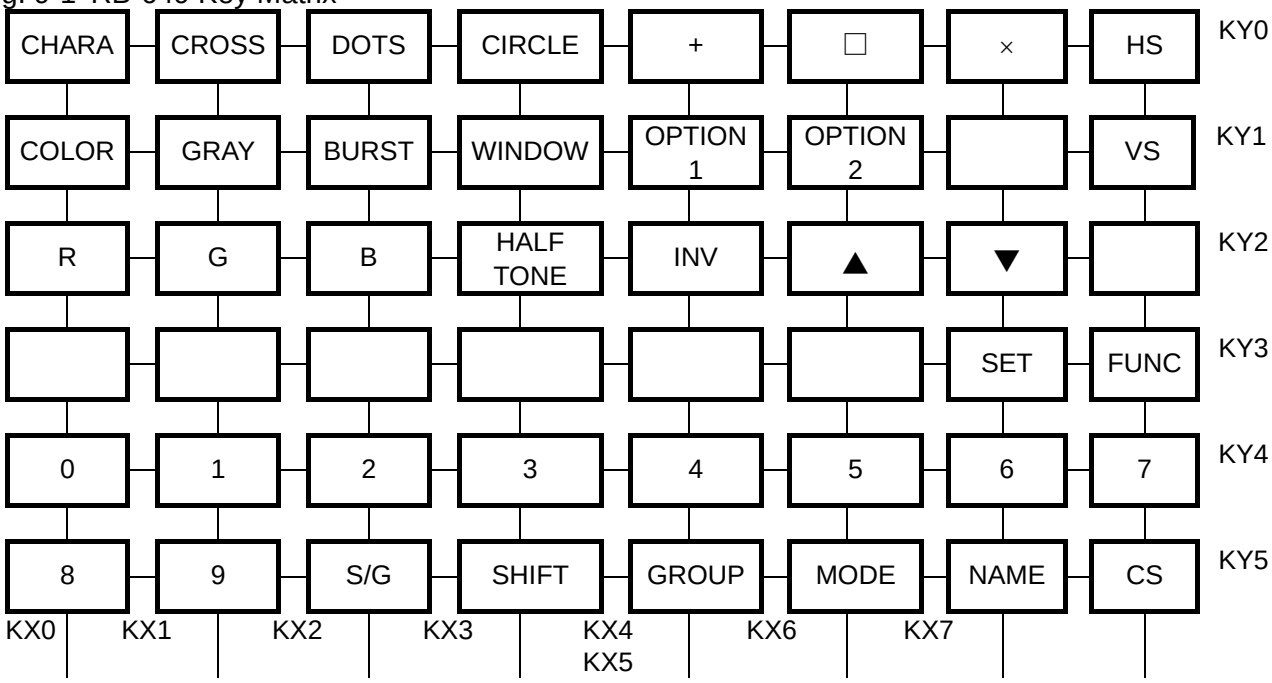
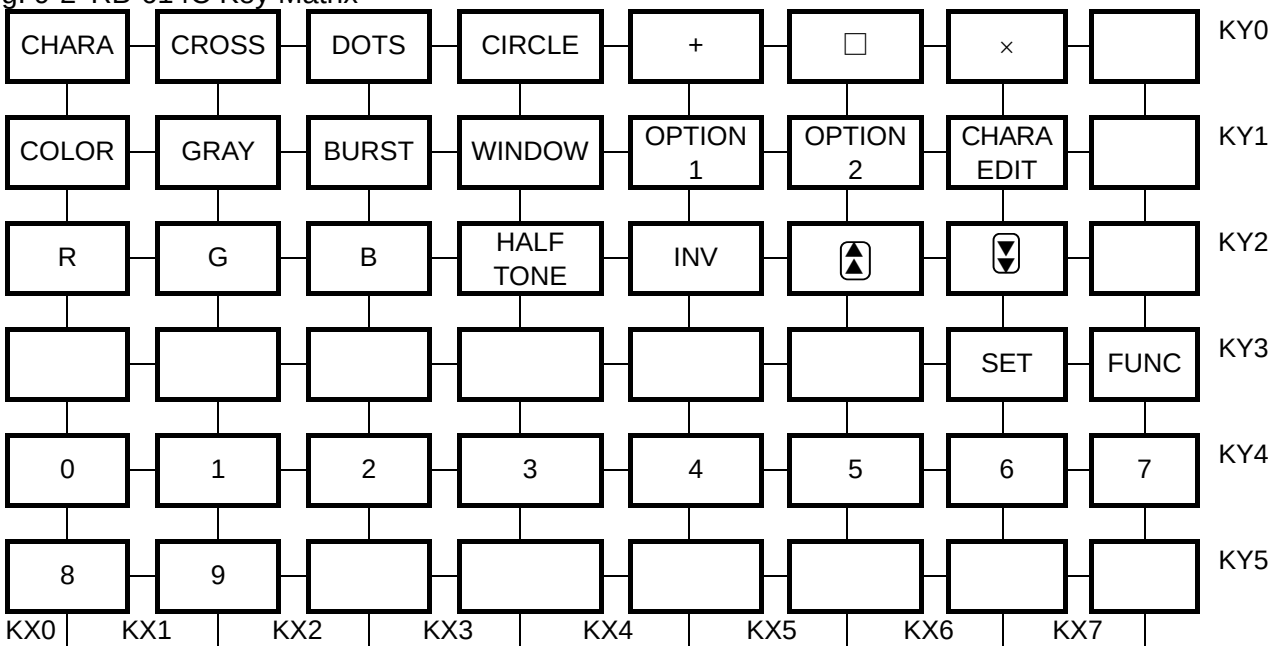
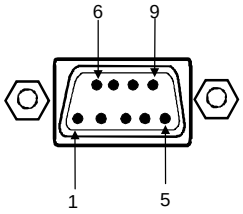


Fig. 9-2 RB-614C Key Matrix



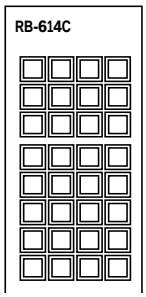
<5> RS-232C connector (D-sub 9-pin, female)



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

9･6 Optional Accessories

<1> RB-614C remote control box

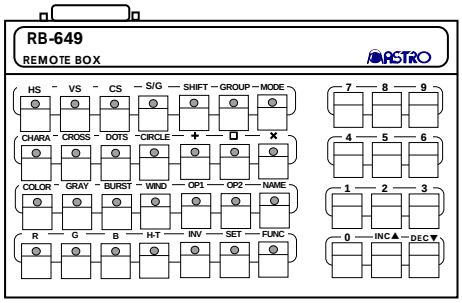


This is one of the remote control boxes used for the VG generator.
Connecting this box to the VG-828 enables a program to be called directly by its number and the character, dot, crosshatch and other patterns as well as the RGB signals to be set ON/OFF.
The box can also be used with the VG-812, 813, 814, 815, 819, 822, 823, 827, 833, 829, 851, 856, 825, 826A and 852.

<2> AH-3000 expansion panel ROM

This has 8 times the capacity of a conventional EEPROM, and it can accommodate the data in up to 320 programs.

<3> RB-649 remote control box



This is another remote control box designed for use with the VG generator.
It can also be used with the VG-822, 823, 827, 826A, 851, 852 and 856.

<4> D connector cable

This cable is used to connect the D connector.

* Internal remodeling is required for VG-828 generators in lots manufactured prior to June 2000.

CHAPTER 10 INTERNAL DATA

10･1 Internal Program Data

Program No.	Horizontal frequency (KHz)	Vertical frequency (Hz)	Dot clock frequency (MHz)	No. of display dots (H×V)	Timing name	Pattern data	Pattern name
850	37.86	85.08	31.50	640×400	VESA400-85	Character list 7x9	Character List
851	37.86	72.81	31.50	640×480	VESA480-72	OPT27 (song of youth)	Words
852	37.50	75.00	31.50	640×480	VESA480-75	Character 1 (H 5×7 / 10×14)	H Character 1
853	35.16	56.25	36.00	800×600	VESA600-56	Character 1 (H 7×9 / 14×18)	H Character 2
854	37.88	60.32	40.00	800×600	VESA600-60	Character 1 (H 16×16 / 32×32)	H Character 3
855	48.08	72.19	50.00	800×600	VESA600-72	Character 2 (H 5×7 / 10×14)	H Character 4
856	48.36	60.00	65.00	1024×768	VESA768-60	Character 2 (H 7×9 / 14×18)	H Character 5
857	56.48	70.07	75.00	1024×768	VESA768-70	Character 2 (H 16×16 / 32×32)	H Character 6
858	60.02	75.03	78.75	1024×768	VESA768-75	Character 1 (@ 7×9 / 14×18)	@ Character
859	79.98	75.02	135.00	1280×1024	VESA1024-75	Character 1 (Chinese character "KU" 7×9 / 14×18)	Chinese Chara 1
860	91.15	85.02	157.50	1280×1024	VESA1024-85	Character 1 (Chinese character "BI" 64×64 / 64×64)	Chinese Chara 2
861	75.00	60.00	162.00	1600×1200	VESA1200-60	Character 1 (Chinese character "AI" 64×64 / 64×64)	Chinese Chara 3
862	81.25	65.00	175.50	1600×1200	VESA1200-65	Character 1 (chessboard 16×16 / 16×16)	1 dot ON/OFF
863	87.50	70.00	189.00	1600×1200	VESA1200-70	Character me (#1 18x18)	me Character 1
864	93.75	75.00	202.50	1600×1200	VESA1200-75	Character me (VESA specifications 18×18)	me Character 2
865	100.00	80.00	216.00	1600×1200	VESA1200-80	OPT0B (character edge H)	H Character Line
866	106.25	85.00	229.50	1600×1200	VESA1200-85	OPT0C (character edge O)	O Character Line
867	98.21	70.05	236.50	1800×1350	VESA1350-70		
868	18.44	49.83	16.26	750×350	MDA	1-dot width crosshatch (H=5, V=5)	1 line Cross 5×5
869	15.75	60.10	14.36	640×200	CGA	2-dot width crosshatch (H=5, V=5)	2 line Cross 5×5
870	21.85	59.71	16.26	640×350	EGA	OPT23 (8-block crosshatch)	1 line Cross 8×8
871	30.48	60.00	24.87	640×400	PGA	2-dot width crosshatch (H=8, V=8)	2 line Cross 8×8
872	31.47	50.03	28.32	720×350	VGA-TEXT350-50	1-dot width crosshatch (H=10, V=8)	1 line Cross 10×8
873	31.47	59.94	28.32	720×350	VGA-TEXT350-60	2-dot width crosshatch (H=10, V=8)	2 line Cross 10×8
874	31.47	70.08	28.32	720×350	VGA-TEXT350-70	1-dot width crosshatch (H=16, V=12)	1 line Cross 16×12
875	31.47	50.03	28.32	720×400	VGA-TEXT400-50	2-dot width crosshatch (H=16, V=12)	2 line Cross 16×12
876	31.47	59.94	28.32	720×400	VGA-TEXT400-60		
877	31.47	70.08	28.32	720×400	VGA-TEXT400-70	Burst (format 0)	Burst 1
878	31.46	50.02	25.17	640×350	VGA350-50	Burst (format 1)	Burst 2
879	31.46	59.93	25.17	640×350	VGA350-60	Burst (format 2)	Burst 3
880	31.46	70.07	25.17	640×350	VGA350-70	Burst (format 3)	Burst 4
881	31.46	50.02	25.17	640×400	VGA400-50		
882	31.46	59.93	25.17	640×400	VGA400-60	OPT10 (sine wave scroll)	Sign Wave Scroll
883	31.46	70.07	25.17	640×400	VGA400-70	OPT11 (multi burst)	Multi Burst
884	31.46	50.02	25.17	640×480	VGA480-50	OPT12 (10 steps & 1/10 MHz)	1/10 MHz × 10step
885	31.46	59.93	25.17	640×480	VGA480-60	Circle (format 0)	Circle 1
886	35.16	57.16	36.00	800×600	S-VGA-56	Circle (format 1)	Circle 2
887	48.08	72.19	50.00	800×600	S-VGA-72	Circle (format 2)	Circle 3
888	46.88	75.00	49.50	800×600	S-VGA-75	Circle (format 3)	Circle 4
889	48.08	59.80	65.00	1024×768	XGA-60	Circle (format 4)	Circle 5

Internal program data

Program No.	Horizontal frequency (KHz)	Vertical frequency (Hz)	Dot clock frequency (MHz)	No. of display dots (H×V)	Timing name	Pattern data	Pattern name
890	53.95	66.11	71.64	1024×768	XGA-66	Circle (format 5)	Circle 6
891	56.48	70.07	75.00	1024×768	XGA-70	Circle (format 6)	Circle 7
892	60.68	57.03	100.00	1280×1024	SXGA-57		
893	63.50	59.68	106.93	1280×1024	SXGA-60A	Window (format 0, flicker 0)	Window 1
894	63.75	59.75	110.16	1280×1024	SXGA-60B	Window (format 1, flicker 0)	Window 2
895	63.72	60.00	109.47	1280×1024	SXGA-60C	Window (format 2, flicker 0)	Window 3
896	78.91	74.16	132.88	1280×1024	SXGA-70	Window (format 3, flicker 0)	Window 4
897	74.63	59.94	160.00	1600×1200	UXGA1200-60	Window (format 4, flicker 0)	Window 5
898	107.42	85.05	220.00	1600×1200	UXGA1200-85A	Window (format 5, flicker 0)	Window 6
899	106.48	85.05	230.00	1600×1200	UXGA1200-85B	Window (format 8, flicker 7)	Moving Window 1
900	107.42	80.05	220.00	1600×1280	UXGA1280-80A	Window (format 9, flicker 7)	Moving Window 2
901	106.48	80.06	230.00	1600×1280	UXGA1280-80B	Window (format E, flicker 7)	Moving Window 3
902	106.40	80.00	238.34	1600×1280	UXGA1280-80C	Window (format F, flicker 0)	Window Level
903	109.82	80.40	246.00	1600×1280	UXGA1280-82	Window (format 0, flicker 1)	Flicker Window 1
904	35.52	43.48	44.90	1024×768	IBM 8514A	Window (format 0, flicker 3)	Flicker Window 2
905	63.36	60.00	89.12	1024×1024	IBM 5080	Window (format 0, flicker 5)	Flicker Window 3
906	29.58	36.57	24.02	640×754	IBM 5550	Window (format 0, flicker 7)	Flicker Window 4
907	63.36	60.00	111.52	1280×1024	IBM 6000		
908	15.71	59.98	6.38	323×246	NAVIGATION	Color bar (horizontal, 8 colors × 1)	Color Bar 1
909	35.00	66.67	30.24	640×480	Mac 480-66A	Color bar (horizontal, 8 colors × 2)	Color Bar 2
910	34.97	66.60	31.33	640×480	Mac 480-66B	Color bar (vertical, 8 colors × 1)	Color Bar 3
911	48.83	66.89	50.00	800×600	Mac 600-66	Color bar (vertical, 8 colors × 2)	Color Bar 4
912	49.72	74.55	57.28	832×624	Mac 624-57	Color bar (horizontal, H=0.1%)	Color Bar 5
913	48.78	59.56	64.00	1024×768	Mac 768-60	Color bar (vertical, V=0.1%)	Color Bar 6
914	60.24	74.93	80.00	1024×768	Mac 768-75	OPT06 (color temperature)	Color Temp.
915	68.68	75.06	100.00	1152×870	Mac 870-75	OPT2D (random 256 colors)	Random 256 Color
916	24.82	56.42	21.05	640×400	NEC PC9801	OPT2A (256-color character)	256 Color Chara
917	32.86	39.92	47.84	1120×750	NEC PC9801XL	OPT00 (256-block color)	256 Block Color
918	50.02	60.05	78.43	1120×750	NEC 768-60A	OPT03 (8 colors & 16 grays)	8 Color & 16 Gray
919	56.48	70.07	75.00	1024×768	NEC 768-70	Gray scale (4 steps)	Gray 4 step
920	64.60	59.93	107.50	1280×1024	NEC 1024-60	Gray scale (horizontal 8 gradations)	Gray 8 step (H)
921	74.88	69.85	127.00	1280×1024	NEC 1024-70	Gray scale (horizontal 16 gradations)	Gray 16 step (H)
922	78.86	74.11	135.00	1280×1024	NEC 1024-75	OPT1B (horizontal 32 gradations of gray)	Gray 32 step (H)
923	48.36	60.08	65.00	1024×768	NEC 768-60B	OPT1C (horizontal 64 gradations of gray)	Gray 64 step (H)
924	61.80	65.95	92.94	1152×900	SUN 900-66	OPT2B (horizontal linear gradation ramp)	Gray 256 step (H)
925	71.73	76.07	105.59	1152×900	SUN 900-76	Gray scale (vertical 8 gradations)	Gray 8 step (V)
926	70.84	84.03	92.94	1024×800	SUN 800-84	Gray scale (vertical 16 gradations)	Gray 16 step (V)
927	81.13	76.11	135.00	1280×1024	SUN 1024-76	OPT36 (vertical 32 gradations of gray)	Gray 32 step (V)
928	63.38	60.02	107.50	1280×1024	SONY NEWS	OPT37 (vertical 64 gradations of gray)	Gra 64 step (V)
929	78.86	74.11	135.00	1280×1024	SONY 1024-74	OPT2C (vertical linear gradation ramp)	Gray 256 step (V)

Internal program data

Program No.	Horizontal frequency (KHz)	Vertical frequency (Hz)	Dot clock frequency (MHz)	No. of display dots (H×V)	Timing name	Pattern data	Pattern name
930	126.84	60.00	357.18	2048×2048	SONY DDM2802	OPT01 (64-gradation block gray)	Gray 64 Block 1
931	48.48	59.64	64.00	1024×768	SGI Indigo768-60	OPT02 (64-gradation block gray)	Gray 64 Block 2
932	77.01	72.38	130.00	1280×1024	SGI Indigo1024-70	OPT34 (circle & crosshatch)	Circle & Cross
933	63.90	60.00	107.35	1280×1024	SGI IRIS4D	OPT0D (crosstalk width 90%)	Cross Talk 90%
934	63.33	59.97	108.17	1280×1024	HP 9000t1	OPT0E (crosstalk width 60%)	Cross Talk 60%
935	78.13	72.00	135.00	1280×1024	HP 9000t2	Black solid	Black
936	54.00	60.00	69.12	1024×864	VAX 768-60	White solid	RGB
937	70.66	66.47	119.84	1280×1024	VAX 1024-66	Red solid	R
938	60.05	75.06	78.78	1024×768	Fujitsu FMV 1024-75	Green solid	G
939	80.66	100.83	108.41	1280×1024	Fujitsu FMV 1024-100	Blue solid	B
940	79.70	74.83	134.37	1280×1024	Fujitsu FMV5166	Magenta solid	R-B
941	80.38	75.12	135.04	1280×1024	Fujitsu FMV5133	Yellow solid	R-G
942	63.74	60.02	108.10	1280×1024	Fujitsu SIGMA	Cyan solid	G-B
943	78.16	71.64	135.06	1280×1024	HITACHI SXGA	Dot (H=20, V=20)	Dot H20 / V20
944	26.35	59.90	22.77	640×400	Panasonic M550	Dot (H=60, V=60)	Dot H60 / V60
945	46.88	75.00	49.50	800×600	VESA600-75	OPT00 (256-block color)	256 Block Color
946	15.73	29.97	12.65	646×484	NTSC	OPT26 (SMPTE color version)	SMPTE RP133 COL
947	31.47	59.95	28.64	746×471	ASTRO SC-2025	OPT26 (SMPTE color version)	SMPTE RP133 COL
948	62.95	59.95	57.28	746×942	NTSC*4	OPT26 (SMPTE color version)	SMPTE RP133 COL
949	15.63	25.00	14.50	756×574	PAL	OPT26 (SMPTE color version)	SMPTE RP133 COL
950	31.25	50.00	29.00	756×557	PAL*2	OPT26 (SMPTE color version)	SMPTE RP133 COL
951	33.75	30.00	74.25	1920×1034	HDTV	OPT26 (SMPTE color version)	SMPTE RP133 COL
952	67.50	60.00	148.50	1920×1035	HDTV*2	OPT26 (SMPTE color version)	SMPTE RP133 COL
953	31.54	60.08	27.00	720×480	480p	OPT34 (circle & crosshatch)	4:3 Test
954	45.00	60.00	74.25	1280×720	720p	OPT34 (circle & crosshatch)	16:9 Test
955	33.75	30.00	74.25	1920×1080	1080i	OPT34 (circle & crosshatch)	16:9 Test
956	31.22	24.99	46.20	1170×1168	MEDICAL-1I	OPT25(SMPTE RP-133)	SMPTE RP133 MONO
957	31.22	50.03	46.20	1170×584	MEDICAL-1N	OPT25(SMPTE RP-133)	SMPTE RP133 MONO
958	30.69	30.00	36.83	947×946	MEDICAL-2I	OPT25(SMPTE RP-133)	SMPTE RP133 MONO
959	30.69	60.07	36.83	947×473	MEDICAL-2N	OPT25(SMPTE RP-133)	SMPTE RP133 MONO
960	37.93	85.04	35.50	720×400	VESA400-88	OPT00 (256-block color)	256 Block Color
961	112.50	90.00	243.00	1600×1200	1200-90	OPT1A (ITC H character)	ITC H Character
962	67.50	60.00	148.50	1920×1080	1080p	OPT18 (ITC 9 window)	ITC 9 Window
963	63.98	60.02	108.00	1280×1024	VESA1024-60	OPT19 (ITC cross & marker)	ITC Cross & Marker
964						OPT04 (gray & crosshatch)	Gray & Cross
965	31.47	59.94	34.24	864×480	W-VGA	OPT05 (color bar & crosshatch)	Color & Cross
966	37.88	60.32	53.94	1072×600	W-SVGA	OPT07 (pairing)	Pairing
967	48.36	60.00	87.44	1376×768	W-XGA	OPT08 (crosshatch & circle & gray)	Cross & Circle
968						OPT09 (crosshatch + circle + character)	Total Test
969						OPT0A (circle & line)	Circle & Line

Internal program data

Program No.	Horizontal frequency (KHz)	Vertical frequency (Hz)	Dot clock frequency (MHz)	No. of display dots (H×V)	Timing name	Pattern data	Pattern name
970	67.50	60.00	148.50	1920×1080	1080P (*3, *p0)	OPT13 (gamma correction ramp wr2.5)	Gamma Ramp 1
971	67.50	59.94	148.35	1920×1080	1080P (*3, *p0)	OPT14 (gamma correction ramp r2.0)	Gamma Ramp 2
972	33.75	30.00	74.25	1920×1080	1080i (*3, *p0)	OPT15 (gamma correction ramp r0.5)	Gamma Ramp 3
973	33.75	29.97	74.18	1920×1080	1080i (*3, *p0)	OPT17(SMPTE RP27.1)	SMPTE PR27.1
974	33.75	30.00	74.25	1920×1035	1035i (*3, *p1)	OPT25(SMPTE RP-133)	SMPTE RP133 MONO
975	33.75	29.97	74.18	1920×1035	1035i (*3, *p1)	OPT26 (SMPTE color version)	SMPTE RP133 COL
976	45.00	60.00	74.25	1280×720	720P (*3, *p0)	OPT1D (64 gray + RGBW color)	64 Gray & Color
977	45.00	59.94	74.18	1280×720	720P (*3, *p0)	OPT1E (gray scale + circle)	Gray & Circle
978	31.50	59.94	27.00	720×483	483P (*3, *p2)	OPT29 (crosshatch & marker)	Cross & Marker
979						OPT30	Edge & Window
980	83.64	60.00	204.75	1792×1344	VESA1344-60	OPT35 (chessboard & window)	1dot ON/OFF
981	106.27	75.00	261.00	1792×1344	VESA1344-75	OPT22 (high-voltage power supply)	High Voltage
982	86.33	60.00	218.25	1856×1392	VESA1392-60	OPT33 (19×15 crosshatch & marker)	D.Y.Test
983	112.50	75.00	288.00	1856×1392	VESA1392-75	OPT32 (3 gradation window)	TTL test
984	90.00	60.00	234.00	1920×1440	VESA1440-60	OPT16 (SMPTE color bar)	SMPTE Color Bar
985	112.50	75.00	297.00	1920×1440	VESA1440-75	OPT32 (timing chart)	Timing Chart
986							
987						Center + edge	Center & Edge
988						Edge + diagonal line	Diagonal & Edge 1
989						Edge + diagonal line + center	Diagonal & Edge 2
990						OPT24 (display position adjustment)	Display Position
991						OPT20 (corner & center)	Corner & Center
992							
993							
994							
995							
996	31.46	59.93	25.17	640×480	VGA480-60	OPT80 (image data #1 display)	IMG Disp #1
997	48.08	72.19	50.00	800×600	VESA600-72	OPT81 (image data #2 display)	IMG Disp #2
998	56.48	70.07	75.00	1024×768	VESA768-70	OPT82 (image data #3 display)	IMG Disp #3
999	79.98	75.02	135.00	1280×1024	VESA1024-75	OPT83 (image data #4 display)	IMG Disp #4

*: Default timing data (VGA) applies where the timing data is blank.
*3: Tri-level sync signal output.
*pN: Color difference table No. = N.

10・2 Internal Optional Patterns

Code	Pattern	Code	Pattern	Code	Pattern	Code	Pattern
00	256 color block color	10	Sine wave scroll	20	Corner & center point marker	30	Center, corner window & edge marker
01	64-gradation block gray (white → black)	11	Multi burst	21	Crosstalk (width 60%)	31	32-gradation gray scale in horizontal direction
02	64-gradation block gray (black → white)	12	10 steps & 1/10 MHz	22	High-voltage power supply	32	3-gradation window
03	8 color bars & 16 gray scale	13	Gamma correction ramp wr=2.5	23	8-block crosshatch	33	19×15 crosshatch & marker
04	Gray scale & crosshatch	14	Gamma correction ramp r=2.0	24	Display position adjuster	34	Crosshatch & circle
05	Color bar & crosshatch	15	Gamma correction ramp r=0.5	25	SMPTE RP-133	35	Chessboard & window
06	Color temperature	16	SMPTE color bar	26	SMPTE color version	36	32-gradation gray scale (V)
07	Pairing	17	SMPTE PR27.1	27	Song of youth	37	64-gradation gray scale (V)
08	Crosshatch & circle & gray	18	ITC pattern 9 windows	28	Timing chart	38	Ramp scroll (H)
09	Crosshatch & circle & character	19	ITC pattern crosshatch & marker	29	Crosshatch & marker	39	Ramp scroll (V)
0A	Circle & line	1A	ITC pattern H character	2A	256-color block color "Color" letters	3A	Ramp scroll (diagonal)
0B	Character edge (H)	1B	32-gradation gray scale (H)	2B	Linear gradation ramp H direction	3B	ANSI pattern (setup)
0C	Character edge (O)	1C	64-gradation gray scale (H)	2C	Linear gradation ramp V direction	3C	ANSI pattern (contrast)
0D	Crosstalk (width 90%)	1D	64-gray + RGBW color bar superimposed	2D	Random 256-color color bar	3D	ANSI pattern (9 point)
0E	DDC data	1E	Gray scale + circle	2E		3E	ANSI pattern (horizontal resolution)
0F		1F		2F	Full color RGBW color bar superimposed	3F	ANSI pattern (vertical resolution)

*: 80H through BFH are image data (#1 to #64) displays.

10・3 Internal User Character Data

Code	Description	Cell size
F0	"me" letters #1	18×18
F1	"me" letters #2 (VESA specifications)	18×18
F2	Chinese character "AI"	64×64
F3	Chinese character "BI"	64×64
F4	Chinese character "TAKA"	32×32
F5	Chinese character "KIRI"	32×32
F6	Chinese character "KEN"	32×32
F7	Burst	64×64
F8		
F9		
FA		
FB		
FC		
FD		
FE		
FF		

10・4 Concerning Color Difference Coefficients

There are 10 color difference coefficient tables.

The contents of each of these tables are shown below.

No.	a	b	c	d	e	f	g	h	i
#0	0.2126	0.7152	0.0722	0.1146	0.3854	0.5000	0.5000	0.4542	0.0458
#1	0.2120	0.7010	0.0870	0.1161	0.3839	0.5000	0.5000	0.4448	0.0552
#2	0.2990	0.5870	0.1140	0.1687	0.3313	0.5000	0.5000	0.4187	0.0813
#3 to 9	Same contents as #0 (not used)								

*: The data given in the tables contains only the above decimal places (×1000).

Correlation with SMPTE

y = a*R + b*G + c*B
pb = –d*R – e*G + f*B
pr = g*R – h*G – i*B

Correlation with SMPTE

#0	SMPTE 274M, 296M, RP-177	1920×1080, 1280×720
#1	SMPTE 240M	Hivision (1920×1035)
#2	SMPTE 293M	720×483

Correlation with VG-828 edit screens

Color difference coefficients can be edited using Func-A of the VG-828.

The correlation between the coefficients and edit screen is shown below.

Y

Y：	a	b	c

Pb, Pr

Pb：	d	e	f
Pr：	g	h	i

CHAPTER 11 CHARACTER CODES

NOTICE

- An incorrectly collated manual or a manual with missing pages will be replaced.
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- The contents of this manual are subject to change without prior notice due to improvements.
- The manufacturer will not be liable for any effects caused by the incorrect operation of this generator.
- All inquiries concerning this product should be addressed to your dealer or to the manufacturer at the contact numbers given below.
- The products and product names mentioned in this manual are the trademarks and registered trademarks of the companies concerned.

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