VIDEO SIGNAL GENERATOR

VG-826A

Instruction Manual

Part I

Ver. 1.1

July 14, 1997

## Astrodesign, Inc.

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FOREWORD

Thank you for purchasing the model VG-826A video signal generator.

This manual provides details on how to operate the VG-826A and the precautions to take when doing so.

Since improper handling may lead to accidents, we recommend that you take the time to read through this manual before attempting to operate the VG-826A: the information provided will ensure that you will operate the VG-826A properly.

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

SAFETY PRECAUTIONS
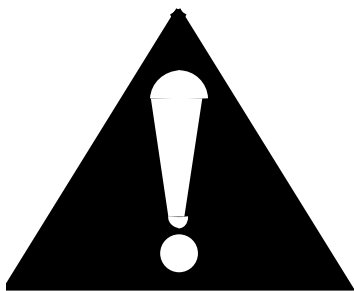
WARN

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.

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⚠ CAUTIO

(1) Concerning the installation and operating locations

● Install the generator in a stable location.

● Choose an operating location which is properly ventilated. The ventilation holes in the sides and fan are designed to prevent the interior temperature from rising. Do NOT block them since this may cause malfunctioning.

(2) Concerning impact

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

(3) Concerning the supply voltage

● A supply voltage ranging from 100V to 240V can be used with the VG-826A.

CHAPTER 1 INTRODUCTION

1-1 Introduction

The VG-826A video signal generator comes with RGB digital parallel output (up to 8 bits; output level 5V/3.3V switchable) and low-voltage digital serial output (LVDS or panel link) to deliver input signals regardless of the type of display device used whether LCD or PDP.   It delivers reliable video signals with a setting accuracy of 1-dot increments.   Since it is compatible with existing programmable video signal generators, the VG-826A can be put to use simply by plugging in the panel ROMs currently employed by the user.

By using the generator with the optional RB-649 remote control box, program data can be edited and entered using on-screen menus.   Finally, the generator can be used in an extremely wide spectrum of applications ranging from technical development to production lines and maintenance of video-related equipment.

1-2 Features

(1) High cost performance

The unit has a gate array design which achieves a compact size, light weight, low cost and reduced power consumption despite its abundant output operations.   Since the 1/2 clock mode (parallel output of 2-dot even/odd data using 1 clock) is provided for the digital outputs, the unit can support dot clock frequencies ranging from 5 to 75 MHz (1/1 clock mode) or 10 to 150 MHz (1/2 clock mode) while XGA (1/1) and SXGA (1/2) output is also possible.

(2) Data compatibility with other models

The unit enables panel ROMs whose data has been set and entered by models in the existing VG series to be used, and the output patterns are also common to all the models in the series.

(3) On-screen menu entry function

Using the RB-649 optional remote control box, menus can be shown on the display of any of the timings, and program data can be edited and entered into panel ROMs.

(4) Sync signal ON/OFF function

By using the optional RB-649 remote control box, the sync signals (HS, VS, CS) can be turned ON or OFF manually.   This enables the simulation of power-saving functions complying with VESA and DPMS standards.   (Switching is also possible by entering data into an existing panel ROM.)

(5) Single-action switching function

A high-speed CPU and other original circuit design features yield high-speed switching in order to reduce the time taken for pattern switching.

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(6) Low-voltage digital serial output facility

A low-voltage digital serial output facility is provided to reduce electromagnetic interference (EMI) when signals are transmitted.   LVDS 6 bits, LVDS 8 bits or panel link can be selected.   (This feature is scheduled to be supported after the sale of mass-produced devices has commenced.   The output clock capabilities will support the performance of the devices.)

(7) DPMS (power saving) simulation function

By using the RB-649 optional remote control box, the sync signals (HS, VS, CS) can be turned ON or OFF manually.

(8) Coordinate display function

The generator is equipped with a function which uses a cross-shaped cursor to display intersecting coordinates so that coordinates can be specified on the display.   Newly added is a function enabling the color of the cursor and background to be changed.

(9) Graphic functions

Crosshatch, dot patterns, etc. can be drawn by sending graphic commands from an external computer via the RS-232C interface, and this enables the generator to be incorporated into automatic measuring systems.

(10) Full support for a wide range of functions

• The keys on the optional RB-649 remote control box come with LEDs for improved operating ease.

• Both the optional RB-649 and existing RB-614C remote control boxes are supported.

• In addition to the existing panel ROMs (40 programs), EE-PROMs (160 programs) with a capacity four times as great are supported.

• The RS-232C interface enables the VG generator to be controlled by an external computer.

• Auto display function

• Group display function

• Forty types of sample timing data incorporated

1-3   Panel parts and their functions
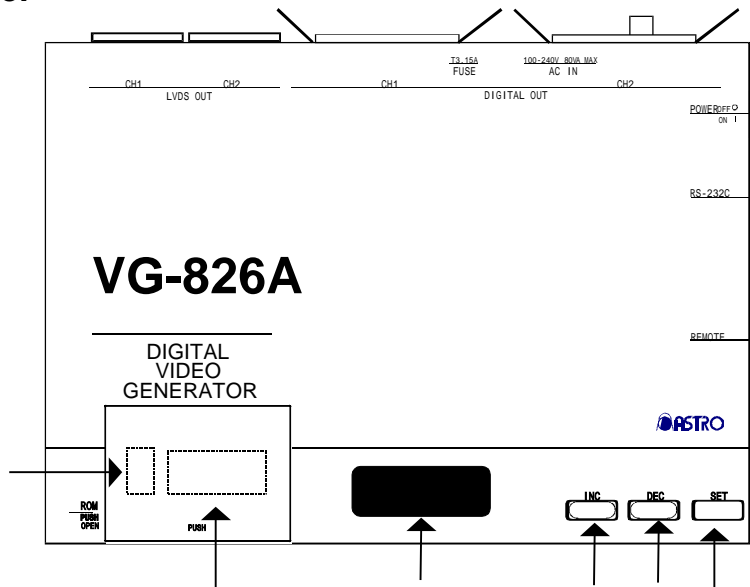
1-3-1   Top panel

Fig. 1-1

INC key

This increments the program number.

DEC key

This decrements the program number.

SET key

This runs the program whose number is displayed and outputs its signals.

LED display

This displays a program number or error code.

Panel ROM socket

Insert the panel ROM (EEPROM or EPROM) in the [1] direction.

* EEPROM: HN58C65P-25 (64Kb, 250ns standard panel ROM) made by Hitachi

HN58C256P-10 (256Kb, 100ns standard panel ROM) made by Hitachi

HN58C256P-20 (256Kb, 200ns) made by Hitachi

＊EPROM: 2764 (64Kb, 250ns) made by different companies

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

DIP switches

●SW1:   This turns the buzzer sound ON or OFF.   The buzzer sounds at ON and is muted at OFF.

●SW2:   This switches between the panel ROM and internal timing.

Note: Refer to Section 3-2-2 ("DIP switch settings") for details on the DIP switch settings.
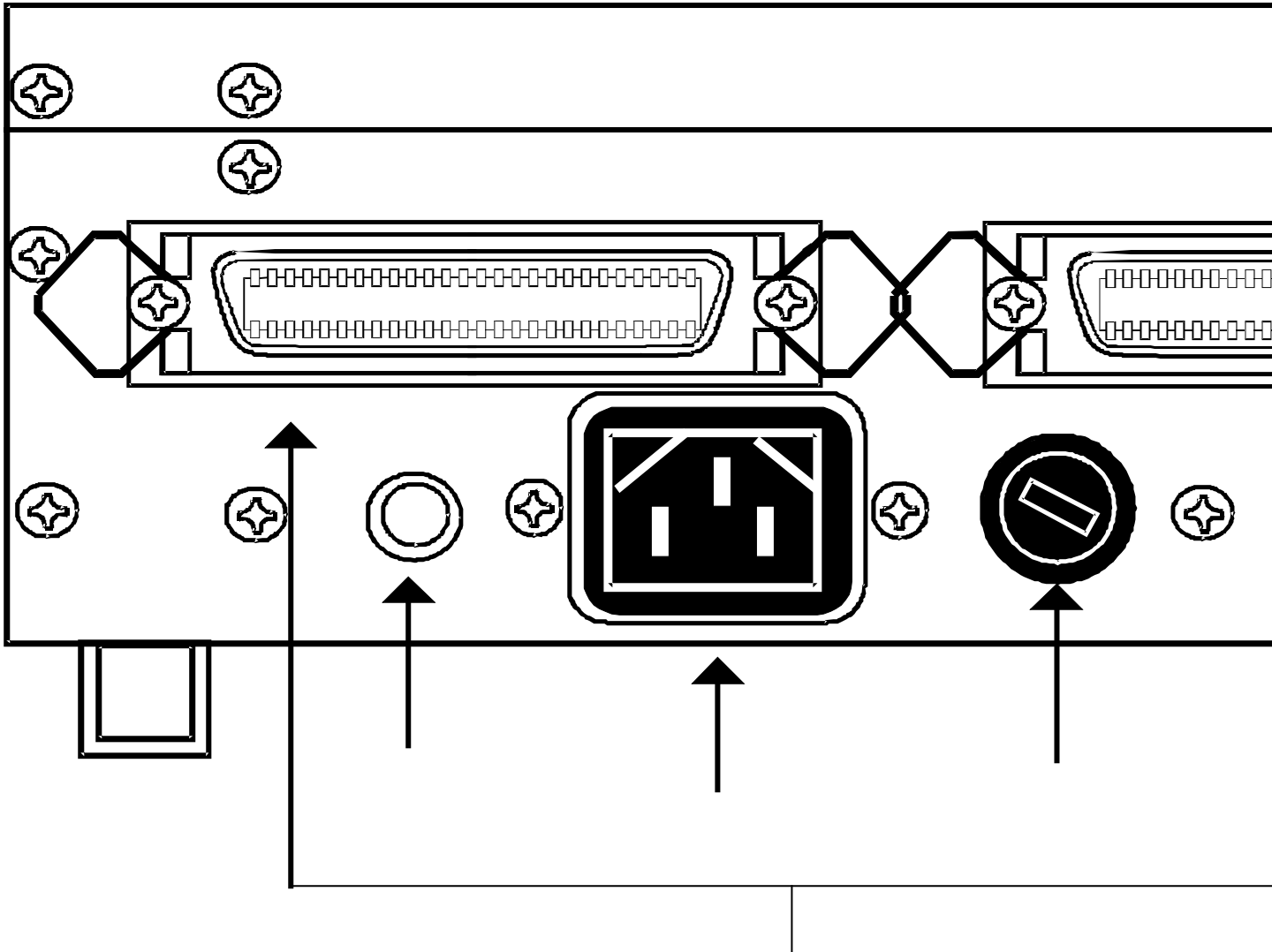
1-3-2   Rear panel

Fig. 1-2

	Frame ground (FG)	This is connected to the frame ground of the unit which is connected to the VG-826A.

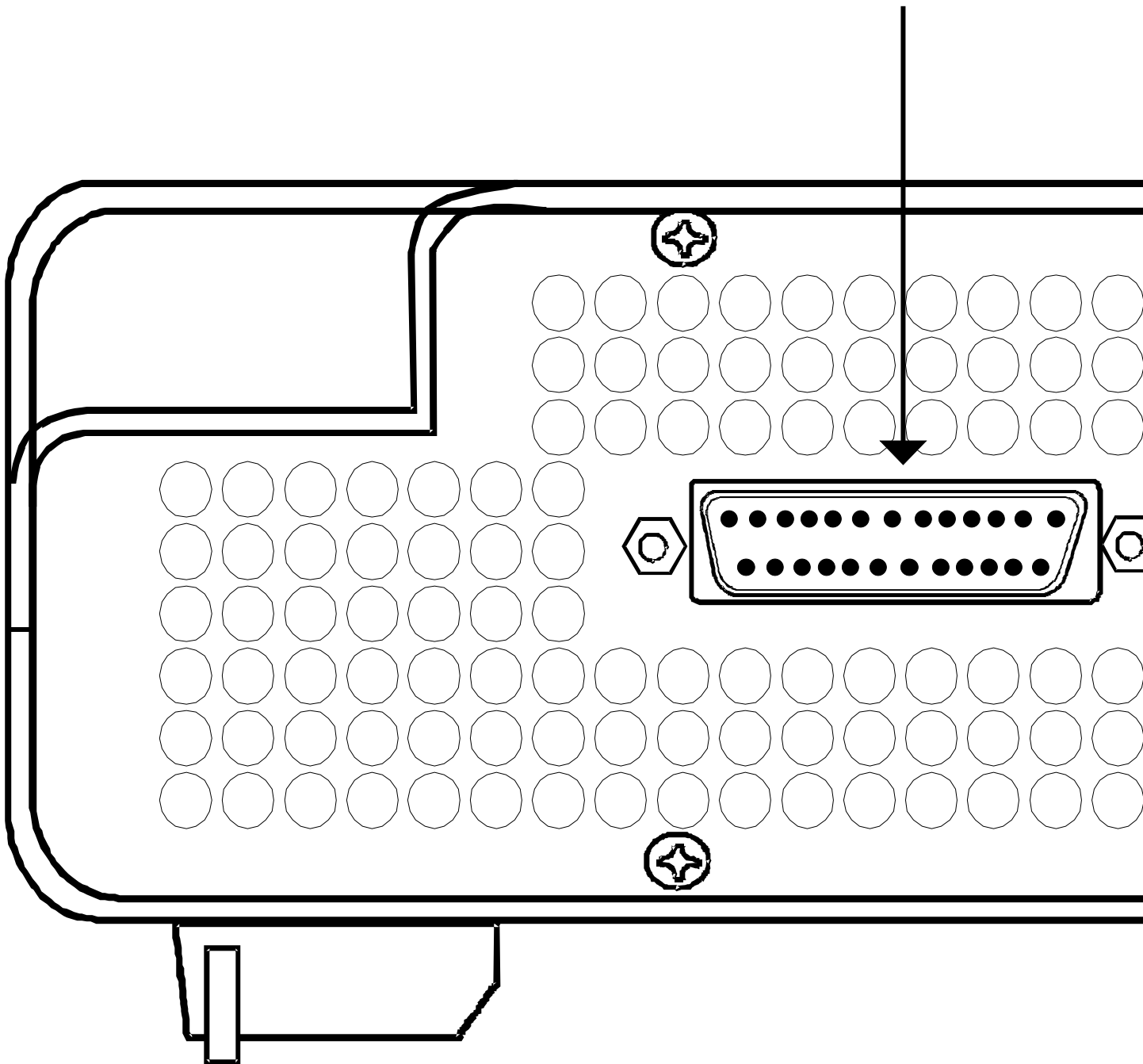|	AC power socket	Any voltage from 100V to 240V can be supplied to this socket.
	Fuse	A 3.15A 250V slow-acting fuse is used.
	TTL output connectors (57 series, 50 pins)	Refer to Section 8-5 ("Connector pin layouts") for the pin layouts.
	Digital serial output (dedicated) connectors (57 series, 26 pins)	Refer to Section 8-5 ("Connector pin layouts") for the pin layouts.

1-3-3   Right side panel

Fig. 1-3

	POWER switch	

	RS-232C connector (9-pin)	This is used to control the VG-826A from an external computer (personal computer, etc.) or the optional operation box (RB-646A). Refer to Section 8-5 ("Connector pin layouts") for the pin layouts.
	Remote connector (25-pin)	This connects the optional remote control box (RB-649, RB-614C) and enables the unit to be operated by remote control. Refer to Section 8-5 ("Connector pin layouts") for the pin layouts.

* The POWER switch on the rear panel must be used to turn on the power of the VG-826A.   Turning on the power by plugging in the AC power cord may damage the panel ROM.

CHAPTER 2   PANEL ROMS

2-1   Workings of the panel ROM

(1)   The VG-826A will not operate without the panel ROM.

The VG-826A operates on the basis of the program data entered in the panel ROM.   When the VG-826A is to be operated, install a panel ROM in which the data has already been entered.   (The panel ROM is not required when using the internal sample program data.)

(2)   How to enter data into the panel ROM

Program data cannot be entered into the panel ROM with the model VG-826A alone.   However, it can be edited and entered by means of the on-screen menu system when the optional remote control box (RB-649) is used.   Panel ROM data can also be prepared using other optional products (such as the RB-646A operation box).

Panel ROMs with data entered for applications involving existing digital models in the VG series (VG-825, 826 or 827) can be used in their original form.   (Refer to the section in Chapter 4 describing the data compatibility with existing models.)

2-2   Panel ROM types and functions

(1)   Types of panel ROMs

The following four types of panel ROMs can be used with the VG-826A.

* EEPROM: HN58C65P-25 (64Kb, 250ns standard panel ROM) made by Hitachi

HN58C256P-10 (256Kb, 100ns standard panel ROM) made by Hitachi

HN58C256P-20 (256Kb, 200ns) made by Hitachi

* EPROM: 2764 (64Kb, 250ns) made by different companies

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

(2)   Panel ROM functions

Table 2-1

	HN58C65P	HN58C256P	AH 3000	2764
Write data using RB-649, RB-646A				× (*1)
Read data using RB-649, RB-646A				
Read data using VG-826A				
Number of programs which can be entered	40	160	320	40
Number of user characters which can be entered	4	8	15	4
Number of groups which can be entered	2	40	8	2

*1 Since data cannot be written into the 2764 (EPROM) with the VG series, use the HN58C65P-25 as the master to write the data with a ROM writer.

2-3   Precautions for using AH-3000

- **Number of digits used for program numbers**

The AH-3000 (expansion panel ROM: option) has a capacity which enables 320 programs to be entered. It is divided into 1) an area equivalent to 40 programs of the conventional panel ROM and 2) an expansion area equivalent to the remaining 280 of the 320 programs. For the program numbers applying when the AH-3000 is installed as the panel ROM, enter two digits for program numbers 01 to 40 in exactly the same way as for the existing panel ROM.

Since the program numbers in the expansion area extend from 500 to 779, use three digits to assign them.

2-4   Precautions for using the HN58C256P panel ROM

- **Number of digits used for 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 conventional panel ROM and 2) an expansion area equivalent to the remaining 120 of the 160 programs.   For the program numbers applying when the HN58C256P is installed as the panel ROM, enter two digits for program numbers 01 to 40 in exactly the same way as for the existing panel ROM.

Since the program numbers in the expansion area extend in 3 blocks from 501 to 540, 601 to 640, and 701 to 740, use three digits to assign them.

This panel ROM is used exclusively with the VG-822, 823, 827 and 826A.

Due to differences in access speed, the data cannot be written on or read from the HN58C256P panel ROM with models other than the VG-822, 823, 827 and 826A.   Although the panel ROM may work with other models, do not use it since its operation cannot be guaranteed.

Note: Due to the fact that no EPROM supporting the HN58C256P is currently being marketed, the data in the HN58C256P cannot be copied onto an EPROM for use .

CHAPTER 3   SOFTWARE CONFIGURATION AND OPERATION

3-1   Software configuration

The VG-826A system consists of the following functions and modes.

(1) Direct display function
This function selects the program, sets the timings and outputs the patterns when the ⟦SET⟧ key is pressed after the target program number has been selected using the ⟦INC⟧ and ⟦DEC⟧ keys.   It is used for adjustments and inspections on production lines, etc.

(2) Auto display function
This runs the programs automatically in accordance with the interval time and start and end program numbers which have been entered in the panel ROM.
It is used for demonstrations, aging, etc.

(3) Self-diagnosis mode
This function checks the devices of the VG-826A.   It can check the LEDs, RAMs, panel ROM and clock generation circuit.   Use it to check out these devices when trouble has occurred in the operation of the signal generator.   (Refer to Chapter 7 for more details on the self-diagnosis mode.)

(4) Terminal mode
This function controls the VG-826A from a personal computer or other external computer.   The commands and data are transferred through the serial I/O port (RS-232C).   For details on the terminal mode operation method, refer to the Instruction Manuals of the units concerned.

3-2   Operations before switching on the power

3-2-1   Installing the panel ROM and connecting the optional units

(1) Connect the generator to the display on which the generator's output signals are to be indicated.   (With some displays, there may be problems if the timings and signals are not as specified.)

(2) Open the cover of the panel ROM socket area, and install the panel ROM containing the data prepared by the RB-646A, VG-825, etc.
To secure the panel ROM in the ROM socket, raise the lever, install the panel ROM (watch for correct direction), and then pull the lever down flat.

(3)   To use the remote control box (RB-649 or RB-614C, option), connect it to the REMOTE connector.

3-2-2   DIP switch settings

- When the generator is shipped from the manufacturing plant, all the DIP switches are set to ON (as indicated by the shading in Table 3-1).
- To change a setting, be absolutely sure to turn off the power, then perform the setting as per the table below, and then turn the power back on again.   (DIP switch settings changed after the power has been turned on will not be recognized.)

Table 3-1

SW No.	Function	ON/OFF operation	
SW1	Selection of buzzer tone	ON	: Buzzer is sounded.
		OFF	: Buzzer is muted.
SW2	Selection of panel ROM or internal timing	ON	: Panel ROM executed
		OFF	: Internal timing executed
SW3	Selection of horizontal timing setting accuracy	ON	: Horizontal timing set in 1-dot increments
		OFF	: Setting accuracy changes *1
SW4	Selection of key lock *2	ON	: Mode not used
		OFF	: Mode established
SW5	Pattern high-speed switching	ON	: Mode not used
		OFF	: Mode established
SW6	Program high-speed switching	ON	: Mode not used
		OFF	: Mode established
SW7	Selection of polarity when HS, VS, CS are OFF	ON	: Low
		OFF	: Hi
SW8	Not used		

Note 1:   If SW5 is set to OFF when the remote control box (RB-649 or RB-614C: option) is used, patterns can be selected in a single-action operation using the direct display function or group display function (see functions which can be used with the RB-614C in Chapter 5).

(However, a multiple number of patterns cannot be displayed simultaneously, and some of the optional patterns cannot be displayed.)

*1 When SW3 is set to OFF, the horizontal timing dot setting accuracy changes.

SW8 ON (VG-826 setting accuracy)	
Dot clock (MHz)	Setting accuracy
5.00 150.00	4 dots

*2 Selecting the key lock function places restrictions on the functions which can be performed by RB-614C or RB-649.

With both the RB-614C and RB-649, only function 7 (group display) can be executed.

3-3   Operation of functions

3-3-1   Direct display function

This executes the timing and pattern data entered in the panel ROM when the user simply inputs the program number.
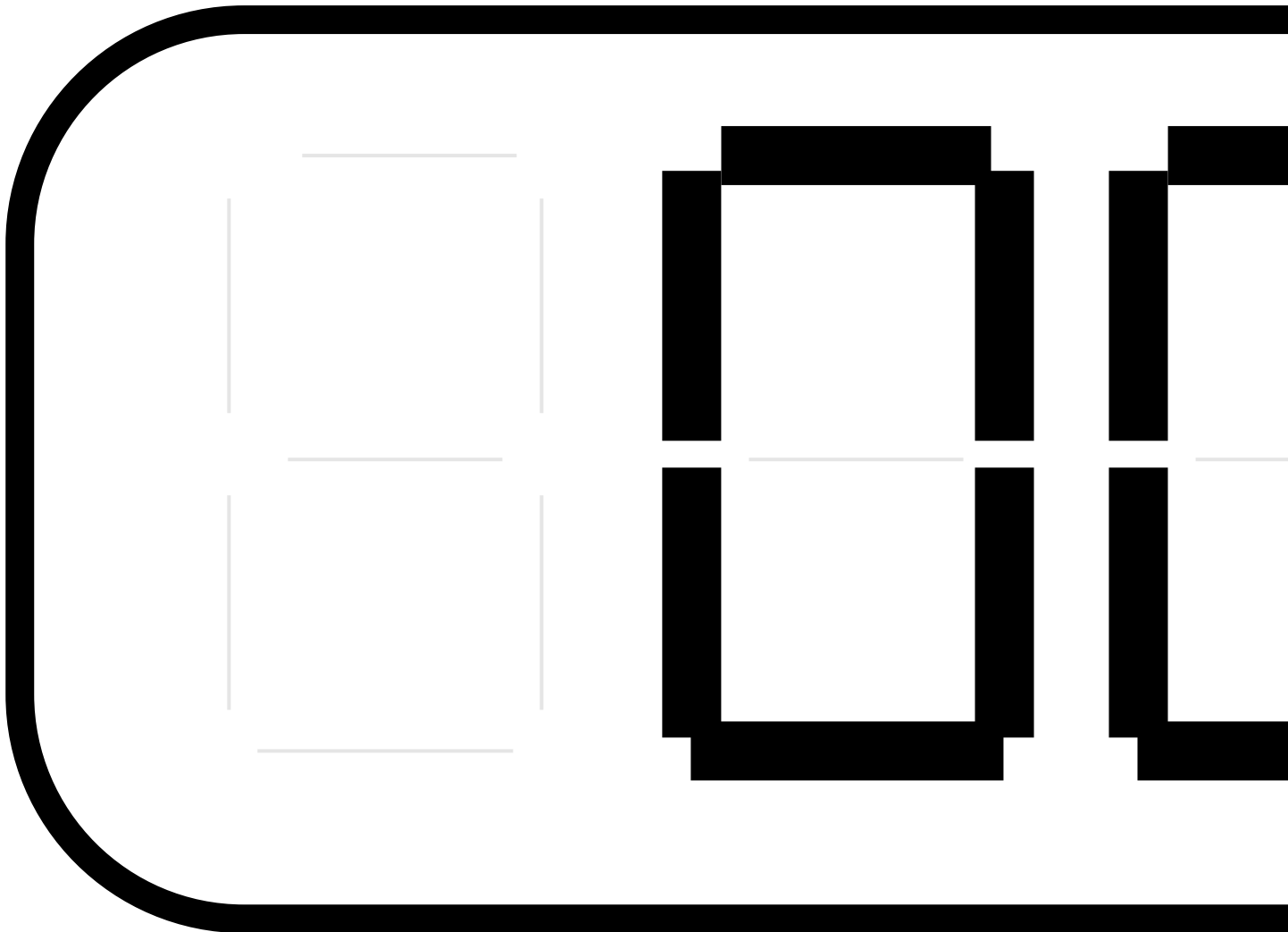
(1)   To initiate this function

To initiate the direct display function, set the power switch on the side panel to ON without pressing any of the keys.

*Turning on the power by plugging in the AC power cord may damage the panel ROM.

(2)   LED initial display

When the power is turned on, program number "001" appears on the display as shown in Fig. 3-7.

Fig. 3-7

(3) Key operations

    |INC|:   Increments the program number by 1.

    |DEC|:   Decrements the program number by 1.

    |SET|:   Executes the program corresponding to the number selected, and outputs the signals.

      First, select the target program number by pressing the |INC| or |DEC| key while monitoring the

      LED display.

      When the |SET| key is pressed after the above step, the signals are output.

< Description >

    • The pattern which is output here is the one entered in the pattern select data (see Note) when the
      panel ROM data was prepared.

    • When the power is turned on, no signals are output from the signal generator.

    • The signals which are output when the |SET| key is pressed continue to be output until the

$\boxed{\text{SET}}$ is next pressed even if the program number is changed using the $\boxed{\text{INC}}$ or $\boxed{\text{DEC}}$ key in the meantime.

• If the remote control box (RB-649 or RB-614C, option) or operation box (RB-646A, option) is used, another pattern entered in the same program number can be selected and displayed or the program number can be selected simply by inputting its 2-digit program number. (The $\boxed{\text{INC}}$, $\boxed{\text{DEC}}$ and $\boxed{\text{SET}}$ keys need not be operated.)

Note: This data assigns the pattern from among the many patterns entered in one program, which is to be displayed using the direct display function or auto display function.

If the data entered in the selected program contains an error, the error buzzer will sound when the $\boxed{\text{SET}}$ key is pressed, and an error message will appear on the LED.

Errors are described in Section 8-1 ("Error messages").

3-3-2   Auto display function

This executes auto display in accordance with the auto display data entered in the panel ROM.
(Auto display data: sequence of numbers of programs to be displayed, interval durations for switching between the programs)

(1) To initiate this function

To initiate the auto display function, turn on the power while keeping the $\boxed{\text{SET}}$ key depressed.   The auto display function is started immediately.

Note 1:   When the program data to be displayed using this function contains an error, the error buzzer will sound, the program concerned will be skipped, and the program with the next program number will be executed.

Note 2:   When no auto display data has been set, the error buzzer will sound and operation will stop. Check the panel ROM data.

(2) To stop the auto display

Turn off the power to stop the auto display.

3-3-3   Using the internal sample timing data

Forty types of typical computer timing data are entered in the VG-826A.   Use them when no panel ROM is installed or when the display timing is unknown.

The internal sample timing data can be used as the copy source when using the copy function described in Section 5-3 ("Panel ROM copy function").

How to use the sample data and what is entered in the VG-826A as the sample data are described below.

(1) How to use the internal sample timing data

Set DIP SW2 on the top panel to OFF, and turn on the power. This establishes the mode for reading the internal sample timing data.

Note: The panel ROM may be kept installed but it is recommended that it be removed in this mode to prevent misoperation.

The steps taken after this mode has been established are the same as for the direct display function: the three keys (**INC** , **DEC** and **SET**) are used to select the program number and run the program.

Note: The **In01** display appears simultaneously with the program number on the LED display during sample timing execution. This enables this mode to be differentiated from the panel ROM mode.

To transfer from this mode to the mode for running the panel ROM programs, first turn off the power. Then set DIP SW2 to ON, and turn the power back on.

Note: When this step is not taken, the panel ROM programs are not run even if the panel ROM has been installed.

(2) Contents of sample timing data

Refer to the list of internal timing data in Section 8-2.

The pattern data in the programs is all exactly identical.

Pattern select data:

• Programs No.01 to 40 ... SMPTE standards complied with

Note 1: Other patterns can be selected using the remote control box (RB649 or RB-614C: option) or operation box (RB-646A: option).

CHAPTER 4 DATA COMPATIBILITY WITH EXISTING SIGNAL GENERATORS

This chapter describes the differences between the VG-826A and existing models, and it outlines the precautions to watch when preparing the panel ROM for the VG-826A using an existing model.

4-1 Concerning ROM interchangeability with existing models

Apart from the dot clocks, the VG-826A and existing VG models are designed to be basically compatible, which means that the ROMs of an existing model can be used without modification in the VG-826A.

In this case, however, the differences described below may change some of the setting conditions, and an error may occur. Check the timing data entered into the panel ROM of another model before using that panel ROM in the VG-826A.

4-2 How the VG-826A differs from existing models

The dot clock setting range is from 5.00 to 150.00 MHz.

The horizontal sync timing can be set in 1-dot increments.

The H front porch and H blanking setting ranges differ from those of other models.

4-2-1 Differences between the VG-826A and existing digital models

The basic panel ROM data for the VG-825, 826, 827 and 826A programmable video signal generators for LCD/flat panel displays is compatible. However, the VG-825 was developed as a stand-alone type while the VG-826A 826 and 827 were developed as simple mass-market models: for this reason, compatibility may be lost in some areas due to the restrictions imposed by the devices used. For instance, the patterns which are output by the VG-825 may not be output by the VG-826. In a case like, it may be possible to enable the VG-826 to output the same patterns by changing the setting method.

The patterns which can be output by the VG-826A, 826 and VG-827 can be output by the VG-825 with no problems. Therefore, compatibility in the pattern data can be ensured by preparing the panel ROM which is usable with the VG-826A, 826 and 827.

Item		VG-826A/VG-827	VG-826	VG-825
Program entry		Possible using RB-646A or RB-649	Possible using RB-646 (RB-646A)	Possible using VG-825 only
Dot clock (MHz)		.00 75.00(1/1) 10.00 150.00(1/2)	.00 60.00(1/1) 10.00 120.00(1/2)	.00 120.00(1/1) 10.00 120.00(1/2)
H timing setting accuracy (clock: dot)	In 1/1 clock mode	Entire area: 1-dot increments	Entire area: 4-dot increments	5.00--60.00: 1-dot increments 60.01--120.00: 2-dot increments
	In 1/2 clock mode	Entire area: 2-dot increments		Entire area: 2-dot increments
H interval setting accuracy (clock: dot) for color bar, gray scale and window patterns		Entire area: 4-dot increments	Entire area: 4-dot increments	5.00--60.00: 1-dot increments 60.01--120.00: 2-dot increments
H blanking period (H period--H disp)		More than 72 dots	More than 64 dots	More than 16 dots
H disp interval		More than 38 dots	More than 38 dots	More than 16 dots
H sync interval		More than 12 dots	More than 12 dots	More than 16 dots

4-2-2   Pattern setting methods

The color bar, gray scale and window patterns for the VG-826A 827 and 826 can be set only in 4-dot increments (multiples of 4).   This means that color bars set in 1-dot increments and prepared by the VG-825, for example, may not be output properly without changing some settings.

The pattern setting method is described below using some examples.

(1) Vertical lines in sub-pixel increments

Fig. 4-1

	1 dot					
R	Black	B	Black	G	Black	R
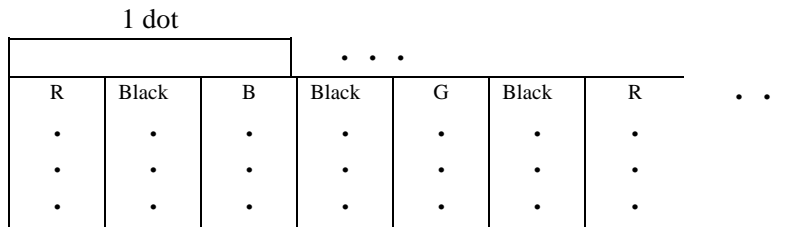
Pattern used   [CROSS] [COLOR (or WINDOW)]

Use function 3 to set Graphic Color as shown in Fig. 4-2.

Fig. 4-2

```
        Graphic Color        BG: OFF
    R: 0          G: 255          B: 0
```

Proceed with the [CROSS] setting as shown in Fig. 4-3.

Fig. 4-3

```
        H interval :    2dot
        V interval :    0dot
```

Proceed with the [COLOR] setting as shown in Fig. 4-4.

Fig. 4-4

%/D : %   H interval :   100.0%
H interval :   100.0%

Set [CO] to [RB].   Any setting is acceptable for direction and C1 — CF.

∗ The [WINDOW] pattern can also be used.   Set the window colors as follows: R=255, G=0, B=255.

[CROSS] and [COLOR] are superimposed on top of each other and displayed by pattern select.
Colors can be reversed by [INV].

(2) Vertical lines in pixel (dot) increments

[CROSS] is the pattern used.
Set Graphic Color, which was set in   of (1), to [255] (standard) in each case.
Set crosshatch as per the setting in   of (1).
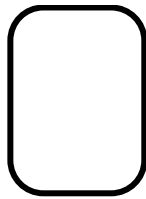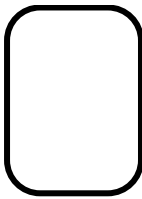Select [CROSS] by pattern select.   Colors can be reversed by [INV].

(3) Vertical lines in increments of 2 white dots

Fig. 4-5

2	2	
Black	Black	White	White	Black	Black

Pattern used   [CHARA]

Use function 3 to set [CHARA] as shown in Fig. 4-6.

Fig. 4-6

Format: 1   Code: 85 [ ]
Font: 7 9   Cell: 8 9

Note: Character codes [80] to [8E] have an 8x9 font size.

Select [CHARA] by pattern select.   Colors can be reversed by [INV].

(4) Checks in sub-pixel increments

Fig. 4-7

1 dot

R	Black	B	Black	G	Black	R
Black	G	Black	R	Black	B	Black

Pattern used   [CHARA] [COLOR (or WINDOW)]

Use function 3 to set Graphic Color as shown in Fig. 4-8.

Fig. 4-8

```
        Graphic Color   BG: OFF
  R: 0              G: 255          B: 0
```

Proceed with the [CHARA] setting as shown in Fig. 4-9.

Fig. 4-9

```
   Format: 1     Code: 80 [ ]
     Font: 7 9   Cell: 8 8
```

Proceed with the [COLOR] setting as shown in Fig. 4-10.

Fig. 4-10

```
   %/D : %   H interval :   100.0%
             H interval :   100.0%
```

Set [CO] to [RB].   Any setting is acceptable for direction and C1 — CF.

* The [WINDOW] pattern can also be used.   Set the window colors as follows: R=255, G=0, B=255.

[CHARA] and [COLOR] are superimposed on top of each other and displayed by pattern select. Colors can be reversed by [INV].

(5) Checks in pixel (dot) increments

[CHARA] is the pattern used.

Set Graphic Color, which was set in   of (4), to [255] (standard) in each case.

Set character as per the setting in   of (4).

Select [CHARA] by pattern select.   Colors can be reversed by [INV].

CHAPTER 5   FUNCTIONS USABLE WITH RB-614C

The functions described below can be executed by connecting the optional RB-614C (remote control box) to the VG-826A and operating it.

5-1   Direct display function
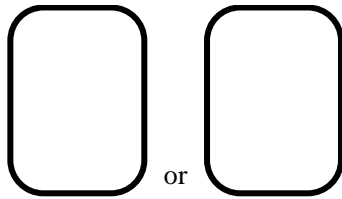
(1) Press the ⬜ or ⬜ key to select the target program number and output the program.

(2) The program can be output (with no need to operate the $\boxed{\text{SET}}$ key) simply by designating its 2-digit program number.

When the $\boxed{\text{SET}}$ key is pressed with the program already output, the program name (No., name, horizontal and vertical frequencies) display at the top left of the screen can be turned ON or OFF.
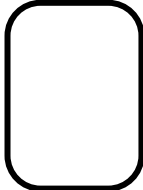
5-2   Group display function

(1) Group data

Whereas with direct display the programs are run in numerical sequence such as 01 => 02 => 03 and so on or 01 => 40 => 39 and so on by incrementing or decrementing the numbers (using the ⬜
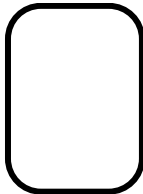
or ⬜ key), with group display the programs are run in the sequence in which the program numbers were entered (group data) using the group data edit function.

This means that, by the use of group data, the sequence in which the programs are to be used can be assigned without changing the sequence in which the program numbers were entered in the panel ROM. The group data can be entered using the optional remote control box (RB-649) or the optional operation box (RB-646A).

(2) To activate this function

When the panel ROM containing the group data is installed and the RB-614C's $\boxed{\text{FUNC}}$ key is

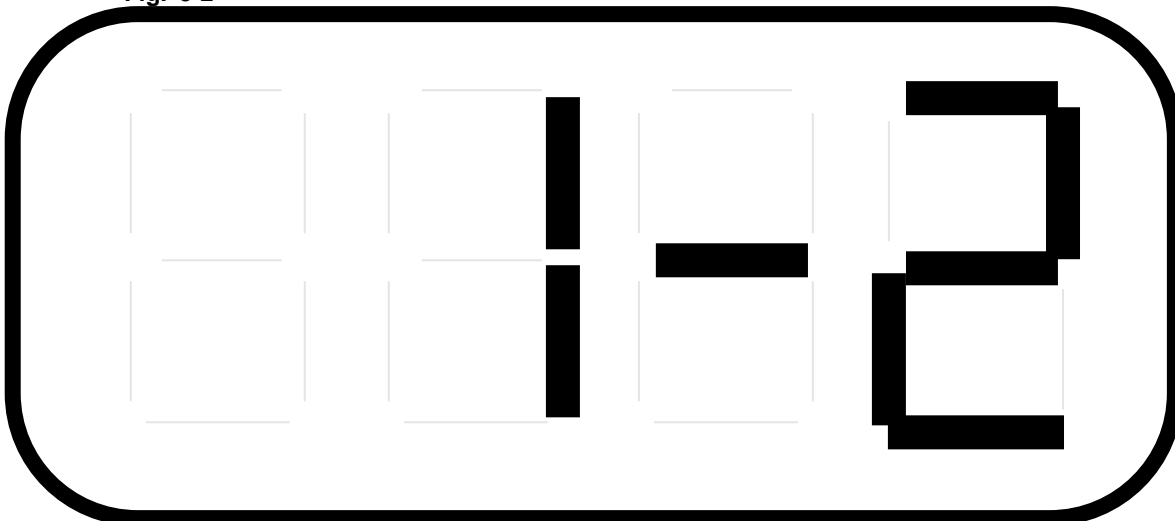pressed, the characters shown in Fig. 5-1 appear on the LED display.
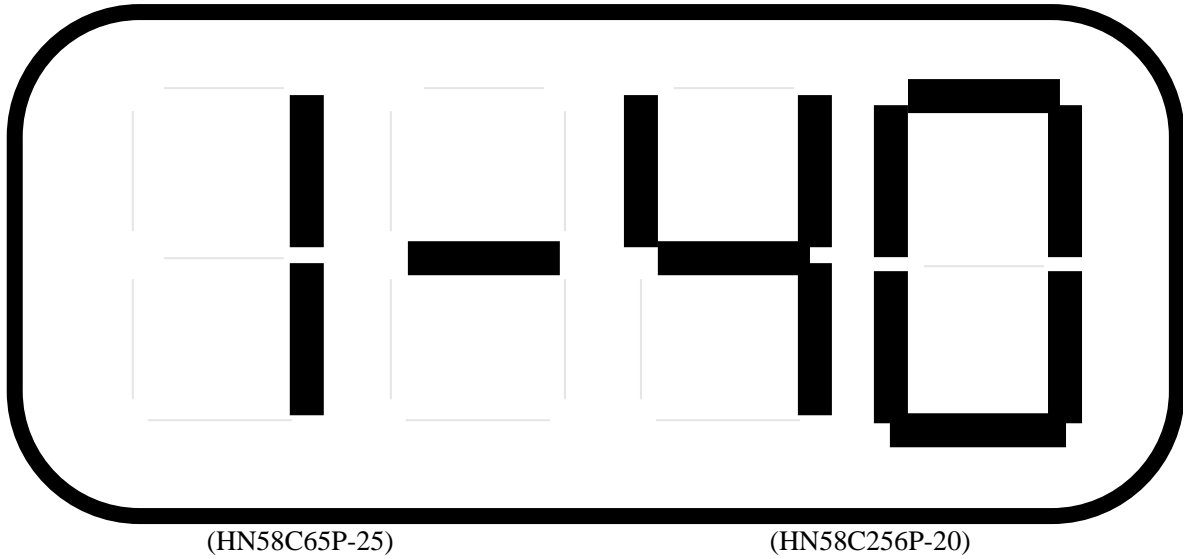
Fig. 5-1
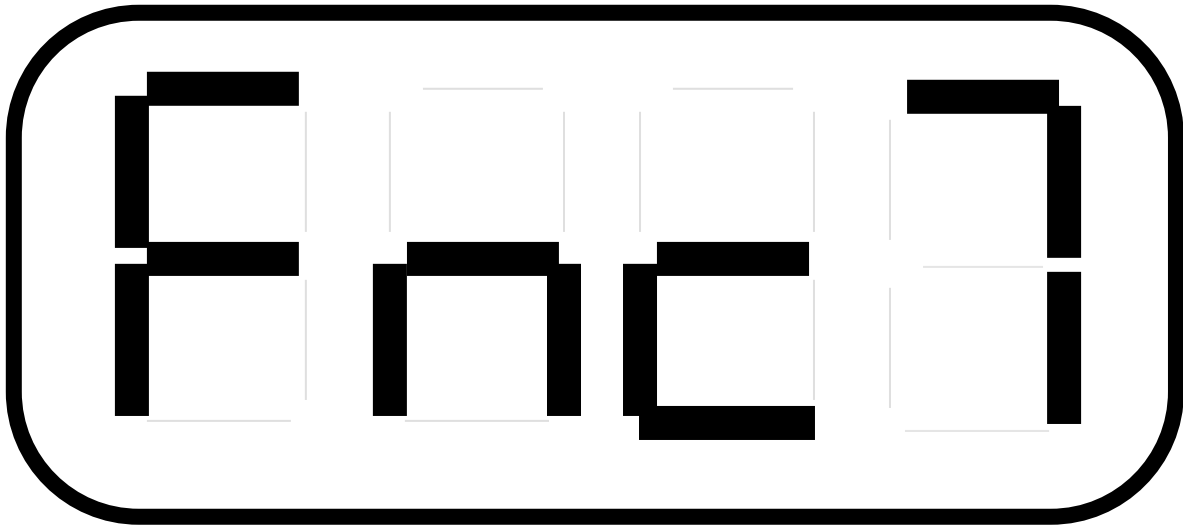
(3) Select the group number

If the 7 and SET keys are subsequently pressed, a number such as the one shown in Fig. 5-2 appears.   When 1 and 2 or 01 to 40 are assigned as the group number, the program whose number was entered first in the group data is now executed.   The LED display shows the number of the program executed.

Note: When no group data has been entered in the panel ROM, an error will result when a group number is assigned.

<Display appearing when group number is selected>

Fig. 5-2

(HN58C65P-25)   (HN58C256P-20)

<Display appearing after group display has been executed)

Fig. 5-3

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        50 1.
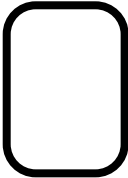
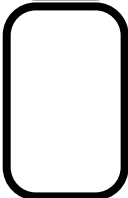(HN58C65P-25)   (HN58C256P-20)
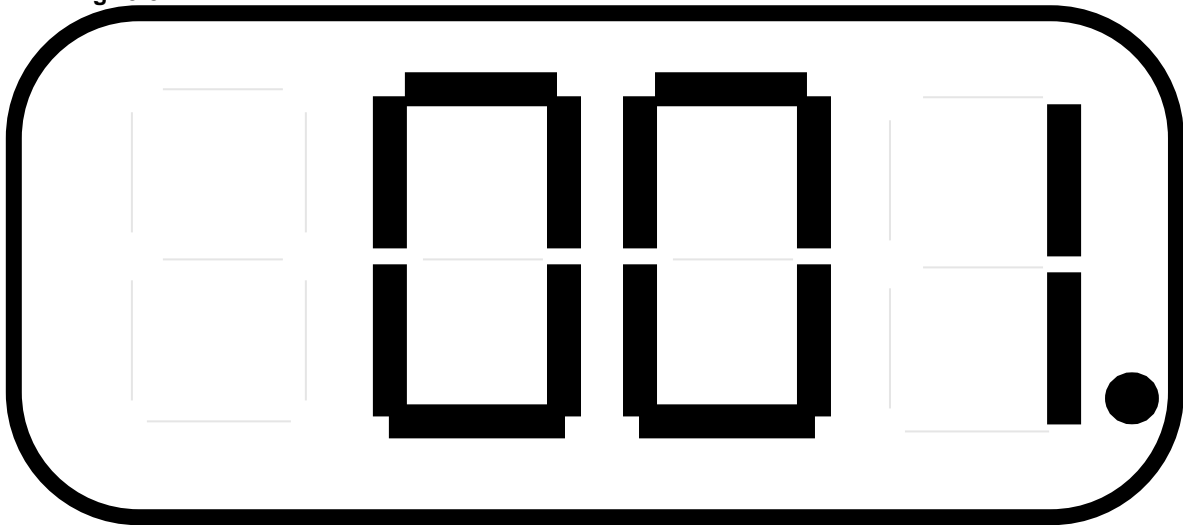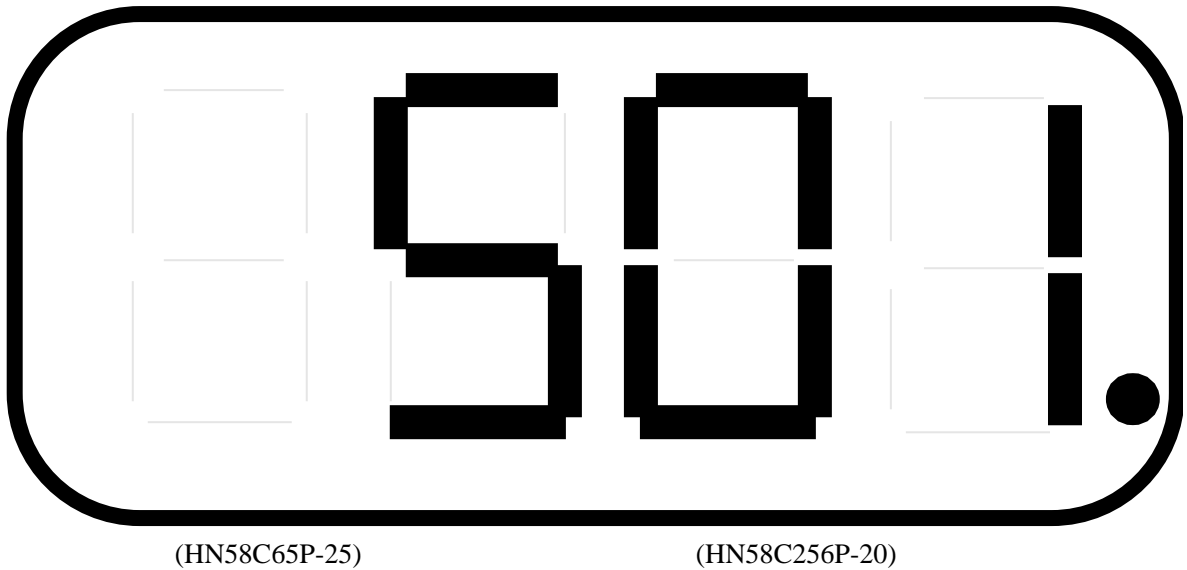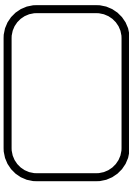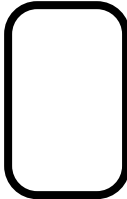
Note: The period at the right end in the figures shown above flashes during group display execution.

Use the ⬜ and ⬜ keys for the following operations.

⬜ key: This increments the program number now on the display.

⬜ key: This decrements the program number now on the display.

FUNC key: This stops execution and returns operation to the direct display mode.

(4) To select a pattern other than the one indicated in (3) above while leaving the program number unchanged, first press the pattern key now selected, and then press the target pattern key.

< Key operation >   (Example: Switching from character to crosshatch)

CHARA , **CROSS**

(5)   Press the **FUNC** key to exit this function.

5-3   Panel ROM copy function

"All copy" of a panel ROM can easily be performed using this function.   The function can also be used to copy the data of panel ROMs used for other models.

(1) Regarding combinations of copy source and copy destination panel ROMs

"All copy" is possible for copying data when the panel ROM at the copy source is the same type as the one at the copy destination.   However, only the data in the program No.1-No.40 area is copied if one panel ROM is a standard type and the other is the AH-3000 or HN58C256.

(2) DIP switch settings

• When SW2 is set to ON and the power is turned on, copying between panel ROMs is enabled.

• When SW2 is set to OFF and the power is turned on, the internal timing data can be copied into the panel ROM.   In this case, no panel ROM need be installed as the copy source.

(3) Operation method

Install the copy source panel ROM in the socket, and press the **FUNC**   key.

The following characters appear on the LED display, and the function selection mode is established.
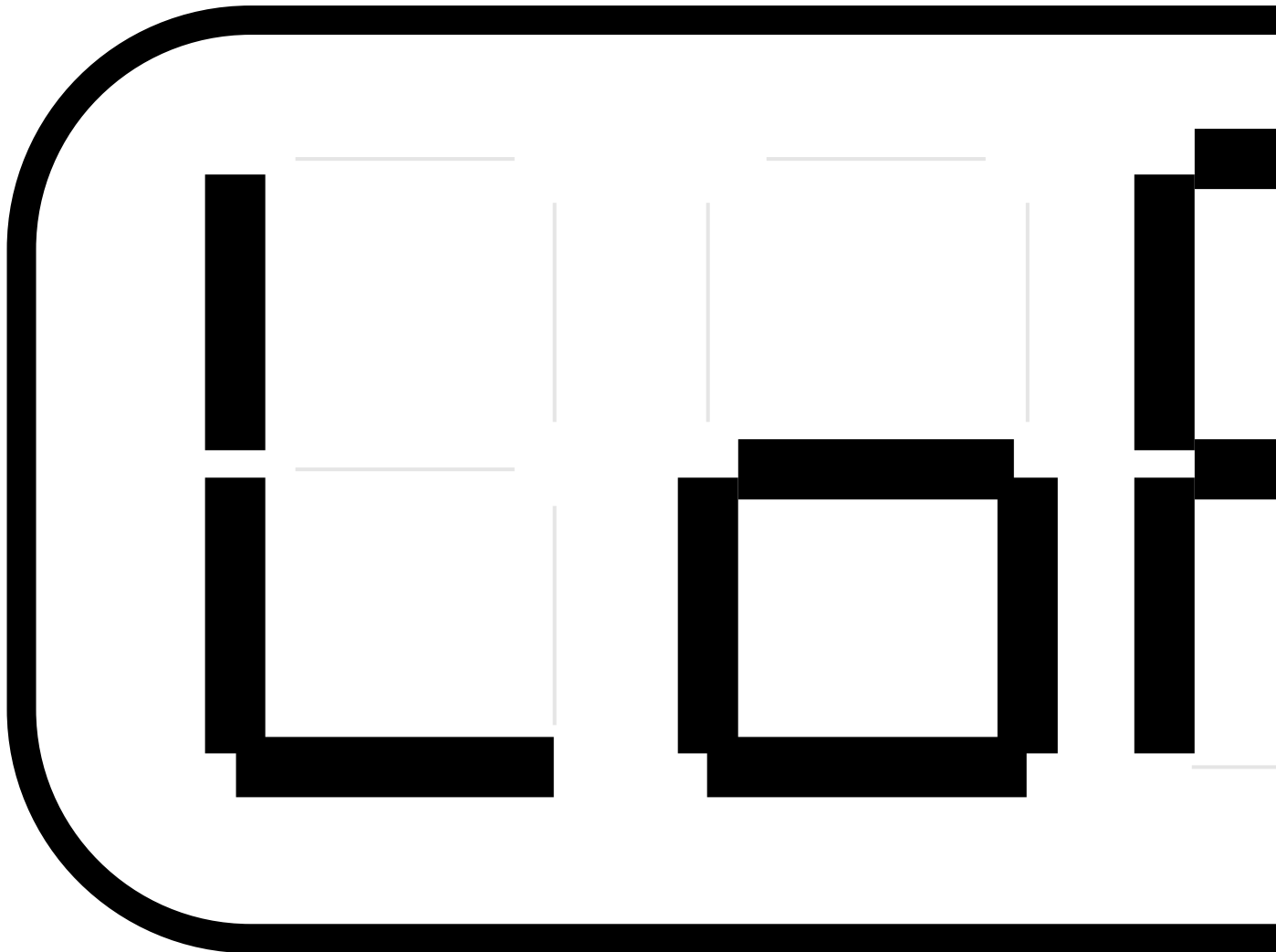
Fig. 5-4
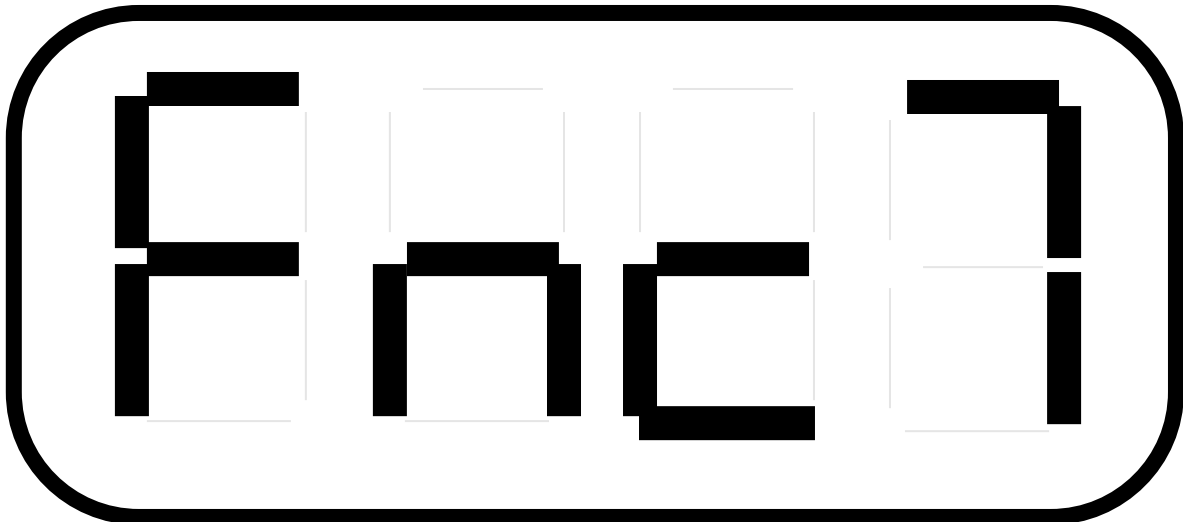
Now press **4** and the **SET** key to select the panel ROM copy function.

The following characters appear on the LED display, and the mode is established for loading the data from the copy source into the VG-826A.

Fig. 5-5

Fig. 5-6

Check that the panel ROM has been installed securely in the socket, and press the $\boxed{\textbf{SET}}$ key.

• There is no need to install the panel ROM when SW2 has been set to OFF (internal timing mode). Loading from the panel ROM is completed in an instant, the following characters appear on the LED display, and the mode is established for copying the data to the copy destination.
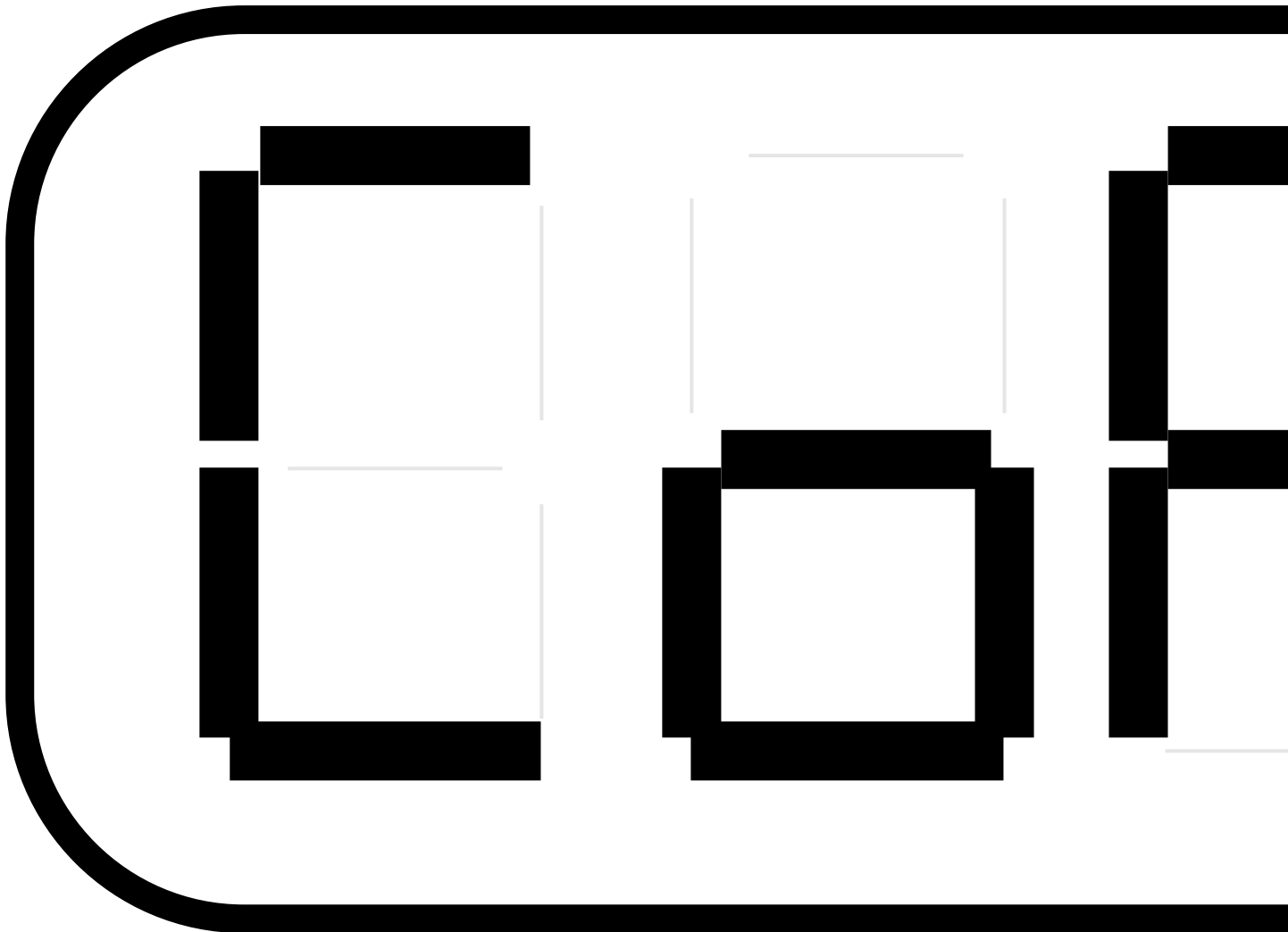
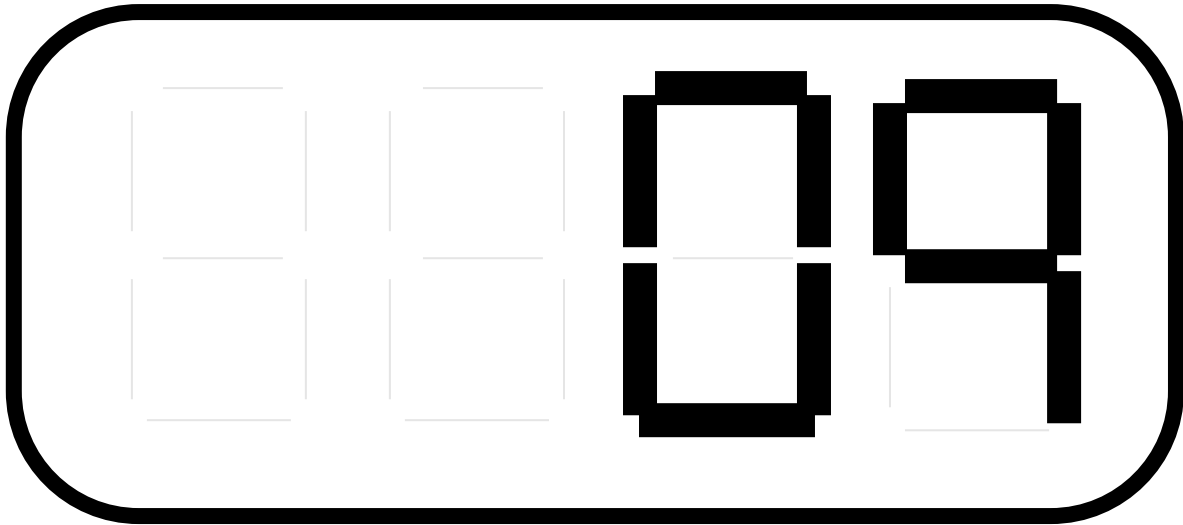Now remove the copy source panel ROM from the socket, and install the copy destination panel ROM.   Press the SET key.

The LED display now starts counting down as shown below, and the data is written into the panel ROM.

Fig. 5-7

Upon completion of the copying, the display returns to the status shown in Fig. 5-5 above, and further copying is possible in this status.

To exit copying and return to the direct display, press the **FUNC** key.

5-4   Coordinate display function

A cursor for specifying the coordinates of liquid crystal dot defects, etc. is provided among the optional patterns.   The cursor and coordinates appear on the display under inspection, and the cursor can be moved using the RB-614C.

Fig. 5-8
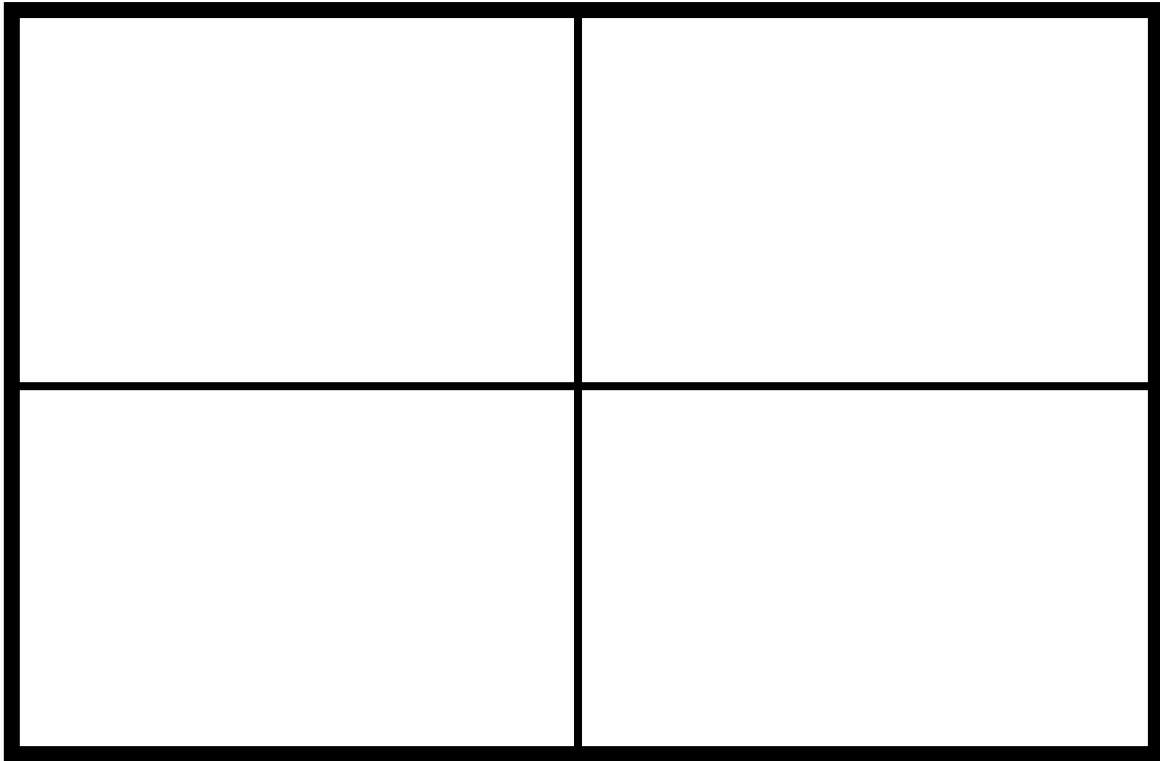
Optional pattern 1 (code 14)

Cross-shaped cursor

Set the code number of the optional pattern either on-screen or using the RB-646A.

(1) RB-614C key operation

For details on the operations of each key, refer to the descriptions given in (2) through (8) below.

0 key	This selects the coordinate display.
1 key	This selects the cursor flashing speed.
3 key	This selects the cursor shape.
5 key	This selects the cursor movement step.
7 key	This sets the background color.

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9 key	This sets the cursor color.
2 **4** **6** **8** key	These move the cursor.

(2) **0** key for selecting the coordinate display

This is used to set the coordinate display to dot units (default), signal electrode (drain)/scanning electrode (gate) units or no display.

	Display
	(0, 0: STEP1) ... Dot units
Press the **0** key.	(GATE:1, STEP:1) (R:1 G:2 B:3) ... Drain/gate units
Press the **0** key.	Display: None
Press the **0** key.	Returns to dot units; cycle is hereafter repeated.

(3) **1** key for selecting the cursor flashing speed

This causes the cursor to flash.   No flashing is the default setting.

Each time the **1** key is pressed:

      No flashing   Flashing   Flashing   No flashing

                  Approx. 4 times/sec. Approx. 8 times/sec.   Cycle is hereafter repeated.

(4) **3** key for selecting the cursor shape

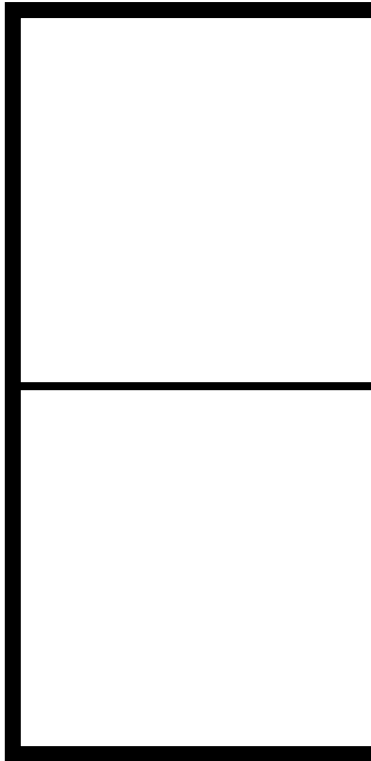This changes the cursor shape.   The cross-shaped cursor is the default setting.
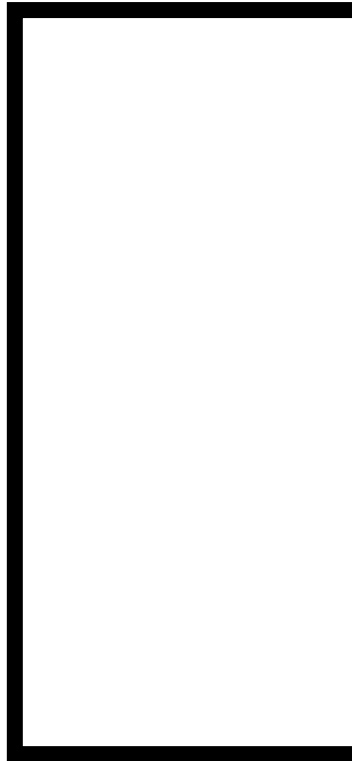
Each time the **3** key is pressed:

Fig. 5-9

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Cross-shaped cursor

Drain (vertical) line only

5x5-dot cross-shaped cursor
Cycle is hereafter repeated.

(5) ⑤ key for selecting the cursor movement step

This selects the step by which the cursor is moved using the cursor movement keys.   The default setting is the 1-dot step.

Each time the ⑤ key is pressed:

      1 dot => 10 dots => 100 dots => 1 dot; cycle is hereafter repeated.

(6) ⑦ key for setting the background color

This sets each of the R, G and B signals for the background color.   The default setting is black (level 0 for each of the R, G and B signals).

When the ⑦ key is pressed, the following appears in the center of the display.

Display INPUT   BACKGROUND   COLOR

      R <u>000</u>   G 000   B 000(000-255)

The underbar (_) is the cursor for inputting numbers.

The background color changes when the figures are input using the number keys and the **SET** key is pressed.   The cursor for inputting numbers is moved by the number keys.   If the wrong number is input, input any number and then proceed with the input again starting from "R".

(7) ⑨ key for setting the cursor color

This sets each of the R, G and B signals for the cursor color.   The default setting is white (level 255 for each of the R, G and B signals with 8-bit outputs).

When the ⑨ key is pressed, the following appears in the center of the display.

Display INPUT   LINE   COLOR

      R <u>255</u> G 255   B 255

The underbar (_) is the cursor for inputting numbers.

The color of the coordinate display cursor and coordinate display characters change when a number is input for each color and the **SET** key is pressed.   As with the background color setting, the cursor for inputting numbers is moved by the number keys.

(8) **2** ④ ⑥ ⑧ keys for moving the cursor

2 key	This moves the cursor down.
4 key	This moves the cursor to the left.
6 key	This moves the cursor to the right.
8 key	This moves the cursor up.

5-5 High-speed display function

This function enables the programs and patterns to be selected more speedily than in the past. It has two modes.

High-speed pattern switching mode

In this mode, pattern switching is conducted at high speed after one program has been run in the direct display function.

High-speed program switching mode

In this mode, the patterns of programs with different timing data are switched at high speed. The program numbers entered by the group display function are used.

* The size of the frame memory in the VG-826A is 2K× 2K. High-speed switching is not possible when the number of display dots is more than 1025 both horizontally and vertically.

The high-speed display function is enabled by the fact that the head address of the display pattern can be designated in the frame memory of the VG-826A.

5-5-1 High-speed pattern switching mode

(1) Outline of high-speed pattern switching mode

- This mode is established by setting the DIP switches of the VG-826A as shown below.
- One program in the panel ROM is run by the direct display function.
- At the same time as a pattern is displayed, it is entered into the 2048× 2048 dot frame memory.
- Patterns once entered in the memory are displayed at high speed when they are next called.

(2) Patterns which can be entered

- There are 7 patterns which can be entered in the frame memory and switched at high speed in this mode: CHARA , CROSS , DOTS , CIRCLE , BURST , OPTION1 (*1) and OPTION2 (*1).

    *1: Contains patterns which cannot be entered.

- There are 6 patterns which cannot be entered in the frame memory: COLOR , GRAY , WINDOW , + , □ and X .

    * If a pattern which cannot be entered is executed, it will simply be placed in the work area for display: it cannot be switched at high speed (because no pattern data is kept in the memory).

(3) Patterns which cannot be displayed in this mode

- Among the OPTION1 and OPTION2 patterns, all 2-plane combined patterns such as SMPTE, ramp and sine wave cannot be displayed.

    * An error occurs when a pattern which cannot be displayed is executed, and the pattern is not

displayed. Display the SMPTE, ramp, sine wave and other such patterns in the regular direct display mode.

(4) Number of patterns which can be entered

- The frame memory has a 2048× 2048 dot capacity, and the number of patterns which can be entered differs according to the number of display dots of each pattern concerned.

- The method for entering patterns in the frame memory is as follows: the first pattern executed is entered in the frame memory at the top left which serves as the home position. The pattern displayed next is entered immediately below. The patterns are entered in the sequence shown in Figs. 5-10 and 5-11 until a work area equivalent to one pattern is left, at which point the pattern entry is completed.

*1: When the number of programs which can be entered is reached, the pattern displayed next is written into the work area but since the pattern in the work area is deleted when another kind of pattern is next selected, it is not subject to switching at high speed.

*2: When the number of display dots for a pattern is more than 1025 dots (lines) both horizontally and vertically, the work area cannot be provided in the area remaining. As a result, no more patterns can be entered and no switching at high speed is possible.

Entry example 1:   When the number of display dots is 640(H)× 480(V)

 Fig. 5-10

Entry example 2:　When the number of display dots is 1024(H) x 768(V)

Fig. 5-11

(5) Operation method

Set the DIP switches in the following sequence.

• Set the VG-826A's POWER switch to the OFF position.

• Set DIP SW5 to OFF (SW6 to ON), and set the VG-826A's POWER switch to the ON position.

First, when the number of the program to be run by the RB-614C is input, the patterns are displayed at the timing entered in the program.   (The │INC│ and │DEC│ keys can also be used.)

*1: In this case, even when a multiple number of patterns have been entered in the program's pattern select data, only one of the patterns will be selected for display depending on the sequence of priority given below.

• Sequence in which patterns are displayed:

• │CHARA│   │CROSS│   │DOTS│   │CIRCLE│   │BURST│   │OPTION1│   │OPTION2│

Example: The │CHARA│ pattern is displayed in the case of a │CHARA│ + │CROSS│ combined pattern.

*2: When the program is run, the displayed pattern is entered at the home position of the frame memory.

*3: At the entry stage, the patterns are displayed and switched at the regular speed, rather than at the high speed.

Next, display a different pattern using the pattern key on the RB-614C.   When the pattern displayed is one which can be entered, it is entered into the frame memory below the pattern which was entered first.

*1: In this mode, patterns are switched in a single-action operation.   There is no need to turn off the pattern which is displayed, a step which was necessary in the past.   (The pattern display is cleared when the key corresponding to the displayed pattern is pressed.)

*2: When the pattern displayed is one which cannot be entered (such as │COLOR│), it is placed in the work area for display.

Repeat these steps to enter the patterns into the frame memory until its limit is reached (see previous section).

When a pattern once entered is selected again, it is switched at high speed.

(6) Inputting other program numbers

When a different program number is input, all the contents entered in the frame memory are cleared, and one of the patterns of the program whose number was input is entered at the home position.

(7) Exiting from the high-speed display mode

To exit from this mode, turn the VG-826A's power OFF, change the DIP switch settings and turn the power back on.

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5-5-2   High-speed program switching mode

(1) High-speed program switching mode

- Set the DIP switches (see below) of the VG-826A.

- Select group No.1 or No.2 of the group display which has already been entered in the panel ROM.

- The VG-826A reads out the first four programs in the selected group number, and places the automatically set patterns in the frame memory.

- The high-speed program switching mode can now be executed.

(2) Patterns which cannot be used in this mode

- Among the   OPTION1   and   OPTION2   patterns, all 2-plane combined patterns such as SMPTE, ramp and sine wave cannot be used.

  All other patterns are entered into the frame memory and can be switched at high speed.

  * An error occurs when an   OPTION1   or   OPTION2   pattern which cannot be used has been set in the panel ROM.   Even when the program number concerned is selected, the pattern will not be displayed.

(3) Number of patterns which can be entered

- The number of patterns which can be entered is always four regardless of the number of display dots.
- The method for entering patterns in the frame memory is as shown in the example in Fig. 5-12: the top left of the frame memory serves as the home position, and the patterns are entered in order of the number of their display dots.
- First, the pattern with the largest number of display dots is entered at position   in Fig. 5-12, and subsequent programs are entered in positions   ,   and   in this order.   Numbers   to   denote the sequence of pattern size (from large to small).

  *1: Patterns can be entered if the number of their display dots does not exceed 2048 (largest   + smallest   ) and 2048 (second largest   + third largest   ) horizontally and 1024 lines (,   , or   ) vertically.

  *2: An error occurs if the display sizes of patterns   to   do not come within this limit, and this mode cannot be executed.

  *3: An error occurs if the numbers of up to the first four programs have not been selected for group display entry, and this mode cannot be executed.

  *4: In terms of the patterns displayed in this case, the multiple number of patterns entered in the pattern select data can also be displayed.   (Example: CHARA   +   CROSS   )
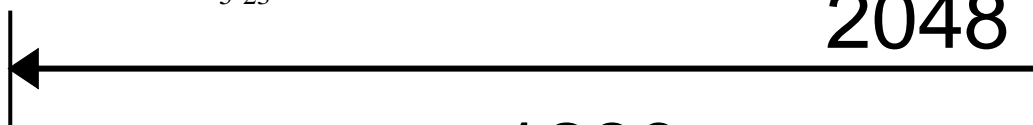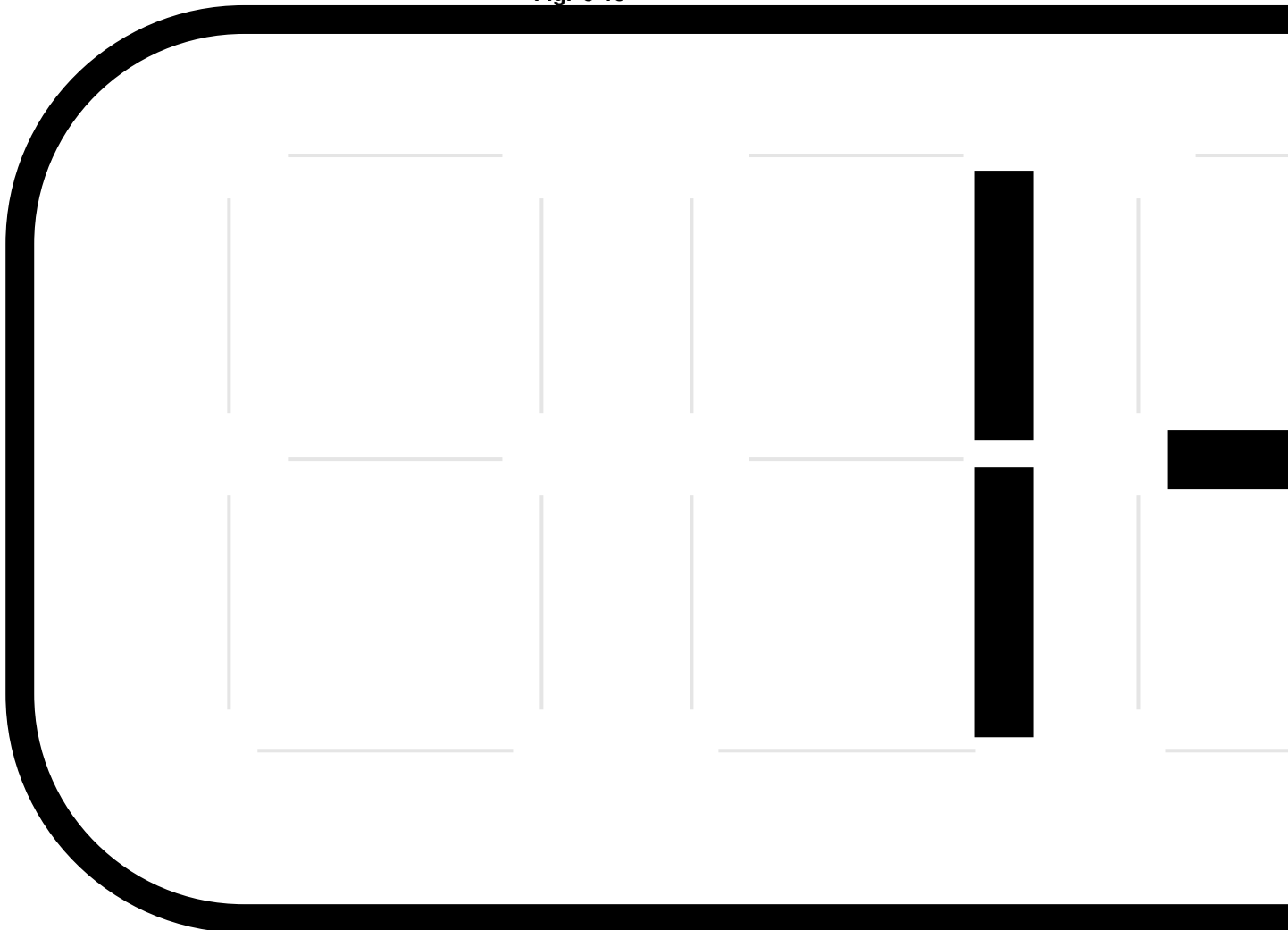
Fig. 5-12

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2048

(4) Operation method

First, set the DIP switches in the following sequence.

• Set the VG-826A's POWER switch to the OFF position.

• Set DIP SW6 to OFF (SW5 to ON), and set the VG-826A's POWER switch to the ON position.

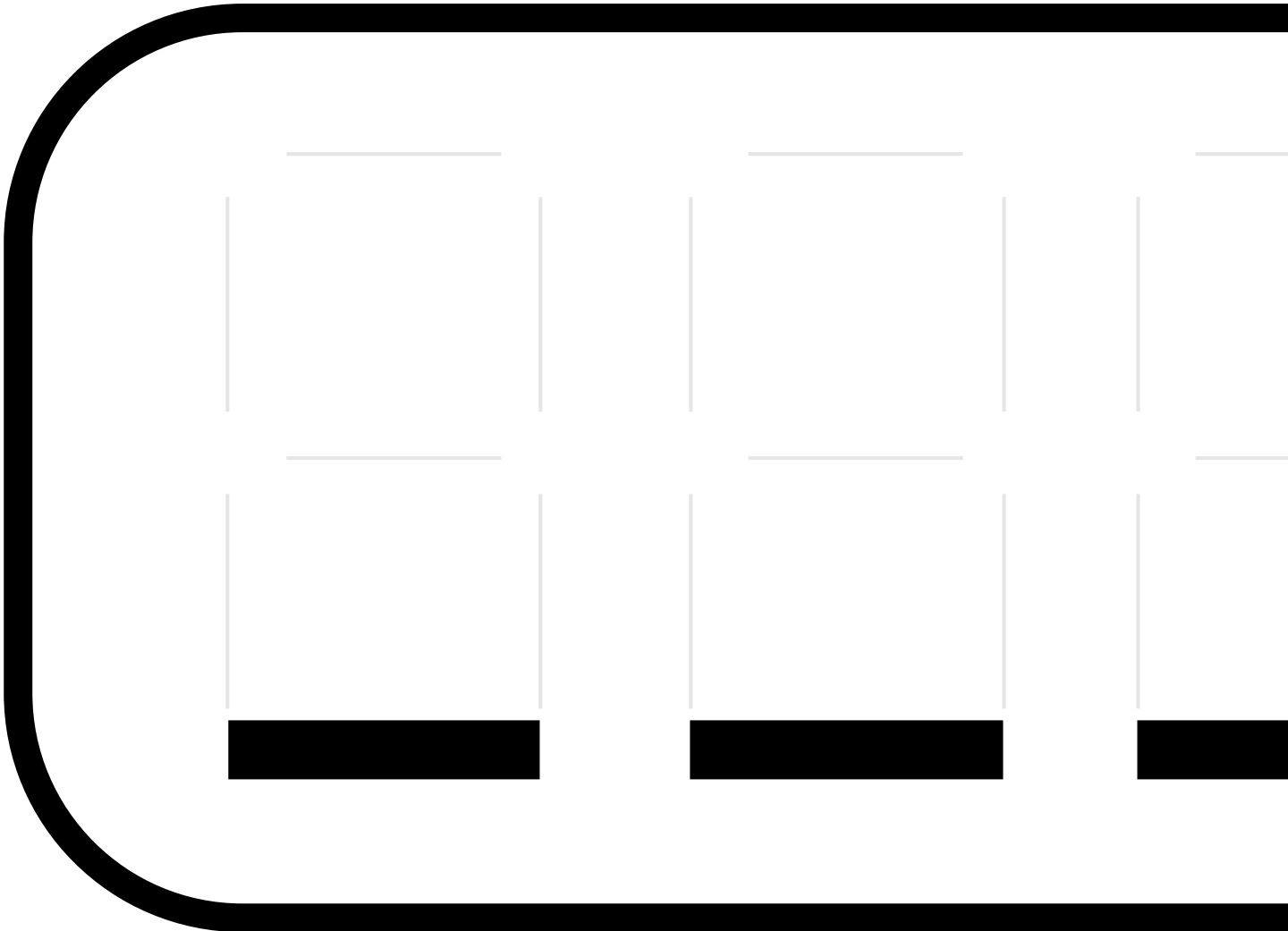The LED on the VG-826A displays the following.

Fig. 5-13

When the group numbers to be executed are input in this mode from the RB-614C, they are entered automatically by the VG-826A in the frame memory in the order in which they were entered.   If "----" appears on the LED as shown on the left below, it means that entry is completed.
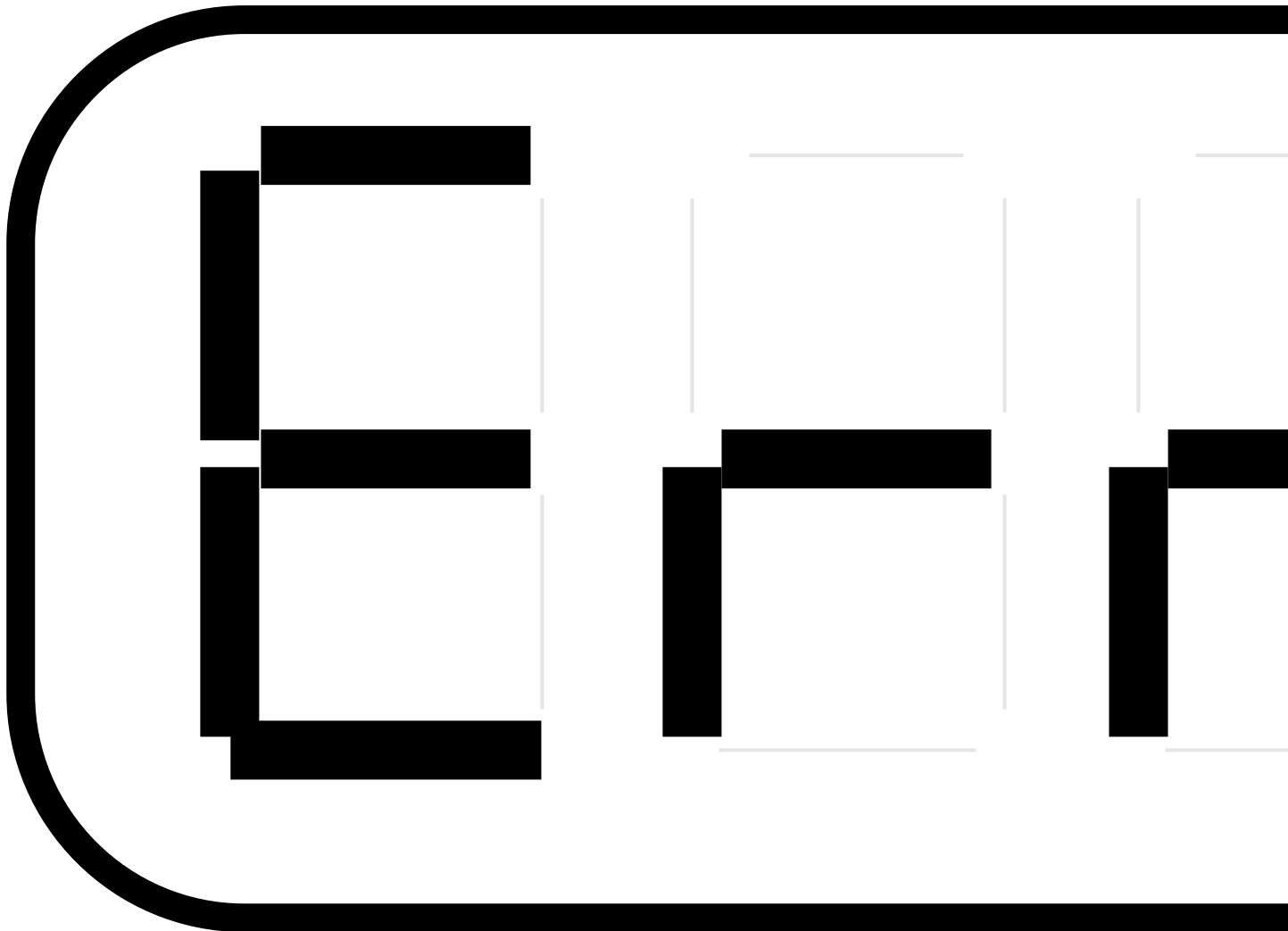
Fig. 5-14

(When entry is completed)

(When an error has occurred, the error display appears, and the display in Fig. 5-13 is restored.)

Upon completion of the entry, the mode enabling high-speed program switching is established.   It is now possible to switch and execute the programs using the $\boxed{0}$ to $\boxed{3}$ keys in the sequence entered in the group display.   (The $\boxed{\text{INC}}$ and $\boxed{\text{DEC}}$ keys can also be used.)

Example: Sequence entered in group display: 10   36   17   05

Key allocation in this mode: 0   1   2   3

* In this mode, only the $\boxed{0}$ to $\boxed{3}$ keys, $\boxed{\text{INC}}$ and $\boxed{\text{DEC}}$ keys and the $\boxed{R}$, $\boxed{G}$, $\boxed{B}$ and $\boxed{\text{INV}}$ keys can be used.

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When the $\boxed{\textbf{FUNC}}$ key is pressed in this status, the display in Fig. 5-13 is restored, and another group number can be selected and high-speed program switching performed.

(5) Exiting from the high-speed program switching mode

To exit from this mode, turn the VG-826A's power OFF, change the DIP switch settings and turn the power back on.