VG-828

Terminal Mode
Operation Manual

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ASTRODESIGN, INC.

Differences from VG-851/852

The VG-851/852 commands serves as the basis of the commands used by the VG-828. The table below explains only the differences from the VG-851/852.

Command code	Command	Description
LOT(44H) SOT(4AH)	Transmission/reception of output condition data	The format in which the data comes differs depending on the operation mode of the VG-828. (Analog output conditions, digital output conditions) The operation mode is set using the D-SW on the VG-828 and CHGMODE command.
LPT(45H) SPT(4BH)	Transmission/reception of pattern data	These commands differ in the analog mode and digital mode.
LPD(4CH) SPD(4DH) EXPBN(08H)	Transmission/reception of program data	These commands differ in the analog mode and digital mode.
PNAMES(5EH) PNAMER(5FH)	Transmission/reception of program names	The command codes differ from those (3EH, 50H) of the VG-851.
CROSS_CTRL (2EH)	Changes in coordinate display pattern settings	Equivalent to VG-852 command.
CHGMODE(50H)	Changes in VG-828 panel ROM mode	This command changes the mode from analog to digital or vice versa.
LPT3(A1H) SPT3(A2H)	Transmission/reception of pattern data	Equivalent to VG-852 command.
LOT3(A6H) SOT3(A7H)	Transmission/reception of output condition data	Both analog output conditions and digital output conditions are handled by the VG-828.
LPD3(A3H) SPD3(A4H) EXPBN3(A5H)	Transmission/reception of program data	Both analog output conditions and digital output conditions are handled by the VG-828. Pattern data is the same as for the VG-852.
SGROUP3(AAH) LGROUP3(ABH)	Transmission/reception of group data	Equivalent to VG-852 command.
LUOPT3(B3H) SUOPT3(B4H)	Transmission/reception of user-generated optional pattern data	Data contents differ with graphic patterns. * This command is used for the transmission/reception of graphic patterns.
QUOPT3(7CH)	Acquisition of user-generated optional pattern data information	This command is used to acquire information such as user-generated optional pattern data or graphic patterns, etc.
QBM3(7DH)	Acquisition of image data information	This command is used to acquire information such as the number of image data colors, size, etc.

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CHAPTER 1 TERMINAL MODE--INTRODUCTION

In the terminal mode, the VG-828 can be controlled from an external computer (PC, etc.). The commands and data are transmitted and received through the serial RS-232C input/output port. By using the terminal mode, it is possible to enter program data, run programs, turn patterns ON or OFF and perform other operations which are virtually identical to manual operations. In addition, functions for writing straight lines, circles, dots, etc. are supported as graphic commands.

CHAPTER 2 INTERFACE SPECIFICATIONS

2-1 RS-232C SPECIFICATIONS

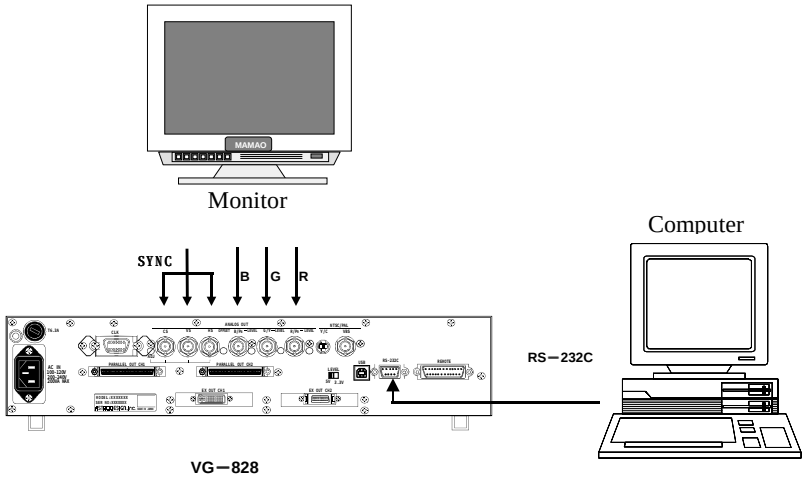
Communication system	Asynchronous system
Transfer rate (baud rate)	9600, 19,200, 38,400 bps
Input/output level	E2A-RS-232C
Data format	Start bit → 1 bit
	Data bits → 7 or 8 bits
	Stop bit → 1 bit
	Parity check → None
Error control system	None

2-2 RS-232C CONNECTOR

Pin no.	Signal
2	TXD (transmitted data)
3	RXD (received data)
5	GND (signal ground)
7	CTS (clear to send)
8	RTS (request to send)

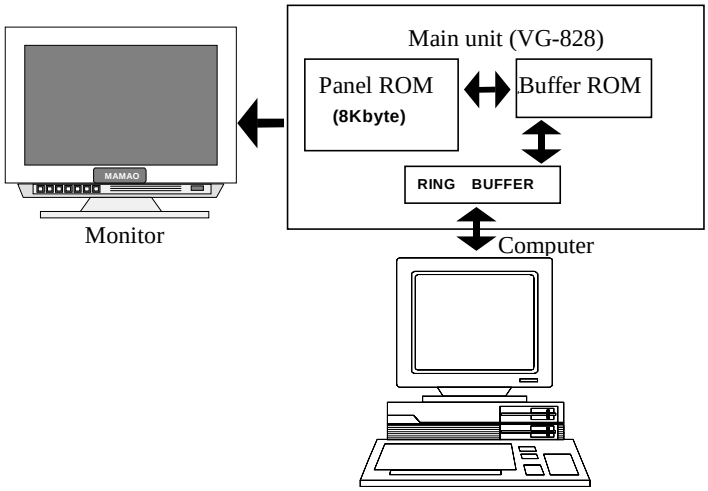
CHAPTER 3 CONNECTION CONFIGURATION DIAGRAM

Fig. 3-1



CHAPTER 4 DATA FLOWCHART

Fig. 4-1 VG-828 flowchart



CHAPTER 5 DESCRIPTION OF SETTING DATA

5-1 DESCRIPTION OF TERMS USED

- Auto display data
  When the VG-828 is operated in the auto display mode, the length of the interval (in seconds) after the patterns have been output until the next program is run as well as the numerical sequence of the programs to be run are set as parameters.

  The numerical sequence of the programs can be set in a 3-block format. If program numbers 01, 02 and 03 are to be output first followed by program numbers 07, 08 and 09 after which the programs are to be repeated from 01, for instance, 01-03 is set in the first block, 07-09 is set in the second block, and 00-00 is set in the third block.

- Pattern select data
  This data is for selecting which pattern is to be output if programs are run when the VG-828 is operated in the direct display and auto display modes. Bear in mind that "R," "G" and "B" must always be entered in the data: otherwise, the data will be entered without colors.
- Buffer RAM
  The VG-828 calls the programs entered in its panel ROM to its execution RAM first, and it then executes the contents of the RAM. The buffer RAM serves as this RAM.
- 1-program data
  The 1-program data includes the H timing data, V timing data, output condition data, pattern select data and various pattern data.
- User character
  A panel ROM contains four characters which can be created and registered by the user. The size of these characters is 64 by 64 dots.
- Graphic plane
  The characters, crosshatches, dots, circles, □, +, × and burst patterns are drawn on this plane.
- Color bar plane
  The color bars, gray scales and window patterns are drawn on this plane.

Note: For details on the H timing data, V timing data and output condition data, refer to the description of the setting items in Section 5-3. For further details on the pattern data, refer to the description of the setting items for each pattern in Section 5-4.

5-2 TIMING AND OUTPUT CONDITION SETTING ITEMS

The H timing data can be input in units of microseconds (time) or dots. The microsecond or dot data is set after [MODE][Dot Clock].

Table 1-1

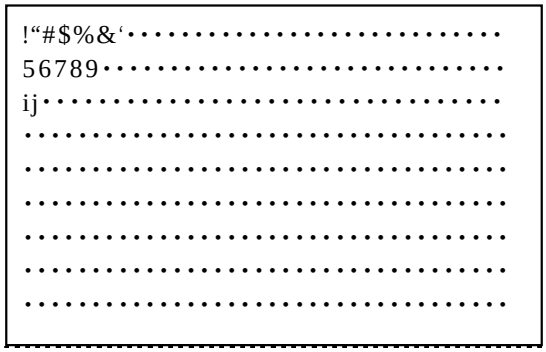
Horizontal timing data	Input Mode(0,1) Dot Clock	0 : µs 1 : dot □□□.□□ MHz
	H period H disp	□□.□□ µsec □□□□ dot □□.□□ µsec □□□□ dot
	H sync H backp	□□.□□ µsec □□□□ dot □□.□□ µsec □□□□ dot
	HD start HD width	□□.□□ µsec □□□□ dot □□.□□ µsec □□□□ dot
Vertical timing data	Scan Mode (0 - 2)	0 : NON INTERLACE 1 : INTERLACE & SYNC 2 : INTERLACE & VIDEO
	V total V disp	□□□□ H □□□□ H
	V sync V backp	□□. □ H □□□□ H
	EQP fp EQP bp	□□. □ H □□. □ H
	Serration (0 - 3) EQP (0,1)	0 : OFF 1 : 0.5H 2 : 1H 3 : XOR 0 : OFF 1 : ON
	VD start VD line	□□□□.□ H □□□□.□ H
Output condition data	Output Mode (0,1) NRZ/RZ (0,1)	0 : ANALOG 1 : TTL 0 : NRZ 1 : RZ
	CV (0 - 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 2 : OFF 0 : Nega 1 : Posi 2 : OFF 0 : Nega 1 : Posi 2 : OFF 0 : Nega 1 : Posi 0 : Nega 1 : Posi 0 : Nega 1 : Posi 0 : Nega 1 : Posi 0 : Nega 1 : Posi
	Video Set up Sync	□.□□ V 0: OFF 1: ON Fixed at RS-343A

5-3 DESCRIPTION OF PATTERNS

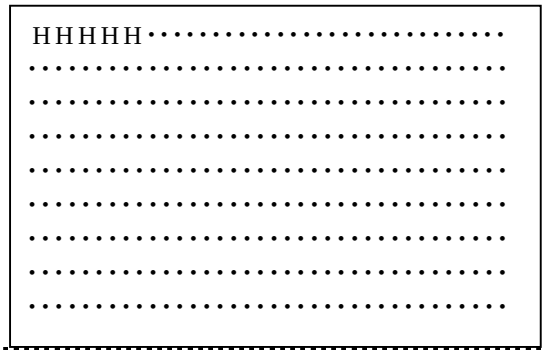
5-3-1 Character pattern

A format from 0 to 2 is selected.

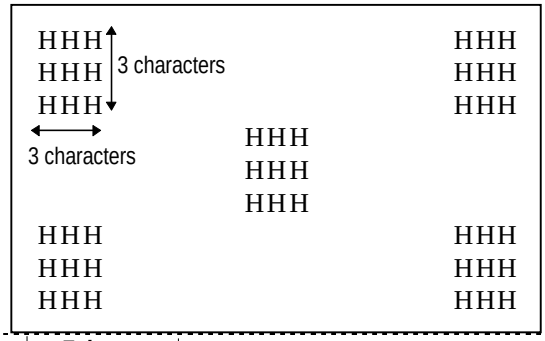
0 ..... Character list Fig. 5-1



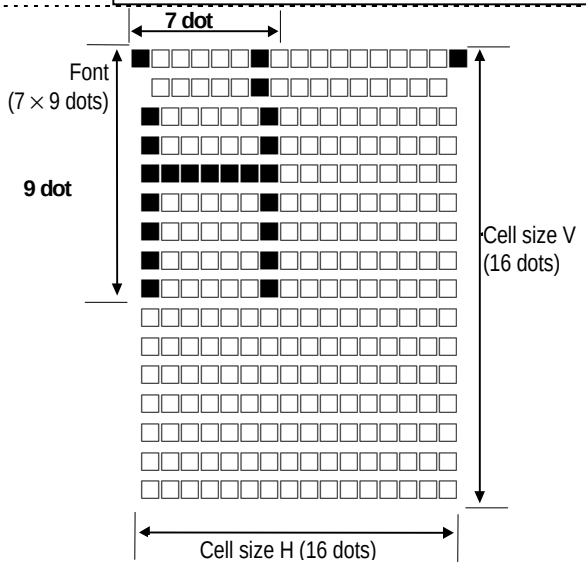
1 ..... All one character Fig. 5-2



2 ..... Corners and center Fig. 5-3



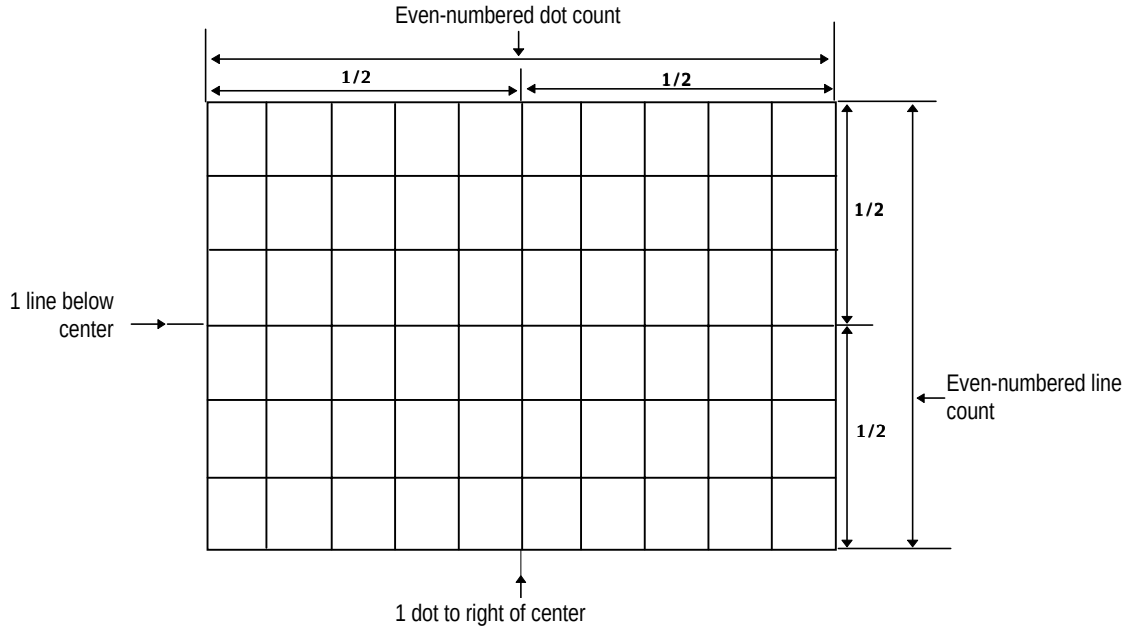
* The correlation between the font and cell size is shown below.
Example with 7 × 9 font and 16 × 16 cell size Fig. 5-4



5-3-2 Crosshatch pattern

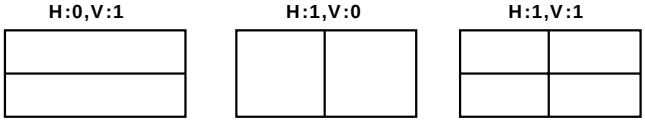
The crosshatch pattern is displayed always after the screen center is calculated. When both the number of dots and number of lines to be displayed are set to odd numbers, the screen center can be calculated, but when they are set to even numbers, the point which is one dot to the right of the center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

Fig. 5-5



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

Fig. 5-6



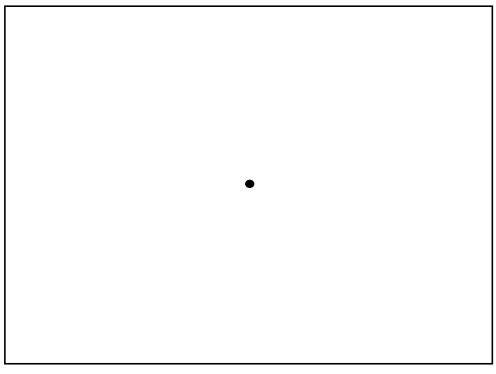
An error occurs when "0" is used for both H and V.

5-3-3 Dot pattern

As with the crosshatch pattern, the dot pattern is also displayed after the screen center is calculated.

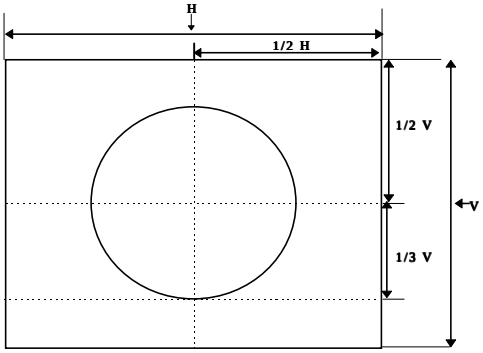
* If "1" is set for both H: and V:, the display shown in the figure below will appear.

Fig. 5-7

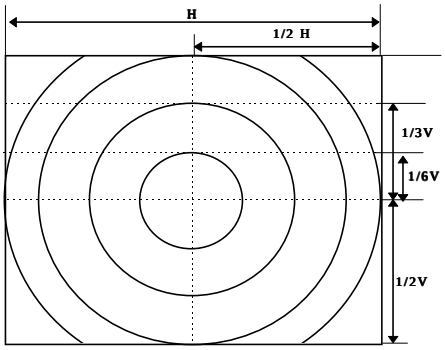


5-3-4 Circle pattern

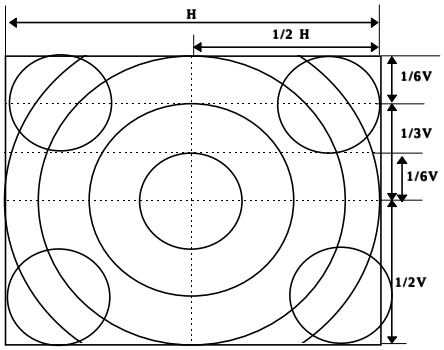
A format from 0 to 4 is selected as the pattern.
Fig. 5-8



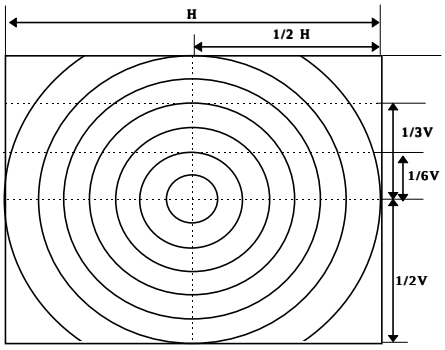
Format [0]
Single circle
Center: 1/2H, 1/2V
Radius: 1/3V



Format [1]
Concentric circles (1)
Center: 1/2H, 1/2V
Radius (from center): 1/6V, 1/3V, 1/2V, 1/2H

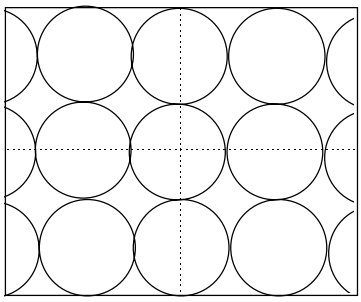


Format [2]
Format [1] + (4 circles with 1/6V radius)



Format [3]
Concentric circles (2) …….. Center: 1/2H, 1/2V
Radius (from center) ……. Addition of other circles inside 1/6V, 1/3V, 1/2V circles

---



Format [4]

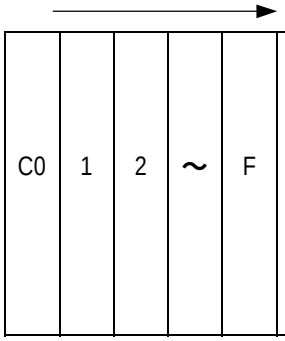
Consecutive circles with 1/6V radius
Circles are displayed symmetrically both horizontally and vertically with the center (1/2H, 1/2V) serving as the reference.

5-3-5 Color bar pattern

The color bar patterns are drawn always from the top left corner of the screen and in the set interval. The layout direction is selected using a direction from 0 to 3.

Fig. 5-9

0 ..... Horizontal direction

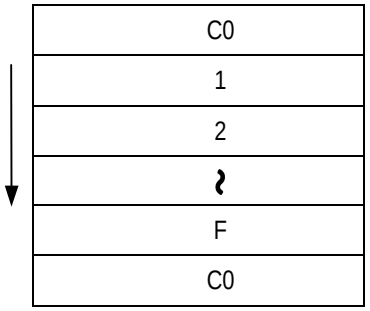


The designated colors from color "C0 to F" are repeated horizontally.

The V interval is ignored.

---

1 ..... Vertical direction



The designated colors from color "C0 to F" are repeated horizontally.

The H interval is ignored.

---

2 ..... Horizontal direction

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

The designated colors from color "C0 to F" 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 designated colors from color "C0 to F" are repeated horizontally, and when they reach the corner, they are continued onto the next row which is determined by the H interval.

5-3-6 Gray scale pattern

As with the color bar pattern, the gray scale pattern is also drawn starting from the top left corner. The color bar settings are cited for the interval, and the layout comes in two types (1 and 2) only.

0	..... Horizontal direction (same principle as direction 2 for color bar pattern)
1	..... Vertical direction (same principle as direction 3 for color bar pattern)

5-3-7 Burst pattern

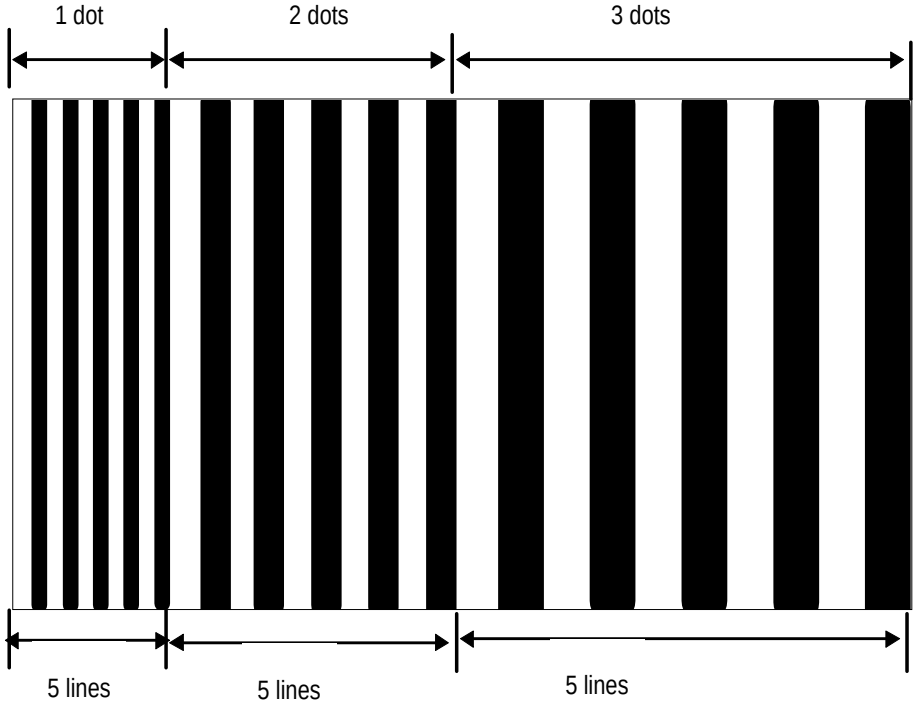
The drawing start point is set using a format from 0 to 3, and the step (line thickness increment) and interval (the number of lines with same thickness to be displayed) are set.
Format

0	..... The pattern is increased from left to right.
1	..... The pattern is increased from right to left.
2	..... The pattern is increased from the center to left and right.
3	..... The pattern is increased from the left and right to the center.

- 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.

[Setting example]
Format 0, step 1, interval 5

Fig. 5-10

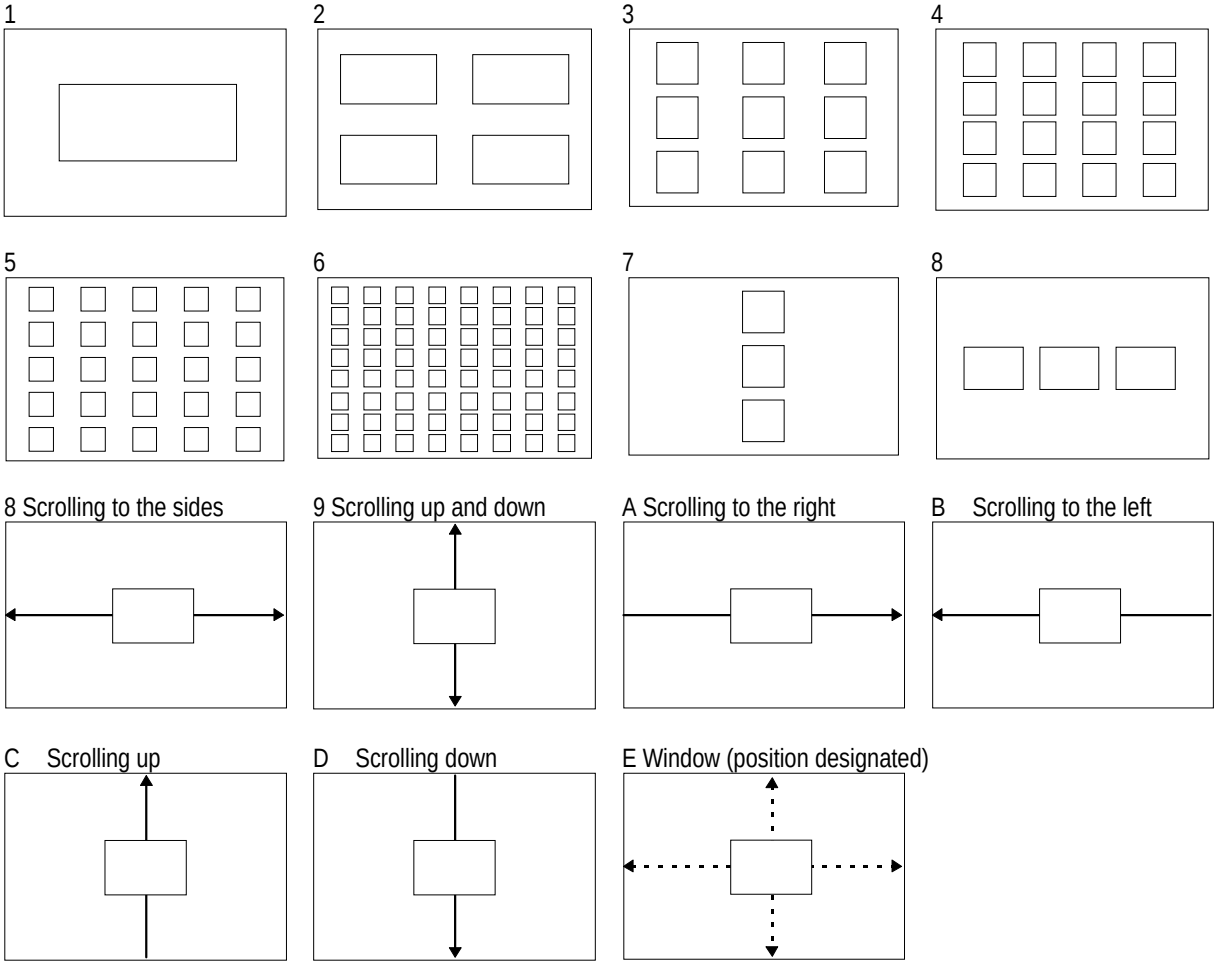


5-3-8 Window pattern

The number of windows and other window-related options are selected using a format from 0 to E. The speed is selected by the flicker interval (with formats 0 to 7). The scroll speed is also selected (with formats 8 to E).

Note: In the VG-828, format F has the same display as format 0.

Fig. 5-11



Note: Format E

This format is valid when using a panel ROM in which the position has been designated beforehand by another model--VG-815, VG-819 and VG-829--in the VG series.
In all other respects, the display for this window format is the same as format 0.

The flicker interval is selected.

	With window formats to 7	With window formats 8 to D (scroll formats)
0	No flicker	Window is scrolled by 4 dots every blanking period.
1	Flicker occurs every V period.	Window is scrolled by 8 dots every blanking period.
2	Flicker occurs every 2 V periods.	Window is scrolled by 12 dots every blanking period.
3	Flicker occurs every 4 V periods.	Window is scrolled by 16 dots every blanking period.
4	Flicker occurs every 8 V periods.	Window is scrolled by 16 dots every blanking period.
5	Flicker occurs every 16 V periods.	Window is scrolled by 16 dots every blanking period.
6	Flicker occurs every 32 V periods.	Window is scrolled by 16 dots every blanking period.
7	Flicker occurs every 64 V periods.	Window is scrolled by 16 dots every blanking period.

CHAPTER 6 TRANSMISSION DATA

6-1 TRANSMISSION CONTROL CHARACTERS

These transmission control codes are for operating the VG-828 and computer in the terminal mode.

No.	Character	HEX code	DEC code	Description
1	ENQ	05H	5	Request to start terminal mode
2	EOT	04H	4	Request to end terminal mode
3	ACK	06H	6	Acknowledge character
4	NAK	15H	21	Negative acknowledge character
5	STX	02H	2	Transmission text (command) start
6	ETB	17H	23	Transmission text (data) end
7	ETX	03H	3	Transmission text (command and data) end

6-2 CONTROL COMMANDS

This group of commands are used for changing the program data and selecting the patterns and signals.

No.	Character	HEX code	DEC code	Description
1	PED	30H	48	Enables or disables the program whose number is designated.
2	LAT	40H	64	Transmits the auto display data in the panel ROM from the VG-828.
3	LPTS	41H	65	Transmits the pattern select data of the program whose number is designated from the VG-828.
4	LHT	42H	66	Transmits the H timing data of the program whose number is designated from the VG-828.
5	LVT	43H	67	Transmits the V timing data of the program whose number is designated from the VG-828.
6	LOT	44H	68	Transmits the output condition data of the program whose number is designated from the VG-828.
7	LPT (LPT2)	45H (55H)	69	Transmits the pattern data of the program whose number is designated from the VG-828.
8	SAT	46H	70	Writes the auto display data into the panel ROM of the VG-828.
9	SPTS	47H	71	Writes the pattern select data of the program whose number is designated into the panel ROM or buffer RAM of the VG-828.
10	SHT	48H	72	Writes the H timing data of the program whose number is designated into the panel ROM or buffer RAM of the VG-828.
11	SVT	49H	73	Writes the V timing data of the program whose number is designated into the panel ROM or buffer RAM of the VG-828.
12	SOT	4AH	74	Writes the output condition data of the program whose number is designated into the panel ROM or buffer RAM of the VG-828.
13	SPT (SPT2)	4BH (5BH)	75	Writes the pattern data of the program whose number is designated into the panel ROM or buffer RAM of the VG-828.
14	LPD (LPD2)	4CH (5CH)	76	Transmits the 1-program data of the program whose number is designated from the VG-828.
15	SPD (SPD2)	4DH (5DH)	77	Writes the 1-program data of the program whose number is designated into the panel ROM or buffer RAM of the VG-828.
16	LCH	4EH	78	Transmits the data of the user character designated from the VG-828. (64x64, E0-E3)
17	SCH	4FH	79	Writes the data of the user character designated into the panel ROM of the VG-828. (64x64, E0-E3)
18	EXPPN	07H	7	Executes the panel ROM program whose number is designated.

No.	Character	HEX code	DEC code	Description
19	EXPBN (EXPBN2)	08H (58H)	8	Transmits the 1-program data to the VG-828 and executes it. (The data is not written into the panel ROM.)
20	EXPDN	09H	9	Designates the direct display number and executes it.
21	EXPON	0EH	14	Runs the designated pattern and turns the signal ON.
22	EXPOFF	0FH	15	Runs the designated pattern and turns the signal OFF.
23	DISPON	21H	33	Turns the CRT display ON.
24	DISPOFF	22H	34	Turns the CRT display OFF.
25	DISPHV	28H	40	Transmits the number of graphic plane display dots from the VG-828.
26	INDC	29H	41	Increments or decrements by 1 the direct display number.
27	EXBN	0CH	12	Executes the contents of the buffer RAM.
28	EXSGON	0BH	11	Turns R, G, B, RHT, GHT and BHT ON or OFF.
29	PNAMES	3EH	62	Writes the name of the program whose number is designated into the panel ROM of the VG-828.
30	PNAMER	50H	80	Transmits the name of the program whose number is designated from the VG-828.
31	EXSYNC	51H	81	Turns HS, VS and CS ON or OFF.
32	SGROUP	52H	82	Writes the group data of the group whose number is designated into the panel ROM of the VG-828.
33	LGROUP	53H	83	Transmits the group data of the group whose number is designated from the VG-828.
34	PRGENTRY	2BH	43	Enters programs No.1 through No.4 which are for performing high-speed program switching into the VG-828.
35	PRGEXE	2CH	44	Executes the programs with the numbers entered by PRGENTRY.

6-3 GRAPHIC COMMANDS

This group of commands can be used only in the terminal mode. Using these commands, a wider variety of patterns can be created than when operations are conducted from the front panel.

No.	Character	HEX code	DEC code	Description
1	GCIRC	18H	24	Draws circles on the graphic plane.
2	CCIRC	12H	18	Clears the circles on the graphic plane.
3	GLINE	19H	25	Draws straight lines on the graphic plane.
4	CLINE	13H	19	Clears the straight lines on the graphic plane.
5	GPSET	1BH	27	Draws a dot on the graphic plane.
6	CPSET	14H	20	Clears the dot on the graphic plane.
7	ACLR	23H	35	Clears the entire screen.
8	COCLR	24H	36	Clears the color plane.
9	GCLR	25H	37	Clears the graphic plane.
10	COLOR	26H	38	Displays 256 colors (H16 x V16).
11	GCHAR	27H	39	Displays characters.
12	GSQPA	31H	49	Draws the box paint on the graphic plane.
13	CSQPA	32H	50	Clears the box paint on the graphic plane.
14	GRPHCL	3BH	59	Sets the graphic colors.
15	WINDW	3CH	60	Draws windows.
16	CWIND	2AH	42	Clears the windows.
17	WINDCL	3DH	61	Sets the window colors.

6-4 DATA AND ERROR COMMANDS

The error status is returned in response to an error which has occurred when commands have been transmitted to the VG-828. These commands are also transmitted when data is transmitted or there is a request to receive data.

No.	Character	HEX code	DEC code	Description
1	TRDT	10H	16	When data is to be transmitted, this command is placed at the head of the block before transmitting it.
2	ESTS	11H	17	When an error status is to be transmitted, one of the error numbers below is transmitted with this command preceding it.

6-5 KEY CODE TABLE

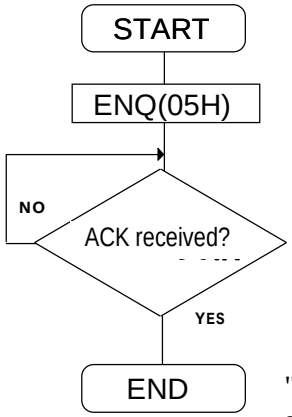
No.	Key	HEX code	DEC code
1	CHARA	50H	80
2	CROSS	51H	81
3	DOTS	52H	82
4	CIRCLE	53H	83
5	+	54H	84
6	□	55H	85
7	×	56H	86
8	COLOR	57H	87
9	GRAY	58H	88
10	BURST	59H	89
11	WINDOW	5AH	90
12	OPTION 1	5BH	91

No.	Key	HEX code	DEC code
13	OPTION 2	5CH	92
14	R	5EH	94
15	G	5FH	95
16	B	60H	96
17	HALF-TONE	61H	97
18	INV	62H	98
19	⏫	63H	99
20	⏬	64H	100
21	RH	65H	101
22	GH	66H	102
23	BH	67H	103
24	CHAR EDIT	5DH	93

- These codes are used to select the pattern keys or output keys.
- The ⏫ and ⏬ keys (No.19 and No.20) are used only when the direct display is to be updated.

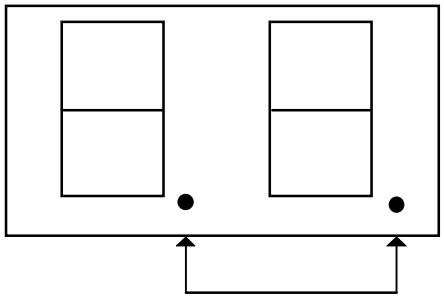
CHAPTER 7 STARTUP METHOD AND TRANSFER FORMATS

7-1 TERMINAL MODE STARTUP METHOD



"Commencement of terminal mode startup"

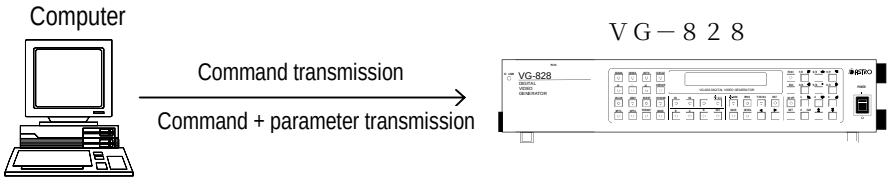
Note: The periods on the 7-segment LED display flash after the terminal mode startup has commenced.



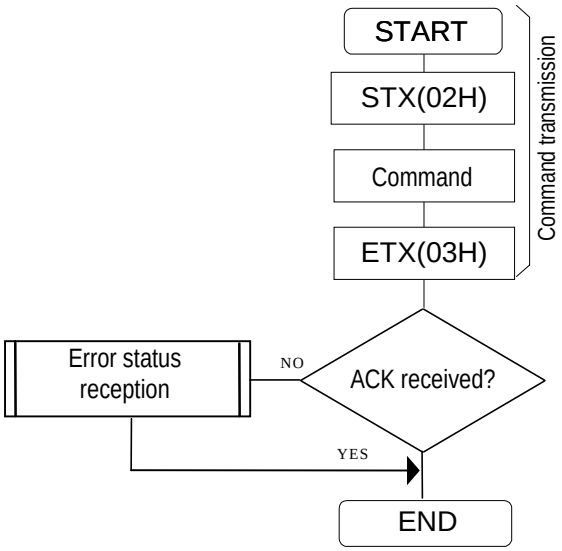
These periods flash.

7-2 COMMAND OR PARAMETER TRANSFER FORMAT

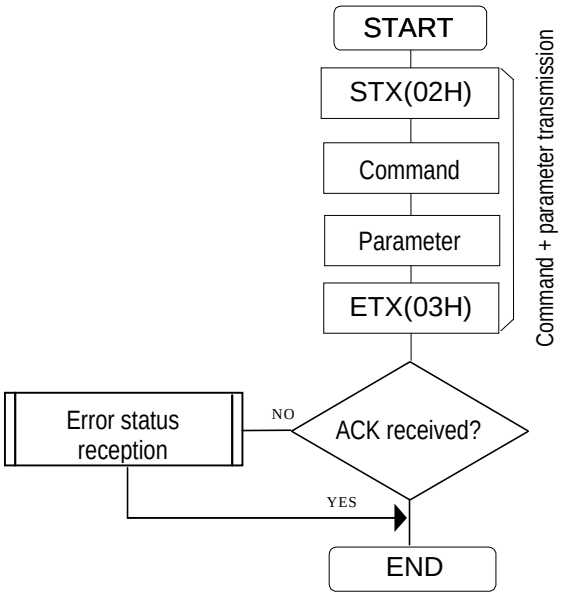
(1)



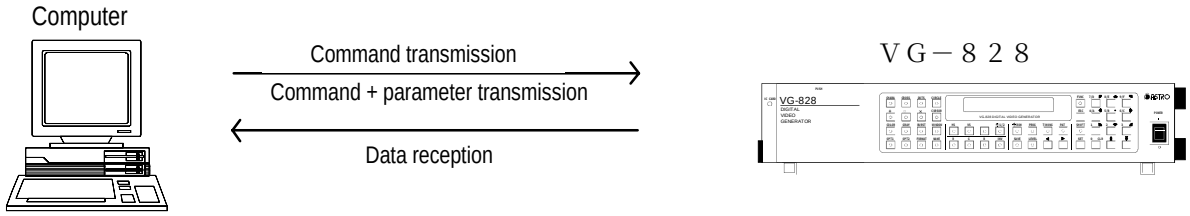
When only commands are to be transmitted



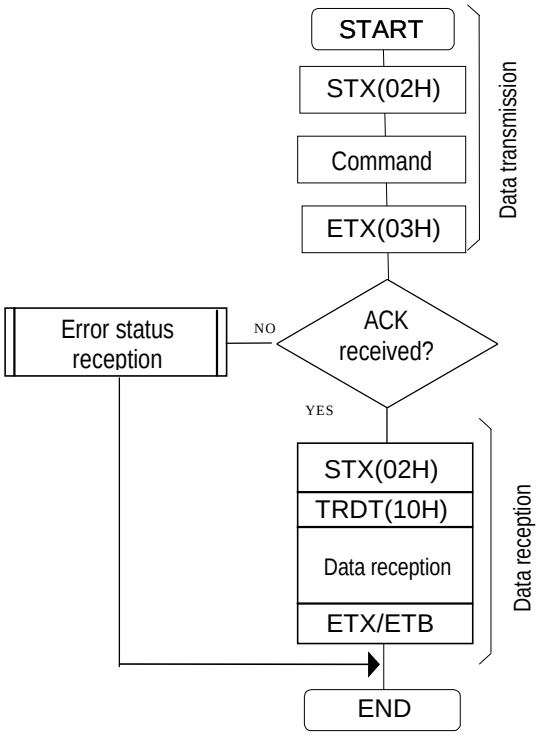
When commands + parameters are to be transmitted



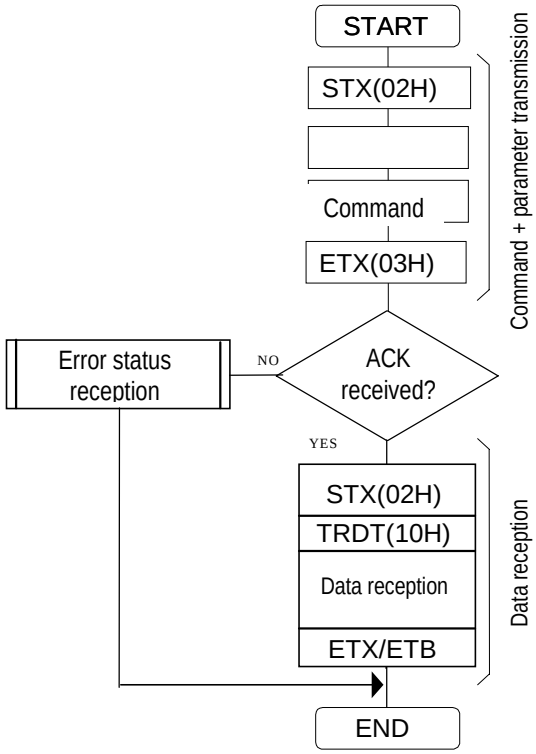
(2)



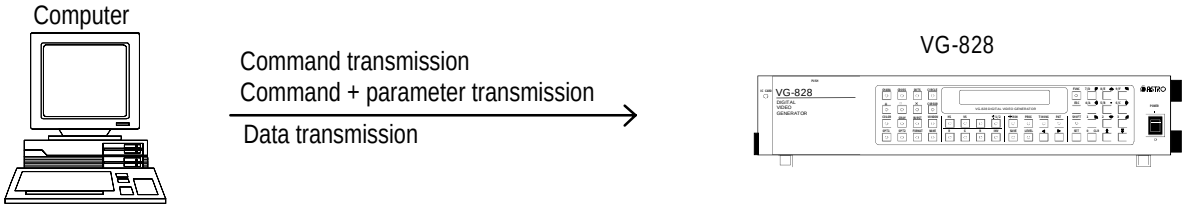
When commands are to be transmitted followed by data reception



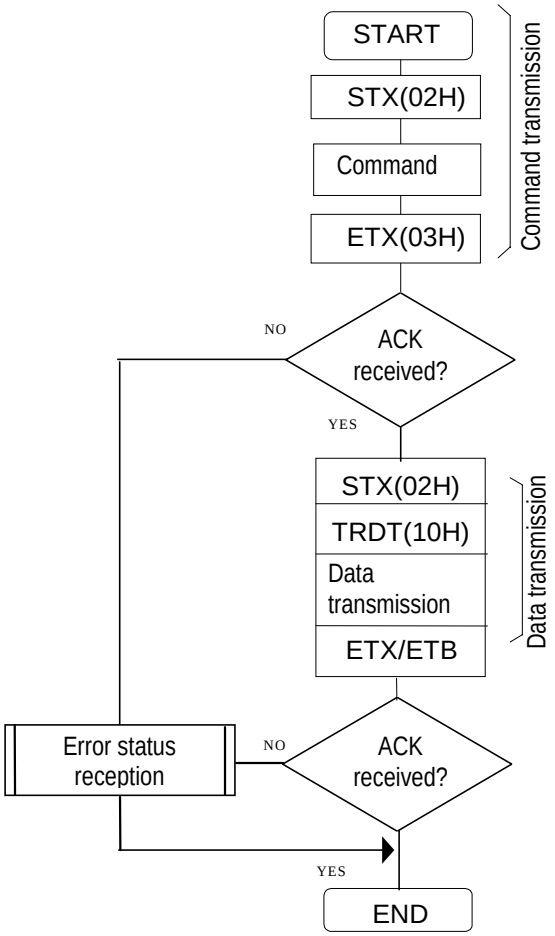
When commands and parameters are to be transmitted followed by data reception



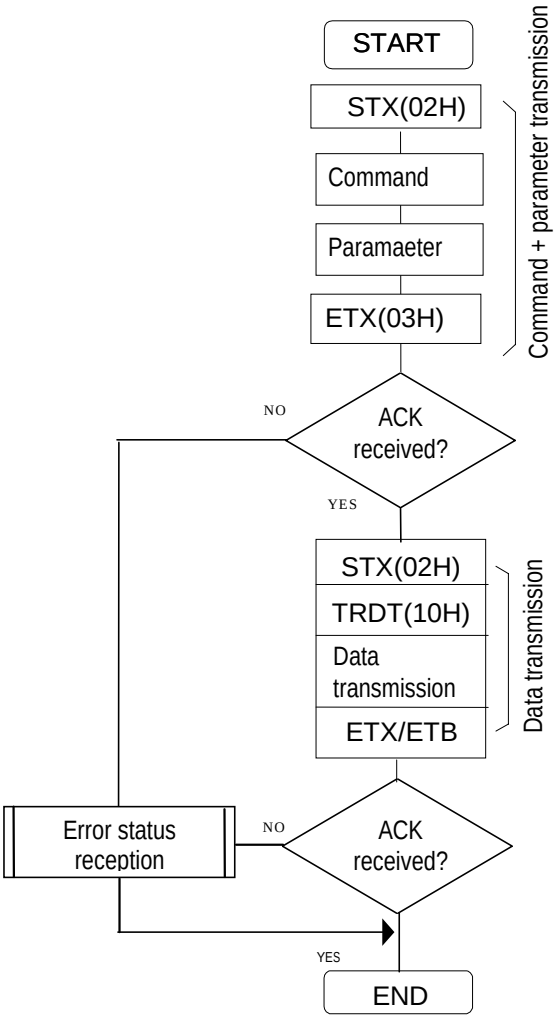
(3)



When commands are to be transmitted followed by data transmission



When commands and parameters are to be transmitted followed by data transmission

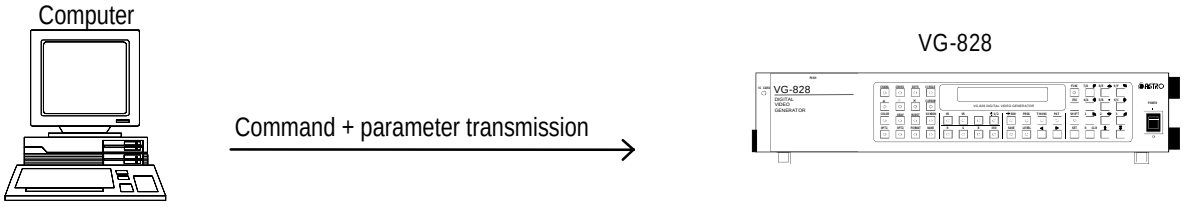


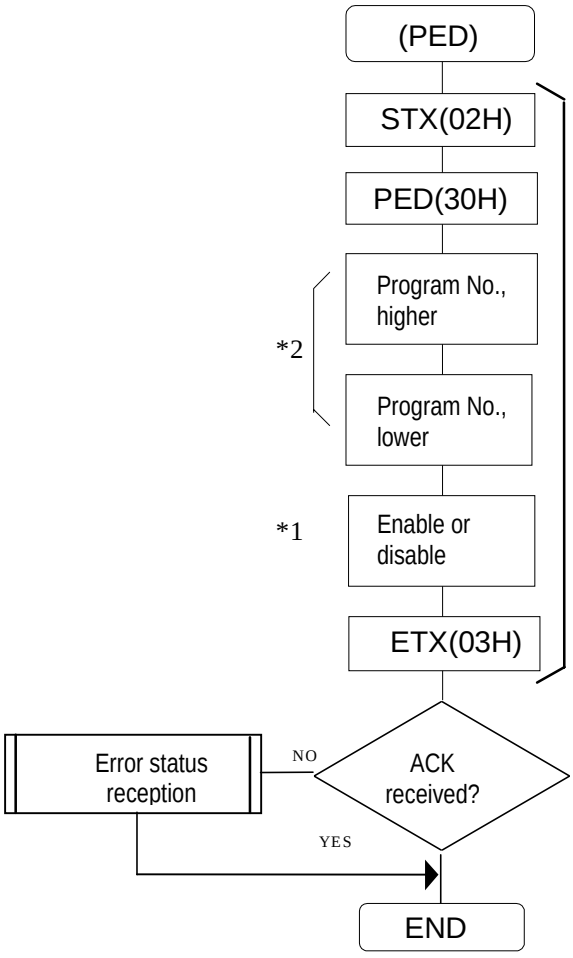
CHAPTER 8 DESCRIPTION OF CONTROL COMMAND FUNCTIONS

8-1 [PED] (30H)

This command is used to enable or disable the programs in the panel ROM. The program number (a number from 01 through 40) and the enable or disable selection data are transmitted as parameters.

* All parameters are in ASCII code.





(Example of data)

02H	**"STX"**
30H	"Command"
30H	**"0"**
31H	**"1"**
30H	**"0"**
03H	**"ETX"**

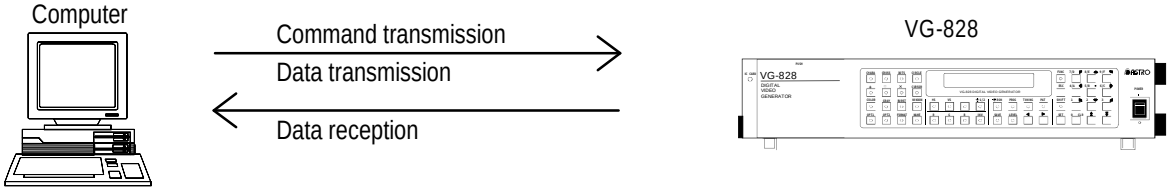
Note: In this example, program "01" is enabled.

*1: "0" is sent for enable; "1" is sent for disable.
*2: Program numbers are designated with either 2 or 3 digits.
They range from 01 to 40 when the HN58C65 is used and from 001 to 040 and from 500 to 779 when the AH-3000 is used.

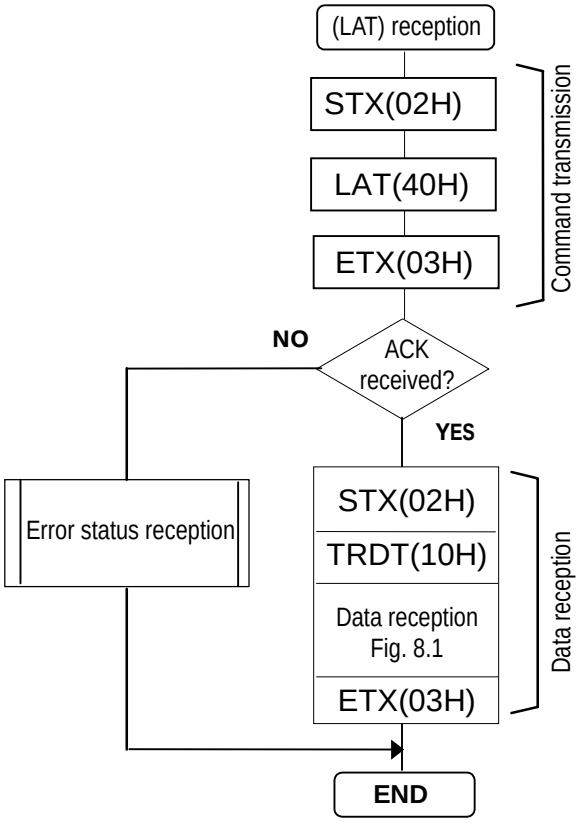
8-2 [LAT] (40H) AND [SAT] (46H)

These commands are used to transmit or receive the parameters for executing auto display. The transmitted data is written into the panel ROM. The parameters which are to be transmitted or received are program numbers consisting of an interval (time) and 3 blocks.

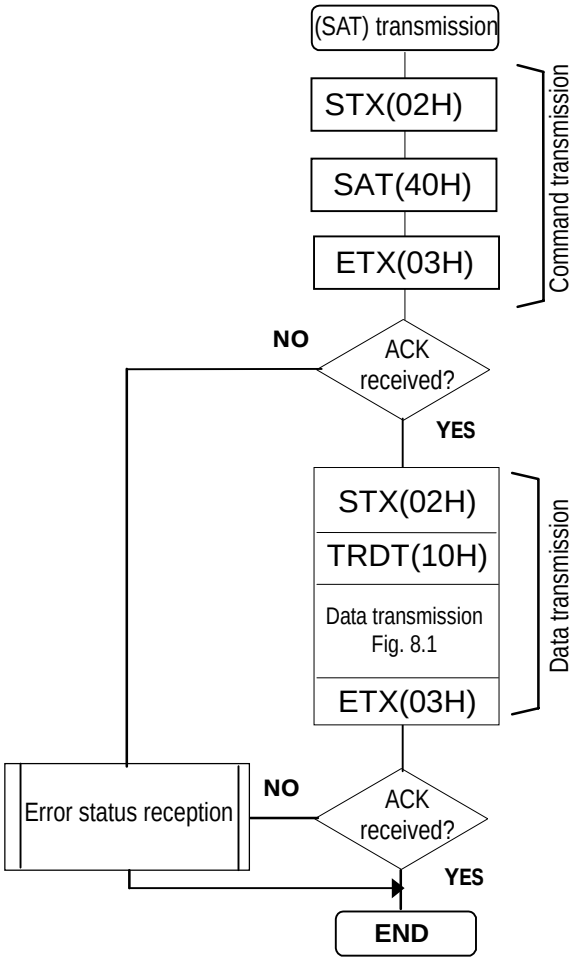
* All parameters are in ASCII code.



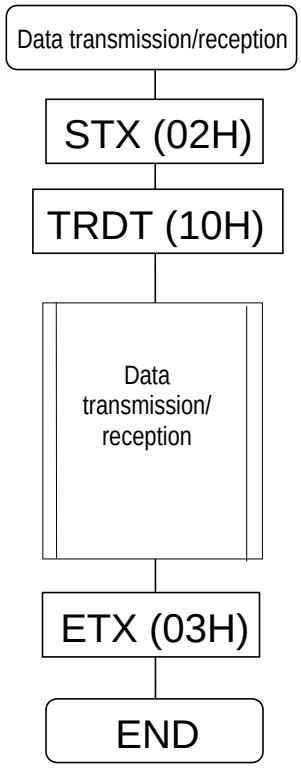
When auto display data is to be received from the VG



When auto display data is to be transmitted to the VG

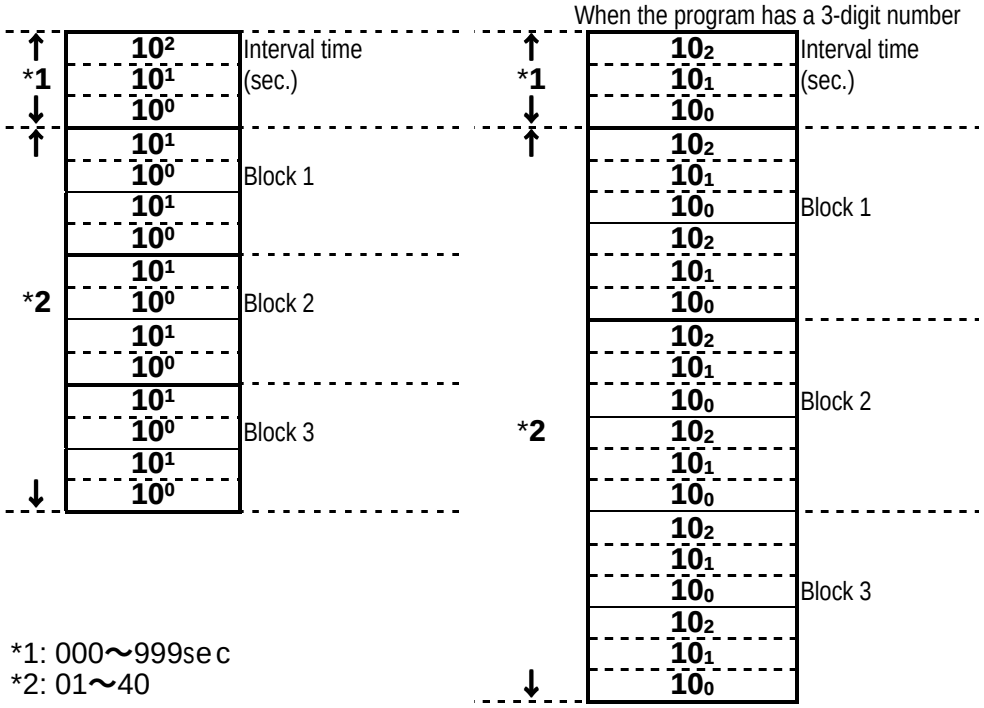


- Shown below is the format used for a program number that consists of an interval (time) and 3 blocks.



02H	"STX"
10H	"TRDT"
30H	"0"
30H	"0" (001 sec)
31H	"1"
30H	"0"
31H	"1" (01-40)
34H	"4"
30H	"0"
30H	"0"
30H	"0" (00-00)
30H	"0"
30H	"0"
30H	"0"
30H	"0" (00-00)
30H	"0"
30H	"0"
03H	"ETX"

Fig. 8-1

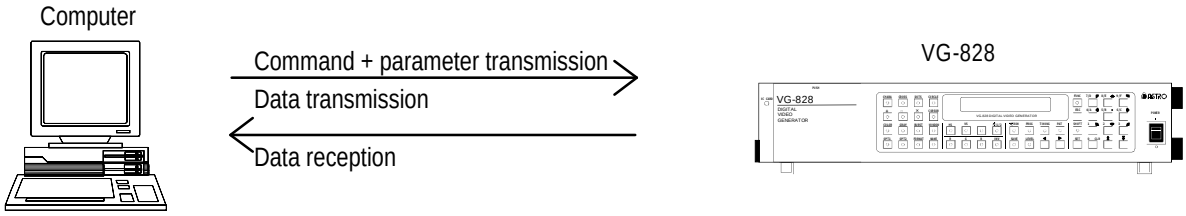


The format used is either a 2-digit program number x 2 x 3 blocks or a 3-digit program number x 2 x 3 blocks.
The program numbers range from 001 to 040 and from 500 to 779 when the AH-3000 is used.
Note: Set blocks 2 and 3 to "0" when only one block is to be used.

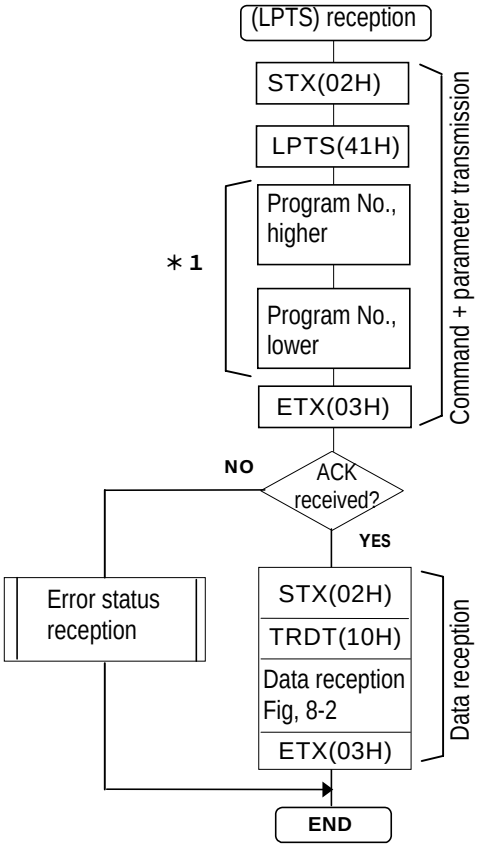
8-3 [LPTS] (41H) AND [SPTS](47H)

These commands are used to transmit or receive the pattern select data of the programs whose numbers are designated. The transmitted data is written into the buffer RAM when the program number is 00 and into the panel ROM when it is in the range from 01 to 40. The parameters to be transmitted or received are in pattern key code.

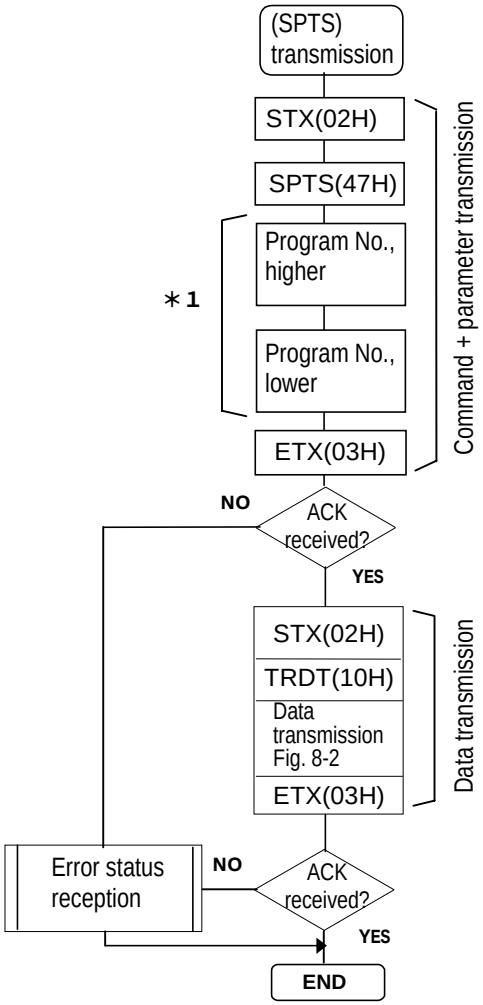
* All parameters are in ASCII code.



When pattern select data is to be received from the VG

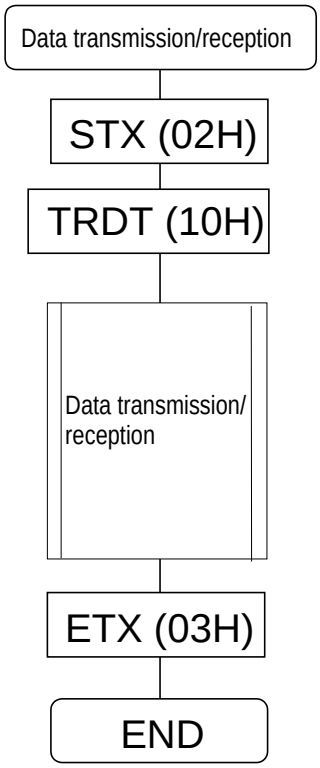


When pattern select data is to be transmitted to the VG



*1: Program numbers are designated with either 2 or 3 digits.
They range from 01 to 40 when the HN58C65 is used and from 001 to 040 and from 500 to 779 when the AH-3000 is used.

• Shown below is the format used for the pattern select data.



02H	"STX"
10H	"TRDT"
50H	"CHARA"
51H	"CROSS"
⋮	⋮
03H	"ETX"

*1: The data length is variable.

Fig. 8-2

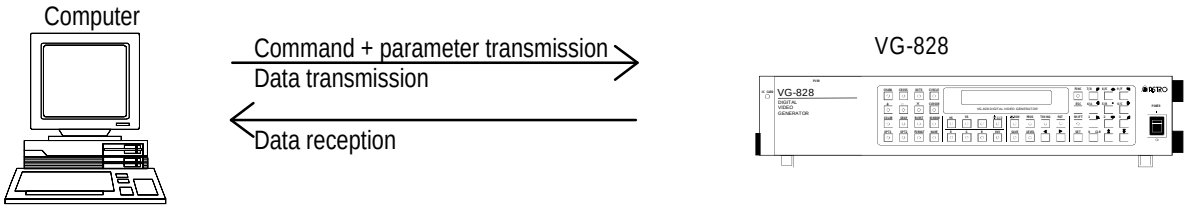
CHARA (50H)
CROSS (51H)
COLOR (57H)
•
•
•
R (5EH)
G (5FH)
B (60H)

Note: For details on the pattern select key or output key codes, refer to the key code table in Section 6-5.

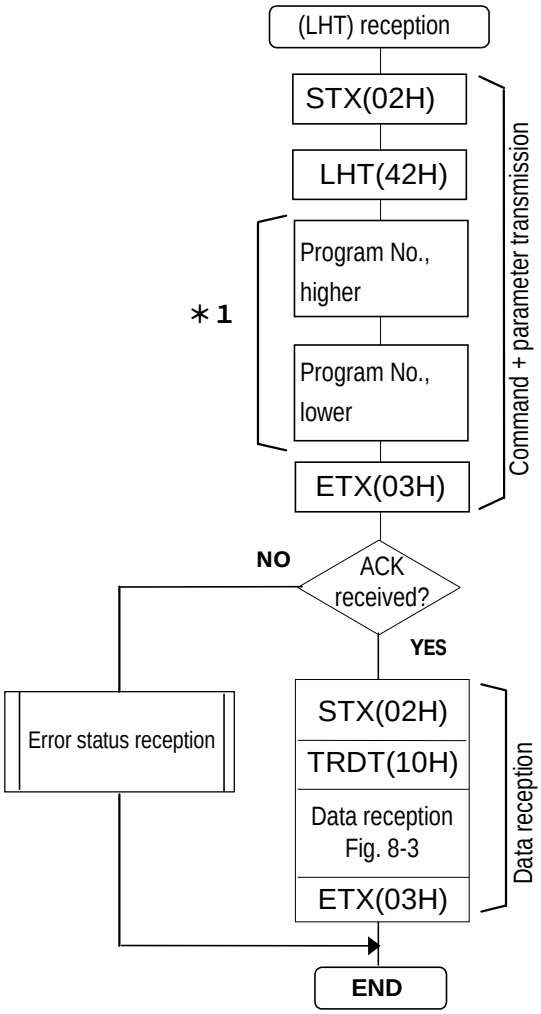
8-4 [LHT](42H) AND [SHT] (48H)

These commands are used to transmit or receive the H timing data of the programs whose numbers are designated. The transmitted data is written into the buffer RAM when the program number is 00 and into the panel ROM when it is in the range from 01 to 40.

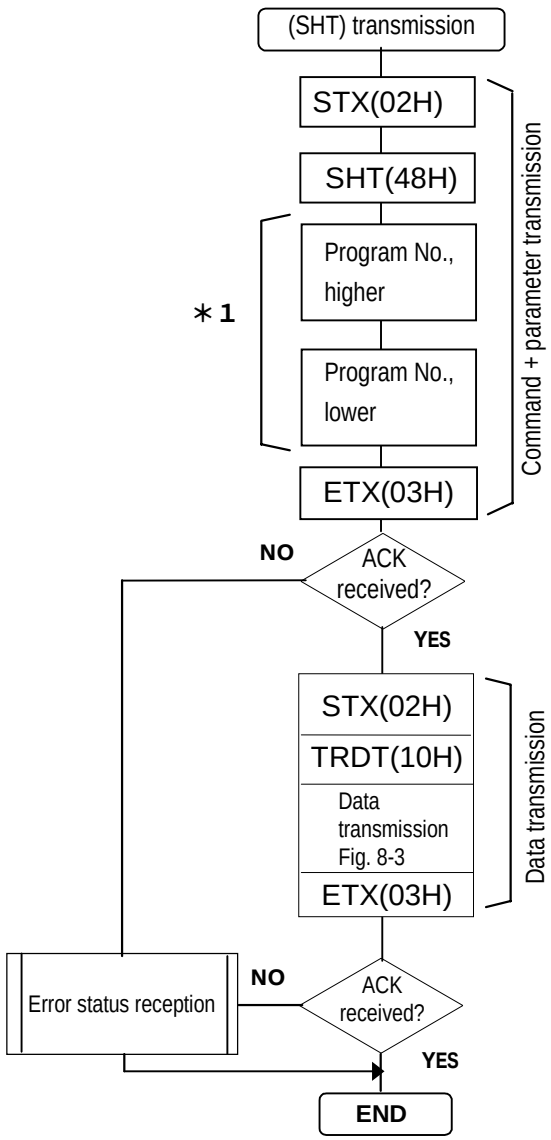
* All parameters are in ASCII code.



When H timing data is to be received from the VG



When H timing data is to be transmitted to the VG



*1: Program numbers are designated with either 2 or 3 digits.
They range from 01 to 40 when the HN58C65 is used and from 001 to 040 and from 500 to 779 when the AH-3000 is used.

- Shown below is the format used for the H timing data.

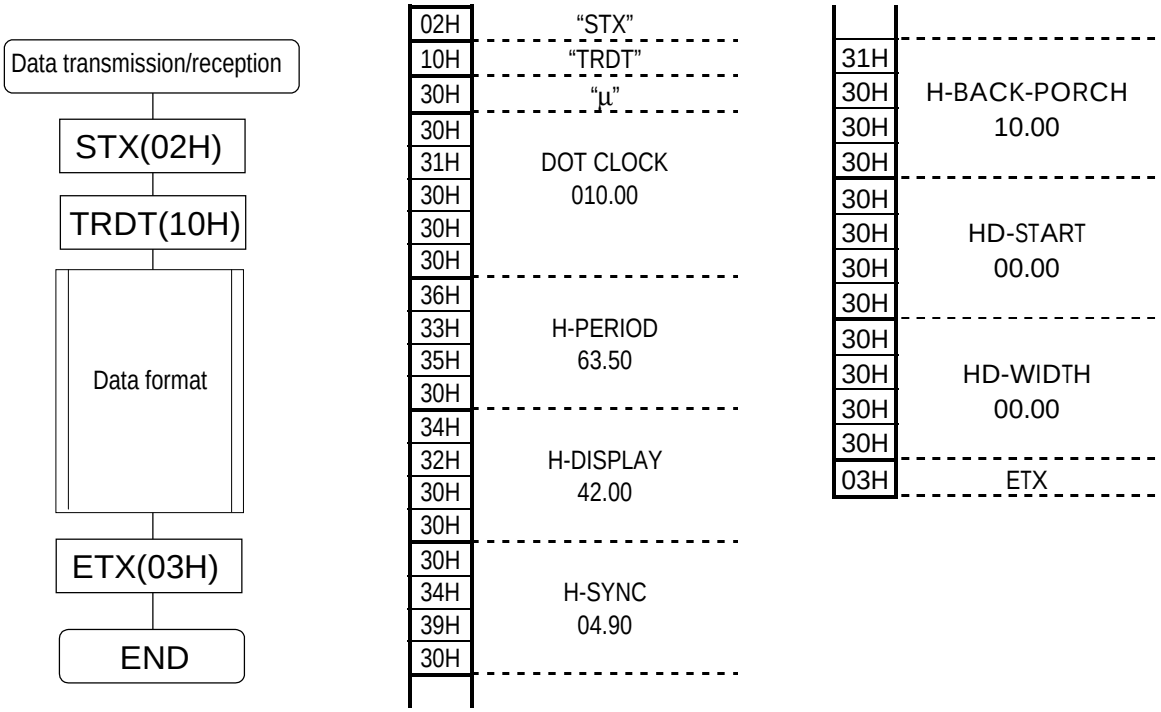
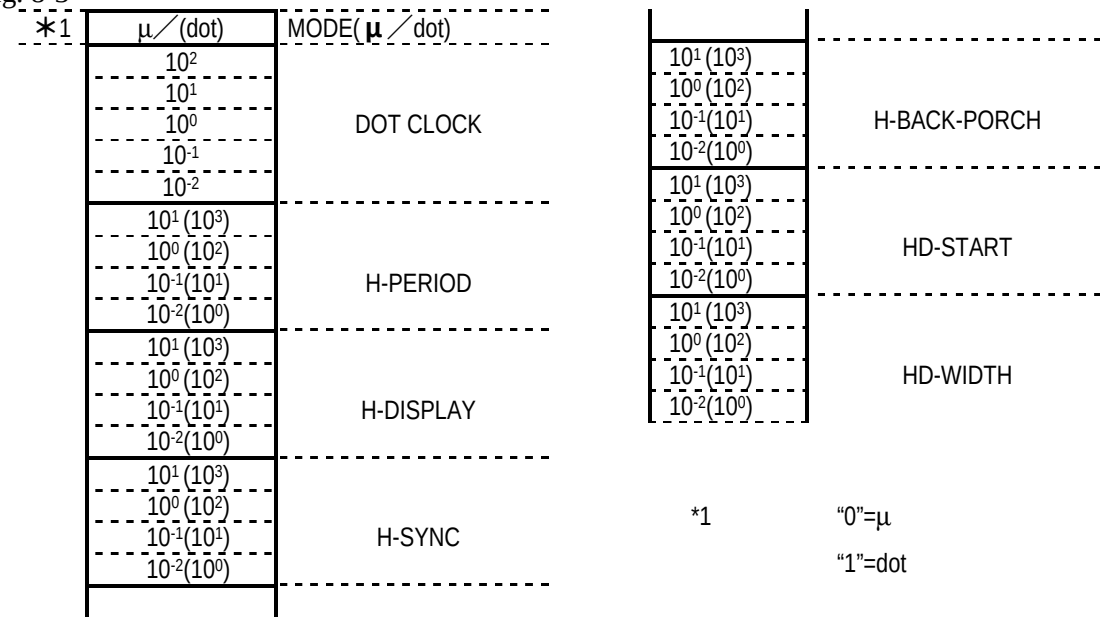


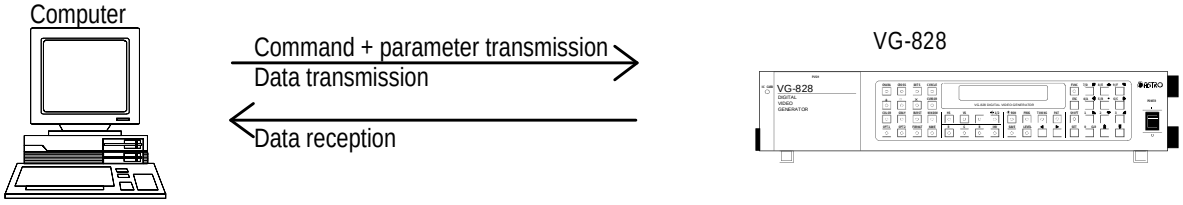
Fig. 8-3



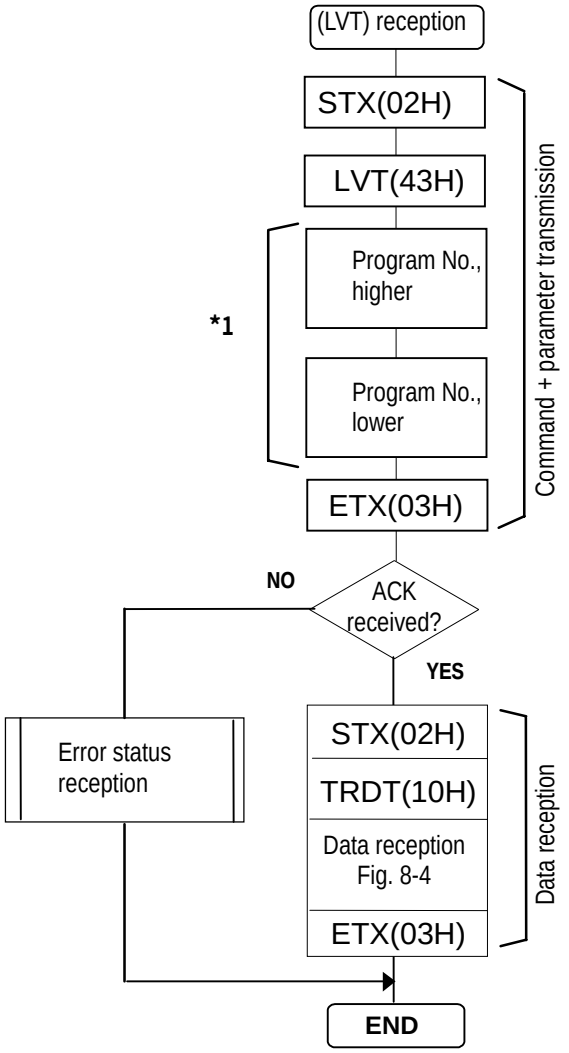
8-5 [LVT] (43H) AND [SVT] (49H)

These commands are used to transmit or receive the V timing data of the programs whose numbers are designated. The transmitted data is written into the buffer RAM when the program number is 00 and into the panel ROM when it is in the range from 01 to 40.

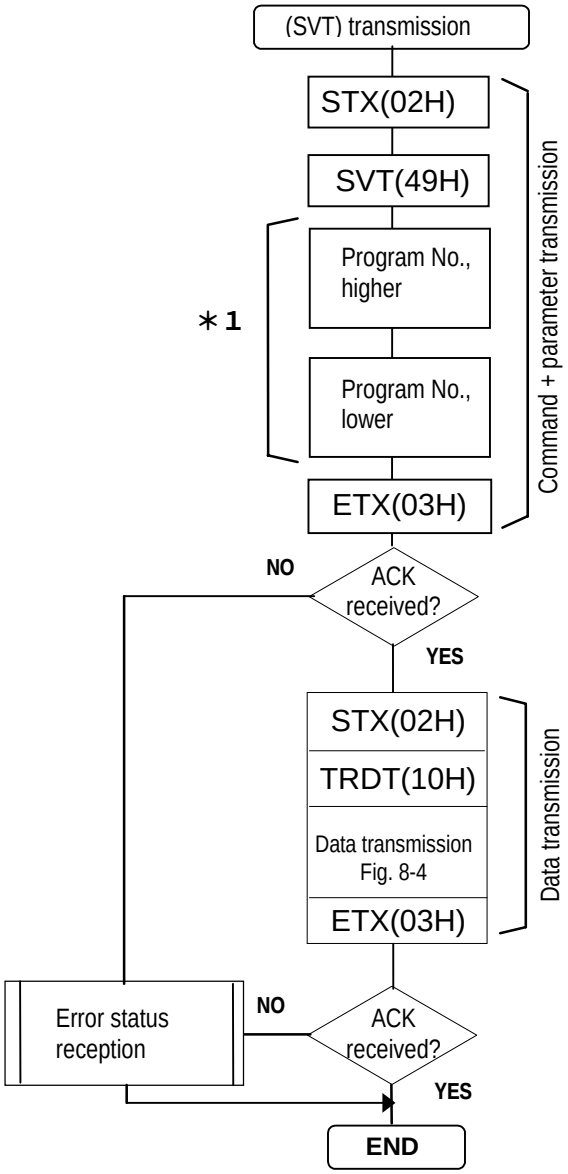
* All parameters are in ASCII code.



When V timing data is to be received from the VG



When V timing data is to be transmitted to the VG



*1: Program numbers are designated with either 2 or 3 digits.
They range from 01 to 40 when the HN58C65 is used and from 001 to 040 and from 500 to 779 when the AH-3000 is used.

- Shown below is the format used for the V timing data.

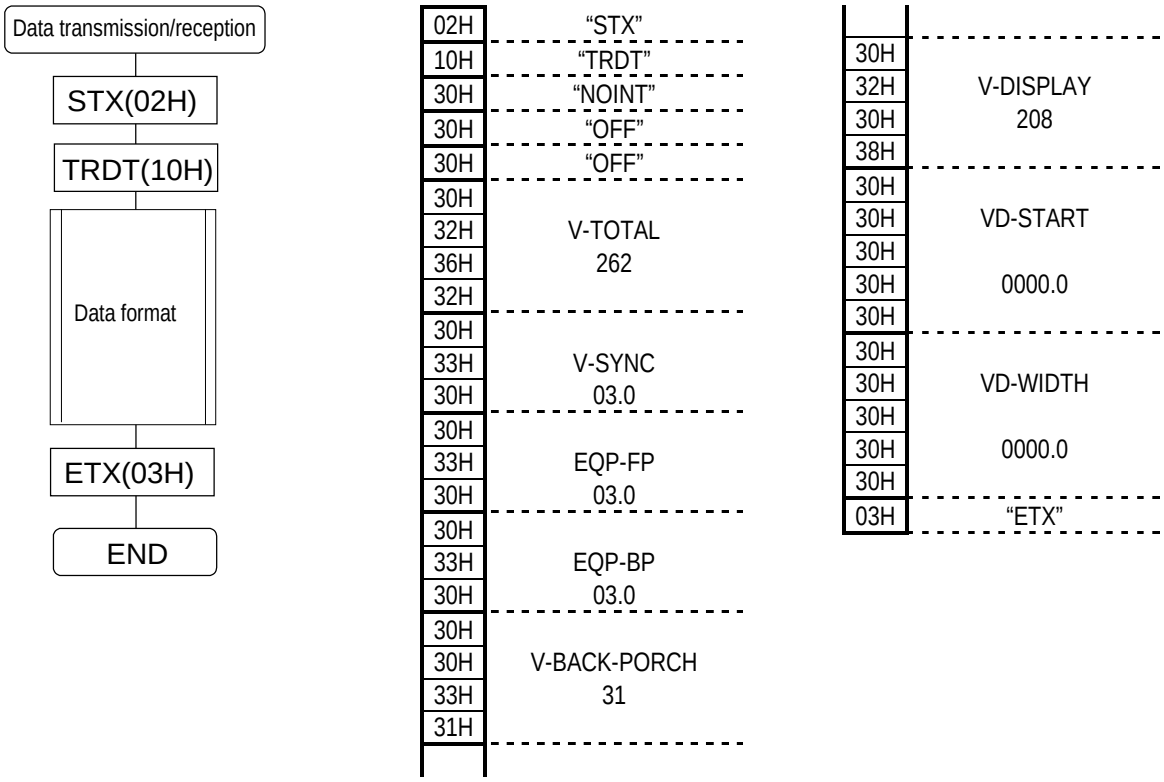
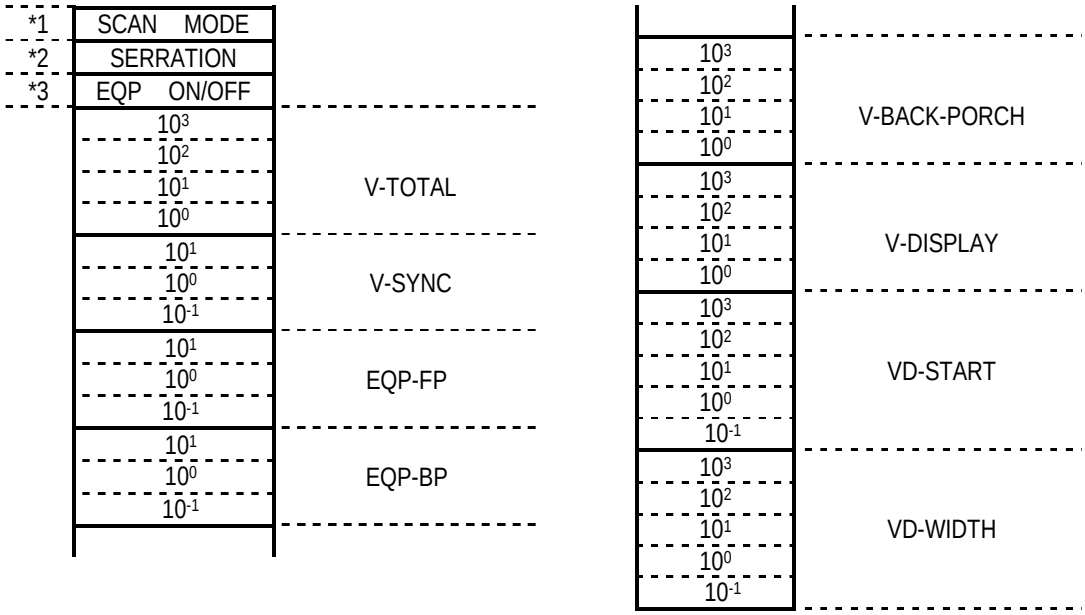


Fig. 8-4

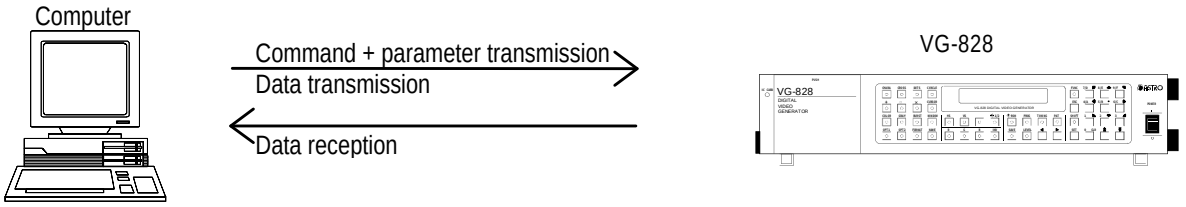


*1	SCAN MODE	"0"=NOINT,"1"=INT&SYNC,"2"=INT&VIDEO
*2	SERRATION	"0"=OFF,"1"=0.5H,"2"=1H,"3"=XOR
*3	EQP ON/OFF	"0"=OFF,"1"=ON

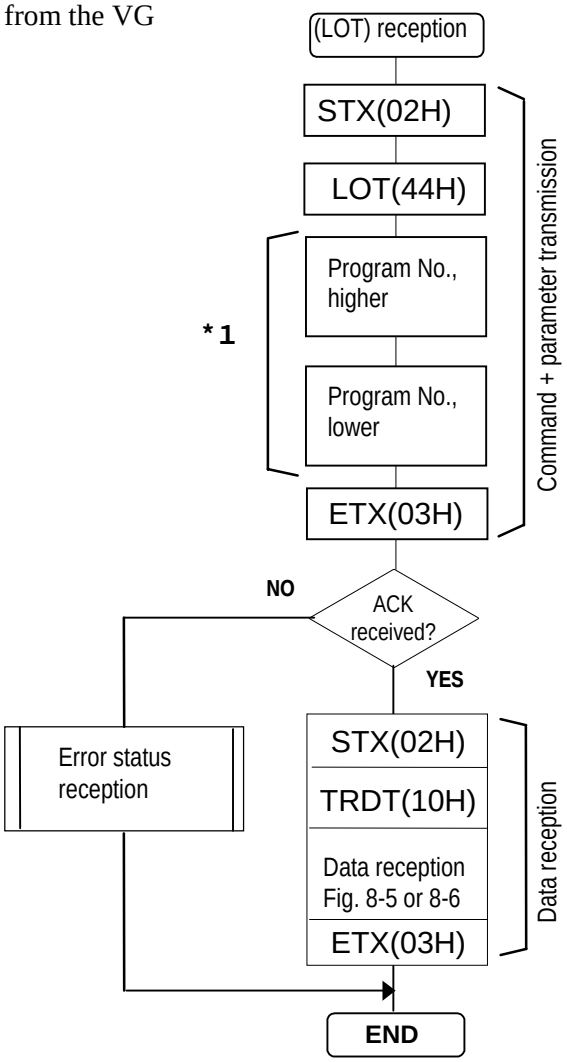
8-6 [LOT[(44H) AND [SOT] (4AH)

These commands are used to transmit or receive the output condition data of the programs whose numbers are designated. The transmitted data is written into the buffer RAM when the program number is 00 and into the panel ROM when it is in the range from 01 to 40.

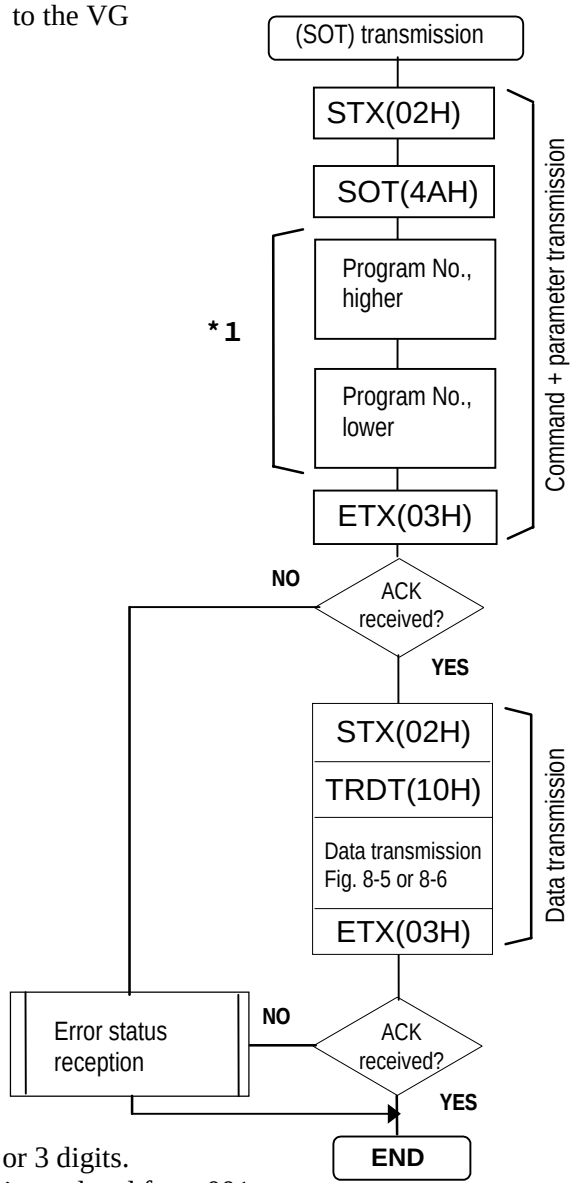
* All parameters are in ASCII code.
* The data format differs depending on whether the panel ROM execution mode (DIP switch 5) has been set to analog (ON) or digital (OFF).



When output condition data is to be received from the VG

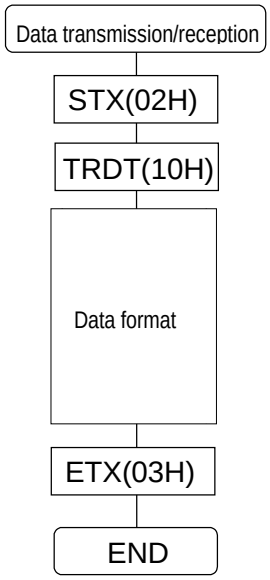


When output condition data is to be transmitted to the VG



*1: Program numbers are designated with either 2 or 3 digits.
They range from 01 to 40 when the HN58C65 is used and from 001 to 040 and from 500 to 779 when the AH-3000 is used.

- Shown below is the format used for the digital output condition data.



02H	"STX"
10H	"TRDT"
30H	"1/1 CLOCK"
30H	"NEGA"
30H	"NEGA"
30H	"NEGA"
31H	"POSI"
31H	"POSI"
30H	"NEGA"
30H	"NEGA"
31H	"POSI"
30H	"NEGA"
30H	"NRZ"
31H	ON
30H	OFF
30H	OFF
30H	ALL
33H	16ns
38H	8 bits
46H	R d7 to d4=ON
46H	R d3 to d0=ON
30H	G d7 to d4=OFF
30H	G d3 to d0=OFF
43H	B d7 to d6=ON d5 to d4=OFF
33H	B d3 to d2=OFF d1 to d0=ON
03H	ETX

Fig. 8-5

*1	CLOCK MODE
	HS
	VS
	CS
	HD
*2	VD
	1ch RGB
	2ch RGB
	CLOCK
	DISP
*3	RZ/NRZ
*4	SW0
	SW1
	DELAY MODE
*5	CLOCK AREA
*6	DELAY TIME
*7	RGB BIT OUT
*8	R MASK, higher
	R MASK, lower
	G MASK, higher
	G MASK, lower
	B MASK, higher
	B MASK, lower

*1	"0"=1/1 clock		"1"=1/2 clock	
*2	"0"=NEGA		"1"=POSI	
*3	"0"=NRZ		"1"=RZ	
*4	"0"=OFF		"1"=ON	
*5	"0"=DISP		"1"=ALL	
*6	"1"=4ns	"2"=8ns	"3"=12ns	"4"=16ns
	"5"=20ns	"6"=24ns	"7"=28ns	"8"=32ns
*7	"1"=1bit	"2"=2bit	"3"=3bit	"4"=4bit
	"5"=5bit	"6"=6bit	"7"=7bit	"8"=8bit

*8

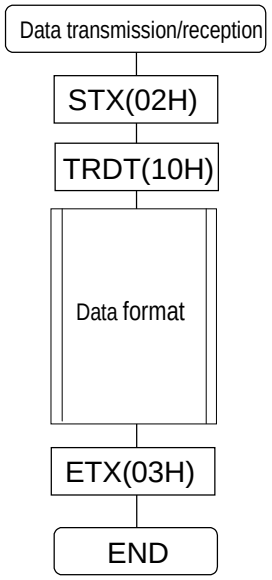
d7	d6	d5	d4	d3	d2	d1	d0
Mask, higher bits				Mask, lower bits			

"0"=OFF "1"=ON

1	0	1	0	0	1	0	1
"A"H				"5"H			
↓ (ASCII)				↓ (ASCII)			
41H				35H			

d7,d5,d2,d0=ON d6,d4d3,d1=OFF

- Shown below is the format used for the analog output condition data.



02H	"STX"
10H	"TRDT"
30H	"Analog"
30H	"NEGA"
30H	"NEGA"
30H	"NEGA"
31H	"POSI"
31H	"POSI"
31H	"POSI"
31H	"POSI"
37H	"RGB"
30H	"NRZ"
31H	"POSI"
31H 30H 30H	VIDEO LEVEL 1.00
30H 32H 35H	SET UP 0.25
30H 33H 30H	SYNC LEVEL 0.30
03H	"ETX"

Fig. 8-6

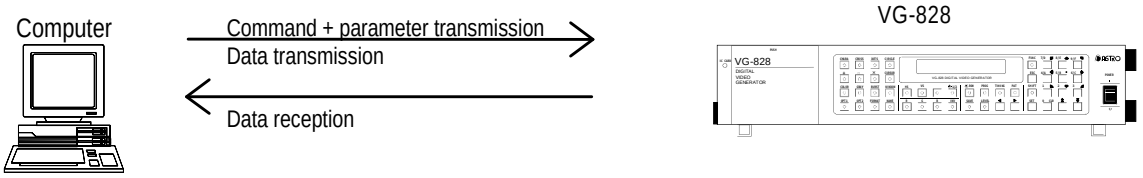
*1	OUT PUT	
*2	HS	
	VS	
*3	CS	
*4	HD	
	VD	
	RH GH BH	
*5	V/S	
*6	RZ/NRZ	
*4	CLOCK	
	10^0	VIDEO LEVEL
	10^{-1}	
	10^{-2}	
	10^0	SET UP
	10^{-1}	
	10^{-2}	
	10^0	SYNC LEVEL
	10^{-1}	
	10^{-2}	

*1	"0"=analog,		"1"=TTL		
*2	"0"=NEGA	"1"=POSI		"2"=OFF	
*3	"0"=NEGA	"1"=POSI	"2"=OFF	"3"=HS	"4"=VS
*4	"0"=NEGA		"1"=POSI		
*5	"0"=none "4"=B	"1"=R "5"=RB	"2"=G "6"=GB	"3"=RG "7"=RGB	
*6	"0"=NRZ		"1"=RZ		

8-7 [LPT] (45H) AND [SPT] (4BH)

These commands are used to transmit or receive the pattern data of the programs whose numbers are designated. The transmitted data is written into the buffer RAM when the program number is 00 and into the panel ROM when it is in the range from 01 to 40. The pattern data is divided into 12 blocks for transmission and reception.

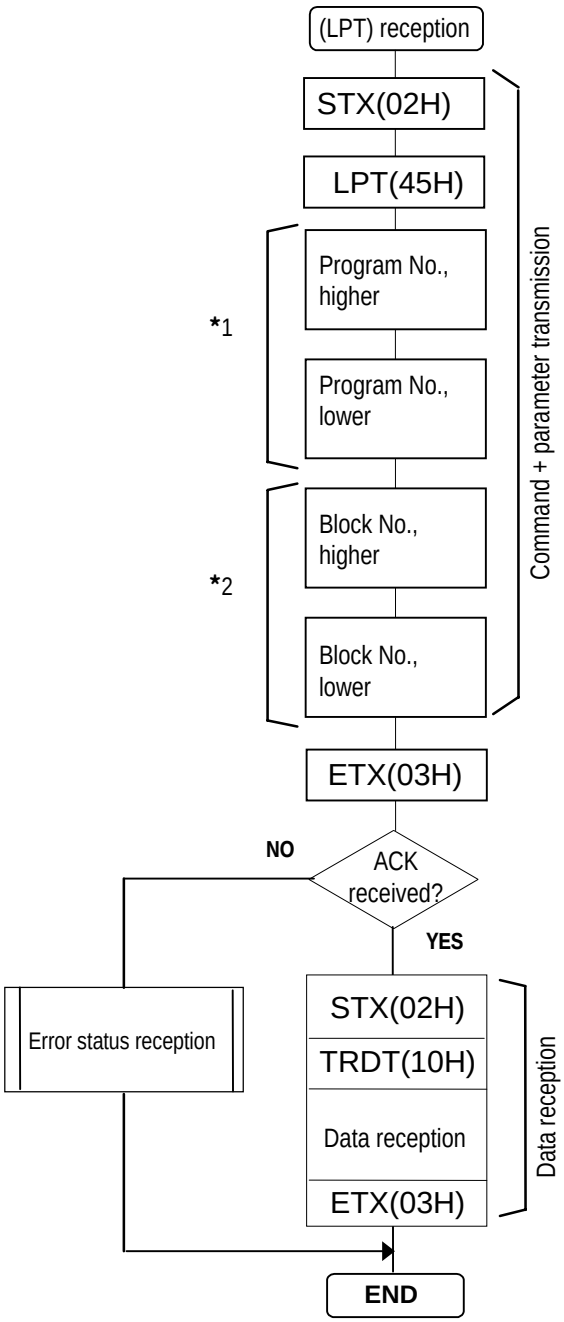
* All parameters are in ASCII code.



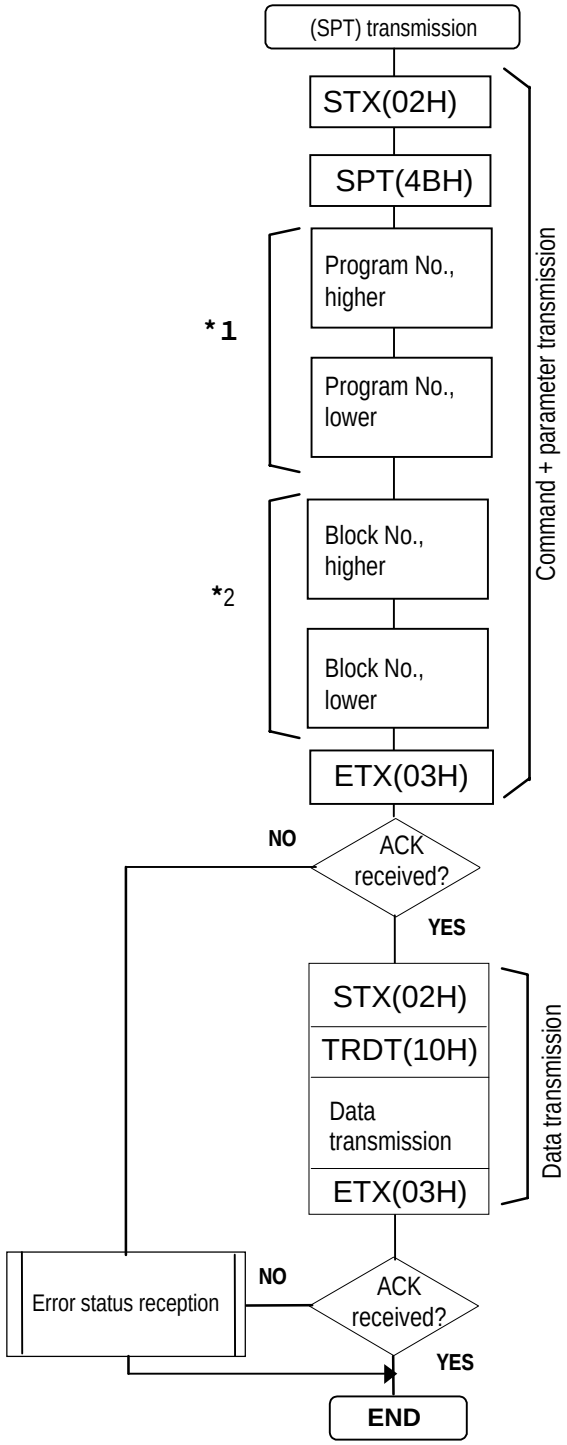
Block No.	Pattern data
01	Graphic color
02	Character
03	Crosshatch
04	Dot
05	Circle
06	Burst
07	Window
08	Option 1 (*1)
09	Option 2 (*1)
10	Color bar
11	Gray scale
12	Half-tones (analog mode only)

*1: The (LPT) and (SPT) commands cannot be used when optional pattern codes are designated with two digits (00 to 1F). Use the (LPT2)(55H) and (SPT2)(5BH) commands instead.
Apart from the number of digits (1 or 2) used for the optional pattern codes, operation is the same in all other respects.

When pattern data is to be received from the VG



When pattern data is to be transmitted to the VG



*1: Program numbers are designated with either 2 or 3 digits.
They range from 01 to 40 when the HN58C65 is used and from 001 to 040 and from 500 to 779 when the AH-3000 is used.

*2: "01" to "12" (ASCII codes) (always 2 digits)

Block No.[01] Format used for graphic color data

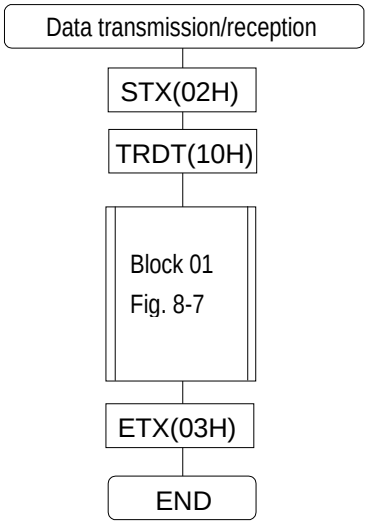


Fig. 8-7

*1	10^2 10^1 10^0	R	32H 35H 35H “255”
	10^2 10^1 10^0	G	32H 35H 35H “255”
	10^2 10^1 10^0	B	32H 35H 35H “255”
*2	Graphic color (TTL)		37H RGB
*3	Graphic half-tones		37H RH GH BH
*4	Background		30H OFF

*1: The analog colors are designated here (000 to 255).
*2: The TTL color or colors are designated here.
"0"=none, “1” = R, “2” =G, “3” = RG, “4” = B, “5” = RB, “6” = GB, “7” = RGB
*3: The TTL half-tone color or colors are designated here.
"0"=none, “1” = RH, “2” =GH, “3” = RHGH, “4” = BH, “5” = RHBH, “6” = GB, “7” = RHGHBH
*4: "0"= OFF, "1"=ON

Block No.[02] Format used for character data

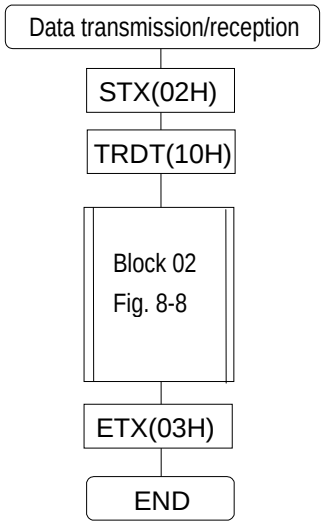


Fig. 8-8

*1	Character format		31H Format 1
*2	Character font		31H 7×9
*3	10^1 10^0	Character code	34H 38H 48(H)
*4	10^1 10^0	H cell size	36H 34H H 64
*4	10^1 10^0	V cell size	36H 34H V 64

*1: "0"=format 0; "1"=format 1; "2"=format 2
*2: "0"=5×7, "1"=7×9, "2"=16×16
*3: "20" to "E3 "20" to "EF" when AH-3000 is used.
*4: "01" to "64"

Block No.[03] Format used for crosshatch data

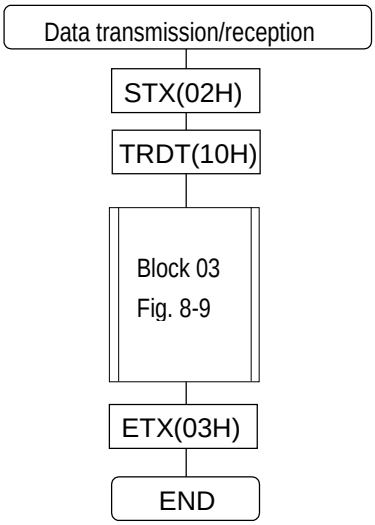
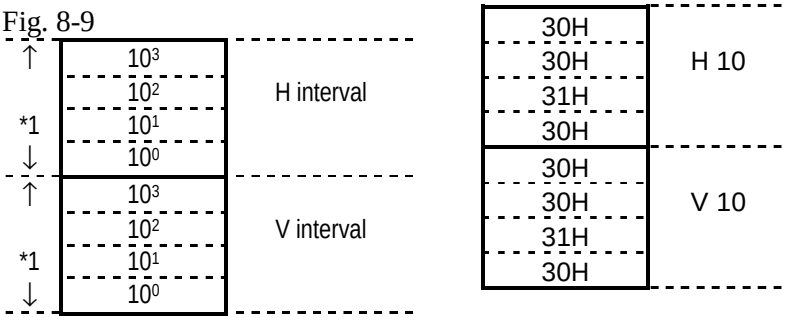


Fig. 8-9



*1 "0000" to "9999"

Block No.[04] Format used for dot data

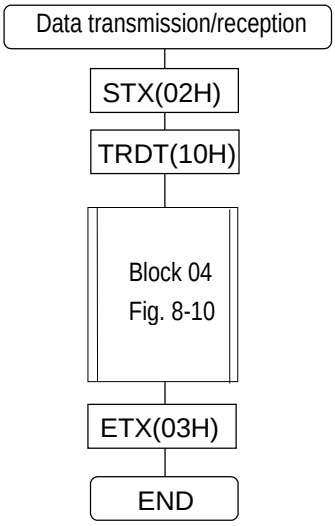
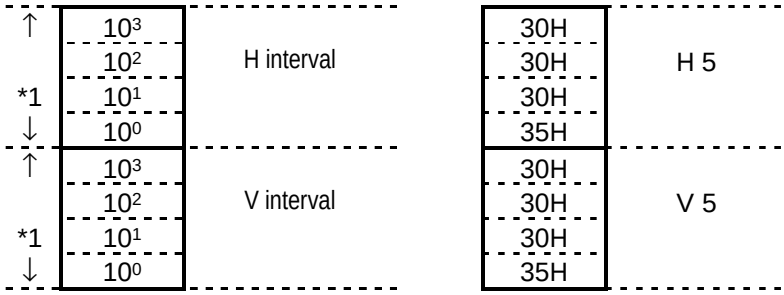


Fig. 8-10



*1 "0001" to "9999"

Block No.[05] Format used for circle

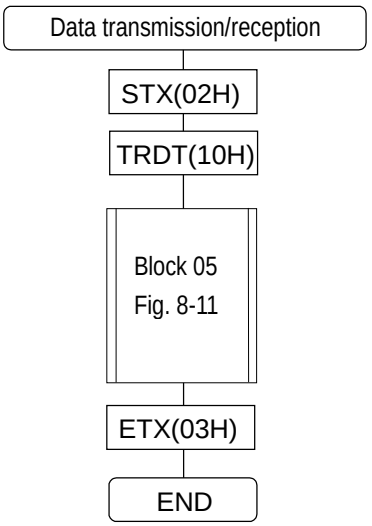


Fig. 8-11

*1	Circle format	32H	Format 2

∗1 "0" to "4"

Block No.[06] Format used for burst data

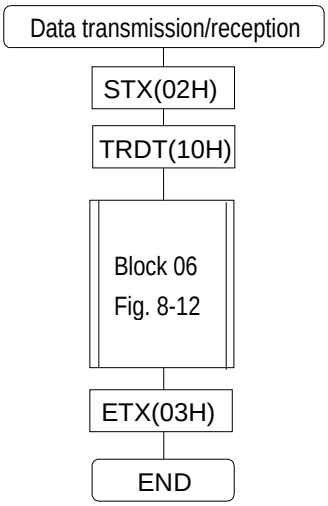


Fig. 8-12

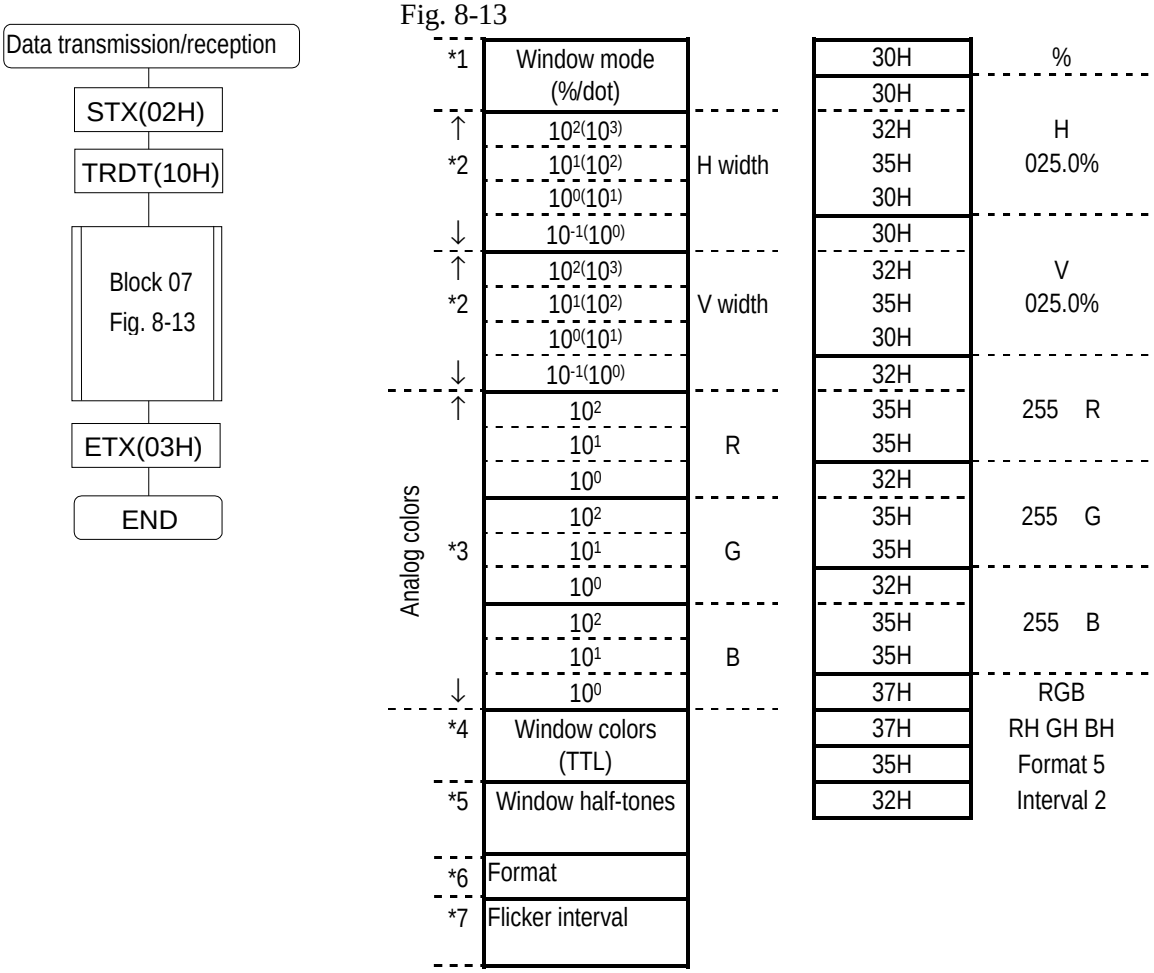
∗1	Burst format		32H	Format 2
∗2	10^1	Interval	30H	Interval 01
↓	10^0		31H	
∗2	10^1	Step	30H	Step 03
↓	10^0		33H	

*1: "0" to "3"

*2: "01" to "99"

Block No.[07] Format used for window data

Fig. 8-13



*1 “0”=%, “1”= dots
*2 “0001” to “1000”%, "0004" and up in display dots
*3 “000” to “255”
*4 “0”="0"=none, “1”=R, “2”=G, “3”=RG, “4”=B, “5”=RB, “6”=GB, “7”=RGB
*5 “0”="0"=none, “1”=RH, “2”=GH, “3”=RHGH, “4”=BH, “5”=RHBH, “6”=GHBH, “7”=RHGHBH
*6 “0” to “F”
*7 “0” to “7”

For details on setting the flicker interval, refer to the flicker intervals in the description of patterns in Section 5-3.

Block No.[08] Format used for option 1 data

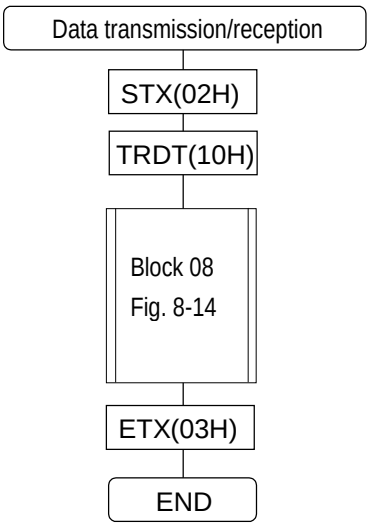


Fig. 8-14

*1	Option code	31H	Format 1

*1 “0” to “F”(“0” to “9”,“A” to “F”)

The optional pattern codes are "00" to "1F" when they are designated with 2 digits.
Use the (LPT2), (SPT2), (LPD2), (SPD2) and (EXPBN2) commands for transmission and reception.

Block No.[09] Format used for option 2 data

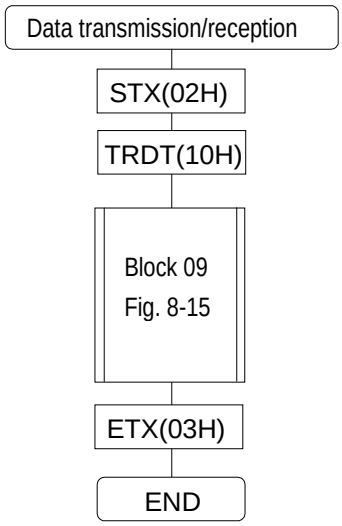


Fig. 8-15

*1	Option code	31H	Option code 1

*1 “0” to “F”(“0” to “9”, “A” to “F”)

The optional pattern codes are "00" to "1F" when they are designated with 2 digits.
Use the (LPT2), (SPT2), (LPD2), (SPD2) and (EXPBN2) commands for transmission and reception.

Block No.[10] Format used for color bar data

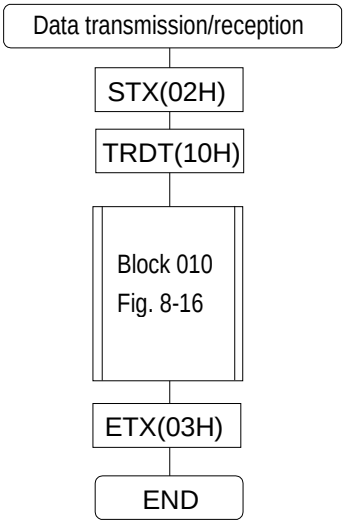


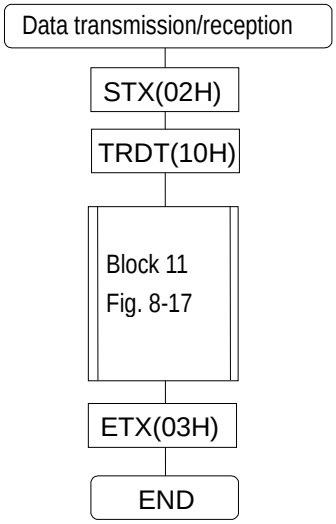
Fig. 8-16

*1	Mode (%/dot)	30H	%
↑	$10^2(10^3)$	30H	
*2	$10^1(10^2)$	30H	
	$10^0(10^1)$	36H	6.3%
↓	$10^{-1}(10^0)$	33H	
↑	$10^2(10^3)$	30H	
*2	$10^1(10^2)$	31H	12.5%
	$10^0(10^1)$	32H	
↓	$10^{-1}(10^0)$	35H	
*3	Direction H/V	30H	H
↑	Color designation	30H	None
	Color designation	31H	R
	Color designation	32H	G
	Color designation	33H	RG
	Color designation	34H	B
	Color designation	35H	RB
	Color designation	36H	GB
*4	Color designation	37H	RGB
	Color designation	30H	None
	Color designation	31H	R
	Color designation	32H	G
	Color designation	33H	RG
	Color designation	34H	B
	Color designation	35H	RB
	Color designation	36H	GB
↓	Color designation	37H	RGB

*1 “0”=% “1”= dots
*2 “0000” to “1000”%, "0004" and up in display dots
*3 horizontal; "1"=vertical; "2"=horizontal repeated; "3"=vertical repeated
*4 “0”= none, “1”=R, “2”=G, “3”=RG, “4”=B, “5”=RB, “6”=GB, “7”=RGB

Block No.[11] Format used for gray scale data

Fig. 8-17



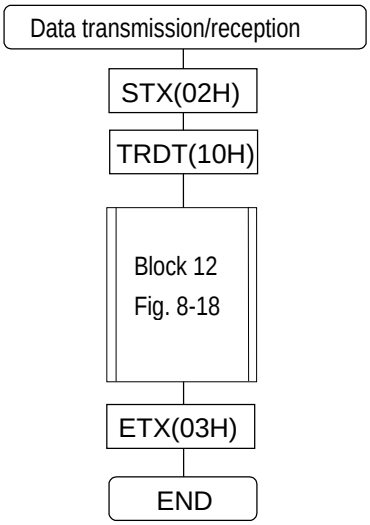
		Direction H/V			30H	H (horizontal)
*1		10^2			30H	
	1	10^1	Level	1	31H	16
		10^0			36H	
		10^2			30H	
*2	2	10^1	Level	2	33H	32
		10^0			32H	
		10^2			30H	
	3	10^1	Level	3	34H	48
		10^0			38H	
		10^2			30H	
	4	10^1	Level	4	36H	64
		10^0			34H	
	.	.	.	.	.	.
	.	.	.	.	.	.
	.	.	.	.	.	.
		10^2			31H	
	12	10^1	Level	12	39H	192
		10^0			32H	
		10^2			32H	
	13	10^1	Level	13	30H	208
		10^0			38H	
		10^2			32H	
*2	14	10^1	Level	14	32H	224
		10^0			34H	
		10^2			32H	
	15	10^1	Level	15	34H	240
		10^0			30H	
		10^2			32H	
	16	10^1	Level	16	35H	255
		10^0			35H	

*1 "0"=horizontal; "1"=vertical

*2 “000” to “255”

Block No.[12] Format used for half-tone data

Fig. 8-18



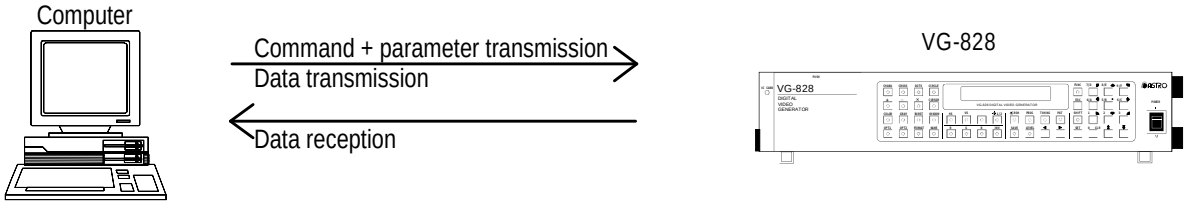
*1	Direction H/V	30H	H (horizontal)
↑	Color designation	30H	None
	Color designation	31H	R
	Color designation	32H	G
	Color designation	33H	RG
	Color designation	34H	B
	Color designation	35H	RB
	Color designation	36H	GB
*2	Color designation	37H	RGB
	Color designation	30H	None
	Color designation	31H	RH
	Color designation	32H	GH
	Color designation	33H	RHGH
	Color designation	34H	BH
	Color designation	35H	RHBH
	Color designation	36H	GHBH
↓	Color designation	37H	RHGHBH

*1 "0"=horizontal; "1"=vertical

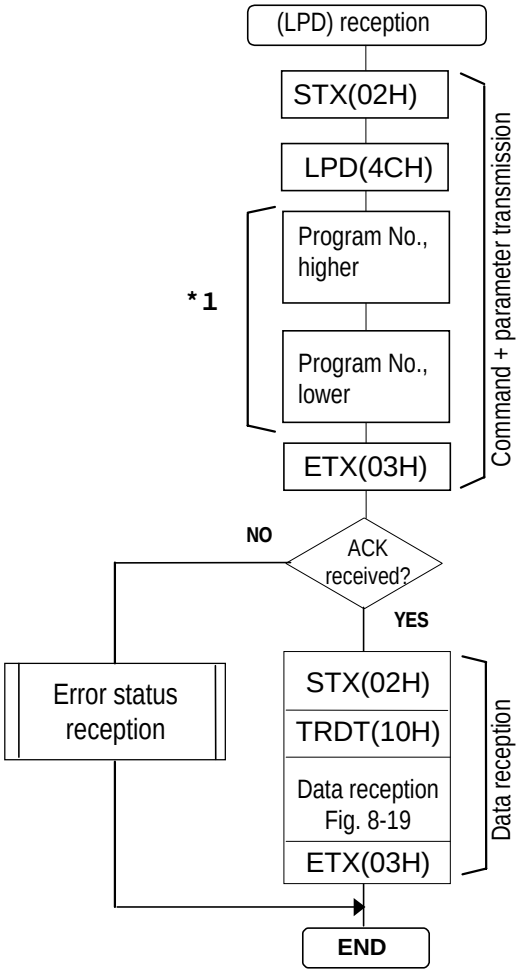
*2 “0”= none, “1”=RH, “2”=GH, “3”=RHGH, “4”=BH, “5”=RHBH, “6”=GHBH, “7”=RHGHBH

8-8 [LPD] (4CH) AND [SPD] (4DH)

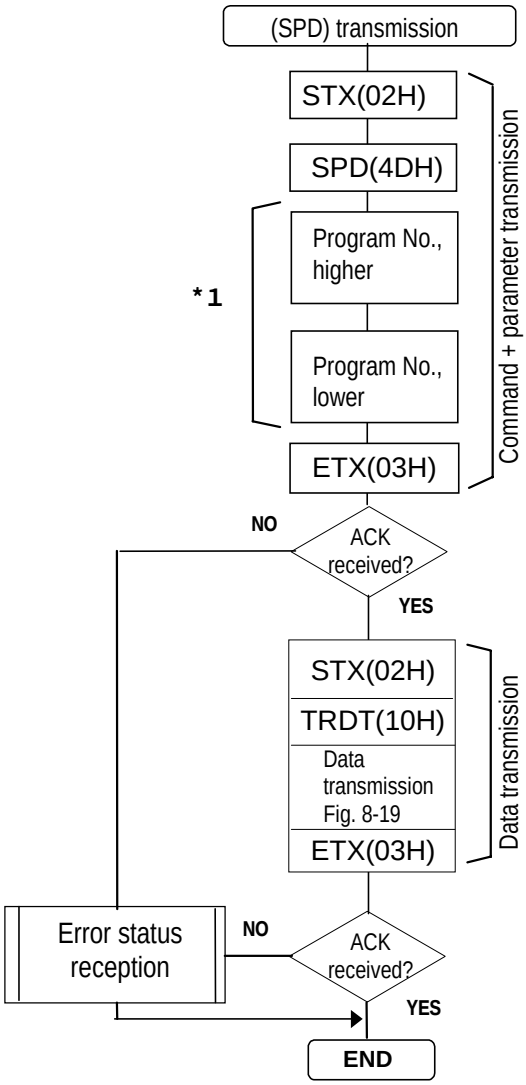
These commands are used to transmit and receive all the data of the programs whose numbers are designated. The transmitted data is written into the buffer RAM when the program number is 00 and into the panel ROM, and it is not executed when it is in the range from 01 to 40.



When the program data is to be received from the VG



When the program data is to be transmitted to the VG



*1: Program numbers are designated with either 2 or 3 digits.
They range from 01 to 40 when the HN58C65 is used and from 001 to 040 and from 500 to 779 when the AH-3000 is used.

The (LPD) and (SPD) commands cannot be used when optional pattern codes are designated with two digits (00 to 1F). Use the (LPD2)(5CH) and (SPD2)(5DH) commands instead for transmission and reception.

Apart from the number of digits (1 or 2) used for the optional pattern codes, operation is the same in all other respects.

- Shown below is the format used for 1-program data in the analog mode.

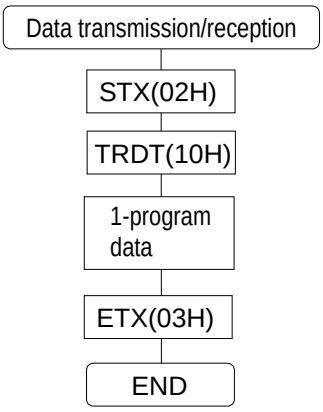
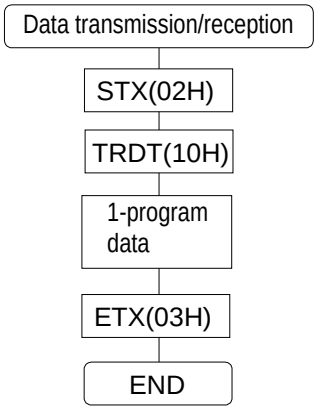


Fig. 8-19

Horizontal timing Fig. 8-3	
(2CH)	"," delimiter
Vertical timing Fig. 8-4	
(2CH)	"," delimiter
Analog output conditions Fig. 8-5	
(2CH)	"," delimiter
Block 01 pattern color Fig. 8-7	
Block 02 character Fig. 8-8	
Block 03 crosshatch Fig. 8-9	
Block 04 dot Fig. 8-10	
Block 05 circle Fig. 8-11	
Block 06 burst Fig. 8-12	
Block 07 window Fig. 8-13	
Block 08 option 1 Fig. 8-14	
Block 09 option 2 Fig. 8-15	
(2CH)	"," delimiter
Block 10 color bar Fig. 8-16	
(2CH)	"," delimiter
Block 11 gray scale Fig. 8-17	
(2CH)	"," delimiter
Block 12 half-tones Fig. 8-18	

- Shown below is the format used for 1-program data in the digital mode.

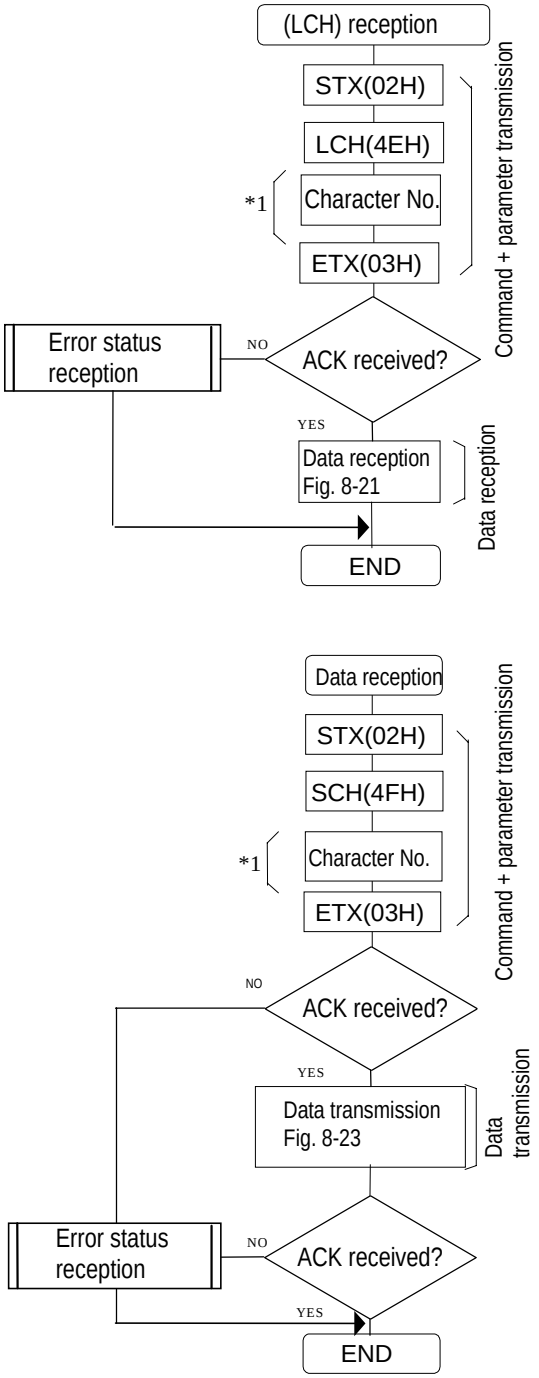
Fig. 8-20



Horizontal timing Fig. 8-3	
(2CH)	"," delimiter
Vertical timing Fig. 8-4	
(2CH)	"," delimiter
Digital output conditions Fig. 8-6	
(2CH)	"," delimiter
Block 01 pattern color Fig. 8-7	
Block 02 character Fig. 8-8	
Block 03 crosshatch Fig. 8-9	
Block 04 dot Fig. 8-10	
Block 05 circle Fig. 8-11	
Block 06 burst Fig. 8-12	
Block 07 window Fig. 8-13	
Block 08 option 1 Fig. 8-14	
Block 09 option 2 Fig. 8-15	
(2CH)	"," delimiter
Block 10 color bar Fig. 8-16	
(2CH)	"," delimiter
Block 11 gray scale Fig. 8-17	

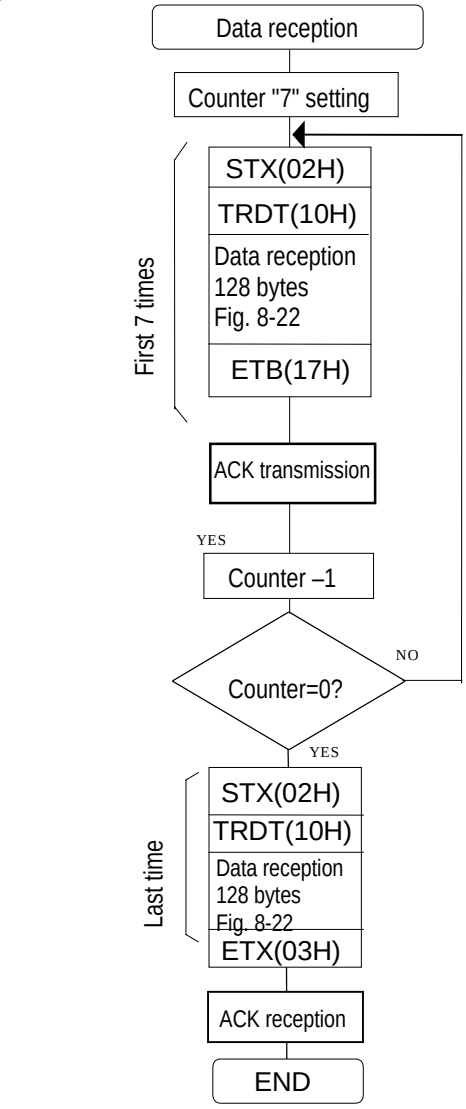
8-9 [LCH] (4EH) AND [SCH] (4FH)

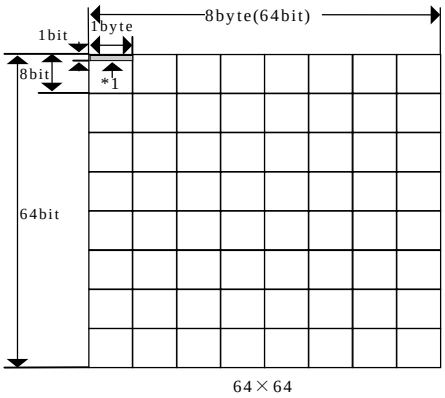
These commands are used to transmit or receive the data of the characters (E0H to E3H) whose numbers are designated.

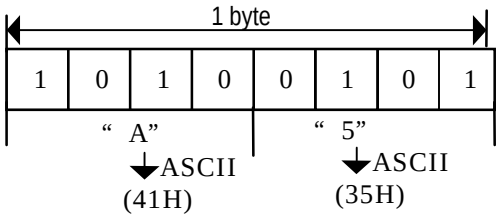


*1 “0”=E0H, “1”=E1H, “2”=E2H, “3”=E3H
Designate "0" through "F" when the AH-3000 or the memory card is used.

Fig. 8-21







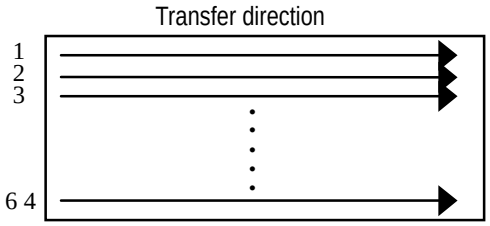
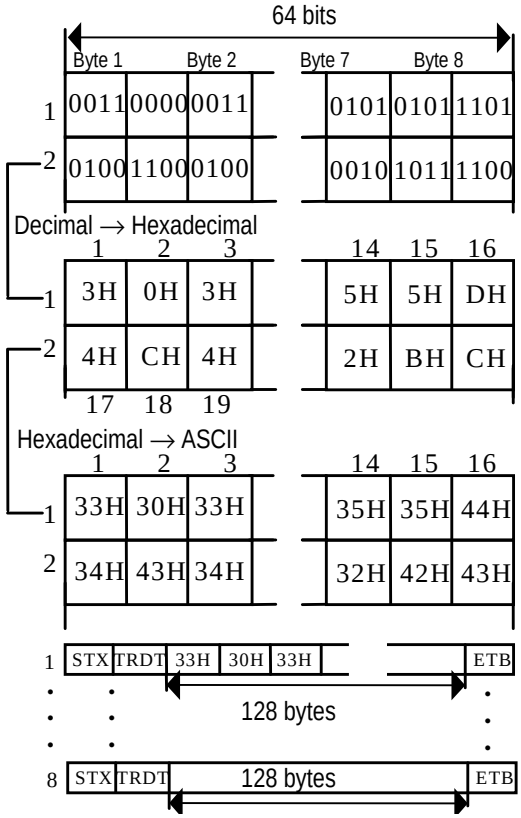
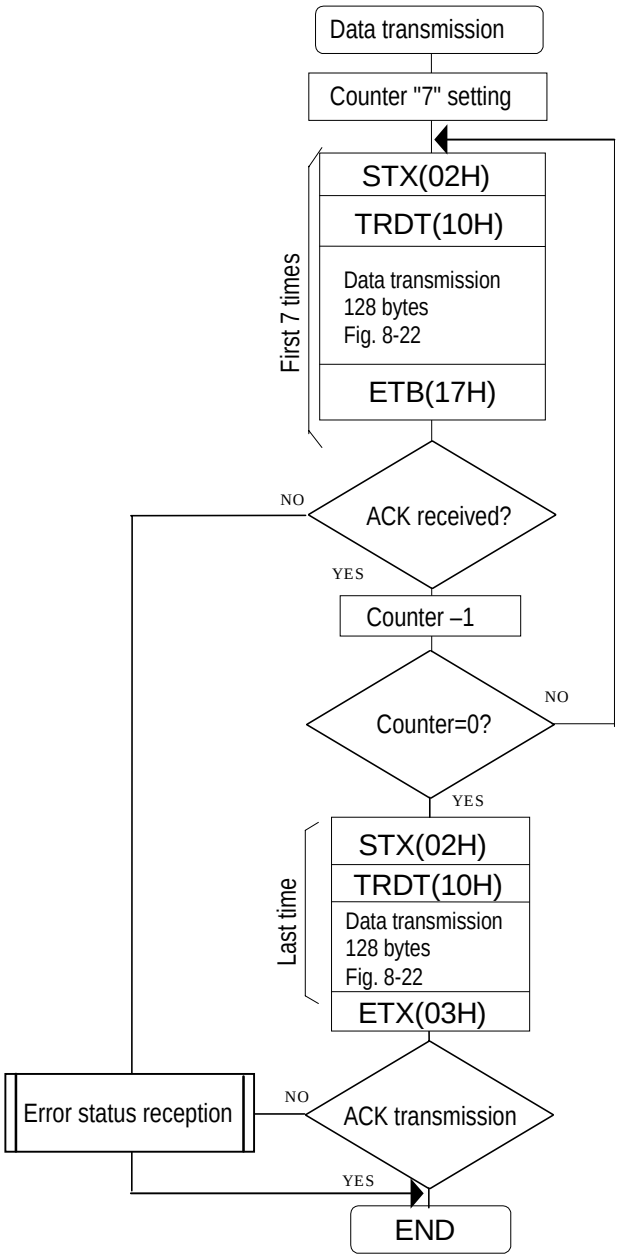


Fig. 8-22



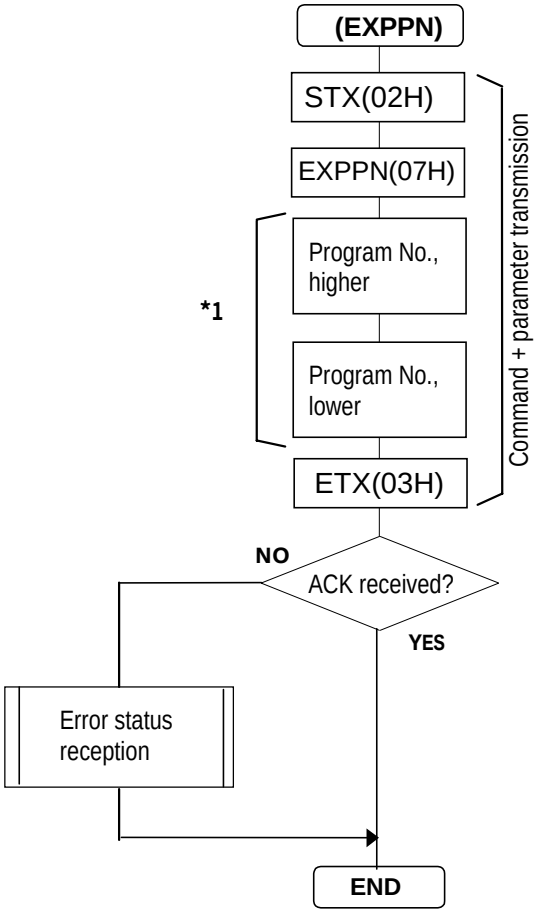
8 bytes x 64 = 512 bytes
512 bytes x 2 = 1024 bytes (ASCII)
1024 bytes ÷ 128 bytes = 8
Since the amount of data transferred each time is always 128 bytes, the data is divided into 8 blocks, each of which is then transmitted and received.

Fig. 8-23


Data transmission
Counter "7" setting
STX(02H)
TRDT(10H)
Data transmission
128 bytes
Fig. 8-22
ETB(17H)
First 7 times
ACK received?
NO
YES
Counter –1
Counter=0?
NO
YES
STX(02H)
TRDT(10H)
Data transmission
128 bytes
Fig. 8-22
ETX(03H)
Last time
Error status reception
ACK transmission
NO
YES
END

8-10 [EXPPN] (07H)

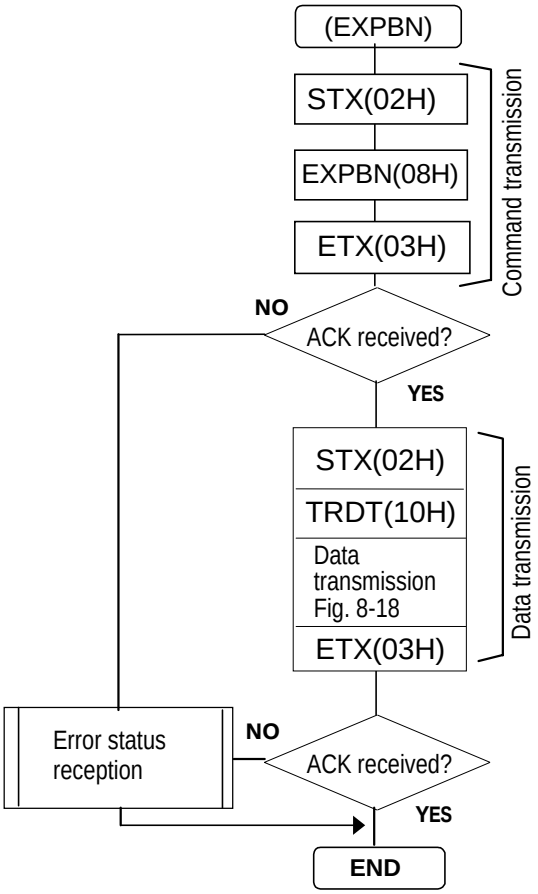
This command is used to execute program No.01 to No.40 whose numbers are designated. (Only the timing data is executed.)



*1: Program numbers are designated with either 2 or 3 digits.
They range from 01 to 40 when the HN58C65 is used and from 001 to 040 and from 500 to 779 when the AH-3000 is used.

8-11 [EXPBN] (08H)

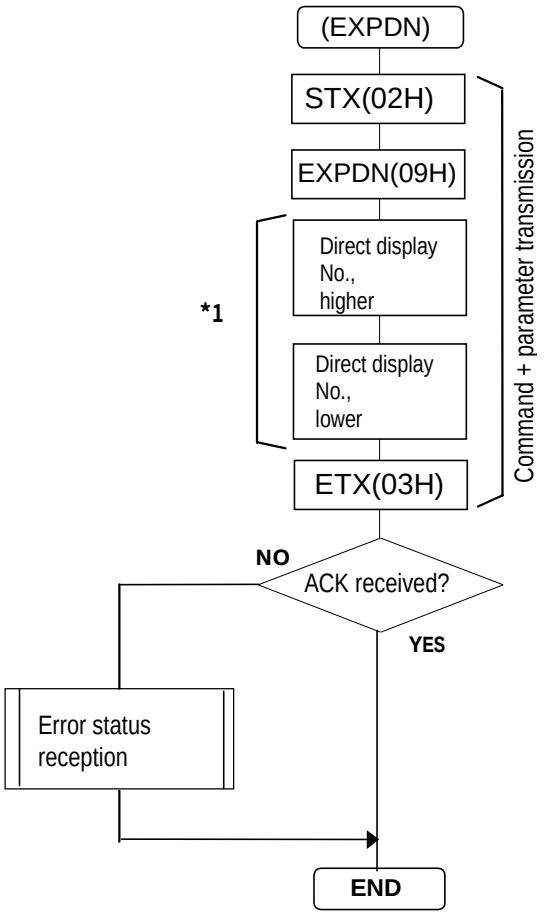
This command is used to transmit the 1-program data to the VG-828 and execute it. The data is not written into the panel ROM. The data format is the same as for the (SPD) command.



Note: Use the (EXPBN2)(58H) command when optional pattern codes are designated with two digits (00 to 1F).
Apart from the number of digits (1 or 2) used for the optional pattern codes, operation is the same in all other respects.

8-12 [EXPDN] (09H)

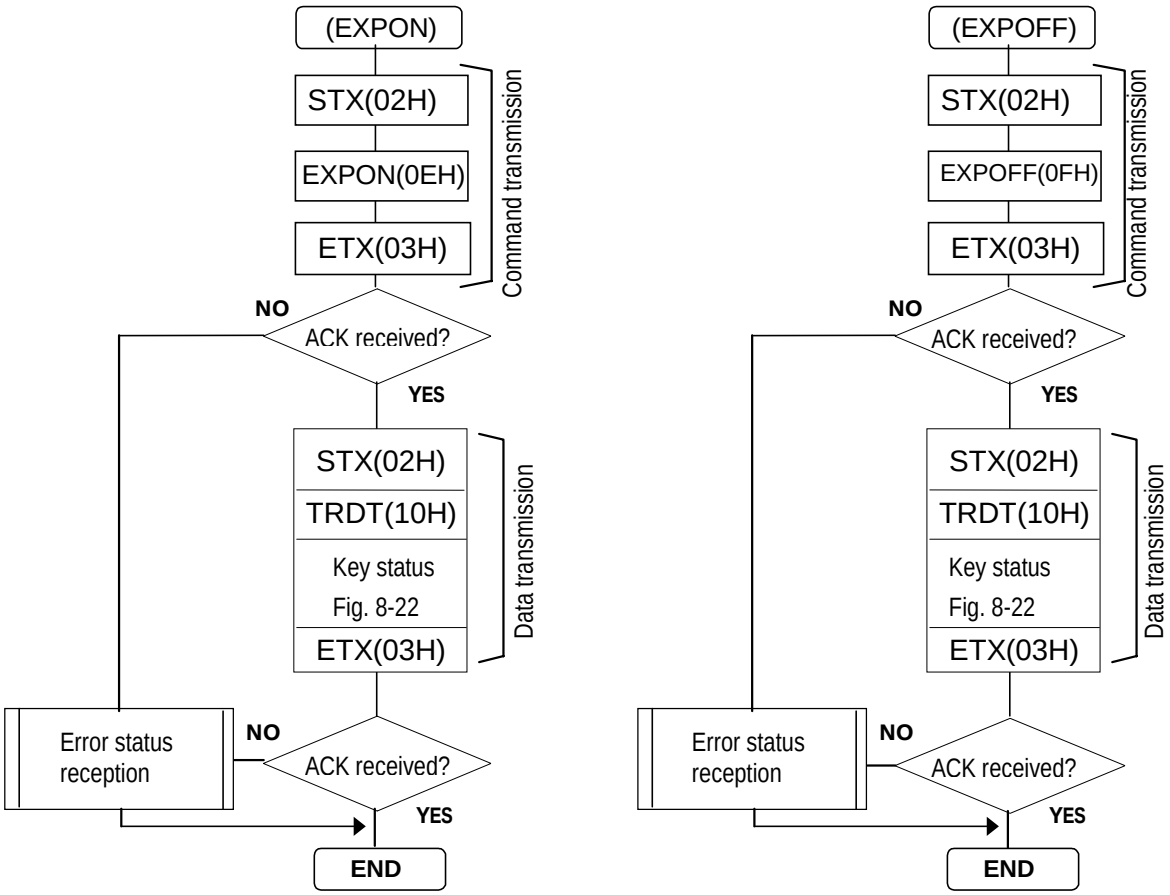
This command is used to designate direct display No.01 to No.40 and execute them.



*1: Program numbers are designated with either 2 or 3 digits.
They range from 01 to 40 when the HN58C65 is used and from 001 to 040 and from 500 to 779 when the AH-3000 is used.

8-13 [EXPON] (0EH) AND [EXPOFF] (0FH)

These commands are used to turn the designated patterns and signals ON or OFF.



- Transmission of key data
  Transmit the key codes to be turned ON or OFF.

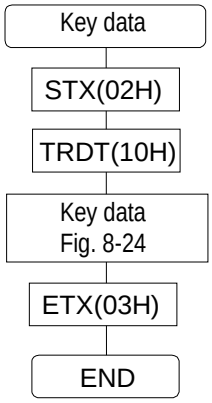
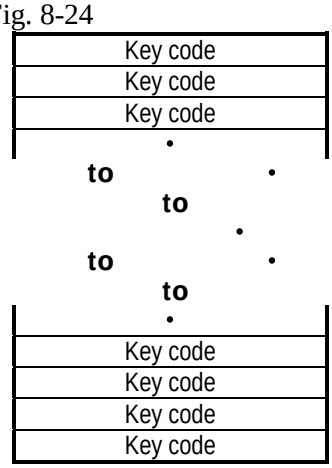


Fig. 8-24

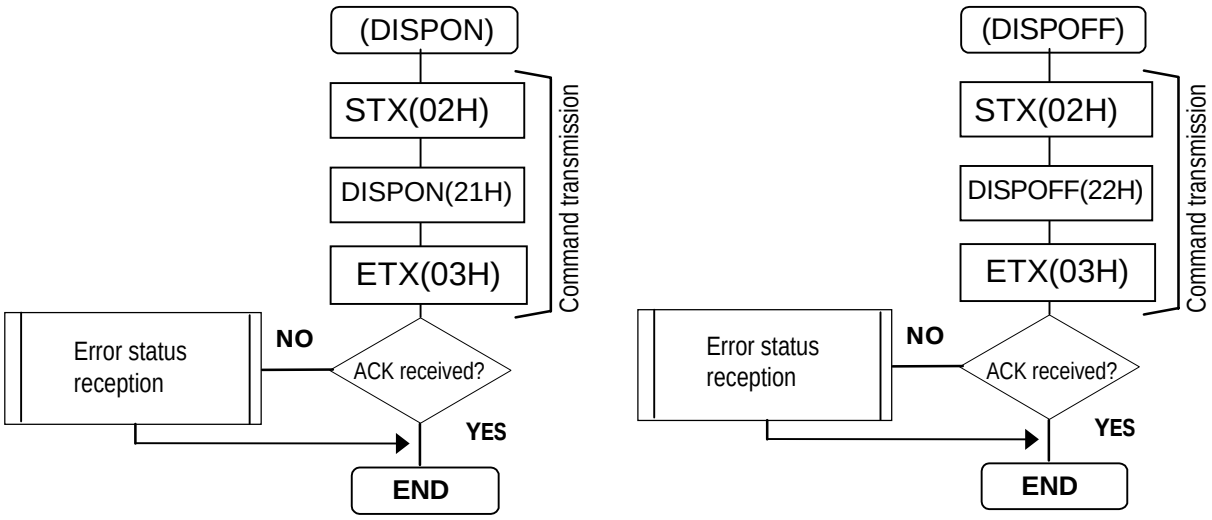


50H	CHARA
53H	CIRCLE
54H	+
56H	×
57H	COLOR
5EH	R
5FH	G
60H	B

Note: For further details, refer to the key code table in Section 6-5. Only the option 1 data is output when "ON" has been selected for option 1.

8-14 [DISPON] (21H) AND [DISPOFF] (22H)

These commands are used to turn the CRT display ON or OFF.



8-15 [DISPHV] (28H)

This command is used to receive the number of graphic plane display dots.

* There are no parameters.

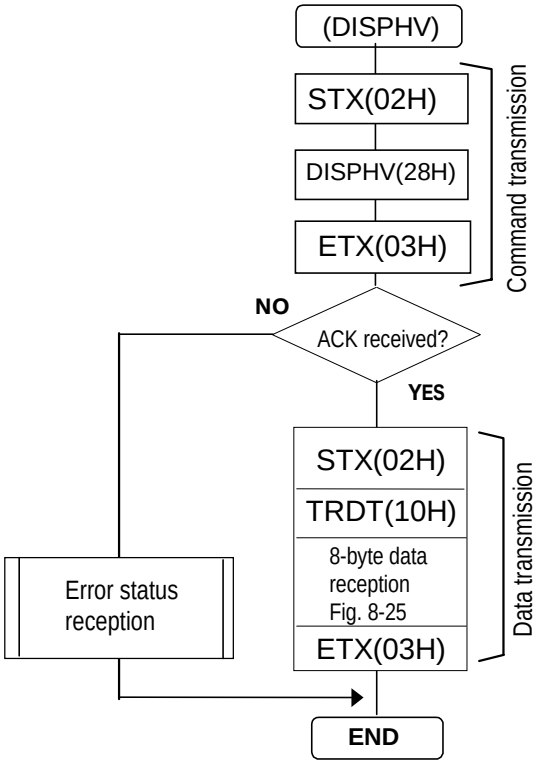
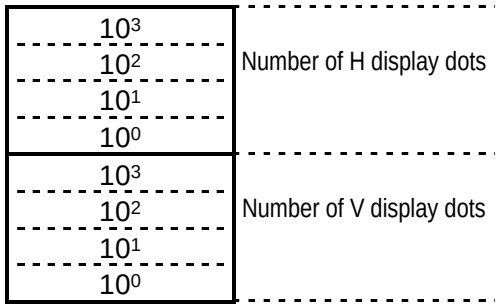


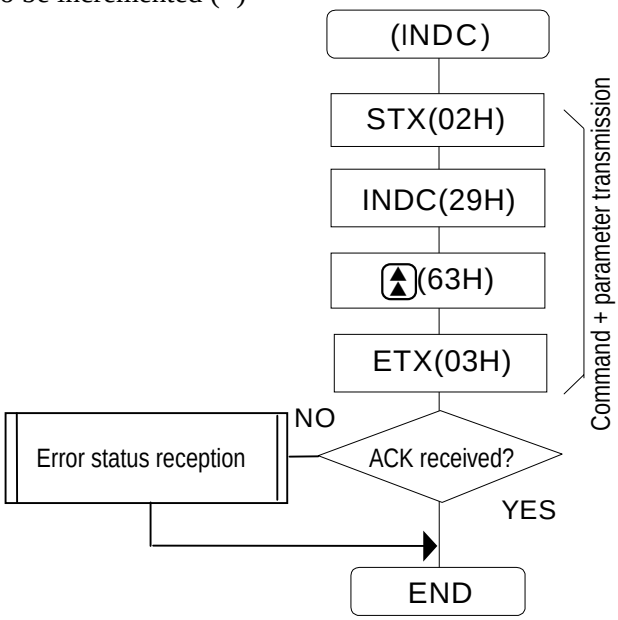
Fig. 8-25



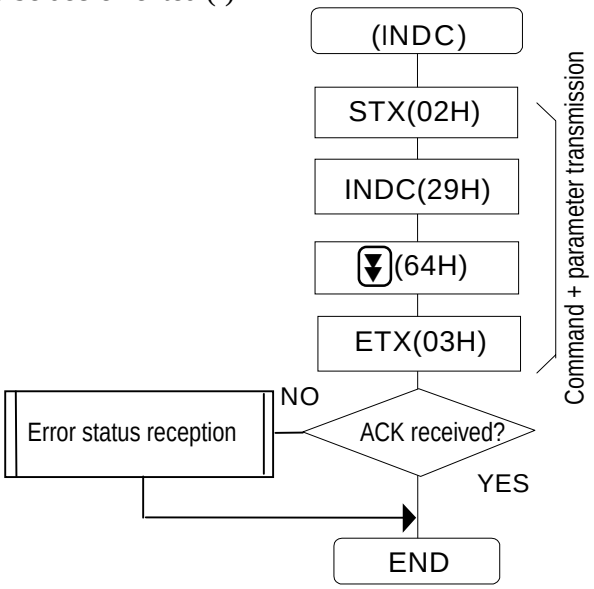
8-16 [INDC] (29H)

This command increments or decrements the direct display No. It executes the numbers entered by enable.

When the numbers are to be incremented (+)

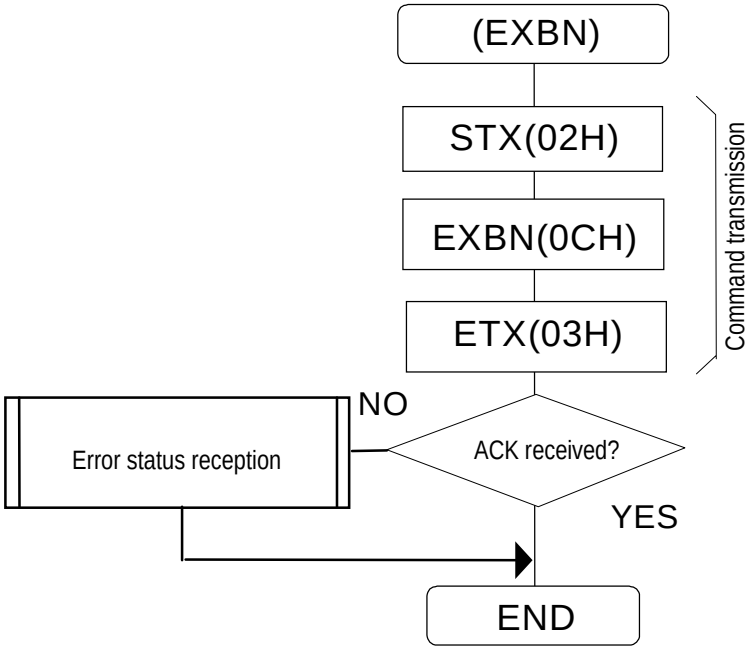


When the numbers are to be decremented (-)



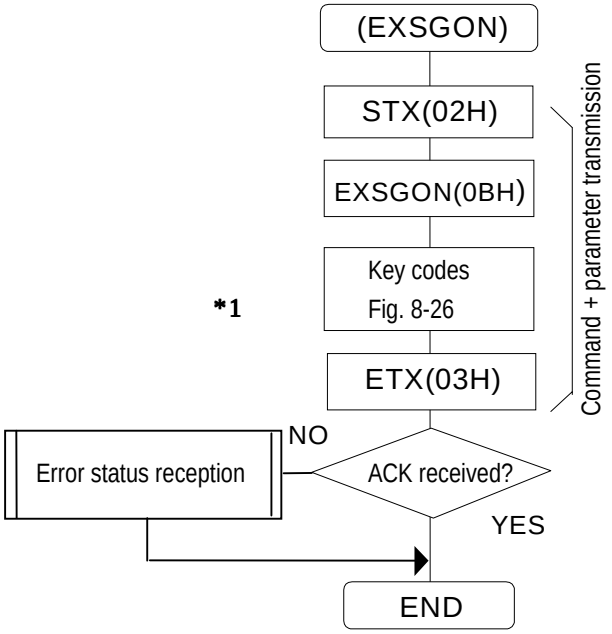
8-17 [EXBN] (0CH)

This command is used to execute the contents of the buffer RAM.
There are no parameters.



8-18 [EXSGON] (0BH)

This command is used to turn the R, G, B, RHT, GHT and BHT signals ON or OFF.
The parameters designate the key codes for turning the signals ON.
Key codes which are not designated are OFF.



*1

Key name	Key code
R	5EH
G	5FH
B	60H
RH	65H
GH	66H
BH	67H

Fig. 8-26

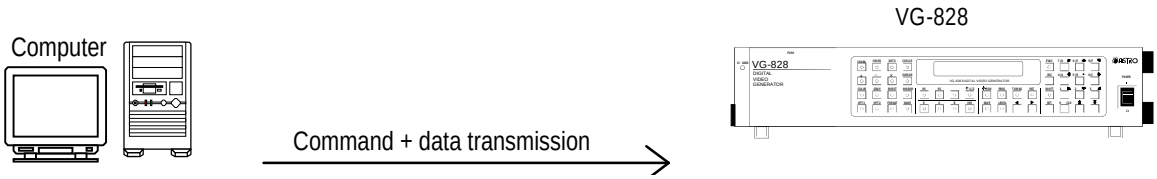
Key code
Key code
Key code
Key code

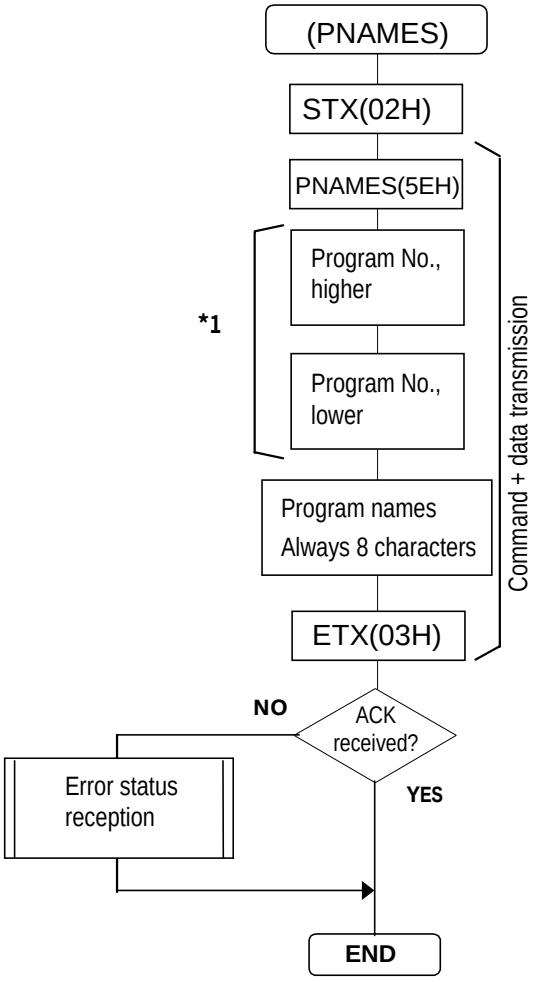
5EH	R
5FH	G
60H	B

8-19 [PNAMES] (5EH)

This command is used to transmit the program names of the programs whose numbers are designated. The transmitted data is written into the panel ROM.

* All parameters are in ASCII code.





Examples of program name data

• Using ASCII codes 20H to 7FH only
Always 8 bytes (example: ASTRO01)

“A”	(41H)	A
“S”	(53H)	S
“T”	(54H)	T
“R”	(52H)	R
“O”	(4FH)	O
“0”	(30H)	0
“1”	(31H)	1
“ ”	(20H)	Space

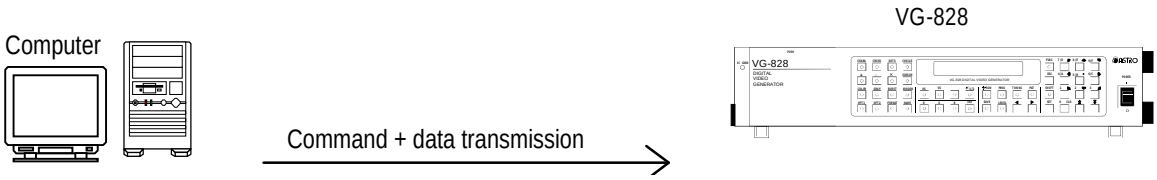
• Using ASCII codes 20H to 7FH and ADH to DFH
Always 16 bytes (example: Asutoro A 01)

“B”	(42H)	"A"
“1”	(31H)	(B1H)
“B”	(42H)	"Su"
“D”	(44H)	(BDH)
“C”	(43H)	"To"
“4”	(34H)	(C4H)
“D”	(44H)	"Ro"
“B”	(42H)	(DBH)
“4”	(34H)	A
“1”	(31H)	(41H)
“2”	(32H)	Space
“0”	(30H)	(20H)
“3”	(33H)	0
“0”	(30H)	(30H)
“3”	(33H)	1
“1”	(31H)	(31H)

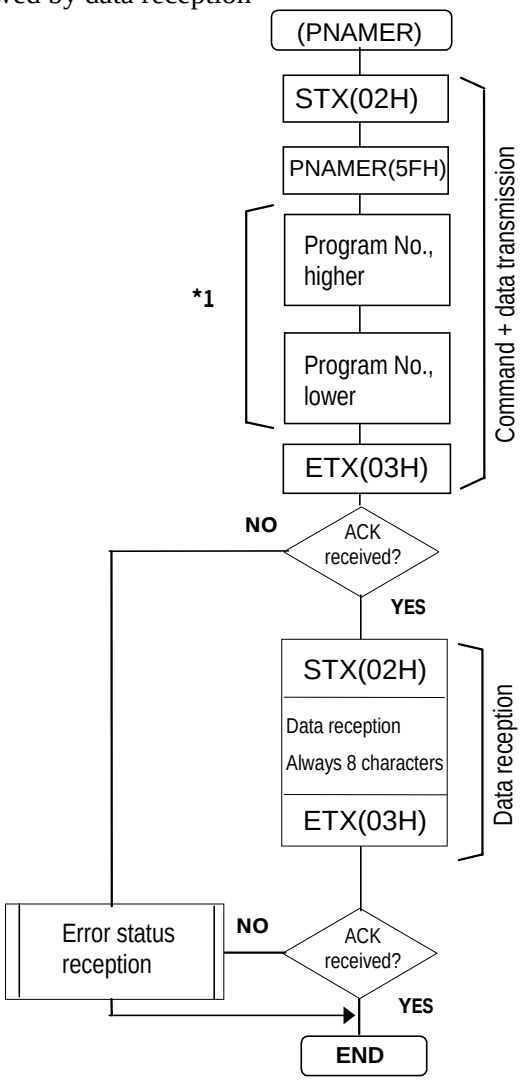
*1: Program numbers are designated with either 2 or 3 digits.
They range from 01 to 40 when the HN58C65 is used, from 01 to 40 and from 500 to 779 when the AH-3000 is used, and from 01 to 40, from 501 to 540, from 601 to 640 and from 701 to 740 when the HN58C256 is used.

8-20 [PNAMER] (5FH)

This command is used to receive the program names of the programs whose numbers are designated.
* All parameters are in ASCII code.



When commands and parameters are to be transmitted followed by data reception



Examples of program name data

• Using ASCII codes 20H to 7FH only
Always 8 bytes (example: ASTRO01)

“A”	(41H)	A
“S”	(53H)	S
“T”	(54H)	T
“R”	(52H)	R
“O”	(4FH)	O
“0”	(30H)	0
“1”	(31H)	1
“ ”	(20H)	Space

• Using ASCII codes 20H to 7FH and ADH to DFH
Always 16 bytes (example: Asutoro A 01)

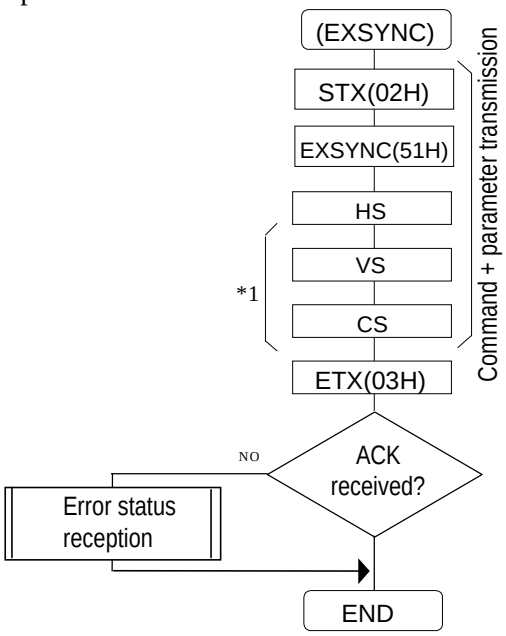
“B”	(42H)	"A"
“1”	(31H)	(B1H)
“B”	(42H)	"Su"
“D”	(44H)	(BDH)
“C”	(43H)	"To"
“4”	(34H)	(C4H)
“D”	(44H)	"Ro"
“B”	(42H)	(DBH)
“4”	(34H)	A
“1”	(31H)	(41H)
“2”	(32H)	Space
“0”	(30H)	(20H)
“3”	(33H)	0
“0”	(30H)	(30H)
“3”	(33H)	1
“1”	(31H)	(31H)

*1: Program numbers are designated with either 2 or 3 digits.
They range from 01 to 40 when the HN58C65 is used, from 01 to 40 and from 500 to 779 when the AH-3000 is used, and from 01 to 40, from 501 to 540, from 601 to 640 and from 701 to 740 when the HN58C256 is used.

8-21 [EXSYNCD] (51H)

This command is used to turn the separate HS, VS and CS sync signals ON or OFF.
* All parameters are in ASCII code.

Command + parameter transmission



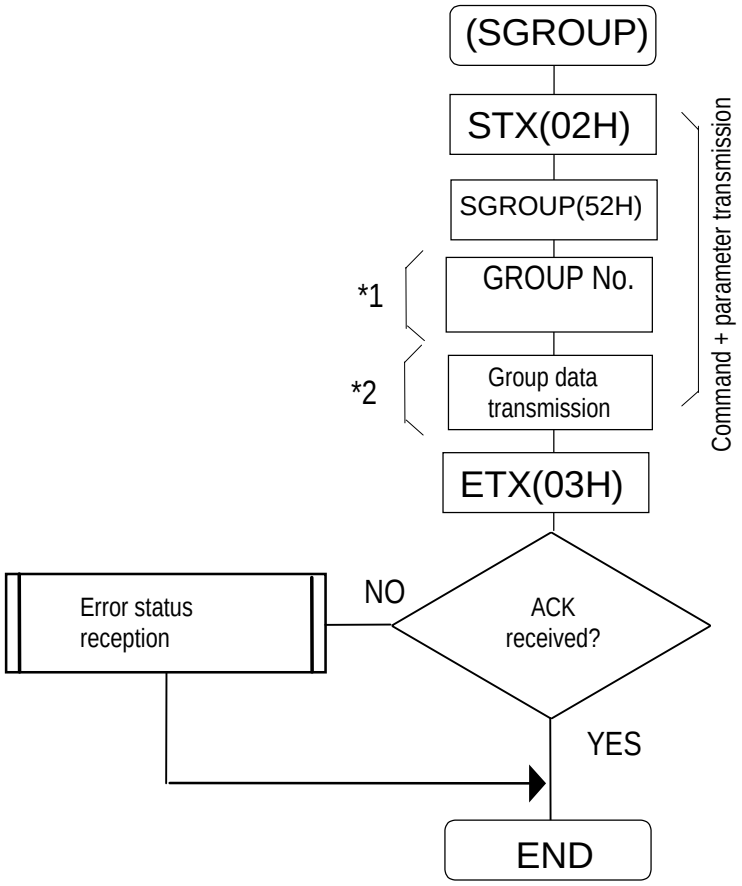
*1 “0”=OFF“1”=ON

8-22 [SGROUP] (52H)

This command is used to store the data of the groups whose numbers are designated in the panel ROM.

* All parameters are in ASCII code.

Command + parameter transmission



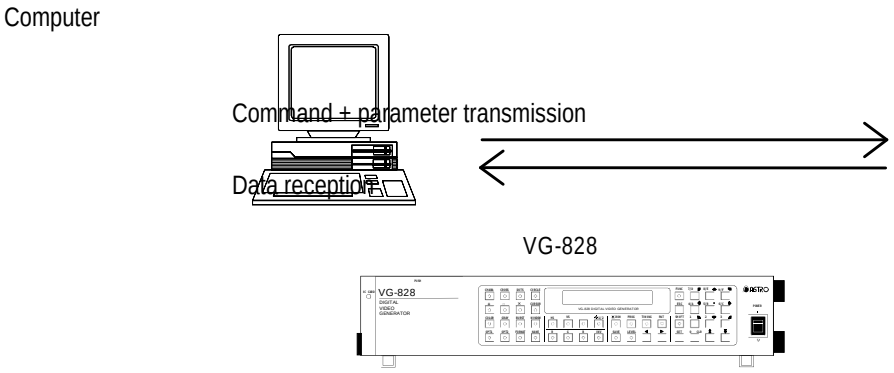
*1: Numbers 1 and 2 for HN58C65
Numbers 1 to 8 for AH-3000
Numbers 1 to 40 for HN58C256
Numbers 1 to 32 for memory card

*2: 2-digit program No. x 20 (40 bytes) or 3-digit program No. x 20 (60 bytes).

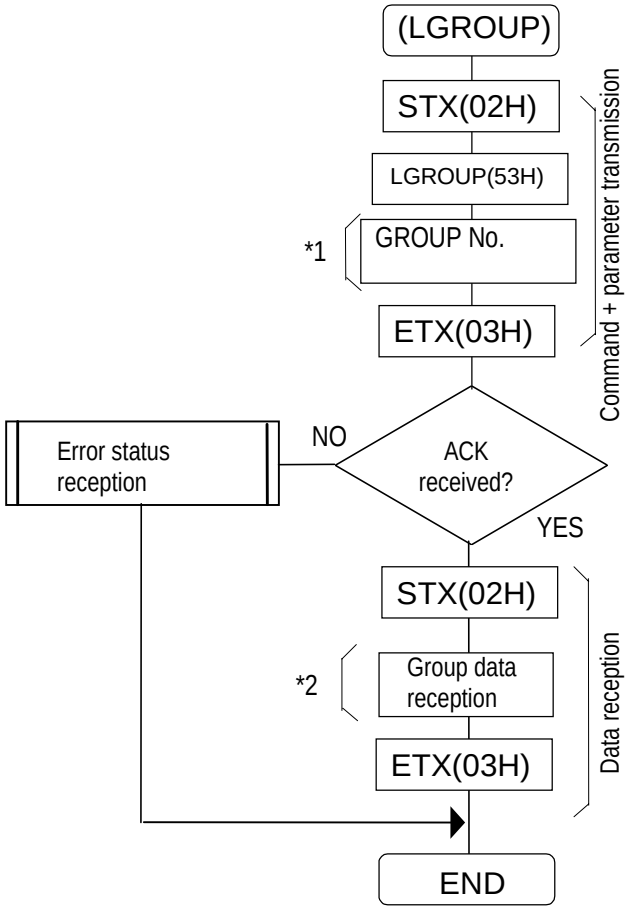
8-23 [LGROUP] (53H)

This command is used to acquire the data of the groups whose numbers are designated from the VG-828.

* All parameters are in ASCII code.



Command + parameter transmission followed by data reception



*1: Numbers 1 and 2 for HN58C65
Numbers 1 to 8 for AH-3000
Numbers 1 to 40 for HN58C256

Numbers 1 to 32 for memory card

*2: 2-digit program No. x 20 (40 bytes) or 3-digit program No. x 20 (60 bytes).

8-24 [PRGENTRY] (2BH)

This command is used to enter program No.1 to No.4, which perform high-speed program switching, in the VG-828.

When commands and data are to be transmitted

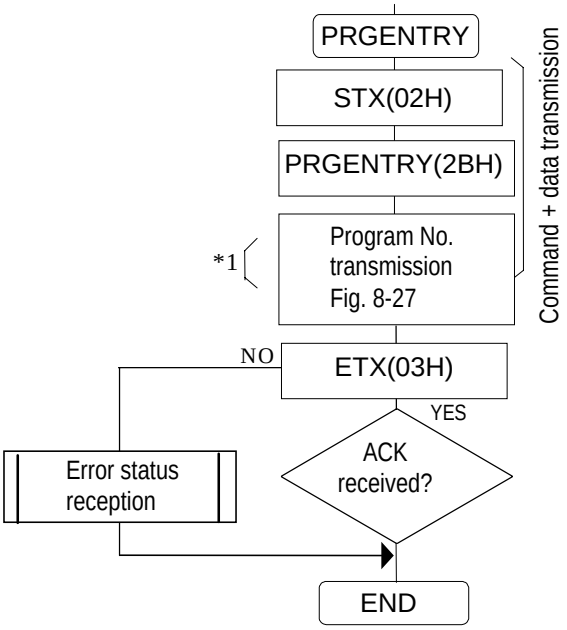
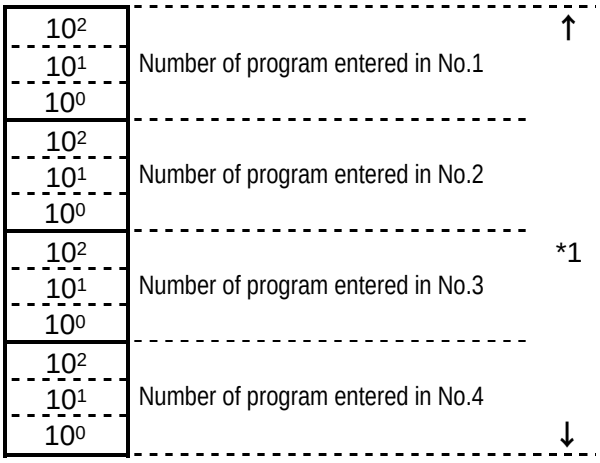


Fig. 8-27

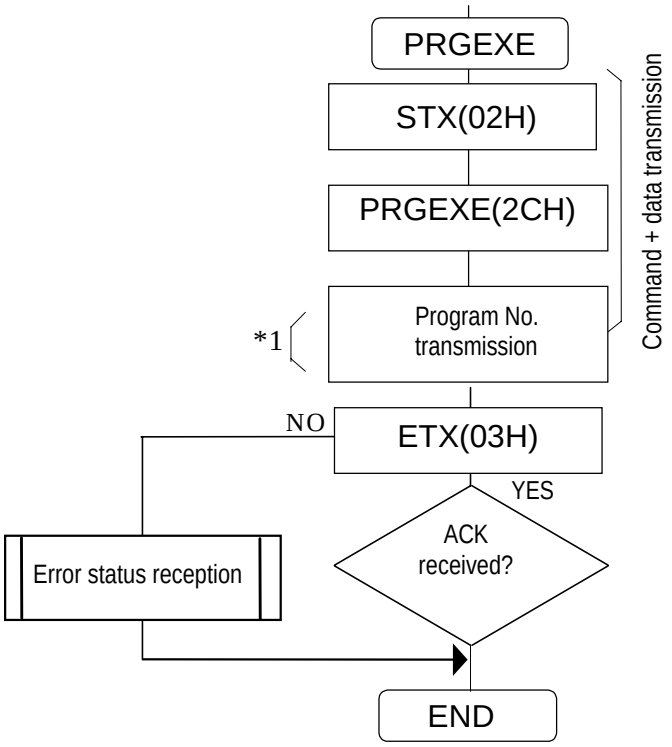


*1: 2-digit program No. x 4 or 3-digit program No. x 4.
Program numbers are designated with 3 digits when the AH-3000 is used. They range from 001 to 040 and from 500 to 779.

8-25 [PRGEXE] (2CH)

This command is used to execute the programs whose numbers have been entered using the PRGENTRY command. By using this command, it is possible to switch programs faster than with the EXPDN (direct display execution) command.

When commands and data are to be transmitted

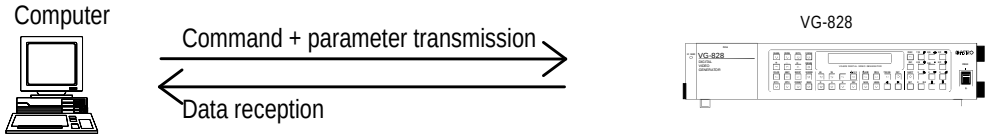


*1: Numbers "1" to "4" are designated for the programs to be executed.

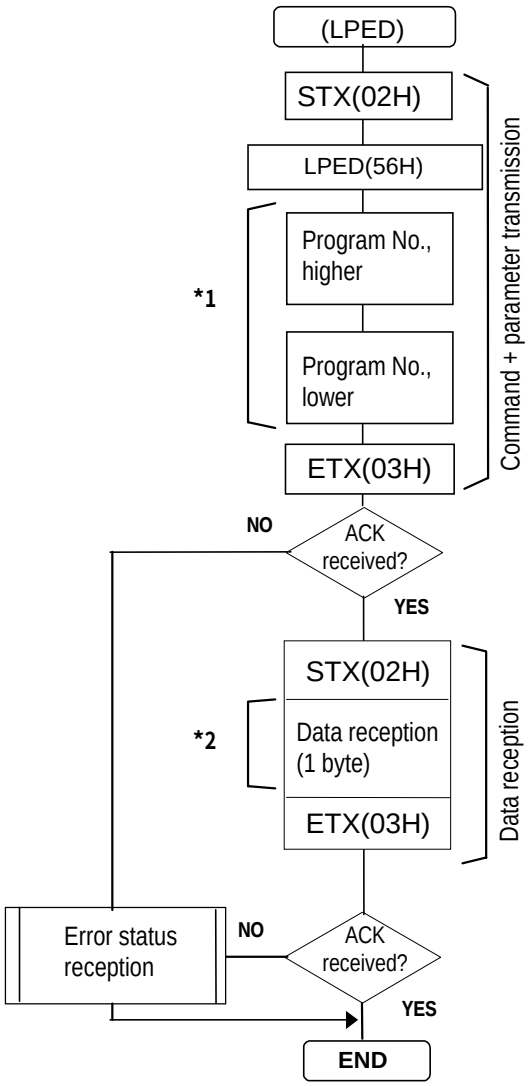
8-26 [LPED] (56H)

This command is used to receive the enable or disable status of the programs whose numbers have been designated. (This is provided as a standard feature on the VG-813, 822, 823 and 827.)

* All parameters are in ASCII code.



When commands and parameters are to be transmitted followed by data reception

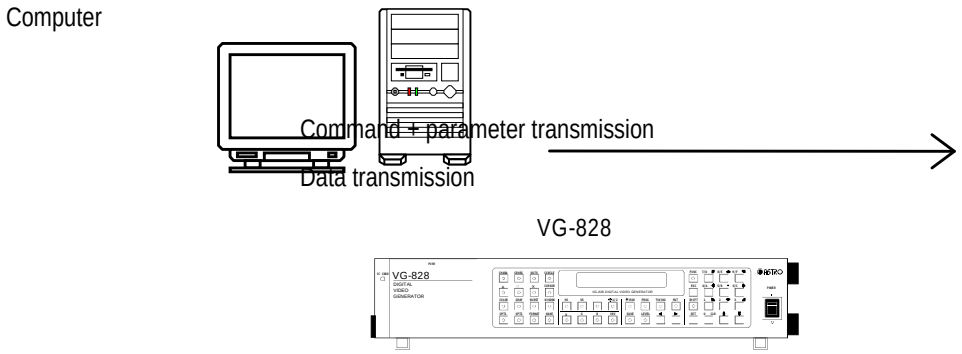


*1: Program No.0 to 999.
Program numbers are designated with 1 to 3 digits.

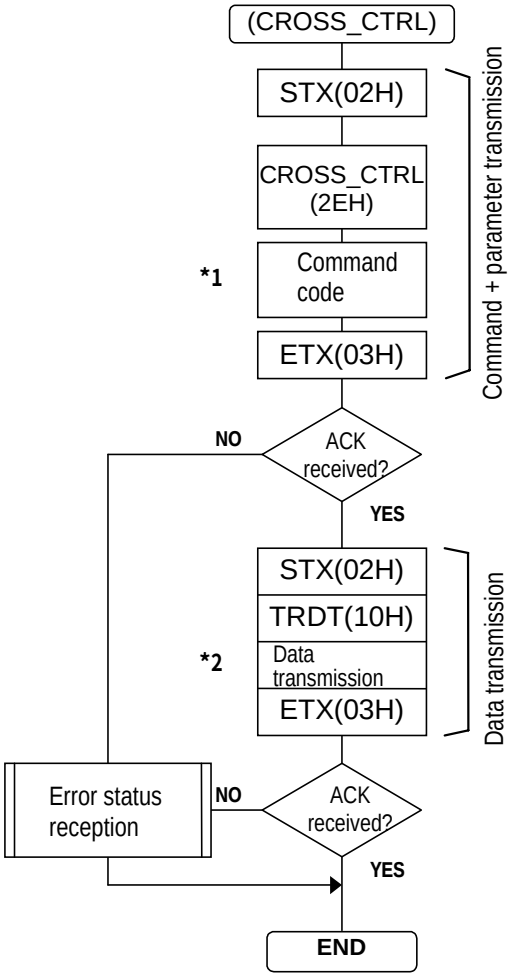
*2: Enable ("0")/disable ("1")

8-27 [CROSS_CTRL] (2EH)

This command is used to change the settings of coordinate display patterns (OPTION 1 to 14). It takes effect only when coordinate display patterns have been output beforehand.



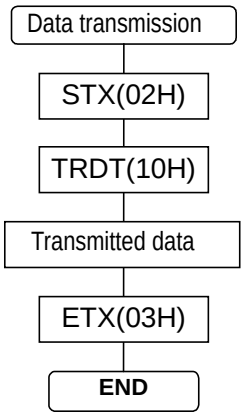
Command code	Function
A	For switching the coordinate display.
B	For changing the flicker speed.
C	For changing the cursor shape.
D	For changing the background color.
E	For changing the cursor color.
F	For changing the cursor coordinates.



*1: “A”(41H) to “F”(46H) (ASCII codes)

*2: The number of bytes differs from one command to another.

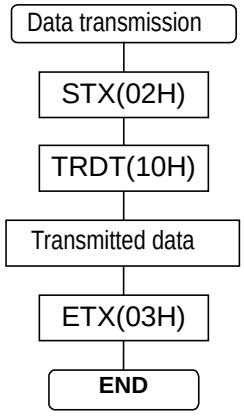
Command code "A" (41H): For switching the coordinate display.



Transmitted data: 1 byte

Data	Display
“0”(30h)	**(639, 479, STEP10)**
“1”(31H)	**(R: 1, G: 2, B: 3)** **(GATE:1, STEP: 10)**
“2”(32H)	No display
“3”(33H)	Up/down and left/right reversed from "0"
“4”(34H)	Up/down and left/right reversed from "1"

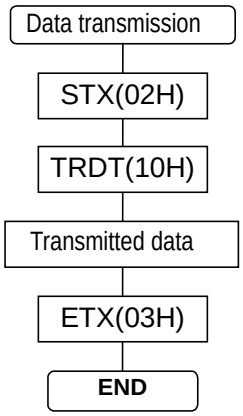
Command code "B" (42H): For changing the flicker speed.



Transmitted data: 1 byte

Data	Flicker speed
“0”(30h)	Flicker stopped
“1”(31H)	Flashes every 16 blankings
“2”(32H)	Flashes every 8 blankings

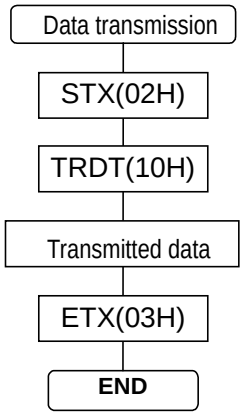
Command code "C" (43H): For changing the cursor shape.



Transmitted data: 1 byte

Data	Cursor shape
“0”(30h)	"+" shaped cursor (full screen)
“1”(31H)	Source line (vertical line)
“2”(32H)	"+" shaped cursor (5 dots x 5 dots)
“3”(33H)	"+" shaped cursor RGB (full screen)
“4”(34H)	Source line RGB (vertical line)
“5”(35H)	"+" shaped cursor RGB (5 dots x 5 dots)

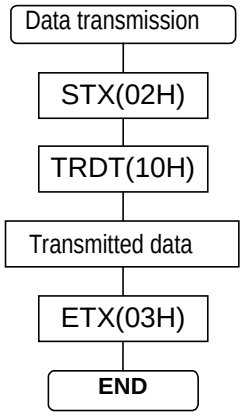
Command code "D" (44H): For changing the background color.



Transmitted data: 9 bytes

↑	10^2	R	30H	R	64
	10^1		36H		
	10^0		34H		
*	10^2	G	31H	G	110
	10^1		31H		
	10^0		30H		
	10^2	B	30H	B	20
	10^1		32H		
↓	10^0		30H		

Command code "E" (45H): For changing the cursor color.

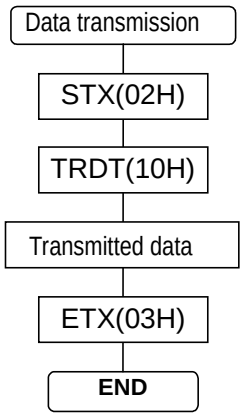


* "000" "255"

Transmitted data: 9 bytes

↑	10^2	R	32H	R 255
	10^1		35H	
	10^0		35H	
*	10^2	G	30H	G 0
	10^1		30H	
	10^0		30H	
	10^2	B	30H	B 72
	10^1		37H	
↓	10^0		32H	

Command code "F" (46H): For changing the cursor coordinates.



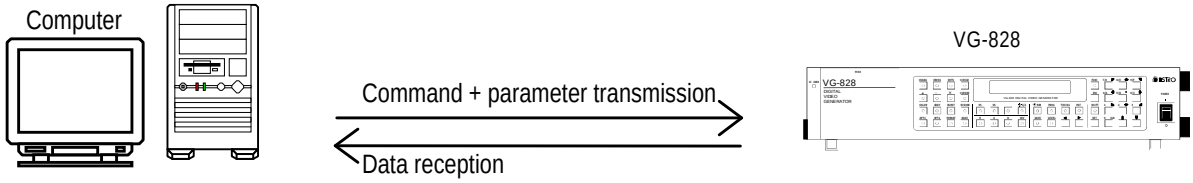
Transmitted data: 9 bytes

↑	10^3	X	30H	X 350
	10^2		33H	
	10^1		35H	
	10^0		30H	
	10^3	Y	30H	Y 470
	10^2		34H	
	10^1		37H	
↓	10^0		30H	

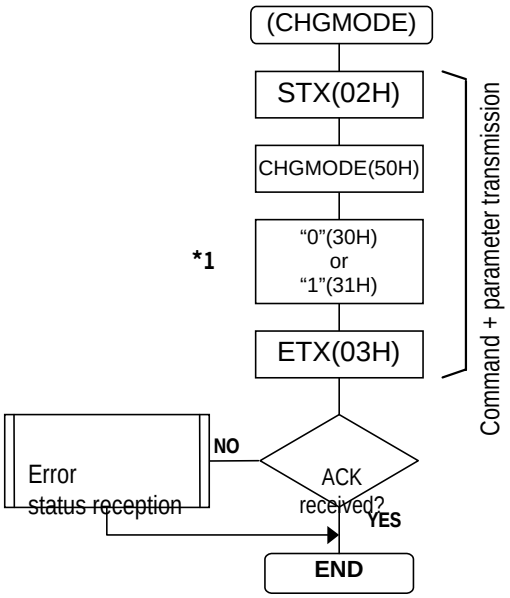
*: The coordinate setting range is determined by the H display size and V display size.
X coordinate range: 0 to H DISP (dots) -1
Y coordinate range: 0 to V DISP (lines) -1

8-28 [CHGMODE] (50H)

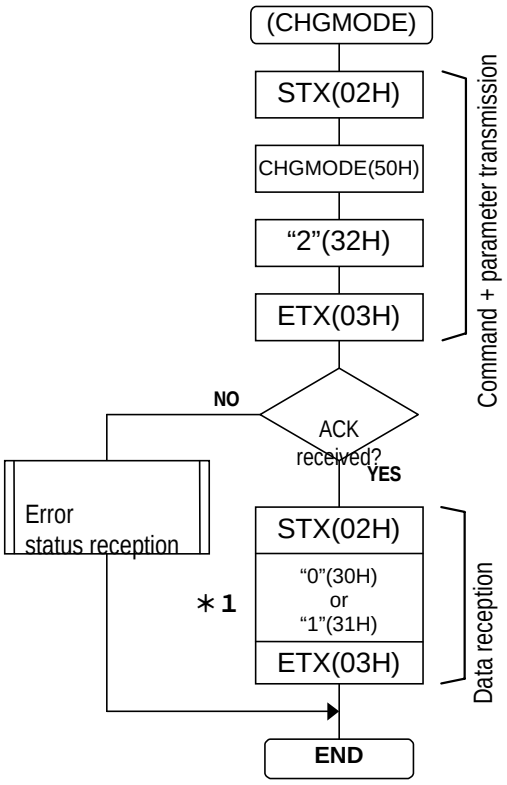
This command is used to change or check the panel ROM mode of the VG-828.



When the mode is to be changed



When the mode is to be checked

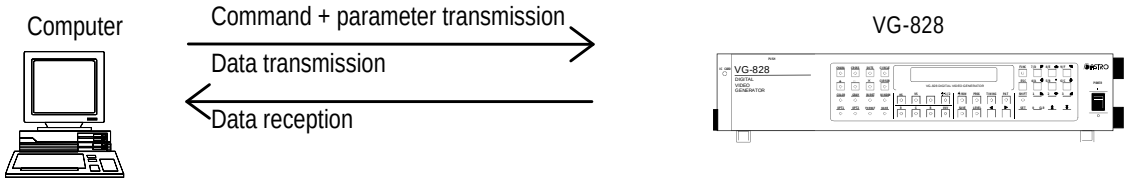


*1: "0" = analog mode, "1" = digital mode

8-29 [LPT3] (A1H) AND [SPT3] (A2H)

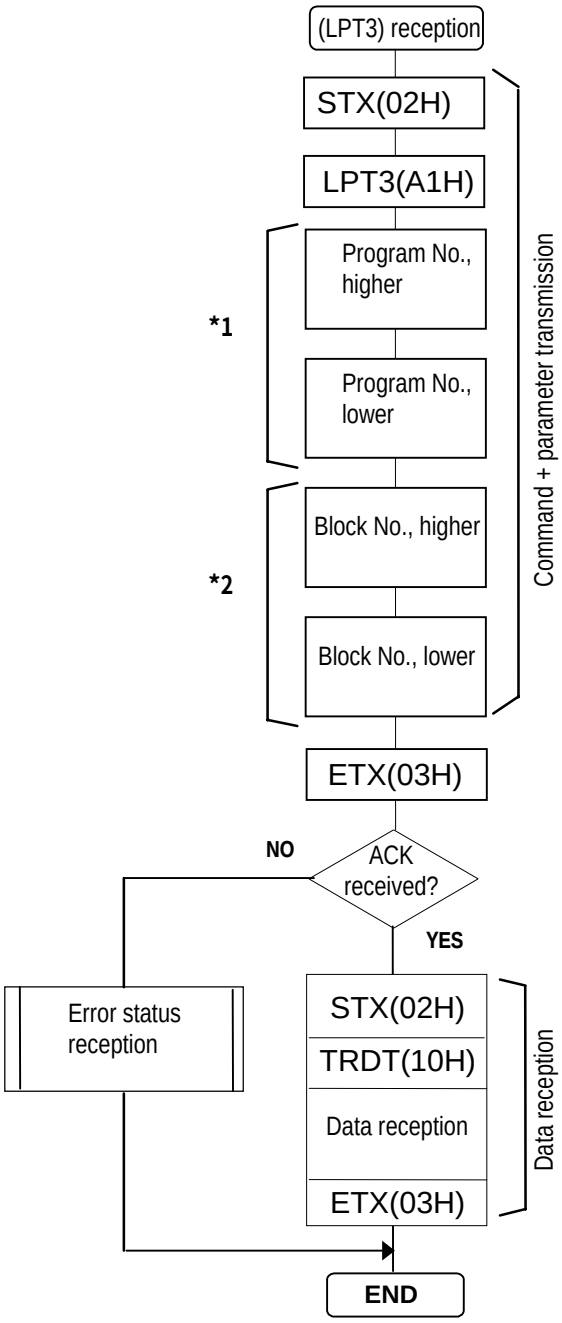
These commands are used to transmit or receive the pattern data of the programs whose numbers are designated. The transmitted data is written into the buffer RAM when the program number is 00 and into the panel ROM when it is in the range from 01 to 40. The pattern data is divided into 12 blocks for transmission and reception.

* All parameters are in ASCII code.

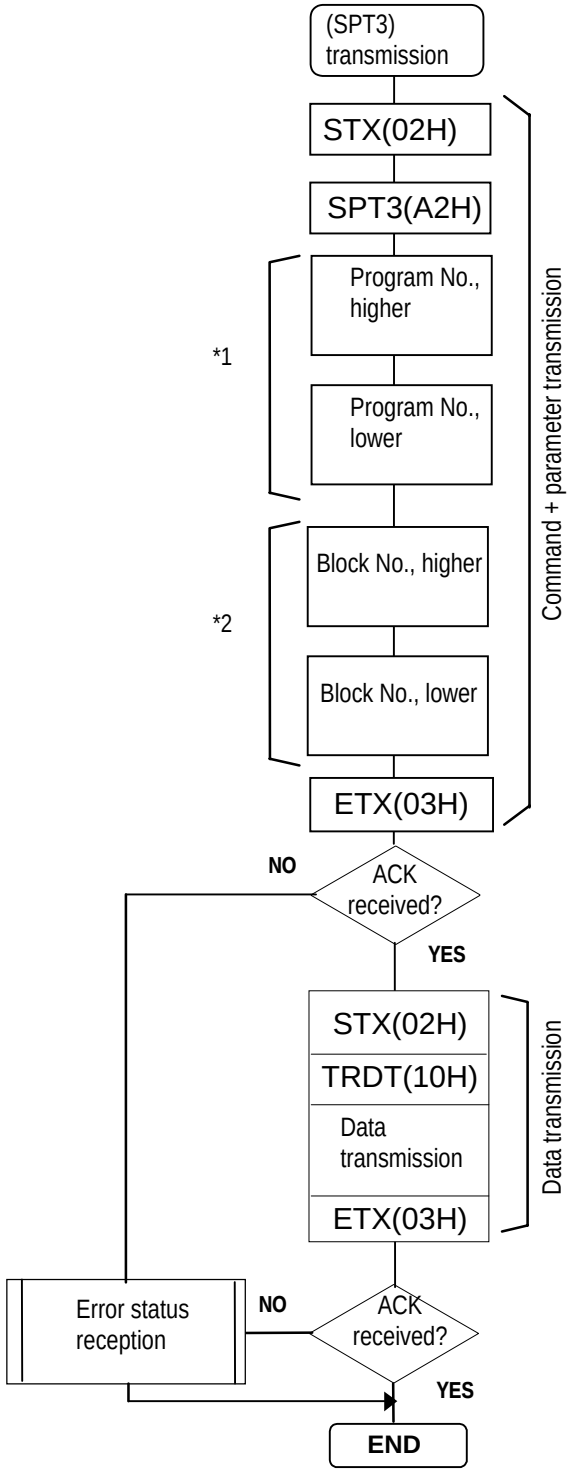


Block No.	Pattern data
01	Graphic color
02	Character
03	Crosshatch
04	Dot
05	Circle
06	Burst
07	Window
08	Option 1
09	Option 2
10	Color bar
11	Gray scale
13	Cursor
14	Action

When commands + parameters are to be transmitted followed by data reception



When commands + parameters are to be transmitted followed by data transmission



*1: Program numbers are designated with 3 digits. They range from 001 to 040 when the HN58C65 is used, and from 001 to 040 and from 500 to 779 when the AH-3000 is used.

*2: "01" to "12" (ASCII codes) (always 2 digits)

Block No.(01) Format used for graphic color data (12 bytes or 21 bytes)

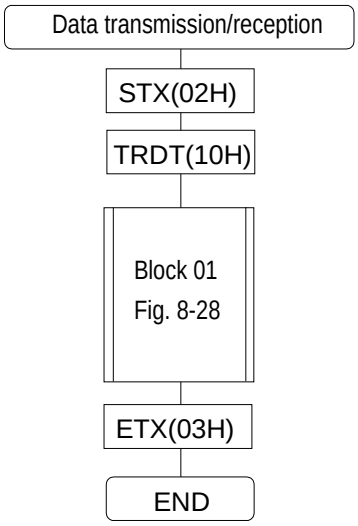


Fig. 8-28

*1	10^2	R	
	10^1		
	10^0		
	10^2	G	
	10^1		
	10^0		
	10^2	B	
	10^1		
	10^0		
*2	Graphic colors (TTL)		
*3	Graphic half-tones		
*4	Background		
*5	BkColor	3 bytes each for R, G and B	

32H	
35H	"255"
35H	
32H	
35H	"255"
35H	
32H	
35H	"255"
35H	
37H	RGB
37H	RH GH BH
30H	OFF

* The graphic color data now consists of 21 bytes although there were only 12 bytes under the old version.
When 12 bytes are used, the BkColor settings (for R, G and B) are treated as "0."

*1: The analog colors are designated here (000 to 255).
*2: The TTL color or colors are designated here.
"0"=none, “1”=R, “2”=G, “3”=RG, “4”=B, “5”=RB, “6”=GB, “7”=RGB
*3: The TTL half-tone color or colors are designated here.
"0"=none, “1”=RH, “2”=GH, “3”=RHGH, “4”=BH, “5”=RHBH, “6”=GHBH, “7”=RHGHBH
*4: “0”=OFF, “1”=ON
*5: The background color is designated here ("000" to "255": same format as *1).

Block No.(02) Format used for character data

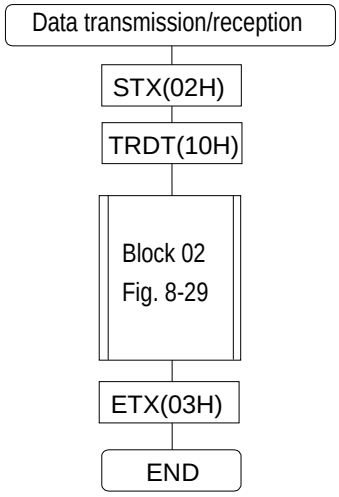


Fig. 8-29

*1	Character format	
*2	Character font	
*3	10^1	Character code
	10^0	
*4	10^2	H cell size
	10^1	
	10^0	
*4	10^2	V cell size
	10^1	
	10^0	

31H	Format 1
31H	7×9
34H	48(H)
38H	
30H	H 64
36H	
34H	
30H	V 64
36H	
34H	

*1: "0"=format 0; "1"=format 1; "2"=format 2
*2: “0”=5×7, “1”=7×9, “2”=16×16
*3: “20” to “FF”
*4: “01” to “255”

Block No.(03) Format used for crosshatch data

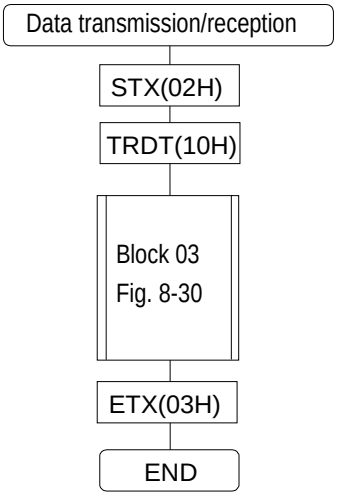


Fig. 8-30

*1	10^0	Mode	30H	Number of lines
*2	10^0	Format	30H	From center
*3 ↑	10^3	H interval	30H	H 10
	10^2		30H	
	10^1		31H	
↓	10^0		30H	
*3 ↑	10^3	V interval	30H	V 10
	10^2		30H	
	10^1		31H	
↓	10^0		30H	
↑	10^1	H line width *4	30H	H line width 1
↓	10^0		31H	
↑	10^1	V line width *4	30H	V line width 1
↓	10^0		31H	

*1: "0"=number of lines;
"1"=number of dots
*2: "0"=from center; "1"=from top left
*3: “0000” to “9999”
*4: “01” to “15”

Block No.(04) Format used for dot data

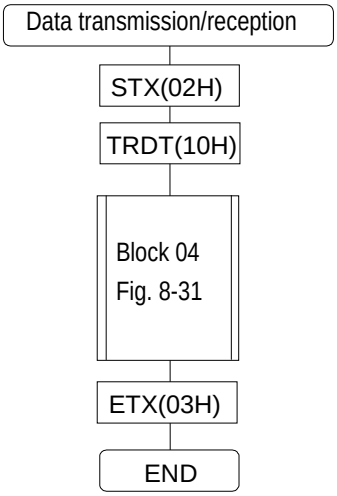


Fig. 8-31

*1	10^0	Mode	30H	Number of lines
*2	10^0	Format	30H	From center
*3 ↑	10^3	H interval	30H	H 10
	10^2		30H	
	10^1		31H	
↓	10^0		30H	
*3 ↑	10^3	V interval	30H	V 10
	10^2		30H	
	10^1		31H	
↓	10^0		30H	
↑	10^1	Size *4	30H	Size 1
↓	10^0		31H	
	10^0	Shape *5	30H	Shape round

*1: "0"=number of lines;
"1"=number of dots
*2: "0"=from center; "1"=from top left
*3: “0000” to “9999”
*4: “01” to “15”
*5: "0"=round; "1"=square

Block No.(05) Format used for circle data

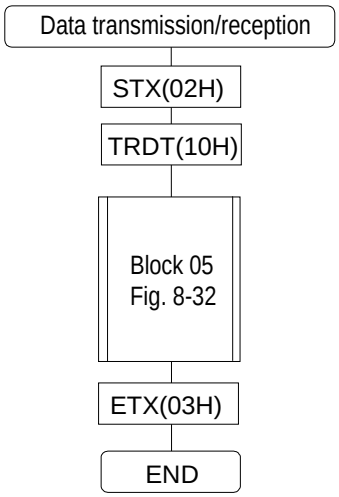


Fig. 8-32

*1	10^0	Format	
↑	10^2		
*2	10^1	Aspect H	
↓	10^0		
↑	10^2		
*2	10^1	Aspect V	
↓	10^0		

*1: "0" to "4"、"5" to "9"
*2: "001" to "255"
Not valid with formats "0" through "4"

35H	Format 5	
30H		
30H		*3
34H		
30H		
30H		*3
33H		

*3: Monitor aspect ratio = 4:3

Block No.(06) Format used for burst data

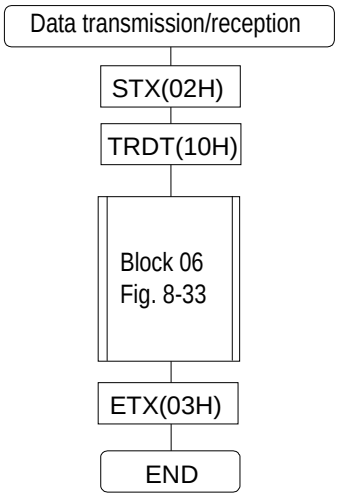


Fig. 8-33

∗1	Burst format		
∗2	10^1	Interval	
↓	10^0		
∗2	10^1	Step	
↓	10^0		

*1: "0" to "3"
*2: "01" to "99"

32H	Format 2
30H	Interval 01
31H	
30H	Step 03
33H	

Block No.(07) Format used for window dat

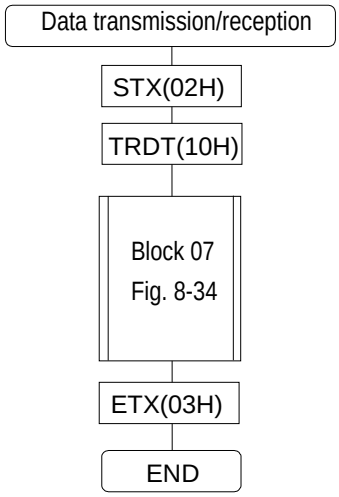


Fig. 8-34

*1	Window mode (%/dot)		30H	%
			30H	
↑	$10^2(10^3)$		32H	H
*2	$10^1(10^2)$	H width	35H	025.0%
	$10^0(10^1)$		30H	
↓	$10^{-1}(10^0)$		30H	
↑	$10^2(10^3)$		32H	V
*2	$10^1(10^2)$	V width	35H	025.0%
	$10^0(10^1)$		30H	
↓	$10^{-1}(10^0)$		32H	
↑	10^2		35H	255 R
	10^1	R	35H	
	10^0		32H	
	10^2		35H	255 G
*3	10^1	G	35H	
	10^0		32H	
	10^2		35H	255 B
	10^1	B	35H	
↓	10^0		37H	RGB
*4	Window colors (TTL)		37H	RH GH BH
*5	Window half-tones		35H	Format 5
*6	Format		32H	Interval 2
*7	Flicker interval			

Analog colors

*1 “0”=%, "1"=dots
*2 “0001” to “1000”%, "0004" and up in display dots
*3 “000” to “255”
*4 "0"=none, “1”=R, “2”=G, “3”=RG, “4”=B, “5”=RB, “6”=GB, “7”=RGB
*5 "0"=none, “1”=RH, “2”=GH, “3”=RHGH, “4”=BH, “5”=RHBH, “6”=GHBH, “7”=RHGHBH
*6 “0” to “F”
*7 “0” to “7”

For details on setting the flicker interval, refer to the flicker intervals in the description of patterns in Section 5-3.

* The coordinate data for window format E is not supported by the terminal commands.

Block No.(08) Format used for option 1 data

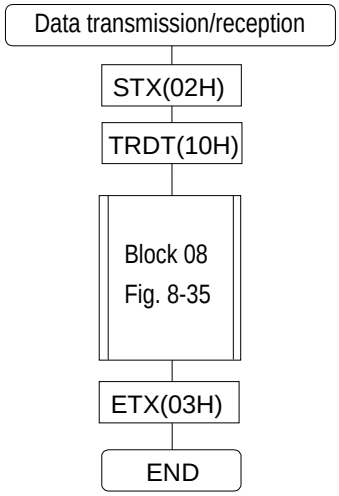


Fig. 8-35

↑	10^1	Option code	30H	Option 03
↓	10^0	*1	33H	

*1 "00" to "7F"

Block No.(09) Format used for option 2 data

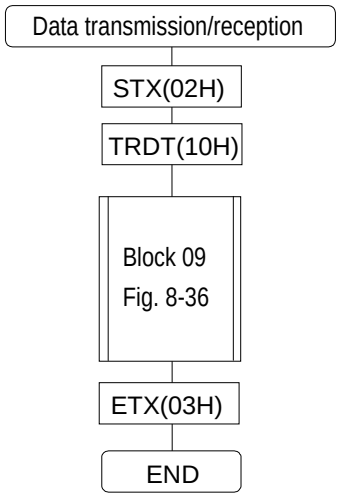


Fig. 8-36

↑	10^1	Option code	ｵﾌﾟｼｮﾝｺｰﾄﾞ	Option 03
↓	10^0	*1	*1 33H	

*1 "00" to "7F"

Block No.(10) Format used for color bar data

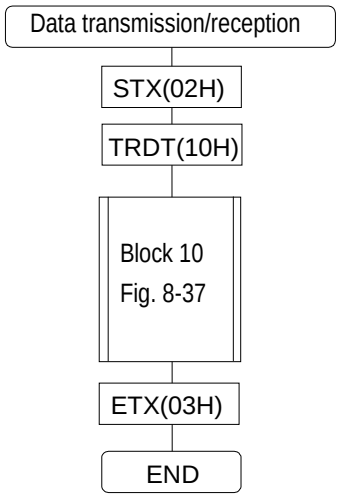


Fig. 37

*1	Mode (%/dot)	30H	%
*2	10^1	31H	16 data effective
	10^0	36H	
↑	$10^2(10^3)$	30H	
*3	$10^1(10^2)$	30H	
	$10^0(10^1)$	36H	6.3%
↓	$10^{-1}(10^0)$	33H	
↑	$10^2(10^3)$	30H	
*3	$10^1(10^2)$	31H	12.5%
	$10^0(10^1)$	32H	
↓	$10^{-1}(10^0)$	35H	
*4	Direction H/V	30H	Horizontal
↑	Color designation	30H	None
	Color designation	31H	R
	Color designation	32H	G
	Color designation	33H	RG
	Color designation	34H	B
	Color designation	35H	RB
	Color designation	36H	GB
*5	Color designation	37H	RGB
	Color designation	30H	None
	Color designation	31H	R
	Color designation	32H	G
	Color designation	33H	RG
	Color designation	34H	B
	Color designation	35H	RB
	Color designation	36H	GB
↓	Color designation	37H	RGB

*1: “0”=%, “1”= number of dots
*2 "00" to "16" number of effective lines (repeated lines)
*3 “0000” to “1000”%, "0001" to "9999" in display dots (H interval, V interval)
*4 "0"=horizontal; "1"=vertical; "2"=horizontal repeated; "3"=vertical repeated
*5 "0"=none, “1”=R, “2”=G, “3”=RG, “4”=B, “5”=RB, “6”=GB, “7”=RGB

Block No.(11) Format used for gray scale data

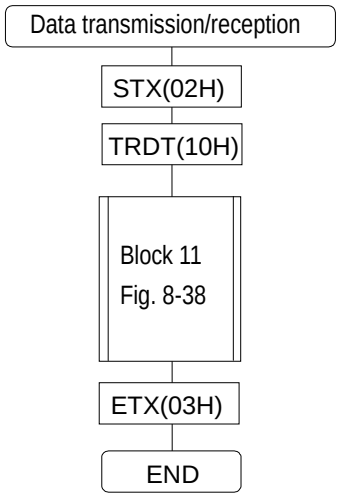
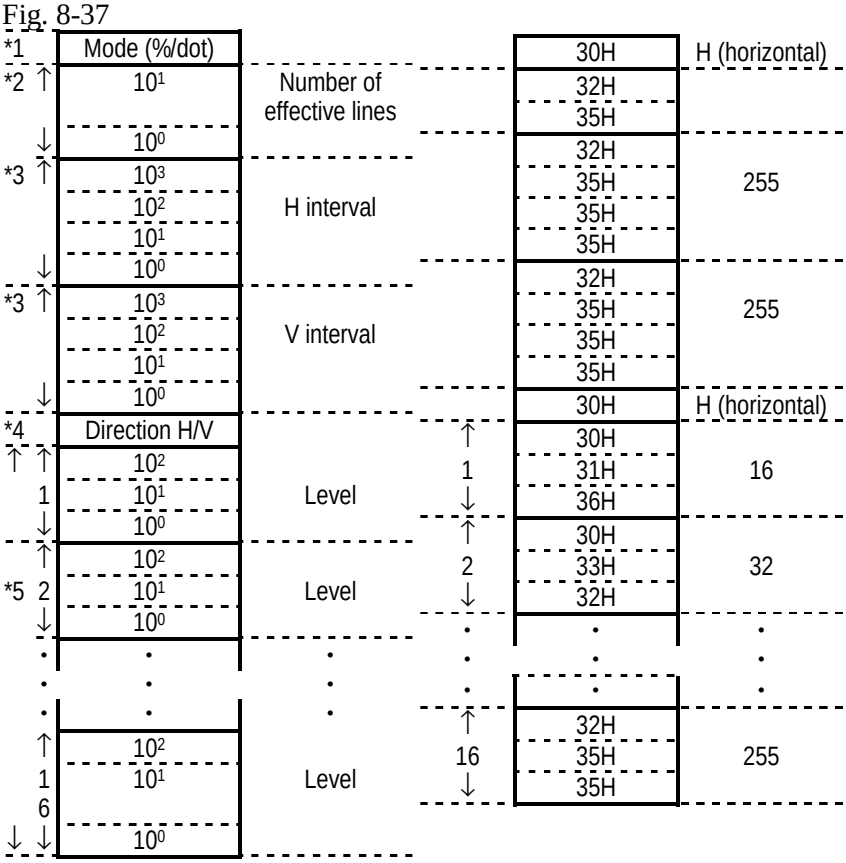


Fig. 8-37



*1: “0”=%, "1"=number of dots
*2: "00" to "16" number of effective lines (repeated lines)
*3 “0000” to “1000”%, "0001" to "9999" in display dots
*4: "0"=horizontal; "1"=vertical
*5: “000” to “255”

Block No.(13)　Format used for cursor data

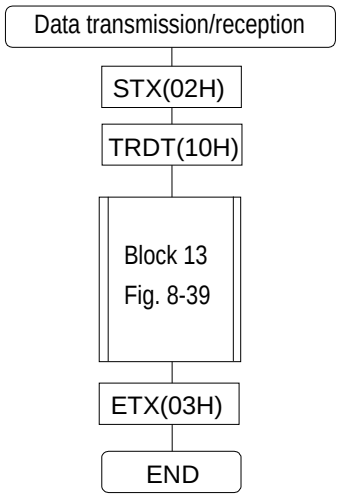


図 8-39

*1	10^0	Shape		30H	5×5
	10^2			30H	
*2	10^1	Flicker		30H	1
	10^0			31H	
*3	10^0	Coordinate display		30H	None
	10^2			30H	
*4	10^1	Step amount		31H	10
	10^0			30H	
	10^3			32H	
	10^1	R		35H	255
	10^0			35H	
	10^2			32H	
	10^1	G		35H	255
	10^0			35H	
	10^2			32H	
	10^1	B		35H	255
	10^0			35H	
*5	10^3			30H	
	10^1	Background R		30H	0
	10^0			30H	
	10^2			30H	
	10^1	Background G		30H	0
	10^0			30H	
	10^2			30H	
	10^1	Background B		30H	0
	10^0			30H	

*1: “0”=5×5、
"1"=full screen "+" shape cursor
"2"=vertical line
*2 “000” to ”007”
*3 "0"=no display
"1"=display 1
"2"=display 2
*4 “001” to ”255”
*5 “000” to”255”

Block No.(14) Format used for action data

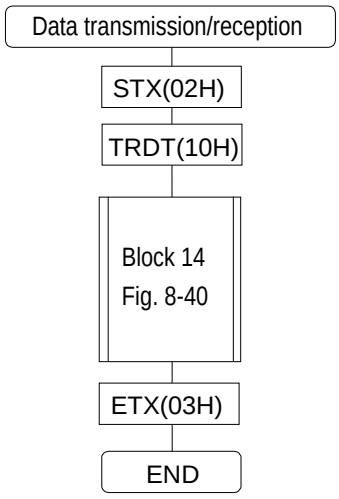


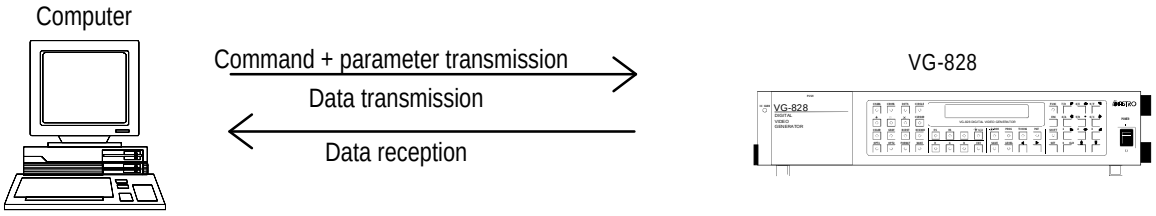
図 8-40

*1	10^2 10^1 10^0	Interval	30H 30H 31H	Every 1V
*2	Chr flicker		30H	No flicker
*3	Win flicker		30H	No flicker
*4	Ptn Scroll		31H	Chr scroll
*5	Chr Mode		30H	Left
*6	Grp Mode		30H	
*7	10^1 10^0	h_rep	30H 30H	
*8	10^3 10^2 10^1 10^0	h_step	30H 30H 30H 34H	004
*9	10^1 10^0	v_rep	30H 30H	
*10	10^3 10^2 10^1 10^0	v_step	30H 30H 30H 30H	0
*11	Win Scroll		31H	Scrolling
*12	Win dir		31H	Right
*13	10^3 10^1 10^0	Win Step	30H 30H 31H	1
*14	Pal Scroll		30H	No scrolling
*15	Code 10^2 10^1 10^0	Pal Scroll step	30H 30H 30H 31H	1
*16	10^2 10^1 10^0	Pal1	30H 30H 30H	0
*17	10^3 10^1 10^0	Pal2	32H 35H 35H	255
*18	10^3 10^1 10^0	Rsv1	30H 30H 30H	0
*18	10^3 10^1 10^0	Rsv2	30H 30H 30H	0

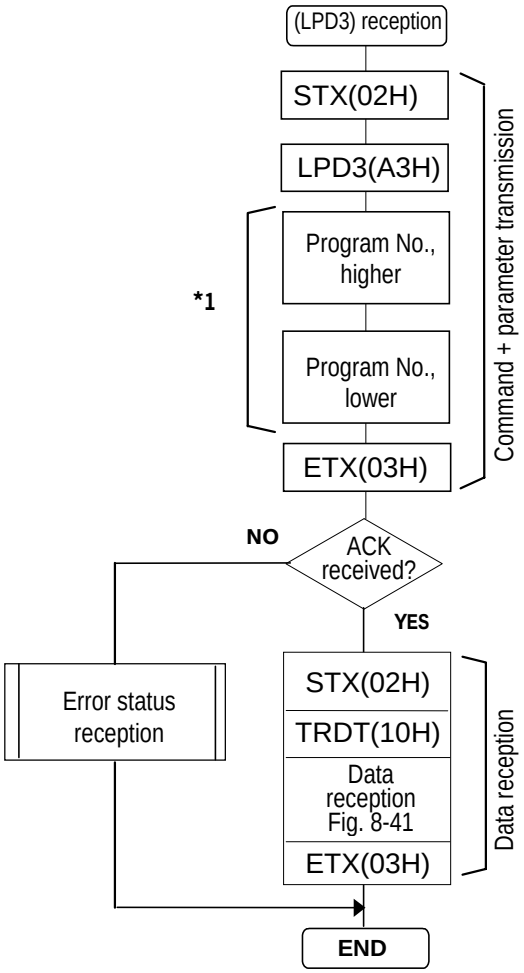
*1: Interval=number of V "001" to "999"
*2: "0"=no CHR flicker; "1"=CHR flicker
*3: "0"=no Win flicker; "1"=Win flicker
*4: "0"=no pattern scrolling; "1"=Chr scrolling; "2"=Grp scrolling; "3"=both Chr and Grp scrolling
*5: CHR scrolling mode
*6: GRP scrolling mode "0"=left; "1"=right; "2"=up; "3"=down; "4"=top left; "5"=bottom left; "6"=top right; "7"=bottom right; "8"=move to display position
*7: Number of times repeated horizontally (1 to 15)
*8: Horizontal steps (1 to 4096)
*9: Number of times repeated vertically (1 to 15)
*10: Vertical steps (1 to 4096)
*11: "0"=no Win scrolling; "1"=Win scrolling
*12: Win scrolling direction "0"=left; "1"=right; "2"=up; "3"=down; "4"=top left; "5"=bottom left; "6"=top right; "7"=bottom right
*13: Win scroll step (1 to 255 dots)
*14: "0"=no Pal scrolling; "1"=Pal scrolling
*15: Pal scroll step Sign: "0"=+; "1"=- (-128 to 127)
*16: Start Pal
*17: End Pal (0 to 255)
*18: Reserved ("000")

8-30 [LPD3] (A3H) AND [SPD3] (A4H)

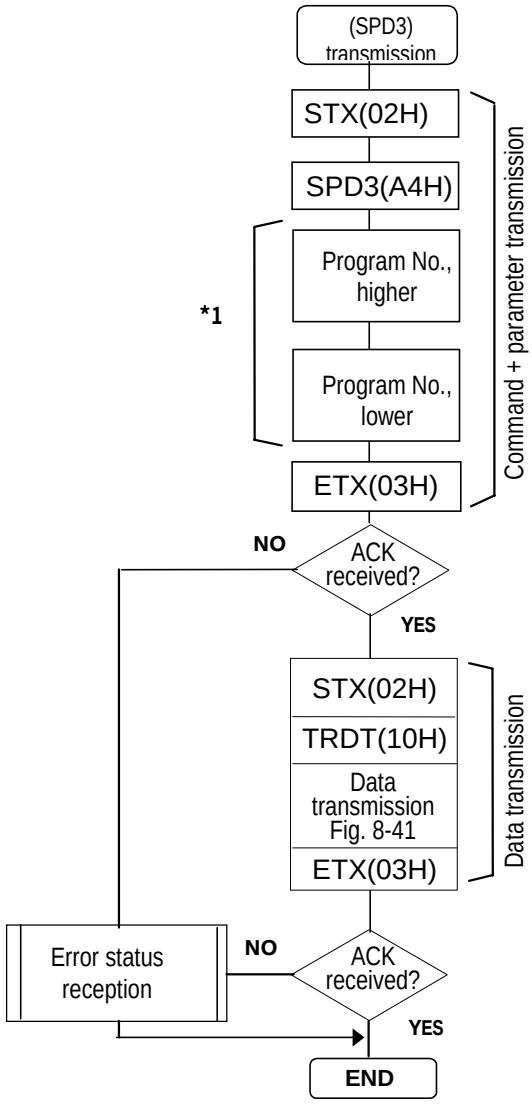
These commands are used to transmit and receive all the data of the programs whose numbers are designated. The transmitted data is written into the buffer RAM when the program number is 00 and into the panel ROM, and it is not executed when it is in the range from 01 to 40.



When commands and parameters are to be transmitted followed by data reception



When commands and parameters are to be transmitted followed by data transmission



*1: Program numbers are designated with 3 digits.
They range from 001 to 040 when the HN58C65 is used and from 001 to 040 and from 500 to 779 when the AH-3000 is used.

- Shown below is the format used for the program data.

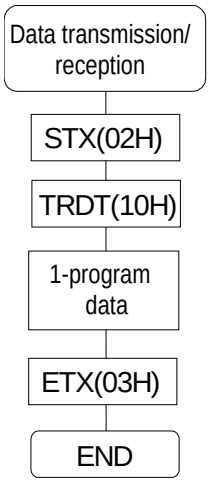
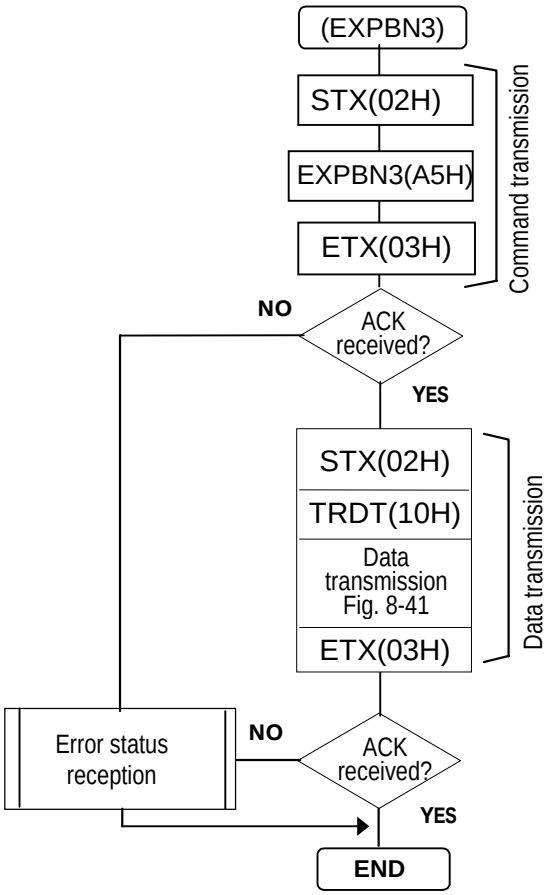


Fig. 8-41

Horizontal timing Fig. 8-3	
(2CH)	"," delimiter
Vertical timing Fig. 8-4	
(2CH)	"," delimiter
Output conditions Fig. 8-45(1)+(2)	(51 bytes)
(2CH)	"," delimiter
Block 01 graphic color Fig. 8-28	(21 bytes)
Block 02 character Fig. 8-29	(10ytes)
Block 03 crosshatch Fig. 8-30	(14ytes)
Block 04 dot Fig. 8-31	(13ytes)
Block 05 circle Fig. 8-32	(7bytes)
Block 06 burst Fig. 8-33	(5bytes)
Block 07 window Fig. 8-34	(22ytes)
Block 08 option 1 Fig. 8-35	(2bytes)
Block 09 option 2 Fig. 8-36	(2 bytes)
(2CH)	"," delimiter
Block 10 color bar Fig. 8-37	
(2CH)	"," delimiter
Block 11 gray scale Fig. 8-38	
(2CH)	"," delimiter
Block 12 cursor Fig. 8-39	
(2CH)	"," delimiter
Block 13 action Fig. 8-40	

8-31 [EXPBN3](A5H)

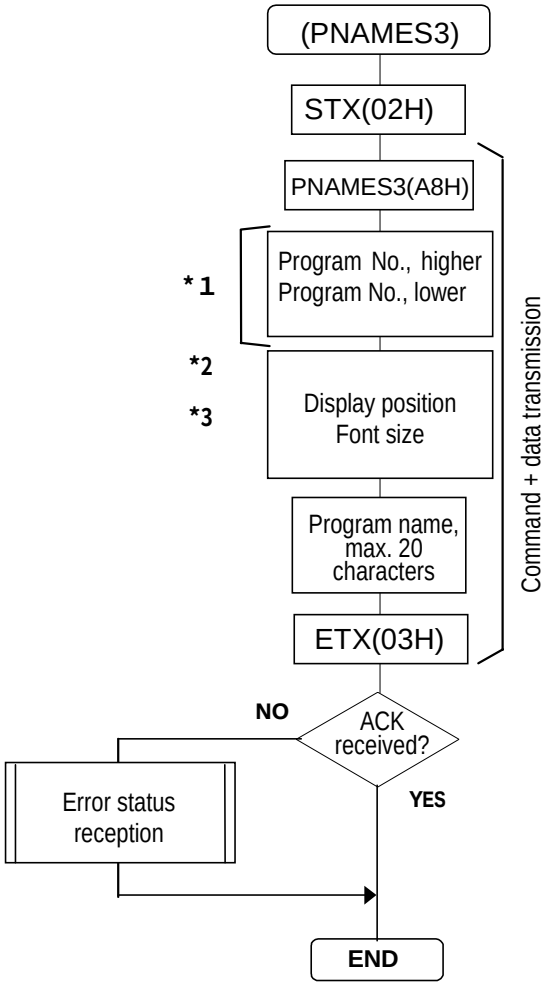
This command is used to transmit the 1-program data to the VG-828 and execute it. The data is not written into the panel ROM. The data format is the same as for the (SPD3) command.



8-32 [PNAMES3](A8H)

This command is used to transmit the program names of the programs whose numbers are designated. The transmitted data is written into the panel ROM.

* All parameters are in ASCII code.



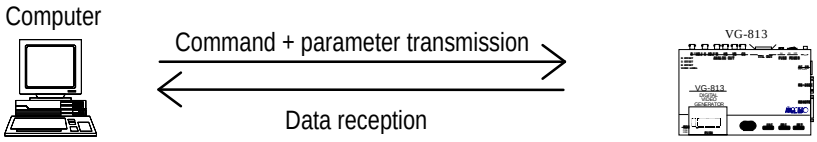
*1: Program numbers are designated with 3 digits.
They range from 001 to 040 when the HN58C65 is used, and from 001 to 040 and from 500 to 779 when the AH-3000 is used.

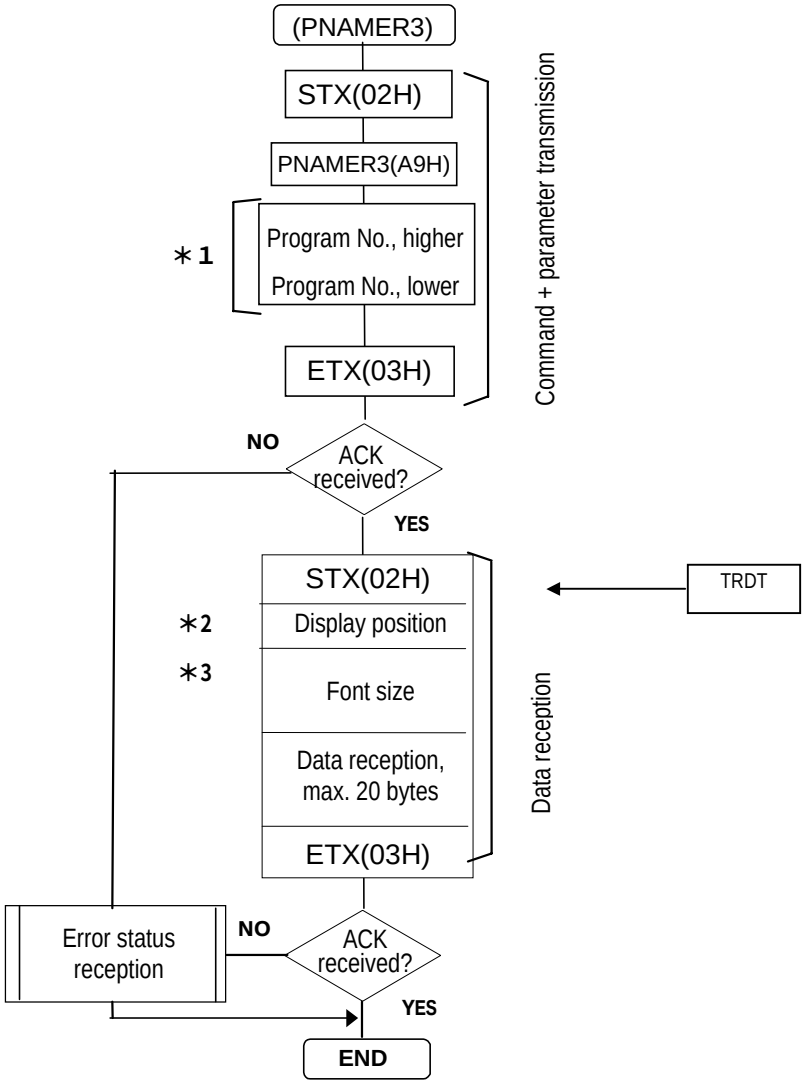
*2: "0"=center; "1"=top left; "2"=bottom left; "3"=top right; "4"=bottom right

*3: "0"=5×7; "1"=7×9 "2"=16×16

8-33 [PNAMER3](A9H)

This command is used to receive the program names of the programs whose numbers are designated.
* All parameters are in ASCII code.
When commands and parameters are to be transmitted followed by data reception



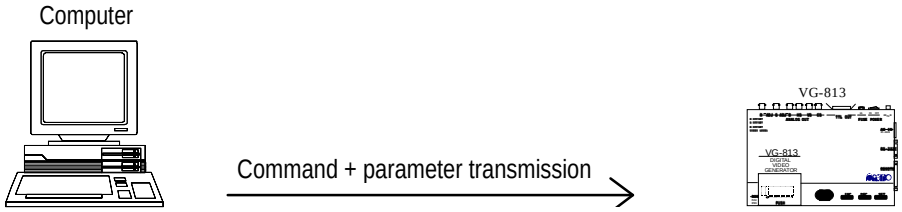


*1: Program numbers are designated with 3 digits.
They range from 001 to 040 when the HN58C65 is used, and from 001 to 040 and from 500 to 779 when the AH-3000 is used.
*2: "0"=center; "1"=top left; "2"=bottom left; "3"=top right; "4"=bottom right
*3: "0"=5×7; "1"=7×9 "2"=16×16

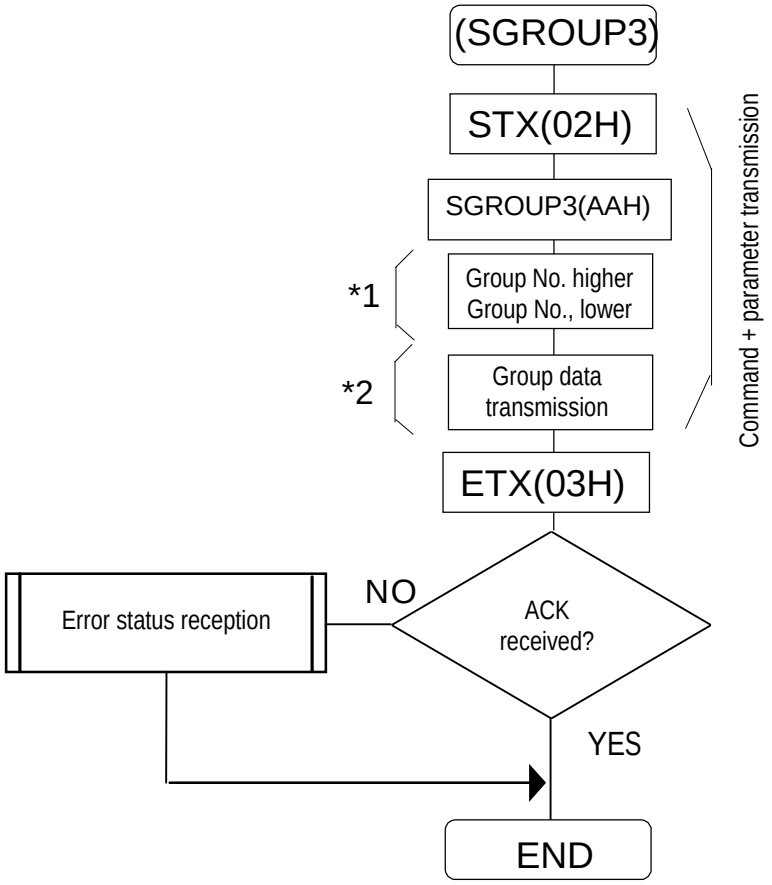
8-34 [SGROUP3](AAH)

This command is used to store the data of the groups whose numbers are designated in the panel ROM.

* All parameters are in ASCII code.



Command + parameter transmission



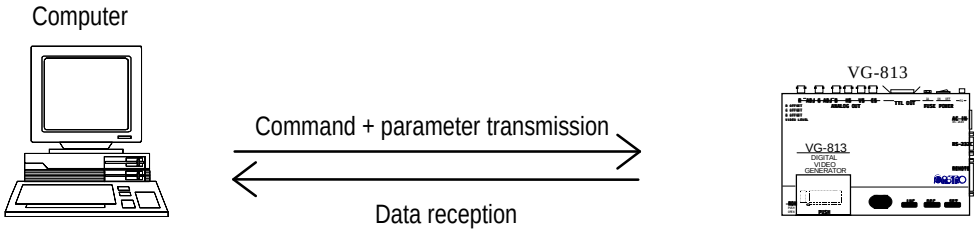
*1: Numbers "01" and "02" for HN58C65
Numbers "01" to "08" for AH-3000
Numbers 1 to 40 for HN58C256
Numbers 1 to 32 for memory card

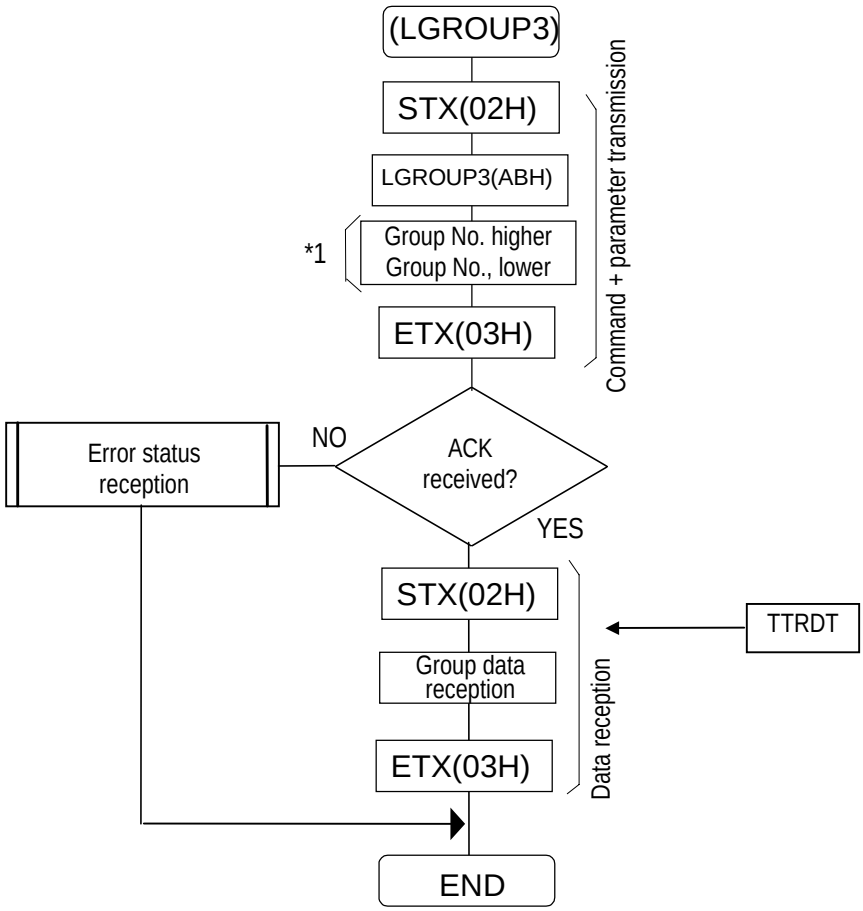
*2: (Timing data program No. (3 digits) + pattern data program No. (3 digits)) x 58 sets (under maximum conditions)

8-35 [LGROUP3](ABH)

This command is used to acquire the data of the groups whose numbers are designated from the VG-828.

* All parameters are in ASCII code.





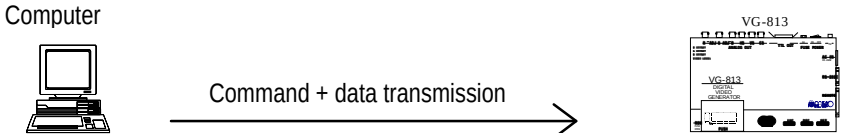
*1: Numbers "01" and "02" for HN58C65
Numbers "01" to "08" for AH-3000
Numbers 1 to 40 for HN58C256
Numbers 1 to 32 for memory card

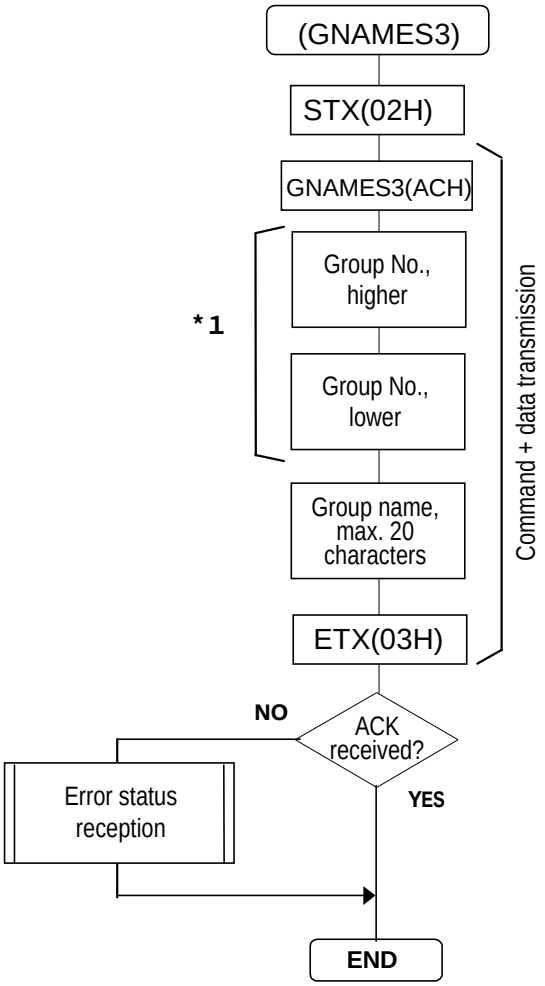
*2: (Timing data program No. (3 digits) + pattern data program No. (3 digits)) x 58 sets (under maximum conditions)

8-36 [GNAMES3](ACH)

This command is used to transmit the names of the groups whose numbers are designated. The transmitted data is written into the panel ROM.

* All parameters are in ASCII code.





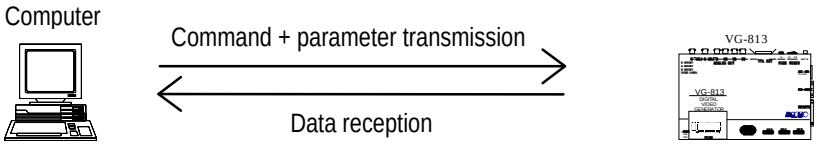
*1: "0" to "32"

There are no group names when the HN58C65 or AH-3000 is used.

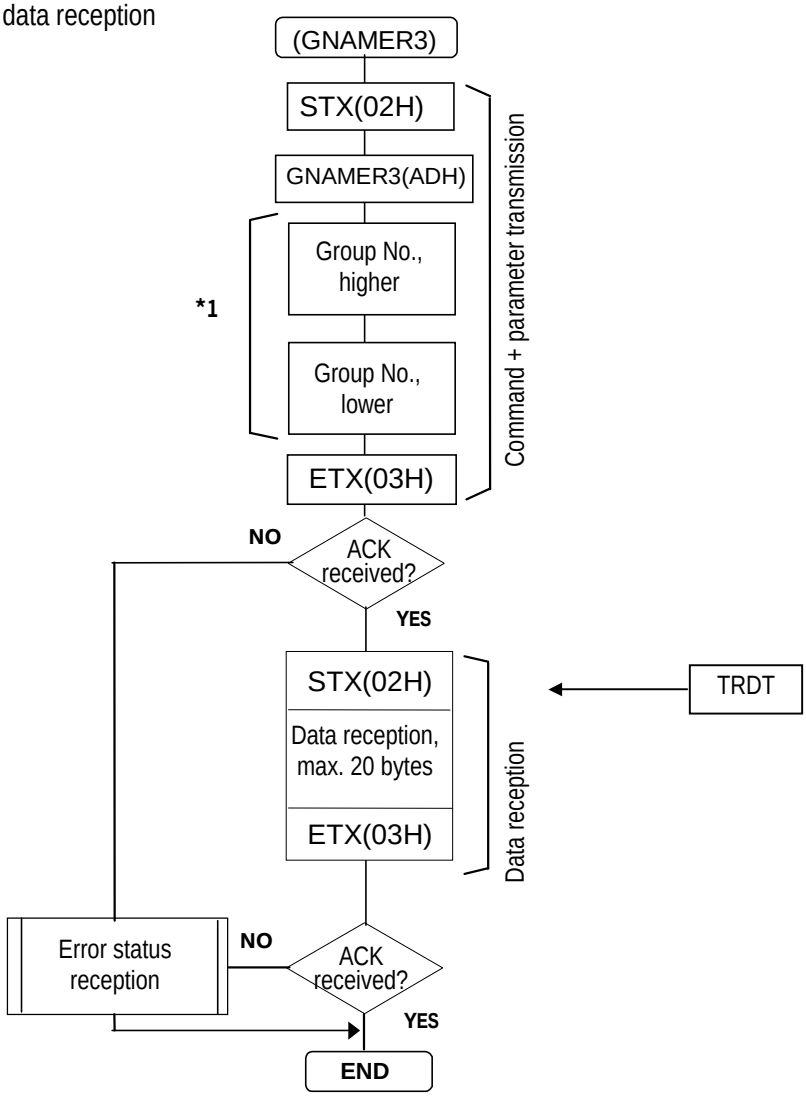
8-37 [GNAMER3](ADH)

This command is used to receive the names of the groups whose numbers are designated.

* All parameters are in ASCII code.



When commands and parameters are to be transmitted followed by data reception



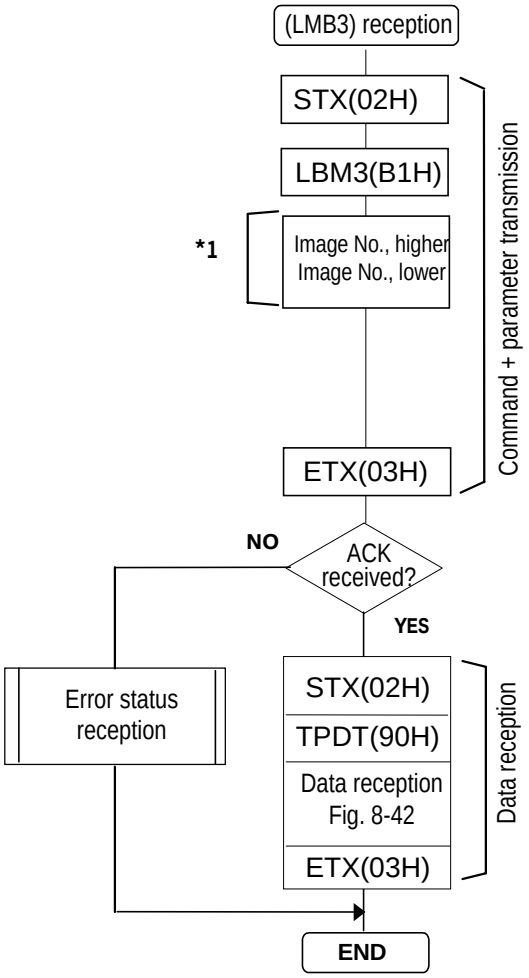
*1: “0” to “32”

There are no group names when the HN58C65 or AH-3000 is used.

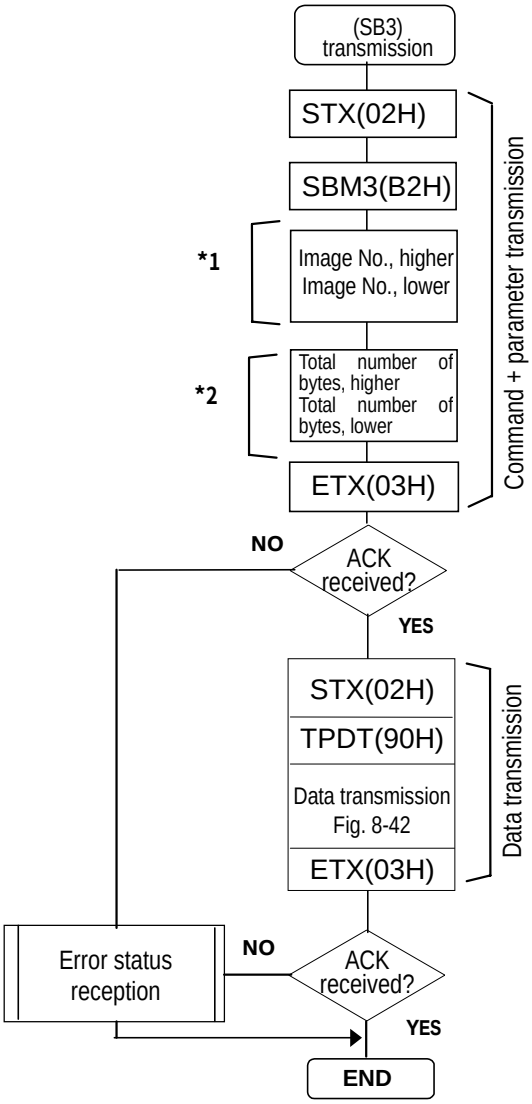
8-38 [LBMS](B1H) AND [SBM3](B2H)

These commands are used to transmit or receive the image data whose numbers are designated.

When commands and parameters are to be transmitted followed by data reception

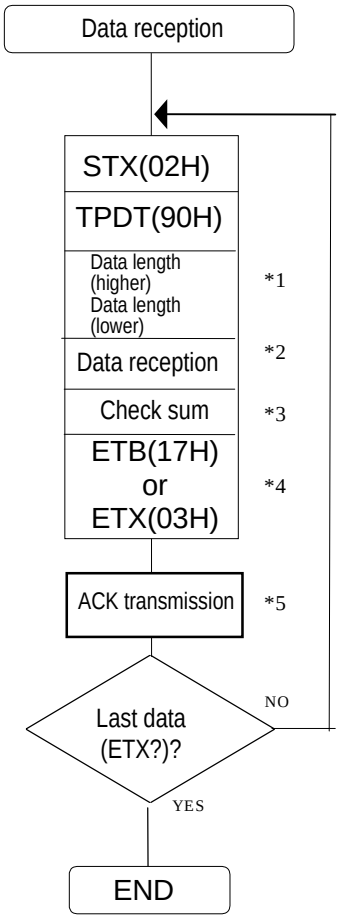


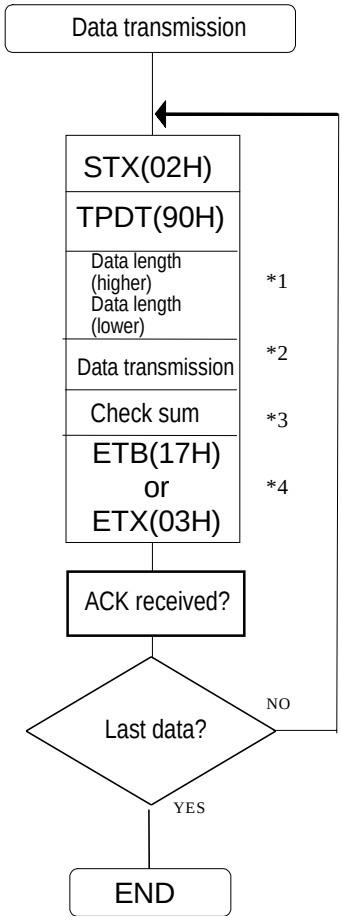
When commands and parameters are to be transmitted followed by data transmission



*1: Image data numbers are designated with two digits (from "01" to "64").
*2: The total number of bytes (header + palette + image data) is designated in decimal notation and ASCII code.

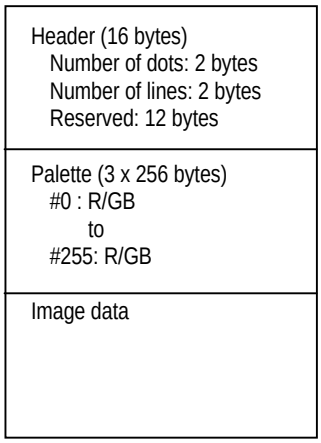
Fig. 8-42





*1: This is the number of bytes of data transmitted or received in a packet. It is designated in binary notation with 2 bytes. The maximum number of data bytes which can be transferred at one time is 1024.

*2: The following data is transmitted and received in binary notation. The data format is as shown below.



*3: This is the sum (1 lower byte) of all the bytes from the data length to the last data.

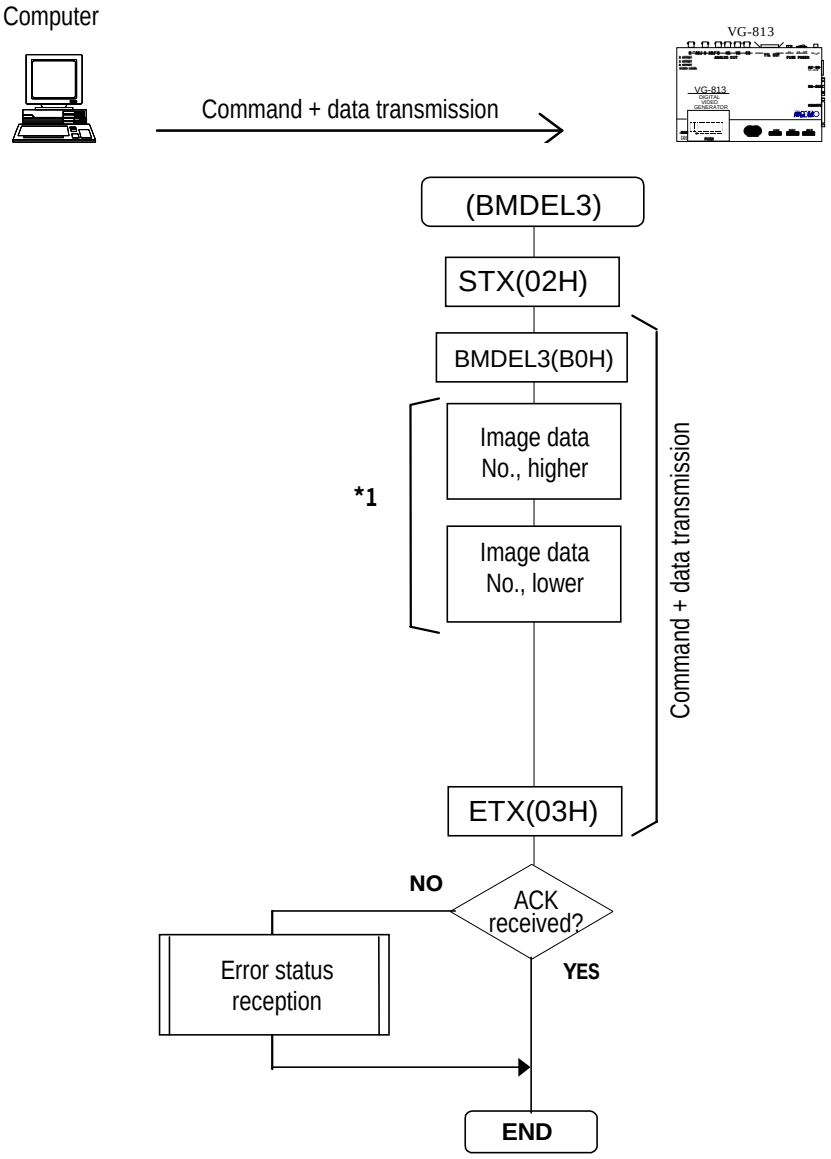
*4: ETX when it is the last data; ETB when data transfer is to be continued.

*5: ACK is not transmitted when ETX applies for the last data

8-39 [BMDEL3](B0H)

This command is used to delete the image data whose numbers are designated. The designated image data is deleted from the memory card.

* All parameters are in ASCII code.

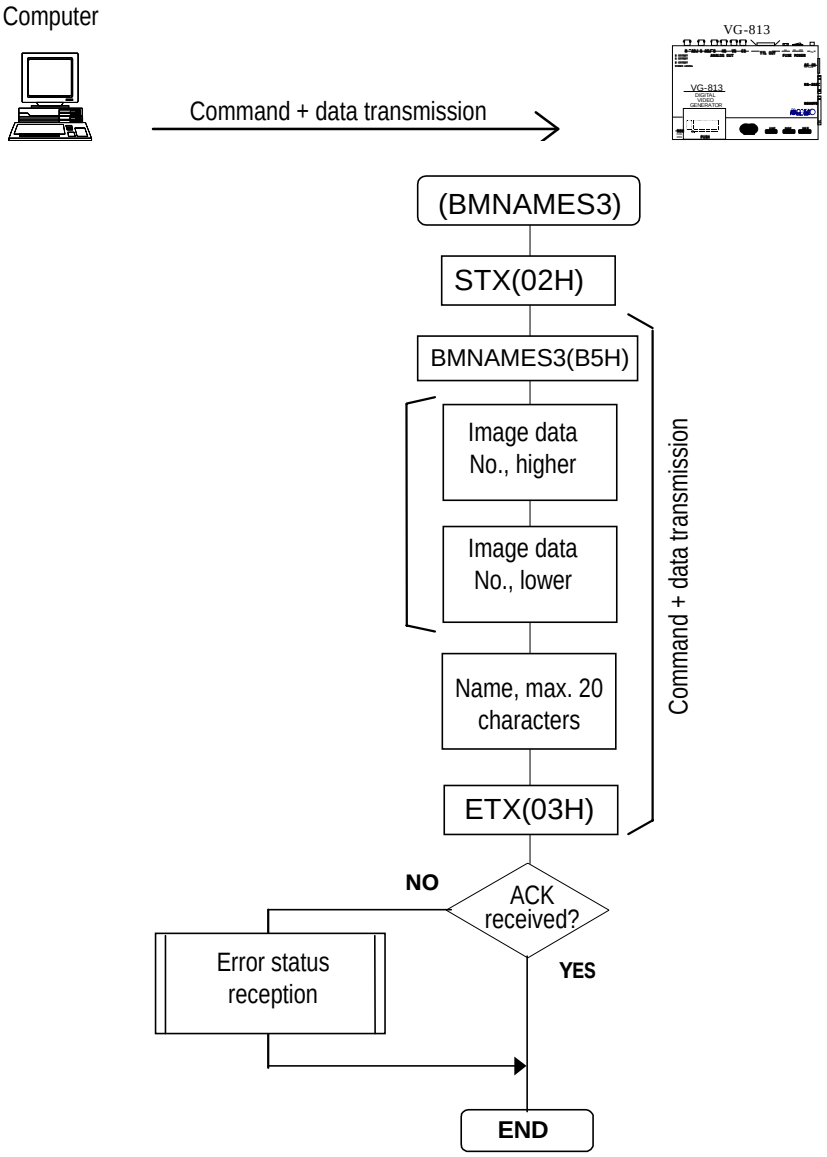


*1: “0” to “64”
"**": All data deleted

8-40 [BMNAMES3](B5H)

This command is used to transmit the names of the image data whose numbers are designated. The transmitted names are written into the memory card.

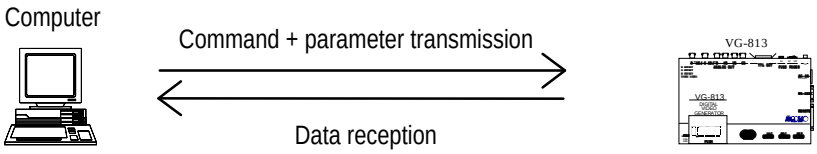
* All parameters are in ASCII code.



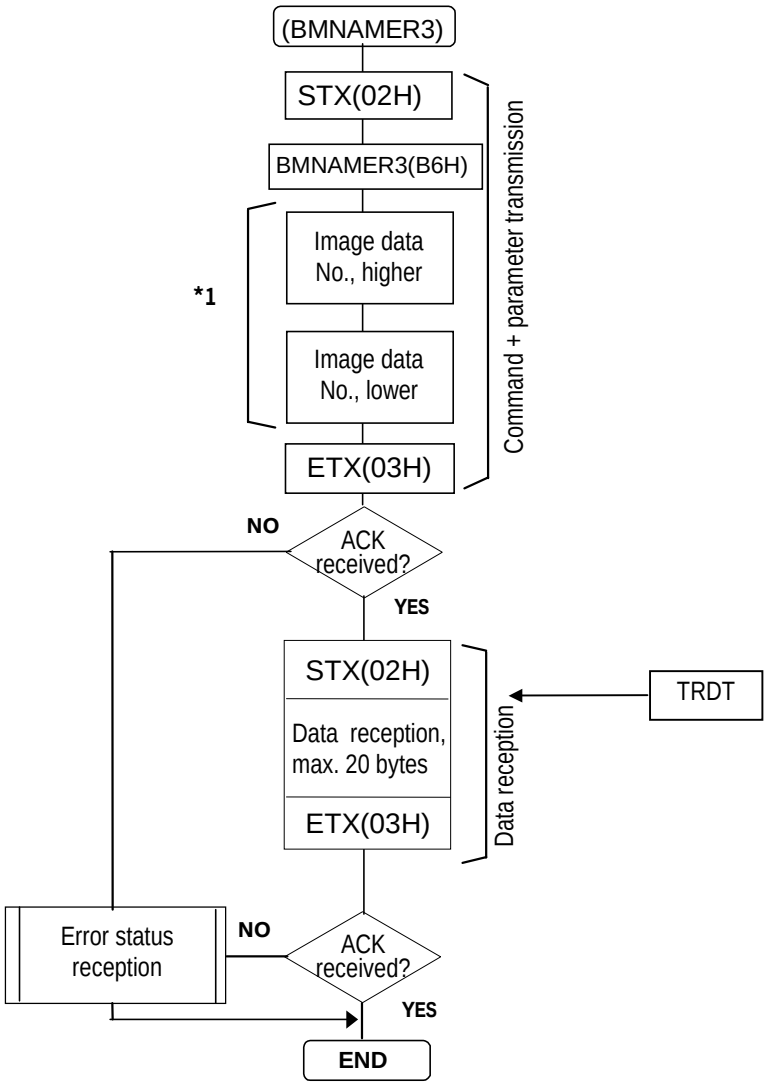
*1: “0” to “64”

8-41 [BMNAMER3](B6H)

This command is used to receive the names of the image data whose numbers are designated.
* All parameters are in ASCII code.



When commands and parameters are to be transmitted followed by data

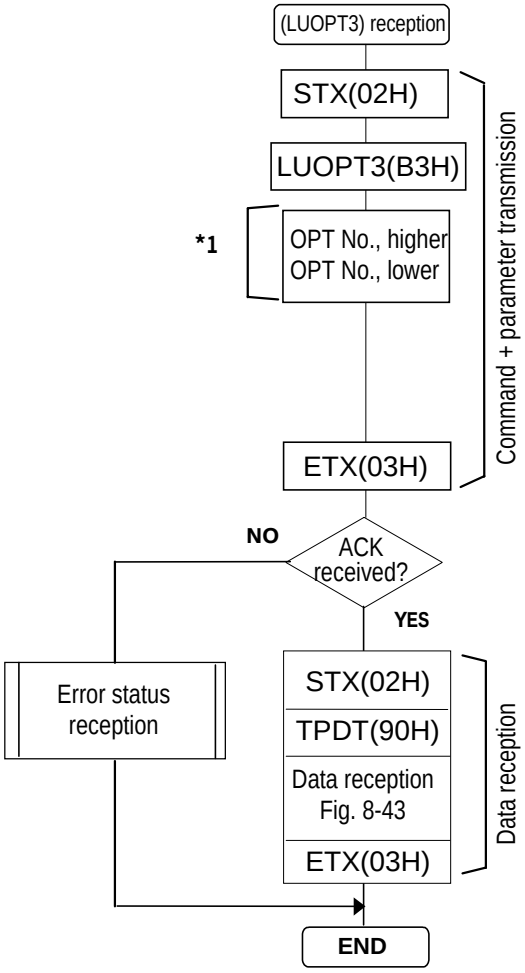


*1: “0” to “64”

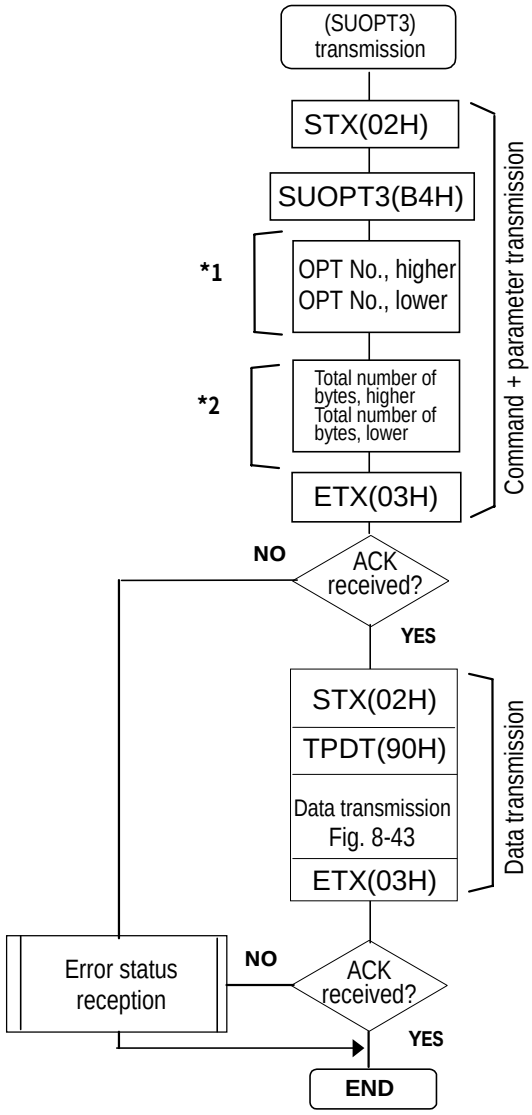
8-42 [LUOPT3](B3H) AND [SUOPT3](B4H)

These commands are used to transmit or receive the data of the user optional patterns whose numbers are designated.

When commands and parameters are to be transmitted followed by data reception

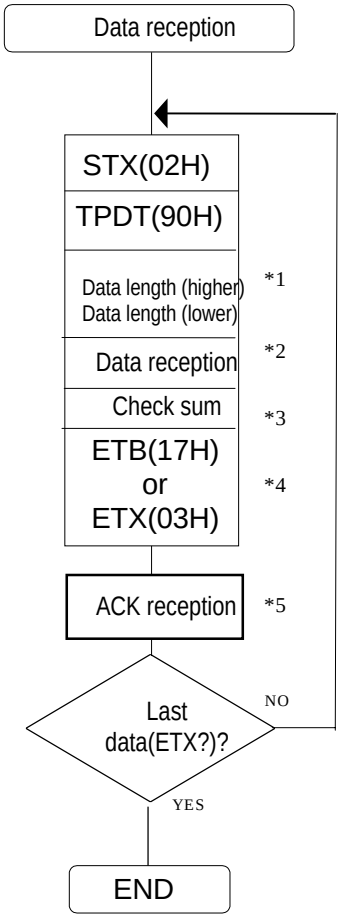


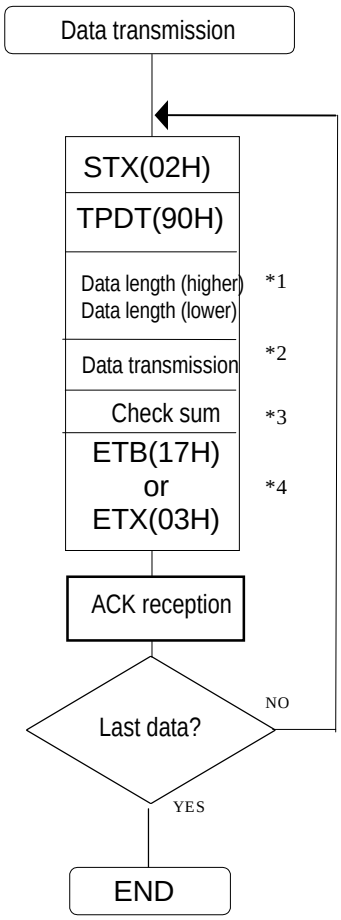
When commands and parameters are to be transmitted followed by data transmission



*1: User optional pattern numbers are designated in hexadecimal notation with 2 digits ("00" to "3F").
*2: The total number of bytes (user optional pattern data) is designated in decimal notation and ASCII code.

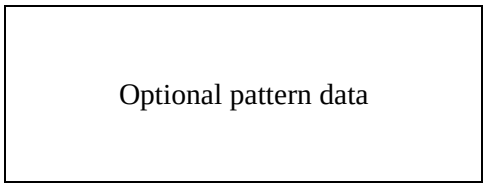
Fig. 8-43





*1: This is the number of bytes of data transmitted or received in a packet. It is designated in binary notation with 2 bytes. The maximum number of data bytes which can be transferred at one time is 1024.

*2: The following data is transmitted and received in binary notation. The data format is as shown below.



*3: This is the sum (1 lower byte) of the all bytes from the data length to the last data.

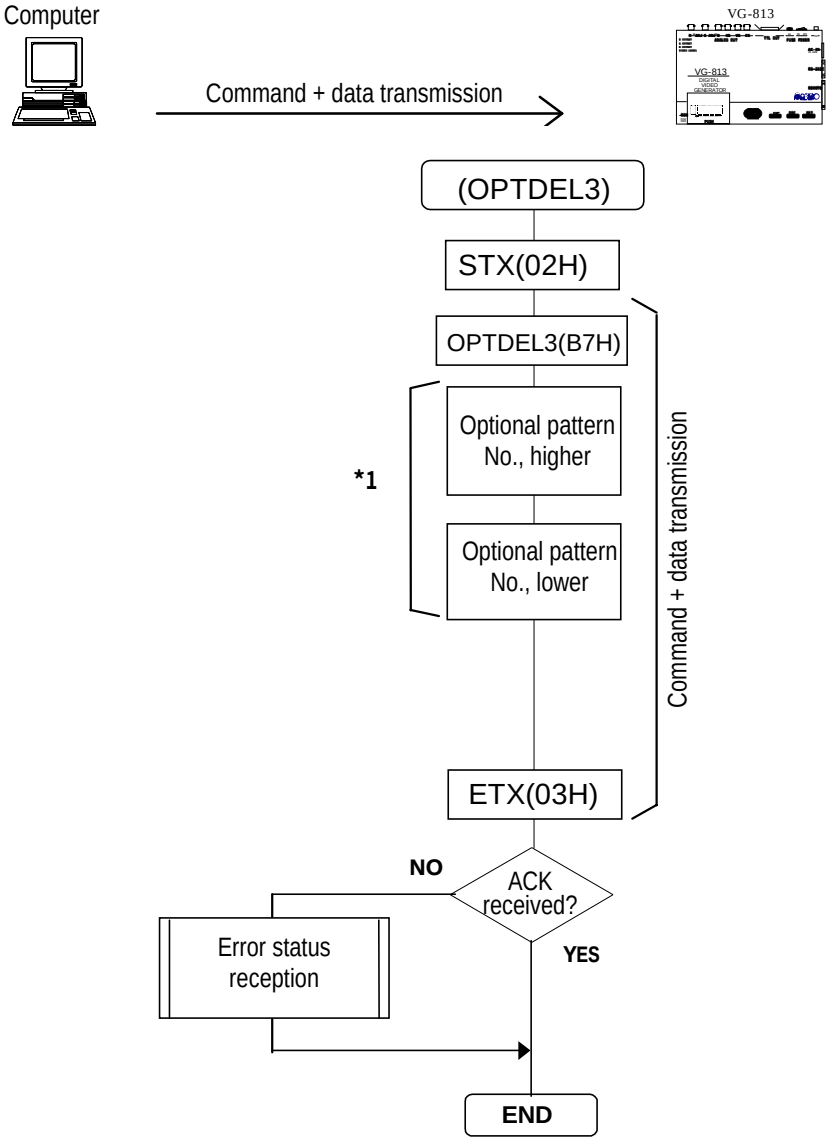
*4: ETX when it is the last data; ETB when data transfer is to be continued.

*5: ACK is not transmitted when ETX applies for the last data.

8-43 [OPTDEL3](B7H)

This command is used to delete the data of the optional patterns whose numbers are designated. The designated optional pattern data is deleted from the memory card.

* All parameters are in ASCII code.

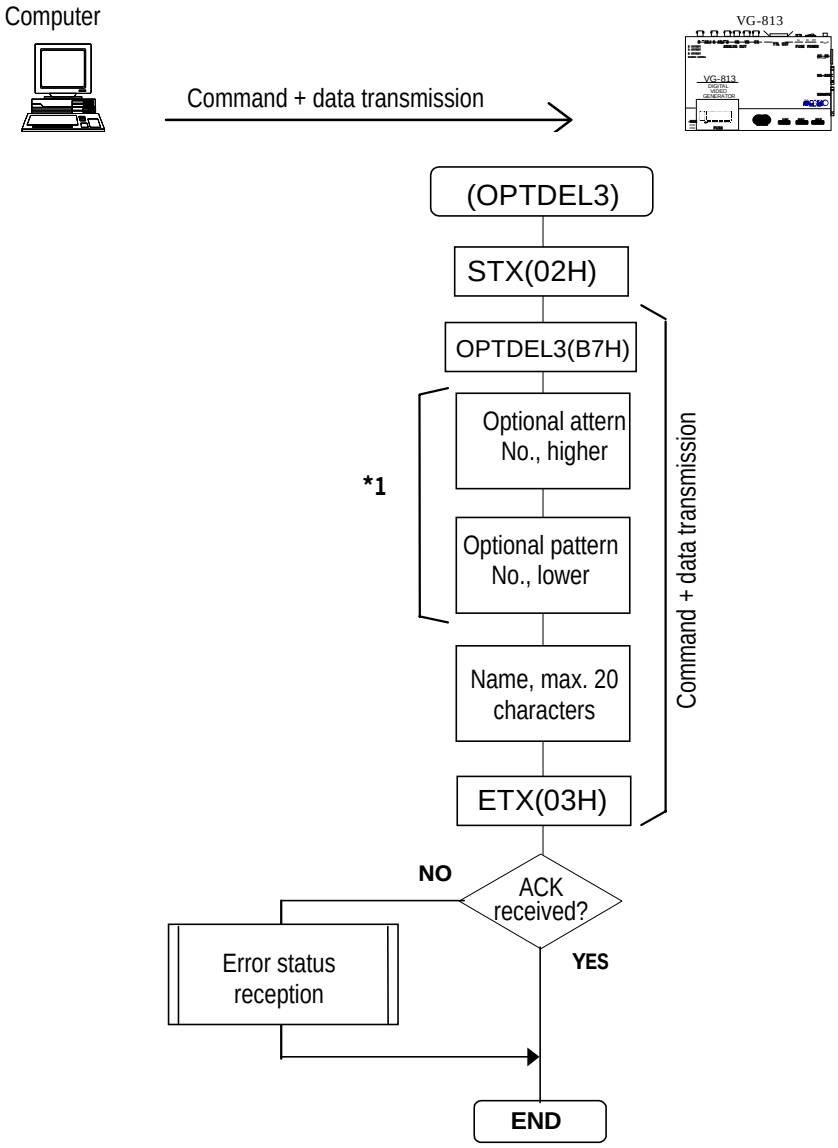


*1: "0" to "31"
Numbers are designated in hexadecimal notation with 2 digits.
"**": All data deleted

8-44 [OPTNAMES3](B8H)

This command is used to transmit the names of the optional patterns whose numbers are designated. The transmitted names are written into the memory card.

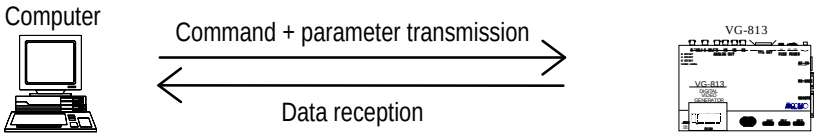
* All parameters are in ASCII code.



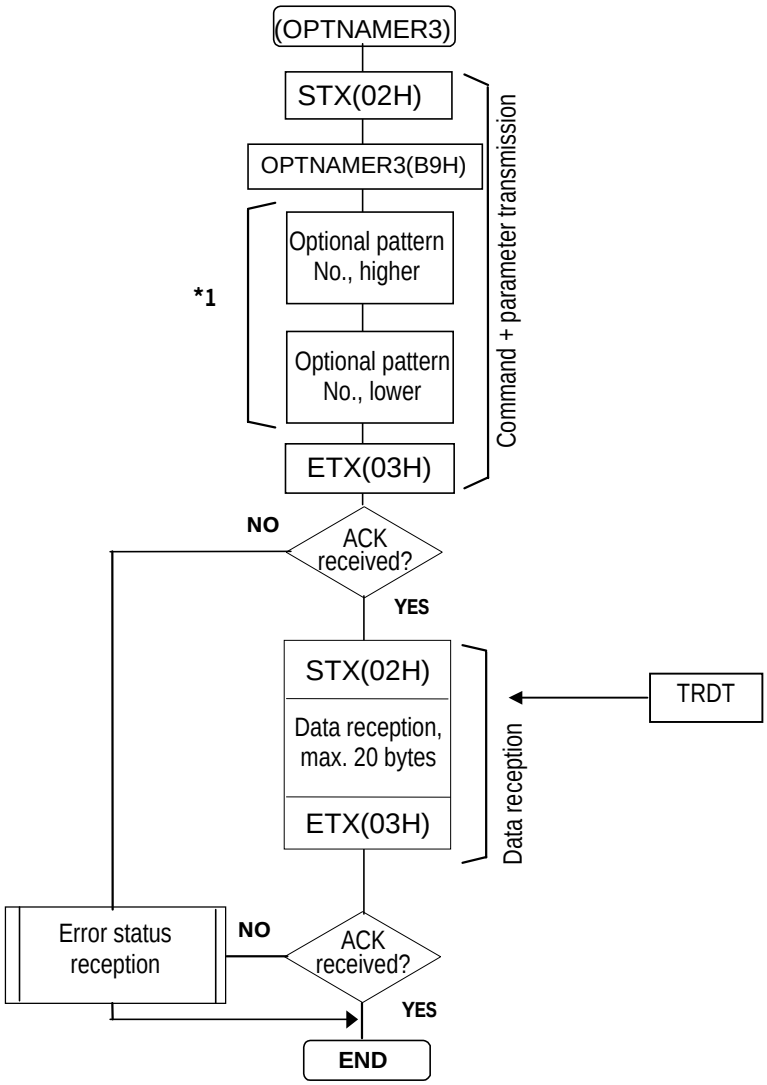
*1: "0" to "31"
Numbers are designated in hexadecimal notation with 2 digits.

8-45 [OPTNAMER3](B9H)

This command is used to receive the names of the optional patterns whose numbers are designated.
* All parameters are in ASCII code.



When commands and parameters are to be transmitted followed by data reception.

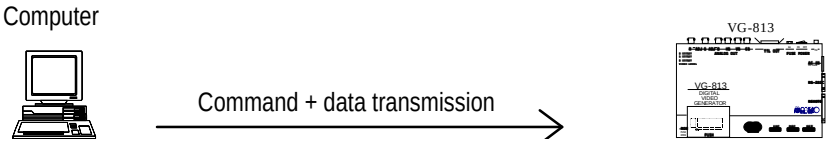


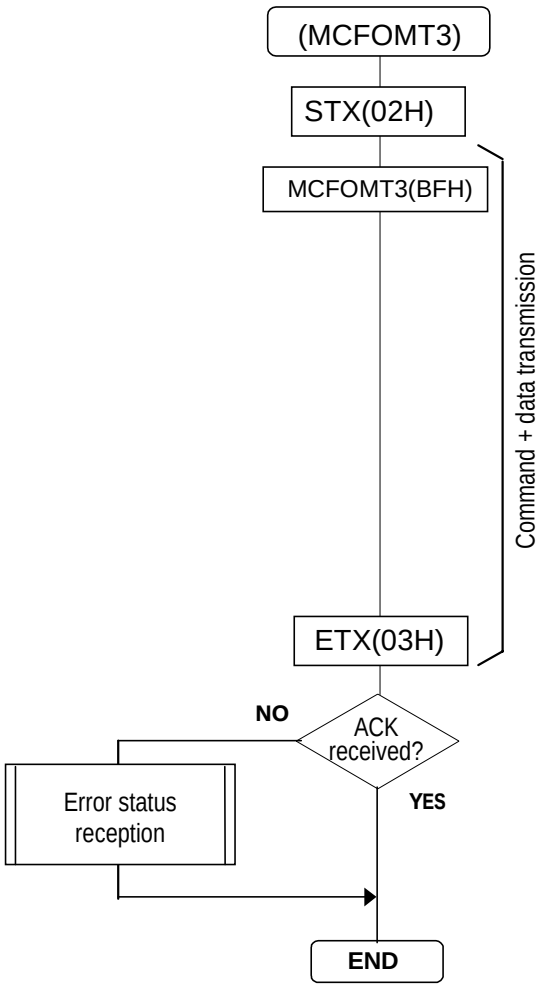
*1: "0" to "31"
Numbers are designated in hexadecimal notation with 2 digits.

8-46 [MCFOMT3](BFH)

This command is used to format the memory card.

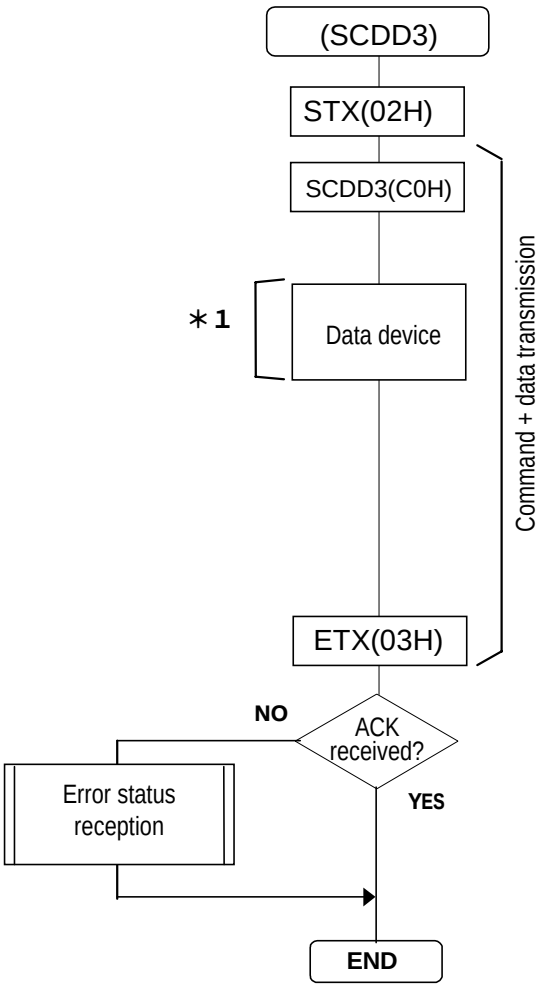
* All parameters are in ASCII code.





8-47 [SCDD3](C0H)

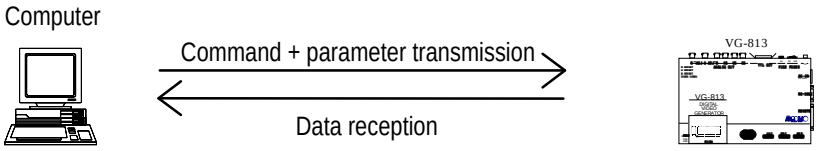
This command is used to set the current data device to either the memory card or panel ROM.
* All parameters are in ASCII code.



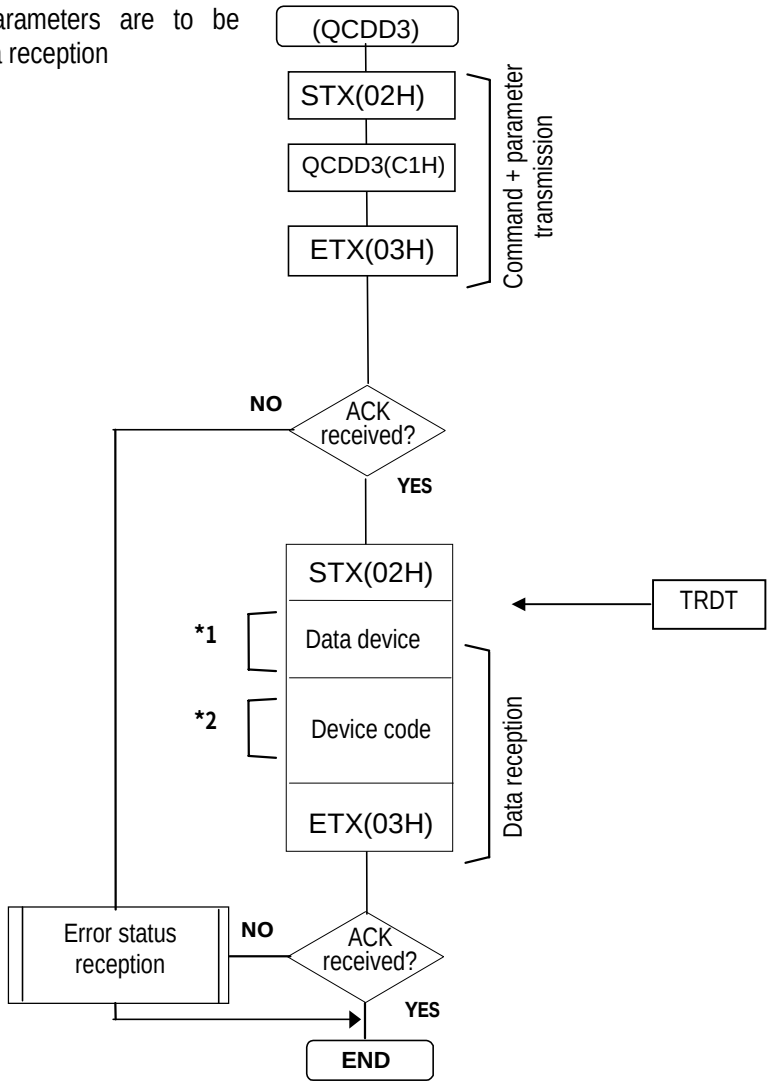
*1: "0"=memory card; "1"=panel ROM

8-48 [QCDD3](C1H)

This command is used to inquire about the current data device (memory card or panel ROM) and its type.
* All parameters are in ASCII code.



When commands and parameters are to be transmitted followed by data reception



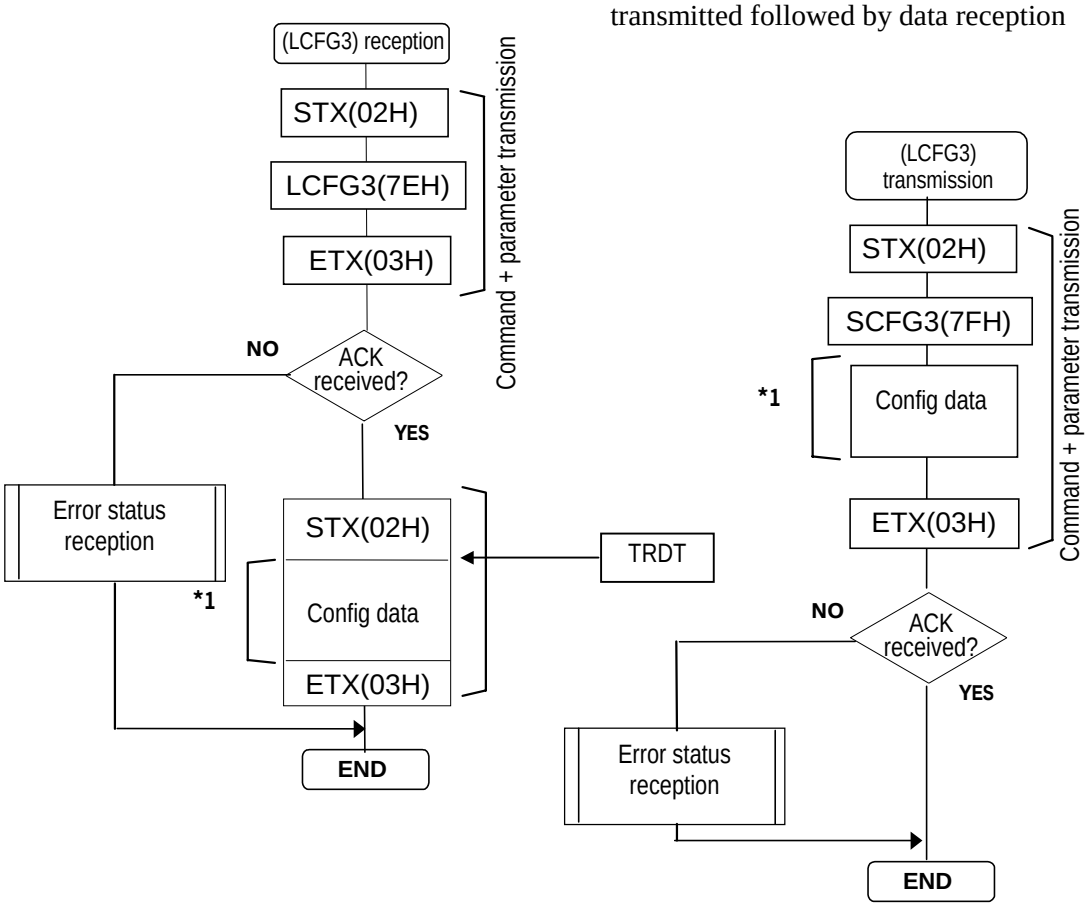
*1: "0"=memory card; "1"=panel ROM
*2: Device code
"0"= HN58C65P, "1"= 2764, "2"= AH_3000, "3"= HN58C256P (when a panel ROM is used)
"0"=1MB, "1"=2MB, "2"=4MB, "3"=8MB, "4"=16MB, "5"=32MB (when a memory card is used)
"?"=device not set

8-49 [LCFG3](7EH) AND [SCFG3](7FH)

These commands are used to transmit or receive the configuration data of the VG-851. The settings are entered into the EEPROM contained inside the VG-851, and they take effect as soon as the VG-851 is restarted.

When commands and parameters are to be transmitted followed by data reception

When commands and parameters are to be transmitted followed by data reception



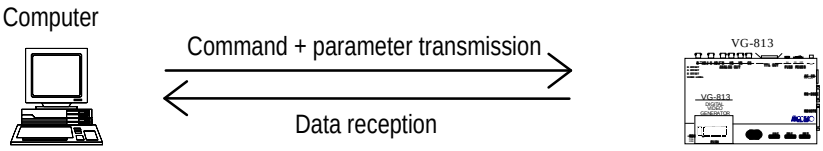
*1: See contents of table below.

Fig.8-44

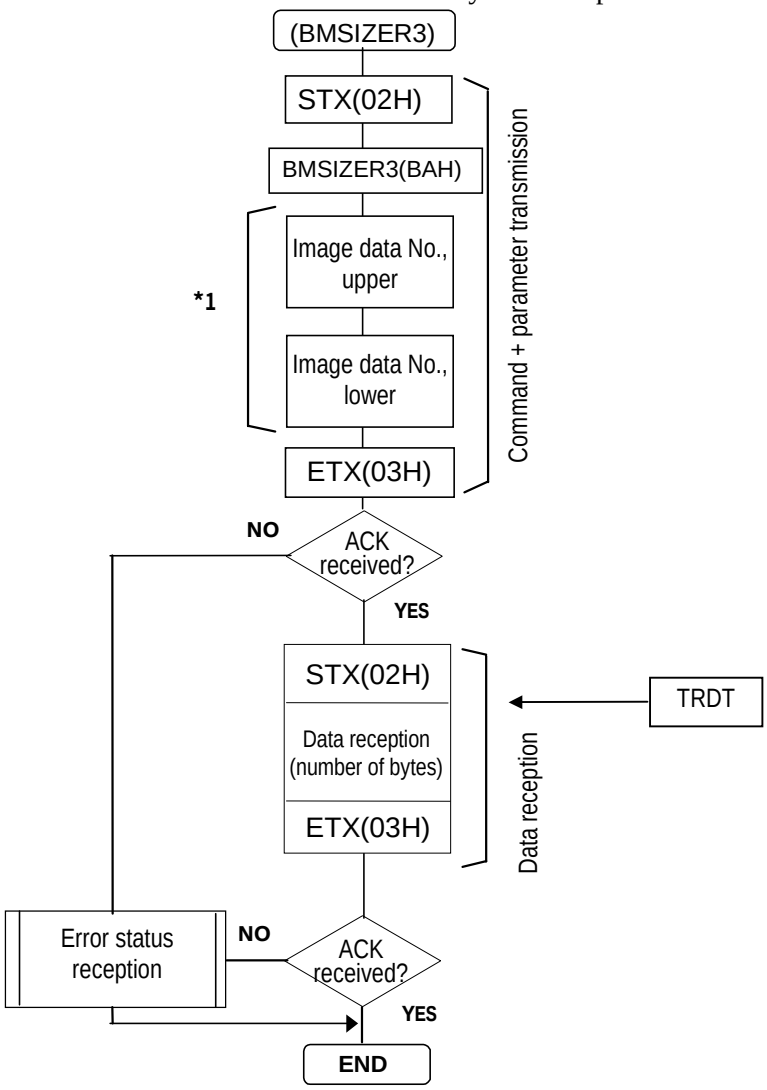
*1	Program data device	"0"=memory card; "1"=panel ROM
*2	Pattern display mode	"0"=one-touch switching; "1"=overwriting
*3	Group No.	"00"=group not used; "01" to "32"=execution of designated group
*4	Beep tone	"0"=off,"1"=on
*5	Baud rate	"0"=9600, "1"=19200, "2"=38400
*6	Data length	"0"=7, "1"=8
*7	Parity	"0"=none, "1"=even, "2"=odd
*8	Stop length	"0"=1, "1"=2

8-50 [BMSIZER3](BAH)

This command is used to receive the size of the image data whose numbers are designated.
* All parameters are in ASCII code.



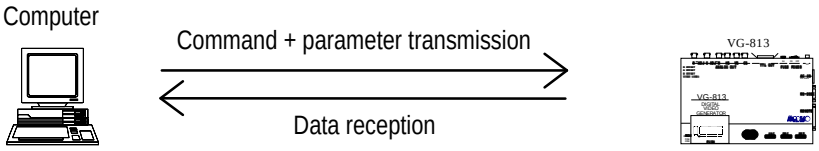
When commands and parameters are to be transmitted followed by data reception



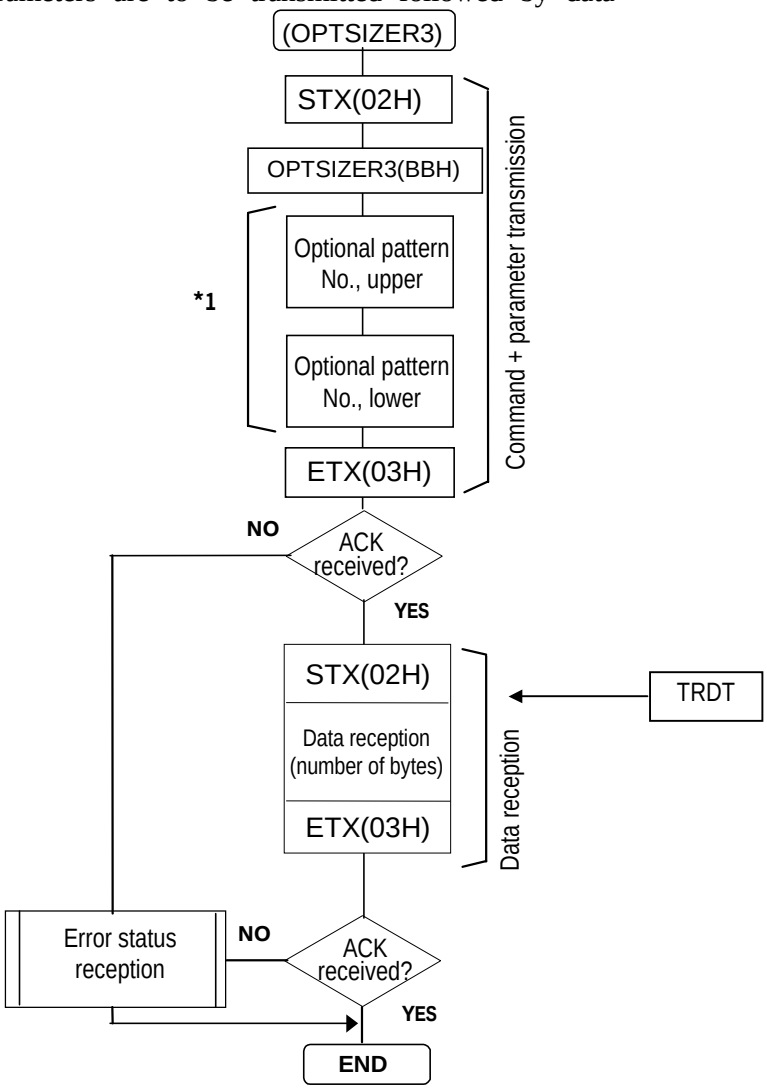
*1: “01” to “64”

8-51 [OPTSIZER3](BBH)

This command is used to receive the size of the optional pattern data whose numbers are designated.
* All parameters are in ASCII code.



When commands and parameters are to be transmitted followed by data

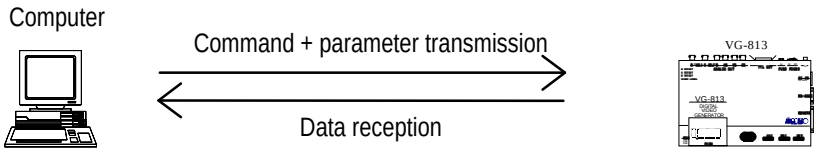


*1: "01" to "64"
Numbers are designated in hexadecimal notation with 2 digits.

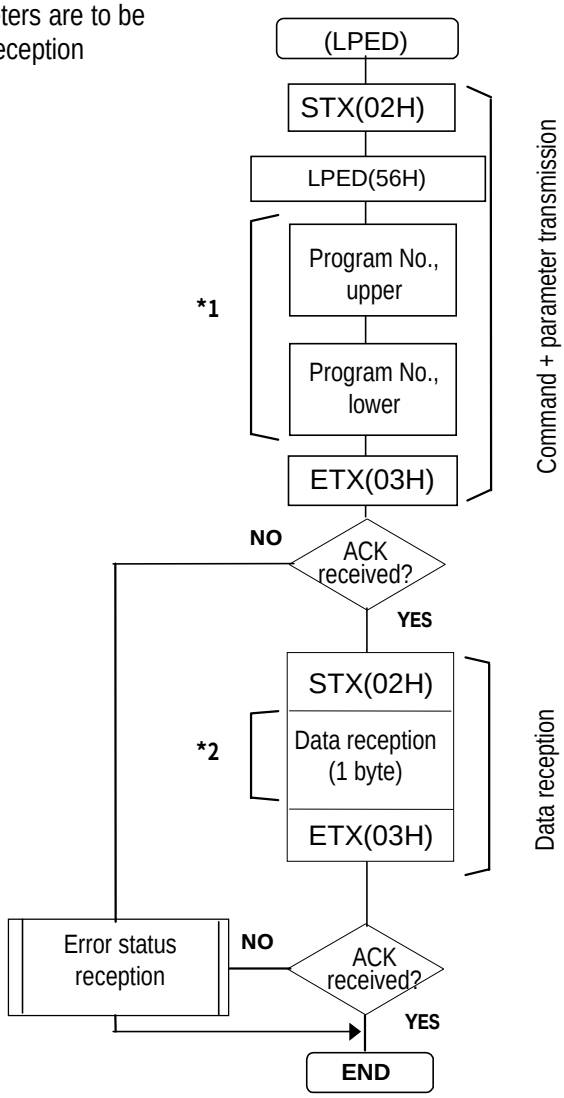
8-52 [LPED]56H)

This command is used to receive the enable or disable setting for the programs whose numbers are designated. (This is provided as a standard feature on the VG-813, 822, 823 and 827.)

* All parameters are in ASCII code.



When commands and parameters are to be transmitted followed by data reception

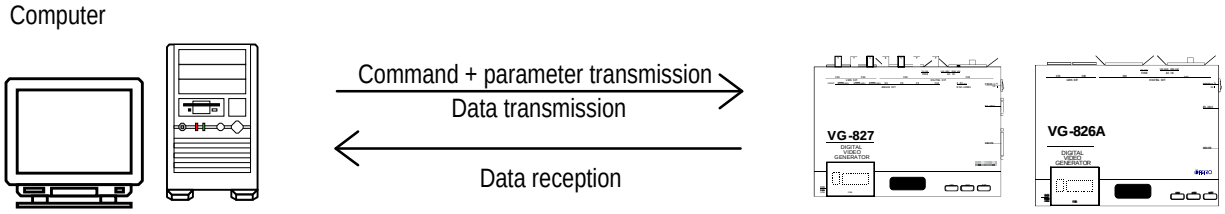


*1: Program No. 0 to 999; numbers are designated with 1 to 3 digits.

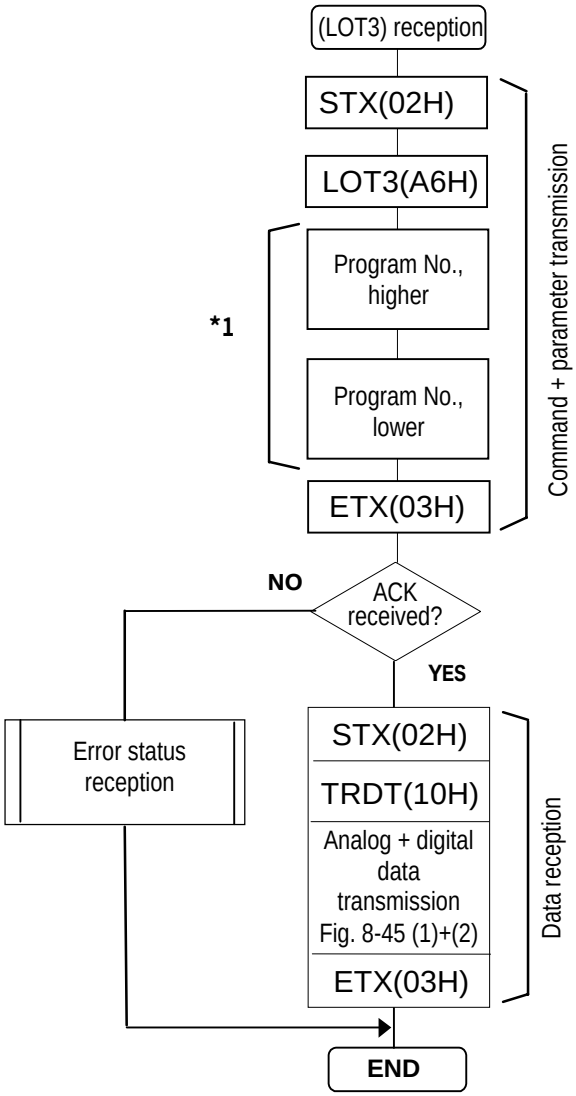
*2: Enable ("0")/disable ("1")

8-53 [OT3]A6H) AND [OT3](A7H)

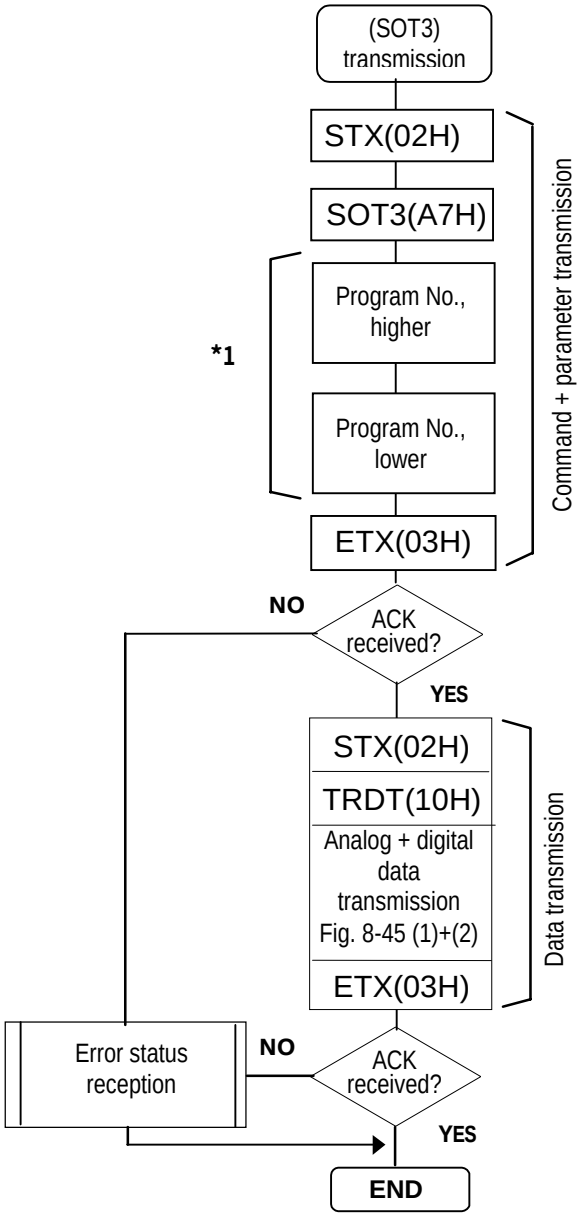
These commands are used to transmit or receive the output condition data of the programs whose numbers are designated. The transmitted data is written into the buffer RAM when the program number is 00 and into the panel ROM when it is in the range from 01 to 40.



When commands and parameters are to be transmitted followed by data reception

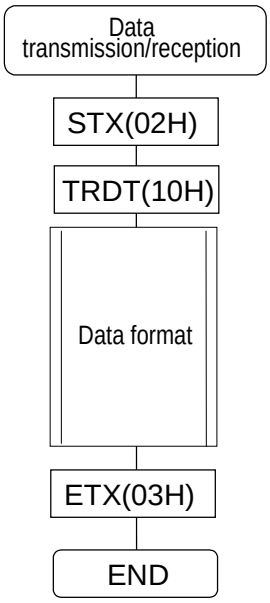


When commands and parameters are to be transmitted followed by data reception



*1: Program numbers are designated with either 2 or 3 digits.
They range from 01 to 40 when the HN58C65 is used, from 01 to 40 and from 500 to 779 when the AH-3000 is used, and from 01 to 40, from 501 to 540, from 601 to 640 and from 701 to 740 when the HN58C256 is used.

- Shown below is the format used for the output condition data.

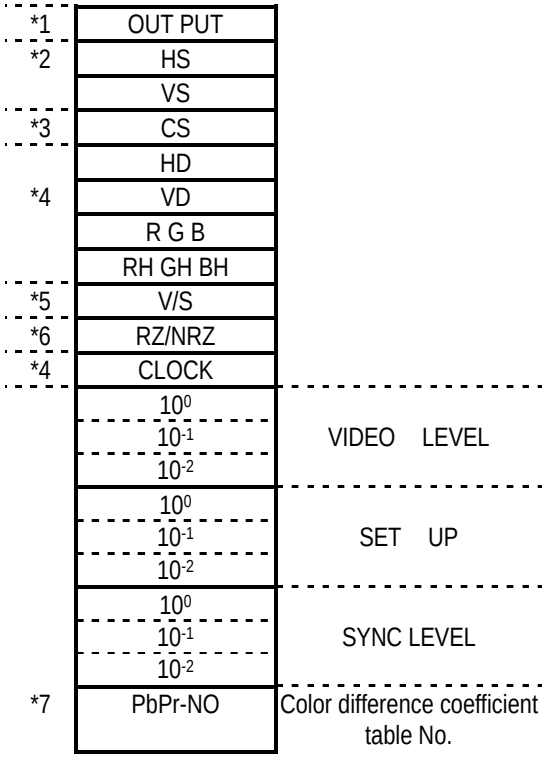


02H	"STX"
10H	"TRDT"
	Analog output condition data (21 bytes)
	Digital output condition data (30 bytes)
03H	"ETX"

- Shown below is the format used for analog output condition data.

30H	"Analog"
30H	"NEGA"
30H	"NEGA"
30H	"NEGA"
31H	"POSI"
31H	"POSI"
31H	"POSI"
31H	"POSI"
37H	"RGB"
30H	"NRZ"
31H	"POSI"
31H	VIDEO LEVEL
30H	1.00
30H	
30H	SET UP
32H	0.25
35H	
30H	SYNC LEVEL
33H	0.30
30H	
30H	Color difference coefficient table "0"

Fig. 8-45



*1 “0”=Anlog, “1”=TTL,
“2”=Bi-Sync(1080), “3”=Bi-Sync(1035), “4”=Bi-Sync(720), “5”=Bi-Sync(483)
*2 “0”=NEGA, “1”=POSI, “2”=OFF
*3 “0”=NEGA, “1”=POSI, “2”=OFF, “3”=HS, “4”=VS
*4 “0”=NEGA, “1”=POSI
*5 “0”= none, “1”=R, “2”=G, “3”=RG, “4”=B, “5”=RB, “6”=GB, “7”=RGB
*6 “0”=NRZ, “1”=RZ
*7: Color difference coefficient table No. ("0" to "9") or 0x70 to 0x79 (with YPbPr)

- Shown below is the format used for the digital output condition data.

30H	“1/1 CLOCK”
30H	“NEGA”
30H	“NEGA”
30H	“NEGA”
31H	“POSI”
31H	“POSI”
30H	“NEGA”
30H	“NEGA”
31H	“POSI”
30H	“NEGA”
30H	“NRZ”
31H	ON
30H	OFF
30H	OFF
30H	ALL
31H	16ns
36H	
38H	8 bits
46H	R d7～d4=ON
46H	R d3～d0=ON
30H	G d7～d4=OFF
30H	G d3～d0=OFF
43H	B d7～d6=ON d5～d4=OFF
33H	B d3～d2=OFF d1～d0=ON
30H	CS
30H	CS
30H	VS
30H	HS
40H	1CHOUT～2CHCLK=OFF
40H	Reserved

Fig. 8-45(2)

*1	CLOCK MODE
	HS
	VS
	CS
	HD
*2	VD
	1ch RGB
	2ch RGB
	CLOCK
	DISP
*3	RZ/NRZ
	OSW0
*4	OSW1
	DELAY MODE
*5	CLOCK AREA
*6	DELAY TIME
*7	RGB BIT OUT
	R MASK higher
	R MASK lower
	G MASK higher
*8	G MASK lower
	B MASK higher
	B MASK lower
	SW0SEL
	SW1SEL
	SW2SEL
	SW3SEL
*9	CLK/OUT
*10	Rsv2

*1	"0"=1/1 clock	"1"=1/2 clock
*2	"0"=NEGA	"1"=POSI
*3	"0"=NRZ	"1"=RZ
*4	"0"=OFF	"1"=ON
*5	"0"=DISP	"1"=ALL
*6	"00"ns～"31"ns (always 2 bytes)	
*7	"1"=1bit "2"=2bit "3"=3bit "4"=4bit "5"=5bit "6"=6bit "7"=7bit "8"=8bit	

*8

d7	d6	d5	d4	d3	d2	d1	d0
MASK higher				MASK lower			
"0"=OFF "1"=ON							
1	0	1	0	0	1	0	1
"A"H ↓ (ASCII) 41H				"5"H ↓ (ASCII) 35H			
d7,d5,d2,d0=ON				d6,d4d3,d1=OFF			

SW0: "0"=CS, "1"=VD, "2"=HD,
"3"=OSW0, "4"=OSW1, "5"=GSW0, "6"=GSW1,

SW1: "0"=CS, "1"=VD, "2"=HD,
"3"=OSW0, "4"=OSW1, "5"=GSW0, "6"=GSW1,

SW2: "0"=VS, "1"=VD, "2"=HD,
"3"=OSW0, "4"=OSW1, "5"=GSW0, "6"=GSW1,

SW3: "0"=HS, "1"=VD, "2"=HD,
"3"=OSW0, "4"=OSW1, "5"=GSW0, "6"=GSW1,

*9: The 4 lower bits from 4xH are defined below.

*10: Reserved (40H)

*6: Concerning the delay time

The delay time is "00"ns to "31"ns for the VG-828.

*9: Concerning CLK/OUT

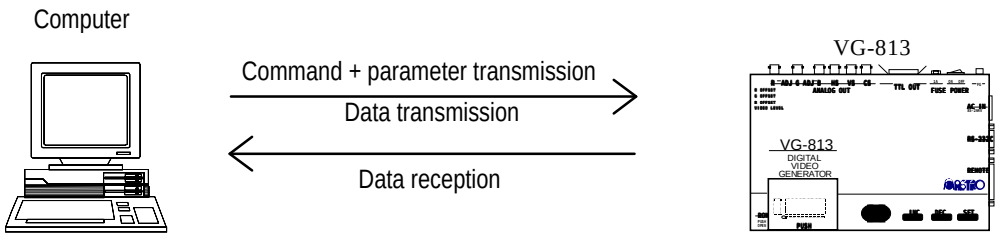
0	1	0	0	2CHCLK OE	1CHCLK OE	2CHOUT OE	1CHOUT OE

0=ON

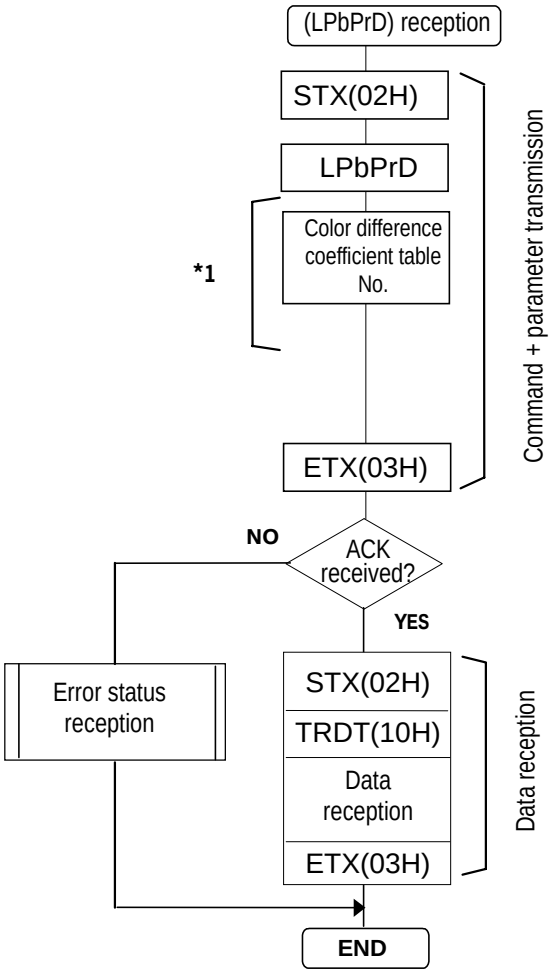
1=High impedance

8-54 [LPBPRD](91H) AND [SPBPRD](92H)

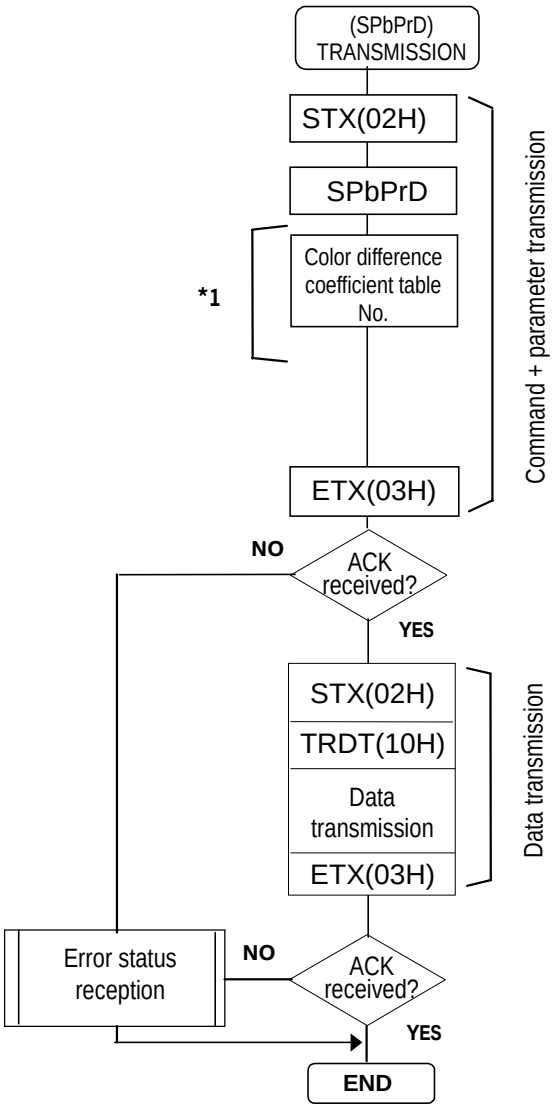
These commands are used to transmit or receive the color difference coefficient data.



When color difference coefficient data is to be received from the VG



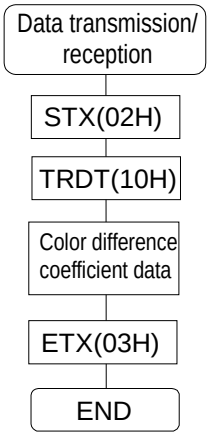
When color difference coefficient data is to be transmitted to the VG

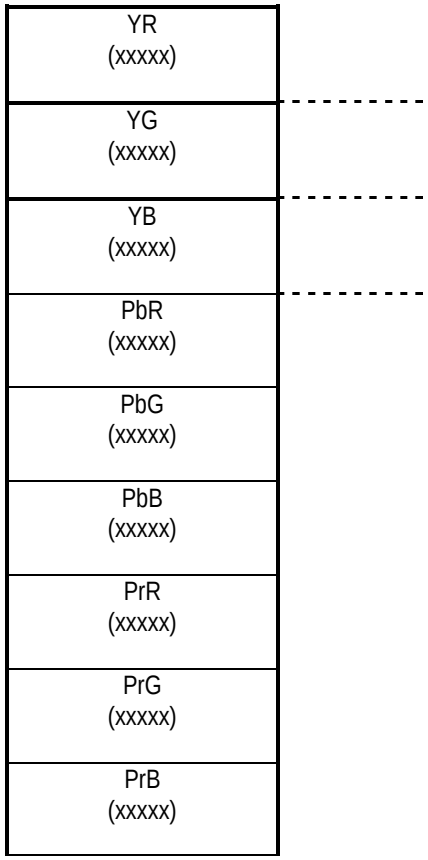


*1: Numbers "0" to "9" are used as the color difference coefficient table numbers

- Shown below is the format used for the color difference coefficient data.

Fig. 8-46



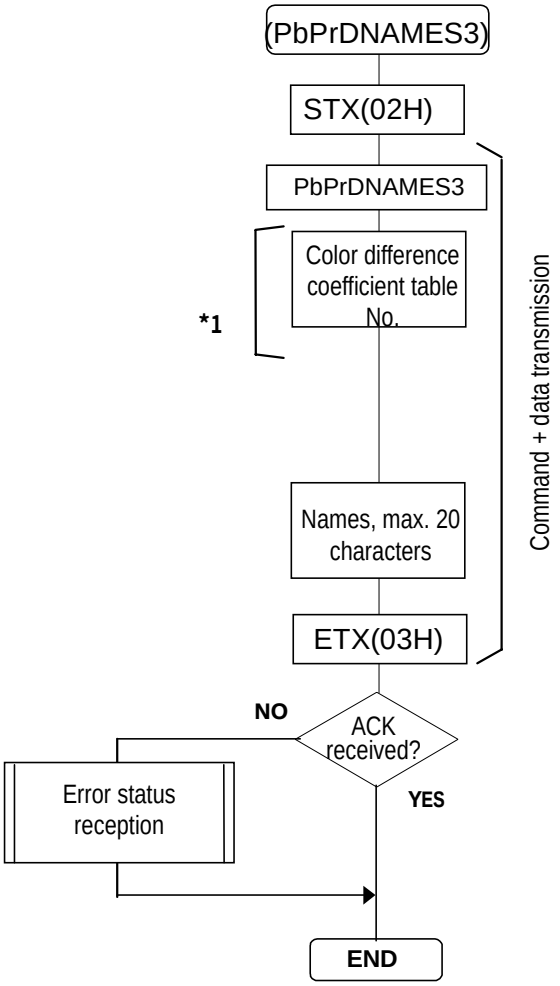


5 bytes in each case, a value from "00000" to "10000" is used.

8-55 [PBPRDNAMES3](93H)

This command is used to transmit the names of the color difference coefficient tables whose numbers are designated.

* All parameters are in ASCII code.

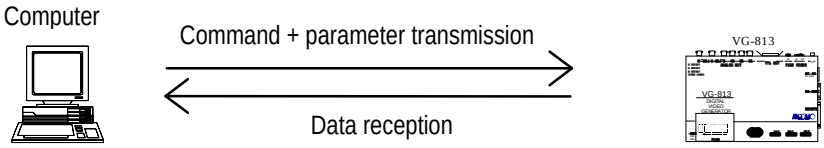


*1: “0” to “9”

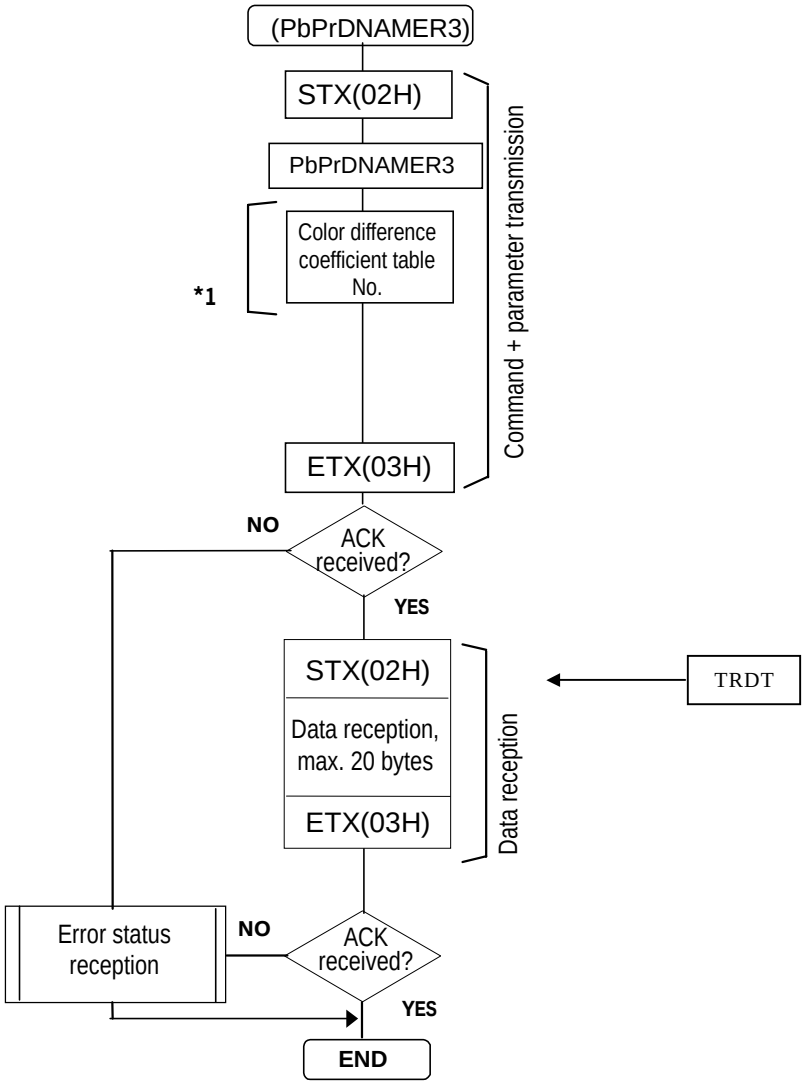
8-56 [PBPRDNAMER3](94H)

This command is used to receive the names of the color difference coefficient whose numbers are designated.

* All parameters are in ASCII code.



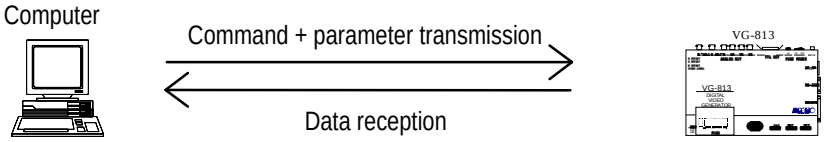
When commands and parameters are to be transmitted followed by data reception



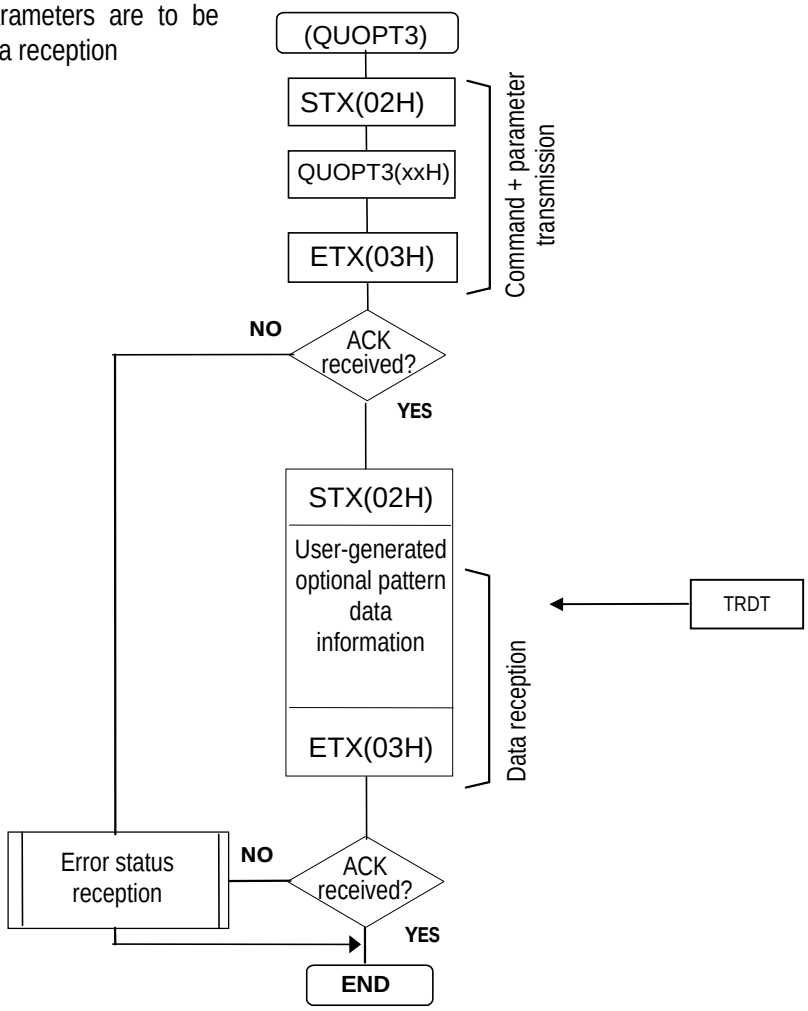
*1: “0” to “9”

8-57 [QUOPT3](7CH)

This command is used to acquire user-generated optional pattern data information.
* All parameters are in ASCII code.



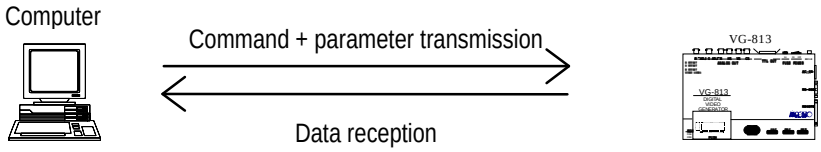
When commands and parameters are to be transmitted followed by data reception



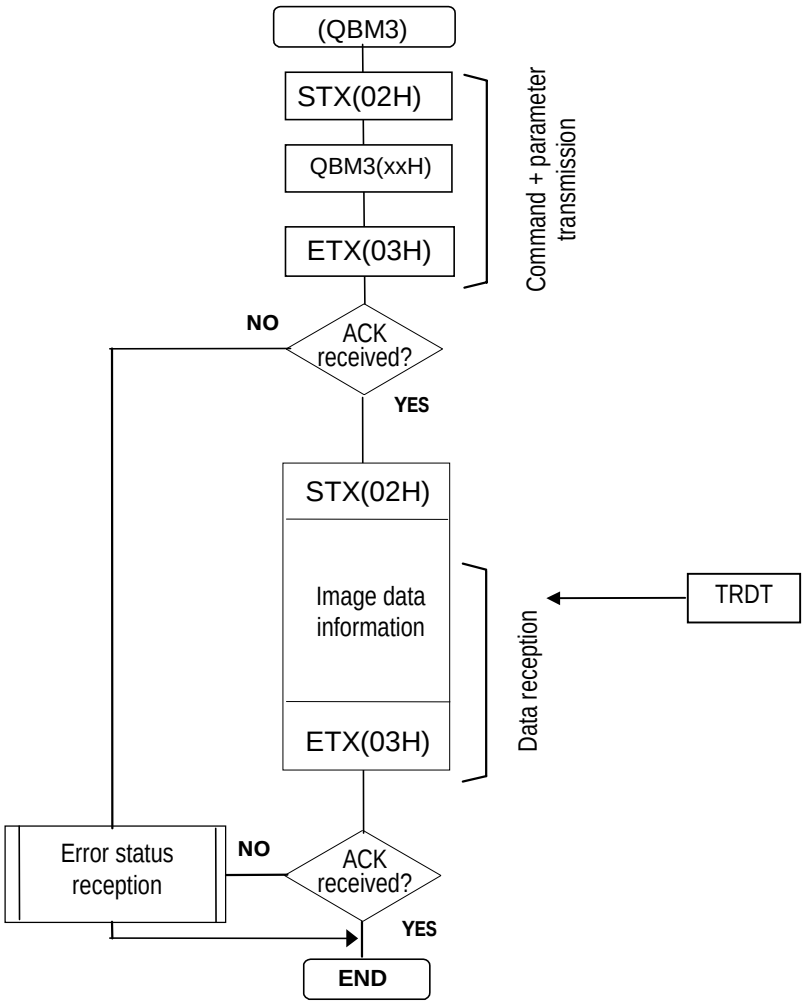
Offset	Content	No. of bytes	Description
0	Data type	1	"0"=not entered; "1"=optional pattern, "2"=graphic pattern
1	Number of colors	2	Valid only with graphic patterns Number of colors ("08" or "24") per pixel
3	Palette data/no palette data	1	Valid only with graphic patterns "0"=no palette data; "1"=palette data
4	Expansion	2	All "0" (for expansion)

8-58 [QBM3](7DH)

This command is used to acquire image data information.
* All parameters are in ASCII code.



When commands and parameters are to be transmitted followed by data reception



* Image data information

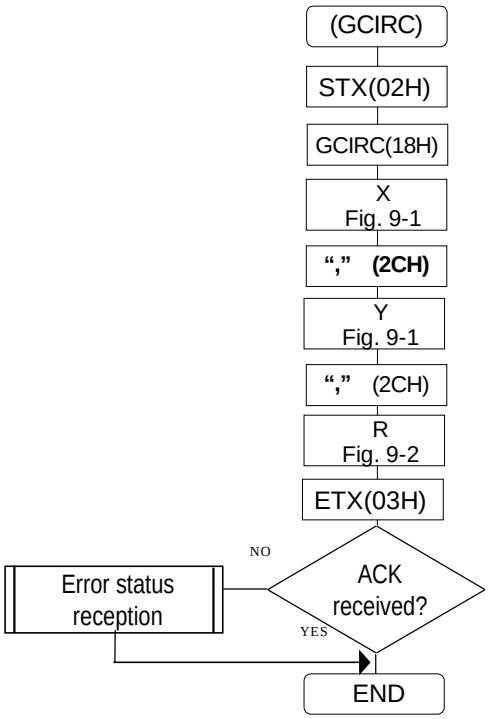
Offset	Content	No. of bytes	Description
0	Number of dots	5	Number of dots of image data
5	Number of lines	5	Number of lines of image data
10	Number of colors	2	Valid only with graphic patterns Number of colors ("08" or "24") per pixel
12	Palette data/no palette data	1	"0"=no palette data; "1"=palette data
13	JPEG identification	1	"0"=raw data; "1"=JPEG compression
3	Expansion	3	All "0" (for expansion)

CHAPTER 9 DESCRIPTION OF GRAPHIC COMMAND FUNCTIONS

9-1 [GCIRC] (18H), [CCIRC] (12H), [GCIRCPA] (d4H) and [CIRCPA] (d5H)

These commands are used to draw circles and painted circles on the graphic plane. The center coordinates X and Y of the center and the radius R of the circle are designated as the parameters. Each data has a variable length of 1 to 4 digits, and a comma is used to delimit one data from the next.
The setting range is -2048 to 4095 for the center coordinates and 1 to 4095 for the radius.

* The center coordinates come with sign codes.
* Before executing these commands, set the sync signals.



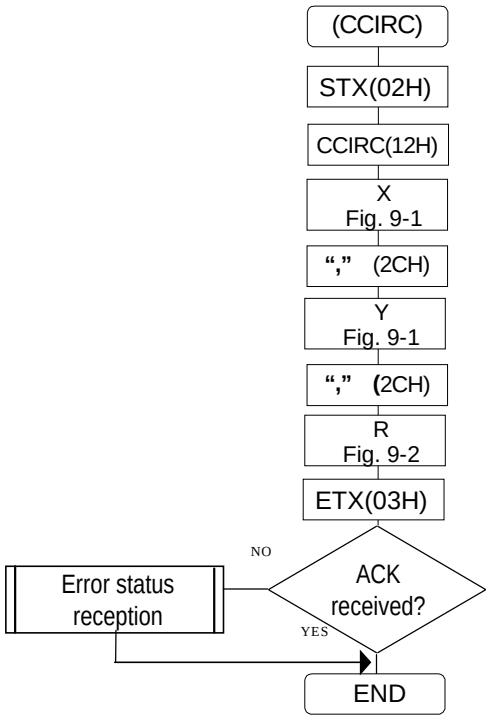


Fig. 9-1
With sign code

Sign code	∗1
10^3	Data (variable length of 1 to 4 digits)
10^2	
10^1	
10^0	

*1 “0”=+,〜“1”= -

Fig. 9-2
Without sign code

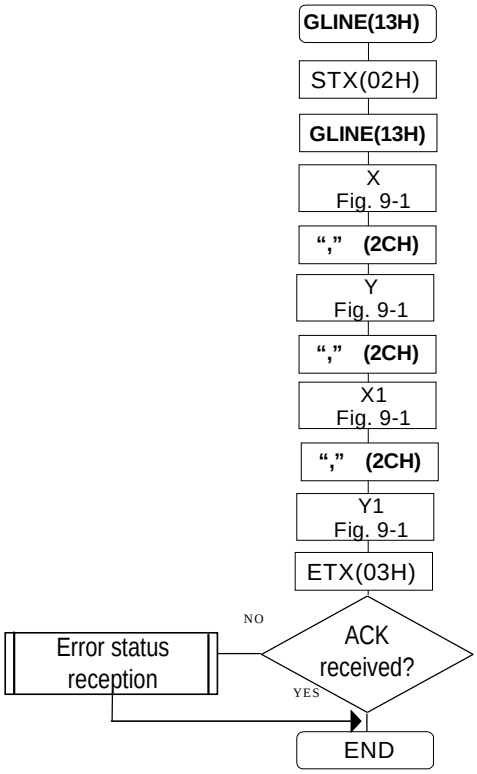
10^3	Data (variable length of 1 to 4 digits)
10^2	
10^1	
10^0	

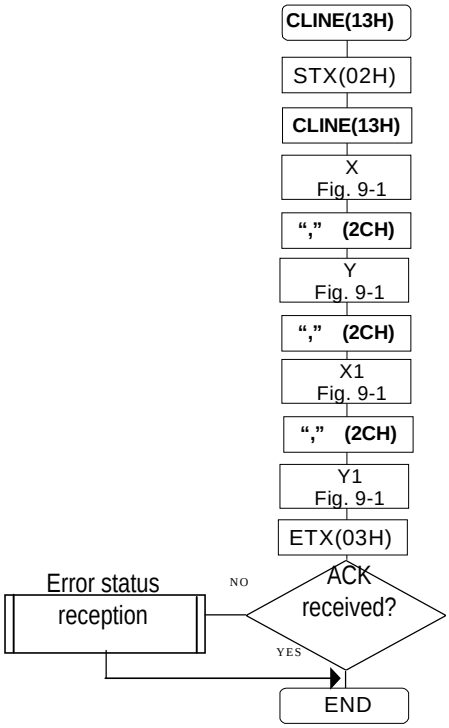
	+100
Sign code	
“1”	30H
“0”	31H
“0”	30H
	30H

9-2 [LINE] (19H) and [LINE] (3H)

These commands are used to draw straight lines on the graphic plane. The start point coordinates X and Y and end point coordinates X1 and Y1 are designated as the parameters. Each data has a variable length of 1 to 4 digits, and a comma is used to delimit one data from the next.
The setting range for all coordinates is -2048 to 4095.

* The coordinates come with sign codes.

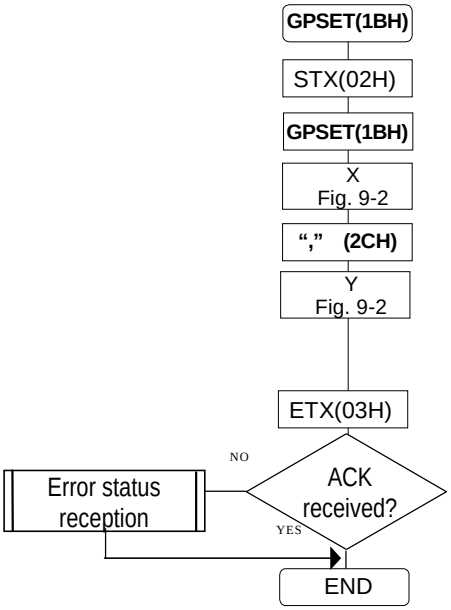


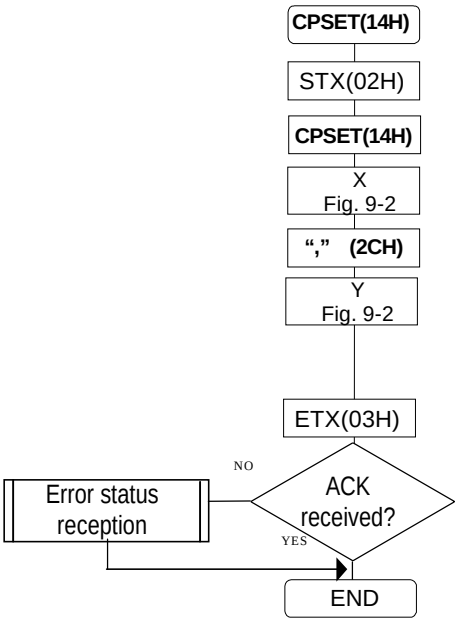


9-3 [PSET] (1BH), [PSET] (14H)

These commands are used to draw a dot on the graphic plane. The coordinates X and Y of the dot (0 to 4095) are designated as the parameters. Each data has a variable length of 1 to 4 digits, and a comma is used to delimit one data from the next.

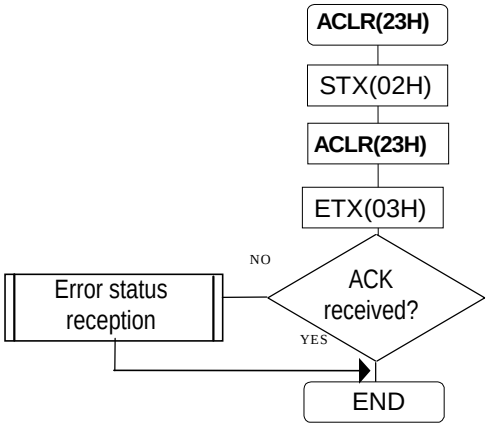
* The coordinates do not come with sign codes.





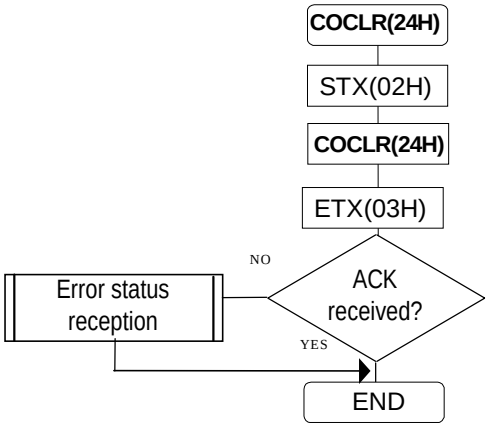
9-4 [ACLR] (23H)

This command is used to clear the graphic plane and color bar plane.
There are no parameters.



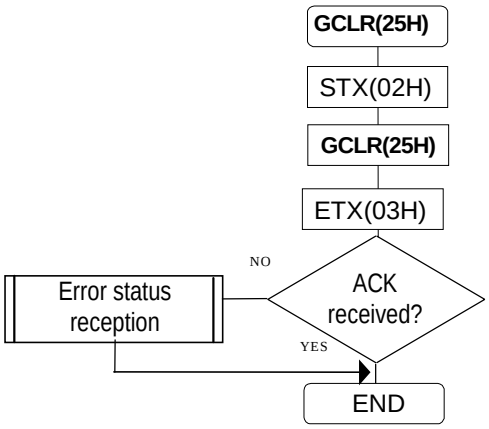
9-5 [COCLR] (24H)

This command is used to clear the color bar plane.
There are no parameters.



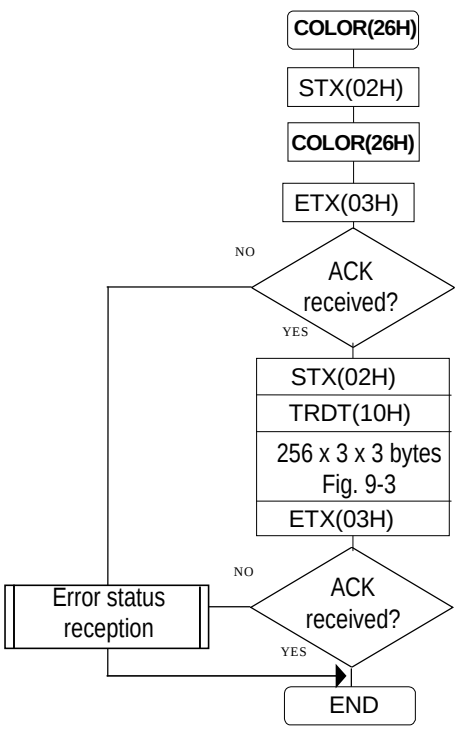
9-6 [GCLR] (25H)

This command is used to clear the graphic plane.
There are no parameters.



9-7 [COLOR] (26H)

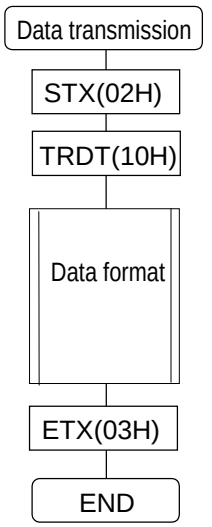
This command is used to display 256 colors on the color bar plane. The color bar plane is divided into 16 parts horizontally and 16 parts vertically.



	← 16 →															
↑	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	17	18	19	20	21	22	•	•	•	•	•	•	•	•	31	32
	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
16	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
↓	•	•	•	•	•	•	•	•	•	•	•	•	•	254	255	256

256 x 3 (RGB) x 3 (levels) = 2304
Transmit all the 2304 bytes of data in succession.

Fig. 9-3

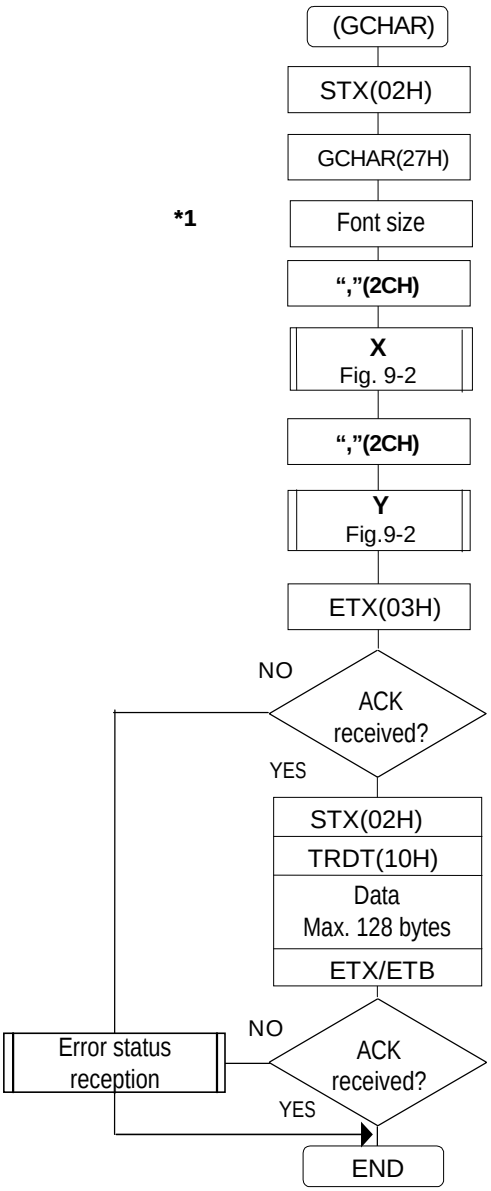


↑	10^2 10^1 10^0	R	↑	32H 35H 35H	"255" R	↑
∗1	10^2 10^1 10^0	G	1	31H 32H 38H	"128" G	1
	10^2 10^1 10^0	B		32H 35H 35H	"255" B	
↓			↓			↓
	• • •					
	10^2 10^1 10^0	R	↑	30H 34H 38H	"48" R	↑
	10^2 10^1 10^0	G	256	30H 39H 38H	"98" G	256
	10^2 10^1 10^0	B		32H 35H 35H	"255" B	
			↓			↓

Note: "000" to "255"

9-8 [GCHAR] (27H)

This command is used to write the points designated on the graphic plane using characters. The font size and display coordinates X and Y (0 to 4095) are designated as the parameters.



*1

Data	Font size
"0"	5×7
"1"	5×7 inverse
"2"	7×9
"3"	7×9 inverse
"4"	16×16
"5"	16×16 inverse

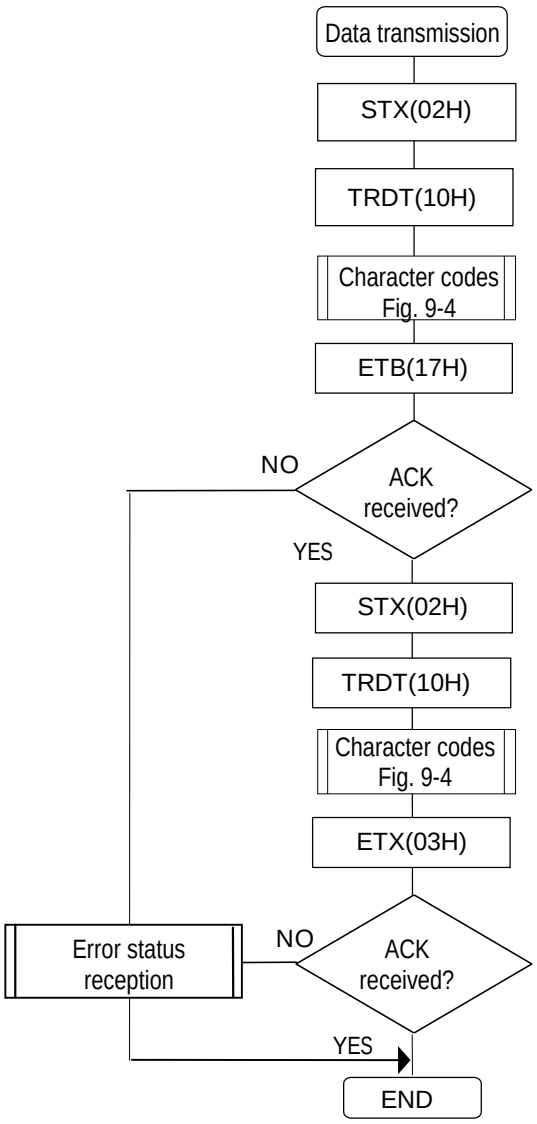


Fig. 9-4

<Block 1>

STX	TRDT	Character data	ETB

← MAX128 →

<Block 2>

STX	TRDT	Character data	ETB

← MAX128 →

•
•
•
•

<Block h>

STX	TRDT	Character data	ETB

← MAX128 →

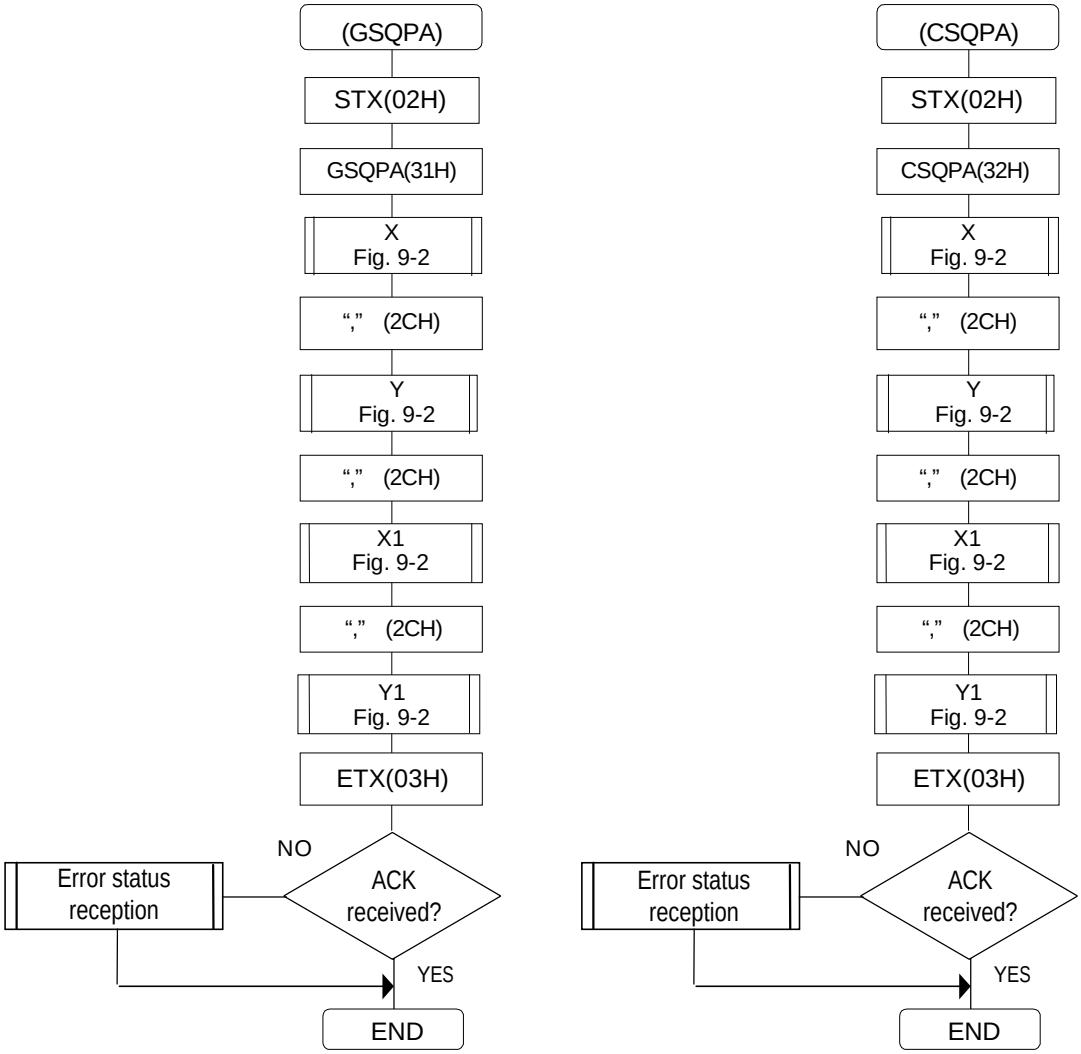
* CR (0DH)

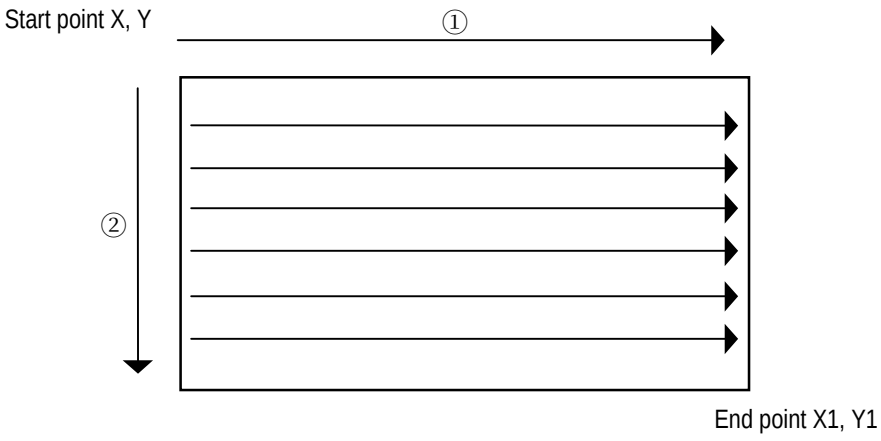
* The display point is lowered by one digit, and the point is moved to the left end.

9-9 [GSQPA] (31H), [CSQPA] (32H), [GSQRE] (d0H) and [CSQRE] (d1H)

These commands are used to draw box paint and squares on the graphic plane. The start point coordinates X and Y and the end point coordinates X1 and Y1 are designated as the parameters. Each data has a variable length of 1 to 4 digits, and a comma is used to delimit one data from the next. The setting range for all coordinates is 0 to 4095.

* The coordinates do not come with sign codes.

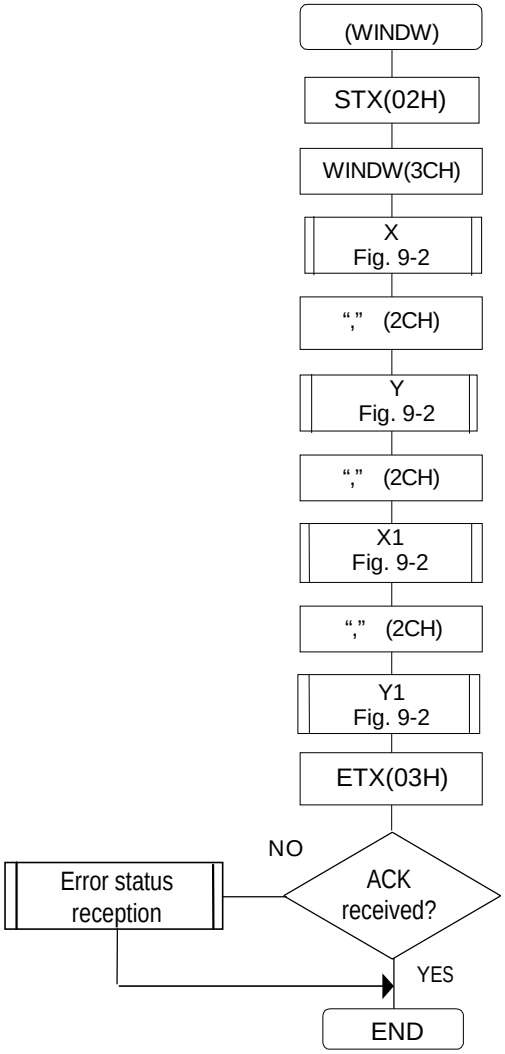


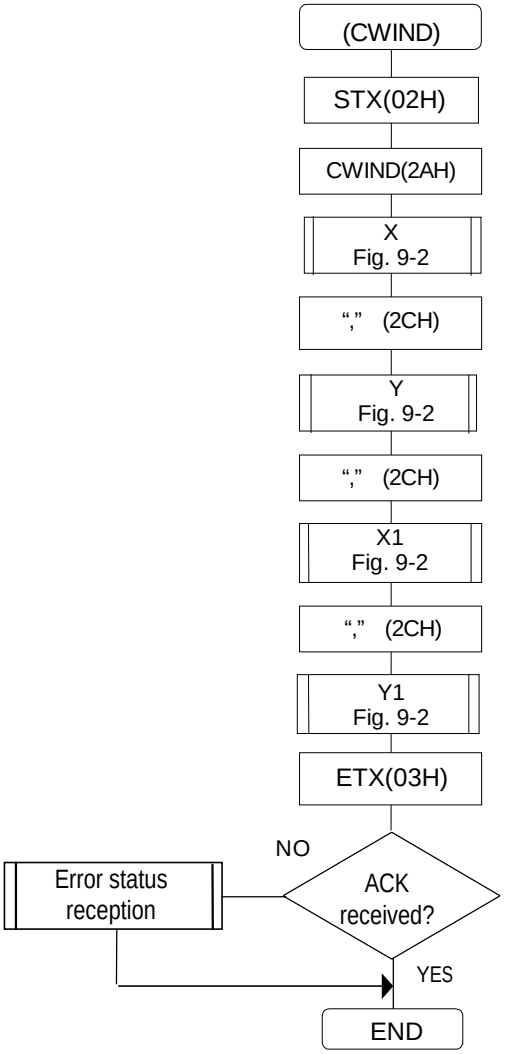


*Note: X<X1
Y<Y1

9-10 [WINDW] (3CH) and [CWIND] (2AH)

These commands are used to draw windows. The start point coordinates X and Y and the end point coordinates X1 and Y1 are designated as the parameters. Each data has a variable length of 1 to 4 digits, and a comma is used to delimit one data from the next. The setting range for all coordinates is 0 to 4095.





9-11 [WINDCL] 3DH)

This command is used to set the color of the drawn window. R, G and B (always 3 digits for each) are designated as the parameters.

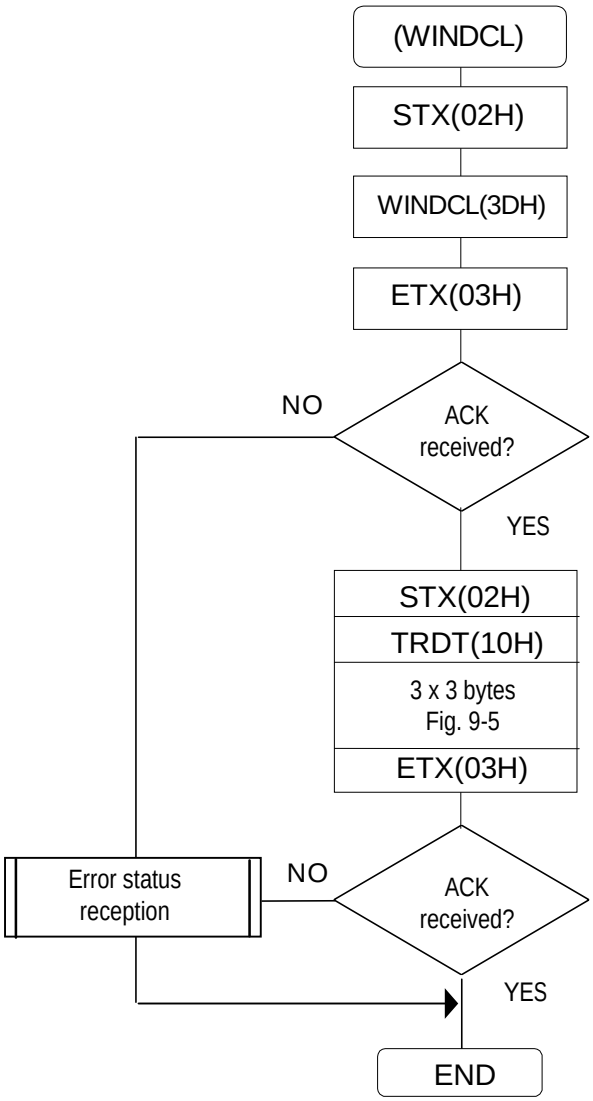
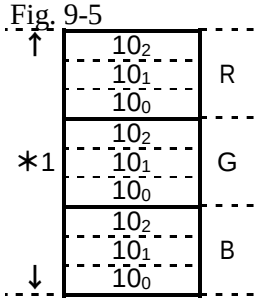
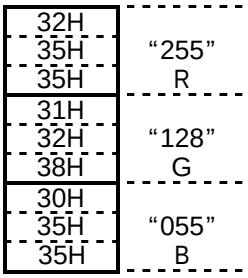


Fig. 9-5

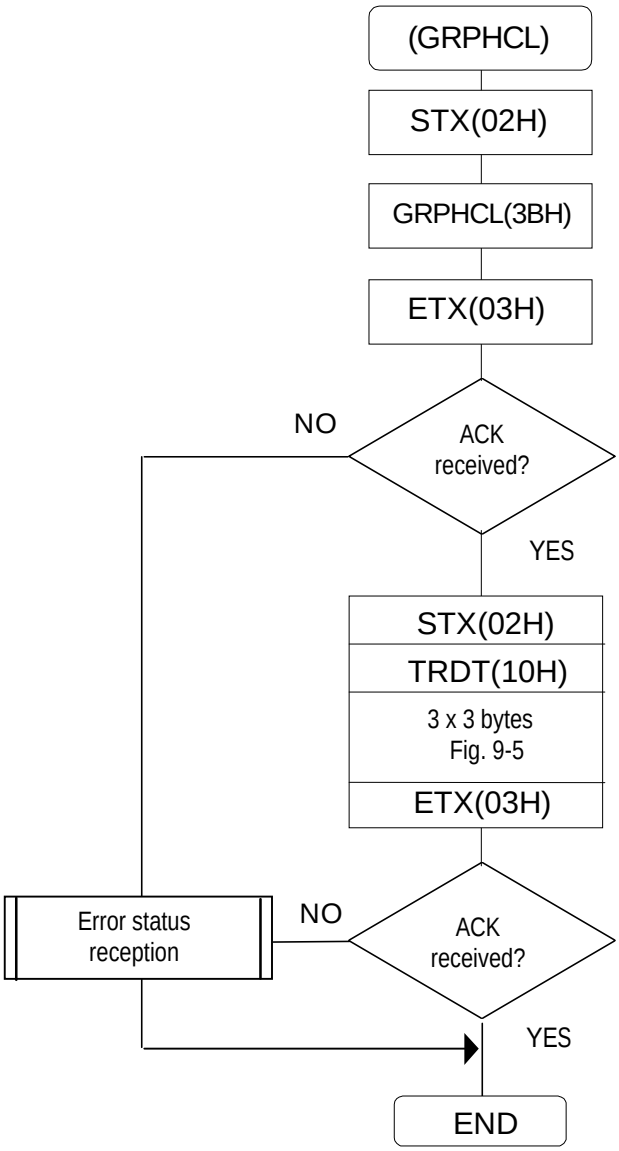


*Note: “000”～“255”



9-12 [GRPHCL] (3BH)

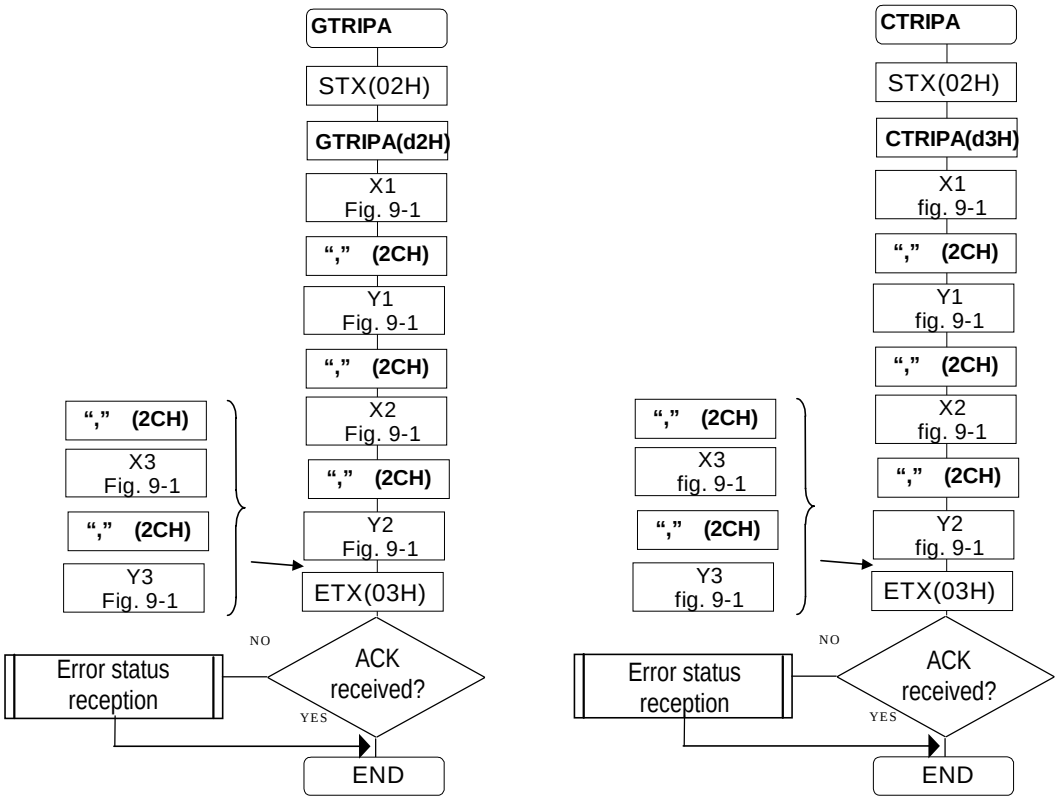
This command is used to set the graphic colors. R, G and B (always 3 digits for each) are designated as the parameters.



9-13 [GTRIPA] (d2H) and [CTRIPA] (d3H)

These commands are used to draw painted triangles on the graphic plane. The three apex coordinates are designated as the parameters. Each data has a variable length of 1 to 4 digits, and a comma is used to delimit one data from the next.
The setting range is -2048 to 4095 for all the coordinates.

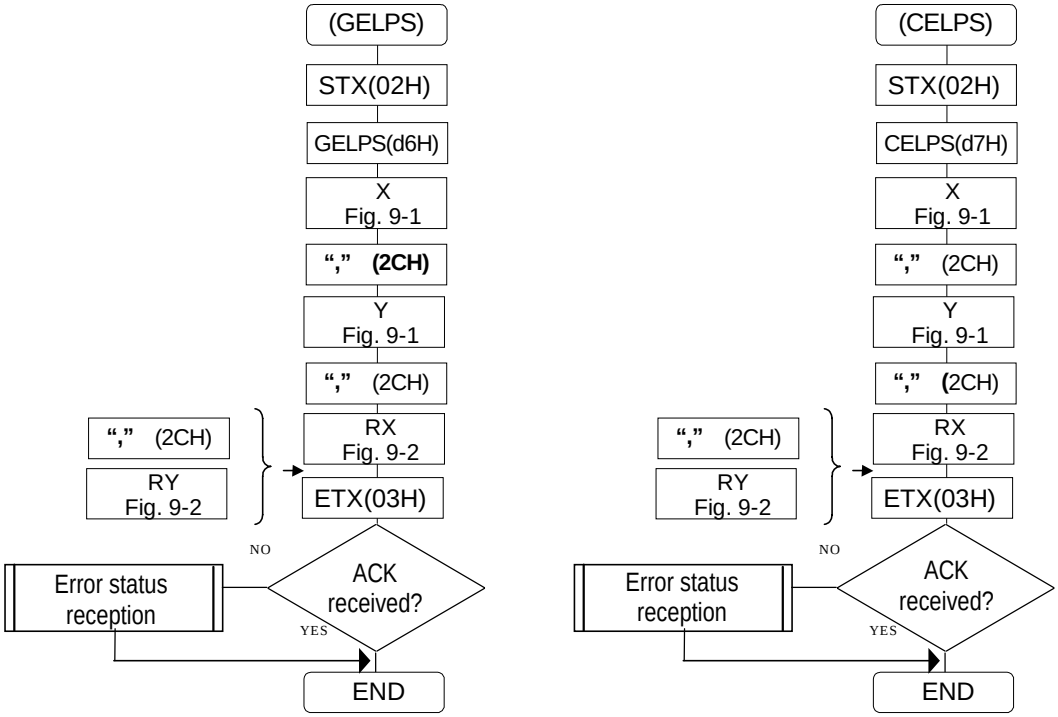
* The coordinates come with sign codes.



9-14 [GELPS] (d6H), [CELPS] (d7H), [GELPSPA] (d8H) and [CELPSPA] (d9H)

These commands are used to draw ellipses and painted ellipses on the graphic plane. The center coordinates X and Y and the radii RX and RY of the ellipse are designated as the parameters. Each data has a variable length of 1 to 4 digits, and a comma is used to delimit one data from the next.
The setting range is -2048 to 4095 for the center coordinates and 1 to 4095 for the radii.

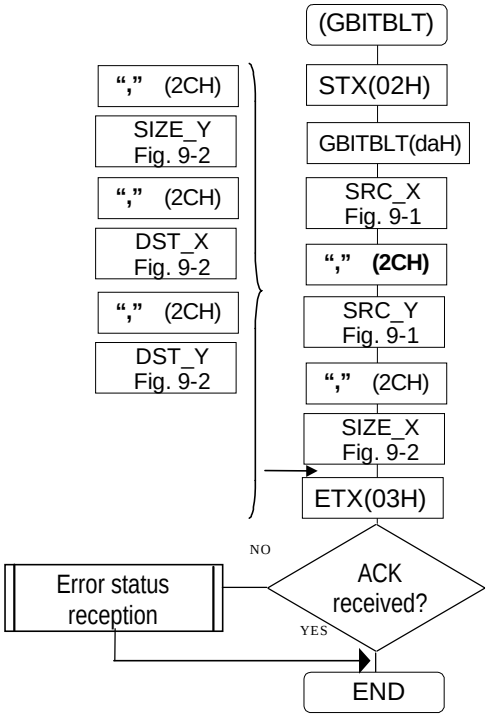
* The center coordinates come with sign codes.
* Before executing these commands, set the sync signals.



9-15 [GBITBLT](daH)

This command is used to copy an area in the 1-bit VRAM (graphic plane). The top left coordinates SRC_X and SRC_Y and the size SIZE_X and SIZE_Y of the transfer source, and the top left coordinates DST_X and DST_Y of the transfer destination are designated as the parameters.
Each data has a variable length of 1 to 4 digits, and a comma is used to delimit one data from the next.
The setting range is 0 to 4095 for the top left coordinates and 1 to 4095 for the size.

* Before executing these commands, set the sync signals.



9-16 [G8CIRC] (e0H), [G8CIRCPA] (e6H)

These commands are used to draw circles (CIRC) or painted circles (CIRCPA) in the 8-bit VRAM (color bar plane). The center coordinates X and Y, the radius R of the circle, and color Col are designated as the parameters.
Each data has a variable length of 1 to 4 digits (1 to 3 digits for Col), and a comma is used to delimit one data from the next.
The setting range is -2048 to 4095 for the center coordinates, 1 to 4095 for the radius, and 0 to 255 for the color.

* The center coordinates come with sign codes.
* Before executing these commands, set the sync signals.

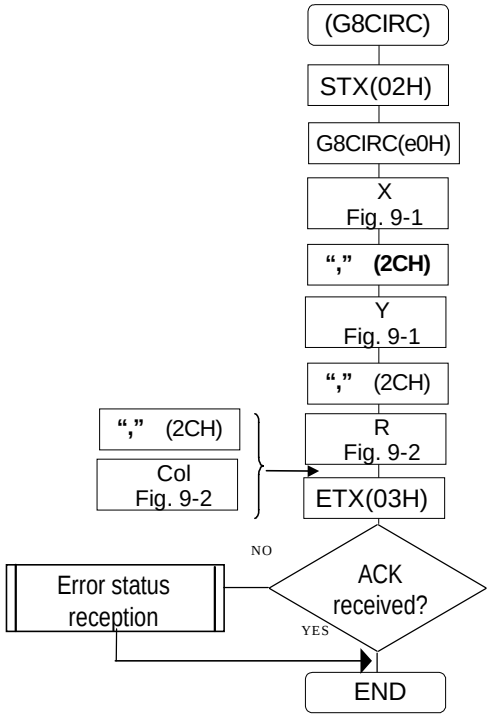


Fig. 9-1
With sign code

Sign code	*1
10^3	
10^2	Data
10^1	(variable length of 1
10^0	to 4 digits)

Fig. 9-2
Without sign code

10^3	
10^2	Data
10^1	(variable length of 1
10^0	to 4 digits)

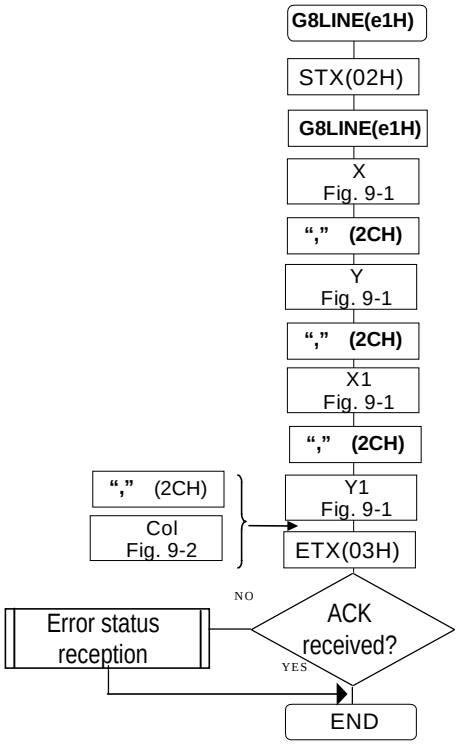
*1: “0”＝＋,～“1”＝－

	－100
Sign code	31H
“1”	31H
“0”	30H
“0”	30H

	+100
Sign code	30H
“1”	31H
“0”	30H
“0”	30H

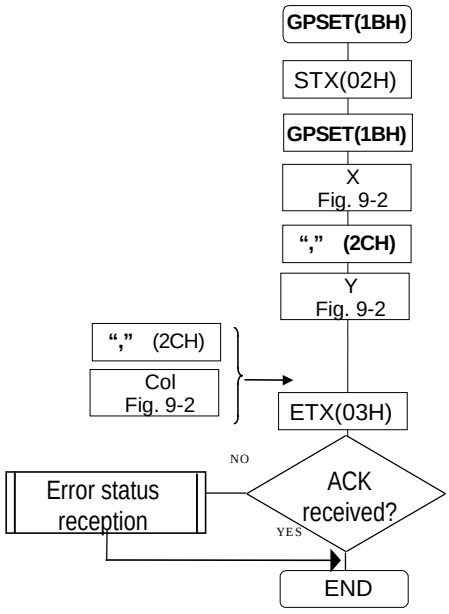
9-17 [G8LINE] (e1H)

This command is used to draw straight lines in the 8-bit VRAM (color bar plane). The start point coordinates X and Y, the end point coordinates X1 and Y1, and color Col are designated as the parameters. Each data has a variable length of 1 to 4 digits (1 to 3 digits for Col), and a comma is used to delimit one data from the next.
The setting range is -2048 to 4095 for the coordinates and 0 to 255 for the color.
* The coordinates come with sign codes.



9-18 [G8PSET](e2H)

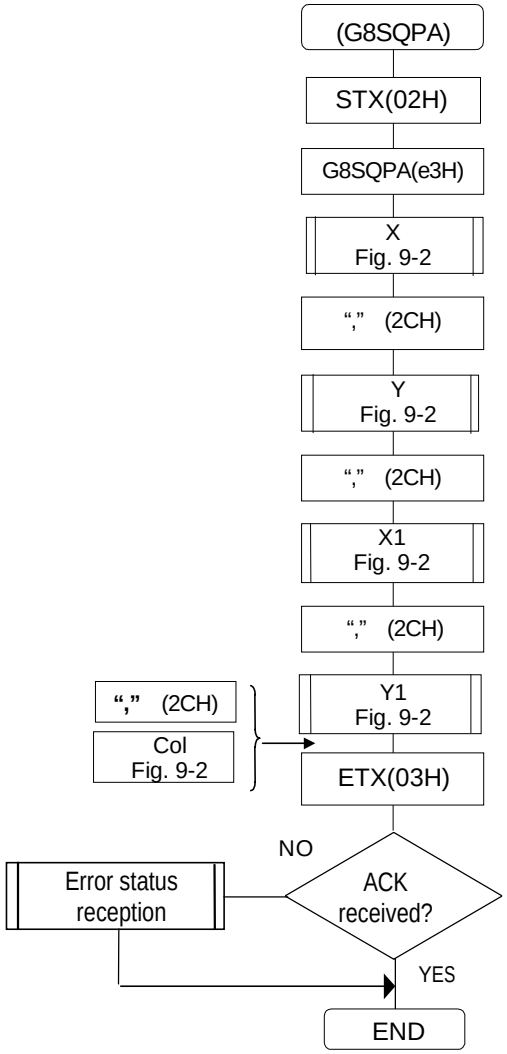
This command is used to draw a dot in the 8-bit VRAM (color bar plane). The coordinates X and Y (0 to 4095) and color Col are designated as the parameters. Each data has a variable length of 1 to 4 digits (1 to 3 digits for Col), and a comma is used to delimit one data from the next.
* The coordinates do not come with sign codes.

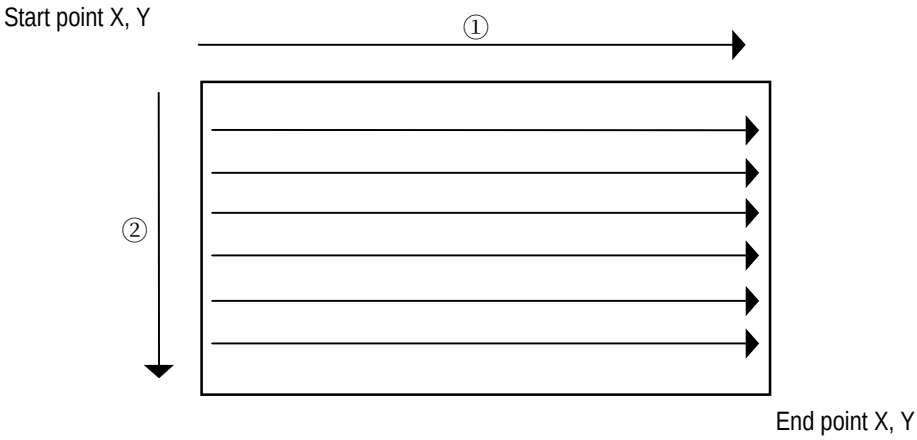


9-19 [G8SQPA] (e3H) and [G8SQRE] (e4H)

These commands are used to draw painted squares (SQPA) and squares (SQRE) in the 8-bit VRAM (color bar plane). The start point coordinates X and Y, end point coordinates X1 and Y1, and color Col are designated as the parameters. Each data has a variable length of 1 to 4 digits (1 to 3 digits for Col), and a comma is used to delimit one data from the next.
The setting range is 0 to 4095 for the coordinates and 0 to 255 for the color.

* The coordinates do not come with sign codes.



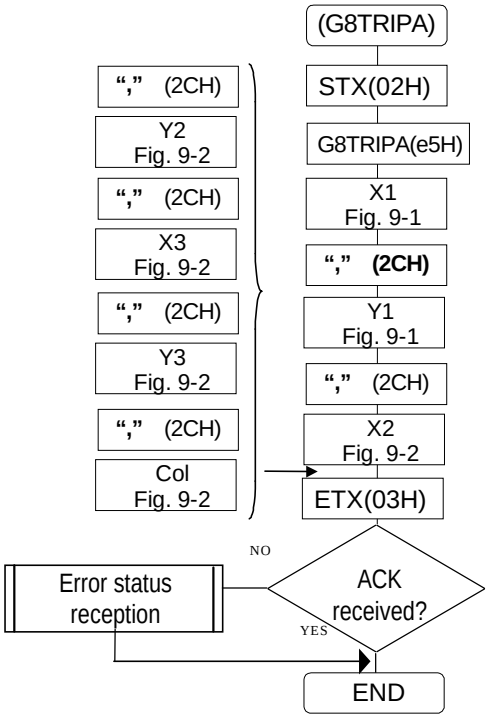


*Note: X<X1
Y<Y1

9-20 [G8TRIPA] (e5H)

This command is used to draw painted triangles in the 8-bit VRAM (color bar plane). The apex coordinates X1, Y1, X2, Y2, X3 and Y3, and color Col of the triangle are designated as the parameters.
Each data has a variable length of 1 to 4 digits (1 to 3 digits for Col), and a comma is used to delimit one data from the next.
The setting range is -2048 to 4095 for the coordinates and 0 to 255 for the color.

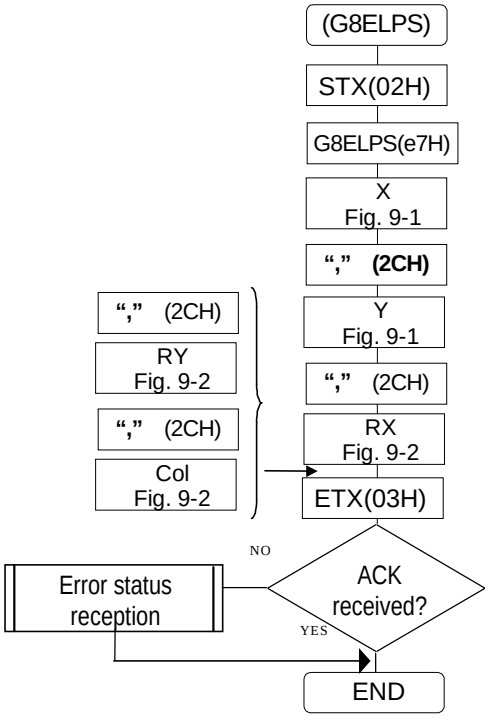
* The apex coordinates come with sign codes.
* Before executing these commands, set the sync signals.



9-21 [G8ELPS] (e7H) and [G8ELPSA] (e8H)

These commands are used to draw ellipses (ELPS) and painted ellipses (ELPSPA) in the 8-bit VRAM (color bar plane). The center coordinates X and Y, the radii RX and RY, and the color Col of the ellipse are designated as the parameters. Each data has a variable length of 1 to 4 digits (1 to 3 digits for Col), and a comma is used to delimit one data from the next.
The setting range is -2048 to 4095 for the center coordinates, 1 to 4095 for the radii, and 0 to 255 for the color.

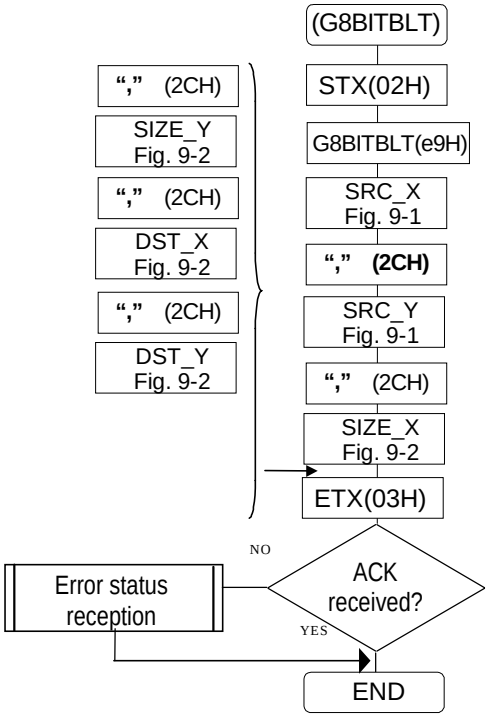
* The center coordinates come with sign codes.
* Before executing these commands, set the sync signals.



9-22 [G8BITBLT] (e9H)

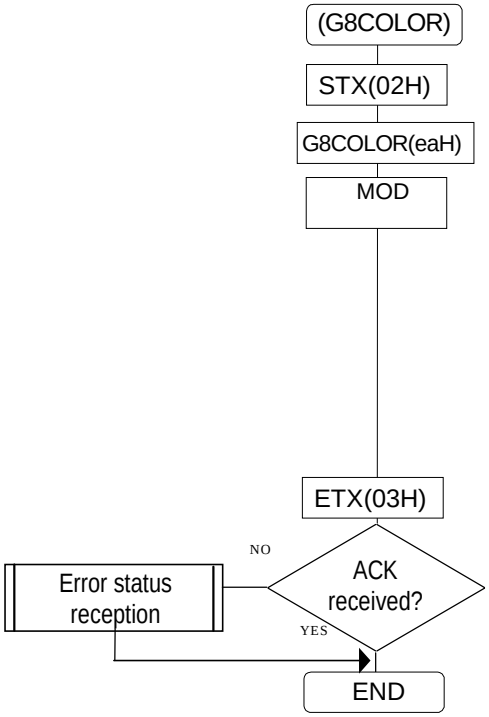
This command is used to copy an area in the 8-bit VRAM (color bar plane). The top left coordinates SRC_X and SRC_Y and the size SIZE_X and SIZE_Y of the transfer source, and the top left coordinates DST_X and DST_Y of the transfer destination are designated as the parameters.
Each data has a variable length of 1 to 4 digits, and a comma is used to delimit one data from the next.
The setting range is 0 to 4095 for the top left coordinates and 1 to 4095 for the size.

* Before executing these commands, set the sync signals.



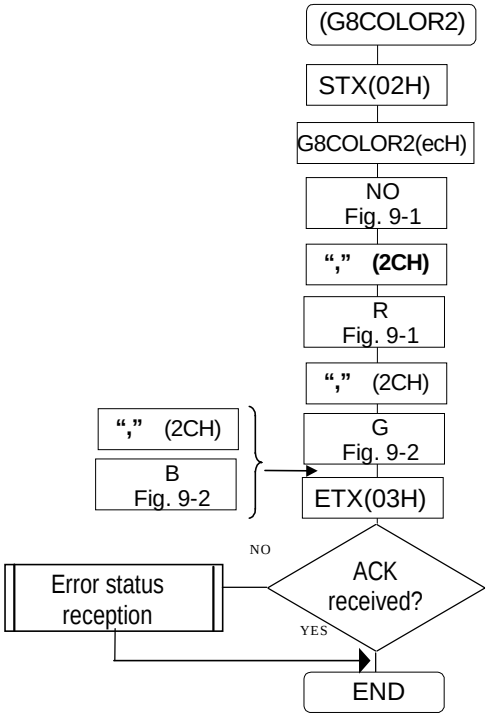
9-23 [G8COLOR] (eaH)

This command is used to set the 8-bit VRAM (color bar plane) display color. The color mode MOD ('0'=mode with 256 gradations of gray; '1'=mode with 256 colors) is designated as the parameter.



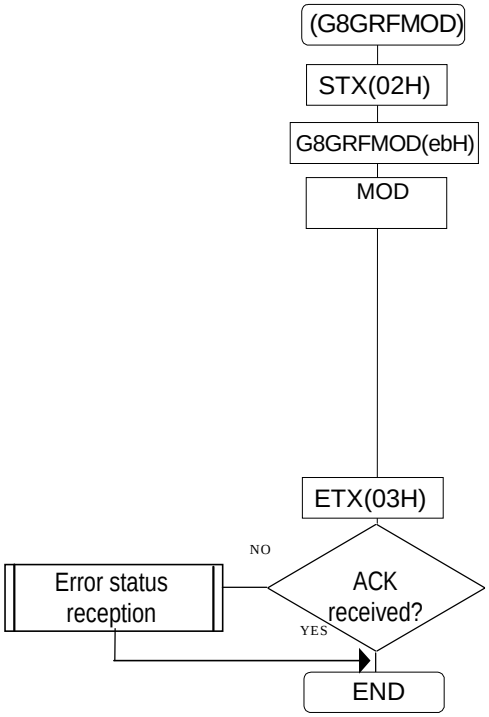
9-24 [G8COLOR2] (ecH)

This command is used to set the 8-bit VRAM (color bar plane) display color. The pallet number (0 to 255) and R, G and B (0 to 255) are designated as the parameters.



9-25 [G8GRFMOD] (ebH)

This command is used to set the 8-bit VRAM (color bar plane) display mode. The display mode MOD ('0'=bit map mode; '1'=line mode) is designated as the parameter.

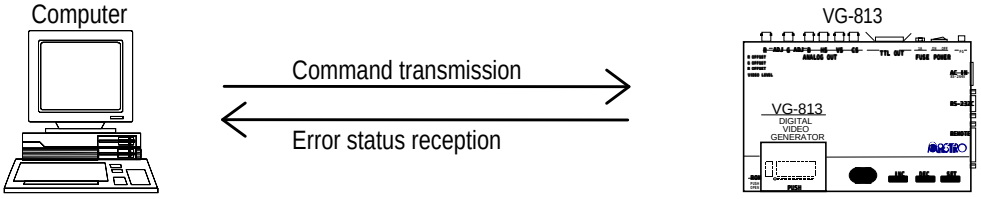


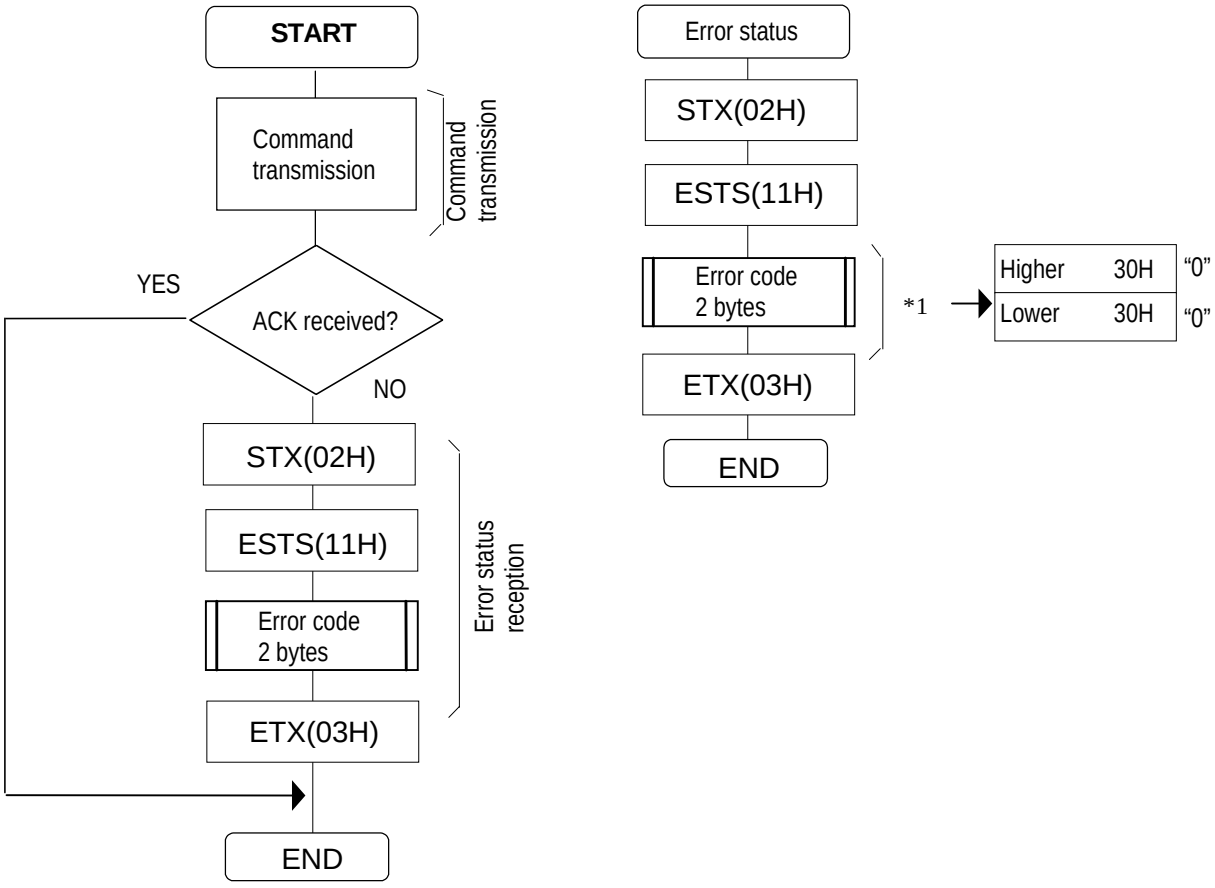
CHAPTER 10 SAMPLE PROGRAM

```
10 '***********************************************
20 '              VG - 813 TERMINAL MODE
30 '*                 SAMPLE PROGRAM
40 '*            RS-232C (Bps:9600 Data:7 Parity:NONE)
50 '***********************************************
60 '
70 ' --------          CONTROL CODE        ---------
80 '
90 STX$=CHR$(&H2)
100 ETX$=CHR$(&H3)
110 EOT$=CHR$(&H4)
120 ENQ$=CHR$(&H5)
130 ACK$=CHR$(&H6)
140 TRDT$=CHR$(&H10)
150 NAK$=CHR$(&H15)
160 '
170 ' --------          CONTROL COMAND        ---------
180 '
190 EXPDN$=CHR$(&H9)                                    ' Direct display execution command
200 EXPON$=CHR$(&HE)                                    ' Pattern selection command
210 EXSGON$=CHR$(&HB)                                   ' Color selection command
220 '
230 ' --------          KEY         CODE          ---------
240 '
250 COLB$=CHR$(&H57)                                    ' Color bars
260 OPT1$=CHR$(&H5B)                                    ' Optional pattern
270 R$=CHR$(&H5E)                                       ' RED
280 G$=CHR$(&H5F)                                       ' GREEN
290 B$=CHR$(&H60)                                       ' BLUE
300 '
310 '       ------------        RS232-C MODE INITIALIZE    ------------
320 '
330 OPEN "COM1:N71NN" AS #1
340 COM ON : CLS 3
350 '
360 '       ------------            Terminal mode start                 ------------
370 '
380 GOSUB *INIT                                         ' Terminal mode start
390 '
400 '       ------------            Direct display                  ------------
410 '
420 PRINT #1,STX$+EXPDN$+"01"+ETX$;                     ' Program No.01 execution
430 PRINT "-----> PROG No. 01           "
440 GOSUB *ACKGET                                       ' ACK reception
450 '
460 '       ------------            Pattern change                      ------------
470 '
480 PRINT #1,STX$+EXPON$+ETX$;                          ' Pattern change
490 PRINT "-----> PATTERN SELECT    "
500 GOSUB *ACKGET                                       ' ACK reception
510 '
520 '       ------------    Pattern data ( COLOR BAR )      ------------
530 '
540 PRINT #1,STX$+TRDT$+COLB$+ETX$;                     ' Pattern data (COLOR BAR)
550 PRINT "-----> COLOR BAR             "
560 GOSUB *ACKGET                                       ' ACK reception
570 '
580 '       ------------    Color data      ( RGB )             ------------
590 '
600 PRINT #1,STX$+EXSGON$+R$+G$+B$+ETX$;                ' Color data ( RGB )
610 PRINT "-----> COLOR RGB             "
620 GOSUB *ACKGET                                       ' ACK reception
630 '
640 '       ------------    Terminal mode end                   ------------
650 '
660 PRINT #1,EOT$;                                      ' Terminal mode end
670 PRINT "-----> EOT                   "
680 PRINT "END PROGRAM"
690 END
700 '
710 '
720 '
730 *INIT
740 PRINT #1,ENQ$;                                      ' VG ← ENQ
750 PRINT "-----> ENQ"
760 '
770 '
780 *ACKGET
790 RDATA$=INPUT$(1,#1)                                 ' VG → ACK ?
800 IF RDATA$ = ACK$ THEN 840
810 IF RDATA$ = NAK$ THEN 860
820 IF RDATA$ = STX$ THEN 880
830 GOTO 790
840 PRINT "ACK"
850 RETURN
860 PRINT "NAK"
870 RETURN
880 RDATA$=INPUT$(1,#1)
890 IF RDATA$<>CHR$(&H11) THEN 880
900 RDATA$=INPUT$(2,#1)
910 PRINT "ERROR CODE = "RDATA$
920 RDATA$=INPUT$(1,#1)
930 IF RDATA$<>ETX$ THEN 920
940 RETURN
```

CHAPTER 11 ERROR STATUS FORMAT

(1) When an error is found in the parameters or data, a 2-digit error code is transmitted to the computer.





*1: When "00" serves as the error code

(2) Error code table

No.	Error code	Description
1	00	This error results when an attempt has been made to write data when the EEPROM has not been inserted or an EPROM has been inserted into the panel ROM socket.
2	01	This error results when the number of the program which was input was set to "Disable" when direct display or program execution was initiated.
3	02	This error concerns the horizontal sync data when direct display or program execution was initiated. It results when the data is not inside the range of 5.00 MHz ≤ dot clock ≤ 220.00 MHz.
4	03	This error concerns the horizontal sync data when direct display or program execution was initiated. It results when the data is not inside the range of Hperiod ≥ Hsync + Hbackp + Hdisp (dots).
5	04	This error concerns the horizontal sync data when direct display or program execution was initiated. It results when the data is not inside the range of Hperiod ≥ Hsync + Hbackp + Hdisp (microseconds).
6	05	This error concerns the horizontal sync data when direct display or program execution was initiated. It results when the data is not inside the range of Hperiod ≥ Hsync + HDstart + HDwidth (dots).
7	06	This error concerns the horizontal sync data when direct display or program execution was initiated. It results when the data is not inside the range of Hperiod ≥ Hsync + HDstart + HDwidth (microseconds).
8	16	This error results when the correct data has not been set for the output condition data.
9	17	This error results when the correct data has not been set for the character pattern data.
10	18	This error results when the correct data has not been set for the crosshatch pattern data.
11	19	This error results when the correct data has not been set for the dot pattern data.
12	20	This error results when the correct data has not been set for the circle pattern data.
13	21	This error results when the correct data has not been set for the burst pattern data.
14	22	This error results when the correct data has not been set for the window pattern data.
15	23	This error results when the correct data has not been set for the color bar pattern data.
16	24	This error results when there is an error in a parameter.
17	25	This error results when there is an error in the data.
18	26	This error results when the sync signal has not been set.

Control commands

Command	Code	Description	Note
PED	30H	Enables or disables the programs which are designated.	
LAT	40H	Reads the auto display data on the memory card (panel ROM) from the VG.	
SAT	46H	Writes the auto display data into the memory card (panel ROM) of the VG.	
LPTS	41H	Reads the pattern select data of the programs whose numbers are designated from the VG.	
SPTS	47H	Writes the pattern select data of the programs whose numbers are designated into the memory card (panel ROM) or buffer RAM of the VG.	
LHT	42H	Reads the H timing data of the programs whose numbers are designated from the VG.	
SHT	48H	Writes the H timing data of the programs whose numbers are designated into the memory card (panel ROM) or buffer RAM of the VG.	
LVT	43H	Reads the V timing data of the programs whose numbers are designated from the VG.	
SVT	49H	Writes the V timing data of the programs whose numbers are designated into the memory card (panel ROM) or buffer RAM of the VG.	
LOT LOT3	44H A6H	Reads the output condition data of the programs whose numbers are designated from the VG. * LOT: The data differs depending on whether the analog or digital format is used. * LOT3: Only digital data is used with the VG-852. * LOT3: Only analog data is used with the VG-844. * LOT3: Both analog and digital data is used with the VG-828.	*3
SOT SOT3	4AH A7H	Writes the output condition data of the programs whose numbers are designated into the memory card (panel ROM) or buffer RAM of the VG. * Same as for the LOT command.	*3
LPT LPT2 LPT3	45H 55H A1H	Reads the pattern data of the programs whose numbers are designated from the VG. * LPT: The data differs depending on whether it is in the analog or digital mode. * LPT2: Only the analog mode is used with the VG-844. * LPT3: The data differs depending on whether it is used for the VG-854 or for the VG-852, 828 or 844.	*3
SPT SPT2 SPT3	4BH 5BH A2H	Reads the pattern data of the programs whose numbers are designated from the VG. * Same as for the LPT command.	*3
LPD LPD2 LPD3	4CH 5CH A3H	Reads the 1-program data of the programs whose numbers are designated from the VG. * LPD: The data differs depending on whether it is in the analog or digital mode. * LPD2: Only the digital mode is used. * LPD3: Output conditions: digital mode for the VG-852, analog mode for the VG-844, and both modes for the VG-828.	*3
SPD SPD2 SPD3	4DH 5DH A4H	Pattern data: differs depending on whether it is used for the VG-854 or for the VG-852, 828 or 844. Writes the 1-program data of the programs whose numbers are designated into the memory card (panel ROM) or buffer RAM of the VG. * Same as for the LPD command.	*3
LCH	4EH	Reads the data of the user character whose number is designated from the	

		VG.	
SCH	4FH	Writes the data of the user character whose number is designated into the memory card (panel ROM) of the VG.	
EXPPN	07H	Executes the timing data of the program in the memory card (panel ROM) designated.	
EXPBN EXPBN2 EXPBN3	08H 58H A5H	Transmits the 1-program data to the VG and executes it. (The data is not written into the panel ROM). * Same as for the LPD and SPD commands.	 *3
EXPDN	09H	Executes the program No. in the memory card (panel ROM) designated.	
EXPON	0EH	Executes the designated pattern, and turns the signals ON.	
EXPOFF	0FH	Executes the designated pattern, and turns the signals OFF.	
DISPON	21H	Turns the CRT display ON.	
DISPOFF	22H	Turns the CRT display OFF.	
DISPHV	28H	Reads the number of graphic plane display dots from the VG.	
INDC	29H	Increments or decrements the direct display number.	
EXBN	0CH	Executes the contents of the buffer RAM.	
EXSGON	0BH	Turns R, G, B, RHT, GHT and BHT ON or OFF.	
PNAMES PNAMES3	5EH A8H	Writes the name of the programs whose numbers are designated into the memory card (panel ROM) of the VG.	*2 *3
PNAMER PNAMER3	5FH A9H	Reads the name of the programs whose numbers are designated from the VG.	*2 *3
EXSYNC	51H	Turns HS, VS and CS ON or OFF.	
SGROUP SGROUP3	52H AAH	Writes the data of the group whose number is designated into the memory card (panel ROM) of the VG.	 *3
LGROUP LGROUP3	53H ABH	Reads the data of the group whose number is designated from the VG.	 *3
PRGENTRY	2BH	Enters programs No.1 to No.4 which are for performing high-speed program switching into the VG.	*1
PRGEXE	2CH	Executes the numbers of the programs which were entered using the PRGENTRY command.	*1
OPTCH	3EH	Writes characters into OPT1-10, 11, 12 and OPT2-10, 11 and 12. (VG-825, 826 and 827 only)	*2
CROSS_CTRL	2EH	Controls the cursor pattern.	
LPED	56H	Receives enable or disable for the programs whose numbers are designated.	
CHGMODE	50H	Switches between the digital mode and analog mode. (VG-827 and 828 only)	*2
GNAMER3	ADH	Reads the name of the group whose number is designated from the VG.	*3
GNAMES3	ACH	Writes the name of the group whose number is designated into the memory card (panel ROM) of the VG.	*3
LBM3	B1H	Reads the image data whose number is designated from the VG.	*3
SBM3	B2H	Writes the image data whose number is designated into the memory card of the VG.	*3
BMDEL3	B0H	Deletes the image data whose number is designated from the memory card.	*3
BMNAMES3	B5H	Writes the name of the image data whose number is designated into the memory card of the VG.	*3
BMNAMER3	B6H	Reads the name of the image data whose number is designated from the VG.	*3
BMSIZER3	BAH	Reads the size of the image data whose number is designated from the VG.	*3
QBM3	7DH	Reads the information of the image data whose number is designated from the VG.	*4
LUOPT3	B3H	Reads the data of the user optional pattern whose number is designated from the VG.	*3
SUOPT3	B4H	Writes the data of the user optional pattern whose number is designated into the memory card of the VG.	*3
OPTDEL3	B7H	Deletes the data of the user optional pattern whose number is designated from	*3

		the memory card.	
OPTNAMES3	B5H	Writes the name of the user optional pattern whose number is designated into the memory card of the VG.	*3
OPTNAMER3	B6H	Reads the name of the user optional pattern whose number is designated from the VG.	*3
OPTSIZER3	BBH	Reads the size of the user optional pattern whose number is designated from the VG.	*3
QUOPT3	7CH	Reads the information of the user-generated optional pattern data whose number is designated from the VG.	*4
MCFORM3	BFH	Formats the memory card.	*3
SCDD3	C0H	Sets the current data device to either the memory card or panel ROM.	*3
QCDD3	C1H	Reads the current data device (memory card or panel ROM) from the VG.	*3
LCFG3	7EH	Reads the configuration data of the VG.	*3
SCFG3	7FH	Transmits the configuration data to the VG and sets it.	*3
LDDC2B	C9H	Reads the DDC data of the monitor from the VG.	*3
SDDC2B	CAH	Writes the DDC data into the monitor via the VG.	*3
LDDC1	C8H	Reads the DDC data of the monitor from the VG. (DDC1)	*3
LPbPrD	91H	Reads the color difference coefficient data whose number is designated from the VG.	*3
SPbPrD	92H	Writes the color difference coefficient data whose number is designated into the VG.	*3
PbPrNAMES3	93H	Writes the name of the color difference coefficient data whose number is designated into the VG.	*3
PbPrNAMER3	94H	Reads the name of the color difference coefficient data whose number is designated from the VG.	*3

*1: Supported by old VG models only.
*2: The command code differs between the digital VG and analog VG models.
Digital VG: PNAMES(5EH), PNAMER(5FH)
OPTCH(3EH) for VG-825, 826 and 827 only
CHGMODE(50H) for VG-827 and 828 only
Analog VG: PNAMES(3EH), PNAMER(50H)
*3: Supported by the VG-851 and subsequent models.
*4: Supported by the VG-828 and subsequent models.

Graphic commands

Command	Code	Description	Note
GCIRC CCIRC	18H 12H	Draws (GCIRC) a circle on the graphic plane or clears (CCIRC) it.	
GLINE CLINE	19H 13H	Draws (GLINE) a straight line on the graphic plane or clears (CLINE) it.	
GPSET CPSET	1BH 14H	Draws (GPSET) a dot on the graphic plane or clears (CPSET) it.	
ACLR	23H	Clears the entire screen.	
COCLR	24H	Clears the color bar plane.	
GCLR	25H	Clears the graphic plane.	
COLOR	26H	Displays 256 colors (H16 x V16).	
GCHAR	27H	Displays characters.	
GSQPA CSQPA	31H 32H	Draws (GSQPA) a painted square on the graphic plane or clears (CSQPA) it.	
GRPHCL	3BH	Sets the graphic color.	
WINDW CWIND	3CH 2AH	Draws (WINDW) a window or clears (CWIND) it.	
WINDCL	3DH	Sets the window color.	
GTRIPA CTRIPA	D2H D3H	Draws (GTRIPA) a painted triangle on the graphic plane or clears (CTRIPA) it.	*1
GELPS CELPS	D6H D7H	Draws (GELPS) an ellipse on the graphic plane or clears (CELPS) it.	*1
GELPSPA CELPSPA	D8H D9H	Draws (GELPSPA) a painted ellipse on the graphic plane or clears (CELPSPA) it.	*1
GBITBLT	DAH	Copies an area on the graphic plane.	*1
G8CIRC G8CIRCPA	E0H E6H	Draws a circle or painted circle on the color bar plane.	*1
G8LINE	E1H	Draws a straight line on the color bar plane.	*1
G8PSET	E2H	Draws a dot on the color bar plane.	*1
G8SQRE G8SQPA	E4H E3H	Draws a square or painted square on the color bar plane.	*1
G8TRIPA	E5H	Draws a painted triangle on the color bar plane.	*1
G8ELSP G8ELPSPA	E7H E8H	Draws an ellipse or painted ellipse on the color bar plane.	*1
G8BITBLT	E9H	Copies an area on the color bar plane.	*1
G8COLOR G8COLOR2	EAH ECH	Sets the color bar plane display color.	*1
G8GRFMOD	EBH	Sets the color bar plane display mode.	*1

*1: Supported only by the VG-851 and subsequent models.

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