Video Signal Generator

VG-823

Terminal Mode

Instruction Manual

Part II

Ver 1.0.1

1996. 06. 10. 2nd ed.

Astrodesign Inc.

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CAUTIONS

- **The contents of this manual are subject to change without prior notice due to improvements.**
- **The manufacturer will not be liable for any damage or trouble caused by the faulty connection or operation of this generator.**
- **All inquiries concerning this product should be addressed to your dealer or to the manufacturer at the contact numbers given below.**

VG-823 Instruction Manual

July 11, 1996

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CHAPTER 1 INTRODUCTION TO TERMINAL MODE

The terminal mode is a function for controlling the VG-823 generator from an external computer (such as a personal computer).
The commands and data are sent and received through the serial I/O port (RS-232C).
Use of the terminal mode enables program data to be entered, programs to be run, patterns to be turned ON/OFF and other operations, which are virtually identical
to their manual counterparts, to be performed.
In addition, straight line, circle, dot and other write functions are supported as graphic commands.

CHAPTER 2 INTERFACE SPECIFICATIONS

2-1 RS-232C specifications

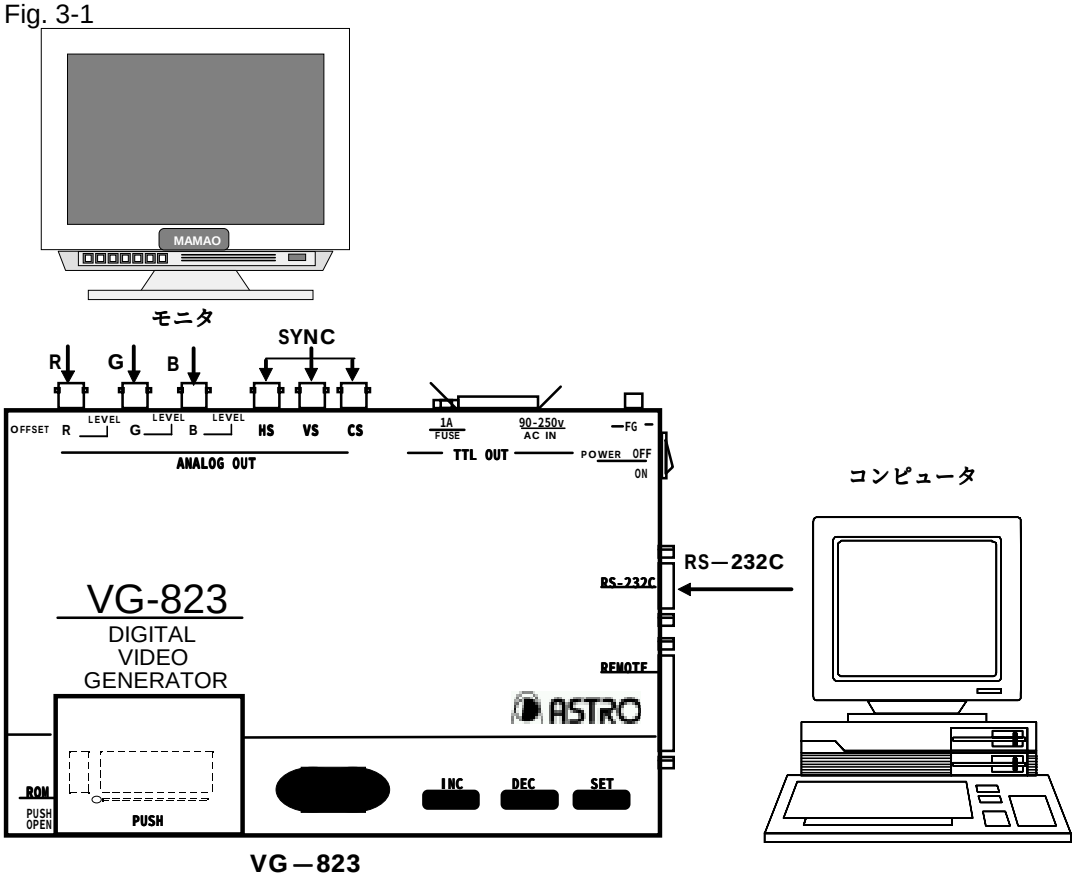
Communication system	Asynchronous
Transfer rate (baud rate)	9600bps
Input/output level	E2A-RS-232C
Data format	1 start bit
	7 data bits
	1 stop bit
	no parity check
Error control system	None

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

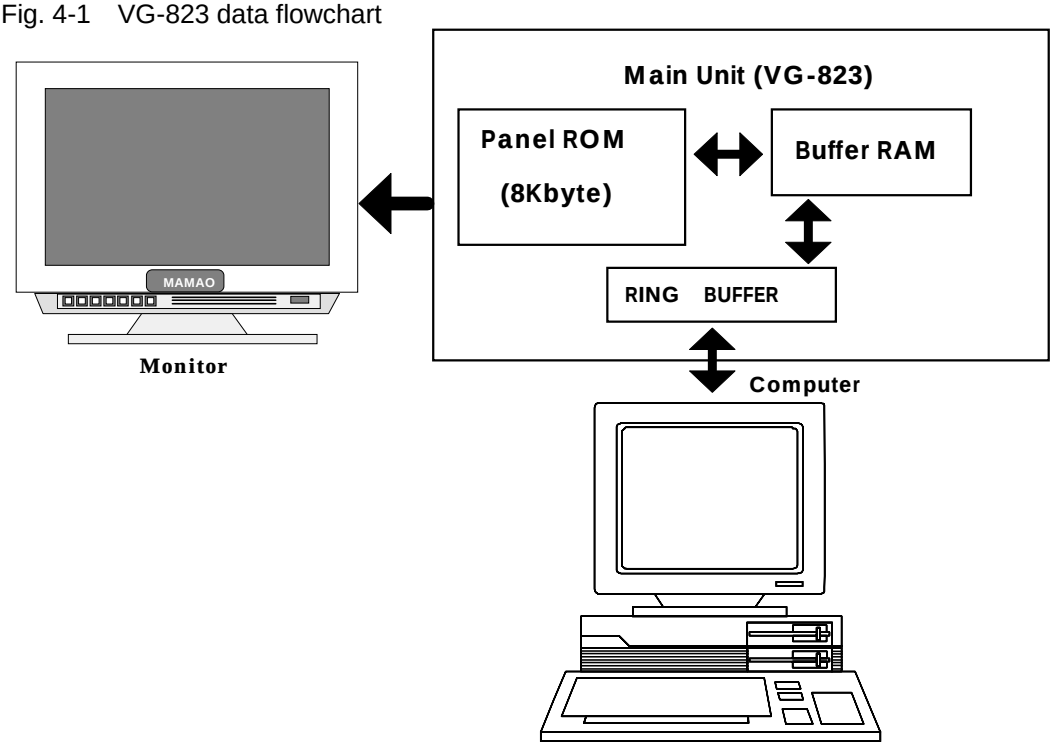
CHAPTER 3 CONNECTION DIAGRAM

Fig. 3-1



CHAPTER 4 DATA FLOWCHART

Fig. 4-1 VG-823 data flowchart



CHAPTER 5 DESCRIPTION OF SETTING DATA

5・1 Definition of terms

- Auto display data

  When the VG-823 is operated in the auto display mode, the interval time (in seconds) from the output of the patterns to the running of the next program, and the numerical sequence of the programs to be run are provided as parameters.
  The numerical sequence of the programs can be provided in the form of three blocks. For instance, if programs 07, 08 and 09 are to be run after 01, 02 and 03, and then the programs are to be repeated from 01, programs 01-03 are set for the first block, programs 07-09 for the second block and programs 00-00 for the third block.

- Pattern select data

  This data is for selecting which patterns are to be output during program execution when the VG-823 is operated in the direct display or auto display mode. R/G/B must be included in the data. Otherwise, the data will be entered without color.

- Buffer RAM

  The VG-823 first calls the program entered in the panel ROM to the RAM used for running programs, and then runs the program. The buffer RAM refers to this RAM.

- 1 program data

  The H timing data, V timing data, output condition data, pattern select data and each pattern data are collectively known as 1-program data.

- User characters

  A panel ROM has four characters which the user can create and enter. Each has a 64 x 64 dot size.

- Graphic plane

  This memory plane traces character, crosshatch, dot, circle, [ ], +, X and burst patterns among the display patterns.

- Color bar plane

  This memory plane traces color bar, gray scale, and window patterns among the display patterns.

  Note: The H timing, V timing and output condition data is described in the setting items of 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 microseconds (time) or dots.
Set either microsecond or dot data following "MODE" and "dot clock."

Table 1-1

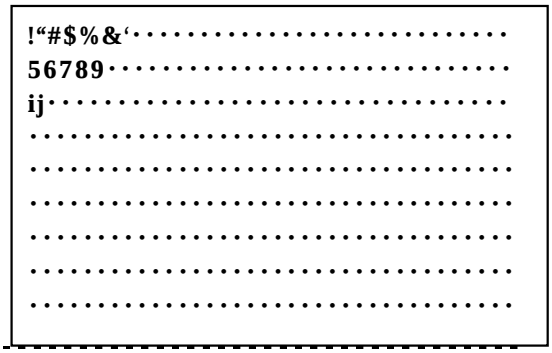
Horizontal timing data	Input Mode(0,1) Dot Clock	0 : μs 1 : dot □□□.□□ MHz
	H period H disp	□□.□□ μsec □□□□ dot □□.□□ μsec □□□□ dot
	H sync H backp	□□.□□ μsec □□□□ dot □□.□□ μsec □□□□ dot
	HD start HD width	□□.□□ μsec □□□□ dot □□.□□ μsec □□□□ dot
Vertical timing data	Scan Mode (0～2)	0 : NON INTERLACE 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 □.□□ V □.□□ V

5・3 Description of patterns

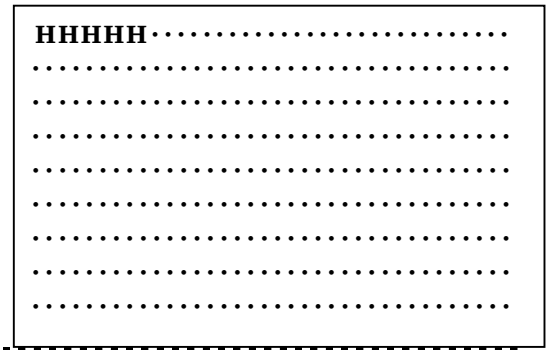
5・3・1Character

One of the formats (0, 1 or 2) is selected.

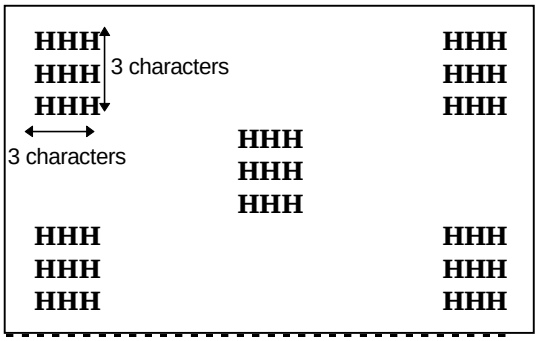
0・・・・・・・Character list Fig. 5-1



1・・・・・・・All 1 character Fig. 5-2

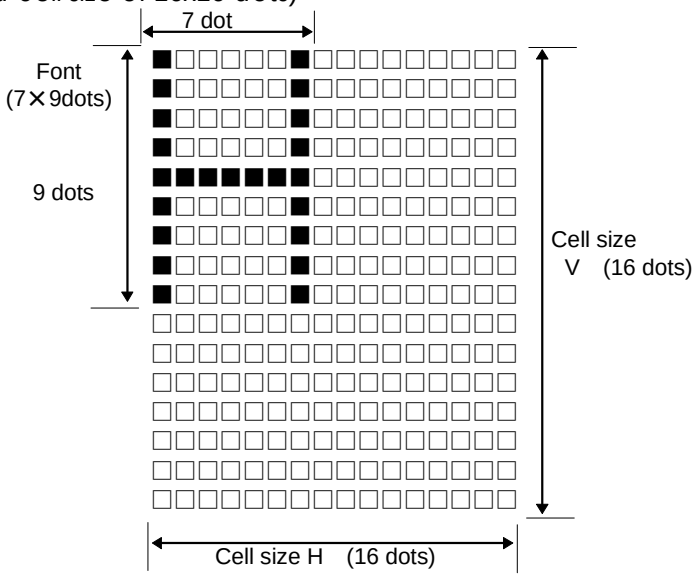


2・・・・・・・・ Corners and center Fig. 5-3



* The correlation between the font and cell size is shown below.
(Example with font of 7x9 dots and cell size of 16x16 dots)

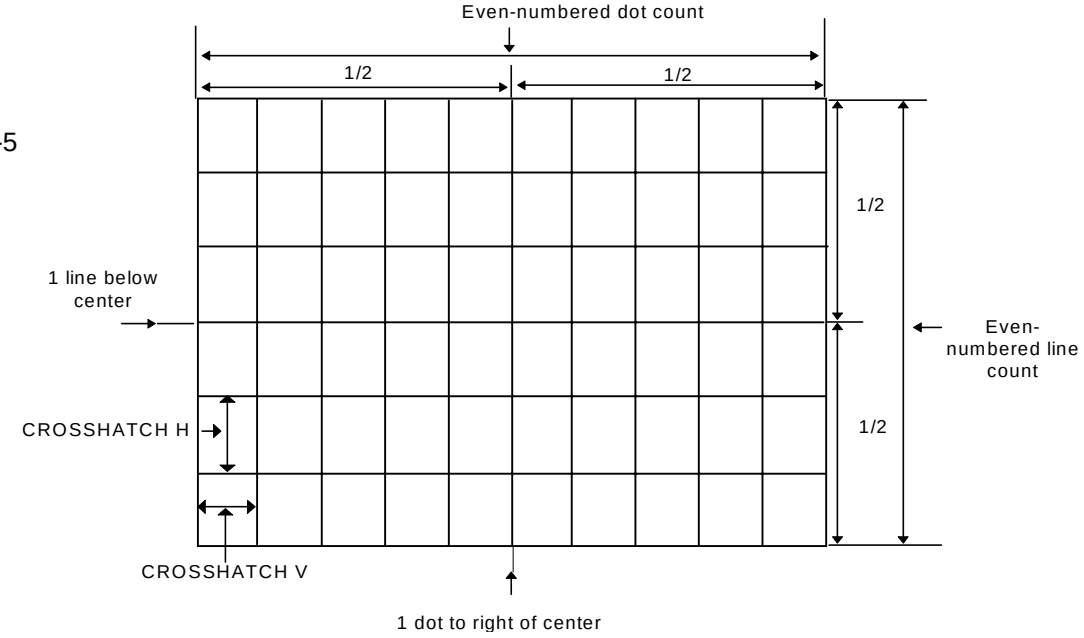
Fig. 5-4



5･3･2 Crosshatch

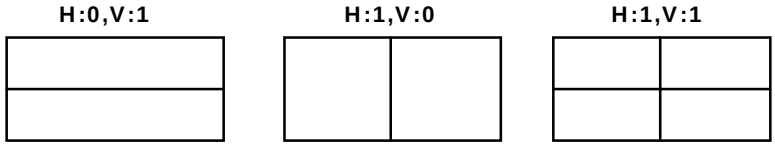
Crosshatch patterns are always displayed after the screen center is calculated.
When both the number of dots and number of lines displayed are set to odd numbers, the screen center can be calculated, but when they are set to even numbers, the point which is one dot to the right of the center and one 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



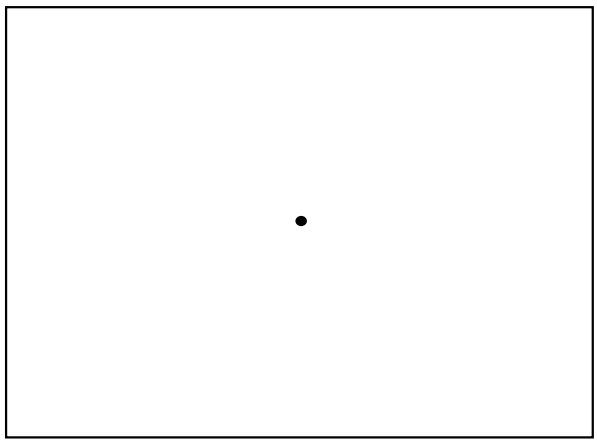
An error results when both H and V are "0."

5･3･3 Dot

As with the crosshatch pattern, the dot pattern is also traced after the screen center has been calculated.

* The following figure shows what is produced when H: and V: are both "1."

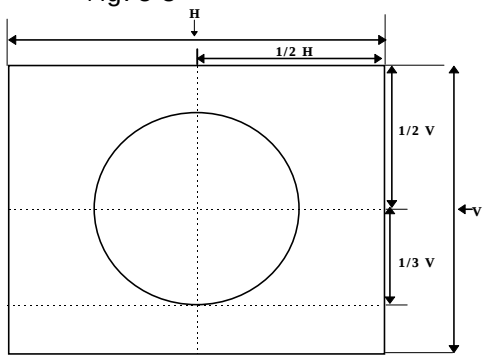
Fig. 5-7



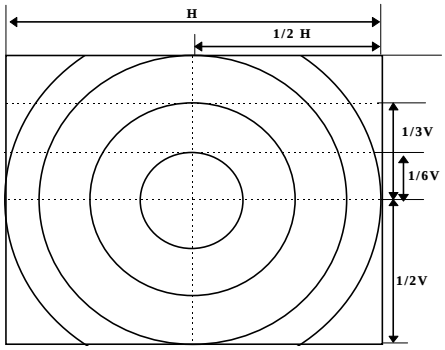
5･3･4 Circle

Select format 0, 1, 2, 3 or 4.

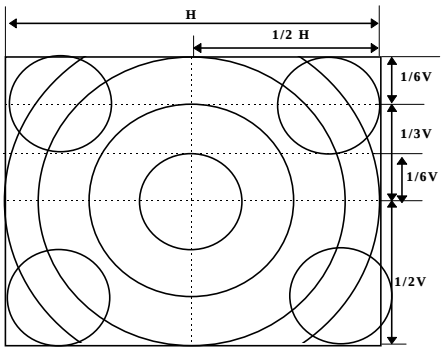
Fig. 5-8



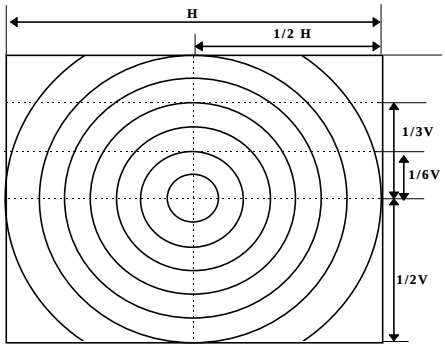
Format **0** Single circle
Center･･･1/2 H,1/2 V
Radius･･･1/3 V



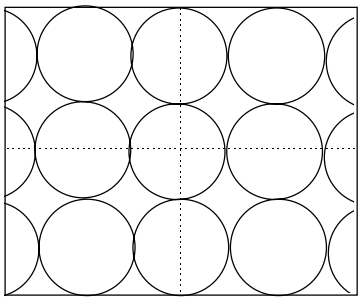
FORMAT **1**
Concentric circles (1)
Center ･･･1/2 H,1/2 V
Radius (from center)･･･1/6 V,1/3 V1/2 V,1/2 H



FORMAT **2**
FORMAT **1** ＋(4 circles with 1/6V radius)



FORMAT **3**
Centric circle (2)
Center ･･･1/2 H,1/2 V
Radius (from center)
･･･addition of other circles inside 1/6V, 1/3V, 1/2V circles, and addition of 1/2 radius



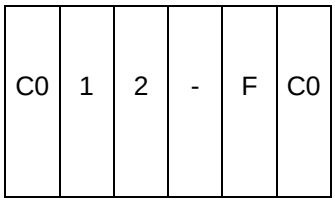
FORMAT **4** Consecutive circles with 1/6V radius
Circles are displayed symmetrically both horizontally and vertically with the center (1/2H, V/2V) serving as the reference.

5･3･5 Color bar

The color bar pattern is always traced from the top left corner of the screen at the interval provided.
DIRECTION 0, 1, 2 or 3 is selected as the alignment direction.

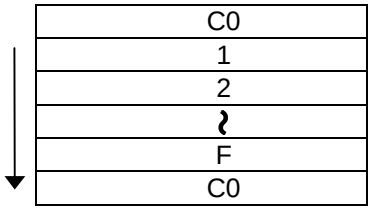
Fig. 5-9

0･･･････････････ Horizontal direction



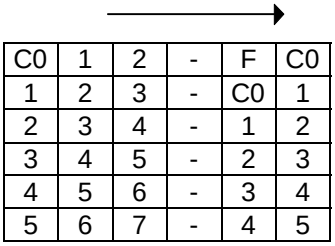
The designated colors "C0-F" are repeated horizontally.
The V interval is ignored.

1･･･････････････ Vertical direction



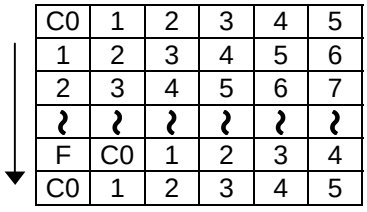
The designated colors "C0-F" are repeated vertically.
The H interval is ignored.

2･･･････････････ Horizontal direction



The designated colors "C0-F" are repeated horizontally, and when they reach the rightmost position, they are repeated on the next line which is separated from the first line by the V interval.

3･･･････････････ Vertical direction



The designated colors "C0-F" are repeated vertically, and when they reach the bottom position, they are repeated in the next row which is separated from the first row by the H interval.

5･3･6 Gray scale

As with the color bar pattern, the gray scale pattern is traced from the top left corner.
However, the color bar setting is used for the gray scale interval and there are only two layouts (0 and 1).

0	･･･････････Horizontal direction (same as direction 2 for the color bar pattern)
1	･･･････････Vertical direction (same as direction 3 for the color bar pattern)

5･3･7 Burst

Set the tracing start point with formats 0 to 3, and set the step (thickness increment amount) and interval (number of lines with same thickness to be displayed).

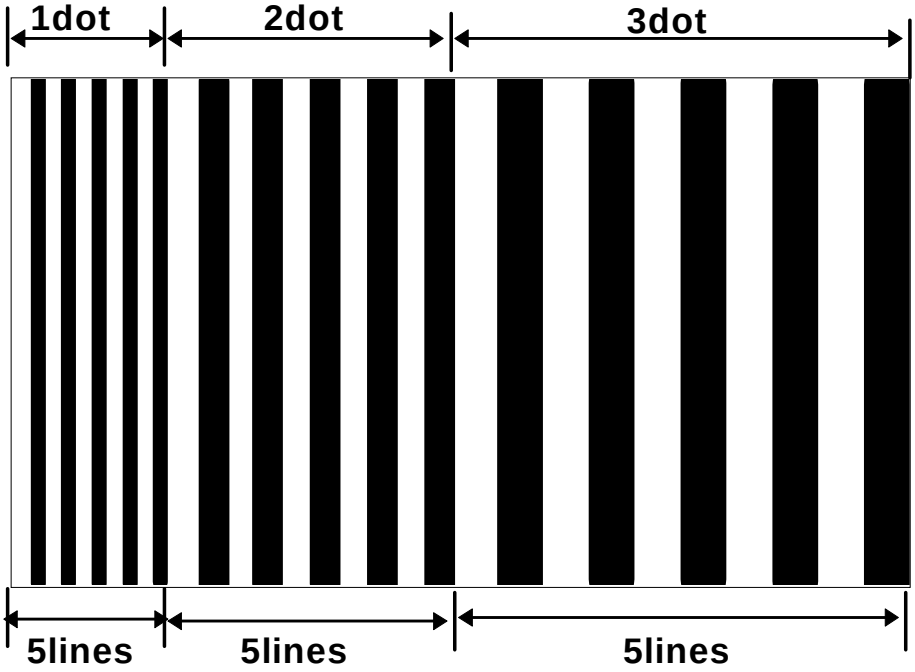
FORMAT

0	･･･････････････････	Settings are incremented from left to right.
1	･･･････････････････	Settings are incremented from right to left.
2	･･･････････････････	Settings are incremented from center to left and right.
3	･･･････････････････	Settings are incremented from left and right to center.

※ "Step" is an amount by which the thickness of the vertical lines is incremented.
※ "Interval" is the number of vertical lines displayed with the same thickness.

【Examples of settings】
Format 0, step, interval 5

Fig. 5-10

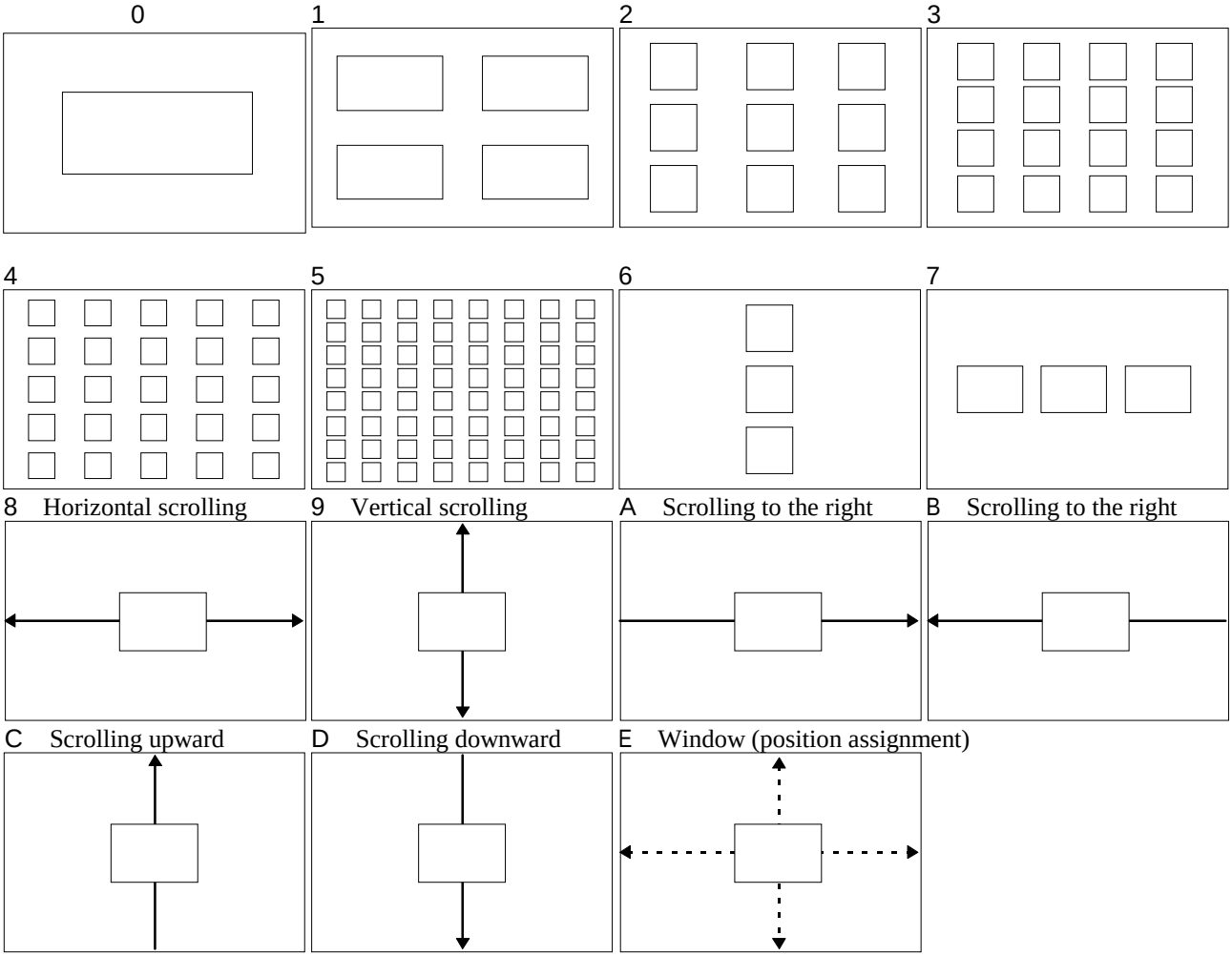


5･3･8 Window

Select the number of windows, etc. by selecting one format from formats 0 to E.
Select the speed (with formats 0 to 7) with the flicker interval.
Select the scrolling speed (with formats 8 to E).

Note: The VG-823 shows the same display for "format F" as for "format 0."

Fig. 5-11



Note: Format E

This format is effective when using a panel ROM in which the position has already been assigned by another model (VG-815, VG-819 or VG-829) in the VG series.
Otherwise, the same display as for format 0 appears.

Select the flicker interval.

	With window format 0 to 7	With window format 8 to D (scroll)
0	No flicker arises	4-dot scrolling every V period
1	Flicker every V period	8-dot scrolling every V period
2	Flicker every two V periods	12-dot scrolling every V period
3	Flicker every four V periods	16-dot scrolling every V period
4	Flicker every eight V periods	16-dot scrolling every V period
5	Flicker every sixteen V periods	16-dot scrolling every V period
6	Flicker every thirty-two V periods	16-dot scrolling every V period
7	Flicker every sixty-four V periods	16-dot scrolling every V period

CHAPTER 6 TRANSMISSION DATA

6･1 Transmission control characters

These are the transmission control codes for operating the VG-823 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	Start of transmission text (command)
6	ETB	17H	23	End of transmission text (data)
7	ETX	03H	3	End of transmission text (command/data)

6･2 Control commands

This group of commands are 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 designated program No.
2	LAT	40H	64	Sends the auto display data in the panel ROM from the VG-823.
3	LPTS	41H	65	Sends the pattern select data in the designated program No. from the VG-823.
4	LHT	42H	66	Sends the H timing data in the designated program No. from the VG-823.
5	LVT	43H	67	Sends the V timing data in the designated program No. from the VG-823.
6	LOT	44H	68	Sends the output conditions data in the designated program No. from the VG-823.
7	LPT	45H	69	Sends the pattern data in the designated program No. from the VG-823.
8	SAT	46H	70	Writes the auto display data in the VG-823's panel ROM.
9	SPTS	47H	71	Writes the pattern select data of the designated program No. into the VG-823's panel ROM or buffer RAM.
10	SHT	48H	72	Writes the H-timing data of the designated program No. into the VG-823's panel ROM or buffer RAM.
11	SVT	49H	73	Writes the V-timing data of the designated program No. into the VG-823's panel ROM or buffer RAM.
12	SOT	4AH	74	Writes the output conditions data of the designated program No. into the VG-823's panel ROM or buffer RAM.
13	SPT	4BH	75	Writes the pattern data of the designated program No. into the VG-823's panel ROM or buffer RAM.

NO	Character-	HEX code	DEC code	Description
14	LPD	4CH	76	Sends the 1 program data in the designated program No. from the VG-823.
15	SPD	4DH	77	Writes the 1 program data of the designated program No. into the VG-823's panel ROM or buffer RAM.
16	LCH	4EH	78	Sends the data of the designated user character No. from the VG-823. (64x64, E0-E3)
17	SCH	4FH	79	Writes the data of the designated user character No. in the VG-823's panel ROM. (64x64, E0-E3)
18	EXPPN	07H	7	Outputs only the sync signals of the program with the designated program No. entered in the panel ROM. The previously output pattern is displayed as the pattern data.
19	EXPBN	08H	8	Sends 1 program data to the VG-823 and executes it (but does not write the data in the panel ROM).
20	EXPDN	09H	9	Designates the direct display No. and executes the display.
21	EXPON	0EH	14	Executes the designated pattern and turns on its signals.
22	EXPOFF	0FH	15	Executes the designated pattern and turns off its signals.
23	DISPON	21H	33	Turns on the display.
24	DISPOFF	22H	34	Turns off the display.
25	DISPHV	28H	40	Sends the display dot count on the graphic plane from the VG-823.
26	INDC	29H	41	Increments or decrements the direct display number by 1.
27	EXBN	0CH	12	Executes the contents of the buffer RAM.
28	EXSGON	0BH	11	Turns R/G/B and RHT/GHT/BHT ON and OFF.
29	PNAMES	3EH	62	Writes in the VG-823's panel ROM the name of the program whose number is designated.
30	PNAMER	50H	80	Sends from the VG-823 the name of the program whose number is designated.
31	EXSYNC	51H	81	Turns HS/VS/CS ON and OFF.
32	SGROUP	52H	82	Writes into the VG-823's panel ROM the group data of the group whose number has been designated.
33	LGROUP	53H	83	Sends from the VG-823 the group data of the group whose number has been designated.

6･3 Graphic commands

These commands can be used only in the terminal mode. They enable more patterns to be prepared than the number of patterns which can be prepared by operating the controls on the front panel.

NO	Character-	HEX code	DEC code	Description
1	GCIRC	18H	24	Traces a circle on the graphic plane.
2	CCIRC	12H	18	Clears a circle on the graphic plane.
3	GLINE	19H	25	Traces a straight line on the graphic plane.
4	CLINE	13H	19	Clears a straight line on the graphic plane.
5	GPSET	1BH	27	Traces a dot on the graphic plane.
6	CPSET	14H	20	Clears a dot on the graphic plane.
7	ACLR	23H	35	Clears the whole screen.
8	COCLR	24H	36	Clears the color plane.
9	GCLR	25H	37	Clears the graphic plane.
10	COLOR	26H	38	Displays in 256 colors (H16xV16).
11	GCHAR	27H	39	Displays characters.
12	GSQPA	31H	49	Traces 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	Traces a window.
16	CWIND	2AH	42	Clears a window.
17	WINDCL	3DH	61	Sets the window color.

6･4 Data and error commands

The error status is returned in response to an error occurring when a command is sent to the VG-823.
One of these commands is sent to send data or to request data to be sent.

NO	Character-	HEX code	DEC code	Description
1	TRDT	10H	16	This command is placed at the head of the block when data is sent.
2	ESTS	11H	17	To send the error status, this command is sent followed by the error No.

6･5 Key code table

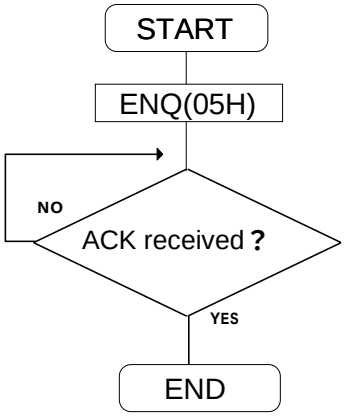
NO	key name	HEX code	DEC code
1	CHARA	50H	80
2	CROSS	51H	81
3	DOTS	52H	82
4	CIRCLE	53H	83
5	+	54H	84
6		55H	85
7	x	56H	86
8	COLOR	57H	87
9	GRAY	58H	88
10	BURST	59H	89
11	WINDOW	5AH	90
12	OPTION 1	5BH	91

NO	key name	HEX code	DEC code
	OPTION 2	5CH	92
	R	5EH	94
	G	5FH	95
	B	60H	96
	HALF-TONE	61H	97
	INV	62H	98
	⏫	63H	99
	⏬	64H	100
	RH	65H	101
	GH	66H	102
	BH	67H	103
	CHAR EDIT	5DH	93

- These codes are used to select the pattern keys or output keys.
- The ⏫ and ⏬ keys in No.19 and 20 are used only when updating the direct display.

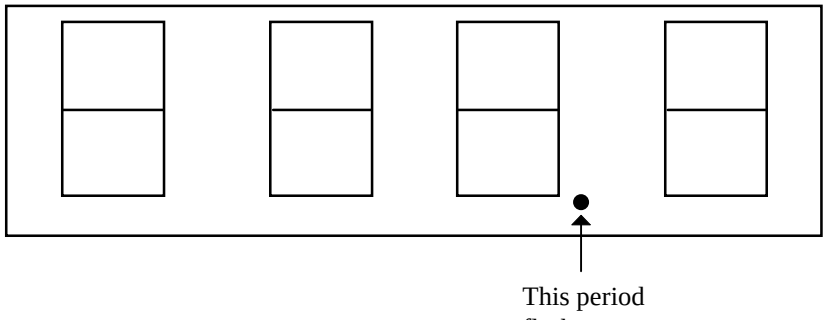
CHAPTER 7 STARTUP METHOD AND TRANSFER FORMATS

7・1 Terminal mode startup method



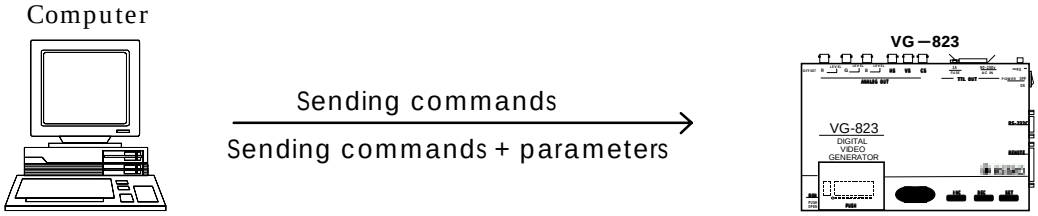
"Commencement of terminal mode startup"

Note: When terminal mode start-up commences, the period on the 7-segment LED begins to flash.

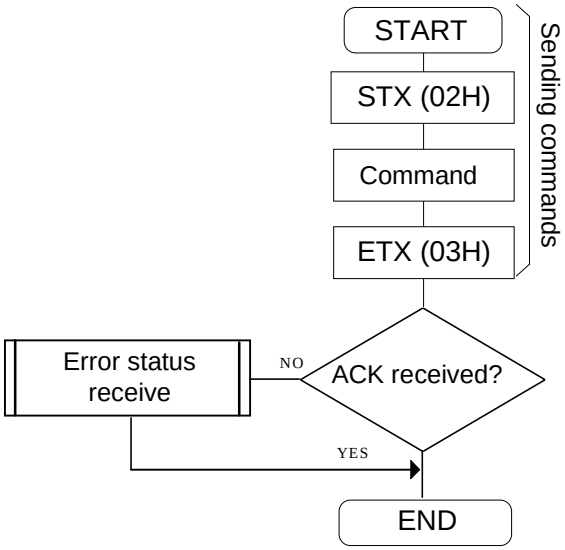


7･2 Command and parameter transfer formats

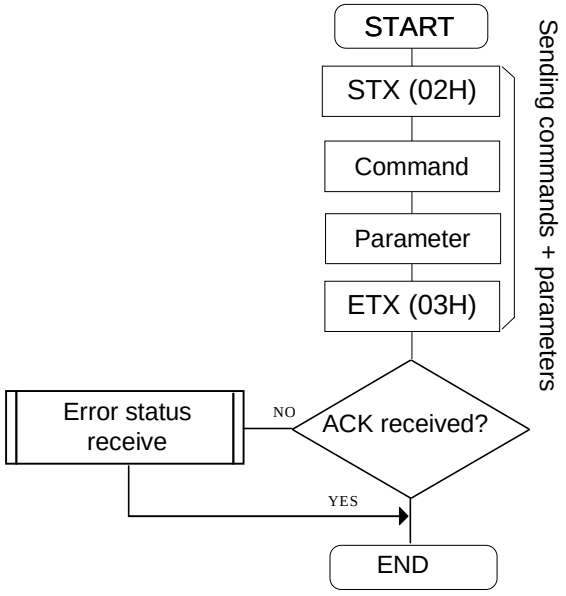
(1)



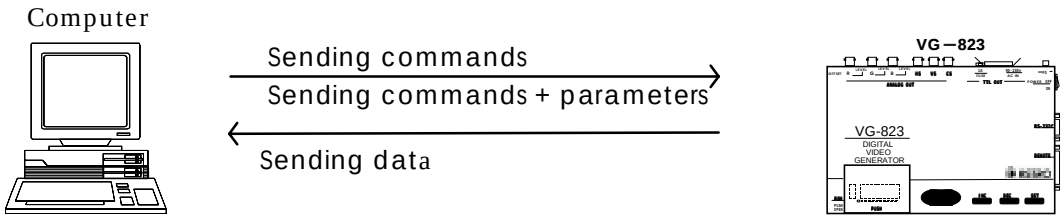
In the case of commands only



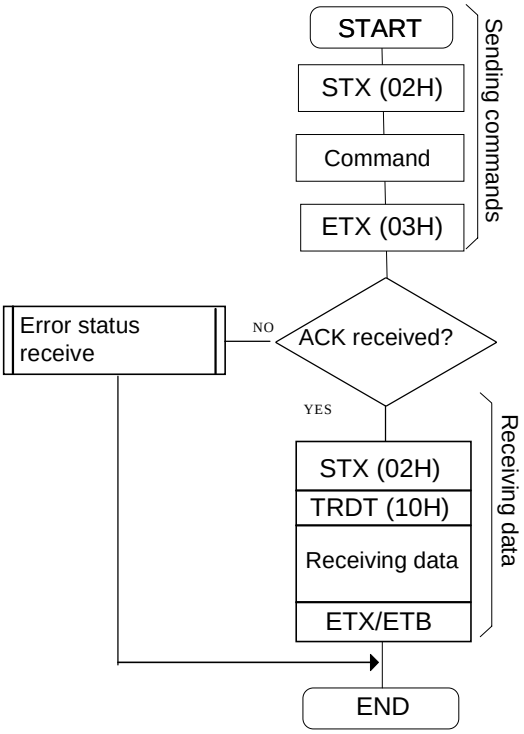
In the case of commands + parameters



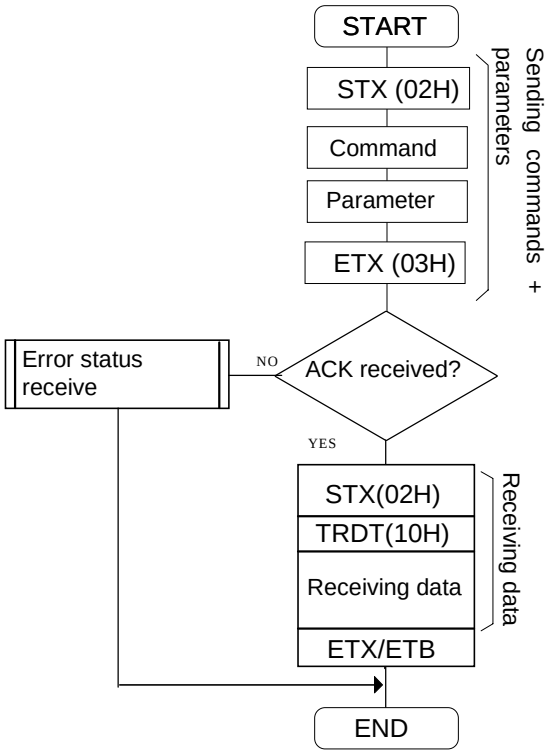
(2)



When sending commands and receiving data



When sending commands + parameters and receiving data

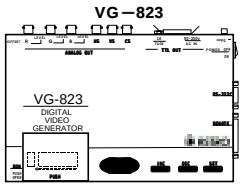


(3)

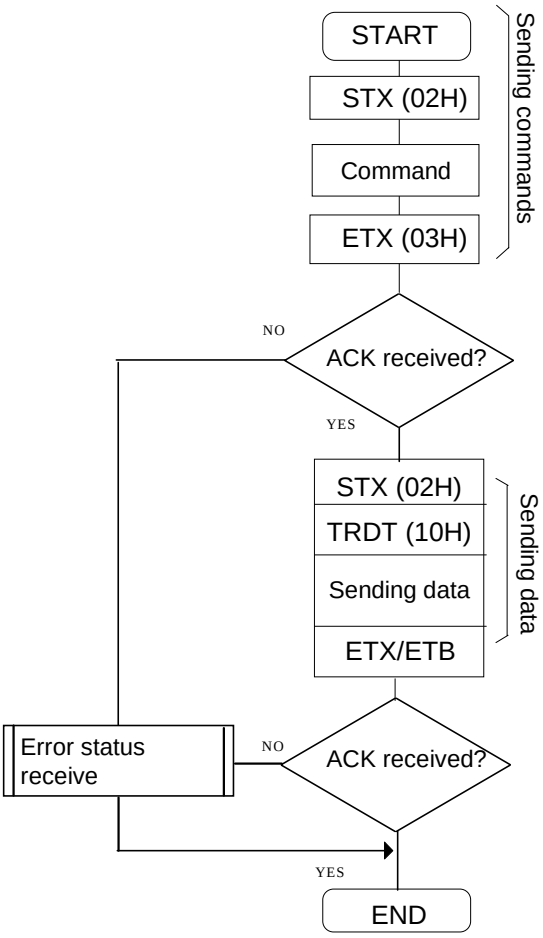
Sending commands

Sending commands + parameters

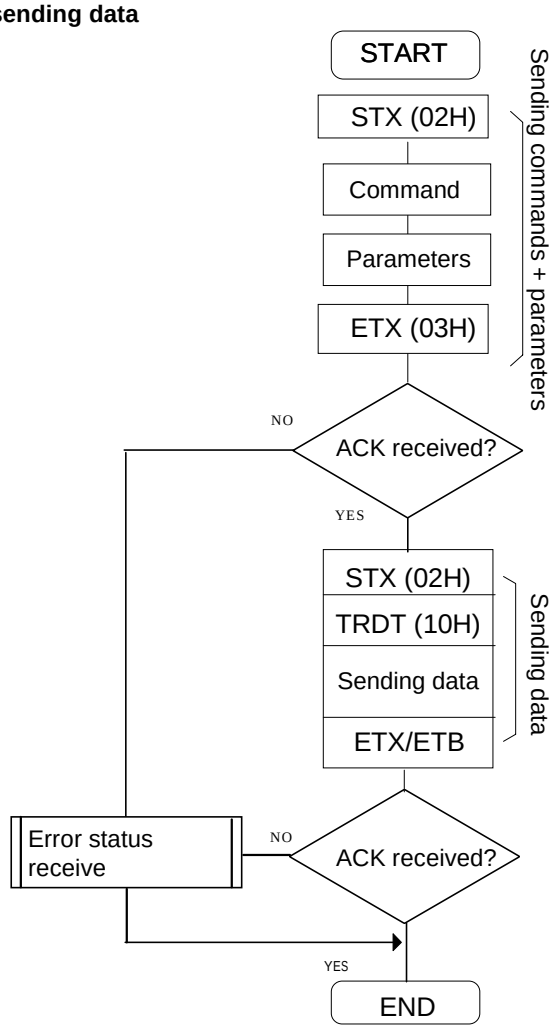
Sending data



When sending commands and sending data



When sending commands + parameters and sending data



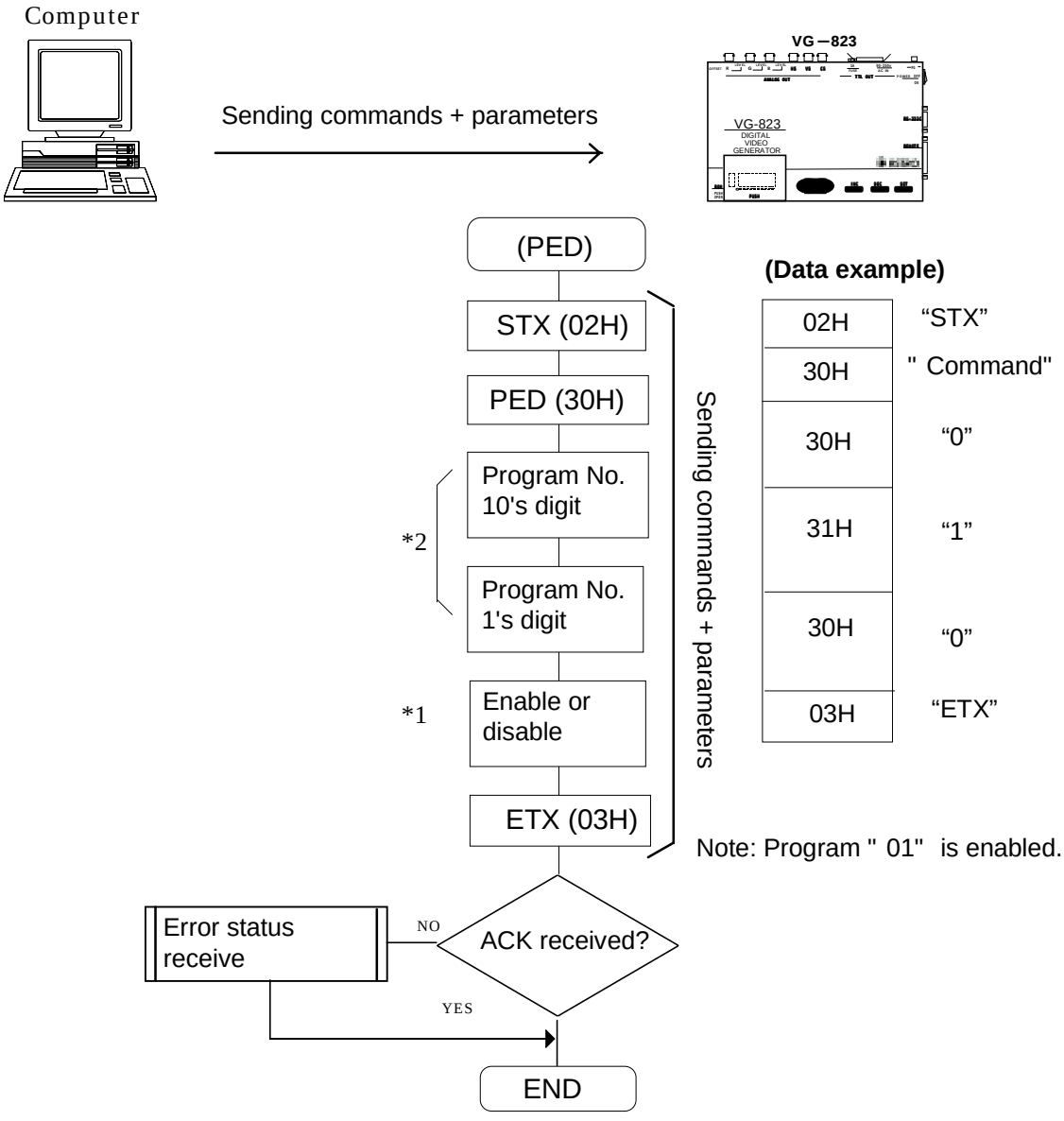
CHAPTER 8 DESCRIPTION OF CONTROL COMMAND FUNCTIONS

8-1 [PED] (30H)

This command enables or disables programs in the panel ROM.
The program No. (01-40) and enable or disable selection data are sent as the parameters.

* All parameters are in ASCII code.

1)



*1: "0" for enable; "1" for disable.

*2: Three digits are designated when the AH-3000 is used.

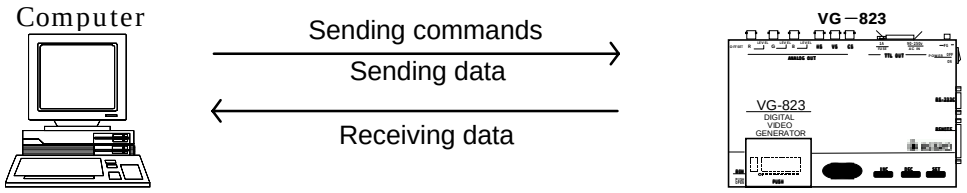
Program No.(001-040), (500-779)

When the HN58C256 panel ROM is used, the number of digits designated depends on the program number.
For program No.(01-40): 2 digits are designated
For program No.(501-541, 601-641, 701-741): 3 digits are designated

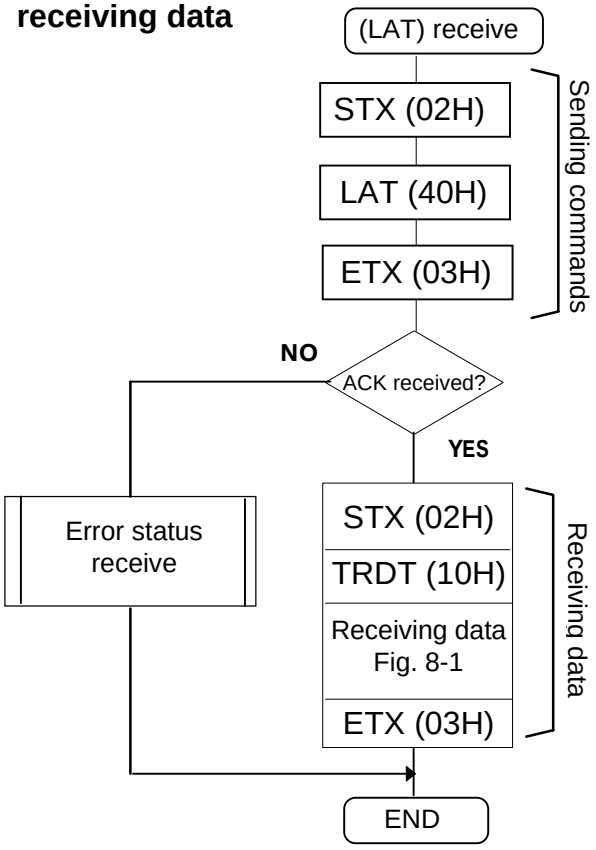
8･2 [LAT] (40H)･[SAT] (46H)

These commands are for sending or receiving parameters to execute the auto display.
The data sent is written in the panel ROM.
The parameters sent or received are for the interval (time) and program numbers consisting of 3 blocks.

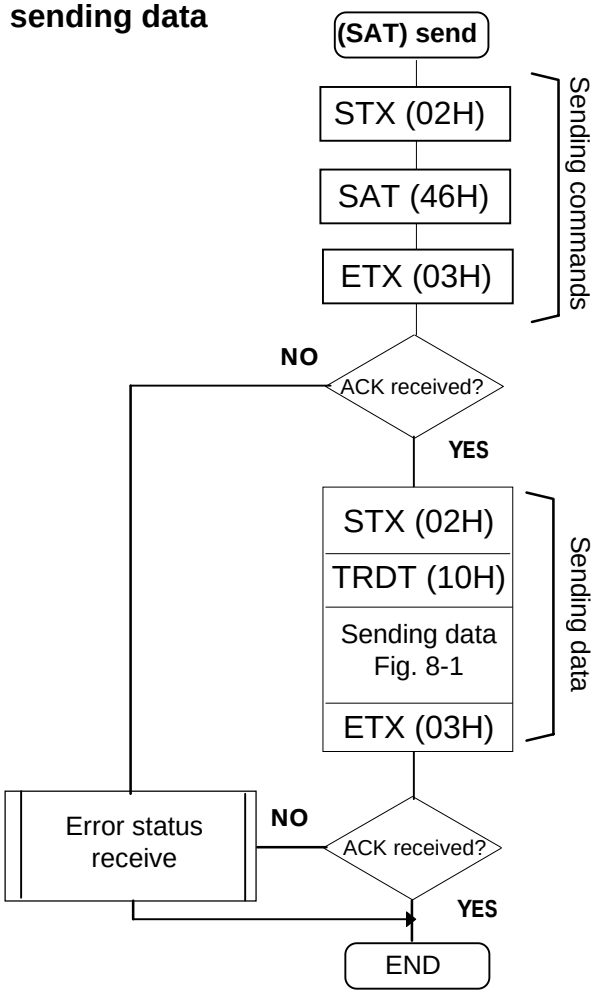
* All parameters are in ASCII code.



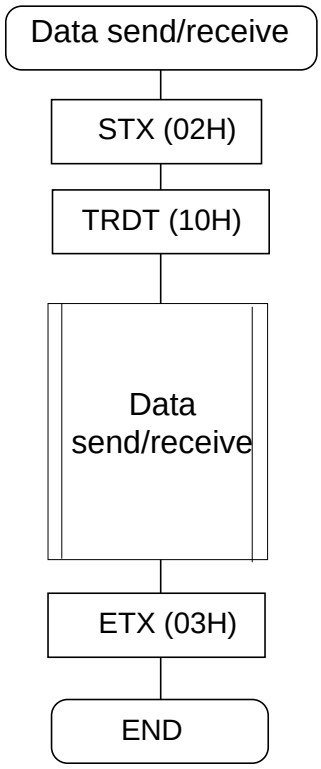
When sending commands and receiving data



When sending commands and sending data

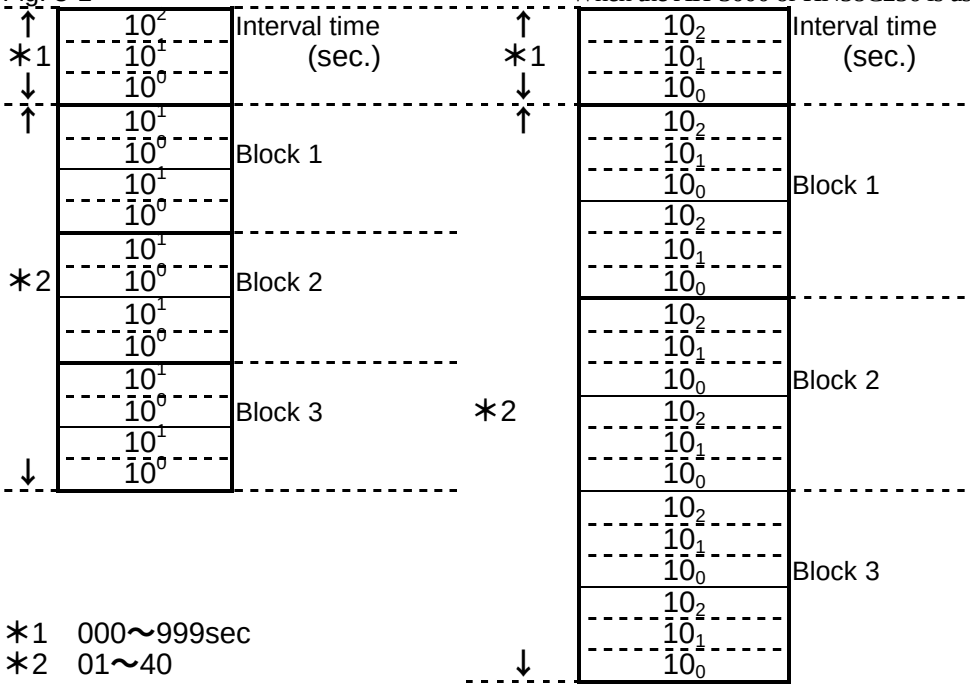


- The data comes in the format of the interval (time) and 3 blocks for program numbers.



02H	" STX"
10H	" TRDT"
30H	" 0"
30H	" 0" (001sec)
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



∗1 000～999sec
∗2 01～40

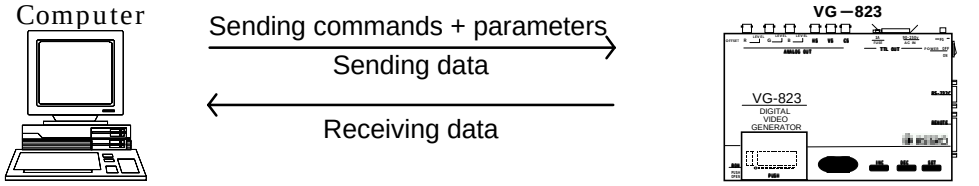
001-040, 501-541, 601-641, 701-741 when AH-3000 is used
001～040,501～541,601～641,701～741when HN58C256 is used

Note: Set blocks 2 and 3 to "0" when using block 1 only.

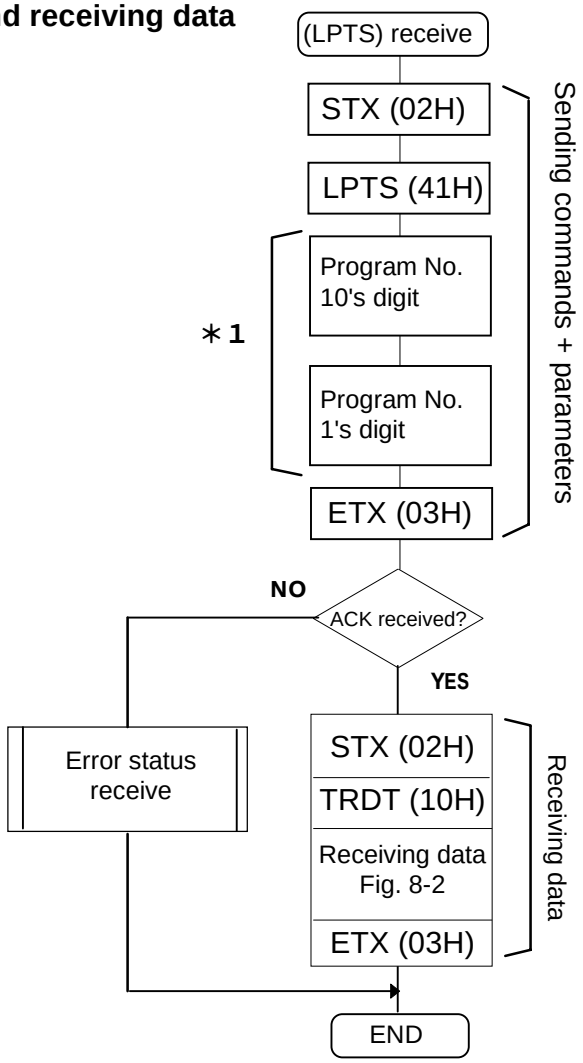
8･3 [LPTS] (41H)･[SPTS] (47H)

These commands are for sending or receiving the pattern select data in the designated program number.
The data sent is written in buffer RAM for program No.00 and in the panel ROM for programs No.01 to 40. The parameters sent or received are pattern key codes.

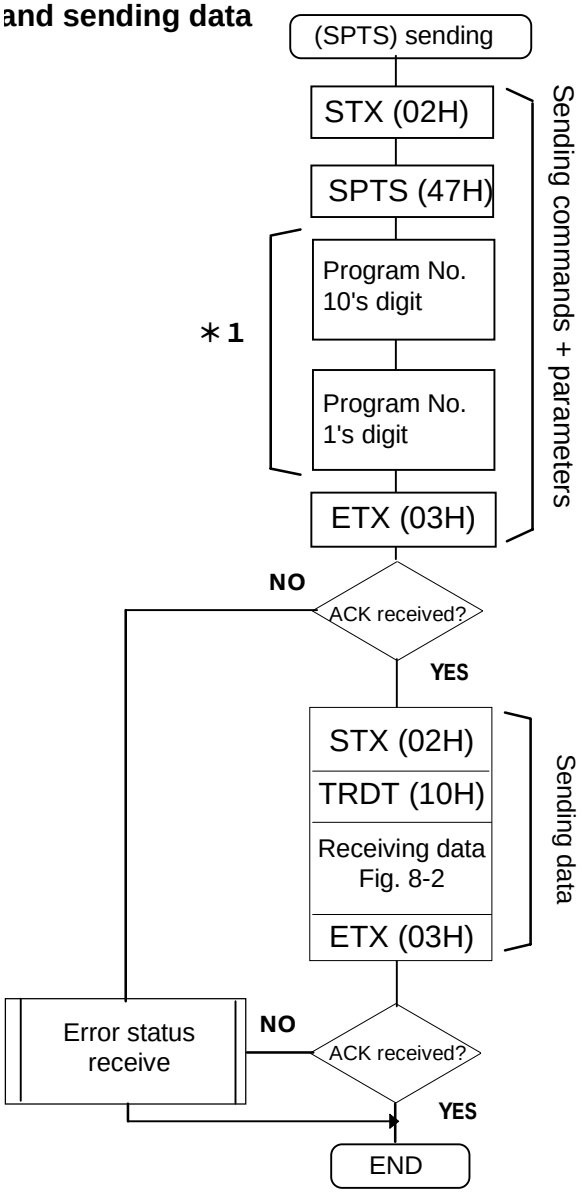
* All parameters are in ASCII code.



When sending commands + parameters and receiving data



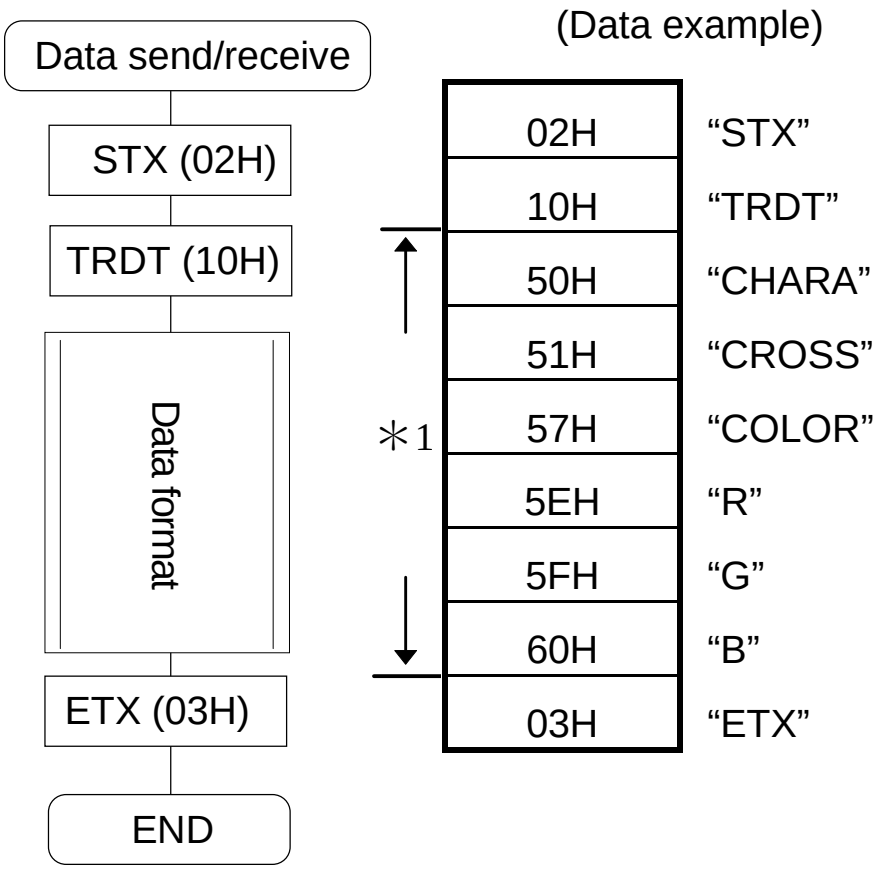
When sending commands + parameters and sending data



*1 Three digits are designated when the AH-3000 is used.
Program No.(001-040), (500-779)

When the HN58C256 panel ROM is used, the number of digits designated depends on the program number.
For program No.(01-40): 2 digits are designated
For program No.(501-541, 601-641, 701-741): 3 digits are designated

- Pattern select data format



*1: Data is of variable length

Fig. 8-2

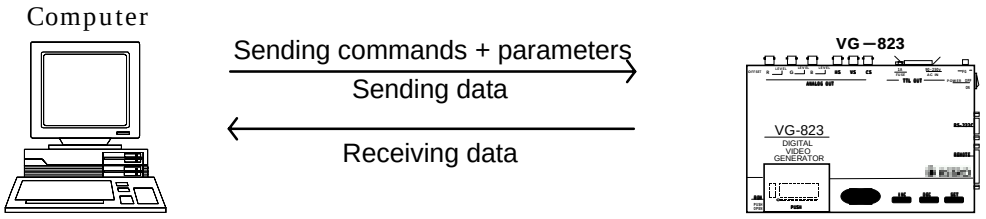
CHARA (50H)
CROSS (51H)
COLOR (57H)
・ ・ ・
R (5EH)
G (5FH)
B (60H)

Note: Refer to the key code table in 6-5 for the pattern key and output key codes.

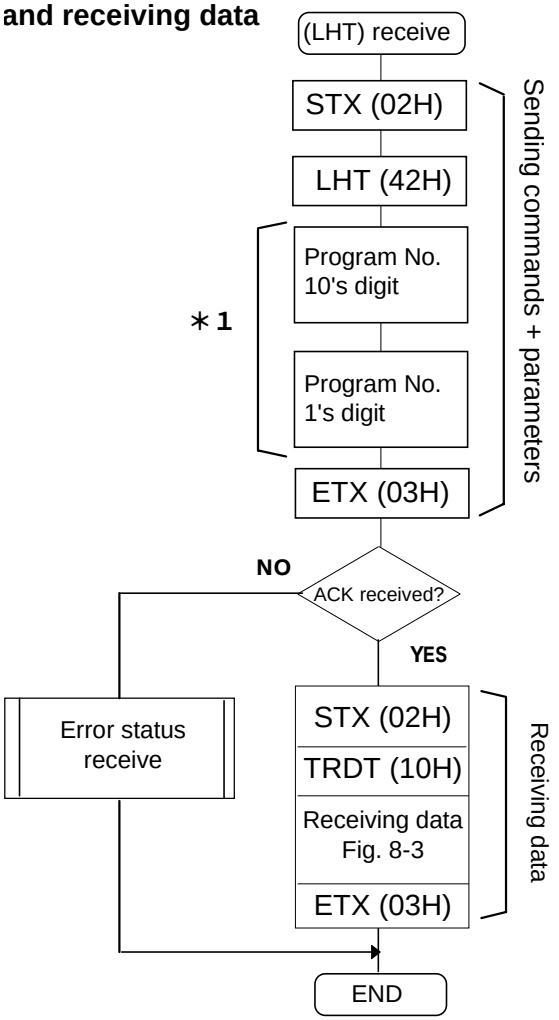
8・4 [LHT] (42H)・[SHT] (48H)

These commands are for sending or receiving the H timing data in the designated program number.
The data sent is written in buffer RAM for program No.00 and in the panel ROM for programs No.01 to 40.

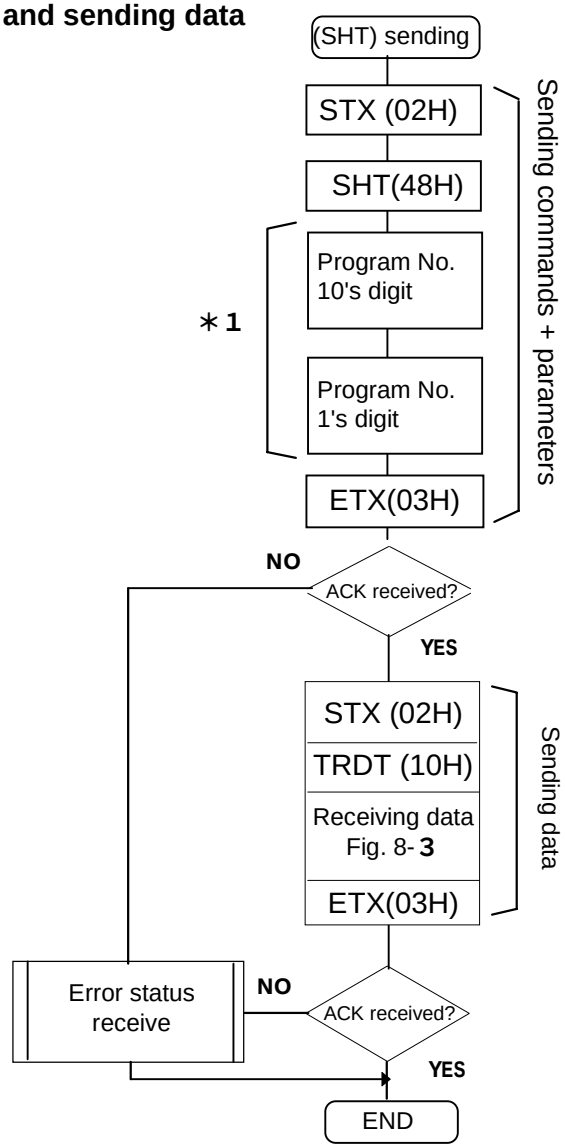
* All parameters are in ASCII code.



When sending commands + parameters and receiving data



When sending commands + parameters and sending data



*1 Three digits are designated when the AH-3000 is used.
Program No.(001-040), (500-779)

When the HN58C256 panel ROM is used, the number of digits designated depends on the program number.
For program No.(01-40): 2 digits are designated
For program No.(501-541, 601-641, 701-741): 3 digits are designated

- H timing data format

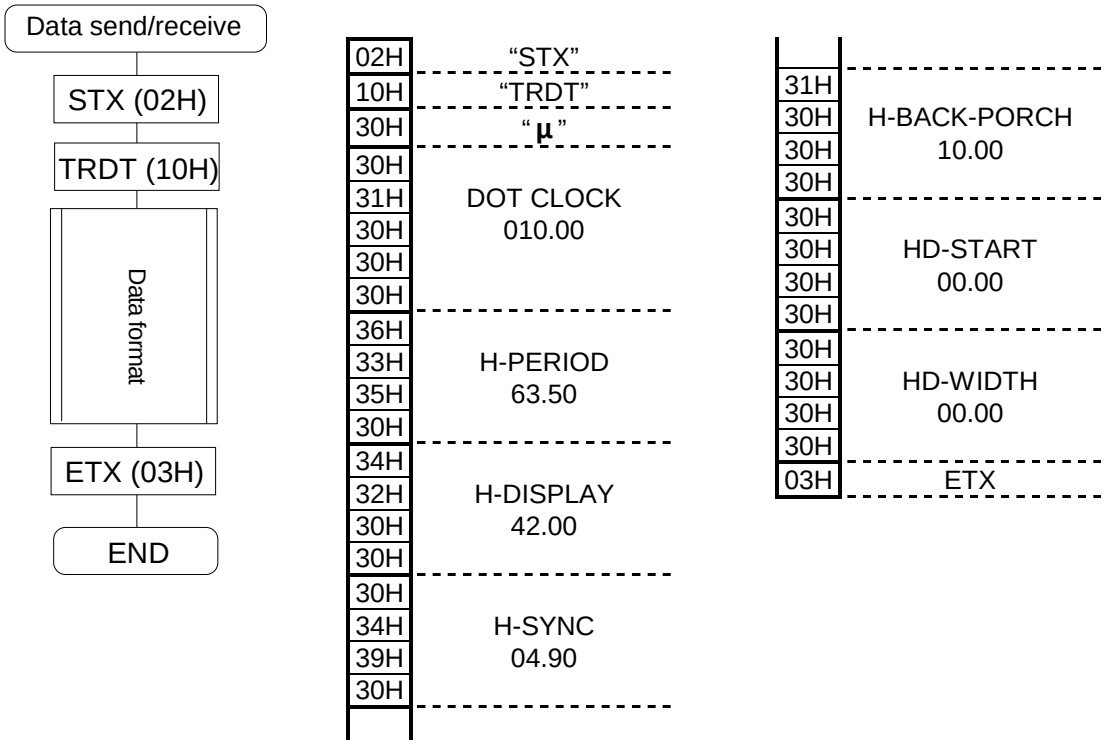


Fig.8-3

＊1	μ／(dot)	MODE(μ／dot)
	10^{2}	DOT CLOCK
	10^{1}	
	10^{0}	
	10^{-1}	
	10^{-2}	
	$10^{1}(10^{3})$	H-PERIOD
	$10^{0}(10^{2})$	
	$10^{-1}(10^{1})$	
	$10^{-2}(10^{0})$	
	$10^{1}(10^{3})$	H-DISPLAY
	$10^{0}(10^{2})$	
	$10^{-1}(10^{1})$	
	$10^{-2}(10^{0})$	
	$10^{1}(10^{3})$	H-SYNC
	$10^{0}(10^{2})$	
	$10^{-1}(10^{1})$	
	$10^{-2}(10^{0})$	

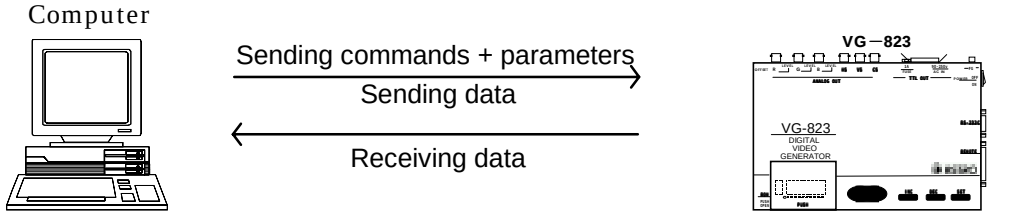
$10^{1}(10^{3})$	H-BACK-PORCH
$10^{0}(10^{2})$	
$10^{-1}(10^{1})$	
$10^{-2}(10^{0})$	
$10^{1}(10^{3})$	HD-START
$10^{0}(10^{2})$	
$10^{-1}(10^{1})$	
$10^{-2}(10^{0})$	
$10^{1}(10^{3})$	HD-WIDTH
$10^{0}(10^{2})$	
$10^{-1}(10^{1})$	
$10^{-2}(10^{0})$	

*1 "0"= μ
"1"=dot

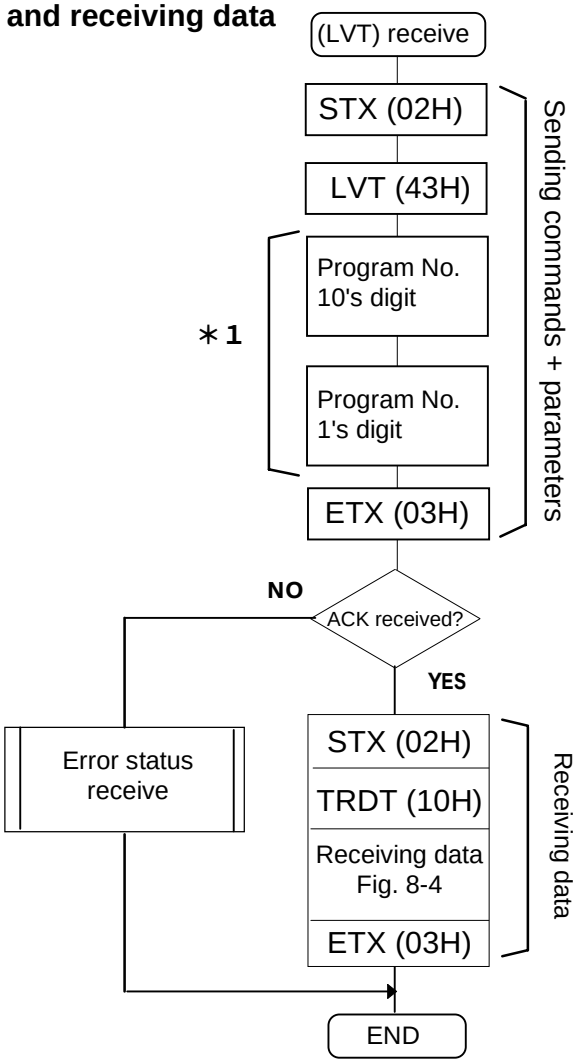
8･5 [LVT] (43H)･[SVT] (49H)

These commands are for sending or receiving the H timing data in the designated program number.
The data sent is written in buffer RAM for program No.00 and in the panel ROM for programs No.01 to 40.

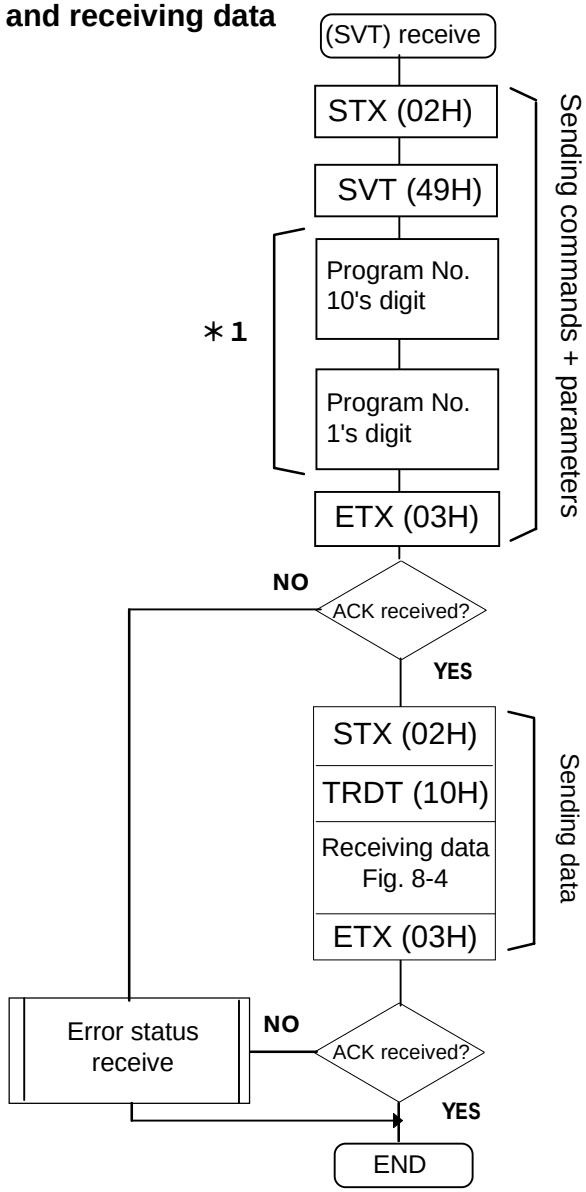
* All parameters are in ASCII code.



When sending commands + parameters and receiving data



When sending commands + parameters and receiving data



*1 Three digits are designated when the AH-3000 is used.
Program No.(001-040), (500-779)

When the HN58C256 panel ROM is used, the number of digits designated depends on the program number.
For program No.(01-40): 2 digits are designated
For program No.(501-541, 601-641, 701-741): 3 digits are designated

- V timing data format

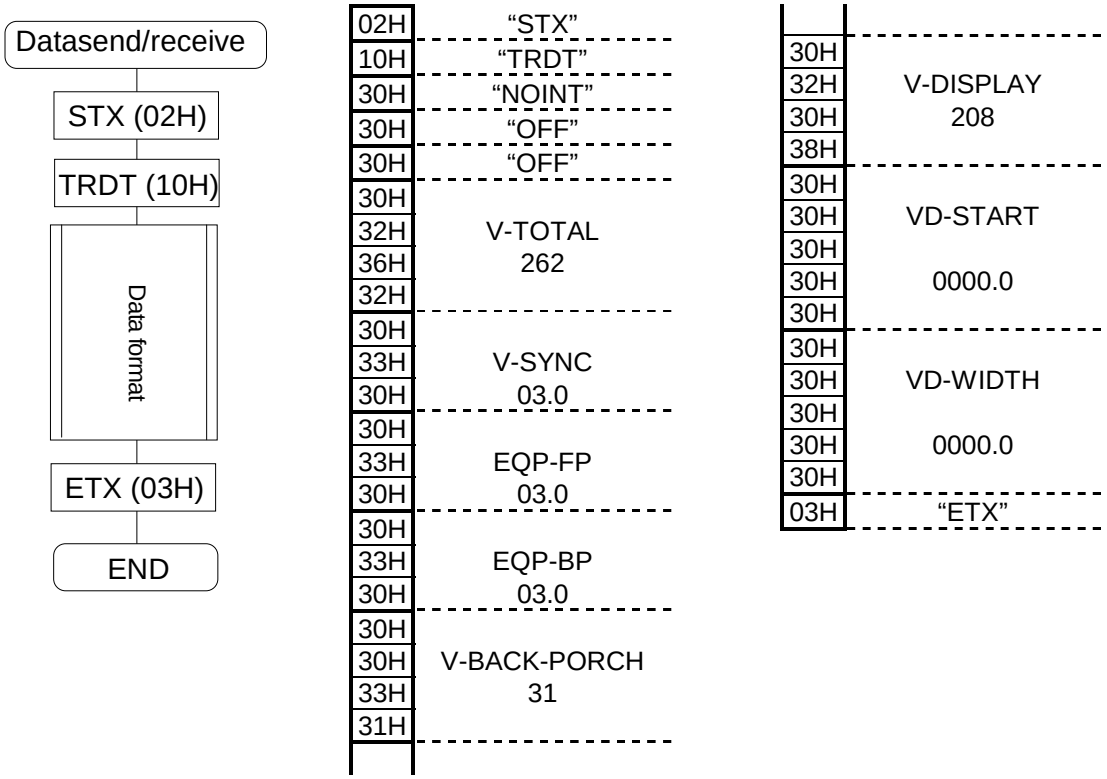
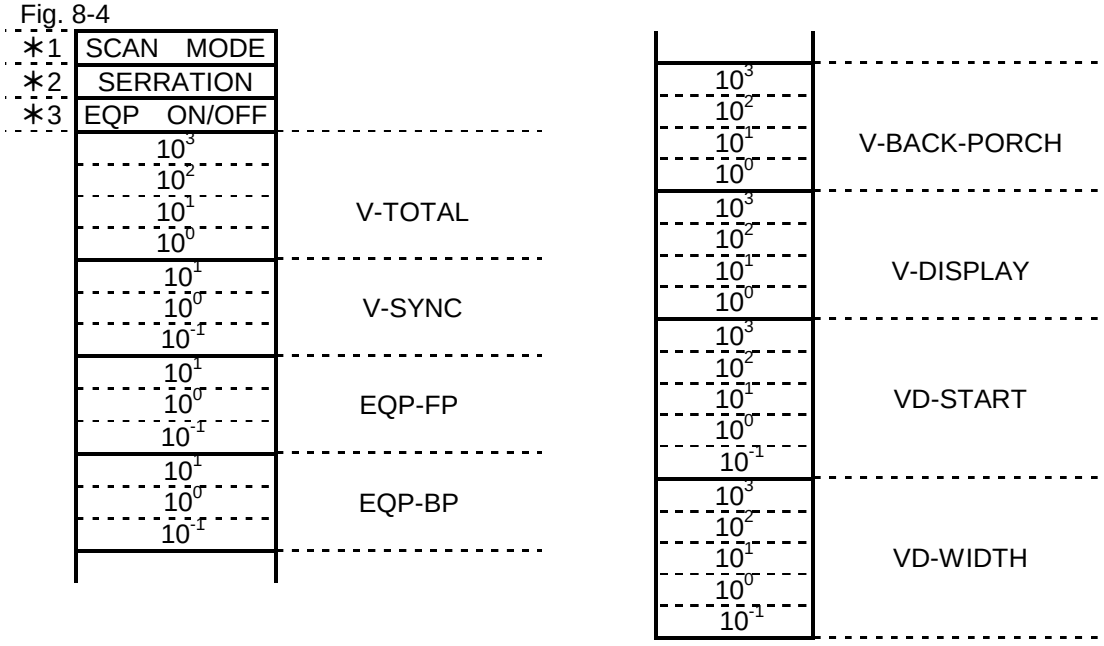


Fig. 8-4

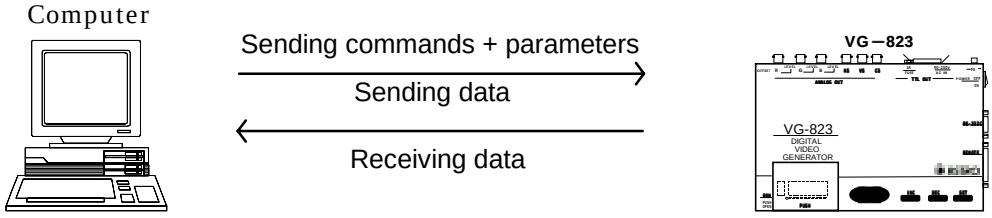


∗1	SCAN MODE	"0"= NOINT,"1"= INT&SYNC,"2"= INT&VIDEO
∗2	SERRATION	"0"= OFF,"1"= 0.5H,"2"= 1H,"3"= XOR
∗3	EQP ON/OFF	"0"= OFF,"1"= ON

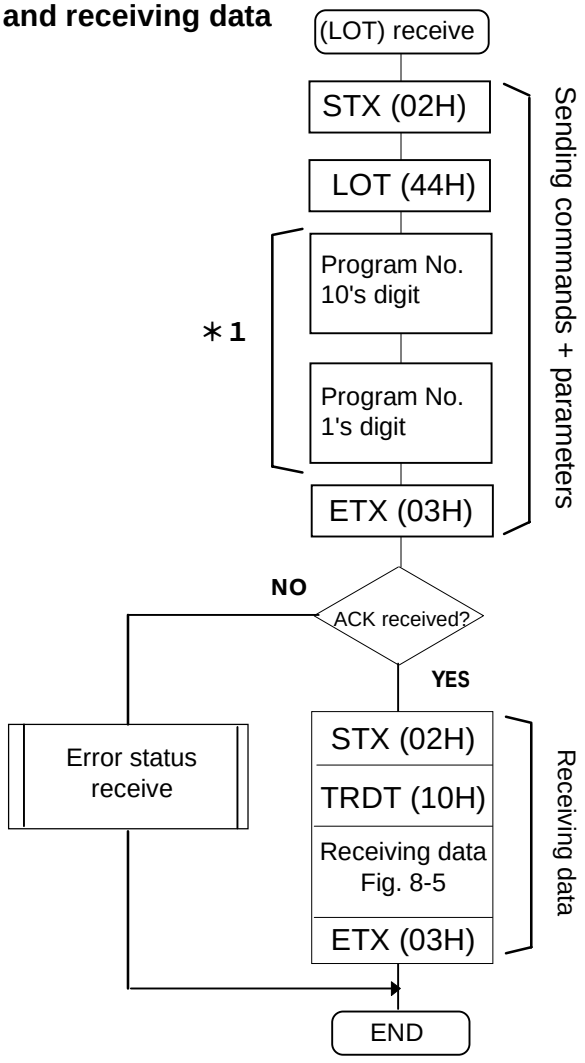
8･6 [LOT] (44H)･[SOT] (4AH)

These commands are for sending or receiving the output conditions in the designated program number.
The data sent is written in buffer RAM for program No.00 and in the panel ROM for programs No.01 to 40.

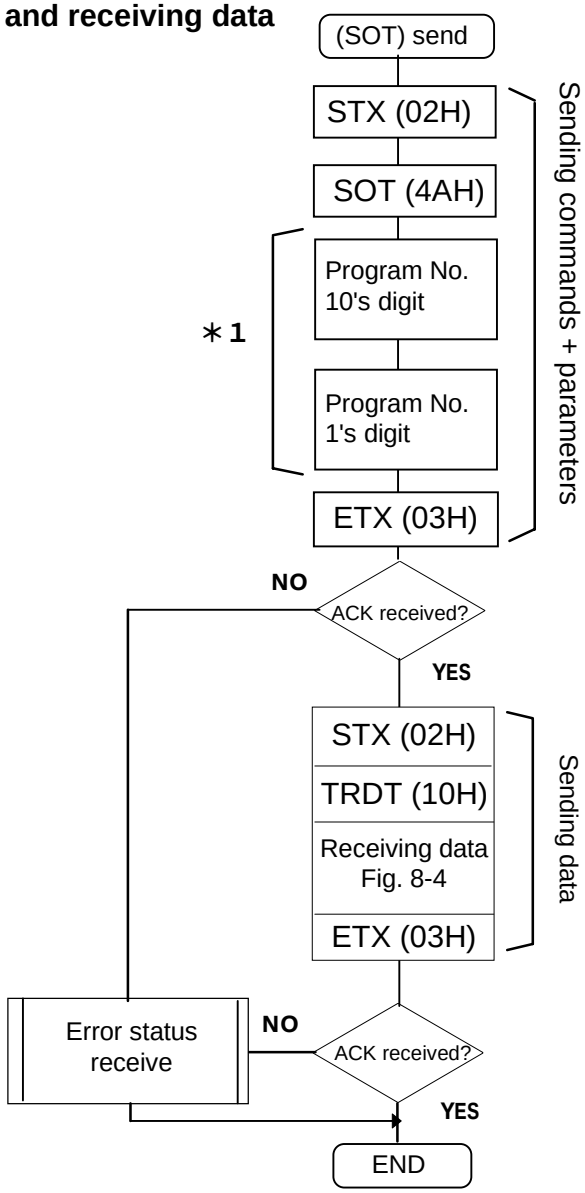
* All parameters are in ASCII code.



When sending commands + parameters and receiving data



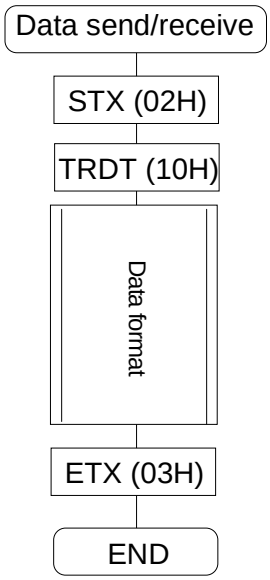
When sending commands + parameters and receiving data



*1 Three digits are designated when the AH-3000 is used.
Program No.(001-040), (500-779)

When the HN58C256 panel ROM is used, the number of digits designated depends on the program number.
For program No.(01-40): 2 digits are designated
For program No.(501-541, 601-641, 701-741): 3 digits are designated

- Output condition data format



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	VIDEO LEVEL
30H	1.00
30H	
30H	SET UP
32H	0.25
35H	
30H	SYNC LEVEL
33H	0.30
30H	
03H	“ETX”

Fig.8-5

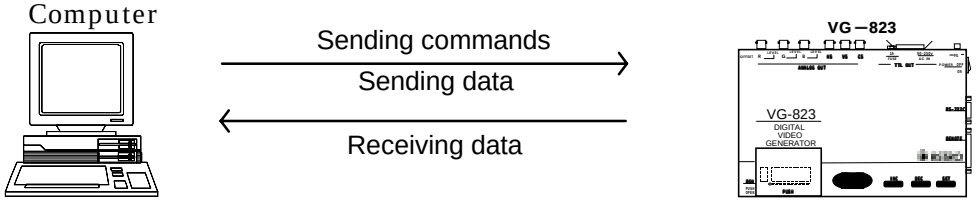
∗1	OUT PUT	
∗2	HS	
	VS	
∗3	CS	
	HD	
∗4	VD	
	R G B	
	RH GH BH	
∗5	V/S	
∗6	RZ/NRZ	
∗4	CLOCK	
	10^{0}	VIDEO LEVEL
	10^{-1}	
	10^{-2}	
	10^{0}	SET UP
	10^{-1}	
	10^{-2}	
	10^{0}	SYNC LEVEL
	10^{-1}	
	10^{-2}	

∗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, “1”= R, “2”= G, “3”= RG, “4”= B, “5”= RB, “6”= GB, “7”= RGB
∗6 “0”= NRZ, “1”= RZ

8・7 [LPT] (45H)・[SPT] (4BH)

These commands are for sending or receiving the pattern data in the designated program number.
The data sent is written in buffer RAM for program No.00 and in the panel ROM for programs No.01 to 40. The pattern data is divided into 12 blocks for sending or receiving.

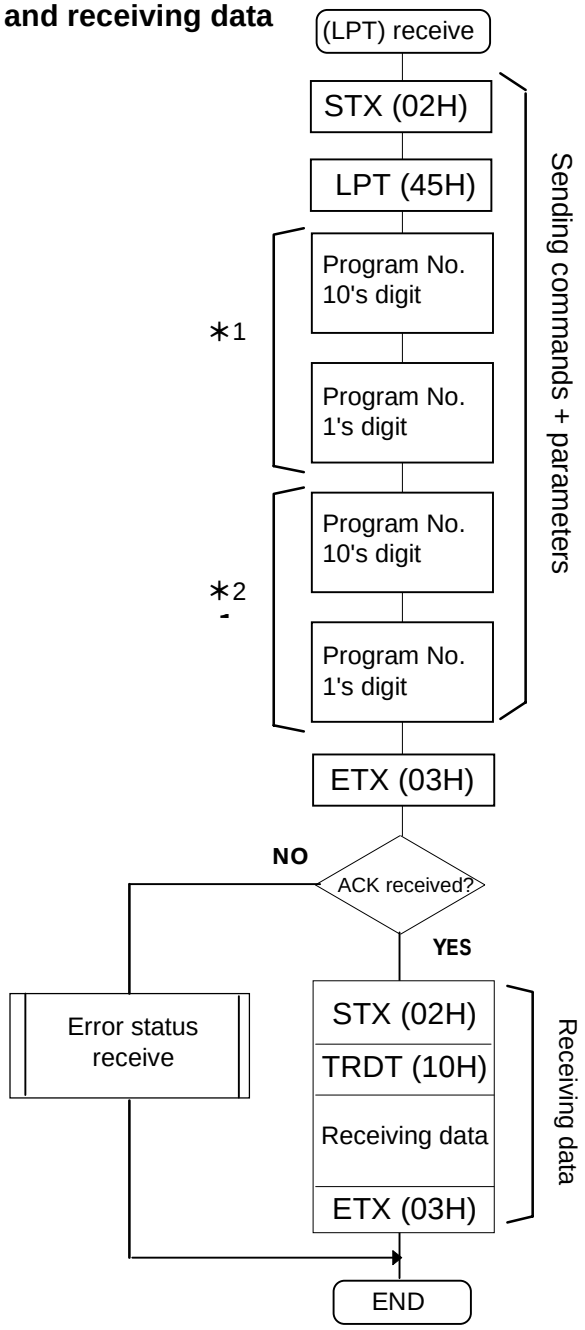
* All parameters are in ASCII code.



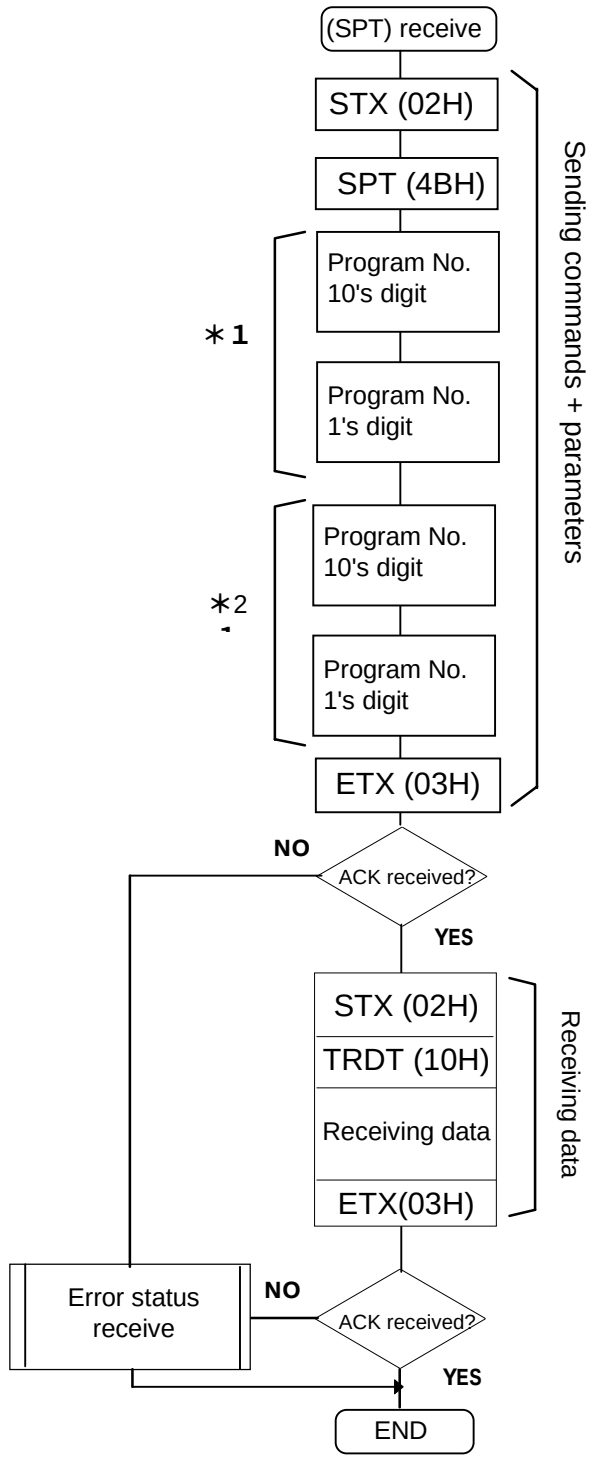
Block No.	Pattern data
01	Graphic color
02	Character
03	Crosshatch
04	Dot
05	Circle
06	Burst
07	Window
08	Option 1 (* 1)
09	Option 2 (* 1)
10	Color bar
11	Gray scale
12	Halftone

*1 The LPT and SPT commands cannot be used when designating optional pattern codes with two digits (00-1F). Use the LPT2 (55H) and SPT2 (5BH) commands instead.
Apart from the number of optional pattern code digits (1 or 2), these commands are used in the same way.

When sending commands + parameters and receiving data



When sending commands + parameters and receiving data

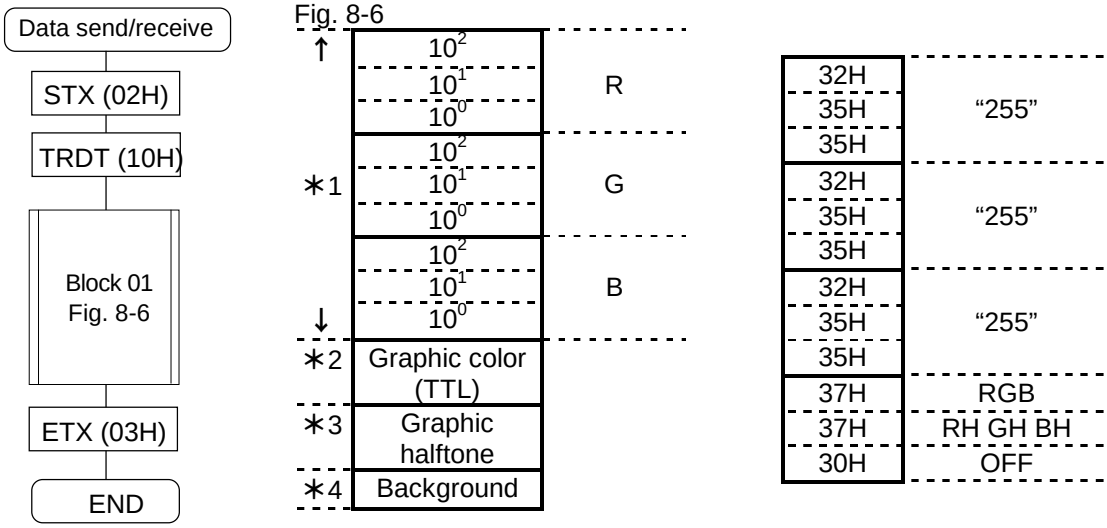


∗1 "00"〜"40" (ASCII code)
Three digits are designated when the AH-3000 is used.
Program No.(001-040), (500-779)

When the HN58C256 panel ROM is used, the number of digits designated depends on the program number.
For program No.(01-40): 2 digits are designated
For program No.(501-541, 601-641, 701-741): 3 digits are designated

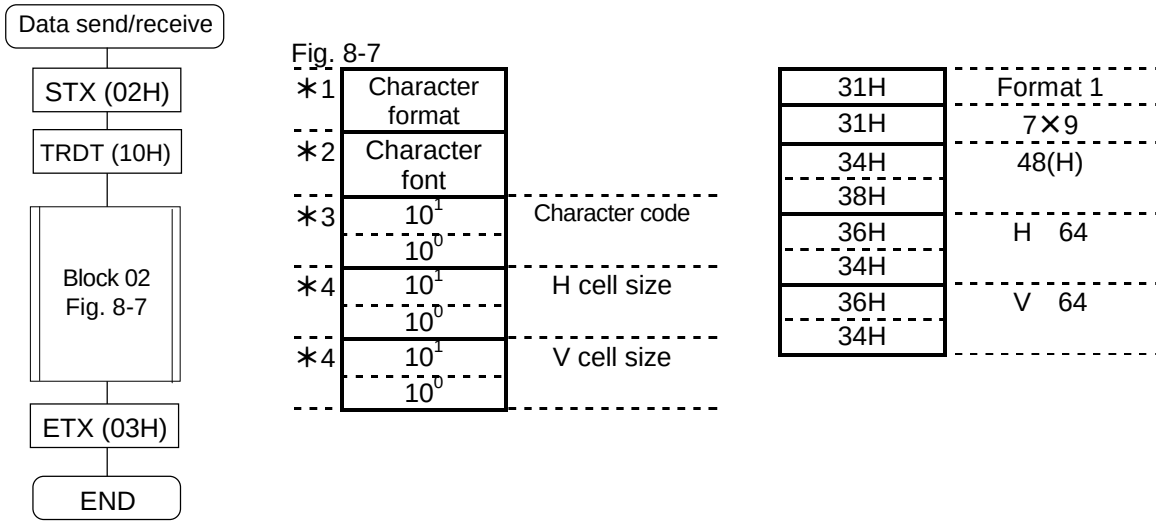
∗2 "01"〜"12"(ASCII code)

Block No. 01: Graphic color data format



*1 These assign the analog colors (000-255).
*2 This assigns the TTL color(s).
"0" = No color; "1" = R; "2" = G; "3" = RG; "4" = B; "6" GB; "7" = RGB
*3 This assigns the TTL halftone color(s).
"0" = No color; "1" = RH; "2" = GH; "3" = RHGH; "4" = BH; "6" GHBH; "7" = RHGHBH
*4 "0" = OFF; "1" = ON

Block No. 02: Character code format



∗1 “0”= Format 0, “1”= Format 1, “2”= Format 2
∗2 “0”=5×7, “1”=7×9, “2”=16×16
∗3 “20”～“E3” , “20”～“EF” when AH-3000 used, “20”～“E7” when HN58C256 used.
∗4 “01”～“64”

Block No. 03: Crosshatch data format

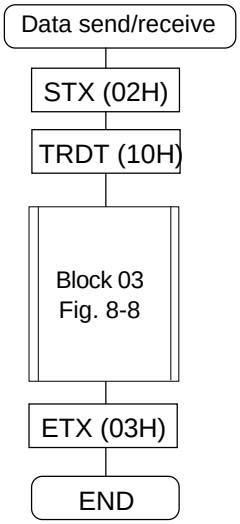


Fig. 8-8

↑	10^3	H interval	30H
	10^2		30H
∗1	10^1		31H
↓	10^0		30H
↑	10^3	V interval	30H
	10^2		30H
∗1	10^1		31H
↓	10^0		30H

H 10

V 10

∗1 “0000”～“9999”

Block No. 04: Dot data format

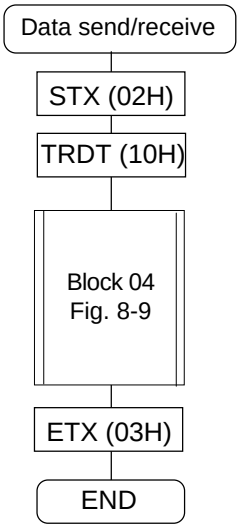


Fig. 8-9

↑	10^3	H interval	30H
	10^2		30H
∗1	10^1		30H
↓	10^0		35H
↑	10^3	V interval	30H
	10^2		30H
∗1	10^1		30H
↓	10^0		35H

H 5

V 5

∗1 “0001”～“9999”

Block No. 05: Circle data format

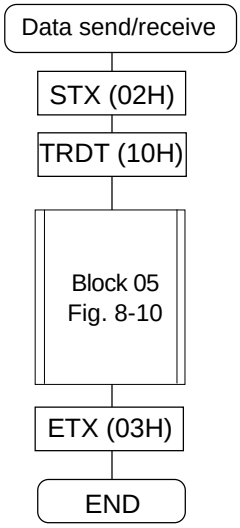


Fig. 8-10

∗1	Circle format	32H	Format 2

∗1 “0”～“4”

Block No. 06: Burst data format

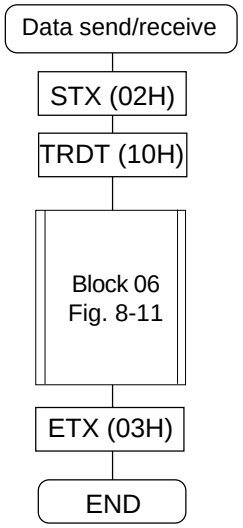


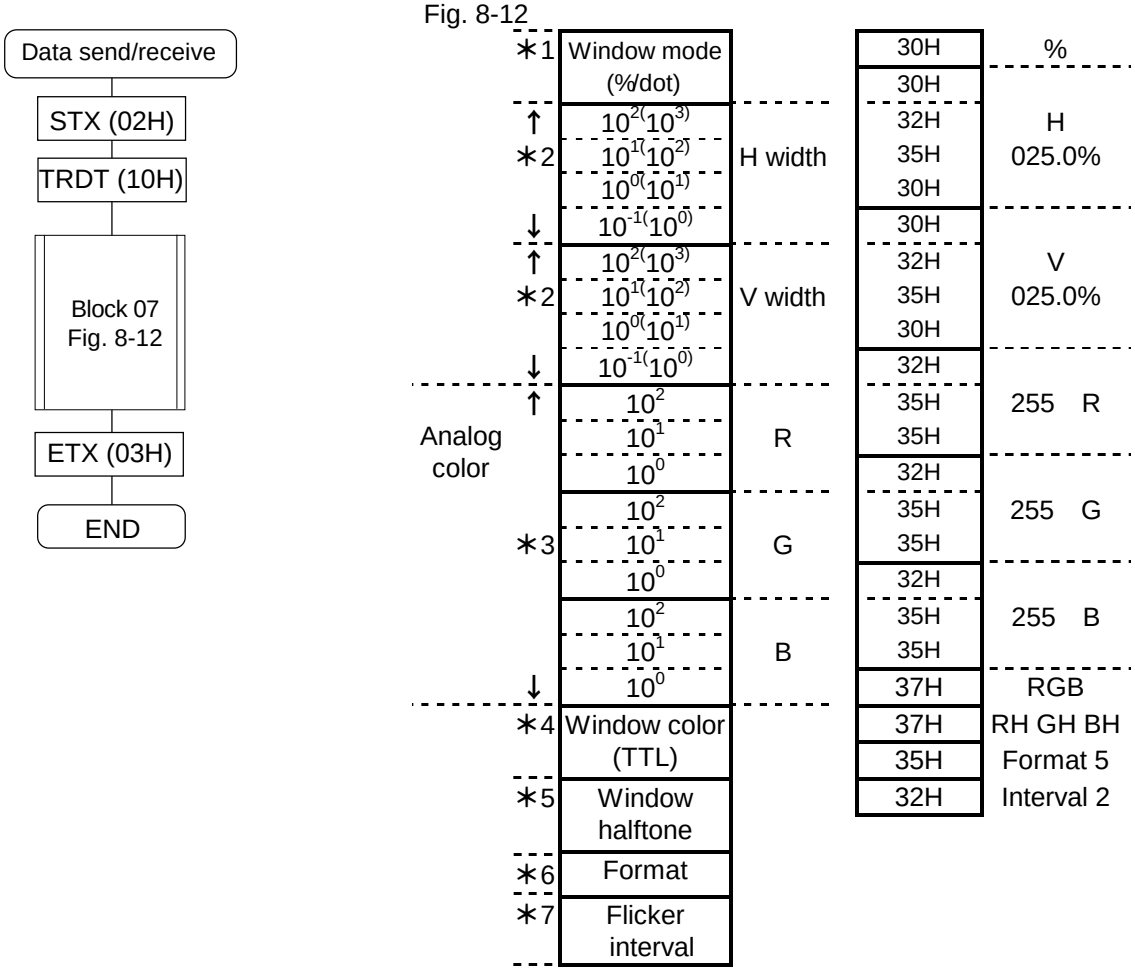
Fig. 8-11

∗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”～“3”
∗2 “01”～“99”

Block No. 07: Window data format

Fig. 8-12



∗1 “0”=%, “1”= dot

∗2 “0001” to “1000”%, “0004” to display dots

∗3 “000”〜“255”

∗4 “0”= No color, “1”=R, “2”=G, “3”=RG, “4”=B, “5”=RB, “6”=GB, “7”=RGB

∗5 “0”== No color, “1”=RH, “2”=GH, “3”=RHGH, “4”=BH, “5”=RHBH, “6”=GHBH, “7”=RHGHBH

∗6 “0”〜“F”

∗7 “0”〜“7”

For details on setting the flicker interval, refer to what the description of the patterns says about the flicker interval in section 5.3.

Block No. 08: Option 1 data format

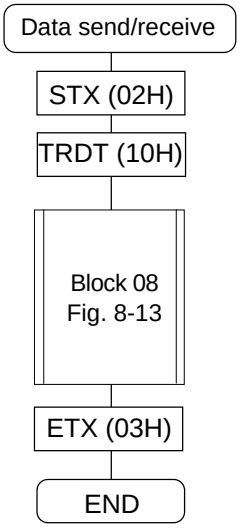


Fig. 8-13

∗1	Option code	31H	Format 1

∗1 “0”～“F”(“0”～“9”,“A”～“F”)

"00"-"1F" when the optional pattern code is designated with two digits.
Use the LPT2, SPT2, LPD2, SPD2 and EXPBN2 commands for sending and receiving data.

Block No. 09: Option 2 data format

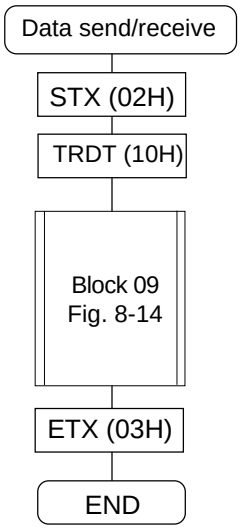


Fig. 8-14

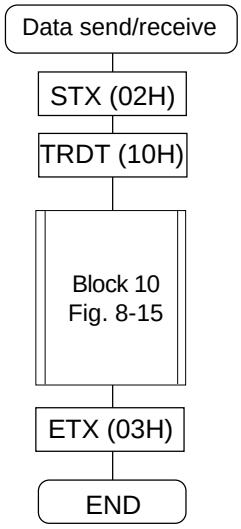
∗1	Option code	31H	Option code 1

∗1 “0”～“F” (“0”-“9”,“A”-“F”)

"00"-"1F" when the optional pattern code is designated with two digits.
Use the LPT2, SPT2, LPD2, SPD2 and EXPBN2 commands for sending and receiving data.

Block No. 10: Color bar data format

Fig. 8-15



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

∗1 “0”=%, “1”= dot

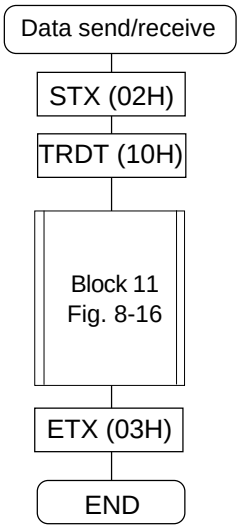
∗2 “0000” to “1000”%, “0004” to display dot

∗3 “0”= horizontal, “1”= vertical, “2”= horizontally repeated, “3”= vertically repeated

∗4 “0”= None, “1”=R, “2”=G, “3”=RG, “4”=B, “5”=RB, “6”=GB, “7”=RGB

Block No. 11: Gray scale data format

Fig. 8-16

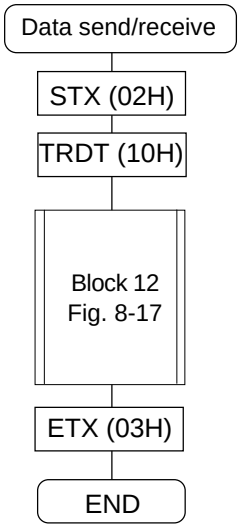


∗1	Direction H/V			30H	Horizontal
↑ ↑	10^2		↑	30H	
1	10^1	Level	1	31H	16
↓	10^0		↓	36H	
↑	10^2		↑	30H	
∗2 2	10^1	Level	2	33H	32
↓	10^0		↓	32H	
↑	10^2		↑	30H	
3	10^1	Level	3	34H	48
↓	10^0		↓	38H	
↑	10^2		↑	30H	
4	10^1	Level	4	36H	64
↓	10^0		↓	34H	
.	.	.	.	.	.
.	.	.	.	.	.
.	.	.	.	.	.
↑	10^2		↑	31H	
12	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: Halftone data format

Fig. 8-17

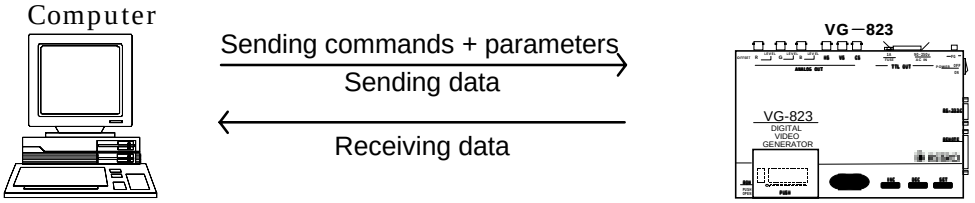


∗1	Direction H/V	30H	Horizontal
↑	Color destination	30H	None
	Color destination	31H	RH
	Color destination	32H	GH
	Color destination	33H	RHGH
	Color destination	34H	BH
	Color destination	35H	RHBH
	Color destination	36H	GHBH
∗2	Color destination	37H	RHGHBH
	Color destination	30H	None
	Color destination	31H	RH
	Color destination	32H	GH
	Color destination	33H	RHGH
	Color destination	34H	BH
	Color destination	35H	RHBH
	Color destination	36H	GHBH
↓	Color destination	37H	RHGHBH

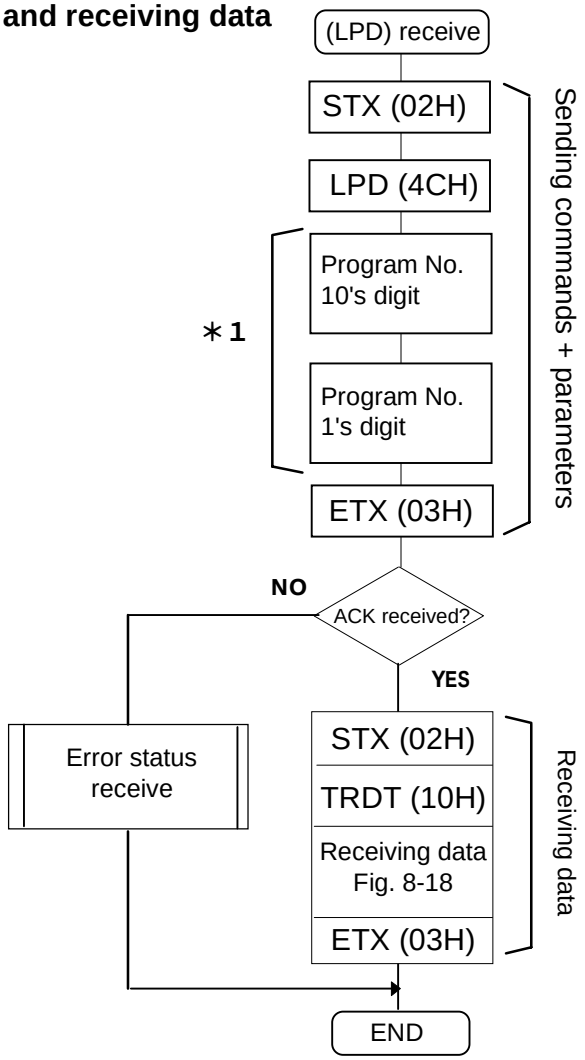
∗1 "0"= horizontal, "1"= vertical
∗2 "0"=None, "1"=RH, "2"=GH, "3"=RHGH, "4"=BH, "5"=RHBH, "6"=GHBH, "7"=RHGHBH

8･8 [LPD] (4CH)･[SPD] (4DH)

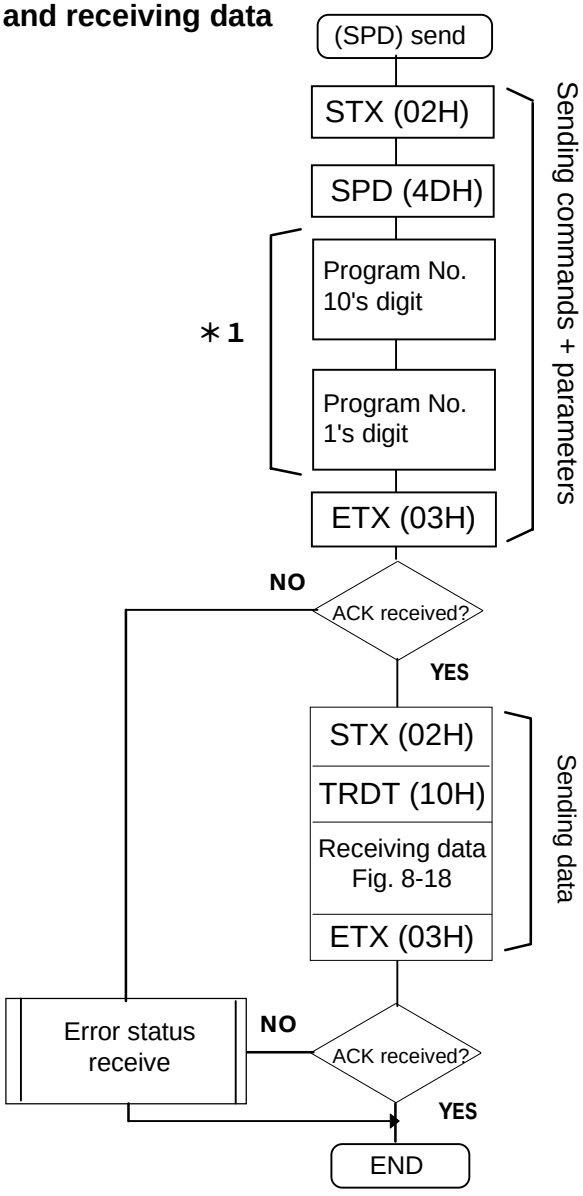
These commands are for sending or receiving all the data in the designated program number. The data sent is written (in the buffer RAM for program No.00; in the panel ROM for program No.01 to 40) but not executed.



When sending commands + parameters and receiving data



When sending commands + parameters and receiving data



*1 Three digits are designated when the AH-3000 is used.
Program No.(001-040), (500-779)
When the HN58C256 panel ROM is used, the number of digits designated depends on the program number.
For program No.(01-40): 2 digits are designated
For program No.(501-541, 601-641, 701-741): 3 digits are designated

The LPD and SPD commands cannot be used when designating optional pattern codes with two digits ("00"-"1F"). Use the LPD2 (5CH) and SPD2 (5DH) commands instead for sending and receiving data.
Apart from the number of optional pattern code digits (1 or 2), these commands are used in the same way.

- 1 program data format

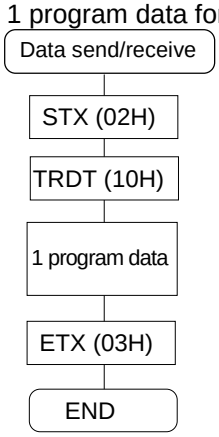
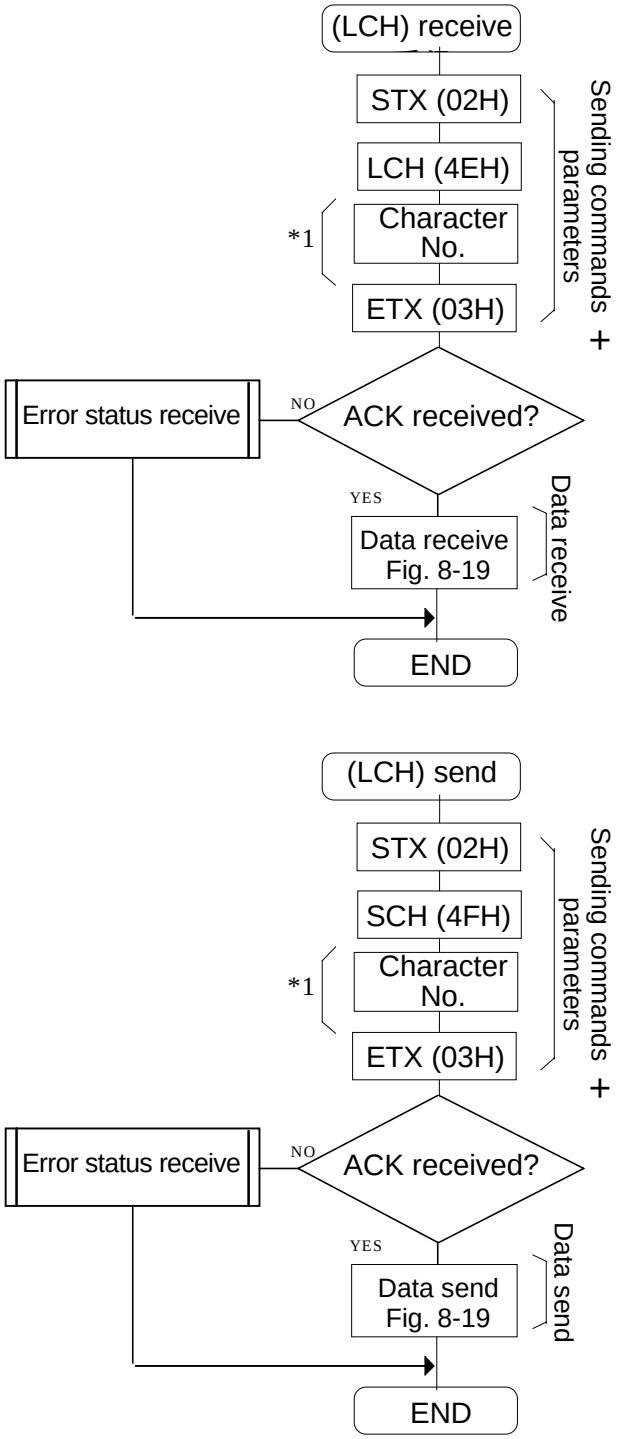


Fig. 8-18

Horizontal timing Fig. 8-3	
(2CH)	"," Delimiter
Vertical timing Fig. 8-4	
(2CH)	"," Delimiter
Output conditions Fig. 8-5	
(2CH)	"," Delimiter
Block Fig. 8-6 01 Pattern color	
Block Fig. 8-7 02 Character	
Block Fig. 8-8 03 Crosshatch	
Block Fig. 8-9 04 dot	
Block Fig. 8-10 05 Circle	
Block Fig. 8-11 06 Burst	
Block Fig. 8-12 07 Window	
Block Fig. 8-13 08 Option 1	
Block Fig. 8-14 09 Options 2	
(2CH)	"," Delimiter
Block Fig. 8-15 10 Color bar	
(2CH)	"," Delimiter
Block Fig. 8-16 11 Gray scale	
(2CH)	"," Delimiter
Block Fig. 8-17 12 Halftone	

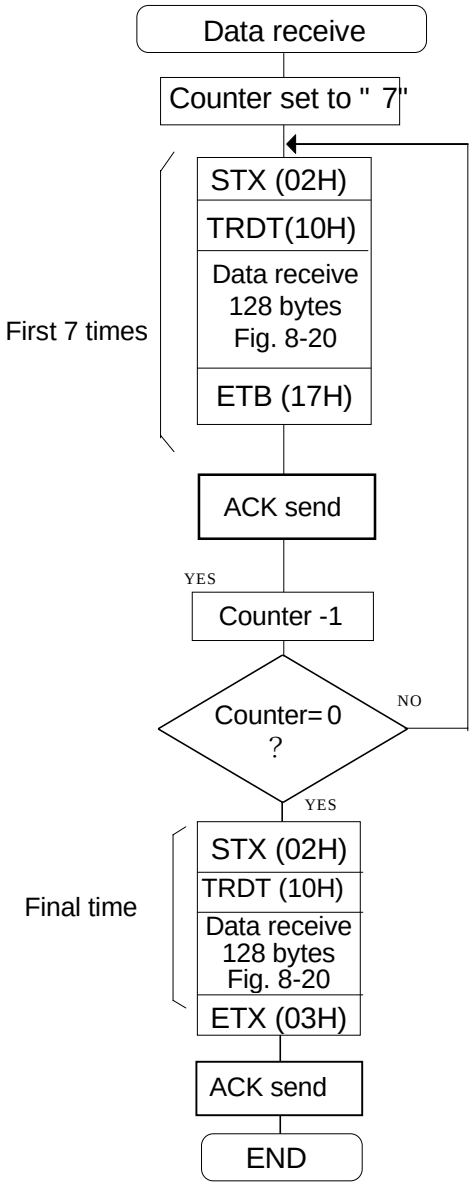
8･9 [LCH] (4EH)･[SCH] (4FH)

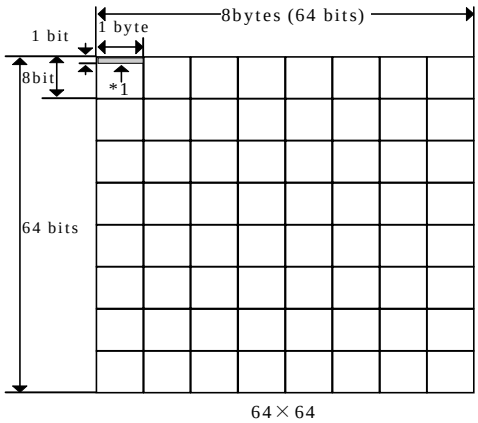
These commands are for sending or receiving the data of the designated character number (E0H to E3H).



∗1 “0”=E0H, “1”=E1H, “2”=E2H, “3”=E3H
Designate "0"-"F" when using the AH-3000.
Designate "0"-"7" when using the HN58C256.

Fig. 8-19





8 bytes x 64 = 512 bytes
512 bytes x 2 = 1024 bytes (ASCII)
1024 bytes/128 bytes = 8
Since the amount of data per transfer is fixed at 128 bytes, it is divided into 8 blocks of 128 bytes for sending and receiving.

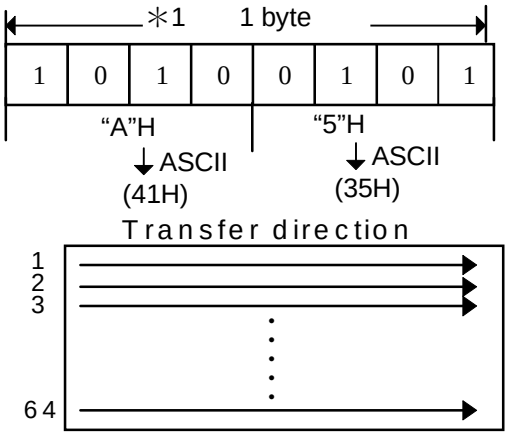


Fig. 8-20

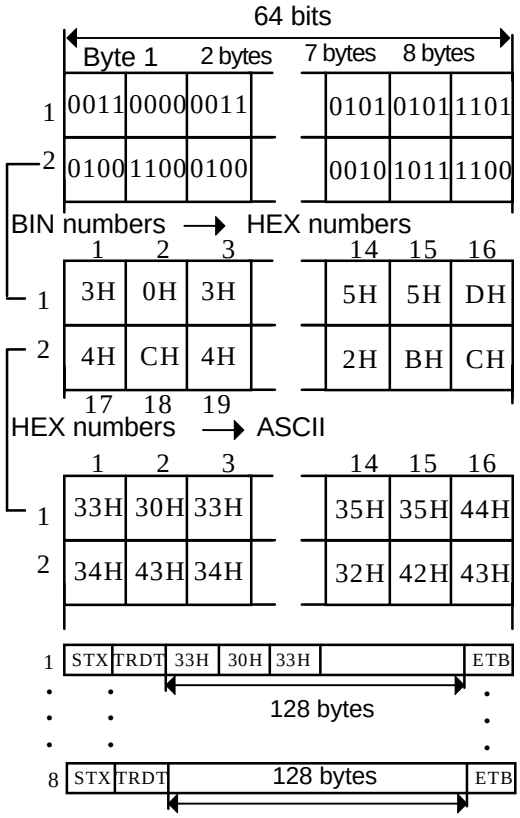
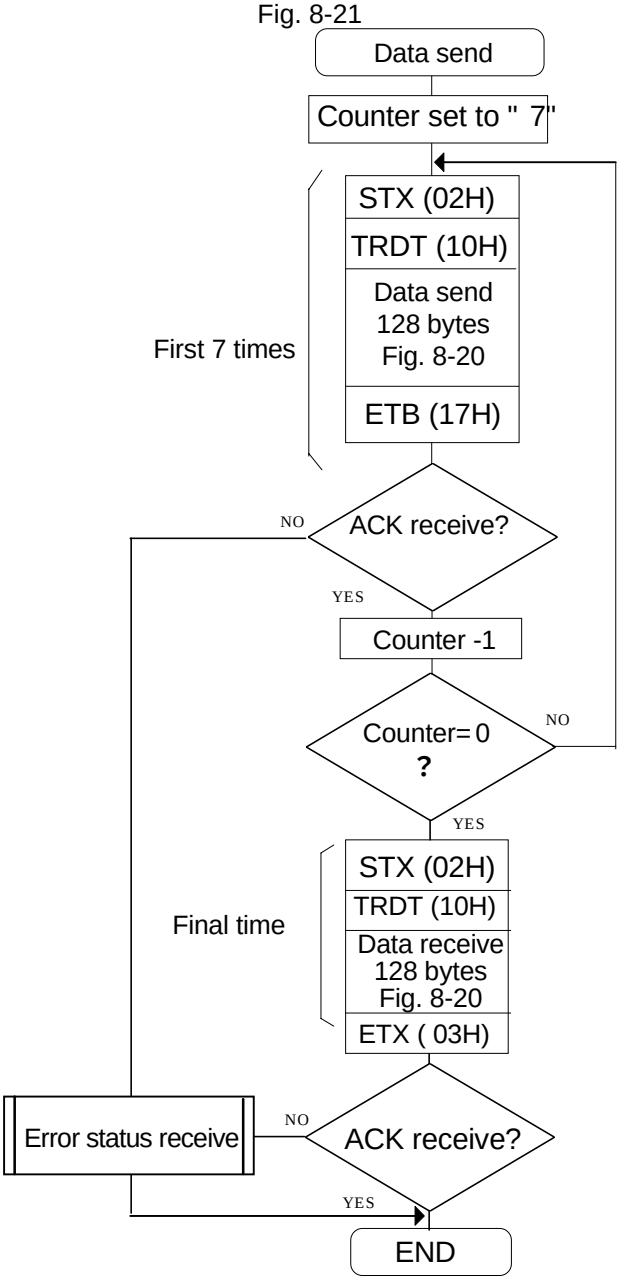
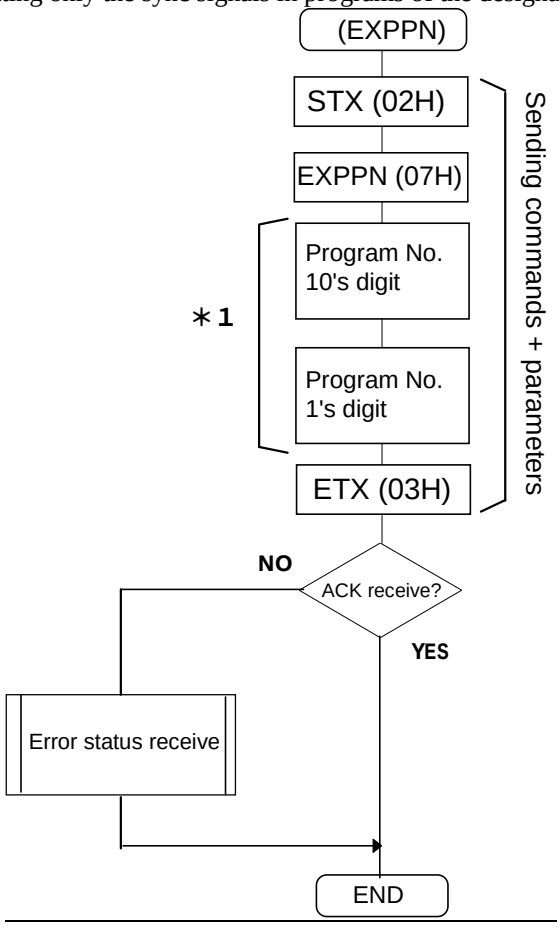


Fig. 8-21


Data send
Counter set to " 7"
First 7 times
STX (02H)
TRDT (10H)
Data send
128 bytes
Fig. 8-20
ETB (17H)
NO
ACK receive?
YES
Counter -1
Counter= 0
?
NO
YES
Final time
STX (02H)
TRDT (10H)
Data receive
128 bytes
Fig. 8-20
ETX (03H)
Error status receive
NO
ACK receive?
YES
END

8▪10 [EXPPN] (07H)

This command is for outputting only the sync signals in programs of the designated number (01 to 40).

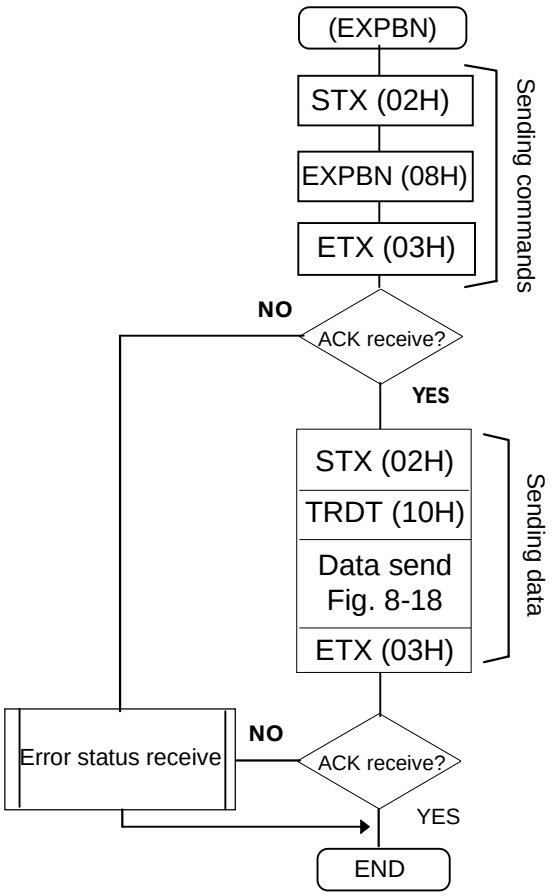


***1** Three digits are designated when the AH-3000 is used.
Program No.(001-040), (500-779)

When the HN58C256 panel ROM is used, the number of digits designated depends on the program number.
For program No.(01-40): 2 digits are designated
For program No.(501-541, 601-641, 701-741): 3 digits are designated

8▪11 [EXPBN] (08H)

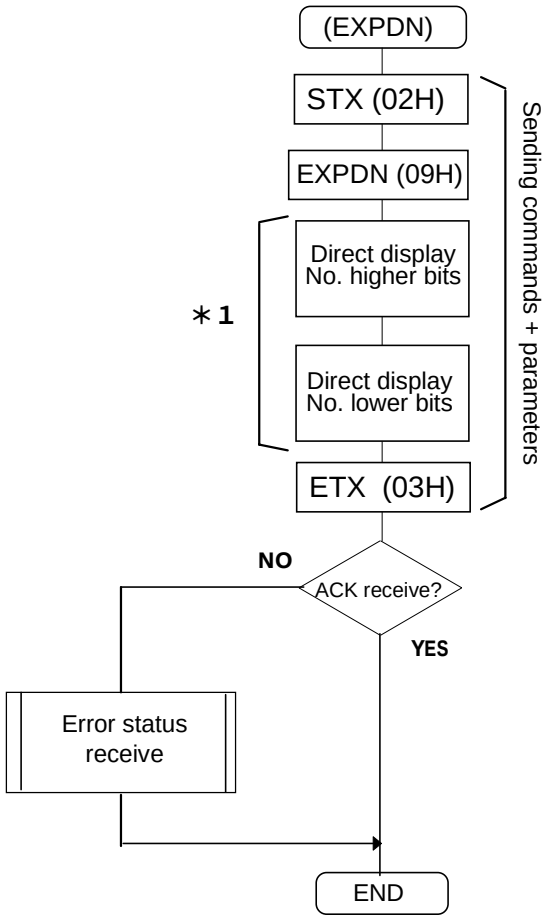
This command is for sending 1 program data to the VG-822 and executing it.
The data is not written in the panel ROM. The data format is the same as for (SPD).



Note: Use the EXPBN2 (58H) command when designating optional patterns codes with two digits (00-1F).
Apart from the number of optional pattern code digits (1 or 2), this command is used in the same way.

8▪12 [EXPDN] (09H)

This command is for assigning the direct display number (01 to 40) and executing it.

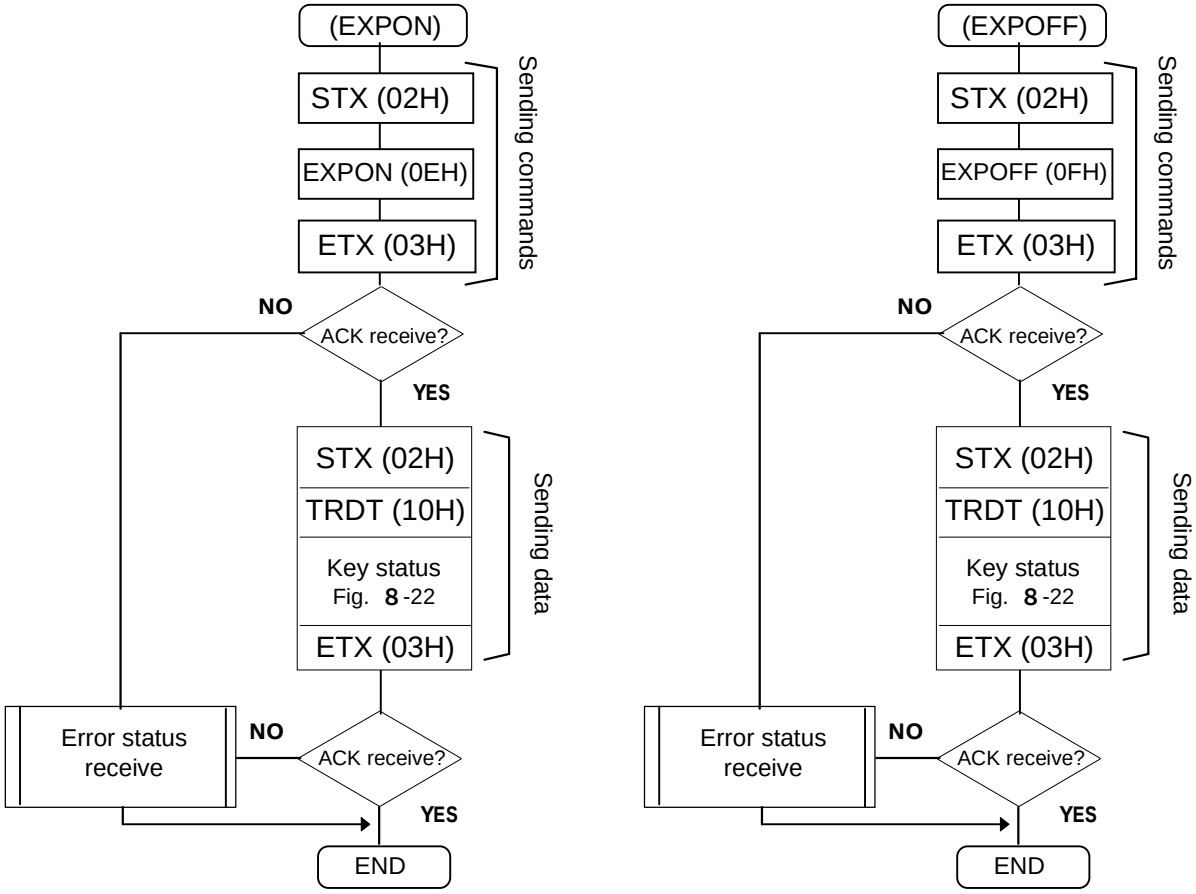


***1** Three digits are designated when the AH-3000 is used.
Program No.(001-040), (500-779)

When the HN58C256 panel ROM is used, the number of digits designated depends on the program number.
For program No.(01-40): 2 digits are designated
For program No.(501-541, 601-641, 701-741): 3 digits are designated

8▪13 [EXPON] (0EH)▪[EXPOFF] (0FH)

These commands are for turning the designated patterns and signals ON and OFF.



- Sending key data
  Send the key code to be turned ON or OFF.

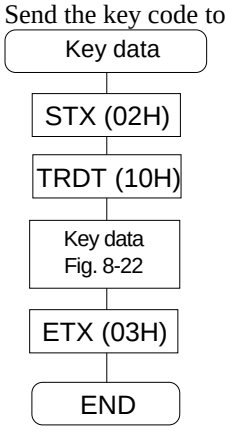
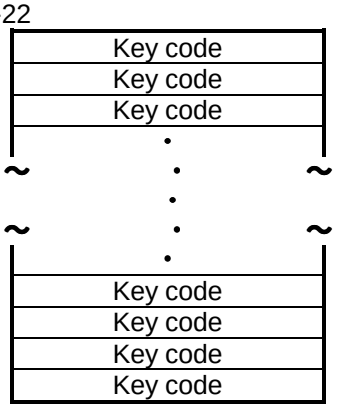


Fig. 8-22

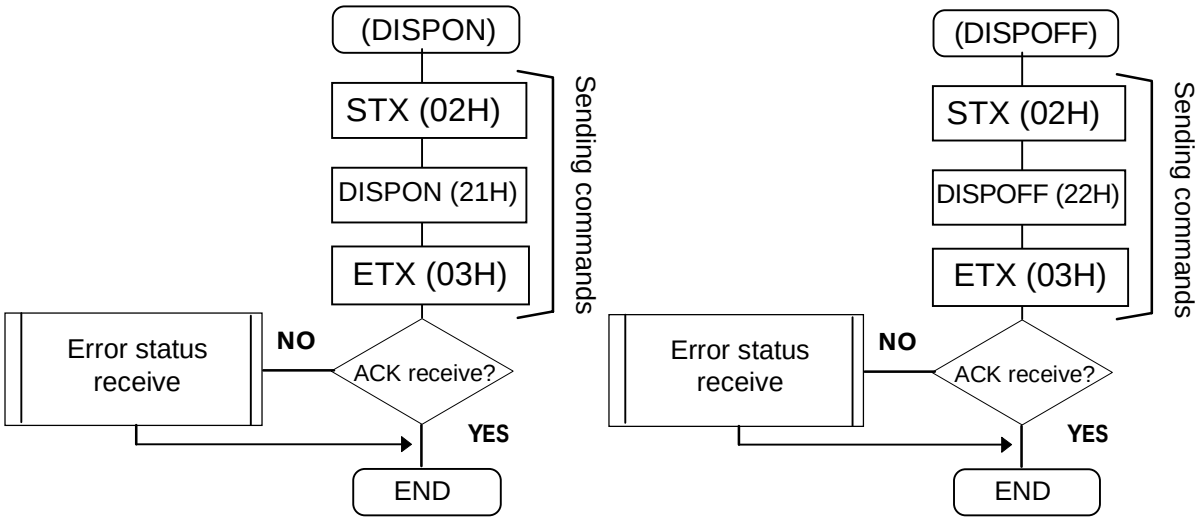


50H	CHARA
53H	CIRCLE
54H	+
56H	×
57H	COLOR
5EH	R
5FH	G
60H	B

Note: For details, refer to the key code table in 6-5.
If option 1 has been selected with "ON," only the option 1 data will be output.

8▪14 [DISPON] (21H)▪[DISPOFF] (22H)

These commands are for turning the CRT display ON or OFF.



8▪15 [DISPHV] (28H)

This command is for receiving the display dot count on the graphic plane.
* It has no parameters.

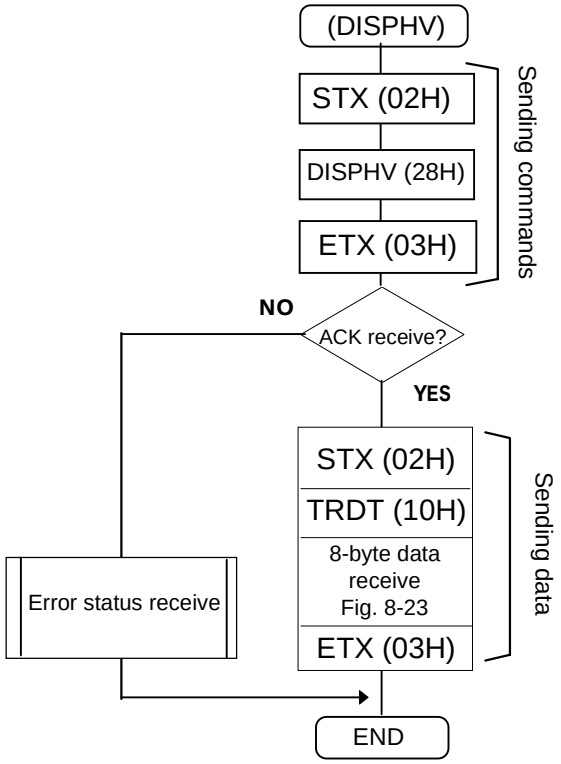
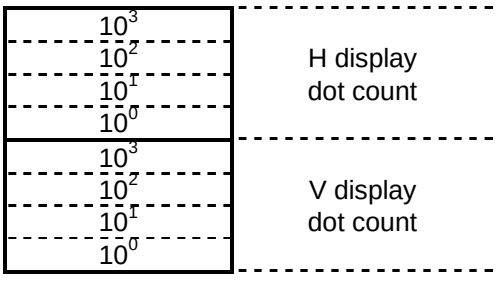
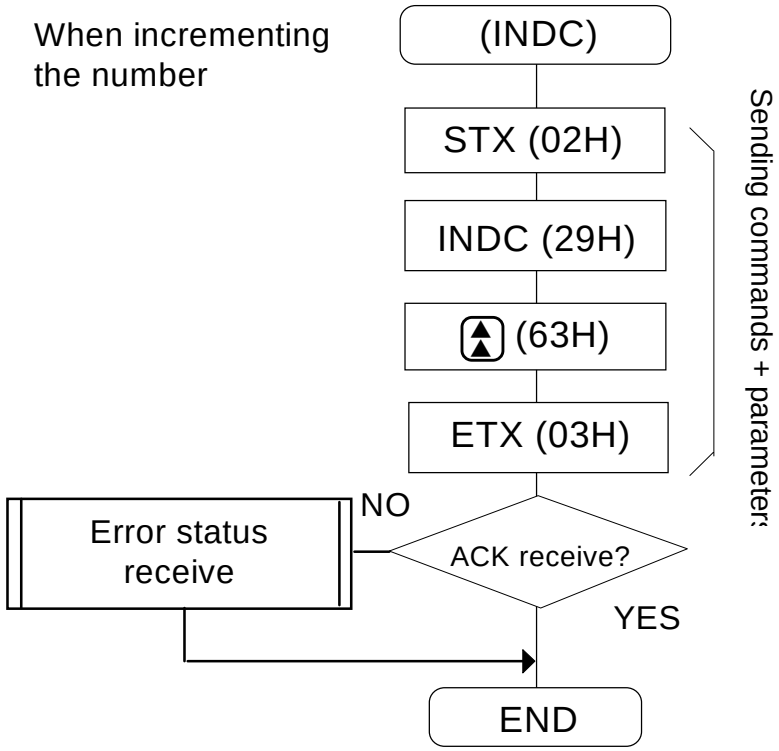


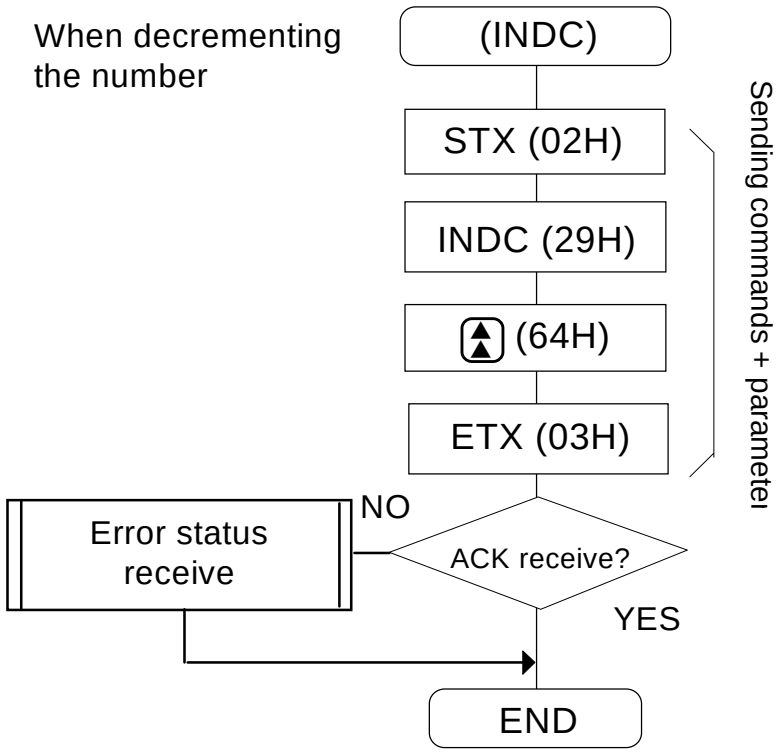
Fig. 8-23



8▪16 [INDC] (29H)

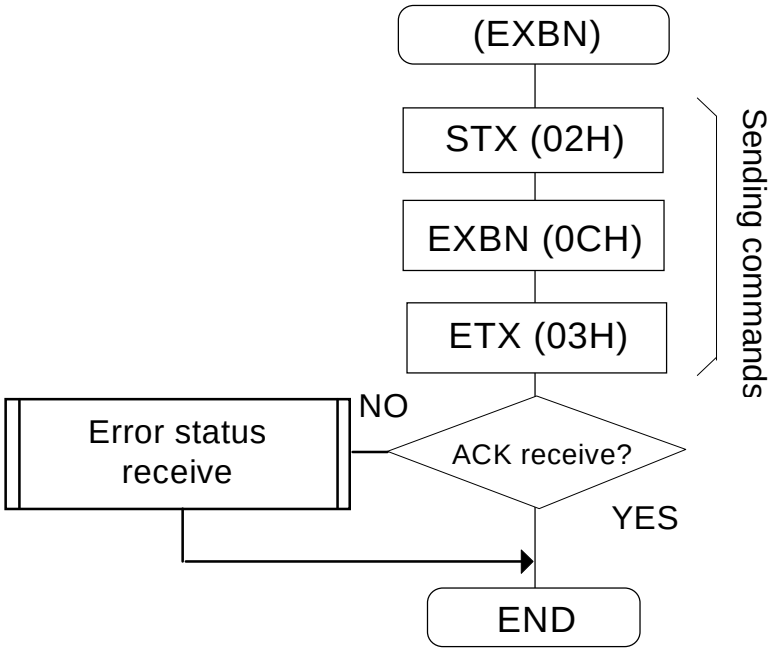
This command is for incrementing or decrementing the direct display numbers.
The number which has been entered at the enable setting is incremented or decremented.





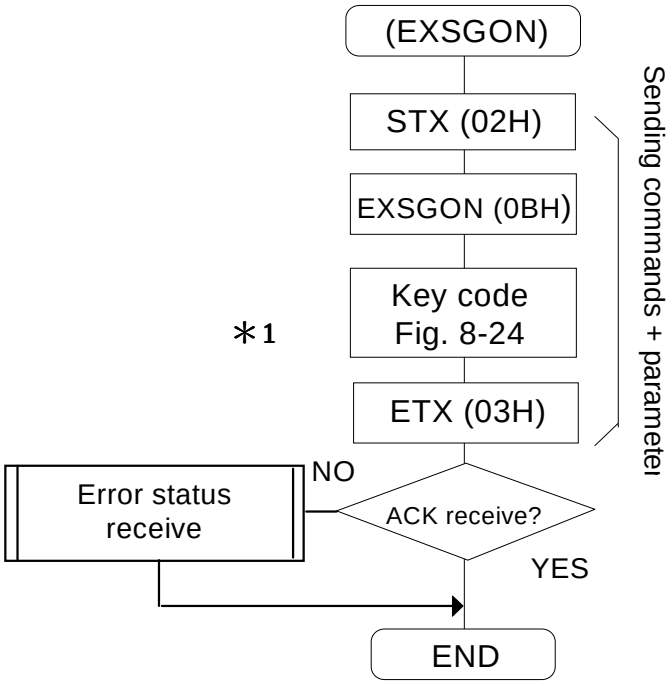
8-17 [EXBN] (0CH)

This command is for executing the buffer RAM contents.
It has no parameters.



8-18 [EXSGON] (0BH)

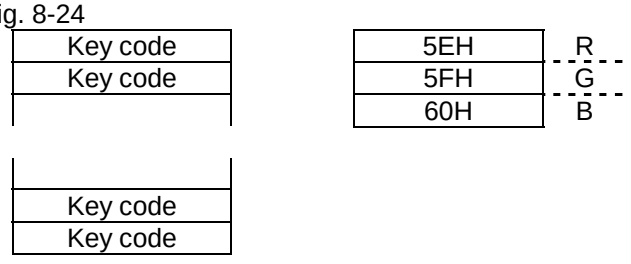
This command is for setting each of the R/G/B and RHT/GHT/BHT signals ON or OFF.
The key codes to be set ON are designated as the parameters.
Key codes which are not designated are set OFF.



∗1

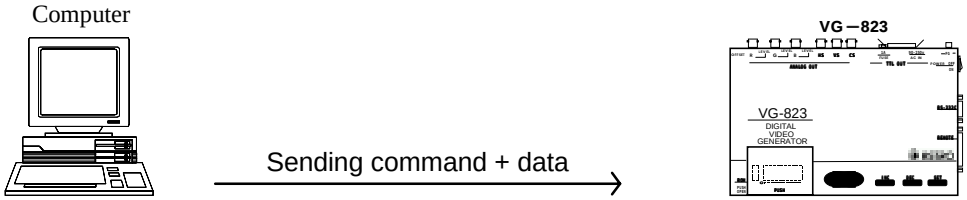
Key name	Key code
R	5EH
G	5FH
B	60H
RH	65H
GH	66H
BH	67H

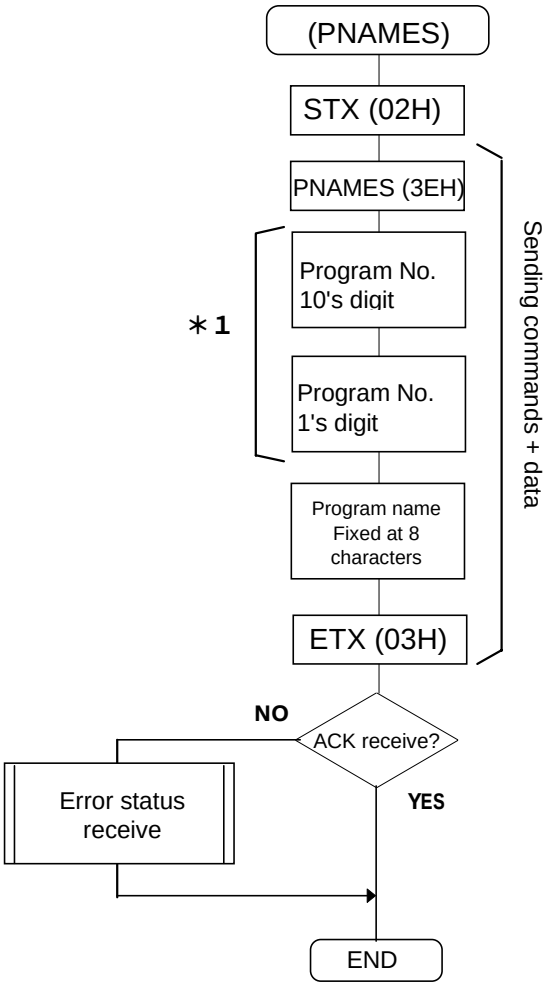
Fig. 8-24



8▪19 [PNAMES] (3EH)

This command is for sending the name of the program whose number has been designated.
The data sent is written in the panel ROM.
* All parameters are in ASCII code.





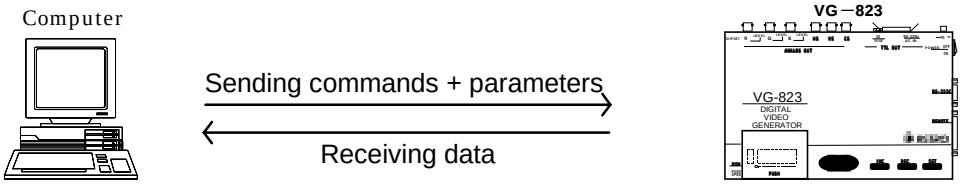
***1** Three digits are designated when the AH-3000 is used.
Program No.(001-040), (500-779)

When the HN58C256 panel ROM is used, the number of digits designated depends on the program number.
For program No.(01-40): 2 digits are designated
For program No.(501-541, 601-641, 701-741): 3 digits are designated

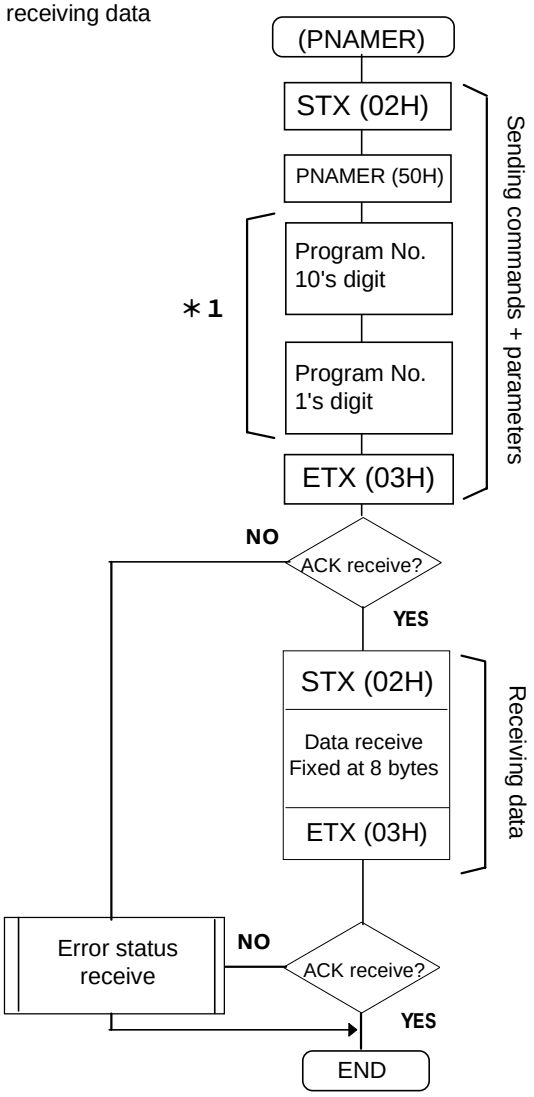
8-20 [PNAMER] (50H)

This command is for receiving the name of the program whose number has been designated.

* All parameters are in ASCII code.



When sending commands + parameters and receiving data



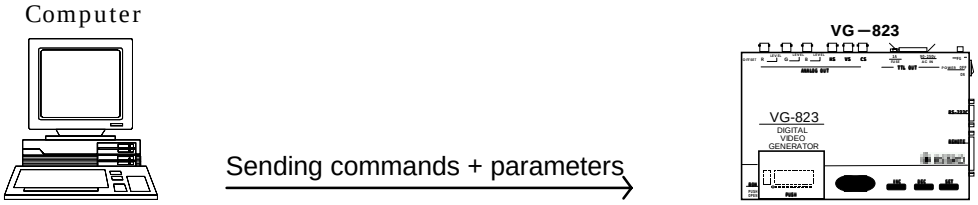
***1** Three digits are designated when the AH-3000 is used.
Program No.(001-040), (500-779)

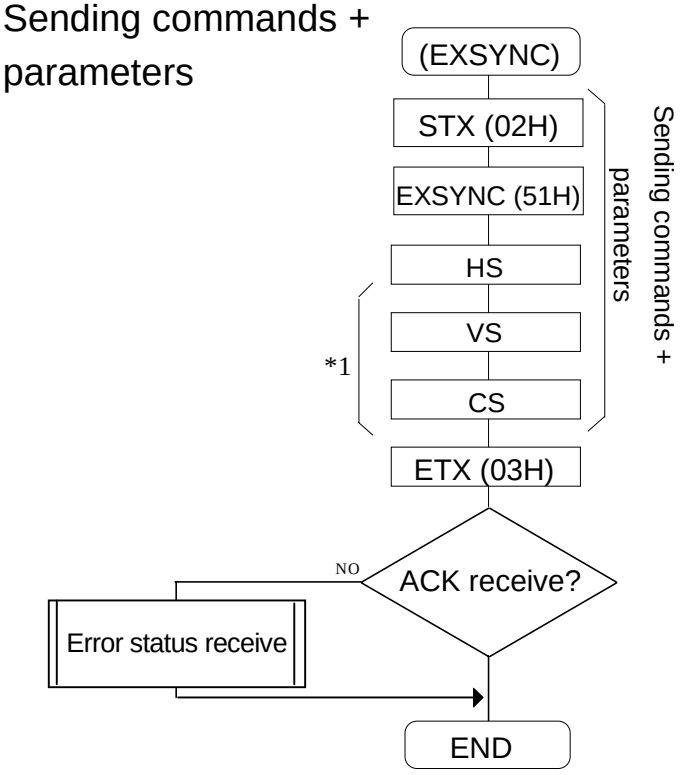
When the HN58C256 panel ROM is used, the number of digits designated depends on the program number.
For program No.(01-40): 2 digits are designated
For program No.(500-779): 3 digits are designated

8▪21 [EXSYNC] (51H)

This command is for turning ON and OFF each of the HS/VS/CS separate sync signals.

* All parameters are in ASCII code.



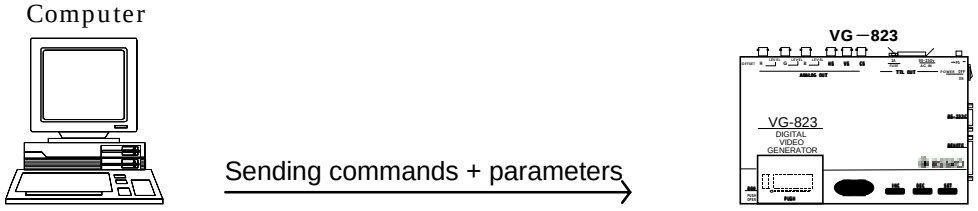


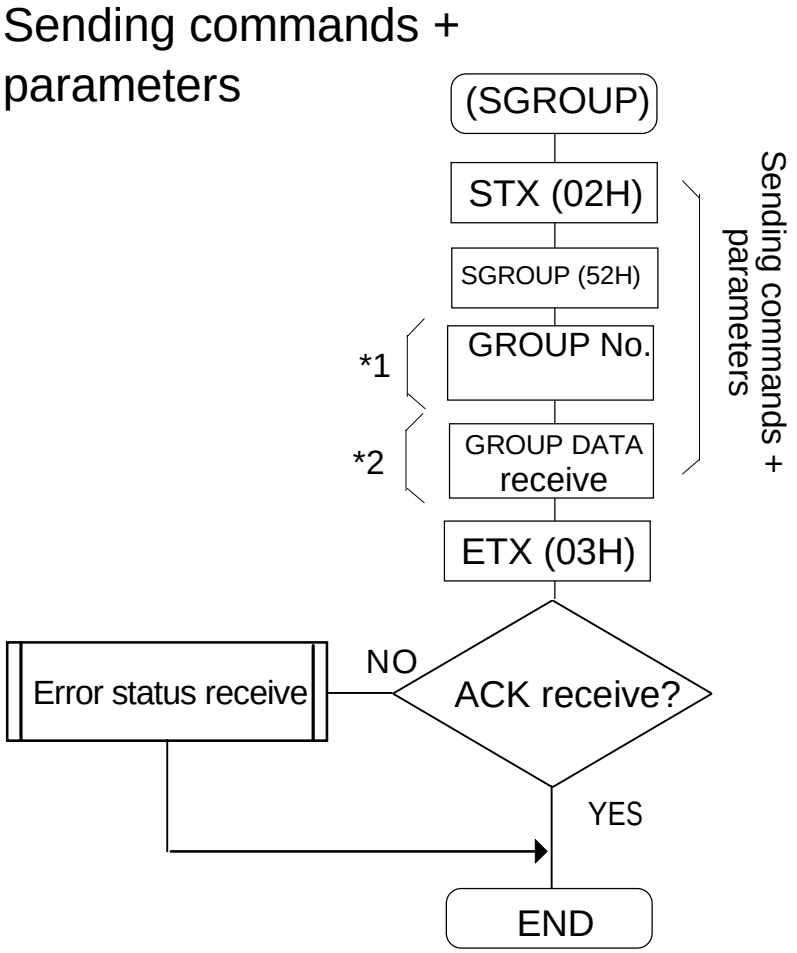
＊1　　“0”= OFF “1”= ON

8-22 [SGROUP] (52H)

This command is for sending the data of the group No. whose number has been designated.

* All parameters are in ASCII code.





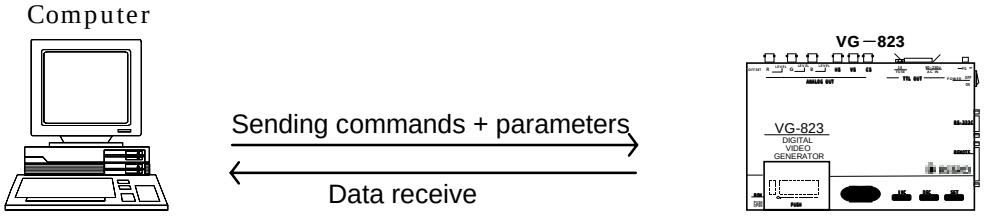
*1 1 or 2 when HN58C65 is used; 1 to 8 when AH-3000 is used.
01 to 28 when HN58C256 is used (2 digits are designated)

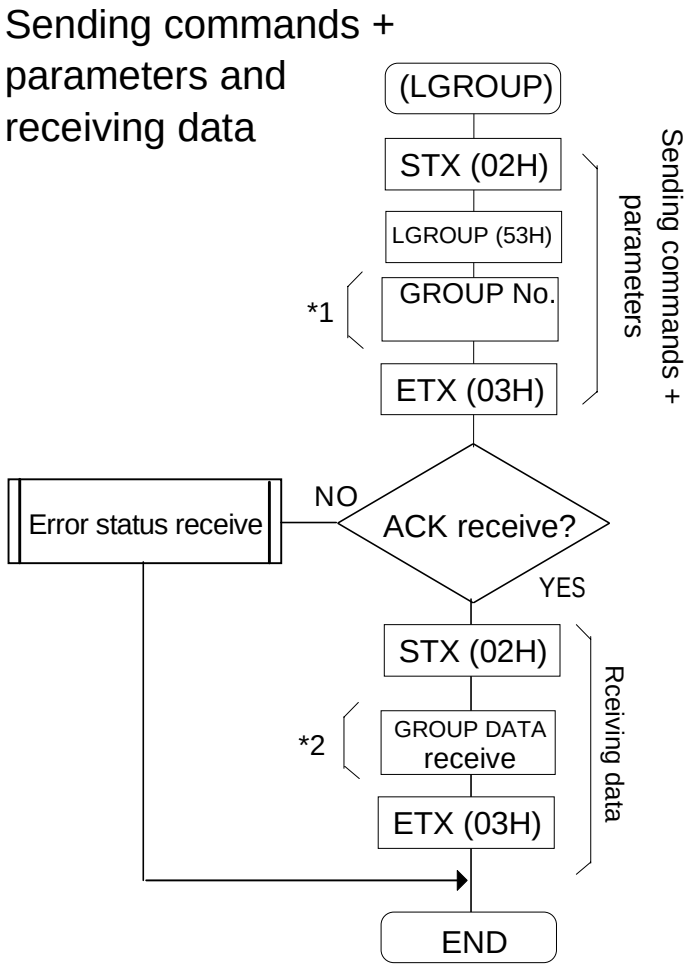
*2 Program No. 2 digits x 20 (40 bytes) for HN58C65
Program No. 3 digits x 20 (60 bytes) for AH-3000
Program No. 3 digits x 20 (60 bytes) for HN58C256

8▪23 [LGROUP] (53H)

This command is for receiving the data of the group No. whose number has been designated.

* All parameters are in ASCII code.





*1 1 or 2 when HN58C65 is used; 1 to 8 when AH-3000 is used.
01 to 28 when HN58C256 is used (2 digits are designated)

*2 Program No. 2 digits x 20 (40 bytes) for HN58C65
Program No. 3 digits x 20 (60 bytes) for AH-3000
Program No. 3 digits x 20 (60 bytes) for HN58C256

CHAPTER 9 DESCRIPTION OF GRAPHIC COMMAND FUNCTIONS

9･1 [GCIRC] (18H)･[CCIRC] (12H)

These commands are for tracing circles on the graphic plane. The center coordinates X and Y and radius R of the circle are designated as parameters.
Each data has a variable length of 1 to 4 digits, and it is separated from the next data by a comma.
The setting ranges are -2048 to 4095 for the center coordinates, and 1 to 4095 for the radius.

* Sign codes are added to the center coordinates.
* Execute the command after setting the sync signals.

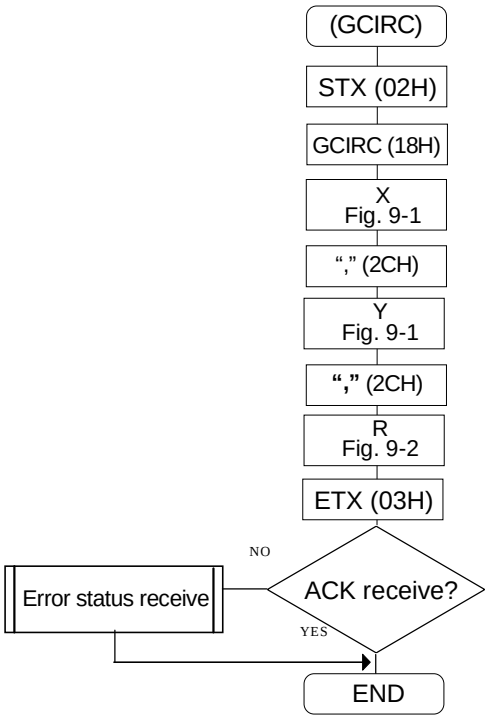


Fig. 9-1

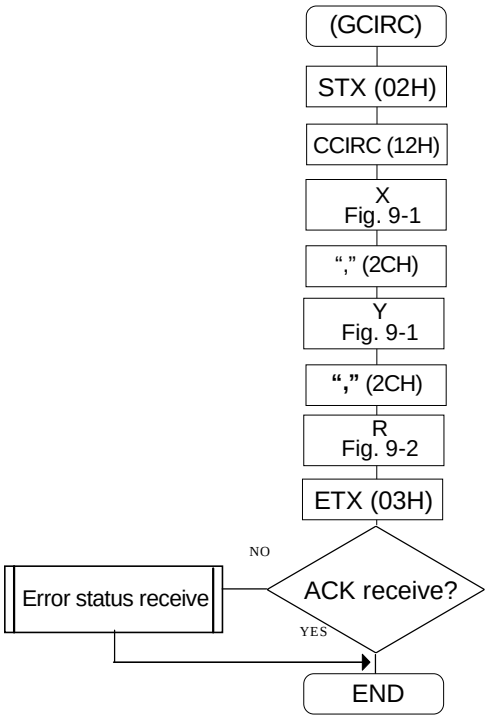


Fig. 9-2
No sign code present

Sign code present

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

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

∗1 “0”＝＋, “1”＝－

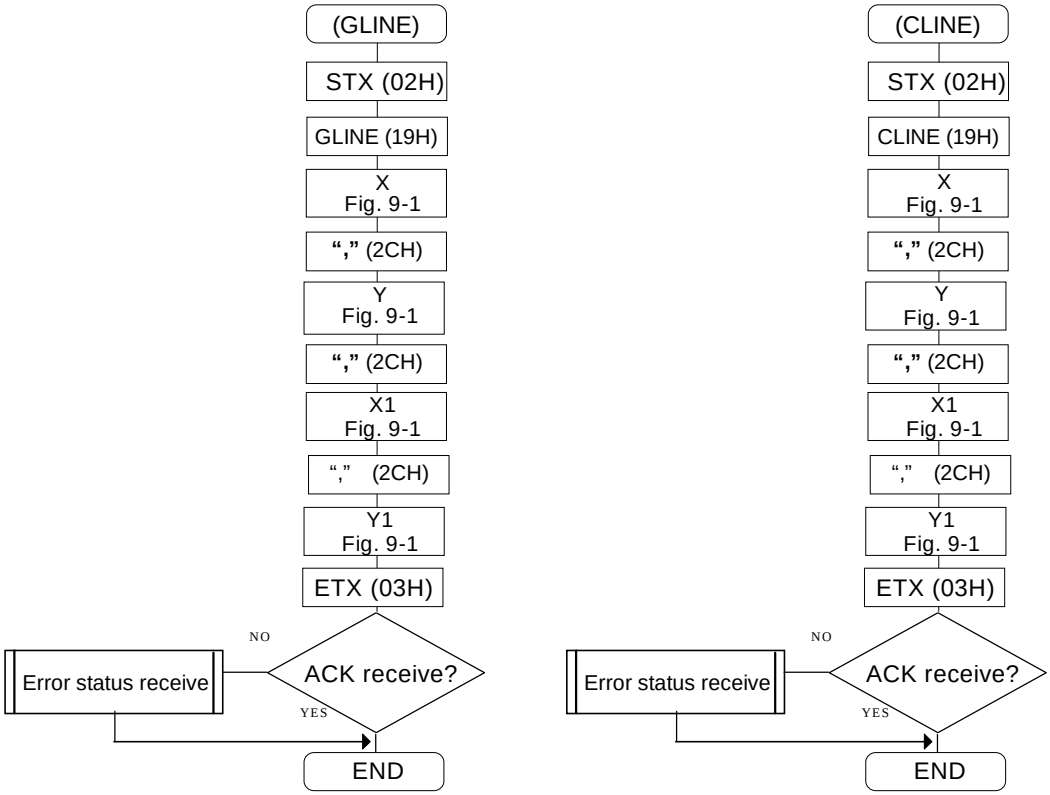
	−100
Sign code	31H
“1”	31H
“0”	30H
“0”	30H

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

9･2 [GLINE] (19H)･[CLINE] (13H)

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

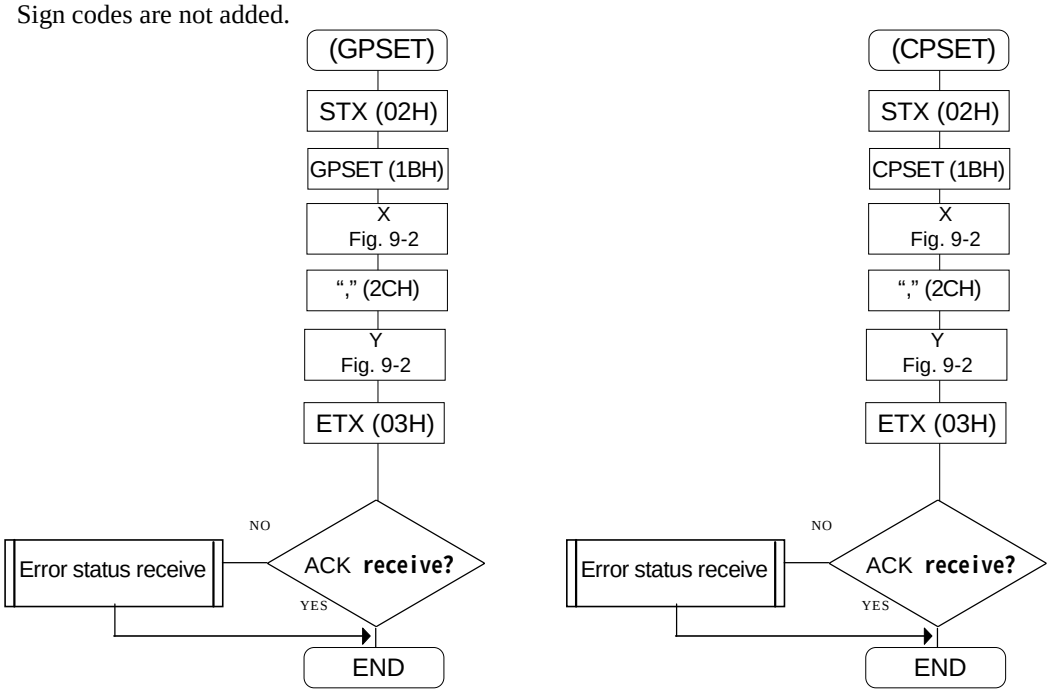
* Sign codes are added.



9･3 [GPSET] (1BH)･[CPSET] (14H)

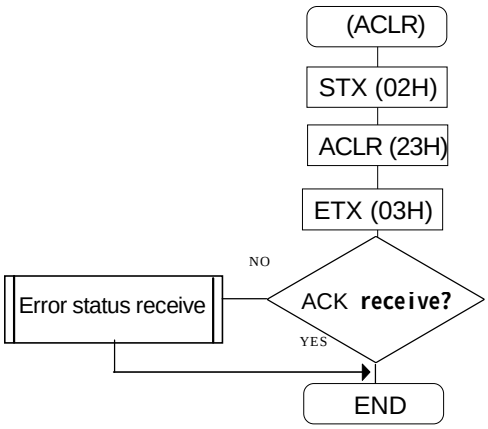
These commands are for tracing one dot on the graphic plane. The coordinates X and Y are designated as parameters. Each data has a variable length of 1 to 4 digits, and it is separated from the next data by a comma.

* Sign codes are not added.



9･4 [ACLR] (23H)

This command is for clearing the graphic plane and color bar plane.
It has no parameters.

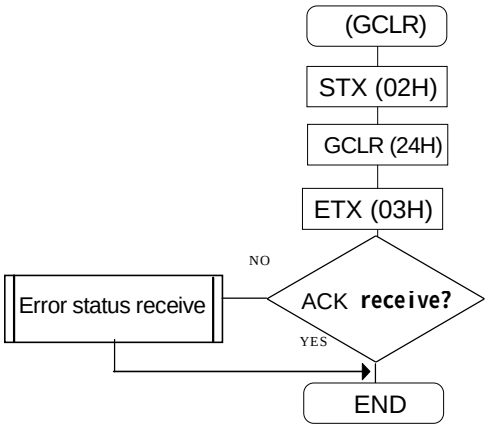


9･5 [COCLR] (24H)

This command is for clearing the color bar plane.
It has no parameters.

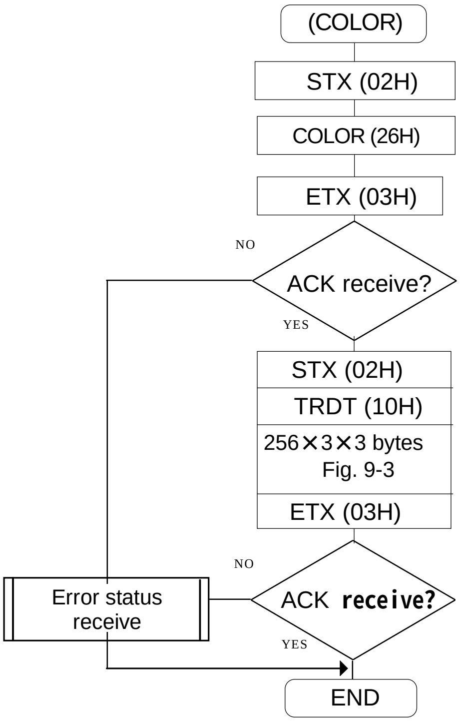
9･6 [GCLR] (25H)

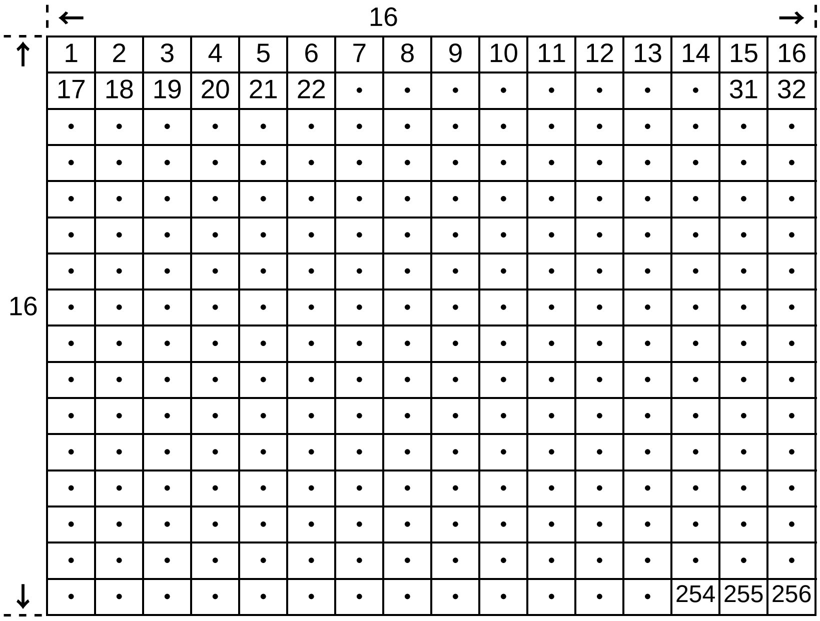
This command is for clearing the graphic plane.
It has no parameters.



9・7 [COLOR] (26H)

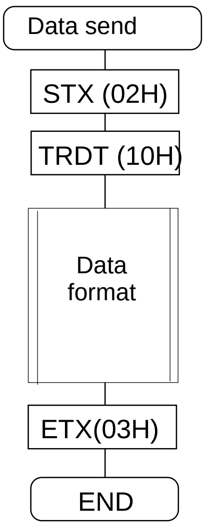
This command is for displaying the 256 colors on the color plane. It divides the color plane into 16 segments both horizontally and vertically.

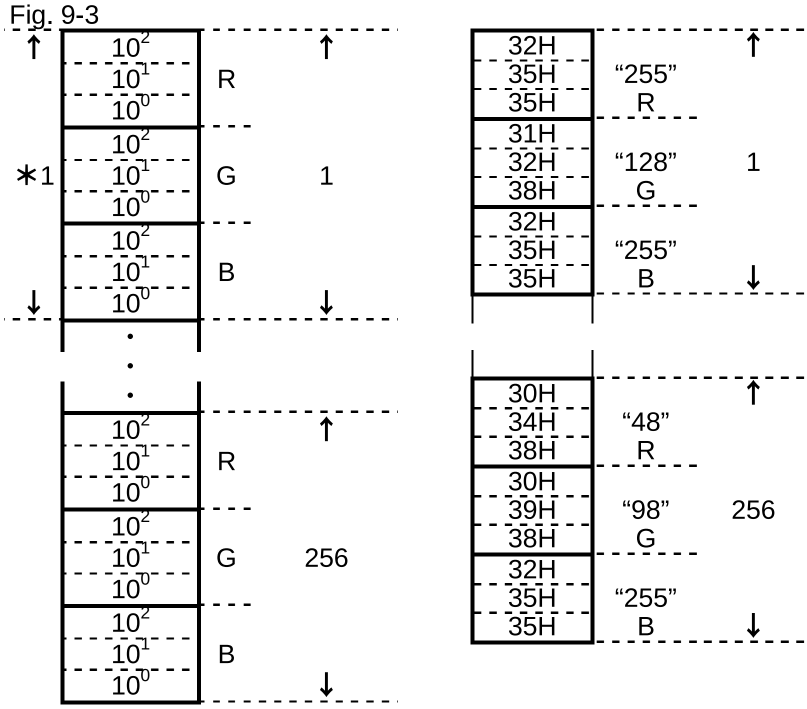




256×3(RGB)×3(レベル)＝2304
Send all 2304 bytes of data in succession.

Fig. 9-3

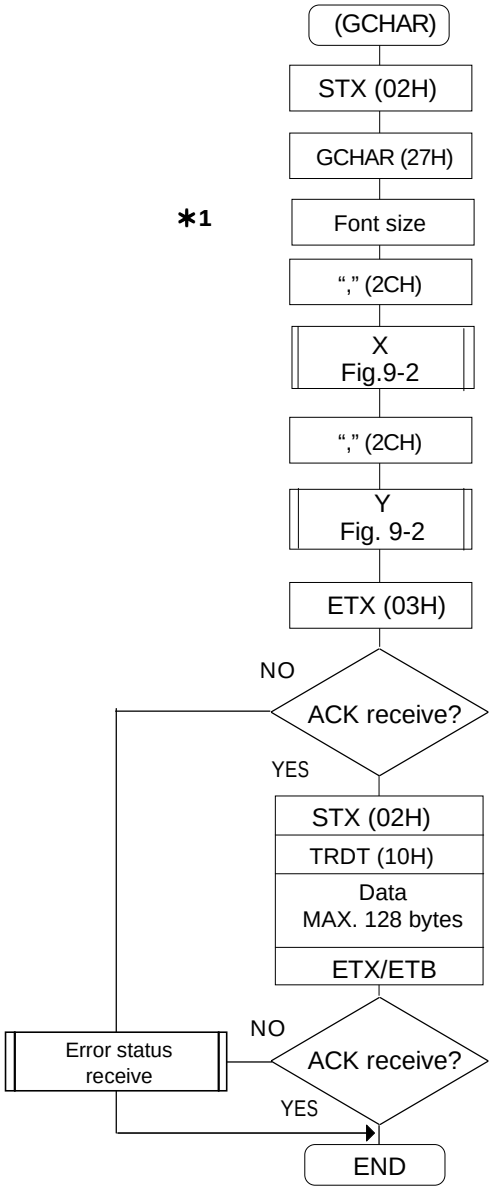




∗1 “000”-“255”

9･8 [GCHAR] (27H)

This command is for writing points designated on the graphic plane in the form of characters.
The font size and display coordinates X and Y are designated as 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

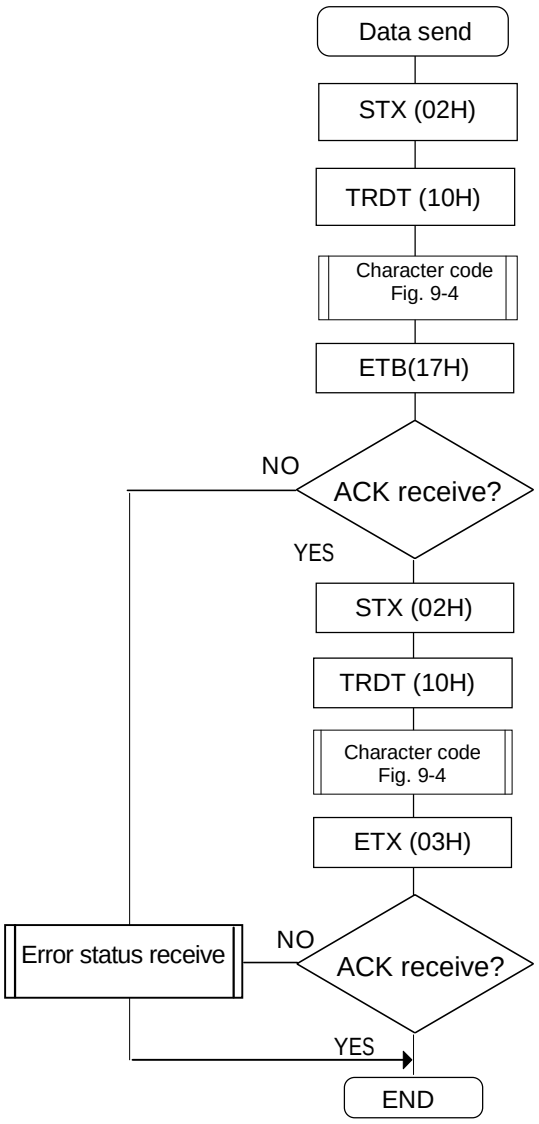


Fig. 9-4

<Block 1>

STX	TRDT	Character data	ETB

← MAX128 →

<Block 2>

STX	TRDT	Character data	ETB

← MAX128 →

<Block h>

STX	TRDT	Character data	ETB

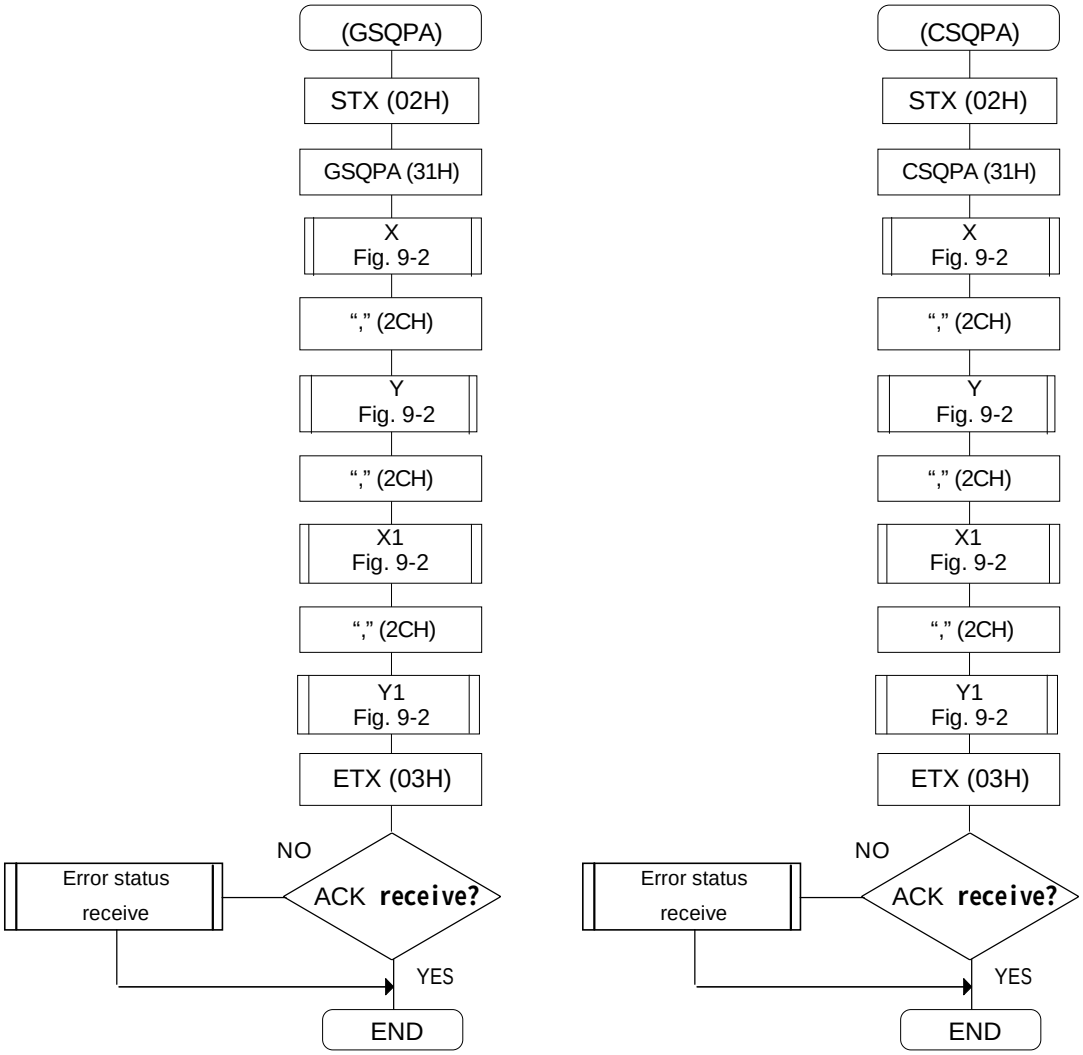
← MAX128 →

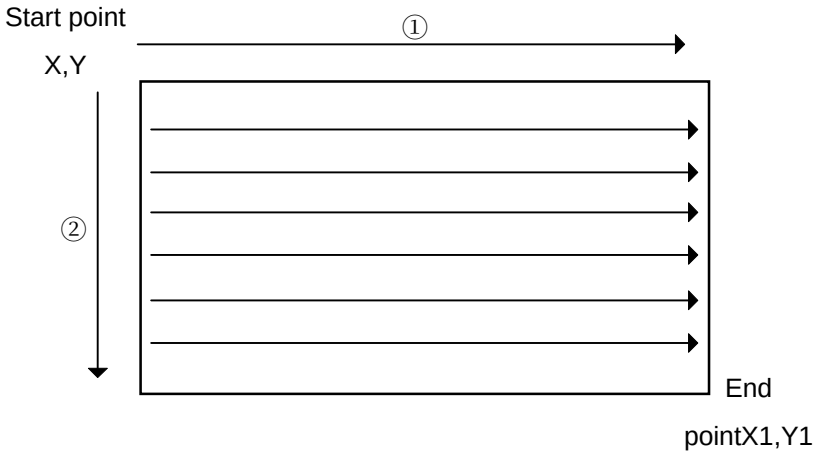
* CR (0DH)
* The display point is brought down by one row and moved to the left edge.

9･9 [GSQPA] (31H), [CSQPA] (32H)

These commands are for tracing the box paint on the graphic plane. The start point coordinates X and Y and end point coordinates X1 and Y1 are designated as parameters. Each data has a variable length of 1 to 4 digits, and it is separated from the next data by a comma.
The setting range is 0 to 2048 for all the coordinates.

* Sign codes are not added.

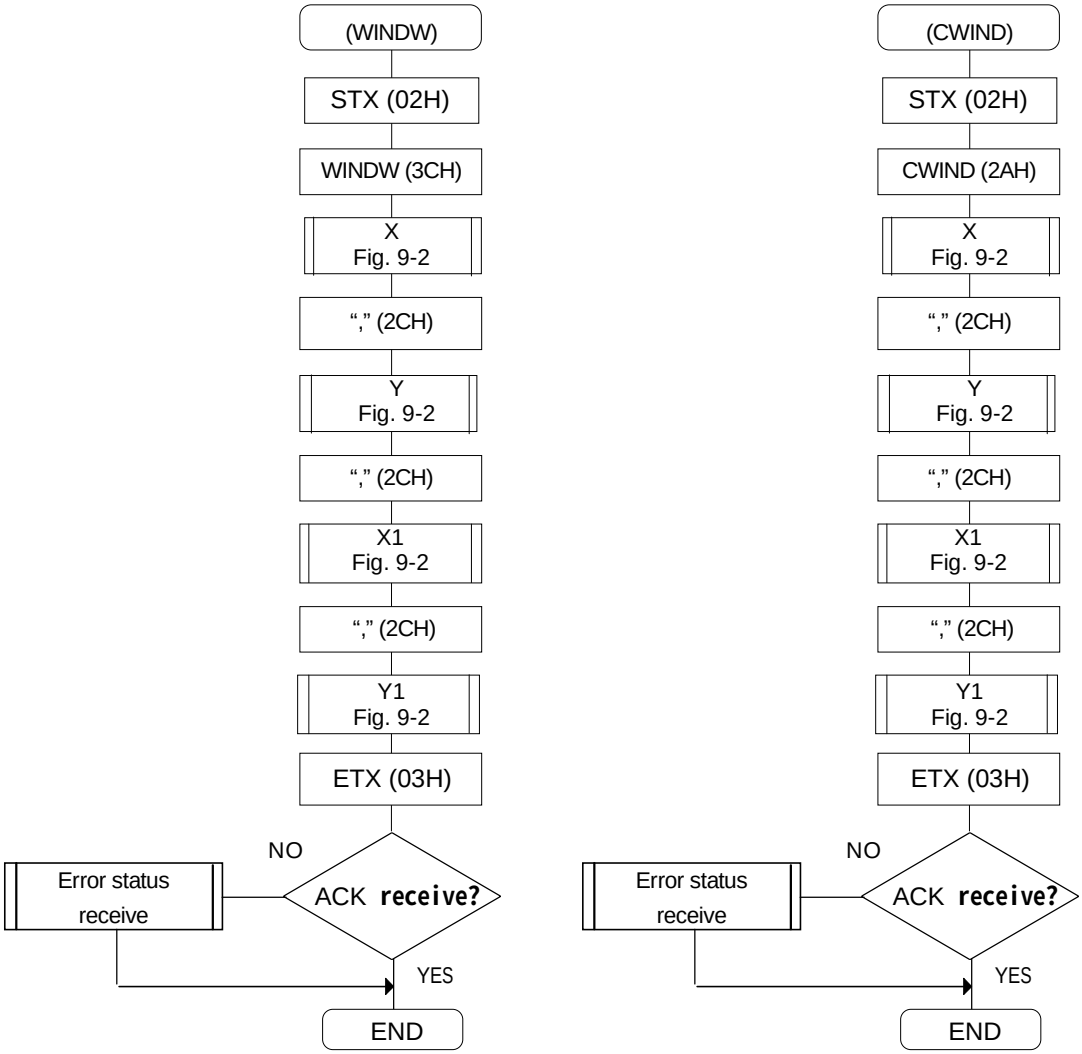




*NOTE X<X1
Y<Y1

9･10 [WINDW] (3CH)･[CWIND] (2AH)

These commands are for tracing the window. The start point coordinates X and Y and end point coordinates X1 and Y1 are designated as parameters. Each data has a variable length of 1 to 4 digits, and it is separated from the next data by a comma.
The setting range is 0 to 2048 for all the coordinates.



9･11 [WINDCL] (3DH)

This command is for setting the color of the traced window.
R, G and B (each fixed at 3 digits) are designated as parameters.

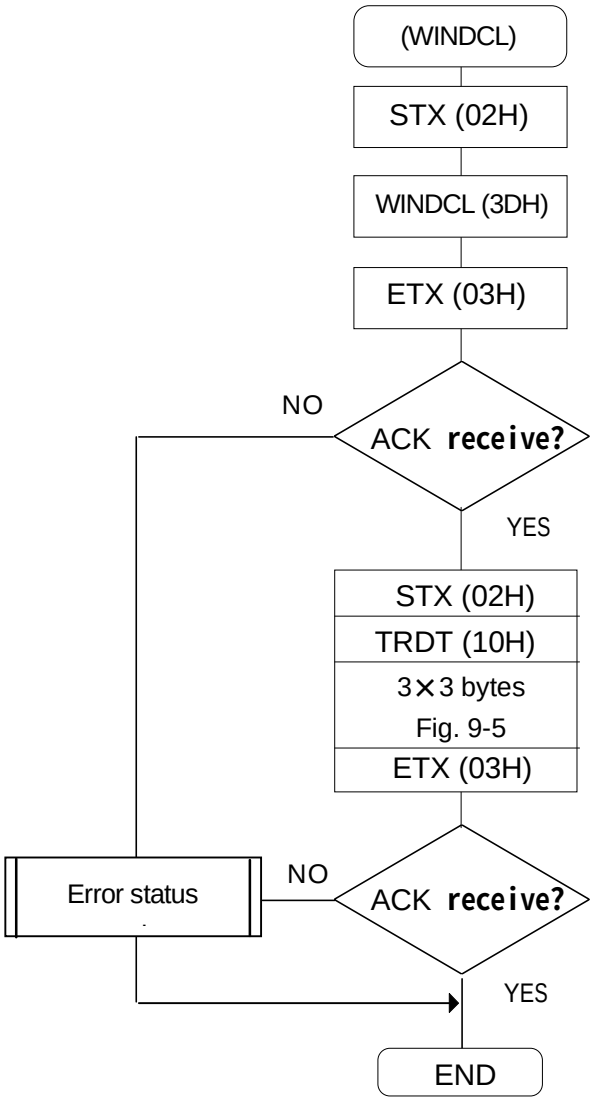
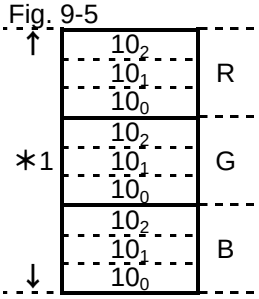
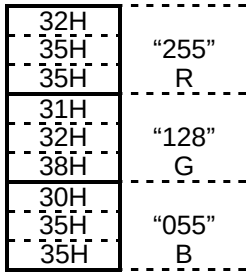


Fig. 9-5

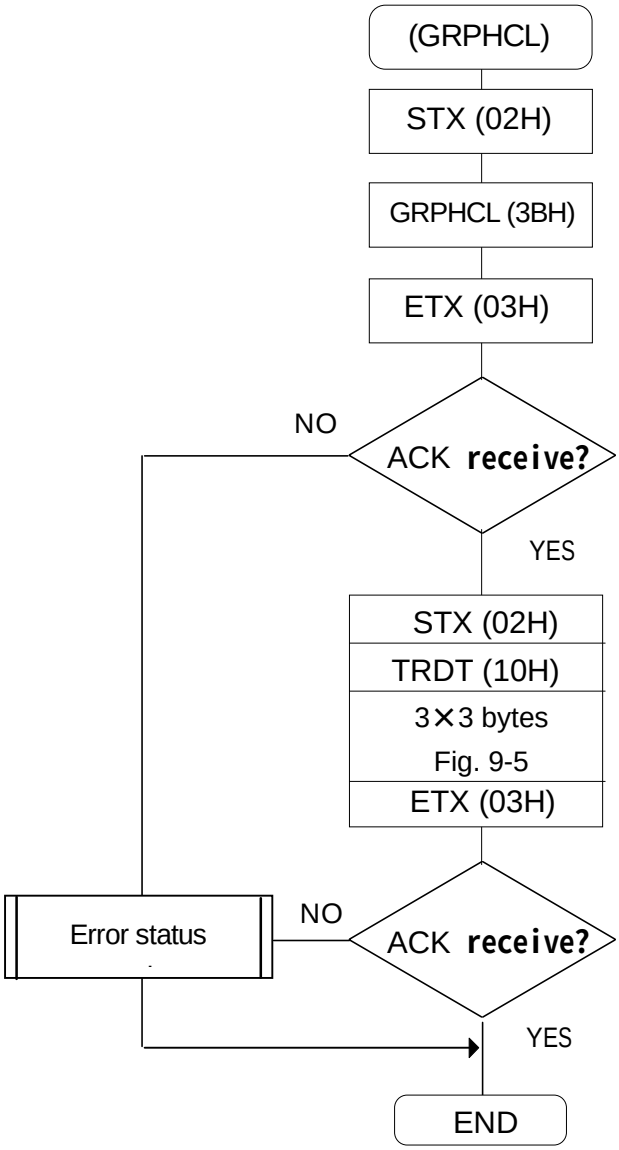


∗Note: “000”-“255”



9･12 [GRPHCL] (3BH)

This command is for setting the graphic color.
R, G and B (each fixed at 3 digits) are designated as parameters.

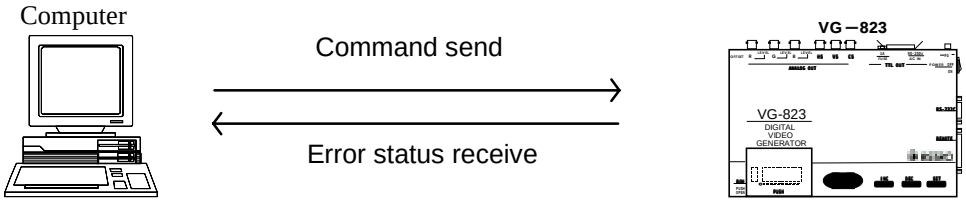


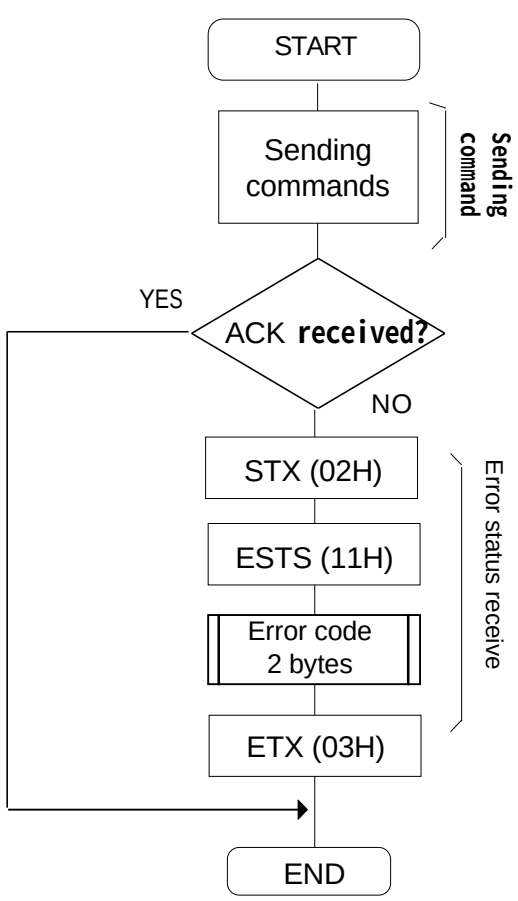
CHAPTER 10 SAMPLE PROGRAM

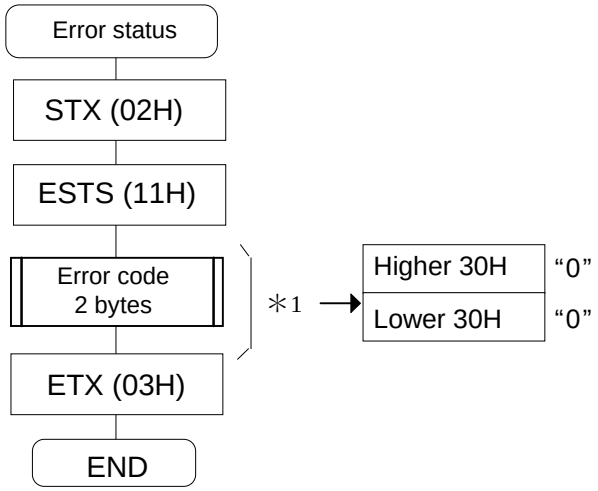
```
10 '* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
20 '           VG - 823 TERMINAL MODE
30 '*               SAMPLE PROGRAM
40 '*          RS-232C (Bps:9600 Data:7 Parity:NONE)
50 '* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
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 started
390 '
400 '     ------------     Direct display        ------------
410 '
420 PRINT # 1,STX$ +EXPDN$ +" 01" +ETX$ ;        ' Program No.1 executed
430 PRINT " -----> PROG No. 01      "
440 GOSUB * ACKGET                               ' ACK received
450 '
460 '     ------------     Pattern change        ------------
470 '
480 PRINT # 1,STX$ +EXPON$ +ETX$ ;               ' Pattern changed
490 PRINT " -----> PATTERN SELECT   "
500 GOSUB * ACKGET                               ' ACK received
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 received
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 received
630 '
640 '     ------------   Terminal mode end        ------------
650 '
660 PRINT # 1,EOT$ ;                             ' Terminal mode ended
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) If an error is found in a parameter or data, a 2-digit error code is sent to the computer.







*1: When the error code is "00"

(2) Table of error codes

NO	Error code	Description
1	00	This error results if an attempt has been made to write data when the EEPROM is not installed in the panel ROM socket or when the EPROM is installed.
2	01	This error results if the program number input has been " disabled" when a direct display or program is executed.
3	02	This error results if " 5.00 MHz ≦ dot clock ≦ 250.00 MHz" does not apply to the horizontal sync data when a direct display or program is executed.
4	03	This error results if " Hperiod ≧ Hsync + Hbackp + Hdisp (dot)" does not apply to the horizontal sync data when a direct display or program is executed.
5	04	This error results if " Hperiod ≧ Hsync + Hbackp + Hdisp (microsec)" does not apply to the horizontal sync data when a direct display or program is executed.
6	05	This error results if " Hperiod ≧ HDstart + HDwidth (dot)" does not apply to the horizontal sync data when a direct display or program is executed.
7	06	This error results if " Hperiod ≧ HDstart + HDwidth (microsec.)" does not apply to the horizontal sync data when a direct display or program is executed.
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	Error in parameter.
17	25	Error in data.
18	26	This error results when the sync signals have not been set.

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July 11, 1996

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