DSP-A01 SERIES
CUSTOMER DISPLAY
TECHNICAL REFERENCE

Rev.02

Seiko Instruments Inc.

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PREFACE

This technical reference describes about DSP-A01 SERIES CUSTOMER DISPLAY (hereinafter referred to as "Display").

See "DSP-A01 SERIES CUSTOMER DISPLAY USER'S GUIDE" for operation.

[Product name]

DSP-A01-x1
(1)

(1) : Case color
W: White
K: Black

Display complies with EU RoHS Directive (2011/65/EU).

Follow “2.1 DISPLAY SPECIFICATIONS” about the input rating of DSP-A01 when the power is supplied from customer’s device.

[Contents]

TABLE OF CONTENTS

FIGURES

TABLES

CHAPTER 1
TERMS USED IN THIS MANUAL

This chapter describes the terms used in this manual.

- **Input Buffer**

  When Display receives data (character codes and commands) from the host devices, it stores the data in the Display's input buffer. The input buffer has a capacity of 4096 bytes. Then, Display retrieves data which is stored to the input buffer and performs data analysis processing.

- **Line Spacing**

  Line spacing is the amount of line feed from one line to the next line when characters are displayed (see Figure 1-1).

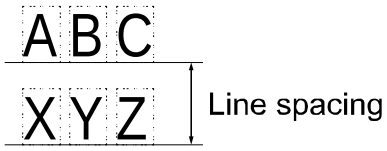


Figure 1-1 Line Spacing

  In case of line feed with displaying, the line feed is performed only the character height to be displayed even when the line spacing is set below the number of dots in the height direction of the characters to be displayed. Underline cannot be displayed when the character height is equal to or greater than the line spacing. Set the line spacing to at least character height + 1 dot when the underline is used.
  In case of line feed without displaying, the line feed is performed by the set line spacing.

- **Space Between lines**

  Space between lines is the space between two adjacent lines (see Figure 1-2).

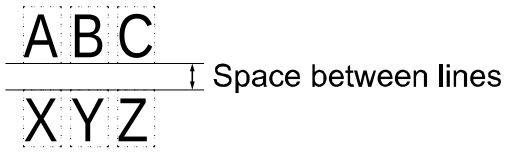


Figure 1-2 Space Between Lines

- **Space Between Characters, Character Left Space, Character Right Space**

  Space between characters is the space between adjacent characters next to each other (see Figure 1-3).
  In the space between characters, the character left space means the left part of the character and the character right space means the right part of the character.

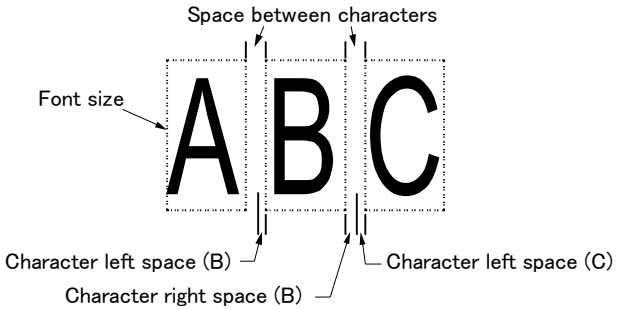


Figure 1-3 Space Between Characters

- **Line**

  The word "line" in this manual indicates a line of characters shown on the screen.

- **Notation in the Technical Reference**

  Hexadecimal: the character 'H' which indicates hexadecimal is added behind a number.
  Example: 0AH

  Character: a character is enclosed with single quotation marks.
  Example: 'G'

CHAPTER 2
SPECIFICATIONS

2.1 DISPLAY SPECIFICATIONS

Table 2-1 Display Specifications

(1/2)

Item		Specifications	
		DSP-A01-K1	**DSP-A01-W1**
Screen size		4.3 inch	
LCD type		TFT LCD	
Number of pixels		WQVGA (W 480 px × H 272 px)	
Pixel pitch		W 0.198 mm × H 0.198 mm	
Displaying area		W 95.04 mm × H 53.856 mm	
Color		ARGB1555 (16 bit) / RGB565 (16 bit)	
Luminance		300 cd/m^2 or more (Brightness Selection: 100%)	
Viewing angle (up/down/left/right)		40 deg. / 50 deg. / 50 deg. / 50 deg. (vertically placed)	
Opening and closing angle		0 to 150 degrees	
Opening and closing position		Free stop	
Operating environment	Temperature	5°C to 45°C (41°F to 113°F)	
	Relative humidity	10%RH to 90%RH (non-condensing)	
Storage environment	Temperature	-20°C to 60°C (-4°F to 140°F)	
	Relative humidity	10%RH to 90%RH (non-condensing)	
Dimensions (excluding projections)		W 120 mm × D 25 mm × H 122 mm	
Mass		Approx. 260 g (excluding USB cable)	
Input voltage		DC5.0 V ±5%	
Installation type		Integrated type (vertically placed) Stand-alone type (vertically placed) Stand-alone type (horizontally placed) Wall hanging	
Exterior color		Black	White
Communication method	USB	Ver. 2.0 Full speed (12 Mbps)	

Item		Specifications	
		DSP-A01-K1	DSP-A01-W1
Character size	1-byte character font A	24 dots × 12 dots	
	1-byte character font B	16 dots × 8 dots	
	2-byte character font A	24 dots × 24 dots	
	2-byte character font B	16 dots × 16 dots	
Character type	1-byte character	USA, Standard Europe (Code Page437) Katakana Multilingual (Code Page850) Portuguese (Code Page860) Canadian-French (Code Page863) Nordic (Code Page865) Turkish (Code Page857) Greek (Code Page737) Latin (Code Page1252) Russian (Code Page866) Eastern Europe (Code Page852) Euro (Code Page858) Cyrillic (Code Page855) Arabic (Code Page864)*1 Central European (Code Page1250) Cyrillic (Code Page1251) Greek (Code Page1253) Turkish (Code Page1254) Optional fonts	
	2-byte character	Kanji (JIS 1st and 2nd levels, special characters, NEC special characters, NEC selection of IBM extended characters, IBM extended characters), user-defined characters	
Characters per line	1-byte character font A	40	
	1-byte character font B	60	
	2-byte character font A	20	
	2-byte character font B	30	
Barcode	Barcode	UPC-A, UPC-E, JAN13 (EAN13), JAN8 (EAN8), ITF, CODABAR, CODE39,CODE128,	
	Two-dimensional barcode	QR Code (Model 2)	
Display status		Standby mode Customer mode Guide mode Function setting operation mode	
Input buffer		4096 bytes	
Operation switch		Function setting switch	
Reliability*2	MTBF	30,000 hours (LCD)	

*1: Font B cannot be used when this character set is selected.
*2: Reliability is a value at brightness setting 100%, operating temperature 25°C (77°F), and displaying.

2.1.1 Sale Destinations

Sale destinations for Display are listed below.

Table 2-2 Sale Destinations

✓: Sale Destinations

Country/Region*	DSP-A01-x1
Japan	✓
EU, EFTA	✓
Turkey	✓
USA, Canada	✓
Brazil	✓

*: Ask your SII sales representative when you want to operate the products in countries/regions other than listed above.

2.1.2 Precautions for Use

- When an image such as a slide or image is expanded repeatedly in a single display, it may take some time until the image is displayed.
- Always use the printer within the shadowed range shown in the graph below for the relationship between temperature and humidity.

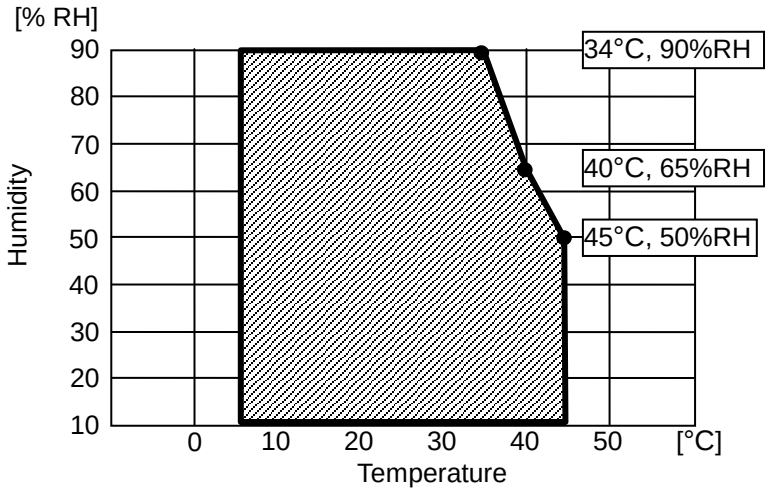


Figure 2-1 Operating Temperature and Humidity Range

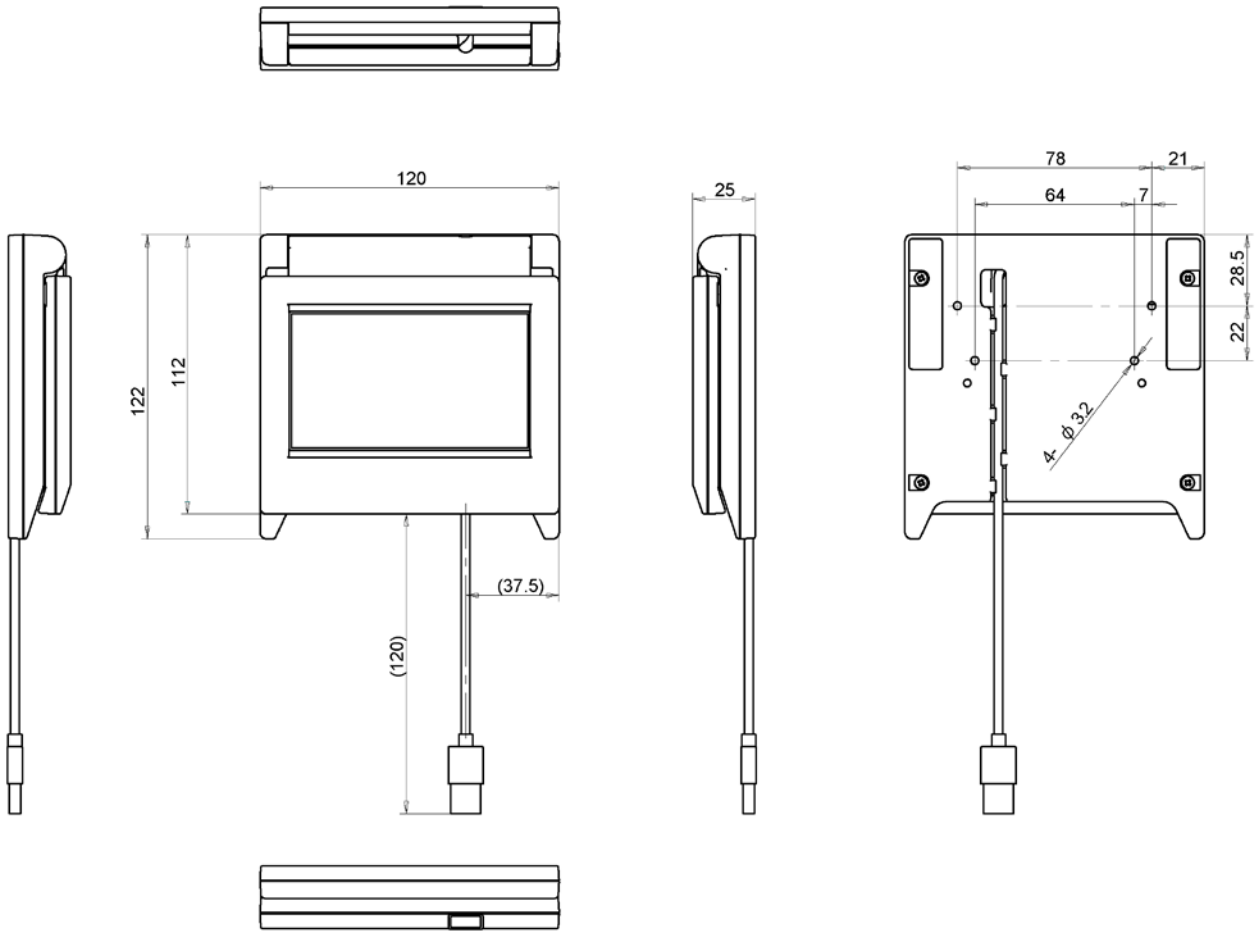
- When handling Display, be aware of static electricity. When the static electricity is discharged, this could cause USB communication failure. When this problem occurs, remove the USB cable of Display and wait a few seconds before connecting it again.
- To clean the LCD, follow the procedure below.

  (a) Remove the USB cable of Display.

  (b) Clean the LCD using a dust-free cloth moistened with a small amount of alcohol. At this time, be careful that alcohol does not enter inside the LCD. In addition, do not wipe with a dry cloth or tissue.

- For other precautions, see "2 SAFETY PRECAUTIONS" and "3 OPERATING PRECAUTIONS" in "DSP-A01 SERIES CUSTOMER DISPLAY USER'S GUIDE".

2.1.3 Dimensions



Unit : mm
General tolerance for dimensions : ±0.3 mm

Figure 2-2 DSP-A01 Dimensions

- Installation type

  Indicates the installation type of Display. Set the display orientation according to the installation type. See "4.2 FUNCTION SETTINGS" 3. General Setting (MS4) for details.

Integrated type (vertically placed)

Stand-alone type (vertically placed)

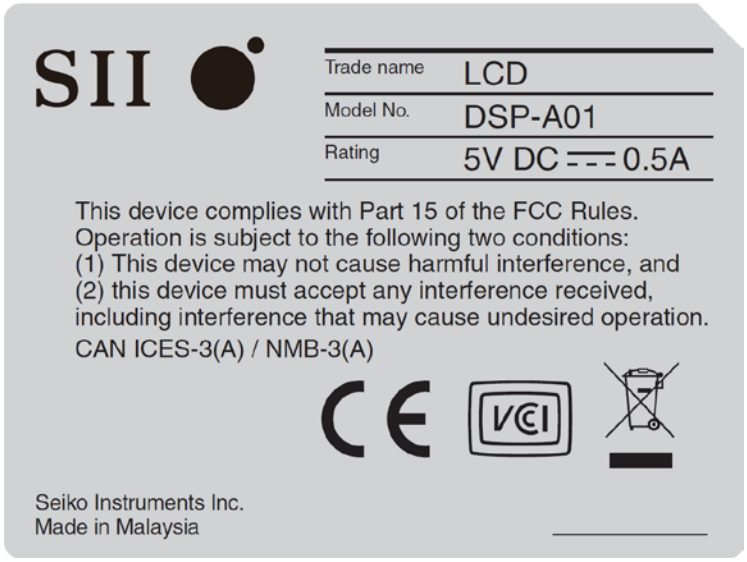
Stand-alone type (horizontally placed)

Wall hanging

Figure 2-3 DSP-A01 Installation Type

2.1.4 Label

(1) DSP-A01 Series



2.2 COMMUNICATION CABLE SPECIFICATIONS

2.2.1 Specified USB Cable Specifications

Table 2-3 Specified USB Cable Specifications

Item		Specifications
Product name		IFC-U05-1
Use		USB cable
Connection destination		RP-F10
Color		Black
Cable	Length	Approx. 300 mm
	Outside diameter	Approx. ϕ4.0 mm
Plug C1	Type	Series "A" plug
Plug C2	Type	Series "micro-B" plug

Table 2-4 Connection Cable for Specified USB Cable

Plug C1	Plug C2
1	1
2	2
3	3
-	4
4	5
SHELL	SHELL

CHAPTER 3
INTERFACE

This chapter describes interface specifications required for connecting host devices with Display.

The amount of the input buffer in Display is 4096 bytes.

3.1 USB INTERFACE

(1) General Specifications

Table 3-1 General Specifications of USB Interface

Item	Specifications
USB version	Ver. 2.0 Printer device class 1.1
Communication speed	Full speed (12 Mbps)
Communication protocol	Bulk transfer

(2) Pin Assignment

Table 3-2 Pin Assignment of USB Interface

Terminal No.	Terminal Name	Input/Output Direction	Function
1	Vbus	-	USB power supply
2	D-	Input/Output	USB data
3	D+	Input/Output	USB data
4	N.C.	-	Prohibition to connect
5	GND	-	GND

(NOTE) Use a USB cable that conforms to the Full speed when you prepare a cable separately.

(3) Connector

CSS5305-6704FSZ (SMK) or equivalent (micro-B)

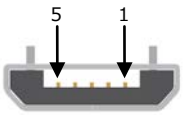


Figure 3-1 Connector

(4) Data Reception

USB data reception uses a bulk-out transfer method.
Data is received during displaying. However, since displaying is prioritized, the NAK response may be returned even when there is free space in the input buffer.
When the input buffer usage becomes 3840 bytes or more (the remaining capacity becomes 256 bytes or less), the NAK response continues. When the data process is proceeded, and the input buffer usage becomes 3712 bytes or less (the remaining capacity becomes 384 bytes or more), data reception resumes.
The maximum number of bytes that can be received with 1 packet is 64 bytes. Data reception is available during an error.

(5) Data Transmission

USB data transmission uses a bulk-in transfer method.
The response data is stored temporarily in the output buffer, and it is sent in response to the bulk-in packet request from the host device. When the bulk-in packet request is received while no response data exists, zero-length packet is sent.
The maximum number of bytes that can be transmitted with 1 packet is 64 bytes.

CHAPTER 4
FUNCTION SETTINGS

4.1 FUNCTION SETTING METHOD

In this Display, initial states of selectable items such as brightness of screen after power on and displaying orientation can be preset. Preset these functions before using Display. Details for settings of the software switches are described below.

The function settings are allocated to memory switches (hereinafter referred to as "MS") that are stored in the FLASH memory. These are enabled until they are rewritten.

The function settings can be set using MS1 to 16. Do not rewrite MS2 to 3, 6 to 7, and 10 to 16 since they are reserved for the system. The value shown in the shaded cell (in bold) in the table is set at the shipping.

(NOTE)	**Be sure to configure the setting or the value as instructed when "Fixed" is stated in the table. Otherwise, Display may not work correctly or may crash.**

4.1.1 Changing Memory Switch

(1) Change Procedures

There are following 3 ways to change the MS.

- Using the memory switch setting tool (for Windows)
  Utilize the "memory switch setting utility (Display Setting Utility)" from the start menu or start screen.
  See "SII Display Setting Utility for Windows User's Guide" for details.

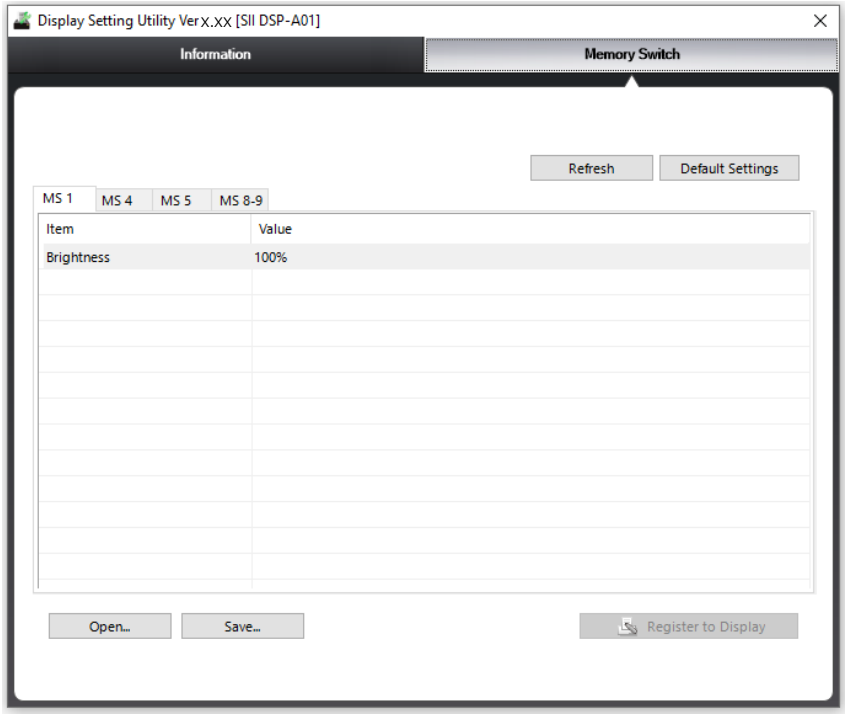


Figure 4-1 Memory Switch Setting Utility (Display Setting Utility)

- Using the "Change Function Settings" command ("DSW")
  See "DSW" in "6.7.9 Auxiliary Functions".

- Using the switches
  The MS can be changed manually using the Display's function setting switch for some settings.
  See "5.2.4 For Function Setting Operation Display".

4.2 FUNCTION SETTINGS

Details of each function are described below. The value shown in the shaded cell (in bold) in the table is set at the shipping.

(NOTE)	**Be sure to configure the setting or the value as instructed when "Fixed" is stated in the table.** **For reserved area, be sure to set the specified value. Otherwise, Display may not work correctly or may crush. Reserved values may be changed.**

1. General Setting 1 (MS1)

   - Brightness Selection (MS1-1 to 8)
     Adjusts the brightness of the screen.

Table 4-1 General Setting 1 (MS1)

MS1-8	MS1-7	MS1-6	MS1-5	MS1-4	MS1-3	MS1-2	MS1-1	Brightness Setting
0	0	0	0	0	0	0	0	10%
0	0	0	0	0	0	0	1	20%
0	0	0	0	0	0	1	0	30%
0	0	0	0	0	0	1	1	40%
0	0	0	0	0	1	0	0	50%
0	0	0	0	0	1	0	1	60%
0	0	0	0	0	1	1	0	70%
0	0	0	0	0	1	1	1	80%
0	0	0	0	1	0	0	0	90%
0	**0**	**0**	**0**	**1**	**0**	**0**	**1**	**100%**
Other than those above								Prohibition

2. Reserved (MS2 to 3)

   MS2 to 3 are all reserved. To write all 16 bytes, send FFH as values of MS2 to 3.

3. General Setting 2 (MS4)

Selects the initialized response and the display orientation.

- Initialized Response Selection (MS4-1)
  Enables or disables the initialized response function.
- Display Direction Selection (MS4-2)
  The display orientation of other than Guide mode, such as Customer mode and Standby mode can be selected.
- Guide Display Selection (MS4-3)
  The display orientation of Guide mode can be selected.
- Guide Display Automatic Switching Selection (MS4-4)
  Enables or disables automatic changing of Guide mode when a printer error occurs.

Table 4-2 General Setting 2 (MS4)

MS	Function	Value	
		0	**1**
4-1	Initialized Response Selection (Init. Response)	Enable	**Disable**
4-2	Display Direction Selection (Display Direction)	Rotate 180 degrees (Rotate 180deg.)	**No Rotate**
4-3	Guide Display Selection (Guide Display)	**Rotate 180 degrees (Rotate 180deg.)**	No Rotate
4-4	Guide Display Automatic Switching Selection (Auto Guide Display)	Enable	**Disable**
4-5 to 8	Reserved	-	**Fixed**

4. General Setting 3 (MS5)

Enables or disables the guide display.

- Out-of-paper Event Display Selection (MS5-1)
  Enables or disables Guide mode when the printer is out of paper.
- Cover Open Event Display Selection (MS5-2)
  Enables or disables Guide mode when the printer cover is open.
- Hardware Error Event Display Selection (MS5-3)
  Enables or disables Guide mode when the printer hardware error occurs.
- Head Temperature Error Event Display Selection (MS5-4)
  Enables or disables Guide mode when the printer head temperature error occurs.
- Vp Voltage Error Event Display Selection (MS5-5)
  Enables or disables Guide mode when the printer Vp voltage error occurs.
- Cutter Error Event Display Selection (MS5-6)
  Enables or disables Guide mode when the printer cutter error occurs.
- Bluetooth Pairing Event Display Selection (MS5-7)
  Enables or disables Guide mode during Bluetooth pairing of the printer.

Table 4-3 General Setting 3 (MS5)

MS	Function	Value	
		0	1
5-1	Out-of-paper Event Display Selection (Paper Empty Event)	**Enable**	Disable
5-2	Cover Open Event Display Selection (Cover Open Event)	**Enable**	Disable
5-3	Hardware Error Event Display Selection (H/W Error Event)	**Enable**	Disable
5-4	Head Temperature Error Event Display Selection (Head Temperature Error Event)	**Enable**	Disable
5-5	Vp Voltage Error Event Display Selection (Vp Voltage Error Event)	**Enable**	Disable
5-6	Cutter Error Event Display Selection (Cutter Error Event)	**Enable**	Disable
5-7	Bluetooth Pairing Event Display Selection (Bluetooth Pairing Event)	**Enable**	Disable
5-8	Reserved	-	**Fixed**

5. Reserved (MS6 to 7)

MS6 to 7 are all reserved. To write all 16 bytes, send FFH as values of MS6 to 7.

6. Character Code Table Setting (MS8)

A value corresponding to the character code table number can be set.
The character code table number is the number shown in Table 4-4.

Table 4-4 Character Code Table

Character Code Table No.	Codepage
0	USA, Standard Europe (Code Page437)
1	Katakana
2	Multilingual (Code Page850)
3	Portuguese (Code Page860)
4	Canadian-French (Code Page863)
5	Nordic (Code Page865)
13	Turkish (Code Page857)
14	Greek (Code Page737)
16	Latin (Code Page1252)
17	Russian (Code Page866)
18	Eastern Europe (Code Page852)
19	Euro (Code Page858)
34	Cyrillic (Code Page855)
37	Arabic (Code Page864)
45	Central European (Code Page1250)
46	Cyrillic (Code Page1251)
47	Greek (Code Page1253)
48	Turkish (Code Page1254)

When a number not assigned to the character code table is set, the character code table number is set to 0 (USA, Standard Europe). For the character code table, see the "Set Codepage" command ("TCP").

Table 4-5 Character Code Table Setting (MS8)

MS	Function	Number of Bytes	Definition Range	Default Setting
8	Character Code Table Setting (Character Code Table)	1 byte	0 to 48	**0**

7. International Character Setting (MS9)

A value corresponding to the international character set can be selected.

Table 4-6 International Character Set

n	Country	n	Country
0	USA	9	Norway
1	France	10	Denmark II
2	Germany	11	Spain II
3	United Kingdom	12	Latin America
4	Denmark I	13	Prohibition*
5	Sweden	14	Prohibition*
6	Italy	15	Prohibition*
7	Spain I	16	Prohibition*
8	Japan	17	Arabia

*: The setting is ignored when the prohibition is selected.

When a number not assigned to the international character is set, USA is set. For the international character setting, see the "Set International Character" command ("TIN").

Table 4-7 International Character Setting (MS9)

MS	Function	Number of Bytes	Definition Range	Default Setting
9	International Character Setting (International Character)	1 byte	0 to 17	**0**

8. Reserved (MS10 to 16)

MS10 to 16 are all reserved. To write all 16 bytes, send FFH as values of MS10 to 16.

CHAPTER 5
ERROR AND SWITCH FUNCTION

5.1 ERROR AND RECOVERY PROCEDURE

When an error occurs in Display, the displaying is stopped. However, the data receiving is enabled. The table below shows errors and their recovery procedures.

Table 5-1 Error and Recovery Procedure

Error	Detail	Recovery Procedure
Voltage error	The power voltage is out of the allowable range.	The printer automatically recovers when the voltage is returned to the allowable range.
Hardware error	An abnormality occurs in the LCD or the circuit board.	Recovery is not possible. Request for repair.

5.2 SWITCH

Display has the function setting switch (hereinafter referred to as the "switch").
The switch function changes depending on the mode.
See "6.5 STATE TRANSITION" for details of the mode.

Figure 5-1 Function Setting Switch

5.2.1 For Standby Mode

By pressing the switch for 1 second or more (hereinafter referred to as the "long press"), changes to the display of Function setting operation mode.

When an event notification request is caused from the printer, the screen changes to the display of Guide mode by pressing the switch for less than 1 second (hereinafter referred as the "short press").
If there is no event notification request, nothing happens.

5.2.2 For Customer Mode

By doing a long press of the switch, rotates the display orientation other than Guide mode 180 degrees and saves the setting (MS4-2).

When an event notification request is caused from the printer, the screen changes to the display of Guide mode by doing a short press.
If there is no event notification request, nothing happens.

5.2.3 For Guide Mode

By doing a long press of the switch, rotates the display orientation of Guide mode 180 degrees and saves the setting (MS4-3).

By doing a short press of the switch, returns to the display of previous mode (Customer mode or Standby mode).

5.2.4 For Function Setting Operation Mode

The Function Settings can be changed by using a long press and short press of the switch.
The operation method is as follows.

(1) By doing a short press of the switch, the "→" mark moves to the next item.
By doing a long press of the switch, confirms the item that the "→" mark indicates.

(2) The item indicated by the "◆" mark in the function setting operation screen is the current selection item.
Move the "→" mark to the item to change by a short press and confirm by a long press.
The "◆" mark is moved to the changed item after confirming.

(3) To save the Function Settings, select "Save Setting and Exit / 保存して終了" from "Exit / 終了".

The function setting items that can be changed by the switch operation are shown below.

- Brightness Selection (MS1-1 to 8)
- Display Direction Selection (MS4-2)
- Guide Display Selection (MS4-3)

CHAPTER 6
COMMAND FUNCTIONS

6.1 CHARACTER CODES AND COMMANDS

Character code is entered as text element data of template or data of the "Input Text Data" command ("TXW").
The encoding method of the character code entered in the above template is specified by the encoding attribute of the template. See "6.8.3 Template" for details.

This chapter describes about the character code to be entered as data of "Input Text Data" command ("TXW").

6.1.1 JIS Code System

2-byte characters cannot be displayed when JIS code system is selected.

(1) Character codes

00H to 1FH:	For barcode data, these are available. For text data, codes other than LF (0AH) and CR (0DH) are ignored. For other than barcode data and text data, all codes are ignored.
20H to 7EH:	Character code.
7FH:	Ignored.
80H to FEH:	Character code.
FFH:	Depends on the character set. For the Codepage 1250 to 1254 character sets and optional fonts, they are processed as a character code. For character sets other than above, they are ignored.

6.1.2 Shift-JIS Code System

(1) Character codes of 1-byte code system character

00H to 1FH:	For barcode data, these are available. For text data, codes other than LF (0AH) and CR (0DH) are ignored. For other than barcode data and text data, all codes are ignored.
20H to 7EH:	Character code.
7FH:	Ignored.
80H to FEH:	See (2).
FFH:	Depends on the character set. For the Codepage 1250 to 1254 character sets and optional fonts, they are processed as a character code. For character sets other than above, they are ignored.

(2) Character codes of 2-byte code system character

2-byte character is specified with 2 bytes character code.

(a) The 1st byte

81H to 9FH:	2-byte character area
E0H to EBH:	2-byte character area
ECH:	User-defined character area
EDH to EFH:	2-byte character area
FAH to FCH:	2-byte character area

The codes 80H to FEH other than above are processed as 1-byte code system characters.

(b) The 2nd byte

40H to 7EH:	Processed as the 2nd byte of Shift-JIS code.
80H to FCH:	Processed as the 2nd byte of Shift-JIS code.

Codes other than above are ignored with the 1st byte.

The codes not defined as Shift-JIS code system or special characters within the 2-byte character area are processed as 2-byte spaces.

6.2 FLASH MEMORY

The configuration of FLASH memory is as follows.

System area:	Stores data for controlling system.
Font area:	Stores font data such as Kanji.
User area:	Stores templates, images, user-defined characters, downloaded characters, optional fonts, macros.
Slide data area:	Stores slide data.

The system area is rewritten using commands, such as "Change Function Settings" command ("DSW") and "Save Maintenance Counter" command ("MNW").
The font area cannot be rewritten.
The user area can be rewritten by registration commands for templates, images, user-defined characters, downloaded characters, optional fonts, macro function, and so on. The memory capacity of the user area is 5M bytes.
The slide data area can be rewritten by the "Register Slide Data" command ("SLW").
Slide data has a fixed storage area for each ID.

(1) Memory area

When templates, images, optional fonts, user-defined characters, and macro are registered, the remaining memory capacity of the user area must not be exceeded.
These registration commands operate as follows.

- When the parameter of command is out of range
  Everything is ignored including the following data.

- When the command is normal, but the memory area cannot be allocated (insufficient memory capacity)
  Everything is ignored including the following data.

- When the command is normal and the memory area has been allocated
  The data is registered.
  The remaining memory capacity can be confirmed by the "Send Remaining User Area" command ("UAT").

Moreover, the amount of data for templates, images, optional fonts, user-defined characters, and macros is limited to the values in the table below. When these functions are used, do not exceed the limits.

Function	Capacity (Bytes)
Template (per ID)	8192
Image data registration (per ID)	261120
Optional font (per character)	8160
User-defined character (all text data)	9776
Macro (per ID)	1024

(2) Memory control information

When the data of each function is registered to the user area, the memory control information is always added to the beginning of the allocated area.
The size of memory control information for each function is shown as follows.

Function	Memory Control Information (Bytes)
Template	48
Image data registration	52
Optional font	16
User-defined character	12
Macro	52

When the memory capacity required for registration is calculated, include the number of bytes of memory control information. In addition, the total number of registered data is a multiple of 4. When the calculation result is other than a multiple of 4, it will be rounded up to a multiple of 4.

For the template, the amount of change in the send data size and the remaining memory capacity do not match since the sent data is saved after converting to the data for saving inside Display.
To calculate the required memory capacity, use the send data size.

For the image, the amount of change in the send data size and the remaining memory capacity do not match since the sent data is saved after converting to the data for saving inside Display.
To calculate the required memory capacity, the saving data size is needed to be calculated by the following formula.

vertical size × horizontal size × 2 bytes

e.g. vertical: 100 px × horizontal : 50 px

The saving data size = 100 × 50 × 2 = 10000 bytes

(3) Precautions for the macro registration

The commands other than those shown in Table 6-1 cannot be included in the macro.

Table 6-1 Macro Registration Possible Commands

Command	Command Name	Command	Command Name
"TPR"	Select Template	"TUL"	Set Underline
"IMR"	Set Image Data	"TSZ"	Set Character Size
"SLR"	Select Slide Data	"TCF"	Set Character Font
"TXW"	Input Text Data	"TDF"	Set Registered Font
"BCR"	Input Barcode Data	"TCP"	Set Codepage
"QRW"	Input QR Code Data	"TIN"	Set International Character
"TIS"	Select Text Element	"TSP"	Set Character Right Space
"TAL"	Alignment	"TCL"	Set Character Color
"TLM"	Set Left Margin	"TLS"	Set Line Spacing
"TBD"	Set Bold Character	"DPU"	Update Display

When there are commands other than those shown in Table 6-1 during macro registration, they will be ignored at the time of macro execution.

(4) Data at the shipping

The following data are registered in advance at the current shipping.

- Template data (ID = 119 to 127) : for sample data, ID = 119 to 126
- Image data (ID = 49 to 63)
- Macro data (ID = 120 to 127)
- Slide data (ID = 80 to 91) : for sample data, ID = 80 to 83

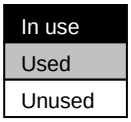
Do not delete or overwrite the data other than sample since it is used at the time of displaying Guide mode. The sample data can be deleted or overwritten if it is not necessary. In addition, note that sample data at the shipping may be added as needed. For example, when 1 template sample is added at the shipping, ID = 118 is registered and shipped.

(5) Memory management

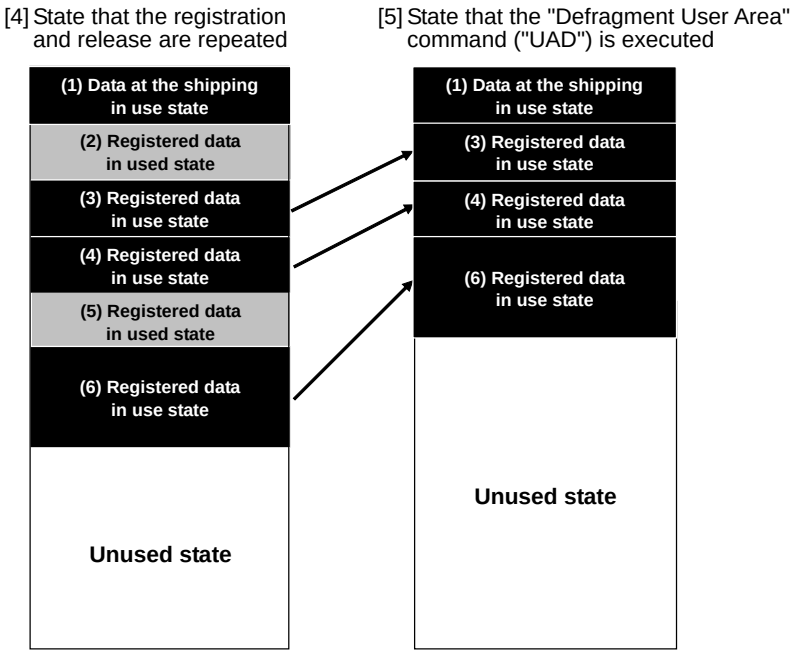
1. Usage status of the user area in the FLASH memory

The user area in the FLASH memory has the following 3 usage states:

- In use state
- Used state
- Unused state



The data are registered in advance at the shipping.
When a data is registered in the user area, the user area turns to "In use state" as described in the figure below. When the data in use state is released, the area turns to "Used state". This area cannot be reused as it is.



When data registration and release are repeated, the memory state turns to the [4] state in the figure. In order to use the "Used state" area again, execute the "Defragment User Area" command ("UAD"). The [5] shows the memory state after defragmented.

Execute the "Send Remaining User Area" command ("UAT") to check the current memory empty capacity.
By the "Send Remaining User Area" command ("UAT"), Display sends the current memory capacity which is in an unused state.

2. Precautions during rewriting, releasing and allocating in the FLASH memory area

At executing the commands that register data to the user area (template, image, macro, optional font, downloaded character and user-defined character) and slide command that register data to the slide area, when the data is already registered in these areas, the registered data and the data to be newly registered are compared. And when they are equal, overwriting is not performed.

The FLASH memory can be rewritten approximately 100000 times. In order to effectively use the number of rewritable times, execute the "Defragment User Area" command ("UAD") only after the free area of memory becomes low.

Do not turn off the power while the command involving writing or deleting to the FLASH memory is executed. When doing so, the data in the FLASH memory may be destructed and operational malfunctioning may occur. To confirm these terminations, send the "Execution Response Request" command ("EXT") following the command and check the response code.

6.3 DRAWING METHOD

There are the following 2 drawing methods of Display.

6.3.1 Slide Drawing

Slide drawing is a drawing method that a slide is displayed on the screen according to the following procedure.

- Register slide data with the "Register Slide Data" command ("SLW")
- Select the registered slide data with the "Select Slide Data" command ("SLR")
- Display the selected slide data on the screen by the "Update Display" command ("DPU").

It is not necessary to specify the position since the slide that can be registered has the same size as the number of pixels (480 px × 272 px) of LCD.

6.3.2 Template Drawing

Template drawing is a drawing method that a template is displayed on the screen according to the following procedure.

- Register a template with the "Register Template" command ("TPW")
- Select the registered template with the "Select Template" command ("TPR")
- Display the selected template on the screen by the "Update Display" command ("DPU").

The following elements can be mapped in the template.

- Text data (text)
- Image data (img)
- QR Code (qr)
- Barcode (barcode)

Input template data in XML format. See"6.8.3 Template" for details.

The mapping of text data is described as follows.
Attributes that are not described in particular use initial values.

Text element mapping example 1

The following describes an example of displaying characters as shown in Figure 6-1.

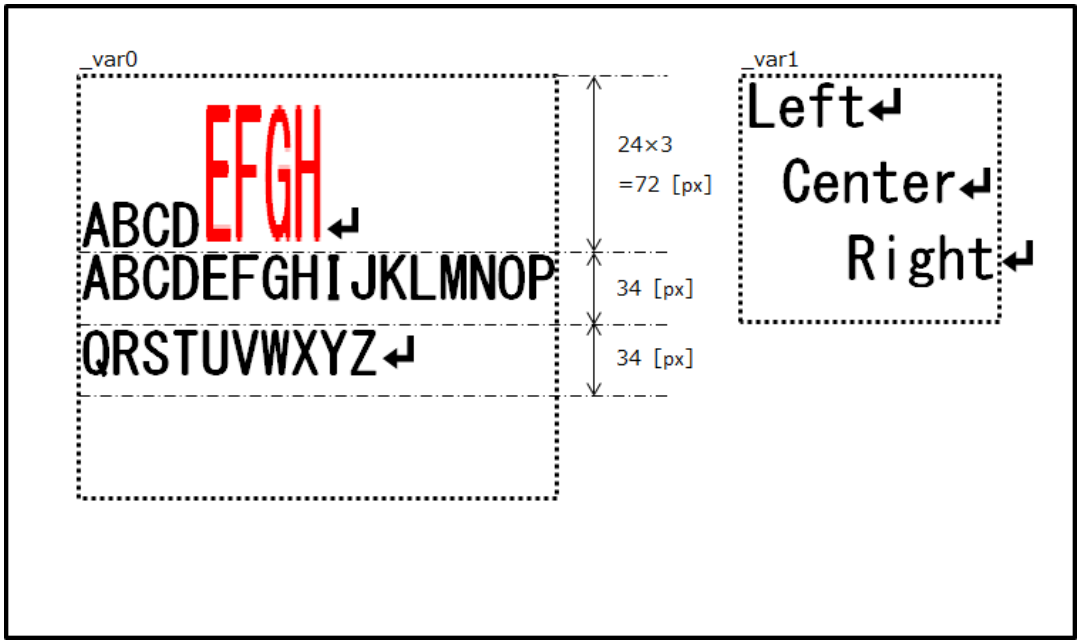


Figure 6-1 Text Element Mapping Example 1 (Display State)

Register a template in which 2 text elements (_var0, _var1) are mapped by the "Register Template" command ("TPW").

- _var0 : Drawing area start point (30, 30), drawing area size (192, 177)
- _var1 : Drawing area start point (296, 30), drawing area size (104, 104)

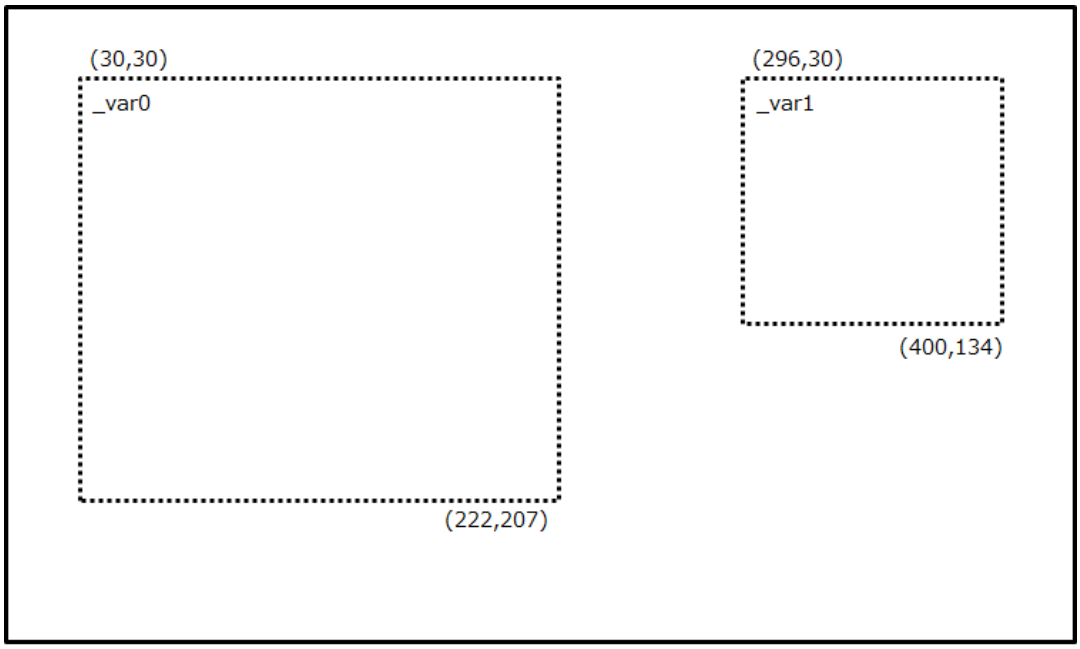


Figure 6-2 Text Element Mapping Example 1 (Template Mapping)

After selecting a template with the "Select Template" command ("TPR"), select _var0 with the "Select Text Element" command ("TIS") and enter as follows:

- Enter the character string "ABCD" with the "Input Text Data" command ("TXW")
- After specifying vertical scale of the character size to 3 times (×3) with the "Set Character Size" command ("TSZ") and the character color to red with the "Set Character Color" command ("TCL"), enter the character string "EFGH" with the "Input Text Data" command ("TXW")
- After canceling vertical scale of the character size 3 times (×3) with the "Set Character Size" command ("TSZ") and changing the character color to black with the "Set Character Color" command ("TCL"), enter the character string of 26 characters from "A" to "Z" with the "Input Text Data" command ("TXW") and insert line feed.

In the 1st line, a line feed is inserted at 72 px because the line spacing is the initial value (34 px) and the character height which is vertical 3 times higher (24 × 3 = 72 px) is higher than the line spacing.
In the 2nd line, a line feed is inserted automatically because the character size exceeds 192 px (horizontal drawing area size) at the 17th character "Q" and subsequent characters.
In the 2nd and 3rd lines, a line feed is inserted at 34 px because the size of line spacing is higher than one of the character height.

Then, select _var1 by the "Select Text Element" command ("TIS") and enter as follows:

- After specifying horizontal alignment to left (Left aligned) with the "Alignment" command ("TAL"), enter the character string "Left" with the "Input Text Data" command ("TXW") and enter line feed
- After specifying horizontal alignment to center (Align center)with the "Alignment" command ("TAL"), enter the character string "Center" with the "Input Text Data" command ("TXW") and enter line feed
- After specifying horizontal alignment to right (Right aligned)with the "Alignment" command ("TAL"), enter the character string "Right" with the "Input Text Data" command ("TXW") and enter line feed

Displays with the "Update Display" command ("DPU").
The 1st line is aligned left, the 2nd line is centered, and the 3rd line is aligned right.

(1) Text element mapping example 2

The following describes an example of using the scroll function.

Register a template in which 2 text elements (_var0, _var1) with Selecting scroll direction (scroll attribute) up specified are mapped.

- _var0 : Drawing area start point (30, 30), drawing area size (133, 118)
  / scroll attribute: up / horizontal-align attribute: left
- _var1 : Drawing area start point (164, 30), drawing area size (176, 118)
  / scroll attribute: up / horizontal-align attribute: right

When the line spacing (line-height attribute) remains in the initial value (34 px), the number of lines that can be entered to each text element (vertical size: 118 px) is 3 lines.

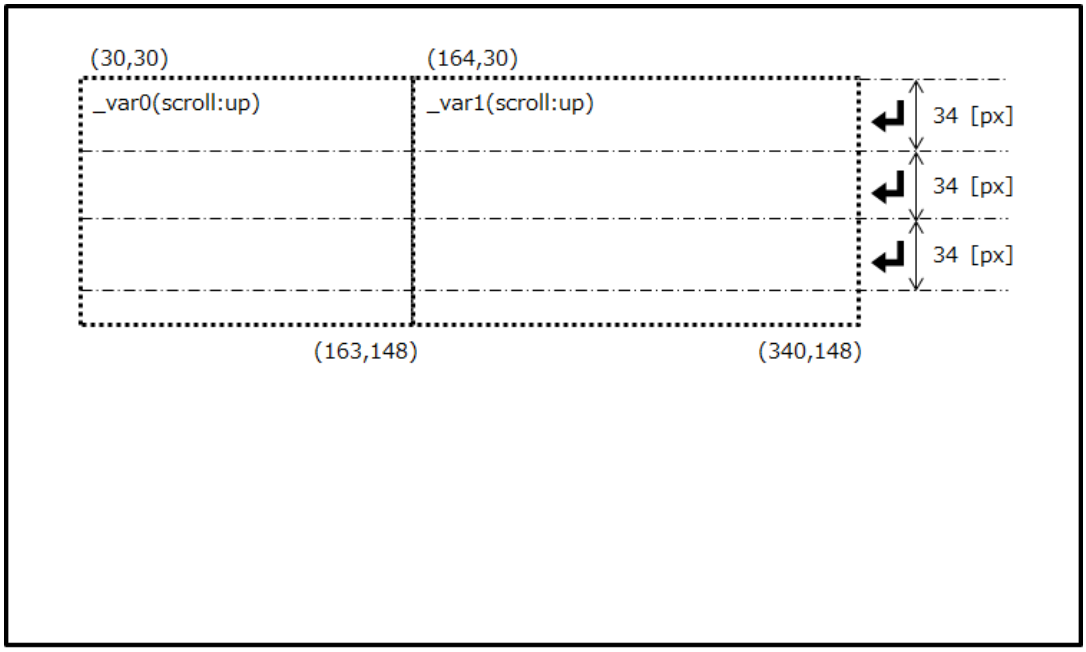


Figure 6-3 Text Element Mapping Example 2 (Template Mapping)

Figure 6-4 shows a display state in which text data is input in _var0 and _var1.
Text data is mapped from the 3rd line since Selecting scroll direction (scroll attribute) is set to up.
In addition, characters are aligned right since Selecting horizontal display position (horizontal-align attribute) of _var1 is selected to the right.

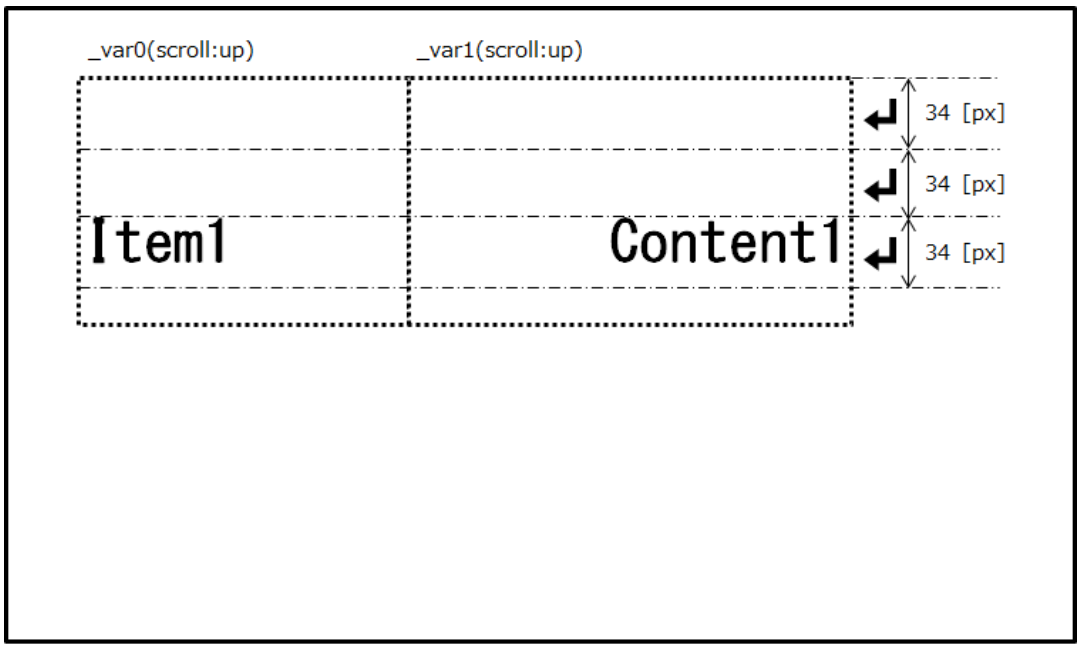


Figure 6-4　Text Element Mapping Example 2 (Display State 1)

Figure 6-5 shows a display state that text data of _var0 and _var1 are updated twice.
Text data is mapped by scrolling from the 3rd line to the upper lines sequentially.
Therefore, since previously entered text data is scrolled automatically, it is not necessary to enter it repeatedly.
In this example, the 3rd line of _var0 is specified as blue text, and the 2nd line of _var1 is specified as red text.

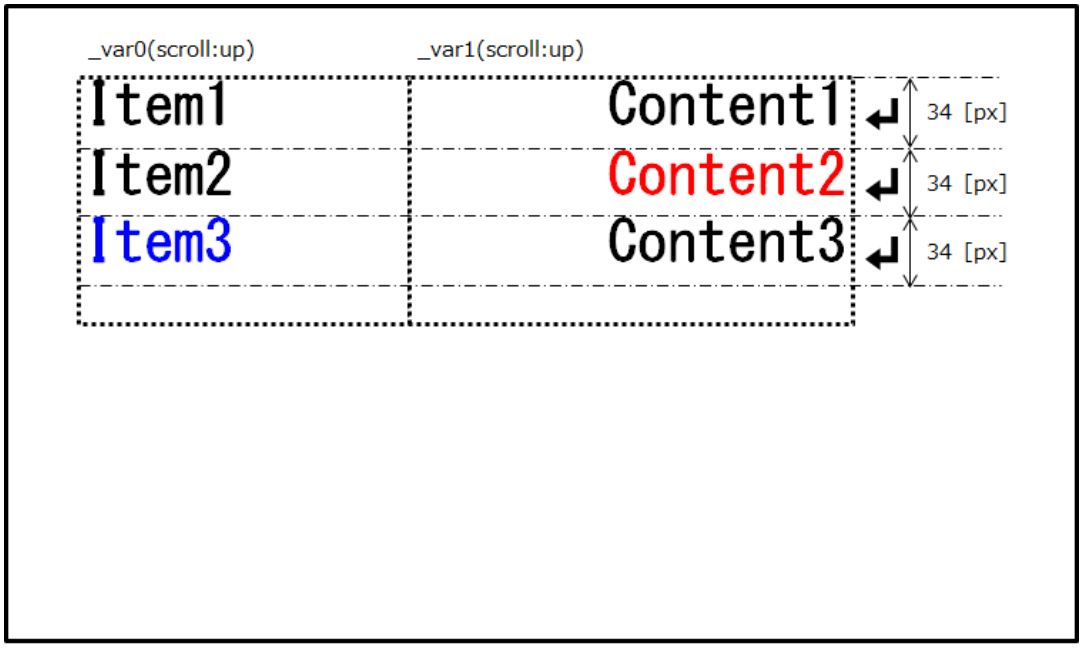


Figure 6-5　Text Element Mapping Example 2 (Display State 2)

Next, the mapping of image data (img), QR Code (qr), and barcode (barcode) elements are described below.

Each element is mapped based on the drawing area start point specified in the template.
When the horizontal width of the element is larger than horizontal width of the drawing area size, the element is ignored without being mapped.
When the vertical width of the element is larger than vertical width of the drawing area size, the element is mapped within the area (the part that goes out of the area is not displayed).

(a) img element mapping example

Figure 6-6 shows an example of mapping img elements (_var0 to _var2).

Register 3 image data with the "Register Image Data" command ("IMW").
Register a template in which 3 img elements (_var0, _var1, _var2) are mapped with the "Register Template" command ("TPW").

- _var0 : Drawing area start point (30, 30), drawing area size (370, 212)
  / horizontal-align attribute: left / vertical-align attribute: top
- _var1 : Drawing area start point (30, 30), drawing area size (370, 212)
  / horizontal-align attribute: center
- _var2 : Drawing area start point (30, 30), drawing area size (370, 212)
  / horizontal-align attribute: right

After selecting a template with the "Select Template" command ("TPR"), specify the image ID for each img element (_var0, _var1, _var2) by the "Set Image Data" command ("IMR").
Display with the "Update Display" command ("DPU").
Images are overlapped and drawn in the order of mapping since they are mapped (command input) in the order of _var0, _var1 and _var2.
In addition, all images are aligned based on the start point and size of the area where they are mapped: _var0 is aligned left, _var1 is centered, and _var2 is aligned right.

The mapping procedure is the same for image data as for QR Codes and barcodes.

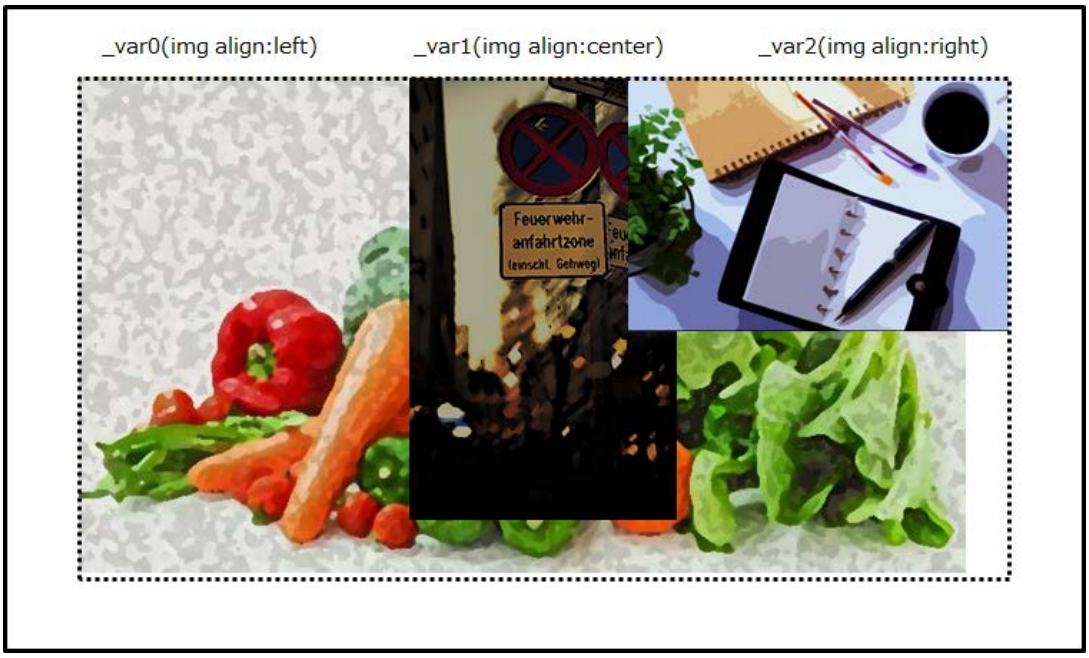


Figure 6-6 Img Element Mapping Example

6.4 MACRO FUNCTION

The macro function is a function that can register and execute the command string for drawing an image.
Macros can be registered by the "Register Macro" command ("MCW").
Combine 1 or more command strings and separate them with the "Update Display" command ("DPU").
It is also possible to display multiple images sequentially in the set display time by setting the period to the "Update Display" command ("DPU").
Both slide drawing and template drawing can be displayed with the macro function.

Macros can be executed by the following way and states:

- "Execute Macro" command ("MCR")
- Standby mode
- Guide mode

Execution count can be specified by the "Execute Macro" command ("MCR").
In Standby mode, the macro specified by the "Specify Macro ID For Standby" command ("MCS") (initial value: ID = 127) is executed repeatedly.
In Guide mode, the registered macro is executed repeatedly according to the event notification request received from the printer. Since macros are registered in the macro ID 120 to 126 at the shipping, do not delete or overwrite when using as it is.

6.5 LAYER

Display draws mapped data by transferring from the layer to the LCD.
The layer indicates a memory area of the LCD's number of pixels (480 px × 272 px) for mapping data such as images and characters.

The layer configuration and application are shown as follows.

6.5.1 Drawing by Commands (For Other Than Display Time Specifying Mode)

When mapped data is displayed without specifying the "Display Time Specifying Mode" command ("DPT"), uses 2 layers.

Maps text data / QR Code / barcode on Character layer, and maps slide data / image data on Image layer.

From the front, in the order of Character layer, Image layer and Background color is superimposed and displayed.

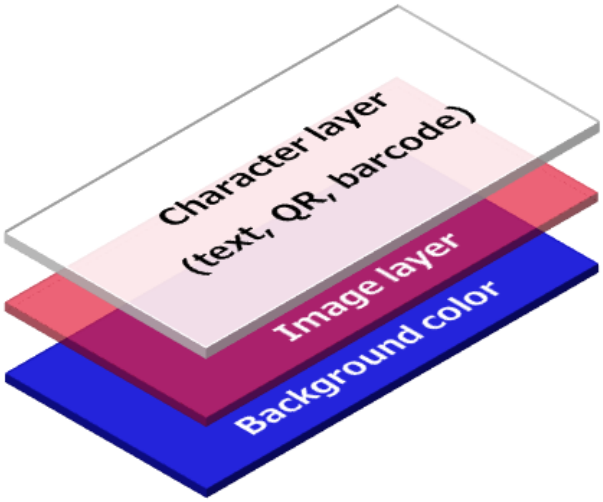


Figure 6-7 Superimposing Order of Layer 1

The drawing content by the command that does not use the "Display Time Specifying Mode" command ("DPT") displayed immediately before is automatically copied to each layer when the content to be drawn is created.
When there is no drawing content by the command that does not use the "Display Time Specifying Mode" command ("DPT") immediately before, copying is not performed.

The mapping of text data, QR Code and barcode is performed after clearing the entire area of each element mapped in the layer.

The mapping of slide data and image data is sequentially overlapped on Image layer. Display does not clear the area.

When overlapping elements on a template are used, be careful because the display contents vary depending on the order of commands. For example, when the following elements are defined on the template, or when text data is mapped after QR data is mapped, all QR data is overwritten. On the other hand, when QR data is mapped after text data is mapped, only the upper half of the text element is overwritten with the QR Code, and the lower half of text element retains text data.

text element : Drawing area start point (0, 0), drawing area size (50, 200)
qr element : Drawing area start point (0, 0), drawing area size (50, 100)

6.5.2 Drawing by Commands (For Display Time Specifying Mode) and Drawing by Macro Functions

When the following functions are used, all data of slide/image/text/QR/barcode are mapped on 1 common layer.

- Drawing by the command using the "Display Time Specifying Mode" command ("DPT")
- Drawing by the "Execute Macro" command ("MCR")
- Standby mode
- Guide mode
- Function setting operation mode

From the front, in the order of Common layer and Background color is superimposed and displayed.

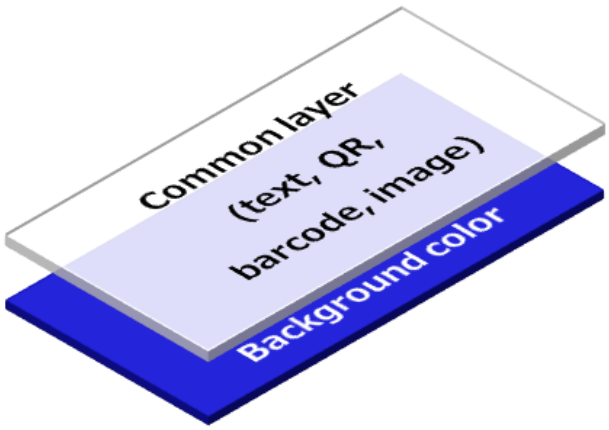


Figure 6-8 Superimposing Order of Layer 2

Each element and slides are overlapped in order and mapped into Common layer. Display does not clear the entire area.

Normally, specify text data / QR / barcode with commands or register them in macros after slide data or image data.

6.6 STATE TRANSITION

There are 6 states exist in Display.

Power off	:	A state that power is not supplied by Vbus
Initialization	:	A state between power supply start and Standby mode (during initialization)
Standby mode	:	A state that Display shows the standby screen without the display of Guide mode, Customer mode and Function setting operation mode
Customer mode	:	A state that Display shows contents by communication data sequentially
Guide mode	:	A state that Display shows the guide screen by event notification request
Function setting operation mode	:	A state that Display shows the function setting operation screen by switch operation

The transition to Guide mode or the return from Guide mode to Standby mode / Customer mode is performed by the USB vendor request (event notification request).
Data by the command that is not in display time specifying mode is updated in the background during even Guide mode.
Guide mode has no priority. Executes the macro assigned to the received event notification request.
Display does not execute anything when no macro is set in the received event notification request.
See "6.8.1 USB Vendor Request" for details of USB vendor request.

Figure 6-9 shows state transition.

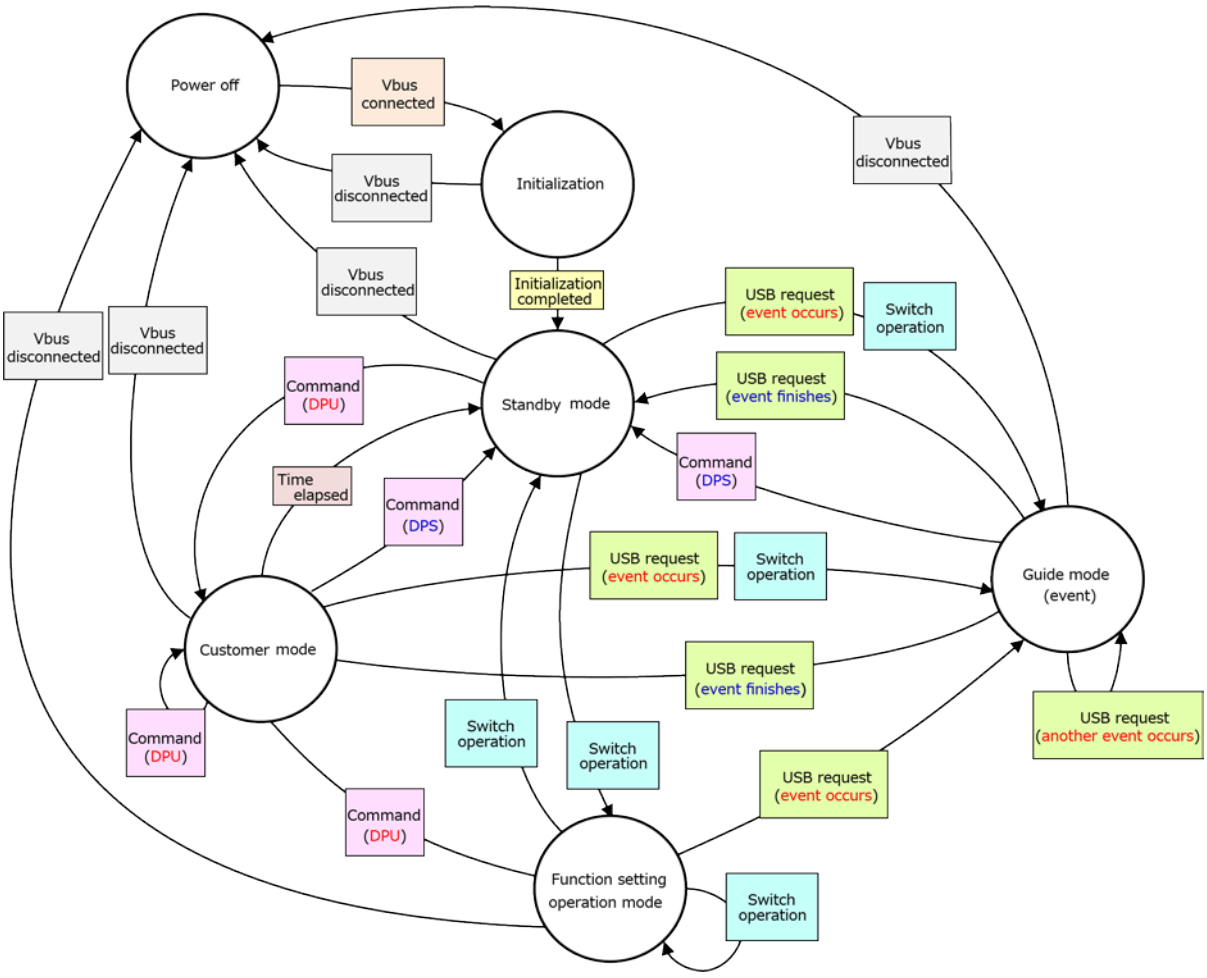


Figure 6-9 Figure of State Transition

6.7 RESPONSE DATA

All of upper 4 bits in response data sent from Display to the host device are identifiers. Table 6-2 shows the meanings to the identifiers.
For multi-byte string responses, the 1-byte ASCII code shown in Table 6-3 following the start identifier (10H) specifies the data format to be responded.

Table 6-2 Response Identifiers

Identifier	Function
00H	End of multi-byte string
10H	Start of multi-byte string
2xH to 7xH	ASCII characters
ExH	Lower 4 bits of HEX code
FxH	Upper 4 bits of HEX code

Table 6-3 Type Code

Type Code	Response Format
32H	Character string
3EH	HEX code
4xH	Execution response
7xH	Initialized response

The responses are sent in the following forms.

(1) Character string

The data is sent in the order of start code (10H), type code (32H), character string, and termination code (00H).

For example, when the character string 'SII' is sent from Display:
10H, 32H, 53H, 49H, 49H, 00H

(2) HEX code

The data is sent in the order of start code (10H), type code (3EH), lower byte of HEX code, higher byte of HEX code, and termination code (00H).

For example, when 12H, 34H, and 56H are sent from Display:
10H, 3EH, E2H, F1H, E4H, F3H, E6H, F5H, 00H

(3) Execution response

Following start code (10H), 1 byte data which is the logical sum of lower 4 bits of the parameter n input in the "Execution Response Request" command ("EXT") and type code (40H), and termination code (00H) are sent.

For example, when n = 4 is input:
10H, 44H, 00H

(4) Initialized response

Display informs that initialization has completed by sending start code (10H), 1 byte data which is the logical sum of lower 4 bits indicating the factor of the initialization and type code (70H), and termination code (00H).

70H: Initialization by the power on

For example, when the power is turned on:
10H, 70H, 00H

6.8 COMMAND DESCRIPTION

This chapter describes the commands in each function.

Code	Indicates the hexadecimal code (H).
Definition Range	Shows the parameter and the settable data range.
Default	Describes the default value for the command involving parameter.
Function	Shows the function of the command.
Notes	Describes notes about the command as needed.
Related Commands	Describes commands related to this command operation.
Description Example	Shows a concrete command or description example of template, etc.

The meanings of the terms are described below.

- Ignore
  This is a state of discarding all codes including parameters and not doing anything.
- LSB/MSB
  LSB represents the least significant bit and MSB represents the most significant bit.

6.8.1 Header Code

US “LD” id p1 p2 p3 p4 Common Header Code

Code 1FH 4CH 44H id p1 p2 p3 p4

Definition Range id = 49
3 ≤ (p3 × 65536 + p2 × 256 + p1) ≤ 16777215
(0 ≤ p1 ≤ 255, 0 ≤ p2 ≤ 255, 0 ≤ p3 ≤ 255)
p4 = 0

Function
id : Device ID
p1, p2, p3 : Number of bytes of subsequent command data
p4 : (Reserved)

This code must be added immediately before each command shown below.

Notes This command cannot be omitted.

6.8.2 Screen Operation

"DPU" time — Update Display

Code 44H 50H 55H time

Definition Range 0 ≤ time ≤ 255

Function Displays slide drawing or template drawing for the period (seconds) specified with 'time'.
time : Display time
In the case of 1 ≤ time ≤ 255, continues to display for the specified period (seconds).
In the case of time = 0, continues to display until another request is received.

In the case of 1 ≤ time ≤ 255, it is necessary to specify the "Display Time Specifying Mode" command ("DPT") before starting drawing to be displayed.
For example, when the screen 2 is displayed by display time specifying, the flow is as follows.

Step 1: Display the screen 1 with the "Update Display" command ("DPU").
Step 2: Set the next display to display time specifying mode with the "Display Time Specifying Mode" command ("DPT").
Step 3: Draw the screen 2 (template drawing or slide drawing)
Step 4: Display the screen 2 with the "Update Display" command ("DPU") (display time can be specified with 'time')

Note that even if "Display Time Specifying Mode" command ("DPT") is specified after starting drawing (Step 3), specifying display time by 'time' is not valid. In addition, "Display Time Specifying Mode" command ("DPT") needs to be specified every display.

When "Display Time Specifying Mode" command ("DPT") is not specified, Display continues to show the drawing regardless of the value of 'time' (same as time = 0).

In the case of 1 ≤ time ≤ 255, the screen returns to the previous screen after the specified display time is elapsed. On the other hand, when Display receives a request to show another screen during displaying, changes the screen at the time and does not return to this screen.

Displayed data on the screen is held even after this command is executed.
When you want to change a part and redisplay the template drawing, it can be displayed by only changing a part of the original data.

Notes The scroll attribute of the text element is disabled when the "Display Time Specifying Mode" command ("DPT") is specified. Specify time = 0 to enable the scroll attribute.

Only when this command is registered in a macro and used, the display time can be specified with 'time' without specifying the "Display Time Specifying Mode" command ("DPT"). (1 ≤ time ≤ 255)

"DP+" Turn On Screen

Code 44H 50H 2BH

Function Turns on the screen backlight.

"DP-" Turn Off Screen

Code 44H 50H 2DH

Function Turns off the screen backlight.

"DPS" Display standby

Code 44H 50H 53H

Function Changes Display Standby mode and displays the standby screen.

Notes This command cannot be registered in macro.

"DPT" Display Time Specifying Mode

Code 44H 50H 54H

Function When the display time is specified as 1 ≤ time ≤ 255 with the "Update Display" command ("DPU"), this command is required to specify in advance.
See the "Update Display" command ("DPU") for details.

Notes This command cannot be registered in macro.

6.8.3 Template

Data to display can be mapped by inputting XML format tags. Capital letters and small letters are distinguished.

Start and end tags cannot be omitted. Never fail to input them.

When the control code is included in text data or barcode data, describe the code by adding "&#x" before the hexadecimal character code, and adding ";" after the hexadecimal character code.
The control codes that can be used in text data are only LF (0AH) and CR (0DH) which execute line feed. LF (0AH) immediately after CR (0DH) is ignored.

The control codes (00H to1FH, 7FH) in XML documents other than the above are ignored.
See Table 6-4 for details.

Table 6-4 Control Code Description Method

Hexadecimal	Name	Description Method	Hexadecimal	Name	Description Method
00H	NUL	&#x00;	11H	DC1	&#x11;
01H	SOH	&#x01;	12H	DC2	&#x12;
02H	STX	&#x02;	13H	DC3	&#x13;
03H	ETX	&#x03;	14H	DC4	&#x14;
04H	EOT	&#x04;	15H	NAC	&#x15;
05H	ENQ	&#x05;	16H	SYN	&#x16;
06H	ACK	&#x06;	17H	ETB	&#x17;
07H	BEL	&#x07;	18H	CAN	&#x18;
08H	BS	&#x08;	19H	EM	&#x19;
09H	HT		1AH	SUB	&#x1A;
0AH	LF
1BH	ESC	&#x1B;
0BH	VT	&#x0B;	1CH	FS	&#x1C;
0CH	FF		1DH	GS	&#x1D;
0DH	CR
1EH	RS	&#x1E;
0EH	SO	&#x0E;	1FH	US	&#x1F;
0FH	SI	&#x0F;	7FH	DEL	&#x7F;
10H	DLE	&#x10;			

As for the escape characters shown below, describe according to Table 6-5.

Table 6-5 Description Method by Entity Reference

Character	Description Method by Entity Reference
<	<
>	>
&	&
"	"
'	'

As for the map ID used to identify each element (text, img, qr, barcode) mapped in the template, describe "_" (underbar) before the map ID as shown below.

e.g. When a text element with map ID = 3 is described (including tags)
<text>_var3</text>

To describe "_" (underbar) as characters at the beginning of text data or barcode data, describe twice in a row.

e.g. When "_ABC" is described as text data (including tags)
<text>__ABC</text> (Describe the underbar twice)

Space (20H) in the XML document at the beginning of the line is ignored. Note that 20H is processed as character code when it is not at the beginning. In particular, be careful when the XML documents are described using indents.

In the table of attributes, the initial value of the attribute is indicated by an underline in the "Value" column or ( ).

Set all units in px (pixel).

(1) Template operation command

"TPW" template_id [name]k 00H [data]m Register Template

Code 54H 50H 57H template_id [name]k 00H [data]m

Definition Range
0 ≤ template_id ≤ 127
32 ≤ name ≤ 126
0 ≤ data ≤ 255
0 ≤ k ≤ 32
0 ≤ m ≤ 8192

Function Registers a template in the selected ID.
template_id : Template ID
name : Template name
data : Template data

128 types of templates can be registered independently.
Template data are described in XML format.

The available number of characters is 0 to 32 for the template name. The template name which is registered in the ID can be checked by responding with the "Send Template Name" command ("TPN"). The name can be omitted.

The character code system is specified by the encoding attribute of the XML declaration part. When 2-bytes characters such as Kanji are used, selects Shift-JIS code system. When they are not used, select JIS code system.
When JIS code system is selected, describe "ISO-2022-JP".
When Shift-JIS code system is selected, describe "Shift_JIS".
When the encoding attribute of the XML declaration part is omitted, JIS code system is selected.
The template registration is also described in "6.2 FLASH MEMORY", so refer to it.

Notes Template data size is maximum 8192 bytes. This data size includes all data entered into Display, such as spaces and line feeds. That is, when the template is converted as a text file, the file size is the data size of the template.
In addition, Display is required to have a header that describes the data size of the command when the command is specified.

Do not specify the template ID of 127 because it is being used for the system.

Description Example

```
1FH 4CH 44H 31H F0H 01H 00H 00H                 //header code
54H 50H 57H 00H 00H                             //template registration command (5 bytes)
<?xml version="1.0" encoding="ISO-2022-JP"?>
<template>
  <text pos="0,0" size="152,209" scroll="up">_var0</text>
  <text pos="152,0" size="74,209" scroll="up">_var1</text>
  <text pos="226,0" size="124,209" scroll="up">_var2</text>
  <text pos="350,0" size="130,209" scroll="up">_var3</text>
  <text pos="0,210" size="220,62" font-size="2x">Total</text>
  <text pos="220,210" size="64,62" font-size="2x">$</text>
  <text pos="284,210" size="196,62" font-size="2x">_var4</text>
</template>
```

"TPC" template_id — Delete Template

Code 54H 50H 43H template_id

Definition Range 0 ≤ template_id ≤ 127

Function Deletes a template of the selected ID.
template_id : Template ID

Notes This command is ignored when the template is not registered in the specified ID, or when other than definition range is specified.

"TPR" template_id — Select Template

Code 54H 50H 52H template_id

Definition Range 0 ≤ template_id ≤ 127, 255

Function Selects or cancels a template.
template_id : Template ID

Notes When template_id = 255 is specified, the template is canceled.
This command is ignored when the template is not registered in the specified ID, or when other than definition range is specified.
The selected template is canceled by the "Display Standby" command ("DPS").
This command erases Display contents input so far.
This command deselects the previous text element, and the setting is initialized to the setting value of the template.

In the following cases, the selected template is canceled when the screen is displayed with the "Update Display" command ("DPU").
- When a template is selected with the state that the "Display Time Specifying Mode" command ("DPT") is specified
- When the macro with which the "Select Template" command ("TPR") is defined is used

Related Commands "SLR"

Description Example

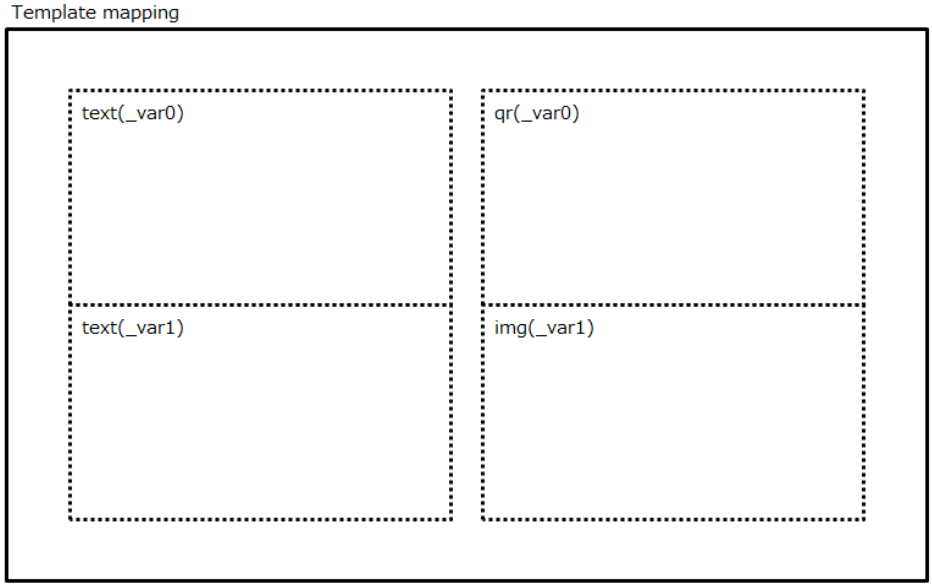
[Command contents]

1. Select the template (ID: 0)
2. Select the text element (_var0)
3. Input text data in the text element of _var0 ("ABCDE")
4. Set the character color (red)
5. Input text data in the text element of _var0 ("abcde")
6. Select the text element (_var1)
7. Set the character size (2 × 2)
8. Input text data in the text element of _var1 ("12345")
9. Input QR Code data in the qr element of _var0 (00H to 07H, "01234567")
10. Set image data in the img element of _var1 (ID: 0)
11. Update display (time: 0)
12. Select the text element (_var0)
13. Input text data in the text element of _var0 ("FGHIJ")
14. Update display (time: 0)

[Data]

```
1FH 4CH 44H 31H 04H 00H 00H 00H  // 1.  Common Header Code (4 bytes)
54H 50H 52H 00H                  //     "Select Template" command
1FH 4CH 44H 31H 04H 00H 00H 00H  // 2.  Common Header Code (4 bytes)
54H 49H 53H 00H                  //     "Select Text Element" command
1FH 4CH 44H 31H 08H 00H 00H 00H  // 3.  Common Header Code (8 bytes)
54H 58H 57H 41H 42H 43H 44H 45H  //     "Input Text Data" command ("ABCDE")
1FH 4CH 44H 31H 05H 00H 00H 00H  // 4.  Common Header Code (5 bytes)
54H 43H 4CH 00H FCH              //     "Set Character Color" command
                                 //     (FC00H = "red")
1FH 4CH 44H 31H 08H 00H 00H 00H  // 5.  Common Header Code (8 bytes)
54H 58H 57H 61H 62H 63H 64H 65H  //     "Input Text Data" command ("abcde")
1FH 4CH 44H 31H 04H 00H 00H 00H  // 6.  Common Header Code (4 bytes)
54H 49H 53H 01H                  //     "Select Text Element" command
1FH 4CH 44H 31H 04H 00H 00H 00H  // 7.  Common Header Code (4 bytes)
54H 53H 5AH 11H                  //     "Set Character Size" command (2 × 2)
1FH 4CH 44H 31H 08H 00H 00H 00H  // 8.  Common Header Code (8 bytes)
54H 58H 57H 31H 32H 33H 34H 35H  //     "Input Text Data" command ("12345")
1FH 4CH 44H 31H 15H 00H 00H 00H  // 9.  Common Header Code (21 bytes)
51H 52H 57H 00H 00H              //     "Input QR Code Data" command
00H 01H 02H 03H 04H 05H 06H 07H  //     Control code (00H to 07H)
30H 31H 32H 33H 34H 35H 36H 37H  //     Character code ("01234567")
1FH 4CH 44H 31H 05H 00H 00H 00H  // 10. Common Header Code (5 bytes)
49H 4DH 52H 01H 00H              //     "Set Image Data" command
1FH 4CH 44H 31H 04H 00H 00H 00H  // 11. Common Header Code (4 bytes)
44H 50H 2BH 00H                  //     "Update Display" command
1FH 4CH 44H 31H 04H 00H 00H 00H  // 12. Common Header Code (4 bytes)
54H 49H 53H 00H                  //     "Select Text Element" command
1FH 4CH 44H 31H 09H 00H 00H 00H  // 13. Common Header Code (9 bytes)
54H 58H 57H 46H 47H 48H 49H 4AH  //     "Input Text Data" command ("FGHIJ")
1FH 4CH 44H 31H 04H 00H 00H 00H  // 14. Common Header Code (4 bytes)
44H 50H 2BH 00H                  //     "Update Display" command
```

Template mapping



Display state 1

Display state 2

"TPT" Send Template ID

Code 54H 50H 54H

Function In response to the request of this command, Display sends the registered template ID in HEX code format.
Responds ID = 0 as 00H, ID = 1 as 01H, ・・・, ID = 127 as 7FH.
When 30 or more templates are registered, the data is divided to the upper limit of 29 templates and sent.
The first 2 bytes of the response shows the status of the data that follows.

Response Data	Status
FFH	No following data exists
FEH	Following data exists

The following shows an example of response data when a template with ID = 0 to 31 is registered.
10H, 3EH, EEH, FFH, E0H, F0H, ・・・, ECH, F1H, 00H (1st time : 63 bytes)
10H, 3EH, EFH, FFH, EDH, F1H, ・・・, EFH, F1H, 00H (2nd time: 11 bytes)

When no template is registered, only the start code (10H), type code (3EH), status data (EFH, FFH) and end code (00H) of response data in HEX code format are sent.

Related Commands See "6.7 RESPONSE DATA"

"TPN" template_id Send Template Name

Code 53H 50H 4EH template_id

Definition Range 0 ≤ template_id ≤ 127

Function In response to the request of this command, Display sends template name of the specified ID in character string format.
The following response data are sent when the template name is "TEMPLATE1".
10H, 32H, 54H, 45H, 4DH, 50H, 4CH, 41H, 54H, 45H, 31H, 00H

When no template is registered, only the start code (10H), type code (32H), and end code (00H) of response data in character string format are sent.

Related Commands See "6.7 RESPONSE DATA"

(2) Elements in template

template

Start Tag <template>

End Tag </template>

Function Starts the description of the XML by start tag.
Ends the description of the XML by end tag.

Child Elements "text", "img", "qr", "barcode"

Attribute "background"

Attribute	Value	Function
background	black/white/red/ green/blue/yellow/ cyan/magenta/#RRGGBB	Specifying the background color (RGB565)

text

Start Tag <text>

End Tag </text>

Function Describes the format of text element.

Up to 64 text elements can be mapped in 1 template.
Assign a map ID (_var0 to _var63) to each text element for identification.

There are 2 ways to draw a character (character string): using the "Input Text Data" command ("TXW") and describing in the template directly.

When a character (character string) is described in the template directly, describe a character string directly between the start tag and the end tag.

Attribute

Attribute	Value	Function
pos	0 to 479, 0 to 271 (0,0)	Selecting drawing area start point (x, y)
size	1 to 480, 1 to 272 (480,272)	Specifying drawing area size (wx, wy)
scroll	none/up/down	Selecting scroll direction When none is specified, the scroll function is invalid When up or down is specified, the line spacing is fixed to the value of line-height and cannot be changed by the "Set Line Spacing" command ("TLS") In the following cases, the up or down function is invalid and processed as none ・Display by display time specifying ・Display by macro execution ・Guide mode ・Standby mode
line-height	0 to 255 (34)	Setting line spacing
horizontal-align	left/center/right	Selecting horizontal display position (alignment)
margin	0 to 479 (0)	Setting left margin
font-weight	normal/bold	Setting bold character
text-decoration	none/underline	Setting underline
font-size	1x/2x/3x/4x/ or WHx (W: width, H: height)	Setting character size (Can be enlarged to 4 times each direction Optional fonts are not enlarged)
font-type	fontA/fontB	Setting font size (24-dot/16-dot)
memory-font	normal/option	Setting optional font
encoding	ISO-2022-JP/Shift_JIS	Selecting encoding (Applying the encoding attribute of XML declaration part when this attribute is omitted)
font-table	codepage437/katakana/ codepage850/codepage860/ codepage863/codepage865/ codepage857/codepage737/ codepage1252/codepage866/ codepage855/codepage852/ codepage858/codepage864/ codepage1250/codepage1251/ codepage1253/codepage1254	Setting codepage (Applying the setting value of function settings when this attribute is omitted)
international-character	usa/france/germany/ united-kingdom/denmark1/ sweden/italy/spain1/japan/ norway/denmark2/spain2/ latin-america/arabic	Setting international character (Applying the setting value of function settings when this attribute is omitted)
letter-spacing	0 to 255 (0)	Setting character right space (Character left space is fixed to 0)
color	black/white/red/green/blue/ yellow/cyan/magenta/#RRGGBB	Setting character color (color is reduced to 5 bits each for RGB at displaying)

img

Start Tag <img>

End Tag </img>

Function Describes the format of img element.

Up to 64 img elements can be mapped in 1 template.
Assign a map ID (_var0 to _var63) to each img element for identification.

To draw image data, use the "Set Image Data" command ("IMR").

Attribute

Attribute	Value	Function
pos	0 to 479, 0 to 271 (0, 0)	Selecting drawing area start point (x, y)
size	1 to 480, 1 to 272 (480, 272)	Specifying drawing area size (wx, wy)
horizontal-align	left/center/right	Selecting horizontal display position (alignment)
vertical-align	top/middle/bottom	Selecting vertical display position (alignment)

qr

Start Tag <qr>

End Tag </qr>

Function Describes the format of QR Code element.

Up to 8 QR Code elements can be mapped in 1 template.
Assign a map ID (_var0 to _var7) to each QR Code element for identification.

There are 2 ways to draw the QR Code, using the "Input QR Code Data" command ("QRW"), or describing in the template directly.

When the data of QR Code is described in the template directly, describe a data string directly between the start tag and the end tag.
When double quotation mark (" 22H), ampersand mark (& 26H), single quotation mark (' 27H), less than sign (< 3CH), greater than sign (> 3EH) which are escape characters are included in the data string, describe along with the entity reference.
In addition, when the control codes (00H to 1FH, 7FH) are included in the data string, describe according to the hexadecimal control code description method.
See "6.8.3 Template" for details.

Attribute

Attribute	Value	Function
pos	0 to 479, 0 to 271 (0, 0)	Selecting drawing area start point (x, y)
size	1 to 480, 1 to 272 (480, 272)	Specifying drawing area size (wx, wy)
horizontal-align	left/center/right	Selecting horizontal display position (alignment)
vertical-align	top/middle/bottom	Selecting vertical display position (alignment)
module-size	2 to 11 (3)	Selecting module size
error-correct	L/M/Q/H	Selecting error correction level
mode	N/A/B/K/M	Selecting mode (see the table below)
quiet-zone	enable/disable	Selecting quiet zone enable/disable

Value	Mode
N	Numeric mode
A	Alphanumeric mode
B	8-bit byte mode
K	Kanji mode
M	Mixed mode

barcode

Start Tag <barcode>

End Tag </barcode>

Function Describes the format of barcode element.

Up to 8 barcode elements can be mapped in 1 template.
Assign a map ID (_var0 to _var7) to each barcode element for identification.

There are 2 ways to draw the barcode, using the "Input Barcode Data" command ("BCW"), or describing in the template directly.

When the data of barcode is described in the template directly, describe a data string directly between the start tag and the end tag.
When double quotation mark (" 22H), ampersand mark (& 26H), single quotation mark (' 27H), less than sign (< 3CH), greater than sign (> 3EH) which are escape characters are included in the data string, describe along with the entity reference.
In addition, when the control codes (00H to 1FH, 7FH) are included in the data string, describe according to the hexadecimal control code description method.
See "6.8.3 Template" for details.

Attribute

Attribute	Value	Function
pos	0 to 479, 0 to 271 (0, 0)	Selecting drawing area start point (x, y)
size	1 to 480, 1 to 272 (480, 272)	Specifying drawing area size (wx, wy)
horizontal-align	left/center/right	Selecting horizontal display position (alignment)
vertical-align	top/middle/bottom	Selecting vertical display position (alignment)
type	UPCA/UPCE/JAN8/JAN13/ ITF/CODABAR/CODE39/ CODE93/CODE128	Selecting barcode type (see the table below)
width	1 to 4 (2)	Specifying horizontal size
height	1 to 128 (50)	Specifying vertical size
font-type	fontA/fontB	Selecting font size of HRI character
hri-text	none/top/bottom/two-sides	Selecting position of HRI character When width attribute = 1, this attribute is processed as "none"
quiet-zone	enable/disable	Selecting quiet zone enable/disable

Barcode System	Number of Barcode Data Bytes
UPC-A	11 or more and 12 or less
UPC-E	11 or more and 12 or less
JAN8 (EAN)	7 or more and 8 or less
JAN13 (EAN)	12 or more and 13 or less
ITF	Variable (always even)
CODABAR	Variable
CODE39	Variable
CODE93	Variable
CODE128	Variable

Notes The NW ratio is automatically determined by the setting value of the width attribute.

6.8.4 Image

"IMW" img_id [name]k NULL [data]m — Register Image Data

Code 49H 4DH 57H img_id [name]k 00H [data]m

Definition Range
0 ≤ img_id ≤ 63
32 ≤ name ≤ 126
0 ≤ data ≤ 255
0 ≤ k ≤ 32
0 ≤ m ≤ 786432

Function Registers image data in the selected ID.
img_id : Image ID
name : Image name
data : Image data

Either JPEG or PNG data format can be used.
The image data is saved in the user area.
Since data is decoded and saved, allocate the data size after decoding for memory empty capacity of the user area.
The remaining capacity of the user area required for image data registration is calculated using the following formula. (Memory control information is 52 bytes for image registration. In addition, when the calculation result is other than a multiple of 4, it will be rounded up to a multiple of 4.)
vertical size (number of pixels) × horizontal size (number of pixels) × 2 bytes + 52 bytes

The image data registration is also described in "6.2 FLASH MEMORY", so refer to it.

Notes This command is ignored in the following cases.
When other than definition range is specified
When the file is other than specified format (JPEG, PNG)
When the image size is greater than 480 × 272

JPEG and PNG may not be registered depending on the format.

Do not specify the image IDs of 49 to 63 because they are being used for the system.

"IMC" img_id — Delete Image Data

Code 49H 4DH 43H img_id

Definition Range 0 ≤ img_id ≤ 63

Function Deletes image data of the selected ID.
img_id : Image ID

Notes This command is ignored when the image is not registered in the specified ID or when other than definition range is specified.

"IMR" tpl_img_id img_id — Set Image Data

Code 49H 4DH 52H tpl_img_id img_id

Definition Range
0 ≤ tpl_img_id ≤ 63
0 ≤ img_id ≤ 63

Function Selects the image ID (img_id) to be mapped for the map ID: _var0 to _var63 (tpl_img_id) of img element defined on the template.
img_id : Image ID
tpl_img_id : Map ID of img element

Notes This command is ignored in the following cases.
When no template is selected
When image data is not registered in the specified ID
When the specified ID is not defined in the template
When other than definition range is specified

"IMT" Send Image ID

Code 49H 4DH 54H

Function In response to the request of this command, Display sends the registered image ID in HEX code format.
Responds ID = 0 as 00H, ID = 1 as 01H, ・・・, ID = 63 as 3FH.
When 30 or more image data are registered, the data is divided to the upper limit of 29 and sent.
The first 2 bytes of the response shows the status of the data that follows.

Response Data	Status
FFH	No following data exists
FEH	Following data exists

The following shows an example of response data when all image data with ID = 0 to 63 is registered.
10H, 3EH, EEH, FFH, E0H, F0H, ・・・, ECH, F1H, 00H (1st time : 63 bytes)
10H, 3EH, EEH, FFH, EDH, F1H, ・・・, E9H, F3H, 00H (2nd time: 63 bytes)
10H, 3EH, EFH, FFH, EAH, F3H, ・・・, EFH, F3H, 00H (3rd time : 17 bytes)

When no image data is registered, only the start code (10H), type code (3EH), status data (EFH, FFH) and end code (00H) of response data in HEX code format are sent.

Related Commands See "6.7 RESPONSE DATA"

"IMN" img_id Send Image Name

Code 49H 4DH 4EH img_id

Definition Range 0 ≤ img_id ≤ 63

Function In response to the request of this command, Display sends image name of the specified ID in character string format.
The following response data are sent when the image name is "IMG1".
10H, 32H, 49H, 4DH, 47H, 31H, 00H

When no image data is registered or when no image name is registered, only the start code (10H), type code (32H), and end code (00H) of response data in character string format are sent.

Related Commands See "6.7 RESPONSE DATA"

"SLW" slide_id [name]k NULL [data]m — Register Slide Data

Code 53H 4CH 57H slide_id [name]k 00H [data]m

Definition Range
0 ≤ slide_id ≤ 91
32 ≤ name ≤ 126
0 ≤ data ≤ 255
0 ≤ k ≤ 32
m ≤ 786432

Function Registers slide data (480 × 272 = 130560 px fixed) in the selected ID.
slide_id : Slide ID
name : Slide name
data : Slide data

Either JPEG or PNG data format can be used.

The available number of characters is 0 to 32 for the slide name. The slide name which is registered in the ID can be checked by responding with the "Send Slide Name" command ("SLN"). The name can be omitted.

Slide data is saved in a dedicated area determined for each ID. When slide data has already been registered in the ID, it is overwritten.

Notes This command is ignored in the following cases.
If other than definition range is specified
If the file is other than specified format (JPEG, PNG)
If the slide size is 480 × 272 or more

JPEG and PNG may not be registered depending on the format.

Do not specify the slide IDs of 80 to 90 because they are being used for the system.

"SLC" slide_id — Delete Slide Data

Code 53H 4CH 43H slide_id

Definition Range 0 ≤ slide_id ≤ 91

Function Deletes slide data of the selected ID.
slide_id : Slide ID

Notes This command is ignored when the slide is not registered in the specified ID or when other than definition range is specified.

"SLR" slide_id — Select Slide Data

Code 53H 4CH 52H slide_id

Definition Range 0 ≤ slide_id ≤ 91

Function This command can be used in the template drawing as well as in the slide drawing.
For slide drawing, after selecting a slide ID with this command, a slide can be displayed with the "Update Display" command ("DPU").
For template drawing, after selecting a template, a slide can be displayed as the background of the template by selecting the slide ID with this command.
slide_id : Slide ID

Notes This command is ignored when the slide is not registered in the specified ID or when other than definition range is specified.

"SLT" Send Slide ID

Code 53H 4CH 54H

Function In response to the request of this command, Display sends the registered slide ID in HEX code format.
Responds ID = 0 as 00H, ID = 1 as 01H, ・・・, ID = 91 as 5BH.
When 30 or more slide data are registered, the data is divided to the upper limit of 29 and sent.
The first 2 bytes of the response shows the status of the data that follows.

Response Data	Status
FFH	No following data exists
FEH	Following data exists

The following shows an example of response data when all slide data with ID = 0 to 91 is registered.
10H, 3EH, EEH, FFH, E0H, F0H, ・・・, ECH, F1H, 00H (1st time : 63 bytes)
10H, 3EH, EEH, FFH, EDH, F1H, ・・・, E9H, F3H, 00H (2nd time: 63 bytes)
10H, 3EH, EEH, FFH, EAH, F3H, ・・・, E6H, F5H, 00H (3rd time : 63bytes)
10H, 3EH, EFH, FFH, E7H, F5H, ・・・, EBH, F5H, 00H (4th time : 15bytes)

When no slide data is registered, only the start code (10H), type code (3EH), status data (EFH, FFH) and end code (00H) of response data in HEX code format are sent.

Related Commands See "6.7 RESPONSE DATA"

"SLN" slide_id Send Slide Name

Code 53H 4CH 4EH slide_id

Definition Range 0 ≤ slide_id ≤ 91

Function In response to the request of this command, Display sends slide name of the specified ID in character string format.
The following response data are sent when the slide name is "SLIDE1".
10H, 32H, 53H, 4CH, 49H, 44H, 45H, 31H, 00H

When no slide data is registered or when no image name is registered, only the start code (10H), type code (32H), and end code (00H) of response data in character string format are sent.

Related Commands See "6.7 RESPONSE DATA"

6.8.5 Macro

"MCW" macro_id [data]k — Register Macro

Code 4DH 43H 57H macro_id [data]k

Definition Range
0 ≤ macro_id ≤ 127
0 ≤ data ≤ 255
0 ≤ k ≤ 1024

Function Registers macro.
macro_id : Macro ID
data : Macro data

Notes Registers multiple command strings (macro) in the user area, and specifies the ID.
The display of Guide mode is also displayed by the macro function. That is, the corresponding macro is executed when an event occurs.

The commands that can be registered in macro are as follows. Adds the number of data of that command in 2 bytes at the beginning of each command as size information. (Common header code (US + "LD") is required at the beginning of this command, but this is not required at the beginning of each command to be registered.)
If any command other than the following is input, it will be ignored at macro execution.

"Select Template" command ("TPR")
"Set Image Data" command ("IMR")
"Select Slide Data" command ("SLR")
"Input Text Data" command ("TXW")
"Input Barcode Data" command ("BCW")
"Input QR Code Data" command ("QRW")
"Select Text Element" command ("TIS")
"Alignment" command ("TAL")
"Set Left Margin" command ("TLM")
"Set Bold Character" command ("TBD")
"Set Underline" command ("TUL")
"Set Character Size" command ("TSZ")
"Set Character Font" command ("TCF")
"Set Registered Font" command ("TDF")
"Set Codepage" command ("TCP")
"Set International Character" command ("TIN")
"Set Character Right Space" command ("TSP")
"Set Character Color" command ("TCL")
"Set Line Spacing" command ("TLS")
"Update Display" command ("DPU")

When the data part is NULL (=00H), deletes the macro of the ID.

The remaining capacity of the user area required for macro registration is the value of multiple of 4 (round up) including the number of data for each command, size information (2 bytes), and memory control information. (Memory control information is 52 bytes for macro registration.)
The maximum number of data bytes that can register macro is 1024 bytes.

Notes This command is ignored when other than definition range is specified.
A maximum of 20 "Update Display" command ("DPU") can be registered in a macro.

Do not specify the macro IDs of 120 to 126 because they are being used for the system.

Description Example

[Command contents]

1. Register the macro
2. Select the template (ID: 0)*
3. Select slide data (ID: 0)*
4. Input QR Code data ("1234567890")*
5. Update display (time: 30)*

*: Size information (2 bytes) is added instead of the common header code (8 bytes).

[Data]

```
1FH 4CH 44H 31H 27H 00H 00H 00H   // 1.  Common Header Code (total 39 bytes)
4DH 43H 57H 00H                   //     "Register Macro" command (4 bytes)
04H 00H                           // 2.  Size information (2 bytes)
54H 50H 52H 00H                   //     "Select Template" command (4 bytes)
04H 00H                           // 3.  Size information (2 bytes)
53H 4CH 52H 00H                   //     "Select Slide Data" command (4 bytes)
0FH 00H                           // 4.  Size information (2 bytes)
51H 52H 57H 00H 00H               //     "Input QR Code Data" command (15 bytes)
31H 32H 33H 34H 35H 36H 37H 38H   //     ("1234567890")
39H 30H                           //
04H 00H                           // 5.  Size information (2 bytes)
44H 50H 55H 1EH                   //     "Update Display" command (4 bytes)
```

"MCR" macro_id num — Execute Macro

Code 4DH 43H 52H macro_id num

Definition Range 0 ≤ macro_id ≤ 127
0 ≤ num ≤ 255

Function Executes the macro specified by macro ID the number of times specified by 'num'.
When num = 0, executes the macro for an unlimited number of times.
macro_id : Macro ID

When the macro execution count is specified with 'num' (1 ≤ num ≤ 255), the screen returns to the previous screen after macro execution of the specified number of times has finished. On the other hand, when Display receives a request to display another screen during macro execution, changes the screen at the time and does not return to this screen.

Notes This command is ignored when other than definition range is specified.

"MCS" macro_id — Specify Macro ID For Standby

Code 4DH 43H 53H macro_id

Definition Range 0 ≤ macro_id ≤ 127

Default macro_id = 127

Function Specifies the macro ID to be executed at standby.
The display of Standby mode is displayed by the macro function.

Notes This command is ignored when other than definition range is specified.

"MCT" macro_id — Send Macro Data

Code 4DH 43H 54H macro_id

Definition Range 0 ≤ macro_id ≤ 127

Function In response to the request of this command, Display sends macro data of the specified ID in HEX code format.
When macro data of the specified ID is more than 30 bytes, the data is devided to the upper limit of 29 bytes and sent.
The first 2 bytes of the response shows the status of the data that follows.

Response Data	Status
FFH	No following data exists
FEH	Following data exists

The following shows an example of response data when combination data of slide selection of slide 0 to 4 and image display are registered in the specified ID macro (04H 00H "SLR" 00H 04H 00H "DPU" 03H ・・・ 04H 00H "SLR" 04H 04H 00H "DPU" 03H:60 bytes)
10H, 3EH, EEH, FFH, E4H, F0H, E0H, F0H, ・・・, E2H, F5H, 00H (1st time : 63 bytes)
10H, 3EH, EEH, FFH, E2H, F0H, E4H, F0H, ・・・, E0H, F5H, 00H (2nd time: 63 bytes)
10H, 3EH, EFH, FFH, E5H, F5H, E3H, F0H, 00H (3rd time : 9 bytes)

When no macro is registered, only the start code (10H), type code (3EH), status data (EFH, FFH) and end code (00H) of response data in HEX code format are sent.

Notes This command is ignored when other than definition range is specified.

Related Commands See "6.7 RESPONSE DATA"

6.8.6 Data Input

"TXW" [data]k — Input Text Data

Code 54H 58H 57H [data]k

Definition Range data = 0AH, 0DH, 20H to FFH

Function After selecting a template with the "Select Template" command ("TPR"), inputs text data in the text element mapped on the template.
LF (0AH) or CR (0DH) can be used as a line feed code. In addition, LF (0AH) immediately after CR (0DH) is ignored.

Notes Execute this command with the state that a text element is selected with the "Select Text Element" command ("TIS").
This command is ignored when other than definition range is specified.

"BCW" tpl_bar_id 00H [data]k — Input Barcode Data

Code 42H 43H 57H tpl_bar_id 00H [data]k

Definition Range
0 ≤ tpl_bar_id ≤ 7
0 ≤ data ≤ 255
1 ≤ k ≤ 150

Function After selecting a template with the "Select Template" command ("TPR"), inputs barcode data in the barcode element mapped on the template.
tpl_bar_id : Map ID of barcode element
data : Barcode data

Specifies the barcode element with map ID: _var0 to _var7 (tpl_bar_id).
In 'data', input data according to the input format of barcode data specified in the template.

Notes This command is ignored in the following cases.
If no template is selected
If other than definition range is specified
If the specified ID is not defined in the template
If data does not conform to the input format of barcode data
If the data size exceeds the definition range

UPC-A: Enter 11 characters using numbers from '0' to '9'. Alternatively, enter additional 1 check digit.
The check digit is automatically calculated inside Display as well.

UPC-E: Enter 11 characters using numbers from '0' to '9'. Alternatively, enter additional 1 check digit.
The check digit is automatically calculated inside Display as well.
The following data can be input:
When the original code is 0 - ABCDE - VWXYZ
1 . 0 - ABCDE - 0000Z (Z is 5 to 9)
2 . 0 - ABCD0 - 0000Z
3 . 0 - ABC00 - 000YZ (C is 3 to 9)
4 . 0 - ABC00 - 00XYZ (C is 0 to 2)

JAN13: Enter 12 characters using numbers from '0' to '9'. Alternatively, enter additional 1 check digit.
The check digit is automatically calculated inside Display as well.

JAN8: Enter 7 characters using numbers from '0' to '9'. Alternatively, enter additional 1 check digit.
The check digit is automatically calculated inside Display as well.

CODE39: Enter any number of characters using ' ', '$', '%', '+', '-', '.', '/', '0' to '9', and 'A' to 'Z'.

ITF: Enter any even number of characters using numbers from '0' to '9'.

CODABAR: Enter 1 start character of 'A' to 'D', any number of characters using '0' to '9', '+', '.', '/', ':', '$', '-', and 1 stop character of 'A' to 'D'.

CODE128: There are the following 2 types of data input format.
The start code determines which type of data input format has been selected.

(1) Input the start code of 67H, 68H, or 69H shown in the table of CODE128 Code Set.
Then input any data from 00H to 66H. Multiple data can be input.

(2) Input the start code (START A, START B, or START C) of the code set to be selected shown in the table of CODE128 Special Code. Then input the data in the respective formats.

Code Set A	Data from 00H to 5FH can be input.
Code Set B	Data from 20H to 7FH can be input.
Code Set C	Data from 00H(00) to 63H(99) can be input.

As for the data corresponding to the special code, input it in 2 characters according to the table of CODE128 Special Code.

CODE128 Code Set

Input	Data			Input	Data			Input	Data		
	CodeSet A	CodeSet B	CodeSet C		CodeSet A	CodeSet B	CodeSet C		CodeSet A	CodeSet B	CodeSet C
00H	SP	SP	00	24H	D	D	36	48H	BS	h	72
01H	!	!	01	25H	E	E	37	49H	HT	i	73
02H	"	"	02	26H	F	F	38	4AH	LF	j	74
03H	#	#	03	27H	G	G	39	4BH	VT	k	75
04H	$	$	04	28H	H	H	40	4CH	FF	l	76
05H	%	%	05	29H	I	I	41	4DH	CR	m	77
06H	&	&	06	2AH	J	J	42	4EH	SO	n	78
07H	'	'	07	2BH	K	K	43	4FH	SI	o	79
08H	(	(	08	2CH	L	L	44	50H	DLE	p	80
09H	)	)	09	2DH	M	M	45	51H	DC1	q	81
0AH	*	*	10	2EH	N	N	46	52H	DC2	r	82
0BH	+	+	11	2FH	O	O	47	53H	DC3	s	83
0CH	,	,	12	30H	P	P	48	54H	DC4	t	84
0DH	-	-	13	31H	Q	Q	49	55H	NAK	u	85
0EH	.	.	14	32H	R	R	50	56H	SYN	v	86
0FH	/	/	15	33H	S	S	51	57H	ETB	w	87
10H	0	0	16	34H	T	T	52	58H	CAN	x	88
11H	1	1	17	35H	U	U	53	59H	EM	y	89
12H	2	2	18	36H	V	V	54	5AH	SUB	z	90
13H	3	3	19	37H	W	W	55	5BH	ESC	{	91
14H	4	4	20	38H	X	X	56	5CH	FS	|	92
15H	5	5	21	39H	Y	Y	57	5DH	GS	}	93
16H	6	6	22	3AH	Z	Z	58	5EH	RS	~	94
17H	7	7	23	3BH	[	[	59	5FH	US	DEL	95
18H	8	8	24	3CH	\	\	60	60H	FNC3	FNC3	96
19H	9	9	25	3DH	]	]	61	61H	FNC2	FNC2	97
1AH	:	:	26	3EH	^	^	62	62H	SHIFT	SHIFT	98
1BH	;	;	27	3FH	_	_	63	63H	CODE C	CODE C	99
1CH	<	<	28	40H	NUL	`	64	64H	CODE B	FNC4	CODE B
1DH	=	=	29	41H	SOH	a	65	65H	FNC4	CODE A	CODE A
1EH	>	>	30	42H	STX	b	66	66H	FNC1	FNC1	FNC 1
1FH	?	?	31	43H	ETX	c	67				
20H	@	@	32	44H	EOT	d	68	67H	START A		
21H	A	A	33	45H	ENQ	e	69	68H	START B		
22H	B	B	34	46H	ACK	f	70	69H	START C		
23H	C	C	35	47H	BEL	g	71				

CODE128 Special Code

Input		Data		
Code	**ASCII**	**CodeSet A**	**CodeSet B**	**CodeSet C**
7B41H	{A	START A	CODE A	CODE A
7B42H	{B	CODE B	START B	CODE B
7B43H	{C	CODE C	CODE C	START C
7B31H	{1	FNC1	FNC1	FNC1
7B32H	{2	FNC2	FNC2	-
7B33H	{3	FNC3	FNC3	-
7B34H	{4	FNC4	FNC4	-
7B53H	{S	SHIFT	SHIFT	-
7B7BH	{{	-	'{'	-

"QRW" tpl_qr_id s e m q [data]k — Input QR Code Data

Code 51H 52H 57H tpl_qr_id s e m q [data]k

Definition Range
0 ≤ tpl_qr_id ≤ 7
s = 0, 2 ≤ s ≤ 11
e = 'L' (4CH), 'M' (4DH), 'Q' (51H), 'H' (48H)
m = 'N' (4EH), 'A' (41H), 'B' (42H), 'K' (4BH), 'M' (4DH)
q = '0' (30H), '1' (31H)
0 ≤ data ≤ 255
1 ≤ k ≤ 3909

Function After selecting a template with the "Select Template" command ("TPR"), inputs QR Code data in the qr element mapped on the template.

tpl_qr_id	:	Map ID of qr element
s	:	Module size
e	:	Error correction level
m	:	Mode of data
q	:	Quiet zone enable (31H) /disable (30H)
data	:	QR Code data

Specifies the qr element with map ID: _var0 to _var7 (tpl_qr_id).
Even when s, e, m, q are set in the template, the setting of this command has priority. (The setting value of the template is not changed with this command.)

Specifies s = 0 when s, e, m, q are not changed with the values set in the template or with default values. In that case, the data after 's' is processed as QR Code data. (Do not input e, m, q.: "QRW" tpl_qr_id 0 [data]k)

Notes This command is ignored in the following cases.
- If no template is selected
- If other than definition range is specified
- If the specified ID is not defined in the template
- If data does not conform to the input format of QR Code data
- If the data size exceeds the definition range

6.8.7 Character Input Setting

"TIS" tpl_text_id — Select Text Element

Code 54H 49H 53H <tpl_text_id>

Definition Range 0 ≤ tpl_text_id ≤ 63

Default tpl_text_id = 0

Function Selects the text element mapped in the selected template.
tpl_qr_id : Map ID of text element

Specifies the text element with map ID: _var0 to _var63 (tpl_text_id).

Notes Execute this command with the state that a template is selected with the "Select Template" command ("TPR").

Related Commands "TXW", "TPR"

"TAL" horizontal 00H — Alignment

Code 54H 41H 4CH <horizontal> 00H

Definition Range 0 ≤ horizontal ≤ 2

Function Sets horizontal position to the selected text element.
The setting at the beginning of the line is applied.

horizontal	Horizontal Alignment
0	Left aligned
1	Align center
2	Right aligned

Even when horizontal-align attribute is set in the template, the setting of this command has priority. (The setting value of the template is not changed with this command.)

Notes Execute this command with the state that a text element is selected with the "Select Text Element" command ("TIS").
This command is ignored when other than definition range is specified.

Related Commands "TXW", "TPR", "TIS"

"TLM" nL nH — Set Left Margin

Code 54H 4CH 4DH nL nH

Definition Range 0 ≤ nH × 256 + nL ≤ 479

Function Sets mapping start position (left margin) to the selected text element.
The setting at the beginning of the line is applied.

Even when margin attribute is set in the template, the setting of this command has priority. (The setting value of the template is not changed with this command.)

Notes Execute this command with the state that a text element is selected with the "Select Text Element" command ("TIS").
This command is ignored when other than definition range is specified.

Related Commands "TXW", "TPR", "TIS"

"TBD" data Set Bold Character

Code 54H 42H 44H data

Definition Range 0 ≤ data ≤ 255

Function Sets bold character to the selected text element.
When data = <*******0>B, bold character is canceled.
When data = <*******1>B, bold character is specified.
The setting for each character can be switched in the line. The setting is applied to the text data to be input after this command.

Even when font-weight attribute is set in the template, the setting of this command has priority. (The setting value of the template is not changed with this command.)

Notes Execute this command with the state that a text element is selected with the "Select Text Element" command ("TIS").

Related Commands "TXW", "TPR", "TIS"

"TUL" data Set Underline

Code 54H 55H 4CH data

Definition Range 0 ≤ data ≤ 255

Function Sets underline to the selected text element.
When data = <*******0>B, underline is canceled.
When data = <*******1>B, underline is specified.
The setting for each character can be switched in the line. The setting is applied to the text data to be input after this command.

Even when text-decoration attribute is set in the template, the setting of this command has priority. (The setting value of the template is not changed with this command.)

Notes Execute this command with the state that a text element is selected with the "Select Text Element" command ("TIS").

Related Commands "TXW", "TPR", "TIS"

"TSZ" data — Set Character Size

Code 54H 53H 5AH data

Definition Range 0 ≤ data ≤ 255
1 ≤ vertical scale ≤ 4, 1 ≤ horizontal scale ≤ 4

Function Sets character size (vertical scale / horizontal scale) to the selected text element.

Bit 3	Bit 2	Bit 1	Bit 0	Vertical Scale
0	0	0	0	× 1
0	0	0	1	× 2
0	0	1	0	× 3
0	0	1	1	× 4
Other than those above				(Prohibition)

Bit 7	Bit 6	Bit 5	Bit 4	Horizontal Scale
0	0	0	0	× 1
0	0	0	1	× 2
0	0	1	0	× 3
0	0	1	1	× 4
Other than those above				(Prohibition)

The setting for each character can be switched in the line. The setting is applied to the text data to be input after this command.

Even when font-size attribute is set in the template, the setting of this command has priority. (The setting value of the template is not changed with this command.)

Notes Execute this command with the state that a text element is selected with the "Select Text Element" command ("TIS").
This command is ignored when other than definition range is specified.

Related Commands "TXW", "TPR", "TIS"

"TCF" data — Set Character Font

Code 54H 43H 46H data

Definition Range data = 0, 1

Function Sets a character font used for the selected text element.

data	Character Font
0	Select font A (24 × 12, 24 × 24)
1	Select font B (16 × 8, 16 × 16)

The setting for each character can be switched in the line. The setting is applied to the text data to be input after this command.

Even when font-type attribute is set in the template, the setting of this command has priority. (The setting value of the template is not changed with this command.)

Notes Execute this command with the state that a text element is selected with the "Select Text Element" command ("TIS").
This command is ignored when other than definition range is specified.

Related Commands "TXW", "TPR", "TIS"

"TDF" data Set Registered Font

Code 54H 44H 46H data

Definition Range data = 0, 1

Function Sets the registered font (standard font / optional font) used for the selected text element.

data	Registered Font
0	Select standard font
1	Select optional font

The setting for each character can be switched in the line. The setting is applied to the text data to be input after this command.
When the registered font is not defined in the character code, the standard font is applied.

Even when memory-font attribute is set in the template, the setting of this command has priority. (The setting value of the template is not changed with this command.)

Notes Execute this command with the state that a text element is selected with the "Select Text Element" command ("TIS").
This command is ignored when other than definition range is specified.

Related Commands "TXW", "TPR", "OFW", "DFW", "TIS"

"TCP" data Set Codepage

Code 54H 43H 50H data

Definition Range data = 0 to 5, 13 to 14, 16 to 19, 34, 37, 45 to 48

Function Sets the codepage used for the selected text element.

data	Codepage
0	USA, Standard Europe (Code Page437)
1	Katakana
2	Multilingual (Code Page850)
3	Portuguese (Code Page860)
4	Canadian-French (Code Page863)
5	Nordic (Code Page865)
13	Turkish (Code Page857)
14	Greek (Code Page737)
16	Latin (Code Page1252)

data	Codepage
17	Russian (Code Page866)
18	Eastern Europe (Code Page852)
19	Euro (Code Page858)
34	Cyrillic (Code Page855)
37	Arabic (Code Page864)
45	Central European (Code Page1250)
46	Cyrillic (Code Page1251)
47	Greek (Code Page1253)
48	Turkish (Code Page1254)

The setting for each character can be switched in the line. The setting is applied to the text data to be input after this command.

Even when font-table attribute is set in the template, the setting of this command has priority. (The setting value of the template is not changed with this command.)

Notes Execute this command with the state that a text element is selected with the "Select Text Element" command ("TIS").
When "Arabic (Code Page864)" is selected, only 24-dot font can be displayed.
When other than definition range is specified, selects USA, Standard Europe (Code Page437).

Related Commands "TXW", "TPR", "TIS"

"TIN" data Set International Character

Code 54H 49H 4EH data

Definition Range 0 ≤ data ≤ 17

Function Sets the international character used for the selected text element.

data	Country	data	Country
0	USA	9	Norway
1	France	10	Denmark II
2	Germany	11	Spain II
3	United Kingdom	12	Latin America
4	Denmark I	13	Prohibition*1
5	Sweden	14	Prohibition*1
6	Italy	15	Prohibition*1
7	Spain I	16	Prohibition*1
8	Japan	17	Arabia

*1: When the prohibition is selected, the setting is ignored.

The setting for each character can be switched in the line. The setting is applied to the text data to be input after this command.

Even when international-character attribute is set in the template, the setting of this command has priority. (The setting value of the template is not changed with this command.)

Notes Execute this command with the state that a text element is selected with the "Select Text Element" command ("TIS").
This command is ignored when other than definition range is specified.

Related Commands "TXW", "TPR", "TIS"

"TSP" data Set Character Right Space

Code 54H 53H 50H data

Definition Range 0 ≤ data ≤ 255

Function Sets the amount of character right space to the selected text element. (The amount of character left space is fixed to 0.)
The setting for each character can be switched in the line. The setting is applied to the text data to be input after this command.

Even when letter-spacing attribute is set in the template, the setting of this command has priority. (The setting value of the template is not changed with this command.)

Notes Execute this command with the state that a text element is selected with the "Select Text Element" command ("TIS").

Related Commands "TXW", "TPR", "TIS"

"TCL" nl nh Set Character Color

Code 54H 43H 4CH nl nh

Definition Range 0 ≤ nH × 256 + nL ≤ 65535

Function Sets the character color used for the selected text element.

data	Character Color
8000H	Black
801FH	Blue
83E0H	Green
83FFH	Cyan
FC00H	Red
FC1FH	Magenta
FFE0H	Yellow
FFFFH	White
Option	ARGB1555 (16 bit color)

The setting for each character can be switched in the line. The setting is applied to the text data to be input after this command.

Even when color attribute is set in the template, the setting of this command has priority. (The setting value of the template is not changed with this command.)

Notes Execute this command with the state that a text element is selected with the "Select Text Element" command ("TIS").
When 0000H to 7FFFH are specified to 'data', this command is ignored.

Related Commands "TXW", "TPR", "TIS"

"TLS" data — Set Line Spacing

Code 54H 4CH 53H data

Definition Range 0 ≤ data ≤ 255

Function Sets line spacing to the selected text element.
The setting at the beginning of the line is applied.
When the character height is higher than the set line spacing, the line spacing of that line is applied to the character height.

Even when line-height attribute is set in the template, the setting of this command has priority. (The setting value of the template is not changed with this command.)
However, for the text element with the scroll attribute set to up or down, the setting of the line-height attribute has priority. (The setting of this command is ignored.)

Notes Execute this command with the state that a text element is selected with the "Select Text Element" command ("TIS").

Related Commands "TXW", "TPR", "TIS"

6.8.8 Registered Character

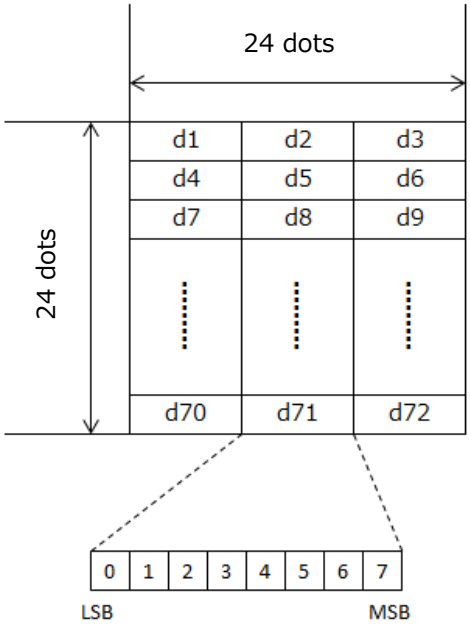
"EFW" 00H [data]k Register User-Defined Character

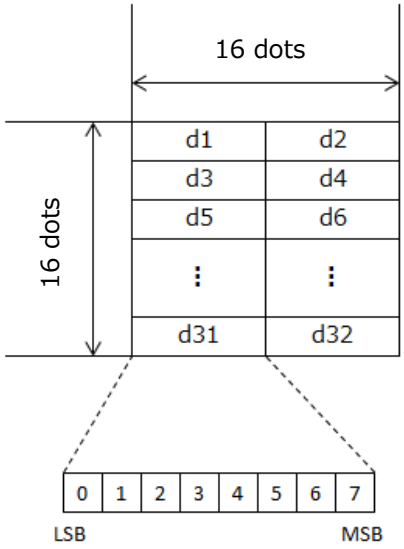
Code 45H 46H 57H 00H [data]k

Definition Range 0 ≤ data ≤ 255
k = 9776 (94 characters × (72 + 32) bytes)

Function Registers user-defined character image.
The number of data bytes per character is 72 bytes for font A and 32 bytes for font B.
The character code assigned to the user-defined character is 94 characters of EC40H to EC7EH and EC80H to EC9EH.
Registers all user-defined character images of each font to the user-defined character code.
Input the user-defined character image in the order of data for 94 characters of font A and data for 94 characters of font B.
Specify any data for the unused user-defined character code.
This command is ignored when the user-defined character area cannot be allocated due to insufficient memory capacity.

Font data is registered by the low scan method.





Notes Sets the bit corresponding to the dot to be displayed to 1, and the bit corresponding to the dot not to be displayed to 0.
The memory usage m (including the amount of memory control information) is 9788 bytes.

"EFC" 00H Delete User-Defined Character

Code 45H 46H 43H 00H

Function Deletes user-defined characters.
The user-defined character area turns to used state.

Notes User-defined characters cannot be used when the user-defined character area turns to used state. The user-defined character area is 9776 bytes.
However, the user-defined character area cannot be reused as it is. Execute the "Defragment User Area" command ("UAD") to reuse.
See "6.2(5) Memory management" for details.

"EFT" Send User-Defined Character ID

Code 45H 46H 54H

Function In response to the request of this command, Display sends in HEX code format whether or not user-defined characters are registered (user-defined character ID).
The user-defined character ID when user-defined characters are registered is 00H.

When user-defined characters are registered, the start code (10H), type code (3EH), user-defined character ID code (E0H, F0H) and end code (00H) of response data in HEX code format are sent.
When user-defined characters are not registered, only the start code (10H), type code (3EH), and end code (00H) of response data in HEX code format are sent.

Related Commands See "6.7 RESPONSE DATA"

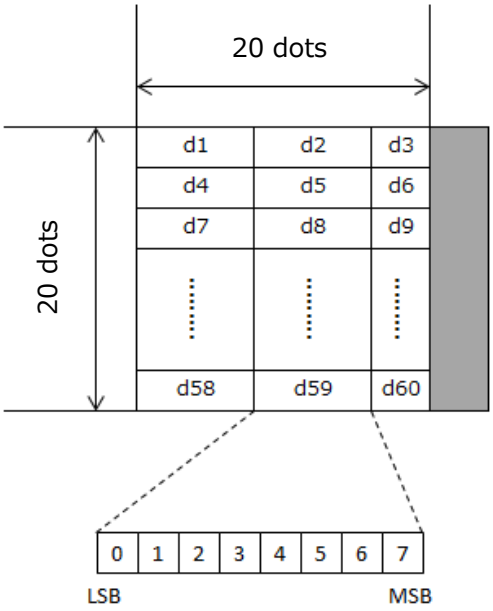
"OFW" 00H s e y x [data]k Register Optional Font

Code 4FH 46H 57H 00H s e y x [data]k

Definition Range 20H ≤ s ≤ e ≤ FFH
1 ≤ y ≤ 255, 1 ≤ x ≤ 255

Function Registers optional fonts.

s	:	Registration start character code
e	:	Registration end character code
y	:	Number of vertical dots in optional font
x	:	Number of horizontal dots in optional font
data	:	Font data
k	:	Total number of data bytes



The gray part is ignored.

Notes Sets the bit corresponding to the dot to be displayed to 1, and the bit corresponding to the dot not to be displayed to 0.
The registerable character codes are ASCII codes ranging from 20H to FFH.
When this command is executed with optional fonts already registered, the registered optional font area turns to used state. The optional fonts cannot be used when the registered optional font area turns to used state.
Optional fonts by this command are then saved in a new area and can be used. In addition, execute the "Defragment User Area" command ("UAD") to reuse the optional font area that turned to used area.
See "6.2(5) Memory management" for details.
When y or x is other than definition range, the following data is ignored.

The number of data bytes of 1 character is expressed by the following formula.
INT ((x + 7) / 8) × y byte

Total number of data bytes 'k' is expressed by the following formula.
k = INT ((x + 7) / 8) × y × (e - s + 1)

"OFC" 00H Delete Optional Font

Code 4FH 46H 43H 00H

Function Deletes optional fonts.
The optional font area turns to used state.

Notes Optional fonts cannot be used when the optional font area turns to used state.
However, the optional font area cannot be reused as it is. Execute the "Defragment User Area" command ("UAD") to reuse.
See "6.2(5) Memory management" for details.

"OFT" Send Optional Font ID

Code 4FH 46H 54H

Function In response to the request of this command, Display sends in HEX code format whether or not optional fonts are registered (optional font ID).
The optional font ID when optional fonts are registered is 00H.

When optional fonts are registered, the start code (10H), type code (3EH), optional font ID code (E0H, F0H) and end code (00H) of response data in HEX code format are sent.
When optional fonts are not registered, only the start code (10H), type code (3EH), and end code (00H) of response data in HEX code format are sent.

Related Commands See "6.7 RESPONSE DATA"

6.8.9 Auxiliary Functions

"IDT" n — Send Display ID

Code 49H 44H 54H n

Definition Range 1 ≤ n ≤ 3, 49 ≤ n ≤ 51, 65 ≤ n ≤ 67, 97 ≤ n ≤ 100

Function In response to the request of this command, Display sends the specified display ID.

n	Display ID Type	Specifications	Response Format
1, 49	Display model ID	26H	HEX code
2, 50	Type ID	See Table [Type ID].	HEX code
3, 51	ROM version ID	Depends on ROM version.	HEX code
65	Firmware version (main)	x.xx.xx	Character string
66	Manufacturer	Seiko Instruments Inc.	Character string
67	Model name	SII DSP-A01	Character string
97	Firmware version (boot)	x.xx.xx	Character string
98	Firmware checksum (boot)	2 bytes checksum	HEX code
99	Firmware checksum (main)	2 bytes checksum	HEX code
100	Firmware checksum (main + boot)	2 bytes checksum	HEX code

Table [Type ID]

Bit	Information	Value	
		0	1
0	Reserved	Fixed to 1	
1	Reserved	Fixed to 1	
2	Undefined	Fixed to 0	
3	Undefined	Fixed to 0	
4	Reserved	Fixed to 1	
5	Reserved	Fixed to 1	
6	Undefined	Fixed to 0	
7	Undefined	Fixed to 0	

Notes Sends Display ID according to the response format.
This command is ignored when other than definition range is specified.
Received data is executed sequentially after being once input to the input buffer. Therefore, a delay may occur between this command reception and display ID transmission depending on the status of unexecuted data in the input buffer.
ROM version ID is needed when the firmware of Display is uploaded.

Related Commands See "6.7 RESPONSE DATA".

"MNC" n — Initialize Maintenance Counter

Code 4DH 4EH 43H n

Definition Range n = 70

Function Sets the value of the specified resettable maintenance counter to 0. The maintenance counter saved in the FLASH memory is also set to 0. The counter type is selected by 'n'.

n		Counter Type
Hexadecimal	Decimal	
46H	70	Drive time of Display (unit: minute)

Notes Note that frequent use of this command will shorten the life of the FLASH memory. The FLASH memory can be rewritten approximately 100000 times.
Display may turn to BUSY status while writing data to the FLASH memory with this command processing. Do not transmit data from the host since Display stops data receiving while in BUSY status.
Do not turn off the power while executing this command.

Related Commands "MNW", "MNT"

"MNW" m — Save Maintenance Counter

Code 4DH 4EH 57H m

Definition Range m = 0

Function Saves maintenance counter values in the FLASH memory.

Notes The maintenance counter is automatically saved at 2-minute intervals without using this command.
Note that frequent use of this command will shorten the life of the FLASH memory. The FLASH memory can be rewritten approximately 100000 times.
This command is ignored when other than definition range is specified.
Do not turn off the power while executing this command.

Related Commands "MNC", "MNT"

"MNT" m n — Send Maintenance Counter

Code 4DH 4EH 54H m n

Definition Range m = 0
n = 70, 198

Function In response to the request of this command, Display sends the maintenance counter value. The counter type is selected by 'n'.

n		Counter Type
Hexadecimal	Decimal	
46H	70	Drive time of printer (unit: minute)
C6H	198	Drive time of printer (integrated value) (unit: minute)

Notes The maintenance counter value is sent by 4 bytes in a HEX code format.
The number of data bytes to be sent is as follows:
Header (1 byte) + data (4 bytes) × 2 + footer (1 byte) = 10 bytes
This command is ignored when other than definition range is specified.

Related Commands "MNW", "MNC",
See "6.7 RESPONSE DATA"

"UAD" area — Defragment User Area

Code 55H 41H 44H area

Definition Range area = 1

Function Defragments the user area (FLASH memory), and allocates the remaining memory capacity.

Notes In the user area, releasing the area or deleting data cannot increase the remaining memory capacity. The area can be used again as the user area by this command.
This command is ignored when other than definition range is specified.
The processing time of 1 data movement varies depending on the amount of data registered in the user area.
It may take several minutes to complete this command execution depending on the data registration status.
The FLASH memory can be rewritten approximately 100000 times. Execute this command after the free area of memory becomes low in order to effectively use the number of rewritable times.
Do not turn off the power while executing this command.

"UAT" area — Send Remaining User Area

Code 55H 41H 54H area

Definition Range area = 1

Function In response to the request of this command, Display sends the remaining memory capacity of the user area (FLASH memory) by 4 bytes in a HEX code format.
The number of data bytes to be sent is as follows:
Header (2 bytes) + data (4 bytes) × 2 + footer (1 byte) = 11 bytes

Notes The memory capacity of the unused area excluding the released area is sent by HEX code.
This command is ignored when other than definition range is specified.

Related Commands See "6.7 RESPONSE DATA".

"UAC" area — Initialize User Area

Code 55H 41H 43H area

Definition Range area = 1

Function Initializes the user area (FLASH memory).

Notes All templates, images, user-defined characters, downloaded characters, optional fonts, and macro functions are cleared and returned to the initial state.
The Function Settings, the maintenance counter, and slides are not initialized.
This command is ignored when other than definition range is specified.

Part of data which is registered at the shipping to use for the system is deleted either.
Therefore, it is impossible to display by Guide mode when an error occurs in the printer.
The used memory area can be reused after executing the "Defragment User Area" command ("UAD").

"DSW" type [data]k — Change Function Settings

Code: 44H 53H 57H type [data]k

Definition Range: 0 ≤ type ≤ 16
0 ≤ data ≤ 255
k = 16 (type = 00H), k = 1 (1 ≤ type ≤ 16)

Function: Sets the MS.

Sets the following functions. The setting values are effective from the time of command execution.

MS	type	Function
All MS	00H	16 Bytes All Writing
1	01H	General Setting 1
2 to 3	02H to 03H	(Reserved)
4	04H	General Setting 2
5	05H	General Setting 3
6 to 7	06H to 07H	(Reserved)
8	08H	Character Code Table Setting
9	09H	International Character Setting
10 to 16	0AH to 10H	(Reserved)
-	Other than those above	(Prohibition)

Notes: Do not turn off the power while executing this command.

Related Commands: "DST",
See "CHAPTER 4 FUNCTION SETTINGS"

"DST" type — Send Function Settings

Code: 44H 53H 54H type

Definition Range: type = 0 (the current setting value of MS)
type = 1 (the setting value at the shipping of MS)

Function: In response to the request of this command, Display sends the current setting value of MS or the setting value at the shipping of MS.
Selects the type of setting value to respond by 'type'.

Notes: The response sends 16 bytes of data in HEX code format.
The number of data bytes to be sent is as follows:
Header (2 bytes) + data (16 bytes) × 2 + footer (1 byte) = 35 bytes

Related Commands: "DSW",
See "6.7 RESPONSE DATA".

"EXT" data — Execution Response Request

Code 45H 58H 54H data

Definition Range 0 ≤ data ≤ 255

Function At the moment that this command has been processed, Display sends the specified response code.

Notes Specify the response code by 'data'. The low order 4 bits are valid for 'data'. The code to be sent is the code from 40H to 4FH, which is the logical sum of the low order 4 bits of the specified 'data' and 40H.

Display has an input buffer of 4096 bytes, and input and execution of command/data are not synchronized. Therefore, the command execution completion cannot be confirmed from outside. This command enables the completion of command execution to be confirmed from outside. To confirm the end of the command, input this command following those commands. The response to this command is sent after the command input immediately before is ended.

Related Commands See "6.7 RESPONSE DATA".

6.9 VENDOR REQUEST

6.9.1 USB Vendor Request

Event Notification Request

Field
bmRequestType : 40H
bRequest : 50H
wValue : event_id
wIndex : 00H
wLength : size

Definition Range
0 ≤ event_id ≤ 65535
3 ≤ size ≤ 255

Function
Starts/Ends Guide mode.
When event_id ≤ 65534, the macro corresponding to the specified ID is executed by pressing the function setting switch for less than 1 second.
When Display is already in Guide mode, the display changes at the time of receiving this request.
When an ID for which no macro is specified, the request is ignored.
When event_id ≤ 65535, Guide mode is ended.

The data specified with 'size' can be used as additional data to macro.
When data is defined in macro and overlaps with a command, it may not be displayed correctly.
This data is applied each time in conjunction with the "Update Display" command "DPU" in macro.
The commands that can be input are as follows. Data other than the below commands is ignored at the time of execution.

"Select Template" command ("TPR")
"Set Image Data" command ("IMR")
"Select Slide Data" command ("SLR")
"Input Text Data" command ("TXW")
"Input Barcode Data" command ("BCW")
"Input QR Code Data" command ("QRW")
"Select Text Element" command ("TIS")
"Alignment" command ("TAL")
"Set Left Margin" command ("TLM")
"Set Bold Character" command ("TBD")
"Set Underline" command ("TUL")
"Set Character Size" command ("TSZ")
"Set Character Font" command ("TCF")
"Set Registered Font" command ("TDF")
"Set Codepage" command ("TCP")
"Set International Character" command ("TIN")
"Set Character Right Space" command ("TSP")
"Set Character Color" command ("TCL")
"Set Line Spacing" command ("TLS")

The screen returns to the previous screen after the event ends.
When the previous screen is the screen displayed by executing macro and the screen displayed with the display time specifying mode set, it is not possible to return to them.

The status of the printer assigned to 'event_id' is as follows.

event_id	Printer Status
126	Out-of-paper error
125	Cover open error
124	Hardware error
123	Head temperature error
122	Vp voltage error
121	Cutter error
120	Bluetooth paring
0 to 119, 127 to 65534	Not assigned
65535	Event end

Input Buffer Clear

Field
bmRequestType : 40H
bRequest : 44H
wValue : 00H
wIndex : 00H
wLength : 03H

Function Clears the input buffer.

Notes The reset is not executed.

6.10 COMMAND LIST

CHAPTER 7
INITIAL VALUE OF INPUT DATA

7.1 INITIAL VALUE OF INPUT DATA

The settings for character input (text), image selection (img), QR Code data input (qr), and barcode input (barcode) depend on the used template.
When the values are not set with the template attribute, the initial values described in Table 7-1 are applied.

Table 7-1 Initial Value of Input Data

Item (Element Name)	Attribute	Initial Value	Command
Area start point (text)	pos	(0, 0)	None
Area size (text)	size	(480, 272)	None
Scroll (text)	scroll	none	None
Line spacing (text)	line-height	34 (unit: px)	"TLS"
Horizontal display position (text)	horizontal-align	left	"TAL"
Left margin (text)	margin	0 (unit: px)	"TLM"
Bold character (text)	font-weight	normal	"TBD"
Underline (text)	text-decoration	none	"TUL"
Character size (text)	font-size	1x	"TSZ"
Character font (text)	font-type	fontA	"TCF"
Optional font (text)	memory-font	normal	"TDF"
Encoding (text)	encoding	JIS code system	None
Character code table (text)	font-table	Depends on Function Settings	"TCP"
International character (text)	international-character	Depends on Function Settings	"TIN"
Character right space (text)	letter-spacing	0 (unit: px)	"TSP"
Character color (text)	color	black	"TCL"
Area start point (img)	pos	(0, 0)	None
Area size (img)	size	(480, 272)	None
Horizontal display position (img)	horizontal-align	left	None
Vertical display position (img)	vertical-align	top	None
Area start point (qr)	pos	(0, 0)	None
Area size (qr)	size	(480, 272)	None
Horizontal display position (qr)	horizontal-align	left	None
Vertical display position (qr)	vertical-align	top	None
Module size (qr)	module-size	3 (unit: px)	"QRW"

Item (Element Name)	Attribute	Initial Value	Command
Error correction level (qr)	error-correct	M	"QRW"
Mode (qr)	mode	M	"QRW"
Quiet zone enable/disable (qr)	quiet-zone	enable	"QRW"
Area start point (barcode)	pos	(0, 0)	None
Area size (barcode)	size	(480, 272)	None
Horizontal display position (barcode)	horizontal-align	left	None
Vertical display position (barcode)	vertical-align	top	None
Barcode type (barcode)	type	UPCA	None
Narrow width (barcode)	width	2 (unit: px)	None
Vertical size (barcode)	height	50 (unit: px)	None
Character font (barcode)	font-type	font A	None
HRI character position (barcode)	hri-text	none	None
Quiet zone enable/disable (barcode)	quiet-zone	enable	None

7.2 INITIALIZATION BY POWER ON

When the power is turned on, initialization is performed.

USB interface is initialized. When the interface is initialized, the communications are disconnected.

APPENDIX A
CHARACTER SETS (CHARACTER CODE TABLE)

A.1 CHARACTER CODE TABLE (CODEPAGE)

The codepage when the international character setting is set to USA is shown below.
The displaying result of a specific character code differs depending on the international character set to be set.
For specific character codes, See "A.2 INTERNATIONAL CHARACTER SET".

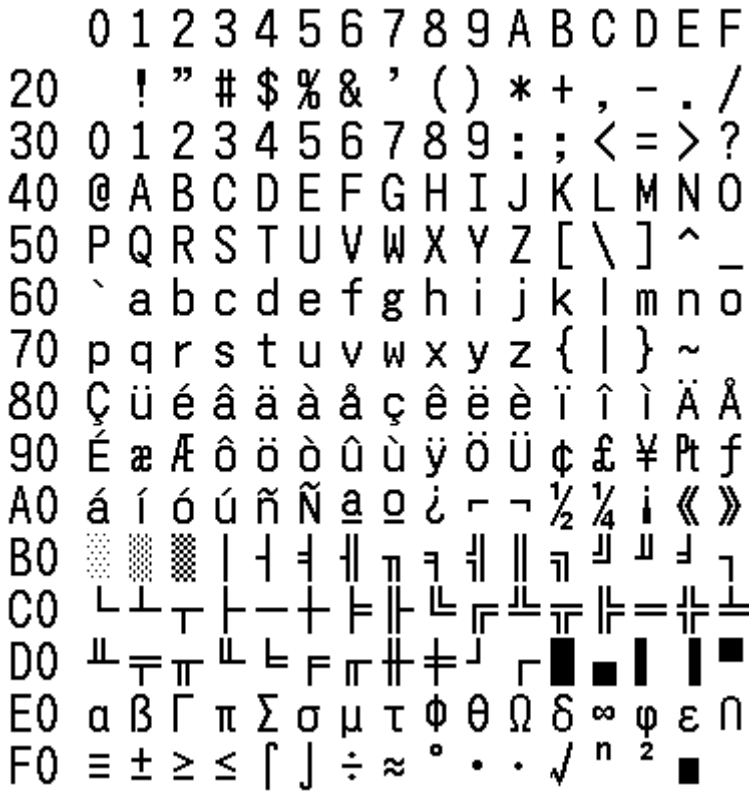


Figure A-1 USA, Standard Europe (Code Page437)

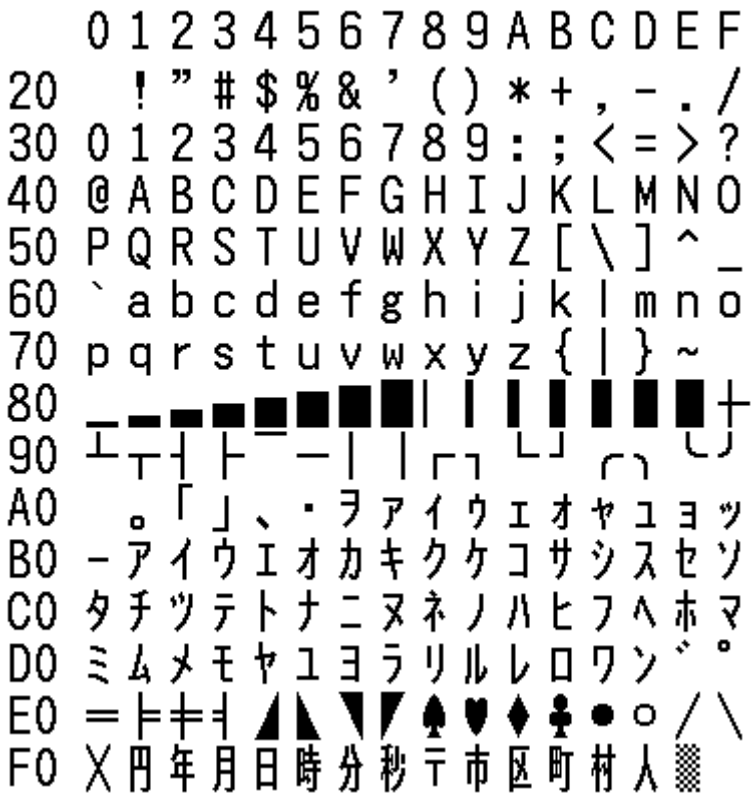


Figure A-2 Katakana

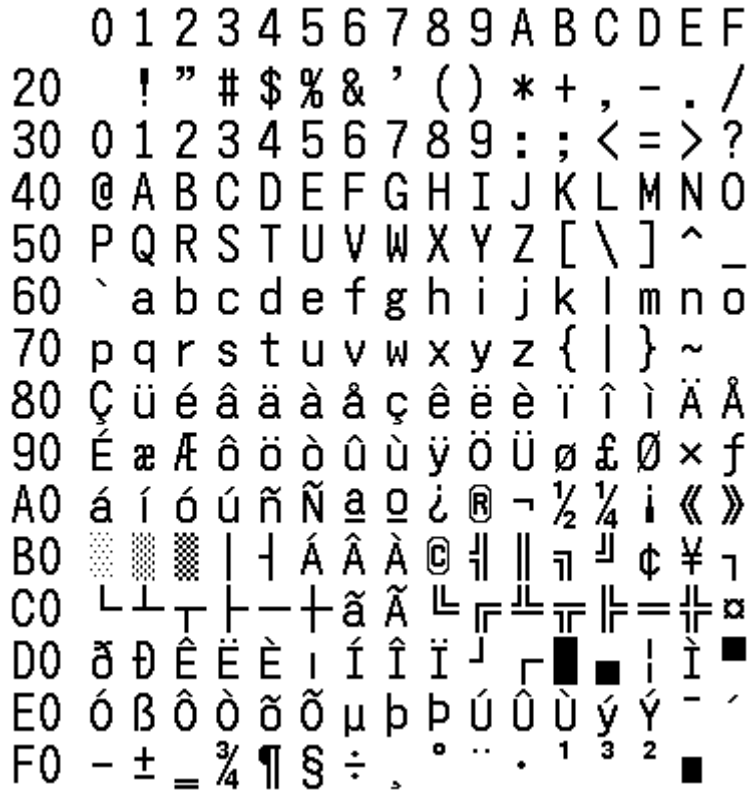


Figure A-3 Multilingual (Code Page850)

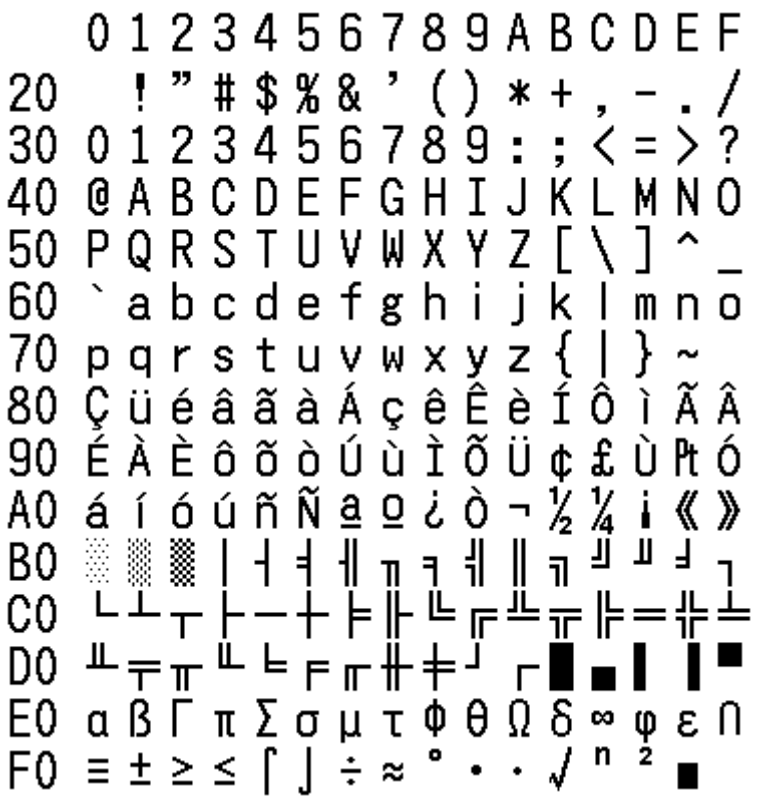


Figure A-4 Portuguese (Code Page860)

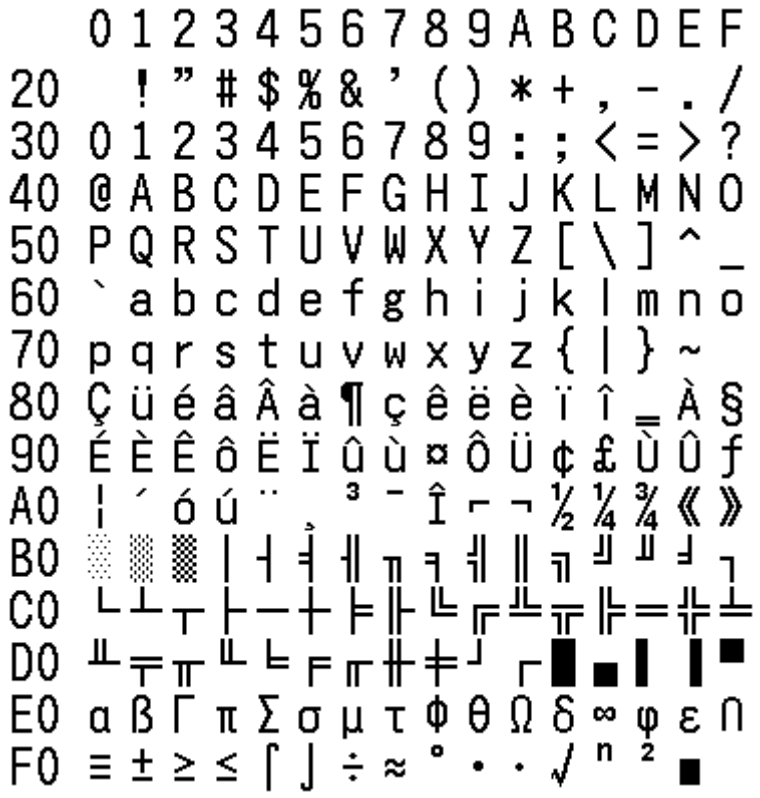


Figure A-5 Canadian-French (Code Page863)

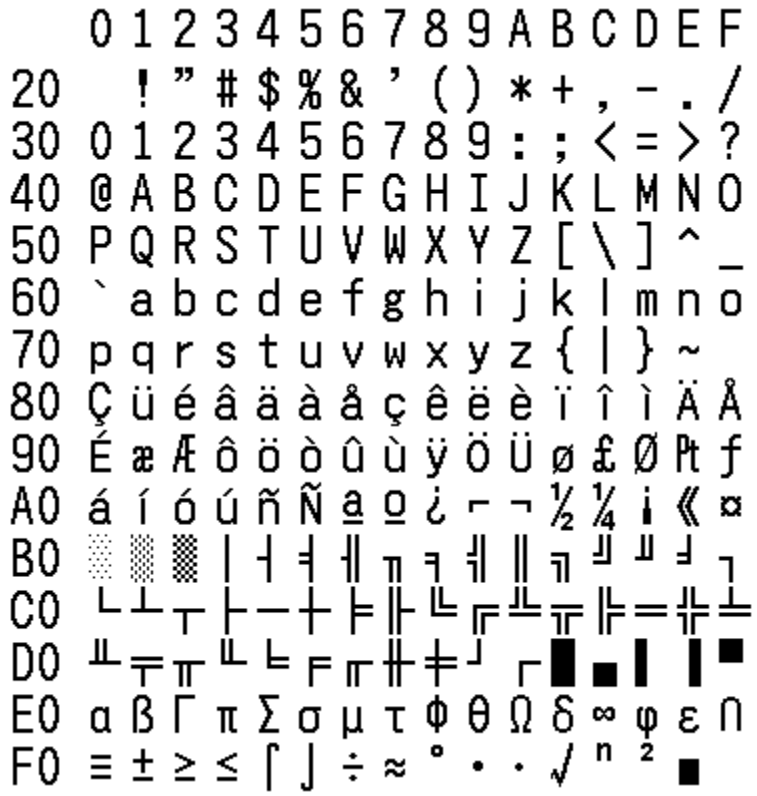


Figure A-6　Nordic (Code Page865)

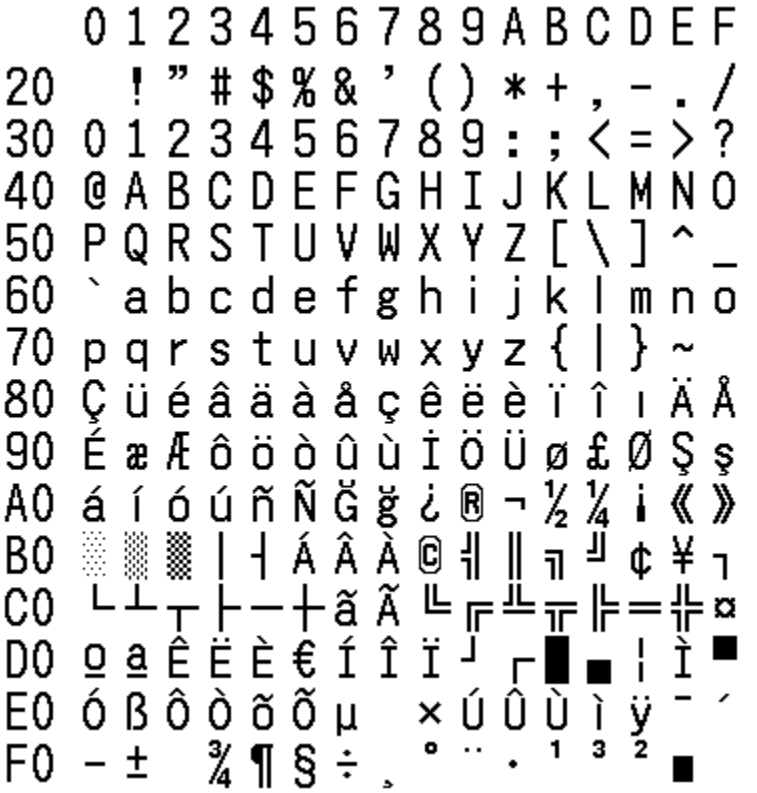


Figure A-7　Turkish (Code Page857)

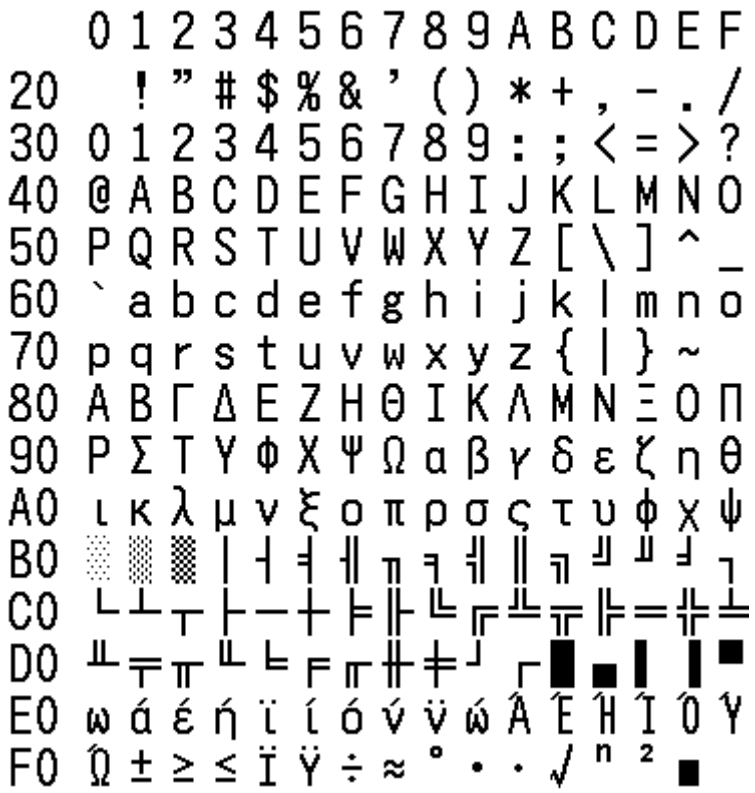


Figure A-8　Greek (Code Page737)

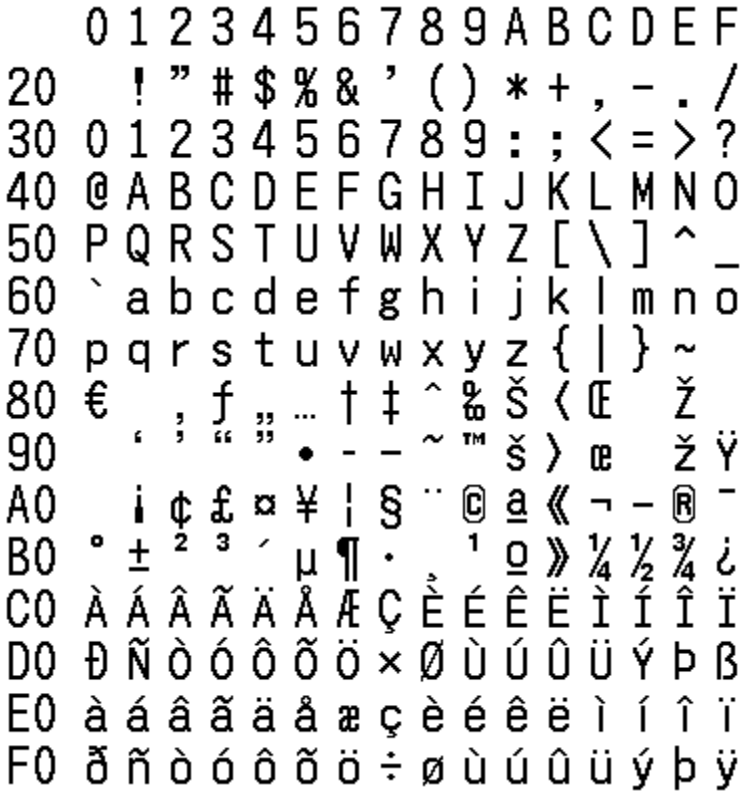


Figure A-9　Latin (Code Page1252)

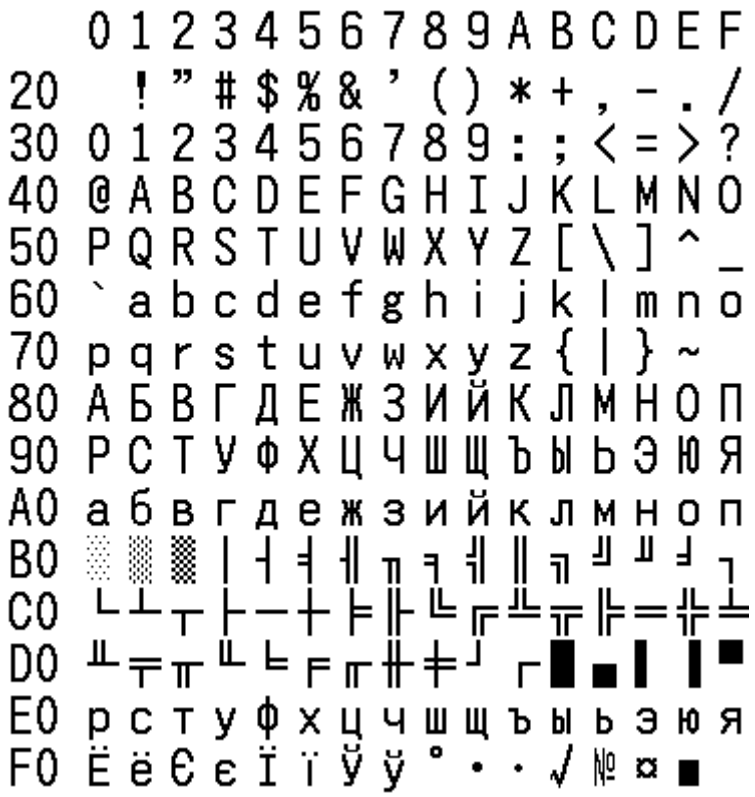


Figure A-10 Russian (Code Page866)

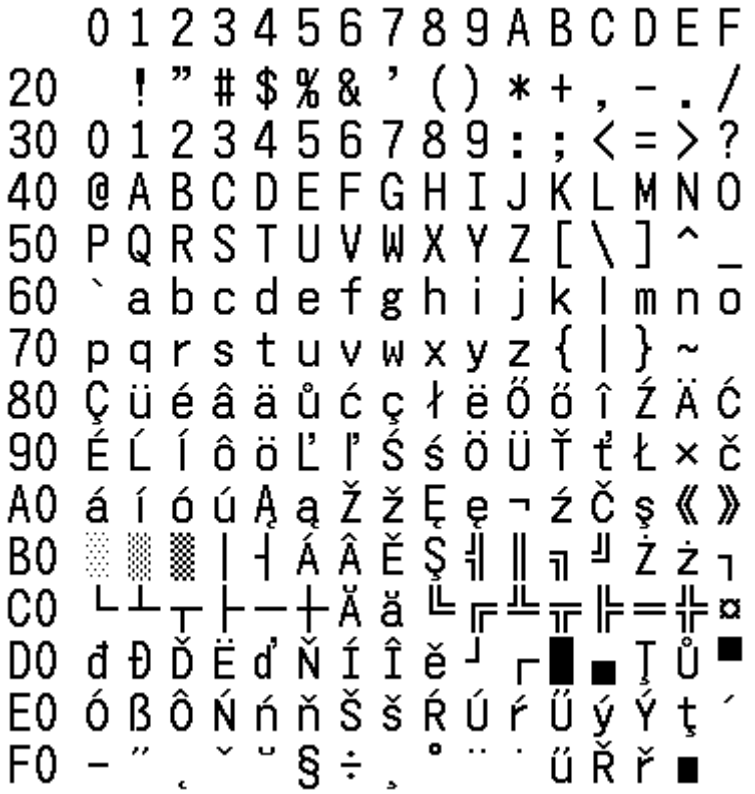


Figure A-11 Eastern Europe (Code Page852)

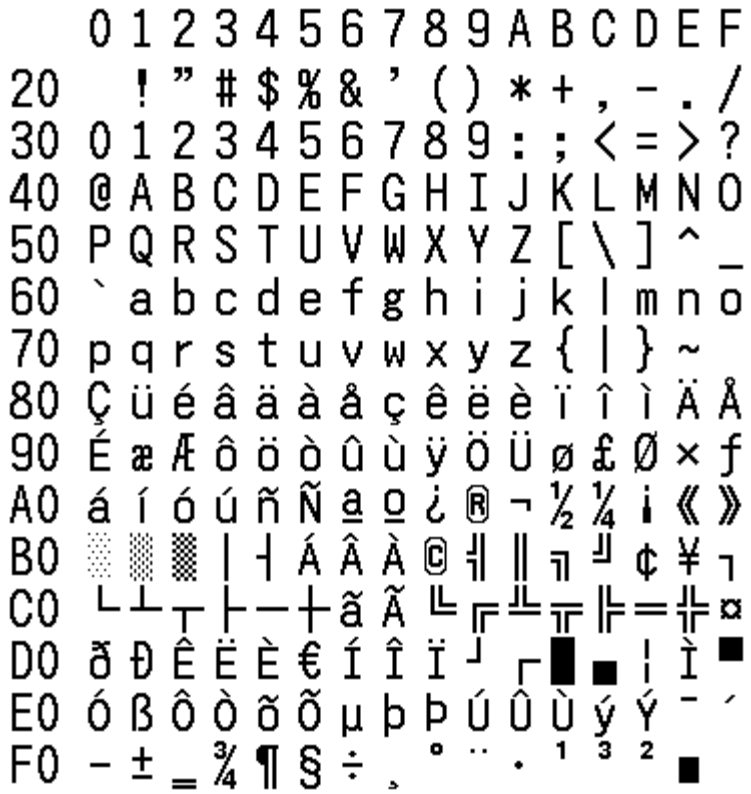


Figure A-12 Euro (Code Page858)

Figure A-13 Cyrillic (Code Page855)

Figure A-14 Arabic (Code Page864)

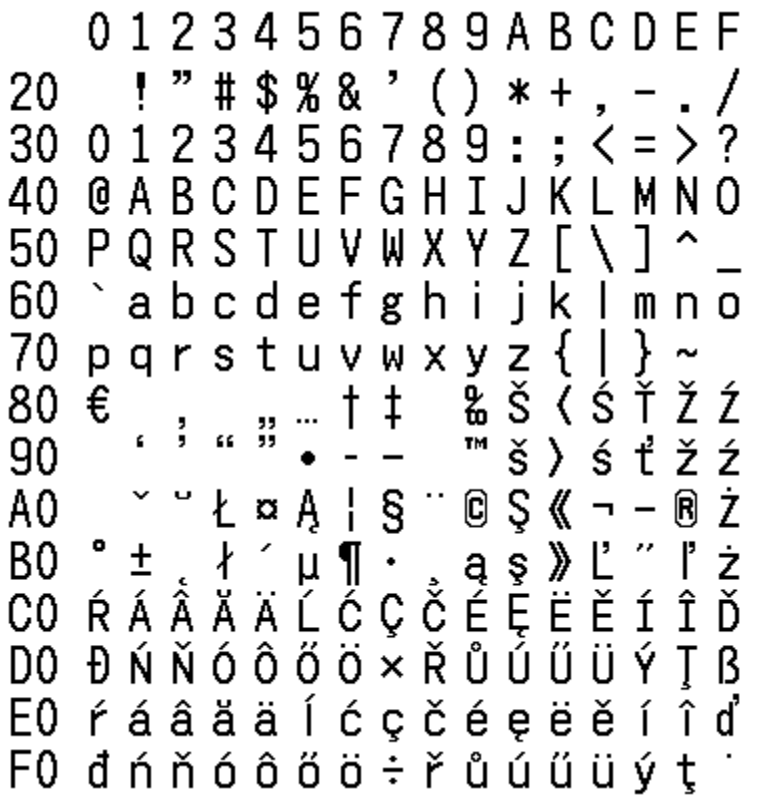


Figure A-15 Central European (Code Page1250)

Figure A-16 Cyrillic (Code Page1251)

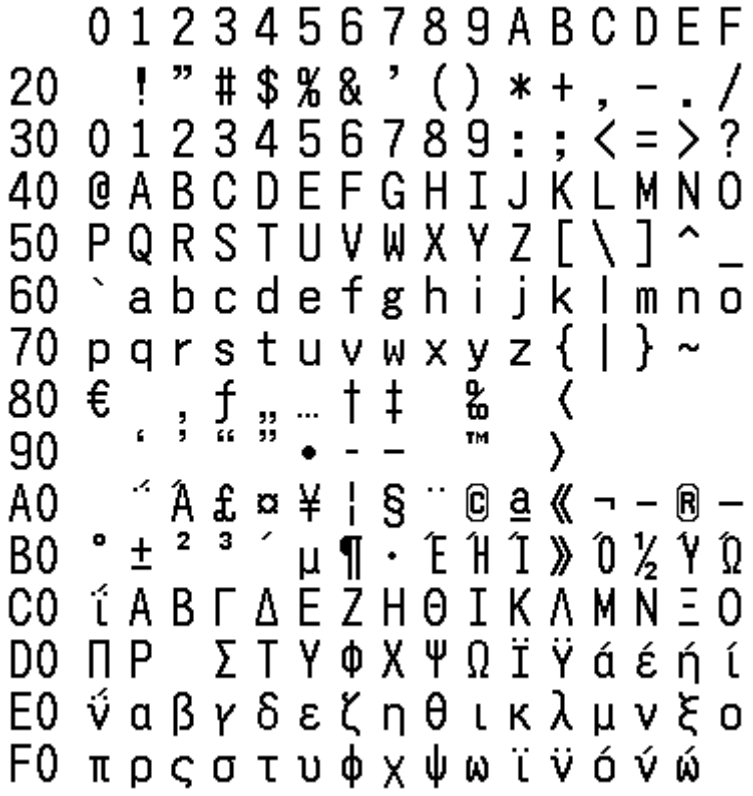


Figure A-17 Greek (Code Page1253)

Figure A-18 Turkish (Code Page1254)

A.2 INTERNATIONAL CHARACTER SET

The printing result of a specific character code differs depending on the international character set to be set. Specific character codes and their printing results are shown below.

	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
U.S.A.	#	$	@	[	\	]	^	`	{	|	}	~
France	#	$	à	°	ç	§	^	`	é	ù	è	¨
Germany	#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
U.K.	£	$	@	[	\	]	^	`	{	|	}	~
Denmark I	#	$	@	Æ	Ø	Å	^	`	æ	ø	å	~
Sweden	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
Italy	#	$	@	°	\	é	^	ù	à	ò	è	ì
Spain I	₧	$	@	¡	Ñ	¿	^	`	¨	ñ	}	~
Japan	#	$	@	[	¥	]	^	`	{	|	}	~
Norway	#	¤	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
Denmark II	#	$	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
Spain II	#	$	á	¡	Ñ	¿	é	`	í	ñ	ó	ú
Latin America	#	$	á	¡	Ñ	¿	é	ü	í	ñ	ó	ú
Arabia	#	$	@	[	\	]	^	`	{	|	}	~

Figure A-19 International Character Set

A.3 2-BYTE CHARACTER

Kanji defined in the JIS 1st and 2nd levels in 1997, NEC selection of IBM extended characters, and IBM extended characters can be displayed.
In addition, special characters and NEC special characters are assigned to the Kanji code of the non-Kanji area.

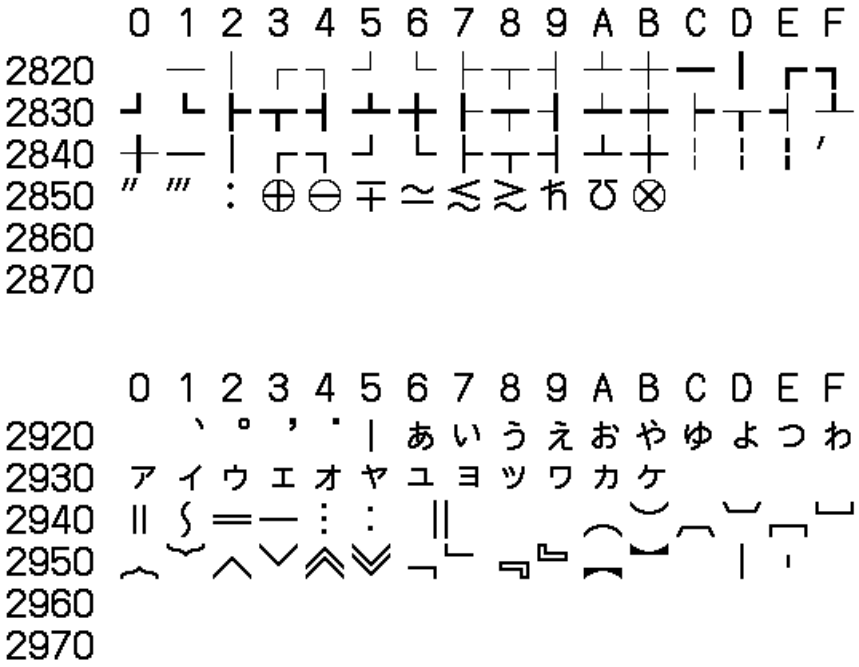


Figure A-20 Special Character Set

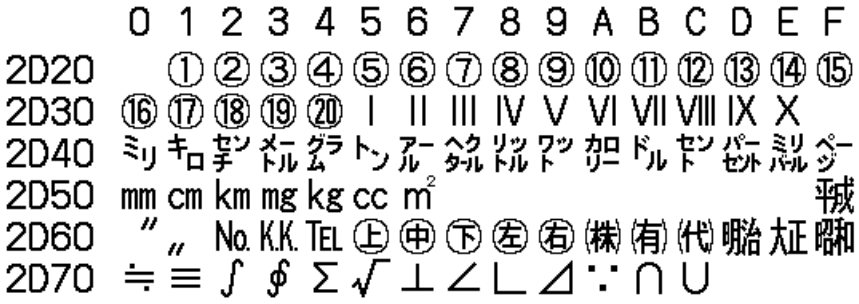


Figure A-21 NEC Special Character Set

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
7920		纊	褜	鍈	銈	蓜	俉	炻	昱	棈	鋹	曻	彅	丨	仡	仼
7930	伀	伃	伹	佖	侒	侊	侚	侔	俍	偀	倢	俿	倞	偆	偰	偂
7940	傔	僴	僘	兊	兤	冝	冾	凬	刕	劜	劦	勀	勛	匀	匇	匤
7950	卲	厓	厲	叝	﨎	咜	咊	咩	哿	喆	坙	坥	垬	埈	埇	﨏
7960	塚	增	墲	夋	奓	奛	奝	奣	妤	妺	孖	寀	甯	寘	寬	尞
7970	岦	岺	峵	崧	嵓	﨑	嵂	嵭	嶸	嶹	巐	弡	弴	彧	德	

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
7A20		忞	恝	悅	悊	惞	惕	愠	惲	愑	愷	愰	憘	戓	抦	揵
7A30	摠	撝	擎	敎	昀	昕	昻	昉	昮	昞	昤	晥	晗	晙	晴	晳
7A40	暙	暠	暲	暿	曺	朎	朗	杦	枻	桒	柀	栁	桄	棏	﨓	楨
7A50	﨔	榘	槢	樰	橫	橆	橳	橾	櫢	櫤	毖	氿	汜	沆	汯	泚
7A60	洄	涇	浯	涖	涬	淏	淸	淲	淼	渹	湜	渧	渼	溿	澈	澵
7A70	濵	瀅	瀇	瀨	炅	炫	焏	焄	煜	煆	煇	凞	燁	燾	犱	

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
7B20		犾	猤	猪	獷	玽	珉	珖	珣	珒	琇	珵	琦	琪	琩	琮
7B30	瑢	璉	璟	甁	畯	皂	皜	皞	皛	皦	益	睆	劯	砡	硎	硤
7B40	硺	礰	礼	神	祥	禔	福	禛	竑	竧	靖	竫	箞	精	絈	絜
7B50	綷	綠	緖	繒	罇	羡	羽	茁	荢	荿	菇	菶	葈	蒴	蕓	蕙
7B60	蕫	﨟	薰	蘒	﨡	蠇	裵	訒	訷	詹	誧	誾	諟	諸	諶	譓
7B70	譿	賰	賴	贒	赶	﨣	軏	﨤	逸	遧	郞	都	鄕	鄧	釚	

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
7C20		釗	釞	釭	釮	釤	釥	鈆	鈐	鈊	鈺	鉀	鈼	鉎	鉙	鉑
7C30	鈹	鉧	銧	鉷	鉸	鋧	鋗	鋙	鋐	﨧	鋕	鋠	鋓	錥	錡	鋻
7C40	﨨	錞	鋿	錝	錂	鍰	鍗	鎤	鏆	鏞	鏸	鐱	鑅	鑈	閒	隆
7C50	﨩	隝	隯	霳	霻	靃	靍	靏	靑	靕	顗	顥	飯	飼	餧	館
7C60	馞	驎	髙	髜	魵	魲	鮏	鮱	鮻	鰀	鵰	鵫	鶴	鸙	黑	
7C70		ⅰ	ⅱ	ⅲ	ⅳ	ⅴ	ⅵ	ⅶ	ⅷ	ⅸ	ⅹ	￢	￤	＇	＂	

Figure A-22 NEC Selection of IBM Extended Character Set

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
9320		ⅰ	ⅱ	ⅲ	ⅳ	ⅴ	ⅵ	ⅶ	ⅷ	ⅸ	ⅹ	Ⅰ	Ⅱ	Ⅲ	Ⅳ	Ⅴ
9330	Ⅵ	Ⅶ	Ⅷ	Ⅸ	Ⅹ	￢	￤	＇	＂	㈱	№	℡	∵	纊	褜	鍈
9340	銈	蓜	俉	炻	昱	棈	鋹	曻	彅	丨	仡	仼	伀	伃	伹	佖
9350	侒	侊	侚	侔	俍	偀	倢	俿	倞	偆	偰	偂	傔	僴	僘	兊
9360	兤	冝	冾	凬	刕	劜	劦	勀	勛	匀	匇	匤	卲	厓	厲	叝
9370	﨎	咜	咊	咩	哿	喆	坙	坥	垬	埈	埇	﨏	塚	增	墲	

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
9420		夋	奓	奛	奝	奣	妤	妺	孖	寀	甯	寘	寬	尞	岦	岺
9430	峵	崧	嵓	﨑	嵂	嵭	嶸	嶹	巐	弡	弴	彧	德	忞	恝	悅
9440	悊	惞	惕	愠	惲	愑	愷	愰	憘	戓	抦	揵	摠	撝	擎	敎
9450	昀	昕	昻	昉	昮	昞	昤	晥	晗	晙	晴	晳	暙	暠	暲	暿
9460	曺	朎	朗	杦	枻	桒	柀	栁	桄	棏	﨓	楨	﨔	榘	槢	樰
9470	橫	橆	橳	橾	櫢	櫤	毖	氿	汜	沆	汯	泚	洄	涇	浯	

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
9520		涖	涬	淏	淸	淲	淼	渹	湜	渧	渼	溿	澈	澵	濵	瀅
9530	瀇	瀨	炅	炫	焏	焄	煜	煆	煇	凞	燁	燾	犱	犾	猤	猪
9540	獷	玽	珉	珖	珣	珒	琇	珵	琦	琪	琩	琮	瑢	璉	璟	甁
9550	畯	皂	皜	皞	皛	皦	益	睆	劯	砡	硎	硤	硺	礰	礼	神
9560	祥	禔	福	禛	竑	竧	靖	竫	箞	精	絈	絜	綷	綠	緖	繒
9570	罇	羡	羽	茁	荢	荿	菇	菶	葈	蒴	蕓	蕙	蕫	﨟	薰	

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
9620		蘒	﨡	蠇	裵	訒	訷	詹	誧	誾	諟	諸	諶	譓	譿	賰
9630	賴	贒	赶	﨣	軏	﨤	逸	遧	郞	都	鄕	鄧	釚	釗	釞	釭
9640	釮	釤	釥	鈆	鈐	鈊	鈺	鉀	鈼	鉎	鉙	鉑	鈹	鉧	銧	鉷
9650	鉸	鋧	鋗	鋙	鋐	﨧	鋕	鋠	鋓	錥	錡	鋻	﨨	錞	鋿	錝
9660	錂	鍰	鍗	鎤	鏆	鏞	鏸	鐱	鑅	鑈	閒	隆	﨩	隝	隯	霳
9670	霻	靃	靍	靏	靑	靕	顗	顥	飯	飼	餧	館	馞	驎	髙	

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
9720		髜	魵	魲	鮏	鮱	鮻	鰀	鵰	鵫	鶴	鸙	黑			
9730																
9740																
9750																
9760																
9770																

Figure A-23 IBM Extended Character Set