COMBINATION PRINTER

SCP700 SERIES

Programmer's Manual

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Chapter 1: Outline

The SCP700 Series combines both a quick, quiet and highly reliable thermal receipt printer with an impact dot slip printer, enabling printing on single or multiple sheets of slip paper of an unspecified size.

The thermal printer enables receipt printing without a thermal ribbon and makes paper insertion extremely easy.

The biggest advantage of combining the two printer mechanisms into one unit is that less space, only one power supply and only one port are necessary, compared with using a slip printer which is separate from a thermal receipt printer, each requiring space and a power supply.

Thermal printing on receipt paper is quiet and fast.

For improvement purposes, the descriptions and specifications in this manual are subject to change without notice.

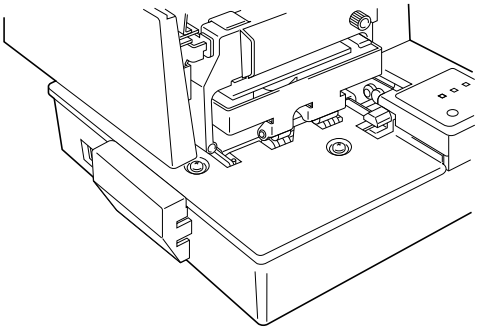
Chapter 2: DIP Switch Settings

The printer's DIP switches let you change communications parameters, thermal printing density, interface type, input buffer size, and emulation. This chapter explains the settings you can make and tells you how to actually change DIP switch settings.

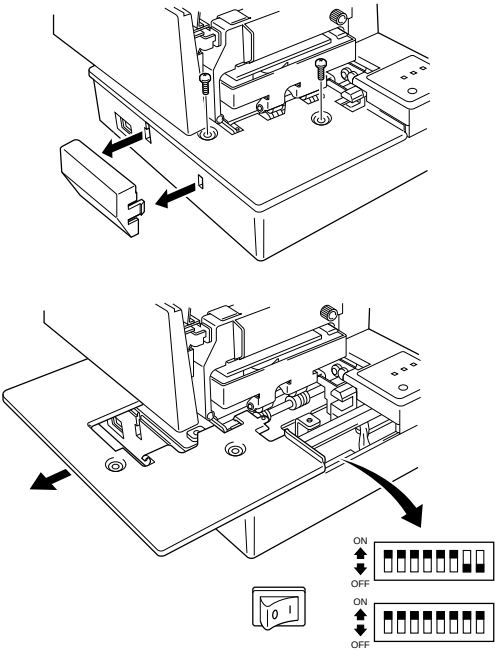
Accessing the DIP switches

The DIP switches are located inside the printer, underneath the document table. Use the following procedure to remove the document table so you can operate the DIP switches.

- ❏ Make sure that the printer is turned off and unplugged from its wall outlet.
- ❏ Open the printer cover.
- ❏ Use a Phillips head screwdriver to remove the two screws that secure the document table in place.



❏ Carefully work the document table loose and slide it to the left of the printer out of the way. It is not necessary to remove the document table complete, just move it enough so you can get at the DIP switches inside.



❏ After the document table is opened sufficiently, use a thin flat-blade screwdriver or some other similar object to change DIP switch settings.

❏ Carefully return the document table to its original position and secure it in place with the two screws.

Available DIP switch settings

There are two DIP switches inside the printer, named DIP Switch 1 and DIP Switch 2. DIP Switch 1 controls data communication parameters, while DIP Switch 2 controls other settings.

DIP Switch 1

The following table shows all the possible settings for DIP Switch 1. This switch sets the transmission parameters of the Standard Serial Interface. All switch settings, except for 1-7 and 1-8, are ON when the printer is shipped from the factory.

Switch	Parameter	ON	OFF
1-1	Baud Rate	See table below	
1-2			
1-3	Data Length	8 bits	7 bits
1-4	Parity Check	Disabled	Enabled
1-5	Parity Selection	Odd	Even
1-6	Handshake	DTR/mode	XON/XOFF mode
1-7	Serial I/F Pin 6 Reset Signal	Active	Inactive
1-8	Serial I/F Pin8 Reset Signal	Active	Inactive

Baud Rate	Switch 1-1	Switch 1-2
2400BPS	OFF	OFF
4800BPS	ON	OFF
9600BPS	ON	ON
19200BPS	OFF	ON

DIP Switch 2

The following table shows all the possible settings for DIP Switch 2. The factory default setting for this switch is all ON.

Switch	Parameter	ON	OFF
2-1	Thermal Print Density	See table below	
2-2			
2-3	Input Buffer Size	4 KB	45 bytes
2-4	Always ON		

Switch	Parameter	ON	OFF
2-5	Interface	Standard	Option
2-6	Always ON		
2-7	Not Used		
2-8	Not Used		

Thermal Print Density	Switch 2-1	Switch 2-2
Light	OFF	OFF
Standard	ON	ON
Heavy	ON	OFF
Very Heavy	OFF	ON

Chapter 3: Memory Switch Settings

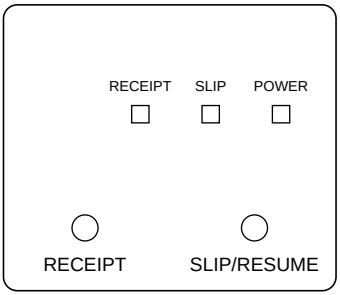
Each memory switch is a 16-bit word store in EEPROM. For details on the functions and settings of memory switches, refer to “Chapter 9”.

The table below shows the factory settings for the memory switches.

Memory Switch	Hexadecimal Code
0	0000
1	0000
2	0000
3	0000
4	0000
5	0000

Chapter 4: Control Panel Operations

The control panel gives you some push-button control over the printer's receipt and slip printer operations. It also includes indicator lights, which tell you the current status of the printer at a glance.



Indicator lights

The following table describes the meaning of indicator lights when it is on, off, or flashing.

Indicator Light	On	Off	Flashing (slow)	Flashing (fast)
POWER	Power on	Power off	Dot adjustment mode	Automatic recovery Error
SLIP	Slip paper released	Slip paper engaged	Request slip paper	Slip printer error
RECEIPT	Receipt printer ready	Receipt printer not ready	Out of receipt paper/Near end	Receipt printer error

* All indicators flash to indicate a non-recoverable error.

Buttons

The following table describes the function of the two control buttons of the control panel.

Button	Description
RECEIPT	Press to feed the thermal paper. Holding down this button feeds paper at high speed.
SLIP/RESUME	1. Press this button to release or engage slip paper from the slip printer. (Switching from releasing to engaging is only possible if slip paper is inserted.) 2. Press this button to clear the errors of the slip printer and receipt printer.

Producing a test print

The following procedure can be used at any time to test the receipt printer and the slip printer.

❏ Turn on the printer and insert a piece of paper into the slip printer. Also make sure that roll paper is loaded for the receipt printer.

Note:

If you want to produce a test print on the receipt printer only, simply don't insert paper into the slip printer.

❏ Turn off printer power.

❏ While holding down the **RECEIPT** button, turn printer back on. Keep **RECEIPT** depressed for a few moments until the printer beeps and the receipt printer test print starts.

After the receipt test print is complete, the slip printer will produce a test print on the paper you inserted in the first step of this procedure. The slip printer test will continue until it reaches the end of the paper.

Note:

The slip printer momentarily releases the slip paper when you turn printer power back on. If you are using a large piece of paper, it may fall out of the slip printer when this happens, causing the slip printer test to be skipped. Because of this, it is a good idea to keep hold of the paper in the slip printer when you turn power back on.

Adjusting the slip printer's dot alignment

You may never have to use the procedure described in this section, but after you have been using your printer for some time you may find that the dots of some graphics do not align correctly. For example, what should look like:

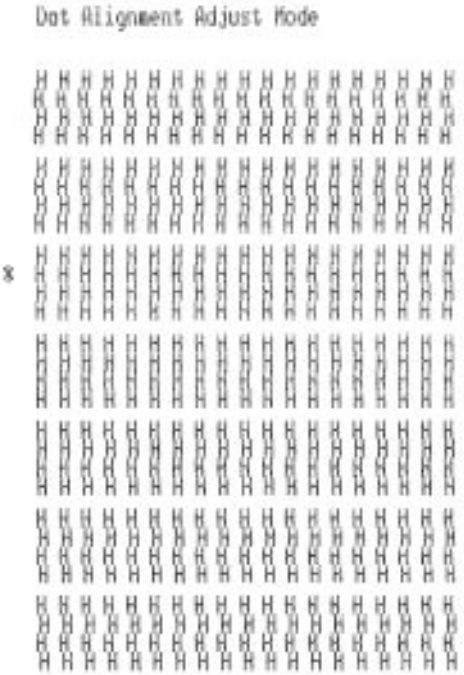
may come out looking like one of the following:

 or like this 

This is caused when mechanical parts of the printer get out of alignment. This happens only rarely and you may never experience it at all throughout the life of the printer. If you do have problems, use the following procedure to correct it.

- ❏ Execute the test print
- ❏ When the slip printer produce the test print, hold down the control panel's **RECEIPT** and **SLIP/RESUME** buttons, to enter the Dot Alignment Adjust Mode. The **POWER** indicator flashes slowly to indicate this mode.

Entering the Dot Alignment Adjust Mode causes seven blocks of characters to be printed as shown below. An asterisk to the left of the blocks indicates which setting is currently selected. Use the **RECEIPT** button to specify which block has the best aligned characters. Press **RECEIPT** once to specify the first block, twice to specify the second block, and so on up to seven times to specify the seventh block. Pressing the **RECEIPT** button more than seven times specifies the seventh block, no matter how many times it is pressed.



To exit this mode, press the **SLIP/RESUME** button. The dot alignment adjust mode setting is stored in the memory, a pattern using the selected setting, followed by “Adjust Completed” is printed, and the printer ejects the slip paper.

Note:

*If you press the **SLIP/RESUME** button without pressing the **RECEIPT** button after entering the Dot Alignment Adjust Mode, the printer assumes that you do not want make any settings, so it prints the message “Adjust Complete!” and exits the mode.*
If a paper feed error occurs during this mode, the printer ejects the paper and this mode is cancelled.

Hexadecimal dump

This procedure prints in hexadecimal format all codes (character codes and control codes) that are sent to the printer by the computer. The printer does not execute any control codes (such as 0A - linefeed), it just prints them out. The hexadecimal dump is useful when you are writing programs for printer control.

- ❏ Make sure that roll paper is loaded in the receipt printer.
- ❏ Turn off the printer.
- ❏ While holding down the control panel's **SLIP/RESUME** button, turn the printer back on to enter this mode. The printer beeps once to indicate in this mode.
- ❏ The printer will now print out the hexadecimal values of any data that is subsequently sent to it from your computer. The last line buffer should be flushed by pressing the **RECEIPT** button.
- ❏ To exit this mode, turn the printer off.

Errors

There are three types of errors: *automatic recovery* errors that clear automatically after some condition is attained, *recoverable* errors that require some action by you before they clear, and *non-recoverable* errors that require servicing by an authorized dealer. If a slip printer error occurs, the **SLIP** indicator flashes quickly. If a receipt printer error occurs, the **RECEIPT** indicator flashes quickly.

Automatic Recovery Error

Error Name	Cause	POWER Flashing Pattern	Recovery
Head Temperature Error	Abnormal thermal head temperature	Fast	Recovery occurs automatically after head temperature returns to normal.

Receipt Printer Recoverable Errors

Error Name	Cause	RECEIPT Flashing Pattern	Recovery
Paper Out Error	No roll paper	Slow	Insert paper and press SLIP/RESUME.
Head Up Error	Raised receipt printer head	Fast	Lower head and press SLIP/RESUME.
Near End	Roll paper near end	Slow	Press SLIP/RESUME to resume printing.
Cutter Error	Error during roll paper cutting	Fast	If the blade is in the home position, press SLIP/RESUME to continue printing. If the blade is not in the home position, this is a non-recoverable error.

Slip Printer Recoverable Errors

Error Name	Cause	SLIP Flashing Pattern	Recovery
Slip printer mechanism error	• Carriage motor lock • Timing signal defect • Abnormal home position check	Fast	Correct the problem and press SLIP/RESUME.

Non-recoverable Errors

First try turning the printer off and then on again. If the error persists or if a non-recoverable error is indicated by all indicators flashing, contact your nearest authorized dealer.

Chapter 5: Standard Serial Interface

❑ This chapter provides detailed specifications for the printer's standard serial interface (Connector Type: D-sub 9-pin).
Set the transmission parameters with DIP Switch 1.

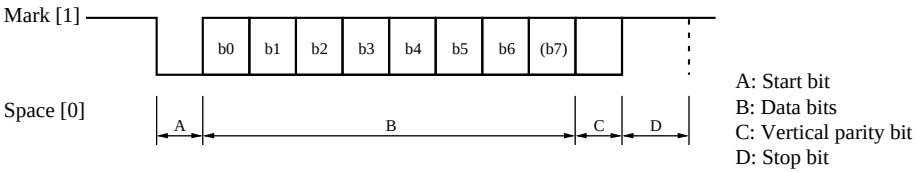
Transmission type ..... Asynchronous serial interface

Baud rate (bps) ..... 2400, 4800, 9600, or 19200
(Selected by DIP switch)

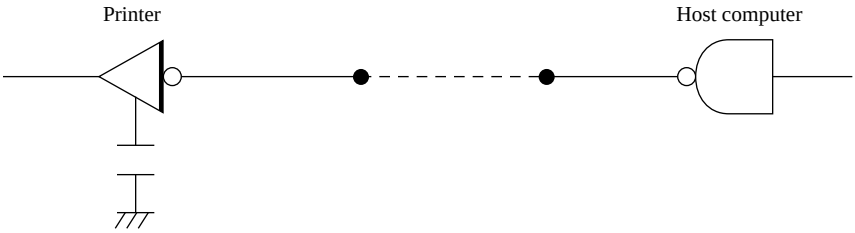
Word format
- Start bit: 1
- Data bits: ..... 7 or 8 (Selected by DIP switch)
- Parity: ..... Odd, Even, or None
(Selected by DIP switch)
- Stop bit: 1

Signal polarities
- RS-232C ..... Mark = Logic "1" (–3V to –15V)
Space = Logic "0" (+3V to +15V)

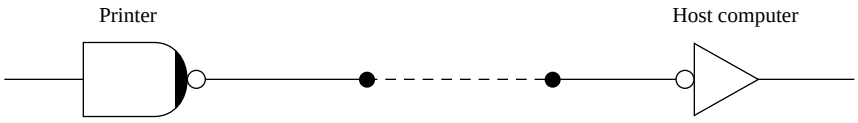
Handshaking ..... DTR or XON/XOFF mode (Selected by DIP switch)



Input (RXD, DSR)

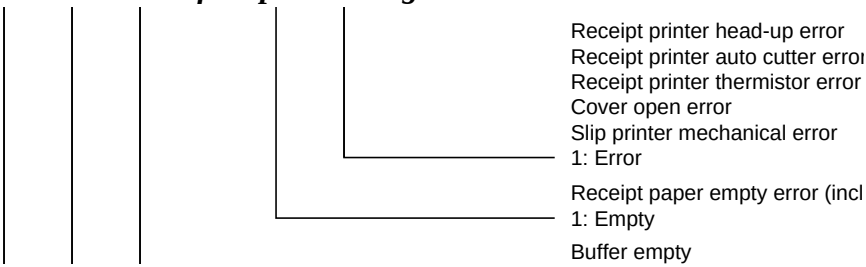


Output (DTR, FAULT, TXD, RTS)



75188 or equivalent

Standard serial interface pins and signal names

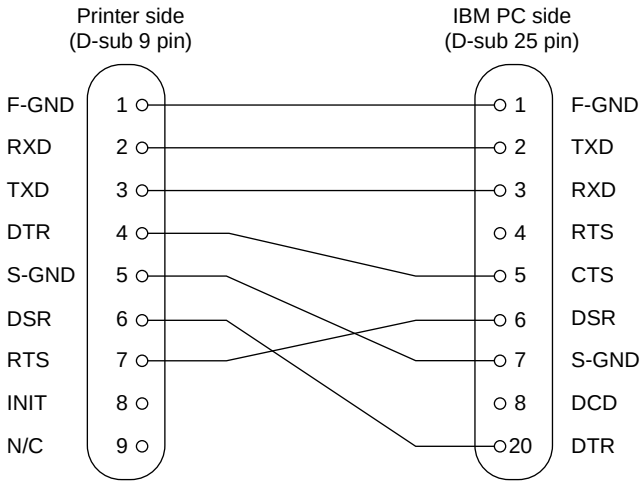


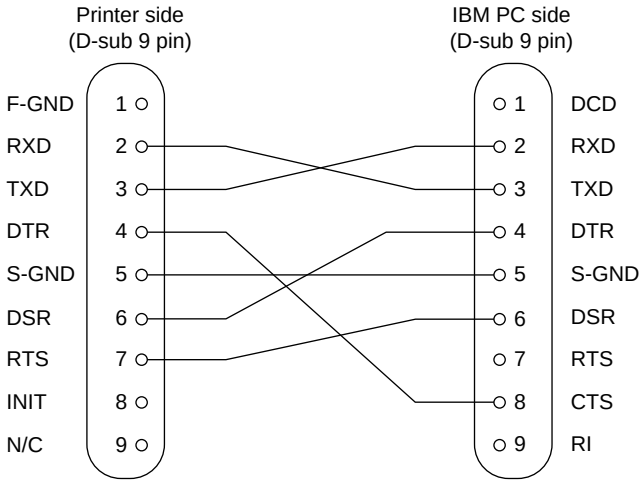
Pin No.	Signal Name	Direction	Function
1	FG	—	Frame Ground
2	RXD	IN	Receive data
3	TXD	OUT	Transmission data
4	DTR	OUT	Data terminal ready signal. This signal changes to SPACE when the printer is ready to receive data.
5	SG	—	Signal ground
6	DSR	IN	Signal line that indicates if the host computer can receive data. SPACE: host can receive MARK: host cannot receive The status of this signal is not confirmed. This signal can be specified as an internal reset signal using Switch 7 of DIP Switch 1 (page 4). MARK of 1ms or longer activates the reset.
7	RTS	OUT	Same as DTR (Pin 4).
8	INIT	IN	This signal can be specified as an internal reset signal using Switch 8 of DIP Switch 1 (page 4). SPACE of 1ms or longer activates the reset.
9	N/C	—	Not connected

Interface connections

❑ Refer to the interface specifications for the host computer for details on connecting to its interface connector. The following illustration shows a typical connection configuration.

RS-232C

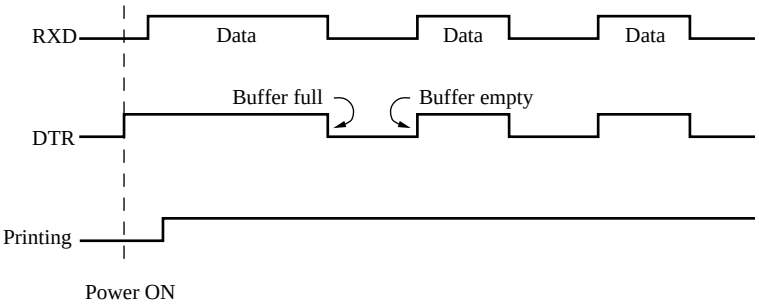




Data protocol

❑ DTR mode

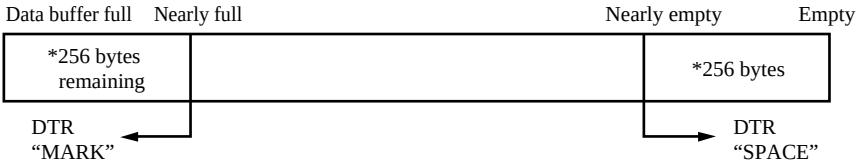
This mode is accessed when the DIP switch 1-6 is set to ON.
Signals are controlled using the DTR line as a BUSY flag.



Immediately after power on (provided that no error occurs), the printer sets DTR to “SPACE” to indicate that it is ready to receive data. When the host detects that DTR is in “SPACE” condition, it begins sending text data over the RXD line.

When the printer’s remaining buffer space falls to *256 bytes or less, the printer sets DTR to “MARK.” The host responds by halting the data transfer. However, note that the printer remains capable of receiving data until the buffer becomes full.

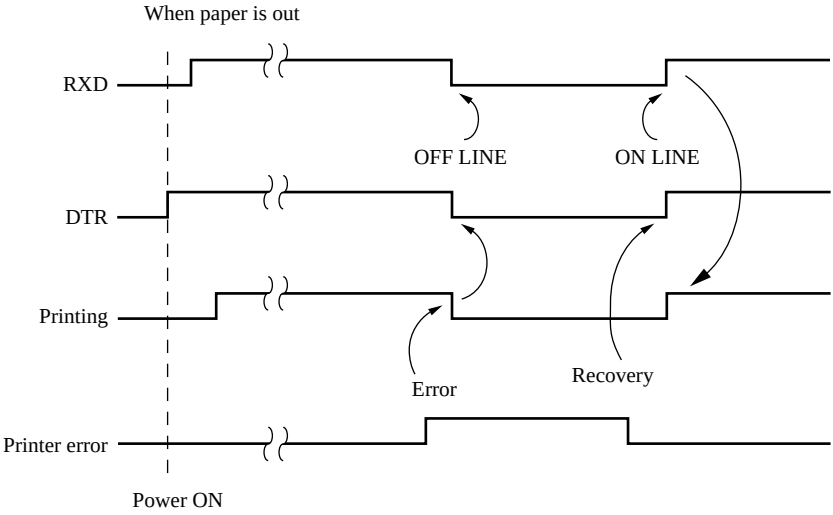
Available buffer space increases as the printer prints the buffered data. When the printer has cleared all but the last *256 bytes of data, it sets DTR back to “SPACE” to indicate that it is ready to receive more data.



* 16 bytes when the buffer size is set to 45 bytes

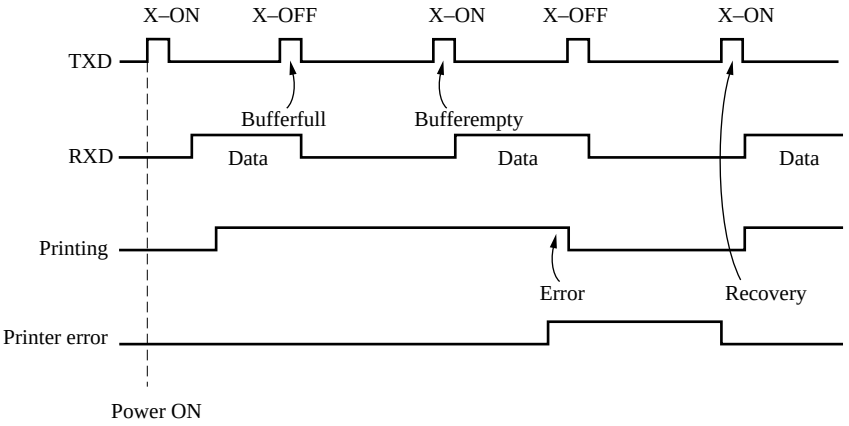
Error Condition

Upon detecting an error, the printer immediately sets DTR to “MARK” and goes off-line. If the printer recovers from the error, DTR is set to “SPACE” and the printer goes back on-line.



❑ X-ON/X-OFF mode

This mode is accessed when DIP switch 1-6 is set to OFF.

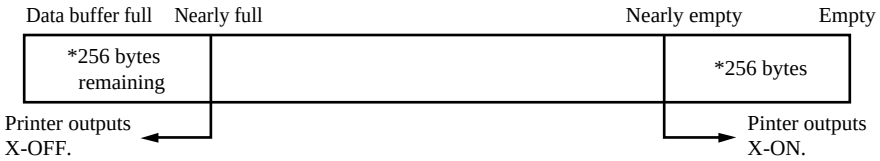


The output timing conditions for X-ON and X-OFF are set using Memory Switch 4-C. If memory switch 4-C is set to 0 (factory setting), 1 byte is output for the X-ON signal when switching from Off-line (Printer Busy) to On-line (Printer Ready), while 1 byte is output for the X-OFF signal when switching from On-line (Printer Ready) to Off-line (Printer Busy). If Memory Switch 4-C is set to 1, the X-ON signals are output every three seconds.

Immediately after power on (provided that no error occurs), the printer informs the host that it is ready to receive data by outputting the X-ON signal (control code DC1; valve = 11H) over the TXD line. If necessary the printer repeats the signal every three seconds until the host begins sending text data over the RXD line.

When the printer's remaining buffer space falls to *256 bytes or less, the printer begins to output X-OFF signals (DC3, value = 13H) over the TXD line. The host responds by halting the data transfer. Note that the printer remains capable of receiving data until the buffer becomes full. If Memory Switch 4-C is set to 1, the X-OFF signal is output each time 1 byte of data is received.

Available buffer space increases as the printer prints the buffered data. When the printer has cleared all but the last *256 bytes of data, it again outputs the X-ON signal.

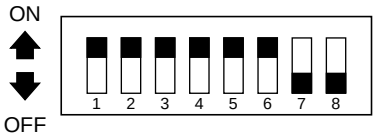


* 16 bytes when the buffer size is set to 45 bytes

Chapter 6: Optional Interface

Optional serial interface

Use a thin flat-blade screwdriver or some other similar object to change DIP switch settings on the optional serial interface board.

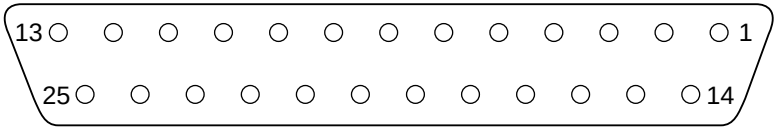


The following table shows all the possible settings for the DIP switches. All switch settings, except for 1-7 and 1-8, are ON when the printer is shipped from the factory.

Switch	Parameter	ON	OFF
1	Baud Rate	See table below	
2			
3	Data Length	8 bits	7 bits
4	Parity Check	Disabled	Enabled
5	Parity Selection	Odd	Even
6	Handshake	DTR/DSR	XON/XOFF
7	Serial I/F Pin 6 Reset Signal	Active	Inactive
8	Serial I/F Pin 25 Reset Signal	Active	Inactive

Baud Rate	Switch 1	Switch 2
2400BPS	OFF	OFF
4800BPS	ON	OFF
9600BPS	ON	ON
19200BPS	OFF	ON

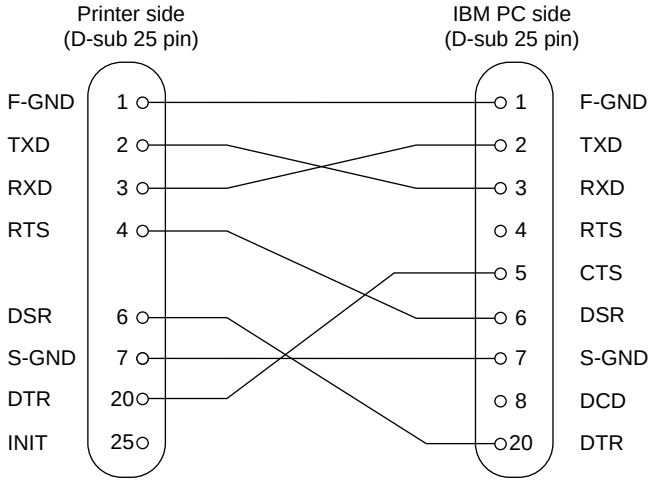
Optional serial interface pins and signal names

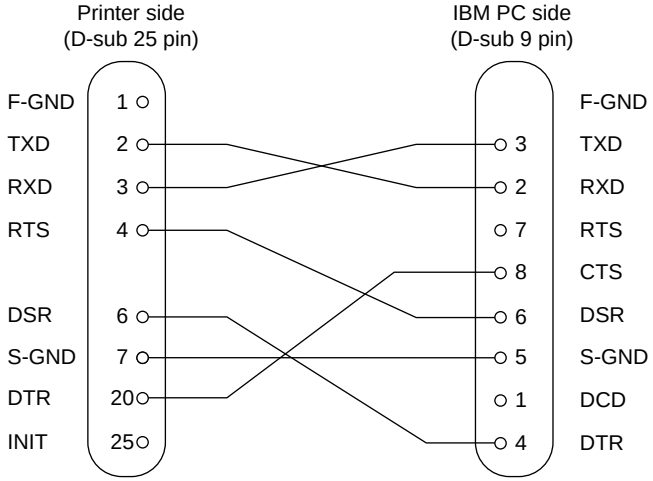


Pin No.	Signal Name	Direction	Function
1	FG	—	Frame Ground
2	TXD	OUT	Transmission data
3	RXD	IN	Receive data
4	RTS	OUT	Data terminal ready signal. This signal changes to SPACE when the printer is ready to receive data.
6	DSR	IN	Signal line that indicates if the host computer can receive data. SPACE: host can receive MARK: host cannot receive The status of this signal is not confirmed. This signal can be specified as an internal reset signal using of DIP Switch 7 (page 19). MARK of 1ms or longer activates the reset.
7	SG	—	Signal ground
20	DTR	OUT	Same as RTS (Pin 4).
25	INIT	IN	This signal can be specified as an internal reset signal using of DIP Switch 8 (page 19). SPACE of 1ms or longer activates the reset.

Interface connections

❏ Refer to the interface specifications for the host computer for details on connecting to is its interface connector. The following illustration shows a typical connection configuration.



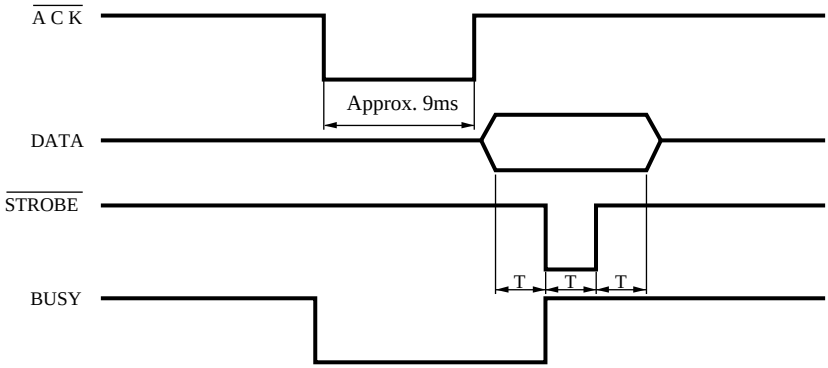


Data protocol

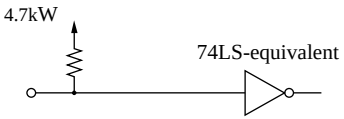
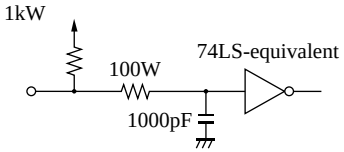
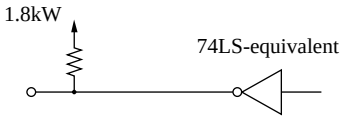
❏ The specifications for the DTR and X-ON/X-OFF modes are the same as for the Standard Serial Interface.

Optional parallel interface

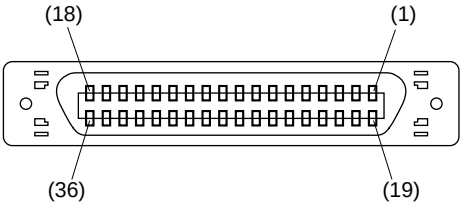
Interface:	Conforms with Centronics parallel interface standard
Data transfer speed:	1000 ~ 5000 CPS
Synchronization:	External strobe pulse
Handshaking:	Using ACK and BUSY
Logic level:	TTL-level compatible



T: At least 0.5ms

	Signal Name	Sample Circuit
Input	DATA 1 DATA 8	
Input	$\overline{\text{STROBE}}$	
Output	BUSY $\overline{\text{ACK}}$	

Optional parallel interface pins and signal names



Pin No.	Signal Name	Direction	Function
1	$\overline{\text{STROBE}}$	IN	Signals when data is ready to be read. Signal goes from HIGH to LOW (for at least 0.5 µs) when data is available.
2 - 9	DATA 1 - 8	IN	Information on the first eight bits of parallel data. Each signal is HIGH for logical 1 and LOW for logical 0.
10	$\overline{\text{ACK}}$	OUT	9µs LOW pulse to acknowledge receipt of data
11	BUSY	OUT	Printer is ready to receive data when LOW. HIGH indicates one of the following conditions. • Data being entered • Printer off line • Error condition
12	PAPER OUT	OUT	Normally LOW, this signal goes HIGH when the printer is out of paper.
13	SELECTED	OUT	HIGH when the printer is on line
14	—	IN	This signal is not checked by printer.
15	N/C	—	Not connected
16	SIGNAL GND	—	Signal ground
17	CHASSIS GND	—	Chassis ground (isolated from logic ground)
18	+5VDC	—	+5V DC (max. 50mA)
19 - 30	GND	—	Twisted pair return signal ground level
31	$\overline{\text{RESET}}$	IN	LOW when printer is reset to power-on defaults
32	$\overline{\text{ERROR}}$	OUT	Normally HIGH, this signal goes LOW to signal that printing is disabled due to an error condition.
33	EXT GND	—	External ground
34 - 35	N/C	—	Not connected
36	—	IN	This signal is not checked by printer.

Chapter 7: Peripheral Unit Driver Circuit

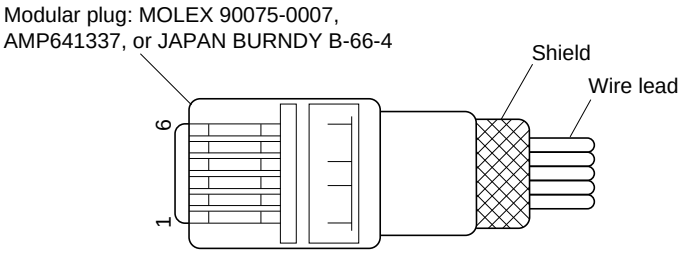
The main logic board of this printer includes a circuit for driving peripheral units, such as cash drawers. A modular connector for connection of the peripheral unit is located on the back of the printer. To connect to the drive circuit, connect the peripheral unit to the modular connector using a cable supplied by you that meets the following specifications.

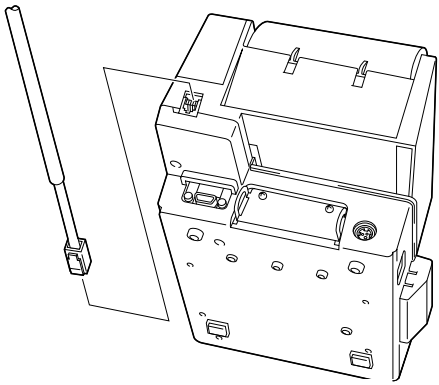
- Use a cable with a modular plug like that one shown in the figure below.

Important!

Never connect any other type of plug to the peripheral unit connector.

Modular plug

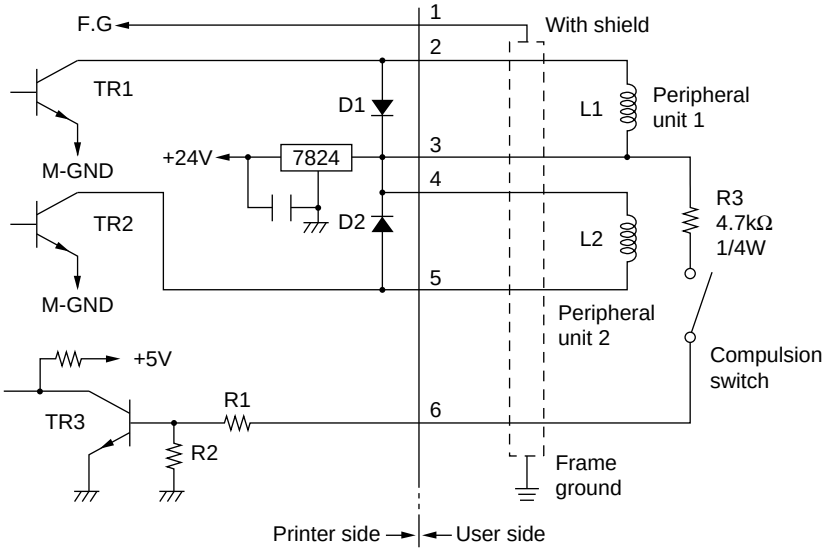




Drive circuit

The recommended drive unit is shown below.

[Drive output 24V, max. 1.0A]



Notes

- Peripheral Units 1 and 2 cannot be driven simultaneously.
- For continuous driving, do not use drive duty above 20%.
- Compulsion switch status is available as status data.
- Minimum resistance for coils L1 and L2 is 24Ω.
- Absolute maximum ratings for diodes D1 and D2 (Ta = 25°C) are:
  Average Rectified Current Io = 1A
  Maximum forward surge current (60Hz, 1-cycle sine wave) I_{FSM} = 40A
- Absolute maximum rating for transistors TR1 and TR2 (Ta = 25°C) are:
  Collector current Ic = 2A

Chapter 8: Automatic Cutter

1. The cutter operates in response to data commands. To enable cutter operation, set Memory Switch #2-8 to indicate that the cutter is installed.
2. NEVER place fingers or metal objects in the cutter area.
3. If a jam occurs in the cutter area, switch off the power, use tweezers to remove the jammed paper, then switch the power back on. The printer will return the blade to the home position.
4. Never clean the cutter blade with alcohol or any other solvent, as this may remove the blade's lubrication and shorten the blade life.

Chapter 9: Control Codes

Print Station Selection

Control codes	Hexadecimal codes	Function	Receipt-printer	Slip printer	Page
<ESC> “+” “A” 0 <ESC> “+” “A” <0>	1B 2B 41 30 1B 2B 41 00	Select receipt printer		○	33
<ESC> “+” “A” 3 <ESC> “+” “A” <3>	1B 2B 41 33 1B 2B 41 03	Select slip printer	○		33

Character Selection

Control codes	Hexadecimal codes	Function	Receipt-printer	Slip printer	Page
<ESC> “R” *n*	1B 52 *n*	Select international character set	○	○	33
<ESC> “/” “1” <ESC> “/” <1>	1B 2F 31 1B 2F 01	Select slash zero	○	○	33
<ESC> “/” “0” <ESC> “/” <0>	1B 2F 30 1B 2F 00	Select normal zero	○	○	33
<ESC> “b” *n1 n2 n3 n4 d1* ... <RS>	1B 62 *n1 n2 n3 n4 d1* ... 1E	Select bar code printing	○		34
<ESC> “M”	1B 4D	Select 12-dot pitch printing	○		38
		Select 7 × 9 (half dot) font		○	38
<ESC> “p”	1B 70	Select 14-dot pitch printing	○		38
<ESC> “P”	1B 50	Select 15-dot pitch printing	○		38
		Select 5 × 9 (2 pulses = 1 dot) font		○	38
<ESC> “:”	1B 3A	Select 16-dot pitch printing	○		38
		Select 5 × 9 (3 pulses = 1 dot) font		○	38
<ESC> <SP> *n*	1B 20 *n*	Set character spacing	○	○	38
<SO>	0E	Set the printing magnified double in character width.	○	○	39
<DC4>	14	Resets the printing magnified in character width.	○	○	39
<ESC> “W” *n*	1B 57 *n*	Set the magnification rate in character width.	○	○	39
<ESC> <SO>	1B 0E	Sets the printing magnified double in character height.	○		39

Control codes	Hexadecimal codes	Function	Receipt-printer	Slip printer	Page
<ESC> <DC4>	1B 14	Resets the printing magnified in character height.	○		39
<ESC> “h” *n*	1B 68 *n*	Sets the magnification rate in character height.	○	○	40
<ESC> “i” *n1 n2*	1B 69 *n1 n2*	Sets the magnification rates in character width and height.	○		40
<ESC> “–” “1” <ESC> “–” <1>	1B 2D 31 1B 2D 01	Select underlining	○	○	40
<ESC> “–” “0” <ESC> “–” <0>	1B 2D 30 1B 2D 00	Cancel underlining	○	○	40
<ESC> “_” “1” <ESC> “_” <1>	1B 5F 31 1B 5F 01	Select upperlining	○	○	41
<ESC> “_” “0” <ESC> “_” <0>	1B 5F 30 1B 5F 00	Cancel upperlining	○	○	41
<ESC> “4”	1B 34	Select highlight printing	○	○	41
<ESC> “5”	1B 35	Cancel highlight printing	○	○	41
<SI>	0F	Inverted printing	○	○	41
<DC2>	12	Cancel inverted printing	○	○	41
<ESC> “E”	1B 45	Select emphasized printing	○	○	42
<ESC> “F”	1B 46	Cancel emphasized printing	○	○	42

Page Formatting (Line Mode)

Control codes	Hexadecimal codes	Function	Receipt-printer	Slip printer	Page
<ESC> “C” *n*	1B 43 *n*	Set page length in lines	○		43
<ESC> “C” <0> *n*	1B 43 00 *n*	Set page length in inches	○		43
<ESC> “N” *n*	1B 4E *n*	Set bottom margin	○		43
<ESC> “O”	1B 4F	Cancel bottom margin	○		43
<ESC> “1” *n*	1B 6C *n*	Set left margin	○	○	44
<ESC> “Q” *n*	1B 51 *n*	Set right margin	○	○	44

Print Position Control

Control codes	Hexadecimal codes	Function	Receipt-printer	Slip printer	Page
<LF>	0A	Line feed	○	○	45
<CR>	0D	Carriage Return	○	○	45
<ESC> “a” *n*	1B 61 *n*	Feed paper *n* lines	○	○	45

Control codes	Hexadecimal codes	Function	Receipt-printer	Slip printer	Page
<FF>	0C	Form feed	○		45
<HT>	09	Horizontal tab	○	○	45
<VT>	0B	Vertical tab	○		46
<ESC> “z” “1” <ESC> “z” <1>	1B 7A 31 1B 7A 01	Set line spacing to 4 mm	○		46
		Set line spacing to 1/6-inch		○	46
<ESC> “0”	1B 30	Set line spacing to 3 mm	○		46
		Set line spacing to 1/8-inch		○	46
<ESC> “J” *n*	1B 4A *n*	One time *n*/4 mm feed	○		46
		One time *n*/72-inch feed		○	46
<ESC> “j” *n*	1B 6A *n*	One time *n*/4 mm backfeed	○		47
		One time *n*/72-inch backfeed		○	47
<ESC> “B” *n1 n2* ... <0>	1B 42 *n1 n2* ... 00	Set vertical tab stops	○		47
<ESC> “D” *n1 n2* ... <0>	1B 44 *n1 n2* ... 00	Set horizontal tab stops	○	○	48

Dot Graphics Printing

Control codes	Hexadecimal codes	Function	Receipt-printer	Slip printer	Page
<ESC> “K” *n* <0> *m1 m2* ...	1B 4B *n* 00 *m1 m2* ...	Print normal density graphics	○	○	49
<ESC> “L” *n1 n2* *m1 m2* ...	1B 4C *n1 n2 m1 m2* ...	Print high density graphics	○	○	52
<ESC> “k” *n* <0> *m1* ...	1B 6B *n* 00 *m1* ...	Print fine density graphics	○		54
<ESC> “X” *n1n2 m1* ...	1B 58 *n*1n2 *m1*...	Print fine density graphics	○		57

Download Graphics Printing

Control codes	Hexadecimal codes	Function	Receipt-printer	Slip printer	Page
<ESC> “&” “1” “1” *n m1 m2 ... m48*	1B 26 31 31 *n* *m1 m2 ... m48*	Define download character (12 × 24 dot font)	○		58
<ESC> “&” <1> <1> *n m1 m2 ... m48*	1B 26 01 01 *n m1 m2 ... m48*				
<ESC> “&” <0> *n1 n2*	1B 26 00 *n1 n2*	Define download character (7 × 9, 5 × 9 dot font)		○	59
<ESC> “&” “1” “0” *n*	1B 26 31 30 *n*	Delete a download character (12 × 24 dot font)	○		61
<ESC> “&” <1> <0> *n*	1B 26 01 00 *n*				

Control codes	Hexadecimal codes	Function	Receipt-printer	Slip printer	Page
<ESC> “%” “1” <ESC> “%” <1>	1B 25 31 1B 25 01	Enable download character set	○	○	61
<ESC> “%” “0” <ESC> “%” <0>	1B 25 30 1B 25 00	Disable download character set	○	○	61

Peripheral Device Control

Control codes	Hexadecimal codes	Function	Receipt-printer	Slip printer	Page
<ESC> <BEL> *n1 n2*	1B 07 *n1 n2*	Define drive pulse width for peripheral device #1	○	○	62
<BEL>	07	Control peripheral device #1	○	○	62
<FS>	1C	Control peripheral device #1 immediately	○	○	62
<EM>	19	Control peripheral device #2 immediately	○	○	62
<SUB>	1A	Control peripheral device #2 immediately	○	○	62

Auto Cutter Control

Control codes	Hexadecimal codes	Function	Receipt-printer	Slip printer	Page
<ESC> “d” “0” <ESC> “d” <0>	1B 64 30 1B 64 00	Full-cut command to the auto cutter	○		62
<ESC> “d” “1” <ESC> “d” <1>	1B 64 31 1B 64 01	Partial-cut command to the auto cutter	○		62

Slip Printer Control

Control codes	Hexadecimal codes	Function	Receipt-printer	Slip printer	Page
<ESC> <SI> *n*	1B 0F *n*	Setting slip sensor		○	63
<ESC> <FF> *n*	1B 0C *n*	Slip function		○	63
<ESC> <VT> *m n*	1B 0B *m n*	Set the paper eject direction/ length		○	64
<EOT>	04	Slip status enquiry		○	64

Page Mode

Control codes	Hexadecimal codes	Function	Receipt-printer	Slip printer	Page
<ESC> “n”	1B 6E	Select page mode		○	65
<ESC> “!”	1B 21	Select line mode		○	67
<ESC> “*” ...	1B 2A ...	Setting print area in page mode		○	68
<ESC> “T” *n*	1B 54 *n*	Setting print direction in page mode		○	69
<FF>	0C	Print in page mode		○	70

Other Commands

Control codes	Hexadecimal codes	Function	Receipt-printer	Slip printer	Page
<CAN>	18	Cancel printer buffer & Initialize printer	○	○	71
<DC3>	13	Deselect printer	○	○	71
<DC1>	11	Set select mode	○	○	71
<RS>	1E	Beep the buzzer	○	○	71
<ESC> “#N, *n1 n2 n3 n4*” <LF> <NUL>	1B 23 N 2C *n1 n2 n3 n4* 0A 00	Set memory switch	○	○	72
<ESC> “@”	1B 40	Initialize printer	○	○	74
<ENQ>	05	Enquiry	○	○	74
<ESC> “?” <LF> <NUL>	1B 3F 0A 00	Reset printer hardware and produce a test print.	○	○	75

Printer Station Selection

CODE <ESC> "+" "A" *n*
1B 2G 41 *n*

FUNCTION Print Station Selection
n = 0, "0" : Selects the receipt printer
3, "3" : Selects the slip printer

This command is only valid when it entered at the beginning of a line. Be sure to add <LF> in the data immediately before this code.

Character Selection

CODE <ESC> "R" *n*

HEX 1B 52 *n*

FUNCTION Select international character set

Selects an international character set according to the value of *n*, as shown below:

0 ≦ n ≦ 12, "0" ≦ n ≦ "9", "A" ≦ n ≦ "C"

n = 0, "0" : U.S.A. 1, "1" : France 2, "2" : Germany
3, "3" : England 4, "4" : Denmark I 5, "5" : Sweden
6, "6" : Italy 7, "7" : Spain I 8, "8" : Japan
9, "9" : Norway 10, "A" : Denmark Ⅱ 11, "B" : Spain Ⅱ
12, "C" : Latin America

Although the international character set can also be selected using a memory switch, the control code setting is given priority.

CODE <ESC> "/" *n*

HEX 1B 2F *n*

FUNCTION Select zero style

Causes subsequent zero characters to be printed with a slash when *n* is 1, and without a slash when *n* is 0.
The valve of *n* can be set to 0(00H) or "0"(30H), or 1(0H) or "1"(31H).

The default may differ depending on the memory switch setting.

CODE <ESC> "b" *n1* *n2* *n3* *n4* *d1* ... *dk* <RS>

HEX 1B 62 *n1* *n2* *n3* *n4* *d1* ... *dk* 1E

FUNCTION Select bar code printing

Prints bar code according to the value of *n1*, as shown below: This command is only valid with the receipt printer.

n1: Type of bar code

0	UPC-E
1	UPC-A
2	JAN/EAN-8
3	JAN/EAN-13
4	CODE 39
5	ITF
6	CODE 128
7	CODE 93
8	NW-7

The value of *n1* can be set to 0(00H) or 8(08H) or "0"(30H) to "8"(38H).

n2: Printing character below bar code or line feed

1	Character below bar code is not printed, Line feed is performed after execution of command.
2	Character below bar code is printed, Line feed is performed after execution of command.
3	Character below bar code is not printed, Line feed is not performed after execution of command.
4	Character below bar code is printed, Line feed is not performed after execution of command.

The value of *n2* can be set to 1(01H) to 4(04H) or "1"(31H) to "4"(34H).

n3: Mode of bar code

UPC-E, UPC-A, JAN/EAN-8, JAN/EAN-13, CODE 128, CODE 93

1	Minimum module 2 dots
2	Minimum module 3 dots
3	Minimum module 4 dots

CODE 39, NW-7, ITF

		CODE 39, NW-7	ITF
1	Narrow : wide	2:6 dots	2:5 dots
2	Narrow : wide	3:9 dots	4:10 dots
3	Narrow : wide	4:12 dots	6:15 dots
4	Narrow : wide	2:5 dots	2:4 dots
5	Narrow : wide	3:8 dots	4:8 dots
6	Narrow : wide	4:10 dots	6:12 dots
7	Narrow : wide	2:4 dots	2:6 dots
8	Narrow : wide	3:6 dots	3:9 dots
9	Narrow : wide	4:8 dots	4:12 dots

When the value of *n3* is UPC-E, UPC-A, JAN/EAN-8, JAN/EAN-13, CODE 128 or CODE 93, 1(01H) to 3(03H) or “1”(31H) to “3”(33H) can be set. When the value of n3 is CODE39, NW-7 or ITF, 1(01H) to 9(09H) or “1”(31H) to “9”(39H) can be set.

n4: Height of bar code
Can be up to 255 dots (31.9 mm).
If the bar code height is larger than the line feed amount, the line feed amount is automatically multiplied by an integer.

d1...dk: Bar code data

UPC-E/UPC-A: K = 11 (or 12)
The check digit at the 12th digit is automatically added, and ignored even if it is specified.

JAN/EAN-8: K = 7 (or 8)
The check digit at the 8th digit is automatically added, and ignored even if it is specified.

JAN/EAN-13: K = 12 (or 13)
The check digit at the 13th digit is automatically added, and ignored even if it is specified.

CODE39: The value of k is optional, and the maximum value also differs according to the modes (21 digits maximum in mode 7).
The start/stop code (“∗”) is automatically added.

ITF
: The value of k is optional, and the maximum value also differs according to the modes (40 digits maximum in mode 4).
If the data is number of an odd digits, 0 is automatically added at the beginning of the data.

CODE 128:
: The value of k is optional, and the maximum value also differs according to the modes and the types of character number (51 digits maximum in mode 1).
The check character is automatically added.

CODE 93:
: The value of k is optional, and the maximum value also differs according to the modes and the types of character (30 digits maximum in mode 1).
The check characters (C and K) are automatically added.

NW-7:
: The value of k is optional, and the maximum value also differs according to the modes and the types of character number (29 digits maximum in mode 7).
The start/stop code is also contained in the data (it is not automatically added).

The bar code printing start position is at the upper end of the current line.
If the bar code is positioned beyond the right margin, neither the bar code nor the character below the bar code will be printed.

Data of CODE 128 and CODE 93

When <LF> is used in a command, some kinds of control code cannot be sent by the host PC. The control code should be sent as the data as shown below:

- When sending the following data, express as a set of two characters.
  Express “% (25H)” as “%0 (25H30H)”.
  Add “40H-5FH” after “%” for the control codes (00H-1FH).
  Express the control code (7FH) as “%5(25H35H)”.
  Add “1 - 4 (31H - 34H)” after “%” for the function code.
  Add “6 - 8 (36H - 38H)” after “%” for the start code.

3) 2-character codes

Control codes

CODE		FORMAT		
NUL	00H	%@	25H	40H
SOH	01H	%A	25H	41H
STX	02H	%B	25H	42H
ETX	03H	%C	25H	43H
EOT	04H	%D	25H	44H
ENQ	05H	%E	25H	45H
ACK	06H	%F	25H	46H
BEL	07H	%G	25H	47H
BS	08H	%H	25H	48H
HT	09H	%I	25H	49H
LF	0AH	%J	25H	4AH
VT	0BH	%K	25H	4BH
FF	0CH	%L	25H	4CH
CR	0DH	%M	25H	4DH
SO	0EH	%N	25H	4EH
SI	0FH	%O	25H	4FH
DLE	10H	%P	25H	50H
DC1	11H	%Q	25H	51H
DC2	12H	%R	25H	52H
DC3	13H	%S	25H	53H
DC4	14H	%T	25H	54H
NAK	15H	%U	25H	55H
SYN	16H	%V	25H	56H
ETB	17H	%W	25H	57H
CAN	18H	%X	25H	58H
EM	19H	%Y	25H	59H
SUB	1AH	%Z	25H	5AH
ESC	1BH	%[	25H	5BH
FC	1CH	%¥	25H	5CH
GS	1DH	%]	25H	5DH
RS	1EH	%^	25H	5EH
US	1FH	%_	25H	5FH
DEL	7FH	%5	25H	35H

Special code

CODE		FORMAT		
%	25H	%0	25H	30H

Function codes

CODE	FORMAT			
FNC1	%1	25H	31H	☆
FNC2	%2	25H	32H	☆
FNC3	%3	25H	33H	☆
FNC4	%4	25H	34H	☆

Start codes

CODE	FORMAT			
START A	%6	25H	36H	☆
START B	%7	25H	37H	☆
START C	%8	25H	38H	☆

☆ For CODE 128 only.

CODE <ESC> "M"

HEX 1B 4D

FUNCTION Receipt printer: Select 12-dot pitch printing
Prints in a 12 × 24 dot font with no spacing between characters.
Slip printer : Select 7 × 9 (half dot) font

CODE <ESC> "p"

HEX 1B 70

FUNCTION Select 14-dot pitch printing
Prints in a 12 × 24 dot font with 2-dot spacing between characters.
This command is only valid with the receipt printer.

CODE <ESC> "P"

HEX 1B 50

FUNCTION Receipt printer: Select 15-dot pitch printing
Prints in a 12 × 24 dot font with 3-dot spacing between characters.
Slip printer : Select 5 × 9 (2 pulses = 1 dot) font

CODE <ESC> ":"

HEX 1B 3A

FUNCTION Receipt printer: Select 16-dot pitch printing
Prints in a 12 × 24 dot font with 4-dot spacing between characters.
Slip printer : Select 5 × 9 (3 pulses = 1 dot) font

CODE <ESC> <SP> *n*

HEX 1B 20 *n*

FUNCTION Set character spacing
Sets the spacing between characters according to the value of *n*.
The value of *n* can be set from 0 through 15, or from "0" through "9" and "A" through "F".
The default value of *n* is 0.

CODE <SO>

HEX 0E

FUNCTION Sets the printing magnified double in character width.
Prints the subsequent data including a character spacing set by <ESC><SP> *n*, magnified double in character width.

CODE <DC4>

HEX 14

FUNCTION Resets the printing magnified in character width.
Resets the printing magnified in character width set by <SO>, <ESC> "W" *n* and <ESC> "i"*n1n2*.

CODE <ESC> "W" *n*

HEX 1B 57 *n*

FUNCTION Set the magnification rate in character width
Prints the subsequent data with a character width magnified by a rate specified by the value of n.
Receipt printer: n= 0, "0": Reset magnification (same as <DC4>)
1, "1": Double magnification (same as <SO>)
2, "2": Triple magnification
3, "3": Quadruple magnification
4, "4": Quintuple magnification
5, "5": Sextuple magnification

Slip printer: n= 0, "0": Reset magnification (same as <DC4>)
1, "1": Double magnification (same as <SO>)

CODE <ESC> <SO>

HEX 1B 0E

FUNCTION Sets the printing magnified double in character height.
Prints the subsequent data magnified double in character height.
This command is only valid with the receipt printer.

CODE <ESC> <DC4>

HEX 1B 14

FUNCTION Resets the printing magnified in character height set by <ESC><SO>, <ESC>"h"*n* and <ESC> "i" *n1n2*.
This command is only valid with the receipt printer.

CODE <ESC> "h" *n*

HEX 1B 68 *n*

FUNCTION Set the magnification rate in character height
Prints the subsequent data with a character height magnified by a rate specified by the value of *n*.
Receipt printer: n= 0, "0": Reset magnification (same as <ESC><DC4>)
1, "1": Double magnification (same as <ESC><SO>)
2, "2": Triple magnification
3, "3": Quadruple magnification
4, "4": Quintuple magnification
5, "5": Sextuple magnification

Slip printer: n= 0, "0": Reset magnification (same as <DC4>)
1, "1": Double magnification (same as <SO>)

CODE <ESC> "i" *n1 n2*

HEX 1B 69 *n* 1 n2

FUNCTION Sets the magnification rates in character width and height
Prints the subsequent data in the size specified by *n1* and *n2*. The value of *n1* indicates the height magnification and the value of *n2* indicates the width magnification.
Receipt printer: n1 (n2)= 0, "0": Normal height (or width) size
1, "1": Double height (or width) size
2, "2": Triple height (or width) size
3, "3": Quadruple height (or width) size
4, "4": Quintuple height (or width) size
5, "5": Sextuple height (or width) size

The value of n is between 0(00H) and 5(05H) or "0" (30H) and "5" (35H). This command is only valid with the receipt printer.

CODE <ESC> "–" *n*

HEX 1B 2D *n*

FUNCTION Underlining
When the value of *n* is 1, underlines the subsequent data including a character spacing set by <ESC><SP> *n*.
The part to be skipped by the horizontal tab setting and the block graphic characters are not underlined.
Resets the underline mode when the value of *n* is 0.
The value of *n* can be set to 0(00H) or "0"(30H), or 1(01H) or "1"(31H).

CODE <ESC> "_" *n*

HEX 1B 5F *n*

FUNCTION Upperlining
When the value of *n* is 1, over lines the subsequent data including a character spacing set by <ESC><SP> *n*.
The part to be skipped by the horizontal tab setting and the block graphic characters are not upper lined.
Resets the upper line mode when the value of *n* is 0.
The value of *n* can be set to 0(00H) or "0"(30H), or 1(01H) or "1"(31H).

CODE <ESC> "4"

HEX 1B 34

FUNCTION Select highlight printing
Prints the subsequent data including a character spacing set by <ESC><SP> *n* reversed.
The part to be skipped by the horizontal tab setting is not reversed.

CODE <ESC> "5"

HEX 1B 35

FUNCTION Cancel highlight printing
Cancels highlight printing

CODE <SI>

HEX 0F

FUNCTION Inverted printing
Causes subsequent characters to be inverted.
Enter this command at the beginning of the line. If this code is entered at any other position, it will be invalid. Therefore, it is not possible to mix correct and inverted printing in one line.

CODE <DC2>

HEX 12

FUNCTION Cancel inverted printing
Cancels inverted printing
Enter this code at the beginning of the line.

CODE <ESC> “E”

HEX 1B 45

FUNCTION Select emphasized printing
Causes subsequent characters to be emphasized.

CODE <ESC> “F”

HEX 1B 46

FUNCTION Cancel emphasized printing
Cancels emphasized printing.

Page Formatting (Line Mode)

CODE <ESC> "C" *n*

HEX 1B 43 *n*

FUNCTION Set page length in lines
Sets the page length using the current line spacing, where *n* is between 1 and 127.
Changing the line spacing later does not alter the physical page length.
The current line becomes the top of the page.
Resets the bottom margin.
Default page length is 42 lines.
This command is only valid with the receipt printer.

CODE <ESC> "C" <0> *n*

HEX 1B 43 00 *n*

FUNCTION Set page length in inches
Sets the page length to $n \times 24$ mm, where *n* is between 1 and 22.
The current line becomes the top of the page.
Resets the bottom margin
This command is only valid with the receipt printer.

CODE <ESC> "N" *n*

HEX 1B 4E *n*

FUNCTION Set bottom margin
Sets the bottom margin to *n* lines at the current line spacing, where *n* is between 0 and 255.
Bottom margin is reset when you change the page length.
Setting is invalid if the printing area on one page is 36 mm or less.
This command is only valid with the receipt printer.

CODE <ESC> "O"

HEX 1B 4F

FUNCTION Cancel bottom margin
Cancels the bottom margin.
This command is only valid with the receipt printer.

CODE <ESC> "1" *n*

HEX 1B 6C *n*

FUNCTION Set left margin at column *n* at the current character pitch.
The left margin does not move if the character pitch is changed later.
If this function is set in the middle of a line, it will become valid starting with the following line. When the power is turned on, the left edge is set as the left margin.

Receipt printer : The setting is invalid if the print area for one line would be 36 mm or less.
The value of n is between 0 and 255.

Slip printer : The left margin must be at least 18 dots to the left of the right margin and within the limits below. If the size of one character and its spacing is larger than the print area defined by the margins, printing is not possible and "?" is printed, instead of the character.
The value of n is between 0 and the value of the right margin - 2.

CODE <ESC> "Q" *n*

HEX 1B 51 *n*

FUNCTION Set right margin
Set right margin at column *n* at the current character pitch.
The right margin does not move if the character pitch is changed later.
If this function is set in the middle of a line, it will become valid starting with the following line. When the power is turned on, the right edge is set as the right margin.

Receipt printer : The setting is invalid if the print area for one line would be 36 mm or less. The value of n is between 0 and 255.

Slip printer : The right margin must be within the limits below and set so that the allowable print area is more than 18 dots. If the size of one character and its spacing is larger than the print area defined by the margins, printing is not possible and "?" is printed, instead of the character.
The value of n is between 2 and the value of the maximum number of print columns.

Print Position Control

CODE <LF>

HEX 0A

FUNCTION Line feed
Prints the current line and feeds the paper to the next line.

CODE <CR>

HEX 0D

FUNCTION Carriage return
The <CR> code is valid for both the receipt and slip printers only if memory switch 3-1 is set to 1. (The factory setting is 0.)
If the <CR> code is valid:
Receipt printer : Functions in the same way as an <LF> code.
Slip printer : The function of the <CR> code changes according to the setting of memory switch 5-8.

When memory switch 5-8 is set to 0 (factory setting): Functions in the same way as an <LF> code (CRLF).
When memory switch 5-8 is set to 1: Executed only when printing. The paper is not fed (CR).

CODE <ESC> "a" *n*

HEX 1B 61 *n*

FUNCTION Feed paper *n* lines
Prints the current line and feeds the paper *n* lines (where *n* is between 1 and 127).

CODE <FF>

HEX 0C

FUNCTION From feed
Feeds the paper to the top of the next page, according to the page length set by <ESC> "C"*n* or <ESC>"C"<0>*n*.
This command is only valid with the receipt printer.

CODE <HT>

HEX 09

FUNCTION Horizontal tab
Moves the print position to the next horizontal tab stop. Ignored if there is no next horizontal tab stop on the current line.

CODE <VT>

HEX 0B

FUNCTION Vertical tab
Prints the current line and feeds the paper to the next vertical tab stop and moves the print position to the left margin.
Performs paper feed if no vertical tabs are set or if the current line is at or below the last vertical tab stop.
This command is only valid with the receipt printer.

CODE <ESC> "z" "1" or <ESC> "z" <1>

HEX 1B 7A 31 or 1B 7A 01

FUNCTION Receipt printer: Set line spacing to 4 mm
Sets the distance that the paper advances in subsequent line feeds to 4 mm.

Slip printer : Set line spacing to 1/6 inch
Sets the distance that the paper advances in subsequent line feeds to 1/6 inch.

CODE <ESC> "0"

HEX 1B 30

FUNCTION Receipt printer: Set line spacing to 3 mm
Sets the distance that the paper advances in subsequent line feeds to 3 mm.

Slip printer : Set line spacing to 1/8 inch
Sets the distance that the paper advances in subsequent line feeds to 1/8 inch.

CODE <ESC> "J" *n*

HEX 1B 4A *n*

FUNCTION Receipt printer: One time n/4-mm feed
Performs a line feed of n/4 mm only once after printing the data in the line buffer. The space setting for lines do not change. The value of n is between 1 and 255.

Slip printer : One time n/72-inch feed
Performs a line feed of n/72-inch only once after printing the data in the line buffer. The space setting for lines do not change. The value of n is between 1 and 255.

CODE <ESC> "j" *n*

HEX 1B 6A *n*

FUNCTION Receipt printer: One time n/4-mm backfeed
Feeds the paper back n/4 mm only once after printing the data in the line buffer. The space setting for lines do not change. This command can also feed the paper back to a previous page; however, the position in the line on the previous page is determined by the page length control.
The value of n is between 1 and 255.

Slip printer : One time n/72-inch backfeed
Performs a line feed of n/72-inch only once after printing the data in the line buffer. The space setting for lines do not change. The value of n is between 1 and 255.

CODE <ESC> "B" *n1* *n2* ... <0>

HEX 1B 42 *n1* *n2* ... 00

FUNCTION Set vertical tab stops
Cancels all current vertical tab stops and sets new vertical tab stops at lines *n1*, *n2*, etc., where *n1*, *n2*, etc. are numbers between 0 and 255. A maximum of 16 vertical tab stops can be set.
The tab stops must be specified in ascending order; any violation of ascending order terminates the tab stop list. Standard termination is by the <0> control code.
The vertical tab stops are set in terms of the current line spacing and do not move if the line spacing is changed later.
With <ESC> "B" <0>, all vertical tab stops are cancelled. This command is only valid with the receipt printer. When the power is turned on, no vertical tabs are set.

CODE	<ESC>	“D”	*n1*	*n2*	...	<0>
HEX	1B	44	*n1*	*n2*	...	00

FUNCTION Set horizontal tab stops

Cancels all current horizontal tab stops and sets new tab stops at columns *n1*, *n2*, etc. at the current character pitch, where *n1*, *n2*, etc. are numbers between 1 and 255. A maximum of 16 horizontal tab stops can be set.

The tab stops must be specified in ascending order; any violation of ascending order terminates the tab stop list. Standard termination is by the <0> control code.

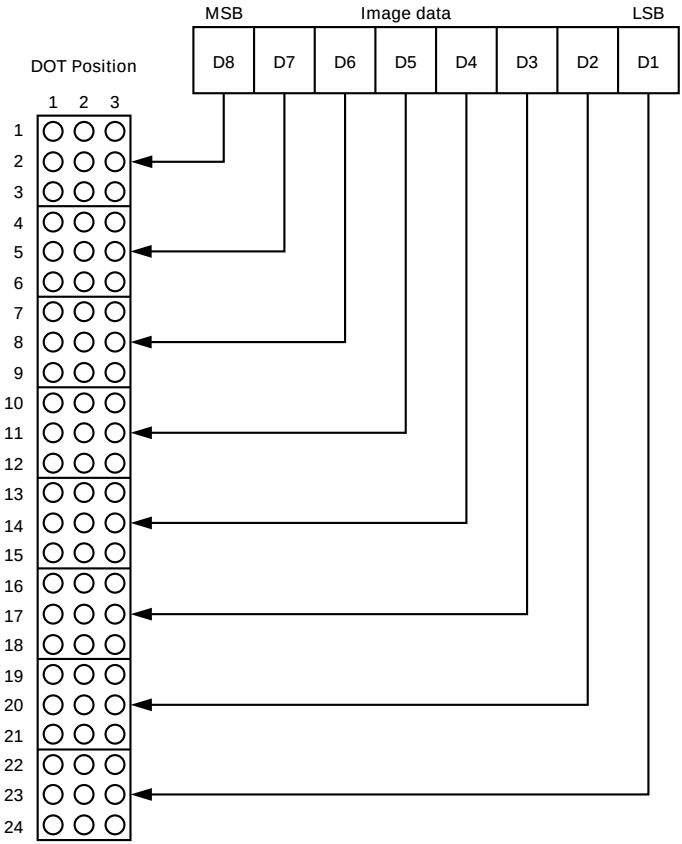
With <ESC> “D” <0>, all horizontal tab stops are cancelled. The left edge of the paper is always the reference point for the horizontal tab positions, regardless of the left margin setting. When the power is turned on, no horizontal tabs are set.

Dot Graphics Printing

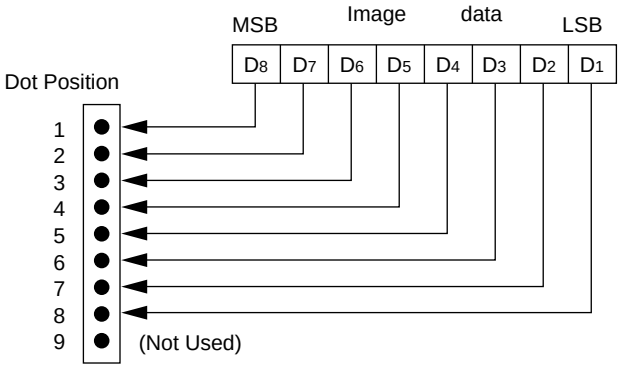
CODE	<ESC>	"K"	*n*	<0>	*m1*	*m2*	...
HEX	1B	4B	*n*	00	*m1*	*m2*	...

FUNCTION Print normal density graphics

Receipt printer: Prints a 3 (horizontal) × 3 (vertical) dot bit image for each dot of entered data. Data extending beyond the right margin is ignored. The relationship between the entered data and the actual printing is shown below. The value of *n* is between 1 and 192.

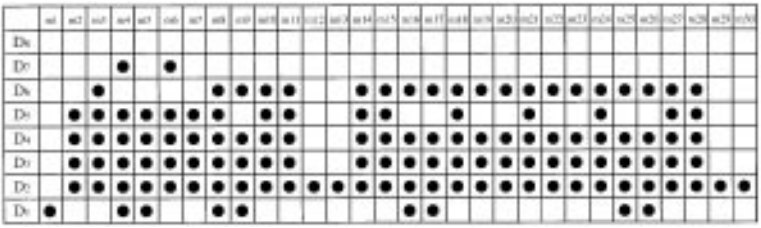


Slip printer: Prints a bit image of the number of dots specified by n. After printing the bit image, the printer automatically returns to the character mode. The relationship between the pins on the print head and the data is shown below.



The value of n is between 1 and 210.
A maximum of 210 data bytes can printed in one line. Any data exceeding 210 bytes is ignored. Only uni-directional printing is possible.

EXAMPLE We will create the design below using a bit image.



First, since the volume of data is 30, *n1* = (1E)H. If the data *m1* ~ *m30* is converted to hexadecimal, it appears as shown below.

Data	Binary	Hexa-decimal
m1	00000001	01
m2	00011110	1E
m3	00111110	3E
m4	01011111	5F
m5	00011111	1F
m6	01011110	5E
m7	00011110	1E
m8	00111111	3F
m9	00101111	2F
m10	00111110	3E

Data	Binary	Hexa-decimal
m11	00111110	3E
m12	00000010	02
m13	00000010	02
m14	00111110	3E
m15	00111110	3E
m16	00101111	2F
m17	00101111	2F
m18	00111110	3E
m19	00101110	2E
m20	00101110	2E

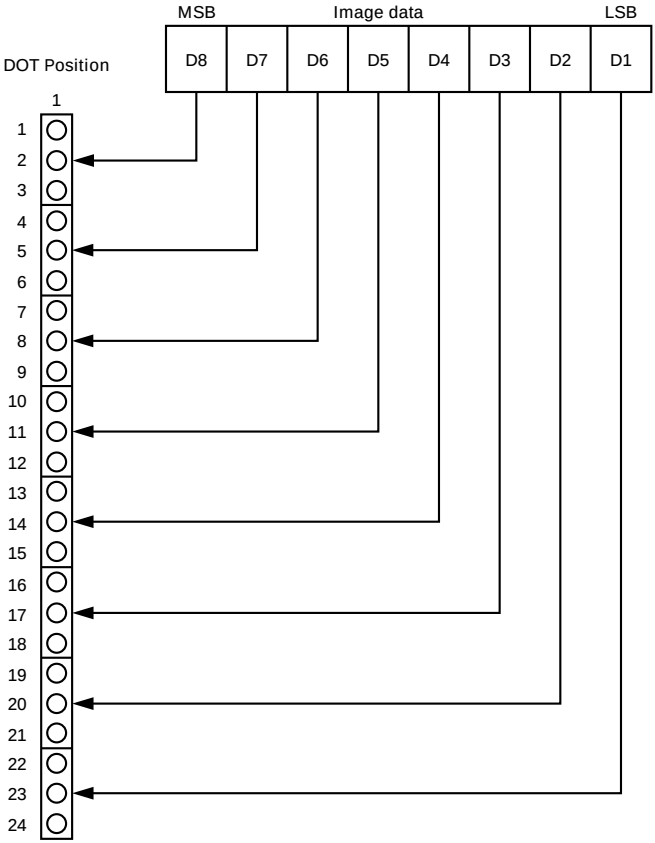
Data	Binary	Hexa-decimal
m21	00111110	3E
m22	00101110	2E
m23	00101110	2E
m24	00111110	3E
m25	00101111	2F
m26	00101111	2F
m27	00111110	3E
m28	00111110	3E
m29	00000010	02
m30	00000010	02

Printing Sample

CODE	<ESC>	"L"	*n1*	*n2*	*m1*	*m2*	...
HEX	1B	4C	*n1*	*n2*	*m1*	*m2*	...

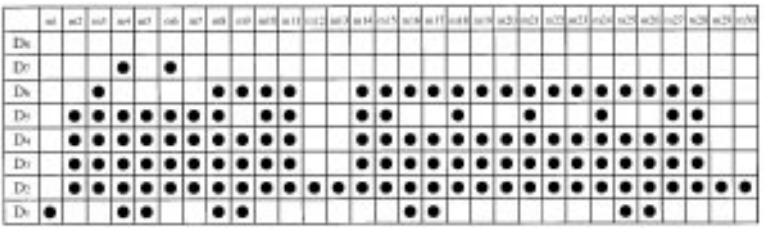
FUNCTION Print high density graphics

Receipt printer: Prints a 1 (horizontal) × 3 (vertical) dot bit image for each dot of entered data. Data extending beyond the right margin is ignored. The relationship between the entered data and the actual printing is shown below. The value of n1 + n2 × 256 is between 1 and 576.



Slip printer: Prints a high density bit image of the number of dots specified by n1 and n2.
The value of n1 + 256 × n2 is between 1 and 420.
A maximum of 420 data bytes can printed in one line. Any data exceeding 420 bytes is ignored.
After printing the bit image, the printer automatically returns to the character mode. The relationship between the pins on the print head and the data is the same as those shown for the previous bit image code <ESC> “K”.
While printing a high density bit image, the horizontally adjacent dots cannot be printed.

EXAMPLE We will create the design below using a bit image.



First, since the volume of data is 30, *n1* = (1E)H. If the data *m1* ~ *m30* is converted to hexadecimal, it appears as shown below.

Data	Binary	Hexa-decimal
m1	00000001	01
m2	00011110	1E
m3	00111110	3E
m4	01011111	5F
m5	00011111	1F
m6	01011110	5E
m7	00011110	1E
m8	00111111	3F
m9	00101111	2F
m10	00111110	3E

Data	Binary	Hexa-decimal
m11	00111110	3E
m12	00000010	02
m13	00000010	02
m14	00111110	3E
m15	00111110	3E
m16	00101111	2F
m17	00101111	2F
m18	00111110	3E
m19	00101110	2E
m20	00101110	2E

Data	Binary	Hexa-decimal
m21	00111110	3E
m22	00101110	2E
m23	00101110	2E
m24	00111110	3E
m25	00101111	2F
m26	00101111	2F
m27	00111110	3E
m28	00111110	3E
m29	00000010	02
m30	00000010	02

Horizontal density is three times that of the bit image for <ESC>“k”. (Compare the print samples.)

Printing Sample

CODE	<ESC>	“k”	*n*	<0>	*m1*	*m2*	...
HEX	1B	6B	*n*	00	*m1*	*m2*	...

FUNCTION

Print fine density graphics
Prints a 1 (horizontal) × 1 (vertical) dot bit image for each dot of entered data. Data extending beyond the right margin is ignored. The relationship between the entered data and the actual printing is shown below. The value of n is between 1 and 72.

This command is only valid with the receipt printer.

Relationship between image data and print dots

Image data

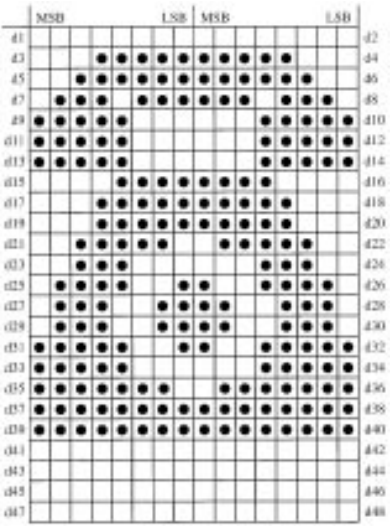
b7	b6	b5	b4	b3	b2	b1	b0

Dot position

d_1 b7 b6 b5 b4 b3 b2 b1 b0	d_2 b7 b6 b5 b4 b3 b2 b1 b0	• • •	d_3 b7 b6 b5 b4 b3 b2 b1 b0
d_{n+1} b7 b6 b5 b4 b3 b2 b1 b0	d_{n+2} b7 b6 b5 b4 b3 b2 b1 b0	• • •	d_{3n} b7 b6 b5 b4 b3 b2 b1 b0
d_{2n+1} b7 b6 b5 b4 b3 b2 b1 b0	d_{2n+2} b7 b6 b5 b4 b3 b2 b1 b0	• • •	d_{4n} b7 b6 b5 b4 b3 b2 b1 b0
d_{3n+1} b7 b6 b5 b4 b3 b2 b1 b0	d_{3n+2} b7 b6 b5 b4 b3 b2 b1 b0	• • •	d_{5n} b7 b6 b5 b4 b3 b2 b1 b0
d_{4n+1} b7 b6 b5 b4 b3 b2 b1 b0	d_{4n+2} b7 b6 b5 b4 b3 b2 b1 b0	• • •	d_{6n} b7 b6 b5 b4 b3 b2 b1 b0
d_{5n+1} b7 b6 b5 b4 b3 b2 b1 b0	d_{5n+2} b7 b6 b5 b4 b3 b2 b1 b0	• • •	d_{7n} b7 b6 b5 b4 b3 b2 b1 b0
d_{6n+1} b7 b6 b5 b4 b3 b2 b1 b0	d_{6n+2} b7 b6 b5 b4 b3 b2 b1 b0	• • •	d_{8n} b7 b6 b5 b4 b3 b2 b1 b0
d_{7n+1} b7 b6 b5 b4 b3 b2 b1 b0	d_{7n+1} b7 b6 b5 b4 b3 b2 b1 b0	• • •	d_{9n} b7 b6 b5 b4 b3 b2 b1 b0
d_{8n+1} b7 b6 b5 b4 b3 b2 b1 b0	d_{8n+2} b7 b6 b5 b4 b3 b2 b1 b0	• • •	d_{10n} b7 b6 b5 b4 b3 b2 b1 b0
d_{9n+1} b7 b6 b5 b4 b3 b2 b1 b0	d_{9n+2} b7 b6 b5 b4 b3 b2 b1 b0	• • •	d_{11n} b7 b6 b5 b4 b3 b2 b1 b0
d_{10n+1} b7 b6 b5 b4 b3 b2 b1 b0	d_{10n+2} b7 b6 b5 b4 b3 b2 b1 b0	• • •	d_{12n} b7 b6 b5 b4 b3 b2 b1 b0
d_{11n+1} b7 b6 b5 b4 b3 b2 b1 b0	d_{11n+2} b7 b6 b5 b4 b3 b2 b1 b0	• • •	d_{13n} b7 b6 b5 b4 b3 b2 b1 b0
d_{12n+1} b7 b6 b5 b4 b3 b2 b1 b0	d_{12n+2} b7 b6 b5 b4 b3 b2 b1 b0	• • •	d_{14n} b7 b6 b5 b4 b3 b2 b1 b0
d_{13n+1} b7 b6 b5 b4 b3 b2 b1 b0	d_{13n+2} b7 b6 b5 b4 b3 b2 b1 b0	• • •	d_{15n} b7 b6 b5 b4 b3 b2 b1 b0
d_{14n+1} b7 b6 b5 b4 b3 b2 b1 b0	d_{14n+2} b7 b6 b5 b4 b3 b2 b1 b0	• • •	d_{16n} b7 b6 b5 b4 b3 b2 b1 b0
d_{15n+1} b7 b6 b5 b4 b3 b2 b1 b0	d_{15n+2} b7 b6 b5 b4 b3 b2 b1 b0	• • •	d_{17n} b7 b6 b5 b4 b3 b2 b1 b0
d_{16n+1} b7 b6 b5 b4 b3 b2 b1 b0	d_{16n+2} b7 b6 b5 b4 b3 b2 b1 b0	• • •	d_{18n} b7 b6 b5 b4 b3 b2 b1 b0
d_{17n+1} b7 b6 b5 b4 b3 b2 b1 b0	d_{17n+2} b7 b6 b5 b4 b3 b2 b1 b0	• • •	d_{19n} b7 b6 b5 b4 b3 b2 b1 b0
d_{18n+1} b7 b6 b5 b4 b3 b2 b1 b0	d_{18n+2} b7 b6 b5 b4 b3 b2 b1 b0	• • •	d_{20n} b7 b6 b5 b4 b3 b2 b1 b0
d_{19n+1} b7 b6 b5 b4 b3 b2 b1 b0	d_{19n+2} b7 b6 b5 b4 b3 b2 b1 b0	• • •	d_{21n} b7 b6 b5 b4 b3 b2 b1 b0
d_{20n+1} b7 b6 b5 b4 b3 b2 b1 b0	d_{20n+2} b7 b6 b5 b4 b3 b2 b1 b0	• • •	d_{22n} b7 b6 b5 b4 b3 b2 b1 b0
d_{21n+1} b7 b6 b5 b4 b3 b2 b1 b0	d_{21n+2} b7 b6 b5 b4 b3 b2 b1 b0	• • •	d_{23n} b7 b6 b5 b4 b3 b2 b1 b0
d_{22n+1} b7 b6 b5 b4 b3 b2 b1 b0	d_{22n+2} b7 b6 b5 b4 b3 b2 b1 b0	• • •	d_{24n} b7 b6 b5 b4 b3 b2 b1 b0
d_{23n+1} b7 b6 b5 b4 b3 b2 b1 b0	d_{23n+2} b7 b6 b5 b4 b3 b2 b1 b0	• • •	d_{25n} b7 b6 b5 b4 b3 b2 b1 b0

EXAMPLE

Printing Sample

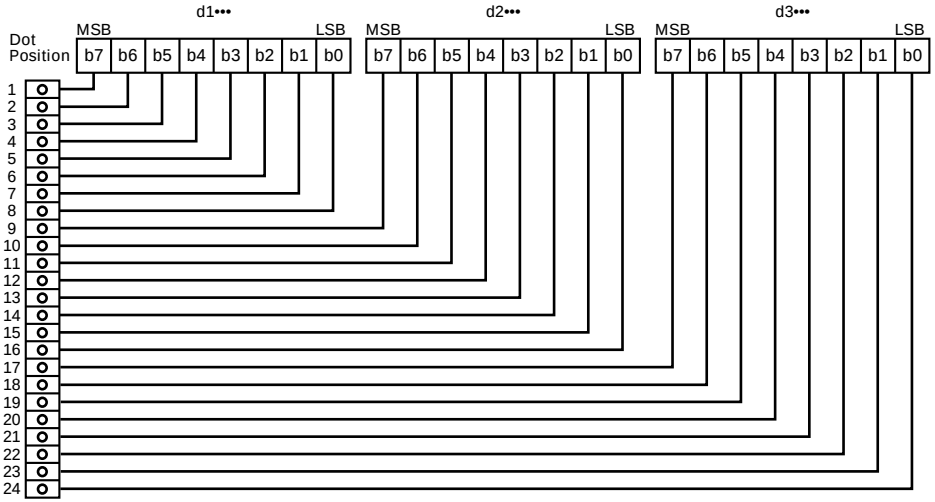


Data	Binary	Hexa-decimal	Data	Binary	Hexa-decimal
d1	00000000	00	*d2*	00000000	00
d3	00011111	1F	*d4*	11111000	F8
d5	00111111	3F	*d6*	11111100	FC
d7	01110111	77	*d8*	01110111	EE
d9	11111000	F8	*d10*	00011111	1F
d11	11111000	F8	*d12*	00011111	1F
d13	11111000	F8	*d14*	00011111	1F
d15	00001111	0F	*d16*	11110000	F0
d17	00011111	1F	*d18*	11111000	F8
d19	00011111	1F	*d20*	11111000	F8
d21	00111110	3E	*d22*	01111100	7C
d23	00111000	38	*d24*	00011100	1C
d25	01111001	79	*d26*	10011110	9E
d27	01110011	73	*d28*	11001110	CE
d29	01110011	73	*d30*	11001110	CE
d31	11111001	F9	*d32*	10011111	9F
d33	11111000	F8	*d34*	00011111	1F
d35	11111110	FE	*d36*	01111111	7F
d37	11111111	FF	*d38*	11111111	FF
d39	11111111	FF	*d40*	11111111	FF
d41	00000000	00	*d42*	00000000	00
d43	00000000	00	*d44*	00000000	00
d45	00000000	00	*d46*	00000000	00
d47	00000000	00	*d48*	00000000	00

CODE	<ESC>	“X”	*n1*	*n2*	*m1*	*m2*	...
HEX	1B	5	*n1*	*n2*	*m1*	*m2*	...

FUNCTION

Print fine density graphics
Prints a bit image of the input data using horizontal and vertical resolutions of 8 dots/mm.
Data extending past the right margin is ignored.
The relationship between the input data and the actual printing is shown below.
$1 \leqq n1 + n2 \times 256 \leqq 576$



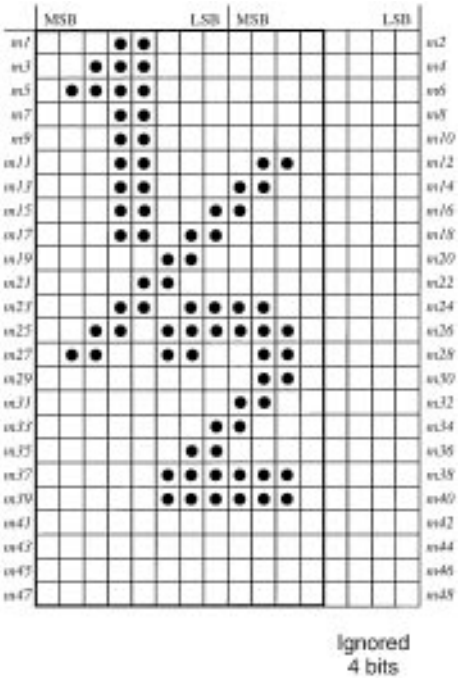
Download Graphics Printing

CODE	<ESC>	"&"	<1>	<1>	*n*	*m1*	*m2*	...	*m48*
CODE	<ESC>	"&"	"1"	"1"	*n*	*m1*	*m2*	...	*m48*
HEX	1B	26	01	01	*n*	*m1*	*m2*	...	*m48*
HEX	1B	26	31	31	*n*	*m1*	*m2*	...	*m48*

FUNCTION

Define download character
Defines one new character and stores it in RAM for later use.
n is the character code of the character defined and must be between 21H and 7F4.
If the maximum of 32 external characters have already been stored, the oldest stored external character are deleted so that new external character can be stored.
The character matrix is 12 dots wide and 24 dots high.
Relationship between the character pattern and the character data is shown below.
This command is only valid with the receipt printer.

EXAMPLE



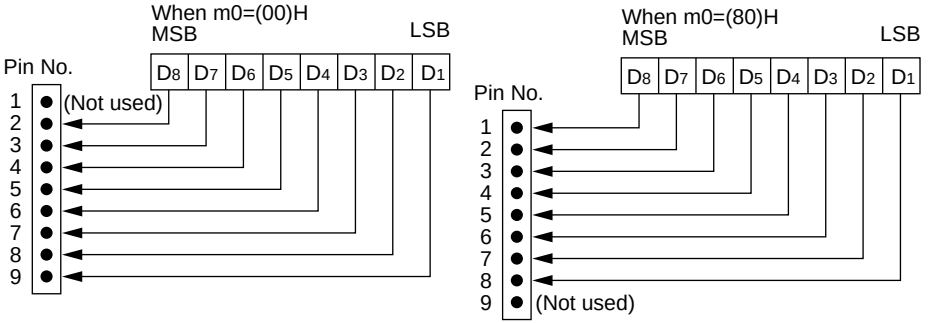
Data	Binary	Hexa-decimal	Data	Binary	Hexa-decimal
m1	00011000	18	*m2*	00000000	00
m3	00111000	38	*m4*	00000000	00
m5	01111000	78	*m6*	00000000	00
m7	00011000	18	*m8*	00000000	00
m9	00011000	18	*m10*	00000000	00
m11	00011000	18	*m12*	01100000	60
m13	00011000	18	*m14*	11000000	C0
m15	00011001	19	*m16*	10000000	80
m17	00011011	1B	*m18*	00000000	00
m19	00000110	06	*m20*	00000000	00
m21	00001100	0C	*m22*	00000000	00
m23	00011011	1B	*m24*	11000000	C0
m25	00110111	37	*m26*	11100000	E0
m27	01100110	66	*m28*	01100000	60
m29	00000000	00	*m30*	01100000	60
m31	00000000	00	*m32*	11000000	C0
m33	00000001	01	*m34*	10000000	80
m35	00000011	03	*m36*	00000000	00
m37	00000111	07	*m38*	11100000	E0
m39	00000111	07	*m40*	11100000	E0
m41	00000000	00	*m42*	00000000	00
m43	00000000	00	*m44*	00000000	00
m45	00000000	00	*m46*	00000000	00
m47	00000000	00	*m48*	00000000	00

CODE

When the 7 × 9 (half dot) character size (default setting) is set:
<ESC> “&” <0> *n1 n2* [*m0 m1 m2 m3 m4 m5 m6 m7*] *n2 – n1 + 1*
(1B)H (26)H (00)H *n1 n2* [*m0 m1 m2 m3 m4 m5 m6 m7*] *n2 – n1 + 1*
When the 5 × 9 dot character size is set:
<ESC> “&” <0> *n1 n2* [*m0 m1 m2 m3 m4 m5*] *n2 – n1 + 1*
(1B)H (26)H (00)H *n1 n2* [*m0 m1 m2 m3 m4 m5*] *n2 – n1 + 1*

FUNCTION

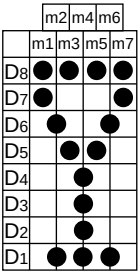
Define download character (7×9 (half dot) font or 5×9 dot font)
Defines download characters
Up to 10 download characters can be defined and the defined character patterns can be stored in the printer's RAM.
The values of *n1* and *n2* are between (21)H and (7F)H with *n1* less than or equal to *n2* and the value of *m0* is either (00)H or (80)H.
Defining of download characters begins with character code *n1* and completes with *n2*. When only one character is defined, *n1 = n2*.
m0 indicates the relationship between the character pattern and print head.
m1 m2.... Indicate the character pattern
This command is only valid with the slip printer.



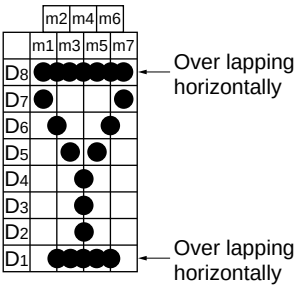
EXAMPLE

When the 7×9 (half dot) character size (default setting) is set, the horizontally adjacent dots cannot be printed.

Printing possible



Printing not possible



CODE <ESC> “&” <1> <0> *n*

CODE <ESC> “&” “1” “0” *n*

HEX 1B 26 01 00 *n*

HEX 1B 26 31 30 *n*

FUNCTION Delete a download character (12 × 24 dot font)
Deletes the download character which was assigned the value *n*.
This command is only valid with the receipt printer.

CODE <ESC> “%” “1” or <ESC> “%” <1>

HEX 1B 25 31 or 1B 25 01

FUNCTION Enable download character set
Enables the download character set.

CODE <ESC> “%” “0” or <ESC> “%” <0>

HEX 1B 25 30 or 1B 25 00

FUNCTION Disable download character set
Disables the selected download character set and returns to the built-in ROM character set.

Peripheral Device Control

CODE <ESC> <BEL> *n1* *n2*

HEX 1B 07 *n1* *n2*

FUNCTION Define drive pulse width for peripheral device #1
Defines the drive pulse width for peripheral devices requiring other than standard 200 ms pulse time and delay time.
n1 indicates the energizing time and *n2* indicates the delay time, using 10ms units.

CODE <BEL>

HEX 07

FUNCTION Control peripheral device #1
Executes drive pulse for peripheral device #1.

CODE <FS>

HEX 1C

FUNCTION Control peripheral device #1 immediately
Executes drive pulse for peripheral device #1 immediately.

CODE <EM>

HEX 19

FUNCTION Control peripheral device #2 immediately
Drives peripheral device #2. The drive pulse width and delay time are fixed at 200 ms.

CODE <SUB>

HEX 1A

FUNCTION Control peripheral device #2 immediately
Drives peripheral device #2. The drive pulse width and delay time are fixed at 200 ms.

Auto Cutter Control

CODE	<ESC>	“d”	“0”	or	<ESC>	“d”	<0>
HEX	1B	64	30	or	1B	64	00

FUNCTION Full-cut command to the auto cutter
Cuts the receipt paper fully.
This command is only valid with the receipt printer.

CODE	<ESC>	“d”	“1”	or	<ESC>	“d”	<1>
HEX	1B	64	31	or	1B	64	01

FUNCTION Partial-cut command to the auto cutter
Cuts the receipt paper partially.
This command is only valid with the receipt printer.

Slip Printer Control

CODE <ESC> <SI> *n*

HEX (1B)H (0F)H *n*

FUNCTION Setting slip sensor
Sets the slip printer TOF/BOF sensor according to the value of *n*.

	TOF Sensor	BOF Sensor
n = 00, "0" :	Valid	Valid
01, "1" :	Valid	Invalid
02, "2" :	Invalid	Valid
03, "3" :	Invalid	Invalid

The default value of n is 0.
This command is only valid with the slip printer.

CODE <ESC> <FF> *n*

HEX (1B)H (0C)H *n*

FUNCTION Slip function
After printing the data in the line buffer, operates the slip printer according to the value of *n*.

n = 00, "0" : Operates the clamp
01, "1" : Releases the paper
02, "2" : Releases the paper and waits until it is removed
03, "3" : Feeds the paper backward (backfeed) until it moves past the TOF sensor, then releases the paper. (See NOTE below.)
04, "4" : Feeds the paper into the printer (operational feed) until it moves past the BOF sensor, then releases the paper.
05, "5" : Feeds the paper according to the direction and length set by <ESC> <VT> m n (the paper is not released)

(NOTE) When the slip paper is attached to duplicates, a paper jam may occur if the paper is always fed backward. Therefore, the paper should not be ejected with n=3. To feed slip paper attached to duplicates backward, use <ESC> <VT> to set the eject length to about half of the paper length, then eject the paper using <ESC> <FF> 5.

This command is only valid with the slip printer.

CODE <ESC> <VT> *m* *n*

HEX (1B)H (0B)H *m* *n*

FUNCTION Set the paper eject direction/length
Sets the length of the ejection operation performed using <ESC> <FF> 5 in line mode.

The value of m determines the ejection direction.

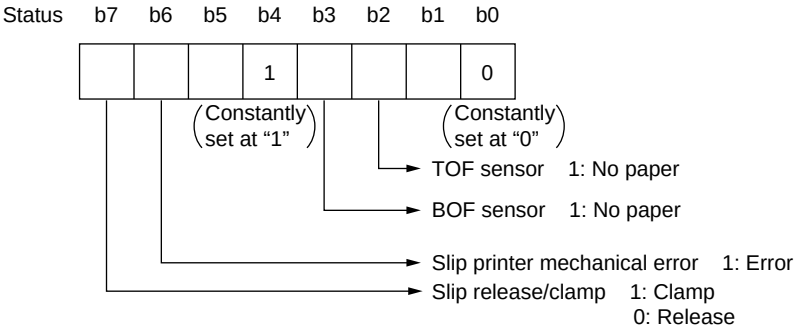
When m= "+": the ejection direction is into the printer (operational feed), and the ejection length is n lines (at the current carriage return)
When m= "-": the ejection direction is backward (backfeed), and the ejection length is n lines (at the current carriage return)
When m= 0 : the ejection direction is backward (backfeed), and the ejection length is n inches
The default value of n is 0.

This command is only valid with the slip printer.

CODE <EOT>

HEX (04)H

FUNCTION Slip status enquiry
Sends slip printer status information to the host computer.



This command is only valid with the slip printer.

Page Mode

CODE <ESC> "*n*"

HEX (1B)H (6E)H

FUNCTION Select page mode

Switches from line mode (default) to page mode.
This code is only valid when it is entered at the beginning of the line.
The page mode is suitable even though data is printed in the rotational direction specified by <ESC> "T" n and in the page coordinate range specified by <ESC> "*" •••, and though paper with a horizontal length of a check, etc. is rotated 90 or 270 and printing is carried out in all modes.
In page mode, since OR is applied to the data in the print area, characters and bit images can be printed overlapping each other and each character can be rotated and oriented independently.
In page mode, if printing data and a command such as <CR> or <LF> are sent in the same way as in line mode, there is an automatic rotation to the printer side.
All printing of data in the print area is performed according to <LF>.
After printing according to <FF>, the printer returns to line mode. In addition, if <ESC> "!", <ESC> "@" or <CAN> are specified, printing is not performed and the printer leaves page mode and returns to line mode.
While returning to line mode, the data in the printer buffer, the area coordinates and the rotation directions are all cleared.
This command is only valid with the slip printer.

The following restrictions exist in page mode.

1) In page mode, half-dot characters cannot be printed since printing is carried out in normal dot units.
   When entering page mode, the ANK font is automatically set to a 5×9 (2 pulses = 1 dot) font.
   Since the 7×9 font and 5×9 (3 pulses = 1 dot) font commands cannot be executed in page mode, they are executed after the printer returns to line mode.
   High density printing of graphics is ignored.

2) Paper feed command
In paper mode, the paper feed command and carriage return are executed in units of dots. A 1/72-inch (0.353-mm) paper feed is considered 1 dot. Since a 1-dot pitch in the horizontal direction is 0.30 mm and a 1-dot pitch in the vertical direction is 0.353 mm, the paper amount that is fed while printing using a 90 or 270 rotation is less when compared with a 0 or 150 rotation. As a result, when printing using a 90 or 270 rotation, execute a test print, check the horizontal and vertical dot alignment, then adjust the alignment as necessary.

3) The following commands are not executed in page mode, but are stored and executed when the printer returns to line mode.

Select 7 × 9 (half dot) font	<ESC> “M”
Select 5 × 9 (3 pulses = 1 dot) font	<ESC> “:”
Inverted printing/Cancel inverted printing	<SI>/<DC2>
Select highlight printing/Cancel highlight printing	<ESC> “4”/<ESC> “5”
Underlining	<ESC> “-” n
Upperlining	<ESC> “_” n
Select print direction	<ESC> “U” n
Select emphasized printing/Cancel emphasized printing	<ESC> “E”/<ESC> “F”
Select left margin	<ESC> “1” n
Select right margn	<ESC> “Q” n

4) The following commands are ignored in page mode.

One time backfeed	<ESC> “j” n
Print high density graphics	<ESC> “L” •••
Slip function	<ESC> <FF> n
Select print station	<ESC> “+” “A” n
STX-ETX mode	<STX> ••• <ETX>

CODE <ESC> “!”

HEX (1B)H (21)H

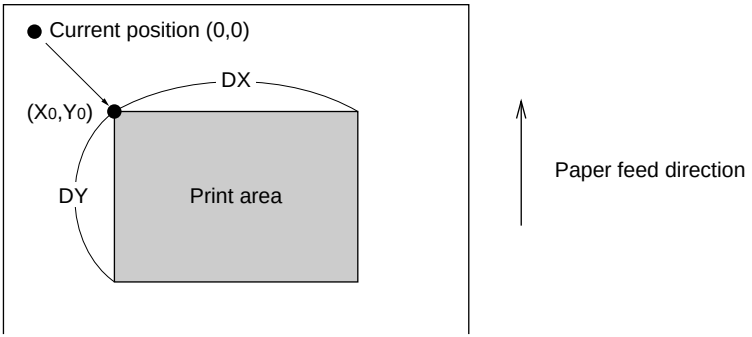
FUNCTION Select line mode (default)
If this command is specified while in page mode, printing is not carried out and the printer returns to line mode.
This command is only valid with the slip printer.

CODE <ESC> "*" X_L X_H Y_L Y_H dX_L dX_H dY_L dY_H

HEX 1B 2A X_L X_H Y_L Y_H dX_L dX_H dY_L dY_H

FUNCTION

Setting print area in page mode
The coordinates of the current position at the moment that page mode is entered are (0,0). The starting point of the print area is defined by X_L, X_H, Y_L and Y_H. In addition, the length DX in the X direction is specified by dX_L and dX_H, and the length DY in the Y direction is specified by dY_L and dY_H.



Starting point $X_0 = X_L + (X_H \times 256)$ dots
Starting point $Y_0 = Y_L + (Y_H \times 256)$ dots
Length in horizontal direction $DX = dX_L + (dX_H \times 256)$ dots
Length in vertical direction $DY = dY_L + (dY_H \times 256)$ dots

The values of XL, YL, dXL and dYL are between 0 and 255, and the values of XH, YH, dXH and dYH are between 0 and 1.
However, dXL = dXH = 0 and dYL = dYH = 0 are not included.
In addition, since the maximum range in the X direction (X_O + DX) is 210 dots and the maximum range in the Y direction (Y_O + DY) is 720 dots, each parameter should be specified to satisfy these ranges.
When the power is turned on, XL = XH = YL = YH = 0 (X_O,Y_O = 0,0)
dXL = 210, dXH = 0 (DX = 210) and
dYL = 64, dYH = 2 (DY = 576).

This command is stored, even in line mode, and the position at the time that page mode is entered is used as the standard point (0,0). Since the bottom of the character is used as the baseline, a minimum print area of 8 dots are necessary in the character height direction to print data in the page. (When printing a magnified character height, the paper must be fed before printing.)

This command is only valid with the slip printer.

CODE <ESC> "T" *n*

HEX (1B)H (54)H *n*

FUNCTION Setting print direction in page mode
Sets the direction in which the printing will be executed in page mode according to the value of n.
This command is only valid in line mode.

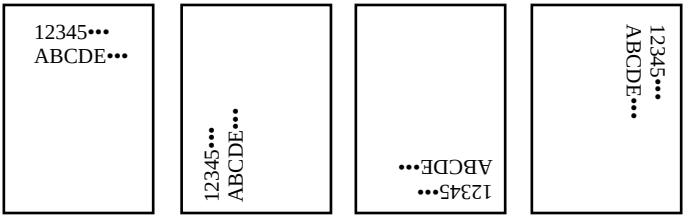
Value of n	Mode
0 or "0"	0 rotation mode (uni-directional printing)
1 or "1"	270 rotation mode (uni-directional printing)
2 or "2"	180 rotation mode (uni-directional printing)
3 or "3"	90 rotation mode (uni-directional printing)

The default value of n is 0.

<Rotation direction examples>

n = 1 n = 1 or 4 n = 2 n = 3

0° rotation 270° rotation 180° rotation 90° rotation



This command is only valid with the slip printer.

CODE <FF>

HEX (0C)H

FUNCTION Print in page mode (only valid when in page mode)
This command can only activate the slip printer. In page mode, all page data in the page area is printed, then the printer returns to line mode. After all the page data is printed, the data in the page, the page print area and the print direction are all initialized.
In addition, this command has no function in line mode.

Other Commands

CODE <CAN>

HEX (18)

FUNCTION Cancel printer buffer & Initialize printer
Clears the line buffer, and initializes the commands set already. Does not affect the external equipment drive conditions set by the code <ESC> <BEL> *n1 n2*. (This is the same during a mechanical error.)
(Line buffer means the print data expansion area.)
If <CAN> is specified in page mode while printing using the slip printer, printing is not carried out and the printer returns to line mode from page mode.
In addition, <CAN> initializes the print station selection. If the slip printer was selected, the receipt printer will be re-selected.
This command cannot recover from errors or return to the on-line status from off-line.

CODE <DC3>

HEX 13

FUNCTION Deselect printer
Deselects the printer. The printer disregards all subsequent characters and commands except <DC1>, which activates the printer.

CODE <DC1>

HEX (11)H

FUNCTION Set select mode
When the printer receives a <DC1> code, the deselect mode is canceled and data following this code is input to the buffer.

CODE <RS>

HEX 1E

FUNCTION Beep the buzzer
Sounds a brief beep tone.

CODE	<ESC	"#	N	,	n1n2n3n4"	<LF>	<NUL>
HEX	1B	23	N	2C	n1n2n3n4	0A	00

FUNCTION

Set the memory switch. In order to enable changed memory switch setting, turn the printer OFF and ON again or send printer reset command (<ESC> "?"<LF><NUL>") to the printer. Changed memory switch settings are stored in EEPROM and these setting will be stored as long as the time when they are changed again.

N :Memory switch number ("0", "1", "2", "3", "4", "5")
n1n2n3n4 :Mode settings (For details see below)

1) N=0

n1 :Always "0"
n2 :Always "0"
n3 :Always "0"

(Default)

Parameter	Setting	"0"	"4"
n4	Receipt FF command	Form Feed	Paper Feed, Cut & Back

2) N=1

n1 :Always "0"
n2 :Always "0"

(Default)

Parameter	Setting	"0"	"1"
n3	Zero style	Normal zero	Slashed zero
n4	International character set		See below

n4	Country
"0"	USA
"1"	France
"2"	Germany

n4	Country
"3"	UK
"4"	Denmark #1
"5"	Sweden

n4	Country
"6"	Italy
"7"	Spain #1
"8"	Japan

n4	Country
"9"	Norway
"A"	Denmark #2
"B"	Spain #2

n4	Country
"C"	Latin America

3) N=2

n3 :Always “0”

(Default)

Parameter	Setting	0	1
n1	Receipt printer ESC d command Receipt printer	Cut	Paper feed, & Cut
n2	Receipt printer cutter	Valid	Invalid
n3	Cover Open	Invalid	Valid
n4	Receipt printer paper near end	Invalid	Valid

4) N=3

n1 :Always “0”

(Default)

Parameter	Setting	0	1	2	3
n2	Character table	Normal	IBM	Katakana	IBM
n3	Receipt printer printer column	48	38	–	–
n4	CR code	Invalid	Invalid	Valid	Valid
	Receipt printer line feed (mm)	4	3	4	3

5) N=4

n2 :Always “0”
n3 :Always “0”
n4 :Always “0”

(Default)

Parameter	Setting	0	1
n1	X on/X off Timing	When Toggled	every 3 sec

6) N=5

n1 :Always “0”
n3 :Always “0”

(Default)

Parameter	Setting	0	1	2	3
n2	When slip printer <CR> code is valid	Print + line feed (CRLF)	print (CR)	–	–
n4	Slip printer automatic clamp	Valid	Valid	Invalid	Invalid
	Slip printer automatic starting print positioning	Valid	Invalid	Valid	Invalid

CODE <ESC> “@”

HEX 1B 40

FUNCTION Initialize printer

Reinitializes the printer. Clears the print buffer and returns settings to their power-up values.

Does not clear the input buffer, downloaded characters, or conditions for peripheral devices.

In addition, this command initializes the print station selection. If the slip printer was selected, the receipt printer will be re-selected.

If this command is specified in page mode while printing using the slip printer, printing is not carried out and the printer returns to line mode from page mode.

This command cannot recover from errors or return to the on-line status from off-line.

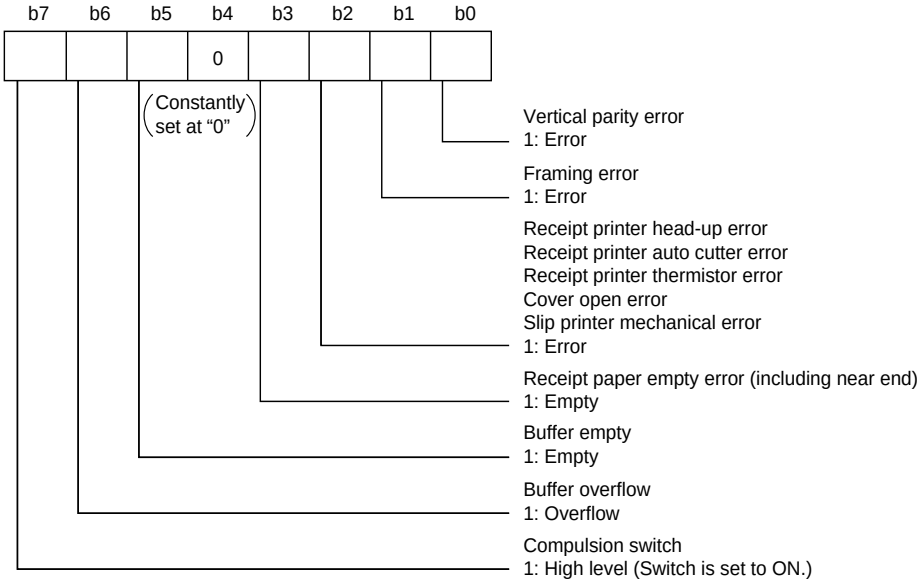
CODE <ENQ>

HEX 05

FUNCTION Enquiry

Causes the printer to transmit a status byte.

Status byte



CODE	<ESC> “?” <LF> <NUL>
HEX	1B 3F 0A 00

FUNCTION Reset the printer hardware.
Resets the printer hardware and produces a test print

Appendix : Character Code Tables

Hexa-decimal	0	1	2	3	4	5	6	7
0	<NUL> 0	16	SP 32	0 48	@ 64	P 80	` 96	p 112
1	1	<DC1> 17	! 33	1 49	A 65	Q 81	a 97	q 113
2	2	<DC2> 18	" 34	2 50	B 66	R 82	b 98	r 114
3	3	<DC3> 19	# 35	3 51	C 67	S 83	c 99	s 115
4	4	<DC4> 20	$ 36	4 52	D 68	T 84	d 100	t 116
5	<ENQ> 5	21	% 37	5 53	E 69	U 85	e 101	u 117
6	6	22	& 38	6 54	F 70	V 86	f 102	v 118
7	<BEL> 7	23	' 39	7 55	G 71	W 87	g 103	w 119
8	8	<CAN> 24	(40	8 56	H 72	X 88	h 104	x 120
9	<HT> 9	<EM> 25	) 41	9 57	I 73	Y 89	i 105	y 121
A	<LF> 10	<SUB> 26	* 42	: 58	J 74	Z 90	j 106	z 122
B	<VT> 11	<ESC> 27	+ 43	; 59	K 75	[91	k 107	{ 123
C	<FF> 12	<FS> 28	, 44	< 60	L 76	\ 92	l 108	¦ 124
D	<CR> 13	29	- 45	= 61	M 77	] 93	m 109	} 125
E	<SO> 14	<RS> 30	. 46	> 62	N 78	^ 94	n 110	~ 126
F	<SI> 15	31	/ 47	? 63	O 79	_ 95	o 111	▒ 127

(Character table: Normal)

Hexa-decimal	8	9	A	B	C	D	E	F
0	128	144	Ä 160	é 176	ù 192	ā 208	224	240
1	129	145	Ö 161	è 177	ū 193	â 209	225	241
2	130	146	Ü 162	ō 178	û 194	° 210	226	242
3	131	147	ß 163	ê 179	ç 195	°C 211	227	243
4	132	148	§ 164	ī 180	¿ 196	°F 212	228	244
5	133	149	a 165	í 181	Ñ 197	Ω 213	229	245
6	134	150	o 166	ì 182	ñ 198	µ 214	230	246
7	135	151	f 167	ī 183	Ē 199	Σ 215	231	247
8	136	152	¢ 168	î 184	ɔ 200	σ 216	232	248
9	137	153	½ 169	ö 185	ì 201	x 217	233	249
A	138	154	N T 170	ò 186	Ä 202	TL 218	234	250
B	139	155	T X 171	ò 187	φ 203	X 219	235	251
C	140	156	¥ 172	ō 188	θ 204	∞ 220	236	252
D	141	157	¼ 173	ô 189	ā 205	± 221	237	253
E	142	158	Ā 174	ū 190	á 206	÷ 222	238	254
F	143	159	ē 175	ú 191	à 207	π 223	239	255

(Character table: katakana)

Hexa-decimal	8	9	A	B	C	D	E	F
0	128	144	160	ー 176	タ 192	ミ 208	224	240
1	129	145	。 161	ア 177	チ 193	ム 209	225	241
2	130	146	「 162	イ 178	ツ 194	メ 210	226	242
3	131	147	」 163	ウ 179	テ 195	モ 211	227	243
4	132	148	、 164	エ 180	ト 196	ヤ 212	228	244
5	133	149	・ 165	オ 181	ナ 197	ユ 213	229	245
6	134	150	ヲ 166	カ 182	ニ 198	ヨ 214	230	246
7	135	151	ァ 167	キ 183	ヌ 199	ラ 215	231	247
8	136	152	ィ 168	ク 184	ネ 200	リ 216	232	248
9	137	153	ゥ 169	ケ 185	ノ 201	ル 217	233	249
A	138	154	ェ 170	コ 186	ハ 202	レ 218	234	250
B	139	155	ォ 171	サ 187	ヒ 203	ロ 219	235	251
C	140	156	ャ 172	シ 188	フ 204	ワ 220	236	252
D	141	157	ュ 173	ス 189	ヘ 205	ン 221	237	253
E	142	158	ョ 174	セ 190	ホ 206	゛ 222	238	254
F	143	159	ッ 175	ソ 191	マ 207	゜ 223	239	255

(Character table: IBM)

Hexa-decimal	8	9	A	B	C	D	E	F
0	Ç 128	É 144	á 160	▒ 176	└ 192	╨ 208	α 224	≡ 240
1	ü 129	æ 145	í 161	▒ 177	┴ 193	╤ 209	β 225	± 241
2	é 130	Æ 146	ó 162	▓ 178	┬ 194	╥ 210	Γ 226	≥ 242
3	â 131	ô 147	ú 163	│ 179	├ 195	╙ 211	π 227	≤ 243
4	ä 132	ö 148	ñ 164	┤ 180	─ 196	╘ 212	Σ 228	⌠ 244
5	à 133	ò 149	Ñ 165	╡ 181	┼ 197	╒ 213	σ 229	⌡ 245
6	å 134	û 150	ª 166	╢ 182	╞ 198	╓ 214	µ 230	÷ 246
7	ç 135	ù 151	º 167	╖ 183	╟ 199	╫ 215	τ 231	≈ 247
8	ê 136	ÿ 152	¿ 168	╕ 184	╚ 200	╪ 216	Φ 232	° 248
9	ë 137	Ö 153	⌐ 169	╣ 185	╔ 201	┘ 217	Θ 233	∙ 249
A	è 138	Ü 154	¬ 170	║ 186	╩ 202	┌ 218	Ω 234	· 250
B	ï 139	¢ 155	½ 171	╗ 187	╦ 203	▉ 219	δ 235	√ 251
C	î 140	£ 156	¼ 172	╝ 188	╠ 204	▪ 220	∞ 236	ⁿ 252
D	ì 141	¥ 157	¡ 173	╜ 189	═ 205	▌ 221	φ 237	² 253
E	Ä 142	₧ 158	« 174	╛ 190	╬ 206	▐ 222	∈ 238	■ 254
F	Å 143	ƒ 159	» 175	┐ 191	╧ 207	▪ 223	∩ 239	255

International Character Set

	35	36	64	91	92	93	94	96	123	124	125	126
U. S. A.	#	$	@	[	\	]	^	`	{	|	}	~
France	#	$	à	°	ç	§	^	`	é	ù	è	¨
Germany	#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
England	£	$	@	[	\	]	^	`	{	|	}	~
Denmark 1	#	$	@	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 1	₧	$	@	¡	Ñ	¿	^	'	¨	ñ	}	~
Japan	#	$	@	[	¥	]	^	`	{	|	}	~
Norway	#	¤	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
Denmark 2	#	$	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
Spain 2	#	$	á	¡	Ñ	¿	é	'	í	ñ	ó	ú
Latin America	#	$	á	¡	Ñ	¿	é	ü	í	ñ	ó	ú

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