

# TP UP-NH Line Thermal Printer

## User's Manual

April 1998

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## Introduction

TP UP-NH is a new type of line direct thermal printer. The special features of this printer are small in size, light in weight, low noisy and high in printing quality and reliability. It is suitable for printing receipt of cash register and data records of medical instruments.

### 1.1 Printing Features

- Printing Method: Line direct thermal
- Paper Width: 57.5 mm  $\pm$  0.5 mm
- Printing Density: 8 dots/mm, 384dots/line
- Printing Speed: 12.5mm/sec. (DC9V 1A)
- Printing Width: 48mm

### 1.2 Printing Paper

- Thermal Paper Roll
  - Paper Width: 57.5 mm  $\pm$  0.5mm
  - OD: 50 mm(max, Build-in)
  - ID: 10 mm(min)
  - Thickness: 53 - 64 g /m<sup>2</sup>

### 1.3 Printing Character

- IBM Character set 2
  - 12 x 24 dots, 1.50 mm(w) x 3.00 mm(h)
  - 8 x 16 dots, 1.00 mm(w) x 2.00 mm(h)

### 1.4 Data Buffer Size

- 10k bytes

### 1.5 Printing Commands

- ESC/P Commands

### 1.6 Operation

- Printing out text in ANK, graph and hexadecimal
- Self-test
- Paper feed

### 1.7 Printer-head Energy Compensation Function

- Temperature Control: by test of build-in thermal resistor.

- Voltage Control: by test of voltage

### 1.8 Printer-head Protection Function

- Stop warning for out of paper
- Stop warning for printer-head over/under the normal temperature

### 1.9 Interface

- Serial (compatible with RS232)  
Baud Rate: 1200/2400/4800/9600, selected by DIP switch built-in  
Handshaking: RTS/CTS or XON/XOFF protocol.  
Data Structure: 7/8 Data Bits and even, odd or no Parity Bit  
Connect Socket: D-Sub 25pin (femal in printer side)  
Signal Level: EIA +/-3V to +/-12V
- Parallel (compatible with PC Printer port)  
Handshaking: BUSY or ACK protocol  
Connect Socket: D-Sub 25pin (male in printer side)  
Signal Level: TTL

### 1.10 Power Supply

- DC9V 1A average printing current 2.6A, non-printing current 80mA.
- Power Socket: DC Jack type with center pin  $\phi$  2.0mm

### 1.11 Power Supply Control

- Auto Power off Function
- Support Push Button and Interface Signal Control

### 1.12 Dimension

- 160 (w) x 106 (d) x 42 (h) mm

### 1.13 Weight

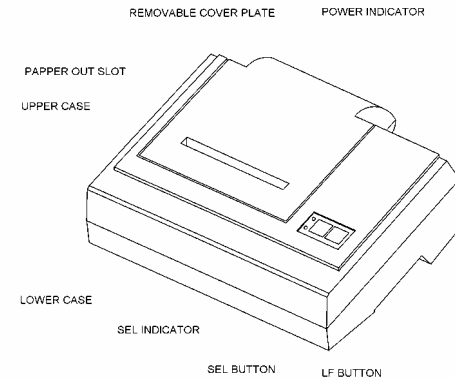
- 350g including paper roll

### 1.14 Operation Environment

- Operating temperature: 5<sup>o</sup> - 50<sup>o</sup> C
- Relative humidity: 5 - 85% RH

## Chapter 2 Installation and Operation

### 2.1 Appearance



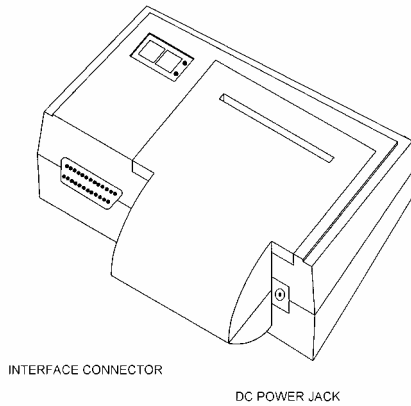


Figure.2-1 Appearance

## 2.2 Loading Printing Paper

Paper roll can be put inside the case, Loading paper as follows:

1. push the removable upper cover plate forward till its off the printer like figure 2-2 below, figure 2-3 is not correct.

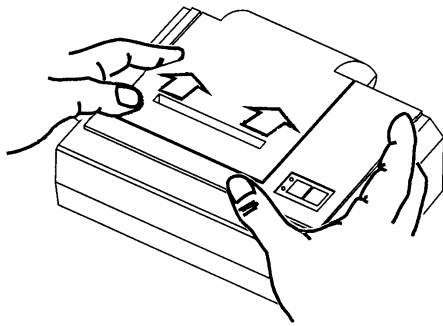


Figure 2-2

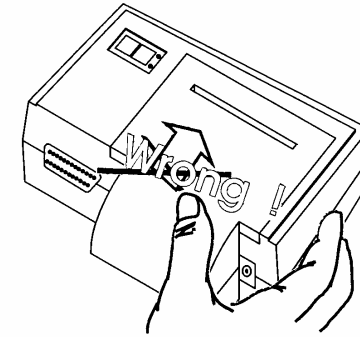


Figure 2-3

2. Cut the paper end like figure 2-4 below.
  - for paper roll placed inside the case: Insert the paper end deep-down into paper in slot on rear of printer mechanism like figure 2-5. Figure 2-6 is not correct.
  - for paper roll hold outside the case: Insert the paper end through paper in slot on the back of the printer first, then repeat the action above.

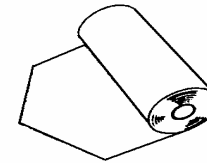


Figure 2-4

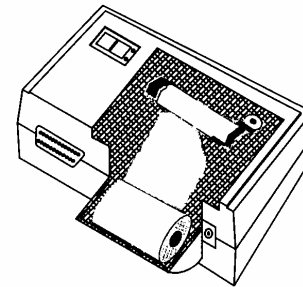


Figure 2-5

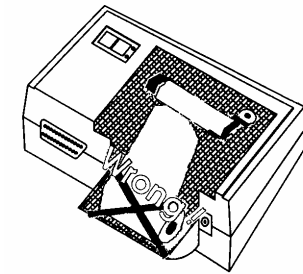


Figure 2-6

3. Lift the lever of the print mechanism and push the paper end forward out of the mechanism. Turn on the power. Power indicator flashing while press SEL button. Hold the LF button, paper will automatically move upwards to paper out slot on top of printer mechanism for certain length, then release the button.

4. Pull the paper out through paper out slot on upper cover plate and then close the plate like figure 2-7 below.

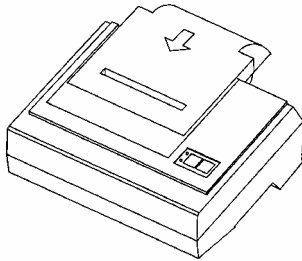


Figure 2-7 put upper cover plate back to the printer

### 2-3 Power On and OFF

This printer provides auto power cut off function to save energy.

#### 2.3.1 Connecting of Power

After connecting the power supply, there are two methods of power connecting namely: 1. by push button; 2. by interface.

##### 1. By Push Button.

There are two push buttons on the control panel namely SEL & LF. Press SEL button, power indicator will be in red to indicate the printer is on power..

##### 2. By Interface

- Using Parallel Interface. The interface signal INIT is negative pulse signal and will remain for at least 3ms to ensure power on. Power Indicator turns in red to signal the printer is on power. Wait another 600ms to initialize printer before sending data.

- Using Serial Interface. The interface signal DTR is EIA standard. It is logical level from "1" to "0" and remain at least 3ms to ensure power connection. Power indicator turns in red to signal the printer is on power. Wait another 600ms to initialize printer before sending data.

##### 3. Example of Using Parallel Interface (for PC)

Basic Formal	Explanation
100 DEF SEG=&H40	: Bottom of BIOS database.
200 prtr=PEEK (9) *256+PEEK (8) +2	: Get base address of LPT1.
300 OUT prtr, 8	: Initialize printer by negative signal through INIT.

400 IF (INP (prtr-1) AND &H98)	: Loop if check the printer
<>&H98THEN 400	is BUSY.
500 .	: Normal printing
.	procedure.
.	
.	
.	
prtr-1	status register of parallel interface
BIT3: 0, printer error; 1, printer normal	
BIT4: 0, printer off line;1, printer on line	
BIT7: 0, printer busy; 1, printer not busy	
prtr	control register of parallel interface
BIT2: 0, initialize printer; 1, normal setting	
BIT3: 0, make printer off line; 1, normal setting	

##### 4. Example of Using Serial Interface (for PC)

Basic Program	Explanation
100 baseaddress = &H2f8	: Set base address of serial port.
	: &H3F8 for COM1 and &H2F8 for COM2.
200 OUT baseaddress +4, &H1	: DTR (data terminal ready) set high.
300 IF (INP (baseaddress+6) AND &HB0) <> &HB0 THEN 300.	: Loop if check printer is not READY.
400 .	: Execute normal printing procedure
.	
.	
.	
.	
baseaddress+4:	Control register of modem of the PC serial port COM1 or COM2.
BIT0:	DTR (data terminal ready) set 1 for valid.
baseaddress +6	Status register of modem of the PC serial port

COM1.  
 BIT4: CTS allow for transmitting" input high (ok).  
 BIT5: DSR data ready" input high (ok).  
 BIT7: RLSD receipt route signal testing" input high(ok).

### 2.3.2 Auto Power Off

This printer provides auto power cut off function. If no paper feed and printing function performed more than 10 seconds, power will be automatically cut off.

### 2.4 Indicator & Function Key

There are two indicators and two switch buttons on the panel of TP UP-NH printer. Power Indicator marked with P and Status indicator marked with SEL. When SEL indicator in light or flash , it means printer is wrong otherwise means printer is normal. For power connection, press SEL button; for paper feed press LF button. see figure 2-8 below:



Figure 2-8

#### 1. Self-test

To start self-test, press and hold down LF button and SEL button as well while power on, when power indicator light, release both buttons, then self-test sample will be printed.

#### 2. Paper feed

Press and hold down LF button to start paper feeding and release it to stop paper feeding.

### 2.5 Connecting of Interface (parallel port)

TP UP-NH adopts DB-25 parallel port which is compatible with PC 's printer port.

### 1. The Pin Assignment of DB-25 is shown as follows:

PinNo	Signal	I/O	Description
1	/STB	In	Strobe pulse, to read data. Reading occurs at falling edge.
2	D0	In	Data line: D0
3	D1	In	Data line: D1
4	D2	In	Data line: D2
5	D3	In	Data line: D3
6	D4	In	Data line: D4
7	D5	In	Data line: D5
8	D6	In	Data line: D6
9	D7	In	Data line: D7
10	/ACK	Out	Acknowledge pulse. Printer is ready to accept data. It takes no less than 10 $\mu$ s to change from high level to low level.
11	BUSY	Out	High level signal indicates that the printer is Busy and can not receive data while low level is able to receive data.
12	PE	Out	High level signal indicates that paper running out. Low level signal indicates otherwise.
13	SLCT	Out	Selection, pull up to 5V.
14	-----	----	No connection.
15	/ERROR	Out	Pull up to 5V
16	/INIT	In	Low level signal (no less than 3ms) for control of printer power.
17	-----	----	No connection.
18	-----	----	No connection.
-	-----	----	Grounding.
25	-----	----	No connection.

### 2. The signal timing chart in parallel port is as follows:

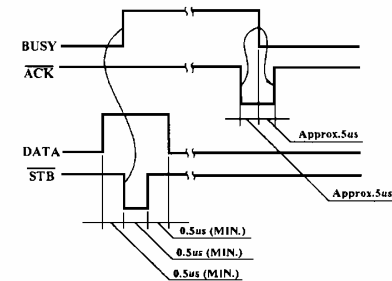


Figure 2-9 Signal timing chart of parallel port

### 2.6 Connecting of Interface (serial port)

TP UP-NH adopts serial port which is compatible with RS232C for DB-25 socket (female type in printer side)

#### 1. DIP Switch Setting

K1-K6 for setting of baud rate, data bit, stop bit and parity. Default settings are all on off position, users can change setting according to the following tables:

Baud Rate (BPS)

ON	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	1200
OFF	<input type="checkbox"/> <input type="checkbox"/>	
	1 2	
ON	<input type="checkbox"/> <input checked="" type="checkbox"/>	2400
OFF	<input checked="" type="checkbox"/> <input type="checkbox"/>	
ON	<input checked="" type="checkbox"/> <input type="checkbox"/>	4800
OFF	<input type="checkbox"/> <input checked="" type="checkbox"/>	
ON	<input type="checkbox"/> <input type="checkbox"/>	9600
OFF	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	

Parity Check

ON	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	8 bit odd parity
OFF	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	
	4 5 6	
ON	<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>	8 bit even parity
OFF	<input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>	
ON	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	8 bit non-parity
OFF	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	
ON	<input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>	7 bit odd parity
OFF	<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>	
ON	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	7 bit even parity
OFF	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
ON	<input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>	7 bit non-parity
OFF	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>	

DIP Switch

ON	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
OFF	<input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
	1 2 3 4 5 6
ON	<input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
OFF	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
	1 2 3 4 5 6

Handshaking

XON/XOFF
RTS/CTS

Default Setting

ON	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
OFF	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
	1 2 3 4 5 6

Figure 2-10 DIP Switch Setting

Pin Assignment of DB25

Pin No.	Signal	Source	Description
2	TXD	Host	Printer receive data from host.
3	RXD	Printer	Printer transmit data. Printer transmit XON/XOFF code to host while in use of handshaking of XON/XOFF.
5	CTS	Printer	There are two states of this signal, "Mark" and "Space". "Mark" indicates that the printer is busy and unable to receive data; "Space" indicates that printer is ready to receive data.
7	GND	Printer	Signal ground
20	DTR	Host	In "SPACE" status for not less than 3ms, for control of printer power.

## Chapter 3 Printing Commands

### 3.1 Summary

TP UP-NH provides ESC/P commands:

1. define format
2. enlarge characters
3. print bit map graphs
4. choice character sets
5. define user-defined characters
6. others

Each command is described in following format:

**Printing command** **Function**

Format: ASCII: the standard ASCII characters sequence.

Decimal: the decimal numbers sequence.

Hexadecimal: the hexadecimal numbers sequence.

Explanation: What the command does and how to use it.

### 3.2 Paper Feed Commands

**LF** **Line Feed**

Format ASCII : LF

Decimal : 10

Hexadecimal: 0A

Explanation:

Print data in buffer of the printer and feed one line forward. Feed one line forward only if no data in buffer of the printer.

<b>ESC J</b>		<b>'n' Dot Line Feed</b>		
Format	ASCII	:	ESC J	n
	Decimal	:	27 74	n
	Hexadecimal:		1B 4A	n

Explanation:  
 print data in buffer of the printer and feed 'n' -dot line forward. The value of n is between 0 and 255.  
 Line space will be automatically adjusted when using commands ESC V & ESC W for enlarge characters.

<b>ESC I</b>		<b>Set n' dot line spacing</b>		
Format	ASCII	:	ESC I	n
	Decimal	:	27 49	n
	Hexadecimal:		1B 31	n

Explanation:  
 The line spacing is set to n dot lines for future Line Feed command. The value of n is between 0 and 255. Default setting n=10 for text printing, n=0 for bit map printing when using ESC K command.

### 3.3 Format Setting Commands

<b>ESC D</b>		<b>Set Horizontal Tabs</b>		
Format	ASCII	:	ESC D	n1 n2 ... NUL
	Decimal	:	27 68	n1 n2 ... 0
	Hexadecimal:		1B 44	n1 n2 ... 00

Explanation:  
 The tab positions are entered as n<sub>1</sub>, n<sub>2</sub> and so on. These n<sub>1</sub>, n<sub>2</sub> should be within the line width of the printer. For character set A 12x24 dots, the maximum value n=32; for character set B 8x16 dots, the maximum value n=48. NUL character is added to indicate the end of command.  
 All settings can be cleared by using command ESC D NUL.

<b>HT</b>		<b>Horizontal Tab</b>		
Format	ASCII	:	HT	
	Decimal	:	9	
	Hexadecimal:		09	

Explanation:  
 The printing position is advanced to the next horizontal tab.

HT command will not execute if the current print position exceeds the last horizontal tab.

<b>ESC f</b>		<b>Print Blank Characters or Lines</b>		
Format	ASCII	:	ESC f	m n
	Decimal	:	27 102	m n
	Hexadecimal:		1B 66	m n

Explanation:  
 If m=0, command ESC f NUL will print n blank characters. The value n should be within the line width of the printer (see command ESC D in the chapter).  
 If m=1, command ESC f n will print n blank lines. The value of n should be within the range between 0 to 255.

<b>ESC I</b>		<b>Set Left Margin</b>		
Format	ASCII	:	ESC I	n
	Decimal	:	27 108	n
	Hexadecimal:		1B 6C	n

Explanation:  
 This command sets start printing position as n character from left.  
 The value of n should be within the line width of the printer. For character set A, n=32 and character set B, n=48. Default value n=0, This means no left margin.  
 The command sets an absolute position and is not affected by character enlarge command ESC U or ESC W.

### 3.4 Character Setting Commands

<b>ESC U</b>		<b>Enlarge Width</b>		
Format	ASCII	:	ESC U	n
	Decimal	:	27 85	n
	Hexadecimal:		1B 55	n

Explanation:  
 Characters or graphics following this command are printed at n times normal width. The value n should be in the range 1- 2. Default value n=1, that means normal width.

<b>ESC V</b>		<b>Enlarge Height</b>		
Format	ASCII	:	ESC V	n
	Decimal	:	27 86	n
	Hexadecimal:		1B 56	n

Explanation:

Characters or graphics following this command are printed at n times normal height. The value n should be within the range 1-2. Default value n=1, that means normal height.

<b>ESC W</b>		<b>Enlarge Width &amp; Height</b>	
Format	ASCII	:	ESC W n
	Decimal	:	27 87 n
	Hexadecimal:	:	1B 57 n

Explanation:  
 Characters or graphics following this command are printed at n times normal width and height. The value n should be in the range 1-2. Default value n=1, that means normal width and height.

<b>ESC -</b>		<b>Turn Underline on/off</b>	
Format	ASCII	:	ESC - n
	Decimal	:	27 45 n
	Hexadecimal:	:	1B 2D n

Explanation:  
 Underlining is turned on if n=1, all characters are underscored including spaces. Underline is turned off if n=0.

<b>ESC 6</b>		<b>Select Font A</b>	
Format	ASCII	:	ESC 6
	Decimal	:	27 54
	Hexadecimal:	:	1B 36

Explanation:  
 Characters following this command are printed using the Font A. There are two fonts available in the TP UP-NH printer. Font A is selected at power on or on ESC @ command.

<b>ESC 7</b>		<b>Select Font B</b>	
Format	ASCII	:	ESC 7
	Decimal	:	27 55
	Hexadecimal:	:	1B 37

Explanation:  
 Characters following this command are printed using the font B (see ESC 6).

<b>SO</b>		<b>Select Double-width Printing</b>	
Format	ASCII	:	SO

Decimal : 14  
 Hexadecimal: OE

Explanation:  
 Characters following this command on the same line n the print buffer are printed at twice their normal width. The command is canceled by a Carriage Return or using DC4 command.

<b>DC4</b>		<b>Cancel Double-width Printing</b>	
Format	ASCII	:	DC4
	Decimal	:	20
	Hexadecimal:	:	14

Explanation:  
 Double-width printing is canceled if it has been set using SO. This command does not cancel enlarge width printing selected using ESC U or ESC W.

<b>ESC c</b>		<b>Turn Inverse Printing on/off</b>	
Format	ASCII	:	ESC c n
	Decimal	:	27 99 n
	Hexadecimal:	:	1B 63 n

Explanation:  
 Inverse printing is turned on if n=1; inverse printing is turned off if n=0. Default value n=0

### 3.5 User Defined Characters Commands

There two forms of user defined characters which can be recognized by printer automatically.

#### 3.5.1 User Defined Characters Form 1

Support user defined characters for 101 DPI horizontal and 68 DPI vertical. Compatible with TPuP-T printer.

<b>ESC &amp;</b>		<b>Define User Defined Characters</b>			
Format	ASCII	:	ESC &	m	n1 n2 ... n6
	Decimal	:	27	38	m n1 n2 ... n6
	Hexadecimal:	:	1B	26	m n1 n2 ... n6

Explanation:  
 This command allows a character to be defined. The value m is the code of this user-defined character and ranges from 32 to 255. The value n1,n2,...n6 are codes for structure defined characters. Character size is 6 x 8 dot matrix. That means there are six codes, each code define one row of character for 8 rows. User-defined characters are stored in printer RAM until power off. It can print out according to 101 DPI horizontal and 68 DPI vertical. If many ESC & commands use same m value, only the last one is effective. The maximum number of user-defined characters is 32. Also

see ESC% and ESC: commands.

<b>ESC %</b>		<b>Replace with User Defined Characters</b>			
Format	ASCII	:	ESC %	m1 n1 m2 n2 ... mk nk	NUL
	Decimal	:	27 37	m1 n1 m2 n2 ... mk nk	0
	Hexadecimal:		1B 25	m1 n1 m2 n2 ... mk nk	00

Explanation:

This command is used to replace font characters n with user-defined characters m. m1, m2, ... mk are codes of user-defined characters.

n1, n2, ... nk are codes of the characters in the current font - the replaced characters. The values m and n should be in the range 32 to 255. The subscript k ranges from 1 to 32. The maximum number of replaced characters is 32.

The NUL character is added to indicate the end of the commands. Also refer ESC & ESC: commands.

<b>ESC :</b>		<b>Reinstate the Font Characters</b>	
Format	ASCII	:	ESC :
	Decimal	:	27 58
	Hexadecimal:		1B 3A

Explanation:

The command reinstates the original characters in the font replaced by user-defined characters using ESC % command. User-defined characters, however, are not deleted from the RAM in printer and may be brought back again with ESC %.

### 3.5.2 User Defined Characters Form 2

Support user defined high density characters for 203 DPI horizontal and vertical. Compatible with printer using ESC/POS commands.

<b>.ESC %</b>		<b>Select User Defined Characters</b>	
Format	ASCII	:	ESC % n
	Decimal	:	27 37 n
	Hexadecimal:		1B 25 n

Explanation:

This command can select /cancel user-defined characters. n should be in the range 0 -1.

If n = <00000001> B the user-defined characters are selected.

If n = <00000000> B the regular characters are selected.

Default setting is regular characters. Using ESC & command to define user-defined characters.

<b>ESC &amp;</b>		<b>Define User Defined Characters</b>			
Format	ASCII	:	ESC &	s n m [a [p] s x a ]m-n+1	
	Decimal	:	27 38	s n m [a [p] s x a ]m-n+1	
	Hexadecimal:		1B 26	s n m [a [p] s x a ]m-n+1	

Explanation:

This command allows characters to be defined.  $s = 3, 32 \leq n < m \leq 126, 0 \leq a \leq 12$  (for font A),  $0 \leq a \leq 9$  (for font B),  $0 \leq p \leq 255$ .

- s stands for number of bytes in vertical.  $S = 3$ .

- n stands for starting ASCII code of user-defined character.

- m stands for ending ASCII code of user-defined character.

When define only one character  $n=m$ . The maximum number of user-defined characters is 50 and the maximum number of times for different user-defined characters is 50 for each Font A & Font B.

- a stands for number of dots horizontal.

- p stands for data of user-defined characters, there are s x a character codes for each character for defining m-n+1 characters.

- user-defined characters are valid till re-definition or return back to start position or power off.

## 3.6 Graphics Printing Commands

### 3.6.1 Bit Image Graph Setting Form I

Only support bit map 101 DPI horizontal and 68 DPI vertical.

<b>ESC K</b>		<b>Bit Image Graph Printing</b>			
Format	ASCII:	ESC K	n1 n2 ... data	...	...
	Decimal:	27 75	n1 n2 ... data	...	...
	Hexadecimal:	1B 4B	n1 n2 ... data	...	...

Explanation:

This command is designed to print n1 x 8 bit image. The width of this bit map is n1 + n2 x 256 dots and the height is 8 dots.

Each column has 8 dots and can be presented by a byte (8 bits and bit 7 presents the highest dot in the column). The data are the bytes of relative columns in the graphics sequential from left to right.. The number of bytes should be n1 + n2 x 256.

### 3.6.2 Bit Map Graph Setting Form II

<b>ESC *</b>		<b>Set Bit Map</b>			
Format	ASCII	:	ESC *	m n1 n2 [d] k.	
	Decimal	:	27 42	m n1 n2 [d] k	
	Hexadecimal:		1B 2A	m n1 n2 [d] k	

Explanation:

This command is for setting bit map by using m and n1,n2. The bit map graph can be printed by either followed LF command or the width of the graph exceeds the width of the line. So, this command allows to print both characters and graphics in same line.

$m = 0, 1, 32, 33.$   $n1 = 0 - 255, n2 = 0 - 3, d = 0 - 255.$

$k = n1 + 256 \times n2$  ( $m = 0, 1$ )

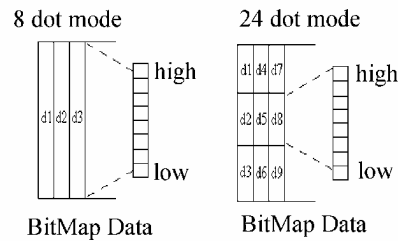
$$k = (n1 + 256 \times n2) \times 3 \quad (m = 32,33)$$

- The number of horizontal dots of the graphics is  $n1 + 256 \times n2$ .
- The width of bit map data should be within the line width, excess parts will be ignored.

- d presents bit map data, and k presents number of bit map data.

■ m for the setting of bit map. The definition of m is shown as below:

m	mode	vertical	horizontal		
		dot	dot density	dot density	max dot
0	8 dot single density	8	68 DPI	101 DPI	192
1	8 dot double density	8	68 DPI	203 DPI	384
32	24 dot single density	24	203 DPI	101 DPI	192
33	24 dot double density	24	203 DPI	203 DPI	384



**GS \*** **Define Down-load Bit Map Graph**

Format	ASCII	:	GS	*	n1	n2	[d]	k.	
	Decimal	:	29		42	n1	n2	[d]	k
	Hexadecimal:		1D		2A	n1	n2	[d]	k

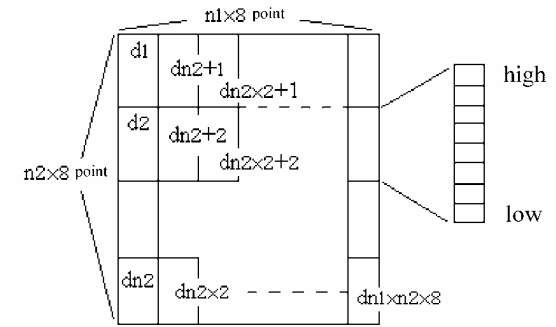
Explanation:

This command sets a down-load bit map graph.

$n1 = 1 - 48, n2 = 1 - 255, n1 \times n2 < 9600, k = n1 \times n2 \times 8$ .

- d presents bit map data.
- The horizontal size of this graph is  $n1 \times 8$  dots and vertical is  $n2 \times 8$  dots
- This setting will be lost while resetting or return back to start position.

Bit Map format is showing as follows:



**GS /** **Print Down-load Bit Map Graph**

Format	ASCII	:	GS	/	n
	Decimal	:	29	47	n
	Hexadecimal:		1D	2F	n

Explanation:

This command print out the down-load bit map graph set by command GS \*. n for selection of bit map.  $n = 0 - 3$ .

The relative graph sizes are listed as follows:

n	graph size	density in vertical	density in horizontal
0	normal	203 DPI	203 DPI
1	double width	203 DPI	101 DPI
2	double height	101 DPI	203 DPI
3	double height & width	101 DPI	101 DPI

**ESC '** **Print Curving Lines**

Format	ASCII	:	ESC	'	m	n1	n1'	...	nk	nk'	CR	
	Decimal	:	29		39	m	n1	n1'	...	nk	nk'	CR
	Hexadecimal:		1B		27	m	n1	n1'	...	nk	nk'	CR

Explanation:

This command is designed to print curving graphic lines along with the paper feed direction. (vertically). The value m is the number of lines to be printed, and should be within the range of 1 to 384. In a horizontal line, there are m dots of m curving line. The value  $n1, n1', n2, n2' \dots nk, nk'$  represents the position of dot of m line. The quantity of  $nk$  should be equal m and each  $nk$  should be fall on the largest dot in each line. The last CR (carriage return) lets printer print this one horizontal dot line out and carriage return to next dot line. So a set of horizontal dot lines will be printed out to form m curving graphic lines. base on the data of  $n1, n1', n2, n2', \dots, nk, nk'$ .

### 3.7 Initialization Command

<b>ESC @</b>		<b>Initialize Printer</b>	
Format	ASCII	:	ESC @
	Decimal	:	27 64
	Hexadecimal:		1B 40

Explanation:

This command initialize printer in following aspects:

- clear data in printing buffer.
- reinstate default value.
- select internal character font A.
- clear user defined characters.

### 3.8 Data Control Command

<b>CR</b>		<b>Carriage Return</b>	
Format	ASCII	:	CR
	Decimal	:	13
	Hexadecimal:		OD

Explanation:

When a Carriage Return is sent to the printer, any data in the buffer is printed and paper is fed one line. Same as LF command.

<b>NUL</b>		<b>Null</b>	
Format	ASCII	:	NUL
	Decimal	:	0
	Hexadecimal:		00

Explanation:

NUL is used as the final code in some commands such as ESC B, ESC D. NUL command is ignored by printer when used alone.

### 3.9 Hexadecimal Printing Command

<b>ESC "</b>		<b>Turn Hexadecimal Dump Printing on/off</b>	
Format	ASCII:	ESC "	n
	Decimal:	27 34	n
	Hexadecimal:	1B 22	n

Explanation:

Hexadecimal Dump print mode is turned on if n = 1, and turned off if n = 0. If you execute programs or list program in Hexadecimal Dump print mode, all data sent from the host computer will be printed out in hexadecimal.

Printing in the Hexadecimal Dump mode is performed only when the printer is in the line buffer-full state.

## Appendix 1 Index of Printing Command

Decimal	Hexadecimal	Command	Description	Page No.
0	00	NUL	Nil	27
9	09	HT	Horizontal Tab	17
10	0A	LF	Line Feed	15
13	0D	CR	Carriage Return	27
14	0E	SO	Select Double-width Printing	19
20	14	DC4	Cancel Double-width Printing	20
27 34	1B 22	ESC " n	On/off Hexadecimal Printing	27
27 38	1B 26	ESC & m n1 n2..n6	Define User-defined Characters	20
27 37	1B 25	ESC % m n1 n2 ..mk nk NUL	Replace with User Defined Characters	21
27 42	1B 2A	ESC *	Set Bit Map Graph	23
27 58	1B 3A	ESC :	Reinstate the Font Characters	21
27 37	1B 25	ESC % n (n<2)	Selection of self-defined Character Sets	22
27 38	1B 26	ESC & s n m [a[p]sxa]m-n+1	Define User-defined Characters	22
27 39	1B 27	ESC 'm n1 n1' ...nk nk" CR	Print Curving Lines	26
27 45	1B 2D	ESC - n	On/off Underline Printing	19
27 49	1B 31	ESC 1 n	Set n' dot line Spacing	16
27 54	1B 36	ESC 6	Select Character set A	19
27 55	1B 37	ESC 7	Select Character Set B	19
27 64	1B 40	ESC @	Initial the Printer	26
27 68	1B 44	ESC D	Set Horizontal Tab	16
27 74	1B 4A	ESC J n	Line Feed	16
27 75	1B 4B	ESC K n1 n2 ...data	Bit Map Graph Printing	23
27 85	1B 55	ESC U n	Character Width Enlarge	18
27 87	1B 57	ESC W n	Character Width & Height Enlarge	18
27 86	1B 56	ESC V n	Character Height Enlarge	18
27 99	1B 63	ESC c n	On/Off Inverse Printing	20
27 102	1B 66	ESC f m n	Print Blank Characters or Lines	17
27 108	1B 6C	ESC I n	Set Left Margin	17
29 42	1D 2A	GS * n1 n2 [d] k	Define Down-load Bit Map Graph	24
29 47	1D 2F	GS / n	Print Down-load Bit Map graph	25