



KERN & Sohn GmbH

Ziegelei 1
D-72336 Balingen
E-Mail: info@kern-sohn.com

Tel: +49-[0]7433- 9933-0
Fax: +49-[0]7433-9933-149
Internet: www.kern-sohn.com

Operating Instructions

Dot matrix printer

KERN YKN-01

Version 1.0
11/2013
GB

The KERN Printer YKN-01 corresponds
to the model SPRT 16S.

YKN-01-BA-e-1310

Content

Introduction	2
Chapter 1 Feature and Performance	3
1.1 Model Definition	3
1.2 Interface	3
1.3 Printer Codes	3
1.4 Print Commands	4
1.5 Working Mode	4
1.6 Offline Working	4
1.7 Performance Index	4
Chapter 2 System Installation	5
2.1 Checking Model	5
2.2 Checking Accessories	6
2.3 Ribbon Cassette Installation	6
2.4 Paper Roll Installation	8
2.5 Power Supply	9
Chapter 3 Operation	10
3.1 Parallel Interface Connection	10
3.2 Serial Interface Connection	11
3.3 Buttons and Indicators	14
3.4 Self-test	15
3.5 Printer Initialization	15
3.6 Command Set Selection	16
Chapter 4 Print Commands	16
4.1 Summary	16
4.2 Paper Feed Commands	17
4.3 Format Setting Commands	18
4.4 Character Setting Commands	23
4.5 User-defined Character Setting Commands	27
4.6 Graphics Print Commands	29
4.7 Initialization Command	31
4.8 Data Control Commands	31
4.9 Hexadecimal Print Commands	32
4.10 Chinese Print Control Commands	32
Chapter 5 Print Examples	37
Chapter 6 Printer Using under Windows	40
Chapter 7 Printer Model Alteration and Protection	40
7.1 Printer Model Alteration	40
7.2 Print Head Protection	41
7.3 Other	41
Appendix	42

Introduction

SP-T series printers are a series of desk-top micro printer which are with updated design. They are with these remarkable features of delicate dimension, perfect performance, elegant appearance, simple operation, convenient connection.

The specification of SP-T printers is complete, you can choose different print speed, different print line width, different print font, different print buffer, and different interface of serial and parallel. So, these printers can be as print output devices of all kinds of intelligent instruments, meters and micro computers.

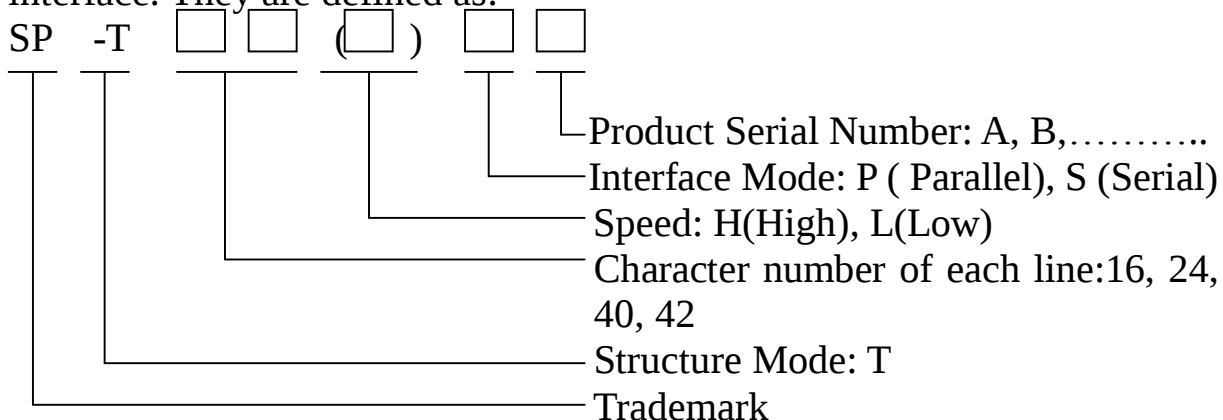
SP-T printers can be widely used in many application areas. They can print report forms, pay slip and record pathologic curves of all kinds of medical instruments and meters. They also can print 15 kinds of different font Chinese characters if connected to China learning machine. Under CCDOS and Windows of IBM PC, they can replace 2024 etc. 24-pin printers that are with expensive price to print Chinese characters directly, and needn't alter the printing driver program of original system. Moreover, owing to adopt qualified ESC standard control code commands, SP-T also can replace 9-pin printers.

SP-T printers have five models; two kinds of interface: serial, parallel; three levels of print buffer: 2K bytes, 8K bytes, 32K bytes; 52 control commands; 448 kinds of internal characters, including English, Greek, German, French, Japanese katakana and GB Chinese character library level I, II, a large number of mathematics symbols, special-purpose symbols and various kinds of graphic and curving symbols. Besides, SP-T printers are compatible with SP-16, SP-40 micro printers.

Chapter 1 Feature and Performance

1.1 Model definition

SP-T printers have five kinds of print head model and two kinds of interface. They are defined as:



You can compare your SP-T micro printer with the above definition, so as to correctly read and understand the contents in this manual.

1.2 Interface

SP-T series have serial and parallel two kinds of interface, parallel interface is compatible with CENTRONICS and serial interface is compatible with RS-232C. The two kinds of interface are connected to the host both by using standard 25-pin D model socket and 25-pin cable.

The parallel interface socket is D model 25-pin male socket; the serial is D model 25-pin female socket. The host that has D model 25-pin standard output socket such as IBM PC and its compatible computer and LAPTOP portable computer etc, can use 25-pin standard cable to connect with directly. The host that hasn't standard output socket such as China learning machine etc, can use special cable (see Appendix 5) to connect with. The details please see the printer cable connection in Chapter 3 and Appendix 5.

1.3 Printer Codes

SP-T printers offer 448 kinds of internal characters, including English, Greek, German, French, Japanese katakana and GB Chinese character library level I, II, a large number of mathematics symbols, special-purpose symbols and various kinds of graphic and curving symbols. All the characters are composed by two character sets (see Appendix 1), chosen by the host's programs through control commands. Character size is 5×7 dots, graphic character size is 6×8 dots, through certain programs, also

can define 32 kinds of character, so as to satisfy your particular needs. SP-T printers also offer graphics print mode, characters and graphics can be printed together.

1.4 Print Commands

SP-T printers offer 52 kinds of print command. Most of them are compatible with the command standard of IBM and EPSON printer. Combining micro printer's features and application situation, SP-T add some commands that are convenient for using, such as print curve command etc. Therefore, SP-T can replace most 9-pin or 24-pin printers to be used directly, only by doing a little adjustment to the original print driver programs or such adjustment is needless. When programming for printing graphics and curves, you may feel it is more convenient.

If you have ever used SP-40 or SP-16 micro printer, you will find SP-T printers are fully compatible with the print commands of SP-40 or SP-16, and characters are more abundant, please see 3.6 of Chapter3 for details.

1.5 Working Mode

SP-T printers have six kinds of working mode, they are: hexadecimal print mode, character print mode, graphics print mode, self-test mode, on/off line mode and paper feeding mode. Among them the anterior three kinds of mode can be changed by control commands, the posterior three ones can be realized by button operation. Please refer to Chapter 3 and Chapter 4.

1.6 Offline Print

For some printers in SP-T series such as SP-T40, the print speed is a bit slow. However, SP-T printers adopt advanced design method, provide rather big print buffer, so that the host can finish the data exchange with the printer quickly, and realize assumed offline print. The internal RAM of SP-T is 2K bytes, 8K bytes or 32K bytes these three levels, they have been set at ex-factory, you can select according to your own requirements, but after you have selected, generally it can't be altered by yourself.

1.7 Performance Index

The command performance index of SP-T is as below:

1. Parallel interface: adopt D-25 parallel standard which is compatible with CENTRONICS, single directional receiving data line DB0-DB7; provide synchronous signal STB by external host; send printer's status to the host by ACK, BUSY and SEL. The logic signal level of all control signal and data signal are TTL.

2. Serial interface: adopt RS-232C compatible standard. The baud rate in serial interface mode is selected in the range of 150, 300, 1200, 2400, 4800, 9600 and 19200bps and it is set by DIP switch on the control panel; asynchronous transmission mode. Handshaking mode is mark control or X-ON/X-OFF protocol. Three kinds of parity checking modes are odd, even or no parity. Logic signal level of all signals is EIA.
3. Indicators and buttons: power P indicator, on/off line selection SEL indicator, SEL button switch and LF paper feeding button switch.
4. DC5V power supply: as to SP-T16, SP-T24 (L) and SP-T40, 1.5A current is demanded, as to SP-T24 (H) and SP-T42, 3A current is demanded.
5. Ribbon life: 1×100000 lines.
6. Print paper: common white paper, width: $44.5 \pm 0.5\text{mm}$ or $57.5 \pm 0.5\text{mm}$, thickness: 0.07mm, if installed inside, the diameter of paper roll should not be larger than 30mm; if installed outside, should not be larger than 80mm.

Other Index of 5 Models of SP-T Series:

SP	Character/line	Font (mm $\times$ mm)	Dot/line	Speed (line/sec.)
16	16	1.8 $\times$ 2.5(W $\times$ H)	96	1
24L	24	1.7 $\times$ 2.4(W $\times$ H)	144	0.7
40	40	1.1 $\times$ 2.4(W $\times$ H)	240	0.4
24H	24	1.7 $\times$ 2.6(W $\times$ H)	144	1.7
42	42	1.1 $\times$ 2.6(W $\times$ H)	252	1

Chapter 2 System Installation

2.1 Model Checking

SP-T printers appear the outline as Figure2-1below. Please check up the model number at the bottom of the printer, seeing if or not it accords with what you need. And pay attention to the detailed using specifications about your model in this user manual.

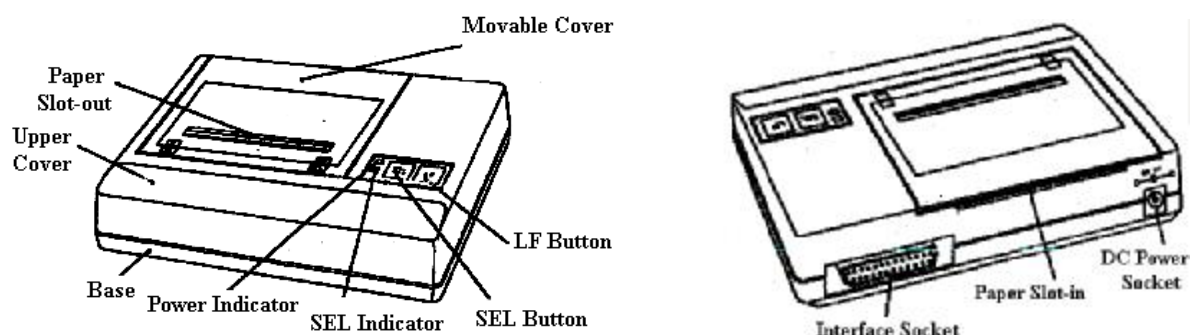


Fig. 2-1 SP-T Printer Outline

SP-T printers allow you to make proper alteration to the printer model, detailed method please see Chapter 7.

2.2 Checking Accessories

There is already a paper roll and ribbon is installed in the printer at ex-factory, and a *User's Manual* as well. You can also choose other accessories according to your requirements. (see Appendix 5)

2.3 Ribbon Cassette Installation

The ribbon cassette has already been installed well at ex-factory, but after using for a period of time, it needs to change the ribbon cassette, the ways for changing ribbon cassette may accord to the following steps:

- (1) Take down the movable cover panel of the printer as Fig. 2-2 shows; what Fig 2-3 shows is wrong.

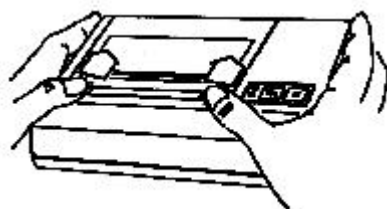


Fig.2-2 Taking down the Movable Cover Panel Correctly

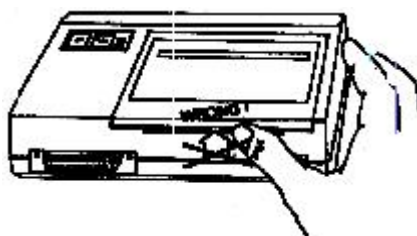


Fig.2-3 Taking down the Movable Cover Panel Incorrectly

- (2) Take down the old ribbon cassette which is on the head of printer, (see Fig.2-5). Please note: lift up the right end of the ribbon cassette first, then lift up the left one, take down the ribbon cassette.

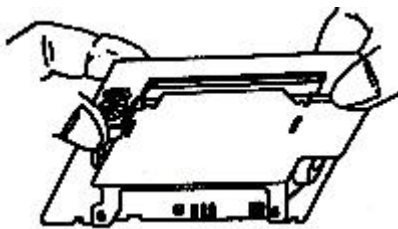


Fig.2-4 Taking Down the Ribbon Cassette

(3)Installing the new ribbon cassette: firstly put down gently the left end of ribbon cassette on the gear wheel which is on the left end of the print head, lift up the right end a little, don't put down, as Fig 2-5 shows. At this time if you find the left end of ribbon cassette has not been put down to the bottom, please hold down the knob of ribbon cassette with finger, rotate slightly according to the arrow direction, as Fig.2-6 shows, until the ribbon cassette has been put down to the bottom then put down the right end, as Fig. 2-7 shows. So the ribbon cassette has been installed.



Fig. 2-5 Putting down the Left End



Fig2-6 Rotating the Knob According to the Arrow Direction

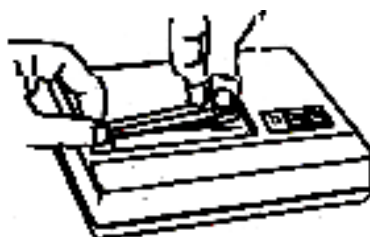


Fig2-7 Putting down the Right End

(4)Close the movable cover panel of the printer as Fig 2-8 shows.

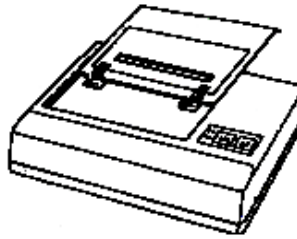


Fig.2-8 Closing the Movable Cover Panel

2.4 Paper Roll Installation

For SP-T printers, paper roll can be put inside the case, installing paper as follows:

(1) Push the removable cover plate forward till it off the printer like Fig.2-2,

(2) Cut the paper end like Fig.2-10 below.

For paper roll placed inside the case: Insert the paper end downwards into paper-in slot on rear of printer mechanism like Fig. 2-11, Fig.2-12 paper upward is not correct.

For paper roll hold outside the case: firstly put paper through the narrow orifice that is at the back of printer shell, as shown in Fig 2-12, then make paper face the paper-in slot.



Fig 2-9 Sample of Paper End

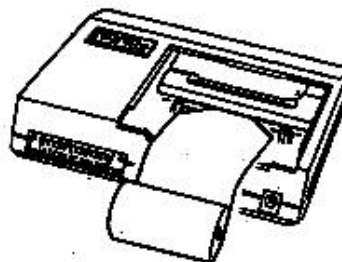


Fig.2-10 Paper End Downwards

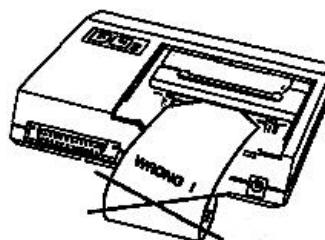


Fig. 2-11 Paper End Upwards Is Wrong

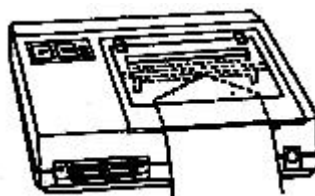


Fig.2-12 Face the Paper-in Slot

- (3) Turn on + 5V power supply.
- (4) Press the button<SEL> and the SEL indicator will be turned off. Press the button <LF> to run the print head, and then insert the paper into the paper-in slot, and the paper will be loaded into the print head and come out from the front for a certain seemly length.
- (5) Press LF or SEL button again or turn the power off.
- (6) Put paper end through the paper-out slot that on the movable cover panel, and close the movable cover panel.

2.5 Power Supply

SP-T printers adopt DC+5V power supply. It is recommended to use the power connector that matches well to the printer, so that you can directly connect the plug of connector to the socket of printer. If use other power supply, its voltage is higher than 5.5V or lower than 4.5V, and current is lower than 3A, we won't guarantee the printer works normally, even may damage the print head.

Please note that the polarity of the power shouldn't be connected incorrectly.

For SP-T printers, the column end is positive pole (+), and the board end is negative pole (-), as shown in Fig.2-13:



Fig.2-13 Power Polarity Sketch Map

Caution: Don't connect AC220V with the power socket of the printer directly!

The whole system connection is as Fig.2-14 shows:



Fig.2-14 System Connection

Chapter 3 Printer Operation

3.1 Parallel Interface Connection

SP-T printers adopt D-25 parallel interface, which is compatible with CENTRONICS standard, and the interface socket matches well the print interface of IBM PC. So, if you connect the printer to IBM PC, LAPTOP portable computer etc. hosts by using the cable said in Appendix 5 directly, you needn't to worry the plug and socket connected incorrectly. There are several kinds of cable accessories shown in Appendix 5 of this manual for selection, you can select to use according to your printer's interface. If there is no suitable cable in Appendix 5, you may specially order the cables according to the signals of SP-T printers' parallel interface and host interface.

The pin order of parallel port is as Fig. 3-1 shows:

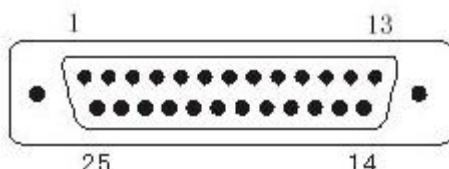


Fig.3-1 Pin Order of Parallel Port

The pin assignment of parallel interface is shown in Fig. 3-2, signal level is TTL standard:

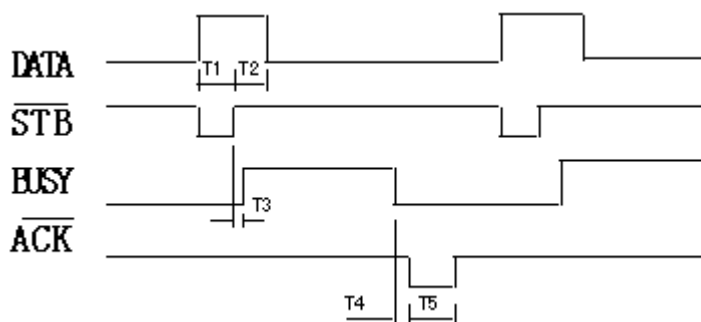
Pin No.	Signal	Direction	Description
1	STB	In	Strobe pulse to latch data, reading occurs at falling edge.
2	DATA1	In	These signals represent the 1 st bit to 8 th bit of the parallel data representatively, each signal is at HIGH level when data is logic 1, and LOW when data is logic 0.
3	DATA2	In	
4	DATA3	In	
5	DATA4	In	
6	DATA5	In	
7	DATA6	In	
8	DATA7	In	
9	DATA8	In	

10	$\overline{\text{ACK}}$	Out	Answering pulse, LOW level signal indicates that data have already been received and the printer gets ready to receive the next data.
11	BUSY	Out	HIGH level signal indicates that the printer is BUSY and can not receive data.
12	PE	---	Grounding
13	SEL	---	Pulling up to HIGH level signal by a resistor
15	$\overline{\text{ERR}}$	Out	Pulling up to HIGH level signal by a resistor
14-17	NC	Out	No connection
18-25	GND	---	Grounding logical 0 level

Fig.3-2 Pin Assignment of Parallel Interface

Notice: (1) “In” denotes input to the printer, “Out” denotes output from the printer.

The timing chart for interface signal of parallel interface is as Fig.3-3 shows:



$T1 > 20 \text{ NSEC}$, $T2 > 30 \text{ NSEC}$, $T3 < 5 \text{ NSEC}$

Fig.3-3 Signal Timing Chart of Parallel Interface

3.2 Serial Interface Connection

The serial interface of SP-T printers is compatible with RS-232C standard, the 25-pin interface socket matches RS-232C interface of IBM PC, so you can connect the printer with IBM PC directly by using the corresponding cables whose details are in Appendix 5.

The pin order of serial port is as Fig. 3-4 shows:

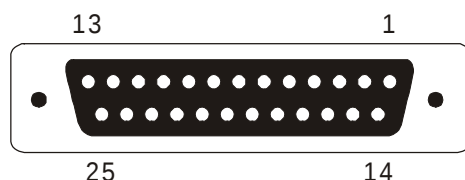


Fig.3-4 Pin Order of Serial Interface

The pin assignment of serial interface is shown in Fig. 3-5, logical signal level is EIA:

Pin No.	Signal Name	Source	Description
2	RXD	Host	Printer receives data from host
3	TXD	Printer	Printer transmits control code X-ON/X-OFF to host when using X-ON/X-OFF handshaking protocol
5	CTS	Printer	Signal "MARK" indicates that the printer is "BUSY" and unable to receive data; "SPACE" indicates that the printer is "READY" for receiving data.
6	DSR	Printer	Signal "SPACE" indicates that the printer is "ONLINE"
7	GND	—	Signal Ground
8	DCD	Printer	Same to signal CTS

Fig. 3-5 Pin Assignment of Serial Interface

Note: The "Printer" and "Host" in "Source" denote the source that signal come from;

The baud rate in serial interface mode is selected in the range of 150, 300, 1200, 2400, 4800, 9600 and 19200bps and it is set by DIP switch on the control panel. You can do some adjustments according to your demands. The detailed method is: opening the movable cover panel, then opening the printer's upper cover. DIP switch is on the right corner of the printer, the side marked with white dot is OFF status; another side is ON status. Also you can select suitable baud rate according to Fig.3-6, the white-dot place is K1. It has set the baud rate to 9600bps at ex-factory.

The DIP switch settings of SP-T series printers, please see Appendix 8.

DIP Switch	Baud Rate	DIP Switch		DIP Switch	
ON ■ ■ ■ □ □ □ □ □ □ □ □ □ 1 2 3 4 5 6	150	ON □ □ □ □ ■ ■ □ □ □ □ □ □ 1 2 3 4 5 6	8-Non	ON □ □ □ ■ □ □ □ □ □ □ □ □ 1 2 3 4 5 6	Mark
ON □ ■ ■ □ □ □ ■ □ □ □ □ □ 1 2 3 4 5 6	300	ON □ □ □ □ ■ □ □ □ □ □ □ ■ 1 2 3 4 5 6	8-Odd	ON □ □ □ □ □ □ □ □ □ ■ □ □ 1 2 3 4 5 6	XON XOFF
ON ■ □ ■ □ □ □ □ ■ □ □ □ □ 1 2 3 4 5 6	600	ON □ □ □ □ □ ■ □ □ □ □ ■ □ 1 2 3 4 5 6	8-Even	Ex-factory Setting ■ □ □ □ ■ ■ □ ■ ■ ■ □ □ 1 2 3 4 5 6	
ON □ □ ■ □ □ □ ■ ■ □ □ □ □ 1 2 3 4 5 6	1200	ON □ □ □ □ □ □ □ □ □ □ ■ ■ 1 2 3 4 5 6	7-Even		
ON ■ ■ □ □ □ □ □ □ ■ □ □ □ 1 2 3 4 5 6	2400				
ON □ ■ □ □ □ □ ■ □ ■ □ □ □ 1 2 3 4 5 6	4800				
ON ■ □ □ □ □ □ □ ■ ■ □ □ □ 1 2 3 4 5 6	9600				
ON □ □ □ □ □ □ ■ ■ ■ □ □ □ 1 2 3 4 5 6	19200				

Fig.3-6 DIP Switch Setting

The data structure of serial interface is as Fig.3-7 shows:

Start Bit	Data Bit	Parity Bit	Stop Bit
1 bit	7 or 8 bits	1 bit	1 bit

Fig.3-7 Data Structure of Serial Interface

When selecting 7 data bits, only allowed adopting 1start bit, 7 data bits, 1 even bit and 1 stop bit. Thereof the start bit and stop bit are both 1 bit. Data bit is 8 bits, parity bit is 1 bit. The checking mode can be selected through DIP switch K5 and K6, as Fig.3-6 shows. It has set no parity at ex-factory, that is, K5, K6=ON, ON

The polarity of RS-232 signal in serial interface mode is:

MARK=logic “1” (EIA-3V to -27V low signal level)

SPACE=logic “0” (ELA+3V to +27V high signal level)

There are two kinds of handshaking mode for selection, one is mark control mode, another is X-ON/X-OFF protocol mode, they can be selected by DIP switch K4, as Fig.3-6 shows. It is K4=OFF at ex-factory, the description for the two kinds of handshaking mode is as Fig.3-8 shows.

Handshaking Mode	Data Direction	RS-232C Interface Signal
Mark Control	In	5 th and 8 th signal line are SPACE status
	Out	5 th and 8 th signal line are MARK status
X-ON/X-OFF Control	In	Send X-ON code 11H on 3 rd signal line
	Out	Send X-OFF code 13H on 3 rd signal line

Fig.3-8 Two Kinds of Handshaking Mode

The operation steps for serial interface mode are as below:

- (1) Select baud rate with DIP switch K1-K3;
- (2) Select parity checking with DIP switch K5, K6;
- (3) Select mark control or X-ON/X-OFF control handshaking mode with DIP switch K4;
- (4) When remaining 32 bytes in the data buffer, signal line DCD (8th signal line) and CTS (5th signal line) will be set to BUSY status by the printer, namely MARK status. Otherwise set to READY status, namely SPACE status;
- (5) When it is BUSY status under X-ON/X-OFF control, the printer sends X-OFF (13H) code. When READY status, it sends X-ON (11H) code;
- (6) When it is under mark control, the host sends or stops sending code string according to DCD and CTS. DCD and CTS denote READY status or BUSY status representatively.

3.3 Buttons and Indicators

There are two indicators and two buttons (SEL and LF) on the control panel of SP-T printers. The indicator marked with P is power indicator, another indicator is marked with SEL. One of the two buttons is also marked with SEL, another one is marked with LF, as Fig.3-9 shows. SEL indicator only presents the status of SEL button and is irrelevant to LF. SEL and LF can change printer's working mode, including self-test mode, on/off line mode or paper feeding mode.

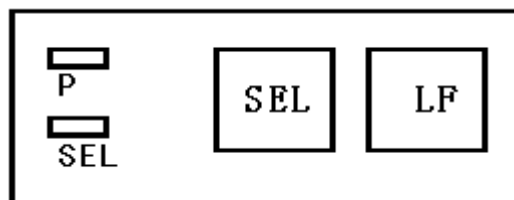


Fig. 3-9 Indicators and buttons

- (1) Self-test mode:

There are two kinds of method to select self-test mode, one kind of method

is holding down SEL button when power on, that means pressing SEL button first, then putting through DC5V power supply, at this moment the printer prints out the self-test receipt, and SEL indicator goes dark; another kind of method is selecting self-test mode at any time after powered on, the detail is: if SEL indicator lights, hold down SEL button to make the indicator go dark, otherwise can omit this step: hold down LF button, then hold down SEL button at once, the printer will begin the self-test.

Also there are two kinds of method to cancel self-test mode. One is printer exits automatically after it finished printing the self-test receipt; another is printer exits during the course of printing, at this time only need to press SEL button.

(2) On/off line mode:

After powered on or exited self-test mode, printer goes in online mode, SEL indicator lights, hold down SEL button, the SEL indicator goes dark, printer goes in offline mode, hold down SEL again, printer re-goes in online working mode. When printer is offline, it doesn't receive the data from host.

Another function of SEL is realizing pause during the course of printing. If hold down SEL when printing is going on, then release it, the printer will pause after finished printing the current line, at this time paper feeding mode can be selected. Hold down SEL button again and release it, the printer will continue printing.

(3) Paper feeding mode:

It is in off-line status when SEL indicator is dark, at this moment if need to feed paper, hold down LF button, then release it, the printer will feed paper empty, but won't print. Hold down LF button and release it again, the print will pause, hold down SEL button at this moment, the printer will restore to on-line status. Besides, it paper feeding mode can be switched to on-line status directly by pressing SEL button.

3.4 Self-test

The self-test will check the condition of printer, if the printer prints out the self-test receipt correctly, it means the printer works normally. Otherwise it needs to repair. After self-test, the printer is in on-line status and can receive the data from the host. Sometimes the self-test may be incorrect, but in fact, there is no matter with the printer, in this instance, please check whether the power supply adopted meets the specification.

3.5 Printer Initialization

There are three kinds of modes for printer initialization. The first one is that the host sends command to the printer with control code ESC@, realizing initialization through software. The second one is that realizing initialization through self-test. The third one is that power on initialization. The contents of initialization include: select default of each control code, namely the dot number of line spacing is 3, no binding length, vertical and horizontal tab value are both 0, left and right margin width are both 0, enlarging multiple is 1; cancel all the user-defined characters or graphics characters; and select non reverse white print etc.; select character set fixed by short circuit block W1.

3.6 Command Set Selection

SP-T16 and SP-T40 both have two command sets, one is ESC control codes, another is compatible with the commands of SP-16 and SP-40 micro printers, can be selected by internal short circuit block W1. When W1 is short connected, select the command set that is compatible with the commands of SP-16 and SP-40; when W1 is disconnected then select ESC control code command set. It is set to ESC control code command set at ex-factory. Refer to appendix.

As for SP-T24(L), SP-24(H), SP-T42, only ESC control code command set is available.

Chapter 4 Print command

4.1 Summary

SP-T offer more than 52 kinds of print commands, these commands specify the following function:

- (1) Define format
- (2) Enlarge or diminish characters
- (3) Print bit map graphics
- (4) Select character set
- (5) Define user-defined characters
- (6) Etc.

These commands include one-byte control codes or ESC control code sequences. ESC control code sequences are begun with “ESC” code and followed by other character codes.

Each command is described in following format:

Command name	Function
Format:	ASCII: the standard ASCII character sequence

Decimal: the Decimal number sequence

Hexadecimal: the Hexadecimal number sequence

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

Example: some examples are listed to illustrate the command for better understanding.

The following is the description of each command according to the function of each command.

4.2 Paper Feeding Commands

LF	Feed Line
----	-----------

Format:	ASCII:	LF
	Decimal:	10
	Hexadecimal:	0A

Explanation:

The printer feeds paper forwards one line.

ESC J	n Dot Line Feed
-------	-----------------

Format:	ASCII:	ESC	J	n
	Decimal:	27	74	n
	Hexadecimal:	1B	4A	n

Explanation:

The printer feeds paper n dot lines. n=0~255.

This command sends carriage return and feed line. It won't influence the latter feed line command.

If you need to feed paper immediately but no carriage return, can use ESC J command. Line spacing will be adjusted automatically when using commands ESC V and ESC W for enlarge characters.

ESC 1	Set n Dot-line Spacing
-------	------------------------

Format:	ASCII:	ESC	1	n
	Decimal:	27	49	n
	Hexadecimal:	1B	31	n

Explanation:

The line spacing is set to n dot-lines for future Line Feed command. n=0~255, default setting n=3 for text printing, n=0 for bit map printing when using ESC K command.

The BASIC programs for observing the effect of this command are as below:

```
10 FOR I= 1 TO 11 STEP 2      ' ESC 1 set line spacing
20 LPRINT CHR$ (27); "1"; CHR$ (I) print character string and feed line
30 LPRINT "LINE SPACING"
```

40 NEXT I

The print result of the said programs in SP-T16 is as following:

LINE SPACING
LINE SPACING
LINE SPACING
LINE SPACING
LINE SPACING
LINE SPACING

FF	Feed Page
Format:	ASCII: FF
	Decimal: 12
	Hexadecimal: 0C

Explanation:

Feed paper to the beginning of the next page.

4.3 Format Setting Commands

ESC C	Set Page Length
Format:	ASCII: ESC C n
	Decimal: 27 67 n
	Hexadecimal: 1B 43 n

Explanation:

The page length is set to n character lines. n=0~255, when n=0, the page length is 256 lines. Default n=40.

ESC N	Set Binding Length
Format:	ASCII: ESC N n
	Decimal: 27 78 n
	Hexadecimal: 1B 4E n

Explanation:

The binding length is set to n lines. n=0~255, default n= 0. In SP-T, binding length denotes the number of blank line between one page and the next page.

Example: set binding length to 3 lines, send the following sequence to the printer:

ASCII:	ESC	N	ETX
Decimal:	27	78	3
Hexadecimal:	1B	4E	03

The BASIC programs for sending the said sequence are as below:

LPRINT CHR\$ (27); "N"; CHR\$ (3)

ESC O				Cancel Binding Length
Format:	ASCII:	ESC	O	
	Decimal:	27	79	
	Hexadecimal:	1B	4F	

Explanation:

The binding length is set to 0 line, it means the printer will print line-by-line, won't vacate blank lines between each page.

ESC B				Set Vertical Tab Value
Format:	ASCII:	ESC	B	n1 n2 n3...NUL
	Decimal:	27	66	n1 n2 n3...0
	Hexadecimal:	1B	42	n1 n2 n3...00

Explanation:

The vertical tab positions are entered as n1, n2 and so on, all of these should be within the page length set by ESC C command.

Command NUL added at the end indicates the command is over.

All vertical tab positions that input can be deleted by using this command in ESC B NUL format.

VT command is to carry out vertical tab, the paper fed to the next vertical position.

Example: set three vertical tab values at 2nd line, 5th line, 8th line in one page, you can send the following commands:

ASCII:	ESC	B	STX	ENQ	BS	NUL
Decimal:	27	66	2	5	8	0
Hexadecimal:	1B	42	02	05	08	00

The BASIC programs for this example are as below:

```
10 LPRINT CHR$ (27); "B" ; CHR$ (2); CHR$ (5); CHR$ (8); CHR$ (0); 'ESC B command
```

```
20 LPRINT CHR$ (11); 'VT command
```

```
30 LPRINT "VTAB1"; 'Print character string
```

```
40 LPRINT CHR$ (11); 'VT command
```

```
50 LPRINT "VTAB2"; 'Print character string
```

```
60 LPRINT CHR$ (11); 'VT command
```

```
70 LPRINT "VTAB3"; 'Print character string
```

The print result in SP-T16 is as following:

UTAB1**UTAB2****UTAB3****VT**

Carry out Vertical Tab Value

Format:	ASCII:	VT
	Decimal:	11
	Hexadecimal:	0B

Explanation:

Feed paper to the next vertical tab position which is set by ESC B command.

Notice: if there is no vertical tab value setting, or the current position equals or is beyond the last vertical tab position, VT command is to feed paper one line only (same to LF command).

ESC D

Set Horizontal Tab Value

Format:	ASCII:	ESC	D	n1 n2 n3...NUL
	Decimal:	27	68	n1 n2 n3...0
	Hexadecimal:	1B	44	n1 n2 n3...00

Explanation:

The tab positions are entered as n1, n2 and so on, all of these should be within the line width of this model printer. (Refer to 1.7) Command NUL added at the end indicates the command is over.

All horizontal tab positions that set can be deleted by using this command in ESC D NUL format.

HT command is to carry out horizontal tab.

Example: set three horizontal tab values at 2nd, 9th line, 14th character position in one line, you can send the following commands:

ASCII:	ESC	D	STX	HT	SO	NUL
Decimal:	27	68	2	9	14	0
Hexadecimal:	1B	44	02	09	0E	00

The BASIC programs for this example are as below:

```
10 LPRINT "1234567890123456" 'Ruler
```

```
20 LPRINT CHR$(27); "D"; CHR$(2); CHR$(9); CHR$(14); CHR$(0); 'ESC D command
```

```
30 LPRINT CHR$(9); 'HT command
```

```
40 LPRINT "HT1"; 'Print character string
```

```
50 LPRINT CHR$(9); 'HT command
```

SPRT

60 LPRINT "HT2"; 'Print character string
70 LPRINT CHR\$(9); 'HT command
80 LPRINT "HT3"; 'Print character string

The print result in SP-T16 is as following:

1234567890123456
HT1 HT2 HT3

HT		Carry out Horizontal Tab Value
Format:	ASCII:	HT
	Decimal:	9
	Hexadecimal:	09

Explanation:

The print position is advanced to the next horizontal tab position which is set by ESC D command.

If there is no horizontal tab value setting, or the current position equals or is beyond the last horizontal tab position, HT command won't be carried out.

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

Explanation:

When m=0, ESC f NUL n will command to print n blank characters, the value of n should be within the line width of this model printer. (Refer to 1.7)

When m=1, ESC f SOH n will command to print n blank lines. n=0~255.

Example: print 6 blank characters in one line, you can send the following commands:

ASCII:	ESC	f	NUL	ACK
Decimal:	27	102	0	6
Hexadecimal:	1B	66	00	06

Another example: print 6 blank lines, you can send the following commands:

ASCII:	ESC	F	SOH	CK
Decimal:	27	102	1	6
Hexadecimal:	1B	66	01	06

ESC Q		Set Right Margin			
Format:	ASCII:	ESC	Q	n	
	Decimal:	27	81	n	

Hexadecimal:	1B	51	n
--------------	----	----	---

Explanation:

The value of n should be in the range from 0 to the line width of this model printer. (Refer to 1.7)

Default n=0, that means no right margin.

This command sets absolute position, and won't be influenced by character enlarging commands ESC U and ESC W.

After setting this command, the printer will carry out carriage return and feed line as long as the right margin position is reached.

Example: set right margin value to 6, you can send the following commands:

ASCII:	ESC	Q	ACK
Decimal:	27	81	6
Hexadecimal:	1B	51	06

The BASIC programs for this example are as below:

```
10 LPRINT "1234567890123456" 'Ruler
20 LPRINT CHR$(27); "Q" ; CHR$(6); 'ESC Q command
30 LPRINT "123456789012345678901234567890"
```

The print result in SP-T16 is as following:

```
1234567890123456
1234567890
1234567890
1234567890
```

ESC 1**Set Left Margin**

Format:	ASCII:	ESC	1	n
	Decimal:	27	108	n
	Hexadecimal:	1B	6C	n

Explanation:

The value of n should be in the range from 0 to the line width of this model printer.(refer to 1.7)

Default n=0, that means no left margin.

This command sets absolute position, and won't be influenced by character enlarging commands ESC U and ESC W.

Example: set left margin value to 6, you can send the following commands:

ASCII:	ESC	1	ACK
Decimal:	27	108	6
Hexadecimal:	1B	6C	06

The BASIC programs for this example are as below:

```
10LPRINT "1234567890123456" 'Ruler
```

```
20 LPRINT CHR$ (27); “1” ; CHR$ (6); ’ESC 1 command
```

```
30 LPRINT “123456789012345678901234567890”
```

The print result in SP-T16 is as following:

```
1234567890123456
1234567890
1234567890
1234567890
```

4.4 Character Setting Commands

ESC U

Enlarge Width

Format:	ASCII:	ESC	U	n
	Decimal:	27	85	n
	Hexadecimal:	1B	55	n

Explanation:

The characters and graphics following this command are printed at n times of normal width, n=1~4, default n=1, that means normal width, no width enlarging.

The BASIC programs for observing the enlarging effect of this command are as below:

```
10 FOR I=1 TO 3          ’ from 1 to 3 times
20 LPRINT CHR$ (27); “U”; CHR$ (I);    ’ESC U command
30 LPRINT “SP”;           ’Print character string
40 NEXT I
50 LPRINT CHR$ (13);      ’CR command
```

The print result in SP-T16 is as following:

```
SPSPSP
```

Notice: this command is valid only after sending ESC W SOH (n=1) command.

ESC V

Enlarge Height

Format:	ASCII:	ESC	V	n
	Decimal:	27	86	n
	Hexadecimal:	1B	56	n

Explanation:

The characters and graphics following this command are printed at n times of normal height, n=1~4, default n=1.

This command should be sent at the beginning of one line.

The BASIC programs for observing the enlarging effect of this command are as below:

```
10 FOR I=1 TO 3          ’ from 1 to 3 times
20 LPRINT CHR$ (27); “V”; CHR$ (I);    ’ESC V command
```

SPRT

```
30 LPRINT "SP";           'Print character string
40 NEXT I
```

The print result in SP-T16 is as following:

SP
SP
SP

Notice: this command is valid only after sending ESC W SOH (n=1) command.

ESC W		Enlarge Width and Height		
Format:	ASCII:	ESC	W	n
	Decimal:	27	87	n
	Hexadecimal:	1B	57	n

Explanation:

The characters and graphics following this command are printed at n times of normal width and height, n=1~4, default n=1.

The BASIC programs for observing the enlarging effect of this command are as below:

```
10 FOR I=1 TO 3           ' from 1 to 3 times
20 LPRINT CHR$ (27); "W"; CHR$ (I); 'ESC W command
30 LPRINT "SP";           'Print character string
40 NEXT I
```

The print result in SP-T16 is as following:

SP
SP
SP

ESC -		Select/cancel Underline Print		
Format:	ASCII:	ESC	-	n
	Decimal:	27	45	n
	Hexadecimal:	1B	2D	n

Explanation:

When n=1, select underline print; when n=0, cancel underline print.

All characters including spaces will be printed out with underline after selecting underline print command, unless cancel the underline print

SPRT

command.

The BASIC programs for observing the effect of this command are as below:

```
10 LPRINT CHR$ (27); "W"; CHR$ (2);      ' Enlarge the width and
height twice
20 LPRINT "SP";
30 LPRINT CHR$ (27); "-"; CHR$ (1);      ' Select underline print
40 LPRINT "UP";                          ' UP print with
underline
50 LPRINT CHR$ (27); "-"; CHR$ (0);      ' Cancel underline print
60 LPRINT "SP";
```

The print result in SP-T16 is as following:

SPUPSP

ESC +		Select/cancel Up-line Print		
Format:	ASCII:	ESC	+	n
	Decimal:	27	43	n
	Hexadecimal:	1B	2B	n

Explanation:

When n=1, select up-line print; when n=0, cancel up-line print.

All characters including spaces will be printed out with up-line after selecting up-line print command, unless cancel the up-line print command.

The BASIC programs for observing the effect of this command are as below:

```
10 LPRINT CHR$ (27); "W"; CHR$ (2);      ' Enlarge the width
and height twice
20 LPRINT "SP";
30 LPRINT CHR$ (27); "+"; CHR$ (1);      ' Select up-line print
40 LPRINT "UP";                          ' UP print with up-line
50 LPRINT CHR$ (27); "+"; CHR$ (0);      ' Cancel up-line print
60 LPRINT "SP";
```

The print result in SP-T16 is as following:

SPOUPSP

ESC 6		Select Character Set I	
Format:	ASCII:	ESC	6
	Decimal:	27	54
	Hexadecimal:	1B	36

Explanation:

SPRT

All characters following this command are printed using the character set I. There are two character sets available in SP-T, character set I is selected at power on or on ESC @ command.

ESC 7		Select Character Set II	
Format:	ASCII:	ESC	7
	Decimal:	27	55
	Hexadecimal:	1B	37

Explanation:

All characters following this command are printed using the character set II, please refer to ESC 6.

SO		Set double width character print	
Format:	ASCII:	SO	
	Decimal:	14	
	Hexadecimal:	0E	

Explanation:

All characters following this command on the same line are printed at twice their normal width, this command can be deleted by a carriage return or DC4 command. Normal characters and width-enlarged characters can be printed on the same line.

DC4		Cancel double width character print	
Format:	ASCII:	DC4	
	Decimal:	20	
	Hexadecimal:	14	

Explanation:

Double width print mode which is set by SO command can be canceled by DC4 command. This command doesn't cancel width enlarging print which set by ESC U and ESC W.

ESC i		Select/cancel Reverse White Print		
Format:	ASCII:	ESC	i	n
	Decimal:	27	105	n
	Hexadecimal:	1B	69	n

Explanation:

When n=1, select reverse white print; when n=0, cancel reverse white print. Reverse white print is printing in the black background, just like the film of photography.

It is normal print that printing black characters in white background, it is selected at power on or on ESC @ command.

The BASIC programs for reverse white print are as below:

If many ESC& commands use same m value, only the last one is valid. User can define at most 32 characters. Please refer to ESC % and ESC : commands.

ESC %		Replace with User-defined Characters							
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 the character n with the user-defined character m, and the user-defined character m will be printed out as the replacement of character n.

m1, m2.....mk are the codes of user-defined characters.

n1, n2.....nk are codes of characters in the current character set – the replaced characters.

The values of m and n both should be in the range 32 to 255. The subscript K=1~32, the maximum number of replaced characters is 32.

Character NUL added to the end means the command is over.

Please refer to ESC % and ESC : commands.

ESC :		Restore Characters that in Character Set	
Format:	ASCII:	ESC	:
	Decimal:	27	58
	Hexadecimal:	1B	3A

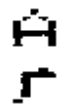
Explanation:

This command is used to restore the original characters in the character set replaced by user-defined characters using ESC % command. However, user-defined characters won't be deleted from the RAM in printer and may brought back again with ESC % command.

The BASIC programs for observing the effect of ESC &, ESC % and ESC : are as below:

```
10 LPRINT CHR$(27); "W"; CHR$(2); ' Enlarge width twice
20 LPRINT CHR$(27); "&"; CHR$(65); 'ESC & command
30 LPRINT CHR$(&H02); CHR$(&H7C); CHR$(&H40);
40 LPRINT CHR$(&HC0); CHR$(&H40); CHR$(&H00);
50 LPRINT CHR$(27); "%"; CHR$(65); CHR$(65); CHR$
(0); 'ESC % command
60 LPRINT CHR$(65); 'Print user-defined characters
70 LPRINT CHR$(27); ":", 'ESC : command
80 LPRINT CHR$(65); 'Restore characters in the character set
```

The print result in SP-T16 is as following:



4.6 Graphics Print Commands

ESC K	Print bit-map graphics			
Format:	ASCII:	ESC K	n1	n2....data.....
	Decimal:	27 75	n1	n2....data.....
	Hexadecimal:	1B 4B	n1	n2....data.....

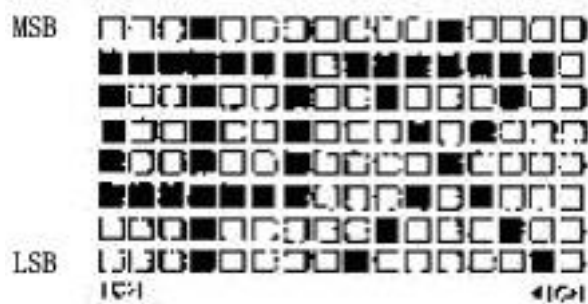
Explanation:

This command is used to print $n1 \times 8$ bit map. The width of this graphics is $n1$ dots and the height is 8 dots. Each column has 8 dots and can be presented by a 8-bit byte, the MSB is on the top.

The values of $n1$, $n2$ denote a 16-bit binary data, $n1$ is LSB, $n2$ is MSB, $n2 \times 256 + n1$ denotes the width of this printing graphics, in SP-T, $n2 = 0$, $n1$ should be in the range from 1 to the max. dots number of each line of this model printer. (Refer to 1.7).

Data are the bytes of relative columns in the graphics sequential from left to right, the number of bytes should equal $n1$, when the height of the graphics is larger than 8 dots, it can be marked off several units according to 8 dot lines for each graphic unit, when the dots are fewer than 8, use blank dots to make up it, then print out every graphic unit with ESC K command orderly, at last compose an intact graphics. Notice: when adopting reverse print mode, you should print every graphic unit sequentially according to the order from top to bottom of the graphics.

For example: If you want to print two Chinese characters “中文” with ESC K command, the bit- map for the two Chinese is as the below figure shows. Each character is composed by 7×8 dots to 7 columns, there is a space between the two characters, so totally there are 15 columns, then $n1=15$, $n2=0$, the 15-byte data showed in hexadecimal are as follows:
7C, 44, 44, FF, 44, 44, 7C, 00, 41, 62, 54, C8, 54, 62, 41



The BASIC programs for this example are as below:

```
LPRINT CHR$ (27); "W"; CHR$ (4); 'Enlarge the width and height
4 times
LPRINT CHR$ (27); "K"; CHR$ (15); CHR$ (0); 'ESC K command
```

```
LPRINT    CHR$ (&H7C); CHR$ (&H44); CHR$ (&H44); CHR$
(&HFF);
LPRINT    CHR$ (&H44); CHR$ (&H44); CHR$ (&H7C); CHR$
(&H0);
LPRINT    CHR$ (&H41); CHR$ (&H62); CHR$ (&H54); CHR$
(&HC8);
LPRINT    CHR$ (&H54); CHR$ (&H62); CHR$ (&H41); CHR$
(&H13);
```

The print result in SP-T16 is as following:

中文

ESC '	Print Curve					
Format:	ASCII:	ESC	'	m	n1	n2.... nk
	Decimal:	27	39	m	n1	n2.... nk
	Hexadecimal:	1B	27	m	n1	n2.... nk

Explanation:

This command is designed to print curving graphics along with the paper feeding direction. The value of m is the line number of the printing curve, it should be within the range of the max. dots number of each line of this model printer. (Refer to 1.7).

There are m curving dots in one horizontal line. n1, n2.... nk denote the position of m curves. The value of nk should equal m and each nk should be within the range of the max. dots number of each line of this model printer. The last CR (Carriage Return) lets the printer print out the current dot line, so a set of dot lines will be printed out form m-line curving graphics based on the data of n1, n2.... Nk.

For example: If you want to print the following 5 equational curving graphics.

Y1=50+40*EXP (-0.01*X) *SIN (X/10)

Y2=50-40*EXP (-0.01*X) *SIN (X/10)

Y3=50

Y4=50+40*EXP (-0.01*X)

Y5=50-40*EXP (-0.01*X)

You can program the following programs with BASIC language:

```
10 FOR   X =0 TO 150      ' Print 150 dot lines
```

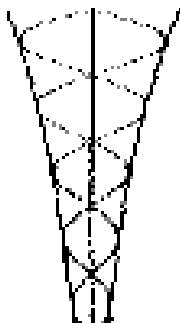
```
20 Y=INT (40*EXP (-0.01*X))
```

```
30 YY=INT (Y*SIN (X/10))
```

```
40 LPRINT CHR$ (27); CHR$ (39); CHR$ (5);   'ESC ' command,
m=5
```

```
50 LPRINT CHR$ (50+YY); CHR$ (50-YY); CHR$ (50);  
60 LPRINT CHR$ (50+Y); CHR$ (50-Y ); CHR$ (13);  
70 NEXT X  
71
```

The print result for these programs in SP-T16 is as following:



4.7 Initialization Commands

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

Explanation:

This command is to initialize the following contents of the printer:

- Clear the data in the print buffer;
- Restore the default;
- Select character set 1;
- Delete user-defined characters.

4.8 Data Control Commands

<u>CR</u>		<u>Carriage Return</u>
Format:	ASCII:	CR
	Decimal:	13
	Hexadecimal:	0D

Explanation:

If a “CR” command is sent to printer the total data in the print buffer will be printed out and paper will be fed for one line forwards.

<u>CAN</u>		<u>Cancel One Line</u>
Format:	ASCII:	CAN
	Decimal:	24
	Hexadecimal:	18

Explanation:

This command is to cancel all the characters in the print buffer before this

command code, and return to the last carriage return code. It doesn't cancel any control code sequences in the current line.

DEL	Delete One Character
-----	----------------------

Format:	ASCII:	DEL
	Decimal:	127
	Hexadecimal:	7F

Explanation:

This command is to delete one character in the print buffer, it doesn't delete the control code unless this character has been printed.

NUL	NUL
-----	-----

Format:	ASCII:	NUL
	Decimal:	0
	Hexadecimal:	00

Explanation:

NUL command is used as the final code in some commands such as ESC B, ESC D, ESC % and ECS ', denotes these commands are over.

NUL command is ignored when used alone.

4.9 Hexadecimal Print Command

ESC "	Turn Hexadecimal Dump Print On/Off
-------	------------------------------------

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, when Hexadecimal dump print mode is turned on, all data sent from the host computer will be printed out in hexadecimal.

For example: when send the following data from the host computer to the printer

LPRINT CHR\$ (0); CHR\$ (27); "A"; CHR\$ (24);

These data will be printed out in hexadecimal:

00 1B 41 18

Hexadecimal print mode carries out print only when the print buffer is full.

4.10 Chinese Character Print Commands

Chinese character print commands adopt FS standard commands. The Chinese character library is the level I, II Chinese characters, graphics and symbols which all meet the specifications of GB2312-80. Each Chinese character or character is presented by 2-byte GB code. SP-T adopt internal

code which is corresponding GB code to denote the Chinese characters.

The following is the description for these commands.

Command descriptions

ESC 9		Select Special Chinese Character Library	
Format:	ASCII:	ESC	9
	Decimal:	27	57
	Hexadecimal:	1B	39

Explanation:

This command is to select the Chinese characters or characters in the special Chinese character library. After printer received the command, it will switch from printing character set I or II to printing the special Chinese character library.

If print bit-map characters, can use ESC 6 or ESC 7 command to return to character set I or II.

FS &		Select Chinese Print Mode	
Format:	ASCII:	FS	&
	Decimal:	28	38
	Hexadecimal:	1C	26

Explanation:

After printer received this command, it will switch from ASCII character print mode to Chinese character print mode. Using GB Chinese character library level I, II.

FS •		Cancel Chinese Print Mode	
Format:	ASCII:	FS	•
	Decimal:	28	46
	Hexadecimal:	1C	2E

Explanation:

After printer received this command, it will switch from Chinese character print mode to character print mode.

Notice: inputting FS Chinese character print mode to printer will be invalid.

FS SO		Set Chinese Double Width Print	
Format:	ASCII:	FS	SO
	Decimal:	28	14
	Hexadecimal:	1C	0E

Explanation:

Characters following this command are printed at twice their normal width, does not enlarge the height.

FS DC4 Cancel Chinese Double Width Print

Format:	ASCII:	FS	DC4
	Decimal:	28	20
	Hexadecimal:	1C	14

Explanation:

This command is to cancel FS SO command.

FS W Set the Enlarging Multiple of Chinese Character

Format:	ASCII:	FS	W	n
	Decimal:	28	87	n
	Hexadecimal:	1C	57	n

Explanation:

Characters following this command are printed at twice their normal width and height. When n=1, this command is selected, when n=0, it is canceled.

FS J Set Vertical Print

Format:	ASCII:	FS	J
	Decimal:	28	74
	Hexadecimal:	1C	4A

Explanation:

This command is to print Chinese characters vertically, namely printing by rotating widdershins for 90°

FS K Set Horizontal Print

Format:	ASCII:	FS	K
	Decimal:	28	75
	Hexadecimal:	1C	4B

Explanation:

This command is to print Chinese characters horizontally, if have not set rotation, the Chinese characters will be printed horizontally, that is normal print status.

FS I Set Chinese Character Rotational Print

Format:	ASCII:	FS	I	n
	Decimal:	28	73	n
	Hexadecimal:	1C	49	n

Explanation:

This command is to rotate Chinese characters, the values of n are as

following:

n	Chinese characters rotated widdershins
0	0°
1	90°
2	180°
3	270°

FS - Chinese Character with Underline Print

Format:	ASCII:	FS	-	n
	Decimal:	28	45	n
	Hexadecimal:	1C	2D	n

Explanation:

The specified Chinese characters after this command are printed with underline. When n=1, underline selected; when n=0, it canceled.

FS r Select Superscript and Subscript Print

Format:	ASCII:	FS	r	n
	Decimal:	28	114	n
	Hexadecimal:	1C	72	n

Explanation:

This command is to select the position for superscript and subscript, n=0 is superscript and n=1 is subscript. Notice: this command is only valid for 16 × 8, 8 × 8 Chinese characters and 5 × 7 or 6 × 8 ASCII characters, so before using this command, the Chinese characters or ASCII characters which are regarded as superscript and subscript for print, should be set firstly using FS i or FS • command.

FS SI Select Vertical DBC Case Chinese Character Print

Format:	ASCII:	FS	SI
	Decimal:	28	15
	Hexadecimal:	1C	0F

Explanation:

After the printer received this command, it will print Chinese characters with 8 × 16 dots.

FS DC Cancel Vertical DBC Case Chinese Character Print

Format:	ASCII:	FS	DC
---------	--------	----	----

Decimal:	28	18
Hexadecimal:	1C	12

Explanation:

This command cancels FS SI, restore to print Chinese characters with 16×16 dots.

FS i	Select Chinese Character Bit Map		
Format:	ASCII:	FS	i n
	Decimal:	28	105 n
	Hexadecimal:	1C	69 n

Explanation:

This command is to select Chinese characters with different bit map, as the following tab shows:

n	Chinese Character Bit Map
0	16×16
1	8×16
2	16×8
3	8×8

Characters with different bit map can be printed in one line, but before the Chinese character code, should set the bit map with FS i or FS SI command firstly.

FS G	Select Chinese Character Misplace Print	
Format:	ASCII:	FS G
	Decimal:	28 71
	Hexadecimal:	1C 47

Explanation:

This command is to set Chinese character misplace print. The characters that put in the printer after this command will be printed out in misplace mode, namely Chinese characters will become thicker and heavier than normal single-line ones, can be used for printing titles or printing heavily.

FS H	Cancel Chinese Character Misplace Print	
Format:	ASCII:	FS H
	Decimal:	28 72
	Hexadecimal:	1C 48

Explanation:

This command is to cancel Chinese character misplace print that set by FS

G command, and restore to normal single-line Chinese character print mode.

Chapter 5 Print Examples

This chapter puts out several examples, explain how to control the SP-T series printer to print.

Example 1: Control parallel interface printer with 51 serial one-chip computers:

; The address of the printer port is 2000H

```
ORG      0000H
LJMP     LBUSY
```

; Output one-byte interruptive service programs.

; External intermittence 0

```
PRINT0: INC      DPTR
          CLR      A
          MOVC     A, @A+DPTR
          CJNE     A, #00H, RPINT2
          CLR      EX0
          RETI
```

```
PRINT2: MOVX     @R1, A
```

```
PRINT1: RETI
```

; BUSY is answering signal,

; Sending data by inquiring control

LBUSY:

```
          MOV      DPTR, # DATE1
LL:       CLR      A
          MOVC     A, @A+DPTR
          CJNE     A, #00H, L10
          SJMP     LACK
```

L10:

```
          LCALL    PRINT
          INC      DPTR
          SJMP     LL
```

; ACK is used as answering signal,

; Sending data by intermitted control

LACK:

```
          CLR      IT0
          SETB     EA
          SETB     EX0
          MOV      P2, # 20H
          MOV      R1, # 00H
```

```
        MOV        DPTR, # DATE2
        CLR        A
        MOVC       A, @A+DPTR
        MOVX       @R1, A
LACK3:  JB         EX0, $
        SJMP       $
; Output one-byte subprograms
PRINT:  PUSH       DPH
        PUSH       DPL
        MOV        DPTR, # 2000H
PRL:    SETB       P3.3; BUSY signal
        JB         P3.3, PRL
        MOVX       @DPTR, A
        POP        DPL
        POP        DPH
        RET
DATE1:  DB         'SPRINTER'
        DB         'TEST BUSY OK!'
        DB         1CH, 26H;   Select Chinese character mode
        DB         '北京思普瑞特公司'
        DB         1CH, 2EH;   Cancel Chinese character mode
        DB         0DH, 00H
DATE2:  DB         'SPRINTER'
        DB         'TEST ACK OK!'
        DB         1CH, 26H;   Select Chinese character mode
        DB         '北京思普瑞特公司'
        DB         1CH, 2EH;   Cancel Chinese character mode
        DB         0DH, 00H
```

Example 2: Control serial interface printer with 51 serial one-chip computers.

```
; Crystal vibration 11.0592MHZ
; P3.0 connects to busy mark CTS of the printer,
; Handshaking is mark mode
```

```
        ORG        000H
        CTS        EQU P3.0
```

```
; Initializing serial interface
```

```
        MOV        TM0D, #20H
        MOV        TL1,   #0FDH
        MOV        TH1,   #0FDH Baud rate 9600
        MOV        SC0N,  #0C0H Mode 3
```

```
                SETB    TR1
; Output a series of data circularly, the first address is DATE
                MOV     R7, #0
                MOV     DPTR, #DATE
LOOP:           MOV     A, R7
                MOVC    A, @A+DPTR      ; Get data
                INC     R7
                CJNE    A, #00H, LOOP1; Is ending mark 00H?
                SJMP    $
LOOP1:          CALL    SCZJ
                SJMP    LOOP
SCZJ:           JB      CTS, $          ; Judge to be busy
                MOV     C, PSW.0        ;
                CPL     C              ; Odd parity, C reverse
                MOV     TB8, C          ; Even parity
                MOV     SBUF, A
                JNB     TI, $           ; Wait for sending end
                CLR     TI
                RET
DATE:           DB      1BH, 40H
                DB      'SPRINTER RS232  TEST'
                DB      0DH, 00H
                END
```

Example 3: Control parallel interface printer with BASIC programs of PC
FOR $\times = 1$ TO 5

```
LPRINT  CHR$ (27); CHR$ (64);
LPRINT  CHR$ (13); CHR$ (13); CHR$ (13); CHR$ (13); CHR$ (13);
CHR$ (13);
LPRINT  CHR$ (28); "&"; adopt internal codes to print Chinese
character library I, II.
LPRINT  CHR$ (&HB1); CHR$ (&HB1); CHR$ (&HBE); CHR$
(&HA9);      '北京
LPRINT  CHR$ (&HCB); CHR$ (&HBC); CHR$ (&HC6); CHR$
(&HD5);      '思普
LPRINT  CHR$ (&HC8); CHR$ (&HF0); CHR$ (&HCC); CHR$
(&HD8);      '瑞特
LPRINT  CHR$ (&HB9); CHR$ (&HAB); CHR$ (&HCB); CHR$
(&HBE);      '公司
LPRINT  CHR$ (28); CHR$ (46);      ' Cancel Chinese character print
```

NEXT	×
LPRINT	CHR\$ (27); CHR\$ (49); CHR\$ (1); 'Set line spacing
LPRINT	CHR\$ (27); "W"; CHR\$ (2); 'Set enlarging multiple
LPRINT	CHR\$ (28); "&";
LPRINT	CHR\$ (&HA1); CHR\$ (&HF9); CHR\$ (&HA1); CHR\$ (&HF9);
LPRINT	CHR\$ (&HA1); CHR\$ (&HF9); CHR\$ (&HA1); CHR\$ (&HF9);
LPRINT	CHR\$ (&HA1); CHR\$ (&HF9); CHR\$ (&HA1); CHR\$ (&HF9);
LPRINT	CHR\$ (&HA1); CHR\$ (&HF9); CHR\$ (&HA1); CHR\$ (&HF9);
LPRINT	' 打印 8 个※
LPRINT	
LPRINT	CHR\$ (&H81); CHR\$ (&HB1); CHR\$ (&HBE); CHR\$ (&HA9);
LPRINT	' 北京
LPRINT	CHR\$ (&HCB); CHR\$ (&HBC); CHR\$ (&HC6); CHR\$ (&HD5);
LPRINT	' 思普
LPRINT	CHR\$ (&HC8); CHR\$ (&HF0); CHR\$ (&HCC); CHR\$ (&HD8);
LPRINT	' 瑞特
LPRINT	CHR\$ (&HB9); CHR\$ (&HAB); CHR\$ (&HCB); CHR\$ (&HBE);
	' 公司

Chapter 6 Printer Using under Windows

SP-T series printers can be used under Windows of PC.

1. Must install the driver that offered by our company. Installation method is same to the large-scale printer, sketch the steps of installation: start-----set-----printer-----add the printer-----default
2. Key in the contents.
3. Set the paper width to 44mm or 57mm, spacing and the length of page are optional.
4. Select serial or parallel interface.
5. Carry out printing (at this time the printer can print out the contents that you have selected or input).

Chapter 7 Printer Model Alteration and Protection

7.1 Printer Model Alteration

SP-T series printers allow you to make proper alteration to the printer model, model alteration offers much more flexibility for using SP-T printers, you can make a machine multi-purpose, can choose print speed,

print width and print font, furthermore, model alteration also offers you possibility to utilize SP-T printers for developing the update of other products. However you must be very cautious to alter the printer model, if you have not used SP-T for a period of time or you are not familiar with SP-T very much, suggest you asking the seller or the producer of the printer for help, otherwise may damage the print head.

As for SP-T16, SP-T24 and SP-T40 the three kinds of model, they can change the model each other, just changing the print head is all right, needn't change others.

The process of altering the model is as follows:

1. Taking down the front cover;
2. Taking down the printer's upper cover;
3. Taking down the print paper;
4. Taking down the ribbon cassette;
5. Taking down the print head;
6. Changing new print head;
7. Installing the ribbon cassette;
8. Installing the paper roll;
9. Closing the printer's upper cover;
10. Closing the front cover.

7.2 Print head protection

In order to guarantee the printer works normally, please especially pay attention not to dismantle the print head at random. As to the users who don't use the outer cover of the printer should give their attention to protect the print head even more.

1. If you do not use the printer for a long time, please don't put through the printer on the power.
2. If the printer works abnormally, please turn off the printer power.
3. The power Used must meet the requirements, otherwise it will be disadvantageous to the print head.
4. Don't lubricate the print head.
5. While changing the paper roll, please notice whether there is paper scrap on the print head, if there is, please blow it away gently.
6. While changing the ribbon cassette, don't press the ribbon cassette heavily, otherwise may damage the plastic roller on the printer.
7. Keep the circuit board of the printer clean and dustless.

7.3 Other

Please notice the following aspects too:

1. Don't insert and pull out the chip, if there is abnormity, please hand over

- to the producer for repairing.
2. Don't lubricate the ribbon cassette, otherwise damage the print head.
 3. When you suppress to join the electric wire by yourself, should pay attention to whether your printer port is parallel interface or serial interface, don't connect to the host computer incorrectly.

Appendix 1 Valid Codes Tab

The serial number of valid codes is from 00H to 0FFH, among them 00H-1FH are control codes, 20H-0FFH are character codes. Character codes composed by two character sets, the character codes of each character set are all 20H-0FFH permutation.

Character Set I

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
2		!	~	#	\$	%	&	'	(	)	*	+	,	-	.	/
3	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
4	␣	A	B	C	D	E	F	G	H	I	J	K	L	■	N	O
5	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	↑	←
6	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
7	p	q	r	s	t	u	v	w	x	y	z	{		}	~	
8	o	—	二	≡	四	五	六	七	八	九	+	元	年	月	日	¥
9	£	§	↓	→	∧	±	÷	∞	□	...	o	□	z	z	z	z
A	α	β	γ	δ	ε	ζ	η	θ	λ	μ	υ	Ω	ξ	π	ρ	σ
B	τ	φ	ψ	ω	Γ	Δ	Π	Σ	Ψ	Ω	Ξ	Θ	Λ	Φ	Τ	Ζ
C	[	=	□	]	—	_			/	\	Γ	Λ	Π	□	×	×
D	[	=	□	]	—	_			/	\	Γ	Λ	Π	□	—	
E	┐	┐	┐	┐	┐	┐	┐	┐	┐	┐	┐	┐	┐	┐	<	>
F	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	+

Character Set II

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
2	百	千	万	Ⅱ	℃	°F	¹	²	¾	½	⅓	¼	τ	X	✓	
3	//	!	U	∩	⊕	⊂	⊃	€	⊘	∇	∇	∂	ℓ	ℓ	⊕	∴
4	∴	=	≡	∞	≠	α	<	>	⋈	⋈	⋈	⋈	⋈	⋈	⋈	⋈
5	※	☒	()	《 》	⌈ ⌋	⌈ ⌋	⌈ ⌋	⌈ ⌋	⌈ ⌋	⌈ ⌋	⌈ ⌋	⌈ ⌋	⌈ ⌋	⌈ ⌋	⌈ ⌋	⌈ ⌋
6	▲	ア	イ	ウ	エ	オ	カ	キ	ク	ケ	コ	サ	シ	ス	セ	ソ
7	タ	チ	ツ	テ	ト	ナ	ニ	ヌ	ネ	ノ	ハ	ヒ	フ	ヘ	ホ	マ
8	ミ	ム	メ	モ	Ⓟ	Ⓟ	Ⓟ	Ⓟ	Ⓟ	Ⓟ	Ⓟ	Ⓟ	Ⓟ	Ⓟ	Ⓟ	Ⓟ
9	ン	ア	ウ	Ⓟ	Ⓟ	Ⓟ	Ⓟ	Ⓟ	Ⓟ	Ⓟ	Ⓟ	Ⓟ	Ⓟ	Ⓟ	Ⓟ	Ⓟ
A	N	Ñ	Π	Π	Π	Π	Π	Π	Π	Π	Π	Π	Π	Π	Π	Π
B	Ø	⊗	ü	é	â	ä	â	â	⊗	ê	ë	è	ï	î	ì	Ä
C	Å	É	æ	Æ	ø	Ö	Ö	ü	ü	ÿ	ö	ü	⊕	R	⊕	a
D	í	ó	ú	ñ	Ñ	a	o	¿	⊗	ü	é	ä	ä	ä	ä	⊗
E	ê	ë	è	í	î	ï	Ä	Ä	Ä	Ä	Ä	Ä	Ä	Ä	Ä	Ä
F	ÿ	ö	ü	⊕	R	f	á	í	ó	ú	ñ	Ñ	a	o	¿	o

Appendix 2 GB ASCII Codes Tab

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
2		!	"	#	\$	%	&	'	(	)	*	+	,	-	.	/
3	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
4	␣	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
5	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
6	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
7	p	q	r	s	t	u	v	w	x	y	z	{		}	~	µ
8	ç	u	é	â	ä	å	ç	ê	ë	è	ï	î	í	ï	Ä	Å
9	É	æ	Æ	ô	ö	ò	û	ù	ÿ	ö	ü	ø	£	¢	¥	₹
A	à	í	ó	ú	ñ	Ñ	º	»	¿	¬	½	¼	³	²	¹	⁰
B					¬	¼	½	¾	⅞	⅝	⅜	⅓	⅔	⅕	⅖	⅗
C	└	┐	┌	└	┐	┌	┐	┌	┐	┌	┐	┌	┐	┌	┐	┌
D	└	┐	┌	└	┐	┌	┐	┌	┐	┌	┐	┌	┐	┌	┐	┌
E	α	β	Γ	π	Σ	σ	μ	τ	Φ	θ	Ω	0	∞	∅	€	∩
F	≡	±	>	<	ƒ	ℳ	÷	≈	°	•	·	√	n	2	■	

Appendix 3 Parallel Interface and Operation

Connect function: exchange data between the host's parallel interface of the instrument, equipment and the printer's parallel interface.

The pin assignment of parallel interface is shown in the following:

Pin No.	Signal	Direction	Description
1	STB	In	Strobe pulse to latch data, reading occurs at falling edge.

2	DATA1	In	These signals represent the 1 st bit to 8 th bit of the parallel data representatively, each signal is at HIGH level when data is logic 1, and LOW when data is logic 0.
3	DATA2	In	
4	DATA3	In	
5	DATA4	In	
6	DATA5	In	
7	DATA6	In	
8	DATA7	In	
9	DATA8	In	
10	$\overline{\text{ACK}}$	Out	Answering pulse, LOW level signal indicates that data have already been received and the printer gets ready to receive the next data.
11	BUSY	Out	HIGH level signal indicates that the printer is BUSY and can not receive data.
12	PE	---	Grounding
13	SEL	---	Pulling up to HIGH level signal by a resistor
15	$\overline{\text{ERR}}$	Out	Pulling up to HIGH level signal by a resistor
14-17	NC	Out	No connection
18-25	GND	---	Grounding logical 0 level

Notice: (1) “In” denotes input to the printer, “Out” denotes output from the printer.

(2) Signal level is TTL standard.

Appendix 4 Serial Interface and Operation

Connect function: exchange data between the host's serial interface of the instrument, equipment and the printer's serial interface.

The pin assignment of serial interface is shown in the following:

Pin No.	Signal Name	Source	Description
2	RXD	Host	Printer receives data from host

3	TXD	Printer	Printer transmits control code X-ON/X-OFF to host when using X-ON/X-OFF handshaking protocol
5	CTS	Printer	Signal “MARK” indicates that the printer is “BUSY” and unable to receive data; “SPACE” indicates that the printer is “READY” for receiving data.
6	DSR	Printer	Signal “SPACE” indicates that the printer is “ONLINE”
7	GND	—	Signal Ground
8	DCD	Printer	Same to signal CTS

Notice: (1) The “Printer” and “Host” in “Source” denote the source that signal come from;
 (2) Logical signal level is EIA.

Appendix 5 Paper Roll Holder Installation

When users need to use the paper roll that the outer diameter is over 30mm, a paper roll holder can be chosen (see Appendix 6), and paper loading is external. This holder can be installed the paper roll whose maximum width is 58mm, outer diameter is 80mm.

The steps for paper roll holder installation are as the following:

1. Assemble the three parts of paper roll holder together according to Fig 6-1.



Fig.6-1 Paper Roll Holder Assembling

2. Take down the movable cover panel of printer firstly according to Fig. 6-1, then hang the assembled paper roll holder on the back wall of printer shell.



Fig. 6-2 Hanging the holder on the back wall of printer shell

3. According to Fig. 6-3, grasp the printer shell with one hand, press downwards the paper roll holder with another hand until a sound comes from the printer, that means the holder has been installed, then close the movable cover panel.

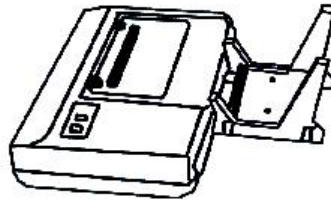
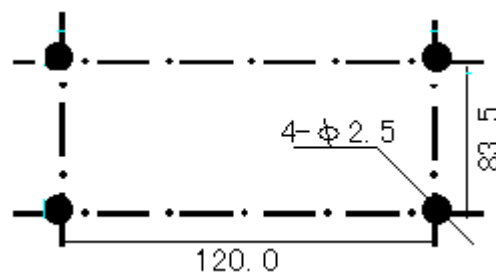
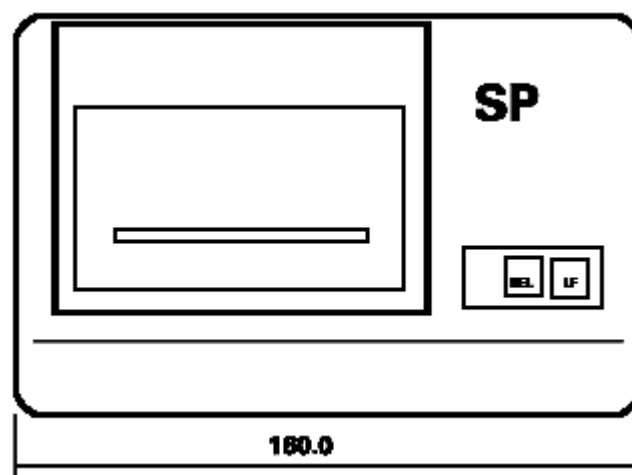
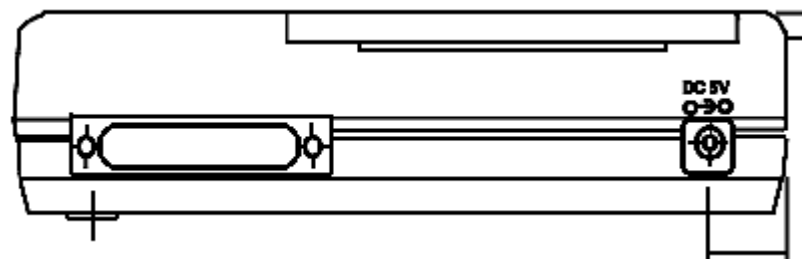
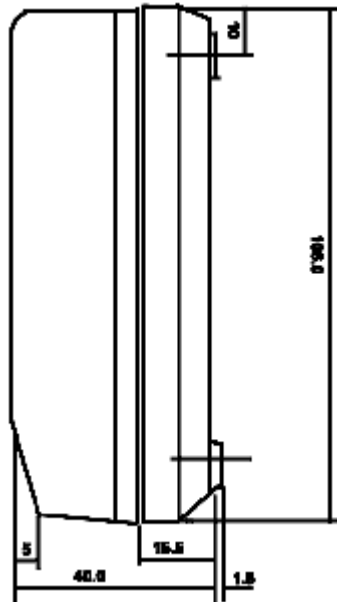


Fig. 6-3 Finishing holder installation and closing movable cover panel

Appendix 6 Printer Appearance

Unit: mm





Index of Print Commands

Decimal	Hexadecimal	Command Name	Function
0	0	NUL	Ending symbol
9	9	HT	Carry out horizontal tab
10	0A	LF	Feed line
11	0B	VT	Carry out vertical tab
12	0C	FF	Feed page
13	0D	CR	Carriage return
14	0E	SO	Set double width character print
20	14	DC4	Cancel SO command
24	18	CAN	Cancel the characters in current line
127	7F	DEL	Delete the last character
27 34	1B 22	ESC" n	Select/cancel hexadecimal print

27 37	1B 25	ESC % m1 n1...mk nk NUL	Replacing code nk is defining code mk
27 38	1B 26	ESC & m n1 n2...n6	User-defined characters
27 39	1B 27	ESC ' m n1 n2 -nk CR	Print m curving dots
27 43	1B 2B	ESC + n	Select/cancel up-line print
27 45	1B 2D	ESC - n	Select/cancel underline print
27 49	1B 31	ESC 1 n	Set line spacing to n dot lines
27 54	1B 36	ESC 6	Select character set I
27 55	1B 37	ESC 7	Select character set II
27 57	1B 39	ESC 9	Select/cancel Chinese character print mode
27 58	1B 3A	ESC :	Restore original codes
27 64	1B 40	ESC @	Initialize printer
27 66	1B 42	ESC B n1...nk NUL	Set vertical tab value
27 67	1B 43	ESC C n	Set page length to n lines
27 68	1B 44	ESC D n1...nk NUL	Set horizontal tab value
27 74	1B 4A	ESC J n	Feed line n dot lines
27 75	1B 4B	ESC K n1 n2...data...	Print $n1 \times 8$ bit-map graphics
27 78	1B 4E	ESC N n	Set binding length to n lines
27 79	1B 4F	ESC O	Cancel binding length
27 81	1B 51	ESC Q n	Set right margin width

27 85	1B 55	ESC U n	Enlarge width n times
27 86	1B 56	ESC V n	Enlarge height n times
27 87	1B 57	ESC W n	Enlarge width and height n times
27 99	1B 63	ESC c n	Select/cancel reverse print
27 102	1B 66	ESC f m n	Print blank or feed line
27 105	1B 69	ESC i n	Select/cancel reverse white print
27 108	1B 6C	ESC l n	Set left margin width
28 14	1C 0E	FS SO	Set double width print of Chinese character
28 20	1C 14	FS DC4	Cancel FS SO
28 38	1C 26	FS &	Select Chinese print mode
28 45	1C 2D	FS – n	Print Chinese characters with underline
28 46	1C 2E	FS •	Cancel Chinese print mode
28 73	1C 49	FS 2 n	Set Chinese character rotational print
28 74	1C 4A	FS J	Set vertical print
28 75	1C 4B	FS K	Set horizontal print
28 87	1C 57	FS W n	Set the enlarging multiple of Chinese character
28 114	1C 72	FS r n	Select superscript and subscript
28 15	1C 0F	FS SI	Select vertical DBC case Chinese character print

SPRT

28 18	1C 12	FS DC2	Cancel vertical DBC case Chinese character print
28 105	1C 69	FS i n	Select Chinese character bit-map
28 71	1C 47	FS G	Select Chinese character misplace print
28 72	1C 48	FS H	Cancel Chinese character misplace print