

USER MANUAL

T90 THERMAL PRINTER

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1 GENERAL DESCRIPTION

1.1 Basic Specifications

Printing Method: Line Thermal Printer
Printing Density: 8dot/mm
Printing Directions: Feed Paper Directions
Printing Speed: 220mm/s(Max)
Printing Width: 64mm/72mm/58mm
Paper Solve Method: Autocutter
Line Width: 3.75mm

1.2 Character Specifications

Character Set: 12×24 dot

Chinese Character: Support GB18030 Simple Chinese (downward compatible with GB2312-1980)

NOTE: At present, only support GB18030 double byte 1、2、3、4、5 areas.

1.3 Autocutter

Support Full cut、Partial cut (one point uncut) .

NOTE: At least feed paper 1mm or more after cutting.

1.4 Paper Specifications

Paper Type: Thermal Paper

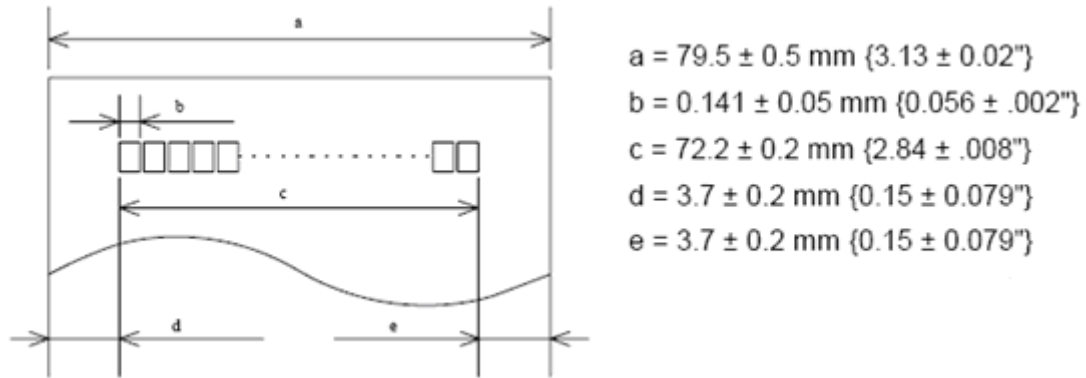
Paper Width: 79.5±0.5mm; 57.5±0.5mm

Paper Dimensions: Max diameter 83mm

Roll Paper Core Dimensions: inner diameter 12mm, outer diameter 18mm

1.5 Printable Area

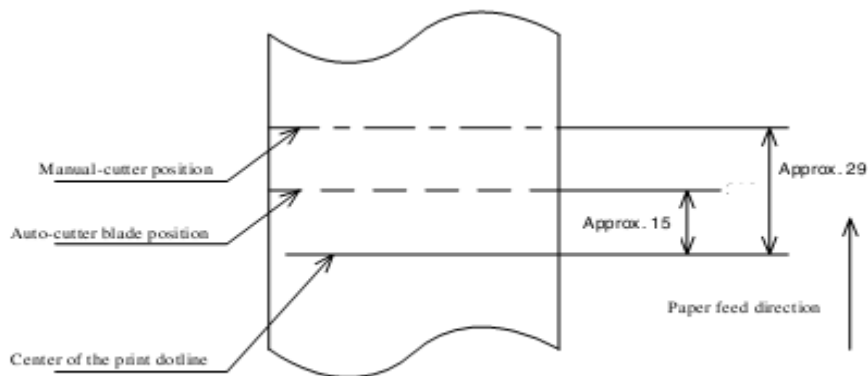
79.5±0.5mm The printable area of thermal paper is 72.2 ± 0.2 mm, There are 3.7 ± 0.2 mm blank area left and right side, as follows:



1.6 Internal Buffer

- 1、Receive Data Buffer Memory: 4 KB
- 2、User-defined Buffer Memory: 12KB
- 3、Macro Defined Buffer Memory: 2K
- 4、NV Bit Image BufferMemory: 256K
- 5、User-defined Commands Buffer Memory: 1K

1.7 Printing Position and Tear off Position



[Units: mm (All the numeric values are typical.)]

NOTE: The values shown in the figures are typical values, the values may vary slightly as a result of the paper slack or variations in the paper.

1.8 Operated Specifications

Power Supply: DC24V \pm 7%

1.9 Reliability

- 1、Useful Time:
Thermal Print Head: 100km

Autocutter: 1000000 times

1.10 Environmental Specifications

- 1、Temperature: During Operation: 5 ~ 55°C
During Storage: -10 ~ 50°C (excludes paper)
- 2、Humidity: During Operation: 10~90%RH
During Storage: 10~90%RH (excludes paper)

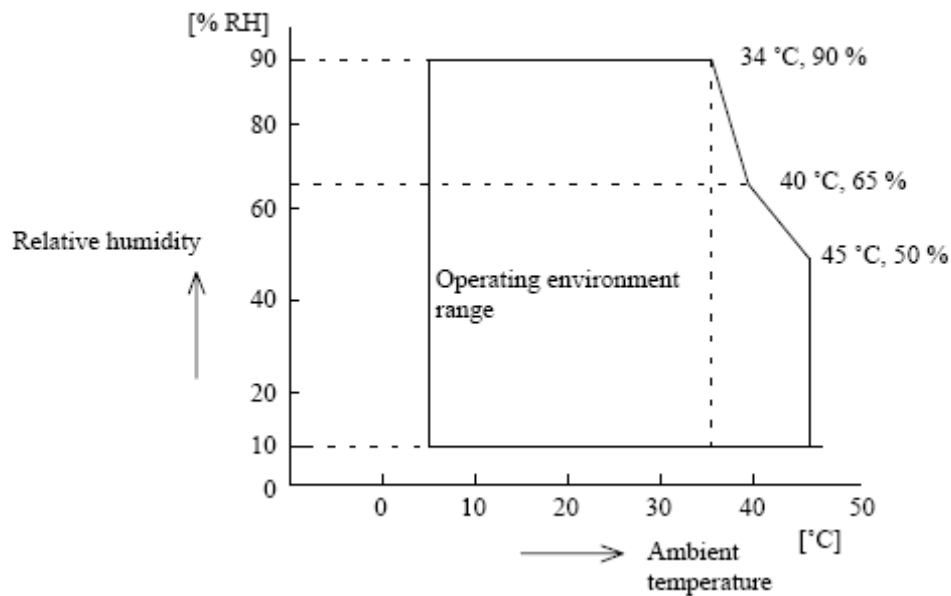


Figure 1.8 Operating Temperature and Humidity Range

NOTE: If the printer don't work for a long time but installing the paper, the paper may be go to bad and fall on print head; In such a case, before printing that must be fed paper 30mm firstly.

2 CONFIGURATION AND INSTALLATION

2.1 Interface Specifications

2.1.1 RS232 Serial Interface

2.1.1.1 Specifications

Data Transmission: Serial

Synchronization: Asynchronous

Handshaking: RTS/CTS or DTR/DSR or XON/XOFF control

Signal Levels: MARK = -3 to -15 V; Logic "1"/ OFF

SPACE = +3 to +15 V; Logic "0"/ ON

Baud Rate: 115200、38400、19200、9600bps

Data Word Length: 8 bits

Parity: None

Stop Bits: 1 bit or more

Connector (the side on the printer): D-SUB25 male

NOTE: Handshaking, Baud rate and Parity decided by DIP Switch 1 setting. (refer to 3.3.1)

the stop bits fixed on 1.

Switching between online and offline:

The printer have not the online and offline switch.

The printer goes offline:

- 1) Between when the power is turned on (includes reset using the interface) and when the printer is get ready to receive the data.
- 2) During the self-test.
- 3) When the cover is open.
- 4) During paper feeding pushing the paper feed button.
- 5) Stop printing when out of paper.
- 6) During macro executing standby status.
- 7) When an error have occurred.

2.1.1.2 Interface Pin Signal Definition

Interface connector terminal assignments and signal fuctions description as the following table

Signal assignments and functions

Pin NO.	Signal Name	Signal Direction	Function
2	RXD	Input	Receive data
3	TXD	Output	Receive data

4	RTS	Output	1) When DTR/DSR control is selected, The signal indicates whether the printer is busy. SPACE indicates that the printer get ready to receive data. but MARK indicates that the printer is busy. Changing the Memory Switch setting to be used as a signal for printer busy.																																
			2)																																
			<table><tr><th rowspan="2"></th><th rowspan="2">Printer Status</th><th colspan="2">Memory SW1-3 Status</th></tr><tr><th>ON</th><th>OFF</th></tr><tr><td rowspan="7">Offline</td><td>1.During the period from when the power is turned on to when the printer is ready to receive data.</td><td>BUSY</td><td>BUSY</td></tr><tr><td>2. During the self-test.</td><td>BUSY</td><td>BUSY</td></tr><tr><td>3. When the cover is open.</td><td>—</td><td>BUSY</td></tr><tr><td>4. During paper feeding using the paper feed button.</td><td>—</td><td>BUSY</td></tr><tr><td>5. When the printer stops printing due to a paper-end.</td><td>—</td><td>BUSY</td></tr><tr><td>6. During macro executing standby status.</td><td>—</td><td>BUSY</td></tr><tr><td>7. When an error has occurred.</td><td>—</td><td>BUSY</td></tr><tr><td></td><td>8. When the receive buffer becomes full.(*1)</td><td>BUSY</td><td>BUSY</td></tr></table>		Printer Status	Memory SW1-3 Status		ON	OFF	Offline	1.During the period from when the power is turned on to when the printer is ready to receive data.	BUSY	BUSY	2. During the self-test.	BUSY	BUSY	3. When the cover is open.	—	BUSY	4. During paper feeding using the paper feed button.	—	BUSY	5. When the printer stops printing due to a paper-end.	—	BUSY	6. During macro executing standby status.	—	BUSY	7. When an error has occurred.	—	BUSY		8. When the receive buffer becomes full.(*1)	BUSY	BUSY
						Printer Status	Memory SW1-3 Status																												
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6. During macro executing standby status.	—	BUSY																																	
7. When an error has occurred.	—	BUSY																																	
	8. When the receive buffer becomes full.(*1)	BUSY	BUSY																																
3) When XON/XOFF control is selected: Signal indicates whether the printer is correctly connected and is ready to receive data. SPACE indicates that the printer is ready to receive data. The signal is always SPACE except in the following cases: <ul style="list-style-type: none">• During the period from when the power is turned on to when the printer is ready to receive data• During the self-test																																			
7	SG	—	Signal ground																																

Signal assignments and functions (continued)

Pin No.	Signal Name	Signal Direction	Function
6	DSR	Input	<p>This signal indicates whether the host computer can receive data. SPACE indicates that the host computer can receive data, and MARK indicates the host computer can't receive the data.</p> <p>When DTR/DSR control is selected, the printer transmits data after confirming this signal (except when transmitting data by DLE EOT and GS a) .</p> <p>When XON/XOFF control is selected, the printer does not check this signal.</p>

			Changing the DIP switch setting enables this signal to be used as a reset signal for the printer.
20	DTR	Output	Same as RTS signal
6	DSR	Input	<p>This signal indicates whether the host computer can receive data. SPACE indicates that the host computer can receive data, and MARK indicates the host computer can't receive the data.</p> <p>When DTR/DSR control is selected, the printer transmits data after confirming this signal (except when transmitting data by DLE EOT and GS a) .</p> <p>When XON/XOFF control is selected, the printer does not check this signal.</p>

Serial interface connection example

Use the cable with the following signal relations.

Connector Pin NO. (T90)	Signal Name		Signal Name	Connector Pin NO.
2	TXD		DCD	1
3	RXD		TXD	2
4	RTS		RXD	3
5	CTS		DSR	4
6	DSR		GND	5
7	GND		DTR	6
8	DCD		CTS	7
20	DTR		RTS	8

2. 1. 2 IEEE 1284 Bidirectional Parallel Interface

2.1.2.1 Specifications

Data Transmission: 8-bit parallel

Synchronization: Externally supplied nStrobe signals

Handshaking: nAck and busy signals

Signal Level: TTL compatible

Connector : ADS-B36BLFDR176 (Honda) or equivalent (IEEE 1284 Type B)

Switching between online and offline

The printer is not equipped with any online/offline switch. The printer is placed into offline status in either of the followings:

- 1) When the power is turned on or until the printer becomes ready for data transmission after it is initialized by the reset signal (nInit) from the interface.
- 2) During the self-test.
- 3) When the cover is open.
- 4) During paper feeding using the paper feed button.
- 5) When the printer stops printing due to a paper-end (in cases when empty paper supply is

detected by either the paper roll end detector or the paper roll near-end detector with a printing halt due to paper shortage enabled by ESC c 4).

6) During macro executing standby status.

7) When an error has occurred.

Reverse data mode

The status data transmission from the printer to the host is processed in the nibble or byte mode.

NOTE: At present, reverse data transmission by nibble.

- Description

This mode allows data transmission from the asynchronous printer under the control by the host.

Data transmissions in the Nibble mode are made via the existing control lines in units of four bits. In the byte mode, data transmissions are processed by making the eight-bit data lines bidirectional.

The both modes fall to process concurrently with the compatibility mode, thereby causing half duplex transmission.

2.1.2.2 Interface Pin Signal Definition

Interface Pin Assignments for Each Mode

Pin	Source	Compatibility Mode	4-bits Mode
1	Host	nStrobe	HostClk
2	Host/Ptr	Data0(LSB)	Data0(LSB)
3	Host/Ptr	Data1	Data1
4	Host/Ptr	Data2	Data2
5	Host/Ptr	Data3	Data3
6	Host/Ptr	Data4	Data4
7	Host/Ptr	Data5	Data5
8	Host/Ptr	Data6	Data6
9	Host/Ptr	Data7(MSB)	Data7(MSB)
10	Printer	nAck	PtrClk
11	Printer	Busy	PtrBusy/Data3, 7
12	Printer	Perror	AckDataReq/Data2, 6
13	Printer	Select	Xflag/Data1, 5
14	Host	nAutoFd	HostBusy
15		NC	ND
16		GND	GND
17		FG	FG
18	Printer	Logic-H	Logic-H
19		GND	GND
20		GND	GND
21		GND	GND
22		GND	GND
23		GND	GND
24		GND	GND

25		GND	GND
26		GND	GND
27		GND	GND
28		GND	GND
29		GND	GND
30		GND	GND
31	Host	nInit	nInit
32	Printer	nFault	nDataAvail/Data0, 4
33		GND	ND
34	Printer	DK_STATUS	ND
35	Printer	+5V	ND
36	Host	nSelectIn	1284-Active

*NC: Not Connected

ND: Not Defined

- NOTES:
1. A prefix "n" to signal names refer to low level active signals.
 2. To the host provided with none of the signal lines listed above, both-way communication fails.
 3. For interfacing, signal lines shall use twisted pair cables with the return sides connected to signal ground level.
 4. Interfacing conditions shall be all based on the TTL level to meet the following characteristics
In addition, both rise and fall time of each signal shall be 0.5μs or less.
 5. Data transmission shall not ignore the signal nAck or Busy. An attempt to transmit data with signal, nAck or Busy, ignored can cause data lose. (Data transmission for the printer shall be made after verifying the nAck signal or while the Busy signal is at the low level.)
 6. Interface cables shall be as min required short in length as possible.

Electrical Characteristics

DC Characteristics (Except Logic- H, + 5 V signals)

Characteristics	Symbol	Specifications		Conditions
		Min	Max	
Output High Voltage	V _{OH}	*2.4 V	5.5 V	*I _{OH} =0.32 mA
Output Low Voltage	V _{OL}	-0.5 V	*0.4 V	*I _{OL} =-12 mA
Output High Current	I _{OH}	0.32 mA	-	V _{OH} =2.4 V
Output Low Current	I _{OL}	-12 mA	-	V _{OL} =0.4 V
Input High Voltage	V _{IH}	2.0 V	-	V _{IH} =2.0 V V _{IL} =0.8 V
Input Low Voltage	V _{IL}	-	0.8 V	
Input High Current	I _{IH}	-	-0.32 mA	
Input Low Current	I _{IL}	-	12 mA	

Logic - H Signal Sender Characteristics

Characteristics	Symbol	Specifications		Conditions
		Min	Max	
Output High Voltage	V _{OH}	3.0 V	5.5 V	While the power is OFF
Output Low Voltage	V _{OL}	-	2.0 V	

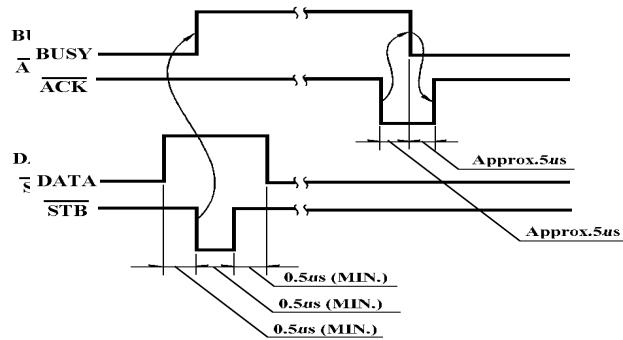
+5 V Signal Sender Characteristics

Characteristics	Symbol	Specifications		Conditions
		Min	Max	
Output High Voltage	V_{OH}	*2.4 V	5.5 V	* $I_{OH}=0.32$ mA
Output Low Voltage	V_{OL}	-	-**	While the power is OFF
Output High Current	I_{OH}	-	0.32 mA	$V_{OH}=2.4$ V
Output Low Current	I_{OL}	-**	-	While the power is OFF

** No guarantee is offered to V_{OL} and I_{OL} while the power is OFF.

Parallel Data Receiving Timing

Parallel Interface Signal Timing Figure as follows(Compatibility Mode):



Reset the printer through parallel interface

To enable the printer reset by nInit signal (PIN 31) in compatibility mode. Set nInit signal by SWITCH DIP. To enable the printer reset, meet the following signal timing.

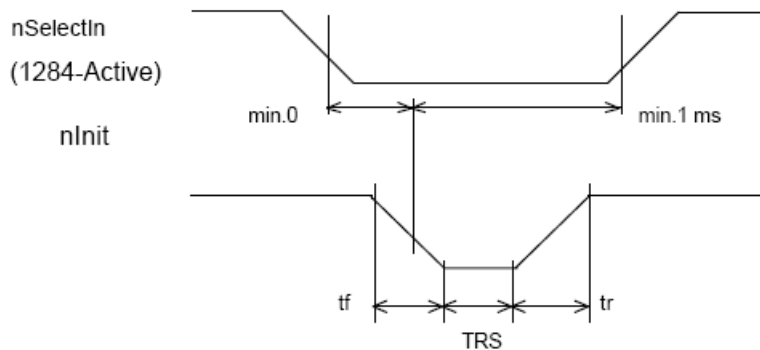
The signal is ignored when #36 nSelectIn /1284-Active is high in reverse mode.

• DC characteristic

TTL Level

• AC characteristic

Min reset pulse width: TRS 50μs (min)



NOTE: The prefix "n" named active-low

Reception of status from the printer through the bidirectional parallel interface

In the bidirectional parallel interface specifications, the printer status transmission is available by

using the both-way communication facility in the Nibble/Byte Modes in accordance with the IEEE 1284.

In this case, different from in the RS-232 serial interface specifications, the real-time interruptions from the printer to the host are disabled and thus precautions must be taken to the followings:

- 1) Allowable capacity of the printer internal buffer is 99 bytes (except ASB status). The status signals exceeding this capacity will be discarded. To prevent possible loss of status, the host shall be ready for data acceptance (Reverse Mode).
- 2) When ASB is used, the host is preferably in the wait state for data acceptance (Reverse Mode). When this state is not available, the host shall enter the Reverse Mode to always monitor the presence of data.
- 3) When ASB is used, preference shall be given to the ASB status for transmission over the other status signals. Once one ASB condition changed, all ready to send ASB conditions from last time that need to send together, then sending the latest ASB conditions.

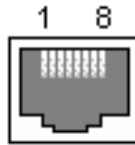
2.1.3 Ethernet Interface

2.1.3.1 Interface Specifications

Ethernet Type: Standard Ethernet (10M)

TCP/IP agreement: ETHERNET, ARP, IP, ICMP, IGMP, UDP, TCP, HTTP, DHCP;

Connector Type: RJ45 (as table)



2.1.3.2 Interface Pin Signal Definition

Pin NO.	Signal Name	Signal Source
1	TX+	Tranceive Data+ (Send signal+)
2	TX-	Tranceive Data+-(Send signal-)
3	RX+	Receive Data+ (Receive signal+)
4	N/C	Not connected(Blank)
5	N/C	Not connected(Blank)
6	RX-	Receive Data-(Receive signal-)
7	N/C	Not connected(Blank)
8	N/C	Not connected(Blank)

2.1.4 USB Interface

2.1.4.1 Interface Specifications

Connector Type: Type B female interface

Communication Agreement: USB2.0

2.1.4.2 Interface Pin Signal Definition



Pin Definition:

Pin NO.	Function	Color	Definition
1	V Bus	Red	Power +5V
2	Data-	White	Data-
3	Data+	Green	Data+
4	GND	Black	Ground

2.2 Printer Installation

2.2.1 Interface Connector

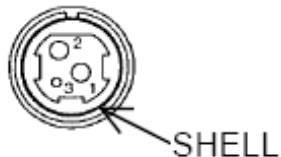
Refer to section 2.1 port

2.2.2 Power Connector

NOTE : To guarantee the normal operation to the printer. Please use the standard power from our company.

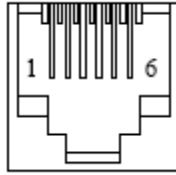
Pin Definition:

Pin NO.	Signal
1	+24
2	GND
3	NC
SHELL	F. G



2.3 Drawer Connector

T90 used RJ-11 6 connector, as follows



Pin Definition as the following table

Pin NO.	Signal Ground	Direction
1	Frame GND	---
2	Drawer kick-out drive signal 1	Output
3	Drawer open/close signal	Input
4	+24V	-
5	Drawer kick-out drive signal 1	Output
6	Signal GND	-

3 FUNCTIONS

3.1 List of Commands

Command	Name	Command Type		Standard Mode	Page Mode
		Executive	Set		
HT	Horizontal tab	i		i	i
LF	Print and line feed	i		i	i
FF	Print and return to standard mode(in page mode)	i		Ignored	i
CR	Print and carriage return	i		i	i
CAN	Cancel print data in page mode	i		Ignored	i
DLE EOT	Transmit real-time status	i		i	i
DLE ENQ	Send real-time request to printer	i		i	i
ESC FF	Print data in page mode	i		Ignored	i
ESC SP	Set right-side character spacing		i	i	i
ESC I	Select print modes		i	i	i
ESC \$	Set absolute print position	i		i	i
ESC %	Select/cancel user-defined character set		i	i	i
ESC &	Define user-defined characters		i	i	i
ESC *	Select bit-image mode	i		i	i
ESC -	Turn underline mode on/off		i	i	i
ESC 2	Select default line spacing		i	i	i
ESC 3	Set line spacing		i	i	i
ESC ?	Cancel user-defined characters		i	i	i
ESC @	Initialize printer	i	i	i	i
ESC D	Set horizontal tab positions		i	i	i
ESC E	Turn emphasized mode on/off		i	i	i
ESC G	Turn double-strike mode on/off		i	i	i
ESC I	Full cut	i		i	i
ESC J	Print and feed paper	i		i	i
ESC L	Select page mode	i		(i)	Ignored
ESC m	Partial cut	i		i	i
ESC M	Select character font			i	i
ESC R	Select an international character set		i	i	i
ESC S	Select standard mode	i		Ignored	i
ESC T	Select print direction in page mode		i	▲	i
ESC V	Turn 90° clockwise rotation mode on/off		i	i	▲
ESC W	Set print area in page mode		i	▲	i

ESC \	Set relative print position	i		i	i
ESC a	Select justification		i	(i)	▲
ESC c 3	Select paper sensors to output paper-end signals		i	i	i
ESC c 4	Select paper sensors to stop printing		i	i	i
ESC c 5	Enable/disable panel buttons		i	i	i
ESC d	Print and feed n lines	i		i	i
ESC t	Select character code table		i	i	i
ESC {	Turn upside-down print mode on/off		i	(i)	▲
FS p	Print NV bit image	i		i	i
FS q	Define NV bit image		i	(i)	i
GS l	Set character size		i	i	i
GS \$	Set absolute vertical print position in page mode	i		Ignored	i
GS '	Define downloaded bit image		i	i	i
GS (A	Execute test print	i		i	Ignored
GS (B	Set printer parameter		i	i	i
GS /	Print downloaded bit image	i		•	i
GS :	Start/end macro definition	i	i	i	i
GS B	Turn white/black reverse print mode on/off		i	i	i
GS C 0	Set attribute value print mode		i	i	i
GS C 1	Select attribute mode(A)		i	i	i
GS C 2	Set attribute value		i	i	i
GS C ;	Select attribute mode(B)		i	i	i
GS H	Select print position of HRI characters		i	i	i
GS I	Transmit printer ID	i		i	i
GS L	Set left margin		i	(i)	▲
GS T	Set print position as printing origin	i		i	Ignored
GS V	Select cut mode and cut paper	i		(i)	i
GS W	Set print area width		i	(i)	▲
GS \	Set relative vertical print position in page mode	i		Ignored	i
GS ^	Execute macro	i		i	i
GS a	Enable/disable automatic status back(ASB)	i	i	i	i
GS b	Turn smoothing mode on/off		i	i	i
GS c	Print attribute value	i		i	i
GS f	Select font for HRI characters		i	i	i
GS h	Set bar code height		i	i	i
GS k	Print bar code	i		•	i
GS r	Transmit status	i		i	i
GS v 0	Print grating bit image	i		•	i

GS w	Set bar code width		i	i	
------	--------------------	--	---	---	--

List of Chinese characters command

Comm and	Name	Command Type		Standard Mode	Page Mode
		Executive	Set		
FS I	Set print modes for Chinese character		i	i	i
FS &	Set Chinese characters mode		i	i	i
FS -	Turn underline mode on/off for Chinese characters		i	i	i
FS .	Cancel Chinese mode		i	i	i
FS 2	Define user-defined Chinese character		i	i	i
FS C	Select Chinese character code system		i	i	i
FS S	Set Chinese character spacing		i	i	i
FS W	Turn quadruple-size mode on/off for Chinese characters		i	i	i

Command Type

Excutive command: The printer execute this command, it won't influence the following data if change this command.

Set command: Set the printer through the relative zonebit, the set will influence the following data.

Standard mode

i : Allowance

(i) : To be valid when only the command locate the beginning of the line.

●: It is valid only no data in print buffer.

Page Mode

i : Allowance

▲: Set data only.

Forbid: Detail with parameter as print data.

Ignored: Ignore all command codes, include parameter, do not execute any operation.

3.2 Power Button and Buttons**3.2.1 Power Button**

The power button designed at the bottom right on the front of the printer.

Turn the power off, push the power button more than 2 seconds.

NOTE: Connect the power correctly before turning the power on.

3.2.2 Panel Button**3.2.2.1 Paper Feed Button**

Functions:

Push one time, the printer feed one line (On basis of setting the line spacing, line spacing set by ESC 2 and ESC 3 command) .

It won't feed paper at the below conditions:

① Forbid the button function by ESC c 5.

② Paper out sensor detect no paper.

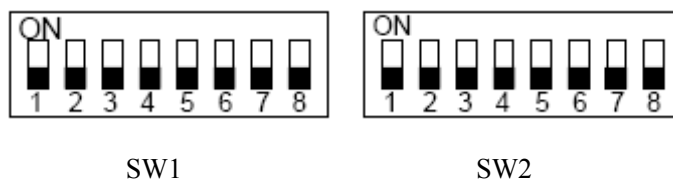
·Under the condition of macro wait executive, push the feed paper button and executive the defined macro.

·During self-test, push the button to stop self-test printing, and push once again, then continuing to print self-test.

NOTE: ESC c 5, enable/disable the button function. Push button to prohibit, it isn't valid.

3.3DIP Switch

T90 designed two DIP Switchs and printed agreed number, each function refer to the below sections;



3.3.1 DIP Switch 1

DIP Switch 1

Switch NO.	Fuction	ON	OFF	Default
1	Chinese character mode	Character mode	Chinese character mode	OFF
2	Undefined	---	---	OFF
3	Undefined	---	---	OFF
4	Undefined	---	---	OFF
5	Undefined	---	---	OFF
6	Undefined	---	---	OFF
7	Serial baud rate selection	Refer to table: baud rate selection		OFF
8				OFF

Baud Rate Selection

Transmission Speed (Baud rate BPS)	Switch NO.	
	7	8
115200	OFF	ON
38400	OFF	OFF
19200	ON	OFF
9600	ON	ON

NOTE: BPS – bit/second

3.3.2 DIP Switch 2

DIP Switch 2

Switch NO.	Function	ON	OFF	Default
1	Select print valid width	Line printing 48 characters	Line printing 42 characters	OFF
2	Select print gray leve	Deepen	Lighten	OFF
3	Select print paper width	Paper width 58mm	Paper width 80mm	OFF
4	Kitchen mode	Buzzer doesn't awake after paper cut	Buzzer awake after paper cut	OFF
5	Hex dump	Enter hex mode	Exit hex mode	OFF
6	Partial cut/full cut	Full cut	Partial cut	OFF
7	Alarm	Warn when closing the buzzer	Warn when opening the buzzer	OFF
8	Undefined	----	---	OFF

3. 4 LED/Alarm

1) Power LED: Green

On: Power is stable.

Off: Power is not stable.

2) Paper out LED: Red

On: Paper out or near-end paper.

Off: Paper is loaded (normal condition)

Flashing: Macro standby state

Macro execution stanby state (When the macro execution command is used.)

Table 3.3 Standby State Indication

State	Paper Out LED Flashing Pattern	Recovery Conditions
Macro execution ready state.		Pressing the FEED button executes the macro.

NOTE: A macro can be executed r times(r specifies the number of times to execute the macro) within the specified definition range. The macro can be executed continuously or can be executed by pressing the button. If the macro is executed by pressing the FEED button, the PAPER OUT LED blinks to indicate the macro execution ready state. (see macro definition commands)

3) ERROR LED: Red

On: Offline (except during paper feeding using the FEED button and during test printing, and the error state)

Off: Normal condition

Flashing: Error

4) Alarm LED: Blue

Flashing: Paper out, Cover open, The temperature of print head is extremely high, Autocutter error,

another mechanism error.

Off: Printer is ready to go.

5) **ALARM: Buzzer**

Sound : Paper out, Cover open, The temperature of print head is extremely high, Autocuttererror, Print the receipt under the back kitchen mode, another mechanism error.

Quiet : Printer is ready to go.

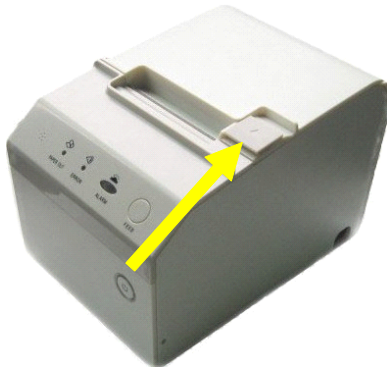
NOTES:

- ◆ Only two times when printing each receipt under the back kitchen mode;
- ◆ Other fault conditions, only 15s with sound then closing by it.

3.5 Roll Paper Cover

Cover button

As the following picture, pointed out direction and push the button.



3.6 Autocutter Reset

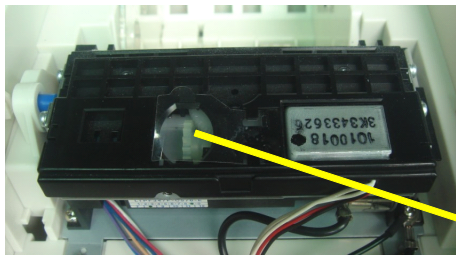
Autocutter reset, there are two directions:

1. Connect the printer again.
2. Autocutter wheel (as following picture)

First, open the front cover as following operation (if the autocutter be jammed and don't open the cover, also do like this way)



Then, Turn the autocutter wheel around, do it make the autocutter reset.



Autocutter wheel

3. 7 Self-test

Self-test that checks whether the printer is stable or not. If the self-test is correct, indicates that the printer is stable except the interface what connect the host. Or it is unstable.

1) The printer has a self-test function that checks the followings:

- Print quality
- Interface type and its operate conditions
- Control software version
- DIP Switch settings
- Built-in character set

2) Starting the self-test

To start the self-test on a roll paper, hold down the FEED button and turn on the printer with the cover closed, then printing the self-test list.

- Control software version
- DIP Switch settings
- A rolling pattern using only the built-in character set
- A partial cut after completing the test printing

3. 8HexDump

1) Hexadecimal print function

This function prints the data transmitted from the host computer in hexadecimal numbers and in its corresponding characters.

2) Starting hexadecimal printing

Starting hexadecimal printing has two ways:

- DIP switch setting: In the DIP-SW2 Function, SW-5 is "ON"
- Execute Command **GS (A**

The printer first prints "Hexadecimal Dump" on roll paper and prints the received printdata in hexadecimal numbers and in its corresponding characters.

NOTES: 1. If no characters correspond to the data received, the printer prints ".".

2. During hexadecimal dumping, any commands other than DLE EOT, DLE ENQ and DLE DC4 do not function.

3. Insufficient print data to fill the last line can be printed by setting te printer offline (for

example: push the feed paper button down).

3) Ending hexadecimal dumping

Hexadecimal printing ends by setting SW-5 is "OFF" in DIP-SW2 function, resetting the printer, push down button three times (but returning to hexadecimal at once).

< Printing example >

```
Hexadecimal Dump

1B 21 00 1B 26 02 40 40 1B 69      . ! . . & . @@ . i
1B 25 01 1B 63 34 00 1B 30 31      . % . . c 4 . . 0 1
41 42 43 44 45 46 47 48 49 4A      A B C D E F G H I J

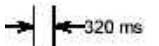

*** completed ***
```

3. 9 Error Processing

3. 9. 1 Error Type



1) Error that automatically recover

Errors That Automatically Recover

Error	Description	Error LED Flashing Pattern 	Recovery
Print head over-temperature error	Print head temperature is over 57° C		Recovers automatically when the print head is below 45° C.

2) Errors that have the possibility of recovery

Errors That Can Possibly Recover

Error	Description	Error LED Flashing Pattern 	Recovery
Autocutter error	The autocutter does not work correctly		If paper jams, after solving this problem, then recovering by DLE ENQ 1 or DLE ENQ 2

3. 9. 2 Printer Operation When an Error Occurs

The printer executes the following operations when detecting an error.

- Stops all printer operations for the selected paper section.

- Goes BUSY.
- Blinks the ERROR LED.

3. 9. 3 Date Receive Error

If one of the following errors during serial interface communication, the printer prints“? ”or ignores the data.

3. 10 Status Conditions

The printer has the following two roll paper status condition sensor:

1) Roll paper end sensor

The sensor which detects whether paper is present or not. When the sensor detects a paper-end, the printer stops printing.

2) Roll paper near-end sensor

The sensor which detects a near-end of a paper roll.

When the paper roll diameter becomes sufficiently small, the detects a near-end of the paper roll and the PAPER OUT LED lights. If the sensor is enabled by ESC c 4, the printer stops printing.

NOTES: ·Install the new roll paper and close the cover, the printer start to printer again.

·Paper near-end sensor ready by user.

3.11 Buffer-Full Printing

After the printer deal with one line dates in the buffer area, When the printer receive the continued date, the printer will automatically print the processed date and feed paper one line (under the standard mode).

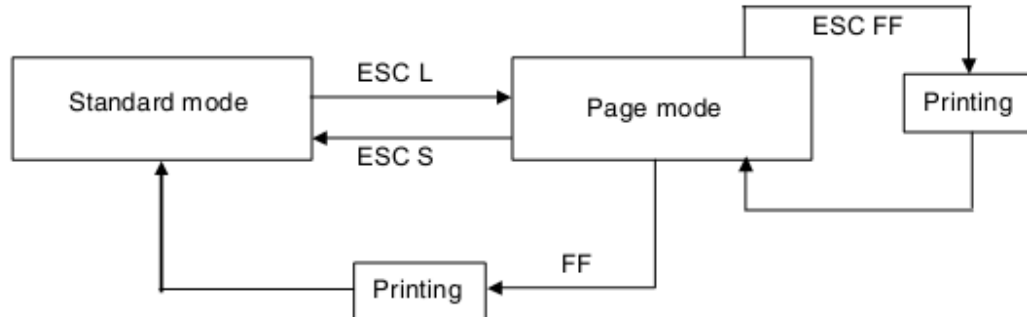
3.12 Page Mode

3.12.1 Description

The printer has two operate modes (only at the conditions of selecting the roll paper as the source of roll paper): the standard mode and the page mode. Under the standard mode, The printer prints and feed paper after receiving the data and command of feed paper every time. Under the page mode, the printing data and the command of feed paper which received by the printer are dealt with and deposit at the one special memory, and the printer does not any operations. After receiving the ESC FF or FF command, all deposit data will be printed.

For example: Under standard mode, after receiving the data of "ABCDEF"<LF>, the printer prints the characters "ABCDEF" and feed paper one line. Under the page mode, "ABCDEF" be written to the special print data area in the memory, meanwhile the print area of the next print data in the data area will move down one line. To page mode by ESC L command, after all data and commands dealt with

page mode. Print all received data by ESC FF command, but execute FF command, after printing all data, the printer return to the standard mode. Execute ESC S command, the printer return to the standard mode directly, but do not print the received data which received under the page mode, these data will be deleted from memory.



3.12.2 Set Value under the Standard Mode and Page Mode

- 1) Set the commands the same as parameters under the standard mode and page mode. But ESC SP, ESC 2, ESC 3 command could be set the different values under the standard mode and page mode, the different set value under the each mode will be remembered.
- 2) Under the standard mode, if use the 82.5mm paper width, when printing dot image, the max printable width is 640 dots; but the same roll paper under the page mode that will be printed 664 dots at the direction of Y (feed paper direction) (the above that need to set as follows: set Y direction by SC W command, and the print area is 664 dots, Set 1 or 3 as the print direction parameter n by ESC T command .)

3.12.3 Data Print Mode in the Print Area

The data in the print area will be executed as the following description:

- 1、 Set the print area by ESC W command, before the printer receives the ESC W command, The started position (x0, y0) on the left (the operator face to the printer), the print area at the extended length(dxdots) x(dy dots) at the X direction, at the Y direction to extend the length(feed paper direction), If do not use ESC w to point, the print area keep silence.
- 2、 Point the set position by ESC w command, and set the print direction by ESC T, the print data prints at the appointed area, 3.11.2 the first point, means at the default conditions.
The print data include the down-load dot image and bar code, dot image data at the point of the left bottom (3.11.3 the second point) will be in line at the bottom, but all HRI characters are printed under the bottom line.
Under this (3.11.3 point 2) circumstancesm, If the height of characters over the stable height or receive the download dot image data, any part which over the stable height can not be printed.
- 3、 Not any setting commands (for example: LF or ESC J) which includes feed paper one line to print, If date(include the spacing of the right side) which over the printing area, the printer in printing area which will be fed paper one line. Or, the printing position will be moved to the initial position of the next line, the lines of feed paper decided on setting the relative parameters (For example: ESC 2, ESC 3) .

- 4、 Under default circumstances, the line width spacing is 4.23mm (1/6 inch), the width is 30 dots. If the date in the next line printing date is higher than the height of double printing, then the dot image will be had two lines or more, bar code is higher than the stable characters, the total lines of feed paper is not enough, lead to overlapping printing. To solve this problem to extend the line spacing, At the section 3.11.4, the line spacing is 27 dots or more.

For example: Print one map of dot image which have 6 bytes in the vertical direction, do as the following solutions:

Dot (8×6) in the vertical direction—21 dots when starting feed paper in the printarea ×

Exchangeable unit (360/180) in the vertical direction=54

The line spacing is 27 dots (the height is 54 dots), need to feed paper.

Use the following commands:

ESC W xL, xH, yL, yH, dxL, dxH, dyL, dyH

ESC T n

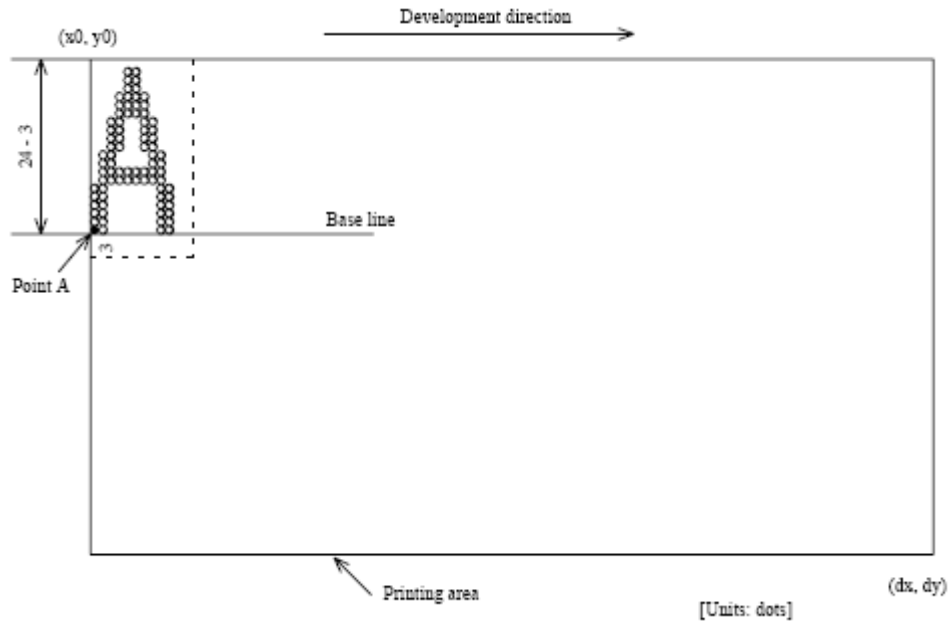
ESC 3 54 Extend the line spacing

LF

GS / 1

ESC 2 The line spacing recovers to default (1/6 inch)

NOTE: The vertical dot density is 1/380, level dot density is 1/180. The position of variable definition is decided by the printing direction, Set the dot density 1/180 by GS p in the vertical direction, can not change the present printing position.

**Figure 3.11.2 Character Data Initial Position**

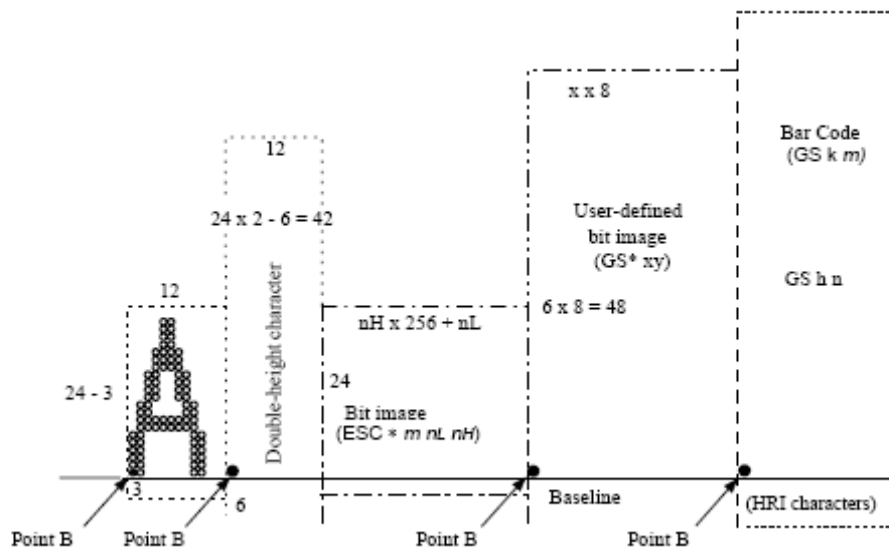


Figure 3.11.3 Printing Data Initial Position

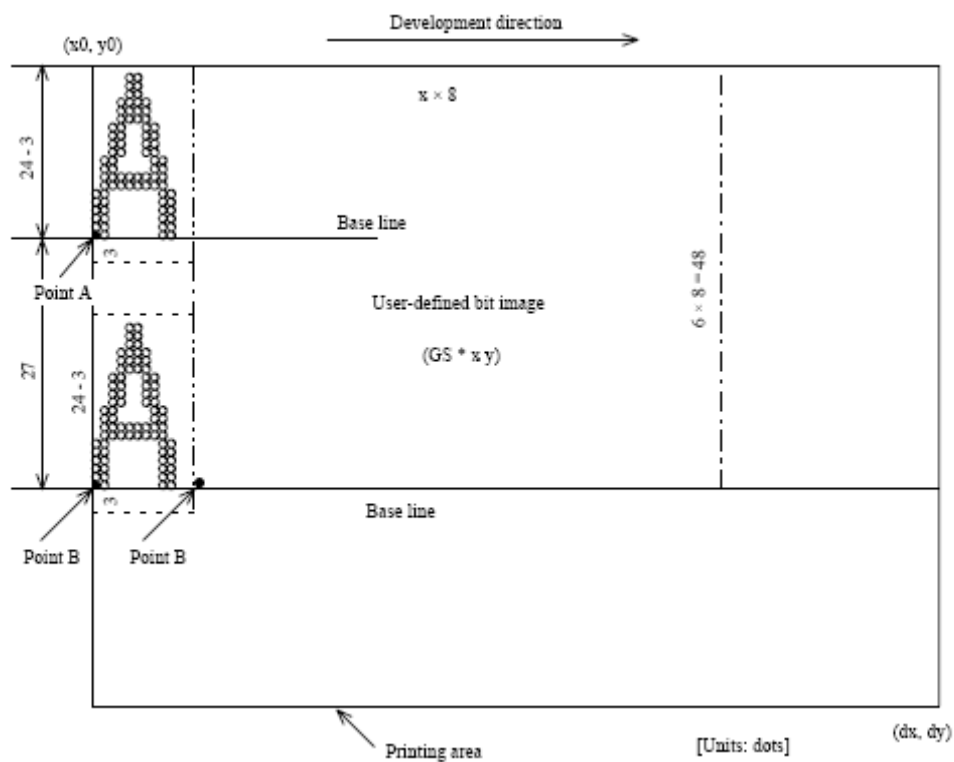


Figure 3.11.4 Download Dot Image Initial Position

4 CASE SPECIFICATIONS

4.1 External Dimensions and Mass

Height: 152mm

Width: 145mm

Depth: 220mm

Mass: 2320g (except for a roll paper)

4.2 Color

White、Black、Gray

4.3 External Appearance

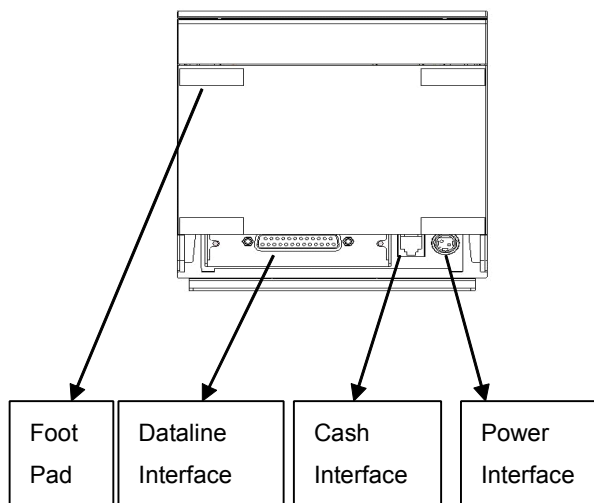


Figure 1: T90 Back

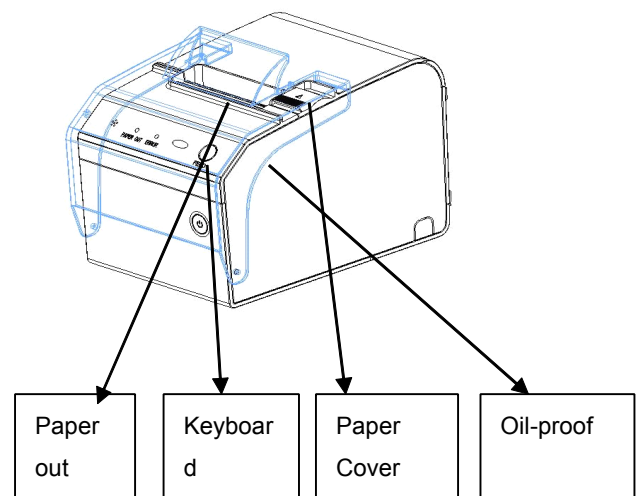


Figure 2: T90 Plan

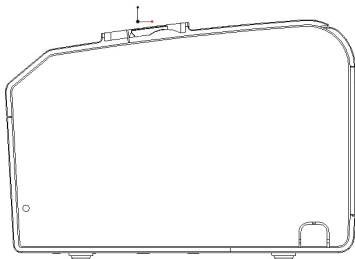


Figure 3: T90 Side

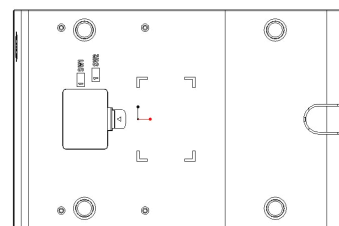


Figure 4: T90 Underside

5 COMMANDS

5.1 Command Notation

[Name]	The name of the command
[Format]	The code sequence [] k indicates the contents in brackets [] should be repeated k time.
[Range]	Gives the variable allowable ranges
[Description]	Describes the function of the command.
[Particularize]	Goes into particular use of commands.
[Notes]	Provides important information on setting and using the printer command, if necessary.
[Default]	Gives the default values, if the commands with the parameters.
[Reference]	List the interrelated commands.

The data signed by < >H, is hexadecimal.

The data signed by < >B, is binary.

5.2 Explanation of Terms

(1) Receive buffer

The receive buffer is used to store data from the host computer. All received data is stored in this buffer and processed in the order received.

(2) Print buffer

The print buffer is used to store image data for printing.

(3) Full printing buffer area

The printer buffer is full. When the printer buffer is full, if new printing data comes, the data in the printing buffer area to be printed, and execute the operation of exchanging the line. The operation the same as the LF commands.

(4) Initial position of line

Initial position of line conditions meets the following points:

- 1 No printing data in the present printing buffer area (includes part empty data which caused by blank and HT command)
- 1 Appoints the printing position that have not through ESC \$ or ESC \ commands.

(5) Printable area

The maximum printable area of this printer is as follows:

①Standard mode, horizontal direction:

About 72.2mm

②Page mode, horizontal direction:

About 72.2mm

③Page mode, vertical direction:

About 117.3mm

(6) Print area

The print area set by commands, the print area is printable area.

(7) Ignored

All commands in this condition, include the parameters which be read, then discarding, but do not any operations.

(8) Inch

Length unit. 1 inch=25.4mm.

(9) MSB

Most Significant Bit

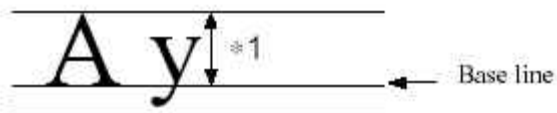
(10) LSB

Least Significant Bit

(11) Baseline

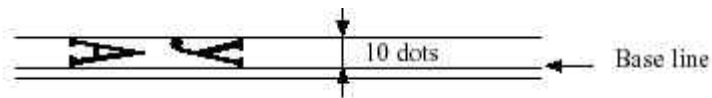
The standard position of the characters data which be stroed in the print buffer area. The following indicates the general characters position under the standard mode and page mode:

*1 When selecting character font A, the width is 21 dots



When selecting character B, the width is 16 dots.

Rotate the characters under the standard mode: (only when selecting the font A)



5.3 List of Commands

Commands	Name	Command s Type	Standard Mode	Page Mode	
		Execute	Set		
HT	Horizontal tab	i		i	i
LF	Print and line feed	i		i	i
FF	Print and return to standard mode(in page mode)	i		Ignored	i
CR	Print and carriage return	i		i	i
CAN	Cancel print data in page mode	i		Ignored	i
DLE EOT	Transmit real-time request to printer	i		i	i
DLE ENQ	Send real-time request to printer	i		i	i
ESC FF	Print data in page mode	i		Ignored	i
ESC SP	Set right-side charcter spacing		i	i	i
ESC !	Select print modes		i	i	i
ESC \$	Set absolute print position	i		i	i
ESC %	Select/cancel user-defined character set		i	i	i
ESC &	Define user-defined characters		i	i	i
ESC *	Select bit-image mode	i		i	i
ESC -	Turn underline mode on/off		i	i	i
ESC 2	Select default line spacing		i	i	i
ESC 3	Set line spacing		i	i	i
ESC ?	Cancel user-defined characters		i	i	i
ESC @	Initialize printer	i	i	i	i

ESC D	Set horizontal tab positions		i	i	i
ESC E	Turn emphasized mode on/off		i	i	i
ESC G	Turn double-strike mode on/off		i	i	i
ESC I	Full cut	i		i	i
ESC J	Print and feed paper	i		i	i
ESC L	Select page mode	i		(i)	Ignored
ESC m	Partial cut	i		i	i
ESC M	Select character font			i	i
ESC R	Select an international character set		i	i	i
ESC S	Select standard mode	i		Ignored	i
ESC T	Select print direction in page mode		i	▲	i
ESC V	Turn 90° clockwise rotation mode on/off		i	i	▲
ESC W	Set print area in page mode		i	▲	i
ESC \	Set relative print position	i		i	i
ESC a	Select justification		i	(i)	▲
ESC c 3	Select paper sensors to output paper-end signals		i	i	i
ESC c 4	Select paper sensors to stop printing		i	i	i
ESC c 5	Enable/disable panel buttons		i	i	i
ESC d	Print and feed n lines	i		i	i
ESC t	Select character code tables		i	i	i
ESC {	Turn upside-down print mode on/off		i	(i)	▲
FS p	Write to NV bit image	i		i	i
FS q	Define to NV bit image		i	(i)	i
GS l	Select character size		i	i	i
GS \$	Set absolute vertical print position in page mode	i		Ignored	i
GS '	Define download bit image		i	i	i
GS (A	Execute test print	i		i	Ignored
GS /	Print download bit image	i		•	i
GS :	Start/end macro definition	i	i	i	i
GS B	Turn white/black reverse print mode on/off		i	i	i
GS C 0	Set attribute value print mode		i	i	i
GS C 1	Select attribute mode(A)		i	i	i
GS C 2	Set attribute value		i	i	i
GS C ;	Select attribute mode(B)		i	i	i
GS H	Select print position of HRI characters		i	i	i
GS I	Transmit printer ID	i		i	i
GS L	Set left margin		i	(i)	▲

GS T	Set print position as printing origin	i		i	Ignored
GS V	Select out mode and cut paper	i		(i)	i
GS W	Set print area width		i	(i)	▲
GS \	Set relative vertical print position in page mode	i		Ignored	i
GS ^	Execute macro	i		i	i
GS a	Enable/disable automatic status back(ASB)	i	i	i	i
GS b	Turn smoothing mode on/off		i	i	i
GS c	Print attribute value	i		i	i
GS f	Select font for HRI characters		i	i	i
GS h	Set bar code height		i	i	i
GS k	Print bar code	i		•	i
GS r	Transmit status	i		i	i
GS v 0	Print grating bit image	i		•	i
GS w	Set bar code width		i	i	

List of Chinese characters command

Command	Name	Command Type		Standard Mode	Page Mode
		Executive	Set		
FS I	Set print modes for Chinese character		i	i	i
FS &	Set Chinese characters mode		i	i	i
FS -	Turn underline mode on/off for Chinese characters		i	i	i
FS .	Cancel Chinese mode		i	i	i
FS 2	Define user-defined Chinese character		i	i	i
FS C	Select Chinese character code system		i	i	i
FS S	Set Chinese character spacing		i	i	i
FS W	Turn quadruple-size mode on/off for Chinese characters		i	i	i

Command Type

Executive command: The printer execute this command, it won't influence the following data if change this command.

Set command: Set the printer through the relative zonebit, the set will influence the following data.

Standard mode

i : Allowance

(i): To be valid when only the command locate the beginning of the line.

•: It is valid only no data in print buffer.

Page Mode

i : Allowance

▲: Set data only.

Forbid: Detail with parameter as print data.

Ignored: Ignore all command codes, include parameter, do not execute any operation.

5.4 Detailed Explanation of Commands

HT

[Name] Horizontal tab

[Format] ASCII HT
 HEX 09
 Decimal 9

[Description] Moves the print position to the next horizontal tab position.

[Particularize] • If didn't set the next horizontal tab position, then this command will be ignored.
 • If the next horizontal tab position is out of the print area, then moving the print position to "print area width+1".
 • Set horizontal position through **ESC D** command.
 • Print position set on "print area width+1" and receive this command, the printer moves ahead when buffer full, and execute the horizontal tab position at the starting of the next line.

[Reference] **ESC D**

LF

[Name] Print and line feed

[Format] ASCII LF
 HEX 0A
 Decimal 10

[Description] Prints the data in the print buffer and feeds one line, based on the current line spacing. Moves the print position to the next horizontal tab position.

[Note] This command set the print position to the starting of the line.

[Reference] **ESC 2, ESC 3**

FF

[Name] Print and return to standard mode (in page mode)

When selecting the page mode:

[Description] Prints all the data in the print buffer collectively and switches from page mode to standard mode.

[Notes] • This command on only effective in page mode.¹
 • After printing, delete the data in the printing buffer area.
 • Recover the print area which set by **ESC W** to default setting.
 • This command set the print position to the starting of the line.

[Reference] **ESC FF, ESC L, ESC S**

CR

[Name] Print and carriage return

[Format] ASCII CR
 HEX 0D
 Decimal 13

[Description] Allow feed paper automatically, the function of this command is the same as LF command.

This command will be ignored when do not allow to feed paper automatically.

- [Particularize] • For serial interface mode, the feed paper function of this command could be ignored.
- • This command set the print position to the starting of the line.
- [Reference] LF

CAN

[Name] Cancel print data in page mode

[Format] ASCII CAN
Hex 18
Decimal 24

[Description] In page mode, deletes all the print data in the current print area.

- [Particularize] • This command on only effective in page mode.
- The data in the appointed print area be deleted.

[Reference] **ESC L , ESC W**

DLE EOT n

[Name] Transmit real-time status

[Format] ASCII DLE EOT n
HEX 10 04 n
Decimal 16 4 n

[Range] $1 \leq n \leq 4$

[Description] Transmit the real-time status. Parameter n used to be appointed the printer transmitting status. The definition as follows:

- n = 1: Transmit printer status.
n = 2: Transmit offline cause status.
n = 3: Transmit error cause status.
n = 4: Transmits roll paper sensor status.

- [Particularize] • The printer transmits the current status, each status is one byte data.
- When transmitting the status, the printer can not confirm whether the host can receive the data or not.
 - Starts to execute when the printer received this command.
 - In serial interface mode, even if the printer located on offline status, full receiving buffer, or executed this command when error occurred.
 - In parallel interface mode, can not execute this command when the printer is busy. When the printer located in offline status, Memory Switch 1-3 located on ON, the printer can not go to BUSY status.
 - Reply (ASB) automatically through GS a command, need to make a distinction the sending satus of DLE EOT command and ASB status. (Refer to appendix C, transmitting status identification)
 - If the printer don't be selected peripheral device command ESC = , the selected command remain in effect.

[Notes] • Whenever get <10>H<04>H<n>(1 £ n £ 4) data sequence, will transmit the status.
For example in the following commands:

ESC 'm nL nH d1 ... dk , d1=<10>H, d2=<04>H, d3=<01>H

- Can not use this command when there are 2 or more bytes in the command.

For example:

If want to send **ESC 3 n** to the printer, before sending the n, DTR (for host is

DSR) will be changed to MARK, so before receiving the n, interrupt **DLE EOT 3**.

The code of **DLE EOT 3** <10>H will be dealt with as the code of **ESC 3** <10>H.

n = 1 Printer status

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Not used. Select off.
1	On	02	2	Not used. Select on.
2	On	04	4	Not used. Select on.
3	Off	00	0	Online.
	On	08	8	Offline.
4	On	10	16	Not used. Select on.
5	Off	00	0	Do not wait online error recovery.
	On	20	32	Wait online error recovery.
6	Off	00	0	Feed paper button switch off.
	On	40	64	Feed paper button switch on.
7	Off	00	0	Not used, Select off.

NOTE: bit 5: Online error is the process that the printer will execute waiting switch on/off during the macro command and self-test.

n = 2 : Offline status

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Not used. Select off.
1	On	02	2	Not used. Select on.
2	Off	00	0	Cover is closed.
	On	04	4	Cover is open.
3	Off	00	0	Paper is not being fed by the paper FEED button.
	On	08	8	Paper is being fed by the paper FEED button.
4	On	10	16	Not used. Select on.
5	Off	00	0	No paper end stop.
	On	20	32	Printing stopped by paper end.
6	Off	00	0	No error.
	On	40	64	Error occurred.
7	Off	00	0	Not used. Select off.

Bit 5: Turn on when stopping print when the no paper sensor detected paper end.

n = 3: Error status

Bit	Off/On	Hex	Decimal	Fuction
0	Off	00	0	Not used. Select off.
1	On	02	2	Not used. Select on.
2	Off	00	0	No mechanical error.
	On	04	4	Mechanical error occurred.
3	Off	00	0	No autocut error.
	On	08	8	Autocut error occurred.
4	On	10	16	Not used. Select on.
5	Off	00	0	No unrecoverable error.
	On	20	32	Unrecoverable error occurred.

6	Off	00	0	No automatically recoverable error.
	Off	40	64	Automatically recoverable error occurred.
7	On	00	0	Not used. Select off.

Bit 2: While the cover is opening, the printer showed it as the mechanical error.

Bit 6: If the temperature of print head is extremely high, bit 6 will be turn on, until temperature of the print head effectively comes down or open the cover during printing.

n = 4: Roll paper sensor status

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Not used. Select off.
1	On	02	2	Not used. Select on.。
2, 3	Off	00	0	No paper end detected by paper near-end sensor.
	On	0C	12	Paper near-end detected by paper near-end sensor.
4	On	10	16	Not used. Select on.
5, 6	Off	00	0	Paper near-end sensor: with paper.
	On	60	96	Paper near-end detect printing to the paper end.
7	Off	00	0	Not used. Select off.

[Reference] **DLE ENQ, GS a, GS r**

DLE ENQ n

[Name] Real-time request to printer

[Format] ASCII DLE ENQ n
 Hex 10 05 n
 Decimal 16 5 n

[Range] $1 \leq n \leq 2$

[Description] Responds to a request in real-time from the host computer. N appoint the following functions

n	Function
1	Recovers from a recoverable error and restarts printing from the line where the error occurred.
2	Recovers from a recoverable error after clearing the receive and print buffers.

- [Particularize]
- This command only effected when the autocutter error, cover open.
 - Deal with the data once the printer receive this command.
 - Though the printer is offline, full printing buffer or serial interface mode error, always execute this command.
 - In parallel interface mode, this command can not be executed when the printer is busy. When Memory Switch 1-3 is ON, even the printer is offline, the printer do not set BUSY.
 - **DLE ENQ 2** allow that the printer recovers after clearing receiving buffer area and printing area. When the printer keep the error occurred, it located in effective set (as **ESC I**, **ESC 3** etc) . Compeletly initialize the printer by this command and **ESC @**.

This command only effects for the error which can be recovered, except for print head temperature error.

- [Notes]
- Whenever receive `<10>H<05>H<n>` ($1 \leq n \leq 2$) data sequence, will send status.
For example:
`ESC * m nL nH dk`, $d1 = <10>H$, $d2 = <05>H$, $d3 = <01>H$
 - In the command data includes 2 or more bytes, can not use this command.
For example:
If want to send **ESC 3 n** to the printer, but before sending the n, DTR (For the host is DSR)will change to MARK, hence before receiving n, **DLE ENQ 2** to discontinue.
The code of **DLE ENQ 2** `<10>H` will be processed by the code `<10>H` of **ESC 3**.
- [Reference] **LE EOT**

ESC FF

- [Name] Print data in page mode
- [Format]
- | | | |
|---------|-----|----|
| ASCII | ESC | FF |
| Hex | 1B | 0C |
| Decimal | 27 | 12 |
- [Description] In page mode, put together to print all data in the printing buffer area.
- [Particularize] This effected only in page mode.
- After printing, the printer do not clear the data which set by ESC T and ESC W and the characters data position in the buffer area.
- [Reference] **FF , ESC L , ESC S**

ESC SP n

- [Name] Set right-side character spacing
- [Format]
- | | | | |
|---------|-----|----|---|
| ASCII | ESC | SP | n |
| Hex | 1B | 20 | n |
| Decimal | 27 | 32 | n |
- [Range] $0 \leq n \leq 255$
- [Description] Set right-side character spacing [$n \times 0.125$ mm].
- [Particularize]
- For double width mode, right-side character spacing is the twice than the usual mode. When the characters enlarges to n times, right-side character spacing is the n times than the usual mode.
 - This command does not affect the setting of the Chinese characters.
 - This command set right-side character spacing in stable mode and page mode.
- [Default] $n = 0$

ESC ! n

- [Name] Select print modes
- [Format]
- | | | | |
|---------|-----|----|---|
| ASCII | ESC | ! | n |
| Hex | 1B | 21 | n |
| Decimal | 27 | 33 | n |
- [Range] $0 \leq n \leq 255$

[Description] Select print modes by the data of appointing parameter n. The definition of n as follows:

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Character type A (12 × 24)。
	On	01	1	Character type B (9 × 17)。
1	-	-	-	Undefined
2	-	-	-	Undefined
3	Off		0	Emphasized mode is turned off.
	On		8	Emphasized mode is turned on.
4	Off		0	Double height canceled
	On		16	Double height selected
5	Off		0	Double width canceled
	On		32	Double width selected
6	-	-	--	Undefined
7	Off		0	Underline mode is turned off
	On		128	Underline mode is turned on

- [Particularize] When selecting the double height and width mode at the same time, print 4 times characters.
- The printer can add the underline to all characters, but can not add the underline to blank and clockwise switching 90 which set by HT command.
- The thickness of the underline set by ESC, unrelated with the character size.
 - When the double or more height characters in one line, all characters will be justified along basis line
 - **ESC M** could be set the font type of characters. The last command received that is effective.
 - **ESC E** Emphasized mode is turned on/off. The last command received that is effective.
 - **ESC -** Under mode is turned on/off, the last command received that is effective.
 - **GS I** Set character size. The last command received that is effective.
 - Emphasized mode is affect for English and Chinese characters. All print mode only affect for English expect for emphasized mode.

[Default] n = 0

[Reference] **ESC -, ESC E, GS I**

ESC \$ nL nH

[Name] Set absolute print position

[Format]	ASCII	ESC	\$	nL	nH
	Hex	1B	24	nL	nH
	Decimal	27	36	nL	nH

[Range] $0 \leq nL \leq 255$

$0 \leq nH \leq 255$

[Description] Set the distance from the beginning of one line to the position which will be printed the characters.

The distance from the beginning of one line to the position which will be printed is:

$[(nL + nH \times 256) \times 0.125 \text{ mm}]$.

[Particularize] • The set which be appointed as the print area will be ignored.

•

In stable mode, use the horizontal motor unit (x).

- In page mode, horizontal or vertical motor unit which will be different as the original of printable area, as follows:

① When **ESC T** set the original position to the up left or lower right printable area, using the horizontal motor unit (x).

② When **ESC T** set the original position to the up right or lower left printable area, using the vertical motor unit (y).

[Reference] **ESC \, GS \$, GS **

ESC % n

[Name] Select/cancel user-defined character set

[Format]	ASCII	ESC	%	n
Hex		1B	25	n
Decimal		27	37	n

[Range] $0 \leq n \leq 255$

[Description] Select/cancel user-defined character set.

- When the LSB of n is 0, the user-defined character set is canceled.
- When the LSB of n is 1, the user-defined character set is selected.

[Particularize] • When select cancel user-defined character set, automatically select inner character set.

- n only valid at least significant bit.

[Default] n = 0

[Reference] **ESC &, ESC ?**

ESC & y c1 c2 [x1 d1...d(y × x1)]...[xk d1...d(y × xk)]

[Name] Define user-defined characters

[Format]	ASCII	ESC	&	y c1 c2 [x1 d1...d(y × x1)]...[xk d1...d(y × xk)]
Hex		1B	26	y c1 c2 [x1 d1...d(y × x1)]...[xk d1...d(y × xk)]
Decimal		27	38	y c1 c2 [x1 d1...d(y × x1)]...[xk d1...d(y × xk)]

[Range] y = 3

$32 \leq c1 \leq c2 \leq 126$

$0 \leq x \leq 12$ (when font A (12 × 24) is selected)

$0 \leq x \leq 9$ (when font B (9 × 17) is selected)

$0 \leq d1...d(y \times xk) \leq 255$

[Description] Define user-defined characters.

- y specifies the number of bytes in the vertical direction.
- c1 specifies the beginning character code for the definition, and c2 specifies the final code.
- x specifies the number of dots in the horizontal direction.

[Particularize] • Characters code can be defined: ASCII from <20>H to <7E>H (95 characters).

- The continued characters code of several characters can be undefined. When only need one character, so $c1 = c2$.
- d is the dot data of characters. Dot mode is from the left in horizontal direction. The right left dots are blank.
- Define the data of user-defined character is (y × x) bytes.

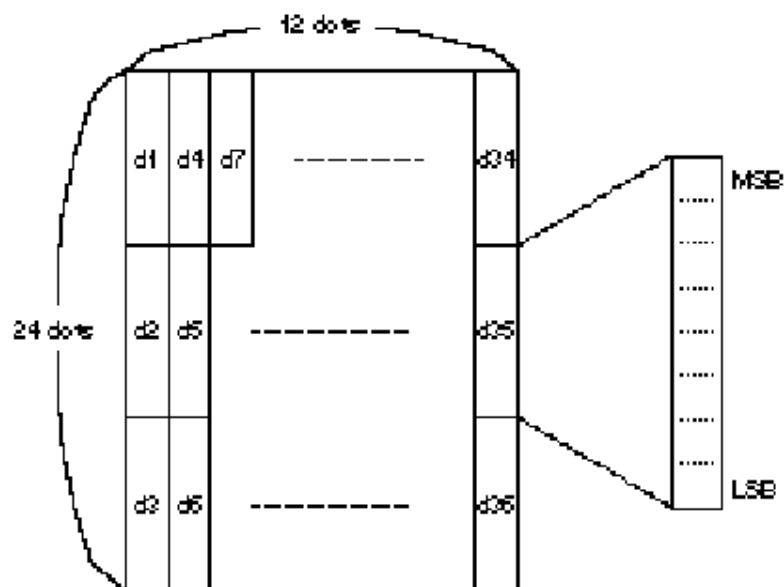
- Set the relevant of printing dot is 1 or 0 which is the relevant of do not printing the dots.
- Define the different user-defined character mode for each character type by this command. Set the character type by **ESC I** or **ESC M**.
- User-defined character and download bit image can not define at the same time. When executing this command, download bit image will be cleared.
- Under the following situations, user-defined characters will be cleared:
 - ① Execute **ESC @**.
 - ② Execute **GS ***.
 - ③ Execute **ESC ?**.
 - ④ The printer reset or turn the power off.
- When the user-defined characters defines in character typeB (9 ~ 17), only effect to the highest variable bit of the third byte in the vertical direction data.

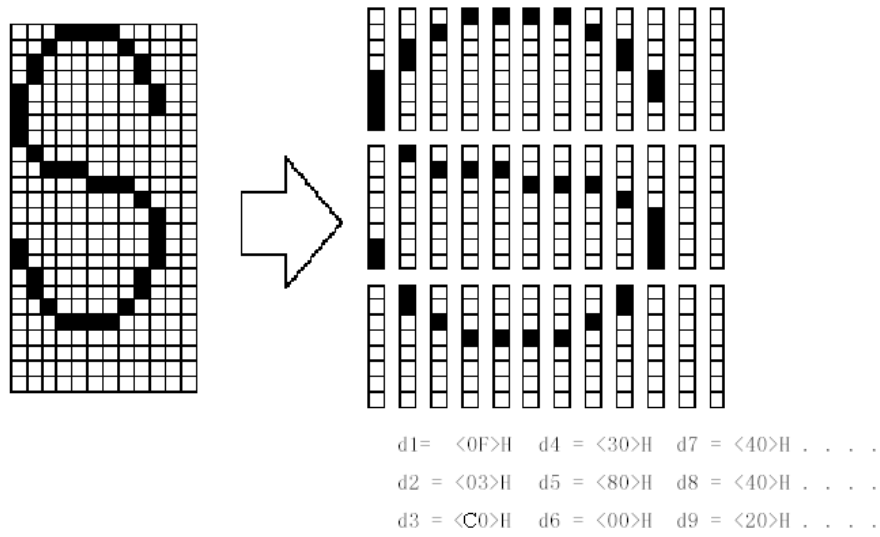
[Default] Inner character font

[Reference] **ESC %, ESC ?**

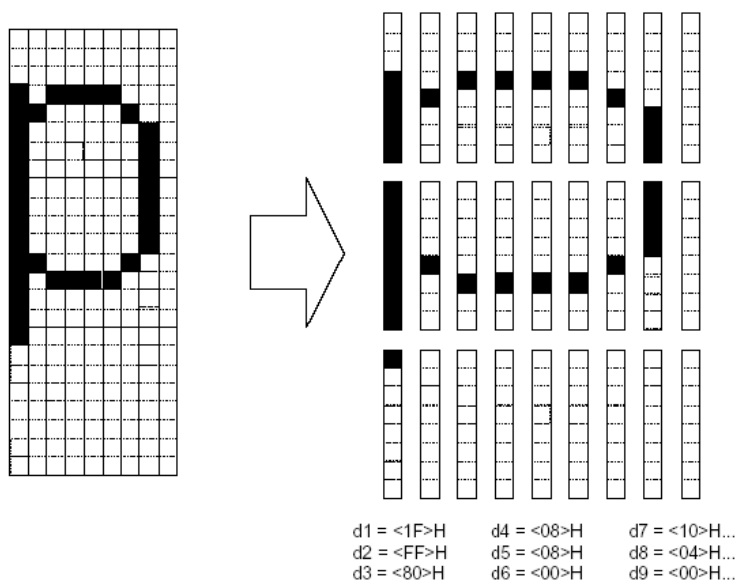
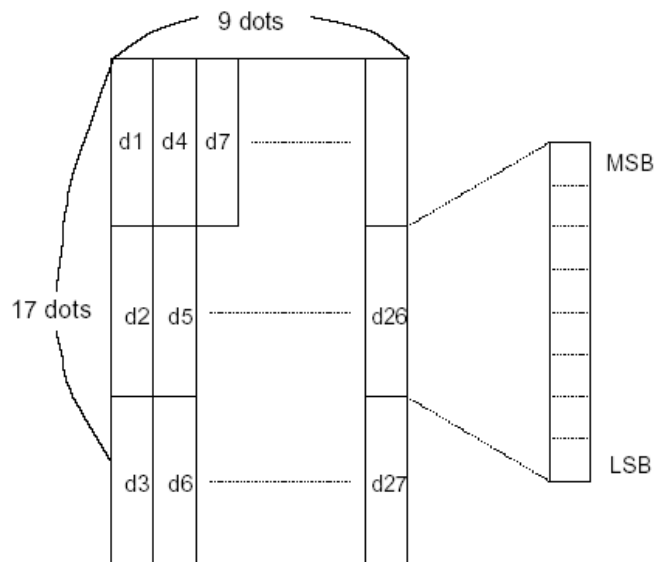
[For example]

- When setting the character type A (12 × 24).





- When set the character type B (9 × 17).



ESC * m nL nH d1... dk

[Name] Select bit-image mode

[Format] ASCII ESC * m nL nH d1...dk
 Hex 1B 2A m nL nH d1...dk
 Decimal 27 42 m nL nH d1...dk

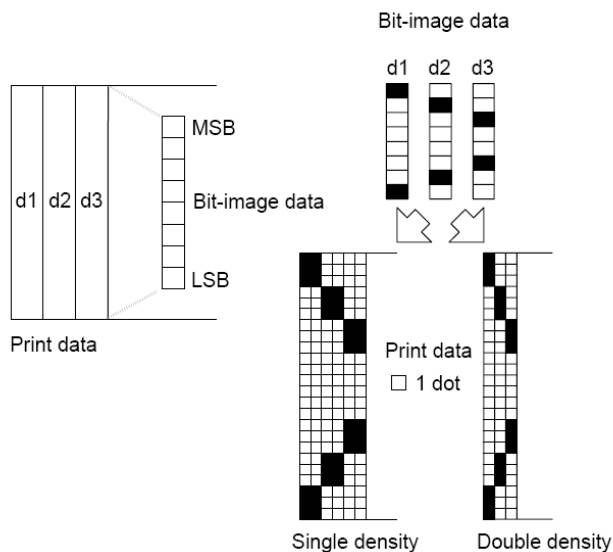
[Range] m = 0, 1, 32, 33
 $0 \leq nL \leq 255$
 $0 \leq nH \leq 3$
 $0 \leq d \leq 255$

[Description] Selects bit-image mode by m, the bit image dot set by nL and nH, as above table:

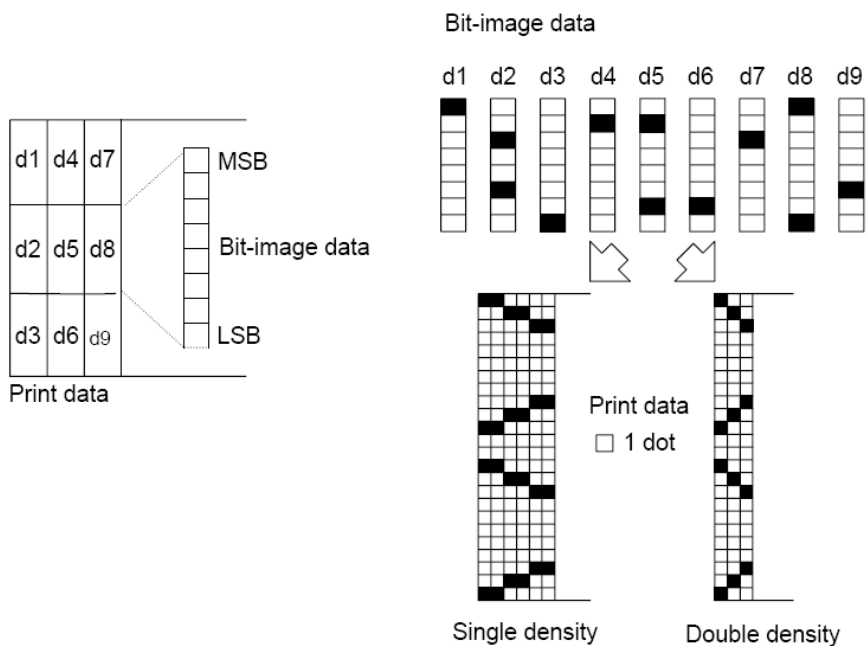
m	Mode	Vertical direction		Horizontal direction	
		Dot	Dot density	Dot density	Data number (K)
0	8-dot single-density	8	67.7 dpi	101.6 dpi	$nL + nH \times 256$
1	8-dot double-density	8	67.7 dpi	203.2 dpi	$nL + nH \times 256$
3 2	24-dot single-density	24	203.2 dpi	101.6 dpi	$(nL + nH \times 256) \times 3$
3 3	24-dot double-density	24	203.2 dpi	203.2 dpi	$(nL + nH \times 256) \times 3$

Dpi: {1 inch}/25.4mm print dot

- [Notes] If the data of m overs the defined range, then the data of n and after n will be dealt as the rule data.
- nL and nH indicates the bit-image data in the horizontal direction. Calculate the dot through $nL + nH \times 256$.
 - If input the bit-image data that overs the printable dots in one line, then the over data will be ignored.
 - d indicates bit-image data. Set the relative bit to 1 and print one point, or set to 0 and do not print one point.
 - If the printable width which set by **GS L** and **GS W** is smaller than the data which sent by ESC *, Then executing the following operation to the line which have problems (but the printing can not over the max printable area):
 - ① The printable width extend to the right and meet the data content.
 - ② If the step ① can not apply the enough width to the data, so the left will be decreased to apply the relative data. For the bit data in the single density mode (m = 0, 32), The printer has two points: for the bit dat in the double density mode (m = 1, 33), the printer prints one point. When calculating the data content in one line, these have to consider.
 - After printing one bit-image, the printer return to the common data dealing mode.
 - This command won't be affected by printing mode(bold、overlapping、underline、character size、 or inverse printing), except for upside down print mode.
 - The following figures describes the the relationship of image data and printing dot.
 - 8-dot bit-image is selected:



- 24-dot bit-image is selected:



ESC – n

[Name] Turn underline mode on/off

[Format]

ASCII	ESC	-	n
Hex	1B	2D	n
Decimal	27	45	n

[Range] $0 \leq n \leq 2, 48 \leq n \leq 50$

[Description] Turns underline mode on/off:

n	Function
0, 48	Turns off underline mode.
1, 49	Turns on underline mode (1 dot width)
2, 50	Turns on underline mode (2 dot width)

[Notes]	<ul style="list-style-type: none"> • The printer can print all character with underline (include the right spacing of character), except for blank which set by HT. • The printer can not print underline of the character of clockwise 90 and reverse character. • Turns off underline mode by setting the data of n with 0 or 48, the following data won't print underline, and the bold won't change before turing off underline mode. The bold of default underline is 1 dot. • Changes the character size won't affect the bold of underline. • Turned on/off underline mode by ESC !. but notes that the last receiving command is valid.
[Default]	n = 0
[Reference]	ESC !

ESC 2

[Name]	Select default line spacing		
[Format]	ASCII	ESC	2
	Hex	1B	32
	Decimal	27	50
[Description]	Sets the line spacing to 3.75mm (30 ´ 0.125mm).		
[Note]	Line spacing set independently in stable mode and page mode.		
[Reference]	ESC 3		

ESC 3 n

[Name]	Set line spacing			
[Format]	ASCII	ESC	3	n
	Hex	1B	33	n
	Decimal	27	51	n
[Range]	$0 \leq n \leq 255$			
[Description]	Set line spacing [n × 0.125mm].			
[Notes]	Sets line spacing independently in stable mode and page mode.			
	<ul style="list-style-type: none"> • In stable mode, uses vertical unit (y). 			
	<ul style="list-style-type: none"> • In page mode, as the printable original position, the function of this command as followings: 			
	<ul style="list-style-type: none"> ① When set the original position to printable up left or down right by ESC T, uses vertical motor unit (y). ② When set the original position to printable up right or down left by ESC T, used the horizontal motor unit (x). 			
[Default]	n = 30			
[Reference]	ESC 2			

ESC ? n

[Name]	Cancel user-defind characters			
[Format]	ASCII	ESC	?	n
	Hex	1B	3F	n
	Decimal	27	63	n

[Range]	$32 \leq n \leq 126$
[Description]	Cancel user-defined characters.
[Notes]	<ul style="list-style-type: none">• This command stops the type which defined for character code, character code set by n• After canceling the user-defined character, prints with inner character relative mode.• Select character type by ESC !, this command selects the type which defined the pointed code.• If one of the user-defined characters do not define, then the printer ignore this command.
[Reference]	ESC & , ESC %

ESC @

[Name]	Initialize printer
[Format]	ASCII ESC @ Hex 1B 40 Decimal 27 64
[Description]	Clears the data in the print buffer and resets the printer modes to the modes that were in effect when the power was turned on.
[Notes]	<ul style="list-style-type: none">• The set of DIP switch and Memory Switch won't check.• The data in receiving buffer area won't be cleared.• Macro definition won't be cleared.

ESC D n1 . . . nk NUL

[Name]	Set horizontal tab positions
[Format]	ASCII ESC D n1 . . . nk NUL Hex 1B 44 n1 . . . nk 00 Decimal 27 68 n1 . . . nk 0
[Range]	$1 \leq n \leq 255$ $0 \leq k \leq 32$
[Description]	Set horizontal tab positions. <ul style="list-style-type: none">• n specifies the number from the beginning of one line, uses to set horizontal position.• k indicates the total data which set by horizontal position.
[Notes]	<ul style="list-style-type: none">• Horizontal position as a data to store, this data is [character width ´ n], is measuring from the beginning of the line. The character width includes the right spacing of the character, and double width character set by double width of stable character.• This command selects the horizontal position which set before.• When set n = 8, the print position moved to the ninth row by sending HT.• Could be set position to 32 (k = 32). The data overs 32 will be dealt as normal data.• As sort ascending to transmit [n] k and put one NUL 0 at last. When [n] k is less than or equal to the fore data, sets position which be finished, and the continued data dealt as normal data.• ESC D NUL cancel all horizontal position.• Even if changes the character width, the fore specified horizontal position also do not change.

- For stable and page mode, character width will be memoried.

[Default] Default position is 8 character spacing (raw 9, 17, 25 ...) of type A (12 ´ 24).

[Reference] **HT**

ESC E n

[Name] Turn emphasized mode on/off

[Format]	ASCII	ESC	E	n
	Hex	1B	5	n
	Decimal	27	69	n

[Range] $0 \leq n \leq 255$

[Description] Turn emphasized mode on/off.

When the LSB of n is 0, emphasized mode is turned off.

When the LSB of n is 1, emphasized mode is turned on.

[Notes]

- Permits to only the LSB of n.
- This command turns emphasized mode on/off by the same command as ESC ! Be care, when this command used the same time as ESC !.

[Default] n = 0

[Reference] **ESC I**

ESC G n

[Name] Turn double-strike mode on/off

[Format]	ASCII	ESC	G	n
	Hex	1B	47	n
	Decimal	27	71	n

[Range] $0 \leq n \leq 255$

[Description] Turn double-strike mode on/off.

- When the LSB of n is 0, double-strike mode is turned off.

- When the LSB of n is 1, double-strike mode is turned on.

[Notes]

- Permits to use only the LSB of n.
- The same output in double-strike mode and emphasized mode.

[Default] n = 0

[Reference] **ESC E**

ESC i

[Name] Full cut

[Format]	ASCII	ESC	i
	Hex	1B	69
	Decimal	27	105

[Description] After receiving this command, the printer executes full cut.

[Note] As it won't feed paper when executing this command, please assures that feed paper 5mm or more before executing this command next time, to avoid that the cutter be damaged.

[Default] The default is partial cut mode.

ESC J n

[Name]	Print and feed paper			
[Format]	ASCII	ESC	J	n
	Hex	1B	4A	n
	Decimal	27	74	n
[Range]	$0 \leq n \leq 255$			
[Description]	Prints and outputs the data in print buffer area, and feed paper [$n \times 0.125$ mm].			
[Notes]	<ul style="list-style-type: none"> • After printing, this command set the original position to the beginning of one line. • The feed paper quatinty do not affect the data which set by ESC 2 or ESC 3. • In stable mode, the printer uses vertical unit(y). • In page mode, according to the printable original position, the function of this command as follows: <ol style="list-style-type: none"> ① When set original position to printable up left or down right by ESC T, uses vertical motor unit (y). ② When set original position to printable up right or down left by ESC T, uses horizontal motor unit (x). 			

ESC L

[Name]	Select page mode		
[Format]	ASCII	ESC	L
	Hex	1B	4C
	Decimal	27	76
[Description]	From stable mode to page mode.		
[Notes]	<ul style="list-style-type: none"> • In stable mode, this command affects only the beginning of one line. • This command is invalidate in page mode. • Finishes the printing by FF or executes ESC S, the printer returns to the stable mode. • This command set the position of data buffer area which be set by ESC T in printable area. Printable range defines by ESC W. • This command set the following commands (In these commands, the data of stable mode and page mode could be set separately) as the relevant set in page mode. <ol style="list-style-type: none"> ① Set the right characters spacing: ESC SP ② Select default line spacing: ESC 2 , ESC 3 • In page mode, only can set the following command data; but do not execute these commands. <ol style="list-style-type: none"> ① Set/cancel clockwise 90° Rotate: ESC V ② Select alignment: ESC a ③ Set/cancel reverse print mode: ESC { ④ Set left page spacing: GS L ⑤ Set print area width: GS W • Turn the power on, printing reset or uses ESC @, The printer return to stable mode. 		
[Reference]	FF , CAN , ESC FF , ESC S , ESC T , ESC W , GS \$, GS \		

ESC m

[Name]	Partial cut
--------	-------------

[Format]	ASCII	ESC	m
	Hex	1B	6d
	Decimal	27	109

[Description] The printer received this command, then executing partial cut at present position.

[Note] As the printer do not feed paper when executing this command, so before executing this command in the next time, assure that feed paper at least 5mm or more, prevent cutter broken.

[Default] Partial cut mode is default.

ESC M n

[Name] Select character font

[Format]	ASCII	ESC	M	n
	Hex	1B	4D	n
	Decimal	27	77	n

[Range] n = 0, 1, 48, 49

[Description] Select character font

n	Function
0, 48	Select character font A (12 × 24)
1, 49	Select character font B (9 × 17)

[Particularize] • **ESC I** could be selected character type. But, the set by command received at last is valid.

[Reference] **ESC I**

ESC R n

[Name] Select an international character set

[Format]	ASCII	ESC	R	n
	Hex	1B	52	n
	Decimal	27	82	n

[Range] 0 ≤ n ≤ 13

[Description] Select an international character set according to the following table.

n	International character set
0	USA
1	France
2	Germany
3	UK
4	Denmark I
5	Sweden
6	Italy
7	Spain I
8	Japan
9	Norway
10	Denmark II
11	Spain II

1	
1	Latin America
2	
1	Korea
3	

[Default] n = 0

[Reference] International character set

ESC S

[Name] Select standard mode

[Format]	ASCII	ESC	S
	Hex	1B	53
	Decimal	27	83

[Description] Switch from page mode to standard mode.

[Notes]

- This command only effects in page mode.
- In page mode Clear the data in buffer area.
- This command set the original of the line as the print position.
- The print area set by ESC W which be initialized.
- This command set the following commands (In these commands, the data of stable mode and page mode could be set separately) as the relevant set in stable mode:

① Set right side character spacing: **ESC SP**

② Select default line spacing: **ESC 2** , **ESC 3**

[Reference] **FF** , **ESC FF** , **ESC L**

ESC T n

[Name] Select print direction in page mode

[Format]	ASCII	ESC	T	n
	Hex	1B	54	n
	Decimal	27	84	n

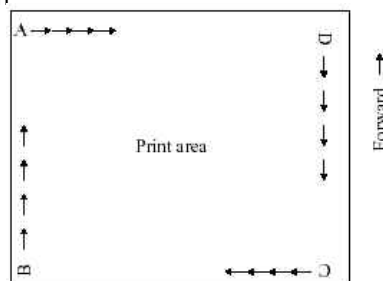
[Range] $0 \leq n \leq 3$

$48 \leq n \leq 51$

[Description] In page mode, selects the print direction and starting position.

Parameter n which used to be pointed print direction and starting position, as follows:

n	Print direction	Starting position
0, 48	Left to right	Upper left (Figure A)
1, 49	Bottom to top	Lower left (Figure B)
2, 50	Right to left	Lower right (Figure C)
3, 51	Top to bottom	Upper right (Figure D)



[Notes]

- Input this command in stable mode, the printer only executes inner signs operation. This command can not be affected print in stable mode.

- This command in print area which set by ESC W, set the data buffer position.

[Default] n = 0

[Reference] **ESC \$, ESC L , ESC W , ESC \ , GS \$, GS **

ESC V n

[Name] Turn 90 clockwise rotation mode on/off

[Format]	ASCII	ESC	V	n
	Hex	1B	56	n
	Decimal	27	86	n

[Range] $0 \leq n \leq 1, 48 \leq n \leq 49$

[Description] Turn 90 clockwise rotation mode on/off

N	Fuction
0, 48	Turn off 90 clockwise rotation mode
1, 49	Turn on 90 clockwise rotation mode

- [Notes]
- This command effects print in stable mode. And the set always effects.
 - When setting the underline mode, for 90 clockwise rotation character, the printer do not be add the underline.°
 - In 90 clockwise rotation mode, the direction of enlarging characters which set by double height and width is relative with the direction in general mode.

[Default] n = 0

[Reference] **ESC ! , ESC -**

ESC W xL xH yL yH dxL dxH dyL dyH

[Name] Set print area in page mode

[Format]	ASCII	ESC	W	xL xH yL yH dxL dxH dyL dyH
	Hex	1B	57	xL xH yL yH dxL dxH dyL dyH
	Decimal	27	87	xL xH yL yH dxL dxH dyL dyH

[Range] $0 \leq xL, xH, yL, yH, dxL, dxH, dyL, dyH \leq 255$ (except $dxL = dxH = 0$ or $dyL = dyH = 0$)

[Description]

- x0, y0, dx, dy specify the horizontal and vertical starting position, print area width and height separately.

Each item setting data in print area as follows:

$$x0 = [(xL + xH \times 256) \times 0.125 \text{ mm}]$$

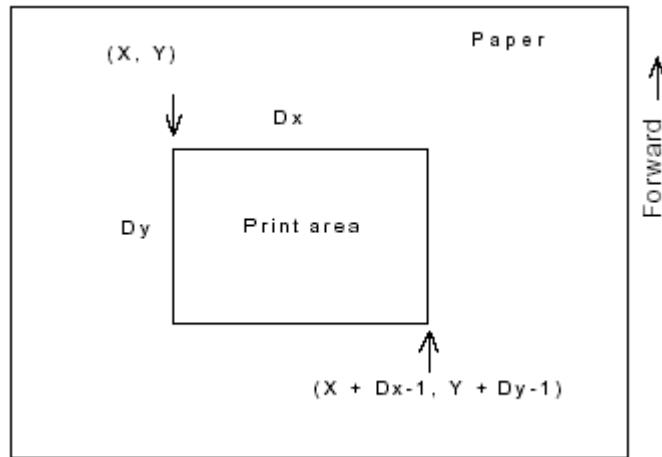
$$y0 = [(yL + yH \times 256) \times 0.125 \text{ mm}]$$

$$dx = [(dxL + dxH \times 256) \times 0.125 \text{ mm}]$$

$$dy = [(dyL + dyH \times 256) \times 0.125 \text{ mm}]$$

- [Notes]
- If input this command in stable mode, the printer only executes inner sign operation. This command can not be affected print in stable mode.
 - If the set of horizontal and vertical starting position overs printable area, printer stops command processing and deal with the continued data as normal data.
 - If the set of print area width and height is 0, printer stops command processing and deal with the continued data as normal data.
 - This command set the data buffer area the same as the position which set by ESC T in the print area.
 - If (horizontal starting position + print area width) overs printable area, print area width set automatically (horizontal printable area – horizontal starting position).
 - If (vertical starting position + print area height) overs printable area, print area height set automatically (vertical printable area – vertical starting position).

- Set horizontal starting position and print area width by using 0.125mm spacing, and set vertical starting position and print area height.
- x0, y0, dx and dy specify horizontal starting position, vertical starting position, print area width, print area height separately, print area set as follows:



[Default] xL = xH = yL = yH = 0

[Reference] **CAN** , **ESC L** , **ESC T**

ESC \ nL nH

[Name]	Set relative print position				
[Format]	ASCII	ESC	\	nL	nH
	Hex	1B	5C	nL	nH
	Decimal	27	92	nL	nH
[Range]	$0 \leq nL \leq 255$				
	$0 \leq nH \leq 255$				
[Description]	<p>On basis of present position, set print starting position by horizontal and vertical motor unit.</p> <ul style="list-style-type: none"> • This command set the print position from present position to $[(nL + nH \times 256) \times 0.125 \text{ mm}]$. 				
[Notes]	<ul style="list-style-type: none"> • Any set over printable area which will be ignored. • Spacing N points the right: $nL + nH \times 256 = N$ Spacing <i>N point the left</i>. (negative direction), uses 65536 complement code. $nL + nH \times 256 = 65536 \times N$ • In stable mode, uses horizontal motor unit. • In page mode, according to the different of print area starting position, the difference of horizontal motor unit and vertical motor unit as follows: <ol style="list-style-type: none"> ① Set the starting position upper left or lower right by ESC T, uses horizontal motor unit (x). ② Set the starting position upper right or lower left by ESC T, uses vertical motor unit (y). 				
[Reference]	ESC \$				

ESC a n

[Name] Select justification

[Format] ASCII ESC a n
 Hex 1B 61 n
 Decimal 27 97 n

[Range] $0 \leq n \leq 2, 48 \leq n \leq 50$

[Description] Justify a line data according to the point position

Select justification by n as follows:

n	Justification
0, 48	Left justification
1, 49	Centering
2, 50	Right justification

- [Notes]
- In stable mode, this command is valid only the original line.
 - If input this command in page mode, printer only executes inner sign operation.
This command invalids in page mode.
 - This command executes justification in print area.
 - This command justifies the blank area according to **HT** , **ESC \$** or **ESC **.

[Default] n = 0

[Examples]

Left justification
justification

```

ABC
ABCD
ABCDE

```

Centering

```

      ABC
     ABCD
    ABCDE

```

Right

```

                ABC
               ABCD
              ABCDE

```

ESC c 3 n

[Name] Select paper sensors to output paper-end signals

[Format] ASCII ESC c 3 n
 Hex 1B 63 33 n
 Decimal 27 99 51 n

[Range] $0 \leq n \leq 255$

[Description] Select paper sensors to output paper-end signals.

- Uses each parameter n as follows:

Bit	Off/O n	Hex	Decimal	Function
0	Off	-	-	Undefined.
1	Off	00	0	Roll paper near-end sensor disable.
	On	02	2	Roll paper near-end sensor enable.
2	Off	-	-	Undefined.
3	Off	00	0	Roll paper end sensor disable.

	On	08	8	Roll paper end sensor enable.
4-7	-	-	-	Undefined.

- [Notes]
- Select several sensors and input signal. In this case, if any one of sensors detect paper out, it will output paper out signal.
 - This command only effects to parallel interface, in serial interface mode, this command will be ignored.

[Default] n = 0

ESC c 4 n

[Name] Select paper sensors to stop printing

[Format]	ASCII	ESC	c	4	n
	Hex	1B	63	34	n
	Decimal	27	99	52	n

[Range] $0 \leq n \leq 255$

[Description] Selects the paper sensor to stop printing when paper end detected.

Bit	Off/On	Hex	Decimal	Fuction
0	Off	-	-	Undefined.
1	On	00	0	Roll paper near end sensor disabled.
	Off	02	2	Roll paper near end sensor enabled.
2-7	-	-	-	Undefined.

- [Notes]
- When this command enables one roll paper sensor, only uses the related roll paper, the printer will be stopped.
 - When paper end sensor detects the end of paper, the printer stops printing and enters to offline condition.
 - When bit 1 is on, the printer selects paper near end sensor and stops printing.

[Default] n = 0

ESC c 5 n

[Name] Enable/disable panel buttons

[Format]	ASCII	ESC	c	5	n
	Hex	1B	63	35	n
	Decimal	27	99	53	n

[Range] $0 \leq n \leq 255$

[Description] Enable/disable panel buttons.

- When the LSB of n is 0, the panel buttons are enabled.
- When the LSB of n is 1, the panel buttons are disabled.

- [Notes]
- Only uses the LSB of n.
 - If disable the panel buttons, so close the printer cover, all buttons are disable.
 - For this printer, the only one panel button is feed paper button.
 - When locates in macro executing conditions, however how to set this command,

feed paper button are enable. But can not feed paper.

[Default] n = 0

ESC d n

[Name] Print and feed n lines

[Format]	ASCII	ESC	d	n
	Hex	1B	64	n
	Decimal	27	100	n

[Range] $0 \leq n \leq 255$

[Description] Prints the data in the right buffer and feeds the paper n.

[Notes]

- This command set the print starting position to line starting position.
- This command can not effect the line spacing which set by ESC 2 or ESC 3.
- The max feed paper measure is 1016 mm{40inch}. If the specified feed paper measure (n line spacing) overs 1016mm{40inch}, so the printer only feed paper 1016mm{40 inch}.

[Reference] **ESC 2 , ESC 3**

ESC t n

[Name] Select character code table

[Format]	ASCII	ESC	t	n
	Hex	1B	74	n
	Decimal	27	116	n

[Range] $0 \leq n \leq 5, 16 \leq n \leq 19, n = 255$

[Decription] Select page n from the character code table.

n	Page
0	PC437 [USA Standard Europe]
1	Katakana
2	PC850 [Multilingual]
3	PC860 [Poruguese]
4	PC863 [Canadian-French]
5	PC865 [Nordic]
16	WPC1252
17	PC866 [Cyrillic 2]
18	PC852 [Latin 2]
19	PC858 [Euro]
25	Space page
5	

[Default] n = 0

[Reference] Character tables

ESC { n

[Name] Turn upside-down print mode on/off

[Format]	ASCII	ESC	{	n
	Hex	1B	7B	n
	Decimal	27	123	n

[Range] $0 \leq n \leq 255$

[Description] Turn upside-down print mode on/off.

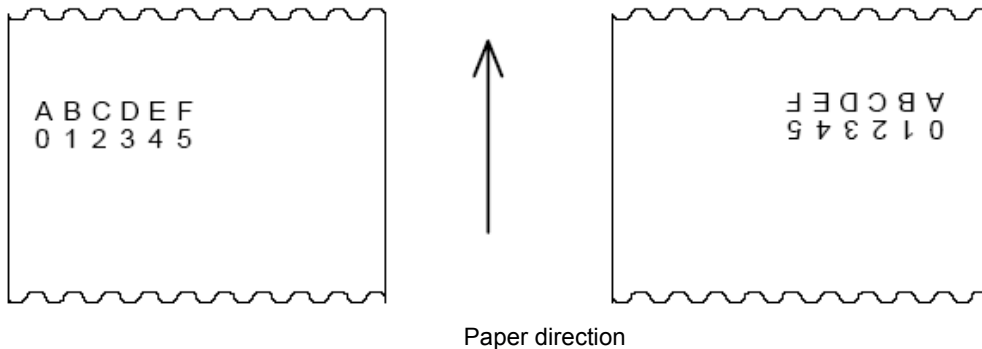
- When the LSB of n is 0, upside-down print mode is turned off.
- When the LSB of n is 1, upside-down print mode is turned on.

[Notes]

- Effect when the LSB of n.
- This command effects only when input at the starting of a line in stable mode.
- This command can not affect the print in page mode.
- In upside-down mode, the printer rotates 180° to the line which need to print, then printing.

[Default] n = 0

[Examples]



FS p n m

[Name] Print NV bit image

[Format]	ASCII	Hex	FS	p	n	m
			1C	70	n	m
			28	112	n	m

[Range] $1 \leq n \leq 255$

$0 \leq m \leq 3, 48 \leq m \leq 51$

[Description] Prints NV bit image n using m.

m	Mode	Vertical direction	Horizontal direction
0, 48	Normal	203.2 dpi	203.2 dpi
1, 49	Double -width	203.2 dpi	101.6 dpi
2, 50	Double -height	101.6 dpi	203.2 dpi
3, 51	Quadru ple	101.6 dpi	101.6 dpi

dpi: per 25.4 mm{1inch} print dot

- n is the quantity of NV bit image(defined by ES q).
- m specify bit image mode

[Particularize]

- NV bit image defined bit image in NVM. Define by FS q, print by FS P.
- When the appointed NV bit image absent, this command is invalid.
- In stable mode, this command effects only when there are no data in buffer area.
- In page mode, this command is invalid.
- This command do not effected by print mode (bold print, overlap print, underline, character size, anti-white print or character 90 rotation etc.) , except reversal print mode.

- If set the NV bit image print area width which is less than a vertical line by GS L and GS W, Executes the following operation only for problem line. In NV bit image mode, a vertical line means the dot of normal mode (m= 0, 48) and double height mode (m= 2, 50), two dots of double width mode (m= 1, 49) and quadruple mode (m= 3, 51).
- ① In NV bit image mode, the print area width extends to right to a vertical line. In this case, print can not over the print area.
- ② If the print area width can not extend to a vertical line, the left blank decreases to contain a vertical line.
- If the download bit image overs one line, do not print the over data.
- In normal and double width mode, this command feed paper n dots, n is the height of NV bit image, In double height and quadruple mode, this command feed paper 2n dots, n is NV bit image height, do not related with the line spacing which set by ESC 2 and ESC 3.
- After printing bit image, this command set the print position at the original of one line, and deal with the continued data as normal data.

[Reference] **ESC *, FS q , GS / , GS v 0**

FS q n [xL xH yL yH d1...dk]1...[xL xH yL yH d1...dk]n

[Name] Define NV bit image

[Format] ASCII FS q n [xL xH yL yH d1...dk]1...[xL xH yL yH d1...dk]n
Hex 1C 71 n [xL xH yL yH d1...dk]1...[xL xH yL yH d1...dk]n
Decimal 28 113 n [xL xH yL yH d1...dk]1...[xL xH yL yH d1...dk]n

[Range] $1 \leq n \leq 255$
 $0 \leq xL \leq 255$
 $0 \leq xH \leq 3$ (when $1 \leq (xL + xH \times 256) \leq 1023$)
 $0 \leq yL \leq 255$
 $0 \leq yH \leq 1$ (when $1 \leq (yL + yH \times 256) \leq 288$)
 $0 \leq d \leq 255$
 $k = (xL + xH \times 256) \times (yL + yH \times 256) \times 8$
Total defined data area = 192K byte

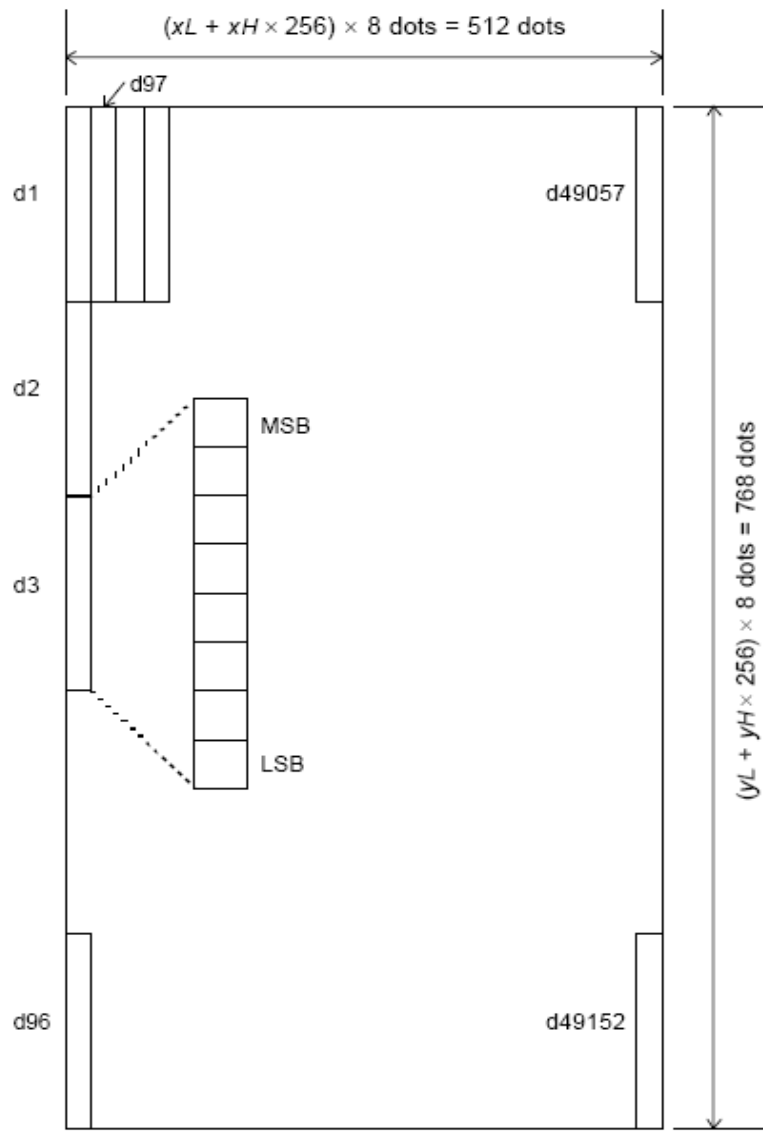
[Description] Set NV bit image by specified n.

- n specify the quantity of NV bit image.
- xL, xH for defined NV bit image points the dot of horizontal direction ($xL + xH \times 256$) $\times 8$.
- yL, yH for defined NV bit image points the dot of vertical direction ($yL + yH \times 256$) $\times 8$.

[Particularize] This command cancels all defined NV bit image by this command. The defined data, the printer can not define anyone of data repeatedly. If repeat certain data, so all data should be sent once again.

- During deal with this command to finish resetting hardware, can not execute mechanism operation (contains when the cover is open to initialize the print head position, feed paper by feed paper button etc.) .
- During deals with this command, when writing data to user NV memory, the printer is busy and stop receiving data. So forbid to transmit data during execute this command, contain real-time command.

- NV bit image is one bit image which defines in NVM. Prints by FS p which defined by FS q.
- In stable mode, This command only effects on the original line.
- In page mode, this command is invalid.
- The 7 bytes <FS~ yH> of this command, after normal dealing with, this command effects.
- When the data quantity overs the left capacity range, the printer processes the range which defined by xL, xH, yL, yH.
- At the first group bit image, when any parameters in xL, xH, yL, yH overs the defined range, this command is disabled.
- At any one of group bit image except for the first group, when the printer meets that xL, xH, yL, yH overs the defined scale, stops processing this command, and begins to write NV image. At this moment, the undefined NV bit image (undefined) is disabled, but any NV bit image defined before always affects.
- .d indicates defined data. At the data (d), one bit specifies one dot which need to print and one 0 bit specifies one dot which do not need to print.
- .This command put n to define as the quantity of NV bit image. The quantity goes up from bit image 01H. So the first data group [xL xH yL yH dL...dK] is the NV bit image 01H. The last data group [xL xH yL yH dL...dK] is the NV bit image n. The total the same as the NV bit image quantity which be set by FS p.
- . One NV bit image defined data consists of [xL xH yL yH dL...dK]. So, when only has one NV bit image n=1, the printer only processes the data group [xL xH yL yH dL...dK] once. The printer uses $((\text{data}:(xL+xH \times 256) \times (yL+yH \times 256) \times 8) + [\text{header}:4])$ bytes of the NV memory.
- .The defined area of this printer is 192K bytes (max). This command can define several bit images, but can't define the bit image which the total capacity [bit image data+head] overs 192K bytes.
- .Whatever how to set DIP switch 2-1, the printer enters "busy" before writing NV memory.
- .Even set ASB, the printer do not send the ASB status or execute status test during process this command.
- .When receive this command during macro definition, the printer stops macro definition and executes this command.
- .Once defines one NV bit image, it can't be executed ESC @, and deleted when reset and power off.
- .This command only executes the definition of NV bit image, do not execute print. NV bit image print executed by FS p.
- [Notes] . Writes command frequently which could be broken the NV memory.
So, suggests that executes the written operation less than ten times.
- .After the process of putting one bit image into NV memory, the printer executes one hardware reset operation. So, defines the user-defined character, download bit image and macro after finishing this command. The printer clears receive and print buffer area, and reset to the effective mode when turning the power on. At this moment, the switch DIP set will be checked once again.
- [Reference] FS p
- [Examples] When xL = 64, xH = 0, yL = 96, yH = 0

**GS ! n**

[Name] Select character size

[Format]	ASCII	GS	!	n
	Hex	1D	21	n
	Decimal	29	33	n

[Range] $0 \leq n \leq 255$ $(1 \leq \text{vertical} \leq 8, 1 \leq \text{horizontal} \leq 8)$

[Description] Set character height by 0-2, character width by 4-6. As follows:

Bit	Off/on	Hex	Decimal	Function
0				Set character height. See table 2.
1				
2				
3				
4				Set character width. See table 1.
5				

6	
7	

Hex	Decimal	Width
00	0	1(Standard)
10	16	2(Double width)
20	32	3
30	48	4
40	64	5
50	80	6
60	96	7
70	112	8

Table 1

Set character width

Hex	Decimal	Width
00	0	1(Standard)
01	1	2(Double height)
02	2	3
03	3	4
04	4	5
05	5	6
06	6	7
07	7	8

Table 2

Set character height

- [Notes] .This command affects to all characters (English characters and Chinese) except for HRI character.
- .If n is out of the definition scale, this command will be ignored.
- . In stable mode, the vertical direction is the feed paper direction. However, when the character direction rotates clockwise 90°, the vertical direction and horizontal direction will be reversed.
 - .In page mode, the vertical direction and horizontal direction are on basis of the character direction.
 - .When enlarging the characters in a line by the different size, all characters in a line will be paralleled along the baseline.
 - .Turn double width and height mode by ESC !. The set of command which received at last will be affected.

[Default] n = 0

[Reference] **ESC !****GS \$ nL nH**

[Name] Set absolute vertical print position in page mode

[Format] ASCII GS \$ nL nH

Hex 1D 24 nL nH

Decimal 29 36 nL nH

[Range] $0 \leq nL \leq 255, 0 \leq nH \leq 255$

[Description] .In page mode, sets absolute vertical print starting position for buffer data.

.This command sets the absolute print position at $[(nL+nH \times 256) \times 0.125 \text{ mm}]$.

[Notes] .This command only affects in page mode.

.If $[(nL+nH \times 256) \times (\text{vertical or horizontal moving unit})]$ overs the specified print area, this command will be ignored

.The position of horizontal starting buffer area won't be moved.

.The reference starting position specifies by ESC T.

.The operation of this command as follows, decides by the printable area starting position which set by ESC T:

- ① When the starting position sets at the up-left or down-right, this command sets the absolute position in the vertical direction.
- ② When the starting position sets at the up-right or down-left, this command sets the absolute position in the parallel direction.

[Reference] **ESC \$, ESC T , ESC W , ESC \ , GS **

GS (A pL pH n m

[Name] Execute test print

[Format] ASCII GS (A pL pH n m
 Hex 1D 28 41 pL pH n m
 Decimal 29 40 65 pL pH n m

[Range] (pL+(pH×256))=2 (pL=2, pH=0)

$0 \leq n \leq 2, 48 \leq n \leq 50$

$1 \leq m \leq 3, 49 \leq m \leq 51$

[Description] Executes the test print at the specified printing paper and uses the

specified mode.

- pL and pH specify (pL + (pH × 256)) as the number of bytes.

n specifies the paper used for the test print

n	Paper
0, 48	Basic sheet (roll paper)
1, 49	Roll paper
2, 50	

m specifies a test pattern

m	Test pattern
1, 49	Hexadecimal dump print
2, 50	Printer status print
3, 51	Rolling pattern print

[Particularize] . This command only affects at the beginning of a line in stable mode.

. This commands is invalid in page mode.

. When receiving this command during macro definition, the printer finishes the macro definition and begins to execute this command.

. The printer reset automatically after finishing printing. Therefore, the defined data before executing this command, For example, the user-defined character, download bit image and macro will change to be undefined; Receive buffer area and print buffer area will be cleared; all set will be returned to default data. The printer read the DIP switch set again.

. The printer cuts the paper when finishing test print.

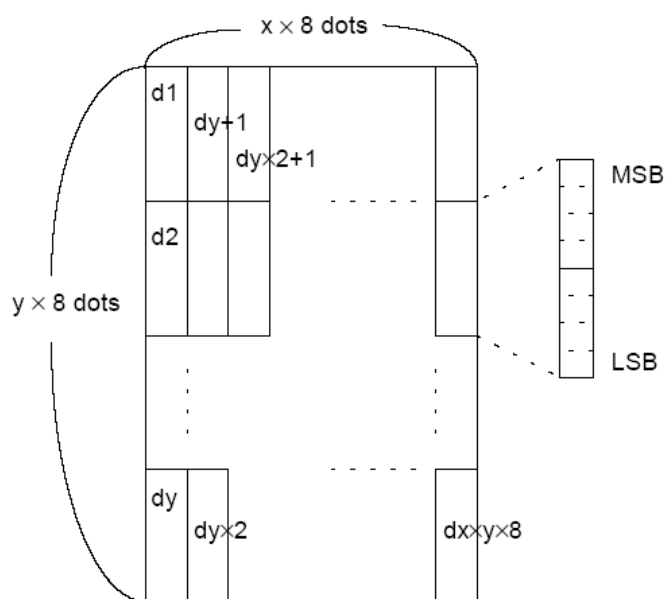
. During executes this commands, the printer enters into "BUSY" status.

GS * x y d1..d(x y 8)

[Name] Defines down-load bit image

[Format] ASCII GS ' x y d1...d(x ' y ' 8)

- | | Hex | 1D | 2A | x | y | d1...d(x' y' 8) |
|--|-----|----|----|---|---|-----------------|
| | | | | x | y | d1...d(x' y' 8) |
| | | | | x | y | d1...d(x' y' 8) |
- [Range] $1 \leq x \leq 255$
 $1 \leq y \leq 48 (x \times y \times 1536)$
 $0 \leq d \leq 255$
- [Description] Specifies dot by x and y, and defines the down-load bit image.
- x specify horizontal dot.
 - y specify vertical dot.
- [Notes]
- Horizontal direction dot is $x \times 8$; Vertical direction dot is $y \times 8$.
 - When $x \times y$ overs the defined range, this command is disabled.
 - d *indicates bit image dat.* Data (d) specifies that print bit is 1, Do not print bit that is 0.
 - In following case, clear down-load bit image definition :
 - ① Executes **ESC @** .
 - ② Executes **ESC &** .
 - ③ The printer reset or turn the power of.
 - The connection between down-load bit image and print data as follows.



[Reference] **GS /**

GS / m

- [Name] Prints down-load bit image
- [Format]
- | ASCII | GS | / | m |
|---------|----|----|---|
| Hex | 1D | 2F | m |
| Decimal | 29 | 47 | m |
- [Range] $0 \leq m \leq 3, 48 \leq m \leq 51$
- [Description] Prints down-load bit image by mode which defines by m.

m set mode from following table:

m	Mode	Vertical dot density	Horizontal dot density
0, 48	Stable	203.2 dpi	203.2 dpi
1, 49	Double width	203.2 dpi	101.6 dpi
2, 50	Double height	101.6 dpi	203.2 dpi
3, 51	Quadruple	101.6 dpi	101.6 dpi

dpi: per 25.4 mm {1inch}

- [Notes]
- .If the bit image data has not defined, then this command will be ignored.
 - .In stable mode, this command affects only when there are no data in the printing buffer area.
 - .This command is invalid in print mode [bold, overlap, underline, character size or reverses blank printing], except for up-down printing mode.
 - .If the download bit image which will be printed overs the printable area, then the over data can not print.
 - .If the printable width which set by GS L and GS W is less than the asked width by GS to send the data, then executes the following continued operation for the problem lines [the print can not over the max printable area].
 - ① The width of the printable area which extends to the right and holds the data capacity.
 - ② If the step ① can't provided enough width for data, then narrows the left blank to hold the data.
 - Each data in stable mode (m=0, 48) and double height mode (m=2,50), the printer prints one dot;
 - Each data under the double width mode (m=1, 48) and four double mode (m=3, 51), the printer prints two dots.

[Reference] **GS ***

GS :

[Name] Start/end macro definition

[Format] ASCII GS :
Hex 1D 3A
Decimal 29 58

[Description] Start/end macro definition

- [Notes]
- .When receiving this command in stable operation, starts macro definition. When receiving this command during macro definition, finishes the macro definition.
 - .During macro definition, when receiving GS ^, the printer stops macro definition and clears macro definition.
 - .When turns the power on, undefined macro.
 - .ESC @ does not clear the content of macro definition. So, ESC @ could be contained in macro definition.
 - .If the printer receives GS :, then receiving GS promptly,the printer stops on undefined macro definition.

.The content of macro definition reaches to 2048 bytes. If the content of macro definition overs 2048 bytes, so it can not store the over part of data.

[Reference] **GS ^**

GS B n

[Name] Turn white/black reverse print mode on/off

[Format]	ASCII	GS	B	n
	Hex	1D	42	n
	Decimal	29	66	n

[Range] $0 \leq n \leq 255$

[Description] Turn white/black reverse print mode on/off.

- When the LSB of n is 0, turn white/black reverse print mode off.
- When the LSB of n is 1, turn white/black reverse print mode on.

[Notes] • Only the LSB of n is valid.

.This command to inner characters and user-defined characters are valid.

.Turns white/black reverse print mode on, blank area which set by ESC SP is also valid.

.This command no affects to bit image, user-defined bit image, bar code, HRI character, and the space skipped by HT, ESC \$ and ESC \ .

.This command do not affect bit image, user-defined bit image, bar code, HRI character, skim space by HT, **ESC \$** and **ESC **.

.This command can not affect line spacing.

.The white/black reverse print mode take precedence of underline mode. When setting white/black reverse print mode, even turn the underline mode on which will also be disabled [but do not cancel].

[Default] n = 0

GS C 0 n m

[Name] Set attribute value print mode

[Format]	ASCII	GS	C	0	n	m
	Hex	1D	43	30	n	m
	Decimal	29	67	48	n	m

[Range] $0 \leq n \leq 5$

$0 \leq m \leq 2, 48 \leq m \leq 50$

[Description] Continued attribute value print mode.

- n will set the figure, the number as follows:
When n = 0, The printer prints actual value.
When n = 1 to 5, This command sets the figure number.
- m set print position in all range, as follows:

m	Print position	Process the figure less than the pointed bit digit
0, 48	Right	Add blank to left
1, 49	Right	Add 0 to left

2, 50	Left	Add blank to right
-------	------	--------------------

- [Notes]
- If n or m overs defined range, the original print mode is the same as before.
 - If n = 0, m has not any meaning.

[Default] n = 0, m = 0

[Reference] **GS C 1, GS C 2, GS C ;, GS c**

[Examples]

$n = 3, m = 0$	$n = 3, m = 1$	$n = 3, m = 2$
▲▲1	001	1▲▲

▲Indicates a space

GS C 1 aL aH bL bH n r

[Name]	Select attribute value print mode (A)									
[Format]	ASCII	GS	C	1	aL	aH	aL	bH	n	r
	Hex	1D	43	31	aL	aH	aL	bH	n	r
	Decimal	29	67	49	aL	aH	aL	bH	n	r
[Range]	$0 \leq aL \leq 255$									
	$0 \leq aH \leq 255$									
	$0 \leq bL \leq 255$									
	$0 \leq bH \leq 255$									
	$0 \leq n \leq 255$									
	$0 \leq r \leq 255$									
[Description]	.Select attribute value print mode.									
	• aL, aH or bL, bH specify attribute value range.									
	• When increase or decrease by degrees, n specify step value.									
	• When attribute value fixed, r indicates repeat times.									
[Notes]	If meet the following conditions, set increase by degrees:									
	$[aL + aH \times 256] < [bL + bH \times 256]$ and $n \neq 0$ and $r \neq 0$									
	• If meet the following conditions, set decrease by degrees:									
	$[aL + aH \times 256] > [bL + bH \times 256]$ and $n \neq 0$ and $r \neq 0$									
	• If meet the following conditions, stop count:									
	$[aL + aH \times 256] = [bL + bH \times 256]$ and $n \neq 0$ and $r \neq 0$									
	• Set increase by degrees count, the min data is $[aL + aH \times 256]$, the max is $[bL + bH \times 256]$. If the count data overs the max data, returns min data to count repeatly.									
	• Set decrease by degree mode, the min data is $[aL + aH \times 256]$, the min is $[bL + bH \times 256]$. If the count data decreases to min data, return max data to count repeatly.									
	• When executing this command, clear the inner count by r.									
[Default]	aL = 1, aH = 0, bL = 255, bH = 255, n = 1, r = 1									
[Reference]	GS C 0, GS C 2, GS C ;, GS c									

GS C 2 nL nH

[Name]	Set attribute value					
[Format]	ASCII	GS	C	2	nL	nH
	Hex	1D	43	32	nL	nH
	Decimal	29	67	50	nL	nH
[Range]	$0 \leq nL \leq 255$					
	$0 \leq nH \leq 255$					
[Description]	Set serial attribute data.					
	• nL and nH define the attribute value as $[nL + nH \times 256]$.					
[Notes]	• In increase by degrees, if the attribute value overs the operation range by GS C 1 or GS C , changes to the min value by GS c.					
	• In decrease by degrees, if the attribute value overs the operation range by GS C 1 or GS C , changes to the max value by GS c.					
[Default]	nL = 1, nH = 0					
[Reference]	GS C 0 , GS C 1 , GS C :, GS c					

GS C sa sb sn sr sc

[Name]	Select attribute value mode (B)													
[Format]	ASCII	GS	C	;	sa	;	sb	;	sn	;	sr	;	sc	;
	Hex	1D	43	3B	sa	3B	sb	3B	sn	3B	sr	3B	sc	3B
	Decimal	29	67	59	sa	59	sb	59	sn	59	sr	59	sc	59
[Range]	"0" ≤ sa ≤ "65535"													
	"0" ≤ sb ≤ "65535"													
	"0" ≤ sn ≤ "255"													
	"0" ≤ sr ≤ "255"													
	"0" ≤ sc ≤ "65535"													
	Above value are character strings.													
[Description]	Select one attribute value for attribute counter, and points the attribute value.													
	<ul style="list-style-type: none">• sa, sb, sn, sr and sc to show ASCII characters, uses the code from "0" to "9".• sa and sb specify attribute value range.• sn indicates the step space of increase or decrease by degrees.• sr indicates repeat times, attribute value is fixed.• sc indicates attribute value.													
[Notes]	<ul style="list-style-type: none">• Meet the following conditions, increase by degrees attribute mode: sa < sb and sn ≠ "0" and sr ≠ "0"• Meet the following conditions, decrease by degrees attribute mode: sa > sb and sn ≠ "0" and sr ≠ "0"• Meet the following conditions, stops attribute value: sa = sb or sn = "0" or sr = "0"													
	<ul style="list-style-type: none">• Specifies the mode of increase by degrees, sa is the min count value, sb is the max. If the increase counts value overs the max value, the count value returns to the min value and begins again. If the count value set by sc which overs the counter operation scale, will change the count value to min value through executing GS c.• Specifies the mode of decrease by degrees, sa is the max count value, sb is the min count value. If the decrease count value overs the min count value , the count value returns to the max value and begins again. If the count value set by sc													

which overs the counter operation scale, will change the count value to max value through executing GS c.

.Could omit parameter sa to sc. If omitting, then these parameter value won't change.

.The parameter sa to sa what couldn't contain another characters out of the "0" to "9".

.If the grammar is wrong, so the relevant parameters setting is invalid, and processes the following data as the normal data.

[Default] sa = "1", sb = "65535", sn = "1", sr = "1", sc = "1"

[Reference] **GS C 0, GS C 1, GS C 2, GS c**

GS H n

[Name] Select print position of HRI characters

[Format]

ASCII	GS	H	n
Hex	1D	48	n
Decimal	29	72	n

[Range] $0 \leq n \leq 3; 48 \leq n \leq 51$

[Description] Print bar code, select print position of HRI characters.

n select print position, as following table:

n	Print position
0, 48	Not print
1, 49	Above bar code
2, 50	Below bar code
3, 51	Above and below bar code

Note: Printing HRI character position does not set according to the standard position.

- HRI (Human Readable Interpretation) indicates the barcode corresponding characters.

[Note] • Print HRI character which set by GS F.

[Default] n = 0

[Reference] **GS f, GS k**

GS I n

[Name] Transmit printer ID

[Format]

ASCII	GS	I	n
Hex	1D	49	n
Decimal	29	73	n

[Range] $1 \leq n \leq 3, 49 \leq n \leq 51$

[Description] Transmit printer ID.

- n indicates the type of printer ID.

n	Printer ID type	ID
1, 49	Printer type ID	Model: T90, Hex: 21H
2, 50	Type ID	Below table
3, 51	Firmware version ID	43H

[Type ID]

Bit	Off/on	Hex	Decim	Function
-----	--------	-----	-------	----------

			al	
0	OFF	00	0	Not support double byte character code.
	ON	01	1	Support double byte character type.
1	OFF	00	0	Uninstall auto cutter.
	ON	02	2	Install auto cutter.
2	-	-	-	Undefined.
3	-	-	-	Not used.
4	-	-	-	Not used.
5	-	-	-	Undefined.
6	-	-	-	Undefined.
7	-	-	-	Not used.

[Particularize] .In serial interface mode, controls by selecting DTR/DSR, be sure that the host have ready to receive data(DSR signal is SPACE), The printer only transmits one byte. If the host have not ready to receive data (DSR signal is MARK), the printer will be waited, until the printer have ready to.

.In serial interface mode, controls by selecting XON/XOFF, the printer only transmits one byte, but not sure that the conditions of DSR signal.

- .When spreading the data in the receiving buffer area, transmits printer ID. After receiving this command, could be waited a period of transmitting conditions, it decided by the conditions of receiving buffer area.

. Enable automatically restoring (ASB) by GS a, must be distinguished the conditions of transmitting by GS I and ASB.

Note: At present, no bit 0 changeable information.

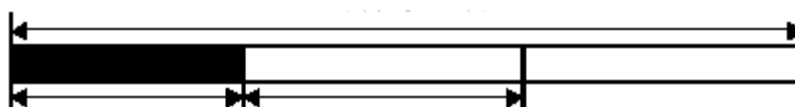
GS L nL nH

[Name] Set left margin

[Format]	ASCII	GS	L	nL	nH
	Hex	1D	4C	nL	nH
	Decimal	29	76	nL	nH

[Range] $0 \leq nL \leq 255$

$0 \leq nH \leq 255$



[Description] Set left margin by nL and nH.

- Set left margin $[(nL + nH \times 256) \times 0.125 \text{ mm}]$.

The left side blank The width of printable width

- [Notes]
- In stable mode, this command is valid only at the line origin position.
 - Input this command in page mode, the printer only executes the inner sign operation.
 - In page mode, this command can not affect the print.
 - If the set overs the printable area, so uses the max printing unit.
 - When execute (**GS v 0**), set left margin by this command, 8 bits as unit. If the left margin can not be deleted by 8, or, leave out remainder.
(For example) If $(nL + nH \times 256) = 20$, set value as 16.

Note: Uses this command together with GS /, ESC *, print result may not be expected.

[Default] nL = 0, nH = 0

[Reference] **GS W**

GS T n

- [Name] Set print position as printing origin
- [Format]
- | | | | |
|---------|----|----|---|
| ASCII | GS | T | n |
| Hex | 1D | 54 | n |
| Decimal | 29 | 84 | n |
- [Range] n = 0, 1, 48, 49
- [Description] Set print position as printing origin
.n specifies the data process method in print buffer area.

n	Print position
0, 48	Delete all data in print area, then set print position as printing origin
1, 49	Print all data in print area, then set print position as printing origin

①GS V m ②GS V m n

- [Name] Select cut paper mode and cut paper
- [Format]
- | | | | | |
|---------|----|----|---|---|
| ①ASCII | GS | V | m | |
| Hex | 1D | 56 | m | |
| Decimal | 29 | 86 | m | |
| ②ASCII | GS | V | m | n |
| Hex | 1D | 56 | m | n |
| Decimal | 29 | 86 | m | n |
- [Range]
- ① m = 1, 49
- ② m = 66, $0 \leq n \leq 255$
- [Description] Select cut paper mode, and execute cut paper operation. Select model by m, as follows:
- [The particularize of ① and ②]
- .As the difference of the autotcut type, the cut paper status is different.
 - .This command affects only when processing this command at the printing origin.
- [The particularize for ①]
- Only partial cut; not full cut.

[The particularize for ②]

When $n \neq 0$, the printer feeds paper to (cut paper position + $[n \times 0.125\text{mm}\{0.0049\text{ inch}\}]$) and cut paper.

GS W nL nH

[Name] Set print area width

[Format]	ASCII	GS	W	nL	nH
Hex		1D	57	nL	nH
Decimal		29	87	nL	nH

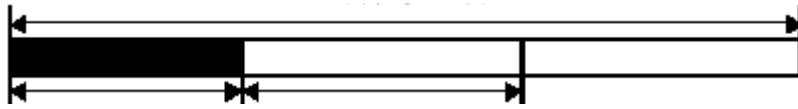
[Range] $0 \leq nL \leq 255$

$0 \leq nH \leq 255$

[Description] Set print area width by nL and nH.

- Set print area width as $[(nL + nH \times 256) \times 0.125\text{mm}]$.

Printable area

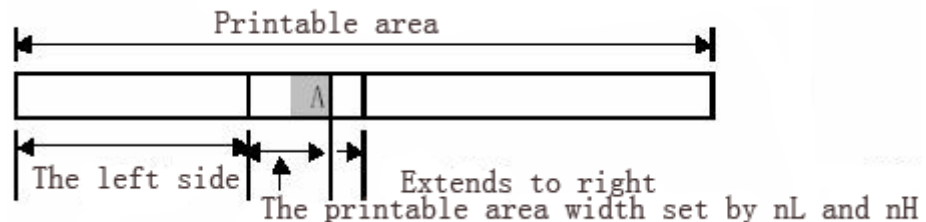


The left side blank The width of printable width

[Notes]

- This command only affects when processing the line origin.
- If input this command in page mode, The printer executes inner sign operation.
- This command does not affect printing in page mode.
- If set value overs the printable area, uses the max vaule of printable value.
- The set priority of GS W is higher than GS L. If [Left blank+printable area width] overs the printable area, the printer uses [printable area width- left blank]. However, do not use the set which sets by GS W, reserve the set which sets by GS W. If the printable area width set which is smaller than one character width, when printing character data, execute the following steps:

- The printable area width extends to right to meet one character.



- If printable area width couldn't be extended fully, decrease left page to meet one character.

- If printable area width couldn't be extended fully, decrease right spacing.

- If printable area width is smaller than one vertical line, when printing non-character data (for example, bit image, the user-defined bit image), only process the problem lines as follows:

- Extend printable area width to right and meet one vertical line of bit image in the printable area.

- If printable area width couldn't be extended fully, decrease left page to meet one vertical line.

[Default]

Mode type	Horizontal dot	Default
(82.5 mm paper width type)	640 dot	nL = 128, nH = 2
(79.5 mm paper width type)	576 dot	nL = 64, nH = 2
(60 mm paper width type)	448 dot	nL = 192, nH = 1
(58 mm paper width type)	432 dot	nL = 176, nH = 1

[Reference] **GS L****GS \ nL nH**

[Name] Set relative vertical print position in page mode

[Format] ASCII GS \ nL nH
 Hex 1D 5C nL nHf
 Decimal 29 92 nL nH

[Range] $0 \leq nL \leq 255$
 $0 \leq nH \leq 255$

[Description] Set the present position as relative vertical print position in page mode. The distance set by this command from the present position to $[(nL+nH \times 256) \times 0.125\text{mm}]$.

[Notes] If do not select page mode, this command ignored.

When N specified as the downward move:

$$nL + nH \times 256 = N$$

When N specified as the upward move (negative direction), uses 65536 complement code.

When N specified as the upward move:

$$nL + nH \times 256 = 65536 - N$$

.Any set what overs the specified printable area which will be ignored.

.As the print origin position set by ESC T, this command functions as follows:

- ① When setting the origin position to up-left or down-right of printable area, uses the vertical move unit(y).
- ② When setting the origin position to up-right or down-left of printable area, uses the horizontal move unit(x).

[Reference] **ESC \$, ESC T , ESC W , ESC \ , GS \$****GS ^ r t m**

[Name] Execute macro

[Format] ASCII GS ^ r t m
 Hex 1D 5E r t m
 Decimal 29 94 r t m

[Range] $0 \leq r \leq 255$
 $0 \leq t \leq 255$
 m = 0, 1

[Description] Execute macro

- r specifies times of executing macro.
- t specifies the waiting time of operating macro.
- .m specifies the macro executed mode.

When the LSB of m is 0:

Macro continues to execute r times at the specified time spacing.

When the LSB of m is 1:

After the waiting time which specifies by t, PAPER OUT LED will be flashed, and the printer be waited, FEED button will be pushed. After pushing the button, the printer executes macro one time. The printer operates r times repeatly.

- [Notes]
- . Executes macro one time, the waiting time is $t \times 100\text{ms}$.
 - . If receive this command when defining one macro, so the macro definition will be failed and the definition will be cleared.
 - . If do not define macro or r is 0, do not execute any operation.
 - . When operating macro(m=1), feed paper can't be taken by FEED button.

[Reference] **GS :**

GS a n

[Name] Enable/disable automatic status back (ASB)

[Format]	ASCII	GS	a	n
Hex		1D	61	n
Decimal		29	97	n

[Range] $0 \leq n \leq 255$

[Description] Enable/disable ASB and n specifies the contained items,

As follows:

Bit	Off/ On	Hex	Deciaml	ASB Status
0	Off	00	0	Off is fixed.
1	Off	00	0	Disable online/offline status.
	On	02	2	Enable online/offline status.
2	Off	00	0	Disable error status.
	On	04	4	Enable error status.
3	Off	00	0	Disable roll paper sensor.
	On	08	8	Enable roll paper sensor.
4		-	-	Undefined.
5		-	-	Undefined.
6	Off	00	0	Disable roll paper "FEED" .
	On	40	64	Enable roll paper "FEED"
7	-	-	-	Undefined.

- [Notes]
- .If any one of status items in the above table is enabled, so execute this command and the printer is transmission status. Once the enabled status changes, the printer transmits status automatically. Because each status transmission means the current status, So, the disabled status could be changed.
 - .If all status items are disabled, the ASB function also be disabled.
 - .If ASB set to default set, so when the printer be opened to receive and transmit the data, the printer transmits the data.
 - .Transmit the following four status bytes, do not need to sure whether the host have ready to receive the data or not. The four status bytes have to be continued, except for the XOFF code.

.Because the data processed in the receiving buffer area and executed later, so there are one period of lag time between data receiving and condition transmission.

.When uses DLE EOT or GS r, have to distinguish the transmission status and ASB status, according to appendix C, the process of transmission status in read.

.The transmission status items as follows:

The first type (the printer information)

Bit	Off/On	Hex	Decimal	ASB Status
0	Off	00	0	Off is fixed.
1	Off	00	0	Off is fixed.
2	On	04	4	Undefined, On is fixed.
3	Off	00	0	Online.
	On	08	8	Offline.
4	On	10	16	On is fixed
5	Off	00	0	Close the cover.
	On	20	32	Open the cover.
6	Off	00	0	Disable roll paper "FEED".
	On	40	64	Enable roll paper "FEED".
7	Off	00	0	Off is fixed.

The second type (the printer information)

Bit	Off/On	Hex	Decimal	ASB Status
0	Off	00	0	Offline wait status.
	On	01	1	Online wait status.
1	Off	00	0	Turn roll paper FEED off.
	On	02	2	Turn roll paper FEED on.
2	Off	00	0	No mechanical error.
	On	04	4	Mechanical error occurred.
3	Off	00	0	No auto cut error.
	On	08	8	Auto cut error occurred.
4	Off	00	0	Off is fixed.
5	Off	00	0	No unrecoverable error.
	On	20	32	Unrecoverable error occurred.
6	Off	00	0	No automatical recoverable error.
	On	40	64	Automatical recoverable error occurred.
7	Off	00	0	Off is fixed.

Bit 0: refer to **DLE EOT**.

Bit 2: refer to **DLE EOT**.

Bit 6: The printer stops printing as the over temperature of print head, bit 6 is ON, until the temperature is normal or open the cover when printing.

Recover printing, Bit 6 is OFF.

The third byte (roll paper sensor information)

Bit	Off/On	Hex	Decimal	ASB Status
0, 1	Off	00	0	Roll paper near-end sensor: enough roll paper.

	On	03	3	Roll paper near-end sensor: roll paper near end.
2, 3	Off	00	0	Roll paper end sensor: with roll paper.
	On	0C	12	Roll paper end sensor: no roll paper.
4	Off	00	0	Off is fixed.
5, 6	-	-	-	Undefined.
7	Off	00	0	Off is fixed.

The fourth byte (roll paper sensor information)

Bit	Off/On	Hex	Decimal	ASB Status
0-3	-	-	-	Undefined
4	Off	00	0	Off is fixed.
5, 6	-	-	-	Undefined
7	Off	00	0	Off is fixed.

[Reference] **DLE EOT, GS r**

GS b n

[Name] Turn smoothing mode on/off

[Format] ASCII GS b n
 Hex 1D 62 n
 Decimal 29 98 n

[Range] $0 \leq n \leq 255$

[Description] Turn smoothing mode on/off

When the LSB of n is 0, Turn smoothing mode off.

When the LSB of n is 1, Turn smoothing mode on.

[Notes] • Only effects when the LSB of n.
 • Smoothing mode for inner user-defined characters is useful.
 • Even if set smoothing mode, when the character width or height is not the normal size, don't execute smoothing.

[Default] n = 0

[Reference] **ESC I, GS I**

Note: Enlargment smoothing process of characters and Chinese characters is complicated, no viable idea at present, now print by this command which can not be reached the idea printing result.

GS c

[Name] Print attribute value

[Format] ASCII GS c
 Hex 1D 63
 Decimal 29 99

[Description] Set serial attribute value, and increase or decrease of attribute value in printing buffer area.

[Notes] . After setting the present attribute value as the print data (one character font) in printing buffer area, on basis of the attribute value mode set, increase or decrease the attribute value. When the printer received a printing command or on the conditions of the full

printing buffer area, prints the attribute value in the printing buffer area.

. Set attribute count print mode by GS C 0.

. Set attribute count print mode by GS C 1 or GS C.

. At the increase attribute mode, If the attribute value which set by this command overs the attribute operation range which set by GS C 1 or GS C, then the attribute value have to change to the min value.

. At the decrease attribute mode, If the attribute value which set by this command overs the attribute operation range which set by GS C 1 or GS C, then the attribute value have to change to the max value.

[Reference] **GS C 0** , **GS C 1** , **GS C 2** , **GS C** ;

GS f n

[Name] Select font for HRI (Human Readable Interpretation) characters

[Format] ASCII GS f n
 Hex 1D 66 n
 Decimal 29 102 n

[Range] n = 1, 48, 49

[Description] When printing the bar code, selects one font of HRI characters.

n specifies one character font as following table:

N	Character Font
0, 48	Font A (12 ' 24)
1, 49	Font B (9 ' 17)

[Notes] • HRI Human Readable Interpretation.
 • Print HRI characters to specified position by GS H.

[Default] n = 0

[Reference] **GS H** , **GS k**

GS h n

[Name] Set bar code height

[Format] ASCII GS h n
 Hex 1D 68 n
 Decimal 29 104 n

[Range] $1 \leq n \leq 255$

[Description] Set bar code height
 n set vertical dot

[Default] n = 162

[Reference] **GS k**

①GS k m d1 . dk NUL ②GS k m n d1 . dn

[Name] Set bar code

[Format] ①ASCII GS k m d1 ... dk NUL
 Hex 1D 6B m d1 ... dk 00
 Decimal 29 107 m d1 ... dk 0
 ②ASCII GS k m n d1 ... dn
 Hex 1D 6B m n d1 ... dn

Decimal 29 107 m n d1 ... dn

[Range] ① $0 \leq m \leq 6$ (k and d decided by the used bar code system)

② $65 \leq m \leq 73$ (n and d decided by the used bar code system)

[Description] Select bar code system and print bar code.

m select the following bar code system

m		Bar code system	Character number	Notes
①	0	UPC-A	$11 \leq k \leq 12$	$48 \leq d \leq 57$
	1	UPC-E	$11 \leq k \leq 12$	$48 \leq d \leq 57$
	2	JAN13 (EAN13)	$12 \leq k \leq 13$	$48 \leq d \leq 57$
	3	JAN8 (EAN8)	$7 \leq k \leq 8$	$48 \leq d \leq 57$
	4	CODE39	$1 \leq k$	$48 \leq d \leq 57, 65 \leq d \leq 90, 32, 36, 37, 43, 45, 46, 47$
	5	ITF	$1 \leq k \text{ (k is even)}$	$48 \leq d \leq 57$
	6	CODABAR	$1 \leq k$	$48 \leq d \leq 57, 65 \leq d \leq 68, 36, 43, 45, 46, 47, 58$
	7	Standard EAN13	$12 \leq k \leq 13$	$48 \leq d \leq 57$
	8	Standard EAN8	$7 \leq k \leq 8$	$48 \leq d \leq 57$
②	65	UPC-A	$11 \leq n \leq 12$	$48 \leq d \leq 57$
	66	UPC-E	$11 \leq n \leq 12$	$48 \leq d \leq 57$
	67	JAN13 (EAN13)	$12 \leq n \leq 13$	$48 \leq d \leq 57$
	68	JAN8 (EAN8)	$7 \leq n \leq 8$	$48 \leq d \leq 57$
	69	CODE39	$1 \leq n \leq 255$	$48 \leq d \leq 57, 65 \leq d \leq 90, 32, 36, 37, 43, 45, 46, 47$
	70	ITF	$1 \leq n \leq 255 \text{ (n is even)}$	$48 \leq d \leq 57$
	71	CODABAR	$1 \leq n \leq 255$	$48 \leq d \leq 57, 65 \leq d \leq 68, 36, 43, 45, 46, 47, 58$
	72	CODE93	$1 \leq n \leq 255$	$0 \leq d \leq 127$
	73	CODE128	$1 \leq n \leq 255$	$0 \leq d \leq 127$
	74	Standard EAN13	$12 \leq n \leq 13$	$48 \leq d \leq 57$
	75	Standard EAN8	$7 \leq n \leq 8$	$48 \leq d \leq 57$

[Note ①]

- This command finished by NUL.
- When bar code system UPC-A or UPC-E be used, the printer receives 12 bytes bar code data, and then printing bar code and processing the continued data as normal data.
- When bar code system JAN13 (EAN13) be used, the printer receives 13 bytes bar code data, and then printing bar code and processing the continued data as normal data.
- When bar code system JAN8 (EAN8) be used, the printer receives 8 bytes bar code data, and then printing bar code and processing the continued data as normal data.

- The number of ITF bar code data must be even. When inputting the odd number, the printer ignores the last receiving data.

[Note②]

- n specifies bar code data bytes, and the printer processes n byte data as bar code data from the next character.
- If n overs the specified range, the printer stops processing this command, and processes the continued data as the normal data.

[Notes in standard mode]

- If d overs the specified range, the printer only feeds paper and processes the continued data as the normal data.
- If horizontal direction size overs the printable area, the printer only feeds paper.
- This command feeds paper as the requirement of bar code, do not relate the line spacing which set by ESC 3 or ESC 2.
- This command affects only no data in printing buffer area. When there are data in printing buffer area, the printer processes the continued data of n as the normal data.
- After printing bar code, this command set the origin line as the printing position.
- This command do not affect the print mode (bold, overlap, underline, character size, invert blank print, or character 90°revolution etc.), except for the upside down print mode.

[Notes in page mode]

- .This command makes bar code data in the print buffer area, but do not print. After processing bar code data, this command moves the print position to the right dot of bar code.
- .If d overs the specified range, the printer stops processing the commands and deals with the continued data as the normal data. In such circumstances, data buffer area position does not change.
- .If the bar code width overs the printable area, the printer doesn't print bar code, but moves data buffer area position to left to out of print area.
- .Refer to the section 3.9 in page mode.

When using thermal label:

- .If the bar code height can not meet the present label, the over parts will be printed on the next label.

When using CODE93 (m = 72):

- .The printer prints one HRI character (□) at the beginning of the HRI character font, as the origin character of HRI character font.
- . The printer prints one HRI character (□) at the end of the HRI character font, as the end character of HRI character font.
- .The printer prints HRI characters (■+one word character) as the control character (<00>H to <1F> and <7F>H):

Control Character			HRI Character	Control Character			HRI Character
ASCII	Hex	Decimal		ASCII	Hex	Decimal	
NUL	00	0	■U	DLE	10	16	■P
SOH	01	1	■A	DC1	11	17	■Q

STX	02	2	■B	DC2	12	18	■R
ETX	03	3	■C	DC3	13	19	■S
EOT	04	4	■D	DC4	14	20	■T
ENQ	05	5	■E	NAK	15	21	■U
ACK	06	6	■F	SYN	16	22	■V
BEL	07	7	■G	ETB	17	23	■W
BS	08	8	■H	CAN	18	24	■X
HT	09	9	■I	EN	19	25	■Y
LF	0A	10	■J	SUB	1A	26	■Z
VT	0B	11	■K	ESC	1B	27	■A
FF	0C	12	■L	FS	1C	28	■B
CR	0D	13	■M	GS	1D	29	■C
SO	0E	14	■N	RS	1E	30	■D
SI	0F	15	■O	US	1F	31	■E
				DEL	7F	127	■T

[For example] Print GS k 72 7 67 111 100 101 13 57 51



When using CODE128 (m = 73) :

. Refer to the information of CODE128 bar code and its code table, see the appendix E.

. When the printer uses CODE128, please consider the following data transmission:

- ① The head of bar code data font have to the code font select characters (CODE A, CODE B, or CODE C), be used to select the first used code font.
- ② Define the special characters by character "{" and one character group. Define ASCII character "{" through continuing to transmit "{" twice.

Special Character	Transmission Data		
	ASCII	Hex	Decimal
SHIFT	{S	7B,53	123,83
CODE A	{A	7B,41	123,65
CODE B	{B	7B,42	123,66
CODE C	{C	7B,43	123,67
FNC1	{1	7B,31	123,49
FNC2	{2	7B,32	123,50
FNC3	{3	7B,33	123,51
FNC4	{4	7B,34	123,52
"{"	{{	7B,7B	123,123

[For example] Print "No. 123456" data

As this sample, the printer prints "No" by CODE B firstly, then printing the following numbers by CODE C.

GS k 73 10 123 66 78 111 46 123 67 12 34 56



.If the head of bar code data is not the code font selected characters, the printer stops processing the command, and deals with the continued data as the normal data.

.If "{" and continued character group are not meet to any special characters, the printer stops processing the command, and deals with the continued data as the normal data.

.If the printer received the characters which can't be used to special code font, the printer stops processing the command, and deals with the continued data as the normal data.

.The printer doesn't print the HRI characters which relative to shift characters or code font selected characters.

.Related function HRI characters are blank.

.Related control characters (<00>H to <1F>H and HRI characters <7F>H) are blank.

<Others> Be sure to leave the spacing both on right and left bar code. (the different bar code type, the different spacing)

[Reference] **GS H, GS f, GS h, GS w**

GS r n

[Name] Transmit status

[Format]

ASCII	GS	r	n
Hex	1D	72	n
Decimal	29	114	n

[Range] n = 1, 49

[Description] Transmit n as follows:

N	Function
1,49	Transmit roll paper sensor status

[Notes] .When using serial interface, If set DTR/DSR control, the printer only transmits one byte after the host have received the data (DSR signal is SPACE). If the host haven't ready to receive data (DSR signal is MARK), the printer wait until the host have ready to.

If set XON/XOFF control, the printer only transmits one byte, and can not specify the DSR signal status.

.Execute this command when the data made in the print buffer area. So, between receiving this command and transmitting status, may be one time spacing, it decides by the status of receive buffer area.

.When uses GS a to enable ASB, distinguish the transmitting status by GS r and ASB status by appendix C.

.Transmitting status type as follows: •

Roll paper sensor status (n = 1, 49)

Bit	Off/On	Hex	Decimal	ASB Status
0, 1	Off	00	0	Roll paper near-end sensor: enough.
	On	03	3	Roll paper near-end sensor: end.
2, 3	Off	00	0	Roll paper end sensor: enough.

	On	(0C)	(12)	Roll paper end sensor: end.
4	Off	00	0	Off is fixed.
5, 6	-	-	-	Undefined.
7	On	00	0	Off is fixed.

Bit 2 and 3: When the roll paper end sensor detects no paper, the printer turns to offline, and don't execute this command. So, bit 2 and 3 can not transmit no paper status.

[Reference] **DLE EOT, GS a**

GS v 0 m xL xH yL yH d1 ... dk

[Name] Print grating bit image

[Format] ASCII GS v 0 m xL xH yL yH d1...dk
Hex 1D 76 30 m xL xH yL yH d1...dk
Decimal 29 118 48 m xL xH yL yH d1...dk

[Range] $0 \leq m \leq 3, 48 \leq m \leq 51$
 $0 \leq xL \leq 255$
 $0 \leq xH \leq 255$ here $1 \leq (xL + xH \times 256) \leq 128$
 $0 \leq yL \leq 255$
 $0 \leq yH \leq 8$ here $1 \leq (yL + yH \times 256) \leq 4095$
 $0 \leq d \leq 255$
 $k = (xL + xH \times 256) \cdot (yL + yH \times 256) (k \neq 0)$

[Description] Set grating bit image as follows:

m	Mode	Vertical dot density	Horizontal dot density
0, 48	Normal	203.2 dpi	203.2 dpi
1, 49	Double width	203.2 dpi	101.6 dpi
2, 50	Double height	101.6 dpi	203.2 dpi
3, 51	Four time size	101.6 dpi	101.6 dpi

(dpi: per 25.4 mm {1 inch} print dot)

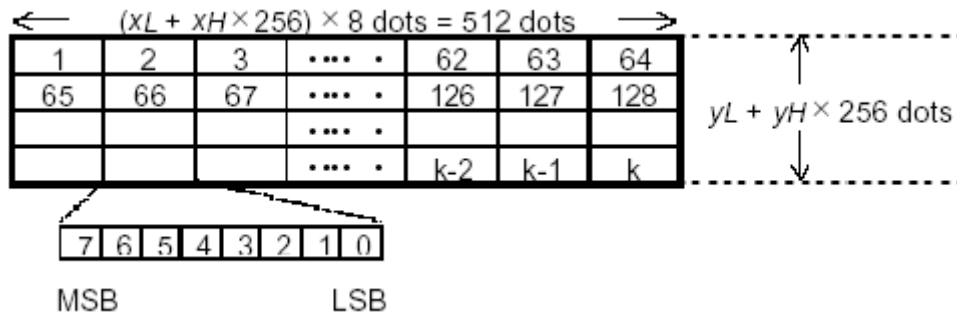
- xL, xH, set bit image horizontal direction data byte ($xL + xH \times 256$).
- yL, yH, set bit image vertical direction data byte ($yL + yH \times 256$).

[Notes]

- In standard mode, this command affects only when there are no data in print buffer area.
- For grating bit image print, this command doesn't affect by print mode (character size, bold, overlap, upside down print, underline, invert blank print etc.).
- If the printable area width which set by GS L and GS W is narrower than the min width, the printer only extends the problem line to the min width. The min width for the normal mode (m=0,48) and the double height mode(m=2, 50) are one dot, for the double width mode(m=1,49) and the four times mode(m=3,51) are two dots.
- The data out of the print area be read, and discarded one by one.
- If the continued character position is multiple of 8. The continued character print position as the grating bit image print, set by HT(horizontal table), ESC \$(set absolute print position), ESC \ (set relative print position) and GS L(set left side spacing).
- The set by ESC a (set justification) for the grating bit image is also effective.
- Receive this command during macro definition, the printer finishes the macro definition, and begins to execute this command. The definition of this command should be cleared.
- d specifies bit image data. Set the dot which will be printed as 1, the dot which won't

be printed as 0.

[For example] When $xL + xH \times 256 = 64$



GS w n

[Name] Set bar code width

[Format] ASCII GS w n
 Hex 1D 77 n
 Decimal 29 119 n

[Range] $2 \leq n \leq 6$

[Description] Set bar code horizontal size.
 n set bar code width as follows:

n	Multi bar code unit width(mm)	Binary bar code	
		Narrow width(mm)	Wide width(mm)
2	0.250	0.250	0.625
3	0.375	0.375	1.000
4	0.560	0.500	1.250
5	0.625	0.625	1.625
6	0.750	0.750	2.000

- Multi bar code as follows:
 UPC-A, UPC-E, JAN13 (EAN13), JAN8 (EAN8), CODE93, CODE128
- Binary bar code as follows:
 CODE39, ITF, CODABAR

[Default] n = 3

[Reference] **GS k**

5.5 Chinese Character Control Command

FS ! n

[Name] Set print mode for Chinese character

[Format] ASCII FS ! n
 Hex 1C 21 n
 Decimal 28 33 n

[Range] $0 \leq n \leq 255$

[Description] Set print mode for Chinese character, set n as follows:

Bit	Off/On	Hex	Decimal	Function
-----	--------	-----	---------	----------

0	-	-	-	Undefined
1	-	-	-	Undefined
2	Off	00	0	Disable double width mode
	On	04	4	Enable double width mode
3	Off	00	.	Disable double height mode
	On	08	8	Disable double height mode
4	-	-	-	Undefined
5	-	-	-	Undefined
6	-	-	-	Undefined
7	Off	00	0	Disable underline mode
	On	08	128	Enable underline mode

- [Particularize] . Set both double width mode and double height mode (contain right side and left side character spacing), will print four times character size.
- . The printer can add underline to all characters (contain right side and left side character spacing), but can't add underline to the blank which set by HT command, and clockwise 90°revolved characters.
- The underline width specified by FS. It is not relevant to the character size.
 - When some of characters in a line are double height or more times, all characters in this line will adjust along the base line.
 - Bold Chinese character by FS W or GS !, the last received set is effective.
 - Set/cancel the underline mode by FS, the last received set is effective.

[Default] n = 0

[Reference] **FS -, FS W , GS !**

FS &

[Name] Set Chinese character mode

[Format]	ASCII	FS	&
	Hex	1C	26
	Decimal	28	38

[Description] Select Chinese character mode.

- [Particularize]
- This command only affects when selecting GB18030 code system.
 - GB18030 only supports double bytes 1、2、3、4、5 area.
 - Select Chinese character mode, the printer processes all Chinese character code, two bytes each time.
 - Process Chinese character code as the sequence of the first byte, the second byte.
 - Turn the power on, the printer enter into Chinese character mode automatically.
 - Select Chinese character mode, firstly the printer detects whether the code is Chinese character or not; If it is the Chinese character and processes the first byte and the second byte.

[Reference] **FS ., FS C**

FS - n

[Name] Turn underline mode on/off for Chinese characters

[Format]	ASCII	FS	-	n
	Hex	1C	2D	n

Decimal 28 45 n

[Range] $0 \leq n \leq 2, 48 \leq n \leq 50$

[Description] For receipt and allonge, turn underline mode on/off for Chinese characters as follows:

n	Function
0, 48	Turn underline mode off for Chinese characters
1, 49	Turn underline mode on for Chinese characters(1 dot width)
2, 50	Turn underline mode on for Chinese characters(2 dots width)

[Particularize] . The printer can add underline to all characters(contain right side and left side character spacing), but can't add underline to the blank which set by HT command, and clockwise 90°revolved characters.

. Set n as 0, and turn underline off for Chinese characters, won't execute underline print, but the underline width set before which remains the same. Default underline width is 1 dot.

. Even the character size is changed, the specified underline width remains the same.

. Turn underline mode on/off by FS !, and the last received command is effective.

. Select allonge, even n is 2 or 50, the underline width is 1 dot.

[Default] n = 0

[Reference] **FS !**

FS .

[Name] Cancel Chinese mode

[Format] ASCII FS .
Hex 1C 2E
Decimal 28 46

[Description] Cancel Chinese mode

[Particularize] . This command only affects when selecting GB18030 code system.

. When Chinese character mode doesn't be selected, all character codes are ASCII code, process one character each time.

. Turn the power on, the printer enters into Chinese character mode automatically.

[Reference] **FS &, FS C**

FS 2 [c11 c12 d1...d1k]1 ... [cn1 cn2 d1...dnk]n NULL

[Name] Define user-defined Chinese character

[Format] ASCII FS 2 [c11 c12 d1...d1k]1 ... [cn1 cn2 d1...dnk]n NUL
Hex 1C 32 [c11 c12 d1...d1k]1 ... [cn1 cn2 d1...dnk]n 00
Decimal 28 50 [c11 c12 d1...d1k]1 ... [cn1 cn2 d1...dnk]n 0

[Range] c1, c2 are zone bit codes in the user-defined Chinese character which set by FS 2, K=72, n is the number of Chinese character which will be defined, d1...dk are defined Chinese character data. Another zone bit codes which are not in the selected user-defined Chinese character zone, will be no any meanings.

[Description] .c1 is zone code、c2 is bit code. User-defined Chinese character saved in FLASH, lost when turn the power off.

.Before defining user-defined Chinese character by FS 2 command, have to make sure the used code zone. (use FS C command, more details refer to FS C command description.)

.After transmitting FS 2 [c11 c12 d1...d1k]1...[cn1 cn2 d1...dnk]n, finishes definition by transmitting NUL finally.

.After sending FS 2 [c11 c12 d1...d1k]1 ... [cn1 cn2 d1...dnk]n , at last send NUL to finish the definition.

.Repeat [note] to define the character frequently, It may break FLASH MEMORY, so suggests that it is less than ten times every day.

.Define several Chinese characters, finish by one command as makes definition together.

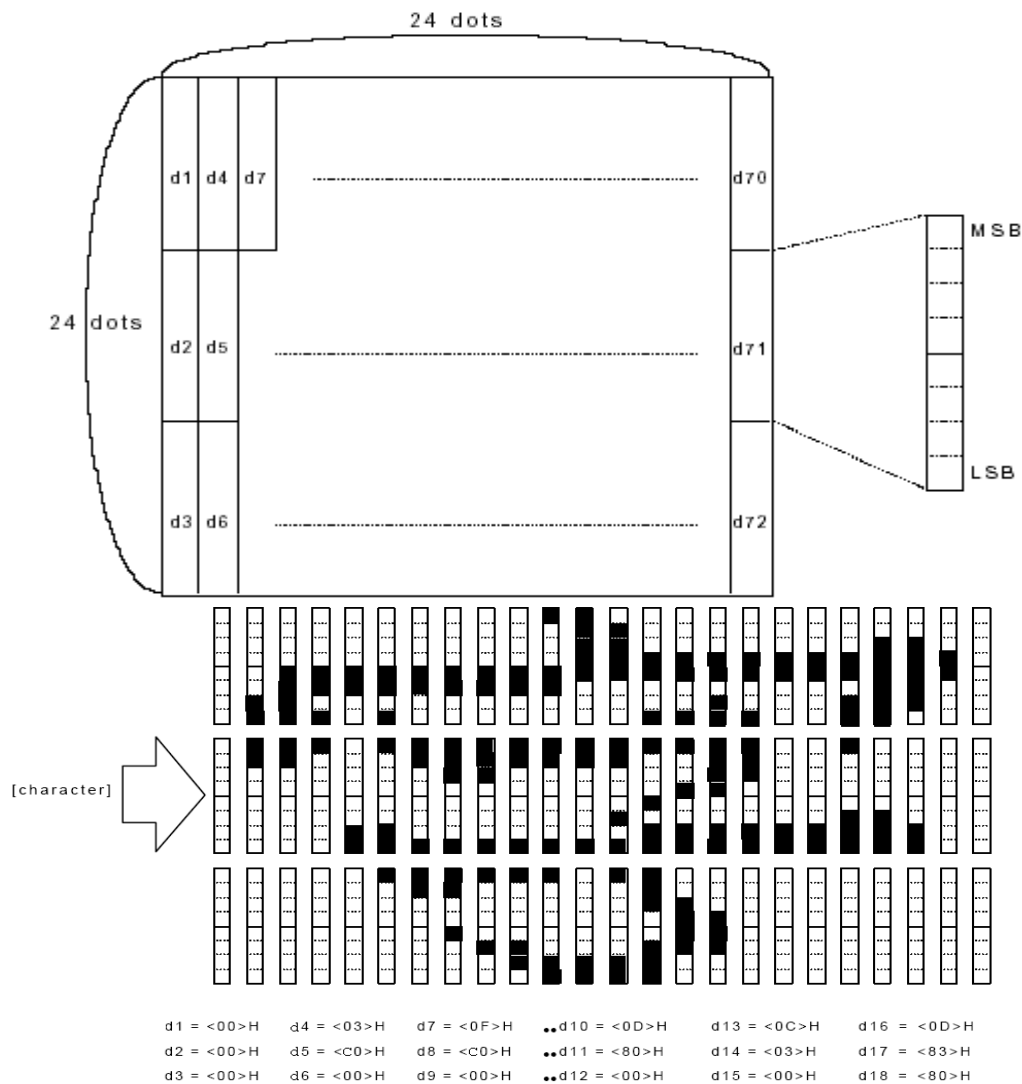
.This command affect only at the origin of one line.

[Particularize] This command can define n characters each time, after sending FS 2 [c11 c12 d1...d1k]1...[cn1 cn2 d1...dnk]n, to end the definition by sending NUL at last. You can define all Chinese characters in the the user-defined zone according to this command. Repeat to define, as more two times.

[Default] Blank

[Reference] **FS C**

[For example]



[Name] Select Chinese character code system

[Format] ASCII FS C n

Hex 1C 43 n

Decimal 28 67 n
 [Range] n = 0、1、2、48、49、50
 [Description]

N	User defined zone	Code bit range
0, 48	User zone 1	AAA1 ~ AF FE
1, 49	User zone 2	F8A1 ~ FE FE
2, 50	User zone 3	A140 ~ A7A0

Notes:

- 1、Change user zone , will clear all old characters.
- 2、Use user defined Chinese characters, notes that selected zone the same as defined zone, Or, Or, may print incorrectly.
- 3、Before defining by FS 2, be sure user defined zone by FS C firstly.

[Default] n = 0

FS S n1 n2

[Name] Set Chinese character spacing

[Format]

ASCII	FS	S	n1	n2
Hex	1C	53	n1	n2
Decimal	28	83	n1	n2

[Range] $0 \leq n1 \leq 255$
 $0 \leq n2 \leq 255$

[Description] Set Chinese character spacing n1 and n2 separately.

- Left Chinese character spacing is $[n1 \times 0.125 \text{ mm}]$, Right Chinese character spacing is $[n2 \times 0.125 \text{ mm}]$.

[Particularize] .This command set left side and right side Chinese characters spacing in normal size.
 When setting double width mode, left side and right side Chinese characters spacing are twice than normal mode.

.Set spacing by this command separately in standard mode and page mode.

- In standard mode, use horizontal motor unit.
- In page mode, Horizontal motor unit or vertical motor unit is different according to pge mode, depends on the origin print position. More as follows:
 - ① set the origin position to the up-left or down-right of printable area by ESC T, use the horizontal motor unit(x).
 - ②Set the origin position to the up-right or down-left of printable area, use the vertical motor unit(y).
 - ③For allonge, the max right side spacing is about 32 mm (255×0.125 mm). Any set which overs the max will be changed to the max data automatically.

[Default] n1 = 0, n2 = 0

FS W n

[Name] Turn quadruple-size mode on/off for Chinese characters

[Format]

ASCII	FS	W	n
Hex	1C	57	n
Decimal	28	87	n

[Range] $0 \leq n \leq 255$

- [Description] Turn quadruple-size mode on/off for Chinese characters.
- When the LSB is 0, turn quadruple-size mode off for Chinese characters.
 - When the LSB is 1, turn quadruple-size mode on for Chinese character.
- [Particularize] .Only LSB of n is effective.
- .In quadruple-size mode, the print character size is the same as the print character size which be set double width and double height.
- Turn quadruple-size mode off by this command, the following character size printed as normal size.
- .Different character height in one line, all characters in this line will be adjusted on base line.
- .Characters enlarges along the horizontal direction, characters enlarges to the right side on basis of the left side.
- .Select double width and double height mode, turn quadruple-size mode on/off by FS ! or GS !. The last received command set is effective.
- [Default] n = 0
- [Reference] **FS !** , **GS !**

APPENDIX A: MISCELLANEOUS NOTES

A.1 Print and feed paper notes

- 1) The printer is the line printer, so auto cut after printing. So, When the line spacing is less than print data, the feed paper quantity may be more than set feed paper quantity and to print data. For example, the line spacing is 10 dots (10/180 inch), only execute feed paper, roll paper fed 10 dots, If print the bit image characters, the printer feeds paper 24 dots.

Only print character rotation in one line, execute feed paper as the table A.

		Paper feed quantity (dot)
Normal character	Font A	24Xvertical magnification
	Font B	17Xvertical magnification
	Chinese characters	24Xvertical magnification
Character rotation	Font A	12Xvertical magnification
	Font B	9X vertical magnification
	Chinese characters	24Xvertical magnification
Bit image (ESC*)		24

- 2) When the printer enters into ready mode (data ready) during print period, so stops printing and feeding paper for a while. When execute data transmission and printing, roll paper will be moved 1 to 3 dots from origin position, it affects bit image printing mainly.
- 3) In receipt parts, auto cut operated spacing
- For auto cutter in driver receipt parts, the min spacing is 10 print line or feed paper line (prevent the small sheet paper to auto cut).

A.2 External Power Connection Notes

- Connect the external power to the printer. and turn the power on when need. Be sure the correct connection, if it is wrong, may be damage the external power or the printer.

- Over high voltage or low voltage occurred, turn the power off as soon as possible.

A.3 Another Notes

- The printer operation
- When roll paper cover is closed, do not pull the roll paper.
- Thermal print head slice and driver IC are easy to damage, do not touch by metal.
- In printing process or after using one period time, thermal print head slice temperature turns to high, do not touch the print head slice.
- Do not use the roll paper cover usually when it is with roll paper.
- Do not touch the print head slice, dusty and other dirt materials with print head cover that will damage the print head.
- Thermal roll paper contains Na⁺, K⁺, Cl⁻ that will damage the thermal element with thermal print head, so, please use the specified roll paper.
- Label paper can not be used.

APPENDIX B: ROLL PAPER SETUP

B1 Change roll paper

- 1、 Open the roll paper cover.
- 2、 Put the new roll paper.
- 3、 Pull one small part, and close the roll paper cover.

APPENDIX C: GET RIGHT FROM AUTOCUTTER ERROR

If the other materials, as clip, fall to autocutter and lock up autocutter, the printer turn to error status and recover operation automatically.

If the problem is not serious, autocutter recovers to the normal position automatically. (Error LED flash continually, but error may be correct automatically.)

If autocutter does not return to the normal position, so run autocutter motor to return the origin position.

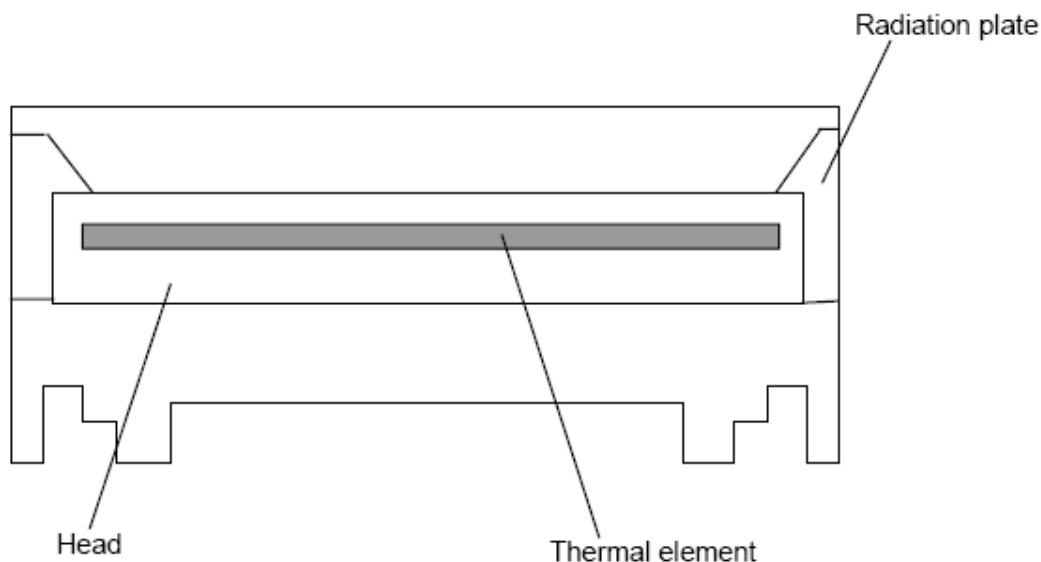
If can not run motor gear, so contrarotate to loosen gear; then push feed paper button. Next, detect error LED, If error LED always flash, repeat the same step, until turn error LED off. When turning error LED off, autocutter cut returned to normal position. Open the cover, move the jammed paper, put the roll paper again. At last, close the cover.

APPENDIX D: CLEAN THE PRINT HEAD

Roll paper slice fallen to the print head, it will cause print quality, clean the print head as the following steps:

- 1 . Turn the power off, and pull the power cable and communication out.
2. Open the roll paper cover.

- 3 . Clean cotton with a little alcohol, paint to surface dirt slightly, do not use sandpaper, blade or force materials to clean print head slice! Or, the thermal print head slice will be damaged, and can not be recovered.
- 4 . Clean the print head slice, after complete dry, do self test, watch the print result.



Note: Never clean the print head slice when the thermal print head slice is heat, Or, it will cause head slice to break.

APPENDIX E: THE MARK OF TRANSFER STATUS

Because the specific transmission status bit from this circuit board is fixed, the user can confirm the command of status:

Table C.1 Transmission status sign

Command and function	Respond status
GS r	⟨0**0****⟩ B
XON	⟨00010001⟩ B
XOFF	⟨00010011⟩ B
DLE EOT	⟨0**1**10⟩ B
ASB(1 st byte)	⟨0**1**00⟩ B
ASB(2 nd to 4 th bytes)	⟨0**0****⟩ B

APPENDIX F: THE EXAMPLE OF PAGE MODE

In page mode, transmission command process as follows:

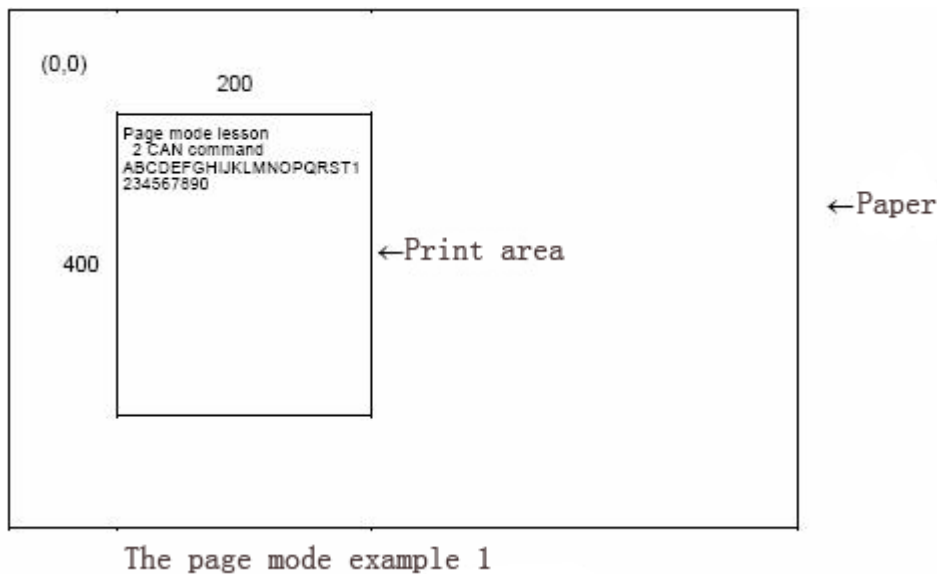
- ① Enter into page mode by ESC L.

- ② Specify print area by ESC W.
- ③ Specify print direction by ESC T.
- ④ Transmit print data.
- ⑤ Put data together by FF.
- ⑥ The printer automatically returns to standard mode after printing

For example 1: BASIC program example(if #1 file opened, can be transmitted data to the printer)

```
100 PRINT #1,CHR$(&H1B);"L";
110 PRINT #1,CHR$(&H1B);"W";CHR$(0);CHR$(0);CHR$(0);CHR$(0);
120 PRINT #1,CHR$(200);CHR$(0);CHR$(144);CHR$(1);
130 PRINT #1,CHR$(&H1B);"T";CHR$(0);
140 PRINT #1,"Page mode lesson TEST 1"
150 PRINT #1,CHR$(&HC);
```

In example 1 program, set one print area from (0,0) 200 ´ 400 dots, and print characters at the first line, as follows:



Note: Insert one feed paper line between "lesson" and "TEST 1". Because in the 200 ´ 400 print area horizontal range, behind word "lesson" no empty mark position, so insert this feed paper line automatically. Feed paper quantity set by ESC 3. Before executing FF, can set any quantity print area. If any print area is overlapping, the overlapping data part to print as the last data. The generated data could be deleted partly. Specify one print area by ESC W, this area make up the deleted part. All data in specified area will be deleted, even its only part of characters.

Example 2: BASIC program example

```
100 PRINT #1,CHR$(&H1B);"L";
110 PRINT #1,CHR$(&H1B);"W";CHR$(0);CHR$(0);CHR$(0);CHR$(0);
120 PRINT #1,CHR$(200);CHR$(0);CHR$(144);CHR$(1);
130 PRINT #1,CHR$(&H1B);"T";CHR$(0);
```

```

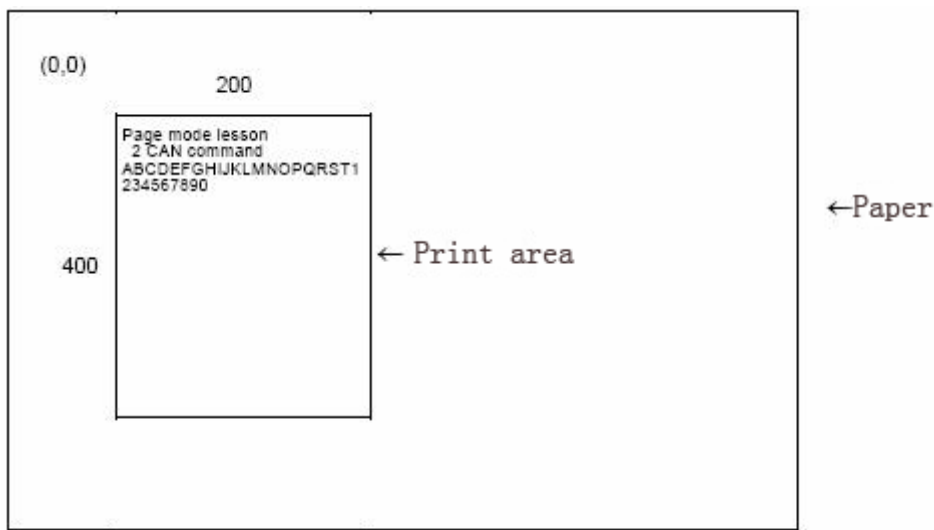
140 PRINT #1,"Page mode lesson 2 CAN command"
150 PRINT #1,CHR$(&HA);
160 PRINT #1,"ABCDEFGHJKLMNOPQRST1234567890"
170 PRINT #1,CHR$(&HC);

```

The process as follows:

Firstly, transmit ESC L to turn to page mode (100 lines). Then sending n1 to n8 by ESC W according to the specified print area. Specify one print area from (0,0), 200 dots in x direction, 400 dots in y direction. Send parameter as 0, 0, 0, 0, 200, 0, 144, 1 (line number 110 and 120). In addition, set print direction to 0 by ESC T (line number 130).

After setting these items, transmit print data "Page mode lesson 2 CAN command" and "ABCDEFGHJKLMNOPQRST1234567890" (line number 140 to 160). The following print result by sending FF (line number 170).



The page mode example 2

Contain the following program line by sending FF, the part data will be deleted:

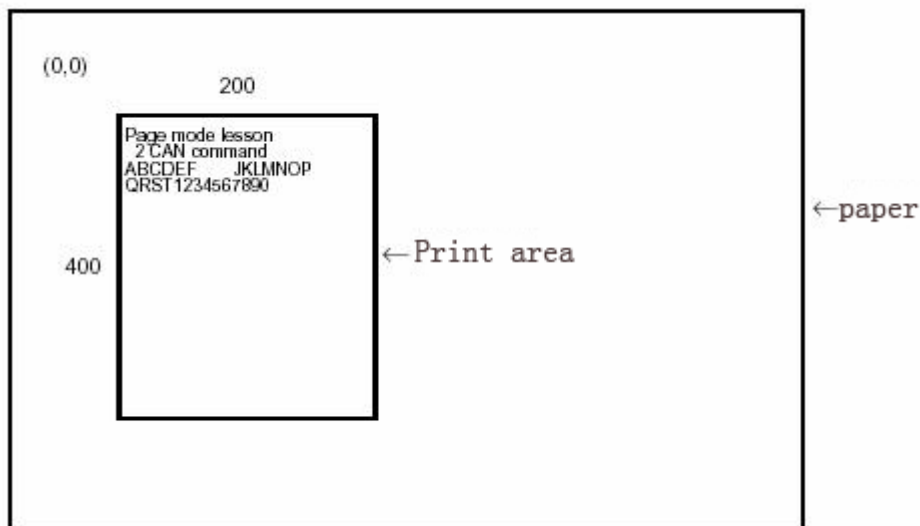
```

170 PRINT #1,CHR$(&H1B);"W";CHR$(72);CHR$(0);CHR$(96);CHR$(0);
180 PRINT #1,CHR$(51);CHR$(0);CHR$(81);CHR$(0);
190 PRINT #1,CHR$(&H18);
200 PRINT #1,CHR$(&HC);

```

Contain the above program, delete character "GHI" series, will bring to the following print result. When deleting one area by CAN, the blank as the deleted part.

The page mode example 3



APPENDIX G: CODE128 BAR CODE

G.1 CODE128 bar code description

In CODE128 bar code system, use one bar code character set, indicate 128 unit ASCII characters and 2 bit data. These bar code characters specify 103 unit bar code characters and 3 unit code. Each code indicates the following characters:

- Code set A: ASCII character from 00H to 5FH
- Code set B: ASCII character from 20H to 7FH
- Code set C: 2 bit natural digit character indicate by one character (100 unit natural digit from 00 to 99)

The following special characters in CODE128:

- SHIFT characters

Code set A, the code follow with SHIFT will be processed as code B. Code B, the code follow with SHIFT will be processed as code A. SHIFT characters can not be used in code C.

- Code set select character (CODE A, CODE B, CODE C)

The code set follow with this character turn to code AB or C.

- Function characters (FNC1, FNC2, FNC3, FNC4)

Function character depends on application software. FNC1 is valid in code C.

G.2 Code table

Printable character in code set A

Character	Transmit Data		Character	Transmit Data		Character	Transmit Data	
	Hex	Decimal		Hex	Decimal		Hex	Decimal
NUL	00	0	(	28	40	P	50	80
SOH	01	1	)	29	41	Q	51	81
STX	02	2	*	2A	42	R	52	82
ETX	03	3	+	2B	43	S	53	83
EOT	04	4	,	2C	44	T	54	84
ENQ	05	5	-	2D	45	U	55	85
ACK	06	6	.	2E	46	V	56	86
BEL	07	7	/	2F	47	W	57	87
BS	08	8	0	30	48	X	58	88
T	09	9	1	31	49	Y	59	89
LF	0A	10	2	32	50	Z	5A	90
VT	0B	11	3	33	51	[	5B	91
FF	0C	12	4	34	52	\	5C	92
CR	0D	13	5	35	53	]	5D	93
SO	0E	14	6	36	54	^	5E	94
SI	0F	15	7	37	55	_	5F	95
DLE	10	16	8	38	56	FNC1	7B, 31	123,49
DC1	11	17	9	39	57	FNC2	7B,32	123,50
DC2	12	18	:	3A	58	FNC3	7B,33	123,51
DC3	13	19	;	3B	59	FNC4	7B,34	123,52
DC4	14	20	<	3C	60	SHIFT	7B,53	123,83
NAK	15	21	=	3D	61	CODEB	7B,42	123,66

SYN	16	22	>	3E	62	CODEC	7B,43	123,67
ETB	17	23	?	3F	63			
CAN	18	24	@	40	64			
EM	19	25	A	41	65			
SUB	1A	26	B	42	66			
ESC	1B	27	C	43	67			
FS	1C	28	D	44	68			
GS	1D	29	E	45	69			
RS	1E	30	F	46	70			
US	1F	31	G	47	71			
SP	20	32	H	48	72			
!	21	33	I	49	73			
"	22	34	J	4A	74			
#	23	35	K	4B	75			
\$	24	36	L	4C	76			
%	25	37	M	4D	77			
&	26	38	N	4E	78			
'	27	39	O	4F	79			

Printable character in code set B

Character	Transmit Data		Character	Transmit Data		Character	Transmit Data	
	Hex	Decimal		Hex	Decimal		Hex	Decimal
SP	20	32	H	48	72	p	70	112
!	21	33	I	49	73	q	71	113
"	22	34	J	4A	74	r	72	114
#	23	35	K	4B	75	s	73	115
\$	24	36	L	4C	76	t	74	116
%	25	37	M	4D	77	u	75	117
&	26	38	N	4E	78	v	76	118
'	27	39	O	4F	79	w	77	119
(	28	40	P	50	80	x	78	120
)	29	41	Q	51	81	y	79	121
*	2A	42	R	52	82	z	7A	122
+	2B	43	S	53	83	{	7B,7B	123,123
,	2C	44	T	54	84	|	7C	124
_	2D	45	U	55	85	}	7D	125
.	2E	46	V	56	86	—	7E	126
/	2F	47	W	57	87	DEL	7F	127
0	30	48	X	58	88	FNC1	7B,31	123,49
1	31	49	Y	59	89	FNC2	7B,32	123,50
2	32	50	Z	5A	90	FNC3	7B,33	123,51
3	33	51	[	5B	91	FNC4	7B,34	123,52
4	34	52	\	5C	92	SHIFT	7B,53	123,83
5	35	53	]	5D	93	CODEA	7B,41	123,66
6	36	54	^	5E	94	CODEC	7B,43	123,67

7	37	55	_	5F	95			
8	38	56	`	60	96			
9	39	57	a	61	97			
:	3A	58	b	62	98			
;	3B	59	c	63	99			
<	3C	60	d	64	100			
=	3D	61	e	65	101			
>	3E	62	f	66	102			
?	3F	63	g	67	103			
@	40	64	h	68	104			
A	41	65	i	69	105			
B	42	66	j	6A	106			
C	43	67	k	6B	107			
D	44	68	l	6C	108			
E	45	69	m	6D	109			
F	46	70	n	6E	110			
G	47	71	o	6F	111			

Printable character in code set C

Character	Transmit Data		Character	Transmit Data		Character	Transmit Data	
	Hex	Decimal		Hex	Decimal		Hex	Decimal
00	00	0	40	28	40	80	50	80
01	01	1	41	29	41	81	51	81
02	02	2	42	2A	42	82	52	82
03	03	3	43	2B	43	83	53	83
04	04	4	44	2C	44	84	54	84
05	05	5	45	2D	45	85	55	85
06	06	6	46	2E	46	86	56	86
07	07	7	47	2F	47	87	57	87
08	08	8	48	30	48	88	58	88
09	09	9	49	31	49	89	59	89
10	0A	10	50	32	50	90	5A	90
11	0B	11	51	33	51	91	5B	91
12	0C	12	52	34	52	92	5C	92
13	0D	13	53	35	53	93	5D	93
14	0E	14	54	36	54	94	5E	94
15	0F	15	55	37	55	95	5F	95
16	10	16	56	38	56	96	60	96
17	11	17	57	39	57	97	61	97
18	12	18	58	3A	58	98	62	98
19	13	19	59	3B	59	99	63	99
20	14	20	60	3C	60	FNC1	7B,31	123,49
21	15	21	61	3D	61	CODEA	7B,41	123,65
22	16	22	62	3E	62	CODEB	7B,42	123,66

23	17	23	63	3F	63			
24	18	24	64	40	64			
25	19	25	65	41	65			
26	1A	26	66	42	66			
27	1B	27	67	43	67			
28	1C	28	68	44	68			
29	1D	29	69	45	69			
30	1E	30	70	46	70			
31	1F	31	71	47	71			
32	20	32	72	48	72			
33	21	33	73	49	73			
34	22	34	74	4A	74			
35	23	35	75	4B	75			
36	24	36	76	4C	76			
37	25	37	77	4D	77			
38	26	38	78	4E	78			
39	27	39	79	4F	79			