USER MANUAL

T91

THERMAL PRINTER

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CAUTIONS

☜It’s grade A product， maybe it cause wireless jammer in the environment. In such circumstances, need the user to do related steps.

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☜Version： 1.5

目 录

1 GENERAL DESCRIPTION

1.1 Basic Specifications

Specifications	Parameter
Printing Method	Line Thermal Printer
Printing Speed	150mm/S(Max)
Printing Density	8dot/mm
Printing Directions	Feed Paper Directions
Printing Width	79±0.5mm
Max diameter	83mm
Printing effective width	72mm
Paper Solve Method	Full cut/Partial cut
Line Width	3.75MM
Print head	Seiko CADP347
Thermal Print Head	100KM
Auto cutter	700,000 times
Interface	Serial/Parallel/Ethernet/USB
Character	ASCII/GB18030 Simplified Chinese /Traditional Chinese/Multinational Chinese
Print character each line	24/48 21/42 16/58
Print character each line	48/48 42/42 32/58
Emulation	ESC/POS® standard command protocol
Power Supply	DC24V/2A
During Operation	0℃～50℃ 0～85%（humidity）
During Storage	-20℃～60℃ 0～85%（humidity）
Dimension	142×154×144(W×L×H)
Weight	1300g(no paper roll)
Support OS	XP/2000/2003/Win7/Win 8

1.2 Printable Area

79.5±0.5mm The printable area of thermal paper is 72.2 ± 0.2 mm，There are 4.0 mm blank area left and right side，as follows：

.

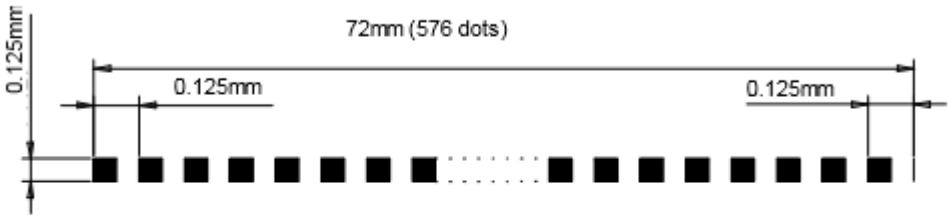
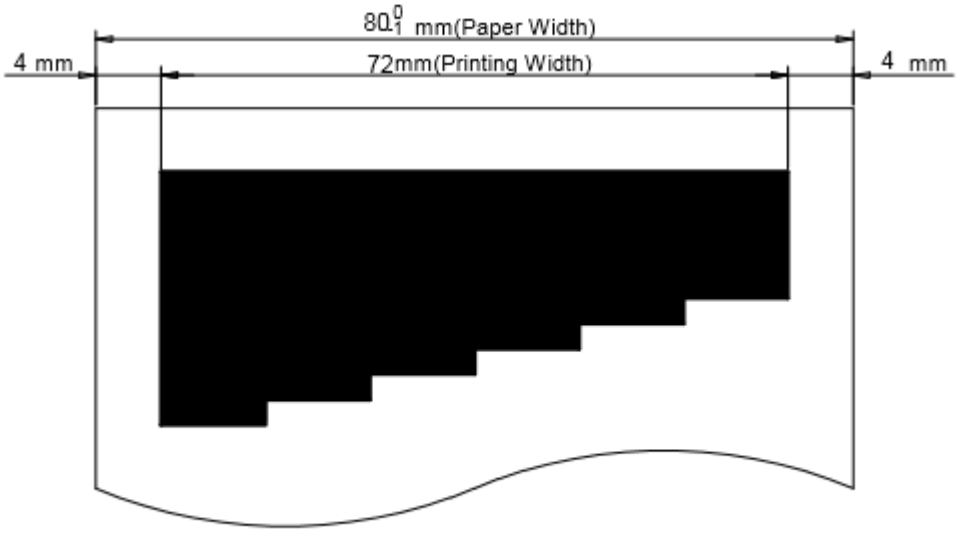


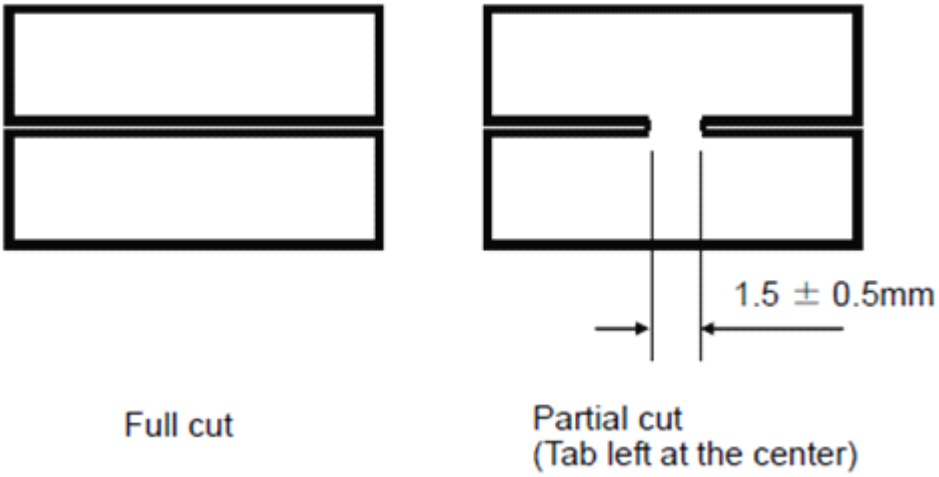
Figure 3-1 Dot Pitch



1.3 Internal Buffer

Receive Date Buffer Memory	4KB
Macro Defined Buffer Memory	2KB
NV Bit Image Buffer Memory	192KB

1.4 Printing Position and Tear off Position



NOTE：

1. 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.
2. 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 functions 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

<table>
<tr><td>4</td><td>RTS</td><td>Output</td><td>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 printingdue 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>
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：
· During the period from when the power is turned on to when the printer is ready to receive data
· During the self-test</td></tr>
<tr><td>7</td><td>SG</td><td>—</td><td>Signal ground</td></tr>
</table>

Signal assignments and functions (continued)

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

XON/XOFF Transmit time

When XON/XOFF be selected，The printer transmits the following XON or XOFF signal. The difference of transmit time decided by DIP switch setting.

XON/XOFF Transmit time

	Printer status	DIP Switch	
		ON	OFF
XON 传送	① Turn the power on, the printer enter into online ② When "buffer area is full" of the receive buffer area be removed ③ When the printer from offline to online ① Recover from the error by DLE ENQ 1 or DLE ENQ 2 command	Transmit Transmit — —	Transmit Transmit Transmit Transmit
XOFF 传送	④ When receive buffer area becomes full ② When the printer from online to offline	Transmit —	Transmit Transmit

Notes:
- XON code is <11>H， XOFF code is <13>H。
- In the case of ③，When the receive buffer area is full, XON will not transmit.
- In the case of ⑥，When the receive buffer area is full, XOFF will not transmit.a

Serial interface socket case

Can use the below signal relational cables.

9 pin serial pin definition **25 pin serial pin definition**

9 pin RS-232 serial（DB9）			**25 pin RS-232 serial（DB25）**		
Pin No.	**Simplified**	**Function**	**Pin No.**	**Simplified**	**Function**
1	CD	Carrier Detect	8	CD	Carrier Detect
2	RXD	Receive	3	RXD	Receive
3	TXD	Transmit	2	TXD	Transmit

4	DTR	Data Terminal Ready		20	DTR	Data Terminal Ready
5	GND	Ground		7	GND	Ground
6	DSR	Data Set Ready		6	DSR	Data Set Ready
7	RTS	Request To Send		4	RTS	Request To Send
8	CTS	Clear To Send		5	CTS	Clear To Send
9	RI	Ring Indicator		22	RI	Ring Indicator

DIP Switch 1-3 is ON

1) When the printer occure error, open the cover, when out of paper or feed paper, the printer only stop working but not busy status.
2) When DIP Switch is ON and handshaking signal is effective, check the printer status by GS a and ASB command. In this status, the default of GS a parameter n is 2. The printer transmit the printer status automatically, it decided by online/offline status.
3) When use DLE EOT, should be confirm that the receive buffer area is not full enough.
   - For example, when the printer is busy, the host can not transmit the data:
     When receive buffer area full to make printer busy, if occur error, can not use DLE EOT。
   - If the printer is busy, the host can transmit the data:
     When transmite bit image data, if receive buffer area full and process bit image date that transmit DLE EOT at the same time that will be as bit image data.
     When receive buffer area full, maybe lose the data if transmit.

For example: When use 4KB receive buffer area, after transmitting each lie data, check theprinter status by GS r 1. Transmit one line data to make the receive buffer is not full enough.

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 turened on or until the printer becomes ready for data transmission afterit 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 fedd 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 Defination

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 n Ack 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	-	
Input Low Voltage	V_{IL}	-	0.8 V	
Input High Current	I_{IH}	-	-0.32 mA	V_{IH}=2.0 V
Input Low Current	I_{IL}	-	12 mA	V_{IL}=0.8 V

Logic - H Signal Sender Characteristics

Characteristics	Symbol	Specifications		Conditions
		Min	Max	
Output High Voltage	V_{OH}	3.0 V	5.5 V	While the

Output Low Voltage	V_{OL}	-	2.0 V	power is OFF

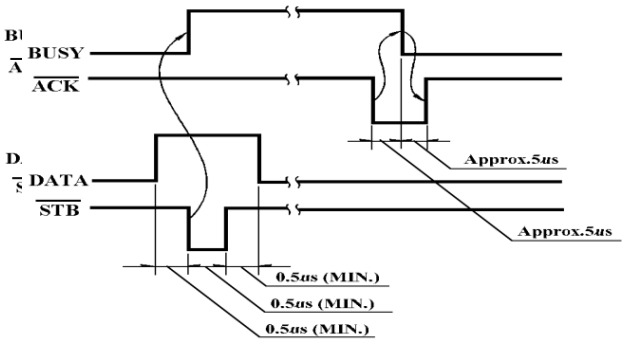
+5 V Signal Sender Characteristics

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

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.

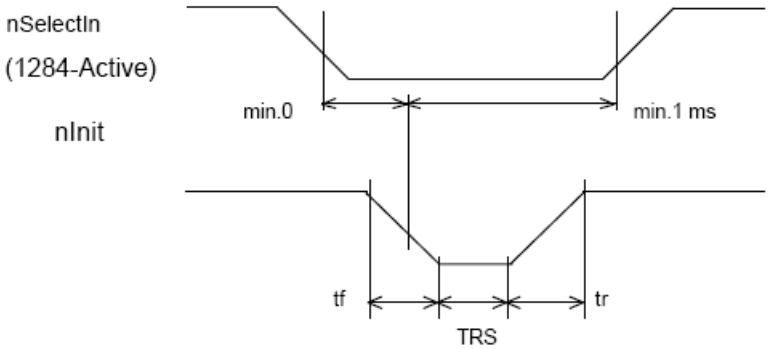
The signal is ignored when #36 nSelectIn /1284-Active is high in reverse mode.

· DC characteristic

TTL Level

· AC characteristic

Min reset pluse 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 acception (Reverse Mode).

2) When ASB is used, the host is preferably in the wait state for data acception (ReverseIdle 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 conditions changed, all ready to send ASB conditions from last time that need to send together, then sending the latest ASB conditions.

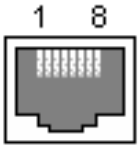
2.1.3 Ethernet Interface

2.1.3. 1Interface Specifications

Ethernet Type: Standard Ethernet (10M)

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

Connector Type: RJ45 (as table)



2.1.3.2 Interface connection

1.Default IP address “192.168.1.6”, IP port “9100”, checked by self-test list;

2.Link the printer to LAN, open IE and input the IP address of the printer, default “192.168.1.6”, Carriage return to log in. After modifying the related information, then “Reset”;

3. If printing by Windows driver, install T91 driver. After installing driver, find installed T91 driver in “printer and fax”. Choose attribute, then “Port”-“Add port”-choose “Standard TCP/IP Port”, operate according its prompt.

4.Change driver to this port, test through printing test page.

Notes:

1.Default IP port 9100, normal condition that needn’t change;

2.Add “Standard TCP/IP Port”, when choosing “Device type”, to choose “Standard”.

2.1.3.3 Interface Pin Signal Definition

Pin NO.	Signal Name	Signal Source
1	TX+	Tranceive Data+ (Send signa+)
2	TX-	Tranceive Data+-(Send signa-)
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 interfaceB

Communication Agreement: USB2.0

2.1.4.1Interface connection

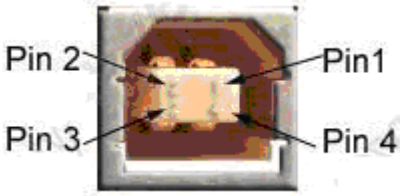
1. Connect printer to PC, and turn the power on;

2.Install Windows driver(T91), At the page of ”Printer and fax”, find the installed driver ”T91”, right click and open the page of ”Attribute”, will have ”USB000n” at ”Port”(May be n is 1,2,3 or anothers, decided by printer USB port), change the printer driver to this port and print test page;

Notes:

When use USB port,if turn the printer power off for a long time, printer driver (T91) will be went off automatically, this moment driver can not print normally, right click to cancel offline print;

2.1.4.3 Interface Pin Signal Defination



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 Power Connector

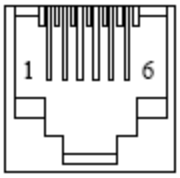
NOTE： To guarantee the normal operation to the printer. Please use the standard power from our company.

Pin Definition：

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

2.3 Drawer Connector

T91 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
		Executive	Set	
HT	Horizontal tab	¡		¡
LF	Print and line feed	¡		¡
CR	Print and carriage return	¡		¡
DLE EOT	Transmit real-time status	¡		¡
DLE ENQ	Send real-time request to printer	¡		¡
ESC !	Select print modes		¡	¡
ESC %	Select/cancel user-defined character set		¡	¡
ESC &	Define user-defined characters		¡	¡
ESC *	Select bit-image mode	¡		¡
ESC 2	Select default line spacing		¡	¡
ESC 3	Set line spacing		¡	¡
ESC ?	Cancel user-defined characters		¡	¡
ESC @	Initialize printer	¡	¡	¡
ESC a	Select justification		¡	¡
ESC D	Set horizontal tab positions		¡	¡
ESC i	Full cut	¡		¡
ESC J	Print and feed paper	¡		¡
ESC m	Partial cut	¡		¡
ESC V	Turn 90° clockwise rotation mode on/off		¡	¡
ESC c 5	Enable/disable panel butons		¡	¡
ESC d	Print and feed n lines	¡		¡
ESC t	Select character code table		¡	¡
ESC {	Turn upside-down print mode on/off		¡	（¡ ）
ESC P	Cash draw command	¡		¡
FS p	Print NV bit image	¡		¡
FS q	Define NV bit image		¡	（¡ ）
GS !	Set character size		¡	¡
GS *	Define downloaded bit image		¡	¡
GS (A	Execute test print	¡		¡
GS (B	Set printer parameter		¡	¡
GS /	Print downloaded bit image	¡		●
GS :	Start/end macro definition	¡	¡	¡
GS B	Turn white/black reverse print mode on/off		¡	¡

GS H	Select print position of HRI characters		¡	¡
GS I	Transmit printer ID	¡		¡
GS L	Set left margin		¡	（¡ ）
GS T	Set print position as printing origin	¡		¡
GS V	Select cut mode and cut paper	¡		（¡ ）
GS W	Set print area width		¡	（¡ ）
GS ^	Execute macro	¡		¡
GS a	Enable/disable automatic status back(ASB)	¡	¡	¡
GS b	Turn smoothing mode on/off		¡	¡
GS f	Select font for HRI characters		¡	¡
GS h	Set bar code height		¡	¡
GS k	Print bar code	¡		●
GS r	Transmit status	¡		¡
GS v 0	Print grating bit image	¡		●
GS w	Set bar code width		¡	¡
GS (K	Print QR code	¡		●

List of Chinese characters command

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

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 zone bit, the set will influence the following data.

Standard mode

¡ : Allowance.

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

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

Page Mode

¡ : 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

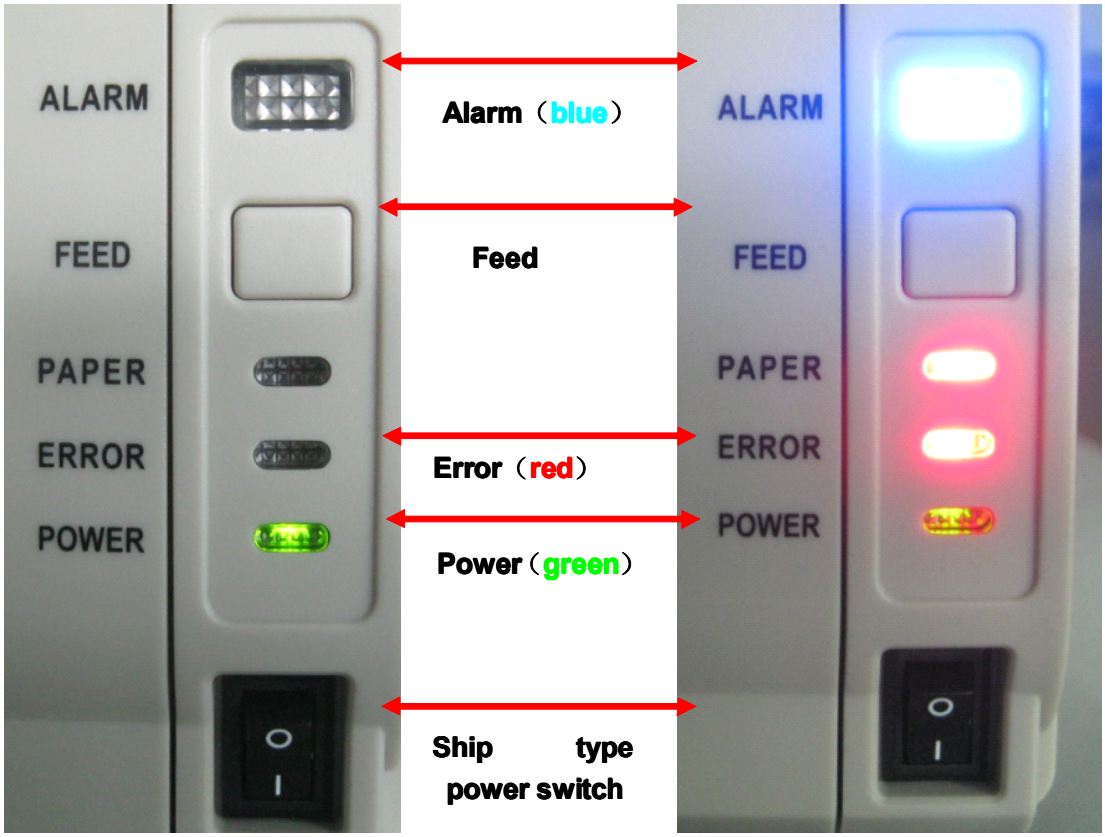
Power switch under the printer front side

Use ship type mode

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

3.2.2 Panel Button

3.2.2.1 Paper Feed Button



T91 key panel picture　　T91 key panel picture

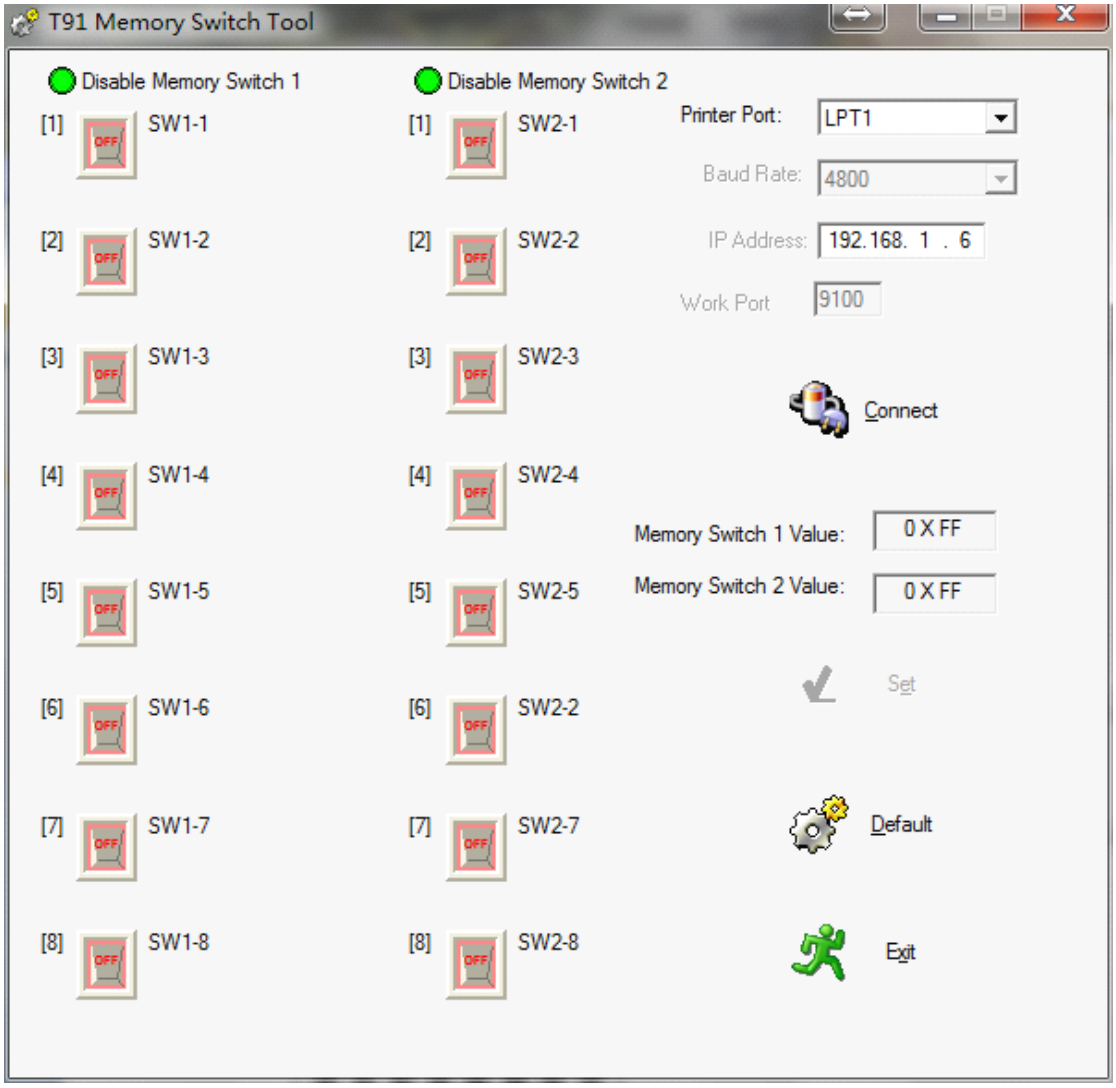
self-test:

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

3.3 DIP Switch

T91 has two DIP Switchs and printed agreed number, each function refer to the below sections；

Can change from DIP setting utility



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	Traditional/Simplified Chinese	BIG5	GB18030	OFF
3	Print speed	Low	High	OFF
4	---	---	---	OFF
5	---	---	---	OFF
6	---	---	---	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 – bits per second 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	----	----	----	OFF
6	----	----	----	OFF
7	Alarm	Warn when closing the buzzer	Warn when opening the buzzer	OFF
8	----	----	---	OFF

3.4 LED/Alarm

1）Power LED：Green

On：Power is stable.

Off： Power is not stable.

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 specifices 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 bliks to indicate the macro execution ready state. (see macro definition commands）

2）

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.

3）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.

Open the paper cover

Install the paper

3．6 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

Select printer character

2) Starting the self-test

1、Firstly install the paper roll

2、Turn the power off, and press feed paper key

3、Turn the power on, about 1~3 seconds and release FEED paper key, will print self-test print.

3．9 Error Processing

3．9．1 Error Type

1) Error that automatically recover

Errors That Automatically Recover

Error	Description	Error LED Flashing Pattern (320 ms)	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 (320 ms)	Recovery
Auto cutter error	The auto cutter does not work correctly	Approximately 5.12 s	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.

3．10 Status Conditions

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

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

1）Roll paper end sensor

The sensor which detect 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 detect 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).

4 CASE SPECIFICATIONS

4.1 External Dimensions and Mass

Height：144mm
Width：142mm
Depth：154mm
Mass：1300g(except for a roll paper)

4.2 Color

White、Black

4.3 External Appearance

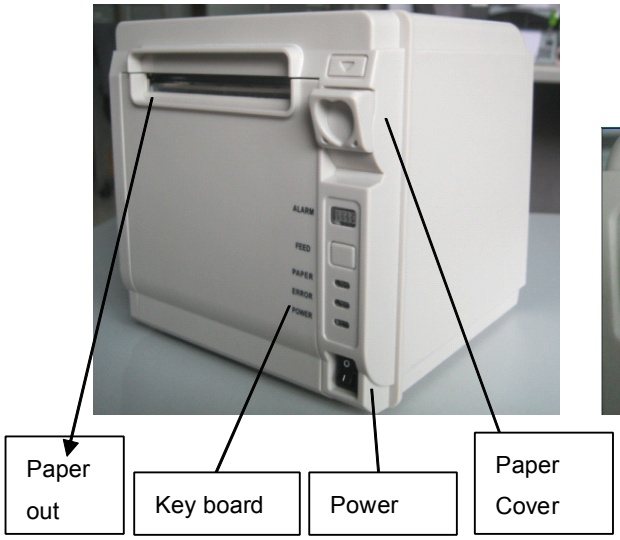


Figure 1：T91 Plan

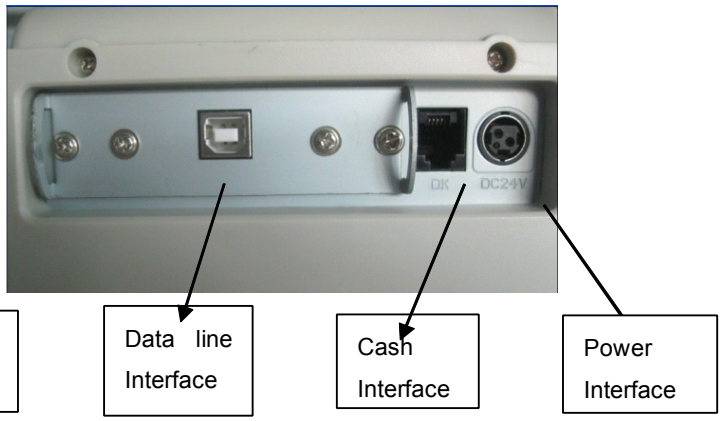


Figure 2：T91 Back

Figure 3：T91 Front

Figure 4：T91 Side

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] Describe the functions of the command.

[Particularize] Go into particular use of commands.

[Notes] Provide 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 comings, 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 falling points:

- No printing data in the present printing buffer area (includes part empty data which caused by blank and HT command)
- 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 are £ 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

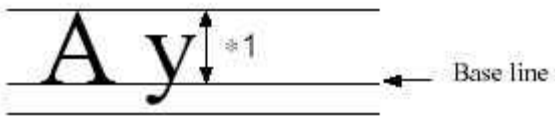
(10) LSB

Least Significant Bit

(11)Baseline

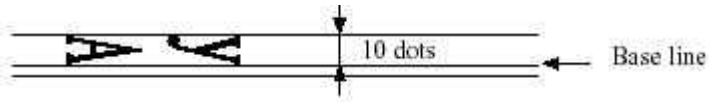
The standard position of the character data what stocked in the print buffer area. The following indicates the general characters position under the standard mode and page mode:

*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 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**

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**

DLE EOT n

[Name] Transmit real-time status

[Format]

ASCII	DLE	EOT	n
HEX	10	04	n
Decimal	16	4	n

[Range] 1 ≤ n ≤ 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 lacated 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 lacated on ON, the printer can not go to BUSY status.
- Reply (ASB) automatically through GS a command, need to make a distinction the sending status 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 deal 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	Function
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 auto cut error.
	On	08	8	Auto cut 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≤ n≤ 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 auto cutter 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 !， **ESC 3** etc）. Completely 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≤ n≤ 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 S0

[Name] Set character double print

[Format] ASCII ESC S0

Hex 1B 0E

Decimal 27 14

[Range] -

[Description] After setting, all characters will be printed double width(Chinese character invalid)

[Particularize] Cancel by carriage return or ESC DC4

[Default] -

ESC DC4

[Name] Cancel character double width print

[Format] ASCII ESC DC4

Hex 1B 14

Decimal 27 20

[Range] -

[Description] Cancel double width by ESC SO

[Particularize] Refer to ESC S0

[Default] -

ESC ! n

[Name] Select print modes

[Format] ASCII ESC ! n

Hex 1B 21 n

Decimal 27 33 n

[Range] 0 ≤ n ≤ 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	On	D4	212	Set double width print
2	On	D5	213	Cancel double width print
3	-	-	--	Undefined
	-	-	--	Undefined
4	Off	0	0	Cancel double height mode
	On	10	16	Set double height mode
5	Off	00	0	Cancel double width mode
	On	20	32	Set double width mode
6	-	-	--	Undefined
7	-	-	--	Undefined
	-	-	--	Undefined

[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.

· When the double or more height characters in one line, all characters will be justified along basis line.

· This command only effect for characters, Chinese invalid

[Default] n = 0

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 ≤ nL ≤ 255

0 ≤nH ≤ 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× 256) ×0.125 mm].

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

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

[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 ≤ n ≤ 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 ≤ c1 ≤c2 ≤126

0 ≤ x≤ 12 (when font A (12× 24) is selected)

0 ≤ x≤ 9 (when font B (9 × 17) is selected)

0 ≤ d1...d(y×xk) ≤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 specifiesthefinal 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 !** 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.

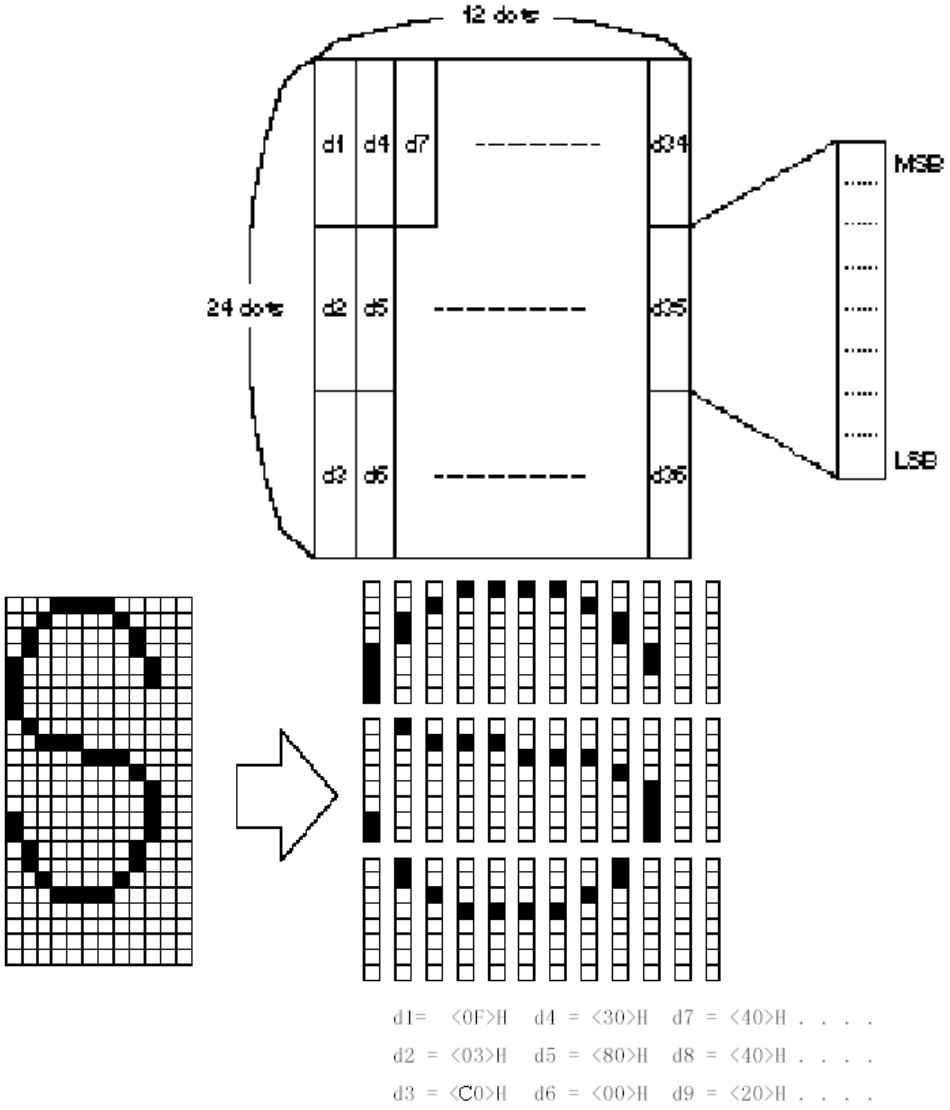
· When the user-defined characters defines in character typeB (9 ´ 17), only effect to the highest valuable bit of the third byte in the vertical direction data.

[Default] Inner character font

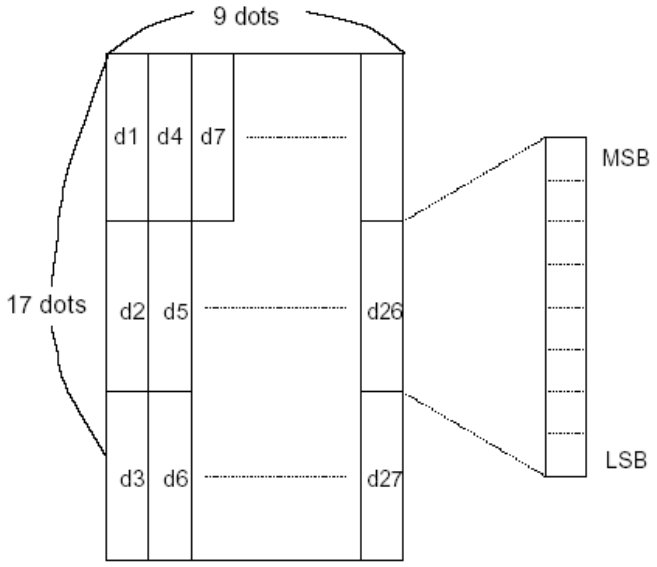
[Reference] **ESC %**, **ESC ?**

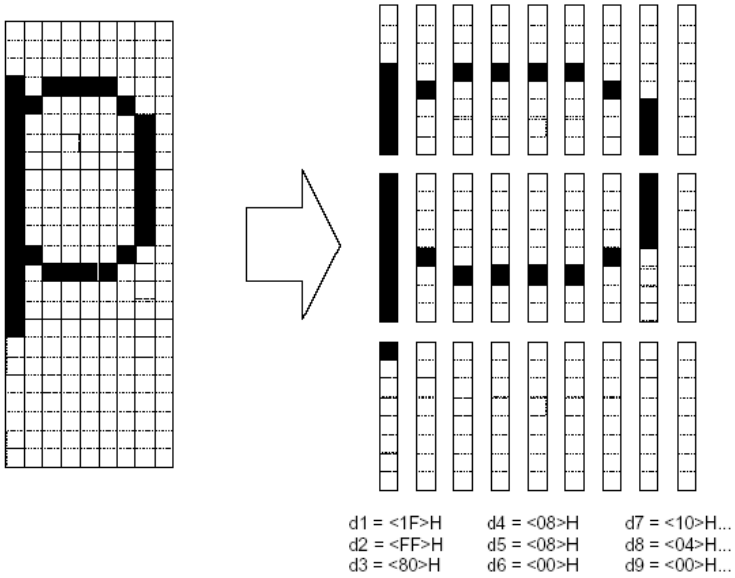
[For example]

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



· When set 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 ≤nL ≤255

0 ≤nH ≤3

0≤ d ≤ 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× 256
1	8-dot double-density	8	67.7 dpi	203.2 dpi	nL + nH ×256
3 2	24-dot single-density	24	203.2 dpi	101.6 dpi	(nL + nH × 256) ×3
3 3	24-dot double-density	24	203.2 dpi	203.2 dpi	(nL + nH × 256) ×3

Dpi: {1 inch}/25.4mm print dot

[Notes] If the data of m over the defined range, then the data of n and after n will be dealt as the rule data.

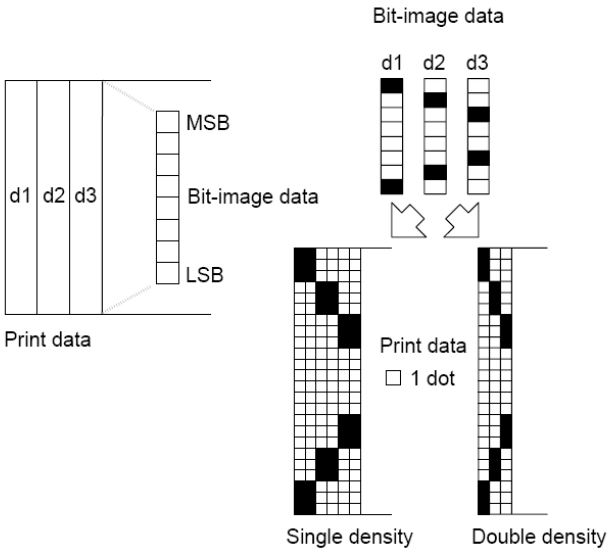
- nL and nH indicates the bit-image data in the horizontal direction. Calculate the dot through nL + nH × 256.
- If input the bit-image data that overs the printable dots in one line, then the over data will be ignored.
- d indicates bit-image data. Set the relative bit to 1 and print one point, or set 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):

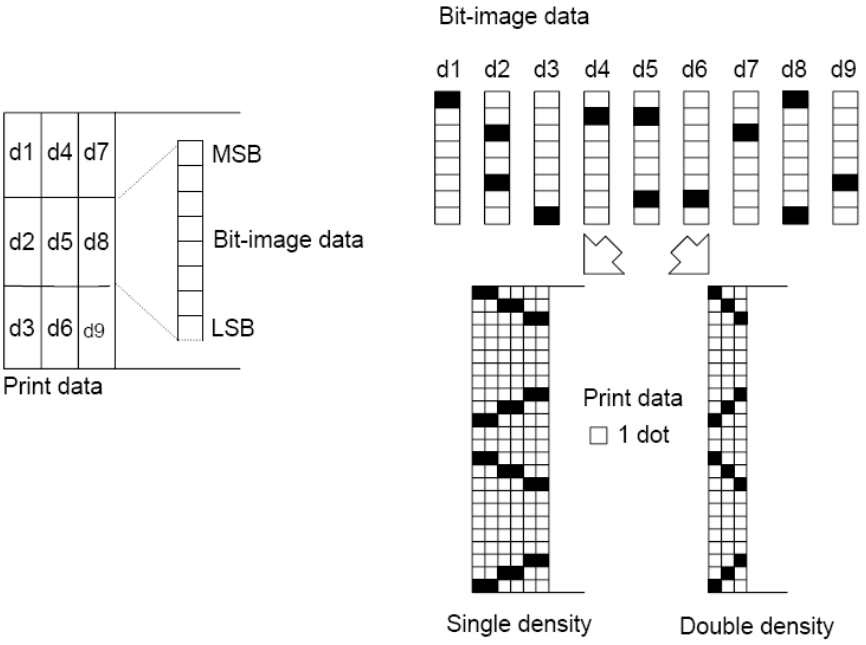
① The printable width extend to the right and meet the data content.

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 2

[Name] Select default line spacing

[Format]

ASCII	ESC	2
Hex	1B	32
Decimal	27	50

[Description] Set 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 ≤ n ≤ 255

[Description] Set line spacing [n × 0.125mm].

[Notes]
- Sets line spacing independently in stable mode
- In stable mode, uses vertical unit (y).

[Default] n = 30

[Reference] **ESC 2**

ESC ? n

[Name] Cancel user-defined characters

[Format]

ASCII	ESC	?	n
Hex	1B	3F	n
Decimal	27	63	n

[Range] 32 ≤ n ≤ 126

[Description] Cancel user-defined characters.

[Notes]
- 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 defect 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]
- The set of DIP swith and Memory Switch won't check.
- The data in receiving buffer area won't be cleared.

· Macro definition won't be cleared.

ESC a n

[Name] Select alignment mode

[Format]

ASCII	ESC	a	n
Hex	1B	61	n
Decimal	27	97	n

[Range] 0 £ n £ 2, 48 £ n £ 50

[Description] Put one line date alignment as the point position

Select alignment type by n

n	Alignment
0, 48	Left alignment
1, 49	Middle
2, 50	Right alignment

[Notes] · At the standard mode, only at the beginning of the line deal with, this command will effect.

Input this command in page mode, the printer only execute interior sign operation.

This command is not effect for page mode.

This command executed alignment in print area.

This command align blanket area by **HT** , **ESC $** or **ESC **.

[Default] n = 0

[For example]

Left alignment

ABC
ABCD
ABCDE

Middle

ABC
ABCD
ABCDE

Right alignment

ABC
ABCD
ABCDE

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 ≤ n ≤ 255

0 ≤ k ≤ 32

[Description] Set horizontal tab positions.

· 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] · 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 delects 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 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 paper5mm 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 ≤ n ≤ 255

[Description] Prints and outputs the data in print buffer area, and feed paper [n × 0.125 mm].

[Notes]

· After printing, this command set the original position to the beginning of one line.

· The feed paper quantity do not affect the data which set by ESC 2 or ESC 3.

· In stable mode, the printer uses vertical unit(y).

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 \ nL nH

[Name] Set relative print position

[Format]

ASCII	ESC	\	nL	nH

Hex	1B	5C	nL	nH
Decimal	27	92	nL	nH

[Range] 0 ≤nL ≤ 255

0 ≤nH ≤ 255

[Description] On basis of present position, set print starting position by horizontal and vertical motor unit.

· This command set the print position from present position to [(nL + nH × 256) × 0.125 mm]。

[Notes] · Any set over printable area which will be ignored.

· Spacing N points the right:

nL + nH ´ 256 = N

Spacing *N point the left*: (negative direction), uses 65536 complement code.

nL + nH ´ 256 = 65536 - N

· In stable mode, uses horizontal motor unit.

[Reference] **ESC $**

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 ≤ n ≤255

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

· Uses each parameter n as follows:

Bit	Off/On	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 paer end sensor enable.
4-7	-	-	-	Undefind.

[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 ≤n ≤255
[Description] Selects the paper sensor to stop printing when paper end detected:

Bit	Off/On	Hex	Decimal	Fuction
0	Off	-	-	Undefinded.
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 ≤n ≤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 ≤ n ≤ 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 ≤n ≤ 5, 16 ≤n ≤ 19, n = 255

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

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

[Default] n = 0

[Reference] Character tables

FS p n m

[Name] Print NV bit image

[Format]

ASCII	FS	p	n	m
Hex	1C	70	n	m
Decimal	28	112	n	m

[Range] 1 ≤ n ≤ 255

0 ≤ m≤ 3 , 48≤m ≤ 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	Quadruple	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 extendes 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 qu adruple 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**

ESC P m n1 n2

[Name] Set cash drawer command

[Format]

ASCII	ESC	P	m	n1	n2
Decimal	27	112	m	n1	n2
Hex	1b	70	m	n1	n2

[Range] In cash drawer connector, output n1 n2, asked n2≥n1

m=0,48 output on cash drawer pin2.

m=1,49 output on cash drawer pin5.

[Description] Notes：

Open time is t_1×2ms

Turn-off time is t_2×2ms

If t_2< t_1, printer deal with t_2=t_1×2ms

If t_2<50, interior printer set t_2 to 50

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 ≤n ≤ 255

0 ≤ xL≤255

0 ≤xH ≤ 3 (when 1 ≤ (xL+ + xH× 256) ≤ 1023

0 ≤ yL ≤ 255

0 ≤ yH ≤ 1 (when 1 ≤ (yL+yH× 256) ≤ 288

0 ≤ d ≤ 255

k = (xL+xH × 256) × (yL+ + yH ×256) × 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× 256) ×8.

· yL, yH for defined NV bit image points the dot of vertica direction (yL+yH× 256) × 8.

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

· During deal with this command to finish reseting 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 definds in NVM. Prints by FS p which defined by FS q.

· In stable mode, This command only effecs 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 effecs.

· 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 o 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 yLl xH 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 ([data:(xL+xH×256) × (yL+yH×256) × 8]+[header:4]) bytes of the NV memory.

· The definded 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.

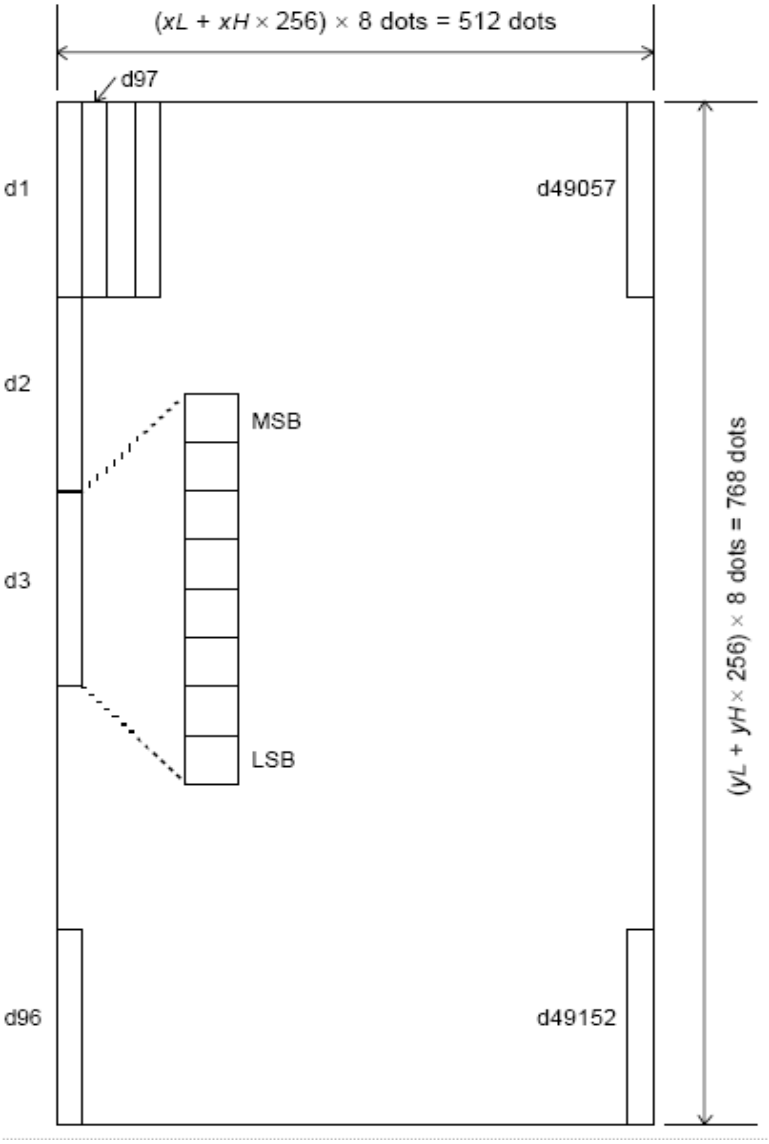
[Notes] · Writes command frequently which could be broken the NV memory.

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 turing 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.



FS p n m

[Name] Print NV bit image

[Format]

ASCII	FS	p	n	m
Hex	1C	70	n	m
Decimal	28	112	n	m

[Range] 1 ≤ n ≤ 255

0 ≤ m ≤ 3 , 48 ≤ m ≤ 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	101.6 dpi	101.6 dpi

	ple		

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 extendes 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 qu adruple 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**

GS ! n

[Name] Select character size

[Format]

ASCII	GS	!	n
Hex	1D	21	n
Decimal	29	33	n

[Range] 0 ≤ n ≤255

(1 ≤ vertical ≤ 8, 1 ≤horizontal≤ 8)

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

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

Set character width

[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.

[Default] n = 0

[Reference] **ESC !**

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)
Decimal	29	42	x	y	d1...d(x ´ y ´ 8)

[Range] 1 ≤x ≤ 255

1 ≤ y ≤ 48 (x × y × 1536)

0 ≤ d ≤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×8； Vertical direction dot is y×8.

· When x×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.

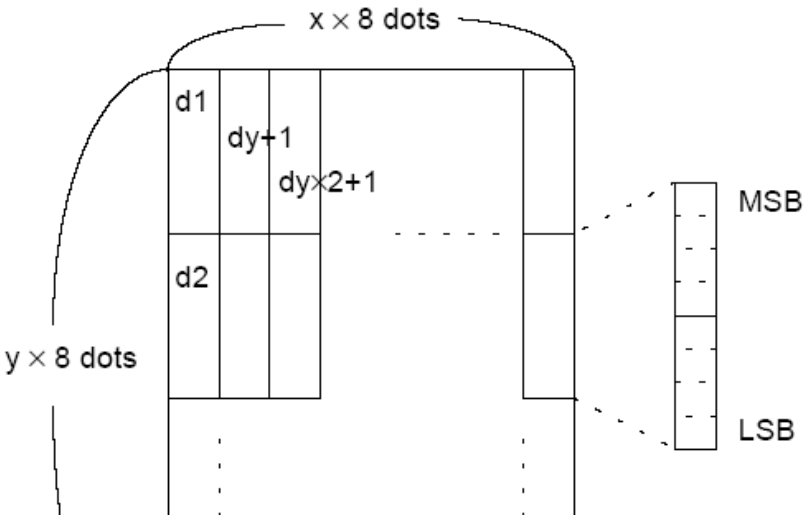
· In following case, clear down-load bit image definition:

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 ≤ m ≤ 3, 48 ≤ m ≤ 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 H n

[Name] Select print position of HRI characters

[Format]

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

[Range] 0 ≤ n ≤ 3; 48 ≤ n ≤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≤n≤ 3, 49≤n ≤51

[Description] Transmit printer ID.

· n indicates the type of printer ID.

n	Printer ID type	ID
1, 49	Printer type ID	Model: T91, Hex: 21H
2, 50	Type ID	Below table
3, 51	Firmware version ID	43H

[Type ID]

Bit	Off/on	Hex	Decimal	Function
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]

· n 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

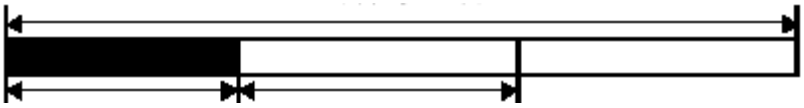
[Name] Set left margin

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

[Range] 0 ≤nL≤255
0 ≤ nH ≤ 255

[Description] Set left margin by nL and nH.

· Set left margin [(nL + nH×256) ×0.125 mm].



The left side blank The width of printable width

[注意]
· 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 × 256) = 20, set value as 16。
Note：Uses this command together with GS /、ESC *, print result may not the expected.

[Default] nL = 0, nH = 0

[Reference] **GS W**

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 ≤ n ≤ 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 autocut 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≠0, the printer feeds paper to (cut paper position+[n×0.125㎜{0.0049 inch}] and cut paper.

GS W nL nH

[Name] Set pirnt area width

[Format]

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

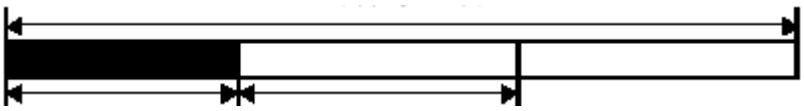
[Range] 0 ≤ nL ≤ 255

0 ≤ nH ≤ 255

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

· Set print area width as [(nL + nH× 256) × 0.125mm].

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.

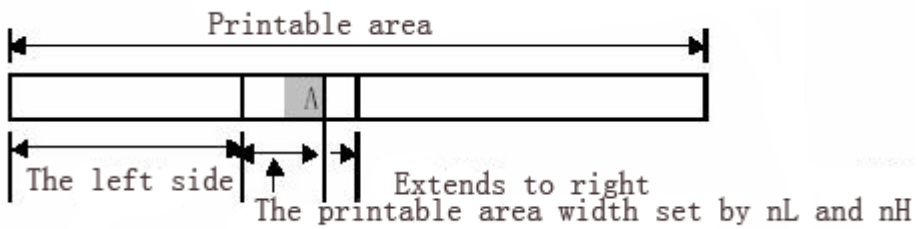
· This command does not affect printing in page mode.

· 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:

① The printable area width extends to right to meet one character.



② If printable area width couldn't be extended fully, decrease left page to meet one character.

③ 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:

① Extend printable area width to right and meet one vertical line of bit image in the printable area.

② 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 ^ 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 ≤ r ≤ 255

0 ≤ t ≤ 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×100ms.
- 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 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 = 0 , 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 ≤ n ≤ 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 ≤ m ≤ 6 (k and d decided by the used bar code system)

② 65 ≤ m ≤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≤ k ≤12	48 ≤ d ≤57
	1	UPC-E	11 ≤ k ≤ 12	48 ≤ d ≤57
	2	JAN13 (EAN13)	12 ≤k ≤13	48 ≤ d ≤57
	3	JAN8 (EAN8)	7 ≤ k ≤ 8	48 ≤ d ≤57
	4	CODE39	1 ≤ k	48 ≤d≤ 57, 65≤ d≤ 90, 32, 36, 37, 43, 45, 46, 47
	5	ITF	1 ≤ k (k is even)	48 ≤ d ≤ 57
	6	CODABAR	1 ≤ k	48 ≤ d ≤ 57, 65 ≤d ≤ 68, 36, 43, 45, 46, 47, 58
	7	Standard EAN13	12≤ k ≤13	48 ≤ d ≤57
	8	Standard EAN8	7≤ k ≤ 8	48 ≤ d ≤57
②	65	UPC-A	11≤ n ≤12	48 ≤ d ≤57
	66	UPC-E	11≤ n ≤12	48 ≤ d ≤57
	67	JAN13 (EAN13)	12 ≤ n ≤ 13	48 ≤ d ≤57
	68	JAN8 (EAN8)	7 ≤ n ≤8	48 ≤ d ≤57
	69	CODE39	1 ≤ n ≤ 255	48 ≤ d ≤ 57, 65 ≤ d ≤ 90, 32, 36, 37, 43, 45, 46, 47

	70	ITF	1 ≤ n ≤255 (n is even)	48 ≤ d ≤ 57
	71	CODABAR	1 ≤ n ≤ 255	48 ≤ d ≤ 57, 65 ≤d ≤ 68, 36, 43, 45, 46, 47, 58
	72	CODE93	1 ≤ n ≤255	0 ≤ d ≤ 127
	73	CODE128	1 ≤ n ≤ 255	0≤ d ≤ 127
	74	Standard EAN13	12 ≤ n ≤ 13	48≤ d ≤ 57
	75	Standard EAN8	7 ≤n ≤8	48 ≤d ≤ 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 printe 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	Control Character	HRI Character		ASCII	Control Character	HRI Character	
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 considers 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.

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 characers are blank.

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

<Anothers> 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 date (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 £ m £ 3, 48 £ m £ 51

0 £ xL £ 255

0 £ xH £ 255 here 1 £ (xL + xH ´ 256) £ 128

0 £ yL £ 255

0 £ yH £ 8 here 1 £ (yL + yH ´ 256) £ 4095

0 £ d £ 255

k = (xL + xH ´ 256) ´ (yL + yH ´ 256) (k ¹ 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×256).
- yL, yH, set bit image vertical direction data byte (yL+yH×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.

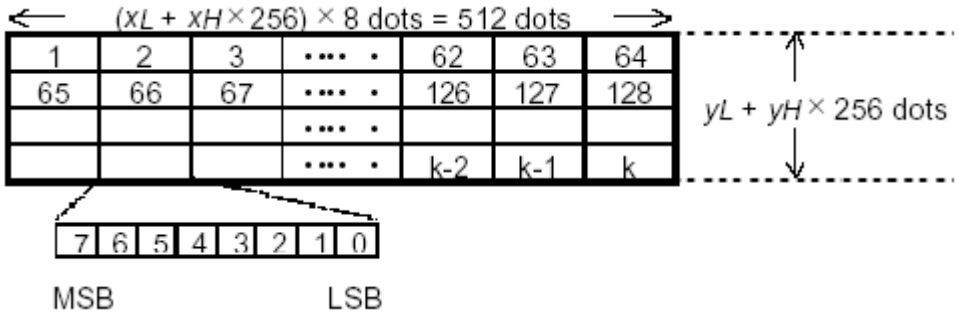
· If the continued character position is multiple of 8. The continuthe ed character print position as the grating bit image print, set by HT(horizontal table), ESC $(set absolute print position), ESC \ (set relative print position) and GS L(set left side spacing).

· 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´ 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≤n≤ 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**

GS (k PL PH cn fn n1 n2(cn=49 ,fn=65)

[Name] Select QR type

[Format] ASCII GS (K pL pH cn fn n1 n2

Hex 1D 28 6B pL pH cn fn n1 n2

Decimal 29 40 107 pL pH cn fn n1 n2

[Range] ($p_L + p_H \times 256$) = 4 ($p_L = 4$, $p_H = 0$)

cn = 49

fn = 65

n1 = 49, 50

n2 = 0

[Default]*n1* = 50 , *n2* = 0

[Description] Select QR code type<Function 01>

n1	Function
49	Select QR code type 1
50	Select QR code type 2

GS （ k pL pH cn fn n（cn=49，fn=67）

[Name] Set QR code module size

[Format] ASCII GS (k pL pH cn fn n

Hex 1D 28 6B pL pH cn fn n

Decimal 29 40 107 pL pH cn fn n

[Range]($p_L + p_H \times 256$) = 3 ($p_L = 3$, $p_H = 0$)

cn = 49

fn = 67

$1 \le n \le 16$

[Default] *n* = 3

[Description] Set QR code module size to n dots<Function 02>

GS (k pL pH cn fn n1 n2(cn=49 ,fn=69)

[Name] Select QR code error grade

[Format] ASCII GS (k *pL pH cn fn n*

Hex 1D 28 6B *pL pH cn fn n*

Decimal 29 40 107 *pL pH cn fn n*

[Range]($p_L + p_H \times 256$) = 3 ($p_L = 3$, $p_H = 0$)

cn = 49

fn = 69

$48 \le n \le 51$

[Default] n = 48

[Description] Select QR code error grade <Function 03>

n	Error grade	Explain
48	Grade L	Can error correction 7% data

49	Grade M	Can error correction 15% data
50	Grade Q	Can error correction 25% data
51	Grade H	Can error correction 30% data

GS (k pL pH cn fn m d1.....dk(cn=49 ,fn=80)

[Name] Set QR code data in sign storage area

[Format] ASCII GS (k *pL pH cn fn m d1…dk*

Hex 1D 28 6B *pL pH cn fn m d1…dk*

Decimal 29 40 107 *pL pH cn fn m d1…dk*

[Range] $4 \le (p_L + p_H \times 256) \le 7092$ ($0 \le p_L \le 255$, $0 \le p_H \le 27$)

$cn = 49$

$fn = 80$

$m = 48$

$0 \le d \le 255$

$k = (p_L + p_H \times 256) - 3$

[Description] Set storage QR code sign data （d1.....dk）sign storage area <Function 04>

GS (k pL pH cn fn m (cn=49 ,fn=81)

[Name] Set QR code sign data in storage area

[Format] ASCII GS (k *pL pH cn fn m*

Hex 1D 28 6B *pL pH cn fn m*

Decimal 29 40 107 *pL pH cn fn m*

[Range] $(p_L + p_H \times 256) = 3$ ($p_L = 3$, $p_H = 0$)

$cn = 49$

$fn = 81$

$m = 48$

[Description] Editor use <Function 04> and print QR code sign data in rich storage area.

[Note] Consider one blank area to print QR code（left，right，up，down，area decided by QR code sign specificaiton

GS (k pL pH cn fn m (cn=49 ,fn=82)

[Name] QR code：transmit sign data size information in rich storage

[Format] ASCII GS (k *pL pH cn fn m*

Hex 1D 28 6B *pL pH cn fn m*

Decimal 29 40 107 *pL pH cn fn m*

[Range] $(p_L + p_H \times 256) = 3$ ($p_L = 3$, $p_H = 0$)

$cn = 49$

$fn = 81$

$m = 48$

[Description] Use <Function 04> to transmit size information in QR code sign

[Note] This function could not be printed

For example：

##1D 28 6B 03 00 31 43 05##

##1D 28 6B a0 00 31 50 30 ##

Antiquity of its 19

Xiyue Lotus Hill.
Far-ranging see stars.
Su hand hibiscus.
Step tread too pure virtual.
Colourful drag wide belt.
Fimbrist
##1D 28 6B 03 00 31 51 30##

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 ≤n ≤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 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.

[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 .

[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 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 ≤n ≤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 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.2 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 touc 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

B1Change 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

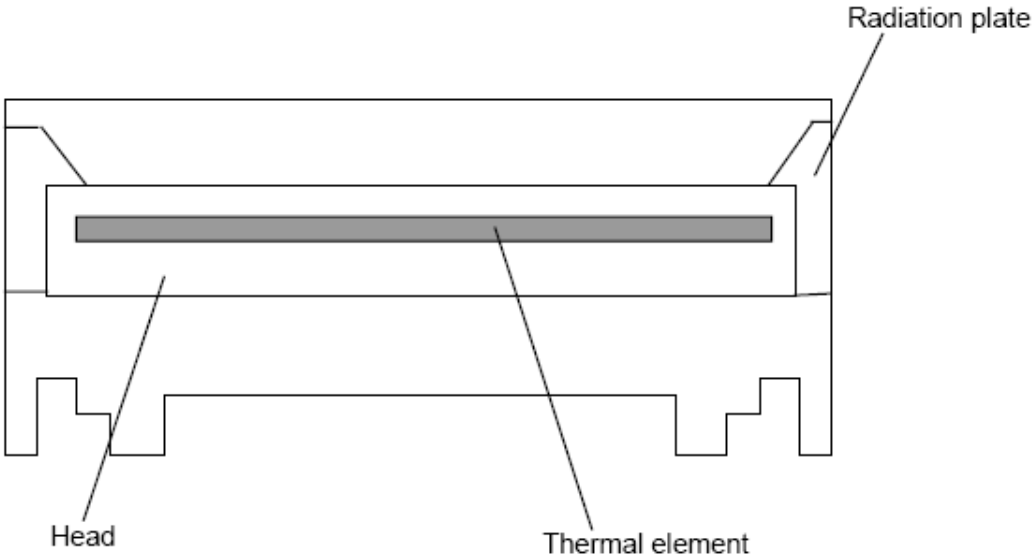
1. If the other materials, as clip, fall to autocutter and lock up autocutter, the printer turn to error status and recover operation automatically .
2. If the problem is not serious, autocutter recovers to the normal position automatically. (Error LED flash continuely, but error may be correct automatically.)
3. If autocutter does not return to the normal position, so run autocutter motor to return the origin position.

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: CODE128 BAR CODE

E.1 CODE128 bar code description

In CODE128 bar code system, use one bar code character set, indicate 128 unit ASCII charactersand 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 followwith 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.

E.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

Charac ter	Transmit Data		Characte r	Transmit Data		Characte r	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

Charac ter	Transmit Data		Character	Transmit Data		Charact er	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			