Thermal Printer

TSP400 Series
TUP400

Programmer's Manual

star

TABLE OF CONTENTS

1. OUTLINE

The TSP400 series is ideal for printing text, bar code and graphics.

The TSP400 series has the following features:

1. extremely quiet and fast printing (50 mm/sec.) using the direct line thermal printing method
2. a straight paper path, which prevents paper jams and is ideal for label printing
3. support for many bar code types (UPC, JAN/EAN-8, JAN/EAN-13, CODE 39, IFT 2 OF 5, CODE 128, CODE 93, NW-7)
4. a black mark sensor that detects the top of the page
5. a transmissive sensor that detects the gap between labels (no black mark is necessary)
6. a large-diameter (115 mm) roll
7. a wide selection of interchangeable interfaces (RS232C, Centronics Parallel, RS422A)
8. an installed heavy-duty and reliable cutter (TSP442 only)
9. enclosed utility software (TSPLABEL) that makes it easier to design and print bar code labels
10. a memory switch that enables a wide selection of printer default settings and easy setup using the enclosed utility software (TSPSETUP)

The printer has two different software modes which can be selected using the memory switch. In order to enable changed memory switch settings, turn the printer OFF and ON again or send printer reset command (<ESC>"?") to the printer.
(Factory setting: Page Mode)

Page Mode:

Code	<ESC>	"#0,0000"	<LF>	<NUL>
Hex	1B	23 30 2C 30 30 30 30	0A	00

Ideal for bar code label, graphics and text data printing.
Can locate and rotate bar code and text. Accepts a non-compressed BMP file so that the printer can import and print a BMP file which is scanned or edited in Windows applications.

Line Mode:

Code	<ESC>	“#0,0001”	<LF>	<NUL>
Hex	1B	23 30 2C 30 30 30 31	0A	00

This mode is compatible with Star Receipt printers, such as the SP300 and SP200 series.

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

2. MEMORY SWITCH AND DIP SWITCH

Functional settings are made using the printer's EEPROM memory switches and the DIP switches located on the interface board.

2-1. Memory Switch

Each memory switch is a 16-bit word stored in EEPROM.
The printer is shipped with the factory setting which is made in accordance with its product type.
For the detailed functions and the settings of the Memory switches, please refer to "Chapter 7 and 8".
The factory settings are shown in the table below.

Momory switch	TSP412	TSP442	TUP482
#0	0000	0000	0000
#1	0000	0000	0000
#2	0000	0000	0000
#3	0000	0000	0000
#B	-	-	0101

2-2. DIP Switch

For the detailed functions and the settings of theDIP switches, please refer to "Installation manual".

3. DISPLAY PANEL AND FUNCTIONS

3-1. LED

LED	Function
POWER	Lights up when the printer is turned on
HEAD UP NO PAPER ERROR	Lights up when an error occurs (Refer to 6-1 Errors.)
ON LINE	Lights up when the printer is on line; goes off when the printer is off line; lights up when the head temperature is too high

3-2. Switches

Switch	Function
ON LINE	Switches between on line and off line
FEED	Enable starting position: Feeds the paper to the next starting position Disable starting position: Feeds the paper while pressed

3-3. Power switch and ON LINE/FEED switch combinations

The following can be set when the power switch is turned on.

1) Power + FEED switches

1 short beep … Test print
HEAD UP LED lights up

2) Power + ON LINE switches

Approx. 2 sec. Approx. 2 sec.
1 short beep … 2 short beeps … 3 short beeps …
a b c
HEAD UP LED lights up — NO PAPER LED lights up — ERROR LED lights up

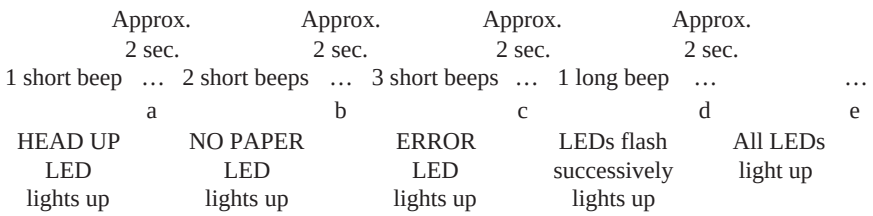
Pause at a: HEX dump
Pause at b: sensor selection

Press ON LINE	1 short beep	Reflecting sensor
Press FEED	2 short beeps	Transmissive sensor

Pause at c: command mode selection

Press ON LINE	1 short beep	Page mode
Press FEED	2 short beeps	Line mode

3) Power + ON LINE + FEED switches



Pause at a: RAM backup cleared

Pause at b: feed function selection

Press ON LINE	1 short beep	Disable starting position
Press FEED	2 short beeps	Enable starting position

Pause at c: sensor adjustment mode

Pause at d: no operation

Pause at e: clearing of all memory switches and test print

3-4. Sensor adjustment mode

a) Reflecting sensor (black mark sensor)

- Insert the paper in front of the sensor mechanism so that the sensor is not positioned at a black mark.
- Turn the reflecting sensor adjustment controller VR4 on the PCB until the HEAD UP LED lights up.

b) No paper sensor

- Insert the paper in front of the sensor mechanism so that the sensor is not positioned at a black mark.
- Turn the reflecting sensor adjustment controller VR3 on the PCB until the NO PAPER LED lights up.

c) Transmissive sensor

- Insert only the label's base paper in front of the sensor mechanism.
- Turn the reflecting sensor adjustment controllers VR1 and VR2 on the PCB until the ERROR LED lights up.
- VR1 is used for coarse adjustment and VR2 is used for fine adjustment.

4. SERIAL INTERFACE

4-1. Interface Specifications

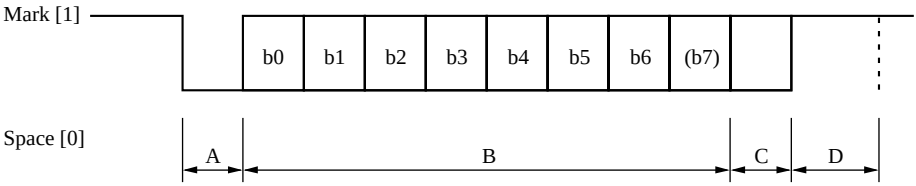
Transmission type ..... Asynchronous serial interface

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

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

Signal polarities
- RS-232C ..... Mark = Logic "1" (–3V to –15V)
Space = Logic "0" (+3V to +15V)
- RS-422A ..... Mark = Logic "1" ("A" negative with respect to "B" by at least 0.2V: $A \leqq B - 0.2V$)
Space = Logic "0" ("A" positive with respect to "B" by at least 0.2V: $A \geqq B + 0.2V$)

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

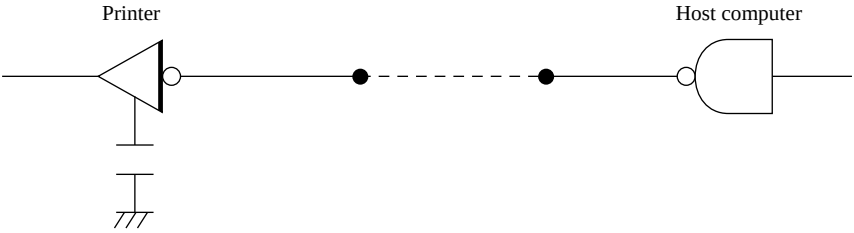


A: Start bit
B: Data bits
C: Vertical parity bit
D: Stop bit

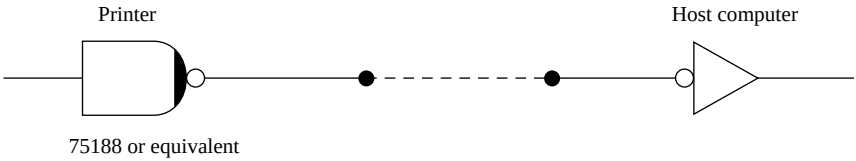
4-2. Interface Circuit

4-2-1. RS-232C Interface

Input (RXD, CTS)

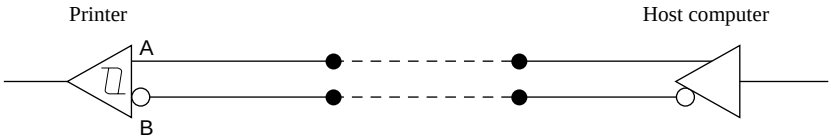


Output (DTR, FAULT, TXD, RCH, RTS)

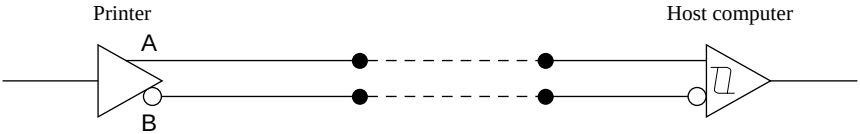


4-2-2. RS-422A Interface

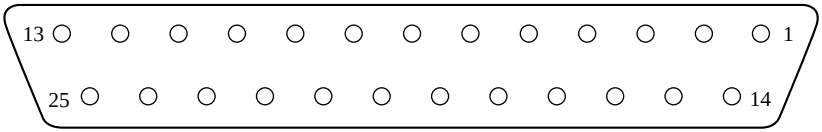
Input (RD, RS)



Output (SD, CS)



4-3. Connectors and Signal Names



4-3-1. RS-232C Interface

Pin no	Signal name	Direction	Function
1	F-GND	–	Frame ground
2	TXD	OUT	Outgoing data
3	RXD	IN	Incoming data
4	RTS	OUT	Request To Send: The printer sets this signal to “SPACE” when it is ready to send.
5	CTS	IN	The host sets this signal to “SPACE” when it is ready to send. NOTE: The printer does not monitor this signal.
6	N/C		Not used
7	S-GND	–	Signal ground
8	N/C		Not used
9 ~ 10	N/C		Not used
11	RCH	OUT	The printer sets this signal to “SPACE” when it is ready to receive. This pin outputs the same signal as pin 20, to which it is connected.
12	N/C		Not used
13	S-GND	–	Signal ground.
14	FAULT	OUT	The printer sets this signal to “MARK” to indicate an error condition (machine error, no paper, etc.).
15	Multi-Printer TXD	OUT	Diode gate TXD
16	Multi-Printer DTR	OUT	Diode gate DTR
17 ~ 19	N/C		Not used
20	DTR	OUT	Data Terminal Ready: The printer sets this signal to “SPACE” when it is ready to receive.
21 ~ 22	N/C		Not used
23 ~ 25	N/C		Not used

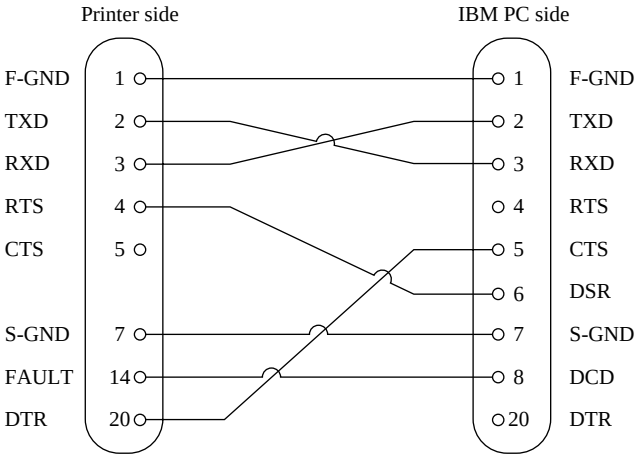
4-3-2. RS-422A Interface

Pin no	Signal name	Direction	Function
9	SD(+)	OUT	These pins carry data from the printer.
10	SD(–)	OUT	
17	RD(+)	IN	These pins carry data to the printer.
18	RD(–)	IN	
19	CS(+)	IN	The host sets this signal to “SPACE” when it is ready to send. NOTE: The printer does not monitor this signal.
23	CS(–)	IN	The host sets this signal to “SPACE” when it is ready to receive. NOTE: The printer does not monitor this signal.
24	RS(+)	OUT	The printer sets this signal to “SPACE” when it is ready to receive.
25	RS(–)	OUT	The printer sets this signal to “SPACE” when it is ready to receive.

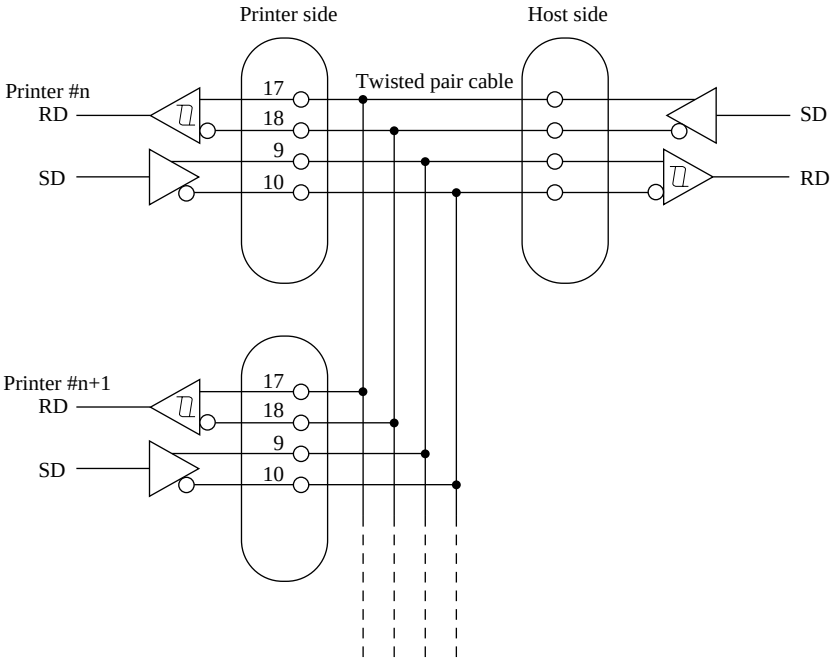
4-4. Interface Connections

Refer to the host computer's interface specifications for details of how to connect the interface. The following illustrations show typical connection configurations.

[RS-232C]



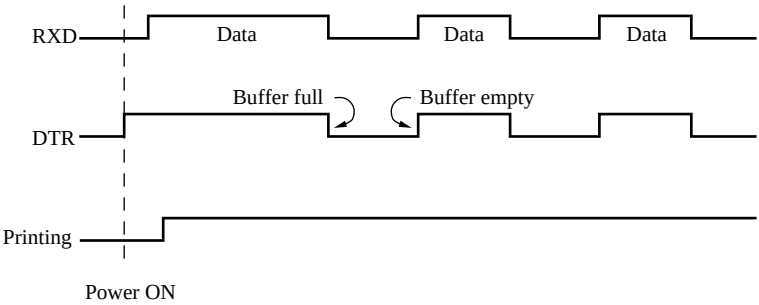
[RS-422A]



4-5. Data Protocol

4-5-1. DTR/DSR mode

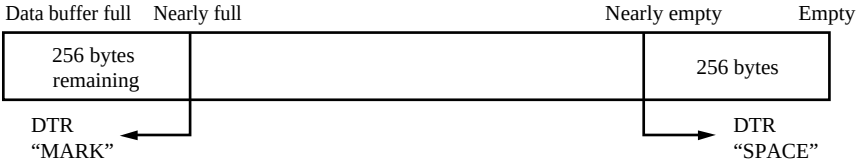
This mode is accessed when the DIP switch 1-3 is set to ON.
Signals are controlled using the DTR line as a BUSY flag.



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

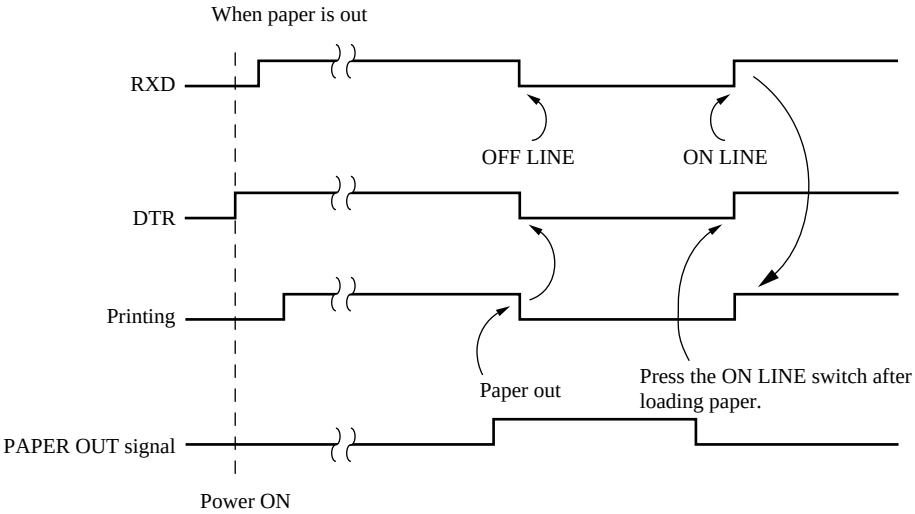
When the printer’s remaining buffer space falls to 256 bytes or less, the printer sets DTR to “MARK.” The host responds by halting the data transfer. However, note that the printer remains capable of receiving data until the buffer becomes full.

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



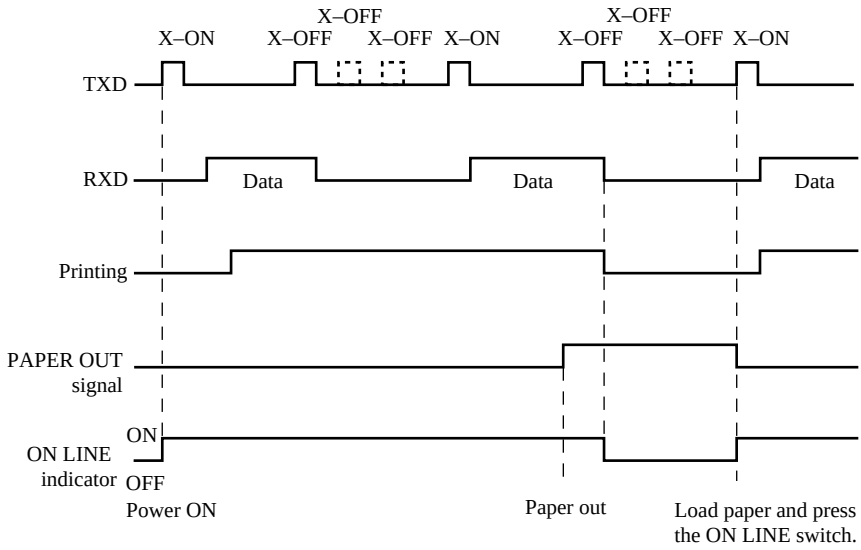
■ Error Condition

Upon detecting an error, the printer immediately sets DTR to “MARK” and goes offline. If the error was caused by a paper-out condition, you can clear it by loading new paper and then pressing the ON LINE switch.



4-5-2. X-ON/X-OFF mode

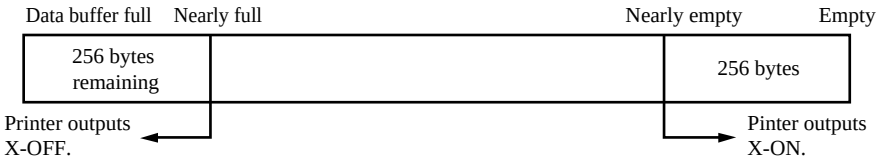
This mode is accessed when DIP switch 1-3 is set to OFF.



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

When the printer's remaining buffer space falls to 256 bytes or less, the printer begins to output X-OFF signals (DC3, 13H) over the TXD line. The host responds by halting the data transfer. Note that the printer remains capable of receiving data until the buffer becomes full.

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



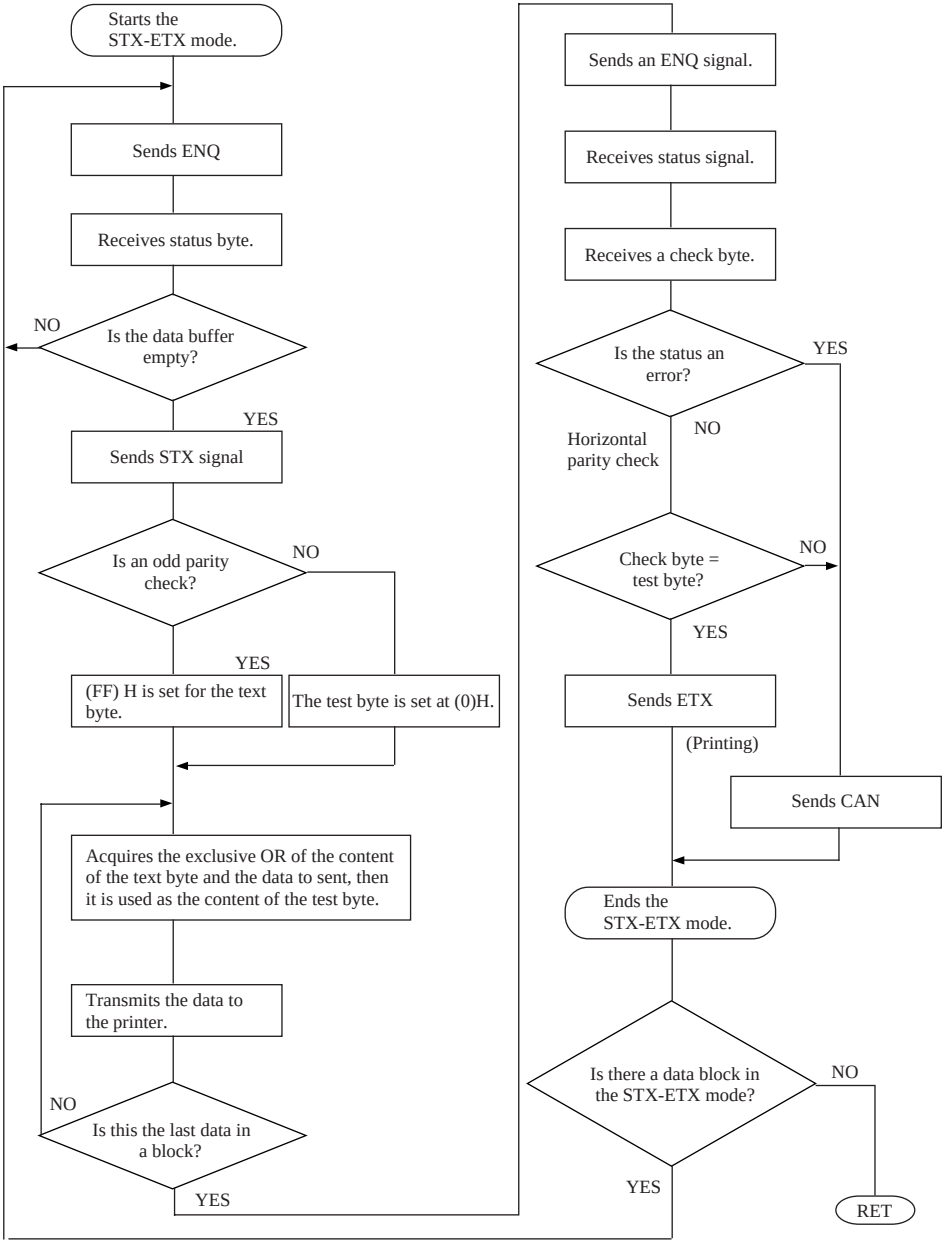
4-5-3. STX-ETX mode

This mode is accessed from whichever DTR mode or XON/XOFF mode. To set this mode, the data buffer must be empty.

The host computer sends an ENQ code to the printer and acknowledges the printer status. Then, the host computer checks if the printer buffer is empty. After the host computer detects that the buffer is empty, a STX code and data are transmitted. After 1 block of data is transmitted, the host computer sends an ENQ code to the printer and then receives the printer status and check byte (horizontal parity for the printer).

At this point, the host computer performs a status and horizontal parity check. When the host computer determines that there was no error, it transmits an ETX code which serves as text end code. After the printer receives the ETX code, data in the data buffer is printed out. If an error occurs, a CAN code is transmitted by the host computer. (In this instance, the data which was previously sent to the buffer is cleared, thus, the host computer must retransmit the same data to the printer.)

A flowchart of this operation is shown on the next page.



Check byte:
Horizotal parity of the printer.
Test byte:
Horrizontal parity of the host computer.

4-6. Error Status

Page Mode

During Label-Mode operation, the printer sends the following statuses to the host.

Data	Meaning
<SOH> <STX> “F” “I” <ETX> <EOT> <CR> <LF>	Printing finished
<SOH> <STX> “O” “F” <ETX> <EOT> <CR> <LF>	Printer is offline
<SOH> <STX> “P” “R” <ETX> <EOT> <CR> <LF>	Printing in progress
<SOH> <STX> “R” “E” <ETX> <EOT> <CR> <LF>	Ready
<SOH> <STX> “E” “1” <ETX> <EOT> <CR> <LF>	System error
<SOH> <STX> “E” “2” <ETX> <EOT> <CR> <LF>	Head up
<SOH> <STX> “E” “3” <ETX> <EOT> <CR> <LF>	No paper

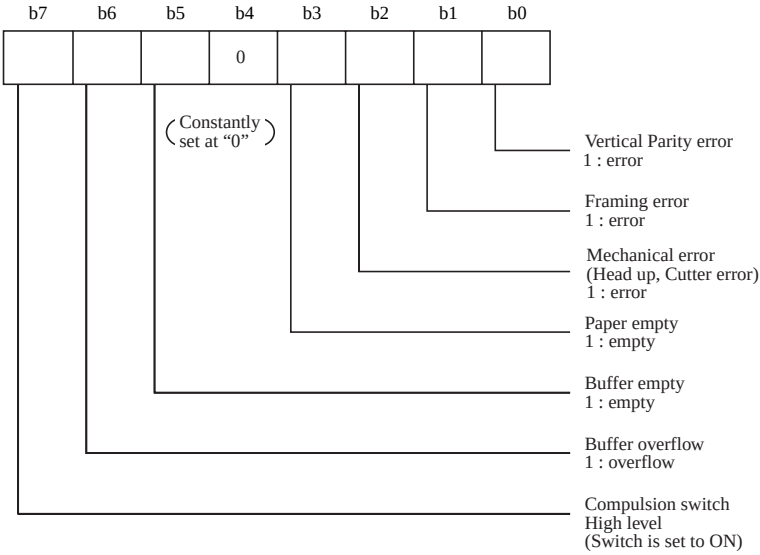
The printer outputs the “Printing in progress” status only upon receipt of a status request command. The printer issues the “Printing finished” status when printing finishes, but never in response to a status request command. All other statuses are issued both when the event occurs and upon request.

A “system error” indicates one of the following: ① cutter error, ② communication error, or ③ command error.

TUP400 Only

Data	Meaning
<SOH> <STX> “NA” <ETX> <EOT> <CR> <LF>	Inside near-end
<SOH> <STX> “NB” <ETX> <EOT> <CR> <LF>	Outside near-end
<SOH> <STX> “E3” <ETX> <EOT> <CR> <LF>	No paper
<SOH> <STX> “E5” <ETX> <EOT> <CR> <LF>	Paper was fed from presenter
<SOH> <STX> “E6” <ETX> <EOT> <CR> <LF>	Presenter paper jam error
<SOH> <STX> “E0” <ETX> <EOT> <CR> <LF>	None of the above

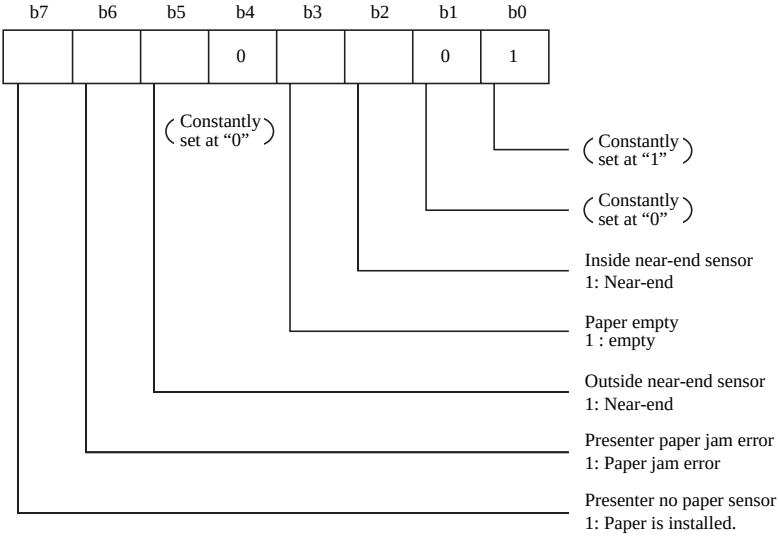
Line Mode



■ Compulsion switch

When pin 6 of the peripheral unit drive circuit connector is set “high”, status bit 7 becomes “1”.

TUP400 Only

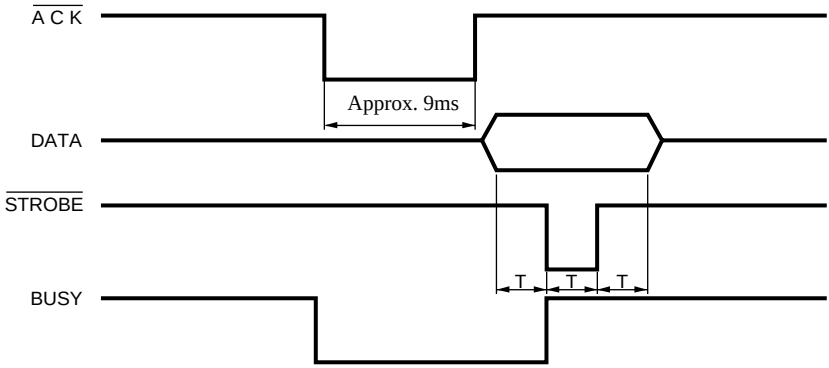


5. PARALLEL INTERFACE

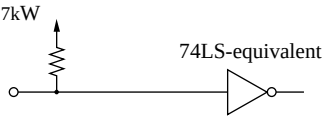
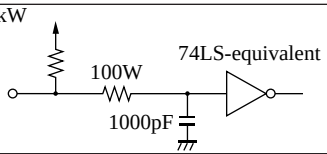
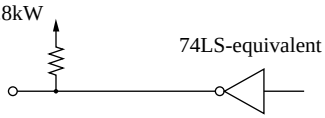
5-1. Interface Specifications

①	Interface:	Conforms with Centronics parallel interface standard
②	Data transfer speed:	1000 ~ 6000 CPS
③	Synchronization:	External strobe pulse
④	Handshaking:	Using $\overline{\text{ACK}}$ and BUSY
⑤	Logic level:	TTL-level compatible

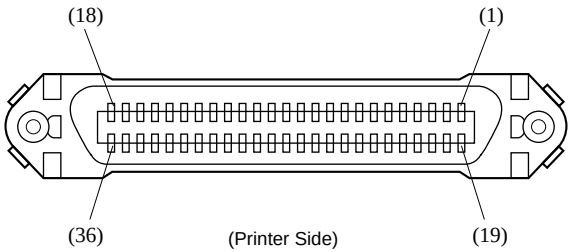
5-2. Interface Timing



T: At least 0.5ms

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

5-3. Connectors and Signal Names



Conforms to Amphenol connector 57-30360

Figure 5-1. Parallel Interface Connector

Pin no	Signal name	Direction	Function
1	$\overline{\text{STROBE}}$	IN	Strobe pulse for data read. Usually HIGH; goes LOW to trigger data read.
2-9	DATA 1~8	IN	Parallel data lines for eight-bit data. HIGH is "1"; LOW is "0".
10	$\overline{\text{ACK}}$	OUT	Printer outputs this pulse for approximately 9μs to indicate that data read is completed. Printer becomes ready to receive new data at the moment the ACK pulse ends.
11	BUSY	OUT	DC-level signal indicating printer's current status. LOW indicates that printer is ready to receive the next data; HIGH indicates that printer is unable to receive. The printer holds this signal "HIGH" during any of the following conditions. ① While data entry is in progress ② While printer is offline ③ While error condition exists
12	PAPER OUT	OUT	DC-level signal indicating whether printer has paper. The signal stays LOW while paper is present; it goes HIGH to indicate that paper has run out.
13	SELECTED	OUT	DC-level signal; stays HIGH while printer is online.
14-15	N/C		Not used
16	SIGNAL GND		Signal ground
17	CHASSIS GND		Printer-frame ground
18	+5V		Outputs +5V (Max. 50mA)
19-30	TWISTED PAIR RETURN		Return pins for various signals. Each pin is connected to the corresponding signal line by twisted pair line.
31	$\overline{\text{RESET}}$	IN	LOW level causes printer to reset its control circuitry and return to its initial state.
32	$\overline{\text{ERROR}}$	OUT	Goes LOW to indicate that printer is unable to print.
33	EXT GND		Ground terminal for external connection
34-35	N/C		Not used
36	–	–	Fixed "HIGH" at printer side

6. PERIPHERAL UNIT DRIVE CIRCUIT

A drive circuit for driving peripheral units (such as cash drawers) is featured on the main logic board of this printer. A modular connector for driving peripheral units is featured on the output side on the drive circuit. When using this circuit, connect the cable for the peripheral unit. (Cables must be prepared by the user.) Note that Page Mode does not support external-device drive commands. Drive commands are available only in Line Mode.

Use cables which meet the following specifications.

1. Use the modular plug as shown in Figure 1.
2. Separate ground wire is required for Europe only.
3. Use if the printer is to be used in Europe, the noise filter and the cable should be separate, as shown in Figure 2.

CAUTION: DO NOT connect any other plug to the peripheral unit connector.

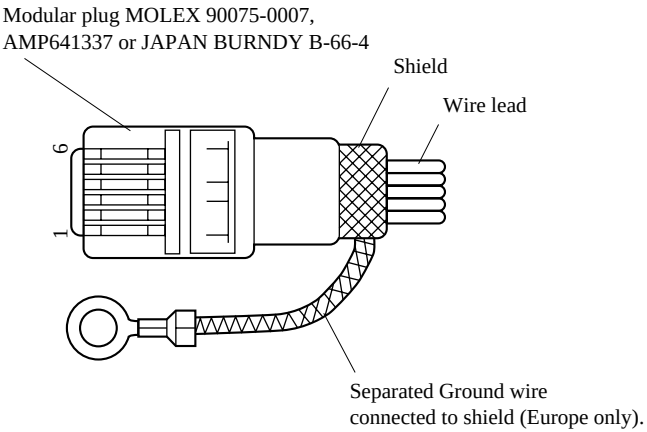


Figure 6-1. Cable specifications for peripheral unit.

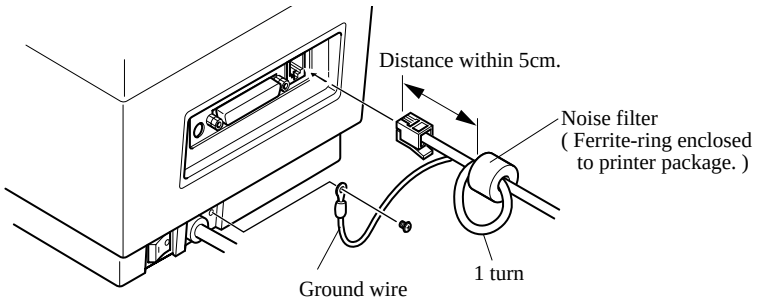
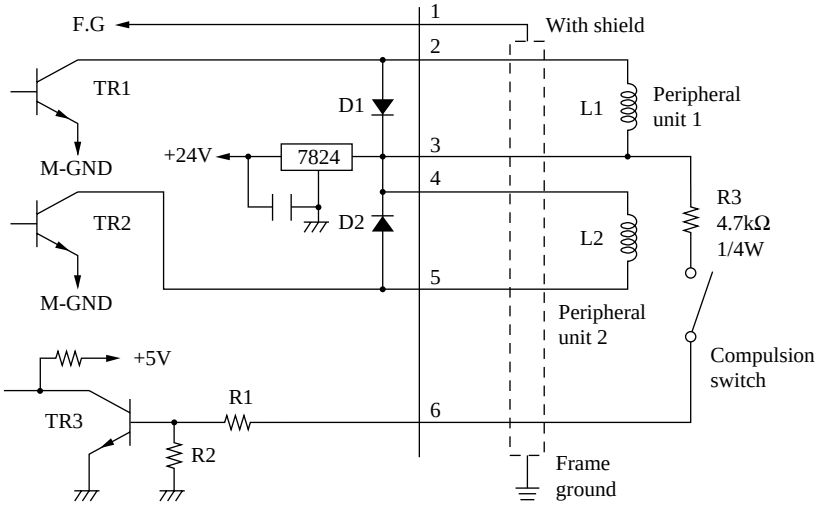


Figure 6-2. Separate ground wire and noise filter are required for Europe.

■ Drive circuit

The recommended drive circuit is shown.

[Drive output 24V, max. 1.0 A]



NOTES:

1. Peripheral units #1 and #2 cannot be driven simultaneously.
   When driving a device continuously, do not use drive duty above 20%.
2. Compulsion switch status is available as status data.
3. Resistance for coils L1 and L2 is not less than 24 ohms.
4. Absolute maximum ratings for diodes D1 and D2 (at Ta=25˚C):
   Average rectified current Io = 1A
   Maximum forward surge current (60Hz,1-cycle sine wave) I_{FSM}=40A
5. Absolute maximum rating for transistors TR1 and TR2 (at Ta = 25˚C):
   Collector current Ic = 2A

6-1. Errors

The various types of errors can be identified by the buzzer's sound and the lit LEDs or the test print result.
Buzzer: The circled numbers refer to the type of buzzer sound.
LED: The circle (◯) indicates that the LED is lit up.

a) Recoverable errors

The printer goes off line (ON LINE LED goes off) when these errors occur. After the cause of the error is removed, operation of the printer should return after the ON LINE switch is pressed.

Error	Cause	Buzzer	LED		
			ERROR	HEAD UP	NO PAPER
Head up error	The head is up.	②		◯	
No paper error	Paper is not installed.	③			◯
Label size error	The paper size differs from the set size.	④			◯

b) Unrecoverable errors

The printer goes off line (ON LINE LED goes off) when these errors occur. Operation of the printer cannot be returned after the cause of the error is removed.

Error	Cause	Buzzer	LED		
			ERROR	HEAD UP	NO PAPER
Command error *1	There is an error in the command.	⑤	◯		
Cutting error	The paper was not cut properly.	⑤	◯		◯
Transmission error *2	There is an abnormality in the received data.	⑤	◯	◯	

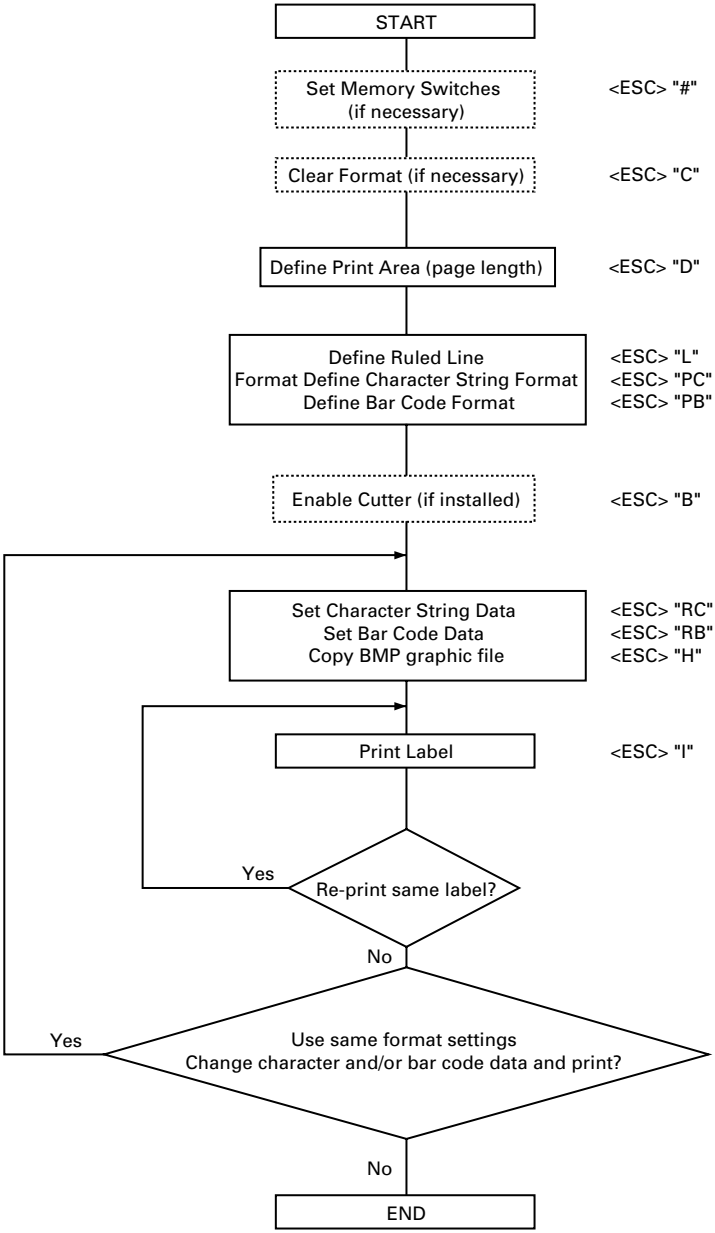
*1 Only in page mode
*2 Only with the serial interface
If a framing error or a vertical parity error occurs in Line Mode, "?" is printed.

c) Other errors (only in page mode)

- Data errors (<ESC> "PC" command: defines character and bar code data)
  A data error will occur if an invalid character or bar code type is selected or if the print result extends outside the print area. When a data error occurs, all commands become invalid (character strings and bar codes cannot be printed). However, the printer will not go off line and the LEDs will not light up.

7. CONTROL CODES/PAGE MODE

7-1. General Flow for Programming the Page Mode



7-2. Command Summary

The printer has the following control commands. Each control code starts with <ESC> code and ends with <LF> <NUL> codes, except for the Request status command <ENQ> and the Call Download Character command <ESC> “G”.

Format Definition

Control codes	Hexadecimal codes	Function	Pages
<ESC> “C”<LF> <NUL>	1B 43 0A 00	Clear format	28
<ESC> “D n1n2n3n4” <LF> <NUL>	1B 44 n1n2n3n4 0A 00	Define print area	28
<ESC> “L n1n2 ; x1x2x3x4 , y1y2y3y4, x5x6x7x8 , y5y6y7y8, d, w” <LF> <NUL>	1B 4C n1n2 3B x1x2x3x4 2C y1y2y3y4 2C x5x6x7x8 2C y5y6y7y8 2C d 2C w 0A 00	Define ruled line format	30
<ESC> “E n1n2” <LF> <NUL>	1B 45 n1n2 0A 00	Cancel ruled line format	31
<ESC> “PC n1n2 ; x1x2x3x4 , y1y2y3y4, w, h, c, r1r2, d1d2” <LF> <NUL>	1B 50 43 n1n2 3B x1x2x3x4 2C y1y2y3y4 2C w 2C h 2C c 2C r1r2 2C d1d2 0A 00	Define character string format	32
<ESC> “PB n1n2 ; x1x2x3x4 , y1y2y3y4, w, b, m, h1h2h3h4” <LF> <NUL>	1B 50 42 n1n2 3B x1x2x3x4 2C y1y2y3y4 2C w 2C b 2C m 2C h1h2h3h4 0A 00	Define bar code format	34
<ESC> “Y d1d2” <LF> <NUL>	1B 59 d1d2 0A 00	Define character pitch	36

Print Data Settings

Control codes	Hexadecimal codes	Function	Pages
<ESC> “RC n1n2 ; a1.....an” <LF> <NUL>	1B 52 43 n1n2 3B a1a2.…an 0A 00	Set character string data	37
<ESC> “RB n1n2 ; a1.....an” <LF> <NUL>	1B 52 42 n1n2 3B a1a2.…an 0A 00	Set bar code data	38
<ESC> “Q ; x1x2x3x4, y1y2y3y4, |1|2|3|4, w1w2w3, n11n12n13 n.…n1k <LF>….nm1nm2 ….nmk” <LF> <NUL>	1B 51 3B x1x2x3x4 2C y1y2y3y4 2C|1|2|3|4 2C w1w2w3 2C n11n12n13 n.…n1k <LF>….nm1nm2 ….nmk” 0A 00	Store dot graphic data into image memory	38
<ESC> “H m x1x2x3x4, y1y2y3y4, (BMP file data) ,” <LF> <NUL>	1B 48 m x1x2x3x4 2C y1y2y3y4 2C (BMP file data) 2C 0A 00	Copy BMP file to printer	40
<ESC> “G n1n2, n3n4” <ESC> “0”	1B 47 n1n2 2C n3n4 1B 30	Call download character	42
<ESC> “X” <LF> <NUL>	1B 58 0A 00	Clear image data	42

Other commands

Control codes	Hexadecimal codes	Function	Pages
<ESC> “I” <LF> <NUL>	1B 49 0A 00	Print Label	43
<ESC>“Td n1n2” <LF> <NUL>	1B 54 d n1n2 0A 00	Set Feed Length after Printing	43
<ESC> “B d n1n2” <LF> <NUL>	1B 42 d n1n2 0A 00	Enable cutter	44
<ESC> “# N, n1n2n3n4” <LF> <NUL>	1B 23 N 2C n1n2n3n4 0A 00	Set Memory Switch	44
<ESC> “?” <LF> <NUL>	1B 3F 0A 00	Reset printer	46
<ENQ>	05	Request status	46
<ESC> “N n1n2” <LF> <NUL>	1B 4E n1n2 0A 00	Select international character set	47
<ESC> “F n1n2 ; d1.....d48” <LF> <NUL>	1B 46 n1n2 3B d1.…d48 0A 00	Register download character	48
<ESC> “Z n” <LF> <NUL>	1B 5A n 0A 00	Select “zero”style	48

TUP400 only

Control codes	Hexadecimal codes	Function	Pages
<EOT>	04	Request status	49

7-3. Command Specification

Format Definition

FUNCTION Clear format

CODE <ESC> "C" <LF><NUL>

HEX 1B 43 0A 00

REMARKS When the printer receives this command, all defined format and image data are cleared.
The format defined by the following commands will be cleared by <ESC> "C".

<ESC> "D"	<ESC> "L"	<ESC> "PC"	<ESC> "PB"
<ESC> "Y"	<ESC> "RC"	<ESC> "RB"	<ESC> "Q"
<ESC> "H"	<ESC> "G"	<ESC> "T"	<ESC> "B"

EXAMPLE LPRINT CHR$(&H1B);"C";CHR$(&H0A);CHR$(&H00);

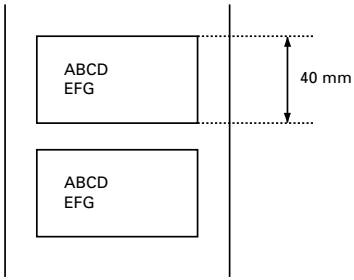
FUNCTION Define print area

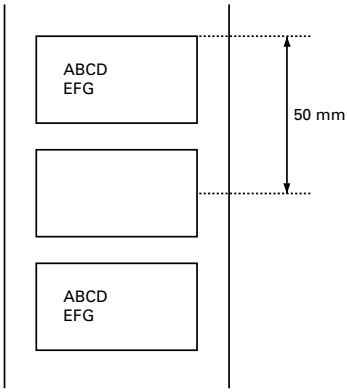
CODE <ESC> "D n1n2n3n4" <LF> <NUL>

HEX 1B 44 n1n2n3n4 0A 00

REMARKS This command defines the print area(page length) according to the value of n1n2n3n4 in 1/10 mm unit.
When start position detect is OFF(memory switch #1 n2=0, Default), defined print area is same as page length.
When start position detect is ON(memory switch #1 n2=1), page length is automatically detected and set by either black mark (when reflective sensor is selected) or a gap between each label (when transmissive sensor is selected). So size of print area is different from actual page length in this case.
n1n2n3n4 : Print area 0080 to 3000 (8 mm to 300 mm)

Note : When a value greater than the size of the label is set, two or more labels are assumed to be one label.
For example, when 50 mm is set for a label whose pitch is 40 mm, one print pattern is printed using two labels.





EXAMPLE Define print area 254 mm (10 inches)

```
LPRINT CHR$(&H1B);“D2540”;CHR$(&H0A);CHR$(&H00);
```

FUNCTION Define ruled line format

CODE <ESC> "L n1n2 ; x1x2x3x4 , y1y2y3y4 , x5x6x7x8 , y5y6y7y8 , d , w" <LF> <NUL>

HEX 1B 4C n1n2 3B x1x2x3x4 2C y1y2y3y4 2C x5x6x7x8 2C y5y6y7y82C d 2C w 0A 00

REMARKS This command defines ruled line format.

n1n2 : Line number(00 to 63)

x1x2x3x4 : Position of the starting point in the X direction (0000 to 0800 × 0.1 mm)

y1y2y3y4 : Position of the starting point in the Y direction (0000 to 0300 × 0.1 mm)

x5x6x7x8 : Position of the ending point in the X direction (0000 to 0800 × 0.1 mm)

y5y6y7y8 : Position of the ending point in the Y direction (0000 to 0300 × 0.1 mm)

These four parameters work in 1/10 mm unit, and should be given with four digit numbers.

d : Line direction d=0 : Horizontal line
d=1 : Vertical line
When d=0, then y1y2y3y4 = y5y6y7y8. When d=1, then x1x2x3x4 = x5x6x7x8.

w : Line width 1 to 9 dots

Note:
a) This command is used to define lines for label framing.
b) Up to 64 lines can be defined.
c) Lines must be vertical or horizontal (no diagonal line).
d) The width of one dot is about 0.125 mm, and so four dots make 0.5 mm width.

EXAMPLE Line number: 00
Position of the starting point (X,Y) direction: (3.3)mm
Position of the ending point (X,Y) direction: (72.3)mm
Line direction :Horizontal line, Line width 5 dots (0.625 mm)

```
LPRINT CHR$(&H1B);"L00;0030,0030,0720,0030,0,5";
CHR$(&H0A); CHR$(&H00);
```

FUNCTION Cancel ruled line format

CODE <ESC> “E n1n2” <LF><NUL>

HEX 1B 45 n1n2 0A 00

REMARKS This command cancels the line previously defined by<ESC> “L n1n2”.

n1n2 : Line number (00 to 63)

EXAMPLE Cancel the line 00 which is previously defined.

```
LPRINT CHR$(&H1B);“E00”;CHR$(&H0A);CHR$(&H00);
```

FUNCTION Define character string format

CODE

<ESC> “P C n1n2 ; x1x2x3x4 , y1y2y3y4 , w , h , c , r1r2 , d1d2” <LF> <NUL>

HEX

1B 50 43 n1n2 3B x1x2x3x4 2C y1y2y3y4 2C w 2C h 2C c 2C r1r2 2C d1d2 0A 00

REMARKS This command defines start position and type of character string.

n1n2 : Character string number(00 to 99)

x1x2x3x4 : Print start position in the X direction (0000 to 0800 × 0.1 mm)

y1y2y3y4 : Print start position in the Y direction (0000 to 3000 × 0.1 mm)

w : Character width magnification (1 to 6)

h : Character height magnification (1 to 6)

c : Character type (1to 5)

1: Small size character (8×16 dots)
2: Standard size character (16×24 dots)
3: Reserved
4: Boldface character (24×32 dots)
5: OCR-B(16×24 dots)

r1 : Character rotation direction (0 to 3)

0	1	2	3
0 degree	90 degrees	180 degrees	270 degrees

r2 : Character string rotation direction (0 to 3)

0	1	2	3
0 degree	90 degrees	180 degrees	270 degrees

d1d2 : Space between characters (00 to 63 dots)

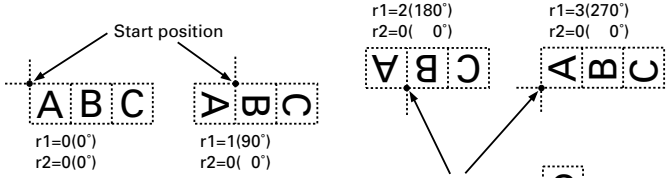
Note: a) “d1d2” can be left out. When “d1d2” is left out, a space between characters is defined by <ESC> “Y”. Default value is “00”.

b) Up to 100 character strings can be defined.

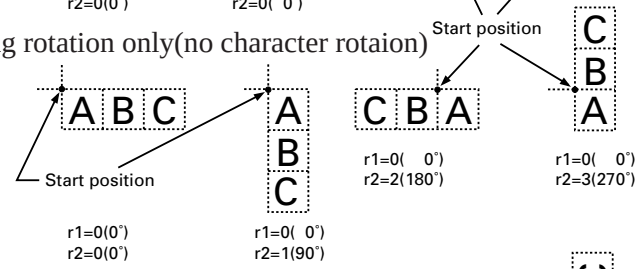
c) If “;” or “,” is missing, printer goes into an error condition.

Character rotation and character string rotation

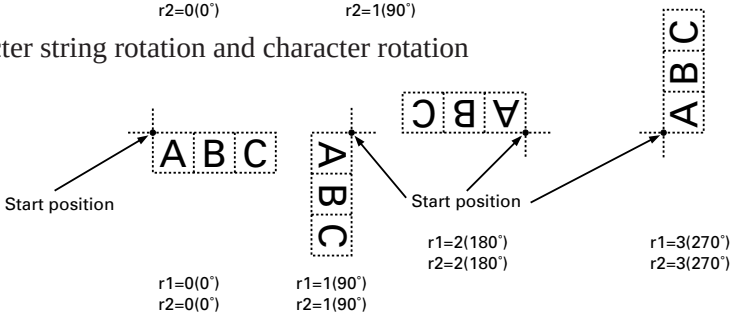
1) Charcter rotation only(no character string rotaion)



2) Charcter string rotation only(no character rotaion)

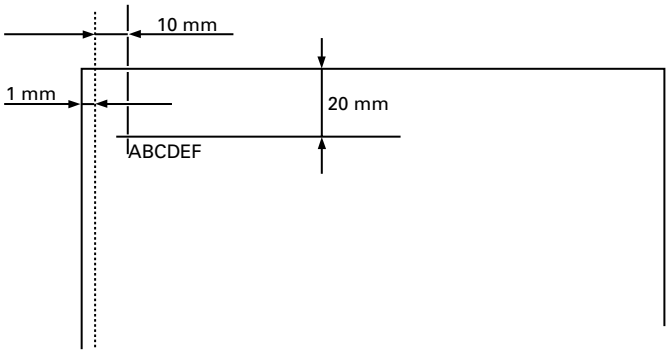


3) Charcter string rotation and character rotation



EXAMPLE Character number : 00 print start position (X,Y) = (10.20) mm, character width magnification : 2,
height magnification : 1, standard size character, character and character string rotation : 0 degree. 10 dots character space.

```
LPRINT CHR$(&H1B);“PC00;0100,0200,2,1,2,00,10”;
CHR$(&H0A);CHR$(&H00);
```



FUNCTION Define bar code format

CODE

<ESC> “P B n1n2 ; x1x2x3x4 ,
y1y2y3y4 , w , b , m ,
h1h2h3h4”<LF><NUL>

HEX

1B 50 42 n1n2 3B x1x2x3x4 2C
y1y2y3y4 2C w 2C b 2C m 2C
h1h2h3h4 0A 00

REMARKS This command defines start position and type of bar code string.

n1n2 : Bar code string number (00 to 31)

x1x2x3x4 : Print start position in the X direction (0000 to 0800 × 0.1 mm)

y1y2y3y4 : Print start position in the Y direction (0000 to 3000 × 0.1 mm)

w : Mode (See Appendix for details)

b : Bar code type (1 to 7)

1: CODE 39
2: INTERLEAVED 2 OF 5 (ITF)
3: CODE 93
4: UPC-A
5: JAN/EAN-8
6: JAN/EAN-13
7: CODE 128
8: NW-7

m : Bar code rotation direction (0 to 3) (clockwise)

0	1	2	3
0 degree	90 degrees	180 degrees	270 degrees

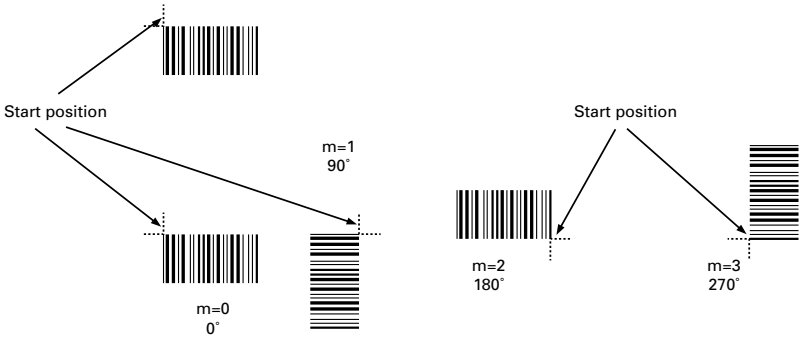
h1h2h3h4 : Bar code height (0000 to 2999 × 0.1 mm)

Note: a) When a bar code is rotated, its dimensions may not conform to ANSI specifications. Make sure that the printed bar code is compatible with the scanner or scanners to be utilized.

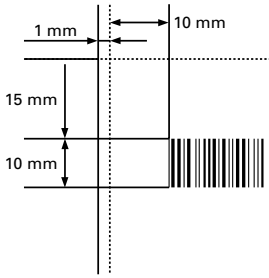
b) Up to 32 bar codes can be defined.

c) If “;” or “,” is missing, printer goes into an error condition.

Bar code rotation



EXAMPLE LPRINT CHR$(&H1B);“PB00;0100,0150,2,1,0,0100”;
CHR$(&H0A);CHR$(&H00);



Bar code string number : 00
Print start position (X,Y)= 10 mm, 15 mm
Mode: 2
Bar code type : CODE 39
Bar code rotation : 0 degree
Bar code height : 10 mm

FUNCTION Define character pitch

CODE <ESC> "Y d1d2" <LF><NUL>

HEX 1B 59 d1d2 0A 00

REMARKS This command defines dot space between characters.
d1d2 : Indicates dot space (00 to 63)

Note:
a) The command is used to define dot space between characters.
b) When changing the inter character space, a new value must be placed in front of the <ESC> "PC" command.
c) Default value is 00.
d) Pitch for each kind of character is as shown below.
e) Up to 64 dot space can be defined.

(default) (unit: mm)

d1d2	00 dot	01 dot	02 dots	03 dots	04 dots	05 dots	06 dots	07 dots
Small size character	1	1.125	1.25	1.375	1.5	1.625	1.75	1.875
Standard size character	2	2.125	2.25	2.375	2.5	2.625	2.75	2.875
Boldface character	3	3.125	3.25	3.375	3.5	3.625	3.75	3.875

Increase 0.125 mm per 1 dot. (d1d2=10 , then 1(or 2 or 3)+0.125 × 10 mm)

EXAMPLE Use standard size character and character pitch is 4.0 mm. d1d2=16 (=(4-2)/0.125)
LPRINT CHR$(&H1B);"Y16";CHR$(&H0A);CHR$(&H00);

Print Data Settings

FUNCTION Set character string data

CODE <ESC> "R C n1n2 ; a1a2.…an" <LF><NUL>

HEX 1B 52 43 n1n2 3Ba1a2.…an 0A 00

REMARKS This command sets character strings defined by the <ESC> "PC".

n1n2 : Two digit reference number of character string whose print position and type are previously defined with <ESC> "PC".

a1a2.…an : Character string data (up to 100 characters)

Note:
a) The same reference numbers used by the format definition command <ESC> "PC" is used.
b) To print data, the Print Label command (<ESC> "I") must be sent.
c) This command, along with the Print Label command (<ESC> "I"), allows reprinting of labels where only the character string data changes.
d) If ";" is missing, printer goes into an error condition.

EXAMPLE (1) Defined character string number : 03, Print data is "STAR MICRONICS"

```
LPRINT CHR$(&H1B);"RC03;STAR
MICRONICS";CHR$(&H0A);CHR$(&H00);
```

(2) Change data of character string number 03 to"TSP400 Thermal" and reprint.

```
LPRINT CHR$(&H1B);"RC03;TSP400 Thermal";
CHR$(&H0A);CHR$(&H00);
LPRINT CHR$(&H1B);"l";CHR$(&H0A);CHR$(&H00);
```

FUNCTION Set bar code data

CODE <ESC> "R B n1n2 ; a1a2.…an"<LF> <NUL>

HEX 1B 52 42 n1n2 3B a1a2.…an 0A 00

REMARKS This command defines the bar code data to be printed.

n1n2 : Two digits reference number of defined bar code whose print position and type are previously defined with <ESC>"PB".

a1a2.…an : Bar code data to be encoded and printed.

Note:
a) Start character of CODE 39 is automatically inserted.
b) Check word of JAN, EAN, or UPC is automatically calculated and inserted.
c) When data length does not meet the specifications of JAN, EAN, or UPC, data length is automatically modified.
d) CODE 128 conforms to EAN-128; the start code, check word, and stop code of CODE 128 are automatically inserted.
e) Start, stop and check characters of CODE 93 are automatically inserted.
f) Start and stop characters of Interleaved 2 of 5 are automatically inserted.
g) When the number of digits of lnterleaved 2 of 5 is an odd number, "0" is automatically inserted as the highest digit.
h) If ";" is missing, printer goes into an error condition.

EXAMPLE Defined bar code number: 00, print data: 12345678901

```
LPRINT CHR$(&H1B);"RB00;12345678901";CHR$(&H0A);
CHR$(&H00);
```

FUNCTION Store dot graphic data into image memory

CODE <ESC> "Q ; x1x2x3x4 , y1y2y3y4 , |1|2|3|4 , w1w2w3 , n11n12n13n.…n1k
<LF>.…nm1nm2.…nmk" <LF> <NUL>

HEX 1B 51 3B x1x2x3x4 2C y1y2y3y4 2C |1|2|3|4 2C w1w2w3 2C n11n12n13n.…n1k
<LF>.…nm1nm2.…nmk" 0A 00

REMARKS

This command stores graphic data into image memory.

x1x2x3x4 : Print start position in the X direction. (0000 to 0800 × 0.1 mm)

y1y2y3y4 : Print start position in the Y direction. (0000 to 3000 × 0.1 mm)

|1|2|3|4 : Defines the length (Y direction) of the graphic area. (0001 to 2400 dots)

w1w2w3 : Defines the width (X direction) of the graphic area. (010 to 080 dots)

n11.…nmk: n11 represents data in the 1st line. Each line ends with <LF>.
Data (X direction) appears in the same way as bit image data. n21 represents data in the 2nd line.

Note:
a) This command can be used any number of times.
b) Size of graphic data is set in 1 mm units (byte units (8 bits/bytes)) in the X direction and 0.125 mm units (dot units) in the Y direction.
c) <ESC> “X” cancels data that was set using the command.
d) If “;” or “,” is missing, printer goes into an error condition.

EXAMPLE

Position of starting point (X,Y) direction : (30,40) mm
Size of image data (X,Y) direction : (3,3) mm, (|1|2|3|4 = 3 × 8 = 0024 bytes, w1w2w3 = 3 × 1 = 003 dots)

```
LPRINT CHR$(&H1B);”Q;0300,0400,0024,003,”;
CHR$(&H01);CHR$(&H02);CHR$(&H03);CHR$(&H0A);
CHR$(&H01);CHR$(&H02);CHR$(&H03);CHR$(&H0A);
CHR$(&H01);CHR$(&H02);CHR$(&H03);CHR$(&H0A);
CHR$(&H01);CHR$(&H02);CHR$(&H03);CHR$(&H0A);
CHR$(&H01);CHR$(&H02);CHR$(&H03);CHR$(&H0A);
CHR$(&H01);CHR$(&H02);CHR$(&H03);CHR$(&H0A);
CHR$(&H01);CHR$(&H02);CHR$(&H03);CHR$(&H0A);
CHR$(&H01);CHR$(&H02);CHR$(&H03);CHR$(&H0A);
CHR$(&H01);CHR$(&H02);CHR$(&H03);CHR$(&H0A);
CHR$(&H01);CHR$(&H02);CHR$(&H03);CHR$(&H0A);
CHR$(&H01);CHR$(&H02);CHR$(&H03);CHR$(&H0A);
CHR$(&H01);CHR$(&H02);CHR$(&H03);CHR$(&H0A);
CHR$(&H01);CHR$(&H02);CHR$(&H03);CHR$(&H0A);
CHR$(&H01);CHR$(&H02);CHR$(&H03);CHR$(&H0A);
```

```
CHR$(&H01);CHR$(&H02);CHR$(&H03);CHR$(&H0A);
CHR$(&H01);CHR$(&H02);CHR$(&H03);CHR$(&H0A);
CHR$(&H01);CHR$(&H02);CHR$(&H03);CHR$(&H0A);
CHR$(&H01);CHR$(&H02);CHR$(&H03);CHR$(&H0A);
CHR$(&H01);CHR$(&H02);CHR$(&H03);CHR$(&H0A);
CHR$(&H01);CHR$(&H02);CHR$(&H03);CHR$(&H0A);
CHR$(&H01);CHR$(&H02);CHR$(&H03);CHR$(&H0A);
CHR$(&H01);CHR$(&H02);CHR$(&H03);CHR$(&H0A);
CHR$(&H01);CHR$(&H02);CHR$(&H03);CHR$(&H0A);
CHR$(&H01);CHR$(&H02);CHR$(&H03);CHR$(&H0A);
CHR$(&H00);
```


FUNCTION Copy BMP file to printer

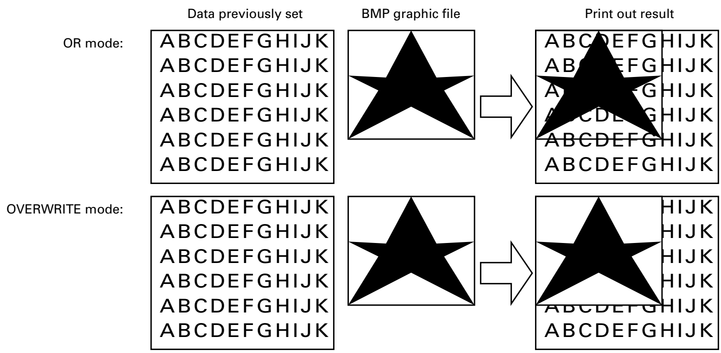
CODE <ESC> "H m x1x2x3x4 , y1y2y3y4 , (BMP file data) ," <LF> <NUL>

HEX 1B 48 m x1x2x3x4 2C y1y2y3y4 2C (BMP file data) 2C 0A 00

REMARKS This command copies BMP file to the printer(Image buffer). BMP file can be scanned by scanner and edited by a program such as the PAINT BRUSH in the WINDOWS. The printer can accept non-compressed monochrome BMP file only.

BMP file contains white pixel (dots). There are two mode in this command depending on how to handle these white pixels when there are black pixels already set in the area to be printed on.

m : Mode ";" 3B(hex) "OR" mode : White pixels (area) of BMP file do not erase black pixels previously set.
";" 3A(hex) "OVERWRITE" : White pixels (area) of BMP file erase(overwrite) black pixels previously set.



x1x2x3x4 : Print start position in the X direction
y1y2y3y4 : Print start position in the Y direction
BMP file data : Command accepts BMP non-compressed monochrome graphic file as binary file.

Note : Printer will result in an error on the following conditions:
a) Error in command format structure
b) If either start position or image data is located out of print area.
c) If a BMP file does not meet command specification. (Printer can only accept non-compressed, monochrome BMP file)

Contents of BMP file

Please refer the following as contents of standard BMP graphic file. Pleas note that only some of data apply to the Printer. All other data will be ignored. The printer can accept non-compressed, monochrome BMP file only.

BIT MAP FILE HEADER (Total 14 byte)

2 byte	bf Type	Type of file	Always "BM". Error for other letter
4 byte	bf Size	File Size	Ignored
2 byte	bf Received	1 Reserved	Ignored
2 byte	bf Received	2 Reserved	Ignored
4 byte	bf off bits	Off set byte for Bit Map data	Read Bit Map data from off-set

BIT MAP INFO HEADER (Total 40 byte or more)

4 byte	bi Size	Size of Bit Map Info Header	Used as size of Bit Map Info Header
4 byte	bi Width	Width of Bit Map	Used as width of graphic.
4 byte	bi Height	Width of Bit Map	Used as height of graphic.
2 byte	bi Planes	Number of Planes(Always 1)	Always "1". Error for other number
2 byte	bi Bit	Count Number of bit per pixel	Always "1"(Monochrome). Error for other number
4 byte		Type of compression	Always "0". Error for other number
4 byte	bi Size Image	Size of image	Ignored
4 byte	bi X Pels Per Meter	Horizontal resolution	Ignored
4 byte	bi Y Pels Per Meter	Vertical resolution	Ignored
4 byte	bi Cir Used	Number of color index	Ignored
4 byte	bi Cir Important	Number of important color index	Ignored
4 byte	bi Unknown	Unknown	Ignored

RGB QUAD (Total 4 byte)

1 byte rgb Blue	Brightness of Blue	Ignored
1 byte rgb Green	Brightness of Green	Ignored
1 byte rgb Red	Brightness of Red	Ignored
1 byte rgb Reserved	Reserved	Ignored

EXAMPLE Please see a sample program "SAMPLE2.BAS" written in QBASIC at the end of this booklet.

FUNCTION Call download character

CODE <ESC> "G n1n2 , n3n4 " <ESC> "0"

HEX 1B 47 n1n2 2C n3n4 1B 30

REMARKS This command calls download character.

n1n2,n3n4 : Reference numbers of defined download characters(00 to 31).

Note : Only standard size characters (16 (W) × 24 (H) dots) can be defined as download characters.

EXAMPLE

Character number "00" is "ABC" and "DEF" and between those character, print download character number : 00,01

```
LPRINT CHR$(&H1B);"RC00;ABC";CHR$(&H1B);
"G00,01";CHR$(&H1B);"0";"DEF";CHR$(&H0A);CHR$(&H00);
```

FUNCTION Clear image data

CODE <ESC> "X" <LF><NUL>

HEX 1B 58 0A 00

REMARKS When the printer receives this command, the defined image data are cleared.

The following commands will be cleared by<ESC> "X"

<ESC> "RC"<ESC> "RB"<ESC> "Q"<ESC> "H"<ESC> "G"

Note:
a) Image print area specified by <ESC> "D" is cleared.
b) The defined format is not cleared.
c) To change the format, use <ESC> "C".
d) This command clears data for rewriting, allowing the existing format to be used.

EXAMPLE

```
LPRINT CHR$(&H1B);"X";CHR$(&H0A);CHR$(&H00);
```

Other commands

FUNCTION Print Label

CODE <ESC> "I" <LF><NUL>

HEX 1B 49 0A 00

REMARKS This command print out one label according to the previously defined format and data.

EXAMPLE LPRINT CHR$(&H1B);"I";CHR$(&H0A);CHR$(&H00);

FUNCTION Set Feed Length after Printing

CODE <ESC> "T d n1n2" <LF><NUL>

HEX 1B 54 d n1n2 0A 00

REMARKS This command sets paper feed length after printing. Paper feed is executed only the printer receives<ESC> "I" command.
This command is designed to adjust distance between print head and paper tear off bar(applicable only for TSP412)
Feed paper will be feed back again for same length right before next printing starts.

d : "+" or "-" indicates the direction of the paper feed length from the tear bar.
"+" indicates a forward feed, and "-" indicates a reverse feed.

n1n2 : Indicates the value to move with 1/10 mm unit. (00 to 50)

Note: a) If parameters (d and n1n2) are omitted, then paper feed is to the default position.
b) Feeds paper to the tear bar and stops until next <ESC> "I" command, then reverse feeds and prints.

EXAMPLE Feed paper length from tear bar: +2.5 mm
LPRINT CHR$(&H1B);"T+25";CHR$(&H0A);CHR$(&H00);

PAGE MODE

FUNCTION Enable cutter(applicable only for TSP442)

CODE <ESC> "B d n1n2" <LF><NUL>

HEX 1B 42 d n1n2 0A 00

REMARKS This command defines cut position and enables cutter. This command does not energize cutter.
Cutter will be operated only when receiving<ESC> "I" command.

d : "+" or "-" indicates the direction of the cut position from the normal position.
"+" indicates a forward feed, and "-" indicates a reverse feed from the normal cut position.

n1n2 : Indicates the value to move in 1/10 mm unit.(00 to 50)

Note: a) If these parameters (d and n1n2) are omitted, then the cut position is set at the default position.
b) Default cut position , or normal position, is at the bottom edge of the print area.
c) This command is only applicable when cutter is installed. (model TSP442 only)

EXAMPLE + 2.5 mm from the edge of print area.
LPRINT CHR$(&H1B);"B+25";CHR$(&H0A);CHR$(&H00);

FUNCTION Set Memory Switch

CODE <ESC> "# N , n1n2n3n4"<LF> <NUL>

HEX 1B 23 N 2C n1n2n3n4 0A 00

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

N : Memory switch number (1 or 2)
n1n2n3n4 : Mode settings (For details see below)
1) Use N=1 to set printer conditions. Parameters are as follows.
n1 : Sensor select
n2 : Start-position detect
n3 : Zero style
n4 : International character set

(Default)

Parameter	Setting	0	1
n1	Sensor select	Reflective sensor (Black mark)	Transmissive sensor
n2	Start-position detect	OFF	ON
n3	Zero style	Normal zero	Slashed zero
n4	International character set		See below

n4	Country
0	USA
1	France
2	Germany

n4	Country
3	UK
4	Denmark #1
5	Sweden

n4	Country
6	Itary
7	Spain #1
8	Japan

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

n4	Country
C	Latin America

2) Use N=2 to set option-related settings. Parameters are as follows.

n1 : Always “0” (TSP400)
n2 : Cutter installed status
n3 : Always “0”
n4 : Printing speed

n	Setting	0	1
n2	Cutter	Invalid(TSP412)	Valid(TSP442)
n4	Printing speed	50 mm/sec(Default)	25 mm/sec

EXAMPLE 1

```
LPRINT CHR$(&H1B);“#1,010A”;CHR$(&H0A); CHR$(&H00);

LPRINT CHR$(&H1B);“#2,0100";CHR$(&H0A); CHR$(&H00);

LPRINT CHR$(&H1B);“?”;CHR$(&H0A); CHR$(&H00);
```

Sensor : Reflective sensor
Start position detect : ON
Zero style : Normal Zero
International character set : Denmark #2
Cutter : Valid
Printing speed : 50 mm/sec

EXAMPLE 2

LPRINT CHR$(&H1B);"#1,1111";CHR$(&H0A);CHR$(&H00);

LPRINT CHR$(&H1B);"?";CHR$(&H0A);CHR$(&H00);

Sensor :	Transmissive sensor
Start position detect :	ON
Zero style :	Slashed zero
International character set :	France

EXAMPLE 3

LPRINT CHR$(&H1B);"#2,0001";CHR$(&H0A);CHR$(&H00);

LPRINT CHR$(&H1B);"?";CHR$(&H0A);CHR$(&H00);

Cutter :	Invalid
Printing speed :	25 mm/sec

Note: In order to enable the changed memory switch setting, turn the printer OFF and ON again or send the printer reset command (<ESC>"?") to the printer.

FUNCTION Reset printer

CODE <ESC> ? <LF><NUL>

HEX 1B 3F 0A 00

REMARKS Resets the printer and prints self-test. This command will also set memory switch conditions without the need to turn the printer power OFF and ON again.

EXAMPLE LPRINT CHR$(&H1B);"?";CHR$(&H0A);CHR$(&H00);

FUNCTION Request status

CODE <ENQ>

HEX 05

REMARKS When the printer receives this command, the printer sends back a status byte for the current printer condition immediately to the host.

Note: Printer conditions are reported by the following status bytes:

Data	HEX	Condition
<SOH> <STX> “FI” <ETX> <EOT> <CR> <LF>	01 02 46 49 03 04 0D 0A	Printing finished
<SOH> <STX> “OF” <ETX> <EOT> <CR> <LF>	01 02 4F 46 03 04 0D 0A	Printer off-line
<SOH> <STX> “PR” <ETX> <EOT> <CR> <LF>	01 02 50 52 03 04 0D 0A	Printing in progress
<SOH> <STX> “RE” <ETX> <EOT> <CR> <LF>	01 02 52 45 03 04 0D 0A	Ready
<SOH> <STX> “E1” <ETX> <EOT> <CR> <LF>	01 02 45 31 03 04 0D 0A	System error
<SOH> <STX> “E2” <ETX> <EOT> <CR> <LF>	01 02 45 32 03 04 0D 0A	Head up
<SOH> <STX> “E3” <ETX> <EOT> <CR> <LF>	01 02 45 33 03 04 0D 0A	Paper empty

Note: When more than one printer condition exists, the printer sends each status byte separated by a comma.
Head up, and paper empty: <SOH> <STX> “E2”,“E3” <ETX> <EOT> <CR> <LF>

EXAMPLE LPRINT CHR$(&H05);
If the printer is in a condition of “Head up, paper empty” then the printer returns the following codes to the host.

CODE	<SOH>	<STX>	“E2”	,	“E3”	<ETX>	<EOT>	<CR>	<LF>
HEX	01	02	45 32	2B	45 33	03	04	0D	0A

FUNCTION Select international character set

CODE <ESC> “N n1n2” <LF><NUL>

HEX 1B 4E n1n2 0A 00

REMARKS This command defines temporary change of the international character set.
For permanent change of the international character set, change memory switch settings by using<ESC> “#”.

n1n2	Country
00	U.S.A
01	France
02	Germany

n1n2	Country
03	UK
04	Denmark #1
05	Sweden

n1n2	Country
06	Itary
07	Spain #1
08	Japan

n1n2	Country
09	Norway
10	Denmark #2
11	Spain #2

n1n2	Country
12	Latin America

EXAMPLE Select Spain #2 Character set.
LPRINT CHR$(&H1B);“N11”;CHR$(&H0A);CHR$(&H00);

FUNCTION Register download character

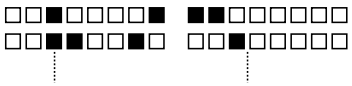
CODE <ESC> "F n1n2 ; d1.…d48"<LF><NUL>

HEX 1B 46 n1n2 3B d1.…d48 0A 00

REMARKS This command defines one download character.

n1n2 : Download character reference number.(00 to 31).
d1.…d48 : Character bit map data.
Note: a) Only standard size character (16 (W) × 24 (H) dots) can be defined as download characters.
b) Data consists of 48 bytes (2 bytes × 24) and defined in the same way as bit image data:
c) If ";" is missing, printer goes into an error condition.

EXAMPLE In this example data d1,d2,d3,.…



LPRINT
CHR$(&H1B);"F00";CHR$(&H21);CHR$(&HC0);CHR$(&H32);
CHR$(&H20).…;CHR$(&H0A);CHR$(&H00)

FUNCTION Select "zero" style

CODE <ESC> "Z n" <LF><NUL>

HEX 1B 5A n 0A 00

REMARKS This command selects zero style, normal zero slashed zero.
n=0 : Select normal zero.
n=1 : Select slashed zero.

EXAMPLE Select normal zero.

LPRINT CHR$(&H1B);"Z0";CHR$(&H0A);CHR$(&H00);

PAGE MODE

TUP400 Only

FUNCTION Request status

CODE <EOT>

HEX 04

REMARKS When the printer receives this command, the printer sends back a status byte for the current printer condition immediately to the host.

Note: Printer conditions are reported by the following status bytes:

Data	HEX	Condition
<SOH> <STX> "NA" <ETX> <EOT> <CR> <LF>	01 02 4E 41 03 04 0D 0A	Inside near-end
<SOH> <STX> "NB" <ETX> <EOT> <CR> <LF>	01 02 4E 42 03 04 0D 0A	Outside near-end
<SOH> <STX> "E3" <ETX> <EOT> <CR> <LF>	01 02 45 35 03 04 0D 0A	Page Empty
<SOH> <STX> "E5" <ETX> <EOT> <CR> <LF>	01 02 45 35 03 04 0D 0A	Paper was fed from presenter
<SOH> <STX> "E6" <ETX> <EOT> <CR> <LF>	01 02 45 36 03 04 0D 0A	Presenter paper jam error
<SOH> <STX> "E0" <ETX> <EOT> <CR> <LF>	01 02 45 30 03 04 0D 0A	None of the above

Note: When more than one printer condition exists, the printer sends each status byte separated by a comma.
Inside near-end, Outside near-end: <SOH> <STX> "NA","NB" <ETX> <EOT> <CR> <LF>

EXAMPLE LPRINT CHR$(&H04);
If the printer is in a condition of "Inside near-end, Outside near-end" then the printer returns the following codes to the host.

CODE	<SOH>	<STX>	"NA"	,	"NB"	<ETX>	<EOT>	<CR>	<LF>
HEX	01	02	4E 41	2B	4E 42	03	04	0D	0A

7-4. Appendix

How to set various bar codes

Refer to the industry standards reference material for the features and applications of each bar code symbology.
This section of this document covers the proper commands to select the bar code symbology required.

(1) CODE 39

CODE 39 can represent numeric characters from 0 to 9 and alphabetical characters A to Z. Width of each bar of bar code depends on the mode.
The number of dots for each element of the bar code in each mode is shown as below. The number of dots depends on whether the print direction is horizontal or vertical.

1) Length of each element in each mode

a) Horizontal printing

Item	Mode 1	Mode 2	Mode 3	Mode 4	Mode 5	Mode 6	Mode 7	Mode 8	Mode 9
Width of narrow elements	2 dots	3 dots	4 dots	2 dots	3 dots	4 dots	2 dots	3 dots	4 dots
Width of wide elements	6 dots	9 dots	12 dots	5 dots	8 dots	10 dots	4 dots	6 dots	8 dots
Ratio	1 : 3	1 : 3	1 : 3	1 : 2.5	1 : 2.7	1 : 2.5	1 : 2	1 : 2	1 : 2
Inter-character space	2 dots	3 dots	4 dots	2 dots	3 dots	4 dots	2 dots	3 dots	4 dots
Length of one character (mm)	4	6	8	3.625	5.625	7.25	3.25	4.875	6.5

b) Vertical printing

In vertical printing, one dot is added to each white bar which is horizontally printed. (This is because the width of black bars is made wider due to the change of printing characteristics caused by heating of the printing head. As a result, the number of dots for white bars and for black bars are different even when white and black bars have the same narrow-element width. Length of each element is as shown below.

Item	Mode 1	Mode 2	Mode 3	Mode 4	Mode 5	Mode 6	Mode 7	Mode 8	Mode 9
Length of one character (mm)	4.625	6.625	8.625	4.25	6.25	7.875	3.875	5.5	7.125

2) REQUIREMENTS

a) The Start code and the Stop code of CODE 39 are automatically added.

b) The position defined by the control command locates the bar code symbols. It is necessary to provide space for a quiet zone for bar code symbol.

3) ANSI and AIM specifications (for reference only)

a) Width of narrow elements:
Minimum 0.0075 inch (0.191 mm)

b) Ratio of narrow-element width to width-element width:
1 : 2.2 (the width of narrow elements is 0.508 mm or smaller)
1 : 2 (the width of narrow elements is 0.508 mm or greater)

c) Inter-element space:
Minimum is the same as the narrow-element width.
Maximum is three times the narrow-element width or 1.524 mm, whichever is greater.

d) Bar height:
For hand scanners, the minimum is 0.25 inch (6.35 mm) or 15% of the bar code-length, whichever is greater.
For non-hand scanners, the minimum is 0.8 inch (20.3 mm) or 25% of the bar code-length, whichever is greater.

e) Quiet zone:
Minimum is ten times the narrow-element width or 0.10 inch (2.54 mm), whichever is greater.
For hand scanners, the minimum is 0.25 inch (6.35 mm) or greater.

EXAMPLE Bar code string number 11 ,starting position of bar code (X,Y) = 10 mm, 10 mm, use Mode 2 of CODE39, Bar code height 10mm data:ABCDEFG, bar code rotation direction 0 degree.

```
LPRINT CHR$(&H1B);“PB11;0100;0100,2,1,0,0100”;
CHR$(&H0A);CHR$(&H00);
LPRINT CHR$(&H1B);“RB11;ABCDEFG”;CHR$(&H0A);
CHR$(&H00);
```

(2) Interleaved 2 of 5 (ITF)

This code can represent numeric characters from 0 to 9. This code can be used for an application that requires higher character density.
JIS and EAN specify that this code be used for printing on corrugated boxes.

1) Width of narrow elements and length of two characters

a) Horizontal printing

Item	Mode 1	Mode 2	Mode 3	Mode 4	Mode 5	Mode 6	Mode 7	Mode 8	Mode 9
Width of narrow elements	2 dots	4 dots	6 dots	2 dots	4 dots	6 dots	2 dots	3 dots	4 dots
Width of wide element	5 dots	10 dots	15 dots	4 dots	8 dots	12 dots	6 dots	9 dots	12 dots
Ratio	1 : 2.5	1 : 2.5	1 : 2.5	1 : 2	1 : 2	1 : 2	1 : 3	1 : 3	1 : 3
Length of one character (mm)	4	8	12	3.5	7	10.5	4.5	6.75	9

b) Vertical printing

Item	Mode 1	Mode 2	Mode 3	Mode 4	Mode 5	Mode 6	Mode 7	Mode 8	Mode 9
Length of two character (mm)	4.625	8.625	12.625	4.125	7.625	11.125	5.125	7.375	9.625

2) REQUIREMENTS

a) When this code is used, the start and stop patterns are automatically inserted.
b) When the number of digits for bar code data is an odd number, the printer automatically adds “0” in the highest digit position.
c) Details conform to the AIM, USS-12/5, ANSI, and JIS X 0502 specifications

EXAMPLE Bar code string number 25, starting position of bar code (X, Y) = 5 mm, 10 mm, use Mode 1 of ITF, Bar code height 10 mm
Data: 0123456, bar code rotation direction 0 degree

```
LPRINT CHR$(&H1B);“PB25;0050,0100,1,2,0,0100”;
CHR$(&H0A); CHR$(&H00);
LPRINT CHR$(&H1B);“RB25;0123456”; CHR$(&H0A);
CHR$(&H00);
```

(3) CODE 93

1) Each mode and module width

a) Horizontal printing

Item	Mode 1	Mode 2	Mode 3
Module width	2 dots	3 dots	4 dots
Width of one character (mm)	2.25	3.375	4.5

Note: The start and stop bars are not included.

b) Vertical printing

Item	Mode 1	Mode 2	Mode 3
Module width	2 dots	3 dots	4 dots
Width of one character (mm)	2.625	3.75	4.875

2) REQUIREMENTS

a) The start and stop patterns are automatically inserted.
b) The check characters are automatically inserted.
c) 2-character set codes are same as CODE 128. (Expect FNC1-4, and START A-C)

EXAMPLE Bar code number 00, starting position of bar code (X, Y) = 40 mm, 16 mm Mode 2 of CODE 93, Bar code rotation: 0 degree. Bar code height 10 mm, Data “ABCDefg”

```
LPRINT CHR$(&H1B);“PB00;0400,0160,2,3,0,0100”;
CHR$(&H0A);CHR$ (&H00);
LPRINT CHR$(&H1B);“RB00;ABCDefg”;
CHR$(&H0A);CHR$ (&H00);
```

(4) UPC (5) JAN/EAN-8 (6) JAN/EAN-13

These codes are common commodity codes, mainly used for miscellaneous goods or groceries sold at supermarkets.

1) Each mode and bar code width

a) Horizontal printing

Item	Mode 1	Mode 2	Mode 3
Module width	2 dots	3 dots	4 dots
Bar code width			
JAN/EAN-8	16.75 mm	25.125 mm	33.5 mm
JAN/EAN-13, UPC	23.75 mm	36.625 mm	47.5 mm

Note: Right and left guard bars are included, white spaces are not included.

b) Vertical printing

Item	Mode 1	Mode 2	Mode 3
Module width	2 dots	3 dots	4 dots
Bar code width			
JAN/EAN-8	13.375 mm	27.75 mm	36.125 mm
JAN/EAN-13, UPC	27.624 mm	39.5 mm	51.375 mm

Note: Right and left guard bars are included, white spaces are not included.

2) REQUIREMENTS

a) JAN/EAN-8
Must consist of a 7 or 8 numeric digits, otherwise, the command is ignored. The check digit is automatically added using modules 10/3 weight.
When the calculated value and the value in the 8th digit differ, the former value has precedence over the latter values.

b) JAN/EAN-13
Must consist of a 12 or 13 numeric digits; otherwise, the command is ignored. The check digit is automatically added using modules 10/3 weight.
When the calculated value and the value in the 13th digit differ, the former value has precedence over the latter values.

c) UPC-A Must consist of a 11 or 12 numeric digits, otherwise, the command is ignored. The check digit is automatically added using modules 10/3 weight.
When the calculated value and the value in the 12th digit differ, the former value has precedence over the latter values.

EXAMPLE Bar code string number 10, starting position of bar code (X, Y) = 5 mm, 10 mm, use Mode 1 of EAN-13, Bar code height 10 mm data:246801357956, bar code rotation direction 0 degree

```
LPRINT CHR$(&H1B);“PB10;0050,0100,1,6,0,0100”;
CHR$(&H0A);CHR$(&H00);
LPRINT CHR$(&H1B);“RB10;246801357956”;
CHR$(&H0A);CHR$(&H00);
```

(7) CODE 128

This code can represent 128 ASCII characters.

1) Each mode and module width

a) Horizontal printing Note: The start and stop bars are not included.

Item	Mode 1	Mode 2	Mode 3
Module width	2 dots	3 dots	4 dots
Width of one character	2.75 mm	4.125 mm	5.5 mm

b) Vertical printing

Item	Mode 1	Mode 2	Mode 3
Module width	2 dots	3 dots	4 dots
Width of one character	3.125 mm	4.5 mm	6.5 mm

2) REQUIREMENTS

%(25 H) is sent as data %0(25H 35H). Control codes 00H to 1FH and 7FH are sent as data % followed by 40H to 5FH and 35 H. For example, control code 7FH is sent as data %5 (25H 35H). Function codes are sent as data % followed by 1 to 4 (31H to 34H). The start code is sent as data % followed by 6 to 8(36H to 38H). Although CODE 128 data requires START CODE, the printer automatically adds START CODE. Please omit START CODE when sending data to the printer.

3) 2-character set codes

Control codes

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

Special code

Code	HEX	Format	HEX
%	25H	%0	25H 30H

Function codes

Code	HEX	Format	HEX
FNC1		%1	25H 31H
FNC2		%2	25H 32H
FNC3		%3	25H 33H
FNC4		%4	25H 34H

Start codes

Code	HEX	Format	HEX
START A		%6	25H 36H
START B		%7	25H 37H
START C		%8	25H 38 H

EXAMPLE Bar code string number 00, starting position of bar code (X, Y) = 15 mm, 5 mm, use Mode 1 of CODE128, Bar code height 15 mm, data: 1213477657, and CR (carriage return)

```
LPRINT CHR$(&H1B);“PB00;0150,0050,1,7,0150”;
CHR$(&H0A);CHR$(&H00);
LPRINT CHR$(&H1B);“RB00;1213477657%M”;
CHR$(&H0A);CHR$(&H00);
```

(8) NW-7

NW-7 bar code can represent numeric characters 0 to 9 and special characters such as - , $, : , / , . , + with one of character from A to D as Start or Stop code in NW-7.

1) Width of character in each mode

Width of each bar code character varies since number of narrow bars and wide bars are different in each character.

Normal character

(number of narrow element : 5 , number of wide element : 2)
0 to 9 , $, -

Wide character

(number of narrow element : 4 , number of wide element : 3)
: , / , . , + , A to D

Length of each bar code character includes a space between characters.

a) Horizontal direction print

Item	Mode 1	Mode 2	Mode 3	Mode 4	Mode 5	Mode 6	Mode 7	Mode 8	Mode 9
Width of narrow elements	2 dots	3 dots	4 dots	2 dots	3 dots	4 dots	2 dots	3 dots	4 dots
Width of wide element	6 dots	9 dots	12 dots	5 dots	8 dots	10 dots	4 dots	6 dots	8 dots
Ratio	1 : 3	1 : 3	1 : 3	1 : 2.5	1 : 2.7	1 : 2.5	1 : 2	1 : 2	1 : 2
Space between characters	2 dots	3 dots	4 dots	2 dots	3 dots	4 dots	2 dots	3 dots	4 dots
Length of (Normal)(mm)	3	4.5	6	2.75	4.25	5.5	2.5	3.75	5
each character (Wide)(mm)	3.5	5.25	7	3.125	5.125	6.25	2.75	4.125	5.5

b) Vertical direction print

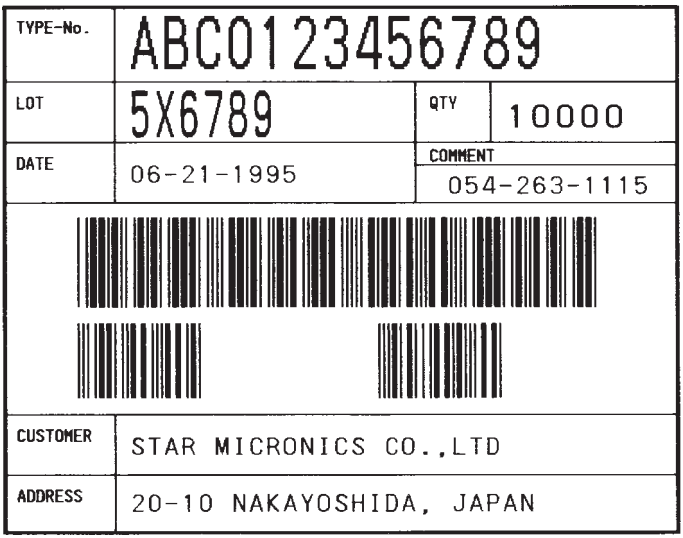
Item	Mode 1	Mode 2	Mode 3	Mode 4	Mode 5	Mode 6	Mode 7	Mode 8	Mode 9
Length of (Normal)(mm)	3.5	5	6.5	3.25	4.75	6	3	4.25	5.5
each character (Wide)(mm)	4	5.75	7.5	3.625	5.625	6.75	3.25	4.625	6

7-5. Sample Program

```
==SAMPLE  PROGRAM==

'This sample program (SAMPLE1.BAS) is included in a floppy disk comes with the
TSP400  printer.
'——<< SAMPLE1.BAS >>——
E$=CHR$(27): LN$ = CHR$(10) + CHR$(0): A$ = DATE$
OPEN "COM1:9600,N,8,1,CS0,DS0"FOR RANDOM AS #1      :'For Serial I/F COM1:
'OPEN "COM2:9600,N,8,1,CS0,DS0"FOR RANDOM AS #1     :'For Serial I/F COM2:
'OPEN "LPT1:"FOR RANDOM AS #1: WIDTH "LPT1:", 255   :'For Parallel I/F LPT1:

'——<< FORMAT SETTINGS >>——
PRINT #1, E$; "C"; LN$;   :'Clear format
PRINT #1, E$; "D1500"; LN$;      :'Set print area
PRINT #1, E$; "L00;0050,0050,0750,0050,0,4"; LN$;   :'Define ruled line format
PRINT #1, E$; "L01;0150,0300,0230,0300,0,2"; LN$;
PRINT #1, E$; "L02;0150,0400,0310,0400,0,2"; LN$;
PRINT #1, E$; "L03;0050,0800,0310,0800,0,2"; LN$;
PRINT #1, E$; "L04;0590,0800,0750,0800,0,2"; LN$;
PRINT #1, E$; "L05;0050,0945,0750,0945,0,4"; LN$;
PRINT #1, E$; "L06;0050,0050,0050,0950,1,4"; LN$;
PRINT #1, E$; "L07;0150,0050,0150,0950,1,2"; LN$;
PRINT #1, E$; "L08;0230,0050,0230,0950,1,2"; LN$;
PRINT #1, E$; "L09;0260,0050,0260,0400,1,2"; LN$;
PRINT #1, E$; "L010;0310,0050,0310,0950,1,2"; LN$;
PRINT #1, E$; "L011;0590,0050,0590,0950,1,2"; LN$;
PRINT #1, E$; "L012;0670,0050,0670,0950,1,2"; LN$;
PRINT #1, E$; "L013;0745,0050,0745,0950,1,4"; LN$;
PRINT #1, E$; "PC00;0070,0930,1,1,1,33,02"; LN$;    :'Define character string
position and type
PRINT #1, E$; "PC01;0060,0780,2,3,2,33,02"; LN$;
PRINT #1, E$; "PC02;0170,0930,1,1,1,33,02"; LN$;
PRINT #1, E$; "PC03;0160,0780,1,2,4,33,02"; LN$;
PRINT #1, E$; "PC04;0170,0380,1,1,1,33,02"; LN$;
PRINT #1, E$; "PC05;0180,0280,1,1,4,33,02"; LN$;
PRINT #1, E$; "PC06;0250,0930,1,1,1,33,02"; LN$;
PRINT #1, E$; "PC07;0260,0780,1,1,2,33,02"; LN$;
PRINT #1, E$; "PC08;0240,0380,1,1,1,33,02"; LN$;
PRINT #1, E$; "PC09;0275,0380,1,1,2,33,02"; LN$;
PRINT #1, E$; "PC10;0610,0930,1,1,1,33,02"; LN$;
PRINT #1, E$; "PC11;0620,0780,1,1,2,33,02"; LN$;
PRINT #1, E$; "PC12;0690,0930,1,1,1,33,02"; LN$;
PRINT #1, E$; "PC13;0695,0780,1,1,2,33,02"; LN$;
PRINT #1, E$; "PB00;0330,0850,1,1,3,0120"; LN$;     :'Define bar code position
and type
PRINT #1, E$; "PB01;0470,0850,1,2,3,0100"; LN$;
PRINT #1, E$; "PB02;0470,0450,1,2,3,0100"; LN$;
PRINT #1, E$; "B"; LN$;   :'Enable cutter

'——<< PRINT DATA >>——
PRINT #1, E$; "RC00;TYPE-No"; LN$;     :'Set character data
PRINT #1, E$; "RC01;ABC0123456789"; LN$;
PRINT #1, E$; "RC02;LOT"; LN$;
PRINT #1, E$; "RC03;5X6789"; LN$;
PRINT #1, E$; "RC04;QTY"; LN$;
PRINT #1, E$; "RC05;10000"; LN$;
PRINT #1, E$; "RC06;DATE"; LN$;
PRINT #1, E$; "RC07;";A$; LN$;
```

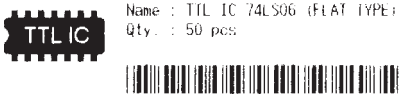
```
PRINT #1, E$; "RC08;COMMENT"; LN$;
PRINT #1, E$; "RC09;054-263-1115"; LN$;
PRINT #1, E$; "RC10;CUSTOMER"; LN$;
PRINT #1, E$; "RC11;STAR MICRONICS CO.,LTD"; LN$;
PRINT #1, E$; "RC12;ADDRESS"; LN$;
PRINT #1, E$; "RC13;20-10 NAKAYOSHIDA, JAPAN"; LN$;
PRINT #1, E$; "RB00;ABC0123456789"; LN$;      :'Define bar code data
PRINT #1, E$; "RB01;10000"; LN$;
PRINT #1, E$; "RB02;940517"; LN$;

'──<< PRINT >>──
PRINT #1, E$; "1"; LN$;   :'Print Label
END
```

Print Out Sample



```
==SAMPLE  PROGRAM==

'This sample program (SAMPLE2.BAS) is included in a floppy disk with the TSP400
printer.

'——<< SAMPLE2.BAS >>——
E$ = CHR$(27): LN$ = CHR$(10) + CHR$(0)
OPEN "COM1:9600,N,8,1,CS0,DS0" FOR RANDOM AS #1     :'For Serial I/F COM1:
'OPEN "COM2:9600,N,8,1,CS0,DS0" FOR RANDOM AS #1    :'For Serial I/F COM2:
'OPEN "LPT1:"FOR RANDOM AS #1: WIDTH "LPT1:", 255   :'For Parallel I/F LPT1:

'——<< FORMAT SETTINGS >>——
PRINT #1, E$; "C"; LN$;   :'Clear format
PRINT #1, E$; "D0800"; LN$;      :'Set print area
PRINT #1, E$; "PC00;0300,0222,1,1,1,00,01"; LN$;    :'Define character string
position and type
PRINT #1, E$; "PC01;0300,0249,1,1,1,00,01"; LN$;
PRINT #1, E$; "PC02;0300,0276,1,1,1,00,01"; LN$;
PRINT #1, E$; "PB00;0300,0330,4,1,0,0040"; LN$;     :'Define bar code position
and type
PRINT #1, E$; "B"; LN$;   :'Enable cutter

'——<< PRINT DATA >>——
PRINT #1, E$; "RC00;Part#": 08210116   ";LN$; :'Set character data
PRINT #1, E$; "RC01;Name : TTL IC 74LS06 (FLAT TYPE)"; LN$;
PRINT #1, E$; "RC02;Qty.: 50 pcs "; LN$;
PRINT #1, E$; "RB00;08210116"; LN$;               :'Set bar code data
'
PRINT #1, E$; "H;0135,0255,";    :'Copy BMP file to image buffer"
OPEN "TTLIC.BMP" FOR BINARY AS #2
FOR I = 1 TO LOF(2): D$ = INPUT$(1, #2): PRINT #1, D$;: NEXT I
CLOSE #2
PRINT #1, ","; LN$

'——<< PRINT >>——
PRINT #1, E$; "I"; LN$    :'Print Label
END
```

Print Out Sample



PAGE MODE

8. CONTROL CODES/LINE MODE

8-1. Line Mode Command Summary

The details of each command are shown in the following sections.

Commands to Select Characters

Control codes	Hexadecimal codes	Function	Page
<ESC> "R" *n*	1B 52 *n*	Select international character set	65
<ESC> "/" "1" <ESC> "/" <1>	1B 2F 31 1B 2F 01	Select slash zero	65
<ESC> "/" "0" <ESC> "/" <0>	1B 2F 30 1B 2F 00	Select normal zero	65
<ESC> "b" *n1 n2 n3 n4 d1 ...* <RS>	1B 62 *n1 n2 n3 n4 d1 ... 1E*	Select bar code printing	66
<ESC> "M"	1B 4D	Select 12-dot pitch printing	70
<ESC> "p"	1B 70	Select 14-dot pitch printing	70
<ESC> "P"	1B 50	Select 15-dot pitch printing	70
<ESC> ":"	1B 3A	Select 16-dot pitch printing	70
<ESC> <SP> *n*	1B 20 *n*	Set character spacing	70
<SO>	0E	Sets the printing magnified double in character width.	71
<DC4>	14	Resets the printing magnified in character width.	71
<ESC> "W" *n*	1B 57 *n*	Sets the magnification rate in character width.	71
<ESC> <SO>	1B 0E	Sets the printing magnified double in character height.	71
<ESC> <DC4>	1B 14	Resets the printing magnified in character height.	71
<ESC> "h" *n*	1B 68 *n*	Sets the magnification rate in character height.	72
<ESC> "i" *n1 n2*	1B 69 *n1 n2*	Sets the magnification rates in character width and height.	72
<ESC> "–" "1" <ESC> "–" <1>	1B 2D 31 1B 2D 01	Select underlining	72
<ESC>"–" "0" <ESC> "–" <0>	1B 2D 30 1B 2D 00	Cancel underlining	72
<ESC> "_" "1" <ESC> "_" <1>	1B 5F 31 1B 5F 01	Select upperlining	73
<ESC> "_" "0" <ESC> "_" <0>	1B 5F 30 1B 5F 00	Cancel upperlining	73

Control codes	Hexadecimal codes	Function	Page
<ESC> “4”	1B 34	Select highlight printing	73
<ESC> “5”	1B 35	Cancel highlight printing	73
<SI>	0F	Inverted printing	73
<DC2>	12	Cancel inverted printing	73
<ESC> “E” <ESC> “G”	1B 45 1B 47	Select emphasized printing	74
<ESC> “F” <ESC> “H”	1B 46 1B 48	Cancel emphasized printing	74

Commands to Set the Page Format

Control codes	Hexadecimal codes	Function	Page
<ESC> “C” *n*	1B 43 *n*	Set page length in lines	75
<ESC> “C” <0> *n*	1B 43 00 *n*	Set page length in inches	75
<ESC> “N” *n*	1B 4E *n*	Set bottom margin	75
<ESC> “O”	1B 4F	Cancel bottom margin	75
<ESC> “l” *n*	1B 6C *n*	Set left margin	76
<ESC> “Q” *n*	1B 51 *n*	Set right margin	76

Commands to Move the Print Position

Control codes	Hexadecimal codes	Function	Page
<LF>	0A	Line feed	77
<CR>	0D	Carriage Return	77
<ESC> “a” *n*	1B 61 *n*	Feed paper *n* lines	77
<FF>	0C	Form feed7	77
<HT>	09	Horizontal tab	77
<VT>	0B	Vertical tab	78
<ESC> “z” “1” <ESC> “z” <1>	1B 7A 31 1B 7A 01	Set line spacing to 4 mm	78
<ESC> “0”	1B 30	Set line spacing to 3 mm	78
<ESC> “J” n	1B 4A *n*	One time n/4 mm feed	78
<ESC> “j” n	1B 6A *n*	One time n/4 mm backfeed	79
<ESC>“I” n	1B 49 *n*	One time n/8 mm feed	79
<ESC> “B” *n1 n2* ... <0>	1B 42 *n1 n2* ... 00	Set vertical tab stops	79
<ESC> “D” *n1 n2* ... <0>	1B 44 *n1 n2* ... 00	Set horizontal tab stops	80

Commands to Print Dot Graphics

Control codes	Hexadecimal codes	Function	Page
<ESC> "K" *n* <0> *m1 m2 ...*	1B 4B *n* 00 *m1 m2 ...*	Print normal density graphics	81
<ESC> "L" *n1 n2 m1 m2 ...*	1B 4C *n1 n2 m1 m2 ...*	Print high density graphics	83
<ESC> "k" *n* <0> *d1 ...*	1B 6B *n* 00 *d1 ...*	Print fine density graphics	84
<ESC> "X" *n1 n2 m1* ••	1B 58 *n1 n2 m1* ••	Print fine density graphics	87

Commands to Print Download Characters

Control codes	Hexadecimal codes	Function	Page
<ESC> "&" <1> <1> *n m1 m2 ... m48*	1B 26 01 01 *n m1 m2 ... m48*	Define download character	88
<ESC> "&" <1> <0> *n*	1B 26 01 00 *n*	Delete a download character7	89
<ESC> "%" "1" <ESC> "%" <1>	1B 25 31 1B 25 01	Enable download character set	89
<ESC> "%" "0" <ESC> "%" <0>	1B 25 30 1B 25 00	Disable download character set	89

Commands to Control Peripheral Devices

Control codes	Hexadecimal codes	Function	Page
<ESC> <BEL> *n1 n2*	1B 07 *n1 n2*	Define drive pulse width for peripheral device #1	90
<BEL>	07	Control peripheral device #1	90
<FS>	1C	Control peripheral device #1 immediately	90
<EM>	19	Control peripheral device #2 immediately	90
<SUB>	1A	Control peripheral device #2 immediately	90

Commands to Control Auto Cutter

Control codes	Hexadecimal codes	Function	Page
<ESC> "d" "0" <ESC> "d" <0> <ESC> "d" "1" <ESC> "d" <1>	1B 64 30 1B 64 00 1B 64 31 1B 64 01	Full-cut command to the auto cutter	91

Other Commands

Control codes	Hexadecimal codes	Function	Page
<CAN>	18	Cancel last line & Initialize printer	92
<DC3>	13	Deselect printer	93
<DC1> <DC1> *n*	11 11 *n*	Set select mode	93
<RS>	1E	Beep the buzzer	93
<ESC> "#N, n1 n2 n3 n4" <LF> <NUL>	1B 23 N 2C n1 n2 n3 n4 0A 00	Set memory switch	94
<ESC> "@"	1B 40	Initialize printer	96
<ENQ>	05	Enquiry	96
<STX>	02	Enter STX-ETX mode	97
<ETX>	03	Terminate STX-ETX mode	97
<ESC> "?" <LF> <NUL>	1B 3F 0A 00	Reset printer hardware	97

Commands to Control Auto Cutter

Control codes	Hexadecimal codes	Function	Page
<EOT>	04	Request status	98

8-2. Command Specification

Commands to Select Characters

FUNCTION Select international character set

CODE <ESC> "R" *n*

HEX 1B 52 *n*

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

n	Character set	*n*	Character set
0	U.S.A.	7	Spain I
1	France	8	Japan
2	Germany	9	Norway
3	England	10	Denmark II
4	Denmark I	11	Spain II
5	Sweden	12	Latin America
6	Italy		

When the value of *n* is 0 to 9, 0(00H) to 9(09H) or "0"(30H) to "9"(39H) can be set. When the value of *n* is 10 to 12, 10(0AH) to 12(0CH) or "A"(41H) to "C"(43H) can be set.

FUNCTION Select zero style

CODE <ESC> "/" *n*

HEX 1B 2F *n*

REMARKS Causes subsequent zero characters to be printed with a slash when *n* is 1, and without a slash when *n* is 0.
The value of *n* can be set to 0(00H) or "0"(30H), or 1(01H) or "1"(31H).

FUNCTION Select bar code printing

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

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

REMARKS Prints bar code according to the value of *n1*, as shown below:

n1: Type of bar code

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

The value of *n1* can be set to 1(01H) or 8(08H) or "1"(31H) to "8"(38H).

n2: Printing character below bar code or line feed

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

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

n3: Mode of bar code

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

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

CODE 39, NW-7, ITF

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

When the value of *n3* is UPC-A, JAN/EAN-8, JAN/EAN-13, CODE128 or CODE93, 1(01H) to 3(03H) or "1"(31H) to "3"(33H) can be set. When the value of n3 is CODE39, NW-7 or ITF, 1(01H) to 9(09H) or "1"(31H) to "9"(39H) can be set.

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

di...dk: Bar code data

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

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

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

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

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

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

CODE93: The value of k is optional, and the maximum value also differs according to the modes and the types of character (30 digits maximum in mode 1).
The check characters (C and K) are automatically added.

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

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

Data of CODE 128 and CODE 93

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

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

3) 2-character codes

Control codes

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

Special code

CODE	FORMAT
% 25H	%0 25H 30H

Function codes

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

Start codes

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

☆ For CODE 128 only.

FUNCTION Select 12-dot pitch printing

CODE <ESC> "M"

HEX 1B 4D

REMARKS Prints 12-dot pitch characters without an extra space.

FUNCTION Select 14-dot pitch printing

CODE <ESC> "p"

HEX 1B 70

REMARKS Prints 12-dot pitch characters with 2-dot spacing between characters.

FUNCTION Select 15-dot pitch printing

CODE <ESC> "P"

HEX 1B 50

REMARKS Prints 12-dot pitch characters with 3-dot spacing between characters.

FUNCTION Select 16-dot pitch printing

CODE <ESC> ":"

HEX 1B 3A

REMARKS Prints 12-dot pitch characters with 4-dot spacing between characters.

FUNCTION Set the character spacing

CODE <ESC> <SP> *n*

HEX 1B 20 *n*

REMARKS Sets the space between characters to *n* dots, where *n* is a number from 0 to 15.
When the value of *n* is 0 to 9, 0(00H) to 9(09H) or "0"(30H) to "9"(39H) can be set. When the value of *n* is 10 to 15, 10(0AH) to 15(0FH) or "A"(41H) to "F"(46H) can be set.

FUNCTION Sets the printing magnified double in character width.

CODE <SO>

HEX 0E

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

FUNCTION Resets the printing magnified in character width.

CODE <DC4>

HEX 14

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

FUNCTION Sets the magnification rate in character width.

CODE <ESC> "W" *n*

HEX 1B 57 *n*

REMARKS Prints the subsequent data including a character spacing set by <ESC><SP> *n*, magnified in character width by a rate specified by the value of *n*.

n	Character width	*n*	Character width
0	Unmagnify	3	Quadruple
1	Double	4	Quintuple
2	Triple	5	Sextuple

The value of *n* can be set to 0(00H) to 5(05H) or "0"(30H) to "5"(35H).

FUNCTION Sets the printing magnified double in character height.

CODE <ESC> <SO>

HEX 1B 0E

REMARKS Prints the subsequent data magnified double in character height.

FUNCTION Resets the printing magnified in character height.

CODE <ESC><DC4>

HEX 1B 14

REMARKS Resets the printing magnified in character height set by <ESC><SO>, <ESC>"h"*n* and <ESC>"i"*n1n2*.

FUNCTION Sets the magnification rate in character height.

CODE <ESC> "h" *n*

HEX 1B 68 *n*

REMARKS Prints the subsequent data magnified in character height by a rate specified by the value of *n*.

n	Character height	*n*	Character height
0	Unmagnify	3	Quadruple
1	Double	4	Quintuple
2	Triple	5	Sextuple

The value of *n* can be set to 0(00H) to 5(05H) or "0"(30H) to "5"(35H).

FUNCTION Sets the magnification rates in character width and height.

CODE <ESC> "i" *n1 n2*

HEX 1B 69 *n1 n2*

REMARKS Prints the subsequent data in the size specified by *n1*, *n2*. *n1* indicates the height magnification and *n2* indicates the width magnification.

n1 (*n2*) = 0 Normal height (or width) size.
1 Double height (or width) size.
2 Triple height (or width) size.
3 Quadruple height (or width) size.
4 Quintuple height (or width) size.
5 Sextuple height (or width) size.

The values of *n1*, *n2* are 0(00H) to 5(05H) or "0"(30H)" to "5"(35H).

FUNCTION Underlining

CODE <ESC> "–" *n*

HEX 1B 2D *n*

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

FUNCTION Upperlining

CODE <ESC> "_" *n*

HEX 1B 5F *n*

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

FUNCTION Select highlight printing

CODE <ESC> "4"

HEX 1B 34

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

FUNCTION Cancel highlight printing

CODE <ESC> "5"

HEX 1B 35

REMARKS Cancels highlight printing.

FUNCTION Inverted printing

CODE <SI>

HEX 0F

REMARKS Causes subsequent characters to be inverted.

FUNCTION Cancel inverted printing

CODE <DC2>

HEX 12

REMARKS Cancels inverted printing.

FUNCTION Select emphasized printing

CODE <ESC> “E”

HEX 1B 45

CODE <ESC> “G”

HEX 1B 47

REMARKS Causes subsequent characters to be emphasized.

FUNCTION Cancel emphasized printing

CODE <ESC> “F”

HEX 1B 46

CODE <ESC> “H”

HEX 1B 48

REMARKS Cancels emphasized printing.

Commands to Set the Page Format

FUNCTION Set page length in lines

CODE <ESC> "C" *n*

HEX 1B 43 *n*

REMARKS Sets the page length using the current line spacing, where *n* is between 1 and 127.
Changing the line spacing later does not alter the physical page length.
The current line becomes the top of the page.
Resets the bottom margin.
Invalid when start position detect is ON.

FUNCTION Set page length in inches

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

HEX 1B 43 00 *n*

REMARKS Sets the page length to *n* × 24 mm, where *n* is between 1 and 22.
The current line becomes the top of the page.
Resets the bottom margin.
Invalid when start position detect is ON.

FUNCTION Set bottom margin

CODE <ESC> "N" *n*

HEX 1B 4E *n*

REMARKS Sets the bottom margin to *n* lines at the current line spacing, where *n* is between 0 and 127.
Bottom margin is reset when you change the page length.
Setting is invalid if the printing area on one page is 36 mm or less.
Invalid when start position detect is ON.

FUNCTION Cancel bottom margin

CODE <ESC> "O"

HEX 1B 4F

REMARKS Cancels the bottom margin.
Invalid when start position detect is ON.

FUNCTION Set left margin

CODE <ESC> "l" *n*

HEX 1B 6C *n*

REMARKS Sets the left margin at column *n* (where *n* is between 0 and 255) at the current character pitch.
The left margin does not move if the character pitch is changed later.
Setting is invalid if the printing area for one line would be 36mm or less.

FUNCTION Set right margin

CODE <ESC> "Q" *n*

HEX 1B 51 *n*

REMARKS Sets the right margin at column *n* (where *n* is between 1 and 255) at the current character pitch.
The right margin does not move if the character pitch is changed later.
Setting is invalid if the printing area for one line would be 36mm or less.

Commands to Move the Print Position

FUNCTION Line feed

CODE <LF>

HEX 0A

REMARKS Prints the current line and feeds the paper to the next line.

FUNCTION Carriage return

CODE <CR>

HEX 0D

REMARKS Prints the current line and feeds the paper to the next line. This command is ignored when CR code is invalid.

FUNCTION Feed paper *n* lines

CODE <ESC> "a" *n*

HEX 1B 61 *n*

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

FUNCTION Form feed

CODE <FF>

HEX 0C

REMARKS Feeds the paper to the top of the next page, according to the page length set by <ESC>"C"*n* or <ESC>"C"<0>*n* when memory switch 1-8 is set to 0, and according to the sensor output when the memory switch is set to 1. The print position is at the left margin in both cases.

FUNCTION Horizontal tab

CODE <HT>

HEX 09

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

FUNCTION Vertical tab

CODE <VT>

HEX 0B

REMARKS When start position detect is invalid, feeds the paper to the next vertical tab stop and moves the print position to the left margin. Performs a line feed if no vertical tabs are set or if the current line is at or below the last vertical tab stop.
Same as <LF> when start position detect is valid.

FUNCTION Set line spacing to 4 mm

CODE <ESC> “z” “1” or <ESC> “z” <1>

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

REMARKS Sets the distance the paper advances in subsequent line feeds to 4 mm.

FUNCTION Set line spacing to 3 mm

CODE <ESC> “0”

HEX 1B 30

REMARKS Sets the distance the paper advances in subsequent line feeds to 3 mm.

FUNCTION One time n/4 mm feed

CODE <ESC> “J” *n*

HEX 1B 4A *n*

REMARKS Performs a line feed of *n*/4mm once only.
The value of *n* is 1 to 255.
Space setting for lines is not changed.

FUNCTION One time n/4 mm backfeed

CODE <ESC> "j" *n*

HEX 1B 6A *n*

REMARKS Feeds the paper back *n*/4mm once only.
The value of n is 1 to 255.
Space setting for one line is not changed.
This command can also feed the paper back to the page before the current page. In this case, the position of the line on the previous page is determined by the page length control.

FUNCTION One time n/8 mm feed

CODE <ESC> "I" *n*

HEX 1B 49 *n*

REMARKS Performs a line feed *n*/8mm once only.
The value of *n* is 1 to 255.
Space setting for lines is not changed.

FUNCTION Set vertical tab stops

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

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

REMARKS Cancels all current vertical tab stops and sets new vertical tab stops at lines *n1*, *n2*, etc., where *n1*, *n2*, etc. are numbers between 0 and 255. A maximum of 16 vertical tab stops can be set.
The tab stops must be specified in ascending order; any violation of ascending order terminates the tab stop list. Standard termination is by the <0> control code.
The vertical tab stops are set in terms of the current line spacing and do not move if the line spacing is changed later.
Invalid when start position detect is valid.

FUNCTION Set horizontal tab stops

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

HEX 1B 44 *n1* *n2* ... 00

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

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

Commands to Print Dot Graphics

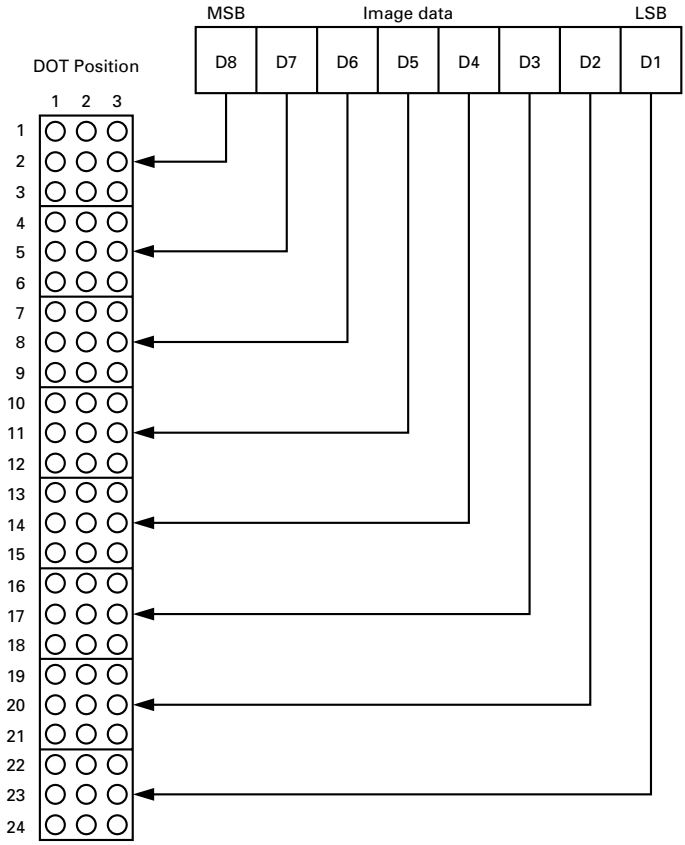
FUNCTION Print normal density graphics

CODE <ESC> "K" *n* <0> *m1* *m2* ...

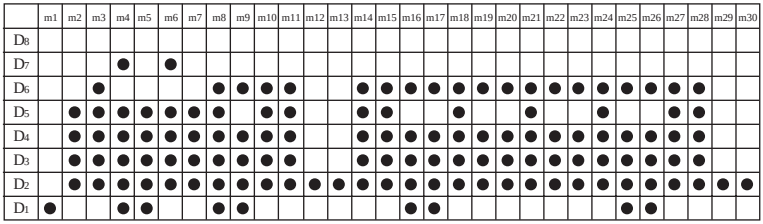
HEX 1B 4B *n* 00 *m1* *m2* ...

REMARKS Prints normal density dot graphics. The graphics image is 24 dots high and $n \times 3$ dots wide. Maximum width is 600 dots.
m1, *m2*, ... are the dot data, each a 1-byte value from 0 to 255 representing 24 vertical dots, with the most significant bit representing the top three and the least significant bit representing the bottom three.
The number of data bytes must be *n*.
Dots beyond the right margin are ignored.

Relationship between image data and print dots



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



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

Data	Binary	Hexa-decimal	Data	Binary	Hexa-decimal	Data	Binary	Hexa-decimal
m1	00000001	01	*m11*	00111110	3E	*m21*	00111110	3E
m2	00011110	1E	*m12*	00000010	02	*m22*	00101110	2E
m3	00111110	3E	*m13*	00000010	02	*m23*	00101110	2E
m4	01011111	5F	*m14*	00111110	3E	*m24*	00111110	3E
m5	00011111	1F	*m15*	00111110	3E	*m25*	00101111	2F
m6	01011110	5E	*m16*	00101111	2F	*m26*	00101111	2F
m7	00011110	1E	*m17*	00101111	2F	*m27*	00111110	3E
m8	00111111	3F	*m18*	00111110	3E	*m28*	00111110	3E
m9	00101111	2F	*m19*	00101110	2E	*m29*	00000010	02
m10	00111110	3E	*m20*	00101110	2E	*m30*	00000010	02

Printing Sample

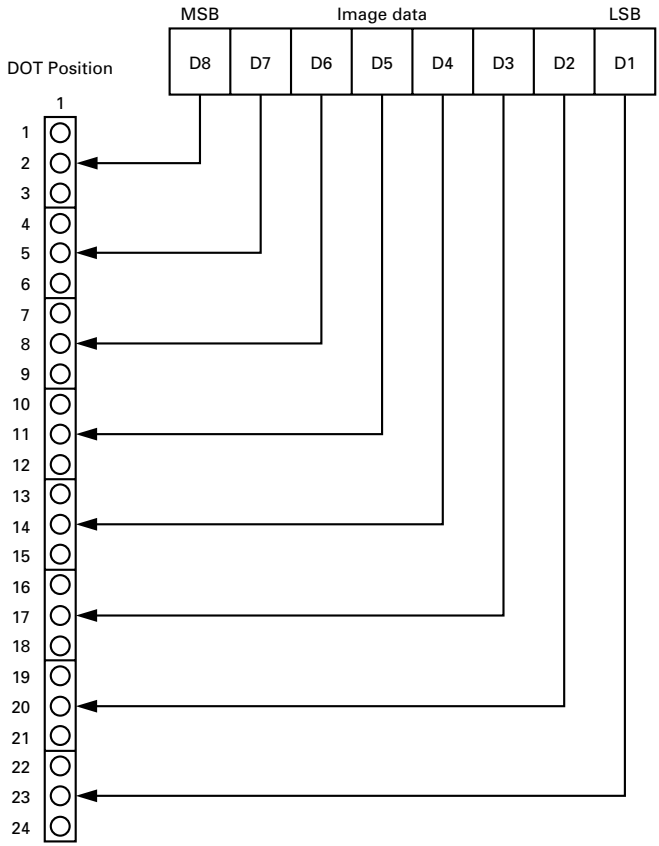
FUNCTION Print high density graphics

CODE <ESC> "L" *n1* *n2* *m1* *m2* ...

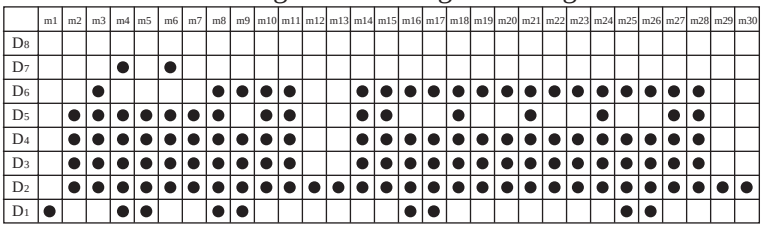
HEX 1B 4C *n1* *n2* *m1* *m2* ...

REMARKS Prints high density dot graphics. The graphics image is 24 dots high and $n1 + n2 \times 256$ dots wide. Maximum width is 600 dots. *m1*, *m2*, ... are the dot data, each a 1-byte value from 0 to 255 representing 24 vertical dots, with the most significant bit representing the top three and the least significant bit representing the bottom three.
The number of data bytes must be $n1 + n2 \times 256$.
Dots beyond the right margin are ignored.

Relationship between image data and print dots



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



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

Data	Binary	Hexa-decimal	Data	Binary	Hexa-decimal	Data	Binary	Hexa-decimal
m1	00000001	01	*m11*	00111110	3E	*m21*	00111110	3E
m2	00011110	1E	*m12*	00000010	02	*m22*	00101110	2E
m3	00111110	3E	*m13*	00000010	02	*m23*	00101110	2E
m4	01011111	5F	*m14*	00111110	3E	*m24*	00111110	3E
m5	00011111	1F	*m15*	00111110	3E	*m25*	00101111	2F
m6	01011110	5E	*m16*	00101111	2F	*m26*	00101111	2F
m7	00011110	1E	*m17*	00101111	2F	*m27*	00111110	3E
m8	00111111	3F	*m18*	00111110	3E	*m28*	00111110	3E
m9	00101111	2F	*m19*	00101110	2E	*m29*	00000010	02
m10	00111110	3E	*m20*	00101110	2E	*m30*	00000010	02

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

Printing Sample

FUNCTION Print fine density bit image

CODE <ESC> "k" *n* <0> *d1...dk* [k = *n* * 24]

HEX 1B 6B *n* 00 *d1...dk* [k = *n* * 24]

REMARKS Prints a bit image using 1 horizontal dot and 1 vertical dot for 1 dot of input data.

n is designated by the number of data bytes in the horizontal direction and n must be within the range 1 to 80.

The data is ignored if it is longer than 80 digits or goes beyond the right margin. Relationship between the input data and actual printing is shown below.

Relationship between image data and print dots

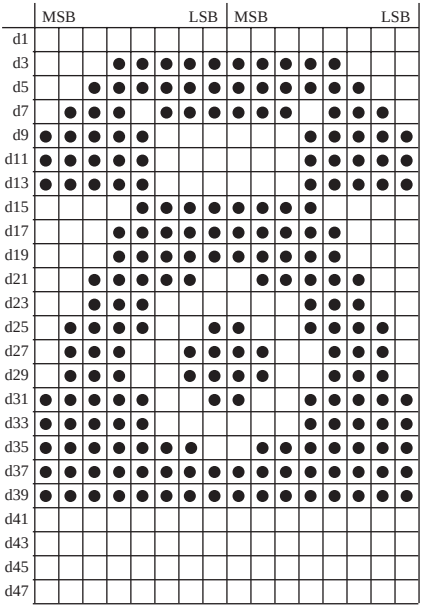
Image data

b7	b6	b5	b4	b3	b2	b1	b0

Dot position

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

EXAMPLE



Printing Sample

☎

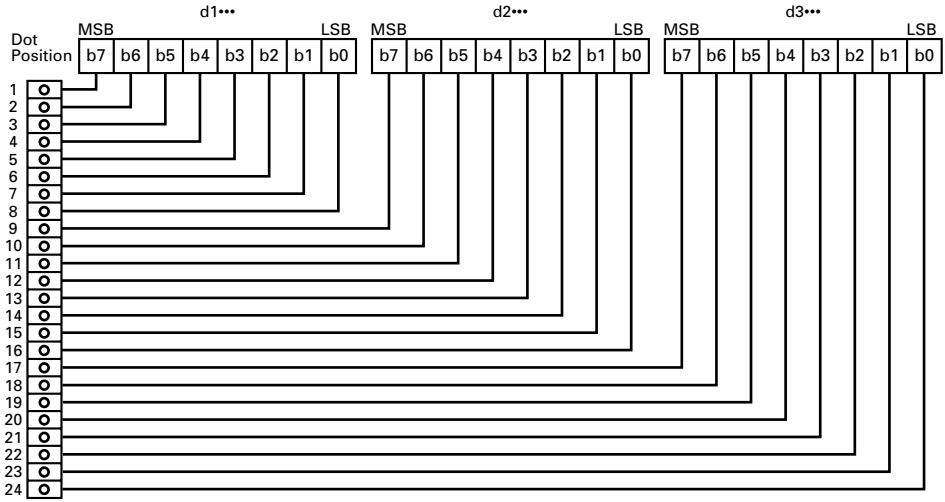
Data	Binary	Hexa-decimal	Data	Binary	Hexa-decimal
d1	00000000	00	d2	00000000	00
d3	00011111	1F	d4	11111000	F8
d5	00111111	3F	d6	11111100	FC
d7	01110111	77	d8	01110111	EE
d9	11111000	F8	d10	00011111	1F
d11	11111000	F8	d12	00011111	1F
d13	11111000	F8	d14	00011111	1F
d15	00001111	0F	d16	11110000	F0
d17	00011111	1F	d18	11111000	F8
d19	00011111	1F	d20	11111000	F8
d21	00111110	3E	d22	01111100	7C
d23	00111000	38	d24	00011100	1C
d25	011111001	79	d26	10011110	9E
d27	01110011	73	d28	11001110	CE
d29	01110011	73	d30	11001110	CE
d31	11111001	F9	d32	10011111	9F
d33	11111000	F8	d34	00011111	1F
d35	11111110	FE	d36	01111111	7F
d37	11111111	FF	d38	11111111	FF
d39	11111111	FF	d40	11111111	FF
d41	00000000	00	d42	00000000	00
d43	00000000	00	d44	00000000	00
d45	00000000	00	d46	00000000	00
d47	00000000	00	d48	00000000	00

FUNCTION Print fine density graphics

CODE <ESC> “X” *n*1 *n*2 d1...d [(n1+n2*256)*3]

HEX 1B 5 *n*1 *n*2 d1...d [(n1+n2*256)*3]

REMARKS Prints a bit image of the input data using horizontal and vertical resolutions of 8 dots/mm.
Data extending past the right margin is ignored.
The relationship between the input data and the actual printing is shown below.
$1 \leqq n1 + n2 \times 256 \leqq 600$



Commands to Print Download Characters

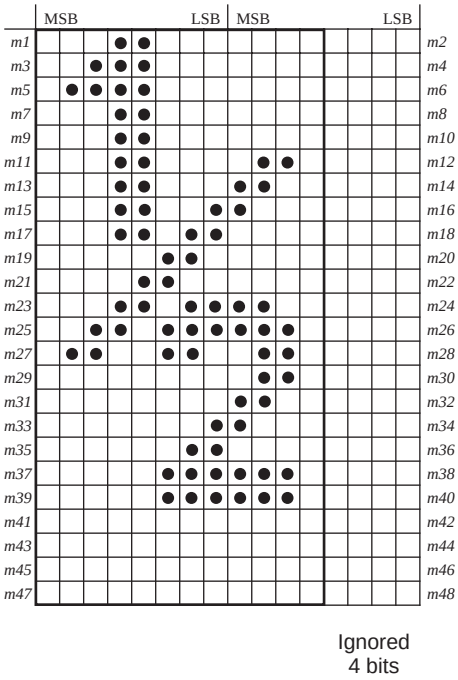
FUNCTION Define download character

CODE <ESC> “&” <1> <1> *n* *m1* *m2* ... *m48*

HEX 1B 26 01 01 *n* *m1* *m2* ... *m48*

REMARKS Defines one new character and stores it in RAM for later use.
n is the character code of the character defined and must be between 32 and 127.
The character matrix is 12 dots wide and 24 dots high.
Relationship between the character pattern and the character data is shown below.

EXAMPLE



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

FUNCTION Delete a download character

CODE <ESC> "&" <1> <0> *n*

HEX 1B 26 01 00 *n*

REMARKS Deletes the download character which was assigned the value *n*.

FUNCTION Enable download character set

CODE <ESC> "%" "1" or <ESC> "%" <1>

HEX 1B 25 31 or 1B 25 01

REMARKS Enables the download character set.

FUNCTION Disable download character set

CODE <ESC> "%" "0" or <ESC> "%" <0>

HEX 1B 25 30 or 1B 25 00

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

Commands to Control Peripheral Devices

FUNCTION Define drive pulse width for peripheral device #1

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

HEX 1B 07 *n1* *n2*

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

FUNCTION Control peripheral device #1

CODE <BEL>

HEX 07

REMARKS Executes drive pulse for peripheral device #1.

FUNCTION Control peripheral device #1 immediately

CODE <FS>

HEX 1C

REMARKS Executes drive pulse for peripheral device #1 immediately.

FUNCTION Control peripheral device #2 immediately

CODE <EM>

HEX 19

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

FUNCTION Control peripheral device #2 immediately

CODE <SUB>

HEX 1A

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

Commands to Control Auto Cutter

FUNCTION	Full-cut command to the auto cutter
CODE	<ESC> “d” “0” or <ESC> “d” <0>
HEX	1B 64 30 or 1B 64 00
CODE	<ESC> “d” “1” or <ESC> “d” <1>
HEX	1B 64 31 or 1B 64 01
REMARKS	Cuts the paper fully when start position detect is invalid. Feeds the paper to the top of the next page, then cuts it fully when start position detect is valid. When auto cutter is in valid, this command is not valid.

Other Commands

FUNCTION Cancel last line & Initialize printer

CODE <CAN>

HEX 18

REMARKS Clears the line buffer, and initializes the commands set already. Does not affect the select/de-select state in addressable mode and DC1/DC3 mode or the external equipment drive conditions set by the code <ESC> <BEL> *n1 n2*. (This is the same during a mechanical error.)
The data cleared by the CAN code in STX-ETX mode are the data between STX and ETX and the line buffer data, for which the command is not initialized.
(Line buffer means the print data expansion area.)

FUNCTION Deselect printer

CODE <DC3>

HEX 13

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

FUNCTION Set select mode

When using serial interface printer;

CODE <DC1> or <DC1> *n*

HEX (11)H or (11)H *n*

When using parallel interface printer

CODE <DC1>

HEX (11)H

REMARKS (1) When using serial interface printer;
This function differs depending on the setting of the DIP switch 4.
a) When the DC1, DC3 invalid mode is set (DIP switches 2-1 to 2-4 are all set to ON), the printer ignores this code.
b) In the DC1, DC3 valid mode (with DIP switches 4-1 to 4-4 set to OFF), when the printer receives a <DC1> code, the deselect mode is canceled and data following this code is input to the buffer.
c) If the printer receives a <DC1>*n* code (*n* is the DIP switch controlled address) during the addressable mode (with DIP switches 2-1 to 2-4 set other than settings a) and b) above,), the deselect mode is canceled and data following this code is input to the buffer.
Note that addressable mode is valid only when optional RS-422A interface is installed.

(2) When using parallel interface printer;
When the printer receives a <DC1> code, the deselect mode is canceled and data following this code is input to the buffer.

FUNCTION Beep the buzzer

CODE <RS>

HEX 1E

REMARKS Sounds a brief beep tone.

FUNCTION Set memory switch

CODE <ESC> "# N , n1n2n3n4" <LF> <NUL>

HEX 1B 23 N 2C n1n2n3n4 0A 00

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

N : Memory switch number (1 or 2)

n1n2n3n4 : Mode settings (For details see below)

1) Use N=1 to set printer conditions. Parameters are follows.

n1 : Sensor select
n2 : Start-position detect
n3 : Zero style
n4 : International character set

(Default)

Parammeter	Setting	0	1
n1	Sensor select	Reflective sensor (Black mark)	Transmissive sensor
n2	Start-position delect	OFF	ON
n3	Zero style	Normal zero	Slashed zero
n4	International character set		See below

n4	Country
0	USA
1	France
2	Germany

n4	Country
3	UK
4	Denmark #1
5	Sweden

n4	Country
6	Itary
7	Spain #1
8	Japan

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

n4	Country
C	Latin America

2) Use N=2 to set option-related settings. Parameters are as follows.

n1 : Always "0" (TSP400)
n2 : Cutter installed status
n3 : Always "0"
n4 : Printing speed

n	Setting	0	1
n2	Cutter	Invalid (TSP412)	Valid (TSP442)
n4	Printing speed	50 mm/sec (Default)	25 mm/sec

3) Use N=3 for folloing settings

n1 : Always “0”
n2 : Character table
n3 : Print column
n4 : Line feed, CR code

n	Setting	0	1	2	3
n2	Character table	Normal	IBM	Katakana	IBM
n3	Print colum	40	50	–	–
n4	Line feed (mm)	4	3	4	3
	CR code	Invalid	Invalid	Valid	Valid

EXAMPLE 1

LPRINT CHR$(&H1B);“#1,010A”;CHR$(&H0A); CHR$(&H00);

LPRINT CHR$(&H1B);“#2,0100”;CHR$(&H0A); CHR$(&H00);

LPRINT CHR$(&H1B);“?”;CHR$(&H0A); CHR$(&H00);

Sensor:	Reflective sensor
Start position detect:	ON
Zero style:	Normal Zero
International character set:	Denmark #2
Cutter:	Valid
Printing speed:	50 mm/sec

EXAMPLE 2

LPRINT CHR$(&H1B);“#1,1111”;CHR$(&H0A); CHR$(&H00);

LPRINT CHR$(&H1B);“?”;CHR$(&H0A); CHR$(&H00);

Sensor:	Transmissive sensor
Start position detect:	ON
Zero style:	Slashed zero
International character set:	France

EXAMPLE 3

LPRINT CHR$(&H1B);"#2,0001";CHR$(&H0A); CHR$(&H00);

LPRINT CHR$(&H1B);"?";CHR$(&H0A); CHR$(&H00);

Cutter:	Invalid
Printing speed:	25 mm/sec

Note: In order to enable the changed memory switch setting, turn the printer OFF and ON again or send the printer reset command (<ESC>"?") to the printer.

FUNCTION Initialize printer

CODE <ESC> "@"

HEX 1B 40

REMARKS Reinitializes the printer. Clears the print buffer and returns settings to their power-up values.
Does not clear the input buffer, downloaded characters, or conditions for peripheral devices.

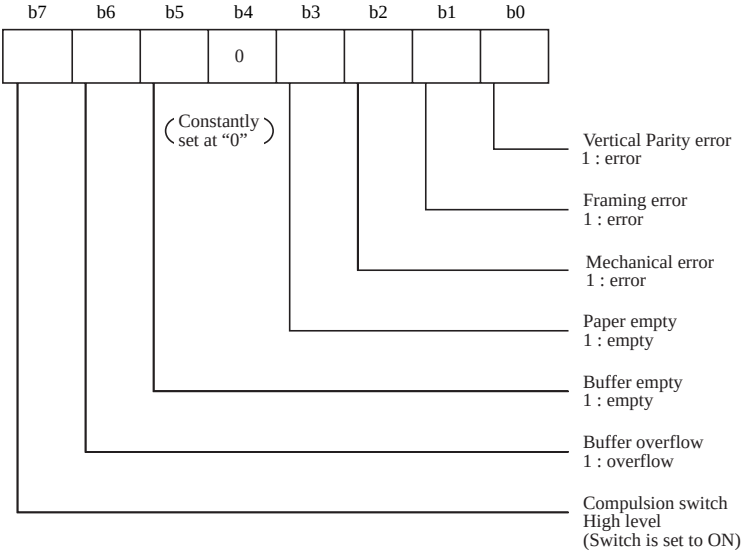
FUNCTION Enquiry

CODE <ENQ>

HEX 05

REMARKS Causes the printer to transmit a status byte (except in STX-ETX mode).
When this command is received after text data in STX-ETX mode, the printer transmits the status and check bytes.

Status byte



FUNCTION	Enter STX-ETX mode
CODE	<STX>
HEX	02
REMARKS	Causes the printer to select STX-ETX mode.

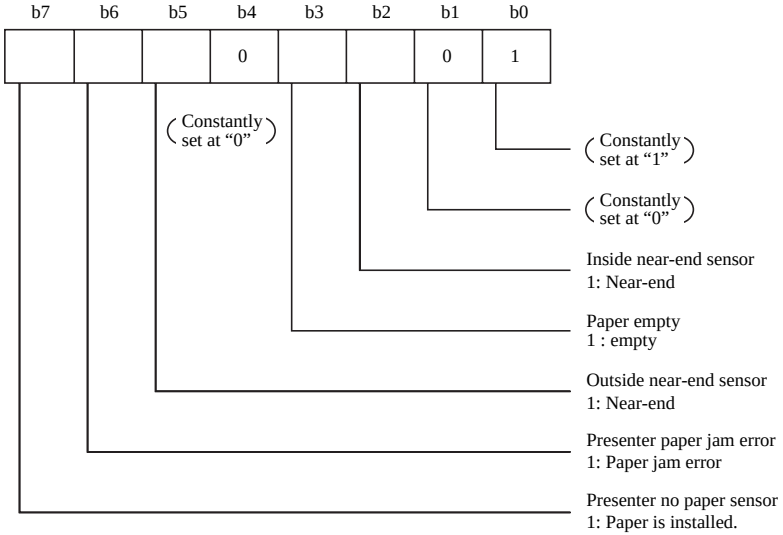
FUNCTION	Terminate STX-ETX mode
CODE	<ETX>
HEX	03
REMARKS	Terminates STX-ETX mode, and prints out the text data.

FUNCTION	Reset the printer hardware.
CODE	<ESC> "?" <LF><NUL>
HEX	1B 3F 0A 00
REMARKS	Resets the printer hardware.

TUP400 Only

FUNCTION	Request Status
CODE	<EOT>
HEX	04
REMARKS	Causes the printer to transmit a status byte.

Status byte



9. CHARACTER CODE TABLES

Character code table
Differs according to the memory switch settings.

Page Mode

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

Page Mode

(Character type: Small size or standard)

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

Page Mode

(Character type: Boldface)

Hexa-decimal	8	9	A	B	C	D	E	F
0	128	É 144	á 160	176	192	208	224	240
1	ü 129	æ 145	í 161	177	193	209	β 225	241
2	é 130	Æ 146	ó 162	178	194	210	226	242
3	131	147	ú 163	179	195	211	227	243
4	ä 132	ö 148	ñ 164	180	196	212	228	244
5	à 133	ò 149	Ñ 165	181	197	213	229	245
6	å 134	150	166	182	198	214	230	246
7	ç 135	ù 151	167	183	199	215	231	247
8	136	152	¿ 168	184	200	216	232	° 248
9	137	Ö 153	169	185	201	217	233	249
A	è 138	Ü 154	170	186	202	218	234	250
B	139	155	171	187	203	219	235	251
C	140	£ 156	172	188	204	220	236	252
D	ì 141	¥ 157	¡ 173	189	205	221	ϕ 237	253
E	Ä 142	Pt 158	174	190	206	222	238	254
F	Å 143	159	175	191	207	223	239	255

Page Mode

International Character Set

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

Line Mode

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

Line Mode

(Character table: Normal)

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

Line Mode

(Character table: katakana)

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

Line Mode

(Character table: IBM)

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

Line Mode

International Character Set

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

10. AUTOMATIC CUTTER

The TSP442 comes equipped with a swing-type automatic paper cutter.

① The cutter operates in response to data commands. To enable cutter operation, set Memory Switch #2 to indicate that the cutter is installed.

② NEVER place fingers or metal objects in the cutter area.

③ Be sure to completely remove any taped area from paper rolls before loading then. Residual adhesive can stick to the cutter area and cause problems.

④ If a jam occurs in the cutter area, switch off the power, use tweezers to remove the jammed paper, then switch the power back on. The printer will return the blade to the home position.

⑤ Never clean the cutter blade with alcohol or any other solvent, as this may remove the blade's lubrication and shorten the blade life.

11. PRESENTER'S MEMORY SWITCH SETTINGS

Memory switch 2
N=2
n1: Always 0
n2: Always 1
n3: Always 0
n4: Printing speed

0	50 mm/sec. (Default)
1	25 mm/sec.

Memory switch B
N=B
n1: Always 0
n2: Presenter

0	Not Installed (TUP452)
1	Installed (TUP482)

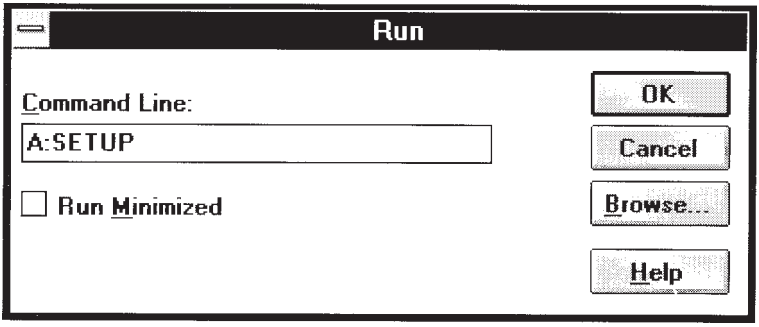
n3: Always 0
n4: Always 1

12. TSP LABEL

NOTE: It is recommended that Generic/Text Only driver should be used when TSPLABEL program is running.

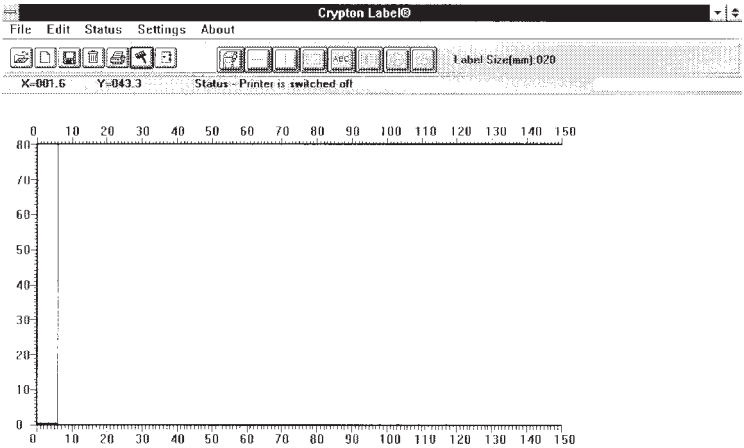
INSTALLATION

Go into Windows Program Manager and Press RUN. At the prompt type A:SETUP:



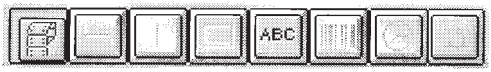
This will automatically place the program on your hard disk and pressing the

 icon will start the program.



TOOLS FOR CREATING A LABEL

The following tools are explained later in detail:



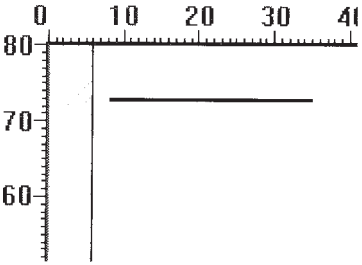
In addition to these tools, a printer-port status display indicates when the printer is ready to accept data: . Status - Printer is switched off .

 **Label Size:** Set the size of the new label from this icon.

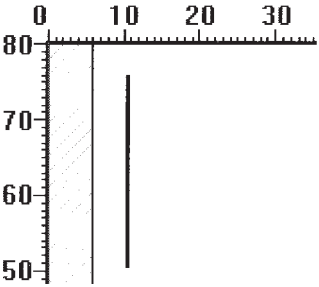
Choosing the appropriate icon will change its colour to red. When the Icon is selected and clicking the mouse on the label position will position the selected line on the label. While drawing the lines and boxes you are given the default line thickness. If you would like to change the thickness, use the **EDIT** menu described later.

Accurate size settings: The Windows Screen may show you the setting of 99.9. This program lets you adjust your size to the nearest 0.1mm. Tho do this go to the EDIT PAPER SIZE menu, de-select the High-Speed. Now you are able to move the size in a 0.1mm increment.
The Maximum Label size is 20cm. If you are using a low resolution monitor, the size may be reduced to 16cm.

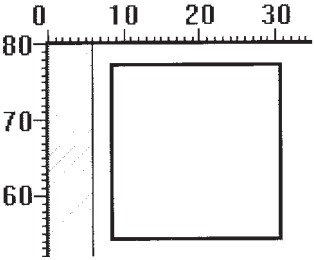
 **Draw Horizontal Lines:**
Click the mouse where you want the line to start. Keep the mouse button pressed while moving the mouse. The line is complete as soon as you release the mouse:



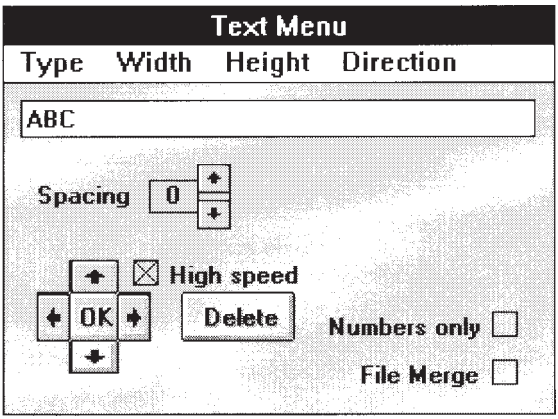
Draw Vertical Lines:



Draw Boxes: Click and move the mouse in the vertical and horizontal directions until the box is the size required.



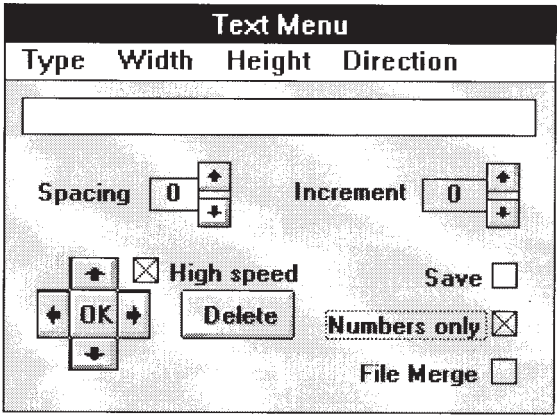
Entering Text: Operate the same procedure used for drawing of the lines above. Choose the 'ABC' icon and click the mouse where you want the text to appear. As soon as you choose the position the following screen appears:



You have three different kinds of text:

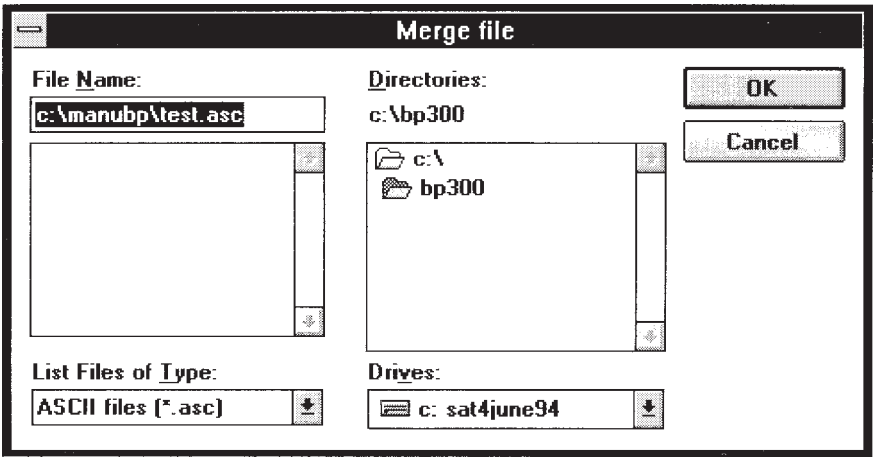
You can type in the Alpha-Numeric text in the window where the letters ABC are shown in the above sample.

You can choose to input only numbers by clicking on the Numbers only ☒ option. This will show two additional options:

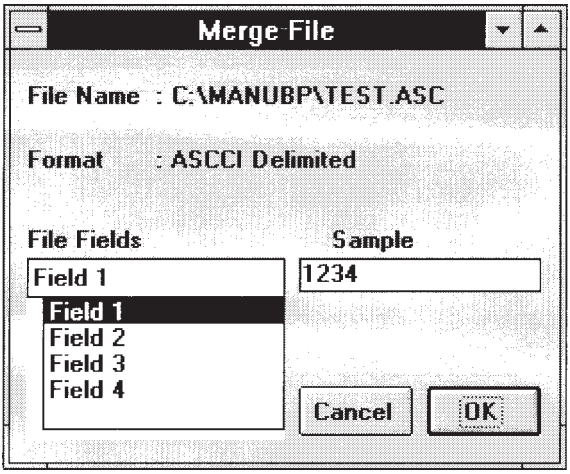


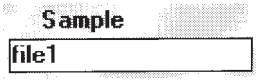
Increment 0 is used to increase the number printed with each label printed; an increment of 2 will print the number in steps of 2 that is 1,3,5,7,9 etc. Clicking the mouse on Save ☒ will store the last number printed on the label and next time you print the same label, the number will continue on the last number printed.

File Merge ☐ is a convenient way how to print labels using data comming from other programs, spreadsheets or databases. Clicking on File Merge, this program asks you to specify the file name and location of the file to be used for such input:



This program is using an intelligent way to select the data in the file you choose. The program reads the number of fields in the file and then prompts you to link the required field or column to the respective text on the label.



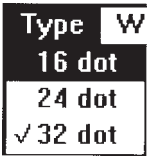


The shows a sample of the data contained in the field you selected so you can check it is correct.

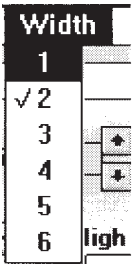
Character Styles

From the top sub-menu you can specify options which will enhance the readability of the labels:

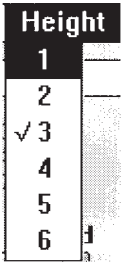
Type will change the boldness of the characters:



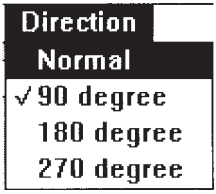
Width expands the character horizontally:



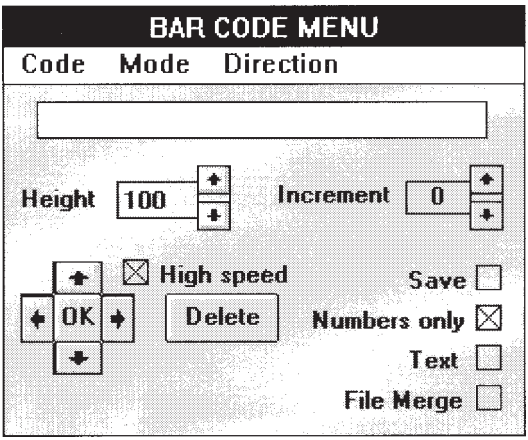
Height increases the point size:



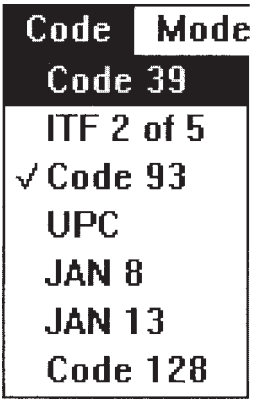
Direction allows you to change the orientation of the text.



Entering Bar Codes



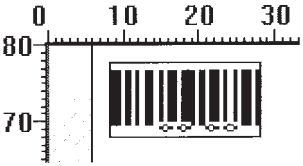
First you must specify the bar-code type required:



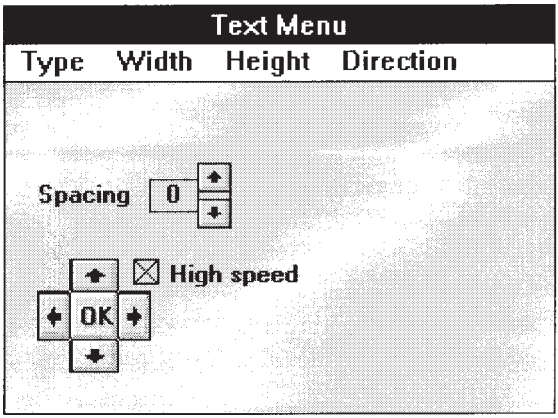
The available options will change in accordance to the bar-code type chosen.

The Height indicates the size of the bar code.

The Corresponding size is reflected on the screen:

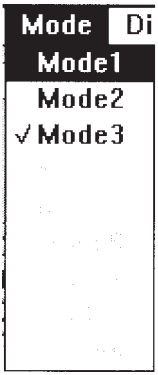


Choosing Text ☒ will print the human readable code below the bar code. This option leads you to another menu where you can position and alter the characteristics of the text.

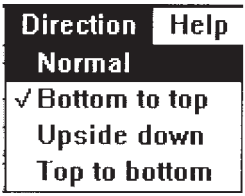


The **Spacing** refers to the distance between one character an another. Press OK when you are ready.

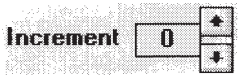
The **Mode** indicates the thickness of the bar code lines:



The **Direction** shows the direction of the bar code:



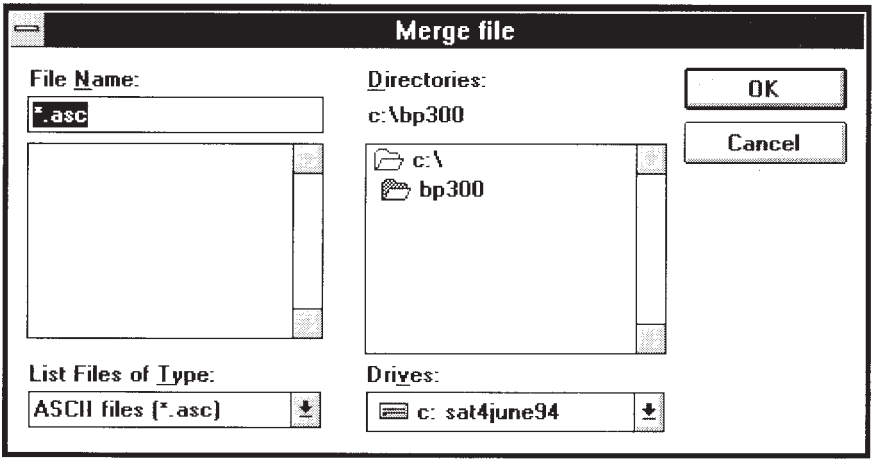
The Bar Code graphic presentation shows a red line. This indicates the top of the bar code so that when rotation is performed you can follow the direction on screen.

If the bar-code chosen is displays only numbers then the 

is displayed. On bar codes which normally print alpha-numeric character, you can choose the option to use numbers only. This give you the chance set the bar code number auto-incrementation. This is used to increase the bar-code number with each label printed. Example: an increment of 2 will add 2 to the number of the bar code with each label printed. Clicking the mouse on 

will store the last bar-code number printed on the label and the next time you print the same label, the bar-code number will continue from the last number printed.

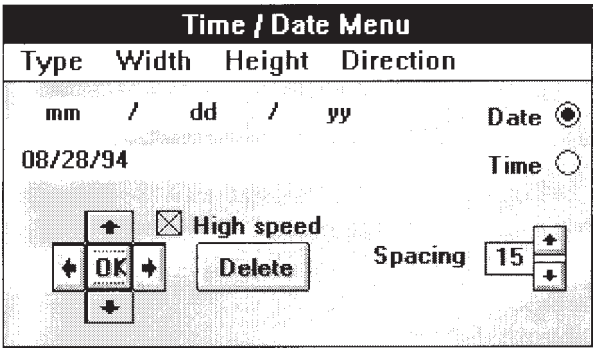
is a convenient way how to print labels using data comming from other programs, spreadsheets or databases. Clicking on **File Merge**, this program asks you to specify the file name and location of the file to be used for such input:



Before using this **File Merge** option it is recommended to double check that the data in the file being read corresponds to the bar-code type selected.

Time & Date function

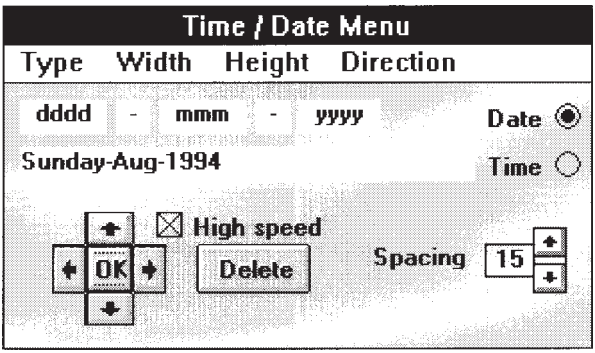
This prints the date and/or time automatically when you print labels. This is blocked at the time the printer starts to print. Check your computer time and date before printing such labels.



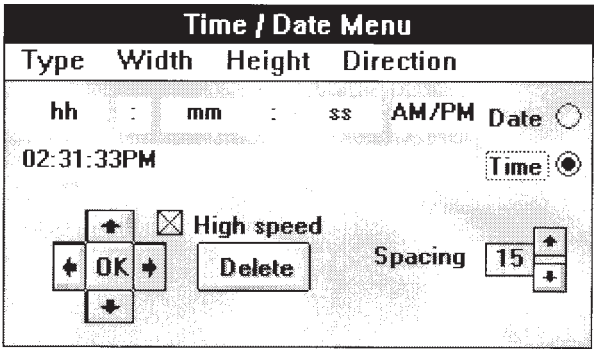
From the left side select **Date** or **Time**. If you want to print both, you can do one selection now and then do the other selection next to it later.

The options of **Time, Width, Height and Direction** are the same as used in the Text input option.

Clicking the mouse several times on the windows displaying **dddd - mmmm - 9999** lets you modify the presentation of the date or to display only a certain part like the year only.



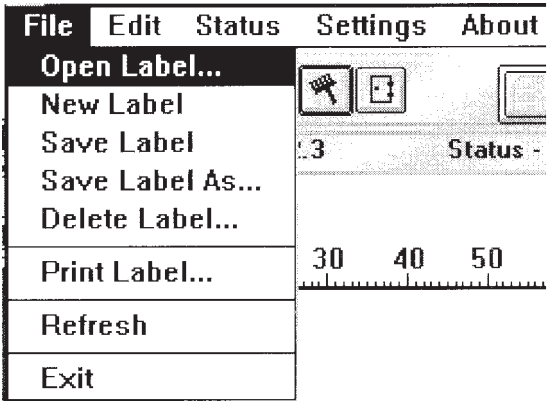
Selecting **Time** will give you options similar to the ones described above in the **Date** function.



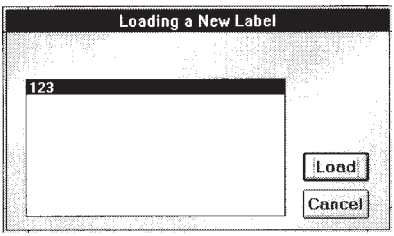
A new feature of Version 2 is the Forward date. By pressing the mouse on the 'up arrow' the date is advanced by the number of days inserted. This is used to insert expiry-dates.

A LOOK AT THE MENU

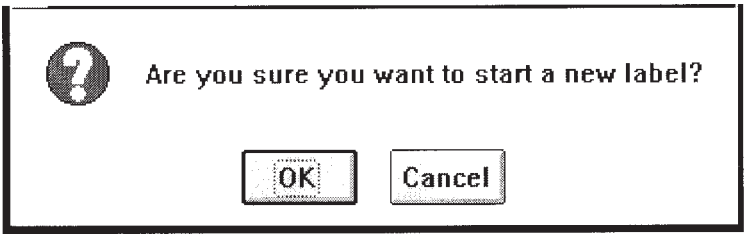
File



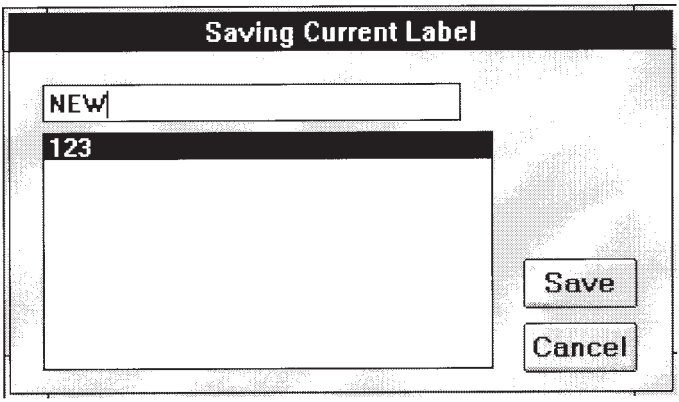
Open Label will enable you to call a label which was previously designed and saved. After 'Opening' you will be able to edit, print and save the new label.



New Label will discard the modifications done on screen and the user can start designing a new label.



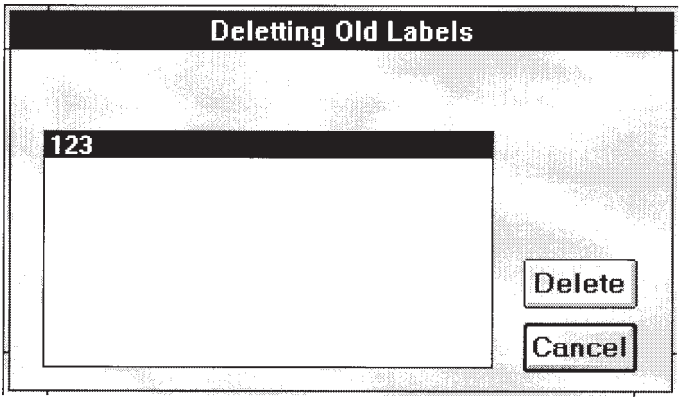
Save Label: after designing your label be sure to save your work before you exit. for later modification or printing.



The difference between **Save Label** and **Save Label As**. **Save Label** will save the label with the same name it had before you started to modify it. That means that if you have an old version of that label and you use **Save Label**, the old label will be overwritten by the new version.

Save Label As allows you to give a new name to the modified label before saving the work on your hard disk.

Delete Label will remove a label from the list of labels.



Import Label If you are using an old label program and wish to import this 'old' label to the new Version 2, choose this option.

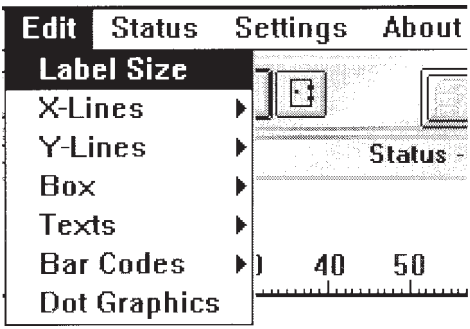
 **Print Label** will print the label already designed.

 **Refresh** will re-draw the screen to remove unwanted drafting signs which may be left during designing.

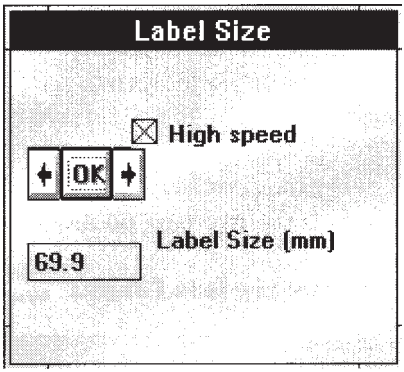
 **Exit** from the label program.

Edit Menu

allows you to change the various settings and sizes of items drawn on screen.

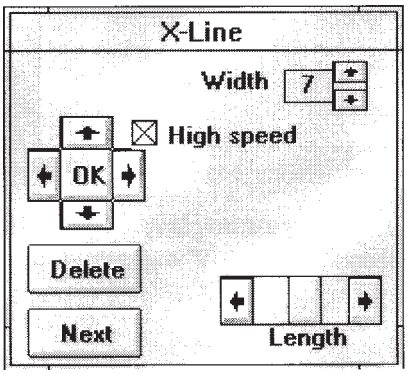


 **Label Size:** change the label size



The arrow signs  designate the move to the new size; High Speed will move the position faster.

X-Lines: change the Line Width, the length and position of the horizontal lines.



☒ High speed Removing the X from the High speed icon will move the line in smaller steps allowing a more accurate positioning.

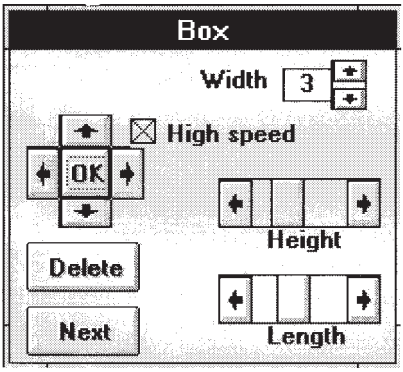
If there is more than one line drawn, the lines will be numbered. For easier operation the line being edited turns red (on most monitors).

Pressing the Next Mbutton will move the controls to the next line.

When ready press OK .
If you want to remove the line being edited press Delete button.

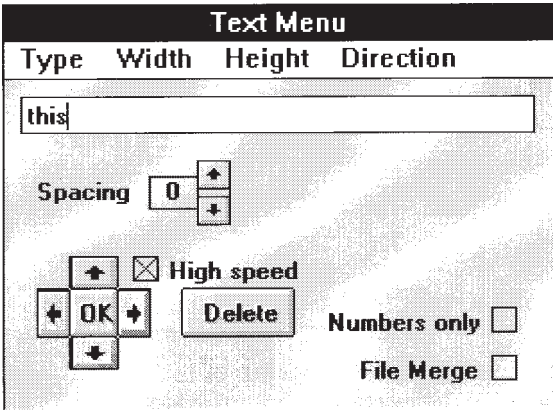
Y-Lines: change the Line Width, line length and position of the vertical lines used.

Boxes: Changing boxes is similar to line changes above.

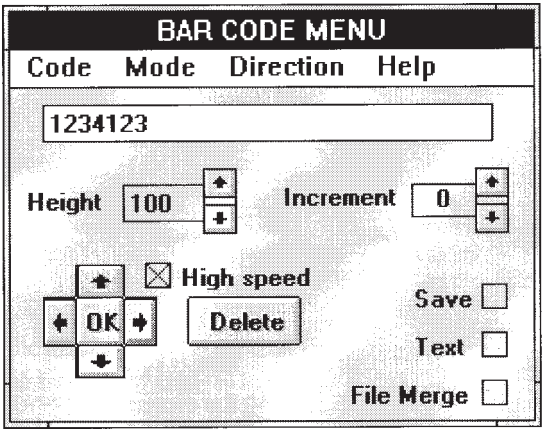


Edit Texts: You can also enter Text Editing by just clicking the mouse on the text you need to edit.

This will bring up the text menu with the text already written in the edit window:



Edit Bar-Codes: Likewise, to edit bar-codes you can click the mouse on the bar-code you need to change:



Edit Dot-Graphics calls the graphic editor.

Status

The maximum number of which can be used in any one label is the following:

X-Lines: 20

Y-Lines: 20

Boxes: 5

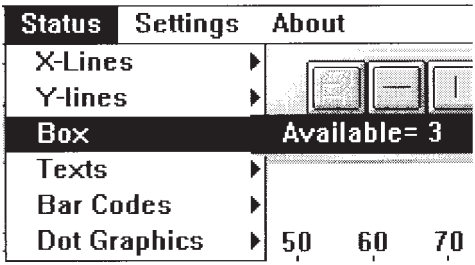
Texts: 90

Bar-Codes: 30

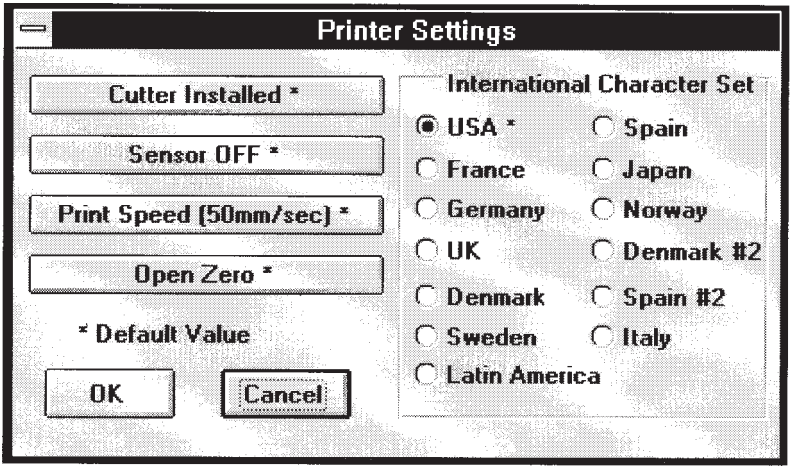
BMP Graphic files: 5

Pressing the Status and scrolling down, each item will display how many more you can use of that item.

Example: There are no boxes drawn so the Status of the Boxes is ‘3 Available’.



Printer Settings



Cutter : Specify if the paper cutter is installed or not.

Sensor : This must match the paper/labels you are using.

Cut Position : Detects the start position of the label.

Print Speed : you can choose high or slow printing speed.

Zero : you can choose to print the Zero with a slash through it.

Choosing the International Character Set is done from the right of the screen.

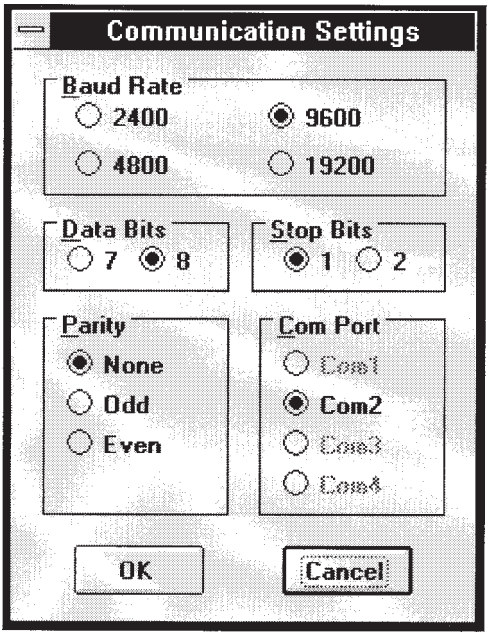
Settings

This software comes configured to be used with the computer parallel or serial ports.

Parellel Port:

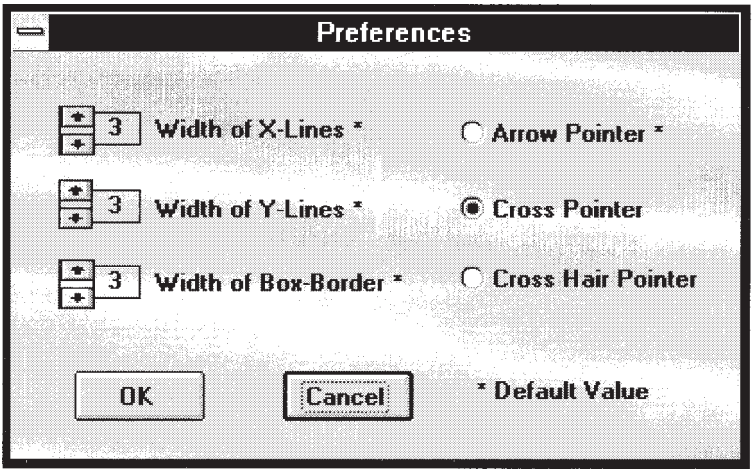
If you want to use the parallel port, setup the windows ‘GENERIC TEXT PRINTER’ Driver and set this as the default printer.

Serial Port:



The software checks automatically for the first available serial port but this can be over-ridden by the user by pressing the appropriate setting button .

Preferences



Default settings for the width of boxes, horizontal and vertical lines can be set through this option. After the lines are drawn the thickness and size can be modified through the EDIT menu.

This menu also give yout the option to choose between various shapes of the cursor. You can choose between the shapes of the Arrow, Cross or Hairline. Hairline gives you the best accuracy when you want to position objects in exact alignment with other objects across.

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