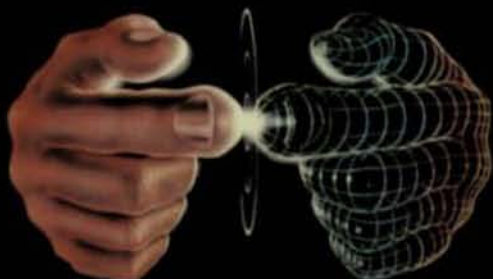


NEC

**PC-8023A-C Dot Matrix Printer
User's Manual**

**PC-8000 Series
Microcomputer System**



**Productivity
at your fingertips**

PC-8111AAM
PTS-052

PC-8023A-C

Dot Matrix Printer

User's Manual

NEC

NEC America, Inc.

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- reorient the receiving antenna
- relocate the computer with respect to the receiver
- move the computer away from the receiver
- plug the computer into a different outlet so that computer and receiver are on different branch circuits.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful:

"How to Identify and Resolve Radio-TV Interference Problems". This booklet is available from the US Government Printing Office, Washington, D.C., 20402, Stock No. 004-000-00345-4."

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- Reorient the receiving antenna.
- Relocate the computer with respect to the receiver.
- Move the computer away from the receiver.
- Plug the computer into a different outlet so that the computer and receiver are on different branch circuits.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. This document does not intend to provide technical support to the Federal Communications Commission (FCC). For more information contact the FCC, 47 CFR Part 15.209, and the FCC's website at <http://www.fcc.gov>. The FCC's website also has information on the FCC's enforcement of the rules. The FCC's website also has information on the FCC's enforcement of the rules. The FCC's website also has information on the FCC's enforcement of the rules.

TABLE OF CONTENTS

1.	OUTLINE	1
2.	CONFIGURATION	1
3.	SPECIFICATIONS	1
3.1	Printing Functions	1
3.2	Paper	3
3.3	Ribbon Cartridge for Exclusive Use in the PC-8023A-C	3
3.4	Paper Feeding Mechanism	4
3.5	Interface	4
3.6	Environmental and Electrical Requirements	4
3.7	Weight and External Dimensions	5
4.	EXTERNAL VIEW AND NAMES OF RESPECTIVE PARTS	6
5.	OPERATION	7
5.1	Power Switch and Control Panel	7
5.2	Switches	7
5.3	Indicators	8
5.4	Limit Switches	8

5.5	Paper Loading	9
5.6	Adjusting the Printing Position	13
5.7	Replacing the Ribbon Cartridge	13
6.	SELF-PRINTING MECHANISM	15
7.	INTERFACE CONNECTION	16
8.	HINTS ON CLEANING	16
9.	BASIC HINTS ON CORRECT USE	17
10.	CONTROL OF THE PC-8023A-C USING NBASIC	17
10.1	Changing the Font Type/Character Size	18
10.2	Dot Space (for Proportionally Spaced Printing Only)	18
10.3	Character Codes Selection	19
10.4	Character Enlargement	21
10.5	Character Enhancement (Not Applicable to Condensed Characters)	22
10.6	Changing the Line Spacing	22
10.7	Underline Printing	23
10.8	Horizontal Tabulation	23
10.9	Setting the Left Margin	25
10.10	Line Spacing for N Lines	26

10.11	Vertical Tabulation	26
10.12	Printer Select and Deselect Mode	30
10.13	Incremental Mode/Logical-Seeking Mode Selection	30
10.14	Changing the Line Feed Direction	31
10.15	Other Control Commands	31
11.	SETTING THE DIP SWITCHES	33
11.1	Changing the Character Set for Various Countries	33
11.2	Selecting the Number of Lines between TOFs	34
11.3	Processing DC1 and DC3	34
11.4	Selecting the Line Feed Function at Full-Characters Print in One Line	34
11.5	Selecting the Print Command Code (Valid in Logical-Seeking Mode Only)	35
11.6	Selecting the CR Function	35
11.7	Selecting the Zero-Indication Function	35
11.8	Selecting the Device Address	36
11.9	Setting the Device Address	36
11.10	Setting the Print Mode at Power-On Time	37

11.11	Selecting 7- or 8-Bit Data	37
11.12	Selecting Printer Select or Deselect Mode at Power-On Time	37
12.	DESCRIPTION OF FUNCTION CODES	38
13.	DESCRIPTION OF ESC CODES	45
14.	OTHER FUNCTIONS	52
14.1	Printing under Data-Buffer-Full Conditions	52
14.2	Override Function	52
15.	INTERFACE SPECIFICATIONS	53
15.1	Data Input Method	53
15.2	Control Signals	53
15.3	Data Input Codes	53
15.4	Input/Output Circuit Configuration	53
15.5	Connectors Used	54
15.6	Pin Assignments for the Connector	54
15.7	Input and Output Signals	55
15.8	Timing Chart	59
16.	PROPORTIONAL CHARACTERS	61
16.1	Dot Width between Proportional Characters	61

16.2	Proportional Character Coding Table . . .	62
17.	CODING TABLES	63
17.1	JA8 Coding Table	63
17.2	US, UK, GE, SW and JA7 Coding Tables	64
17.3	Additional Coding Table for Columns 2a to 5a	65
18.	EXAMPLES	66
18.1	Printer Test Program	66

1. OUTLINE

The PC-8023A-C is an impact-type high-speed serial dot matrix printer with a 7 (horizontal) × 9 (vertical) or 8 (horizontal) × 8 (vertical) dot matrix pattern for character formation.

The printing speed is 100 characters per second and the maximum number of characters per line is 136.

2. CONFIGURATION

· Printer		
· Attachment:	Ribbon cartridge	

3. SPECIFICATIONS

3.1 Printing Functions

(1) Printing methods:

Logical-seeking mode
Incremental mode

(2) Printing speed:

100 CPS (when printing ordinary characters)

(3) Character formation:

Horizontal		Vertical	
7	×	9	(Alphanumeric, Japanese phonetic characters "Katakana", symbols)
8	×	8	(Character-generator graphics)
8	×	8	(Dot-image graphics)

Character set:	ASCII	96 characters
	JIS	160 characters
	Character generator graphics	64 characters
	European characters	14 characters

(4) Printing sizes:

Ch/Line	Ch/Inch	Remarks
136	17	Condensed characters
68	8.5	Condensed enlarged characters
80	10	Pica-pitch characters
40	5	Pica-pitch enlarged characters
96	12	Elite-pitch characters
48	6	Elite-pitch, enlarged characters, proportionally spaced printing

(5) Printing direction:
Bidirectional

Note: When mixed printing in both the forward and reverse directions is to be performed, care must be exercised in loading the paper, since the paper may slip, causing improper printing while being fed by pin or by friction.

(6) Line spacing:
1/6", 1/8" or N/144" (N = 00 to 99)
(Minimum spacing: 1/144")

(7) Line feed rate:
100 ms max. (at 1/6"-line-feed)

3.2 Paper

- (1) Width:
10 inches max.
- (2) Thickness:
0.05 to 0.28 mm
- (3) Copies:
One original plus three copies
(Total thickness not to exceed 0.28 mm)
- (4) Kinds of paper:
Fanfold paper (See Fig. 1.)
Paper roll
Single sheet paper

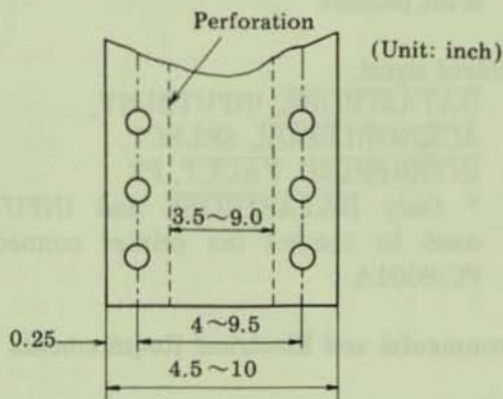


Fig. 1

3.3 Ribbon Cartridge for Exclusive Use in the PC-8023A-C

3.4 Paper Feeding Mechanism

- (1) Paper feeding method:
 - Friction feed
 - Sprocket feed
- (2) Paper supply direction:
 - From upper rear
- (3) Driving method:
 - Stepper motor

3.5 Interface

- (1) Data input method:
 - 8-bit parallel
- (2) Control signal:
 - DATASTROBE, INPUTBUSY,
 - ACKNOWLEDGE, SELECT,
 - INTERPRIME, FAULT, PE
 - * Only DATASTROBE and INPUTBUSY are used to control the printer connected to the PC-8001A.

3.6 Environmental and Electrical Requirements

- (1) Operating ambient temperature and humidity:
 - 5 to 40°C
 - 10 to 85% RH
- (2) Storage temperature and humidity:
 - 25 to +60°C
 - 0 to 90% RH
- (3) Supply voltage:
 - 115 V AC $\pm 10\%$, 60 Hz

- (4) Power consumption:
16 W when idle
180 W max. when operating

3.7 Weight and External Dimensions

- (1) Weight:
8.5 kg
- (2) Dimensions:
398 mm × 285 mm × 121 mm

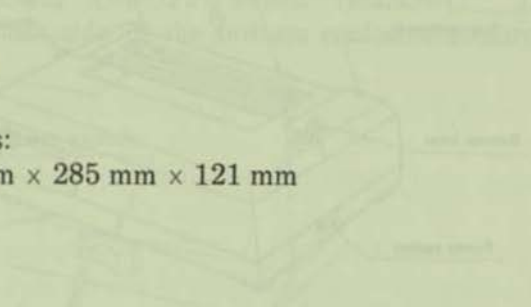


Fig. 2. External View

Fig. 3. External View



Fig. 4. View from A (External View)

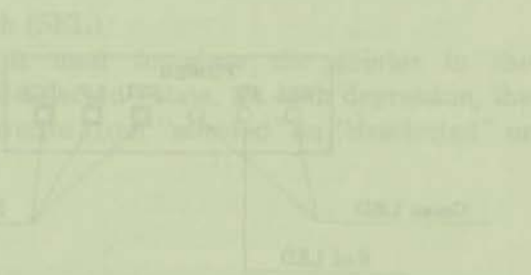


Fig. 5. External View

4. EXTERNAL VIEW AND NAMES OF RESPECTIVE PARTS

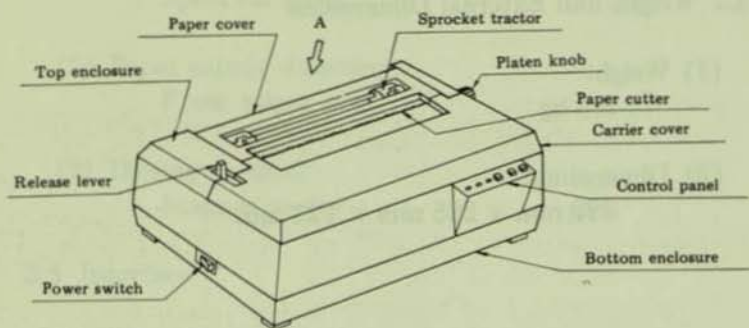


Fig. 2. External View

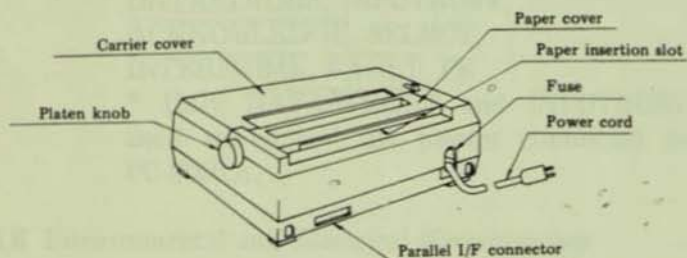


Fig. 3. View from A Direction (Rear)

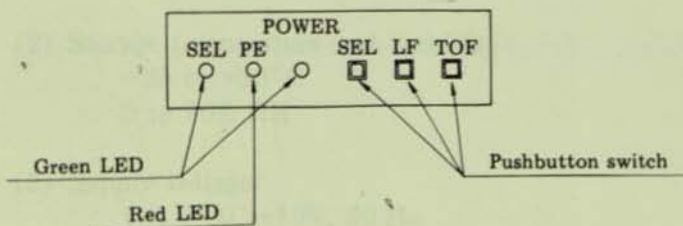


Fig. 4. Control Panel

5. OPERATION

5.1 Power Switch and Control Panel

(1) Power switch

Push the power ON/OFF switch (marked) located on the left side of the bottom enclosure to turn on the power.

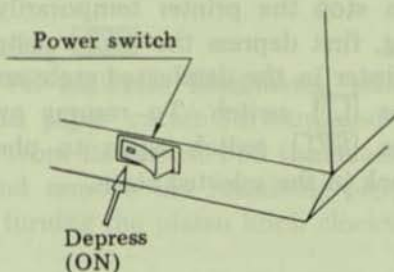


Fig. 5. Power Switch

(2) Control panel

The control panel is located in the right front section of the top cover. As shown in Fig. 4, the control panel consists of 3 pushbutton switches and 3 indicators (2 green LEDs and 1 red LED).

5.2 Switches

(1) Select switch (SEL)

This switch is used to place the printer in the "selected" or "deselected" state. At each depression, the printer mode reverses from "selected" to "deselected" or vice versa.

(2) Line feed switch (LF)

When the printer is in the deselected state, depression of this switch causes the printer to execute one line feed.

(3) Top of form switch (TOF)

When this switch is depressed with the printer in the deselected state, the paper advances to the TOF position.

Note: To stop the printer temporarily during printing, first depress the **[SEL]** switch to place the printer in the deselected state and then depress the **[LF]** switch. To resume printing, depress the **[SEL]** switch again to place the printer back in the selected state.

5.3 Indicators

(1) SEL indicator

This indicator is a green LED which is illuminated while the printer is in the selected state. When this indicator goes off, it indicates that the printer is in the deselected state.

(2) PE indicator

This indicator is a red LED which illuminates when the paper empty switch detects that the paper is nearly exhausted.

(3) POWER indicator

This indicator is a green LED which is illuminated while power is being supplied to the printer.

5.4 Limit Switches

(1) Paper empty switch (PE)

This is a micro-switch located at the paper outlet to detect the approaching end of the paper supply. When the PE switch is actuated, the PE indicator illuminates

and the printer is placed in the deselected state. In this state the printer performs neither data reception nor printing.

(2) Interlock switch

When the carrier cover is opened, the printer detects this fact and automatically enters the deselected state. To resume the printing operation, depress the select switch after closing the carrier cover.

5.5 Paper Loading

When the PE indicator illuminates, remove the paper cover, pull the paper cutter forward and pull the roller shaft forward from its center. Pull the release lever forward to its limit and remove the remaining paper by pulling it upward while turning the platen knob clockwise.

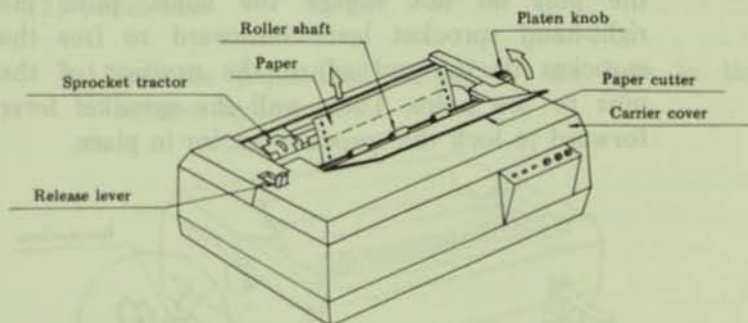


Fig. 6. Paper Unloading

Then, load the new paper by following the procedures described below.

(1) Fanfold paper:

Raise the paper holders located at each of the two sprocket tractors.

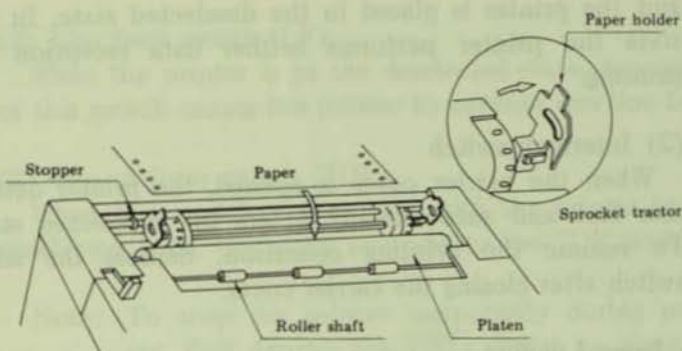


Fig. 7. Paper Loading-1

- (a) Push the release lever backward. Engage the paper feed holes at both the left and right margins of the paper on the sprocket pins at both ends. If the pins do not engage the holes, push the right-hand sprocket lever backward to free the sprocket tractor and adjust the position of the pins to the holes. Then, pull the sprocket lever forward to lock the sprocket tractor in place.

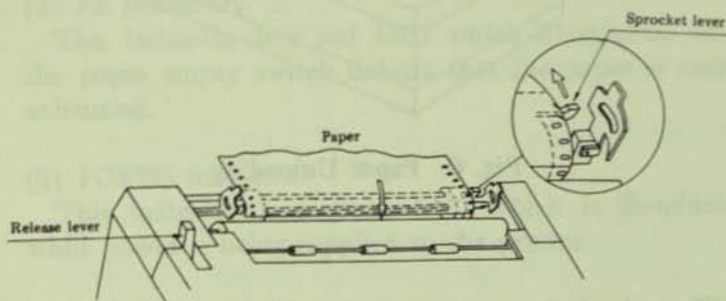


Fig. 8. Paper Loading-2

- (b) Lower the paper holder at each sprocket tractor and turn the platen knob clockwise. The inserted end of the paper will emerge in front of the platen while following the paper guide.

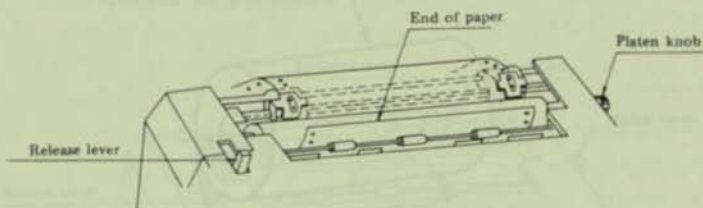


Fig. 9. Paper Loading-3

- (c) Return the roller shaft to the original position and set the release lever to the pin feed position.
- (2) Paper roll:

- (a) Set the paper roll holder to the hole in the bottom enclosure.

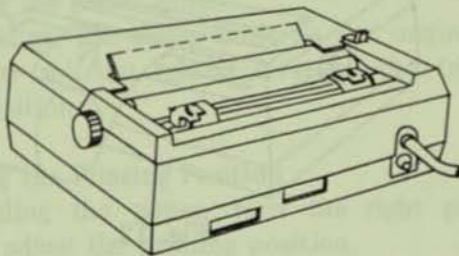


Fig. 10. Paper Roll Holder Hole

Note: The paper roll holder is optional.

- (b) Insert the roll shaft into the core hole of the paper roll and set the paper roll on the paper roll holder.

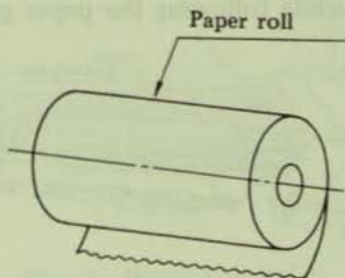


Fig. 11. Insertion of Roll Shaft

Note: Be sure to set the paper roll on the paper roll holder so that it unrolls from its underside as shown in Fig. 12.

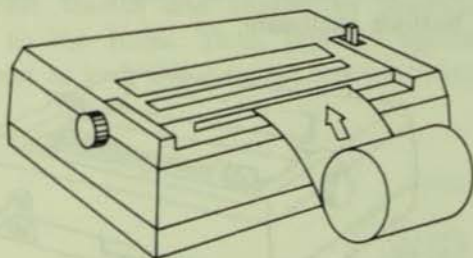


Fig. 12.

- (c) Raise the paper holders of the sprocket tractors and load the paper so that its edges align with the insides of the sprocket pins on both ends. When the paper cannot be loaded properly, push the sprocket lever backward to free the sprocket tractor and move the left sprocket tractor fully to the left stopper position and move the right

sprocket tractor transversely to align the two paper edges with the sprocket pins on both sides. After the proper position is obtained, pull the sprocket lever forward to lock the sprocket tractor in position.

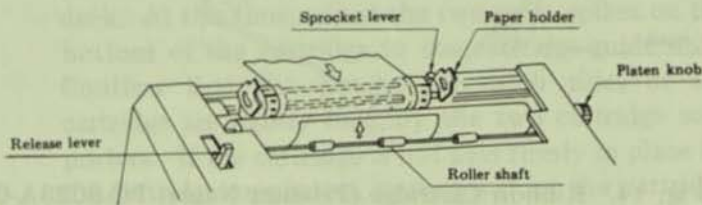


Fig. 13. Paper Roll Loading

- (d) Lower both the paper holders, insert the end of the paper roll along the sprocket pins and turn the platen knob clockwise. The end of the paper will emerge in front of the platen while following the paper guide.
- (e) Return the roller shaft to the original position and set the release lever to the friction feed position.

5.6 Adjusting the Printing Position

After loading the paper, turn the right platen knob clockwise to adjust the printing position.

5.7 Replacing the Ribbon Cartridge

When the printed characters become faint, turn over or replace the ribbon without delay. To replace the ribbon, exchange the ribbon cartridge shown in the following figure in the manner described below.

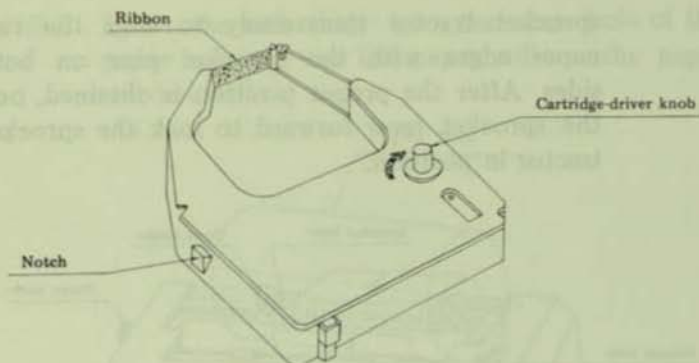


Fig. 14. Ribbon Cartridge (Product Name: PC-8023A-01)

- ① Turn the power off and remove the paper cover and carrier cover.

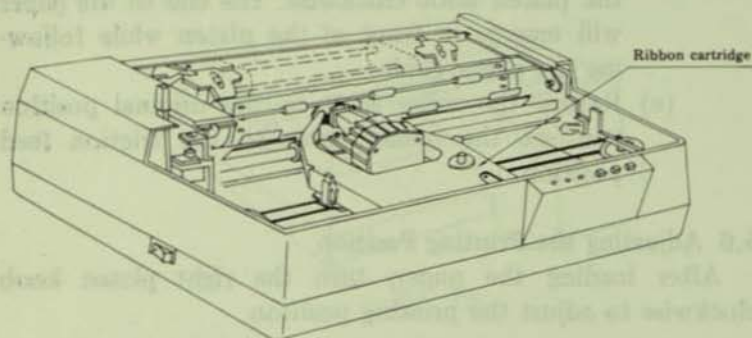


Fig. 15. Printer with Its Paper Cover and Carrier Cover Removed

- ② Move the print head to a position where there are no rollers of the roller shaft. Remove the old ribbon together with the cartridge, by widening the cartridge supporter with your fingers while raising the cassette.

- ③ To mount a new ribbon cartridge, first turn the knob of the cartridge driver on the cartridge in the direction of the arrow (clockwise) to tighten the ribbon. Next, insert the top of the ribbon between the ribbon guide plate and the ribbon guide of the printer and push the cartridge down onto the ribbon deck. At this time, adjust the two guide spikes on the bottom of the cartridge to the cartridge-guide hole. Confirm that the notches on both sides of the cartridge are tightly held by the two cartridge supporters. If the cartridge is not held firmly in place by the cartridge supporters, push down on the cartridge while turning the cartridge-driver knob clockwise.

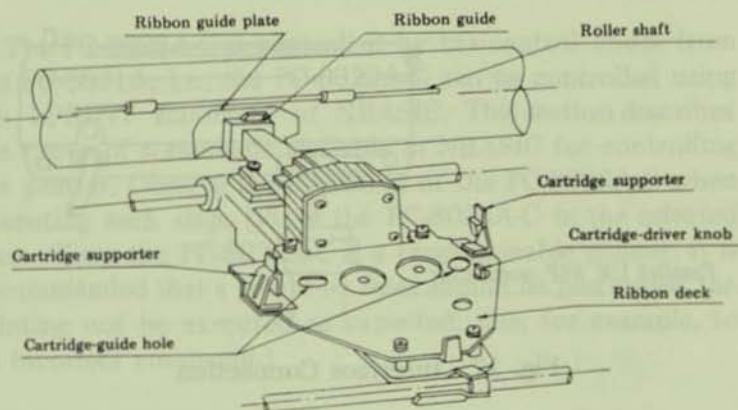


Fig. 16. Ribbon Deck before the Ribbon Cartridge is Mounted

- ④ Replace the paper cover and carrier cover.

6. SELF-PRINTING MECHANISM

The self-printing mechanism is provided so the basic printing functions and printer can be checked as a unit. The procedure for operating the self-printing mechanism is described below.

- (1) Turn the power switch on, then turn it off after confirming that the print head has returned to its home position on the left.
- (2) Load the paper.
- (3) Turn the power switch on while the TOF switch on the control panel is depressed.

The printer will then continue to print repeated cycles of the incorporated print pattern and line feeds.

To stop the self-printing function, turn the power switch off.

7. INTERFACE CONNECTION

The interface is connected as shown in Fig. 17.

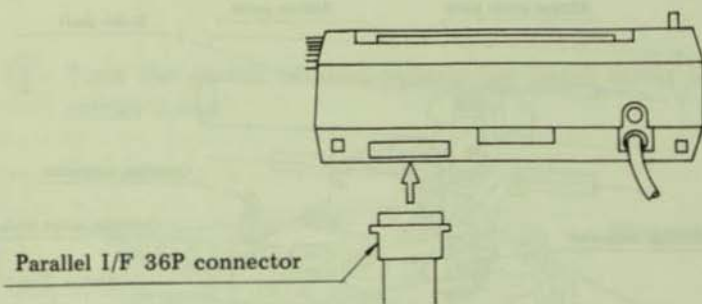


Fig. 17. Interface Connection

8. HINTS ON CLEANING

- (1) Since each unit has been factory adjusted and assembled under optional conditions, do not remove any parts other than the ribbon during cleaning.
- (2) Do not use detergents or solvents, such as benzine, to clean the mechanical portions.
- (3) Wipe the cover with a cloth moistened with water or slightly soapy water.

9. BASIC HINTS ON CORRECT USE

- (1) Do not print characters without using ribbon, otherwise, the head pins will be damaged.
- (2) Use the ribbon cartridge designed for exclusive use in the PC-8023A-C.
- (3) Replace the ribbon before it becomes threadbare from excessive use.
- (4) Use only the specified paper.
- (5) Care must be exercised to prevent foreign objects such as clips, pins, etc. from falling into the printer since they may cause problems.

10. CONTROL OF THE PC-8023A-C USING NBASIC

The PC-8023A-C is controlled by the control codes from the PC-8001A, i.e., the PC-8023A-C can be controlled using the LPRINT statement of NBASIC. This section describes the types of statements available in NBASIC for controlling the printer. Observe the operation of the PC-8023A-C when executing each step. (Place the PC-8023A-C in the selected state. Since the PC-8023A-C is a programmable printer, it is recommended that a power-on reset should be performed the printing not be executed as expected, due, for example, to an incorrect command.)

< Reference >

Since the statement LPRINT CHR\$(&HXX) is frequently used to send control codes to the printer via the PC-8001A, this statement may be entered beforehand in a function key for convenience in subsequent processing.

Example:

To enter "LPRINT CHR\$(&H1B);" in function key 1, perform the following: Input &H1B as decimal code 27 (due to the limitation on the number of characters that can be entered).

KEY1, "LPRINTCHR\$(27);"

It is also convenient if "CHR\$(&H)" is entered beforehand in KEY2.

10.1 Changing the Font Type/Character Size

- (1) Execute the following statement to change the font type to Pica (10 cpi).

```
LPRINT CHR$(&H1B);CHR$(&H4E);
```

When the printer is powered on, this mode is automatically selected.

- (2) Execute the following statement to change the font type to Elite (12 cpi). (In this mode, dot-image printing cannot be performed.)

```
LPRINT CHR$(&H1B);CHR$(&H45);
```

- (3) Execute the following statement to print condensed characters (17 cpi). (In this mode, enhanced-character printing and dot-image graphics printing cannot be performed.)

```
LPRINT CHR$(&H1B);CHR$(&H51);
```

- (4) Execute the following statement for proportionally spaced printing.

```
LPRINT CHR$(&H1B);CHR$(&H50);
```

10.2 Dot Space (for Proportionally Spaced Printing Only)

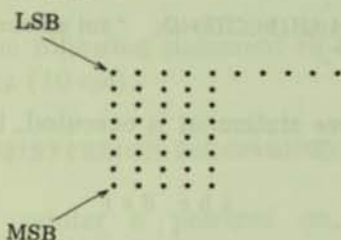
In the proportionally spaced printing mode, spaces can have lengths from 1 to 6 dots.

Execute the following statement for n-dot space printing.

Example:

```
100 LPRINT CHR$(&H1B);CHR$(&H53);"0010";  
110 LPRINT STRING$(5,&HFF);STRING$(5,&H1);
```

When the above statement is executed, the printer prints as follows:



Note: When graphic data x is to be transferred using the statement `LPRINT CHR$(x)` in the dot-image graphics printing mode, it is recommended that the data be sent using the following subroutine since other codes may be output under the code (&H9) of the NBASIC interpreter and since an automatic line feed occurs when more than a specified number of characters are sent.

```
100 'putchar  
110 OUT &H10,C: OUT &H40,0: OUT &H40,1  
120 A=INP(&H40)AND1: IF A=0 THEN RETURN ELSE 120
```

The above subroutine is called using the following statement:

```
C=X: GOSUB 100
```

(The value of x is output as a code.)

In addition, a subroutine defining the following USR function can also be used.

Loading machine code

```
100 ' loading machine code
110 POKE &HFF60,&HF5 ' PUSH AF
120 POKE &HFF61,&H7E ' LD A,(HL)
130 POKE &HFF62,&HCD ' CALL LPTCHR
140 POKE &HFF63,&H2B
150 POKE &HFF64,&H0
160 POKE &HFF65,&HF1 ' POP AF
170 POKE &HFF66,&HC9 ' RET
180 DEFUSR=&HFF60
```

Then, execute $A = \text{USR}(x\%)$ and the contents of $x\%$ will be sent to the PC-8023A-C as codes. (The factors used in the USR function must be integers.)

Example:

```
200 A=USR(&H41)
```

The code &H41("A") is sent to the PC-8023A-C.

```
300 FOR C%=0 TO 255
310 A=USR(C%)
320 NEXT C%
```

The codes 0 to 255 are sent to the PC-8023A-C.

10.4 Character Enlargement

- (1) Execute the following statement to print enlarged characters.

```
LPRINT CHR$(&HE);
```

- (2) Execute the following statement to clear the enlarged character mode.

LPRINT CHR#(&HF);

10.5 Character Enhancement (Not Applicable to Condensed Characters)

- (1) Execute the following statement to print enhanced characters.

LPRINT CHR#(&H1B);"!";

- (2) Execute the following statement to clear the enhanced character mode.

LPRINT CHR#(&H1B);CHR#(&H22);

(When the power is turned on, this mode is automatically selected.)

10.6 Changing the Line Spacing

- (1) Execute the following statement for line spacing of 1/6 inch.

LPRINT CHR#(&H1B);"A";

- (2) Execute the following statement for line spacing of 1/8 inch.

LPRINT CHR#(&H1B);"B";

- (3) Execute the following statement for line spacing of N/144 inch.

LPRINT CHR#(&H1B);"T";' n₁ n₀ ' ;

n₁ n₀ is a 2-digit decimal number representing N. 2/144" corresponds to a width equal to one dot.

Example:

```
LPRINT CHR*(&H1B);"T";"05";
```

The line spacing is set to 5/144" by this statement.

10.7 Underline Printing

- (1) Execute the following statement to start underlining.

```
LPRINT CHR*(&H1B);CHR*(&H58);
```

- (2) Execute the following statement to stop underlining.

```
LPRINT CHR*(&H1B);CHR*(&H59);
```

(When the power is turned on, this mode is automatically selected.)

Example:

```
100 LPRINT "This is ";  
110 LPRINT CHR*(&H1B);CHR*(&H58);  
120 LPRINT "underline";  
130 LPRINT CHR*(&H1B);CHR*(&H59);  
140 LPRINT ". This is not underline.";
```

When the above statements are executed, the printer prints the following.

This is underline. This is not underline.

10.8 Horizontal Tabulation

- (1) Execute the following statement to set the horizontal tab positions.

```
LPRINT CHR*(&H1B);CHR*(&H28);"  $\alpha$  ,  $\beta$  , ... ,  $\delta$  . " ;
```

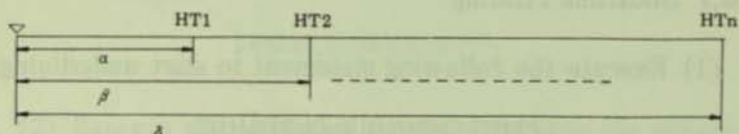
where

α β δ : 3-digit decimal numbers

,: Continuation code

:: Completion

HP (Head Position)



Note: The maximum number of horizontal tab positions allowed is 16. If an error occurs while setting the horizontal tab positions, all the horizontal tab positions set are cleared. This function is not in effect in the proportional printing mode.

- (2) Execute the following statement to partially clear the horizontal tab positions.
(Partial clear)

```
LPRINT CHR#(&H1B);CHR#(&H29);'α,β. ';
```

This statement clears the horizontal tabs set at the positions α and β , and all the other positions remain uncleared.

- (3) Execute the following statement to clear all horizontal tab positions.

```
LPRINT CHR#(&H1B);CHR#(&H32);
```

- (4) Execute the following subroutine to set the horizontal tabs (&H9) for the printer.

```
100 ' put Horizontal Tab code
110 OUT &H10,&H9: OUT &H40,0: OUT &H40,1
120 A=INP(&H40)AND1: IF A=0 THEN RETURN ELSE 120
```

(Since other codes are output, LPRINT CHR\$(&H9) cannot be used.)

Example:
Horizontal tab setting

```
LPRINT CHR$(&H1B);CHR$(&H28);"010,020,030,040,050.";
```

If the above statement is executed, horizontal tabs are set at the 10th, 20th, 30th, 40th and 50th positions.

```
LPRINT CHR$(&H1B);CHR$(&H29);"020,040.";
```

If this statement is executed, horizontal tabs at the 20th and 40th positions are cleared.

10.9 Setting the Left Margin

- (1) Execute the following statement to set the left margin.

```
LPRINT CHR$(&H1B);"L";' n2 n1 n0 ' ;
```

where n₂ n₁ n₀ is a 3-digit decimal number representing the width of the margin.

- (2) Execute the following statement to clear the left margin setting.

```
LPRINT CHR$(&H1B);"L000";
```

Note: In the proportional printing mode, the left margin set command cannot be used. Set the left margin when the printer is in a mode other than the proportional printing mode to make it effective.

10.10 Line Spacing for N Lines

Execute the following statement for a line spacing of "n" number of lines.

```
LPRINT CHR$( &H1F ); CHR$( &H10+n );
```

where $1 \leq n \leq 15$

10.11 Vertical Tabulation

The following section describes the Vertical Form Unit (VFU). This device has been designed to facilitate automatic feeding of a form for a predetermined number of lines before printing. In other words, the VFU provides a vertical tab function.

For the PC-8023A-C, the form length per page is considered to be 66 lines; the first line is called TOF (Top of Form Position) and the last line to be printed, BOTTOM. When the BOTTOM position is sensed while printing, the printer automatically feeds the form to the next TOF position. This function allows a bottom margin to be set. (The BOTTOM is set at only one position per page.)

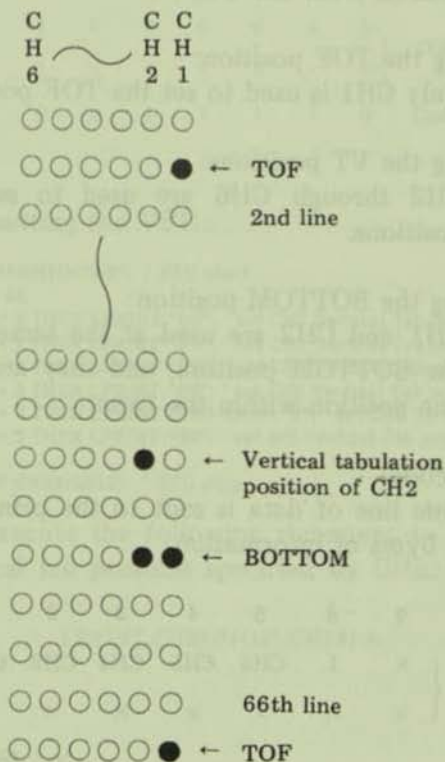
By setting the VFU, vertical tab positions can be set at arbitrary lines between the TOF and the BOTTOM. When the vertical tab code is sent from the PC-8001A, the form in the printer is automatically fed to the next vertical tab position. The VFU has a 6-channel memory in which 6 vertical tab positions (including the TOF) can be stored. CH1 is used for the TOF position and both CH1 and CH2 for the BOTTOM position. In CH2, vertical tabs are set at 6-line intervals for the initial values when the power is turned on. Therefore, when the VT code (&HB) is transferred from the PC-8001A to the printer, the form is

fed to the vertical tab positions set by CH2. If the FF code (&HC) is sent from the PC-8001A to the printer, the form is fed to the vertical tab position set by CH1, i.e., the TOF position. Users can freely set their own vertical tab positions between CH2 and CH6. To perform the vertical tab function for CHn, execute the following statement.

```
LPRINT CHR$(&H1F);CHR$(n);
```

where $1 \leq n \leq 6$

The VFU can be considered to be a continuous 6-level tape of 66 lines if viewed graphically. (See figure below.)



The following is a summary of the VFU.

VFU

- (1) Max. form length (between TOFs):
66 lines
- (2) Initialization format:
When the VFU is not set externally, it is automatically set as follows.
*Form length: 66 lines
*Tab position: Set in CH2 at every 6-line interval from the TOF.
- (3) Setting the TOF position:
Only CH1 is used to set the TOF position.
- (4) Setting the VT positions:
CH2 through CH6 are used to set other VT positions.
- (5) Setting the BOTTOM position:
CH1 and CH2 are used at the same time to set the BOTTOM position, and they are set to only one position within the form.
- (6) Data code:
One line of data is sent to the printer for these 2 bytes of information.

Bit	7	6	5	4	3	2	1	0	
2-byte data	{	×	1	CH6	CH5	CH4	CH3	CH2	CH1
	{	×	×	×	×	×	×	×	×

× : Irrelevant

(7) The following codes must be input to the printer to set the VFU.

Bit	7	6	5	4	3	2	1	0	
No. of lines	0	0	0	1	1	1	0	1	Code GS (start)&H1D
1	x	1	0	0	0	0	0	1	TOF
	x	1	x	x	x	x	x	x	
2	x	1	0	0	0	0	0	0	User can freely set these codes.
	x	1	x	x	x	x	x	x	
6 7	x	1	0	0	0	0	0	1	TOF
(1)	x	1	x	x	x	x	x	x	
	0	0	0	1	1	1	1	0	Code RS (stop)&H1E

Example setting the VFU:

```

100 LPRINT CHR$(&H1D);"AQ"; ' VFU start
110 FOR L=2 TO 66
120 IF L MOD 6 = 0 THEN LPRINT "B@"; ' set CH2 Vertical Tab position
130 IF L MOD 6 = 1 THEN LPRINT "D@"; ' set CH3 Vertical Tab position
140 IF L MOD 6 = 2 THEN LPRINT "H@"; ' set CH4 Vertical Tab position
150 IF L MOD 6 = 3 THEN LPRINT "P@"; ' set CH5 Vertical Tab position
160 IF L MOD 6 = 4 THEN LPRINT CHR$(&H60);"Q"; ' set CH6 Vertical Tab position
170 IF L MOD 6 = 5 THEN LPRINT "Q@"; ' set NO Vertical Tab position
180 NEXT L
190 LPRINT "AQ";CHR$(&H1E); ' VFU stop
    
```

Then, execute the following statement to line feed up to the vertical tab position specified by CHn. ($1 \leq n \leq 6$)

```
LPRINT CHR$(&H1F);CHR$(n);
```

<Reference>

To output an ordinary program listing, the operation mode can be defined using the following program which provides proportionally spaced printing, a 10-character left margin and automatic page ejection at every 60 lines.

```
100 LPRINT CHR$(27);"L";"010";CHR$(&H1B);CHR$(&H50);
110 LPRINT CHR$(&H1D);"A";
120 FOR N=1 TO 117
130 LPRINT "@";
140 NEXT
150 LPRINT "C@@@@@@@@@@@@@A@";
160 LPRINT CHR$(&H1E)
170 LPRINT CHR$(&HB)
180 END
```

10.12 Printer Select and Deselect Mode

- (1) Printer select (The printer becomes on-line.)

Execute the following statement to place the printer on-line with the PC-8001A.

```
OUT &H10,&H11: OUT &H40,0: OUT &H40,1
```

- (2) Printer deselect (The printer becomes off-line.)

Execute the following statement to place the printer off-line with the PC-8001A.

```
OUT &H10,&H13: OUT &H40,0: OUT &H40,1
```

10.13 Incremental Mode/Logical-Seeking Mode Selection

- (1) Execute the following statement to place the printer in the incremental mode.

```
LPRINT CHR$(&H1B);CHR$(&H5B);
```

(This is valid only when the printer is in the same condition as its initialized state when the power is turned on.)

- (2) Execute the following statement to place the printer in the logical-seeking mode.

```
LPRINT CHR$( &H1B ); CHR$( &H5D );
```

(When the power is turned on, this mode is automatically selected.)

10.14 Changing the Line Feed Direction

- (1) Execute the following statement to have the line feed occurring in the forward direction.

```
LPRINT CHR$( &H1B ); " f ";
```

(When the power is turned on, this mode is automatically selected.)

- (2) Execute the following statement to have the line feed occurring in the reverse direction.

```
LPRINT CHR$( &H1B ); " r ";
```

10.15 Other Control Commands

- (1) Execute the following statement to backspace the carriage by one character in the incremental mode.

```
LPRINT CHR$( &H8 );
```

- (2) Execute the following statement to cancel the data transferred in the logical-seeking mode.

```
LPRINT CHR$( &H18 );
```

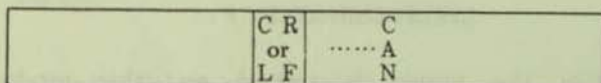

Example:

```
100 LPRINT "ABC";  
110 LPRINT CHR$(8H10);  
120 LPRINT "TEXT"
```

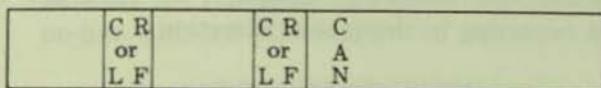
When the above statements are executed, datum "ABC" is cancelled and only "TEXT" is printed.

Note: If the cancel code is output after the codes to be printed have been output, the subject line will not be cancelled.

Example:



← Cancels up to this position.



↑ This part is not cancelled even if the cancel code is output.

11. SETTING THE DIP SWITCHES

The PC-8023A-C is capable of operating under the following specifications which can be selected by manipulating the two DIP switches located within the carrier cover. These switches are called SW2 and SW1 viewed from the front.

11.1 Changing the Character Set for Various Countries

Since character requirements will differ depending on the country to where the printer is being shipped, the character set may be changed by choosing the appropriate DIP-switch settings.

Country	SW1-1	SW1-2	SW1-3
JA	X	X	X
US	X	O	X
UK	O	O	X
GE	X	X	O
SW	O	X	O

(ST)

(ST): Factory-set to these positions.

SW: Indicates DIP switch number.

x: OFF (OPEN)

O: ON

(Combinations of switch positions other than those listed will result in the SW specification.)

11.2 Selecting the Number of Lines between TOFs

No. of Lines between TOFs	SW1-4	(ST)
66	X	
72	○	

(ST): Factory-set to this position.

11.3 Processing DC1 and DC3

Processing	SW1-5	(ST)
Invalid	○	
Valid	X	

(ST): Factory-set to this position.

11.4 Selecting the Line Feed Function at Full-Characters Print in One Line

Function	SW1-6	(ST)
With LF	○	
Without LF	X	

(ST): Factory-set to this position.

11.5 Selecting the Print Command Code (Valid in Logical-Seeking Mode Only)

Command code	SW1-7	
CR only	X	(ST)
CR, LF, VT and FF	O	

(ST): Factory-set to this position.

11.6 Selecting the CR Function

Function	SW1-8	
CR	X	(ST)
CR+LF	O	

(ST): Factory-set to this position.

11.7 Selecting the Zero-Indication Function

Indication	SW2-1	
0	X	
ϕ	O	(ST)

(ST): Factory-set to this position.

11.8 Selecting the Device Address

Condition	SW2-2	
Valid	○	
Invalid	×	(ST)

(ST): Factory-set to this position.

11.9 Setting the Device Address

Device No.	SW2-3	SW2-4	
0	×	×	(ST)
1	○	×	
2	×	○	
3	○	○	

(ST): Factory-set to this position.

When the device address is valid and the device address is n ($0 \leq n \leq 3$), the desired printer can be selected using the following NBASIC statement.

```
LPRINT CHR$( &H1B ); CHR$( &H61 + n );
```

(Note that the printer must be in on-line mode.) To release the device from the selected state, execute the following NBASIC statement.

```
100 LPRINT CHR$( &H1B );  
110 OUT &H10, &H60: OUT &H40, 0: OUT &H40, 1
```

11.10 Setting the Print Mode at Power-On Time

Mode	SW2-5
Proportional	○
Pica	×

(ST)

(ST): Factory-set to this position.

11.11 Selecting 7- or 8-Bit Data

Data	SW2-6
8 bits	×
7 bits	○

(ST)

(ST): Factory-set to this position.

11.12 Selecting Printer Select or Deselect Mode at Power-On Time

Mode	SW2-7
Select	○
Deselect	×

(ST)

(ST): Factory-set to this position.

12. DESCRIPTION OF FUNCTION CODES

(1) CR (0D)H

- (a) This is the print command code.
- (b) The line feed function after the printing can be selected by DIP switch (SW1-8).
- (c) In the incremental mode, this code functions as the carriage return (CR) command code. It also functions as the CR command code in the logical-seeking mode without print data.

(2) LF (0A)H

- (a) This is the line feed command code.
- (b) In the logical-seeking mode, it also functions as the print command when the DIP switch (SW1-7) is set to the "ON" position.
- (c) In the FORWARD/REVERSE mode, a FORWARD/REVERSE line feed is performed.
- (d) When the BOTTOM position is set in the VFU, the line feed is automatically performed up to the next TOF after the BOTTOM position is reached in the FORWARD mode. (In the REVERSE mode, the paper feeding in the reverse direction is performed to the BOTTOM position when the paper has reached the BOTTOM area.)

(3) VT (0B)H

- (a) This is the multi-line feed command code which provides an automatic line feed up to the vertical tab position set in channel 2 of the VFU.
- (b) In the logical-seeking mode, it also functions as the print command when the DIP switch (SW1-7) is set to the "ON" position.
- (c) When no tab position is set in channel 2, the automatic line feed is performed up to the next TOF position.

- (d) The abovementioned functions also apply in the REVERSE mode.
- (4) FF (0C)H
- (a) This is the multi-line feed command code, which provides an automatic line feed up to the TOF position set in channel 1 of the VFU. (The line feed will not stop at the BOTTOM position set in the VFU.)
 - (b) In the logical-seeking mode, it also functions as the print command when the DIP switch (SW1-7) is set to the "ON" position.
 - (c) The abovementioned functions also apply in the REVERSE mode.
- (5) CAN (18)H
- (a) This is the cancel code which cancels the line of print data received before receiving this code. (In the incremental mode, this code is ignored.)
 - (b) All the control codes received before receiving this code are valid and the printer mode is changed to the last mode received before receiving the CAN code.
- (6) SO (0E)H
- (a) This is the enlarged character command code.
 - (b) The enlarged character command will not be cleared until an SI code is received after an SO code is received.
 - (c) In the JA 7-bit mode (SW1-1 to 3: OFF, SW2-6: ON), it also functions as a code to select the katakana character set.
- (7) SI (0F)H
- (a) This is the enlarged character command clear code.

- (b) In the JA 7-bit mode, it functions as a code to cancel the selected katakana character set (and selects alphanumeric character/symbol set.)
- (8) DC1 (22)H
- (a) This is the printer select command code.
 - (b) By changing the position of the DIP switches (SW1-5: ON), this code may be ignored.
- (9) DC3 (13)H
- (a) This is the printer deselect command code.
 - (b) By changing the position of the DIP switches (SW1-5: ON), this code may be ignored.
- (10) BS (08)H
- (a) This is a command code to backspace the carriage by one character.
 - (b) This code is ignored when the carriage is at the home position.
 - (c) This code is valid only in the incremental mode.
- (11) HT (09)H
- (a) When this code is received, the carriage moves to the nearest horizontal tab position already set.
 - (b) If there is no horizontal tab position set, this code is ignored.
- (12) DC2 (12)H
- (a) This is the enlarged character command code in the JA7-bit mode.
 - (b) The enlarged character command will not be cleared until the input of a DC4 code after a DC2 code has been received.
 - (c) This is a null code in modes other than the JA7-bit mode.

(13) DC4 (14)H

(a) This is the enlarged character command clear code in the JA7-bit mode.

(b) This is a null code in modes other than the JA7-bit mode.

(14) GS (1D)H

This is the initial start command code to load the VFU. Data received after the input of this code are stored in the VFU memory.

The TOF code must follow immediately after this code. Codes other than the TOF code are ignored, the received GS code is cancelled and the printer is set to the initialization format of the VFU status.

When the power is turned on, the predetermined format for the PC-8023A-C is set in the VFU memory. This format is called the initialization format. Details regarding this format are described in a separate section.

(15) RS (1E)H

This is the set end command code which terminates the VFU setting.

The TOF code must always be received prior to this code. If this code does not follow a TOF code, it is handled as a null code, the VFU load is cancelled, and the VFU status is set to the initialization format.

(16) US (1F)H

This is a command code which causes the printer to execute the vertical tab operation according to the format set in the VFU, the channel being designated by the 1 byte which follows the command.

When the US code is input, the VT operation is performed according to the format of the channel designated by the 1 byte which follows. If the designated channel is not set to a line number

greater than the present line (or smaller than the present line in the reverse mode), an automatic feed is performed up to the next TOF position. Depending on the contents of the byte following the US code, a line feed for N lines can be performed instead of the VT operation specified by the channel. ($0 \leq N \leq 15$)

When $N = 0$, no line feed occurs.

Example:

	7	6	5	4	3	2	1	0	—— Bit	
	0	0	0	1	1	1	1	1	—— US code	
Command after US code	{	x	x	x	0	0	C2	C1	C0	—— VT operation specified by channel
		x	x	x	1	N3	N2	N1	N0	—— Line feed for N lines

Note: x Either 0 or 1
 C = 1 Line feed until either the next
 BOTTOM or TOF position.
 C = 0 Null code
 All codes are ignored other than $1 \leq C \leq 6$.
 When a null code is input, the received US
 command is cancelled.

(17) VFU Characteristics

(a) Maximum form length (between TOFs):
 66 or 72 lines

(b) Initialization format:
 When the VFU is not set externally, the
 printer is formatted as follows:
 *Form length: 66 (72)
 *Tab position: Set to channel 2, tabs
 occur every 6 lines from TOF.

(c) TOF position setting:
 Only channel 1 is used.

- (d) VT position setting:
Channels 2 to 6 are used.
- (e) BOTTOM position setting:
Both channels 1 and 2 are used at the same time and are set to only one position on the form.
- (f) Data code:
Information for 1 line is received as 2-bytes of data.

Bit	7	6	5	4	3	2	1	0	
2-bytes of data	{	×	1	CH6	CH5	CH4	CH3	CH2	CH1
	{	×	1	×	×	×	×	×	×

(g) VFU load (initialization format)

No. of lines	Bit								GS code (start)
	7	6	5	4	3	2	1	0	
1	x	1	0	0	0	0	0	1	} TOF
	x	1	x	x	x	x	x	x	
2	x	1	0	0	0	0	0	0	} for 1 line
	x	1	x	x	x	x	x	x	
3	↓								}
4									
5									
6		x	1	0	0	0	0	0		0
	x	1	x	x	x	x	x	x	
7	x	1	0	0	0	0	1	0	} Channel 2 VT
	x	1	x	x	x	x	x	x	
8	x	1	0	0	0	0	0	0	}
	x	1	x	x	x	x	x	x	
	↓								
60	x	1	0	0	0	0	0	0	} Channel 2 VT
	x	1	x	x	x	x	x	x	
61	x	1	0	0	0	0	1	0	}
	x	1	x	x	x	x	x	x	
62	x	1	0	0	0	0	0	0	}
	x	1	x	x	x	x	x	x	
63	↓								}
65		x	1	0	0	0	0	0		0
	x	1	x	x	x	x	x	x	
66	x	1	0	0	0	0	0	0	}
	x	1	x	x	x	x	x	x	
67 (1)	x	1	0	0	0	0	0	1	} TOF
	x	1	x	x	x	x	x	x	
-	0	0	0	1	1	1	1	0	RS code (stop)

The above figure shows the initialization format.

13. DESCRIPTION OF ESC CODES

- PICA* (1) ESC, N (1B, 4E)H *M=78*
- (a) When this code is input, the 10-cpi print mode is selected.
 - (b) If a code for any other print mode (17 cpi, proportional spacing or 12 cpi) is received, the 10-cpi print mode is cancelled.
 - (c) When the printer is initialized when the power is turned on, the 10-cpi print mode is selected.

- PROP* (2) ESC, P (1B, 50)H *P=80*
- (a) When this code is input, the proportionally spaced printing mode is selected.
 - (b) If a code for any other print mode (10 cpi, 17 cpi or 12 cpi) is received, the proportionally spaced printing mode is cancelled.
 - (c) The total number of dots when a full line of data is printed is 1,280.

- COND* (3) ESC, Q (1B, 51)H *Q=81*
- (a) When this code is input, the 17-cpi print mode is selected.
 - (b) If a code for any other print mode (10 cpi, proportional spacing or 12 cpi) is received, the 17-cpi print mode is cancelled.

- FLITE* (4) ESC, E (1B, 45)H *E=69*
- (a) When this code is input, the 12-cpi print mode is selected.
 - (b) If a code for any other print mode (10 cpi, proportional spacing or 17 cpi) is received, the 12-cpi print mode is cancelled.

ESC = 27

(5) ESC, SOH (1B, 01)H

} } }

ESC, ACK (1B, 06)H

- (a) When this code is input while in proportionally spaced printing mode, spacing changes from one to 6 dots.
- (b) This code is ignored in all the other print modes.

(6) ESC, \$ (1B, 24)H

- (a) When this code is input, the character set for alphanumeric characters and symbols is selected.
- (b) When any of the selection codes for the internal graphics dot-image graphics mode, katakana characters (JA7) or Greek characters is received, the character set for alphanumeric characters and symbols is cancelled.
- (c) When the printer is initialized when the power is turned on, the character set for alphanumeric characters and symbols is selected.

(7) ESC, # (1B, 23)H

- (a) When this code is input, data are shifted out and the internal graphics pattern (A to D columns) area is selected.
- (b) When any of the selection codes for alphanumeric characters and symbols, dot-image graphics mode, katakana characters (JA7) or Greek characters is received, the selection of the internal graphics pattern is cancelled.

(8) ESC, S(n3)(n2)(n1)(n0) (n0 to n3: 30H to 39H)

- (a) This command code consists of 6 bytes.
- (b) When this code is input, the dot-image graphics mode is selected.
- (c) The information in the 3rd to 6th bytes specifies the data to be transferred and the

number of bytes to be printed in dot-image graphics mode.

Example: When receiving 200 bytes of data:

(n3)(n2)(n1)(n0) = 30H, 32H, 30H, 30H

The maximum number of bytes to be transferred is 9,999.

- (d) After the specified number of bytes are output, the mode previously specified [alphanumeric characters, symbols, katakana characters (JA7), Greek characters or internal graphics] is automatically selected.
- (9) ESC, ! (1B, 21)H
- (a) When this code is input, the enhanced character mode is selected.
 - (b) The enhanced character mode is in effect until the enhanced-character-mode clear code (ESC, ") is received.
- (10) ESC, " (1B, 22)H
- (a) When this code is input, the enhanced character mode is cleared.
- (11) ESC, [(1B, 5B)H
- (a) When this code is input, the incremental mode is selected and printing is performed each time data are received.
 - (b) In the incremental mode, dot-image printing cannot be performed.
 - (c) The incremental mode is in effect until the logical-seeking command code (ESC,]) is received.
 - (d) After the maximum number of columns of data has been printed in one line, data will continue to be printed in the same column until a CR code is received.

(12) ESC,] (1B, 5D)H

- (a) When this code is input, the logical-seeking mode is selected.
- (b) When the printer is initialized when the power is turned on, the logical-seeking mode is selected.

(13) ESC, A (1B, 41)H

- (a) When this code is input, the line spacing is set to 1/6 inch.
- (b) The 1/6-inch line spacing continues until another line spacing command code is received.
- (c) When the printer is initialized when the power is turned on, the 1/6-inch line spacing is selected.

(14) ESC, B (1B, 42)H

- (a) When this code is input, the line spacing is set to 1/8 inch.
- (b) The 1/8-inch line spacing continues until another line spacing command code is received.

(15) ESC, T, (n1)(n0)

- (a) When this code is input, the line spacing is set to $N/144$ inch ($N = 0$ to 99).
- (b) N is defined as follows.
 $n1$ and $n0$ should be within $30H$ to $39H$.
Example: For line spacing of $15/144$ inch,
 $n1 = (31)H$
 $n0 = (35)H$
- (c) This mode continues until another line-spacing command code is received.

(16) ESC, f (1B, 66)H

- (a) When this code is input, the line feed direction is set to "Forward."

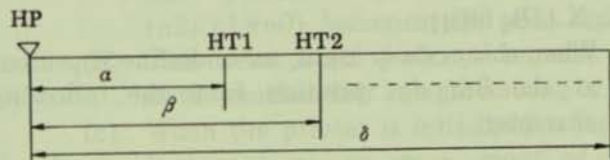
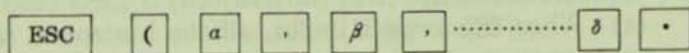
- (b) When the printer is initialized when the power is turned on, the forward-line-feed mode is selected.
- (c) The forward-line-feed mode continues until the reverse-line-feed command code (ESC, r) is received.

(17) ESC, r (1B, 72)H

- (a) When this code is input, the line feed direction is set to "Reverse."
- (b) The reverse-line-feed mode continues until the forward-line-feed command (ESC, f) is received.

(18) ESC, ((1B, 28)H

- (a) This is a code to set the horizontal tab positions.
- (b) The method of setting the horizontal tab positions is described below.



$\alpha \sim \delta$; Decimal code $0 < \alpha \sim \delta < 135$

. ; Continuation code (2C)H

. ; Completion code (2E)H

- (c) Horizontal tabulation can be set at a maximum of 16 positions.

- (d) If an error occurs in setting the horizontal tabulation, all the horizontal tab positions previously set are cleared.
- (e) This code is ignored in the proportionally spaced printing mode.
- (f) α , β and δ are defined by 3-digit decimal numbers (n2) (n1) and (n0), respectively.

(19) ESC,) (1B, 29)H

- (a) When this code is input, the horizontal tab positions are cleared.
- (b) The clearing method is described as below.

ESC)	α	.	β	.
-----	---	----------	---	---------	---

Clears α and β horizontal tab positions.
Other set positions remain unchanged.

(20) ESC, 2 (1B, 32)H

- (a) When this code is input, all the horizontal tab positions are cleared.

(21) ESC, X (1B, 58)H

- (a) When this code is input, an underline is printed at the 9th dot position from the following character.

(22) ESC, Y (1B, 59)H

- (a) When this code is input, underline printing at the 9th dot position is stopped.

(23) ESC, a to d (1B, 61 to 64)H

- (a) When the printer select mode is valid (DIP switch SW2-2 is ON).
When this code is input with the select switch turned on or after receiving the DC1 code, the device of the specified number is selected.

$\left\{ \begin{array}{l} \text{ESC, a} \\ \text{ESC, b} \\ \text{ESC, c} \\ \text{ESC, d} \end{array} \right.$	(1B, 61)H	Selection of device No. 0
	(1B, 62)H	Selection of device No. 1
	(1B, 63)H	Selection of device No. 2
	(1B, 64)H	Selection of device No. 3

The device number selection depends on the combination of the ON/OFF positions of DIP switch pins SW2-3 and 2-4.

(24) ESC, \ (1B, 60)H

- (a) When the printer select mode is valid (DIP switch SW2-2 is ON).

When this code is input, the selection of all the printers is cleared.

(The device selection becomes invalid and the printers are placed in the deselected state. To select the printers again, repeat the operation described in paragraph (23) above.

(25) ESC, L (n2)(n1)(n0) [1B, 4C, (n2)(n1)(n0)]
 n0 to n3 = (30)H to (39)H

- (a) When this code is input, the offset from the left position specified by the number (n2)(n1)(n0) becomes the print start position.
- (b) This print start position remains unchanged until another left margin setting is performed.
- (c) When the printer is initialized when the power is turned on or upon input of the INPUT PRIME signal, the left margin becomes "0."
- (d) This code cannot be set in the proportionally spaced printing mode.

14. OTHER FUNCTIONS

14.1 Printing under Data-Buffer-Full Conditions

Conditions under which printing is performed other than when the print command code is received, are described below.

- (1) When print data for one line are received and the print command code is not received. (The selection of the line feed function depends on the ON/OFF positions of the DIP switches.)
- (2) When the print data are received in the incremental mode.
- (3) When there is data in the buffer when the printer is to be placed in the deselected state, the data are printed and the print head stops in the position at the end of the data.

14.2 Override Function

- (1) When the select switch is depressed while the printer is in the PE state, the printer enters the selected state and prints 1 line of data. The printer enters the PE state again after printing.
- (2) If the "Paper Empty" condition is detected while the printer is receiving data (or when data are stored in the buffer), the data reception continues to the end of the data and the printer enters the PE state after printing.
- (3) In the PE state, the select code (DC1) from the printer is invalid.

15. INTERFACE SPECIFICATIONS

15.1 Data Input Method

8-bit parallel system (DATA1 ~ 8)

15.2 Control Signals

$\overline{\text{ACK}}$, $\overline{\text{BUSY}}$, $\overline{\text{SELECT}}$, $\overline{\text{DATA}\cdot\text{STB}}$, $\overline{\text{INPUT}\cdot\text{PRIME}}$,
 $\overline{\text{FAULT}}$, $\overline{\text{INPUT}\cdot\text{BUSY}}$ and PE.

15.3 Data Input Codes

ASCII, JIS 8 bits, JIS 7 bits

UK, GE, SW codes

Dot-image graphics 8-bit codes

CG graphics codes

15.4 Input/Output Circuit Configuration

	Signal Name	Configuration
Input	DATA 1 ~ 8	
	$\overline{\text{DATA}\cdot\text{STB}}$ $\overline{\text{INPUT}\cdot\text{PRIME}}$	
Output	$\overline{\text{BUSY}}$, $\overline{\text{SELECT}}$ $\overline{\text{FAULT}}$, $\overline{\text{ACK}}$ $\overline{\text{INPUT}\cdot\text{BUSY}}$, PE	

15.5 Connectors Used

Printer: Nihon Amp 552742-1 or equivalent

Cable: Nihon Amp 552470-1 or equivalent

15.6 Pin Assignments for the Connector

Pin No.	Signal Name	Pin No.	Signal Name
1	DATA - STB	19	TWISTED PAIR GND (PIN 1)
2	DATA 1	20	(2)
3	2	21	(3)
4	3	22	(4)
5	4	23	(5)
6	5	24	(6)
7	6	25	(7)
8	7	26	(8)
9	DATA 8	27	(9)
10	ACK	28	(10)
11	INPUT - BUSY	29	(11)
12	PE	30	TWISTED PAIR GND (31)
13	SELECT	31	INPUT-PRIME
14	0V	32	FAULT
15	NC	33	0V
16	0V	34	NC
17	CHASSIS GND	35	NC
18	+5 V DC	36	INPUT-BUSY

15.7 Input and Output Signals

(1) DATA 1 ~ 8

- (a) These signals are input signals to receive the 1st to the 8th bit of information, respectively.
- (b) Each signal is at a high level when data is logic "1".
- (c) Pulse width should be $3\mu\text{sec}$ min.

(2) $\overline{\text{DATA STROBE}}$ ($\overline{\text{DATA-STB}}$)

- (a) This signal is a synchronizing input signal to read each of DATA 1 ~ 8.
- (b) This signal is normally high; data is read when the signal level changes to low.
- (c) Pulse width should be $1\mu\text{sec}$ min.

(3) $\overline{\text{INPUT-PRIME}}$

- (a) This signal is an input signal to place the printer in the selected or deselected state, as well as to initialize the entire electronic control circuitry of the printer except the VFU.
(The VFU will remain preset even if this signal is input.)
- (b) If the $\overline{\text{INPUT-PRIME}}$ signal is input while data are being stored in the buffer, the entire control circuitry of the printer except the VFU are initialized after all the data in the buffer have been printed.
- (c) Pulse width should be $1\mu\text{sec}$ min.

(4) $\overline{\text{ACKNOWLEDGE}}$ ($\overline{\text{ACK}}$)

- (a) This signal is an output signal which indicates that each operation specified by the received data code has been completed, and that the printer is ready to receive the next data code. This signal is therefore regarded as a data request pulse. (Note however, that the ACK signal is output when the printer changes from

the deselected state to the selected state.)

- (b) This signal is also output after the DC3 code has been received.
- (c) The normal pulse width is 7μ sec.
- (d) This signal is normally high. When the condition becomes "TRUE", the signal level becomes low.
- (e) The ACK signal is always output when the level of the BUSY signal changes from high to low.

(5) BUSY

- (a) This signal is an output signal which indicates that the printer is not ready to accept data (that is, the printer is busy).
- (b) The level of this signal becomes high (printer busy) when:
 - 1) The printer enters the "DATA BUFFER FULL" state.
 - 2) The printer enters the deselected state.
 - 3) The printer enters the "FAULT" state.
 - 4) The $\overline{\text{INPUT-PRIME}}$ signal is received.

In this case, if the level of the received $\overline{\text{INPUT-PRIME}}$ signal remains high after the lapse of a specified time interval, the BUSY signal is cancelled.

(6) SELECT

- (a) This signal is an output signal which indicates that the printer is in the selected state or the deselected state. While the printer is in the selected state, it is ready to receive data. While the printer is in the deselected state, it can accept no data except the DC1 code. (When DIP switch pin 1-5 is ON, the DC1 code is ignored.)
- (b) The level of this signal becomes high when the printer is placed in the selected state.

- (c) The printer enters the selected state:
- 1) When the SEL switch is depressed while the printer is in the deselected state. However, if the SEL switch is depressed while there is no data in the buffer and the printer is in the "Paper End" (PE) state, the printer temporarily enters the selected state, and the "Paper End" state is cancelled. After the printer has accepted and printed a line of data, the printer returns to the "Paper End" state and the deselected state.
 - 2) When the DC1 code is received while the printer in the deselected state (i.e., when DIP switch pin 1-5 is OFF). Note that the DC1 code is ignored in the "Paper End" state.
 - 3) Immediately after the power is turned ON (i.e., when DIP switch pin 2-7 is ON).
- (d) The printer enters the deselected state when:
- 1) The SEL switch is depressed while the printer is in the selected state.
 - 2) The DC3 code is received (i.e., when DIP switch pin 1-5 is OFF).
 - 3) The printer enters the "Paper End" state.
 - 4) The power is turned ON (i.e., DIP switch pin 2-7 is OFF).
 - 5) An error occurs in the printer (i.e., when the head carrier overruns).
 - 6) The "COVER OPEN" condition is detected.

(7) FAULT

- (a) This signal is an output signal which indicates that the printer is in the "FAULT" state.
- (b) The level of this signal is low while the printer is in the "FAULT" state.

- (c) The printer enters the "FAULT" state when:
- 1) The printer enters the "Paper End" state. [However, if the printer enters the selected state, the "Paper End" state is released (i.e., the level of the "FAULT" signal becomes high) and the level of the "FAULT" signal changes back to low after the printer has received and printed data.]
 - 2) The printer is in the deselected state.
 - 3) An error occurs in the printer (i.e., when the head carrier overruns).
 - 4) The "COVER OPEN" condition is detected.

(8) PE

- (a) This signal is an output signal which indicates that the paper is nearing its end.
- (b) With the printer in the "Paper End" state, the level of this signal is high.

(9) INPUT-BUSY

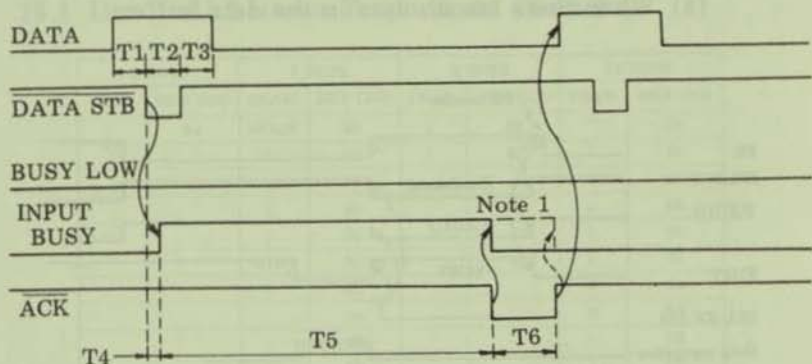
- (a) This signal is an output signal which indicates that the printer is busy.
- (b) This signal is different from the BUSY signal described in (5) above, in that its level becomes high (printer busy) when the printer receives data.

(10) +5 V DC

- (a) This is a +5 V supply voltage.
- (b) Using this voltage, a current of up to 50 mA may be provided to an external device.

15.8 Timing Chart

(1) When data are accepted:



T1 ~ T3: $1\mu\text{sec}$ min.

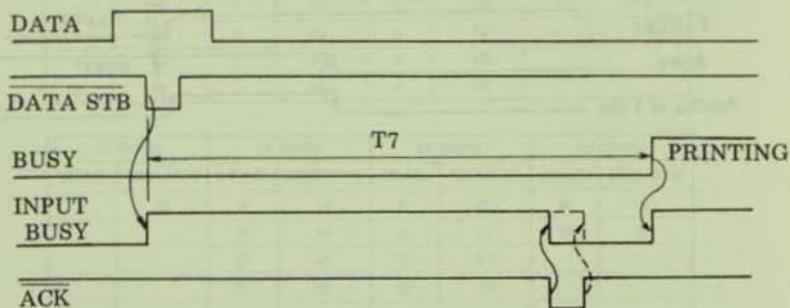
T4: 100 nsec max.

T5: 0.1 ~ 0.5 msec

T6: 6 ~ 8 μsec

Note 1: May be optionally changed over using a jumper.

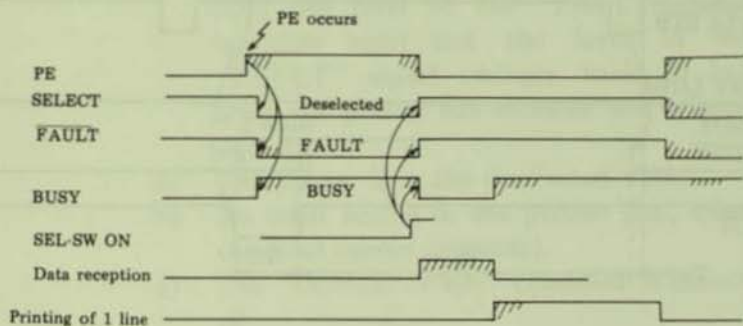
(2) When the data buffer is full:



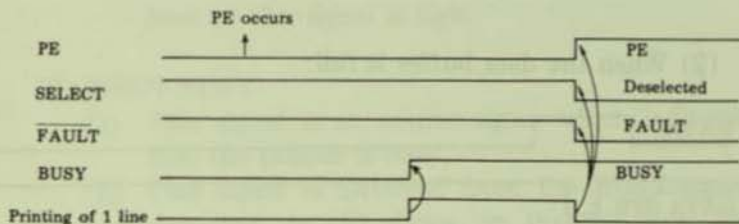
T7 = 0.2 ~ 1 ms

(3) When the printer enters the "Paper End" state while in the selected state:

(a) When there are no data in the data buffer:



(b) When stored data exist in the data buffer:



16. PROPORTIONAL CHARACTERS

16.1 Dot Width between Proportional Characters

6 DOTS		7 DOTS		8 DOTS		10 DOTS	
CHAR.	HEX COD	CHAR.	HEX COD	CHAR.	HEX COD	CHAR.	HEX COD
j	6A	SPACE	20	i	69	"	22
		!	21	l	6C	l	49
		.	27			Z	5A
		(	28			c	63
		)	29			f	66
		,	2C			r	72
		.	2E			t	74
		:	3A			z	7A
		;	3B			l	7B
		'	60			l	7D
		:	7C				

12 DOTS							
CHAR.	HEX COD	CHAR.	HEX COD	CHAR.	HEX COD	CHAR.	HEX COD
\$	24	6	36	l	5D	o	6F
*	2A	7	37	^	5E	p	70
+	2B	8	38	+	5F	q	71
-	2D	9	39	a	61	s	73
/	2F	<	3C	b	62	u	75
0	30	=	3D	d	64	v	76
1	31	>	3E	e	65	x	78
2	32	?	3F	g	67	y	79
3	33	S	53	h	68	~	7E
4	34	[	5B	k	6B		
5	35	\	5C	n	6E		

13 DOTS		14 DOTS		16 DOTS		18 DOTS	
CHAR.	HEX COD	CHAR.	HEX COD	CHAR.	HEX COD	CHAR.	HEX COD
&	26	#	14	%	25	M	4D
		@	40	A	41	W	57
		C	43	D	44		
		E	45	H	48		
		F	46	K	4B		
		G	47	N	4E		
		J	4A	O	4F		
		L	4C	U	55		
		P	50	V	56		
		O	51	X	58		
B	42	T	54	Y	59		
R	52			m	6D		
				w	77		

16.2 Proportional Character Coding Table

HEX COD	20	21	22	23	24	25	26	27
CHAR.	SP	!	"	#	\$	%	&	'
WIDTH	7	7	10	14	12	16	13	7
HEX COD	28	29	2A	2B	2C	2D	2E	2F
CHAR.	()	*	+	,	-	.	/
WIDTH	7	7	12	12	7	12	7	12
HEX COD	30	31	32	33	34	35	36	37
CHAR.	0	1	2	3	4	5	6	7
WIDTH	12	12	12	12	12	12	12	12
HEX COD	38	39	3A	3B	3C	3D	3E	3F
CHAR.	8	9	:	;	<	=	>	?
WIDTH	12	12	7	7	12	12	12	12
HEX COD	40	41	42	43	44	45	46	47
CHAR.	@	A	B	C	D	E	F	G
WIDTH	14	16	15	14	16	14	14	14
HEX COD	48	49	4A	4B	4C	4D	4E	4F
CHAR.	H	I	J	K	L	M	N	O
WIDTH	16	10	14	16	14	18	16	16
HEX COD	50	51	52	53	54	55	56	57
CHAR.	P	Q	R	S	T	U	V	W
WIDTH	14	14	15	12	14	16	16	18
HEX COD	58	59	5A	5B	5C	5D	5E	5F
CHAR.	X	Y	Z	[\]	^	÷
WIDTH	16	16	10	12	12	12	12	12
HEX COD	60	61	62	63	64	65	66	67
CHAR.	`	a	b	c	d	e	f	g
WIDTH	7	12	12	10	12	12	10	12
HEX COD	68	69	6A	6B	6C	6D	6E	6F
CHAR.	h	i	j	k	l	m	n	o
WIDTH	12	8	6	12	8	16	12	12
HEX COD	70	71	72	73	74	75	76	77
CHAR.	p	q	r	s	t	u	v	w
WIDTH	12	12	10	12	10	12	12	16
HEX COD	78	79	7A	7B	7C	7D	7E	7F
CHAR.	x	y	z	{	:	}	~	NOT
WIDTH	12	12	10	10	7	10	12	USED

17. CODING TABLES

17.1 JA8 Coding Table

b8	b7	b6	b5	b4	b3	b2	b1	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
0	0	0	0	1	1	1	1	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1	
0	0	1	1	0	0	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	
0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	
0	0	0	0	0	0	0	0	D	E	0	@	P	p					∞	a	ç		X	
0	0	0	1	1	S	H	D1	!	1	A	Q	a	q					≥	³	ν	ω		
0	0	1	0	2	X	D2	**	2	B	R	b	r						·	γ	Δ	∞		
0	0	1	1	3	X	D3	#	3	C	S	c	s						*	ι	β	√		
0	1	0	0	4	T	D4	\$	4	D	T	d	t						≤	³	ε	τ		
1	1	0	1	5	Q	N	K	%	5	E	U	e	u						·	η	³		
0	1	1	0	6	K	S	N	&	6	F	V	f	v						·	e	θ	³	
0	1	1	1	7	L	E	B	·	7	G	W	g	w						|	ρ	ι	ι	
1	0	0	0	8	S	C	N	(	8	H	X	h	x						½	o	±	φ
1	0	0	1	9	T	E	M	)	9	I	Y	i	y						↓	ψ	υ	∞
1	0	1	0	A	L	F	S	B	*	:	J	Z	j	z					↓	Ω	π	X	
1	0	1	1	B	H	M	E	C	+	:	K	(	k	l					↓	Γ	Λ	∞
1	1	0	0	C	C	L	—	.	<	L	\	l	:						+	o	±	∞	
1	1	0	1	D	C	R	—	—	=	M	] m	]								δ	⊕	∞
1	1	1	0	E	S	O	|	.	>	N	^	n	~)	κ	—	λ
1	1	1	1	F	S	I	|	|	/	? O	-	o								υ	Σ	τ	μ

Graphic (Note 1) Graphic (Note 1)

Note: 1. Columns 8, 9, E and F represent character generator graphics (8 x 8 dot matrix).

17.2 US, UK, GE, SW and JA7 Coding Tables

								0	0	0	0	1	1	1	1					
								0	0	1	1	0	0	1	1					
								0	1	0	1	0	1	0	1					
b7	b6	b5	b4	b3	b2	b1		0	1	2	2a	3	3a	4	4a	5	5a	6	7	
								0	0	0	0	0		Note 3	P	Note 8	P			
								0	0	0	1	1		A	Q	a	q			
								0	0	1	0	2		B	R	b	r			
								0	0	1	1	3		C	S	c	s			
								0	1	0	0	4		D	T	d	t			
								0	1	0	1	5		E	U	e	u			
								0	1	1	0	6		F	V	f	v			
								0	1	1	1	7		G	W	g	w			
								1	0	0	0	8		H	X	h	x			
								1	0	0	1	9		I	Y	i	y			
								1	0	1	0	A	LF	*	J	Z	j	z		
								1	0	1	1	B	VT ESC	+	K	Note 4	k	Note 9		
								1	1	0	0	C	FF FS	.	L	Note 5	l	Note 10		
								1	1	0	1	D	CR GS	-	M	Note 6	m	Note 11		
								1	1	1	0	E	SO RS	.	N	Note 7	n	Note 12		
								1	1	1	1	F	SI US	/	O		o			

Columns 2a to 5a represent:

CG graphics (8 x 8 dot matrix) . . . 2a1 to 5a1

Greek characters 2a2 to 5a2

Note: Refer to the following page for a separate coding table for columns 2a through 5a.

Differences by Country

Note No.	1	2	3	4	5	6	7	8	9	10	11	12
Address	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
US	#	\$	@	[	\	\]	^	·	|	:	;	~
UK	£											
GE			§	À	Ö	Û			ä	ö	ü	ß
SW		☒	È	À	Ö	Û	é	ä	ö	ä	ü	

Those columns left blank are the same as those in the US specification.

17.3 Additional Coding Table for Columns 2a to 5a

	Column 2		Column 3		Column 4		Column 5	
	2a1	2a2	3a1	3a2	4a1	4a2	5a1	5a2
0	SP		0	∞	Note 3		P	ϕ
1	!	~	1	1	A	α	Q	ω
2	*	.	2	2	B	ν	R	≈
3	Note 1	#	3	3	C	Δ	S	√
4	Note 2	≤	4	4	D	β	T	7
5	%	/	5	5	E	ξ	U	8
6	&	.	6	6	F	η	V	9
7	*	|	7	7	G	ι	W	ι
8	(	½	8	8	H	±	X	φ
9	)	|	9	9	I	υ	Y	κ
A	*	—	:	∩	J	π	Z	χ
B	+	—	:	∩	K	∧	Note 4	ο
C	.	+	<	∩	L	∩	Note 5	ο
D	-	(	=	∩	M	⊕	Note 6	ζ
E	.	)	>	∩	N	∩	Note 7	λ
F	/	¼	?	∩	O	∩	-	μ

- Notes: 1) Columns 2 through 5 apply to the alphanumeric/symbolic mode. (This is specified by ESC,\$. The SI code may also be used in JA7 mode.)
- 2) Columns 2a1 through 5a1 apply to the CG graphics mode (as specified by ESC,#).
- 3) Columns 2a2 through 5a2 apply to the Greek mode (as specified by the SO code).

18. EXAMPLES

18.1 Printer Test Program

The program described in the following pages includes all the functions of this printer. The practical use of each function described in Chapter 10 will be better understood by actually using this program or by reading the listing.

```
10 '  
20 ' printer test  
30 '  
40 ' (C) 1988 NEC  
50 '  
60 OUT &H10,&H11: OUT &H40,0: OUT &H40,1 ' select printer ( online )  
70 '  
80 '  
90 '  
100 '  
110 '  
120 '  
130 LPRINT CHR#(&H1B);CHR#(&H4E); ' select pica char. ( 10 CPI )  
140 LPRINT "pica characters"  
150 FOR C=ASC(" ") TO 255: LPRINT CHR#(C);: NEXT C ' print all char  
160 LPRINT: LPRINT  
170 '  
180 LPRINT CHR#(&H1B);CHR#(&H45); ' select elite char. ( 12 CPI )  
190 LPRINT "elite characters"  
200 FOR C=ASC(" ") TO 255: LPRINT CHR#(C);: NEXT C ' lprint all char.  
210 LPRINT: LPRINT  
220 '  
230 LPRINT CHR#(&H1B);CHR#(&H51); ' select condensed char. ( 17 CPI )  
240 LPRINT "condensed characters"  
250 FOR C=ASC(" ") TO 255: LPRINT CHR#(C);: NEXT C ' lprint all char.  
260 LPRINT: LPRINT  
270 '  
280 LPRINT CHR#(&H1B);CHR#(&H50); ' select proportional char.  
290 LPRINT "proportional characters"  
300 FOR C=ASC(" ") TO 255: LPRINT CHR#(C);: NEXT C ' lprint all char.  
310 LPRINT: LPRINT  
320 '  
330 LPRINT CHR#(&H1B);"!"; ' set enhance char.  
340 LPRINT CHR#(&H1B);CHR#(&H4E); ' select pica char.  
350 LPRINT "enhanced pica characters"  
360 FOR C=ASC(" ") TO 255: LPRINT CHR#(C);: NEXT C ' lprint all char.  
370 LPRINT: LPRINT  
380 LPRINT CHR#(&H1B);CHR#(&H22); ' defeat enhance char.  
390 '  
400 LPRINT CHR#(&H1B);"!"; ' set enhance char.  
410 LPRINT CHR#(&H1B);CHR#(&H45); ' select elite char.  
420 LPRINT "enhanced elite characters"  
430 FOR C=ASC(" ") TO 255: LPRINT CHR#(C);: NEXT C ' lprint all char.  
440 LPRINT: LPRINT  
450 LPRINT CHR#(&H1B);CHR#(&H22); ' defeat enhance char.  
460 '
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470 LPRINT CHR#(&H1B);""; ' set enhance char.
480 LPRINT CHR#(&H1B);CHR#(&H50); ' select proportional char.
490 LPRINT "enhanced & proportional characters"
500 FOR C=ASC(" ") TO 255: LPRINT CHR#(C);: NEXT C ' lprint all char.
510 LPRINT: LPRINT
520 LPRINT CHR#(&H1B);CHR#(&H22); ' defeat enhance char.
530 '
540 LPRINT CHR#(&HE); ' set enlarge char.
550 LPRINT CHR#(&H1B);CHR#(&H4E); ' select pica char.
560 LPRINT "enlarged pica characters"
570 FOR C=ASC(" ") TO 255: LPRINT CHR#(C);: NEXT C ' lprint all char.
580 LPRINT: LPRINT
590 LPRINT CHR#(&HF); ' defeat enlarge char.
600 '
610 LPRINT CHR#(&HE); ' set enlarge char.
620 LPRINT CHR#(&H1B);CHR#(&H45); ' select elite char.
630 LPRINT "enlarged elite characters"
640 FOR C=ASC(" ") TO 255: LPRINT CHR#(C);: NEXT C ' lprint all char.
650 LPRINT: LPRINT
660 LPRINT CHR#(&HF); ' defeat enlarge char.
670 '
680 LPRINT CHR#(&HE); ' set enlarge char.
690 LPRINT CHR#(&H1B);CHR#(&H51); ' select condensed char.
700 LPRINT "enlarged & condensed characters"
710 FOR C=ASC(" ") TO 255: LPRINT CHR#(C);: NEXT C ' lprint all char.
720 LPRINT: LPRINT
730 LPRINT CHR#(&HF); ' defeat enlarge char.
740 '
750 LPRINT CHR#(&HE); ' set enlarge char.
760 LPRINT CHR#(&H1B);CHR#(&H50); ' select proportional char.
770 LPRINT "enlarged & proportional characters"
780 FOR C=ASC(" ") TO 255: LPRINT CHR#(C);: NEXT C ' lprint all char.
790 LPRINT: LPRINT
800 LPRINT CHR#(&HF); ' defeat enlarge char.
810 '
820 LPRINT CHR#(&HE); ' set enlarge char.
830 LPRINT CHR#(&H1B);""; ' set enhance char.
840 LPRINT CHR#(&H1B);CHR#(&H4E); ' select pica char.
850 LPRINT "enlarged & enhanced pica characters"
860 FOR C=ASC(" ") TO 255: LPRINT CHR#(C);: NEXT C ' lprint all char.
870 LPRINT: LPRINT
880 LPRINT CHR#(&HF); ' defeat enlarge char.
890 LPRINT CHR#(&H1B);CHR#(&H22); ' defeat enhance char.
900 '
910 LPRINT CHR#(&HE); ' set enlarge char.
920 LPRINT CHR#(&H1B);""; ' set enhance char.
930 LPRINT "enlarged & enhanced elite characters"
940 LPRINT CHR#(&H1B);CHR#(&H45); ' select elite char.
950 FOR C=ASC(" ") TO 255: LPRINT CHR#(C);: NEXT C ' lprint all char.
960 LPRINT: LPRINT
970 LPRINT CHR#(&HF); ' defeat enlarge char.
980 LPRINT CHR#(&H1B);CHR#(&H22); ' defeat enhance char.
990 '
1000 LPRINT CHR#(&HE); ' set enlarge char.
1010 LPRINT CHR#(&H1B);""; ' set enhance char.
1020 LPRINT CHR#(&H1B);CHR#(&H50); ' select proportional char.
1030 LPRINT "enlarged & enhanced & proportional characters"
1040 FOR C=ASC(" ") TO 255: LPRINT CHR#(C);: NEXT C ' lprint all char.
1050 LPRINT: LPRINT

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1060 LPRINT CHR$(8HF): ' defeat enlarge char.
1070 LPRINT CHR$(8H1B);CHR$(8H22): ' defeat enhance char.
1080 '
1090 '
1100 ' dot spacing
1110 LPRINT CHR$(8H1B);CHR$(8H50): ' select proportional char.
1120 LPRINT
1130 LPRINT "proportional characters"
1140 LPRINT "dot spacing"
1150 LPRINT "abcdefghijklmnopqrstuvwxy2"
1160 FOR N=1 TO 6
1170 LPRINT "abcdefghi!";
1180 LPRINT CHR$(8H1B);CHR$(N): ' dot spacing ( n dots ) 1<=n<=6
1190 LPRINT "klmnopqrstuvwxyz. dot spacing (":N;" dots ) between ; and k."
1200 NEXT N
1210 LPRINT CHR$(8H1B);CHR$(8H4E): ' select pica char.
1220 '
1230 '
1240 ' cancel test
1250 LPRINT
1260 LPRINT "cancel test"
1270 LPRINT "abcdefghijklmnopqrstuvwxy2.";
1280 LPRINT " This is text."
1290 LPRINT "abcdefghijklmnopqrstuvwxy2.";
1300 LPRINT CHR$(8H10): ' cancel code
1310 LPRINT " This is text."
1320 LPRINT: LPRINT
1330 '
1340 '
1350 ' underline
1360 LPRINT "This is ";
1370 LPRINT CHR$(8H1B);CHR$(8H58): ' start underline
1380 LPRINT "underline";
1390 LPRINT CHR$(8H1B);CHR$(8H59): ' stop underline
1400 LPRINT ". This is not underline."
1410 LPRINT: LPRINT
1420 '
1430 ' variable line spacing
1440 LPRINT
1450 LPRINT "variable line spacing"
1460 LPRINT
1470 LPRINT CHR$(8H1B);"A": ' line spacing ( 1/6 inch )
1480 LPRINT "line spacing ( 1/6 inch )"
1490 FOR L=1 TO 2
1500 LPRINT "abcdefghijklmnopqrstuvwxy ABCDEFGHIJKLMNOPQRSTUVWXYZ"
1510 NEXT L
1520 LPRINT
1530 LPRINT CHR$(8H1B);"B": ' line spacing ( 1/8 inch )
1540 LPRINT "line spacing ( 1/8 inch )"
1550 FOR L=1 TO 2
1560 LPRINT "abcdefghijklmnopqrstuvwxy ABCDEFGHIJKLMNOPQRSTUVWXYZ"
1570 NEXT L
1580 LPRINT
1590 LPRINT CHR$(8H1B);CHR$(8H54);"16": ' line soacing ( 16/144 inch )
1600 LPRINT "line spacing ( 16/144 inch )"
1610 FOR L=1 TO 2
1620 LPRINT "abcdefghijklmnopqrstuvwxy ABCDEFGHIJKLMNOPQRSTUVWXYZ"
1630 NEXT L
1640 LPRINT

```

```

1650 FOR N=20 TO 99 STEP 5
1660 LPRINT CHR$(&H1B);CHR$(&H54);RIGHT$(STR$(100+N),2); ' line spacing (n/144 inch)
1670 LPRINT "line spacing ("N;"/144 inch)"
1680 FOR L=1 TO 2
1690 LPRINT "abcdefghijklmnopqrstuvmxy: ABCDEFGHIJKLMNOPQRSTUVWXYZ"
1700 NEXT L
1710 LPRINT: LPRINT
1720 NEXT N
1730 LPRINT CHR$(&H1B);"A";
1740 LPRINT: LPRINT
1750 '
1760 '
1770 ' using Horizontal Tab
1780 LPRINT "Horizontal Tab"
1790 LPRINT CHR$(&H1B);CHR$(&H20);"010,020,030,040,050."; ' set Horizontal Tab
1800 LPRINT "e";
1810 GOSUB 2000
1820 LPRINT "tab1";
1830 GOSUB 2000
1840 LPRINT "tab2";
1850 GOSUB 2000
1860 LPRINT "tab3";
1870 GOSUB 2000
1880 LPRINT "tab4";
1890 GOSUB 2000
1900 LPRINT "tab5"
1910 LPRINT CHR$(&H1B);CHR$(&H29);"020,040."; ' clear Horizontal Tab
1920 LPRINT "e";
1930 GOSUB 2000
1940 LPRINT "tab1";
1950 GOSUB 2000
1960 LPRINT "tab2";
1970 GOSUB 2000
1980 LPRINT "tab3"
1990 LPRINT CHR$(&H1B);CHR$(&H32); ' clear ALL Horizontal Tab
2000 LPRINT "e";
2010 GOSUB 2000
2020 LPRINT "tab1";
2030 GOSUB 2000
2040 LPRINT "tab2";
2050 GOSUB 2000
2060 LPRINT "tab3"
2070 GOTO 2120
2080 ' put Horizontal Tab code (&h9)
2090 OUT &H10,&H9: OUT &H40,0: OUT &H40,1
2100 A=INP(&H40)AND1: IF A=0 THEN RETURN ELSE 2100
2110 ' end of subroutine
2120 '
2130 '
2140 LPRINT CHR$(&H1F);CHR$(&H10+15); ' multi linefeed ( 15 lines)
2150 LPRINT CHR$(&H1F);CHR$(&H10+14); ' multi linefeed ( 14 lines)
2160 LPRINT CHR$(&H1F);CHR$(&H10+1); ' multi linefeed ( 1 lines)
2170 '
2180 '
2190 ' left margin
2200 LPRINT
2210 LPRINT CHR$(&H1B);"L";"010"; ' set left margin ( 10 )
2220 LPRINT "left margin 10"
2230 FOR C=ASC(" ") TO 255: LPRINT CHR$(C);: NEXT C ' lprint all char.

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2240 LPRINT
2250 LPRINT CHR$(8H1B):"L":"020": ' set left margin ( 20 )
2260 LPRINT "left margin 20"
2270 FOR C=ASC(" ") TO 255: LPRINT CHR$(C): NEXT C ' lprint all char.
2280 LPRINT
2290 LPRINT CHR$(8H1B):"L000": ' defeat left margin
2300 '
2310 '
2320 '
2330 ' loading machine code ( putchar )
2340 POKE &HFF60,&HF5 ' PUSH AF
2350 POKE &HFF61,&H7E ' LD A,(HL)
2360 POKE &HFF62,&HCD ' CALL LPTCHR
2370 POKE &HFF63,&H2B
2380 POKE &HFF64,&H0
2390 POKE &HFF65,&HF1 ' POP AF
2400 POKE &HFF66,&HC9 ' RET
2410 DEFUSR=&HFF60
2420 '
2430 ' graphic print
2440 LPRINT
2450 LPRINT "graphic print"
2460 LPRINT
2470 FOR L=1 TO 20
2480 LPRINT CHR$(8H1B):CHR$(8H54):"16": ' line spacing ( 16/144 inch )
2490 LPRINT CHR$(8H1B):CHR$(8H53):"0255": ' select graphic mode ( 255 bytes )
2500 FOR X%=1 TO 255
2510 A=USR(X%)
2520 NEXT X%
2530 LPRINT
2540 NEXT L
2550 FOR L=1 TO 20
2560 LPRINT CHR$(8H1B):CHR$(8H54):"16": ' line spacing ( 16/144 inch )
2570 LPRINT CHR$(8H1B):CHR$(8H53):"0600":
2580 FOR N=1 TO 150
2590 A=USR(&HFF):A=USR(&HFF):A=USR(&H0):A=USR(&H0)
2600 NEXT N
2610 LPRINT
2620 NEXT L
2630 FOR L=1 TO 10
2640 LPRINT CHR$(8H1B):CHR$(8H54):"16": ' line spacing ( 16/144 inch )
2650 LPRINT CHR$(8H1B):CHR$(8H53):"0600":
2660 FOR N=1 TO 300
2670 A=USR(&HAA):A=USR(&H55)
2680 NEXT N
2690 LPRINT
2700 LPRINT CHR$(8H1B):CHR$(8H54):"16": ' line spacing ( 16/144 inch )
2710 LPRINT CHR$(8H1B):CHR$(8H53):"0600":
2720 FOR N=1 TO 300
2730 A=USR(&H55):A=USR(&HAA)
2740 NEXT N
2750 LPRINT
2760 NEXT L
2770 LPRINT CHR$(8H1B):"A":
2780 LPRINT: LPRINT
2790 '
2800 '
2810 ' set VFU
2820 LPRINT CHR$(8H1D):"AG": ' VFU start

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```

2830 FOR L=2 TO 66
2840 IF L MOD 6 = 0 THEN LPRINT "B@": ' set CH2 Vertical Tab
2850 IF L MOD 6 = 1 THEN LPRINT "D@": ' set CH3 Vertical Tab
2860 IF L MOD 6 = 2 THEN LPRINT "H@": ' set CH4 Vertical Tab
2870 IF L MOD 6 = 3 THEN LPRINT "P@": ' set CH5 Vertical Tab
2880 IF L MOD 6 = 4 THEN LPRINT CHR$(8H60):"G": ' set CH6 Vertical Tab
2890 IF L MOD 6 = 5 THEN LPRINT "@@": ' set NO Vertical Tab
2900 NEXT L
2910 LPRINT "A@":CHR$(8H1E): ' VFU stop
2920 '
2930 '
2940 LPRINT "Vertical Tab ( TOF )"
2950 FOR N=2 TO 6
2960 LPRINT CHR$(8H1F):CHR$(N): ' CH_n Vertical Tab
2970 LPRINT "CH ":N:" Vertical Tab"
2980 NEXT N
2990 LPRINT CHR$(8HB): ' VT ( CH2 )
3000 LPRINT "VT"
3010 LPRINT CHR$(8H1F):CHR$(1): ' TOF ( CH1 )
3020 '
3030 LPRINT "**** printer test end ****": LPRINT

```


line spacing (35 /144 inch)
abcdefghijklmnopqrstuvwxyz ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz ABCDEFGHIJKLMNOPQRSTUVWXYZ

line spacing (40 /144 inch)
abcdefghijklmnopqrstuvwxyz ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz ABCDEFGHIJKLMNOPQRSTUVWXYZ

line spacing (45 /144 inch)
abcdefghijklmnopqrstuvwxyz ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz ABCDEFGHIJKLMNOPQRSTUVWXYZ

line spacing (50 /144 inch)
abcdefghijklmnopqrstuvwxyz ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz ABCDEFGHIJKLMNOPQRSTUVWXYZ

line spacing (55 /144 inch)
abcdefghijklmnopqrstuvwxyz ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz ABCDEFGHIJKLMNOPQRSTUVWXYZ

line spacing (60 /144 inch)
abcdefghijklmnopqrstuvwxyz ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz ABCDEFGHIJKLMNOPQRSTUVWXYZ

line spacing (65 /144 inch)

abcdefghijklmnopqrstuvwxyz ABCDEFGHIJKLMNOPQRSTUVWXYZ

abcdefghijklmnopqrstuvwxyz ABCDEFGHIJKLMNOPQRSTUVWXYZ

line spacing (70 /144 inch)

abcdefghijklmnopqrstuvwxyz ABCDEFGHIJKLMNOPQRSTUVWXYZ

abcdefghijklmnopqrstuvwxyz ABCDEFGHIJKLMNOPQRSTUVWXYZ

line spacing (75 /144 inch)

abcdefghijklmnopqrstuvwxyz ABCDEFGHIJKLMNOPQRSTUVWXYZ

abcdefghijklmnopqrstuvwxyz ABCDEFGHIJKLMNOPQRSTUVWXYZ

line spacing (80 /144 inch)

abcdefghijklmnopqrstuvwxyz ABCDEFGHIJKLMNOPQRSTUVWXYZ

abcdefghijklmnopqrstuvwxyz ABCDEFGHIJKLMNOPQRSTUVWXYZ

line spacing (85 /144 inch)

abcdefghijklmnopqrstuvwxyz ABCDEFGHIJKLMNOPQRSTUVWXYZ

abcdefghijklmnopqrstuvwxyz ABCDEFGHIJKLMNOPQRSTUVWXYZ

line spacing (90 /144 inch)

abcdefghijklmnopqrstuvwxyz ABCDEFGHIJKLMNOPQRSTUVWXYZ

abcdefghijklmnopqrstuvwxyz ABCDEFGHIJKLMNOPQRSTUVWXYZ

line spacing (95 /144 inch)

abcdefghijklmnopqrstuvwxyz ABCDEFGHIJKLMNOPQRSTUVWXYZ

abcdefghijklmnopqrstuvwxyz ABCDEFGHIJKLMNOPQRSTUVWXYZ

Horizontal Tab

*	tab1	tab2	tab3	tab4	tab5
*	tab		tab2		tab3
*	tab1	tab2	tab3		

CH 4 Vertical Tab

CH 5 Vertical Tab

CH 6 Vertical Tab

VT

XXXX printer test end XXXX

NEC

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