Preface

This newly developed model is a 9-wire, Serial Impact, Dot Matrix printer with 136 columns wide. It has been designed for the use with data communication systems, personal computers, or as a terminal printer.

Also, this model is a high-performanced, highly reliable one and is easy to operate. It can print as fast as 240 characters per second under Draft printing mode. If a higher printing quality is more preferred, users can choose the Near Letter Quality mode for their writing. In fact, there are a number of printing modes which could be arranged in hundreds of combinations. Users can select one of them either from the operation panel or from software control to produce an enormous variaty of effect. The followings are part of the features of this machine:

(1) Printer for personal computer terminal.
(2) Standard 136 columns, Serial Impact, Dot Matrix printer.
(3) This high-speed, low energy consumption, 9-wire printhead gives printing speed: 200 cps upon PICA or 240 cps upon ELITE.
(4) Logical-seeking printing or incremental printing with high response stepping motor.
(5) Alternative of adjustable tractor feed and friction feed. Fanfold, roll and cut-sheet paper are selectable.
(6) Both fixed and proportional character pitches are available.
(7) Both emphasize and double-strike modes are available.
(8) Both superscript and subscript modes are also available.
(9) With bit image graphics capability.
(10) High printing quality upon Near Letter Quality mode.
(11) Justification modes are available (including left, center, right and full justifications).
(12) Both download and input buffer are available at the same time.
(13) With 6.25K Bytes input buffer (can expand to 14.25K).
(14) Printing modes are selectable from the operation panel.
(15) 13 international character sets are build-in.
(16) Compatible with both IBM Proprinter and EPSON FX series.

In the following chapters, we conclude the complete features and details about the printer. Before started, we highly recommand this manual to you and hope you'll get better understanding of this machine.

FEDERAL COMMUNICATIONS COMMISSION RADIO FREQUENCY INTERFERENCE STATEMENT

"This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. It has been type tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

..... 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 technicir 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."

This statement will be applied only for the printers marketed in the U.S.A.

P.S. Using the shielded interface cable and power cord may prevent interference to radio and television reception.

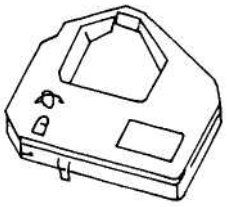
CONTENTS

CHAPTER 1 INSTALLATION

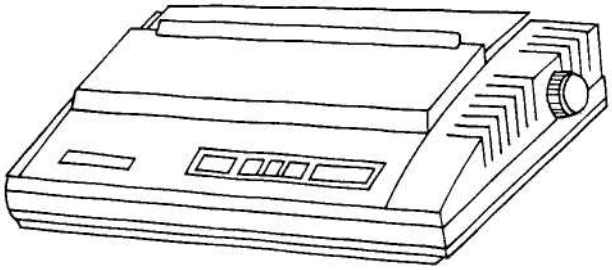
1.1 Unpacking

Check whether the whole set contains the following parts. If any of them is missing or damaged during transportation, please contact your dealer right away.

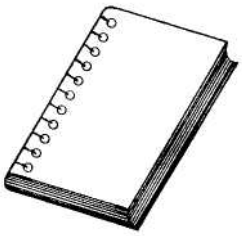
a. Printer
b. Ribbon cassette
c Paper separator
d. User's manual



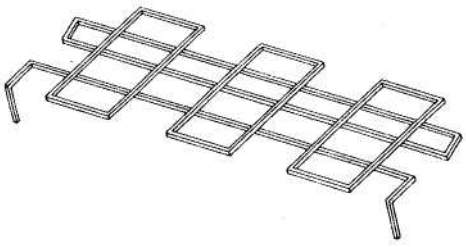
Ribbon cassette



Printer

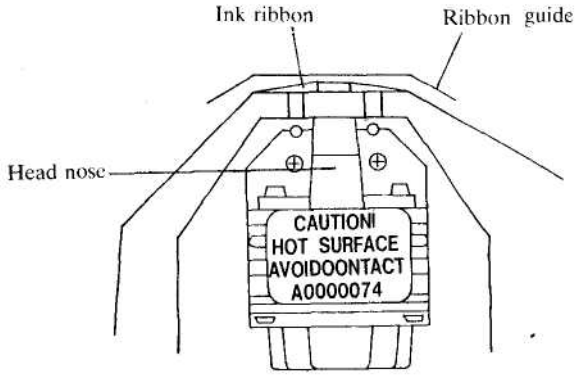


User's manual

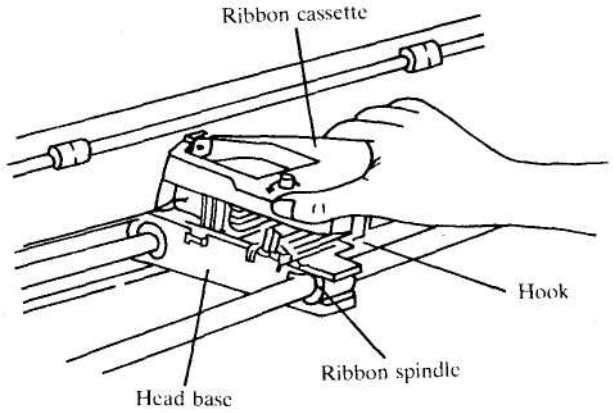


Paper separator

3. Push the paper bail against the platen and withdraw the paper if loaded.
4. Gently slide the head base to the center of the machine.
5. Insert the ribbon (the front part of the ribbon cassette) between the ribbon guide and head nose.

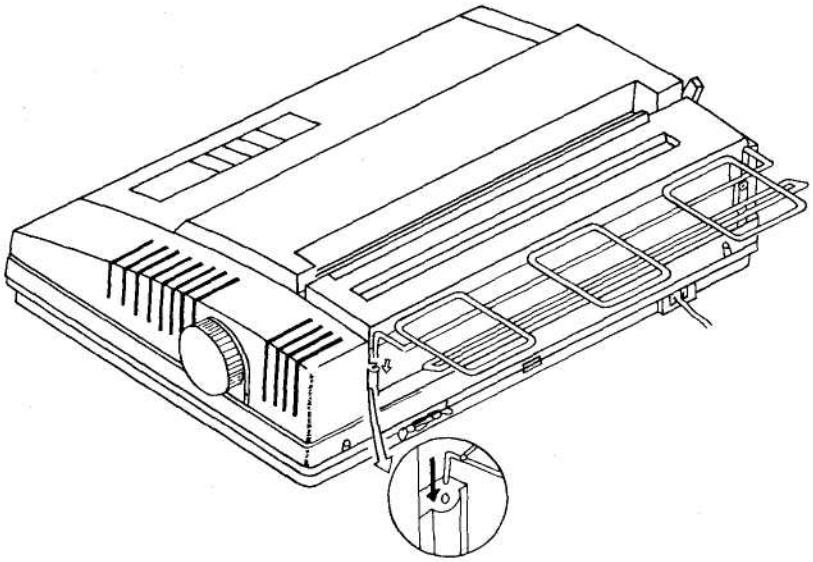


6. While using your left hand to turn the take-up knob counterclockwise, use your right hand to press a little harder on the cassette so that the take-up knob will mount on the spindle and the three hooks hold the head base steadily.
7. After properly mounting the cassette on, turn the ribbon take-up knob counterclockwise until the ribbon properly passes through the head nose and the ribbon guide.



1.4 Installing the Paper Separator

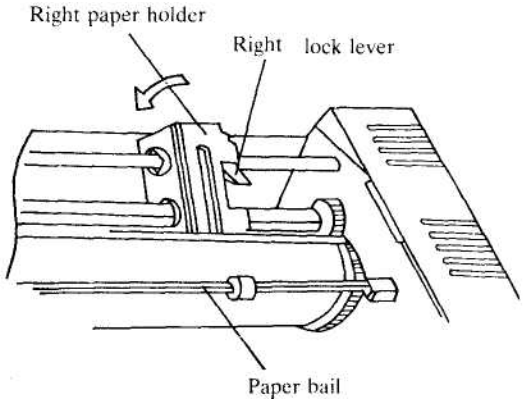
Insert the two ends of the paper separator into the two holes located on the rear of the top cabinet, and push the paper separator downward.



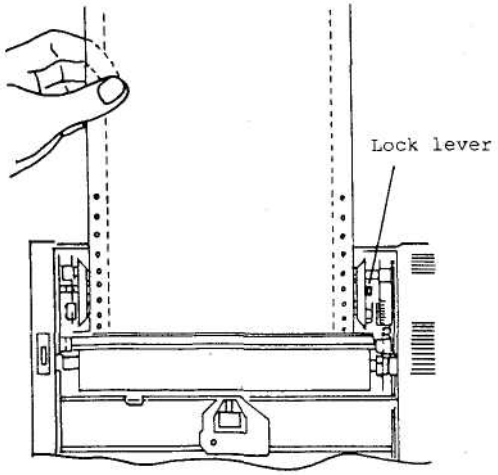
1.5 Paper Loading and Arranging

1.5.1 Fan-fold paper

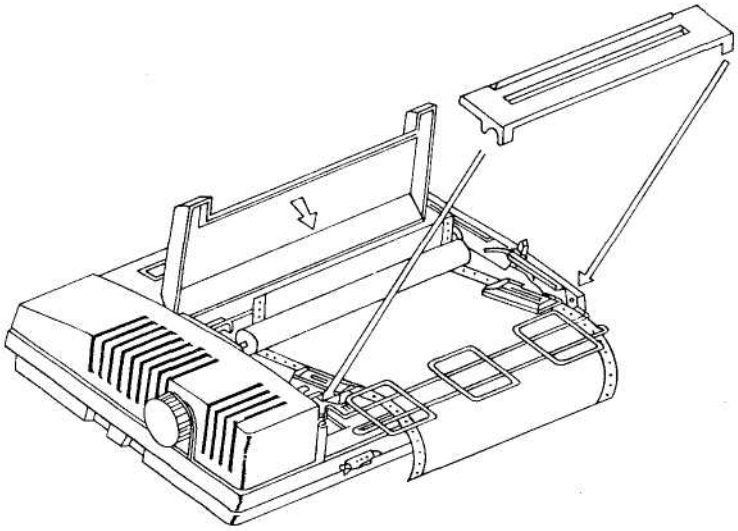
1. Remove the front cover and tractor cover.
2. Set the release lever to PIN.
3. Raise the paper bail toward you.
4. Release the left and right lock levers.
5. Adjust both tractor positions according to the paper width.



6. Open both tractor holders.
7. Insert fan-fold paper from below the paper separator.
8. Align the sprocket holes with the tractor pins by sliding the tractors, and close the tractor holders.
9. Turn the manual feed knob clockwise until the paper emerges from between the platen and paper bail.

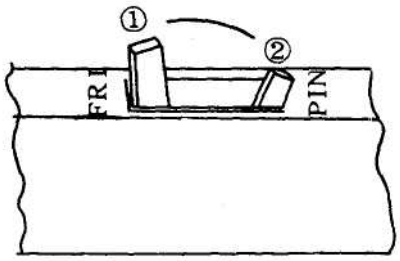


10. If you're satisfied with the paper position, fixed up both lock levers and place the paper bail back against the paper and platen.
11. If not, repeat the above procedures.
12. Place back the front cover and tractor cover you've just removed.



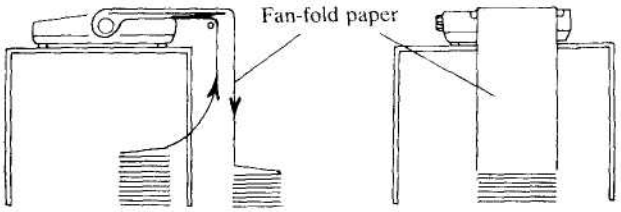
1.5.2 Cut-sheet Paper

1. Remove the front cover.
2. Set the release lever to FRI.
3. Raise the paper bail toward you.
4. Insert the paper into the opening of tractor cover.
5. Turn the manual feed knob clockwise till the paper emerges from between the platen and paper bail. Use the start-printing-notch on the paper bail for reference.
6. If the paper is not aligned, set the release lever to PIN, re-adjust the paper position by sliding it to the left or right, and set the release lever back to FRI.
7. Push the paper bail against the paper.
8. Turn the manual feed knob to advance or withdraw the paper in order to decide where to start printing.
9. If you're satisfied with it, place back the front cover you just removed, otherwise, repeat the above procedures.



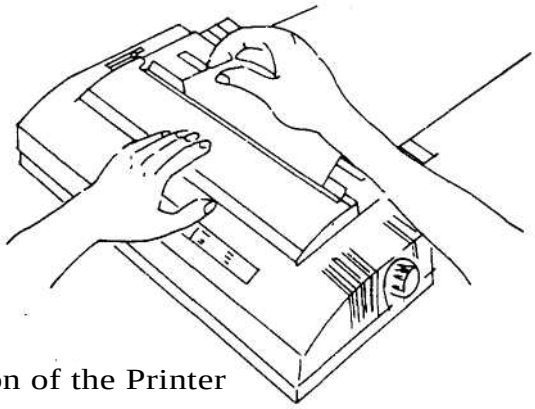
1.5.4 Paper Arrangement

If fan-fold paper is placed beneath a desk and the printer is installed on the desk, the better way for paper arrangement is shown below.



1.6 Removing Paper

1. In order to remove the paper, you can choose either turning the manual feed knob by hand or pressing the LF or FF switches in the offline state.
2. The edge of the front cover serves as a paper knife. Raise the paper 45 degrees and cut it with the cover.
3. The next printing is done about 1 inch apart from the paper cut

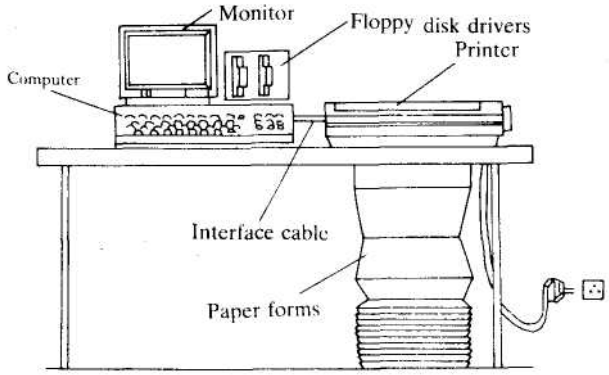


1.7 Location of the Printer

position. 4 ^

Before starting, obviously it will make the printer stand longer if choosing a nice place for it. The followings are our suggestions:

1. Places where sun shines directly should be avoided.
2. Keep it away from high temparature and high mositure.
3. Keep it in clean shape and away from dust or grease.
4. Use an exclusive AC voltage outlet. Avoid connecting to the same circuit as large power-comsumption or noise-producing devices. An extremely high or low voltage may cause to an error or damage the printer.
5. Use a short interface cable instead of a long one.



CHAPTER 2 OPERATION

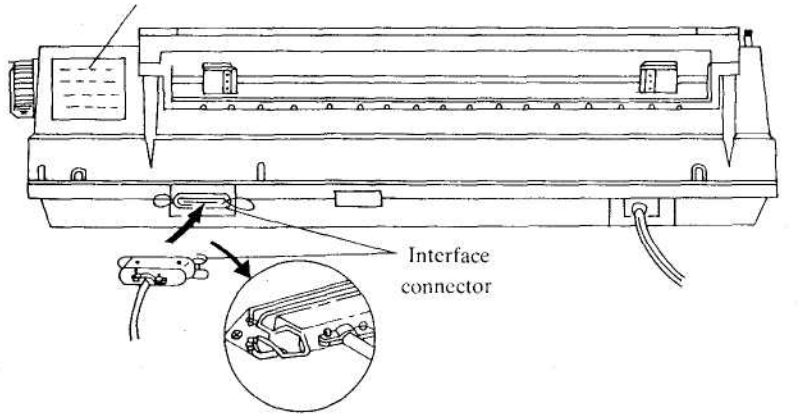
2.1 Power Connection

Before plugging the power cord, remember to check the power requirements of the printer. If the printer is connected to an incorrect AC power source, the printer may not operate properly or may be amaged.

2.2 **Parallel Interface Connection**

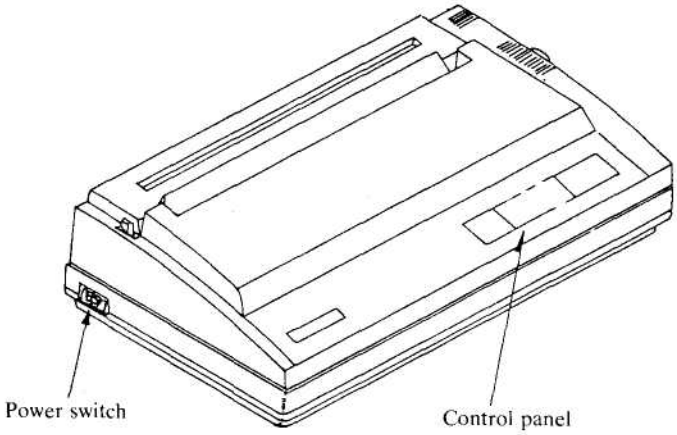
Be aware of the following notes when connecting the printer to a host computer with an interface cable:

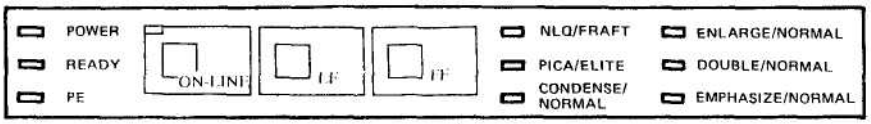
a. Turn off the power of both computer and printer.
b. Check if the interface and connectors were matched,
c Use an appropriate interface cable.
d. Mount on the connector properly.
e. Lock the connector securely.



2.3 Switches

There are four switches of the printer. The POWER switch is found on the left rear side. The ON-LINE, LF and FF switches are on the operation panel.





1. POWER Switch
   a. The POWER switch is used to turn the power on or off.
   b. When turning the power on, the printer is initialized and the printhead will return to home position (to the left).
   c. Before turning the power on, be sure that paper has been loaded.
2. ON-LINE switch
   a. The ON-LINE switch is used to select the online or offline state.
   b. The printer automatically shifts into online state and waits for data when power is on and paper loaded.
   c If changing from online to offline during data transmitted, the printer stop acting. If changing from offline to online, printing begins at where it stopped.
   d. It's better not leaving the online state during data transmitted, otherwise the data might be lost.

3. LF (Line Feed) switch
   a. The LF switch will function only in the offline state.
   b. Pressing the LF switch once **will** cause the paper advancing by one line.
   c Continuously pressing the LF switch will cause lines advancing automatically.
4. FF (Form Feed) switch
   a. The FF switch will function only in the offline state.
   b. Pressing the FF switch once will cause the paper advancing to the top of next page.

2.4 Indicators

There are ten indicators on the operation panel:

1. POWER LED
   Illuminates when the power is on.
2. READY LED
   Illuminates when printer is ready to receive data.
3. PE LED
   Illuminates when running out of paper.
4. ON-LINE LED
   Illuminates to indicate online state.
5. Printing mode LED

a. NLQ/DRAFT LED	Illuminates in NLQ mode.
b. ELITE/PICA LED	Illuminates in ELITE mode,
c CONDENSE/NORMAL LED	Illuminates in CONDENSE mode.
d. EMPHASIZE/NORMAL LED	Illuminates in EMPHASIZE mode.
e. ITALIC/NORMAL LED	Illuminates in ITALIC mode.
f. ENLARGE/NORMAL LED	Illuminates in ENLARGE mode.

2.5 Printing Mode Selection

Perform the following procedures to select the printing mode needed:

1. Press the ON-LINE switch to enter offline state.
2. While holding down the ON-LINE switch, press the FF switch. As you hear a beep, printer enters selecting state by NLQ/DRAFT LED flashing.
3. Now the FF switch serves just like a ON/OFF (toggle) switch. To check whether it is On or OFF of this flashing (printing mode), simply hold it for 2 seconds. If the LED iluminates, it means the printer stays in NLQ mode. If not, the printer is in DRAFT mode. To change the ON/OFF state, just hold the FF switch for 2 seconds.

4. To inspect the next printing mode just press the ON-LINE switch. Now, the ELITE/PICA LED starts to flash.
5. Repeat procedure 3 to 4 to select other printing modes.
6. After finishing the selection, press the LF switch to leave the selecting condition. When the ON-LINE LED illuminates again, your printer has entered the ON-LINE state.

2.6 Buzzer

The buzzer is provided inside the printer.

1. When printer receives a BEL code (HEX 07), The buzzer beeps for approximately 0.1 second.
2. When running out of paper, the buzzer sounds intermittently for 4 cycles of 6 short pips. (Pip.Pip.Pip.Pip.Pip.Pip.)
3. When a position error occurs, the buzzer sounds for continual long beeps. (Beep...Beep...Beep.....)
4. When an internal short-circuit error occurs, the buzzer sounds for continual short pips. (Pip.Pip.Pip.....)

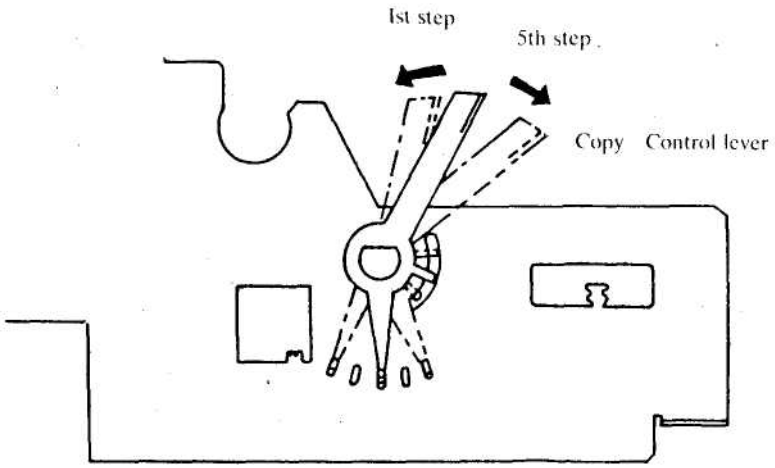
2.7 Paper End Detector

Paper End Detector can dectect whether there is paper loaded on the printer or not. When an out-of-paper condition is detected, the buzzer beeps, the PE LED illuminates and the printer enters offline state.

This detection can be disabled by setting the DIP switch 2-2 to ON.

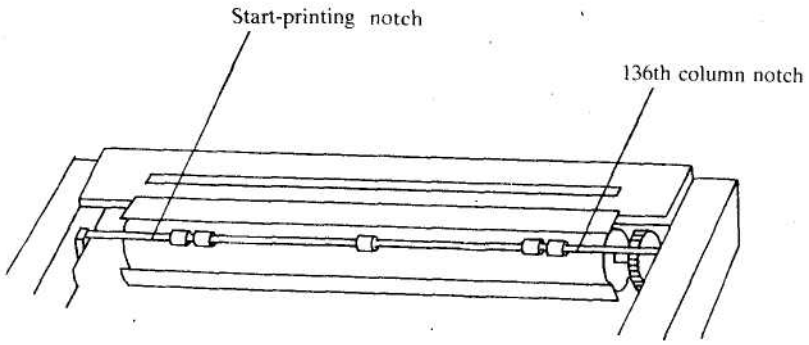
2.8 Self-test function

1. The printer has two sets of self-test (diagnosis) functions to check the followings:
   a. Functions of control circuit
   b. Functions of printer mechanism (e.g. printhead, stepping motor, ribbon feeding)
   c Printing quality
   d. The software version of ROM
2. Turn the power on with the LF witch pessed, the build-in character generator performs random shift printing to make a self-test in DRAFT mode.
3. Turn the power on with the ON-LINE switch pressed. The built-in NLQ character generator performs random shift printing to make a self-test in NLQ mode.
4. When running out of paper, the self-test function temporarily stops until paper has been reloaded and the ON-LINE switch been pressed.
5. The self-test function is terminated by turning the power off.

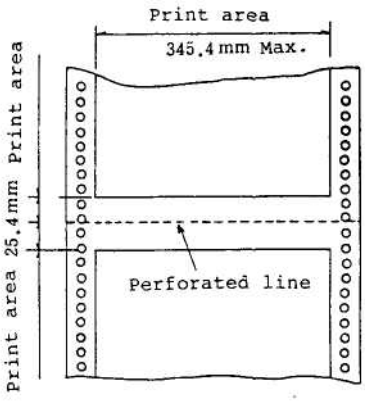


2.12 Printing Area

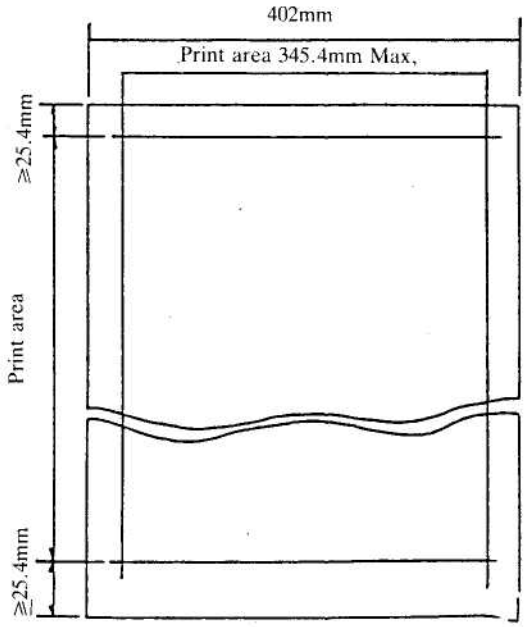
The printing area of the paper forms is shown as follows. It is recommended that users better avoid using the edges of paper. The notch on the left of the paper bail indicates start printing position. It's a useful measurement as a reference while printing.



(1) Fan-fold paper



(2) Cut-sheet paper



2.13 DIP switch setting

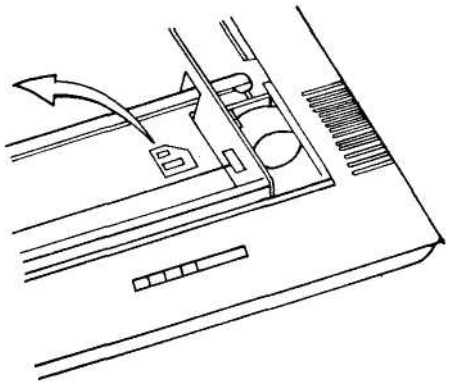
There're two DIP switches installed on the main control PWB so that users are allowed to select the desired configurations of this machine.

Perform the following procedures to set DIP switches:

1. Turn the power off.
2. Remove the front cover and slide the head base to the left.
3. DIP switches are located on the right lower corner inside the printer. Use a screw driver or pencil to set them on or off.
4. After finishing, install the front cover again.
5. For more informations, refer to Appendix B DIP Switch Setting Tables.

SW2

SW1



CHAPTER 3 SOFTWARE CONTROL

3.1 Character Set Table

Refer to APPENDIX D for Character Set Table. The UPPER HALF BYTE is arranged on the horizontal-axis. The LOWER HALF BYTE is arranged on the vertical-axis.

Example:
ESC 0: specifies 1/8 inch form feeding.

(1) ESC is represented by (1B)H for UPPER HALF BYTE = 1 and LOWER HALF BYTE = B.
(2) "0" is represented by (30)H for UPPER HALF BYTE = 3 and LOWER HALF BYTE = 0.
(3) The ESC 0 command is executed by sending (1B)H (30)H to printer.

3.2 Built-in Functions

3.2.1 Printing

Characters entered by the host computer are temporarily stored in the printer buffer. They are printed when a control code (e.g., CR or LF) is received or when the printer buffer is full.

3.2.2 Incremental function

The incremental function allows users to view and check the typescript more easily. If characters are entered at intervals of less than approximately 0.2 second, then printing will continue just as it looks on a typewriter. If typing is stopped more than one second, the characters, which are normally hidden behind the printhead, will automatically shift up six lines s'o that users can check them up more clearly. For more information, refer to ESC i command in this chapter.

3.2.3 Buffer-full printing

When a full line of characters (including spaces) has been entered and the next character is valid and not a control code, the contents of the printer buffer will be automatically printed out followed by a line feed.

3.3 Using Control Codes

If one of the control code sequences in the folowing section is entered, the appropriate function will be performed. Control codes are classified into two groups:

a. One-byte control codes
   CR, SO, LF, etc.
b. Control codes extended by ESC
   ESC 0, ESC A + n, etc.

Note:
In the following section, n, nl and n2 preceded by a plus (+) sign in a control code sequence indicate arguments. Enter appropriate numbers for substitude.

3.4 Command Explanation

(A) 1-BYTE Control Codes

BEL

Name: Bell
Format

ASCII:	BEL
decimal:	7
hexadecimal:	07

Function:
The printer's buzzer beeps for approximately 0.1 second.

BS

Name: Back space t
Format

ASCII:	BS
decimal:	8
hexadecimal:	08

Function:
The contents of printer buffer will be printed out and the printhead will move to the left by one column.
The BS is ignored if the previous character is an excute printing command. If the last data printed was in bit image mode, the printhead moves back to the position where bit image print began.
This command is ignored if any justification mode other than left aligment has been selected using the ESC a command.

HT

Name: Horizontal tab
Format

ASCII:	HT
decimal:	9
hexadecimal:	09

Function:

The printhead advances to next horizontal tab setting. The positions of horizontal tabs are at intervals of eight characters in the default character pitch, unless they have been altered using the ESC D command.

This command is ignored if any justification mode other than left alignment has been selected using ESC a command.

LF

Name: Line feed
Format

ASCII:	LF
decimal:	10
hexadecimal:	0A

Function:

Any data in the print buffer is printed out, and paper is advanced by one line according to the current setting of the line spacing.

VT

Name: Vertical tab
Format

ASCII:	VT
decimal:	11
hexadecimal:	OB

Function:

The paper is advanced to next tab setting in the current vertical tab channel. The default channel is channel 0. If no vertical tab have been set, this function same as LF.

FF

Name: Form feed
Format

ASCII:	FF
decimal:	12
hexadecimal:	0C

Function:
Any data in the print buffer is printed out, and the paper advances to the top of the next page according to the specified page length.

CR

Name: Carriage return
Format

ASCII:	CR
decimal:	13
hexadecimal:	0D

Function:
Any data in the print buffer is printed and the printhead return to left margin. A line feed may be added if either SW1-7 is ON or die interface connector pin 14 (AUTO FEED XT) is in the LOW level.

SO

Name: Select enlarged printing for one line
Format

ASCII:	SO
decimal:	14
hexadecimal:	0E

Function:
When the code of this command is input, subsequent data on the same line is printed at twice their normal width. This function is cancelled by line feed or by the code input of DC 4.

SI

Name: Select condensed printing
Format

ASCII:	SI
decimal:	15
hexadecimal:	0F

Function:
When the code of this command is input, subsequent data is printed at approximately 60% of their normal width.

DC1

Name: Select printer
Format

ASCII:	DC1
decimal:	17
hexadecimal:	11

Function: ,
The printer is return to the on-line state if it has been switched off by

DC2 TECO

IBM

Name: Cancel condensed printing
Format

ASCII:	DC2
decimal:	18
hexadecimal:	12

Function:
TECO: This command cancels condensed printing if this has been set by using SI, ESC SI, ESC! or from Operation Panel. *IBM:* This command cancels condensed, elite and proportional printing and selects pica. It does not cancel double-width.

Name: Deselect printer
Format

ASCII:	DC3
decimal:	19
hexadecimal:	13

Function:
The printer is placed in the off-line state.

DC4

Name: Cancel enlarged printing
Format

ASCII:	DC4
decimal:	20
hexadecimal:	14

Function:
Enlarged printing is cancelled if it has been set using SO or ESC SO, but not if it has been turn on by ESC W or ESC !.

CAN

Name: Cancel line
Format

ASCII:	CAN
decimal:	24
hexadecimal:	18

Function:
All the data previous store in print buffer on the same line is cancelled.

DEL

Name: Delete character
Format

ASCII:	DEL
decimal:	127
hexadecimal:	7F

Function:
The last character store in the print buffer is deleted unless that character already been printed.

ESC SO

Name: Select enlarged printing for one line
Format

	ASCII:	ESC	SO
	decimal:	27	14
	hexadecimal:	1B	OE

Function:
Same as the SO command.

ESC SI

Name: Select condensed printing
Format

	ASCII:	ESC	SI
	decimal:	27	15
	hexadecimal:	1B	OF

Function: Same as the SI command.

ESC EM

Name: Dummy Command
Format

	ASCII:	ESC	EM	*n*
	decimal:	27	25	*n*
	hexadecimal:	1B	19	*n*

Function:
This command does nothing.

ESC SP

Name: Set intercharacter space
Format

ASCII:	ESC	SP	*n*
decimal:	27	32	л
hexadecimal:	1B	20	*n*

Function:

The size of the space printed between characters is increased by n dot positions.The value of n should be in the range 0 to 127. The unit of n depends on the currently selected character pitch and the character mode. The unit of n is 1/120 inch if in DRAFT pica, and 1/120 inch if in

ESC !

Name: Print mode selection '
Format

ASCII:	ESC	!	*n*
decimal:	27	33	л
hexadecimal:	IB	21	*n*

Function:

This command provides overall control of the size and style except NLQ/Draft and superscript/subscript mode. Full details of the values and examples are shown in the print mode command summary. Print Mode:

The priority of print mode is as shown below.

■Superscript/Subscript> Double—strik

Bit	7	6	5	4	3	2	1	0 1
Under-	Italic	En-	Double-	Emph-	Con-	Propor-	Elite line	
larged	strike	asized	densed	tional 0	-	-	-	
-	-	-	-	Pica				

Note: If you have previously selected any of the nine printing modes listed above, you have to include it here or it **will** be reset by this command.

Example:

DRAFT PICA

	Pica		Condensed		Enlarged		Enhanced	
regular	WBij	0	WBij	4	WBij	32	WBij	36
emphasized	WBij	8	WBij	12	WBij	40	WBij	44
double-strike	WBij	16	WBij	20	WBij	48	WBij	52
emphasized double-strike	WBij	24	WBij	28	WBij	56	WBij	60
italic								
regular	WBij	64	WBij	68	WBij	96	WBij	100
emphasized	WBij	72	WBij	76	WBij	104	WBij	108
double-strike	WBij	80	WBij	84	WBij	112	WBij	116
emphasized double-strike	WBij	88	WBij	92	WBij	120	WBij	124
underlined								
regular	WBij	128	WBij	132	WBij	160	WBij	164
emphasized	WBij	136	WBij	140	WBij	168	WBij	172
double-strike	WBij	144	WBij	148	WBij	176	WBij	180
emphasized double-strike	WBij	152	WBij	156	WBij	184	WBij	188
italic underlined								
regular	WBij	192	WBij	196	WBij	224	WBij	228
emphasized	WBij	200	WBij	204	WBij	232	WBij	236
double-strike	WBij	208	WBij	212	WBij	240	WBij	244
emphasized double-strike	WBij	216	WBij	220	WBij	248	WBij	252

DRAFT ELITE

	Elite				Enlarged			
regular	WBij	1	WBij	5	WBij	33	WBij	37
emphasize	WBij	9	WBij	13	WBij	41	WBij	45
double-strike	WBij	17	WBij	21	WBij	49	WBij	53
emphasized double-strike	WBij	25	WBij	29	WBij	57	WBij	61
italic								
regular	WBij	65	WBij	69	WBij	97	WBij	101
emphasize	WBij	73	WBij	77	WBij	105	WBij	109
double-strike	WBij	81	WBij	85	WBij	113	WBij	117
emphasized double-strike	WBij	89	WBij	93	WBij	121	WBij	125
underlined								
regular	WBij	129	WBij	133	WBij	161	WBij	165
emphasize	WBij	137	WBij	141	WBij	169	WBij	173
double-strike	WBij	145	WBij	149	WBij	177	WBij	181
emphasized double-strike	WBij	153	WBij	157	WBij	185	WBij	189
italic underlined								
regular	WBij	193	WBij	197	WBij	225	WBij	229
emphasize	WBij	201	WBij	205	WBij	233	WBij	237
double-strike	WBij	209	WBij	213	WBij	241	WBij	245
emphasized double-strike	WBij	217	WBij	221	WBij	249	WBij	253

PROPORTIONAL

	Pica		Enlarged		Enhanced	
regular	WBij	2	WBij	34	WBij	38
emphasize	WBij	10	WBij	42	WBij	46
double-strike	WBij	18	WBij	50	WBij	54
emphasized double-strike	WBij	26	WBij	58	WBij	62

Name: Cancel MSB control
Format

ASCII:	ESC	#
decimal:	27	35
hexadecimal:	1B	23

Function:
This command cancels the MSB contorl set by ESC = (TECO mode) or ESC > command.

ESC $

Name: Set absolute dot position
Format

ASCII:	ESC	$	*nl*	*n2*
decimal:	27	36	*nl*	*n2*
hexadecimal:	1B	24	*nl*	*n2*

Function:
The printhead is moved to an absolute dot position, independently of current character size. The dot position is determined by the formula (nl+n2*256). The value of nl should lie between 0 and 255, and n2 should be between 0 and 3.
This command is ignored if it .would cause the print position to move beyond the right margin.

ESC %

Name: Turn download CG on/off

ASCII:	ESC	%	*n*	NUL
decimal:	27	37	*n*	0
hexadecimal:	1B	25	л	O

Function:
The download CG is selected if n=l, or the ROM CG is selected if n=0

ESC &

Name: Download character definition
Format

ASCII:	ESC	&NUL		*n*	*m*	*a Pl...Pn*
decimal:	27	38	0	*я*	*m*	*a Pl...Pn*
hexadecimal:	IB	26	0	*n*	*m*	*a Pl...Pn*

Function:

This command allows character to be defined, n is the ASCII code for the first character you want to define, m is the code for the last character. If you just want to define one character, n and m are the same, a is attribute data composed of shift data and proportional data-Pi...Pn be sure to send 11 numbers for each character defined in DRAFT mode and 46 numbers in NLQ mode. When defining a character in DRAFT mode, no adjacent dot can be specified.

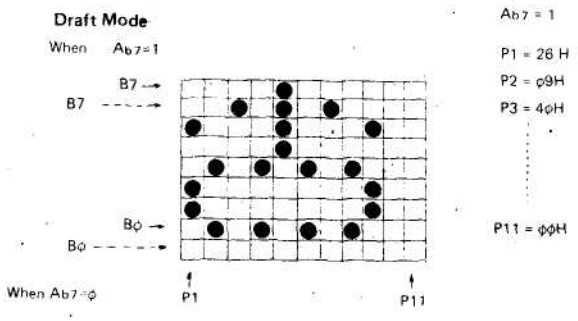
The shift data means that one dot must be shift downward at a print time. The proportional data is used at proportional printout in order to specify the print area of one character on a position basis. B7 of "a" is the shift data, it means "shift" as B7 = 0, "not shift" as B7=T. Low nibble of "a" is proportional data for ending position. High nibble of "a"(except B7) is proportional data for starting position. In NLQ mode the ending and starting position are mutiply by 2.

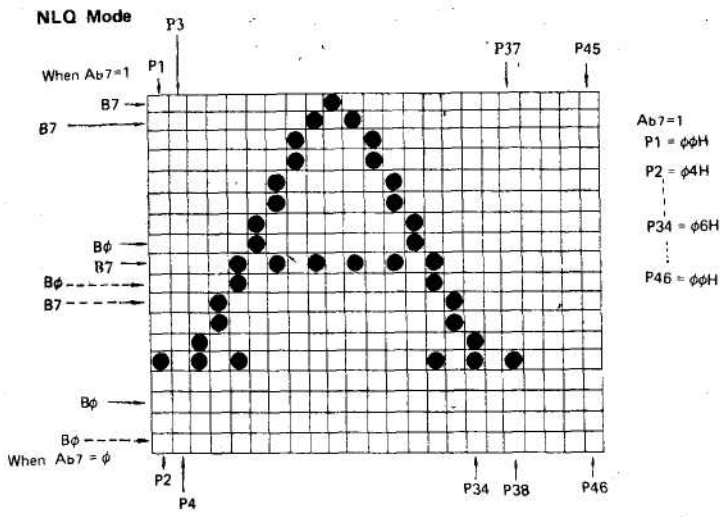
The NLQ and DRAFT download can not be mixed together. IBM ASCII codes (176 to 223) can not used for Download character.

Note:

When "DIP SW2—4 is set on, this command is not available.

Example:






```
10 'DOWNLOAD
20 E$=CHR$(27>
30 LPRINT "Download mode : user define character"
40 LPRINT E$; "xO";"Draft mode:"
5 0 'select character set
60 LPRINT E$;":";CHR$<0>;CHR$<0);CHR$<0);
70 'Define CG pattern
80 LPRINT E$;"&";CHR$(&H0>;CHR$(&H40) ;CHR$(&H41) ;
90 LPRINT CHR$(139);
100 LPRINT CHR$(38);CHR$(9);CHR$(64);CHR$(9>;
110 LPRINT CHR$(240);CHR$(9);CHR$(64);CHR$(9);
12 0 LPRINT CHR$(38);CHR$<0);CHR$(0);
130 LPRINT CHR$(&H8B>;:LPRINT CHR$(&HF2);CHR$<&H4>;
140 LPRINT CHR$(&H8);CHR$(&H10);CHR$(&H29);CHR$(&H52);
150 LPRINT CHR$(&H81);CHR$(*H14);CHR$(&H9) ;CHR$(0) ;CHR$(0) ;
160 LPRINT "@@@@@AAAAABBBBB";"==========>ROM CG"
170 LPRINT CHR$(27);"%";CHR$(1);CHR$(0) ;
180 LPRINT "@@@@@AAAAABBBBB";"==========>Download CG"
190 LPRINT CHR$(27);"%";CHR$(0);CHR$(0);
200 LPRINT "@@@@@AAAAABBBBB";"==========>Return to ROM CG"
210 END
```

```
Download mode : user define character
Draft mode:
@@@@@AAAAABBBBB==========>ROM CG
¿ßßßß½½½½½BBBBB==========>Download CG
@@@@@AAAAABBBBB==========>Return to ROM CG
```

```
10 E$=CHR$(27)
20 LPRINT E$;"x";CHR$(1);
30 LPRINT "n=1 : NLQ MODE SET"
40 WIDTH "LPT1:",255
50 LPRINT E$;"%";CHR$(0);CHR$(0);"ROM        CG...@ABCDEFGH"
60 LPRINT E$;":";CHR$(0);CHR$(1);CHR$(0);
70 LPRINT E$;"&";CHR$(0);"@B";
80 FOR J=0 TO 2
90 LPRINT CHR$(&H8B);
100 LPRINT CHR$(&H0);CHR$(&H4);CHR$(&H0);
110 LPRINT CHR$(&H0);CHR$(&H0);CHR$(&HC);CHR$(0);CHR$(&H30);
120 LPRINT CHR$(0);CHR$(&HC4);CHR$(&H3);
130 LPRINT CHR$(0);CHR$(&HC);CHR$(&H80);CHR$(&H30);CHR$(0);
140 LPRINT CHR$(&H40);CHR$(&H80);
150 LPRINT CHR$(&H80);CHR$(0);
160 LPRINT CHR$(&H40);CHR$(&H80);CHR$(&H30);
170 LPRINT CHR$(0);CHR$(&HC);CHR$(&H80);CHR$(&H3);CHR$(0);
180 LPRINT CHR$(0);CHR$(&HC4);CHR$(0);
190 LPRINT CHR$(&H30);CHR$(&H0);CHR$(&HC);CHR$(0);CHR$(0);
200 LPRINT CHR$(0);CHR$(&H4);
210  FOR I= 1 TO 8 :LPRINT CHR$(0);:NEXT I :NEXT J
220 LPRINT "Download  CG...";:LPRINT E$;"%";CHR$(1);CHR$(0);"@ABCDEFGH"
230 LPRINT E$;"%";CHR$(0);CHR$(0);"ROM        CG...@ABCDEFGH"
240 LPRINT E$;"x";CHR$(0);
```

```
n=1 : NLQ MODE SET
ROM        CG...@ABCDEFGH
Download   CG...AAACDEFGH
ROM        CG...@ABCDEFGH
```

ESC *

Name: 8-pin bit image mode selection
Format

ASCII:	ESC	*	*m*	*nl*	*n2*	... *data*	...
decimal:	27	42	*m*	*nl*	*n2*	... *data*	...
hexadecimal:	IB	2A	*m*	*nl*	*n2*	... *data*	...

Function:

One of bit image printing modes is selected according to the value of m. nl and n2 determine the number of pieces of bit image data.

m is between 0 and 6. nl and n2 are between 0 and 255.

value of m	function	dot density (dots/inch)	print'speed (inch/sec)	dot overlap dot overlap
0	single density	60	IN	possible
1	double density	120	9	possible
	high speed double density	120	18	impossible
3	quadruple density	240	9	impossible
4	CRT graphics	80	9	possible-
	plotter garphies	72	15	possible
6	CRT graphics II	90	9	possible
7	Double-density plotter	144	7.5	possible

Example:

```
10 'Bit image variety
20 FOR A= 0 TO 6
30 LPRINT CHR$(27);"*";CHR$(A);CHR$(12);CHR$(0);
40 FOR J=1 TO 12
50 READ R
60 LPRINT CHR$(R);
70 NEXT J :LPRINT
80 DATA 1,3,7,15,31,63,63,31,15,7,3,1
90 RESTORE
100 NEXT A
110 END
```

E S C -

Name: Turn underlining on/off
Format ,

ASCII:	ESC	-	я
decimal:	27	45	*n*
hexadecimal:	1B	2D	*n*

Function:
Underlining is turned on if n = l or turned off if n=0.

ESC /

Name: Select vertical tab channel
Format

ASCII:	ESC	/	*n*
decimal:	27	47	*n*
hexadecimal:	1B	2F	*n*

Function:
All future VT commands will use the tab settings in tab channel n. The value of n should be in the range 0 to 7.

ESC 0

Name: Select 1/8 inch line spacing
Format

ASCII:	ESC	0
decimal:	27	48
hexadecimal:	1B	30

Function:
The line spacing is set to 1/8 inch for future line feed commands.

ESC 1

Name: Select 7/72 inch line
Format

ASCII:	ESC	1
decimal:	27	49
hexadecimal:	1B	31

Function:
The line spacing is set to 7/72 inch for future line feed command.

ESC 2

Name: Select 1/6 inch line spacing *TECO*
Select programmable line spacing *IBM*

Format

ASCII:	ESC	2
decimal:	27	50
hexadecimal:	1B	32

Function:

TECO: The line spacing is set to 1/6 inch for future line feed commands.

IBM: For future line feed commands, the line spacing is set to the spacing set by the ESC A command, or to 1/6 inch if no ESC A command has been given.

ESC3

Name: Set n/216 inch line spacing

Format

ASCII:	ESC	3	*n*
decimal:	27	51	*n*
hexadecimal:	1B	33	*n*

Function:

The line spacing is set to n/216 inch for future line feed commands. The value of n should be in the range 0 to 255. The vertical spacing of the dots is 1/216 inch.

ESC 4 *TEco*

Name: Select italic characters

Format , ,

ASCII:	ESC	4
decimal:	27	52
hexadecimal:	1B	34

Function:

The characters are printed using the italic character set. Italic characters are also printed if codes with the eighth bit set are sent to the printer.

ESC 4 *IBM*

Name: Set top—of—page
Format

ASCII:	ESC	4
decimal:	27	52
hexadecimal:	1B	34

Function:
Set the current position as top—of—page.

ESC 5 *TECO*

Name: Cancel italic characters
Format

ASCII:	ESC	5
decimal:	27	53
hexadecimal:	1B	35

Function:
Italic printing is cancelled. Italic characters will still be printed if codes greater than 128 are received.

ESC 5 IBM

Name: Turn automatic line feed function on/off
Format

ASCII:	ESC	5	*n*
decimal: -	27	53	л
hexadecimal:	1B	35	я

Function:
The automatic line feed is turned on if n=l, and off if n = 0. When this function is turned on, a line feed is automatically added to each carrige return received by the printer.

ESC 6

Name: Permits printing of ASCII codes 128 to 159 TECO
Name: Select world trade character set IBM
Format

ASCII:	ESC	6
decimal:	27	54
hexadecimal:	1B	36

Function:

TECO: ASCII codes 128 to 159 are set as printable characters. They are international characters in italic.

IBM: World trade characters set is selected. ASCII codes 3 to 6 and 128 to 159 are printed as world trade character set and graphics symbols.

ESC 7

Name: Prevents printing of ASCII codes 128 to 159 TECO
Name: Selects normal character set IBM
Format

ASCII:	ESC	7
decimal:	27	55
hexadecimal:	1B	37

Function:

TECO: Causes ASCII codes 128 to 159 to duplicate the function of the low order control codes, 0 to 31.

IBM Same as TECO, but ASCII codes 3 to 6 also treated as control codes.

ESC 8

Name: Disable paper end detector
Format

ASCII:	ESC	8
decimal:	27	56
hexadecimal:	1B	38

Function:

The paper end detector is turned off. This command has priority over DIP SW2-2.

ESC 9

Name: Enable paper end detector
Format

ASCII:	ESC	9
decimal:	27	57
hexadecimal:	1B	39

Function:
The paper end detector is valid so that the printer buzzer sounds when the printer has not paper.

ESC : . *TECO*

Name: Copy ROM CG into download CG
Format

ASCII:	ESC	:	NUL	NUL	NUL
decimal:	27	58	0	0	0
hexadecimal:	1B	3A	00	00	00

Function:
The fonts in the ROM CG set are copied into the Download CG area with the exception of graphic characters (code 176-223,244) in IBM mode.

ESC : *IBM*

Name: Select elite pitch
Format

ASCII:	ESC	:
decimal:	27	58
hexadecimal:	1B	3A

Function:
This command selects Elite mode.

ESC <

Name: Printhead return to home
Format

ASCII:	ESC	<
decimal:	27	60
hexadecimal:	IB	3C

Function:
The printhead return to home position.

ESC= *TECO*

Name: Clear MSB of incoming data
Format

ASCII:	ESC	
decimal:	27	61
hexadecimal:	IB	3D

Fuction:
The MSB of incoming data is set to 0. This command does not work for bit image data and define download CG data.

ESC = *IBM*

Name> Define user-defined characters
Format

ASCII:	ESC	=	*nl*	*n2*	*n3*	*n4*	*m5NUL...data...*	
decimal:	27	61	*nl*	*n2*	*20*	*n4*	*n5*	*O...data...*
hexadecimal:	IB	3D	*nl*	*n2*	*14*	*n4*	*n5*	*O...data...*

Function:
If X is the amount of characters to be defined, let Y = (X * 13) + 2 *nl* = Y MOD 256 *n2* = INT (Y/256)
n3 = 20
n4 = the ASCII code of the first character to be defined *n5* = 0 if the top 8 pins are used; n5 = 128 for the bottom 8 pins data: character definition, with 11 data for each character The amount of data must be multiple of 11.

Note: Use command "ESC I" to point a user-defined character. If DIP SW2-4 is on, this function is not available.

Name: Set MSB of incoming data
Format

ASCII:	ESC	>
decimal:	27	62
hexadecimal:	1B	3E

Function:
The MSB of incoming data is set to 1. This command does not work for bit image data and define download CG data.

ESC ?

Name: Re-assign 8-pin bit image commands
Format

ASCII:	ESC	?	*n*	*m*
decimal:	27	63	*n*	*m*
hexadecimal:	1B	3F	*n*	*m*

Function:
One of the general bit image modes listed under ESC * is assigned to any of the commands ESC K, ESC L, ESC Y and ESC Z.
The value of n is one of the ASCII K, L, Y, or Z. The value of m corresponds to the mode m in the ESC command.

ESC @

Name: Initialize printer
Format

ASCII:	ESC	@
decimal:	27	64
hexadecimal:	1B	40

Function:
The printer is initialized, same as turn on the POWER SW, But all the data in input buffer is protected.

ESC A

Name: Set n/72 inch line spacing *TECO*
Set programable line spacing *IBM*

Format

ASCII:	ESC	A	*n*
Secimal:	27	65	*n*
hexadecimal:	1B	41	*n*

Function:

TECO: The line spacing is set to n/72 inch for future line feed commands.

IBM: The programable line spacing is set to n/72 inch. ESC 2 will be sent to printer before the future line feed commands. The value of n should be in the range 0 to 85.

ESC B

Name: Set vertical tabs

Format

ASCII:	ESC	B	*nl*	*n2*	...	*nk*	*NUL*
decimal:	27	66	*nl*	*n2*	...	*nk*	*0*
hexadecimal:	1B	42	*nl*	*n2*	...	*nk*	*00*

Function:

This command sets up to 16 vertical tab positions. The tab positions are entered as nl,n2 and so on, all in the range 1 to 255, and in ascending order.

The vertical tabs are absolute position. After setting this command, altering the line spacing will not affect the tab positions.

This command sets the channel 0 of vertical tab.

ESC C

Name: Set form length in line
Format

ASCII:	ESC	C	*n*
decimal:	27	67	n
hexadecimal:	1B	43	*n*

Function:

The page length is set to n lines. The page length will depend on the setting of the line spacing. The value of n should be in the range 1 to 127.

The top of form position is set to the current line and the skip perforation length is reset.

ESC C NUL

Name: Set form length in inch
Format

ASCII:	ESC	C	NUL	*n*
decimal:	27	67	0	*n*
hexadecimal:	1B	43	00	n

Function:

The page length is set to n inches. The value of n should be in range 1 to 22.

The top of form position is set to the current line and the skip perforation length is reset.

ESC D

Name: Set horizontal tabs
Format

ASCII:	ESC	D	*nl*	*n2*	...	*nk*	*NUL*
decimal:	27	68	*nl*	*n2*	...	*nk*	*0*
hexadecimal:	1B	44	*nl*	*n2*	...	*nk*	*00*

Function:

This command sets up to 32 horizontal tab positions in ascending order.

TECO: The tab positions are seted depend on the currently selected character pitch. After set this command, the tab positions will not change even the character size is changed. *IBM:* The position of the tabs are realative to the character pitch selected when subsequent tab commands are used.

Example:

```
10 'horizontal TAB test in TECO mode
20 LPRINT "01234567890123456789012345678901234567890"
30 LPRINT CHR$(27);"D";CHR$(6);CHR$(14);CHR$(25);CHR$(0);
40 FOR I=49 TO 51
50 LPRINT CHR$(9);"TAB";CHR$(I);
60 NEXT I
70 LPRINT
```

```
01234567890123456789012345678901234567890
      TAB1     TAB2          TAB3
```

ESC E

Name: Select emphasized printing
Format

ASCII:	ESC	E
decimal:	27	69
hexadecimal:	1B	45

Function:
Following this command, the characters will be printed twice density. Each character's pattern is printed twice at a position slightly shifted along the line.

ESCF

Name: Cancel emphasized printing
Format

ASCII:	ESC	F
decimal:	27	70
hexadecimal:	1B	46

Function:
This command cancels the emphasized mode set by the ESC E and ESC !.

ESCG

Name: Select double—strike printing
Format

ASCII:	ESC	G
decimal:	27	71
hexadecimal:	1B	47

Function:
Each character is printed twice. The first time same as the normal mode. The second time is printed after a 1/216 inch line feed.

ESCH

Name: Cancel double-strike printing
Format

ASCII:	ESC	H
decimal:	27	72
hexadecimal:	1B	48

Function:
This command cancels the double—strike mode set by the ESC F and ESC !.

ESC I *TECO*

Name: Permits printing of control codes
Format

ASCII:	ESC	1	n
decimal:	27	73	*n*
hexadecimal:	1B	49	*n*

Function:
If n= 1, code 0 to 6,16, 21 to 23, and 28 to 31 are not used for control commands and can be printed.
If n=0, code 0 to 6, 16, 21 to 23, and 28 to 31 are used for control commands.

ESC I *IBM*

Name: Select font
Format

ASCII:	ESC	I	*n*
decimal:	27	73	*n*
hexadecimal:	1B	49	*n*

Function:

When n=0 the draft font is selected; when n=2 the NLQ font is selected. When n=4, a user—defined font is selected; when n=6, a user—defined NLQ font is selected.

TECO

ESC J IBM

Name: Execute n/216 inch line feed
Format

ASCII:	ESC	J	n
decimal:	27	74	*n*
hexadecimal:	1B	4A	*n*

Function:

This command moves paper forward by n/216 inch. The value of n should be in the range 0 to 255.

TECO: This command does not perform a carrige return with the line feed. *IBM:* A carrige return is peformed after execute the line feed.

ESC K

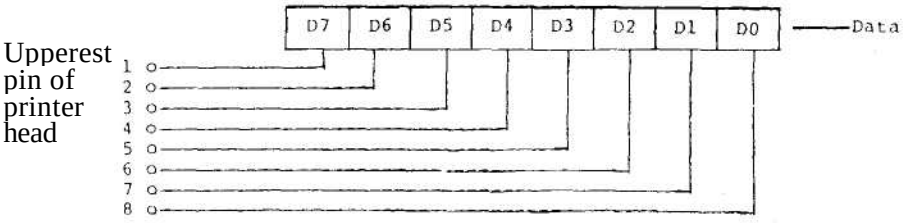
Name: Set single density bit image mode
Format

ASCII:	ESC	K	*nl*	*n2*	*... data*	*...*
decimal:	27	75	*nl*	*n2*	*... data*	*...*
hexadecimal:	1B	4B	*nl*	*n2*	*... data*	

Function:

Single density bit image graphics is selected. The number of bit image data is indicated by nl and n2.

This command has same function as ESC * NUL. (NUL is ASCII code 0).



The number of bit image data items (m) is given by following formula:
m = n 4- 256 x n

Example:

```
10 'Set single density bit image mode
20 FOR I=1 TO 4: LPRINT CHR$(27);"K";CHR$(16);CHR$(0);
30 FOR J=1 TO 16: READ D: LPRINT CHR$(D);: NEXT J
40 RESTORE 50 : NEXT I : END
50 DATA 32,112,248,112,32,32,64,140,146,98,4,8,16,32,32,16
```

ESC L

Name: Set double density bit image mode
Format

ASCII:	ESC	L	*nl*	*n2*	*... data*	...
decimal:	27	76	*nl*	*n2*	*... data*	...
hexadecimal:	1B	4C	*nl*	*n2*	*... data*	

Function:

Double density bit image graphics is selected. The number of bit image data is indicated by nl and n2.

This command has same function as ESC * SOH. (SOH is ASCII code 1).

ESC M

Name: Select elite characters
Format

ASCII:	ESC	M
decimal:	27	77
hexadecimal:	1B	4D

Function:

Elite characters (12 characters per inch) is selected.

ESC N

Name: Skip perforation length setting
Format

ASCII:	ESC	N	*n*
decimal:	27	78	*n*
hexadecimal:	1B	4E	*n*

Function:
This command is set skip perforation length to n lines. The value of n should be in the range 1 to 127. The value of n+1 must not exceed the page length.
If page length is specified by the ESC C command, the skip perforation length must be specified by ESC N.

ESC O

Name: Skip perforation cancel
Format

ASCII:	ESC	O
decimal:	27	79
hexadecimal:	1B	4F

Function:
This command cancel the skip perforation function specified by ESC N or DIP SW2-3.

ESC P *TECO*

Name: Select pica characters
Format

ASCII:	ESC	P
decimal:	27	80
hexadecimal:	1B	50

Function:
Pica characters (10 characters per inch) is selected.

ESC P _____ *IBM*

Name: Select proportional mode
Format

ASCII:	ESC	P	*n*
decimal:	27	80	*n*
hexadecimal:	IB	50	*n*

Function:

This command selects proportional spacing. Proportional spacing is selected when n=l and cancelled when n=0.

ESC Q _____ *TECO*_

Name: Set right margin
Format

ASCII:	ESC	Q	*n*
decimal:	27	81	*n*
hexadecimal:	IB	51	*n*

Function:

The right margin is set to n columns in current character pitch. The minimum of n is 1, and the maximum value of n depends on different character pitch as shown below:

	Left margin	Right margin
Pica	134	136
Elite	160	163
Condense	229	122
Condense	268	272

Note: The minimum space between the margin is 1/5 inch (e.g. the width of two pica characters).

ESC Q SYN _____ IBM

Name: Deselect printer Format

ASCII:	ESC	Q	SYN
decimal:	27	81	22
hexadecimal:	IB	51	16

Function:

Places the printer in an off line state until the printer is turned off and back on or until it receives a DC1 code. This code is only valid with a 136 column printer.

Name: Select international character set
Format

ASCII:	ESC	R	*n*
decimal:	27	82	*n*
hexadecimal:	IB	52	*n*

Function:

Some character codes have different patterns for different countries. The value of n determines character set of country.

n	country	n	country
0	USA	1	France
z	Germany	3	United Kingdom
4	Denmark T	5	Sweden
6	Italy	7	Spain
8	Japan	9	Norway
10	Denmark It	11	Spanish II
12 .	Latin America		

Example:

```
10 'International Character Set    ESCR
20 LPRINT "International character set":LPRINT
30 FOR I=0 TO 12
40 READ I$
50 LPRINT USING "\                  \";I$;
60 LPRINT CHR$(27);"R";CHR$(I);"# $ @ [ \ ] ^ ` { | } ~  "
70 NEXT I
80 LPRINT CHR$(27);"R";CHR$(0);
90 DATA "USA","FRANCE","GERMANY"
100 DATA "UNITED KINGDOM","DENMARK I","SWEDEN"
110 DATA "ITALY","SPAIN I","JAPAN","NORWAY","DENMARY II"
120 DATA "SPAIN II","LATIN AMERICA"
130 END
```

```
International character set

USA                 # $ @ [ \ ] ^ ` { | } ~
FRANCE              # $ à ° ç § ^ ` é ù è ¨
GERMANY             # $ § Ä ö Ü ^ ` ä ö ü ß
UNITED KINGDOM      £ $ @ [ \ ] ^ ` { | } ~
DENMARK I           # $ @ 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 I             ₧ $ @ ¡ Ñ ¿ ^ ` ¨ ñ } ~
JAPAN               # $ @ [ ¥ ] ^ ` { | } ~
NORWAY              # ¤ É Æ Ø Å Ü è æ ø å ü
DENMARY II          # $ É Æ Ø Å Ü é æ ø å ü
SPAIN II            # $ á ¡ Ñ ¿ é ` í ñ ó ú
LATIN AMERICA       # $ á ¡ Ñ ¿ é ü í ñ ó ú
```

Name: Restore default tab setting
Format

ASCII:	ESC	R
decimal:	27	82
hexadecimal:	1B	52

Function:

All vertical and horizontal tab settings are replaced with the default settings used when the printer is first switched on.

ESC S

Name: Select superscript/subscript mode
Format

ASCII:	ESC	S	*n*
decimal:	27	83	n
hexadecimal:	1B	53	*n*

Function:

Superscript mode is selected if n=0, or subscript mode is selected if n= 1. In the superscript mode, the character is printed on the upper half of a line. In the subscript mode, the character is printed on the lower half of a line. Example:

```
10 'Set Super/Sub-script printing mode
20 E$=CHR$(27)
30 LPRINT E$;"!";CHR$(0);"Normal";
40 LPRINT E$;"S";CHR$(0);"Superscript";
50 LPRINT E$;"S";CHR$(1);"Subscript";E$;"T"
60 LPRINT E$;"E";"Y=aX";E$;"F";
70 LPRINT E$;"S";CHR$(0);CHR$(15);"3";
80 LPRINT E$;"T";CHR$(18);
85 LPRINT E$;"E";"+bX";E$;"F";
90 LPRINT E$;"S";CHR$(0);CHR$(15);"2";
95 LPRINT E$;"T";CHR$(18);E$;"E";"+cX+d"
```

Normal Superscript Subscript
$Y=aX^3+bX^2+cX+d$

ESCT

Name: Cancel superscript/subcsript mode
Format

ASCII:	ESC	T
decimal:	27	84
hexadecimal:	1B	54

Function:
This command cancel the superscript and subscript mode.

ESC U

Name: Select uni-directional printing
Format

ASCII:	ESC	U	*n*
decimal:	27	85	n
hexadecimal:	1B	55	*n*

Function:
Uni—directional printing is selected if n=l and cancelled if n=0. The uni—directional printing starts from left—margin for the future lines.

ESC W

Name: Select enlarged printing
Format

ASCII:	ESC	W	*n*
decimal:	27	87	*n*
hexadecimal:	1B	57	*n*

Function:
All the character following this command is printed enlarged if n=l. If n=0, it is printed normal size.

ESC X

Name: Set left and right margins
Format

ASCII:	ESC	X	*nl*	*n2*
decimal:	27	88	*nl*	*n2*
hexadecimal:	1B	58	*nl*	*n2*

Function:

The left margin is set to nl column, and the right margin is set to n2 column in the current character pitch ignoring enlarged size. The minimu m space between the two margins is 1/2 inch.

ESC Y

Name: Set high speed double density bit image graphics
Format

ASCII:	ESC	Y	*nl*	*n2*	...	*data*	...
decimal:	27	89	*nl*	*n2*	...	*data*	...
hexadecimal:	1B	59	*nl*	*n2*	...	*data*	...

Function:

High speed, double density bit image graphics mode is selected. The number of bit image data is indicated by nl, n2.

This command has same function as the ESC * STX command. STX is ASCII code 2.

ESC Z

Name: Set quadruple density bit image graphics
Format

ASCII:	ESC	Z	*nl*	*n2*	...	*data ...*
decimal:	27	90	*nl*	*n2*	...	*data ...*
hexadecimal:	1B	5A	*nl*	*n2*	...	*data ...*

Function:

Quadruple density bit image graphics is selected. The number of bit image data is indicated by nl and n2.

This command has same function as the ESC * ETX command. EXT is ASCII code 3.

ESC [_____ : ____

Name: Select double-height mode
Format

ASCII:	ESC	[	@	*nl*	*n2*	*ml*	*m2*	*m3*	*m4*
decimal:	27	91	64	*nl*	*n2*	*ml*	*m2*	*m3*	*m4*
hexadecimal:	IB	SB	40	*nl*	*n2*	*ml*	*m2*	*m3*	*m4*

Function:

This command controls character height, width and line spacing. The value of nl, n2, ml and m2 are fixed as follows, nl = 4 n2 = 0 ml = 0 m2 = 0

The value of m3 controls the line spacing and character height.

m3	line spacing and character height
0	no change
1	spacing unchanged, normal height
2	spacing unchanged, double—height
16	single line spacing, unchanged height
17	single line spacing, normal height
18	single line spacing, double—height
32	double line spacing, unchanged height
33	double line spacing, normal height
34	double line spacing, double—height

The value of nt4 controls the character width

m4	character width I
0	no change
1	standard width
2	double—width

Example:

```
10 'ESC [ @    Double-height mode
20 LPRINT "Single line spacing, normal height, standard width"
30 GOSUB 90 : LPRINT CHR$(18);CHR$(1);
40 LPRINT "Single line spacing, double-height, standard width"
50 GOSUB 90 : LPRINT CHR$(34);CHR$(2);
60 LPRINT "Double line spacing,"
70 LPRINT "double-height, double-width"
75 GOSUB 90 : LPRINT CHR$(17);CHR$(2);
80 LPRINT "Single line spacing,"
85 LPRINT "normal-height, double-width" : END
90 LPRINT CHR$(27);"[@";CHR$(4);CHR$(0);CHR$(0);CHR$(0);:RETURN
```

```
Single line spacing, normal height, standard width
Single line spacing, double-height, standard width
Double line spacing,
double-height, double-width
Single line spacing,
normal-height, double-width
```

ESC \ *TECO*

Name: Set relative dot position

Format

ASCII:	ESC	\	*nl*	*n2*
decimal:	27	92	*nl*	*n2*
hexadecimal:	1B	5C	*nl*	*nl*

Function:

The printhead is moved to a dot position specified relative to its' current position. The size of relative movement is depenent on the current character size. The number of dots is given in two's complenment form by following formula:
(nl + 256*n2).

If this command would move the printhead outside the current margins it will be ignored.

ESC \ _____ *IBM*

Name: Print characters from symbol set
Format

ASCII:	ESC	\	*nl*	*n2*	...	*data*
decimal:	27	92	*nl*	*n2*	...	*data*
hexadeciaml:	IB	5C	*nl*	*n2*	...	*data*

Function:

Prints a number of characters from the IBM symbol set. The number of characters = nl + (n2 * 256).

ESC ^ _____ *TECO*

Name: Set 9—pin bit image graphics
Format

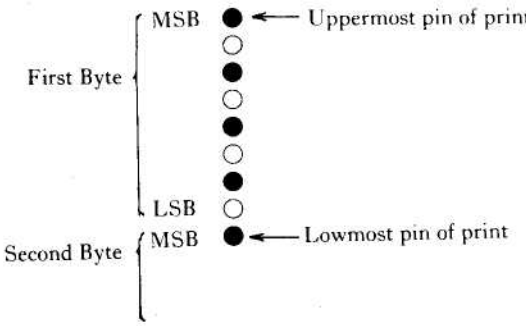
ASCII:	ESC	A	m	*nl*	*n2*	... *data*	...
decimal:	27	94	m	*nl*	*n2*	... *data*	
hexadecimal:	IB	5E	m	*nl*	*n2*	... *data*	

Function:

9—pin bit image graphics mode is selected. It is printed single density if m=0, or double density if m=l.
Example:

```
10 'Set 9-pin bit image in TECO mode
20 E$=CHR$(27)
30 'Bit image print (normal density)
40 WIDTH "lpt1:",255
50 LPRINT "9 Pin bit image mode :"
60 FOR A=0 TO 1
70 RESTORE 130
80 LPRINT "  ESC ^ Mode=";A;" ";
90 LPRINT E$;"^";CHR$(A);CHR$(12);CHR$(0);
100 FOR J=1 TO 12*2 :READ R:LPRINT CHR$(R);:NEXT J
110 LPRINT
120 NEXT A
130 DATA &H08,0,&H1C,0,&H3E,0,&H7F,0,&HFF,&H80,&HFF
140 DATA &H80,&HFF,&H80,&HFF,&H80,&H7F,0,&H3E,0,&H1C,0,&H8,0
150 END
```

```
9 Pin bit image mode :
  ESC ^ Mode= 0
  ESC ^ Mode= 1
```



ESC ^ *IBM*

Name: Print one character from symbol set
Format

ASCII:	ESC	^	c
decimal:	27	1B	c
hexadecimal:	1B	5E	c

Function:

Prints a single character (c) from the symbol set. See the character tables for the symbol set and the codes to use for c. Example:

```
10 ' ESC ^ Print one character from symbol set
20 FOR I= 128 TO 143 :LPRINT CHR$(27);"^";CHR$(I);:NEXT I
30 LPRINT :END
```

```
ÇüéâäàåçêëèïîìÄÅ
```

ESC _

Name: Turn overscore on/off
Format

ASCII:	ESC	_	*n*
decimal:	27	95	*n*
hexadecimal:	1B	5F	*n*

function:

If n=l or "1", the command selects overscore, if n=0 or "0", the command cancels overscore.

ESC a

Name: Select justification mode
Format

ASCII:	ESC	a	*n*
decimal:	27	97	*n*
hexadecimal:	1B	61	*n*

Function:

This command cause text to be justified automatically by the printer. The type of justification set depends on the value of n as follows:

n justification mode 0 left (default) 1 centre 2 right 3 full or fill If full justification is selected, the function is performed whenever the buffer becomes full.

n	justification mode
0	left (default)
1	centre
2	right
3	full or fill

If full justification is selected, the function is performed whenever the buffer becomes full.

ESCb

Name: Set vertical tabs in channel
Format

ASCII: .	ESC	b	c	*nl*	*n2*	...
decimal:	27	98	c	*nl*	*n2*	*0*
hexadecima	1B	62	c	*nl*	*n2*	*00*

Function:

This command sets up to 16 vertical tabs in one of 8 tab channels, c is channel number and should be in the range 0 to 7. The tab positions are entered as nl, n2 and so on, all in the range 1 to 255, and in ascending order.

After setting this function, the absolute tab positions will not change when the line spacing is altered. Example:

```
10 'set vertical TABs
20 LPRINT CHR$(27);"b";
30 LPRINT CHR$(2);CHR$(5);CHR$(10);CHR$(13);
40 LPRINT CHR$(0);
50 'select channel 2
55 LPRINT CHR$(12);       'set top of form
60 LPRINT CHR$(27);"/";CHR$(2);
70 LPRINT "Start!";CHR$(11);"BB";CHR$(11);
80 LPRINT "CC";CHR$(11);"DD"
```

```
Start!
BB


CC

DD
```

ESC i

Name: Select incremental and view print mode
Format

ASCII:	ESC	i	*n*
decimal:	27	105	*n*
hexadecimal:	1B	69	*n*

Function:
All the character following this command is printed in incremental print mode if n=l. If the character is input at intervals of less than approx. 0.2 sec, printout will be performed continuously. If n=0, the printer returns to normal printing mode.

ESC j

Name: Reverse line feed
Format

ASCII:	ESC	j	*n*
decimal:	27	106	*n*
hexadecimal:	1B	6A	*n*

Function:
This command moves paper backward by n/216 inch. The value of n should be in the range 0 to 255.

ESC k

Name: Select font family
Format

ASCII:	ESC	k	*n*
decimal:	27	107	n
hexadecimal:	1B	6B	*n*

Function:

This command is used to select a NLQ font from the two built-in fonts. The following values select built—in fonts.

n	NLQ font
0	Roman
1	Sans Serif

Example:

```
10 'ESC k select font family
20 GOSUB 100:LPRINT " <---- Normal draft mode" :LPRINT
25 LPRINT CHR$(27);"x";CHR$(1);
30 LPRINT CHR$(27);"k";CHR$(0);:GOSUB 100:LPRINT " <---- NLQ ROM mode":LPRINT
40 LPRINT CHR$(27);"k";CHR$(1);:GOSUB 100:LPRINT " <---- NLQ Sans Serif mode"
45 LPRINT CHR$(27);"x";CHR$(0);
50 END
100 I=65 :GOSUB 150
110 I=65+&H80 :GOSUB 150
120 RETURN
150 FOR J=I TO I+25
160 LPRINT CHR$(J);:NEXT J :RETURN
```

```
ABCDEFGHIJKLMNOPQRSTUVWXYZABCDEFGHIJKLMNOPQRSTUVWXYZ <---- Normal draft mode

ABCDEFGHIJKLMNOPQRSTUVWXYZABCDEFGHIJKLMNOPQRSTUVWXYZ <---- NLQ ROM mode

ABCDEFGHIJKLMNOPQRSTUVWXYZABCDEFGHIJKLMNOPQRSTUVWXYZ <---- NLQ Sans Serif mode
```

ESC 1

Name: Set left margin
Format

ASCII:	ESC	1	*n*
decimal:	27	108	*n*
hexadecimal:	1B	6C	*n*

Function:

The left margin is set to n columns in the current character pitch. The minimum value of n is 1, and the maximum value of n depends on different character pitch as described in ESC Q command.

ESC p

Name: Select proportional spacing
Format

ASCII:	ESC	p	*n*
decimal:	27	112	*n*
hexadecimal:	1B	70	*n*

Function:

Proportional printing is selected if n=l, or cancelled if n=0. Proportional spacing cannot be used together with elite and condensed characters. Also, printing is combined with emphasized mode.
Example:

```
10 'Select proportional spacing
20 LPRINT "      <Normal print mode>"
30 GOSUB 100
40 LPRINT
50 LPRINT "      <Proportional print mode>"
60 LPRINT CHR$(27);"p";CHR$(1);
70 GOSUB 100
80 LPRINT CHR$(27);"p";CHR$(0);
90 END
100 'Subroutine
110 LPRINT "Bioling and baking food with focused"
120 LPRINT "sunlight is one of the simplest applications"
130 LPRINT "of solar energy."
140 RETURN
```

```
      <Normal print mode>
Bioling and baking food with focused
sunlight is one of the simplest applications
of solar energy.

      <Proportional print mode>
Bioling and baking food with focused
sunlight is one of the simplest applications
of solar energy.
```

ESC s

Name: Select half speed printing
Format

ASCII:	ESC	s	*n*
decimal:	27	115	*n*
hexadecimal:	1B	73	n

Function:

Half speed is selected if n= 1, or the printer returns to full speed if n=0.

ESC t

Name: Select character table
Format

ASCII:	ESC	t	*n*
decimal:	27	116	*n*
hexadecimal:	1B	74	*n*

Function:

When n=0, italic character table is selected— the upper half of the character table contains control codes and italic charactera.

Control codes' area (from 128 to 159) can be changed into printable characters by ESC 6.

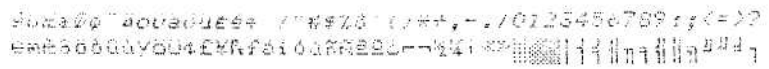
When n=l, graphic character table is selected— the upper half of the character table contains international and graphic characters like those used by IBM printers. Graphic characters can be changed into control codes by ESC 7.

Not also that ESC 6 can be used to cancel the selection made by ESC 7, as can ESC 7 cancel the selection made by ESC 6.

See the individual character tables for which characters are available in each mode.

Example:

```
10 LPRINT CHR$(27);"6";
20 LPRINT CHR$(27);"t";CHR$(0);:GOSUB 100 :LPRINT
30 LPRINT CHR$(27);"t";CHR$(1);:GOSUB 100 :LPRINT
40 END
100 FOR I= &H90 TO &HBF :LPRINT CHR$(I);:NEXT I:RETURN
```



ESC w

Name: Select double—height
Format

ASCII:	ESC	w	*n*
decimal:	27	119	*n*
hexadecimal:	1B	77	*n*

Function:

Characters following this command are printed double—height if n=l. If n=0, double—height printing is turned off. In double—height mode super/subscript and condensed modes are invalid.

ESC x

Name: Select NLQ/DRAFT mode
Format

ASCII:	ESC	x	*n*
decimal:	27	120	*n*
hexadecimal:	1B	78	*n*

Function:

NLQ mode is selected if n=l, or DRAFT mode is selected if n=0.

CHAPTER 4 INTERFACE

4.1 Parallel Interface

This model is provided with a Centronics parallel interface. The RS-232C interface is optional. The parallel interface offers:

1. Data transmission : 8-bit parallel
2. Synchronization : By externally supplied STROBE pulse
3. Handshaking : ACKNLG and BUSY signals
4. Logic level : TTL level
5. Connector : DDK 57 LE-40360-7700

Pin	Return	Signal	Direction	Description
1	19	STROBE	In	STROBE pulse indicates that data is ready to be received.
2	20	DATA1	In	These are input signals of the 1st
3	21	DATA2	In	bit to 8th bit of a parallel data.
4	22	DATA3	In	A HIGH signal indicates a logic "1".
5	23	DATA4	In	A LOW signal indicates a logic "0".
6	24	DATA5	In	
7	25	DATA6	In	
8	26	DATA7	In	
9	27	DATA8	In	
10	28	ACKNLG	Out	ACKNLG pulse at LOW indicates that data has been received and printer is ready to accept other data.
11	29	BUSY	Out	A HIGH signal indicates printer is not ready to accept data.
12	30	PE	Out	A HIGH signal indicates an out-of-paper condition occurs.
13		SLCT	Out	Pull up to +5 V through 3.3k Ohms resistance.
14		AUTO FEED XT	In	With this signal at LOW level, a line feed is added to each carrige return.
15		P/S	In	This signal is used by RS-232C card. Which at High indicates parallel interface, at LOW, serial interface.
16		0V (SG)		Signal ground level.
17		FRAME GND		Printer chassis ground line.
18		TXD	Out	This signal is used by RS-232C card. It is the serial data output signal.
19-30		GND		Signal ground for pins 1 to 12.
31		INIT	In	When this signal is at LOW, printer is initialized. The pulse width must keep at least 50 microsenconds.

32		ERROR	Out	A LOW signal indicates one of the following cases: out of paper, off-line mode or position error.
33		OV(SG)		Signal ground line
34		NC		Not used.
35		+5V	Out	This volatage is used by RS232C card. It supplies 100 mA current.
36		SLCTIN	In	Signal at LOW indicates that printer is selected.

4.2 Serial Interface

The serial interface offers:

1. Synchronization : Asynchronous system
2. Baudrate
   RS-232C : 75-19200 (user selectable)
   Current loop : 75-1200
3. Word length
   Start bit : 1 bit
   Data bit : 7 or 8 bits
   Parity bit : odd, even, or no—parity
   Stop bit : over 1 bit length
4. Logic level
   RS-232C : mark = logical "1" (-5V to -15V)
   : space = logical "0" (+ 5V to +15V)
   Current loop : mark = logical "1" (current on)
   : space = logical "0" (current off)
5. Handshaking
   a. Flag control
      RS-232C : DTR
      : space = data entry possible : mark = data entry not possible Current loop : TTY TXD
      ON = data entry possible OFF = data entry not possible
   b. X-on/X-off
      RS-232C :TXD
      X-ON **<11H>** is sent = data entry possible X—OFF <13H> is sent = data entry not possible Current loop : TTY TXD
      X—ON is sent = data entry possible X—OFF is sent = data entry not possible
6. Connector : EIA-rated 25-pin cannon type

Pin	Signal	Discription
1	***FG***	Printer chassis ground
2	TXD	Serial output data
3	RXD	Serial input data
4	RTS	It is connected with CTS internally.
5	CTS	
6	DSR	This signal must keep in space status if the host computer is going to send data to printer.
7	SG	Signal ground
8	DCD	It is connected with DSR internally.
11	REV	It is connected with DTR internally. This signal can be set to space status by users.
17	TTY TXD	Serial current loop output data.
20	DTR	This signal indicates that the printer is busy when it is in mark status. The polarity of this signal can be reversed by users.
23	TTY RXD return	Serial current loop input data return
24	TTY TXD return	Serial current loop output data return
25	TTY RXD	Serial current loop input data

7. DIP switch and Jumper

There are a DIP switch and 26 Jumpers on the RS—232C interface card, a. DIP switch

SW No	Function	ON	OFF	Factory set
1	Baudrate select			OFF
2	Baudrate select			OFF
3	Baudrate select			OFF
4	Baudrate select			ON
5	Data Length	7 bit	8 bit	OFF
6	Parity Check	enable	disable	OFF
7	Parity	EVEN	ODD	OFF
8	I/O select	Serial	Parallel	ON

Baudrate select

Baudrate	SW4	SW3	SW2	SW 1
75	ON	ON	ON	ON
110	ON	ON	ON	OFF
134.5	ON	ON	OFF	ON
150	ON	ON	OFF	OFF
200	ON	OFF	ON	ON
300	ON	OFF	ON	OFF
600	ON	OFF	OFF	ON
1200	ON	OFF	OFF	OFF
1800	OFF	ON	ON	ON
2400	OFF	ON	ON	OFF
4800	OFF	ON	OFF	ON
9600	OFF	ON	OFF	OFF
19200	OFF	OFF	ON	ON

b. lumper

Jumper No.	Factor set	Function
JP3-1	O	Select RS-232C or Current loop.
2	O	
JP3-3	**S**	Select Flag control or X-ON/X-OFF for current loop.
4	**O**	
JP3-5	**O**	Select the drive side of RXD signal for Current loop.
6	**O**	
JP3-7	**O**	Select the drive side of TXD or REV signal for
8	**S**	Current loop.
JP2-9	**S**	REV signal polarity
10	**S**	
JP2-11	**O**	Fixed or unfixed DSR and DCD
JP2-12	**O**	Select straight or twisted cable.
13	**S**	
14	**O**	
15	**S**	
JP1-16	**O**	
17	**S**	
18	**O**	
19	**S**	
JP1-20	**S**	Select the drive side of RXD signal for Current loop.
21	**O**	
22	**S**	
JP1-23	**S**	Select the drive side of TXD or REV signal for
24	**O**	Current loop. ^
25	**S**	
JP1-26	**O**	Set Pin 14 to space

8. Setting of Jumpers

a. Select RS-232C or Current loop

	RS-232C	Current loop
JP3-1	S	O
JP3-2	**o**	S

b. REV signal polarity

	Normal	reverse
JP2-9	O	S
JP2-10	S	**o**

c. Select Flag control or X-ON/X-OFF for Current loop

	Flag control	X-ON/X-OFF
JP3-3	S	O
JP3-4	**o**	**s**

d. Fixed or unfixed DSR and PCD

	Fixed	Unfixed
JP2-11	S	O

Note: In DSR and DCD Fixed, users must remove JP1-9 and JP1-12. e. Select straight or twisted cable

	Straight	Twisted
JP2-12	S	O
JP2-13	O	**S**
JP2-14	**S**	**o**
JP2-15	**o**	**S**
JP1-16	**S**	**o**
JP1-17	**o**	**S**
JP1-18	**S**	**o**
JP1-19	**o**	**S**

Note: The twisted cable means that line 2 exchanges with line 3 and line 6 with line 20.

f. Select the drive side of signal for Current loop

1. RXD_____

	Printer	Computer
JP3-5	O	**S**
JP1-20	S	**O**
JP1-21	**O**	**S**
JP1-22	**S**	**O**
JP3-6	**O**	**S**

2. TXD

	Printer	Computer
JP3-7	O	S
JP1-23	S	**O**
JP1-24	**O**	**S**
JP1-25	**S**	**O**
JP3-8	**O**	**S**

g. Set Pin 14 to space

	Space	Open
JP1-26	S	O

Note: "S" means short circuit, "O" means open circuit.

CHAPTER 5 MAINTENANCE

5.1 Routine Maintenance

It is recommanded that routine maintenance should be performed regularly to prevent machine faults and to ensure long operation life. Perform routine maintenance every 500,000 lines printed or once a year.

5.1.1 Cleaning

a. Exterior of printer

Clean the printer cabinet and cover with a soft cloth moistened with a neutral detergent.

Do not use a hard cloth or volatile solvent (e.g., alcohol or thinner), because the printer cabinet or cover may be discolored or scratched, and printed characters may be erased.

Be careful not to get electronic components and mechanical parts wet. It will hurt your printer seriously.

b. Interior of Printer

Use a soft brush to remove dust from the printer mechanism and PWB units.

Be careful not to damage the circuit of electronic components.

c. Head Nose

Remove the ribbon cassette from the printer.

Push copy control lever toward "+" direction to increase the gap between the platen and head nose.

Use a soft brush to clean dust or dirt (e.g., paper dust, ribbon fluff).

Be careful not to damage the ribbon guide plate.

After cleaning, push copy control lever back to the standard position.

5.1.2 Oiling

It is recommended that oiling should be performed to keep the early-time capability for along period and prevent machine faults.

a. Use dry gauze or absorbent cotton to clean the two shafts of the head base.

b. Apply a small quantity of T-37 oil to the head base oiling rings, and the head base shafts.

Notes:

1. Do not use oils other than T-37.
2. Do not apply T-37 to parts other than those specified.
3. Do not use too much oil to dirty other parts of this printer (e.g., platen, electronic components and printhead).

5.2 Replacement of Parts

5.2.1 Printhead

Perform the following procedures to replace the printhead:

a. Turn the power off.
b. Remove the front cover and ribbon cassette.
c. Draw out the head cable from the connector.
d. Remove two screws from the head base and lift the old printhead off the head base.
e. Install the new printhead by fixing it with two screws.
f. Insert the head cable into the connector.

Notes:

1. Check the gap between the platen and printhead. (ideal gap is 0.35-0.40 mm.)
2. Make sure that head cable is connected correctly arid securely.
3. Slide the head base along the shaft to make sure that the head cable is connected correctly and securely.

5.3 Notes **upon Operation**

a. Do not operate the printer without the ink ribbon and paper.
b. Use the specified ink ribbon and cassette.
c. Replace the ink ribbon before it is torn or damaged.
d. It's a good habit always closing the front cover and tractor cover while printing.

5.4 Repair Service

If you require any information or have any problem with the printer, please contact the dealer.

APPENDIX A SPECIFICATIONS

1. Printing system : Serial impact dot matrix

2. Printing direction
   a. Upon text : Bidirectional logical seeking printing
   b: Upon graphics : Unidirectional printing (from left to right)

3. Maximum printing range : 345.4 mm (13.6 inches)

4. Type of character sets
   96 ASCII characters, marks, symbols plus other 12 international character sets (including Italic font).

   a) USA
   b) France
   c) Germany
   d) United Kingdom
   e) Denmark I
   f) Sweden
   g) Italy
   h) Spain I
   i) Japan
   j) Norway
   k) Denmark II
   1) Spain II
   m) Latin America

5. Character configuration
   a. Draft character mode -
      9 dots * 9 dots + 3 spaces (half-dot used)
   b. NLQ character mode -
      18 dots * 20 dots + 4 spaces (quarter-dot used)
   c. 8-pin bit image graphic mode -

Single density	: 60 dots/inch
Double density	: 120 dots/inch
Double-speed, Double-density	: 120 dots/inch
Quadruple-density	: 240 dots/inch
CRT graphics I	: 80 dots/inch
Plotter graphics	: 72 dots/inch
CRT graphics II	: 90 dots/inch
Double density plotter	: 144 dots/inch

   d. 9-pin bit image graphic mode -

Normal density	: 60 dots/inch
Double-density	: 120 dots/inch

6. Character size
   a. Pica (10 characters per inch)
   b. Elite (12 characters per inch)
   c. Condensed (17 characters per inch)

7. Printing speed
   a. 200 characters/sec (PICA)
   b. 240 characters/sec (Elite)
   c. 40 characters/sec (NLQ: Pica)

8. Printing width in characters

a. Pica	:	136 characters per line
b. Elite	:	163 characters per line
c. Condensed	:	233 characters per line
d. Double-width Pica	:	68 characters per line
e. Double-width Elite	:	81 characters per line
f. Double-width condensed	:	116 characters per line

9. Character spacing
   a. Fixed pitch mode
   b. Proportional pitch mode

10. Form feed specifications
    a. Form feeding system:
       - Variable sprocket pin feed — Paper width: 4 to 16 inches
       - Friction feed — Paper width: 4 to 15 inches
    b. Form feeding pitch:
       - Standard form feed pitch — 4.233 mm (1/6 inch)
       - Minimum form feed pitch — 0.117 mm (1/216 inch)

11. Forms

a. Fan-fold paper width	: 4 to 16 inches
b. Roll paper width	: 4 to 15 inches
c. Cut-sheet paper width	: 4 to 15 inches
d. Copy paper	
• Type	Carbonless paper
• Number of copies	3 copies (one original plus two copies)

12. Ink ribbon

a. Color	Black
b. Dimensions	13 mm (W) * 11 m (L)
c. Ribbon cassette	Snap-in cartridge (Special ribbon cassette)

13. Operation conditions

(1) Supply voltage (select one type)	a. 110VAC±10%, 60Hz b. 117VAC±1O%, 60Hz c. 22OVAC±1O%, 50Hz d. 240VAC±10%, 50Hz
(2) Temperature	: 5 (,o 40 C

	(3) Relative humidity	: Up to 80% (No dew condensation allowed)
	(4) Shock resistance	: 1G or less (Within 1 msec)
	(5) Vibration resistance	: 0.25G or less, 55Hz.
14.	Interface	a. Centronics parrallel b. RS-232C serial (optional)
15.	Power consumption	
	a. Operation	HOW or less (Draft:90W or less)
	b. Standby	20W or less
16.	Reliability	
	a. MCBF	: 5 million lines (excluding printhead and ink ribbon)
	b. Printhead life	: 100 million characters
	c. Ink ribbon life	: 4 million characters
17.	Dimensions	: 556 mm (L) * 350 mm (D) * 120 mm (H)
18.	Weight	-.About 11 kg

APPENDIX B DIP SWITCH SETTING TABLES

Table 1: Functions and conditions of DIP switch No. 1

Switch number	Functions	ON	OFF	Factory—set condition
1-1	Zero font	*0*	0	OFF
1-2	Print Style	CONDENS	NORMAL	OFF
1-3	Mode selector	IBM	TECO	OFF
1-4 1-5 1-6	Internal character set	See Table 3,4		ON ON ON
1-7	AUTO FEED XT signal	Fixed internally	Not fixed internally	OFF
1-8	TECO Character Set (DIP SW 1-3 OFF) IBM MODE Auto CR (1-3 ON)	Italic Valid	Graphics Invalid	ON

Table 2: Funtions and conditions of DIP switch No. 2

Switch number	Functions	ON	OFF	Factory — set condition
2-1	Page length	12 inch	11 inch	OFF
2-2	Paper—end detector	Invalid	Valid	OFF
2-3	1 inch skip—over perforation	Valid	Invalid	OFF
2-4	Input buffer or	Input buffer *t* only	Download & Input buffer	ON

Table 3: International character set designation in TECO mode while DIPSW1-3OFF

	SW1-4	SW1-5	SW1-6
USA	ON	ON	ON
FRANCE	OFF	ON	ON
GERMANY	ON	OFF	ON
U.K	OFF	OFF	ON
DENMARK I	ON	ON	OFF
SWEDEN	OFF	ON	OFF
ITALY	ON	OFF	OFF
SPAIN I	OFF	OFF	OFF

Table 4: Character set designation in IBM mode while DIP SW1-3 ON

	SW1-4	SW1-5	SW1-6
Character set 1	X	ON	X
Character set 2	ON	OFF	X
Character set 3	OFF	OFF	X

Note:
"X" means you don't have to care

APPENDIX C INTERNATIONAL CHARACTER SET

USA	#	$	@	[	\	]	^	`	{	¦	}	~
FRANCE	#	$	à	°	ç	§	^	`	é	ù	è	¨
GERMANY	#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
UNITED KINGDOM	£	$	@	[	\	]	^	`	{	¦	}	~
DENMARK I	#	$	@	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 I	₧	$	@	¡	Ñ	¿	^	`	¨	ñ	}	~
JAPAN	#	$	@	[	¥	]	^	`	{	¦	}	~
NORWAY	#	¤	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
DENMARY II	#	$	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
SPAIN II	#	$	á	¡	Ñ	¿	é	`	í	ñ	ó	ú
LATIN AMERICA	#	$	á	¡	Ñ	¿	é	ü	í	ñ	ó	ú

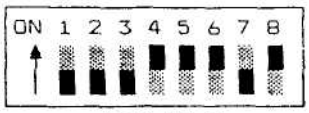
International character set under TECO mode set by command "ESC R n."

Also set by DIP switch 1-4, 1-5, 1-6 when 1-3 is off.

APPENDIX D CHARACTER SETS

TECO Italic Character Set --UPPER HALF BYTE--

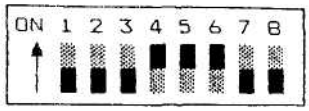
LOWER HALF BYTE	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0			SP	0	@	P	`	p			SP	*0*	*@*	*P*	*`*	*p*
1		DC1	!	1	A	Q	a	q		DC1	*!*	*1*	*A*	*Q*	*a*	*q*
2		DC2	"	2	B	R	b	r		DC2	*"*	*2*	*B*	*R*	*b*	*r*
3		DC3	#	3	C	S	c	s		DC3	*#*	*3*	*C*	*S*	*c*	*s*
4		DC4	$	4	D	T	d	t		DC4	*$*	*4*	*D*	*T*	*d*	*t*
5			%	5	E	U	e	u			*%*	*5*	*E*	*U*	*e*	*u*
6			&	6	F	V	f	v			*&*	*6*	*F*	*V*	*f*	*v*
7	BEL		'	7	G	W	g	w	BEL		*'*	*7*	*G*	*W*	*g*	*w*
8	BS	CAN	(	8	H	X	h	x	BS	CAN	*(*	*8*	*H*	*X*	*h*	*x*
9	HT		)	9	I	Y	i	y	HT		*)*	*9*	*I*	*Y*	*i*	*y*
A	LF		*	:	J	Z	j	z	LF		*	*:*	*J*	*Z*	*j*	*z*
B	VT	ESC	+	;	K	[	k	{	VT	ESC	*+*	*;*	*K*	*[*	*k*	*{*
C	FF		,	<	L	\	l	|	FF		*,*	*<*	*L*	**	*l*	*|*
D	CR		-	=	M	]	m	}	CR		*-*	*=*	*M*	*]*	*m*	*}*
E	SO		.	>	N	^	n	~	SO		*.*	*>*	*N*	*^*	*n*	*~*
F	SI		/	?	O	_	o	DEL	SI		*/*	*?*	*O*	*_*	*o*	DEL



DIP SW 1

TECO Grphics Character Set --UPPER HALF BYTE--

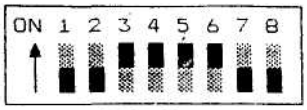
LOWER HALF BYTE	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0			SP	0	@	P	`	p			ä	▒	└	╙	α	≡
1		DC1	!	1	A	Q	a	q		DC1	ì	▒	┴	╤	β	±
2		DC2	"	2	B	R	b	r		DC2	ó	▒	┬	╥	Γ	≥
3		DC3	#	3	C	S	c	s		DC3	ú	▒	├	╙	π	≤
4		DC4	$	4	D	T	d	t		DC4	ñ	▒	─	╘	Σ	⌠
5			%	5	E	U	e	u			Ñ	▒	┼	╒	σ	⌡
6			&	6	F	V	f	v			ª	▒	╞	╓	µ	÷
7	BEL		'	7	G	W	g	w	BEL		º	▒	╟	╫	τ	≈
8	BS	CAN	(	8	H	X	h	x	BS	CAN	¿	▒	╚	╪	Φ	°
9	HT		)	9	I	Y	i	y	HT		⌐	▒	╔	┘	Θ	∙
A	LF		*	:	J	Z	j	z	LF		¬	▒	╩	┌	Ω	·
B	VT	ESC	+	;	K	[	k	{	VT	ESC	½	▒	╦	▉	δ	√
C	FF		,	<	L	\	l	¦	FF		¼	▒	╠	■	∞	ⁿ
D	CR		-	=	M	]	m	}	CR		¡	▒	═	▌	ø	²
E	SO		.	>	N	^	n	~	SO		«	▒	╬	▐	∈	▪
F	SI		/	?	O	_	o	DEL	SI		»	▒	╧	▀	∩	DEL



DIP SW 1

IBM Character Set 1

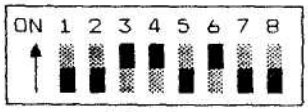
LOWER HALF BYTE	UPPER HALF BYTE 0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0			SP	0	@	P	`	p			á	▒	└	╨	α	≡
1		DC1	!	1	A	Q	a	q		DC1	í	▓	┴	╤	β	±
2		DC2	"	2	B	R	b	r		DC2	ó	▓	┬	╥	Γ	≥
3		DC3	#	3	C	S	c	s		DC3	ú	│	├	╙	π	≤
4		DC4	$	4	D	T	d	t		DC4	ñ	┤	─	╘	Σ	⌠
5			%	5	E	U	e	u			Ñ	╡	┼	╒	σ	⌡
6			&	6	F	V	f	v			ª	╢	╞	╓	µ	÷
7	BEL		'	7	G	W	g	w	BEL		º	╖	╟	╫	τ	≈
8	BS	CAN	(	8	H	X	h	x	BS	CAN	¿	╕	╚	╪	Φ	°
9	HT		)	9	I	Y	i	y	HT		⌐	╣	╔	┘	Θ	∙
A	LF		*	:	J	Z	j	z	LF		¬	║	╩	┌	Ω	·
B	VT	ESC	+	;	K	[	k	{	VT	ESC	½	╗	╦	█	δ	√
C	FF		,	<	L	\	l	|	FF		¼	╝	╠	▄	∞	n
D	CR		-	=	M	]	m	}	CR		¡	╜	═	▌	ø	²
E	SO		.	>	N	^	n	~	SO		«	╛	╬	▐	∈	■
F	SI		/	?	O	_	o	DEL	SI		»	┐	╧	▀	∩	



DIP SW 1

IBM Character Set 2

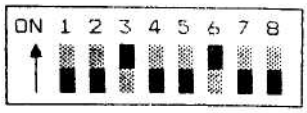
LOWER HALF BYTE:	UPPER HALF BYTE: 0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0			SP	0	@	P	`	p	Ç	é	á	▒	└	╙	α	≡
1		DC1	!	1	A	Q	a	q	ü	æ	í	▒	┴	╤	β	±
2		DC2	"	2	B	R	b	r	é	Æ	ó	▓	┬	╥	Γ	≥
3	♥	DC3	#	3	C	S	c	s	â	ô	ú	│	├	╙	π	≤
4	♦	DC4	$	4	D	T	d	t	a	ö	ñ	┤	─	╘	Σ	⌠
5	♣	§	%	5	E	U	e	u	à	ò	Ñ	╡	┼	╒	σ	J
6	♠		&	6	F	V	f	v	ª	û	ª	╢	╞	╥	µ	÷
7	BEL		'	7	G	W	g	w	ç	ù	º	╖	╟	╫	τ	≈
8	BS	CAN	(	8	H	X	h	x	ê	ÿ	¿	╕	╚	╪	Φ	°
9	HT		)	9	I	Y	i	y	ë	Ö	⌐	╣	╔	┘	Θ	•
A	LF		*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Ω	·
B	VT	ESC	+	;	K	[	k	{	ï	¢	½	╗	╦	▉	δ	√
C	FF		,	<	L	\	l	|	î	£	¼	╝	╠	■	∞	n
D	CR		-	=	M	]	m	}	ì	¥	¡	╜	═	▌	ϕ	²
E	SO		.	>	N	^	n	~	Ä	₧	«	╛	╬	▐	∈	■
F	SI		/	?	O	_	o	DEL	Å	ƒ	»	┐	╧	■	∩	



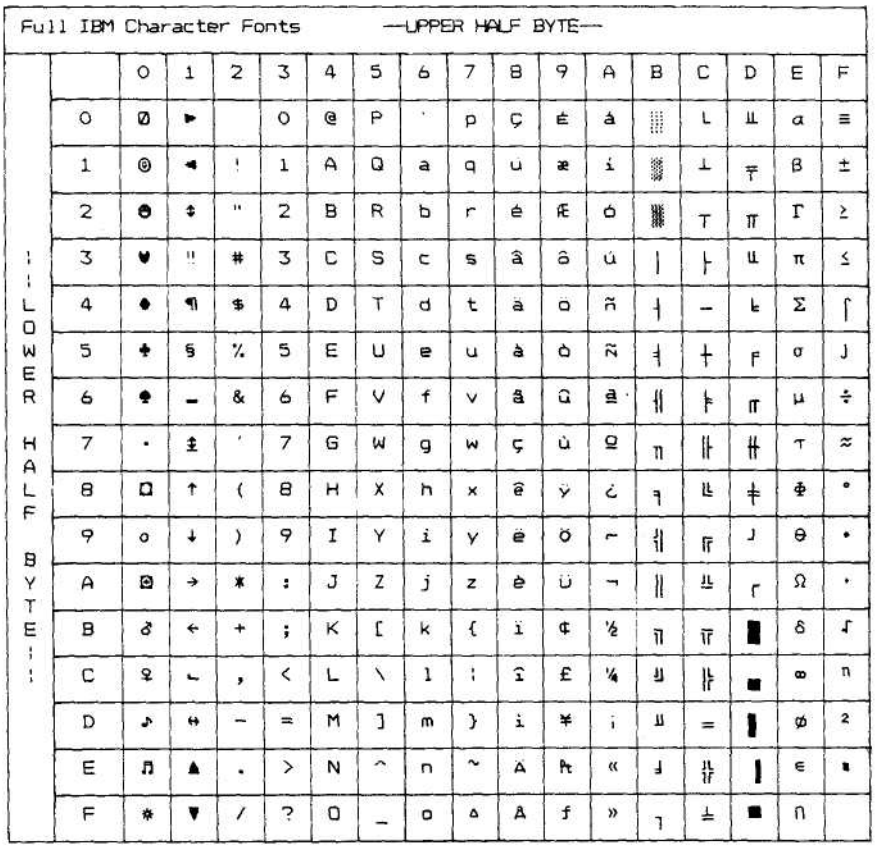
DIP SW 1

IBM Character Set 3 —UPPER HALF BYTE—

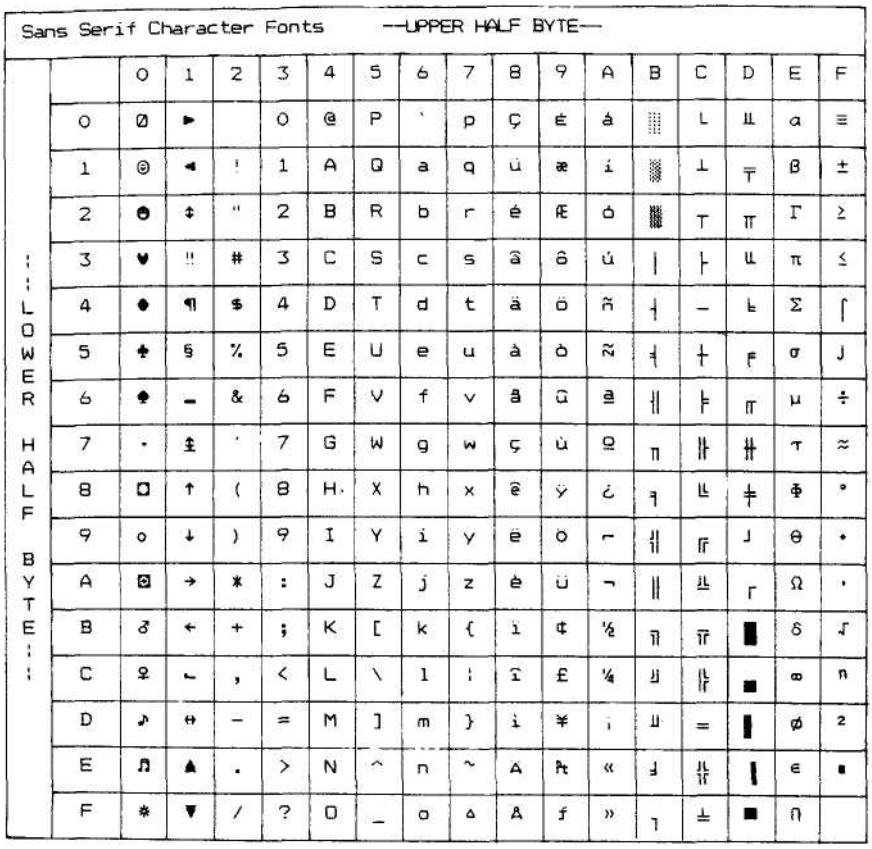
LOWER HALF BYTE	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	Ø	►	SP	0	@	P	`	p	Ç	é	á	▒	└	╨	α	≡
1	☺	◄	!	1	A	Q	a	q	ü	æ	í	▓	┴	╤	β	±
2	☻	↕	"	2	B	R	b	r	é	Æ	ó	▓	┬	╥	Γ	≥
3	♥	‼	#	3	C	S	c	s	â	ô	ú	│	├	╙	π	≤
4	♦	¶	$	4	D	T	d	t	ä	o	ñ	┤	─	╘	Σ	⌠
5	♣	§	%	5	E	U	e	u	à	ò	Ñ	╡	┼	╒	σ	⌡
6	♠	▬	&	6	F	V	f	v	ã	Ú	ª	╢	╞	╓	μ	÷
7	BEL	↨	'	7	G	W	g	w	ç	ù	º	╖	╟	╫	τ	≈
8	BS	↑	(	8	H	X	h	x	ê	ÿ	¿	╕	╚	╪	Φ	°
9	HT	↓	)	9	I	Y	i	y	ë	Ö	⌐	╣	╔	┘	Θ	•
A	LF	→	*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Ω	·
B	♂	ESC	+	;	K	[	k	{	ï	¢	½	╗	╦	█	δ	√
C	FF	∟	,	<	L	\	l	¦	î	£	¼	╝	╠	▄	∞	n
D	CR	↔	-	=	M	]	m	}	ì	¥	¡	╜	═	▌	ø	²
E	♫	▲	.	>	N	^	n	~	Ä	₧	«	╛	╬	▐	∈	■
F	☼	▼	/	?	O	_	o	DEL	Å	ƒ	»	┐	╧	▀	∩	



DIP SW 1



This is a table of full IBM characters build-in, which could be picked up by using command "ESCV and "ESC A" under IBM mode.



This is another shape of NLQ character, which is different from Roman NLQ characer.

To produce these characters use command "ESC k" together with "ESC x."

APPENDIX E COMMAND SUMMARY

COMMAND	TEC O	IBM	DESCRIPTION	Page
BEL			Bell	17
BS			Back Space	17
HT			Horizontal Tab	18
LF			Line Feed	18
VT			Vertical Tab	18
FF			Form Feed	19
CR			Carriage Return	19
SO			Select enlarged printing for one line	19
SI			Select condensed printing	20
DC1			Select printer	20
DC2	T		Cancel condensed printing	20
DC2		I	Cancel condensed, elite and proportional printing	20
DC3	T		Deselect printer	21
DC4			Cancel enlarged printing	21
CAN			Cancel line	21
DEL			Delete character	21
ESC SO			Select enlarged printing for one line	22
ESC SI			Select condensed printing	**22**
ESC EM			Dummy command	22
ESC SP			Set intercharacter space	23
ESC !			Print mode selection	23
ESC #	T		Cancel MSB control	25
ESC $			Set absolute dot position	25
ESC %			Turn download CO on/off	25
ESC &			Download character definition	26
ESC *			8 —pin bit image mode selection	29
ESC -			Turn underlining on/off	30
ESC /			Select vertical tab channel	30

COMMAND	T E C O	I B M	DESCRIPTION	Page
ESC 0			Select 1/8 inch line spacing	30
ESC 1			Select 7/72 inch line spacing	30
ESC 2	T		Select 1/6 inch line spacing	31
ESC 2		I	Select programmable line spacing	31
ESC 3			Select n/216 inch line spacing	31
ESC 4	T		Select italic characters	31
ESC 4		I	Set top of page	32
ESC 5	T		Cancel italic characters	32
ESC 5		I	Turn automatic line feed function	32
ESC 6	T		Permits printing of ASCII code 128 to 159 /	33
ESC 6		I	Selects World Trade character set	33
ESC 7	T		Prevents printing of ASCII 128 to 159	33
ESC 7		I	Selects normal character set	33
ESC 8			Disable paper end detector	33
ESC 9			Enable paper end detector	34
ESC :	T		Copy ROM CG into download CG	34
ESC :		I	Select elite pitch	34
ESC <			Print head return to home	35
ESC =	T		Clear MSB of incoming data	35
ESC =		I	Define user-defined characters	35
ESC >	T		Set MSB of incoming data	36
ESC ?			Re assign 8—pin image commands	36
ESC @			Initialize printer	36
ESC A	T		Set n/72 inch line spacing	37
ESC A		I	Set programmable line spacing	37
ESC B			Set vertical tabs	37
ESC C			Set page length in line	38
ESC C NUL			Set page length in inch	38
ESC D			Set horizontal tabs '	38
ESC E			Set emphasized printing	39
ESC F			Cancel emphasized printing	39
ESC G			Select double strike printing	40
ESC H			Cancel double strike printing	40
ESC I	T		Permits printing of control codes	40
ESC I		I	Select font	41

COMMAND	TECO	IBM	DESCRIPTION	Page
ESCJ	T		execute n/216 inch line feed without carriage return	41
ESCJ		I	Execute n/216 inch line feed with carriage return	41
ESC K			et single density bit image mode	41
ESC L			et double density bit image mode	42
ESC M			elect elite characters	42
ESC N			kip perforation length setting	43
ESC O			kip perforation cancel	43
ESC P	T		elect pica characters	43
ESC P		I	elect proportional mode	44
ESC Q	T		Set right margin	44
ESC Q SYN		I	)eselect printer	44
ESC R	T		Select international character set	45
ESC R		I	Restore default tab settings	46
ESC S			Select superscript/subscript mode	46
ESCT			Cancel superscript/subscript mode	47
ESC U			Select uni—directional mode	47
ESC W			Select enlarged printing	47
ESC X			Set left and right margins	48
ESC Y			Set high speed double density bit image graphics	48
ESCZ			Set quadruple density bit image graphics	48
ESC [@			Select double—height mode	49
ESC\	T		Set relative dot position	50
ESC\		I	Print characters from symbol set	51
ESCA	T		Set 9 pin bit image graphics	51
ESCA		I	Print one character from symbol set	52
ESC-			Turn overscore on/off	52
ESC a			Select justification mode	53
ESC b			Set vertical tabs in channel	53
ESC i			Select incremental and view print mode	54
ESC j			Reverse line feed	54
ESC k			Select font family	55
ESC 1			Set left margin	55
ESCp			Select proportional spacing	56
ESC s			Select half speed printing	57
ESC t			Select character table	57
ESC w			Select double —height	58
ESC x			Select NLQ/DRAFT mode	58

Note: "T" means TECO mode only. "I" means IBM mode only.

CONFIGURATION

COMMAND	TECO	IBM	DESCRIPTION	Page
ESC @			Initialize printer	36
DC1			Select printer	20
DC3	T		Deselect printer	21
ESC Q SYN		I	Deselect printer	44
ESC EM			Dummy command	22
ESC 8			Disable paper end detector	33
ESC 9			Enable paper end detector	34
ESC <			Print head return to home	35
ESC U			Select uni-directional mode	47
ESC s			Select half speed printing	57
ESC i			Select incremental and view print mode	54
ESC #	T		Cancel MSB control	25
ESC =	T		Clear MSB of incoming data	35
ESC >	T		Set MSB of incoming data	36

MISCELLANEOUS CHARACTER CODES:

BEL			Bell	17
BS			Back Space	17
CB			Carriage Return	19
CAN			Cancel line	21
DEL			Delete character	21

PAPER LINE FEED COMMANDS:

LF			Line Feed	18
ESCJ	T		Execute n/216 inch line feed without carriage reture	41
ESCj		I	Execute n/216 inch line feed with carriage return	41
ESCj			Reverse line feed	54
ESC 0			Select 1/8 inch line spacing	30
ESC 1			Select 7/72 inch line spacing	30
ESC 2	T		Select 1/6 inch line spacing	31
ESC 2		I	Select programmable line spacing	31
ESC 3			Set n/216 inch line spacing	31
ESC A	T		Set n/72 inch line spacing	37
ESC A		I	Set programmable line spacing	37
ESC 5		I	Turn automatic line feed function on/off	32

Note: "T" means TECO mode only. "I" means IBM mode only.

PAPER FORM FEED COMMANDS:

COMMAND	TEC O	IBM	DESCRIPTION	Page
FF			Form Feed	19
ESC 4		I	Set top of page	**32**
ESCC			Set page length in line	**38**
ESC C NUL			Set page length in inch	**38**

VERTICAL FORMATING COMMANDS:

COMMAND	TEC **O**	IBM	DESCRIPTION	Page
VT			Vertical Tab	18
ESC R		I	Restore default tab setting	46
ESC B			Set vertical tabs.	**37**
ESCb			Set vertical tabs in channel	**53**
ESC/			Select vertical tab channel	**30**
ESC N			Skip perforation length setting	**43**
ESC O			Skip perforation cancel	**43**

HORIZONTAL FORMATING COMMANDS:

ESCQ	T	Set right margin	44
ESC 1		Set left margin	55
ESCX		Set left and right margin	48
ESCD		Set horizontal tabs	38
HT		Horizontal Tab	18
ESC R	I	Restore default tab settings	46
ESC SP		Set intercharacter space	23
ESC $		Set absolute dot position	25
ESC \	T	Set relative dot position	50
ESC a		Select justification mode	53

GENERAL PRINT STYLE SELECTION:

COMMAND	TECO	IBM	DESCRIPTION	Page
ESCx			Select NLQ/DRAFT mode	58
ESC I		I	Select font	41
ESCk			Select font family	55
ESC !			Print mode selection	23
ESC M			Select elite characters	42
ESC:		I	Select elite pitch	34
ESC P	T		Select pica characters	43
ESC P		I	Select proportional mode	44
ESCp			Select proportional spacing	56

PRINT SIZE COMMANDS:

SI			Select condensed printing	20
ESC SI			Select condensed printing	22
DC2	T		Cancel condensed printing	20
DC2		I	Cancel condensed, elite and proportional printing	20
SO			Select enlarged printing for one line	19
ESC SO			Select enlarged printing for one line	22
DC4			Cancel enlarged printing	21
ESC W			Select enlarged printing	47
ESC [*(a*			Select double—height mode	49
ESC w			Select double—height	58

PRINT ENHANCEMENT COMMANDS:

ESC E			Set emphasized printing	39
ESC F			Cancel emphasized printing	39
ESCG			Select double strike printing	40
ESC H			Cancel double strike printing	40
ESC S			Select superscript/subscript mode	46
ESCT			Cancel superscript/subscript mode	47
ESC -			Turn underlining on/off	30
ESC .			Turn overscore on/off	52

ALTERNATIVE CHARACTER SETS:

COMMAND	TECO	IBM	DESCRIPTION	Page
ESC R	T		Select international character set	45
ESC 4	T		Select italic characters	**31**
ESC 5	T		Cancel italic characters	**32**
ESC &			Download character definition	**26**
ESC =		**I**	Define user-defined characters	**35**
ESC :	T		Copy ROM CG into download CG	**34**
ESC %			Turn download CG on/off	**25**
ESC 6	T		Permits printing of ASCII code 128 to 159	**33**
ESC 6		I	Selects World Trade character set	**33**
ESC 7	T		Prevents printing of ASCII code 128 to 159	**33**
ESC 7		I	Selects normal character set	**33**
ESC I	T		Permit printing of control codes	**40**
ESC \		I	Print characters from symbol set	**51**
ESC A		I	Print one character from symbol set	**52**
ESC t			Select character table	**57**

GRAPHICS COMMANDS:

ESC*		8-pin bit image mode selection	29
ESC K		Set single density bit image mode	41
ESC L		Set double density bit image mode	42
ESC Y		Set high speed double density bit image graphics	48
ESC Z		Set quadruple density bit image graphics	48
ESC ?		Re assign 8 bit image commands	36
ESC A	T	Set 9—pin bit image graphics	51

Note: "T" means TECO mode only. "I" means IBM mode only.