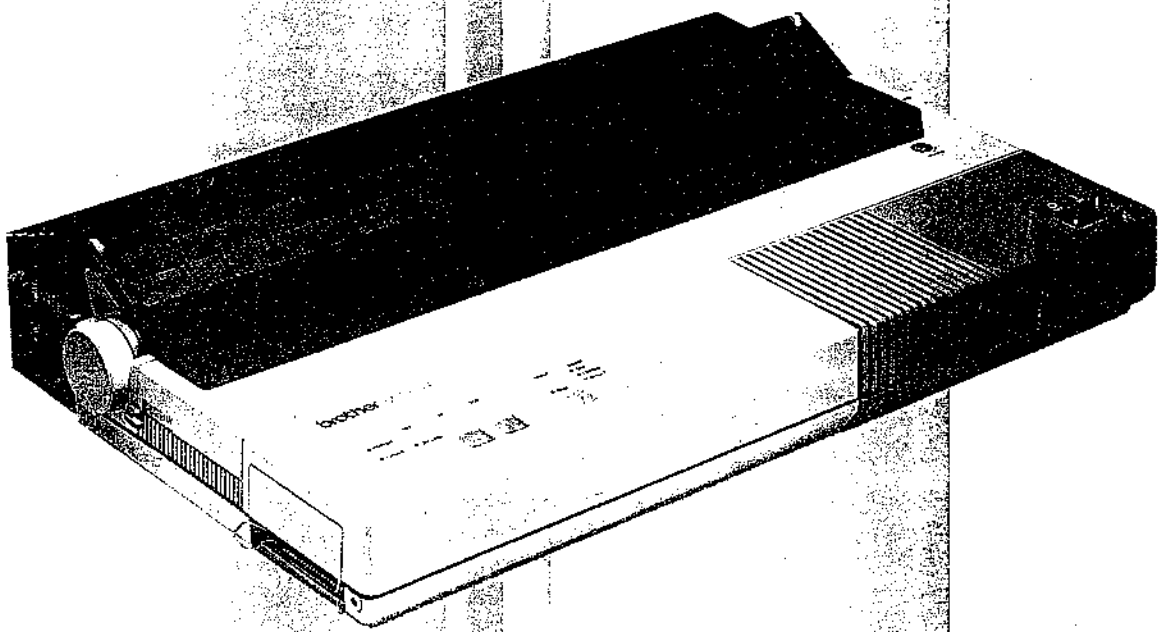


IMPACT DOT MATRIX PRINTER

M-1509

OWNER'S MANUAL

85-05-05

brother

Binary	Hex	Dec	Character	Binary	Hex	Dec	Character
0000000	00	0	NUL	1000000	40	64	@
0000001	01	1	SOH	1000001	41	65	A
0000010	02	2	STX	1000010	42	66	B
0000011	03	3	ETX	1000011	43	67	C
0000100	04	4	EOT	1000100	44	68	D
0000101	05	5	ENQ	1000101	45	69	E
0000110	06	6	ACK	1000110	46	70	F
0000111	07	7	BEL	1000111	47	71	G
0001000	08	8	BS	1001000	48	72	H
0001001	09	9	HT	1001001	49	73	I
0001010	0A	10	LF	1001010	4A	74	J
0001011	0B	11	VT	1001011	4B	75	K
0001100	0C	12	FF	1001100	4C	76	L
0001101	0D	13	CR	1001101	4D	77	M
0001110	0E	14	SO	1001110	4E	78	N
0001111	0F	15	SI	1001111	4F	79	O
0010000	10	16	DLE	1010000	50	80	P
0010001	11	17	DC1	1010001	51	81	Q
0010010	12	18	DC2	1010010	52	82	R
0010011	13	19	DC3	1010011	53	83	S
0010100	14	20	DC4	1010100	54	84	T
0010101	15	21	NAK	1010101	55	85	U
0010110	16	22	SYN	1010110	56	86	V
0010111	17	23	ETB	1010111	57	87	W
0011000	18	24	CAN	1011000	58	88	X
0011001	19	25	EM	1011001	59	89	Y
0011010	1A	26	SUB	1011010	5A	90	Z
0011011	1B	27	ESC	1011011	5B	91	[
0011100	1C	28	FS	1011100	5C	92	\
0011101	1D	29	GS	1011101	5D	93	]
0011110	1E	30	RS	1011110	5E	94	^
0011111	1F	31	US	1011111	5F	95	—
0100000	20	32	SP	1100000	60	96	`
0100001	21	33	!	1100001	61	97	a
0100010	22	34	"	1100010	62	98	b
0100011	23	35	#	1100011	63	99	c
0100100	24	36	$	1100100	64	100	d
0100101	25	37	%	1100101	65	101	e
0100110	26	38	&	1100110	66	102	f
0100111	27	39	'	1100111	67	103	g
0101000	28	40	(	1101000	68	104	h
0101001	29	41	)	1101001	69	105	i
0101010	2A	42	*	1101010	6A	106	j
0101011	2B	43	+	1101011	6B	107	k
0101100	2C	44	,	1101100	6C	108	l
0101101	2D	45	-	1101101	6D	109	m
0101110	2E	46	.	1101110	6E	110	n
0101111	2F	47	/	1101111	6F	111	o
0110000	30	48	0	1110000	70	112	p
0110001	31	49	1	1110001	71	113	q
0110010	32	50	2	1110010	72	114	r
0110011	33	51	3	1110011	73	115	s
0110100	34	52	4	1110100	74	116	t
0110101	35	53	5	1110101	75	117	u
0110110	36	54	6	1110110	76	118	v
0110111	37	55	7	1110111	77	119	w
0111000	38	56	8	1111000	78	120	x
0111001	39	57	9	1111001	79	121	y
0111010	3A	58	:	1111010	7A	122	z
0111011	3B	59	;	1111011	7B	123	{
0111100	3C	60	<	1111100	7C	124	|
0111101	3D	61	=	1111101	7D	125	}
0111110	3E	62	>	1111110	7E	126	~
0111111	3F	63	?	1111111	7F	127	DEL

Thank you for purchasing this quality Brother product. Please read this manual carefully before operating your printer. It provides valuable tips on operation and information on how to get the most out of the versatility built into every Brother printer.
Note: Always keep this manual in a safe place.

Federal Communications Commission (FCC) 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 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 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 U.S. Government Printing Office, Washington, D.C., 20402, Stock No. 004-000-00345-4.

Shield interface cable must be used according to FCC 15.838D.
This statement will be applied only for printers marketed in the U.S.A.

CONTENTS

WARNING

This printer contains high voltage components. All repairs should be carried out by qualified personnel only.

INTRODUCTION

Your new Brother M-1509 impact dot matrix printer combines high quality and high performance in a compact, lightweight and affordable design that makes it ideal for computer applications for personal or office use. Its reliability and versatility make it the best choice for a high-performance, low-cost printer.

The M-1509 prints at 180 characters per second, but is quiet (less than 58 dB). It uses a stationary ribbon cassette.

The printer accepts both cut forms and fanfold continuous forms with both friction and pin feeds. Forms can be loaded to the specified position with switch panel operations alone. An automatic cut sheet feeder is available as an option.

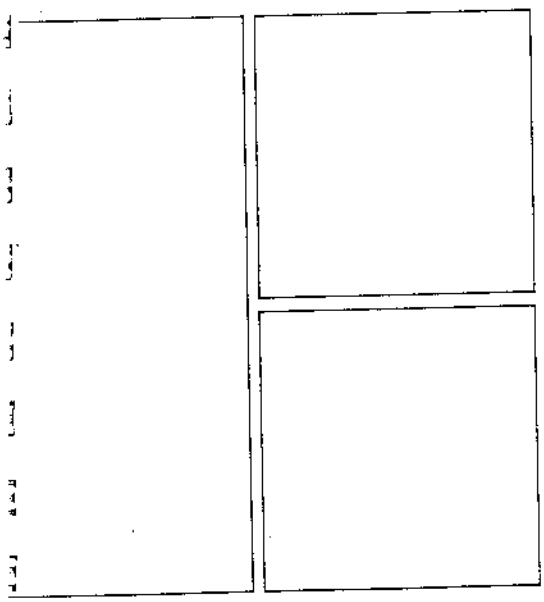
The M-1509 allows the user to print on all but the first inch from the top edge or perforation. This capability can be used to save paper.

The M-1509 provides two plug-compatible modes: Mode I and Mode II — controlled with a DIP switch. This printer provides also a wide choice of eighteen different character sets (including sets for 12 different countries). These character sets can all be combined with various print enhancements: Pica, Elite, Enlarged, Emphasized, Condensed, Sub- and Superscripts, Double-Strike, Underlined, and Near Letter Quality (NLQ). Optional NLQ fonts are also available: Gothic, Quadro, and Anelia Proportional.

The versatile M-1509 can print bit image data defined bytewise by the user in three print densities: Standard, Double, and Quadruple. Also available are two CRT-compatible and two plotter-compatible densities for graphic applications.

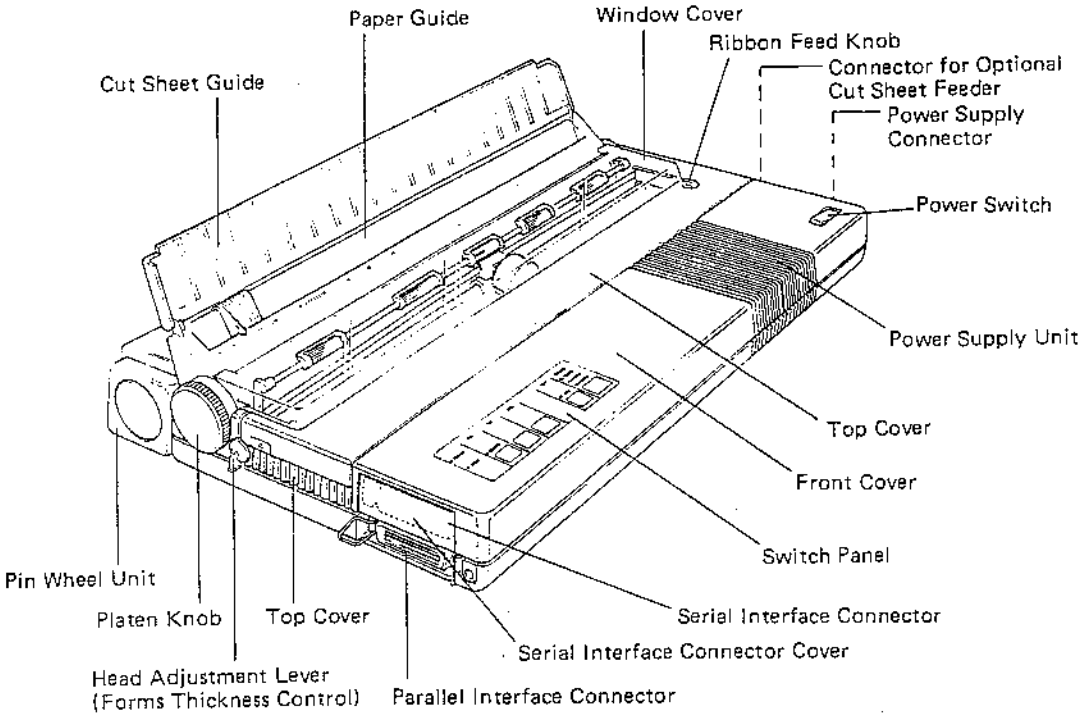
On top of these advanced features, Brother has added a downloading function for loading user-defined character sets and a three kilobyte (3k) buffer.

The M-1509 is equipped with both parallel and serial interfaces.



Chapter 1.
GETTING STARTED

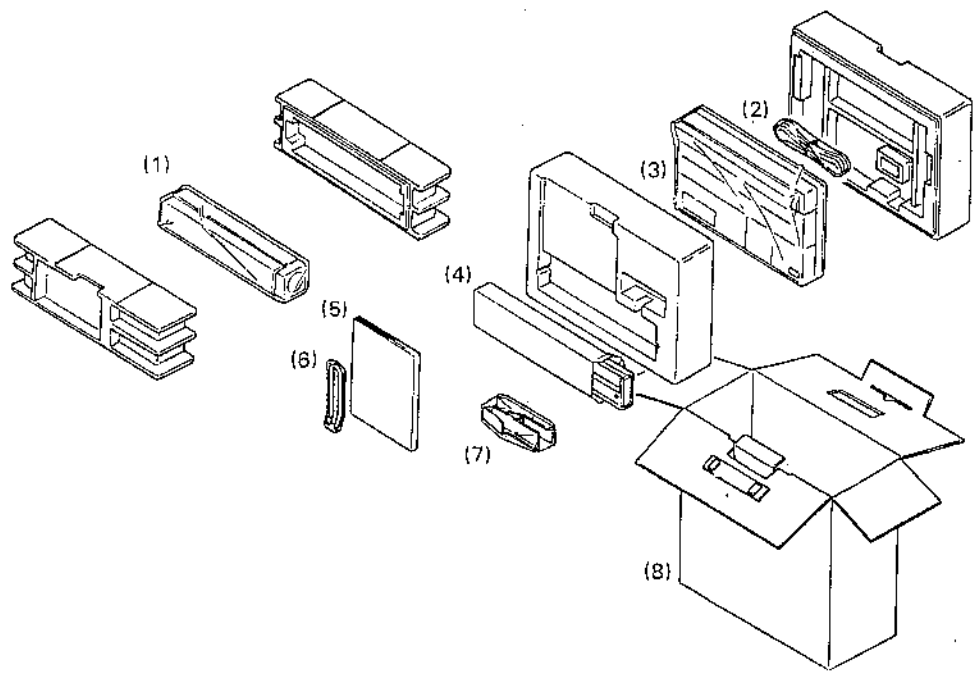
1.1 Names of Sections



1.2 Checking Contents

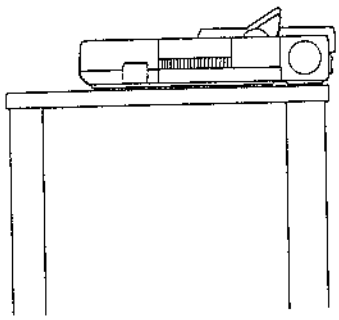
Take your printer out of the carton and check the contents.

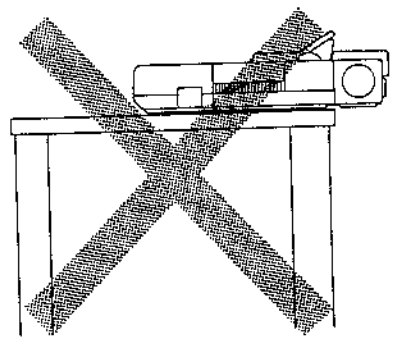
(1) Pin Wheel Unit
(2) Power Cord
(3) Printer
(4) Ribbon Cassette (Stationary type)
(5) Owner's Manual (This booklet)
(6) Latch Attach/Remover
(7) Position Guides
(8) Carton



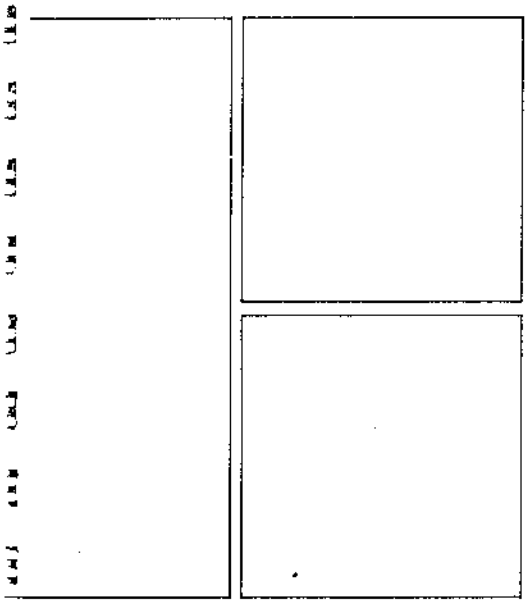
1.3 Site Location

- Place the printer on a flat, firm surface. Make sure that any section of the printer including the Pin Wheel Unit (if installed) does not protrude from the printer stand or the table.





- Shield the printer from sources of heat – direct sunlight and heating equipment, for example – humidity, vibration, and electrical noise.
- Do not use the printer in an environment where it may be subjected to wind-borne dust, oil, grease, or iron filings.
- Do not use the printer in the same circuit with large electrical motors or other sources of line noise.
- Do not subject the printer to rapid temperature changes or operate it outside the specified temperature range (5°C – 35°C).
- Use only the power supply specified on the seal at the back of the printer. An incorrect voltage or frequency will interfere with operation and damage the electrical components.
- Make sure that the platen knob is unencumbered and free to turn throughout operation.



Chapter 2.
SETTING-UP

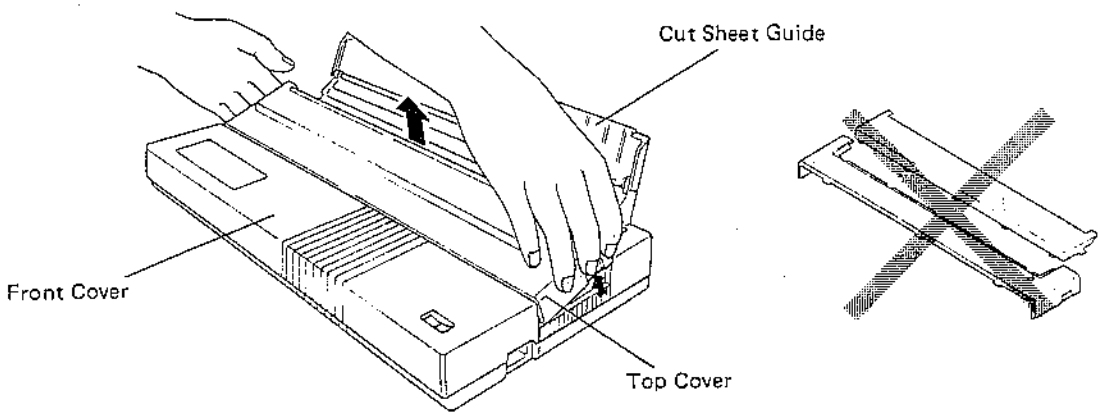
2.1 Installing and Removing Ribbon Cassette

■ Installing

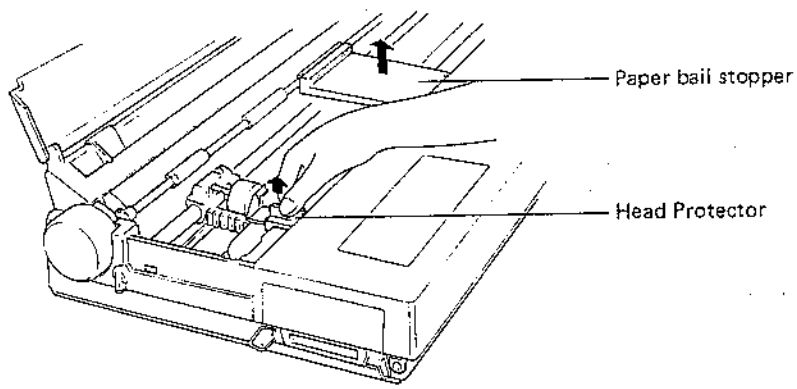
Your printer is shipped with a head protector and a paper bail stopper attached to protect it from shocks during transport. Be sure to remove them before use.

(1) Open the cut sheet guide.

(2) Pull and detach the top cover, putting your hands on both sides. Take care not to pull the window cover by force; otherwise, it may be broken.



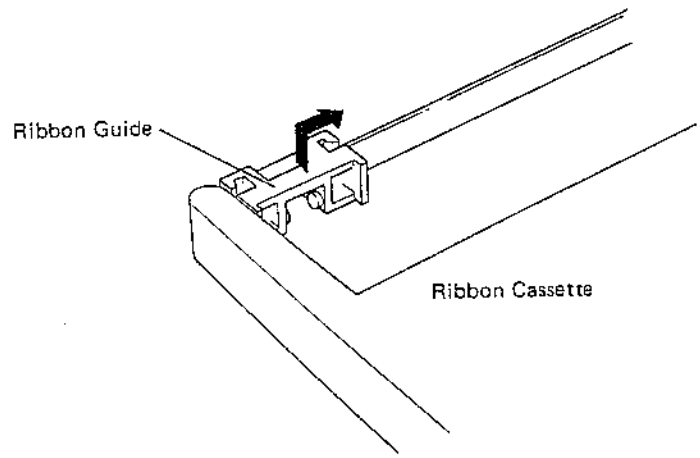
(3) Take off the paper bail stopper and the head protector which protects the print head from damage due to shocks during transportation. For possible future use, store them.



It is recommended that you save all of the packing materials — especially the head protector and the paper bail stopper — for possible future use.

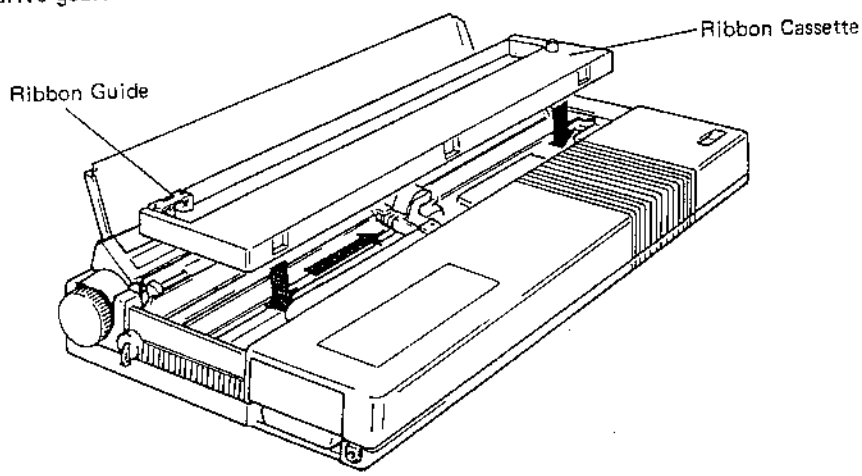
(4) Confirm that the POWER switch is turned OFF.

(5) Pull up the ribbon guide from the cassette.

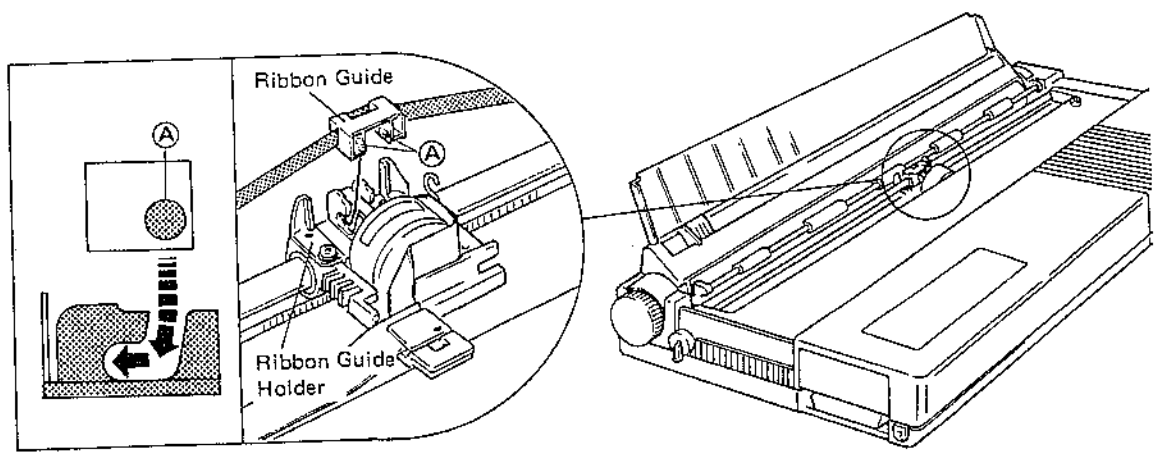


(6) Move the carriage to the center of the frame.

(7) Place the cassette on the frame unit so that the hole located on the ribbon cassette engages the ribbon drive gear.

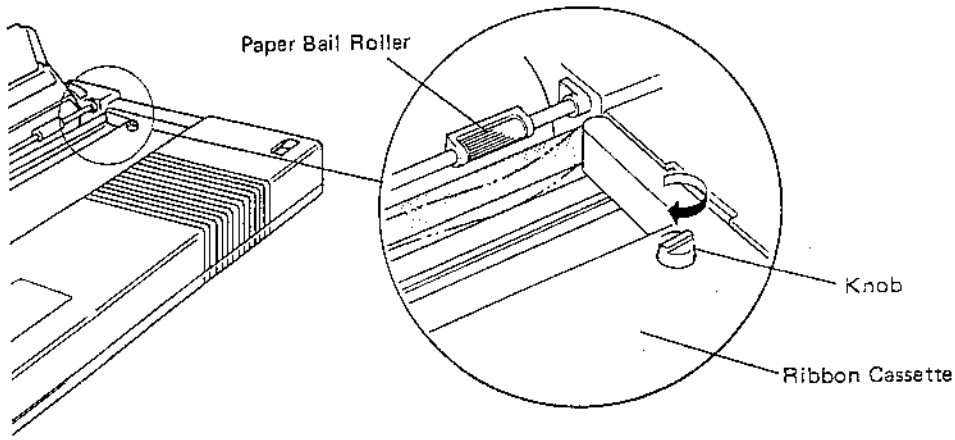


(8) Place the ribbon guide onto the ribbon guide holder and push it forward until it clicks.



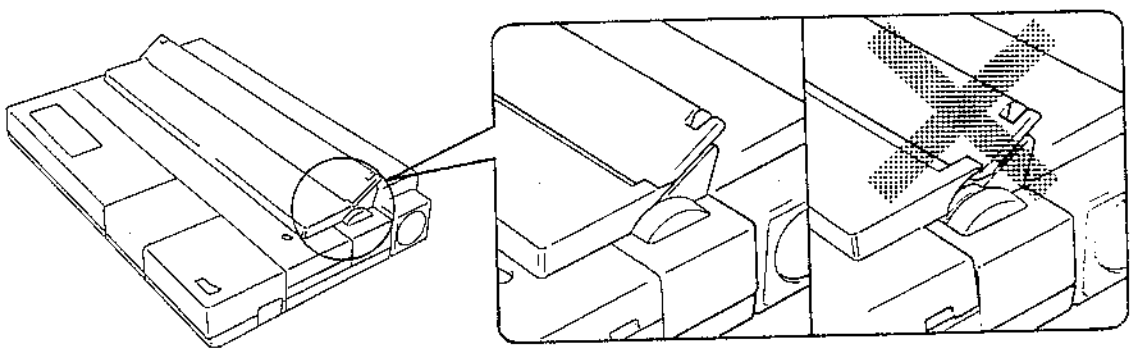
(9) Turn the blue knob on the cassette clockwise to remove slack of the ribbon.

- Ribbon slack may result in poor print quality and the damage of the platen and print head.



(10) Reposition the top cover.

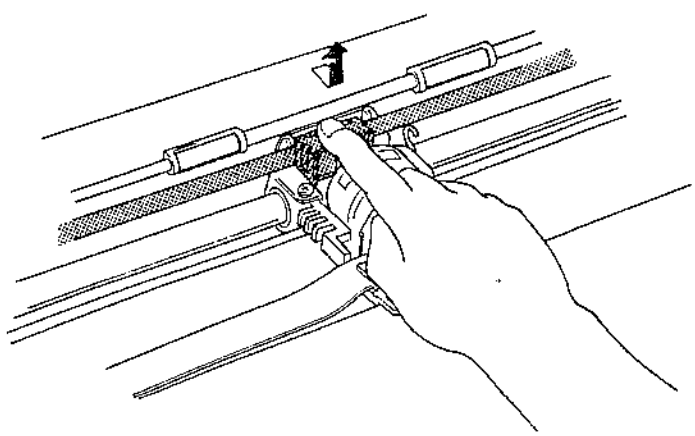
(11) Close the cut sheet guide.



■ Removing

To remove the ribbon cassette, reverse the installation procedure.

- Pulling up the ribbon guide while tilting slightly toward you makes it easy to remove the ribbon guide.



2.2 Loading Forms

With this printer, the printing can be done either on continuous forms or on cut forms. When only cut forms are used, there is no need to install the pin wheel unit to the printer.

2.2.1 Continuous Forms

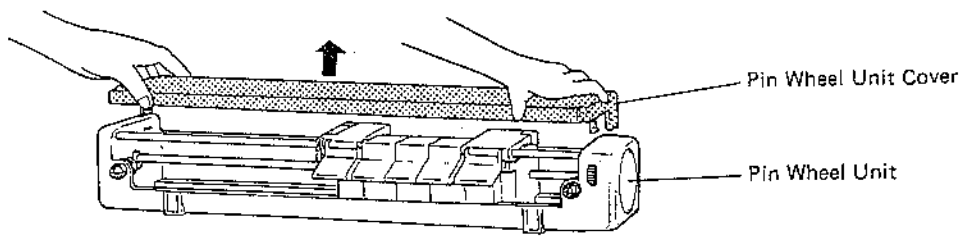
Continuous forms cannot be used simultaneously with cut forms in the printer.
To use continuous forms, first install the Pin Wheel Unit on the printer unit, following the instructions described below.

<Installation/Removal of Pin Wheel Unit>

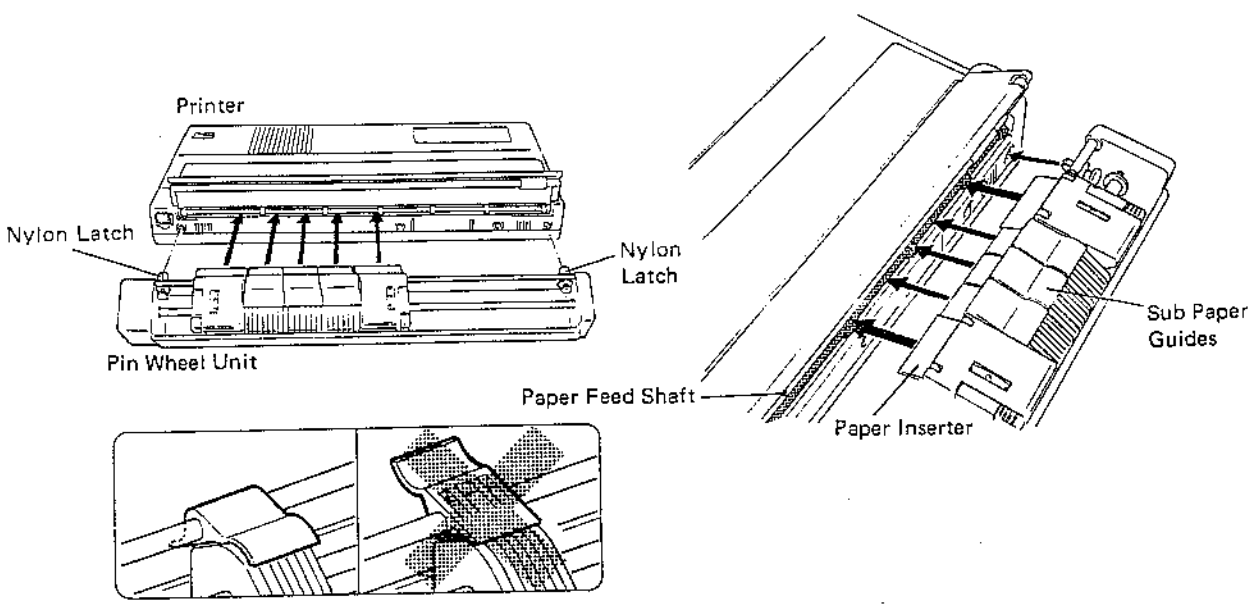
■ Installing

(1) Turn the POWER switch to OFF position.

(2) Remove the pin wheel unit cover, by pulling it backward or upward.

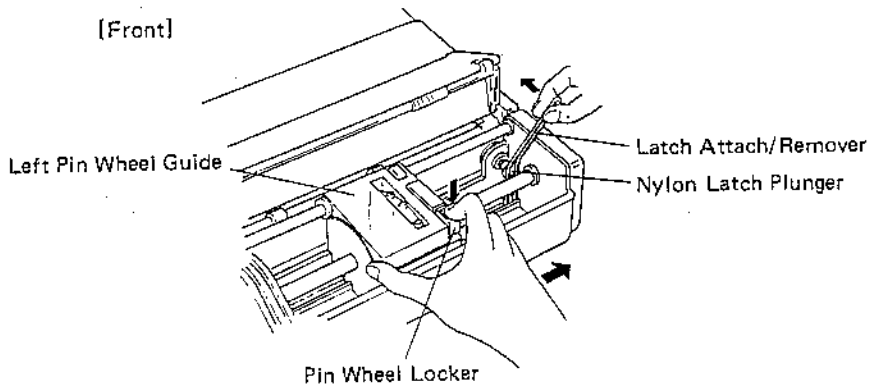


(3) Insert the nylon latches into the holes on the rear side of the printer, introducing the paper inserters and sub paper guides into the slit between the paper feed shaft and the frame.



(4) Push the plungers until a clicking sound is heard, using a latch attach/remover or by fingertip.

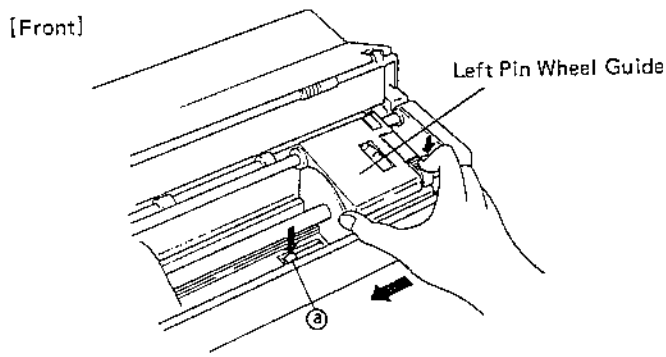
(5) Holding down the pin wheel locker, move the left pin wheel guide rightwards, as shown below.



(6) Reposition the pin wheel unit cover.

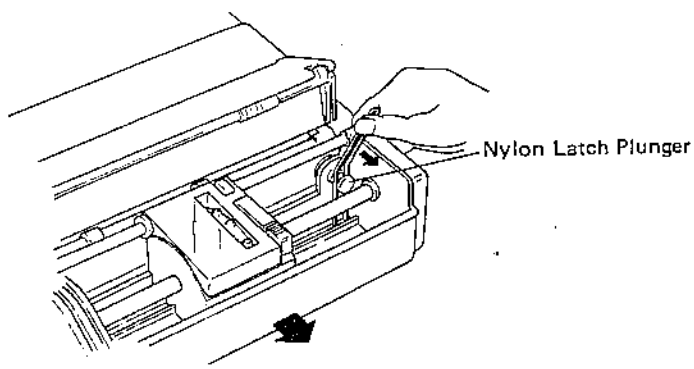
■ Removing

(1) Pushing down the pawl ⓐ, slide the left pin wheel guide leftwards, as shown below.



(2) Pull each of the nylon latch plungers toward the rear of the printer using a latch attach/remover.

(3) Take off the pin wheel unit from the printer.

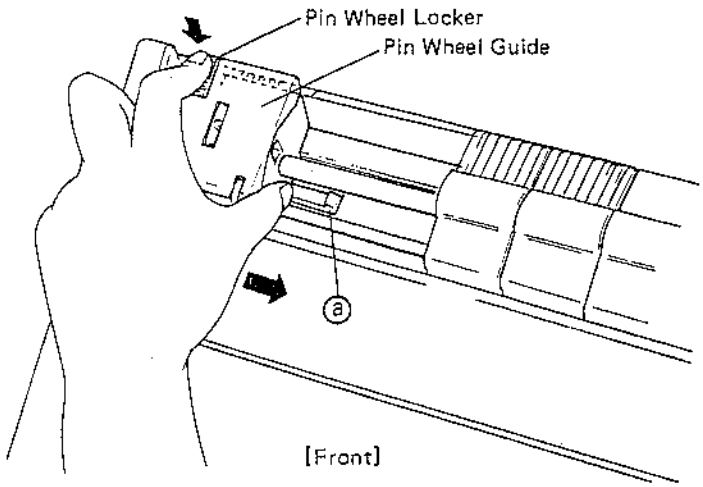


<Paper Loading>

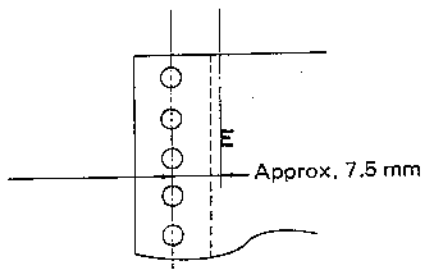
After installing the Pin Wheel Unit, load continuous forms taking the following steps:

(1) Remove the pin wheel unit cover and the position guides (if installed) from the cut sheet guide.

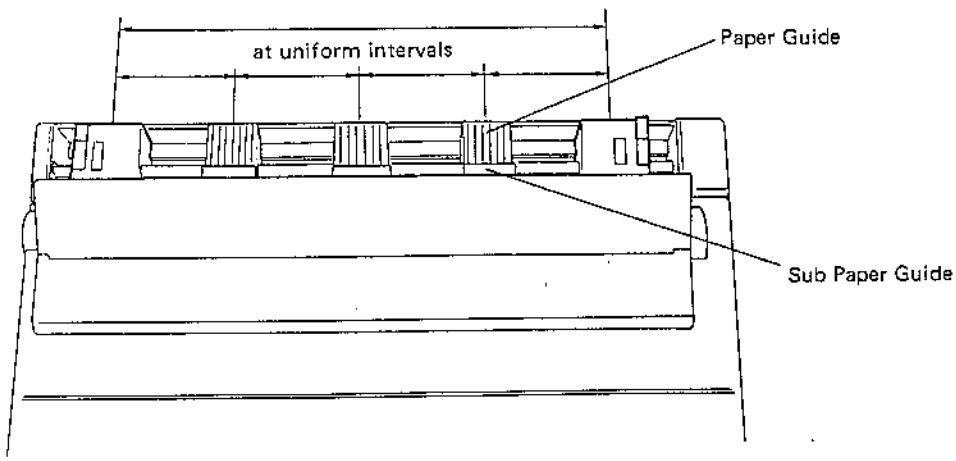
(2) Adjust the right and left pin wheel guides while holding down each pin wheel locker in accordance with the paper width.



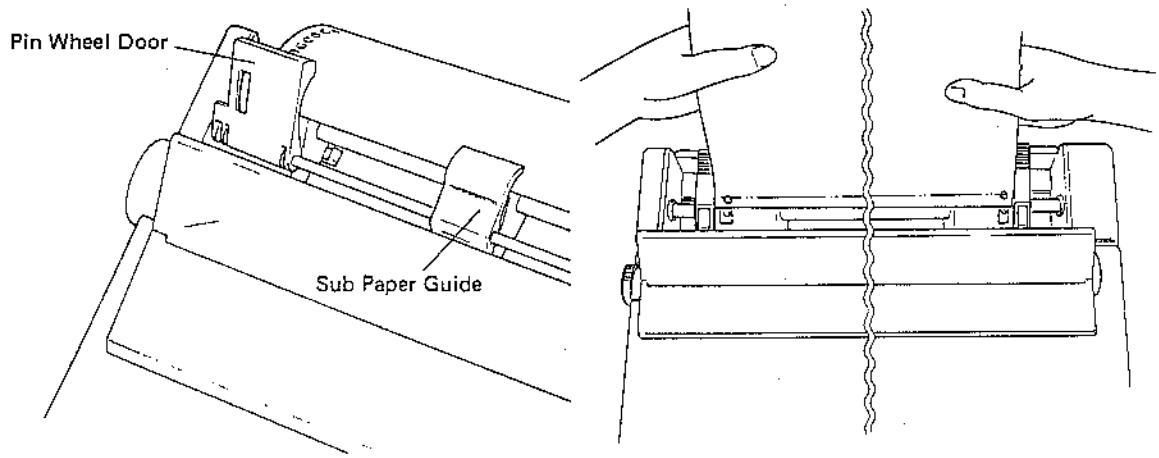
- When the left pin wheel guide is locked against the pawl ⓐ, the distance between the center of the sprocket holes and the left edge of the first print position is approximately 7.5 mm, as shown below.



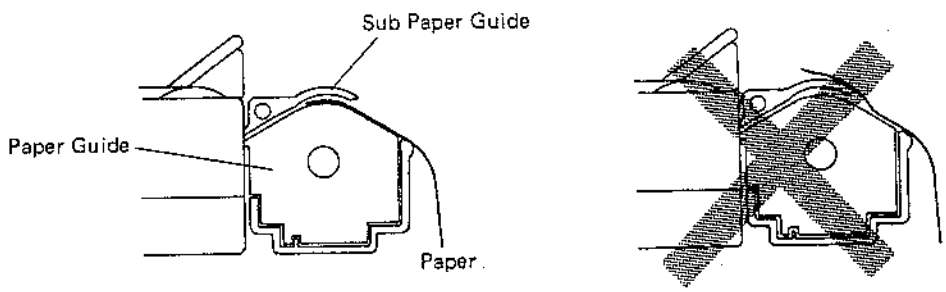
(3) Be sure to move the three paper guides and sub paper guides to their proper positions. Otherwise, paper jam may result.

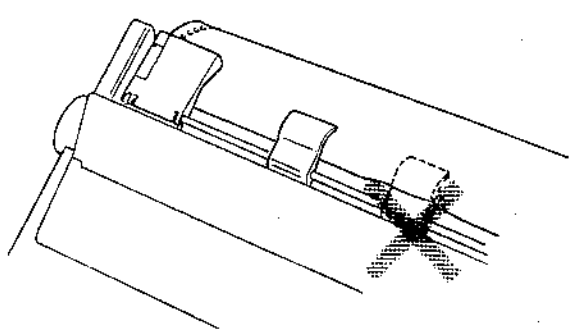


(4) Open the pin wheel doors and engage the sprocket holes of the paper on the pins.



- Be sure to insert the leading edge of the paper into the slip between the sub paper guides and the paper guides.





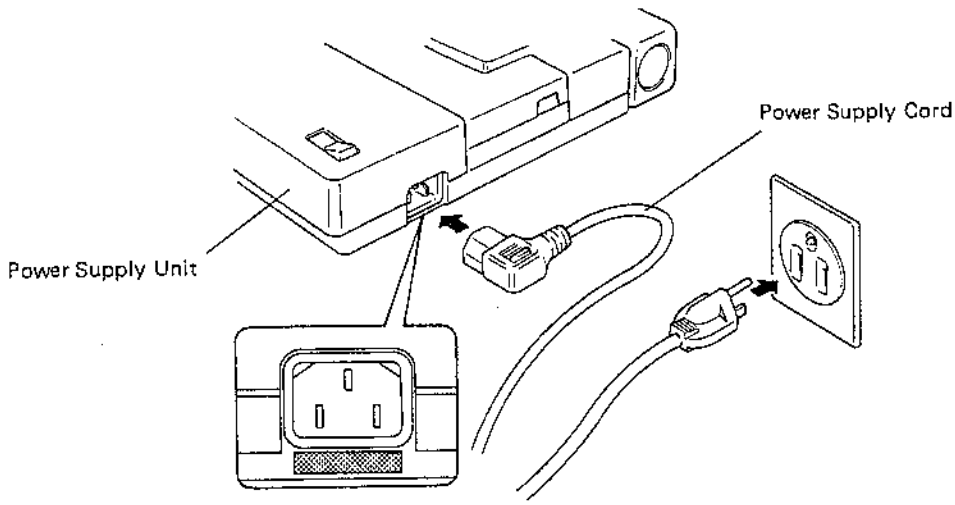
- Make sure that the paper is not skewed, and that the paper tension is neither too loose nor too tense.

NOTE: Take care not to make the paper reach under the platen. If so, the automatic paper insertion does not function.

(5) Close the pin wheel doors completely.

(6) Reposition the pin wheel unit cover.

(7) Make sure that the printer is turned off. Put the coupler of the power cord into the power supply connector at the right side of the printer and then connect the power cord to the AC outlet.
Before actually loading the paper, set the head adjust lever to the desired position according to the number of copies to be printed. See "Head Gap Adjustment" on page 14.

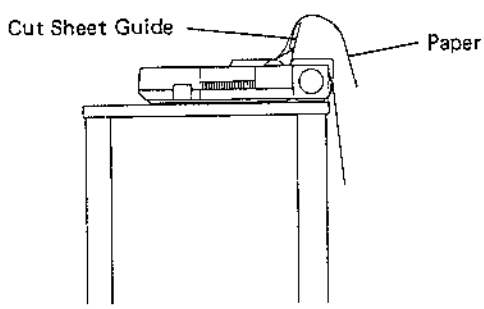


(8) Turn the POWER switch to ON position.

(9) Press the LOAD switch until the FORMS lamp comes on.

(10) Press the TOF switch, and the paper will be fed automatically.
NOTE: When the SEL lamp is already on, the automatic paper insertion cannot be performed.

(11) Close the cut sheet guide. It is, however, recommended that you use the printer with the cut sheet guide kept open when you cut the continuous paper frequently.

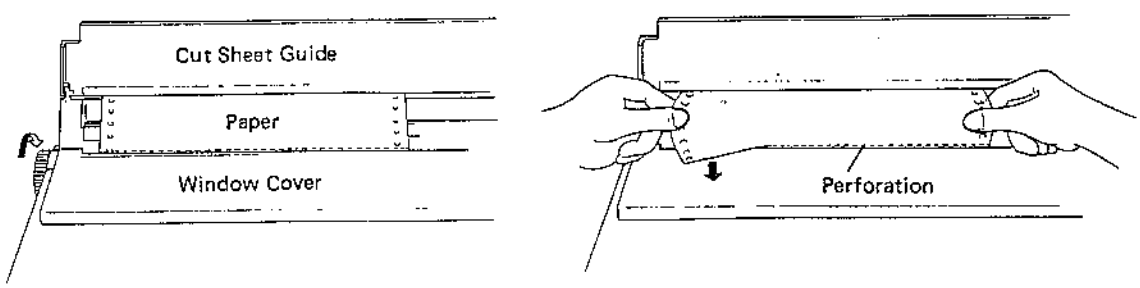


<Paper Cut>

(1) Open the cut sheet guide.

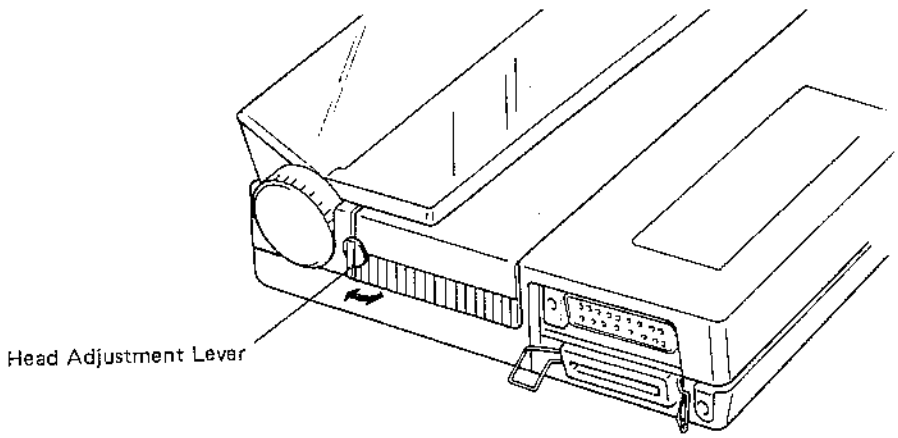
(2) Align the perforation to the window cover.

(3) Pull out the paper with your finger to cut it at the perforation.



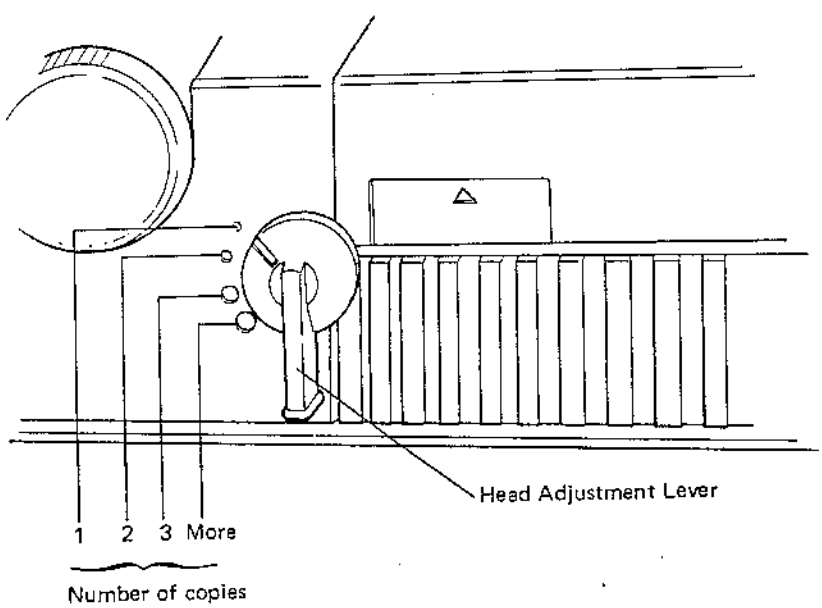
<Head Gap Adjustment>

It is necessary to adjust the gap between the print head and the platen, in accordance with the number of copies to be printed, using a head adjustment lever.



The relation between the number of copies and the lever set position is shown below.

- Depending upon the thickness and quality of paper used, discrepancy may occur, so adjust accordingly.
- If paper is smudged with ink, turn the head adjustment lever counterclockwise to widen the gap.
- Do not print with an excessively large head gap. Otherwise, the head life will be shortened.



< Note for Continuous Paper Supply >

(1) If the paper is in a box, remove the upper flaps or secure them out of the way.

(2) Position the box so that the paper feeds straight into the printer.

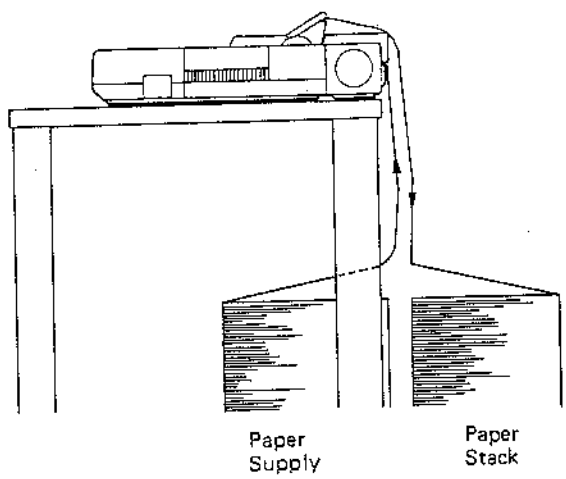
(3) If possible, firmly secure the box holding the paper in position.

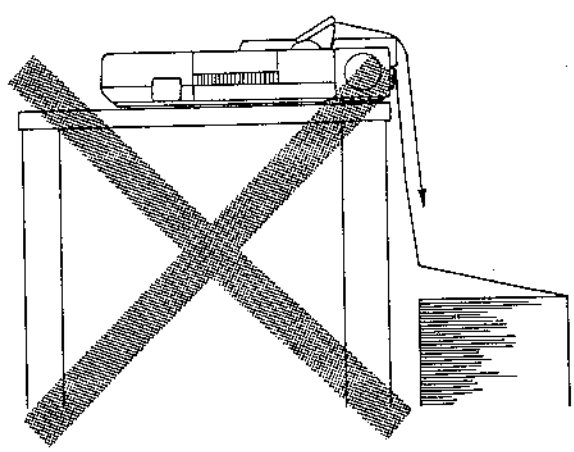
(4) Make sure that the box is level and that the paper does not lean to one side.

(5) Make sure that nothing impedes the paper's progress.

(6) Be extra careful in a humid environment or during the rainy season. Excessive humidity may cause the paper to breach or alter the line spacing.

Place the box of paper under the printer, as illustrated below. Make sure that the paper does not touch edges, corners, or anything else that may impede its progress through the printer's paper feed mechanism.

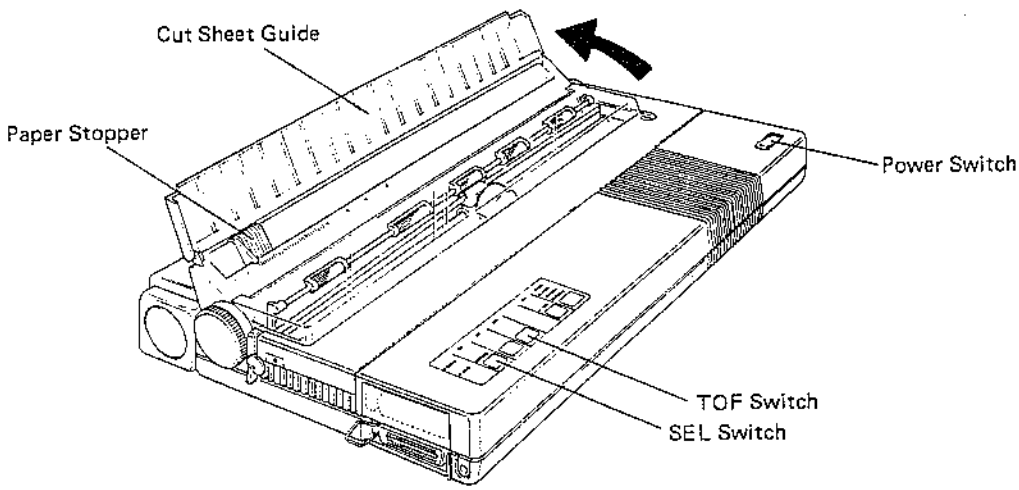




2.2.2 Cut Forms

Cut forms cannot be used with a continuous form in the printer. Remove the continuous form with the following procedure:

1) Cut the continuous forms along the perforations nearest the window cover.
2) Take the printer offline by pressing the SEL switch.
3) Press the LOAD switch until the SHEET lamp comes on.
4) Press the TOF switch to eject the paper backward from the printer.



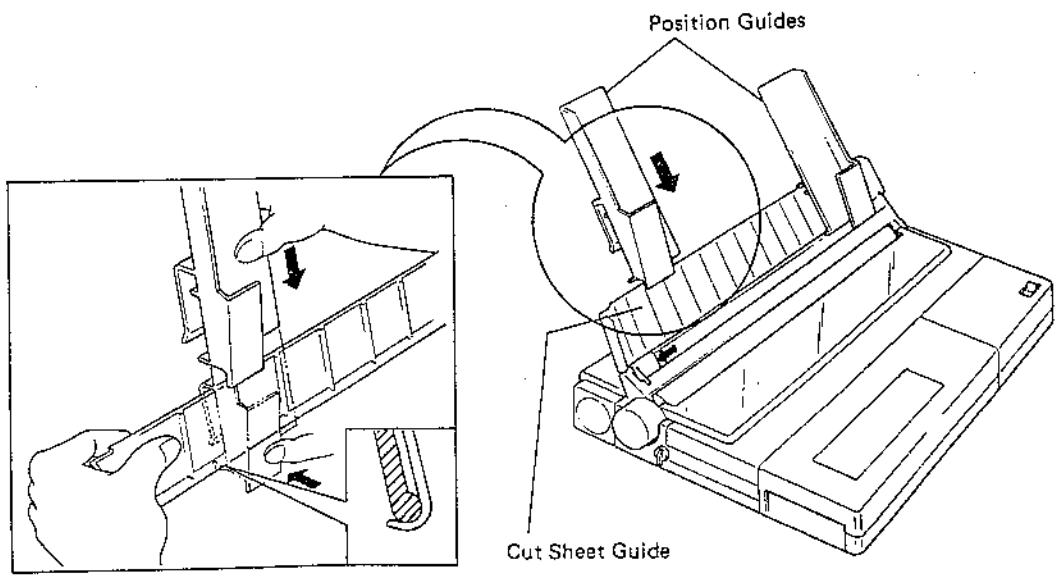
The position guides prevent cut forms from skewing. Install with the following procedure:

<Installing the Position Guides>

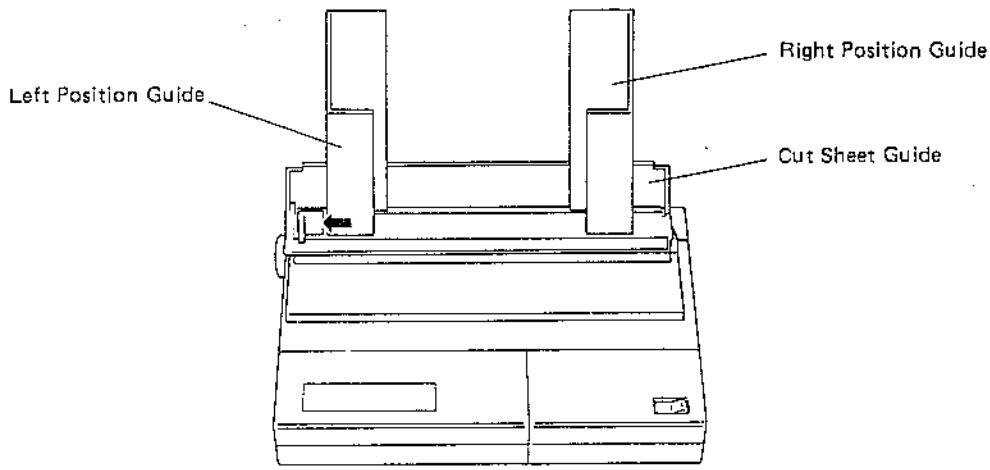
(1) Flip the cut sheet guide up.

(2) Make sure that the paper stopper is at the left end of the paper guide.

(3) Install the position guides onto the cut sheet guide slowly so as not to let the cut sheet guide come off the printer but securely until they click. See the following figure.



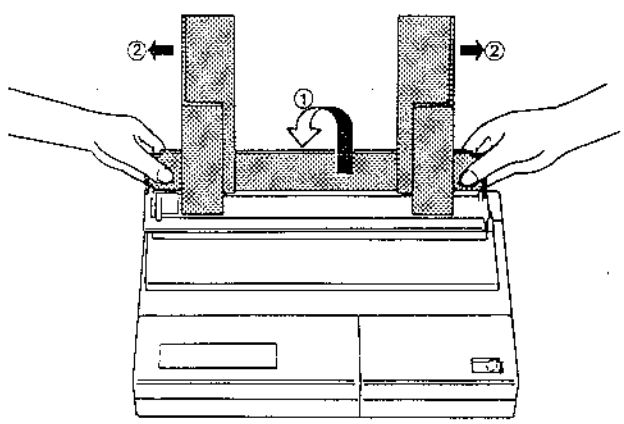
(4) Adjust the left and right position guides to match the form width.
Be sure to read "Position of Print Characters and Paper Guide Scale" on page 19.



< Removing the Position Guides>

(1) Detach the cut sheet guide with care.

(2) Remove both position guides from the cut sheet guide as shown below.



(3) Put back the cut sheet guide in place.

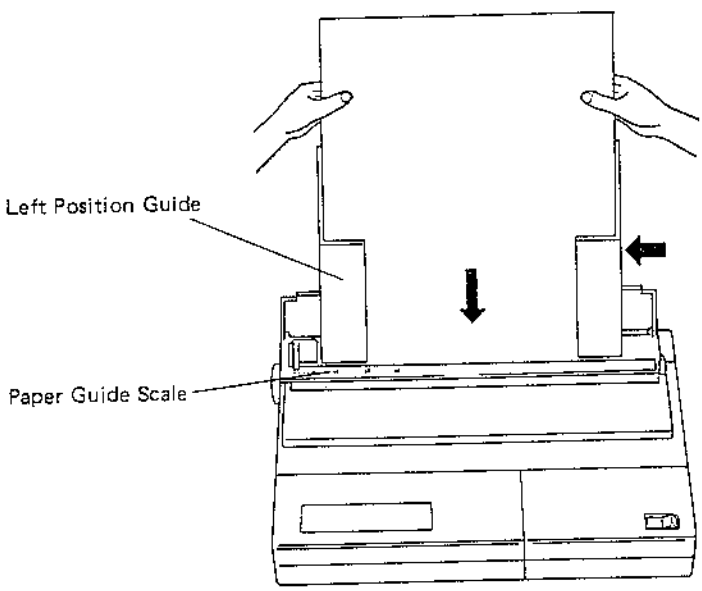
<Paper Loading>

(1) Turn the POWER switch to ON position.

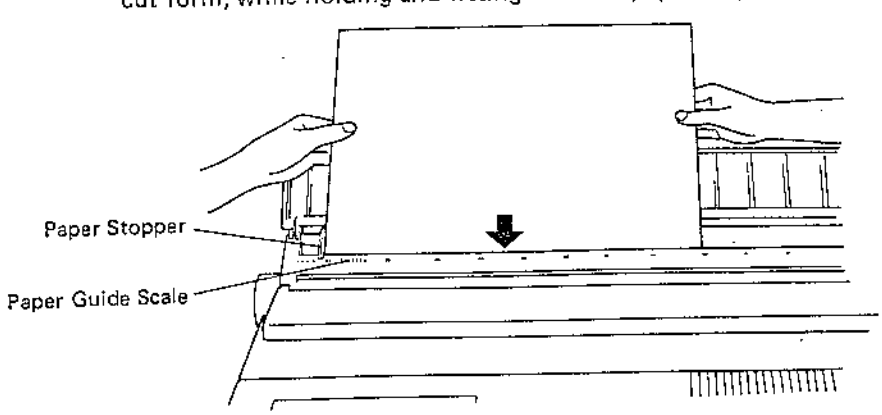
(2) Set a cut form to the printer.

- Before setting the cut form, confirm that the CHECK lamp is on. If the lamp is off – for example, the cut form is ejected by turning the platen knob or by pulling it out manually, press the LF switch or the TOF switch until the lamp comes on.
- Do not use folded, torn or creased forms, as they may degrade print quality or the paper may jam.
- See "Position of Print Characters and Paper Guide Scale" on page 19.

When the position guides are installed;
Be sure to check the location of the left position guide and confirm the beginning of printing, referring to the paper guide scale. Then insert a cut form between the position guides and press lightly until it stops.



When the position guides are not installed;
Move the paper stopper to the desired position, referring to the paper guide scale. Then set a cut form, while holding and fitting it to the paper stopper with both hands.



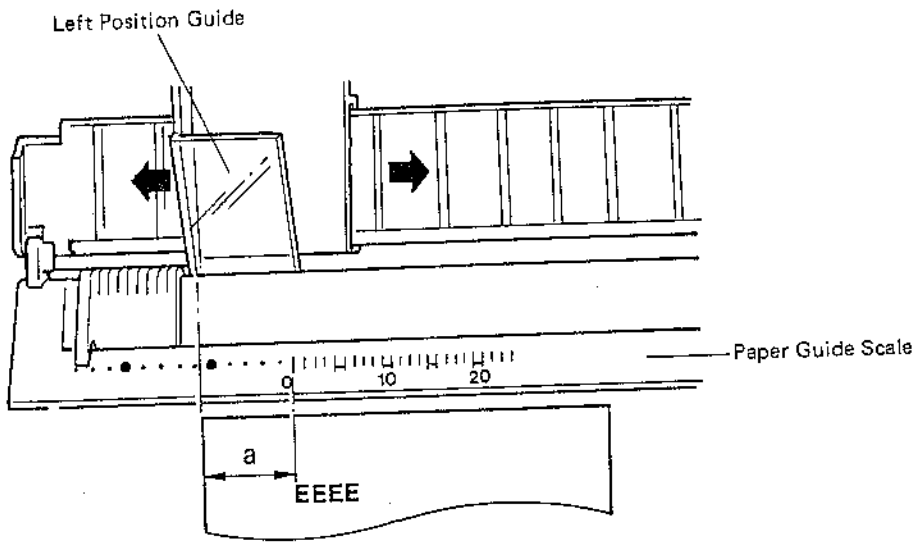
(3) Press the TOF switch while keeping the paper so as to be fed straight and neatly to the specified first print position.

<Position of Print Characters and Paper Guide Scale>

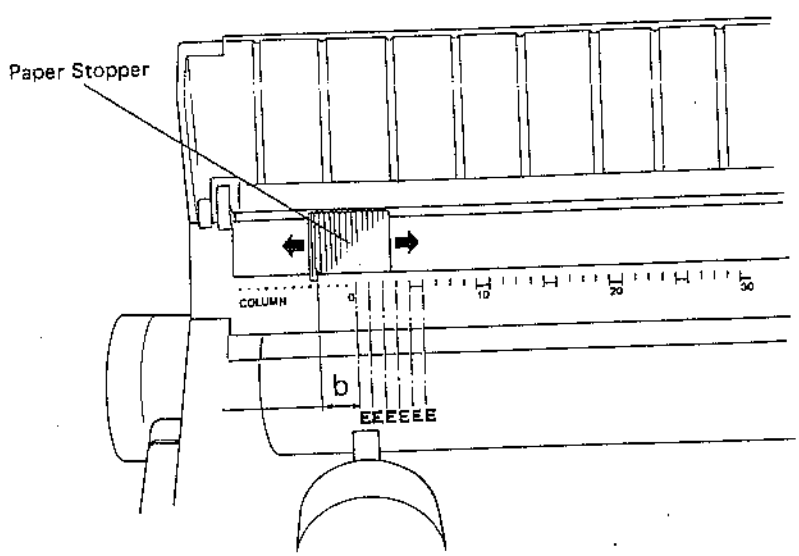
The graduations on the paper guide scale are aligned with the left edge of the printed characters.
Use the paper guide scale as a guidepost when loading paper.

Printing begins at the zero point of the scale.
Adjust the left position guide or the paper stopper to obtain the desired left margin.

When the position guides are used; a = Left margin

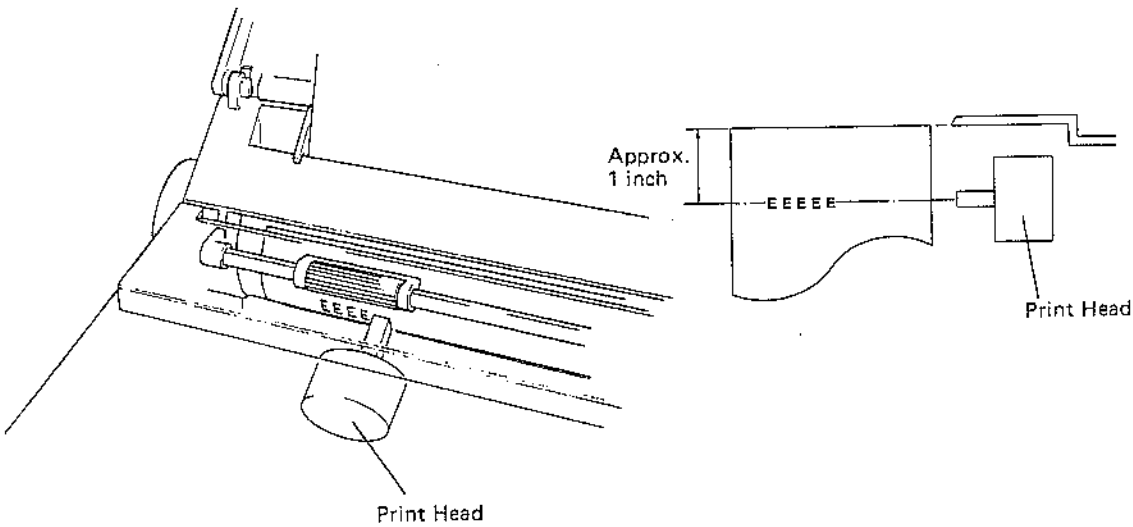


When the position guides are not used; b = Left margin



2.2.3 Relation of the First Print Line and the Top Edge of the Paper

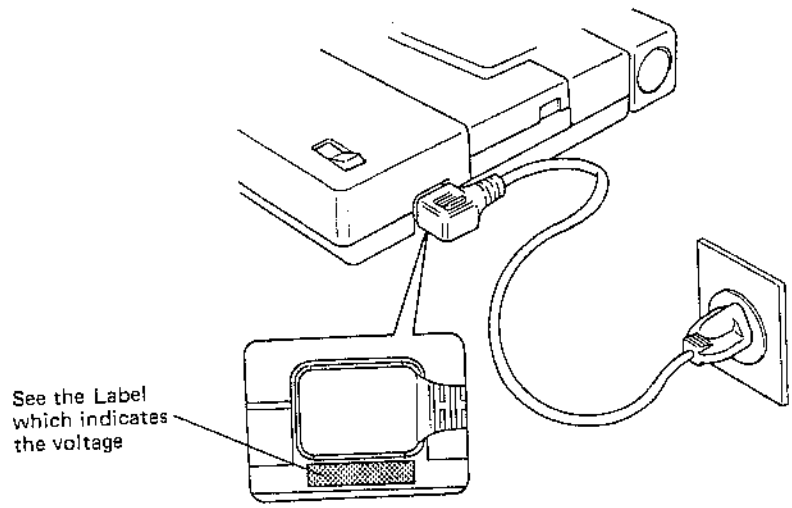
Pressing the TOF switch loads forms to the specified position. The paper automatically stops so that the first print line is approximately one inch from the top edge or perforation.



2.3 Connecting to Computer

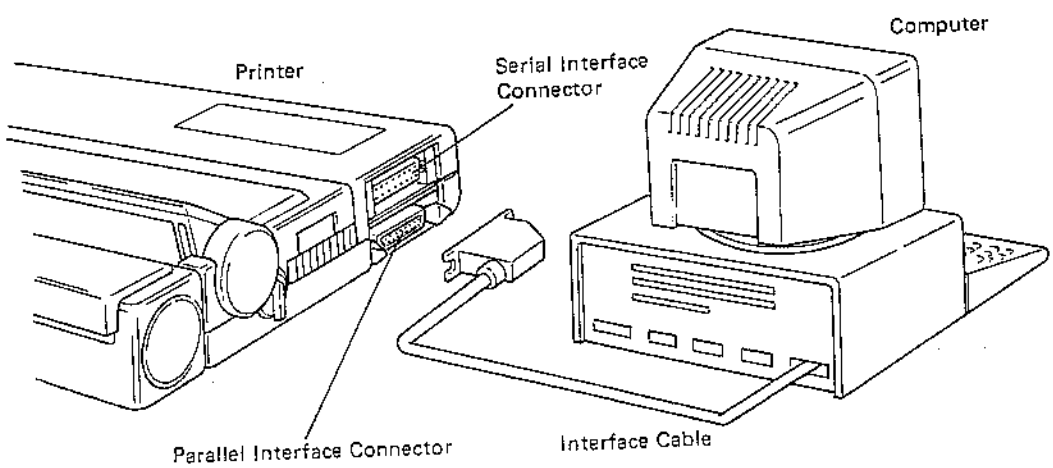
(1) Make sure that the printer and computer are turned off.

(2) Check the AC voltage, referring to the lower part of the power inlet. And make sure the printer is connected to the AC outlet with the power cord.



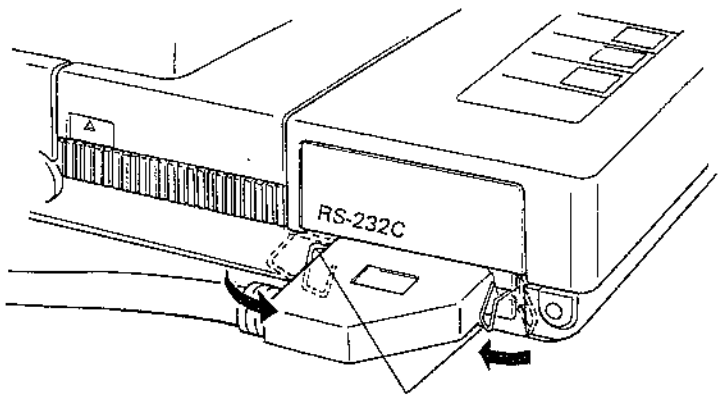
(3) Connect the interface cable to the printer securely.

Your printer is equipped with both Centronics parallel and RS-232C serial interfaces. Select the proper interface and connect it, following the instructions described below.



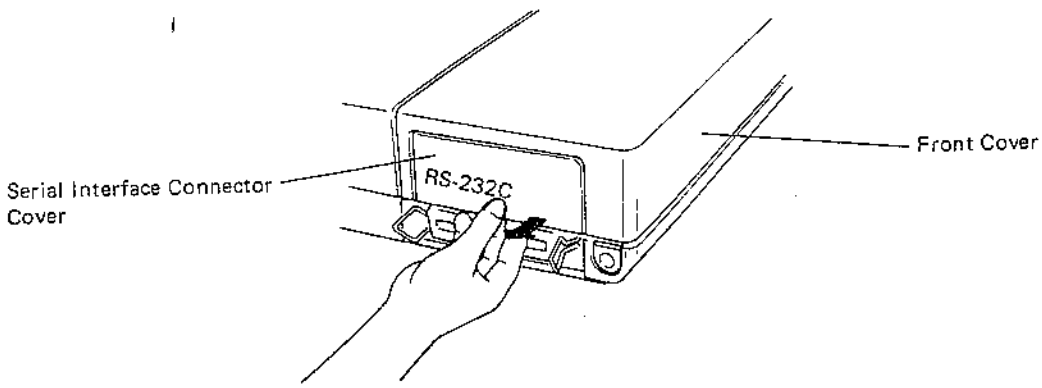
■ Parallel Interface (Set DIP SW1-8 to OFF. See the description of the DIP switch.)

Connect the interface cable to the parallel interface connector located on the left side of the printer.

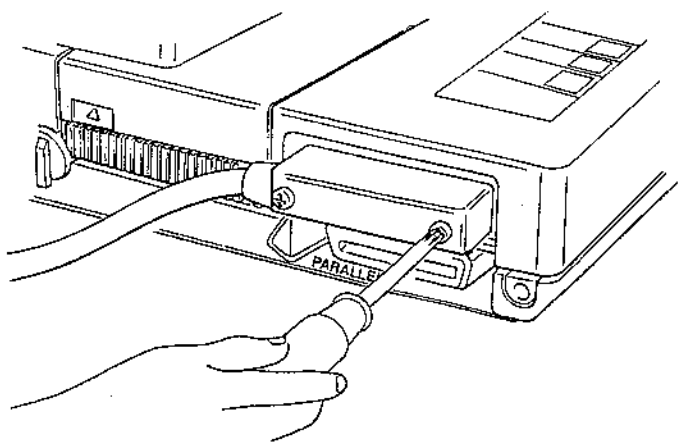


■ Serial Interface (Set DIP SW1-8 to ON. See the description of the DIP switch.)

(1) Remove the serial interface connector cover from the front cover.

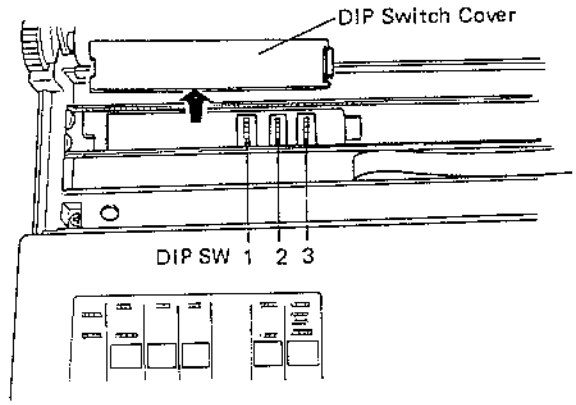


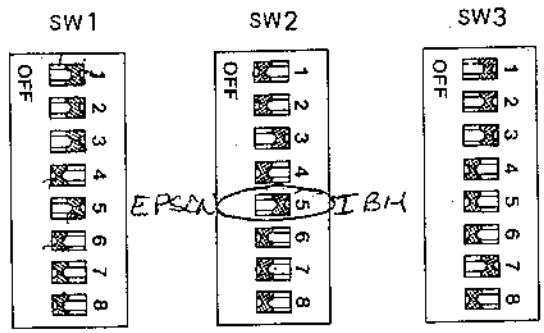
(2) Connect the interface cable to the serial interface connector and lock it, using a screwdriver.



2.4 Setting DIP Switches

The Dual In-Line Package (DIP) Switches on this printer control various aspects of printer operation. The printer has three DIP Switches, SW1, SW2 and SW3. Each of the eight selectors on a DIP SW serves a particular purpose, described on the following pages.

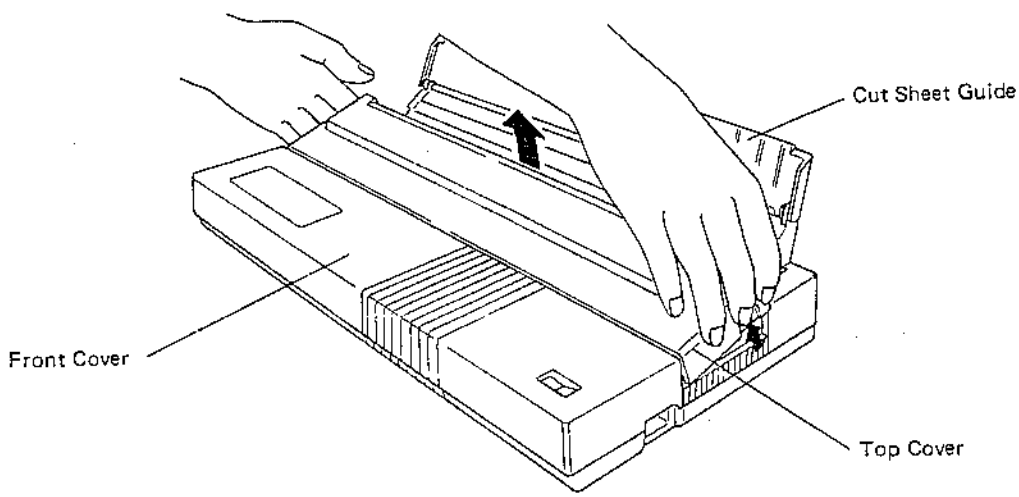




NOTE: The illustration above shows the DIP switch settings of the machine as delivered. For further information, see pp. 24 ~ 28.

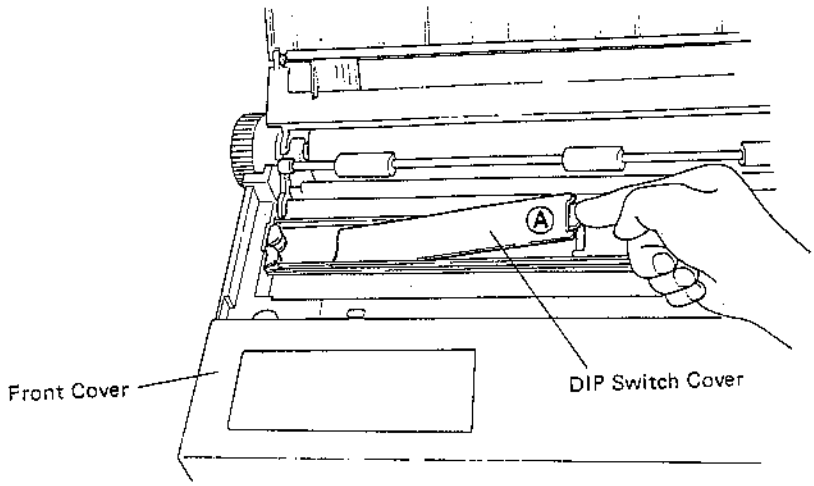
These switches are located on the Logic Control Circuit Board beneath the DIP switch cover under the timing belt. To change a setting,

1) Unplug the power cord from the AC outlet.
2) Open the cut sheet guide.
3) Pull and detach the top cover, putting your hands on both sides. Take care not to pull the window cover by force; otherwise it may be broken.



4) Move the carriage to the right side.
5) Remove the ribbon cassette, if installed.

6) Pushing the DIP switch cover at portion Ⓐ leftwards with your fingertip, pull it up and off the printer.



7) Press the selector with tweezers, a small screwdriver, or any similar pointed object.

NOTES:
- The switches have been set at the factory. Do not disturb them unless necessary.
- Always double-check switch and selector numbers.
- Do not let any foreign objects fall onto the circuit board under the DIP switch cover when removing the cover.
- Do not forget to replace the DIP switch cover.

SW2-5, selector 5 of SW2, switches the printer between the Mode I and Mode II.* When the printer leaves the factory, it is set up for Mode II – that is, with this switch ON. Turning this switch OFF changes to the Mode I, a mode which assigns a different set of meanings to the selectors 1 to 4 on SW3 and to the control codes as well.

* Mode I : Epson-compatible mode
Mode II : IBM-compatible mode

IMPORTANT:
The data sent from the computer may not be valid according to the setting of DIP switch. See the DIP SW1-8 and the DIP SW3-7.

M1509

■ Functions of DIP SW1

Selector No.	Function	OFF	ON	As delivered
1	Baud Rate Selection	See Table 1.		ON
2				ON
3				ON
4	Character Code Level	8 bits	7 bits	OFF
5	Parity Check	Yes	No	ON
6	Parity	Even	Odd	OFF
7	X-ON/OFF	Not transmit	Transmit	OFF
8	Interface Mode	Parallel	Serial	OFF

Table 1. Baud Rate

Selector No.	Baud Rate							
	9600*	4800	2400	1200	600	300	150	110
1	ON	OFF	ON	OFF	ON	OFF	ON	OFF
2	ON	ON	OFF	OFF	ON	ON	OFF	OFF
3	ON	ON	ON	ON	OFF	OFF	OFF	OFF

* Setting at the factory.

M 1509

LEFT RIGHT

■ Functions of DIP SW2

Selector No.	Function	OFF	ON	As delivered
1	"0" Font Selection	0	ø	OFF
2	PAPER-END Detector	Valid	Invalid	OFF
3	Buffer Selection	Download buffer	Input data buffer	ON
4	Print Mode	Normal mode	Emphasized mode	OFF
5	Printer Mode (Note 1)	EPSON FX100+ Mode I	IBM G.P. Mode II	ON
6	1 Inch Skip Perforation	Invalid	Valid	OFF
7	Typeface Selection	See Table 2.		OFF
8				OFF

P. 24

NOTE 1: As already mentioned, this selector, SW2-5 allows the operator to select the Mode I or Mode II. Depending upon this selector setting, selectors 1 to 4 on SW3 are assigned different functions.

Table 2. Typeface

Selector No.		Typeface
7	8	
OFF	OFF	Prestige
ON	OFF	Anelia Proportional
OFF	ON	Quadro
ON	ON	Gothic

ESC+k+n
(Note 2)→PAGE 59

NOTE 2: Available if optional Near Letter Quality (NLQ) Fonts P.C.B.s — LQ-100 and LQ-200 — are installed.
LQ-100: Gothic, Quadro, and Anelia Proportional
LQ-200: Gothic, Anelia Proportional, and 16K input/download buffer

219.95

SW2-3

U 3177001 27256 EPROM

BUFFER — PRINTER — 4K BYTE
— INPUT DATA — 3K BYTE (THIS 3K ALSO FOR DOWN LOAD, BY DIP SW2-3

■ Functions of DIP SW3

M1509

Selector No.	Function	OFF	ON	As delivered
1	If SW2-5 is set up for Mode II – that is, with the selector ON, see Table 3. If for Mode I, with the selector OFF, see Table 4.			ON
2				ON
3				ON
4				OFF (Note 3)
5	Form Length	11"	12"	OFF (Note 4)
6	LF Amount	1/6"	1/8"	OFF
7	SLCT IN (PARALLEL)	Not fixed	Fixed	ON (Note 5)
8	CR (Auto Feed)	Print without LF	Print with LF	OFF

Table 3. Functions of DIP SW3-1 to SW3-4 in Mode II (SW2-5, ON)

Selector No.	Function	OFF	ON	As delivered
1	Character Set (MODE I / MODE II)	1 PAGE 127	PAGE 75 2 PAGE 124 / PAGE 128	ON
2	Cancel Code	Valid	Invalid	ON
3	Buffer Full Print	Without LF	With LF	ON
4	Scandinavian/Normal Character Selection	Normal characters	Scandinavian characters PAGE 128	OFF (Note 3)

NOTE 3: For Norway, Finland, Denmark and Sweden specifications, this switch is set to ON.

NOTE 4: For Norway specifications, this switch is set to ON.

NOTE 5: When set to OFF

- The input data is not valid unless the low signal is input to the pin 36 ($\overline{\text{SLCT IN}}$) of the parallel interface connector; the printer receives but ignores the data.
- In case of MODE I (DIP SW2-5: OFF), if the DC1 code (11H) is input, the data input after the DC1 code are valid. And if the DC3 code (13H) is input, the data input after the DC3 are invalid. At power on, the printer is in the state of data ignorance.

When set to ON

- The data are valid regardless of the state of the pin 36 ($\overline{\text{SLCT IN}}$) of the parallel interface connector; however, the DC1 and DC3 codes are ignored under MODE I.

DIP SW3-7		OFF		ON	
MODE		I	II	I	II
Parallel Interface ($\overline{\text{SLCT IN}}$)	LOW	Valid	Valid	Valid*	Valid
	HIGH	DC1: Valid DC3: Invalid	Invalid	Valid*	Valid
Serial Interface		DC1: Valid DC3: Invalid	Invalid	Valid*	Valid

NOTE*: The DC1 and DC3 codes are ignored.

CANCEL ONE LINE

Table 4. Functions of DIP SW3-1 to SW3-4 in Mode I (SW2-5, OFF)

COUNTRY	Selectors				HEX. CODE											
	1	2	3	4	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
U.S.A.	OFF	OFF	OFF	OFF	#	$	@	[	\	]	^	`	{	|	}	~
FRANCE I	ON	OFF	OFF	OFF	#	$	à	°	ç	§	^	`	é	ù	è	¨
GERMANY	OFF	ON	OFF	OFF	#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
U.K. I	ON	ON	OFF	OFF	£	$	@	[	\	]	^	`	{	|	}	~
DENMARK I	OFF	OFF	ON	OFF	#	$	@	Æ	Ø	Å	^	`	æ	ø	å	~
SWEDEN	ON	OFF	ON	OFF	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
ITALY	OFF	ON	ON	OFF	#	$	@	°	\	é	^	ù	à	ò	è	ì
SPAIN	ON	ON	ON	OFF	₧	$	@	¡	Ñ	¿	^	`	¨	ñ	}	~
JAPAN	OFF	OFF	OFF	ON	#	$	@	[	¥	]	^	`	{	|	}	~
NORWAY I	ON	OFF	OFF	ON	#	¤	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
DENMARK II	OFF	ON	OFF	ON	#	$	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
U.K. II	ON	ON	OFF	ON	#	£	@	[	\	]	^	`	{	|	}	~
NORWAY II	OFF	OFF	ON	ON	£	$	§	Æ	Ø	Å	^	`	æ	ø	å	¨
NETHERLANDS	ON	OFF	ON	ON	#	$	@	[	]	ƒ	^	`	é	ij	é	¨
FRANCE II	OFF	ON	ON	ON	#	é	à	°	ç	é	ù	è	ú	è	ï	¨
S. AFRICA	ON	ON	ON	ON	#	é	É	É	ö	è	ü	é	ë	ö	ô	ü

See Page 90
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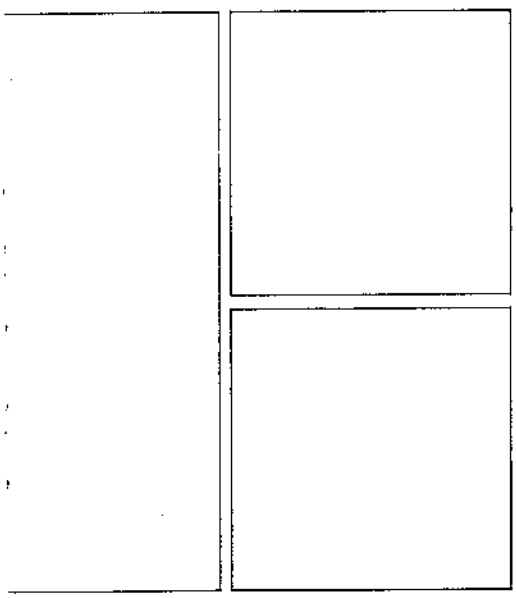
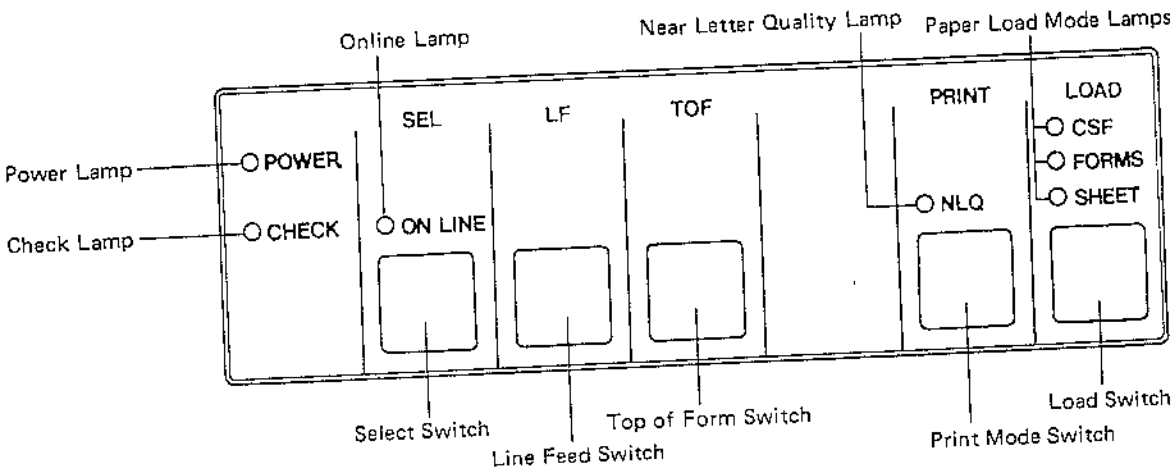


Chapter 3.
OPERATION

3.1 Switch Panel

The switch panel, located at the front of the printer, has the layout shown in the illustration below. The switches and lamps operate as described below.



■ Switches

• SEL (Select) Switch

Controls the printer's connection to the computer. At power on, the printer goes online automatically if no error is detected. Each time this switch is pressed, the printer enters the online or offline mode alternately.

• LF (Line Feed) Switch

Pressing this switch once advances the paper by one line. Continued pressure produces continuous feeding. This switch is operational only while the printer is in offline mode.

• TOF (Top of Form) Switch

Pressing this switch when the paper is ready to advance feeds the paper by the preset form feed length. If this switch is pressed when the paper has been printed to its middle, the printer operates as follows, depending upon the paper load mode selected.

- Ejects the printed paper if the SHEET mode is selected.
- Feeds the paper to the top of the next page if the FORMS mode is selected.
- Ejects the printed paper if the CSF mode is selected.
  (See the owner's manual for the cut sheet feeder.)

This switch is operational only while the printer is in offline mode.

• PRINT Mode Switch

At power on, the printer selects the Draft mode automatically. Pressing this switch toggles between the Draft and NLQ modes. This switch is operational only while the printer is in offline mode.

• LOAD Switch

At power on, the SHEET mode lamp lights. Each time this switch is pressed, the paper load mode changes in order of FORMS, CSF, and SHEET modes.

■ Indicators

• POWER Lamp (red)

Comes on when the POWER switch is turned ON.

• CHECK Lamp (red)

Indicates an abnormality in the printer. This lamp comes on when no paper is loaded in the printer or any error status is detected. If any error occurs on automatic insertion or rejection of forms, this lamp blinks on and off. While this lamp lights or blinks, no printing can perform.

• ON LINE Lamp (green)

Indicates that the printer is in the SELECT state. This lamp lights when the printer is ready to accept data or receiving data, or when the data is stored in the print buffer.

• NLQ (Near Letter Quality) Lamp (yellow)

Comes on when the printer is in the NLQ print mode and goes out in the Draft print mode.

• CSF, FORMS, SHEET (Paper Load Mode) Lamps (yellow)

One of these three lamps lights each time the LOAD switch is pressed. Each lamp indicates the paper load mode as follows:

CSF : Cut Sheet Feeder mode (if optional Cut Sheet Feeder is installed.)
FORMS : Pin Wheel mode (for continuous forms)
SHEET : Manual insertion mode (for cut forms)

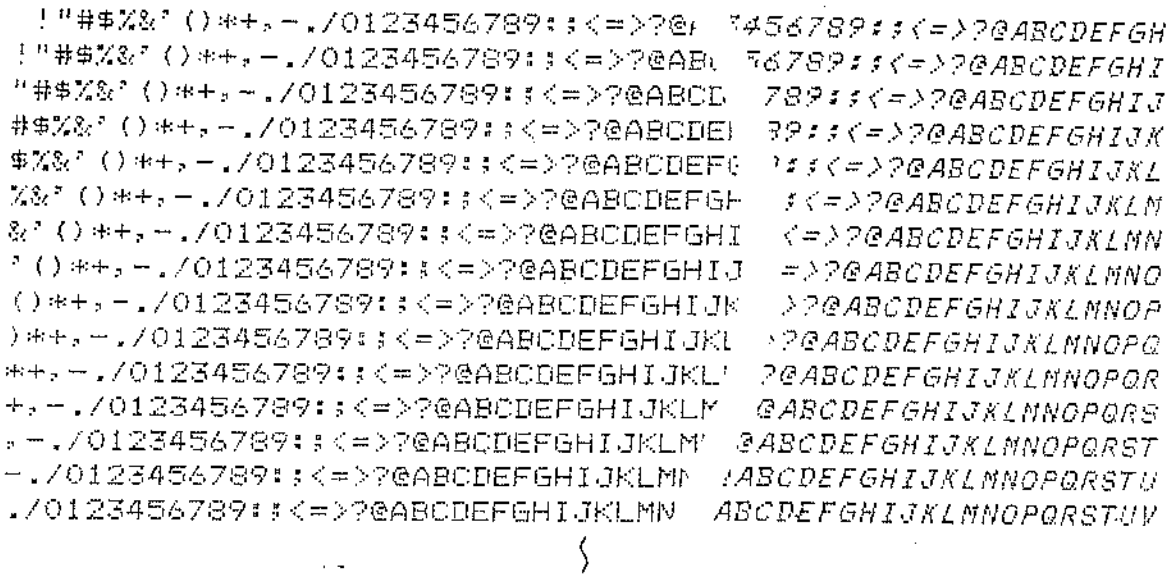
The CSF, FORMS, and SHEET lamps blink on and off if carriage error, RAM error, and ROM error occur, respectively.

3.2 Performing Self Test

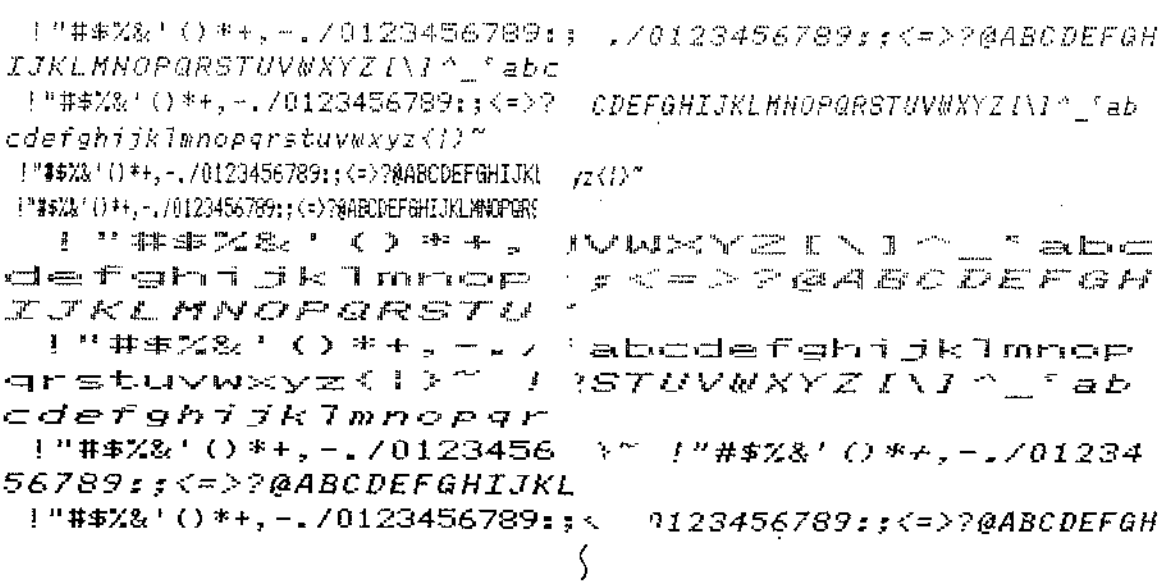
The self test is performed without connection to the computer in order to check the printing function and quality.

(1) Press the TOF switch to load the paper. However when the cut sheet feeder SF-40 is used, there is no need to press the TOF switch; the paper is automatically loaded to perform the self test with the 6-inch margin width.

(2) Turn the POWER switch ON while pressing the LF switch, and all characters in the ROM are printed out.



(3) Turning the POWER switch ON with the PRINT mode switch held down starts the printing of test patterns in Condensed, Emphasized, Double-Strike and other print modes.



NOTE: The self test is terminated when the POWER switch is turned OFF or the printer runs out of paper.

3.3 Hexadecimal Dump and Other Functions

HEX

■ Hexadecimal Dump

This diagnostic function prints the data transmitted from the computer in hexadecimal form.

Turn the POWER switch ON while pressing both the LF and ON LINE switches.

- The moment the buffer becomes full, the hexadecimal dump (print) will start.
- To start the hexadecimal dump (print) before the buffer becomes full, press the ON LINE switch again to take the printer offline.

NOTE: To terminate this operation and restore the normal print mode, turn the POWER switch OFF and then ON again.

Sample Program

```
1  LPRINT CHR$(27);"E";"HEX.DUMP";
10 END
```

Print Example

```
1B 45 48 45 58 2E 44 55 4D 50 0D 0A
```

■ Home Positioning

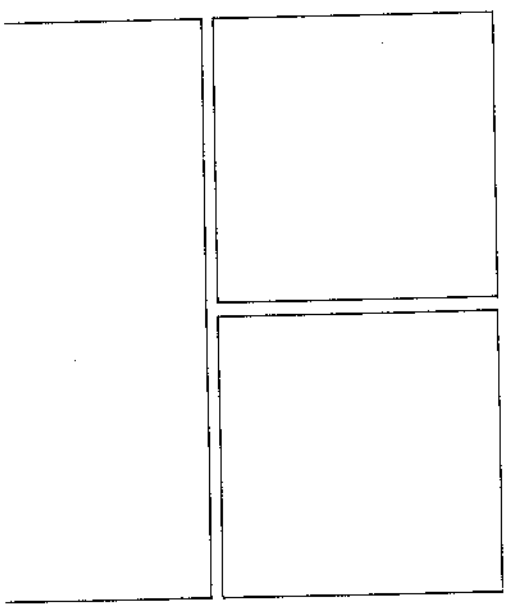
This function automatically returns the carriage to the home position when the power is first applied.

■ Paper Empty (PE) Detection

When this function detects the end of paper, it lights the CHECK lamp, stops the printing, and switches it offline. To continue printing, load forms and press the ON LINE switch.
The ON LINE switch is disabled until the PE state is cleared unless the Paper Empty Ignore has been set with the ESC 8 command.

Upon detection of the end of a continuous form, the printer immediately stops printing. For cut forms, however, the printer continues to print on the following lines for approx. 1/2" — e.g. three lines at 1/6" line feed pitch — before stopping.

Setting DIP SW2-2 to ON disables this function.



Chapter 4.
CONTROL COMMANDS

To print data on your printer, the software in your computer supporting the Epson FX, IBM PC or its compatible printer must send it to the printer. The popular programming language, BASIC, uses the instruction LPRINT followed a list of the data to be sent. This printer also provides special print modes such as Enlarged or Underlined characters. To take advantage of these enhanced features, you must send one of the special codes listed in the CHARACTER SET TABLES in Chapter 5.

For example, the ASCII control code SO (Shift Out – 14 in decimal or 0E in hexadecimal) switches the printer to Enlarged characters. To send this command to the printer in BASIC, type

LPRINT CHR$(14) or LPRINT CHR$(&H0E)

As already mentioned in Chapter 2, this printer provides two separate modes of operation, each of which assigns slightly different interpretations to the codes used for printer control. Some (BS, DC1, DC3, ESC EM, ESC ! , ESC #, ESC %, ESC &, ESC *, ESC /, ESC 4, ESC 5, ESC :, ESC =, ESC >, ESC ? , ESC @, ESC B, ESC I, ESC M, ESC P, ESC Q, ESC R, ESC ^ , ESC b, ESC j, ESC ℓ, ESC p, ESC s, and DEL) apply only to Mode I. To avoid confusion, separate command summary tables are provided on the next and the subsequent pages. Each command description is also labelled ■ Mode I or ■ Mode II at the top of the page.

[NOTE] ESC (Escape Sequence)

ESC is to expand the defined characters, alphanumeric, or symbolic characters, to control codes. ESC never expands any control character itself. If any undefined character code is set following ESC, both ESC and the character code are invalid.
In the following tables, "n" (or "n*i*") or "m" following ESC represents variable value to be specified by the user. It designates specifications concerning data or switching of the mode. For example, in Bit Image mode, "n" specifies the data length. In Underlined mode, "n" switches the mode to set or cancel.

4.1 Command Summary

EPSON FX-105

■ Mode I (DIP SW2-5, OFF)

Format	Command	Code		Ref. Page
		Hex.	Dec.	
BS	Backspace	08	8	43
HT	Horizontal TAB	09	9	105
LF	Line Feed	0A	10	39
VT	Vertical TAB	0B	11	107
FF	Form Feed	0C	12	41
CR	Carriage Return	0D	13	42
SO (Shift-out)	Enlarged Character Mode	0E	14	60
SI (Shift-in)	Condensed Character Mode	0F	15	63
DC1 (Device Control 1)	Cancel DC3 State	11	17	45
DC2 (Device Control 2)	Cancel Condensed Character Mode	12	18	64
DC3 (Device Control 3)	Set Offline State	13	19	45
DC4 (Device Control 4)	Cancel Enlarged Character Mode	14	20	61
CAN	Cancel	18	24	44
ESC EM n	Control Cut Sheet Feeder	1B 19 n	27 25 n	52
ESC I n	Change Print Mode Parameters	1B 21 n	27 33 n	73
ESC #	Cancel MSB Control Mode	1B 23	27 35	48
ESC % n NUL	Select Internal/Downloaded Character Set	1B 25 n 00	27 37 n 0	85
ESC & NUL n m	Define Downloaded Characters	1B 26 00 n m	27 38 0 n m	81
ESC * m n_1 n_2	Select Bit Image Mode	1B 2A m n_1 n_2	27 42 m n_1 n_2	117
ESC – n	Set/Cancel Underlined Mode	1B 2D n	27 45 n	70
ESC / n	Select VFU Channel	1B 2F n	27 47 n	109
ESC 0 (ZERO)	1/8" Line Spacing	1B 30	27 48	88
ESC 1	7/72" Line Spacing	1B 31	27 49	89
ESC 2	1/6" Line Spacing	1B 32	27 50	87
ESC 3 n	n/216" Line Spacing	1B 33 n	27 51 n	93
ESC 4	Italic Print Mode	1B 34	27 52	69
ESC 5	Cancel Italic Print Mode	1B 35	27 53	69
ESC 6	Expand Printable Character Code Area	1B 36	27 54	79
ESC 7	Cancel Expanded Code Area	1B 37	27 55	80
ESC 8	Ignore Paper Empty	1B 38	27 56	53
ESC 9	Cancel Paper Empty Ignore	1B 39	27 57	53
ESC : NUL NUL NUL	Copy Internal Character Set to Download Buffer	1B 3A 00 00 00	27 58 0 0 0	86
ESC <	Home Positioning	1B 3C	27 60	46
ESC =	Set MSB to 0.	1B 3D	27 61	47
ESC >	Set MSB to 1.	1B 3E	27 62	47
ESC ? n m	Translate Bit Image Density	1B 3F n m	27 63 n m	119
ESC @	Printer Initialization	1B 40	27 64	46
ESC A n	n/72" Line Spacing	1B 41 n	27 65 n	90
ESC B n_1 .. nk NUL	Vertical TAB Setting	1B 42 n_1 .. nk 00	27 66 n_1 .. nk 0	106
ESC C n	Page Length Spacing (No. of Lines)	1B 43 n	27 67 n	97
ESC C NUL n	Page Length Setting (In inches)	1B 43 00 n	27 67 0 n	97
ESC D n_1 .. nk NUL	Horizontal TAB Setting	1B 44 n_1 .. nk 00	27 68 n_1 .. nk 0	103
ESC E	Emphasized Character Mode	1B 45	27 69	65
ESC F	Cancel Emphasized Character Mode	1B 46	27 70	66
ESC G	Double-Strike Character Mode	1B 47	27 71	67
ESC H	Cancel Double-Strike Character Mode	1B 48	27 72	68
ESC I n	Switch to Control Codes/Printable Characters	1B 49 n	27 73 n	49
ESC J n	n/216" Line Feed	1B 4A n	27 74 n	94
ESC K n_1 n_2	Standard Density Bit Image Mode	1B 4B n_1 n_2	27 75 n_1 n_2	111
ESC L n_1 n_2	Double Density Bit Image Mode	1B 4C n_1 n_2	27 76 n_1 n_2	114
ESC M	Elite-Sized Character Mode 12CPI	1B 4D	27 77	54
ESC N n	Set Skip Perforation	1B 4E n	27 78 n	99
ESC O	Cancel Skip Perforation	1B 4F	27 79	100
ESC P	Cancel Elite-Sized Character Mode 10CPI	1B 50	27 80	55
ESC Q n	Right Margin Setting	1B 51 n	27 81 n	102
ESC R n	National Character Set	1B 52 n	27 82 n	75
ESC S n	Superscript/Subscript Mode	1B 53 n	27 83 n	71
ESC T	Cancel Superscript/Subscript Mode	1B 54	27 84	72
ESC U n	Select Unidirectional/Bidirectional Print	1B 55 n	27 85 n	51
ESC W n	Set/Cancel Enlarged Character Mode	1B 57 n	27 87 n	62
ESC Y n_1 n_2	Double Speed & Double Density Bit Image Mode	1B 59 n_1 n_2	27 89 n_1 n_2	115
ESC Z n_1 n_2	Quadruple Density Bit Image Mode	1B 5A n_1 n_2	27 90 n_1 n_2	116
ESC ^ m n_1 n_2	9-Pin Bit Image Print	1B 5E m n_1 n_2	27 94 m n_1 n_2	120
ESC b m n_1 .. nk NUL	Set VFU Position	1B 62 m n_1 ..nk 00	27 98 m n_1 ..nk 0	108
ESC j n	n/216" Reverse Line Feed	1B 6A n	27 106 n	95
ESC k n	Select NLQ Font	1B 68 n	27 107 n	59
ESC l n	Left Margin Setting	1B 6C n	27 108 n	101
ESC p n	Set/Cancel Proportional Spacing	1B 70 n	27 112 n	56
ESC s n	Set/Cancel Half-Speed Print	1B 73 n	27 115 n	52
ESC x n	Set/Cancel NLQ Print Mode	1B 78 n	27 120 n	57
DEL	Delete	7F	127	44

■ Mode II (DIP SW2-5, ON)

Format	Command	Code		Ref. Page
		Hex.	Dec.	
HT	Horizontal TAB	09	9	105
LF	Line Feed	0A	10	39
VT	Vertical TAB	0B	11	107
FF	Form Feed	0C	12	41
CR	Carriage Return	0D	13	42
SO (Shift-out)	Enlarged Character Mode	0E	14	60
SI (Shift-in)	Condensed Character Mode	0F	15	63
DC 2 (Device Control 2)	Cancel Condensed Character Mode	12	18	64
DC 4 (Device Control 4)	Cancel Enlarged Character Mode	14	20	61
CAN	Cancel	18	24	44
ESC * m n_1 n_2	Select Bit Image Mode	1B 2A m n_1 n_2	27 42 m n_1 n_2	117
ESC – n	Set/Cancel Underlined Mode	1B 2D n	27 45 n	70
ESC 0 (ZERO)	1/8" Line Spacing	1B 30	27 48	88
ESC 1	7/72" Line Spacing	1B 31	27 49	89
ESC 2	Activate n/72" Line Spacing	1B 32	27 50	91
ESC 3 n	n/216" Line Spacing	1B 33 n	27 51 n	93
ESC 6	Character Set 2	1B 36	27 54	78
ESC 7	Character Set 1	1B 37	27 55	77
ESC 8	Ignore Paper Empty	1B 38	27 56	53
ESC 9	Cancel Paper Empty Ignore	1B 39	27 57	53
ESC <	Home Positioning	1B 3C	27 60	46
ESC ? n m	Translate Bit Image Density	1B 3F n m	27 63 n m	119
ESC A n	n/72" Line Spacing	1B 41 n	27 65 n	90
ESC C n	Page Length (No. of Lines)	1B 43 n	27 67 n	97
ESC C NUL n	Page Length (In inches)	1B 43 00 n	27 67 0 n	97
ESC D n_1 .. nk NUL	Horizontal TAB Setting	1B 44 n_1 .. nk 00	27 68 n_1 .. nk 0	103
ESC E	Emphasized Character Mode	1B 45	27 69	65
ESC F	Cancel Emphasized Character Mode	1B 46	27 70	60
ESC G	Double-Strike Character Mode	1B 47	27 71	67
ESC H	Cancel Double-Strike Character Mode	1B 48	27 72	68
ESC J n	n/216" Line Feed	1B 4A n	27 74 n	94
ESC K n_1 n_2	Standard Density Bit Image Mode	1B 4B n_1 n_2	27 75 n_1 n_2	111
ESC L n_1 n_2	Double Density Bit Image Mode	1B 4C n_1 n_2	27 76 n_1 n_2	114
ESC N n	Set Skip Perforation	1B 4E n	27 78 n	99
ESC O	Cancel Skip Perforation	1B 4F	27 79	100
ESC S n	Superscript/Subscript Mode	1B 53 n	27 83	71
ESC T	Cancel Superscript/Subscript Mode	1B 54	27 84	72
ESC U n	Select Unidirectional/Bidirectional Print	1B 55 n	27 85 n	51
ESC W n	Set/Cancel Enlarged Character Mode	1B 57 n	27 87 n	62
ESC Y n_1 n_2	Double Speed & Double Density Bit Image Mode	1B 59 n_1 n_2	27 89 n_1 n_2	115
ESC Z n_1 n_2	Quadruple Density Bit Image Mode	1B 5A n_1 n_2	27 90 n_1 n_2	116
ESC ^ m n_1 n_2	9-Pin Bit Image Print	1B 5E m n_1 n_2	27 94 m n_1 n_2	120
ESC k n	Select NLQ Font	1B 6B n	27 107 n	59
ESC x n	Set/Cancel NLQ Print Mode	1B 78 n	27 120 n	57

No Exit Used in IBM Mode

4.2 Basic Printer Control

LF — Line Feed

Format LF

BASIC CHR$(10)

Hex 0A

Function

■ Mode I

Advances paper by one line after printing all the data stored in the print buffer.

* Line feed spacing is automatically set at 1/6" (DIP SW3-6, OFF) or 1/8" (ON), at power on.
* The line feed pitch is modified by ESC 0, ESC 1, ESC 2, ESC 3, or ESC A.
* If an LF code only, or space data followed by LF code is received, a line feed only occurs.
* If data, CR and LF codes are received, the printer performs a line feed after the end of printing.
* If this line feed operation encroaches on the lines to be skipped, set by ESC N, paper will advance to the first print position of the next page.
* This code clears the Enlarged character mode set by SO code.

■ Mode II

Advances paper by one line after printing all the data stored in the print buffer.

* Line feed spacing is automatically set at 1/6" (DIP SW3-6, OFF) or 1/8" (ON), at power on.
* The line feed pitch is modified by ESC 0, ESC 1, ESC 2, ESC 3, or ESC A.
* If an LF code only, or space data followed by LF code is received, a line feed only occurs.
* If data, CR and LF codes are received, the printer performs a line feed after the end of printing.
* If this line feed operation encroaches on the lines to be skipped, set by ESC N, paper will advance to the first print position of the next page.
* This code clears the Enlarged character mode set by SO code.
* If the line to be printed contains any special graphic characters of code $(176)_{10}$ — $(223)_{10}$ or $(244)_{10}$ and the line feed spacing is set at less than 1/6", the specified line feed pitch is automatically changed to 1/6" for only that line.

NOTE: See "4.4 Line Control" on page 87.

Example

```
1  LPRINT "*** LF ***";CHR$(10);
10 LPRINT "IMPACT DOT MATRIX ";"PERSONAL ";
   "PRINTER"
20 LPRINT "* SET LINE FEED *";CHR$(10);
30 LPRINT "IMPACT";CHR$(10);
40 LPRINT "DOT MATRIX";CHR$(10);
50 LPRINT "PERSONAL";CHR$(10);
60 LPRINT "PRINTER";CHR$(10);
70 END
```

```
*** LF ***
IMPACT DOT MATRIX PERSONAL PRINTER
* SET LINE FEED *
IMPACT
DOT MATRIX
PERSONAL
PRINTER
```

FF

Form Feed

Format FF

BASIC CHR$(12)

Hex 0C

Function

■ Mode I

Moves the print position to the top of the next page after printing all the data stored in the print buffer.

* The default value for form feed is 11 inches (12 inches if DIP SW3-5 is ON). e.g. 66 lines when 1/6" line feed pitch is selected.
* The default value is set up when the printer is powered on, reset, or given ESC @ sequence.
* The form length can be modified by an ESC C sequence.
* This code clears the Enlarged character mode set by SO code.

■ Mode II

Moves the print position to the top of the next page after printing all the data stored in the print buffer.

* The default value for form feed is 11 inches (12 inches if DIP SW3-5 is ON). e.g. 66 lines when 1/6" line feed pitch is selected.
* The default value is set up when the printer is powered on or reset.
* The form length can be modified by an ESC C sequence.
* This code clears the Enlarged character mode set by SO code.

NOTE: See "4.5 Page Control" on page 97.

Example

```
1  LPRINT "*** FF ***";CHR$(10);
10 LPRINT CHR$(27);"C";CHR$(5);
20 '* SET ENLARGED MODE *
30 LPRINT CHR$(14);"1ST LINE OF PAGE1";
40 '* SET FORM FEED *
50 LPRINT CHR$(12);"1ST LINE OF PAGE2";
60 LPRINT
70 LPRINT "---ENLARGED MODE IS CLEARED BY FF";
80 END
```

```
*** FF ***
1ST LINE OF PAGE1



1ST LINE OF PAGE2
---ENLARGED MODE IS CLEARED BY FF
```

CR

Carriage Return

Format CR

BASIC CHR$(13)

Hex 0D

Function

■ Mode I

Performs printing of all the data stored in the print buffer.

* A line feed occurs after the printing if $\overline{\text{AUTO FEED XT}}$ signal is Low or the DIP SW3-8 is set to ON.
* The line feed pitch is set by ESC 0, ESC 1, ESC 2, ESC 3, or ESC A.
* CR with line feed clears the Enlarged character mode set by SO code.
* If a CR code only, or space data followed by CR code is received when $\overline{\text{AUTO FEED XT}}$ signal is Low or the DIP SW3-8 is set to ON, a line feed only occurs without movement of the print head.

■ Mode II

Performs printing of all the data stored in the print buffer.

* A line feed occurs after the printing if $\overline{\text{AUTO FEED XT}}$ signal is Low or the DIP SW3-8 is set to ON.
* The line feed pitch is set by ESC 0, ESC 1, ESC 2, ESC 3, or ESC A.
* This command clears the Enlarged character mode set by SO code.
* If a CR code only, or space data followed by CR code is received when $\overline{\text{AUTO FEED XT}}$ signal is Low or the DIP SW3-8 is set to ON, a line feed only occurs without movement of the print head.

Example

```
1  LPRINT "*** CR ***";CHR$(13);CHR$(10);
10 LPRINT "CARRIAGE ";"RETURN"
20 LPRINT
30 LPRINT "* SET CARRIAGE RETURN *";CHR$(13);
   CHR$(10);
40 LPRINT
50 LPRINT "CARRIAGE";CHR$(13);CHR$(10);
60 LPRINT "RETURN";CHR$(13);CHR$(10);
70 END
```

```
*** CR ***
CARRIAGE RETURN

* SET CARRIAGE RETURN *

CARRIAGE
RETURN
```

BS

Backspace

Format BS

BASIC CHR$(8)

Hex 08

Function Moves the print position horizontally one position to the left, in the current character size, after printing all the data stored in the print buffer.

* In Enlarged character mode, the print position backspaces in double Pica pitch.
* This command never moves the print position to the left more than the home position. If the printer receives this command at home position, the command is ignored and does not move the print position to the left.

Example

```
1   LPRINT "*** BS ***";CHR$(10);
10  LPRINT ">>>>><<<<<";CHR$(10);
20  LPRINT CHR$(14);">>>>><<<<<";CHR$(10);
30  LPRINT "* SET BS CODE *";CHR$(10);
40  GOSUB 80
50  LPRINT CHR$(14);
60  GOSUB 80
70  END
80  LPRINT ">>>>>";CHR$(8);CHR$(8);"<<<<<";
    CHR$(10);
90  RETURN
```

```
*** BS ***
>>>><<<<
> > > > ><  <  <  <  <
* SET BS CODE *
>>>**<<<
> > > **<  <  <
```

CAN

Cancel

Format CAN

BASIC CHR$(24);

Hex 18

Function ■ Mode I ■ Mode II

Clears the data in the print buffer.

Example

```
1  LPRINT "*** CAN ***";CHR$(10);
10 LPRINT "0123456789";CHR$(10);
20 '* CANCEL *
30 LPRINT "0123";CHR$(24);
40 LPRINT "456789":END
```

```
*** CAN ***
0123456789
456789
```

■ Mode I

DEL

Delete

Format DEL

BASIC CHR$(127);

Hex 7F

Function Deletes the last one character stored in the print buffer.

*This command is ignored in Proportional or Bit image print mode.
*This command does not change the current print mode.

Example

```
1  LPRINT "*** DEL ***";CHR$(10);
10 LPRINT "Manual for operate";
20 '* DELETE LAST CHARACTER e *
30 LPRINT CHR$(127);"ing";
40 END
```

```
*** DEL ***
Manual for operating
```

■ Mode I

DC 1 (Device Control 1)

Cancel DC3 State

Format DC1

BASIC CHR$(17);

Hex 11

Function Cancels the printer's offline state set by DC3 code.
This command is valid if DIP SW3-7 is set to OFF and the $\overline{\text{SLCT IN}}$ signal is High.
NOTE: See "2.4 Setting DIP Switches" on page 23.

■ Mode I

DC 3 (Device Control 3)

Set Offline State

Format DC3

BASIC CHR$(19);

Hex 13

Function Takes the printer offline where received data is ignored.
This command is valid if DIP SW3-7 is set to OFF and the $\overline{\text{SLCT IN}}$ signal is High.
NOTE: See "2.4 Setting DIP Switches" on page 23.

ESC @

■ Mode I

Printer Initialization

Format ESC @

BASIC CHR$(27);"@";

Hex 1B 40

Function Initializes the printer.

* When receiving this command, the printer returns to the same status as at power on.
* This command clears the data in the print buffer.

Example

```
1  LPRINT "*** ESC @ ***";CHR$(10);
10 '* SET ITALIC MODE *
20 LPRINT CHR$(27);"4";
30 LPRINT "Please clear the data."
40 '* INITIALIZE THE PRINTER *
50 LPRINT CHR$(27);"@";
60 LPRINT "O.K! Now in Normal Mode.";
70 END
```

```
*** ESC @ ***
Please clear the data.
O.K! Now in Normal Mode.
```

ESC <

Home Positioning

Format ESC <

BASIC CHR$(27);"<";

Hex 1B 3C

Function ■ Mode I ■ Mode II

Returns the print head to its home position, after printing all the data stored in the print buffer.

* Subsequent data will be printed, from left to right, starting at the print position immediately following the data previously printed.
* See ESC U sequence.

ESC >

■ Mode I

Set MSB to 1

Format ESC >

BASIC CHR$(27);">";

Hex 1B 3E

Function After this command is received, the most significant bit (MSB) of the following input data is forced to be set to 1.

* This MSB control is not effective to the Bit image data.

Example

```
1   LPRINT "*** ESC > & = ***";CHR$(10);
10  '* SET MSB TO 1 *
20  LPRINT CHR$(27);">";
30  GOSUB 80
40  '* SET MSB TO 0 *
50  LPRINT CHR$(27);"=";
60  GOSUB 80
70  END
80  LPRINT  "Dot Matrix Printer"
90  LPRINT
100 RETURN
```

```
*** ESC > & = ***
Dot Matrix Printer

Dot Matrix Printer
```

ESC =

■ Mode I

Set MSB to 0

Format ESC =

BASIC CHR$(27);"=";

Hex 1B 3D

Function After this command is received, the most significant bit (MSB) of the following input data is forced to be set to 0.

Example See ESC >.

ESC

Cancel MSB Control Mode

Format ESC #

BASIC CHR$(27);"#";

Hex 1B 23

Function Clears the MSB control mode set by ESC > or ESC = .

Example

```
1  LPRINT "*** ESC # ***";CHR$(10);
10 LPRINT CHR$(27);">";
20 LPRINT "SET MSB CONTROL"
30 LPRINT
40 LPRINT CHR$(27);"#";
50 LPRINT "CANCEL MSB CONTROL";
60 END
```

```
*** ESC # ***
SET MSB CONTROL

CANCEL MSB CONTROL
```

ESC I

Switch to Control Codes/Printable Characters

Format ESC I n

n = 0 : Control codes
n = 1 : Printable characters

BASIC CHR$(27);"I";CHR$(n);

Hex 1B 49 n

Function Switches the control code area to printable characters or control codes.

*Receiving this command with n = 1, the printer interprets codes assigned for $(0)_{10}$ – $(31)_{10}$, and $(128)_{10}$ – $(159)_{10}$ as printable characters; with n = 0, as control codes, if defined.

Dec. code	Char.	Dec. code	Char.	Dec. code	Char.	Dec. code	Char.	Dec. code	Char.	Dec. code	Char.
0	à	13	CR	26	ä	128	À	141	CR	154	Ä
1	è	14	SO	27	ESC	129	È	142	SO	155	ESC
2	ù	15	SI	28	ü	130	Ù	143	SI	156	Ü
3	ò	16	§	29	É	131	Ò	144	§	157	É
4	ì	17	ß	30	é	132	Ì	145	ß	158	é
5	°	18	DC2	31	ö	133	°	146	DC2	159	Ö
6	£	19	DC3			134	£	147	DC3		
7	¡	20	DC4			135	¡	148	DC4		
8	BS	21	ø			136	BS	149	ø		
9	HT	22	-			137	HT	150	-		
10	LF	23	Ä			138	LF	151	Ä		
11	VT	24	CAN			139	VT	152	CAN		
12	FF	25	Ü			140	FF	153	Ü		

Example

```
1   LPRINT "*** ESC I n ***";CHR$(10);
10  '* SWITCH TO PRINTABLE CHARACTERS *
20  LPRINT CHR$(27);"I";CHR$(1);
30  FOR M=1 TO 2
40  FOR N=1 TO 19
50  READ A:LPRINT CHR$(A);
60  NEXT:LPRINT
70  NEXT
80  '* SWITCH TO CONTROL CODES *
90  LPRINT CHR$(27);"I";CHR$(0);:END
100 DATA 0,1,2,3,4,5,6,7,16,17,21
110 DATA 22,23,25,26,28,29,30,31
120 DATA 128,129,130,131,132,133
130 DATA 134,135,144,145,149,150
140 DATA 151,153,154,156,157,158,159
```

```
*** ESC I n ***
àèùòì°£¡§ßø¨ÄÜäüëé¥
àèùòì°£¡§ßø¨ÄÜäüëé¥
```

ESC U

Select Unidirectional/Bidirectional Print

Format ESC U n

n = 0 : Bidirectional print
n = 1 : Unidirectional print

BASIC CHR$(27);"U";CHR$(n);

Hex 1B 55 n

Function ■ Mode I ■ Mode II

Selects Unidirectional or Bidirectional print mode.

* At power on, the printer is automatically set in the bidirectional print mode.
* The unidirectional print mode set by ESC U with n = 1 keeps errors in horizontal print positions from accumulating.

Example

```
1   LPRINT "*** ESC U n ***";CHR$(10);
10  '* SELECT UNIDIRECTIONAL PRINT *
20  LPRINT CHR$(27);"U";CHR$(1);
30  LPRINT "Uni-direction"
40  FOR I=1 TO 2
50  LPRINT "->->->->->->->->->->->->";
60  LPRINT CHR$(10);
70  NEXT
80  '* SELECT BIDIRECTIONAL PRINT *
90  LPRINT CHR$(27);"U";CHR$(0);
100 LPRINT "Bi-direction"
110 LPRINT "->->->->->->->->->->->->";CHR$(10);
120 LPRINT "<-<-<-<-<-<-<-<-<-<-<-<-";
130 END
```

```
*** ESC U n ***
Uni-direction
->->->->->->->->->->->->
->->->->->->->->->->->->
Bi-direction
->->->->->->->->->->->->
<-<-<-<-<-<-<-<-<-<-<-<-
```

■ Mode I

ESC s

Set/Cancel Half-Speed Print

Format ESC s n

n = 0 : Cancel
n = 1 : Set

BASIC CHR$(27);"s";CHR$(n);

Hex 1B 73 n

Function Sets or clears half-speed print operation.

* After receiving this command with n = 1 in Pica Draft print mode, the print speed is reduced to half resulting in quieter print operation.

■ Mode I

ESC EM

Control Cut Sheet Feeder

Format ESC EM n

BASIC CHR$(27);CHR$(25);CHR$(n);

Hex 1B 19 n

Function Controls an optional Cut Sheet Feeder.

n	Function
"0" = CHR$(48)	Deselect Cut Sheet Feeder.
"4" = CHR$(52)	Select Cut Sheet Feeder.
"R" = CHR$(82)	Eject forms.

* This command makes the Cut Sheet Feeder operable. The cut sheet feeder mode can be changed with switch panel operation when the printer is offline.
* Unless an optional Cut Sheet Feeder is installed, this command operation is not assured.

ESC 8

Ignore Paper Empty

Format ESC 8

BASIC CHR$(27);"8";

Hex 1B 38

Function ■ Mode I ■ Mode II

Causes the printer to ignore the Paper Empty (PE) state.

* This command allows the printer to keep online and print to the end of the paper. It is functionally equivalent to the DIP SW2-2 setting ON. However this command does not disable the PE detection function completely; that is, the CHECK lamp comes on and the PE signal is output.

ESC 9

Cancel Paper Empty Ignore

Format ESC 9

BASIC CHR$(27);"9";

Hex 1B 39

Function ■ Mode I ■ Mode II

Clears the Paper Empty Ignore condition set by ESC 8 sequence.

* This command activates the PE detection function.
* If DIP SW2-2 is set to OFF, this function is always active when the power is first applied.
* If this command is received in the Paper Empty Ignore state, the printer outputs $\overline{\text{FAULT}}$ and BUSY signals.

4.3 Character Control

4.3.1 Typeface

■ Mode I

ESC M

Elite-Sized Character Mode

Format ESC M

BASIC CHR$(27);"M";

Hex 1B 4D

Function Prints the data in Elite-sized character mode (12 characters/inch).

*This code will be ignored if the printer has already been set in Elite-sized character mode.

Example

```
1  LPRINT "*** ESC M ***";CHR$(10);
10 LPRINT "* PICA-SIZED * 1234567890";CHR$(10);
20 LPRINT CHR$(27);"M";
30 LPRINT "* ELITE-SIZED *   1234567890";
40 LPRINT CHR$(27);"P";:END
```

```
*** ESC M ***
* PICA-SIZED * 1234567890
* ELITE-SIZED *   1234567890
```

10 CPI

12 CPI

ESC P

Cancel Elite-Sized Character Mode

Format ESC P

BASIC CHR(27);"P";

Hex 1B 50

Function Clears the Elite-sized character mode set by ESC M sequence.

* The printer returns to the Pica-sized character mode.
* This command clears only ESC M sequence and does not clear other modes such as Enlarged or Condensed character mode.

Example

```
1   LPRINT "*** ESC P ***";CHR$(10);
10  LPRINT CHR$(27);"M";
20  LPRINT "ELITE-SIZED  ";:GOSUB 140
30  '* CANCEL ELITE MODE *
40  LPRINT CHR$(27);"P";
50  LPRINT "PICA-SIZED ";:GOSUB 140
60  LPRINT CHR$(15);
70  LPRINT "CONDENSED-SIZED    ";:GOSUB 140
80  LPRINT CHR$(27);"M";
90  LPRINT "CONDENSED ELITE-SIZED ";:GOSUB 140
100 '* CANCEL ELITE MODE *
110 LPRINT CHR$(27);"P";
120 LPRINT "CONDENSED-SIZED    ";:GOSUB 140
130 LPRINT CHR$(18);:END
140 LPRINT "1234567890 ABCDEFGHIJ";CHR$(10);
150 RETURN
```

```
*** ESC P ***
ELITE-SIZED  1234567890 ABCDEFGHIJ
PICA-SIZED 1234567890 ABCDEFGHIJ
CONDENSED-SIZED    1234567890 ABCDEFGHIJ
CONDENSED ELITE-SIZED 1234567890 ABCDEFGHIJ
CONDENSED-SIZED    1234567890 ABCDEFGHIJ
```

ESC p

Set/Cancel Proportional Spacing

Format ESC p n

n = 0 : Cancel
n = 1 : Set

BASIC CHR$(27);"p";CHR$(n);

Hex 1B 70 n

Function Sets or cancels Proportional print mode.

* After receiving ESC p with n = 1, the printer prints the subsequent data in Proportional spacing mode. In the proportional mode, BS and DEL codes are invalid.
* In the proportional mode, the data is always printed in Emphasized characters.

Example

```
1   LPRINT "*** ESC p n ***";CHR$(10);
10  LPRINT "* NORMAL PRINT MODE *"
20  GOSUB 90
30  LPRINT
40  LPRINT CHR$(27);"p";CHR$(1);
50  LPRINT "* PROPORTIONAL SPACING MODE *"
60  GOSUB 90
70  LPRINT CHR$(27);"p";CHR$(0);
80  END
90  LPRINT "  This excellent impact dot matrix"
100 LPRINT "  printer combines high quality"
110 LPRINT "  and performance features!!"
120 RETURN
```

```
*** ESC p n ***
* NORMAL PRINT MODE *
  This excellent impact dot matrix
  printer combines high quality
  and performance features!!

* PROPORTIONAL SPACING MODE *
  This excellent impact dot matrix
  printer combines high quality
  and performance features!!
```

Example

```
1   LPRINT "*** ESC x n ***";CHR$(10);
10  LPRINT CHR$(27);"x";CHR$(1);
20  LPRINT "* NLQ MODE *";CHR$(10);
30  GOSUB 100
40  LPRINT
50  LPRINT CHR$(27);"x";CHR$(0);
60  LPRINT "* DRAFT MODE *";CHR$(10);
70  GOSUB 100
80  LPRINT CHR$(27);CHR$(3);
90  END
100 FOR X=33 TO 126
110 IF Y>31 THEN LPRINT CHR$(10);:Y=0
120 LET Y=Y+1:LPRINT CHR$(X);
130 NEXT
140 LPRINT CHR$(10);:Y=0
150 RETURN
```

```
*** ESC x n ***
* NLQ MODE *
!"#$%&'()*+,-./0123456789:;<=>?@
ABCDEFGHIJKLMNOPQRSTUVWXYZ¡Ñ¿^_`
abcdefghijklmnopqrstuvwxyz¨ñ}~

* DRAFT MODE *
!"#$%&'()*+,-./0123456789:;<=>?@
ABCDEFGHIJKLMNOPQRSTUVWXYZ¡Ñ¿^_`
abcdefghijklmnopqrstuvwxyz¨ñ}~
```

ESC k

Select NLQ Font

Format ESC k n (0 ≦ n ≦ 3)

BASIC CHR$(27);"k";CHR$(n);

Hex 1B 6B n

Function ■ Mode I ■ Mode II

Prints data with NLQ font selected by "n", after printing all the data stored in the print buffer.

n	Font
0	Prestige (built in the internal CG)
1	Anelia Proportional
2	Quadro
3	Gothic

(built in optional external NLQ fonts P.C.B.s)

* This command is invalid unless an optional NLQ fonts P.C.B. is installed.

Example

```
1   LPRINT "*** ESC k n ***";CHR$(10);
10  '* SET NLQ MODE *
20  LPRINT CHR$(27);"x";CHR$(1);
30  '* SELECT NLQ FONT *
40  LPRINT CHR$(27);"k";CHR$(0);
50  LPRINT "NLQ CHARACTER SET 0 <PRESTIGE>"
60  LPRINT CHR$(27);"k";CHR$(1);
70  LPRINT "NLQ CHARACTER SET 1 <ANELIA P.S.>"
80  LPRINT CHR$(27);"k";CHR$(2);
90  LPRINT "NLQ CHARACTER SET 2 <QUADRO>"
100 LPRINT CHR$(27);"k";CHR$(3);
110 LPRINT "NLQ CHARACTER SET 3 <GOTHIC>";
120 END
```

```
*** ESC k n ***
NLQ CHARACTER SET 0 <PRESTIGE>
NLQ CHARACTER SET 1 <ANELIA P.S.>
NLQ CHARACTER SET 2 <QUADRO>
NLQ CHARACTER SET 3 <GOTHIC>
```

SO (Shift Out)

Enlarged Character Mode

Format SO

BASIC CHR$(14);

Hex 0E

Function

■ Mode I

Sets Enlarged character print mode.

* After receiving this command, the printer prints the data in horizontally enlarged characters until
  - DC 4, ESC W (n = 0) or ESC @ command is received.
  - CR with line feed is received,
  - line feed is performed by LF, VT or FF code (except ESC J), or
  - auto line feed is performed by buffer full.
* This command is cleared by carriage return while ESC W is not.

■ Mode II

Sets Enlarged character print mode.

* After receiving this command, the printer prints the data in horizontally enlarged characters until
  - CR, DC 4, or ESC W (n = 0) command is received,
  - line feed is performed by LF, VT or FF code (except ESC J), or
  - auto line feed is performed by buffer full.
* This command is cleared by carriage return while ESC W is not.

Example

```
1  LPRINT "*** SO ***";CHR$(10);
10 LPRINT "DOT ";
20 '* SET ENLARGED MODE *
30 LPRINT CHR$(14);"MATRIX ";
40 '* CANCEL ENLARGED MODE *
50 LPRINT CHR$(20);"PRINTER";
60 LPRINT CHR$(10);
70 END
```

```
*** SO ***
DOT MATRIX  PRINTER
```

DC 4 (Device Control 4)

Cancel Enlarged Character Mode

Format DC4

BASIC CHR$(20);

Hex 14

Function ■ Mode I ■ Mode II

Clears the Enlarged character mode set by SO code.

*This code does not clear the Enlarged character mode set by ESC W sequence.

Example

```
1  LPRINT "*** DC4 ***";CHR$(10);
10 LPRINT "IMPACT ";
20 '* SET ENLARGED MODE *
30 LPRINT CHR$(14);"DOT MATRIX ";
40 '* CANCEL ENLARGED MODE *
50 LPRINT CHR$(20);"PRINTER";CHR$(10);
60 END
```

```
*** DC4 ***
IMPACT DOT MATRIX PRINTER
```

ESC W

Set/Cancel Enlarged Character Mode

Format ESC W n

n = 0 : Cancel
n = 1 : Set

BASIC CHR$(27);"W";CHR$(n);

Hex 1B 57 n

Function ■ Mode I ■ Mode II

Sets or clears Enlarged character print mode.

* After receiving this code with n = 1, the printer prints the data in Enlarged character mode until ESC W with n = 0 is received. This mode is not cleared by a carriage return while the Enlarged character mode set by SO code is cleared.
* This code with n = 0 clears the Enlarged character mode set by SO.

Example

```
1  LPRINT "*** ESC W n ***";CHR$(10);
10 LPRINT "DOUBLE WIDTH ";
20 '* SET ENLARGED MODE *
30 LPRINT CHR$(27);"W";CHR$(1);"ENLARGED ";
40 '* CANCEL ENLARGED MODE *
50 LPRINT CHR$(27);"W";CHR$(0);"PRINTING";
60 END
```

```
*** ESC W n ***
DOUBLE WIDTH ENLARGED  PRINTING
```

SI (Shift In)

Condensed Character Mode

Format SI

BASIC CHR$(15);

Hex 0F

Function

■ Mode I

Sets Condensed character print mode.

- *After receiving this command, the printer prints the data in condensed mode until DC2 code is received.
- *If the printer receives this command in Pica-sized or Elite-sized character mode, the character pitch becomes 17 or 20 characters/inch, respectively.
- *If this code is used together with SO or ESC W command in Pica-sized or Elite-sized character mode, the printer prints the data in Condensed Enlarged character mode.
- *If this code is used together with ESC E command in Pica-sized character mode, the printer prints the data in Emphasized Condensed character mode; if used in Elite-sized character mode, the ESC E command is ignored.

■ Mode II

Sets Condensed character print mode.

- *After receiving this command, the printer prints the data in condensed mode until DC2 code is received.
- *If the printer receives this command, the character pitch becomes 17 characters/inch.
- *If this code is used together with SO or ESC W command, the printer prints the data in Condensed Enlarged character mode.
- *If this code is used together with ESC E command, the printer prints the data in Emphasized Condensed character mode.

Example

```
1  LPRINT "*** SI ***";CHR$(10);
10 LPRINT "Print ";
20 '* SET CONDENSED MODE *
30 LPRINT CHR$(15);"in Condensed character ";
40 LPRINT "mode after receiving SI code.";
50 LPRINT CHR$(18);:END
```

```
*** SI ***
Print in Condensed character mode after receiving SI code.
```

DC 2 (Device Control 2)

Cancel Condensed Character Mode

Format DC2

BASIC CHR$(18);

Hex 12

Function ■ Mode I ■ Mode II

Clears the Condensed character mode set by SI code after printing all the data stored in the print buffer.

Example

```
1  LPRINT "*** DC2 ***";CHR$(10);
10 '* SET CONDENSED MODE *
20 LPRINT CHR$(15);
30 LPRINT "How can you cancel Condensed ";
40 LPRINT "mode?";CHR$(10);
50 '* CANCEL CONDENSED MODE *
60 LPRINT CHR$(18);
70 LPRINT "By setting DC2 code.";
80 END
```

```
*** DC2 ***
How can you cancel Condensed mode?
By setting DC2 code.
```

ESC E

Emphasized Character Mode

Format ESC E

BASIC CHR$(27);"E";

Hex 1B 45

Function

■ Mode I

Sets Emphasized character mode after printing all the data stored in the print buffer.

*If this code is used together with SI code in Elite-sized character mode, this command is ignored and the current print mode is not changed.
*This mode is cleared by ESC F sequence.

■ Mode II

Sets Emphasized character mode after printing all the data stored in the print buffer.

*This mode is cleared by ESC F sequence.

Example

```
1   LPRINT "*** ESC E & F ***";CHR$(10);
10  '* SET EMPHASIZED MODE *
20  LPRINT CHR$(27);"E";
30  FOR I=1 TO 3
40  FOR J=1 TO 12
50  LPRINT "<*>";:NEXT J
60  LPRINT CHR$(10);
70  NEXT I
80  '* CANCEL EMPHASIZED MODE *
90  LPRINT CHR$(27);"F";
100 FOR I=1 TO 3
110 FOR J=1 TO 12
120 LPRINT "<*>";:NEXT J
130 LPRINT CHR$(10);
140 NEXT I
150 END
```

```
*** ESC E & F ***
<*><*><*><*><*><*><*><*><*><*><*><*>
<*><*><*><*><*><*><*><*><*><*><*><*>
<*><*><*><*><*><*><*><*><*><*><*><*>
<*><*><*><*><*><*><*><*><*><*><*><*>
<*><*><*><*><*><*><*><*><*><*><*><*>
<*><*><*><*><*><*><*><*><*><*><*><*>
```

ESC F

Cancel Emphasized Character Mode

Format ESC F

BASIC CHR$(27);"F";

Hex 1B 46

Function ■ Mode I ■ Mode II

Clears the Emphasized character mode set by ESC E sequence after printing all the data stored in the print buffer.

Example See ESC E.

ESC G

Double-Strike Character Mode

Format ESC G

BASIC CHR$(27);"G";

Hex 1B 47

Function ■ Mode I ■ Mode II

Prints the data in Double-strike character mode.

*Double-strike is a print method in which the same character is printed twice 1/216" vertically staggered.

*In the case of mixed use with Superscript/Subscript mode, this command is ignored, since Superscript/Subscript mode has priority.

Example

```
1  LPRINT "*** ESC G & H ***";CHR$(10);
10 FOR I=1 TO 2
20 '* SET DOUBLE-STRIKE MODE *
30 LPRINT CHR$(27);"G";
40 LPRINT "DOT MATRIX PRINTER";CHR$(10);
50 '* CANCEL DOUBLE-STRIKE MODE *
60 LPRINT CHR$(27);"H";
70 LPRINT "DOT MATRIX PRINTER";CHR$(10);
80 NEXT
90 END
```

```
*** ESC G & H ***
DOT MATRIX PRINTER
DOT MATRIX PRINTER
DOT MATRIX PRINTER
DOT MATRIX PRINTER
```

ESC H

Cancel Double-Strike Character Mode

Format ESC H

BASIC CHR$(27);"H";

Hex 1B 48

Function ■ Mode I ■ Mode II

Clears the Double-strike character mode set by ESC G sequence after printing all the data stored in the print buffer.

Example See ESC G.

■ Mode I

ESC 4

Italic Print Mode

Format ESC 4

BASIC CHR$(27);"4";

Hex 1B 34

Function Prints the data in italics.

* This is invalid in Bit image mode.

Example

```
1  LPRINT "*** ESC 4 & 5 ***";CHR$(10);
10 LPRINT "Do you like Italic mode?";CHR$(10);
20 '* SET ITALIC MODE *
30 LPRINT CHR$(27);"4";CHR$(10);
40 LPRINT "Yes, I like it very much.";CHR$(10);
50 '* CANCEL ITALIC MODE *
60 LPRINT CHR$(27);"5";
70 LPRINT "No. I like Normal mode.";CHR$(10);
80 END
```

```
*** ESC 4 & 5 ***
Do you like Italic mode?

Yes, I like it very much.
No. I like Normal mode.
```

■ Mode I

ESC 5

Cancel Italic Print Mode

Format ESC 5

BASIC CHR$(27);"5";

Hex 1B 35

Function Clears the Italic print mode set by ESC 4 sequence.

Example See ESC 4.

ESC–

Set/Cancal Underlined Mode

Format ESC – n

n = 0 : Cancel
n = 1 : Set

BASIC CHR$(27);"–";CHR$(n);

Hex 1B 2D n

Function

■ Mode I

Sets or clears Underlined print mode.

* After receiving this command with n = 1, the printer prints the subsequent data with an underline.
* Mixed use with all other modes except bit image mode is available.

■ Mode II

Sets or clears Underlined print mode.

* After receiving this command with n = 1, the printer prints the subsequent data with an underline after printing all the data stored in the print buffer.
* Special graphic characters of codes $(176)_{10}$ – $(223)_{10}$ and $(244)_{10}$ can not be underlined.
* Mixed use with all other modes except bit image mode is available.

Example

```
1   LPRINT "*** ESC - n ***";CHR$(10);
10  GOSUB 60
20  LPRINT CHR$(27);"E";
30  GOSUB 60
40  LPRINT CHR$(27);"F";
50  END
60  LPRINT "Elementary ";
70  '* SET UNDERLINED MODE *
80  LPRINT CHR$(27);"-";CHR$(1);
90  LPRINT " Junior ";
100 '* CANCEL UNDERLINED MODE *
110 LPRINT CHR$(27);"-";CHR$(0);
120 LPRINT " High School";
130 LPRINT CHR$(10);
140 RETURN
```

```
*** ESC - n ***
Elementary  Junior  High School
Elementary  Junior  High School
```

ESC S

Superscript/Subscript Mode

Format ESC S n

n = 0 : Set Superscript mode
n = 1 : Set Subscript mode

BASIC CHR$(27);"S";CHR$(n);

Hex 1B 53 n

Function ■ Mode I ■ Mode II

Sets Superscript/Subscript print mode.

- Superscript or subscript is a print method in which upper half or lower half of a character is printed, respectively.
- In these script modes, printing of one character is completed by unidirectional dual printing with 1/216" line feed.
- In the case of mixed use with Double-strike character mode, double striking is not performed.

Example

```
1   LPRINT "*** ESC S n ***";CHR$(10);
10  LPRINT CHR$(27);"E";"EMPHASIZED ";
20  '* SET SUBSCRIPT MODE *
30  LPRINT CHR$(27);"S";CHR$(1);"SUBSCRIPT ";
40  LPRINT CHR$(15);"SUBSCRIPT";
50  LPRINT CHR$(27);"T";CHR$(27);"F";CHR$(18);
    CHR$(10);
60  LPRINT "NORMAL ";
70  '* SET SUPERSCRIPT MODE *
80  LPRINT CHR$(27);"S";CHR$(0);"SUPERSCRIPT";
90  LPRINT CHR$(15);" SUPERSCRIPT";
100 LPRINT CHR$(27);"T";CHR$(18);
110 END
```

```
*** ESC S n ***
EMPHASIZED SUBSCRIPT SUBSCRIPT
NORMAL SUPERSCRIPT SUPERSCRIPT
```

ESC T

Cancel Superscript/Subscript Mode

Format ESC T

BASIC CHR$(27);"T";

Hex 1B 54

Function ■ Mode I ■ Mode II

Clears the Superscript/Subscript print mode set by ESC S sequence after printing all the data stored in the print buffer.

Example

```
1   LPRINT "*** ESC S n & T ***";CHR$(10);
10  LPRINT "* SUBSCRIPT *     ";
20  LPRINT "H";
30  '* SET SUBSCRIPT MODE *
40  LPRINT CHR$(27);"S";CHR$(1);CHR$(15);"2";
50  '* CANCEL SUBSCRIPT MODE *
60  LPRINT CHR$(27);"T";CHR$(18);"0";CHR$(10);
70  LPRINT "* SUPERSCRIPT *   ";
80  LPRINT "y";
90  LPRINT CHR$(27);"S";CHR$(0);CHR$(15);"3";
100 LPRINT CHR$(27);"T";CHR$(18);"xy";
110 LPRINT CHR$(27);"S";CHR$(0);CHR$(15);"5";
120 LPRINT CHR$(27);"T";CHR$(18);"=y";
130 LPRINT CHR$(27);"S";CHR$(0);CHR$(15);"8";
140 LPRINT CHR$(27);"T";CHR$(18);:END
```

```
*** ESC S n & T ***
* SUBSCRIPT *      H2O
* SUPERSCRIPT *    y3xy5=y8
```

ESC !

Change Print Mode Parameters

Format ESC ! n (0 ≦ n ≦ 255)

BASIC CHR$(27);"!";CHR$(n);

Hex 1B 21 n

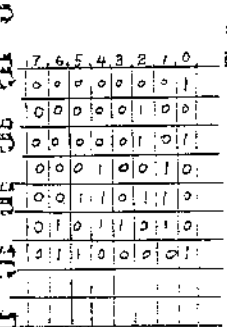
Function Changes print mode parameters with a single command.

* The print mode parameters are determined by the bit values in "n".

Bit No.	Bit Value "1"	Bit Value "0"	Bit order
7	Underlined	—	2^7
6	Italic	—	2^6
5	Enlarged	—	2^5
4	Double-Strike	—	2^4
3	Emphasized	—	2^3
2	Condensed	—	2^2
1	Proportional	—	2^1
0	Elite	Pica	2^0

Example

```
1  LPRINT "*** ESC ! n ***";CHR$(10);
10 LPRINT CHR$(27);"D";CHR$(12);CHR$(0);
20 FOR N=1 TO 10:READ A
30 LPRINT CHR$(27);"!";CHR$(0);
40 LPRINT "Mode ";A;CHR$(9);
50 '* SELECT MULTIPLE PRINT *
60 LPRINT CHR$(27);"!";CHR$(A);
70 LPRINT "Select Print Mode"
80 NEXT
90 DATA 0,1,4,5,18,54,90,97,156,178,
```




```
*** ESC ! n ***
Mode   0    Select Print Mode
Mode   1    Select Print Mode
Mode   4    Select Print Mode
Mode   5    Select Print Mode
Mode  18    Select Print Mode
Mode  54    Select Print Mode
Mode  90    Select Print Mode
Mode  97    Select Print Mode
Mode 156    Select Print Mode
Mode 178    Select Print Mode
```

■ Pica Mode

	Proportional	Condensed	Emphasized	Double-Strike	Enlarged	Italic	Underlined
Proportional		Proportional	Proportional	○	○	○	○
Condensed	Proportional		○	○	○	○	○
Emphasized	Proportional	○		○	○	○	○
Double-Strike	○	○	○		○	○	○
Enlarged	○	○	○	○		○	○
Italic	○	○	○	○	○		○
Underlined	○	○	○	○	○	○	

■ Elite Mode

	Proportional	Condensed	Emphasized	Double-Strike	Enlarged	Italic	Underlined
Proportional		Proportional	Proportional	○	○	○	○
Condensed	Proportional		Condensed	○	○	○	○
Emphasized	Proportional	Condensed		○	○	○	○
Double-Strike	○	○	○		○	○	○
Enlarged	○	○	○	○		○	○
Italic	○	○	○	○	○		○
Underlined	○	○	○	○	○	○	

The above tables list all possible print mode pairs. A circle "○" denotes a valid combination. (e.g.) Double-Strike and Proportional print modes may be used together.

Some entries in the table have a print mode name instead. The corresponding combination is impossible so the printer uses only the one listed.
(e.g.) If Condensed and Proportional print modes are set together, the Proportional mode has priority and the Condensed mode is ignored.

ESC R (EPSON) National Character Set

Format ESC R n (0 ≦ n ≦ 15)

BASIC CHR$(27);"R";CHR$(n);

Hex 1B 52 n

Function Selects each national character set.

* After receiving this command, the printer prints with each national character set selected by "n".

n	National character set
0	U.S.A.
1	France I
2	Germany
3	U.K. I
4	Denmark I
5	Sweden
6	Italy
7	Spain
8	Japan
9	Norway I
10	Denmark II
11	U.K. II
12	Norway II
13	Netherlands
14	France II
15	South Africa

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* The selected national character set remains valid until re-set by ESC R sequence.

Example

```
1   LPRINT "*** ESC R n ***";CHR$(10);
10  LPRINT "< U.S.A >":GOSUB 70
20  LPRINT "< FRANCE >":GOSUB 70
30  LPRINT "< GERMANY >":GOSUB 70
40  LPRINT "< U.K.I >":GOSUB 70
50  LPRINT "< SPAIN >":GOSUB 70
60  END
70  '* SELECT NATIONAL CHARACTER SET *
80  READ N:LPRINT CHR$(27);"R";CHR$(N);
90  X=0:FOR I=33 TO 126:LET X=X+1
100 IF X>40 THEN LPRINT CHR$(10);:X=0
110 LPRINT CHR$(I);:NEXT
120 LPRINT CHR$(10);:RETURN
130 DATA 0,1,2,3,7
```

```
*** ESC R n ***
< U.S.A >
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGH
IJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopq
rstuvwxyz{|}~
< FRANCE >
!"#$%&'()*+,-./0123456789:;<=>?àABCDEFGH
IJKLMNOPQRSTUVWXYZ°ç§^_`abcdefghijklmnopq
rstuvwxyzéùè¨
< GERMANY >
!"#$%&'()*+,-./0123456789:;<=>?§ABCDEFGH
IJKLMNOPQRSTUVWXYZÄÖÜ^_`abcdefghijklmnopq
rstuvwxyzäöüß
< U.K.I >
!"£$%&'()*+,-./0123456789:;<=>?@ABCDEFGH
IJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopq
rstuvwxyz{|}~
< SPAIN >
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGH
IJKLMNOPQRSTUVWXYZ¡Ñ¿^_`abcdefghijklmnopq
rstuvwxyz¨ñ}~
```

ESC 7

Character Set 1

Format ESC 7

BASIC CHR$(27);"7";

Hex 1B 37

Function Selects Character set 1.

Example

```
1   LPRINT "*** ESC 6 & 7 ***";CHR$(10);
10  LPRINT "* CHARACTER SET 2 *";CHR$(10);
20  LPRINT CHR$(27);"6";
30  FOR Z=128 TO 159
40  IF Z=144 THEN LPRINT CHR$(10);
50  LPRINT CHR$(Z);" ";
60  NEXT:LPRINT CHR$(10);
70  LPRINT "* CHARACTER SET 1 *";CHR$(10);
80  LPRINT CHR$(27);"7";
90  LPRINT CHR$(128);
100 END
```

```
*** ESC 6 & 7 ***
* CHARACTER SET 2 *
Ç ü é â ä à å ç ê ë è ï î ì Ä Å
É æ Æ ô ö ò û ù ÿ Ö Ü ¢ £ ¥ ₧ ƒ
* CHARACTER SET 1 *
```

ESC 6

Character Set 2

Format ESC 6

BASIC CHR$(27);"6";

Hex 1B 36

Function Selects Character set 2.

Example

```
1   LPRINT "*** ESC 6 ***";CHR$(10);
10  LPRINT "* SELECT CHARACTER SET 2 *";
    CHR$(10);
20  LPRINT CHR$(27);"6";
30  FOR I=1 TO 5
40  READ A:LPRINT CHR$(A);" ";
50  NEXT:LPRINT CHR$(10);
60  DATA 3,4,5,6,21
70  FOR J=128 TO 159
80  IF J=144 THEN LPRINT CHR$(10);
90  LPRINT CHR$(J);" ";
100 NEXT J
110 END
```

```
*** ESC 6 ***
* SELECT CHARACTER SET 2 *
♥ ♦ ♣ ♠ §
Ç ü é â ä à å ç ê ë è ï î ì Ä Å
É æ Æ ô ö ò û ù ÿ Ö Ü ¢ £ ¥ ₧ ƒ
```

ESC 6

Expand Printable Character Code Area

Format ESC 6

BASIC CHR$(27);"6";

Hex 1B 36

Function Prints the characters assigned for $(128)_{10} - (159)_{10}$ and $(255)_{10}$.

* This command is used to print the hidden printable characters assigned for code address $(128)_{10} - (159)_{10}$ and $(255)_{10}$.
* All characters are printed in italics only.

Dec. code	Char.	Dec. code	Char.	Dec. code	Char.	Dec. code	Char.
128	à	137	Ñ	145	ß	153	Ü
129	è	138	ñ	139	¤	154	ä
130	ù	139	¤	147	æ	155	ö
131	ò	140	Pt	148	Ø	156	ü
132	ì	141	Á	149	ø	157	É
133	•	142	á	150	¨	158	é
134	£	143	ç	151	Ä	159	¥
135	/	144	§	152	Ö	255	ɔ
136	¿						

Example

```
1    LPRINT "*** ESC 6 & 7 ***";CHR$(10);
10   '* EXPAND PRINTABLE CHARACTER CODE AREA *
20   LPRINT CHR$(27);"6";
30   GOSUB 80
40   LPRINT "* CANCEL ESC 6 SETTING *";CHR$(10);
50   LPRINT CHR$(27);"7";
60   GOSUB 80
70   END
80   FOR I=128 TO 159
90   LPRINT CHR$(I);
100 NEXT I
110 LPRINT
120 RETURN
```

```
*** ESC 6 & 7 ***
àèùòì•£/¿ÑñႢPtÁáç§ßÆæØø¨ÄÖÜäöüÉé¥
* CANCEL ESC 6 SETTING *
```

■ Mode I

ESC 7

Cancel Expanded Code Area

Format ESC 7

BASIC CHR$(27);"7";

Hex 1B 37

Function Clears the expanded code area set by ESC 6 sequence.

*This command suppresses printing of the printable characters defined in $(128)_{10}$ – $(159)_{10}$ and $(255)_{10}$, making control codes in these areas valid.

Example See ESC 6 in Mode I.

4.3.3 Download

■ Mode I

ESC &

Define Downloaded Characters

[Draft Mode]

Format 1 ESC & NUL n m a_0 p_{0-1} ... p_{0-11} a_k p_{k-1} ... p_{k-2} ... p_{k-11}
(0 ≦ n, m ≦ 255)

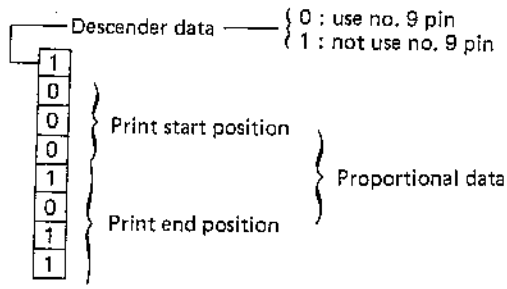
BASIC CHR$(27);"&";CHR$(0);CHR$(n);CHR$(m);
CHR$($a_0$);CHR$(p_{0-1}); ... CHR$($p_{0-11}$); ...
CHR$($a_k$);CHR$(p_{k-1}); ... CHR$($p_{k-11}$);

Hex 1B 26 00 n m a_0 p_{0-1} ... p_{0-11} ... a_k p_{k-1} ... p_{k-11}

Function Defines the user-defined download characters in the pattern of p_{k-1}... p_{k-11} for the character addresses from n to m.

* Character "a" is an attribute character consisting of descender data and proportional data.

Attribute "a"



* To define only one character , m = n.
* If DIP SW2-3 is set to ON (download buffer not selected), this command is ignored.

■ Mode I

Example

```
1   LPRINT "*** ESC & 0 n m ***";CHR$(10);
10  '* DEFINE DOWNLOADED CHARACTER *
20  LPRINT CHR$(27);"&";CHR$(0);"DD";
30  LPRINT CHR$(139);
40  LPRINT CHR$(8);CHR$(16);CHR$(40);CHR$(64);
50  LPRINT CHR$(191);CHR$(64);CHR$(40);CHR$(16);
    CHR$(8);CHR$(0);CHR$(0);
60  LPRINT "--DOWNLOADED CHARACTER--"
70  '* SELECT DOWNLOADED CHARACTER *
80  LPRINT CHR$(27);"%";CHR$(1);CHR$(0)
90  LPRINT "    DDDDDDDDDDDDD"
100 LPRINT CHR$(27);"%";CHR$(0);CHR$(0)
110 END
```

```
*** ESC & 0 n m ***
--DOWNLOADED CHARACTER--

     ♦♦♦♦♦♦♦♦♦♦♦♦♦
```

[NLQ Mode]

Format 2 ESC & n m_1 m_2 a_0 a_1 a_2 p_{1-1} p_{1-2} p_{1-3} ... pa_{1-1} pa_{1-2} pa_{1-3} ... ak_0 ak_1 ak_2 pk_{1-1} pk_{1-2} pk_{1-3} ... pak_{1-1} pak_{1-2} pak_{1-3}

$n = 0$ or 1

$0 \leq m_1, m_2 \leq 127$

BASIC CHR$(27);"&";CHR$(n);CHR$($m_1$);CHR$(m_2);CHR$($a_0$);CHR$(a_1);CHR$($a_2$);CHR$(p_{1-1});CHR$($p_{1-2}$);CHR$(p_{1-3});... CHR$($pa_{1-1}$);CHR$(pa_{1-2});CHR$($pa_{1-3}$);... CHR$(ak_0);CHR$($ak_1$);CHR$(ak_2);CHR$($pk_{1-1}$);CHR$(pk_{1-2});CHR$($pk_{1-3}$);... CHR$(pak_{1-1});CHR$($pak_{1-2}$);CHR$(pak_{1-3})

Hex 1B 26 n m_1 m_2 a_0 a_1 a_2 p_{1-1} p_{1-2} p_{1-3} ... pa_{1-1} pa_{1-2} pa_{1-3} ... ak_0 ak_1 ak_2 pk_{1-1} pk_{1-2} pk_{1-3} ... pak_{1-1} pak_{1-2} pak_{1-3}

Function Defines the user-defined download characters in the pattern of pa_{1-1} ... pa_{1-3} ... for the character addresses from m_1 to m_2.

* a_0 : Pre-character space
a_1 : Character size
a_2 : Post-character space
} These are represented by the number of dots.

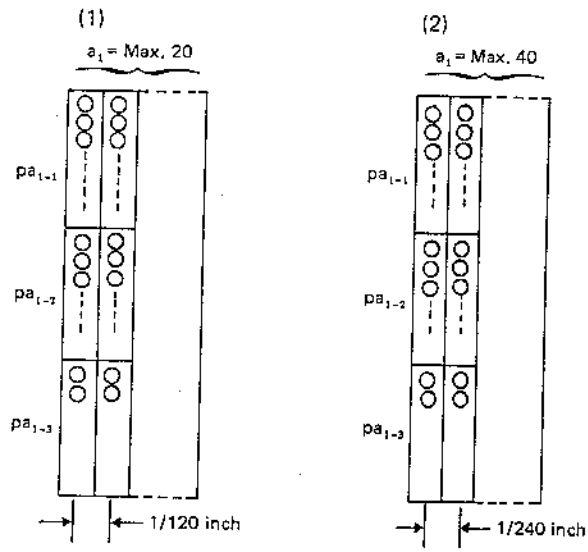
* The dot density is specified by "n".

(1) If n = 0, standard density (1/120")

$0 \leqq a_0 \leqq 20$ $0 \leqq a_1 \leqq 20$ $0 \leqq a_2 \leqq 20$ $0 \leqq a_0 + a_1 + a_2 \leqq 60$

(2) If n = 1, double density (1/240", adjoining dots are not printed.)

$0 \leqq a_0 \leqq 40$ $0 \leqq a_1 \leqq 40$ $0 \leqq a_2 \leqq 40$ $0 \leqq a_0 + a_1 + a_2 \leqq 120$



* Only the two upper bits are effective in pak_{1-3}.
* The maximum character size in above (1) and (2) cases is 18(H) x 20(W) and 18 (H) x 40 (W), respectively.
* This command is invalid if no optional NLQ font, LQ-200, is installed or if DIP SW2-3 is set to ON.

Example

n = 0
Standard
Density

```
1   LPRINT "*** ESC 'x n' & '& 0 m1 m2' ***";
    CHR$(10);
10  '* SET NLQ MODE *
20  LPRINT CHR$(27);"x";CHR$(1);
30  '* DEFINE STANDARD DENSITY DOWNLOAD *
40  LPRINT CHR$(27);"&";CHR$(0);"AA";CHR$(20);
    CHR$(19);CHR$(20);
50  FOR I=1 TO 57
60  READ A$:LPRINT CHR$(VAL("&H"+A$));
70  NEXT I
80  LPRINT CHR$(27);"%";CHR$(1);CHR$(0);
90  LPRINT "AAAAAAAAA"
100 DATA 00,40,00,00,80,00,01,40,00,02,00,00
110 DATA 04,40,00,08,00,00,10,40,00,20,00,00
120 DATA 5F,FF,C0,80,00,00,5F,FF,C0,20,00,00
130 DATA 10,40,00,08,00,00,04,40,00,02,00,00
140 DATA 01,40,00,00,80,00,00,40,00
150 END

*** ESC 'x n' & '& 0 m1 m2' ***
```

n = 1
Double
Density

```
1   LPRINT "*** ESC 'x n' & '& 1 m1 m2' ***";
    CHR$(10);
10  '* SET NLQ MODE *
20  LPRINT CHR$(27);"x";CHR$(1);
30  '* DEFINE DOUBLE DENSITY DOWNLOAD *
40  LPRINT CHR$(27);"&";CHR$(1);"AA";CHR$(20);
    CHR$(19);CHR$(20);
50  FOR I=1 TO 57
60  READ A$:LPRINT CHR$(VAL("&H"+A$));
70  NEXT I
80  LPRINT CHR$(27);"%";CHR$(1);CHR$(0);
90  LPRINT "AAAAAAAAAAAAAAAAAA"
100 DATA 00,40,00,00,80,00,01,40,00,02,00,00
110 DATA 04,40,00,08,00,00,10,40,00,20,00,00
120 DATA 5F,FF,C0,80,00,00,5F,FF,C0,20,00,00
130 DATA 10,40,00,08,00,00,04,40,00,02,00,00
140 DATA 01,40,00,00,80,00,00,40,00
150 END

*** ESC 'x n' & '& 1 m1 m2' ***
```

ESC %

Select Internal/Downloaded Character Set

Format ESC % n NUL

n = 0 : Internal character set
n = 1 : Downloaded character set

BASIC CHR$(27);"%";CHR$(n);CHR$(0);

Hex 1B 25 n 00

Function Selects the internal or downloaded character set by "n".

* The internal character set is automatically selected at power on.
* If no downloaded characters are set, no printing occurs.

Example

```
1   LPRINT "*** ESC % n 0 ***";CHR$(10);
10  '* DEFINE DOWNLOADED CHARACTER *
20  LPRINT CHR$(27);"&";CHR$(0);CHR$(68);
    CHR$(68);
30  LPRINT CHR$(139);
40  LPRINT CHR$(8);CHR$(16);CHR$(40);CHR$(64);
50  LPRINT CHR$(191);CHR$(64);CHR$(40);
    CHR$(16);
60  LPRINT CHR$(8);CHR$(0);CHR$(0);
70  LPRINT "--INTERNAL CHARACTER--"
80  '* SELECT INTERNAL CHARACTER *
90  LPRINT CHR$(27);"%";CHR$(0);CHR$(0)
100 LPRINT "    DDDDDDDDDDDDD"
110 LPRINT
120 LPRINT "--DOWNLOADED CHARACTER--"
130 '* SELECT DOWNLOADED CHARACTER *
140 LPRINT CHR$(27);"%";CHR$(1);CHR$(0)
150 LPRINT "    DDDDDDDDDDDDD"
160 LPRINT CHR$(27);"%";CHR$(0);CHR$(0);
170 END
```

```
*** ESC % n 0 ***
--INTERNAL CHARACTER--

    DDDDDDDDDDDDD

--DOWNLOADED CHARACTER--

    ♦♦♦♦♦♦♦♦♦♦♦♦♦
```

■ Mode I

ESC :

Copy Internal Character Set to Download Buffer

Format ESC : NUL NUL NUL

BASIC CHR$(27);":";CHR$(0);CHR$(0);CHR$(0);

Hex 1B 3A 00 00 00

Function Copies the internal character set into the download buffer.

Example

```
1   LPRINT "*** ESC : 0 0 0 ***";CHR$(10);
10  LPRINT "* DOWNLOAD SET *";CHR$(10);
20  LPRINT CHR$(27);"%";CHR$(1);CHR$(0);
30  GOSUB 110
40  LPRINT CHR$(27);"%";CHR$(0);CHR$(0);
50  LPRINT "* COPY INTERNAL CHARACTER SET ";
60  LPRINT "INTO DOWNLOAD *";CHR$(10);
70  LPRINT CHR$(27);"%";CHR$(1);CHR$(0);
80  LPRINT CHR$(27);":";CHR$(0);CHR$(0);CHR$(0);
90  GOSUB 110
100 END
110 FOR I=32 TO 55
120 LPRINT CHR$(I);:NEXT
130 LPRINT CHR$(10);
140 RETURN
```

```
*** ESC : 0 0 0 ***
* DOWNLOAD SET *

* COPY INTERNAL CHARACTER SET INTO DOWNLOAD *
 !"#$%&'()*+,-./01234567
```

4.4 Line Control

■ Mode I

ESC 2

1/6" Line Spacing

Format ESC 2

BASIC CHR$(27);"2";

Hex 1B 32

Function Sets line spacing to 1/6".

* After this command is received, the subsequent line spacing is set at 1/6 inch.
* This line feed pitch is automatically set when the printer is initialized.

Example

```
1  LPRINT "*** ESC 2 ***";CHR$(10);
10 LPRINT "* SET 1/8 INCH LINE SPACING *"
20 LPRINT CHR$(27);"0";:FOR N=1 TO 4
30 LPRINT "--- 1/8 INCH LINE FEED ---";
   CHR$(10);
40 NEXT
50 LPRINT "* SET 1/6 INCH LINE SPACING *"
60 LPRINT CHR$(27);"2";:FOR N=1 TO 4
70 LPRINT "--- 1/6 INCH LINE FEED ---";
   CHR$(10);
80 NEXT:END
```

```
*** ESC 2 ***
* SET 1/8 INCH LINE SPACING *
--- 1/8 INCH LINE FEED ---
--- 1/8 INCH LINE FEED ---
--- 1/8 INCH LINE FEED ---
--- 1/8 INCH LINE FEED ---
* SET 1/6 INCH LINE SPACING *
--- 1/6 INCH LINE FEED ---
--- 1/6 INCH LINE FEED ---
--- 1/6 INCH LINE FEED ---
--- 1/6 INCH LINE FEED ---
```

ESC O (ZERO)

1/8" Line Spacing

Format ESC O

BASIC CHR$(27);"O";

Hex 1B 30

Function

■ Mode I

Sets line spacing to 1/8".

* After this command is received, the subsequent line spacing is set at 1/8 inch until a new line spacing command is received.

■ Mode II

Sets line spacing to 1/8".

* After this command is received, the subsequent line spacing is set at 1/8 inch until a new line spacing command is received.
* This command is ignored if the print line contains any special graphic characters not in the Superscript or Subscript mode. Instead, the form advances 1/6".

Example

```
1  LPRINT "*** ESC O ***";CHR$(10);
10 FOR I=1 TO 4
20 LPRINT "--- 1/6 INCH LINE FEED ---";
   CHR$(10);
30 NEXT
40 LPRINT "* SET 1/8 INCH LINE SPACING *"
50 LPRINT CHR$(27);"O";:FOR N=1 TO 4
60 LPRINT "--- 1/8 INCH LINE FEED ---";
   CHR$(10);
70 NEXT:END
```

```
*** ESC O ***
--- 1/6 INCH LINE FEED ---
--- 1/6 INCH LINE FEED ---
--- 1/6 INCH LINE FEED ---
--- 1/6 INCH LINE FEED ---
* SET 1/8 INCH LINE SPACING *
--- 1/8 INCH LINE FEED ---
--- 1/8 INCH LINE FEED ---
--- 1/8 INCH LINE FEED ---
--- 1/8 INCH LINE FEED ---
```

ESC 1

7/72" Line Spacing

Format ESC 1

BASIC CHR$(27);"1";

Hex 1B 31

Function

■ Mode I

Sets line spacing to 7/72".

* After this command is received, the subsequent line spacing is set at 7/72 inch
* until a new line spacing command is received.
* This line spacing pitch makes characters on the current line patch with those on the subsequent line.

■ Mode II

Sets line spacing to 7/72".

* After this command is received, the subsequent line spacing is set at 7/72 inch
* until a new line spacing command is received.
* This line spacing pitch makes characters on the current line patch with those on the subsequent line.
* This command is ignored if the print line contains any special graphic characters not in the Superscript or Subscript mode. Instead, the form advances 1/6".

Example

```
1  LPRINT "*** ESC 1 ***";CHR$(10);
10 FOR I=1 TO 4
20 LPRINT "--- 1/6 INCH LINE FEED ---";
   CHR$(10);
30 NEXT
40 LPRINT "* SET 7/72 INCH LINE SPACING *"
50 LPRINT CHR$(27);"1";:FOR N=1 TO 4
60 LPRINT "--- 7/72 INCH LINE FEED ---";
   CHR$(10);
70 NEXT:END
```

```
*** ESC 1 ***
--- 1/6 INCH LINE FEED ---
--- 1/6 INCH LINE FEED ---
--- 1/6 INCH LINE FEED ---
--- 1/6 INCH LINE FEED ---
* SET 7/72 INCH LINE SPACING *
--- 7/72 INCH LINE FEED ---
--- 7/72 INCH LINE FEED ---
--- 7/72 INCH LINE FEED ---
--- 7/72 INCH LINE FEED ---
```

ESC A

n/72" Line Spacing

Format ESC A n

BASIC CHR$(27);"A";CHR$(n);

Hex 1B 41 n

Function

■ Mode I

Sets line spacing to n/72". (0 ≦ n ≦ 85)

* When n = 0, LF and VT codes are functionally equivalent to CR codes. The LF switch is ignored.
* When n = 1, the line feed pitch equals the vertical distance between dots in the matrix.
* Since the most significant bit of "n" is ignored, "n" + 128 is recognized as "n". "n" out of this range (86 ≦ n ≦ 127 and 214 ≦ n ≦ 255) makes this command invalid and retains the line spacing previously set.
* When the power is first applied, "n" is automatically set to 12. (for a line spacing of 1/6")

Example

```
1  LPRINT "*** ESC A n ***";CHR$(10);
10 FOR I=10 TO 20 STEP 5
20 '* SET n/72 INCH LINE SPACING *
30 LPRINT CHR$(27);"A";CHR$(I);
40 LPRINT "---";I;"/72 INCH LINE FEED ---";
50 LPRINT CHR$(10);
60 NEXT
70 LPRINT "- END -":END
```

```
*** ESC A n ***
--- 10 /72 INCH LINE FEED ---
--- 15 /72 INCH LINE FEED ---
--- 20 /72 INCH LINE FEED ---

- END -
```

■ Mode II

Sets line spacing to n/72". (1 ≦ n ≦ 85)

* The form advances by the specified line spacing when the printer receives an ESC 2 sequence.
* When n = 1, the line feed pitch equals the vertical distance between dots in the matrix.
* Since the most significant bit is ignored, "n" + 128 is the same as "n". "n" out of this range makes this command invalid and retains the line spacing previously set.
* At power on, "n" is automatically set to 12. (for a line spacing of 1/6")
* For the sample program and printout, see the description for ESC 2 on page 92.

ESC 2

Activate n/72" Line Spacing

Format ESC 2

BASIC CHR$(27);"2";

Hex 1B 32

Function Activates ESC A command received previously.

* If an ESC A has been received, the line feed pitch changes to that specified by the ESC A sequence.
* This command still takes effect even if the line feed spacing has been changed by other commands after receipt of the ESC A.
* This command is ignored if the print line contains any special graphic characters not in the Superscript or Subscript mode and the ESC A sequence specified a line spacing of less than 1/6". Instead, the form advances 1/6".

Example

```
1   LPRINT "*** ESC 2 ***";CHR$(10);
10  LPRINT "* ESC A n *";CHR$(10);
20  FOR N=10 TO 40 STEP 10
30  '* SET n/72 INCH LINE SPACING *
40  LPRINT CHR$(27);"A";CHR$(N);
50  LPRINT "---";N;"/72 INCH LINE FEED ---";
    CHR$(10);
60  NEXT N:LPRINT
70  LPRINT "* ESC A n & 2 *";CHR$(10);
80  FOR Z=10 TO 40 STEP 10
90  '* SET n/72 INCH LINE FEED *
100 LPRINT CHR$(27);"A";CHR$(Z);CHR$(27);"2";
110 LPRINT "---";Z;"/72 INCH LINE FEED ---";
    CHR$(10);
120 NEXT Z
130 LPRINT "- END -":END
```

```
*** ESC 2 ***
* ESC A n *
--- 10 /72 INCH LINE FEED ---
--- 20 /72 INCH LINE FEED ---
--- 30 /72 INCH LINE FEED ---
--- 40 /72 INCH LINE FEED ---

* ESC A n & 2 *
--- 10 /72 INCH LINE FEED ---
--- 20 /72 INCH LINE FEED ---

--- 30 /72 INCH LINE FEED ---


--- 40 /72 INCH LINE FEED ---


- END -
```

ESC 3

n/216" Line Spacing

Format ESC 3 n

BASIC CHR$(27);"3";CHR$(n);

Hex 1B 33 n

Function

■ Mode I (0 ≦ n ≦ 255)

Sets line spacing to n/216".

* After this command is received, the subsequent line spacing is set at n/216 inch, or n/3 vertical dot pitch.
* This command remains valid until a new line spacing command is received.
* If n = 1 or 2, the paper feed accuracy is not assured.
* If n = 0, LF and VT codes are functionally equivalent to CR codes. The LF switch is inoperable.

■ Mode II (1 ≦ n ≦ 255)

Sets line spacing to n/216".

* After this command is received, the subsequent line spacing is set at n/216 inch,
* or n/3 vertical dot pitch.
* This command remains valid until a new line spacing command is received.
* If n = 1 or 2, the paper feed accuracy is not assured.
* This command is ignored if the print line contains any special graphic characters not in the Superscript or Subscript mode and n/216" is less than 1/6". Instead, the form advances 1/6".

Example

```
1  LPRINT "*** ESC 3 n ***";CHR$(10);
10 FOR N=10 TO 130 STEP 40
20 '* SET n/216 INCH LINE SPACING *
30 LPRINT CHR$(27);"3";CHR$(N);
40 LPRINT "---";N;"/216 INCH LINE FEED ---";
50 LPRINT CHR$(10);:NEXT
60 LPRINT "- END -":END
```

```
*** ESC 3 n ***
=== 10 /216 INCH LINE FEED ===
--- 90 /216 INCH LINE FEED ---

--- 130 /216 INCH LINE FEED ---


- END -
```

ESC J

n/216" Line Feed

Format ESC J n (0 ≦ n ≦ 255)

BASIC CHR$(27);"J";CHR$(n);

Hex 1B 4A n

Function

■ Mode I

Feeds the form n/216" after printing all the data stored in the print buffer.

* This sequence does not change line spacing. (See ESC 3.)
* A specification of n = 0 produces only printing. It does not advance the form.
* This code does not clear the Enlarged character mode set by an SO code.
* The carriage does not return after printing. The next character will be printed on the next print position on the new line.

■ Mode II

Feeds the form n/216" after printing all the data stored in the print buffer.

* This sequence does not change line spacing. (See ESC 3.)
* A specification of n = 0 produces only printing. It does not advance the form.
* This code does not clear the Enlarged character mode set by SO code.
* The carriage returns after printing to the print start position at the left end of the new line.

Example

```
1  LPRINT "*** ESC J n ***";CHR$(10);
10 FOR N=50 TO 130 STEP 40
20 LPRINT "---";N;"/216 INCH LINE FEED ---";
   CHR$(13);
30 '* SET n/216 INCH LINE FEED *
40 LPRINT CHR$(27);"J";CHR$(N);
50 NEXT
60 LPRINT "- END -":END
```

```
*** ESC J n ***
--- 50 /216 INCH LINE FEED ---
--- 90 /216 INCH LINE FEED ---

--- 130 /216 INCH LINE FEED ---


- END -
```

ESC j

n/216" Reverse Line Feed

Format ESC j n

BASIC CHR$(27);"j";CHR$(n);

Hex 1B 6A n

Function Executes an n/216" reverse line feed, after printing all the data stored in the print buffer.

* After executing the reverse line feed, the set value is cleared.
* Next print position will be the subsequent position, not returning to the leftmost.

Example

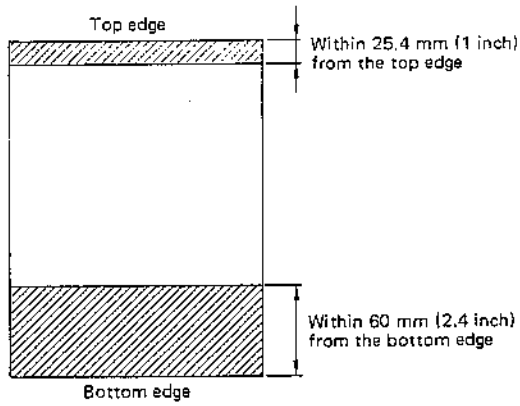
```
1   LPRINT "*** ESC j n ***";CHR$(10);
10  LPRINT CHR$(27);"B";CHR$(8);CHR$(0);
20  LPRINT CHR$(11);
30  LPRINT "DOT";
40  GOSUB 100
50  LPRINT "MATRIX";
60  GOSUB 100
70  LPRINT "PRINTER";
80  END
90  '* SET 100/216 INCH REVERSE LF *
100 LPRINT CHR$(27);"j";CHR$(100);
110 RETURN
```

```
*** ESC j n ***

          PRINTER


    MATRIX


DOT
```

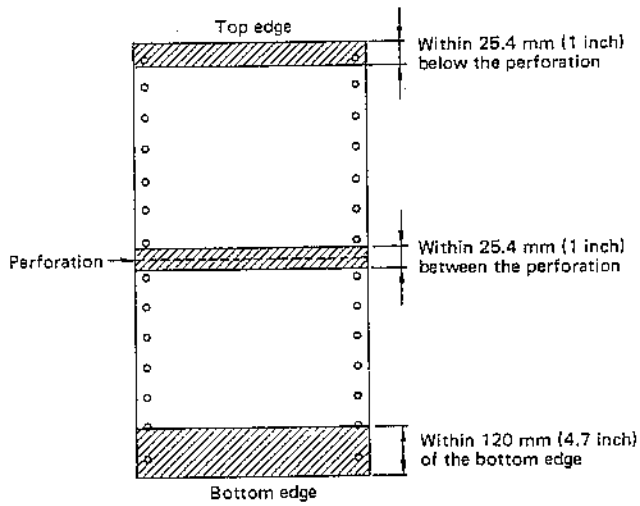
■ Cautions for Reverse Paper Feed

To avoid damage to the printer or a paper jam, do not execute a reverse paper feed in the shaded areas shown below.

(1) Cut Forms



(2) Fanfold Forms The reverse paper feed is possible in unrestricted area. However, reverse paper feed over the restricted area should be avoided.



4.5 Page Control

ESC C

Page Length Setting

Format 1 ESC C n (1 ≦ n ≦ 127)

BASIC CHR$(27);"C";CHR$(n);

Hex 1B 43 n

Function ■ Mode I ■ Mode II

Defines the number of lines per page.

* One page is defined as "n" line length.
* The top of page position is assumed when this command is received.
* Since stored as an absolute value, the specified page length is not changed even if the line feed pitch is modified after this setting.
* This code clears skip perforation mode and vertical TABs previously set.
* Since the most significant bit of "n" is ignored, "n" + 128 is recognized as "n".

Format 2 ESC C NUL n (1 ≦ n ≦ 22)

BASIC CHR$(27);"C";CHR$(0);CHR$(n);

Hex 1B 43 00 n

Function ■ Mode I ■ Mode II

Defines page length in inches.

* The page length is defined as "n" inches.
* The top of page position is assumed when this command is received.
* This code clears skip perforation mode and vertical TABs previously set.
* Since stored as an absolute value, the specified page length is not changed even if the line feed pitch is modified after this setting.

Example

```
1  LPRINT "*** ESC C n ***";CHR$(10);
10 FOR I=1 TO 3
20 READ A
30 '* SET PAGE LENGTH *
40 LPRINT CHR$(27);"C";CHR$(A);
50 LPRINT "TOP OF PAGE"I;CHR$(12);
60 NEXT
70 DATA 2,4,6
80 LPRINT "- END -":END
```

```
*** ESC C n ***
TOP OF PAGE 1

TOP OF PAGE 2


TOP OF PAGE 3



- END -
```

ESC N

Set Skip Perforation

Format ESC N n (1 ≦ n ≦ 127)

BASIC CHR$(27);"N";CHR$(n);

Hex 1B 4E n

Function ■ Mode I ■ Mode II

Sets skip perforation mode.

* The last "n" lines on the page are skipped.
* If n = 0, this command is ignored and previous setting is valid.
* The value of "n" should not exceed the page length set by ESC C sequence.
* Since the skip perforation amount is stored as an absolute value, it is not changed even if the line feed pitch is modified after this setting.
* This mode is cleared when the page length is changed by ESC C sequence.
* One inch skip perforation is automatically set up at power on, if DIP SW2-6 is set to ON. Since the default value of the page length is 11 inches (DIP SW3-5, ON), the printer prints 60 lines and skips 6 lines.
  The 1 inch skip perforation will be cleared by ESC C sequence.

Example

```
1  LPRINT "*** ESC N n ***";CHR$(10);
10 '* SET PAGE LENGTH *
20 LPRINT CHR$(27);"C";CHR$(5);
30 '* SET SKIP PERFORATION *
40 LPRINT CHR$(27);"N";CHR$(1);
50 FOR I=1 TO 5
60 LPRINT "---SKIP PERFORATION---"
70 NEXT
80 END
```

```
*** ESC N n ***
---SKIP PERFORATION---
---SKIP PERFORATION---
---SKIP PERFORATION---
---SKIP PERFORATION---

---SKIP PERFORATION---
```

ESC O

Cancel Skip Perforation

Format ESC O

BASIC CHR$(27);"O";

Hex 1B 4F

Function ■ Mode I ■ Mode II

Clears skip perforation mode set by ESC N sequence

* This command turns the printer into the same status as at power on or at ESC @ input, if DIP SW2-6 is set to OFF.
* This command clears the default of 1 inch skip perforation automatically set with DIP SW2-6 ON.

Example

```
1   LPRINT "*** ESC O ***";CHR$(10);
10 '* SET PAGE LENGTH *
20  LPRINT CHR$(27);"C";CHR$(3);
30 '* SET SKIP PERFORATION *
40  LPRINT CHR$(27);"N";CHR$(1);
50  FOR I=1 TO 3
60  LPRINT "---SKIP PERFORATION---"
70  NEXT I
80 '* CANCEL SKIP PERFORATION *
90  LPRINT "* SET ESC O CODE *";
100 LPRINT CHR$(27);"O";CHR$(10);
110 FOR J=1 TO 3
120 LPRINT "---CLEAR SKIP---"
130 NEXT J
140 END
```

```
*** ESC O ***
---SKIP PERFORATION---
---SKIP PERFORATION---

---SKIP PERFORATION---
* SET ESC O CODE *
---CLEAR SKIP---
---CLEAR SKIP---
---CLEAR SKIP---
```

4.6 Magins and Tobs Set

4.6.1 Margins

■ Mode I

ESC ℓ

Left Margin Setting

Format ESC ℓ n

BASIC CHR$(27);"ℓ";CHR$(n);

Hex 1B 6C n

Function Sets left margin.

* This command sets the first print position in the current character size.
* The valid range of "n" depends on the character size as shown below.

		Enlarged mode
Pica-size	0 ≦ n ≦ 133	0 ≦ n ≦ 67
Elite-size	0 ≦ n ≦ 159	0 ≦ n ≦ 79
Condensed	0 ≦ n ≦ 228	0 ≦ n ≦ 114
Condensed Elite-size	0 ≦ n ≦ 266 (255 max.)	0 ≦ n ≦ 134

* This command clears the horizontal TAB positions previously set and sets new
* horizontal TAB positions with the print start position set by this code.
* This code should be set at the beginning of a print line. If not, the data in the print buffer is not assured.

Example

```
1  LPRINT "*** ESC l n ***";CHR$(10);
10 FOR I=1 TO 2:LPRINT "0123456789";
20 NEXT:LPRINT CHR$(10);
30 FOR I=1 TO 4:READ X
40 '* SET LEFT MARGIN *
50 LPRINT CHR$(27);"l";CHR$(X);
60 LPRINT "COLUMN HEAD";
70 LPRINT CHR$(10);:NEXT:END
80 DATA 10,0,5,3
```

```
*** ESC l n ***
01234567890123456789
          COLUMN HEAD
COLUMN HEAD
     COLUMN HEAD
   COLUMN HEAD
```

ESC Q

Right Margin Setting

Format ESC Q n

BASIC CHR$(27); "Q"; CHR$(n);

Hex 1B 51 n

Function Sets right margin.

* * When this command is received, "n"th print position from the absolute home * position is set as a right margin in the current character mode.
* * The valid range of "n" depends on the character size as shown below.

		Enlarged mode
Pica-size	2 = LM + n = 136	1 = LM + n = 68
Elite-size	3 = LM + n = 162	2 = LM + n = 81
Condensed	4 = LM + n = 232	2 = LM + n = 116
Condensed Elite-size	4 = LM + n = 272 (255 max.)	2 = LM + n = 136

LM : Left margin

* This code should be set at the beginning of a print line. If not, the data already stored in the print buffer is not assured.

Example

```
1  LPRINT "*** ESC Q n ***";CHR$(10);
10 GOSUB 60:LPRINT CHR$(10);CHR$(10);
20 '* SET RIGHT MARGIN *
30 LPRINT CHR$(27);"Q";CHR$(10);
40 GOSUB 60
50 END
60 FOR I=1 TO 3
70 LPRINT "1234567890";
80 NEXT:RETURN
```

```
*** ESC Q n ***
12345678901234567890123456789O

1234567890
1234567890
1234567890
```

HT

Horizontal TAB Execution

Format HT

BASIC CHR$(9)

Hex 09

Function

■ Mode I

Moves the print position horizontally to the next TAB stop position previously set by an ESC D sequence, after printing all the data stored in the print buffer.

* The TABs are set every 8 positions in Pica size automatically at power on.
* When the left margin is shifted by ESC ℓ code, the horizontal TAB positions are also shifted correspondingly.
* Since horizontal TAB positions have been set as absolute values, they are not changed even if another printing pitch is selected.
* A sequence of n HT codes moves the print position n horizontal TAB positions.

■ Mode II

Moves the print position horizontally to the next TAB stop position previously set by an ESC D sequence.

* The TABs are set every 8 positions in Pica size automatically at power on.
* Since horizontal TAB positions have been set not as absolute values but by the number of characters, they are changed depending upon the character size selected.
* A sequence of n HT codes moves the print position n horizontal TAB positions.

Example

```
1  LPRINT "*** HT ***";CHR$(10);
10 LPRINT "H-TAB1";"H-TAB2";"H-TAB3";
20 LPRINT CHR$(10);
30 LPRINT "* SET H-TAB *";CHR$(10);
40 LPRINT CHR$(9);"H-TAB1";
50 LPRINT CHR$(9);"H-TAB2";
60 LPRINT CHR$(9);"H-TAB3";CHR$(13);CHR$(10);
70 END
```

```
*** HT ***
H-TAB1H-TAB2H-TAB3
* SET H-TAB *
        H-TAB1   H-TAB2   H-TAB3
```

ESC B

Vertical TAB Setting

Format ESC B n_1 n_2 ... n_k NUL ($1 \leqq n \leqq 255$) ($1 \leqq k \leqq 16$)

BASIC CHR$(27);"B";CHR$(n_1);CHR$($n_2$); ... CHR$(n_k);CHR$(0);

Hex 1B 42 n_1 n_2 ... n_k 00

Function Sets Vertical TAB positions in line units.

* This command sets vertical TAB stop positions up to 16 at each "n"th print line.
* TAB positions must be set in an ascending order. If not, the setting is terminated.
* This TAB setting is terminated when a NUL code is received or "k" exceeds 16.
* Since the vertical TAB positions are stored absolute values obtained by multiplying the number of lines by the current line spacing, they are kept unchanged even if the line spacing is modified after this setting.

Example

```
1   LPRINT "*** ESC B nk 0 ***";CHR$(10);
10  '* SET PAGE LENGTH *
20  LPRINT CHR$(27);"C";CHR$(10);
30  '* SET VERTICAL TAB POSITION *
40  LPRINT CHR$(27);"B";CHR$(3);CHR$(8);
50  LPRINT CHR$(10);CHR$(0);
60  FOR N=1 TO 3
70  LPRINT CHR$(11);"--- V-TAB";N;"---";
80  NEXT
90  LPRINT CHR$(11);"--- NEXT PAGE ---";
100 END
```

```
*** ESC B nk 0 ***


--- V-TAB 1 ---


--- V-TAB 2 ---

--- V-TAB 3 ---


--- NEXT PAGE ---
```

VT

Vertical TAB

Format VT

BASIC CHR$(11)

Hex 08

Function

■ Mode I

Feeds the form to the next vertical TAB position previously set by an ESC B sequence, after printing all the data stored in the print buffer.

* When the printer is initialized or given ESC @, VT = LF = 1/6 inch.
* If the specified VT amount is equal to or greater than the remaining page length, the form advances to the top of the next page.
* If no vertical TAB positions have been set, this code is functionally equivalent to an LF code.
* This code clears the Enlarged character mode set by SO code.
* A sequence of n VT codes advances the form n vertical TAB positions.

■ Mode II

Functionally equivalent to LF code.

Example

```
1  LPRINT "*** VT ***";CHR$(10);
10 '* SET VERTICAL TAB POSITION *
20 LPRINT CHR$(27);"B";
30 LPRINT CHR$(3);CHR$(7);CHR$(12);CHR$(0);
40 FOR N=1 TO 3
50 '* SET VT CODE *
60 LPRINT CHR$(11);"--- VT";N;"---";
70 NEXT
80 END
```

```
*** VT ***


--- VT 1 ---


--- VT 2 ---


--- VT 3 ---
```

ESC b

Set VFU Position

Format ESC b n m_1 m_2 ... m_k NUL

n : Channel number ($0 \leqq n \leqq 7$)
m : Position number ($1 \leqq k \leqq 16$)

BASIC CHR$(27);"b";CHR$(n);CHR$($m_1$);CHR$(m_2) ... CHR$(mk);CHR$(00);

Hex 1B 62 n m_1 m_2 ... m_k 00

Function Sets "m"th position on the "n"th channel of the VFU (Vertical Format Unit).

* Channel 0 is automatically selected at power on.
* This setting is the same as that of ESC B.
* Channel 0 can also be set by ESC B.
* "m_i" sequence is terminated by NUL code (i=1 ... k) or m_{16}.

NOTE VFU (Vertical Format Unit) means independent TAB setting for each channel which controls a format. For example, VT for designated channels — such as 3, 5 and 15 lines for channel 1 and 5, 10 and 30 lines for channel 2 — is possible.

Example

```
1   LPRINT "*** ESC b n mk 0 ***";CHR$(10);
10  '* SET PAGE LENGTH *
20  LPRINT CHR$(27);"C";CHR$(10);
30  '* SET VFU POSITION *
40  LPRINT CHR$(27);"b";CHR$(3);
50  LPRINT CHR$(3);CHR$(5);CHR$(10);CHR$(0);
60  '* SELECT VFU CHANNEL 3 *
70  LPRINT CHR$(27);"/";CHR$(3);
80  LPRINT "0th line";CHR$(11);
90  LPRINT "3rd line---VT 1";CHR$(11);
100 LPRINT "5th line---VT 2";CHR$(11);
110 LPRINT "10th line---VT 3";CHR$(11);
120 END
```

```
*** ESC b n mk 0 ***
0th line


3rd line---VT 1

5th line---VT 2




10th line---VT 3
```

ESC /

Select VFU Channel

Format ESC / n (0 ≦ n ≦ 7)

BASIC CHR$(27);"/";CHR$(n);

Hex 1B 2F n

Function Designates that a later VT is to be carried out according to VFU (Vertical Format Unit) channel n.

* TAB positions to be executed by this command must be previously set by ESC b sequence.
* This command and ESC B can not concur.

Example

```
1   LPRINT "*** ESC / n ***"; CHR$(10);
10  '* SET PAGE LENGTH *
20  LPRINT CHR$(27);"C";CHR$(10);
30  '* SET CHANNEL 1 VFU POSITION *
40  LPRINT CHR$(27);"b";CHR$(1);
50  LPRINT CHR$(3);CHR$(7);CHR$(9);CHR$(0);
60  '* SET CHANNEL 2 VFU POSITION *
70  LPRINT CHR$(27);"b";CHR$(2);
80  LPRINT CHR$(4);CHR$(6);CHR$(10);CHR$(0);
90  FOR N=1 TO 2
100 LPRINT "*CHANNEL";N;"SELECT*";
110 '* SELECT VFU CHANNEL *
120 LPRINT CHR$(27);"/";CHR$(N);
130 FOR I=1 TO 3
140 LPRINT CHR$(11);" VT";I
150 NEXT I
160 NEXT N
170 END
```

```
*** ESC / n ***
*CHANNEL 1 SELECT*

 VT 1


 VT 2

 VT 3
*CHANNEL 2 SELECT*


 VT 1

 VT 2


 VT 3
```

4.7 Bit Image Control

ESC K

Standard Density Bit Image Mode

Format ESC K n_1 n_2 $(1 \leqq n_1 + 256 \times n_2 \leqq 816)$

BASIC CHR$(27);"K";CHR$(n_1);CHR$($n_2$);
CHR$($d_1$);CHR$(d_2); ... CHR$(dn);

Hex 1B 4B n_1 n_2 d_1 d_2 ... dn

Function ■ Mode I ■ Mode II

Sets Standard (single) density bit image print mode.

* n_1 and n_2 are the number of columns of bit image data to be sent following the ESC K n_1 n_2. n_1 and n_2 are each 1 byte of data. n_1 is the lower byte, and n_2 is the upper byte.

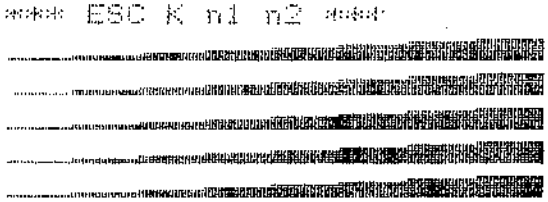
  For example, if the number of bit image data is "a", n_1 is a remainder of "a" divided by 256. n_2 is the quotient.

* The maximum number of columns of bit image data printable on one line is 816. If the number of dot positions exceeds 816, excess image data is ignored.
* Both characters and bit image data can be printed on the same line.
* On completion of the bit image print, the printer automatically turns to the text print mode.
* n_1 and n_2 should be defined in the range, $1 \leqq$ number of columns of bit image data $\leqq n_1 + 256 \times n_2 \leqq 816$. For the line including and text data, see Note 2.

Example

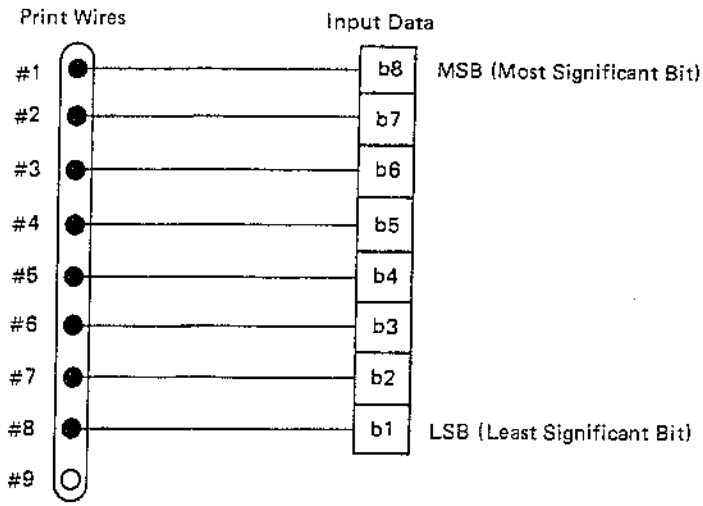
```
1   LPRINT "*** ESC K n1 n2 ***";CHR$(10);
10  FOR I=1 TO 5
20  '* STANDARD DENSITY BIT IMAGE MODE *
30  LPRINT CHR$(27);"K";CHR$(160);CHR$(0);
40  FOR J=1 TO 8
50  FOR K=1 TO 20
60  N=2^J-1
70  LPRINT CHR$(N);
80  NEXT K
90  NEXT J
100 LPRINT CHR$(10);
110 NEXT I:END
```

*** ESC K n1 n2 ***



NOTES

1. The relation of the bit image data and the print wires is as follows:



- Wire #9 is not used for bit image print.
- Each print wire is driven if the corresponding bit of the input data is "1"; not driven if "0".

2. If the text data and bit image data are to be mix printed on the same line, take the number of the printable bit images on the remaining line into consideration.

■ Mode I

	Number of bit image data/character (Columns)	Enlarged mode (Columns)
Pica-sized character Emphasized character	6	12
Condensed character	3.5	7
Elite-sized character	5	10
Condensed Elite-sized character	3	6

■ Mode II

	Number of bit image data/character (Columns)	Enlarged mode (Columns)
Normal (Pica) character Emphasized character	6	12
Condensed character	3.5	7

For example, if ten characters have been set in Normal (Pica) character mode, the number of the printable bit images on the same line is,

$$816 - 6 \times 10 = 756$$

ESC L

Double Density Bit Image Mode

Format ESC L n_1 n_2 $(1 \leqq n_1 + n_2 \times 256 \leqq 1632)$

BASIC CHR$(27);"L";CHR$(n_1);CHR$($n_2$);
CHR$($d_1$);CHR$(d_2);... CHR$(dn);

Hex 1B 4C n_1 n_2 d_1 d_2 ... dn

Function ■ Mode I ■ Mode II

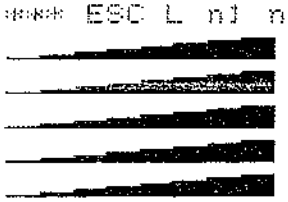
Sets Double density bit image print mode.

* This mode doubles the Standard density bit image mode in horizontal density,
* providing denser graphic data print.
* The maximum number of columns of bit image data printable on one line is 1632.
* Other terms and conditions are identical to those of the ESC K command. Read 1632 for 816 in the ESC K description, and double the number of columns per character in Note 2.

Example

```
1   LPRINT "*** ESC L n1 n2 ***";CHR$(10);
10  FOR I=1 TO 5
20  '* DOUBLE DENSITY BIT IMAGE MODE *
30  LPRINT CHR$(27);"L";CHR$(160);CHR$(0);
40  FOR J=1 TO 8
50  FOR K=1 TO 20
60  N=2^J-1
70  LPRINT CHR$(N);
80  NEXT K
90  NEXT J
100 LPRINT CHR$(10);
110 NEXT I:END
```

```
*** ESC L n1 n2 ***
```



ESC Y

Double Speed & Double Density Bit Image Mode

Format ESC Y n_1 n_2 $(1 \leqq n_1 + 256 \times n_2 \leqq 1632)$

BASIC CHR$(27);"Y";CHR$(n_1);CHR$($n_2$);
CHR$($d_1$);CHR$(d_2);... CHR$(dn);

Hex 1B 59 n_1 n_2 d_1 d_2 ... dn

Function ■ Mode I ■ Mode II

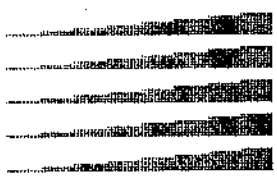
Sets Double speed & double density bit image print mode.

* This mode is identical with the mode set by ESC L sequence, except for the print speed. This command allows the printer to print the bit image data in 1/120" pitch in normal print speed, while ESC L command in reduced print speed.
* Adjoining dots are not printed.
* Other terms and conditions are identical to those of the ESC K command. Read 1632 for 816 in the ESC K description, and double the number of columns per character in Note 2.

Example

```
1   LPRINT "*** ESC Y n1 n2 ***";CHR$(10);
10  FOR I=1 TO 5
20  '* DOUBLE SPEED & DOUBLE DENSITY
    BIT IMAGE MODE *
30  LPRINT CHR$(27);"Y";CHR$(160);CHR$(0);
40  FOR J=1 TO 8
50  FOR K=1 TO 20
60  N=2^J-1
70  LPRINT CHR$(N);
80  NEXT K
90  NEXT J
100 LPRINT CHR$(10);
110 NEXT I:END
```

```
*** ESC Y n1 n2 ***
```



ESC Z

Quadruple Density Bit Image Mode

Format ESC Z n_1 n_2 $(1 \leqq n_1 + n_2 \times 256 \leqq 3264)$

BASIC CHR$(27);"Z";CHR$(n_1);CHR$($n_2$);
CHR$($d_1$);CHR$(d_2);... CHR$(dn);

Hex 1B 5A n_1 n_2 d_1 d_2 ... dn

Function ■ Mode I ■ Mode II

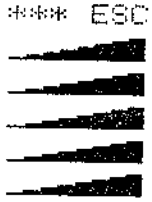
Sets Quadruple density bit image print mode.

* This mode quadruples the Standard density bit image mode in horizontal density, providing much denser graphic data print.
* The maximum number of columns of bit image data printable on one line is 3264.
* Adjoining dots are not printed.
* Other terms and conditions are identical to those of the ESC K command. Read 3264 for 816 in the ESC K description, and quadruple the number of columns per character in Note 2.

Example

```
1   LPRINT "*** ESC Z n1 n2 ***";CHR$(10);
10  FOR I=1 TO 5
20  '* QUADRUPLE DENSITY BIT IMAGE MODE *
30  LPRINT CHR$(27);"Z";CHR$(160);CHR$(0);
40  FOR J=1 TO 8
50  FOR K=1 TO 20
60  N=2^J-1
70  LPRINT CHR$(N);
80  NEXT K
90  NEXT J
100 LPRINT CHR$(10);
110 NEXT I:END
```

```
*** ESC Z n1 n2 ***
```



ESC *

Select Bit Image Mode

Format ESC * m n_1 n_2

m : Bit image select ($0 \leqq m \leqq 7$)
n : Bit image data

BASIC CHR$(27);"*";CHR$(m);CHR$($n_1$);CHR$(n_2);
CHR$($d_1$);CHR$(d_2); ... CHR$(dn);

Hex 1B 2A m n_1 n_2 d_1 d_2 ... dn

Function ■ Mode I ■ Mode II

Selects bit image print mode depending on the value of "m".

m	Mode	Dots/line (13.6")	Horizontal Pitch	Codes functionally equivalent
0	Standard density	816	1/60	ESC K
1	Double density	1632	1/120	ESC L
2	Double-speed Double-density	1632	1/120	ESC Y
3	Quadruple density	3264	1/240	ESC Z
4	CRT graphic I	1088	1/80	–
5	Plotter graphic I	978	1/72	–
6	CRT graphic II	1224	1/90	–
7	Plotter graphic II	1956	1/144	–

* For n_1 and n_2, refer to ESC K description.
* In the above table, densities selected by m = 0 – 3 are compatible with the printer's print pitch. Densities by m = 4 and 6 are compatible with CRT densities, which are suitable for hard copy of CRT.
* If m = 2 or 3, adjoining dots are not printed.

Example

```
1   LPRINT "*** ESC * m n1 n2 ***";CHR$(10);
10  FOR M=0 TO 7
20  LPRINT "m=";M;CHR$(10);
30  '* SELECT BIT IMAGE MODE *
40  LPRINT CHR$(27);"*";CHR$(M);CHR$(240);
    CHR$(0);
50  FOR I=1 TO 8
60  N=2^I-1
70  FOR J=1 TO 30
80  LPRINT CHR$(N);
90  NEXT J:NEXT I:LPRINT CHR$(10);
100 NEXT M:END
```

```
*** ESC * m n1 n2 ***
m= 0
m= 1
m= 2
m= 3
m= 4
m= 5
m= 6
m= 7
```

ESC ?

Translate Bit Image Density

Format ESC ? n m

n = K, L, Y, Z
0 ≦ m ≦ 7

BASIC CHR$(27);"?";CHR$(n);CHR$(m);

Hex 1B 3F n m

Function ■ Mode I ■ Mode II

Translates the graphic density of the bit image mode accessed by ESC K, ESC L, ESC Y, or ESC Z to a graphic density specified by the bit image mode selection command, ESC *.

* At power on,

  ESC K defaults to ESC * 0.
  ESC L defaults to ESC * 1.
  ESC Y defaults to ESC * 2.
  ESC Z defaults to ESC * 3.

* For example, to translate the graphic density of ESC K to the graphic density of ESC * 6 n_1 n_2, input ESC ? K 6. (i.e., CHR$(27);"?";"K";CHR$(6);)
* This density remains in effect until a new one is specified.

Example

```
1   LPRINT "*** ESC ? n m ***";CHR$(10);
10  LPRINT
20  GOSUB 90
30  LPRINT
40  LPRINT "* TRANSLATE BIT IMAGE DENSITY *";
    CHR$(10);
50  LPRINT CHR$(27);"?";"K";CHR$(1);
60  LPRINT
70  GOSUB 90
80  END
90  LPRINT CHR$(27);"K";CHR$(160);CHR$(0);
100 FOR J=1 TO 8:FOR K=1 TO 20
110 N=2^J-1:LPRINT CHR$(N);
120 NEXT K:NEXT J:LPRINT CHR$(10);
130 RETURN
```

```
*** ESC ? n m ***

* TRANSLATE BIT IMAGE DENSITY *
```

ESC ^

9-Pin Bit Image Mode

Format ESC ^ m n_1 n_2

m = 0 : Standard density
m = 1 : Double density

BASIC CHR$(27);"^";CHR$(m);CHR$($n_1$);CHR$(n_2);
CHR$($d_1$);CHR$(d_2);... CHR$(dn);

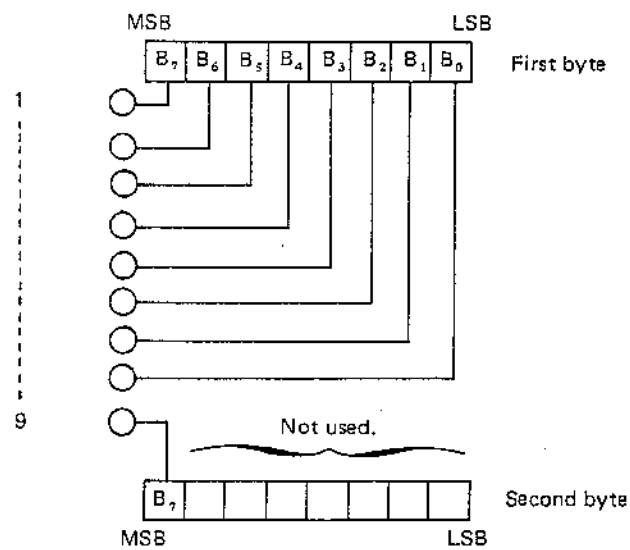
Hex 1B 5E m n_1 n_2 d_1 d_2 ... dn

Function ■ Mode I ■ Mode II

Sets 9-pin bit image print mode.

* After receiving this command, the printer prints bit image at 9 dots/column,
* in standard (m = 0) or double (m = 1) density.
* On completion of the bit image print, the printer automatically turns to the text
* print mode.
* For n_1 and n_2, refer to ESC K description.

Pin No.

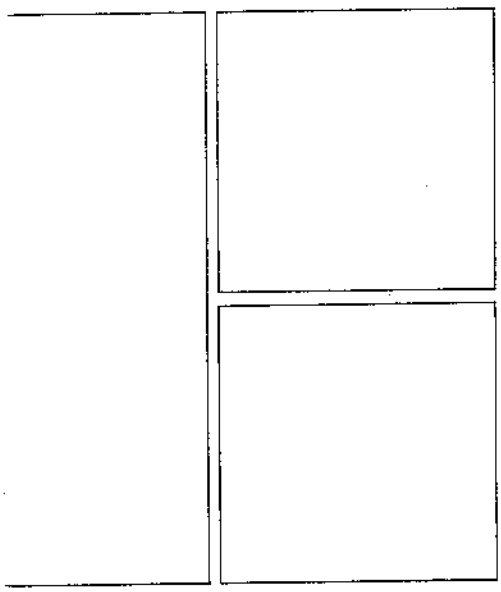


* One bit image column is formed by two bytes as shown above. Only MSB is used in the second byte.
The number of bytes is equal to (n_1 + n_2 x 256) x 2.

Example

```
1   LPRINT "*** ESC ^ m n1 n2 ***";CHR$(10);
10  LPRINT "--STANDARD DENSITY--"
20  M=0
30  GOSUB 100
40  LPRINT
50  LPRINT
60  LPRINT "--DOUBLE DENSITY--"
70  M=1
80  GOSUB 100
90  END
100 FOR A=1 TO 10
110 LPRINT CHR$(27);"^";CHR$(M);CHR$(10);CHR$(0);
120 LPRINT CHR$(8);CHR$(128);CHR$(20);CHR$(0);
130 LPRINT CHR$(34);CHR$(128);CHR$(65);CHR$(0);
140 LPRINT CHR$(128);CHR$(128);CHR$(65);CHR$(0);
150 LPRINT CHR$(34);CHR$(128);CHR$(20);CHR$(0);
160 LPRINT CHR$(8);CHR$(128);CHR$(0);CHR$(0);
170 NEXT A
180 RETURN
```

```
*** ESC ^ m n1 n2 ***
--STANDARD DENSITY--
◇◇◇◇◇◇◇◇◇◇◇◇◇◇◇◇

--DOUBLE DENSITY--
◇◇◇◇◇◇◇◇◇◇
```



Chapter 5. CHARACTER SET TABLES

5.1 Mode I

(1) U.S.A.

Upper 4 Bits / Lower 4 Bits	Hex No.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Hex. No.	Binary No.	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	NUL 0	16	SPC 32	0 48	@ 64	P 80	` 96	p 112	NUL 128	144	SPC 160	° 176	À 192	Đ 208	à 224	ð 240
1	0001	1	DC1 17	! 33	1 49	A 65	Q 81	a 97	q 113	129	DC1 145	¡ 161	± 177	Á 193	Ñ 209	á 225	ñ 241
2	0010	2	DC2 18	" 34	2 50	B 66	R 82	b 98	r 114	130	DC2 146	¢ 162	² 178	Â 194	Ò 210	â 226	ò 242
3	0011	3	DC3 19	# 35	3 51	C 67	S 83	c 99	s 115	131	DC3 147	£ 163	³ 179	Ã 195	Ó 211	ã 227	ó 243
4	0100	4	DC4 20	$ 36	4 52	D 68	T 84	d 100	t 116	132	DC4 148	§ 164	´ 180	Ä 196	Ô 212	ä 228	ô 244
5	0101	5	21	% 37	5 53	E 69	U 85	e 101	u 117	133	149	• 165	µ 181	Å 197	Õ 213	å 229	õ 245
6	0110	6	22	& 38	6 54	F 70	V 86	f 102	v 118	134	150	¶ 166	¶ 182	Æ 198	Ö 214	æ 230	ö 246
7	0111	7	23	' 39	7 55	G 71	W 87	g 103	w 119	135	151	ß 167	· 183	Ç 199	× 215	ç 231	÷ 247
8	1000	BS 8	CAN 24	(40	8 56	H 72	X 88	h 104	x 120	BS 136	CAN 152	® 168	¸ 184	È 200	Ø 216	è 232	ø 248
9	1001	HT 9	EM 25	) 41	9 57	I 73	Y 89	i 105	y 121	HT 137	EM 153	© 169	¹ 185	É 201	Ù 217	é 233	ù 249
A	1010	LF 10	26	* 42	: 58	J 74	Z 90	j 106	z 122	LF 138	154	™ 170	º 186	Ê 202	Ú 218	ê 234	ú 250
B	1011	VT 11	ESC 27	+ 43	; 59	K 75	[91	k 107	{ 123	VT 139	ESC 155	¬ 171	» 187	Ë 203	Û 219	ë 235	û 251
C	1100	FF 12	28	, 44	< 60	L 76	\ 92	l 108	| 124	FF 140	156	½ 172	¼ 188	Ì 204	Ü 220	ì 236	ü 252
D	1101	CR 13	29	- 45	= 61	M 77	] 93	m 109	} 125	CR 141	157	¥ 173	¾ 189	Í 205	Ý 221	í 237	ý 253
E	1110	SO 14	30	. 46	> 62	N 78	^ 94	n 110	~ 126	SO 142	158	¸ 174	¿ 190	Î 206	Þ 222	î 238	þ 254
F	1111	SI 15	31	/ 47	? 63	O 79	_ 95	o 111	DEL 127	SI 143	159	ƒ 175	? 191	Ï 207	ß 223	ï 239	ÿ DEL 255

This page shows the character set for the U.S.A. Specific characters in each France, Germany, United Kingdom, Denmark, Sweden, Italy, Spain, Japan, Norway, Netherlands, and South Africa are shown on the following pages.

SEE PAGE 28

(2) Other 11 Countries PAGE 75

- France I

HEX. CODE											
23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
#	$	à	°	Ç	§	^	`	é	ù	è	¨
A3	A4	C0	DB	DC	DD	DE	E0	FB	FC	FD	FE
#	$	à	°	Ç	§	^	`	é	ù	è	¨

- Germany

#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß

- United Kingdom I

£	$	@	[	\	]	^	`	{	¦	}	~
£	$	@	[	\	]	^	`	{	/	}	~

- Denmark I

#	$	@	Æ	Ø	Å	^	`	æ	ø	å	~
#	$	@	Æ	Ø	Å	^	`	æ	ø	å	~

- Sweden

#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü

- Italy

#	$	@	°	\	é	^	ù	à	ò	è	ì
#	$	@	°	\	é	^	ù	à	ò	è	ì

- Spain

₧	$	@	¡	Ñ	¿	^	`	¨	ñ	}	~
₧	$	@	¡	Ñ	¿	^	`	¨	ñ	}	~

■ Japan

HEX. CODE											
23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
#	$	@	[	¥	]	^	`	{	|	}	~
A3	A4	C0	DB	DC	DD	DE	E0	FB	FC	FD	FE
#	$	@	[	¥	]	^	`	{	/	}	~

■ Norway I

#	¤	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
#	¤	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü

■ Denmark II

#	$	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
#	$	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü

■ United Kingdom II

#	£	@	[	\	]	^	`	{	|	}	~
#	£	@	[	\	]	^	`	{	/	}	~

■ Norway II

£	$	§	Æ	Ø	Å	^	`	æ	ø	å	¨
£	$	§	Æ	Ø	Å	^	`	æ	ø	å	¨

■ Netherlands

#	$	@	[	]	ƒ	^	`	é	ü	è	¨
#	$	@	[	]	ƒ	^	`	é	ü	è	¨

■ France II

#	â	à	î	ç	ê	ü	ô	é	ú	è	ï
#	â	à	î	ç	ê	ü	ô	é	ú	è	ï

■ South Africa

#	ë	É	Ê	ö	è	ü	é	ë	ö	ô	ü
#	ë	É	Ê	ö	è	ü	é	ë	ö	ô	ü

5.2 Mode II

(1) Character Set 1

Upper 4 Bits / Lower 4 Bits	Hex No.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Hex. No.	Binary No.	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	NUL 0	16	SPC 32	48	64	80	96	112	NUL 128	144	160	176	192	208	224	240
1	0001	1	17	33	49	65	81	97	113	129	145	161	177	193	209	225	241
2	0010	2	DC2 18	34	50	66	82	98	114	130	DC2 146	162	178	194	210	226	242
3	0011	3	19	35	51	67	83	99	115	131	147	163	179	195	211	227	243
4	0100	4	DC4 20	36	52	68	84	100	116	132	DC4 148	164	180	196	212	228	244
5	0101	5	21	37	53	69	85	101	117	133	149	165	181	197	213	229	245
6	0110	6	22	38	54	70	86	102	118	134	150	166	182	198	214	230	246
7	0111	7	23	39	55	71	87	103	119	135	151	167	183	199	215	231	247
8	1000	8	CAN 24	40	56	72	88	104	120	136	CAN 152	168	184	200	216	232	248
9	1001	HT 9	25	41	57	73	89	105	121	HT 137	153	169	185	201	217	233	249
A	1010	LF 10	26	42	58	74	90	106	122	LF 138	154	170	186	202	218	234	250
B	1011	VT 11	ESC 27	43	59	75	91	107	123	VT 139	ESC 155	171	187	203	219	235	251
C	1100	FF 12	28	44	60	76	92	108	124	FF 140	156	172	188	204	220	236	252
D	1101	CR 13	29	45	61	77	93	109	125	CR 141	157	173	189	205	221	237	253
E	1110	SO 14	30	46	62	78	94	110	126	SO 142	158	174	190	206	222	238	254
F	1111	SI 15	31	47	63	79	95	111	127	SI 143	159	175	191	207	223	239	SPC 255

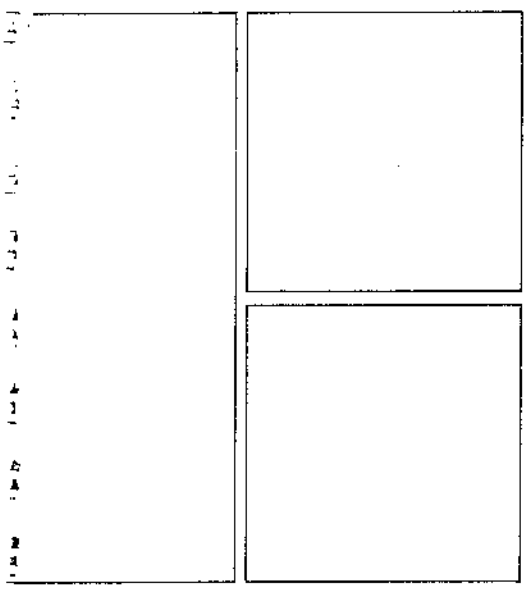
IBM

(2) Character Set 2

Upper 4 Bits / Lower 4 Bits	Hex No.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Hex. No.	Binary No.	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
0	0000	NUL 0	16	SPC 32	48	64	80	96	112	128	144	160	176	192	208	224	240
1	0001	1	17	33	49	65	81	97	113	129	145	161	177	193	209	225	241
2	0010	2	DC2 18	34	50	66	82	98	114	130	146	162	178	194	210	226	242
3	0011	3	19	35	51	67	83	99	115	131	147	163	179	195	211	227	243
4	0100	4	DC4 20	36	52	68	84	100	116	132	148	164	180	196	212	228	244
5	0101	5	21	37	53	69	85	101	117	133	149	165	181	197	213	229	245
6	0110	6	22	38	54	70	86	102	118	134	150	166	182	198	214	230	246
7	0111	7	23	39	55	71	87	103	119	135	151	167	183	199	215	231	247
8	1000	8	CAN 24	40	56	72	88	104	120	136	152	168	184	200	216	232	248
9	1001	HT 9	25	41	57	73	89	105	121	137	153	169	185	201	217	233	249
A	1010	LF 10	26	42	58	74	90	106	122	138	154	170	186	202	218	234	250
B	1011	VT 11	ESC 27	43	59	75	91	107	123	139	155	171	187	203	219	235	251
C	1100	FF 12	28	44	60	76	92	108	124	140	156	172	188	204	220	236	252
D	1101	CR 13	29	45	61	77	93	109	125	141	157	173	189	205	221	237	253
E	1110	SO 14	30	46	62	78	94	110	126	142	158	174	190	206	222	238	254
F	1111	SI 15	31	47	63	79	95	111	127	143	159	175	191	207	223	239	SPC 255

Scandinavian Characters

HEX. CODE											
9B	9D	9E	9F	A6	A7	A9	AA	AB	AC	AE	AF
ø	Ø	L	l	ó	ò	ã	Ã	ℓ	ñ	³	¤



Chapter 6. MAINTENANCE

6.1 Proper Care of Printer

To keep your printer in good working condition, pay attention to the following points:

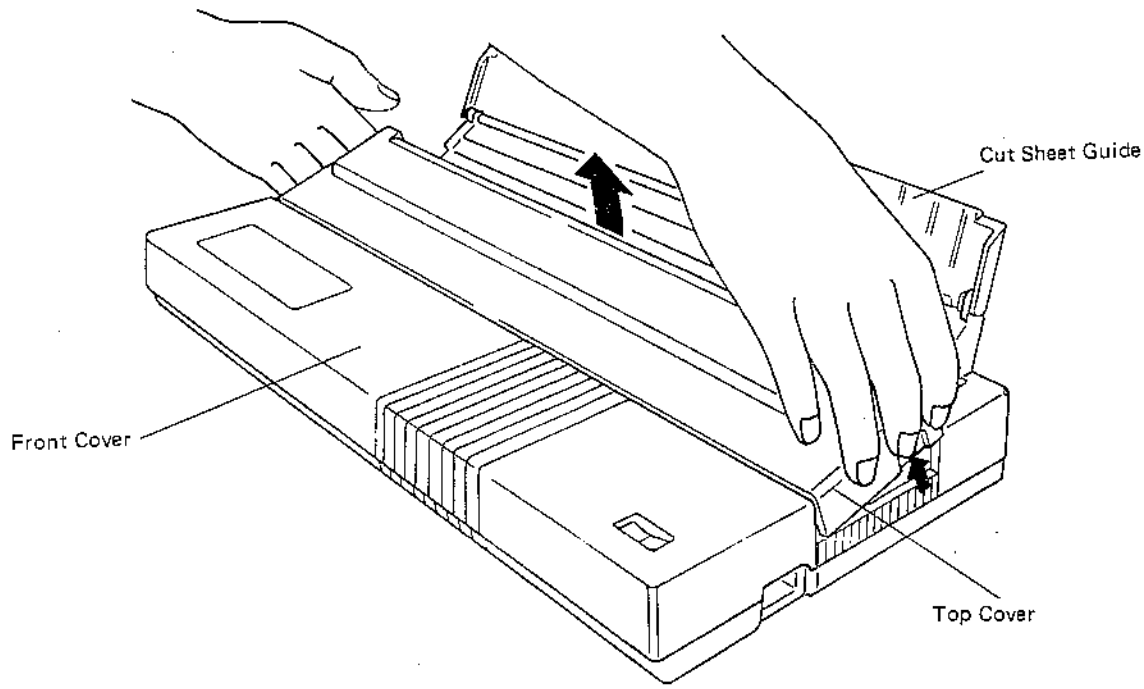
- Clean the printer with a soft brush at least every three months, to remove the paper particles and dust.
- If the exterior of the printer is smudged, use a cloth which has been dampened with a mild detergent and water solution. Never use alcohol, thinner or other organic solvents.
- Do not let clips or other metal objects drop in the printer as they could cause malfunctions.

6.2 Replacing Print Head

In case of print head trouble or a worn dot wire, replace the print head as follows:

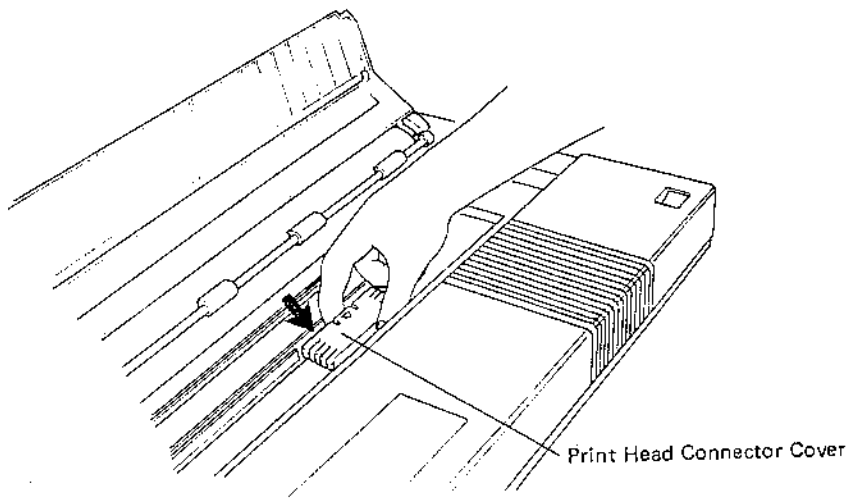
■ Removal

(1) Unplug the printer power cord from the AC outlet.
(2) Make sure that the print head has cooled enough to touch it.
(3) Open the cut sheet guide.
(4) Pull and detach the top cover, putting your hands on both sides. Take care not to pull the window cover by force; otherwise it may be broken.

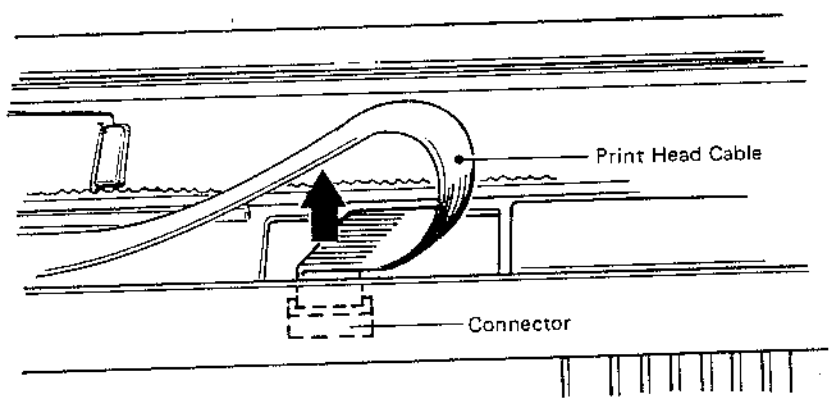


(5) Take off the ribbon cassette. (Refer to Sec. 2.1.)
(6) Move the carriage to the left from the center of the frame unit.

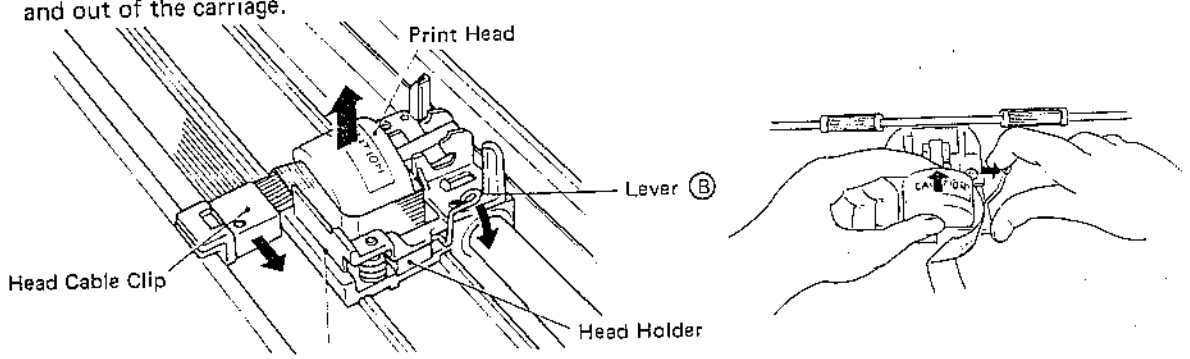
(7) By pushing the print head connector cover in the direction of an arrow to unlatch the pawl, remove the head connector cover.



(8) Pull out the print head cable from the connector on the P.C.B.



(9) Slide the head cable clip to the right and remove it.
(10) Pushing the lever Ⓑ outward with your thumb to release the head holder, hold the print head up and out of the carriage.

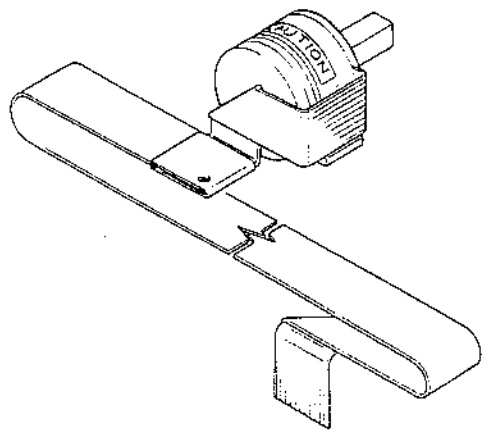


(11) Taking care not to damage the head cable, take the print head out of the printer.

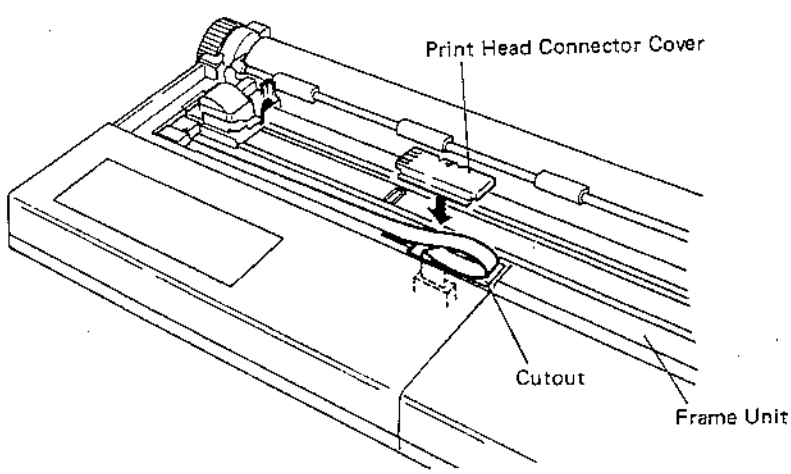
■ Installation

Install a new print head in the reverse sequence of the removal procedure.

- While pushing the print head toward the front of the printer, mount the print head on the carriage.
- Make sure that the head cable is arranged as illustrated below.



- After mounting the print head on the carriage and inserting the head cable into the connector on the P.C.B., move the carriage to the leftmost position and remove the excessive cable slack by putting the excess of the cable into the cutout of the frame unit. Then install the print head connector cover.



- After the installation, be sure to adjust the gap between the print head and the platen, following instructions described on page 14.

APPENDICES

A. Specifications

■ PRINTING

Print Method	Impact dot matrix	
Number of Pins	9	
Print Speed	180 cps (in Pica Draft mode)	
Print Head Service Life	Approx. 200 million dots/pin	
Dot Configuration		
Dot Diameter	0.29 mm	
Dot Pitch		
Vertical	1/72 inch	
Horizontal	1/60 inch (Pica) 1/72 inch (Elite)	240 × 215 ↑
Character Formation (Standard)		
Vertical	7 dots	
Horizontal	9 dots (including half dot)	
Character Sets	ASCII 96 characters, 43 national characters (12 countries), 133 IBM PC characters	
No. of Characters per Line (No. of Characters per Inch)		
Pica	Normal:	136 (10 cpi)
	Enlarged:	68 (5 cpi)
	Emphasized:	136 (10 cpi)
Elite	Normal:	162 (12 cpi)
	Enlarged:	81 (6 cpi)
Condensed Pica	Standard:	232 (17 cpi)
	Enlarged	116 (8.5 cpi)
Condensed Elite	Standard:	272 (20 cpi)
Print Direction	* Bidirectional logic seeking * Unidirectional (in graphic programmable)	
No. of Lines per Minute	Approx. 50 (Full line test print of Alphanumerics in 1/6" line feed pitch, in Pica Draft mode.)	
Copy Capability	3 copies including an original	
Noise Level	55 dB	

■ PAPER FEED MECHANISM

Paper Feed Method	• Friction Feed (cut forms) • Pin feed push-tractor system (continuous forms) • Optional sheet feeders for cut forms
Line Feed Pitch	1/6", 1/8" (selectable by DIP SW), n/72" or 1/216 x N inch programmed pitch
Forms	
Cut Forms	
Width	101.6 – 420 mm (4 – 16.5")
Thickness	0.06 – 0.1 mm
Ream Weight	45 – 70 kg
Continuous Forms	
Width	127.6 – 406.4 mm (4 – 16 inches)
Ream Weight	45 – 60 kg (single-part) 34 kg (three-part)

■ INK RIBBON

Type	Stationary cassette
Size	10 mm wide, 25 m long
Color	Black
Service Life	2.5 million characters

■ INTERFACE

- Centronics parallel interface
- RS-232C serial interface

■ EXTERNAL DIMENSIONS AND WEIGHT

Dimensions (W x D x H)	490 x 238 x 76 mm (490 x 305 x 76 mm if Pin Wheel Unit is installed.)
Weight	Approx. 6 kg (Approx. 6.7 kg if Pin Wheel Unit is installed.)

⁎ POWER REQUIREMENTS AND ENVIRONMENTAL CONDITIONS

Source Voltage	115 ± 10 % VAC, 220 ± 10 % VAC or 240 ± 10 % VAC	
Frequency	50/60 ± 2 % Hz	
Power Consumption	100 VA max. while operating 30 VA while idling	
Temperature and Humidity		
	Temperature	Humidity
Operating	5 to 35°C	20–80 %
Non-operating	0 to 50°C	10–80 %
Storage	−20 to 60°C	5–95 %
	(with no dew condensation.)	

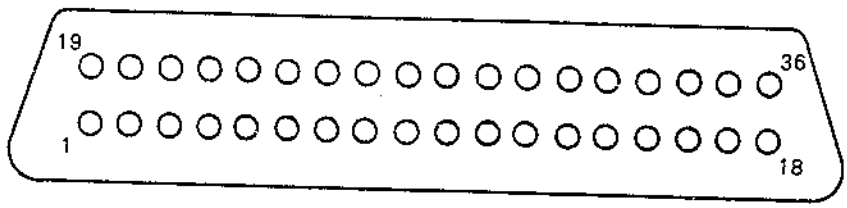
B. Interface

1. Parallel Interface (Centronics)

(1) Interface Connectors

Printer Side : Amphenol 57LE-40360 or equivalent
Cable Side : Amphenol 57FE-30360 or equivalent

Shielded cable (twisted pair cable) shall be used.
Cable Length: 1.9 m (6 feet) max.



(2) Pin Assignment

Pin No.	Signal	Pin No.	Signal
1	$\overline{\text{DATA STROBE}}$	19	GND
2	DATA 1	20	
3	DATA 2	21	
4	DATA 3	22	
5	DATA 4	23	
6	DATA 5	24	
7	DATA 6	25	
8	DATA 7	26	
9	DATA 8	27	
10	ACKNLG	28	
11	BUSY	29	
12	PE	30	$\overline{\text{INPUT PRIME RET}}$
13	+5V (4.7 kΩ pull-up)	31	$\overline{\text{INPUT PRIME}}$
14	$\overline{\text{AUTO FEED}}$	32	$\overline{\text{FAULT}}$
15	Not used.	33	0V
16	0V	34	Not used.
17	0V	35	+5V (4.7 kΩ pull-up)
18	+5V	36	$\overline{\text{SLCT IN}}$

(3) Signal Description

Pin No.	Signal Name	IN/OUT	Explanation
1	$\overline{\text{DATA STROBE}}$	IN	Data reading strobe pulse whose minimum width shall be 1 μs. High in steady state. Data is read on the leading edge of this signal going Low.
2-9	DATA 1-8	IN	Bit 1 through bit 8 of the data. The level is High for 1 and Low for 0. The minimum width shall be 3 μs.
10	$\overline{\text{ACKNLG}}$	OUT	Acknowledge pulse that is output upon completion of data input or upon completion of printer operation. The pulse width is 6 μs.
11	BUSY	OUT	Signal to indicate if the printer is data receivable. Data input is possible when this signal is Low. This signal goes High under any of the following conditions: – During printer operation – During data input – In offline (DESELECT) state
12	PE	OUT	DC level signal that goes High when the paper empty state is detected.
13, 35	+5V	OUT	Pulled up to +5V by 4.7 kΩ resistor.
14	$\overline{\text{AUTO FEED}}$	IN	When this signal goes Low, the printer automatically feeds paper by one line after printing.
18	+5V Source	OUT	Output max. 300 mA
31	$\overline{\text{INPUT PRIME}}$	IN	When this signal goes Low, the printer is reset to the initial state.
32	$\overline{\text{FAULT}}$	OUT	DC level signal that goes Low when the printer is in the offline state.
36	$\overline{\text{SLCT IN}}$	IN	Turning this signal Low enters the printer into online state; High, offline state, if no error is detected in the printer. When the DIP SW3-7 is set to OFF, the printer may receive but ignore the data being sent from the computer, resulting in no operation. If this signal is low, the data are always valid regardless of the device control codes and the mode state. But if high, they are valid only when the DC1 code is input under MODE I. See the description of the DIP switch.

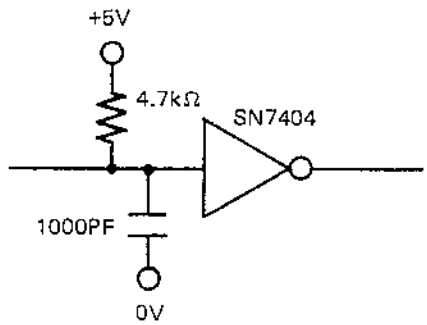
(4) Interface Circuit

Signals of the interface line are compatible to TTL level. The input and output levels are as follows at TTL I/O pins.

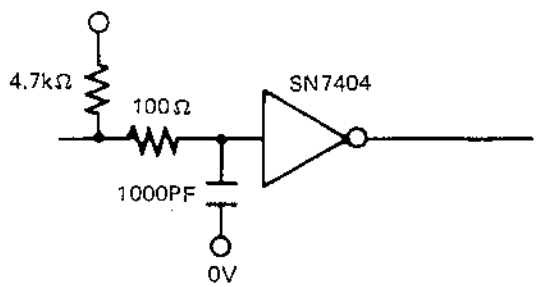
	LOW level (V)	HIGH level (V)
Input	$0 \leqq V \leqq 0.4$	$2.4 \leqq V \leqq 5.0$
Output	$0 \leqq V \leqq 0.4$	$2.4 \leqq V \leqq 5.0$

(a) Input Circuits

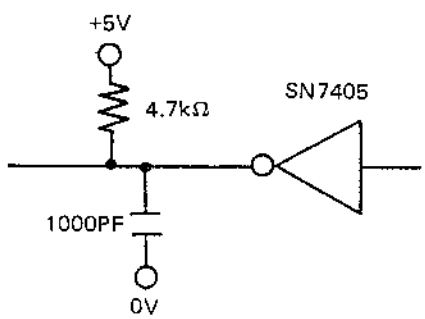
DATA 1-8



$\overline{\text{DATA STROBE}}$
$\overline{\text{INPUT PRIME}}$

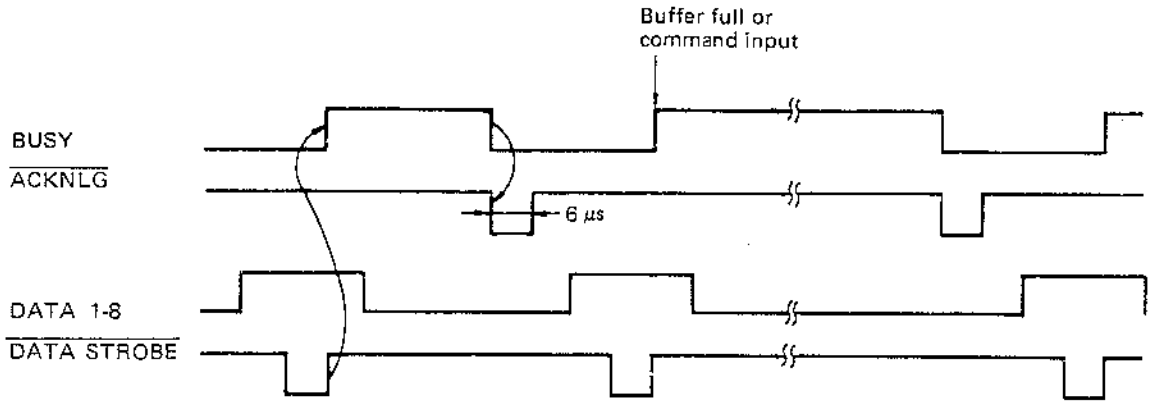


(b) Output Circuits

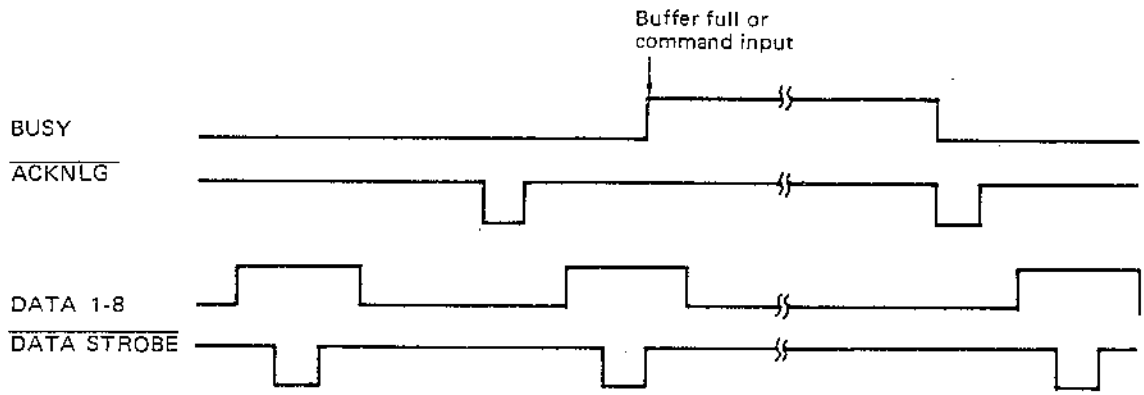


(5) Timing Charts

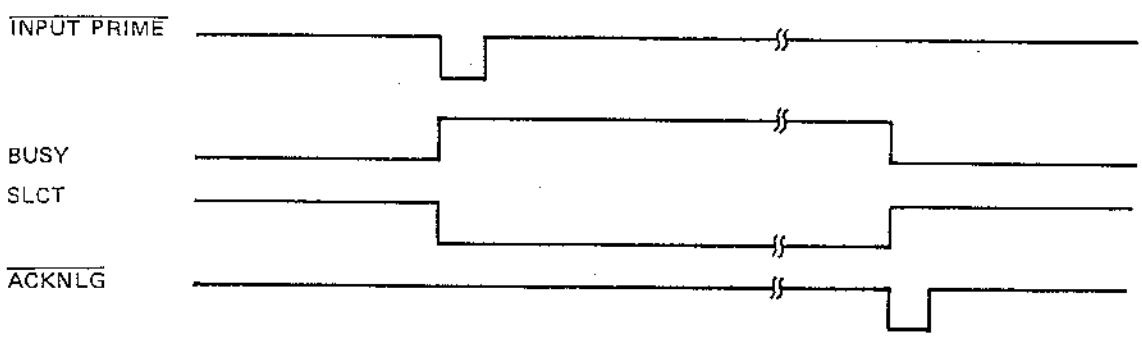
1) Data receiving under one-data BUSY condition



2) Data receiving under one-line BUSY condition



3) Receiving $\overline{\text{INPUT PRIME}}$

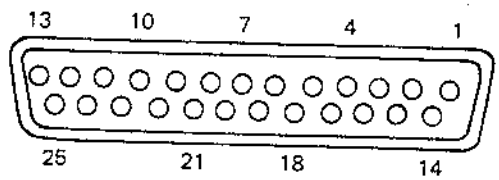


2. Serial Interface (RS-232C)

(1) Interface Connectors

Printer Side : Amphenol 17LE-13250 or equivalent
Cable Side : Amphenol 17JE-23250 or equivalent

Shielded cable shall be used.
Cable Length: 2 m (6.5 feet) max.



(2) Pin Assignment

Pin No.	Signal	IN/OUT Printer Controller	Pin No.	Signal	IN/OUT Printer Controller
1	FG		14	SCA	→
2	SD	→	15	NC	
3	RD	←	16	NC	
4	RTS	→	17*	Current loop (DTR)	→
5	CTS	←	18	NC	
6	DSR	←	19	NC	
7	SG		20	DTR	→
8	CD	←	21	NC	
9	NC		22	NC	
10	NC		23*	Current loop (RP) RET	
11	SCA	→	24*	Current loop (DTR) RET	
12	NC		25*	Current loop (RP)	←
13	NC				

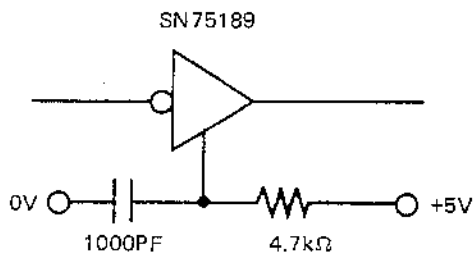
NOTE*: The signals of pin No. 17, 23, 24, and 25 are optionally available.

(3) Signal Description

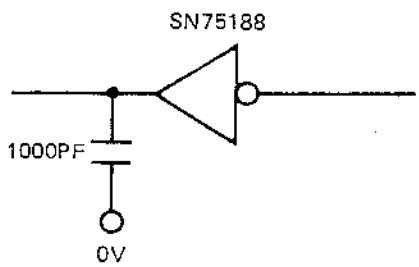
Signal Name	IN/OUT	Explanation
FG	–	Frame Ground (protective GND)
SD	OUT	Send Data
RD	IN	Receive Data
RTS	OUT	Request to Send
CTS	IN	Clear to Send
DSR	IN	Data Set Ready
SG	–	Signal Ground
CD	IN	Carrier Detect
SCA	OUT	Secondary Request to Send
DTR	OUT	Data Terminal Ready

(4) Interface Circuit

a) Input Circuit

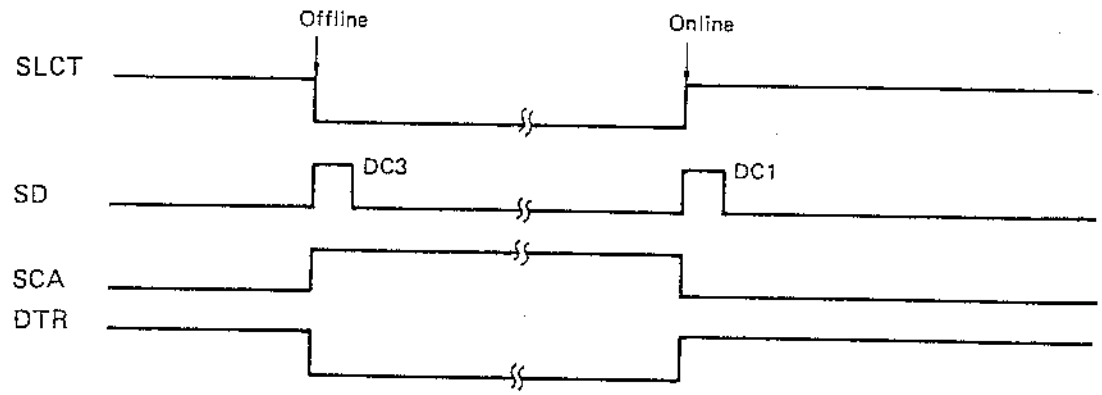


4) Output Circuit

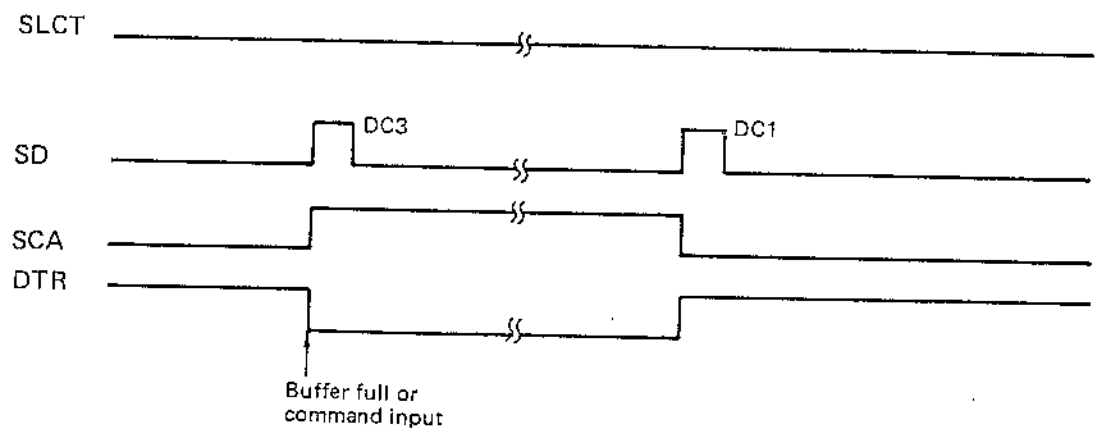


(5) Timing Charts

1) Turning to offline and online modes



2) Data receiving



- **X-ON/OFF Control**

When the printer is receiving data into the input buffer, X-OFF (DC3 code) is transmitted from SD if the input data accounts for 3056 bytes minimum of the input buffer; X-ON (DC1 code), 153 bytes maximum by data transfer to the image buffer.

(6) Standard Specification

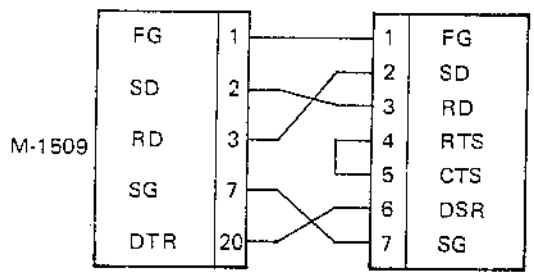
1) Band rate
   110, 150, 300, 600, 1200, 2400, 4800, 9600 bauds
2) Synchronization
   Start-stop
3) Communication control procedure
   No procedure
4) Data format
   9, 10 bits/character or 11 bits/character
   7 bit or 8 bit serial:
   1 Start bit, Data bits (7 or 8), Party bit (0 or 1), Stop bit (1 or 2)
   See DIP SW1 WORD TABLE.

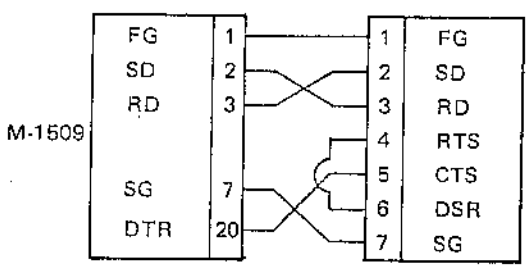
(7) Signal Level

Logic	Nominal output voltage	Receiving-end voltage
MARK (OFF)	−12V	Less than −3V
SPACE (ON)	+12V	More than +3V

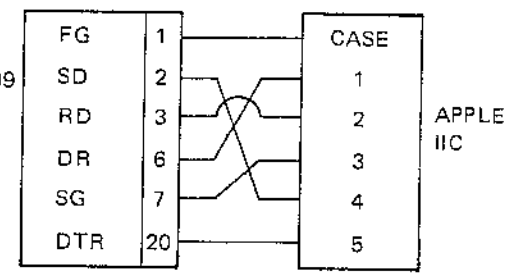
(8) Pin Configuration

1) IBM-PC & PCJr. (Example)

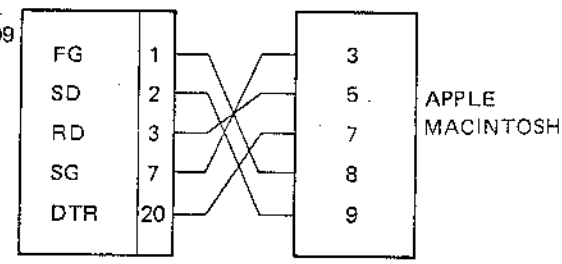




2) APPLE IIC (Example)



3) APPLE MACINTOSH (Example)



C. Options

The following accessories are available as options.

(1) SF-40 Cut Sheet Feeder (1 bin for forms)

(2) Near Letter Quality (NLQ) Fonts P.C.B.

LQ100 : Gothic, Quadro, and Anelia Proportional

LQ200 : Gothic, Anelia Proportional, and 16K input/download buffer

NOTE The character generators for the normal (Pica) and Prestige (NLQ) are built in the Logic Control P.C.B.

(3) Dustproof Cover

(These options are to be released in the near future.)

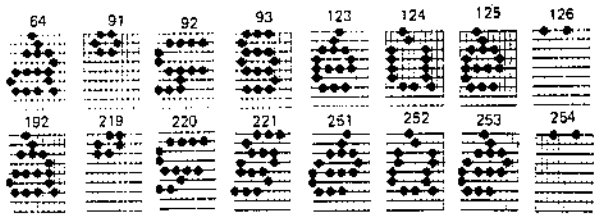
D. Dot Patterns

EPSON

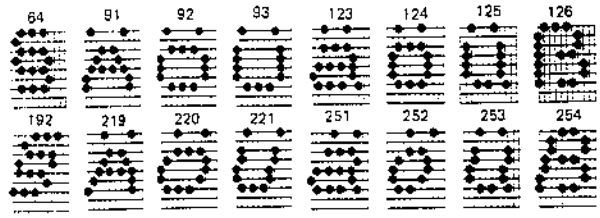
- Mode I

U.S.A.

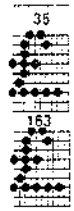
FRANCE I



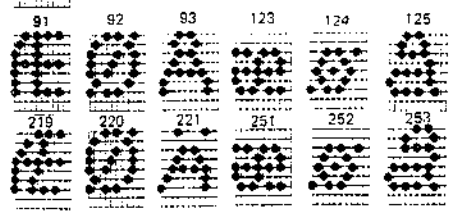
GERMANY



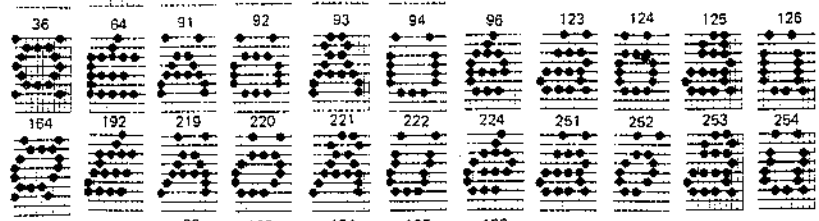
U.K.I



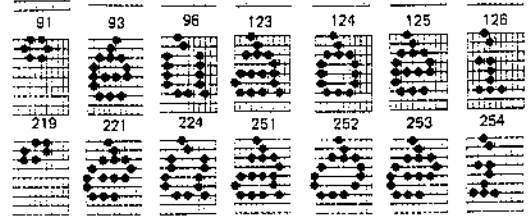
DENMARK I



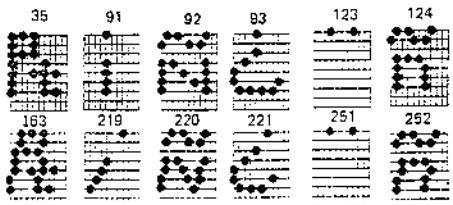
SWEDEN



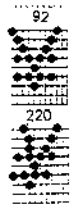
ITALY



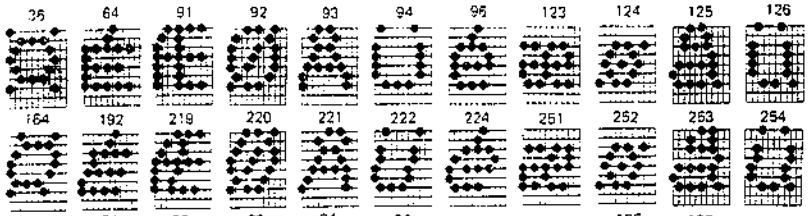
SPAIN



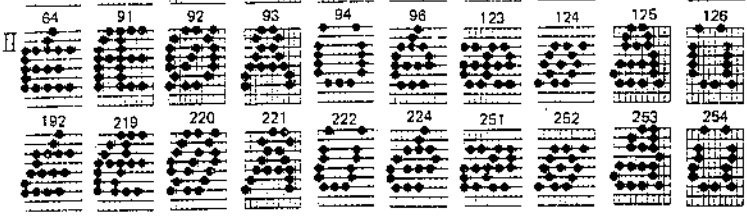
JAPAN



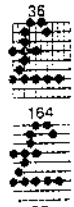
NORWAY I



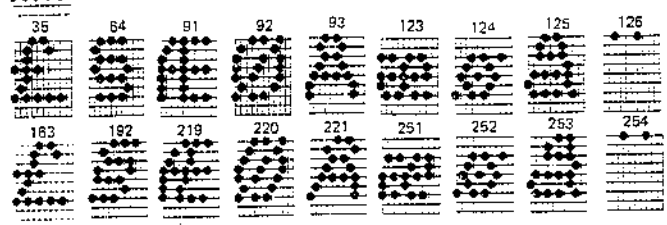
DENMARK II



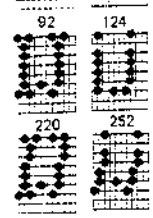
U.K II



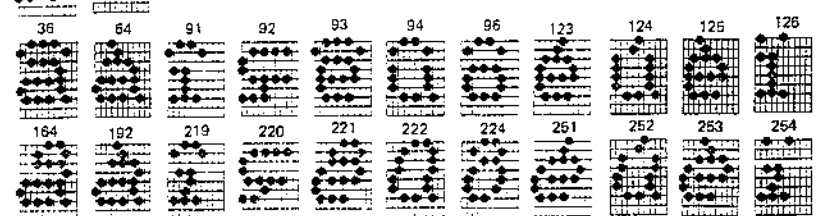
NORWAY II



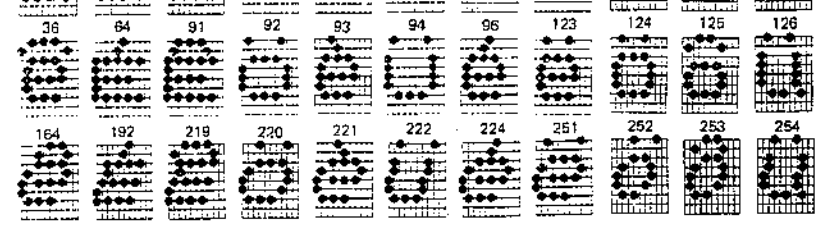
NETHER LANDS



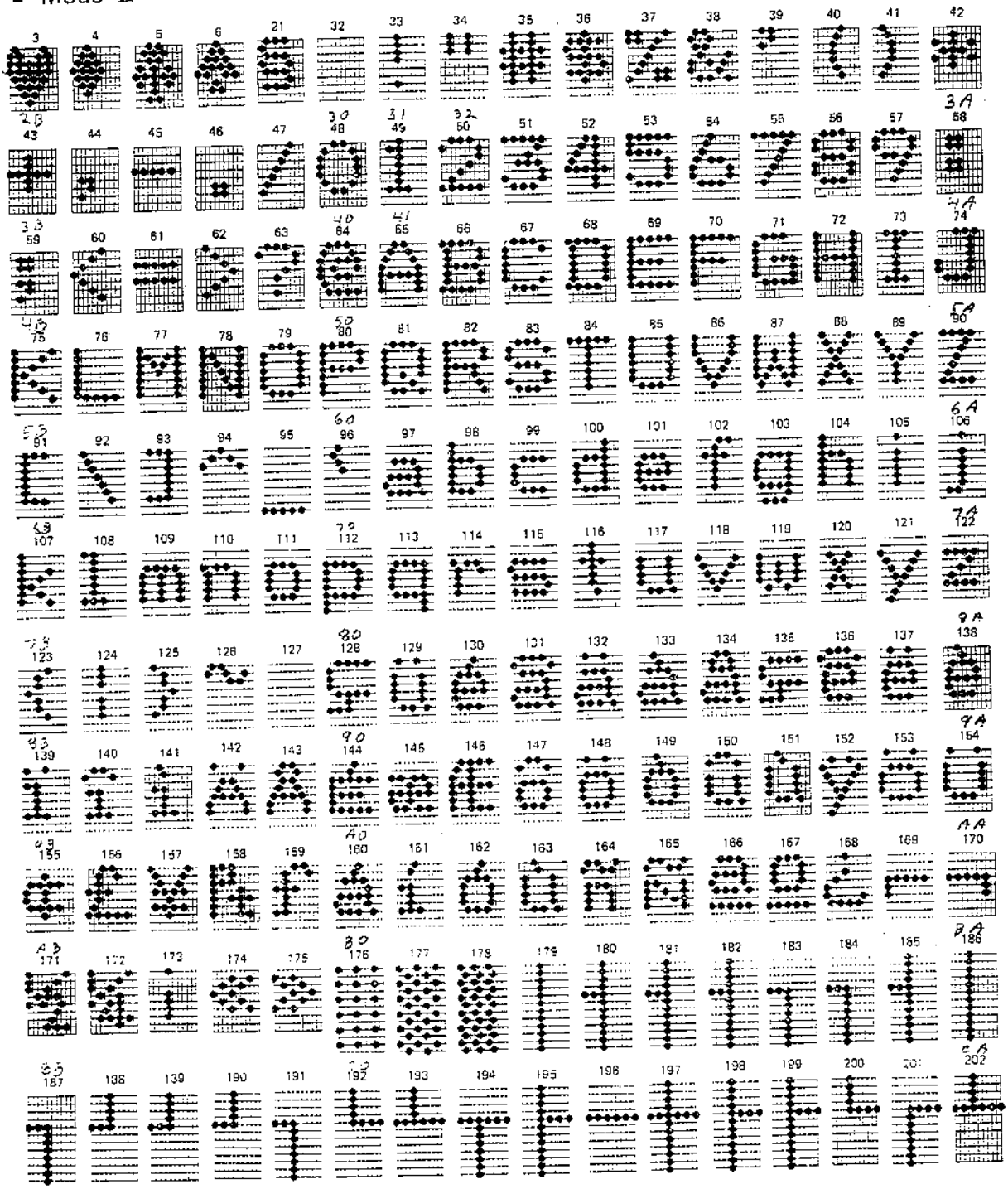
FRANCE II

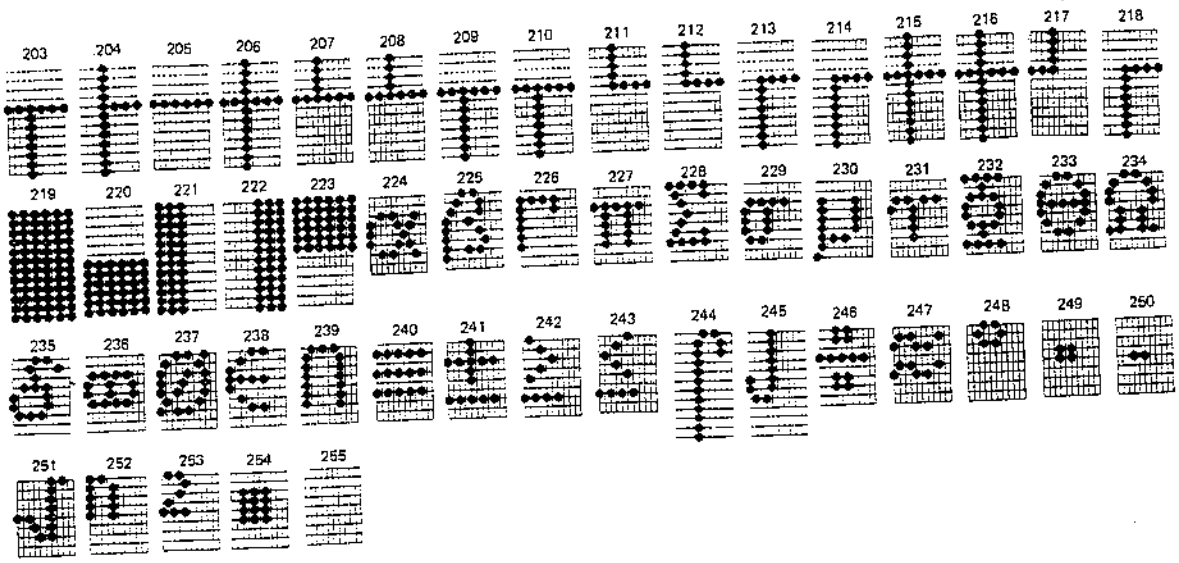


S. AFRICA

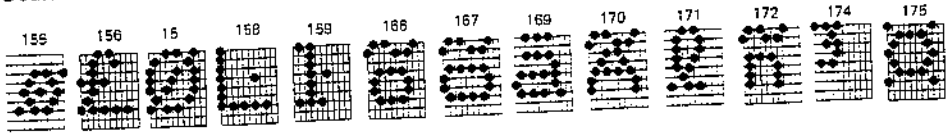


■ Mode II





Scandinavian Characters



INTERNATIONAL CHARACTER SET TABLE

COUNTRY	Selectors				HEX. CODE										
	1	2	3	4	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
U.S.A.	OFF	OFF	OFF	OFF	#	$	@	[	\	]	^	`	{	|	}	~
FRANCE I	ON	OFF	OFF	OFF	#	$	à	°	ç	§	^	`	é	ù	è	¨
GERMANY	OFF	ON	OFF	OFF	#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
U.K. I	ON	ON	OFF	OFF	£	$	@	[	\	]	^	`	{	¦	}	~
DENMARK I	OFF	OFF	ON	OFF	#	$	@	Æ	Ø	Å	^	`	æ	ø	å	~
SWEDEN	ON	OFF	ON	OFF	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
ITALY	OFF	ON	ON	OFF	#	$	@	°	\	é	^	ù	à	ò	è	ì
SPAIN	ON	ON	ON	OFF	₧	$	@	¡	Ñ	¿	^	`	¨	ñ	}	~
JAPAN	OFF	OFF	OFF	ON	#	$	@	[	¥	]	^	`	{	|	}	~
NORWAY I	ON	OFF	OFF	ON	#	¤	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
DENMARK II	OFF	ON	OFF	ON	#	$	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
U.K. II	ON	ON	OFF	ON	#	£	@	[	\	]	^	`	{	|	}	~
NORWAY II	OFF	OFF	ON	ON	£	$	§	Æ	Ø	Å	^	`	æ	ø	å	¨
NETHERLANDS	ON	OFF	ON	ON	#	$	@	[	]	ƒ	^	`	é	ij	è	¨
FRANCE II	OFF	ON	ON	ON	#	à	à	°	ç	ê	ô	è	é	ù	è	¨
S. AFRICA	ON	ON	ON	ON	#	è	É	£	ö	è	ü	é	ë	ö	ö	ü

NLQ CHARACTER SET TABLE

Selector No.		Typeface	
7	8		
OFF	OFF	Prestige	(Note)
ON	OFF	Anelia Proportional	
OFF	ON	Quadro	
ON	ON	Gothic	

NOTE: Available if optional Near Letter Quality (NLQ) Fonts P.C.B.s – LQ-100 and LQ-200 – are installed.
LQ-100: Gothic, Quadro, and Anelia Proportional
LQ-200: Gothic, Anelia Proportional, and 16K input/download buffer

M-1509 DIP SWITCH SETTING EXAMPLE

DIP SW1	FUNCTION	OFF/ON	EPSON (FX-100+)	IBM (GRAPHIC PRINTER)
1	BAUD RATE	110 ~ 9600 BPS	—	—
2			—	—
3			—	—
4	LENGTH	8 bit ⇔ 7 bit	—	—
5	PARITY	EN ⇔ DIS	—	—
6	PARITY	EVEN ⇔ ODD	—	—
7	X-ON/OFF	RO ⇔ TR	—	—
8	I/F	P ⇔ S	OFF	OFF

DIP SW2	FUNCTION	OFF/ON	EPSON (FX-100+)	IBM (GRAPHIC PRINTER)
1	FONT	0 ⇔ Ø	OFF	OFF
2	PE	EN ⇔ DIS	OFF	OFF
3	BUFFER	DL ⇔ IB	OFF	ON
4	PRINT MODE	NORM ⇔ EMPH	OFF	OFF
5	COM MODE	EPS ⇔ IBM	OFF	ON
6	1" S-P	INV ⇔ VAL	OFF	OFF
7				
8				

DIP SW3	FUNCTION	OFF/ON	EPSON (FX-100+)	IBM (GRAPHIC PRINTER)
1	EACH FUNCTION VARIES ACCORDING TO THE SETTING OF DIP SW2-5. SEE THE FOLLOWING TABLE.			
2				
3				
4				
5	FORM LENGTH	11" ⇔ 12"	OFF*1	OFF
6	PITCH	1/6" ⇔ 1/8"	OFF	OFF
7	SELECT IN	NOT FIX ⇔ FIX	ON	ON
8	AUTO FEED	INV ⇔ VAL	OFF	OFF

NOTE: *1 If the printer is 220V version, set this switch to ON.

EPSON (FX-100+): DIP SW2-5 OFF

DIP SW3	INTERNATIONAL CHARACTER SET
1	SET ACCORDING TO YOUR REQUIREMENTS. SEE INTERNATIONAL CHARACTER SET TABLE.
2	
3	
4	

IBM (GRAPHIC PRINTER): DIP SW2-5 ON

DIP SW3	FUNCTION	OFF/ON	SETTING
1	CHR SET	I ⇔ II	ON
2	CANCEL	VAL ⇔ INV	OFF
3	BUFFER FULL LF	INV ⇔ VAL	ON
4	CHR SET	NORM ⇔ SCAN	OFF

M-1509 DIP SWITCH SETTING EXAMPLE

MODE I MODE II

DIP SW1	FUNCTION	OFF/ON	EPSON (FX-100+)	IBM (GRAPHIC PRINTER)
1	BAUD RATE	110 ~ 9600 BPS	—	—
2			—	—
3			—	—
4	LENGTH	8 bit ⇔ 7 bit	—	—
5	PARITY	EN ⇔ DIS	—	—
6	PARITY	EVEN ⇔ ODD	—	—
7	X-ON/OFF	RO ⇔ TR	—	—
8	I/F	P ⇔ S	OFF	OFF

DIP SW2	FUNCTION	OFF/ON	EPSON (FX-100+)	IBM (GRAPHIC PRINTER)
1	FONT	0 ⇔ Ø	OFF	OFF
2	PE	EN ⇔ DIS	OFF	OFF
3	BUFFER	DL ⇔ IB	OFF	ON
4	PRINT MODE	NORM ⇔ EMPH	OFF	OFF
5	COM MODE	EPS ⇔ IBM	OFF	ON
6	1" S.P	INV ⇔ VAL	OFF	OFF
7				
8				

DIP SW3	FUNCTION	OFF/ON	EPSON (FX-100+)	IBM (GRAPHIC PRINTER)
1	EACH FUNCTION VARIES ACCORDING TO THE SETTING OF DIP SW2-5. SEE THE FOLLOWING TABLE. PAGE 129			PAGE 127+128
2				
3				
4				
5	FORM LENGTH	11" ⇔ 12"	OFF*1	OFF
6	PITCH	1/6" ⇔ 1/8"	OFF	OFF
7	SELECT IN	NOT FIX ⇔ FIX	ON	ON
8	AUTO FEED	INV ⇔ VAL	OFF	OFF

NOTE: *1 If the printer is 220V version, set this switch to ON.

EPSON (FX-100+): DIP SW2-5 OFF

DIP SW3	INTERNATIONAL CHARACTER SET
1	SET ACCORDING TO YOUR REQUIREMENTS. SEE INTERNATIONAL CHARACTER SET TABLE.
2	
3	
4	

IBM (GRAPHIC PRINTER): DIP SW2-5 ON

DIP SW3	FUNCTION	OFF/ON	SETTING
1	CHR SET	I ⇔ II	ON
2	CANCEL	VAL ⇔ INV	OFF
3	BUFFER FULL LF	INV ⇔ VAL	ON
4	CHR SET	NORM ⇔ SCAN	OFF

INTERNATIONAL CHARACTER SET TABLE

PAGE 75

COUNTRY	Selectors				HEX. CODE											
	1	2	3	4	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
U.S.A.	OFF	OFF	OFF	OFF	#	$	@	[	\	]	^	`	{	|	}	~
FRANCE I	ON	OFF	OFF	OFF	#	$	à	°	ç	§	^	`	é	ù	è	¨
GERMANY	OFF	ON	OFF	OFF	#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
U.K. I	ON	ON	OFF	OFF	£	$	@	[	\	]	^	`	{	!	}	~
DENMARK I	OFF	OFF	ON	OFF	#	$	@	Æ	Ø	Å	^	`	æ	ø	å	~
SWEDEN	ON	OFF	ON	OFF	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
ITALY	OFF	ON	ON	OFF	#	$	@	°	\	é	^	ù	à	ò	è	ì
SPAIN	ON	ON	ON	OFF	₧	$	@	¡	Ñ	¿	^	`	¨	ñ	}	~
JAPAN	OFF	OFF	OFF	ON	#	$	@	[	¥	]	^	`	{	¦	}	~
NORWAY I	ON	OFF	OFF	ON	#	¤	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
DENMARK II	OFF	ON	OFF	ON	#	$	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
U.K. II	ON	ON	OFF	ON	#	£	@	[	\	]	^	`	{	¦	}	~
NORWAY II	OFF	OFF	ON	ON	£	$	§	Æ	Ø	Å	^	`	æ	ø	å	¨
NETHERLANDS	ON	OFF	ON	ON	#	$	@	[	]	ƒ	^	`	¨	ij	¯	¸
FRANCE II	OFF	ON	ON	ON	#	à	à	°	ç	ê	Ô	ô	é	ù	è	¨
S. AFRICA	ON	ON	ON	ON	#	¤	É	£	Ö	è	Ü	é	ë	ö	ô	ü

NLQ CHARACTER SET TABLE

Selector No.		Typeface
7	8	
OFF	OFF	Prestige
ON	OFF	Anelia Proportional
OFF	ON	Quadro
ON	ON	Gothic

ESC+k+n (Note)

NOTE: Available if optional Near Letter Quality (NLQ) Fonts P.C.B.s – LQ-100 and LQ-200 – are installed.
LQ-100: Gothic, Quadro, and Anelia Proportional
LQ-200: Gothic, Anelia Proportional, and 16K input/download buffer

SWP-3