

FCC Notice (U.S.A. only)

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

- Reorient the receiving antenna
- Relocate the equipment with respect to the receiver
- Move the equipment away from the receiver.
- Plug the equipment into a different outlet so that the equipment 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 Communication helpful:

"How to Identify and Resolve Radio TV Interference Problems"

This booklet is available from the U.S. Government Printing Office, Washington, DC 20402. Stock No. 004-000-00345-4.

1. Preface

This equipment is a daisy wheel impact printer which delivers high quality printouts.

The printer provides both a serial print mode and a line print mode by means of a DIP switch operation.

In the serial print mode, an ESC sequence offers a minimum of 1/120 inch carriage movement and a minimum of 1/48 inch paper feed, which allows the printer to perform bold print, superscripts and subscripts. Full use of various word processing programs such as WordStar*, etc. is possible.

In line print mode, the equipment automatically prints bi-directionally.

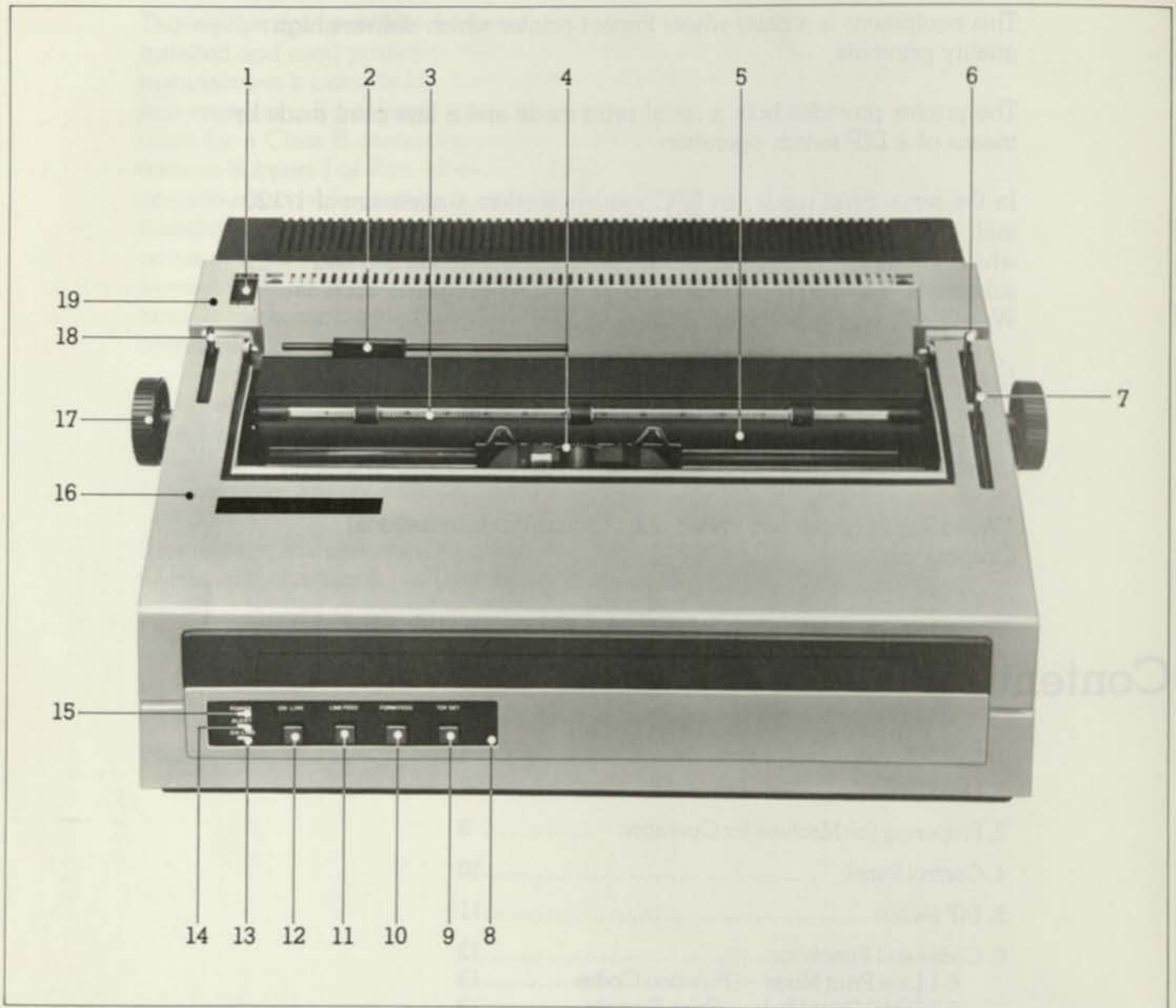
The printer is provided with a Centronics compatible parallel interface. The printer for RS232C serial interface is also available.

*WordStar is registered trademark of MicroPro International Corporation.

Contents

1. Preface	1
2. Description	2
3. Preparing the Machine for Operation	3
4. Control Panel	10
5. DIP Switch	11
6. Codes and Functions	12
6-1 Line Print Mode — Function Codes	13
6-2 Serial Print Mode — Print Formats	13
6-3 Serial Print Mode — Function Codes	15
7. Power-On and Remote Reset	17
8. ASCII Codes	18
9. Parallel Interface	19
9-1 Explanation of Signals and Specifications	19
9-2 Input/Output Circuits	21
10. Complement	22
Spacing Units when PS Daisy Wheel is in use	22
11. Specifications	23
12. Care and Maintenance	24
In Case of Difficulty	24

2. Description



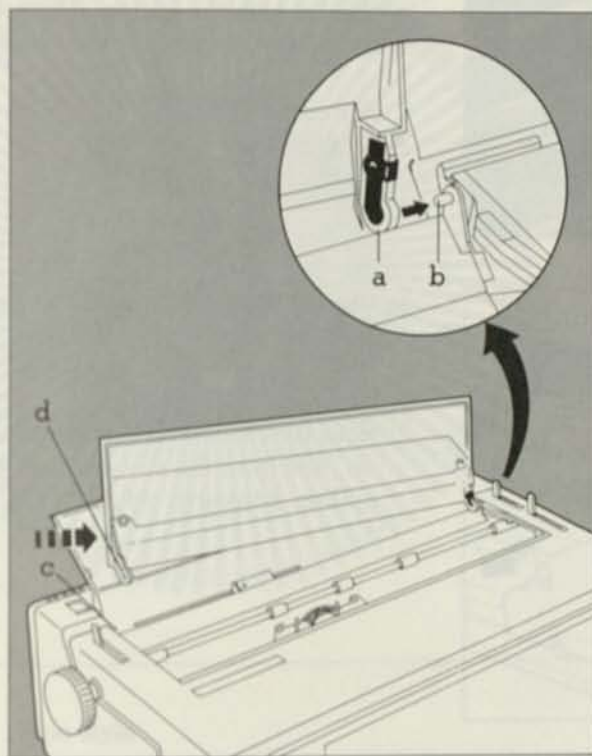
- | | |
|------------------------|---|
| 1. Power Switch | 14. ALERT Lamp |
| 2. Paper Guide | 15. POWER Lamp |
| 3. Paper Bail Shaft | 16. Top Cover |
| 4. Daisy Wheel | Type wheel/ribbon replacement is easily accomplished by opening the top cover. Opening the top cover interrupts the printing and, after closing the top cover, printing can be resumed with the ON LINE switch. |
| 5. Platen | 17. Platen Knob Left (Platen Variable) |
| 6. Paper Release Lever | 18. Paper Injector |
| 7. Paper Bail Lever | 19. Upper Cover |
| 8. Control Panel | |
| 9. TOF SET Switch | |
| 10. FORM FEED Switch | |
| 11. LINE FEED Switch | |
| 12. ON LINE Switch | |
| 13. ON LINE Lamp | |

3. Preparing the Machine for Operation

The following accessories are packed together with this printer:

1. Daily Wheel

2. Multi-strike film ribbon (installed to the carriage)
3. Acoustic Hood



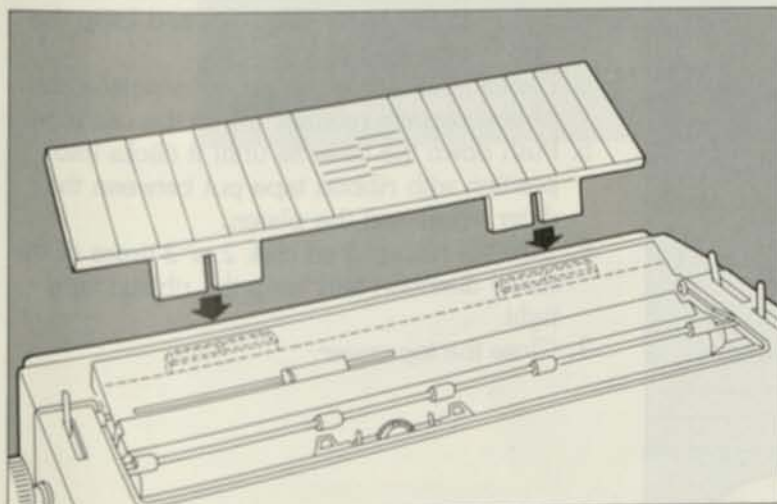
Acoustic Hood

To install the acoustic hood

1. Position the right hand hole (a) of the acoustic hood onto the right hinge pin (b), and hold the acoustic hood to the right side.
2. Insert the left hinge pin (c) into the left hand hole (d) of the acoustic hood.
3. Make sure that the acoustic hood can rotate smoothly.

To remove the acoustic hood

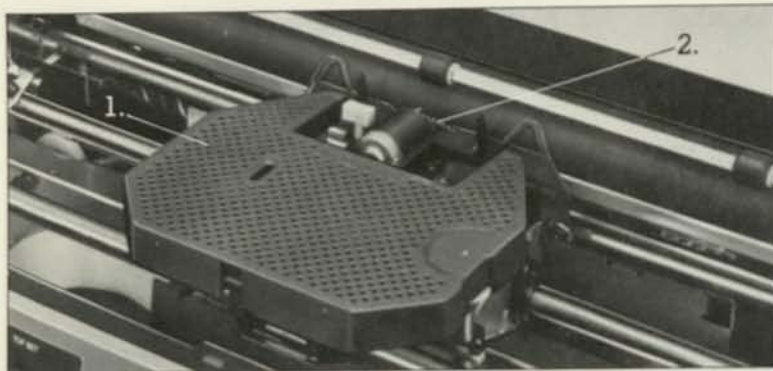
1. Raise the left side of the acoustic hood while pushing it to the right, and release it from the left hinge pin (c).
2. Release the acoustic hood from the right hinge pin (b).



Paper Table with Paper Support (Option)

The paper table is used to support the paper when inserting it or while printing.

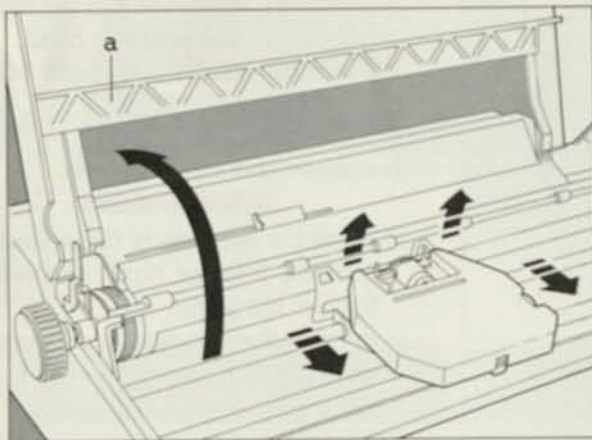
Install the paper table in inserting the two extensions of the paper table into the slots on the upper cover on the rear side of the printer.



Carriage

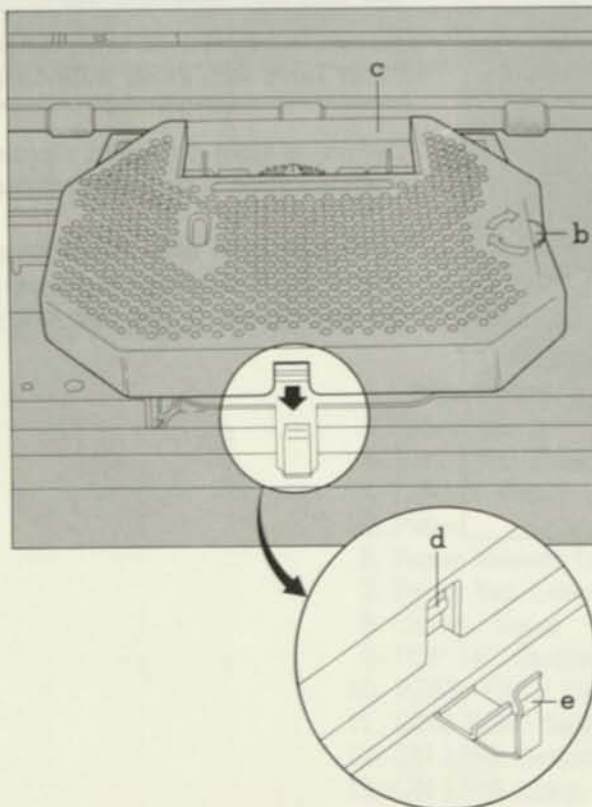
The carriage prints on the paper while moving in parallel with the platen. The following print elements are attached to the carriage.

1. Ribbon
2. Daisy wheel

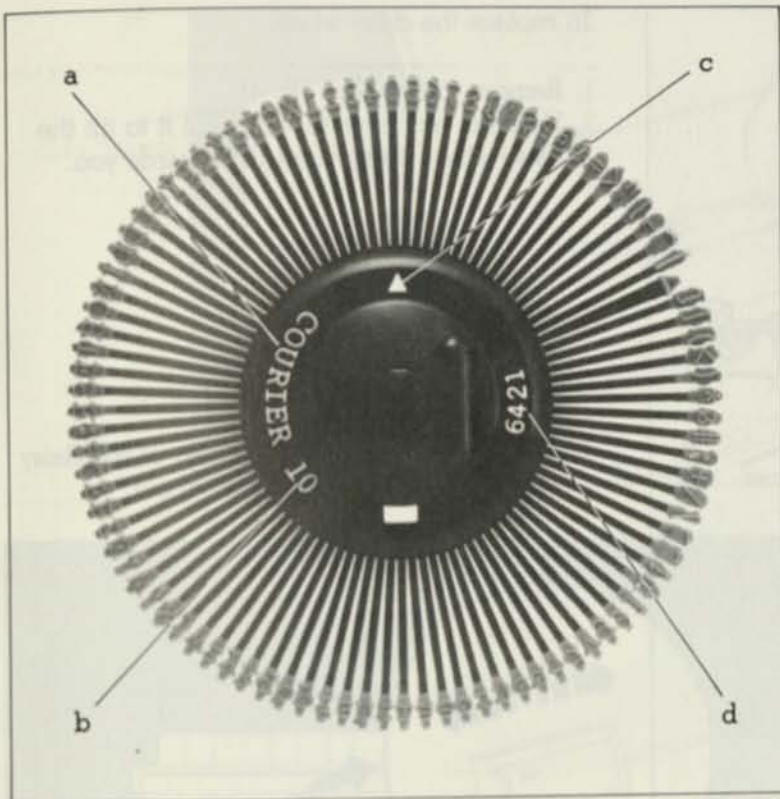


To replace the ribbon (Multi-strike film ribbon is provided with the printer.)

1. Raise the top cover (a).
2. Hold the ribbon with both hands and lift it up, first from the ribbon tape side, while pulling it towards you.



3. Turn the ribbon feed disk (b) on the new ribbon in the arrow direction and keep the ribbon tape (c) tight.
4. Position the recess (d) of the cassette at the ribbon cassette retainer (e) on the carriage.
5. Push down the cassette until it clicks into position with ribbon tape put between the daisy wheel and the platen.
6. Turn the ribbon feed disk 2 or 3 times in the arrow direction and keep the ribbon tape tight.
7. Close the top cover.



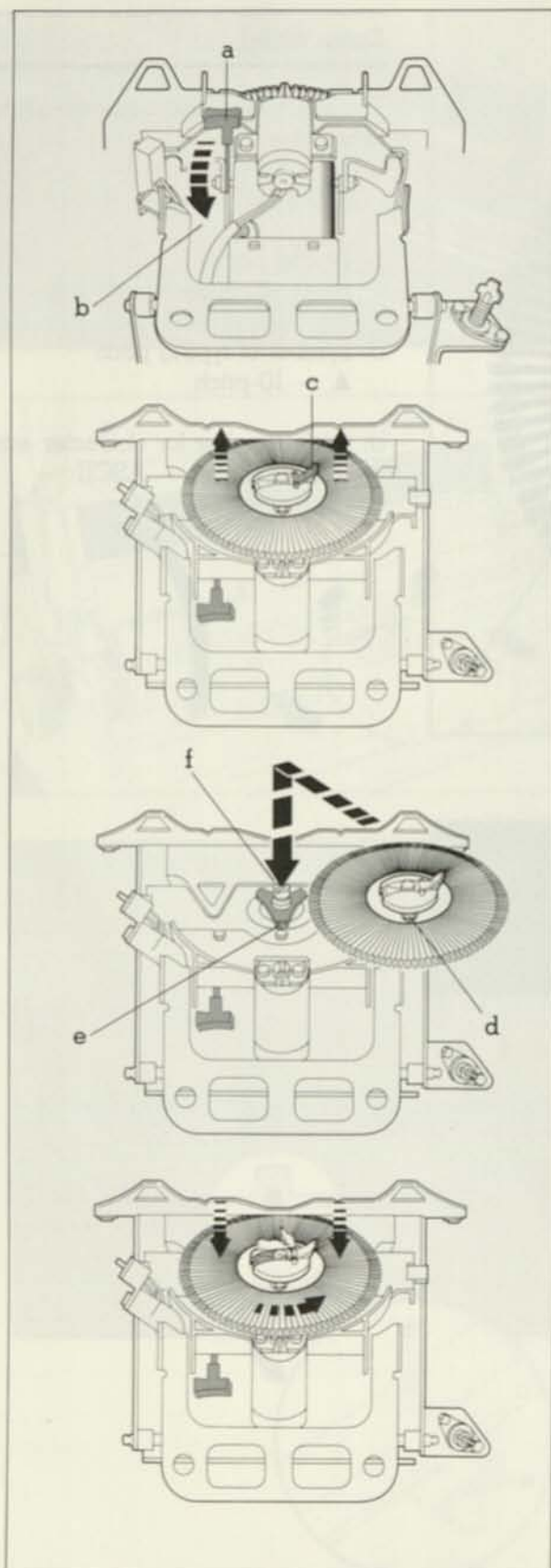
Daisy Wheel

The following indications are given on the daisy wheel:

- a. Type style (standard)
COURIER
- b. Typing pitch
10 — 10-character per inch
- c. Symbol of typing pitch
▲ — 10-pitch
- d. Code number for character arrangement
6421 (4 digits) — ASCII

Type style

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz

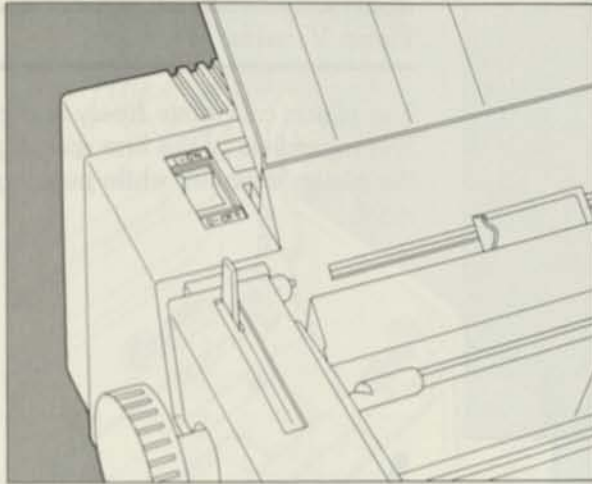


To replace the daisy wheel

1. Remove the ribbon. (P. 4)
2. Hold the red lever (a) and pull it to tilt the daisy wheel holder unit (b) towards you.
3. Open the lever (c) in the center of the daisy wheel until it clicks, and take it out.
4. Open the lever in the center of the daisy wheel of your choice and align the slot (d) of the daisy wheel with the daisy wheel holder (e) and mount the daisy wheel onto the guide pin (f).
5. Close the lever by pushing it with a forefinger until it clicks into position.
6. Make one turn of the daisy wheel with fingers to confirm it is set properly.
7. Restore the daisy wheel holder unit to the original position using the red lever.
8. Restore the ribbon in the position.

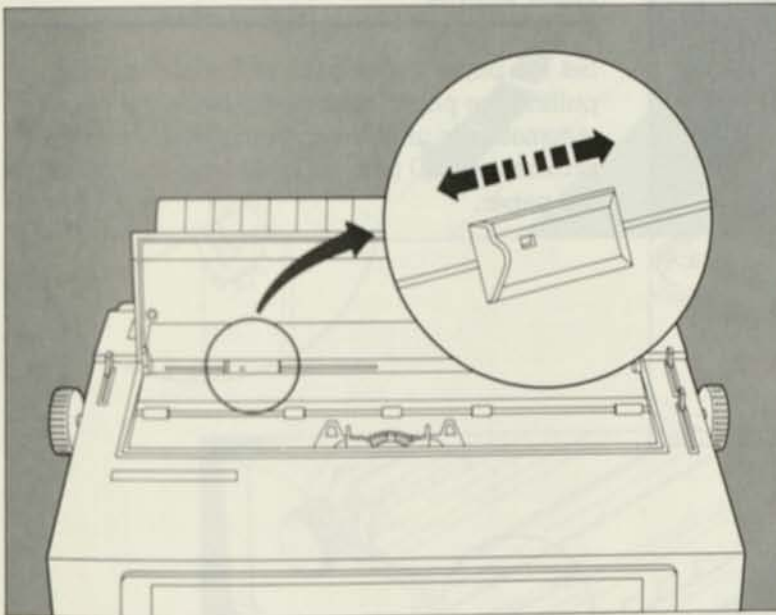
Notes:

- When replacing the daisy wheel, be sure to turn power switch off.
- Do not turn the power switch on before the daisy wheel is mounted.



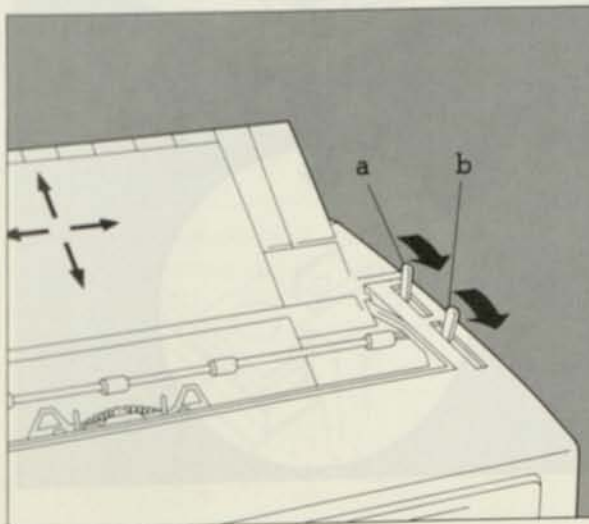
Power Switch

This switch supplies power to all circuits of the printer and also initializes the printer. As to re-initialization with the power switch on, refer to "Power On and Remote Reset" on page 17.



Paper Guide

This guide is responsible for positioning the paper in the horizontal direction.

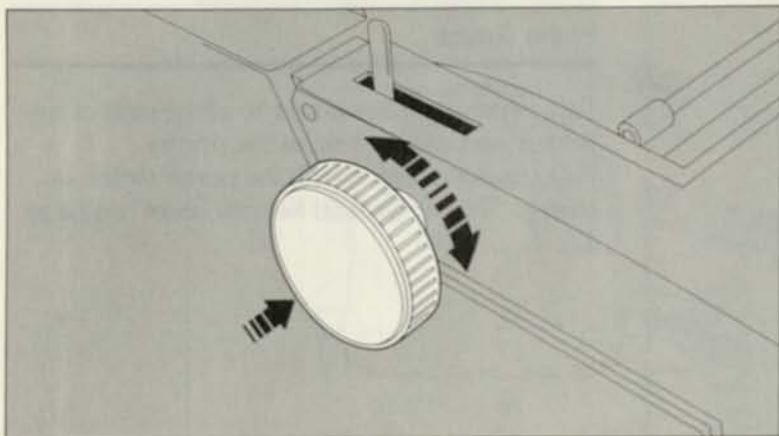


Paper Release Lever (a)

Pulling the lever towards you permits you to adjust the paper position as desired. Used in conjunction with the paper bail lever.

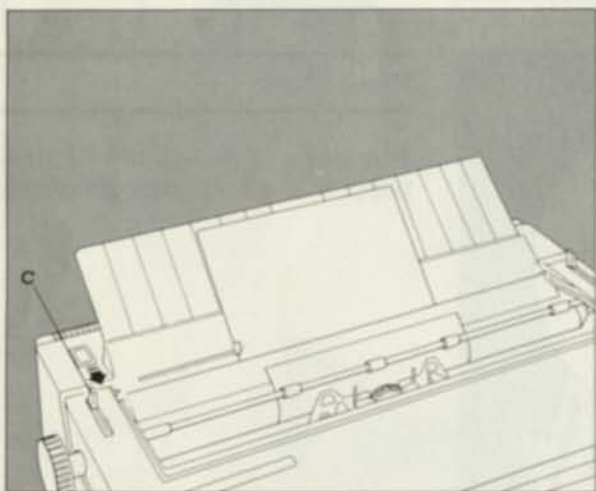
Paper Bail Lever (b)

Pulling the lever towards you releases the paper bail rollers from the platen, allowing free motion of the paper.



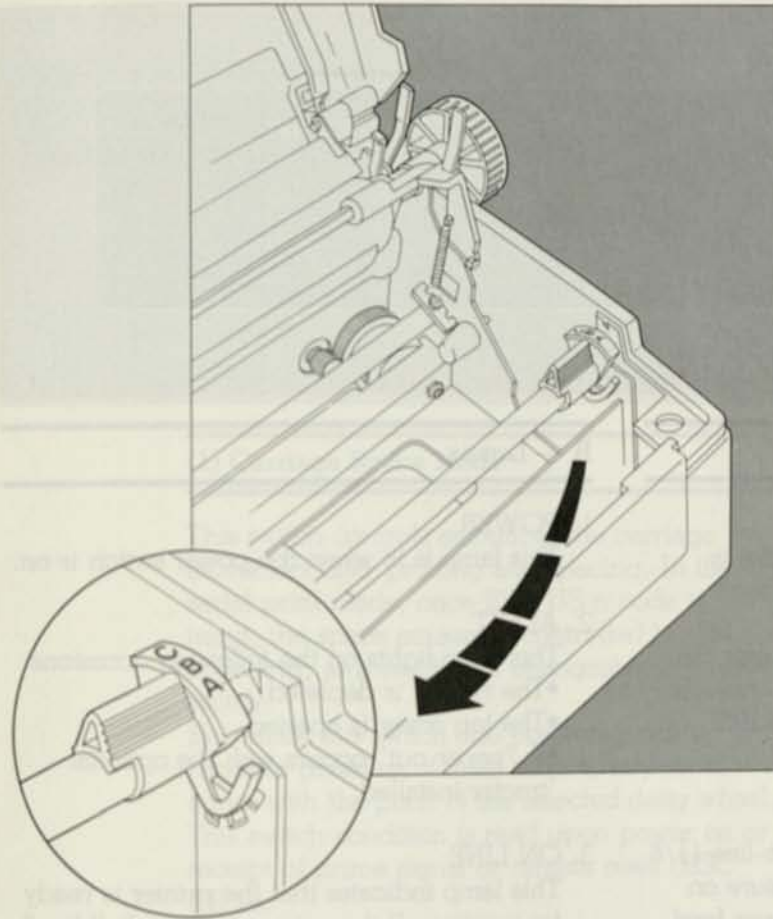
Platen Variable

The platen can rotate freely and be set at any line regardless of the line spacing by turning the platen knob left while pushing it to the right.



Paper Injector

Set the paper in the back of the platen, and pulling the paper injector (c) feeds the paper automatically until the printing position is approximately 1.0 inch (25mm) from the top of the paper.

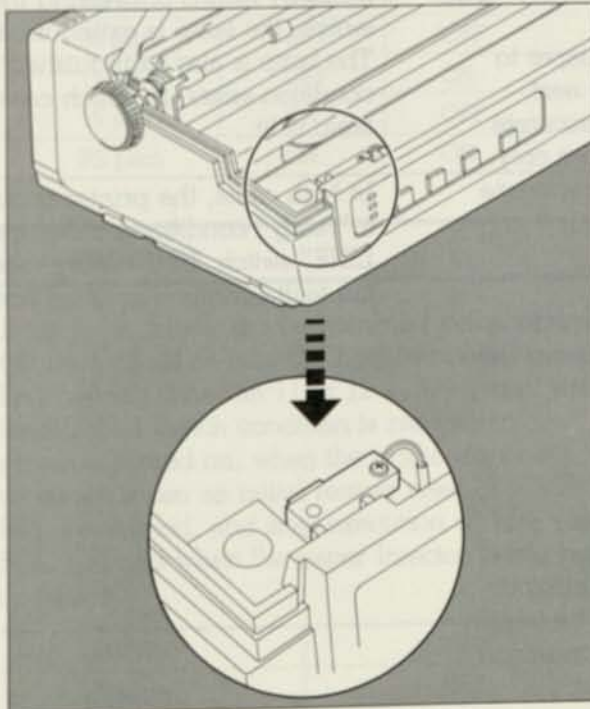


Copy Control Lever

The copy control lever is located on the right when the top cover is opened. It adjusts the distance between the platen and the daisy wheel according to the number of copies or the paper thickness to get the optimum quality of printing on both the original and copies.

Set the copy control lever to one of the following 3 positions:

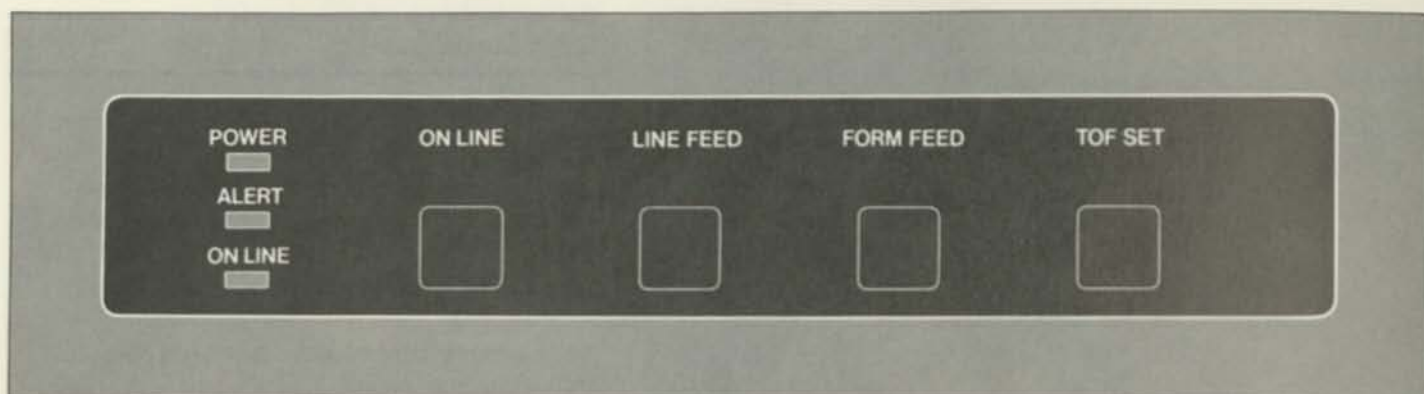
- A — Minimum distance (normal)
- B — Medium distance
- C — Maximum distance
(original and 5 copies)



Protector Switch

The protector switch is provided inside the printer and open the top cover interrupts the printing and, after closing the top cover depressing the ON LINE switch resumes printing.

4. Control Panel



A — Switches

- 1. ON LINE**

In the "off-line" mode, a BUSY signal is transmitted to host computer while the SELECT signal goes high.

Pressing the "ON LINE" switch toggles the printer between the two states. The present condition is indicated by the "ON LINE" lamp.
- 2. LINE FEED**

Depressing this switch causes a one-line (1/6 inch) paper feed. Continuous pressure on this switch results in continuous paper feed.
- 3. FORM FEED**

Depressing this switch causes the paper to be advanced to the first line of the next page. This paper advancement is accurate with paper lengths of 11 or 12 inches only. Page length setting is carried out by means of a DIP switch setting.
- 4. TOF SET**

With the printing position set to the position on the paper designated, by the user as the first line, depressing this switch stores "top of form" information in memory.
- 5. SELF TEST**

With power switch off, simultaneously depress the "LINE FEED" switch and place power switch to "ON". A five-line printout will occur. The power switch must be toggled off and back on before normal operation is resumed.

B — Lamps

- 1. POWER**

This lamp is lit when the power switch is on.
- 2. ALERT**

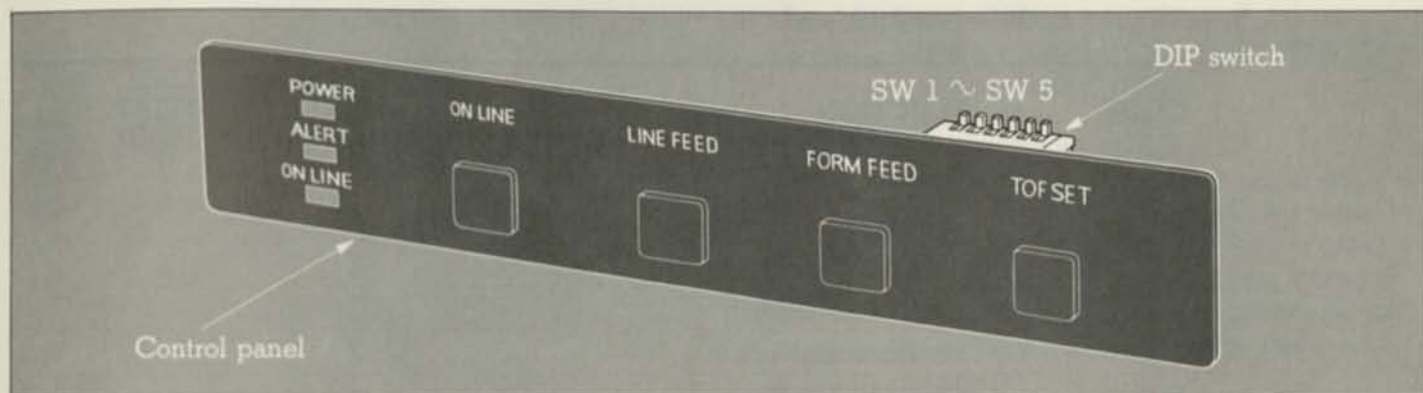
This lamp lights on the following occasions:

 - The ribbon is depleted.
 - The top cover is opened.
 - A "paper out" occurs with the optional tractor installed.
- 3. ON LINE**

This lamp indicates that the printer is ready for printing. If the printer is taken "off-line" mode by means of pressing the "ON LINE" switch, the lamp is extinguished. The lamp is also extinguished if a fault condition exists, in which case the "ALERT" lamp is lit.

In both cases, the printer is placed back into a "ready" condition by depressing the "ON LINE" switch. In the latter case, of course, the fault condition must be corrected.

5. DIP Switch



(1) Carriage Space Mode

This switch controls amount of the carriage movement after printing and spacing. In the serial print mode, once ESC US n code is input, the space amount is controlled by ESC code and, as a result, not changeable by this switch.

But, since this switch also controls printing hammer pressure, it must be properly set to agree with the pitch of the selected daisy wheel. This switch condition is read upon power on or receipt of prime signal or remote reset (ESC CR P).

PITCH	SW1	SW2
10 pitch	OFF	OFF
12 pitch	OFF	ON
15 pitch	ON	OFF
PS pitch	ON	ON

(2) Form Length

Form feed, which can be activated either from the front panel or from the host computer, must be preset to either an 11 or 12 inches paper length. The switch condition is read when power is turned on, when the prime signal is received, when an initial remote reset (ESC CR P) is performed, and after execution of TOF SET, FF, and when the paper injector is put in operation.

LENGTH	SW3
11 inches	OFF
12 inches	ON

(3) Auto Line Feed

Auto Line Feed selects whether or not a line feed (LF) is automatically carried out with the execution of a carriage return (CR).

In the serial print mode, the switch condition is read immediately before data input, and in the line print mode, the switch condition is read immediately before execution of a carriage return.

MODE	SW4
CR	OFF
CR + LF	ON

(4) Serial or Line Print Mode

In the serial print mode, the printer executes the printing as it receives a character of data from the host computer, but in the line print mode, the received data is placed into a buffer and printed only upon receipt of a CR, LF, or FF code. In this mode, the printer will automatically print bi-directionally.

The switch condition is read when power is turned on or the prime signal is received.

MODE	SW5
SERIAL	OFF
LINE	ON

6. Codes and Functions

In serial print mode or line print mode, the following codes (X) are usable.

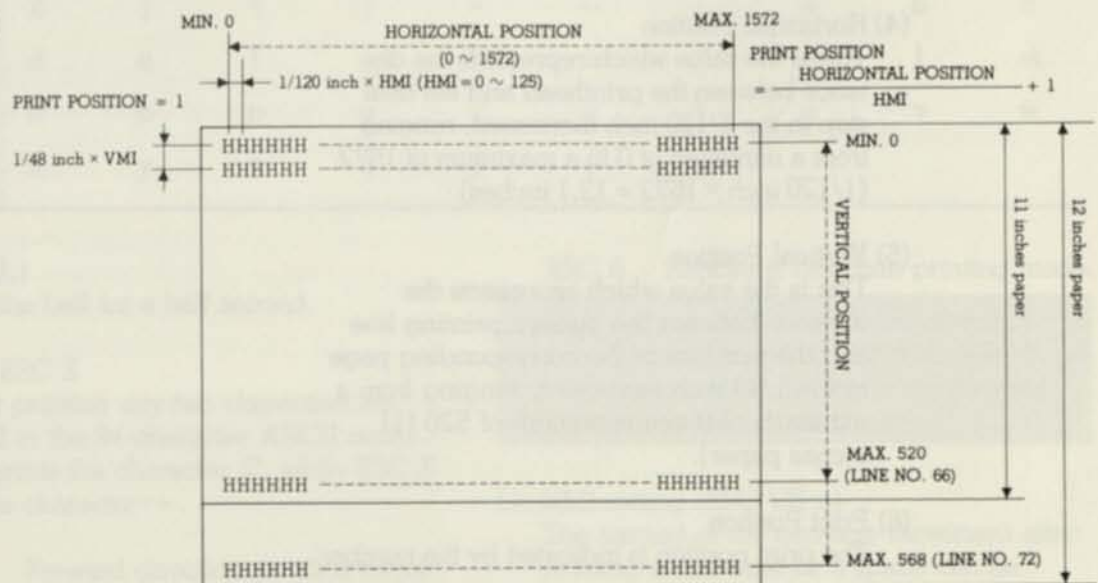
CODE	FUNCTION	SERIAL PRINT MODE	LINE PRINT MODE
BEL	Audible Alarm	X	X
BS	Backspace	X	
CR	Carriage Return	X	X
ESC Ø	Set Right Margin	X	
ESC 1	Set Horizontal Tab	X	
ESC 2	Clear All Tab Stops	X	
ESC 3	Graphics Mode On	X	
ESC 4	Graphics Mode Off	X	
ESC 5	Forward Print On	X	
ESC 6	Backward Print On	X	
ESC 8	Clear Individual Tab Stop	X	
ESC 9	Set Left Margin	X	
ESC D	Negative Half-Line Feed	X	
ESC U	Half-Line Feed	X	
ESC E	Auto Underscore On		X
ESC R	Auto Underscore Off		X
ESC O	Bold Print On (clear with CR)		X
ESC W	Shadow Print On (clear with CR)		X
ESC &	Bold/Shadow Print Off		X
ESC Y	Print 20 Hex (ASCII ¢)	X	X
ESC Z	Print 7F Hex (ASCII ¬)	X	X
ESC LF	Negative Line Feed	X	
ESC HT n	Absolute Horizontal Tab	X	
ESC VT n	Absolute Vertical Tab	X	
ESC RS n	Vertical Motion Index (VMI)	X	
ESC US n	Horizontal Motion Index (HMI)	X	
ESC CR P	Reinitialize	X	
FF	Form Feed	X	X
HT	Horizontal Tab (normal)	X	
LF	Line Feed	X	X
NUL	Ignored	X	X
DEL	Ignored	X	X
SP	Space	X	X

6-1 Line Print Mode — Function Codes

- (1) Bell (BEL)
Sounds the bell for a half second.
- (2) ESC E, ESC R
After the input of ESC E code, a character or space will automatically be underscored. The underscore mode can be cleared by means of ESC R code.
- (3) ESC O, ESC W, ESC &
The input of ESC O code automatically carries out bold print by printing the same character twice shifting the second print position by 1/120 inch.
The input of ESC W automatically carries out shadow print by printing the same character twice shifting the second printing position by 1/60 inch.
These modes can be cleared by means of ESC & or CR codes.
- (4) ESC Y, ESC Z
Used for printing any two characters not included in the 94-character ASCII code. ESC Y prints the character \mathcal{C} , while ESC Z prints the character \neg .
- (5) Space (SP)
Moves the carriage by one character space in the printing direction.
- (6) Carriage Return (CR)
When in the line print mode, a CR will cause the data stored in the buffer to be printed. A line feed may or may not be generated, depending upon the setting of DIP switch 4. Upon completion of printing, the carriage will remain at the last print position.
The CR code also resets bold print mode and shadow print mode.
- (7) Line Feed (LF)
Advances the paper 1/6 inch without changing the position of the carriage.
- (8) Form Feed (FF)
Advances the paper to the first line on the next page. The top of form position can be set by depressing the TOF SET switch on the control panel with the print position aligned with the desired top line of the paper.
- (9) Ignored Code (NUL, DEL)
These codes are ignored.

6-2 Serial Print Mode — Print Formats

(CHART 1)



6. Codes and Functions

(1) Horizontal Motion Index (HMI)

Following the printing of a character or a space, the carriage moves by $1/120$ inch \times HMI. HMI represents Horizontal Motion Index and is variable from a minimum of 0 (no spacing) to a maximum 125 ($125/120 = 1.04$ inch).

(2) Vertical Motion Index (VMI)

A line feed causes the paper to move by $1/48$ inch \times VMI. VMI represents Vertical Motion Index and is variable from a minimum of 0 to a maximum of 125.

(3) Standard Format

Upon power-on and reset, the following standard format will be set:

- Standard vertical format: Six lines per inch.
- Standard horizontal spacing: Standard horizontal spacing depends upon the setting of DIP switches SW1 and SW2. Ten, twelve and fifteen characters per inch plus Proportional Spacing is available.

PITCH SELECT SWITCH	HORIZONTAL SPACING		
	Ch./inch	Max. ch. per line	HMI
10	10	132	12
12	12	158	10
15	15	197	8
PS	Variable	Variable	6-14 (Space = 10)

(4) Horizontal Position

This is the value which represents the distance between the printhead and left final stop in the $1/120$ inch increment, ranging from a minimum of 0 to a maximum of 1572 ($1/120$ inch \times 1572 = 13.1 inches).

(5) Vertical Position

This is the value which represents the distance between the current printing line and the first line in the corresponding page in the $1/48$ inch increment, ranging from a minimum of 0 to a maximum of 520 (11 inches paper).

(6) Print Position

The print position is indicated by the number

calculated from the maximum left margin setting (the position the carriage goes upon power-on) to the present position of the carriage taking into consideration the pitch selected, according to the following formula:

$$\text{Print Position} = \frac{\text{Horizontal Position}}{\text{HMI}} + 1$$

The maximum left margin is always considered as position 1 and therefore the maximum printed line, in 10 pitch, (HMI = 12) is:

$$(1572/12 + 1) = 132$$

(7) Line Number

The line number is indicated by the number calculated from the first line of the page, to the present position of the carriage, taking into consideration the line feed spacing selected. The line number, there, can be calculated as follows:

$$\text{Line Number} = \frac{\text{Vertical Position}}{\text{VMI}} + 1$$

For example, when using the standard (the default value upon power-on) 6 lines per inch spacing (VMI = 8) on 11 inches paper, the maximum number of lines would be:

$$(520/8 + 1) = 66$$

7. Power-On and Remote Reset

6-3 Serial Print Mode — Function Codes

ESC 2-Character Sequence:

ESC 0 to ESC 9 (no ESC 7 exists) ESC D, ESC U, ESC Y, ESC Z and ESC LF are input by means of an ASCII code, for example, ESC 8, should be entered as HEX 1B, 38.

The escape code would be ESC 8 where escape = ASCII 27 and 8 = ASCII 56 in decimal notation.

ESC 3-Character Sequence:

The n value of ESC HT n, ESC VT n, ESC RSn and ESC US n are indicated by the ASCII code in the following chart.

For example, to directly move the carriage to printing position 37, the hex input would be 1B, 09, 25 and the ESC code would be ESC HT %, where escape = ASCII 27, HT = ASCII 09 and % = ASCII 37.

(CHART 2)

	UNITS									
	0	1	2	3	4	5	6	7	8	9
0		SOH	STX	ETX	EOT	ENQ	ACK	BEL	BS	HT
10	LF	VT	FF	CR	SO	SI	DLE	DC1	DC2	DC3
20	DC4	NAK	SYN	ETB	CAN	EM	SUB	ESC	FS	GS
30	RS	US	SP	!	"	#	\$	%	&	'
40	(	)	*	+	,	-	.	/	0	1
TENS 50	2	3	4	5	6	7	8	9	:	;
60	<	=	>	?	@	A	B	C	D	E
70	F	G	H	I	J	K	L	M	N	O
80	P	Q	R	S	T	U	V	W	X	Y
90	Z	[	\	\]	^	—	`	a	b	c
100	d	e	f	g	h	i	j	k	l	m
110	n	o	p	q	r	s	t	u	v	w
120	x	y	z	{	|	|	~			

(1) Bell (BEL)

Sounds the bell for a half second.

(2) ESC Y, ESC Z

Used for printing any two characters not included in the 94-character ASCII code. ESC Y prints the character ϕ , while ESC Z prints the character \neg .

(3) ESC 5 Forward direction printing mode.

ESC 6 Backward direction printing mode.

Note: When in the backward direction printing mode a CR or an ESC 5 restores the printer to the forward direction printing mode.

(4) HMI setting (ESC US n)

The amount of the carriage movement after printing a character or a space can be

controlled by executing the 3-character sequence of ESC US n.

$HMI = n - 1$ (n = ASCII value from chart #2)

Amount of the carriage movement would be $HMI \times 1/120$ inch.

(5) VMI setting (ESC RS n)

The amount of vertical paper feed can be controlled by executing the 3-character sequence of ESC RS n.

$VMI = n - 1$ (N = ASCII value from chart 2)

The amount of paper feed movement would be $VMI \times 1/48$ inch.

(6) Space (SP)

SP moves the carriage by one character in the printing direction ($HMI \times 1/120$ inch).

In the case of graphic mode, the carriage is moved by 1/60 inch.

(7) Back Space (BS)

BS moves the carriage in the direction opposite to the printing direction by one character ($HMI \times 1/120$ inch). In the case of graphic mode, the printing position is moved by 1/60 inch.

In the case of PS, if the back space is executed immediately after the printing of a character, the printing position will be returned to the exact last printing position. If additional back spaces are sent to the printer they will be executed by the designated HMI, and the carriage may not be aligned to the already printed character.

(8) Carriage Return (CR)

CR moves the carriage to the left margin and at the same time cancels the backward direction printing mode and graphic mode.

(9) Horizontal Tab (HT, ESC HT n)

1. Normal tab

A HT code moves the carriage to a pre-set tab position in the left to right direction.

If there are no further pre-set tabs to the right of the carriage, the carriage will move to the far right position upon receiving another tab command.

2. Absolute Tab

ESC HT n makes it possible to move the carriage to any desired position in the first 126 printing positions, without preliminarily pre-setting the tab position. Since ESC HT n indicates the post-tab printing position, if the carriage is located in any position to the right of the printing position, the tab performance will move the carriage towards the left. The horizontal position following the absolute tab is:

Horizontal position = (ASCII character - 1) \times HMI

Absolute tab is unchanged in the graphics mode.

(10) Tab Stop setting and clear (ESC 1, ESC 2, ESC 8)

A tab stop can be set by means of an ESC 1 sequence after the carriage has been set to the position where the tab stop is desired.

The tab stop can be cleared by means of an ESC 8 sequence after the carriage has been moved by normal tab performance (HT) to the desired tab stop.

All the stops can simultaneously be cleared by means of an ESC 2 sequence irrespective of the position of the carriage.

(11) Vertical Tab (ESC VT n)

Unlike the horizontal tab, there is only one method of vertical tabbing, that is an absolute vertical tab. The input of ESC VT n directly brings the next printing position to any of the first 126 lines on the page and the vertical position is calculated as:

Vertical position = (ASCII character - 1) \times VMI

Although it is possible for the vertical tab to advance to any line over the page boundary, the paper feed thereafter is conducted from the first line of that page.

(12) Margin (ESC 9, ESC 0)

An ESC 9 will set the left margin at the present printing position. It is possible to move the carriage in the left direction, past the left margin stop, by use of the backspace.

ESC Ø sets the right margin at the current printing position. If printing exceeds the right margin, the bell sounds.

(13) Line Feed (LF, ESC LF, ESC U, ESC D)

The line feed execution (LF) feeds the paper by one line ($1/48 \times \text{VMI}$) upwards. ESC LF feeds the paper in the negative direction, that is, downwards.

In the graphic mode the movement is set at $1/48$ inch. The half line feed (ESC U) feeds the paper by $1/2$ line upwards, while the negative half line feed (ESC D) feeds paper by $1/2$ line downwards.

The execution of these two codes in the graphic mode is performed in the same manner.

(14) Form Feed (FF)

Paper is advanced to the first line of the next page. The first paper position is set by depressing the TOF SET switch on the control panel with the carriage aligned with the designated first line of the paper.

(15) Graphics Mode (ESC 3, ESC 4)

An ESC 3 places the printer in the graphics mode, while the ESC 4 or a carriage return will return the printer to the normal mode.

In the graphics mode, the carriage will not move even if a character is printed.

Moving the carriage requires the operation of tab, space, back space or line feed.

In the graphics mode, the space and back space are fixed to $1/60$ inch. Line feed (LF) and negative line feed (ESC LF) performs a $1/48$ inch paper feed.

(16) Initial Remote Reset (ESC CR P)

This code resets the printer in the same manner as a power-on (refer to Item 7 "Power-ON and Remote Reset" on page 17).

Upon:

- a— power-on
- b— receipt of the $\overline{\text{PRIME}}$ signal (pin 31 of the connector).
- or
- c— receipt of the ESC, CR, P sequence (serial mode only), the printer will default to the follows:

- 1) Carriage moves to the far left (print position 1)
- 2) Printing will be in the forward printing direction.
- 3) Horizontal spacing is set at the value set by the pitch select DIP switch.
- 4) Vertical spacing is set to 6 lines per inch.
- 5) The left margin is set to print position 1.
- 6) All horizontal tab stops will be cleared.
- 7) The present print position will be designated as line Ø for the purpose of form feed.
- 8) The following modes will be set in accordance with the DIP switch setting:

- a— Carriage space mode
- b— Form length
- c— Auto line feed
- d— Serial or line print mode

Upon receipt of a remote reset (re-initialization), serial or line print mode is not read.

Note: The carriage will move only when there is a character to be printed after execution of the space (SP), backspace (BS), carriage return (CR) or horizontal tab (HT).

8. ASCII Codes

				b8	0	0	0	0	0	0	0	0	0
				b7	0	0	0	0	1	1	1	1	
				b6	0	0	1	1	0	0	1	1	
				b5	0	1	0	1	0	1	0	1	
b4	b3	b2	b1		0	1	2	3	4	5	6	7	
0	0	0	0	0	NUL	DEL	SP	0	@	P	`	p	
					0	10	20	30	40	50	60	70	
					0	16	32	48	64	80	96	112	
0	0	0	1	1	SOH	DC1	!	1	A	Q	a	q	
					1	11	21	31	41	51	61	71	
					1	17	33	49	65	81	97	113	
0	0	1	0	2	STX	DC2	"	2	B	R	b	r	
					2	12	22	32	42	52	62	72	
					2	18	34	50	66	82	98	114	
0	0	1	1	3	ETX	DC3	#	3	C	S	c	s	
					3	13	23	33	43	53	63	73	
					3	19	35	51	67	83	99	115	
0	1	0	0	4	EOT	DC4	\$	4	D	T	d	t	
					4	14	24	34	44	54	64	74	
					4	20	36	52	68	84	100	116	
0	1	0	1	5	ENQ	NAC	%	5	E	U	e	u	
					5	15	25	35	45	55	65	75	
					5	21	37	53	69	85	101	117	
0	1	1	0	6	ACK	SYN	&	6	F	V	f	v	
					6	16	26	36	46	56	66	76	
					6	22	38	54	70	86	102	118	
0	1	1	1	7	BEL	ETB	'	7	G	W	g	w	
					7	17	27	37	47	57	67	77	
					7	23	39	55	71	87	103	119	
1	0	0	0	8	BS	CAN	(	8	H	X	h	x
					8	18	28	38	48	58	68	78	
					8	24	40	56	72	88	104	120	
1	0	0	1	9	HT	EM	)	9	I	Y	i	y
					9	19	29	39	49	59	69	79	
					9	25	41	57	73	89	105	121	
1	0	1	0	A	LF	SUB	*	: 3A	4A	5A	6A	7A	
					A	1A	2A	3A	4A	5A	6A	7A	
					10	26	42	58	74	90	106	122	
1	0	1	1	B	VT	ESC	+	; 3B	4B	5B	6B	7B	
					B	1B	2B	3B	4B	5B	6B	7B	
					11	27	43	59	75	91	107	123	
1	1	0	0	C	FF	FS	,	< 3C	4C	5C	6C	7C	
					C	1C	2C	3C	4C	5C	6C	7C	
					12	28	44	60	76	92	108	124	
1	1	0	1	D	CR	GS	-	= 3D	4D	5D	6D	7D	
					D	1D	2D	3D	4D	5D	6D	7D	
					13	29	45	61	77	93	109	125	
1	1	1	0	E	SO	RS	.	> 3E	4E	5E	6E	7E	
					E	1E	2E	3E	4E	5E	6E	7E	
					14	30	46	62	78	94	110	126	
1	1	1	1	F	SI	US	/	? 3F	4F	5F	6F	7F	
					F	1F	2F	3F	4F	5F	6F	7F	
					15	31	47	63	79	95	111	127	

ASCII Code → ESC 1B ← Hex
 27 ← Decimal

9. Parallel Interface

9-1 Explanation of Signals and Specifications

PIN NO.	RETURN PIN NO.	SIGNAL	DIRE.	DESCRIPTION
1	19	$\overline{\text{STROBE}}$	IN	Used to strobe (clock) the read data into the printer. The pulse width must be greater than 0.5us when received at the printer. This signal is normally "High" and data is read into the printer when the signal goes "Low".
2	20	Data Bit 1	IN	Data bits 1 through 7 represent the 1st (MSB) to 7th (LSB) bits of the ASCII "word" (character or command) to be executed by the printer (positive logic).
3	21	Data Bit 2	IN	
4	22	Data Bit 3	IN	
5	23	Data Bit 4	IN	
6	24	Data Bit 5	IN	
7	25	Data Bit 6	IN	
8	26	Data Bit 7	IN	
9	27	Data Bit 8	IN	This bit is ignored.
10	28	$\overline{\text{ACK}}$	OUT	A pulse of approx. 8.5us which, when low, indicates that data has been received and that the printer is ready to accept more data.
11	29	BUSY	OUT	When this signal is "High" it indicates that the printer cannot receive data. This signal will go into the "High" state upon the following conditions: a) While data is being accepted. b) During a printing operation c) When the printer is taken "off-line" mode. d) When a fault condition, ribbon out, top cover open or paper out (when using optional tractor)
12	30	ALERT	OUT	This line will go "High" upon: a) ribbon is depleted. b) the top cover is opened. c) paper is depleted (when using optional tractor).
13		SELECT	OUT	A "High" signal indicates that the host computer has "selected" the printer to receive data.
14				Not used.
15				Not used.
16		$\emptyset V$		Logic ground

PIN RETURN NO.	PIN NO.	SIGNAL	DIRE.	DESCRIPTION
17		CHASSIS GROUND		Ground
18				+5V (see note)
19				Twisted Pair Ground
thru.				
30				
31		$\overline{\text{PRIME}}$	IN	This signal, also known as $\overline{\text{INIT}}$, when "low" resets the printer to its initial "Power-on" state. This signal must be kept high when the printer is in normal operation. The pulse width of this signal must always exceed 50 μ s at the printer input.
32		$\overline{\text{FAULT}}$	OUT	This signal will go "low" if the ribbon is entangled with the daisy wheel or and operation is attempted without a daisy wheel in place.
33				Not used.
34				Not used.
35				Not used.
36				Not used.

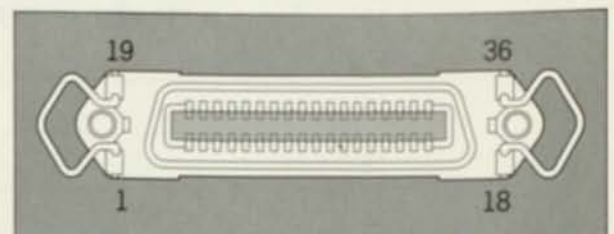
Note: No more than 5 m/A may be drawn from pin 18.

Applicable connectors

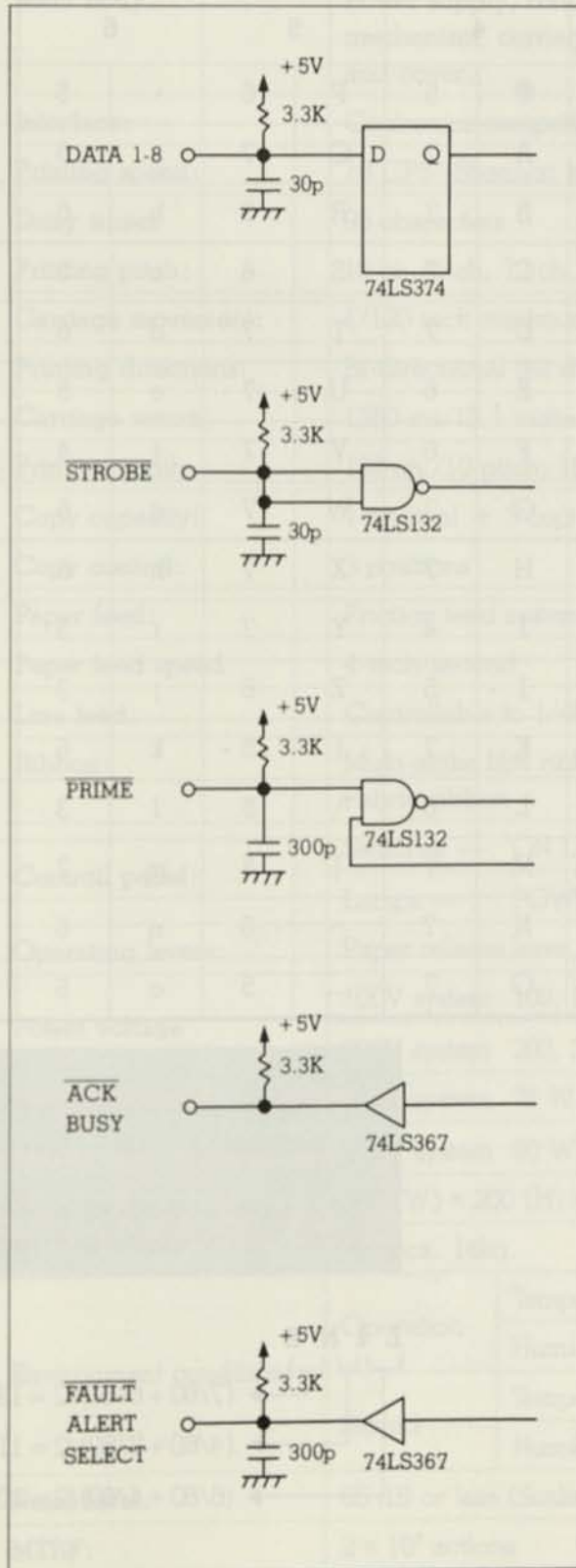
Plug: (on cable side) Amphenol 57-30360 or equal

Receptacle: (on printer side) Amphenol 57-40360 or equal

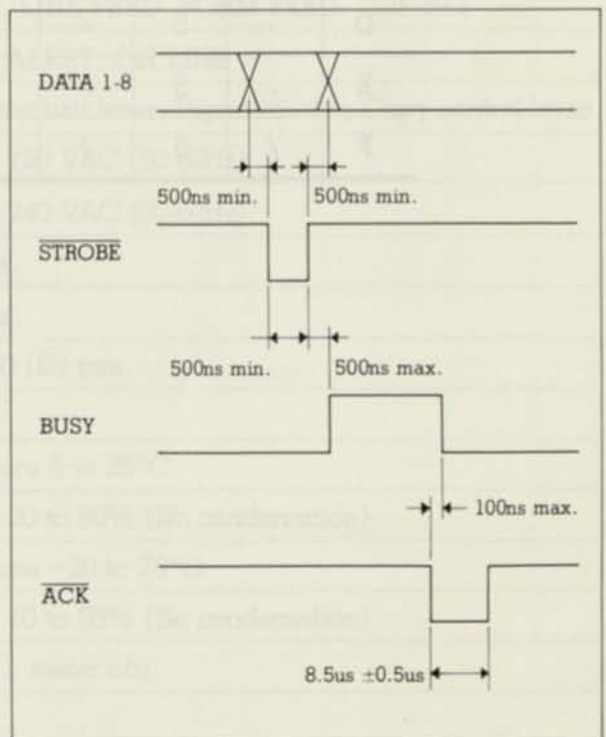
View on receptacle from connector cable side.



9-2 Input/Output Circuits



9-3 Timing Chart



10. Complement

Spacing Units when PS Daisy Wheel is in use.

	2		3		4		5		6		7	
0			0	5	@	5	P	6	\	5	p	6
1	!	5	1	5	A	7	Q	7	a	5	q	6
2	"	5	2	5	B	7	R	7	b	6	r	5
3	#	5	3	5	C	7	S	6	c	5	s	5
4	\$	5	4	5	D	7	T	7	d	6	t	4
5	%	5	5	5	E	6	U	7	e	5	u	6
6	&	5	6	5	F	6	V	7	f	4	v	6
7	'	5	7	5	G	7	W	7	g	6	w	7
8	(	5	8	5	H	7	X	7	h	6	x	6
9	)	5	9	5	I	4	Y	7	i	3	y	6
A	*	5	:	5	J	5	Z	6	j	3	z	5
B	+	5	;	5	K	7	[	5	k	6	|	5
C	,	5	<	5	L	6	\	5	l	3	|	5
D	-	5	=	5	M	7	]	5	m	7	|	5
E	.	5	>	5	N	7	^	5	n	6	~	5
F	/	5	?	5	O	7	_	5	o	5		

Note:

- (1) The above numerical values are indicated in units — one unit is 1/60 inch.
- (2) A space and a back space is five units.
- (3) HMI is calculated as follows:

L I N E

$(7/60 + 6/60)/2 = 13/120$ HMI = 13
 $(4/60 + 7/60)/2 = 11/120$ HMI = 11
 $(6/60 + 4/60)/2 = 10/120$ HMI = 10

11. Specifications

Type:	Daisy wheel impact printer	
Main body:	Power supply, control board, printing mechanism, paper feed mechanism, carriage feed mechanism, control panel, operating levers and cover.	
Interface:	Centronics compatible parallel interface	
Printing speed:	16 CPS (Shannon text)	
Daisy wheel	96 characters	
Printing pitch:	10 ch./inch, 12 ch./inch, 15 ch./inch and Proportional Spacing (PS)	
Carriage movement:	1/120 inch minimum	
Printing directions:	Bi-directional the shortest distance	
Carriage return:	1350 ms/13.1 inches	
Printing width:	132 ch./10 pitch, 158 ch./12 pitch, 197 ch./15 pitch	
Copy capacity:	1 original + 3 copies	
Copy control:	3 positions	
Paper feed:	Friction feed system — tractor feed (option)	
Paper feed speed	4-inch/second	
Line feed:	Controllable to 1/48 inch minimum by means of host computer	
Ribbon:	Multi-strike film ribbon (standard), One-time film ribbon, Fabric ribbon	
Controll panel:	Switches — ON LINE, LINE FEED, FORM FEED, TOF SET	
	Lamps — POWER, ALERT, ON LINE	
Operating levers:	Paper release lever, Paper bail lever, Paper injector, Copy control lever	
Power voltage	100V system 100, 115, 120 VAC (50-60Hz)	
	200V system 200, 220, 240 VAC (50-60Hz)	
Power consumption	100V system 75 W max.	
	200V system 80 W max.	
External dimensions:	583 (W) × 200 (H) × 380 (D) mm.	
Weight:	Approx. 14kg.	
Environment conditions:	Operation	Temperature 5 to 35°C
		Humidity 20 to 80% (No condensation)
	Stored	Temperature -20 to 70°C
		Humidity 10 to 95% (No condensation)
Noise level:	65 dB or less (Scale A, 1 meter off)	
MTBF:	2 × 10 ⁷ actions	

12. Care and Maintenance

Please carefully follow the instructions below so that your printer will always perform with the optimum efficiency.

Daisy Wheel:

Be extremely careful not to bend the petal or scratch the typeface when handling.

Cleaning:

An operator should periodically wipe and dust the interior of the printer to remove paper dust or residue with a soft cloth using mild cleaning solvent. Absolutely do not use an organic solvent like thinner.

Also clean the exterior of the printer periodically to keep its appearance.

Do not use the printer in the environment where electro-static or electro-magnetic field exists.

Service:

It is recommended that the printer be periodically checked by an authorized service engineer only.

In Case of Difficulty

The following is a quick reference for solving problems if occurred.

PROBLEMS	POSSIBLE CAUSES
The printer does not operate at all.	Make sure: <ul style="list-style-type: none">— the power cord is plugged in.— the cable between host unit and the printer is properly connected.— the ON LINE Switch is not in OFF LINE mode. (ON LINE Lamp is lit.)
Paper does not advance.	Make sure: <ul style="list-style-type: none">— the paper release lever is in closed position.— the paper is not jammed in the back of the platen or at the paper bail rollers.
Ribbon does not feed.	Make sure: <ul style="list-style-type: none">— the ribbon is properly set.— the ribbon is not entangled with the daisy wheel or not twisted.



SILVER-REED

SILVER-REED (U.K.) LTD.

Silver Seiko House
19-23, Exchange Road, Watford, Herts.
WD1 7EB, England
Telephone: 0923-45976

SILVER-REED AMERICA, INC.

8665 Hayden Place, Culver City
California 90230, U.S.A.
Telephone: 213-837-6104 - 9

SILVER SEIKO INTERNATIONAL GMBH

Langer Kornweg 40, 6092 Kelsterbach
Postfach 1112, West Germany
Telephone: 06107-5001 - 6

SILVER SEIKO LTD.

16-6, Shinjuku 2-chome
Shinjuku-ku, Tokyo, 160 Japan
Telephone: 03-356-6111

SILVER-REED AMERICA, INC.

Liaison Office, Panama
Apartado Postal 6-3694
Estafeta El Dorado
Panama, Republica de Panama
Telephone: 60-6715/60-6179

SILVER-REED INTERNATIONAL (HONG KONG) LTD.

South China Building, 12th Floor
1-3, Wyndham Street, Central, Hong Kong
Telephone: 5-212376 - 7