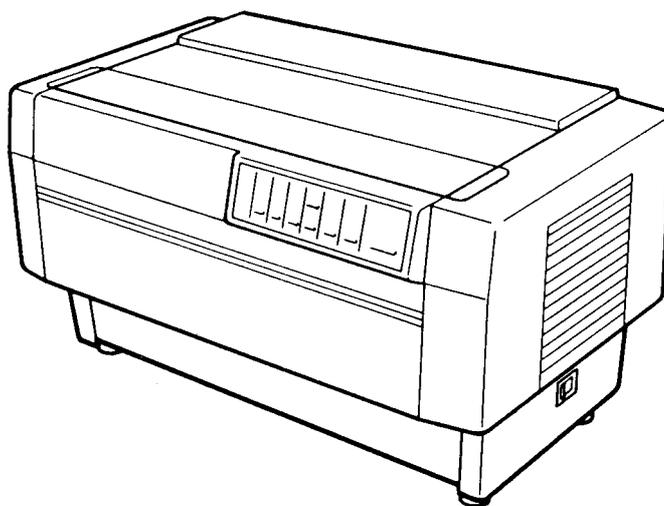


EPSON TERMINAL PRINTER

DFX-5000+

SERVICE MANUAL



EPSON

4002995

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PRECAUTIONS

Precautionary notations throughout the text are categorized relative to 1) personal injury and 2) damage to equipment.

DANGER Signals a precaution which, if ignored, could result in serious or fatal personal injury. Great caution should be exercised in performing procedures preceded by DANGER Headings.

WARNING Signals a precaution which, if ignored, could result in damage to equipment.

The precautionary measures itemized below should always be observed when performing repair/maintenance procedures.

DANGER

1. ALWAYS DISCONNECT THE PRODUCT FROM BOTH THE POWER SOURCE AND PERIPHERAL DEVICES PERFORMING ANY MAINTENANCE OR REPAIR PROCEDURE.
2. NO WORK SHOULD BE PERFORMED ON THE UNIT BY PERSONS UNFAMILIAR WITH BASIC SAFETY MEASURES AS DICTATED FOR ALL ELECTRONICS TECHNICIANS IN THEIR LINE OF WORK.
3. WHEN PERFORMING TESTING AS DICTATED WITHIN THIS MANUAL, DO NOT CONNECT THE UNIT TO A POWER SOURCE UNTIL INSTRUCTED TO DO SO. WHEN THE POWER SUPPLY CABLE MUST BE CONNECTED, USE EXTREME CAUTION IN WORKING ON POWER SUPPLY AND OTHER ELECTRONIC COMPONENTS.

WARNING

1. REPAIRS ON EPSON PRODUCT SHOULD BE PERFORMED ONLY BY AN EPSON CERTIFIED REPAIR TECHNICIAN.
2. MAKE CERTAIN THAT THE SOURCE VOLTAGE IS THE SAME AS THE RATED VOLTAGE, LISTED ON THE SERIAL NUMBER/RATING PLATE. IF THE EPSON PRODUCT HAS A PRIMARY AC RATING DIFFERENT FROM AVAILABLE POWER SOURCE, DO NOT CONNECT IT TO THE POWER SOURCE.
3. ALWAYS VERIFY THAT THE EPSON PRODUCT HAS BEEN DISCONNECTED FROM THE POWER SOURCE BEFORE REMOVING OR REPLACING PRINTED CIRCUIT BOARDS AND/OR INDIVIDUAL CHIPS.
4. IN ORDER TO PROTECT SENSITIVE MICROPROCESSORS AND CIRCUITRY, USE STATIC DISCHARGE EQUIPMENT, SUCH AS ANTI-STATIC WRIST STRAPS, WHEN ACCESSING INTERNAL COMPONENTS.
5. REPLACE MALFUNCTIONING COMPONENTS ONLY WITH THOSE COMPONENTS BY THE MANUFACTURE; INTRODUCTION OF SECOND-SOURCE ICS OR OTHER NON APPROVED COMPONENTS MAY DAMAGE THE PRODUCT AND VOID ANY APPLICABLE EPSON WARRANTY.

PREFACE

This manual describes functions, theory of electrical and mechanical operations, maintenance, and repair of DFX-5000+.

The instructions and procedures included herein are intended for the experience repair technician, and attention should be given to the precautions on the preceding page. The chapters are organized as follows:

CHAPTER 1. GENERAL DESCRIPTION

Provides a general product overview, lists specifications, and illustrates the main components of the printer.

CHAPTER 2. OPERATING PRINCIPLES

Describes the theory of printer operation.

CHAPTER 3. DISASSEMBLY AND ASSEMBLY

Includes a step-by-step guide for product disassembly and assembly.

CHAPTER 4. ADJUSTMENTS

Includes a step-by-step guide for adjustment.

CHAPTER 5. TROUBLESHOOTING

Provides Epson-approved techniques for adjustment.

CHAPTER 6. MAINTENANCE AND LUBRICATION

Describes preventive maintenance techniques and lists Lubricants and adhesives required to service the equipment.

APPENDIX

Describes connector pin assignments, circuit diagrams, circuit board component layout and exploded diagram.

The contents of this, manual are subject to change without notice.

REVISION SHEET

Revision	Issue Data	Revision Page
Rev.-A	February 9, 1994	1 st issue
Rev.-B	April 20, 1994	Page 4-10: Addition the notes Page 4-1 1: Addition the notes
Rev.-C	November 22, 1994	Page 4-4 to 4-7: Change the explanation
Rev.-D	December 15, 1994	Whole Revise of the Chap.4
Rev.-E	March 7, 1995	Page 4-12: Change the explanation Page 4-12: Addition the notes

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CHAPTER 1 Product Description

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1.1 GENERAL FEATURES

The DFX-5000+ is a 9-pin, serial, dot matrix printer with a maximum speed of 560 characters per second (cps). It is designed for business use and provides high-speed, high-volume printing and continuous-sheet handling. The main features of the printer are:

- ❑ Maximum printing speeds:
 - 560 cps (high-speed draft mode)
 - 504 cps (draft elite mode)
 - 420 cps (draft pica mode)
- ❑ Advanced paper handling:
 - 10 inches per second (ips) paper feeding
 - Paper jam detection
 - Paper width detection
 - Front and rear two-way push tractors
 - Automatic paper back-out and loading from another paper path and paper park
 - Automatic platen gap adjustment for paper thickness
 - Automatic tear off
 - Paper memory function
 - Automatic paper path changing
- ❑ Eight-bit parallel interface and RS-232C serial interface standard
- ❑ Epson ESC/P-83 (ESC/P version 83) printer driver (compatible with the FX-870/1170 and DFX-5000)
- ❑ 9 character tables in the standard version
21 character tables in the NLSP (National Language Support) version
- ❑ Upgraded data handling:
 - 20KB input buffer
 - Automatic interface selection
 - Type B optional I/F cards

The figure below shows the DFX-5000+.

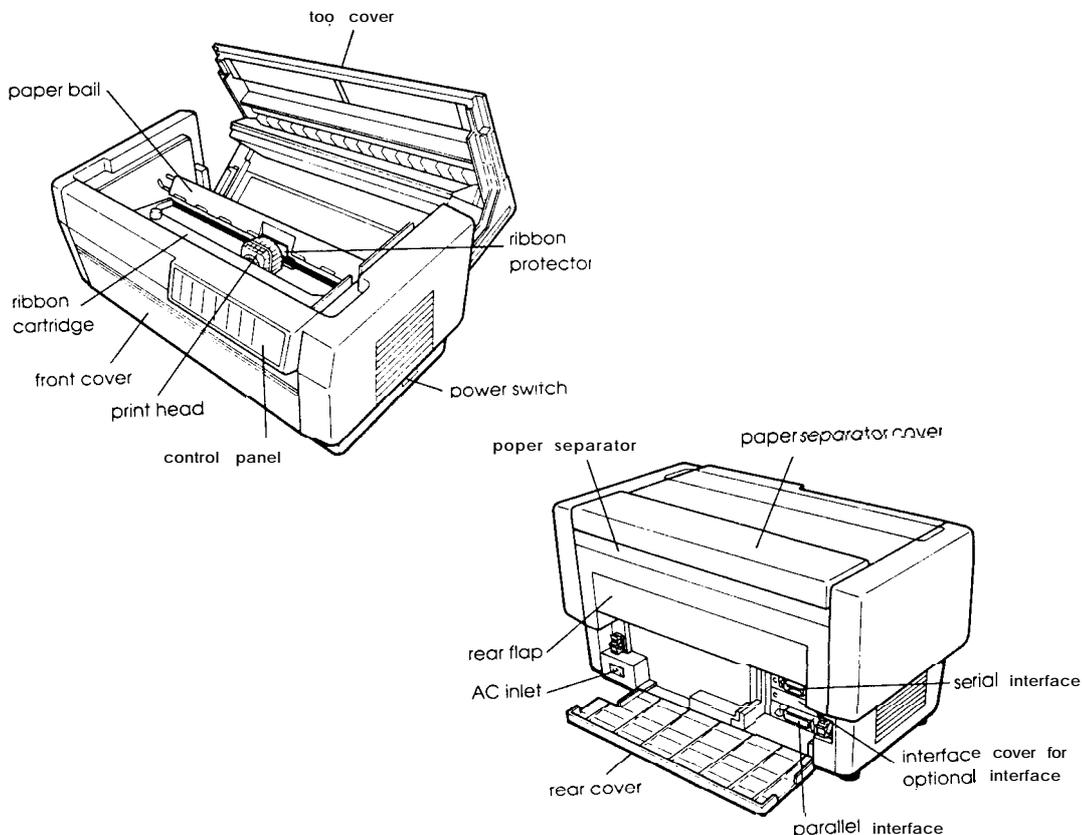


Figure 1-1. Exterior View of the DFX-5000+

Table 1-1. Options and Consumables

<i>Model</i>	<i>Description</i>
#8309	Pull tractor unit
#8766	Ribbon cartridge
#8767	Ribbon pack
C82305*	Serial I/Fcard, simple serial interface** (SSi), inch screw
C82306*	Serial I/F card, SSI, mm screw
C82307'	32KB intelligent serial I/F card (inch screw)
C82308*	32KB intelligent serial I/F card (mm screw)
C82310*	32KB intelligent parallel I/F card
C82312*	LocalTalk I/F card
C82313*	32KB IEEE-488 I/F card
C82314*	Coax I/F card
C82315*	Twinax I/F card
C82324*	Ethernet I/Fcard

The digit indicated by an asterisk () varies by country.

● *A simple serial interface card has no CPU; the printer processes the data from the card.

1.2 SPECIFICATIONS

This section provides detailed information about the DFX-5000+.

1.2.1 Printer Capabilities

Printing method: Serial impact dot matrix
 Pin configuration: 9 wires
 Pin diameter: 0.29 mm (0.01 inches)

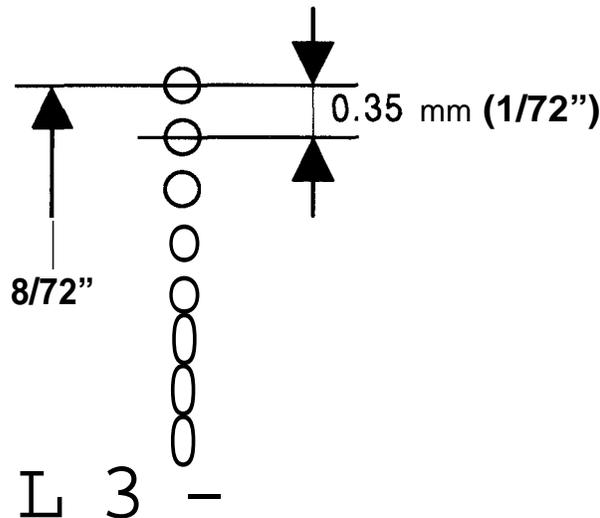


Figure 1-2. Pin Configuration

Dot matrix:

9 x 7 (high-speed draft mode)
 9 x 9 (draft **mode**)
18x 23 (NLQ mode)

Printing direction:

Text mode

Bidirectional with logic seeking
 (Unidirectional mode can be selected using the ESC U command.)

Bit image mode

Unidirectional

Built-in fonts:

Draft
 NLQ Roman
 NLQ Saris Serif

Table 1-2. Character Size and Pitch

Type of Letters	Width in mm (inches)	Height in mm (inches)	Pitch in mm (inches)	printable Columns
Pica (10 cpi)	2.12 (0.08)	3.1 (0.12)	2.54 (0.10)	136
Elite (12 cpi)	1.69 (0.07)	3.1 (0.12)	2.12 (0.08)	163
15 cpi	1.41 (0.06)	3.1 (0.12)	1.69 (0.07)	204
Condensed (17.1 cpi)	1.06 (0.04)	3.1 (0.12)	1.48 (0.06)	233
Condensed elite (20 cpi)	0.85 (0.03)	3.1 (0.12)	1.27 (0.05)	272

Table 1-3. Printing Speeds

Type of Letters	Print Speed (cps)	High Duty (cps)
High-speed draft	560	533
Draft pica 10@	420	400
Draft elite 12 cpi	504	480
Draft 15 cpi	420	400
Draft condensed pica 17 Cpi	360	343
Draft emphasized pica 20cpi	210	200
NLQ pica	84	80
NLQ elite	101	96

Input data buffer: 20KB or 0 bytes (selectable by DIP switch 2-2)
control codes: ESC/P-83 mode

Table 1-4. Character Tables

Character Tables	standard Version	NLSP* Version	IBM Mode
Italic	o	0	x
PC437 (U. S., Standard Europe)	o	0	0
PC850 (Multilingual)	o	0	x
PC860 (Portuguese)	o	0	x
PC863 (Canadian-French)	o	0	x
PC865 (Norwegian)	o	0	0
PC861 (Iceland)	o	0	x
BRASCII	o	0	x
Abicornp	o	0	x
PC853(Turkish)	x	o	x
PC857(Turkish)	x	o	x
ISO Latin IT (Turkish)	x	o	x
PC437 (Greak)	x	o	x
PC869 (Greek)	x	o	x
ISO 8859-7 (Greek)	x	o	x
PC855 (Cyrillic)	x	o	x
PC866 (Russian)	x	o	x
PC852 (East Europe)	x	o	x
MAZOWIA (Polish)	x	o	x
Code MJK (Czecho, Slovak)	x	o	x
Bulgaria (Bulgaria)	x	o	x

0: supported

x: Not supported

*: Nationa/Language Support

1.2.2 Paper Handling Specifications

Feeding methods:	Push tractor feed (front and rear) Push-pull feed with the optional pull tractor (front or rear)
Paper size:	
Fanfold paper	101 -406 mm (4 - 16 inches) wide
Single sheet paper	Not available
Roll paper	Not available
Line spacing:	1/6- or 1/8-inch feed or programmable with a 1/216-inch minimum increment
Feeding speed (1/6-inch per line):	
Continuous	17 ins/line (10 inches per second)
Intermittent	26 ins/line

Note: The feeding speed (10 ips) is reduced to 6 ips when the optional pull tractor is installed.

1.2.3 Paper Specifications

Fanfold Paper

Quality:	Plain paper
Width:	101 -406 mm (4 - 16inches)
Copy capability:	
Front	6 sheets (1 original + 5 carbonless copies)
Rear	4 sheets (1 original + 3 carbonless copies)
Total thickness:	
Front	Up to 0.46 mm (0.018 inches)
Rear	Up to 0.30 mm (0.012 inches)
Weight:	
Single	45-70 kg(14- 22 lb)
Multi-part	35-48 kg (11 - 15 lb) x n (n ≤ 8), up to the total thickness

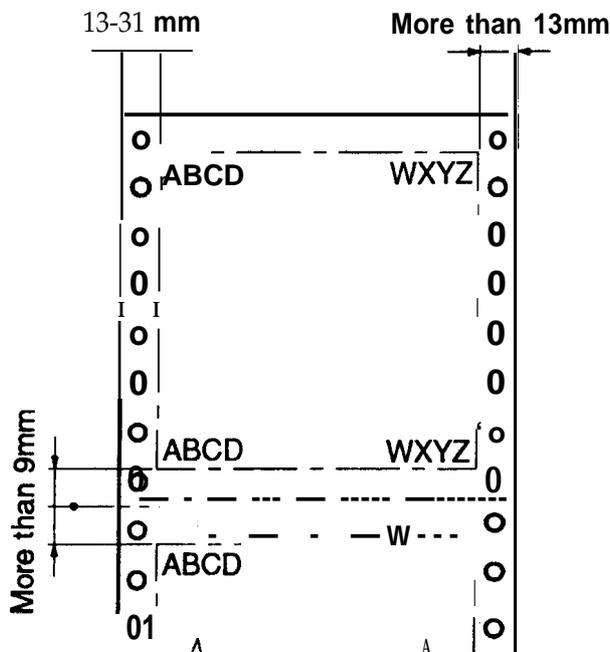


Figure 1-3. Printable Area for Fanfold Paper

Notes:

1. Horizontal alignment may be irregular in the top 75 mm (3 inches) of the first page.
2. When using the optional pull tractor, the top 120 mm (4.8 inches) of the first page are unprintable.
3. Use clean paper with no folds, creases, or tears (especially for multi-part paper). Figure 1-4 shows paper you should not use.

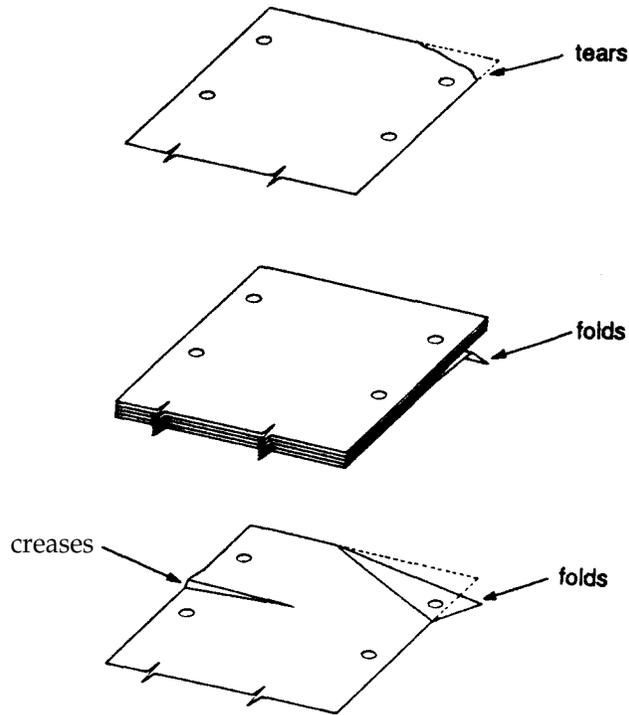


Figure 1-4. Unsuitable Paper

4. Form override printing is available for 20 lines after the paper end. The paper feeding pitch is not guaranteed. The end of the printable area is 15 mm (0.60 inches) above the bottom edge of the paper.

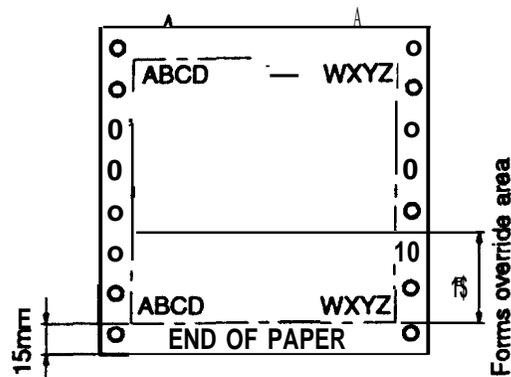


Figure 1-5. Form override Area

5. Weak horizontal and vertical perforations cause paper jams.
6. The pitch of perforations (the ratio of the cut part to the uncut part) must be less than 5:1.

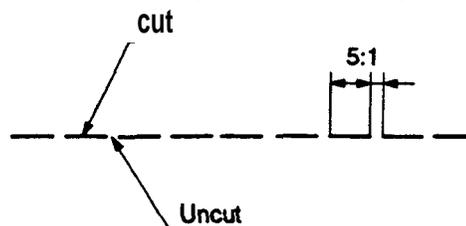


Figure 1-6. Perforation pitch

- Horizontal perforations must have uncut parts on both edges of the paper.

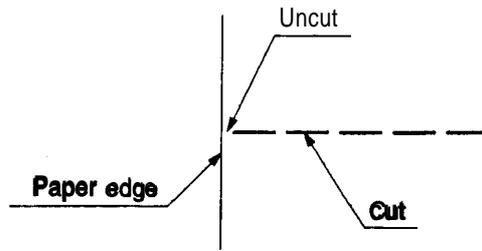


Figure 1-7. Paper Edge at a Horizontal Perforation

- At the intersection of a horizontal and vertical perforation, the perforation cuts must not cross each other. Figure 1-8 shows examples of correct perforation intersections.



Figure 1-8. Perforation Intersections

- The raised portion at a perforation (fold) must be less than 1 mm (0.04 inches) from the flat part, and the bottom layer must be kept flat by force.

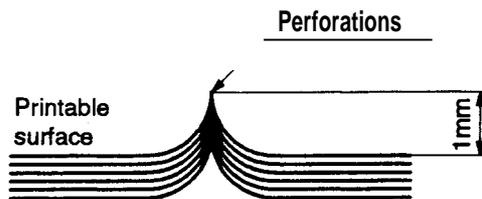


Figure 1-9. Raised Portion at a Perforation

- Sprocket holes must be circular and may have teeth.



Figure 1-10. Sprocket Holes

- The sprocket holes of each paper layer must be properly aligned.

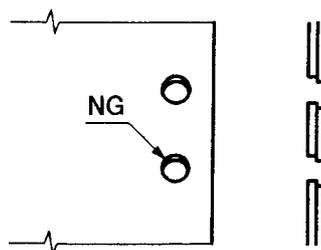


Figure 1-11. Aligned Sprocket Holes

- 12. Any pieces of paper remaining in the sprocket holes must be removed.
- 13. The paper should be fanfolded at the horizontal perforations. Never use incorrectly folded paper, such as the paper shown below.



Figure 1-12. Incorrectly Folded Paper

- 14. Make sure there are no holes in the printable area.
- 15. The paper must be tom off cleanly along a perforation.

Overlapping Multi-part Forms

Paper path:	Front only
Quality:	Plain paper
Width:	101-406 mm (4 -16 inches)
Copy capability:	5 sheets (1 original + 4 carbonless copies), excluding the bottom carrier
Overlap length:	10 mm (0.394 inches) maximum
Total thickness:	
Print area	0.46 mm (0.018 inches) maximum
Overlap area	0.70 mm (0.028 inches) maximum, including the bottom carrier
Weight:	
Multi-part	35-48 kg (11 - 15 lb), up to the total thickness
Carrier	45- 70kg (14- 221b)

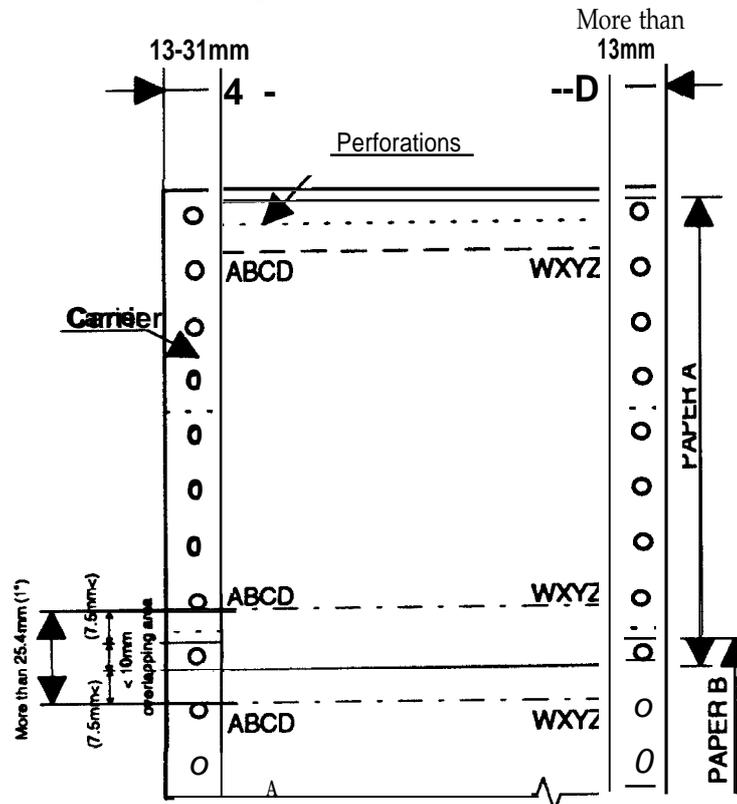


Figure 1-13. Printable Area, Overlapping Multi-part Forms

CAUTION

When using overlapping multi-part forms, do not use the paper select (change tractors) or tear off function; to avoid a paper jam, it is important not to feed overlapping multi-part forms backward.

Notes:

1. Rough multi-part form binding causes paper jams.
2. **The** multi-part form sheets should be bound together with spot gluing (dotted paste), paper stapling (mechanical staking), or tape stitching. Forms joined with spot gluing are recommended for the best printing quality.
3. For multi-part forms joined with dotted paste, the form sheets can be joined on either a single side or both sides. Figure 1-14 shows the recommended paste positions.

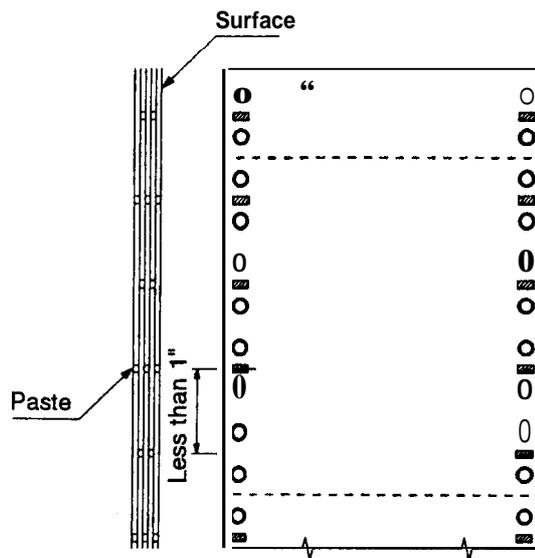


Figure 1-14. Dotted Paste Positions

4. **The** pasted areas must be pressed flat. There must be no creases in the paper.
5. Paper stapling must be applied from the front, and the paper must be flat. Figure 1-15 shows a cross section of the stapled area.

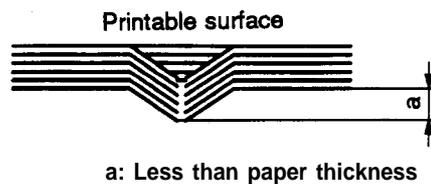


Figure 1-15. Stapled Area 1

6. Paper stapling must be applied for both feeding directions. Figure 1-16 shows a cross section of the stapled area.

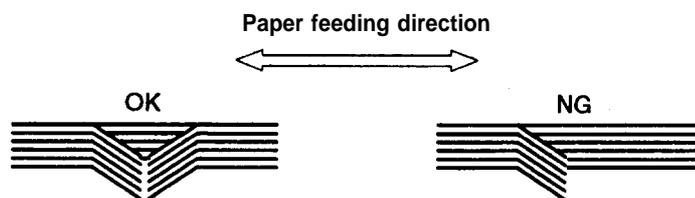


Figure 1-16. Stapled Area 2

7. The binding area must be flat. Figure 1-17 shows a cross section of the stapled area.



Figure 1-17. Stapled Area 3

- 8. Never use forms joined with metal staples.
- 9. The binding (dots of paste or paper staples) must be outside the printable area.
- 10. Overlapping multi-part forms must be bound at the top side by spot gluing. The binding must be secure and there should be no spilled glue. Figure 1-18 shows the correct multi-part form binding method.
- 11. Multi-part form sheets should be securely bound to each other, and the binding area must not be too large.

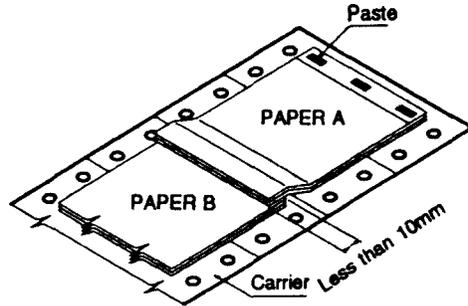


Figure 1-18. Correct Multi-part Form Binding

Fanfold Paper with a Label

Paper path:	Front only
Quality:	Plain paper
Width:	101-406 mm (4 - 16 inches)
Total thickness:	0.46 mm (0.018 inches) maximum
Weight:	
Single	45 - 70 kg (14 ~ 22 lb)
Multi-part	35- 48kg (11 -15 lb) x <i>n</i> (<i>n</i> ≤ 8), up to the total thickness

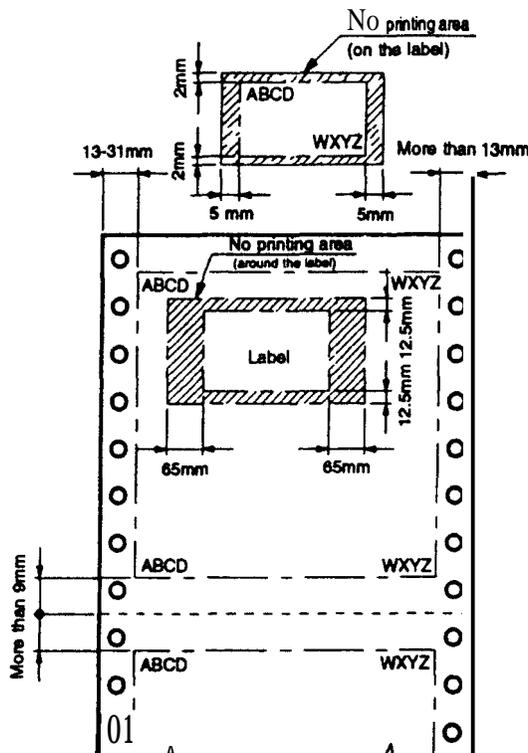
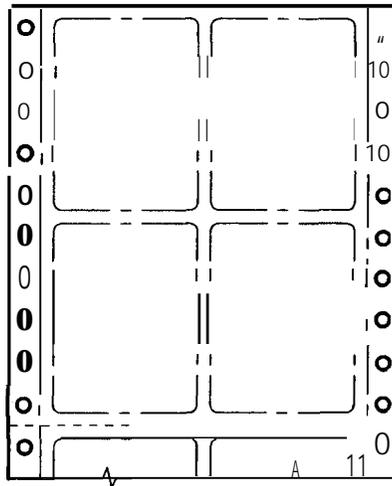


Figure 1-19. Printable Area for Fanfold Paper with a Label

Labels

Paper path:	Front only
Label size (W x H):	2½ x 15/16 inches 4 x 15/16 inches 4 x 17/16 inches
Bottom carrier:	
Width	4- 16 inches
Length	3.5 inches minimum
Total thickness:	0.19 mm (0.0075 inches) maximum Differences in thickness must be less than 0.12 mm (0.0047 inches).
Label examples:	Avery continuous form labels Avery mini-line labels



Inside of each. label

Figure 1-20. Printable Area for Labels**CAUTION**

When using labels, do not use the paper select (change tractors) or tear off function; to avoid a paper jam, it is important not to feed label forms backward.

Notes:

1. Load label forms only onto the front tractor. The paper select function must not be used.
2. Feed label forms only in the forward direction, using the forward-feeding MICRO FEED button (A). Do not feed label forms in the reverse direction. (Feeding label forms backward may cause a paper jam, or the labels may come off the backing and stick to the printer.)
3. When using label forms, do not use the TOF (top of form) function.
4. Do not use easy-peel labels.
5. Label corners must be rounded.
6. The labels and the bottom carrier should have no folds or creases.
7. Labels must be on carrier paper, and there should be carrier paper between the labels. (The labels should not touch each other.)
8. The label surface must be flat.

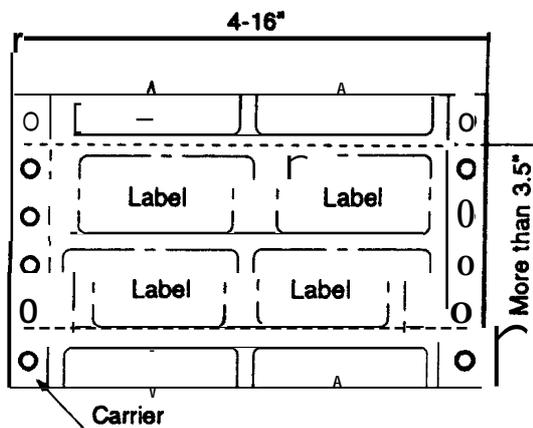


Figure 1-21. Label and Carrier

1.2.4 Ribbon Specifications

- Ribbon cartridge: #8766
- Ribbon pack: #8767
- Ribbon pack exchanges: 4 times per cartridge maximum
- Ribbon color: Black
- Dimensions:
 - Cartridge 506 (W) × 23 (H) × 140 (D) mm (20.24X 0.92 x5.60 inches)
 - Ribbon 13 mm x 70 m (0.52 inches x 231.0 feet), endless
- Life: 15 million characters (14 dots/character)

1.2.5 Environmental Conditions

Table 1-5. Acceptable Environmental Conditions

Condition	Operating	storage
Temperature	5- 35°C (41° - 95°F)	-30- 60°C (-22 - 140°F) ^{**}
Humidity	10- 80% RH ^{**2}	5- 85% RH ^{*1, *2}
Shock resistance	1 G (within 1 msec.)	2 G (within 2 msec.) ^{*1}
Vibration resistance	0.25 G, 55 Hz maximum	0.50 G, 55 Hz maximum

● ^{*}: These conditions are acceptable when the printer is in its shipping container.

● ²: Without condensation.

1.2.6 Electrical Specifications

Table 1-6. Rated Electrical Ranges

m	120 V Version	220-240 V Version
Rated voltage	120 VAC	220-240 VAC
Input voltage range	103.5- 132 V	198-264 V
Rated frequency range	50-60 Hz	50-60 Hz
Input frequency range	49.5 -60.5 Hz	49.5 -60.5 Hz
Rated current	5.0 A	3.0 A
Power consumption	Approx. 115 W (self-test in 10 cpi draft mode)	Approx.110 W (self-test in 10 cpi draft mode)
Insulation resistance	10 M Ω , minimum (applying 500 VDC between AC line and chassis)	10 M Ω , minimum (applying 500 VDC between AC line and chassis)
Dielectric strength	1000 VAC rms -1 minute or 1200 VAC rms -1 second (between AC line and chassis)	1500 VAC rms -1 minute (between AC line and chassis)

1.2.7 Reliability

MTBF:	8000 power-on hours (POH) at a duty cycle of 25%
MCBF:	24 million lines (excluding the printhead and ribbon)
Printhead life:	300 million characters (14 dots/character)

1.2.8 Safety Approvals

Safety standards:	U.S. version:	UL1950 with D3 CSA22.2 #950 with D3
	European version:	EN 60950 (TÜV, SEMKO, DEMKO, NEMKO, SETI)
Radio frequency interference (RFI):	U.S. version:	FCC part 15 sub-part B class B
	European version:	Vfg 243 (VDE 0878 part 3) CISPR Pub 22 class B

1.2.9 Physical Specifications

Size (W x D x H):	700 x 382x 369 mm (27.6 x 15.0 x 14.5 inches)
Weight:	29 kg (63.8 lb)

1.3 INTERFACE SPECIFICATIONS

1.3.1 Parallel Interface

Data format:	8-bit parallel
Synchronization:	By $\overline{\text{STROBE}}$ pulse synchronization
Handshaking:	By BUSY and $\overline{\text{ACKNLG}}$ signals
Signal level:	TT'compatible level
Connector:	%-pm 57-30360 (Amphenol) or equivalent

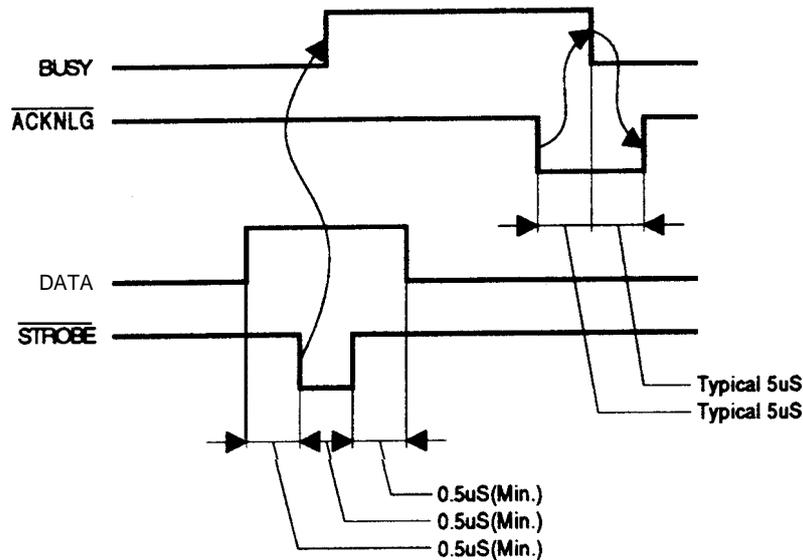


Figure 1-22. Data Transmission Timing

Note: The transition time (the rise and fall time) of each input signal must be less than 0.2 μs .

The BUSY signal is active (HIGH) under the following conditions:

- During data reception (See Figure 1-22.)
- When the **input** buffer is **full**
- When the $\overline{\text{INIT}}$ input signal is active
- During initialization
- When the $\overline{\text{ERROR}}$ or PE signal is active
- During the self-test
- In paper memory setting mode
- In pause mode
- When a fatal error occurs

The $\overline{\text{ERROR}}$ signal is active (LOW) under the following conditions:

- When a paper out error occurs
- When a paper jam error occurs
- When a fatal **error** occurs

The PE signal is active (HIGH) when a paper out error occurs.

Table 1-7 shows the signal functions and connector pin assignments for the 8-bit parallel interface.

Table 1-7. Parallel Interface Signals and Connector Pin Assignments

Pin No.	Signal Name	Return Pin No.	I/O'	Description
1	$\overline{\text{STROBE}}$	19	I	$\overline{\text{STROBE}}$ pulse to read the input data. The pulse width must exceed 0.5 μs . Input data is latched after the falling edge of this signal.
2-9	DATA 1- DATA 8	20-27	I	Parallel input data to the printer. HIGH level means data 1. LOW level means data 0.
10	$\overline{\text{ACKNLG}}$	28	O	This pulse indicates data has been received and the printer is ready to accept the next data. The pulse width is approximately 12 p.s.
11	BUSY	29	O	HIGH indicates the printer cannot accept the next data.
12	PE	30	O	HIGH indicates paper out. This signal is effective only when the $\overline{\text{ERROR}}$ signal is LOW.
13	SLCT		O	Always HIGH output. (Pulled up to +5 V through a 3.3 K Ω resistor.)
14	$\overline{\text{AFXT}}$		I	If the signal is LOW when the printer is initialized, a line feed is automatically performed when a CR code is input (auto LF).
15,34	NC			No connection (not used).
16	0v			Signal ground level.
17	FG	-		Chassis ground. In the printer, chassis ground and signal ground are short circuited.
18,35	+5 V			Pulled up to +5 V through a 3.3 K Ω resistor.
19-30	GND			Ground for twisted-pair return signal.
31	INIT		I	Pulse input (width: 50 μs minimum, active LOW) for printer initialization.
32	$\overline{\text{ERROR}}$		O	LOW indicates that some error has occurred in the printer.
33	GND			Signal ground.
36	$\overline{\text{SLCTIN}}$		I	If the signal is LOW when the printer is initialized, DC1/DC3 control is disabled.

*The I/O column indicates the direction of the signal as viewed from the printer.

1.3.2 RS-232C Serial Interface

Data format:	RS-232C serial
Synchronization:	Asynchronous
Handshaking:	By DTR signal or X-ON/X-OFF protocol
Word length:	
Start bit	1 bit
Data bit	8 bits
Parity bit	Odd, even, or no parity
Stop bit	1 bit or more
Bit rate:	300,1200,9600, or 19200 bps (selectable by DIP switches 2-7 and 2-8)
Logic level:	
MARK (logical 1)	-3 to -27 V
SPACE (logical 0)	+3 to +27 V
Connector:	EIA standard 25-pin connector

Table 1-8 shows the signal functions and connector pin assignments for the serial interface.

Table 1-8. Serial Interface Signals and Connector Pin Assignments

Pin No.	Signal Name	I/O*	Description
1	FG	.	Chassis ground.
2	TXD	O	Transmit data for X-ON/X-OFF handshake.
3	RXD	I	Receive data.
7	SG	.	Signal ground.
11,20	DTR	O	Indicates whether the printer is ready to receive data. If the printer is not ready, the DTR signal becomes MARK.
4-6,8-10, 12-19,21-25	NC	'	No connection (not used).

*The I/O column indicates the data flow as viewed from the printer.

1.4 PRINTER OPERATION

This section describes the basic operation of the printer.

1.4.1 Control Panel

The printer's control panel contains eight non-lock type push buttons and twelve LED indicators for easy use of the various printer functions.

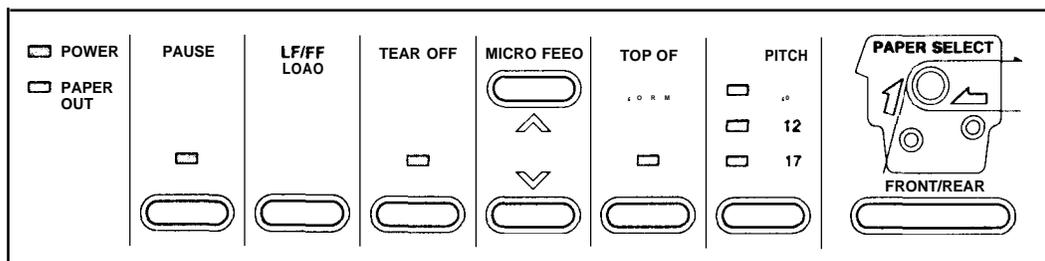


Figure 1-23. Control Panel

Buttons

- PAUSE:** Stops or starts printing, if any print data exists in the input buffer. (Turns pause mode on or off.)
- LF/FF LOAD:** Advances the paper line by line according to the set line spacing while the printer is ready to print or paused by the PAUSE button. Holding down the button for about one second advances the paper to the next top of form (TOF) position. This button is also used to load the paper from the push tractor of the selected paper path when the printer is in the paper-out state.
- TEAR OFF:** Enables tear off mode and advances the paper to the tear off position. This button functions only when the printer is in pause mode. The tear off position can be adjusted using the MICRO FEED buttons. The adjusted value is stored in the EEPROM on the main board when the printer is turned off.
- MICRO FEED:** Adjusts the paper position, including the top of form (TOF) and tear off positions. The forward MICRO FEED button (\wedge) advances the paper in 1/216 inch increments and the backward MICRO FEED button (\vee) feeds the paper backward in 1 /216 inch increments.
- TOP OF FORM:** Enables top of form (TOF) setting mode, so that the TOF position can be adjusted using the MICRO FEED buttons. This button functions only when paper is loaded into the printer using the LF/FF LOAD button and the printer is in pause mode. In TOF setting mode, the PAUSE LED is lit and the TOF LED blinks.
- PITCH:** Selects a character pitch of 10,12, or 17 cpi.
- PAPER SELECT:** Selects the front or rear paper path. If there is paper in the current path and the printer is in pause mode, the paper is fed backward to the tractor. Then, the selected paper from the other tractor is fed to the TOF position. If all the paper in the current path is not fed backward to the tractor by the single 22-inch (55.9-cm) backward feeding sequence, make sure your previous print job is tom off and press the PAPER SELECT button again until the current path is empty.

1.4.6 Paper Width Detection

The printer detects the right paper edge and determines the right end of the printable area. This disables printing in areas where there is no paper.

1.4.7 Automatic Paper Thickness Adjustment

The printer measures the paper thickness each time paper is loaded. The distance between the printhead and the platen is automatically adjusted to match the paper's thickness and obtain the best print quality.

1.4.8 Paper Memory Function

The paper memory function allows the printer to print properly when different areas of the same form vary in thickness. For the best print quality when using forms with a label or overlapping forms, use the paper memory function. It allows you to save paper format and thickness information using the DIP switches and the control panel buttons. The paper memory function is available only for forms loaded on the front tractor.

Forms with a label

Multi-part forms that vary in thickness include forms with a label; the label area is thicker than the rest of the form.

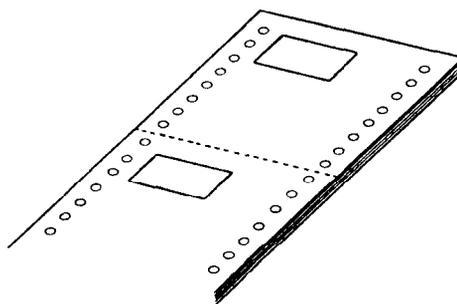


Figure 1-24. Multi-part Forms with a Label

Multi-part forms that partly overlap the next page

Multi-part forms that vary in thickness include forms that overlap slightly where they are glued together; the overlap area is twice as thick as the rest of the form.

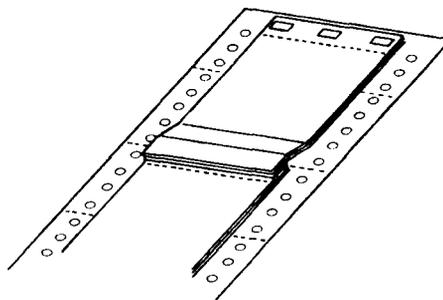


Figure 1-25. Overlapping Multi-part Forms

Set the information about the label and overlap areas before printing. The printer works according to this information.

Note: The tear off and paper select functions are not available when the paper memory function is used.

1.4.8.1 Using the Paper Memory Function

To use the paper memory function, you must first save paper format and thickness information for up to two different types of paper as described in **Section 1.4.8.2**, below.

To turn on the paper **memory** function after saving your paper format and thickness information, hold down one of the buttons below and turn on the printer.

MICRO FEED (A)	Recalls the paper format and thickness information stored in memory area 1.
MICRO FEED (v)	Recalls the paper format and thickness information stored in memory area 2.

To turn off the paper memory function and use normal paper, hold down the PAPER SELECT button and turn on the printer.

- Notes:**
- A 1-inch skip over perforation area is automatically included for overlapping forms.
 - ESC C (set page length) is valid when using the paper memory function.
 - ESC N (set skip over perforation) is valid when using the paper memory function; however, if the skip **length is less than** 1 inch, the setting is ignored when using overlapping forms.
 - ESC O (reset skip over perforation) is valid when using the paper memory function with overlapping forms.
 - When using overlapping forms, the loading position must be adjusted each time you load paper.

1.4.8.2 Saving Paper Format and Thickness Information

To save paper format and thickness information for overlapping forms, forms with a label, or overlapping forms with a label, follow these steps:

1. Turn off the printer.
2. Use DIP switch 3-4 to select the memory area where you want the printer to store the paper format and thickness information. Memory area 1 is **selected** when DIP switch 3-4 is off. **This** is the printer's default setting. To select memory area 2, turn on the switch.

Table 1-9. Selecting the Paper Memory Area

Paper Memory Area	DIP SW 3-4
1	OFF
2	ON

3. Use DIP switches 3-1 and 3-2 or **software commands** to set the page length.

Table 1-10. Setting the Page Length

Page Length (inches)	DIP SW 3-1	DIP SW 3-2
11	OFF	OFF
12	OFF	ON
8.5	ON	OFF
70/6	ON	ON

4. Use DIP switches 3-5 and 3-6 to set the paper type.

Table 1-11. Setting the Paper Type

Paper Type	Sw 3-5	Sw 3-6
Normal paper	OFF	OFF
Forms with a label	OFF	ON
Overlapping forms	ON	OFF
Overlapping forms with a label	ON	ON

5. Hold down both MICRO FEED buttons and turn on the printer.
6. If you are using forms with a label, indicate the label's position by following these steps:
- (1) Open the printer cover.
 - (2) Align the pointer on the ribbon mask with one of the label's comers.
 - To feed the paper up or down, press the appropriate MICRO FEED button.
 - To move the pointer right or left, move the printhead by hand.
 - (3) Press the TOP OF FORM button.
 - (4) Move the pointer to the comer of the label diagonally opposite the first comer.
 - (5) Press the TOP OF FORM button.
 - (6) Close the printer cover.
7. Use the printer beeps to confirm that the paper format and thickness information has been saved properly. If the printer beeps once or twice, the information has been saved correctly in memory area 1 or 2. If the printer beeps 10 times, the information has not been saved; carefully follow steps 1 through 7 in this section again.

1.4.9 Automatic Tear Off Function

Use DIP switch 3-8 to enable or disable the automatic tear off function. When the tear off function is enabled, the printer automatically feeds fanfold paper until its perforation reaches the tear off position of the printer cover under these conditions:

- The paper is advanced to the TOF position after a print job.
- The printer receives an FFcode and then no other codes or characters for at least 3 seconds. (The printer has finished a print job.)
- The pull tractor is not being used.
- The paper memory function is not being used.

Then, if the printer receives more data, it automatically feeds the paper backward to the original position and printing starts.

1.4.10 Paper Jam Detection

When a paper jam is detected, the printer beeps, stops feeding the paper, and enters pause mode. The PAPER OUT indicator flashes. Remove the paper and load new paper properly. Then press the PAUSE button to turn off pause mode so the printer is ready to print.

1.4.11 Automatic Interface Selection

When the printer does not receive any data for the set time over the currently selected interface, it checks the parallel interface, serial interface, and optional interface, and selects the interface that receives data first. The standby time can be set to 10 seconds or 30 seconds using DIP switches 24, 2-5, and 2-6.

Note: The built-in serial interface and Type B simple serial interface card cannot be used at the same time. The simple serial interface card takes precedence over the built-in serial interface.

1.4.12 Thermal Protection

The printhead has a thermistor inside it, and the printhead cooling fan also has a thermistor. When the printhead or cooling fan is too hot, the printer stops printing while it cools.

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The skip binding function is used for printing on multi-part forms with binding that could scratch the printhead during paper feeding. When this function is used, the head parks away from the binding during paper feeding to avoid paper jams. Use DIP switch 3-7 to enable or disable the skip binding function; when it is enabled, throughput is reduced.

1.4.14 Printer Initialization

The printer is initialized in the following cases:

- When the printer is turned on.
- When the INIT signal is input through the parallel interface.

Initialization performs the following functions:

- Returns the printhead to the far left position (carriage home).
- Puts the printer in ready mode, so it is ready to print.
- Clears the print buffer and input data buffer.
- Clears download characters (CG ROM copy in IBM mode).
- Sets the line spacing to 1/6 inch.
- Sets the page length according to the DIP switch settings.
- Clears all vertical tab positions.
- Sets the horizontal tab position to every 8 columns.
- Sets the print mode according to the DIP switch settings and non-volatile memory.

The top of form (TOF) position is reset by the following:

- Printer initialization
- ESC/P software reset command (ESC @)
- Page length command (ESC C)
- IBM top-of-form setting command (ESC 4)

1.4.15 Buzzer Operation

The buzzer sounds for approximately 0.1 second when a BEL code (07H) is input. Buzzer beeps indicate printer status, as shown below. Each asterisk (*) represents one 0.1 second beep.

The ESC BEL command (07H) is input.

*(1 beep)

A carriage error is detected due to:

*** ** (2 sets of 3 beeps)

- CR lockup.

Low insulation resistance (less than 1 K Ω).

A paper out or paper jam is detected.

• *** '* *_*'~ **** (5 sets of 4 beeps)

(The printer runs out of paper or a paper jam occurs during paper feeding or printing.)

Another paper error is detected:

*** (3 beeps)

Incomplete back-out. (The previous print job is not tom off.)

Empty during operation. (The paper is out at power on.)

An abnormal voltage is detected.

* ** • " (5 beeps with a pause between each beep)

RAM error is detected.

** ** ** ** * (5 sets of 2 beeps)

A cover open is detected:

**** (4 beeps)

The cover open sensor detects that the cover is open.

The interlock switch detects that the cover is open.

A short circuited printhead is detected.

* * * • • * * • * (10 & p with a pause between each beep)

(The head driver FETs are bad.)

** ** ** ** * ** ** ** (8 sets of 2 beeps)

A short circuited printhead fan is detected.

**** W-* (10 beeps)

An illegal paper memory setting is detected.

***_*_*_*_* ... (continuous beeps)

A micro adjust limit is detected.

*** ** ** (3* of 3 beeps)

A platen gap adjust error is detected.

Note: * 0.1 second interval, ** 0.3 second interval

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