

# XR-1020 XR-1520

MULTI-FONT

USERS MANUAL

NOT INTENDED FOR SALE

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Radio Frequency Interference Statement**

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful 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 or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

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**Trademark Acknowledgements**

**XR-1020/1520, XR-1000/1500, NX-1020 Color, NX-1000 Color, LZ9, X9CL, IS-8XL, IP-128XL, SF-10DMII/15DMII, SF-10RMII/15RMII, PT-10XM/15XM:** Star Micronics Co., Ltd.  
**IBM-PC, PS/2, PC-AT, Proprinter, PC-DOS:** International Business Machines Corp.  
**MS-DOS, Microsoft BASIC:** Microsoft Corporation  
**EX-800/1000, FX-850/1050:** Seiko Epson Corp.

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# HOW TO USE THIS MANUAL

This manual is organized into eleven chapters. To learn how to make the best use of your printer you are urged to read through chapters 2 through 6. The remaining chapters may be treated as a reference guide for programming operations, etc. It assumes a degree of acknowledge of the operation of computers (for instance, it assumes you know about hexadecimal numbers). The chapters are as follows:

## **Chapter 1 — Introduction**

This chapter indicates the some features of the printer, the names and those functions of the printer components, and the actual example of font style.

## **Chapter 2 — Setting up the printer**

This chapter explains how to get the printer unpacked and set up. Read this chapter before you do anything else.

## **Chapter 3 — Optional accessories**

This chapter explains the optional accessories with your printer, and how to install them.

## **Chapter 4 — Paper installation and use**

This chapter describes instructions for printing such as selecting paper types, adjusting the printing gap, and installing paper.

## **Chapter 5 — Control panel operations**

There are a number of controls on the front panel which perform various functions related to paper handling, print modes and font selection.

After getting set up, read this chapter and try out the procedures in it to find out how the printer works.

## **Chapter 6 — Setting the Memory Switches**

This chapter explains how to set the Memory Switches to make system settings on the printer.

## **Chapter 7 — Printer control commands**

This chapter explains the different emulations provided by your printer, and the software commands used to drive it. This section is of use if you are writing or modifying programs to take advantage of the printer's features.

## **Chapter 8 — Download characters**

This chapter explains the procedures to create your own characters.

## **Chapter 9 — MS-DOS and your printer**

Since the PS/2 or PC-AT family of computers running under MS-DOS is currently the most popular configuration of microcomputer, we have included a few hints and tips to help you use your printer with such systems.

Since virtually all PCs are sold with a Microsoft BASIC interpreter, we have also included some hints, and a sample program in this language to demonstrate the capabilities of the printer.

## **Chapter 10 — Troubleshooting and maintenance**

This section gives a checklist of points to check if your printer is not working in the expected way. It also includes details of some routine maintenance operations you can carry out yourself. It is not, however, a complete service manual. Call a qualified service engineer if you are unsure of your ability to carry out any maintenance or servicing operations.

## **Chapter 11 — Reference**

This section gives some references of your printer, such as specifications of your printer, the pinout of interface connector, the character tables.

The character table charts give the different character sets available.

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# Chapter 1

## INTRODUCTION

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This printer has a full complement of features, making it an excellent partner for a personal computer. It supports the Epson/IBM printer commands and character sets, enabling it to print just about anything your computer can generate, both text and graphics.

### FEATURES OF THE PRINTER

Some of main features are the following:

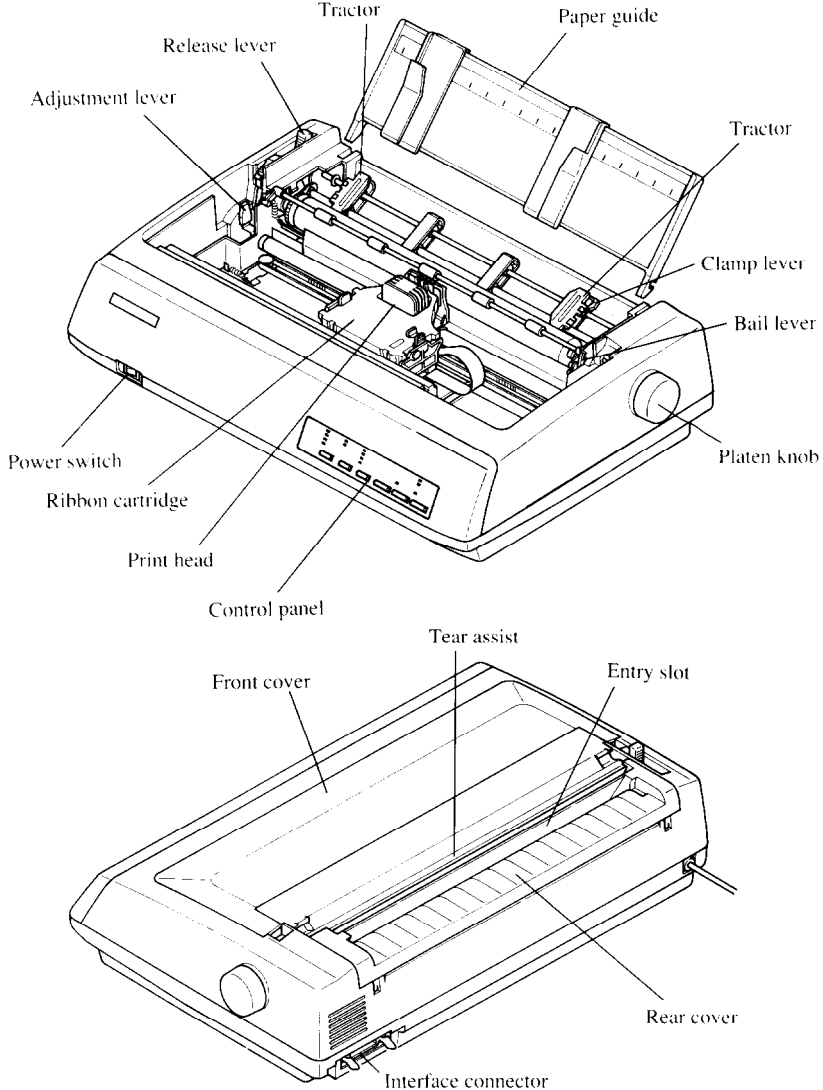
- **Versatile paper handling**  
Single sheets, fanfold forms, and multi-part forms (up to 5-ply) are all accepted, and you can use either push/pull tractor or friction feed. (You can load fanfold forms from the rear with internal push tractor, or fanfold forms and multi-part forms from the bottom with optional pull tractor.) A special feature enables you to keep fanfold forms parked in readiness while printing on other paper.
- **Six bright colors**  
Red, blue, violet, yellow, orange and green add a color dimension to your printed output by the optional color ribbon.
- **Large variety of fonts**  
The printer has the following resident fonts:
  - Draft
  - High-Speed Draft
  - Tms Romn
  - Sanserif
  - Courier
  - Prestige
  - Script
  - Orator
  - Helvet
- **Extensive software support**  
Since it is compatible with the Epson and IBM printers, it works with any software that supports those printers. That includes most word-processing and graphics programs, spread-sheets, and integrated software packages.
- **Easy operation**  
Indicator displays and beep tones provide immediate, easy to understand feedback when you press the buttons on the control panel. The six buttons can operate in combinations to perform a surprising variety of functions, including micro-alignment.

- Easy care and maintenance

The ribbon cartridge can be replaced in seconds the print head in a few minutes.

## PRINTER COMPONENTS

To get acquainted with the printer's components and capabilities, refer to the information on the following pages.



<b>Paper guide</b>	Aligns single sheets (cut forms) to help the printer detect when paper is inserted.
<b>Release lever</b>	Releases pressure on the paper. This lever must be back for fanfold forms, and forward for single sheets.
<b>Front cover</b>	Protects the print head and other internal components of your printer.
<b>Rear cover</b>	Protects the tractor feed unit and separates incoming and outgoing fanfold forms.
<b>Entry slot</b>	For inserting single sheets of paper.
<b>Tear assist</b>	Assists when tearing fanfold forms at the perforation. <b>CAUTION:</b> Since the tear assist edge is made sharp to cut off paper, you must swing down the transparent part when you open the front cover. Otherwise, you may injure your fingers.
<b>Control panel</b>	Indicates printer status and makes various control of printer functions simple and convenient.
<b>Power switch</b>	Switches power on or off.
<b>Platen knob</b>	Advances the paper manually.
<b>Interface connector</b>	Connects the computer to the printer.
<b>Print head</b>	Has a dot matrix (9-wire) composition.
<b>Ribbon cartridge</b>	Contains the printer ribbon.
<b>Adjustment lever</b>	Controls print darkness by adjusting for the thickness of forms being printed.
<b>Tractors</b>	Control the movement of fanfold forms.
<b>Clamp lever</b>	Clamps the tractor in place.
<b>Bail lever</b>	Opens and closes the paper bail which holds the paper against the platen.

# FONT STYLE EXAMPLE

The following example shows the many font styles your printer can print.

Draft            0123456789ABCDEFGHIJKLMabcdefghijklm

HS Draft        0123456789ABCDEFGHIJKLMabcdefghijklm

Tms Romn      **0123456789ABCDEFGHIJKLMabcdefghijklm**

Sanserif       0123456789ABCDEFGHIJKLMabcdefghijklm

Courier        0123456789ABCDEFGHIJKLMabcdefghijklm

Prestige       0123456789ABCDEFGHIJKLMabcdefghijklm

Script         0123456789ABCDEFGHIJKLMabcdefghijklm

Orator         0123456789ABCDEFGHIJKLMABCDEFGHIJKLM

Helvet         0123456789ABCDEFGHIJKLMabcdefghijklm

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# **Chapter 2**

## **SETTING UP THE PRINTER**

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This chapter describes the following procedures to set up your new printer. If you have optional accessories, refer to chapter 3 after setting up the printer.

- Locating the printer
- Unpacking the carton box
- Mounting the platen knob
- Installing the ribbon cartridge
- Connecting the printer to your computer

### **LOCATING THE PRINTER**

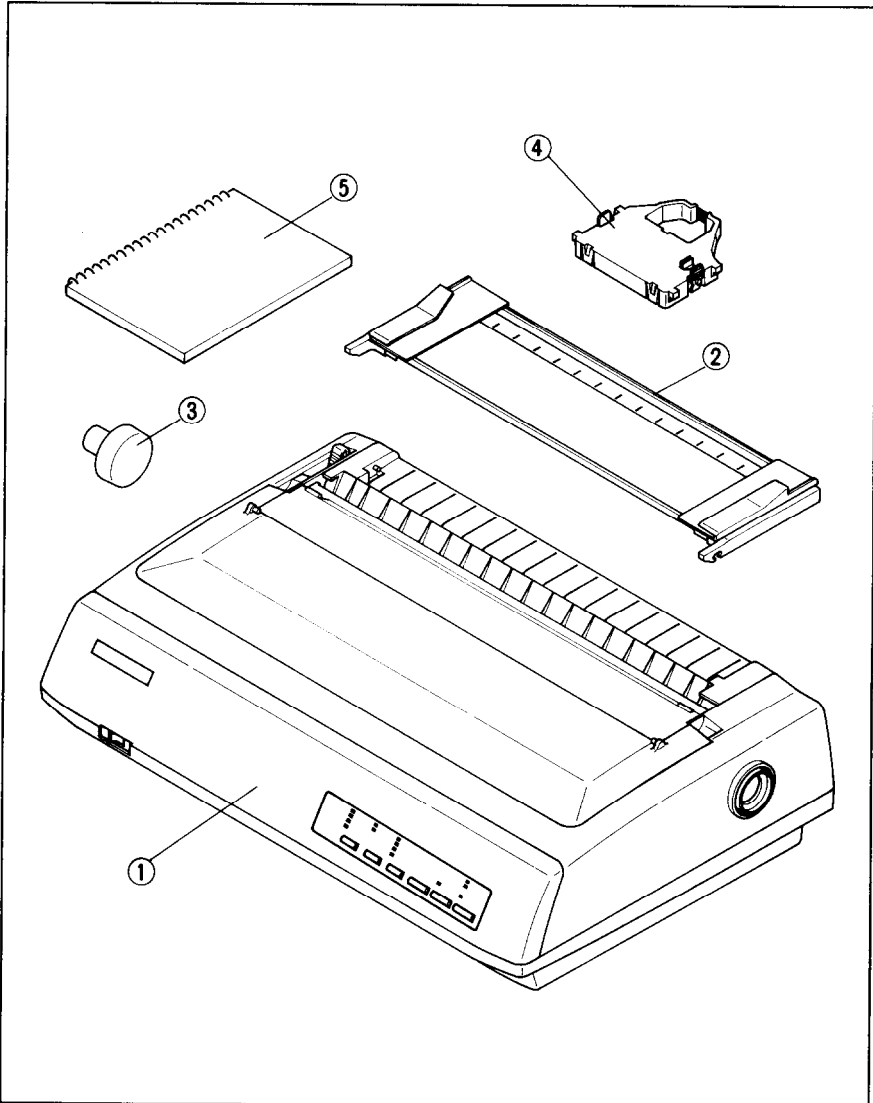
Before you start unpacking and setting up your printer, make sure that you have a suitable place on which to locate it. By "a suitable place", we mean:

- A firm, level surface which is fairly vibration-free
- Away from excessive heat (such as direct sunlight, heaters, etc)
- Away from excessive humidity
- Away from excessive dust
- Supply it with "clean" electricity. Do not connect it to the same circuit as a large, noise-producing appliance such as a refrigerator.
- Make sure the line voltage is the voltage specified on the printer's identification plate.
- To disconnect the printer, the plug has to be disconnected from the wall socket, which has to be located close to the printer, and easy to access.
- Install the printer where there is sufficient room for the paper and any paper being fed in or printed out.
- If you are connecting your printer with a Centronics parallel interface, make sure that the cable is within 2m (6ft) of the printer. An RS-232 serial connection using the optional IS-8XL interface cartridge can be made over longer distances.

# UNPACKING AND INSPECTION

Now unpack the contents of the shipping carton, and check each item in the box against Figure 2-1 to make sure that you have everything (there should be five items).

If any of these items are missing, contact your supplier.



**Figure 2-1.** Check to make sure you have all five items: 1) Printer, 2) Paper guide, 3) Platen knob, 4) Ribbon cartridge, and 5) User's manual.

The optional accessories which you may have ordered with your printer are:

- Color ribbon cartridge (X9CL)
- Serial interface cartridge (IS-8XL)
- Buffered parallel interface cartridge (IP-128XL)
- Automatic sheet feeder (SF-10DMII/15DMII, SF-10RMII/15RMII)
- Pull tractor unit (PT-10XM/15XM)

For details of the optional accessories, refer to Chapter 3.

## SETTING UP

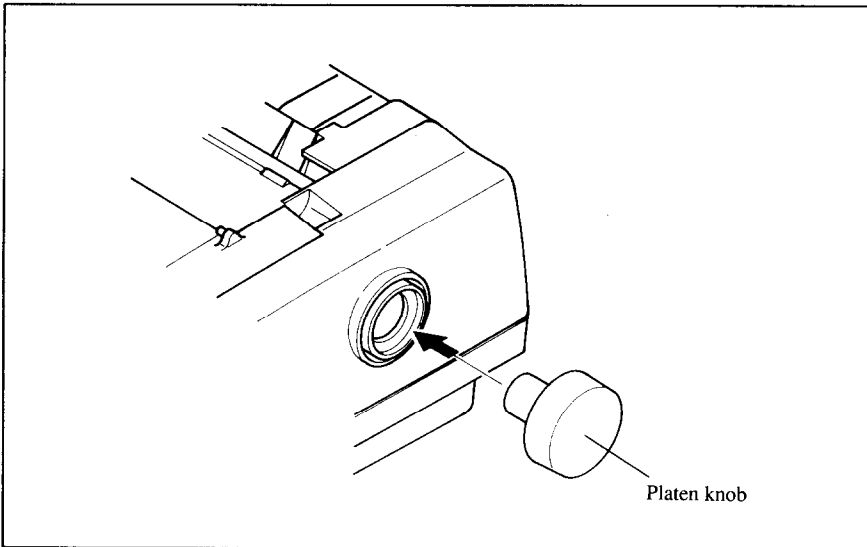
Place the printer in the desired location, and remove all packing material from inside the printer cover. This packing material is intended to prevent damage to the printer while in transit. You will want to keep all the packing material, along with the printer carton, in case you have to move the printer to a new location.

### *Mounting the platen knob*

The platen knob is packed into an accessory box with other accessories for the Wide carriage printer.

**NOTE:** For the Normal carriage printer, the platen knob is mounted on the printer at factory.

Mount the knob on the platen shaft, which is located on the right-hand side of the printer. Rotate the knob on the shaft before pushing the knob fully into position.

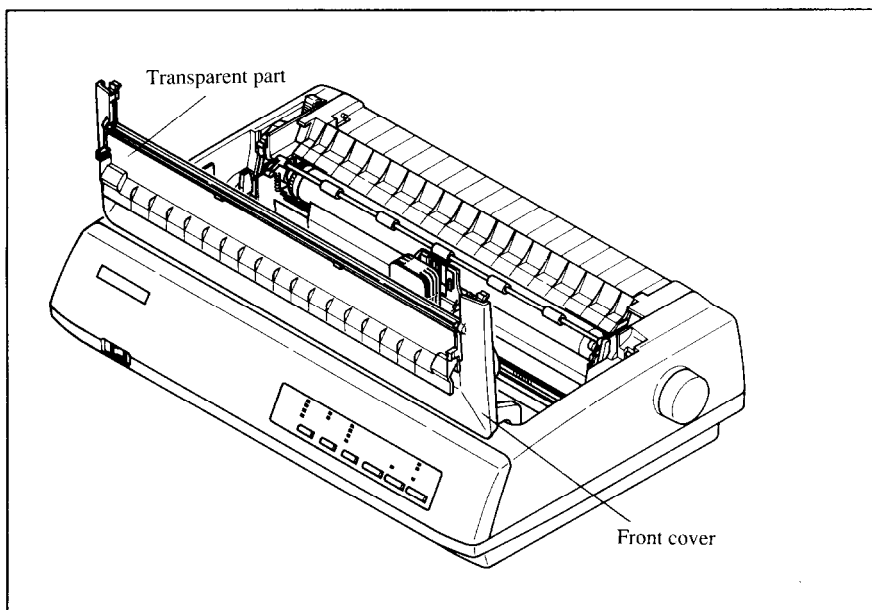


**Figure 2-2.** Mount the platen knob.



## Install the ribbon cartridge

Open the front cover by lifting up the back using the two grips on either side, then swing down the transparent part (see Figure 2-3).

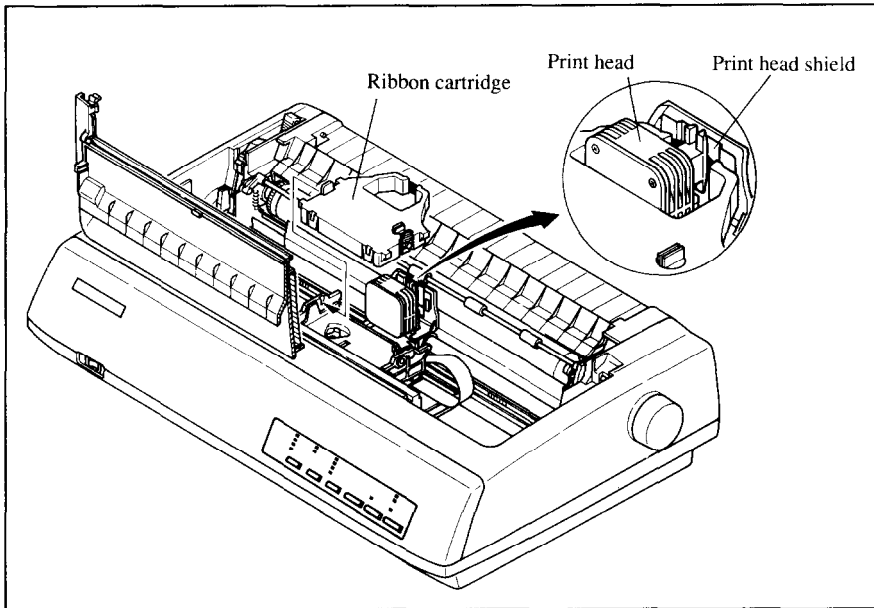


**Figure 2-3.** Open the front cover, and swing down the transparent part.

Now install the ribbon with the following procedure. (If you want to print with color, install the optional color ribbon cartridge, X9CL.)

1. Turn the tension knob clockwise on the ribbon cartridge to tighten the ribbon if it is slack.
2. Guide the ribbon between the print head and the silver print head shield, making certain that the spindles on the cartridge holder fit into the sockets on the cartridge itself.

The ribbon should pass between the print head and the print head shield as shown in Figure 2-4.



**Figure 2-4.** Installing the ribbon cartridge.

After you have installed the ribbon cartridge, close the front cover.

Leave the front cover closed during normal operation. The cover keeps out dust and dirt and reduces the printer's operating sounds. Open the cover only to change the ribbon or make an adjustment.

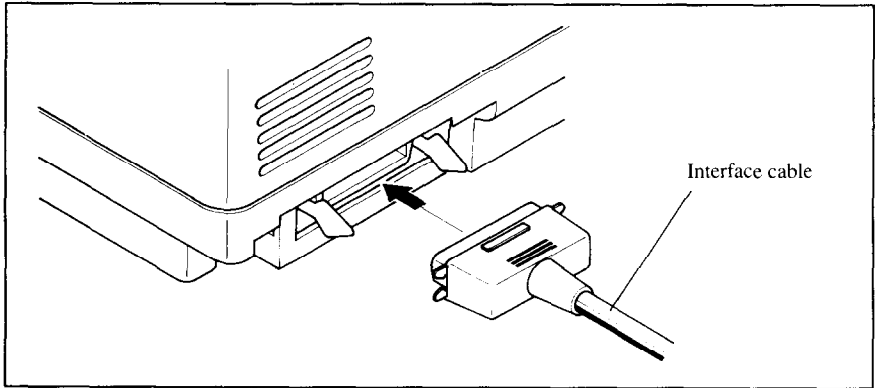
## ***Connecting the interface cable***

Connect the printer to your computer using a standard Centronics parallel interface cable. On a PS/2 or PC/AT-type computer, this means that you use the 25-pin D-type connector at the computer end, and the Amphenol-type 36-pin connector at the printer end. The configuration of the printer's connector is given in Chapter 11 should you need a cable for connecting to another computer.

If you need to connect to a serial port, use the optional Serial RS-232 interface cartridge, IS-8XL.

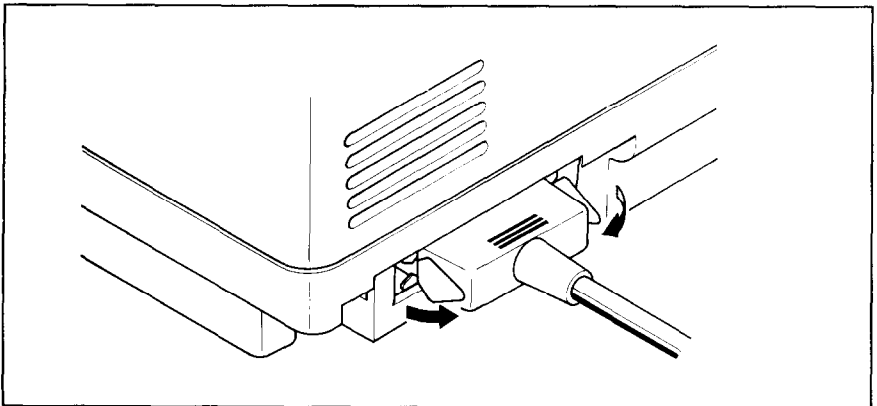
Follow the procedures below to connect the interface cable:

1. Turn off the power switch both the printer and the computer.
2. Connect the interface cable to the printer as shown in Figure 2-5.  
Make sure that you press the plug fully into the interface connector.



**Figure 2-5.** Connecting the interface cable.

3. Move both clips inside the extended prongs on the sides of the plug until you hear a click.



**Figure 2-6.** Move the clips until you hear a click.

4. Connect the other end of the interface cable to your computer. Use your computer instructions to attach the interface cable.  
**NOTE:** Because you need your computer when you start printing, ensure that it is completely installed.

Plug the printer into a suitable outlet. However, **DO NOT** turn on the power switch at the front of the printer yet.

**NOTE:** To disconnect the printer the plug has to be disconnected from the wall socket, which has to be located close to the printer, and easy to access.

# **MEMO**

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# Chapter 3

## OPTIONAL ACCESSORIES

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You can select the following accessories as option.

- Automatic sheet feeder (SF-10DMII/15DMII, SF-10RMII/15RMII)
- Pull tractor unit (PT-10XM/15XM)
- Serial interface cartridge (IS-8XL)
- Buffered parallel interface cartridge (IP-128XL)

This chapter describes how to install these optional accessories.

**NOTE:** When you install or remove the optional accessories, turn off the power switch.

### AUTOMATIC SHEET FEEDER

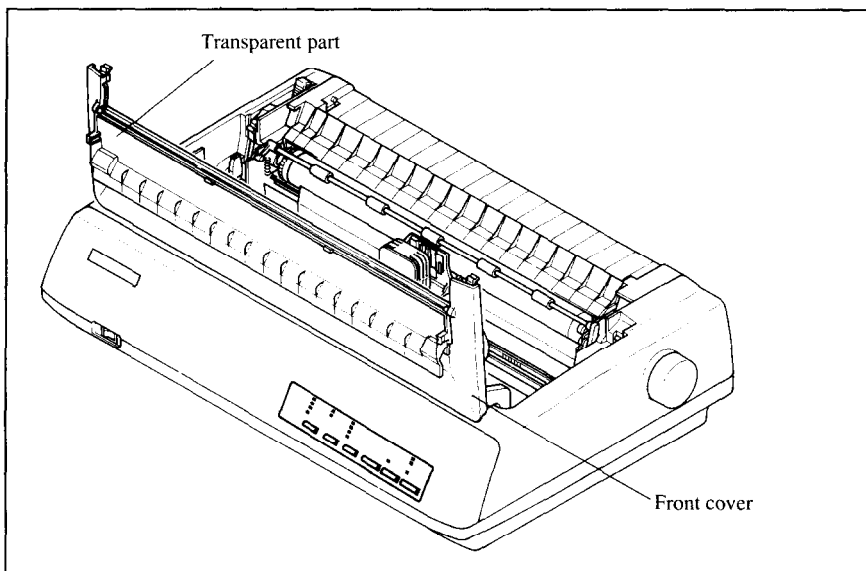
You can use the Automatic Sheet Feeder to print on single sheets.

This printer can be used either a Single-bin type or Dual-bin type Automatic Sheet Feeder.

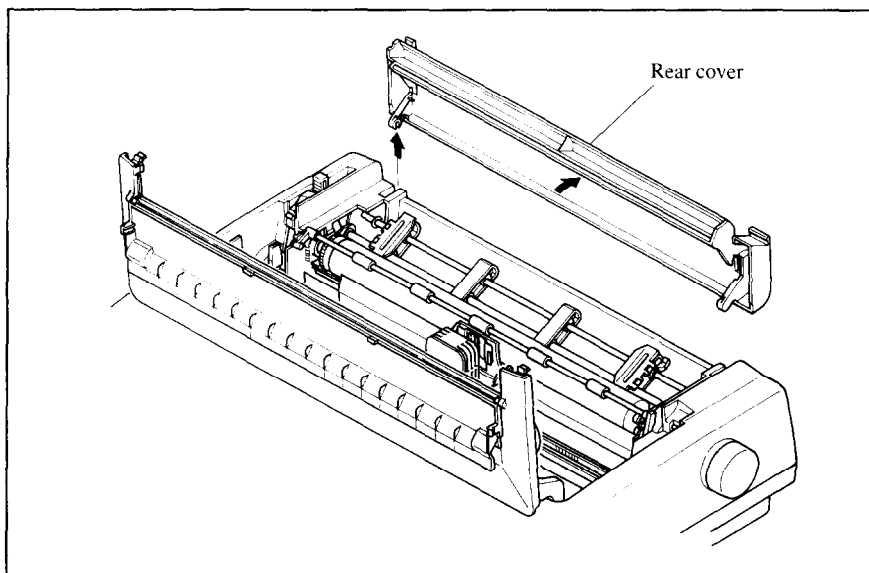
#### *Single-Bin Automatic Sheet Feeder* *(SF-10DMII/15DMII)*

The procedure to mount the Single-Bin ASF is:

1. Open the front cover by lifting up the back using the two grips on either side, then swing down the transparent part (see Figure 3-1).
2. Open the rear cover by lifting up the front using the two grips on either side, then remove it upward.  
If the paper guide is installed, remove it before taking off the rear cover.
3. Move the bail lever on top of the printer forward to open the paper bail.

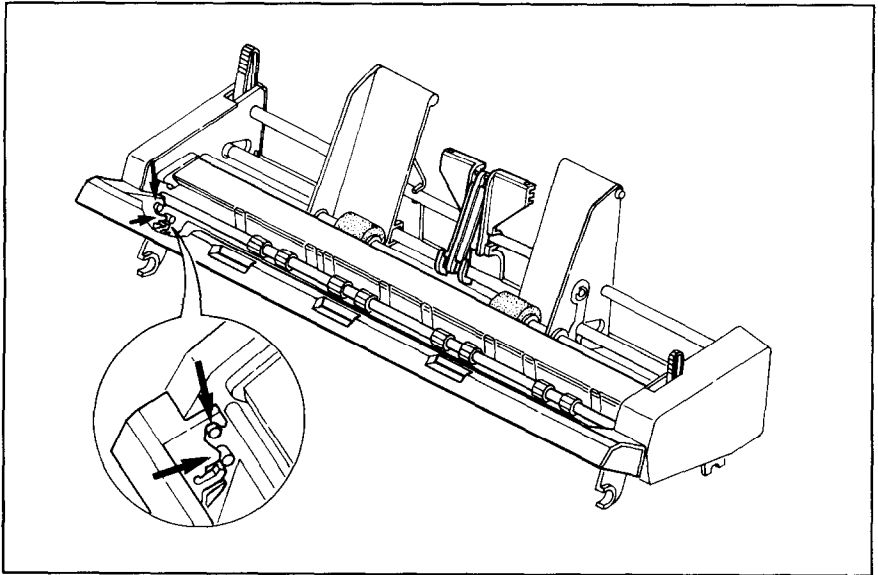


**Figure 3-1.** Open the front cover, and swing down the transparent part.



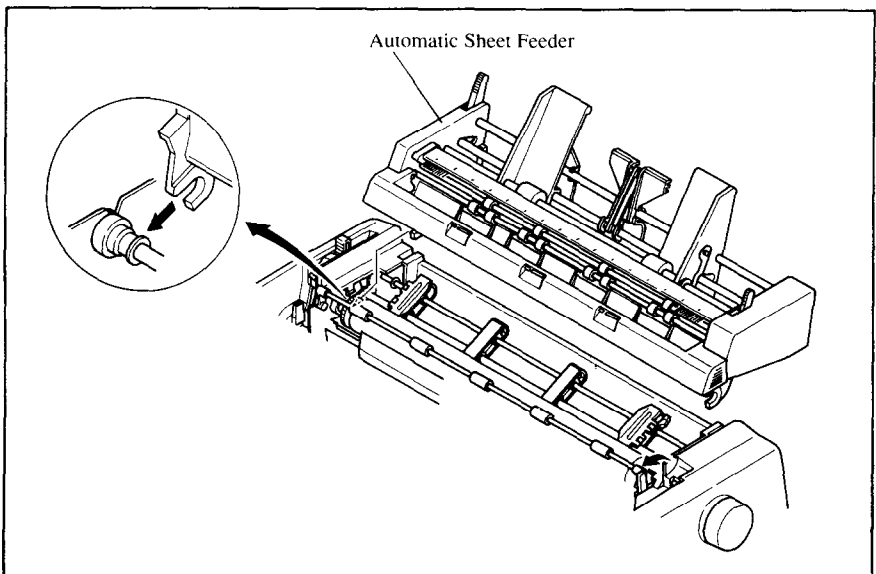
**Figure 3-2.** Open the rear cover, and remove it.

4. A stacker is included with the Automatic Sheet Feeder. Attach the hook at the top of the stacker to the Automatic Sheet Feeder. Then push the lower section of the stacker down into position, and engage the lower hook as shown in Figure 3-3.



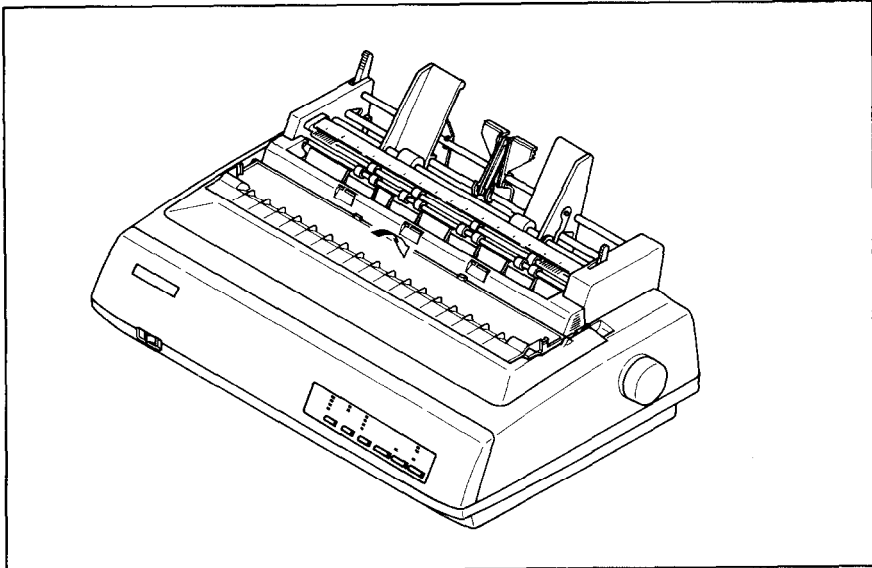
**Figure 3-3.** Attach the stacker to the Automatic Sheet Feeder.

5. Tip the Automatic Sheet Feeder forward slightly and put the feeder into place behind the printer platen roller.
6. Lower the rear side of the Automatic Sheet Feeder and attach it to the platen shaft.



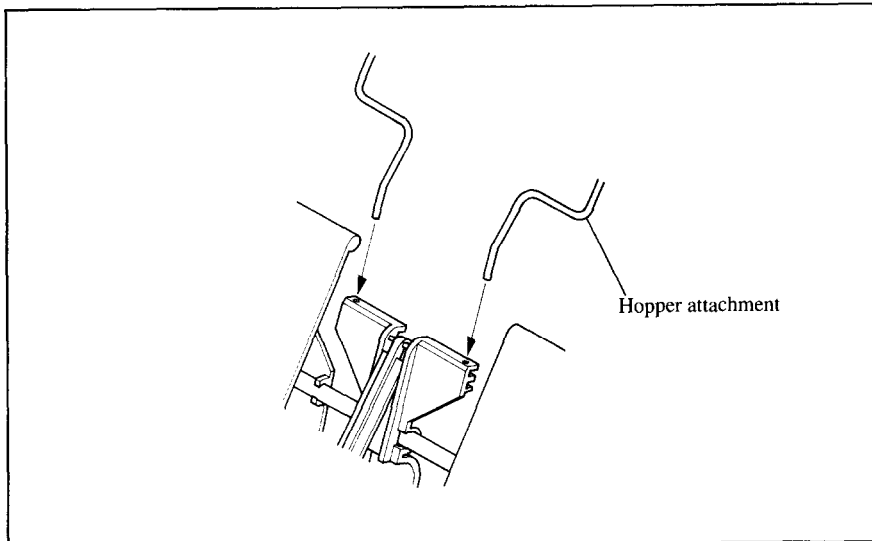
**Figure 3-4.** Mount the Automatic Sheet Feeder to the printer.

7. Close the front cover with the transparent part in the open position.



**Figure 3-5.** Close the front cover.

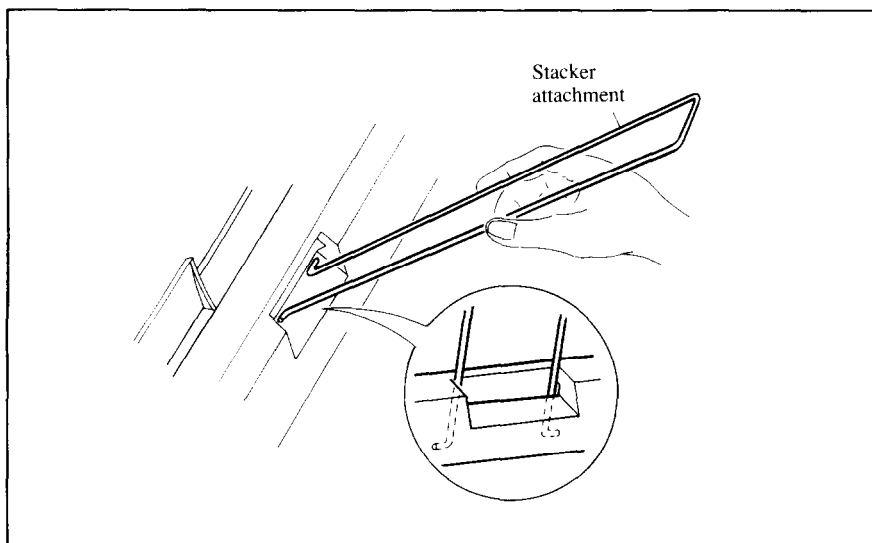
8. Insert the hopper attachment by hand into the holders on top of the hopper support section as shown in Figure 3-6.



**Figure 3-6.** Insert the hopper attachment.



9. Squeeze the sides of the stacker attachments lightly, and insert into the holders on the front part of the sheet feeder.



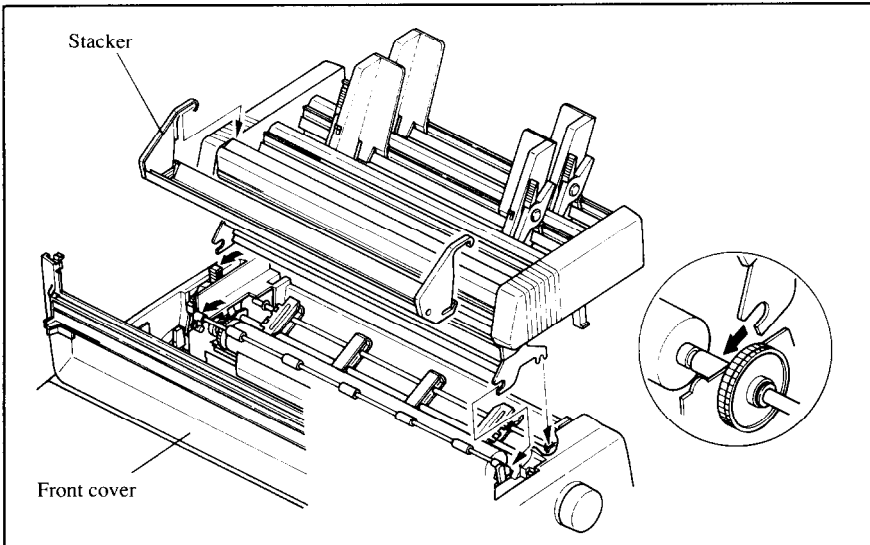
**Figure 3-7.** Insert the stacker attachments.

**NOTE:** Set the paper guide and rear cover aside carefully after they have been removed from the printer. Reverse the procedure described above when removing the Automatic Sheet Feeder.

# Dual-Bin Automatic Sheet Feeder (SF-10RMII/15RMII)

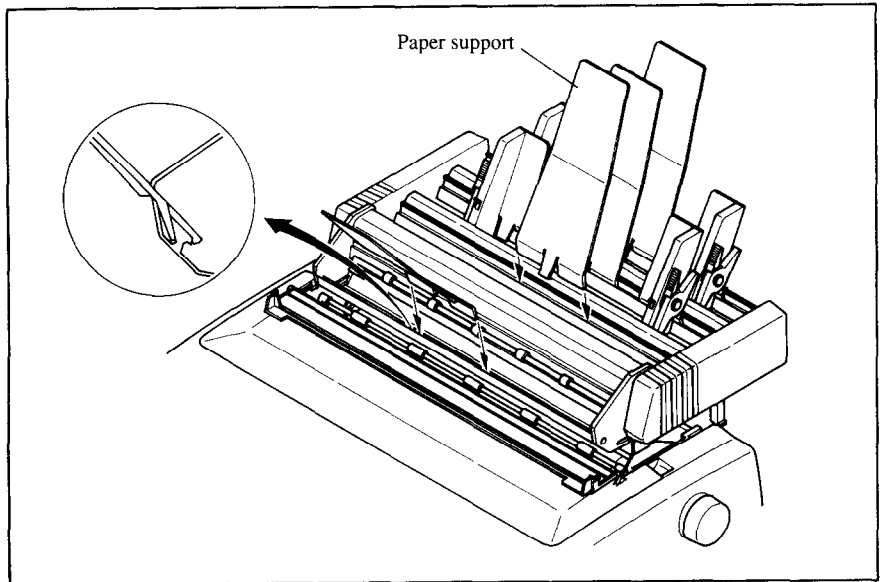
The procedure to mount the Dual-Bin ASF is:

1. Open the front cover by lifting up the back using the two grips on either side, then swing down the transparent part (see Figure 3-1).
2. Open the rear cover by lifting up the front using the two grips on either side, then remove it upward.  
If the paper guide is installed, remove it before taking off the rear cover.
3. Move the bail lever on top of the printer forward to open the paper bail.
4. A stacker is included with the Automatic Sheet Feeder. Attach the hook at the top of the stacker to the Automatic Sheet Feeder. Then push the lower section of the stacker down into position, and engage the lower hook as shown in Figure 3-8.



**Figure 3-8.** Attach the stacker to the Automatic Sheet Feeder.

5. Tip the Automatic Sheet Feeder forward slightly and put the feeder into place behind the printer platen roller.
6. Lower the rear side of the Automatic Sheet Feeder and attach it to the platen shaft.
7. Close the front cover with the transparent part in the open position.
8. Attach the clear plastic paper supports between the left and right paper guides of the hopper bins and the stacker.



**Figure 3-8.** Attach the clear plastic paper supports to the Automatic Sheet Feeder.

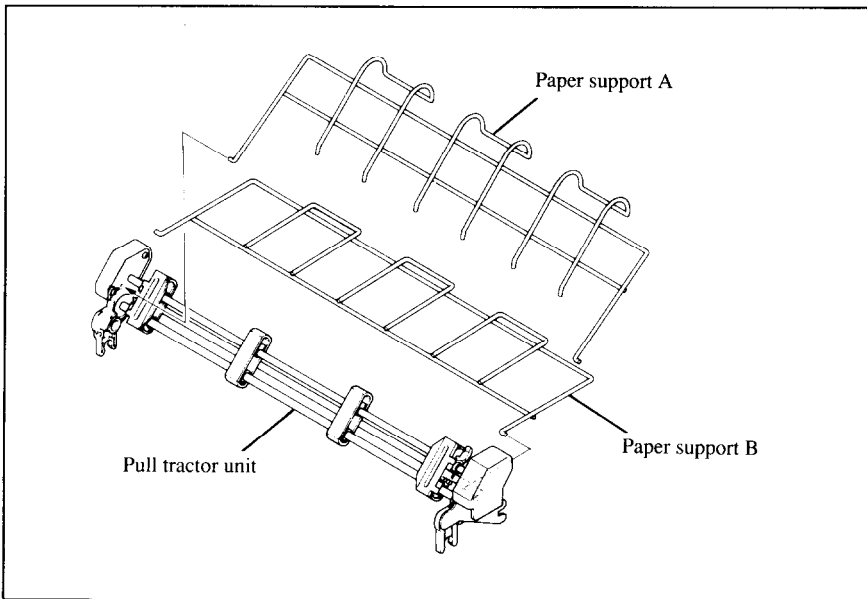
**NOTE:** Set the paper guide and rear cover aside carefully after they have been removed from the printer. Reverse the procedure described above when removing the Automatic Sheet Feeder.

## PULL TRACTOR UNIT (PT-10XM/15XM)

You can use the Pull Tractor Unit to print on fanfold forms or multi-part forms.

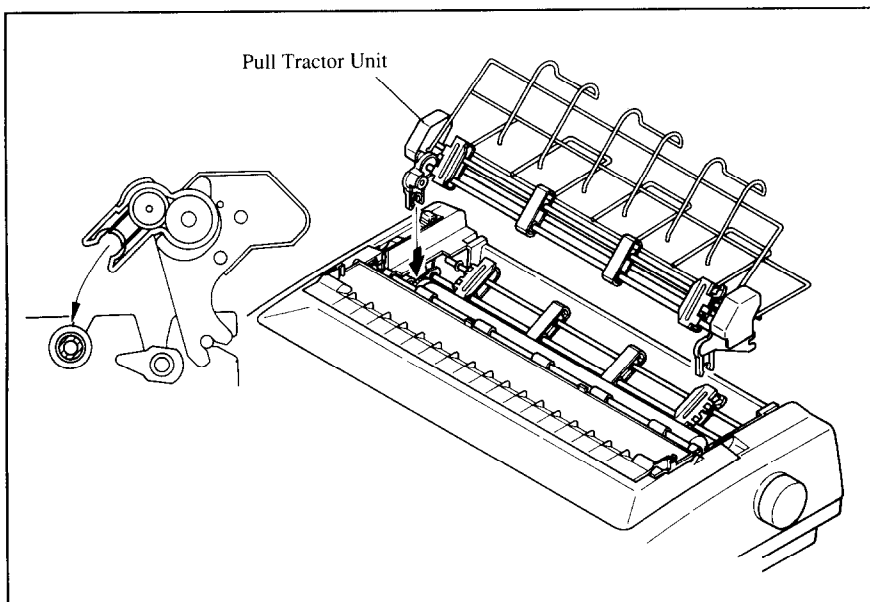
The procedure to mount the Pull Tractor Unit is:

1. Open the front cover by lifting up the back using the two grips on either side, then swing down the transparent part (see Figure 3-1).
2. Open the rear cover by lifting up the front using the two grips on either side, then remove it upward.  
If the paper guide is installed, remove it before taking off the rear cover.
3. Move the bail lever on top of the printer forward to open the paper bail.
4. Squeeze the sides of the paper supports lightly, and insert into the holes on both side of the Pull Tractor Unit as shown in Figure 3-10.



**Figure 3-10.** Mount the paper support A and B onto the Pull Tractor Unit.

5. Fit the mounting brackets of the Pull Tractor Unit onto the shaft of the printer mechanism, tilting the Pull Tractor Unit slightly backward.
6. Secure the Pull Tractor Unit firmly by lowering it into position, as shown in Figure 3-11.
7. Close the front cover with the transparent part in the open position.



**Figure 3-11.** Mount the Pull Tractor Unit onto the printer.

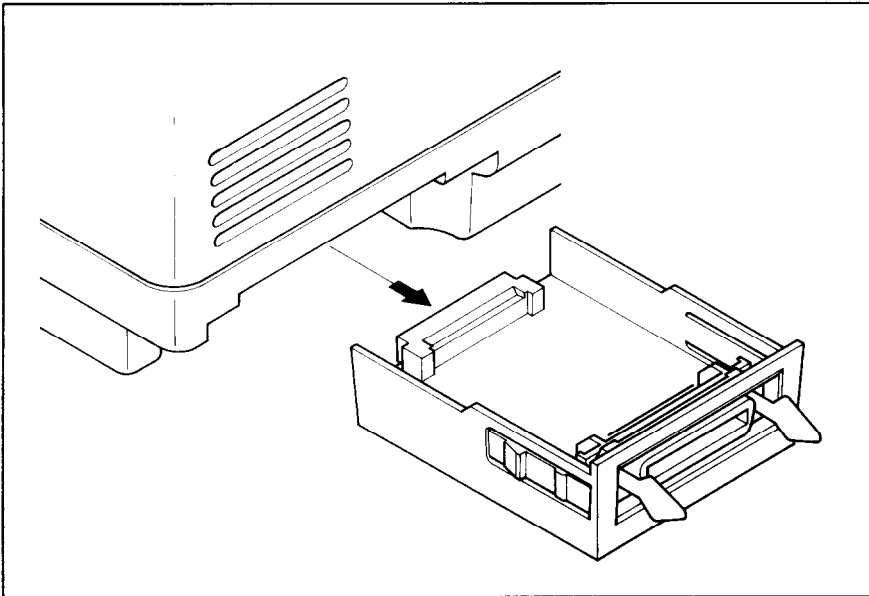
**NOTE:** Set the paper guide and rear cover aside carefully after they have been removed from the printer. Reverse the procedure described above when removing the Pull Tractor Unit.

## INTERFACE CARTRIDGES

You can use the RS-232 Serial Interface with the optional Serial Interface Cartridge (IS-8XL), or extend the print buffer by installing the optional Buffered Parallel Interface Cartridge (IP-128XL), instead of the Standard Interface Cartridge.

If you want to use the Serial Interface Cartridge, set the DIP switches on the board before install it to the printer.

1. Turn off the power switch and disconnect the power cord from the power source.
2. Disconnect the interface cable if attached.
3. Compress the projected parts on the right and left, and pull the Standard Interface Cartridge to remove it from the printer.



*Figure 3-12.* Remove the Standard Interface Cartridge from the printer.

4. Insert the optional Interface Cartridge securely into place. If it is not fully inserted, the printer will not properly print.
5. Connect the interface cable to the connector.

**NOTE:** Store the removed Interface Cartridge in a safe place.

## DIP Switch Functions on The Serial Interface Cartridge

It is necessary to make compatible the data transfer conditions between the computer and the serial interface board with the DIP switch settings on the serial interface board.

Following table shows the functions of the DIP switches on the Serial Interface Cartridge.

Switch	Function	ON	OFF	[Parity condition]		
1	Data length	8-bit	7-bit	Switch 2	Switch 5	Condition
2	Parity condition	(Refer below)		ON	ON	No parity
3	Data Protocol	(Refer below)		ON	OFF	
4				OFF	ON	Odd parity
5	Parity condition	(Refer below)		OFF	OFF	Even parity
6	Transfer speed	(Refer below)		[Data protocol]		
7				Switch 3	Switch 4	Protocol
8				ON	ON	DTR
				ON	OFF	XON/XOFF
				OFF	ON	ETX/ACK

### [Transfer speed]

Switch 6	Switch 7	Switch 8	Transfer speed
OFF	OFF	OFF	150 BPS
OFF	OFF	ON	300 BPS
OFF	ON	OFF	600 BPS
OFF	ON	ON	1200 BPS
ON	OFF	OFF	2400 BPS
ON	OFF	ON	4800 BPS
ON	ON	OFF	9600 BPS
ON	ON	ON	19200 BPS

# ***MEMO***



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# Chapter 4

## PAPER INSTALLATION AND USE

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This chapter describes instructions for printing such as selecting paper types, adjusting the printing gap, and installing paper.

### SELECTION OF PAPER

Your printer accepts any of the following papers:

- **Single sheets (cut forms) and stationery**  
Use the friction feed or the optional Automatic Sheet Feeder.
- **Fanfold forms**  
Fanfold forms have holes along the sides and perforations between the sheets. They are also called sprocket forms, punched forms, or just plain "computer paper".  
Printing on or near the perforations of continuous fanfold forms may reduce printing quality, misalign the fanfold forms, or cause a paper jam. It is recommended not to print within an area of one inch before and after the perforations.
- **Multi-part forms**  
You can use multi-part forms that have up to five parts including the original when the Multi-part mode is selected with the Memory Switch setting. (For details, please refer to Chapter 6.)  
Use pressure sensitive multi-part forms with both side edges glued and a difference in thickness of 0.05mm or less between the side edges. It is recommended to use the bottom feed with the optional Pull Tractor Unit to get fine alignment.  
**NOTE:** Care should be taken in color printing with continuous multi-part forms. Side edges of paper might be damaged.
- **Preprinted forms**

Figure 4-1 shows the recommended print area for each type of papers.

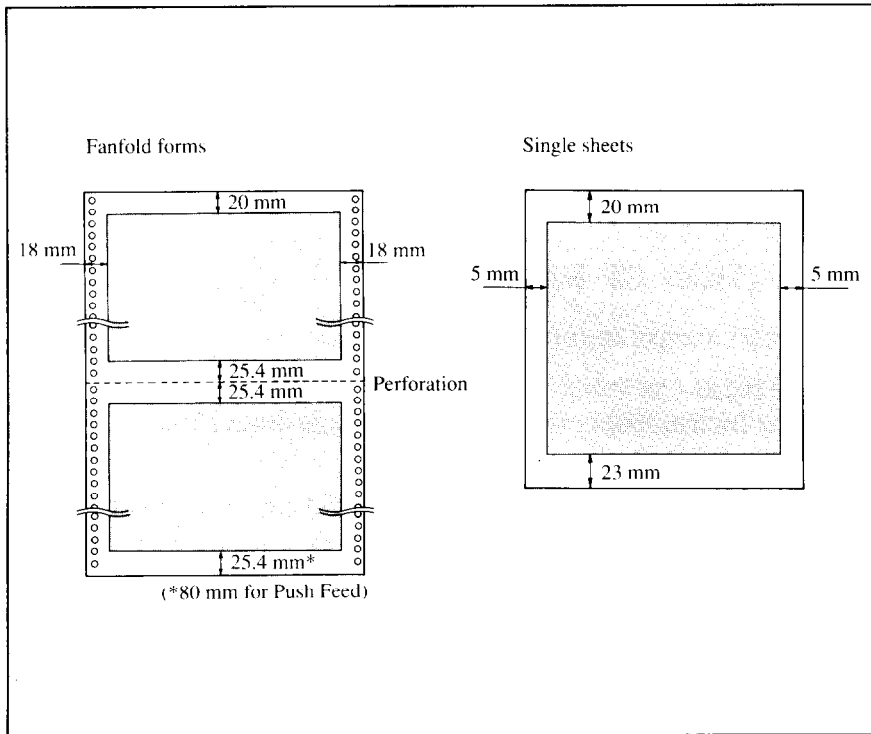


Figure 4-1. Recommended print area for acceptable papers.

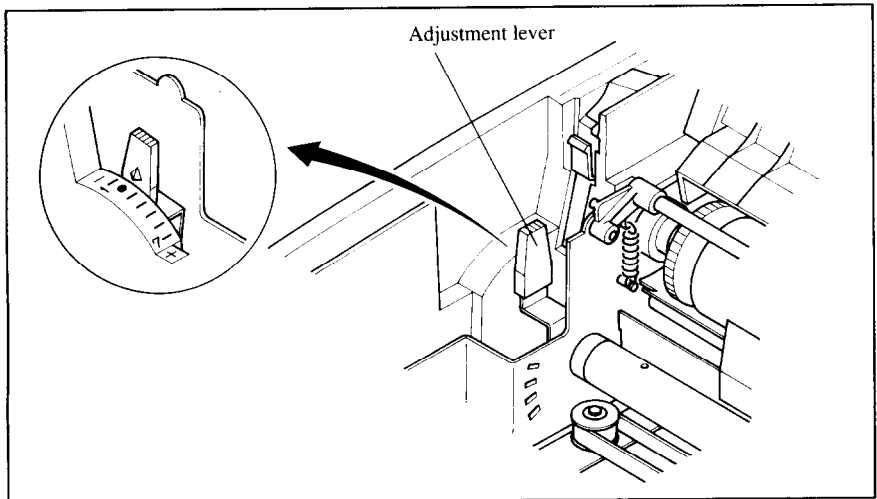
## ADJUSTING THE PRINTING GAP

The distance between the print head and the platen can be adjusted to accommodate different paper thicknesses. To make this adjustment, open the front cover. The adjustment lever is located at the left side of the printer mechanism. Pushing the adjustment lever backwards narrows the gap; pulling it forwards widens the gap.

There are seven positions, and you can feel the lever clicking into each position. The second position from the rear (marked with “•”) is the one most commonly used for single sheets of paper.

Try different positions until you get the best printing results.

**NOTE:** Printing with an inappropriate gap may drastically shorten the life of the print head.



**Figure 4-2.** Location of the adjustment lever.

The following table provides the recommended lever positions for each paper types as a reference.

Paper Type	Weight (g/m <sup>2</sup> ) (Each paper)	Thickness (mm) (Total)	Recommended Lever position
Single	52 ~ 90	0.07 ~ 0.12	2nd or 3rd
2-ply	40 ~ 58	0.12 ~ 0.16	2nd or 3rd
3-ply	40 ~ 58	0.18 ~ 0.25	3rd or 4th
4-ply	40 ~ 58	0.24 ~ 0.30	5th or 6th
5-ply	40 ~ 58	0.30 ~ 0.35	6th or 7th

## LOADING FANFOLD FORMS

This printer accepts fanfold forms up to 10" wide for the normal carriage printer, and up to 16" wide for the wide carriage printer.

You can load fanfold paper with the following three ways:

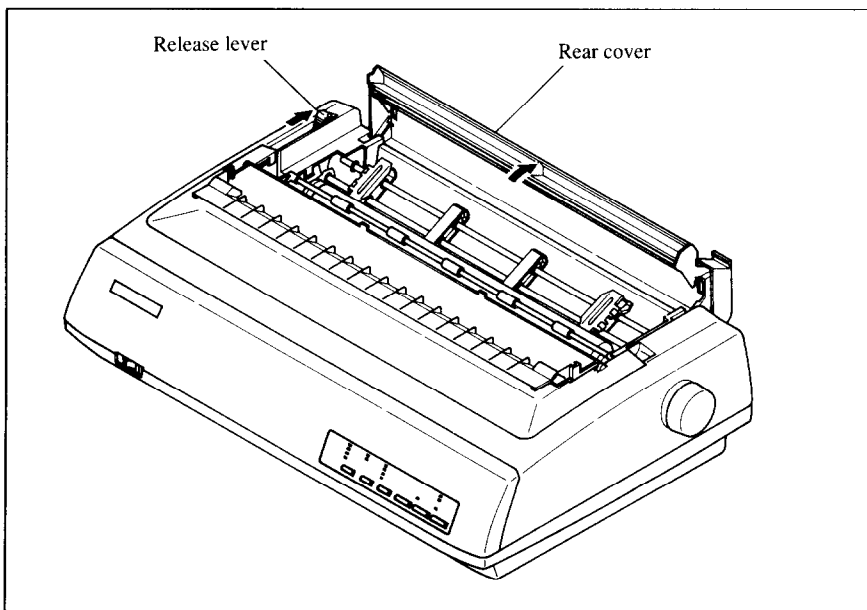
- Push feed with internal tractor unit
- Bottom feed with optional Pull Tractor Unit
- Push/Pull feed with internal tractor unit and the optional Pull Tractor Unit.

This section will take you through the procedures for loading, parking and unparking fanfold forms.

## **Loading the paper from the rear of the printer (Push feed)**

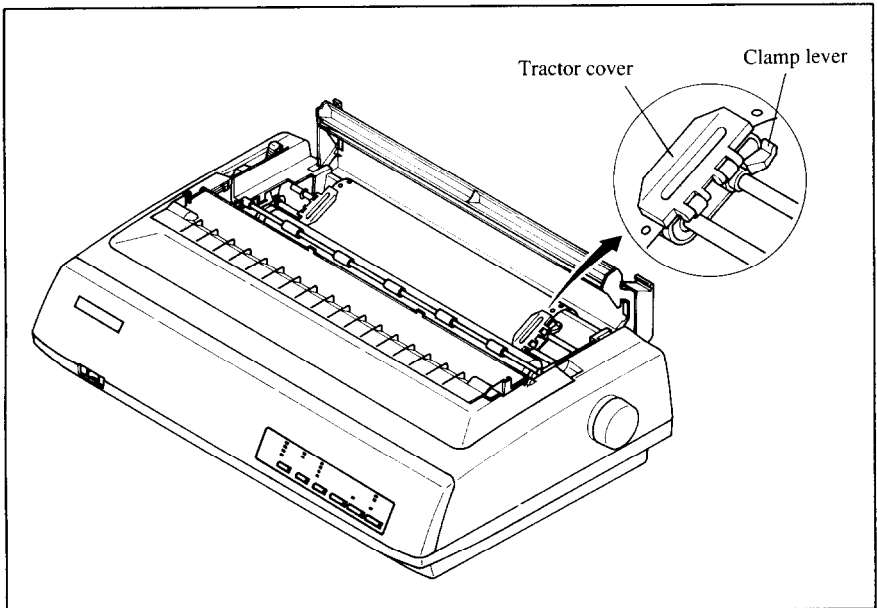
You can load the fanfold paper with the internal push tractor unit.

1. Place a stack of fanfold paper behind and at least one page-length below the printer.
2. Turn the printer's power OFF.
3. Push the release lever backward. This has the effect of releasing the paper from the platen roller, and engaging the tractor feed.
4. Remove the paper guide and put it aside for the moment.
5. Open the transparent part of the front cover, and the rear cover using the two grips on either side, as in Figure 4-3.



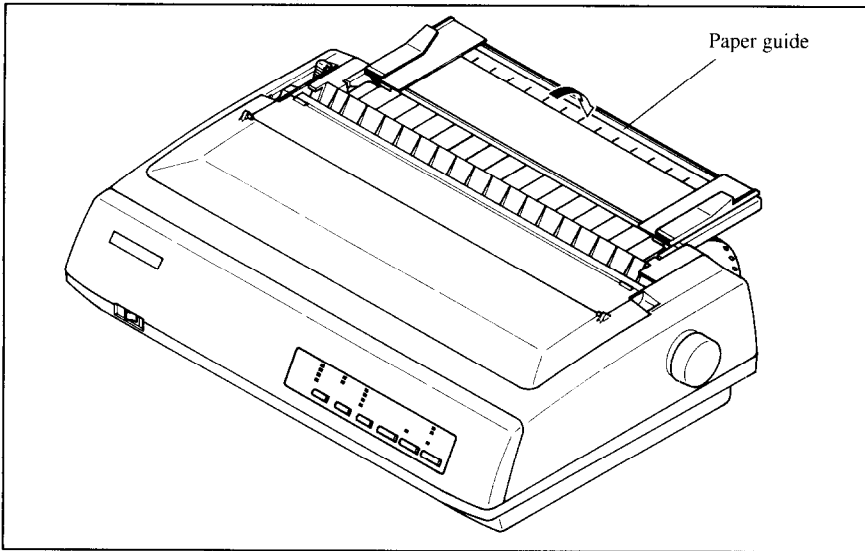
**Figure 4-3.** Opening the rear cover.

6. Pass the paper between the printer case and the rear cover.
7. With the tractor covers open, mount the paper by aligning holes with the pins on the tractor unit.
8. Adjust the spacing of the tractor units by sliding them along the bar, using the clamp lever at the back of each unit to release and lock them in position. When the clamp lever is up, the unit is released, and when it is down, the unit is locked.



**Figure 4-4.** Mount the fanfold paper over the tractor units.

9. Now close the tractor covers, again making sure that the paper holes are aligned with the pins on the tractor units. If they are not aligned properly, you will have problems with paper feeding, possibly resulting in tearing and jamming of the paper.
10. Turn on the power using the switch located at the front of the printer. The printer will beep, indicating that the paper is not yet fully loaded. The PAPER indicator will also illuminate to confirm this.
11. Now press the **SELECT/PARK** button. The paper will be fed and adjusted past the print head to a position ready for printing.
12. If you want to set the paper to a different position, set the printer off-line by pressing the **ON LINE** button, then set the paper by using the micro-feed function. (For details, refer to Chapter 5.)
13. Close the rear cover and the transparent part of the front cover, then mount the paper guide in the horizontal position shown in Figure 4-5, so that it will separate the printed from the unprinted paper.

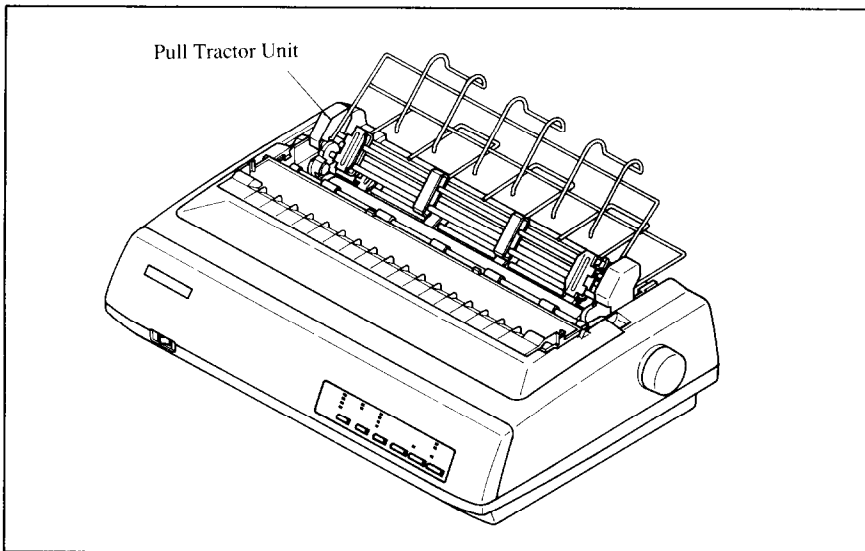


**Figure 4-5.** Mounting the paper guide for fanfold forms.

## ***Loading the paper from the bottom of the printer***

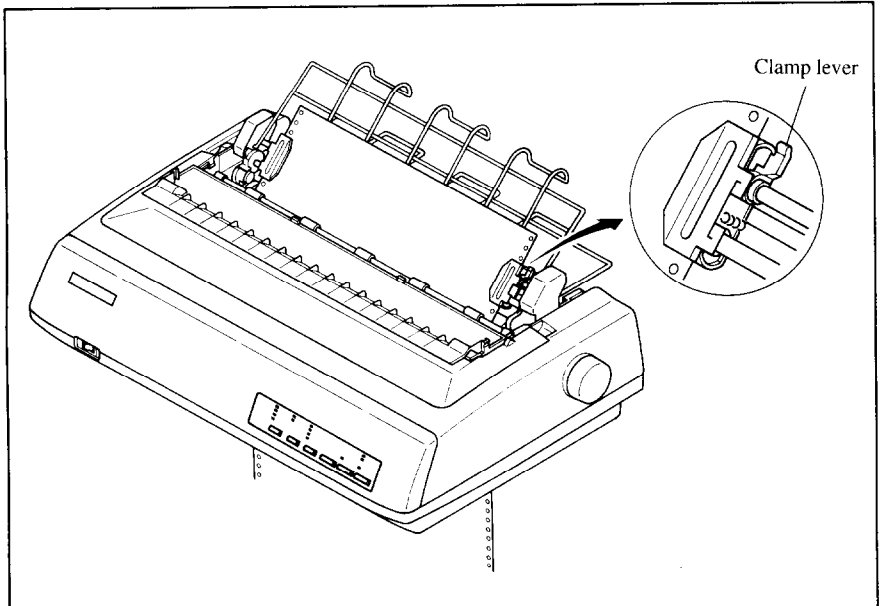
You can load the fanfold paper from the bottom of the printer with the optional Pull Tractor Unit.

1. Install the optional Pull Tractor Unit as described in Chapter 3.



**Figure 4-6.** Install the optional Pull Tractor Unit.

2. With the tractor covers open, mount the paper from the bottom of the printer, by aligning holes with the pins on the tractor unit.



**Figure 4-7.** Mount the fanfold paper from the bottom of the printer.

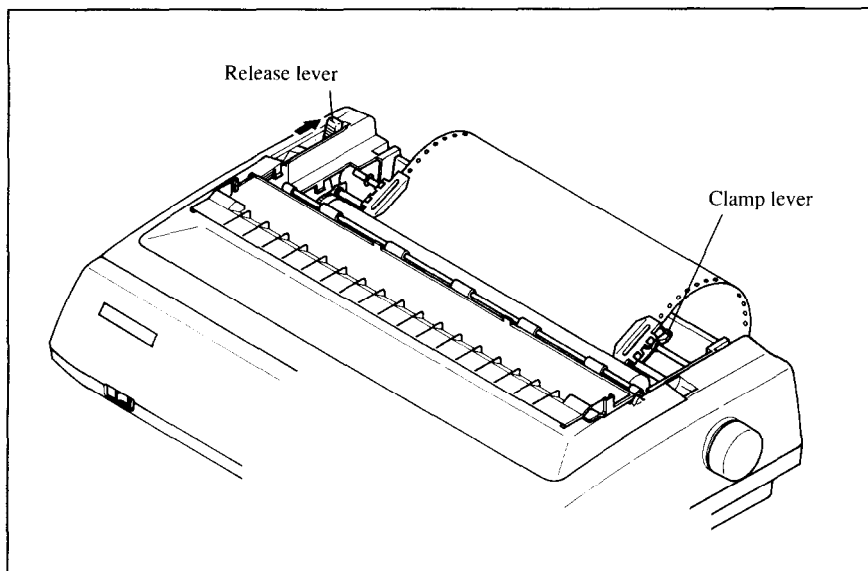
3. Adjust the spacing of the tractor units by sliding them along the bar, using the clamp lever at the back of each unit to release and lock them in position. When the lever is up, the unit is released, and when it is down, the unit is locked.
4. Now close the tractor covers, again making sure that the paper holes are aligned with the pins on the tractor units. If they are not aligned properly, you will have problems with paper feeding, possibly resulting in tearing and jamming of the paper.

### ***Loading the paper with Push/Pull feed***

You can load the fanfold paper with Push/Pull feed by using both the internal push tractor unit and the optional Pull Tractor Unit.

1. Place a stack of fanfold paper behind and at least one page-length below the printer.
2. Turn the printer's power OFF.
3. Push the release lever backward. This has the effect of releasing the paper from the platen roller, and engaging the tractor feed.

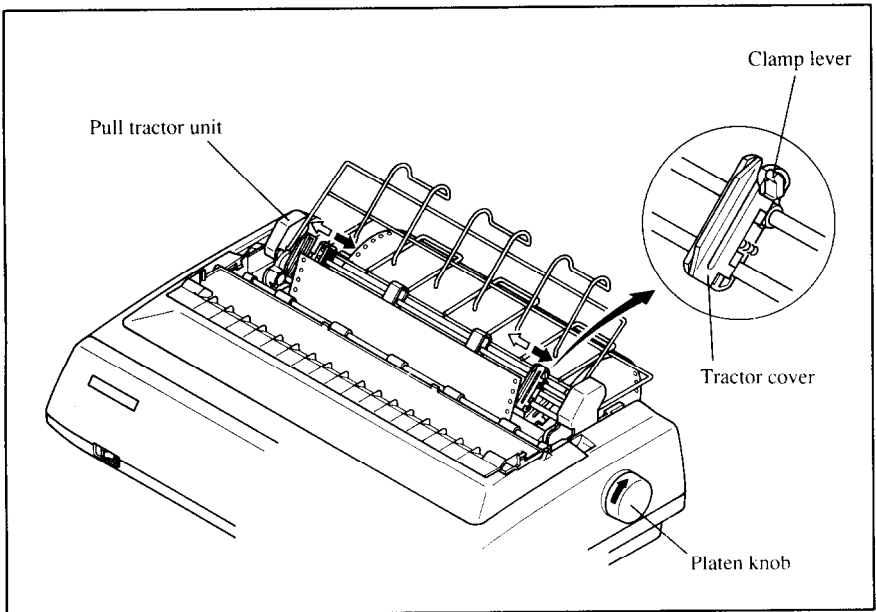
4. Open the transparent part of the front cover, and remove the paper guide and the rear cover.
5. With the tractor covers open, mount the paper by aligning holes with the pins on the tractor unit.
6. Adjust the spacing of the tractor units by sliding them along the bar, using the clamp lever at the back of each unit to release and lock them in position. When the clamp lever is up, the unit is released, and when it is down, the unit is locked.
7. Now close the tractor covers, again making sure that the paper holes are aligned with the pins on the tractor units. If they are not aligned properly, you will have problems with paper feeding, possibly resulting in tearing and jamming of the paper.



**Figure 4-8.** Mount the fan-fold paper over the internal tractor units.

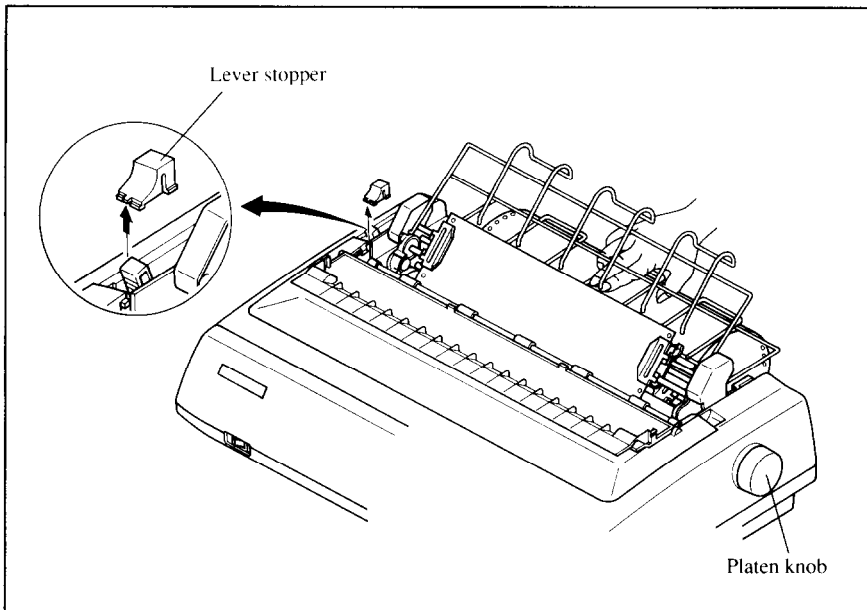
8. Turn on the power using the switch located at the front of the printer. The printer will beep, indicating that the paper is not yet fully loaded. The PAPER indicator will also illuminate to confirm this.
9. Now press the **SET/EJECT** button. The paper will be fed past the print head.
10. Turn off the power, and install the optional Pull Tractor Unit as described in Chapter 3.
11. With the optional tractor covers open, turn the platen knob clockwise to mount the paper by aligning holes with the pins on the optional tractor unit.





**Figure 4-9.** Mount the fanfold paper to the Pull Tractor Unit by turning the platen knob.

12. Adjust the spacing of the optional tractor units by sliding them along the bar, using the clamp lever at the back of each unit to release and lock them in position. When the lever is up, the unit is released, and when it is down, the unit is locked.
13. Now close the tractor covers, again making sure that the paper holes are aligned with the pins on the optional tractor units. If they are not aligned properly, you will have problems with paper feeding, possibly resulting in tearing and jamming of the paper.
14. Remove the lever stopper from the slot of the release lever as shown in Figure 4-10.
15. Set the release lever to the “•” position, and turn the platen knob clockwise to tighten the paper if it is slack.



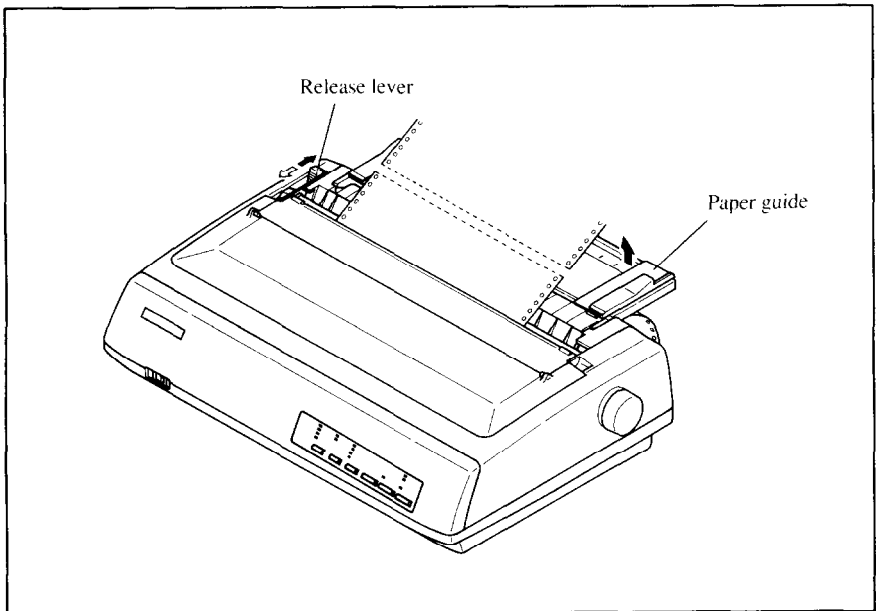
**Figure 4-10.** Remove the lever stopper, and tighten the paper.

16. Push the release lever backward, and remount the lever stopper to the original position.

## ***Paper parking***

After loading fanfold paper with Push feed mode, you do not have to unload it when you want to print on a single sheet. The printer will “park” it for you if you follow the procedure below.

1. To begin paper parking, start with power ON, fanfold paper loaded in printing position, and the release lever backward.
2. Press the  button on the control panel to set the printer off-line. ON LINE indicator will turn off.
3. Tear off the printed form at the last perforation, leaving not more than about half a page showing above the front cover. If necessary, press the  button to feed paper forward until a perforation is located just above the front cover, and tear there.
4. Press the  button on the control panel.  
The printer will automatically feed the fanfold form backward until the paper is completely free of the platen.
5. Move the release lever to the front.



**Figure 4-11.** Tear off the printed fanfold paper.

**6. Mount the paper guide in the upright position.**

Now you can load single sheets. The fanfold paper remains parked at the back of the printer.

**NOTE:** You cannot park the fanfold paper if you have loaded it using the optional Pull Tractor Unit.

### ***Paper unparking***

When you want to resume using fanfold paper, the procedure is as follows.

1. Remove all single sheets from the printer.
2. Mount the paper guide in the horizontal position.
3. Move the release lever to the backward.
4. Press the **SET/EJECT PARK** button. The printer will automatically feed the parked fanfold paper back into position for printing.

**NOTE:** The printer beeps intermittently if you move the release lever while the paper is loaded.

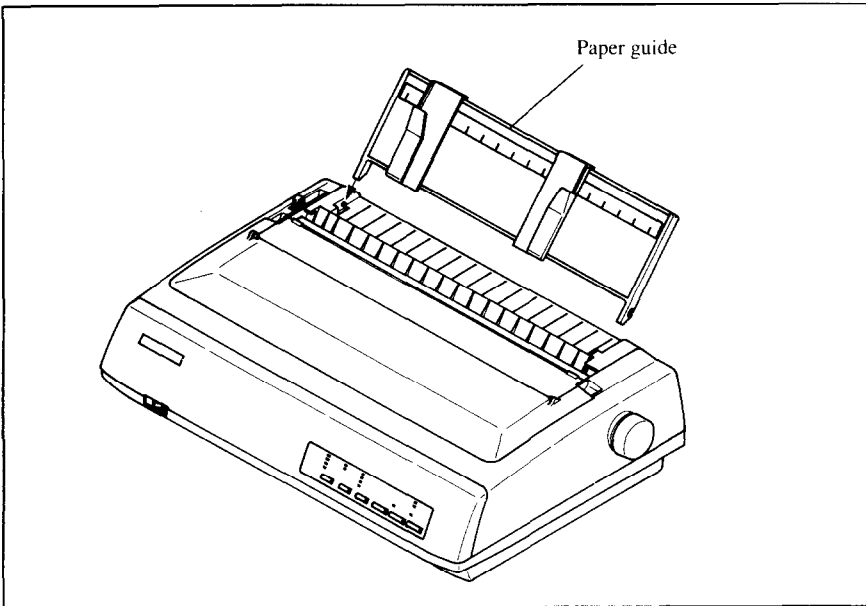
# LOADING SINGLE SHEETS

This section will take you through the procedures for loading single sheets of paper.


## *Loading the paper without optional accessories*

If you are using the optional Automatic Sheet Feeder, refer to next section.

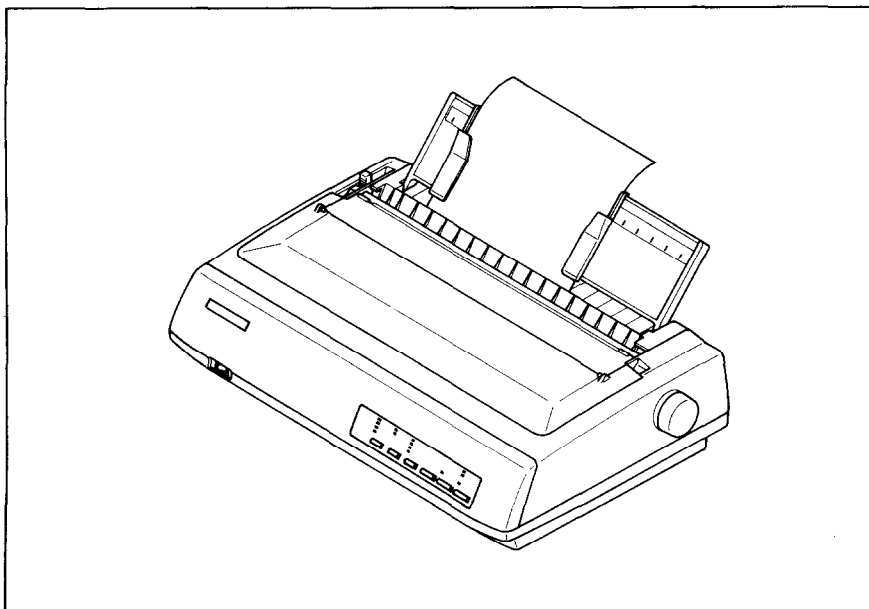
1. Place the paper guide in position by inserting the tabs, located on the bottom of the assembly, into the slots on the rear cover of the printer.



**Figure 4-12.** Mounting the paper guide for single sheets.

2. Adjust the paper guides to match the size of the paper you will be using. Remember that printing will start some distance from the left-hand edge of the carriage.
3. Turn on the power using the switch located at the front of the printer. The printer will beep, indicating that there is no paper in position for printing. The PAPER indicator will also illuminate to confirm this.
4. Make sure that the release lever is at front position.  
If fanfold paper is already mounted in the printer, press the  button to park the paper in the off-line state, then move the release lever forward.

5. Place a single sheet between the guides, placing the side on which you want to print towards the back of the printer. Gently push the paper down in the guides until you feel it stop.
6. Now press the **SET/EJECT PAPER** button. The paper will be fed into the printer and adjusted past the print head to a position ready for printing.
7. If you want to set the paper to a different position, set the printer off-line by pressing the **ON LINE** button, then set the paper position by using the micro-feed function. (For details, refer to Chapter 5.)



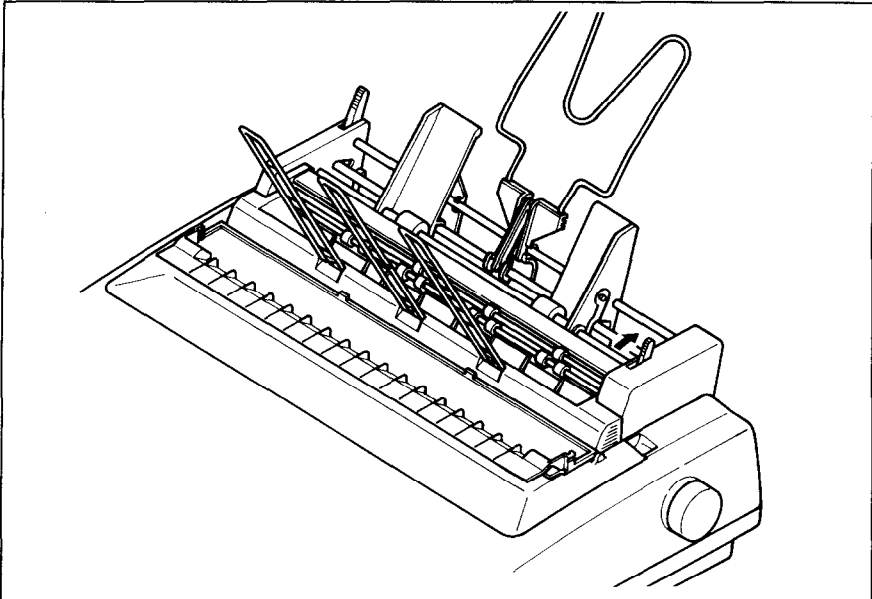
*Figure 4-13.* Loading a single sheet.

**NOTE:** You can also load paper manually from the slot at the front of the ASF roller or the front of the ASF bin when using the Automatic Sheet Feeder.

## ***Loading the paper with optional Automatic Sheet Feeder***

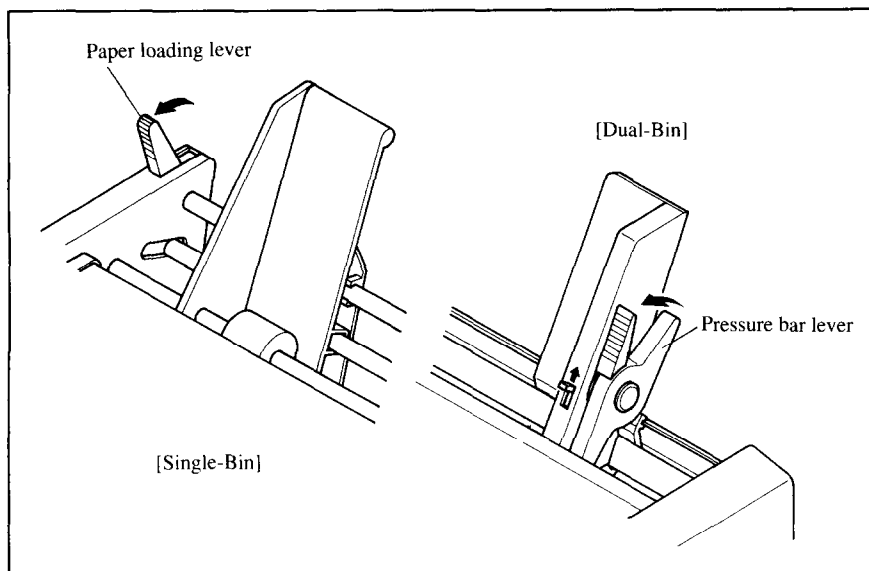
If you are not using the optional Automatic Sheet Feeder, refer to the previous section.

1. Install the optional Automatic Sheet Feeder as described in Chapter 3.



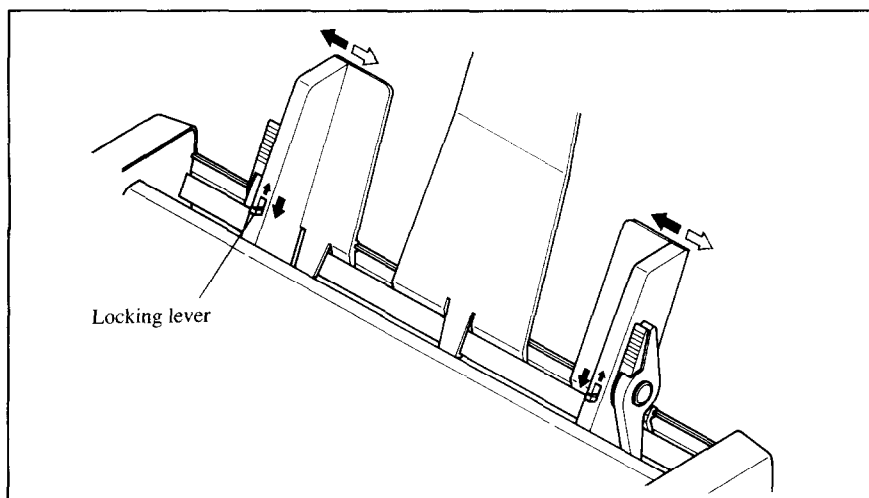
**Figure 4-14.** Install the optional Automatic Sheet Feeder.

2. Use the printer's Memory Switch mode to select ASF. (For details, please refer to Chapter 6.)
3. If fanfold paper has already been loaded in the printer, park the paper through the rear slot.
4. Pull the printer release lever forward to load single sheets.
5. When you are using Single-Bin ASF, pull the paper loading lever forward to pull the hopper out until it is in position.  
In case of the Dual-Bin ASF, pull both pressure bar levers forward to open the pressure bar.



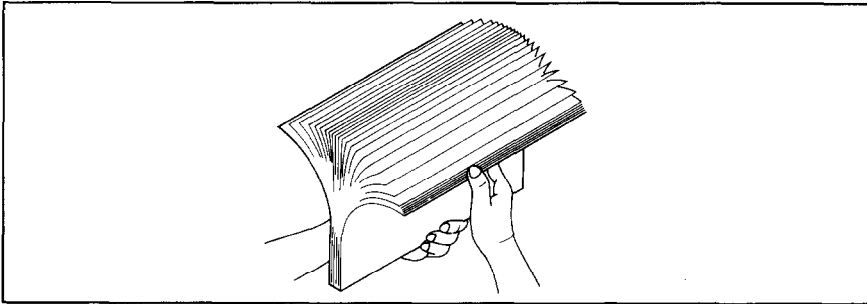
**Figure 4-15.** Make ready to load paper.

6. Adjust the left paper guide to the desired left position by moving it horizontally in either direction. (Unlock the paper guides by pressing down on the locking levers in case of Dual-Bin ASF.)
7. Lock the left paper guides in position by moving the locking lever up for the Dual-Bin ASF.



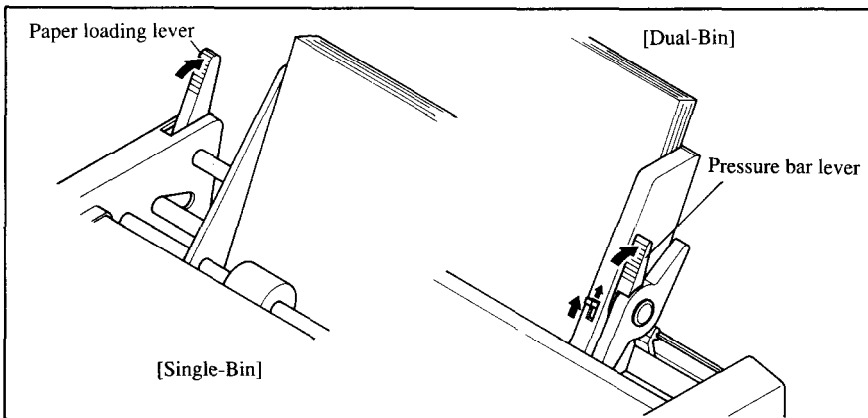
**Figure 4-16.** Adjust the paper guides to accommodate the width of the paper.

8. Adjust the right paper guide to accommodate the width of the paper. The guides should be adjusted to restrict the amount of horizontal play while allowing the paper to slide up and down freely between the two paper guides. The ideal distance between paper ream and paper guides is 0.25 mm (0.01") on both sides at the narrowest part of the paper guides.
9. Fan the paper stack and square it off properly before inserting it into the Automatic Sheet Feeder.



**Figure 4-17.** Fan the paper before inserting into the ASF.

10. Insert the paper stack into Automatic Sheet Feeder.  
The stack should not be more than 15 mm (5/8") equivalent to 150 sheets of 20 lb paper.  
If necessary, remove some sheets. The ASF may not perform satisfactorily if it is overloaded.
11. When you are using Single-Bin ASF, push the paper loading lever toward the back.  
In case of the Dual-Bin ASF, push both pressure bar levers toward the back to "FEED".



**Figure 4-18.** Push the paper loading lever or pressure bar levers to hold the paper stack.



# Chapter 5

## CONTROL PANEL OPERATIONS

The control panel buttons can be pressed individually to perform the operations indicated by their names. Other functions can be achieved by holding these buttons down when you turn the printer's power on, or by pressing the control panel buttons in combination.

This chapter explains all the button and indicator functions.

- Pause printing
- Feed paper (fast and slow, forward and reverse)
- Park fanfold forms
- Set the top-of-form position
- Select the print pitch
- Select a font
- Print test patterns
- Prevent software from changing the panel pitch and font selections
- Print a hexadecimal dump
- Clear the printer's buffer
- Change the print color
- Store macro definition

### BUTTONS AND INDICATORS

The printer is equipped with six buttons on the control panel. From left to right they are **FONT**, **MODE** and **PITCH** (smaller buttons), and **SET/EJECT PARK**, **PAPER FEED** and **ON LINE** (larger buttons).

The following is a brief guide to the buttons and indicators on the control panel.

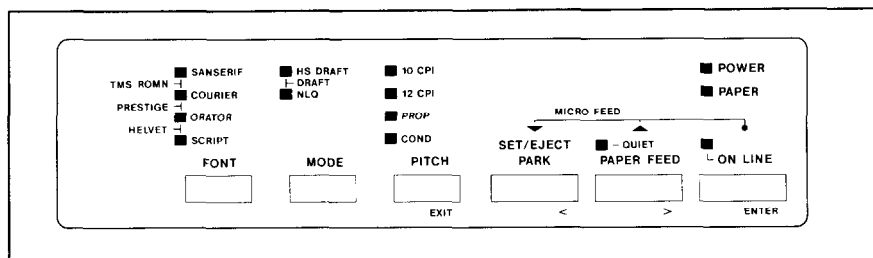


Figure 5-1. Control panel.

## **ON LINE button**

The  ON LINE button sets the printer on-line and off-line. The status changes each time you press the button.

When the printer is on-line, it can receive and print data from the computer. When the printer is off-line, it stops printing and sends the computer a signal indicating that it cannot accept data.

The printer powers up in the on-line status if paper is loaded. If paper is not loaded, the printer powers up off-line with the PAPER indicator illuminating. When you load paper, the printer goes on-line.

You will want to press the  ON LINE button:

- Before and after any other panel operation  
The other panel buttons operate only in the off-line state. Press the  ON LINE button to go off-line. After performing the panel operation(s), press the  ON LINE button again to go back on-line.
- To pause during printing  
If you press the  ON LINE button during printing, the printer stops printing and goes off-line, allowing you to check the printout or change a control panel setting. Printing resumes when you press the  ON LINE button again to go back on-line.
- To cut fanfold forms at the end of printing  
When you hold the  ON LINE button down for one second with the push tractor mode, the printer goes off-line, then the printer also feeds the paper forward approximately two inches forward. This allows you to cut it off just below the last line printed.  
When you press the  ON LINE button again to go back on-line, the paper feeds backward stopping where you left off.  
NOTE: This function is valid only when the buffer is empty.

## **PAPER FEED button**

If you press this button while the printer is off-line, the paper will feed forward. If you hold the button down, the printer will perform consecutive line feeds.

If you also press the  ON LINE button while you are line-feeding, the paper will feed automatically to the top of the next page. This is explained later.

If you press this button while on-line, this will alternately flash the QUIET indicator. When in Quiet mode with the QUIET indicator lit, the printer will print slightly slower, but at a reduced noise level.

### **SET/EJECT/PARK button**

**NOTE:** This button has no effect if the bottom feed mode is selected.

Pressing this button causes the printer to begin paper loading if the paper has not loaded while in the off-line state.

If the paper has been loaded, this button results in different functions depending on the position of the release lever.

If the release lever is back for the fanfold forms, pressing this button parks the forms.

If the release lever is forward for the single sheets, pressing this button ejects the paper.

### **PITCH button**

This button allows you to select the printing pitch. Remember that the printer must be off-line for you to do this. Successive presses of this button will illuminate (and select) the following options in order (Note that condensed elite is not available in the IBM mode):

<b>Pitch</b>	<b>Indicator(s)</b>
Pica (10CPI)	10 CPI
Elite (12CPI)	12 CPI
Condensed pica (17CPI)	10 CPI, COND
Condensed elite(20CPI)	12 CPI, COND
Proportional	PROP

## **MODE button**

This button allows you to select the printing mode. Remember that the printer must be off-line for you to do this. Successive presses of this button will illuminate (and select) the following options in order:

<b>Print mode</b>	<b>Indicator(s)</b>
HS-Draft	HS-DRAFT
Draft	HS-DRAFT, NLQ
Near Letter Quality	NLQ

## **FONT button**

This button selects the NLQ font to be printed. Sanserif font is selected at power-up unless the default settings are changed. To change the font, set the printer off-line, then press the  button repeatedly until the indicators beside the desired selection illuminate. The selections cycle in the following order:

<b>Font</b>	<b>Indicator(s)</b>
Sanserif	SANSERIF
Courier	COURIER
Orator	ORATOR
Script	SCRIPT
Tms Romn	SANSERIF, COURIER
Prestige	COURIER, ORATOR
Helvet	ORATOR, SCRIPT

# POWER-UP FUNCTIONS

In addition to their normal functions, all the control panel buttons have special functions that operate if you hold them down while switching power on.

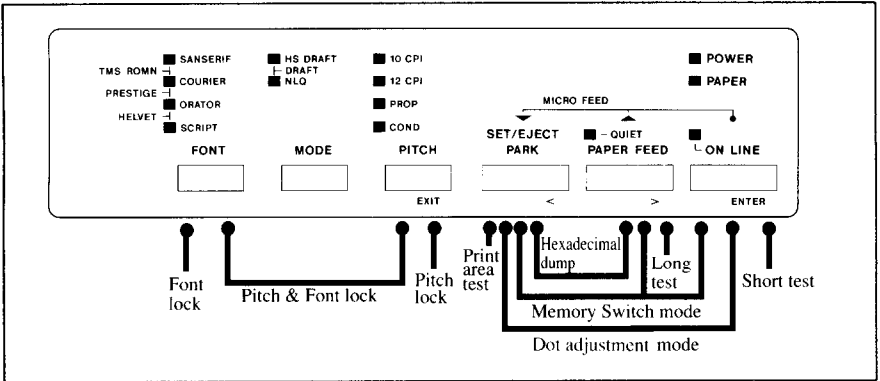


Figure 5-2. Power-up functions of control panel.

## Short test mode

If the printer is turned on while the **ON LINE** button is pressed, the printer will enter the short self-test mode. The printer will print the version number of the printer's ROM, followed by seven lines of the character set.

Each line will be offset by one character from the one before it. The final result will be something like Figure 5-3. (If the color ribbon is used, each line prints in a different color.)

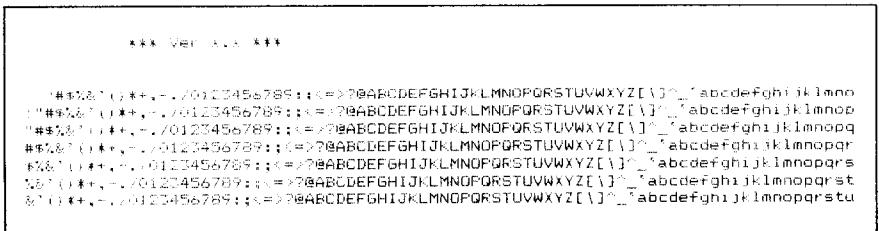


Figure 5-3. Short self-test.

Since the self-test occupies the full width of the carriage, it is recommended that the printer is loaded with the widest paper possible to avoid damage to the print head and/or platen.

# Long test mode

If the printer is turned on while the **PAPER FEED** button is pressed, the printer will enter the long self-test mode. The printer will print the version number of the printer's ROM, the Memory Switch Tree, followed by the whole character set printed in each font and pitch available.

The test cycles endlessly, so you must turn the power off to stop it.

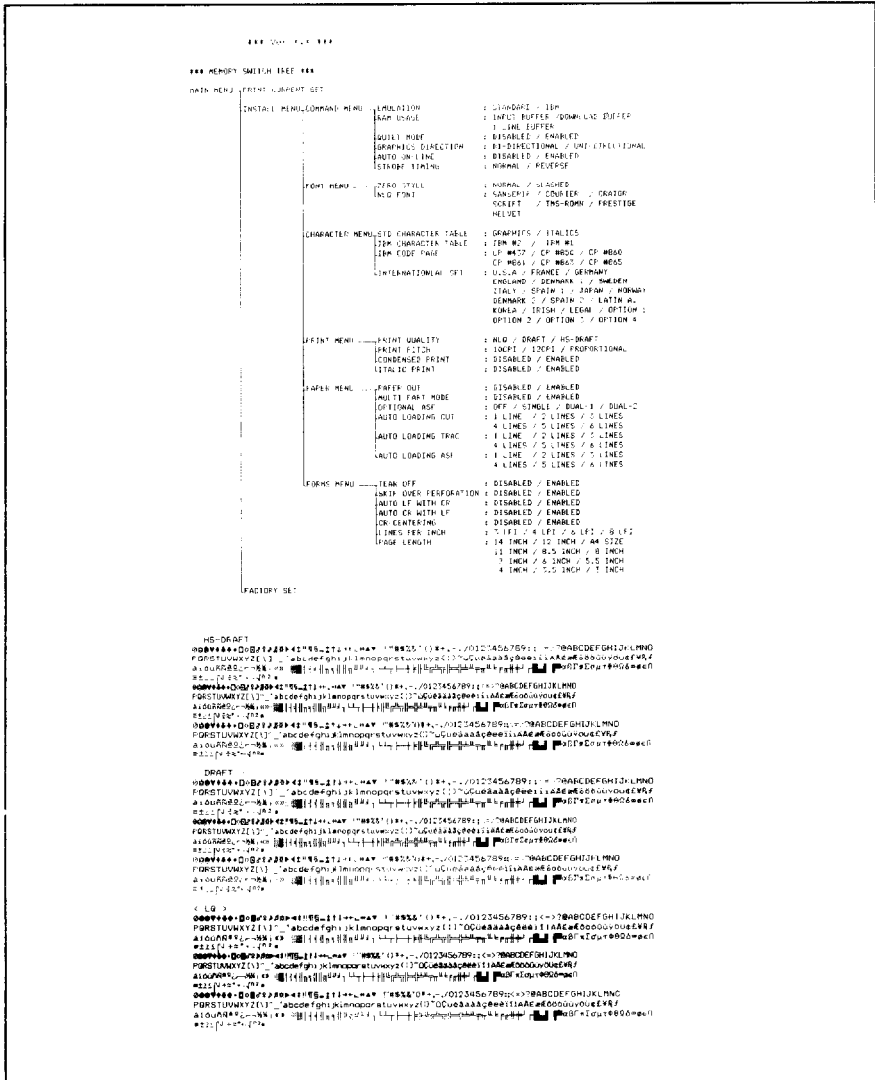


Figure 5-4. Long self-test.

Since the self-test occupies the full width of the carriage, it is recommended that the printer is loaded with the widest paper possible to avoid damage to the print head and/or platen. In addition, the total number of lines printed is considerable, more than can be accommodated on a single sheet, so fanfold paper is recommended for this test.

### ***Print area test mode***

By holding the **GET/EJECT  
PARK** button down during power-up, the printer will enter the print area test mode. This way, you can find how many lines on your paper are available for printing. The printer will print the first line message, then print the last line message after feeding to the bottom of the page.

If you have loaded the fanfold paper, only the first line message is printed.

### ***Pitch lock mode***

By holding the **PITCH** button down during power-up, the print pitch can only be selected from the control panel. This prevents software interference. You will hear an acknowledging beep as power comes on.

After the beep tone, you can set the printer off-line, select a print pitch, then return to on-line and start printing. The pitch you selected will not be reset or otherwise changed by any commands your software may issue.

### ***Font lock mode***

By holding the **FONT** button during power-up, print mode and fonts can only be selected from the control panel. This prevents software interference. There will be an acknowledging beep as power comes on. After which you can set the printer off-line, select a print mode and font, then return to the on-line state and begin printing. The selected print mode and font will not be changed by any commands your software may issue.

### ***Pitch and Font lock mode***

If you want to protect both the pitch and font settings from software changes, press both the **PITCH** and **FONT** buttons during power-up. There will be two acknowledging beep tones.

Pressing these buttons during power-up does not prevent you from making any number of changes later from the control panel.

## Hexadecimal dump

This feature is useful for programmers who are debugging printing programs and want to see the actual codes the printer is receiving. (Some computers change the codes the programmer intended.)

In this mode, all data received will be printed in a hexadecimal dump format, rather than the control codes being acted on as command codes.

This mode is accessed with the following procedure:

1. While holding both the **PAPER FEED** and **REJECT PARK** buttons down, turn power ON. A beep tone will be heard.
2. Begin printing. In place of the usual printout you will get a formatted dump showing exactly what data the printer receives. Each line presents sixteen characters, their hexadecimal codes to the left and printable characters printed on the right.
3. At the end of the hexadecimal dump, set the printer off-line with the **ON LINE** button. This is necessary to print the last line.

The following BASIC program is a simple test you can run in hexadecimal mode:

```
10 WIDTH "LPT1:",255
20 FOR I=0 TO 255
30 LPRINT CHR$(I);
40 NEXT I
50 LPRINT
60 END
```

If your system passes the codes directly to the printer without changing them, you will get a printout like Figure 5-5.

00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F	.....
10	11	12	13	14	15	16	17	18	19	1A	1B	1C	1D	1E	1F	.....
20	21	22	23	24	25	26	27	28	29	2A	2B	2C	2D	2E	2F	!"#\$%&'()*+,-./
30	31	32	33	34	35	36	37	38	39	3A	3B	3C	3D	3E	3F	0123456789:;<=>?
40	41	42	43	44	45	46	47	48	49	4A	4B	4C	4D	4E	4F	@ABCDEFGHIJKLMNO
50	51	52	53	54	55	56	57	58	59	5A	5B	5C	5D	5E	5F	PQRSTUVWXYZ[\]^_
60	61	62	63	64	65	66	67	68	69	6A	6B	6C	6D	6E	6F	`abdefghijklmno
70	71	72	73	74	75	76	77	78	79	7A	7B	7C	7D	7E	7F	pqrstuvwxyz{ }~.
80	81	82	83	84	85	86	87	88	89	8A	8B	8C	8D	8E	8F	.....
90	91	92	93	94	95	96	97	98	99	9A	9B	9C	9D	9E	9F	.....
AA	A1	A2	A3	A4	A5	A6	A7	AB	AC	AD	AE	AF	.....	.....	.....	.....
B0	B1	B2	B3	B4	B5	B6	B7	BE	BF	.....	.....	.....	.....	.....	.....	.....
C0	C1	C2	C3	C4	C5	C6	C7	CE	CF	.....	.....	.....	.....	.....	.....	.....
D0	D1	D2	D3	D4	D5	D6	D7	DE	DF	.....	.....	.....	.....	.....	.....	.....
E0	E1	E2	E3	E4	E5	E6	E7	EE	EF	.....	.....	.....	.....	.....	.....	.....
F0	F1	F2	F3	F4	F5	F6	F7	FE	FF	.....	.....	.....	.....	.....	.....	.....
0D	0A															..

Figure 5-5. Sample hexadecimal dump.



Most BASICs, however, are not quite that straightforward. For example, the IBM-PC will give you a printout similar to Figure 5-6.

```

00 01 02 03 04 05 06 07      08 09 0A 0B 0C 0D 0E 0F      .....
0F 10 11 12 13 14 15 16      17 18 19 1B 1C 1D 1E 1F      .....
20 21 22 23 24 25 26 27      28 29 2A 2B 2C 2D 2E 2F      !"#%&'()*+,-./
30 31 32 33 34 35 36 37      38 39 3A 3B 3C 3D 3E 3F      0123456789:;<=>?
40 41 42 43 44 45 46 47      48 49 4A 4B 4C 4D 4E 4F      @ABCDEFGHIJKLMNO
50 51 52 53 54 55 56 57      58 59 5A 5B 5C 5D 5E 5F      PQRSTUvwxyz[\]^_
60 61 62 63 64 65 66 67      68 69 6A 6B 6C 6D 6E 6F      `abdefghijklmno
70 71 72 73 74 75 76 77      78 79 7A 7B 7C 7D 7E 7F      pqrstuvwxyz0123.
80 81 82 83 84 85 86 87      88 89 8A 8B 8C 8D 8E 8F      .....
90 91 92 93 94 95 96 97      98 99 9A 9B 9C 9D 9E 9F      .....
A0 A1 A2 A3 A4 A5 A6 A7      AB A9 AA AB AC AD AE AF      .....
B0 B1 B2 B3 B4 B5 B6 B7      BB B9 BA BB BC BD BE BF      .....
C0 C1 C2 C3 C4 C5 C6 C7      CB C9 CA CB CC CD CE CF      .....
D0 D1 D2 D3 D4 D5 D6 D7      DB D9 DA DB DC DD DE DF      .....
E0 E1 E2 E3 E4 E5 E6 E7      EB E9 EA EB EC ED EE EF      .....
F0 F1 F2 F3 F4 F5 F6 F7      FB F9 FA FB FC FD FE FF      .....
0D 0A      ..

```

Figure 5-6. Sample hexadecimal dump with IBM-PC.

When the IBM-PC BASIC interpreter sends hex code 0D (carriage return) it adds an extra hex 0A (line feed). Hex code 1A (end-of-file) also gets special treatment: the interpreter does not send it at all. This can cause problems with graphics or download character data. However, you can solve this problem by changing line 30 in the preceding program and adding the coding shown below.

Coding for IBM-PC with monochrome display:

```

30 GOSUB 100
100 X=INP(&H3BD) :IF X<128 THEN 100
110 OUT &H3BC,I :OUT &H3BE,5 :OUT &H3BE,4
120 RETURN

```

Coding for IBM-PC with color adapter:

```

30 GOSUB 100
100 X=INP(&H379) :IF X<128 THEN 100
110 OUT &H378,I :OUT &H37A,5 :OUT &H37A,4
120 RETURN

```

# SWITCH COMBINATION FUNCTIONS

Several additional functions can be achieved by pressing the control panel buttons in combinations.

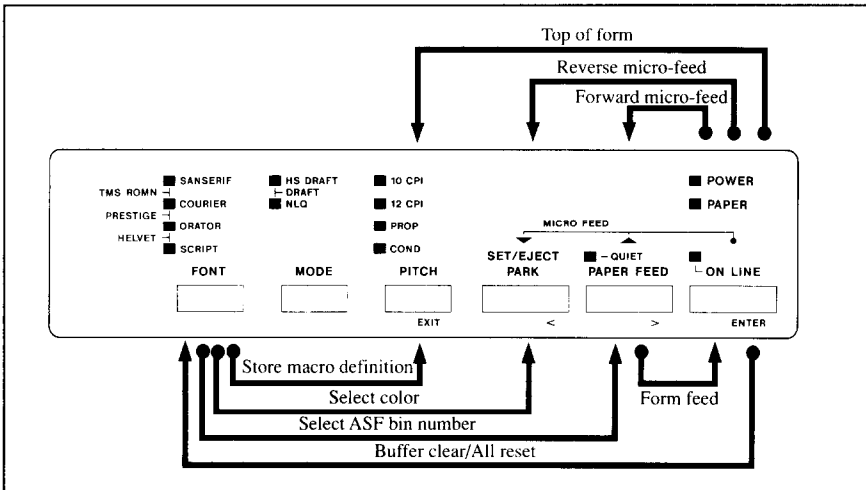


Figure 5-7. Switch combination functions of control panel.

## Form feed

If you are using single sheets, this operation ejects the current page. If you are using fanfold forms, it feeds to the top of the next page.

1. Press the  button to set the printer off-line.
2. Press the  button and hold it down. The printer will start performing successive line feeds.
3. While holding the  button down, press the  button, then release both buttons at the same time. The printer will smoothly eject the current page.

## Top of form

When you power on the printer, the top-of-form position is automatically set to the current position. If this is not where you want the top of the page to be, you can change the top-of-form position as follows:

1. Press the  button to set the printer off-line.
2. Move the paper to the desired top-of-form position by pressing the  button, or by performing a forward or reverse micro-feed.

3. Press and hold the  button.
4. While holding the  button down, press the  button, then release both buttons at the same time. The printer will beep to indicate that the top-of-form position has been set.

### ***Forward micro-feed***

For fine alignment, you can feed the paper forward in very small increments as follows:

1. Press the  button to set the printer off-line.
2. Press the  button again and hold it down.
3. While holding the  button down, press the  button. The paper will start advancing in a series of small steps. When you want to stop, release both buttons.

### ***Reverse micro-feed***

You can also feed the paper in small increments in reverse, to return to a higher position on the same page.

**NOTE:** With fanfold forms, do not try to return to a previous page. The perforation may catch inside the printer.

1. Press the  button to set the printer off-line.
2. Press the  button again and hold it down.
3. While holding the  button down, press the  button. The paper will start moving backwards in a series of small steps. When you want to stop, release both buttons.

### ***Changing the auto loading value***

Normally, the printer automatically loads the paper one line from the top edge.

If you want to change this value, follow this procedure:

1. Load the paper using the  button.
2. Change the print position using the micro feed function.
3. After you get the desired position, press the  button to save the value.

This value will remain unless you power off the printer. If you want to retain this value even after you turn off the power, store it using the Macro Definition function, which is described later.

Note that you can only change this value immediately after loading paper. If you feed paper, you cannot change the auto loading value.

## ***Clearing the buffer/All reset***

The printer stores received data in a large memory buffer. This creates a problem when you want to abandon a printing job and restart: the printer may be holding more data in its buffer than it has actually printed, and this unprinted data must be cleared out before restarting. Turning power off is one way to clear the buffer, but there is another way:

1. Halt the printing program on the computer. If printing stops immediately, the buffer is clear and the rest of this procedure is unnecessary. If printing does not stop, continue as follows:
2. Press the  ON LINE button to set the printer off-line. Printing will now stop, but there may be data remaining in the buffer.
3. Press and hold the  ON LINE button.
4. While pressing the  ON LINE button down, press and hold the  FONT button. Continue holding these two buttons down. In few seconds you will hear a beep tone signaling that the buffer has been cleared.  
If you hold these switches more three seconds, you will hear three beep tones signaling that the printer has been initialized to the power-on default settings.
5. Release these buttons, make any necessary control panel settings, then set the printer back on-line.

It is essential to halt the printing program on the computer before you go off-line. Otherwise, when you go back on-line the computer will start sending data again and the printer will continue printing, with missing data where the buffer was cleared.

## ***Selecting the print color***

Normally, the printer prints with black even if the color ribbon is installed. Without the aid of software, you can change the printing color as follows:

1. Press the  ON LINE button to set the printer off-line.
2. Press the  FONT button and hold it down.

3. While holding the **FONT** button, press the **SET/EJECT/PARK** button. The indicators beside the **FONT** button will blink to show the current color setting.
4. If you want to change the color, press the **SET/EJECT/PARK** button while holding the **FONT** button.  
The relation between the indicators and the color is shown below.

Color	Indicators	Color	Indicators
Black	SANSERIF	Yellow	ORATOR
Magenta	SANSERIF, COURIER	Orange	ORATOR, SCRIPT
Cyan	COURIER	Green	SCRIPT
Violet	COURIER, ORATOR		

5. Release both buttons after you set the desired printing color. If you want to save the selected color for later use, store it using the Macro Definition.

**NOTE:** This function is valid only when the color ribbon is installed into the printer.

## Selecting the ASF bin number

You can use the dual-bin type Automatic Sheet Feeder (SF-10RMII/15RMII) with this printer.

You can select this ASF bin number by the control panel operation as shown below:

1. Press the **ON LINE** button to set the printer off-line.
2. Press the **FONT** button and hold it down.
3. While holding down the **FONT** button, press the **PAPER FEED** button.
4. Each time you press the **PAPER FEED** button while holding down the **FONT** button, two indicators above the **PITCH** button will blink (to indicate that bin #1 is selected), or all indicators above the **PITCH** button will blink (to indicate that bin #2 is selected).
5. Release both buttons after you set the desired ASF bin number.

**NOTE:** This function is valid only when the Dual-bin ASF is selected by the Memory Switch setting.

## **Store Macro Definition**

You can store the current settings to the printer for later use with the following procedure:

1. Press the **ON LINE** button to set the printer off-line.
2. Press the **FONT** button and hold it down.
3. While holding the **FONT** button down, press the **PITCH** button and hold them down until the two beep tones heard.
4. Release both buttons at the same time after the beep tones to store the current setting.

If you release these buttons after the three beep tones, the macro is cleared.

**NOTE:** You can store the following settings with this procedure.

- Current Font and Pitch
- Current auto-loading amount for cut sheet
- Current auto-loading amount for continuous paper
- Current auto-loading amount in ASF mode
- Current print color

Data to be stored are controlled in Standard mode and IBM mode separately. For example, the data stored in the Standard mode are not effective in the IBM mode, and vice versa.

# Chapter 6

# SETTING UP THE MEMORY SWITCHES

In addition to the pitch, print mode, and font, many other options regarding the setup of the printer can be carried out from the control panel. To access these options, it is necessary to turn off the printer, and then turn it on again, while holding down the **SET/EJECT PARK**, **PAPER FEED** and **ON LINE** buttons together. This will cause the printer to print a series of questions to which you can answer using the control panel buttons. This is called the Memory Switch mode.

In the Memory Switch mode, the buttons on the control panel are used as shown below in Figure 6-1.

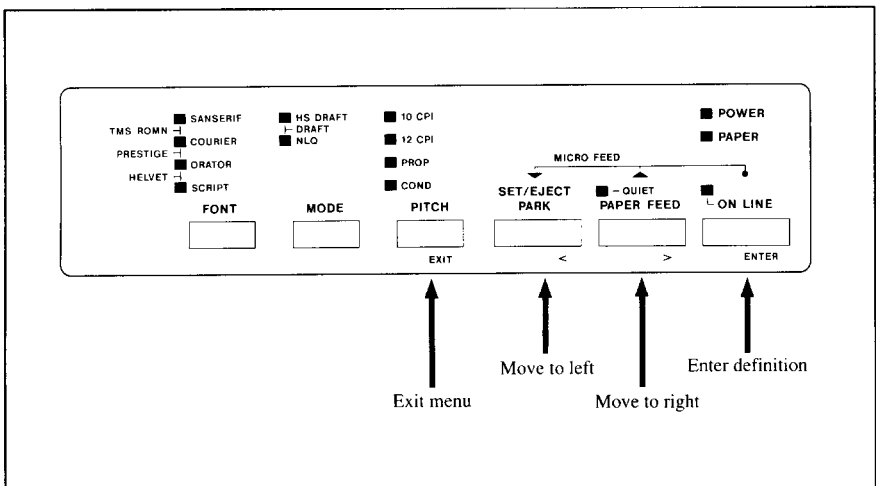


Figure 6-1. Button functions in the Memory Switch mode.

The principle involved is that the printer will print a list of options on one line. You use the **SET/EJECT PARK** and **PAPER FEED** buttons to move the print head so that it is below the option you want to choose.

The printer will move the paper up and down as appropriate, so that the menu options are visible.

The **SET/EJECT PARK** button moves the print head one option to the left, and the **PAPER FEED** button moves one option to the right. Holding down one of these buttons will still move the print head only one option forward or back.

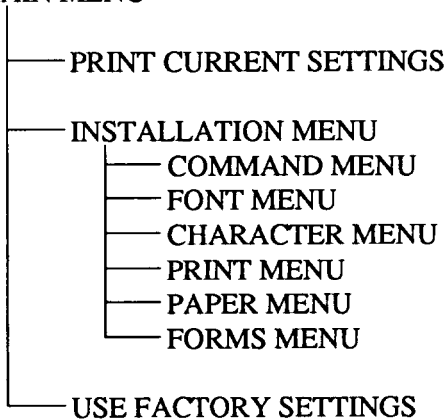
When the print head is below the desired option, press the  button to enter this into the printer's memory. Any option chosen at this stage will now be stored, even when the printer is turned off.

When you press the  button to enter an option, a "\*" (asterisk) will be printed on the paper to confirm that the option has been chosen.

The menus are organized in a hierarchical (tree-structured) fashion. Some menus do not choose options directly, but instead, move down to other menus. To move up through the menu structure towards the "root" of "trunk", use the  button as an  button.

The structure of the menus are shown below:

#### MAIN MENU



The options within each menu are given below.

As mentioned above, when you press the  (EXIT) button from any sub-menu or from an option within a menu, you will return to the menu level above the current one. If you press the  (EXIT) button from the main menu, the printer will print "\*\*\* END \*\*\*" and exit to being on-line, with the settings chosen in Memory Switch mode being now set in the printer.



# MENU OPTIONS

The following is a list of the options within the menus, and their meanings, together with the prompts printed in Memory Switch mode. The prompts are given in capital letters in square brackets, thus: [OFF]. Factory settings are marked here with an asterisk (for example, [\*ON]). A summary of factory settings is also provided following this section.

## Print current settings

When you select this option, the current settings will be printed, similar to the sample below.

\*\*\* Print Current Set \*\*\*

```

COMMAND MENU:
EMULATION          : #STANDARD          IBM
RAM USAGE         : #INPUT BUFFER      DOWNLOAD BUFFER      1 LINE BUFFER
QUIET MODE        : #DISABLED          ENABLED
GRAPHICS DIRECTION : #BI-DIRECTIONAL      UNI-DIRECTIONAL
AUTO ON-LINE      : #DISABLED          #ENABLED
STROBE TIMING     : #NORMAL            REVERSE

FONT MENU:
ZERO STYLE       : #NORMAL          BLASHEG
NLG FONT         : #SANSERIF        COURIER              DRAFTER              SCRIPT              OTHER
                  : #MS-ROMM          PRESTIGE             HELVET              OTHER

CHARACTER MENU:
STD CHARACTER TABLE : #GRAPHICS          ITALICS
IBM CHARACTER TABLE : #IBM #2            IBM #1
IBM CODE PAGE       : #CP #437          CP #850              CP #860              CP #861              CP #862              OTHER
                  : #CP #865          OPTION 1             OPTION 2             OPTION 3             OPTION 4             OTHER
INTERNATIONAL SET   : #U.S.A            FRANCE               GERMANY              ENGLAND              DENMARK 1           OTHER
                  : #SWEDEN           ITALY                SPAIN 1              JAPAN                NORWAY              OTHER
                  : #DENMARK 2       SPAIN 2              LATIN A              KOREA                IRISH               OTHER
                  : #LEGAL           OPTION 1             OPTION 2             OPTION 3             OPTION 4             OTHER

PRINT MENU:
PRINT QUALITY      : #NLG              #DRAFT              HS-DRAFT
PRINT PITCH        : #10CPI           12CPI
CONDENSED PRINT    : #DISABLED         ENABLED
ITALIC PRINT       : #DISABLED         ENABLED

PAPER MENU:
PAPER-OUT          : #DISABLED         #ENABLED
MULTI-PART MODE    : #DISABLED         ENABLED
OPTION ASF         : #OFF              SINGLE              DUAL-1              DUAL-2
AUTO LOADING CUT   : #1 LINE           2 LINES            3 LINES              4 LINES              5 LINES              6 LINES
AUTO LOADING TRAC  : #1 LINE           2 LINES            3 LINES              4 LINES              5 LINES              6 LINES
AUTO LOADING ASF   : #1 LINE           2 LINES            3 LINES              4 LINES              5 LINES              6 LINES

FORMS MENU:
TEAR OFF           : #DISABLED         ENABLED
SKIP OVER PERFORATION: #DISABLED         ENABLED
AUTO LF WITH CR    : #DISABLED         ENABLED
AUTO CR WITH LF    : #DISABLED         #ENABLED
CR-CENTERING       : #DISABLED         ENABLED
LINES PER INCH     : 3 L.P.I          4 L.P.I            6 L.P.I              8 L.P.I
PAGE LENGTH        : 14 INCH          12 INCH            A4 SIZE              #11 INCH              8.5 INCH              OTHER
                  : 8 INCH           7 INCH             6 INCH              5.5 INCH              4 INCH              OTHER
                  : 3.5 INCH        3 INCH
    
```

## ***Installation menu***

In this menu, you can select the following sub-menus.

- Command menu (which commands the printer accepts)
- Font menu (which font to print)
- Character menu (which character set to print)
- Print menu (which style to print)
- Paper menu (what paper the printer will use)
- Forms menu (how pages will be formatted)

## ***Command menu***

This menu allows you to set up various parameters controlling the overall setup of the printer.

- Emulation

Select the mode compatible with your computer and software. In Standard mode, [\*STANDARD], the printer operates like the Epson EX-800/EX-1000. In IBM mode, [IBM], it operates like the IBM Proprinter III.

- RAM usage

In order to download characters this switch must be set [DOWNLOAD BUFFER]. The printer then uses its RAM memory for storing character patterns and provides only a one-line print buffer.

If you leave this switch to [\*INPUT BUFFER], the printer uses its RAM memory as an input buffer, allowing the computer to send data faster than the printer prints.

If you want the print buffer only one line, set to [1LINE BUFFER].

- Quiet mode

You can select the Quiet mode as the power-on default by setting this switch to [ENABLED].

When in Quiet mode, the printer will print slightly slower, but at a reduced noise level.

- Graphics direction

When printing in dot graphics mode, the printer may either print bi-directionally (in alternate directions), [\*BI-DIRECTIONAL], for speed or in one direction only (uni-directional for increased accuracy), [UNI-DIRECTIONAL].

For practically all purposes, however, bi-directional printing is sufficiently accurate.

- **Auto On-Line**

Set the status just after loaded the paper into the printer.

When the Auto-Online is set [**\*ENABLED**], the printer automatically goes on-line.

When it is set [**DISABLED**], you must press the  **ON LINE**  button to set on-line after load the paper.

- **STROBE timing**

This switch controls the timing of the interface.

Most computers can communicate with the Normal timing, as the factory-setting, [**\*NORMAL**].

If you were not possible to communicate with your computer to the printer, set this switch to [**REVERSE**].

### ***Font menu***

The Font menu allows you to set two parameters concerning fonts which will be automatically selected whenever you turn on the printer.

- **Zero style**

This menu tells the printer how to print zero's.

When the [**\*NORMAL**] is selected, the printer prints the normal zero; when it is [**SLASHED**], the slash zero (which is often used in draft mode to prevent any possible confusion with the letter "O").

- **NLQ Font**

There are many font styles for NLQ print mode. You can select one of them as the power-on default by setting this switch.

**NOTE:** Since there are many fonts you can select, the [**OTHER**] option indicates to select other options on the next line.

### ***Character menu***

The Character menu allows you to select the character set which will be printed.

- **Standard Character Table**

If you selected Standard mode, you can set either italic or graphic characters.

When you select the [**ITALIC**] characters, the character table is the same as the Epson printers.

When you select the [**\*GRAPHICS**] characters, in place of italics you will get the graphic characters, international characters, and mathematical symbols of IBM character set #2.

- **IBM Character Table**

If you selected IBM mode, you can select either character set #1 [IBM #1] or #2 [\*IBM #2].

Character set #2 is for computers with an 8-bit interface (the most common kind), and set #1 is for computers with a 7-bit interface.

- **IBM Code Page**

Except in the Standard Italic character set, this switch selects the default character code page.

- **International Character Set**

International character sets differ in their assignment of 14 character codes in the Standard Italic character set.

### ***Print menu***

This menu allows you to set up various printing options which will be automatically selected whenever you turn the printer on.

- **Print Quality**

Select the print quality.

HS Draft, [HS-DRAFT], prints with the highest speed, but the dot matrix is reduced to print faster. Draft [\*DRAFT] has a reduced dot matrix compared to NLQ, but the print quality is better than the HS Draft.

Near Letter Quality is referred as [NLQ], and there are many font styles as shown in the "NLQ Font" menu.

- **Print pitch**

Selects the default print pitch, such as [\*10CPI] (pica), [12CPI] (elite), and [PROPORTIONAL].

- **Condensed print**

Selects condensed print to be either [\*DISABLED] or [ENABLED].

- **Italic print**

Selects to print all characters with Italic style, or not.

This is different from the italic characters in the Standard Italic character table.

## ***Paper menu***

This menu allows you to set up various handling options of paper.

- **Paper-out detector**  
When this switch is [DISABLED] the printer ignores the paper-out detector and prints down to (and beyond) the bottom edge. Otherwise leave it [+ENABLED].
- **Multi-part mode**  
You can use up to 3-ply paper with normal mode, [+DISABLED]. If you want to print on 4-ply or 5-ply paper, set the Multi-part mode to [ENABLED].
- **Automatic Sheet Feeder**  
In order to use the optional Automatic Sheet Feeder, set this switch to the related position. [SINGLE] for single-bin ASF, [DUAL-1] for the front bin of Dual-bin ASF, and [DUAL-2] for the rear bin of the Dual-bin ASF.  
If you do not use the optional Automatic Sheet Feeder, leave this [+OFF].
- **Auto loading amount for each paper type**  
Sets the first line position on the each paper type.

## ***Forms menu***

The Forms menu allows you to set various options associated with paper handling.

- **Tear-Off function**  
You can select the Tear Off function with this switch [ENABLED].  
When using fanfold paper, the Tear Off function allows you to tear off one sheet of paper without fully advancing the following sheet.
- **Skip-over-perforation**  
You can select the Skip-over-perforation with this switch [ENABLED].  
It is recommended to skip close to the perforation of fanfold forms to get good print quality.  
If you cannot set this function with your software, set this switch [ENABLED].  
The printer automatically skips the perforations.
- **Auto Line Feed with CR**  
If you set this switch [+DISABLED], a separate line-feed code is required from your computer to obtain a line feed.  
If you set this switch [ENABLED], the printer performs both a carriage return and line feed each time it receives a carriage-return code.  
Most computer systems send a line feed code, or both a carriage return and line feed, at the end of each line, so this switch should be left [+DISABLED].

If you get double line spacing when you expect single spacing, or if lines overprint each other, try changing the setting of this switch.

- **Auto Carriage Return with LF**

If you set this switch [DISABLED], a separate carriage-return code is required from your computer to return to the left margin.

If you set this switch [+ENABLED], the printer performs both a carriage return and line feed each time it receives a line-feed code.

- **Carriage centering**

If you set this switch [ENABLED], the carriage moves to the center each time to feed paper near the perforations. It is recommended to match the page length setting to your fanfold paper, otherwise, this function does not work properly at the perforations.

If you leave this switch [+DISABLED], the carriage does not move when feeding paper.

- **Lines per Inch**

Sets how many lines to be printed in one inch.

- **Page length**

You can set a different page length to accommodate your paper with this switch.

## ***Factory settings***

This option clears all current settings, and restores the Factory Settings to the Memory Switch.

# DOT ADJUSTMENT MODE

This mode is used to adjust the alignment of the print head on successive bi-directional passes.

After a period of some months, your printer may work itself out of alignment on left and right printing passes, showing itself most obviously in graphics printing. This mode will probably be used very rarely.

1. Turn the printer off and then turn it on again while holding down the **SET/EJECT PARK** and **ON LINE** buttons. The printer will then print something like the following:

```
*** DOT ADJUSTMENT SETTING ***  
HS-DRAFT 00 | | | | | | | | | |
```

2. The printer will feed the paper forwards and backwards during this operation, allowing you to view the paper for optimum alignment.
3. To adjust the printing, use the **SET/EJECT PARK** and **PAPER FEED** buttons. The **SET/EJECT PARK** button will move the second pass to the left. The **PAPER FEED** button will move the second pass to the right.

```
*** DOT ADJUSTMENT SETTING ***  
HS-DRAFT 00 | | | | | | | | | |  
PAPER FEED → HS-DRAFT +1 | | | | | | | | | |  
SET/EJECT PARK → HS-DRAFT 00 | | | | | | | | | |
```

4. When the three lines are aligned with each other to form one continuous line, the bi-directional alignment test is completed.
5. To change the mode for which the bi-directional adjustment is performed, press the **ON LINE** button. This will cycle between "HS Draft", "Draft", "NLQ-A", "NLQ-B", "GRAPHICS-A" and "GRAPHICS-B". Repeat the process for all print modes.

\*\*\* DOT ADJUSTMENT SETTING \*\*\*

HS-DRAFT	00								
HS-DRAFT	+1								
HS-DRAFT	00								
<b>ON LINE</b> →	DRAFT	00							

6. To exit from this mode, press the **PITCH** button.

\*\*\* DOT ADJUSTMENT SETTING \*\*\*

HS-DRAFT	00								
HS-DRAFT	+1								
HS-DRAFT	00								
DRAFT	00								
<b>ON LINE</b> →	NLD-A	00							
<b>ON LINE</b> →	NLD-B	00							
<b>ON LINE</b> →	GRAPHICS-A	00							
<b>ON LINE</b> →	GRAPHICS-B	00							
<b>PITCH</b> →	*** END ***								



---

# Chapter 7

## PRINTER CONTROL COMMANDS

---

The printer has two emulation modes: Standard mode and IBM mode. In standard mode, the printer emulates the functions of the Epson EX-800/EX-1000. In IBM mode, the printer emulates the IBM Proprinter III. Additional command codes are included as a superset of these emulations.

The emulation is changed by means of Memory Switch mode. When the Emulation option is set to [STANDARD], the printer will be in standard mode, and when [IBM], the printer will be in IBM mode (see Chapter 6). It is not possible to change the emulation by means of software control.

This chapter describes the printer's control commands. Some commands are common to both the standard and IBM modes. In the descriptions of the commands, all commands will given by functions. The name of each command is followed by a table like the one below:

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "x" "1"	27 120 49	1B 78 31
	<ESC> "x" <1>	27 120 1	1B 78 01

**Mode:** Indicates the mode in which the command is recognized.

Std. Standard mode

IBM IBM mode

Both Both standard and IBM modes

**ASCII:** Indicates the ASCII coding of the command. Control characters are enclosed in pointed brackets: For example, <1> means character code 1.

**Decimal:** Gives the command in decimal character codes.

**Hexadecimal:** Gives the command in hexadecimal character codes.

Parameters for which values must be supplied are indicated by italic letters such as *n*, *m* or *d*.

# FONT CONTROL COMMANDS

## Select draft quality characters

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "x" "0"	27 120 48	1B 78 30
	<ESC> "x" <0>	27 120 0	1B 78 00

Changes from near letter quality to draft quality. Ignored if the FONT LOCK mode was selected during power-up.

## Select draft pica characters

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "I" <0>	27 73 0	1B 49 00

Changes to draft quality characters with pica pitch (10 cpi). Ignored if the FONT LOCK or PITCH LOCK mode was selected during power-up.

## Select draft elite characters

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "I" <1>	27 73 1	1B 49 01

Changes to draft quality characters with elite pitch (12 cpi). Ignored if the FONT LOCK or PITCH LOCK mode was selected during power-up.

## Select NLQ characters

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "x" "1"	27 120 49	1B 78 31
	<ESC> "x" <1>	27 120 1	1B 78 01
IBM	<ESC> "I" <2>	27 73 2	1B 49 02
	<ESC> "I" <3>	27 73 3	1B 49 03

Changes from draft quality to near letter quality. The initial NLQ font is Sanserif unless a different font has been selected by a preceding command. Ignored if the FONT LOCK mode was selected during power-up.

## Select NLQ font

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "k" <i>n</i>	27 107 <i>n</i>	1B 6B <i>n</i>

Selects an NLQ font according to the value of *n*. In draft mode, this command remains dormant and takes effect later when NLQ is selected. Ignored if the FONT LOCK mode was selected during power-up.

<i>n</i>	Font	<i>n</i>	Font
0	Tms Romn	4	Script
1	Sanserif	7	Orator
2	Courier	12	Helvet
3	Prestige		

## Select font

Mode	ASCII	Decimal	Hexadecimal
Both	"(" "(" "F" ")" ")" <i>d</i>	40 40 70 41 41 <i>d</i>	28 28 46 29 29 <i>d</i>

Changes to the font according to the value of *d*. Ignored if the FONT LOCK mode was selected during power-up.

<i>d</i>	Font	<i>d</i>	Font
0	Tms Romn	4	Script
1	Sanserif	7	Orator
2	Courier	9	Draft
3	Prestige		

## Select italic characters

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "4"	27 52	1B 34

Causes subsequent characters to be printed in italics.

## Select NLQ italic characters

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "I" <VT>	27 73 11	1B 49 0B

Causes subsequent characters to be printed in italics with NLQ characters. Ignored if the FONT LOCK mode was selected during power-on.

## Select upright characters

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "5"	27 53	1B 35

Stops italic printing and causes subsequent characters to be printed upright.

## Emphasized printing

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "E"	27 69	1B 45

Causes subsequent characters to be emphasized by adding extra thickness to vertical strokes.

## Cancel emphasized printing

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "F"	27 70	1B 46

Cancels emphasized printing.

## Double-strike printing

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "G"	27 71	1B 47

Causes subsequent characters to be printed in double-strike mode with a slight vertical paper motion in between, causing a thickening of horizontal strokes.

For bold print, use of double-strike is recommended in NLQ mode, and combined use of emphasized and double-strike is recommended in draft mode.

## ***Cancel double-strike printing***

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "H"	27 72	1B 48

Cancels double-strike printing.

## ***Start underlining***

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "_" "1"	27 45 49	1B 2D 31
	<ESC> "_" <1>	27 45 1	1B 2D 01

Causes subsequent characters to be underlined. IBM block graphics characters and spaces skipped by horizontal tabulation are not underlined.

## ***Stop underlining***

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "_" "0"	27 45 48	1B 2D 30
	<ESC> "_" <0>	27 45 0	1B 2D 00

Stops underlining.

## ***Start overlining***

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "_" "1"	27 95 49	1B 5F 31
	<ESC> "_" <1>	27 95 1	1B 5F 01

Causes subsequent characters to be overlined. Spaces skipped by horizontal tabulation are not overlined.

## ***Stop overlining***

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "_" "0"	27 95 48	1B 5F 30
	<ESC> "_" <0>	27 95 0	1B 5F 00

Stops overlining.

## ***Superscript***

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "S" "0"	27 83 48	1B 53 30
	<ESC> "S" <0>	27 83 0	1B 53 00

Causes subsequent characters to be printed as superscripts. Does not change the character pitch.

## ***Subscript***

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "S" "1"	27 83 49	1B 53 31
	<ESC> "S" <1>	27 83 1	1B 53 01

Causes subsequent characters to be printed as subscripts. Does not change the character pitch.

## ***Cancel superscript or subscript***

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "T"	27 84	1B 54

Stops printing superscripts or subscripts and returns to normal printing.

# CHARACTER SET COMMANDS

## *Select standard character set*

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "t" "0"	27 116 48	1B 74 30
	<ESC> "t" <0>	27 116 0	1B 74 00

Selects the standard character set. This is the power-up default in Standard mode when the "Standard Italic" is selected with the Memory Switch.

## *Select IBM character set*

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "t" "1"	27 116 49	1B 74 31
	<ESC> "t" <1>	27 116 1	1B 74 01

Selects an IBM character set. This is the power-up default in IBM mode, or the "Standard Graphics" is selected in standard mode.

## *Select character set #1*

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "7"	27 55	1B 37

Selects character set #1.

## *Select character set #2*

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "6"	27 54	1B 36

Selects character set #2.

## Select international character set

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "R" <i>n</i>	27 82 <i>n</i>	1B 52 <i>n</i>

Selects an international character set in the Standard character set according to the value of *n*.

<i>n</i>	Character set	<i>n</i>	Character set
0	U.S.A	8	Japan
1	France	9	Norway
2	Germany	10	Denmark II
3	England	11	Spain II
4	Denmark I	12	Latin America
5	Sweden	13	Korea
6	Italy	14	Irish
7	Spain I	64	Legal

One of these character sets can be selected as power-up default by the Memory Switch mode.

## Select IBM code page

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "[" "T" <4> <0> <0> <0> <i>n1</i> <i>n2</i>	27 91 84 4 0 0 0 <i>n1</i> <i>n2</i>	1B 5B 54 04 00 00 00 <i>n1</i> <i>n2</i>

Changes the code page of the current IBM character set according to the values of *n1* and *n2*.

<i>n1</i>	<i>n2</i>	Code Page
1	181	#437 U.S.A.
3	82	#850 Multi-lingual
3	92	#860 Portuguese
3	93	#861 Icelandic
3	95	#863 Canadian French
3	97	#865 Nordic

One of these code pages can be selected as power-up defaults by the Memory Switch mode.



## Enable printing of all character codes

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> “\” <i>n1 n2</i>	27 92 <i>n1 n2</i>	1B 5C <i>n1 n2</i>

Enables printing of all characters in the IBM character set, including those assigned to character codes which are normally considered control codes. This command remains in effect for the next  $n1 + n2 \times 256$  characters, where  $n1$  and  $n2$  are numbers between 0 and 255. During this interval no control functions are executed. If a code with no assigned character is received, the printer prints a space.

## Enable printing of all character codes on next character

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> “^” <i>n</i>	27 94 <i>n</i>	1B 5E <i>n</i>

This command operates like <ESC> “^” except that it remains in effect for only one character.

## Select slash zero

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> “~” “1”	27 126 49	1B 7E 31
	<ESC> “~” <1>	27 126 1	1B 7E 01

Causes subsequent zero characters to be overprinted with a slash (Ø).

## Select normal zero

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> “~” “0”	27 126 48	1B 7E 30
	<ESC> “~” <0>	27 126 0	1B 7E 00

Causes subsequent zero characters to be printed normally (0), without a slash.

# CHARACTER SIZE AND PITCH COMMANDS

## *Pica pitch*

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "P"	27 80	1B 50
IBM	<DC2>	18	12

In Standard mode, changes from elite to pica pitch (10 cpi) or from condensed elite to condensed pica (17 cpi). In IBM mode, changes from either elite or condensed to pica (10 cpi). Ignored if the PITCH LOCK mode was selected during power-up.

## *Elite pitch*

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "M"	27 77	1B 4D
IBM	<ESC> ":"	27 58	1B 3A

Changes from pica to elite pitch (12 cpi) or from condensed pica to condensed elite (20 cpi). Ignored if the PITCH LOCK mode was selected during power-up.

## *Condensed printing*

Mode	ASCII	Decimal	Hexadecimal
Both	<SI>	15	0F
Std.	<ESC> <SI>	27 15	1B 0F

Changes from pica to condensed pica (17 cpi) or from elite to condensed elite (20 cpi).

Ignored if the PITCH LOCK mode was selected during power-up.

## *Cancel condensed printing*

Mode	ASCII	Decimal	Hexadecimal
Both	<DC2>	18	12

In Standard mode, changes from condensed pica to normal pica or from condensed elite to normal elite. In IBM mode, always changes to normal pica. Ignored if the PITCH LOCK mode was selected during power-up.

## ***Expanded printing***

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "W" "1"	27 87 49	1B 57 31
	<ESC> "W" <1>	27 87 1	1B 57 01

Causes subsequent characters to be expanded to double width.

## ***Cancel expanded printing***

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "W" "0"	27 87 48	1B 57 30
	<ESC> "W" <0>	27 87 0	1B 57 00

Stops expanded printing and returns to normal width.

## ***Expanded printing for one line***

Mode	ASCII	Decimal	Hexadecimal
Both	<SO>	14	0E
Std.	<ESC> <SO>	27 14	1B 0E

Causes subsequent characters in the current line to be expanded to double width. Characters return to normal width after the next line feed (<LF>). The <DC4>, <VT>, <FF>, and <ESC> "W" 0 commands also cancel expanded printing.

## ***Cancel one-line expanded printing***

Mode	ASCII	Decimal	Hexadecimal
Both	<DC4>	20	14

Stops one-line expanded printing set with <SO> or <ESC> <SO>. Does not cancel <ESC> "W" 1.

## ***Select proportional spacing***

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "p" "1"	27 112 49	1B 70 31
	<ESC> "p" <1>	27 112 1	1B 70 01
IBM	<ESC> "P" <1>	27 80 1	1B 50 01

Causes subsequent characters to be proportionally spaced. Ignored if the PITCH LOCK mode was selected during power-up.

## Select fixed spacing

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "p" "0"	27 112 48	1B 70 30
	<ESC> "p" <0>	27 112 0	1B 70 00
IBM	<ESC> "P" <0>	27 80 0	1B 50 00

Causes subsequent characters to be printed with fixed character spacing. Ignored if the PITCH LOCK mode was selected during power-up.

## Select master print mode

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "!" <i>n</i>	27 33 <i>n</i>	1B 21 <i>n</i>

Selects a combined print mode according to the value of *n*. The value of *n* is the sum of the values given below for the desired characteristics.

Function	<i>n</i> value
Underline	128
Italic	64
Expanded	32
Double strike	16
Emphasized	8
Condensed [*]	4
Proportional [*]	2
Elite [*]	1

[\*] Ignored if the PITCH LOCK mode was selected during power-up.

Examples:  $n = 1$  gives elite;  $n = 9$  ( $1 + 8$ ) gives emphasized elite;  $n = 137$  ( $1 + 8 + 128$ ) gives underlined emphasized elite.

## Increase character spacing

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> <SP> <i>n</i>	27 32 <i>n</i>	1B 20 <i>n</i>

Increases the space between characters by *n* dots, where *n* is a number from 0 to 127. Used in microjustification.

## Select double or quadruple size

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "h" <i>n</i>	27 104 <i>n</i>	1B 68 <i>n</i>

Selects the size of subsequent characters as shown below. Extra-high characters align along the cap-line of normal characters, with the base line temporarily moving down. Line spacing is temporarily doubled when  $n = 1$  and quadrupled when  $n = 2$ .

*n* Effect

0 Normal size

1 Double-high, double-wide

2 Quadruple-high, quadruple-wide

## Select character size

Mode	ASCII	Decimal	Hexadecimal
Both	"(" "((" "S" ")") "d	40 40 83 41 41 d	28 28 53 29 29 d

Selects a combination of character height and width according to the value of *d*, as below.

Does not move the base line.

*d* Line spacing      Character height

0 Single width      Single weight

1 Double width      Single height

2 Single width      Double height

3 Double width      Double height

Double-height characters are always printed at near letter quality. Double height printing temporarily cancels the super/subscript and condensed printing modes, but these modes resume when the printer returns to normal mode.

## Print double-height characters

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "w" "1"	27 119 49	1B 77 31
	<ESC> "w" <1>	27 119 1	1B 77 01

Prints subsequent characters at double height without moving the base line, and without changing the line spacing. Temporarily cancels super/subscript and condensed modes.

## Return to normal height

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "w" "0"	27 119 48	1B 77 30
	<ESC> "w" <0>	27 119 0	1B 77 00

Terminates double-height printing and prints subsequent characters at normal height.

Resumes super/subscript and condensed printing if these modes were in effect before double height was selected.

## Select character height, width, and line spacing

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "[" "@" <4> <0>	27 91 64 4 0	1B 5B 40 04 00
	<0> <0> <i>n</i> <i>m</i>	0 0 <i>n</i> <i>m</i>	00 00 <i>n</i> <i>m</i>

Selects a combination of character height, width, and line spacing according to the value of *n* and *m*, as below. Does not move the base line.

<i>n</i>	Line spacing	Character height
0	Unchanged	Unchanged
1	Unchanged	Single height
2	Unchanged	Double height
16	Single	Unchanged
17	Single	Single height
18	Single	Double height
32	Double	Unchanged
33	Double	Single height
34	Double	Double height

### *m* Character width

- 1 Single width (same as <ESC> "W" 0)
- 2 Double width (same as <ESC> "W" 1)

Double-height characters are always printed at near letter quality. Double height printing temporarily cancels the super/subscript and condensed printing modes, but these modes resume when the printer returns to normal mode.

## VERTICAL POSITION COMMANDS

### *Set line spacing to 1/8 inch*

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "0"	27 48	1B 30

Sets the distance the paper advances or reverses in subsequent line feeds to 1/8 inch.

### *Set line spacing to 7/72 inch*

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "1"	27 49	1B 31

Sets the distance the paper advances or reverses in subsequent line feeds to 7/72 inch.

### *Set line spacing to 1/6 inch*

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "2"	27 50	1B 32

Sets the distance the paper advances or reverses in subsequent line feeds to 1/6 inch.

### *Set line spacing to n/216 inch*

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "3" <i>n</i>	27 51 <i>n</i>	1B 33 <i>n</i>

Sets the distance the paper advances or reverses in subsequent line feeds to  $n/216$  inch, where  $n$  is between 0 and 255. If  $n = 0$ , in Standard mode the line-feed distance is set to 0, but in IBM mode this command is ignored.

## Set line spacing to $n/72$ inch

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "A" $n$	27 65 $n$	1B 41 $n$

In Standard mode, sets the distance the paper advances or reverses in subsequent line feeds to  $n/72$  inch, where  $n$  is between 0 and 255. If  $n = 0$ , the line spacing is set to 0.

In IBM mode this command defines the distance the paper advances or reverses in subsequent line feeds to  $n/72$  inch, where  $n$  is between 1 and 85. The new line spacing does not take effect until next <ESC> "2" command.

## Execute <ESC> "A"

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "2"	27 50	1B 32

Sets the line spacing to the value defined by the last preceding <ESC> "A" command. Sets the line spacing to 1/6 inch if there is no preceding <ESC> "A" command.

## Line feed

Mode	ASCII	Decimal	Hexadecimal
Both	<LF>	10	0A

Prints the current line and feeds the paper to the next line. See the preceding commands for the line spacing.

## Reverse line feed

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> <LF>	27 10	1B 0A
IBM	<ESC> "J"	27 93	1B 5D

Prints the current line and feeds the paper in the reverse direction to the preceding line.

See the preceding commands for the line spacing. Ignored when the friction feed is used.



## ***Perform one n/216-inch line feed***

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "J" <i>n</i>	27 74 <i>n</i>	1B 4A <i>n</i>

Feeds the paper once by  $n/216$  inches, where  $n$  is between 1 and 255.  
Does not move the print position right or left in the standard mode.  
Does not change the line-spacing setting.

## ***Perform one n/216-inch reverse line feed***

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "j" <i>n</i>	27 106 <i>n</i>	1B 6A <i>n</i>

Feeds the paper once by  $n/216$  inches in the reverse direction, where  $n$  is between 1 and 255.  
Does not move the print position right or left. Does not change the line-spacing setting.

## ***Feed paper n lines***

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "f" "1" <i>n</i>	27 102 49 <i>n</i>	1B 66 31 <i>n</i>
	<ESC> "f" <1> <i>n</i>	27 102 1 <i>n</i>	1B 66 01 <i>n</i>

Feeds the paper  $n$  lines from the current line, where  $n$  is between 0 and 127.

## ***Set top of page at current position***

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "4"	27 52	1B 34

Sets the current position as the top-of-page position. Note that this can also be done from the control panel.

## Set page length to *n* lines

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "C" <i>n</i>	27 67 <i>n</i>	1B 43 <i>n</i>

Sets the page length to *n* lines in the current line spacing, where *n* is between 1 and 127 in Standard mode or between 1 and 64 in IBM mode. Changing the line spacing later does not alter the physical page length. The current line becomes the top of the page.

## Set page length to *n* inches

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "C" <0> <i>n</i>	27 67 0 <i>n</i>	1B 43 00 <i>n</i>

Sets the page length to *n* inches, where *n* is between 1 and 32 in Standard mode or between 1 and 64 in IBM mode. The current line becomes the top of the page.

## Set bottom margin

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "N" <i>n</i>	27 78 <i>n</i>	1B 4E <i>n</i>

Sets the bottom margin to *n* lines, where *n* is between 1 and 127 in Standard mode or between 1 and 255 in IBM mode. The bottom margin is reset when you change the page length.

## Cancel bottom margin

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "O"	27 79	1B 4F

Cancels the bottom margin.

## Form feed

Mode	ASCII	Decimal	Hexadecimal
Both	<FF>	12	0C

Feeds the paper to the top of the next page according to the current page length, and moves the print position to the left margin. When the automatic sheet feeder (ASF) is selected with Memory Switch setting, this command ejects the current page.

## ***Return to top of current page***

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> <FF>	27 12	1B 0C

Feeds the paper backward to the top of the current page. Ignored when the friction feed is used.

## ***Disable paper-out detector***

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "8"	27 56	1B 38

Causes the printer to disregard the signal sent by the paper-out detector, enabling printing to the bottom of the paper. Overrides the setting of Memory Switch.

## ***Enable paper-out detector***

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "9"	27 57	1B 39

Causes the printer to stop printing before the end of the paper. Overrides the setting of Memory Switch.

## ***Set vertical tab stops***

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "B" <i>n1 n2 ...</i> <0>	27 66 <i>n1 n2 ...</i> 0	1B 42 <i>n1 n2 ...</i> 00

Cancels all current vertical tab stops and sets new vertical tab stops at lines *n1*, *n2*, etc., where *n1*, *n2*, etc. are numbers between 1 and 255. A maximum of 16 vertical tab stops can be set. The tab stops must be specified in ascending order; any violation of ascending order terminates the tab stop list. Standard termination is by the <0> control code. The vertical tab stops are set in terms of the current line spacing and do not move if the line spacing is changed later.

## Set vertical tab stops every *n* lines

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "e" "1" <i>n</i>	27 101 49 <i>n</i>	1B 65 31 <i>n</i>
	<ESC> "e" <1> <i>n</i>	27 101 1 <i>n</i>	1B 65 01 <i>n</i>

Cancels all current vertical tab stops and sets new tab stops every *n* lines, where *n* is between 1 and 127.

## Set vertical tab stops in channel

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "b" <i>n0 n1</i> <i>n2 ... &lt;0&gt;</i>	27 98 <i>n0 n1</i> <i>n2 ... 0</i>	1B 62 <i>n0 n1</i> <i>n2 ... 00</i>

Cancels all current vertical tab stops in channel *n0*, (where *n0* is between 0 and 7) and sets new vertical tab stops in this channel. (A channel is a set of vertical tab stops selected by the <ESC> "f" command.) See <ESC> "B" for parameters *n1*, *n2*, ... <0>.

## Select vertical tab channel

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "f" <i>n0</i>	27 47 <i>n0</i>	1B 2F <i>n0</i>

Selects a set of vertical tab stops designated by a channel number (*n0*) from 0 to 7. The tab stops in each channel are set by <ESC> "b".

## Vertical tab

Mode	ASCII	Decimal	Hexadecimal
Both	<VT>	11	0B

Feeds the paper to the next vertical tab stop and moves the print position to the left margin. Performs a line feed if no vertical tabs are set, as at power-up. Feeds to the top of the next page if vertical tabs are set but the current line is at or below the last vertical tab stop.

# HORIZONTAL POSITION COMMANDS

## Set left margin

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "I" <i>n</i>	27 108 <i>n</i>	1B 6C <i>n</i>

Sets the left margin at column *n* (where *n* is between 0 and 255) in the current character pitch (pica pitch if proportional spacing is selected). The left margin does not move if the character pitch is changed later. The left margin must be at least two columns to the left of the right margin and within the limits below:

Printer Type	Normal Carriage	Wide Carriage
Pica	$0 \leq n \leq 76$	$0 \leq n \leq 132$
Elite	$0 \leq n \leq 91$	$0 \leq n \leq 158$
Condensed pica	$0 \leq n \leq 130$	$0 \leq n \leq 226$
Condensed elite	$0 \leq n \leq 152$	$0 \leq n \leq 255$
Expanded pica	$0 \leq n \leq 38$	$0 \leq n \leq 66$
Expanded elite	$0 \leq n \leq 45$	$0 \leq n \leq 79$
Expanded condensed pica	$0 \leq n \leq 64$	$0 \leq n \leq 113$
Expanded condensed elite	$0 \leq n \leq 76$	$0 \leq n \leq 132$

## Set right margin

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "Q" <i>n</i>	27 81 <i>n</i>	1B 51 <i>n</i>

Sets the right margin at column *n* in the current character pitch (pica pitch if proportional spacing is currently selected). Column *n* becomes the last character position in the line.

The right margin does not move if the character pitch is changed later. The right margin must be within the limits below:

Printer Type	Normal Carriage	Wide Carriage
Pica	$4 \leq n \leq 80$	$4 \leq n \leq 136$
Elite	$5 \leq n \leq 96$	$5 \leq n \leq 163$
Condensed pica	$7 \leq n \leq 137$	$7 \leq n \leq 233$
Condensed elite	$8 \leq n \leq 160$	$8 \leq n \leq 255$
Expanded pica	$2 \leq n \leq 40$	$2 \leq n \leq 68$
Expanded elite	$3 \leq n \leq 48$	$3 \leq n \leq 81$
Expanded condensed pica	$4 \leq n \leq 68$	$4 \leq n \leq 116$
Expanded condensed elite	$4 \leq n \leq 80$	$4 \leq n \leq 136$

## Set left and right margins

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "X" <i>n1</i> <i>n2</i>	27 88 <i>n1</i> <i>n2</i>	1B 58 <i>n1</i> <i>n2</i>

Sets the left margin at column *n1* and the right margin at column *n2*. See the preceding commands for margin restrictions and other notes.

## Carriage return

Mode	ASCII	Decimal	Hexadecimal
Both	<CR>	13	0D

Prints the current line and returns the next print position to the left margin. If the Auto LF mode is selected with the Memory Switch, also performs a line feed.

## Set automatic line feed

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "5" <1>	27 53 1	1B 35 01

Causes the printer to perform both a carriage return and line feed each time it receives a <CR> code. This command takes priority over the setting of Memory Switch.

## Cancel automatic line feed

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "5" <0>	27 53 0	1B 35 00

Causes the printer to perform only a carriage return when it receives a <CR> code. This command takes priority over the setting of Memory Switch.

## Backspace

Mode	ASCII	Decimal	Hexadecimal
Both	<BS>	8	08

Moves the print position one column to the left. Ignored if the print position is at the left margin. This command can be used to overstrike or combine characters.

## ***Left justify***

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "a" "0"	27 97 48	1B 61 30
	<ESC> "a" <0>	27 97 0	1B 61 00

Aligns subsequent text with the left margin, leaving the right margin ragged.

## ***Center text***

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "a" "1"	27 97 49	1B 61 31
	<ESC> "a" <1>	27 97 1	1B 61 01

Centers subsequent text between the left and right margins.

## ***Right justify***

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "a" "2"	27 97 50	1B 61 32
	<ESC> "a" <2>	27 97 2	1B 61 02

Aligns subsequent text with the right margin, leaving the left margin ragged.

## ***Full justify***

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "a" "3"	27 97 51	1B 61 33
	<ESC> "a" <3>	27 97 3	1B 61 03

Aligns subsequent text between the left and right margins.

## Set horizontal tab stops

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "D" <i>n1 n2 ....</i> <0>	27 68 <i>n1 n2 ....</i> 0	1B 44 <i>n1 n2 ...</i> 00

Cancels all current horizontal tab stops and sets new tab stops at columns *n1*, *n2*, etc. in the current character pitch (pica pitch if proportional spacing is currently selected), where *n1*, *n2*, etc. are numbers between 1 and 255. The maximum number of horizontal tab stops allowed is 32 in Standard mode and 64 in IBM mode. The tab stops must be specified in ascending order; any violation of ascending order terminates the tab stop list. Standard termination is by the <0> control code. To clear all tab stops, specify <ESC> "D" <0>.

## Set horizontal tab stop every *n* columns

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "e" "0" <i>n</i>	27 101 48 <i>n</i>	1B 65 30 <i>n</i>
	<ESC> "e" <0> <i>n</i>	27 101 0 <i>n</i>	1B 65 00 <i>n</i>

Cancels all current horizontal tab stops and sets new tab stops every *n* columns, where *n* is between 1 and 127.

## Reset all tab stops

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "R"	27 82	1B 52

Resets the horizontal tab stops to their power-up values in which a tab stop is set every 8 column starting at column 9. Also clears all vertical tab stops.

## Horizontal tab

Mode	ASCII	Decimal	Hexadecimal
Both	<HT>	9	09

Moves the print position to the next horizontal tab stop. Ignored if there is no next horizontal tab stop in the current line. Note that when underlining is selected, spaces skipped by horizontal tabulation are not underlined.



## Relative horizontal tab

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> “\” <i>n1 n2</i>	27 92 <i>n1 n2</i>	1B 5C <i>n1 n2</i>

Moves the print position right or left a specified distance. Ignored if the resulting position is beyond the right or left margin. The formulas for the distance and direction are as follows:

If *n2* is between 0 and 63, the print head moves right by  $(n1 + n2 \times 256)$  dots.

If you want to move the print head to the left, *n1* and *n2* are obtained by subtracting the value from 65536, and dividing the result into high and low bytes.

## Absolute horizontal tab in inches

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> “\$” <i>n1 n2</i>	27 36 <i>n1 n2</i>	1B 24 <i>n1 n2</i>

Sets the next print position to  $(n1 + n2 \times 256)/60$  inches from the left margin on the current line. Ignored if this position is beyond the right margin.

## Absolute horizontal tab in columns

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> “f” “0” <i>n</i>	27 102 48 <i>n</i>	1B 66 30 <i>n</i>
	<ESC> “f” <0> <i>n</i>	27 102 0 <i>n</i>	1B 66 00 <i>n</i>

Moves the next print position to column *n* from the left margin, where *n* is between 0 and 127.

# GRAPHICS COMMANDS

## *Print normal-density graphics*

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "K" $n1$ $n2$ $m1$ $m2$ ...	27 75 $n1$ $n2$ $m1$ $m2$ ...	1B 4B $n1$ $n2$ $m1$ $m2$ ...

Prints bit-image graphics at 60 dots per inch horizontally. The graphic image is 8 dots high and  $n1 + n2 \times 256$  dots wide. Maximum width is 8 inches (480 dots) for normal carriage printer, and 13.6 inches (816 dots) for wide carriage printer.  $m1$ ,  $m2$ , ... are the dot data, each a 1-byte value from 0 to 255 representing 8 vertical dots, with the most significant bit at the top and the least significant bit at the bottom. The number of data bytes must be  $n1 + n2 \times 256$ . Dots beyond the right margin are ignored. At the end of bit-image printing the printer returns automatically to character mode.

## *Print double-density graphics*

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "L" $n1$ $n2$ $m1$ $m2$ ...	27 76 $n1$ $n2$ $m1$ $m2$ ...	1B 4C $n1$ $n2$ $m1$ $m2$ ...

Prints bit-image graphics at 120 dots per inch horizontally (maximum 960 dots wide for normal carriage printer, 1632 dots for wide carriage printer). See <ESC> "K" for other information.

## *Print double-density, double-speed graphics*

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "Y" $n1$ $n2$ $m1$ $m2$ ...	27 89 $n1$ $n2$ $m1$ $m2$ ...	1B 59 $n1$ $n2$ $m1$ $m2$ ...

Prints bit-image graphics at 120 dots per inch horizontally (maximum 960 dots wide for normal carriage printer, 1632 dots for wide carriage printer), skipping every second dot in the horizontal direction. See <ESC> "K" for other information.

## Print quadruple-density graphics

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "Z" <i>n1 n2</i> <i>m1 m2 ...</i>	27 90 <i>n1 n2</i> <i>m1 m2 ...</i>	1B 5A <i>n1 n2</i> <i>m1 m2 ...</i>

Prints bit-image graphics at 240 dots per inch horizontally (maximum 1920 dots wide for normal carriage printer, 3264 dots for wide carriage printer), skipping every second dot in the horizontal direction. See <ESC> "K" for other information.

## Select graphics mode

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "*" <i>n0 n1</i> <i>n2 m1 m2 ...</i>	27 42 <i>n0 n1</i> <i>n2 m1 m2 ...</i>	1B 2A <i>n0 n1</i> <i>n2 m1 m2 ...</i>

Selects one of eight graphics modes depending on the value of *n0* and prints bit-image graphics in this mode. See <ESC> "K" for information on *n1*, *n2*, *m1*, *m2*, ...

### *n0* Graphics mode

0	Normal-density	( 60 dots per inch)
1	Double-density	(120 dots per inch)
2	Double-density, double-speed	(120 dots per inch)
3	Quadruple-density	(240 dots per inch)
4	CRT graphics, mode I	( 80 dots per inch)
5	Plotter graphics	( 72 dots per inch)
6	CRT graphics, mode II	( 90 dots per inch)
7	Double-density plotter graphics	(144 dots per inch)

## Convert graphics density

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "?" <i>n m</i>	27 63 <i>n m</i>	1B 3F <i>n m</i>

Converts graphics defined by subsequent <ESC> "K", <ESC> "L", <ESC> "Y" or <ESC> "Z" commands to a density mode defined by <ESC> "\*". *n* is "K", "L", "Y" or "Z", indicating the mode to be converted. *m* is a code from <0> to <7> indicating one of the modes of <ESC> "\*".

## Select 9-pin graphics mode

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "A" <i>n0 n1</i> <i>n2 m1 m2 ...</i>	27 94 <i>n0 n1</i> <i>n2 m1 m2 ...</i>	1B 5E <i>n0 n1</i> <i>n2 m1 m2 ...</i>

Selects one of eight graphics modes depending on the value of *n0* and prints 9-pin bit-image graphics in this mode. The graphic image is 9 dots high and  $n1 + n2 \times 256$  dots wide.

### *n0* Graphics mode

0	Normal-density	( 60 dots per inch)
1	Double-density	(120 dots per inch)
2	Double-density, double-speed	(120 dots per inch)
3	Quadruple-density	(240 dots per inch)
4	CRT graphics, mode I	( 80 dots per inch)
5	Plotter graphics	( 72 dots per inch)
6	CRT graphics, mode II	( 90 dots per inch)
7	Double-density plotter graphics	(144 dots per inch)

Maximum width is 8 inches for normal carriage printer, and 13.6 inches for wide carriage printer. *m1*, *m2*, ... are byte pairs representing 9 vertical dots each.

In the leftmost position, the most significant bit of *m1* is the top dot; the least significant bit of *m1* is the second dot from the bottom; the most significant bit of *m2* is the bottom dot; and the other bits of *m2* are ignored. Other byte pairs are similar. The number of data bytes must be  $2 \times (n1 + n2 \times 256)$ . Dots beyond the right margin are ignored. At the end of bit-image printing the printer returns automatically to character mode.

# DOWNLOAD CHARACTER COMMANDS

## Define draft download characters

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "&" <0> <i>n1</i> <i>n2</i> <i>m0</i> <i>m1</i> <i>m2</i> <i>m3</i> ... <i>m11</i>	27 38 0 <i>n1</i> <i>n2</i> <i>m0</i> <i>m1</i> <i>m2</i> <i>m3</i> ... <i>m11</i>	1B 26 00 <i>n1</i> <i>n2</i> <i>m0</i> <i>m1</i> <i>m2</i> <i>m3</i> ... <i>m11</i>

Defines one or more new draft characters and stores them in RAM for later use. Memory Switch must be set to "DOWNLOAD"; otherwise RAM is used as an input buffer, not for downloading characters, and this command is ignored. Draft mode must be selected before this command is executed.

*n1* is the character code of the first character defined and *n2* is the character code of the last character defined. *n1* must be equal to or less than *n2*.

Each character is defined by an attribute byte (*m0*) and 11 data bytes (*m1*, *m2*, ... *m11*).

The most significant bit of the attribute byte is 0 if the character is an ascender (positioned entirely above the baseline) or 1 if it is a descender (descending below the baseline). The attribute byte also indicates the amount of white space to the left of the character (0 to 7 dots, specified by bits 4 to 6), and the width of the character cell, including this space (4 to 15 dots, specified by bits 0 to 3). The left space and cell width attributes are used only in proportional spacing. Each data byte indicates eight vertical dots, with the most significant bit being the top dot, and the least significant bit being the bottom dot.

For further details, please refer to chapter 8.

## Define NLQ download characters

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "&" <0> <i>n1</i> <i>n2</i> <i>m0</i> <i>m1</i> <i>m2</i> <i>d1</i> <i>d2</i> ... <i>dx</i>	27 38 0 <i>n1</i> <i>n2</i> <i>m0</i> <i>m1</i> <i>m2</i> <i>d1</i> <i>d2</i> ... <i>dx</i>	1B 26 00 <i>n1</i> <i>n2</i> <i>m0</i> <i>m1</i> <i>m2</i> <i>d1</i> <i>d2</i> ... <i>dx</i>

Defines one or more new NLQ characters and stores them in RAM for later use. Memory Switch must be set to "DOWNLOAD", and NLQ mode must be selected before this command is executed.

*n1* is the character code of the first character defined and *n2* is the character code of the last character defined. *n1* must be equal to or less than *n2*.

Each character is defined by three attribute bytes and data bytes. The first attribute byte *m0* specifies the left space, the second attribute byte *m1* specifies the character width, and the third attribute byte *m2* specifies the right space.

The dot density is doubled in each direction, so each character consists of 18 dots vertically and *m1* dots horizontally and requires (*m1* × 3) data bytes. Since the vertical definition of the character is 18 dots, each byte represents a third of vertical definition.

For further details, please refer to chapter 8.

## Define draft download characters

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "=" <i>n1</i> <i>n2</i> <DC4> <i>m0</i> <i>m1</i> <i>m2</i> <i>d1</i> <i>d2</i> ... <i>d11</i>	27 61 <i>n1</i> <i>n2</i> 20 <i>m0</i> <i>m1</i> <i>m2</i> <i>d1</i> <i>d2</i> ... <i>d11</i>	1B 3D <i>n1</i> <i>n2</i> 14 <i>m0</i> <i>m1</i> <i>m2</i> <i>d1</i> <i>d2</i> ... <i>d11</i>

Defines one or more new draft characters and stores them in RAM for later use. Memory Switch must be set to "DOWNLOAD", and draft mode must be selected before this command is executed.

*n1* and *n2* give the number of bytes of character data that will follow. *m0* is the character code of the first character defined, *m1* and *m2* are attribute bytes. *d1* to *d11* are the character data.

The attribute byte *m1* indicates whether the character is an ascender (not using the lowest of the nine vertical dots) or a descender (not using the highest dot) and whether it has a downward extension to 12 dots.

The attribute byte *m2* gives proportional-spacing information. Bit 7 is ignored. Bits 4 to 6 specify the offset to the first byte printed (0 to 7), enabling leading spaces in the character to be ignored. Bits 0 to 3 specify the width of the character cell (maximum 11 dots). The character will be followed by a mandatory blank dot column which is not included in this width.

Characters defined by this command can be selected by <ESC> "I" 4 or <ESC> "I" 5.

## Define NLQ download characters

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "=" <i>n1 n2</i> <NAK> <i>m0 m1 m2</i> <i>d1 d2 ... d46</i>	27 61 <i>n1 n2</i> 21 <i>m0 m1 m2</i> <i>d1 d2 ... d46</i>	1B 3D <i>n1 n2</i> 15 <i>m0 m1 m2</i> <i>d1 d2 ... d46</i>

Defines one or more new NLQ characters and stores them in RAM for later use. Memory Switch must be set to "DOWNLOAD", and NLQ mode must be selected before this command is executed.

The parameters are the same as for the draft download command except that the dot density is doubled in each direction, so each character consists of 16 dots vertically and 23 dots horizontally and requires 46 data bytes.

Characters defined by this command can be selected by <ESC> "I" 7.

## Copy character set from ROM into RAM

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> ":" <0> <i>n</i> <0>	27 58 0 <i>n</i> 0	1B 3A 00 <i>n</i> 00

Copies the selected character set with *n*, as shown below, to the corresponding download character RAM area, overwriting any download data already present. Ignored when Memory Switch is not set to "DOWNLOAD".

<u><i>n</i></u>	<u>Font</u>	<u><i>n</i></u>	<u>Font</u>
0	Tms Romn	4	Script
1	Sanserif	7	Orator
2	Courier	12	Helvet
3	Prestige		

## Select download character set

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> “%” “1”	27 37 49	1B 25 31
	<ESC> “%” <1>	27 37 1	1B 25 01

Selects the download character set. Ignored when Memory Switch is not set to “DOWNLOAD”.

## Shift download character area

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> “1” “2”	27 116 50	1B 74 32
	<ESC> “1” <2>	27 116 2	1B 74 02

Shifts the download character area defined between 0 to 127 to the area between 128 to 255.

## Select draft pica download character set

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> “1” <4>	27 73 4	1B 49 04

Selects the download character set, draft quality, and pica pitch (10 cpi). Ignored if the FONT LOCK mode was selected during power-up or if Memory Switch is not set to “DOWNLOAD”.

## Select draft elite download character set

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> “1” <5>	27 73 5	1B 49 05

Selects the download character set, draft quality, and elite pitch (12 cpi). Ignored if the FONT LOCK mode was selected during power-up or if Memory Switch is not set to “DOWNLOAD”.



## Select draft download characters with double-strike

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "I" <6>	27 73 6	1B 49 06

Selects the download character set, draft quality, and double-strike mode. Ignored if the FONT LOCK mode was selected during power-up or if Memory Switch is not set to "DOWNLOAD".

## Select NLQ download characters

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "I" <7>	27 73 7	1B 49 07

Selects the NLQ download character set. Ignored if the FONT LOCK mode was selected during power-up or if Memory Switch is not set to "DOWNLOAD".

## Select NLQ download characters with italic

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "I" <SI>	27 73 15	1B 49 0F

Selects the NLQ download character set with italic mode. Ignored if the FONT LOCK mode was selected during power-up or if Memory Switch is not set to "DOWNLOAD".

## Select ROM character set

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "%" "0"	27 37 48	1B 25 30
	<ESC> "%" <0>	27 37 0	1B 25 00

Stops using the download character set and returns to the built-in ROM character set. Ignored when Memory Switch is not set to "DOWNLOAD".

# COLOR SELECTION COMMANDS

## Select print color

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "I" <i>n</i>	27 114 <i>n</i>	1B 72 <i>n</i>

Selects the printing color according to the value of *n*, as shown below. Ignored if the color ribbon is not installed.

<u><i>n</i></u>	<u>Color</u>	<u><i>n</i></u>	<u>Color</u>
0	Black	4	Yellow
1	Red	5	Orange
2	Blue	6	Green
3	Violet		

## Select print color

Mode	ASCII	Decimal	Hexadecimal
Both	"(" "(" "C" ")" ")" <i>d</i>	40 40 67 41 41 <i>d</i>	28 28 43 29 29 <i>d</i>

Changes the printing color according to the value of *d*, as shown below. Ignored if the color ribbon is not installed.

<u><i>d</i></u>	<u>Color</u>	<u><i>d</i></u>	<u>Color</u>
0	Black	4	Yellow
1	Red	5	Orange
2	Blue	6	Green
3	Violet		

## OTHER PRINTER COMMANDS

### *Set MSB to 1*

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> ">"	27 62	1B 3E

Sets the most significant bit of each subsequent byte received to 1, allowing users with a 7-bit interface to access characters with ASCII codes greater than 127.

### *Set MSB to 0*

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "="	27 61	1B 3D

Sets the most significant bit of each subsequent byte received to 0.

### *Accept MSB as is*

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "#"	27 35	1B 23

Cancels the preceding commands and accepts the most significant bit as it is sent to the printer.

### *Delete last character sent*

Mode	ASCII	Decimal	Hexadecimal
Std.	<DEL>	127	7F

Deletes the last character received. Ignored if the last character received has already been printed, or if the last character received was all or part of a command.

### *Cancel last line*

Mode	ASCII	Decimal	Hexadecimal
Both	<CAN>	24	18

Deletes the last line currently present in the print buffer.

## Set printer off-line

Mode	ASCII	Decimal	Hexadecimal
Std.	<DC3>	19	13
IBM	<ESC> "Q" <i>n</i>	27 81 <i>n</i>	1B 51 <i>n</i>

Sets the printer off-line. The printer disregards all subsequent characters and commands except <DC1>, which returns it to the on-line. The printer's ON LINE indicator does not go off.

In the IBM mode, the value of *n* should be 3 for normal carriage printer, and 17 for wide carriage printer.

## Set printer on-line

Mode	ASCII	Decimal	Hexadecimal
Both	<DC1>	17	11

Returns the printer on-line state, allowing it to receive and process all subsequent characters and commands. This command is ignored if the printer was set off-line by pressing the  ON LINE  button on the control panel.

## Bell

Mode	ASCII	Decimal	Hexadecimal
Both	<BEL>	7	07

Sounds a brief beep tone from the printer.

## Bi-directional printing

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "U" "0"	27 85 48	1B 55 30
	<ESC> "U" <0>	27 85 0	1B 55 00

Causes subsequent printing to be done in the normal bi-directional mode, which is faster than uni-directional printing.

## Uni-directional printing

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "U" "1"	27 85 49	1B 55 31
	<ESC> "U" <1>	27 85 1	1B 55 01

Causes subsequent printing to be done uni-directionally, ensuring maximum vertical alignment precision.

## One-line uni-directional printing

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "<"	27 60	1B 3C

Immediately returns the print head to the left margin, then prints the remainder of the line from left to right. Normal printing resumes on the next line.

## Manual feed

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> <EM> <0>	27 25 0	1B 19 00
	"(" "(" "0" ")" ")"	40 40 48 41 41	28 28 30 29 29

Selects manual sheet feeding even when the optional automatic sheet feeder is mounted. Ignored if Memory Switch is not selected ASF.

## Auto feed

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> <EM> <4>	27 25 4	1B 19 04
	"(" "(" "4" ")" ")"	40 40 52 41 41	28 28 34 29 29

Selects the automatic sheet feeder. Ignored if Memory Switch is not selected ASF.

## Select ASF bin #1

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> <EM> <1>	27 25 1	1B 19 01
	"(" (" "1" ")" ")"	40 40 49 41 41	28 28 31 29 29

Selects the ASF bin #1, and feeds paper from bin #1. Ignored if Memory Switch is not selected the Dual-bin ASF.

## Select ASF bin #2

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> <EM> <2>	27 25 2	1B 19 02
	"(" (" "2" ")" ")"	40 40 50 41 41	28 28 32 29 29

Selects the ASF bin #2, and feeds paper from bin #2. Ignored if Memory Switch is not selected the Dual-bin ASF.

## Eject paper from ASF

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> <EM> "R"	27 25 82	1B 19 52
	"(" (" "R" ")" ")"	40 40 82 41 41	28 28 52 29 29

Ejects the current page. Ignored if Memory Switch is not selected ASF.

## Set print start position on ASF

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> <EM> "T" <i>n</i>	27 25 84 <i>n</i>	1B 19 54 <i>n</i>
	"(" (" "T" ")" ") " <i>n</i>	40 40 84 41 41 <i>n</i>	28 28 54 29 29 <i>n</i>

Skips *n*/6 inches at the top of the page, where *n* is equal to or greater than 1. Ignored if Memory Switch is not selected ASF.

## Reset printer

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "@"	27 64	1B 40

Reinitializes the printer. Clears the print buffer and returns settings to their power-up values. Does not clear the input buffer or change ASF selections.

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