star

USERS MANUAL

ZA-200 MULTI-FONT
ZA-250 MULTI-FONT

ZA-200
ZA-250
MULTI-FONT

USERS MANUAL

VDE Statement

This device carries the VDE RFI protection mark to certify that it meets the radio interference requirements of the Postal Ordinance No. 243/1991. The additional marking "Vfg. 243/P" expresses in short form that this is a peripheral device (not operable alone) which only individually meets the Class B RFI requirements in accordance with the DIN VDE 0878 part 3/11.89 and the Postal Ordinance 243/1991.

If this device is operated in conjunction with other devices within a set-up, in order to take advantage of a "General (Operating) Authorization" in accordance with the Postal Ordinance 243/1991, the complete set-up must comply with the Class B limits in accordance with the DIN VDE 0878 part 3/11.89, as well as satisfy the preconditions in accordance with § 2 and the prerequisites in accordance with § 3 of the Postal Ordinance 243/1991.

As a rule, this is only fulfilled when the device is operated in a set-up which has been type-tested and provided with a VDE RFI protection mark with the additional marking "Vfg 243".

Machine Noise Information Ordinance 3. GSGV, January 18, 1991: The sound pressure level at the operator position is equal or less than 70 dB(A) according to ISO 7779.

The above statement applies only to printers marketed in Germany.

Trademark Acknowledgements

ZA-200/250, FR-10/15, LC-200 Color, LC-10 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.

TABLE OF CONTENTS

Chapter 1

INTRODUCTION

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
  • Sanserif   • Courier
  • Script   • Orator

• 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.

Tractor

Paper guide

Release lever

Adjustment lever

Tractor

Clamp lever

Bail lever

Power switch

Platen knob

Ribbon cartridge

Print head

Control panel

Tear assist

Entry slot

Front cover

Rear cover

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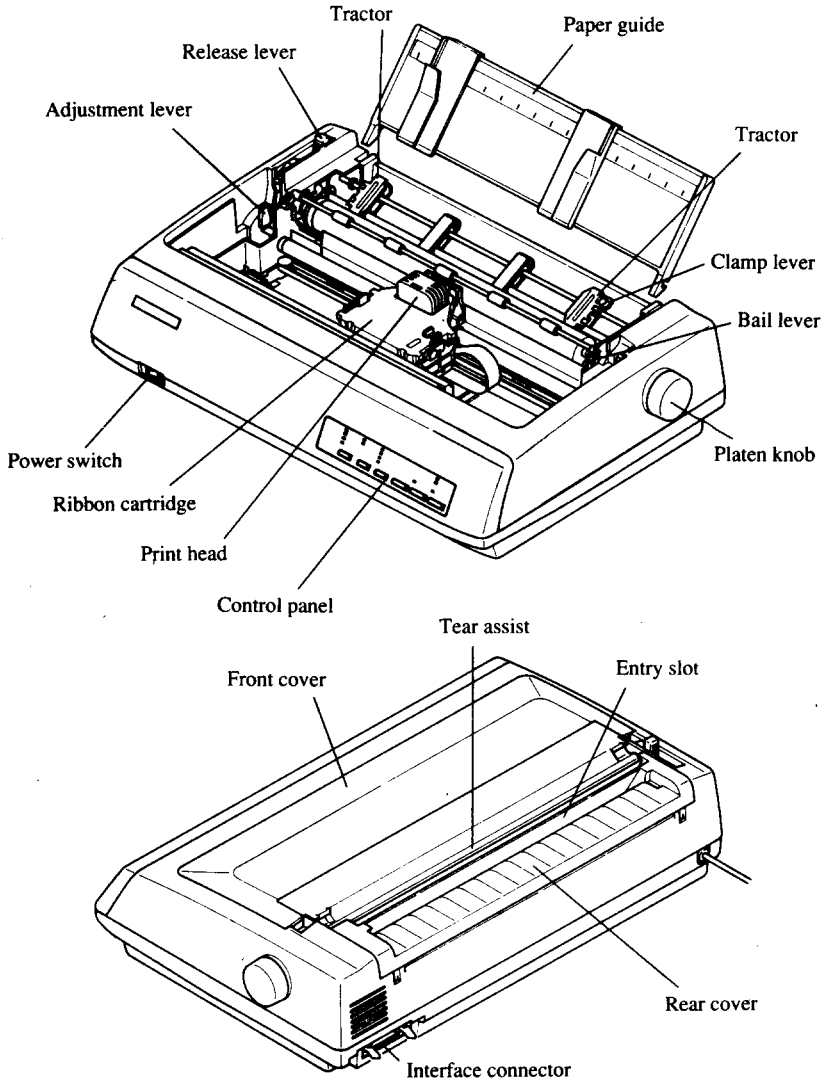
Paper guide	Aligns single sheets (cut forms) to help the printer detect when paper is inserted.
Release lever	Releases pressure on the paper. This lever must be back for fanfold forms, and forward for single sheets.
Front cover	Protects the print head and other internal components of your printer.
Rear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

Sanserif    0123456789ABCDEFGHIJKLMabcdefghijklm

Courier     0123456789ABCDEFGHIJKLMabcdefghijklm

Script      0123456789ABCDEFGHIJKLMabcdefghijklm

Orator      0123456789ABCDEFGHIJKLMABCDEFGHIJKLM
```

chapter 2

SETTING UP THE PRINTER

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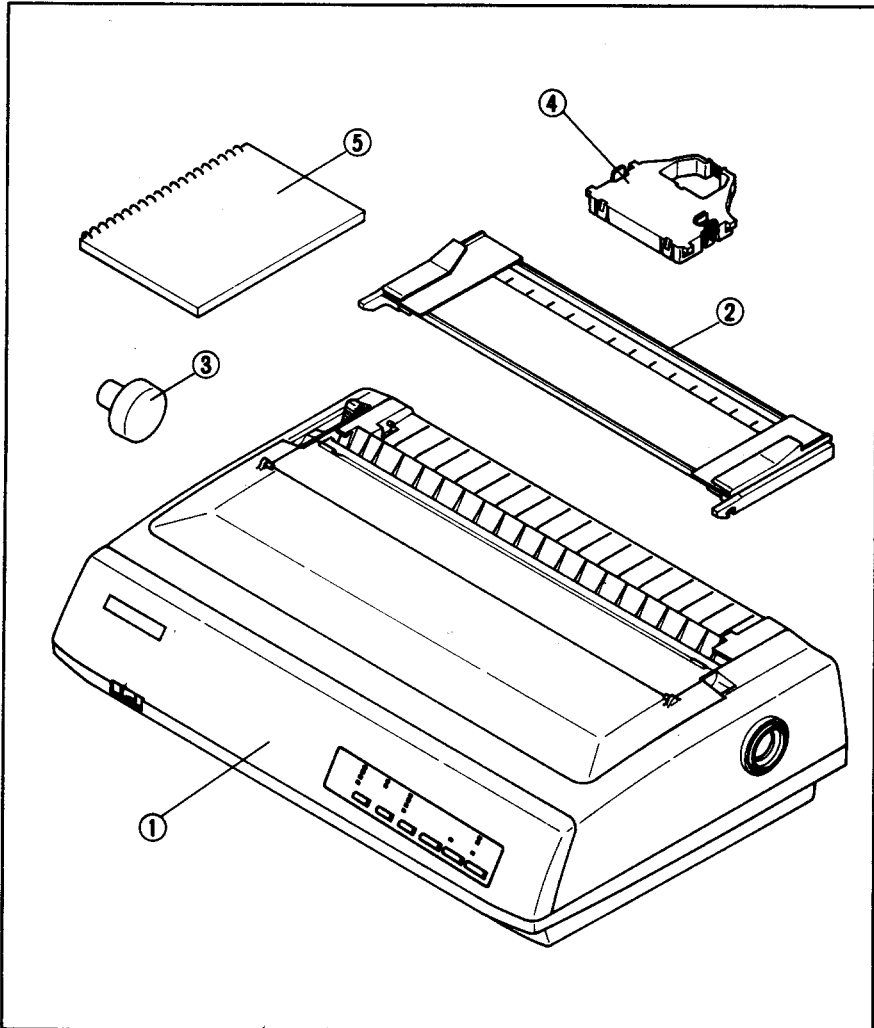
Figure 2-1. Check to make sure you have all five items: 1) Printer, 2) Paper guide, 3) Platen knob, 4) Ribbon cartridge, and 5) User's manual.

NOTE: The platen knob is mounted on the printer for the Normal carriage printer.

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 a recess of the white foam packing material which held your printer inside the carton. Be sure to remove the knob from the packaging.

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.
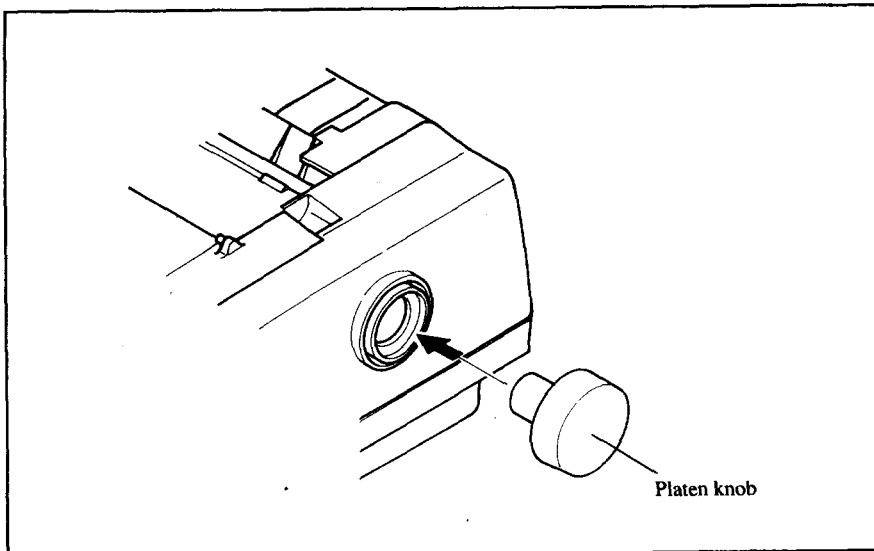
Figure 2-2. Mount the platen knob.

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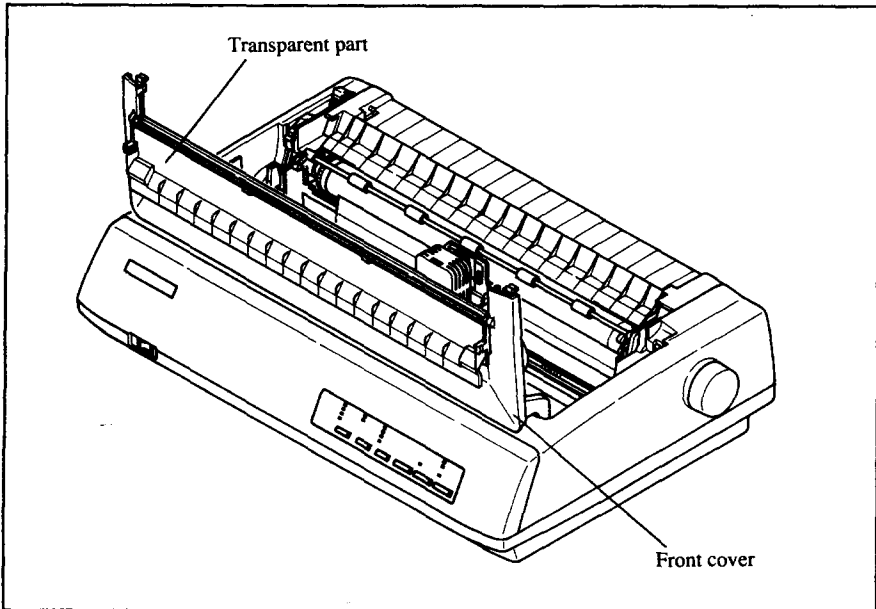
Figure 2-3. Open the front cover, and swing down the transparent part.

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.
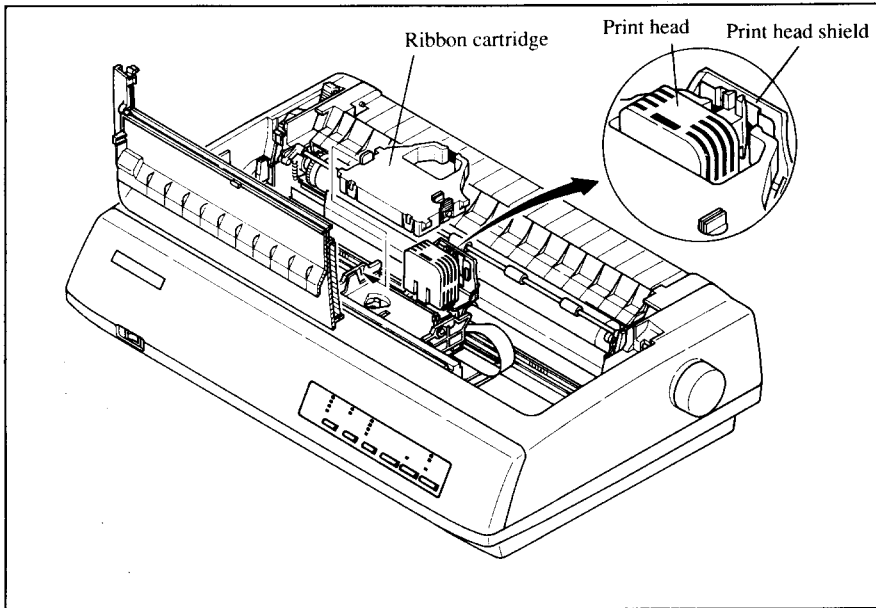
Figure 2-4. Installing the ribbon cartridge.

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.

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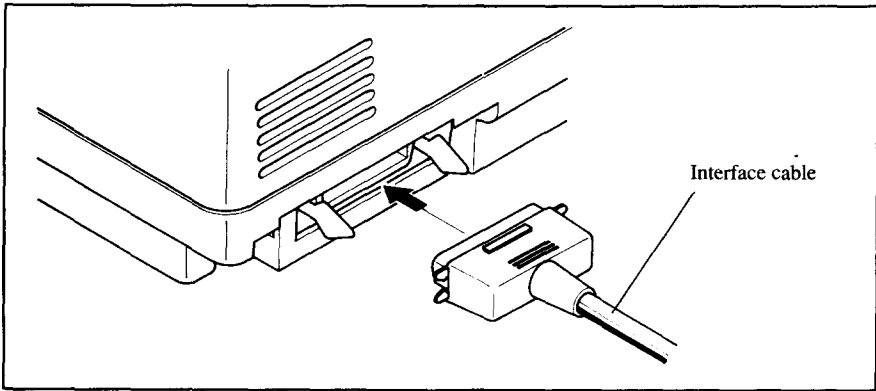
Interface cable

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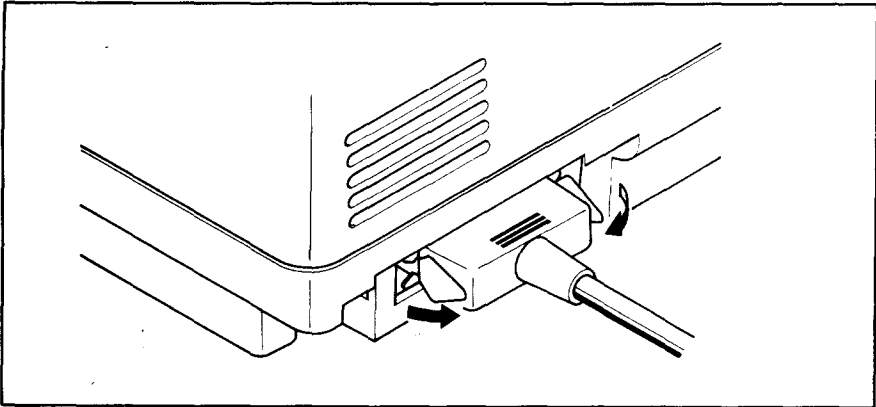
Figure 2-6. Move the clips until you hear a click.

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

chapter 3

OPTIONAL ACCESSORIES

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.

Transparent part
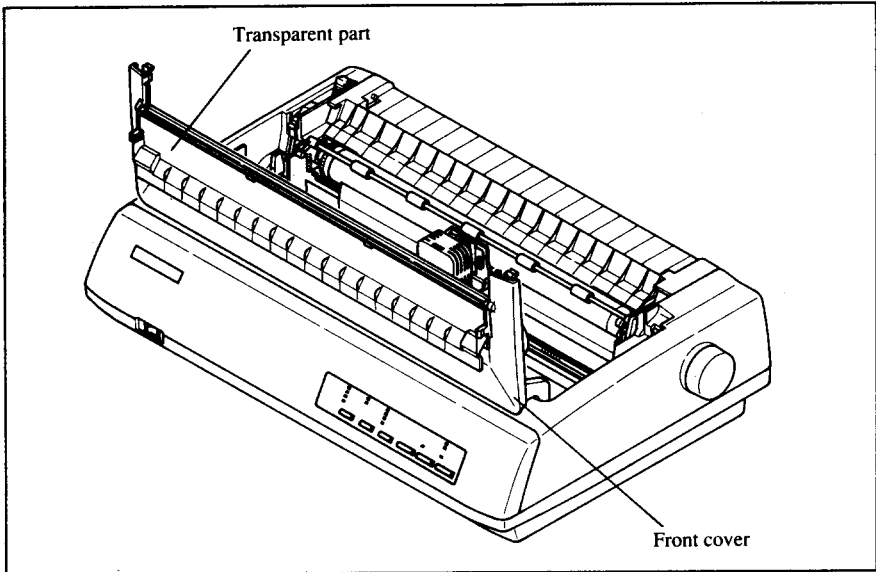
Front cover

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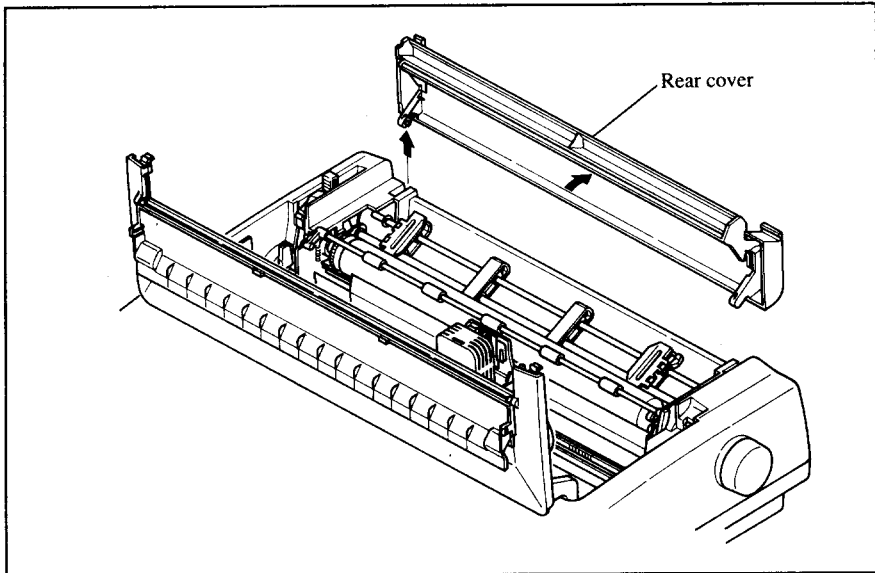
Rear cover

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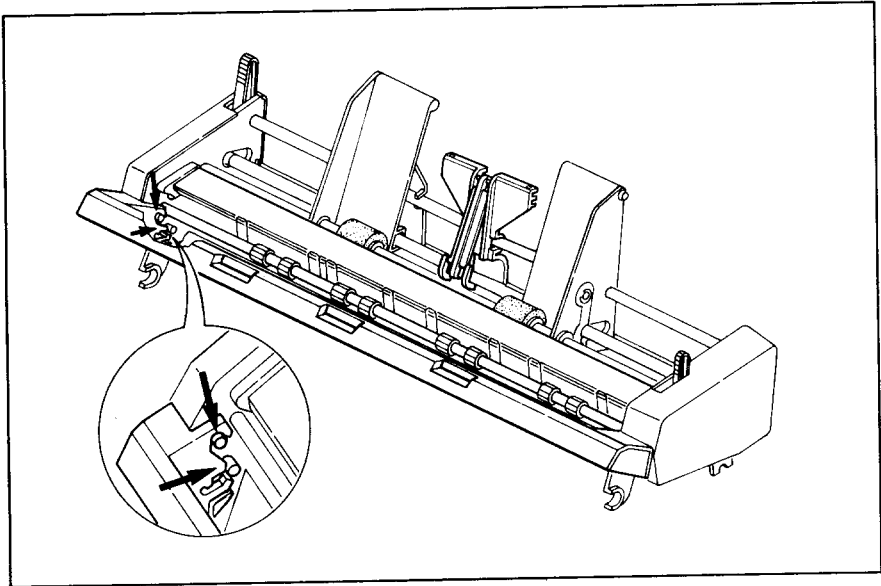
Figure 3-3. Attach the stacker to the Automatic Sheet Feeder.

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.

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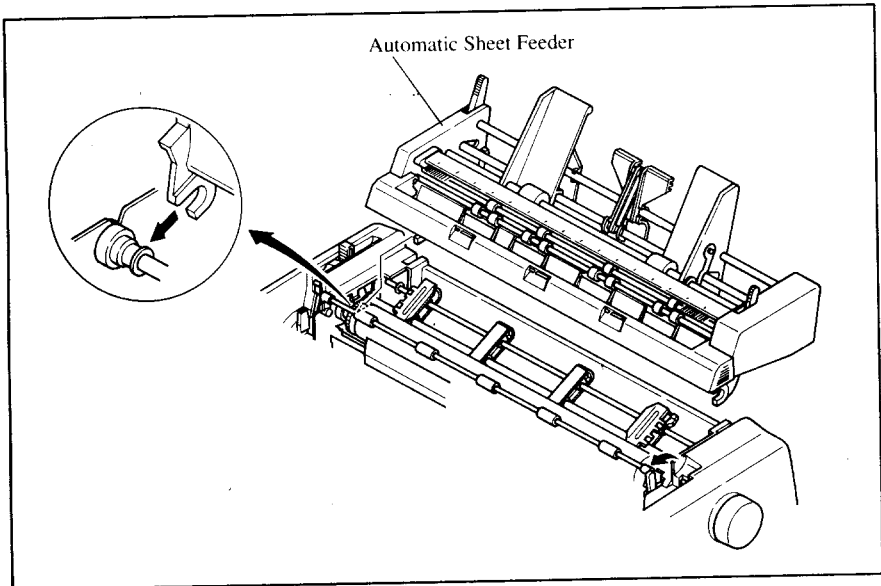
Figure 3-4. Mount the Automatic Sheet Feeder to the printer.

7. Close the front cover with the transparent part in the open position.
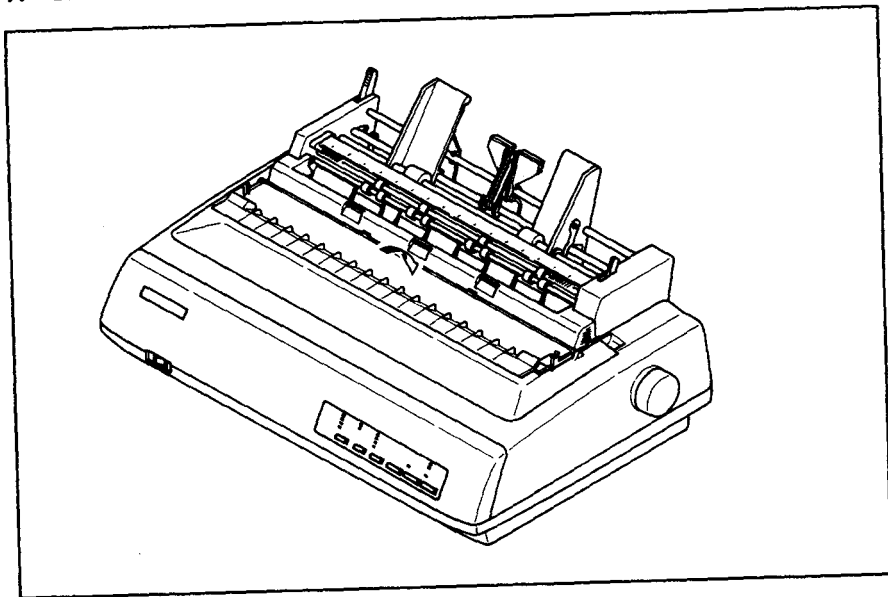
Figure 3-5. Close the front cover.

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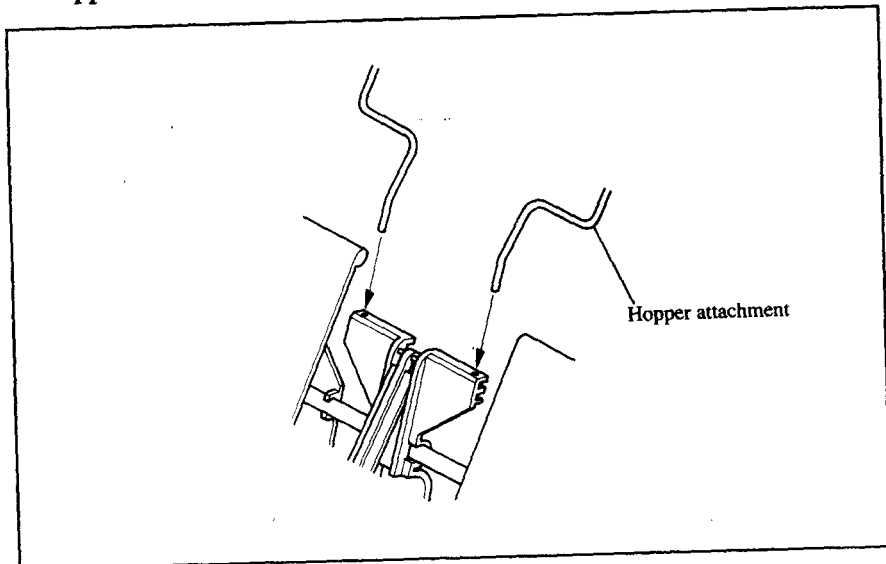
Hopper attachment

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.
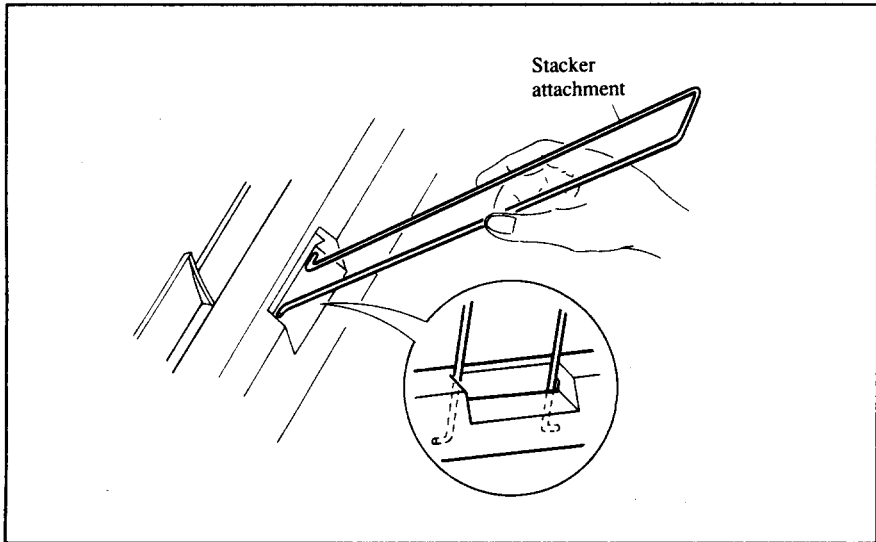
Figure 3-7. Insert the stacker attachments.

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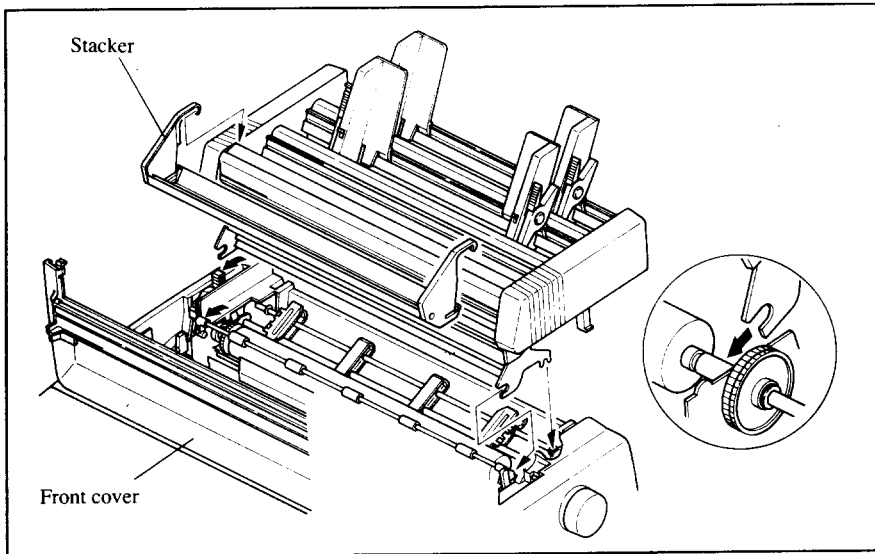
Figure 3-8. Attach the stacker to the Automatic Sheet Feeder.

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.

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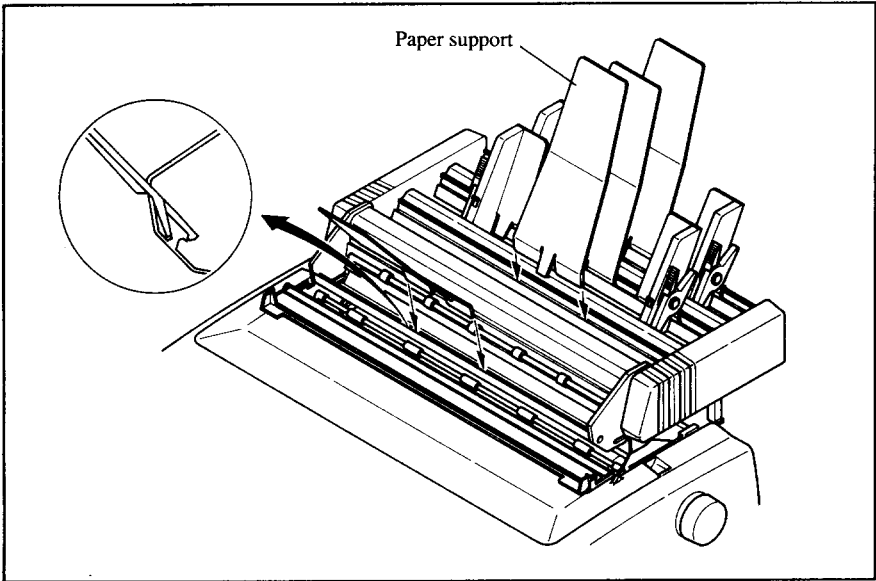
Paper support

Figure 3-9. 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.
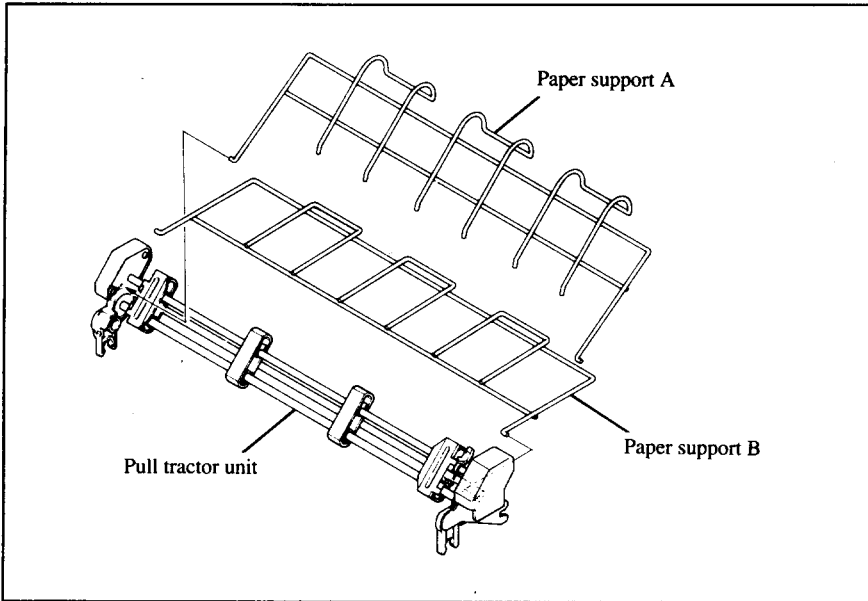
Figure 3-10. Mount the paper support A and B onto the Pull Tractor Unit.

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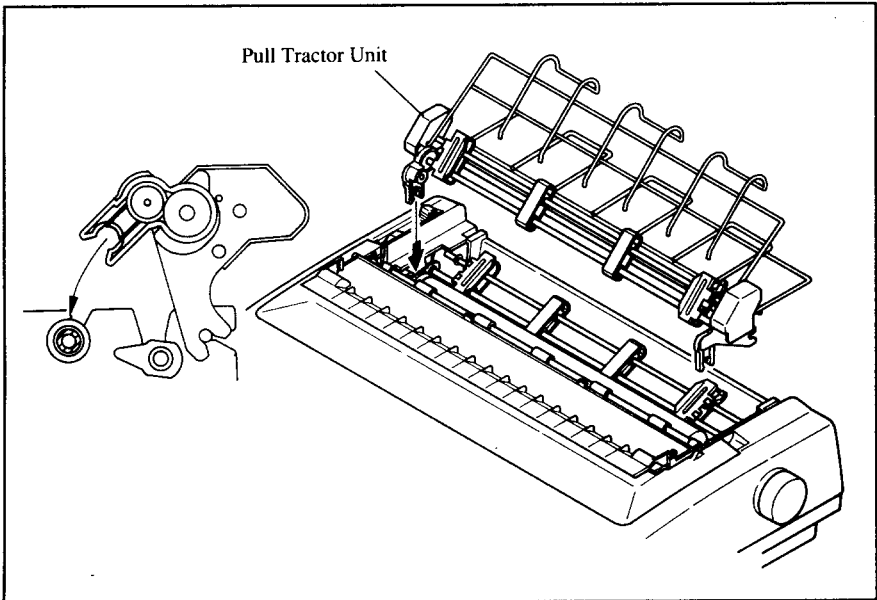
Figure 3-11. Mount the Pull Tractor Unit onto the printer.

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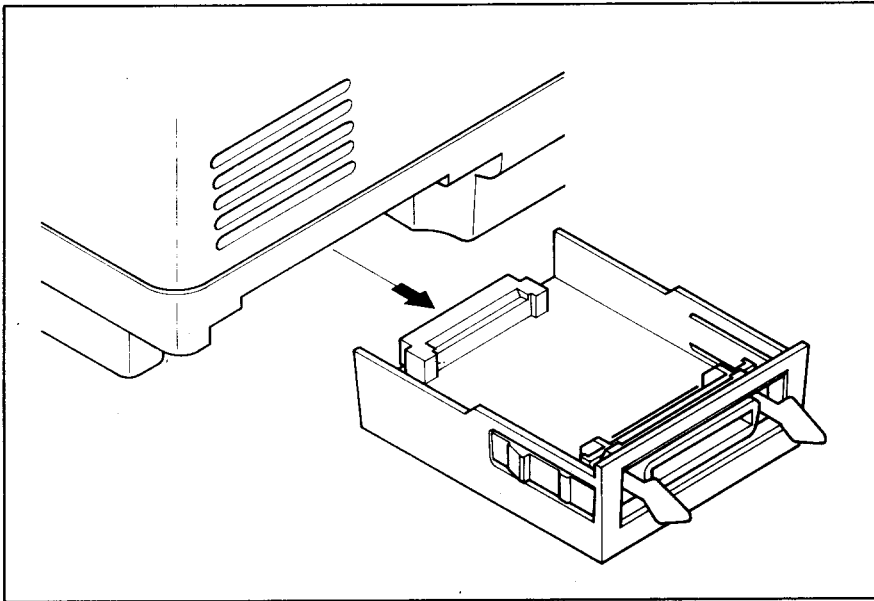
Figure 3-12. Remove the Standard Interface Cartridge from the printer.

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.

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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
1	Data length	8-bit	7-bit
2	Parity condition	(Refer below)	
3	Data Protocol	(Refer below)	
4			
5	Parity condition	(Refer below)	
6	Transfer speed	(Refer below)	
7			
8			

[Parity condition]

Switch 2	Switch 5	Condition
ON	ON	No parity
ON	OFF	
OFF	ON	Odd parity
OFF	OFF	Even parity

[Data protocol]

Switch 3	Switch 4	Protocol
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

Chapter 4

PAPER INSTALLATION AND USE

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

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

Fanfold forms   Single sheets

20 mm

18 mm   18 mm

5 mm   20 mm   5 mm

25.4 mm
25.4 mm   Perforation

23 mm

25.4 mm*
(*80 mm for Push Feed)
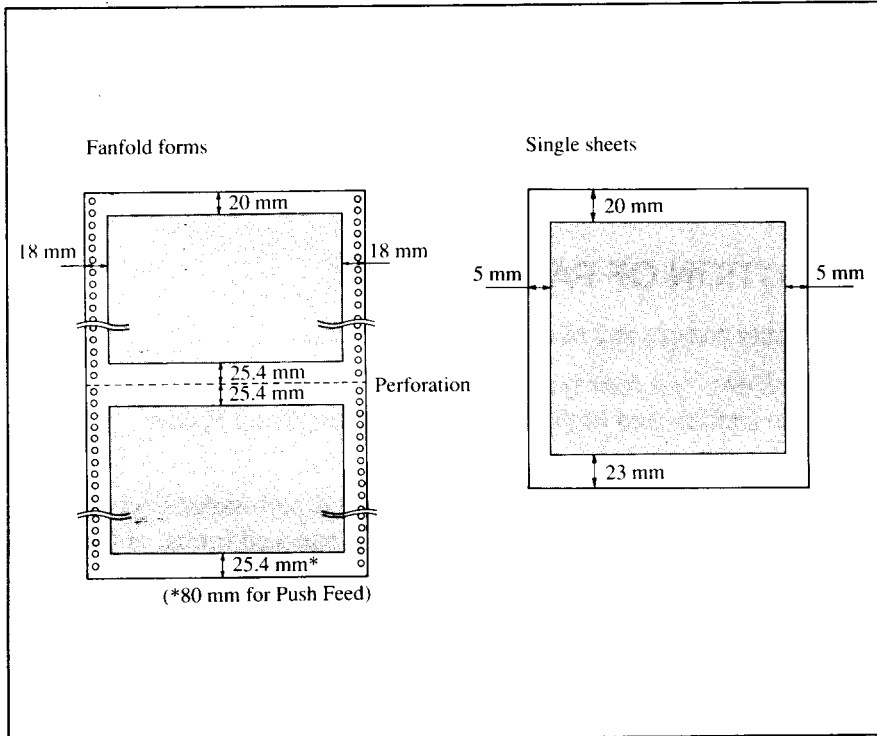
Figure 4-1. Recommended print area for acceptable papers.

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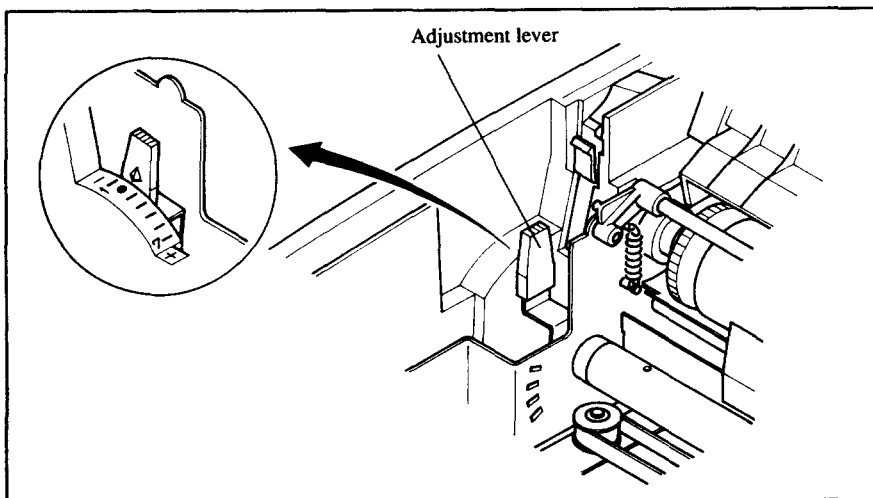
Figure 4-2. Location of the adjustment lever.

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

Paper Type	Weight (g/m²) (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.
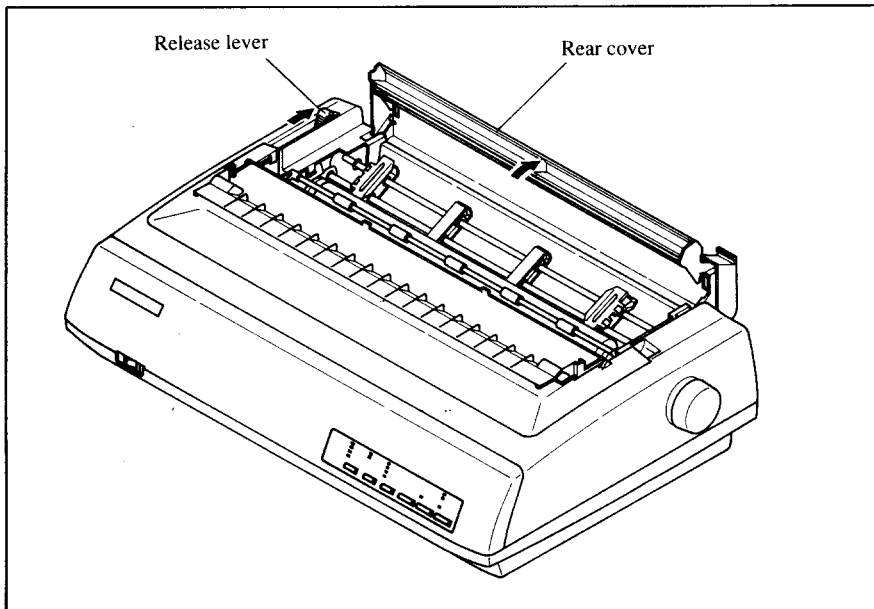
Figure 4-3. Opening the rear cover.

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.

Tractor cover   Clamp lever
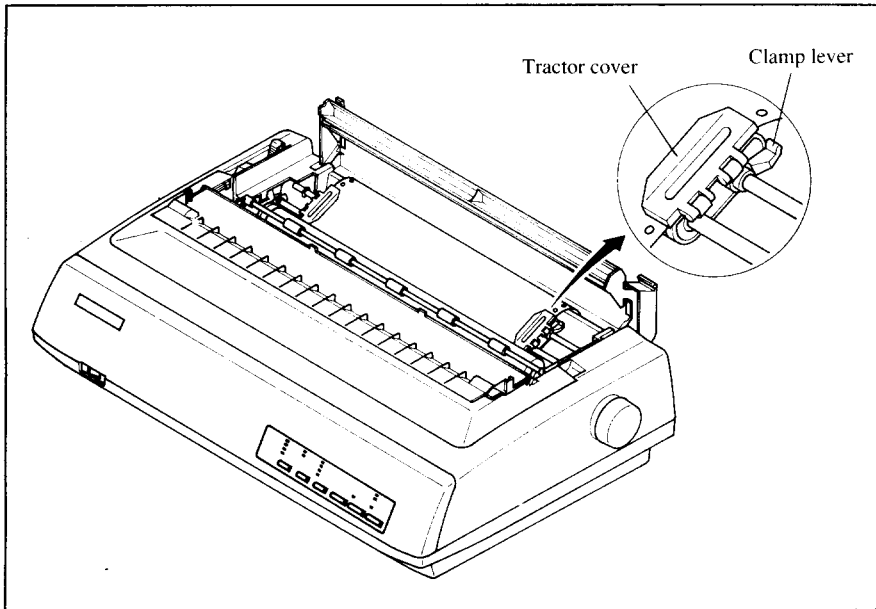
Figure 4-4. Mount the fanfold paper over the tractor units.

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 ⌈SET/EJECT 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.
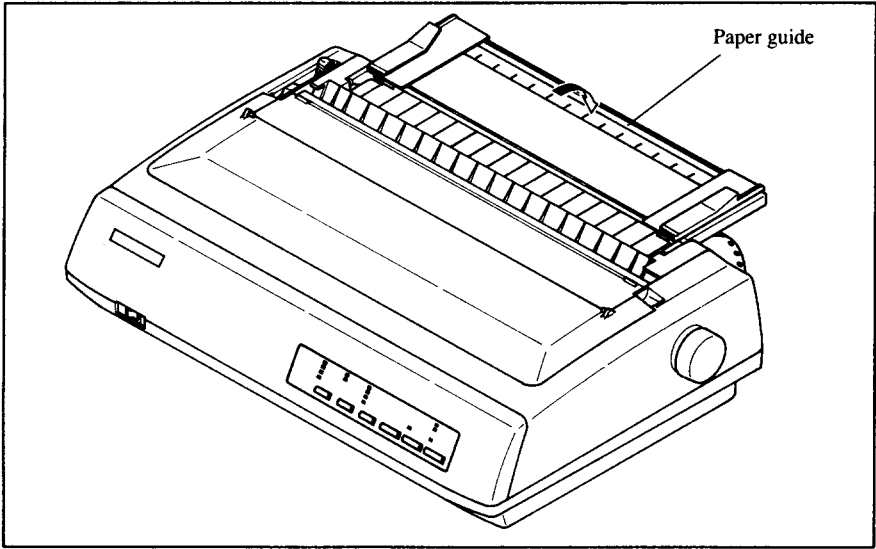
Figure 4-5. Mounting the paper guide for fanfold forms.

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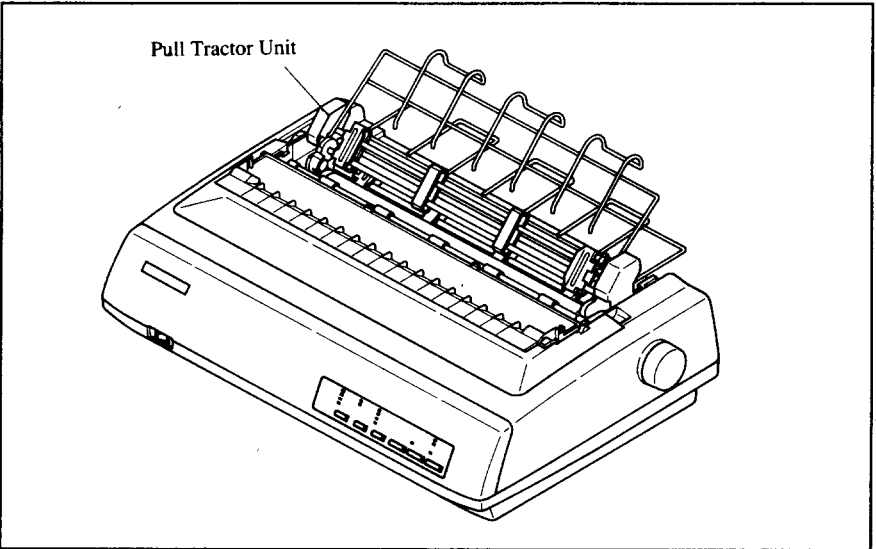
Figure 4-6. Install the optional Pull Tractor Unit.

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.
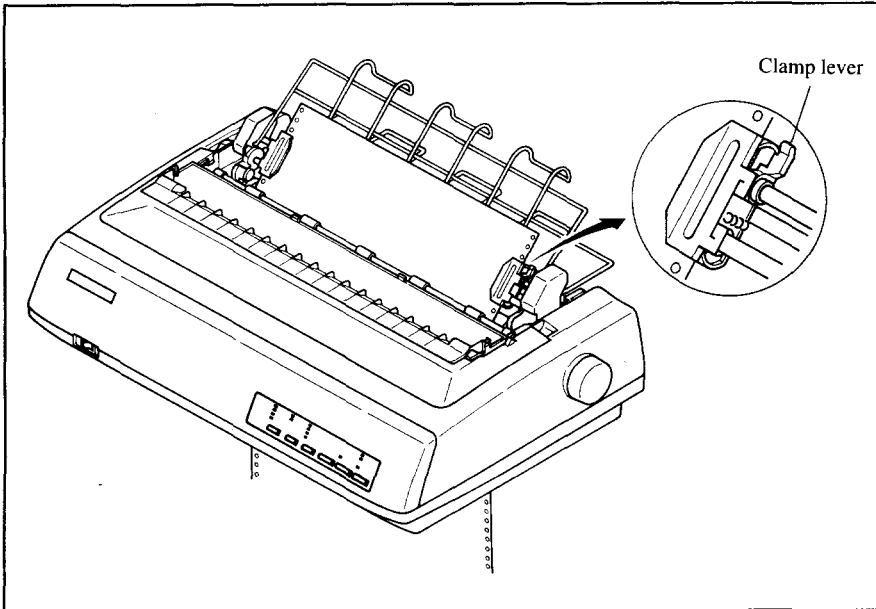
Clamp lever

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.
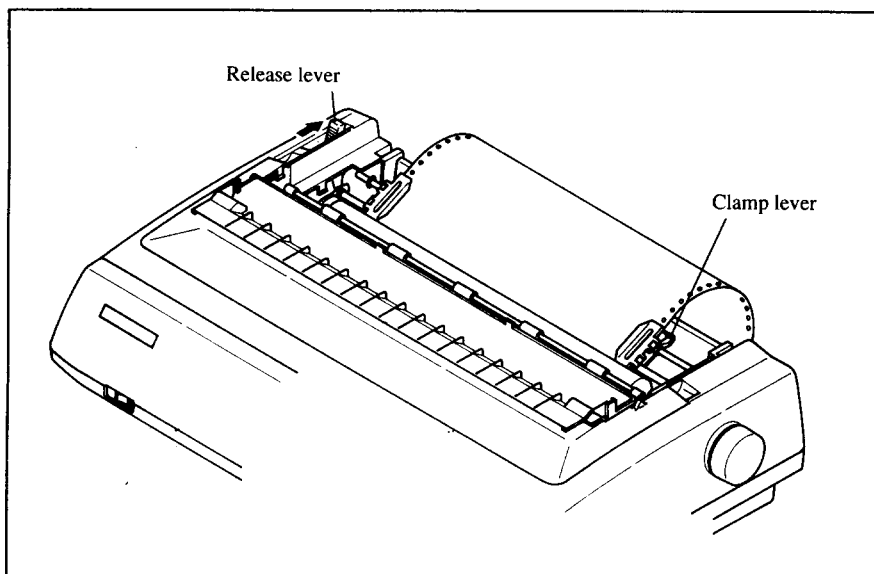
Figure 4-8. Mount the fanfold paper over the internal tractor units.

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 PARK⌋ 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.

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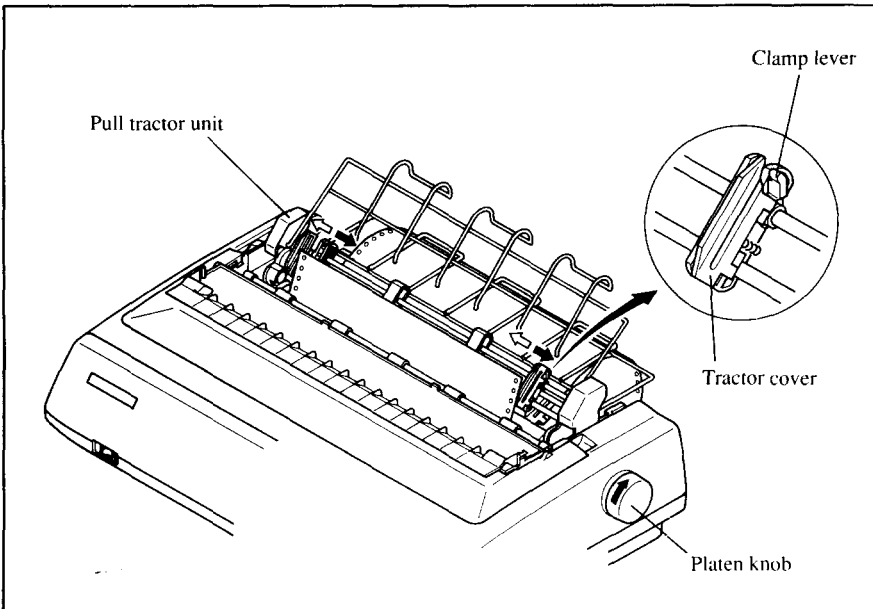
Figure 4-9. Mount the fanfold paper to the Pull Tractor Unit by turning the platen knob.

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.

Lever stopper

Platen knob

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 [ON LINE] 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 [PAPER FEED] button to feed paper forward until a perforation is located just above the front cover, and tear there.
4. Press the [SET/EJECT PARK] 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.

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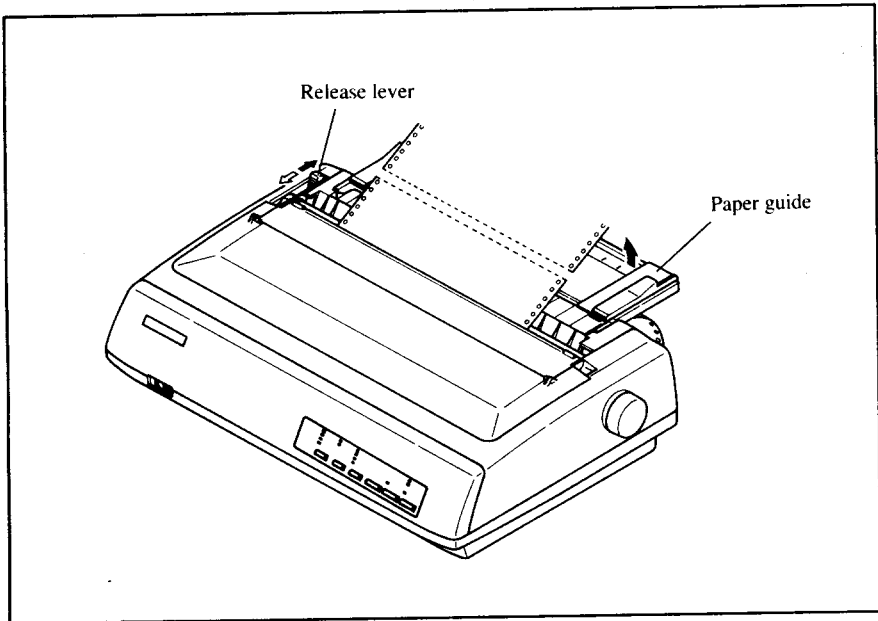
Figure 4-11. Tear off the printed fanfold paper.

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.
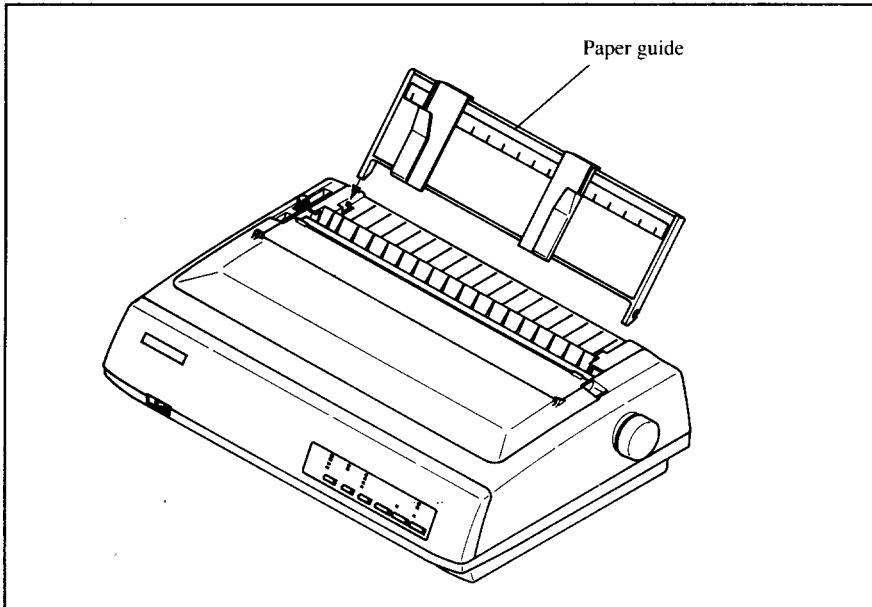
Paper guide

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 ⌐SET/EJECT⌐ button to park the paper in the off-line state, then move the PARK 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 PARK] 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.)
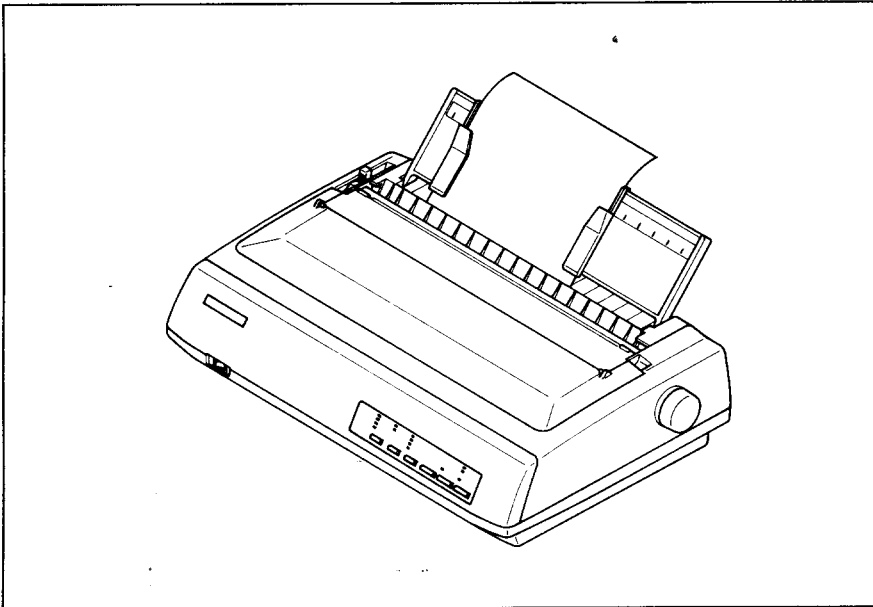
Figure 4-13. Loading a single sheet.

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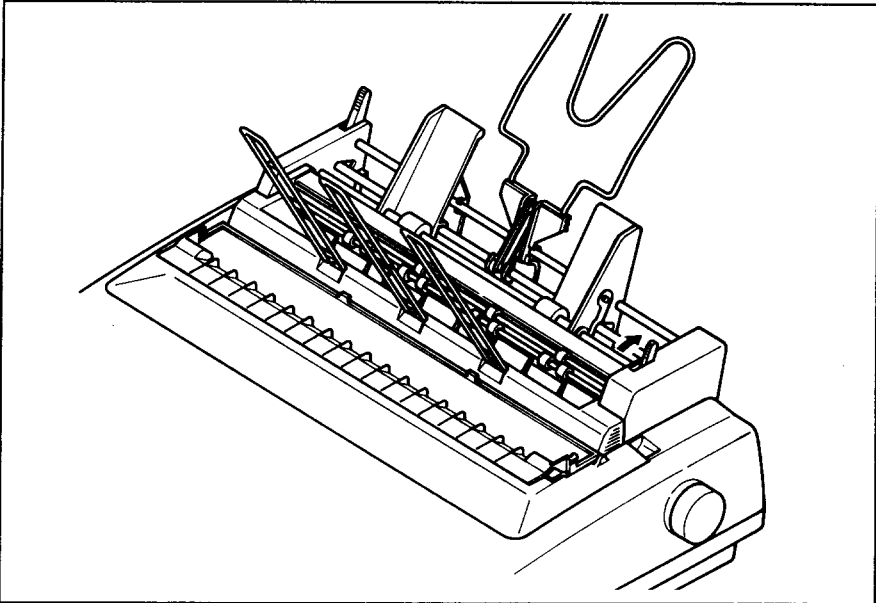
Figure 4-14. Install the optional Automatic Sheet Feeder.

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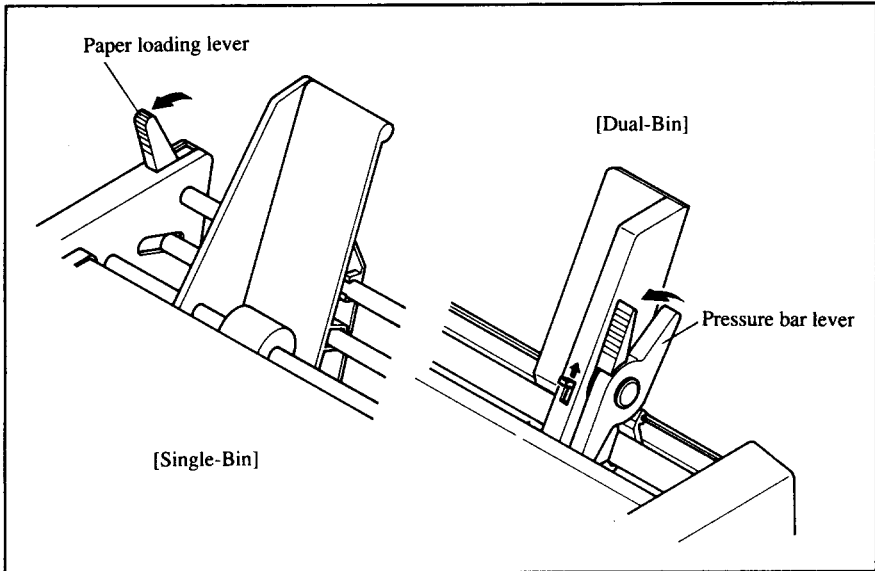
Figure 4-15. Make ready to load paper.

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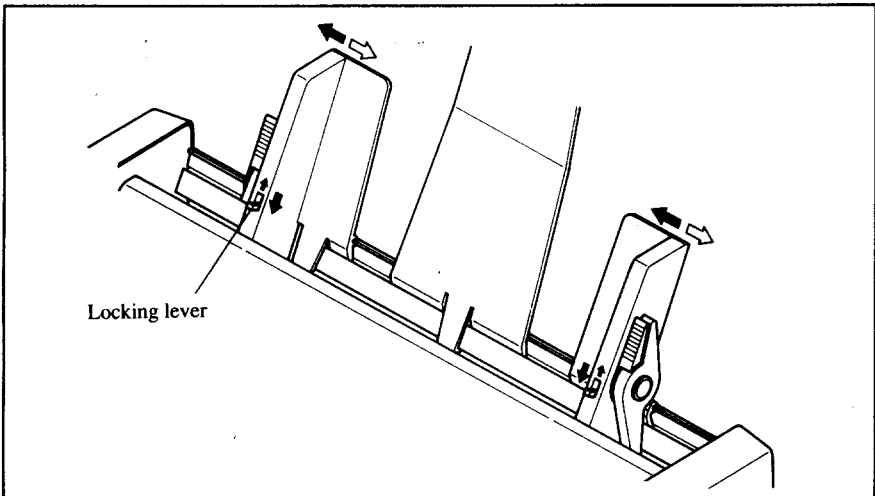
Figure 4-16. Adjust the paper guides to accommodate the width of the paper.

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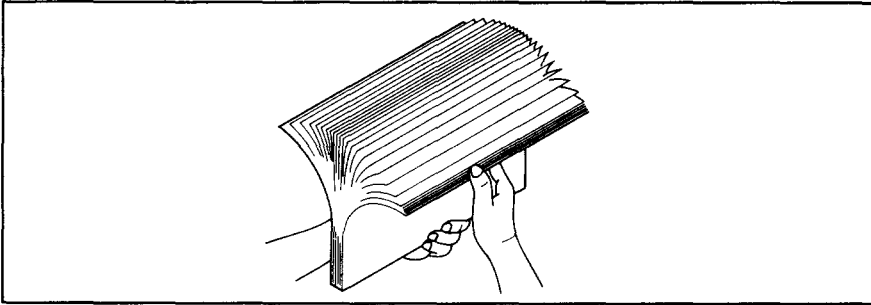
Figure 4-17. Fan the paper before inserting into the ASF.

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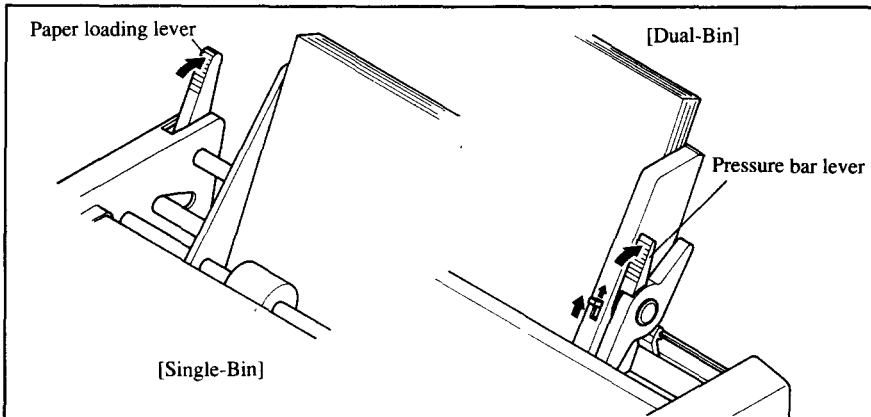
Figure 4-18. Push the paper loading lever or pressure bar levers to hold the paper stack.

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.

■ SANSERIF	■ HS DRAFT	■ 10 CPI			■ POWER
■ COURIER	⊢ DRAFT ■ NLQ	■ 12 CPI			■ PAPER
■ ORATOR		■ PROP	MICRO FEED		
■ SCRIPT		■ COND	SET/EJECT ■ – QUIET		■
FONT	MODE	PITCH	PARK	PAPER FEED	⎣ON LINE
		EXIT	<	>	ENTER
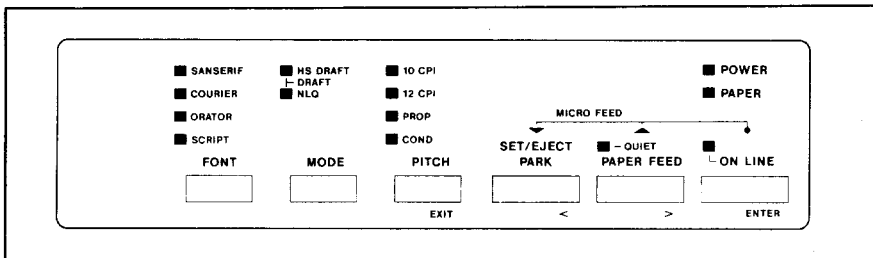
Figure 5-1. Control panel.

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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):

Pitch	Indicator(s)
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:

Print mode	Indicator(s)
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 ⎣FONT⎤ button repeatedly until the indicator beside the desired selection illuminate. The selections cycle in the following order:

Font	Indicator
Sanserif	SANSERIF
Courier	COURIER
Orator	ORATOR
Script	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.
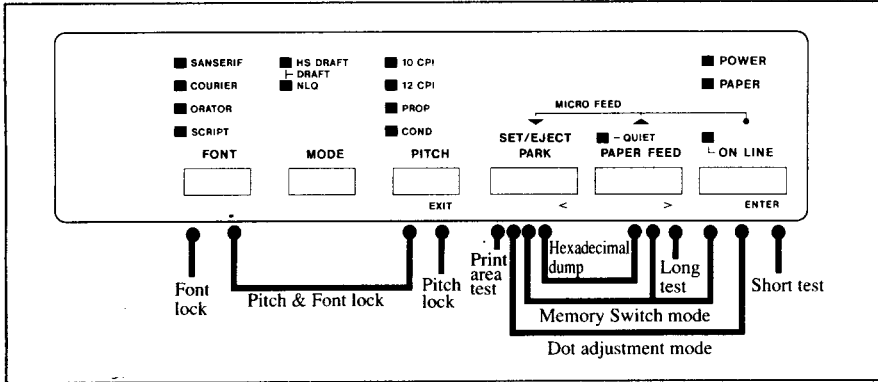
Figure 5-2. Power-up functions of control panel.

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.)
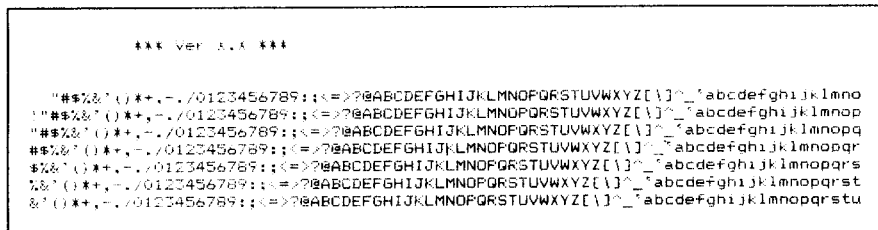
Figure 5-3. Short self-test.

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.
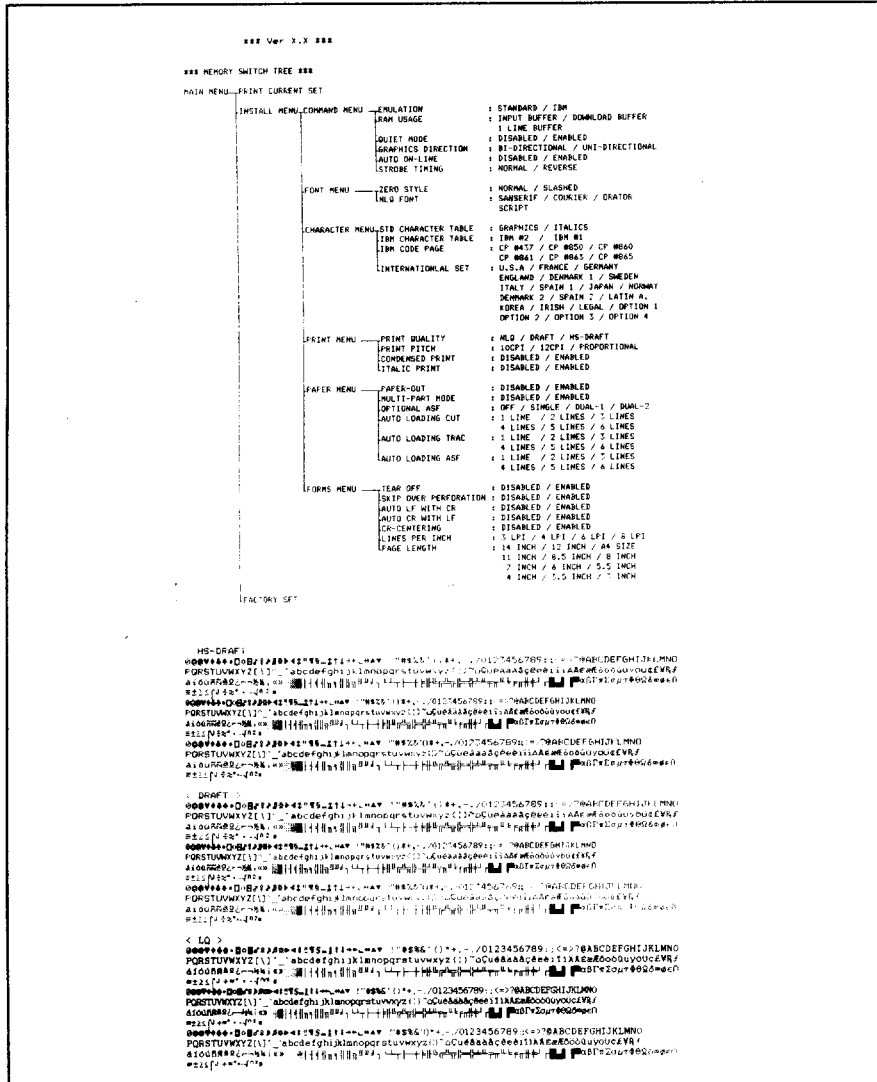
Figure 5-4. Long self-test.

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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 ⌈BET/EJECT⌉ 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 SET/EJECT 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    `abcdefghijklmno
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    ................
A0 A1 A2 A3 A4 A5 A6 A7    A8 A9 AA AB AC AD AE AF    ................
B0 B1 B2 B3 B4 B5 B6 B7    B8 B9 BA BB BC BD BE BF    ................
C0 C1 C2 C3 C4 C5 C6 C7    C8 C9 CA CB CC CD CE CF    ................
D0 D1 D2 D3 D4 D5 D6 D7    D8 D9 DA DB DC DD DE DF    ................
E0 E1 E2 E3 E4 E5 E6 E7    E8 E9 EA EB EC ED EE EF    ................
F0 F1 F2 F3 F4 F5 F6 F7    F8 F9 FA FB FC FD 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 0A 0E    ................
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    `abcdefghijklmno
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    ................
A0 A1 A2 A3 A4 A5 A6 A7    A8 A9 AA AB AC AD AE AF    ................
B0 B1 B2 B3 B4 B5 B6 B7    B8 B9 BA BB BC BD BE BF    ................
C0 C1 C2 C3 C4 C5 C6 C7    C8 C9 CA CB CC CD CE CF    ................
D0 D1 D2 D3 D4 D5 D6 D7    D8 D9 DA DB DC DD DE DF    ................
E0 E1 E2 E3 E4 E5 E6 E7    E8 E9 EA EB EC ED EE EF    ................
F0 F1 F2 F3 F4 F5 F6 F7    F8 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
```

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SWITCH COMBINATION FUNCTIONS

Several additional functions can be achieved by pressing the control panel buttons in combinations.
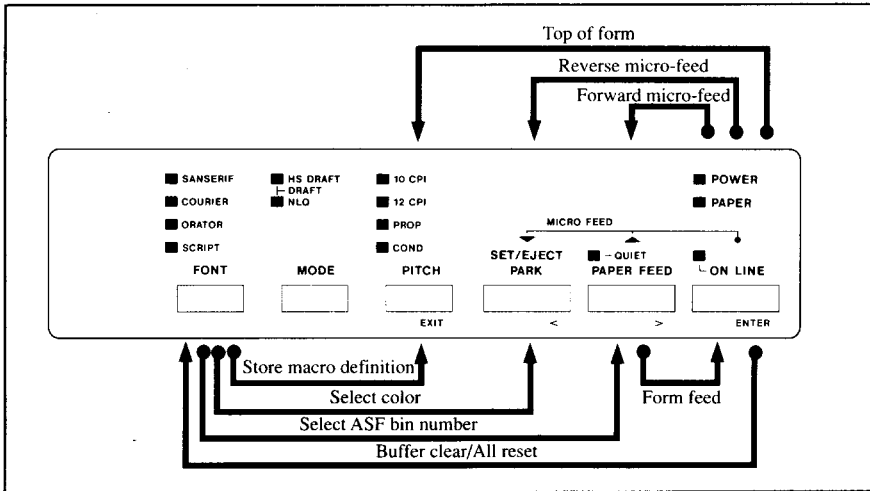
Figure 5-7. Switch combination functions of control panel.

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 [ON LINE] button to set the printer off-line.
2. Press the [PAPER FEED] button and hold it down. The printer will start performing successive line feeds.
3. While holding the [PAPER FEED] button down, press the [ON LINE] 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 [ON LINE] button to set the printer off-line.
2. Move the paper to the desired top-of-form position by pressing the [PAPER FEED] button, or by performing a forward or reverse micro-feed.

3. Press and hold the [ON LINE] button.
4. While holding the [ON LINE] button down, press the [PITCH] 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 [ON LINE] button to set the printer off-line.
2. Press the [ON LINE] button again and hold it down.
3. While holding the [ON LINE] button down, press the [PAPER FEED] 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 [ON LINE] button to set the printer off-line.
2. Press the [ON LINE] button again and hold it down.
3. While holding the [ON LINE] button down, press the [SET/EJECT PARK] 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 [SET/EJECT PARK] button.
2. Change the print position using the micro feed function.
3. After you get the desired position, press the [ON LINE] 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.

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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
Red	SANSERIF, COURIER	Orange	ORATOR, SCRIPT
Blue	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.
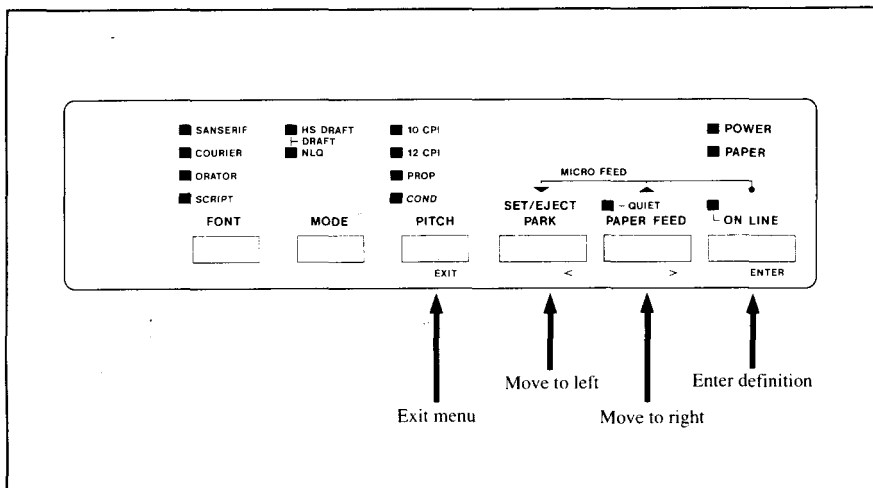
Figure 6-1. Button functions in the Memory Switch mode.

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.

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When the print head is below the desired option, press the [ON LINE] 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 [ON LINE] 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 hierachical (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 [PITCH] button as an [EXIT] button.

The structure of the menus are shown below:

```
MAIN MENU
  ├── PRINT CURRENT SETTINGS
  │
  ├── INSTALLATION MENU
  │     ├── COMMAND MENU
  │     ├── FONT MENU
  │     ├── CHARACTER MENU
  │     ├── PRINT MENU
  │     ├── PAPER MENU
  │     └── FORMS MENU
  │
  └── USE FACTORY SETTINGS
```
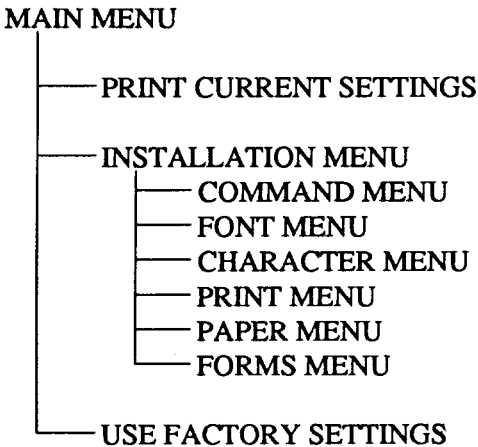
The options within each menu are given below.

As mentioned above, when you press the [PITCH] (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 [PITCH] (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            SLASHED
    NLQ FONT           : *SANSERIF          COURIER    ORATOR    SCRIPT

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 #863   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     LEGAL     OTHER
                        : LEGAL             OPTION 1   OPTION 2  OPTION 3  OPTION 4  OTHER

PRINT MENU:
    PRINT QUALITY      : NLQ                *DRAFT             HS-DRAFT
    PRINT PITCH        : *10CPI             12CPI              PROPORTIONAL
    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
                        : 6 INCH            7 INCH     8 INCH    5.5 INCH  4 INCH    OTHER
                        : 3.5 INCH          3 INCH                                  OTHER
```

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-DIREC-TIONAL].
  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.

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.

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

- 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 refered 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      |    |    |    |    |    |    |    |
                      |    |    |    |    |    |    |    |

[ ON LINE ]→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      |    |    |    |    |    |    |    |
                      |    |    |    |    |    |    |    |

[ ON LINE ]→NLQ-A      00      |    |    |    |    |    |    |    |
                      |    |    |    |    |    |    |    |

[ ON LINE ]→NLQ-B      00      |    |    |    |    |    |    |    |
                      |    |    |    |    |    |    |    |

[ ON LINE ]→GRAPHICS-A  00      |    |    |    |    |    |    |    |
                      |    |    |    |    |    |    |    |

[ ON LINE ]→GRAPHICS-B  00      |    |    |    |    |    |    |    |
                      |    |    |    |    |    |    |    |

[ PITCH ]→      *** 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" *n*	27 107 *n*	1B 6B *n*

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.

n	Font	*n*	Font
0	Courier	4	Script
1	Sanserif	7	Orator
2	Courier		

Select font

Mode	ASCII	Decimal	Hexadecimal
Both	"(" "(" "F" ")" ")" *d*	40 40 70 41 41 *d*	28 28 46 29 29 *d*

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

d	Font	*d*	Font
0	Courier	4	Script
1	Sanserif	7	Orator
2	Courier		

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> "T" <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" n	27 82 n	1B 52 n

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

n	Character set	n	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> nl $n2$	27 91 84 4 0 0 0 nl $n2$	1B 5B 54 04 00 00 00 nl $n2$

Changes the code page of the current IBM character set according to the values of nl and $n2$.

nl	$n2$	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> "\" *n1* *n2*	27 92 *n1* *n2*	1B 5C *n1* *n2*

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* × 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> "^" *n*	27 94 *n*	1B 5E *n*

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 (∅).

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> "!" *n*	27 33 *n*	1B 21 *n*

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	*n* 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> *n*	27 32 *n*	1B 20 *n*

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" *n*	27 104 *n*	1B 68 *n*

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.

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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> n m			0 0 n m			00 00 n m		

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.

n	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" *n*	27 51 *n*	1B 33 *n*

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> "]"	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" *n*	27 74 *n*	1B 4A *n*

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" *n*	27 106 *n*	1B 6A *n*

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" *n*	27 102 49 *n*	1B 66 31 *n*
	<ESC> "f" <1> *n*	27 102 1 *n*	1B 66 01 *n*

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" n	27 67 n	1B 43 n

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> n	27 67 0 n	1B 43 00 n

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" n	27 78 n	1B 4E n

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" $n1$ $n2$ .... <0>	27 66 $n1$ $n2$ ... 0	1B 42 $n1$ $n2$ ... 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" *n*	27 101 49 *n*	1B 65 31 *n*
	<ESC> "e" <1> *n*	27 101 1 *n*	1B 65 01 *n*

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" *n0* *n1* *n2* .... <0>	27 98 *n0* *n1* *n2* 0	1B 62 *n0* *n1* *n2* ... 00

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> "/" command.) See <ESC> "B" for parameters *n1*, *n2*, ... <0>.

Select vertical tab channel

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

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> "l" *n*	27 108 *n*	1B 6C *n*

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" *n*	27 81 *n*	1B 51 *n*

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" *n1* *n2*	27 88 *n1* *n2*	1B 58 *n1* *n2*

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" *n1* *n2* .... <0>	27 68 *n1 n2* 0	1B 44 *n1 n2* ... 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" *n*	27 101 48 *n*	1B 65 30 *n*
	<ESC> "e" <0> *n*	27 101 0 *n*	1B 65 00 *n*

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> "\" *n1* *n2*	27 92 *n1* *n2*	1B 5C *n1* *n2*

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* × 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> "$" *n1* *n2*	27 36 *n1* *n2*	1B 24 *n1* *n2*

Sets the next print position to (*n1* + *n2* × 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" *n*	27 102 48 *n*	1B 66 30 *n*
	<ESC> "f" <0> *n*	27 102 0 *n*	1B 66 00 *n*

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* × 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* × 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 (maxi-
mum 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 (maxi-
mum 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" *n1* *n2* *m1* *m2* ...	27 90 *n1* *n2* *m1* *m2* ...	1B 5A *n1* *n2* *m1* *m2* ...

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> "*" *n0* *n1* *n2* *m1* *m2* ...	27 42 *n0* *n1* *n2* *m1* *m2* ...	1B 2A *n0* *n1* *n2* *m1* *m2* ...

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> "?" *n* *m*	27 63 *n* *m*	1B 3F *n* *m*

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> "^" *n0* *n1*		27 94 *n0* *n1*	1B 5E *n0* *n1*
	n2 *m1* *m2* ...		*n2* *m1* *m2* ...	*n2* *m1* *m2* ...

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> *n1* *n2* *m0* *m1* *m2* *m3* ... *m11*	27 38 0 *n1* *n2 m0 m1 m2* *m3 ... m11*	1B 26 00 *n1* *n2 m0 m1 m2* *m3 ... m11*

Defines one or more new draft characters and stores them in RAM
for later use. Memory Switch must be set to "DOWNLOAD"; other-
wise RAM is used as an input buffer, not for downloading charac-
ters, 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> *nl* *n2 m0 m1 m2* *d1 d2 ... dx*	27 38 0 *nl* *n2 m0 m1 m2* *d1 d2 ... dx*	1B 26 00 *nl* *n2 m0 m1 m2* *d1 d2 ... dx*

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.

nl is the character code of the first character defined and *n2* is the character code of the last character defined. *nl* 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> "=" *nl n2* <DC4> *m0 m1 m2* *d1 d2 ... d11*	27 61 *nl n2* 20 *m0 m1 m2* *d1 d2 ...d11*	1B 3D *nl n2* 14 *m0 m1 m2* *d1 d2 ...d11*

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.

nl 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> "=" *n1 n2* <NAK> *m0 m1 m2* *d1 d2 ... d46*	27 61 *n1 n2* 21 *m0 m1 m2* *d1 d2 ...d46*	1B 3D *n1 n2* 15 *m0 m1 m2* *d1 d2 ...d46*

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> *n* <0>	27 58 0 *n* 0	1B 3A 00 *n* 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".

n	Font	*n*	Font
0	Courier	4	Script
1	Sanserif	7	Orator
2	Courier		

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> "t" "2"	27 116 50	1B 74 32
	<ESC> "t" <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> "I" <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> "I" <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> "r" n	27 114 n	1B 72 n

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

n	Color	n	Color
0	Black	4	Yellow
1	Red	5	Orange
2	Blue	6	Green
3	Violet		

Select print color

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

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

d	Color	d	Color
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" *n*	27 81 *n*	1B 51 *n*

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" n	27 25 84 n	1B 19 54 n
	"(" "(" "T" ")" ")" n	40 40 84 41 41 n	28 28 54 29 29 n

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.

Chapter 8

DOWNLOAD CHARACTERS

With this printer you can create new characters and symbols, download their dot data, and have them printed in place of selected characters in the regular character set. Characters that can be generated in this way range from simple but useful symbols like the check mark through to complex Chinese or Japanese characters.

Regular characters are permanently stored in the printer's ROM, but characters you design are downloaded and stored in RAM for use.

DESIGNING YOUR OWN DRAFT CHARACTERS

Designing and printing your own characters has two requirements: first, designing the shape of the character, calculating the data necessary to make the shape, and sending that data to the printer, and secondly, sending the command to print the downloaded characters instead of the regular characters. There are a number of design constraints for download draft quality characters:

- The matrix or grid on which you design the characters is six boxes wide by nine boxes high.
- Horizontally, dots may be centered in a box, or may straddle a line, making the actual character grid 11 dots wide by 9 dots high. Vertically, dots can only be centered in a box. See Figure 8-1.
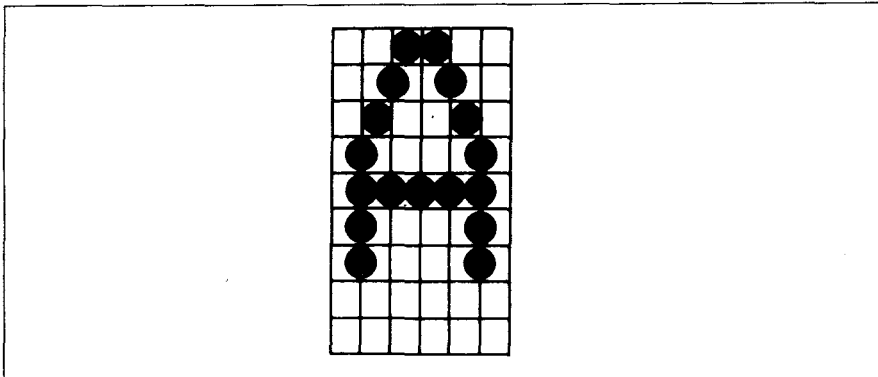
Figure 8-1. Dots can be inside boxes or straddle the vertical lines of the grid.

- The minimum width of a character is five dots.
- The user-defined characters may use eight dots vertically.
- Dots cannot overlap — that is, you may not have a dot inside a box next to one that is on a line.
- You may define any position in the ASCII table.

Photocopy the grid in Figure 8-2 to help design your new characters. We will use a tiny representation of a car-shaped symbol for our example.
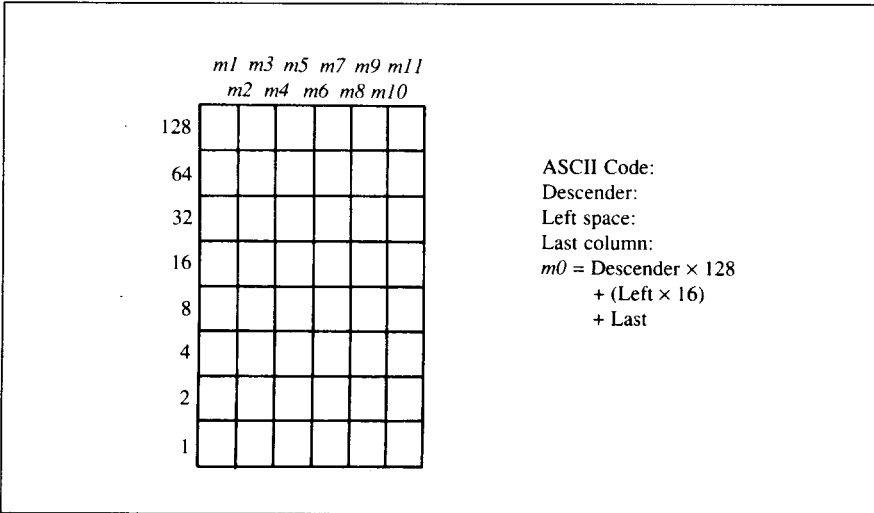
Figure 8-2. Use this grid (or one similar to it) to define your own draft characters.

Defining the attribute data

Before you start the definition, you will need to decide exactly where in the regular ASCII set you want to place your characters. After downloading, you access your new character by sending the code for the character you replaced.

Next you must choose whether to make the car symbol an ascender or a descender. This determines how the character is seated on the line:

Ascender: C&R   Descender: C&R

We decided that our car symbol will be a "descender", so a figure "1" is written next to Descender on the grid. If your character is not a descender, write a "0" next to Descender.

Next, you must specify the left space and the last print column of the character.

Being able to specify the width of the character allows you to specify the precise area inside the grid that the character will occupy, so that narrow characters will look attractive next to wide ones.

Acceptable values for the left space are 0 to 7, and the last print column are from 4 to 11.

Our character will occupy from column 1 to column 11, so the left space is 0 and the character width data is 11.

Assigning the character data

Now, we calculate the vertical numerical values of the columns of dots, and enter them underneath the grid. For example, looking at Figure 8-3, we see that in the left-most column there are five dots, and they are sitting in the "64" box, "32" box, "16" box, "8" box, and "4" box. Thus its vertical value is 124. In the next column, there is no dot straddling the vertical line; its value is recorded as 0.
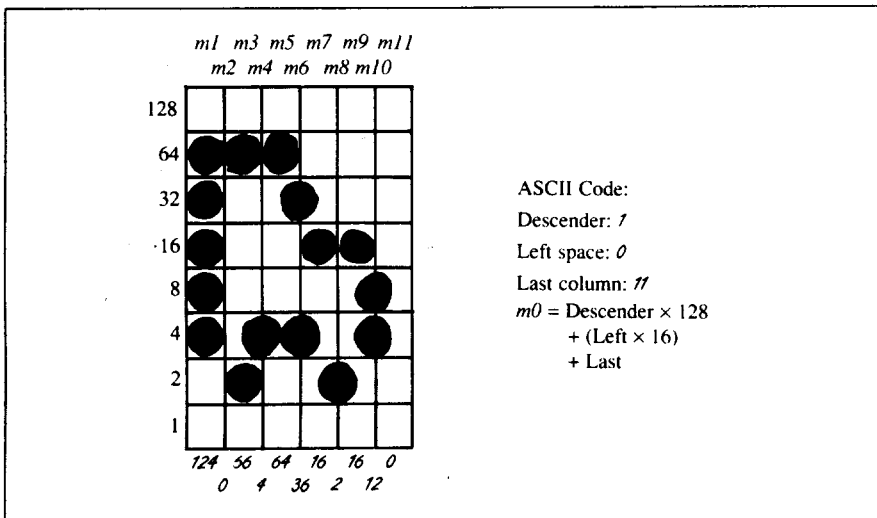
Figure 8-3. Add the values of the dots in each column and write the sum of each column at the bottom.

You will see the letters *m1*, *m2*, *m3*, etc., are above your values. When you define the character, you will substitute your value for each of these letters.

Sample program

To demonstrate how to use the download characters, let's use the "car" character and some other user-defined characters to print a small graph. This program will do just that with the Standard mode:

```
1000 WIDTH "LPT1:",255
1010 LPRINT CHR$(27);"x0";
1020 LPRINT CHR$(27);"&";CHR$(0);
1030 LPRINT CHR$(60);CHR$(62);
1040 FOR N=60 TO 62
1050 FOR M=0 TO 11
1060 READ MM
1070 LPRINT CHR$(MM);
1080 NEXT M
1090 NEXT N
1100 LPRINT
1110 DATA 139,  2,  5,  8,241,  0
1120 DATA   0,241,  8,  5,  2,  0
1130 DATA 139,124,  0, 66,  4, 64
1140 DATA  36, 16,  2, 16, 12,  0
1150 DATA 139, 46, 16,  2, 60,  0
1160 DATA  48,  0, 48,  0, 48,  0
1170 '
1180 LPRINT CHR$(27);"D";CHR$(11);CHR$(0);
1190 LPRINT CHR$(27);"h";CHR$(1);
1200 LPRINT "   U.S. EXPORTS"
1210 LPRINT CHR$(27);"h";CHR$(0);
1220 LPRINT CHR$(27);"%";CHR$(1);
1230 LPRINT "AUTOS";CHR$(9);
1240 FOR I=.4 TO 9.3 STEP .4
1250 LPRINT CHR$(61);
1260 NEXT I
1270 LPRINT
1280 LPRINT "CHEMICALS";CHR$(9);
1290 FOR I=.4 TO 8.7 STEP .4
1300 LPRINT CHR$(60);
1310 NEXT I
1320 LPRINT
1330 LPRINT "GUNS";CHR$(9);
1340 FOR I=.4 TO 1.4 STEP .4
1350 LPRINT CHR$(62);
```

```
1360 NEXT I
1370 LPRINT
1380 LPRINT CHR$(9);"+--";
1390 SCALE$="--+--"
1400 FOR I=2 TO 8 STEP 2
1410 LPRINT SCALE$;
1420 NEXT I
1430 LPRINT "--+"
1440 LPRINT CHR$(9);"   ";
1450 FOR I=2 TO 8 STEP 2
1460 LPRINT "   ";I;
1470 NEXT I
1480 LPRINT CHR$(27);"%";CHR$(0)
1490 LPRINT CHR$(27);"S";CHR$(0);
1500 LPRINT CHR$(9);"MILLIONS OF DOLLARS"
1510 LPRINT CHR$(27);"T"
1520 END
```

U.S. EXPORTS

```
AUTOS         ꙮꙮꙮꙮꙮꙮꙮꙮꙮꙮꙮꙮꙮꙮꙮꙮ
CHEMICALS     ﺎﺎﺎﺎﺎﺎﺎﺎﺎﺎﺎﺎﺎﺎﺎﺎﺎ
GUNS          ﬀﬀﬀ
              +----+----+----+----+----+
                 2    4    6    8
              MILLIONS OF DOLLARS
```

DEFINING YOUR OWN NLQ CHARACTERS

As you probably noticed, NLQ characters are printed by two passes of the print head. Half of the character is printed on the first pass, and the remainder on the second pass. The paper is rolled up half a dot height in between passes to let the print head print dots on the second pass that overlap the previous dots, in order to fill in the spaces and produce denser characters. Additionally, the print head speed is halved, and the dots are printed at double the density of draft characters. For this reason, NLQ characters can contain up to 23 dots in the horizontal direction.

Fundamentally, the process to define and print downloaded NLQ character is the same as for draft characters, except that you must assign the character data according to the emulation mode, you are using.

Assigning the character data with the Standard mode

There are differences in the way the attribute information is processed.

In the draft quality mode the attribute byte carries the descender data, and
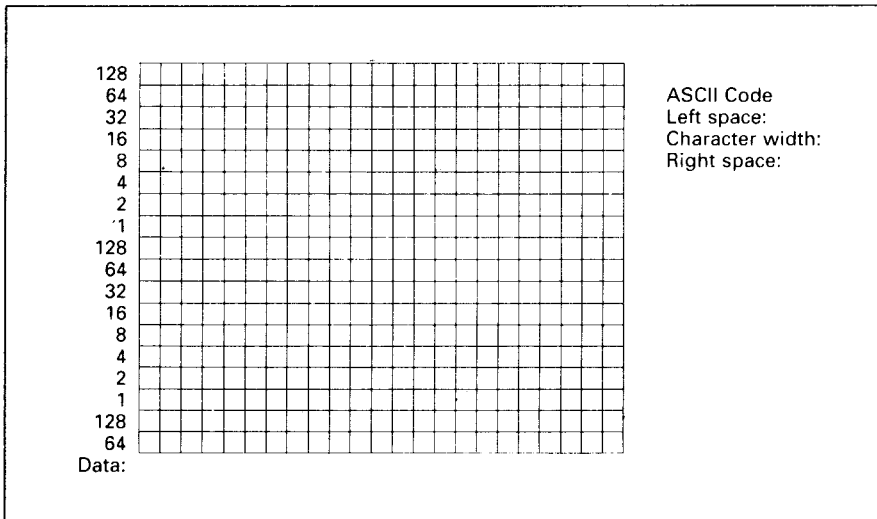
Figure 8-4. Use this grid (or one similar to it) to define your own NLQ characters with the Standard mode.

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specifies the left space and the character width. In the NLQ mode, there are three attribute bytes, the first byte describes the character's left space, the second byte describes the character width. And the third byte describes the right space. Appropriate allocation of data in these three bytes lets you place the character where you like within the grid.

Use the grid in Figure 8-4 to help plot the data. The vertical definition of the character is 18 dots. Each byte therefore represents a third of the vertical definition. That's where the numbers down the left side of the grid come in. Notice that there is a number for each row of dots and that each number is twice the number below it. By making these numbers of two we can take any combination of dots in a vertical column and assign them a unique value.

If we plot our car-shaped symbol for NLQ, the grid data will look like Figure 8-5.

The defining process is the same as for draft characters, except that you must select NLQ mode, and you must define 69 data. If you wish to print your NLQ characters with the regular character set, the remarks regarding the simultaneous use of regular and download characters in the draft character section apply equally to NLQ characters.
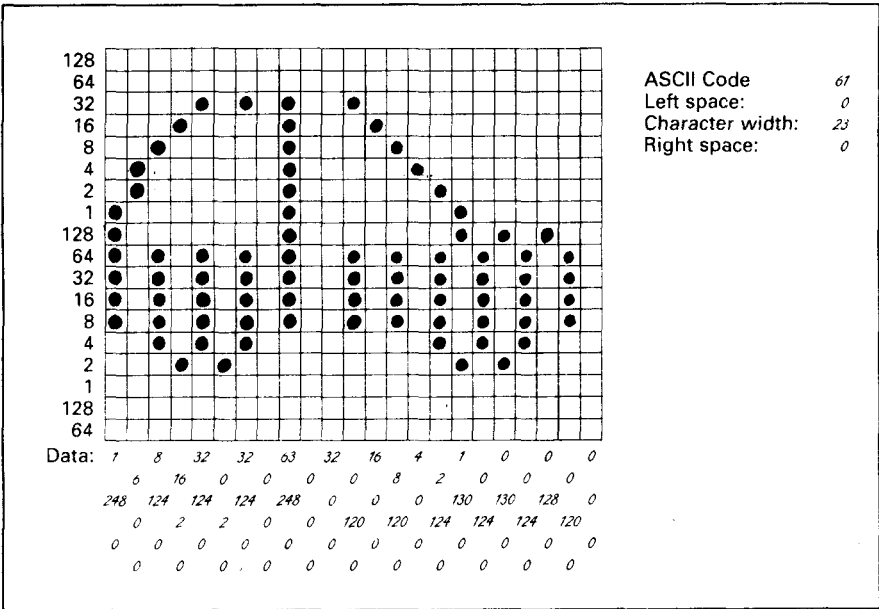
Figure 8-5. Add the values of the dots into three bytes.

The following program demonstrates how to use the NLQ download characters with the Standard mode:

```
1000 WIDTH "LPT1:",255
1010 LPRINT CHR$(27);"x1"
1020 LPRINT CHR$(27);"&";CHR$(0);
1030 LPRINT CHR$(60);CHR$(62);
1040 FOR N=60 TO 62
1050 LPRINT CHR$(0);CHR$(23);CHR$(0);
1060 FOR M=1 TO 69
1070 READ MM
1080 LPRINT CHR$(MM);
1090 NEXT M
1100 NEXT N
1110 LPRINT
1120 '
1130 LPRINT CHR$(27);"D";CHR$(11);CHR$(0);
1140 LPRINT CHR$(27);"h";CHR$(1);
1150 LPRINT "    U.S. EXPORTS"
1160 LPRINT CHR$(27);"h";CHR$(0);
1170 LPRINT CHR$(27);"%";CHR$(1);
1180 LPRINT "AUTOS";CHR$(9);
1190 FOR I=.4 TO 9.3 STEP .4
1200 LPRINT CHR$(61);
1210 NEXT I
1220 LPRINT
1230 LPRINT "CHEMICALS";CHR$(9);
1240 FOR I=.4 TO 8.7 STEP .4
1250 LPRINT CHR$(60);
1260 NEXT I
1270 LPRINT
1280 LPRINT "GUNS";CHR$(9);
1290 FOR I=.4 TO 1.4 STEP .4
1300 LPRINT CHR$(62);
1310 NEXT I
1320 LPRINT
1330 LPRINT CHR$(9);"+--";
1340 SCALE$="--+--"
1350 FOR I=2 TO 8 STEP 2
1360 LPRINT SCALE$;
1370 NEXT I
1380 LPRINT "--+"
1390 LPRINT CHR$(9);"  ";
1400 FOR I=2 TO 8 STEP 2
1410 LPRINT "   ";I;
1420 NEXT I
1430 LPRINT CHR$(27);"%";CHR$(0)
```

```
1440 LPRINT CHR$(27);"S";CHR$(O);
1450 LPRINT CHR$(9);"MILLIONS OF DOLLARS"
1460 LPRINT CHR$(27);"T"
1470 END
1480 '
1490 DATA   0,  0,  0,  0,  0,  0,  0,  6,  0
1500 DATA   0,  9,  0,  0, 16,128,  0, 32,  0
1510 DATA   0, 64,128, 63,128,  0,  0,  0,128
1520 DATA   0,  0,  0,  0,  0,128,  0,  0,  0
1530 DATA   0,  0,128,  0,  0,  0,  0,  0,128
1540 DATA  63,128,  0,  0, 64,128,  0, 32,  0
1550 DATA   0, 16,128,  0,  9,  0,  0,  6,  0
1560 DATA   0,  0,  0,  0,  0,  0
1570 '
1580 DATA   1,248,  0,  6,  0,  0,  8,124,  0
1590 DATA  16,  2,  0, 32,124,  0,  0,  2,  0
1600 DATA  32,124,  0,  0,  0,  0, 63,248,  0
1610 DATA   0,  0,  0, 32,  0,  0,  0,120,  0
1620 DATA  16,  0,  0,  8,120,  0,  4,  0,  0
1630 DATA   2,124,  0,  1,130,  0,  0,124,  0
1640 DATA   0,130,  0,  0,124,  0,  0,128,  0
1650 DATA   0,120,  0,  0,  0,  0
1660 '
1670 DATA   0,  0,  0,  2,208,  0,  5, 40,  0
1680 DATA  10,215,128,  5, 40,  0, 10,215,128
1690 DATA   5, 40,  0,  0, 87,128,  4,128,  0
1700 DATA   0,  4,  0,  4,144,  0,  0,100,  0
1710 DATA   4,128,  0,  0,  8,  0,  4,144,  0
1720 DATA   0, 96,  0,  4,128,  0,  0,  0,  0
1730 DATA   4,128,  0,  8,  0,  0,  4,128,  0
1740 DATA   0,  0,  0,  7,128,  0
```

U.S. EXPORTS

```
AUTOS       ▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲
CHEMICALS   ᛞᛞᛞᛞᛞᛞᛞᛞᛞᛞᛞᛞᛞᛞᛞᛞᛞᛞᛞᛞᛞᛞ
GUNS        ▼▼▼
            +----+----+----+----+----+
                 2    4    6    8
            MILLIONS OF DOLLARS
```
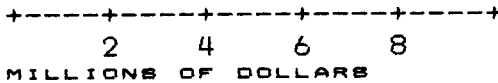
Assigning the character data with the IBM mode

Fundamentally, the process to define and print downloaded NLQ character with the IBM mode is the same as for draft characters, except that you must supply about four times as much character data, and you must design the character with the two passes of the print head in mind.

Use the grid in Figure 8-6 to help plot the data with the IBM mode. Due to the two-pass process, NLQ characters can contain up to 16 dots vertically.
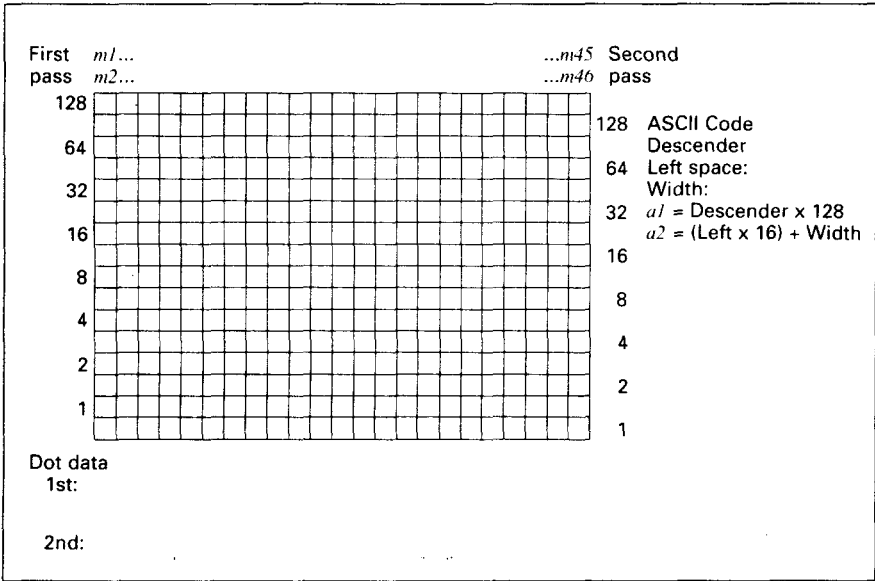
Figure 8-6. Use this grid (or one similar to it) to define your own NLQ characters with the IBM mode.

To make the character data easier to calculate, put the first pass dots with black circle on the grid when you are designing your characters, and the second pass dots with white circle. Remember that adjacent dots may not overlap on the same pass; in other words, if one dot is in a box, its adjacent dot on the same pass may not be on next box. Therefore, to make smooth characters, put the dots needed to overlap any spaces in a character in the appropriate places in the second pass grid.

If we plot our car-shaped symbol for NLQ, the grid data will look like Figure 8-7.

The defining process is the same as for draft characters, except that you must select NLQ mode, and you must define 46 data. If you wish to print your NLQ

First $m1$... pass $m2$... ...$m45$ Second ...$m46$ pass

ASCII Code 61
Descender 1
Left space: 0
Width: 23
$a1$ = Descender x 128
$a2$ = (Left x 16) + Width

Dot data
1st: 14 38 70 70 126 0 0 0 9 9 8 0
16 1 1 0 0 70 38 22 6 6 6
2nd: 28 14 14 14 124 0 64 32 16 0 0 0
32 64 0 0 0 12 12 14 14 14 12
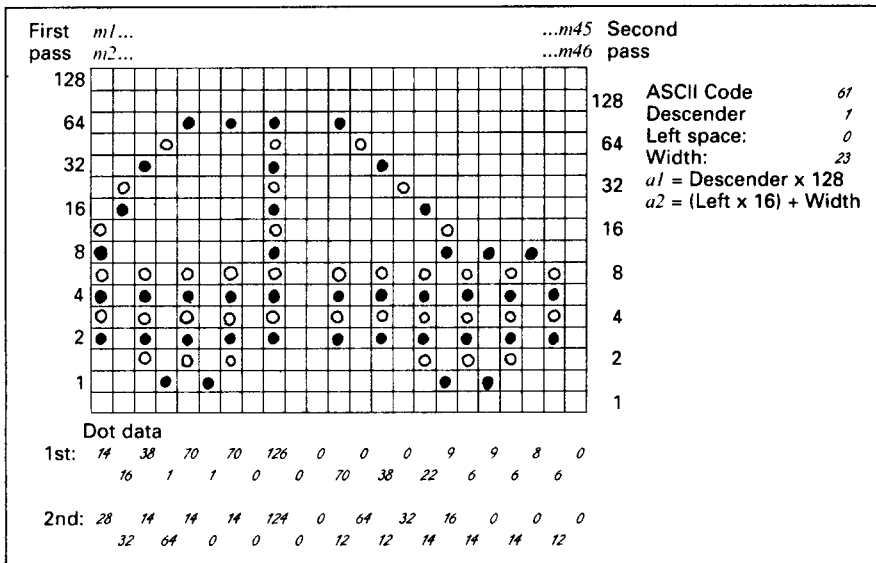
Figure 8-7. Add the values of the dots for each pass.

characters with the regular character set, the remarks regarding the simultaneous use of regular and download characters in the draft character section apply equally to NLQ characters.

The following program demonstrates how to use the NLQ download characters with the IBM mode:

```
1000 WIDTH "LPT1:",255
1010 LPRINT CHR$(27);"I";CHR$(7);
1020 LPRINT CHR$(27);"=";CHR$(146);CHR$(0);CHR$(21);
1030 LPRINT CHR$(60);
1040 FOR N=60 TO 62
1050 LPRINT CHR$(128);CHR$(23);
1060 FOR M=1 TO 46
1070 READ MM
1080 LPRINT CHR$(MM);
1090 NEXT M
1100 NEXT N
1110 LPRINT
1120 '
1130 LPRINT CHR$(27);"D";CHR$(11);CHR$(0);
1140 LPRINT CHR$(27);"[@";CHR$(4);CHR$(0);
1150 LPRINT CHR$(0);CHR$(0);CHR$(34);CHR$(2);
1160 LPRINT "    U.S. EXPORTS"
1170 LPRINT CHR$(27);"[@";CHR$(4);CHR$(0);
1180 LPRINT CHR$(0);CHR$(0);CHR$(17);CHR$(1);
1190 LPRINT CHR$(27);"I";CHR$(7);
```

```
1200 LPRINT "AUTOS";CHR$(9);
1210 FOR I=.4 TO 9.3 STEP .4
1220 LPRINT CHR$(61);
1230 NEXT I
1240 LPRINT
1250 LPRINT "CHEMICALS";CHR$(9);
1260 FOR I=.4 TO 8.7 STEP .4
1270 LPRINT CHR$(60);
1280 NEXT I
1290 LPRINT
1300 LPRINT "GUNS";CHR$(9);
1310 FOR I=.4 TO 1.4 STEP .4
1320 LPRINT CHR$(62);
1330 NEXT I
1340 LPRINT
1350 LPRINT CHR$(9);"+--";
1360 SCALE$="--+--"
1370 FOR I=2 TO 8 STEP 2
1380 LPRINT SCALE$;
1390 NEXT I
1400 LPRINT "--+"
1410 LPRINT CHR$(9);"   ";
1420 FOR I=2 TO 8 STEP 2
1430 LPRINT "   ";I;
1440 NEXT I
1450 LPRINT CHR$(27);"I";CHR$(2)
1460 LPRINT CHR$(27);"S";CHR$(0);
1470 LPRINT CHR$(9);"MILLIONS OF DOLLARS"
1480 LPRINT CHR$(27);"T"
1490 END
1500 '
1510 DATA   0,  0,  0,  0,  2,  4,  4,  2,  1,  8
1520 DATA   8,  0,  1, 16,240,224,  1,  0,  0,  0
1530 DATA   1,  0,  0,  0,  1,  0,  0,  0,  1,  0
1540 DATA 240,224,  1, 16,  8,  0,  1,  8,  4,  2
1550 DATA   2,  4,  0,  0,  0,  0
1560 '
1570 DATA  14, 28, 16, 32, 38, 14,  1, 64, 70, 14
1580 DATA   1,  0, 70, 14,  0,  0,126,124,  0,  0
1590 DATA   0,  0, 70, 12,  0, 64, 38, 12,  0, 32
1600 DATA  22, 14,  9, 16,  6, 14,  9,  0,  6, 14
1610 DATA   8,  0,  6, 12,  0,  0
1620 '
1630 DATA   0,  0, 24, 32,  7, 16, 56, 14,  1, 48
1640 DATA  56, 14,  7, 48,  8, 14,  2, 32,  8,  0
1650 DATA   6, 32,  8,  0,  2, 40,  8,  0,  4, 36
1660 DATA   8,  0,  0, 40,  8,  0,  0, 32, 32,  0
1670 DATA   8, 32,  0,  0, 24, 48
```

U.S. EXPORTS

```
AUTOS      ▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲
CHEMICALS  ♨♨♨♨♨♨♨♨♨♨♨♨♨♨♨♨♨♨♨♨♨♨
GUNS       ▰▰▰
           +----+----+----+----+----+
              2    4    6    8
           MILLIONS OF DOLLARS
```
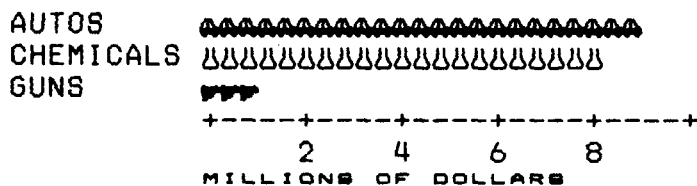
MEMO

chapter 9

MS-DOS AND YOUR PRINTER

When using your printer with an IBM PS/2, PC-AT or compatible, you will probably be using PC-DOS or MS-DOS as an operating system. A number of software tricks may be useful here. This chapter is not, however, a substitute for the operating system manuals supplied with your computer.

To learn how to print files, etc. it is best to read the relevant parts of these manuals.

INSTALLING APPLICATION SOFTWARE WITH YOUR PRINTER

When installing application software, you may find that your printer is not specifically mentioned in the lists of printers given for installation. However, this should pose no problem. Read this section, and guidelines provided with your software on printer installation.

Choose one of the following (in order of preference) according to your selected Emulation mode.

#	Standard mode	IBM mode
1	Star ZA-200/250	* Proprinter III
2	Star FR-10/15	* Proprinter II
3	Star LC-200 Color	* Proprinter
4	Epson EX-800/1000	
5	* Epson FX-850/1050	
6	Star LC-10 Color	

NOTE: * does not support color printing.

If your software package does not mention printers by name, but asks instead what features your printer is capable of, the most common questions are: "Can your printer perform a backspace?" and "Can it do a hardware form feed?". You should answer "Yes" to both these questions.

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Other software packages may allow you to install specific features. Spreadsheet programs will often ask for the maximum number of columns to be printed. This is given below.

	CPI	Number of columns	
		Normal type	Wide type
Pica	10	80	136
Elite	12	96	163
Condensed pica	17.1	137	233
Condensed elite	20	160	272
Proportional		Variable	

Sometimes the software installation will ask you for an initialization sequence to return to the default settings. The command for your printer is <ESC> @.

Make sure that the Memory Switches are set for the correct printer emulation, and that you have selected the appropriate character set using the Memory Switch settings.

If you are in doubt about the configuration of your application software, seek expert advice. Your software supplier will probably be your most qualified reference.

EMBEDDING PRINTER COMMANDS

Many word-processors and other software lack commands for changing font, printing double-size characters, or printing in color. Your printer therefore has commands that can be embedded in documents to control these functions without software help. The commands consist of a capital letter enclosed in double parentheses, followed by a digit:

Font:	((F))0	Courier
	((F))1	Sanserif
	((F))2	Courier
	((F))4	Script
	((F))7	Orator
	((F))9	Draft
Size:	((S))0	Standard size
	((S))1	Double width
	((S))2	Double height
	((S))3	Double width and height

Color:	((C))0	Black
	((C))1	Red
	((C))2	Blue
	((C))3	Violet
	((C))4	Yellow
	((C))5	Orange
	((C))6	Green

If you want to print a title in double-size Script, then change to regular-size fonts for other text, you can use these commands as follows:

File as seen on computer screen:

```
((F))4 ((S))3
Printer commands
((F))0 ((S))0
Font commands ((F))1can be ((F))2embedded
((F))7anywhere ((F))9in a document.
```

Printout:

Printer commands

```
Font commands can be embedded
ANYWHERE in a document.
```

When you use these commands there are several points to note:

• The font ((F)) command is ignored if the FONT LOCK mode was selected when power was switched on.

• The color ((C)) command is valid only when the color ribbon is installed.

• A line consisting of commands alone prints as a blank line.

• The software will not know that these are commands, so you cannot trust your software to give you the correct line width. The printed line may be considerably shorter than the line on the screen; the extra space being the space that was occupied by the commands.

One way to handle the last problem is to prepare your document without the commands, then insert them as a final step, with the margins released. The find, replace, and copy functions of word-processing software can be helpful here.

If you do not use these commands or the panel controls, the printer will print standard-size, draft characters.

The printer supports various commands in addition to the above, such as quadruple-size printing.
Most of these other commands consist of the escape code followed by one or more letters or numbers.

If your software enables you to place the escape code in your files, or if you are able to define this as a user option during installation, you can also embed these escape sequences.

PROGRAMMING THE PRINTER WITH DOS COMMANDS

If your system includes the file PRINT.COM you can use the main DOS printing command. Simply type the word PRINT followed by the name of the file you want to print. To print a file named README.DOC, for example, type:

```
A>PRINT README.DOC
```

The computer may respond with the following message, asking which printer to use:

```
Name of list device [PRN]:
```

If your computer is connected to only one printer, press RETURN to select the default choice (PRN).
Printing will begin and the A> prompt will reappear. You can execute other commands or programs while the file is being printed.

A single PRINT command can print two or more files. List the file names consecutively on the same line, or use wild-card characters (* and ?). Each file will be printed starting on a new page. The PRINT command also has control options. For example, you can terminate a printing job in progress with the /T option. (The printer may not stop printing immediately as there may be considerable data stored ahead in its buffer.) For the /T option, type:

```
A>PRINT/T
```

See your DOS manual for further information about the PRINT command. If your system does not include PRINT.COM, you can print files by using the PRN device name in COPY or TYPE commands such as the following:

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```
A>COPY README.DOC PRN
A>TYPE README.DOC >PRN
```

COPY and TYPE do not permit you to execute other commands while the file is printing.

If you want a particular font, or print pitch, you can make these settings from the control panel before you start printing. See Chapter 5.

If you print from the DOS command level very often, it will be advantageous to create a printer setup file. Then instead of setting font etc. manually each time, you can complete the setup with a single command from your computer. For example, you can create a file containing printer command to select near letter quality, and select elite pitch with the Standard mode. You can find the commands in Chapter 7. We suggest the following:

- Near letter quality   <ESC>   "x"   "1"
- Elite pitch   <ESC>   "!"   <1>

<ESC> "!" <1> is a powerful command that, in addition to selecting elite pitch, cancels unwanted features such as underlining which might be left from previous commands. The angle brackets around the <1> indicate character code 1, which is a control code, not the printable digit "1".

You may want to place additional commands in this file, such as left and right margins, line spacing and bottom margin commands. Or you may want to create a variety of setup files with a different set of commands in each.

To avoid excess line feeds, you should place the commands on one line in the setup file. You may or may not be able to generate a setup file with word-processing software; it depends on whether your software lets you enter control codes. If your system includes the file EDLIN.COM, however, you can easily create a setup file with the DOS line editor.

An appropriate name for this setup file would be NLQELITE.DAT. To use the DOS line editor, type the command EDLIN NLQEJ JTE.DAT, then type the underlined parts of the following display. Press RETURN at the end of each line. Do not type the symbol "^". This symbol means to hold the CTRL key down while pressing the next key: for example, ^V means to type CTRL-V. ^C means to type CTRL-C, which indicates the end of the input.

```
A>EDLIN NLQELITE.DAT
New file
*1
        1:*^V[X1^V[!^VA
        2:*^C
*E
```

^V indicates that the following character is a control code. ^V[enters the
<ESC> code. <ESC> has character code 27, and "[" is the 27th character
from A in the ASCII sequence. Similarly, ^VA enters the control code <1>.
See your DOS manual if you need further information about EDLIN.

You can now set up the printer by sending it the file NLQELITE.DAT. To
avoid unnecessary logging of commands, switch hard-copy output off (by
pressing CTRL-PRTSC if hard copy is on). To print the file README.DOC
in NLQ elite type, give the following two commands:

```
A>COPY NLQELITE.DAT PRN
A>PRINT README.DOC
```

For greater convenience you can make a batch file that will set up the printer
and print any specified file with a single command. To create such a batch
file with the name NLQPRINT.BAT, type in the first four lines shown next.
^Z means to press the CTRL and Z keys simultaneously. To use this file to
print README.DOC, type the fifth line.

```
A>COPY CON NLQPRINT.BAT
COPY NLQELITE.DAT PRN
PRINT %1
^Z
A>NLQPRINT README.DOC
```

The first line above is a copy command from the CONsole screen to a file
named NLQPRINT.BAT. The next two lines are the contents of this file. The
%1 is a dummy parameter: whatever file name you type after NLQPRINT
will be substituted for %1 and printed.

PROGRAMMING WITH BASIC

As an example of programming the printer on Microsoft BASIC, we have listed the program for the IBM-PC. This program runs in the printer's Standard mode, and the downloadable condition.

```
1000 ' Set control codes
1010 E$=CHR$(27)                                    'Escape code
1020 D$=E$+"x0"                                      'Draft quality
1030 N$=E$+"x1"                                      'Near letter quality
1040 F$=E$+"k"                                       'Select font
1050 C$=F$+CHR$(2)+N$                                'Select Courier
1060 H$=CHR$(9)                                      'Horizontal tab
1070 P$=E$+"P"                                       'Pica pitch
1080 ' Start printing
1090 WIDTH "LPT1:",255
1100 LPRINT E$;"D";CHR$(3);CHR$(27);CHR$(0)       'Set HT
1110 LPRINT C$;"Resident fonts are:"
1120 LPRINT H$;D$;"Draft characters,";N$;
1130 LPRINT
1140 LPRINT H$;F$;CHR$(1);"Sanserif characters,";
1150 LPRINT H$;F$;CHR$(2);"Courier characters,";
1160 LPRINT H$;F$;CHR$(4);"Script characters,";
1170 LPRINT H$;F$;CHR$(7);"Orator characters,"
1180 LPRINT
1190 LPRINT C$;"Print pitches are:"
1200 LPRINT H$;P$;"Pica pitch (10 CPI),";
1210 LPRINT H$;E$;"M";"Elite pitch (12 CPI),"
1220 LPRINT H$;P$;
1230 LPRINT CHR$(15);                               'Select condensed print
1240 LPRINT "Condensed pica pitch (17 CPI),";
1250 LPRINT H$;E$;"M";"Condensed elite pitch (20 CPI),";
1260 LPRINT CHR$(18)                                'Cancel condensed print
1270 LPRINT H$;E$;"p1";                             'Select proportional spacing
1280 LPRINT P$;"Proportional spacing,";
1290 LPRINT E$;"p0"                                 'Cancel proportional spacing
1300 LPRINT
1310 LPRINT H$;E$;"w1";"Double-height,";E$;"w0"
1320 LPRINT H$;E$;"W1";"Double width, ";E$;"W0"
1330 LPRINT H$;E$;"h";CHR$(1);"Double-sized,"
1340 LPRINT H$;E$;"h";CHR$(2);"Quad-sized.";
1350 LPRINT E$;"h";CHR$(0)
1360 LPRINT :LPRINT
1370 LPRINT E$;"Q";CHR$(47)                         'Set right margin
1380 LPRINT C$;"Various line and character spacings:"
1390 LPRINT E$;"a1"                                 'Center text
1400 FOR I=1 TO 7
1410 LPRINT E$;"A";CHR$(I);                         'Line spacing set
1420 LPRINT E$;" ";CHR$(I);                         'Increase character space
1430 LPRINT "THE SPACINGS ARE CHANGED"
1440 NEXT I
1450 FOR I=7 TO 1 STEP -1
1460 LPRINT E$;"A";CHR$(I);           ·             'Line spacing set
1470 LPRINT E$;" ";CHR$(I);                         'Increase character space
1480 LPRINT "THE SPACINGS ARE CHANGED"
1490 NEXT I
1500 LPRINT E$;"a0"                                 'Left justify
1510 LPRINT E$;"3";CHR$(36);                        'Set 1/6" line spacing
1520 LPRINT E$;" ";CHR$(0);                         'Normal character space
1530 LPRINT CHR$(27);"Q";CHR$(80)
1540 LPRINT
1550 LPRINT C$;"Other features:"
1560 LPRINT H$;E$;"E";"Emphasized";E$;"F";", ";
1570 LPRINT E$;"G";"Double-strike";E$;"H";", ";
1580 LPRINT E$;"4";"Italics";E$;"5";", "
1590 LPRINT H$;E$;"-1";"Underlining";E$;"-0";", ";
1600 LPRINT E$;"S0";"SUPERSCRIPT";E$;"T";" and ";
```

```
1610 LPRINT E$;"S1";"SUBSCRIPT";E$;"T";", "
1620 LPRINT H$;C$;"Download characters: ";
1630 GOSUB 2090
1640 LPRINT D$;E$;"%1";                    'Select draft download character
1650 FOR I=1 TO 5
1660 LPRINT CHR$(60);                       'Print download character
1670 NEXT I
1680 LPRINT E$;"%0";                        'Select normal character
1690 GOSUB 2180
1700 LPRINT C$;E$;"%1";                     'Select NLQ download character
1710 FOR I=1 TO 5
1720 LPRINT CHR$(60);                       'Print download character
1730 NEXT I
1740 LPRINT E$;"%0"                         'Select normal character
1750 LPRINT
1760 LPRINT H$;C$;"Various dot graphics densities:"
1770 DIM LOGO$(4)
1780 RESTORE 2390
1790 FOR ROW=1 TO 4
1800 FOR COL=1 TO 65
1810 READ DG
1820 LOGO$(ROW)=LOGO$(ROW)+CHR$(DG)
1830 NEXT COL
1840 NEXT ROW
1850 LPRINT E$;"A";CHR$(8);                 'Set 8/72" line spacing
1860 FOR ROW=1 TO 4
1870 LPRINT "     ";
1880 FOR B=0 TO 3
1890 LPRINT E$;"*";CHR$(B);
1900 LPRINT CHR$(65);CHR$(0);LOGO$(ROW);
1910 LPRINT "   ";
1920 NEXT B
1930 LPRINT
1940 NEXT ROW
1950 LPRINT :LPRINT
1960 FOR ROW=1 TO 4
1970 LPRINT "     ";
1980 FOR B=4 TO 7
1990 LPRINT E$;"*";CHR$(B);
2000 LPRINT CHR$(65);CHR$(0);LOGO$(ROW);
2010 LPRINT "   ";
2020 NEXT B
2030 LPRINT
2040 NEXT ROW
2050 LPRINT E$;"@"
2060 END
2070 '
2080 ' SUBROUTINES
2090 ' Define draft download character
2100 LPRINT D$;E$;"&";CHR$(0);CHR$(60);CHR$(60);
2110 RESTORE 2280
2120 FOR M=0 TO 11
2130 READ MM
2140 LPRINT CHR$(MM);
2150 NEXT M
2160 RETURN
2170 '
2180 ' Define NLQ download character
2190 LPRINT C$;E$;"&";CHR$(0);CHR$(60);CHR$(60);
2200 LPRINT CHR$(0);CHR$(23);CHR$(0);
2210 RESTORE 2310
2220 FOR M=1 TO 69
2230 READ MM
2240 LPRINT CHR$(MM);
2250 NEXT M
2260 RETURN
2270 ' DATA
2280 ' Draft download character data
2290 DATA 139,124,  0, 66,  4, 64, 36, 16,  2, 16, 12,  0
2300 '
```

```
2310 ' NLQ download character data
2320 DATA   1,248,  0,  6,  0,  0,  8,124,  0, 16,  2,  0
2330 DATA  32,124,  0,  0,  2,  0, 32,124,  0,  0,  0,  0
2340 DATA  63,248,  0,  0,  0,  0, 32,  0,  0,  0,120,  0
2350 DATA  16,  0,  0,  8,120,  0,  4,  0,  0,  2,124,  0
2360 DATA   1,130,  0,  0,124,  0,  0,130,  0,  0,124,  0
2370 DATA   0,128,  0,  0,120,  0,  0,  0,  0
2380 '
2390 ' Dot graphics data
2400 ' 1ST LINE
2410 DATA   0,  0,  0,  0,  1,  3,  7,  7,  7, 15, 14, 14
2420 DATA  14, 14, 14,  7,  7,  3,  3, 15, 15, 15,  0,  0
2430 DATA   0,  0,  6,  7,  7,  7,  7,  7,  7,  7,  7,  6
2440 DATA   6,  0,  0,  7,  7,  7,  7,  7,  7,  7,  7,  7
2450 DATA   7,  7,  0,  0,  7,  7,  7,  7,  7,  7,  7,  7
2460 DATA   7,  7,  0,  0,  0
2470 ' 2ND LINE
2480 DATA   0,  0, 60,255,255,255,255,143, 15,  7,  7
2490 DATA   7,  7,  3,  3,  3,131,193,241,240,240,  0,  0
2500 DATA   0,  0,  0,  0,224,255,255,255,255,255, 31,  0
2510 DATA   0,  0,  1,  3, 31,255,255,255,255,255,255,  1
2520 DATA   0,  0,  0,  1,  7, 31,255,252,240,192,128,  0
2530 DATA   0,  0,  0,  0,  0
2540 ' 3RD LINE
2550 DATA   0, 31, 31,  3,129,128,192,192,192,192,192,224
2560 DATA 224,224,224,240,255,255,255,255,255,127,  0,  0
2570 DATA   0,  0,  0,  0,192,255,255,255,255,255, 15
2580 DATA  15, 63,252,240,192,  0,240,255,255,255,255,255
2590 DATA   7, 15,127,252,240,192,  0,  0,  0,  0,  0,  0
2600 DATA   0,  0,  0,  0,  0
2610 ' 4TH LINE
2620 DATA   0,248,248,240,224,224,112,112, 56, 56, 56, 56
2630 DATA  56,120,120,240,240,224,224,192,128,  0,  0,  0
2640 DATA   0,  0,  0,  0,  0,  0,128,248,248,248,248,240
2650 DATA 192,  0,  0,  0,  0,  0,240,248,248,248,248,240
2660 DATA 192,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
2670 DATA   0,  0,  0,  0,  0
```

How the program works

This program begins by assigning a number of printer commands to BASIC string variables (lines 1000 to 1070). You can find most of these commands near the beginning of chapter 7.

The WIDTH "LPT1:" 255 statement in line 1090 means infinite line width. It prevents the IBM-PC from inserting unwanted carriage returns and line feeds in graphics data.

Actual printing begins in line 1100. Using the preassigned commands, the program prints samples of its different fonts, followed by samples of the print pitches, then some double and quadruple-sized printing.

Next comes the central attraction of the program: a line of text printed fourteen times in expanding and contracting loops to give a barrel effect. The work is done by four printer commands: a command setting the right margin (line 1370); a centering command (line 1390); a command to vary the line spacing (lines 1410 and 1460); and a command to micro-adjust the space between characters (lines 1420 and 1470).

Next the program returns to normal spacing and gives a demonstration of the printer's word-processing abilities: italic printing, bold printing, underlining, subscripts, etc.

The row of car symbols in the next printed line is created by downloading two new character patterns, which are printed in place of the character "<" (character 60). Details can be found in Chapter 8.

The final part of the program uses dot graphics to print some "SW" logos with various densities.

The dot pattern of the logo was originally laid out on graph paper, then converted to the data in lines 2400 to 2670 with the help of a calculator. Each number represents eight vertical dots. (See "Graphics commands" in Chapter 7 for details.)

The pattern is printed in four rows, each eight dots high and 65 dots wide. Lines 1770 to 1840 read the dot data into a string array variable named LOGO$. Line 1850 sets the line spacing to 8/72 inch so that the rows will connect vertically. The loop in lines 1860 to 1940 and lines 1960 to 2040 do the printing in four passes of the print head.

Resident fonts are:
    Draft characters,
    Sanserif characters,   Courier characters,
    Script characters,   ORATOR CHARACTERS,

Print pitches are:
    Pica pitch (10 CPI),   Elite pitch (12 CPI),
    Condensed pica pitch (17 CPI), Condensed elite pitch (20 CPI),
    Proportional spacing,

Double-height,
Double width,
Double-sized,

Quad-sized.

Various line and character spacings:
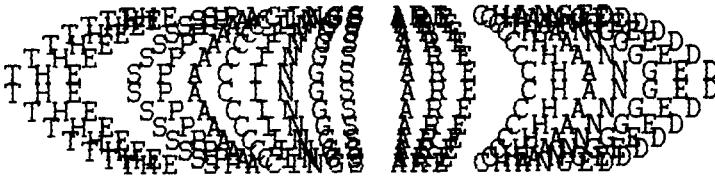
Other features:
    Emphasized, Double-strike, *Italics,*
    Underlining, SUPERSCRIPT and SUBSCRIPT,
    Download characters:

Various dot graphics densities:

MEMO

Chapter 10 TROUBLESHOOTING AND MAINTENANCE

The following section on troubleshooting and maintenance is intended only as a brief guide.

Remember that your printer is a highly sophisticated electronic device, which also contains high voltage inside. For that reason, only carry out those operations described in this chapter.

CAUTION: Any attempt to carry out operations other than those described here may result in electric shock and/or damage to the printer. When carrying out any repairs or maintenance, always follow the instructions carefully.

TROUBLESHOOTING

Your printer is a reliable piece of precision machinery, which should not cause you any trouble, provided it is used and treated sensibly. However, if you do experience a minor problem, the few tips below help you avoid having to make an unnecessary service call. The following table gives you ideas on where to look in this section if you experience faults:

Region of fault	Description
Power supply	Power is not being supplied to the printer
Printing	The printer does not print, or stops printing
	The print is faint or uneven
	Dots are missing in characters or graphics
	While using application software, fonts or characters cannot be printed
	The printout is not what is expected when running a program
Paper feeding	Single sheets do not feed properly (without ASF)
	Continuous paper does not feed properly with the tractor feed
	The ASF is not operating or is not feeding paper properly
	Paper park (switching between continuous paper and cut sheets) is not working properly
	Text is being printed all on one line, or with extra blank lines
	Page length and margin settings are not what is expected

Remember—it is better not to attempt operations or repairs above your level of competence.

Otherwise, you run the risk of damaging the printer.

Power supply

If the POWER indicator does not illuminate, check the following:

Check	Possible remedy
Is the power cable properly plugged into the electrical outlet?	Turn off the printer, ensure the power cable is securely connected, and then turn the printer back on.
Is power being supplied to the outlet?	Turn off the printer, unplug it. Try the outlet with another appliance to determine if electricity is being supplied from that outlet.
Is the printer voltage correct?	Check the bottom panel of your printer to ensure that the outlet voltage corresponds to the voltage required by the printer. If they do not match, DO NOT try to operate the printer. Contact your supplier.

Printing

If your printer does not print, or suddenly stops printing, check the following:

Check	Possible remedy
Is the interface cable connected securely?	Check both ends of the cable - printer and computer to make sure that the connector is firmly in position.
Is the ON LINE indicator illuminated?	If it is not, press the ☐ ON LINE ☐ button to set the printer on-line.
Is the PAPER indicator illuminating?	If it is, the paper has run out. Load more paper.
Is the printer beeping intermittently?	The release lever is moved while the paper is in printing position. Move the release lever to the original position.
Is the paper caught up internally?	Turn off the power, remove the jammed paper, replace, turn on the printer, and continue printing. Make sure that the loading edge of the paper is smooth and uncreased.
Is the ribbon caught up around the print head?	Turn off the power, remove the ribbon, retension it, and replace it. This problem occurs most frequently with a worn ribbon, so you may need to replace the ribbon.
Is the software you are using properly installed for your printer?	Check the installation settings in your software, and reinstall if necessary.
Can the printer perform self-test operations?	Turn the printer off, and turn it on again, holding down one of the buttons to perform a self-test. If these do not work, contact your dealer.

If the print is faint, or uneven, check the following:

Check	Possible remedy
Is the ribbon properly in-stalled?	Check and reinstall if necessary.
Is the ribbon worn out?	The ribbon has a long life, but will eventually need replacing. Fit a new ribbon cartridge if necessary.

If dots are missing in the printing, check the following:

Check	Possible remedy
Are dots missing at random in the printing?	The ribbon has become slack, causing it to get caught up. Stop printing, remove the ribbon cartridge, retension and replace it.
Is a line of dots missing con-sistently throughout the printing?	The print head may be damaged. Stop printing, and contact your supplier.

If your application software cannot print the fonts or characters selected, check the following:

Check	Possible remedy
Is your application software properly installed?	Check the software installation, and re-install the software if necessary.
Are fonts not being selected properly?	Check the software installation, and insert the com-mands necessary for font changes into the software.
Are characters other than those expected being printed?	Either you are using the wrong International Character Set (reset with Memory Switch or software com-mands), or you have the wrong character set selected (for example if characters other than IBM block graphic characters are being printed). Correct this with Memory Switch or the appropriate software sequences.

If the printout is not what is expected:

Check	Possible remedy
Is the printer installed cor-rectly?	Your software may think that it is driving a different emulation to the one actually set. Check the Memory Switch settings to make sure you have the right emula-tion.
Is the printer not printing anything that you are ex-pecting?	Use the Hex Dump mode to analyze the output from the computer to the printer. This will enable you determine that the right escape sequence, etc are being transmitted.

Paper feeding

If cut sheet paper (without ASF) is not feeding smoothly, check the following:

Check	Possible remedy
Is the paper release lever pushed front (to the ▐ position)?	Set the release lever to the ▐ position.
Is the paper guide in place and vertical?	The paper guide should be in place and vertically for cut sheets to feed smoothly.
Are the left and right guides too close together?	If the left and right guides are too close together, the paper will not feed smoothly. Move them a little further apart to allow the paper feed freely.
Is the ASF selected with the Memory Switch setting?	If it is, then deselect it.
Are you trying to feed paper using the front panel buttons while the ON LINE indicator illuminated?	You can only feed paper in this way the printer is off-line. Set the printer off-line and then feed paper.
Is the paper too thick?	There are limits to the thickness of paper that can be fed in this way. Try with thinner paper.
Are forms jamming between printing surface and the platen?	Clean the surface of the platen roller with a cloth barely dampended with a little alcohol.

If fanfold (continuous) paper is not being fed correctly using the tractor feed, check the following:

Check	Possible remedy
Is the paper release lever pushed to the ▐ position?	Make sure the release lever is pushed to the ▐ position.
Is the paper guide in the vertical position?	When using the tractor feed, the paper guide should be horizontal.
Are the holes on each side of the paper aligned with regard to each other in the tractor units?	If the two sides of the paper are out of alignment, realign them so that the tractor holes match up.
Are the tractor units too close or too far apart?	Misalignment of the tractor units, making the paper too close or too tight, will prevent a smooth paper feed.
Are the tractor units locked in position and the covers closed?	Correct this if necessary.

Check	Possible remedy
Is the paper feeding freely into the printer?	The paper should not be too far from the printer (less than 1 meter/3 feet), and there should be no cables or other obstacles obstructing its path. The paper should also be feeding straight into the printer, and an angled feed may cause jams and blockages.
Is the paper caught up around the perforation?	It is recommended to skip around the perforation. If you cannot, set on the CR-CENTERING with Memory seitch.
Are you trying to feed paper using the front panel buttons while the ON LINE indicator illuminated?	You can only feed paper in this way the printer is off-line. Set the printer off-line and then feed paper.
Is the paper too thick?	There are limits to the thickness of paper that can be fed in this way. Try with thinner paper.

If the ASF is not operating or is not feeding paper correctly, check the following:

Check	Possible remedy
Has the correct ASF option been selected with the Memory Switch?	Select correct option.
Is the release lever set to the ▀ position?	The release lever should be set to the single-sheet position.
Is the ASF correctly mounted?	Make sure that the ASF is properly seated on the printer.
Is paper caught up near the print head? ·	Stop printing, remove the jammed sheet (you may have to remove the ASF for this), and continue.
Are the left and right guides too close together?	If the left and right guides are too close together, the paper will not feed smoothly. Move them a little further apart to allow the paper to feed freely.
Is there too much paper in the paper feed hopper or stacker?	The ASF's paper feed hopper and stacker can hold between 100 to 150 sheets each. Make sure that there is no more paper than this in either the hopper or stacker.
Was the paper fanned before being fed into the ASF?	If this is not done, paper jams may occur. Remove the stack of paper from the ASF and fan it before reinserting.
Has the paper been used already or is it creased?	Only new, uncreased paper should be used with the ASF.
Are you trying to feed paper using the front panel buttons while the ON LINE indicator illuminated?	You can only feed paper in this way the printer is off-line. Set the printer off-line and then feed paper.
Is the paper too thick or too thin?	There are limits to the thickness of paper that can be fed in this way. Try with different paper.

If the paper park facility does not appear to be working correctly, check the following:

Check	Possible remedy
Is the paper release lever in the ▮ position?	The paper release lever must be set to the ▮ position after the fanfold paper has been parked.
Has the fanfold paper been properly parked?	Make sure that the PAPER indicator comes on after the fanfold paper has been parked.

If text is being printed all on one line, or with extra blank lines, check the following:

Check	Possible remedy
Is the text all on the same line?	Carriage returns are not being expanded to <CR> + <LF> pairs. Check the Memory Switch setting and correct.
Is text being printed with extra blank lines?	Two line feeds are being printed. Either make sure your software print just a carriage return or (if this is not possible), set the AUTO LF to OFF with the Memory Switch setting.

If the page length and margins are not what is expected, check the following:

Check	Possible remedy
Is the printing starting too high or too low on the page?	Use the Micro Feed facility to adjust the print position relative to the page.
Does the printer's page length not match the physical page length?	Use the Memory Switches to set up the correct page length, or use software commands to do it.

MAINTENANCE

Essentially, your printer is a robust piece of equipment, but should be treated with a modicum of care in order to avoid malfunctions. For example:

- Keep your printer in a "comfortable" environment. Roughly speaking, if you are comfortable, then the environment is suitable for your printer (see Chapter 2).

- Do not subject the printer to physical shocks or excessive vibration.

- Avoid over-dusty environments. Dust is the enemy of all precision mechanical devices.

- To clean the exterior of the printer, use a cloth barely dampened with either water with a little detergent or a little alcohol, but do not allow any liquid to fall inside the printer.

- The interior of the printer may be cleaned with a small vacuum cleaner or a compressed-air aerosol (sold for this purpose). When performing this operation, be sure not to bend or damage any cable connections or electronic components.

REPLACING THE PRINT HEAD

This is not a job which you will need to do very often. The print head has been designed to last for about 100 million draft characters. In normal everyday use, this will translate to years of life. However, if the print quality is faint, even after you have changed the ribbon or you have adjusted the gap between the print head and the platen (see Chapter 4), the print head may need replacement.

Only use a replacement print head as recommended by your supplier.

1. Turn OFF the printer, and unplug the power cord.
2. Open the front cover, and remove the ribbon cartridge.
3. If the printer has been in operation immediately before this operation, the print head will be hot. Allow time for the print head to cool before attempting to work on it.
4. Unscrew the two screws that hold the print head in place and set them aside.
5. Disengage the connector, then remove the print head.
6. Place the new print head on its support, seating it on the two pins.

7. Fasten the print head down with the two screws.
8. Replace the ribbon cartridge and close the front cover, then plug the power cord back in.
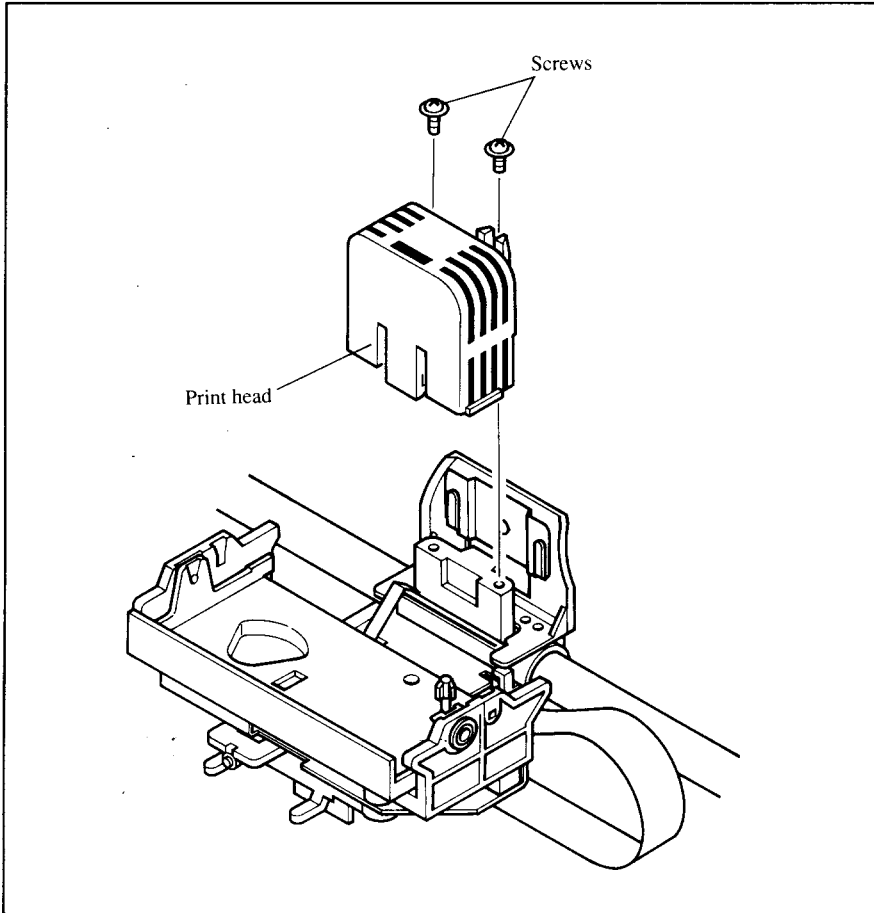
Figure 10-1. Replacing the print head.

Chapter 11

SPECIFICATIONS

Printing system .... Serial Impact Dot-matrix

Printing speed	Pica	Elite
High-Speed Draft	372 cps	420 cps
Draft	280 cps	336 cps
Near Letter Quality	70 cps	84 cps

Print direction .... Bi-directional, logic-seeking
Uni-directional, logic-seeking
(selectable)

Print head .... 9 pins
Life: 100 million draft characters

Line spacing .... 1/6, 1/8, $n/72$, $n/216$ inches

Font styles .... Draft, High-Speed Draft, Sanserif, Courier, Script, Orator

Characters	ASCII	96
	International	16 sets (*)
	IBM special	111
	IBM block graphic	50
	IBM code page	6 sets (**)
	Download	255

* USA, France, Germany, England, Denmark I, Sweden, Italy, Spain I, Japan, Norway, Denmark II, Spain II, Latin America, Korea, Irish, Legal

** #437 (U.S.A.), #850 (Multi-Lingual), #860 (Portuguese), #861 (Icelandic), #863 (Canadian French), #865 (Nordic)

Number of columns ....CPI   Normal type Wide type

	CPI	Normal type	Wide type
Pica	10	80	136
Elite	12	96	163
Condensed pica	17.1	137	233
Condensed elite	20	160	272
Proportional		Variable	Variable

Character matrix ....Draft   NLQ

	Draft	NLQ
Pica	9×11	18×23
Elite	9×8	18×19

Bit image dot-matrix .... DPI   Normal type   Wide type

	DPI	Normal type	Wide type
Normal	60	$(8 or 9) \times 480$	$(8 or 9) \times 816$
Double	120	$(8 or 9) \times 960$	$(8 or 9) \times 1632$
High-speed double*	120	$(8 or 9) \times 960$	$(8 or 9) \times 1632$
Quadruple*	240	$(8 or 9) \times 1920$	$(8 or 9) \times 3264$
CRT graphics type 1	80	$(8 or 9) \times 640$	$(8 or 9) \times 1088$
Plotter graphics	72	$(8 or 9) \times 576$	$(8 or 9) \times 979$
CRT graphics type 2	90	$(8 or 9) \times 720$	$(8 or 9) \times 1224$
Double-density plotter graphics	144	$(8 or 9) \times 1152$	$(8 or 9) \times 1958$

* It is impossible to print adjacent dots in the mode marked with an asterisk (*).

Paper feed..Friction or push tractor feed (standard)
Bottom feed or Push/Pull feed (option)

Paper feed speed ....3.4 inches/second max (Normal type)
3.7 inches/second max (Wide type)

Paper specifications ....Normal Type   Wide type

	Normal Type	Wide type
Cut sheet		
Width	4" - 11.7"	4" - 16.5"
	(101 - 297 mm)	(101 - 419 mm)
Length	7.17" - 14.3"	7.17" - 14.3"
	(182 - 364 mm)	(182 - 364 mm)
Thickness	0.07 - 0.12 mm	0.07 - 0.12 mm
Weight	52 - 90 g/m²	52 - 90 g/m²
	45 - 77 kg	45 - 77 kg
	14 - 24 lb	14 - 24 lb

Fanfold (continuous)

Width	4" - 10"	4" - 16"
	(101 - 254 mm)	(101 - 406 mm)
Length	5.5" (Minimum)	5.5" (Minimum)
	(140 mm)	(140 mm)
Thickness	0.07 - 0.12 mm	0.07 - 0.12 mm
	0.35 mm (Total for multi-part forms)	
Weight	52 - 82 g/m²	52 - 82 g/m²
	45 - 70 kg	45 - 70 kg
	14 - 22 lb	14 - 22 lb

Copies .... Original + 2 copies (Multi-part mode off)
Original + 4 copies (Multi-part mode on)

Maximum buffer size .... Without Download   32 kB
With Download   14 kB

Emulations .... Standard mode: Epson EX-800/1000
IBM mode: IBM Proprinter III

Interface .... Centronics parallel (standard)
RS-232C/422 serial (option)

Ribbon type .... On-carriage, dedicated
Monochrome (Black only)
Color (Black, red, blue, violet, yellow, orange, green)

Ribbon life

Monochrome (LZ9) .... 4 million characters (draft pica)
Color (X9CL) .... 1 million characters (draft pica)

Dimensions and Weight .... Normal type   Wide type

Width	466 mm (18.3")	608 mm (23.9")
Depth	400 mm (15.7")	400 mm (15.7")
Height	157 mm (6.2")	157 mm (6.2")
Weight	9.7 kg (21.4 lb)	11.9 kg (26.2 lb)

Power supply .... 120VAC, 220VAC, 240VAC, 50/60 Hz (varies according to the country of purchase)

Options .... Color Ribbon Cartridge (X9CL)
Single-bin Automatic Sheet Feeder (SF-10DMII/15DMII)
Dual-bin Automatic Sheet Feeder (SF-10RMII/15RMII)
Pull Tractor Unit (PT-10XM/15XM)
Serial Interface Cartridge (IS-8XL)
Buffered Parallel Interface cartridge (IP-128XL)

PINOUT OF INTERFACE CONNECTOR

The following describes the pinout of the interface connector (signals which are low when active are overlined).

Parallel interface

Pin	Name	Function
1	STROBE	Goes from high to low (for ≥ 0.5 μs) when active
2	DATA0	High when active
3	DATA1	High when active
4	DATA2	High when active
5	DATA3	High when active
6	DATA4	High when active
7	DATA5	High when active
8	DATA6	High when active
9	DATA7	High when active
10	ACK	5μs low pulse acknowledges receipt of data
11	BUSY	Low when printer ready to receive data
12	PAPER	High when paper out. Can be disabled with Memory Switch setting
13	SELECT	High when printer is on-line
14, 15	N/C	
16	SIGNAL GND	Signal ground
17	CHASSIS	Chassis ground (isolated from signal ground)
18	+5V	+5V DC output from printer
19 ~ 30	GND	Twisted pair ground return
31	RESET	When this input signal is low, printer is reset
32	ERROR	Outputs low when printer cannot continue, due to an error
33	EXT GND	External ground
34, 35	N/C	
36	SELECT IN	Always high

Serial Interface

Pin	Name	Function
1	GND	Printer's chassis ground.
2	TXD	This pin carries data from the printer.
3	RXD	This pin carries data to the printer.
4	RTS	This pin is always set space.
5	CTS	This pin is Space when the computer is ready to send data. This printer does not check this pin.
6	N/C	
7	GND	Signal ground.
8 ~ 10	N/C	
11	RCH	This printer turn this pin Space when it is ready to receive data. This line carries the same signal as pin 20.
12	N/C	
13	GND	Signal ground.
14 ~ 19	N/C	
20	DTR	This printer turns this pin Sapce when it is ready to receive data.
21 ~ 25	N/C	

CHARACTER SETS

The following tables show the standard and IBM character sets.

The decimal character code of each character is shown in an inset to the lower right of the character.

The hexadecimal code can be found by reading the entires at the top and left edges of the table. For example, the character "A" is in column 4 and row 1, so its hexadecimal character code is 41. This is equivalent (4 × 16 + 1 = 65) to decimal 65, the number in the inset.

Control codes recognized by this printer are indicated by abbreviations inside pointed brackets < >.

	0	1	2	3	4	5	6	7
0	⟨NUL⟩ 0	16	32	0 48	@ 64	P 80	` 96	p 112
1	1	⟨DC1⟩ 17	! 33	1 49	A 65	Q 81	a 97	q 113
2	2	⟨DC2⟩ 18	'' 34	2 50	B 66	R 82	b 98	r 114
3	3	⟨DC3⟩ 19	# 35	3 51	C	S 83	c 99	s 115
		⟨DC4⟩	$					t

Character

Hexadecimal value (high order)

Control code

Decimal value

Hexadecimal value (low order)

Standard character set #2

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

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	8	9	A	B	C	D	E	F
0	à 128	§ 144	160	0 176	@ 192	P 208	` 224	p 240
1	è 129	ß 145	! 161	1 177	A 193	Q 209	a 225	q 241
2	ù 130	Æ 146	" 162	2 178	B 194	R 210	b 226	r 242
3	ò 131	æ 147	# 163	3 179	C 195	S 211	c 227	s 243
4	ì 132	Ø 148	$ 164	4 180	D 196	T 212	d 228	t 244
5	° 133	ø 149	% 165	5 181	E 197	U 213	e 229	u 245
6	£ 134	¨ 150	& 166	6 182	F 198	V 214	f 230	v 246
7	ï 135	Ä 151	' 167	7 183	G 199	W 215	g 231	w 247
8	¿ 136	Ö 152	(168	8 184	H 200	X 216	h 232	x 248
9	Ñ 137	Ü 153	) 169	9 185	I 201	Y 217	i 233	y 249
A	ñ 138	ä 154	* 170	: 186	J 202	Z 218	j 234	z 250
B	¤ 139	ö 155	+ 171	; 187	K 203	[219	k 235	{ 251
C	₧ 140	ü 156	, 172	< 188	L 204	\ 220	l 236	¦ 252
D	Á 141	É 157	- 173	= 189	M 205	] 221	m 237	} 253
E	â 142	é 158	. 174	> 190	N 206	^ 222	n 238	~ 254
F	Ç 143	¥ 159	/ 175	? 191	O 207	_ 223	o 239	Ø 255

International character sets

When an international character set is selected by a command from software, the following changes are made in the Standard Italic character set:

Country	35	36	64	88	90	91	92	93	94	96	123	124	125	126
U.S.A.	#	$	@	X	Z	[	\	]	^	`	{	¦	}	~
FRANCE	#	$	à	X	Z	°	ç	§	^	`	é	ù	è	¨
GERMANY	#	$	§	X	Z	Ä	Ö	Ü	^	`	ä	ö	ü	ß
ENGLAND	£	$	@	X	Z	[	\	]	^	`	{	¦	}	~
DENMARK 1	#	$	@	X	Z	Æ	Ø	Å	^	`	æ	ø	å	~
SWEDEN	#	¤	É	X	Z	Ä	Ö	Å	Ü	é	ä	ö	å	ü
ITALY	#	$	@	X	Z	°	\	é	^	ù	à	ò	è	ì
SPAIN 1	₧	$	@	X	Z	¡	Ñ	¿	^	´	¨	ñ	}	~
JAPAN	#	$	@	X	Z	[	¥	]	^	`	{	¦	}	~
NORWAY	#	¤	É	X	Z	Æ	Ø	Å	Ü	é	æ	ø	å	ü
DENMARK 2	#	$	É	X	Z	Æ	Ø	Å	Ü	é	æ	ø	å	ü
SPAIN 2	#	$	á	X	Z	¡	Ñ	¿	é	´	í	ñ	ó	ú
LATIN AMERICA	#	$	á	X	Z	¡	Ñ	¿	é	ü	í	ñ	ó	ú
KOREA	#	$	@	X	Z	[	₩	]	^	`	{	¦	}	~
IRISH	#	$	@	Ú	´	[	\	]	^	`	Á	É	Ó	~
LEGAL	#	$	§	X	Z	°	'	''	¶	`	©	®	†	™

The command for selecting the international character set is:

<ESC> "R" n

Where n means character code n, i.e. CHR$ (n) in BASIC. The values of n are:

0	U.S.A.	6	Italy
1	France	7	Spain I
2	Germany	8	Japan
3	England	9	Norway
4	Denmark I	10	Denmark II
5	Sweden	11	Spain II

12	Latin America
13	Korea
14	Irish
64	Legal

IBM character set #2

Code Page #437 (U.S.A.)

	0	1	2	3	4	5	6	7
0	<NUL> 0	16	32	0 48	@ 64	P 80	` 96	p 112
1	<DC1> 1	17	! 33	1 49	A 65	Q 81	a 97	q 113
2	<DC2> 2	18	" 34	2 50	B 66	R 82	b 98	r 114
3	♥ 3	19	# 35	3 51	C 67	S 83	c 99	s 115
4	♦ 4	<DC4> 20	$ 36	4 52	D 68	T 84	d 100	t 116
5	♣ 5	§ 21	% 37	5 53	E 69	U 85	e 101	u 117
6	♠ 6	22	& 38	6 54	F 70	V 86	f 102	v 118
7	<BEL> 7	23	' 39	7 55	G 71	W 87	g 103	w 119
8	<BS> 8	<CAN> 24	(40	8 56	H 72	X 88	h 104	x 120
9	<HT> 9	<EM> 25	) 41	9 57	I 73	Y 89	i 105	y 121
A	<LF> 10	26	* 42	: 58	J 74	Z 90	j 106	z 122
B	<VT> 11	<ESC> 27	+ 43	; 59	K 75	[91	k 107	{ 123
C	<FF> 12	28	, 44	< 60	L 76	\ 92	l 108	¦ 124
D	<CR> 13	29	− 45	= 61	M 77	] 93	m 109	} 125
E	<SO> 14	30	. 46	> 62	N 78	^ 94	n 110	~ 126
F	<SI> 15	31	/ 47	? 63	O 79	_ 95	o 111	127

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	8	9	A	B	C	D	E	F
0	Ç 128	É 144	á 160	▓ 176	└ 192	╨ 208	α 224	≡ 240
1	ü 129	æ 145	í 161	▒ 177	┴ 193	╤ 209	β 225	± 241
2	é 130	Æ 146	ó 162	▓ 178	┬ 194	╥ 210	Γ 226	≥ 242
3	â 131	ô 147	ú 163	│ 179	├ 195	╙ 211	π 227	≤ 243
4	ä 132	ö 148	ñ 164	┤ 180	─ 196	╘ 212	Σ 228	⌠ 244
5	à 133	ò 149	Ñ 165	╡ 181	┼ 197	╒ 213	σ 229	⌡ 245
6	å 134	û 150	ª 166	╢ 182	╞ 198	╓ 214	μ 230	÷ 246
7	ç 135	ù 151	º 167	╖ 183	╟ 199	╫ 215	τ 231	≈ 247
8	ê 136	ÿ 152	¿ 168	╕ 184	╚ 200	╪ 216	Φ 232	° 248
9	ë 137	Ö 153	⌐ 169	╣ 185	╔ 201	┘ 217	Θ 233	∙ 249
A	è 138	Ü 154	¬ 170	║ 186	╩ 202	┌ 218	Ω 234	· 250
B	ï 139	¢ 155	½ 171	╗ 187	╦ 203	█ 219	δ 235	√ 251
C	î 140	£ 156	¼ 172	╝ 188	╠ 204	▄ 220	∞ 236	ⁿ 252
D	ì 141	¥ 157	¡ 173	╜ 189	═ 205	▌ 221	φ 237	² 253
E	Ä 142	₧ 158	« 174	╛ 190	╬ 206	▐ 222	ε 238	■ 254
F	Å 143	ƒ 159	» 175	┐ 191	╧ 207	▀ 223	∩ 239	255

Code Page #850 (Multi-lingual)

Other characters are identical to Code Page #437.

	8	9	A	B	C	D	E	F
0	Ç 128	É 144	á 160	░ 176	└ 192	ð 208	Ó 224	- 240
1	ü 129	æ 145	í 161	▒ 177	┴ 193	Ð 209	ß 225	± 241
2	é 130	Æ 146	ó 162	▓ 178	┬ 194	Ê 210	Ô 226	= 242
3	â 131	ô 147	ú 163	│ 179	├ 195	Ë 211	Ò 227	¾ 243
4	ä 132	ö 148	ñ 164	┤ 180	─ 196	È 212	õ 228	¶ 244
5	à 133	ò 149	Ñ 165	Á 181	┼ 197	ı 213	Õ 229	§ 245
6	å 134	û 150	ª 166	Â 182	ã 198	Í 214	µ 230	÷ 246
7	ç 135	ù 151	º 167	À 183	Ã 199	Î 215	þ 231	¸ 247
8	ê 136	ÿ 152	¿ 168	© 184	╚ 200	Ï 216	Þ 232	° 248
9	ë 137	Ö 153	® 169	╣ 185	╔ 201	┘ 217	Ú 233	¨ 249
A	è 138	Ü 154	¬ 170	║ 186	╩ 202	┌ 218	Û 234	· 250
B	ï 139	ø 155	½ 171	╗ 187	╦ 203	█ 219	Ù 235	¹ 251
C	î 140	£ 156	¼ 172	╝ 188	╠ 204	▄ 220	ý 236	³ 252
D	ì 141	Ø 157	¡ 173	¢ 189	= 205	¦ 221	Ý 237	² 253
E	Ä 142	× 158	« 174	¥ 190	╬ 206	Ì 222	¯ 238	■ 254
F	Å 143	ƒ 159	» 175	┐ 191	¤ 207	▀ 223	´ 239	255

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Code Page #860 (Portuguese)

Other characters are identical to Code Page #437.

	8	9	A	B	C	D	E	F
0	Ç 128	É 144	á 160	▓ 176	└ 192	╨ 208	α 224	≡ 240
1	ü 129	À 145	í 161	▓ 177	┴ 193	╤ 209	β 225	± 241
2	é 130	È 146	ó 162	▓ 178	┬ 194	╥ 210	Γ 226	≥ 242
3	â 131	ô 147	ú 163	│ 179	├ 195	╙ 211	π 227	≤ 243
4	ã 132	õ 148	ñ 164	┤ 180	─ 196	╘ 212	Σ 228	⌠ 244
5	à 133	ò 149	Ñ 165	╡ 181	┼ 197	╒ 213	σ 229	⌡ 245
6	Á 134	Ú 150	ª 166	╢ 182	╞ 198	╓ 214	µ 230	÷ 246
7	ç 135	ù 151	º 167	╖ 183	╟ 199	╫ 215	τ 231	≈ 247
8	ê 136	Ì 152	¿ 168	╕ 184	╚ 200	╪ 216	Φ 232	° 248
9	Ê 137	Õ 153	Ò 169	╣ 185	╔ 201	┘ 217	Θ 233	• 249
A	è 138	Ü 154	¬ 170	║ 186	╩ 202	┌ 218	Ω 234	· 250
B	Í 139	¢ 155	½ 171	╗ 187	╦ 203	█ 219	δ 235	√ 251
C	Ô 140	£ 156	¼ 172	╝ 188	╠ 204	▄ 220	∞ 236	ⁿ 252
D	ì 141	Ù 157	¡ 173	╜ 189	= 205	▌ 221	φ 237	² 253
E	Ã 142	₧ 158	« 174	╛ 190	╬ 206	▐ 222	ε 238	■ 254
F	Â 143	Ó 159	» 175	┐ 191	╧ 207	▀ 223	∩ 239	255

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Code Page #861 (Icelandic)

Other characters are identical to Code Page #437.

	8	9	A	B	C	D	E	F
0	Ç 128	É 144	á 160	░ 176	└ 192	╨ 208	α 224	≡ 240
1	ü 129	æ 145	í 161	▒ 177	┴ 193	╤ 209	β 225	± 241
2	é 130	Æ 146	ó 162	▓ 178	┬ 194	╥ 210	Γ 226	≥ 242
3	â 131	ô 147	ú 163	│ 179	├ 195	╙ 211	π 227	≤ 243
4	ä 132	ö 148	Á 164	┤ 180	─ 196	╘ 212	Σ 228	⌠ 244
5	à 133	þ 149	Í 165	╡ 181	┼ 197	╒ 213	σ 229	⌡ 245
6	å 134	û 150	Ó 166	╢ 182	╞ 198	╓ 214	μ 230	÷ 246
7	ç 135	Ý 151	Ú 167	╖ 183	╟ 199	╫ 215	τ 231	≈ 247
8	ê 136	ý 152	¿ 168	╕ 184	╚ 200	╪ 216	Φ 232	° 248
9	ë 137	Ö 153	⌐ 169	╣ 185	╔ 201	┘ 217	Θ 233	∙ 249
A	è 138	Ü 154	¬ 170	║ 186	╩ 202	┌ 218	Ω 234	· 250
B	Ð 139	ø 155	½ 171	╗ 187	╦ 203	█ 219	δ 235	√ 251
C	Ö 140	£ 156	¼ 172	╝ 188	╠ 204	▄ 220	∞ 236	ⁿ 252
D	þ 141	Ø 157	¡ 173	╜ 189	= 205	▌ 221	φ 237	² 253
E	Ä 142	₧ 158	« 174	╛ 190	╬ 206	▐ 222	ε 238	■ 254
F	Å 143	ƒ 159	» 175	┐ 191	╧ 207	▀ 223	∩ 239	255

Code Page #863 (Canadian French)

Other characters are identical to Code Page #437.

	8	9	A	B	C	D	E	F
0	Ç 128	É 144	│ 160	▓ 176	└ 192	╨ 208	α 224	≡ 240
1	ü 129	È 145	´ 161	▒ 177	┴ 193	╤ 209	β 225	± 241
2	é 130	Ê 146	ó 162	▓ 178	┬ 194	π 210	Γ 226	≥ 242
3	â 131	ô 147	ú 163	│ 179	├ 195	╙ 211	π 227	≤ 243
4	Â 132	Ë 148	¨ 164	┤ 180	─ 196	╘ 212	Σ 228	⌠ 244
5	à 133	Ï 149	¸ 165	╡ 181	┼ 197	╒ 213	σ 229	⌡ 245
6	¶ 134	û 150	³ 166	╢ 182	╞ 198	╓ 214	μ 230	÷ 246
7	ç 135	ù 151	─ 167	╖ 183	╟ 199	╫ 215	τ 231	≈ 247
8	ê 136	¤ 152	Î 168	╕ 184	╚ 200	╪ 216	Φ 232	° 248
9	ë 137	Ô 153	⌐ 169	╣ 185	╔ 201	┘ 217	Θ 233	∙ 249
A	è 138	Ü 154	¬ 170	║ 186	╩ 202	┌ 218	Ω 234	· 250
B	ï 139	¢ 155	½ 171	╗ 187	╦ 203	█ 219	δ 235	√ 251
C	î 140	£ 156	¼ 172	╝ 188	╠ 204	▄ 220	∞ 236	ⁿ 252
D	═ 141	Ù 157	¾ 173	╜ 189	═ 205	▌ 221	ø 237	² 253
E	À 142	Û 158	« 174	╛ 190	╬ 206	▐ 222	∈ 238	■ 254
F	§ 143	ƒ 159	» 175	┐ 191	⊥ 207	▀ 223	∩ 239	255

Code Page #865 (Nordic)

Other characters are identical to Code Page #437.

	8	9	A	B	C	D	E	F
0	Ç (128)	É (144)	á (160)	▓ (176)	└ (192)	╨ (208)	α (224)	≡ (240)
1	ü (129)	æ (145)	í (161)	▒ (177)	┴ (193)	╤ (209)	β (225)	± (241)
2	é (130)	Æ (146)	ó (162)	▓ (178)	┬ (194)	╥ (210)	Γ (226)	≥ (242)
3	â (131)	ô (147)	ú (163)	│ (179)	├ (195)	╙ (211)	π (227)	≤ (243)
4	ä (132)	ö (148)	ñ (164)	┤ (180)	─ (196)	╘ (212)	Σ (228)	⌠ (244)
5	à (133)	ò (149)	Ñ (165)	╡ (181)	┼ (197)	╒ (213)	σ (229)	⌡ (245)
6	å (134)	û (150)	ª (166)	╢ (182)	╞ (198)	╓ (214)	µ (230)	÷ (246)
7	ç (135)	ù (151)	º (167)	╖ (183)	╟ (199)	╫ (215)	τ (231)	≈ (247)
8	ê (136)	ÿ (152)	¿ (168)	╕ (184)	╚ (200)	╪ (216)	Φ (232)	° (248)
9	ë (137)	Ö (153)	⌐ (169)	╣ (185)	╔ (201)	┘ (217)	Θ (233)	∙ (249)
A	è (138)	Ü (154)	¬ (170)	║ (186)	╩ (202)	┌ (218)	Ω (234)	· (250)
B	ï (139)	ø (155)	½ (171)	╗ (187)	╦ (203)	█ (219)	δ (235)	√ (251)
C	î (140)	£ (156)	¼ (172)	╝ (188)	╠ (204)	▄ (220)	∞ (236)	ⁿ (252)
D	ì (141)	Ø (157)	¡ (173)	╜ (189)	═ (205)	▌ (221)	φ (237)	² (253)
E	Ä (142)	₧ (158)	« (174)	╛ (190)	╬ (206)	▐ (222)	ε (238)	■ (254)
F	Å (143)	ƒ (159)	¤ (175)	┐ (191)	╧ (207)	▀ (223)	∩ (239)	(255)

Character set #1

Other characters are identical to character set #2.

The duplication of control codes enables systems with a 7-bit interface to obtain control functions when the most significant bit is set to 1 by the <ESC> ">" command in the standard mode.

	0	1
0	<NUL> 0	16
1		<DC1> 17
2		<DC2> 18
3		<DC3> 19
4		<DC4> 20
5		<NAK> 21
6	6	22
7	<BEL> 7	23
8	<BS> 8	<CAN> 24
9	<HT> 9	<EM> 25
A	<LF> 10	26
B	<VT> 11	<ESC> 27
C	<FF> 12	28
D	<CR> 13	29
E	<SO> 14	30
F	<SI> 15	31

	8	9
0	<NUL> 128	144
1		<DC1> 145
2		<DC2> 146
3		<DC3> 147
4		<DC4> 148
5		<NAK> 149
6	134	150
7	<BEL> 135	151
8	<BS> 136	<CAN> 152
9	<HT> 137	<EM> 153
A	<LF> 138	154
B	<VT> .139	<ESC> 155
C	<FF> 140	156
D	<CR> 141	157
E	<SO> 142	158
F	<SI> 143	159

IBM special character set

Additional characters can be printed by special commands.

	0	1
0	∅ 0	▶ 16
1	☺ 1	◀ 17
2	☻ 2	↕ 18
3	♥ 3	‼ 19
4	♦ 4	¶ 20
5	♣ 5	§ 21
6	♠ 6	▬ 22
7	• 7	↨ 23
8	◘ 8	↑ 24
9	○ 9	↓ 25
A	◙ 10	→ 26
B	♂ 11	← 27
C	♀ 12	∟ 28
D	♪ 13	↔ 29
E	♫ 14	▲ 30
F	☼ 15	▼ 31

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COMMAND SUMMARY

Standard Mode

The following commands take effect with the Standard mode.

CONTROL CODE	FUNCTION	PAGE
<BEL>	Bell	100
<BS>	Backspace	86
<HT>	Horizontal tab	88
<VT>	Vertical tab	84
<CR>	Carriage return	86
<LF>	Line feed	80
<FF>	Form feed	82
<SO>	Expanded printing for one line	75
<SI>	Condensed printing	74
<DC1>	Set printer on-line	100
<DC2>	Cancel condensed printing	74
<DC3>	Set printer off-line	100
<DC4>	Cancel one-line expanded printing	75
<CAN>	Cancel last line	99
<ESC> <LF>	Reverse line feed	80
<ESC> <FF>	Return to top of current page	83
<ESC> <SO>	Expanded printing for one line	75
<ESC> <SI>	Condensed printing	74
<ESC> <EM> <0>	Manual feed	101
<ESC> <EM> <1>	Select ASF bin #1	102
<ESC> <EM> <2>	Select ASF bin #2	102
<ESC> <EM> <4>	Auto feed	101
<ESC> <EM> "R"	Eject paper from ASF	102
<ESC> <EM> "T" n	Set print start position on ASF	102
<ESC> <SP> n	Increase character spacing	76
<ESC> "!" n	Select master print mode	76
<ESC> "#"	Accept MSB as is	99
<ESC> "$" n1 n2	Absolute horizontal tab in inches	89
<ESC> "%" 0	Select ROM character set	97
<ESC> "%" 1	Select download character set	96
<ESC> "&" <0> n1 n2 m0 m1 m2 m3 ... m11	Define draft download characters	93
<ESC> "&" <0> n1 n2 m0 m1 m2 d1 d2 ... dx	Define NLQ download characters	94
<ESC> "*" n0 n1 n2 m1 m2 ...	Select graphics mode	91
<ESC> "-" 0	Stop underlining	69
<ESC> "-" 1	Start underlining	69
<ESC> "/" n0	Select vertical tab channel	84
<ESC> "0"	Set line spacing to 1/8 inch	79
<ESC> "1"	Set line spacing to 7/72 inch	79
<ESC> "2"	Set line spacing to 1/6 inch	79
<ESC> "3" n	Set line spacing to n/216 inch	79
<ESC> "4"	Select italic characters	67
<ESC> "5"	Select upright characters	68
<ESC> "6"	Select character set #2	71
<ESC> "7"	Select character set #1	71
<ESC> "8"	Disable paper-out detector	83
<ESC> "9"	Enable paper-out detector	83

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CONTROL CODE	FUNCTION	PAGE
\<ESC\> ":" \<0\> *n* \<0\>	Copy character set from ROM into RAM	95
\<ESC\> "\<"	One-line uni-directional printing	101
\<ESC\> "="	Set MSB to 0	99
\<ESC\> "\>"	Set MSB to 1	99
\<ESC\> "?" *n m*	Convert graphics density	91
\<ESC\> "@"	Reset printer	102
\<ESC\> "A" *n*	Set line spacing to *n*/72 inch	80
\<ESC\> "B" *n1 n2 .... \<0\>*	Set vertical tab stops	83
\<ESC\> "C" \<0\> *n*	Set page length to *n* inches	82
\<ESC\> "C" *n*	Set page length to *n* lines	82
\<ESC\> "D" *n1 n2 .... \<0\>*	Set horizontal tab stops	88
\<ESC\> "E"	Emphasized printing	68
\<ESC\> "F"	Cancel emphasized printing	68
\<ESC\> "G"	Double-strike printing	68
\<ESC\> "H"	Cancel double-strike printing	69
\<ESC\> "J" *n*	Perform one *n*/216-inch line feed	81
\<ESC\> "K" *n1 n2 m1 m2 ...*	Print normal-density graphics	90
\<ESC\> "L" *n1 n2 m1 m2 ...*	Print double-density graphics	90
\<ESC\> "M"	Elite pitch	74
\<ESC\> "N" *n*	Set bottom margin	82
\<ESC\> "O"	Cancel bottom margin	82
\<ESC\> "P"	Pica pitch	74
\<ESC\> "Q" *n*	Set right margin	85
\<ESC\> "R" *n*	Select international character set	72
\<ESC\> "S" 0	Superscript	70
\<ESC\> "S" 1	Subscript	70
\<ESC\> "T"	Cancel superscript or subscript	70
\<ESC\> "U" 0	Bi-directional printing	100
\<ESC\> "U" 1	Uni-directional printing	101
\<ESC\> "W" 0	Cancel expanded printing	75
\<ESC\> "W" 1	Expanded printing	75
\<ESC\> "Y" *n1 n2 m1 m2 ...*	Print double-density, double-speed graphics	90
\<ESC\> "Z" *n1 n2 m1 m2 ...*	Print quadruple-density graphics	91
\<ESC\> "[" "T" \<4\> \<0\> \<0\> \<0\> *n1 n2*	Select IBM code page	72
\<ESC\> "\\" *n1 n2*	Relative horizontal tab	89
\<ESC\> "^" *n0 n1 n2 m1 m2 ...*	Select 9-pin graphics mode	92
\<ESC\> "a" 0	Left justify	87
\<ESC\> "a" 1	Center text	87
\<ESC\> "a" 2	Right justify	87
\<ESC\> "a" 3	Full justify	87
\<ESC\> "b" *n0 n1 n2 .... \<0\>*	Set vertical tab stops in channel	84
\<ESC\> "e" 0 *n*	Set horizontal tab stop every *n* columns	88
\<ESC\> "e" 1 *n*	Set vertical tab stops every *n* lines	84
\<ESC\> "f" 0 *n*	Absolute horizontal tab in columns	89
\<ESC\> "f" 1 *n*	Feed paper *n* lines	81
\<ESC\> "h" *n*	Select double or quadruple size	77
\<ESC\> "j" *n*	Perform one *n*/216-inch reverse line feed	81
\<ESC\> "k" *n*	Select NLQ font	67
\<ESC\> "l" *n*	Set left margin	85
\<ESC\> "p" 0	Select fixed spacing	76
\<ESC\> "p" 1	Select proportional spacing	75
\<ESC\> "r" *n*	Select print color	98
\<ESC\> "t" 0	Select standard character set	71
\<ESC\> "t" 1	Select IBM character set	71
\<ESC\> "t" 2	Shift download character area	96
\<ESC\> "w" 0	Return to normal height	78
\<ESC\> "w" 1	Print double-height characters	77
\<ESC\> "x" 0	Select draft quality characters	66
\<ESC\> "x" 1	Select NLQ characters	66
\<ESC\> "~" 1	Select slash zero	73
\<ESC\> "~" 0	Select normal zero	73

CONTROL CODE	FUNCTION	PAGE
"(" "(" "0" ")" ")"	Manual feed	101
"(" "(" "1" ")" ")"	Select ASF bin #1	102
"(" "(" "2" ")" ")"	Select ASF bin #2	102
"(" "(" "4" ")" ")"	Auto feed	101
"(" "(" "C" ")" ")" d	Select print color	98
"(" . "(" "F" ")" ")" d	Select font	67
"(" "(" "R" ")" ")"	Eject paper from ASF	102
"(" "(" "S" ")" ")" d	Select character size	77
"(" "(" "T" ")" ")" n	Set print start position on ASF	102
<DEL>	Delete last character sent	99

IBM Mode

The following commands take effect with the IBM mode.

CONTROL CODE	FUNCTION	PAGE
\<BEL>	Bell	100
\<BS>	Backspace	86
\<HT>	Horizontal tab	88
\<VT>	Vertical tab	84
\<CR>	Carriage return	86
\<LF>	Line feed	80
\<FF>	Form feed	82
\<SO>	Expanded printing for one line	75
\<SI>	Condensed printing	74
\<DC1>	Set printer on-line	100
\<DC2>	Pica pitch	74
\<DC4>	Cancel one-line expanded printing	75
\<CAN>	Cancel last line	99
\<ESC> \<EM> \<0>	Manual feed	101
\<ESC> \<EM> \<1>	Select ASF bin #1	102
\<ESC> \<EM> \<2>	Select ASF bin #2	102
\<ESC> \<EM> \<4>	Auto feed	101
\<ESC> \<EM> "R"	Eject paper from ASF	102
\<ESC> \<EM> "T" n	Set print start position on ASF	102
\<ESC> "–" 0	Stop underlining	69
\<ESC> "–" 1	Start underlining	69
\<ESC> "0"	Set line spacing to 1/8 inch	79
\<ESC> "1"	Set line spacing to 7/72 inch	79
\<ESC> "2"	Execute \<ESC> "A"	80
\<ESC> "3" n	Set line spacing to $n/216$ inch	79
\<ESC> "4"	Set top of page at current position	81
\<ESC> "5" \<0>	Cancel automatic line feed	86
\<ESC> "5" \<1>	Set automatic line feed	86
\<ESC> "6"	Select character set #2	71
\<ESC> "7"	Select character set #1	71
\<ESC> "8"	Disable paper-out detector	83
\<ESC> "9"	Enable paper-out detector	83
\<ESC> ":"	Elite pitch	74
\<ESC> "=" $n1$ $n2$ \<DC4> $m0$ $m1$ $m2$ $d1$ $d2$ ...$d11$	Define draft download characters	94
\<ESC> "=" $n1$ $n2$ \<NAK> $m0$ $m1$ $m2$ $d1$ $d2$ ...$d46$	Define NLQ download characters	95
\<ESC> "@"	Reset printer	102
\<ESC> "A" n	Set line spacing to $n/72$ inch	80
\<ESC> "B" $n1$ $n2$ .... \<0>	Set vertical tab stops	83
\<ESC> "C" \<0> n	Set page length to n inches	82
\<ESC> "C" n	Set page length to n lines	82
\<ESC> "D" $n1$ $n2$ .... \<0>	Set horizontal tab stops	88
\<ESC> "E"	Emphasized printing	68
\<ESC> "F"	Cancel emphasized printing	68
\<ESC> "G"	Double-strike printing	68
\<ESC> "H"	Cancel double-strike printing	69
\<ESC> "I" \<0>	Select draft pica characters	66
\<ESC> "I" \<1>	Select draft elite characters	66
\<ESC> "I" \<2>	Select NLQ characters	66
\<ESC> "I" \<3>	Select NLQ characters	66
\<ESC> "I" \<4>	Select draft pica download character set	96
\<ESC> "I" \<5>	Select draft elite download character set	96
\<ESC> "I" \<6>	Select draft download characters with double-strike	97
\<ESC> "I" \<7>	Select NLQ download characters	97

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Customer service information

If you experience any technical difficulties with your Star printer, please refer to Chapter 10 Troubleshooting and Maintenance. This chapter describes easy methods to diagnose and resolve some of the problems which you may encounter.

For further technical support, you should first contact your Authorized Star Dealer. If you require additional support, Star Micronics offers a wide variety of technical support services. Please use one of the telephone numbers listed below, depending on the country in which your Star printer was purchased.

Star Micronics Technical Hotline:

North America:	1-908-572-3300
Hong Kong:	852-795-2335
Australia:	61-2-748-4300
New Zealand:	64-9-570-1470

Star Micronics FaxBack (Document Retrieval) System:
Requires access to a facsimile machine or board with receive capability

North America:	1-908-572-4004

Star Micronics Bulletin Board Service:
Requires a computer modem

North America:	1-908-572-5010
United Kingdom:	44-494-461395
France:	33-1-305807
Germany:	49-69-780929
Netherlands:	31-73-424485
Australia and New Zealand:	61-2-748-2960

Customer response

Star Micronics Co., Ltd. invites your suggestions and comments on your printer and this manual. Please address your correspondence to Attn: Product Manager

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