star

USERS MANUAL

LC-200

DOT MATRIX PRINTER

LC-200

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USERS MANUAL

Self Declaration

Radio interference regarding this equipment has been eliminated according to Vfg 1046/1984 announced by the DBP.
DBP has been informed of the introduction of this special equipment and has been granted the right to examine the whole series.
It is the user's responsibility to see that his own assembled system is in accordance with the technical regulations under Vfg 1046/1984.
To conform to FTZ-regulations it is necessary to make all connections to the printer with shielded cable.

The equipment may only be opened by qualified service representatives.

The above statement applies only to printers marketed in West Germany.

Trademark Acknowledgements

LC-200, NX-1000, LC-10, ND-10/15: Star Micronics Co., Ltd.
IBM PC, PC-AT, PC-XT, Proprinter III, Proprinter II, PC-DOS: International Business Machines Corp.
Microsoft BASIC, MS-DOS: Microsoft Corporation
FX-850, EX-800, LX-850, LX-810: Seiko Epson Corp.

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HOW TO USE THIS MANUAL

This manual is organized into nine chapters. To learn how to make the best use of your printer you are urged to read through chapters 1 through 3. The remaining chapters may be treated as a reference guide for programming operations, etc. It assumes a degree of knowledge of the operation of computers (for instance, it assumes you know about hexadecimal numbers). The chapters are as follows:

Chapter 1 — 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 2 — 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 various procedures in it to find out how the printer works.

Chapter 3 — Default settings

This chapter explains how to use the Electronic DIP Switch (EDS) mode to make system settings on the printer.

Chapter 4 — 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 5 — Download characters

This chapter explains the procedures to create your own characters.

Chapter 6 — MS-DOS and your printer

Since the PC 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 7 — 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 8 — Specifications

This section gives the specifications of your printer.

Chapter 9 — Character sets

These charts show the different character sets available.

FEATURES OF THE PRINTER

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

• 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

Clearly understandable indicator displays and beep tones provide immediate feedback when you press the buttons on the control panel. The five 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.

• Versatile paper handling

Single sheets, fanfold forms, and multi-part forms (up to quadruple-ply) are all accepted, and you can use either push/pull tractor or friction feed. A special feature enables you to keep fanfold forms parked in readiness while printing on other paper.

• Large variety of fonts and sizes

The printer has one draft font, one High-Speed Draft font and four NLQ fonts (Courier, Sanserif, Orator and Script), italics for all styles, plus condensed print, bold print, double-sized print, and quadruple-sized print.

TABLE OF CONTENTS

Chapter 1

SETTING UP THE PRINTER

Subjects covered in Chapter 1 include —

- Locating the printer
- Unpacking and inspection (part names)
- Setting up and connecting
- Loading single sheets
- Loading and parking fanfold forms
- Adjusting the printing gap

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 parallel cable, make sure that the cable is within 2m (6ft) of the printer. An RS-232 connection using the optional SPC-8K interface can be made over longer distances.

UNPACKING AND INSPECTION

Checking the carton contents

Now unpack the contents of the shipping carton, and check each item in the box against Figure 1-1 to make sure that you have everything (there should be seven items).
If any of these items are missing, contact your supplier.
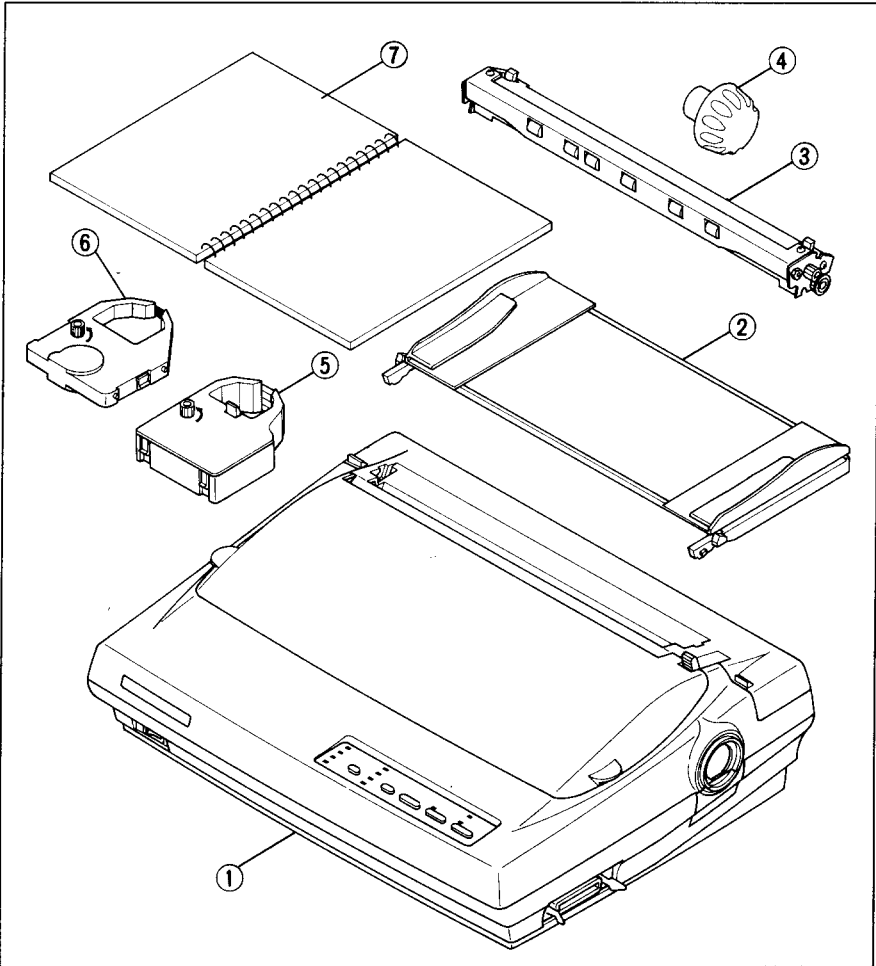
Figure 1-1. Check to make sure you have all seven items: 1) Printer, 2) Paper guide, 3) Roller unit, 4) Platen knob, 5) Color ribbon cartridge, 6) Monochrome ribbon cartridge, and 7) Manual set (User's manual, User's guide and Sticker).

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

- Serial-Parallel converter (SPC-8K)

- Automatic sheet feeder (SF-10DN)

- Roll paper holder (RH-10Z)

Identifying printer parts

Make an external inspection of the printer. Note the locations of the following parts in Figure 1-2.
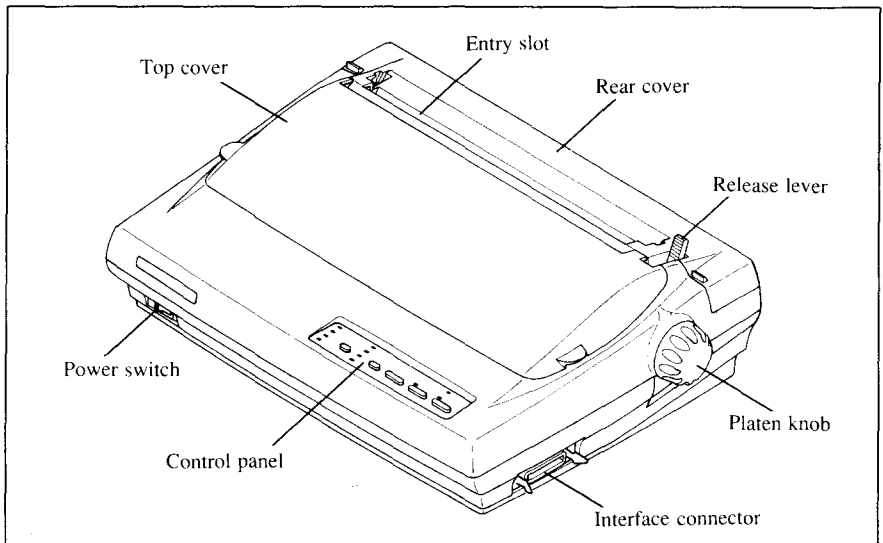
Figure 1-2. The printer's external parts

Roller unit:	holds the paper against the platen.
Release lever:	releases the platen. This lever must be back for single sheets, and forward for fanfold forms.
Top cover:	protects the print head and other internal parts.
Rear cover:	protects the tractor feed mechanism.
Entry slot:	for inserting single sheets of paper.
Control panel:	controls various printer functions.
Power switch:	turns power on and off.
Interface connector:	for connecting the computer to the printer.

SETTING UP

Place the printer in the desired location, and remove all packing material from inside the top 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 on the right-hand side of the printer. Rotate the knob on the shaft before pushing the knob fully into position.
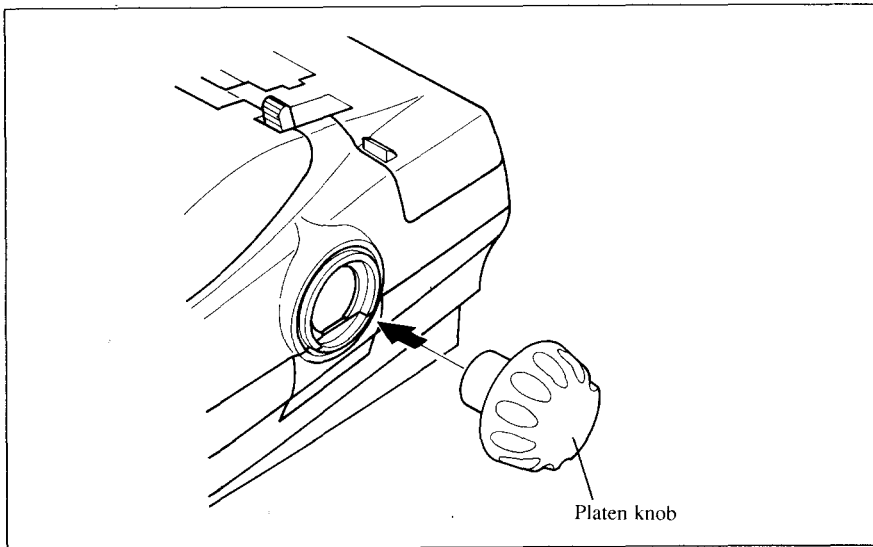
Figure 1-3. Mounting the platen knob

Install the ribbon cartridge and the roller unit

Remove the top cover by lifting up the front (using the two grips on either side), and pulling the cover towards you (see Figure 1-4). Now install the ribbon. (If you want to print with black only, install the monochrome ribbon cartridge, ZX9.)
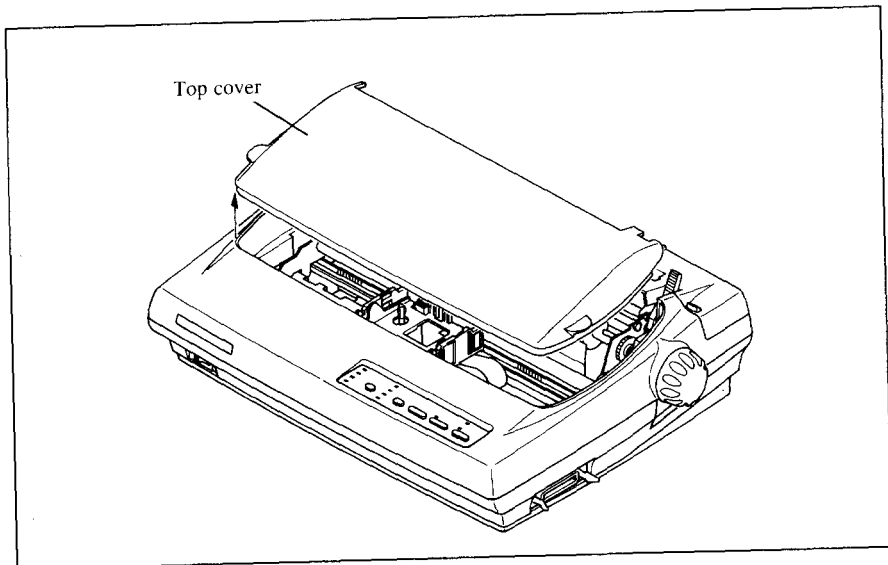
Figure 1-4. Removing the top cover

1. Turn the tension knob counterclockwise 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.
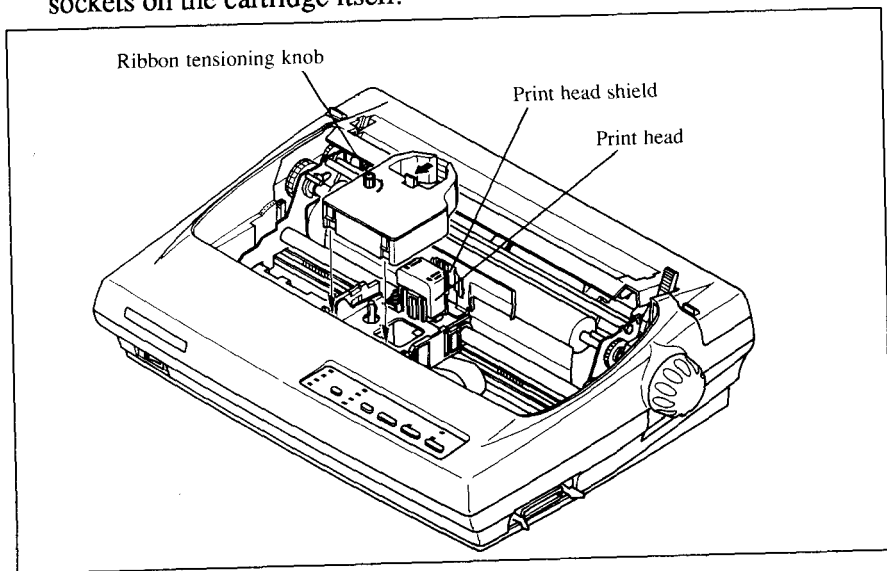
Figure 1-5. Installing the ribbon cartridge

3. The ribbon should pass between the print head and the print head shield (see Figure 1-6).
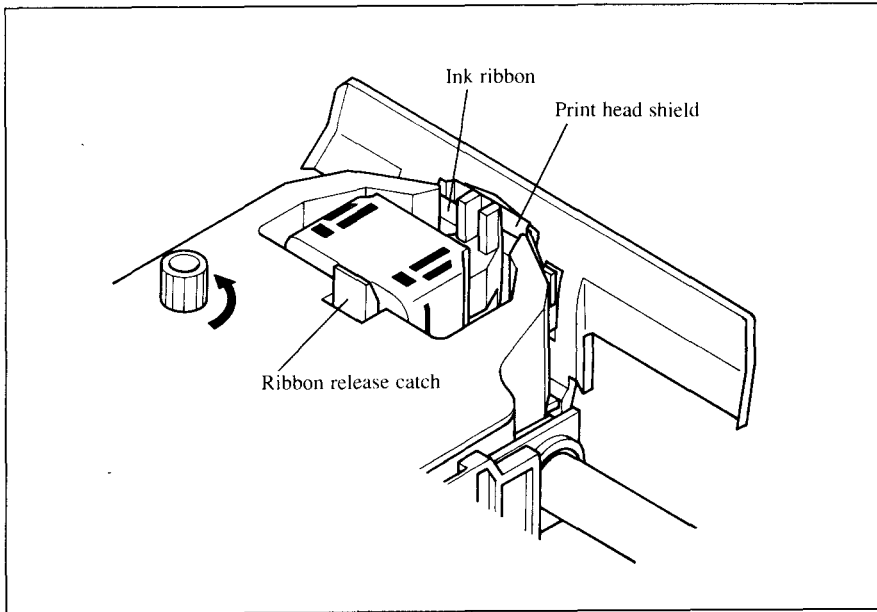
Figure 1-6. Pass the ribbon between the print head and print head shield

4. After you have installed the ribbon cartridge, install the roller unit.
5. Open the rear cover using the two grips on either side.
6. Gripping the lock levers on both sides of the roller unit, fit the mounting brackets onto the shaft inside of the printer mechanism. You will need to tilt the roller unit slightly backward.
7. Secure the roller unit firmly by lowering into position, as shown in Figure 1-7.
8. Close the rear cover.
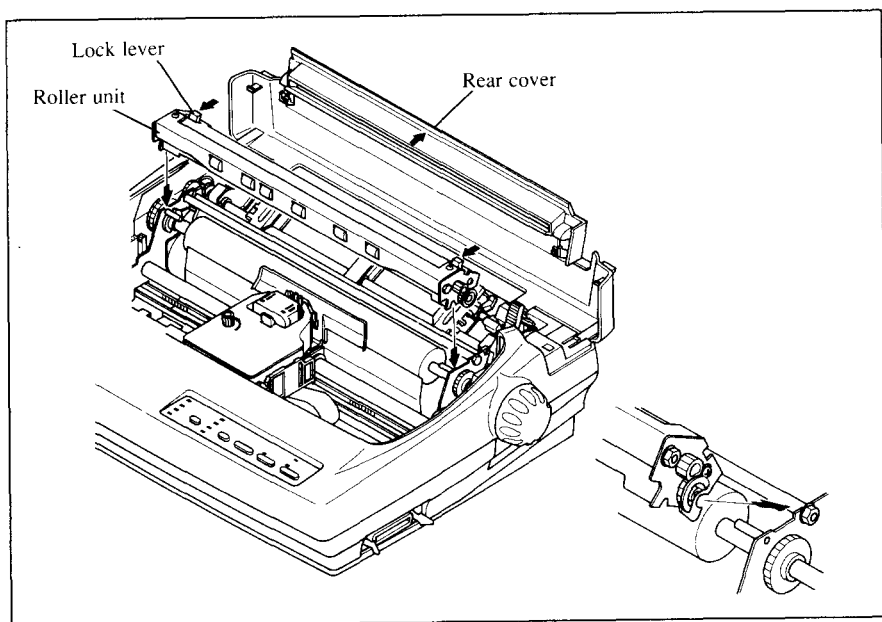
Figure 1-7. Install the roller unit onto the printer

To replace the top cover, insert the tabs into the slots on the printer case. Swing the front edge down to close the cover.

Leave the top 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.

NOTE: When you remove the color ribbon cartridge, press the ribbon release catch toward you with your index finger. Once the ribbon is free of the print head, the cartridge lifts out easily.

Connecting the printer to your computer

Connect the printer to your computer using a standard parallel interface cable. On a PC 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 8 should you need a cable for connecting to another computer.

If you need to connect to a serial port, use the optional Serial-Parallel converter, SPC-8K.
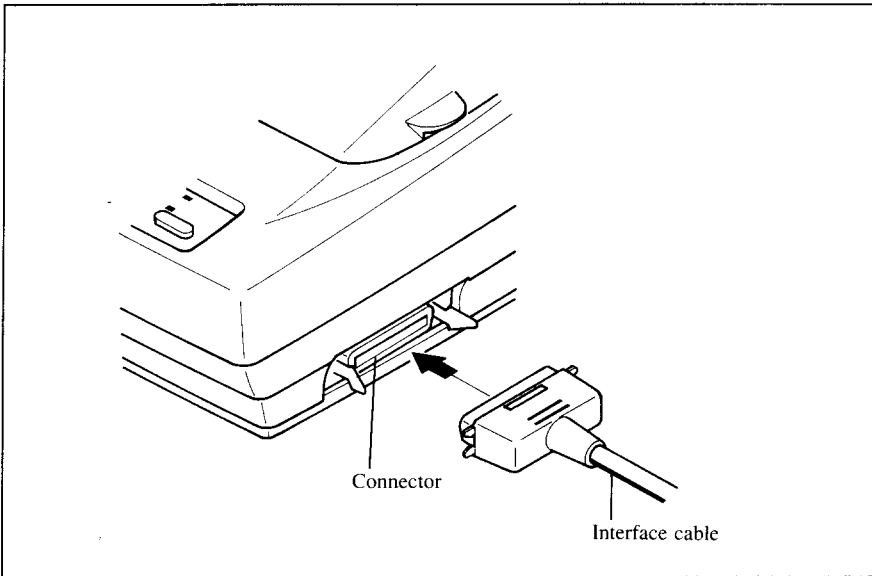
Figure 1-8. Connecting the interface cable

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.

LOADING SINGLE SHEETS

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

If you are using the optional automatic sheet feeder (SF-10DN), refer to the ASF instruction booklet.

Automatic loading

Single sheets can be loaded manually with the power off, or automatically with the power on. We will start the easy way with automatic loading.

1. Place the paper guide in position by inserting the tabs, located on the bottom of the assembly, into the slots on the rear cover of the printer.
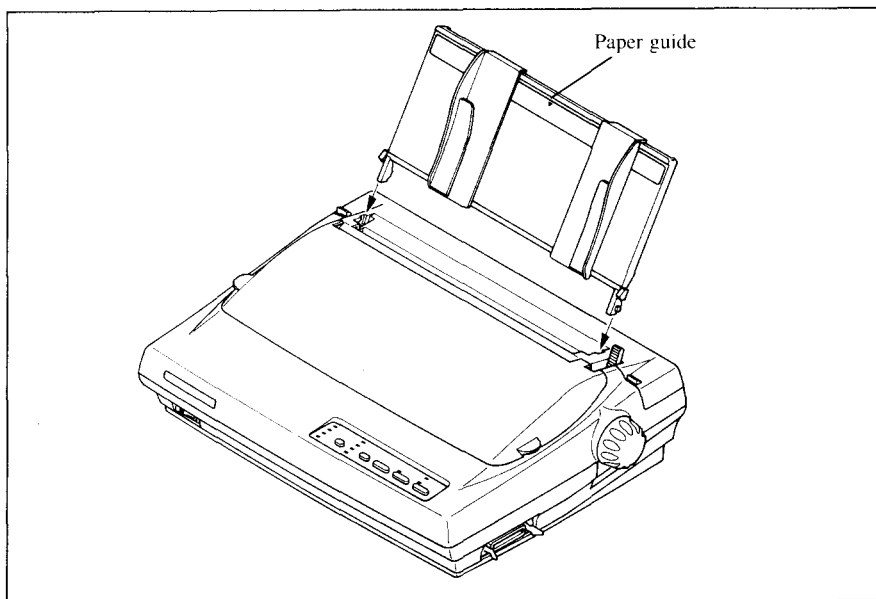
Figure 1-9. Mounting the paper guide for single sheets

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 orange POWER indicator will also flash to confirm this.

4. Make sure that the release lever is back.
   If fanfold paper is already mounted in the printer, press the ⟨ SET/EJECT PARK ⟩ button to park the paper in the off-line state, then move the release lever backwards.
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 by using the micro-feed function. (For details, refer to Chapter 2.)
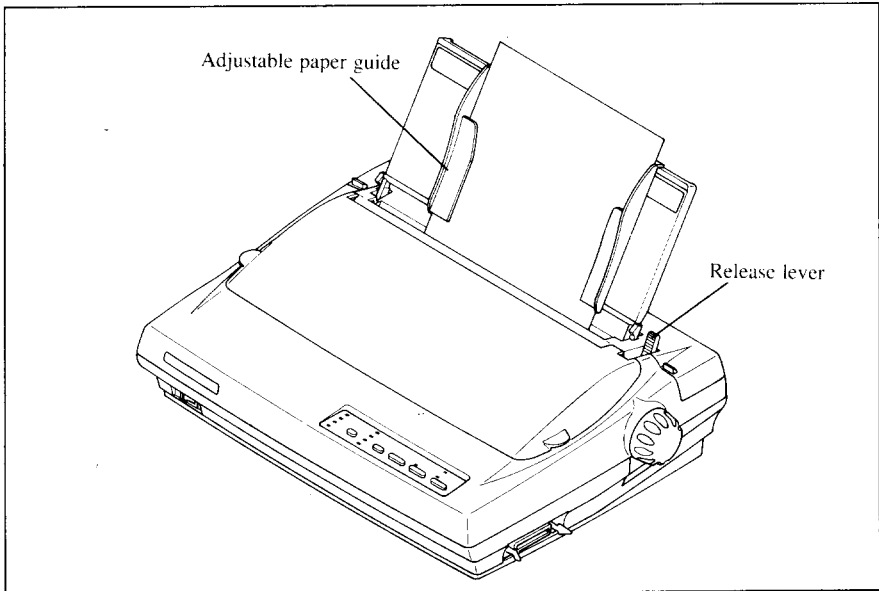
Figure 1-10. Loading a single sheet

Manual loading

It is also possible to load paper manually while the printer's power is off. The procedure is:

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.
2. Check that printer power is off and the release lever is back.
3. Adjust the paper guides to match the size of paper you will be using. Remember that printing will start some distance from the left-hand edge of the carriage.
4. 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.
5. Turn the platen knob clockwise until the front edge of the paper comes out from under the top cover.
6. If the paper is not straight, move the release lever forward, then straighten the paper by hand and move the release lever back.

LOADING AND PARKING 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". This printer accepts forms up to 10" wide. This section will take you through the procedures for loading, parking and unparking fanfold forms.

Loading the paper from the rear of the printer

You can load the fanfold paper either from the rear or from the bottom of the printer. If you are going to load the paper from the bottom, refer to the next section.

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 forward. 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. Remove the rear cover using the two grips on either side, and push backwards as in Figure 1-11.
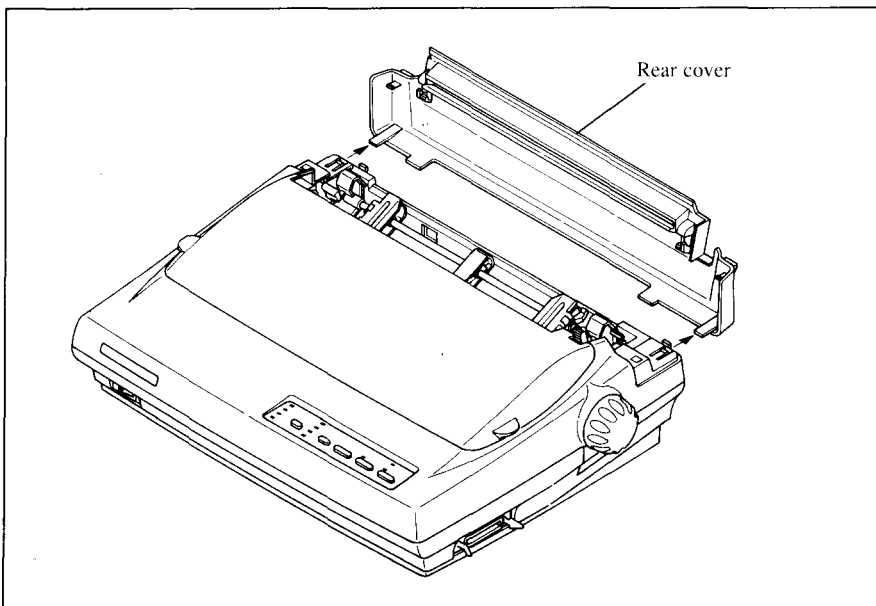
Figure 1-11. Removing the rear cover

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6. Move the tractor units downwards by gripping the positioning levers on both side of the tractor unit as shown in Figure 1-12.
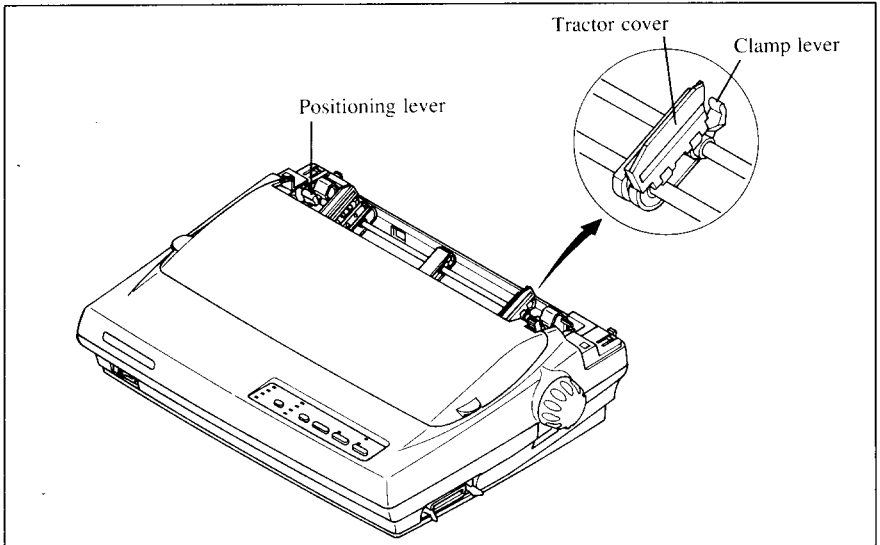
Figure 1-12. Move the tractor units downwards for loading the paper from the rear

7. With the tractor covers open, mount the paper by aligning holes with the pins on the tractor unit.
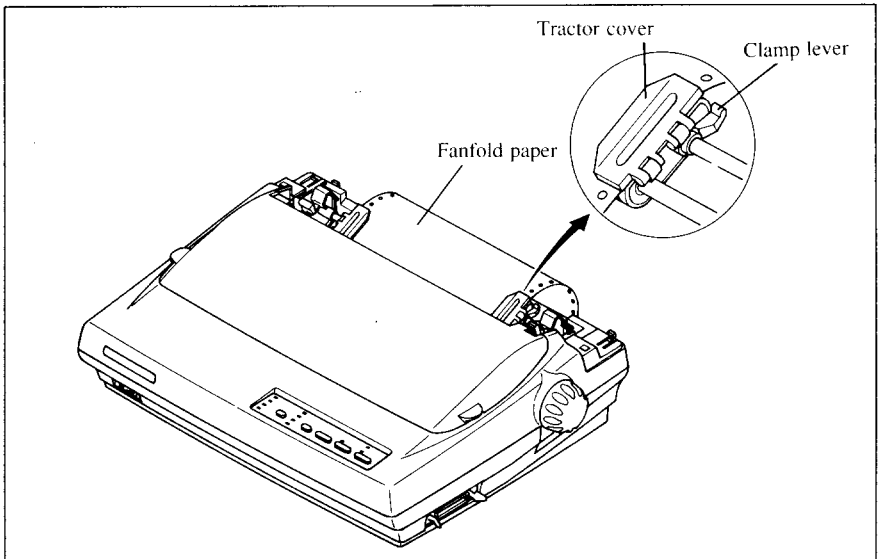
Figure 1-13. Mount the fanfold paper over the tractor units.

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.

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 orange POWER indicator will also flash 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 2.)

13. Replace the rear cover, and mount the paper guide in the horizontal position shown in Figure 1-14, so that it will separate the printed from the unprinted paper.
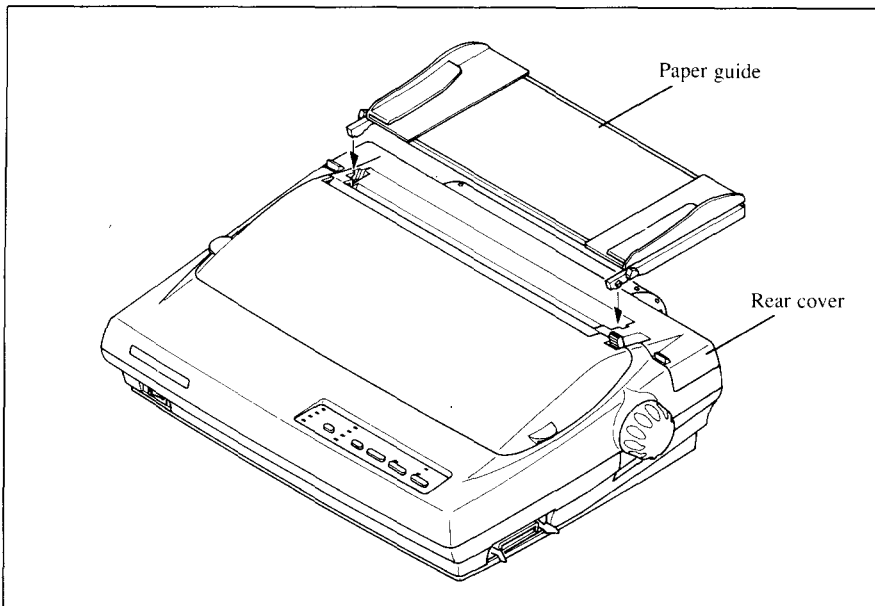
Figure 1-14. Mounting the paper guide for fanfold forms

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Loading the paper from the bottom of the printer

You can load the fanfold paper from the bottom of the printer with the following procedure.

1. Remove the top cover and the roller unit.
2. Open the rear cover using the two grips at the side, and push backwards.
3. Grip the positioning levers on both side of the tractor unit, and pull the unit upwards as shown in Figure 1-15.
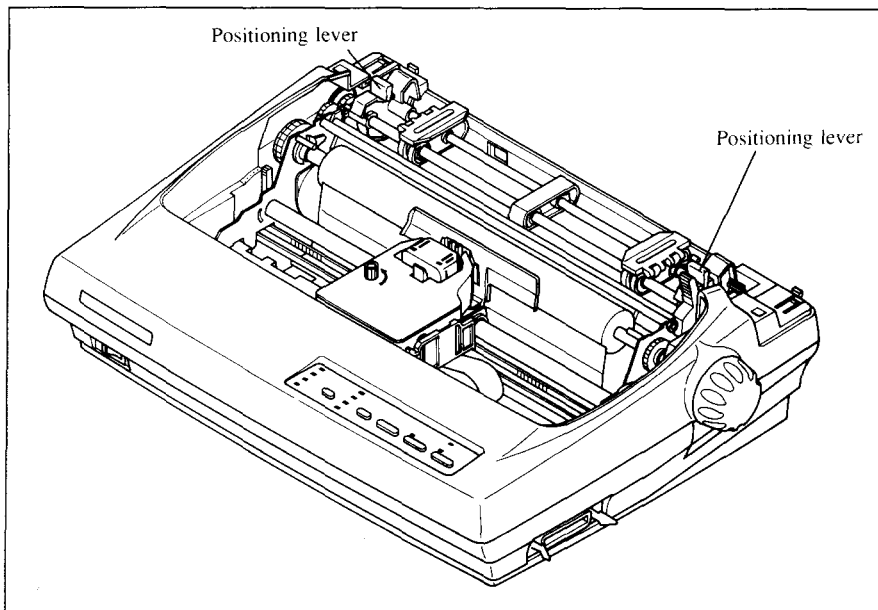
Figure 1-15. Pull up the tractor unit for bottom feeding

4. Place a stack of fanfold paper below the printer.
5. With the tractor covers open, mount the paper from the bottom of the printer, 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 lever is up, the unit is released, and when it is down, the unit is locked.
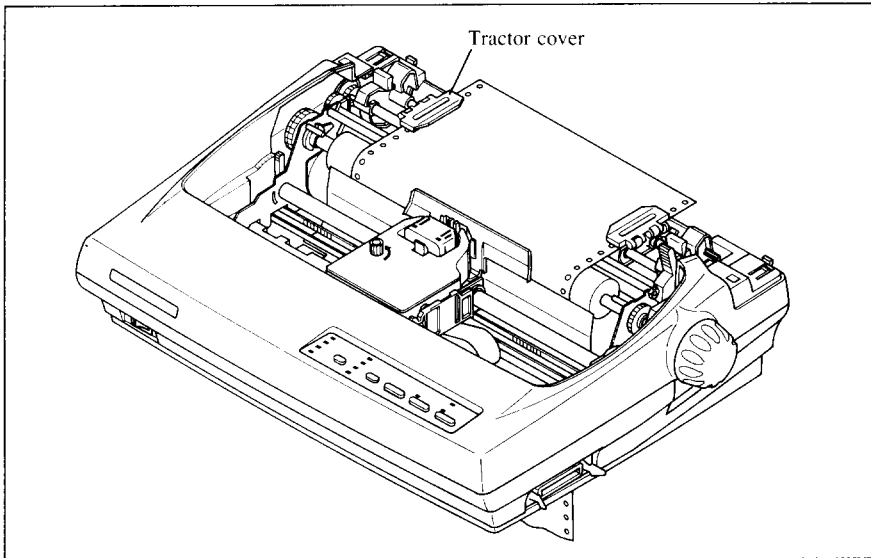
Figure 1-16. Mount the fanfold paper from the bottom of the printer.

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.

8. Remount the roller unit and replace the rear cover and the top cover.

Paper parking

After loading fanfold paper from the rear of the printer, 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 forward.

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 top cover. If necessary, press the ⟨PAPER FEED⟩ button to feed paper forward until a perforation is located just above the top 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 back.
6. Mount the paper guide in the upright position.

Now you can load single sheets either automatically or manually, as explained previously. The fanfold paper remains parked at the back of the printer.

NOTE: You cannot park the fanfold paper if you have loaded it from the bottom of the printer.

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 front.
4. Press the (SEL/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 MULTI-PART FORMS

You can print on continuous multi-part forms with the built-in tractor unit. You can use multi-part forms that have up to four parts including the original when the Multi-part mode is selected with the EDS setting. (For details, please refer to Chapter 3.)

It is recommended to use forms jointed by dotted or pasting under the normal office condition.

Multi-part forms should be pressure sensitive, and should not be used in the friction feed. (Bottom feed with the pull-tractor is recommended.)

NOTE: When printing continuous multi-part forms, care should be taken, as the edges of the paper might be damaged.
The tolerance between the dotted or pasted position and other positions must be less than 0.05 mm.

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, remove the top 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 five positions, and you can feel the lever clicking into each position. The second position from the rear is the one most commonly used for single sheets of paper. Try different positions until you get the best printing results. (Do not set the lever out of the marked positions.)
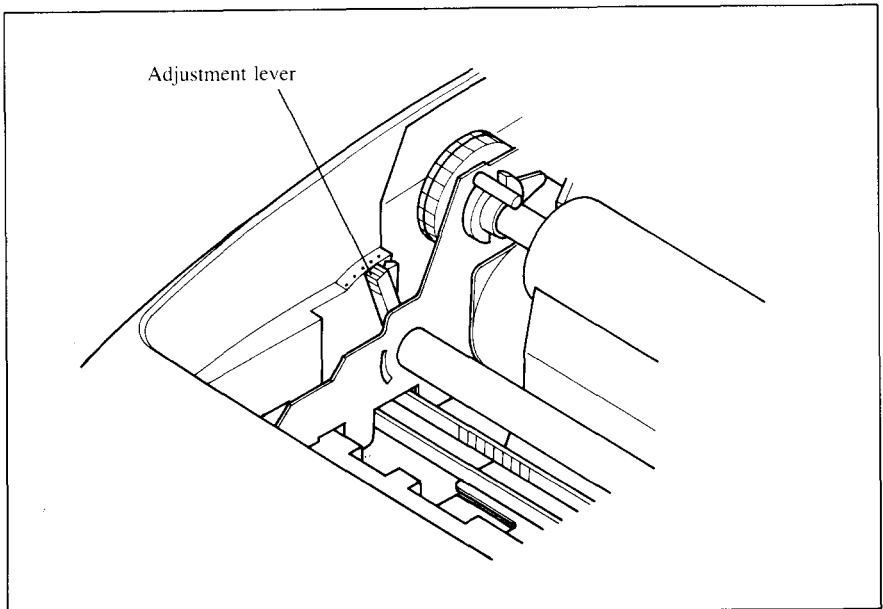
Adjustment lever

Figure 1-17. 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 ~ 82	0.07 ~ 0.10	2nd
	83 ~ 90	0.11 ~ 0.12	3rd
2-ply	40 ~ 58	0.12 ~ 0.16	3rd
3-ply	40 ~ 58	0.18 ~ 0.20	3rd
		0.21 ~ 0.25	4th
4-ply	40 ~ 58	0.24 ~ 0.26	4th
		0.27 ~ 0.30	5th

NOTE: Pressure sensitive paper is recommended for the multi-part paper. Multi-part mode is recommended when using the 4-ply paper. (Refer to Chapter 3.)

Chapter 2
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 five buttons on the control panel. From left to right they are, (FONT) and (PITCH) (smaller buttons), and (SELECT/PARK), (PAPER FEED), and (ON LINE) (larger buttons).

The following is a brief guide to the buttons and indicators on the control panel.
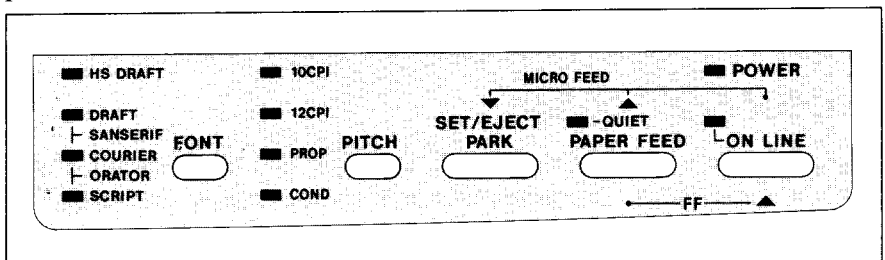
Figure 2-1. Control panel

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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 POWER indicator flashing. When you load paper, the POWER indicator stops flashing, and 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 using fanfold forms, you can hold the ⊂ ON LINE ⊃ button down for one second. In addition to going off-line, the printer also feeds the paper forward approximately two inches. 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 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 on and off. 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 forward for fanfold forms, pressing this button parks the forms.

If the release lever is back for 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:

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

FONT button

This button selects the font to be printed. Draft font is selected at power-up unless the default settings are changed. To change to HS Draft (High-Speed Draft) or one of the NLQ (Near Letter Quality) fonts, set the printer off-line, then press the (FONT) button repeatedly until the indicators beside the desired selection illuminate. The selections cycle in the following order:

Font	Indicator(s)
Draft	DRAFT
Sanserif	DRAFT, COURIER
Courier	COURIER
Orator	COURIER, SCRIPT
Script	SCRIPT
High-Speed Draft	HS DRAFT

The Orator font is unique in two ways. First, it is larger (higher) than the other fonts, which makes it a good choice for labels and other text requiring high visibility. You will need a little extra line spacing when Orator is used. Second, the Orator font prints small capitals in place of lower-case letters. The other fonts do not have this option. Lower case will always print as lower case.

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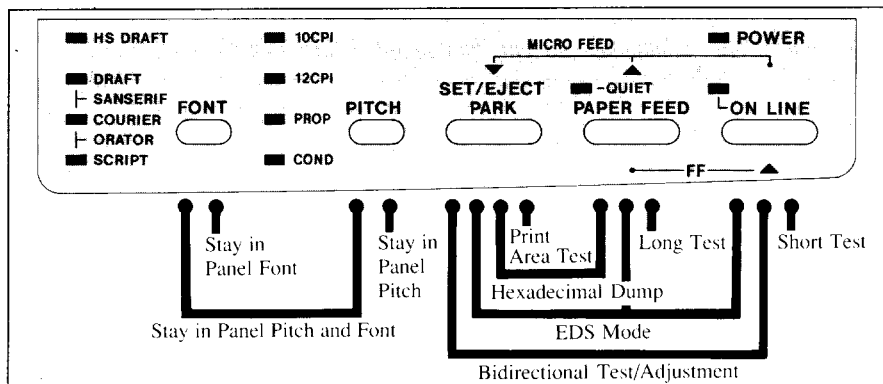
Figure 2-2. Power-up functions of control panel

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 2-3. (If the color ribbon is used, each line prints in a different color.)

Figure 2-3. 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 and the current EDS settings, 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.

```
*** VER X.X ***

CURRENT ELECTRONIC DIP SWITCH (EDS) SETTINGS

Bank       A        B        C        D
Switch 1 2 3 4   1 2 3 4   1 2 3 4   1 2 3 4
ON     * * * *   * * * *   * * * *   * * * *
OFF


EDS SETTINGS     ( Current settings : Emphasized )
Bank:Switch: Function         :  Set ON       :  Set OFF
----+------+----------------------+------------------+-----------------
  A  :  1  : Emulation            : STANDARD    : IBM
  A  :  2  : RAM Usage            : Input Buffer : Download
  A  :  3  : Auto-LF              : Disabled    : Enabled
  A  :  4  : ASF Setting          : Disabled    : Enabled
----+------+----------------------+------------------+-----------------
  B  :  1  : Multi-part mode      : Disabled    : Enabled
  B  :  2  : Paper-out Detector   : Enabled     : Disabled
  B  :  3  : Tear off             : Disabled    : Enabled
  B  :  4  : (Reserved)           : Leave ON    :
----+------+----------------------+------------------+-----------------
  C  : 1,2 : Print Mode           : 10cpi Draft      ON  ON
     :     :                      : 10cpi HS-Draft   ON  OFF
     :     :                      : 17cpi Draft      OFF ON
     :     :                      : 10cpi COURIER    OFF OFF
----+------+----------------------+------------------+-----------------
  C  : 3,4 : Page Length          : 11"  ON  ON  :  8"   OFF ON
     :     :                      : A4   ON  OFF : 12"   OFF OFF
----+------+----------------------+------------------+-----------------
  D  :  1  : Character Table (CT)              :
     :     :        STD   mode  : Graphics     : Italics
     :     :        IBM   mode  : IBM #2       : IBM #1
----+------+----------------------+------------------+-----------------
  D  : 2,3,4: IBM Code Page       (CT=IBM #1, #2, Graphics)
     :     :    #437   ON  ON  ON  :  #863    ON  ON  OFF
     :     :    #850   OFF ON  ON  :  #865    OFF ON  OFF
     :     :    #860   ON  OFF ON  :  Reserved ON  OFF OFF
     :     :    #861   OFF OFF ON  :  Reserved OFF OFF OFF
     :     :    +-------------------+-------------------
     :     : International Character Set (CT=Italics)
     :     :    U.S.A.   ON  ON  ON  :  Denmark-1 ON  ON  OFF
     :     :    France   OFF ON  ON  :  Sweden    OFF ON  OFF
     :     :    Germany  ON  OFF ON  :  Italy     ON  OFF OFF
     :     :    England  OFF OFF ON  :  Spain 1   OFF OFF OFF
----+------+----------------------+------------------+-----------------

 !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmno
pqrstuvwxyz{|}~
 !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmno
pqrstuvwxyz{|}~
 !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmno
pqrstuvwxyz{|}~
 !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmno
pqrstuvwxyz{|}~
 !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`ABCDEFGHIJKLMNO
PQRSTUVWXYZ{|}~
 !"#$*°'            ''6789:;<=>?@ABCDEFGHIJKLMNOPO°`           `abcdefghijklmno
```

Figure 2-4. Long self-test

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

Print area test mode

By holding the (SET/EJECT PARK) button down during power-up, the printer will enter the print area test mode. This way, you can find out 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.

Stay in Panel Pitch

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.

Stay in Panel Font

By holding the (FONT) button during power-up, 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 font, then return to the on-line state and begin printing. The selected font will not be changed by any commands your software may issue.

Stay in Panel Pitch and Font

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) 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 FOR I=0 TO 255
20 LPRINT CHR$(I);
30 NEXT I
40 LPRINT
50 END
```

If your system passes the codes directly to the printer without changing them, you will get a printout like Figure 2-5.

Figure 2-5. Sample hexadecimal dump

Most BASICs, however, are not quite that straightforward. For example, the IBM-PC will give you a printout similar to Figure 2-6.

```
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 2-6. 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 20 in the preceding program and adding the coding shown below.

Coding for IBM-PC with monochrome display:

```
20 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:

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

SWITCH COMBINATION FUNCTIONS

Several additional functions can be achieved by pressing the control panel buttons in combinations.
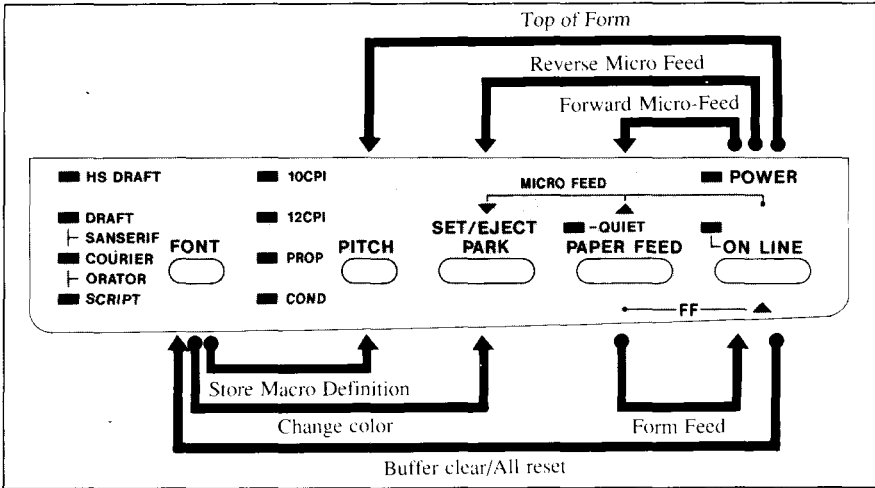
Figure 2-7. Switch combination functions of control panel

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 and cause a jam.

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.
   The line on the card holder helps you to align the baseline of characters to be printed.
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 below.

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 one second you will hear a beep tone signaling that the buffer has been cleared.
   If you hold these buttons 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.

NOTE: If you are using the SPC-8K, Serial-Parallel Converter, reset the converter by pressing the red Clear button on it before you reset the printer.

Selecting the print color

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

1. Press the `ON LINE` button to set the printer off-line.
2. Press the `FONT` button and hold it down.
3. While holding the `FONT` button, press the `SELECT/PARK` button.
   Each time you press the `SELECT/PARK` button, one of the indicators of FONT or PITCH will blink to show the current color as shown below.

Color	Indicator	Color	Indicator
Black	HS DRAFT	Yellow	10CPI
Magenta	DRAFT	Orange	12CPI
Cyan	COURIER	Green	PROP
Violet	SCRIPT		

4. 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.

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 you hear two beep tones.
4. Release both buttons at the same time after the two beep tones to store the current setting.
   If you release these buttons after 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.

MEMO

chapter 3

DEFAULT SETTINGS

Most printers use a bank of DIP (Dual In-line Package) switches inside the printer to achieve various functions. However, this printer can change the power-up default settings by using the Electronic DIP Switch (EDS) mode.

This chapter explains how to use the EDS mode.

HOW TO SET THE EDS MODE

The EDS mode has 16 kinds of functions you can set as the power-on default.

To enter the EDS mode, turn the printer on while simultaneously holding the (SET/EJECT PARK) , (PAPER FEED) and (ON LINE) buttons.

In EDS mode, the indicators and the buttons on the control panel are used as shown below in Figure 3-1.

- Use the (FONT) button to select the Bank Number. One of the FONT indi-cators will illuminate to show the selected Bank Number.

- Use the (PITCH) button to select the Switch Number. One of the PITCH in-dicators will illuminate to show the selected Switch Number.

- The QUIET indicator shows the current setting.
  If you want to set it ON, press the (SET/EJECT PARK) button.

- Press the (PAPER FEED) button to print out the current settings.

- Press the (ON LINE) button to save the new settings and to exit the EDS mode.
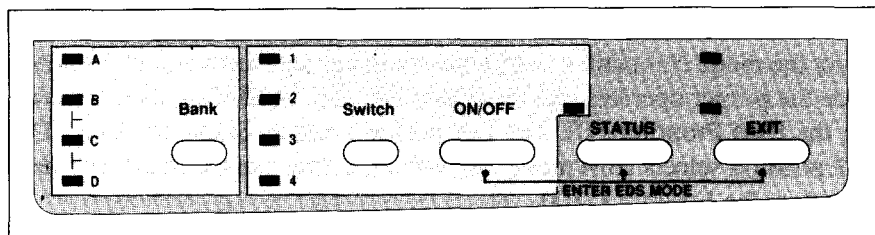
Figure 3-1. Button and indicator functions in the EDS mode

FUNCTIONS OF THE EDS SETTINGS

The printer is factory-set with all EDS switches in the ON position. These are the standard settings. By changing the settings, you can alter various printer functions to match your requirements. The following questions will help you choose the proper settings.

Number	Function	ON	OFF
A-1	Emulation	STANDARD	IBM
A-2	RAM Usage	Input Buffer	Download
A-3	Auto-LF	Disabled	Enabled
A-4	ASF Setting	Disabled	Enabled
B-1	Multi-part mode	Disabled	Enabled
B-2	Paper-out Detector	Enabled	Disabled
B-3	Tear off	Disabled	Enabled
B-4	(Reserved)	Leave ON	
C-1	Print Mode	(See below)	
C-2			
C-3	Page Length	(See below)	
C-4			
D-1	Character Table		
	(Standard mode)	Graphics	Italics
	(IBM mode)	Set #2	Set #1
D-2	IBM Code page or		
D-3	International Character	(See below)	
D-4	Set		

Switch A-1: Do you want to use the printer in Standard mode or IBM mode?

Select the mode compatible with your computer and software. In Standard mode the printer operates like the Epson FX-850. In IBM mode it operates like the IBM Proprinter III. The ON position selects Standard mode. The OFF position selects IBM mode. For color printing use the Standard mode and select the Epson EX-800.

Switch A-2: Does your software download characters to the printer?

In order to download characters this switch must be in the OFF position. The printer then uses its RAM memory for storing character patterns and provides only a one-line print buffer. If you leave this switch ON, the printer uses its RAM memory as an input buffer, allowing the computer to send data faster than the printer prints.

Switch A-3: Do you want an automatic line feed?

If you leave this switch in the ON position, a separate line-feed code is required from your computer to obtain a line feed.

If you move this switch to the OFF position, 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 ON.

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

Switch A-4: Are you going to use the automatic sheet feeder (ASF)?

In order to use the automatic sheet feeder SF-10DN, move this switch to the OFF position. Otherwise leave it ON.

Switch B-1: Are you going to print on multi-part paper?

You can use up to 3-ply paper when this switch is ON. If you want to print on 4-ply paper, set this switch to the OFF position.

Switch B-2: Do you want the printer to stop printing at the end of the paper, or to keep printing?

When this switch is OFF the printer ignores the paper-out detector and prints down to (and beyond) the bottom edge. Otherwise leave it ON.

Switch B-3: Do you want to advance paper automatically at the end of printing?

You can select the Tear Off function with this switch OFF.

When using fanfold paper, the Tear Off function allows you to tear off one sheet of paper without fully advancing the following sheet.

Switch B-4: This switch is used for technical purpose only. Leave this switch ON.

Switches C-1 and C-2: Which print mode do you want to set?

These switches select the default print pitch and the fonts as shown below.

Print Mode	C-1	C-2
10CPI DRAFT	ON	ON
10CPI HS DRAFT	ON	OFF
17CPI DRAFT	OFF	ON
10CPI COURIER	OFF	OFF

NOTE: If you change these switches after you have stored the macro, these settings will override the macro setting.

Switches C-3 and C-4: What is the page length of your paper?

Leave these switches ON if you will be using 11-inch forms. You will need to change the switches if you will be using a different page length as shown below:

Page Length	C-3	C-4
11 inches	ON	ON
A4 sized paper	ON	OFF
8 inches	OFF	ON
12 inches	OFF	OFF

Switch D-1: The action of this switch depends on the mode chosen with switch A-1.

If you selected Standard mode, do you want italic or graphic characters?

Move this switch OFF to print italics in the Standard character set. If you leave this switch in the ON position, in place of italics you will get the graphic characters, international characters, and mathematical symbols of IBM character set #2. See Chapter 9, character codes 128 to 254.

If you selected IBM mode, do you want IBM character set #1 or #2?

ON selects character set #2, which is for computers with an 8-bit interface (the most common kind). OFF selects character set #1, for computers with a 7-bit interface.

Switches D-2 to D-4: Do you want an international character set or IBM code page?

International character sets differ in their assignment of 12 character codes in the Standard Italic character set. See the character tables at the back of this manual. With these switches you can select one of eight character sets as follows:

Country	D-2	D-3	D-4	Country	D-2	D-3	D-4
U.S.A.	ON	ON	ON	Denmark I	ON	ON	OFF
France	OFF	ON	ON	Sweden	OFF	ON	OFF
Germany	ON	OFF	ON	Italy	ON	OFF	OFF
England	OFF	OFF	ON	Spain I	OFF	OFF	OFF

Except in the Standard Italic character set, these switches select the default character code page as shown below:

IBM Code Page	D-2	D-3	D-4	IBM Code Page	D-2	D-3	D-4
#437 U.S.A.	ON	ON	ON	#863 Canadian French	ON	ON	OFF
#850 Multi-lingual	OFF	ON	ON	#865 Nordic	OFF	ON	OFF
#860 Portuguese	ON	OFF	ON	(Reserved)	ON	OFF	OFF
#861 Icelandic	OFF	OFF	ON	(Reserved)	OFF	OFF	OFF

BIDIRECTIONAL TEST/ADJUSTMENT MODE

This mode is used to adjust the alignment of the print head on successive bidirectional passes. After a period of some months, your printer may work itself out of alignment on left and right printing passes. This will be most evident in NLQ printing. This mode will probably be used very rarely.

1. Turn the printer off and then turn it on again while holding down the
(SELECT PARK) and (ON LINE) buttons. The printer will then print something like the following:

```
*** DOT ADJUSTMENT SETTING ***

CURRENT    0  :  ///////////////////////////////////////////////////////
```

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 (SELECT PARK) and (PAPER FEED) buttons. The (SELECT 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 ***

(SELECT PARK)→  CURRENT    0  :  ///////////////////////////////////////////////////////
(PAPER FEED)→   CURRENT   -1  :  ///////////////////////////////////////////////////////
                CURRENT    0  :  ///////////////////////////////////////////////////////
```

4. When the two passes are aligned with each other to form one continuous line, the bidirectional alignment test is completed.
5. To save the corrected value and to exit from this mode, press the (PITCH) button.

```
*** DOT ADJUSTMENT SETTING ***

                CURRENT    0  :  ///////////////////////////////////////////////////////
                CURRENT   -1  :  ///////////////////////////////////////////////////////
(PITCH)─────    CURRENT    0  :  ///////////////////////////////////////////////////////
                *** END ***
```

NOTE: If you want to print NLQ characters unidirectionally, press the (PAPER FEED) button several times until the "UNI" message appears.

Chapter 4

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 FX-850 or EX-800 for color print.

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 EDS switch A-1. When ON, the printer will be in standard mode, and when OFF, the printer will be in IBM mode (see Chapter 3). It is not possible to change the emulation mode 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 be categorized by function. 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 (EDS switch A-1 on)
   IBM IBM mode (EDS switch A-1 off)
   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*.

FONT CONTROL COMMANDS

Select draft quality characters

Mode	ASCII	Decimal	Hexadecimal
Both	"(" "(" "F" ")" ")" "9"	40 40 70 41 41 57	28 28 46 29 29 39
Std.	`<ESC> "x" "0"`	27 120 48	1B 78 30
	`<ESC> "x" <0>`	27 120 0	1B 78 00
IBM	`<ESC> "I" "0"`	27 73 48	1B 49 30
	`<ESC> "I" <0>`	27 73 0	1B 49 00

Changes from near letter quality to draft quality. Ignored if the (FONT) button was pressed during power-up.

Select draft elite characters

Mode	ASCII	Decimal	Hexadecimal
IBM	`<ESC> "I" "1"`	27 73 49	1B 49 31
	`<ESC> "I" <1>`	27 73 1	1B 49 01

Changes to draft quality characters with elite pitch (12 cpi). Ignored if the (FONT) or (PITCH) button was pressed 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 50	1B 49 32
	`<ESC> "I" <2>`	27 73 2	1B 49 02
	`<ESC> "I" "3"`	27 73 51	1B 49 33
	`<ESC> "I" <3>`	27 73 3	1B 49 03

Changes from draft quality to near letter quality. The initial NLQ font is Courier unless a different font has been selected by a preceding command. Ignored if the (FONT) button was pressed 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) button was pressed during power-up.

n	Font
0	Courier (initial value)
1	Sanserif
4	Script
7	Orator

Select Courier characters

Mode	ASCII	Decimal	Hexadecimal
Both	"(" "(" "F" ")" ")" "0"	40 40 70 41 41 48	28 28 46 29 29 30

Changes to the Courier NLQ font. Ignored if the (FONT) button was pressed during power-up.

Select Sanserif characters

Mode	ASCII	Decimal	Hexadecimal
Both	"(" "(" "F" ")" ")" "1"	40 40 70 41 41 49	28 28 46 29 29 31

Changes to the Sanserif NLQ font. Ignored if the (FONT) button was pressed during power-up.

Select Script characters

Mode	ASCII	Decimal	Hexadecimal
Both	"(" "(" "F" ")" ")" "4"	40 40 70 41 41 52	28 28 46 29 29 34

Changes to the Script NLQ font. Ignored if the (FONT) button was pressed during power-on.

Select Orator characters

Mode	ASCII						Decimal	Hexadecimal
Both	"("	"("	"F"	")"	")"	"7"	40 40 70 41 41 55	28 28 46 29 29 37

Changes to the Orator NLQ font. Ignored if the (FONT) button was pressed during power-up.

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) button was pressed during power up.

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 draft 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.

Double-strike cannot be used with superscripts or subscripts.

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 if EDS switch D-1 is OFF.

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.

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

The first eight of these character sets (from U.S.A. to Spain I) can be selected as power-up defaults by EDS switches D-2 to D-4.

Select IBM code page

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

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

n1	*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

These code pages can be selected as power-up defaults by EDS switches D-2 to D-4.

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> "^"	27 94	1B 5E

This command operates like <ESC> "\\" except that it remains in effect for only one character.

Select slash zero

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

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

Select normal zero

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

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

CHARACTER SIZE AND PITCH COMMANDS

Pica pitch

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

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

Condensed printing

Mode	ASCII	Decimal	Hexadecimal
Both	<SI>	15	0F
	<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) button was pressed 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) button was pressed 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
	<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) button was pressed 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) button was pressed 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.

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

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

[*] Ignored if the (PITCH) button was pressed during power-up.

Increase character spacing

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

Increases the space between characters by $n/240$ inches, 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" ")" ")" n	40 40 83 41 41 n	28 28 53 29 29 n

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

n	Character width	Character height
0	Single width	Single height
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 height.

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 printing modes.

Return to normal height

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

Terminates double-height printing and prints subsequent characters at normal height. Resumes super/subscript and condensed printing if these modes were in effect before double height was selected.

Select character height, width, and line spacing

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "[" "@" <4> <0> <0> <0> *n* *m*	27 91 64 4 0 0 0 *n* *m*	1B 5B 40 04 00 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 height.

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 does the same except that (1) the new line spacing does not take effect until the next <ESC> "2" command, and (2) if $n = 0$, the <ESC> "A" command is ignored.

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 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 (EDS switch A-4 is OFF), 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 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 EDS switch B-2.

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 EDS switch B-2.

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 2 and 127.

Set vertical tab stops in channel

Mode	ASCII	Decimal	Hexadecimal
Std.	<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:

Pica	$0 \leq n \leq 76$
Elite	$0 \leq n \leq 91$
Condensed pica	$0 \leq n \leq 130$
Condensed elite	$0 \leq n \leq 152$
Expanded pica	$0 \leq n \leq 38$
Expanded elite	$0 \leq n \leq 45$
Expanded condensed pica	$0 \leq n \leq 64$
Expanded condensed elite	$0 \leq n \leq 76$

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:

Pica	$4 \leq n \leq 80$
Elite	$5 \leq n \leq 96$
Condensed pica	$7 \leq n \leq 137$
Condensed elite	$8 \leq n \leq 160$
Expanded pica	$2 \leq n \leq 40$
Expanded elite	$3 \leq n \leq 48$
Expanded condensed pica	$4 \leq n \leq 68$
Expanded condensed elite	$4 \leq n \leq 80$

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 EDS switch A-3 is OFF, 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 EDS switch A-3.

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 EDS switch A-3.

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 stops 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 (maximum 8 inches). Ignored if the resulting position is beyond the right or left margin. The formulas for the distance and direction are as follows: If *n2* is between 0 and 63, the print head moves right by $(n1 + n2 \times 256)/120$ inches.

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 $(n1 + n2 \times 256)/60$ inches from the left margin on the current line. Ignored if this position is beyond the right margin. The maximum position is 8 inches.

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 8-bit graphics

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

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

Print double-density 8-bit graphics

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

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

Print double-density, double-speed 8-bit graphics

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

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

Print quadruple-density 8-bit 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 (maxi-mum 1920 dots wide), 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> "*".

Print 9-pin graphics

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 graphics image is 9 dots high and *n1* + *n2* × 256 dots wide. Maximum width is 8 inches. Dots beyond the right margin are ignores. *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 × (*n1* + *n2* × 256). At the end of bit-image printing the printer returns automatically to character mode.

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)

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. EDS switch A-2 must be OFF; otherwise RAM is used as an input buffer, not for downloading characters, and this command is ignored. Draft mode must be selected before this command is executed.

n1 is the character code of the first character defined and *n2* is the character code of the last character defined. *n1* must be equal to or less than *n2*. Use of character codes 32 (space) and 127 (delete code) should be avoided if possible.

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 1 if the character is an ascender (positioned entirely above the baseline) or 0 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 MSB being the top dot and the LSB the bottom dot. These correspond to pins 1 to 8 or 2 to 9 of the print head, depending on whether the character is an ascender or descender.

For further details, please refer to the Chapter 5.

Define NLQ download characters

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "&" <0> *n1* *n2* *a0* *a1* *a2* *m1* *m2* ... *m69*	27 38 0 *n1* *n2* *a0* *a1* *a2* *m1* *m2* ...*m69*	1B 26 00 *n1* *n2* *a0* *a1* *a2* *m1* *m2* ...*m69*

Defines one or more new NLQ characters and stores them in RAM for later use. EDS switch A-2 must be OFF. NLQ mode must be selected before this command is executed. The parameters are different from the draft character command. $a0$ specifies the left space, $a1$ specifies the character width, and $a2$ specifies the right space.

The dot density is doubled in each direction, so each character consists of 18 dots vertically and 23 dots horizontally and requires 69 data bytes. Since the vertical definition of the character is 18 dots, each byte represents a third of vertical definition.

For details, please refer to Chapter 5.

Define draft download characters

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "=" *n1* *n2* <DC4> *a0* *a1* *a2* *m1* *m2* ... *m11*	27 61 *n1* *n2* 20 *a0* *a1* *a2* *m1* *m2* ... *m11*	1B 3D *n1* *n2* 14 *a0* *a1* *a2* *m1* *m2* ... *m11*

Defines one or more new draft characters and stores them in RAM for later use. Draft mode must be selected before this command is executed. $n1$ and $n2$ give the number of bytes of character data that will follow. $a0$ is the character code of the first character defined. $a1$ and $a2$ are attributes bytes. $m1$ to $m11$ are the character data, and are the same as in <ESC> "&". The attribute byte $a1$ 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 $a2$ 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. This command is ignored when EDS switch A-2 is ON.

Define NLQ download characters

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "=" $n1$ $n2$ <NAK> $a0$ $a1$ $a2$ $m1$ $m2$ ... $m46$	27 61 $n1$ $n2$ 21 $a0$ $a1$ $a2$ $m1$ $m2$ ... $m46$	1B 3D $n1$ $n2$ 15 $a0$ $a1$ $a2$ $m1$ $m2$ ... $m46$

Defines one or more new NLQ characters and stores them in RAM for later use. EDS switch A-2 must be OFF. NLQ mode must be selected before this command is executed. The parameters are the same as for the draft character 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.

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 EDS switch A-2 is ON.

n	Character set	n	Character set
0	Courier	4	Script
1	Sanserif	7	Orator

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 EDS switch A-2 is ON.

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 download character set

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "I" "4"	27 73 52	1B 49 34
	<ESC> "I" <4>	27 73 4	1B 49 04

Selects the download character set and draft quality. Ignored if the (FONT) button was pressed during power-up or if EDS switch A-2 is ON.

Select draft elite download character set

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "I" "5"	27 73 53	1B 49 35
	<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) button was pressed during power-up or if EDS switch A-2 is ON.

Select NLQ download character set

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "I" "7"	27 73 55	1B 49 37
	<ESC> "I" <7>	27 73 7	1B 49 07

Selects the NLQ download character set. Ignored if the (FONT) button was pressed during power-up or if EDS switch A-2 is ON.

Select NLQ italic download character set

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

Selects the NLQ download character set and prints them with italic style. Ignored if the (FONT) button was pressed during power-up or if EDS switch A-2 is ON.

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 EDS switch A-2 is ON.

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	Magenta	5	Orange
2	Cyan	6	Green
3	Violet		

Select black

Mode	ASCII	Decimal	Hexadecimal
Both	"(" "(" "C" ")" ")" "0"	40 40 67 41 41 48	28 28 43 29 29 30

Changes the print color to Black. Ignored if the color ribbon is not installed.

Select magenta

Mode	ASCII	Decimal	Hexadecimal
Both	"(" "(" "C" ")" ")" "1"	40 40 67 41 41 49	28 28 43 29 29 31

Changes the print color to Magenta. Ignored if the color ribbon is not installed.

Select cyan

Mode	ASCII						Decimal	Hexadecimal
Both	"("	"("	"C"	")"	")"	"2"	40 40 67 41 41 50	28 28 43 29 29 32

Changes the print color to Cyan. Ignored if the color ribbon is not installed.

Select violet

Mode	ASCII						Decimal	Hexadecimal
Both	"("	"("	"C"	")"	")"	"3"	40 40 67 41 41 51	28 28 43 29 29 33

Changes the print color to Violet. Ignored if the color ribbon is not installed.

Select yellow

Mode	ASCII						Decimal	Hexadecimal
Both	"("	"("	"C"	")"	")"	"4"	40 40 67 41 41 52	28 28 43 29 29 34

Changes the print color to Yellow. Ignored if the color ribbon is not installed.

Select orange

Mode	ASCII						Decimal	Hexadecimal
Both	"("	"("	"C"	")"	")"	"5"	40 40 67 41 41 53	28 28 43 29 29 35

Changes the print color to Orange. Ignored if the color ribbon is not installed.

Select green

Mode	ASCII						Decimal	Hexadecimal
Both	"("	"("	"C"	")"	")"	"6"	40 40 67 41 41 54	28 28 43 29 29 36

Changes the print color to Green. Ignored if the color ribbon is not installed.

OTHER PRINTER CONTROL 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.

Quiet print

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "s" "1"	27 115 49	1B 73 31
	<ESC> "s" <1>	27 115 1	1B 73 01

Selects the quiet print mode, in which the printer prints each line in two passes to reduce the sound of printing. You can also set the quiet mode with the control panel button.

Cancel quiet print

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "s" "0"	27 115 48	1B 73 30
	<ESC> "s" <0>	27 115 0	1B 73 00

Cancels the quiet print mode, and resumes normal printing.
You can also cancel the quiet mode with the control panel button.

Set printer off-line

Mode	ASCII	Decimal	Hexadecimal
Std.	<DC3>	19	13
IBM	<ESC> "Q" <3>	27 81 3	1B 51 03

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

Set printer on-line

Mode	ASCII	Decimal	Hexadecimal
Both	<DC1>	17	11

Returns the printer to the 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's beeper.

Bidirectional 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 bidirectional mode, which is faster than unidirectional printing.

Unidirectional 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 unidirectionally, ensuring maximum vertical alignment precision.

One-line unidirectional 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 bidirectional 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 EDS switch A-4 is ON (ASF inactive).

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 EDS switch A-4 is ON (ASF inactive).

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 EDS switch A-4 is ON (ASF inactive).

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 between 1 and 15. Ignored if EDS switch A-4 is ON (ASF inactive).

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.

MEMO

Chapter 5
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 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 5-1.
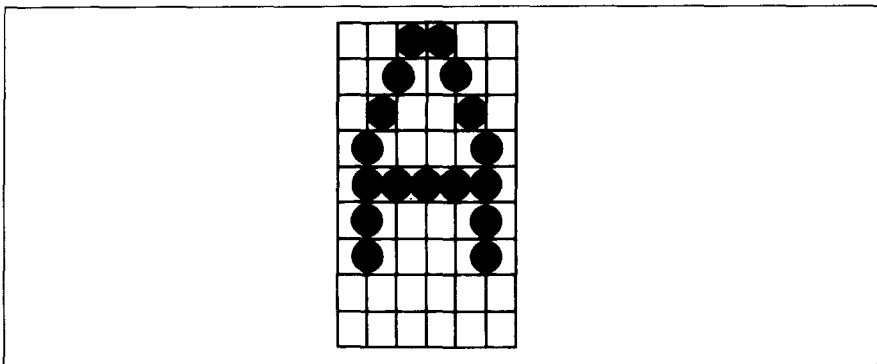
Figure 5-1. Dots can be inside boxes or straddle the vertical lines of the grid

- 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 5-2 to help design your new characters. We will use a tiny representation of a car-shaped symbol for our example.
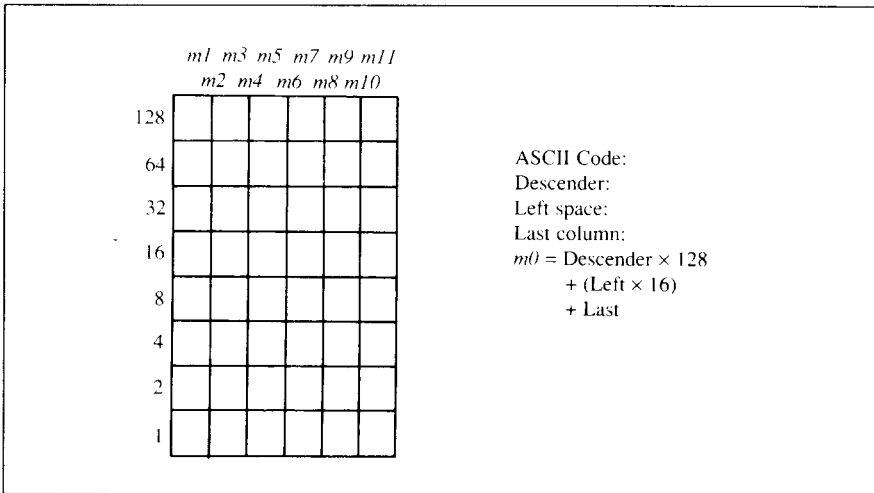
Figure 5-2. Use this grid (or one similar to it) to define your own draft characters

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 not be a "descender", so a figure "1" is written next to Descender on the grid. If your character is 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 5-3, 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.
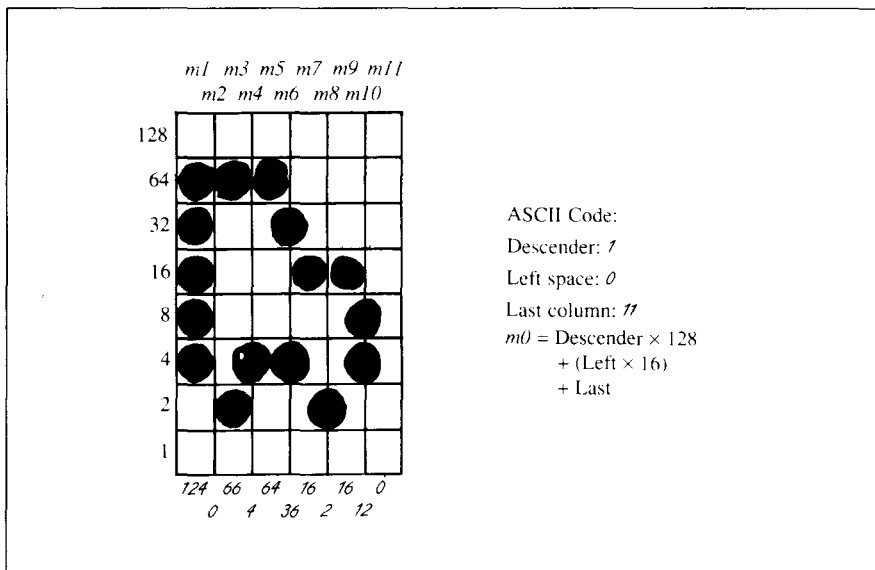
Figure 5-3. Add the values of the dots in each column and write the sum of each column at the bottom

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

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

U.S. EXPORTS

AUTOS
CHEMICALS
GUNS

MILLIONS OF DOLLARS
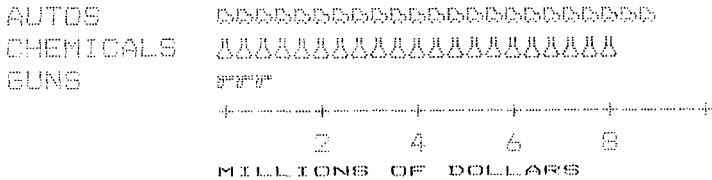
DEFINING YOUR OWN NLQ CHARACTERS

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 specifies the left space and the character width. In the NLQ mode, ther are
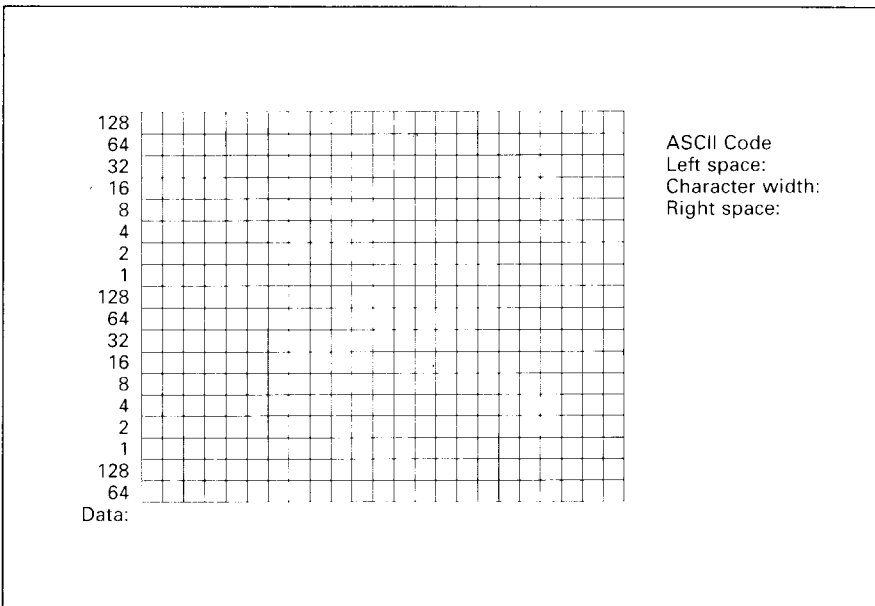
Figure 5-4. Use this grid (or one similar to it) to define your own NLQ characters with the Standard mode

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 5-4 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 5-5.

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.
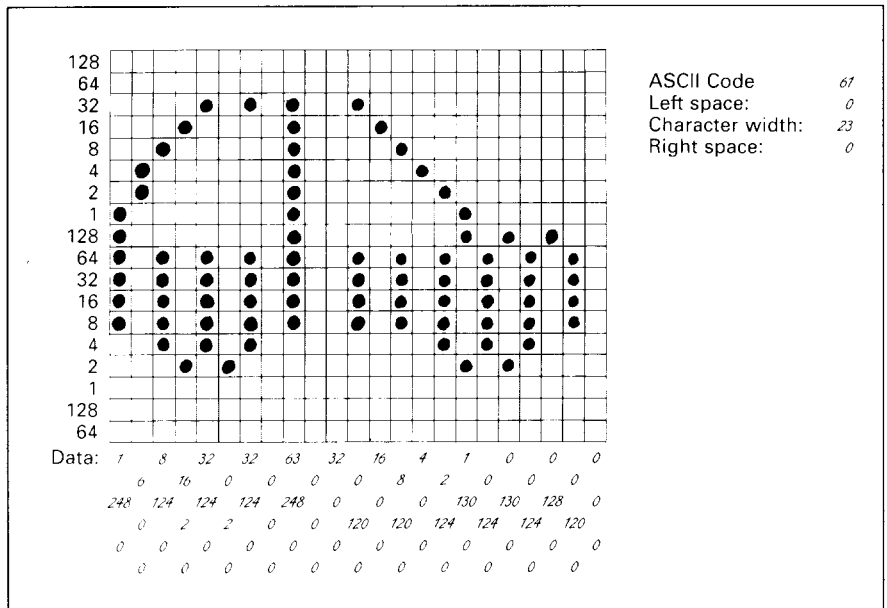
Figure 5-5. Add the values of the dots into three bytes

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

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

```
1400 NEXT I
1410 LPRINT CHR$(27);"%";CHR$(0)
1420 LPRINT CHR$(27);"S";CHR$(0);
1430 LPRINT CHR$(9);"MILLIONS OF DOLLARS"
1440 LPRINT CHR$(27);"T"
1450 END
1500 DATA   0,  0,  0,  0,  0,  0,  0,  6,  0
1510 DATA   0,  9,  0,  0, 16,128,  0, 32,  0
1520 DATA   0, 64,128, 63,128,  0,  0,  0,128
1530 DATA   0,  0,  0,  0,  0,128,  0,  0,  0
1540 DATA   0,  0,128,  0,  0,  0,  0,  0,128
1550 DATA  63,128,  0,  0, 64,128,  0, 32,  0
1560 DATA   0, 16,128,  0,  9,  0,  0,  6,  0
1570 DATA   0,  0,  0,  0,  0,  0
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 DATA   0,  0,  0,  2,208,  0,  5, 40,  0
1670 DATA  10,215,128,  5, 40,  0, 10,215,128
1680 DATA   5, 40,  0,  0, 87,128,  4,128,  0
1690 DATA   0,  4,  0,  4,144,  0,  0,100,  0
1700 DATA   4,128,  0,  0,  8,  0,  4,144,  0
1710 DATA   0, 96,  0,  4,128,  0,  0,  0,  0
1720 DATA   4,128,  0,  8,  0,  0,  4,128,  0
1730 DATA   0,  0,  0,  7,128,  0
```

U.S. EXPORTS

```
AUTOS      ▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲▲
CHEMICALS  ᵾᵾᵾᵾᵾᵾᵾᵾᵾᵾᵾᵾᵾᵾᵾᵾᵾᵾᵾᵾᵾᵾ
GUNS       ᵽᵽᵽ
           +----+----+----+----+----+
             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 5-6 to help plot the data with the IBM mode. Due to the two-pass process, NLQ characters can contain up to 16 dots vertically.
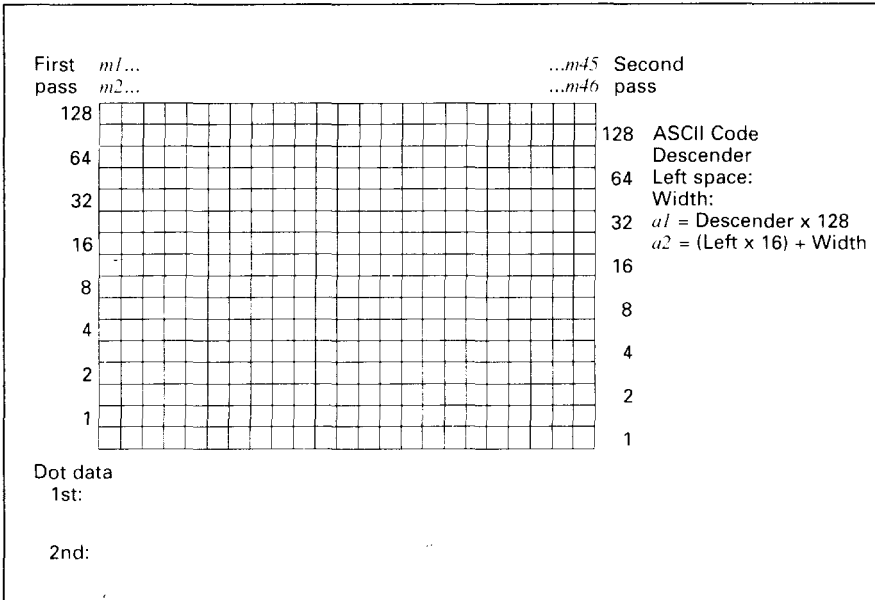
Figure 5-6. Use this grid (or one similar to it) to define your own NLQ characters with the IBM mode

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 a line. 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 5-7.

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

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
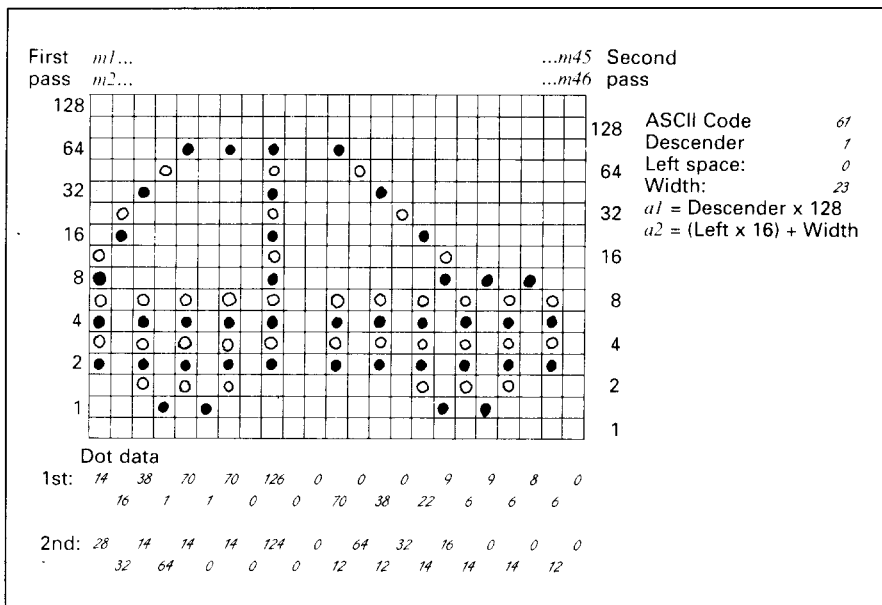
Figure 5-7. Add the values of the dots in the boxes first, and then add the value on the lines

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.

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

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

```
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$(27);"I";CHR$(2)
1440 LPRINT CHR$(27);"S";CHR$(0);
1450 LPRINT CHR$(9);"MILLIONS OF DOLLARS"
1460 LPRINT CHR$(27);"T"
1470 END
1500 DATA   0,   0,   0,   0,   2,   4,   4,   2,   1,   8
1510 DATA   8,   0,   1,  16,240,224,   1,   0,   0,   0
1520 DATA   1,   0,   0,   0,   1,   0,   0,   0,   1,   0
1530 DATA 240,224,   1,  16,   8,   0,   1,   8,   4,   2
1540 DATA   2,   4,   0,   0,   0,   0
1550 DATA  14,  28,  16,  32,  38,  14,   1,  64,  70,  14
1560 DATA   1,   0,  70,  14,   0,   0,126,124,   0,   0
1570 DATA   0,   0,  70,  12,   0,  64,  38,  12,   0,  32
1580 DATA  22,  14,   9,  16,   6,  14,   9,   0,   6,  14
1590 DATA   8,   0,   6,  12,   0,   0
1600 DATA   0,   0,  24,  32,   7,  16,  56,  14,   1,  48
1610 DATA  56,  14,   7,  48,   8,  14,   2,  32,   8,   0
1620 DATA   6,  32,   8,   0,   2,  40,   8,   0,   4,  36
1630 DATA   8,   0,   0,  40,   8,   0,   0,  32,  32,   0
1640 DATA   8,  32,   0,   0,  24,  48
```

U.S. EXPORTS

```
AUTOS      ΔΔΔΔΔΔΔΔΔΔΔΔΔΔΔΔΔΔΔΔΔΔΔΔ
CHEMICALS  ŨŨŨŨŨŨŨŨŨŨŨŨŨŨŨŨŨŨŨŨŨ
GUNS       ₣₣₣
           +----+----+----+----+----+
                2    4    6    8
           MILLIONS OF DOLLARS
```
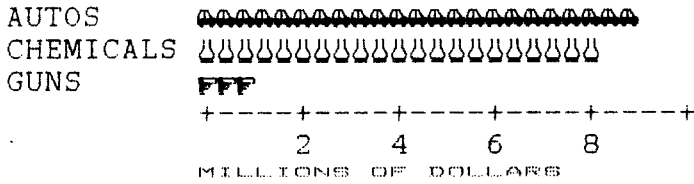
MEMO

Chapter 6

MS-DOS AND YOUR PRINTER

When using your printer with an IBM PC, PC-XT, or 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.

If you have your printer set up in standard mode, then choose an Epson FX-850 or EX-800 Color as your printer to be selected.
If neither of these are mentioned, choose one of the following (in order of preference): Star NX-1000 Color/LC-10 Color, Star ND-10/15, Epson LX-850/LX-810.

If you have your printer set up with the EDS switches to emulate an IBM Proprinter III, simply choose this from the list of printers available in the application software list.
If the IBM Proprinter III is not mentioned, select Proprinter II or Proprinter.

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.

Other software packages may well 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
Pica	10	80
Elite	12	96
Condensed pica	17.1	137
Condensed elite	20	160
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 EDS switches are set for the correct printer emulation, and that you have selected the appropriate character set using the EDS switches.

If you are in doubt about the configration 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))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	Magenta
	((C))2	Cyan
	((C))3	Violet
	((C))4	Yellow

((C))5	Orange
((C))6	Green

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

File as seen on computer screen:

```
((F))7 ((S))3
Printer commands
((F))0 ((S))0
Font commands ((F))1can be ((F))4embedded
((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) button was held down when power was switched on.

- 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:

        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 2.

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 commands to select near letter quality, and select elite pitch with the Standard mode. You can find the commands in Chapter 4. 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 NLQELITE.DAT, then type the underlined parts of the following display. Press RETURN at the end of each line. Don't 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 above line 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 (EDS switch A-1 ON and A-2 OFF).

```
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$(0)+N$    '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$;"Font setting:"
1120 LPRINT H$;D$;"Draft characters, ";N$;
1130 LPRINT H$;F$;CHR$(0);"Courier characters,"
1140 LPRINT H$;F$;CHR$(1);"Sanserif characters,";
1150 LPRINT H$;F$;CHR$(4);"Script characters,"
1160 LPRINT H$;F$;CHR$(7);"Orator characters,"
1170 '
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 pitch
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$;"W1";"Expanded, ";E$;"W0";
1320 LPRINT H$;E$;"w1";"Double-height, ";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$(I); 'Set line spacing
1420 LPRINT E$;" ";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$(I);
1470 LPRINT E$;" ";CHR$(I);
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$(0);    'Normal character space
1530 LPRINT E$;"Q";CHR$(80)    'Set right margin
1540 LPRINT
1550 '
1560 LPRINT C$;"Other features:"
1570 LPRINT H$;E$;"4";"Italics";E$;"5";", ";
1580 LPRINT E$;"E";"Emphasized";E$;"F";", ";
1590 LPRINT E$;"G";"Double-strike";E$;"H";", "
1600 LPRINT H$;E$;"-1";"Underlining";E$;"-0";", ";
1610 LPRINT E$;"S0";"SUPER";E$;"T";" and ";
1620 LPRINT E$;"S1";"SUBSCRIPT";E$;"T";", "
1630 LPRINT
1640 LPRINT H$;C$;"Download characters: ";
1650 GOSUB 2040
1660 LPRINT D$;E$;"%1";        'Select draft download character
1670 FOR I=1 TO 5
1680 LPRINT CHR$(60);          'Print download character
1690 NEXT I
1700 LPRINT E$;"%0";           'Select normal character
1710 GOSUB 2130
1720 LPRINT C$;E$;"%1";        'Select NLQ download character
1730 FOR I=1 TO 5
1740 LPRINT CHR$(60);          'Print download character
1750 NEXT I
1760 LPRINT E$;"%0"            'Select normal character
1770 LPRINT
1780 '
1790 LPRINT H$;C$;"Various dot graphic densities:"
1800 DIM LOGO$(4)
1810 RESTORE 2350
1820 FOR ROW=1 TO 4
1830 FOR COL=1 TO 65
1840 READ DG
1850 LOGO$(ROW)=LOGO$(ROW)+CHR$(DG)
1860 NEXT COL
1870 NEXT ROW
1880 LPRINT E$;"A";CHR$(8);    'Set 8/72" Line spacing
1890 FOR ROW=1 TO 4
1900 LPRINT "    ";
1910 FOR B=0 TO 6
1920 IF B=2 THEN 1970
1930 IF B=5 THEN 1970
1940 LPRINT E$;"*";CHR$(B);    'Select dot graphics mode
1950 LPRINT CHR$(65);CHR$(0);LOGO$(ROW);
1960 LPRINT "   ";
1970 NEXT B
1980 LPRINT
1990 NEXT ROW
2000 LPRINT E$;"@"             'Initialize printer
2010 END
2020 '
2030 ' SUBROUTINES
2040 ' Define draft download character
2050 LPRINT D$;E$;"&";CHR$(0);CHR$(60);CHR$(60);
2060 RESTORE 2240
```

```
2070 FOR M=0 TO 11
2080 READ MM
2090 LPRINT CHR$(MM);
2100 NEXT M
2110 RETURN
2120 '
2130 ' Define NLQ download character
2140 LPRINT C$;E$;"&";CHR$(0);CHR$(60);CHR$(60);
2150 LPRINT CHR$(0);CHR$(23);CHR$(0);
2160 RESTORE 2270
2170 FOR M=1 TO 69
2180 READ MM
2190 LPRINT CHR$(MM);
2200 NEXT M
2210 RETURN
2220 '
2230 ' DATA
2240 ' Draft download character data
2250 DATA 139,124,  0, 66,  4, 64, 36, 16,  2, 16, 12,  0
2260 '
2270 ' NLQ download character data
2280 DATA   1,248,  0,  6,  0,  0,  8,124,  0, 16,  2,  0
2290 DATA  32,124,  0,  0,  2,  0, 32,124,  0,  0,  0,  0
2300 DATA  63,248,  0,  0,  0,  0, 32,  0,  0,  0,120,  0
2310 DATA  16,  0,  0,  8,120,  0,  4,  0,  0,  2,124,  0
2320 DATA   1,130,  0,  0,124,  0,  0,130,  0,  0,124,  0
2330 DATA   0,128,  0,  0,120,  0,  0,  0,  0
2340 '
2350 ' Dot graphics data
2360 ' ROW 1
2370 DATA   0,  0,  0,  0,  1,  3,  7,  7,  7, 15, 14, 14
2380 DATA  14, 14, 14,  7,  7,  3,  3, 15, 15, 15,  0,  0
2390 DATA   0,  0,  6,  7,  7,  7,  7,  7,  7,  7,  7,  6
2400 DATA   6,  0,  0,  7,  7,  7,  7,  7,  7,  7,  7,  7
2410 DATA   7,  7,  0,  0,  7,  7,  7,  7,  7,  7,  7,  7
2420 DATA   7,  7,  0,  0,  0
2430 ' ROW 2
2440 DATA   0,  0, 60,255,255,255,255,255,143, 15,  7,  7
2450 DATA   7,  7,  3,  3,  3,131,193,241,240,240,  0,  0
2460 DATA   0,  0,  0,  0,224,255,255,255,255,255, 31,  0
2470 DATA   0,  0,  1,  3, 31,255,255,255,255,255,255,  1
2480 DATA   0,  0,  0,  1,  7, 31,255,252,240,192,128,  0
2490 DATA   0,  0,  0,  0,  0
2500 ' ROW 3
2510 DATA   0, 31, 31,  3,129,128,192,192,192,192,192,224
2520 DATA 224,224,224,240,255,255,255,255,255,127,  0,  0
2530 DATA   0,  0,  0,  0,  0,192,255,255,255,255,255, 15
2540 DATA  15, 63,252,240,192,  0,240,255,255,255,255,255
2550 DATA   7, 15,127,252,240,192,  0,  0,  0,  0,  0,  0
2560 DATA   0,  0,  0,  0,  0
2570 ' ROW 4
2580 DATA   0,248,248,240,224,224,112,112, 56, 56, 56, 56
2590 DATA  56,120,120,240,240,224,224,192,128,  0,  0,  0
2600 DATA   0,  0,  0,  0,  0,  0,128,248,248,248,248,240
2610 DATA 192,  0,  0,  0,  0,  0,240,248,248,248,248,240
2620 DATA 192,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
2630 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 4.

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 automobiles 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 5.

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 2370 to 2630 with the help of a calculator. Each number represents eight vertical dots. (See "Graphics commands" in Chapter 4 for details.)

The pattern is printed in four rows, each eight dots high and 65 dots wide. Lines 1800 to 1870 read the dot data into a string array variable named LOGO$. Line 1880 sets the line spacing to 8/72 inch so that the rows will connect vertically. The loop in lines 1890 to 1990 does the printing in four passes of the print head.

Font setting:
Draft characters,
Sanserif characters,
ORATOR CHARACTERS,

Courier characters,
Script characters,

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

Elite pitch (12 CPI),
Condensed elite pitch (20 CPI),

Expanded, Double-height,
Double-sized,
Quad-sized.

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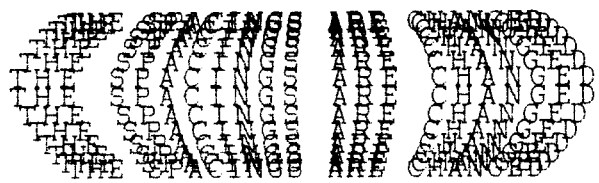
Other features:
Italics, **Emphasized,** Double-strike,
Underlining, SUPER and SUBSCRIPT,

Download characters:

Various dot graphic densities:

SW SW SW SW SW

MEMO

Chapter 7 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 problems:

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, make certain that 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 with another appliance of the outlet to determine if electricity is being supplied to that outlet.
Is the printer voltage correct?	Check the bottom panel of your printer to verify 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 POWER indicator flashing?	If it is, the paper has run out. Load more paper.
Is the printer beeping intermittently?	The release lever has 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 leading 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 re-install 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 installed?	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 consistently throughout the printing?	The print head is damaged. Stop printing, and contact your supplier for a new print head.

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 commands 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 EDS switches or software commands), or you have the wrong character set selected (for example if characters other than IBM block graphic characters are being printed). Correct this with EDS switches or the appropriate software sequences.

If the printout is not what is expected:

Check	Possible remedy
Is the printer installed correctly?	Your software may think that it is driving a different emulation to the one actually set. Check the EDS settings to make sure you have the right emulation.
Is the printer not printing anything that you are expecting?	Use the Hex Dump mode to analyze the output from the computer to the printer. This will enable you to determine that the right escape sequences, etc are being transmitted.

Paper feeding

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

Check	Possible remedy
Is the paper release lever pushed back (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 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 to feed freely.
Is the ASF selected with the EDS settings?	If it is, then deselect it.
Are you trying to feed paper using the front panel buttons while the ON LINE indicator is illuminated?	You can only feed paper in this way when 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 using thinner paper.

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 loose or too tight, will prevent a smooth paper feed.
Are the tractor units locked in position and the covers closed?	Correct this if necessary.
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.

Check	Possible remedy
Are you trying to feed paper using the front panel buttons while the ON LINE indicator is illuminated?	You can only feed paper in this way when 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 using thinner paper.

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

Check	Possible remedy
Has the ASF option been selected with the EDS switch?	Select this 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 50 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 is illuminated?	You can only feed paper in this way when 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 using different paper.

If the paper park function 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 POWER indicator comes on flashing 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 EDS setting and correct.
Is text being printed with extra blank lines?	Two line feeds are being printed. Make your software print just a carriage return or (if this is not possible), set the AUTO LF to OFF with the EDS 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 function to adjust the print position relative to the page.
Does the printer's page length not match the physical page length?	Use the EDS switches to set up the correct page length, or use software commands to do it.

MAINTENANCE

Essentially, your printer is a robust piece of equipement, 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, too (see Chapter 1).

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

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

- To clean the exterior of the printer, use a choth 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 characters. In normal everyday use, this translates 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 1), 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. Remove the top cover and 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 attemping to work on it.
4. Move the print head carriage toward the center, and remove the color ribbon holder on the carriage.

   CAUTION: Do not lose the spring inside the holder.

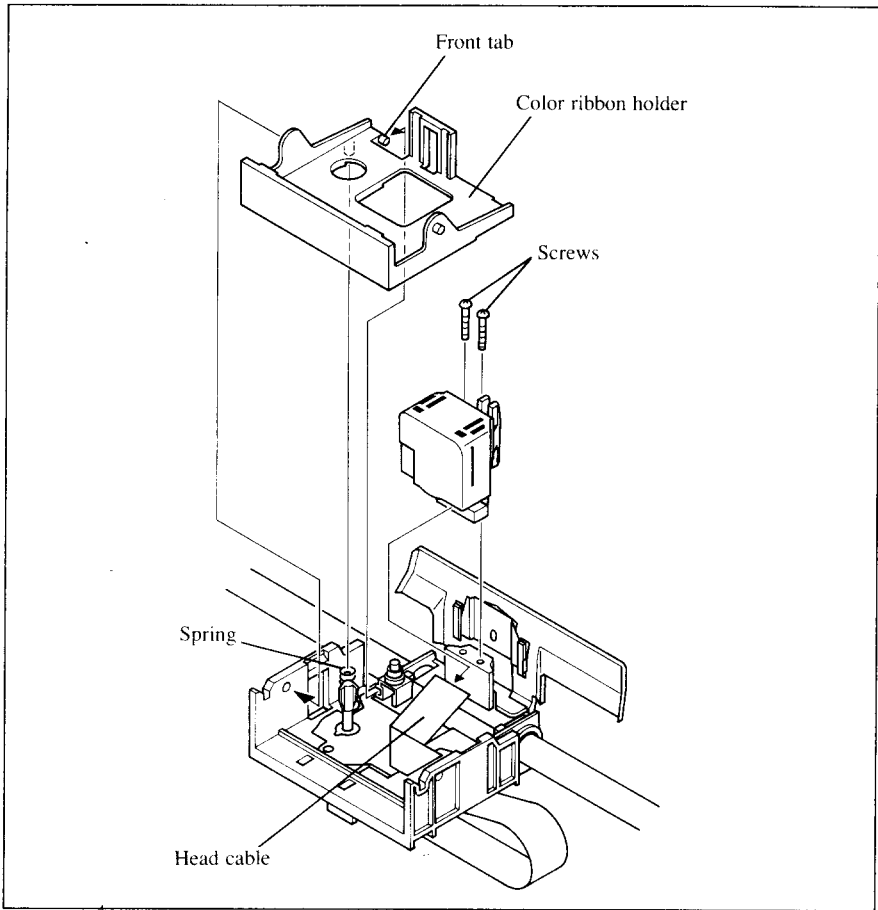5. Unscrew the two screws that hold the print head in place and set them aside.

Figure 7-1. Replacing the print head

6. Disengage the cable from the connector holding it down, then remove the print head.

7. Plug the cable into the connector of the new print head.

8. Place the new print head on its support, seating it on the two pins.

9. Fasten the print head down with the two screws.

10. Remount the color ribbon holder with care to position the spring and the front tab correctly.

11. Replace the ribbon cartridge and top cover, and plug the power cord back in.

Chapter 8

SPECIFICATIONS

Printing system	Serial Impact Dot-matrix	

Printing speed	Pica	Elite
High-Speed Draft	200cps	225cps
Draft	150cps	180cps
NLQ	37.5cps	45cps

Print direction	Bidirectional, logic-seeking
	Unidirectional, logic-seeking
	(selectable)

Print head	9pins
	Life:100 million characters
Line spacing	1/6, 1/8, $n/72$, $n/216$ inches

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 (USA), #850 (Multi-Lingual), #860 (Portuguese), #861 (Ice-landic), #863 (Canadian French), #865 (Nordic)

Number of columns	CPI	
Pica	10	80
Elite	12	96
Condensed pica	17.1	137
Condensed elite	20	160
Proportional		Variable

Character dot matrix .... 9 × 11 (Draft)

18 × 23 (NLQ)

Bit image dot-matrix .... DPI

Normal	60	(8 or 9) × 480
Double	120	(8 or 9) × 960
High-speed double*	120	(8 or 9) × 960
Quadruple	240	(8 or 9) × 1920
CRT I	80	(8 or 9) × 640
CRT II	90	(8 or 9) × 720
Plotter	72	(8 or 9) × 576
Double-plotter	144	(8 or 9) × 1152

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

Paper feed ....Friction and push/pull tractor

Paper feed speed ....2.9 inches/second max

Paper width......................................Cut sheet   4"-11.7"

Fanfold (continuous)   4"-10"

Copies ....Original +3 copies (Max.)

Maximum buffer size ....Without Download   16kB

With Download   1 line

Emulations ....Epson FX-850

Epson EX-800 for color

IBM Proprinter III

Interface ....Centronics parallel (standard)

RS-232C serial (option)

Ribbon type ....On-carriage, dedicated

Monochrome (Black only)

Color (Black, magenta, cyan, violet,
yellow, orange, green)

Ribbon life

        Monochrome (ZX9) .... 3 million characters (draft pica)

        Color (ZX9CL) .... 1 million characters (draft pica)

Dimensions .... 440(w) × 334(d) × 135(h) mm

                                         17.3(w) × 13.1(d) × 5.3(h) in

Weight 6.3kg (13.9lb)

Power supply 120VAC, 220VAC, 240VAC, 50/60Hz

                                           (varies according to the country of pur-
chase)

Options .... Automatic sheet feeder (SF-10DN)

                                           Serial-Parallel converter (SPC-8K)

                                           Roll paper holder (RH-10Z)

The following describes the pinout of the parallel (Centronics-type) interface connector (signals which are low when active are overlined):

Pin	Name	Function
1	STROBE	Goes from high to low (for ≥0.5μs) 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 EDS 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

chapter 9

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 entries 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 < >.

<Sample>

Character
Hexadecimal value (high order)

	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	<DC3> `3`	`19`	# `35`	3	C	S `83`	c `99`	s `115`
	<DC4>							t `116`

Control code — Decimal value

Hexadecimal value (low order)

119

STANDARD CHARACTER SET #1

	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	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

	8	9	A	B	C	D	E	F
0	⟨NUL⟩ 128	144	160	0 176	@ 192	P 208	` 224	p 240
1	129	⟨DC1⟩ 145	! 161	1 177	A 193	Q 209	a 225	q 241
2	130	⟨DC2⟩ 146	'' 162	2 178	B 194	R 210	b 226	r 242
3	131	⟨DC3⟩ 147	# 163	3 179	C 195	S 211	c 227	s 243
4	132	⟨DC4⟩ 148	$ 164	4 180	D 196	T 212	d 228	t 244
5	133	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	⟨BEL⟩ 135	151	' 167	7 183	G 199	W 215	g 231	w 247
8	⟨BS⟩ 136	⟨CAN⟩ 152	(168	8 184	H 200	X 216	h 232	x 248
9	⟨HT⟩ 137	⟨EM⟩ 153	) 169	9 185	I 201	Y 217	i 233	y 249
A	⟨LF⟩ 138	154	* 170	: 186	J 202	Z 218	j 234	z 250
B	⟨VT⟩ 139	⟨ESC⟩ 155	+ 171	; 187	K 203	[219	k 235	{ 251
C	⟨FF⟩ 140	156	, 172	< 188	L 204	\ 220	l 236	¦ 252
D	⟨CR⟩ 141	157	- 173	= 189	M 205	] 221	m 237	} 253
E	⟨SO⟩ 142	158	. 174	> 190	N 206	^ 222	n 238	~ 254
F	⟨SI⟩ 143	159	/ 175	? 191	O 207	_ 223	o 239	⟨DEL⟩ 255

STANDARD CHARACTER SET #2

Other characters are identical to standard character set #1.

	8	9
0	à 128	§ 144
1	è 129	ß 145
2	ù 130	Æ 146
3	ò 131	æ 147
4	ì 132	Ø 148
5	° 133	ø 149
6	£ 134	¨ 150
7	i 135	Ä 151
8	¿ 136	Ö 152
9	Ñ 137	Ü 153
A	ñ 138	ä 154
B	¤ 139	ö 155
C	R 140	ü 156
D	Á 141	É 157
E	ä 142	é 158
F	ç 143	¥ 159

INTERNATIONAL CHARACTER SETS

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

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

The command for selecting the international character sets 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.	5 Sweden	10 Denmark II
1 France	6 Italy	11 Spain II
2 Germany	7 Spain I	12 Latin America
3 England	8 Japan	13 Koria
4 Denmark I	9 Norway	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	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	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

124

	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	ø 237	² 253
E	Ä 142	₧ 158	« 174	╛ 190	╬ 206	▐ 222	∈ 238	■ 254
F	Å 143	ƒ 159	» 175	┐ 191	╧ 207	▀ 223	∩ 239	255

Code Page #850 (Multi-lingual)

Other charcters 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

Code Page #860 (Portuguese)

Other charcters 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	∈ 238	■ 254
F	Â 143	Ó 159	» 175	┐ 191	╧ 207	▀ 223	∩ 239	255

Code Page #861 (Icelandic)

Other charcters 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	π 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	F 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	ð 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 charcters 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	╥ 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	Û 157	¾ 173	╜ 189	═ 205	▌ 221	φ 237	² 253
E	Â 142	Û 158	« 174	╛ 190	╬ 206	▐ 222	ε 238	■ 254
F	§ 143	ƒ 159	» 175	┐ 191	╧ 207	▀ 223	∩ 239	255

Code Page #865 (Nordic)

Other charcters 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

IBM CHARACTER SET #1

	0	1
0	\<NUL\> 0	16
1	1	\<DC1\> 17
2	2	\<DC2\> 18
3	3	19
4	4	\<DC4\> 20
5	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	129	\<DC1\> 145
2	130	\<DC2\> 146
3	131	147
4	132	\<DC4\> 148
5	133	\<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

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.

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	78
<BS>	Backspace	63
<HT>	Horizontal tab	65
<LF>	Line feed	57
<VT>	Vertical tab	61
<FF>	Form feed	59
<CR>	Carriage return	63
<SO>	Expanded printing for one line	51
<SI>	Condensed printing	50
<DC1>	Set printer on-line	77
<DC2>	Cancel condensed printing	51
<DC3>	Set printer off-line	77
<DC4>	Cancel one-line expanded printing	52
<CAN>	Cancel last line	76
<ESC> <LF>	Reverse line feed	57
<ESC> <FF>	Return to top of current page	60
<ESC> <SO>	Expanded printing for one line	51
<ESC> <SI>	Condensed printing	50
<ESC> <EM> <0>	Manual feed	78
<ESC> <EM> <4>	Auto feed	79
<ESC> <EM> "R"	Eject paper from ASF	79
<ESC> <EM> "T" *n*	Set print start position on ASF	79
<ESC> <SP> *n*	Increase character spacing	53
<ESC> "!" *n*	Select master print mode	52
<ESC> "#"	Accept MSB as is	76
<ESC> "$" *n1 n2*	Absolute horizontal tab in inches	66
<ESC> "%" <0>	Select ROM character set	74
<ESC> "%" <1>	Select download character set	72
<ESC> "%" "0"	Select ROM character set	74
<ESC> "%" "1"	Select download character set	72
<ESC> "&" <0> *n1 n2 m0 m1 m2 m3 ...m11*	Define draft download characters	70
<ESC> "&" <0> *n1 n2 a0 a1 a2 m1 m2 m3 ...m69*	Define NLQ download characters	71
<ESC> "*" *n0 n1 n2 m1 m2 ...*	Select graphics mode	68
<ESC> "−" <0>	Stop underlining	46
<ESC> "−" <1>	Start underlining	45
<ESC> "−" "0"	Stop underlining	46
<ESC> "−" "1"	Start underlining	45
<ESC> "/" *n0*	Select vertical tab channel	61
<ESC> "0"	Set line spacing to 1/8 inch	55
<ESC> "1"	Set line spacing to 7/72 inch	56
<ESC> "2"	Set line spacing to 1/6 inch	56
<ESC> "3" *n*	Set line spacing to *n*/216 inch	56
<ESC> "4"	Select italic characters	44
<ESC> "5"	Select upright characters	44
<ESC> "6"	Select character set #2	47
<ESC> "7"	Select character set #1	47

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CONTROL CODE	FUNCTION	PAGE
<ESC> "8"	Disable paper-out detector	60
<ESC> "9"	Enable paper-out detector	60
<ESC> ":" <0> n <0>	Copy standard characters from ROM into RAM	72
<ESC> "<"	One-line unidirectional printing	78
<ESC> "="	Set MSB to 0	76
<ESC> ">"	Set MSB to 1	76
<ESC> "?" n m	Convert graphics density	68
<ESC> "@"	Reset printer	79
<ESC> "A" n	Set line spacing to n/72 inch	56
<ESC> "B" n1 n2 ... <0>	Set vertical tab stops	60
<ESC> "C" n	Set page length to n lines	58
<ESC> "C" <0> n	Set page length to n inches	59
<ESC> "D" n1 n2 ... <0>	Set horizontal tab stops	65
<ESC> "E"	Emphasized printing	44
<ESC> "F"	Cancel emphasized printing	45
<ESC> "G"	Double-strike printing	45
<ESC> "H"	Cancel double-strike printing	45
<ESC> "J" n	Perform one n/216-inch line feed	57
<ESC> "K" n1 n2 m1 m2 ...	Print normal-density 8-bit graphics	67
<ESC> "L" n1 n2 m1 m2 ...	Print double-density 8-bit graphics	67
<ESC> "M"	Elite pitch	50
<ESC> "N" n	Set bottom margin	59
<ESC> "O"	Cancel bottom margin	59
<ESC> "P"	Pica pitch	50
<ESC> "Q" n	Set right margin	62
<ESC> "R" n	Select international character set	48
<ESC> "S" <0>	Superscript	46
<ESC> "S" <1>	Subscript	46
<ESC> "S" "0"	Superscript	46
<ESC> "S" "1"	Subscript	46
<ESC> "T"	Cancel superscript or subscript	47
<ESC> "U" <0>	Bidirectional printing	78
<ESC> "U" <1>	Unidirectional printing	78
<ESC> "U" "0"	Bidirectional printing	78
<ESC> "U" "1"	Unidirectional printing	78
<ESC> "W" <0>	Cancel expanded printing	51
<ESC> "W" <1>	Expanded printing	51
<ESC> "W" "0"	Cancel expanded printing	51
<ESC> "W" "1"	Expanded printing	51
<ESC> "Y" n1 n2 m1 m2 ...	Print double-density, double-speed 8-bit graphics	67
<ESC> "Z" n1 n2 m1 m2 ...	Print quadruple-density 8-bit graphics	68
<ESC> "[" "T" <4> <0> <0> <0> n1 n2	Select IBM code page	48
<ESC> "\" n1 n2	Relative horizontal tab	66
<ESC> "^" n0 n1 n2 m1 m2 ...	Print 9-pin graphics	69
<ESC> "a" <0>	Left justify	64
<ESC> "a" <1>	Center text	64
<ESC> "a" <2>	Right justify	64
<ESC> "a" <3>	Full justify	64
<ESC> "a" "0"	Left justify	64
<ESC> "a" "1"	Center text	64
<ESC> "a" "2"	Right justify	64
<ESC> "a" "3"	Full justify	64
<ESC> "b" n0 n1 n2 ... <0>	Set vertical tab stops in channel	61
<ESC> "e" <0> n	Set horizontal tab stops every n columns	65
<ESC> "e" <1> n	Set vertical tab stops every n lines	61
<ESC> "e" "0" n	Set horizontal tab stops every n columns	65
<ESC> "e" "1" n	Set vertical tab stops every n lines	61
<ESC> "f" <0> n	Absolute horizontal tab in columns	66
<ESC> "f" <1> n	Feed paper n lines	58
<ESC> "f" "0" n	Absolute horizontal tab in columns	66
<ESC> "f" "1" n	Feed paper n lines	58

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IBM Mode

The following commands take effect with the IBM mode.

CONTROL CODE	FUNCTION	PAGE
<BEL>	Bell	78
<BS>	Backspace	63
<HT>	Horizontal tab	65
<LF>	Line feed	57
<VT>	Vertical tab	61
<FF>	Form feed	59
<CR>	Carriage return	63
<SO>	Expanded printing for one line	51
<SI>	Condensed printing	50
<DC1>	Set printer on-line	77
<DC2>	Pica pitch	50
<DC4>	Cancel one-line expanded printing	52
<CAN>	Cancel last line	76
<ESC> <SO>	Expanded printing for one line	51
<ESC> <SI>	Condensed printing	50
<ESC> <EM> <0>	Manual feed	78
<ESC> <EM> <4>	Auto feed	79
<ESC> <EM> "R"	Eject paper from ASF	79
<ESC> <EM> "T" n	Set print start position on ASF	79
<ESC> "–" <0>	Stop underlining	46
<ESC> "–" <1>	Start underlining	45
<ESC> "–" "0"	Stop underlining	46
<ESC> "–" "1"	Start underlining	45
<ESC> "0"	Set line spacing to 1/8 inch	55
<ESC> "1"	Set line spacing to 7/72 inch	56
<ESC> "2"	Execute <ESC> "A"	57
<ESC> "3" n	Set line spacing to n/216 inch	56
<ESC> "4"	Set top of page at current position	58
<ESC> "5" <0>	Cancel automatic line feed	63
<ESC> "5" <1>	Set automatic line feed	63
<ESC> "6"	Select character set #2	47
<ESC> "7"	Select character set #1	47
<ESC> "8"	Disable paper-out detector	60
<ESC> "9"	Enable paper-out detector	60
<ESC> ":"	Elite pitch	50
<ESC> "=" n1 n2 <DC4> a0 a1 a2 m1 m2 ... m1l	Define draft download characters	71
<ESC> "=" n1 n2 <NAK> a0 a1 a2 m1 m2 ... m46	Define NLQ download characters	72
<ESC> "@"	Reset printer	79
<ESC> "A" n	Set line spacing to n/72 inch	56
<ESC> "B" n1 n2 ... <0>	Set vertical tab stops	60
<ESC> "C" n	Set page length to n lines	58
<ESC> "C" <0> n	Set page length to n inches	59
<ESC> "D" n1 n2 ... <0>	Set horizontal tab stops	65
<ESC> "E"	Emphasized printing	44
<ESC> "F"	Cancel emphasized printing	45
<ESC> "G"	Double-strike printing	45
<ESC> "H"	Cancel double-strike printing	45
<ESC> "I" <0>	Select draft quality characters	42
<ESC> "I" <1>	Select draft elite characters	42
<ESC> "I" <2>	Select NLQ characters	42
<ESC> "I" <3>	Select NLQ characters	42
<ESC> "I" <4>	Select draft download character set	73
<ESC> "I" <5>	Select draft elite download character set	73
<ESC> "I" <7>	Select NLQ download character set	73

CONTROL CODE	FUNCTION	PAGE
"(" "(" "F" ")" ")" "1"	Select Sanserif characters	43
"(" "(" "F" ")" ")" "4"	Select Script characters	43
"(" "(" "F" ")" ")" "7"	Select Orator characters	44
"(" "(" "F" ")" ")" "9"	Select draft quality characters	42
"(" "(" "R" ")" ")"	Eject paper from ASF	79
"(" "(" "S" ")" ")" *n*	Select character size	54
"(" "(" "T" ")" ")" *n*	Set print start position on ASF	79

Consumer Response

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