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USERS MANUAL

LC24-200
LC24-200 COLOUR

LC24-200

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VDE Statement

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

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

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

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

The above statement applies only to printers marketed in Germany.

Trademark Acknowledgements

LC24-200, XB24-10, LC24-10, SPC-8K, SF-10DQ, RH-10Z: Star Micronics Co., Ltd.
IBM PC, PC-AT, PC-XT, Proprinter X24E, Proprinter X24, PC-DOS: International Business Machines Corp.
Microsoft BASIC, MS-DOS: Microsoft Corporation
LQ-860, LQ-850: Seiko Epson Corp.

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:

* Versatile paper handling

Single sheets, fanfold forms, and multi-part forms (up to 5-ply) are all accepted, and you can use either push/pull tractor or friction feed. (You can load fanfold forms from the rear with push tractor, or fanfold forms and multi-part forms from the bottom with pull tractor.) A special feature enables you to keep fanfold forms parked in readiness while printing on other paper.

* Six bright colors

Magenta, cyan, violet, yellow, orange, and green add a color dimension to your printed output by the color version printer.

* Large variety of fonts and sizes

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

* Extensive software support

Since it is compatible with the Epson and IBM printers, it works with any software that supports those printers. That includes most word-processing and graphics programs, spread-sheets, and integrated software packages.

* Easy operation

Indicator displays and beep tones provide immediate, easy to understand feedback when you press the buttons on the control panel. The 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.

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 six items).
If any of these items are missing, contact your supplier.
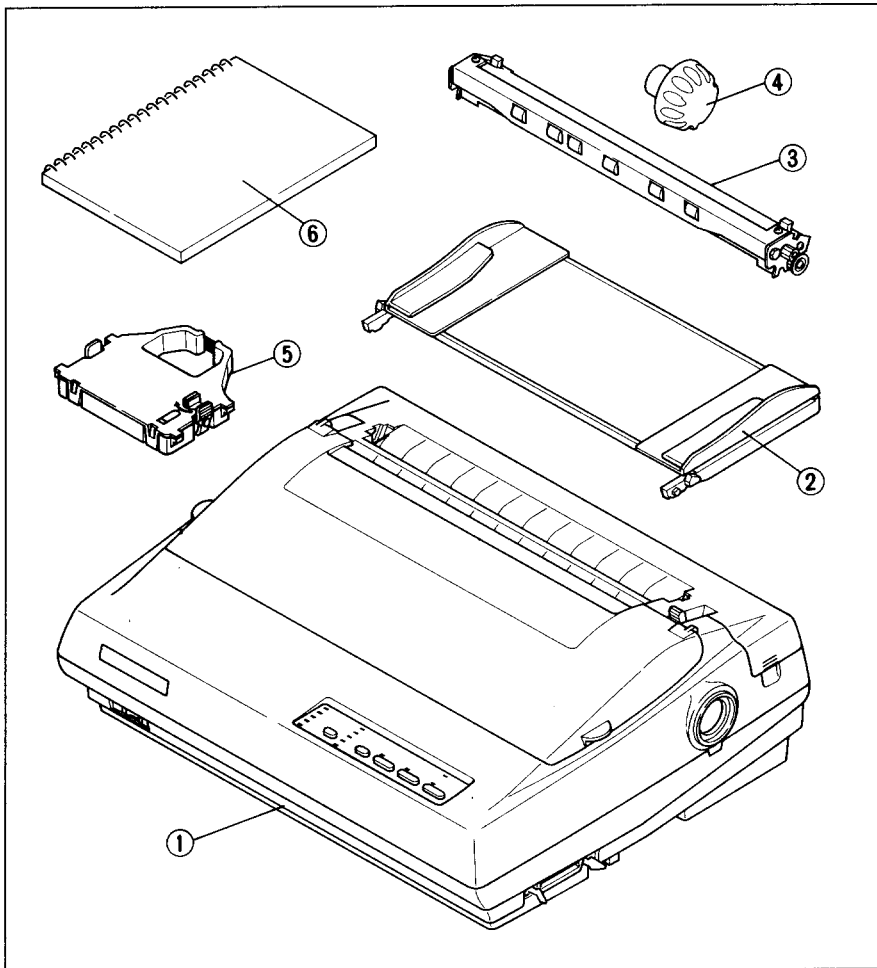
Figure 1-1. Check to make sure you have all six items: 1) Printer, 2) Paper guide, 3) Roller unit, 4) Platen knob, 5) Ribbon cartridge, and 6) Manual set (User's manual, User's guide and Sticker).

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

- Font cartridges (FC-1Z, FC-2Z, FC-3Z, FC-4Z)
- RAM cartridge (RC-32Z)
- Serial-Parallel converter (SPC-8K)
- Automatic sheet feeder (SF-10DQ)
- 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.
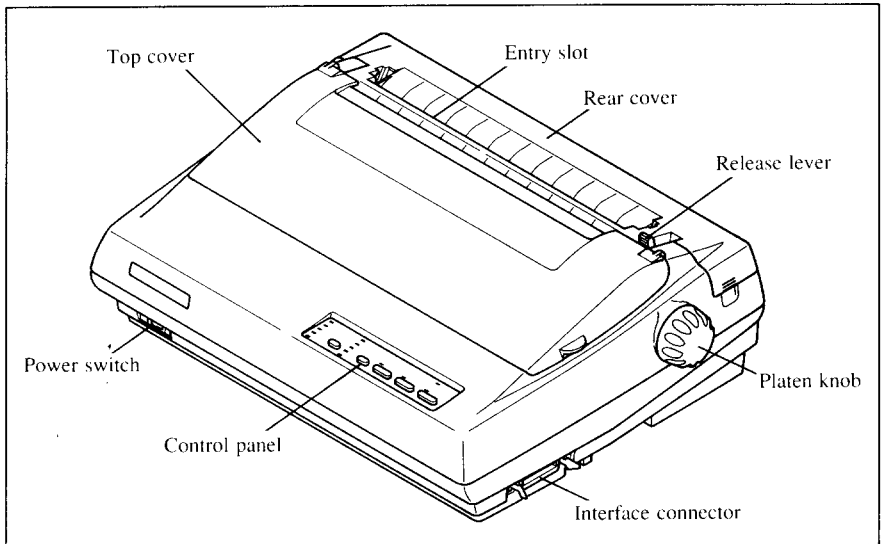
Figure 1-2. The printer's external parts

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 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.
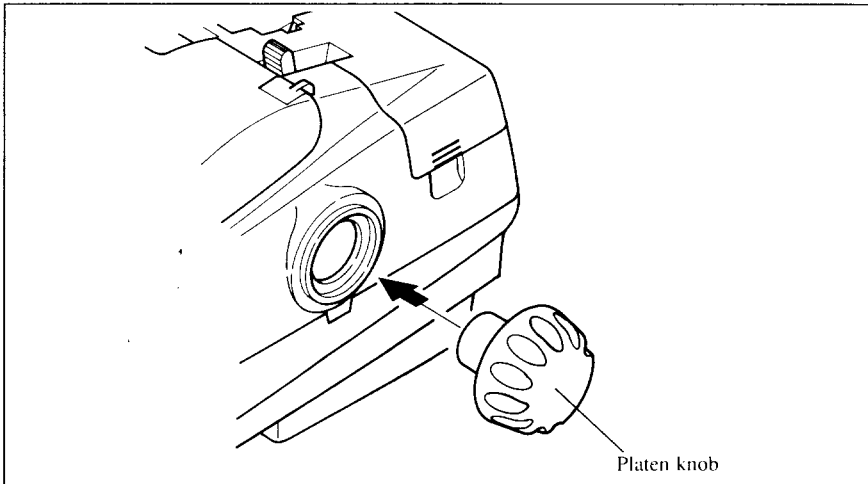
Figure 1-3. Mounting the platen knob

Installing 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 the color printer to print in black only, install the optional monochrome ribbon cartridge, Z24 or LZ24.)

NOTE: Turn off the power switch when you replace the ribbon cartridge.
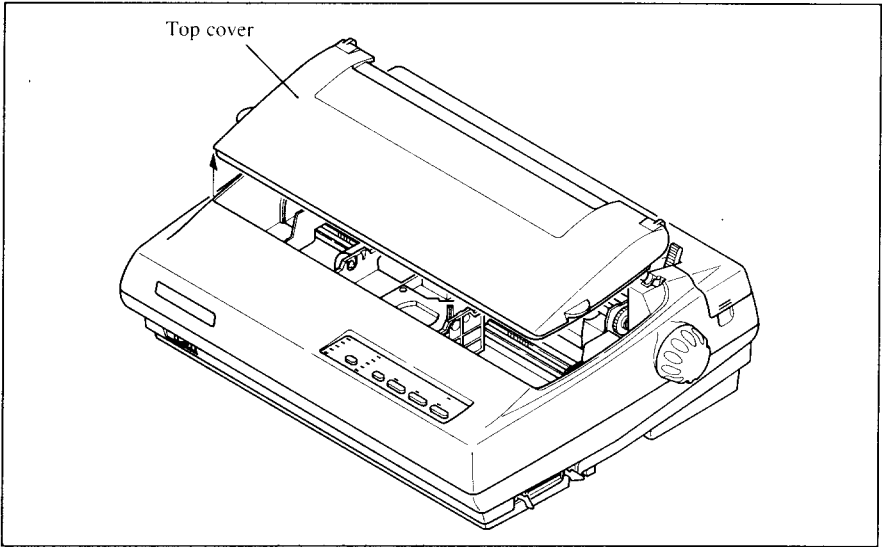
Figure 1-4. Removing the top cover

1. Turn the tension knob clockwise on the ribbon cartridge to tighten the ribbon if it is slack.

2. Guide the ribbon between the print head and the silver print head shield, making certain that the spindles on the cartridge holder fit into the sockets on the cartridge itself.
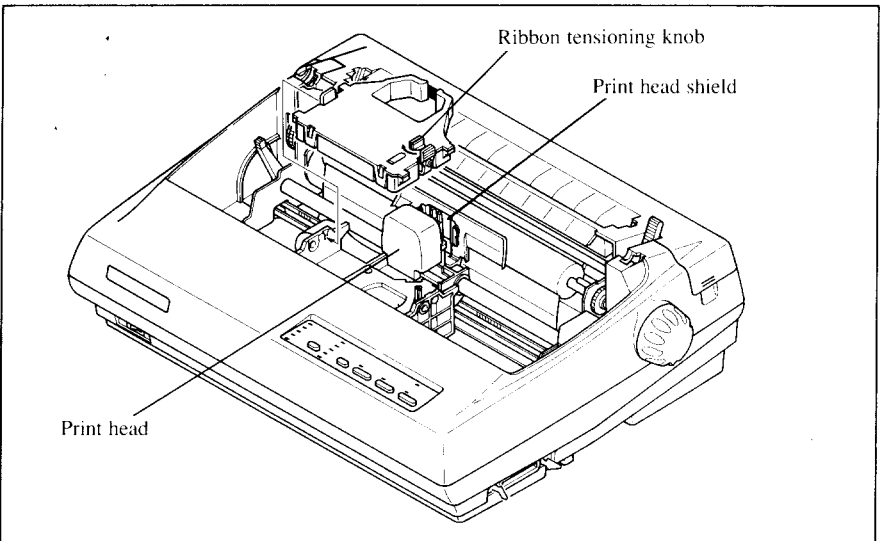
Figure 1-5. Installing the ribbon cartridge

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

Print head

Print head shield

Ink ribbon
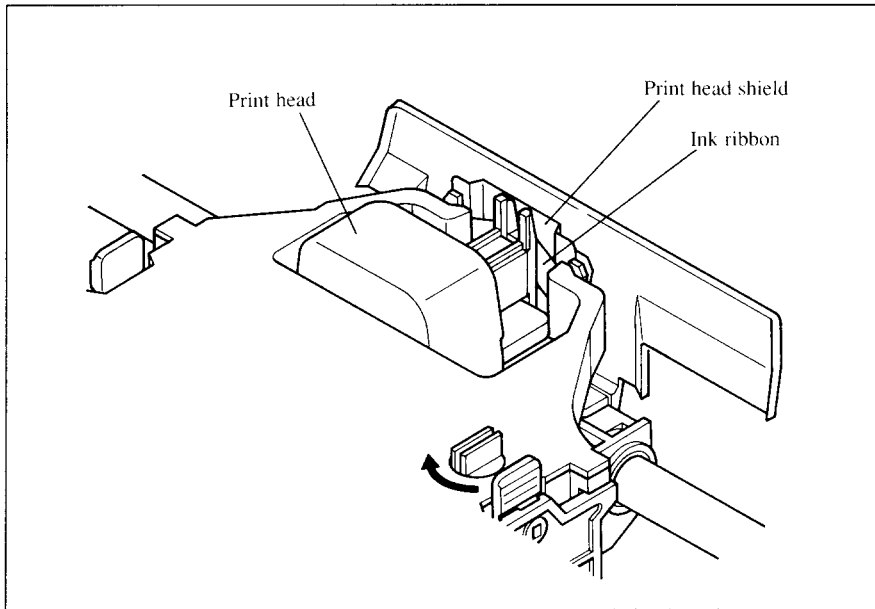
Figure 1-6. Pass the ribbon between the print head and print head shield

4. After you have installed the ribbon cartridge, install the roller unit.
5. Open the rear cover using the two pits 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.
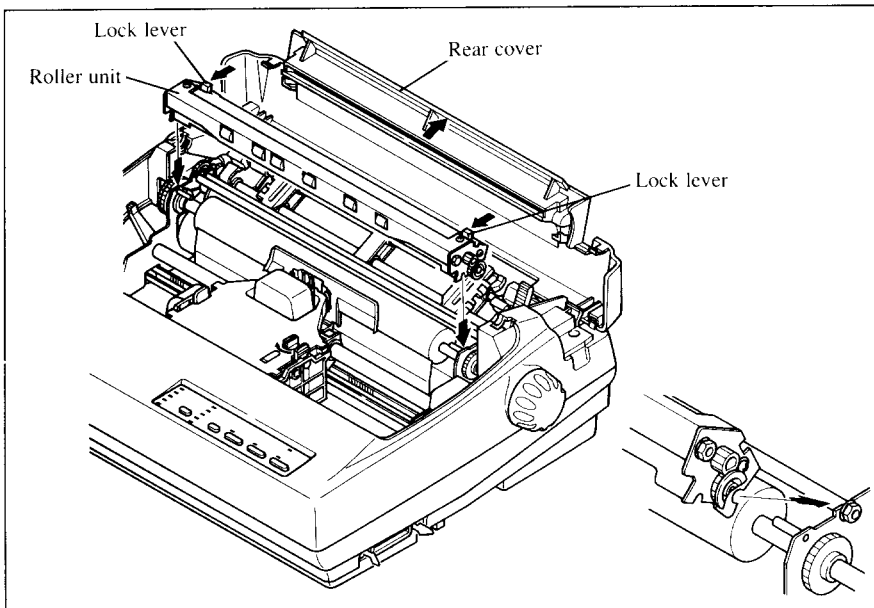
Figure 1-7. Install the roller unit onto the printer

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.

Installing the optional cartridge

This printer has five built-in LQ fonts, and a 7 K-byte (30 K-byte for color printer) printing buffer.

You can add more fonts or expand the printing buffer by installing optional cartridges (Font catridge or RAM cartridge).

To install or change a cartidge, follow the procedure below.

1. Turn off the power switch at the front of the printer, and remove the top cover.
2. Remove the connector cover at the right side of the printer.
3. Push out the cap from the connector cover.
   NOTE : Keep this cap in a safety place.
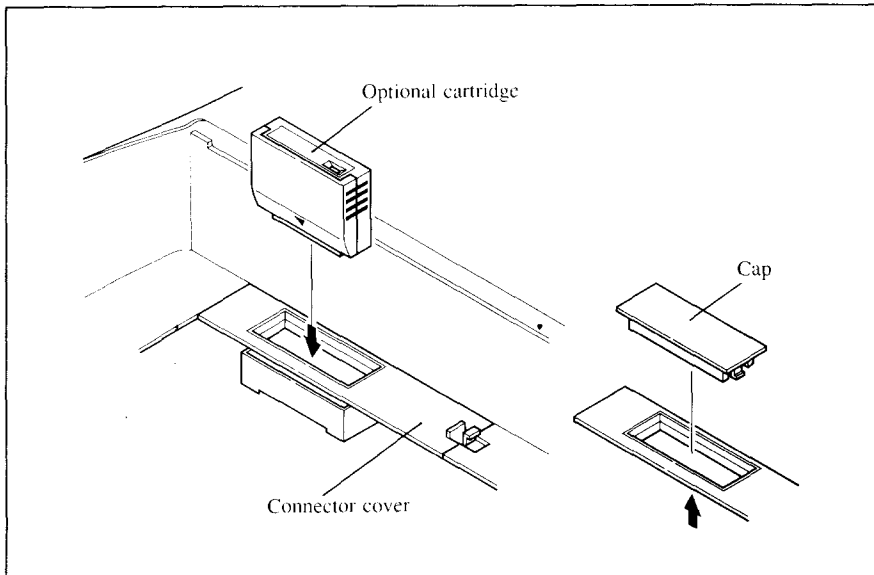
Figure 1-8. Slide the cartridge into the slot with the power switch off.

4. Install the connector cover into the printer.
5. Insert the cartridge into the slot of the connector cover, and slide it all the way in.

NOTE: Remount the cap on the connector cover if you do not use the optional cartridge.

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 connection to another computer.

If you need to connect to a serial port, use the optional Serial-Parallel converter, SPC-8K.
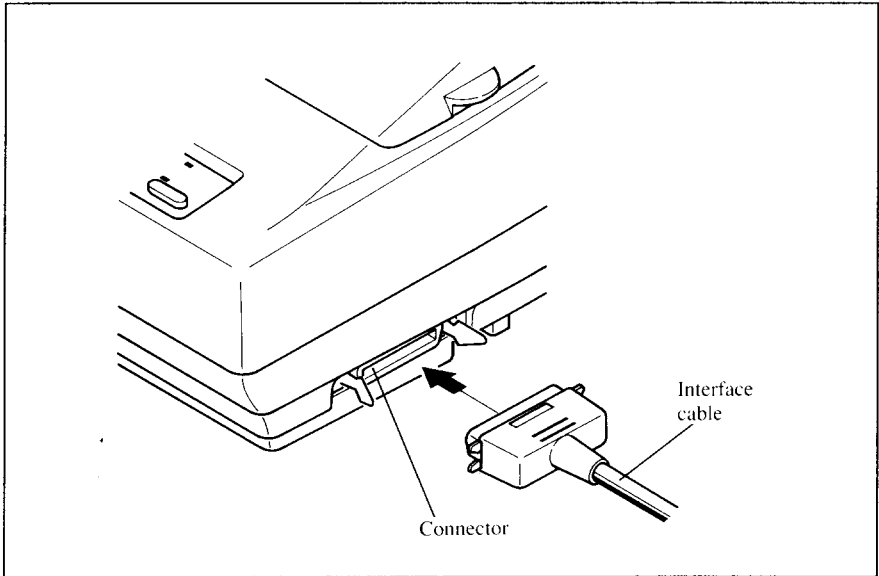
Figure 1-9. Connecting the interface cable

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-10DQ), 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.

Paper guide

Release lever
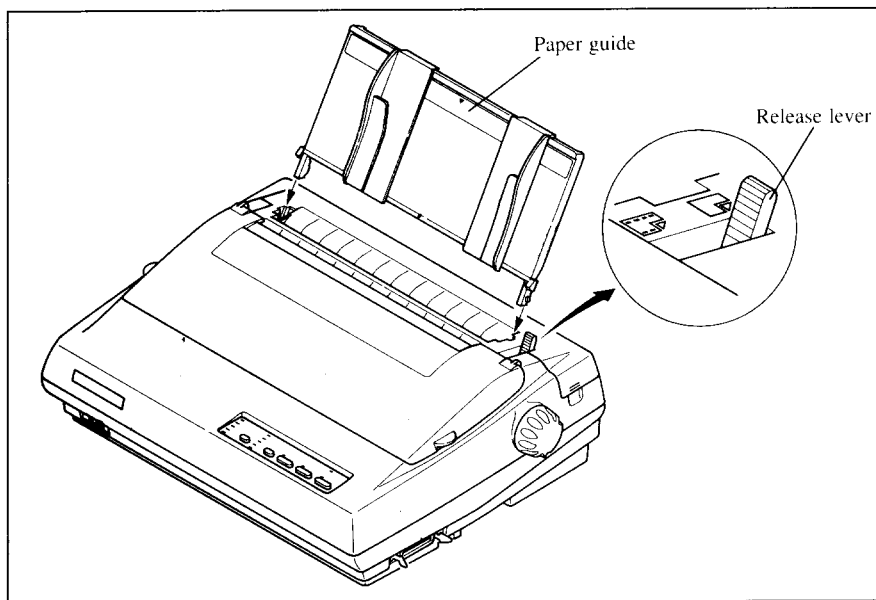
Figure 1-10. Mounting the paper guide for single sheets

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 ⊂ ˢᴱ⫞ᴱ⫞ᴱᶜ⫟ ⊃
    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 ⊂ ˢᴱ⫞ᴱ⫞ᴱᶜ⫟ ⊃ 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.)
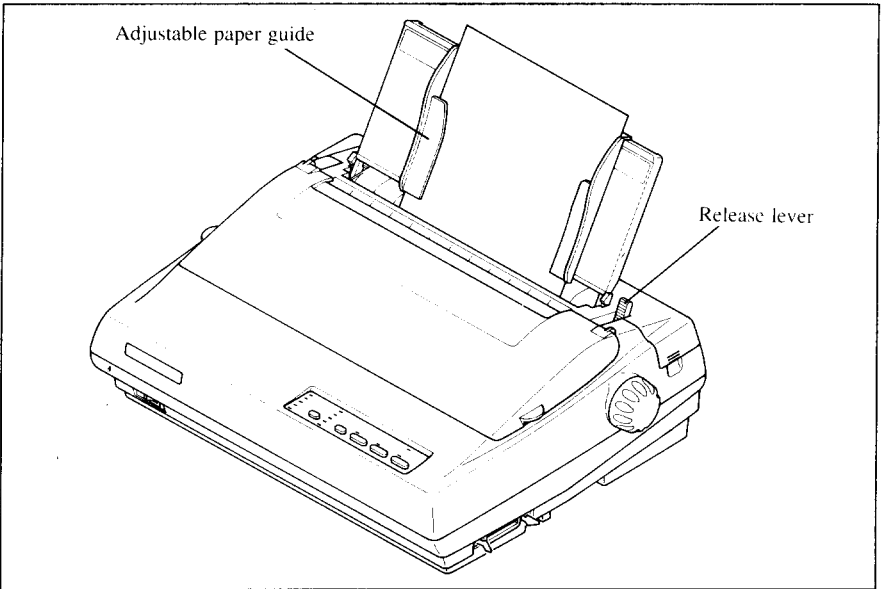
Figure 1-11. Loading a single sheet

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.

NOTE: To get good line-feeding, put 1-inch space (non-printing area) around a perforation.

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 pits on either side, and push backwards as in Figure 1-12.
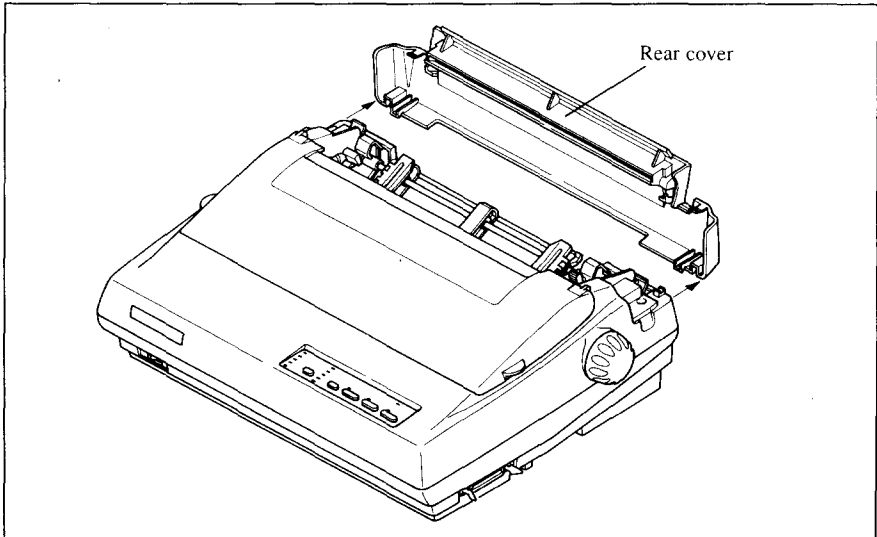
Figure 1-12. Removing the rear cover

6. Move the tractor units downwards by gripping the positioning levers on both side of the tractor unit as shown in Figure 1-13.
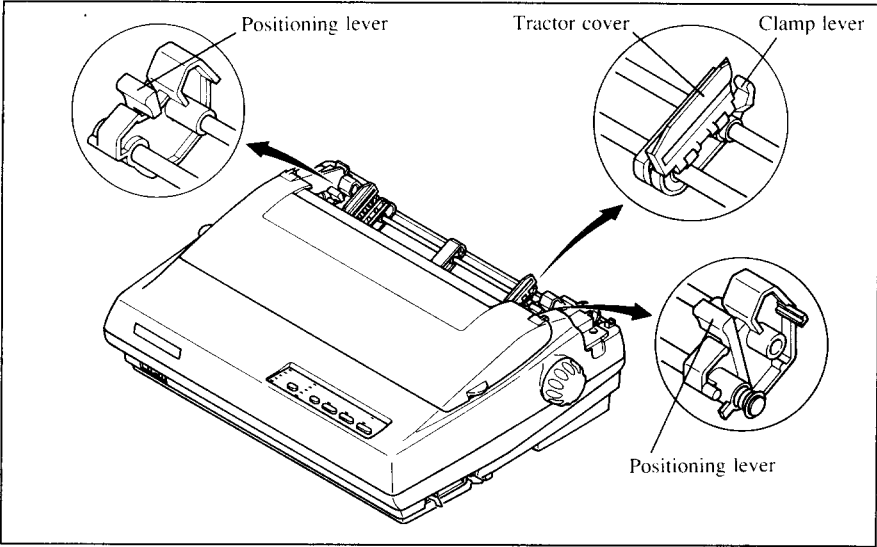

Figure 1-13. Move the tractor units downwards for loading the paper from the rear

7. With the tractor covers open, mount the paper by aligning holes with the pins on the tractor unit.
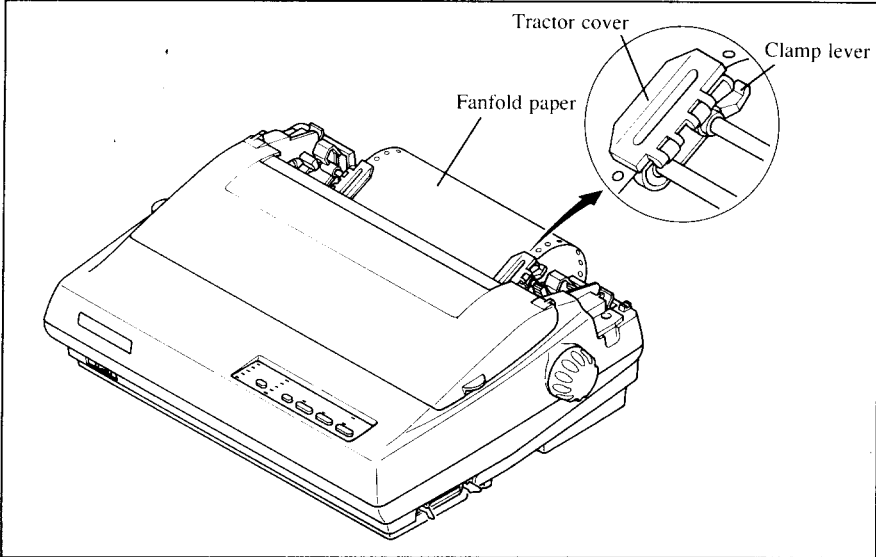

Figure 1-14. Mount the fanfold paper over the tractor units.

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 1-15, so that it will separate the printed from the unprinted paper.
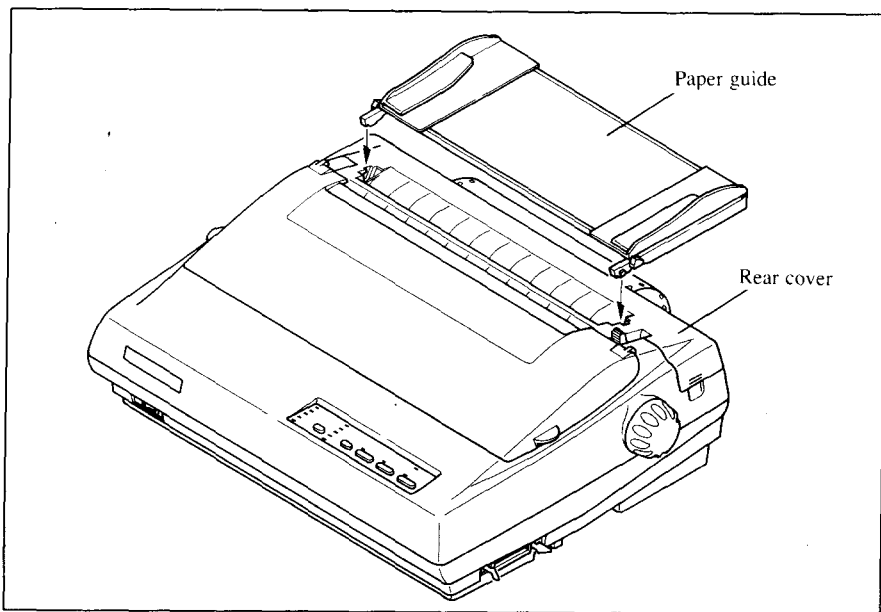

Figure 1-15. Mounting the paper guide for fanfold forms

Loading the paper from the bottom of the printer

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

1. Remove the top cover and the roller unit.
2. Open the rear cover using the two pits 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 1-16.
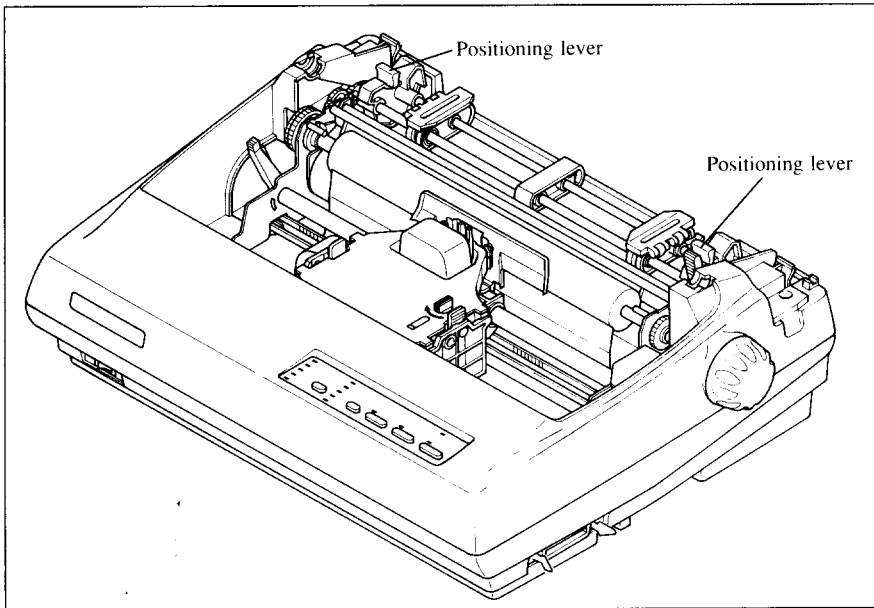
Figure 1-16. Pull up the tractor unit for bottom feeding

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.
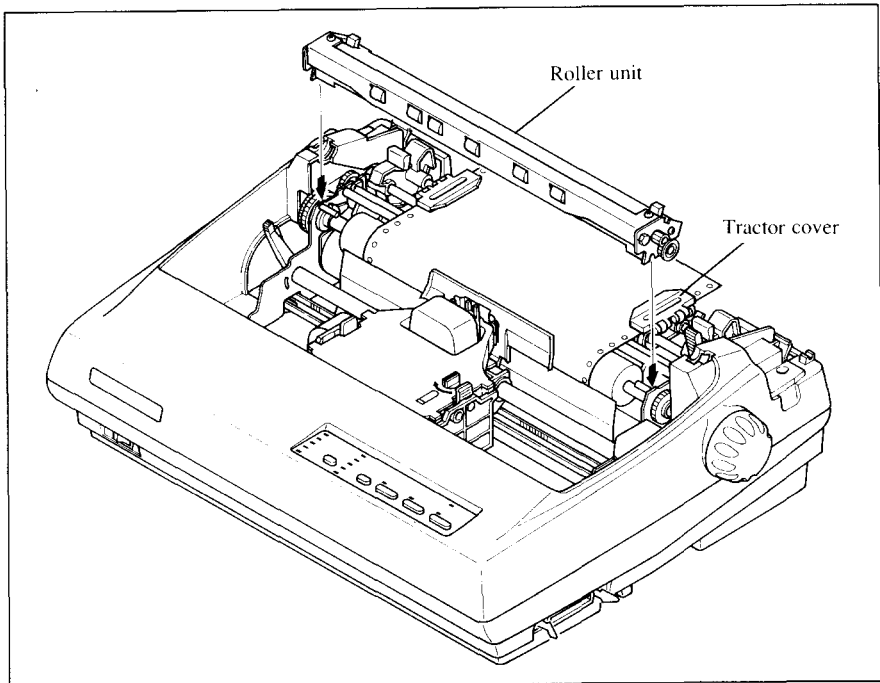
Figure 1-17. Install the roller unit after mounted the fanfold paper from the bottom of the printer.

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⊃ 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 ⊂ˢᴱᵀ/ᴱᴶᴱᶜᵀ⊃ 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 five 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 six 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.)
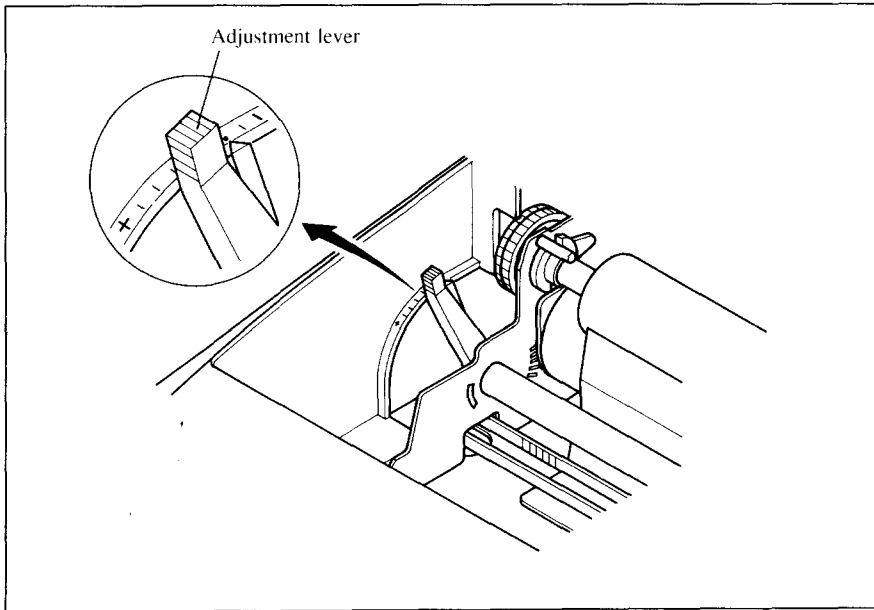

Figure 1-18. Location of the adjustment lever

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
5-ply	40 ~ 58	0.30 ~ 0.33	5th
		0.34 ~ 0.35	6th

NOTE: Pressure sensitive paper is recommended for the multi-part paper. Multi-part mode is recommended when using the 4-ply and 5-ply paper. (Refer to Chapter 3.)

MEMO

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 (color printer only)
- 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 (SET/EJECT PARK), (PAPER FEED), and (ON LINE) (larger buttons).

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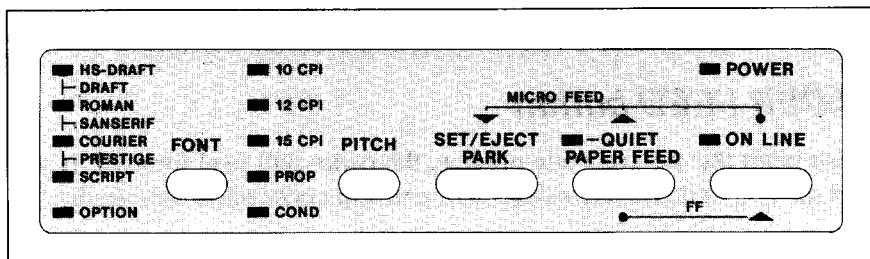

Figure 2-1. Control panel

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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 (Note that semi-condesed pitch is not available in the IBM mode):

Pitch	Indicator(s)
Pica (10 CPI)	10 CPI
Elite (12 CPI)	12 CPI
Semi-condensed (15 CPI)	15 CPI
Condensed pica (17 CPI)	10 CPI, COND
Condensed elite (20 CPI)	12 CPI, COND
Proportional	PROP
Condensed proportional	PROP, COND

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 LQ (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	HS-DRAFT, ROMAN
Roman	ROMAN
Sanserif	ROMAN, COURIER
Courier	COURIER
Prestige	COURIER, SCRIPT
Script	SCRIPT
Option	OPTION
High-Speed Draft	HS-DRAFT

The Option Font selection will be skipped unless a font cartridge is installed.

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.
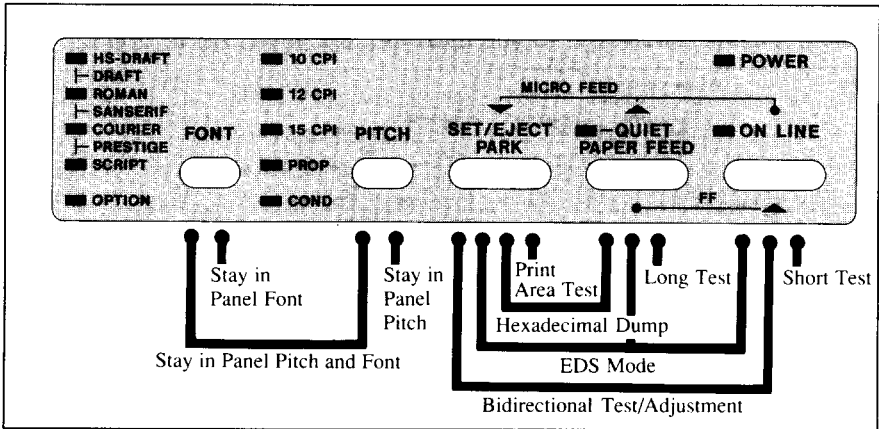

Figure 2-2. Power-up functions of control panel

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 with color printer, each line prints in a different color.)

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

!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmno
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnop
"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopq
#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqr
$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrs
%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrst
&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstu
```

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.

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

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

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

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

```
00 01 02 03 04 05 06 07    08 09 0A 0B 0C 0D 0E 0F    ................
10 11 12 13 14 15 16 17    18 19 1A 1B 1C 1D 1E 1F    ................
20 21 22 23 24 25 26 27    28 29 2A 2B 2C 2D 2E 2F     !"#$%&'()*+,-./
30 31 32 33 34 35 36 37    38 39 3A 3B 3C 3D 3E 3F    0123456789:;<=>?
40 41 42 43 44 45 46 47    48 49 4A 4B 4C 4D 4E 4F    @ABCDEFGHIJKLMNO
50 51 52 53 54 55 56 57    58 59 5A 5B 5C 5D 5E 5F    PQRSTUVWXYZ[\]^_
60 61 62 63 64 65 66 67    68 69 6A 6B 6C 6D 6E 6F    `abcdefghijklmno
70 71 72 73 74 75 76 77    78 79 7A 7B 7C 7D 7E 7F    pqrstuvwxyz{¦}~.
80 81 82 83 84 85 86 87    88 89 8A 8B 8C 8D 8E 8F    ................
90 91 92 93 94 95 96 97    98 99 9A 9B 9C 9D 9E 9F    ................
A0 A1 A2 A3 A4 A5 A6 A7    A8 A9 AA AB AC AD AE AF    ................
B0 B1 B2 B3 B4 B5 B6 B7    B8 B9 BA BB BC BD BE BF    ................
C0 C1 C2 C3 C4 C5 C6 C7    C8 C9 CA CB CC CD CE CF    ................
D0 D1 D2 D3 D4 D5 D6 D7    D8 D9 DA DB DC DD DE DF    ................
E0 E1 E2 E3 E4 E5 E6 E7    E8 E9 EA EB EC ED EE EF    ................
F0 F1 F2 F3 F4 F5 F6 F7    F8 F9 FA FB FC FD FE FF    ................
0D 0A                                                 ..
```

Figure 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 30 in the preceding program and adding the coding shown below.

Coding for IBM-PC with monochrome display:

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

Coding for IBM-PC with color adapter:

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

SWITCH COMBINATION FUNCTIONS

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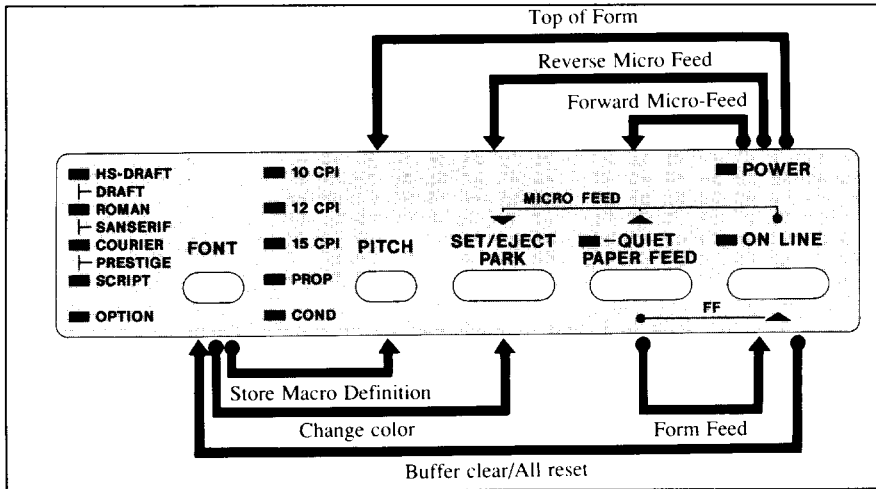
Figure 2-7. Switch combination functions of control panel

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 two 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, the color printer prints with black even if the color ribbon is installed.

Without the aid of software, you can change the printing color as follows:

1. Press the ⊂ON LINE⊃ button to set the printer off-line.
2. Press the ⊂FONT⊃ button and hold it down.
3. While holding the ⊂FONT⊃ button, press the ⊂SET/EJECT PARK⊃ button.
   Each time you press the ⊂SET/EJECT 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	10 CPI
Magenta	ROMAN	Orange	12 CPI
Cyan	COURIER	Green	15 CPI
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 color 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 (color printer only)

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

Chapter 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 25 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 indicators will illuminate to show the selected Bank Number.

* Use the (PITCH) button to select the Switch Number. One of the PITCH indicators 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.
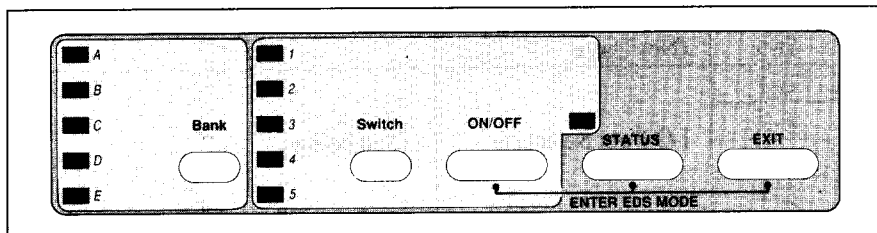
Figure 3-1. Button and indicator functions in the EDS mode

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 Buffer
A-3	Auto LF with CR	Disabled	Enabled
A-4	Auto Sheet Feeder	Not fitted	Fitted
A-5	Graphics Direction	Bi-directional	Uni-directional
B-1	Multi-part	Disabled	Enabled
B-2	Paper-out	Enabled	Disabled
B-3	Tear-off	Disabled	Enabled
B-4	(Reserved)	Leave ON	
B-5	Printable Area	Type A	Type B
C-1	Print Mode	(See below)	
C-2			
C-3	Page Length	(See below)	
C-4			
C-5	(Not Used)		
D-1	Character Table		
	(Standard mode)	Graphics	Italics
	(IBM mode)	IBM #2	IBM #1
D-2	IBM Code page or		
D-3	International	(See below)	
D-4	Character Set		
D-5	(Not Used)		
E-1			
E-2	LQ Font Selection	(See below)	
E-3			
E-4			
E-5	(Not Used)		

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 LQ-860. In IBM mode it operates like the IBM Proprinter X24E. The ON position selects Standard mode. The OFF position selects IBM mode.

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.

NOTE: When you want to download characters with IBM mode by the monochrome version printer, you must install the optional RAM cartridge (RC-32Z). Otherwise, you cannot download even if this switch is set OFF.

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-10DQ, move this switch to the OFF position. Otherwise leave it ON.

Switch A-5: Are you going to print dot graphics uni-directionally?

When printing in dot graphics mode, the printer may either print bidirectionally (in alternate directions) for speed or in one direction only (unidirectional for increased accuracy). For practically all purposes, however, bidirectional printing is sufficiently accurate. In order to print uni-directionally, move this switch to the OFF position.

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 or 5-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.

Switch B-5: Which type of printing area do you want to use for single sheets?

This printer can use two types of printing area format for single sheets.

By putting the switch ON ("Type A"), the top of the first line of printing will start 1/6 inch from the top of the paper, and the printed area will end 1/6 inch from the bottom of the paper.

By putting the switch OFF ("Type B"), the first line of printing will start at one inch from the top of the paper, and the printed area will end 6 mm from the bottom of the printer.

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 LQ	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 14 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

Switches E-1 to E-4: Which font do you want to print as the default Letter Quality?

These switches allows you to choose the default font selected when LQ mode is selected, as shown below.

Font Name	E-1	E-2	E-3	E-4	Font Name	E-1	E-2	E-3	E-4
Roman	ON	ON	ON	ON	Orator 2*	ON	ON	ON	OFF
Sanserif	OFF	ON	ON	ON	TW-Light*	OFF	ON	ON	OFF
Courier	ON	OFF	ON	ON	Letter-Gothic*	ON	OFF	ON	OFF
Prestige	OFF	OFF	ON	ON	Blippo*	OFF	OFF	ON	OFF
Script	ON	ON	OFF	ON	H-Gothic*	ON	ON	OFF	OFF
OCR-B*	OFF	ON	OFF	ON	Orane*	OFF	ON	OFF	OFF
OCR-A*	ON	OFF	OFF	ON	Cinema*	ON	OFF	OFF	OFF
Orator*	OFF	OFF	OFF	ON	Code 39*	OFF	OFF	OFF	OFF

Optional fonts (marked with an asterisk) can be selected only when the corresponding font cartridge is installed in the printer.

If the corresponding font cartridge is not installed, then Roman is selected.

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 graphics printing. This mode will probably be used very rarely.

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

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

   LQ          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 (￼ SET/EJECT PARK ￼) and (PAPER FEED) buttons. The (￼ SET/EJECT PARK ￼) button will move the second pass to the left. The (PAPER FEED) button will move the second pass to the right.

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

                 LQ          0 :   /////////////////////////////////////////
   (SET/EJECT PARK)───►LQ    -1 :   /////////////////////////////////////////
   (PAPER FEED)───►LQ          0 :   /////////////////////////////////////////
   ```

4. When the two passes are aligned with each other to form one continuous line, the bidirectional alignment test is completed.
5. To change the mode for which the bidirectional adjustment is performed, press the (￼ ON LINE ￼) button. This will cycle between "LQ", "DRAFT" and "DRAFT COND".

   Repeat the process for all print modes.

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

                 LQ          0 :   /////////////////////////////////////////
   (SET/EJECT PARK)───►LQ    -1 :   /////////////////////////////////////////
   (PAPER FEED)───►LQ          0 :   /////////////////////////////////////////
   (ON LINE)───►DRAFT          0 :   /////////////////////////////////////////
   (PAPER FEED)───►DRAFT      +1 :   SSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSS
   (SET/EJECT PARK)───►DRAFT   0 :   /////////////////////////////////////////
   ```

6. To save the corrected values and to exit from this mode, press the (PITCH) button.

```
*** DOT ADJUSTMENT SETTING ***
                    LQ          0 :   ///////////////////////////////////////////
( SET/EJECT )──►LQ             -1 :   ///////////////////////////////////////////
(PAPER FEED)──►LQ              0 :   ///////////////////////////////////////////
( ON LINE  )──►DRAFT          0 :   ///////////////////////////////////////////
(PAPER FEED)──►DRAFT         +1 :   ∫∫∫∫∫∫∫∫∫∫∫∫∫∫∫∫∫∫∫∫∫∫∫∫∫∫∫∫∫∫∫∫∫∫∫∫∫∫∫∫∫∫∫∫∫
( SET/EJECT )──►DRAFT         0 :   ///////////////////////////////////////////
( ON LINE  )──►DRAFT COND    0 :   ///////////////////////////////////////////////////////////
    (PITCH)  ──► *** END ***
```

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 LQ-860.
In IBM mode, the printer emulates the IBM Proprinter X24E. 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 com-
mands, 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 recog-
nized.

                   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 brack-
ets: 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

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

Select draft pica characters

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

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

Select draft elite characters

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "I" <8>	27 73 8	1B 49 08

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

Select draft condensed characters

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "I" <DLE>	27 73 16	1B 49 10

Changes to draft quality characters with condensed pitch (17 cpi). Ignored if the (FONT) or (PITCH) button was pressed during power-up.

Select LQ characters

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

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

Select LQ pica characters

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "I" <2>	27 73 2	1B 49 02

Changes to letter quality characters with pica pitch (10 cpi). Ignored if the (FONT) or (PITCH) button was pressed during power-up.

Select LQ elite characters

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "I" <LF>	27 73 10	1B 49 0A

Changes to letter quality characters with elite pitch (12 cpi). Ignored if the (FONT) or (PITCH) button was pressed during power-up.

Select LQ condensed characters

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "I" <DC2>	27 73 18	1B 49 12

Changes to letter quality characters with condensed pitch (17 cpi). Ignored if the (FONT) or (PITCH) button was pressed during power-up.

Select LQ proportional characters

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "I" <3>	27 73 3	1B 49 03

Changes to letter quality characters with proportional pitch. Ignored if the (FONT) or (PITCH) button was pressed during power-up.

Select LQ font

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "k" *n*	27 107 *n*	1B 6B *n*
Std.	<FS> "C" *n*	28 67 *n*	1C 43 *n*

Selects an LQ font according to the value of *n*. In draft mode, this command remains dormant and takes effect later when LQ is selected. Ignored if the (FONT) button was pressed during power-up or the corresponding font is not installed.

n	Font		*n*	Font	
0	Roman		8	Orator 2	(Option)
1	Sanserif		9	TW-Light	(Option)
2	Courier		10	Letter Gothic	(Option)
3	Prestige		11	Blippo	(Option)
4	Script		12	H-Gothic	(Option)
5	OCR-B	(Option)	13	Orane	(Option)
6	OCR-A	(Option)	14	Cinema	(Option)
7	Orator	(Option)	15	Code 39	(Option)

Select font

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

Changes a font according to the value of *n*. Ignored if the (FONT) button was pressed during power-up.

n	Font	*n*	Font
0	Roman	3	Prestige
1	Sanserif	4	Script
2	Courier	9	Draft

Select italic characters

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

Causes subsequent characters to be printed in italics.

Select upright characters

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

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

Emphasized printing

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

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

Cancel emphasized printing

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

Cancels emphasized printing.

Double-strike printing

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

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

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

Cancel double-strike printing

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

Cancels double-strike printing.

Start underlining

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

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

Stop underlining

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

Stops underlining.

Start overlining

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

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

Stop overlining

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

Stops overlining.

Select score

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "(" "–" <3> <0> <1> *n1* *n2*	27 40 45 3 0 1 *n1* *n2*	1B 28 2D 03 00 01 *n1* *n2*

Start score according to the values of *n1* and *n2*, as shown below.

n1	Function		*n2*	Function
1	Underlining		0	Cancel score
2	Strike-through		1	Single continuous line
3	Overlining		2	Double continuous line
			5	Single broken line
			6	Double broken line

Select ornament character

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "q" *n*	27 113 *n*	1B 71 *n*

Selects an ornament character according to the value of *n*, as shown below.

n	Character
0	Normal
1	Outline
2	Shadow
3	Shadow and outline

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
Std.	`<FS> "I" "0"`	28 73 48	1C 49 30
	`<FS> "I" <0>`	28 73 0	1C 49 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
Std.	`<FS> "I" "1"`	28 73 49	1C 49 31
	`<FS> "I" <1>`	28 73 1	1C 49 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> <0> <0> *n1* *n2*	27 91 84 4 0 0 0 *n1* *n2*	1B 5B 54 04 00 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
(∅).

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 either elite or semi-condensed 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 either pica or semi-condensed to elite pitch (12 cpi)
or from condensed pica to condensed elite (20 cpi). Ignored if the
(PITCH) button was pressed during power-up.

Semi-condensed pitch

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "g"	27 103	1B 67

Changes from either pica or elite to semi-condensed pitch (15 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 character width

Mode	ASCII	Decimal	Hexadecimal
Std.	<FS> "E" n	28 69 n	1C 45 n

Select a character width according to the value of n as shown below.

n	Character width
0	Normal-wide
1	Double-wide
2	Triple-wide

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 dots, where n is a number from 0 to 127. Used in microjustification.

Select double or quadruple size

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

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

n	Effect
0	Normal size
1	Double-high, double-wide
2	Quadruple-high, quadruple-wide

Select character size

Mode	ASCII	Decimal	Hexadecimal
Both	"(" "(" "S" ")" ")" *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

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
	<FS> "V" "1"	28 86 49	1C 56 31
	<FS> "V" <1>	28 86 1	1C 56 01

Prints subsequent characters at double height without moving the base line, and without changing the line spacing.

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Return to normal height

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "w" "0"	27 119 48	1B 77 30
	<ESC> "w" <0>	27 119 0	1B 77 00
	<FS> "V" "0"	28 86 48	1C 56 30
	<FS> "V" <0>	28 86 0	1C 56 00

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

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)

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 7/60 or 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 7/60 inch (standard mode) or 7/72 inch (IBM mode).

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/360 inch

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "+" n	27 43 n	1B 2B n
	<FS> "3" n	28 51 n	1C 33 n

Sets the distance the paper advances or reverses in subsequent line feeds to $n/360$ inch, where n is between 0 and 255.

Set base unit for line spacing

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "[" "\" <4> <0> <0> <0> <0> *n*	27 91 92 4 0 0 0 0 *n*	1B 5B 5C 04 00 00 00 00 *n*

Sets the base unit for the line spacing commands, <ESC> "3" and
<ESC> "J". If the value of *n* is 180, the base unit is set to 1/180". If
the value of *n* is 216, the base unit is set to 1/216". If otherwise
specified, this command is ignored. This command becomes effec-
tive only after <ESC> "3" or <ESC> "J" is received, The default
base unit is set to 1/216".

Set line spacing to *n*/180 inch or *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*/180 inch or *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*/60 inch or *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*/60 inch, where *n* is between 0 and 255.
If *n* =0, the line spacing is set to 0.
In IBM mode, this command defines the distance the paper ad-
vances or reverses in subsequent line feeds to *n*/72 inch, where *n* is
between 1 and 85. The new line spacing does not take effect until the
next <ESC> "2" command.

Execute <ESC> "A"

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

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

Line feed

Mode	ASCII	Decimal	Hexadecimal
Both	<LF>	10	0A

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

Reverse line feed

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

Prints the current line and feeds the paper in the reverse direction to the preceding line. See the preceding commands for the line spacing. Ignored when friction feed is used.

Select forward feed mode

Mode	ASCII	Decimal	Hexadecimal
Std.	<FS> "F"	28 70	1C 46

Cancels the reverse feed mode and selects forward feed mode. This is the default setting at power-on.

Select reverse feed mode

Mode	ASCII	Decimal	Hexadecimal
Std.	<FS> "R"	28 82	1C 52

Selects reverse feed mode. Reverses the direction of all vertical movements. Ignored when friction feed or bottom feed is used.

Perform one *n*/180-inch or *n*/216-inch line feed

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

Feeds the paper once by $n/180$ inches or $n/216$ 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*/180-inch reverse line feed

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

Feeds the paper once by $n/180$ 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	$0 \leq n \leq 91$
Semi-condensed	$0 \leq n \leq 114$
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 semi-condensed	$0 \leq n \leq 57$
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	$5 \leq n \leq 96$
Semi-condensed	$6 \leq n \leq 120$
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 semi-condensed	$3 \leq n \leq 60$
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 ($n1$ + $n2$ × 256) dots.

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

Relative horizontal tab in inches

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "d" *n1* *n2*	27 100 *n1* *n2*	1B 64 *n1* *n2*

Sets the next print position to ($n1$ + $n2$ × 256)/120 inches from the current position.

Ignored if this position is beyond the right margin. The maximum position is 8 inches.

Absolute horizontal tab in inches

Mode	ASCII	Decimal	Hexadecimal
Std.	<ESC> "$" *n1* *n2*	27 36 *n1* *n2*	1B 24 *n1* *n2*

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

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Print hex-density 24-bit graphics

Mode	ASCII	Decimal	Hexadecimal
Std.	<FS> "Z" $n1$ $n2$ $m1$ $m2$ $m3$ ...	28 90 $n1$ $n2$ $m1$ $m2$ $m3$ ...	1C 5A $n1$ $n2$ $m1$ $m2$ $m3$ ...

Prints 24-bit dot graphics at 360 dots per inch horizontally. The graphics image is 24 dots high and $n1 + n2 \times 256$ dots wide. Maximum width is 8 inches (2880 dots). In the data $m1$, $m2$, $m3$ ... each three bytes represent 24 vertical dots. In the leftmost position, the most significant bit of $m1$ is the top dot; the least significant bit of $m1$ is the eighth dot from the top; the most significant bit of $m2$ is the ninth dot; the least significant bit of $m2$ is the sixteenth dot from the top; the most significant bit of $m3$ is the seventeenth dot from the top; the least significant bit of $m3$ is the bottom dot. The rest of data is similar. The number of data bytes must be $3 \times (n1 + n2 \times 256)$. Dots beyond the right margin are ignored. At the end of dot graphics printing, the printer returns automatically to character mode.

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 eleven graphics modes depending on the value of $n0$ and prints bit-image graphics in this mode. See <ESC> "K" (for 8-bit graphics) or <FS> "Z" (for 24-bit graphics) for information on $n1, n2, m1, m2, ...$

$n0$	Graphics mode	
0	8-bit Normal-density	(60 dots per inch)
1	8-bit Double-density	(120 dots per inch)
2	8-bit Double-density, double-speed	(120 dots per inch)
3	8-bit Quadruple-density	(240 dots per inch)
4	8-bit CRT graphics, mode I	(80 dots per inch)
6	8-bit CRT graphics, mode II	(90 dots per inch)
32	24-bit Normal-density	(60 dots per inch)
33	24-bit Double-density	(120 dots per inch)
38	24-bit CRT graphics	(90 dots per inch)
39	24-bit Triple-density	(180 dots per inch)
40	24-bit Hex-density	(360 dots per inch)

Select graphics mode

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "[" "g" *n1* *n2* *m0* *m1* *m2* ...	27 91 103 *n1* *n2* *m0* *m1* *m2* ...	1B 5B 67 *n1* *n2* *m0* *m1* *m2* ...

Selects one of eight graphics modes depending on the value of *m0* and prints dot graphics in this mode. The graphics image is ($n1 + n2$ $\times 256$) – 1 dots wide. See <ESC> "K" (for 8-bit graphics) or <FS> "Z" (for 24-bit graphics) for information on *m1*, *m2*, ...

m0	Graphics mode	
0	8-bit Normal-density	(60 dots per inch)
1	8-bit Double-density	(120 dots per inch)
2	8-bit Double-density, double-speed	(120 dots per inch)
3	8-bit Quadruple-density	(240 dots per inch)
8	24-bit Normal-density	(60 dots per inch)
9	24-bit Double-density	(120 dots per inch)
11	24-bit Triple-density	(180 dots per inch)
12	24-bit Hex-density	(360 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 <4> or <6> indicating one of the modes of <ESC> "*".

DOWNLOAD CHARACTER COMMANDS

Define download characters

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

Defines one or more new 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 downloading characters, and this command is ignored.

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*.

The data for each character start with three bytes specifying proportional spacing attributes: the first byte, *m0*, specifies the left of the character; the second byte, *m1*, specifies the character width; the third byte, *m2*, specifies the right of the character. These values must not exceed the following maximum limits:

Character mode	*m1*	*m0 + m1 + m2*
Draft	9	12
·LQ pica	31	36
LQ elite	27	30
LQ semi-condensed	19	24
LQ proportional	37	42
Draft super/subscript	7	12
LQ super/subscript	19	36
LQ prop. super/subscript	37	42

Next comes the dot data. Normal character height is 24 dots, so there must be $3 \times m1$ bytes of dot data. If the printer is in super/subscript mode, however, the character height is 16 dots, so there must be $2 \times m1$ bytes of dot data.

Each data byte indicates eight vertical dots, with the most significant bit being the top dot, and the least significant bit being the bottom dot.

For further details, please refer to chapter 5.

Define download characters

Mode	ASCII	Decimal	Hexadecimal
IBM	\<ESC\> "=" *n1* *n2* "#" *n3* *n4* \<0\> *n5* *m1* *m2* ... *m9* *d1* *d2* ... *dx*	27 61 *n1* *n2* 35 *n3* *n4* 0 *n5* *m1* *m2* ... *m9* *d1* *d2* ... *dx*	1B 3D *n1* *n1* 23 *n3* *n4* 00 *n5* *m1* *m2* ... *m9* *d1* *d2* ... *dx*

Defines new characters and stores them in RAM for later use. EDS switch A-2 must be OFF and the optional RAM cartridge, RC-32Z, must be installed; otherwise RAM is used as an input buffer, not downloading characters, and this command is ignored.

Downloading characters in IBM mode requires Dot Pattern data and Character Index Table data. Dot Pattern data controls which pins fire when printing a character. Index Table data is placed in a "lookup table" that provides information on where Dot Pattern data is stored in memory and defines certain attributes of the character.

$(n1 + n2 \times 256)$ give the number of bytes to be downloaded.
$n3$ and $n4$ indicate the low order and high order addresses in which data is to be stored. $n3$ should be 15 and $n4$ should be 128 for this printer.
$n5$ determines the character mode to be downloaded, as shown below:

$n5$	Character mode	Character width
0	Draft	9
1	LQ pica	35
2	LQ proportional	17 ~ 41
3	LQ elite	29

$m1$ through $m9$ indicate Index Table data.
$m1$ and $m2$ indicate the adress where Dot Pattern is stored. $m1$ is the high-order byte. $m3$ indicates the number of columns in the character memory, and $m4$ indicates the number of columns in the character.
$m5$ through $m9$ are compression mask bits. Data compression allows the efficient use of memory in storing downloaded characters providing space for more characters than would be available without compression. The printer repeats the previous dot column in the current column when the current column compression mask bit is set to 1.
It is necessary to define all of Index Table data before the Dot Pattern data to download many characters.

d1, d2, ... dx is the Dot Pattern data being downloaded.
Each data byte indicates eight vertical dots, with the most significant bit being the top dot, and the least significant bit being the bottom dot.

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	Font		*n*	Font	
0	Roman		8	Orator 2	(Option)
1	Sanserif		9	TW-Light	(Option)
2	Courier		10	Letter Gothic	(Option)
3	Prestige		11	Blippo	(Option)
4	Script		12	H-Gothic	(Option)
5	OCR-B	(Option)	13	Orane	(Option)
6	OCR-A	(Option)	14	Cinema	(Option)
7	Orator	(Option)	15	Code 39	(Option)

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
	<ESC> "t" "2"	27 116 50	1B 74 32
	<ESC> "t" <2>	27 116 2	1B 74 02
Std.	<FS> "I" "2"	28 73 50	1C 49 32
	<FS> "I" <2>	28 73 2	1C 49 02

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

Select draft pica download character set

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

Selects the download character set, draft quality, and pica pitch (10cpi). 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" <FF>	27 73 12	1B 49 0C

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 draft condensed download characters

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "I" <DC4>	27 73 20	1B 49 14

Selects the download character set, draft quality, and condensed pitch (17 cpi). Ignored if the (FONT) button was pressed during power-up or if EDS switch A-2 is ON.

Select LQ pica download characters

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

Selects the LQ download character set with pica pitch (10 cpi). Ignored if the (FONT) button was pressed during power-up or if EDS switch A-2 is ON.

Select LQ elite download characters

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "I" <SO>	27 73 14	1B 49 0E

Selects the LQ download character set with elite pitch (12 cpi). Ignored if the (FONT) button was pressed during power-up or if EDS switch A-2 is ON.

Select LQ condensed download characters

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "I" <SYN>	27 73 22	1B 49 16

Selects the LQ download character set with condensed pitch (17 cpi). Ignored if the (FONT) button was pressed during power-up or if EDS switch A-2 is ON.

Select LQ proportional download characters

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

Selects the LQ download character set with proportional pitch. 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

The commands in this section are valid only with the color printer.

Select print color

Mode	ASCII	Decimal	Hexadecimal
Both	"(" "(" "C" ")" ")" *n*	40 40 67 41 41 *n*	28 28 43 29 29 *n*
	<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		

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.

Set printer off-line

Mode	ASCII	Decimal	Hexadecimal
Std.	<DC3>	19	13
IBM	<ESC> "Q" "S"	27 81 36	1B 51 24

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.

Stop printing

Mode	ASCII	Decimal	Hexadecimal
IBM	<ESC> "j"	27 106	1B 6A

Prints the entire contents of the input buffer, then sets the printer off-line. The ⊂ ON LINE ⊃ indicator on the control panel goes off.

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. Ignored when EDS switch A-5 is set ON.

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. Ignored when EDS switch A-5 is ON.

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 equal to or greater than 1. Ignored if EDS switch A-4 is ON (ASF inactive).

Reset printer

Mode	ASCII	Decimal	Hexadecimal
Both	<ESC> "@"	27 64	1B 40
Std.	<FS> "@"	28 64	1C 40

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

Chapter 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.

Before you start to define your own characters, you must set the EDS switch A-2 to the OFF position. Otherwise, the RAM is used to store the input buffer, and the download commands are ignored. If you want to download characters with IBM mode, you must have the optional RAM cartridge (RC-32Z) installed in the monochrome printer.

DEFINING YOUR OWN CHARACTERS WITH STANDARD MODE

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 characters:

- The matrix or grid on which you design the characters depends upon the print mode as shown below:

Character mode	Horizontal	Vertical
Draft characters	9	24
LQ pica characters	31	24
LQ elite characters	27	24
LQ semi-condesed	19	24
LQ proportional	37	24
Draft super/subscript	7	16
LQ super/subscript	19	16
LQ prop. super/subscript	37	16

- The minimum width of a character is five dots.

- Dots cannot overlap.

- You may define any position in the ASCII table.

Photocopy the grid in Figure 5-1 to help design your new characters. We will use a tiny representation of a telephone symbol for our example.
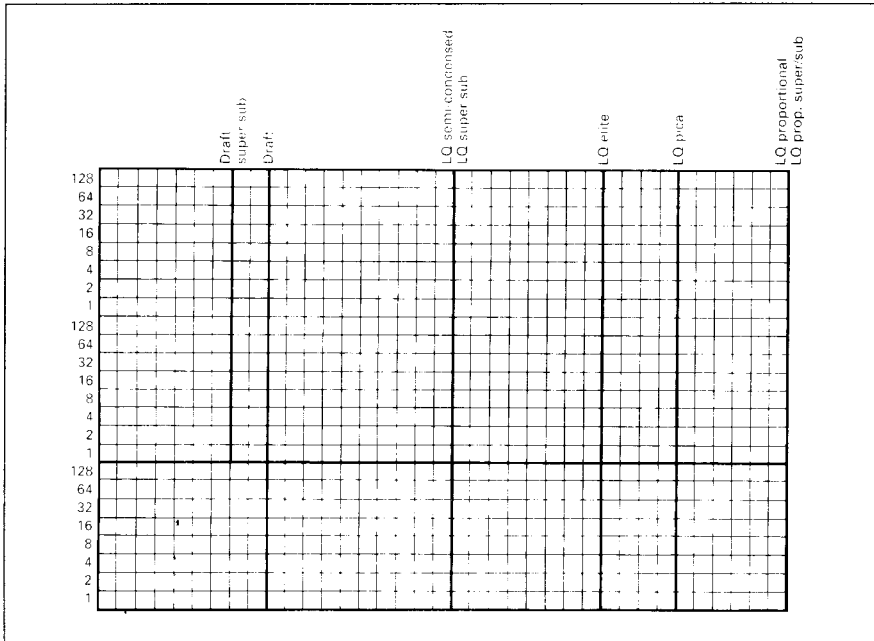
Figure 5-1. Use this grid (or one similar to it) to define your own characters

Assigning the character data

Now, we calculate the vertical numerical values of the columns of dots, and enter them underneath the grid. Each vertical column (which has a maximum of 24 dots) is first divided into three groups (or two groups for super/subscripts) of eight dots. Each group of eight dots is represented by one byte, which consists of eight bits.

This is 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 powers of two we can take any combination of dots in a vertical column and assign them a unique value.
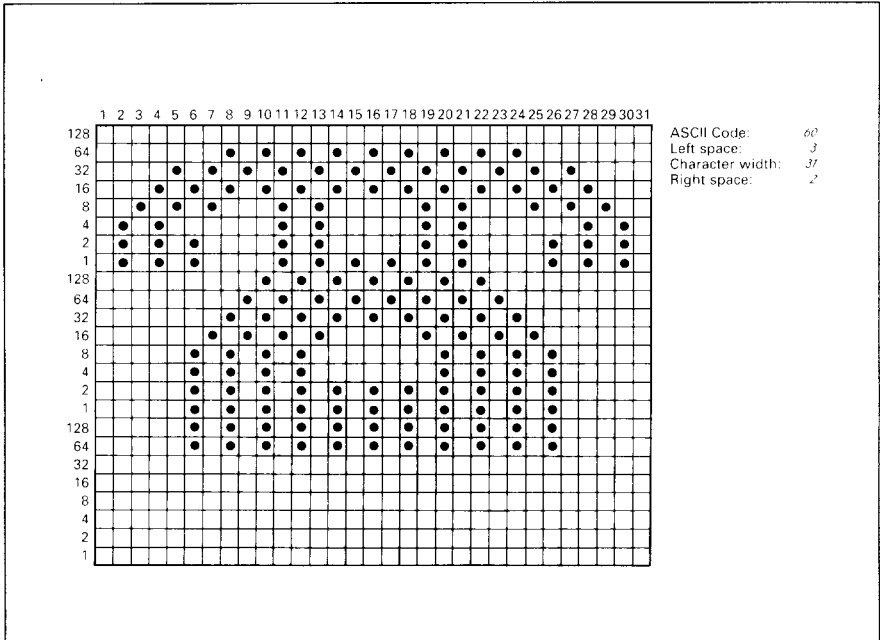
Figure 5-2. Telephone symbol with normal LQ pica

Assigning a value of character space

Besides being able to specify the actual width of the character, this printer allows you to specify the position in the standard grid where the character will print. You must specify the dot column in which the printed character starts and the dot column in which the character ends. Why, you may ask, would you want to define a character this way instead of merely defining the overall width of the character? Because this printer's proportional character definitions can also be used to print normal width characters, and by centering even the narrow characters in the complete grid they will look good even if you are not printing them proportionately.

The three bytes are used to specify the width of the character and the space to be allowed on either side of it. The left space (in dot columns) is specified by *m0* and the right space is specified by *m2*. The second byte (*m1*) specifies the width of the character in dots. By varying the width of the character itself and the spaces around it, you can actually create proportional width characters.

When defining characters, the number of printed columns ($m1$), and the sum of side spaces and the character width ($m0 + m1 + m2$) cannot exceed the value shown below.

Character mode	$m1$	$m0 + m1 + m2$
Draft characters	9	12
LQ pica characters	31	36
LQ elite characters	27	30
LQ semi-condesed	19	24
LQ proportional	37	42
Draft super/subscript	7	12
LQ super/subscript	19	36
LQ prop. super/subscript	37	42

Sample program

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

```
1000 LPRINT WIDTH "LPT1:",255
1010 LPRINT CHR$(27);"x1";
1020 LPRINT CHR$(27);"&";CHR$(0);
1030 LPRINT CHR$(60);CHR$(61);
1040 FOR N=60 TO 61
1050 READ LS :LPRINT CHR$(LS);
1060 READ CW :LPRINT CHR$(CW);
1070 READ RS :LPRINT CHR$(RS);
1080 FOR M=1 TO CW*3
1090 READ MM
1100 LPRINT CHR$(MM);
1110 NEXT M
1120 NEXT N
1130 LPRINT CHR$(27);"D";CHR$(11);CHR$(0)
1140 LPRINT CHR$(27);"k";CHR$(4);
1150 LPRINT CHR$(27);"h";CHR$(1);
1160 LPRINT "    DIFFUSION RANGES OF"
1170 LPRINT "    CARS & TELEPHONES"
1180 LPRINT CHR$(27);"h";CHR$(0);
1190 LPRINT CHR$(27);"k";CHR$(0);
1200 LPRINT CHR$(27);"%";CHR$(1);
1210 LPRINT "USA";CHR$(9);
1220 FOR I=0 TO 681 STEP 25    :LPRINT CHR$(60);  :NEXT I
1230 LPRINT
1240 LPRINT CHR$(9);
1250 FOR I=0 TO 781 STEP 25    :LPRINT CHR$(61);  :NEXT I
1260 LPRINT
1270 LPRINT "GERMANY";CHR$(9);
1280 FOR I=0 TO 412 STEP 25    :LPRINT CHR$(60);  :NEXT I
1290 LPRINT
1300 LPRINT CHR$(9);
1310 FOR I=0 TO 488 STEP 25    :LPRINT CHR$(61);  :NEXT I
1320 LPRINT
1330 LPRINT "JAPAN";CHR$(9);
```

```
1340 FOR I=0 TO 347 STEP 25    :LPRINT CHR$(60);    :NEXT I
1350 LPRINT
1360 LPRINT CHR$(9);
1370 FOR I=0 TO 493 STEP 25    :LPRINT CHR$(61);    :NEXT I
1380 LPRINT
1390 LPRINT CHR$(9);"+-";
1400 SCALE$="+-+-"
1410 FOR I=2 TO 8              :LPRINT SCALE$;     :NEXT I
1420 LPRINT "+-+"
1430 LPRINT CHR$(9);"0 ";
1440 FOR I=1 TO 8
1450 LPRINT "  ";I;
1460 NEXT I
1470 LPRINT CHR$(27);"%";CHR$(0)
1480 LPRINT CHR$(27);"M";
1490 LPRINT CHR$(27);"S";CHR$(0);
1500 LPRINT CHR$(9);"(100 UNITS/1000 PERSONS)"
1510 LPRINT CHR$(27);"T";
1520 LPRINT CHR$(27);"@"
1530 END
2000 ' DATA
2010 ' Telephone Symbol
2020 DATA    3, 31,  2
2030 DATA    0,  0,  0,  7,  0,  0,  8,  0,  0, 23,  0,  0, 40,  0,  0
2040 DATA   19, 15,192, 40, 16,  0, 80, 47,192, 32, 80,  0, 80,175,192
2050 DATA   47, 80,  0, 80,175,192, 47, 80,  0, 80,163,192, 33, 64,  0
2060 DATA   80,163,192, 33, 64,  0, 80,163,192, 47, 80,  0, 80,175,192
2070 DATA   47, 80,  0, 80,175,192, 32, 80,  0, 80, 47,192, 40, 16,  0
2080 DATA   19, 15,192, 40,  0,  0, 23,  0,  0,  8,  0,  0,  7,  0,  0
2090 DATA    0,  0,  0
2100 ' Car Symbol
2110 DATA    3, 31,  2
2120 DATA    0,  0,  0,  0, 30,  0,  0,  0,  0,  0, 60,  0,  0,  3,  0
2130 DATA    0,252,128,  0,  3, 64,  1,252,128,  2,  3, 64,  5,124,128
2140 DATA   10,  3,  0, 20,124,  0, 40,  0,  0, 80,126,  0, 32,  0,  0
2150 DATA   64,126,  0, 63,128,  0, 64,126,  0, 63,128,  0, 64,124,  0
2160 DATA   32,  3,  0, 64,124,128, 32,  3, 64, 64,124,128, 48,  3, 64
2170 DATA. 76,124,128, 51,  3,  0, 12,252,  0,  3,  0,  0,  0,254,  0
2180 DATA    0,  0,  0
```

DIFFUSION RANGES OF
CARS & TELEPHONES

```
USA        ☎☎☎☎☎☎☎☎☎☎☎☎☎☎☎☎☎☎☎☎☎☎☎☎☎☎☎☎☎☎
           🚗🚗🚗🚗🚗🚗🚗🚗🚗🚗🚗🚗🚗🚗🚗🚗🚗🚗🚗🚗🚗🚗🚗🚗🚗🚗🚗🚗
GERMANY    ☎☎☎☎☎☎☎☎☎☎☎☎☎☎☎☎☎
           🚗🚗🚗🚗🚗🚗🚗🚗🚗🚗🚗🚗🚗🚗🚗🚗🚗🚗
JAPAN      ☎☎☎☎☎☎☎☎☎☎☎☎☎☎
           🚗🚗🚗🚗🚗🚗🚗🚗🚗🚗🚗🚗🚗🚗🚗🚗
           +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
           0   1   2   3   4   5   6   7   8
           (100 UNITS/1000 PERSONS)
```

DEFINING YOUR OWN CHARACTERS WITH IBM MODE

Downloading fonts in IBM mode requires downloading character Dot Pattern data and character Index Table data. Dot pattern data controls which pins fire when printing a character. Index Table data is placed in a "lookup table" that provides information on where Dot Pattern data is stored in memory and defines certain attributes of the character.

Assigning the download character set

You can define one or more download character sets for later use in IBM mode. Before you start to design your characters, you must define what character set(s) you want to download.

The character width on which you design the characters depends upon the character set as shown below:

Character set	Character width	Character ID
Draft characters	9	0
LQ pica characters	35	1
LQ elite characters	29	2
LQ proportional	17 ~ 41	3

After you have decided your download character set, you must tell the printer where 'the download character data to be stored, and how many download character sets you will define.

The first download font area starts from <800F>h, and you must enter 0 for the Format byte. This Format byte indicates to the printer that the RAM cartridge has stored the download character set.

Following the format byte, you must enter the Character ID data. If you want to define more character set, add 128 to the Character ID data.

The second area starts from <8911>h, the third area starts from <9212>h, and the last area starts from <9B13>h. But you need not enter the Format byte for these area.

Assigning the character dot pattern

We will use a tiny representation of a telephone symbol for our example.
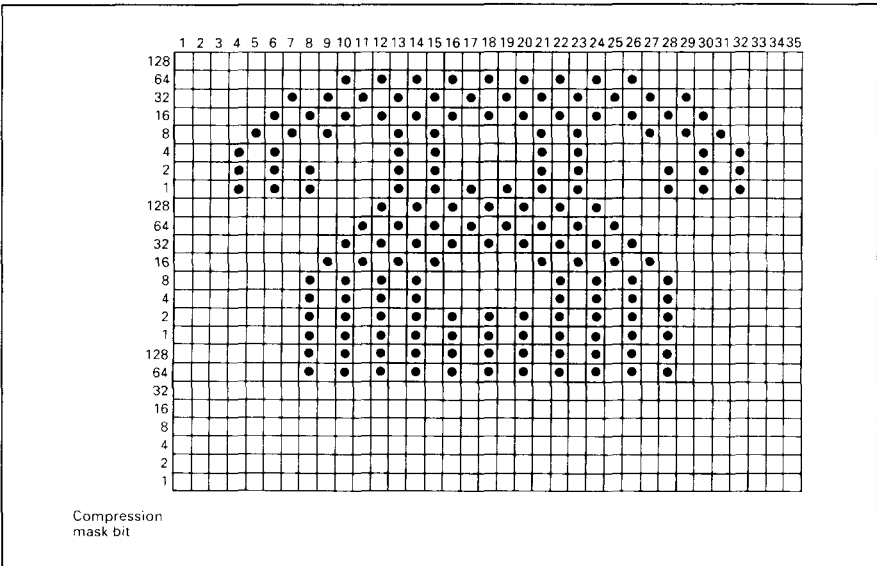
Figure 5-3. Telephone symbol with LQ pica

After you have designed the character pattern, you will need to compress the Dot Pattern. Data compression allows you to store more download characters than 'without compression. It is a more efficient use of memory. The printer will repeat the previous dot column when the current column compression mask bit is set to "1".

Fill up the adjacent dot even they do not print, then compare the each veritcal line to the left line. If the line is the same as the left one, write "1" in the column of the "compression mask bit". If it is different, write "0".
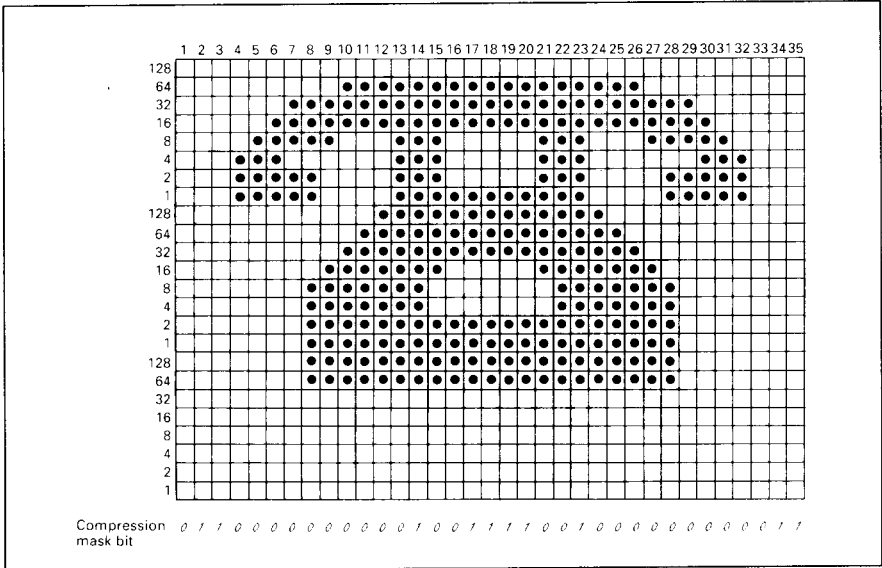
Figure 5-4. Fill up the adjacent dot, then write the "compression data"

After you have written the "compression mask bit" data, line up all the character data for the "compression mask bit" that requires "0". The telephone symbol looks like Figure 5-5.
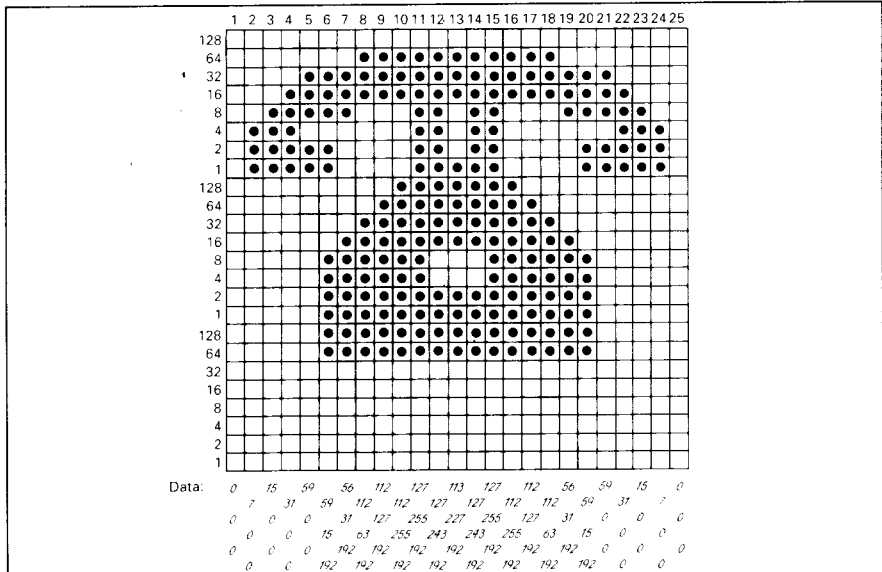
Figure 5-5. Compressed character pattern of telephone symbol

Now we will calculate the vertical numerical values of the columns of dots, and enter them underneath the grid. Each vertical column is first divided into three groups of eight dots. Each group of eight dots is represented by one byte, which consists of eight bits.

This is 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 powers of two we can take any combination of dots in a vertical column and assign them a unique value.

Assigning the Index Table data

Unlike defining in the Standard mode, you must assign the Index Table with the IBM mode. This Index Table is prepared for the information of each characters attribute data, such as character type (Normal 24-dot high, or 30-dot high block graphics), the dot pattern data in the memory, and the compression mask bit data.

Each character requires 9 index table data.

The first and the second bytes ($m1$ and $m2$) indicates the position of the first dot pattern in the memory. $m1$ is the high order byte, and $m2$ is the low order byte.

The third byte, $m3$, indicates the character type and the dot pattern data width in the memory.
If the character is normal, simply enter the width of dot pattern in the memory. If the character is a block graphic, add 128 to the width of dot pattern in the memory.
Our telephone symbol is a normal character and the width of the dot pattern in the memory should be 25, so this value is 25.

The fourth byte, $m4$, indicates the printing attribute.
This byte indicates the character width to be printed, and information of the repetition dots for block graphics characters.
If the character is a normal character, add 192 to the character width.
If the character is a block character, and it should be printed as a line draw character, add 64 to the character width. If the block character is not a line draw character, this byte should be the same as the character width.
Our telephone symbol is a normal pica character, so the character width is 35, and this byte should be 227.

The remaining five bytes ($m5$ through $m9$) indicate the compression mask bits. Each bits shows the data that will translate the compressed dot pattern data back to the original character pattern.

For example, the compression mask bits of our telephone symbol are 01100000 00000100 11110010 00000000 01100000. So these bytes are 96, 4, 242, 0, and 96.

You must define the index table data for all characters from 0 to 255. If you do not want to define a particular character, enter 0 into that index table data.

Sample program

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

```
1000 LPRINT WIDTH "LPT1:",255
1010 LPRINT CHR$(27);"=";CHR$(164);CHR$(9);"#";
1020 LPRINT CHR$(&H0F);CHR$(&H80);CHR$(0);
1030 ' INDEX TABLE
1040 LPRINT CHR$(1);
1050 FOR I=0 TO 59
1060 LPRINT STRING$(9,0);
1070 NEXT I
1080 FOR IT=1 TO 9 :READ MM :LPRINT CHR$(MM); :NEXT IT
1090 FOR IT=1 TO 9 :READ MM :LPRINT CHR$(MM); :NEXT IT
1100 FOR I=62 TO 255
1110 LPRINT STRING$(9,0);
1120 NEXT I
1130 ' DOT PATTERN
1140 FOR DP=1 TO 159
1150 READ MM
1160 LPRINT CHR$(MM);
1170 NEXT DP
1180 ' PRINTOUT PROGRAM
1190 LPRINT CHR$(27);"D";CHR$(11);CHR$(0)
1200 LPRINT CHR$(27);"k";CHR$(4);
1210 LPRINT CHR$(27);"h";CHR$(1);
1220 LPRINT "    DIFFUSION RANGES OF"
1230 LPRINT "     CARS & TELEPHONES
1240 LPRINT CHR$(27);"h";CHR$(0);
1250 LPRINT CHR$(27);"k";CHR$(0)
1260 LPRINT "USA";CHR$(9);
1270 LPRINT CHR$(27);"I";CHR$(6);
1280 FOR I=0 TO 681 STEP 25 :LPRINT CHR$(60); :NEXT I
1290 LPRINT
1300 LPRINT CHR$(9);
1310 FOR I=0 TO 781 STEP 25 :LPRINT CHR$(61); :NEXT I
1320 LPRINT CHR$(27);"I";CHR$(2)
1330 LPRINT "GERMANY";CHR$(9);
1340 LPRINT CHR$(27);"I";CHR$(6);
1350 FOR I=0 TO 412 STEP 25 :LPRINT CHR$(60); :NEXT I
1360 LPRINT
1370 LPRINT CHR$(9);
1380 FOR I=0 TO 488 STEP 25 :LPRINT CHR$(61); :NEXT I
1390 LPRINT CHR$(27);"I";CHR$(2)
```

```
1400 LPRINT "JAPAN";CHR$(9);
1410 LPRINT CHR$(27);"I";CHR$(6);
1420 FOR I=0 TO 347 STEP 25 :LPRINT CHR$(60); :NEXT I
1430 LPRINT
1440 LPRINT CHR$(9);
1450 FOR I=0 TO 493 STEP 25 :LPRINT CHR$(61); :NEXT I
1460 LPRINT CHR$(27);"I";CHR$(2)
1470 LPRINT CHR$(9);"+-";
1480 SCALE$="+-+-"
1490 FOR I=0 TO 2              :LPRINT SCALE$;   :NEXT I
1500 LPRINT "+-+"
1510 LPRINT CHR$(9);"0 ";
1520 FOR I=1 TO 8
1530 LPRINT " ";I;
1540 NEXT I
1550 LPRINT CHR$(27);":";
1560 LPRINT CHR$(27);"S";CHR$(0);
1570 LPRINT CHR$(9);"(100 UNITS/1000 PERSONS)"
1580 LPRINT CHR$(27);"T";
1590 LPRINT CHR$(27);"@"
1600 END
2000 ' DATA
2010 ' Index Table Data
2020 DATA 137, 17, 25,227, 96,  4,242,  0, 96
2030 DATA 137, 92, 28,227, 96,  0, 80, 64, 96
2040 ' Dot Pattern Data
2050 '  Telephone symbol
2060 DATA   0,  0,  0,  7,  0,  0, 15,  0,  0, 31,  0,  0, 59,  0,  0
2070 DATA  59, 15,192, 56, 31,192,112, 63,192,112,127,192,112,255,192
2080 DATA 127,255,192,127,243,192,113,227,192,127,243,192,127,255,192
2090 DATA 112,255,192,112,127,192,112, 63,192, 56, 31,192, 59, 15,192
2100 DATA  59,  0,  0, 31,  0,  0, 15,  0,  0,  7,  0,  0,  0,  0,  0
2110 '  Car symbol
2120 DATA   0,  0,  0,  0, 30,  0,  0, 28,  0,  0, 60,  0,  0, 63,  0
2130 DATA   0,255,128,  0,255,192,  1,255,192,  3,255,192,  7,127,128
2140 DATA  14,127,  0, 28,124,  0, 56,124,  0,112,126,  0, 96,124,  0
2150 DATA 127,254,  0,127,252,  0, 96,124,  0, 96,127,  0, 96,127,128
2160 DATA  96,127,192,112,127,192,124,127,128, 63,127,  0, 15,124,  0
2170 DATA   3,124,  0,  0,254,  0,  0,  0,  0
```

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 LQ-860 as your printer to be selected.
If this is not mentioned, choose one of the following (in order of preference): Star XB24-10 Color, Star LC24-10, Epson LQ-850.

If you have your printer set up with the EDS switches to emulate an IBM Proprinter X24E, simply choose this from the list of printers available in the application software list.
If the IBM Proprinter X24E is not mentioned, select the Proprinter X24.

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 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
Semi-condensed	15	120
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 configuration of your application software, seek expert advice. Your software supplier will probably be your most qualified reference.

EMBEDDING PRINTER COMMANDS

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

Font:	((F))0	Roman
	((F))1	Sanserif
	((F))2	Courier
	((F))3	Prestige
	((F))4	Script
	((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 Script, then change to regular-size fonts for other text, you can use these commands as follows:

File as seen on computer screen:

```
((F))4 ((S))3
Printer commands
((F))0 ((S))0
Font commands ((F))1can be ((F))2embedded
((F))3anywhere ((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.

- The color ((C)) command is valid only with the color printer.

- A line consisting of command 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 letter quality, and select elite pitch with the Standard mode. You can find the commands in Chapter 4. We suggest the following:

- 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 LQELITE.DAT. To use the DOS line editor, type the command EDLIN LQELITE.DAT, then type the underlined parts of the following display. Press RETURN at the end of each line. Do not type the symbol "^". This symbol means to hold the CTRL key down while pressing the next key: for example, ^V means to type CTRL-V. ^C means to type CTRL-C, which indicates the end of the input.

```
A>EDLIN LQELITE.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 LQELITE.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 LQ elite type, give the following two commands:

```
A>COPY LQELITE.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 LQPRINT.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 LQPRINT.BAT
COPY LQELITE.DAT PRN
PRINT %1
^Z
A>LQPRINT README.DOC
```

The first line above is a copy command from the CONsole screen to a file named LQPRINT.BAT. The next two lines are the contents of this file. The %1 is a dummy parameter: whatever file name you type after LQPRINT 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 L$=E$+"x1"                                  'Letter quality
1040 RM$=E$+"k0"+L$                              'Roman characters
1050 SA$=E$+"k1"+L$                              'Sanserif characters
1060 CO$=E$+"k2"+L$                              'Courier characters
1070 PR$=E$+"k3"+L$                              'Prestige characters
1080 SC$=E$+"k4"+L$                              'Script characters
1090 H$=CHR$(9)                                  'Horizontal tab
1100 PI$=E$+"P"                                  'Pica pitch
1110 ' Start printing
1120 WIDTH "LPT1:",255
1130 LPRINT E$;"D";CHR$(3);CHR$(24);CHR$(0)     'Set HT
1140 LPRINT RM$;"Resident fonts are:"
1150 LPRINT H$;D$;"Draft characters,";
1160 LPRINT H$;RM$;"Roman characters,"
1170 LPRINT H$;SA$;"Sanserif characters,";
1180 LPRINT H$;CO$;"Courier characters,"
1190 LPRINT H$;PR$;"Prestige characters,";
1200 LPRINT H$;SC$;"Script characters."
1210 LPRINT
1220 LPRINT RM$;"Print pitches are:"
1230 LPRINT H$;PI$;"Pica pitch (10 CPI),";
1240 LPRINT H$;E$;"M";"Elite pitch (12 CPI),"
1250 LPRINT H$;E$;"g";"Semi-condensed pitch (15 CPI),";
1260 LPRINT H$;PI$;
1270 LPRINT CHR$(15);                           'Select condensed print
1280 LPRINT "Condensed pica pitch (17 CPI),"
1290 LPRINT H$;E$;"M";"Condensed elite pitch (20 CPI),";
1300 LPRINT CHR$(18)                            'Cancel condensed print
1310 LPRINT H$;E$;"p1";                         'Select proportional spacing
1320 LPRINT PI$;"Normal proportional,";
1330 LPRINT H$;CHR$(15);"Condensed proportional.";
1340 LPRINT CHR$(18);
1350 LPRINT E$;"p0"                             'Cancel proportional spacing
1360 LPRINT
1370 LPRINT H$;E$;"w1";"Double-height,";E$;"w0"
1380 LPRINT H$;E$;"W1";"Double width, ";E$;"W0"
1390 LPRINT H$;CHR$(28);"E";CHR$(2);"Triple width,";
1400 LPRINT CHR$(28);"E";CHR$(0)
1410 LPRINT H$;E$;"h";CHR$(1);"Double-sized,"
1420 LPRINT H$;E$;"h";CHR$(2);"Quad-sized.";
1430 LPRINT E$;"h";CHR$(0)
1440 LPRINT :LPRINT
1450 LPRINT E$;"Q";CHR$(47)                     'Set right margin
1460 LPRINT RM$;"Various line and character spacings:"
1470 LPRINT E$;"a1"                             'Center text
1480 FOR I=1 TO 7
1490 LPRINT E$;"A";CHR$(I);                     'Line spacing set
1500 LPRINT E$;" ";CHR$(I);                     'Increase character space
1510 LPRINT "THE SPACINGS ARE CHANGED"
1520 NEXT I
1530 FOR I=7 TO 1 STEP -1
```

```
1540 LPRINT E$;"A";CHR$(I);              'Line spacing set
1550 LPRINT E$;" ";CHR$(I);             'Increase character space
1560 LPRINT "THE SPACINGS ARE CHANGED"
1570 NEXT I
1580 LPRINT E$;"a0"                     'Left justify
1590 LPRINT E$;"3";CHR$(30);            'Set 1/6" line spacing
1600 LPRINT E$;" ";CHR$(0);             'Normal character space
1610 LPRINT :LPRINT
1620 LPRINT RM$;"Other features:"
1630 LPRINT H$;E$;"q";CHR$(1);"OUTLINED";E$;"q";CHR$(0);", ";
1640 LPRINT E$;"q";CHR$(2);"SHADOWED";E$;"q";CHR$(0);", ";
1650 LPRINT E$;"q";CHR$(3);"OUTLINED WITH SHADOWED";
1660 LPRINT E$;"q";CHR$(0);", "
1670 LPRINT H$;E$;"E";"Emphasized";E$;"F";", ";
1680 LPRINT E$;"G";"Double-strike";E$;"H";", ";
1690 LPRINT E$;"4";"Italics";E$;"5";", "
1700 LPRINT H$;E$;"-1";"Underlining";E$;"-0";", ";
1710 LPRINT E$;"(-";CHR$(3);CHR$(0);CHR$(1);CHR$(2);CHR$(2);
1720 LPRINT "Strike-through";
1730 LPRINT E$;"(-";CHR$(3);CHR$(0);CHR$(1);CHR$(2);CHR$(0);", ";
1740 LPRINT E$;"(-";CHR$(3);CHR$(0);CHR$(1);CHR$(3);CHR$(1);
1750 LPRINT "Overlining";
1760 LPRINT E$;"(-";CHR$(3);CHR$(0);CHR$(1);CHR$(3);CHR$(0);", "
1770 LPRINT H$;E$;"S0";"SUPERSCRIPT";E$;"T";" and ";
1780 LPRINT E$;"S1";"SUBSCRIPT";E$;"T";", "
1790 LPRINT H$;RM$;"Download characters: ";
1800 SS$=E$+"S0"                        'Superscript
1810 GOSUB 2520
1820 LPRINT E$;"%1";                    'Select download character
1830 FOR I=1 TO 5
1840 LPRINT CHR$(60);                   'Print download character
1850 NEXT I
1860 LPRINT E$;"%0";                    'Select normal character
1870 LPRINT E$;"T";                     'Cancel superscript
1880 GOSUB 2650
1890 LPRINT E$;"%1";                    'Select download character
1900 FOR I=1 TO 5
1910 LPRINT CHR$(60);                   'Print download character
1920 NEXT I
1930 LPRINT E$;"%0";                    'Select normal character
1940 SS$=E$+"S1"                        'Subscript
1950 GOSUB 2520
1960 LPRINT E$;"%1";                    'Select download character
1970 FOR I=1 TO 5
1980 LPRINT CHR$(60);                   'Print download character
1990 NEXT I
2000 LPRINT E$;"%0";                    'Select normal character
2010 LPRINT E$;"T"                      'Cancel superscript
2020 LPRINT H$;RM$;"Dot graphics:"
2030 RESTORE 3170
2040 LPRINT E$;"A";CHR$(8);             'Set 8/60" line spacing
2050 FOR I=1 TO 3
2060 LPRINT E$;"f0";CHR$(8);
2070 LPRINT E$;"*";CHR$(33);CHR$(240);CHR$(0);
2080 FOR J=1 TO 240*3
2090 READ DAT
2100 LPRINT CHR$(DAT);
2110 NEXT J
2120 LPRINT
2130 NEXT I
2140 LPRINT E$;"@"                      'Initialize printer
2150 END
2500 '
2510 ' SUBROUTINES
2520 ' Define super/subscript download character
```

```
2530 LPRINT SS$;                              'Select super/subscript·
2540 LPRINT E$;"&";CHR$(0);CHR$(60);CHR$(60);
2550 RESTORE 3010
2560 READ LS :LPRINT CHR$(LS);
2570 READ CW :LPRINT CHR$(CW);
2580 READ RS :LPRINT CHR$(RS);
2590 FOR M=1 TO CW*2
2600 READ MM
2610 LPRINT CHR$(MM);
2620 NEXT M
2630 RETURN
2640 '
2650 ' Define LQ pica download character
2660 LPRINT C$;
2670 LPRINT E$;"&";CHR$(0);CHR$(60);CHR$(60);
2680 RESTORE 3070
2690 READ LS :LPRINT CHR$(LS);
2700 READ CW :LPRINT CHR$(CW);
2710 READ RS :LPRINT CHR$(RS);
2720 FOR M=1 TO CW*3
2730 READ MM
2740 LPRINT CHR$(MM);
2750 NEXT M
2760 RETURN
3000 ' DATA
3010 ' Super/subscript download character data
3020 DATA    9, 19,  8
3030 DATA   12,  0, 16,  0, 44,  0, 80,120, 32,128, 95,120, 32,128
3040 DATA   95,120, 32,128, 65,120, 32,128, 95,120, 32,128, 95,120
3050 DATA   32,128, 80,120, 44,  0, 16,  0, 12,  0
3060 '
3070 ' LQ pica download characer data
3080 DATA    3, 31,  2
3090 DATA    0,  0,  0,  7,  0,  0,  8,  0,  0, 23,  0,  0, 40,  0,  0
3100 DATA   19, 15,192, 40, 16,  0, 80, 47,192, 32, 80,  0, 80,175,192
3110 DATA   47, 80,  0, 80,175,192, 47, 80,  0, 80,163,192, 33, 64,  0
3120 DATA   80,163,192, 33, 64,  0, 80,163,192, 47, 80,  0, 80,175,192
3130 DATA   47, 80,  0, 80,175,192, 32, 80,  0, 80, 47,192, 40, 16,  0
3140 DATA   19, 15,192, 40,  0,  0, 23,  0,  0,  8,  0,  0,  7,  0,  0
3150 DATA    0,  0,  0
3160 '
3170 ' Dot graphics data
3180 ' 1st Line
3190 DATA    0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
3200 DATA    0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
3210 DATA    0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
3220 DATA    0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
3230 DATA    0,  0,  0,  0,  0,  0,  0,  0,  0,  0,127,255,  0,255,255
3240 DATA    1,255,255,  3,  0,  0,  7,  0,  0,  7,  0,  0, 15,  0,  0
3250 DATA   31,  0,  0, 31,  0,  0, 31,  0,  0, 31,  0,  0, 31,  0,  0
3260 DATA   31,  0,  0, 31,  0,  0, 31,  0,  0, 31,  0,  0, 31,  0,  0
3270 DATA   31,  0,  0, 31,  0,  0, 31,  0,  0, 31,  0,  0, 31,  0,  0
3280 DATA   31,  0,  0, 31,128,  0, 31,224,  0, 31,248,  0, 31,255,  0
3290 DATA   31,255,224, 15,255,248,  7,255,255,  1,255,255,  0,127,255
3300 DATA    0,  7,255,  0,  0,255,  0,  0, 63,  0,  0, 63,  0,  0,248
3310 DATA    0,  3,192,  0, 63,  0,  0,248,  0,  1,128,  0,  3,  0,  0
3320 DATA    7,  0,  0, 15,  0,  0, 15,  0,  0, 31,  0,  0, 31,  0,  0
3330 DATA   31,  0,  0, 31,  0,  0, 31,  0,  0, 31,  0,  0, 31,  0,  0
3340 DATA   31,  0,  0, 31,  0,  0, 31,  0,  0, 31,  0,  0, 31,  0,  0
3350 DATA   31,  0,  0, 31,  0,  0, 31,  0,  0, 31,  0,  0, 31,  0,  0
3360 DATA   31,255,255, 31,255,255, 31,255,255, 31,255,255, 31,255,255
3370 DATA   31,255,255, 15,255,255,  0,  0,  0,  0,  0,  0,  0,  0,  0
3380 DATA    0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
3390 DATA    0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
3400 DATA    0,  0,  0,  0,  0, 60,  0,  3,255,  0, 11,195,  0, 28,  0
```

```
3410 DATA   0, 12,  0,  0, 96,  0,  0,192,  0,  0,192,  0,  1,128,  0
3420 DATA   3,  0,  0,  3,  0,  0,  7,  0,  0,  7,  0,  0, 15,  0,  0
3430 DATA  15,  0,  0, 31,  0,  0, 31,  0,  0, 31,  0,  0, 31,  0, 15
3440 DATA  31,  0, 31, 31,  0, 31, 31,  0, 31, 31,  0, 31, 31,  0, 31
3450 DATA  31,  0, 31, 31,  0, 31, 31,  0, 31, 31,  0, 31, 31,  0, 31
3460 DATA  31,  0, 31, 31,  0, 31, 31,  0, 31, 31,  0, 31, 31,  0, 31
3470 DATA  31,  0, 31, 31,  0, 31, 31,  0, 31, 31,  0, 31, 31,  0, 63
3480 DATA  31,255,255, 31,255,255, 31,255,247, 31,255,231, 31,255,199
3490 DATA  15,255,135,  7,255,  7,  0,  0,  3,  0,  0,  1,  0,  0,  0
3500 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
3510 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,254,  0
3520 DATA   1,255,240,  3,135,255,  7,  0, 63, 15,  0,  0, 15,  0,  0
3530 DATA  31,  0,  0, 31,  0,  0, 31,  0,  0, 31,  0,  0, 31,  0,  0
3540 DATA  31,  0,  0, 31,  0,  0, 31,  0,  0, 31,128,  0, 31,128,  0
3550 DATA  31,192,  0, 31,255,  0, 31,255,255, 31,255,255, 31,255,255
3560 DATA  31,255,255, 15,255,255,  7,255,255,  0,255,240,  1,254,  0
3570 DATA   1,240,  0,  3,128,  0,  7,  0,  0, 15,  0,  0, 31,  0,  0
3580 DATA  31,  0,  0, 31,  0,  0, 31,  0,  0, 31,  0,  0, 31,  0,  0
3590 DATA  31,  0,  0, 31,  0,  0, 31,  0,  0, 31,128,  0, 31,128,  0
3600 DATA  31,192,  0, 31,240,  0, 31,255,  0, 31,255,240, 31,255,255
3610 DATA  31,255,255,  7,255,255,  0,255,255,  0,255,255,  1,255,240
3620 DATA   3,192,  0,  7,128,  0, 15,  0,  0, 31,  0,  0, 31,  0,  0
3630 DATA  31,  0,  0, 31,  0,  0, 31,  0,  0, 31,  0,  0, 31,  0,  0
3640 DATA  31,  0,  0, 31,  0,  0, 31,  0,  0, 31,  0, 15, 31,135,255
3650 DATA  31,255,255, 31,255,255, 31,255,255, 31,255,255, 31,255,240
3660 DATA  15,252,  0, 47,128,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
3670 ' 2nd Line
3680 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
3690 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
3700 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
3710 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
3720 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,255,255,255,255,255,255
3730 DATA 255,255,255,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
3740 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
3750 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
3760 DATA 255,255,255, 31,255,255,  7,255,255,  0,255,255,  0, 31,255
3770 DATA   0,  3,255,  0,  0,255,  0,  0, 31,  0,  0,  7,  0,  0,  0
3780 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,224,  0,  0,252,  0,  0
3790 DATA 254,  0,  0,248,  0,  0,192,  0,  0,  0,  0,  0,  0,  0,  0
3800 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  7,  0,  0, 63
3810 DATA   0,  1,255,  0, 15,255,  0,127,255,  1,255,255, 15,255,255
3820 DATA 255,255,255,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
3830 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
3840 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
3850 DATA 255,255,255,255,255,255,255,255,255,255,255,255,255,255,255
3860 DATA 255,255,255,255,255,255,  0,  0,  0,  0,  0,  0,  0,  0,  0
3870 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
3880 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
3890 DATA   0,  7,224,  0, 63,252,128,120, 31,192,224,  3, 97,128,  0
3900 DATA  59,  0,  0, 30,  0,  0, 14,  0,  0, 12,  0,  0, 12,  0,  0
3910 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
3920 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0, 63,  0
3930 DATA 128,127,128,128,127,128,128,127,128,128,127,128,128,255,128
3940 DATA 223,255,128,255,255,128,255,255,  0,224,  0,  0,224,  0,  0
3950 DATA 224,  0,  0,224,  0,  0,224,  0,  0,224,  0,  0,224,  0,  0
3960 DATA 224,  0,  0,224,  0,  0,224,  0,  0,224,  0,  0,224,  0,  0
3970 DATA 224,  0,  1,224,  0,  3,240,  0, 15,255,255,255,255,255,254
3980 DATA 255,255,254,255,255,252,255,255,248,255,255,224,255,255,128
3990 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
4000 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
4010 DATA   0,  0,  0,  0,  0,  0,240,  0,  0,255,  0,  0, 15,248,  0
4020 DATA   0, 63,  0,  0,  3,248,  0,  0, 31,  0,  0,  3,  0,  0,  0
4030 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
4040 DATA   0,  0,  0,  0,  0,  0,  0,  0,  0,255,  0,  0,255,224,  0
4050 DATA 255,128,  0,240,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0
```

```
4060 DATA   0,   0,   0,   0,   0,   0,   0,   0,   0,   0,   0,   7,   0,   0,127
4070 DATA   0,   7,255,   0, 63,255,   1,255,255, 31,255,255,   3,255,255
4080 DATA   0,127,254,   0,   7,252,   0,   0,127,   0,   0,   7,   0,   0,   0
4090 DATA   0,   0,   0,   0,   0,   0,   0,   0,   0,   0,   0,128,   0,   0
4100 DATA 248,   0,   0,255,   0,   0,255,192,   0,128,   0,   0,   0,   0,   0
4110 DATA   0,   0,   0,   0,   0,   0,   0,   0,   0,   0,   0,   0,   0,   0
4120 DATA   0,   0,   0,   0,   0,   0,   0,   0,   0,   0,   0,   1,   0,   0, 63
4130 DATA   0, 31,255,   7,255,255,255,255,255,255,255,255,255,255,254
4140 DATA 255,255,192,255,248,   0,255,   0,   0,   0,   0,   0,   0,   0
4150 DATA   0,   0,   0,   0,   0,   0,   0,   0,   0,   0,   0,   0,   0,   0
4160 ' 3rd Line
4170 DATA   0,   0,   0,   0,   0,   0,   0,   0,   0,   0,   0, 24,   0,   0, 56
4180 DATA   0,   0, 56,   0,   0,120,   0,   0,248,   0,   1,248,   0,   1,248
4190 DATA   0,   3,248,   0,   7,248,   0,   7,248,   0, 15,248,   0, 15,248
4200 DATA   0, 31,248,   0, 63,248,   0,127,248,   0,127,248,   0,255,248
4210 DATA   0,255,248,   1,255,248,   3,255,248,199,255,248,247,255,248
4220 DATA 255,255,248, 31,255,240, 15,255,240, 15,255,224, 15,255,224
4230 DATA  15,255,192, 15,255,192, 15,255,192, 15,255,128, 15,255,128
4240 DATA  15,255,   0, 15,255,   0, 15,255,   0, 15,254,   0, 15,254,   0
4250 DATA 252,252, 24,252,252, 56,249,252,248,249,252,248,243,255,248
4260 DATA 227,255,248,231,255,248,199,255,248,231,255,248,255,255,248
4270 DATA  31,255,248, 15,255,248, 15,255,248, 15,255,248, 15,255,248
4280 DATA  15,255,248, 15,255,248, 15,255,248, 15,255,248, 15,207,248
4290 DATA  31, 15,248, 30, 31,248,252, 63,248,248,127,248,240,127,240
4300 DATA 224,255,240,225,255,240,195,255,224,199,255,192,247,255,128
4310 DATA 255,255,128, 63,255,   0, 31,254,   0, 15,254,   0, 15,252,   0
4320 DATA  15,248,   0, 15,240,   0, 15,240,   0, 15,224,   0, 15,192,   0
4330 DATA  15,192,   0, 15,128,   0, 15,   0,   0, 31,   0,   0, 62,   0,   0
4340 DATA 252,   0,   0,252,   0,   0,248,   0,   0,240,   0,224,240,   0,240
4350 DATA 224,   1,240,192,   1,248,   0,   3,248,   0,   3,248,   0,   3,248
4360 DATA   0,   7,248,   0,   7,248,   0, 63,248,   0,127,248,   0,127,248
4370 DATA   0,255,248,   0,255,248,   1,255,248,   1,255,248,   1,255,248
4380 DATA   3,255,248,   3,255,248,   3,255,248,131,255,248,199,255,248
4390 DATA 103,255,248,119,255,248, 55,255,248, 63,255,248, 31,255,248
4400 DATA  31,255,248, 31,255,248, 15,255,248, 15,255,248, 15,255,248
4410 DATA  15,255,248, 15,255,248, 15,255,248, 15,255,248, 15,255,240
4420 DATA  15,255,240, 15,255,224, 15,255,192, 15,255,192, 15,254,   0
4430 DATA  15,254,   0, 15,254,   0, 15,254,   0, 15,254,   0, 15,254,   0
4440 DATA  15,252,   0, 15,252,   0, 15,248,   0, 15,240,   0, 31,240,   0
4450 DATA  31,224,   0, 31,192,   0, 55,128,   0, 48,   0,   8, 96,   0, 24
4460 DATA 192,   0, 24,128,   0, 56,   0,   0, 56,   0,   0,120,   0,   0,120
4470 DATA   0,   0,248,   0,   0,248,   0,   1,248,   0,   1,248,   0,   3,248
4480 DATA   0,   3,248,   0,   7,248,   0,   7,248,   0, 15,248,   0, 15,248
4490 DATA   0, 31,248,   0, 31,240,   0, 63,240,   0, 63,224,   0,127,224
4500 DATA   0,127,192,   0,255,192,   0,255,128,   1,255,128,   1,255, 24
4510 DATA   3,255, 56,   3,255,248,231,255,248,255,255,248, 31,255,248
4520 DATA  15,255,248, 15,255,248, 15,255,248, 15,255,248, 15,255,248
4530 DATA  15,255,248, 15,255,248, 15,255,248, 15,255,248, 15,255,240
4540 DATA  15,255,240, 15,255,240, 15,255,224, 15,255,224, 15,255,192
4550 DATA  15,255,192, 31,255,128,254,127,128,252,127, 24,248,255, 56
4560 DATA 248,255,248,240,255,248,225,255,248,193,255,248,131,255,248
4570 DATA   3,255,248,   7,255,248,135,255,248,231,255,248,255,255,248
4580 DATA  63,255,248, 31,255,248, 15,255,248, 15,255,248, 15,255,240
4590 DATA  15,255,240, 15,255,224, 15,255,192, 15,255,128, 15,255,   0
4600 DATA  15,254,   0, 15,252,   0, 15,248,   0, 15,240,   0, 15,224,   0
4610 DATA  15,192,   0, 15,   0,   0, 62,   0,   0,252,   0,   0,248,   0,   0
4620 DATA 240,   0,   0,224,   0,   0,192,   0,   0,128,   0,   0,   0,   0,   0
4630 DATA   0,   0,   0,   0,   0,   0,   0,   0,   0,   0,   0,   0,   0,   0
4640 DATA   0,   0,   0,   0,   0,   0,   0,   0,   0,   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 1100). You can find most of these commands near the beginning of chapter 4.

The WIDTH "LPT1:" 255 statement in line 1120 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 1130. 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 1450); a centering command (line 1470); a command to vary the line spacing (lines 1490 and 1540); and a command to micro-adjust the space between characters (lines 1500 and 1550).

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 telephone symbols in the next printed line is created by downloading two new character patterns, which are printed in place of the character "<" (character 60). Details can be found in Chapter 5.

The final part of the program uses dot graphics to print an "M&W" logo. The dot pattern of the logo was originally laid out on graph paper, then converted to the data in lines 3180 to 4640 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 three rows, each row is twenty-four dots high and 240 dots wide. Line 2040 sets the line spacing to 8/60 inch so that the rows will connect vertically. The loop in lines 2050 to 2130 does the printing in three passes of the print head.

Resident fonts are:
Draft characters, Roman characters,
Sanserif characters, Courier characters,
Prestige characters, *Script characters.*

Print pitches are:
Pica pitch (10 CPI), Elite pitch (12 CPI),
Semi-condensed pitch (15 CPI), Condensed pica pitch (17 CPI),
Condensed elite pitch (20 CPI),
Normal proportional, Condensed proportional.

Double-height,
Double width,
Triple width,
Double-sized,

Quad-sized.

Various line and character spacings:
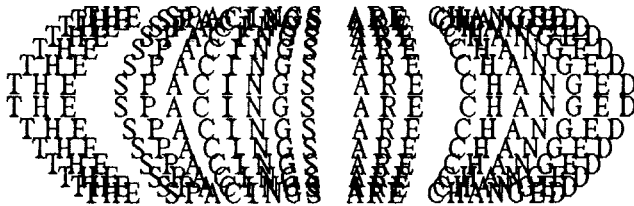
Other features:
OUTLINED, SHADOWED, OUTLINED WITH SHADOWED,
Emphasized, Double-strike, *Italics*,
Underlining, ~~Strike-through~~, Overlining,
SUPERSCRIPT and SUBSCRIPT,
Download characters: ＊＊＊＊＊＊＊＊＊＊＊
Dot graphics:

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 that are 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 that it is used and treated sensibly. However, if you do experience a minor problem, the few tips below should 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 and unplug it. Try out 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.
Are forms jamming between printing surface and the platen?	Clean the surface of the platen roller with a cloth barely dampended with a little alcohol.

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

Check	Possible remedy
Is the paper release lever pushed to the ■ position?	Make sure the release lever is pushed to the ■ position.
Is the paper guide in the vertical position?	When using the tractor feed, the paper guide should be horizontal.
Are the holes on each side of the paper aligned with regard to each other in the tractor units?	If the two sides of the paper are out of alignment, realign them so that the tractor holes match up.
Are the tractor units too close or too far apart?	Misalignment of the tractor units, making the paper too 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.

Check	Possible remedy
Is the paper feeding freely into the printer?	The paper should not be too far from the printer (less than 1 meter/ 3 feet), and there should be no cables or other obstacles obstructing its path. The paper should also be feeding straight into the printer, as an angled feed may cause jams and blockages.
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 prints 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 cloth barely dampened with either water with a little detergent or a little alcohol, but do not allow any liquid to fall inside the printer.

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

REPLACING THE PRINT HEAD

This is not a job which you will need to do very often. The print head has been designed to last for about 200 million dots. 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 right until you can see the connector cover. Remove the connector cover and pull the cables free from the connectors.
5. Unscrew the two screws that hold the print head in place and set them aside.
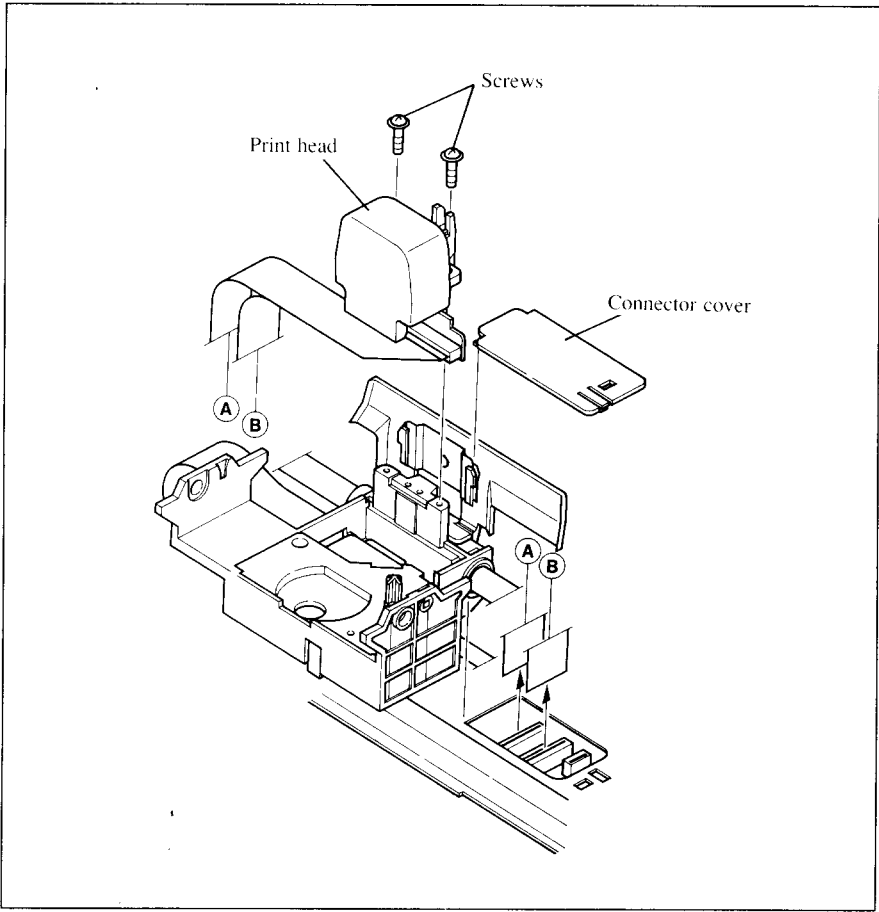
Figure 7-1. Replacing the print head

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

7. Pass the cable of the new print head through the tabs.

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. Replace the connector cover sliding it to the left until it locks into place.

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	222cps	–
Draft	167cps	200cps
Letter Quality	55.5cps	66.7cps

Print direction .... Bidirectional, logic-seeking
(Text and Graphics)   Unidirectional, logic-seeking
                             (selectable)

Print head 24pins
                             Life:200 million dots

Line spacing 1/6, 1/8, n/60, n/72, n/180, n/216,
                             n/360 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 (Icelandic), #863 (Canadian French), #865 (Nordic)

Number of columns .... CPI

	CPI	
Pica	10	80
Elite	12	96
Semi-condensed	15	120
Condensed pica	17.1	137
Condensed elite	20	160
Proportional		Variable

Character dot matrix .... Draft   LQ

	Draft	LQ
Pica	24×9	24×35
Elite	24×9	24×29
Semi-condensed	16×7	16×23
Condensed pica	24×9	24×18
Condensed elite	24×9	24×15
Super/subscript	16×7	16×23
Proportional	–	$24 \times n$
Super/subscript proportional	–	$16 \times n$

Bit image dot-matrix .... DPI

	DPI	
8-bit normal	60	8×480
8-bit double	120	8×960
8-bit high-speed double*	120	8×960
8-bit quadruple*	240	8×1920
8-bit CRT I	80	8×640
8-bit CRT II	90	8×720
24-bit normal	60	24×480
24-bit double	120	24×960
24-bit CRT III	90	24×720
24-bit Triple	180	24×1440
24-bit hex*	360	24×2880

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

Paper feed .... Friction and rear (push tractor) or bottom (pull tractor)

Paper feed speed .... 3.4 inches/second max

Paper width ....Cut sheet   4"-11.7"
                                                Fanfold (continuous)   4"-10"

Copies ....Original + 4 copies (Max.)

Maximum buffer size
        Without Download ....7KB (30KB for Color printer)
        With Download ....1 line

Emulations ....Epson LQ-860
                                                IBM Proprinter X24E

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 (Z24) ....2 million characters (draft pica)
        Monochrome (LZ24).........4 million characters (draft pica)
        Color (X24CL)...................1 million characters (draft pica)

Dimensions ....463(w) × 356(d) × 156(h) mm
                                                18.2(w) × 14.0(d) × 6.1(h) in

Weight 6.6kg (14.6lb)

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

Options ....Automatic sheet feeder (SF-10DQ)
                                                Serial-Parallel converter (SPC-8K)
                                                Roll paper holder (RH-10Z)
                                                Font cartridge (FC-1Z, FC-2Z, FC-3Z,
                                                FC-4Z)
                                                RAM cartridge (RC-32Z)

The following describes the pinout of the parallel (Centronics-type) inter-
face 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>

	0	1	2	3	4	5	6	7
0	⟨NUL⟩ 0	⟨DLE⟩ 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⟩ 35	# 35	3 51	C 67	S	~	s

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STANDARD CHARACTER SET #1

	0	1	2	3	4	5	6	7
0	⟨NUL⟩ 0	⟨DLE⟩ 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	⟨SYN⟩ 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	⟨FS⟩ 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	⟨DLE⟩ 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	⟨SYN⟩ 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	⟨FS⟩ 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	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	¡ 135	Ä 151
8	¿ 136	Ö 152
9	Ñ 137	Ü 153
A	ñ 138	ä 154
B	¤ 139	ö 155
C	₧ 140	ü 156
D	Á 141	É 157
E	å 142	é 158
F	ç 143	¥ 159

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INTERNATIONAL CHARACTER SETS

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

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

The command for selecting the international character 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	\<DLE\> 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	\<SYN\> 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	\<FS\> 28	. 44	< 60	L 76	\ 92	l 108	¦ 124
D	\<CR\> 13	29	— 45	= 61	M 77	] 93	m 109	} 125
E	\<SO\> 14	30	. 46	> 62	N 78	^ 94	n 110	~ 126
F	\<SI\> 15	31	/ 47	? 63	O 79	_ 95	o 111	\<DEL\> 127

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	8	9	A	B	C	D	E	F
0	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	Û 157	¡ 173	╜ 189	= 205	▌ 221	ø 237	² 253
E	Ã 142	₧ 158	« 174	╛ 190	╬ 206	▐ 222	∈ 238	■ 254
F	Â 143	Ó 159	» 175	┐ 191	⊥ 207	▀ 223	∩ 239	255

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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	╒ 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	∈ 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	í 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	À 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	π 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	F 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		8	9
0	(NUL) 0	(DLE) 16	0	(NUL) 128	(DLE) 144
1	1	(DC1) 17	1	129	(DC1) 145
2	2	(DC2) 18	2	130	(DC2) 146
3	3	(DC3) 19	3	131	(DC3) 147
4	4	(DC4) 20	4	132	(DC4) 148
5	5	21	5	133	149
6	6	(SYN) 22	6	134	(SYN) 150
7	(BEL) 7	23	7	(BEL) 135	151
8	(BS) 8	(CAN) 24	8	(BS) 136	(CAN) 152
9	(HT) 9	(EM) 25	9	(HT) 137	(EM) 153
A	(LF) 10	26	A	(LF) 138	154
B	(VT) 11	(ESC) 27	B	(VT) 139	(ESC) 155
C	(FF) 12	(FS) 28	C	(FF) 140	(FS) 156
D	(CR) 13	29	D	(CR) 141	157
E	(SO) 14	30	E	(SO) 142	158
F	(SI) 15	31	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	0̸ [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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PROPORTIONAL SPACING TABLE

This table lists the widths of your printer's proportional LQ characters, for Standard mode and IBM mode.

The values given are in 360ths of an inch. For example, a value of 36 is 36/360ths of an inch. You may need to enter these widths into a special table for your processing program so it can calculate the number of proportional characters that will fit on a line.

The following width table shows each character, its ASCII code (decimal) for each character set, and its width for Standard normal mode, Standard super/subscript mode, and IBM mode.

| Character code | | | | | | | Chr. | Proportional width | | |
Std.	#437	#850	#860	#861	#863	#865		Normal	Super/Sub	IBM
-	0	0	0	0	0	0	∅	30	20	30
-	1	1	1	1	1	1	☺	30	20	30
-	2	2	2	2	2	2	●	30	20	30
-	3	3	3	3	3	3	♥	30	20	30
-	4	4	4	4	4	4	♦	30	20	30
-	5	5	5	5	5	5	♣	30	20	30
-	6	6	6	6	6	6	♠	30	20	30
-	7	7	7	7	7	7	•	30	20	30
-	8	8	8	8	8	8	◘	30	20	30
-	9	9	9	9	9	9	○	30	20	30
-	10	10	10	10	10	10	◙	30	20	30
-	11	11	11	11	11	11	♂	30	20	30
-	12	12	12	12	12	12	♀	30	20	30
-	13	13	13	13	13	13	♪	30	20	30
-	14	14	14	14	14	14	♫	30	20	30
-	15	15	15	15	15	15	☼	30	20	30
-	16	16	16	16	16	16	►	30	20	30
-	17	17	17	17	17	17	◄	30	20	30
-	18	18	18	18	18	18	↕	30	20	30
-	19	19	19	19	19	19	‼	30	20	30

Character code							Chr.	Proportional width		
Std.	#437	#850	#860	#861	#863	#865		Normal	Super/Sub	IBM
INT	20	20	20	20	20	20	¶	30	20	30
INT	21	21	21	21	21	21	§	30	20	30
–	22	22	22	22	22	22	▬	30	20	30
–	23	23	23	23	23	23	‡	30	20	30
–	24	24	24	24	24	24	↑	30	20	30
–	25	25	25	25	25	25	↓	30	20	30
–	26	26	26	26	26	26	→	30	20	30
–	27	27	27	27	27	27	←	30	20	30
–	28	28	28	28	28	28	∟	30	20	30
–	29	29	29	29	29	29	↔	30	20	30
–	30	30	30	30	30	30	▲	30	20	30
–	31	31	31	31	31	31	▼	30	20	30
32	32	32	32	32	32	32		30	20	30
33	33	33	33	33	33	33	!	18	12	30
34	34	34	34	34	34	34	"	30	20	30
35	35	35	35	35	35	35	#	30	20	30
36	36	36	36	36	36	36	$	30	20	30
37	37	37	37	37	37	37	%	36	24	30
38	38	38	38	38	38	38	&	36	24	36
39	39	39	39	39	39	39	'	18	12	18
40	40	40	40	40	40	40	(	24	16	30
41	41	41	41	41	41	41	)	24	16	30
42	42	42	42	42	42	42	*	30	20	30
43	43	43	43	43	43	43	+	30	20	30
44	44	44	44	44	44	44	,	18	12	30
45	45	45	45	45	45	45	–	30	20	30
46	46	46	46	46	46	46	.	18	12	30
47	47	47	47	47	47	47	/	30	20	30
48	48	48	48	48	48	48	0	30	20	30
49	49	49	49	49	49	49	1	30	20	30

Character code							Chr.	Proportional width		
Std.	#437	#850	#860	#861	#863	#865		Normal	Super/Sub	IBM
50	50	50	50	50	50	50	2	30	20	30
51	51	51	51	51	51	51	3	30	20	30
52	52	52	52	52	52	52	4	30	20	30
53	53	53	53	53	53	53	5	30	20	30
54	54	54	54	54	54	54	6	30	20	30
55	55	55	55	55	55	55	7	30	20	30
56	56	56	56	56	56	56	8	30	20	30
57	57	57	57	57	57	57	9	30	20	30
58	58	58	58	58	58	58	:	18	12	30
59	59	59	59	59	59	59	;	18	12	30
60	60	60	60	60	60	60	<	30	20	30
61	61	61	61	61	61	61	=	30	20	30
62	62	62	62	62	62	62	>	30	20	30
63	63	63	63	63	63	63	?	30	20	30
64	64	64	64	64	64	64	@	36	24	30
65	65	65	65	65	65	65	A	36	24	42
66	66	66	66	66	66	66	B	36	24	42
67	67	67	67	67	67	67	C	36	24	42
68	68	68	68	68	68	68	D	36	24	42
69	69	69	69	69	69	69	E	36	24	36
70	70	70	70	70	70	70	F	36	24	36
71	71	71	71	71	71	71	G	36	24	42
72	72	72	72	72	72	72	H	36	24	42
73	73	73	73	73	73	73	I	24	16	24
74	74	74	74	74	74	74	J	30	20	30
75	75	75	75	75	75	75	K	36	24	42
76	76	76	76	76	76	76	L	36	24	36
77	77	77	77	77	77	77	M	42	28	42
78	78	78	78	78	78	78	N	36	24	42
79	79	79	79	79	79	79	O	36	24	42

Character code							Chr.	Proportional width		
Std.	#437	#850	#860	#861	#863	#865		Normal	Super/Sub	IBM
80	80	80	80	80	80	80	P	36	24	36
81	81	81	81	81	81	81	Q	36	24	42
82	82	82	82	82	82	82	R	36	24	42
83	83	83	83	83	83	83	S	36	24	36
84	84	84	84	84	84	84	T	36	24	42
85	85	85	85	85	85	85	U	42	28	42
86	86	86	86	86	86	86	V	36	24	42
87	87	87	87	87	87	87	W	42	28	42
88	88	88	88	88	88	88	X	36	24	42
89	89	89	89	89	89	89	Y	36	24	42
90	90	90	90	90	90	90	Z	30	20	36
91	91	91	91	91	91	91	[	24	16	30
92	92	92	92	92	92	92	\	30	20	30
93	93	93	93	93	93	93	]	24	16	30
94	94	94	94	94	94	94	^	30	20	30
95	95	95	95	95	95	95	_	30	20	30
96	96	96	96	96	96	96	`	18	12	30
97	97	97	97	97	97	97	a	30	20	30
98	98	98	98	98	98	98	b	36	24	36
99	99	99	99	99	99	99	c	30	20	30
100	100	100	100	100	100	100	d	36	24	36
101	101	101	101	101	101	101	e	30	20	30
102	102	102	102	102	102	102	f	24	16	24
103	103	103	103	103	103	103	g	36	24	36
104	104	104	104	104	104	104	h	36	24	36
105	105	105	105	105	105	105	i	18	12	18
106	106	106	106	106	106	106	j	24	16	18
107	107	107	107	107	107	107	k	36	24	36
108	108	108	108	108	108	108	l	18	12	18
109	109	109	109	109	109	109	m	42	28	42

Character code							Chr.	Proportional width		
Std.	#437	#850	#860	#861	#863	#865		Normal	Super/Sub	IBM
110	110	110	110	110	110	110	n	36	24	36
111	111	111	111	111	111	111	o	30	20	30
112	112	112	112	112	112	112	p	36	24	36
113	113	113	113	113	113	113	q	36	24	36
114	114	114	114	114	114	114	r	30	20	30
115	115	115	115	115	115	115	s	30	20	30
116	116	116	116	116	116	116	t	24	16	24
117	117	117	117	117	117	117	u	36	24	36
118	118	118	118	118	118	118	v	36	24	36
119	119	119	119	119	119	119	w	42	28	42
120	120	120	120	120	120	120	x	30	20	36
121	121	121	121	121	121	121	y	36	24	36
122	122	122	122	122	122	122	z	30	20	30
123	123	123	123	123	123	123	{	24	16	30
124	124	124	124	124	124	124	¦	18	12	30
125	125	125	125	125	125	125	}	24	16	30
126	126	126	126	126	126	126	~	30	20	30
–	127	127	127	127	127	127	⌂	30	20	30
128	128	128	128	128	128	128	Ç	36	24	42
129	129	129	129	129	129	129	ü	36	24	36
130	130	130	130	130	130	130	é	30	20	30
131	131	131	131	131	131	131	â	30	20	30
132	132	132	–	132	–	132	ä	30	20	30
133	133	133	133	133	133	133	à	30	20	30
134	134	134	–	134	–	134	å	30	20	30
135	135	135	135	135	135	135	ç	30	20	30
136	136	136	136	136	136	136	ê	30	20	30
137	137	137	–	137	137	137	ë	30	20	30
138	138	138	138	138	138	138	è	30	20	30
139	139	139	–	–	139	139	ï	18	12	18

Character code							Chr.	Proportional width		
Std.	#437	#850	#860	#861	#863	#865		Normal	Super/Sub	IBM
140	140	140	–	–	140	140	î	18	12	18
141	141	141	141	–	–	141	ì	18	12	18
142	142	142	–	142	–	142	Ä	36	24	42
143	143	143	–	143	–	143	Å	36	24	42
144	144	144	144	144	144	144	É	36	24	36
145	145	145	–	145	–	145	æ	42	28	42
146	146	146	–	146	–	146	Æ	42	28	42
147	147	147	147	147	147	147	ô	30	20	30
148	148	148	–	148	–	148	ö	30	20	30
149	149	149	149	–	–	149	ò	30	20	30
150	150	150	–	150	150	150	û	36	24	36
151	151	151	151	–	151	151	ù	36	24	36
152	152	152	–	–	–	152	ÿ	36	24	36
153	153	153	–	153	–	153	Ö	36	24	42
154	154	154	154	154	154	154	Ü	42	28	42
155	155	189	155	–	155	–	¢	30	20	30
156	156	156	156	156	156	156	£	30	20	30
157	157	190	–	–	–	–	¥	36	24	30
158	158	–	158	158	–	158	Pt	42	28	42
159	159	159	–	159	159	159	ƒ	30	20	30
160	160	160	160	160	–	160	á	30	20	30
161	161	161	161	161	–	161	í	18	12	18
162	162	162	162	162	162	162	ó	30	20	30
163	163	163	163	163	163	163	ú	36	24	36
164	164	164	164	–	–	164	ñ	36	24	36
165	165	165	165	–	–	165	Ñ	36	24	42
166	166	166	166	–	–	166	ª	30	20	30
167	167	167	167	–	–	167	º	30	20	30
168	168	168	168	168	–	168	¿	30	20	30
169	169	–	–	169	169	169	⌐	30	20	30

Character code							Chr.	Proportional width		
Std.	#437	#850	#860	#861	#863	#865		Normal	Super/Sub	IBM
170	170	170	170	170	170	170	¬	30	20	30
171	171	171	171	171	171	171	½	30	20	30
172	172	172	172	172	172	172	¼	30	20	30
173	173	173	173	173	–	173	¡	30	20	30
174	174	174	174	174	174	174	«	30	20	42
175	175	175	175	175	175	–	»	30	20	42
176	176	176	176	176	176	176		30	30	30
177	177	177	177	177	177	177		30	30	30
178	178	178	178	178	178	178		30	30	30
179	179	179	179	179	179	179	│	30	30	30
180	180	180	180	180	180	180	┤	30	30	30
181	181	–	181	181	181	181	╡	30	30	30
182	182	–	182	182	182	182	╢	30	30	30
183	183	–	183	183	183	183	╖	30	30	30
184	184	–	184	184	184	184	╕	30	30	30
185	185	185	185	185	185	185	╣	30	30	30
186	186	186	186	186	186	186	║	30	30	30
187	187	187	187	187	187	187	╗	30	30	30
188	188	188	188	188	188	188	╝	30	30	30
189	189	–	189	189	189	189	╜	30	30	30
190	190	–	190	190	190	190	╛	30	30	30
191	191	191	191	191	191	191	┐	30	30	30
192	192	192	192	192	192	192	└	30	30	30
193	193	193	193	193	193	193	┴	30	30	30
194	194	194	194	194	194	194	┬	30	30	30
195	195	195	195	195	195	195	├	30	30	30
196	196	196	196	196	196	196	─	30	30	30
197	197	197	197	197	197	197	┼	30	30	30
198	198	–	198	198	198	198	╞	30	30	30
199	199	–	199	199	199	199	╟	30	30	30

Character code							Chr.	Proportional width		
Std.	#437	#850	#860	#861	#863	#865		Normal	Super/Sub	IBM
200	200	200	200	200	200	200	⊥	30	30	30
201	201	201	201	201	201	201	⌐	30	30	30
202	202	202	202	202	202	202	⊥	30	30	30
203	203	203	203	203	203	203	⊤	30	30	30
204	204	204	204	204	204	204	⊦	30	30	30
205	205	205	205	205	205	205	=	30	30	30
206	206	206	206	206	206	206	⊹	30	30	30
207	207	–	207	207	207	207	⊥	30	30	30
208	208	–	208	208	208	208	⊥	30	30	30
209	209	–	209	209	209	209	⊤	30	30	30
210	210	–	210	210	210	210	⊤	30	30	30
211	211	–	211	211	211	211	⊥	30	30	30
212	212	–	212	212	212	212	⊦	30	30	30
213	213	–	213	213	213	213	F	30	30	30
214	214	–	214	214	214	214	⌠	30	30	30
215	215	–	215	215	215	215	⊹	30	30	30
216	216	–	216	216	216	216	⊧	30	30	30
217	217	217	217	217	217	217	⌐	30	30	30
218	218	218	218	218	218	218	⌐	30	30	30
219	219	219	219	219	219	219	█	30	30	30
220	220	220	220	220	220	220	▄	30	30	30
221	221	–	221	221	221	221	▌	30	30	30
222	222	–	222	222	222	222	▐	30	30	30
223	223	223	223	223	223	223	▀	30	30	30
224	224	–	224	224	224	224	α	30	30	30
225	225	225	225	225	225	225	β	30	30	36
226	226	–	226	226	226	226	Γ	30	30	36
227	227	–	227	227	227	227	π	30	30	36
228	228	–	228	228	228	228	Σ	30	30	42
229	229	–	229	229	229	229	σ	30	30	36

Character code							Chr.	Proportional width		
Std.	#437	#850	#860	#861	#863	#865		Normal	Super/Sub	IBM
230	230	230	230	230	230	230	μ	30	30	36
231	231	–	231	231	231	231	τ	30	30	30
232	232	–	232	232	232	232	Φ	30	30	42
233	233	–	233	233	233	233	θ	30	30	42
234	234	–	234	234	234	234	Ω	30	30	42
235	235	–	235	235	235	235	δ	30	30	30
236	236	–	236	236	236	236	∞	30	30	30
237	237	–	237	237	237	237	ø	30	30	42
238	238	–	238	238	238	238	∈	30	30	30
239	239	–	239	239	239	239	∩	30	30	30
240	240	–	240	240	240	240	≡	30	30	30
241	241	241	241	241	241	241	±	30	30	30
242	242	–	242	242	242	242	≥	30	30	30
243	243	–	243	243	243	243	≤	30	30	30
244	244	–	244	244	244	244	⌠	30	30	30
245	245	–	245	245	245	245	⌡	30	30	30
246	246	246	246	246	246	246	÷	30	30	30
247	247	–	247	247	247	247	≈	30	30	30
248	248	248	248	248	248	248	°	30	30	30
249	249	–	249	249	249	249	∙	30	30	30
250	250	250	250	250	250	250	·	30	30	30
251	251	–	251	251	251	251	√	30	30	30
252	252	–	252	252	252	252	ⁿ	30	30	30
253	253	253	253	253	253	253	²	30	30	30
254	254	254	254	254	254	254	∎	30	30	30
255	255	255	255	255	255	255		30	20	30
INT	–	155	–	155	–	155	ø	30	30	42
INT	–	157	–	157	–	157	Ø	36	28	42
–	–	158	–	–	–	–	×	42	20	30
INT	–	169	–	–	–	–	®	36	21	30

Character code							Chr.	Proportional width		
Std.	#437	#850	#860	#861	#863	#865		Normal	Super/Sub	IBM
INT	–	181	134	164	–	–	Á	36	28	42
–	–	182	143	–	132	–	Â	42	20	42
–	–	183	145	–	142	–	À	42	28	42
INT	–	184	–	–	–	–	©	36	21	30
–	–	198	132	–	–	–	ã	30	20	30
–	–	199	142	–	–	–	Ä	42	28	42
INT	–	207	–	–	152	175	¤	30	20	30
–	–	208	–	140	–	–	ð	36	24	36
–	–	209	–	139	–	–	Ð	42	28	42
–	–	210	137	–	146	–	Ê	36	24	36
–	–	211	–	–	148	–	Ë	36	24	36
–	–	212	146	–	145	–	È	36	24	36
–	–	213	–	–	–	–	ı	18	12	18
–	–	214	139	165	–	–	Í	24	16	24
–	–	215	–	–	168	–	Î	24	16	24
–	–	216	–	–	149	–	Ï	24	16	24
–	–	221	–	–	160	–	¦	18	12	30
–	–	222	152	–	–	–	Ì	24	16	24
INT	–	224	159	166	–	–	Ó	30	28	42
–	–	226	140	–	153	–	Ô	30	28	42
–	–	227	169	–	–	–	Ò	30	28	42
–	–	228	148	–	–	–	õ	30	20	30
–	–	229	153	–	–	–	Õ	30	28	42
–	–	231	–	149	–	–	þ	30	24	36
–	–	232	–	141	–	–	Þ	30	28	42
INT	–	233	150	167	–	–	Ú	30	28	42
–	–	234	–	–	158	–	Û	30	28	42
–	–	235	157	–	157	–	Ù	30	28	42
–	–	236	–	152	–	–	ý	30	24	36
–	–	237	–	151	–	–	Ý	30	28	42

| Character code | | | | | | | Chr. | Proportional width | | |
Std.	#437	#850	#860	#861	#863	#865		Normal	Super/Sub	IBM
–	–	238	–	–	167	–	¯	30	20	30
INT	–	239	–	–	161	–	´	18	20	30
–	–	240	–	–	–	–	¯	30	20	30
–	–	242	–	–	–	–	≡	30	20	30
–	–	243	–	–	173	–	¼	30	21	30
–	–	244	–	–	134	–	¶	30	20	30
–	–	245	–	–	143	–	§	30	20	30
–	–	247	–	–	165	–	˜	30	20	30
INT	–	249	–	–	164	–	¨	30	20	30
–	–	251	–	–	–	–	¹	30	20	30
–	–	252	–	–	166	–	³	30	20	30
–	–	–	–	–	141	–	=	30	20	30
INT	–	–	–	–	–	–	.	30	20	30
INT	–	–	–	–	–	–	°	24	16	24
INT	–	–	–	–	–	–	₩	42	28	42
INT	–	–	–	–	–	–	†	30	20	30
INT	–	–	–	–	–	–	ß	36	24	36
INT	–	–	–	–	–	–	™	36	24	36

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MEMO

COMMAND SUMMARY

Standard Mode

The following commands take effect with the Standard mode.

CONTROL CODE	FUNCTION	PAGE
<BEL>	Bell	83
<BS>	Backspace	69
<HT>	Horizontal tab	71
<LF>	Line feed	63
<VT>	Vertical tab	67
<FF>	Form feed	65
<CR>	Carriage return	69
<SO>	Expanded printing for one line	57
<SI>	Condensed pitch	56
<DC1>	Set printer on-line	82
<DC2>	Cancel condensed pitch	56
<DC3>	Set printer off-line	82
<DC4>	Cancel one-line expanded printing	57
<CAN>	Cancel last line	82
<ESC> <LF>	Reverse line feed	63
<ESC> <FF>	Return to top of current page	66
<ESC> <SO>	Expanded printing for one line	57
<ESC> <SI>	Condensed pitch	56
<ESC> <EM> <0>	Manual feed	84
<ESC> <EM> <4>	Auto feed	84
<ESC> <EM> "R"	Eject paper from ASF	84
<ESC> <EM> "T" n	Set print start position on ASF	84
<ESC> <SP> n	Increase character spacing	58
<ESC> "!" n	Select master print mode	58
<ESC> "#"	Accept MSB as is	82
<ESC> "$" n1 n2	Absolute horizontal tab in inches	72
<ESC> "%" <0>	Select ROM character set	80
<ESC> "%" <1>	Select download character set	78
<ESC> "%" "0"	Select ROM character set	80
<ESC> "%" "1"	Select download character set	78
<ESC> "&" <0> n1 n2 m0 m1 m2 d1 d2 ...	Define download characters	76
<ESC> "(" "-" <3> <0> <1> n1 n2	Select score	51
<ESC> "*" n0 n1 n2 m1 m2 ...	Select graphics mode	74
<ESC> "+" n	Set line spacing to n/360 inch	61
<ESC> "-" <0>	Stop underlining	50
<ESC> "-" <1>	Start underlining	50
<ESC> "-" "0"	Stop underlining	50
<ESC> "-" "1"	Start underlining	50
<ESC> "/" n0	Select vertical tab channel	67
<ESC> "0"	Set line spacing to 1/8 inch	61
<ESC> "1"	Set line spacing to 7/60 inch	61
<ESC> "2"	Set line spacing to 1/6 inch	61
<ESC> "3" n	Set line spacing to n/180 inch	62
<ESC> "4"	Select italic characters	49
<ESC> "5"	Select upright characters	49
<ESC> "6"	Select character set #2	53
<ESC> "7"	Select character set #1	53
<ESC> "8"	Disable paper-out detector	66
<ESC> "9"	Enable paper-out detector	66

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CONTROL CODE	FUNCTION	PAGE
<ESC> ":" <0> n <0>	Copy character set from ROM into RAM	78
<ESC> "<"	One-line unidirectional printing	83
<ESC> "="	Set MSB to 0	81
<ESC> ">"	Set MSB to 1	81
<ESC> "?" n m	Convert graphics density	75
<ESC> "@"	Reset printer	84
<ESC> "A" n	Set line spacing to n/60 inch	62
<ESC> "B" n1 n2 ... <0>	Set vertical tab stops	66
<ESC> "C" n	Set page length to n lines	64
<ESC> "C" <0> n	Set page length to n inches	65
<ESC> "D" n1 n2 ... <0>	Set horizontal tab stops	71
<ESC> "E"	Emphasized printing	49
<ESC> "F"	Cancel emphasized printing	49
<ESC> "G"	Double-strike printing	49
<ESC> "H"	Cancel double-strike printing	50
<ESC> "J" n	Perform one n/180-inch line feed	64
<ESC> "K" n1 n2 m1 m2 ...	Print normal-density 8-bit graphics	73
<ESC> "L" n1 n2 m1 m2 ...	Print double-density 8-bit graphics	73
<ESC> "M"	Elite pitch	55
<ESC> "N" n	Set bottom margin	65
<ESC> "O"	Cancel bottom margin	65
<ESC> "P"	Pica pitch	55
<ESC> "Q" n	Set right margin	68
<ESC> "R" n	Select international character set	53
<ESC> "S" <0>	Superscript	51
<ESC> "S" <1>	Subscript	52
<ESC> "S" "0"	Superscript	51
<ESC> "S" "1"	Subscript	52
<ESC> "T"	Cancel superscript or subscript	52
<ESC> "U" <0>	Bidirectional printing	83
<ESC> "U" <1>	Unidirectional printing	83
<ESC> "U" "0"	Bidirectional printing	83
<ESC> "U" "1"	Unidirectional printing	83
<ESC> "W" <0>	Cancel expanded printing	56
<ESC> "W" <1>	Expanded printing	56
<ESC> "W" "0"	Cancel expanded printing	56
<ESC> "W" "1"	Expanded printing	56
<ESC> "Y" n1 n2 m1 m2 ...	Print double-density, double-speed 8-bit graphics	73
<ESC> "Z" n1 n2 m1 m2 ...	Print quadruple-density 8-bit graphics	73
<ESC> "[" "T" <4> <0> <0> <0> n1 n2	Select IBM code page	54
<ESC> "\" n1 n2	Relative horizontal tab	72
<ESC> "a" <0>	Left justify	70
<ESC> "a" <1>	Center text	70
<ESC> "a" <2>	Right justify	70
<ESC> "a" <3>	Full justify	70
<ESC> "a" "0"	Left justify	70
<ESC> "a" "1"	Center text	70
<ESC> "a" "2"	Right justify	70
<ESC> "a" "3"	Full justify	70
<ESC> "b" n0 n1 n2 ... <0>	Set vertical tab stops in channel	67
<ESC> "e" <0> n	Set horizontal tab stops every n columns	71
<ESC> "e" <1> n	Set vertical tab stops every n lines	67
<ESC> "e" "0" n	Set horizontal tab stops every n columns	71
<ESC> "e" "1" n	Set vertical tab stops every n lines	67
<ESC> "f" <0> n	Absolute horizontal tab in columns	72
<ESC> "f" <1> n	Feed paper n lines	64
<ESC> "f" "0" n	Absolute horizontal tab in columns	72
<ESC> "f" "1" n	Feed paper n lines	64
<ESC> "g"	Semi-condensed pitch	56
<ESC> "h" n	Select double or quadruple size	59
<ESC> "j" n	Perform one n/180-inch reverse line feed	64

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IBM Mode

The following commands take effect with the IBM mode.

CONTROL CODE	FUNCTION	PAGE
<BEL>	Bell	83
<BS>	Backspace	69
<HT>	Horizontal tab	71
<LF>	Line feed	63
<VT>	Vertical tab	67
<FF>	Form feed	65
<CR>	Carriage return	69
<SO>	Expanded printing for one line	57
<SI>	Condensed pitch	56
<DC1>	Set printer on-line	82
<DC2>	Pica pitch	55
<DC4>	Cancel one-line expanded printing	57
<CAN>	Cancel last line	82
<ESC> <SO>	Expanded printing for one line	57
<ESC> <SI>	Condensed pitch	56
<ESC> <EM> <0>	Manual feed	84
<ESC> <EM> <4>	Auto feed	84
<ESC> <EM> "R"	Eject paper from ASF	84
<ESC> <EM> "T" n	Set print start position on ASF	84
<ESC> "–" <0>	Stop underlining	50
<ESC> "–" <1>	Start underlining	50
<ESC> "–" "0"	Stop underlining	50
<ESC> "–" "1"	Start underlining	50
<ESC> "0"	Set line spacing to 1/8 inch	61
<ESC> "1"	Set line spacing to 7/72 inch	61
<ESC> "2"	Execute <ESC> "A"	63
<ESC> "3" n	Set line spacing to $n/180$ or $n/216$ inch	62
<ESC> "4"	Set top of page at current position	64
<ESC> "5" <0>	Cancel automatic line feed	69
<ESC> "5" <1>	Set automatic line feed	69
<ESC> "6"	Select character set #2	53
<ESC> "7"	Select character set #1	53
<ESC> "8"	Disable paper-out detector	66
<ESC> "9"	Enable paper-out detector	66
<ESC> ":"	Elite pitch	55
<ESC> "=" $n1$ $n2$ "#" $n3$ $n4$ <0> $n5$ ...	Define download characters	77
<ESC> "@"	Reset printer	84
<ESC> "A" n	Set line spacing to $n/72$ inch	62
<ESC> "B" $n1$ $n2$ ... <0>	Set vertical tab stops	66
<ESC> "C" n	Set page length to n lines	64
<ESC> "C" <0> n	Set page length to n inches	65
<ESC> "D" $n1$ $n2$ ... <0>	Set horizontal tab stops	71
<ESC> "E"	Emphasized printing	49
<ESC> "F"	Cancel emphasized printing	49
<ESC> "G"	Double-strike printing	49
<ESC> "H"	Cancel double-strike printing	50
<ESC> "I" <0>	Select draft pica characters	46
<ESC> "I" <2>	Select LQ pica characters	47
<ESC> "I" <3>	Select LQ proportional characters	48
<ESC> "I" <4>	Select draft pica download character set	79
<ESC> "I" <6>	Select LQ pica download characters	79
<ESC> "I" <7>	Select LQ proportional download characters	80
<ESC> "I" <8>	Select draft elite characters	46
<ESC> "I" <LF>	Select LQ elite characters	47
<ESC> "I" <FF>	Select draft elite download character set	79

CONTROL CODE	FUNCTION	PAGE
<ESC> "I" <SO>	Select LQ elite download characters	80
<ESC> "I" <DLE>	Select draft condensed characters	46
<ESC> "I" <DC2>	Select LQ condensed characters	47
<ESC> "I" <DC4>	Select draft condensed download characters	79
<ESC> "I" <SYN>	Select LQ condensed download characters	80
<ESC> "J" *n*	Perform one *n*/180-inch or *n*/216-inch line feed	64
<ESC> "K" *n1 n2 m1 m2* ...	Print normal-density 8-bit graphics	73
<ESC> "L" *n1 n2 m1 m2* ...	Print double-density 8-bit graphics	73
<ESC> "N" *n*	Set bottom margin	65
<ESC> "O"	Cancel bottom margin	65
<ESC> "P" <0>	Select fixed spacing	58
<ESC> "P" <1>	Select proportional spacing	57
<ESC> "Q" "$"	Set printer off-line	82
<ESC> "R"	Reset all tab stops	71
<ESC> "S" <0>	Superscript	51
<ESC> "S" <1>	Subscript	52
<ESC> "S" "0"	Superscript	51
<ESC> "S" "1"	Subscript	52
<ESC> "T"	Cancel superscript or subscript	52
<ESC> "U" <0>	Bidirectional printing	83
<ESC> "U" <1>	Unidirectional printing	83
<ESC> "U" "0"	Bidirectional printing	83
<ESC> "U" "1"	Unidirectional printing	83
<ESC> "W" <0>	Cancel expanded printing	56
<ESC> "W" <1>	Expanded printing	56
<ESC> "W" "0"	Cancel expanded printing	56
<ESC> "W" "1"	Expanded printing	56
<ESC> "X" *n1 n2*	Set left and right margins	69
<ESC> "Y" *n1 n2 m1 m2* ...	Print double-density, double-speed 8-bit graphics	73
<ESC> "Z" *n1 n2 m1 m2* ...	Print quadruple-density 8-bit graphics	73
<ESC> "[" "@" <4> <0> <0> <0> *n m*	Select character height, width, and line spacing	60
<ESC> "[" "T" <4> <0> <0> <0> *n1 n2*	Select IBM code page	54
<ESC> "[" "\" <4> <0> <0> <0> *n*	Set base unit for line spacing	62
<ESC> "[" "g" *n1 n2 m0 m1 m2* ...	Select graphics mode	75
<ESC> "\" *n1 n2*	Enable printing of all character codes	54
<ESC> "]"	Reverse line feed	63
<ESC> "^"	Enable printing of all character codes on next character	54
<ESC> "_" <0>	Stop overlining	50
<ESC> "_" <1>	Start overlining	50
<ESC> "_" "0"	Stop overlining	50
<ESC> "_" "1"	Start overlining	50
<ESC> "d" *n1 n2*	Relative horizontal tab in inches	72
<ESC> "j"	Stop printing	83
<ESC> "k" *n*	Select LQ font	48
<ESC> "r" *n*	Select print color	81
<ESC> "t" <0>	Select standard character set	52
<ESC> "t" <1>	Select IBM character set	52
<ESC> "t" "0"	Select standard character set	52
<ESC> "t" "1"	Select IBM character set	52
"(" "(" "0" ")" ")"	Manual feed	84
"(" "(" "4" ")" ")"	Auto feed	84
"(" "(" "C" ")" ")" *n*	Select print color	81
"(" "(" "F" ")" ")" *n*	Select font	48
"(" "(" "R" ")" ")"	Eject paper from ASF	84
"(" "(" "S" ")" ")" *n*	Select character size	59
"(" "(" "T" ")" ")" *n*	Set print start position on ASF	84

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