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MS-DOS, Microsoft BASIC: Microsoft Corporation
LQ-860/1060, LQ-850/1050: Seiko Epson Corp.

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HOW TO USE THIS MANUAL

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

Chapter 1 — Introduction

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

Chapter 2 — Setting up the printer

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

Chapter 3 — Optional accessories

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

Chapter 4 — Paper installation and use

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

Chapter 5 — Control panel operations

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

After getting set up, read this chapter and try out the procedures in it to find out how the printer works.
Chapter 6 — Default settings

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

Chapter 7 — Printer control commands

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

Chapter 8 — Download characters

This chapter explains the procedures to create your own characters.

Chapter 9 — MS-DOS and your printer

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

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

Chapter 10 — Troubleshooting and maintenance

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

Chapter 11 — Reference

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

The character table charts give the different character sets available.
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Chapter 1

INTRODUCTION

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

FEATURES OF THE PRINTER

Some of main features are the following:

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

- Six bright colors
  Magenta, cyan, violet, yellow, orange and green add a color dimension to your printed output by the optional color ribbon.

- Large variety of fonts
  The printer has the following resident fonts:
  - Draft
  - Sanserif
  - Script
  - SLQ Roman
  - High-Speed Draft
  - Courier
  - Orator
  - SLQ TW-Light
  - Roman
  - Prestige
  - H-Gothic

  In addition, following fonts can be used by installing the optional font cartridge:

  [FC-1Z Cartridge]
  - Orator 2
  - Cinema
  - Letter Gothic
  - Blippo
[FC-2Z Cartridge]
- OCR-B
- UPC/EAN

[FC-3Z Cartridge]
- TW-Light

[FC-4Z Cartridge]
- Russian

[FC-5Z Cartridge]
- Old Style

[FC-10Z Cartridge]
- SLQ Script

- 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.
FONT STYLE EXAMPLE

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

<table>
<thead>
<tr>
<th>Font Style</th>
<th>Code</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Draft</td>
<td>123456789</td>
<td>ABCDEFGHIJK</td>
</tr>
<tr>
<td>HS-Draft</td>
<td>123456789</td>
<td>abcdefghijk</td>
</tr>
<tr>
<td>Roman</td>
<td>123456789</td>
<td>ABCDEFGHIJK</td>
</tr>
<tr>
<td>Sanserif</td>
<td>123456789</td>
<td>abcdefghijk</td>
</tr>
<tr>
<td>Courier</td>
<td>123456789</td>
<td>ABCDEFGHIJK</td>
</tr>
<tr>
<td>Prestige</td>
<td>123456789</td>
<td>abcdefghijk</td>
</tr>
<tr>
<td>Script</td>
<td>123456789</td>
<td>ABCDEFGHIJK</td>
</tr>
<tr>
<td>OCR-B</td>
<td>123456789</td>
<td>abcdefghijk</td>
</tr>
<tr>
<td>OCR-A</td>
<td>123456789</td>
<td>abcdefghijk</td>
</tr>
<tr>
<td>Orator</td>
<td>123456789</td>
<td>ABCDEFGHIJK</td>
</tr>
<tr>
<td>Orator-2</td>
<td>123456789</td>
<td>abcdefghijk</td>
</tr>
<tr>
<td>TW-Light</td>
<td>123456789</td>
<td>abcdefghijk</td>
</tr>
<tr>
<td>Letter Gothic</td>
<td>123456789</td>
<td>ABCDEFGHIJK</td>
</tr>
<tr>
<td>Blippo</td>
<td>123456789</td>
<td>abcdefghijk</td>
</tr>
<tr>
<td>H-Gothic</td>
<td>123456789</td>
<td>abcdefghijk</td>
</tr>
<tr>
<td>Orane</td>
<td>123456789</td>
<td>abcdefghijk</td>
</tr>
<tr>
<td>Cinema</td>
<td>123456789</td>
<td>abcdefghijk</td>
</tr>
<tr>
<td>CODE 39</td>
<td>123456789</td>
<td>abcdefghijk</td>
</tr>
<tr>
<td>UPC/EAN</td>
<td>123456789</td>
<td>abcdefghijk</td>
</tr>
<tr>
<td>Old Style</td>
<td>123456789</td>
<td>ABCDEFGHIJK</td>
</tr>
<tr>
<td>Firenze</td>
<td>123456789</td>
<td>abcdefghijk</td>
</tr>
<tr>
<td>SLQ Roman</td>
<td>123456789</td>
<td>ABCDEFGHIJK</td>
</tr>
<tr>
<td>SLQ TW-Light</td>
<td>123456789</td>
<td>abcdefghijk</td>
</tr>
<tr>
<td>SLQ Script</td>
<td>123456789</td>
<td>ABCDEFGHIJK</td>
</tr>
</tbody>
</table>

3
PRINTED COMPONENTS

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

- Release lever
- Tractor
- Paper guide
- Adjustment lever
- Clamp lever
- Bail lever
- Power switch
- Ribbon cartridge
- Platen knob
- Cartridge slot
- Control panel
- Print head
- Front cover
- Tear assist
- Entry slot
- Rear cover
- Interface connector
<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper guide</td>
<td>Aligns single sheets (cut forms) to help the printer detect when paper is inserted.</td>
</tr>
<tr>
<td>Release lever</td>
<td>Releases pressure on the paper. This lever must be back for fanfold forms, and forward for single sheets.</td>
</tr>
<tr>
<td>Front cover</td>
<td>Protects the print head and other internal components of your printer.</td>
</tr>
<tr>
<td>Rear cover</td>
<td>Protects the tractor feed unit and separates incoming and outgoing fanfold forms.</td>
</tr>
<tr>
<td>Entry slot</td>
<td>For inserting single sheets of paper.</td>
</tr>
<tr>
<td>Tear assist</td>
<td>Assists when tearing fanfold forms at the perforation.</td>
</tr>
<tr>
<td>CAUTION:</td>
<td>Since the tear assist edge is made sharp to cut off paper, you must swing down the transparent part when you open the front cover. Otherwise, you may injure your fingers.</td>
</tr>
<tr>
<td>Control panel</td>
<td>Indicates printer status and makes various control of printer functions simple and convenient.</td>
</tr>
<tr>
<td>Power switch</td>
<td>Switches power on or off.</td>
</tr>
<tr>
<td>Platen knob</td>
<td>Advances the paper manually.</td>
</tr>
<tr>
<td>Interface connector</td>
<td>Connects the computer to the printer.</td>
</tr>
<tr>
<td>Cartridge slot</td>
<td>Holds the optional Font cartridge or RAM cartridge.</td>
</tr>
<tr>
<td>Print head</td>
<td>Has a dot matrix (24-wire) composition.</td>
</tr>
<tr>
<td>Ribbon cartridge</td>
<td>Contains the printer ribbon.</td>
</tr>
<tr>
<td>Adjustment lever</td>
<td>Controls print darkness by adjusting for the thickness of forms being printed.</td>
</tr>
<tr>
<td>Tractors</td>
<td>Control the movement of fanfold forms.</td>
</tr>
<tr>
<td>Clamp lever</td>
<td>Clamps the tractor in place.</td>
</tr>
<tr>
<td>Bail lever</td>
<td>Opens and closes the paper bail which holds the paper against the platen.</td>
</tr>
</tbody>
</table>
Chapter 2  

SETTING UP THE PRINTER

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

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

LOCATING THE PRINTER

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

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

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

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

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

NOTE: The platen knob is mounted on the printer for the Normal carriage printer.
The optional accessories which you may have ordered with your printer are:

- Film ribbon cartridge (FZ24)
- Color ribbon cartridge (X24CL)
- Font cartridges (FC series)
- RAM cartridge (RC-32Z, DC-32Z)
- Serial interface cartridge (IS-8XL)
- Buffered parallel interface cartridge (IP-128XL)
- Automatic sheet feeder (SF-10DMII/15DMII, SF-10RMII/15RMII)
- Pull tractor unit (PT-10XM/15XM)

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

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

**Mounting the platen knob**

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

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

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

*Figure 2-2. Mount the platen knob.*
Install the ribbon cartridge

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

![Diagram of ribbon cartridge installation]

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

Now install the ribbon with the following procedure. (If you want to print with color, install the optional color ribbon cartridge, X24CL.)

1. Turn the tension knob clockwise on the ribbon cartridge to tighten the ribbon if it is slack.
2. Guide the ribbon between the print head and the silver print head shield, making certain that the spindles on the cartridge holder fit into the sockets on the cartridge itself. The ribbon should pass between the print head and the print head shield as shown in Figure 2-4.
After you have installed the ribbon cartridge, close the front cover.

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

**Connecting the interface cable**

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

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

Follow the procedures below to connect the interface cable:

1. Turn off the power switch both the printer and the computer.
2. Connect the interface cable to the printer as shown in Figure 2-5.
   Make sure that you press the plug fully into the interface connector.
3. Move both clips inside the extended prongs on the sides of the plug until you hear a click.

4. Connect the other end of the interface cable to your computer. Use your computer instructions to attach the interface cable.

   **NOTE:** Because you need your computer when you start printing, ensure that it is completely installed.

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

   **NOTE:** To disconnect the printer the plug has to be disconnected from the wall socket, which has to be located close to the printer, and easy to access.
Chapter 3

OPTIONAL ACCESSORIES

You can select the following accessories as option.

- Automatic sheet feeder (SF-10DMII/15DMII, SF-10RMII/15RMII)
- Pull tractor unit (PT-10XM/15XM)
- Font cartridges (FC series)
- RAM cartridge (RC-32Z, DC-32Z)
- Serial interface cartridge (IS-8XL)
- Buffered parallel interface cartridge (IP-128XL)

This chapter describes how to install these optional accessories.

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

AUTOMATIC SHEET FEEDER

You can use the Automatic Sheet Feeder to print on single sheets. This printer can be used either a Single-bin type or Dual-bin type Automatic Sheet Feeder.

**Single-Bin Automatic Sheet Feeder**

*(SF-10DMII/15DMII)*

The procedure to mount the Single-Bin ASF is:

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

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

4. A stacker is included with the Automatic Sheet Feeder. Attach the hook at the top of the stacker to the Automatic Sheet Feeder. Then push the lower section of the stacker down into position, and engage the lower hook as shown in Figure 3-3.
5. Tip the Automatic Sheet Feeder forward slightly and put the feeder into place behind the printer platen roller.
6. Lower the rear side of the Automatic Sheet Feeder and attach it to the platen shaft.
7. Close the front cover with the transparent part in the open position.

8. Insert the hopper attachment by hand into the holders on top of the hopper support section as shown in Figure 3-6.
9. Squeeze the sides of the stacker attachments lightly, and insert into the holders on the front part of the sheet feeder.

![Stacker attachment](image)

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

Now, you can use the ASF by installing the paper stack into the hopper. (Refer to Chapter 4.)

In addition, you can feed a sheet of paper manually by inserting into the slot at the front of ASF roller as shown in Figure 3-8.

![Insert a sheet of paper to feed manually](image)

*Figure 3-8. Insert a sheet of paper to feed manually.*

**NOTE:** Set the paper guide and rear cover aside carefully after they have been removed from the printer. Reverse the procedure described above when removing the Automatic Sheet Feeder.
**Dual-Bin Automatic Sheet Feeder**  
*(SF-10RMII/15RMII)*

The procedure to mount the Dual-Bin ASF is:

1. Open the front cover by lifting up the back using the two grips on either side, then swing down the transparent part (see Figure 3-1).
2. Open the rear cover by lifting up the front using the two grips on either side, then remove it upward.
   If the paper guide is installed, remove it before taking off the rear cover.
3. Move the bail lever on top of the printer forward to open the paper bail.
4. A stacker is included with the Automatic Sheet Feeder. Attach the hook at the top of the stacker to the Automatic Sheet Feeder. Then push the lower section of the stacker down into position, and engage the lower hook as shown in Figure 3-9.

![Figure 3-9. Attach the stacker to the Automatic Sheet Feeder.](image)

5. Tip the Automatic Sheet Feeder forward slightly and put the feeder into place behind the printer platen roller.
6. Lower the rear side of the Automatic Sheet Feeder and attach it to the platen shaft.
7. Close the front cover with the transparent part in the open position.
8. Attach the clear plastic paper supports between the left and right paper guides of the hopper bins and the stacker.
Now, you can use the ASF by installing the paper stack into the bin. (Refer to Chapter 4.)

In addition, you can feed a sheet of paper manually by inserting into the slot at the front of ASF bin #1 as shown in Figure 3-11.

**Figure 3-10.** Attach the clear plastic paper supports to the Automatic Sheet Feeder.

**Figure 3-11.** You can insert a sheet of paper to the font slot.

**NOTE:** Set the paper guide and rear cover aside carefully after they have been removed from the printer. Reverse the procedure described above when removing the Automatic Sheet Feeder.
PULL TRACTOR UNIT (PT-10XM/15XM)

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

The procedure to mount the Pull Tractor Unit is:

1. Open the front cover by lifting up the back using the two grips on either side, then swing down the transparent part (see Figure 3-1).
2. Open the rear cover by lifting up the front using the two grips on either side, then remove it upward.
   If the paper guide is installed, remove it before taking off the rear cover.
3. Move the bail lever on top of the printer forward to open the paper bail.
4. Squeeze the sides of the paper supports lightly, and insert into the holes on both side of the Pull Tractor Unit as shown in Figure 3-12.

![Figure 3-12. Mount the paper support A and B onto the Pull Tractor Unit.](image)

5. Fit the mounting brackets of the Pull Tractor Unit onto the shaft of the printer mechanism, tilting the Pull Tractor Unit slightly backward.
6. Secure the Pull Tractor Unit firmly by lowering it into position, as shown in Figure 3-13.
7. Close the front cover with the transparent part in the open position.
Figure 3-13. Mount the Pull Tractor Unit onto the printer.

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

FONT CARTRIDGES AND RAM CARTRIDGES

This printer has seven built-in LQ fonts, and a 29 K-byte (76 K-byte for wide carriage type printer) printing buffer.

You can add the following optional fonts or expand the printing buffer by installing optional cartridges (Font Cartridge or RAM Cartridge).

[FC-1Z Cartridge]
- Orator 2
- Cinema
- Letter Gothic
- Blippo

[FC-2Z Cartridge]
- OCR-B
- UPC/EAN
- OCR-A
- CODE 39

[FC-3Z Cartridge]
- TW-Light
- Orane
[FC-4Z Cartridge]  
  - Russian

[FC-5Z Cartridge]  
  - Old Style  
  - Firenze

[FC-10Z Cartridge]  
  - SLQ Script

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

1. Turn off the power switch at the front of the printer, and open the front cover.
   Swing down the transparent part (see Figure 3-1).

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 safe place.

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.
INTERFACE CARTRIDGES

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

If you want to use the Serial Interface Cartridge, set the DIP switches on the board before install it to the printer.
1. Turn off the power switch and disconnect the power cord from the power source.
2. Disconnect the interface cable if attached.
3. Compress the projected parts on the right and left, and pull the Standard Interface Cartridge to remove it from the printer.

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

NOTE: Store the removed Interface Cartridge in a safe place.
**DIP Switch Functions on The Serial Interface Cartridge**

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

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

<table>
<thead>
<tr>
<th>Switch</th>
<th>Function</th>
<th>ON</th>
<th>OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Data length</td>
<td>8-bit</td>
<td>7-bit</td>
</tr>
<tr>
<td>2</td>
<td>Parity condition</td>
<td>(Refer below)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Data Protocol</td>
<td>(Refer below)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Parity condition</td>
<td>(Refer below)</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Transfer speed</td>
<td>(Refer below)</td>
<td></td>
</tr>
</tbody>
</table>

### [Parity condition]

<table>
<thead>
<tr>
<th>Switch 2</th>
<th>Switch 5</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>ON</td>
<td>No parity</td>
</tr>
<tr>
<td>ON</td>
<td>OFF</td>
<td>Odd parity</td>
</tr>
<tr>
<td>OFF</td>
<td>ON</td>
<td>Even parity</td>
</tr>
</tbody>
</table>

### [Data protocol]

<table>
<thead>
<tr>
<th>Switch 3</th>
<th>Switch 4</th>
<th>Protocol</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>ON</td>
<td>DTR</td>
</tr>
<tr>
<td>ON</td>
<td>OFF</td>
<td>XON/XOFF</td>
</tr>
<tr>
<td>OFF</td>
<td>ON</td>
<td>ETX/ACK</td>
</tr>
</tbody>
</table>

### [Transfer speed]

<table>
<thead>
<tr>
<th>Switch 6</th>
<th>Switch 7</th>
<th>Switch 8</th>
<th>Transfer speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>150 BPS</td>
</tr>
<tr>
<td>OFF</td>
<td>OFF</td>
<td>ON</td>
<td>300 BPS</td>
</tr>
<tr>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>600 BPS</td>
</tr>
<tr>
<td>OFF</td>
<td>ON</td>
<td>ON</td>
<td>1200 BPS</td>
</tr>
<tr>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>2400 BPS</td>
</tr>
<tr>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>4800 BPS</td>
</tr>
<tr>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>9600 BPS</td>
</tr>
<tr>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>19200 BPS</td>
</tr>
</tbody>
</table>
This chapter describes instructions for printing such as selecting paper types, adjusting the printing gap, and installing paper.

SELECTION OF PAPER

Your printer accepts any of the following papers:

- Single sheets (cut forms) and stationary
  Use the friction feed or the optional Automatic Sheet Feeder.

- Fanfold forms
  Fanfold forms have holes along the sides and perforations between the sheets. They are also called sprocket forms, punched forms, or just plain "computer paper". Printing on or near the perforations of continuous fanfold forms may reduce printing quality, misalign the fanfold forms, or cause a paper jam. It is recommended not to print within an area of one inch before and after the perforations.

- Multi-part forms
  You can use multi-part forms that have up to five parts including the original when the Multi-part mode is selected with the EDS setting. (For details, please refer to Chapter 6.) Use pressure sensitive multi-part forms with both side edges glued and a difference in thickness of 0.05mm or less between the side edges. It is recommended to use the bottom feed with the optional Pull Tractor Unit to get fine alignment.

  **NOTE**: Care should be taken in color printing with continuous multi-part forms. Side edges of paper might be damaged.

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

![Figure 4-1. Recommended print area for acceptable papers.](image)

**ADJUSTING THE PRINTING GAP**

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

There are seven positions, and you can feel the lever clicking into each position. The second position from the rear (marked with "•") is the one most commonly used for single sheets of paper. Try different positions until you get the best printing results.

**NOTE:** Printing with an inappropriate gap may drastically shorten the life of the print head.
The following table provides the recommended lever positions for each paper types as a reference.

<table>
<thead>
<tr>
<th>Paper Type</th>
<th>Weight (g/m²) (Each paper)</th>
<th>Thickness (mm) (Total)</th>
<th>Recommended Lever position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single</td>
<td>52 ~ 90</td>
<td>0.07 ~ 0.12</td>
<td>2nd or 3rd</td>
</tr>
<tr>
<td>2-ply</td>
<td>40 ~ 58</td>
<td>0.12 ~ 0.16</td>
<td>2nd or 3rd</td>
</tr>
<tr>
<td>3-ply</td>
<td>40 ~ 58</td>
<td>0.18 ~ 0.25</td>
<td>3rd or 4th</td>
</tr>
<tr>
<td>4-ply</td>
<td>40 ~ 58</td>
<td>0.24 ~ 0.30</td>
<td>4th or 5th</td>
</tr>
<tr>
<td>5-ply</td>
<td>40 ~ 58</td>
<td>0.30 ~ 0.35</td>
<td>5th or 6th</td>
</tr>
</tbody>
</table>

**LOADING FANFOLD FORMS**

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

You can load fanfold paper with the following three ways:
- Push feed with internal tractor unit
- Bottom feed with optional Pull Tractor Unit
- Push/Pull feed with internal tractor unit and the optional Pull Tractor Unit.

This section will take you through the procedures for loading, parking and unparking fanfold forms.
**Loading the paper from the rear of the printer**

*(Push feed)*

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

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

![Figure 4-3. Opening the rear cover.](image)

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

10. Turn on the power using the switch located at the front of the printer. The printer will beep, indicating that the paper is not yet fully loaded. The "PAPER OUT" message will also flash to confirm this.

11. Now press the SET/EJECT 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 ONLINE button, then set the paper by using the micro-feed function. (For details, refer to Chapter 5.)

13. Close the rear cover and the transparent part of the front cover, then mount the paper guide in the horizontal position shown in Figure 4-5, so that it will separate the printed from the unprinted paper.
Loading the paper from the bottom of the printer

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

1. Install the optional Pull Tractor Unit as described in Chapter 3.
2. With the tractor covers open, mount the paper from the bottom of the printer, by aligning holes with the pins on the tractor unit.

3. Adjust the spacing of the tractor units by sliding them along the bar, using the clamp lever at the back of each unit to release and lock them in position. When the lever is up, the unit is released, and when it is down, the unit is locked.

4. Now close the tractor covers, again making sure that the paper holes are aligned with the pins on the tractor units. If they are not aligned properly, you will have problems with paper feeding, possibly resulting in tearing and jamming of the paper.

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

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

1. Place a stack of fanfold paper behind and at least one page-length below the printer.

2. Turn the printer’s power OFF.

3. Push the release lever backward. This has the effect of releasing the paper from the platen roller, and engaging the tractor feed.
4. Open the transparent part of the front cover, and remove the paper guide and the rear cover.

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

6. Adjust the spacing of the tractor units by sliding them along the bar, using the clamp lever at the back of each unit to release and lock them in position. When the clamp lever is up, the unit is released, and when it is down, the unit is locked.

7. Now close the tractor covers, again making sure that the paper holes are aligned with the pins on the tractor units. If they are not aligned properly, you will have problems with paper feeding, possibly resulting in tearing and jamming of the paper.

8. Turn on the power using the switch located at the front of the printer. The printer will beep, indicating that the paper is not yet fully loaded. The "PAPER OUT" message will also flash to confirm this.

9. Now press the button. The paper will be fed past the print head.

10. Turn off the power, and install the optional Pull Tractor Unit as described in Chapter 3.

11. With the optional tractor covers open, turn the platen knob clockwise to mount the paper by aligning holes with the pins on the optional tractor unit.
12. Adjust the spacing of the optional tractor units by sliding them along the bar, using the clamp lever at the back of each unit to release and lock them in position. When the lever is up, the unit is released, and when it is down, the unit is locked.

13. Now close the tractor covers, again making sure that the paper holes are aligned with the pins on the optional tractor units. If they are not aligned properly, you will have problems with paper feeding, possibly resulting in tearing and jamming of the paper.

14. Remove the lever stopper from the slot of the release lever as shown in Figure 4-10.

15. Set the release lever to the "•" position, and turn the platen knob clockwise to tighten the paper if it is slack.

*Figure 4-9. Mount the fanfold paper to the Pull Tractor Unit by turning the platen knob.*
16. Push the release lever backward, and remount the lever stopper to the original position.

**Paper parking**

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

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

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

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

**Paper unparking**

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

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

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

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

**Loading the paper without optional accessories**

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

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

![Paper guide](image)

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

2. Adjust the paper guides to match the size of the paper you will be using. Remember that printing will start some distance from the left-hand edge of the carriage.

3. Turn on the power using the switch located at the front of the printer. The printer will beep, indicating that there is no paper in position for printing. The “PAPER OUT” message will also flash to confirm this.

4. Make sure that the release lever is at front position.

If fanfold paper is already mounted in the printer, press the **PARK** button to park the paper in the off-line state, then move the release lever forward.
5. Place a single sheet between the guides, placing the side on which you want to print towards the back of the printer. Gently push the paper down in the guides until you feel it stop.

6. Now press the **SELECT** button. The paper will be fed into the printer and adjusted past the print head to a position ready for printing.

7. If you want to set the paper to a different position, set the printer off-line by pressing the **ON LINE** button, then set the paper position by using the micro-feed function. (For details, refer to Chapter 5.)

*Figure 4-13. Loading a single sheet.*
Loading the paper with optional Automatic Sheet Feeder

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

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

2. Use the printer’s EDS mode to select ASF. (For details, please refer to Chapter 6.)

3. If fanfold paper has already been loaded in the printer, park the paper through the rear slot.

4. Pull the printer release lever forward to load single sheets.

5. When you are using Single-Bin ASF, pull the paper loading lever forward to pull the hopper out until it is in position.

   In case of the Dual-Bin ASF, pull both pressure bar levers forward to open the pressure bar.

Figure 4-14. Install the optional Automatic Sheet Feeder.
6. Adjust the left paper guide to the desired left position by moving it horizontally in either direction. (Unlock the paper guides by pressing down on the locking levers in case of Dual-Bin ASF.)

7. Lock the left paper guides in position by moving the locking lever up for the Dual-Bin ASF.
8. Adjust the right paper guide to accommodate the width of the paper. The guides should be adjusted to restrict the amount of horizontal play while allowing the paper to slide up and down freely between the two paper guides. The ideal distance between paper ream and paper guides is 0.25 mm (0.01”) on both sides at the narrowest part of the paper guides.

9. Fan the paper stack and square it off properly before inserting it into the Automatic Sheet Feeder.

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

10. Insert the paper stack into the Automatic Sheet Feeder. The stack should not be more than 15 mm (5/8") equivalent to 150 sheets of 20 lb paper.

If necessary, remove some sheets. The ASF may not perform satisfactorily if it is overloaded.

11. When you are using Single-Bin ASF, push the paper loading lever toward the back.

In case of the Dual-Bin ASF, push both pressure bar levers toward the back to “FEED”.

Figure 4-18. Push the paper loading lever or pressure bar levers to hold the paper stack.
The control panel buttons can be pressed individually to perform the operations indicated by their names. Other functions can be achieved by holding these buttons down when you turn the printer’s power on, or by pressing the control panel buttons in combination.

This chapter explains all the button and indicator functions.

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

**BUTTONS AND INDICATORS**

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

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

![Control panel diagram](image)

*Figure 5-1. Control panel.*
**ON LINE button**

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

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

The printer powers up in the on-line status if paper is loaded. If paper is not loaded, the printer powers up off-line with the “PAPER OUT” message blinking. When you load paper, the printer goes on-line.

You will want to press the button:

- **Before and after any other panel operation**
  The other panel buttons operate only in the off-line state. Press the button to go off-line. After performing the panel operation(s), press the button again to go back on-line.

- **To pause during printing**
  If you press the 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 button again to go back on-line.

- **To cut fanfold forms at the end of printing**
  When you hold the button down for one second with the push tractor mode, the printer goes off-line and displays the “SHORT TEAR-OFF” message, then the printer also feeds the paper forward approximately two inches forward. This allows you to cut it off just below the last line printed.
  When you press the 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 button while you are line-feeding, the paper will feed automatically to the top of the next page. This is explained later.
If you press this button while on-line, this will alternately flash the QUIET indicator. When in Quiet mode with the QUIET indicator lit, the printer will print slightly slower, but at a reduced noise level.

**SET/EJECT/PARK button**

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

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

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

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

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

**PITCH button**

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

<table>
<thead>
<tr>
<th>Pitch</th>
<th>Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pica (10CPI)</td>
<td>10</td>
</tr>
<tr>
<td>Elite (12CPI)</td>
<td>12</td>
</tr>
<tr>
<td>Semi-condensed (15CPI)</td>
<td>15</td>
</tr>
<tr>
<td>Condensed pica (17CPI)</td>
<td>17</td>
</tr>
<tr>
<td>Condensed elite (20CPI)</td>
<td>20</td>
</tr>
<tr>
<td>Proportional</td>
<td>PRO</td>
</tr>
<tr>
<td>Condensed proportional</td>
<td>P.C</td>
</tr>
</tbody>
</table>
**FONT button**

This button selects the font to be printed. Roman font is selected at power-up unless the default settings are changed. To change the font, set the printer off-line, then press the [MODE FONT] button repeatedly until the message on the display illuminates. The selections cycle in the following order:

<table>
<thead>
<tr>
<th>Font</th>
<th>Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roman</td>
<td>ROMAN</td>
</tr>
<tr>
<td>Sanserif</td>
<td>SANSERIF</td>
</tr>
<tr>
<td>Courier</td>
<td>COURIER</td>
</tr>
<tr>
<td>Prestige</td>
<td>PRESTIGE</td>
</tr>
<tr>
<td>Script</td>
<td>SCRIPT</td>
</tr>
<tr>
<td>OCR-B</td>
<td>OCR-B</td>
</tr>
<tr>
<td>OCR-A</td>
<td>OCR-A</td>
</tr>
<tr>
<td>Orator with small caps</td>
<td>ORATOR</td>
</tr>
<tr>
<td>Orator with lower case</td>
<td>ORATOR-2</td>
</tr>
<tr>
<td>TW-light</td>
<td>TW-LIGHT</td>
</tr>
<tr>
<td>Letter Gothic</td>
<td>L GOTHIC</td>
</tr>
<tr>
<td>Blippo</td>
<td>BLIPPO</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Font</th>
<th>Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>H-Gothic</td>
<td>H-GOTHIC</td>
</tr>
<tr>
<td>Orane</td>
<td>ORANE</td>
</tr>
<tr>
<td>Cinema</td>
<td>CINEMA</td>
</tr>
<tr>
<td>Bar code 39</td>
<td>CODE 39</td>
</tr>
<tr>
<td>UPC/EAN</td>
<td>UPC/EAN</td>
</tr>
<tr>
<td>Old Style</td>
<td>O STYLE</td>
</tr>
<tr>
<td>Firenze</td>
<td>FIRENZE</td>
</tr>
<tr>
<td>SLQ Roman</td>
<td>ROMAN SQ</td>
</tr>
<tr>
<td>SLQ TW-light</td>
<td>TW-LIGHT SQ</td>
</tr>
<tr>
<td>SLQ Script</td>
<td>SCRIPT SQ</td>
</tr>
<tr>
<td>Draft</td>
<td>DRAFT</td>
</tr>
<tr>
<td>High-Speed Draft</td>
<td>HS-DRAFT</td>
</tr>
</tbody>
</table>

If a Font cartridge is not installed, the selection of related Font is skipped.

If you want to change the character quality quickly, press this [MODE FONT] button in on-line. The printer stops printing and enters the Quick mode, with "QUICK MODE" message on the display.

If you continue to press the [MODE FONT] button, the display changes to "HS-DRAFT", "DRAFT" and LQ/SLQ (currently-selected SLQ or LQ font) repeatedly.

Printing will be performed according to the print mode message on the display which selected when the button is released.
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.

![Diagram](image)

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

**Short test mode**

If the printer is turned on while the **ON LINE** button is pressed, the printer will enter the short self-test mode, with the “SELF TEST SHORT” message on the display. The printer will print the version number of the printer’s ROM, followed by seven lines of the character set.

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

```
*** Ver X.X ***

!"#$%'()*/+,.-0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_abc
defghijklmnopqrstuvwxyz[\]^_abc
defghijklmnopqrstuvwxyz[\]^_abc
defghijklmnopqrstuvwxyz[\]^_abc
defghijklmnopqrstuvwxyz[\]^_abc
defghijklmnopqrstuvwxyz[\]^_abc
defghijklmnopqrstuvwxyz[\]^_abc
defghijklmnopqrstuvwxyz[\]^_abc
```

Figure 5-3. Short self-test.

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

If the printer is turned on while the PAPER FEED button is pressed, the printer will enter the long self-test mode, with the "SELF TEST LONG" message on the display. The printer will print the version number of the printer’s ROM, the current EDS settings and the current Dot Adjustment setting, followed by the whole character set printed in each font and pitch available.

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

---

Figure 5-4. Long self-test.
Since the self-test occupies the full width of the carriage, it is recommended that the printer is loaded with the widest paper possible to avoid damage to the print head and/or platen. In addition, the total number of lines printed is considerable, more than can be accommodated on a single sheet, so fanfold paper is recommended for this test.

**Print area test mode**

By holding the **SELFTEST** button down during power-up, the printer will enter the print area test mode. This way, you can find how many lines on your paper are available for printing. The printer will show the "SELF TEST TOP&B." on the display and print the first line message, then print the last line message after feeding to the bottom of the page.

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

**Pitch lock mode**

By holding the **PITCH** button down during power-up, the print pitch can only be selected from the control panel. This prevents software interference. You will hear an acknowledging beep, and the printer will show the "PITCH LOCK" message on the display 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 show with "*" on the display and not be reset or otherwise changed by any commands your software may issue.

**Font lock mode**

By holding the **MODE** button during power-up, fonts can only be selected from the control panel. This prevents software interference. There will be an acknowledging beep and "FONT LOCK" message on the display. 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, shown with "*" on the display, will not be changed by any commands your software may issue.

**Font and Pitch lock mode**

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

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/DIRECT PARK] buttons down, turn power ON. A beep tone will be heard and the "HEX DUMP MODE" message on the display.

2. Begin printing. In place of the usual printout you will get a formatted dump showing exactly what data the printer receives. Each line presents sixteen characters, their hexadecimal codes to the left and printable characters printed on the right.

3. At the end of the hexadecimal dump, set the printer off-line with the [ON LINE] button. This is necessary to print the last line.

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

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

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

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

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

| 00 01 02 03 04 05 06 07 | 08 09 0A 0B 0C 0D 0E | \ldots \ldots \ldots \ldots |
| 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 |
| 40 41 42 43 44 45 46 47 | 48 49 4A 4B 4C 4D 4E 4F|
| 50 51 52 53 54 55 56 57 | 58 59 5A 5B 5C 5D 5E 5F|
| 60 61 62 63 64 65 66 67 | 68 69 6A 6B 6C 6D 6E 6F|
| 70 71 72 73 74 75 76 77 | 78 79 7A 7B 7C 7D 7E 7F|
| 80 81 82 83 84 85 86 87 | 88 89 8A 8B 8C 8D 8E 8F|
| 90 91 92 93 94 95 96 97 | 98 99 9A 9B 9C 9D 9E 9F|
| A0 A1 A2 A3 A4 A5 A6 A7 | AB AC AD AE AF \ldots \ldots \ldots \ldots |
| B0 B1 B2 B3 B4 B5 B6 B7 | BB BA BB BC BD BE BF \ldots \ldots \ldots \ldots |
| C0 C1 C2 C3 C4 C5 C6 C7 | C8 C9 CA CB CC CD CE CF \ldots \ldots \ldots \ldots |
| D0 D1 D2 D3 D4 D5 D6 D7 | DB DA DB DC DD DE DF \ldots \ldots \ldots \ldots |
| E0 E1 E2 E3 E4 E5 E6 E7 | EB EA EB EC ED EE EF \ldots \ldots \ldots \ldots |
| F0 F1 F2 F3 F4 F5 F6 F7 | FB FA FB FC FD FE FF \ldots \ldots \ldots \ldots |

**Figure 5-5.** 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:

```plaintext
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:

```plaintext
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.

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 \texttt{ON LINE} button.

4. While holding the \texttt{ON LINE} button down, press and the \texttt{PITCH} button, then release both buttons at the same time. The "SET TOF POSITION" message will show on the display 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 \texttt{ON LINE} button to set the printer off-line.
2. Press the \texttt{ON LINE} button again and hold it down.
3. While holding the \texttt{ON LINE} button down, press the \texttt{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.

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

1. Press the \texttt{ON LINE} button to set the printer off-line.
2. Press the \texttt{ON LINE} button again and hold it down.
3. While holding the \texttt{ON LINE} button down, press the \texttt{PAPER FEED} 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 \texttt{SET/EJECT} button.
2. Change the print position using the micro feed function.
3. After you get the desired position, press the \texttt{ON LINE} button to save the value.
   The "TOP MARGIN SET" message will show on the display.
This value will remain unless you power off the printer. If you want to retain this value even after you turn off the power, store it using the Macro Definition function, which is described later.

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

**Clearing the buffer/All reset**

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

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

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

**Selecting the print color**

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

1. Press the **ON LINE** button to set the printer off-line.
2. Press the **MODE** button and hold it down.
3. While holding the \texttt{MODE} button, press the \texttt{SET/EJECT PARK} button. The "CURRENT BLACK" message will show on the display to indicate the current color setting. (In this case, the current color is set black.)

4. If you want to change the color, press the \texttt{MODE} button while holding the \texttt{SET/EJECT PARK} button.

   The message on the display will be changed in the following order.

   \begin{center}
   \begin{tabular}{|c|c|}
   \hline
   Color & Message \\
   \hline
   Black & CHANGE BLACK \\
   Magenta & CHANGE MAGENTA \\
   Cyan & CHANGE CYAN \\
   Violet & CHANGE VIOLET \\
   \hline
   Color & Message \\
   \hline
   Yellow & CHANGE YELLOW \\
   Orange & CHANGE ORANGE \\
   Green & CHANGE GREEN \\
   \hline
   \end{tabular}
   \end{center}

5. Release both buttons after you set the desired printing color.

   If you want to save the selected color for later use, store it using the Macro Definition.

\textbf{NOTE:} This function is valid only when the color ribbon is installed into the printer.

\section*{Selecting the ASF bin number}

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

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

1. Press the \texttt{ON LINE} button to set the printer off-line.

2. Press the \texttt{MODE} button and hold it down.

3. While holding down the \texttt{MODE} button, press the \texttt{PAPER FEED} button.

   The "CURRENT ASF BIN1" message (when ASF bin #1 is selected) will show on the display.

4. Each time you press the \texttt{PAPER FEED} button while holding down the \texttt{MODE} button, the "CHANGE ASF BIN1" and the "CHANGE ASF BIN2" message will be shown on the display.

5. Release both buttons after you set the desired ASF bin number.

\textbf{NOTE:} This function is valid only when the Dual-bin ASF is selected by the EDS setting.
Store Macro Definition

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

1. Press the ON LINE button to set the printer off-line.
2. Press the MODE button and hold it down.
3. While holding the MODE button down, press the PITCH button and hold them down until the "SET MACRO" message shows on the display.
4. Release both buttons at the same time after this message to store the current setting.
   If you release these buttons after the "CLEAR MACRO" message is shown on the display, the macro is cleared.

NOTE: You can store the following settings with this procedure.
   • Current Font and Pitch
   • Current auto-loading amount for cut sheet
   • Current auto-loading amount for continuous paper
   • Current auto-loading amount in ASF mode
   • Current print color

Data to be stored are controlled in Standard mode and IBM mode separately. For example, the data stored in the Standard mode are not effective in the IBM mode, and vice versa.
Chapter 6

DEFAULT SETTINGS

From the control panel you can change the parameters that define how your printer works. Parameter just means “variable”. If you are familiar with earlier kinds of printers, you’ll understand that this printer parameters control pretty much the same things DIP switches do. This function is called as Electronic DIP Switch (EDS) mode.

HOW TO SET THE EDS MODE

The EDS mode has 29 kinds of functions you can set as the power-on default.

Turn the printer on while simultaneously holding the SET/EJECT PARK, PAPER FEED and ON LINE buttons.

The “ELECTRIC DIP SW” message will show on the display, and enter the EDS mode.

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

![Figure 6-1. Button functions in the EDS mode.](image-url)
• Use the \underline{\textbf{[MORE FONT]}} button to select the Bank Number.
• Use the \underline{\textbf{[PITCH]}} button to select the Switch Number.
• The display on the control panel shows the current setting.
  If you want to scroll it, press the \underline{\textbf{[SELECT BANK]}} button.
• Press the \underline{\textbf{[PAPER FEED]}} button to set the current settings.
• Press the \underline{\textbf{[ON LINE]}} button to exit the EDS mode.

If you want to confirm the current EDS settings, try to run the long self-test.
(For details, refer to Chapter 5.)

FUNCTIONS OF THE EDS SETTINGS

The printer stores the parameters as easy-to-use program menu items that you can select from the control panel while in the EDS mode. These parameters specify:

• Command (which commands the printer accept)
• Font (which font to print)
• Character (which character set to print)
• Style (which style to print)
• Layout (how pages will be formatted)
• Forms (what paper the printer will use)
• Others

A default is the setting the printer will use if none is specifically selected by a program. When you first turn on or later reset your printer these default settings will take effect.
Following table shows the default settings at the factory.

<table>
<thead>
<tr>
<th>Display Message</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1 EMULATION STD</td>
<td>Standard emulation mode is selected.</td>
</tr>
<tr>
<td>A2 RAM BUFFER</td>
<td>RAM is used as the print buffer.</td>
</tr>
<tr>
<td>A3 QUIET OFF</td>
<td>Quiet mode is cancelled.</td>
</tr>
<tr>
<td>A4 GRAPH DIR BI</td>
<td>Bi-directional printing is selected for graphics.</td>
</tr>
<tr>
<td>A5 AUTO-ONLINE Y</td>
<td>Auto on-line mode is selected.</td>
</tr>
<tr>
<td>B1 MODE LQ/SLQ</td>
<td>LQ/SLQ mode is selected.</td>
</tr>
<tr>
<td>B2 LQ ROMAN</td>
<td>Roman font is selected for LQ/SLQ mode.</td>
</tr>
<tr>
<td>C1 STD GRAPH</td>
<td>Graphic set is selected for Standard character set.</td>
</tr>
<tr>
<td>C2 IBM IBM#2</td>
<td>Set #2 is selected for IBM character set.</td>
</tr>
<tr>
<td>C3 ZERO NORMAL</td>
<td>Normal zero character is selected.</td>
</tr>
<tr>
<td>C4 CODEPAGE #437</td>
<td>Code Page #437 (U.S.A.) is selected.</td>
</tr>
<tr>
<td>C5 COUNTRY USA</td>
<td>U.S.A. character set is selected.</td>
</tr>
<tr>
<td>D1 ITALIC OFF</td>
<td>Italic print mode is cancelled.</td>
</tr>
<tr>
<td>D2 PITCH 10</td>
<td>Pica pitch (10 CPI) is selected.</td>
</tr>
<tr>
<td>E1 MULTIPART OFF</td>
<td>Multi-part mode is cancelled.</td>
</tr>
<tr>
<td>E2 PAPER-OUT ON</td>
<td>Paper-out detector is enabled.</td>
</tr>
<tr>
<td>E3 ASF OFF</td>
<td>Optional ASF is not installed.</td>
</tr>
<tr>
<td>E4 T.MGN-CUT 1/6</td>
<td>Top margin for cut forms is set to 1/6 inch.</td>
</tr>
<tr>
<td>E5 T.MGN-ASF 1/6</td>
<td>Top margin for ASF is set to 1/6 inch.</td>
</tr>
<tr>
<td>E6 T.MGN-TRA 1/6</td>
<td>Top margin for fanfold forms is set to 1/6 inch.</td>
</tr>
<tr>
<td>E7 BOTTM MGN 1/6</td>
<td>Bottom margin is set to 1/6 inch.</td>
</tr>
<tr>
<td>E8 L.P.I. 6</td>
<td>6 lines can be printed on one inch.</td>
</tr>
<tr>
<td>F1 AUTO-LF OFF</td>
<td>LF must be from host.</td>
</tr>
<tr>
<td>F2 AUTO-CR ON</td>
<td>Auto CR with LF.</td>
</tr>
<tr>
<td>F3 TEAR-OFF OFF</td>
<td>Tear-off function is disabled.</td>
</tr>
<tr>
<td>F4 SKIP-PERF OFF</td>
<td>Skip-over-perforation is disabled.</td>
</tr>
<tr>
<td>F5 PAGE-LGTH 11</td>
<td>Page length is set to 11 inches.</td>
</tr>
<tr>
<td>G1 STROBE NORMAL</td>
<td>Set the normal interface timing.</td>
</tr>
<tr>
<td>G2 EDS CURRENT</td>
<td>Set the current EDS settings.</td>
</tr>
</tbody>
</table>
Command parameters

The Command parameters are assigned to Bank "A", including these functions:

- **Emulation**
  Select the mode compatible with your computer and software. In Standard mode the printer operates like the Epson LQ-860/LQ-1060. In IBM mode it operates like the IBM Proprinter X24E/XL24E.

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

- **Quiet mode**
  You can select the Quiet mode as the power-on default by setting this switch.
  When in Quiet mode, the printer will print slightly slower, but at a reduced noise level.

- **Graphics direction**
  When printing in dot graphics mode, the printer may either print bi-directionally (in alternate directions) for speed or in one direction only (uni-directional for increased accuracy).
  For practically all purposes, however, bi-directional printing is sufficiently accurate.

- **Auto On-Line**
  Set the status just after loaded the paper into the printer.
  When the Auto-Online is set ON, the printer automatically goes on-line.
  When it is set OFF, you must press the **ON LINE** button to set on-line after load the paper.

Following table shows the display messages and those meanings for the Bank "A".
### Display Message meanings

<table>
<thead>
<tr>
<th>Display Message</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1 EMULATION STD</td>
<td>Standard emulation mode is selected.</td>
</tr>
<tr>
<td>A1 EMULATION IBM</td>
<td>IBM emulation mode is selected.</td>
</tr>
<tr>
<td>A2 RAM BUFFER</td>
<td>RAM is used as the print buffer.</td>
</tr>
<tr>
<td>A2 RAM DOWNLOAD</td>
<td>Download commands are enabled.</td>
</tr>
<tr>
<td>A2 RAM 1 LINE</td>
<td>RAM is used as only one-line buffer.</td>
</tr>
<tr>
<td>A3 QUIET OFF</td>
<td>Quiet mode is cancelled.</td>
</tr>
<tr>
<td>A3 QUIET ON</td>
<td>Quiet mode is selected.</td>
</tr>
<tr>
<td>A4 GRAPH DIR BI</td>
<td>Bi-directional printing is selected for graphics.</td>
</tr>
<tr>
<td>A4 GRAPH DIR UNI</td>
<td>Uni-directional printing is selected for graphics.</td>
</tr>
<tr>
<td>A5 AUTO-ONLINE Y</td>
<td>Auto on-line mode is selected.</td>
</tr>
<tr>
<td>A5 AUTO-ONLINE N</td>
<td>Need to press the <strong>ON LINE</strong> button to set on-line.</td>
</tr>
</tbody>
</table>

### Font parameters

The Font parameters are assigned to Bank “B”, including these functions:

- **Mode**
  
  Select the mode of font quality.
  
  HS Draft prints with the highest speed, but the dot matrix is reduced to print faster.
  
  Draft has a reduced dot matrix compared to Letter Quality, but the print quality is better than the HS Draft.
  
  Letter Quality is referred as LQ, and there are many font styles as shown below.
  
  The SLQ (Super Letter Quality) is the highest quality of this printer, and there are three types of font styles.

- **LQ/SLQ Font styles**
  
  There are many font styles for LQ and SLQ print mode. You can select one of them as the power-on default by setting this switch.
  
  Optional fonts can be selected only when the corresponding font cartridge is installed in the printer.
  
  If the corresponding font cartridge is not installed after you selected it with this EDS mode, the Roman is selected.
Following table shows the display messages and those meanings for the Bank “B”.

<table>
<thead>
<tr>
<th>Display Message</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1 MODE LO/SLQ</td>
<td>LQ/SLQ mode is selected.</td>
</tr>
<tr>
<td>B1 MODE DRAFT</td>
<td>Draft mode is selected.</td>
</tr>
<tr>
<td>B1 MODE HS-DRAFT</td>
<td>HS Draft mode is selected.</td>
</tr>
<tr>
<td>B2 LO ROMAN</td>
<td>Roman font is selected for LQ/SLQ mode.</td>
</tr>
<tr>
<td>B2 LO SANSERIF</td>
<td>Sanserif font is selected for LQ/SLQ mode.</td>
</tr>
<tr>
<td>B2 LO COURIER</td>
<td>Courier font is selected for LQ/SLQ mode.</td>
</tr>
<tr>
<td>B2 LO PRESTIGE</td>
<td>Prestige font is selected for LQ/SLQ mode.</td>
</tr>
<tr>
<td>B2 LO SCRIPT</td>
<td>Script font is selected for LQ/SLQ mode.</td>
</tr>
<tr>
<td>B2 LO OCR-B</td>
<td>OCR-B font is selected for LQ/SLQ mode.</td>
</tr>
<tr>
<td>B2 LO OCR-A</td>
<td>OCR-A font is selected for LQ/SLQ mode.</td>
</tr>
<tr>
<td>B2 LO ORATOR</td>
<td>Orator font is selected for LQ/SLQ mode.</td>
</tr>
<tr>
<td>B2 LO ORATOR-2</td>
<td>Orator font with lower case is selected for LQ/SLQ mode.</td>
</tr>
<tr>
<td>B2 LO TW-LIGHT</td>
<td>TW-Light font is selected for LQ/SLQ mode.</td>
</tr>
<tr>
<td>B2 LO L GOTHIC</td>
<td>Letter Gothic font is selected for LQ/SLQ mode.</td>
</tr>
<tr>
<td>B2 LO BLIPPO</td>
<td>Blippo font is selected for LQ/SLQ mode.</td>
</tr>
<tr>
<td>B2 LO H GOTHIC</td>
<td>H-Gothic font is selected for LQ/SLQ mode.</td>
</tr>
<tr>
<td>B2 LO ORANE</td>
<td>Orane font is selected for LQ/SLQ mode.</td>
</tr>
<tr>
<td>B2 LO CINEMA</td>
<td>Cinema font is selected for LQ/SLQ mode.</td>
</tr>
<tr>
<td>B2 LO CODE 39</td>
<td>Code 39 font is selected for LQ/SLQ mode.</td>
</tr>
<tr>
<td>B2 LO UPC/EAN</td>
<td>UPC/EAN font is selected for LQ/SLQ mode.</td>
</tr>
<tr>
<td>B2 LO O STYLE</td>
<td>Old Style font is selected for LQ/SLQ mode.</td>
</tr>
<tr>
<td>B2 LO FIRENZE</td>
<td>Firenze font is selected for LQ/SLQ mode.</td>
</tr>
<tr>
<td>B2 SLO ROMAN</td>
<td>SLQ Roman font is selected for LQ/SLQ mode.</td>
</tr>
<tr>
<td>B2 SLO TW-LIGHT</td>
<td>SLQ TW-Light font is selected for LQ/SLQ mode.</td>
</tr>
<tr>
<td>B2 SLO SCRIPT</td>
<td>SLQ Script font is selected for LQ/SLQ mode.</td>
</tr>
</tbody>
</table>
Character parameters

The Character parameters are assigned to Bank “C”, including these functions:

- Standard Character Set
  If you selected Standard mode, you can set either italic or graphic characters.
  When you select the “Italic” characters, the character table is the same as the Epson printers.
  When you select the “Graphic” characters, in place of italics you will get the graphic characters, international characters, and mathematical symbols of IBM character set #2.

- IBM Character Set
  If you selected IBM mode, you can select either character set #1 or #2. Character set #2 is for computers with an 8-bit interface (the most common kind), and set #1 is for computers with a 7-bit interface.

- Zero style
  This switch tells the printer how to print zero’s.
  When the “NORMAL” is selected, the printer prints the normal zero; when it is “SLASHED”, the slash zero (which is often used in draft mode to prevent any possible confusion with the letter “O”).

- IBM Code Page
  Except in the Standard Italic character set, this switch selects the default character code page.

- International Character Set
  International character sets differ in their assignment of 14 character codes in the Standard Italic character set.
Following table shows the display messages and those meanings for the Bank "C".

<table>
<thead>
<tr>
<th>Display Message</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1 STD STD</td>
<td>Graphic set is selected for Standard character set.</td>
</tr>
<tr>
<td>C1 STD ITALIC</td>
<td>Italic set is selected for Standard character set.</td>
</tr>
<tr>
<td>C2 IBM IBM#2</td>
<td>Set #2 is selected for IBM character set.</td>
</tr>
<tr>
<td>C2 IBM IBM#1</td>
<td>Set #1 is selected for IBM character set.</td>
</tr>
<tr>
<td>C3 ZERO NORMAL</td>
<td>Normal zero character is selected.</td>
</tr>
<tr>
<td>C3 ZERO SLASHED</td>
<td>Slashed zero character is selected.</td>
</tr>
<tr>
<td>C4 CODEPAGE #437</td>
<td>Code Page #437 (U.S.A.) is selected.</td>
</tr>
<tr>
<td>C4 CODEPAGE #850</td>
<td>Code Page #850 (Multi-lingual) is selected.</td>
</tr>
<tr>
<td>C4 CODEPAGE #860</td>
<td>Code Page #860 (Portuguese) is selected.</td>
</tr>
<tr>
<td>C4 CODEPAGE #861</td>
<td>Code Page #861 (Icelandic) is selected.</td>
</tr>
<tr>
<td>C4 CODEPAGE #863</td>
<td>Code Page #863 (Canadian French) is selected.</td>
</tr>
<tr>
<td>C4 CODEPAGE #865</td>
<td>Code Page #865 (Nordic) is selected.</td>
</tr>
<tr>
<td>C5 COUNTRY USA</td>
<td>U.S.A. character set is selected.</td>
</tr>
<tr>
<td>C5 COUNTRY FRA</td>
<td>France character set is selected.</td>
</tr>
<tr>
<td>C5 COUNTRY GER</td>
<td>Germany character set is selected.</td>
</tr>
<tr>
<td>C5 COUNTRY UK</td>
<td>England character set is selected.</td>
</tr>
<tr>
<td>C5 COUNTRY DEN1</td>
<td>Denmark character set 1 is selected.</td>
</tr>
<tr>
<td>C5 COUNTRY SWEDN</td>
<td>Sweden character set is selected.</td>
</tr>
<tr>
<td>C5 COUNTRY ITALY</td>
<td>Italy character set is selected.</td>
</tr>
<tr>
<td>C5 COUNTRY SPA1</td>
<td>Spain character set 1 is selected.</td>
</tr>
<tr>
<td>C5 COUNTRY JAPAN</td>
<td>Japan character set is selected.</td>
</tr>
<tr>
<td>C5 COUNTRY NORWY</td>
<td>Norway character set is selected.</td>
</tr>
<tr>
<td>C5 COUNTRY DEN2</td>
<td>Denmark character set 2 is selected.</td>
</tr>
<tr>
<td>C5 COUNTRY SPA2</td>
<td>Spain character set 2 is selected.</td>
</tr>
<tr>
<td>C5 COUNTRY LTN.A</td>
<td>Latin America character set is selected.</td>
</tr>
<tr>
<td>C5 COUNTRY KOREA</td>
<td>Korea character set is selected.</td>
</tr>
<tr>
<td>C5 COUNTRY IRE</td>
<td>Irish character set is selected.</td>
</tr>
<tr>
<td>C5 COUNTRY LEGAL</td>
<td>Legal character set is selected.</td>
</tr>
<tr>
<td>C5 COUNTRY OPT 1</td>
<td>Optional character set 1 is selected.</td>
</tr>
<tr>
<td>C5 COUNTRY OPT 2</td>
<td>Optional character set 2 is selected.</td>
</tr>
<tr>
<td>C5 COUNTRY OPT 3</td>
<td>Optional character set 3 is selected.</td>
</tr>
</tbody>
</table>
Style parameters

The Style parameters are assigned to Bank “D”, including these functions:

- **Italic print**
  Selects to print all characters with Italic style, or not. This is different from the italic characters in the Standard Italic character table.

- **Print pitch**
  Selects the default print pitch.
  Note that semi-condensed pitch and condensed proportional pitch are not available in the IBM mode.

Following table shows the display messages and those meanings for the Bank “D”.

<table>
<thead>
<tr>
<th>Display Message</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>D1 ITALIC OFF</td>
<td>Italic print mode is cancelled.</td>
</tr>
<tr>
<td>D1 ITALIC ON</td>
<td>Italic print mode is selected.</td>
</tr>
<tr>
<td>D2 PITCH 10</td>
<td>Pica pitch (10 CPI) is selected.</td>
</tr>
<tr>
<td>D2 PITCH 12</td>
<td>Elite pitch (12 CPI) is selected.</td>
</tr>
<tr>
<td>D2 PITCH 15</td>
<td>Semi-condensed pitch (15 CPI) is selected.</td>
</tr>
<tr>
<td>D2 PITCH 17</td>
<td>Condensed pica pitch (17 CPI) is selected.</td>
</tr>
<tr>
<td>D2 PITCH 20</td>
<td>Condensed elite pitch (20 CPI) is selected.</td>
</tr>
<tr>
<td>D2 PITCH PS</td>
<td>Proportional pitch is selected.</td>
</tr>
<tr>
<td>D2 PITCH PS+CND</td>
<td>Condensed proportional pitch is selected.</td>
</tr>
</tbody>
</table>
**Layout parameters**

The Layout parameters are assigned to Bank “E”, including these functions:

- **Multi-part mode**
  You can use up to 3-ply paper with normal mode. If you want to print on 4-ply or 5-ply paper, set the Multi-part mode ON.

- **Paper-out detector**
  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.

- **Automatic Sheet Feeder**
  In order to use the optional Automatic Sheet Feeder, set this switch to the related position.

- **Top margin setting for each paper type**
  Sets the first line position on the each paper type.

- **Bottom margin**
  Sets the last line position on the paper.

- **Lines per Inch**
  Sets how many lines to be printed in one inch.

Following table shows the display messages and those meanings for the Bank “E”.

<table>
<thead>
<tr>
<th>Display Message</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1 MULTIPART OFF</td>
<td>Multi-part mode is cancelled.</td>
</tr>
<tr>
<td>E1 MULTIPART ON</td>
<td>Multi-part mode is selected.</td>
</tr>
<tr>
<td>E2 PAPER-OUT OFF</td>
<td>Paper-out detector is disabled.</td>
</tr>
<tr>
<td>E2 PAPER-OUT ON</td>
<td>Paper-out detector is enabled.</td>
</tr>
<tr>
<td>E3 ASF OFF</td>
<td>Optional ASF is not installed.</td>
</tr>
<tr>
<td>E3 ASF-SINGL ON</td>
<td>Single-Bin ASF is installed.</td>
</tr>
<tr>
<td>E3 ASF-DUAL ON</td>
<td>Dual-Bin ASF is installed.</td>
</tr>
<tr>
<td>E4 T.MGN-CUT 1/6</td>
<td>Top margin for cut forms is set to 1/6 inch.</td>
</tr>
<tr>
<td>E4 T.MGN-CUT 2/6</td>
<td>Top margin for cut forms is set to 2/6 inch.</td>
</tr>
<tr>
<td>E4 T.MGN-CUT 3/6</td>
<td>Top margin for cut forms is set to 3/6 inch.</td>
</tr>
<tr>
<td>E4 T.MGN-CUT 4/6</td>
<td>Top margin for cut forms is set to 4/6 inch.</td>
</tr>
<tr>
<td>E4 T.MGN-CUT 5/6</td>
<td>Top margin for cut forms is set to 5/6 inch.</td>
</tr>
<tr>
<td>E4 T.MGN-CUT 6/6</td>
<td>Top margin for cut forms is set to 6/6 inch.</td>
</tr>
<tr>
<td>Display Message</td>
<td>Meaning</td>
</tr>
<tr>
<td>-----------------</td>
<td>---------</td>
</tr>
<tr>
<td>E5 T.MGN-ASF 1/6</td>
<td>Top margin for ASF is set to 1/6 inch.</td>
</tr>
<tr>
<td>E5 T.MGN-ASF 2/6</td>
<td>Top margin for ASF is set to 2/6 inch.</td>
</tr>
<tr>
<td>E5 T.MGN-ASF 3/6</td>
<td>Top margin for ASF is set to 3/6 inch.</td>
</tr>
<tr>
<td>E5 T.MGN-ASF 4/6</td>
<td>Top margin for ASF is set to 4/6 inch.</td>
</tr>
<tr>
<td>E5 T.MGN-ASF 5/6</td>
<td>Top margin for ASF is set to 5/6 inch.</td>
</tr>
<tr>
<td>E5 T.MGN-ASF 6/6</td>
<td>Top margin for ASF is set to 6/6 inch.</td>
</tr>
<tr>
<td>E6 T.MGN-TRA 1/6</td>
<td>Top margin for fanfold forms is set to 1/6 inch.</td>
</tr>
<tr>
<td>E6 T.MGN-TRA 2/6</td>
<td>Top margin for fanfold forms is set to 2/6 inch.</td>
</tr>
<tr>
<td>E6 T.MGN-TRA 3/6</td>
<td>Top margin for fanfold forms is set to 3/6 inch.</td>
</tr>
<tr>
<td>E6 T.MGN-TRA 4/6</td>
<td>Top margin for fanfold forms is set to 4/6 inch.</td>
</tr>
<tr>
<td>E6 T.MGN-TRA 5/6</td>
<td>Top margin for fanfold forms is set to 5/6 inch.</td>
</tr>
<tr>
<td>E6 T.MGN-TRA 6/6</td>
<td>Top margin for fanfold forms is set to 6/6 inch.</td>
</tr>
<tr>
<td>E7 BOTTM MGN 1/6</td>
<td>Bottom margin is set to 1/6 inch.</td>
</tr>
<tr>
<td>E7 BOTTM MGN 2/6</td>
<td>Bottom margin is set to 2/6 inch.</td>
</tr>
<tr>
<td>E7 BOTTM MGN 3/6</td>
<td>Bottom margin is set to 3/6 inch.</td>
</tr>
<tr>
<td>E7 BOTTM MGN 4/6</td>
<td>Bottom margin is set to 4/6 inch.</td>
</tr>
<tr>
<td>E7 BOTTM MGN 5/6</td>
<td>Bottom margin is set to 5/6 inch.</td>
</tr>
<tr>
<td>E7 BOTTM MGN 6/6</td>
<td>Bottom margin is set to 6/6 inch.</td>
</tr>
<tr>
<td>E8 L.P.I. 1</td>
<td>1 line can be printed on one inch.</td>
</tr>
<tr>
<td>E8 L.P.I. 2</td>
<td>2 lines can be printed on one inch.</td>
</tr>
<tr>
<td>E8 L.P.I. 3</td>
<td>3 lines can be printed on one inch.</td>
</tr>
<tr>
<td>E8 L.P.I. 4</td>
<td>4 lines can be printed on one inch.</td>
</tr>
<tr>
<td>E8 L.P.I. 6</td>
<td>6 lines can be printed on one inch.</td>
</tr>
<tr>
<td>E8 L.P.I. 8</td>
<td>8 lines can be printed on one inch.</td>
</tr>
</tbody>
</table>
Forms parameters

The Forms parameters are assigned to Bank “F”, including these functions:

- **Auto Line Feed**
  If you set this switch OFF, a separate line-feed code is required from your computer to obtain a line feed.
  If you set this switch ON, 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 OFF.
  If you get double line spacing when you expect single spacing, or if lines overprint each other, try changing the setting of this switch.

- **Auto Carriage Return**
  If you set this switch OFF, a separate carriage-return code is required from your computer to return to the left margin.
  If you set this switch ON, the printer performs both a carriage return and line feed each time it receives a line-feed code.

- **Tear-Off function**
  You can select the Tear Off function with this switch ON.
  When using fanfold paper, the Tear Off function allows you to tear off one sheet of paper without fully advancing the following sheet.

- **Skip-over-perforation**
  You can select the Skip-over-perforation with this switch ON.
  It is recommended to skip close to the perforation of fanfold forms to get good print quality.
  If you cannot set this function with your software, set this switch ON. The printer automatically skips the perforations.

- **Page length**
  You can set a different page length to accommodate your paper with this switch.
Following table shows the display messages and those meanings for the Bank "F".

<table>
<thead>
<tr>
<th>Display Message</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1 AUTO-LF OFF</td>
<td>LF must be from host.</td>
</tr>
<tr>
<td>F1 AUTO-LF ON</td>
<td>Auto LF with CR.</td>
</tr>
<tr>
<td>F2 AUTO-CR OFF</td>
<td>CR must be from host.</td>
</tr>
<tr>
<td>F2 AUTO-CR ON</td>
<td>Auto CR with LF.</td>
</tr>
<tr>
<td>F3 TEAR-OFF OFF</td>
<td>Tear-off function is disabled.</td>
</tr>
<tr>
<td>F3 TEAR-OFF ON</td>
<td>Tear-off function is selected.</td>
</tr>
<tr>
<td>F4 SKIP-PERF OFF</td>
<td>Skip-over-perforation is disabled.</td>
</tr>
<tr>
<td>F4 SKIP-PERF ON</td>
<td>Skip-over-perforation is selected.</td>
</tr>
<tr>
<td>F5 PAGE-LGTH 14</td>
<td>Page length is set to 14 inches.</td>
</tr>
<tr>
<td>F5 PAGE-LGTH 12</td>
<td>Page length is set to 12 inches.</td>
</tr>
<tr>
<td>F5 PAGE-LGTH A4</td>
<td>Page length is set to compatible for A4 size.</td>
</tr>
<tr>
<td>F5 PAGE-LGTH 11</td>
<td>Page length is set to 11 inches.</td>
</tr>
<tr>
<td>F5 PAGE-LGTH 10</td>
<td>Page length is set to 10 inches.</td>
</tr>
<tr>
<td>F5 PAGE-LGTH 9</td>
<td>Page length is set to 9 inches.</td>
</tr>
<tr>
<td>F5 PAGE-LGTH 8.5</td>
<td>Page length is set to 8.5 inches.</td>
</tr>
<tr>
<td>F5 PAGE-LGTH 8</td>
<td>Page length is set to 8 inches.</td>
</tr>
<tr>
<td>F5 PAGE-LGTH 7</td>
<td>Page length is set to 7 inches.</td>
</tr>
<tr>
<td>F5 PAGE-LGTH 6</td>
<td>Page length is set to 6 inches.</td>
</tr>
<tr>
<td>F5 PAGE-LGTH 5.5</td>
<td>Page length is set to 5.5 inches.</td>
</tr>
<tr>
<td>F5 PAGE-LGTH 5</td>
<td>Page length is set to 5 inches.</td>
</tr>
<tr>
<td>F5 PAGE-LGTH 4.5</td>
<td>Page length is set to 4.5 inches.</td>
</tr>
<tr>
<td>F5 PAGE-LGTH 4</td>
<td>Page length is set to 4 inches.</td>
</tr>
<tr>
<td>F5 PAGE-LGTH 3.5</td>
<td>Page length is set to 3.5 inches.</td>
</tr>
<tr>
<td>F5 PAGE-LGTH 3</td>
<td>Page length is set to 3 inches.</td>
</tr>
</tbody>
</table>
Other parameters

The Other parameters are assigned to Bank "G", including these functions:

- **STROBE timing**
  This switch controls the timing of the interface.
  Most computers can communicate with the Normal timing, as the factory-setting.
  If you were not possible to communicate with your computer to the printer, set this switch to "INVERSE".

- **EDS setting**
  If you want to cancel your EDS settings and return to the factory-settings, set this switch "RESET".

Following table shows the display messages and those meanings for the Bank "G".

<table>
<thead>
<tr>
<th>Display Message</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>G1 STROBE NORMAL</td>
<td>Set the normal interface timing.</td>
</tr>
<tr>
<td>G1 STROBE INVRSE</td>
<td>Set the inversed interface timing.</td>
</tr>
<tr>
<td>G2 EDS CURRENT</td>
<td>Set the current EDS settings.</td>
</tr>
<tr>
<td>G2 EDS RESET</td>
<td>Resets the EDS setting to the factory-set.</td>
</tr>
</tbody>
</table>
DOT 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, showing itself most obviously in graphics printing. This mode will probably be used very rarely.

1. Turn the printer off and then turn it on again while holding down the SET/EJECT and ON LINE buttons. The display on the control panel shows “DOT-ADJUSTMENT” message, and prints something like the following:

*** DOT ADJUSTMENT SETTING ***
LQ 0 : ||||||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| |||
6. To exit from this mode, press the \[PITCH\] button.

<table>
<thead>
<tr>
<th>*** DOT ADJUSTMENT SETTING ***</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(LQ) 0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(LQ) -1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(LQ) 0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(DRAFT\) 0

\(DRAFT\) +1

\(DRAFT\) 0

- **ONLINE**
- **DRAFT COND**
- **PITCH**

*** END ***
Chapter 7

PRINTER CONTROL COMMANDS

The printer has two emulation modes: Standard mode and IBM mode. In standard mode, the printer emulates the functions of the Epson LQ-860/LQ-1060, and the graphics commands for NEC 24-wire printers. In IBM mode, the printer emulates the IBM Proprinter X24E/XL24E. Additional command codes are included as a superset of these emulations.

The emulation is changed by means of EDS switch A-1. When "EMULATION STD", the printer will be in standard mode, and when "EMULATION IBM", the printer will be in IBM mode (see Chapter 6). It is not possible to change the emulation by means of software control.

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

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std.</td>
<td>&lt;ESC&gt; &quot;x&quot; &quot;1&quot;</td>
<td>27 120 49</td>
<td>1B 78 31</td>
</tr>
<tr>
<td></td>
<td>&lt;ESC&gt; &quot;x&quot; &lt;1&gt;</td>
<td>27 120 1</td>
<td>1B 78 01</td>
</tr>
</tbody>
</table>

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

Std. Standard mode (EDS switch A-1 is "EMULATION STD").

IBM IBM mode (EDS switch A-1 is "EMULATION IBM").

Both Both standard and IBM modes

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

Decimal: Gives the command in decimal character codes.

Hexadecimal: Gives the command in hexadecimal character codes.

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

Select draft quality characters

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std.</td>
<td>&lt;ESC&gt; “x” “0”</td>
<td>27 120 48</td>
<td>1B 78 30</td>
</tr>
<tr>
<td></td>
<td>&lt;ESC&gt; “x” &lt;0&gt;</td>
<td>27 120 0</td>
<td>1B 78 00</td>
</tr>
</tbody>
</table>

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

Select draft pica characters

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM</td>
<td>&lt;ESC&gt; “I” &lt;0&gt;</td>
<td>27 73 0</td>
<td>1B 49 00</td>
</tr>
</tbody>
</table>

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

Select draft elite characters

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM</td>
<td>&lt;ESC&gt; “I” &lt;8&gt;</td>
<td>27 73 8</td>
<td>1B 49 08</td>
</tr>
</tbody>
</table>

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

Select draft condensed characters

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM</td>
<td>&lt;ESC&gt; “I” &lt;16&gt;</td>
<td>27 73 16</td>
<td>1B 49 10</td>
</tr>
</tbody>
</table>

Changes to draft quality characters with condensed pitch (17 cpi). Ignored if the FONT LOCK or PITCH LOCK mode was selected during power-up.
Select LQ characters

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std.</td>
<td><code>&lt;ESC&gt;</code> “x” “1”</td>
<td>27 120 49</td>
<td><code>1B 78 31</code></td>
</tr>
<tr>
<td></td>
<td><code>&lt;ESC&gt;</code> “x” <code>&lt;1&gt;</code></td>
<td>27 120 1</td>
<td><code>1B 78 01</code></td>
</tr>
</tbody>
</table>

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 LOCK mode was selected during power-up.

Select LQ pica characters

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM</td>
<td><code>&lt;ESC&gt;</code> “I” <code>&lt;2&gt;</code></td>
<td>27 73 2</td>
<td><code>1B 49 02</code></td>
</tr>
</tbody>
</table>

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

Select LQ elite characters

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM</td>
<td><code>&lt;ESC&gt;</code> “I” <code>&lt;LF&gt;</code></td>
<td>27 73 10</td>
<td><code>1B 49 0A</code></td>
</tr>
</tbody>
</table>

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

Select LQ condensed characters

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM</td>
<td><code>&lt;ESC&gt;</code> “I” <code>&lt;DC2&gt;</code></td>
<td>27 73 18</td>
<td><code>1B 49 12</code></td>
</tr>
</tbody>
</table>

Changes to letter quality characters with condensed pitch (17 cpi). Ignored if the FONT LOCK or PITCH LOCK mode was selected during power-up.
Select LQ proportional characters

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM</td>
<td>&lt;ESC&gt; &quot;I&quot; &lt;3&gt;</td>
<td>27 73 3</td>
<td>1B 49 03</td>
</tr>
</tbody>
</table>

Changes to letter quality characters with proportional pitch. Ignored if the FONT LOCK or PITCH LOCK mode was selected during power-up.

Select LQ font

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td>&lt;ESC&gt; &quot;k&quot; n</td>
<td>27 107 n</td>
<td>1B 6B n</td>
</tr>
<tr>
<td>Std.</td>
<td>&lt;FS&gt; &quot;C&quot; n</td>
<td>28 67 n</td>
<td>1C 43 n</td>
</tr>
</tbody>
</table>

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 LOCK mode was selected during power-up or the corresponding Font Cartridge is not installed.

<table>
<thead>
<tr>
<th>n</th>
<th>Font</th>
<th>n</th>
<th>Font</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Roman</td>
<td>11</td>
<td>Blippo (FC-1Z)</td>
</tr>
<tr>
<td>1</td>
<td>Sanserif</td>
<td>12</td>
<td>H-Gothic</td>
</tr>
<tr>
<td>2</td>
<td>Courier</td>
<td>13</td>
<td>Orane (FC-3Z)</td>
</tr>
<tr>
<td>3</td>
<td>Prestige</td>
<td>14</td>
<td>Cinema (FC-1Z)</td>
</tr>
<tr>
<td>4</td>
<td>Script</td>
<td>15</td>
<td>CODE 39 (FC-2Z)</td>
</tr>
<tr>
<td>5</td>
<td>OCR-B (FC-2Z)</td>
<td>16</td>
<td>UPC/EAN (FC-2Z)</td>
</tr>
<tr>
<td>6</td>
<td>OCR-A (FC-2Z)</td>
<td>17</td>
<td>Old Style (FC-5Z)</td>
</tr>
<tr>
<td>7</td>
<td>Orator</td>
<td>18</td>
<td>Firenze (FC-5Z)</td>
</tr>
<tr>
<td>8</td>
<td>Orator 2 (FC-1Z)</td>
<td>32</td>
<td>SLQ Roman</td>
</tr>
<tr>
<td>9</td>
<td>TW-Light (FC-3Z)</td>
<td>33</td>
<td>SLQ TW-Light</td>
</tr>
<tr>
<td>10</td>
<td>Letter Gothic (FC-1Z)</td>
<td>34</td>
<td>SLQ Script (FC-10Z)</td>
</tr>
</tbody>
</table>

Select font

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td>&quot;(&quot;  &quot;(&quot; &quot;F&quot; &quot;&quot;)&quot; &quot;&quot;)&quot; d</td>
<td>40 40 70 41 41 d</td>
<td>28 28 46 29 29 d</td>
</tr>
</tbody>
</table>

Changes to the font according to the value of d. Ignored if the FONT LOCK mode was selected during power-up or the corresponding Font Cartridge is not installed.
Font

0 Roman
1 Sanserif
2 Courier
3 Prestige
4 Script
5 OCR-B (FC-2Z)
6 OCR-A (FC-2Z)
7 Orator
8 Orator 2 (FC-1Z)
9 Draft

Select italic characters

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std.</td>
<td>&lt;ESC&gt; &quot;4&quot;</td>
<td>27 52</td>
<td>1B 34</td>
</tr>
</tbody>
</table>

Causes subsequent characters to be printed in italics.

Select upright characters

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std.</td>
<td>&lt;ESC&gt; &quot;5&quot;</td>
<td>27 53</td>
<td>1B 35</td>
</tr>
</tbody>
</table>

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

Emphasized printing

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td>&lt;ESC&gt; &quot;E&quot;</td>
<td>27 69</td>
<td>1B 45</td>
</tr>
</tbody>
</table>

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

Cancel emphasized printing

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td>&lt;ESC&gt; &quot;F&quot;</td>
<td>27 70</td>
<td>1B 46</td>
</tr>
</tbody>
</table>

Cancels emphasized printing.
Double-strike printing

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td>&lt;ESC&gt; &quot;G&quot;</td>
<td>27 71</td>
<td>1B 47</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td>&lt;ESC&gt; &quot;H&quot;</td>
<td>27 72</td>
<td>1B 48</td>
</tr>
</tbody>
</table>

Cancels double-strike printing.

Start underlining

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td>&lt;ESC&gt; &quot;-&quot; &quot;1&quot;</td>
<td>27 45 49</td>
<td>1B 2D 31</td>
</tr>
<tr>
<td></td>
<td>&lt;ESC&gt; &quot;-&quot; &lt;1&gt;</td>
<td>27 45 1</td>
<td>1B 2D 01</td>
</tr>
</tbody>
</table>

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

Stop underlining

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td>&lt;ESC&gt; &quot;-&quot; &quot;0&quot;</td>
<td>27 45 48</td>
<td>1B 2D 30</td>
</tr>
<tr>
<td></td>
<td>&lt;ESC&gt; &quot;-&quot; &lt;0&gt;</td>
<td>27 45 0</td>
<td>1B 2D 00</td>
</tr>
</tbody>
</table>

Stops underlining.
**Start overlining**

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM</td>
<td><code>&lt;ESC&gt; &quot;_&quot; &quot;1&quot;</code></td>
<td>27 95 49</td>
<td>1B 5F 31</td>
</tr>
<tr>
<td></td>
<td><code>&lt;ESC&gt; &quot;_&quot; &lt;1&gt;</code></td>
<td>27 95 1</td>
<td>1B 5F 01</td>
</tr>
</tbody>
</table>

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

**Stop overlining**

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM</td>
<td><code>&lt;ESC&gt; &quot;_&quot; &quot;0&quot;</code></td>
<td>27 95 48</td>
<td>1B 5F 30</td>
</tr>
<tr>
<td></td>
<td><code>&lt;ESC&gt; &quot;_&quot; &lt;0&gt;</code></td>
<td>27 95 0</td>
<td>1B 5F 00</td>
</tr>
</tbody>
</table>

Stops overlining.

**Select score**

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std.</td>
<td><code>&lt;ESC&gt; &quot;(&quot; &quot;_&quot; &lt;3&gt;</code></td>
<td>27 40 45 3</td>
<td>1B 28 2D 03</td>
</tr>
<tr>
<td></td>
<td><code>&lt;0&gt; &lt;1&gt; nl n2</code></td>
<td>0 1 nl n2</td>
<td>00 01 nl n2</td>
</tr>
</tbody>
</table>

Start score according to the values of `nl` and `n2`, as shown below.

- **nl Function**
  1. Underlining
  2. Strike-through
  3. Overlining

- **n2 Function**
  0. Cancel score
  1. Single continuous line
  2. Double continuous line
  5. Single broken line
  6. Double broken line
Select ornament character

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std.</td>
<td>&lt;ESC&gt; “q” n</td>
<td>27 113 n</td>
<td>1B 71 n</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>n</th>
<th>Character</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Normal</td>
</tr>
<tr>
<td>1</td>
<td>Outline</td>
</tr>
<tr>
<td>2</td>
<td>Shadow</td>
</tr>
<tr>
<td>3</td>
<td>Shadow and outline</td>
</tr>
</tbody>
</table>

Superscript

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td>&lt;ESC&gt; “S” “0”</td>
<td>27 83 48</td>
<td>1B 53 30</td>
</tr>
<tr>
<td></td>
<td>&lt;ESC&gt; “S” &lt;0&gt;</td>
<td>27 83 0</td>
<td>1B 53 00</td>
</tr>
</tbody>
</table>

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

Subscript

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td>&lt;ESC&gt; “S” “1”</td>
<td>27 83 49</td>
<td>1B 53 31</td>
</tr>
<tr>
<td></td>
<td>&lt;ESC&gt; “S” &lt;1&gt;</td>
<td>27 83 1</td>
<td>1B 53 01</td>
</tr>
</tbody>
</table>

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

Cancel superscript or subscript

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td>&lt;ESC&gt; “T”</td>
<td>27 84</td>
<td>1B 54</td>
</tr>
</tbody>
</table>

Stops printing superscripts or subscripts and returns to normal printing.
CHARACTER SET COMMANDS

Select standard character set

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td>&lt;ESC&gt; “1” “0”</td>
<td>27 116 48</td>
<td>1B 74 30</td>
</tr>
<tr>
<td></td>
<td>&lt;ESC&gt; “1” &lt;0&gt;</td>
<td>27 116 0</td>
<td>1B 74 00</td>
</tr>
<tr>
<td>Std.</td>
<td>&lt;FS&gt; “1” “0”</td>
<td>28 73 48</td>
<td>1C 49 30</td>
</tr>
<tr>
<td></td>
<td>&lt;FS&gt; “1” &lt;0&gt;</td>
<td>28 73 0</td>
<td>1C 49 00</td>
</tr>
</tbody>
</table>

Selects the standard character set. This is the power-up default in Standard mode if EDS switch C-1 is set to “STD ITALIC”.

Select IBM character set

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td>&lt;ESC&gt; “1” “1”</td>
<td>27 116 49</td>
<td>1B 74 31</td>
</tr>
<tr>
<td></td>
<td>&lt;ESC&gt; “1” &lt;1&gt;</td>
<td>27 116 1</td>
<td>1B 74 01</td>
</tr>
<tr>
<td>Std.</td>
<td>&lt;FS&gt; “1” “1”</td>
<td>28 73 49</td>
<td>1C 49 31</td>
</tr>
<tr>
<td></td>
<td>&lt;FS&gt; “1” &lt;1&gt;</td>
<td>28 73 1</td>
<td>1C 49 01</td>
</tr>
</tbody>
</table>

Selects an IBM character set. This is the power-up default in IBM mode, or EDS switch C-1 is set to “STD GRAPH” in standard mode.

Select character set #1

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td>&lt;ESC&gt; “7”</td>
<td>27 55</td>
<td>1B 37</td>
</tr>
</tbody>
</table>

Selects character set #1.

Select character set #2

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td>&lt;ESC&gt; “6”</td>
<td>27 54</td>
<td>1B 36</td>
</tr>
</tbody>
</table>

Selects character set #2.
Select international character set

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std.</td>
<td>&lt;ESC&gt; &quot;R&quot;</td>
<td>n</td>
<td>27 82 n</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1B 52 n</td>
</tr>
</tbody>
</table>

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

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

One of these character sets can be selected as power-up default by EDS switch C-5.

Select IBM code page

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td>&lt;ESC&gt; &quot;I&quot; &quot;T&quot; &lt;4&gt; &lt;0&gt;</td>
<td>27 91 84 4 0</td>
<td>1B 5B 54 04 00</td>
</tr>
<tr>
<td></td>
<td>&lt;0&gt; &lt;0&gt; n1 n2</td>
<td>0 0 n1 n2</td>
<td>00 00 n1 n2</td>
</tr>
</tbody>
</table>

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

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

One of these code pages can be selected as power-up defaults by EDS switch C-4.
Enable printing of all character codes

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM</td>
<td><code>&lt;ESC&gt; &quot;\&quot; n1 n2</code></td>
<td>27 92 n1 n2</td>
<td>18 5C n1 n2</td>
</tr>
</tbody>
</table>

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

Enable printing of all character codes on next character

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM</td>
<td><code>&lt;ESC&gt; &quot;\&quot; n</code></td>
<td>27 94 n</td>
<td>18 5E n</td>
</tr>
</tbody>
</table>

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

Select slash zero

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td><code>&lt;ESC&gt; &quot;~&quot; &quot;1&quot;</code></td>
<td>27 126 49</td>
<td>1B 7E 31</td>
</tr>
<tr>
<td></td>
<td><code>&lt;ESC&gt; &quot;~&quot; &lt;1&gt;</code></td>
<td>27 126 1</td>
<td>1B 7E 01</td>
</tr>
</tbody>
</table>

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

Select normal zero

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td><code>&lt;ESC&gt; &quot;~&quot; &quot;0&quot;</code></td>
<td>27 126 48</td>
<td>1B 7E 30</td>
</tr>
<tr>
<td></td>
<td><code>&lt;ESC&gt; &quot;~&quot; &lt;0&gt;</code></td>
<td>27 126 0</td>
<td>1B 7E 00</td>
</tr>
</tbody>
</table>

Causes subsequent zero characters to be printed normally (0), without a slash.
CHARACTER SIZE AND PITCH COMMANDS

Pica pitch

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std.</td>
<td>&lt;ESC&gt; “P”</td>
<td>27 80</td>
<td>1B 50</td>
</tr>
<tr>
<td>IBM</td>
<td>&lt;DC2&gt;</td>
<td>18 12</td>
<td>12</td>
</tr>
</tbody>
</table>

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 LOCK mode was selected during power-up.

Elite pitch

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std.</td>
<td>&lt;ESC&gt; “M”</td>
<td>27 77</td>
<td>1B 4D</td>
</tr>
<tr>
<td>IBM</td>
<td>&lt;ESC&gt; “:”</td>
<td>27 58</td>
<td>1B 3A</td>
</tr>
</tbody>
</table>

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 LOCK mode was selected during power-up.

Semi-condensed pitch

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std.</td>
<td>&lt;ESC&gt; “g”</td>
<td>27 103</td>
<td>1B 67</td>
</tr>
</tbody>
</table>

Changes from either pica or elite to semi-condensed pitch (15 cpi). Ignored if the PITCH LOCK mode was selected during power-up.

Condensed printing

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td>&lt;SI&gt;</td>
<td>15 0F</td>
<td>0F</td>
</tr>
<tr>
<td>Std.</td>
<td>&lt;ESC&gt; &lt;SI&gt;</td>
<td>27 15</td>
<td>1B 0F</td>
</tr>
</tbody>
</table>

Changes from pica to condensed pica (17 cpi) or from elite to condensed elite (20 cpi). Ignored if the PITCH LOCK mode was selected during power-up.
**Cancel condensed printing**

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td>&lt;DC2&gt;</td>
<td>18</td>
<td>12</td>
</tr>
</tbody>
</table>

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

**Expanded printing**

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td>&lt;ESC&gt; “W” “1”</td>
<td>27 87 49</td>
<td>1B 57 31</td>
</tr>
<tr>
<td></td>
<td>&lt;ESC&gt; “W” &lt;1&gt;</td>
<td>27 87 1</td>
<td>1B 57 01</td>
</tr>
</tbody>
</table>

Causes subsequent characters to be expanded to double width.

**Cancel expanded printing**

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td>&lt;ESC&gt; “W” “0”</td>
<td>27 87 48</td>
<td>1B 57 30</td>
</tr>
<tr>
<td></td>
<td>&lt;ESC&gt; “W” &lt;0&gt;</td>
<td>27 87 0</td>
<td>1B 57 00</td>
</tr>
</tbody>
</table>

Stops expanded printing and returns to normal width.

**Expanded printing for one line**

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td>&lt;SO&gt;</td>
<td>14</td>
<td>0E</td>
</tr>
<tr>
<td>Std.</td>
<td>&lt;ESC&gt; &lt;SO&gt;</td>
<td>27 14</td>
<td>1B 0E</td>
</tr>
</tbody>
</table>

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**

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td>&lt;DC4&gt;</td>
<td>20</td>
<td>14</td>
</tr>
</tbody>
</table>

Stops one-line expanded printing set with <SO> or <ESC> <SO>. Does not cancel <ESC> “W” 1.
Select character width

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std.</td>
<td>&lt;FS&gt; “E” n</td>
<td>28 69 n</td>
<td>1C 45 n</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>n</th>
<th>Character width</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Normal-wide</td>
</tr>
<tr>
<td>1</td>
<td>Double-wide</td>
</tr>
<tr>
<td>2</td>
<td>Triple-wide</td>
</tr>
</tbody>
</table>

Select proportional spacing

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std.</td>
<td>&lt;ESC&gt; “p” “1”</td>
<td>27 112 49</td>
<td>1B 70 31</td>
</tr>
<tr>
<td></td>
<td>&lt;ESC&gt; “p” &lt;1&gt;</td>
<td>27 112 1</td>
<td>1B 70 01</td>
</tr>
<tr>
<td>IBM</td>
<td>&lt;ESC&gt; “P” &lt;1&gt;</td>
<td>27 80 1</td>
<td>1B 50 01</td>
</tr>
</tbody>
</table>

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

Select fixed spacing

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std.</td>
<td>&lt;ESC&gt; “p” “0”</td>
<td>27 112 48</td>
<td>1B 70 30</td>
</tr>
<tr>
<td></td>
<td>&lt;ESC&gt; “p” &lt;0&gt;</td>
<td>27 112 0</td>
<td>1B 70 00</td>
</tr>
<tr>
<td>IBM</td>
<td>&lt;ESC&gt; “P” &lt;0&gt;</td>
<td>27 80 0</td>
<td>1B 50 00</td>
</tr>
</tbody>
</table>

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

Select master print mode

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std.</td>
<td>&lt;ESC&gt; “!” n</td>
<td>27 33 n</td>
<td>1B 21 n</td>
</tr>
</tbody>
</table>

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.
<table>
<thead>
<tr>
<th>Function</th>
<th>$n$ value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underline</td>
<td>128</td>
</tr>
<tr>
<td>Italic</td>
<td>64</td>
</tr>
<tr>
<td>Expanded</td>
<td>32</td>
</tr>
<tr>
<td>Double strike</td>
<td>16</td>
</tr>
<tr>
<td>Emphasized</td>
<td>8</td>
</tr>
<tr>
<td>Condensed [*]</td>
<td>4</td>
</tr>
<tr>
<td>Proportional [*]</td>
<td>2</td>
</tr>
<tr>
<td>Elite [*]</td>
<td>1</td>
</tr>
</tbody>
</table>

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

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

**Increase character spacing**

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std.</td>
<td>&lt;ESC&gt;</td>
<td>27</td>
<td>1B 20</td>
</tr>
<tr>
<td></td>
<td>&lt;SP&gt;</td>
<td>32</td>
<td>$n$</td>
</tr>
</tbody>
</table>

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**

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std.</td>
<td>&lt;ESC&gt;</td>
<td>27</td>
<td>1B 68</td>
</tr>
<tr>
<td></td>
<td>“h”</td>
<td>104</td>
<td>$n$</td>
</tr>
</tbody>
</table>

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 $n = 2$.

<table>
<thead>
<tr>
<th>$n$</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Normal size</td>
</tr>
<tr>
<td>1</td>
<td>Double-high, double-wide</td>
</tr>
<tr>
<td>2</td>
<td>Quadruple-high, quadruple-wide</td>
</tr>
</tbody>
</table>
Select character size

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td>&quot;(&quot; &quot;(&quot; &quot;S&quot; &quot;&quot;)&quot; &quot;)&quot;</td>
<td>40 40 83 41 41 d</td>
<td>28 28 53 29 29 d</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>$d$</th>
<th>Line spacing</th>
<th>Character height</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Single width</td>
<td>Single height</td>
</tr>
<tr>
<td>1</td>
<td>Double width</td>
<td>Single height</td>
</tr>
<tr>
<td>2</td>
<td>Single width</td>
<td>Double height</td>
</tr>
<tr>
<td>3</td>
<td>Double width</td>
<td>Double height</td>
</tr>
</tbody>
</table>

Print double-height characters

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std.</td>
<td>&lt;ESC&gt; &quot;w&quot; &quot;l&quot;</td>
<td>27 119 49</td>
<td>1B 77 31</td>
</tr>
<tr>
<td></td>
<td>&lt;ESC&gt; &quot;w&quot; &lt;1&gt;</td>
<td>27 119 1</td>
<td>1B 77 01</td>
</tr>
<tr>
<td></td>
<td>&lt;FS&gt; &quot;v&quot; &quot;l&quot;</td>
<td>28 86 49</td>
<td>1C 56 31</td>
</tr>
<tr>
<td></td>
<td>&lt;FS&gt; &quot;v&quot; &lt;1&gt;</td>
<td>28 86 1</td>
<td>1C 56 01</td>
</tr>
</tbody>
</table>

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

Return to normal height

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std.</td>
<td>&lt;ESC&gt; &quot;w&quot; &quot;0&quot;</td>
<td>27 119 48</td>
<td>1B 77 30</td>
</tr>
<tr>
<td></td>
<td>&lt;ESC&gt; &quot;w&quot; &lt;0&gt;</td>
<td>27 119 0</td>
<td>1B 77 00</td>
</tr>
<tr>
<td></td>
<td>&lt;FS&gt; &quot;v&quot; &quot;0&quot;</td>
<td>28 86 48</td>
<td>1C 56 30</td>
</tr>
<tr>
<td></td>
<td>&lt;FS&gt; &quot;v&quot; &lt;0&gt;</td>
<td>28 86 0</td>
<td>1C 56 00</td>
</tr>
</tbody>
</table>

Terminates double-height printing and prints subsequent characters at normal height.
Select character height, width, and line spacing

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td>&lt;ESC&gt; &quot;[&quot; &quot;@&quot; &lt;4&gt; &lt;0&gt; &lt;0&gt; &lt;0&gt; n m</td>
<td>27 91 64 4 0 0 0 n m</td>
<td>1B 5B 40 04 00 00 00 n m</td>
</tr>
</tbody>
</table>

Selects a combination of character height, width, and line spacing according to the value of \( n \) and \( m \), as below. Does not move the baseline.

<table>
<thead>
<tr>
<th>( n )</th>
<th>Line spacing</th>
<th>Character height</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Unchanged</td>
<td>Unchanged</td>
</tr>
<tr>
<td>1</td>
<td>Unchanged</td>
<td>Single height</td>
</tr>
<tr>
<td>2</td>
<td>Unchanged</td>
<td>Double height</td>
</tr>
<tr>
<td>16</td>
<td>Single</td>
<td>Unchanged</td>
</tr>
<tr>
<td>17</td>
<td>Single</td>
<td>Single height</td>
</tr>
<tr>
<td>18</td>
<td>Single</td>
<td>Double height</td>
</tr>
<tr>
<td>32</td>
<td>Double</td>
<td>Unchanged</td>
</tr>
<tr>
<td>33</td>
<td>Double</td>
<td>Single height</td>
</tr>
<tr>
<td>34</td>
<td>Double</td>
<td>Double height</td>
</tr>
</tbody>
</table>

\( m \) 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

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td>&lt;ESC&gt; “0”</td>
<td>27 48</td>
<td>1B 30</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td>&lt;ESC&gt; “1”</td>
<td>27 49</td>
<td>1B 31</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std.</td>
<td>&lt;ESC&gt; “2”</td>
<td>27 50</td>
<td>1B 32</td>
</tr>
</tbody>
</table>

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

Set line spacing to n/360 inch

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std.</td>
<td>&lt;ESC&gt; “+” n</td>
<td>27 43 n</td>
<td>1B 2B n</td>
</tr>
<tr>
<td></td>
<td>&lt;FS&gt; “3” n</td>
<td>28 51 n</td>
<td>1C 33 n</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM</td>
<td>&lt;ESC&gt; &quot;I&quot; &quot;n&quot; &lt;4&gt; &lt;0&gt; &lt;0&gt; &lt;0&gt; &lt;0&gt; n</td>
<td>27 91 92 4 0</td>
<td>1B 5B 5C 04 00</td>
</tr>
</tbody>
</table>

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 effective 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

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td>&lt;ESC&gt; &quot;3&quot; n</td>
<td>27 51 n</td>
<td>1B 33 n</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td>&lt;ESC&gt; &quot;A&quot; n</td>
<td>27 65 n</td>
<td>1B 41 n</td>
</tr>
</tbody>
</table>

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 advances or reverses in subsequent line feeds to n/72 inch, where n is between 1 and 85. The new line spacing does not take effect until next <ESC> "2" command.
Execute <ESC> "A"

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM</td>
<td>&lt;ESC&gt; &quot;2&quot;</td>
<td>27 50</td>
<td>1B 32</td>
</tr>
</tbody>
</table>

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**

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td>&lt;LF&gt;</td>
<td>10</td>
<td>0A</td>
</tr>
</tbody>
</table>

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

**Reverse line feed**

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std.</td>
<td>&lt;ESC&gt; &lt;LF&gt;</td>
<td>27 10</td>
<td>1B 0A</td>
</tr>
<tr>
<td>IBM</td>
<td>&lt;ESC&gt; &quot;J&quot;</td>
<td>27 93</td>
<td>1B 5D</td>
</tr>
</tbody>
</table>

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

**Select forward feed mode**

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std.</td>
<td>&lt;FS&gt; &quot;F&quot;</td>
<td>28 70</td>
<td>1C 46</td>
</tr>
</tbody>
</table>

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

**Select reverse feed mode**

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std.</td>
<td>&lt;FS&gt; &quot;R&quot;</td>
<td>28 82</td>
<td>1C 52</td>
</tr>
</tbody>
</table>

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**

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td><code>&lt;ESC&gt; &quot;J&quot;</code> $n$</td>
<td>27 74 $n$</td>
<td>1B 4A $n$</td>
</tr>
</tbody>
</table>

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**

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std.</td>
<td><code>&lt;ESC&gt; &quot;j&quot;</code> $n$</td>
<td>27 106 $n$</td>
<td>1B 6A $n$</td>
</tr>
</tbody>
</table>

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**

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std.</td>
<td><code>&lt;ESC&gt; &quot;l&quot;</code> $n$</td>
<td>27 102 49 $n$</td>
<td>1B 66 31 $n$</td>
</tr>
<tr>
<td></td>
<td><code>&lt;ESC&gt; &quot;r&quot; &lt;1&gt;</code> $n$</td>
<td>27 102 1 $n$</td>
<td>1B 66 01 $n$</td>
</tr>
</tbody>
</table>

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

**Set top of page at current position**

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM</td>
<td><code>&lt;ESC&gt; &quot;4&quot;</code></td>
<td>27 52</td>
<td>1B 34</td>
</tr>
</tbody>
</table>

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**

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td>&lt;ESC&gt; “C” n</td>
<td>27 67 n</td>
<td>1B 43 n</td>
</tr>
</tbody>
</table>

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**

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td>&lt;ESC&gt; “C” &lt;0&gt; n</td>
<td>27 67 0 n</td>
<td>1B 43 00 n</td>
</tr>
</tbody>
</table>

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**

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td>&lt;ESC&gt; “N” n</td>
<td>27 78 n</td>
<td>1B 4E n</td>
</tr>
</tbody>
</table>

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**

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td>&lt;ESC&gt; “O”</td>
<td>27 79</td>
<td>1B 4F</td>
</tr>
</tbody>
</table>

Cancels the bottom margin.

**Form feed**

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td>&lt;FF&gt;</td>
<td>12</td>
<td>0C</td>
</tr>
</tbody>
</table>

Feeds the paper to the top of the next page according to the current page length, and moves the print position to the left margin. When the automatic sheet feeder (ASF) is selected with EDS switch E-3, this command ejects the current page.
**Return to top of current page**

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std.</td>
<td><code>&lt;ESC&gt; &lt;FF&gt;</code></td>
<td>27 12</td>
<td>1B 0C</td>
</tr>
</tbody>
</table>

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

**Disable paper-out detector**

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td><code>&lt;ESC&gt; &quot;8&quot;</code></td>
<td>27 56</td>
<td>1B 38</td>
</tr>
</tbody>
</table>

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 E-2.

**Enable paper-out detector**

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td><code>&lt;ESC&gt; &quot;9&quot;</code></td>
<td>27 57</td>
<td>1B 39</td>
</tr>
</tbody>
</table>

Causes the printer to stop printing before the end of the paper. Overrides the setting of EDS switch E-2.

**Set vertical tab stops**

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td><code>&lt;ESC&gt; “B” nl n2 .... &lt;0&gt;</code></td>
<td>27 66 nl n2 ... 0</td>
<td>1B 42 nl n2 ... 00</td>
</tr>
</tbody>
</table>

Cancels all current vertical tab stops and sets new vertical tab stops at lines \( nl, n2, \) etc., where \( nl, n2, \) 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

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std.</td>
<td>&lt;ESC&gt; “e” “1” n</td>
<td>27 101 49 n</td>
<td>1B 65 31 n</td>
</tr>
<tr>
<td></td>
<td>&lt;ESC&gt; “e” &lt;1&gt; n</td>
<td>27 101 1 n</td>
<td>1B 65 01 n</td>
</tr>
</tbody>
</table>

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

Set vertical tab stops in channel

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td>&lt;ESC&gt; “b” n0 nl n1 n2 .... &lt;0&gt;</td>
<td>27 98 n0 nl n1 n2 .... 0</td>
<td>1B 62 n0 nl n2 ... 00</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std.</td>
<td>&lt;ESC&gt; “/” n0</td>
<td>27 47 n0</td>
<td>1B 2F n0</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td>&lt;VT&gt;</td>
<td>11</td>
<td>0B</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std.</td>
<td>&lt;ESC&gt; &quot;I&quot;</td>
<td>n</td>
<td>27 108 n</td>
</tr>
</tbody>
</table>

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:

<table>
<thead>
<tr>
<th>Printer Type</th>
<th>Normal Carriage</th>
<th>Wide Carriage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pica</td>
<td>( 0 \leq n \leq 76 )</td>
<td>( 0 \leq n \leq 132 )</td>
</tr>
<tr>
<td>Elite</td>
<td>( 0 \leq n \leq 91 )</td>
<td>( 0 \leq n \leq 158 )</td>
</tr>
<tr>
<td>Semi-condensed</td>
<td>( 0 \leq n \leq 114 )</td>
<td>( 0 \leq n \leq 198 )</td>
</tr>
<tr>
<td>Condensed pica</td>
<td>( 0 \leq n \leq 130 )</td>
<td>( 0 \leq n \leq 226 )</td>
</tr>
<tr>
<td>Condensed elite</td>
<td>( 0 \leq n \leq 152 )</td>
<td>( 0 \leq n \leq 252 )</td>
</tr>
<tr>
<td>Expanded pica</td>
<td>( 0 \leq n \leq 38 )</td>
<td>( 0 \leq n \leq 66 )</td>
</tr>
<tr>
<td>Expanded elite</td>
<td>( 0 \leq n \leq 45 )</td>
<td>( 0 \leq n \leq 76 )</td>
</tr>
<tr>
<td>Expanded semi-condensed</td>
<td>( 0 \leq n \leq 57 )</td>
<td>( 0 \leq n \leq 99 )</td>
</tr>
<tr>
<td>Expanded condensed pica</td>
<td>( 0 \leq n \leq 64 )</td>
<td>( 0 \leq n \leq 113 )</td>
</tr>
<tr>
<td>Expanded condensed elite</td>
<td>( 0 \leq n \leq 76 )</td>
<td>( 0 \leq n \leq 132 )</td>
</tr>
</tbody>
</table>
Set right margin

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:

<table>
<thead>
<tr>
<th>Printer Type</th>
<th>Normal Carriage</th>
<th>Wide Carriage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pica</td>
<td>( 4 \leq n \leq 80 )</td>
<td>( 4 \leq n \leq 136 )</td>
</tr>
<tr>
<td>Elite</td>
<td>( 5 \leq n \leq 96 )</td>
<td>( 5 \leq n \leq 163 )</td>
</tr>
<tr>
<td>Semi-condensed</td>
<td>( 6 \leq n \leq 120 )</td>
<td>( 6 \leq n \leq 204 )</td>
</tr>
<tr>
<td>Condensed pica</td>
<td>( 7 \leq n \leq 137 )</td>
<td>( 7 \leq n \leq 233 )</td>
</tr>
<tr>
<td>Condensed elite</td>
<td>( 8 \leq n \leq 160 )</td>
<td>( 8 \leq n \leq 255 )</td>
</tr>
<tr>
<td>Expanded pica</td>
<td>( 2 \leq n \leq 40 )</td>
<td>( 2 \leq n \leq 68 )</td>
</tr>
<tr>
<td>Expanded elite</td>
<td>( 3 \leq n \leq 48 )</td>
<td>( 3 \leq n \leq 81 )</td>
</tr>
<tr>
<td>Expanded semi-condensed</td>
<td>( 3 \leq n \leq 60 )</td>
<td>( 3 \leq n \leq 102 )</td>
</tr>
<tr>
<td>Expanded condensed pica</td>
<td>( 4 \leq n \leq 68 )</td>
<td>( 4 \leq n \leq 116 )</td>
</tr>
<tr>
<td>Expanded condensed elite</td>
<td>( 4 \leq n \leq 80 )</td>
<td>( 4 \leq n \leq 136 )</td>
</tr>
</tbody>
</table>

Set left and right margins

Sets the left margin at column \( nl \) and the right margin at column \( n2 \). See the preceding commands for margin restrictions and other notes.

Carriage return

Prints the current line and returns the next print position to the left margin. If EDS switch F-1 is set to “AUTO-LF ON”, also performs a line feed.
Set automatic line feed

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM</td>
<td>&lt;ESC&gt; &quot;5&quot; &lt;1&gt;</td>
<td>27 53 1</td>
<td>1B 35 01</td>
</tr>
</tbody>
</table>

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 F-1.

Cancel automatic line feed

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM</td>
<td>&lt;ESC&gt; &quot;5&quot; &lt;0&gt;</td>
<td>27 53 0</td>
<td>1B 35 00</td>
</tr>
</tbody>
</table>

Causes the printer to perform only a carriage return when it receives a <CR> code. This command takes priority over EDS switch F-1.

Backspace

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td>&lt;BS&gt;</td>
<td>8</td>
<td>06</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std.</td>
<td>&lt;ESC&gt; &quot;a&quot; &quot;0&quot;</td>
<td>27 97 48</td>
<td>1B 61 30</td>
</tr>
<tr>
<td></td>
<td>&lt;ESC&gt; &quot;a&quot; &lt;0&gt;</td>
<td>27 97 0</td>
<td>1B 61 00</td>
</tr>
</tbody>
</table>

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

Center text

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std.</td>
<td>&lt;ESC&gt; &quot;a&quot; &quot;1&quot;</td>
<td>27 97 49</td>
<td>1B 61 31</td>
</tr>
<tr>
<td></td>
<td>&lt;ESC&gt; &quot;a&quot; &lt;1&gt;</td>
<td>27 97 1</td>
<td>1B 61 01</td>
</tr>
</tbody>
</table>

Centers subsequent text between the left and right margins.
Right justify

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std.</td>
<td>&lt;ESC&gt; &quot;a&quot; &quot;2&quot;</td>
<td>27 97 50</td>
<td>1B 61 32</td>
</tr>
<tr>
<td></td>
<td>&lt;ESC&gt; &quot;a&quot; &lt;2&gt;</td>
<td>27 97 2</td>
<td>1B 61 02</td>
</tr>
</tbody>
</table>

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

Full justify

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std.</td>
<td>&lt;ESC&gt; &quot;a&quot; &quot;3&quot;</td>
<td>27 97 51</td>
<td>1B 61 33</td>
</tr>
<tr>
<td></td>
<td>&lt;ESC&gt; &quot;a&quot; &lt;3&gt;</td>
<td>27 97 3</td>
<td>1B 61 03</td>
</tr>
</tbody>
</table>

Aligns subsequent text between the left and right margins.

Set horizontal tab stops

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td>&lt;ESC&gt; &quot;D&quot; n1 n2 .... &lt;0&gt;</td>
<td>27 68 n1 n2 .... 0</td>
<td>1B 44 n1 n2 ... 00</td>
</tr>
</tbody>
</table>

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

Set horizontal tab stop every n columns

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std.</td>
<td>&lt;ESC&gt; &quot;e&quot; &quot;0&quot; n</td>
<td>27 101 48 n</td>
<td>1B 65 30 n</td>
</tr>
<tr>
<td></td>
<td>&lt;ESC&gt; &quot;e&quot; &lt;0&gt; n</td>
<td>27 101 0 n</td>
<td>1B 65 00 n</td>
</tr>
</tbody>
</table>

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**

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM</td>
<td>&lt;ESC&gt; “R”</td>
<td>27 82</td>
<td>1B 52</td>
</tr>
</tbody>
</table>

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**

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td>&lt;HT&gt;</td>
<td>9</td>
<td>09</td>
</tr>
</tbody>
</table>

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**

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sld.</td>
<td>&lt;ESC&gt; “\” nl n2</td>
<td>27 92 n1 n2</td>
<td>1B 5C n1 n2</td>
</tr>
</tbody>
</table>

Moves the print position right or left a specified distance. Ignored if the resulting position is beyond the right or left margin. The formulas for the distance and direction are as follows:
- If \( n2 \) is between 0 and 63, the print head moves right by \( (nl + n2 \times 256) \) dots.
- If you want to move the print head to the left, \( nl \) and \( n2 \) are obtained by subtracting the value from 65536, and dividing the result into high and low bytes.

**Relative horizontal tab in inches**

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM</td>
<td>&lt;ESC&gt; “d” nl n2</td>
<td>27 100 n1 n2</td>
<td>1B 64 n1 n2</td>
</tr>
</tbody>
</table>

Sets the next print position to \( (nl + n2 \times 256)/120 \) inches from the current position.
Ignored if this position is beyond the right margin.
### Absolute horizontal tab in inches

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std.</td>
<td>&lt;ESC&gt; &quot;S&quot; nl n2</td>
<td>27 36 nl n2</td>
<td>1B 24 nl n2</td>
</tr>
</tbody>
</table>

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

### Absolute horizontal tab in columns

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std.</td>
<td>&lt;ESC&gt; &quot;f&quot; &quot;O&quot; n</td>
<td>27 102 48 n</td>
<td>1B 66 30 n</td>
</tr>
<tr>
<td></td>
<td>&lt;ESC&gt; &quot;f&quot; &lt;O&gt; n</td>
<td>27 102 0 n</td>
<td>1B 66 00 n</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td>&lt;ESC&gt; “K” n1 n2 m1 m2 ...</td>
<td>27 75 n1 n2 m1 m2 ...</td>
<td>1B 4B n1 n2 m1 m2 ...</td>
</tr>
</tbody>
</table>

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

Print double-density 8-bit graphics

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td>&lt;ESC&gt; “L” n1 n2 m1 m2 ...</td>
<td>27 76 n1 n2 m1 m2 ...</td>
<td>1B 4C n1 n2 m1 m2 ...</td>
</tr>
</tbody>
</table>

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

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

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td>&lt;ESC&gt; “Y” n1 n2 m1 m2 ...</td>
<td>27 89 n1 n2 m1 m2 ...</td>
<td>1B 59 n1 n2 m1 m2 ...</td>
</tr>
</tbody>
</table>

Prints bit-image graphics at 120 dots per inch horizontally (maximum 960 dots wide for normal carriage printer, 1632 dots for wide carriage printer), skipping every second dot in the horizontal direction. See <ESC> “K” for other information.
Print quadruple-density 8-bit graphics

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td><code>&lt;ESC&gt; “Z&quot; n1 n2 ml m2 ...</code></td>
<td>27 90 n1 n2 ml m2 ...</td>
<td>1B 5A n1 n2 ml m2 ...</td>
</tr>
</tbody>
</table>

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

Print hex-density 24-bit graphics

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std.</td>
<td><code>&lt;FS&gt; “Z&quot; n1 n2 ml m2 m3 ...</code></td>
<td>28 90 n1 n2 ml m2 m3 ...</td>
<td>1C 5A n1 n2 ml m2 m3 ...</td>
</tr>
</tbody>
</table>

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) for normal carriage printer, and 13.6 inches (4896 dots) for wide carriage printer. In the data \( ml, m2, m3 \ldots \) each three bytes represent 24 vertical dots. In the leftmost position, the most significant bit of \( ml \) is the top dot; the least significant bit of \( ml \) 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

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td><code>&lt;ESC&gt; “*&quot; n0 n1 n2 ml m2 ...</code></td>
<td>27 42 n0 n1 n2 ml m2 ...</td>
<td>1B 2A n0 n1 n2 ml m2 ...</td>
</tr>
</tbody>
</table>

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 \( n1, n2, ml, m2, ... \)
Select graphics mode

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM.</td>
<td>&lt;ESC&gt; &quot;l&quot; &quot;g&quot; n1 n2</td>
<td>28 91 103</td>
<td>1B 58 67 n1 n2</td>
</tr>
<tr>
<td></td>
<td>m0 m1 m2 ...</td>
<td>m0 m1 m2</td>
<td>m0 m1 m2 ...</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>m0</th>
<th>Graphics mode</th>
<th>Dots per inch</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>8-bit Normal-density</td>
<td>(60)</td>
</tr>
<tr>
<td>1</td>
<td>8-bit Double-density</td>
<td>(120)</td>
</tr>
<tr>
<td>2</td>
<td>8-bit Double-density, double-speed</td>
<td>(120)</td>
</tr>
<tr>
<td>3</td>
<td>8-bit Quadruple-density</td>
<td>(240)</td>
</tr>
<tr>
<td>4</td>
<td>8-bit CRT graphics, mode I</td>
<td>(80)</td>
</tr>
<tr>
<td>6</td>
<td>8-bit CRT graphics, mode II</td>
<td>(90)</td>
</tr>
<tr>
<td>32</td>
<td>24-bit Normal-density</td>
<td>(60)</td>
</tr>
<tr>
<td>33</td>
<td>24-bit Double-density</td>
<td>(120)</td>
</tr>
<tr>
<td>38</td>
<td>24-bit CRT graphics</td>
<td>(90)</td>
</tr>
<tr>
<td>39</td>
<td>24-bit Triple-density</td>
<td>(180)</td>
</tr>
<tr>
<td>40</td>
<td>24-bit Hex-density</td>
<td>(360)</td>
</tr>
</tbody>
</table>
**Convert graphics density**

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std.</td>
<td>&lt;ESC&gt; &quot;?&quot; n m</td>
<td>27 63 n m</td>
<td>18 3F n m</td>
</tr>
</tbody>
</table>

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> "*".

106
DOWNLOAD CHARACTER COMMANDS

**Define download characters**

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std.</td>
<td><code>&lt;ESC&gt; &quot;&amp;&quot; &lt;0&gt; nl &lt;2&gt; d1 d2 ... h dl d2 ... &amp;</code></td>
<td>n1 m0 m1 m2</td>
<td>1B 26 00 n1</td>
</tr>
</tbody>
</table>

Defines one or more new characters and stores them in RAM for later use. EDS switch A-2 must be set to "RAM DOWNLOAD"; otherwise RAM is used as an input buffer, not downloading characters, and this command is ignored.

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

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, ml, specifies the character width; the third byte, m2, specifies the right of the character.

These values must not exceed the following maximum limits:

<table>
<thead>
<tr>
<th>Character mode</th>
<th>ml</th>
<th>m0 + ml + m2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Draft</td>
<td>9</td>
<td>12</td>
</tr>
<tr>
<td>LQ pica</td>
<td>31</td>
<td>36</td>
</tr>
<tr>
<td>LQ elite</td>
<td>27</td>
<td>30</td>
</tr>
<tr>
<td>LQ semi-condensed</td>
<td>21</td>
<td>24</td>
</tr>
<tr>
<td>LQ proportional</td>
<td>37</td>
<td>42</td>
</tr>
<tr>
<td>Draft super/subscript</td>
<td>7</td>
<td>12</td>
</tr>
<tr>
<td>LQ super/subscript</td>
<td>19</td>
<td>36</td>
</tr>
<tr>
<td>LQ prop. super/subscript</td>
<td>37</td>
<td>42</td>
</tr>
</tbody>
</table>

Next comes the dot data. Normal character height is 24 dots, so there must be $3 \times ml$ bytes of dot data. If the printer is in super/subscript mode, however, the character height is 16 dots, so there must be $2 \times ml$ 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 8.
**Define download characters**

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM</td>
<td><code>&lt;ESC&gt; &quot;=&quot; nl n2 &quot;#&quot; n3 n4 &lt;0&gt; n5</code></td>
<td>27 61 n1 n2 35</td>
<td>18 30 n1 n2 23</td>
</tr>
<tr>
<td></td>
<td><code>m1 m2 ... m9</code></td>
<td><code>m1 m2 ... m9</code></td>
<td><code>m1 m2 ... m9</code></td>
</tr>
<tr>
<td></td>
<td><code>d1 d2 ... dx</code></td>
<td><code>d1 d2 ... dx</code></td>
<td><code>d1 d2 ... dx</code></td>
</tr>
</tbody>
</table>

 Defines new characters and stores them in RAM for later use. EDS switch A-2 must be set to “RAM DOWNLOAD”; 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:

<table>
<thead>
<tr>
<th>(n5)</th>
<th>Character mode</th>
<th>Character width</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Draft</td>
<td>10</td>
</tr>
<tr>
<td>1</td>
<td>LQ pica</td>
<td>36</td>
</tr>
<tr>
<td>2</td>
<td>LQ proportional</td>
<td>18 - 42</td>
</tr>
<tr>
<td>3</td>
<td>LQ elite</td>
<td>30</td>
</tr>
</tbody>
</table>

\(m1\) through \(m9\) indicate Index Table data.

\(m1\) and \(m2\) indicate the address 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 less 1.
through \( m_9 \) 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.

\( d_1, d_2, \ldots d_x \) 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**

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std.</td>
<td>&lt;ESC&gt; &quot;;&quot; &lt;0&gt;</td>
<td>27 58 0</td>
<td>1B 3A 00 n 0</td>
</tr>
</tbody>
</table>

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 not set to "RAM DOWNLOAD".

<table>
<thead>
<tr>
<th>( n )</th>
<th>Font</th>
<th>( n )</th>
<th>Font</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Roman</td>
<td>11</td>
<td>Blippo</td>
</tr>
<tr>
<td>1</td>
<td>Sanserif</td>
<td>12</td>
<td>H-Gothic</td>
</tr>
<tr>
<td>2</td>
<td>Courier</td>
<td>13</td>
<td>Orane</td>
</tr>
<tr>
<td>3</td>
<td>Prestige</td>
<td>14</td>
<td>Cinema</td>
</tr>
<tr>
<td>4</td>
<td>Script</td>
<td>15</td>
<td>CODE 39</td>
</tr>
<tr>
<td>5</td>
<td>OCR-B (Option)</td>
<td>16</td>
<td>UPC/EAN (Option)</td>
</tr>
<tr>
<td>6</td>
<td>OCR-A (Option)</td>
<td>17</td>
<td>Old Style (Option)</td>
</tr>
<tr>
<td>7</td>
<td>Orator</td>
<td>18</td>
<td>Firenze (Option)</td>
</tr>
<tr>
<td>8</td>
<td>Orator 2 (Option)</td>
<td>32</td>
<td>SLQ Roman</td>
</tr>
<tr>
<td>9</td>
<td>TW-Light (Option)</td>
<td>33</td>
<td>SLQ TW-Light</td>
</tr>
<tr>
<td>10</td>
<td>Letter Gothic (Option)</td>
<td>34</td>
<td>SLQ Script (Option)</td>
</tr>
</tbody>
</table>

109
Select download character set

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std.</td>
<td>&lt;ESC&gt; “%” “1”</td>
<td>27 37 49</td>
<td>1B 25 31</td>
</tr>
<tr>
<td></td>
<td>&lt;ESC&gt; “%” &lt;1&gt;</td>
<td>27 37 1</td>
<td>1B 25 01</td>
</tr>
</tbody>
</table>

Selects the download character set. Ignored when EDS switch A-2 is not set to “RAM DOWNLOAD”.

Shift download character area

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std.</td>
<td>&lt;ESC&gt; “t” “2”</td>
<td>27 116 50</td>
<td>1B 74 32</td>
</tr>
<tr>
<td></td>
<td>&lt;ESC&gt; “t” &lt;2&gt;</td>
<td>27 116 2</td>
<td>1B 74 02</td>
</tr>
<tr>
<td></td>
<td>&lt;FS&gt; “I” “2”</td>
<td>28 73 50</td>
<td>1C 49 32</td>
</tr>
<tr>
<td></td>
<td>&lt;FS&gt; “I” &lt;2&gt;</td>
<td>28 73 2</td>
<td>1C 49 02</td>
</tr>
</tbody>
</table>

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

Select draft pica download character set

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM</td>
<td>&lt;ESC&gt; “I” &lt;4&gt;</td>
<td>27 73 4</td>
<td>1B 49 04</td>
</tr>
</tbody>
</table>

Selects the download character set, draft quality, and pica pitch (10 cpi). Ignored if the FONT LOCK mode was selected during power-up or if EDS switch A-2 is not set to “RAM DOWNLOAD”.

Select draft elite download character set

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM</td>
<td>&lt;ESC&gt; “I” &lt;FF&gt;</td>
<td>27 73 12</td>
<td>1B 49 0C</td>
</tr>
</tbody>
</table>

Selects the download character set, draft quality, and elite pitch (12 cpi). Ignored if the FONT LOCK mode was selected during power-up or if EDS switch A-2 is not set to “RAM DOWNLOAD”.
### Select draft condensed download characters

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM</td>
<td>&lt;ESC&gt; “I” &lt;DC4&gt;</td>
<td>27 73 20</td>
<td>1B 49 14</td>
</tr>
</tbody>
</table>

Selects the download character set, draft quality, and condensed pitch (17 cpi). Ignored if the FONT LOCK mode was selected during power-up or if EDS switch A-2 is not set to “RAM DOWNLOAD”.

### Select LQ pica download characters

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM</td>
<td>&lt;ESC&gt; “I” &lt;6&gt;</td>
<td>27 73 6</td>
<td>1B 49 06</td>
</tr>
</tbody>
</table>

Selects the LQ download character set with pica pitch (10 cpi). Ignored if the FONT LOCK mode was selected during power-up or if EDS switch A-2 is not set to “RAM DOWNLOAD”.

### Select LQ elite download characters

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM</td>
<td>&lt;ESC&gt; “I” &lt;SO&gt;</td>
<td>27 73 14</td>
<td>1B 49 0E</td>
</tr>
</tbody>
</table>

Selects the LQ download character set with elite pitch (12 cpi). Ignored if the FONT LOCK mode was selected during power-up or if EDS switch A-2 is not set to “RAM DOWNLOAD”.

### Select LQ condensed download characters

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM</td>
<td>&lt;ESC&gt; “I” &lt;SYN&gt;</td>
<td>27 73 22</td>
<td>1B 49 16</td>
</tr>
</tbody>
</table>

Selects the LQ download character set with condensed pitch (17 cpi). Ignored if the FONT LOCK mode was selected during power-up or if EDS switch A-2 is not set to “RAM DOWNLOAD”.

### Select LQ proportional download characters

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM</td>
<td>&lt;ESC&gt; “I” &lt;7&gt;</td>
<td>27 73 7</td>
<td>1B 49 07</td>
</tr>
</tbody>
</table>

Selects the LQ download character set with proportional pitch. Ignored if the FONT LOCK mode was selected during power-up or if EDS switch A-2 is not set to “RAM DOWNLOAD”.

111
Select ROM character set

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std.</td>
<td>&lt;ESC&gt; &quot;%&quot; &quot;0&quot;</td>
<td>27 37 48</td>
<td>1B 25 30</td>
</tr>
<tr>
<td></td>
<td>&lt;ESC&gt; &quot;%&quot; &lt;0&gt;</td>
<td>27 37 0</td>
<td>1B 25 00</td>
</tr>
</tbody>
</table>

Stops using the download character set and returns to the built-in ROM character set. Ignored when EDS switch A-2 is not set to "RAM DOWNLOAD".

COLOR SELECTION COMMANDS

Select print color

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td>&lt;ESC&gt; &quot;r&quot; n</td>
<td>27 114 n</td>
<td>1B 72 n</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>n</th>
<th>Color</th>
<th>n</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Black</td>
<td>4</td>
<td>Yellow</td>
</tr>
<tr>
<td>1</td>
<td>Magenta</td>
<td>5</td>
<td>Orange</td>
</tr>
<tr>
<td>2</td>
<td>Cyan</td>
<td>6</td>
<td>Green</td>
</tr>
<tr>
<td>3</td>
<td>Violet</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Select print color

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td>&quot;(&quot; &quot;(&quot; &quot;C&quot; &quot;&quot;)&quot; &quot;&quot;)&quot;</td>
<td>40 40 67 41 41</td>
<td>28 28 43 29 29</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>d</th>
<th>Color</th>
<th>d</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Black</td>
<td>4</td>
<td>Yellow</td>
</tr>
<tr>
<td>1</td>
<td>Magenta</td>
<td>5</td>
<td>Orange</td>
</tr>
<tr>
<td>2</td>
<td>Cyan</td>
<td>6</td>
<td>Green</td>
</tr>
<tr>
<td>3</td>
<td>Violet</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
OTHER PRINTER COMMANDS

**Set MSB to 1**

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std.</td>
<td>&lt;ESC&gt; “&gt;”</td>
<td>27 62</td>
<td>1B 3E</td>
</tr>
</tbody>
</table>

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**

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std.</td>
<td>&lt;ESC&gt; “=”</td>
<td>27 61</td>
<td>1B 3D</td>
</tr>
</tbody>
</table>

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

**Accept MSB as is**

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std.</td>
<td>&lt;ESC&gt; “#”</td>
<td>27 35</td>
<td>1B 23</td>
</tr>
</tbody>
</table>

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

**Delete last character sent**

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std.</td>
<td>&lt;DEL&gt;</td>
<td>127</td>
<td>7F</td>
</tr>
</tbody>
</table>

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**

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td>&lt;CAN&gt;</td>
<td>24</td>
<td>18</td>
</tr>
</tbody>
</table>

Deletes the last line currently present in the print buffer.
### Set printer off-line

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std.</td>
<td>&lt;DC3&gt;</td>
<td>19</td>
<td>13</td>
</tr>
<tr>
<td>IBM</td>
<td>&lt;ESC&gt; “Q” n</td>
<td>27 81 n</td>
<td>1B 51 n</td>
</tr>
</tbody>
</table>

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

In the IBM mode, the value of n should be 36 for normal carriage printer, and 35 for wide carriage printer.

### Set printer on-line

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td>&lt;DC1&gt;</td>
<td>17</td>
<td>11</td>
</tr>
</tbody>
</table>

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

### Stop printing

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM</td>
<td>&lt;ESC&gt; “j”</td>
<td>27 106</td>
<td>1B 6A</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td>&lt;BEL&gt;</td>
<td>7</td>
<td>07</td>
</tr>
</tbody>
</table>

Sounds a brief beep tone from the printer.
**Bi-directional printing**

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td>&lt;ESC&gt; “U” “0”</td>
<td>27 85 48</td>
<td>1B 55 30</td>
</tr>
<tr>
<td></td>
<td>&lt;ESC&gt; “U” “0&lt;”</td>
<td>27 85 0</td>
<td>1B 55 00</td>
</tr>
</tbody>
</table>

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

**Uni-directional printing**

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td>&lt;ESC&gt; “U” “1”</td>
<td>27 85 49</td>
<td>1B 55 31</td>
</tr>
<tr>
<td></td>
<td>&lt;ESC&gt; “U” “1&lt;”</td>
<td>27 85 1</td>
<td>1B 55 01</td>
</tr>
</tbody>
</table>

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

**One-line uni-directional printing**

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std.</td>
<td>&lt;ESC&gt; “&lt;”</td>
<td>27 60</td>
<td>1B 3C</td>
</tr>
</tbody>
</table>

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

**Manual feed**

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td>&lt;ESC&gt; “EM” “0”</td>
<td>27 25 0</td>
<td>1B 19 00</td>
</tr>
<tr>
<td></td>
<td>“(“ “(“ “0” “)” “)”</td>
<td>40 40 48 41 41</td>
<td>28 28 30 29 29</td>
</tr>
</tbody>
</table>

Selects manual sheet feeding even when the optional automatic sheet feeder is mounted. Ignored if EDS switch E-3 is set to “ASF OFF”.

**Auto feed**

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td>&lt;ESC&gt; “EM” “4”</td>
<td>27 25 4</td>
<td>1B 19 04</td>
</tr>
<tr>
<td></td>
<td>“(“ “(“ “4” “)” “)”</td>
<td>40 40 52 41 41</td>
<td>28 28 34 29 29</td>
</tr>
</tbody>
</table>

Selects the automatic sheet feeder. Ignored if EDS switch E-3 is set to “ASF OFF”.

115
**Select ASF bin #1**

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td><code>&lt;ESC&gt;</code> <code>&lt;EM&gt;</code> <code>&lt;1&gt;</code></td>
<td>27 25 1</td>
<td>1B 19 01</td>
</tr>
<tr>
<td></td>
<td><code>&quot;(&quot; </code>&quot;(&quot; <code>&quot;1&quot; </code>&quot;)&quot; <code>&quot;)&quot;</code></td>
<td>40 40 49 41 41</td>
<td>28 28 31 29 29</td>
</tr>
</tbody>
</table>

Selects the ASF bin #1, and feeds paper from bin #1. Ignored if EDS switch E-3 is not set to “ASF-DUAL ON”.

**Select ASF bin #2**

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td><code>&lt;ESC&gt;</code> <code>&lt;EM&gt;</code> <code>&lt;2&gt;</code></td>
<td>27 25 2</td>
<td>1B 19 02</td>
</tr>
<tr>
<td></td>
<td><code>&quot;(&quot; </code>&quot;(&quot; <code>&quot;2&quot; </code>&quot;)&quot; <code>&quot;)&quot;</code></td>
<td>40 40 50 41 41</td>
<td>28 28 32 29 29</td>
</tr>
</tbody>
</table>

Selects the ASF bin #2, and feeds paper from bin #2. Ignored if EDS switch E-3 is not set to “ASF-DUAL ON”.

**Eject paper from ASF**

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td><code>&lt;ESC&gt;</code> <code>&lt;EM&gt;</code> <code>&quot;R&quot;</code></td>
<td>27 25 82</td>
<td>1B 19 52</td>
</tr>
<tr>
<td></td>
<td><code>&quot;(&quot; </code>&quot;(&quot; <code>&quot;R&quot; </code>&quot;)&quot; <code>&quot;)&quot;</code></td>
<td>40 40 82 41 41</td>
<td>28 28 52 29 29</td>
</tr>
</tbody>
</table>

Ejects the current page. Ignored if EDS switch E-3 is set to “ASF OFF”.

**Set print start position on ASF**

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td><code>&lt;ESC&gt;</code> <code>&lt;EM&gt;</code> <code>&quot;T&quot;</code> <code>n</code></td>
<td>27 25 84 <code>n</code></td>
<td>1B 19 54 <code>n</code></td>
</tr>
<tr>
<td></td>
<td><code>&quot;(&quot; </code>&quot;(&quot; <code>&quot;T&quot; </code>&quot;)&quot; <code>&quot;)&quot;</code> <code>n</code></td>
<td>40 40 84 41 41 <code>n</code></td>
<td>28 28 54 29 29 <code>n</code></td>
</tr>
</tbody>
</table>

Skips `n/6` inches at the top of the page, where `n` is equal to or greater than 1. Ignored if EDS switch E-3 is set to “ASF OFF”.

**Reset printer**

<table>
<thead>
<tr>
<th>Mode</th>
<th>ASCII</th>
<th>Decimal</th>
<th>Hexadecimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td><code>&lt;ESC&gt;</code> <code>&quot;@&quot;</code></td>
<td>27 64</td>
<td>1B 40</td>
</tr>
<tr>
<td>Std.</td>
<td><code>&lt;FS&gt;</code> <code>&quot;@&quot;</code></td>
<td>28 64</td>
<td>1C 40</td>
</tr>
</tbody>
</table>

Reinitializes the printer. Clears the print buffer and returns settings to their power-up values. Does not clear the input buffer or change ASF selections.
Chapter 8
DOWNLOAD CHARACTERS

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

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

Before you start to define your own characters, you must set the EDS switch A-2 to "RAM DOWNLOAD". Otherwise, the RAM is used to store the input buffer, and the download commands are ignored.

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:

<table>
<thead>
<tr>
<th>Character mode</th>
<th>Horizontal</th>
<th>Vertical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Draft characters</td>
<td>9</td>
<td>24</td>
</tr>
<tr>
<td>LQ pica characters</td>
<td>31</td>
<td>24</td>
</tr>
<tr>
<td>LQ elite characters</td>
<td>27</td>
<td>24</td>
</tr>
<tr>
<td>LQ semi-condensed</td>
<td>19</td>
<td>16</td>
</tr>
<tr>
<td>LQ proportional</td>
<td>37</td>
<td>24</td>
</tr>
<tr>
<td>Draft super/subscript</td>
<td>7</td>
<td>16</td>
</tr>
<tr>
<td>LQ super/subscript</td>
<td>19</td>
<td>16</td>
</tr>
<tr>
<td>LQ prop. super/subscript</td>
<td>37</td>
<td>16</td>
</tr>
</tbody>
</table>
- 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 8-1 to help design your new characters. We will use a tiny representation of a telephone symbol for our example.

![Figure 8-1](image)

**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.
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 proportionally.

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 $m_0$ and the right space is specified by $m_2$. The second byte ($m_1$) 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.

Figure 8-2. Telephone symbol with normal LQ pica.
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.

<table>
<thead>
<tr>
<th>Character mode</th>
<th>m1</th>
<th>m0 + m1 + m2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Draft characters</td>
<td>9</td>
<td>12</td>
</tr>
<tr>
<td>LQ pica characters</td>
<td>31</td>
<td>36</td>
</tr>
<tr>
<td>LQ elite characters</td>
<td>27</td>
<td>30</td>
</tr>
<tr>
<td>LQ semi-condensed</td>
<td>19</td>
<td>24</td>
</tr>
<tr>
<td>LQ proportional</td>
<td>37</td>
<td>42</td>
</tr>
<tr>
<td>Draft super/subscript</td>
<td>7</td>
<td>12</td>
</tr>
<tr>
<td>LQ super/subscript</td>
<td>19</td>
<td>36</td>
</tr>
<tr>
<td>LQ prop. super/subscript</td>
<td>37</td>
<td>42</td>
</tr>
</tbody>
</table>

**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:

```basic
1000 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)
1230 FOR I=0 TO 781 STEP 25 :LPRINT CHR$(61)
1240 FOR I=0 TO 412 STEP 25 :LPRINT CHR$(60)
1250 FOR I=0 TO 488 STEP 25 :LPRINT CHR$(61)
1260 LPRINT "GERMANY";CHR$(9)
1270 FOR I=0 TO 412 STEP 25 :LPRINT CHR$(60)
1280 FOR I=0 TO 488 STEP 25 :LPRINT CHR$(61)
1290 LPRINT CHR$(9)
1300 LPRINT CHR$(9)
1310 FOR I=0 TO 488 STEP 25 :LPRINT CHR$(61)
1320 LPRINT 120
```
DIFFUSION RANGES OF CARS & TELEPHONES

USA

GERMANY

JAPAN

(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 of 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:

<table>
<thead>
<tr>
<th>Character set</th>
<th>Character width</th>
<th>Character ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>Draft characters</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>LQ pica characters</td>
<td>35</td>
<td>1</td>
</tr>
<tr>
<td>LQ elite characters</td>
<td>29</td>
<td>2</td>
</tr>
<tr>
<td>LQ proportional</td>
<td>17 ~ 41</td>
<td>3</td>
</tr>
</tbody>
</table>

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 <8001>h, and you must enter 0 for the Format byte.
This Format byte indicates the printer that the RAM is 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 Format byte for these area.
Assigning the character dot pattern

We will use a tiny representation of a telephone symbol for our example.

![Telephone symbol with LQ pica](image)

**Figure 8-3.** Telephone symbol with LQ pica.

After you have designed the character pattern, you 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 vertical 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 not, write “0”.
Figure 8-4. 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 in Figure 8-5.

Figure 8-5. Compressed character pattern of telephone symbol.
Now we 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.

That's where the numbers down the left side of the grid come in. Notice that there is a number for each row of dots and that each number is twice the number below it. By making these numbers 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 character 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 \((m1\text{ and }m2)\) 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 your character is block graphics, add 128 to the width of dot pattern in the memory.

Our telephone symbol is normal character and the width of 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 your character is a normal character, add 192 to the character width. If your character is a block character, and it should be printed as 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 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 of this byte 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 WIDTH "LPT1": 255
1010 LPRINT CHR$(27);"=";CHR$(164);CHR$(9);"#";
1020 LPRINT CHR$(&HOF);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
```

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LPRINT 
LPRINT CHR$(9): 
FOR I=0 TO 493 STEP 25 :LPRINT CHR$(61): :NEXT I 
LPRINT CHR$(27);"I";CHR$(2) 
LPRINT CHR$(9):"++"; 
SCL$="++--" 
FOR I=1 TO 7 :LPRINT SCL$; NEXT I 
LPRINT CHR$(9):"+-" 
SCALE$="+-+-" 
FOR 1=1 TO 7 
LPRINT "+-+-" 
LPRINT CHR$(9): 
FOR 1=1 TO 8 
LPRINT " ":I: 
NEXT I 
LPRINT CHR$(2): 
LPRINT CHR$(2): 
LPRINT CHR$(9): 
LPRINT CHR$(2): 
SCALE$: :NEXT I 
LPRINT CHR$(27);"T": 
LPRINT CHR$(27);"@" 
END 
DATA Index Table Data 
DATA 137, 17, 25, 227, 96, 4, 242, 0, 96 
DATA 137, 92, 28, 227, 96, 0, 80, 64, 96 
DATA Dot Pattern Data 
DATA Telephone symbol 
DATA 0, 0, 0, 7, 0, 0, 15, 0, 0, 31, 0, 0, 59, 0, 0 
DATA 59, 15, 192, 56, 31, 192, 112, 63, 192, 112, 127, 192, 112, 255, 192 
DATA 127, 255, 192, 127, 243, 192, 113, 227, 192, 127, 243, 192, 127, 255, 192 
DATA Dot Pattern Data 
DATA Car symbol 
DATA 0, 0, 0, 0, 0, 7, 0, 0, 15, 0, 0, 31, 0, 0, 59, 0, 0 
DATA 59, 0, 30, 0, 30, 0, 0, 28, 0, 0, 60, 0, 0, 63, 0 
DATA 0, 0, 0, 0, 0, 30, 0, 0, 28, 0, 0, 60, 0, 0, 63, 0 
DATA 0, 0, 0, 0, 0, 28, 124, 0, 56, 124, 0, 112, 126, 0, 96, 124, 0 
DATA 14, 127, 0, 28, 124, 0, 56, 124, 0, 112, 126, 0, 96, 124, 0 
DATA 127, 254, 0, 127, 252, 0, 96, 124, 0, 96, 127, 0, 96, 127, 0 
DATA 96, 127, 192, 112, 127, 192, 124, 127, 128, 63, 127, 0, 15, 124, 0 
DATA 3.124, 0, 0, 0, 0, 0, 0, 0
Chapter 9

MS-DOS AND YOUR PRINTER

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

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

INSTALLING APPLICATION SOFTWARE WITH YOUR PRINTER

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

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

<table>
<thead>
<tr>
<th>#</th>
<th>Standard mode</th>
<th>IBM mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Star XB-2410/2415</td>
<td>* Proprinter XL24E</td>
</tr>
<tr>
<td></td>
<td>Star XB24-10/15</td>
<td>* Proprinter X24E</td>
</tr>
<tr>
<td>2</td>
<td>Star NX-2420 Color</td>
<td>* Proprinter XL24</td>
</tr>
<tr>
<td></td>
<td>Star LC24-200 Color</td>
<td>* Proprinter X24</td>
</tr>
<tr>
<td>3</td>
<td>* Star NX-2420</td>
<td></td>
</tr>
<tr>
<td></td>
<td>* Star LC24-200</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Epson LQ-860/1060</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>* Epson LQ-850/1050</td>
<td></td>
</tr>
</tbody>
</table>

NOTE: * does not support color printing.

You can also select one of NEC 24-wire printers to print graphics in the Standard emulation mode.
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.

<table>
<thead>
<tr>
<th></th>
<th>Normal type</th>
<th>Wide type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pica</td>
<td>10</td>
<td>80</td>
</tr>
<tr>
<td>Elite</td>
<td>12</td>
<td>96</td>
</tr>
<tr>
<td>Semi-condensed</td>
<td>15</td>
<td>120</td>
</tr>
<tr>
<td>Condensed pica</td>
<td>17.1</td>
<td>137</td>
</tr>
<tr>
<td>Condensed elite</td>
<td>20</td>
<td>160</td>
</tr>
<tr>
<td>Proportional</td>
<td>Variable</td>
<td></td>
</tr>
</tbody>
</table>

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)5) OCR-B
- ((F)6) OCR-A
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))1 can be ((F))2 embedded

((F))3 anywhere ((F))9 in a document.

Printout:

**Printer commands**

Font commands can be embedded anywhere in a document.

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

- The font ((F)) command is ignored if the FONT LOCK mode was selected when power was switched on.
- The color ((C)) command is valid only when the color ribbon is installed.
- A line consisting of commands alone prints as a blank line.
The software will not know that these are commands, so you cannot trust your software to give you the correct line width. The printed line may be considerably shorter than the line on the screen; the extra space being the space that was occupied by the commands.

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

If you do not use these commands or the panel controls, the printer will print standard-size, Roman 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 5.

If you print from the DOS command level very often, it will be advantageous to create a printer setup file. Then instead of setting font style 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 7. 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: *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.
As an example of programming the printer on Microsoft BASIC, we have listed the program for the IBM-PC. This program runs in the printer’s Standard mode, and the downloadable condition.

1000 ' Set control codes
1010 ES=CHR$(27) 'Escape code
1020 DS=ES+"x0" 'Draft quality
1030 LS=ES+"xl"+ES+"k" 'Letter quality
1040 RMS=LS+CHR$(0) 'Roman character
1050 HS=CHR$(9) 'Horizontal tab
1060 PIS=ES+"P" 'Pica pitch
1070 ' Start printing
1080 WIDTH "LPT1:",.255
1090 LPRINT ES;"D";CHR$(3);CHR$(24);CHR$(0) 'Set HT
1100 LPRINT LS;CHR$(0);"Resident fonts are;"
1110 LPRINT HS;DS;"Draft characters;;"
1120 LPRINT HS;LS;CHR$(0);"Roman characters;"
1130 LPRINT HS;LS;CHR$(1);"Sanserif characters;"
1140 LPRINT HS;LS;CHR$(2);"Courier characters;"
1150 LPRINT HS;LS;CHR$(3);"Prestige characters;"
1160 LPRINT HS;LS;CHR$(4);"Script characters;"
1170 LPRINT HS;LS;CHR$(7);"Orator characters;"
1180 LPRINT HS;LS;CHR$(12);"H-Gothic characters;"
1190 LPRINT HS;LS;CHR$(32);"SLQ Roman;"
1200 LPRINT HS;LS;CHR$(33);"SLQ TW-Light;"
1210 LPRINT
1220 LPRINT RMS;"Print pitches are;"
1230 LPRINT HS;PIS;"Pica pitch (10 CPI);;"
1240 LPRINT HS;ES;"M;" "Elite pitch (12 CPI);;"
1250 LPRINT HS;ES;"g;" "Semi-condensed pitch (15 CPI);;"
1260 LPRINT HS;PIS;
1270 LPRINT CHR$(15); 'Select condensed print
1280 LPRINT "Condensed pica pitch (17 CPI);"
1290 LPRINT HS;ES;"M;" "Condensed elite pitch (20 CPI);;"
1300 LPRINT CHR$(18); 'Cancel condensed print
1310 LPRINT HS;ES;"pl;" 'Select proportional spacing
1320 LPRINT PIS;"Normal proportional;"
1330 LPRINT HS;CHR$(15);"Condensed proportional;"
1340 LPRINT CHR$(18);
1350 LPRINT ES;"p0;" 'Cancel proportional spacing
1360 LPRINT
1370 LPRINT HS;ES;"w1;" "Double-height;";ES;"w0"
1380 LPRINT HS;ES;"w1;" "Double width;";ES;"w0"
1390 LPRINT HS;CHR$(28);"E;CHR$(2);" "Triple width;"
1400 LPRINT CHR$(28);"E;CHR$(0)"
1410 LPRINT HS;ES;"h;";CHR$(1);"Double-sized;"
1420 LPRINT HS;ES;"h;";CHR$(2);"Quad-sized;"
1430 LPRINT ES;"h;";CHR$(0)
1440 LPRINT :LPRINT
1450 LPRINT ES;"Q;";CHR$(47) 'Set right margin
1460 LPRINT RMS;"Various line and character spacings;"
1470 LPRINT ES;"a1;" 'Center text
1480 FOR I=1 TO 7
1490 LPRINT ES;"A;";CHR$(I); 'Line spacing set
1500 LPRINT ES;";";CHR$(I); 'Increase character space
1510 LPRINT "THE SPACINGS ARE CHANGED"
1520 NEXT I
1530 FOR I=7 TO 1 STEP -1
1540 LPRINT ES;"A;";CHR$(I); 'Line spacing set
1550 LPRINT ES;";";CHR$(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$(0); 'Normal character space
1610 LPRINT :LPRINT
1620 LPRINT RMS;"other features:"
1630 LPRINT HS;E$;"q";CHR$(1);"outlined";E$;"q";CHR$(0);",";
1640 LPRINT HS;E$;"q";CHR$(2);"shadowed";E$;"q";CHR$(0);",";
1650 LPRINT HS;E$;"q";CHR$(3);"outlined with shadowed";
1660 LPRINT HS;E$;"q";CHR$(0);",";
1670 LPRINT HS;E$;"E";"Emphasized";E$;"F";",";
1680 LPRINT HS;E$;"double-strike";E$;"H";",";
1690 LPRINT HS;E$;"4";"Italics";E$;"5";",";
1700 LPRINT HS;E$;"-1";"Underlining";E$;"-0";",";
1710 LPRINT HS;E$;"<";CHR$(3);CHR$(0);CHR$(1);CHR$(2);CHR$(2);
1720 LPRINT "Strike-through";
1730 LPRINT HS;E$;"<";CHR$(3);CHR$(0);CHR$(1);CHR$(2);CHR$(3);CHR$(0);",";
1740 LPRINT HS;E$;"<";CHR$(3);CHR$(0);CHR$(1);CHR$(3);CHR$(1);
1750 LPRINT "overlining";
1760 LPRINT HS;E$;"<";CHR$(3);CHR$(0);CHR$(1);CHR$(3);CHR$(0);",";
1770 LPRINT HS;E$;"SO";"SuperScript";E$;"T";" and ";
1780 LPRINT HS;E$;"Sl";"SubScript";E$;"T";",";
1790 LPRINT HS;RMS;"download characters: ";
1800 SSS=E$+"SO" 'Superscript
1810 GOSUB 2520
1820 LPRINT HS;E$;"%1";
1830 FOR I=1 TO 5
1840 LPRINT CHR$(60);
1850 NEXT I
1860 LPRINT HS;"%0";
1870 LPRINT HS;"T";
1880 GOSUB 2650
1890 LPRINT HS;"%1";
1900 FOR I=1 TO 5
1910 LPRINT CHR$(60);
1920 NEXT I
1930 LPRINT HS;"%0";
1940 SSS=E$+"SI" 'Subscript
1950 GOSUB 2520
1960 LPRINT HS;"%1";
1970 FOR I=1 TO 5
1980 LPRINT CHR$(60);
1990 NEXT I
2000 LPRINT HS;"%0";
2010 LPRINT HS;"T";
2020 LPRINT HS;RMS;"dot graphics:";
2030 RESTORE 3170
2040 LPRINT HS;"A";CHR$(8);
2050 FOR I=1 TO 3
2060 LPRINT HS;"0";CHR$(8);
2070 LPRINT HS;"*";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 HS;"@" 'Initialize printer
2150 END
2500 ' SUBROUTINES
2510 ' Define super/subscript download character
2520 ' Select super/subscript
2530 LPRINT SSS; 'Select super/subscript
2540 LPRINT HS;"&";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
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 character 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
3200 DATA 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
3220 DATA 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, 0, 0, 0, 0
3240 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
3250 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
3260 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
3270 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
3280 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
3290 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
3300 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
3310 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
3320 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
3330 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
3340 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
3350 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
3360 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
3370 DATA 0, 0, 0, 0, 0, 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
3390 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
3400 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
3410 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
3420 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
3430 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
3440 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
3450 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
3460 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
3470 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
3480 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0

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How the program works

This program begins by assigning a number of printer commands to BASIC string variables (lines 1000 to 1060). You can find most of these commands near the beginning of chapter 7.

The WIDTH "LPT1: 255 statement in line 1080 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 1090. 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 8.

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 7 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,
ORATOR CHARACTERS, H-Gothic characters,
SLQ Roman, SLQ TW-Light.

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:

M&W
The following section on troubleshooting and maintenance is intended only as a brief guide to these functions. Remember that your printer is a highly sophisticated electronic device, which also contains high voltage inside. For that reason, only carry out those operations described in this chapter.

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

### TROUBLESHOOTING

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

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

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

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

**Printing**

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

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

<table>
<thead>
<tr>
<th>Check</th>
<th>Possible remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is the ribbon properly installed?</td>
<td>Check and reinstall if necessary.</td>
</tr>
<tr>
<td>Is the ribbon worn out?</td>
<td>The ribbon has a long life, but will eventually need replacing. Fit a new ribbon cartridge if necessary.</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Check</th>
<th>Possible remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are dots missing at random in the printing?</td>
<td>The ribbon has become slack, causing it to get caught up. Stop printing, remove the ribbon cartridge, retension and replace it.</td>
</tr>
<tr>
<td>Is a line of dots missing consistently throughout the printing?</td>
<td>The print head may be damaged. Stop printing, and contact your supplier.</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Check</th>
<th>Possible remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is your application software properly installed?</td>
<td>Check the software installation, and re-install the software if necessary.</td>
</tr>
<tr>
<td>Are fonts not being selected properly?</td>
<td>Check the software installation, and insert the commands necessary for font changes into the software. If you have selected the optional font, you need to install the related Font cartridge to the printer.</td>
</tr>
<tr>
<td>Are characters other than those expected being printed?</td>
<td>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.</td>
</tr>
</tbody>
</table>

If the printout is not what is expected:

<table>
<thead>
<tr>
<th>Check</th>
<th>Possible remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is the printer installed correctly?</td>
<td>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.</td>
</tr>
<tr>
<td>Is the printer not printing anything that you are expecting?</td>
<td>Use the Hex Dump mode to analyze the output from the computer to the printer. This will enable you determine that the right escape sequence, etc are being transmitted.</td>
</tr>
</tbody>
</table>
**Paper feeding**

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

<table>
<thead>
<tr>
<th>Check</th>
<th>Possible remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is the paper release lever pushed front (to the ~ position)?</td>
<td>Set the release lever to the position.</td>
</tr>
<tr>
<td>Is the paper guide in place and vertical?</td>
<td>The paper guide should be in place and vertically for cut sheets to feed smoothly.</td>
</tr>
<tr>
<td>Are the left and right guides too close together?</td>
<td>If the left and right guides are too close together, the paper will not feed smoothly. Move them a little further apart to allow the paper feed freely.</td>
</tr>
<tr>
<td>Is the ASF selected with the EDS setting?</td>
<td>If it is, then deselect it.</td>
</tr>
<tr>
<td>Are you trying to feed paper using the front panel buttons while the ON LINE indicator illuminated?</td>
<td>You can only feed paper in this way the printer is off-line. Set the printer off-line and then feed paper.</td>
</tr>
<tr>
<td>Is the paper too thick?</td>
<td>There are limits to the thickness of paper that can be fed in this way. Try with thinner paper.</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Check</th>
<th>Possible remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is the paper release lever pushed to the ~ position?</td>
<td>Make sure the release lever is pushed to the position.</td>
</tr>
<tr>
<td>Is the paper guide in the vertical position?</td>
<td>When using the tractor feed, the paper guide should be horizontal.</td>
</tr>
<tr>
<td>Are the holes on each side of the paper aligned with regard to each other in the tractor units?</td>
<td>If the two sides of the paper are out of alignment, realign them so that the tractor holes match up.</td>
</tr>
<tr>
<td>Are the tractor units too close or too far apart?</td>
<td>Misalignment of the tractor units, making the paper too close or too tight, will prevent a smooth paper feed.</td>
</tr>
<tr>
<td>Are the tractor units locked in position and the covers closed?</td>
<td>Correct this if necessary.</td>
</tr>
<tr>
<td>Is the paper feeding freely into the printer?</td>
<td>The paper should not be too far from the printer (less than 1 meter/3 feet), and there should be no cables or other obstacles obstructing its path. The paper should also be feeding straight into the printer, and an angled feed may cause jams and blockages.</td>
</tr>
</tbody>
</table>
### Check Possible remedy

| Is the paper caught up around the perforation? | It is recommended to skip around the perforation. If you cannot, set on the Multi-part mode with the EDS switch. |
| Are you trying to feed paper using the front panel buttons while the ON LINE indicator illuminated? | You can only feed paper in this way the printer is off-line. Set the printer off-line and then feed paper. |
| Is the paper too thick? | There are limits to the thickness of paper that can be fed in this way. Try with thinner paper. |

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

<table>
<thead>
<tr>
<th>Check</th>
<th>Possible remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Has the correct ASF option been selected with the EDS switch?</td>
<td>Select correct option.</td>
</tr>
<tr>
<td>Is the release lever set to the position?</td>
<td>The release lever should be set to the single-sheet position.</td>
</tr>
<tr>
<td>Is the ASF correctly mounted?</td>
<td>Make sure that the ASF is properly seated on the printer.</td>
</tr>
<tr>
<td>Is paper caught up near the print head?</td>
<td>Stop printing, remove the jammed sheet (you may have to remove the ASF for this), and continue.</td>
</tr>
<tr>
<td>Are the left and right guides too close together?</td>
<td>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.</td>
</tr>
<tr>
<td>Is there too much paper in the paper feed hopper or stacker?</td>
<td>The ASF’s paper feed hopper and stacker can hold between 100 to 150 sheets each. Make sure that there is no more paper than this in either the hopper or stacker.</td>
</tr>
<tr>
<td>Was the paper fanned before being fed into the ASF?</td>
<td>If this is not done, paper jams may occur. Remove the stack of paper from the ASF and fan it before reinserting.</td>
</tr>
<tr>
<td>Has the paper been used already or is it creased?</td>
<td>Only new, uncreased paper should be used with the ASF.</td>
</tr>
<tr>
<td>Are you trying to feed paper using the front panel buttons while the ON LINE indicator illuminated?</td>
<td>You can only feed paper in this way the printer is off-line. Set the printer off-line and then feed paper.</td>
</tr>
<tr>
<td>Is the paper too thick or too thin?</td>
<td>There are limits to the thickness of paper that can be fed in this way. Try with different paper.</td>
</tr>
</tbody>
</table>
If the paper park facility does not appear to be working correctly, check the following:

<table>
<thead>
<tr>
<th>Check</th>
<th>Possible remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is the paper release lever in the position?</td>
<td>The paper release lever must be set to the position after the fanfold paper has been parked.</td>
</tr>
<tr>
<td>Has the fanfold paper been properly parked?</td>
<td>Make sure that the “PAPER OUT” message comes on flashing after the fanfold paper has been parked.</td>
</tr>
</tbody>
</table>

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

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

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

<table>
<thead>
<tr>
<th>Check</th>
<th>Possible remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is the printing starting too high or too low on the page?</td>
<td>Use the Micro Feed facility to adjust the print position relative to the page.</td>
</tr>
<tr>
<td>Does the printer’s page length not match the physical page length?</td>
<td>Use the EDS switches to set up the correct page length, or use software commands to do it.</td>
</tr>
</tbody>
</table>
MAINTENANCE

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

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

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

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

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

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

REPLACING THE PRINT HEAD

This is not a job which you will need to do very often. The print head has been designed to last for about 200 million dots. In normal everyday use, this will translate to years of life. However, if the print quality is faint, even after you have changed the ribbon or you have adjusted the gap between the print head and the platen (see Chapter 4), the print head may need replacement.

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

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

*Figure 10-1. Replacing the print head.*
Chapter 11

REFERENCE

SPECIFICATIONS

Printing system ......................... Serial Impact Dot-matrix

Printing speed ........................ Pica Elite Semi-condensed

<table>
<thead>
<tr>
<th>Printing speed</th>
<th>Pica</th>
<th>Elite</th>
<th>Semi-condensed</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-Speed Draft</td>
<td>332</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Draft</td>
<td>250</td>
<td>300</td>
<td>375</td>
</tr>
<tr>
<td>Letter Quality</td>
<td>83.3</td>
<td>100</td>
<td>125</td>
</tr>
</tbody>
</table>

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

Print head ............................ 24 pins
Life: 200 million dots

Line spacing ........................... 1/6, 1/8, n/60, n/72, n/180, n/216, n/360 inches

Font styles
Standard ................................ Draft, High-Speed Draft, Roman, Sanserif, Courier, Prestige, Script, Orator, H-Gothic, SLQ Roman, SLQ TW-Light
Option [FC-1Z Cartridge]........... Orator 2, Letter Gothic, Blippo, Cinema
[FC-2Z Cartridge]............. OCR-B, OCR-A, CODE 39, UPC/EAN
[FC-3Z Cartridge]............ TW-Light, Orane
[FC-4Z Cartridge]........... Russian
[FC-5Z Cartridge]........... Old Style, Firenze
[FC-10Z Cartridge]........ SLQ Script
### Characters

<table>
<thead>
<tr>
<th>Characters</th>
<th>ASCII</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>International</td>
<td>16 sets (*)</td>
<td></td>
</tr>
<tr>
<td>IBM special</td>
<td>111</td>
<td></td>
</tr>
<tr>
<td>IBM block graphic</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>IBM code page</td>
<td>6 sets (**)</td>
<td></td>
</tr>
<tr>
<td>Download</td>
<td>255</td>
<td></td>
</tr>
</tbody>
</table>

* 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

<table>
<thead>
<tr>
<th>Number of columns</th>
<th>CPI</th>
<th>Normal type</th>
<th>Wide type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pica</td>
<td>10</td>
<td>80</td>
<td>136</td>
</tr>
<tr>
<td>Elite</td>
<td>12</td>
<td>96</td>
<td>163</td>
</tr>
<tr>
<td>Semi-condensed</td>
<td>15</td>
<td>120</td>
<td>204</td>
</tr>
<tr>
<td>Condensed pica</td>
<td>17.1</td>
<td>137</td>
<td>233</td>
</tr>
<tr>
<td>Condensed elite</td>
<td>20</td>
<td>160</td>
<td>272</td>
</tr>
<tr>
<td>Proportional</td>
<td></td>
<td>Variable</td>
<td>Variable</td>
</tr>
</tbody>
</table>

### Character matrix

<table>
<thead>
<tr>
<th>Character matrix</th>
<th>Draft</th>
<th>LQ</th>
<th>SLQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pica</td>
<td>24 × 9</td>
<td>24 × 31</td>
<td>48 × 31</td>
</tr>
<tr>
<td>Elite</td>
<td>24 × 9</td>
<td>24 × 27</td>
<td>48 × 27</td>
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<tr>
<td>Semi-condensed</td>
<td>16 × 7</td>
<td>16 × 19</td>
<td>32 × 19</td>
</tr>
<tr>
<td>Condensed pica</td>
<td>24 × 9</td>
<td>24 × 16</td>
<td>48 × 16</td>
</tr>
<tr>
<td>Condensed elite</td>
<td>24 × 9</td>
<td>24 × 16</td>
<td>48 × 16</td>
</tr>
<tr>
<td>Super/subscript</td>
<td>16 × 7</td>
<td>16 × 19</td>
<td>32 × 19</td>
</tr>
<tr>
<td>Proportional</td>
<td>—</td>
<td>24 × n</td>
<td>48 × n</td>
</tr>
<tr>
<td>Super/subscript proportional</td>
<td>—</td>
<td>24 × n</td>
<td>48 × n</td>
</tr>
</tbody>
</table>

### Bit image dot-matrix

<table>
<thead>
<tr>
<th>Bit image dot-matrix</th>
<th>DPI</th>
<th>Normal type</th>
<th>Wide type</th>
</tr>
</thead>
<tbody>
<tr>
<td>8-pin normal</td>
<td>60</td>
<td>8 × 480</td>
<td>8 × 816</td>
</tr>
<tr>
<td>8-pin double</td>
<td>120</td>
<td>8 × 960</td>
<td>8 × 1632</td>
</tr>
<tr>
<td>8-pin high-speed double *</td>
<td>120</td>
<td>8 × 960</td>
<td>8 × 1632</td>
</tr>
<tr>
<td>8-pin quadruple *</td>
<td>240</td>
<td>8 × 1920</td>
<td>8 × 3264</td>
</tr>
<tr>
<td>8-pin CRT I</td>
<td>80</td>
<td>8 × 640</td>
<td>8 × 1088</td>
</tr>
<tr>
<td>8-pin CRT II</td>
<td>90</td>
<td>8 × 720</td>
<td>8 × 1224</td>
</tr>
<tr>
<td>24-pin normal</td>
<td>60</td>
<td>24 × 480</td>
<td>24 × 816</td>
</tr>
<tr>
<td>24-pin double</td>
<td>120</td>
<td>24 × 960</td>
<td>24 × 1632</td>
</tr>
</tbody>
</table>
24-pin CRT III | 90 | 24 × 720 | 24 × 1224
24-pin Triple | 180 | 24 × 1440 | 24 × 2448
24-pin Hex * | 360 | 24 × 2880 | 24 × 4896

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

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

Paper feed speed .....................3.7 inches/second max

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

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

Copies ..................................Original + 2 copies (Multi-part mode off)
Original + 4 copies (Multi-part mode on)
Maximum buffer size .................................. Without Download
  29 kB (Normal type)
  76 kB (Wide type)

With Download
  200 Bytes (Normal type)
  46 kB (Wide type)

Emulations
  Standard mode .................................. Epson LQ-860/LQ-1060, NEC 24-wire
                                            Graphics commands
  IBM mode ....................................... IBM Proprinter X24E/XL24E

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

Ribbon type ...................................... On-carriage, dedicated
                                            Film ribbon (Black only)
                                            Monochrome (Black only)
                                            Color (Black, magenta, cyan, violet,
                                            yellow, orange, green)

Ribbon life
  Film ribbon (FZ24) .......................... 0.2 million characters (LQ pica)
  Monochrome (LZ24) ......................... 4 million characters (draft pica)
  Color (X24CL) .............................. 1 million characters (draft pica)

Dimensions and Weight ........................ Normal type          Wide type
  Width  466 mm (18.3")                    608 mm (23.9")
  Depth  400 mm (15.7")                   400 mm (15.7")
  Height 157 mm (6.2")                    157 mm (6.2")
  Weight 9.9 kg (21.8 lb)                 12.3 kg (27.1 lb)

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

- Film ribbon cartridge (FZ24)
- Color ribbon cartridge (X24CL)
- Single-bin Automatic Sheet Feeder (SF-10DMII/15DMII)
- Dual-bin Automatic Sheet Feeder (SF-10RMII/15RMII)
- Pull Tractor Unit (PT-10XM/15XM)
- Font cartridge (FC-1Z, FC-2Z, FC-3Z, FC-4Z, FC-5Z, FC-10Z)
- RAM cartridge (RC-32Z, DC-32Z)
- Serial Interface Cartridge (IS-8XL)
- Buffered Parallel Interface cartridge (IP-128XL)
PINOUT OF INTERFACE CONNECTOR

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

**Parallel interface**

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

<table>
<thead>
<tr>
<th>Pin</th>
<th>Name</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GND</td>
<td>Printer's chassis ground.</td>
</tr>
<tr>
<td>2</td>
<td>TXD</td>
<td>This pin carries data from the printer.</td>
</tr>
<tr>
<td>3</td>
<td>RXD</td>
<td>This pin carries data to the printer.</td>
</tr>
<tr>
<td>4</td>
<td>RTS</td>
<td>This pin is always set space.</td>
</tr>
<tr>
<td>5</td>
<td>CTS</td>
<td>This pin is Space when the computer is ready to send data. This printer does not check this pin.</td>
</tr>
<tr>
<td>6</td>
<td>N/C</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>GND</td>
<td>Signal ground.</td>
</tr>
<tr>
<td>8 ~ 10</td>
<td>N/C</td>
<td>This printer turn this pin Space when it is ready to receive data. This line carries the same signal as pin 20.</td>
</tr>
<tr>
<td>11</td>
<td>RCH</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>N/C</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>GND</td>
<td>Signal ground.</td>
</tr>
<tr>
<td>14 ~ 19</td>
<td>N/C</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>DTR</td>
<td>This printer turns this pin Space when it is ready to receive data.</td>
</tr>
<tr>
<td>21 ~ 25</td>
<td>N/C</td>
<td></td>
</tr>
</tbody>
</table>
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 \((4 \times 16 + 1 = 65)\) to decimal 65, the number in the inset.

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

<table>
<thead>
<tr>
<th>Character</th>
<th>Hexadecimal value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(high order)</td>
</tr>
<tr>
<td></td>
<td>(low order)</td>
</tr>
<tr>
<td>Control code</td>
<td>Decimal value</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Character</th>
<th>DC1</th>
<th>DC2</th>
<th>DC3</th>
<th>DC4</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC</td>
<td>^D</td>
<td>^E</td>
<td>^F</td>
<td>^G</td>
</tr>
<tr>
<td>Control code</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Hexadecimal value</td>
<td>0</td>
<td>16</td>
<td>32</td>
<td>48</td>
</tr>
<tr>
<td>Decimal value</td>
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<td>81</td>
<td>97</td>
</tr>
<tr>
<td>Character</td>
<td>DC1</td>
<td>DC2</td>
<td>DC3</td>
<td>DC4</td>
</tr>
<tr>
<td>Control code</td>
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<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Hexadecimal value</td>
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<tr>
<td>Decimal value</td>
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<td>81</td>
<td>97</td>
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<table>
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<th>Character</th>
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<th>DC2</th>
<th>DC3</th>
<th>DC4</th>
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<tbody>
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<td>11</td>
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<tr>
<td>Hexadecimal value</td>
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<td>Decimal value</td>
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</table>

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### Standard character set #2

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<th>5</th>
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<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>NULL</td>
<td>!</td>
<td>&quot;</td>
<td>#</td>
<td>$</td>
<td>%</td>
<td>&amp;</td>
<td>`'</td>
</tr>
<tr>
<td>1</td>
<td>!</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
<td>F</td>
<td>G</td>
</tr>
<tr>
<td>2</td>
<td>&quot;</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
<td>F</td>
<td>G</td>
<td>H</td>
</tr>
<tr>
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<td>#</td>
<td>C</td>
<td>D</td>
<td>E</td>
<td>F</td>
<td>G</td>
<td>H</td>
<td>I</td>
</tr>
<tr>
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<td>$</td>
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<td>E</td>
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<td>G</td>
<td>H</td>
<td>I</td>
<td>J</td>
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<td>E</td>
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<td>G</td>
<td>H</td>
<td>I</td>
<td>J</td>
<td>K</td>
</tr>
<tr>
<td>6</td>
<td>&amp;</td>
<td>F</td>
<td>G</td>
<td>H</td>
<td>I</td>
<td>J</td>
<td>K</td>
<td>L</td>
</tr>
<tr>
<td>7</td>
<td>`'</td>
<td>G</td>
<td>H</td>
<td>I</td>
<td>J</td>
<td>K</td>
<td>L</td>
<td>M</td>
</tr>
<tr>
<td>8</td>
<td>,</td>
<td>H</td>
<td>I</td>
<td>J</td>
<td>K</td>
<td>L</td>
<td>M</td>
<td>N</td>
</tr>
<tr>
<td>9</td>
<td>?</td>
<td>I</td>
<td>J</td>
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<td>M</td>
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<td>O</td>
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<td>O</td>
<td>P</td>
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<td>M</td>
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<td>O</td>
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<td>P</td>
<td>Q</td>
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<td>O</td>
<td>P</td>
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<td>R</td>
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<td></td>
<td></td>
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<td>Q</td>
<td>R</td>
<td>S</td>
</tr>
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<td>Q</td>
<td>R</td>
<td>S</td>
</tr>
</tbody>
</table>

Note: The characters are arranged in a 7x7 table, with each cell containing a single character from the standard character set #2.
<table>
<thead>
<tr>
<th>0</th>
<th>8</th>
<th>9</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>128</td>
<td>144</td>
<td>160</td>
<td>176</td>
<td>192</td>
<td>208</td>
<td>224</td>
<td>240</td>
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</tr>
<tr>
<td>129</td>
<td>145</td>
<td>161</td>
<td>177</td>
<td>193</td>
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<td>225</td>
<td>241</td>
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<td>130</td>
<td>146</td>
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<tr>
<td>134</td>
<td>150</td>
<td>166</td>
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<td>198</td>
<td>214</td>
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<tr>
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</tr>
<tr>
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<td>153</td>
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<td>185</td>
<td>201</td>
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<tr>
<td>138</td>
<td>154</td>
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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 Standard Italic character set:

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</table>

The command for selecting the international character set is:

<ESC> “R” n

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

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## IBM character set #2

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

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**Code Page #850 (Multi-lingual)**

Other characters are identical to Code Page #437.

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**Code Page #860 (Portuguese)**

Other characters are identical to Code Page #437.
**Code Page #861 (Icelandic)**

Other characters are identical to Code Page #437.

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**Code Page #863 (Canadian French)**

Other characters are identical to Code Page #437.

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### Code Page #865 (Nordic)

Other characters are identical to Code Page #437.

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168
**Character set #1**

Other characters are identical to character set #2.

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

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### IBM special character set

Additional characters can be printed by special commands.

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PROPORTIONAL SPACING TABLE

This table lists the widths of your printer’s proportional 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.

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### COMMAND SUMMARY

**Standard Mode**

The following commands take effect with the Standard mode.

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<th>FUNCTION</th>
<th>PAGE</th>
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<tbody>
<tr>
<td>&lt;BEL&gt;</td>
<td>Bell</td>
<td>114</td>
</tr>
<tr>
<td>&lt;BS&gt;</td>
<td>Backspace</td>
<td>99</td>
</tr>
<tr>
<td>&lt;HT&gt;</td>
<td>Horizontal tab</td>
<td>101</td>
</tr>
<tr>
<td>&lt;LF&gt;</td>
<td>Line feed</td>
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<td>&lt;VT&gt;</td>
<td>Vertical tab</td>
<td>96</td>
</tr>
<tr>
<td>&lt;FF&gt;</td>
<td>Form feed</td>
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</tr>
<tr>
<td>&lt;CR&gt;</td>
<td>Carriage return</td>
<td>98</td>
</tr>
<tr>
<td>&lt;SO&gt;</td>
<td>Expanded printing for one line</td>
<td>85</td>
</tr>
<tr>
<td>&lt;SI&gt;</td>
<td>Condensed printing</td>
<td>84</td>
</tr>
<tr>
<td>&lt;DC1&gt;</td>
<td>Set printer on-line</td>
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<tr>
<td>&lt;DC2&gt;</td>
<td>Cancel condensed printing</td>
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<tr>
<td>&lt;DC3&gt;</td>
<td>Set printer off-line</td>
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<tr>
<td>&lt;DC4&gt;</td>
<td>Cancel one-line expanded printing</td>
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<td>&lt;CAN&gt;</td>
<td>Cancel last line</td>
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<td>&lt;ESC&gt; &lt;LF&gt;</td>
<td>Reverse line feed</td>
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<td>&lt;ESC&gt; &lt;FF&gt;</td>
<td>Return to top of current page</td>
<td>95</td>
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<td>&lt;ESC&gt; &lt;SI&gt;</td>
<td>Condensed printing</td>
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<tr>
<td>&lt;ESC&gt; &lt;EM&gt; &lt;0&gt;</td>
<td>Manual feed</td>
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<td>&lt;ESC&gt; &lt;EM&gt; &lt;1&gt;</td>
<td>Select ASF bin #1</td>
<td>116</td>
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<td>&lt;ESC&gt; &lt;EM&gt; &lt;2&gt;</td>
<td>Select ASF bin #2</td>
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<tr>
<td>&lt;ESC&gt; &lt;EM&gt; &lt;4&gt;</td>
<td>Auto feed</td>
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<tr>
<td>&lt;ESC&gt; &lt;EM&gt; &quot;R&quot;</td>
<td>Eject paper from ASF</td>
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<tr>
<td>&lt;ESC&gt; &lt;EM&gt; &quot;T&quot; n</td>
<td>Set print start position on ASF</td>
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</tr>
<tr>
<td>&lt;ESC&gt; &lt;SP&gt; n</td>
<td>Increase character spacing</td>
<td>87</td>
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<tr>
<td>&lt;ESC&gt; &quot;n&quot; n</td>
<td>Select master print mode</td>
<td>86</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;#&quot; n</td>
<td>Accept MSB as is</td>
<td>113</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;+&quot; n1 n2</td>
<td>Absolute horizontal tab in inches</td>
<td>102</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;%&quot; 0</td>
<td>Select ROM character set</td>
<td>112</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;%&quot; 1</td>
<td>Select download character set</td>
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<tr>
<td>&lt;ESC&gt; &quot;&amp;&quot; &lt;0&gt; n1 n2 m0 m1 m2 dl d2</td>
<td>Define download characters</td>
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<td>&lt;ESC&gt; &quot;0&quot; &lt;3&gt; &lt;0&gt; &lt;1&gt; n1 n2</td>
<td>Select score</td>
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<td>&lt;ESC&gt; &quot;1&quot; n0 n1 n2 m0 m1 m2</td>
<td>Select graphics mode</td>
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<td>&lt;ESC&gt; &quot;2&quot; n</td>
<td>Set line spacing to n/360 inch</td>
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<tr>
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<td>Stop underlining</td>
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<tr>
<td>&lt;ESC&gt; &quot;4&quot; 1</td>
<td>Start underlining</td>
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<td>&lt;ESC&gt; &quot;5&quot; n0</td>
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<td>&lt;ESC&gt; &quot;6&quot; 0</td>
<td>Set line spacing to 1/8 inch</td>
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<td>&lt;ESC&gt; &quot;7&quot; 1</td>
<td>Set line spacing to 7/60 or 7/72 inch</td>
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<td>&lt;ESC&gt; &quot;8&quot; 2</td>
<td>Set line spacing to 1/6 inch</td>
<td>90</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;9&quot; 3</td>
<td>Set line spacing to n/180 inch or n/216 inch</td>
<td>91</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;A&quot; n</td>
<td>Select italic characters</td>
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<td>&lt;ESC&gt; &quot;B&quot; 0</td>
<td>Select upright characters</td>
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<td>&lt;ESC&gt; &quot;C&quot; 1</td>
<td>Select character set #2</td>
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<tr>
<td>&lt;ESC&gt; &quot;D&quot; 2</td>
<td>Select character set #1</td>
<td>81</td>
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<tr>
<td>&lt;ESC&gt; &quot;E&quot; 3</td>
<td>Disable paper-out detector</td>
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</tr>
<tr>
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<td>Enable paper-out detector</td>
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<td>CONTROL CODE</td>
<td>FUNCTION</td>
<td>PAGE</td>
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<td><code>&lt;ESC&gt;</code> <code>~</code> <code>&lt;0&gt;</code> <code>n</code> <code>&lt;0&gt;</code></td>
<td>Copy character set from ROM into RAM</td>
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<td><code>&lt;ESC&gt;</code> <code>~</code> <code>&lt;0&gt;</code></td>
<td>One-line uni-directional printing</td>
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<tr>
<td><code>&lt;ESC&gt;</code> <code>~</code></td>
<td>Set MSB to 0</td>
<td>113</td>
</tr>
<tr>
<td><code>&lt;ESC&gt;</code> <code>~</code></td>
<td>Set MSB to 1</td>
<td>113</td>
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<tr>
<td><code>&lt;ESC&gt;</code> <code>&amp;</code></td>
<td>Convert graphics density</td>
<td>106</td>
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<tr>
<td><code>&lt;ESC&gt;</code> <code>~</code></td>
<td>Reset printer</td>
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<tr>
<td><code>&lt;ESC&gt;</code> <code>A</code> <code>&lt;0&gt;</code></td>
<td>Set line spacing to n/60 inch or n/72 inch</td>
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<td>Set vertical tab stops</td>
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<td><code>&lt;ESC&gt;</code> <code>C</code> <code>&lt;0&gt;</code> <code>n</code></td>
<td>Set page length to n inches</td>
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<td><code>&lt;ESC&gt;</code> <code>C</code> <code>&lt;0&gt;</code></td>
<td>Set page length to n lines</td>
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<td><code>&lt;ESC&gt;</code> <code>D</code> <code>&lt;0&gt;</code> <code>&lt;0&gt;</code></td>
<td>Set horizontal tab stops</td>
<td>100</td>
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<td><code>&lt;ESC&gt;</code> <code>E</code></td>
<td>Emphasized printing</td>
<td>77</td>
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<tr>
<td><code>&lt;ESC&gt;</code> <code>F</code></td>
<td>Cancel emphasized printing</td>
<td>77</td>
</tr>
<tr>
<td><code>&lt;ESC&gt;</code> <code>G</code></td>
<td>Double-strike printing</td>
<td>78</td>
</tr>
<tr>
<td><code>&lt;ESC&gt;</code> <code>H</code></td>
<td>Cancel double-strike printing</td>
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<tr>
<td><code>&lt;ESC&gt;</code> <code>I</code> <code>&lt;0&gt;</code></td>
<td>Perform one n/180-inch or n/216-inch line feed</td>
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<td><code>&lt;ESC&gt;</code> <code>K</code> <code>&lt;0&gt;</code> <code>&lt;0&gt;</code> <code>&lt;0&gt;</code></td>
<td>Print normal-density 8-bit graphics</td>
<td>103</td>
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<td>Print double-density 8-bit graphics</td>
<td>103</td>
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<tr>
<td><code>&lt;ESC&gt;</code> <code>M</code></td>
<td>Elite pitch</td>
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<td>Set bottom margin</td>
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<td>Cancel bottom margin</td>
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<td>Set right margin</td>
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<tr>
<td><code>&lt;ESC&gt;</code> <code>R</code> <code>&lt;0&gt;</code></td>
<td>Select international character set</td>
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<td><code>&lt;ESC&gt;</code> <code>S</code> <code>&lt;0&gt;</code> <code>&lt;0&gt;</code></td>
<td>Superscript</td>
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<td><code>&lt;ESC&gt;</code> <code>S</code> <code>&lt;0&gt;</code> <code>1</code></td>
<td>Subscript</td>
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<td><code>&lt;ESC&gt;</code> <code>T</code></td>
<td>Cancel superscript or subscript</td>
<td>80</td>
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<tr>
<td><code>&lt;ESC&gt;</code> <code>U</code> <code>&lt;0&gt;</code> <code>1</code></td>
<td>Uni-directional printing</td>
<td>115</td>
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<tr>
<td><code>&lt;ESC&gt;</code> <code>W</code> <code>&lt;0&gt;</code> <code>&lt;0&gt;</code></td>
<td>Cancel expanded printing</td>
<td>85</td>
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<td>Expanded printing</td>
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<td><code>&lt;ESC&gt;</code> <code>Y</code> <code>&lt;0&gt;</code> <code>&lt;0&gt;</code> <code>&lt;0&gt;</code></td>
<td>Print double-density, double-speed 8-bit graphics</td>
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<td>Print quadruple-density 8-bit graphics</td>
<td>104</td>
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<tr>
<td><code>&lt;ESC&gt;</code> <code>&lt;I</code> <code>&lt;0&gt;</code> <code>&lt;0&gt;</code> <code>&lt;0&gt;</code> <code>&lt;0&gt;</code> <code>&lt;0&gt;</code></td>
<td>Select IBM code page</td>
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<td><code>&lt;ESC&gt;</code> <code>a</code> <code>&lt;0&gt;</code> <code>&lt;0&gt;</code></td>
<td>Relative horizontal tab</td>
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<td>Set vertical tab stops in channel</td>
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<tr>
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<td>Set horizontal tab stop every n columns</td>
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<tr>
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<td>Set vertical tab stops every n lines</td>
<td>96</td>
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<td>Absolute horizontal tab in columns</td>
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<td><code>&lt;ESC&gt;</code> <code>f</code> <code>&lt;0&gt;</code> <code>&lt;0&gt;</code> <code>1</code></td>
<td>Feed paper n lines</td>
<td>93</td>
</tr>
<tr>
<td><code>&lt;ESC&gt;</code> <code>g</code></td>
<td>Semi-condensed pitch</td>
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</tr>
<tr>
<td><code>&lt;ESC&gt;</code> <code>h</code> <code>&lt;0&gt;</code> <code>&lt;0&gt;</code></td>
<td>Select double or quadruple size</td>
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<td>Perform one n/180-inch reverse line feed</td>
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<tr>
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<td>Select 1Q font</td>
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<td>Select left margin</td>
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<td>Select fixed spacing</td>
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</tr>
<tr>
<td><code>&lt;ESC&gt;</code> <code>p</code> <code>&lt;0&gt;</code> <code>&lt;0&gt;</code> <code>1</code></td>
<td>Select proportional spacing</td>
<td>86</td>
</tr>
<tr>
<td><code>&lt;ESC&gt;</code> <code>q</code> <code>&lt;0&gt;</code> <code>&lt;0&gt;</code> <code>&lt;0&gt;</code></td>
<td>Select ornament character</td>
<td>80</td>
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<tr>
<td><code>&lt;ESC&gt;</code> <code>r</code> <code>&lt;0&gt;</code> <code>&lt;0&gt;</code> <code>&lt;0&gt;</code></td>
<td>Select print color</td>
<td>112</td>
</tr>
<tr>
<td><code>&lt;ESC&gt;</code> <code>t</code> <code>&lt;0&gt;</code> <code>&lt;0&gt;</code> <code>&lt;0&gt;</code> <code>&lt;0&gt;</code></td>
<td>Select standard character set</td>
<td>81</td>
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<tr>
<td><code>&lt;ESC&gt;</code> <code>u</code> <code>&lt;0&gt;</code> <code>&lt;0&gt;</code> <code>&lt;0&gt;</code> <code>&lt;0&gt;</code></td>
<td>Select IBM character set</td>
<td>81</td>
</tr>
<tr>
<td><code>&lt;ESC&gt;</code> <code>w</code> <code>&lt;0&gt;</code> <code>&lt;0&gt;</code> <code>&lt;0&gt;</code> <code>&lt;0&gt;</code></td>
<td>Shift download character area</td>
<td>110</td>
</tr>
<tr>
<td><code>&lt;ESC&gt;</code> <code>w</code> <code>&lt;0&gt;</code> <code>&lt;0&gt;</code> <code>2</code></td>
<td>Return to normal height</td>
<td>88</td>
</tr>
<tr>
<td><code>&lt;ESC&gt;</code> <code>w</code> <code>&lt;0&gt;</code> <code>&lt;0&gt;</code> <code>1</code></td>
<td>Print double-height characters</td>
<td>88</td>
</tr>
<tr>
<td><code>&lt;ESC&gt;</code> <code>x</code> <code>&lt;0&gt;</code> <code>&lt;0&gt;</code> <code>0</code></td>
<td>Select draft quality characters</td>
<td>74</td>
</tr>
<tr>
<td>CONTROL CODE</td>
<td>FUNCTION</td>
<td>PAGE</td>
</tr>
<tr>
<td>--------------</td>
<td>----------</td>
<td>------</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;x&quot; 1</td>
<td>Select LQ characters</td>
<td>75</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;-&quot; 0</td>
<td>Select normal zero</td>
<td>83</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;-&quot; 1</td>
<td>Select slash zero</td>
<td>83</td>
</tr>
<tr>
<td>&lt;FS&gt; &quot;3&quot; n</td>
<td>Set line spacing to n/360 inch</td>
<td>90</td>
</tr>
<tr>
<td>&lt;FS&gt; &quot;@&quot;</td>
<td>Reset printer</td>
<td>116</td>
</tr>
<tr>
<td>&lt;FS&gt; &quot;C&quot; n</td>
<td>Select LQ font</td>
<td>76</td>
</tr>
<tr>
<td>&lt;FS&gt; &quot;E&quot; n</td>
<td>Select character width</td>
<td>86</td>
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<tr>
<td>&lt;FS&gt; &quot;F&quot;</td>
<td>Select forward feed mode</td>
<td>92</td>
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<tr>
<td>&lt;FS&gt; &quot;I&quot; 0</td>
<td>Select standard character set</td>
<td>81</td>
</tr>
<tr>
<td>&lt;FS&gt; &quot;I&quot; 1</td>
<td>Select IBM character set</td>
<td>81</td>
</tr>
<tr>
<td>&lt;FS&gt; &quot;I&quot; 2</td>
<td>Shift download character area</td>
<td>110</td>
</tr>
<tr>
<td>&lt;FS&gt; &quot;R&quot;</td>
<td>Select reverse feed mode</td>
<td>92</td>
</tr>
<tr>
<td>&lt;FS&gt; &quot;V&quot; 0</td>
<td>Return to normal height</td>
<td>88</td>
</tr>
<tr>
<td>&lt;FS&gt; &quot;V&quot; 1</td>
<td>Print double-height characters</td>
<td>88</td>
</tr>
<tr>
<td>&lt;FS&gt; &quot;Z&quot; n l n2 m1 m2 m3 ...</td>
<td>Print hex-density 24-bit graphics</td>
<td>104</td>
</tr>
<tr>
<td>&lt;` &lt;&quot; 0&quot; &quot;y&quot; &quot;y&quot; &quot;y&quot; &gt;</td>
<td>Manual feed</td>
<td>115</td>
</tr>
<tr>
<td>&lt;` &lt;&quot; 1&quot; &quot;y&quot; &quot;y&quot; &quot;y&quot; &gt;</td>
<td>Select ASF bin #1</td>
<td>116</td>
</tr>
<tr>
<td>&lt;` &lt;&quot; 2&quot; &quot;y&quot; &quot;y&quot; &quot;y&quot; &gt;</td>
<td>Select ASF bin #2</td>
<td>116</td>
</tr>
<tr>
<td>&lt;` &lt;&quot; 3&quot; &quot;y&quot; &quot;y&quot; &quot;y&quot; &gt;</td>
<td>Auto feed</td>
<td>115</td>
</tr>
<tr>
<td>&lt;` &lt;&quot; 4&quot; &quot;y&quot; &quot;y&quot; &quot;y&quot; &gt;</td>
<td>Select print color</td>
<td>112</td>
</tr>
<tr>
<td>&lt;` &lt;&quot; 5&quot; &quot;y&quot; &quot;y&quot; &quot;y&quot; &gt;</td>
<td>Select font</td>
<td>76</td>
</tr>
<tr>
<td>&lt;` &lt;&quot; 6&quot; &quot;y&quot; &quot;y&quot; &quot;y&quot; &gt;</td>
<td>Eject paper from ASF</td>
<td>116</td>
</tr>
<tr>
<td>&lt;` &lt;&quot; 7&quot; &quot;y&quot; &quot;y&quot; &quot;y&quot; &gt;</td>
<td>Select character size</td>
<td>88</td>
</tr>
<tr>
<td>&lt;` &lt;&quot; 8&quot; &quot;y&quot; &quot;y&quot; &quot;y&quot; &gt;</td>
<td>Set print start position on ASF</td>
<td>116</td>
</tr>
<tr>
<td>&lt;` &lt;&quot; T&quot; &quot;y&quot; &quot;y&quot; &quot;y&quot; &gt; n</td>
<td>Delete last character sent</td>
<td>113</td>
</tr>
</tbody>
</table>
**IBM Mode**

The following commands take effect with the IBM mode.

<table>
<thead>
<tr>
<th>CONTROL CODE</th>
<th>FUNCTION</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;BEL&gt;</td>
<td>Bell</td>
<td>114</td>
</tr>
<tr>
<td>&lt;BS&gt;</td>
<td>Backspace</td>
<td>99</td>
</tr>
<tr>
<td>&lt;HT&gt;</td>
<td>Horizontal tab</td>
<td>101</td>
</tr>
<tr>
<td>&lt;LF&gt;</td>
<td>Line feed</td>
<td>92</td>
</tr>
<tr>
<td>&lt;VT&gt;</td>
<td>Vertical tab</td>
<td>96</td>
</tr>
<tr>
<td>&lt;FF&gt;</td>
<td>Form feed</td>
<td>94</td>
</tr>
<tr>
<td>&lt;CR&gt;</td>
<td>Carriage return</td>
<td>98</td>
</tr>
<tr>
<td>&lt;SO&gt;</td>
<td>Expanded printing for one line</td>
<td>85</td>
</tr>
<tr>
<td>&lt;SI&gt;</td>
<td>Condensed printing</td>
<td>84</td>
</tr>
<tr>
<td>&lt;DC1&gt;</td>
<td>Set printer on-line</td>
<td>114</td>
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<tr>
<td>&lt;DC2&gt;</td>
<td>Pica pitch</td>
<td>84</td>
</tr>
<tr>
<td>&lt;DC4&gt;</td>
<td>Cancel one-line expanded printing</td>
<td>85</td>
</tr>
<tr>
<td>&lt;CAN&gt;</td>
<td>Cancel last line</td>
<td>113</td>
</tr>
<tr>
<td>&lt;ESC&gt; &lt;EM&gt; &lt;0&gt;</td>
<td>Manual feed</td>
<td>115</td>
</tr>
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<td>&lt;ESC&gt; &lt;EM&gt; &lt;1&gt;</td>
<td>Select ASF bin #1</td>
<td>116</td>
</tr>
<tr>
<td>&lt;ESC&gt; &lt;EM&gt; &lt;2&gt;</td>
<td>Select ASF bin #2</td>
<td>116</td>
</tr>
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<td>&lt;ESC&gt; &lt;EM&gt; &lt;4&gt;</td>
<td>Auto feed</td>
<td>115</td>
</tr>
<tr>
<td>&lt;ESC&gt; &lt;EM&gt; &quot;R&quot;</td>
<td>Eject paper from ASF</td>
<td>116</td>
</tr>
<tr>
<td>&lt;ESC&gt; &lt;EM&gt; &quot;T&quot; n</td>
<td>Set print start position on ASF</td>
<td>116</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;-&quot; 0</td>
<td>Stop underlining</td>
<td>78</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;-&quot; 1</td>
<td>Start underlining</td>
<td>78</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;0&quot;</td>
<td>Set line spacing to 1/8 inch</td>
<td>90</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;1&quot;</td>
<td>Set line spacing to 7/60 or 7/72 inch</td>
<td>90</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;2&quot;</td>
<td>Execute &lt;ESC&gt; &quot;A&quot;</td>
<td>92</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;3&quot; n</td>
<td>Set line spacing to n/180 inch or n/216 inch</td>
<td>91</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;4&quot;</td>
<td>Set top of page at current position</td>
<td>93</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;5&quot; &lt;0&gt;</td>
<td>Cancel automatic line feed</td>
<td>99</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;5&quot; &lt;1&gt;</td>
<td>Set automatic line feed</td>
<td>99</td>
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<tr>
<td>&lt;ESC&gt; &quot;6&quot;</td>
<td>Select character set #2</td>
<td>81</td>
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<tr>
<td>&lt;ESC&gt; &quot;7&quot;</td>
<td>Select character set #1</td>
<td>81</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;8&quot;</td>
<td>Disable paper-out detector</td>
<td>95</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;9&quot;</td>
<td>Enable paper-out detector</td>
<td>95</td>
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<tr>
<td>&lt;ESC&gt; &quot;;&quot;</td>
<td>Elite pitch</td>
<td>84</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;z&quot; n1 n2 &quot;#&quot; n3 n4 &lt;0&gt; n5 m1 m2 ... m9 d1 d2 ... dx</td>
<td>Define download characters</td>
<td>108</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;@&quot;</td>
<td>Reset printer</td>
<td>116</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;A&quot; n</td>
<td>Set line spacing to n/60 inch or n/72 inch</td>
<td>91</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;B&quot; n1 n2 .... &lt;0&gt;</td>
<td>Set vertical tab stops</td>
<td>95</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;C&quot; n1 n2 n3 n4 &lt;0&gt;</td>
<td>Set page length to n inches</td>
<td>94</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;C&quot; n1 n2 n3 n4 &lt;0&gt;</td>
<td>Set page length to n lines</td>
<td>94</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;D&quot; n1 n2 .... &lt;0&gt;</td>
<td>Set horizontal tab stops</td>
<td>100</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;E&quot;</td>
<td>Emphasized printing</td>
<td>77</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;F&quot;</td>
<td>Cancel emphasized printing</td>
<td>77</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;G&quot;</td>
<td>Double-strike printing</td>
<td>78</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;H&quot;</td>
<td>Cancel double-strike printing</td>
<td>78</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;I&quot; &lt;0&gt;</td>
<td>Select draft pica characters</td>
<td>74</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;I&quot; &lt;2&gt;</td>
<td>Select LQ pica characters</td>
<td>75</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;I&quot; &lt;3&gt;</td>
<td>Select LQ proportional characters</td>
<td>76</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;I&quot; &lt;4&gt;</td>
<td>Select draft pica download character set</td>
<td>110</td>
</tr>
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<td>Select LQ pica download characters</td>
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<td>&lt;ESC&gt; &quot;I&quot; &lt;7&gt;</td>
<td>Select LQ proportional download characters</td>
<td>111</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;I&quot; &lt;8&gt;</td>
<td>Select draft elite characters</td>
<td>74</td>
</tr>
<tr>
<td>&lt;ESC&gt; &quot;I&quot; &lt;LF&gt;</td>
<td>Select LQ elite characters</td>
<td>75</td>
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<tr>
<td>&lt;ESC&gt; &quot;I&quot; &lt;SO&gt;</td>
<td>Select LQ elite download characters</td>
<td>111</td>
</tr>
<tr>
<td>CONTROL CODE</td>
<td>FUNCTION</td>
<td>PAGE</td>
</tr>
<tr>
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<td>----------</td>
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<tr>
<td><code>&lt;ESC&gt;</code> &quot;F&quot; &lt;16&gt;</td>
<td>Select draft condensed characters</td>
<td>74</td>
</tr>
<tr>
<td><code>&lt;ESC&gt;</code> &quot;F&quot; <code>&lt;DC2&gt;</code></td>
<td>Select LQ condensed characters</td>
<td>75</td>
</tr>
<tr>
<td><code>&lt;ESC&gt;</code> &quot;F&quot; <code>&lt;DC4&gt;</code></td>
<td>Select draft condensed download characters</td>
<td>111</td>
</tr>
<tr>
<td><code>&lt;ESC&gt;</code> &quot;F&quot; <code>&lt;SYN&gt;</code></td>
<td>Select LQ condensed download characters</td>
<td>111</td>
</tr>
<tr>
<td><code>&lt;ESC&gt;</code> &quot;J&quot; n</td>
<td>Perform one n/180-inch or n/216-inch line feed</td>
<td>93</td>
</tr>
<tr>
<td><code>&lt;ESC&gt;</code> &quot;K&quot; nl n2 ml m2 ...</td>
<td>Print normal-density 8-bit graphics</td>
<td>103</td>
</tr>
<tr>
<td><code>&lt;ESC&gt;</code> &quot;L&quot; nl n2 ml m2 ...</td>
<td>Print double-density 8-bit graphics</td>
<td>103</td>
</tr>
<tr>
<td><code>&lt;ESC&gt;</code> &quot;N&quot; n</td>
<td>Set bottom margin</td>
<td>94</td>
</tr>
<tr>
<td><code>&lt;ESC&gt;</code> &quot;O&quot;</td>
<td>Cancel bottom margin</td>
<td>94</td>
</tr>
<tr>
<td><code>&lt;ESC&gt;</code> &quot;P&quot; 0</td>
<td>Select fixed spacing</td>
<td>86</td>
</tr>
<tr>
<td><code>&lt;ESC&gt;</code> &quot;P&quot; 1</td>
<td>Select proportional spacing</td>
<td>86</td>
</tr>
<tr>
<td><code>&lt;ESC&gt;</code> &quot;Q&quot; n</td>
<td>Set printer off-line</td>
<td>114</td>
</tr>
<tr>
<td><code>&lt;ESC&gt;</code> &quot;R&quot;</td>
<td>Reset all tab stops</td>
<td>101</td>
</tr>
<tr>
<td><code>&lt;ESC&gt;</code> &quot;S&quot; 0</td>
<td>Superscript</td>
<td>80</td>
</tr>
<tr>
<td><code>&lt;ESC&gt;</code> &quot;S&quot; 1</td>
<td>Subscript</td>
<td>80</td>
</tr>
<tr>
<td><code>&lt;ESC&gt;</code> &quot;T&quot;</td>
<td>Cancel superscript or subscript</td>
<td>80</td>
</tr>
<tr>
<td><code>&lt;ESC&gt;</code> &quot;U&quot; 0</td>
<td>Bi-directional printing</td>
<td>115</td>
</tr>
<tr>
<td><code>&lt;ESC&gt;</code> &quot;U&quot; 1</td>
<td>Uni-directional printing</td>
<td>115</td>
</tr>
<tr>
<td><code>&lt;ESC&gt;</code> &quot;W&quot; 0</td>
<td>Cancel expanded printing</td>
<td>85</td>
</tr>
<tr>
<td><code>&lt;ESC&gt;</code> &quot;W&quot; 1</td>
<td>Expanded printing</td>
<td>85</td>
</tr>
<tr>
<td><code>&lt;ESC&gt;</code> &quot;X&quot; nl n2</td>
<td>Set left and right margins</td>
<td>98</td>
</tr>
<tr>
<td><code>&lt;ESC&gt;</code> &quot;Y&quot; nl n2 ml m2 ...</td>
<td>Print double-density, double-speed 8-bit graphics</td>
<td>103</td>
</tr>
<tr>
<td><code>&lt;ESC&gt;</code> &quot;Z&quot; nl n2 ml m2 ...</td>
<td>Print quadruple-density 8-bit graphics</td>
<td>104</td>
</tr>
<tr>
<td><code>&lt;ESC&gt;</code> &quot;[&quot; n</td>
<td>Select character height, width, and line spacing</td>
<td>89</td>
</tr>
<tr>
<td><code>&lt;ESC&gt;</code> &quot;[&quot; &quot;T&quot; &lt;4&gt; 0 0 0 0 0 0 0 0</td>
<td>Select IBM code page</td>
<td>82</td>
</tr>
<tr>
<td><code>&lt;ESC&gt;</code> &quot;[&quot; &quot;W&quot; &lt;4&gt; 0 0 0 0 0 0 0 0</td>
<td>Set base unit for line spacing</td>
<td>91</td>
</tr>
<tr>
<td><code>&lt;ESC&gt;</code> &quot;[&quot; &quot;w&quot; nl n2 m0 m1 m2 ...</td>
<td>Select graphics mode</td>
<td>105</td>
</tr>
<tr>
<td><code>&lt;ESC&gt;</code> &quot;[&quot; n</td>
<td>Enable printing of all character codes</td>
<td>83</td>
</tr>
<tr>
<td><code>&lt;ESC&gt;</code> &quot;T&quot;</td>
<td>Reverse line feed</td>
<td>92</td>
</tr>
<tr>
<td><code>&lt;ESC&gt;</code> &quot;V&quot; n</td>
<td>Enable printing of all character codes on next character</td>
<td>83</td>
</tr>
<tr>
<td><code>&lt;ESC&gt;</code> &quot;W&quot; n</td>
<td>Stop overlining</td>
<td>79</td>
</tr>
<tr>
<td><code>&lt;ESC&gt;</code> &quot;&quot; 0</td>
<td>Start overlining</td>
<td>79</td>
</tr>
<tr>
<td><code>&lt;ESC&gt;</code> &quot;&quot; 1</td>
<td>Relative horizontal tab in inches</td>
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<td>114</td>
</tr>
<tr>
<td><code>&lt;ESC&gt;</code> &quot;&quot; 0</td>
<td>Select LQ font</td>
<td>76</td>
</tr>
<tr>
<td><code>&lt;ESC&gt;</code> &quot;&quot; n</td>
<td>Select print color</td>
<td>112</td>
</tr>
<tr>
<td><code>&lt;ESC&gt;</code> &quot;&quot;</td>
<td>Select standard character set</td>
<td>81</td>
</tr>
<tr>
<td><code>&lt;ESC&gt;</code> &quot;&quot; 0</td>
<td>Select IBM character set</td>
<td>81</td>
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<tr>
<td><code>&lt;ESC&gt;</code> &quot;&quot; 1</td>
<td>Manual feed</td>
<td>115</td>
</tr>
<tr>
<td>&quot;&quot; &quot;0&quot;</td>
<td>Select ASF bin #1</td>
<td>116</td>
</tr>
<tr>
<td>&quot;&quot; &quot;1&quot;</td>
<td>Select ASF bin #2</td>
<td>116</td>
</tr>
<tr>
<td>&quot;&quot; &quot;2&quot;</td>
<td>Auto feed</td>
<td>115</td>
</tr>
<tr>
<td>&quot;&quot; &quot;4&quot;</td>
<td>Select print color</td>
<td>112</td>
</tr>
<tr>
<td>&quot;&quot; &quot;C&quot;</td>
<td>Select font</td>
<td>76</td>
</tr>
<tr>
<td>&quot;&quot; &quot;E&quot;</td>
<td>Eject paper from ASF</td>
<td>116</td>
</tr>
<tr>
<td>&quot;&quot; &quot;S&quot;</td>
<td>Select character size</td>
<td>88</td>
</tr>
<tr>
<td>&quot;&quot; &quot;T&quot;</td>
<td>Set print start position on ASF</td>
<td>116</td>
</tr>
</tbody>
</table>
Consumer Response

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

Worldwide Headquarters:
STAR MICRONICS CO., LTD.
20-10 Nakayoshida
Shizuoka, JAPAN 422-91
Attn: Product Manager

American Market:
STAR MICRONICS AMERICA, INC.
420 Lexington Avenue, Suite 2702-25
New York, NY 10170
Attn: Product Manager

European Market:
STAR MICRONICS DEUTSCHLAND GMBH
Westerbachstraße 59
P.O. Box 940330
D-6000 Frankfurt/Main 90
F.R. of Germany
Attn: Product Manager

U.K. Market:
STAR MICRONICS U.K., LTD.
Star House
Peregrine Business Park
Gomm Road, High Wycombe
Bucks. HP13 7DL, U.K.
Attn: Product Manager

French Market:
STAR MICRONICS FRANCE S.A.R.L.
25, rue Michaël Faraday
78180 Montigny-le-Bretonneux
Attn: Product Manager

Asian Market:
STAR MICRONICS ASIA LTD.
Room 2408-10 Sincere Building;
173 Des Voeux Road, Central, HONG KONG
Attn: Product Manager
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