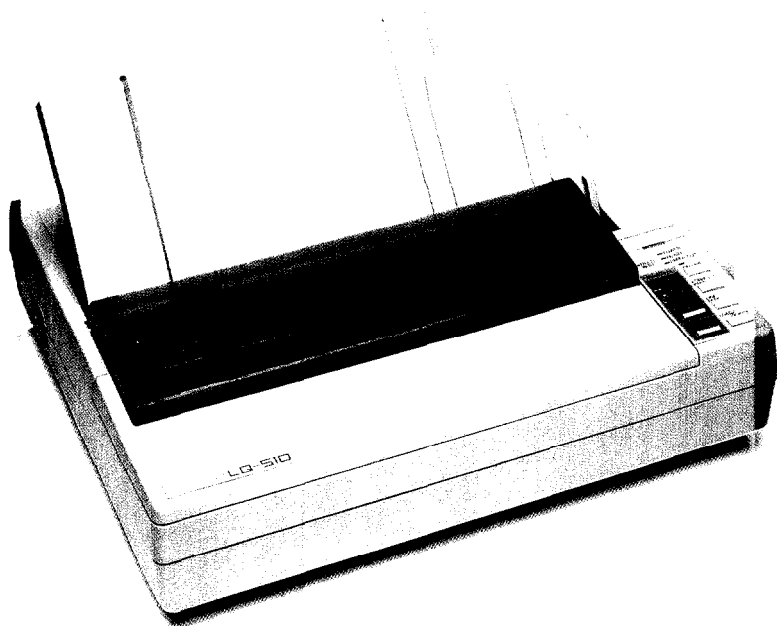# User's Manual

EPSON
LQ-510

User's Manual

FCC COMPLIANCE STATEMENT FOR AMERICAN USERS

This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. It has been type tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio and television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by **one** or more of the following measures:

* Reorient the receiving antenna
* Relocate the printer with respect to the receiver
* Plug the printer into a different outlet so that the printer and receiver are **on** different branch circuits.

If necessary, the user should consult the dealer or **an** experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful:

"Television Interference Handbook"

This booklet is available from **the** U.S. Government Printing Office, Washington DC 20402. Stock No. 004-000-00450-7.

WARNING

The connection of a non-shielded equipment interface cable to this equipment will invalidate the FCC Certification of this device and may cause interference levels **that** exceed the limits established by the FCC for this equipment. If this equipment has more than one interface connector, do not leave cables connected to unused interfaces.

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Introduction

The Epson® LQ-510 is an advanced 24-pin dot matrix printer combining compact design and high performance with a wide range of features.

Features

In addition to the high-quality printing and ease of operation you have come to expect from Epson printers, the LQ-510 offers the following features:

- Easy paper handling, featuring automatic single-sheet loading.

- Compatibility with the Epson ESC/P® commands used by the LQ-500, LQ-800, LQ-850, LQ-950, LQ-1000, LQ-1050, LQ-1500, LQ-2500, and LQ-2550.

- Fast draft mode printing of up to 180 characters per second.

- An improved control panel design that allows direct selection of character fonts, as well as a choice of normal or condensed printing.

- The SmartPark™ paper handling system that lets you use single sheets of paper without removing the continuous paper, eliminates paper waste with short tear-off, and allows easy and accurate paper alignment.

- Two built-in Letter Quality fonts (Roman and Sans Serif) for producing high-quality documents.

- A 360 x 360 dot per inch graphics mode.

- A micro-adjustment feature that allows you to feed the paper forward or backward to finely adjust the loading and short tear-off positions.

- Fourteen international character sets, a legal symbol set, an italic character table, and the Epson Extended Graphics character table.

- The ability to handle a wide range of paper types, including envelopes and labels.

Options

A variety of printer options is available for use with your LQ-510 printer. For detailed information on installing and using these options, see Chapter 5.

- **Single-bin Cut Sheet Feeder (C806122)**

  The cut sheet feeder makes it possible to handle single-sheet paper more easily and more efficiently. Up to 150 sheets of standard bond paper can be automatically fed into the printer without reloading.
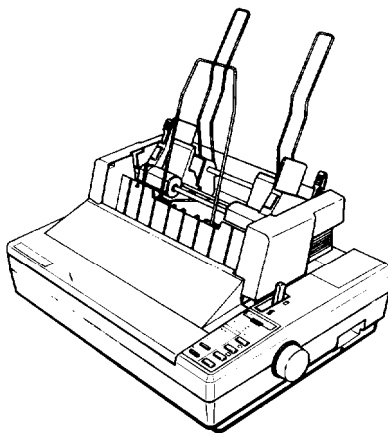
- **Pull Tractor Unit (C800062)**

  This option improves the performance of continuous paper handling. It is especially useful with continuous multi-part forms,
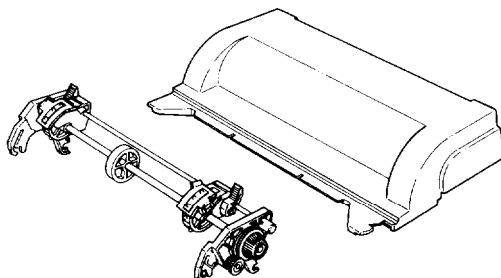
- **Multi-Font Module (#7407)**

  The optional Multi-Font module adds to the number of fonts available in the Letter Quality mode.
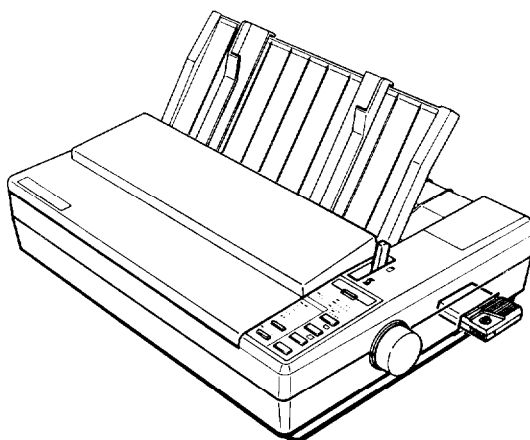
- **Film Ribbon Cartridge (#7768)**

  The optional film ribbon cartridge provides you with even higher quality printing than the standard fabric ribbon.

- **Interface Boards**

  Optional interface boards are available to supplement the printer's built-in parallel interface. Guidelines for choosing the right interface and instructions on installing the boards are given in Chapter 5.
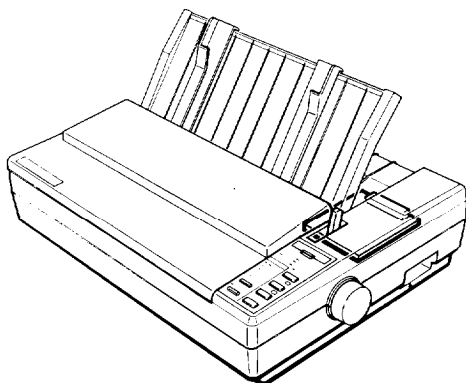
About This Manual

This user's manual provides fully illustrated, step-by-step instructions on setting up and operating your Epson LQ-510 printer.

Finding your way around

- Chapter 1 contains information on unpacking, setting up, testing, and connecting the printer. Be sure to read and follow these instructions first. Inside the back flap of this manual are illustrations of the printer in which all of the major parts are identified.

- Chapters 2 and 3 cover paper handling and general printer operation. This important information is necessary for the day-to-day operation of your printer.

- Chapter 4 shows you how to get the most from your printer. It includes advice on the use of software commands, graphics, and creating your own user-defined characters. See Chapter 9 for a useful summary of printer commands.

- If the printer does not operate properly or the printed results are not what you expect, see Chapter 7 for troubleshooting instructions.

- Other chapters and the appendix contain information on printer options, general maintenance, and specifications. You will also find a glossary of printer terms.

- At the back of this manual is a handy Quick Reference card that contains the information you are most likely to need.

Conventions used in this manual

WARNINGS must be followed carefully to avoid damage to your printer and computer.

CAUTIONS should be followed carefully to ensure that your printer operates correctly.

Notes contain important information and useful tips on the operation of your printer.

Application   Notes

Also included in the box with your printer is a booklet called *Application* Notes. It contains information on using specific software applications with your printer. Be sure to look at the booklet after you set up your printer.

Where to Get Help

Customer support and service for Epson products are provided by a network of authorized Epson Dealers and Customer Care Centers throughout the United States. Epson America provides product information and support to its dealers and Customer Care Centers.

Therefore, we ask that you contact the business where you purchased your Epson product to request assistance. If the people there do not have the answer to your question, they can obtain it through our dealer support program.

Epson is confident that this policy will provide you with the assistance you need.

Call the Epson Consumer Information Center at 1-800-922-8911 for the following:

- The location of the nearest Epson dealer
- The location of the nearest Customer Care Center
- Information on Epson User Groups

To locate or purchase accessories or supplies, contact your nearest Epson dealer or call 1-800-873-7766.

Chapter 1
Setting Up the Printer

Unpacking the Printer

Checking the Parts

When you unpack the printer, make sure that you have all the parts shown below and that none have been damaged.
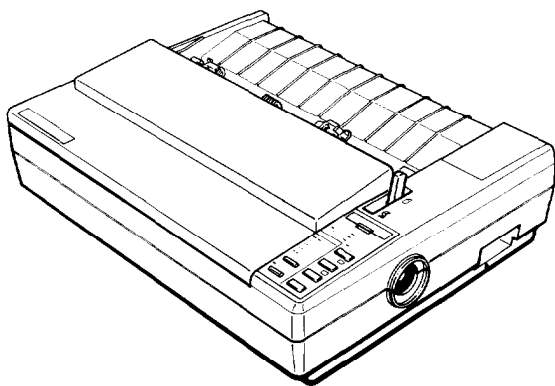
Paper guide
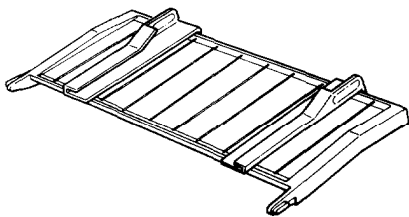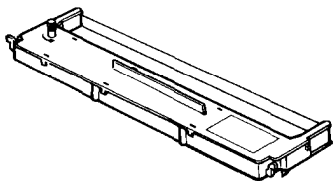
Printer

Platen knob

Ribbon cartridge
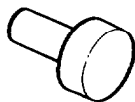
After removing the parts, save the packaging materials in case you ever need to transport your printer.

Note: Be sure to lift the printer cover and remove the pieces of white packing material.

Choosing a Place for the Printer

There are several important things to consider when selecting a place to set up your printer. Keep the following in mind:

• Place the printer on a flat, hard, stable surface. A soft surface, such as a padded counter or carpeted area, will block the ventilation slots and may cause overheating.

• Place the printer close enough to the computer for the printer cable to reach.

• Leave adequate room around the printer to allow for easy printer operation and maintenance, and for unrestricted flow of air around the printer.

• Use a grounded outlet; do not use an adapter plug.

> **WARNING:** Avoid locations that are subject to direct sunlight, excessive heat, moisture, or dust.

• Avoid electrical outlets controlled by wall switches or automatic timers. Accidental interruption of power can wipe out information in both your computer's memory and in your printer's memory.

• Avoid using outlets that share a circuit with large motors or electrical appliances; this could cause fluctuations in line voltage.

• Keep the entire computer system away from potential sources of electromagnetic interference such as loudspeakers or the base units of cordless telephones.

The illustration below shows a good printer location.
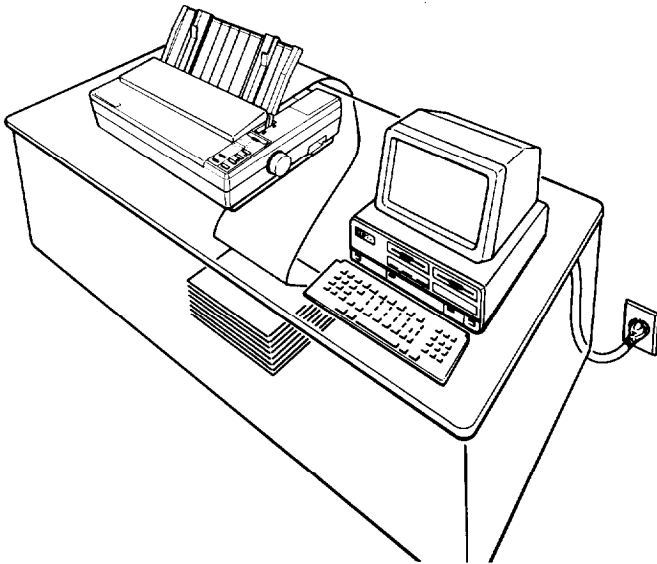
Note: Before using a printer stand, read these requirements and suggestions.

- The stand should be able to support at least twice the weight of the LQ-510 printer (approximately 26 pounds, or 12 kilograms).

- Never use a stand that supports the printer at an angle of more than 15 degrees from horizontal.

- With a cut sheet feeder, your printer must be kept level.

- If your paper supply is positioned below the printer stand, make sure there is enough clearance to keep the paper from catching on the underside of the stand. Also, make sure the distance between the stand supports is wide enough for the paper you are using.

- Position your printer's cables so that they do not interfere with paper feeding. If possible, secure the cables to the printer stand.

Assembling the Printer

After you've decided on the best place to set up your printer, the next step is to install the platen knob,

Installing the Platen Knob

The platen knob is used to feed the paper manually in the event of a paper jam or other paper feeding problem. The platen knob is packed in an indentation in the printer's white foam packing material.

1. Remove the printer cover.
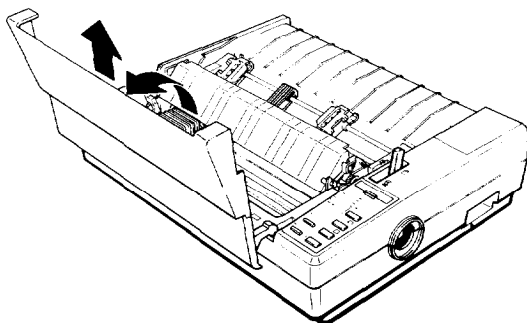
2. Insert the knob into the hole on the printer's side and rotate it slowly until it slips onto the shaft.
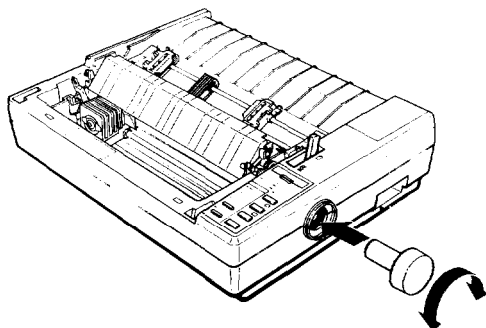
3. Push firmly on the platen knob until it fits against the printer case.
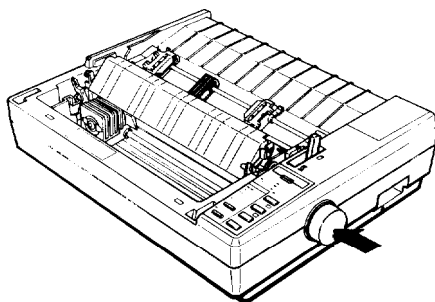
> ⚠ **CAUTION:** Do not use the platen knob to adjust the position of the paper. This interferes with the automatic paper loading system and may cause a paper jam.

Installing the Ribbon Cartridge

Your printer's ribbon cartridge is designed for easy installation and removal. Before installing the ribbon cartridge, make sure the printer is turned off.

Install the ribbon cartridge as follows.

1. Slide the print head to the middle of the printer.
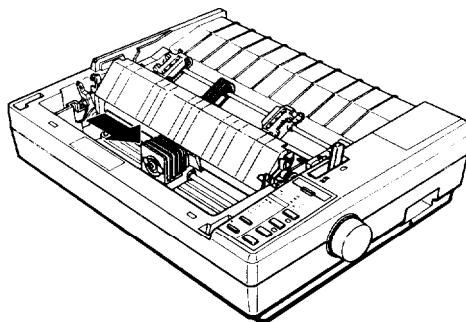
⚠ **CAUTION:** Never move the print head while the printer is turned on because this can damage the printer. Also, if you have been using the printer, the print head may be hot; let it cool for a few minutes before touching it.

2. Turn the ribbon-tightening knob in the direction of the arrow. This removes slack in the ribbon and makes it easier to install.
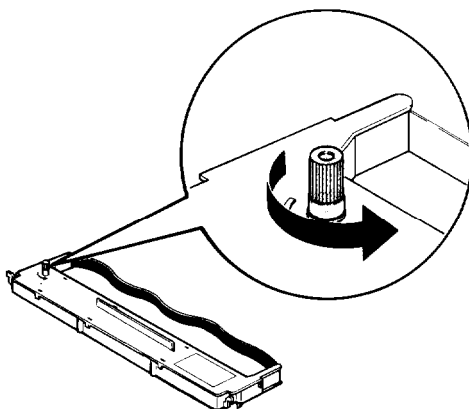
3. Open the paper tension unit cover.
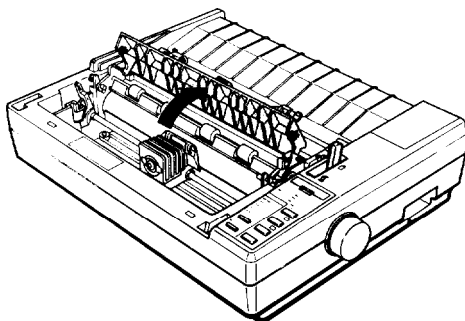
4. Hold the ribbon cartridge by its handle and push it firmly down into position, making sure the plastic hooks fit into the slots.
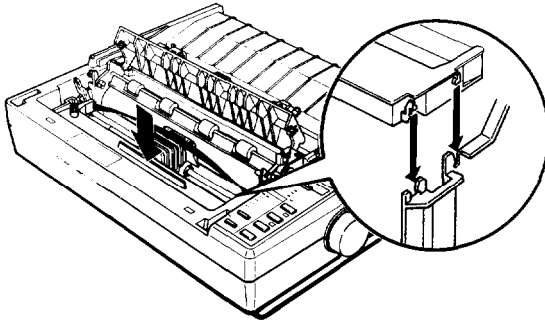
    Note: Press lightly on both ends of the cartridge to make sure the plastic hooks are properly seated.

5. Use a pointed object, such as a ball point pen, to guide the ribbon between the print head and ribbon guide while you turn the ribbon-tightening knob to help feed the ribbon into place.
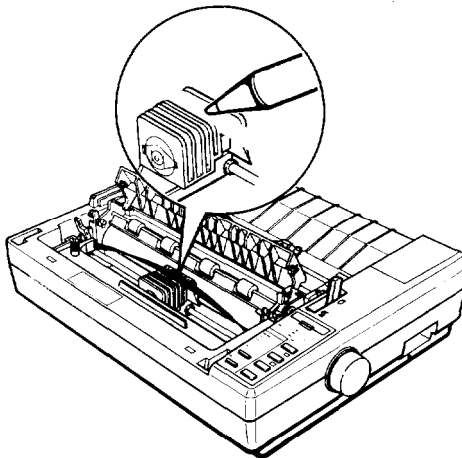
6. Slide the print head from side to side to make sure it moves smoothly. Also check that the ribbon is not twisted or creased.
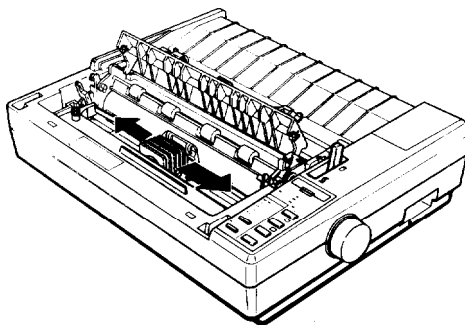
7. Close the paper tension unit cover.
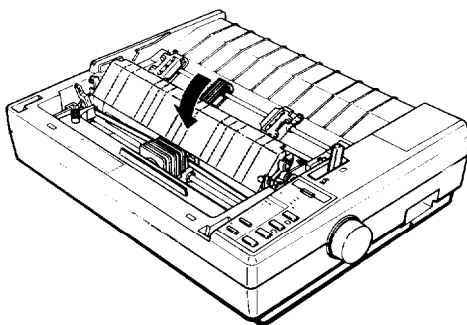
Attaching the Paper Guide

When you use single sheets, the paper guide helps to feed the paper smoothly and efficiently into the printer. Attach the paper guide using the following procedure.

1. Place the paper guide on the printer as shown below.
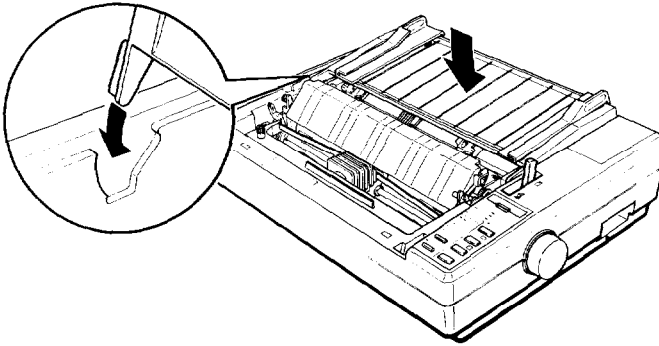
2. Raise the paper guide until it locks into place.
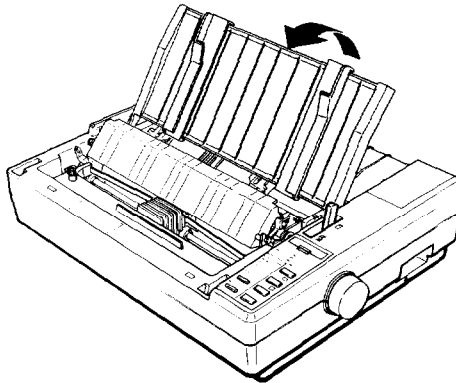
Note: To lower the paper guide, lift up slightly to release it from its locked position; then gently lower it down onto the printer.

3. Attach the printer cover by fitting the hooks on the cover into the notches at the front of the printer and tilting the cover back into place.
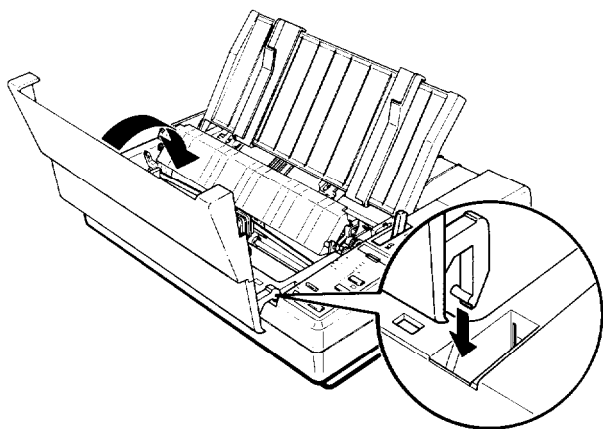
Testing the Printer

Now that your printer is fully assembled, you can use its built-in self test function to see that the printer is working correctly before you connect it to a computer. You should perform this test to make sure that your printer was not damaged during shipping and that the ribbon is correctly installed.

Before running the self test, you need to connect the printer to an electrical outlet and load a sheet of paper.

Plugging in the Printer

1. Make sure that the printer is turned off.
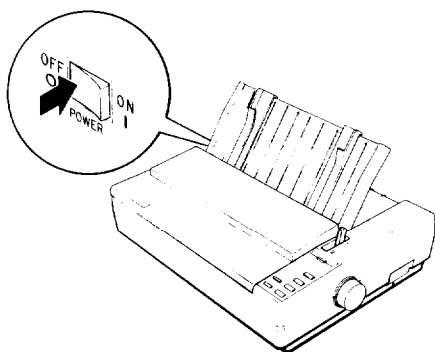
2. Plug the power cable into a properly grounded electrical outlet.
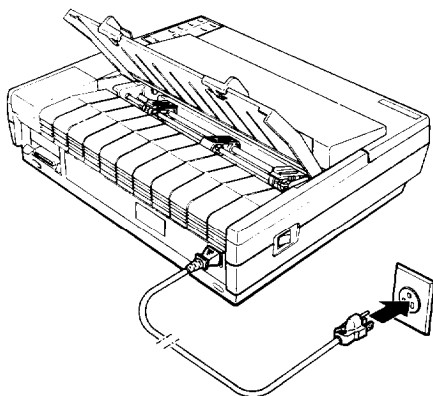
Running the Self Test

The self test can be run in the draft or Letter Quality mode, depending on which button you hold down as you turn on the printer. Although the self test can be run with continuous paper, use single-sheet paper now because single-sheet loading is easier.

1. Make sure the printer is turned off.

2. Push the paper release lever back to the single-sheet position.
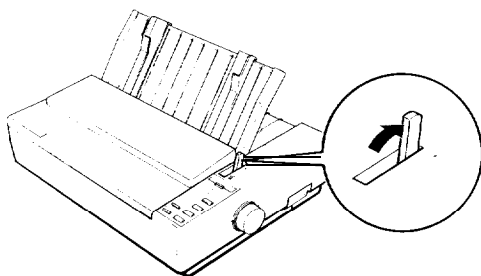
3. While holding down the LINE FEED button (draft mode) or FORM
   FEED button (Letter Quality mode), turn on the printer. The
   printer beeps several times and POWER and PAPER OUT lights
   come on.
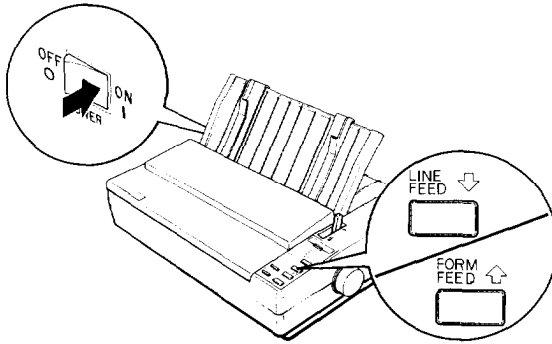
4. Move the left edge guide so that it locks in place next to the guide mark.
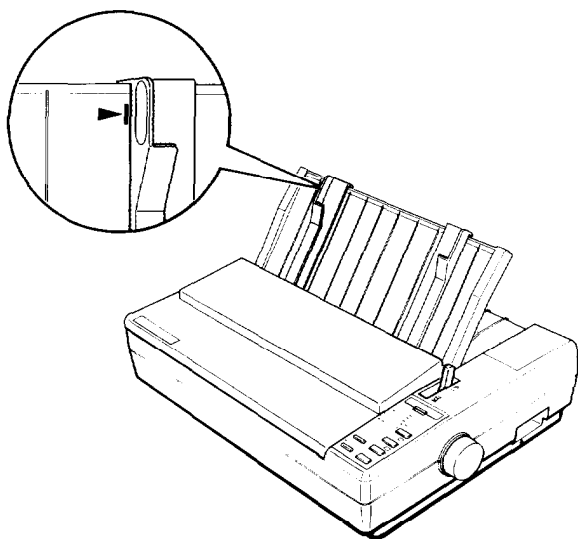
5. Adjust the right edge guide to match the width of your paper. Next, slide a sheet of paper down between the edge guides until it meets resistance.
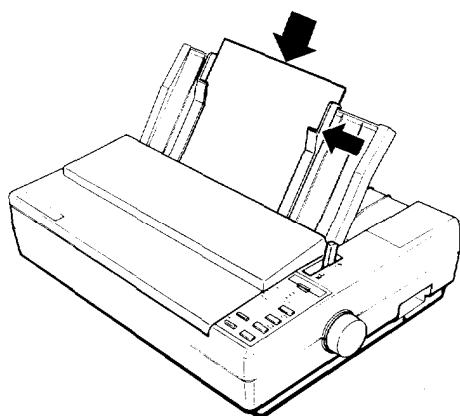
⚠️ **WARNING:** Never run the self test using paper that is narrower than A4 size (8.27 inches or 210 mm) or letter size (8.5 inches or 216 mm) to prevent the print head from printing directly onto the platen.

6. Press the LOAD/EJECT button to load the paper.
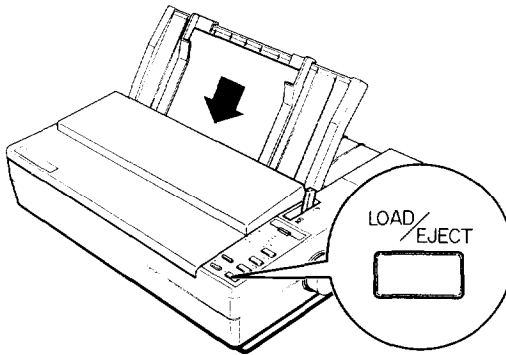
7. Press the ON LINE button to start the self test. A list of DIP switch settings is printed first, followed by a series of characters. The self test continues until the paper runs out or until you press the ON LINE button.

Setting Up the Printer   1-17
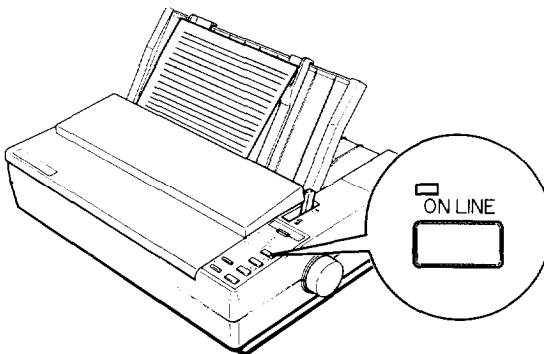
8. If the test results are satisfactory and you wish to stop the test, press the ON LINE button. If the test results are not satisfactory, see Checking the Operation later in this chapter for possible causes and solutions.

    Note: To resume the test, press the ON LINE button once more.

9. If the paper is still loaded, press the LOAD/EJECT button or LINE FEED button to eject it. Then turn off the printer.
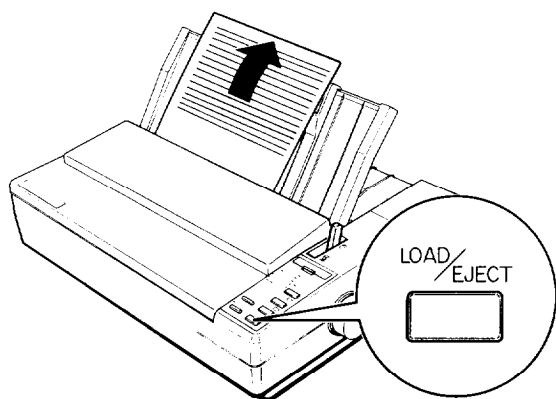
WARNING: After turning the power off, always wait at least five seconds before turning it back on. Turning the power on and off rapidly can damage the printer.

Here is part of a typical self test printed in draft mode.

Draft mode

```
Country          SW1-1 1-2 1-3      Page length
  USA              on   on   on       11"
  France           on   on   off      12"
  Germany          on   off  on     Tear off mod
  U.K.             on   off  off      Invalid
  Denmark          off  on   on       Valid
  Sweden           off  on   off    1"Skip
  Italy            off  off  on       Invalid
  Spain            off  off  off      Valid
Font             SW1-4 1-5          Auto LF
  Roman            off  off           Invalid
  Sans serif       on   off           Valid
  Slot             off  on          Receive buff
  Draft            on   on            1kbytes
Condensed        SW1-6                8kbytes
  Invalid          off             Graphics pri
  Valid            on               Uni-d
                                     Bi-d
                                   Pit
 #$%&'()*+,-./01                         KL
"#$%&'()*+,-./0123456                  GHIJKLM
#$%&'()*+,-./0123456789:;<=>?@BCDEFGHIJKLMN
$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNC
%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOF
&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPG
'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQR
()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRS
)*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRST
*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTU
+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUV
,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVW
```

Note: When using the optional cut sheet feeder, the first page of the self test printout is slightly different. For details, see the Cut Sheet Feeder section in Chapter 5.

Testing the Printer

Here is part of a typical self test printed in Letter Quality mode.

Letter Quality mode

Country	SW1-1	1-2	1-3	Page length
USA	on	on	on	11"
France	on	on	off	12"
Germany	on	off	on	Tear off mod
U.K.	on	off	off	Invalid
Denmark	off	on	on	Valid
Sweden	off	on	off	1"Skip
Italy	off	off	on	Invalid
Spain	off	off	off	Valid
Font	SW1-4	1-5		Auto LF
Roman	off	off		Invalid
Sans serif	on	off		Valid
Slot	off	on		Receive buff
Draft	on	on		1kbytes
Condensed	SW1-6			8kbytes
	cf			Graphics ↲

```
 ↲$%&'()*+,-./
 .'#$%&'()*+,-./01234↲        ↲JKI
 "#$%&'()*+,-./0123456789↲    ↲EFGHIJKLN
 #$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN
 $%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNC
 %&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOF
 &'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPC
 '()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQF
 Sans Serif 10
 ()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRS
```

Checking the Operation

If the self test does not print properly, check the control panel and the print head area. If paper is jammed, turn off the printer. Then remove the paper using the platen knob and load a new sheet. See that all packing material and shipping restraints have been removed from inside the printer. (You can also see Chapter 7 for further information.)

Problem	Solution
The printer does not print.	
The printer sounds like it is printing, but nothing is printed.	The ribbon may not be installed properly. Turn off the printer, reinstall the ribbon cartridge, and then tighten the ribbon by turning the ribbon-tightening knob. Make sure the ribbon passes between the print head and ribbon guide. See page 9.
	The ribbon may be worn. Replace the ribbon cartridge. See page 6-4.
The test did not print when you pressed the ON LINE button.	Turn off the printer and repeat the self test. Make sure you hold down the FORM FEED or LINE FEED button the entire time you are turning on the printer.
	Turn off the printer and disconnect the cable from the host computer. Try the self test again.
	If the printer still does not print the self test correctly, contact your Epson dealer or Epson authorized service center.

Connecting the Printer to Your Computer

If the self test printed correctly, you are now ready to connect the printer to your computer.

If your computer has a parallel interface and you have a suitable shielded cable, you should be able to connect your printer immediately. The steps below describe how to connect the parallel interface cable.

If your computer requires another type of interface, you need to install an optional interface board. See the Interface Boards section in Chapter 5.

If you are not sure which type of interface cable is required, see your computer manual.

The Parallel Interface

Connect the parallel interface cable as described below:

1. Make sure that both your printer and computer are turned off.
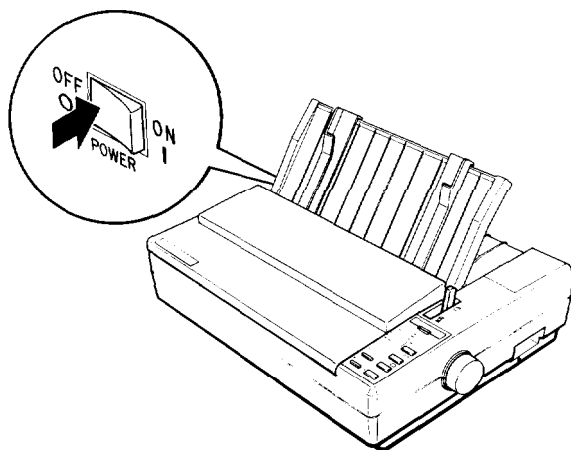
2. Plug the cable connector securely into the printer.
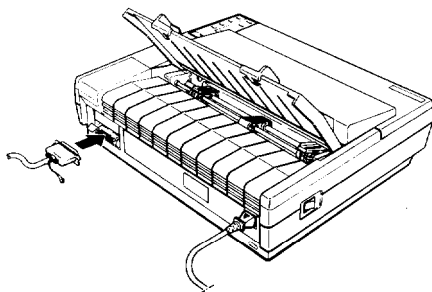
3. Squeeze the wire clips together until they lock in place on either side of the connector.
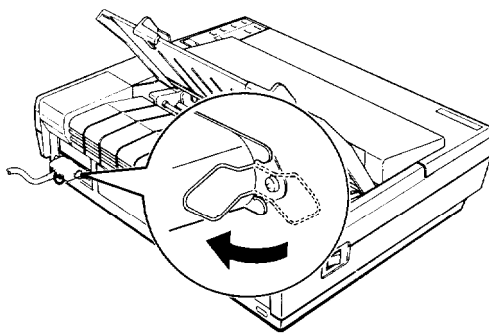
4. If your cable has a ground wire, connect it to the ground screw beneath the interface connector.
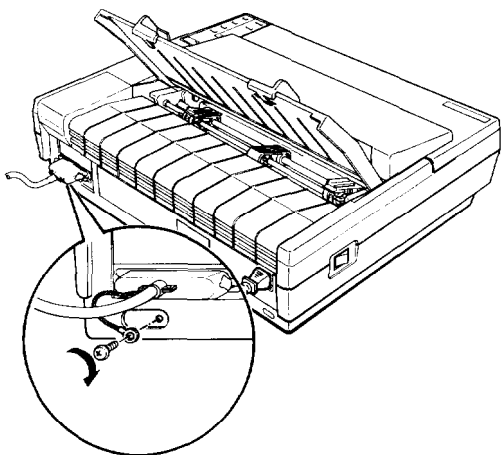
5. Plug the other end of the cable into the computer. If there is a ground wire at the computer end of the cable, attach it to the ground connector at the back of the computer.
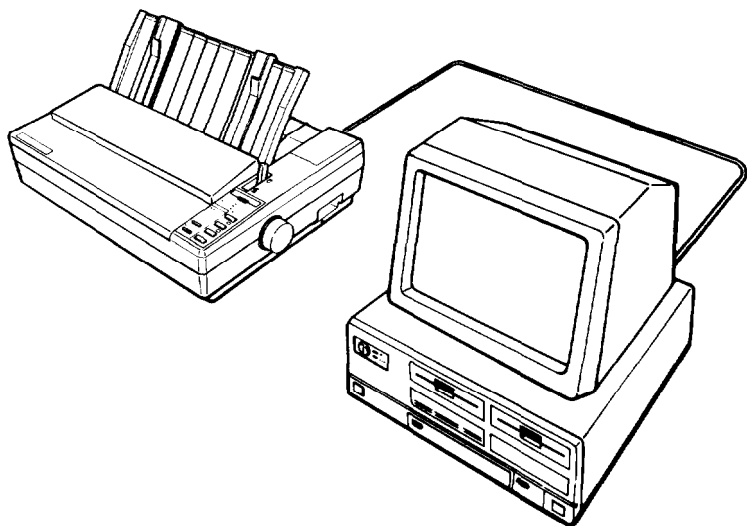
Setting Up Your Application Software

Now that you have set up and tested the LQ-510, you should make sure that it works with your application programs.

Most application programs let you specify the type of printer you are using so that the program can take full advantage of the printer's features. Many of these programs provide an installation or setup menu that presents a list of printers to choose from.

If your application program has a printer selection menu, use the instructions below.

Choosing From a Menu

Because the family of Epson printers shares a great many commands, you can use an application program even if it does not list the LQ-510 on its printer selection menu. If the LQ-510 is not listed, choose one of the following printers. They are listed in order of preference.

LQ-850 (LQ-950, LQ-1050)	SQ-2500
LQ-500	LQ-2500
LQ-2550	LQ-1500
LQ-800 (LQ-1000)	

If none of these printers is listed, select the first one available on the following list:

LQ	LX	Epson printer
EX	R x	Standard printer
FX	MX	Draft printer

To use all of the features of the LQ-510, however, it is best to use a program with the LQ-510 on its menu. If your program does not list the LQ-510, contact the software manufacturer to see if an update is available that supports the LQ-510 model.

Chapter 2
Paper Handling

2

Using Single Sheets

Your printer can accommodate single sheets with a width of 7.2 inches or 182 mm to 10 inches or 254 mm.

If you do most of your printing on single sheets, you may find it more convenient to install the optional cut sheet feeder. This option automatically inserts a new sheet and can hold up to 150 pages. For more details, see Chapter 5.

Loading Paper

1. Push the paper release lever back to the single-sheet position.
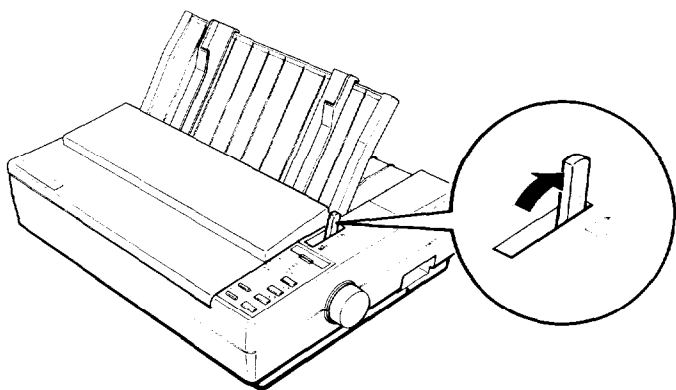
2. Turn on the printer. (The green POWER light should come on.)
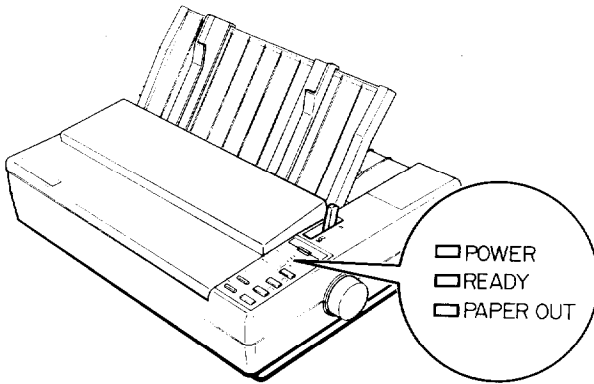
Note: Do not insert paper in the printer before turning on the printer.

3. Move the left edge guide so that it locks in place next to the guide mark. (You may want to change this position later, depending on the margin settings of your application program.)
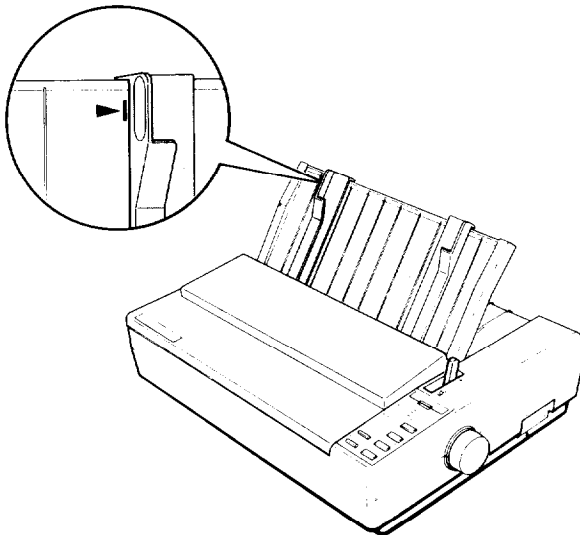
4. Adjust the right edge guide to match the width of your paper. Then slide the paper down between the edge guides until it meets resistance.
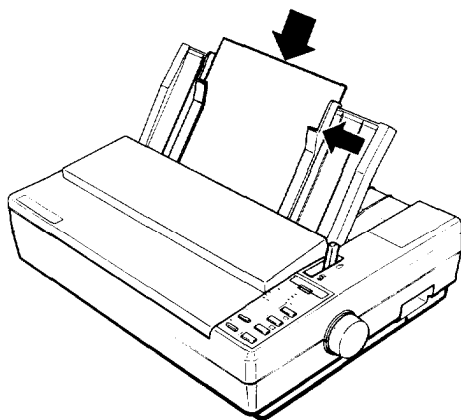
5. Press the LOAD/EJECT button once to load the paper automatically.
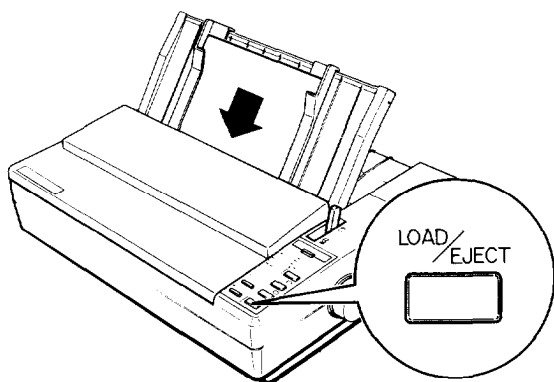
> **CAUTION:** Never advance the paper using the platen knob while the printer is turned on. If the platen turns without loading the paper, remove the paper and reinsert it more firmly. Then press the LOAD/EJECT button again.

6. Press the ON LINE button to set the printer on line. When the ON LINE light is lit, the printer can accept data from your computer.
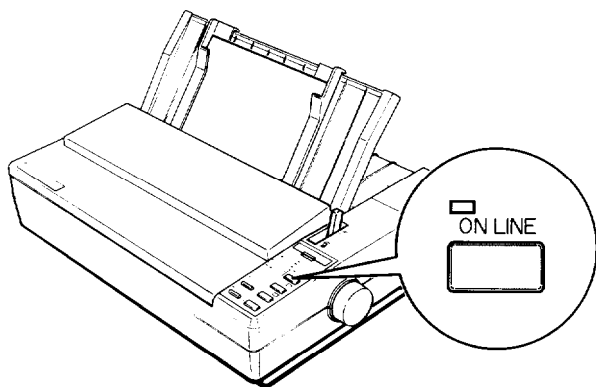
You are now ready to begin printing.

Reloading During Printing

When you print a document of more than one page using single-sheet paper, the printer stops printing when it reaches the bottom of the page. When this happens, the ON LINE light either goes off automatically or remains on, depending on your application program software. If the ON LINE light remains on, the first thing you should do is press the ON LINE button to take the printer off line.

Once the ON LINE light is off, remove the sheet that has just been printed (if necessary, press the LOAD/EJECT button to eject the page) and load a new sheet. Press the ON LINE button to start printing the next page and follow any additional prompts from your software.

Using Continuous Paper

The push tractor built into your LQ-510 printer is remarkably easy to load and operate. Its low-profile design takes up little space and can handle paper up to 10 inches or 254 mm wide.

Positioning Your Continuous Paper Supply

An important consideration for achieving smooth and trouble-free paper feeding is the position of your paper supply.

Three ways of positioning your printer and continuous paper supply are shown below.
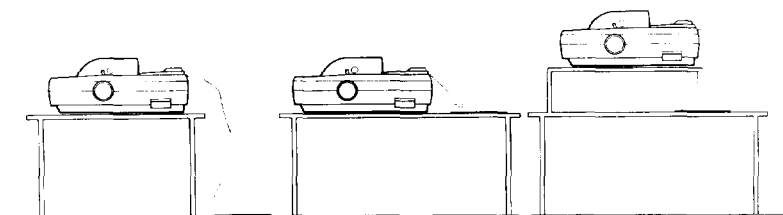
Be sure to align the paper supply with the paper loaded in the tractor so that the paper feeds smoothly into the printer.
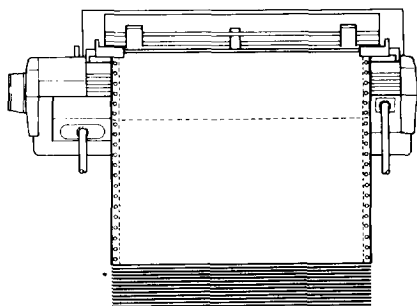
Loading Continuous Paper

1. Be sure that the printer is turned off, then remove the paper guide. Set the paper release lever to the continuous paper position. This position is marked by the icon shown in the illustration below.
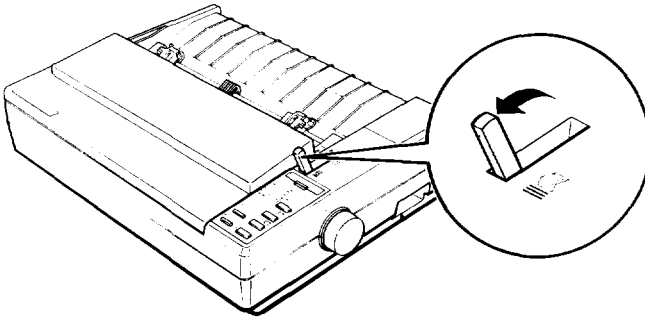
2. Release the sprocket units by pulling the sprocket lock levers forward as shown below.
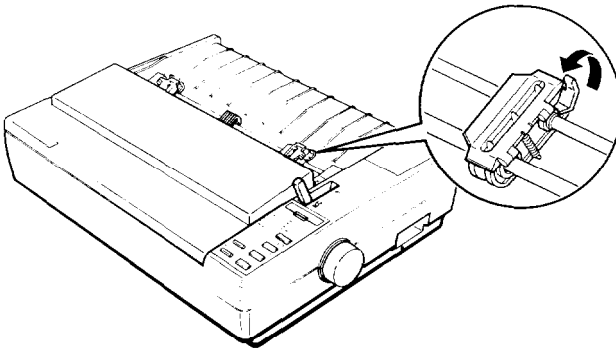
3. Slide the left sprocket unit until it is one-half inch from the farthest left position and press the lever back to lock it in place.
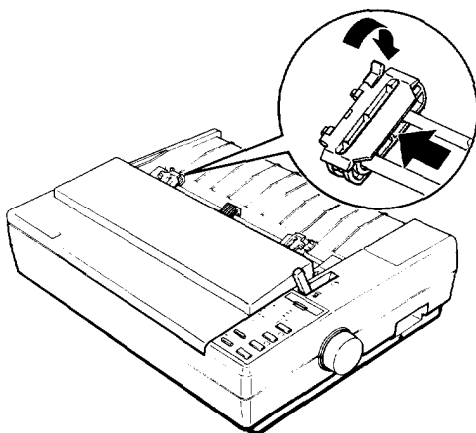
4. Slide the right sprocket unit so that it roughly matches the width of your paper, but do not lock it.
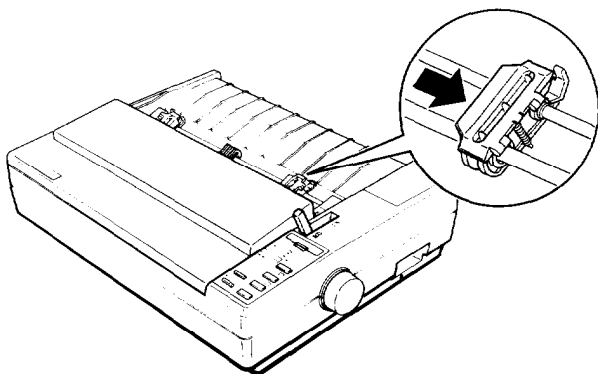
5. Move the paper support midway between the two sprocket units.
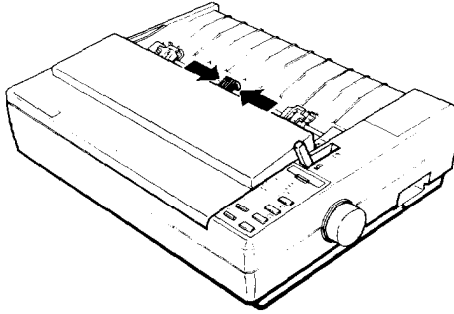
6. Open both sprocket covers.
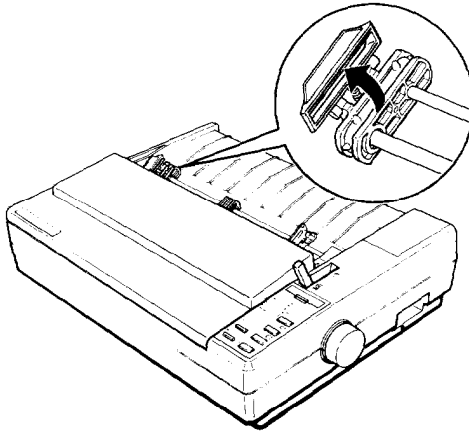
⚠ CAUTION: Make sure that your paper has **a** clean, straight edge before inserting it into the printer.

7. Fit the first three holes in the paper over the pins of both sprockets.
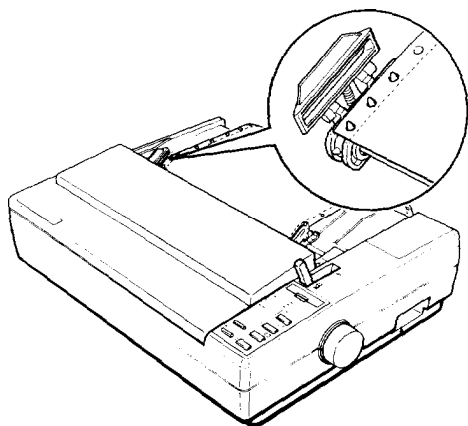
8. Close the sprocket covers.
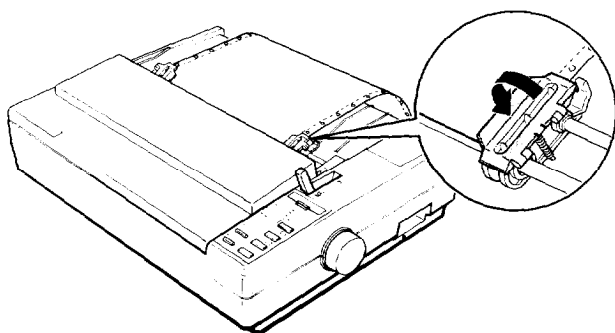
9. Slide the right sprocket unit to a position where the paper is straight and has no wrinkles. Then lock it in place.
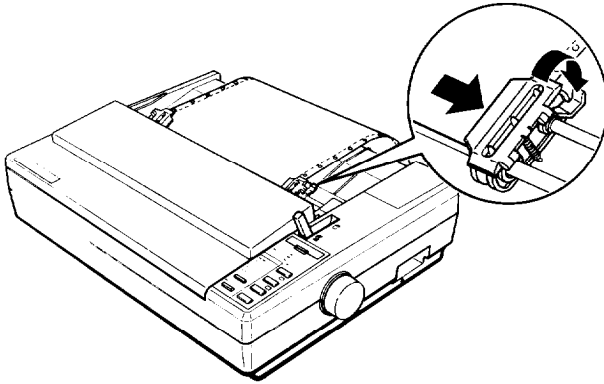
10. Reattach the paper guide as shown below. Then slide the edge guides apart to the sides of the paper guide as shown.
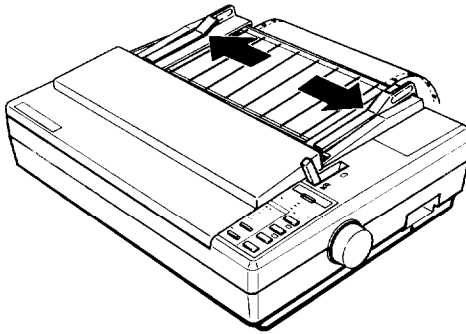
11. Turn on the printer. It will beep because there is no paper in the printer. Then press the LOAD/EJECT button to feed paper to the loading position.
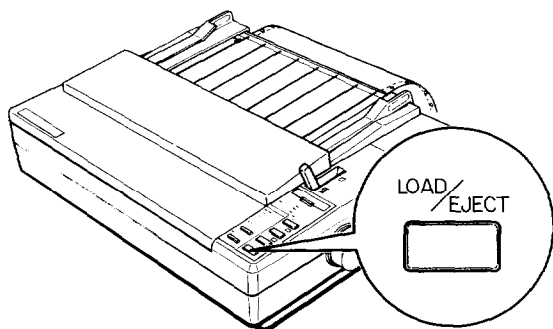
12. Press the ON LINE button to set the printer on line so that it can accept data.
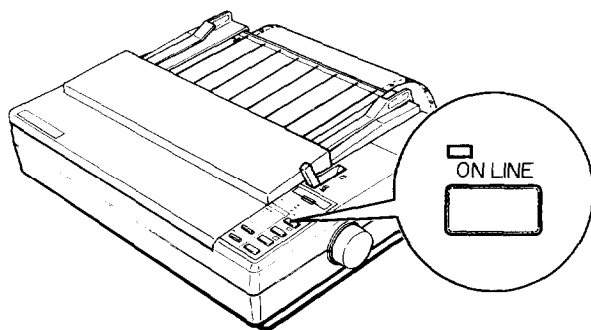
The printer remembers the loading position and advances each page to the same position. If you need to adjust the loading position, use the micro-adjustment feature. See the section on setting the loading position in Chapter 3.

> **CAUTION:** Never adjust the loading position using the platen knob and never turn the platen knob while the printer is turned on.

Switching Between Continuous and Single Sheets

Even with continuous paper loaded in the printer, the SmartPark feature allows you to easily switch to single-sheet printing without removing the continuous paper from the tractor.

Switching to Single Sheets

To switch from continuous paper to single sheets, follow the steps below.

1. If the printer is on line, press the ON LINE button to set the printer off line.
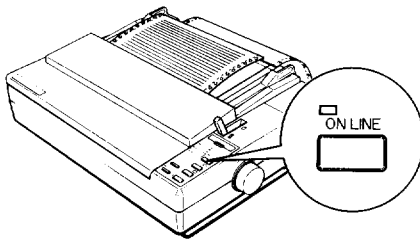
2. Tear off any outgoing sheets. If the paper has advanced past the print head, you need to press the FORM FEED button to advance your document to a point where it can be easily removed.
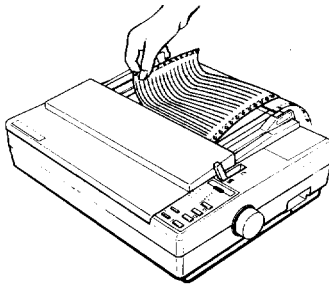
> ⊘ **CAUTION:** Make sure you tear off your printed document before pressing the LOAD/EJECT button. Reverse-feeding several pages at a time may result in a paper jam. This is especially true for narrow paper (less than 6 inches or 152.4 mm wide).

3. Press the LOAD/EJECT button to feed the continuous paper backward out of the printer and into the standby position. The paper is still attached to the tractor but no longer in the paper path.
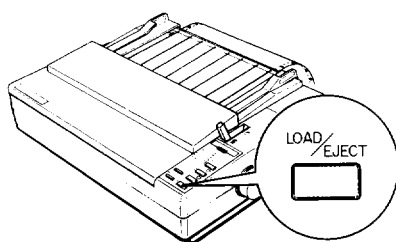
> ⊘ **CAUTION:** Pressing the LOAD/EJECT button once may not feed the paper far back enough to reach the standby position. If the PAPER OUT light does not come on, you need to press the LOAD/EJECT button again. With normal-width continuous paper, you can press the LOAD/EJECT button up to three times. If, however, you are using narrow paper (between 4 and 6 inches or 101.6 and 152.4 mm) you should only press the LOAD/EJECT button once. Also, do not use this button to eject labels.

> 🖐 **WARNING:** Never feed labels backward through the printer. Labels can easily come off the backing sheet and jam the printer.

4. Push the paper release lever back to the single-sheet position. This position is marked by the icon shown in the illustration below.
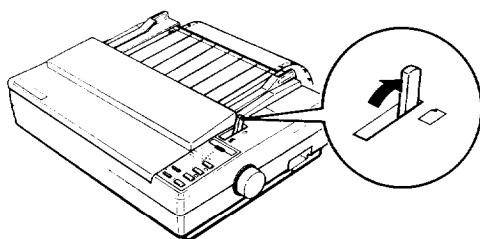
5. Stand the paper guide upright and adjust the edge guides to roughly match the width of your paper.
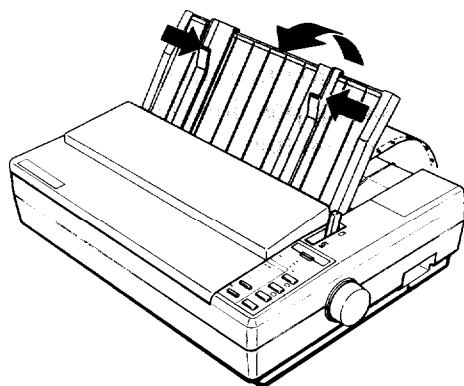
6. Insert a sheet of paper between the edge guides until the bottom meets resistance. Slide the edge guides to exactly match the width of your paper.
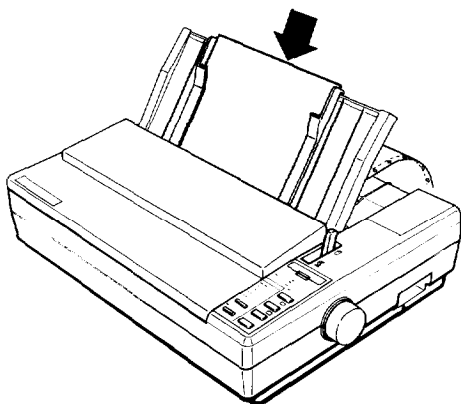
7. Press the LOAD/EJECT button to automatically feed the single-sheet paper to the loading position. Then, press the ON LINE button to set the printer on line.
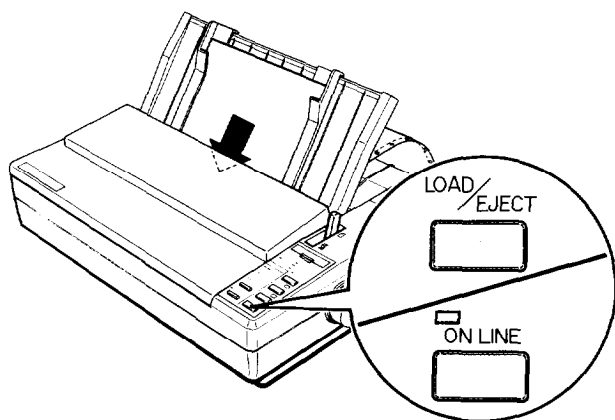
Switching Back to Continuous Paper

It is also easy to switch back to printing with continuous paper.
Before switching to continuous paper, make sure that the single
sheet is ejected and the printer is off line.

1. Slide the edge guides apart so they do not interfere with
   continuous paper feeding.
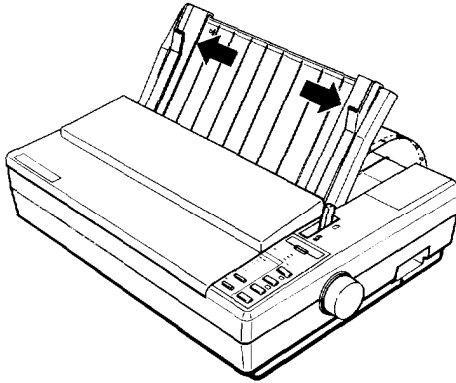
2. Lower the paper guide onto the printer.
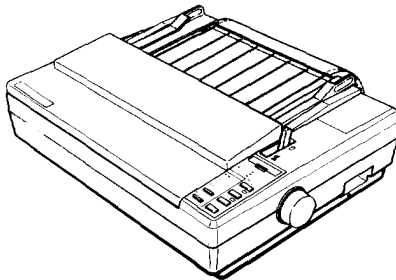
3. Pull the paper release lever forward to the continuous paper position.
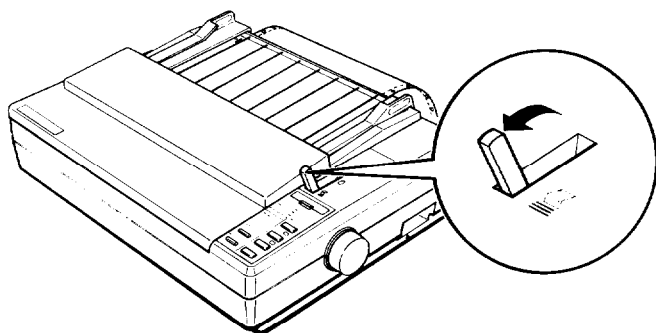
4. Press the LOAD/EJECT button to feed the continuous paper to the loading position.
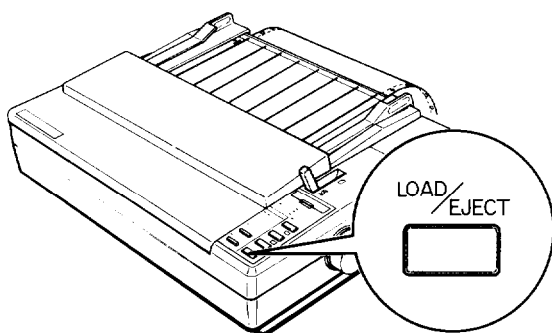
5. Press the ON LINE button to set the printer on line so that it can accept data.
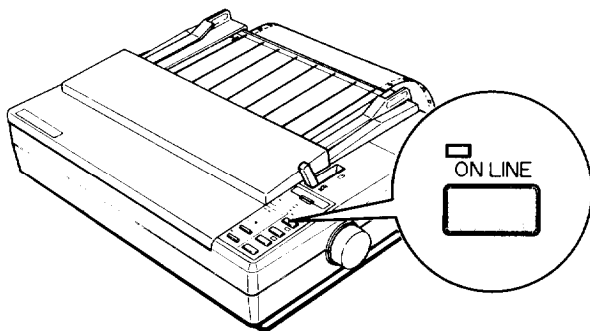
Printing on Special Paper

In addition to printing on single sheets and continuous paper, your printer can also print on a wide variety of paper types, including multi-part forms, labels, and envelopes.

Before printing on special types of paper, you need to change the paper thickness setting.

WARNING: When printing on multi-part forms, labels, or envelopes, make sure that your application program settings keep the printing entirely within the printable area.

For multi-part forms and labels you should not print any closer than one-half inch from either side of the paper.

For information on the printable area for envelopes, see page 2-26.

The Paper Thickness Lever

To accommodate various thicknesses of paper, the LQ-510 is equipped with a paper thickness lever that can be set to seven positions. These positions are identified by a scale on the printer next to the lever.

To change the paper thickness setting, follow these steps.

1. Make sure that the printer is turned off. Then remove the printer cover.
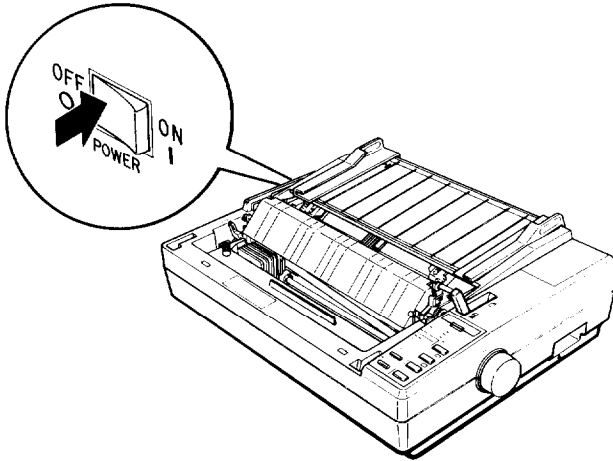
⚠ **WARNING:** If the printer has just been in use, the print head may be hot. Allow it to cool before touching it.
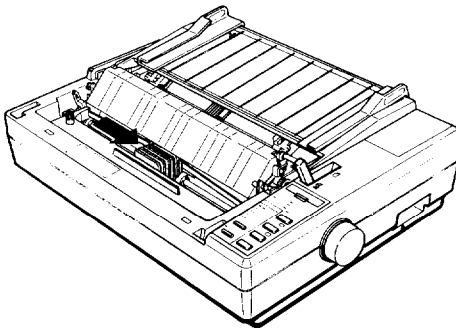
2. Slide the print head to the middle of the printer.

3. Select the paper thickness you want according to the table
    below. For normal use, the lever should always be set to
    position 2 on the scale.
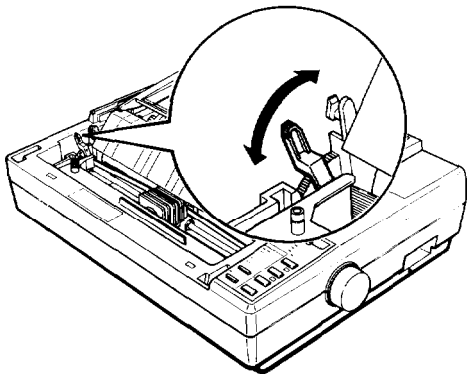
Paper Type	Lever Position
Paper (single sheets or continuous)	2
Thin paper	2
24 lb paper	3
Multi-part forms 　　　　2-sheet 　　　　3-sheet	3 4
Labels	4
Envelopes 　　　　Air mail 　　　　Plain 　　　　Bond (20 lb) 　　　　Bond (24 lb)	4 or 5 6 6 7

Note: Lever position 1 is used only when the printed characters
are too light. Setting the lever to position 1 when you are using
thin paper may damage the print head.

•   If the lever is set to position 4 or higher, the printing speed
    may be reduced slightly.

4.   Reattach the printer cover as shown below.
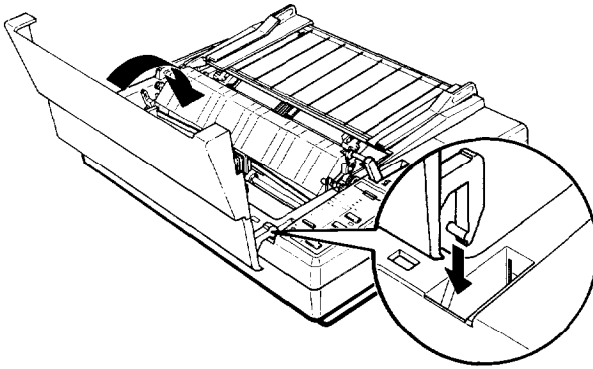
To help you check the position of the paper thickness lever, the orange MULTI-PART light on the control panel comes on if the lever is set to position 4 or higher.

WARNING: Always return the lever to position 2 when you go back to printing on ordinary paper. Continuous printing with the lever set at a position higher than 2 can shorten the life of the print head. Printing past the edge of envelopes, multi-part forms, labels, or thicker-than-normal paper can damage the print head.

Multi-part Forms

With the built-in tractor unit, your printer can print on continuous multi-part forms. You can use multi-part forms that have up to three parts including the original. Make sure you set the paper thickness lever to the proper position; see the table on page 2-22.

Except for the paper thickness lever setting, you load multi-part paper the same way as continuous paper. For details, see the section on loading continuous paper in this chapter. Also see the sections on setting the loading position and page length in Chapter 3.
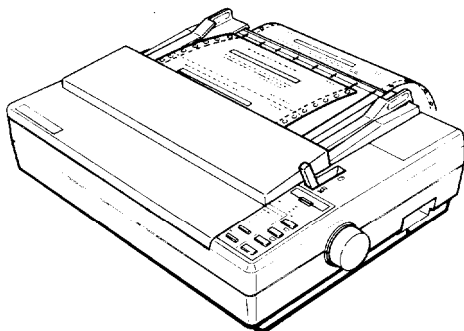
> ⚠ **CAUTION:** Multi-part forms should not be used with the single-sheet feeding system or the optional cut sheet feeder.

Labels

If you need to print labels, always use labels mounted on a continuous backing sheet with sprocket holes for use with a tractor. Do not try to print labels as single sheets because labels on a shiny backing sheet almost always slip a little.

You load labels the same way that you load continuous paper except that the paper thickness lever must be adjusted for printing labels. See the section on loading continuous paper earlier in this chapter. For the correct paper thickness setting, see the table on page 2-22.
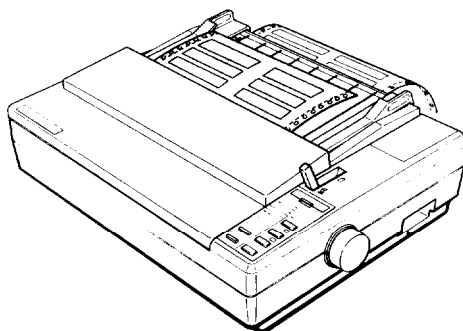
WARNING: Never feed labels backward through the printer. Labels can easily peel off the backing and jam the printer. Therefore, never use the LOAD/EJECT button to eject labels. Also, never use the short tear-off function with labels. (Be sure to set DIP switch 2-2 to OFF.) If a label does become stuck in the printer, contact your Epson dealer.

Since labels are especially sensitive to temperature and humidity, always use them under normal operating conditions. Don't leave labels loaded in the printer between jobs; they curl around the platen and may jam when you resume printing.

Envelopes

You can feed envelopes individually using the single-sheet loading feature. Before loading envelopes, adjust the position of the paper thickness lever according to the table on page 2-22. For details on paper handling, see Using Single Sheets on page 2-2.

When manually feeding an envelope, you may have to push it down slightly while pressing the LOAD/EJECT button to get it to feed properly.
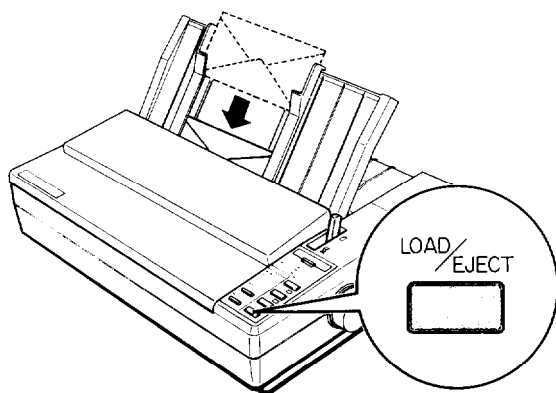
⚠️ CAUTION: The printable area for envelopes is shown on the next page. The print head must not go past the left or right edge of the envelope or other thick paper. Make sure that your application program page setup keeps the printing entirely within this printable area.

8.5 mm
(0.33") or more

Printable area

22 mm
(0.87") or more

3 mm
(0.12") or more
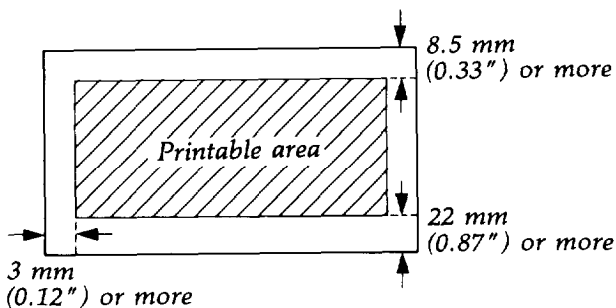
CAUTION: Envelope printing is only available at normal temperature (41°F to 95°F or 5°C to 35°C).

To make sure that the printing fits within the printable area, always print a test sample using a normal sheet of paper before printing on envelopes.

Chapter 3
Using the Printer

3

Operating the Control Panel

The indicator lights give you the current status of the printer. The buttons and paper handling functions let you control many of the printer settings.

Lights

MULTI-PART (orange)
On when the paper thickness lever is set to position 4 or higher. When this light is blinking, the micro-adjustment function can be used.

POWER (green)
On when the POWER switch is on and power is supplied.

READY (green)
On when the printer is ready to accept input data. Flickers during printing.

PAPER OUT (red)
On when the printer is out of paper or when continuous paper is in the standby position.

ON LINE (green)
On when the printer is on line and ready to accept data.

Buttons

ON LINE
This button controls the printer's on line and off line status. Press this button to put the printer on line or to take it off line. When the printer is on line, the ON LINE light is on and the printer can receive and print data from the computer.

FORM FEED
When the printer is off line, press this button to eject a single sheet of paper or to advance continuous paper to the top of the next page.

LINE FEED
When the printer is off line, press this button to advance the paper one line, or hold it down to advance the paper continuously.

LOAD/EJECT
This button is used to feed paper to the loading position or to eject paper that is already loaded. Paper is ejected forward if the paper release lever is set to the single-sheet position and backward (out of the paper path) if the release lever is set to the continuous paper position.

Figure labels in control panel diagram:

POWER
MULTI-PART
READY
PAPER OUT

SelecType

DRAFT
ROMAN
SANS SERIF
SLOT
FONT
CONDENSED

ON LINE
FORM FEED ⇧
LINE FEED ⇩
LOAD/EJECT
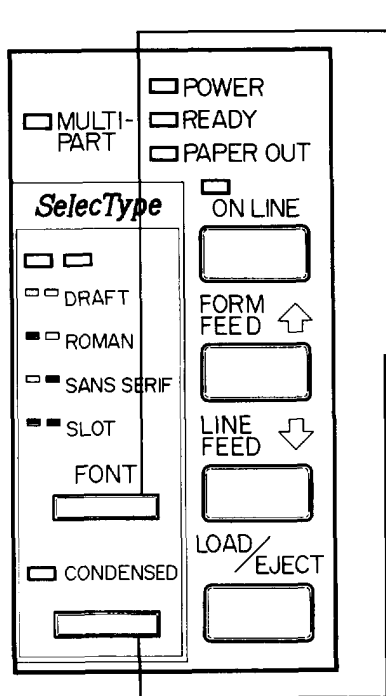
SelecType

FONT

This button is used to select LQ ROMAN, LQ SANS SERIF, DRAFT mode, or a cartridge font (if installed). The two orange indicator lights show the selected font. See Selecting Typestyles later in this chapter.

CONDENSED

This button is used to turn the condensed mode on and off. The orange indicator light is on when the printer is in the condensed mode. In the condensed mode, all characters are printed at approximately 60 percent of their normal width.

Other control panel features

The control panel of your printer also gives you access to several special functions.

Self test: Both a draft and Letter Quality self test function are built into the printer. The self test printout lets you check the current DIP switch settings and operating status of the printer. You can start the printer's self test by holding down the LINE FEED button or the FORM FEED button while turning on the printer. See the section on the self test in Chapter 1 for more information.

Micro-adjustment: By pressing the FORM FEED button immediately after loading paper or when using short tear-off, you can make fine adjustments to the loading and short tear-off positions. These positions can only be adjusted while the MULTI-PART light is blinking. See the sections on adjusting the loading position and using the short tear-off function later in this chapter.

Data dump: By holding down both the LINE FEED and FORM FEED buttons while you switch on the printer, you turn on the data dump mode. This feature allows advanced users to locate the source of communications problems between the computer and printer. See the section on using the data dump mode on page 3-24 for more information.

Setting the DIP Switches

The LQ-510 has two sets of DIP (Dual Inline Package) switches located under a small cover above the control panel. By changing the settings of these switches, you can control various printer features, such as the character set and page length. The new settings become effective when the printer is turned on, reset, or initialized.

DIP switch settings are shown in the DIP switch tables starting on page 3-7. Descriptions of all the DIP switch functions begin on page 3-9.

Changing a DIP Switch Setting

To change a DIP switch setting, first turn off the printer. Then open the DIP switch cover and use a pointed object, such as a pen, to change the DIP switch settings. A DIP switch is on when it is up, and off when it is down.
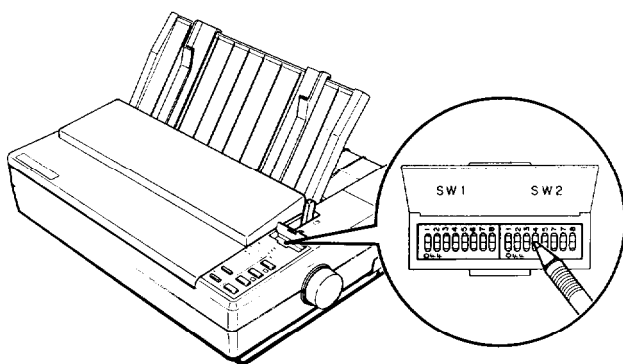
The new DIP switch settings take effect when the printer is turned on.

The DIP Switch Tables

The tables below show the settings for each DIP switch. The shaded areas show the default or factory settings.

DIP switch 1

SW	Description	ON	OFF	Page
1-1	International character set	See table 1		3-20
1-2				
1-3				
1-4	Font selection	See table 2		3-8
1-5				
1-6	Condensed mode on/off	Condensed	Normal	3-19
1-7	Character table	Graphics	Italics	3-22
1-8	Cut sheet feeder mode on/off	On	Off	5-2

DIP switch 2

SW	Description	ON	OFF	Page
2-1	Page length	12 inches	11 inches	3-10
2-2	Tear-off mode	On	Off	3-9
2-3	1 -inch skip over perforation	On	Off	3-11
2-4	Auto line feed	On	Off	3-9
2-5	Input buffer capacity	8KB	1 KB*	3-9
2-6	Graphics print direction	Bidirect.	Unidirect.	3-9
2-7	Character spacing	See table 3		3-8
2-8				

. Required for use of user-defined (download) characters.

Setting the DIP Switches

Table 1   International character sets

Country	SW 1-1	SW 1-2	SW 1-3
USA	ON	ON	ON
France	ON	ON	OFF
Germany	ON	OFF	ON
UK	ON	OFF	OFF
Denmark	OFF	ON	ON
Sweden	OFF	ON	OFF
Italy	OFF	OFF	ON
Spain	OFF	OFF	OFF

Table 2 Font selection

Font	SW 1-4	SW 1-5
Roman	OFF	OFF
Sans Serif	ON	OFF
Slot	OFF	ON
Draft	ON	ON

Table 3   Character spacing

Spacing	SW 2-7	SW 2-8
10 cpi	OFF	OFF
12 cpi	ON	OFF
15 cpi	OFF	ON
Proportional	ON	ON

cpi: characters per inch.

3-**8   Using the Printer**

The DIP Switch Functions

Auto line feed

When auto line feed is on (DIP switch 2-4 on), each carriage return code (CR) is automatically followed by a line feed code (LF).

Input buffer capacity

The input buffer stores data from your computer. If you want to free your computer for other tasks while the printer prints, change the setting of switch 2-5 to 8 KB (on). Before using user-defined characters, however, be sure to set the input buffer to 1 KB (off).

Printing direction

With unidirectional printing, the print head prints in one direction only. This allows for precise vertical alignment, making it ideal for printing graphics such as lines and boxes. When DIP switch 2-6 is off, the printer prints unidirectionally; when it is on, the printer prints bidirectionally. Either setting can be overridden by a software command (ESC U). To achieve precise vertical alignment without the slower printing speed caused by unidirectional printing, see your authorized service dealer for adjustment of your bidirectional print settings.

Tear-off mode

When DIP switch 2-2 is on, the short tear-off mode is on. This feature automatically advances continuous paper to the tear-off position, and then reverse-feeds the paper to the loading position. See the section on using short tear-off later in this chapter.

⊘ CAUTION: Do not use the short tear-off mode with labels.

Page Length

When the setting of DIP switch 2-1 is off, the page length is set to 11 inches, or 27.94 cm. When it is on, the page length is 12 inches, or 30.48 cm. Be sure to set the page length to match the paper you are using.

Other page lengths can be set using the commands ESC C and ESC C 0. See the Command Summary in Chapter 9 for details.

DIP SW2-1

OFF

11-inch page length

DIP SW2-1

ON

12-inch page length
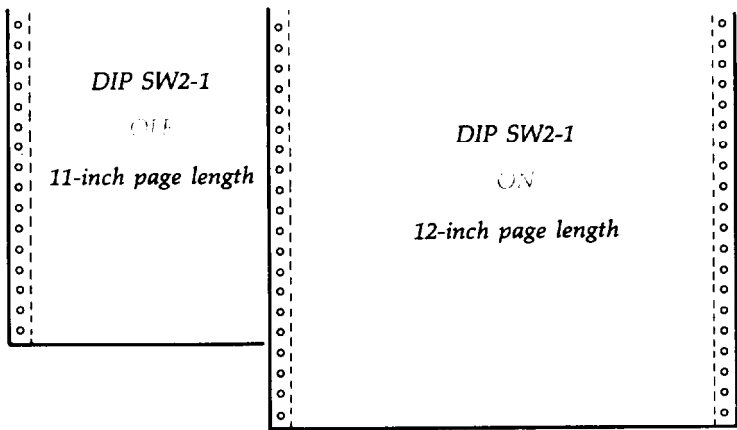
Skip Over Perforation

By changing the setting of DIP switch 2-3, you can set skip over perforation to on or off. If this feature is on when using continuous paper, a one-inch margin is provided between the last printable line on one page and the first printable line on the next page. This feature is very convenient if your application program does not provide for top and bottom margins.

If you adjust your loading position correctly, you can get half of the margin at the bottom of one page and half at the top of the next page, as shown in the following illustration.

DIP switch 2-3 ON (Skip over perforation ON)

```
  ●     23456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]'
        3456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_

  ●
 ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ── ─ ── ─ ─ ─ ─── ─ ─ ─ ─ ─ ─ ─ ──

  ●
        456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_'
  ●     56789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_'ε
        6789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_'ab
```
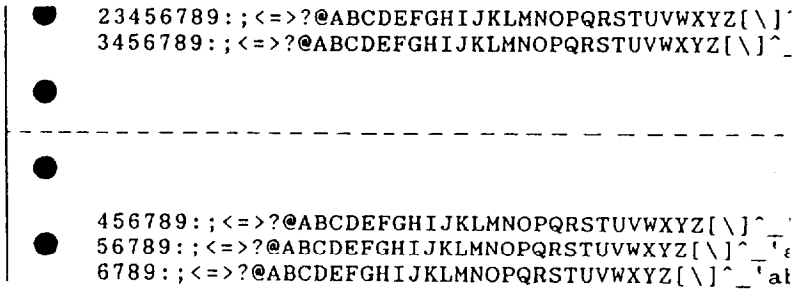
Note: Most application programs take care of top and bottom margins. Use skip over perforation only if your program does not provide these margins.

The skip over perforation setting can be set to values other than one inch by using the ESC N command. See the Command Summary in Chapter 9 for details.

Adjusting the Loading Position

The Loading Position

The loading position is the position of the paper when it has been automatically loaded by the printer.

This position is important because it determines where the printing begins on the page. If the printing is too high or too low on the page, change the loading position using the micro-adjustment feature described in the next section.

> **CAUTION:** Never use the platen knob to feed paper except in case of a paper jam or other paper feeding problem. (If you need to use the platen knob, make sure the power is off.) If you need to adjust the loading position, always use the micro-adjustment feature.

Until the loading position is reset, the printer remembers this position even if it is turned off, and uses it as a reference point for feeding paper.

The micro-adjustment feature moves the paper in 1/180-inch increments to make fine adjustments to the loading position. Once you have used micro-adjustment to change the loading position of continuous paper, the printer remembers that position even after it is turned off.

However, when you use micro-adjustment to change the loading position of single-sheet paper, the printer does not remember this position after the power is turned off. When the power is turned back on, the loading position returns to its factory setting.

Using Micro-adjustment

1. Make sure that the printer is turned on and that either a single sheet or continuous paper is ready to be loaded.

2. Press the LOAD/EJECT button to feed paper to the loading position. Then press the ON LINE button; the MULTI-PART light begins to blink.

$$\text{[::]} \quad \text{MULTI-PART}$$

> **Note:** You can **use the** FORM FEED **and** LINE FEED buttons for micro-adjustment only while the MULTI-PART light is blinking.

3. Press the FORM FEED button to feed the paper forward or the LINE FEED button to feed the paper backward.
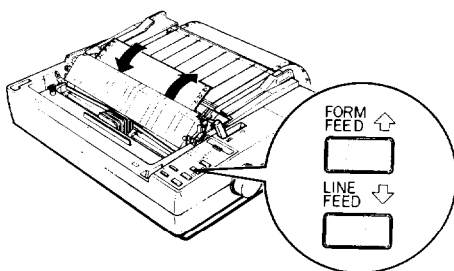
Note: When the paper reaches the factory-set loading position, the printer beeps and micro-adjustment feeding pauses for a moment before continuing. You can use this factory setting as a reference point when adjusting the printer's loading position. When the paper reaches either the minimum or maximum top margin, the printer beeps and the paper stops moving.

Using Short Tear-Off

When you are finished printing, the short tear-off feature automatically feeds the perforation of the continuous paper to the tear-off edge of the printer cover so that you can tear off the last sheet. When you resume printing, the paper feeds backward to the loading position. This feature lets you save the paper normally lost between documents.

To use this feature, set DIP switch 2-2 to on. Then load continuous paper in the normal way.

You can leave the short tear-off feature turned on (DIP switch 2-2 on) even when you are using single sheets. When you move the paper release lever to the single-sheet position, the short tear-off feature is disabled.

WARNING: Never use short tear-off with labels. Otherwise, labels may come off their backing and jam the printer.

When you have finished printing, and if the perforation is at the top of form position, the printer automatically feeds the perforation of the continuous paper to the tear-off edge of the printer cover. You can then tear off the page using the tear-off edge as shown on the next page.
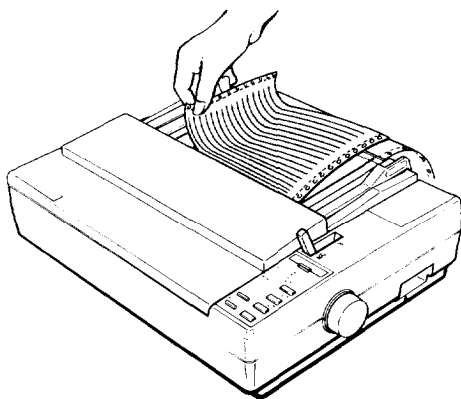
If the page perforation is not properly aligned with the tear-off edge, you can adjust the tear-off position using micro-adjustment, as described below.

Note: Short tear-off is not performed unless printing of a page is completed and the paper has advanced to the top of the next page. If the paper has not advanced to the top of the next page, press the ON LINE button to put the printer off line and press the FORM FEED button to advance the paper. Then put the printer back on line and paper will feed to the tear-off position.

When you resume printing after tearing off the sheet, the paper automatically feeds backward to the loading position before printing begins.

Adjusting the Tear-off Position

If the paper's perforation does not meet the tear-off edge, you can adjust the tear-off position using the micro-adjustment feature.

1. Make sure the printer feeds the paper to the tear-off position after printing the document.
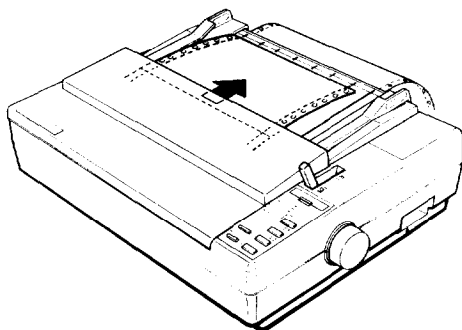
2. The MULTI-PART light should begin blinking, indicating that you can now use the micro-adjustment feature to make fine adjustments to the tear-off position.
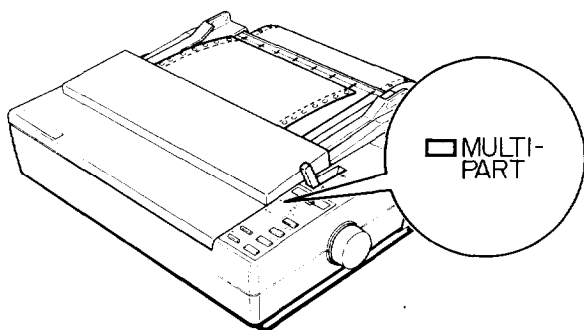
3. To make fine adjustments to the tear-off position, press the FORM FEED button to feed the paper forward or the LINE FEED button to feed it backward.

You can now tear off your document from the perforation and resume printing. The printer remembers this new tear-off position even after the printer is turned off and on again.

Selecting Typestyles

You can produce a wide range of typestyles by selecting different character fonts, widths, and other enhancements from the SelecType control panel or by using software commands. This section describes only the features controlled by SelecType. To use software commands, see the Command Summary in Chapter 9.

You can use the SelecType section of the control panel to choose fonts and condensed printing. Orange lights indicate which features you have chosen.
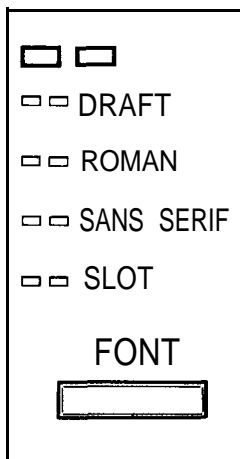
Note: The settings you select using the SelecType panel remain valid until the printer is turned off or until it receives other instructions from software. However, some application programs are designed to control all typestyle functions. These programs cancel all previous typestyle settings by sending certain software commands before printing. Because these commands override SelecType settings, you should use the program's print options instead of SelecType to select your typestyles. If SelecType does not work with a particular application, check your software manual for instructions on selecting typestyles.

Character Fonts

The LQ-510 printer has three built-in fonts:

DRAFT

```
!"#$%&'()*+,-./0123456789:;<=>?àABCDEFGHIJK
LMNOPQRSTUVWXYZ°ç§^_'abcdefghijklmnopqrstuv
wxyzéùè¨ÇüéâäàåçêëèïîìÀÅÉæÆôöòûùÿÖÜ¢£¥Rƒáíó
úñÑªº¿⌐¬½¼¡«»
```

ROMAN

```
!"#$%&'()*+,-./0123456789:;<=>?àABCDEFGHIJK
LMNOPQRSTUVWXYZ°ç§^_'abcdefghijklmnopqrstuv
wxyzéùè¨ÇüéâäàåçêëèïîìÀÅÉæÆôöòûùÿÖÜ¢£¥Rƒáíó
úñÑªº¿⌐¬½¼¡«»
```

SANS SERIF

```
!"#$%&'()*+,-./0123456789:;<=>?àABCDEFGHIJK
LMNOPQRSTUVWXYZ°ç§^_'abcdefghijklmnopqrstuv
wxyzéùè¨ÇüéâäàåçêëèïîìÀÅÉæÆôöòûùÿÖÜ¢£¥Rƒáíó
úñÑªº¿⌐¬½¼¡«»
```

The DRAFT mode uses fewer dots per character for high-speed printing, which makes it ideal for rough drafts and editing work.

ROMAN and SANS SERIF are Letter Quality (LQ) fonts. Letter Quality takes a little longer to print, but produces nicely formed characters suitable for most documentation requirements.

Other fonts are available on optional font cartridges. See Multi-Font Module in Chapter 5.

Condensed Mode

You can use the condensed mode to change the size of printed characters. In the condensed mode, characters are approximately 60 percent of the width of normal characters. Hence, condensed printing is very useful for spreadsheets and other applications where you need to print the maximum amount of information on a page. You can combine the condensed mode with 10 and 12 cpi printing, but not proportional and 15 cpi.

To select the condensed mode, simply press the CONDENSED button so that the orange indicator light comes on. To turn off the condensed mode, press the button again.

The following printout compares normal 10 and 12 cpi with condensed 10 and 12 cpi. The condensed 10 cpi is 17 cpi, and the condensed 12 cpi is 20 cpi.

```
This is 10 CPI printing.
This is condensed 10 CPI printing.
This is 12 CPI printing.
This is condensed 12 CPI printing.
```

Selecting an International Character Set

International character sets provide you with the characters and symbols used in other languages. You can select one of eight international character sets by changing the DIP switch settings.

Whenever the printer is turned on, reset, or initialized, the character set selected by the DIP switches becomes the default character set.

To select an international character set, set DIP switches 1-1, 1-2, and 1-3 according to the table below.

This table also shows the characters that differ in each international character set.

Country	ASCII code hex												DIP SW		
	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E	1-1	1-2	1-3
0 U.S.A.	#	$	@	[	\	]	^	'	{	¦	}	~	ON	ON	ON
1 France	#	$	à	°	ç	§	^	'	é	ù	è	¨	ON	ON	OFF
	#	$	§	Ä	Ö	Ü	^	'	ä	ö	ü	ß	ON	OFF	ON
3 U.K.	£	$	@	[	\	]	^	'	{	¦	}	~	ON	OFF	OFF
4 Denmark	#	$	@	Æ	Ø	Å	^	'	æ	ø	å	~	OFF	ON	ON
5 Sweden	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü	OFF	ON	OFF
6 Italy	#	$	@	°	\	é	^	ù	à	ò	è	ì	OFF	OFF	ON
7 Spain	₧	$	@	¡	Ñ	¿	^	'	¨	ñ	}	~	OFF	OFF	OFF

> CAUTION: To change the setting of a DIP switch, first turn off the printer, change the DIP switch setting, and then turn the printer back on.

In addition to the eight character sets shown above, the seven international character sets that follow can be selected with a software command: ESC **R.** For more information, see the Command Summary in Chapter 9.

Country	ASCII code hex											
	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
8 Japan	#	$	@	[	¥	]	ˆ	‘	{	¦	}	˜
9 Norway	#	¤	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
10 Denmark II	#	$	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
11 Spain II	#	$	á	¡	Ñ	¿	é	‘	í	ñ	ó	ú
12 Latin America	#	$	á	¡	Ñ	¿	é	ü	í	ñ	ó	ú
13 Korea	#	$	@	[	₩	]	ˆ	‘	{	¦	}	˜
64 Legal	#	$	§	°	′	″	¶	‘	©	®	†	™

Choosing a Character Table

DIP switch 1-7 selects either the italic character table or the Epson
Extended Graphics character table. The Epson Extended Graphics
character table contains international accented characters, Greek
characters, mathematic symbols, and character graphics for printing
lines, corners, and shaded areas.

If you have an IBM® or IBM-compatible computer, select the Epson
Extended Graphics table when you wish to print character graphics
as they are displayed on the screen. Even if you select Epson
Character Graphics, you can still print ordinary text and italics. For
italics, see the description of the ESC 4 command in the Command
Summary, Chapter 9.

Note: In most cases, Epson Extended Graphics is the preferred
selection.

Sample printouts of the italic characters and the Epson Extended
Graphics characters are shown below.

Italics

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

Epson Extended Graphics

To select a character table, set DIP switch 1-7 according to the table below.

Character table	DIP SW 1-7
Italics	OFF
Graphics	ON

CAUTION: To change the setting of a DIP switch, first turn off the printer, change the DIP switch, and then turn the printer back on.

Tables showing which characters are printed in each of the character tables are listed in the Appendix.

Using the Data Dump Mode

The data dump mode is a special feature that makes it easy for
experienced users to identify the cause of communication problems
between the printer and application programs. The data dump
mode gives a printout of the codes reaching the printer.

To use the data dump mode, follow these steps:

1. Make sure that the printer is loaded with either single-sheet or
    continuous paper.
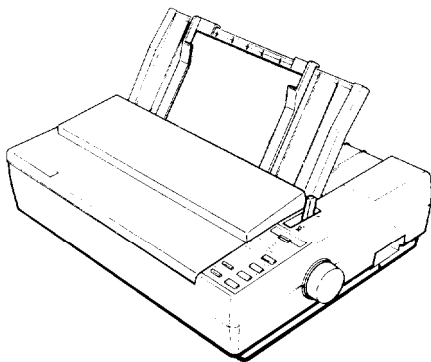
2. If the printer is on, switch it off, then hold down the FORM FEED **and** LINE FEED buttons at the same time you turn on the printer.
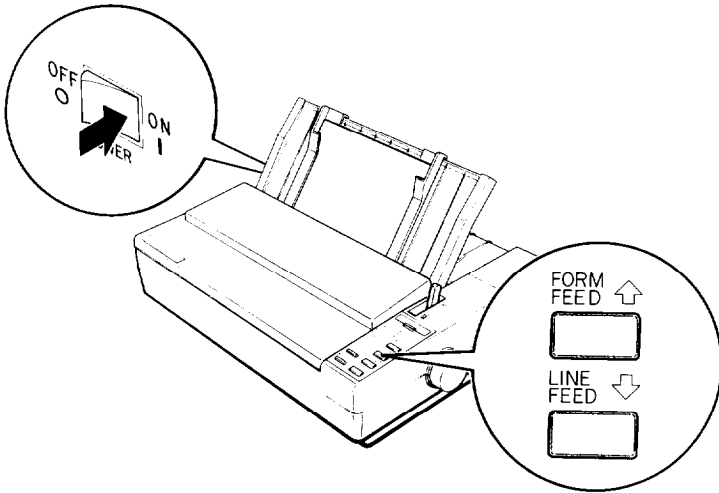
3. Run any program that causes the printer to print (either an application program or one in any programming language). Your printer prints out all the codes sent to the printer, as shown below. (In order to print the last line, you will have to take the printer off line.)

```
1B 40 1B 52 00 1B 74 01  36 12 1B 50 1B 70 00    .@.R..t..6..P.p.
20 20 54 68 69 73 20 6   20 61 6E 20 65 78 61       This is an exa
6D 70 6C 65 20 6F 66 20  20 64 61 74 61 20 64    mple of a data d
75 6D 70 20 70 72 69 6E  F 75 74 2E 20 54 68     ump printout. Th
69 73 20 66 65 61 74 75 75 5 20 6D 61 6B 65 73   is feature makes
0A 20 20 20 20 20 69 74  5 61 73 79 20 66 6F        it easy fo
```

On the left side of the printout all the codes are printed in hexadecimal format. On the right side of the printout all printable characters are printed, and others, such as control codes, are represented by dots.

4. To turn off the data dump mode after you have taken the printer off line, turn off the printer.
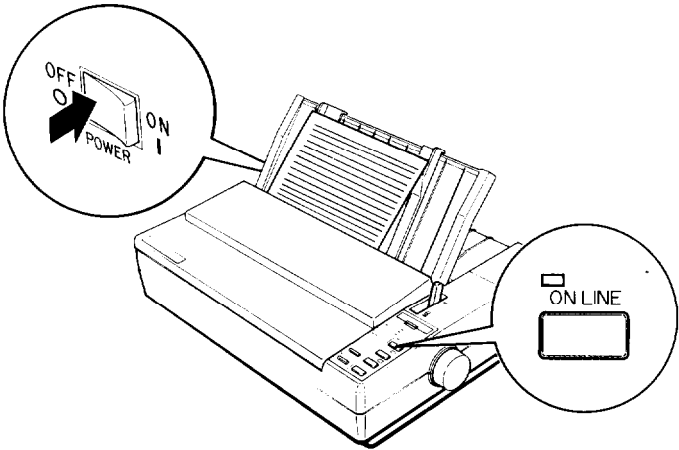
By comparing the characters printed in the text field on the right side of the data dump printout (see step 3) with the printout of hex codes, you can check which codes are being sent to the printer.

To interpret the data dump printout, examine the first three hex codes on the second line of the printout sample (20 20 54). Each hex code 20 represents a space; hex code 54 represents the letter T. Check the second line of the text field on the right side of the printout and you will find the letter T preceded by two spaces.

The chart below interprets the first eight codes.

Hex codes	Command	Function
1B 40	ESC	Initialize printer
1B 52 00	ESC R 0	Select USA character set
1B 74 01	ESC t 1	Select Epson Extended Graphics set

Chapter 4
Software and Graphics

4

Enhancing Your Printing

You can obtain a wide variety of printing effects with the LQ-510, from changing the number of characters per inch to using special effects on selected words and phrases. This section gives you a sampling of the features you may select with your software.

For software control of these features, see the instructions for your application programs or look up their specific commands in the Command Summary in Chapter 9.

Character Spacing

To add greater variety to your documents, the LQ-510 has three cpi spacings, as well as proportional spacing. Each one can be selected with a software command.

For each of the three built-in fonts, you can choose a character spacing of 10, 12, or 15 characters per inch, or proportional spacing. The printout below compares the three spacings:

```
This is 10 cpi printing.
This is 12 cpi printing.
This is 15 cpi printing.
```

As shown above, 15 cpi characters are only about two-thirds the height of 10 and 12 cpi characters. This makes 15 cpi particularly useful when you want to separate certain material from the main text.

In fixed cpi spacing each character is given the same amount of space. The width of proportional characters, however, varies from character to character. For example, a narrow letter like i takes less space than a wide letter like W. The width of each proportional character is given in the Appendix.

The following printout compares 10 cpi spacing with proportional spacing:

```
This is 10 cpi printing.
This is proportional printing.
```

Note: Proportional spacing is not available in the draft mode.

Character Size

In addition to the basic cpi spacings and proportional spacing, the LQ-510 offers three other modes that can change the size of your printing. These modes are double-wide, double-high, and condensed.

The double-wide mode doubles the width of any size character, while the double-high mode doubles the height of any size character. These modes are useful for emphasizing document titles and headings in reports, but are usually not suitable for large amounts of text. These modes can also be combined to obtain even more impressive printing results.

This is normal 10 cpi printing.
This is double-wide,

This is double-high.

This is double-wide and double-high.

Both 10 and 12 cpi printing can be reduced to about 60 percent of their normal width using the condensed mode. This mode is particularly useful for printing wide spreadsheets because condensed 12 cpi printing allows you to print up to 160 characters on an 8-inch line.

The condensed mode can be selected with a software command, or by using SelecType (See Chapter 3). Even if you turn the condensed mode on with SelecType, you can still turn it off with a software command.

Condensed 10 cpi gives you many characters on a line,

Condensed 12 cpi gives you even more characters on a line.

Widening or narrowing the characters also widens or narrows the spaces between words. Because word processors usually create a left margin by printing spaces, you may need to change the left margin and the number of characters on a line to keep the margins correct if you change character widths.

Special Effects and Emphasis

The LQ-510 offers two ways of emphasizing text and also allows you to use underlining, superscripts, subscripts, and italics. These features can be controlled directly by software commands. Many application programs can also produce some of these effects. See your application program manual for details.

Emphasized and double-strike printing

Emphasized and double-strike printing can give words and phrases added prominence. In emphasized mode, each character is printed twice as the print head moves across the paper, with the dots in the second pass printed slightly to the right of the first pass. This process produces darker, more fully formed characters.

In double-strike mode, the print head prints each line twice, making the text bolder. For even greater boldness, emphasized and double-strike can be combined. The following samples show the different effects you can achieve using these modes alone and in combination.

```
This  is ROMAN printing.
This is ROMAN, emphasized.
This  is ROMAN, double-strike.
```
This is ROMAN, with both.

Italic printing

You can print italics by using the ESC 4 software command. This is true no matter how **DIP** switch 1-7 is set.

```
This  is  ROMAN  printing.
```
This is ROMAN italics.

Underlining, strike-through, and overlining

The underline, strike-through, and overline modes are useful for highlighting selected text. This feature can be used to score spaces, subscripts, and superscripts without a break. You can choose from a variety of line styles, including single, double, broken, or continuous. See the ESC (- command in Chapter 9 for more information.

<u>This is continuous underlining.</u>
~~This is double-strike-through.~~
This is broken overlining.

Superscripts and subscripts

Superscripts and subscripts can be used for printing footnote numbers and mathematical formulas. The example below shows underlining and subscripts combined in a mathematical formula.

$$\text{average} = \frac{(a1 \quad t\,a_2 + \ldots\ldots\ldots + a_n)}{n}$$

Outline and shadow

The outline and shadow features are useful for adding variation and emphasis to text that you wish to stand out, such as headings. The following samples show the outline and shadow features individually, plus a combination of outline with shadow.

```
This is outline style.
This is shadow style.
This is outline with shadow.
```

Selecting Typestyles With Master Select

Your LQ-510 printer has a special ESCape code called Master Select that allows you to choose many combinations of these nine modes: 10 cpi, 12 cpi, proportional spacing, condensed, emphasized, double-strike, double-wide, italics, and underline. For more information on sending ESCape codes to your printer, see Chapter 9.

The format of the Master Select code is shown below:

ASCII:	ESC	!	n
Decimal:	27	33	n
Hexadecimal:	1B	21	n

The variable n is a number that identifies the mode or combination of modes. To find the value of n, use the following table to add up either the decimal or hexadecimal numbers for the features you want.

Feature	Dec.	Hex.
10 cpi	0	00
12 cpi	1	01
proportional	2	02
condensed	4	04
emphasized	8	08
double-strike	16	10
double-wide	32	20
italics	64	40
underline	128	80

For example, to print a title you may want to use double-wide 12 cpi characters printed in the double-strike mode. You would add three numbers together to calculate the value of n.

```
12 cpi            1
Double-strike   16
Double-wide     32

        n = 49
```

After calculating the value of n, you use the Master Select command to send the value to the printer.

ASCII:	ESC	!	1
Decimal:	27	33	49
Hexadecimal:	1B	21	31

The print quality and font must be set separately, using SelecType or the ESC x and ESC k commands. There are two more things to consider when using the Master Select command:

- Master Select cancels any of the other listed features that you do not set. For example, if you have already set a different character width and you use Master Select to set emphasized double-strike, the character width is reset to 10 cpi.

- Proportional spacing overrides 10, 12, and 15 cpi.

Graphics

The dot graphics mode allows your printer to produce pictures, graphs, charts, or almost any other pictorial image you can create.

Because many commercial software programs use graphics, you may be able to print pictures and graphs like the ones on this page and the next by simply giving your software a few instructions.

The quickest and easiest way to print graphics on your printer is to use a commercial graphics program. With such programs you usually create an image on your monitor then give a command to send the image to the printer.

If you use commercial software that produces graphics, all you need to know about dot graphics is how to use the software. The application program will take care of the printer. (Some programs call this bit image printing.) On the other hand, if you wish to do your own programming or merely wish to understand how this printer prints graphics, read on.

Income Breakdown

Marketing and Advertising

Profit

Salaries and Production

Future Development
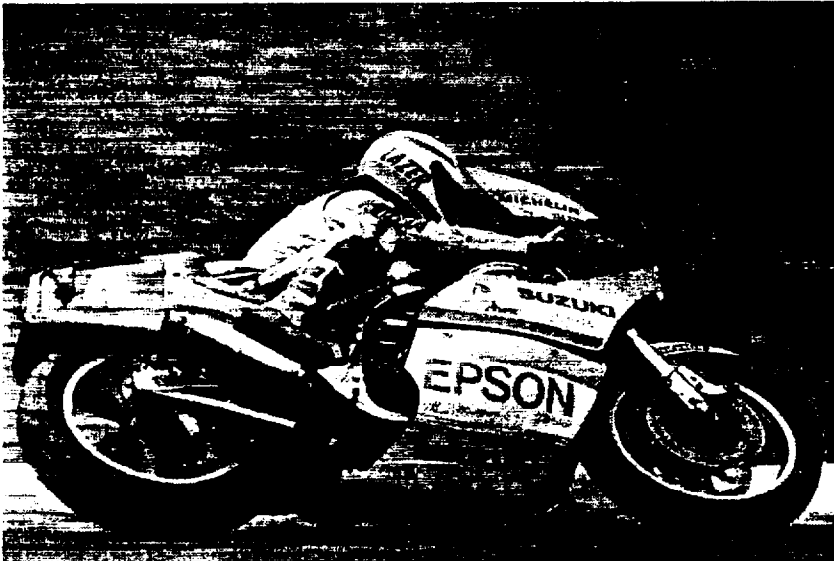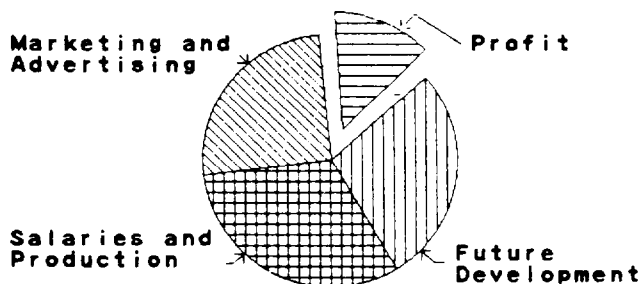
The Print Head

To understand dot graphics you need to know a little about how
your printer's print head works.

The print head has 24 pins. As the print head moves across the page,
electrical impulses cause the pins to fire. Each time a pin fires, it
strikes the inked ribbon and presses it against the paper producing a
small dot. As the print head moves along, the pins fire time after
time in different patterns forming letters, numbers, and symbols.

Because the dots overlap each other both horizontally and vertically
in Letter Quality mode, it is difficult to see the individual dots.
Instead, the letters and symbols seem to be made up of unbroken
lines.

In order for the dots to overlap vertically, the pins in the print head
are in more than one column, but the intelligence of the printer
handles the timing of pin firings so that the effect is that of 24 pins
arranged in a single vertical column.

Dot patterns

The print head is able to print graphics, as well as text because
graphic images are formed on the printer in about the same way
that pictures in newspapers and magazines are printed. If you look

closely at a newspaper photograph, you will find that it is made up
of thousands of small dots. Your printer also forms its images with
patterns of dots, as many as 360 dots per inch, horizontally and 360
dots per inch, vertically. The images printed by this printer can,
therefore, be as finely detailed as the ones at the beginning of this
section.

Twenty-four-pin graphics

The graphics mode that takes full advantage of this printer's print
head is 24-pin graphics. This mode has five densities, but for
simplicity this explanation deals with only one of them, triple-
density.

Triple-density prints up to 180 dots per inch, horizontally. As the
print head moves across the paper, every 1/180th of an inch it must
receive instructions about which of its 24 pins to fire. At each
position it can fire any number of pins, from none to 24. This means
that the printer must receive 24 bits of information for each column
it prints. Since the printer uses B-bit bytes of information in
communicating with the computer, it needs three bytes of
information for each position.

Pin labels

To tell the printer which pins to fire in each column, you first divide
each of the vertical columns into three sections of eight pins each
and consider each section separately. Since there are 256 possible
combinations of the eight pins in each section, you need a
numbering system that allows you to use a single number to specify
which of the 256 possible patterns you want. This numbering
system is shown below:

```
128 ○
 64 ○
 32 ○
 16 ○
  8 ○
  4 ○
  2 ○
  1 ○
```
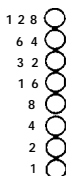
To fire any one pin, you send its number to the printer. To fire more than one pin at the same time, add up the numbers of the pins and send the total. Using these labels for the pins, you fire the top pin by sending 128. To fire the bottom pin, you send 1. If you want to fire only the top and bottom pins, you simply add 128 and 1, and send 129.

By adding the appropriate label numbers together, you can fire any combination of pins. Below are three examples of how to calculate the number that will fire a particular pattern of pins.
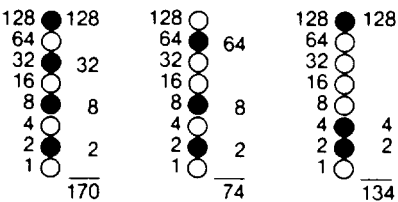
With this numbering system, any combination of the eight pins adds up to a decimal number between 0 and 255, and no numbers are duplicated.

Since there are 24 pins in each column, you must make a calculation for each of the three sections in each column. As you can see, this method of planning and printing dot graphics requires considerable calculation. Because triple-density uses 180 columns per inch, printing a single line of triple-density graphics only one inch long requires 540 numbers. Fortunately, commercial graphics software is available to do these calculations for you.

Before you can put these numbers into a graphics program, however, you need to know the format of the graphics command.

The Graphics Command

The graphics mode command is quite different from the other commands used by the printer. For most of the other printer modes, such as emphasized and double-wide, one ESC code turns the mode on and another turns it off. For graphics, the command is more complicated because the code that turns on a graphics mode also specifies how many columns it will use. After the printer receives this code, it interprets the numbers that follow as pin patterns and prints them on the paper.

Your printer has one command that allows you to use any of the 11 graphics options. The format of the command is:

ESC * m n1 n2 data

In this command, m selects the graphics option and n1 and n2 specify the number of columns to reserve for graphics. The available graphics options are listed below:

Option	Pins	m	Horiz. density dots/in.
Single-density	8	0	60
Double-density	8	1	120
High-speed double-density*	8	2	120
Quadruple-density*	8	3	240
CRT I	8	4	80
CRT II	8	4	90
Single-density	24	31	60
Double-density	24	33	120
CRT III	24	38	90
Triple-density	24	39	180
Hex-density*	24	40	360

. Adjacent dots cannot be printed in this mode.

Column Reservation Numbers

The graphics command requires more than one number to specify how many columns to reserve because one line can use thousands of columns, but the printer does not use numbers larger than 255 in decimal. Therefore the graphics mode command uses two numbers, n1 and n2, for reserving columns.

To find n1 and n2, divide the total number of columns by 256. The result is n2; the remainder is *n1.* Since the command is set up for two numbers, you must supply two even if you need only one. When you need fewer than 256 columns, just make n1 the number of columns you are reserving and make n2 a zero.

For example, if you wish to send 1632 columns of graphics data, n1 should be 96 and n2 should be 6 because $1632 = 96 + (6 \times 256)$.

The printer interprets the number of bytes specified by *n1* and *n2* **as** graphics data, no matter what codes they are. This means that you must be sure to supply enough bytes of graphics data or the printer will stop and wait for more data and will seem to be locked. If, on the other hand, you supply too much graphics data, the excess will be interpreted and printed as regular text.

A Simple Graphics Program

This first program is just a simple example to show you how the graphics command, column reservation numbers, and data can be used in a BASIC program.

Type in and run the following program. Be especially careful to include both semicolons. The program produces the printout you see below:

```
10 WIDTH "LPT1:",255
20 LPRINT  CHR$(27)"*"CHR$(32)CHR$(40)CHR$(0);
30 FOR X=1 TO 120
40 LPRINT CHR$(170);
50 NEXT X
```

Line 20 selects single-density 24-pin graphics mode (mode 32) and also reserves 40 columns for graphics. Since 24-pin graphics requires three bytes of data for each column, line 30 begins a loop to supply 120 bytes of data. Line 40 contains the number 170, which produces the first pin pattern shown in the section on pin labels, and line 50 ends the loop.

Designing Your Own Graphics

With what you know now, you can use the simplest application of graphics-calculating by hand the data to print the graphic image. While this method is the most tedious, it helps you understand dot graphics. It is also useful for small graphic elements that are used many times.

The illustration below shows how you can use a grid on paper to plan where you want dots to be printed. This grid is for a single line of graphics 42 columns long. Since each line of 24-pin graphics is approximately 1/8th of an inch high and since triple-density graphics prints 180 dots per inch, horizontally, a design planned on this grid will be about 1/8th of an inch high and less than 1/4th of an inch wide.
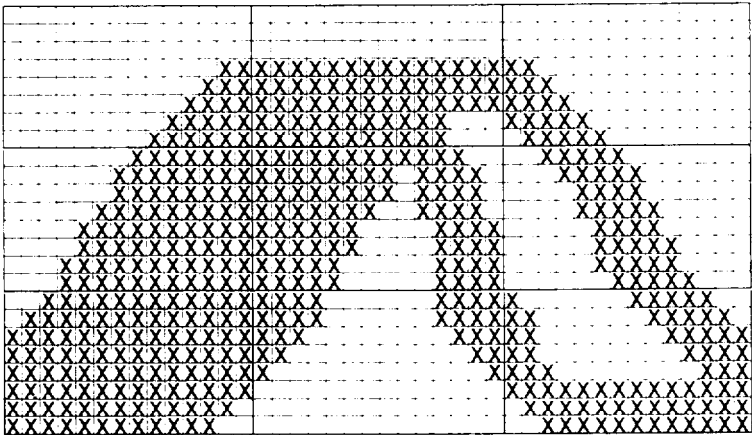
The actual pattern that the printer prints on the paper is, of course, made up of dots that overlap each other both vertically and horizontally. The reason the planning grid uses an x for each dot is that using an accurate representation of the dots makes calculating the data numbers difficult because they cover each other. Therefore, remember that each x represents the center of a dot, and the dots actually overlap.

Write the assigned values of the pins next to your design, then total the values for each column of dots. These totals are the values that you send to the printer as graphics data to print the design.

Below is the same grid divided into three sections to make the data calculation easier. At the bottom of each section of each column is the total of the pin numbers for that section. This gives you the total of 126 data numbers necessary to print this small figure.

Graphics
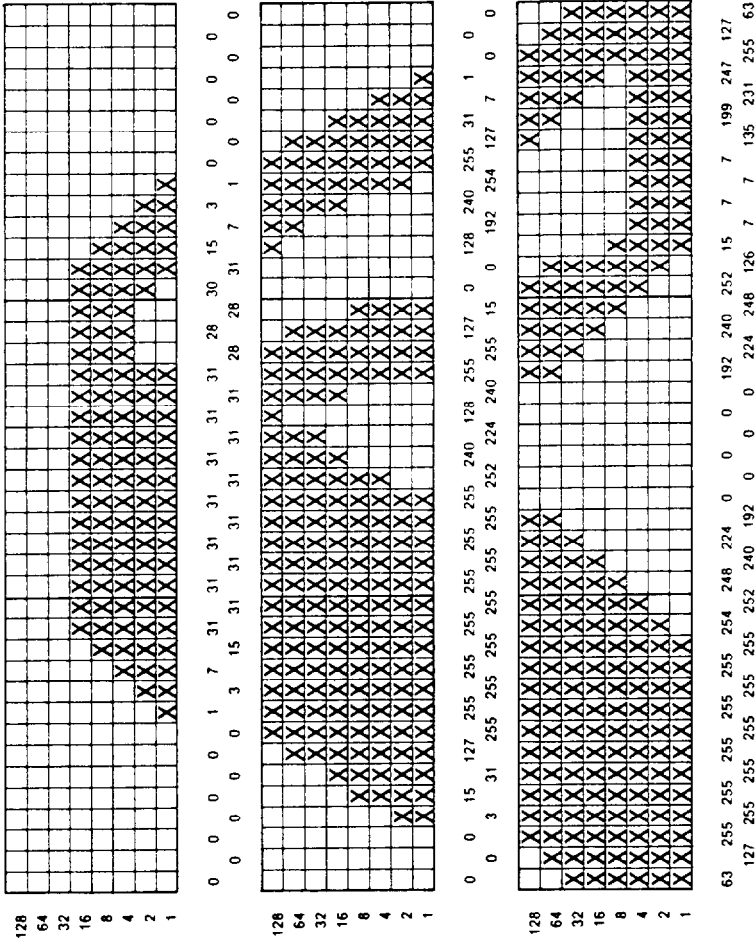
Below is the BASIC program that prints the design shown on the previous pages. Note that the data numbers in lines **80 through 140** are the same numbers that are at the bottom of each section in the last illustration. The WIDTH statement in line **10** is for IBM PC BASIC; the WIDTH statement format may be different for **your** system.

```
10 WIDTH "LPT1:",255
20  LPRINT  CHR$(27)"*"CHR$(39)CHR$(42)CHR$(0);
30 FOR X=1 TO 126
40 READ N
50 SPRINT CHR$(N);
60 NEXT X
70 LPRINT
80  DATA  0,0,63,0,0,127,0,0,255,0,3,255,0,15,255,0,31,255
90 DATA 0,127,255,0,255,255,1,255,255,3,255,255,7,255,255,15,
   255,255
100 DATA 31,255,254,31,255,252,31,255,248,31,255,240,31,255,
   224,31,255,192
110 DATA 31,255,0,31,252,0,31,240,0,31,224,0,31,128,0,31,240,0
120 DATA 31,255,192,28,255,224,28,127,240,28,15,248,30,0,252,
   31,0,126
130 DATA 15,128,15,7,192,7,3,240,7,1,254,7,0,255,7,0,127,135
140  DATA  0,31,199,0,7,231,0,1,247,0,0,255,0,0,127,0,0,63
```

In this program, line 20 assigns the graphics option (24-pin triple-density) with code 39. Code 42 sets the number of pin columns at 42. Lines 80 through 140 contain 126 bytes of data (42-pin columns x 3 bytes) for each pin column. Lines 30 through 60 print the design that you see below:

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Notice that the dots overlap quite a bit. This design was printed using the triple-density, 24-pin graphics option because the density is the same (180 dots per inch) in both directions.

Adding the following lines to the preceding program causes the pattern to print 10 times in a row as shown below:

```
15 FOR C=l TO 10: RESTORE
65 NEXT C
```

User-defined Characters

With this printer, it is possible to define and print characters of your
own design. You can design an entirely new alphabet or typeface,
create special characters for use as mathematical or scientific
symbols, or create graphic patterns with user-defined characters to
serve as building blocks for larger designs.

Below, you can see samples of typefaces created with the user-
defined character function.

ABCDEFGHIJKLMNOPQRSTUVWXYZ
ABCDEFGHIJKLMNOPQRSTUVWXYZ

Note: To use user-defined characters, you must turn DIP switch
2-5 off.

You can make the task of defining characters easier by using a
commercial software program that assists you in creating characters
or simply supplies you with sets of characters already created. Also,
some popular software programs make use of the printer's user-
defined character function to enhance printouts. (These characters
are called download characters in some programs.)

The standard ASCII characters are stored in the printer's Read Only
Memory (ROM) or optional Multi-Font Module, and the user-
defined characters are stored in the printer's Random Access
Memory (RAM).

Designing Your Characters

User-defined characters are like dot graphics because you send the
printer precise instructions on where you want each dot printed. In
fact, planning a user-defined character is like planning a small dot
graphics pattern.

Design grids

To design a character you use a grid that is 24 dots high-one dot for each pin on the printer's print head. The width of the character matrix depends on the character set in use. For draft characters, the grid is nine dots wide, for Letter Quality it is 29 dots wide, and for proportional characters it is 37 dots wide. The dots for both Letter Quality and proportional characters are spaced more closely together than those for draft characters.

The illustrations below show the two design grids. The line at the side, labeled cap, indicates the top of a standard capital letter. The line labeled base indicates the baseline for all letters except those with descenders (the bottom parts of such letters as j and y). The bottom row is usually left blank because it is needed for underlining.
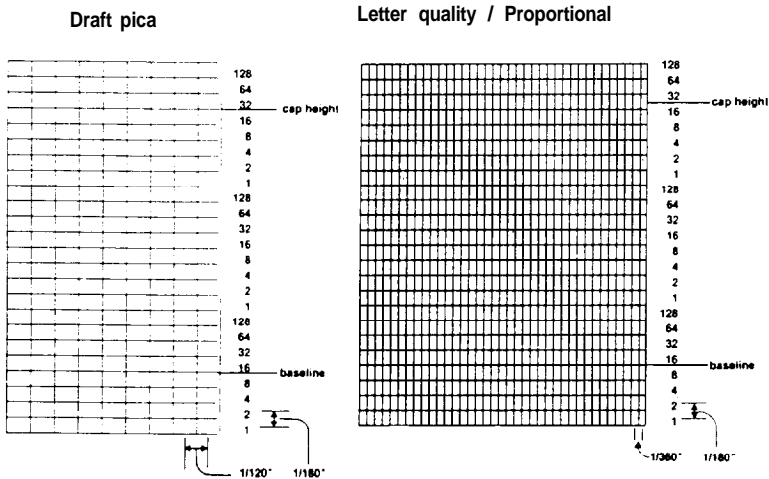
The grid on the right side can be used for either Letter Quality or proportional characters. For Letter Quality you do not use all the columns.

There is one restriction in designing characters. Dots in the same row may not print in adjacent columns. This means that there must be an empty dot position both to the left and right of each dot that prints. This is true in draft, Letter Quality, and proportional mode.

Defining Your Characters

The first step in defining characters is to place the dots on a grid just as you want them to print. The examples shown here, like the ones in the graphics section, use an x to represent each dot.

In the illustration below, you see a draft grid with a simple user-defined character planned on it.
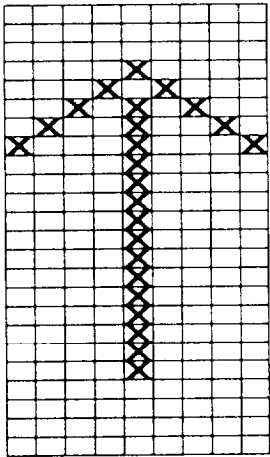
Now you translate the dot pattern you've created on paper to a numeric format so you can send the data to your printer. Every dot has an assigned value. Each vertical column (which has a maximum of 24 dots) is first divided into three groups of eight dots. Each group of eight dots is represented by one byte, which consists of eight bits. Hence, one bit represents one dot.

Data numbers

The bits within each byte have values of 1, 2, 4, 8, 16, 32, 64, and 128. In the vertical column of dots, the bits are arranged so that the most significant bit (with a value of 128) is at the top of the column and the least significant bit (with a value of 1) is at the bottom.

The next illustration shows how to use this method to calculate the data numbers for the character in this example. On the left side of the figure, the data numbers are calculated for the middle column. The value of each byte is calculated by adding the values of the rows in which dots appear. The right side of the figure shows the whole character with the three data numbers for each column indicated at the bottom.

This manual uses decimal numbers because the program examples are written in BASIC and everyone is familiar with decimals. The data you send to your printer, however, must be in the form (binary, decimal, hexadecimal) that you can use with your programming language.
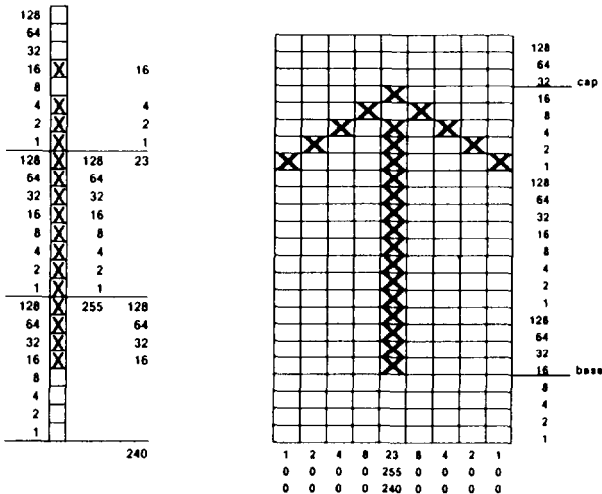
You have seen how to design a character by placing dots on a grid and translating the dots to decimal equivalents. The last step in defining a character is sending this information to your printer.

Sending Information to Your Printer

The printer loads characters in the print style (Letter Quality, draft, or proportional) that the printer is currently using. It also records whether italic, superscript, or subscript is turned on. This means that if you want to print a character in italics, for example, you must have the italic mode turned on when you define the character.

The command your printer uses to define characters is one of the most complex in its repertoire. The format of the command is this:

ESC & 0 n1 n2 d0 d1 d2 data

The ESC & is simple enough. The 0 (which is ASCII code 0, not the numerical zero in quotation marks) allows for future enhancements. At this time, it is always ASCII 0.

You can define many characters with a single command. The values n1 and n2 are the ASCII codes of the first and last characters you are defining. If you are defining only one character, n1 and n2 are the same. You can use any codes between decimal 32 and 127 for n1 and n2, but it is best not to define decimal 32, which is the code for a space. Also, you can use letters in quotation marks instead of ASCII codes for n1 and n2.

Note: Because user-defined characters require additional memory, you must set DIP switch 2-5 to 1 KB (off) before downloading these characters.

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An example will show how to specify n1 and n2. For instance, if you wanted to redefine the characters A through Z, n1 would be A (or ASCII code 65) and n2 would be Z (or ASCII code 90). So the command ESC & 0 AZ (followed by the appropriate data) would replace the entire alphabet of capital letters.

Following the specification of the range of characters to be defined in this command are three data bytes, d0, d1, and *d2,* that specify the width of the character and the space around it. The left space (in dot columns) is specified by *d0,* and the right space is specified by *d2.* The second byte, *d1,* specifies the number of columns of dots that are printed to make up the character. By varying the width of the character and the spaces around it, you can create proportional-width characters that print at draft speed. The table below shows the maximum values for these bytes.

Mode	*d 1*	*d0 + d1 + d2*
Draft	9	12
Letter Quality 10 cpi	29	3 6
Letter Quality 12 cpi	23	30
Proportional	37	42

The last part of the command to define your characters is the actual data that defines the dot patterns for each character. Since it takes three bytes to specify all the dots in one vertical column, your printer expects *d1* x 3 bytes of data to follow *d2.*

This example of a character definition program should make this clear:

```
10 LPRINT CHR$(27)"x0"
20 LPRINT CHR$(27)"&"CHR$(0);
30 LPRINT "@@";
40 LPRINT CHR$(l)CHR$(9)CHRS(l);
50 FOR I=1 TO 27
60 READ A: LPRINT CHR$(A);
70 NEXT I
80 LPRINT "@@@@@"
90 LPRINT CHR$(27)"%"CHR$(l);
100 LPRINT "@@@@@"
110 LPRINT CHE1$(27)"%"CHR$(0);
120 LPRINT "@@@@@"
130 END
140 DATA 1,0,0,2,0,0,4,0,0
150 DATA 8,0,0,23,255,240,8,0,0
160 DATA 4,0,0,2,0,0,1,0,0
```

In line 10, the ESC x0 command selects draft printing.

The actual character definition starts in line 20. The two @ signs in line 30 represent n1 and *n2,* the range of characters being defined (in this case, a range of 1). Line 40 contains *d0, d1,* and *d2.*

The information about the actual character design (which is contained in the DATA statements at the end of the program) is sent to the printer in the loop between lines 50 and 70.

Note: When defining Letter Quality or proportional characters, put a WIDTH statement in your program to prevent carriage return and line feed codes from interfering with your definitions.

Printing User-defined Characters

If you entered the previous program example, you defined an arrow
and placed it in the RAM location for ASCII code 64 (replacing the @
sign). You can now print out a three-line sample of your work. The
first and third lines (printed by lines 80 and 120) print the normal @
sign. The second line (printed by line 100) prints out the arrow that
you defined.

Run the program to see the printout below:

<div align="center">

@@@@@

↑↑↑↑↑

@@@@@

</div>

As you can see, both sets of characters (the @ from the original
characters in ROM that the printer normally uses and the alternative
character you defined) remain in the printer available for your use.
The command to switch between the two sets is used in line 90 and
110. It is:

<div align="center">

ESC % *n*

</div>

If n is equal to 0, the normal ROM character set is selected (this is the
default). If n is equal to 1, the user-defined character set is selected.
If you select the user-defined character set before you have defined
any characters, the command is ignored and the ROM characters
remain in use.

You may switch between character sets at any time--even in the
middle of a line. To try this, place semicolons at the end of lines 80
and 100 in the program example.

Copying ROM Characters to RAM

After running the program, if you select the user-defined character set and try to print other characters, the only one that will print is your arrow. Since no other characters are in the printer's user-defined RAM, there is nothing else to print. Other characters sent to the printer do not even print as spaces; it's as if they were not sent at all.

In many cases, you will want to redefine only a few of the characters to suit your needs--the rest of the alphabet will work fine as it is. As you have seen, it is possible to switch back and forth, at will, between the normal character set and your user-defined character set. It is, however, rather inconvenient.

Therefore, your printer has a command that allows you to copy all of the standard characters from ROM to the user-defined character set.

The command format is as follows, where the value of *n* represents the font family:

<div align="center">ESC: 0 n 0</div>

Note: This command cancels any user-defined characters you have already created. You must send this command to the printer before you define characters.

If you use this command at the beginning of a program, then define your special characters and select the user-defined set, you can print with the user-defined set as your normal character set. You never need to switch back and forth between sets.

Letter Quality Characters

If you select Letter Quality printing with the ESC xl command, you can design user-defined characters using up to 29 columns of the Letter Quality/Proportional grid. The dot columns are spaced closer together horizontally than draft dot columns (the horizontal dot spacing is 1/360th of an inch as opposed to 1/120th of an inch for draft characters).

Proportional mode characters

Selecting the proportional character mode yields user-defined characters of the highest resolution. Characters can be designed using all 37 columns of the Letter Quality/Proportional grid.

Remember that in Letter Quality and proportional modes, as in draft mode, you cannot place dots in adjacent columns. There must be an empty dot position both to the left and right of each dot that prints.

Superscripts and subscripts

You can also create superscript and subscript user-defined characters. Just as Letter Quality characters are defined when the Letter Quality mode is selected, superscript and subscript characters are created when either superscript or subscript is selected.

These characters can be used as either superscripts or subscripts. The characters are exactly the same; only their placement is different. The difference between these characters and regular characters is that superscript and subscript characters are smaller. They are a maximum of 16 dots high. Their maximum width in dot columns is shown in the table below:

Mode	d_1	$d_0 + d_1 + d_2$
Draft	7	12
Letter Quality	23	36
Proportional	23	42

Since superscript and subscript characters are smaller, when you
define them you only need two bytes of data for each vertical row of
dots. Design grids for these characters are shown in the figure
below:
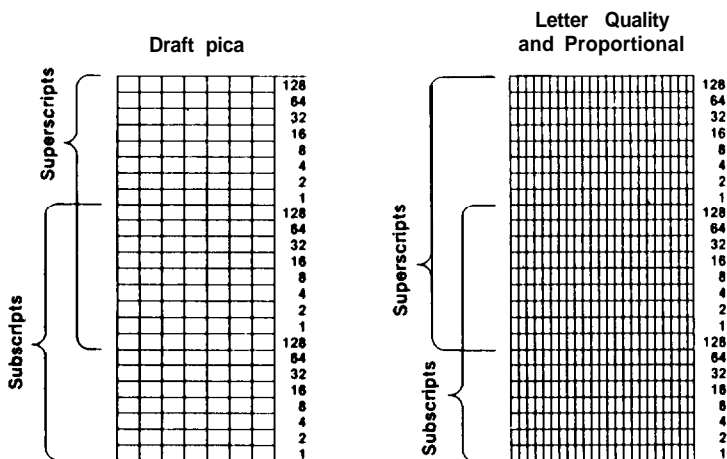
Mixing Print Styles

Each of the three user-defined character modes (draft, Letter
Quality, and proportional) can be used in combination with most of
your printer's various print styles. For instance, emphasized mode
works with user-defined characters. The characters you design are
enhanced to give this printing effect.

Mixing the three types of user-defined character sets is not possible.
For example, if you select draft and define some characters, then
select proportional and define some more, the first draft character
definitions are deleted. Only one type of character definition may be
stored in RAM at any time.

If you define characters in one mode, then switch to another mode and select the user-defined character set, the command is ignored and nothing is printed. The user-defined character definitions, however, remain unaffected. If you switch back to the mode in which they were defined, you can then select and print them.

Keep in mind that user-defined characters are stored in RAM, which is not permanent memory. When the printer power is turned off or the printer is initialized with the INIT signal, the user-defined characters are lost. (Some computers do this each time BASIC is loaded.)

Chapter 5
Using the Printer Options

5

The Cut Sheet Feeder

The optional cut sheet feeder (C806122) makes it possible to handle single-sheet paper more easily and more efficiently. Up to 150 sheets of standard bond paper can be fed automatically into the printer without reloading.

Installation

1. Make sure that the printer is turned off. Then remove the paper guide and printer cover.
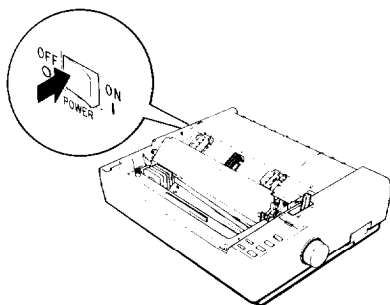
2. Replace the clear plastic part of the printer cover with the clear plastic part included with the cut sheet feeder.
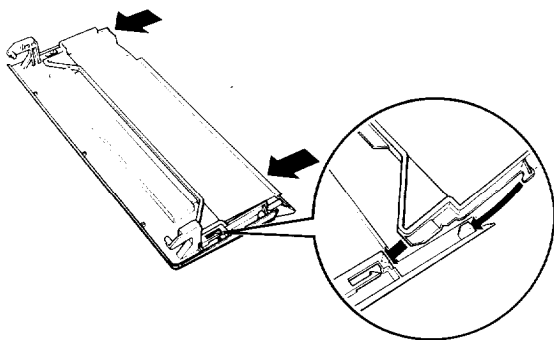
3. Make *sure* that the paper release lever is pushed all the way to the rear.
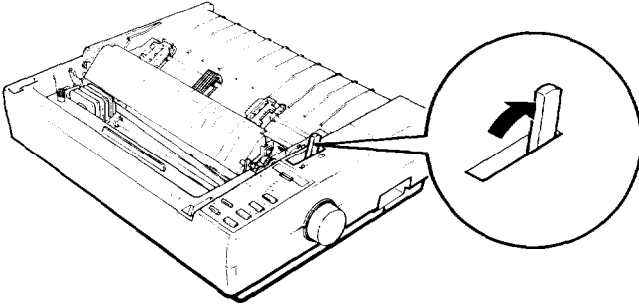
4. Insert the metal brackets into the cut sheet feeder. Then tilt the cut sheet feeder slightly forward to fit the notches at the base of the unit over the black pins inside the printer. Tilt the feeder back until it rests on top of the printer.
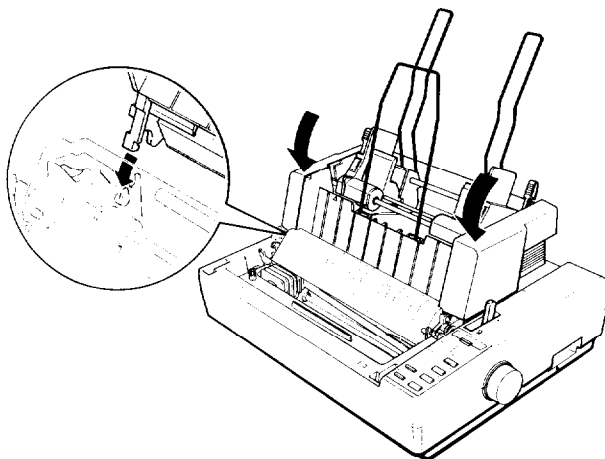
5. Attach the printer cover as shown in the illustration below.
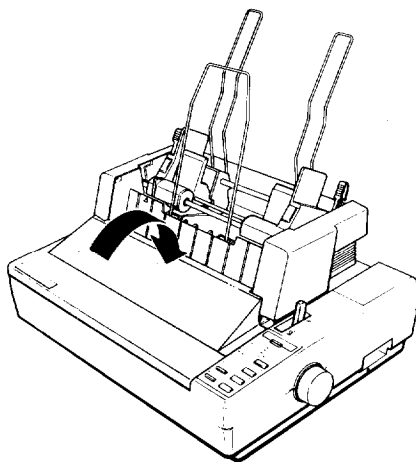
6. Turn on the cut sheet feeder mode by setting DIP switch 1-8 to on.
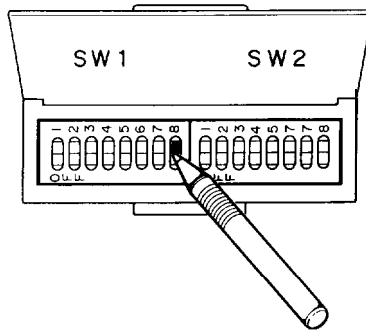
7. Turn on the printer.

Paper Handling

1. Make sure that the cut sheet feeder mode is turned on with DIP switch 1-8 and turn on the printer.
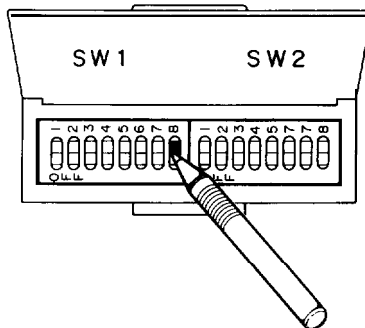
2. Pull the paper set levers all the way forward until the paper supports retract and lock open to allow for paper loading.
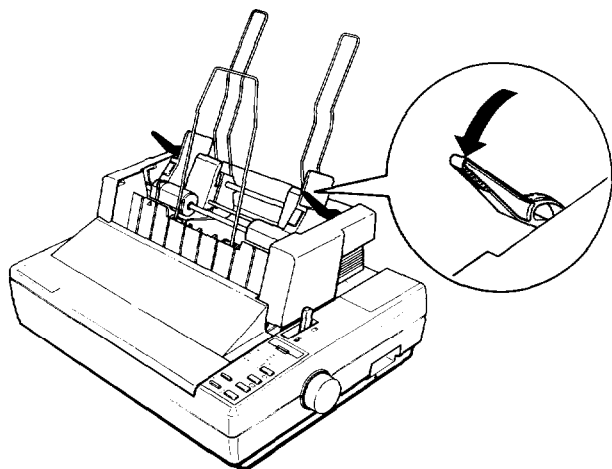
3. Slide the left paper guide to where the fin on the edge guide is slightly left of the arrow on the panel. Next, slide the right paper guide so that it roughly matches the width of your paper.
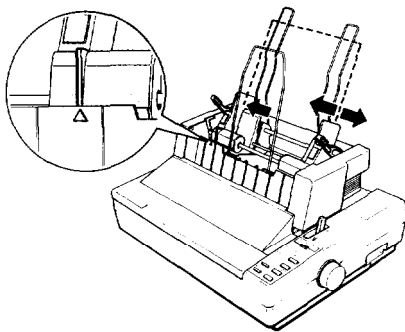
4. Take a stack of paper and fan it as shown. This keeps the paper from sticking and ensures that only one sheet feeds at a time. Tap the side and bottom of the paper on a flat surface to even the stack.
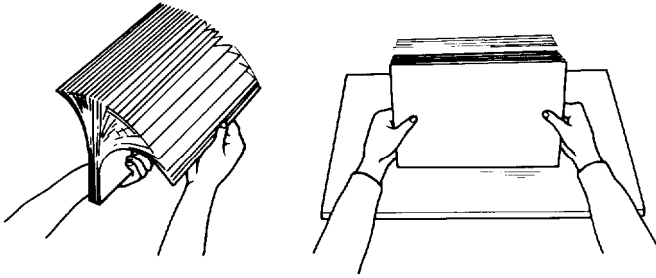
Note: For best results, use typewriter quality paper. If you plan to use paper with a glossy or textured surface, test it before using it to print documents. Do not use multi-part forms, carbon paper, envelopes, or labels in the cut sheet feeder.

5. Insert the stack of paper between the paper guides, aligning it with the left edge of the guide. Then adjust the right paper guide until the paper is held firmly, but not so tightly that it causes the paper to buckle. Make sure the paper can move up and down freely.
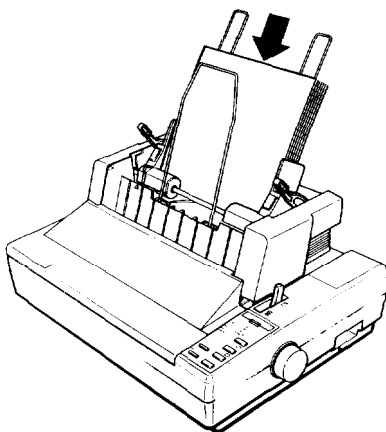
6. Push the paper set levers back until they click into place and clamp the paper against the guide rollers.
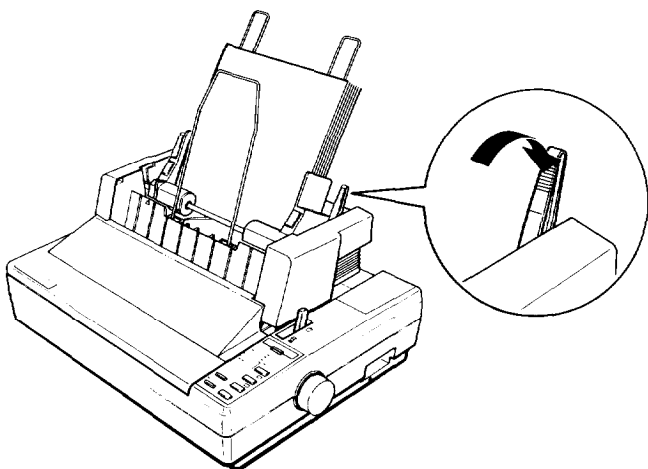
Testing the Printer in the Cut Sheet Feeder Mode

When you perform the cut sheet feeder self test, the printer counts the number of lines on the page. As shown on the following page, the number of lines counted is printed out at the bottom of the first test page. This number is the default page-length setting. This setting, however, can be overridden by software commands.

Running the self test is the same as when the cut sheet feeder mode is off. The steps below are for a self test in draft mode.

1. Make sure that the printer is turned off and a stack of paper is in the bin. Check that the cut sheet feeder mode is selected and the paper release lever is pushed to the rear.
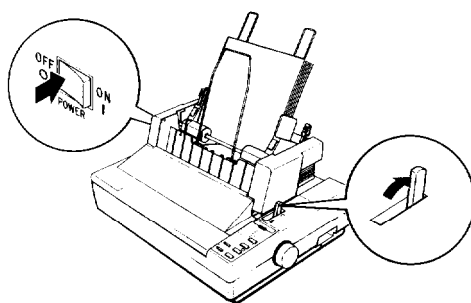
2. While holding down the LINE FEED button, turn on the printer. (For LQ mode, press the FORM FEED button instead of the LINE FEED button.)
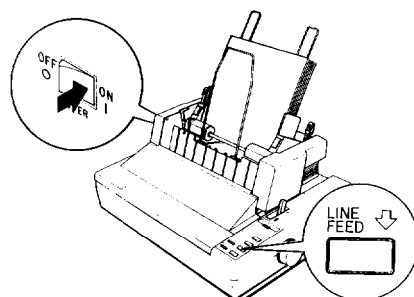
A part of the printout of the first sheet is shown below. The
printout of the second sheet is similar to the original self test
described in Chapter 1.

This is the first line.

This is line XX.
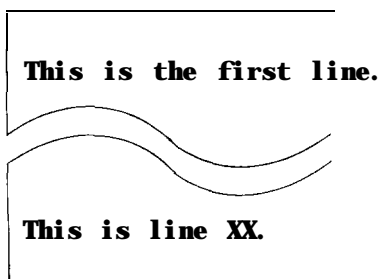
3.   The self test continues until the paper runs out or until you press
the ON LINE button. To stop the test, press the ON LINE button.
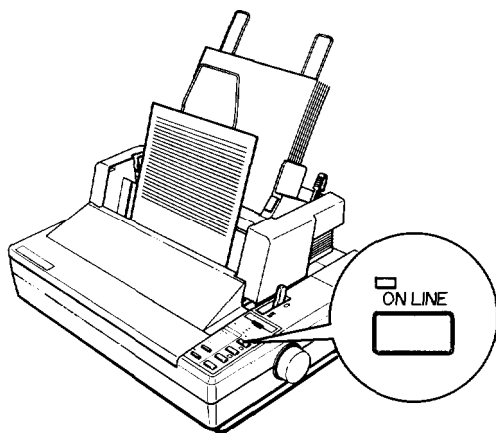
Note: To resume the test, press the ON LINE button once more.

4.   To end the self test when paper is loaded, press the LOAD/EJECT
button to eject the paper. Then turn off the printer.

Operating the Cut Sheet Feeder

After stacking paper in the cut sheet feeder, turn on the printer and make sure that the ON LINE light is on. In on line status, a new sheet of paper loads automatically whenever a printable character or line feed command is sent to the printer.

Paper out condition

When the printer is on line and receives print data from the computer, the first sheet loads automatically. Subsequent sheets load automatically as necessary.

- In the cut sheet feeder mode, the PAPER OUT light goes on while a sheet of paper is being fed, but the printer remains on line.

- When the specified paper bin is empty, the printer automatically goes off line, the PAPER OUT light goes on, and the beeper sounds. To resume printing, add more paper and press the ON LINE button.

  Note: If you turn off your printer during the time the printer detects a paper out or paper jam condition, any data remaining in the printer's buffer is discarded.

Single-sheet Insertion

Your cut sheet feeder also has a single-sheet loading feature. This feature is especially useful because it allows you to switch to a different type or size of paper (for one sheet only) without replacing the stack of paper in your cut sheet feeder.

1. Press the ON LINE button to set the printer off line.
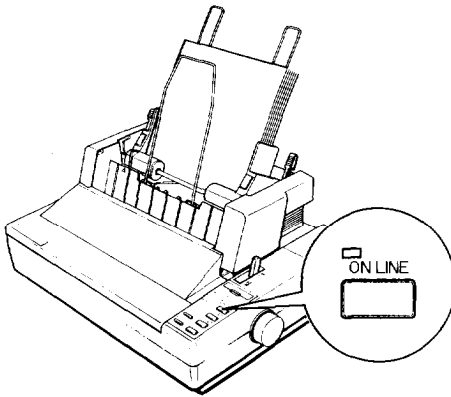
2. Align the single sheet to be fed with the mark on the left paper guide; then slide the sheet into the printer path until you feel resistance.
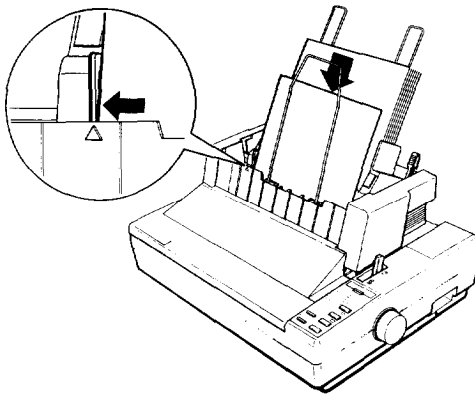
3. Press the LOAD/EJECT button to load the sheet.
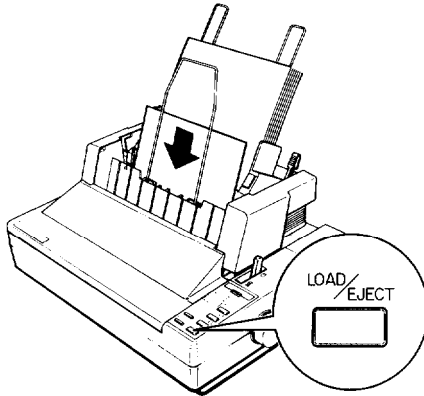
Control panel operation

To operate the cut sheet feeder manually from the control panel when the printer is in the cut sheet feeder mode, first make sure that the printer is off line.

LINE FEED   When there is paper in the printer, press this button to feed the paper one line or hold it down to feed the paper continuously.

FORM FEED   When there is no paper in the printer, press this button to load the paper. When there is paper in the printer, press this button to eject the sheet.

LOAD/EJECT   When there is no paper in the printer, press this button to load the paper. When there is paper in the printer, press this button to eject the sheet.

Software operation

The following commands cause the printer to eject the sheet in the printer without loading the next sheet.

FF: Form Feed

ESC EM R: Ejects a sheet in the cut sheet feeder mode

  Note: The ESC EM command is a software command used to control the operation of the cut sheet feeder. For more information about this command, see the Command Summary in Chapter 9.

If the paper reaches the bottom of the print area when any of the following line feed commands is used, the sheet in the printer is automatically ejected and the next sheet is loaded.

LF: Line Feed; advances the paper one line

VT: Vertical Tab; advances the paper to the next vertical tab position

ESC J: Line feed; advances the paper n/180th of an inch

Software is not effective while the printer is off line. Make sure that the printer is on line if you wish to control the cut sheet feeder using software commands.

Removing the Cut Sheet Feeder

1. Turn off the printer and remove any paper remaining in the bin and printer.
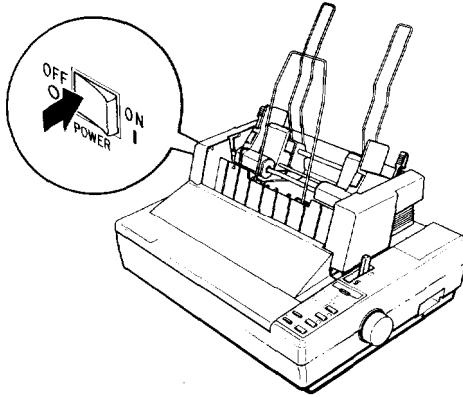
2. Remove the printer cover and tilt the cut sheet feeder back. Release its notches from the printer's pins, and then lift up and remove the cut sheet feeder.
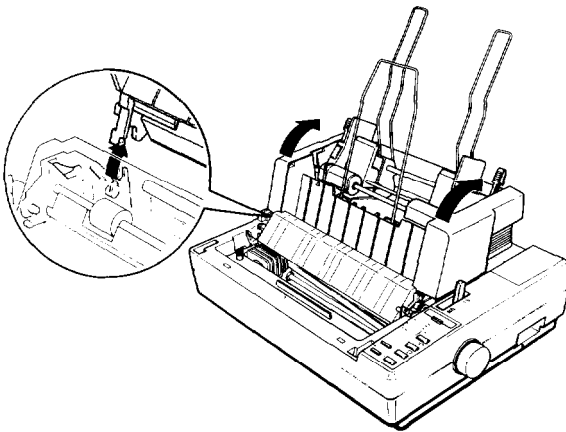
3. Set DIP switch 1-8 to off (to turn off the cut sheet feeder mode).

4. Replace the clear plastic part of the printer cover with the clear plastic part that was on it originally.

Removal of the cut sheet feeder is now completed. Be sure to store the removed cut sheet feeder in its original box and packing materials.

The Pull Tractor

The optional pull tractor (C800062) provides optimum continuous paper handling. The pull tractor is especially useful with continuous multi-part forms and labels. For best results, **use** the pull tractor along with the built-in push tractor as described in this section.

Installation

1. Turn off the printer and remove the printer cover and paper guide.

2. Remove the paper tension unit cover.
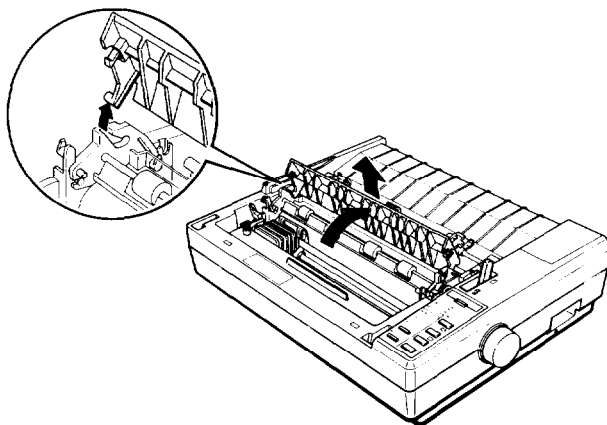
3. Fit the rear notches on the tractor over the rear mounting pins in the printer. Then tilt the tractor unit toward you until the front latches click in place over the black front mounting pins. Push down on the front latches to be sure they are firmly seated.
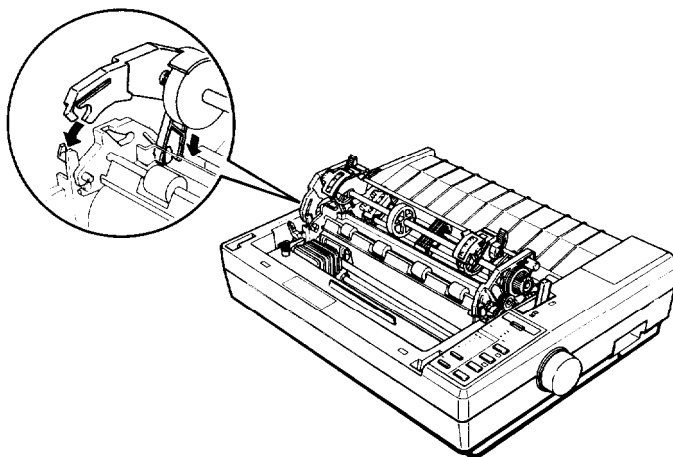
4. Pull the paper release lever to the continuous paper position and turn on the printer.
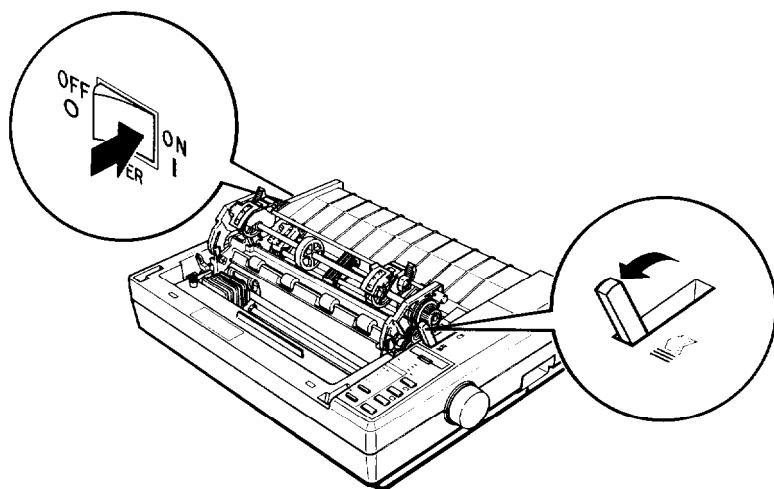
Paper Handling

1. Make sure that the printer is turned on and that the paper
   release lever is set forward to the continuous paper position.
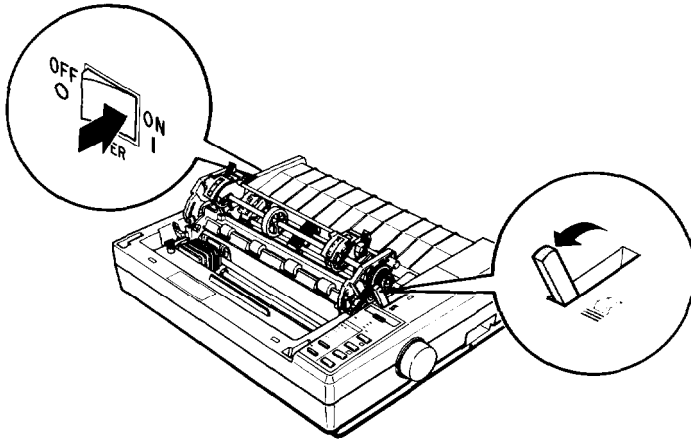
2. Set the first three holes of the continuous paper onto the built-in
   push tractor as described in Chapter 2.
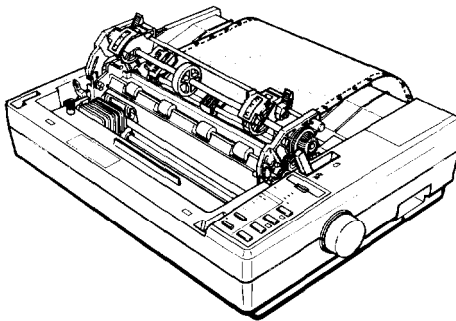
3. Press the LOAD/EJECT button to load the continuous paper; then press the FORM FEED button. This advances the paper one page so that you can fit the paper onto the pull tractor.

    Note: After you press the FORM FEED button, be careful not to touch any of the buttons on the control panel until step 10.
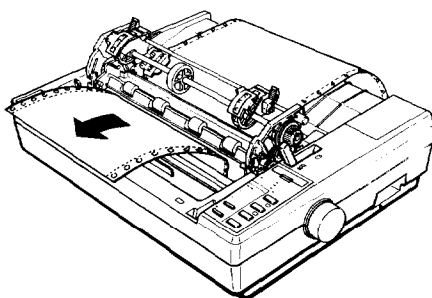
CAUTION: Never use the platen knob while the printer is turned on. To adjust the loading position, use the micro-adjustment feature described in Chapter 3.

4. Open the sprocket covers of the pull tractor and pull the sprocket lock levers toward you to release them.
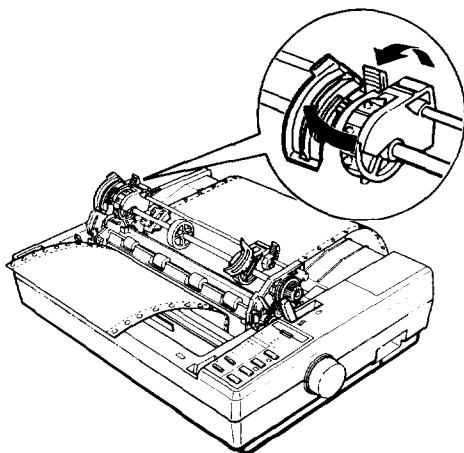
5. Adjust the sprocket units to match the width of the paper; then adjust the paper support so that it is halfway between the sprocket units.
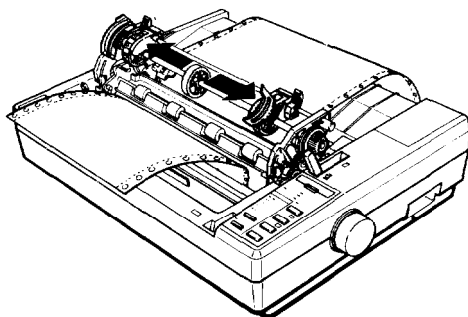
6. Fit the holes in the paper over the tractor pins on the sprocket units and close the sprocket covers.
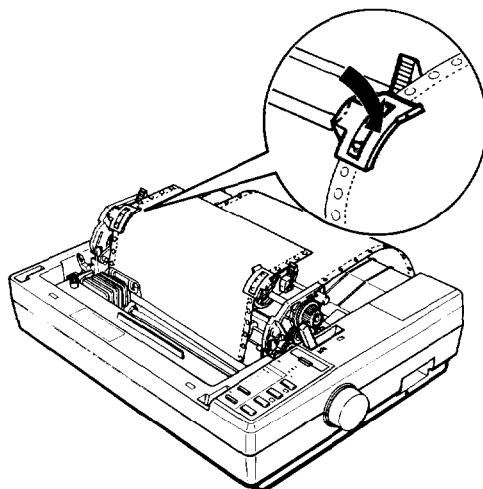
7. If the paper does not fit exactly onto the tractor pins or if the paper buckles, press in on the gray pull tractor knob and turn it in the desired direction until the paper fits properly.
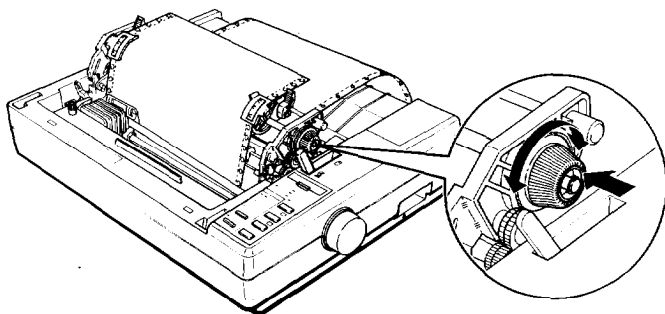
8. See that the paper is not crooked or wrinkled and lock the sprocket units in place.
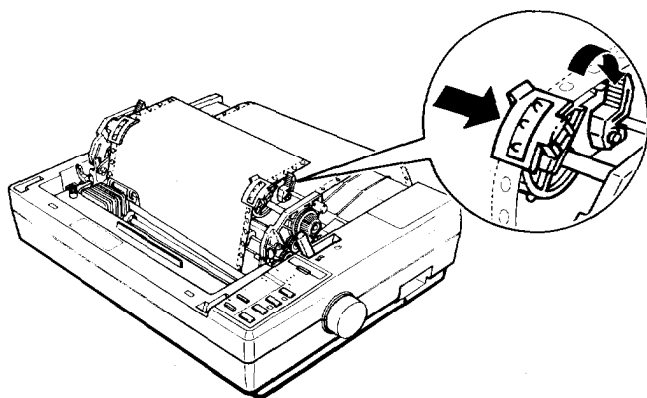
9. Replace the clear plastic part of the printer cover with the clear plastic part included with the pull tractor.
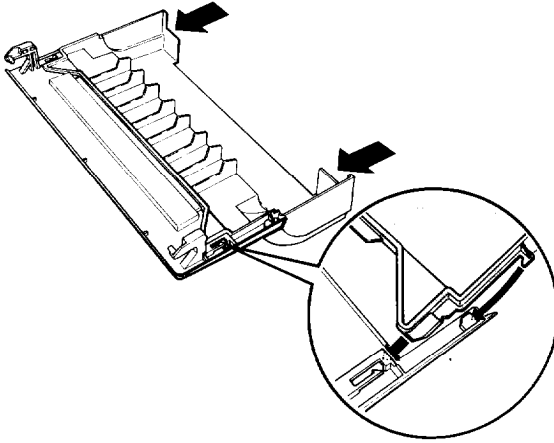
10. Install the paper guide; then install the pull tractor cover as shown below and press the ON LINE button to set the printer on line.
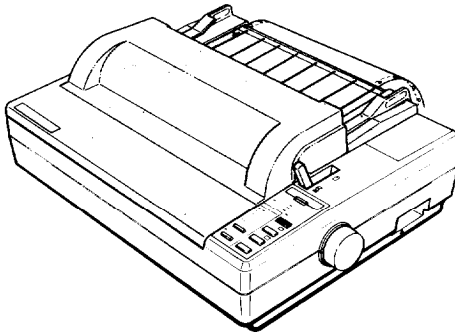
Although the pull tractor can be used in combination with the built-in push tractor as described above, the pull tractor can also be used by itself. Instead of setting the paper on the pins of the push tractor, simply insert it through the same paper path as you would use with single-sheet paper.

Note: Do not use the short tear-off feature with the pull tractor.

Removing the Pull Tractor

1. Make sure to tear off the printed document and remove the tractor cover and paper guide. Then turn on the printer.
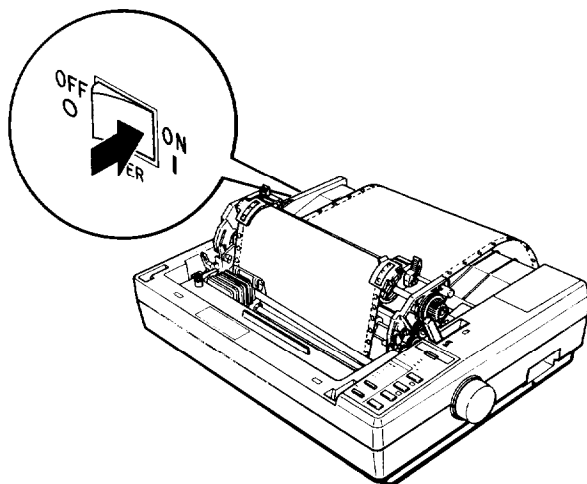
2. Press the ON LINE button to set the printer off line. Then, press
   the LOAD/EJECT button until the continuous paper feeds
   backward out of the paper path to the standby position. The
   PAPER OUT light comes on when the paper is completely out of
   the paper path.
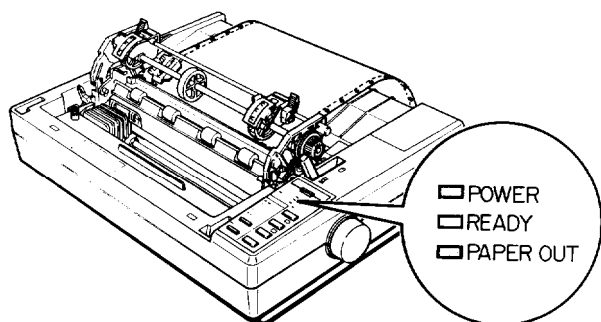
3. Remove the continuous paper from the push tractor unit.
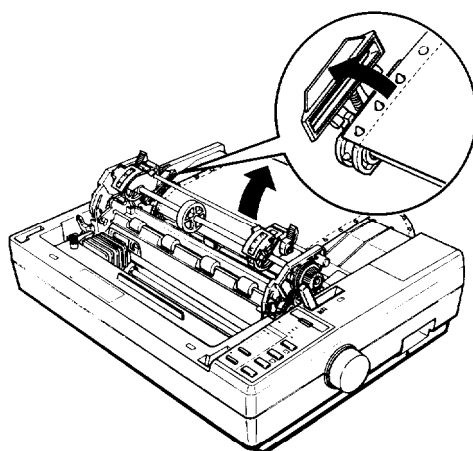
4. Hold the front latches between your thumb and index finger a gently lift them up, slowly tilting the unit back. Then push th paper release lever to the rear.
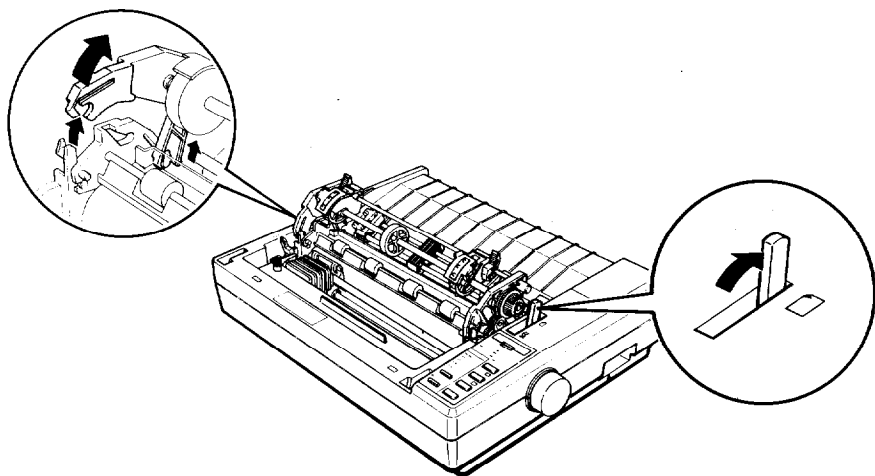
5. Replace the paper tension unit cover as shown below.
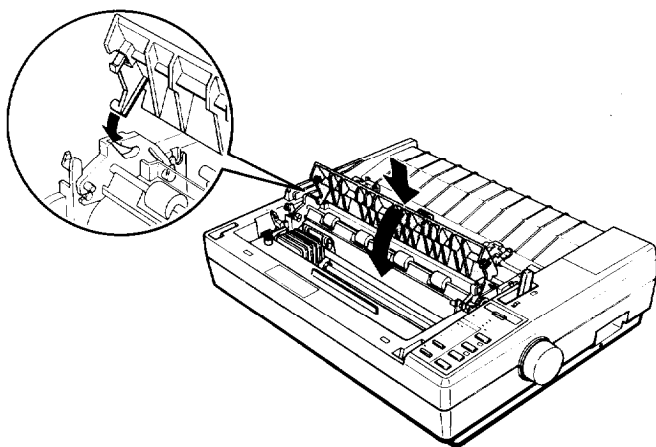
6. Remove the tractor cover from the printer cover and reassemble the printer cover.

7. Install the paper guide and printer cover.
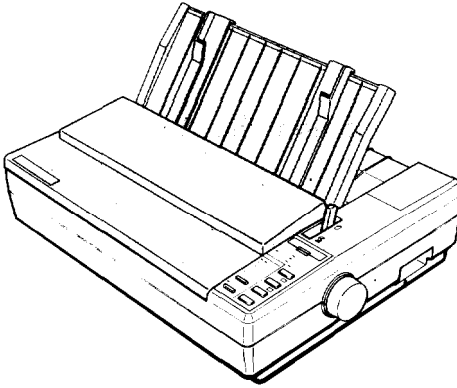
The Multi-Font Module

The optional Multi-Font Module gives you an easy way to have access to seven more fonts for your printer. After you install the Multi-Font Module in its slot, you can use any one of the following fonts as your default font when the printer is turned on and any of the others optionally by sending a command to the printer.

CAUTION: Do not insert the Multi-Font Module when the printer is turned **on.**

These are samples of the character sets of the Multi-Font Module's fonts:

Courier

```
!"#$%&'()*+,-./0123456789:;<=>?àABCDEFGHIJK
LMNOPQRSTUVWXYZ°ç§^_`abcdefghijklmnopqrstuv
wxyzéùè¨ÇüéâäàåçêëèïîìÄÅÉæÆôöòûùÿÖÜ¢£¥₧ƒáíó
úñÑªº¿⌐¬½¼¡«»
```

```
        We've just seen your excellent ad for
miniature zebras in  a recent  back issue of
Trader's Times. What is the price schedule
for quantities over one gross?
```

Prestige

```
!"#$%&'()*+,-./0123456789:;<=>?àABCDEFGHIJK
LMNOPQRSTUVWXYZ°ç§^_`abcdefghijklmnopqrstuv
wxyzéùè¨ÇüéâäàåçêëèïîìÄÅÉæÆôöòûùÿÖÜ¢£¥₧ƒáíó
úñÑªº¿⌐¬½¼¡«»
```

```
        We've just seen your excellent ad for
miniature zebras in a recent back issue of
Trader's Times. What is the price schedule
for quantities over one gross?
```

Script

!"#$%&'( )*+,-./0123456789:;<=>?àABCDEFGHIJK
LMNOPQRSTUVWXYZ°ç§^_`abcdefghijklmnopqrstuv
wxyzéùè¨ÇüéâäàåçêëèïîìÄÅÉæÆôöòûùÿÖÜ¢£¥₧ƒáíó
úñÑªº¿⌐¬½¼¡«»

*We've just seen your excellent ad for
miniature zebras in a recent back issue of
Trader's Times. What is the price schedule
for quantities over one gross?*

OCR-B

!"#$%&'()*+,-./0123456789:;<=>?àABCDEFGHIJK
LMNOPQRSTUVWXYZ°ç§^_`abcdefghijklmnopqrstuv
wxyzéùè¨ÇüéâäàåçêëèïîìÄÅÉæÆôöòûùÿÖÜ¢£¥₧ƒáíó
úñѪº¿⌐¬½¼¡«»

We've just seen your excellent ad for
miniature zebras in a recent back issue of
Trader's Times. What is the price schedule
for quantities over one gross?

OCR-A

!"#$%&'()*+,-./0123456789:;<=>?àABCDEFGHIJK
LMNOPQRSTUVWXYZ°ç§^Уꟼabcdefghijklmnopqrstuv
wxyzéùè¨ÇüéâäàåçêëèïîìÄÅÉæÆôöòûùÿÖÜ¢£¥₧ƒáíó
úñѪº¿⌐¬½¼¡«»

We've just seen your excellent ad for
miniature zebras in a recent back issue of
Trader's Times. What is the price schedule
for quantities over one gross?

Orator

!"#$%&'()*+,-./0123456789:;<=>?ÀABCDEFGHIJK
LMNOPQRSTUVWXYZ ç§ ABCDEFGHIJKLMNOPQRSTUV
WXYZÉÙÈ ÇÜÉÂÄÀÅÇÊËÈÏÎÌÀÅÉÆÆÔÖÒÛÙŸÖÜ¢£¥₧ƒÁÍÓ
ÚÑÑAO¿⌐¬½¼¡«»

**WE' VE JUST SEEN YOUR EXCELLENT AD FOR
MINIATURE ZEBRAS IN A RECENT BACK ISSUE OF
TRADER' S TIMES. WHAT** IS **THE PRICE SCHEDULE
FOR QUANTITIES OVER ONE GROSS?**

Orator-S

!"#$%&'()*+,-./0123456789:;<=>?àABCDEFGHIJK
LMNOPQRSTUVWXYZ ç§ abcdefghijklmnopqrstuv
wxyzéùè çüéâäàåçêëèïîìÀÅÉæÆôöòûùÿÖÜ¢£¥₧ƒáíó
úñÑ0O¿⌐¬½¼¡«»

We've just seen your excellent ad for
miniature zebras in a recent back issue of
Trader's Times, What is the price schedule
for quantities over one gross?

Installation

1. Turn off **the** printer. See the font family table on page 5-33 and
    dial the rotary switch to the font of your choice.
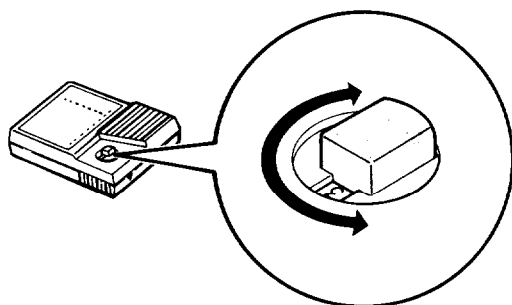
2. Hold the module with the rotary switch on the top and plug it into the slot.
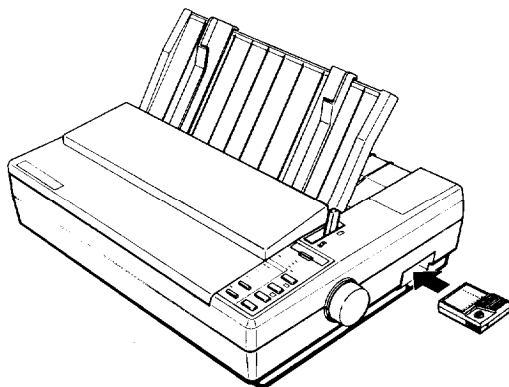
3. Turn the printer on; then select the slot by pressing the FONT switch on the operating panel.
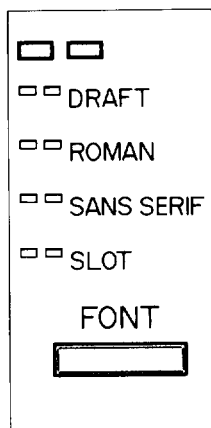
WARNING: Always turn off the power before inserting or removing the module; otherwise you may seriously damage the printer or the module.

Selecting a Font

This table shows the family numbers and characters per inch of the fonts in the Multi-Font Module.

Font name	Family number	Characters per inch
Courier	2	10, 12, 15
Prestige	3	10, 12, 15
Script	4	10, 12, 15
OCR-B	5	10
OCR-A	6	10
Orator	7	10
Orator-S	8	10

There are two ways to select a font from the module:

- With the printer turned off, dial the family number of the font with the rotary switch on the module. When the printer is turned on, that font becomes the default font if the slot is selected with the DIP switch setting or by pressing the button **on** the control panel.

- Send a software command, ESC k, to the printer to select the family number. See the Command Summary in Chapter 9 for details.

Proportional spacing is **not** effective when printing any font in this module.

Numbers 0, 1, and 9 are not used.

The Interface Boards

A number of optional interfaces are available in case your computer is either not provided with a parallel interface or you wish to increase the memory capacity of your printer's buffer.

Choosing an Interface

Optional interfaces can be divided into three main categories which are described briefly below.

IEEE-488 interfaces offer standardized connections, trouble-free operation, and the ability to connect computers, printers, and other devices on the same line so that they may share data freely.

The buffered parallel interfaces also offer trouble-free operation and standardized connections. They provide the printer with more memory to free the computer for other tasks when printing large amounts of text or graphics. You can increase the printer's data buffering capacity by an additional 32 KB (about 10 pages).

Serial interfaces are required if your computer is not equipped with a parallel interface or if you need an interface that conforms to the Current Loop standard instead of RS-232C. These interfaces also provide some combination of the following features: X-ON/X-OFF data communication protocol, loopback self test modes, and data buffers that increase the printer's data buffering capacity by 8 KB.

If you are unsure whether you need an optional interface or would like to know more about interfaces, contact your Epson dealer.

Compatible Interfaces

The following is a list of Epson interfaces that are compatible with
your LQ-510 printer.

Interface number	Name
#8143	New Serial Interface
#8148	Intelligent serial interface
#8165	Intelligent IEEE-488 interface
#8172	32 KB buffered parallel interface

All Epson interfaces have the Epson name printed on them. If the
board has an identification code printed on it, it is a four-digit
number beginning with 8 and should correspond to one of the
numbers listed in the table above.

Also Coax and Twinax interfaces are available from third party
vendors. These interfaces allow connectivity to mainframes and
minicomputers and emulation of IBM printers. The Coax
(EP-Connect) is available from Avatar Corporation (508) 435-6872, and
the Twinax (I-08300) is available from I-O Corporation (801) 973-6767.

Installation

1. Unplug the printer and remove the printer cover and paper guide.

   WARNING: High **voltages** are present inside the printer
   when the power is on. Do not attempt to remove the
   upper case unless the printer is turned off and the power
   cord is unplugged. Also, try not to touch **contacts** on the
   circuit board of the printer because many of the
   components **can** be destroyed by the static electricity
   present in your body.

   Do not change the settings of any DIP switches on the
   main board.

2. Remove the screw securing the interface board cover and lift off
   the cover.
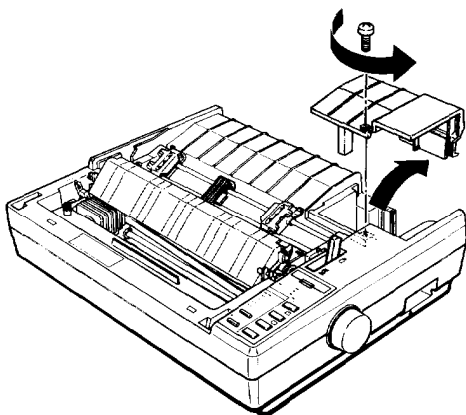
3. Remove the screw labeled CG from the main board.
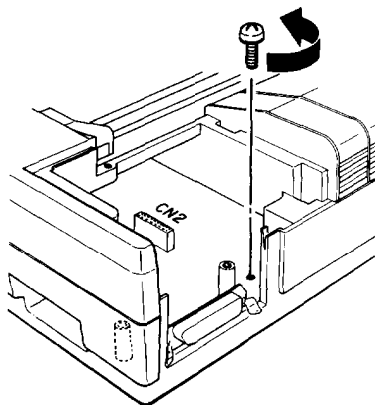
Installing the board

There are two basic interface board designs-one with the FG wire
not attached and one with the FG wire attached. This slight
difference changes the way the boards are installed in the printer
but does not affect the operation of the interface in any way. Check
to see which type of interface board you have.
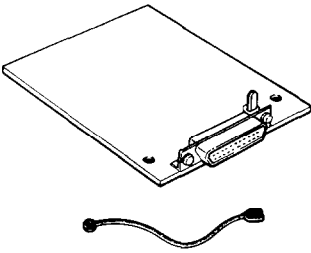
FG wire not attached
See below
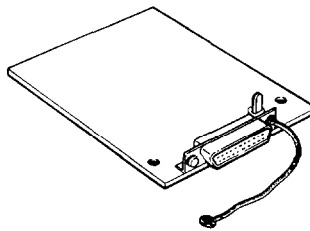
FG wire attached
Skip to page 5-39

FG wire not attached

1. Use the CG screw to attach the round end of the FG (frame
   ground) wire to the main board and position the other end as
   shown.
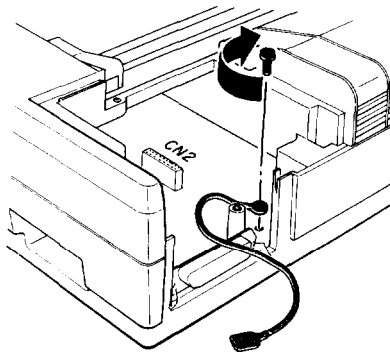
2. Carefully insert the pins on the optional interface board into the mating connector on the main board; then secure the board with the screws provided.
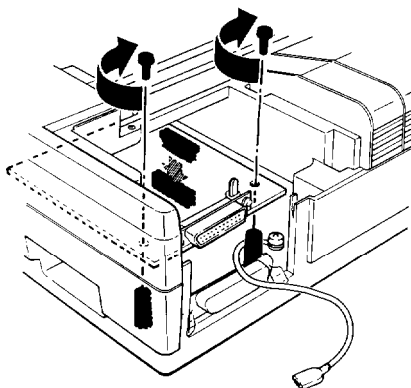
3. Attach the plug end of the FG wire onto the FG pin located on top **of** the interface board.
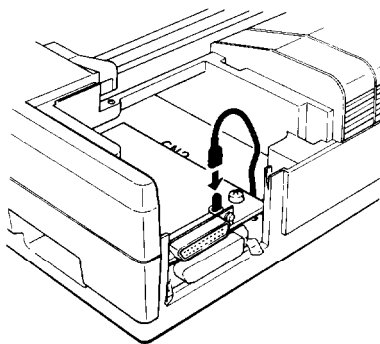
4. Set the DIP switches on the interface board according to the manual accompanying it.

FG wire attached

1. Carefully place the interface board next to the printer as shown
    below. Use the CG screw to connect the round end of the FG
    (frame ground) wire to the main board.
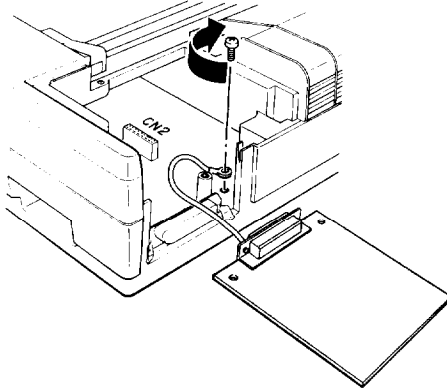
2. Holding the interface board level, rotate it into position and
    attach it to the main board. Make sure that the connector pins
    are properly inserted into the mating connector.
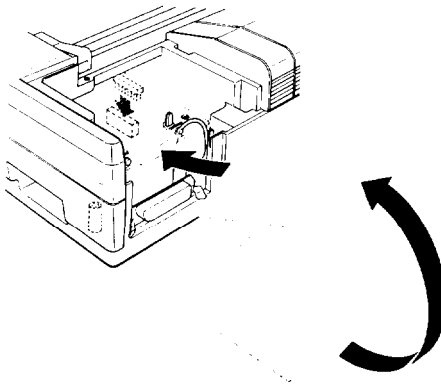
3. Secure the board with the screws provided.
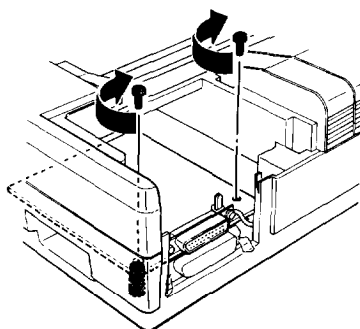
4. For all interface boards except #8l43 New Serial Interface board, set the DIP switches on the interface board according to the manual accompanying it. If you have the #8143, see page 5-41.

Attaching the interface board cover

I. Bend back the hinge plate on the interface board cover as shown below.
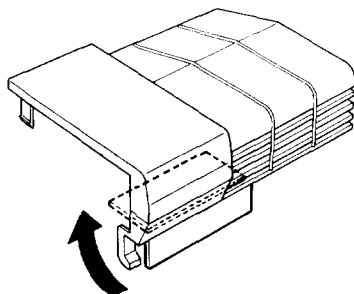
   Note: When you reattach the interface board, rebend the plate to cover the opening. The plate is sturdy, but be careful not to subject it to excessive bending.

2. Reattach the board cover.
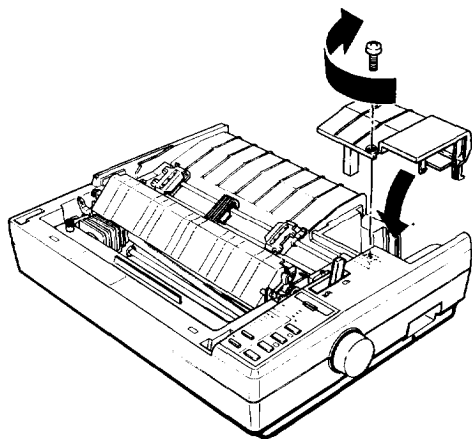
> ⚠ **CAUTION:** When an optional interface board is installed, be sure to disconnect the printer cable from the printer's built-in parallel interface. Two interface cables must not be **connected at the same time.**

#8143 New Serial Interface

If you are using an optional interface, it may be necessary for you to alter the communication protocol of the printer or the computer so that they can communicate properly. In most cases, you should use the information in your optional interface manual or your computer's manual to match the computer with the interface.

If you are using the #8143 optional interface board, make sure that you read through the section below on baud rate selection. You may also want to see the sections on handshaking timing and error handling for interface information specific to the LQ-510 printer.

For all other data transfer conventions, such as word structure or communications protocol, use the information in the manual supplied with your #8143 optional interface.

Baud rate selection

You can select baud rates from 75 to 19,200 BPS (Bits Per Second). When setting the baud rate, make sure you use the bit rate selection table for printers with buffers (in the #8143 interface manual).

For more information on the LQ-510's input buffer settings, see the section on DIP switch functions in Chapter 3 of this manual.

Handshaking timing

When the vacant area for data in the input buffer drops to 256 bytes, the printer outputs an X-OFF code or sets the DTR flag to "1" (MARK) indicating that it cannot receive data.

Error handling

When a parity error is detected, your printer prints an asterisk (*). All other errors, including framing and overrun, are ignored.

Chapter 6
Maintenance

6

Cleaning the Printer

To keep your printer operating at its best, you should clean it thoroughly several times a year. Follow the steps below:

1. Make sure that the printer is turned off. Then remove the paper guide or the cut sheet feeder.
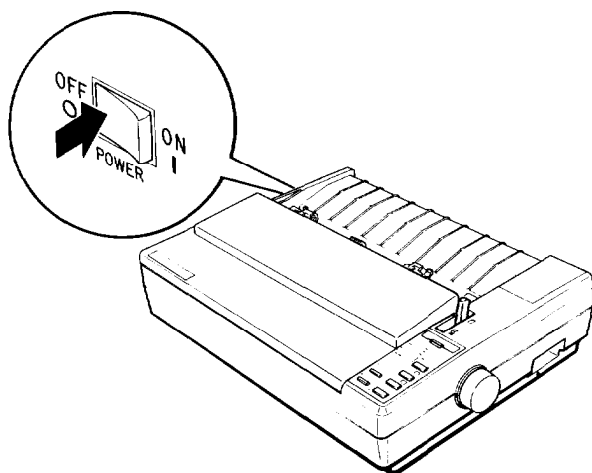
2. Using a soft brush, carefully remove all dust and dirt.
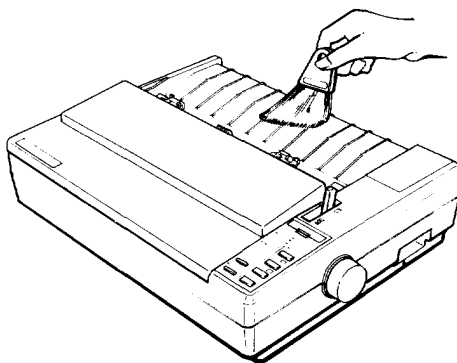
3. If the outer case or paper guide is dirty or dusty, clean it with a soft, clean cloth dampened with a mild detergent solution. Keep the printer cover in place to prevent water from getting inside the printer.
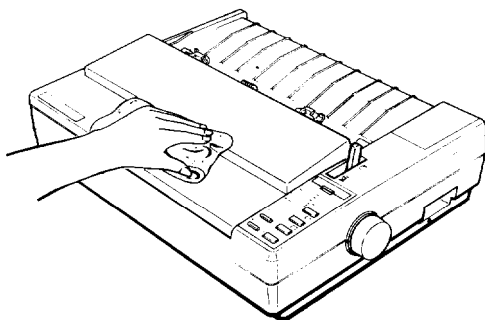
WARNINGS:

- Never use alcohols or thinners to clean the printer, since these chemicals can damage the components as well as the case.

- Be careful not to get water on the printer mechanism or electronic components.

- Do not use a hard or abrasive brush.

- Do not spray the inside of the printer with lubricants; unsuitable oils can damage the mechanism. Contact your Epson dealer if you think lubrication is needed.

Replacing the Ribbon

Replace the ribbon when the printout becomes too faint. The #7753 standard ribbon cartridge or #7768 film ribbon cartridge are recommended for the LQ-510 printer. Do not use ribbons designed for nine-pin printers.

1. Make sure that the printer is turned off. Then remove the printer cover.
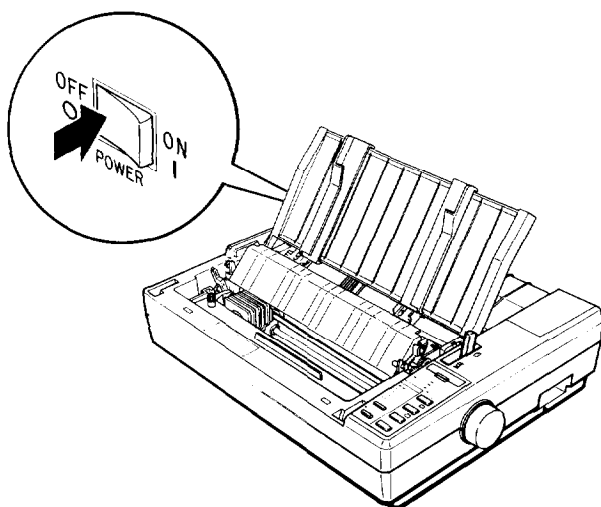
2.   Open the paper tension unit cover.
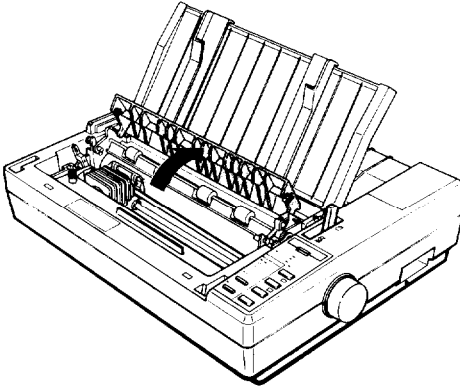
3.   To remove the ribbon cartridge, grip it by the black plastic tab
     and lift the cartridge straight up and out of the printer.
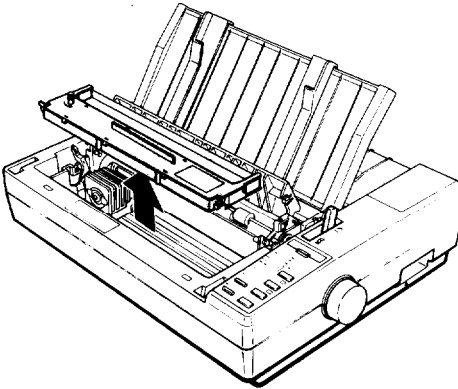
⚠ **WARNING:** If the printer has just been used, the print
head may be hot. Let it cool before attempting to replace
the ribbon.

4. Slide the print head to the middle of the printer.
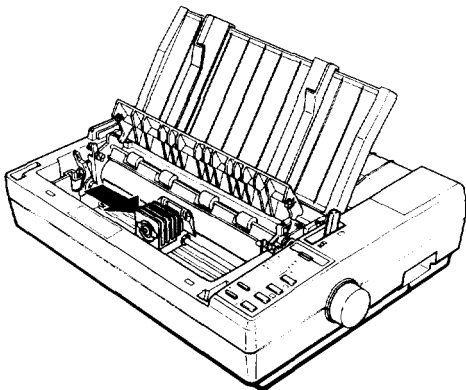
5. To remove slack in the new ribbon, turn the ribbon-tightening knob in the direction of the arrow.
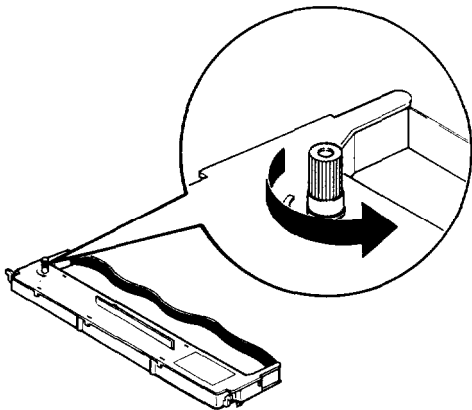
6. Push the new ribbon cartridge firmly into position, making sure the plastic hooks fit into the slots, as shown below.
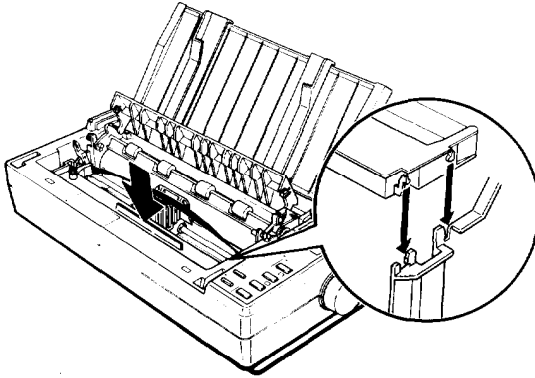
Note: Press lightly on both sides of the cartridge to make sure the hooks are properly inserted.

7. Use a pointed object, such as a ball point pen, to guide the
    ribbon between the print head and ribbon guide while you turn
    the ribbon-tightening knob to help feed the ribbon into place. Be
    careful not to puncture the ribbon.
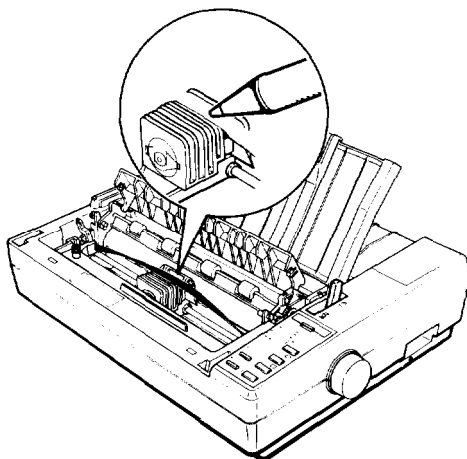
8. Slide the print head from side to side to make sure it moves
    smoothly. Also see that the ribbon is not twisted or creased.
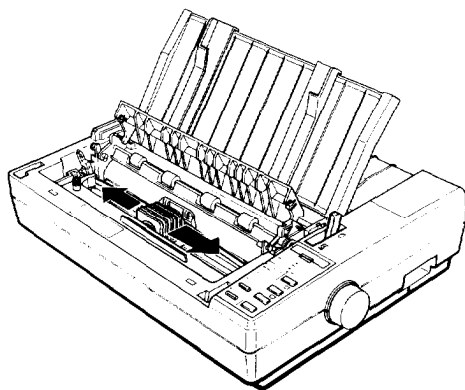
9. **Close** the paper tension unit cover.
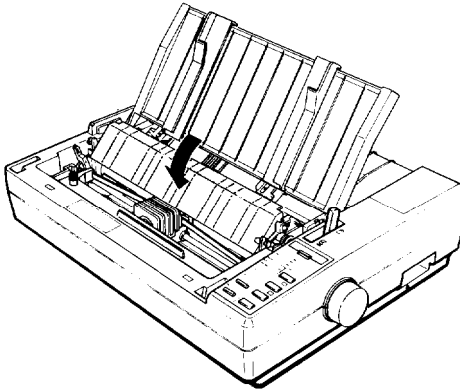
10. Insert the hooks on the printer cover unit into the printer, and then tilt the printer cover back into place.
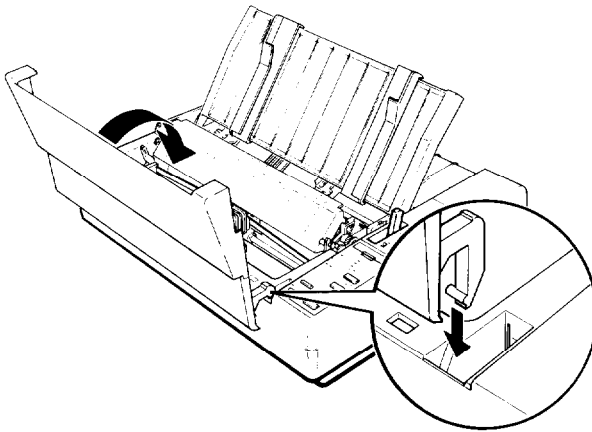
Transporting the Printer

Before you transport your printer some distance, carefully repack it in the original box and packing materials according to the following instructions.

1. Make sure the printer is turned off. Then remove any installed options, as well as the paper guide and printer cover.

    WARNING: Turn the printer off before unplugging the power cable from the AC outlet.

2. Unplug the power cable from the electrical outlet. Coil the cable and tie it; then disconnect the interface cable from the printer and the computer.

3. Remove the ribbon cartridge and platen knob.
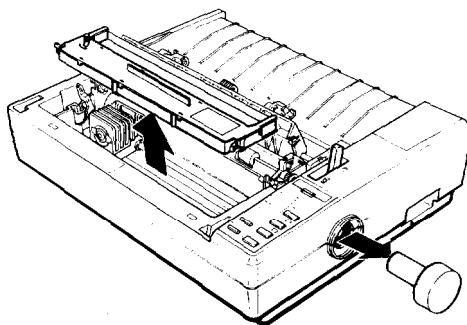
4. Replace the packing materials and put the printer in its box.

Chapter 7
Troubleshooting

7

Problems and Solutions

This chapter discusses problems you may encounter while operating your printer and their likely solutions. If you are having difficulty achieving the desired printing result, first locate the problem in the table below and then see the appropriate page for the solution.

Power supply

Printing

Paper handling

Options

- Using the cut sheet feeder, the paper does not
  feed properly.   See 7-24

- Using the pull tractor with the push tractor,
  continuous paper does not feed properly.   See 7-28

- Using the font module, the module's fonts
  do not print.   See 7-32

- Using an optional interface, the printer does
  not operate properly.   See 7-32

Power Supply

Problem	Solution
Power is not being supplied.	
The POWER light does not go on.	The power cable may be loose or not properly plugged into the electrical outlet. Turn off the printer and see that the power cable is properly plugged in to the electrical outlet.
	The power switch is off. Turn on the switch.
	Power is not being supplied to the electrical outlet. Plug another electrical device into the outlet to determine whether the outlet is operating properly. If the electrical outlet is controlled by a switch, use an electrical outlet that is not controlled by an outside switch.

Printing

Problem	Solution
The printer does not print.	
The ON LINE light is on *but nothing is printed.*	The software may not be installed properly for your printer. Check the printer settings and make the necessary changes.
	The interface cable may be loose. Check both ends of the cable between the printer and the computer. Secure the connector using the wire retaining clips.
	You may not be using the correct interface cable. Make sure your interface cable meets the printer and the computer specifications.
The ON LINE light is off.	The printer may be off line and cannot receive data. Press the ON LINE button. The ON LINE light should go on. See Chapter 3.
The PAPER OUT light is on.	The paper may be set too far to the right, so that the paper detector cannot sense it. Move the paper a little to the left. The PAPER OUT light should go off.
	The printer may be out of paper. Load more paper into the printer. See Chapter 2.

Problem	Solution
The printer does not print (continued).	
The printer sounds like it is printing, but *nothing is printed.*	The ribbon cartridge may not be installed properly. Turn off the printer, reinstall the ribbon cartridge, and take up any slack in the ribbon.
	The ribbon may be worn. Replace the ribbon cartridge. See Chapter 6.
The printer makes a strange noise, the buzzer sounds several times, and the printer stops abruptly.	This indicates an error in printer operation. Turn off the printer, check for paper jams or other problems, then turn the printer back on. If the printer still does not print correctly, contact your Epson dealer.
The ON LINE light is flickering but the printer does not print, or it stops printing abruptly.	The print head is overheated. Wait a few minutes; the printer resumes printing automatically when the print head cools.
The print is faint or uneven.	
Printed characters have parts missing at the bottom as shown here. A B C D	The ribbon cartridge may not be installed properly. Remove the ribbon cartridge and reinstall it. Make sure the cartridge hooks are inserted securely into the printer. See Chapter 1.

Problem	Solution
The print is faint or uneven (continued).	
The printout is faint.	The ribbon may be worn out. A worn ribbon can damage the print head and should be replaced. Install a new ribbon cartridge. See Chapter 6. The paper thickness lever may not be set correctly for the paper you are using. Set the paper thickness lever to match the thickness of your paper. See Chapter 2.
Dots are missing in the printed characters or graphics.	
A line of *dots is missing in the printout.* ABCD	The print head is damaged. Stop printing and contact your Epson dealer to have the printer repaired.
Dots are missing in random positions. ABCD	There is either too much slack in the ribbon or the ribbon has come loose and gotten caught on something. Stop printing, turn off the printer, and reinstall the ribbon cartridge. See Chapter 6.

Printing

Problem	Solution
Printed characters are not what you expected.	
The typestyle or *characters that are set by the software cannot be printed.*	The software may not be correctly installed for your printer. Use the program's setup (or install) procedure to check the printer settings, and reset as needed.
The Roman, Sans Serif, or Draft font is selected in your software, but the characters are printed *in a different* font.	The wrong font is selected. If your program accepts control codes, set the codes to the values below to select the built-in fonts:

Roman: ESC   k   0
Sans Serif: ESC   k   1
Draft: ESC   x   0

See Chapter 3.

| *Italic characters are printed instead* of *the selected graphic "line" characters.* | The wrong character table is selected. If your application program is capable of sending control codes, specify the Epson Extended Graphics character table using ESC t l.

You can also select the graphics character table by changing a DIP switch setting. To do this, turn off the power, set DIP switch 1-7 to on, then turn on the printer. See Chapter 3. |

Problem

Printed characters are not what you expected (continued).

Graphic characters or lines are being printed instead of the selected italic characters.

The wrong international characters are being printed.

Solution

The wrong character table is selected. If your application program is capable of sending control codes, specify the italic character table using ESC t 0.

You can also select the italic character table by changing a DIP switch setting. To do this, turn off the power, set DIP switch 1-7 to off; then turn on the power. See Chapter 3.

The wrong international character set is selected. If your application program is capable of sending control codes, specify the desired international character set using ESC R n. See the description of ESC R in Chapter 9.

You can also select the international character table by changing DIP switch settings. To do this, turn off the power and set DIP switches 1-1, 1-2, and 1-3 to the correct positions for the character set you want. See Chapter 3.

Problem	Solution
Printed characters are not what you expected (continued).	
The characters printed *are smaller than expected.*	The condensed mode may be set. Check to see if the CONDENSED light on the control panel is on. If it is lit, press the CONDENSED button to cancel the mode. Also, if your application program is capable of sending control codes, you can cancel the condensed mode by sending the DC2 code to the printer. See Chapter 9.
The typestyle selected by SelecType is not printed.	The software may not be properly installed for your printer. Use the program's setup (or install) procedure to check the printer settings and reset as needed. Your software may be overriding your SelecType setting. If your program allows you to change the printing style, software control will override the SelecType settings. For these application programs use the program, not SelecType, to change typestyles.
Characters cannot be defined using ESC & and ESC :	User-defined character mode may not be selected. When defining characters, make sure that DIP switch 2-5 is set to off.

Problem	Solution
The print position is not what you expected.	
Printing starts too high or too low on the page.	The loading position may be incorrect. Use micro-adjustment to adjust the loading position. See Chapter 3. If the problem persists, check the top margin set by your application software and adjust it.
One line of printing has taken up two lines.	Auto line feed may be on. Turn off DIP switch 2-4. The margin setting may not be correct. Use your application program to change the margin. In BASIC, enter either of the following statements: WIDTH LPRINT 255 WIDTH "LPT1" 255 If the printer still does not print properly, set the right margin to the maximum setting using ESC Q. See Chapter 9.

Problem	Solution
The print position is not what you expected (continued).	
Page length does not match the length of the paper.	Check the page length set by your application software and adjust it if necessary.
	If you are using the cut sheet feeder, the self test function prints the number of printable lines that can fit on a single sheet. Use this feature to determine the correct page length setting. See Chapter 3.
Regular gaps occur in the printout.	One-inch skip over perforation may be set. Set DIP switch 2-3 to off.
Skip over perforation is set, but the perforation does not fall in the center of the skip.	The loading position of the paper may be too high or too low. Use the micro-adjustment feature to reset the loading position so that the perforation is centered within the skip area.
	Your application program may be setting the top and bottom margins. If this is the case, turn off skip over perforation by setting DIP switch 2-3 to off.

Problem	Solution
The print position is not what you expected (continued).	
Vertical printed lines do not align or gaps appear in lines or graphics.	The printer is usually set for bidirectional printing. This can cause a slight misalignment of graphics characters. When precise printing of vertical lines is necessary, contact your service center to have them perform the bidirectional print alignment adjustment or select the unidirectional print mode by sending ESC U or ESC < to the printer. You can also select unidirectional printing by setting DIP switch 2-6 to off. Unidirectional printing is slightly slower. See Chapter 9.

Note: Use the data dump mode to check data being sent from the computer. In the data dump mode, data is printed in hexadecimal format and in ASCII characters. See Data Dump Mode in Chapter 3.

If the printer still does not print, try the self test described in Chapter 1. If the self test works properly, the printer is all right, and the problem probably lies in the computer, the software, or the cable. If the self test does not work, contact your Epson dealer.

Paper Handling

The following section guides you through problems in handling single sheets and continuous paper. If you are having problems using the optional cut sheet feeder or pull tractor, see the section on options later in this chapter.

Problem	Solution
Single sheets do not feed properly.	
The LOAD/EJECT button was pressed, but the platen did not move and paper was not fed.	You may be trying to feed paper using one of the control panel buttons while the printer is on line (ON LINE light is on). Press the ON LINE button once to set the printer off line; then feed the paper. After feeding the paper, press the ON LINE button again to set the printer on line. See Chapter 3.
	The left edge guide may be set too far to the right so that the paper detector cannot sense it. Move the paper a little to the left. The PAPER OUT light should go off.

Problem	Solution
Single sheets do not feed properly (continued).	
The LOAD/EJECT button was pressed and the platen rotated, but paper was not fed.	The paper release lever may be set in the wrong position. Push paper release lever back to the single-sheet position. See Chapter 2.
	The left and right edge guides may be too close together, preventing the paper from feeding smoothly. Adjust the position of the edge guides so that the paper can move up and down freely. See Chapter 2.
	The paper may not be firmly inserted. When feeding thicker than normal paper, press down lightly on the paper while pressing the LOAD/EJECT button.
When the LOAD/EJECT button is pressed, the paper jams.	The cut sheet feeder mode may be turned on (DIP switch 1-8 is on). When the cut sheet feeder is not in use, DIP switch 1-8 should be off. See Chapter 3.
	The edge guides may be too far apart. Adjust the edge guides to the width of the paper.
	The dimensions of the paper may exceed the specified limitations. Use only paper sizes that are within the specified range. Multi-part forms cannot be used with this printer's single-sheet feeding system. See Chapter 8.

Problem	Solution
Single sheets do not feed properly (continued).	
When the LOAD/EJECT button is pressed, the paper feeds through and then out of the printer.	The paper may have been between the edge guides before the printer was turned on. When loading single sheets, be sure that paper is not in the paper guide before you turn the printer on.
The paper feed is crooked.	The paper guide may not be attached, or it may not be in the correct position. When printing on single sheets, use the paper guide in its upright position.
	The paper may be dog-eared. Use new paper.
The paper does not fully eject.	You may be trying to eject the paper using the FORM FEED button. Always press the LOAD/EJECT button to eject the paper.
	The page length setting may be wrong. If the page length is incorrectly set by your software, the paper may not fully eject. Check your software settings.

Problem	Solution
Continuous paper does not feed properly.	
When the LOAD/EJECT button is pressed, the platen does not rotate and paper does not feed.	You may be trying to feed paper using the control panel buttons while the printer is on line (ON LINE light on). Press the *ON LINE* button once to set the printer off line, then try feeding paper. After feeding paper, press the ON LINE button again to set the printer on line. See Chapter 3.

The paper release lever may be pushed back to the single-sheet position. When using the tractor, be sure the paper release lever is pulled forward to the continuous paper position. See Chapter 2. |
| *When the LOAD/EJECT button is pressed, the platen rotates but* paper *does not feed.* | Continuous paper may have already been in the paper path. (In this case, the paper feeds backward to the standby position.) Press the LOAD/EJECT button again to load the paper. |

Problem	Solution
Continuous paper does not feed properly (continued).	
The paper feed *is crooked or the paper jams.*	The paper supply may be obstructed by a cable or some other object. Make sure that the paper feeds smoothly into the printer. See Chapter 2.
	Your supply of continuous paper may be too far from the printer. Position your paper supply within 3 feet (1 meter) of the printer. See Chapter 2.
	The paper may be caught on the edge guides. When using continuous paper, make sure that the paper guide is lowered to the horizontal position and that the edge guides are positioned as far apart as possible. See Chapter 2.
	The holes on the sides of the paper may not be aligned with each other. Reposition the paper on the tractor pins. See Chapter 2.
	The sprocket units are incorrectly positioned for the paper width. Move the right sprocket unit to remove any slack across the width of the paper. See Chapter 2.
	The position of your paper supply may be preventing it from feeding straight. See Chapter 2.

Problem	Solution
Continuous paper does not feed properly (continued).	
The paper feed is crooked or *the paper jams (continued).*	The sprocket lock levers may be unlocked, or the sprocket covers may be open. Position the sprocket units to match the width of your paper. Then, lock them in place by pressing the sprocket lock levers away from you. See Chapter 2. The paper guide may be in the upright position. When using continuous paper, make sure that the paper guide is in the lowered position so that it can act as a paper separator. See Chapter 2. The paper thickness lever may be in the wrong position. For printing on ordinary paper, always set the lever to position 2. The paper dimensions may exceed the specified limitations. Use only paper sizes that are within the specified range. Your printer can print on continuous multi-part forms consisting of 1 original and 1 or 2 copies. See Chapter 8.
Regular gaps occur in the printout.	Skip over perforation may be interfering with your application program settings. Set DIP switch 2-3 to off.

Problem	Solution
Continuous paper does not feed properly (continued).	
Skip over perforation is set, *but the perforation does* not *fall in the center* **of** *the skip.*	The loading position of the paper may be too high or too low. Use the micro-adjustment to reset the loading position.
The loading position **of** *the paper shifts slightly while printing several pages.*	The paper you are trying to feed may be too heavy for the built-in push tractor. When highly accurate paper feed is necessary, such as when printing carbon copies, use the optional pull tractor.
After printing stops, the paper automatically feeds forward.	The short tear-off function may be selected. When you resume printing, the paper feeds backward to its loading position. If you do not need this function, set DIP switch 2-2 to off. See Chapter 3.
The short fear-off function is selected (DIP switch 2-2 is on), but it does not work.	There may still be data in the print buffer. The short tear-off function works only if the data in the print buffer is completely printed and the next print position is at the top of the next page.
	Your program may not be sending a form feed command to the printer. At the end of your program or the page, send a form feed (FF). If you are using BASIC, be sure to add a semicolon (;) after the FF code to prevent any additional codes from being sent to the printer.

Problem	Solution
Continuous paper does not feed properly (continued).	
The LOAD/EJECT button is pressed to eject the paper, the paper feed stops, and paper does not fully eject or it jams.	You may have tried to back feed too many pages. Before ejecting the paper, always tear off the last printed page. See Chapter 3. You may be trying to eject labels. Labels may jam when they are fed backward, so always use the FORM FEED button and feed labels forward to eject them.
Switching between single sheets and continuous paper cannot be performed properly.	
When the LOAD/EJECT button is pressed to load continuous paper, the platen does not rotate and the paper is not loaded.	Pull the paper release lever forward to the continuous paper position, set the paper, then press the LOAD/EJECT button.

Paper Handling

Problem	Solution
Switching between single sheets and continuous paper cannot be performed properly (continued).	
The paper release lever is correctly set for continuous paper, but when the LOAD/EJECT button is pressed, the platen rotates backward and the paper comes off the sprockets.	A single sheet may be in the paper guide, causing the continuous paper to back out and to come off the sprockets. When using continuous paper, always make sure to remove any single sheets remaining in the paper guide.
When the LOAD/EJECT button is pressed to load a single sheet from the sheet guide, the platen rotates in reverse, the single sheet does not load, and the continuous paper comes off the sprockets.	The paper release lever may not be in the proper position. Push the lever back to the single-sheet position.

7-22   Troubleshooting

Problem	Solution
Switching between single sheets and continuous paper cannot be performed properly (continued).	
Even with the paper release lever set correctly to the single-sheet position, the single sheet and continuous paper feed together and jam.	The continuous paper may not have fed backward far enough to reach the standby position before you changed the position of the paper release lever. Remove the jammed paper and try again. Also, check that the PAPER OUT light comes on before changing the position of the paper release lever to make sure that the continuous paper is completely ejected. When there is more than one page to feed backward to eject, you must press the LOAD/EJECT button at least two times.
The short tear-off function does not operate properly.	
One page is completely printed, but the paper does not feed.	DIP switch 2-2, short tear-off mode, may be set to off. Set DIP switch 2-2 to on to turn on the short tear-off mode.
*Printing ended in the middle **of** a page.*	One page of data may not have been sent to the printer. Finish, the page by sending a form feed code (FF) to the printer or by sending enough line feed codes (LF) to advance the remainder of the page.

Options

Problem	Solution
Using the cut sheet feeder, the paper does not feed properly.	
The LOAD/EJECT button is pressed, but the platen does not move and the paper does not feed.	You may be pressing the LOAD/EJECT button while the printer is on line. Always put the printer off line before feeding the paper. Paper feeds automatically when the cut sheet feeder receives a print command from the computer (only while the printer is on line).
After a print command is sent from the computer, the platen does not move and the paper does not feed.	The printer may be off line. Press the ON LINE button to put the printer on line. The cut sheet feeder mode may be off. Set DIP switch 1-8 to on. If your program allows you to use control codes, use ESC EM 4 to set the cut sheet feeder mode. The printer must be ready with no paper out condition to receive this command. Send the command with continuous paper loaded and with the paper select lever in the continuous position.

Problem	Solution
Using the cut sheet feeder, the paper does not feed properly (continued).	
After a print command is sent from the computer, the platen rotates, but paper does not feed. *The PAPER OUT light is on.*	DIP switch 1-8 is set to off. DIP switch 1-8 must be set to on in order to use the cut sheet feeder. See Chapters 3 and 5.

The cut sheet feeder may be incorrectly installed on the printer. Remove and reinstall the cut sheet feeder making sure that the mounting notches are properly mated with the pins on the printer. See Chapter 5.

The cut sheet feeder may be out of paper. Load more paper in the cut sheet feeder's bin.

The paper release lever may not be in the single-sheet position. Push the lever back to the single-sheet position. See Chapter 5.

The paper set levers may be pulled forward. After loading a stack of paper in the cut sheet feeder, push the paper set levers backward. See Chapter 5.

The left and right paper guides may be too close together, preventing smooth paper feed. Adjust the position of the paper guides so that the paper can move up and down freely. See Chapter 5. |

Problem	Solution
Using the cut sheet feeder, the paper does not feed properly (continued).	
After a print command is sent from the computer, the platen rotates, but paper does not feed. The PAPER OUT *light is on (continued).*	Paper may be jammed near the print head. Remove the paper jam (temporarily remove the cut sheet feeder if necessary). You may have loaded too many sheets in the cut sheet feeder's bin. Remove the sheets. The bin can hold a maximum of 150 sheets. There may be only one sheet left in the bin. The last sheet in the bin may not feed, so add more paper.
Two or more sheets *feed at the same time.*	You may have loaded too many sheets in the cut sheet feeder's bin. Remove the sheets. The bin can hold a maximum of 150 sheets. You may have forgotten to fan the stack of paper before loading it into the bin. Remove the paper and fan it. Then align the edges of the stack. See Chapter 5.

Problem	Solution

Using the cut sheet feeder, the paper does not feed properly (continued).

The paper feed is crooked.

The paper may be old or creased. Discard it and load new, clean sheets of paper.

The left and right paper guides may be too far apart. Adjust the paper guides to the width of the paper.

There may be too much outgoing paper. Never let more than 80 sheets of outgoing paper accumulate while printing.

The weight of your paper may be too heavy or too light for the cut sheet feeder. Refer to the specifications in Chapter 8 and make sure that your paper is the proper size and quality.

You tried to manually insert a single sheet, but instead paper was fed from the cut sheet feeder's bin.

The single sheet may have been inserted in the wrong place. Check it and try again. See Chapter 5.

Paper may feed from the bin if you try to insert several single sheets. To insert several single sheets, pull the paper set lever forward.

Problem	Solution

Using the cut sheet feeder, the paper does not feed properly (continued).

One page of *printing has spread to two pages.*

The page length setting may be wrong. Run a self test in cut sheet feeder mode. The printer will automatically measure the paper loaded and set the correct page length. See Chapter 5.

You may have to change the top or bottom margin or page length for your application program.

Using the pull tractor with the push tractor, continuous paper does not feed properly.

The FORM FEED or LINE FEED button was pressed, but the paper does not feed at all. (Platen does not rotate.)

The printer may be on line. Before using the control panel buttons to feed paper, always put the printer off line (ON LINE light out).

Problem	Solution

Using the pull tractor with the push tractor, continuous paper does not feed properly (continued).

Paper feed is crooked or the paper jams.

Something may be obstructing the paper feed, like an object on top of the paper stack or a cable caught on the paper. Make sure that nothing prevents the smooth flow of paper and position the paper so that it feeds straight in line with the sprockets.

The supply of paper may be too far from the printer. Position the paper supply so that it is less than three feet or one meter away.

The paper may be caught on the edge guides. When using continuous paper, make sure that the paper guide is folded backwards over the paper and that the edge guides are moved to each edge of the paper guide. See Chapter 2.

The pull tractor and push tractor sprockets are not aligned correctly. When using both tractors, be sure that the sprockets on both are positioned evenly.

Problem	Solution
Using the pull tractor with the push tractor, continuous paper does not feed properly (continued).	
Paper feed is crooked or the paper jams (continued).	The paper may be slack. Adjust the position of the sprockets to take up any slack along the width of the paper. Remove slack lengthwise by pressing in and rotating the pull tractor knob on the right. Do not turn the platen knob.
	The paper thickness lever may not be correctly set. Set the paper thickness lever to match the thickness of your paper.
	The paper may not meet the specifications. Check that your paper is the proper size, weight, and thickness.
Several lines of space occur in the printout.	Skip over perforation may be set. Set DIP switch 2-3 to off.
Skip over perforation is set, but the skip has shifted from the perforation, or the perforation does not fall in the center of the skip.	The loading position of the paper may be too high or too low. Use the micro-adjustment feature to reset the loading position.

Problem	Solution

Using the pull tractor with the push tractor, continuous paper does not feed properly (continued).

When the printing ends the paper feeds abruptly, and as it resumes printing, the paper feeds *backward and comes off the pull tractor sprockets.*

The short tear-off function may be selected. The short tear-off function cannot be used with the pull tractor, so be sure to set DIP switch 2-2 to off. See Chapter 3.

When the LOAD/EJECT button is pressed to eject the paper, the paper comes off the pull tractor sprockets.

When the paper release lever is in the continuous paper position, the paper feeds backward to eject. When using the pull tractor, press the FORM FEED button to feed the paper forward to eject.

Problem	Solution
Using the font module, the module's fonts do not print.	
The font *module is set, but the fonts in the module do not print.*	The font module may not be fully inserted in the slot. Check it and insert the module properly if necessary.
	The font module may be inserted the wrong way. Align the (>) marks on the module and the slot and insert it properly.
	The font in the module may not be correctly selected. Select the slot by pressing the FONT button on the control panel.
	If your program allows you to use control codes, use ESC k command to select the font.
Using an optional interface, the printer does not operate properly.	
The printer does not print or the printout is not what you expected.	The interface board may be loose or not properly connected. Check that the interface board is correctly inserted into the connector on the main board.

Problem	Solution
Using an optional interface, the printer does not operate properly (continued).	
The printer does not print or the printout is not what you expected (continued).	You may be trying to use an interface with the wrong specification. Check the specifications to make sure that you can use the interface with this printer.

You may be trying to use a cable with the wrong specification. Make sure that the cable matches the specifications of the interface.

The DIP switches or jumpers on the interface board may be set wrong. See the interface manual for the correct settings.

The interface settings on the computer may be wrong. See your computer manual for the correct settings.

The computer and interface settings may not match. Match the settings for each condition.

Two cables may be installed on the printer; only one cable may be attached at any time. |

If the printer still does not operate properly after checking the above points, run a self test of the interface to make sure that there are no on-board defects. If any abnormality is found, contact your Epson dealer.

Chapter 8
Technical Specifications

8

Printer Specifications

Printing

Print method: 24-pin impact dot matrix

Print speed:

Quality	Characters per inch	Characters/second/line
Draft	10	150
	12	180
LQ	10	50
	12	60

Printing direction: Bidirectional logic-seeking for text printing. Unidirectional for graphics (can also be switched to bidirectional by using the proper software command when DIP switch 2-6 is on).

Line spacing: l/6 inch or programmable in increments of 1/360th of an inch

Paper ***feed speed:*** (continuous feed)

Single sheet: 2.2 inches per set (100 ms/line)
Continuous: 2.2 inches per sec (100 ms/line)

Printable columns:

Character spacing	Maximum printed characters
10 cpi	80
10 cpi condensed	137
12 cpi	96
12 cpi condensed	160

Input **buffer:**	**8 KB/1 KB** (DIP switch selectable)
Optional fonts:	LQ Epson Courier LQ Epson Prestige LQ Epson Script LQ Epson OCR-B LQ Epson OCR-A LQ Epson Orator LQ Epson Orator-S

Character fonts:

Font	Available sizes (Characters per inch)
Epson Draft	10, 12, 15
Epson Roman	10, 12, 15, Proportional
Epson Sans Serif	10, 12, 15, Proportional

Characters:	96 standard ASCII character set (including italic characters) 15 international character sets Epson Extended Graphics character set

Paper

Paper width:	Single sheet	7.2 to 10.1 inches *(182* to 257 mm)
	Continuous	4 to 10 inches (101 to 254 mm)
	Envelope	6.5 or 9.5 inches (166 or 240 mm)
	Labels (continuous ***only)***	21/2 x 15/16 inches (minimum) *(63.5 x 23.8* mm)
Paper Length:	Single sheet	7.2 to 14.3 inches (182 to 364 mm)
Printable area:	Single sheet	

0.33 inches (8.5 mm) or more

0.12 inches (3 mm)
or more

0.12 inches (3 mm)
or more

Printable area

0.53 inches (13.5 mm) or more

8-4   Technical Specifications

Continuous paper

0.35 inches (9 mm)

Printable area

Printable area
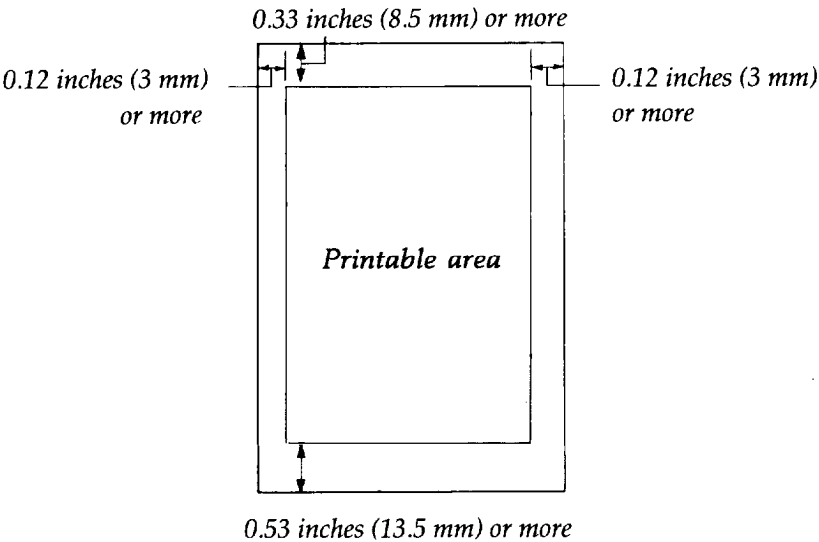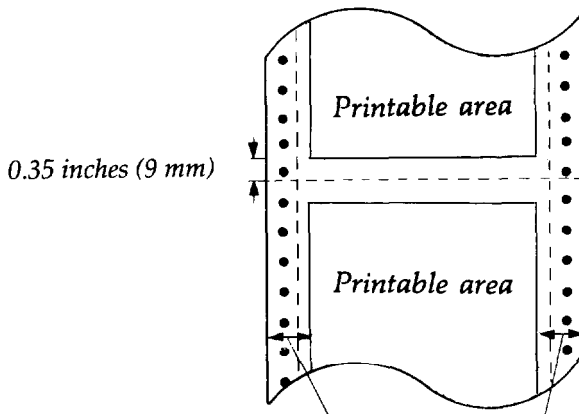
0.51 inches (13 mm) or more (both sides) when the 4 to 9.5 inch
(101 mm to 242 mm) width paper is used.
0.98 inches (25 mm) or more (both sides) when the 10 inch (254 mm)
width paper is used.

Envelope

0.33 inches (8.5 mm)
or more

Printable area

0.87 inches (22 mm)
or more

0.12 inches (3 mm)
or more
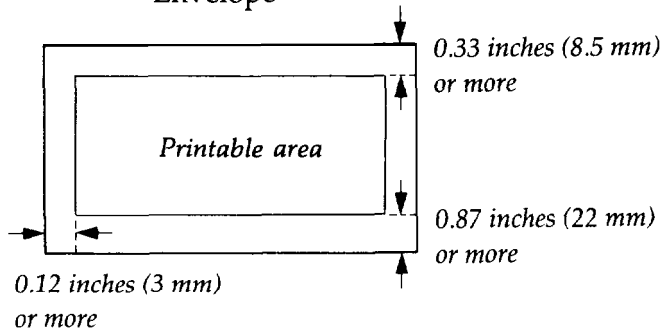
Note: Envelope printing is only available at normal temperature.
Load the envelope with its long side horizontal.

Technical Specifications 8-5

Paper weight:	Single Sheet	14 lb to 24 lb
	Continuous	14 lb to 22 lb
	Multi-part forms	12 lb to 15 lb per sheet. Maximum number sheets = 3
	Envelope	12 lb to 24 lb
Paper thickness:	Single Sheet	0.0025 to 0.0055 inches **(0.065** to 0.14 mm)
	Continuous	0.0025 to 0.01 inches **(0.065** to 0.25 mm)
	Envelope	0.0063 to 0.0197 inches (0.16 to 0.52 mm)
	Label (with backing)	0.01 inches (Maximum 0.28 mm)
Copy Capacity:		Up to 3 sheets including the original. Total thickness must not exceed 0.01 inches **(0.25** mm>.

- 24 lb paper printing is only available at normal temperature.
- Labels with a pressure-sensitive paper joined by line or dot glue and with a total thickness less than or equal to 0.0118 inches (0.3 mm) can be printed out under conditions of 40°F to 95°F **(5°C** to **35°C)** and 10% to 80% humidity.

Mechanical

Paper feeding methods:	Friction
	Push tractor
	Cut sheet feeder (optional)
	Pull tractor (optional)
Ribbon:	Cartridge ribbon, available in black:
	#7753
	#7768 (film)
Life *expectancy* of *ribbon:*	#7753: 2,000,000 characters
	(in Letter Quality characters,
	at 48 dots/character)
	#7768: 200,000 characters
	(in Letter Quality characters,
	at 48 dots/character)
MCBF:	For all components excluding print head:
	3,000,000 lines
MTBF:	4000 power on hours (duty 25%)
Print head life:	200,000,000 strokes/wire
Dimensions and weight:	(excluding knobs and paper guides)

	Height:	5.51 inches (139.9 mm)
	Width:	16.46 inches (418.0 mm)
	Depth:	13.66 inches (347.0 mm)
	Weight:	13 lbs (6 kg approx.)

Electrical

Voltage:	120 VAC ± 10%
Power consumption:	100 watts maximum
Frequency:	**50 ± 0.5** Hz, 60 ± 0.5 Hz
Insulation resistance:	10 Mohms between AC power line and chassis
Dielectric strength (between *AC line* and *chassis):*	Can withstand 1.25 kV rms applied for one minute

Environment

Temperature:	Operation:	40°F to 95°F (5°C to 35°C)
	Storage:	-22°F to 140°F (-30°C to 60°C)
Humidity:	Operation:	10% to 80% (noncondensing)
	Storage:	5% to 85% (noncondensing)
Shock:	Operation:	Up to 1 G within 1 ms
	Storage:	Up to 2 G within 1 ms
Vibration:	Operation:	Up to 0.25 G at up to 55 Hz
	Storage:	Up to 0.50 G at up to 55 Hz
Operation angle:	Less than 15° (without cut sheet feeder) 0° (with cut sheet feeder)	

Interface Specifications

Your printer is equipped with an B-bit parallel interface. For
specifications on optional interfaces, refer to their manuals.

Pin Assignments for the Parallel Interface

Connector pin assignments and a description of their respective
interface signals are shown in the following table.

Signal Pin	Return Pin	Signal	Direction	Description
1	19	STROBE	IN	STROBE pulse to read data. Pulse width must be more than 0.5 microseconds at the receiving terminal.
2	20	DATA 1	IN	These signals represent information of the 1st to 8th bits of parallel data, respectively. Each signal is at HIGH level when data is logical 1 and LOW when it is logical 0.
3	21	DATA 2	IN	
4	22	DATA 3	IN	
5	23	DATA 4	IN	
6	24	DATA 5	IN	
7	25	DATA 6	IN	
8	26	DATA 7	IN	
9	27	DATA 8	IN	
10	28	ACKNLGI	OUT	About an 11 -microsecond pulse. LOW indicates that data has been received and that the printer is ready to accept more data.
11	29	BUSY	OUT	A HIGH signal indicates that the printer cannot receive data. The signal goes HIGH in the following cases: 1) During data entry (ea. char. time) 2) During printing 3) When off line 4) During printer-error state
12	30	PE	OUT	A HIGH signal indicates that the printer is out of paper.

Signal Pin	Return Pin	Signal	Direction	Description
13	—	SLCT	OUT	Pulled up to +5 volts through 3.3 Kohm resistance.
14	— — —	AUTO FEED XT	IN	When this signal is LOW, the paper is automatically fed 1 line after printing. (The signal level can be fixed to this by setting DIP switch 2-4 to on.)
15	—	NC	—	Not used.
16	—	GND	—	Logic ground level.
17	— —	CHASSIS GND	— —	Printer's chassis ground, which is isolated from the logic ground.
18	—	NC	—	Not used.
19-30	—	GND	—	Twisted-pair return signal ground level.
31	16	INIT	IN	When this level becomes LOW, the printer controller is reset to its power-up state and the print buffer is cleared. This level is normally HIGH; its pulse width must be more than 50 microseconds at the receiving terminal.
32	—	ERROR	OUT	This level becomes LOW when the printer is: 1) in paper out state. 2) off line. 3) in error state.
33	—	GND	—	Same as for Pins 19-30.
34	—	NC	—	Not used.
35	—	—	OUT	Pulled up to 5V through 3.3 Kohm resistance.
36	—	SLCT IN	IN	The DC1/DC3 code is valid only when this signal is HIGH. (Internal fixing can be carried out with Jumper J10. The level of this signal is factory-set to LOW.)

- The column heading "Direction" refers to the direction of signal flow as viewed from the printer.

- "Return" denotes the twisted-pair return, to be connected at signal ground level. For the interface wiring, be sure to use a twisted-pair cable for each signal and to complete the connection on the return side. These cables should be shielded and connected to the chassis of the host computer and the printer.

- All interface conditions are based on TTL level. Both the rise and the fall times of each signal must be less than 0.2 microseconds.

- Data transfer must be carried out by observing the ACKNLG or BUSY signal. Data transfer to this printer can be carried out only after receipt of the ACKNLG signal or when the level of the BUSY signal is LOW.

Interface Timing

The figure below shows the timing for the parallel interface.
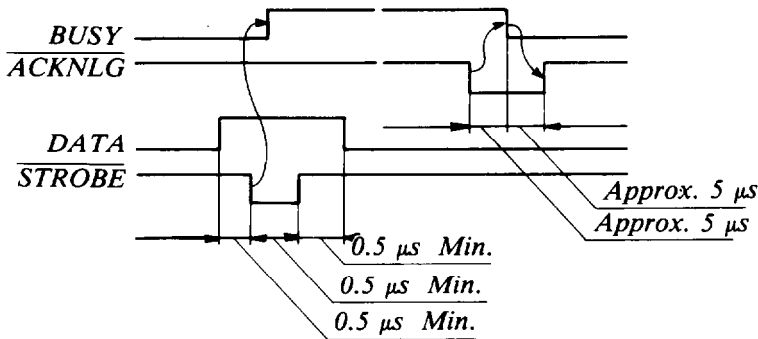
Printing Enabled/Disabled Signals and Control Conditions

The table below shows the relationship between printing being
enabled or disabled, the on line/off line status, and the receipt of the
data on/off control characters, DC1 or DC3.

ON LINE (Indicator on)	SLCT IN	DC1/DC3 (Data on/off control)	ERROR	BUSY	ACKNLG	Printing (Disabled/ enabled)
on line	Low (J1 interface)	DC1/DC3 (no effect)	High	High/Low	Pulsed ea. char.	Enabled (normal cond.)
on line	High	DC1 Recv'd	High	High/Low	Pulsed ea. char.	Enabled
on line	High	DC3 Recv'd	High	High/Low	Pulsed ea. char.	Disabled*
off line	High/Low (no effect)	DC1/DC3 (no effect)	Low	High	Not generated	Disabled

* While printing is disabled, character data is being received and
  acknowledged so that the printer can look for another DC1
  character, which would allow it to resume printing.

Option Specifications

Single-bin Cut Sheet Feeder (Optional)

Dimensions and weight: 17.5 in (W) x 17.1 in (D) x 16.7 in (H)
(444 mm (W) x 434 mm (D) x 423 mm (H))
(mounted on the printer)
approx. 2.4 lb (1.1 kg)

Bin capacity: Single sheet: Up to 150 sheets of 22 lb
                                          Up to 185 sheets of 17 lb
                                          Up to 100 sheets of 24 lb

                           (Total thickness should not exceed
                           9/32 inches or 15 mm)

Stacker capacity: Single sheet: Up to 80 sheets of 22 lb
                                          Up to 100 sheets of 17 lb
                                          Up to 55 sheets of 24 lb

MCBF: 100,000 cycles

*Environmental
condition:*   Temperature
                           Operation: 40°F to 95°F (5°C to 35°C)
                           Storage: -22°F to 140°F (-30°C to 60°C)

                           Humidity
                           Operation: 15% to 80% (noncondensing)
                           Storage: 5% to 85% (noncondensing)

Paper:	Width	7.17 to 8.50 inches (182 to 216 mm)
	Length	8.27 to 14.30 inches **(257** to 364 mm)
	Thickness	0.0028 to 0.0055 inches (0.07 to 0.14 mm)
	Weight	17 lb to 24 lb
	Printable area	(64 g/m^2 to 90g/m^2)

0.33 inches (8.5 mm) or more

0.12 inches (3 mm) or more

0.12 inches (3 mm) or more

Printable area

0.53 inches (13.5 mm) or more
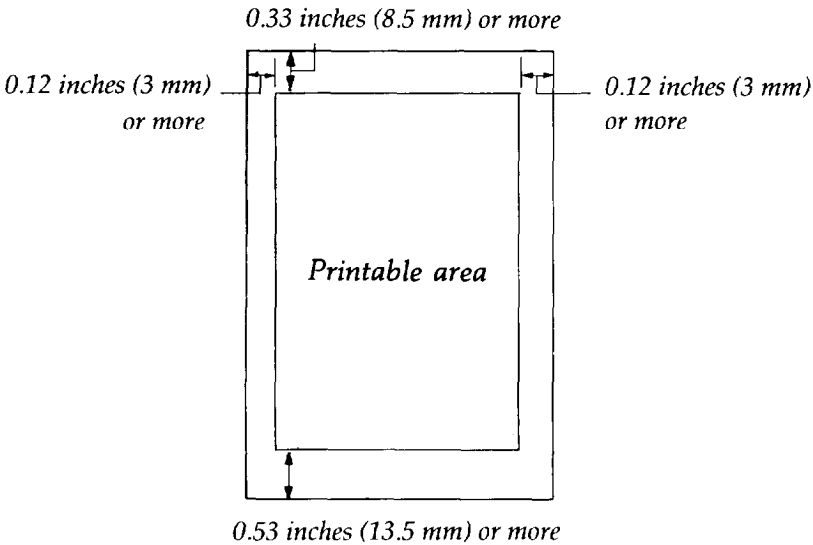
- 24 lb paper printing is only available at normal temperature.

Paper feed accuracy cannot be assured within 0.9" (22 mm) from either the top or bottom edges of the paper.

Storage condition:	Temperature	65°F to 70°F (18°C to 22°C)
	Humidity	**40%** to 60%

Initialization

There are two ways that the printer can be initialized (returned to the default settings) through the hardware and one way through the software. These are described in the following table:

Hardware initialization	• The power is turned on. • The printer receives an $\overline{\text{INIT}}$ signal at the parallel interface (pin 31 goes LOW).
Software initialization	• The software sends the ESC @ (initialize the printer) command.

Default Settings

The table below shows the default conditions that become valid when the printer is initialized.

Item	Reset to:
Top of form position	Current paper position
Left and right margins	Cancelled
Line spacing	16-inch line spacing
Vertical tab position	Cleared
Horizontal tab positions	Every eight characters
VFU channel	Channel 0
Font selection	Hardware: The current DIP switch setting Software: The current SelecType setting
Condensed mode	Hardware: The current DIP switch setting Software: The current SelecType setting
Character spacing	The current DIP switch setting
Justification	Left justification
Special printing effects	Cancelled (except condensed printing)
Graphic mode assignment	ESC K = ESC * 0, ESC L = ESC * 1, ESC Y = ESC * 2, ESC Z = ESC * 3

Also, the data buffer is cleared when the printer is initialized by turning on the power or by an INIT signal.

Note: The user-defined character set is not cleared when the printer is initialized with the software command (ESC @).

Chapter 9
Command Summary

9

Using the Command Summary

This chapter lists and describes all the commands available on the LQ-510.

The first part of this chapter lists all commands in numerical order and gives the number of the page where each is fully described. If you know which command you are looking for, consult the numerical list.

Note: The Quick Reference card at the end of the book also contains a list of the commands divided by topic, with page number references that direct you to full explanations of the commands.

The second part of this chapter lists and describes each command separately; the commands are divided into the following subjects:

Printer operation	Print size and character width
MSB control	Print enhancement
Data control	Word processing
Vertical motion	Character sets
Horizontal motion	User-defined characters
Overall printing style	Graphics

Each command description has a format section and a comment section. The format section gives the ASCII, decimal, and hexadecimal values for the command. These three formats are equivalent, and it should be easy to pick the one most suited to your purpose. The comment section describes the effect of the command and gives any additional information necessary for using it.

Note: Some application programs use control key sequences. See the Control Key chart on page 9-4.

The simplest type of command consists of a single character to be
sent to the printer. For instance, to print in condensed mode, the
code format is:

    ASCII code: SI
    Decimal: 15
    Hexadecimal: 0F

This code can be sent from a program by sending the code 15
directly.

More complex commands consist of two or more character codes.
For example, to print in double-wide mode, the code format is the
following:

    ASCII code: ESC   W   n
    Decimal: 27   87   n
    Hexadecimal: 1B   57   n

In this case *n* can be either 1 (on) or 0 (off), to begin or end double-
wide printing. You can use either of the following commands to
turn on double-wide print from BASIC:

    LPRINT CHR$(27);CHR$(87);CHR$(l)
    LPRINT CHR$(27);"W";CHR$(l)

For the following commands that use only 0 or 1 for the variable,
either the decimal or hexadecimal values 1 and 0 or the ASCII
characters 1 and 0 can be used:

    ESC U, ESC x, ESC p, ESC W, ESC S, ESC -, and ESC %

For example, in BASIC you can turn on proportional spacing with
either of these statements:

    LPRINT CHR$(27);"p";CHR$(l)
    LPRINT CHRS(27);"p";"l"

Control Key Chart

Some application programs use control key codes for decimal values O-27. The table below gives you the proper values. The Control Key column indicates that you press the control key at the same time you press the key for the letter or symbol in that column. For example, you press the control key and A at the same time to send the value 1.

Some application programs that use this system cannot use Control-@, and many programs use the control keys for other purposes.

Dec.	Hex.	Ctrl. Key		Dec.	Hex.	Ctrl. Key
0	00	@		14	0E	N
1	01	A		15	0F	O
2	02	B		16	10	P
3	03	C		17	11	Q
4	04	D		18	12	R
5	05	E		19	13	S
6	06	F		20	14	T
7	07	G		21	15	U
8	08	H		22	16	V
9	09	I		23	17	W
10	0A	J		24	18	X
11	0B	K		25	19	Y
12	0C	L		26	1A	Z
13	0D	M		27	1B	[

Commands in Numerical Order

The following list shows control codes and ESC sequences with
their decimal and hexadecimal values, and the page where the
description of the command can be found.

ASCII	Dec.	**Hex.**	**Description**	**Page**
BEL	7	07	Beeper	9-12
BS	8	08	Backspace	9-20
HT	9	09	Tab Horizontally	9-21
LF	10	**0A**	Line Feed	9-14
VT	11	0B	Tab Vertically	9-17
FF	12	0C	Form Feed	9-13
CR	13	0D	Carriage Return	9-12
s o	14	0E	Select Double-wide Mode	
			(one line)	9-26
SI	15	0F	Select Condensed Mode	9-25
DC1	17	11	Select Printer.	9-8
DC2	18	12	Cancel Condensed Mode	9-26
DC3	19	13	Deselect Printer	9-9
DC4	20	14	Cancel Double-wide Mode	
			(one line)	9-27
CAN	24	18	Cancel Line	9-12
DEL	127	7F	Delete Character.	9-9
ESC SO	14	0E	Select Double-wide Mode	
			(one line)	9-27
ESC SI	15	0F	Select Condensed Mode	9-26
ESC EM	25	19	Control Cut Sheet Feeder	9-10
ESC SP	32	20	Set Intercharacter Space	9-33
ESC !	33	21	Master Select.	9-23
ESC #	35	23	Cancel MSB Control.	9-11
ESC $	36	24	Set Absolute Print Position.	9-20
ESC %	37	25	Select User-defined Set	9-37
ESC &	38	26	Define User-defined Characters	9-36
ESC (-	40	28	Select Score	9-31

ASCII	Dec.	Hex.	Description	Page
ESC *	42	2A	Select Graphics Mode	9-39
ESC +	43	2B	Set n/360-inch Line Spacing. ...	9-15
ESC -	45	2D	Turn Underline Mode On/Off.....................	9-32
ESC /	47	2F	Select Vertical Tab Channel	9-18
ESC 0	48	30	Select 1/8-inch Line Spacing ...	9-15
ESC 2	50	32	Select l/6-inch Line Spacing ...	9-15
ESC 3	51	33	Set n/180-inch Line Spacing. ...	9-16
ESC 4	52	34	Select Italic Mode	9-34
ESC 5	53	35	Cancel Italic Mode	9-35
ESC 6	54	36	Enable Printable Characters	9-37
ESC 7	55	37	Enable Upper Control Codes ...	9-37
ESC :	58	3A	Copy ROM to RAM	9-36
ESC <	60	3C	Select Unidirectional Mode (one line)	9-9
ESC =	61	3D	Set MSB to 0	9-11
ESC >	62	3E	Set MSB to 1	9-11
ESC ?	63	3F	Reassign Graphics Mode	9-40
ESC @	64	40	Initialize Printer	9-8
ESC A	65	41	Set n/60-inch Line Spacing.	9-16
ESC B	66	42	Set Vertical Tabs.	9-17
ESC C	67	43	Set Page Length in Lines.	9-13
ESC C 0	67	43	Set Page Length in Inches.	9-13
ESC D	68	44	Set Horizontal Tabs	9-22
ESC E	69	45	Select Emphasized Mode	9-28
ESC F	70	46	Cancel Emphasized Mode	9-28
ESC G	71	47	Select Double-strike Mode	9-29
ESC H	72	48	Cancel Double-strike Mode	9-29
ESC J	74	4A	Perform n/180-inch Line Feed ..	9-16
ESC K	75	4B	Select Single-density Graphics Mode	9-38
ESC L	76	4C	Select Double-density Graphics Mode	9-38
ESC M	77	4D	Select 12 CPI	9-24

ASCII	Dec.	Hex.	Description	Page
ESC N	**78**	4E	Set Skip Over Perforation	9-14
ESC 0	**79**	4F	Cancel Skip Over Perforation. ..	9-14
ESC P	**80**	50	Select 10 CPI	9-24
ESC Q	**81**	51	Set Right Margin	9-19
ESC R	**82**	52	Select an International Character Set.	9-35
ESC S 0	**83**	53	Select Superscript Mode	9-29
ESC S 1	**83**	53	Select Subscript Mode	9-30
ESC T	**84**	54	Cancel Superscript/Subscript Mode	9-30
ESC U	**85**	55	Turn Unidirectional Mode On/Off.....................	9-10
ESC W	**87**	57	Turn Double-wide Mode On/Off.	9-27
ESC Y	**89**	59	Select High-speed Double-density Graphics Mode.	9-38
ESC Z	**90**	5A	Select Quadruple-density Graphics Mode	9-39
ESC \	**92**	5C	Set Relative Print Position	9-21
ESC a	**97**	61	Select Justification	9-33
ESC b	**98**	62	Set Vertical Tabs in Channels. ..	9-18
ESC g	**103**	67	Select 15 CPI	9-24
ESC k	**107**	6B	Select Typestyle Family.	9-23
ESC 1	**108**	6C	Set Left Margin.	9-19
ESC p	**112**	70	Turn Proportional Mode On/Off.	9-25
ESC q	**113**	71	Select Character Style	9-32
ESC t	**116**	74	Select Character Table	9-34
ESC w	**119**	77	Turn Double-high Mode On/Off.	9-28
ESC x	**120**	78	Select Letter Quality or Draft ...	9-22

Commands Arranged by Topic

This following section lists and describes all the commands by topic.
See the Quick Reference card at the back of this book for a handy list
of commands by topic.

Printer Operation

ESC @			Initialize Printer

Format:

ASCII code:	ESC	@
Decimal:	27	64
Hexadecimal:	1B	40

Comments:

Resets the printer mode and clears the current print line
preceding the command.

DC1	Select Printer

Format:

ASCII code:	DC1
Decimal:	17
Hexadecimal:	11

Comments:

Returns the printer to the selected state if it has been deselected
by the printer deselect code (DC3). It does not select the printer if
it has been switched off line by the ON LINE button,

DC3   **Deselect Printer**

Format:

ASCII code:	DC3
Decimal:	19
Hexadecimal:	13

Comments:

Puts the printer into the deselected state until the select printer code (DCl) is received. The printer cannot be reselected with the ON LINE button.

DEL   **Delete Character**

Format:

ASCII code:	DEL
Decimal:	127
Hexadecimal:	7F

Comments:

Removes the last text character on the print line but does not affect control codes.

ESC <   **Select Unidirectional Mode (one line)**

Format:

ASCII code:	ESC	<
Decimal:	27	60
Hexadecimal:	1B	3C

Comments:

Printing is normally bidirectional. This command selects unidirectional printing for one line only. (It is cancelled by a carriage return.) The print head moves to the extreme left (home) position and printing takes place from left to right. Overrides the DIP switch setting.

ESC U   **Turn Unidirectional Mode On/Off**

Format:

ASCII code:	ESC	U	n
Decimal:	**27**	**85**	*n*
Hexadecimal:	1B	55	*n*

Comments:

The following values can be used for n:

1: Turns the mode **on**

0: Turns the mode off

Printing is normally bidirectional. This command selects
unidirectional printing for more accurate positioning. This setting
can also be performed by SelecType.

ESC EM   **Control Cut Sheet Feeder**

Format:

ASCII code:	ESC	EM	*n*
Decimal:	**27**	**25**	*n*
Hexadecimal:	1B	19	*n*

Comments:

The following values can be used for *n:*

0: Turns mode off

4: Turns mode on

R: Ejects a sheet. (No paper is loaded.)

The command should not be used unless the cut sheet feeder is
installed. It is ignored if any value other than 0, 4, or R is used
for n.

The cut sheet feeder mode can also be turned on and off by
setting DIP switch 1-8.

MSB Control

MSB means the Most Significant Bit. MSB control (ESC =, ESC >, and ESC #) does not work for graphics or user-defined characters.

ESC =   **Set MSB to 0**

Format:

ASCII code:	ESC	=
Decimal:	27	61
Hexadecimal:	1B	3D

Comments:

Sets the MSB of all incoming data to 0. Some computers always send data with the MSB set to 1, which means that italics or character graphics are always printed. ESC = can overcome this problem.

ESC >   **Set MSB to 1**

Format:

ASCII code:	ESC	>
Decimal:	27	62
Hexadecimal:	1B	3E

Comments:

Sets the MSB bit of all incoming data as 1.

ESC #   **Cancel MSB Control**

Format:

ASCII code:	ESC	#
Decimal:	27	35
Hexadecimal:	1B	23

Comments:

Cancels the MSB control set by ESC = or ESC >.

BEL   Beeper

Format:
  ASCII code: BEL
  Decimal: 7
  Hexadecimal: 07

Comments:
  Sounds the printer's beeper.

Data Control

CR   Carriage Return

Format:
  ASCII code: CR
  Decimal: 13
  Hexadecimal: 0D

Comments:
  Prints the data in the print buffer and returns the print position to the left margin. A line feed is added if the AUTO FEED XT line on the parallel interface is held LOW.

CAN   Cancel Line

Format:
  ASCII code: CAN
  Decimal: 24
  Hexadecimal: 18

Comments:
  Clears all text on the print line, but does not affect control codes.

Vertical Motion

FF   **Form Feed**

Format:

ASCII code:	FF
Decimal:	12
Hexadecimal:	0C

Comments:

Prints the data in the print buffer and advances the paper to the top of the next form according to the current page length. When using a cut sheet feeder, FF ejects the sheet into the stacker.

ESC C   **Set Page Length in Lines**

Format:

ASCII code:	ESC	C	n
Decimal:	**27**	**67**	*n*
Hexadecimal:	1B	43	*n*

Comments:

Sets the page length to *n* lines in the current line spacing. The value of *n* must be from 1 to 127 lines. The top of form position is reset to the current line.

Overrides the DIP switch page length setting.

ESC C 0   **Set Page Length in Inches**

Format:

ASCII code:	ESC	C	0	*n*
Decimal:	**27**	**67**	**0**	*n*
Hexadecimal:	1B	43	00	*n*

Comments:

Sets the page length to *n* inches. The value of *n* must be from 1 to 22. The top of form position is reset to the current line.

Overrides the DIP switch page length setting.

ESC N				**Set Skip Over Perforation**

Format:

ASCII code:	ESC	N	*n*
Decimal:	27	78	*n*
Hexadecimal:	1B	4E	n

Comments:

The variable n is the number of lines skipped between the last line printed on one page and the first line to print on the next page. For example, with the standard setting for line spacing (l/6-inch), and page length (66 lines), ESC N 6 prints 60 lines and then skips 6. This setting is cancelled by ESC 0, ESC C, or ESC C 0. The value of *n* must be from 1 to 127.

Overrides the DIP switch setting for 1-inch skip over perforation.

ESC O			**Cancel Skip Over Perforation**

Format:

ASCII code:	ESC	O
Decimal:	27	79
Hexadecimal:	1B	4F

Comments:

Cancels the skip over perforation set by ESC N. Overrides the DIP switch setting for 1-inch skip over perforation.

LF		**Line Feed**

Format:

ASCII code:	LF
Decimal:	10
Hexadecimal:	0 A

Comments:

When this command is received, the data in the print buffer is printed and the paper advances one line in the current line spacing.

ESC 0   **Select 1/8-inch Line Spacing**

Format:

ASCII code:	ESC	0
Decimal:	27	48
Hexadecimal:	1B	30

Comments:

Sets the line spacing to l/8 of an inch for subsequent line feed commands. The 0 is the digit zero and not ASCII code 0.

ESC 2   **Select 1/6-inch Line Spacing**

Format:

ASCII code:	ESC	2
Decimal:	27	50
Hexadecimal:	1B	32

Comments:

Sets the line spacing to l/6 of an inch for subsequent line feed commands. The 2 is the digit two and not ASCII code 2. This line spacing is the default at power on.

ESC +   **Set n/360-inch Line Spacing**

Format:

ASCII code:	ESC	+	n
Decimal:	27	43	*n*
Hexadecimal:	1B	2B	*n*

Comments:

Sets line spacing to n/360 of an inch for subsequent line feed commands. The value of n must be from 0 to 255.

ESC 3   Set n/180-inch Line Spacing

Format:

ASCII code:	ESC	3	n
Decimal:	27	51	*n*
Hexadecimal:	1B	33	*n*

Comments:

Sets the line spacing to n/180 of an inch for subsequent line feed commands. The 3 is the digit three and not ASCII code 3. The value of *n* must be from 0 to 255.

ESC A   Set n/60-inch Line Spacing

Format:

ASCII code:	ESC	A	*n*
Decimal:	27	65	*n*
Hexadecimal:	1B	41	n

Comments:

Sets the line spacing to *n/60* of an inch for subsequent line feed commands. The value of n must be from 0 to 85.

ESC J   Perform n/180-inch Line Feed

Format:

ASCII code:	ESC	J	*n*
Decimal:	27	74	*n*
Hexadecimal:	1B	4A	n

Comments:

Advances the paper n/180 of an inch. The value of n must be from 0 to 255. This command produces an immediate line feed but does not affect subsequent line spacing and does not produce a carriage return.

VT   **Tab Vertically**

Format:
  ASCII code: VT
  Decimal: 11
  Hexadecimal: 0B

Comments:
  Advances the paper to the next vertical tab position in the channel
  selected by ESC ⁄. If no channel has been selected, channel 0 is
  used. If no vertical tabs have been set, the paper advances one
  line.

ESC B   **Set Vertical Tabs**

Format:
  ASCII code: ESC   B   *n1*   *n2*   ...   *0*
  Decimal: **27**   **66**   *n1*   *n2*   ...   *0*
  Hexadecimal: 1B   42   *n1*   *n2*   ...   *00*

Comments:
  Sets up to 16 vertical tabs in the current line spacing. Tab settings
  are not affected by subsequent changes in line spacing. The tab
  settings are entered as *n1, n2,* etc.-all from 1 to 225, in ascending
  order. The 0 value (null) indicates the end of the command. All
  settings are stored in channel 0 (see ESC b). ESC B 0 clears the tab
  settings.

ESC b					**Set Vertical Tabs in Channels**

Format:

ASCII code:	ESC	b	c	*n1*	*n2*	*...*	*0*
Decimal:	27	98	*c*	*n1*	*n2*	*...*	*0*
Hexadecimal:	1B	62	c	*n1*	*n2*	*...*	*00*

Comments:

Functions the same as ESC B, except that the variable c selects a channel for the vertical tabs, which must be from 0 to 7.
Therefore, up to eight sets of vertical tabs can be set. The channels are selected by ESC /. To clear the tabs in channel c, use ESC b c 0.

ESC /			**Select Vertical Tab Channel**

Format:

ASCII code:	ESC	/	c
Decimal:	27	47	c
Hexadecimal:	1B	2F	c

Comments:

This command is used to select the vertical tab channel, with the value of c from 0 to 7. All subsequent VT commands use the channel selected by this command. If no channel has been selected, channel 0 is used.

Horizontal Motion

ESC 1   **Set Left Margin**

Format:

ASCII code:	ESC	1	n
Decimal:	27	108	*n*
Hexadecimal:	1B	6C	*n*

Comments:

Sets the left margin to *n* columns in the current character size.
Settings made in the proportional mode are treated as 10 cpi. This
command clears previous tab settings and all previous characters
in the print line. Use lowercase 1 (as in left), not the numeral one.
The minimum space between the margins is the width of one
double-wide 10 cpi character.

ESC Q   **Set Right Margin**

Format:

ASCII code:	ESC	Q	n
Decimal:	27	81	n
Hexadecimal:	1B	51	n

Comments:

Sets the right margin to *n* columns in the current character size.
Settings made in the proportional mode are treated as 10 cpi. This
command clears previous tab settings and all previous characters
in the print line. The minimum space between the margins is the
width of one double-wide 10 cpi character.

BS   **Backspace**

Format:

  ASCII code: BS
  Decimal: 8
  Hexadecimal: 08

Comments:

  Prints out data in the print buffer, then moves the print position
  one space to the left. Backspacing is possible up to, but not
  beyond, the left margin setting. The BS code is ignored if ESC a2
  or ESC a3 has been sent.

ESC $ **Set Absolute Print Position**

Format:

ASCII code:	ESC	$	n1		n2
Decimal:	*27*	*36*	*n1*	n	*2*
Hexadecimal:	1B	24	n1		n2

Comments:

  This sequence specifies the distance from the current left margin
  that subsequent characters are to be printed, using this formula:
  total number of dots = *n1* + *(n2* x 256). Each unit equals 1/60th of
  an inch. The sequence is ignored and the previous setting remains
  effective if the position specified is beyond the right margin.

ESC **   **Set Relative Print Position

Format:

ASCII code:	ESC	\	n1	n2
Decimal:	27	92	n1	n2
Hexadecimal:	1B	5C	n1	n2

Comments:

Determines the position (relative to the current position) at which printing of subsequent data will start. To find n1 and *n2,* first calculate the displacement required in dots. If the displacement is to the left, subtract it from 65536. Send the resulting number using this formula: total number of dots = *n1 + (256 x n2).* The command is ignored if it would move the print position outside the current margins. A unit is 1/120th of an inch in draft, and 1/180th of an inch in Letter Quality or proportional modes.

HT   **Tab Horizontally**

Format:

ASCII code:	HT
Decimal:	9
Hexadecimal:	09

Comments:

Advances the print position to the next horizontal tab setting. The default tabs are at g-character intervals in the currently set pitch. Tab positions are not affected by subsequent changes in cpi.

ESC D						Set Horizontal Tabs

Format:

ASCII code:	ESC	D	*n1*	*n2*	*...*	*0*
Decimal:	**27**	**68**	*n1*	*n2*	*...*	*0*
Hexadecimal:	1B	44	*n1*	*n2*	*...*	*00*

Comments:

This command allows setting of up to 32 horizontal tabs, which are entered as n1, n2, n3, etc., (from 1 to 255) with the number 0 character terminating the command. The tab settings must be entered in ascending order. ESC D 0 clears all tabs. The default settings, when power is turned on or after an ESC @ command, are at every eight characters. The tab settings are not affected by changes in cpi. The tab positions in proportional printing are determined by the 10 cpi character size.

Overall Printing Style

ESC x			**Select Letter Quality or Draft**

Format:

ASCII code:	ESC	x	n
Decimal:	**27**	120	n
Hexadecimal:	1B	78	n

Comments:

The following values can be used for n:

0: Selects draft mode.

1: Selects Letter Quality (LQ) mode.

Overrides the SelecType panel setting.

ESC k	Select Typestyle Family

Format:

ASCII code:	ESC	k	*n*
Decimal:	27	107	*n*
Hexadecimal:	1B	6B	n

Comments:

This command affects only the Letter Quality typestyle, not draft. If *n* = 0, typestyle in the printer is used. To select one of the other typestyles, use the family number of the font as shown below. For example, to choose the Prestige font, use 3 for the value of *n*. The following values can be used for *n:*

0: Roman	5: OCR-B
1: Sans Serif	6: OCR-A
2: Courier	7: Orator
3: Prestige	8: Orator-S
4: Script	

Typestyle families 2 to 8 are available only if the appropriate font module is installed, such as the Multi-Font Module.

Overrides the SelecType panel setting and DIP switch font setting.

ESC !	**Master Select**

Format:

ASCII code:	ESC	!	*n*
Decimal:	27	33	*n*
Hexadecimal:	1B	21	*n*

Comments:

Selects any valid combination **of** the following modes: 10 cpi, 12 cpi, proportional, condensed, emphasized, double-strike, double-wide, italic, and underline. For details on how to set n, see the Selecting Typestyles With Master Select section in Chapter 4.

Print Size and Character Width

ESC P			Select 10 CPI

Format:

ASCII code:	ESC	P
Decimal:	27	80
Hexadecimal:	1B	50

Comments:

Selects 10 character per inch printing. This command is normally used to cancel 12 or 15 cpi.

ESC M			Select 12 CPI

Format:

ASCII code:	ESC	M
Decimal:	27	77
Hexadecimal:	1B	4D

Comments:

Selects 12 character per inch printing.

ESC g			Select 15 CPI

Format:

ASCII code:	ESC	g
Decimal:	27	103
Hexadecimal:	1B	67

Comments:

Selects 15 character per inch printing, and cancels 10 or 12 cpi. Cannot be combined with condensed mode.

ESC p   **Turn Proportional Mode On/Off**

Format:

ASCII code:	ESC	p	n
Decimal:	27	112	n
Hexadecimal:	1B	70	*n*

Comments:

Turns proportional mode on and off.
The following values can be used for n:
1: Turns mode on.
0: Turns mode off.

The width of proportional characters varies from character to
character. Therefore, a narrow letter like i receives less space than
a wide letter like W. Proportional character widths are given in
the Appendix. This command overrides the condensed mode and
fixed cpi fonts. When proportional is cancelled, the previously
selected font is used. Graphic characters are printed in fixed cpi
only; proportional mode is only available in Roman and Sans
Serif fonts.

SI   **Select Condensed Mode**

Format:

ASCII code:	SI
Decimal:	15
Hexadecimal:	0F

Comments:

Prints characters at about 60 percent of their normal width. For
example, the condensed 10 cpi mode has 17 characters per inch.
Proportional characters override the condensed mode.
Condensed mode cannot be combined with 15 cpi. Condensed
can be turned on and off by SelecType, the SI command, or DIP
switch 1-6.

ESC SI   Select Condensed Mode

Format:

ASCII code:	ESC	SI
Decimal:	27	15
Hexadecimal:	1B	0F

Comments:

Duplicates the SI command and the function of the condensed button on the control panel.

DC2   Cancel Condensed Mode

Format:

ASCII code:	DC2
Decimal:	18
Hexadecimal:	12

Comments:

Cancels condensed mode set by SI, ESC SI, or SelecType and returns printing to normal.

SO   Select Double-wide Mode (one line)

Format:

ASCII code:	SO
Decimal:	14
Hexadecimal:	0E

Comments:

Doubles the width of all characters on one line. This mode is cancelled by LF, FF, VT, or DC4.

ESC SO		**Select Double-wide Mode (one line)**

Format:

ASCII code:	ESC	SO
Decimal:	27	14
Hexadecimal:	1B	**0 E**

Comments:

Duplicates the SO command.

ESC W		**Turn Double-wide Mode On/Off**

Format:

ASCII code:	ESC	W	*n*
Decimal:	27	87	*n*
Hexadecimal:	1B	57	*n*

Comments:

Doubles the width of all characters.

The following values can be used for *n:*

1: Turns mode on.

0: Turns mode off.

DC4	**Cancel Double-wide Mode (one line)**

Format:

ASCII code:	DC4
Decimal:	20
Hexadecimal:	14

Comments:

Cancels double-wide mode selected by SO or ESC SO, but not double-wide mode selected by ESC W or ESC !.

ESC w			**Turn Double-high Mode On/Off**

Format:

ASCII code:	ESC	*w*	*n*
Decimal:	27	119	*n*
Hexadecimal:	1B	77	*n*

Comments:

Doubles the height of all characters.
The following values can be used for *n:*
1: Turns mode on.
0: Turns mode off.

Cannot be used with the pull tractor.

Print Enhancement

ESC E		**Select Emphasized Mode**

Format:

ASCII code:	ESC	E
Decimal:	27	69
Hexadecimal:	1B	45

Comments:

Makes text bolder by printing each dot twice, with the second dot
printed slightly to the right of the first.

ESC F		**Cancel Emphasized Mode**

Format:

ASCII code:	ESC	F
Decimal:	27	70
Hexadecimal:	1B	46

Comments:

Cancels the emphasized mode selected by ESC E.

ESC G   Select Double-strike Mode

Format:

ASCII code:	ESC	G
Decimal:	27	71
Hexadecimal:	1B	47

Comments:

Makes text bolder by printing each line twice, with the second printing slightly below the first.

ESC H   Cancel Double-strike Mode

Format:

ASCII code:	ESC	H
Decimal:	27	72
Hexadecimal:	1B	48

Comments:

Cancels the double-strike mode selected by ESC G.

ESC S 0   Select Superscript Mode

Format:

ASCII code:	ESC	S	0
Decimal:	27	83	0
Hexadecimal:	1B	53	00

Comments:

Prints characters about two-thirds of the normal character height in the upper part of the character space.

ESC S l   **Select Subscript Mode**

Format:

ASCII code:	ESC	S	1
Decimal:	27	83	1
Hexadecimal:	1B	53	01

Comments:

Prints characters about two-thirds of the normal character height in the lower part of the character space.

ESC T   **Cancel Superscript/Subscript Mode**

Format:

ASCII code:	ESC	T
Decimal:	27	84
Hexadecimal:	1B	54

Comments:

Cancels either superscript or subscript.

ESC (-							**Select** Score

Format:

ASCII code:	ESC	(	-	*n1*	*n2*	m	*d1* *d2*
Decimal:	**27**	**40**	**45**	n1	*n2*	m	*d1* *d2*
Hexadecimal:	1B	**28**	**2D**	*n1*	*n2*	m	*d1* *d2*

Comments:

Use decimal or hexadecimal values for all variables, not ASCII characters.

Use the following values for the first 3 variables:

n1 must be 3.

n2 must be 0.

m must be 1.

The value of *d1* determines the location of the score:

d1 = 1 for underline.

d1 = 2 for strike-through.

d1 = 3 for overscore.

The value of *d2* determines whether the score line is single, double, broken, or continuous:

d2 = 0 Cancel the score line selected by *d1.*

d2 = 1 Single continuous line.

d2 = 2 Double continuous line.

d2 = 5 Single broken line.

d2 = 6 Double broken line.

ESC -			**Turn Underline Mode On/Off**

Format:

ASCII code:	ESC	-	n
Decimal:	27	45	*n*
Hexadecimal:	1B	2D	n

Comments:

This mode provides continuous underlining including spaces.

The following values can be used for *n:*

1: Turns mode on.

0: Turns mode off.

Areas skipped with HT or ESC $ are not underlined.

ESC q			**Select Character Style**

Format:

ASCII code:	ESC	*q*	*n*
Decimal:	27	113	*n*
Hexadecimal:	1B	71	*n*

Comments:

The following values can be used for *n:*

0: Selects normal.

1: Selects outline.

2: Selects shadow.

3: Selects outline with shadow.

This command is valid for all characters, with the exception of character codes B0H to DFH, F4H, and F5H (176 to 223, 244, and 245 decimal) in the Epson Extended Graphics character table.

Word Processing

ESC a				Select Justification

Format:

ASCII code:	ESC	*a*	*n*
Decimal:	**27**	**97**	*n*
Hexadecimal:	1B	61	*n*

Comments:

Sets the type of justification.

The following values can be used for *n:*

0: Selects left justification.

1: Selects centering.

2: Selects right justification.

3: Selects full justification.

The default setting is *n* = 0. Full justification (n = 3) is performed when the buffer becomes full; HT and BS are invalid except in *n* = 0 mode. For n = 3 there must be no carriage returns within a paragraph.

ESC SP (space)			Set Intercharacter Space

Format:

ASCII code:	ESC	SP	n
Decimal:	**27**	**32**	n
Hexadecimal:	1B	20	n

Comments:

Sets the amount of space added to the right of each character, in addition to the space already allowed in the design of the character. The number of dots is determined by *n,* which should be from 0 to 127. Each unit of space is 1/120th of an inch in draft mode and 1/180th of an inch in Letter Quality and proportional modes.

Character Tables

ESC t   **Select Character Table**

Format:

ASCII code:	ESC	t	*n*
Decimal:	27	116	*n*
Hexadecimal:	1B	74	n

Comments:

Selects the character table used by codes 128 to 255. Selecting
Epson Extended Graphics characters does not disable italic
printing. Italic printing can still be selected by ESC 4. The
following values can be used for n:

0: Selects italics character table.

1: Selects Epson Extended Graphics character table.

2: Selects user-defined character table and remaps user-defined
O-127 to 128-255.

Overrides the function of DIP switch 1-7. Note that the value of *n*
must equal 00 hex, 01 hex, or 02 hex.

ESC 4   **Select Italic Mode**

Format:

ASCII code:	ESC	4
Decimal:	27	52
Hexadecimal:	1B	34

Comments:

Causes characters from the italic character table to be printed.
This command is valid even if the Epson Extended Graphics
character set has been selected by ESC t or by DIP switch 1-7, but
the character graphics are not italicized.

ESC 5		**Cancel Italic Mode**

Format:

ASCII code:	ESC	5
Decimal:	27	53
Hexadecimal:	1B	35

Comments:

Cancels the mode selected by ESC 4.

ESC R			**Select an International Character Set**

Format:

ASCII code:	ESC	R	*n*
Decimal:	27	82	*n*
Hexadecimal:	1B	52	n

Comments:

Selects one of the international character sets.

The following values can be used for *n:*

0 = USA	8 = Japan
1 = France	9 = Norway
2 = Germany	10 = Denmark II
3 = England	11 = Spain II
4 = Denmark I	12 = Latin America
5 = Sweden	13 = Korea
6 = Italy	64 = Legal
7 = Spain I	

Overrides the DIP switch settings of the international character set.

User-defined Characters

See Chapter 4 for sample programs and full information on this
topic.

ESC & **Define User-defined Characters**

Format:

ASCII code:	ESC	&	0	n1	n2	d1	d2 data
Decimal:	*27*	*38*	*0*	*n1*	*n2*	*d1*	*d2* data
Hexadecimal:	1B	*26*	*00*	*n1*	*n2*	*d1*	*d2* data

Comments:

This command allows characters to be redefined in the currently
selected mode.

When defining characters, DIP switch 2-5 must be set to off.

ESC : **Copy ROM to RAM**

Format:

ASCII code:	ESC	:	0	n	0
Decimal:	*27*	*58*	*0*	*n*	*0*
Hexadecimal:	1B	3A	00	*n*	*00*

Comments:

This sequence copies the characters in ROM to RAM so that
specific characters can be redefined. The variable n represents
the font family. Fonts in font cartridges (except Orator and
Orator-S) can also be copied. The LQ-510 cannot select fonts
2 to 6 if you do not have the multi-font cartridge.

0: Roman 4: Script
1: Sans Serif *5:* OCR-B
2: Courier *6:* OCR-A
3: Prestige

ESC %			**Select User-defined Set**

Format:

ASCII code:	ESC	%	n
Decimal:	27	37	n
Hexadecimal:	1B	25	n

Comments:

This sequence is used to print the user-defined (download) character set. ESC & is required to define the character set. The following values can be used for *n:*

0: Selects the normal set.

1: Selects the user-defined set.

ESC 6		**Enable Printable Characters**

Format:

ASCII code:	ESC	6
Decimal:	27	54
Hexadecimal:	1B	36

Comments:

When the Epson Extended Graphics character table is selected, ESC 6 enables the printing of codes 128 through 159 (decimal) as characters, not control codes. See the Appendix for characters printed.

ESC 7		**Enable Upper Control Codes**

Format:

ASCII code:	ESC	7
Decimal:	27	55
Hexadecimal:	1B	37

Comments:

When the Epson Extended Graphics character table is selected, ESC 7 causes codes 128 through 159 to be treated as control codes. This is the default.

Graphics

See Chapter 4 for sample graphics programs. See the table under
ESC * for graphics modes.

ESC K				**Select Single-density Graphics Mode**

Format:

ASCII code:	ESC	K	*n1*	*n2*
Decimal:	*27*	*75*	*n1*	*n2*
Hexadecimal:	1B	4B	*n1*	*n2*

Comments:

Turns on 8-pin, single-density graphics mode. The total number
of columns = *n1 + (n2 x 256).*

ESC L				**Select Double-density Graphics Mode**

Format:

ASCII code:	ESC	L	*n1*	*n2*
Decimal:	*27*	*76*	*n1*	*n2*
Hexadecimal:	1B	4C	*n1*	*n2*

Comments:

Turns on 8-pin, low-speed, double-density graphics mode. The
total number of columns = *n1 + (n2 x 256).*

ESC Y				**Select High-speed Double-density Graphics Mode**

Format:

ASCII code:	ESC	Y	*n1*	*n2*
Decimal:	*27*	*89*	*n1*	*n2*
Hexadecimal:	1B	59	*n1*	*n2*

Comments:

Turns on 8-pin, high-speed, double-density graphics mode. The
total number of columns = *n1* + (n2 x 256).

ESC Z   Select Quadruple-density Graphics Mode

Format:

ASCII code:	ESC	Z	n1	*n 2*
Decimal:	**27**	**90**	*n1*	*n2*
Hexadecimal:	1B	5A	**n1**	*n 2*

Comments:

Turns on 8-pin, quadruple-density graphics mode. The total number of columns = *n1 + (n2 x 256).*

ESC *   Select Graphics Mode

Format:

ASCII code:	ESC	*	m	*n1*	*n2*
Decimal:	**27**	**42**	**m**	**n1**	**n2**
Hexadecimal:	1B	2A	m	n1	*n 2*

Comments:

Turns on graphics mode m. Refer to the following table for details on the available modes. The total number of columns = **n1** + *(n2 x 256).*

Option	Pins	m	Horiz. density (dots/in)
Single-density	8	0	60
Double-density	8	1	120
High-speed double-density*	8	2	120
Quadruple-density*	8	3	240
CRT I	8	4	80
CRT II	8	6	90
Single-density	24	32	60
Double-density	24	33	120
CRT III	24	38	90
Triple-density	24	39	180
Hex-density*	24	40	360

• Adjacent dots cannot be printed in this mode.

ESC ?   Reassign Graphics Mode

Format:

ASCII code:	ESC	?	*s*	m
Decimal:	27	63	s	m
Hexadecimal:	1B	3F	s	m

Comments:

Changes from one graphics mode to another. The variable s is a character (K, L, Y or Z).

The variable m corresponds to the mode m in the ESC * command.

Appendix

Proportional Width Table

This table lists the widths of your printer's proportional characters. 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 characters with no code indicated are international characters or graphics. See the table in Chapter 3 for the relevant codes for the international characters. Also, see the descriptions of the ESC R and ESC t commands in Chapter 10 for information on how to use these characters.

The following width table shows each character, its ASCII code (hexadecimal), and its width. If there are two numbers in the width column, the second one is for the superscript/subscript version of the character.

Code	CHR	Width	Code	CHR	Width
20		30/20	30	0	30/20
21	!	18/12	31	1	30/20
22	"	30/20	32	2	30/20
23	#	30/20	33	3	30/20
24	$	30/20	34	4	30/20
25	%	36/24	35	5	30/20
26	&	36/24	36	6	30/20
27	'	18/12	37	7	30/20
28	(	24/16	38	8	30/20
29	)	24/16	39	9	30/20
2A	*	30/20	3A	:	18/12
2B	+	30/20	3B	;	18/12
2C	,	18/12	3C	<	30/20
2D	-	30/20	3D	=	30/20
2E	.	18/12	3E	>	30/20
2F	/	30/20	3F	?	30/20

Code	CHR	Width	Code	CHR	Width
40	@	36/24	64	d	36/24
41	A	36/24	65	e	30/20
42	B	36/24	66	f	24/16
43	C	36/24	67	g	36/24
44	D	36/24	68	h	36/24
45	E	36/24	69	i	18/12
46	F	36/24	6A	j	24/16
47	G	36/24	6B	k	36/24
48	H	36/24	6C	l	18/12
49	I	24/16	6D	m	42/28
4A	J	30/20	6E	n	36/24
48	K	361/24	6F	o	30/20
4C	L	36/24	70	p	36/24
4D	M	42/28	71	q	36/24
4E	N	36/24	72	r	30/20
4F	O	36/24	73	s	30/20
50	P	36/24	74	t	24/16
51	Q	36/24	75	u	36/24
52	R	36/24	76	v	36/24
53	S	36/24	77	w	42/28
54	T	36/24	78	x	30/20
55	U	42/28	79	y	36/24
56	V	36/24	7A	z	30/20
57	W	42/28	7B	{	24/16
58	X	36/24	7C	¦	18/12
59	Y	36/24	7D	}	24/16
5A	Z	30/20	7E	~	30/20
5B	[	24/16		Ç	36/24
5C	\	30/20		ü	36/24
5D	]	24/16		é	30/20
5E	λ	30/20		â	30/20
5F	‾	30/20		ä	30/20
60	`	18/12		à	30/20
61	a	30/20		å	30/20
62	b	36/24		ç	30/20
63	c	30/20		ê	30/20

Proportional Width Table

Code	CHR	Width	Code		Width
	ë	30/20		«	30/20
	è	30/20		»	30/20
	ï	18/12	B0		30
	î	18/12	B1		30
	ì	18/12	B2		30
	Ä	36/24	B3		30
	Å	36/24	B4		30
	É	36/24	B5		30
	æ	42/28	B6		30
	Æ	42/28	B7		30
	ô	30/20	B8		30
	ö	30/20	B9		30
	ò	30/20	BA		30
	û	36/24	BB		30
	ù	36/24	BC		30
	ÿ	36/24	BD		30
	Ö	36/24	BE		30
	Ü	42/28	BF		30
	¢	30/20	c0		30
	£	30/20	Cl		30
	¥	36/24	C2		30
	Pt	42/28	C3		30
	ƒ	30/20	C4		30
	á	30/20	C5		30
	í	18/12	C6		30
	ó	30/20	C7		30
	ú	36/24	C8		30
	ñ	36/24	C9		30
	Ñ	36/24	CA		30
	ª	30/20	CB		30
	º	30/20	CC		30
	¿	30/20	CD		30
	⌐	30/20	CE		30
	¬	30/20	CF		30
	½	30/20	D0		30
	¼	30/20	D1		30
	¡	30/20	D2		30

Code	CHR	Width		Code	CHR	Width
D3	⌊	30		F8	°	30
D4	⌊	30		F9	•	30
D5	⌐	30		FA	·	30
D6	⌐	30		FB	√	30
D7	┼	30		FC	ⁿ	30
D8	┼	30		FD	2	30
D9	┘	30		FE	■	30
DA	⌐	30			°	24/16
DB	■	30			¤	30/20
DC	■	30			ß	36/24
DD	■	30			Ø	36/24
DE	■	30			ø	30/20
DF	■	30			¨	30/20
E0	α	30/20			§	30/20
E1	β	30/20				
E2	Γ	30/20				
E3	π	30/20				
E4	Σ	30/20				
E5	σ	30/20				
E6	μ	30/20				
E7	τ	30/20				
E8	Φ	30/20				
E9	θ	30/20				
EA	Ω	30/20				
EB	δ	30/20				
EC	∞	30/20				
ED	ø	30/20				
EE	∈	30/20				
EF	∩	30/20				
F0	≡	30				
F1	±	30				
F2	≥	30				
F3	≤	30				
F4	⌠	30				
F5	⌡	30				
F6	÷	30				
F7	≈	30				

A-5

Character Tables

These character tables are selected by DIP switch 1-7 or the ESC t software command. For the Epson Extended Graphics character table, use of the ESC 6 or ESC 7 software command lets you select whether to print hex codes 80 to 9F as characters (ESC 6) or control codes (ESC 7).

Italic Character Table

CODE	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0				0	@	P	`	t	p			*0*	*@*	*P*	*'*	*p*
1			!	1	A	Q	a	q			*!*	*1*	*A*	*Q*	*a*	*q*
2			"	2	B	R	b	r			"	*2*	*B*	*R*	*b*	r
3			#	3	C	S	c	s			**#**	**3**	**C**	**S**	**c**	**s**
4			$	4	D	T	d	t			*$*	*4*	*D*	*T*	*d*	*t*
5			%	5	E	U	e	u			*%*	*5*	*E*	*U*	*e*	*u*
6			&	6	F	V	f	v			*&*	*6*	*F*	*V*	*f*	*v*
7			'	7	G	W	g	w			*'*	*7*	*G*	*W*	*g*	*w*
8			(	8	H	X	h	x			*(*	*8*	*H*	*X*	*h*	*x*
9			*)*	*9*	*I*	*Y*	*i*	*y*			*)*	*9*	*I*	*Y*	*i*	*y*
A			*	:	J	Z	j	z			***	*:*	*J*	*Z*	*j*	*z*
B			+	;	**K**	**[**	**k**	**{**			**+**	**;**	**K**	**[**	**k**	**{**
C			,	<	L	\	l	|			*,*	*<*	*L*	**	*l*	*|*
D			-	=	M	]	m	}		–	*=*	*M*	*J*	*m*	*}*
E			.	>	N	^	n	~			*.*	*>*	*N*	*^*	*n*	*~*
F			/	?	**O**	-	**o**				*/*	*?*	**O**	*-*	**o**	

Epson Extended Graphics Character Table

CODE	0	1	2	3	4	5	6	7	6	9	A	B	C	D	E	F
0				0	@	P	'	p	Ç	É	á		└	⊥	α	≡
1			!	1	A	Q	a	q	ü	æ	í	▓	┴	╤	ß	±
2			"	2	B	R	b	r	é	Æ	ó	▒	┬	╥	Γ	≥
3			#	3	C	S	c	s	â	ô	ú	│	├	╙	π	≤
4			$	4	D	T	d	t	ä	ö	ñ	┤	─	╘	Σ	⌠
5		§	%	5	E	U	e	u	à	ò	Ñ	╡	┼	╒	σ	⌡
6			&	6	F	V	f	v	å	û	ª	╢	╞	╓	µ	÷
7			'	7	G	W	g	w	ç	ù	º	╖	╫	╪	τ	≈
8			(	8	H	X	h	x	ê	ÿ	¿	╕	╚	╧	Φ	°
9			)	9	I	Y	i	y	ë	Ö	⌐	╣	╔	┘	θ	·
A			*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Ω	·
B			+	;	K	[	k	{	ï	¢	½	╗	╦	█	δ	√
C			,	<	L	\	l	¦	î	£	¼	╝	╠	▄	∞	ⁿ
D			-	=	M	]	m	}	ì	¥	¡	╜	═	▌	ø	²
E			.	>	N	^	n	~	Ä	₧	«	╛	╬	▐	∈	■
F			/	?	O	_	o		Å	ƒ	»	┐	╩	■	∩	

Glossary

Note that these definitions apply specifically to printers. If a word is italicized, see that topic for more information.

application program
A software program that helps you carry out a particular task, such as word processing or financial planning.

ASCII
Acronym for the American Standard Code for Information Interchange. A standardized coding system for assigning numerical codes to letters and symbols.

auto line feed
When this feature is enabled using a DIP switch or external control through the parallel connector, the printer will automatically feed the paper one line after receiving a CR code.

baud rate
A measure of the speed of data transmission. Usually expressed in bits per second or bps.

bidirectional printing
Printing in which the print head alternates printing a line left to right then the next line right to left, and so on. Because the head prints in both directions, the overall printing speed increases by eliminating wasted (non-printing) movement.

binary
See number systems.

bit
A binary digit (0 or l), which is the smallest unit of information used by a printer or computer. See also *number systems.*

buffer
See input buffer and *memory.*

byte
A unit of information consisting of eight bits.

carriage return (CR)
The control code that returns the print position to the left margin. When issued together with a line feed, the print position moves to the left margin of the next line. In bidirectional printing, the print head may not physically move to the left margin.

character set
A collection of letters, numbers, and symbols that provides you with the characters used in a particular language.

condensed
Printing in which each character is approximately 60 percent of the width of standard characters. For example, condensed 10 characters per inch (cpi) has 17 characters per inch. Useful for fitting wide tables or spreadsheets onto the paper.

continuous paper
Paper which has sprocket-feed holes on both long edges, is perforated between pages, and is supplied in a folded stack. Also called fanfold paper.

control code
In addition to the codes for printable characters, the ASCII standard also includes 33 other codes which are called control codes. These control codes perform such functions as sounding the beeper and performing a carriage return or line feed.

cut sheet feeder (CSF)
An optional, detachable device which automatically feeds single sheets of paper into the printer.

data dump
Sometimes called hex dump. A troubleshooting feature. When the printer is in the data dump mode, each code that it receives is printed in hexadecimal notation.

decimal
See number systems.

default
A value or setting that takes effect when the equipment is turned on, reset, or initialized.

DIP switches
Small switches in a printer that control various printer functions and set the default status of the printer when it is turned on or initialized. DIP stands for Dual In-line Package.

dot graphics
A graphic design formed by patterns of dots. Also called bit image graphics.

dot matrix
A method of printing in which each letter or symbol is formed by a pattern (matrix) of individual dots.

double-high printing
Printing in which each character is twice as tall as normal.

double-strike printing
A way of producing bolder characters. Each character is printed twice; the second time, the dots are printed slightly below the original dots. Can only be used in draft mode.

double-wide printing
A print width in which each character is twice as wide as normal characters. (The cpi is halved.)

draft mode
One of two print qualities available on your printer. Draft uses fewer dots per character for high-speed printing. See also *Letter Quality.*

emphasized printing
A way of producing darker characters. In a single pass of the print head, characters receive twice the number of dots.

Epson Extended Graphics character table
The Epson Extended Graphics character table contains international accented characters, Greek characters, and character graphics for printing lines, corners, and shaded areas.

ESC (escape) code
A special control code used to begin most printer commands.

ESC/P
Abbreviation for Epson Standard Code for Printers. The system of commands lets you perform software control of your printer from your computer. It is standard for all Epson printers and supported by most application software for personal computers.

font
A font is a style of type designated by a family name.

form
In printer terminology, a form normally refers to a page.

form feed
Refers to both a control code and a panel button that advances the paper to the top of the next page.

hexadecimal (hex)
See number systems.

initialize
To establish the initial default status of the printer by turning the printer on or by sending an INIT signal or code.

input buffer
The memory in the printer in which data sent from the computer is stored while waiting to be printed.

interface
The means of connection between the computer and printer. See also *parallel interface* and *serial interface.*

italic
A typestyle in which the characters slant. *This sentence is italicized.*

Letter Quality
One of two print qualities available on your printer. Letter Quality
provides better readability and appearance at a reduced print speed.
See also *draft mode.*

line feed
Both a control code and a panel button that advances the paper one
line space.

loading position
The position to which the paper is automatically loaded. It can be
adjusted by using the micro-adjustment feature.

memory
The printer, like a computer, has a memory. When you print a file
from a computer, the contents of the file are transferred quickly
from the computer's memory to the printer's memory. The printer
then prints information from its own memory at a much slower rate.
This way of printing frees the computer to do other work while the
printer is still working. The printer memory is sometimes called the
buffer memory or input buffer.

micro-adjustment
A feature that adjusts the paper loading and short tear-off positions
by the smallest possible increments.

number systems
Three number systems are commonly used with printers:

   decimal is base 10 and uses the digits 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9.
   (This is the most familiar system.)

   hexadecimal (hex) is base 16 and uses the digits 0, 1, 2, 3, 4, 5, 6, 7,
   8, 9, A, B, C, D, E, and F. This is frequently used by programmers.
   Any decimal number between 0 and 255 can be expressed by a
   two-digit hex number.

binary is base 2 and uses only the digits 0 and 1. All information in computer systems is handled in binary form represented by electrical signals that are on or off. A binary digit is often called a bit; any decimal number between 0 and 255 can be expressed by an eight-bit binary number.

on line
When the printer is on line, it is able to communicate with the computer connected to it.

paper-out sensor
A small switch behind the platen that sends a signal when it is not in contact with paper, informing the printer and remote computer that there is no paper loaded, and causing the PAPER OUT light to go on.

paper tension unit
The part of the printer that fits above the platen to assure proper paper tension in the printing area.

parallel interface
An interface that connects the computer and the printer. A parallel interface transmits data one character or code at a time. See also *serial interface.*

platen
The black roller that provides the backing for the paper during printing.

print quality
Your printer has two types of print quality; draft and Letter Quality. Draft is for high-speed, draft quality jobs; Letter Quality is used to produce more polished documents.

proportional printing
Printing in which the character width varies from character to character. For example, a capital W receives much more space than a lowercase i. The result looks more like a typeset book than a typewritten draft.

pull tractor unit
An optional device that feeds continuous paper and multi-part forms through the printer.

push tractor
A built-in device that feeds continuous paper through the printer.

RAM
Acronym for Random Access Memory. The portion of the printer's memory used as a buffer and as a place for storing user-defined characters. All data stored in RAM is lost when the printer is turned off.

reset
To return a printer to its defaults, either by a command, an INIT signal, code, or by turning the printer off and on.

self test
A method of checking the operation of the printer. When the self test is run, the printer prints out its current DIP switch settings and the characters that are stored in its ROM (Read Only Memory).

serial interface
A serial interface transmits data one bit at a time. See also *parallel interface.*

short tear-off
A feature that automatically feeds the perforation of continuous paper to the tear-off position to be removed by the operator, and then draws the paper back to the loading position. These positions can be adjusted using the micro-adjustment feature. See also *micro-adjustment* and *loading position.*

10 cpi
A character spacing of 10 characters per inch. This is often the standard or default pitch. Also referred to as pica.

tractor
The part of the printer that moves continuous paper through the printer by its sprockets gripping the holes in continuous paper.

12 cpi
A character spacing in which each character is slightly narrower than normal, so that there are 12 characters per inch. Also referred to as elite.

unidirectional printing
Printing in one direction only. Allows more precise vertical alignment than bidirectional printing. Often used for printing graphics.

user-defined characters
Characters that are defined and stored in the printer by the user. Also known as download characters.

Index

Command descriptions are not indexed here. To locate the page number of a specific command, see Chapter 9 or the Quick Reference card.

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EPSON®
LQ-510

Quick Reference

Character Tables

ASCII	Dec.	Hex.	Description	pg
ESC t	116	74	Select Character Tables	9-34
ESC 4	52	34	Select Italic Mode	9-34
ESC 5	53	35	Cancel Italic Mode	9-35
ESC R	82	52	Select an International Character Set	9-35

User-defined Characters

ASCII	Dec.	Hex.	Description	Pg
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ESC 7	55	37	EnableUpperControlCodes	9-37

Graphics

ASCII	Dec.	Hex.	Description	Pg
ESC K	75	4B	Select Single-density Graphics Mode	9-38
ESC L	76	4C	Select Double-density Graphics Mode	9-38
ESC Y	89	59	Select High-speed Double-density	9-38
ESC Z	90	5A	Select Quadruple-density Graphics	9-39
ESC*	42	2A	Select Graphics Mode	9-39
ESC ?	63	3F	Reassign Graphics Mode	9-40

DIP switch settings

DIP Switch 1

SW	Description	ON	OFF
1-1	International character set	See page 3-8	
1-2			
1-3			
1-4	Font selection	See page 3-8	
1-5			
1-6	Condensed mode on/off	Condensed	Normal
1-7	Character table	Graphics	Italics
1-8	Cut sheet feeder mode on/off	On	off

DIP Switch 2

SW	Description	ON	OFF
2-1	Page length	12 inches	11 inches
2-2	Tear-off mode	On	off
2-3	1 -inch skip over perforation	On	Off
2-4	Auto line feed	On	Off
2-5	Input buffer capacity	8 KB	1 KB*
2-6	Graphics print direction	Bidirect.	Unidirect.
2-7	Character spacing	See page 3-8	
2-8			

* Required for use of user-defined (download) characters.

Control and ESCape Codes by Function

The following control codes are listed briefly for quick reference. For a more detailed explanation, see the page reference in Chapter 9. Variables are not included in this quick reference due to their complexity. For those codes that contain variables, such as ESC Q *n* for setting the right margin, see Chapter 9.

Printer Operation

ASCII	Dec.	Hex.	Description	Pg
ESC @	64	40	Initialize Printer	9-8
DC1	17	11	Select Printer	9-8
DC3	19	13	Deselect Printer	9-9
DEL	127	7F	Delete Character	9-9
ESC <	60	3C	Select Unidirectional Mode (one line)	9-9
ESC U	85	55	Turn Unidirectional Mode On/Off	9-10
ESC EM	25	19	Control Cut Sheet Feeder Mode	9-10
ESC =	61	3D	Set MSB to 0	9-11
ESC >	62	3E	Set MSB to 1	9-11
ESC #	35	23	Cancel MSB Control	9-11
BEL	7	07	Beeper	9-12

Data Control

ASCII	Dec.	Hex.	Description	Pg
CR	13	0D	Carriage Return	9-12
CAN	24	18	Cancel Line	9-12

Vertical Motion

ASCII	Dec.	Hex.	Description	Pg
FF	12	0C	Form Feed	9-13
ESC C	67	43	Set Page Length in Lines	9-13
ESC C 0	67	43	Set Page Length in Inches	9-13
ESC N	78	4E	Set Skip Over Perforation	9-14
ESC O	79	4F	Cancel Skip Over Perforation	9-14
LF	10	0A	Line Feed	9-14
ESC 0	48	30	Select 1/8-inch Line Spacing	9-15
ESC 2	50	32	Select 1/6-inch Line spacing	9-15
ESC +	43	2B	Set *n*/360-inch Line Spacing	9-15
ESC 3	51	33	Set *n*/180-inch Line Spacing	9-16
ESC A	65	41	Set *n*/60-inch Line Spacing	9-16
ESC J	74	4A	Perform *n*/180-inch Line Feed	9-16
VT	11	0B	Tab Vertically	9-17
ESC B	66	42	Set Vertical Tabs	9-17
ESC b	98	62	Set Vertical Tabs in Channels	9-18
ESC /	47	2F	Select Vertical Tab Channel	9-18

Horizontal Motion

ASCII	Dec.	Hex.	Description	pg
ESC l	108	6C	Set Left Margin	9-19
ESC Q	81	51	Set Right Margin	9-19
BS	8	08	Backspace	**9-20**
ESC $	36	24	Set Absolute Print Position	9-20
ESC \	92	5C	Set Relative Print Position	9-21
HT	9	09	Tab Horizontally	9-21
ESC D	68	44	Set Horizontal Tabs	9-22

Overall Printing Style

ASCII	Dec.	Hex.	Description	Pg
ESC x	120	78	Select Letter Quality or Draft	9-22
ESC k	107	6B	Select Typestyle Family	9-23
ESC !	33	21	Master Select	9-23

Print Size and Character Width

ASCII	Dec.	Hex.	Description	Pg
ESC P	80	50	Select 10 CPI	9-24
ESC M	77	4D	Select 12 CPI	9-24
ESC g	103	67	Select 15 CPI	9-24
ESC p	112	70	Turn Proportional Mode On/Off	9-25
SI	15	0F	Select Condensed Mode	9-25
ESC SI	15	0F	Select Condensed Mode	9-26
DC2	18	12	Cancel Condensed Mode	9-26
SO	14	0E	Select Double-wide Mode (one line)	9-26
ESC SO	14	0E	Select Double-wide Mode (one line)	9-27
ESC W	87	57	Turn Double-wide Mode On/Off	9-27
DC4	20	14	Cancel Double-wide Mode (one line)	9-27
ESC w	119	77	Turn Double-high Mode On/Off	9-28

Print Enhancement

ASCII	Dec.	Hex.	Description	Pg
ESC E	**69**	**45**	Select Emphasized Mode	9-28
ESC F	70	46	Cancel Emphasized Mode	9-28
ESC G	71	47	Select Double-strike Mode	9-29
ESC H	72	48	Cancel Double-strike Mode	9-29
ESC S 0	83	53	Select Superscript Mode	9-29
ESC S 1	83	53	Select Subscript Mode	9-30
ESC T	84	54	Cancel Superscript Mode	9-30
ESC (	40	**28**	Select Score	9-31
ESC ·	45	2D	Turn Underline Mode On/Off	9-32
ESC q	113	71	Select Character Style	9-32

Word Processing

ASCII	Dec.	Hex.	Description	Pg
ESC a	97	61	Select Justification	9-33
ESC SP	32	20	Set Intercharacter Space	9-33

paper guide

edge guides

paper release lever

printer cover

slot

control panel

platen knob

DIP switch

paper tension unit cover

push tractor

parallel interface

paper support

ground connector

print head

power switch

LQ-510

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