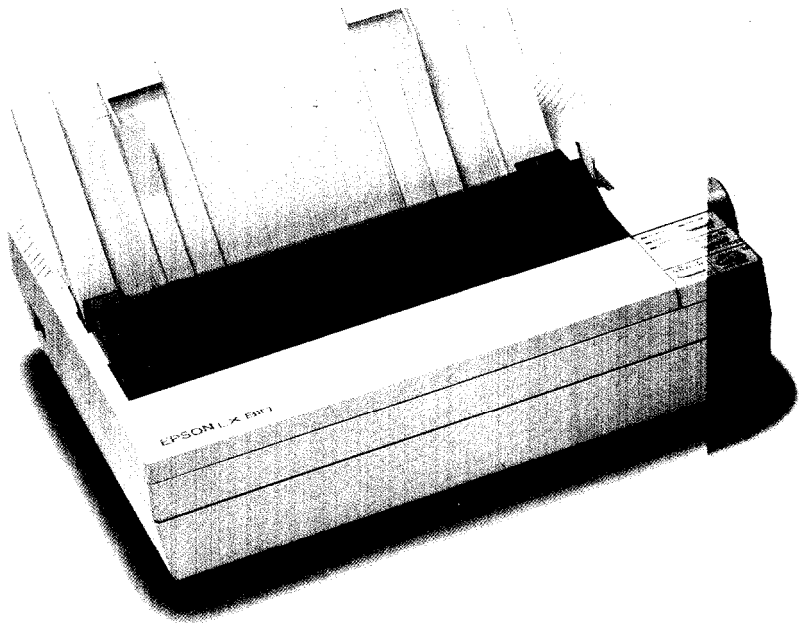


User's Manual



EPSON®

Y46399102000

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
- Move the printer away from 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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About This Manual

This user's manual provides fully illustrated, step-by-step instructions for setting up and operating your Epson's' 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 cover 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 about using software commands, graphics, and creating your own user-defined characters. Also 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 problems and solutions.**
- **Other chapters contain information on printer options, general maintenance, and specifications. You will also find a glossary of printer terms, an appendix of character tables, and an index.**
- **At the back of this manual is a handy Quick Reference card with the information you are likely to need most often.**

Conventions used in this guide



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.

Chapter 1

Setting Up the Printer

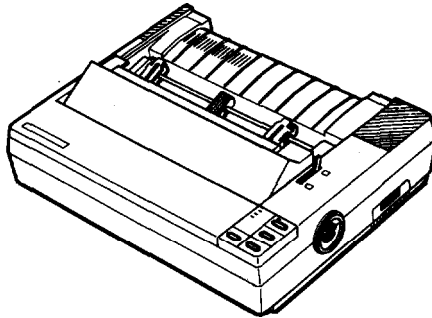
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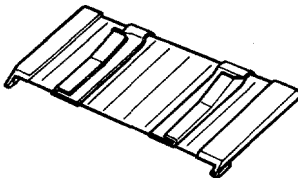
Unpacking the Printer

Checking the parts

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



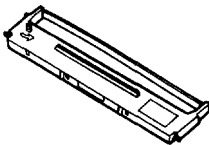
Printer



Paper guide



Platen knob



Ribbon cartridge



Power cable

In some locations, the power cable may be attached to the printer.

WARNING: There are several different versions of the printer designed for different electrical standards. The power supply voltage is shown on the label on the back of the printer. If the voltage shown is not the correct voltage for your country, contact your dealer. It is not possible to adjust the printer for use with different voltages.

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

Choosing a Place for the Printer

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

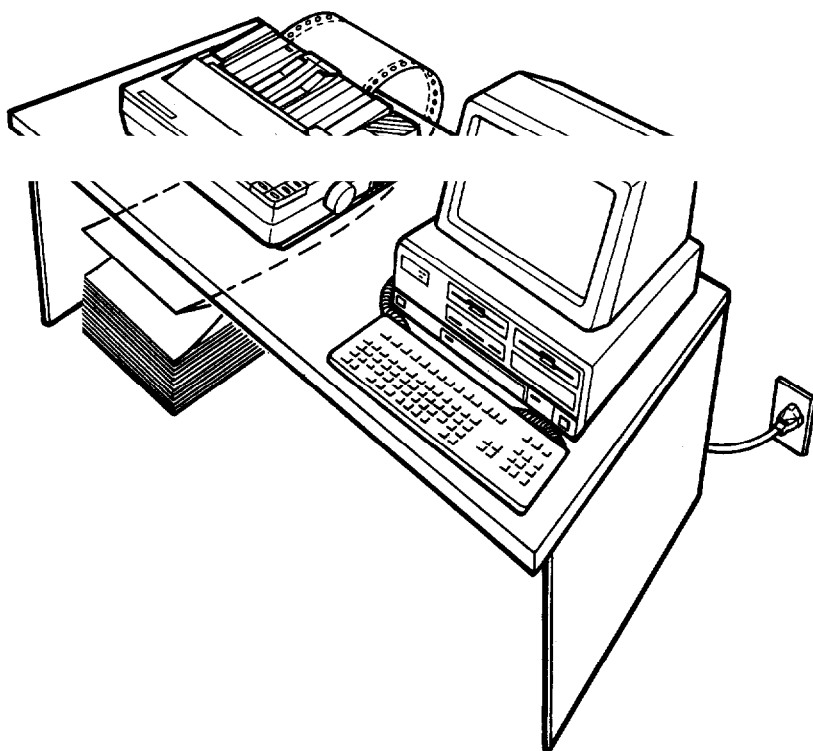
- Place the printer on a flat, stable surface.
- Leave adequate room around the printer to allow easy printer operation and maintenance.
- Use a grounded outlet; do not use an adapter plug.



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 your computer's and printer's memory.
- Avoid outlets on the same circuit with large motors or electrical appliances that might 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: If you plan to use a printer stand, read through the list of requirements and suggestions below to ensure that you have the right stand for your printer.

- **The stand should be able to support at least twice the weight of the LX-810 printer (11.5 kg approx).**
- **Never use a stand that tilts the printer at an angle of more than 15 degrees from horizontal.**
- **With a cut sheet feeder installed, your printer should be kept level at all time.**
- **If your paper supply is positioned below the printer stand, make sure that there is enough clearance to keep the paper from catching on the underside of the stand. Also, check to see that the distance between the stand supports is wide enough to accommodate the paper you will be using.**
- **Position your printer's power cable and I/F cable so that they do not interfere with paper feeding. If possible, secure the cables to the printer stand support.**

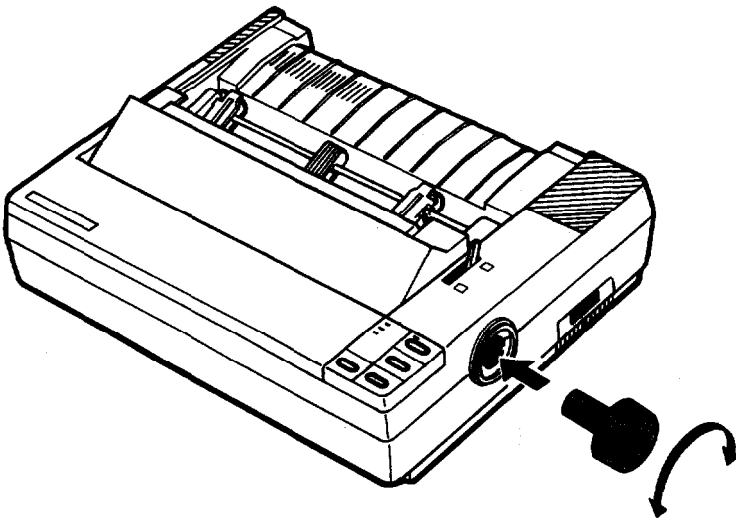
Assembling the Printer

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

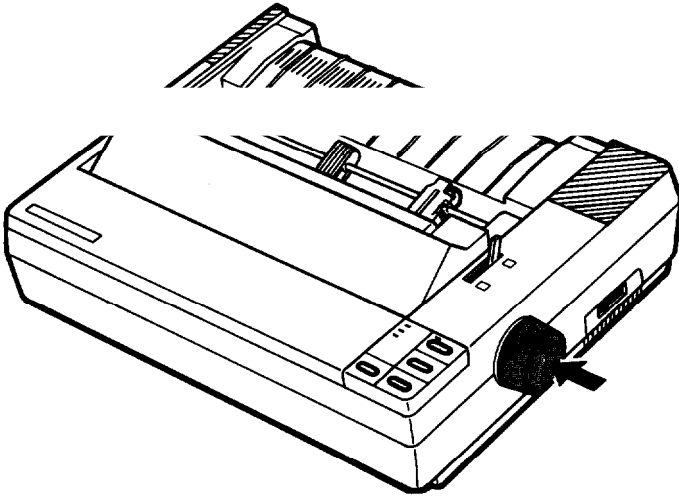
Installing the platen knob

The platen knob is used to manually feed the paper in the event of a paper jam or other paper feeding problem. You will find the platen knob packed in an indentation in the white foam packaging material.

1. Insert the knob into the hole on the printer's side and rotate it slowly until it slips onto the shaft.



2. Push firmly on the platen knob until it fits against the printer case.



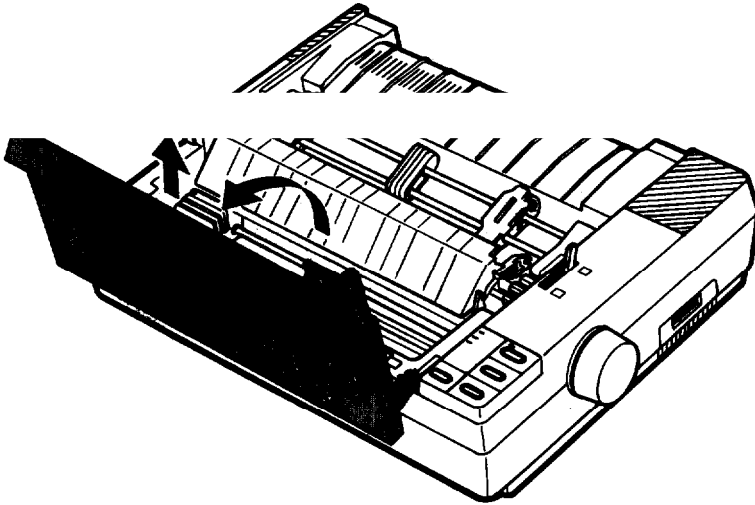
CAUTION: Do not use the platen knob to adjust the position of the paper as this interferes with the automatic paper loading system and may cause a paper jam.

Installing the ribbon cartridge

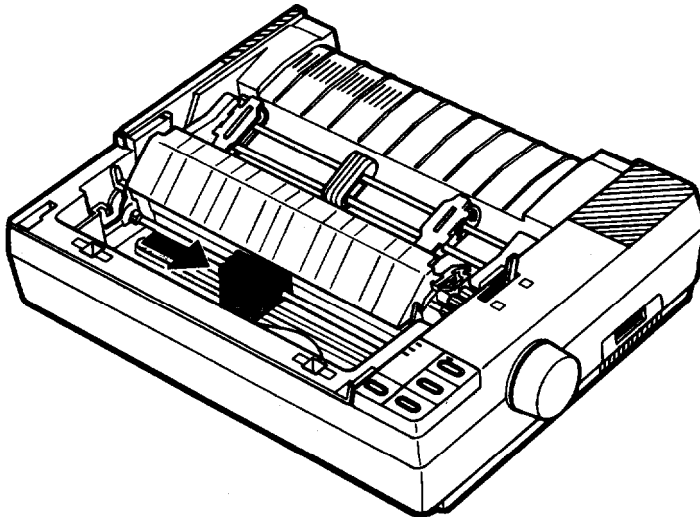
Your printer's ribbon cartridge is designed to allow easy installation and removal. Before installing the ribbon cartridge, make sure that the printer is not plugged in an electrical outlet.

Install the ribbon cartridge as follows.

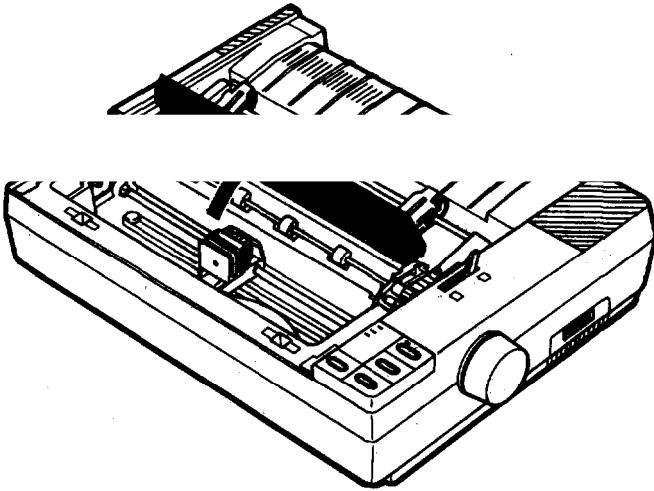
- 1. Remove the printer cover.**



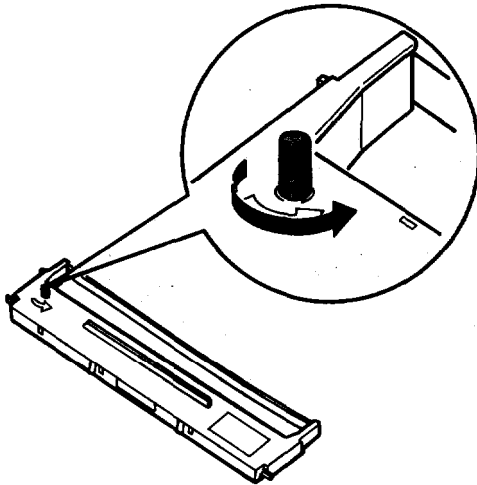
- 2. Slide the print head to the middle of the printer.**



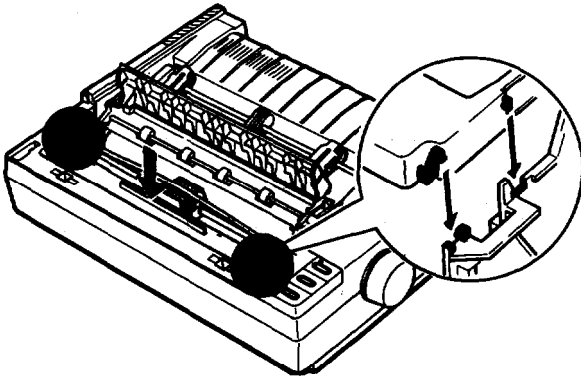
3. Open the paper tension unit cover.



4. Turn the ribbon-tightening knob in the direction of the arrow. This removes excess slack in the ribbon and makes it easier to install.

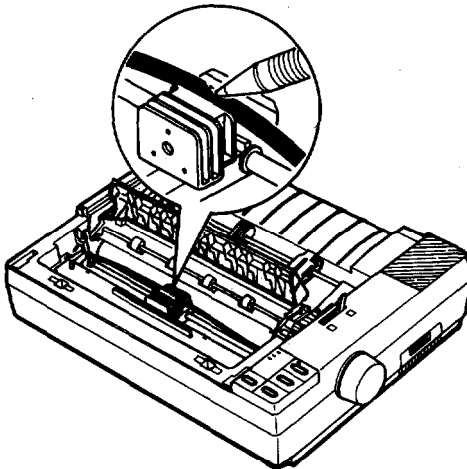


5. **Hold the ribbon cartridge by its handle and push it firmly down into position, making sure the plastic hooks fit in the slots.**

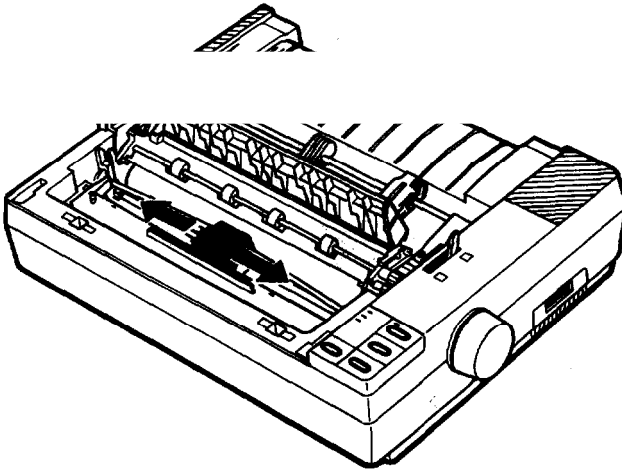


Note: Press lightly on both ends of the cartridge to make sure the plastic hooks are properly seated.

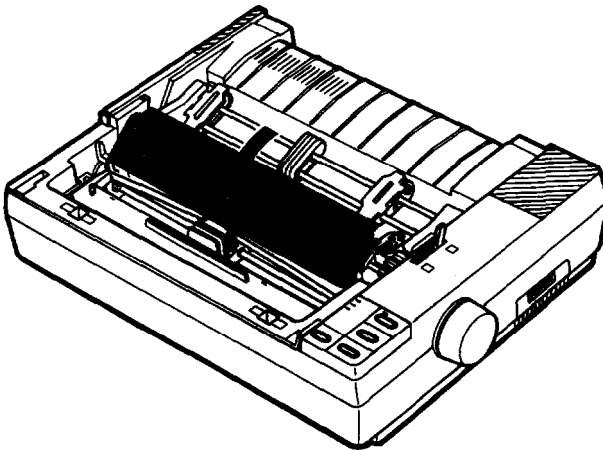
6. **Use a pointed object, such as a pencil, to guide the ribbon between the print head and ribbon guide while you turn the ribbon-tightening knob to help feed the ribbon into place.**



7. Slide the print head from side to side to make sure that it moves smoothly. Also check that the ribbon is not twisted or creased.



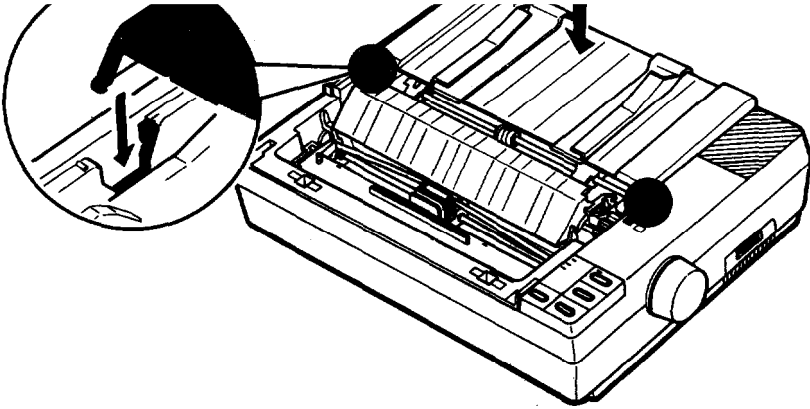
8. Close the paper tension unit cover.



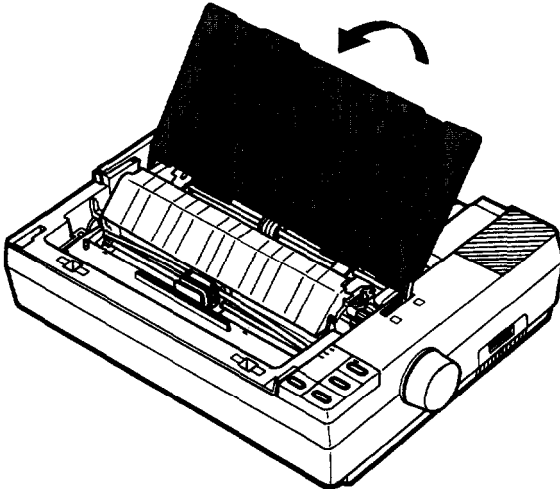
Attaching the paper guide

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.**

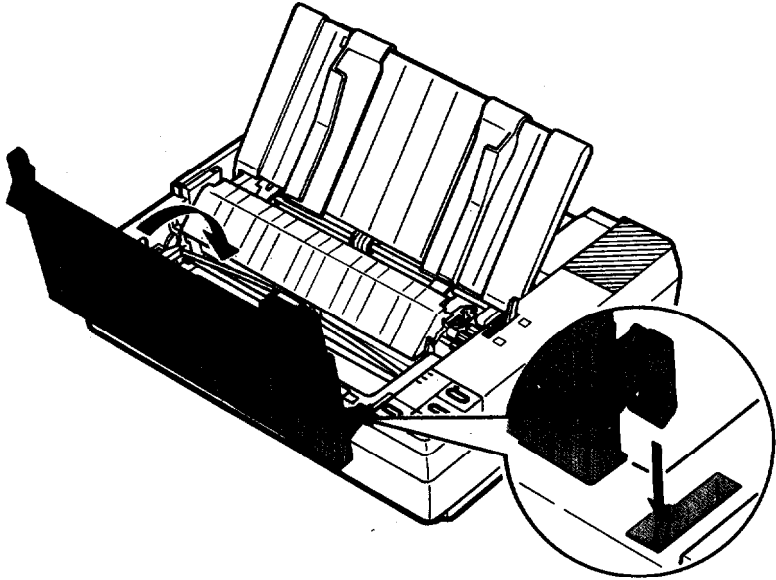


- 2. Raise the paper guide until it locks into place.**



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 projections on the cover into the notches at the front of the printer and tilting the cover back into place.**



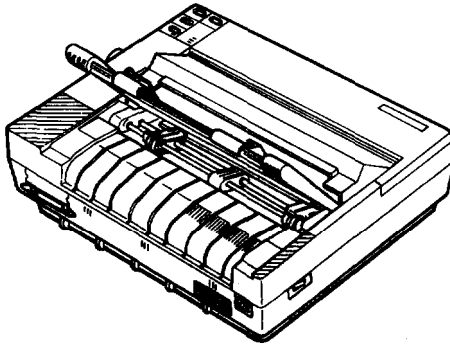
Testing the Printer

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 plug in the printer and load paper.

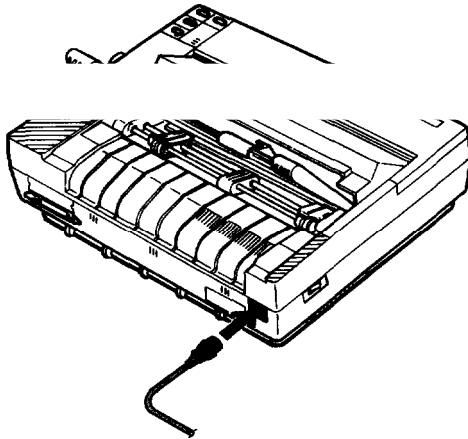
Plugging in the printer

1. Make sure that the printer is turned off. Then check the label on the back of the printer to make sure the power rating required by the printer matches that of your electrical outlet.

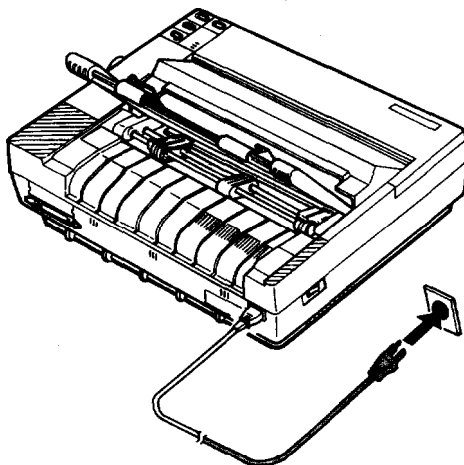


WARNING: If the rated voltage and your outlet voltage do not match, contact your nearest Epson dealer for assistance. Do not plug in the power cable.

- 2. Connect the power cable to the AC inlet on the printer's rear panel. (In some locations, the power cable is already connected to the printer.)**



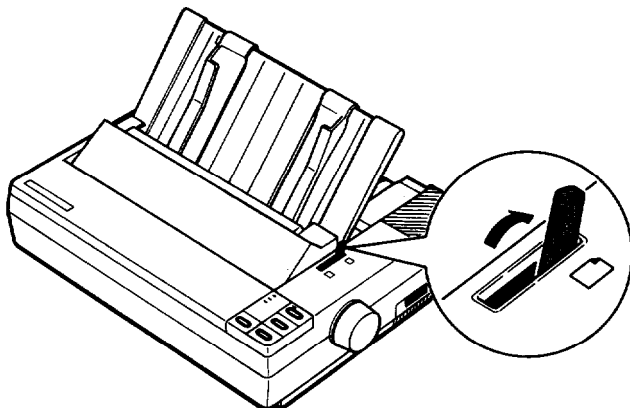
- 3. Plug the power cable into a properly grounded electrical outlet.**



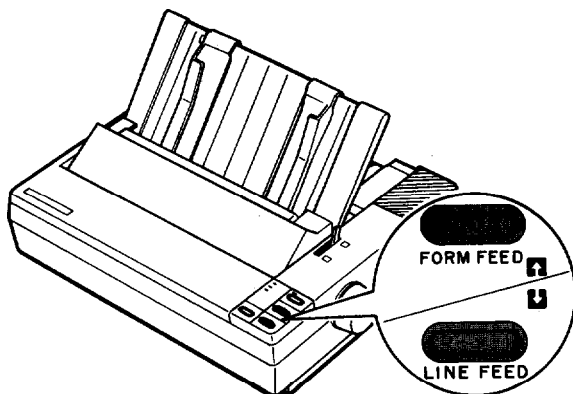
Running the self test

The self test can be run in draft or Near Letter Quality (NLQ) mode, depending on which button you hold down as you turn on the printer.

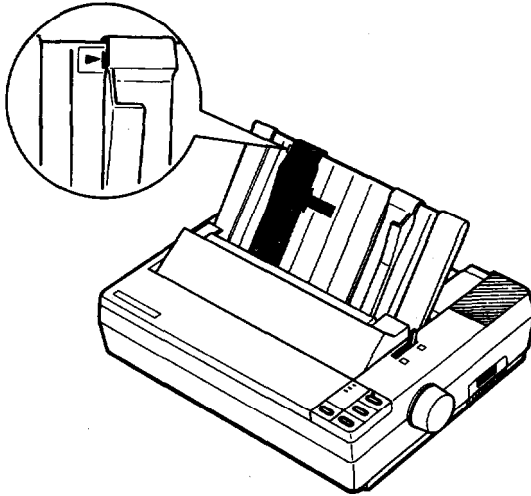
1. **Make sure that the printer is turned off. Then push the paper release lever back to the single-sheet position.**



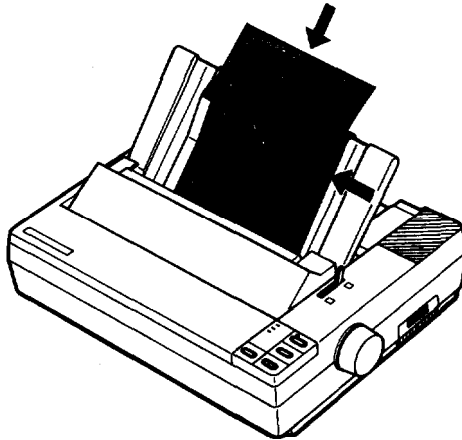
2. **While holding down the LINE FEED button (draft font) or FORM FEED button (NLQ fonts), turn on the printer. The POWER and PAPER OUT lights come on.**



3. Move the left edge guide so that it locks in place next to the guide mark.

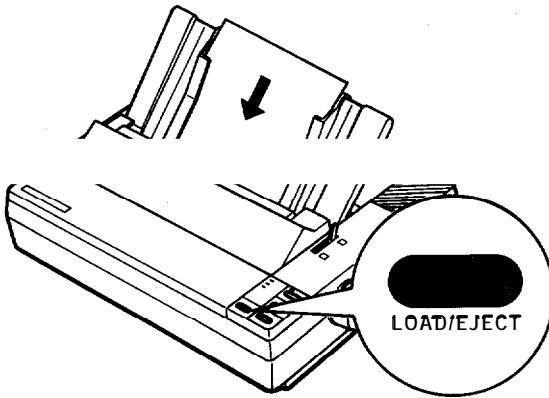


4. Adjust the right edge guide to match the width of your paper. Next, slide a sheet down between the edge guides until it meets resistance.

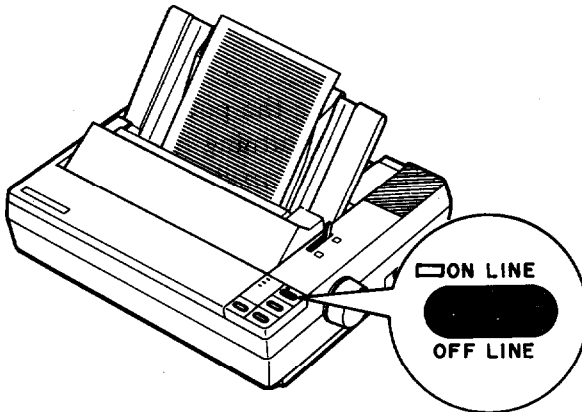


WARNING: Run the self test using paper wider than A4 (8 1/4 inches or 210 mm) or letter size (8 1/2 inches or 216 mm), to prevent the print head from printing directly onto the platen.

5. **Press the LOAD/EJECT button to load paper.**



6. **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.**



- 7. 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 printing problems and solutions later in this chapter,**

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

- 8. If the paper is still loaded, press the LOAD/EJECT or LINE FEED button to eject it and turn off the printer.**

LOAD/EJECT

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 are parts of typical self tests:

Draft mode (normal draft)

Character Spacing	10 CPI	1-1 OFF
Shape of Zero	0 (Unslashed)	1-2 OFF
CG Table	Italics	1-3 OFF
Short Tear-off	Valid	1-4 OFF
Draft Print Speed	Normal	1-S ON
Country	U.S.A.	1-6 ON
Page Length	11 inch	2-1 OFF
CSF Mode	Invalid	2-2 OFF
Skip Perforation	None	2-3 OFF
Auto LF	Depend on I/F	2-4 OFF

```

! " # $ % & ' ( ) * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L
! " # $ % & ' ( ) * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L
" # $ % & ' ( ) * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M
# $ % & ' ( ) * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N
$ % & ' ( ) * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O
% & ' ( ) * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P
& ' ( ) * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P Q
' ( ) * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P Q R
( ) * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P Q R S
) * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T
* + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U
+ , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V
, - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W
- . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X
. / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y
/ 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [ \
1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [ \
2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [ \ ]
3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [ \ ] ^
4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [ \ ] ^ _
5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [ \ ] ^ _ :

```

High-speed Draft Printing

Character Spacing	10 CPI	1-1 OFF
Shape of Zero	0 (Unslashed)	1-2 OFF
CG Table	<i>Italics</i>	1-3 OFF
Short Tear-off	Valid	1-4 OFF
Draft Print Speed	High	1-5 OFF
Country	U.S.A.	1-6 ON
Page Length	11 inch	2-1 OFF
CSF Mode	Invalid	2-2 OFF
Skip Perforation	None	2-3 OFF
Auto LF	Depend on I/F	2-4 OFF

```
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKL
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKL!
"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLM
#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN
%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNO
&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQ
'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQR
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23456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[^\]^
3456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[^\]^_
456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[^\]^_`
56789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[^\]^_`a
```

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

Printing problems and solutions

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

Problem

Solution

The printer does not print.

The printer sounds like it is printing, but nothing is printed.

*The test did not print when you pressed the **ON LINE** button.*

The print is faint or uneven.

Printed characters have parts missing at the bottom.

ABCD

The ribbon may not be installed properly. Turn off the printer, reinstall the ribbon cartridge and take up any slack in the ribbon. See page 1-8.

The ribbon may be worn. Replace the ribbon cartridge. See page 6-4.

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. See page 1-17.

Turn off the printer and disconnect the cable from the computer. Try the self test again.

The ribbon cartridge may not be properly installed. Remove the ribbon cartridge and reinstall it. Make sure the cartridge hooks are inserted securely into the printer. See page 1-8.

Problem**Solution**

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 as soon as possible. See page 6-4.

Dots are missing in the printed characters or graphics.

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 page 2-22.

A line of dots is missing in the printout.

The print head is damaged. Stop printing and contact your Epson dealer or Epson authorized service center to have the print head replaced.

ABCD

Dots are missing in random positions.

There is either too much slack in the ribbon or the ribbon has come loose and caught on something. Stop printing, turn off the printer, and reinstall the ribbon cartridge. See page 1-8.

A B C D

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 your printer to the 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.

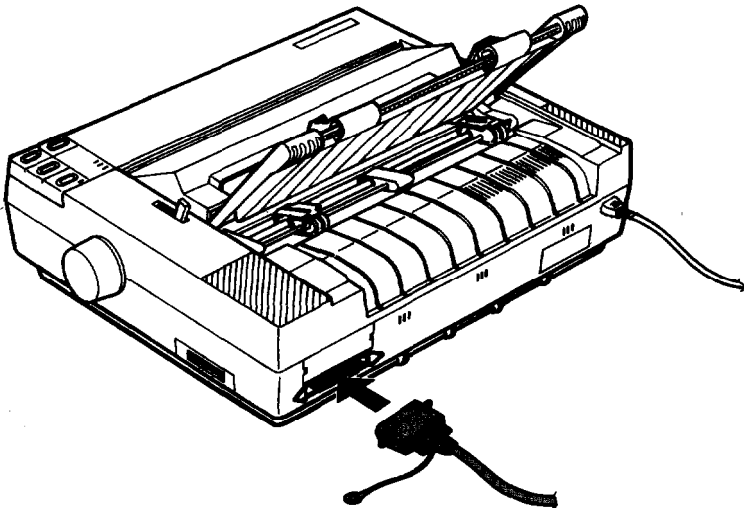
If your computer requires another type of interface, you will need to install an optional interface board. See the section on interface boards in Chapter 5.

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

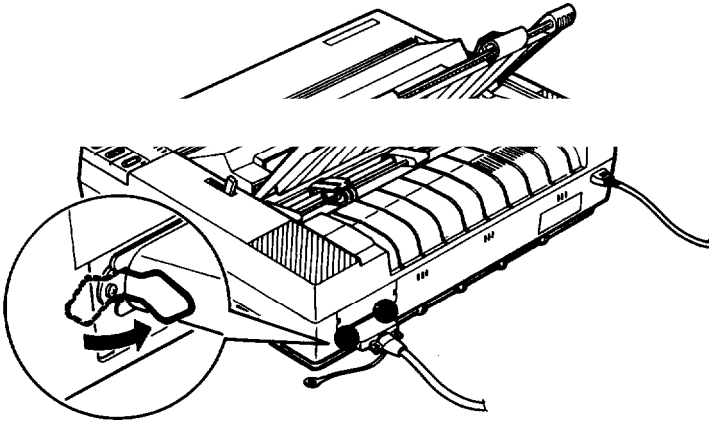
The parallel interface

Connect the parallel interface cable as described below:

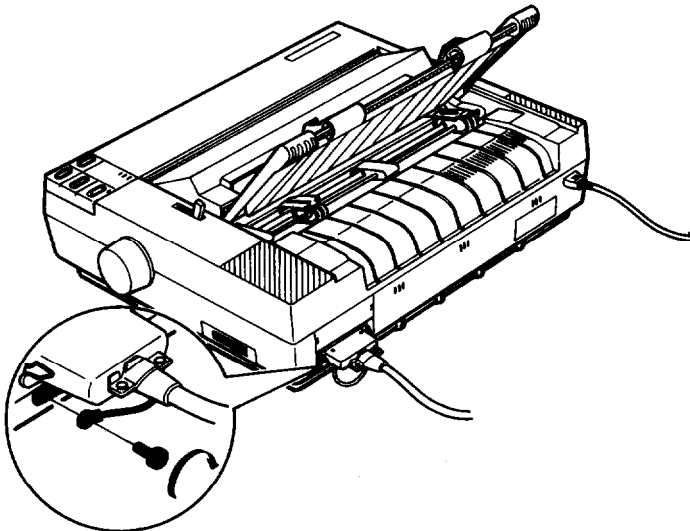
1. Make sure that both your printer and computer are turned off. Then plug the cable connector securely into the printer.



- 2. Squeeze the wire clips together until they lock in place on either side of the connector.**



- 3. If your cable has a ground wire, connect it to the ground connector beneath the interface connector.**



- 4. 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 you have set up and tested the LX-810, 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 LX-810 on its printer selection menu. If the LX-810 is not listed, choose one of the following printers. They are listed in order of preference.

LX-800

LX-86

LX-80

FX-850

FX-86e

EX-800

FX-85

FX-80+

FX-80

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

LX

FX

EX

RX

MX

Epson printer

Standard printer

Draft printer

To use all of the features of the LX-810, however, it is best to use a program with the LX-810 on its menu. If your program does not list any LX printers, contact the software manufacturer to see if an update is available.

Chapter 2

Paper Handling

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Switching back to continuous paper	2-19
Printing on Special Paper	2-22
The paper thickness lever	2-22
Multi-part forms	2-25
Labels	2-26
Envelopes	2-27

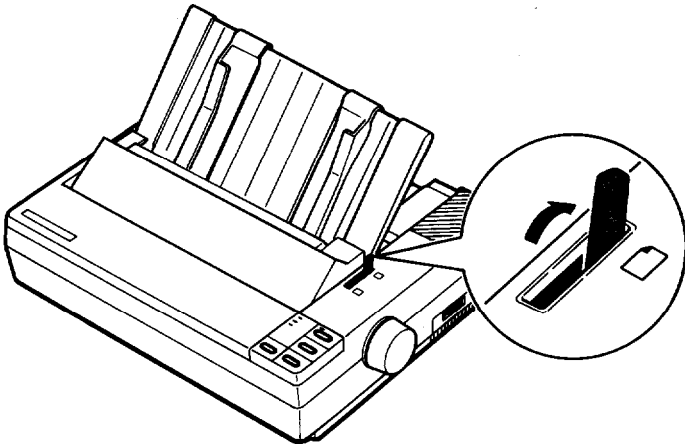
Using Single Sheets

Your printer can accommodate single sheets with a width of 7.2 inches or 182 mm to 10.1 inches or 257 mm.

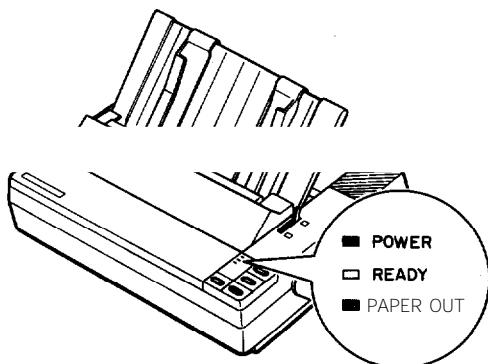
If you do most of your printing on single sheets, you may find it more convenient to install the optional cut sheet feeder. This option automatically inserts a new sheet and can hold up to 150 sheets of standard bond paper (22 lb paper). For more details, see Chapter 5.

Loading paper

1. Make sure the printer is turned off, then place the paper guide in the upright position. Set the paper release lever to the single-sheet position. This position is marked by the icon shown in the illustration below.

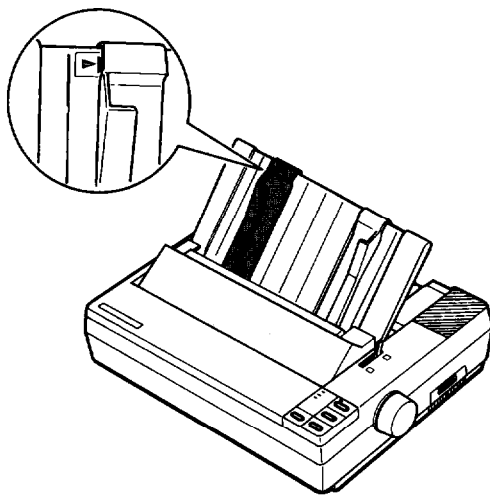


2. Turn on the printer. The POWER and PAPER OUT lights come on.

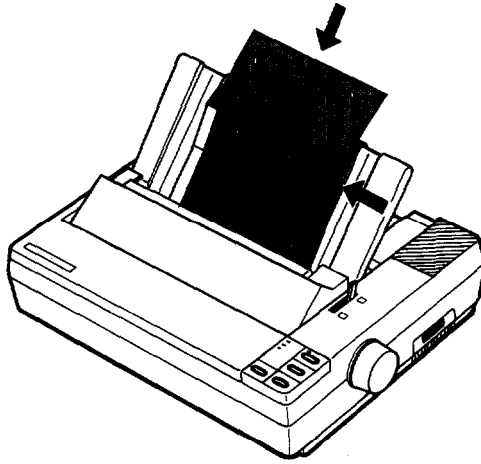


Note: Do not insert paper in the printer before turning on the printer.

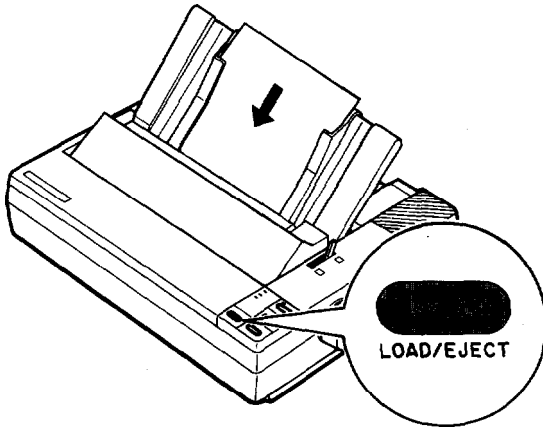
3. Move the left edge guide so that it locks in place next to the guide mark. (You may want to change this position later, depending on the margin settings of your application program.)



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.**



CAUTION: Never advance the paper using the platen knob while the printer is switched on. If the platen turns

- 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 paper. When this happens, the ON LINE light may go off automatically or it may remain on, depending on your application 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.

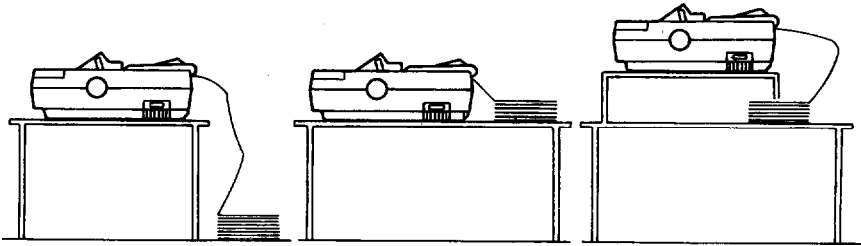
Using Continuous Paper

The push tractor built into your printer is remarkably easy to load and operate. Its low-profile design takes up little space and can handle paper widths from 4 inches or 101 mm to 10 inches or 254 mm.

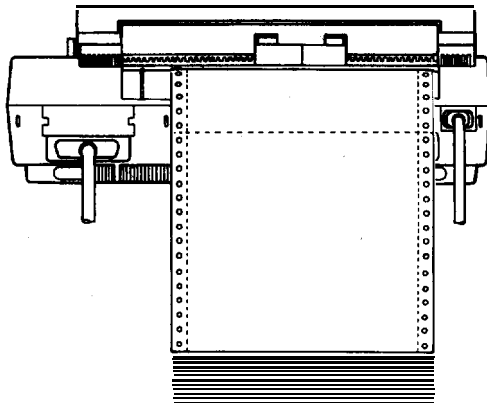
Positioning your continuous paper supply

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

Three ways of positioning your printer and continuous paper supply are shown below.

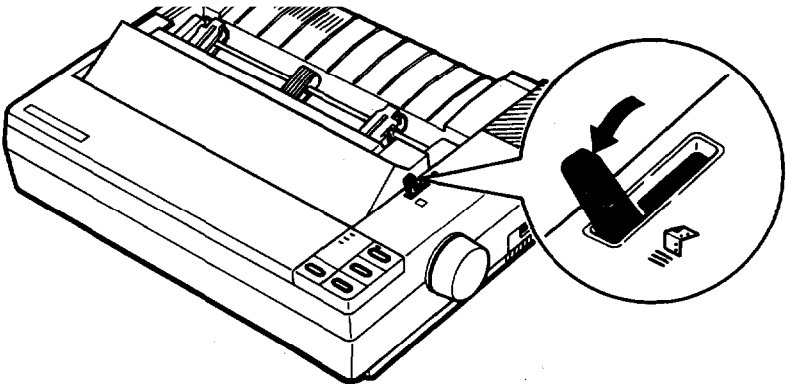


Make sure you align the paper supply evenly with the paper loaded in the tractor so the paper feeds smoothly into the printer.

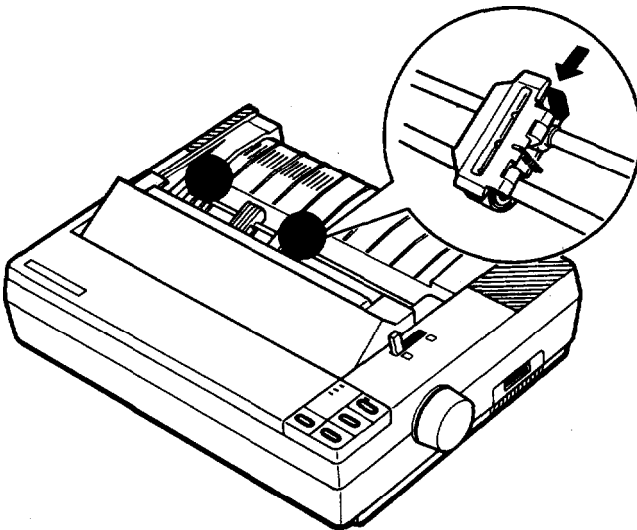


Loading continuous paper

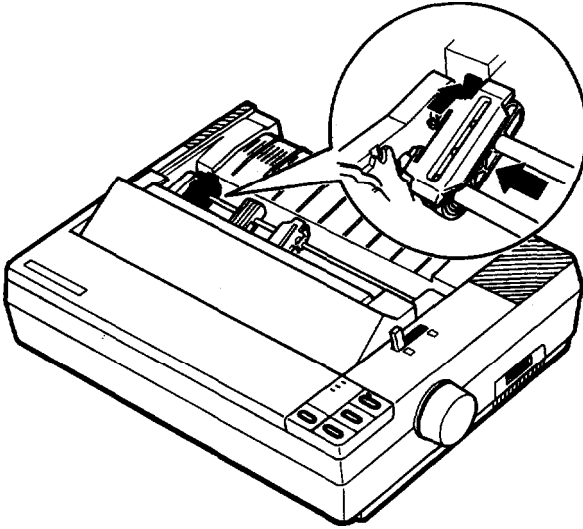
1. **Make sure the printer is turned off; then remove the paper guide. Set the paper release lever to the continuous paper position. This position is marked by the icon shown in the illustration below.**



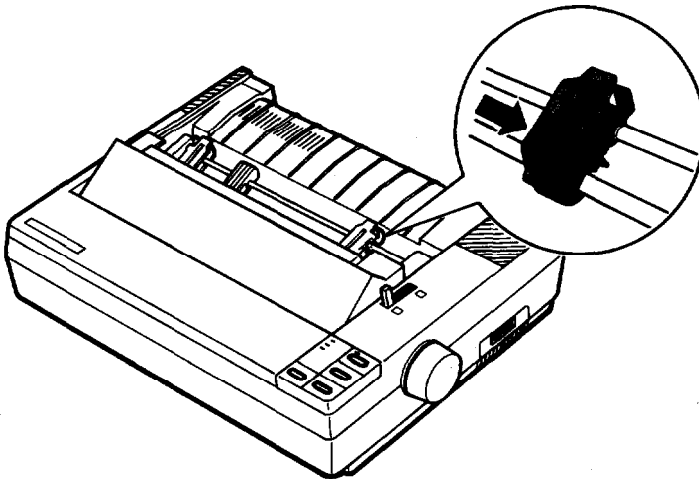
2. **Release the sprocket units by pulling the sprocket lock levers forward as shown.**



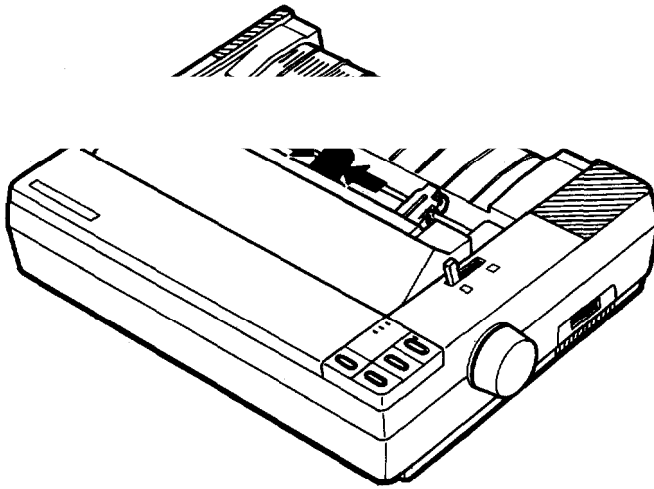
3. Slide the left sprocket unit until it is roughly 1/2 inch or 15 mm from the farthest left position and press down the lever to lock it in place.



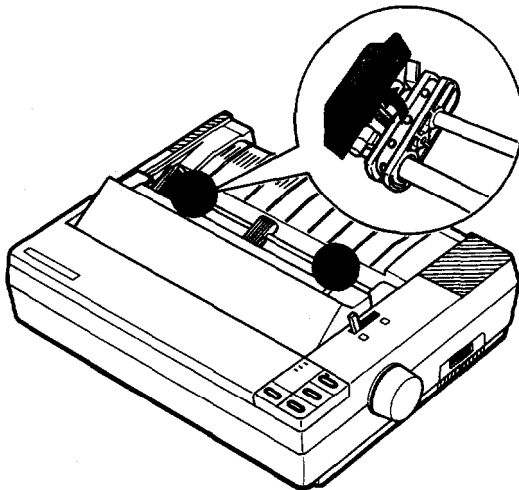
4. Slide the right sprocket unit to roughly match the width of your paper but do not lock it.



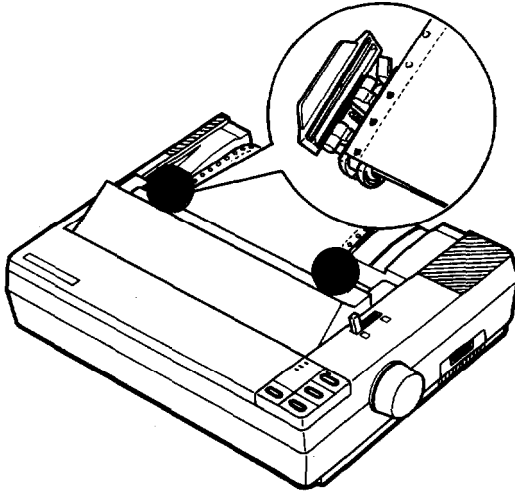
5. **Move the paper support midway between the two sprocket units.**



6. **Open both sprocket covers.**

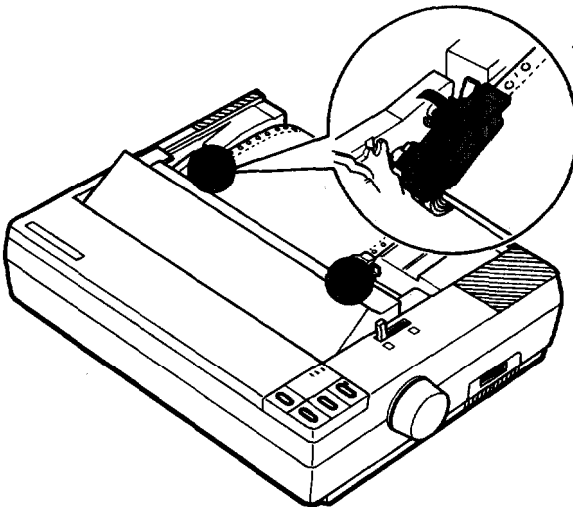


7. Fit the first three holes in the paper over the pins of both sprockets.

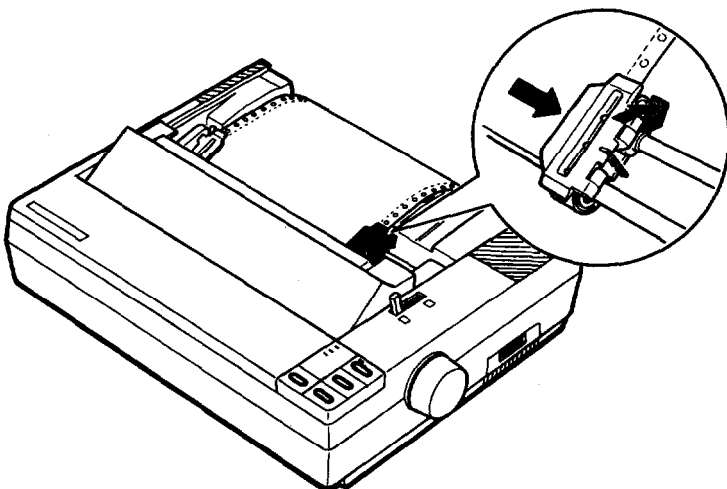


CAUTION: Make sure that your paper has a clean, straight edge before inserting it into the printer.

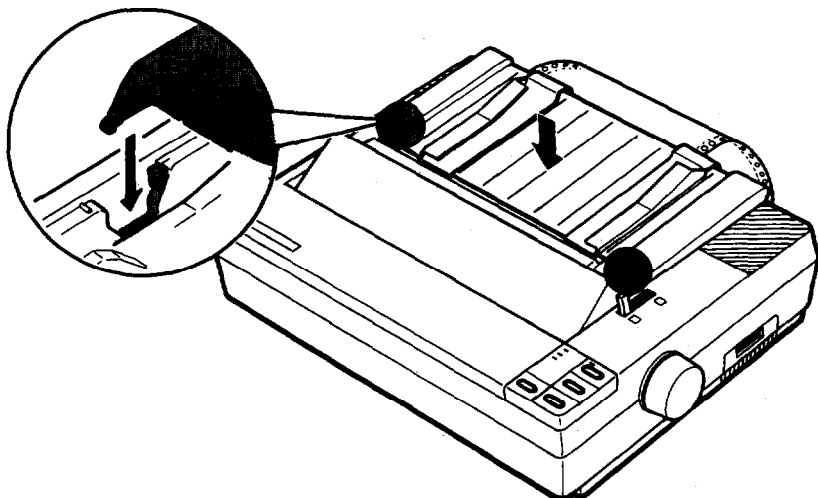
8. Close the sprocket covers.



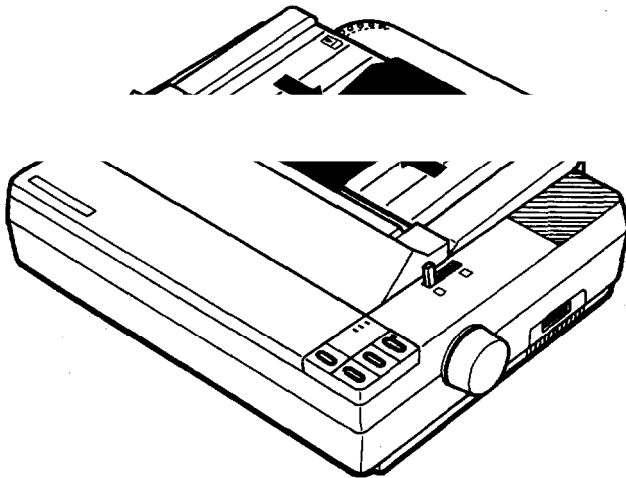
9. Slide the right sprocket unit to a position where the paper is straight and has no wrinkles. Then lock it in place.



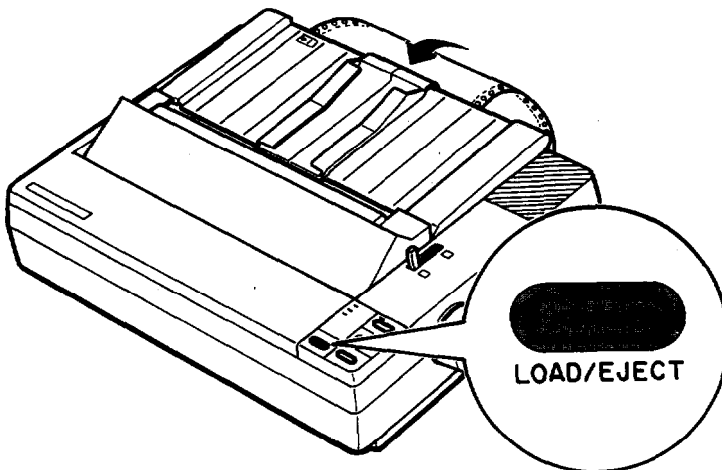
10. Reattach the paper guide as shown below.



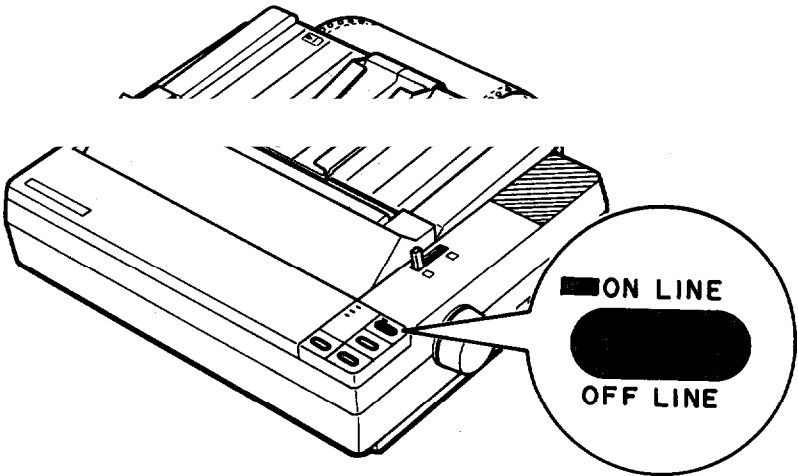
- 11. Slide the edge guides together so they meet at the center of the paper's width.**



- 12. Turn on the printer. The POWER and PAPER OUT lights come on. Then press the LOAD/EJECT button to feed paper to the loading position.**



13. Press the ON LINE button to set the printer on line so 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 adjusting 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.

Note: Before you begin printing, be sure to check the page length and skip over perforation settings, and readjust the settings if necessary. See the sections on page length and skip over perforation in Chapter 3.

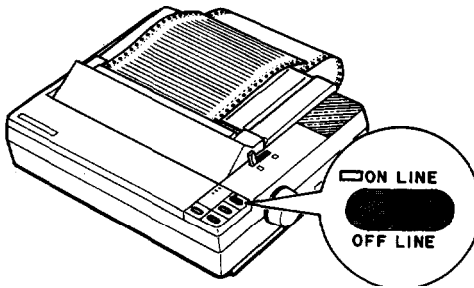
Switching Between Continuous and Single Sheets

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

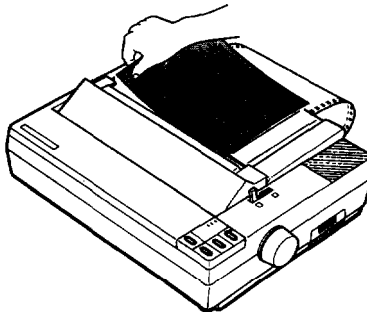
Switching to single sheets

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.



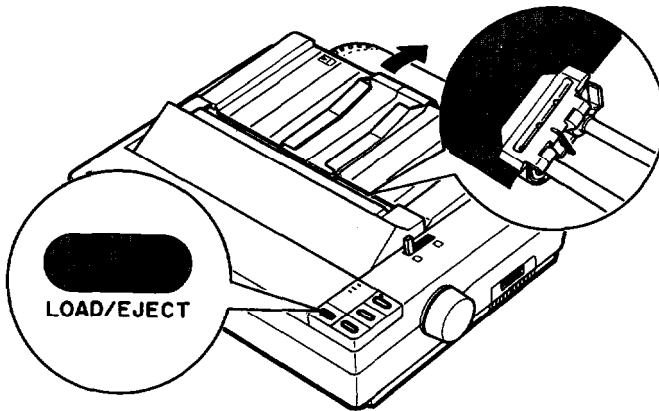
2. Tear off all outgoing sheets. If you are not using the short tear-off feature, you may need to press the FORM FEED button to advance your document to a point where it can easily be removed.





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.

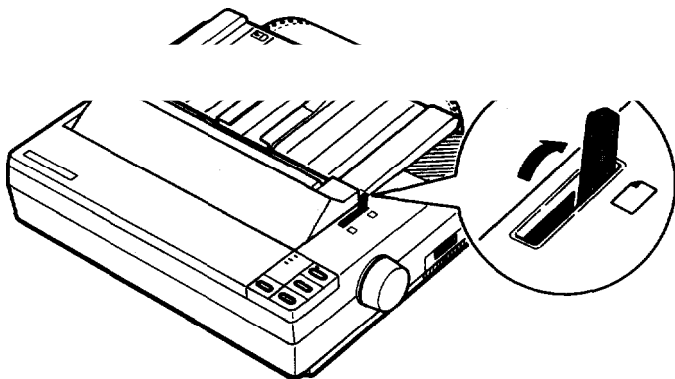


CAUTION: If you are using narrow paper less than 6 inches or 152.4 mm wide, you should only press the **LOAD/EJECT** button once. Also, do not use this button to eject labels.

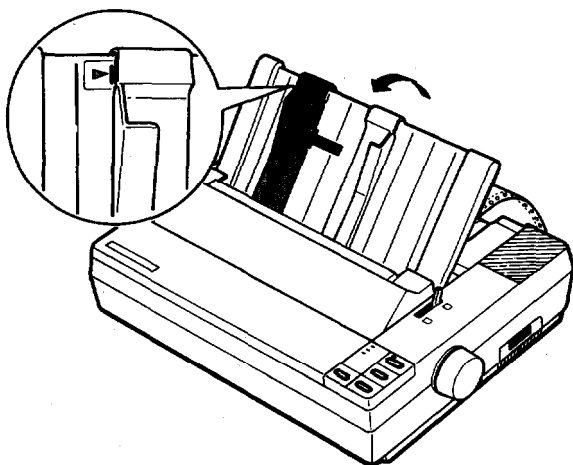


WARNING: Never feed labels backward through the printer. Labels can easily come off the backing sheet and jam the printer.

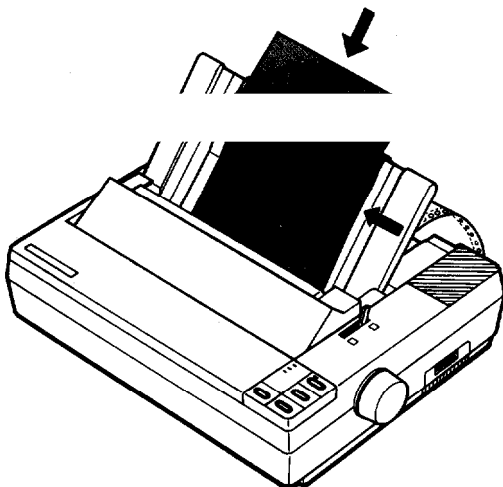
4. **Push the paper release lever back to the single-sheet position. This position is marked by the icon shown in the illustration below.**



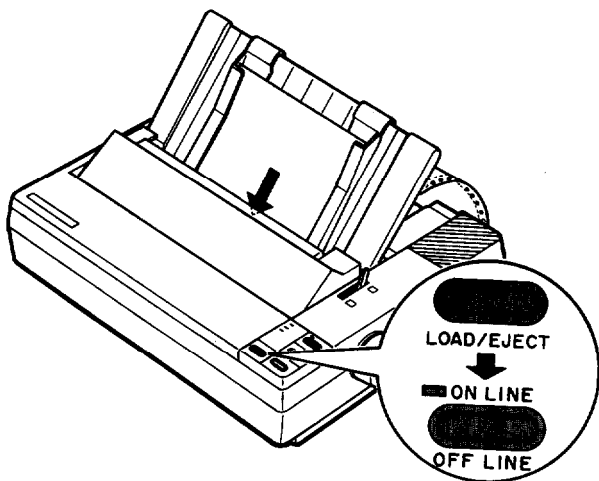
5. **Stand the paper guide upright and move the left edge guide so it locks in place next to the guide mark.**



- 6. Adjust the right edge guide to match the width of your paper. Then insert a sheet of paper between the edge guides until the bottom meets resistance.**



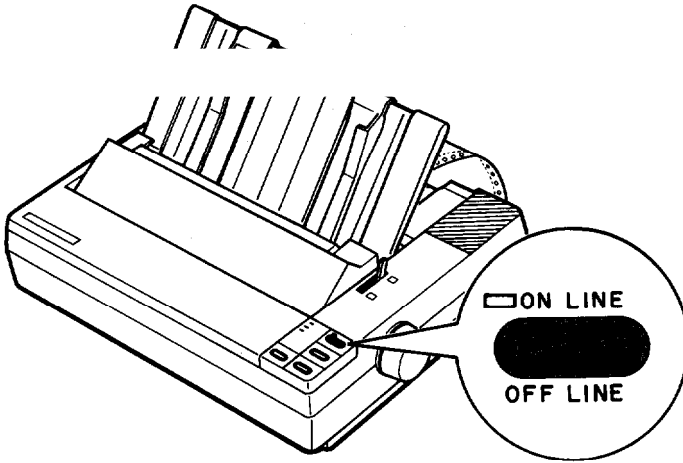
- 7. Press the LOAD/EJECT button to automatically feed the single sheet paper to the loading position. Then press the ON LINE button to set the printer on line.**



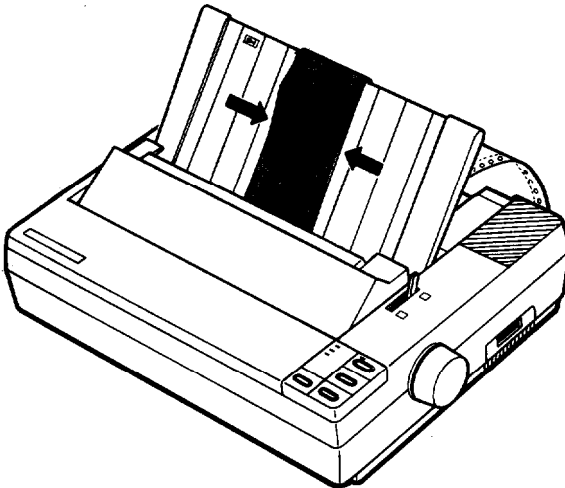
Switching back to continuous paper

It is also easy to switch back to printing with continuous paper.

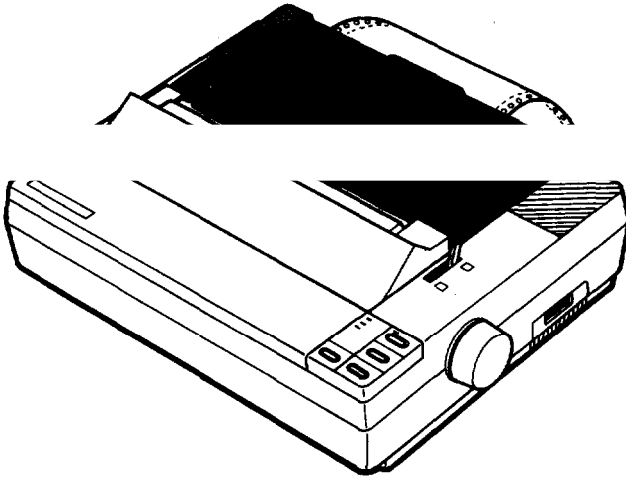
1. Make sure the single sheet is ejected and the printer is off line.



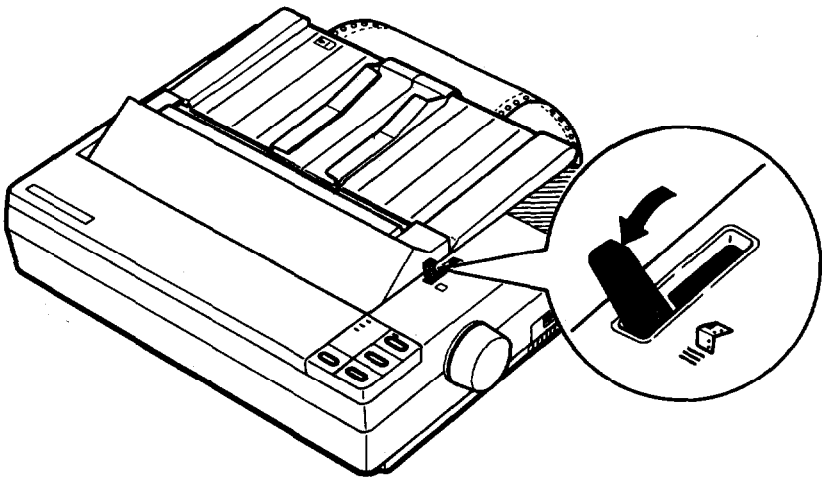
2. Slide the edge guides together so they meet at the center of the paper's width.



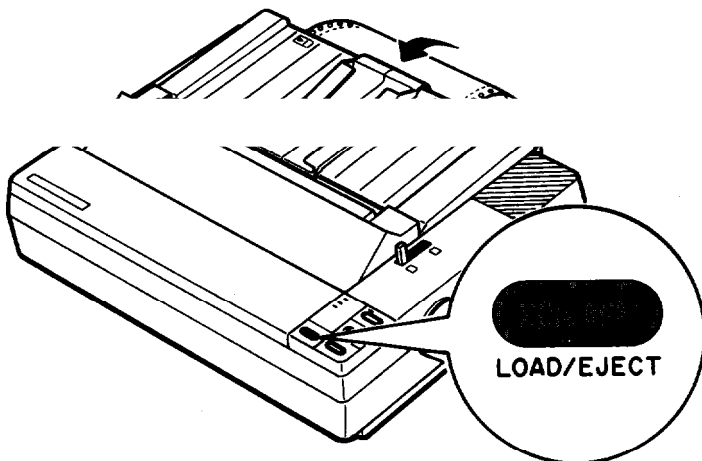
3. Lower the paper guide onto the back of the printer,



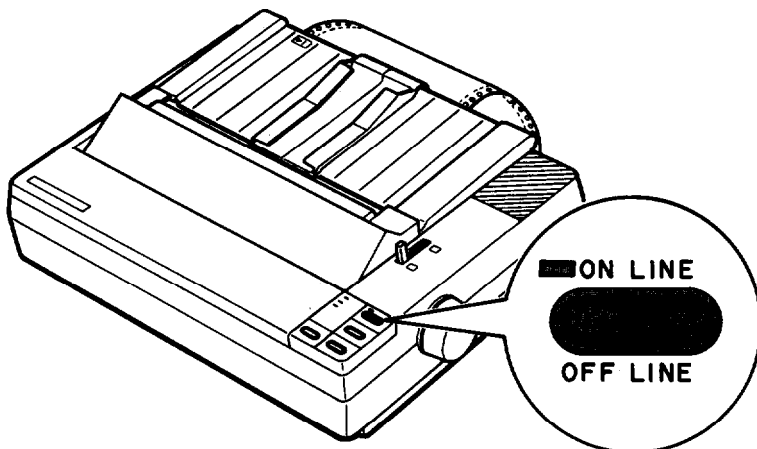
4. Pull the paper release lever forward to the continuous paper position.



5. **Press the LOAD/EJECT button to feed the continuous paper to the loading position.**



6. **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 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 0.5 inches or 13 mm from either side of the paper.

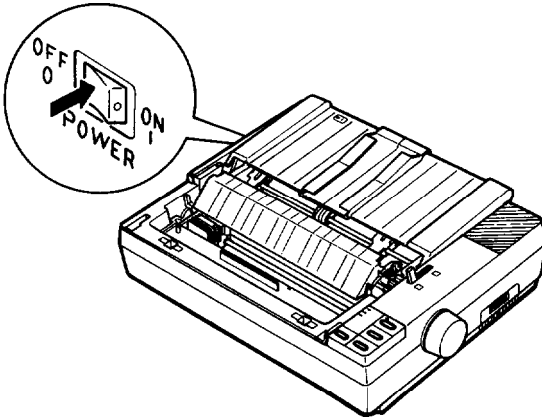
For information on the printable area for envelopes, see page 2-29.

The paper thickness lever

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

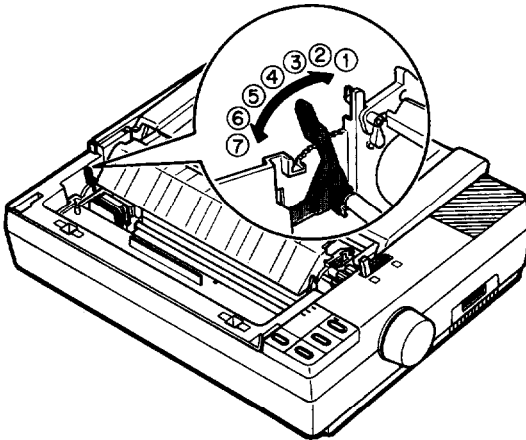
To change the paper thickness setting, follow these steps.

1. Make sure the printer is turned off. Then remove the printer cover.



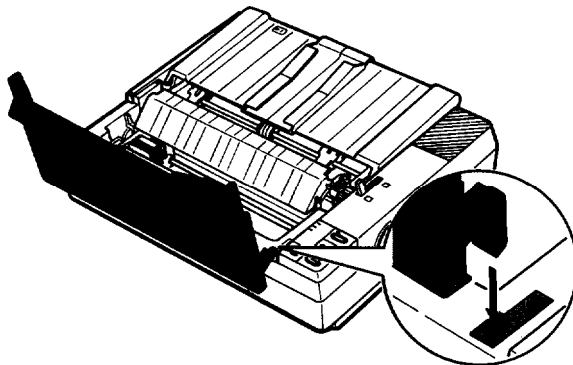
WARNING: If the printer has just been in use, the print head may be hot. Allow it cool before touching it.

2. Select the paper thickness you want according to the table on the next page. 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 (single sheets)	3
Multi-part forms	
2-sheet	2
3-sheet	3
Labels	4
Envelopes	
Air mail	4 or 5
Plain	6
Bond (20 lb.)	6
Bond (24 lb.)	7

3. Attach the printer cover.



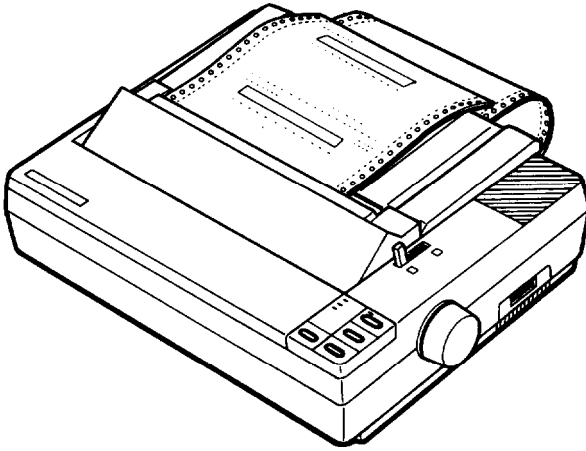
WARNINGS:

- **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 to the table on page 2-25.

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.

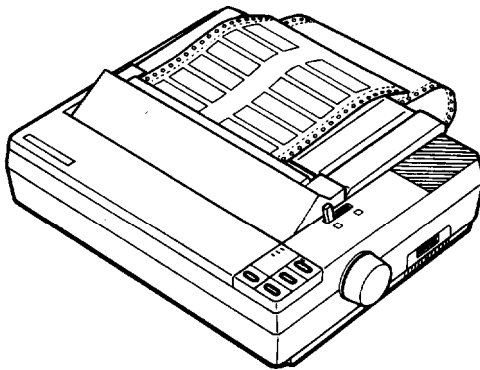


CAUTION: Multi-part forms should not be used with the single sheet feeding system or the optional cut sheet feeder.

Labels

If you need to print labels, always use ones mounted on a continuous backing sheet with sprocket holes made for use with a tractor feed. 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 you load continuous paper except that the paper thickness lever must be adjusted for printing labels. See the section on loading continuous paper in this chapter for details. For the correct paper thickness setting, see the table on page 2-25.



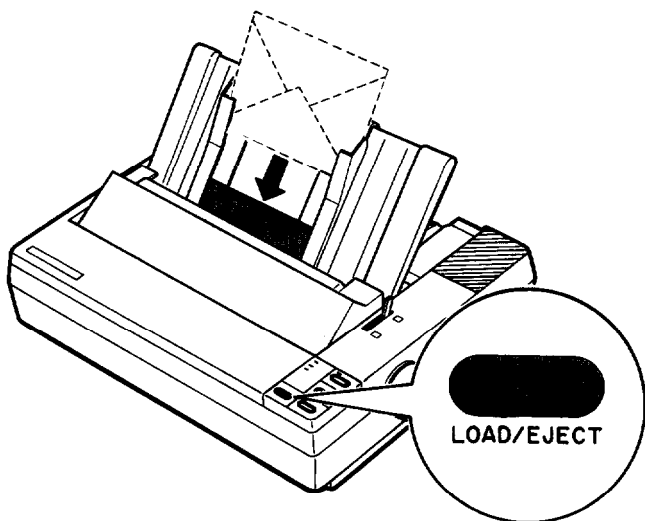
WARNING: Never feed labels backward through the printer. Labels can easily peel off the backing and jam the printer. Therefore, do not use the LOAD/EJECT button to eject labels. Also, never use the short tear-off function with labels (be sure to set DIP switch 1-4 to ON). If a label does become stuck in the printer, contact your 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.

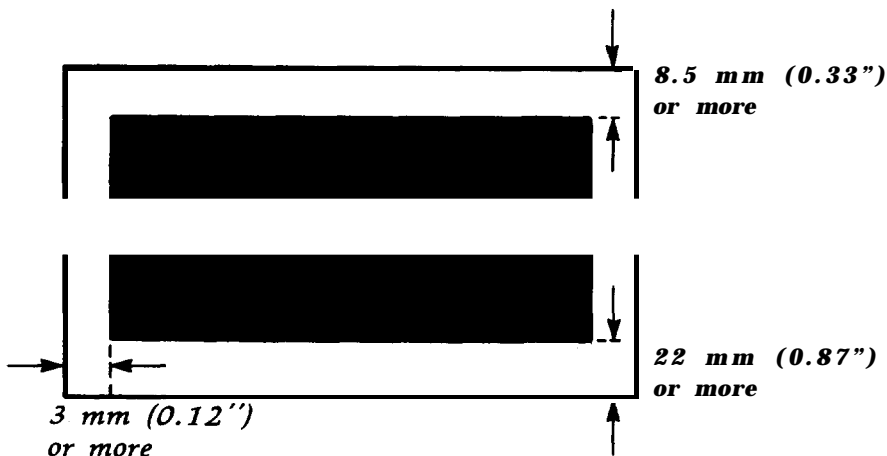
Envelopes

You can feed envelopes individually using the single-sheet loading feature. Before loading envelopes, you should adjust the position of the paper thickness lever according to the table on page 2-25. 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 your application program settings keep the printing entirely within this printable area.



CAUTION: Envelope printing is only available at normal temperature.

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

Chapter 3

Using the Printer

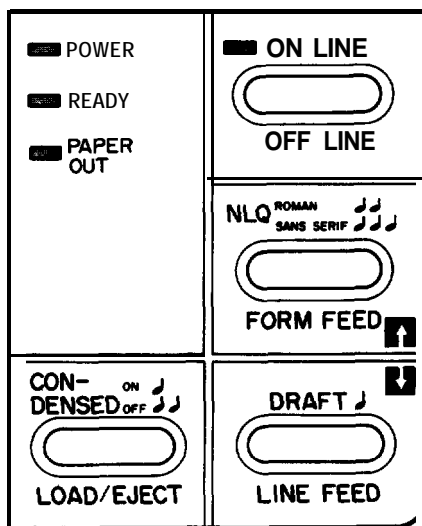
Operating the Control Panel	3-2
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Selecting an International Character Set.....	3-23
Choosing a Character Table	3-25
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Operating the Control Panel

The printer's control panel gives you access to several powerful features.

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

Lights



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 while data is printed.

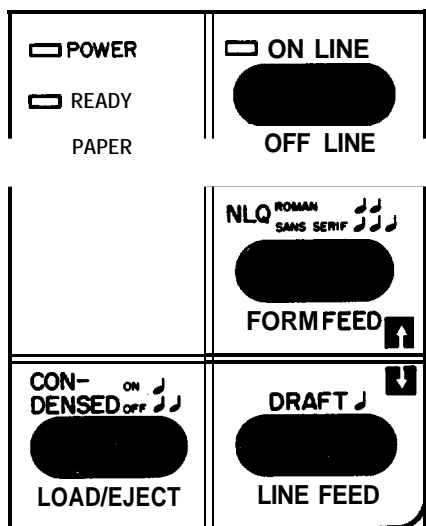
PAPER OUT (red)

On when the printer is out of paper or when continuous paper is in a standby position. The printer also beeps when it is out of paper.

ON LINE (green)

On when the printer is on line and ready to accept data from the computer. When this light is flickering, the micro-adjustment feature can be used.

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 take it off line.

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

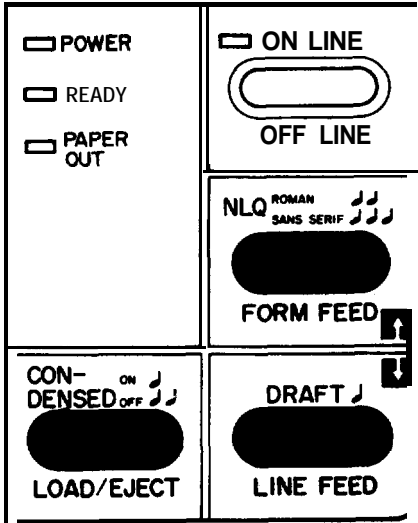
When the printer is off line, press this button to advance the paper one line, or hold it down to advance the paper continuously.

LOAD/EJECT

This button is used to feed the 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 is ejected backward (removed from the paper path) if the release lever is set to the continuous paper position.

SelecType

You can select the built-in character fonts using the SelecType feature on your control panel when the printer is on line.



NLQ

This button is used to select NLQ Roman and NLQ Sans Serif fonts. When you select Roman, the beeper sounds two times. When you select Sans Serif, the beeper sounds three times.

DRAFT

This button is used to select draft printing. When you select draft, the beeper sounds once.

CONDENSED

This button is used to select or deselect the condensed mode. When you select the condensed mode, the beeper sounds once. In this mode all characters are printed at approximately 60% of their normal width. When you return to the normal mode, the beeper sounds twice.

Note: Condensed mode cannot be selected when either of the NLQ fonts have been selected.

Other control panel features

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

- Self test:** Both a draft and NLQ 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 switching the printer on. See the section on running the self test in Chapter 1 for more information.
- Micro-adjustment:** By pressing the FORM FEED and LINE FEED buttons immediately after loading paper or when using short tear-off, you can make fine adjustments to the loading and short tear-off positions. See the sections on adjusting the loading position and using short tear-off later in this chapter.
- Data dump:** By holding down both the LINE FEED and FORM FEED buttons while turning 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 later in this chapter for more information.

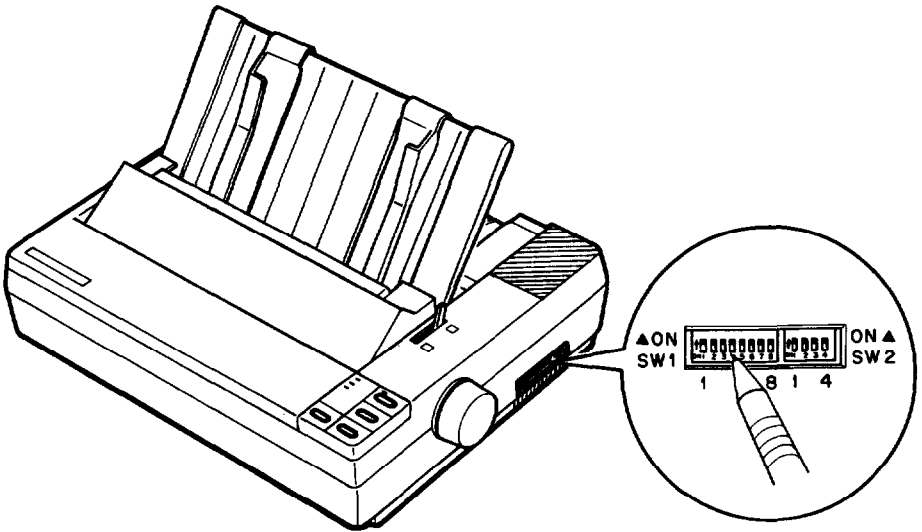
Setting the DIP Switches

The printer has two sets of DIP switches located on right side of the printer. 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.

Changing a DIP switch setting

To change a DIP switch setting, first turn off the printer. Then 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.

DIP Switch 1

SW	Description	ON	OFF	Page
1-1	Character spacing	12 cpi		4-3
1-2	Shape of zero	Slashed		3-8
1-3	Character table	Graphics		3-25
1-4	Short tear-off		Valid	3-15
1-5	Draft printing speed	Normal		3-8
1-6	International character set	See table on the next page		3-23
1-7				
1-8				

DIP Switch 2

SW	Description	ON	OFF	Page
2-1	Page length	12 inches		3-9
2-2	Cut sheet feeder mode on/off	ON		5-2
2-3	1-inch skip over perforation	ON		3-10
2-4	Auto line feed	ON		3-8

The shaded areas show the default or factory settings.

International character sets

Country	SW 1-6	SW 1-7	SW 1-8
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

The DIP switch functions

Slashed zeros

When DIP switch 1-2 is ON, the printer prints slashed zeros(ø); when OFF, the printer prints open zeros (o). This feature is useful for clearly distinguishing between uppercase 0 and zero when printing documents such as program lists.

Draft printing speed

When DIP switch 1-5 is OFF, the printer can print up to 200 draft characters per second; when ON, the printer can print up to 150 characters per second. The high speed setting is effective only when printing at 10 cpi (characters per inch). When printing at a different pitch, this switch is ignored and the printer prints up to 150 characters per second.

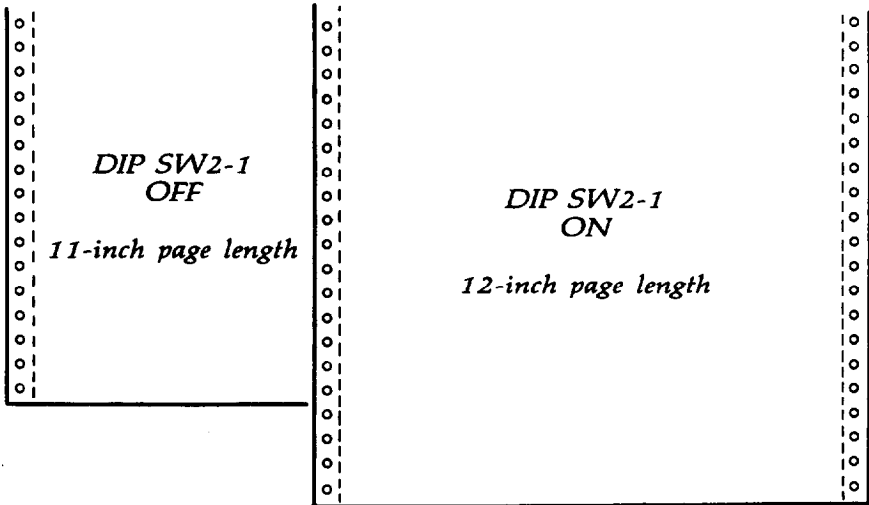
Auto line feed

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)*

Page Length

When the setting of DIP switch 2-1 is OFF, the page length is set to 11 inches (27.94 cm). When it is on, the page length is 12 inches (30.48 cm). Be sure to set the page length to match the paper you will be 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.



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 printed 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 SW2-3 OFF (Skip over perforation OFF)

23456769; <=>?@ABCDEFGHIJKLMN^{OP}QRSTWW
3456789; <=>?@ABCDEFGHIJKLMN^{OP}QRSTUVwK
456789; <=>?@ABCDEFGHIJKLMN^{OP}QRSTWWKY
56789; <=>?@ABCDEFGHIJKLMN^{OP}QRSTWWKYZ
- - - 6789 : ; <=>?@ABCDEFGHIJKL^{MN}OPQRSTU^{VW}XYZ [
789; ~::~?@ABCDEFGHIJKLMN^{OP}QRSTWWKYZ~\
89; <::~?@ABCDEFGHIJKLMN^{OP}QRSTU^{VW}KYZ[\J
9; <=>?@ABCDEFGHIJKLMN^{OP}QRSTWWKYZC\3^
:: <=>?@ABCDEFGHIJKLMN^{OP}QRSTWWKYZ[\J--
;c=>?SABCDEFGHIJKI&INOPQRSTU^{VW}KYZ[\]--'

DIP SW2-3 ON (Skip over perforation ON)

23456789; <=>?@ABCDEFGHIJKLMN^{OP}QRSTU^{VW}
3456789; <=>?@ABCDEFGHIJKLMN^{OP}QRSTU^{VW}
- - -
456789; <=>?@ABCDEFGHIJKLMN^{OP}QRSTWWKY
56769; <=>?@ABCDEFGHIJKLMN^{OP}QRSTWWKYZ
6789 : ; <=>?@ABCDEFGHIJKL^{MN}OPQRSTU^{VW}XYZ [

Note: Most application programs take care of top and bottom margins. Only use skip over perforation 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 is the point where the paper stops when you load paper using the LOAD/EJECT button.

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 that the power is off.) If you need to adjust the loading position, always use the micro-adjustment feature.

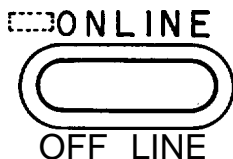
Until the loading position is reset, the printer remembers this position and uses it as a reference point for feeding paper.

The micro-adjustment feature moves the paper in 2/216th-of-an-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.

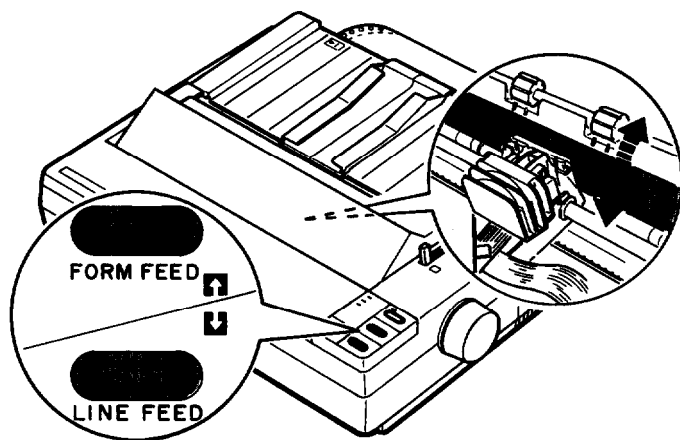
Using micro-adjustment

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 ON LINE light then begins to blink.**



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

3. **Press the FORM FEED button to feed the paper forward or the LINE FEED button to feed the paper backward. When you've set the desired loading position, you can begin printing; the ON LINE light stops blinking automatically.**



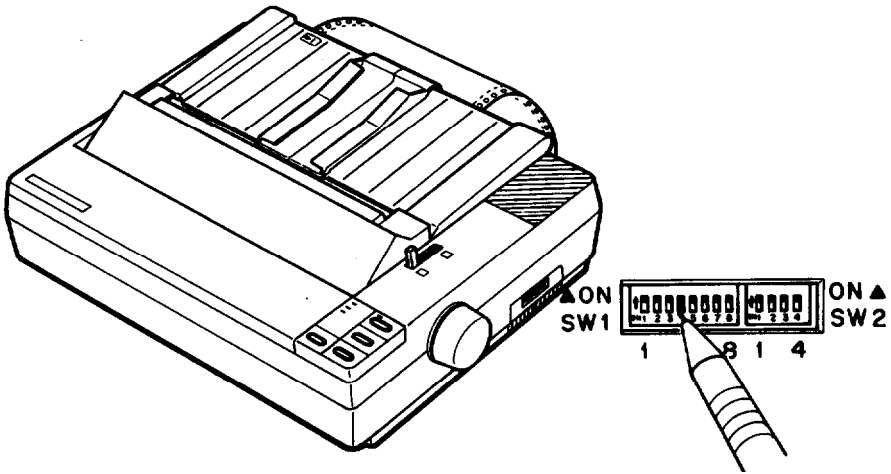
Note: When the paper reaches the factory-set loading position, the printer beeps and micro-adjustment feeding pauses for a moment before continuing. You can use this position as a reference point when adjusting the printer's loading position. When the paper reaches either the minimum or maximum top margin,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

SelectType is not available when the ON LINE light is blinking. If you want to use SelectType, you must press the ON LINE button once to set the printer off line and once more to set the printer on line.

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 1-4 to OFF and load continuous paper.

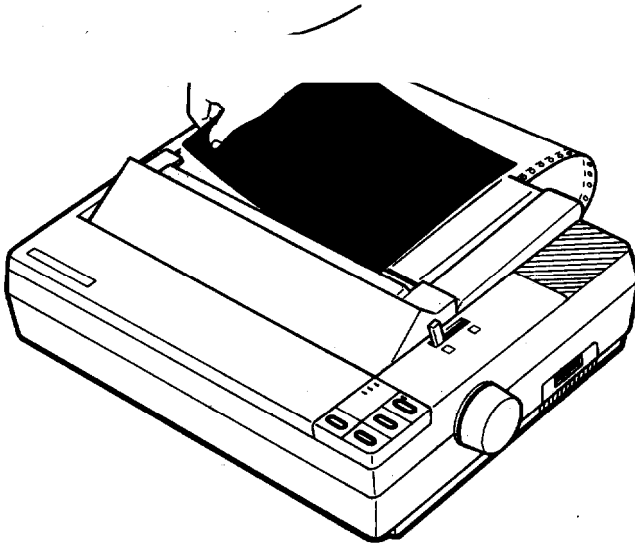


You can leave the short tear-off feature turned on (DIP switch 1-4 OFF) even when you are using single sheets. When you move the paper release lever to the single sheet position, short tear-off is disabled.



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

When you have finished printing and if the paper 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 so you can tear off the last printed sheet.



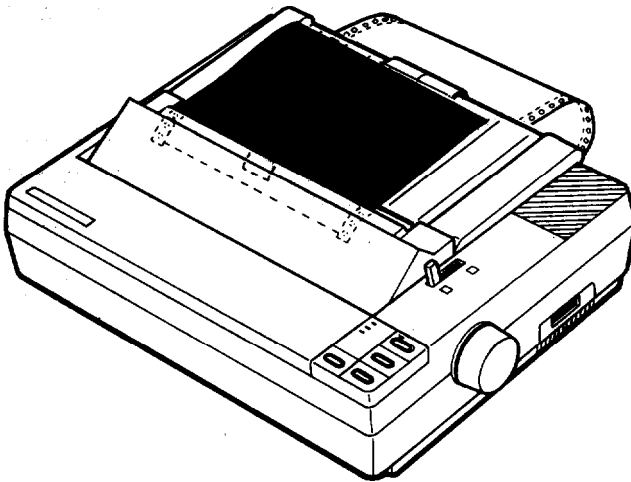
Note: Short tear-off is performed only when your application software feeds the paper to the top of the next page. To manually feed the paper to the top of the next page, press the ON LINE button to put the printer off line; then press the FORM FEED button. When you put the printer back on line, the printer automatically feeds the paper 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

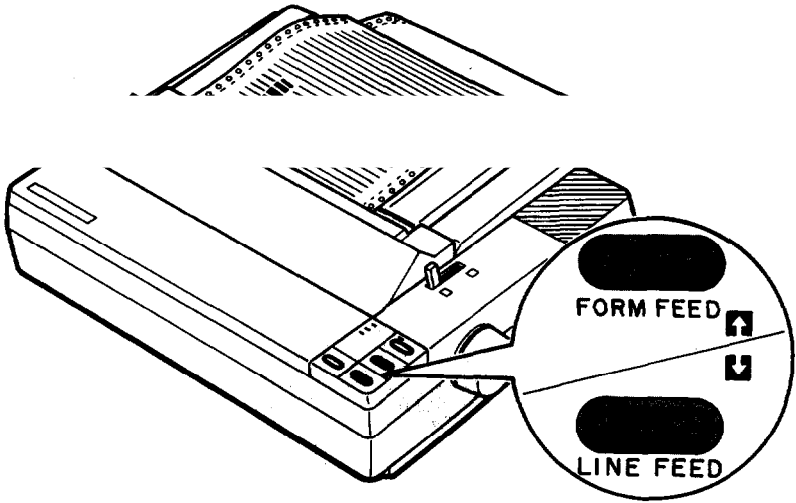
If the paper's perforation does not line up with the tear-off edge, you can adjust the tear-off position using the micro-adjustment feature.

1. **Make sure the short tear-off feature is turned on so the printer feeds paper to the tear-off position after printing the document. The ON LINE light should begin blinking, meaning you can now use the micro-adjustment feature to make fine adjustments to the tear-off position.**



CAUTION: You can only use the micro-adjustment feature while the ON LINE light is blinking.

2. **Press the FORM FEED button to feed the paper forward or the LINE FEED button to feed it backward.**





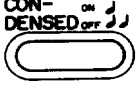
You can now tear off your document and resume printing. The printer remembers this new tear-off position, even when the printer is turned off.

Selecting Typestyles

You can produce a wide range of typestyles by combining different fonts, widths, and other print variations. You can select typestyles in three different ways: by using the SelectType feature on your control panel, by changing the DIP switches, or by using software commands. This section describes only how to select typestyles with the SelectType feature. DIP switch settings are described earlier in this chapter. Software commands are described in Chapter 9.

You can use the control panel to choose fonts and condensed printing. The number of beeps you hear indicates which features you are choosing. The printer must be on line before you can use the SelectType feature.

If the ON LINE light is blinking, press the ON LINE button once to set the printer off line and once more to set the printer on line.

Buttons	Number of beeps	Typestyles
 Select	1 draft	font
	2	Select NLQ Roman font
	3	Select NLQ Sans Serif font
	1	Select Condensed mode
	2	Cancel Condensed mode

The settings you select using the SelecType panel remain valid even if the printer is turned off.

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 cancel 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 the application manual on how to select typestyles.

Character fonts

The printer has three fonts: draft, NLQ Roman, and NLQ Sans Serif. The draft font uses fewer dots per character to allow high-speed printing, which makes it ideal for rough drafts and editing work.

NLQ Roman and NLQ Sans Serif are Near Letter Quality (NLQ) fonts. Near Letter Quality takes a little longer to print, but produces nicely-formed characters suitable for most documentation needs.

To select the draft font, press the DRAFT (LINE FEED) button when the printer is on line. When the draft font is selected, the beeper sounds once.

There are two printing speeds for draft font, high-speed draft and normal draft. These printing speeds are controlled by DIP switch 1-5. See the section on setting the DIP switches in this chapter.

To select the NLQ font, press the NLQ (FORM FEED) button when the printer is on line. When the NLQ Roman font is selected, the beeper sounds two times. When the NLQ Sans Serif font is selected, the beeper sounds three times.

The following samples show the characters for each font.

HIGH-SPEED DRAFT

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

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?

NORMAL DRAFT

!"#\$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJK
LMNOPRRSTUVW XY Z[\]^_`abcdefghijklmnopqrstuv
wxyz{|}~

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?

NLQ ROMAN

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

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?

NLQ SANS SERIF

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

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?

Condensed mode

You can use the condensed mode to change the character size. In the condensed mode, characters are approximately 60% 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. Both 10 and 12 cpi in draft mode can be condensed but NLQ cannot.

To select or cancel condensed mode, press the CONDENSED (LOAD/EJECT) button when the printer is on line. When the condensed mode is selected, the beeper sounds once. When the condensed mode is canceled, the beeper sounds two times.

The following printout compares normal 10 and 12 cpi with condensed 10 and 12 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 1-6, 1-7, and 1-8 according to the table below.

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

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 DIP-switch selectable character sets shown on the previous page, the five international character sets shown below are also available by use of software commands. For more information, refer to the ESC R command in Chapter 9.

Country	ASCII code hex											
	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
8 Japan	#	\$	@	[	¥	]	^	`	{	|	}	~
9 Norway	#	□	Ⓔ	Ⓕ	∅	Ⓐ	Û	é	æ	ø	å	ù
10 Denmark II	#	\$	Ⓔ	Ⓕ	∅	Ⓐ	Û	é	æ	ø	å	ù
11 Spain II	#	\$	é	í	Ñ	¿	é	`	í	ñ	ó	ú
12 Latin America	#	\$	é	í	Ñ	¿	é	ù	í	ñ	ó	ú

Choosing a Character Table

To select a character table, set DIP switch 1-3 according to the table below.

Character table	DIP SW 1-3
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.

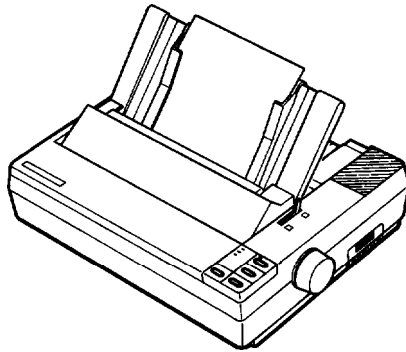
Tables showing what characters are printed in each of the character tables are listed in the Appendix.

Data Dump Mode

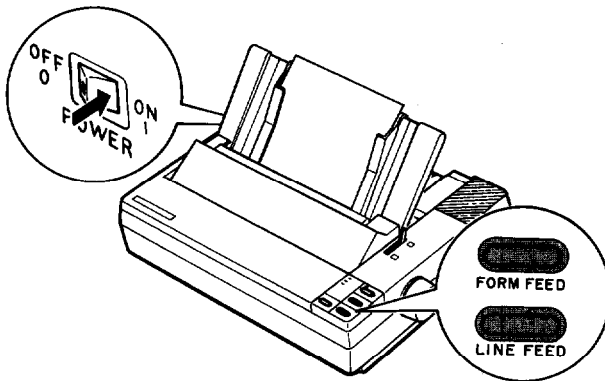
Data dump mode is a special feature that makes it easy for experienced users to identify the cause of communications problems between the printer and computer. In data dump mode, an exact printout of the codes reaching the printer is produced.

To use the data dump mode, follow these steps:

1. Make sure that paper is loaded. Either the tractor unit or the cut sheet feeder can be used for printing in data dump mode.



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. Your printer prints out all the codes sent to the printer in hexadecimal format as shown below.

Data	Dump	Node
0000	18 40 1B 52 00 1B 74 01 16 36 12 LB 50 20 20 20	..@.R..t..6..P
0010	20 20 54 68 69 73 20 69 73 20 61 6E 20 65 78 61	This is an exa
0020	60 70 6C 65 20 6F 66 20 61 20 64 61 74 61 20 64	mple of a data d
0030	75 6D 70 20 70 72 69 6E 74 6F 75 74 ZE 20 54 68	ump printout. Th
0040	69 73 20 69 73 20 66 65 61 74 75 72 65 20 6D 61	is is feature ma
0050	6B 65 73 20 69 74 20 65 61 73 79 20 66 6F 72 20	kes it easy for

On the printout's left side, the codes are printed in hexadecimal format. On the right side, printable ASCII characters are printed normally, but non-printable control codes (00 to 1F hex) are portrayed by dots.

4. To cancel the data dump mode, press the ON LINE button to set the printer off line. Then 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. If characters are printable, they appear as their true ASCII characters. Non-printable codes, such as control codes, are represented by dots.

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. The corresponding text field line on the right side of the printout contains the letter T preceded by two spaces.

The chart below interprets the first six 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 character
1B 36	ESC 6	Enable printable characters
12	DC2	Cancel condensed mode
1B 50	ESC P	Select 10 cpi

Chapter 4

Software and Graphics

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Enhancing Your Printing

You can obtain a wide variety of printing effects with your printer, 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 applications program or look up their specific commands in Chapter 9.

Print quality and fonts

The most apparent change you can make to print quality is to change fonts.

Your printer has three levels of print quality: high-speed draft, normal draft and NLQ (Near Letter Quality). High-speed draft printing is ideal for rough drafts and large documents that you need to print quickly. Normal draft printing is a bit slower, but offers higher resolution characters. NLQ printing takes a little longer, but produces darker, more fully-formed characters suitable for presentation-quality documents. For NLQ printing, the printer offers two fonts: Roman and Sans Serif.

The printout below shows the difference between high-speed draft, normal draft, NLQ Roman, and NLQ Sans Serif characters so you can compare the different styles and densities.

High-speed draft is even faster.
Draft printing is fast.
NLQ Roman is clear and typewriter-like.
NLQ Sans **Serif** is crisp and **distinctive**.

You can choose between the draft and NLQ fonts with either software commands or the SelecType feature. However, high-speed draft printing can only be selected by setting DIP switch 1-5 (see the section on setting the DIP switches in Chapter 3).

Note: High-speed draft printing is only available when 10 cpi printing is selected. The only print enhancements that can be combined with high-speed draft printing are underline mode and double-wide mode. If other enhancements or character sizes are selected, high-speed draft is ignored and replaced by normal draft.

Character spacing

To add greater variety to your documents, the printer has two types of character spacing, 10 and 12 cpi (characters per inch). Each is selected with a software command or a DIP switch (see the section on setting the DIP switches in Chapter 3). The printout below compares the two types.

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

Note: High-speed draft printing is available only in 10 cpi. If you select 12 cpi, the print speed temporarily switches to normal draft speed until 12 cpi is turned off.

Character size

In addition to the basic cpi spacings, the printer offers two other modes that can change the size of your printing. These modes are double-wide and condensed.

The double-wide mode doubles the width of any size character. This mode is useful for emphasizing report headings and creating presentations, but is usually not suitable for large amounts of text. You can also combine double-wide mode with other enhancements to obtain even more impressive printing results.

This is normal 10 cpi printing.
T h i s i s d o u b l e - w i d e .

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

The condensed mode can be selected with software commands or with the SelecType feature.

Condensed 10 cpi gives you more characters on a line.
Condensed 12 cpi gives you even more.

Note: Both 10 and 12 cpi normal draft printing can be condensed but NLQ printing cannot.

Widening or narrowing the characters also widens or narrows the space between words and letters. 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 printer 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 these effects if they are properly installed. Refer to your application program manual for details.

Emphasized and double-strike printing

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

In double-strike mode, the print head goes over each line twice, making the text bolder. For even greater prominence, you can combine emphasized and double-strike modes.

This is normal draft **printing**.

This is emphasized draft printing.

This is double-strike in draft mode.

This is double-strike and emphasized combined.

<p>Note: When using an NLQ font, double-strike mode is ignored because NLQ characters are already formed by two passes of the print head.</p>
--

Italic printing

You can print italics by sending a software command. You can use italics for special emphasis or as an alternative typeface.

This is Roman printing.
This is italicized Roman printing.

Underlining

The underline mode provides an automatic way of fully underlining any piece of text. This mode underlines spaces, superscripts, and subscripts without a break. Most word processors take advantage of this feature, but some programs use the underline character instead. If this happens, check your program for an underlining option.

This is continuous underlining.

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.

$$\text{average} = \frac{\underline{a_1 + a_2 + \dots + a_n}}{n}$$

Selecting typestyles with Master Select

Your printer has a special ESCape code called Master Select that allows you to choose many possible combinations of eight different printing modes:

- 10 cpi
- 12 cpi
- condensed
- emphasized
- double-strike
- double-wide
- italics
- underline

The format of the Master Select code is shown below:

ASCII	:ESC	!	<i>n</i>
Decimal	: 27	33	<i>n</i>
Hexadecimal	: 1B	21	<i>n</i>

The variable *n* is a number that identifies the desired mode or combination of modes. To find the value of *n*, refer to the table below and add up either the decimal or hexadecimal numbers for the features you want to combine.

Feature	Dec.	Hex.
10 cpi	0	00
12 cpi	1	01
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 and print them in double-strike mode. You would add three decimal numbers together to calculate the value of *n*.

12 cpi		1
Double-strike		16
Double-wide		32
	<i>n</i>	= 49

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

ASCII	:ESC	!	<i>n</i>
Decimal	:27	33	49
Hexadecimal	:1B	21	31

The font must be set separately by using the ESC *x* and ESC *k* commands. The draft font printing speed must be set using DIP switch 1-5 (see the section on setting the DIP switches in Chapter 3).

There are two more things to consider when using the Master Select command:

- Master Select cancels any of the listed features that you do not set. For example, if you have already set 12 cpi character spacing, and you use Master Select to set emphasized double-strike printing, the character spacing is reset to 10 cpi.
- Only 10 cpi, underline, and double-wide can be used with high-speed draft printing.

For more information on sending ESCape codes to your printer, see Chapter 9.

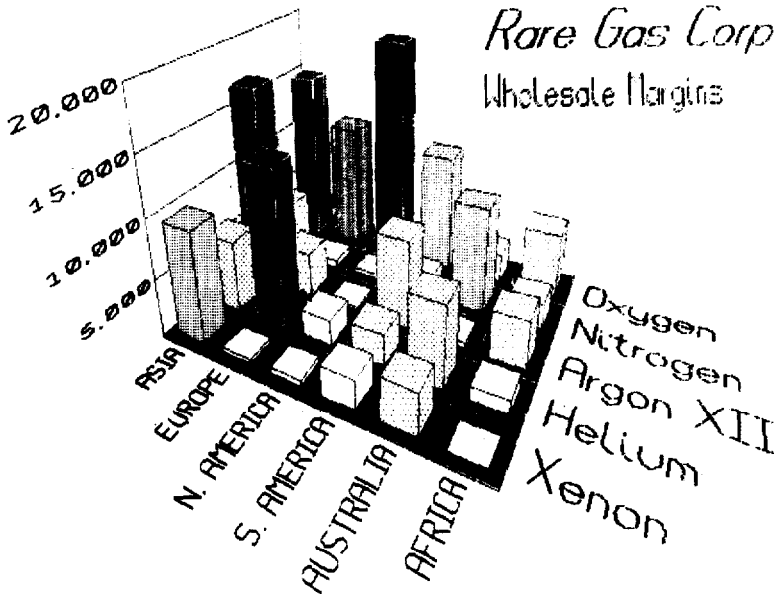
Graphics

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

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 and 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. If, on the other hand, you wish to do your own programming or merely to understand how the printer produces graphics, read on.



The print head

To understand dot graphics you should first learn how your printer's print head works.

The print head has nine pins arranged in a vertical column. 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 to produce a small dot. The pins fire time after time in different patterns that produce letters, numbers, and graphic symbols.

Dot patterns

The print head is able to print both graphics and text because graphic images are formed on the printer in the same way that newspaper and magazine pictures are printed. If you look closely at a newspaper photograph, you can see that it is made up of many small dots. Your printer also forms its images with patterns of dots, as many as 240 dot positions per inch horizontally and 72 dots per inch vertically. The images printed by this printer can be as finely detailed as the one at the beginning of this section.

In its main graphics mode, your printer uses only the top eight of the nine pins to print one column of dots for each code it receives. Your graphics program, therefore, must send one code for each column in a line. Each code specifies the dot pattern for that column.

To print graphic images taller than eight dots, the print head must make more than one pass. After printing one line, the printer advances the paper and prints another, just as it does when printing text.

To keep the print head from leaving gaps between graphics lines as it does between text lines, the line spacing must be changed using the ESC A command described in Chapter 9. Since an 8-dot column prints lines that are 8/72-inch high, you generally want to set the line spacing to 8/72nds, as you'll see in a sample program later in this chapter.

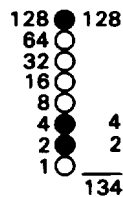
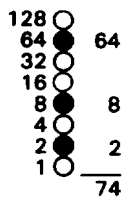
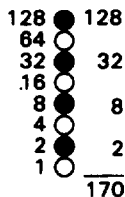
Pin labels

To tell the printer which pins to fire in each column, you need a numbering system that separately identifies each of the eight pins as shown below. This system allows you to specify all 256 possible pin combinations with a single number.



To fire any one pin, you just 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 the pin labels shown above, 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 certain 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. Before you can use these numbers in a graphics program, however, you need to know the format of the graphics command.

The graphics commands

The graphics mode commands are quite different from 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. The graphics commands are more complicated because the code that turns on the graphics mode also specifies how many columns of graphics will be printed. After the printer receives this command, it interprets all subsequent numbers sent to the printer as column patterns, until the specified number of columns has been printed.

While there are alternate commands for four of the most commonly used options (see Chapter 9), your printer has one special command that allows you to use any of the seven 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	m	Horiz. density (dots/in.)
Single-density	0	60
Double-density	1	120
High-speed double-density*	2	120
Quadruple-density*	3	240
CRT I	4	80
Plotter (1:1)	5	72
CRT II	6	90

* Adjacent dots cannot be printed in this mode.

Column reservation numbers

High-density graphics may require thousands of columns to print one line. The printer, however, cannot use decimal number's larger than 255. Therefore, the graphics commands use two numbers, $n1$ and $n2$, to reserve columns.

To calculate $n1$ and $n2$, divide the total number of columns by 256. The result is $n2$; the remainder is $n1$. Since the commands are 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 $1632 = 96 + (6 \times 256)$.

If you are using a programming language with MOD (modulus) and INT (integer) functions, you can use the following formulas to calculate $n1$ and $n2$, in which c is the total number of columns:

$$n1 = c \text{ MOD } 256$$

$$n2 = \text{INT}(c/256)$$

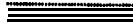
For all subsequent bytes sent to the printer after $n1$ and $n2$, the printer interprets the number of bytes specified by $n1$ and $n2$ as graphics data, no matter what codes they are. This means that you must be sure to supply enough bytes of graphics data or the printer will stop and seem to be locked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

Printing simple patterns

The first example is just a simple program to show you how a 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 all semicolons. The program produces the printout you see below.

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



Line 20 specifies single-density graphics mode and also reserves 40 columns for 'graphics. Line 30 begins a loop to supply 140 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 finishes the loop.

Note: Some software programs (including most version of BASIC) automatically insert carriage return and line feed codes after every 80 or 130 characters. This is usually no problem with text, but it can spoil your graphics. For every CR-LF pair inserted in your program, two extra columns of graphics are printed in the middle of the ones you send, and two data numbers are left over and printed as text.

In some versions of BASIC you can prevent this unwanted control code insertion by putting a WIDTH statement at the beginning of all graphics programs. The format in many forms of BASIC is either WIDTH "LPT1:", 255 or WIDTH LPRINT 255. Check your software manual for the proper format.

Printing taller patterns

The next example shows how several lines of graphics can be formed into a figure taller than eight dots. It uses programming techniques for producing textured or repetitive patterns.

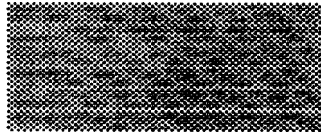
In the following program, the lines inside each pair of FOR and NEXT statements have been indented so that you can see how the program works; the spaces are not needed for the program to run.

```

100 WIDTH "LPT1:"
110 LPRINT CHR$(2); ; & ; CHR$(8) ;
120 FOR R=1 TO 6
130   LPRINT CHR$(27); "K"; CHR$(100); CHR$(0);
140   FOR X=1 TO 50
150     LPRINT CHR$(170); CHR$(85);
160   NEXT X : LPRINT
170 NEXT R
180 LPRINT CHR$(27); "@"

```

If you run the program you will see how it combines six print lines into a pattern.



There are five basic steps that the program goes through to produce this kind of pattern:

1. The computer is prevented from adding any extra characters by the WIDTH statement (line 100).
2. The line spacing is changed to $8/72$ of an inch. This is the height of the dot patterns used in the program (line 110).
3. The program goes through the graphics command the required number of times (line 120 and 170).

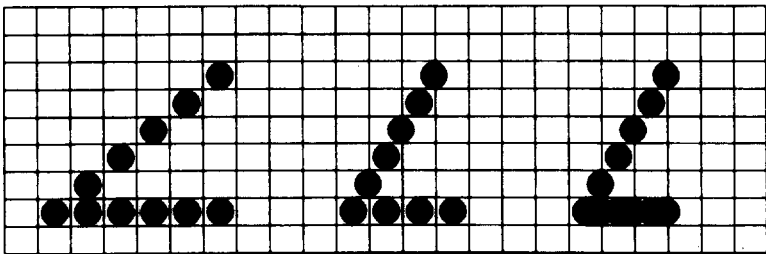
4. A new graphics command is used for each line printed (lines 130 to 160). This part of the program is similar to the last example, but two columns are printed each time through the loop, making a total of 100.
5. Finally, the program resets the printer to its initial settings, including the normal line spacing (line 180). This is an important step that you should include in every program.

Notice that graphics commands can be in effect for only one print line. To print more than one line of graphics, a graphics command must be issued before each line.

Designing your own graphics

This section takes you through the development of a graphics program. The example here is not especially complicated, but it does include the same steps you would use for a more complex figure.

First you must decide which graphics density you want. The illustration below shows the differences between three common densities so that you can choose the one you want. See page 4-12 for a list of available graphics densities.



Single

High-speed
double

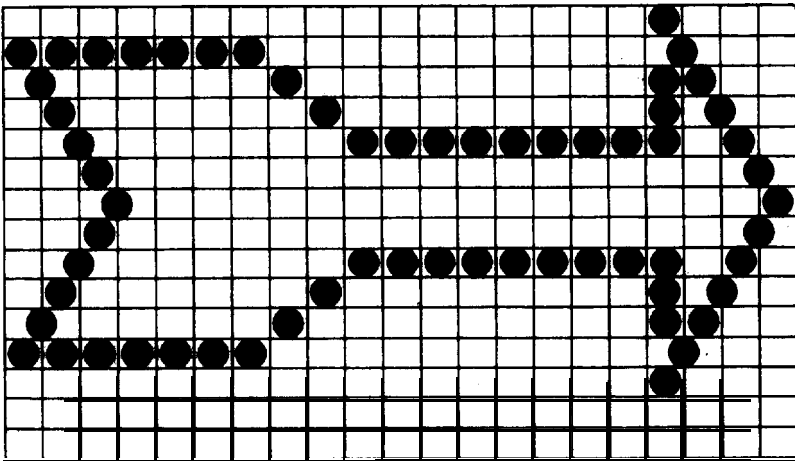
Double

In the illustration on the previous page, you can see the main rules for graphics design:

- In single-density, no dots can be placed on vertical lines.
- In high-speed double-density, dots can be placed on vertical lines, but no dots can overlap.
- In double-density, dots can be placed on vertical lines, and they can overlap.

After choosing the desired density, you design your figure by plotting dots on graph paper.

The high-speed double-density design shown below illustrates the correct way to plot a figure. It should point you in the right direction for your own work.




```

100 WIDTH "LPT1:",255
110 LPRINT CHR$(27);"A";CHR$(7);
120 FOR ROW=1 TO 2
130   LPRINT CHR$(27);"Y";CHR$(41);CHR$(0);
140   FOR COLUMN=1 TO 41
150     READ N
160     LPRINT CHR$(N);
170   NEXT COLUMN
180   LPRINT
190 NEXT ROW
200 END
210 DATA 64,32,80,8,68,2,64,0,64,0
220 DATA 64,0,64,0,32,0,16,0,8,0
230 DATA 8,0,8,0,8,0,8,0,8,0,8,0,8,0
240 DATA 184,64,32,16,8,4,2
250 DATA 8,16,40,64,136,0,8,0,8,0
260 DATA 8,0,8,0,16,0,32,0,64,0,64,0
270 DATA 64,0,64,0,64,0,64,0,64,0,64,0
280 DATA 116,8,16,32,64,128,0

```

When you run this program, it produces the following printout.



If you want to see the figure in other densities, change the Y in line 130 to L or Z.

Individual graphics commands

There are four individual graphics commands that are very much the same as the ESC * command, but each one works for only one graphics option. Note that these commands contain one less variable than the ESC * command because they do not need to select a graphics option.

They are shown below:

Command	Function	ESC * Format
ESC K	Single-density	ESC * 0
ESC L	Double-density	ESC * 1
ESC Y	Double-density, high-speed	ESC * 2
ESC Z	Quadruple-density	ESC * 3

The reassignment command

The LX-810 has a command that allows you to change the graphics option assigned to any of the four individual graphics options commands.

The command looks like this:

ESC ? s m

The letter *s* represents the command that you wish to change the assignment for (K, L, Y, or Z) and *m* is the number of the graphics option that you want to assign to it. For example, to change the ESC K command to use the CRT I graphics option, the command in BASIC is;

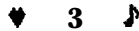
LPRINT CHR\$(27);"?";"K";CHR\$(4)

This is a quick way to change the aspect ratio of the design that you are printing. Changing the graphics option will change the width without changing the height.

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 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 sample typefaces created with the user-defined character function.



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

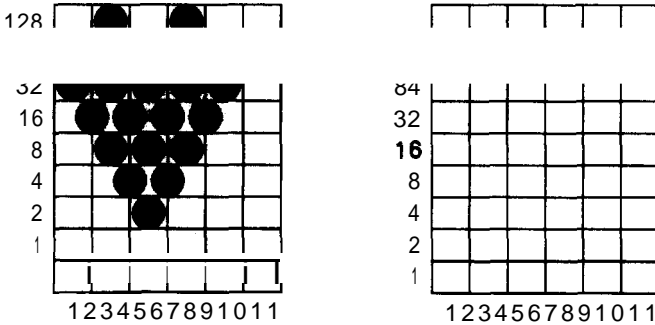
The standard ASCII characters are stored in the printer's Read Only Memory (ROM), and the user-defined characters are stored in the printer's Random Access Memory (RAM).

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. For simplicity, this section shows you how to design draft-quality characters. Designing NLQ characters is more complicated and is therefore described later in this chapter.

Design grids

To design a draft character you use a grid that has nine rows and eleven columns, as shown below.



The grid on the left shows a design plan for a heart-shaped character. Although there are nine pins in your printer's print head, note that you can use only eight of them in a single user-defined character. The heart design above uses the top eight pins, but you can also use the bottom eight by using the grid on the right as explained later in this section.

You generally don't want to use row one (below the heavy line on the grid) except for characters that have descenders, like the letters y and g. Also, while you can use all 11 columns for a character, it's best to leave the two right columns blank to provide space between characters.

*Can define 6 chars. only
; , < , = , > , ?*

Sending information to your printer

Once the character is plotted on the grid, you simply add the pin values for each column together, just as you do for graphic images. Then, you write a program that uses the following command to replace the standard ASCII characters stored in your printer with the characters you've designed.

The format of the command that redefines characters is relatively complex:

$$ESC \& 0 n1 \ n2 \ a1 \ d1 \ . \ . \ . \ dn$$

The ESC & is simple enough. The 0 is not ASCII character 0 (decimal code 48, hex code 30), but is the decimal code for the ASCII character NUL. (The sample program on the next page should make this distinction clear.) You can redefine up to six characters with the command. The values *n1* and *n2* are the decimal codes of the first and last ASCII characters you are replacing. (You can alternatively use the ASCII characters themselves in quotation marks.) If you are replacing only one character, *n1* and *n2* are the same. You can use any codes between 58 and 63 decimal for *n1* and *n2*.

For example, if you wanted to redefine the characters : through ?, *n1* would be : (decimal code 58) and *n2* would be ? (decimal code 63). So the command ESC & 0 : ? (followed by the appropriate data) would replace the characters : through ?.

The value *a1* specifies whether the top eight pins or the bottom eight pins of the print head are used. If you wish to print with the top eight pins, *a1* should be 128. If, however, you wish to print with the bottom eight pins, *a1* should be 0.

The last part of the command (*d1...dn*) is the actual data that defines the dot patterns for each column of each character. Since a character can use up to eleven columns, you must supply eleven data numbers for each character even if some columns are blank. If you redefine six characters, for example, you need to supply 66 data numbers.

The following character definition program should help make this clear:

```
100 LPRINT CHR$(27);"x";CHR$(0);
110 LPRINT CHR$(27);"&";CHR$(0);
120 LPRINT ";;";
130 LPRINT CHR$(128);
140 FOR I=1 TO 11
150 READ A: LPRINT CHR$(A);
160 NEXT I
170 LPRINT ";;;;;"
180 LPRINT CHR$(27);"%" ;CHR$(1);
190 LPRINT ";;;;;"
200 LPRINT CHR$(27);"%" ;CHR$(0);
210 LPRINT ";;;;;"
220 END
230 DATA 32,80,168,84,42,84,168,80,32,0,0
```

In line 100, the ESC x 0 command selects draft printing. The two semicolons (;) in line 120 are *n1* and *n2*, the range of characters being defined (in this case, a range of one). Line 130 contains *a1*, which in this case specifies to use the top eight pins of the print head.

Line 180 selects the user-defined character set, and line 200 switches back to the normal character set. The actual character design information (contained in the DATA statement in line 230) is sent to the printer in the loop between lines 140 and 160.

Printing user-defined characters

If you entered the example program above, you defined a heart and placed it in the RAM location for decimal code 59 (replacing the semicolon). You can now print out a three-line sample of your work. The first and third lines (printed by lines 170 and 210 of the program) print the normal semicolon; the second line (line 190) prints the heart that you defined.

Run the program to see the printout below.

```

: : : :
♦♦♦♦♦♦
: : : :

```

As you can see, both sets of characters (the original ROM characters that the printer normally uses and the user-defined character set) remain in the printer available for your use. The command to switch between the two sets is used in line 180 and 200. It is:

ESC % *n*

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 170 and 190 in the preceding program.

Copying ROM characters to RAM

After running the previous sample program, if you select the user-defined character set and try to print other characters, only the heart will print. Since no other characters are in the printer's user-defined RAM area, other characters print as spaces.

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 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:

ESC : 0 n 0

Note: This command will cancel any user-defined characters you have 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 character set, you can print with the user-defined character set as your normal character set. You never need to switch back and forth between sets.

Mixing print styles

The user-defined character set can be used in combination with most print styles. For example, emphasized and double-wide printing both work well with user-defined characters.

The sample below shows the heart character printed in two different styles.

Normal	♥♥♥♥♥
Double-wide	♥♥♥♥♥

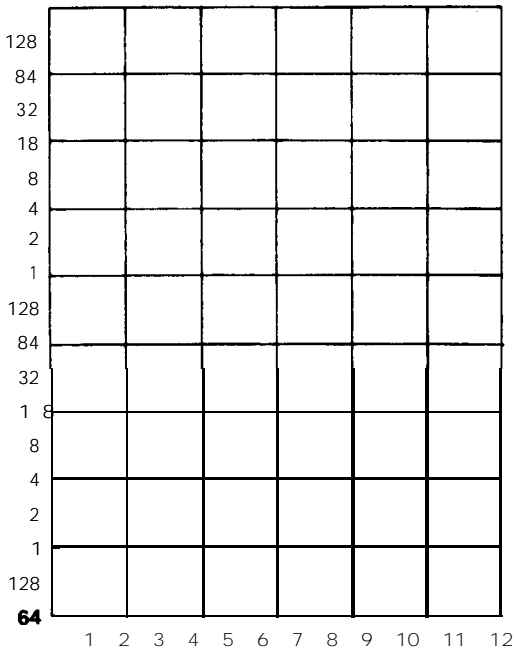
Keep in mind that user-defined characters are stored in RAM, which is not permanent. Whenever the printer power is turned off or your computer sends an initialization (INIT) signal, all of the user-defined characters are lost. (Some computers do this each time BASIC is loaded or when certain application programs start up, and most computers do it if you have to reset them.) If the program resets the printer with the ESC @ command, the ROM set is selected, but the user-defined characters are not lost.,

Defining NLQ characters

NLQ characters use many more dots than draft characters; therefore, the design grid and programs in this section are a little more complex than those you use to design draft characters.

NLQ grid

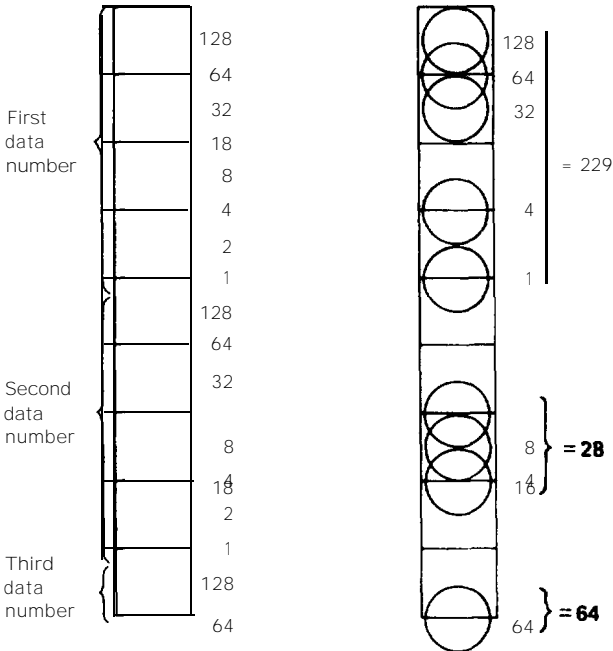
Because the NLQ characters can use as many as 18 dots vertically and 12 dots horizontally, you design the characters on a different grid than the one used for draft characters. The figure below shows an NLQ design grid.



On this grid, you can use any numbered line or space. This includes the bottom line and the line on the right side. As with draft characters, however, you should leave the two right columns blank to create space between characters.

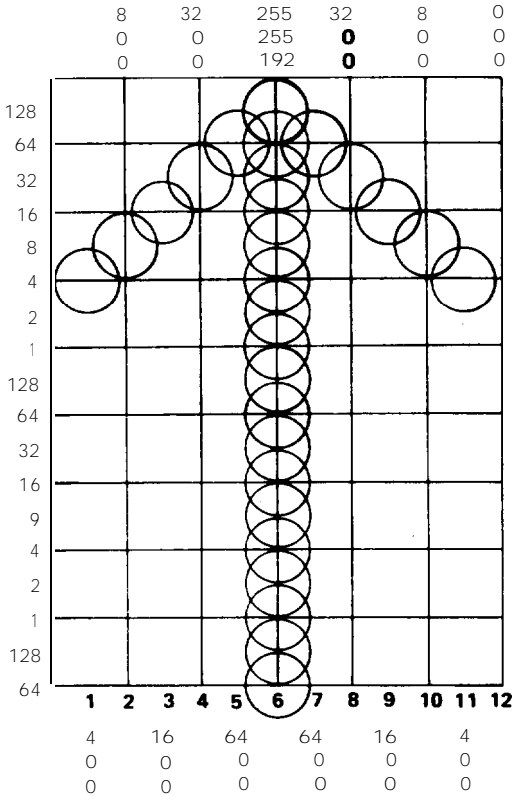
Since NLQ characters can have up to 18 dots in a column, each vertical column must be divided into three sections for data number calculation.

The figure below shows a single column to make clear how the data numbers are calculated. When designing NLQ characters, you should use circles instead of dots to make it easier to see and count overlapping dots.



To calculate the data numbers for this column, just add together the values in each section of the column. If no dots are used in a section, the data number is zero. You must use three numbers, even zeros, for every column when writing the DATA statements for a program.

The illustration below shows a sample design. The data numbers are printed at the top or bottom of each column. The sample program on the following page shows how to use the numbers in a DATA statement.



NLQ definition program

The following program for NLQ user-defined characters contains the data numbers for the arrow design shown above. Lines 230-250 contain the data numbers.

```
100 LPRINT CHR$(27);"x";CHR$(1);
110 LPRINT CHR$(27);"&";CHR$(0);";";";";
120 LPRINT CHR$(0);CHR$(12);CHR$(0);
130 FOR I=1 TO 36
140 READ D
150 LPRINTCHR$(D);
160 NEXT I
170 LPRINT   ; ; ; ;
180 LPRINTCHR$(27);"%" ;CHR$(1);
190 LPRINT  " ; ; ; ; "
200 LPRINT CHR$(27);"%" ;CHR$(0);
210 LPRINT " ; ; ; ; "
220 END
230 DATA 4,0,0,8,0,0,16,0,0,32,0,0
240 DATA 64,0,0,255,255,192,64,0,0,32,0,0
250 DATA 16,0,0,8,0,0,4,0,0,0,0,0
```

Run the program to see the printout below:

```
 ; ; ; ;
↑↑↑↑↑
 ; ; ; ;
```

Chapter 5

Using the Printer Options

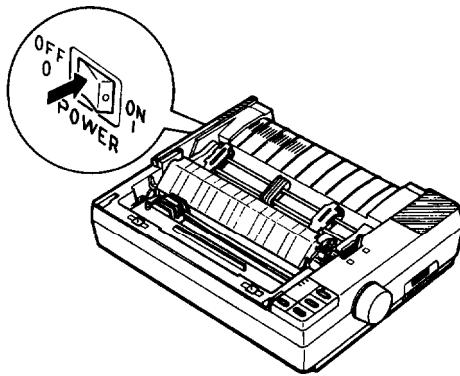
Cut Sheet Feeder..	5-2
Installing the cut sheet feeder.....	5-2
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Testing the printer in cut sheet feeder mode.....	5-9
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Interface Boards..	5-37
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#8143 New Serial Interface board	5-52

Cut Sheet Feeder

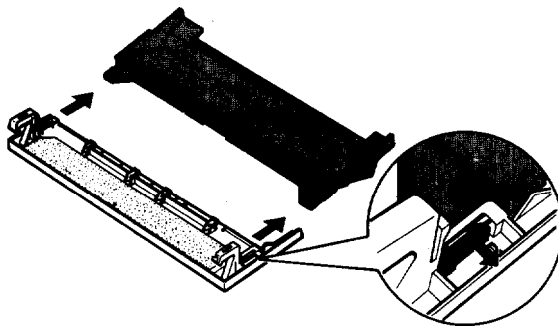
The optional cut sheet feeder (C806121) makes it possible to handle single-sheet paper more easily and more efficiently. Up to 150 sheets of standard bond paper (22 lb paper) can be fed automatically into the printer without reloading.

Installing the cut sheet feeder

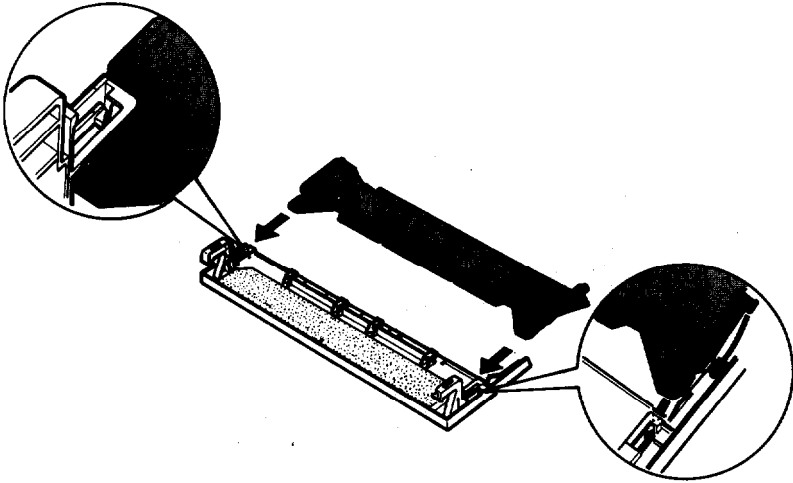
1. Make sure that the printer is turned off. Then remove the paper guide and printer cover.



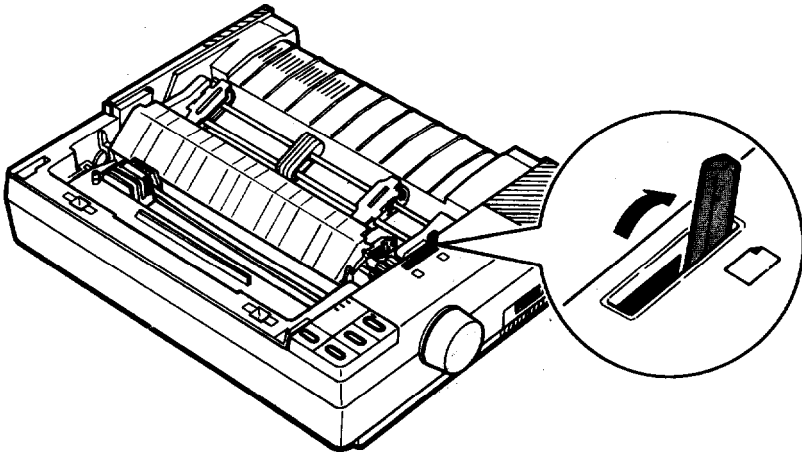
2. Separate the two halves of the printer cover by pressing on the tabs and sliding the clear plastic half of the printer cover off.



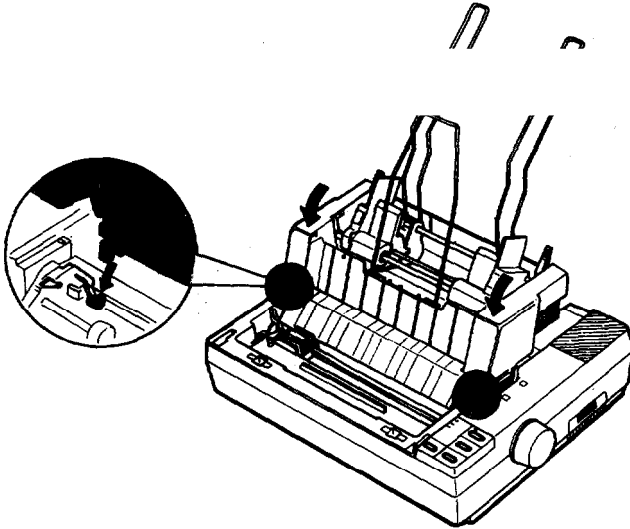
- 3. Attach the cut sheet feeder cover to the front half of the printer cover.**



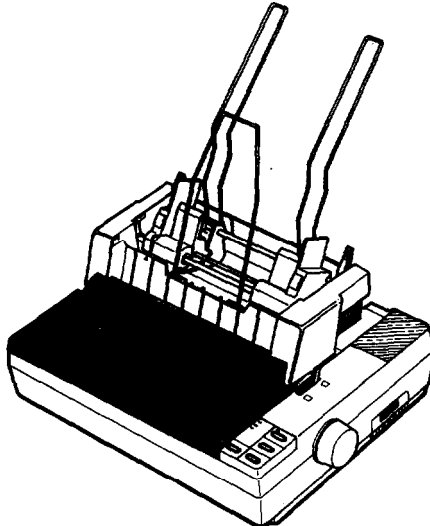
- 4. Make sure that the paper release lever is pushed all the way to the rear.**



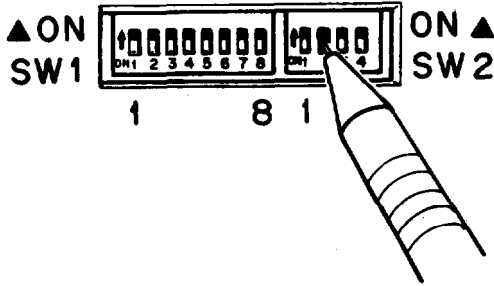
- 5. Tilt the cut sheet feeder slightly forward to fit the notches at the base of the feeder over the black pins inside the printer, just in front of the push tractor sprockets. Tilt the feeder back until it rests on top of the printer.**



- 6. Attach the cut sheet feeder cover.**



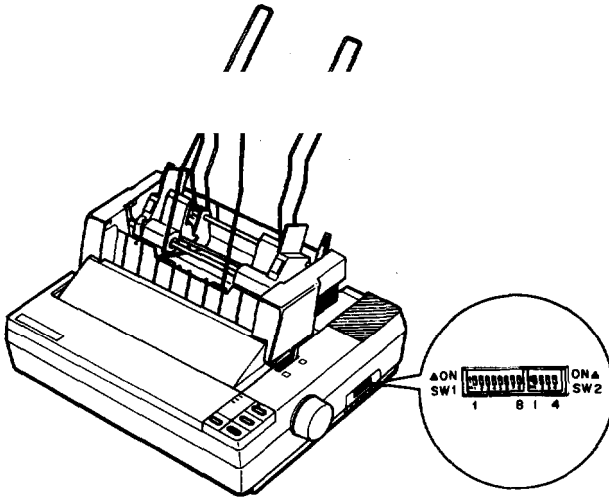
- 7. Turn on the cut sheet feeder mode by setting DIP switch 2-2 to ON,.



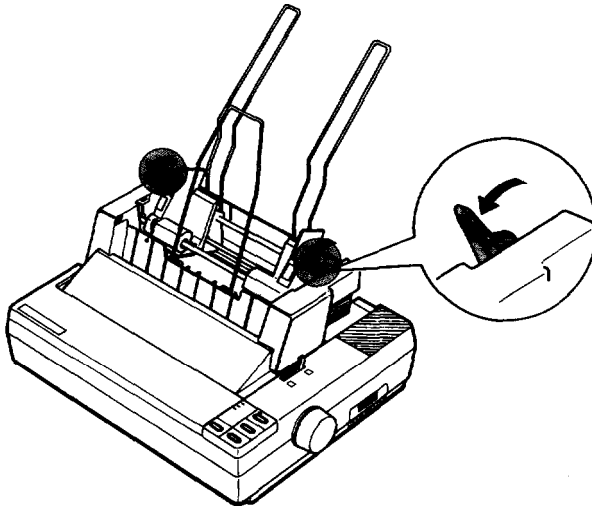
- 8. Turn on the printer.

Paper handling

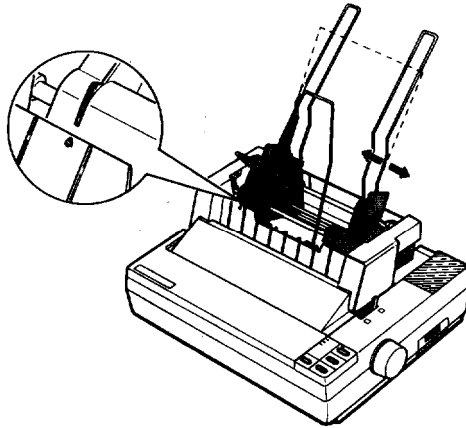
- 1. Make sure that the cut sheet feeder mode is set and turn on the printer.**



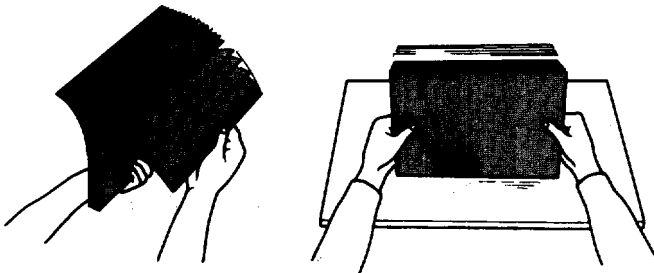
- 2. Pull the paper set levers all the way forward until the paper supports retract and lock open to allow for paper loading.**



3. Slide the left paper guide to where the fin on the edge guide aligns with the arrow on the front panel. Next, slide the right paper guide to roughly match the width of your paper.

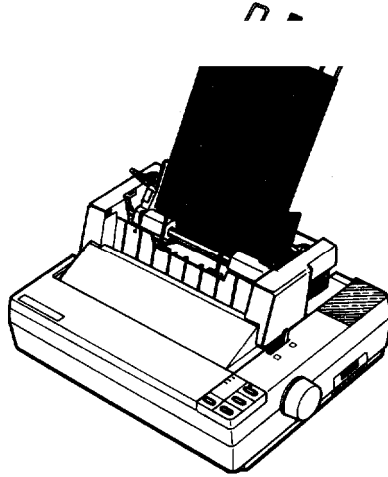


4. Take a stack of paper and fan it as shown. This keeps the paper from sticking so that only one sheet feeds at a time. Tap the side and bottom of the paper on a flat surface to even up the stack.

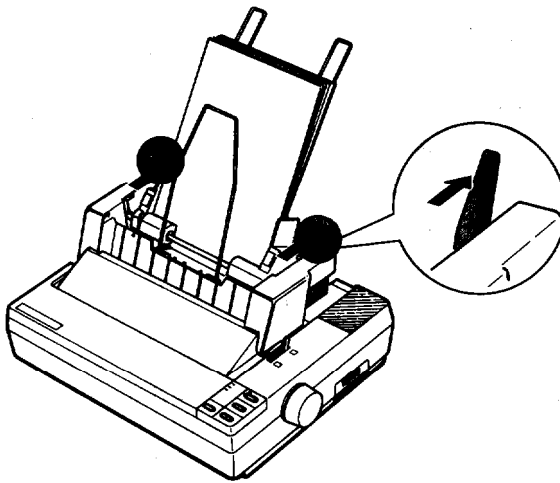


Note: For best results, use typewriter quality paper. If you plan to use paper with a glossy or textured surface, you should test it before regular use. Do not use multi-part forms, carbon paper, envelopes, or labels in the cut sheet feeder.

5. **Insert the 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 freely up and down.**



6. **Push the paper set levers back until they click into place and clamp the paper against the guide rollers.**

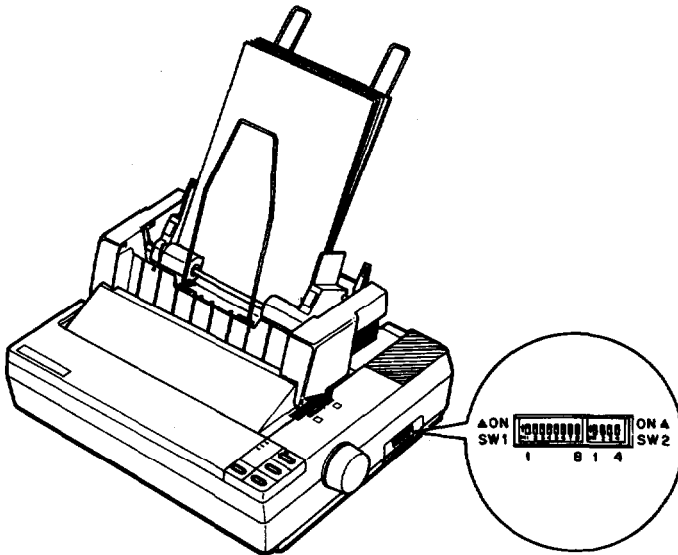


Testing the printer in the cut sheet feeder mode

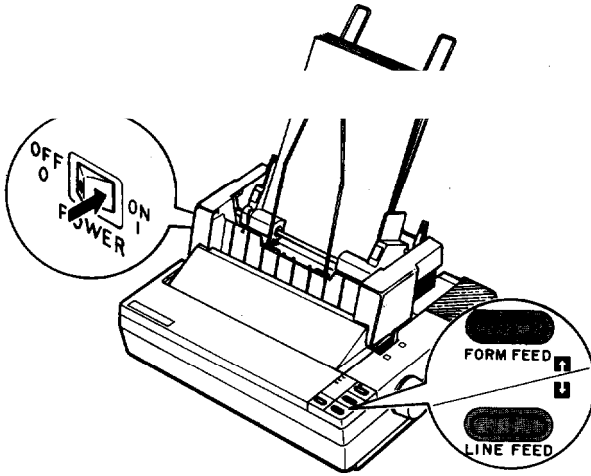
When you perform the cut sheet feeder self test, the printer counts the number of lines on the page and prints out this number at the bottom of the first test page as shown in step 2. The number of lines counted by the printer becomes the default page length setting. This setting, however, can be overridden 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.

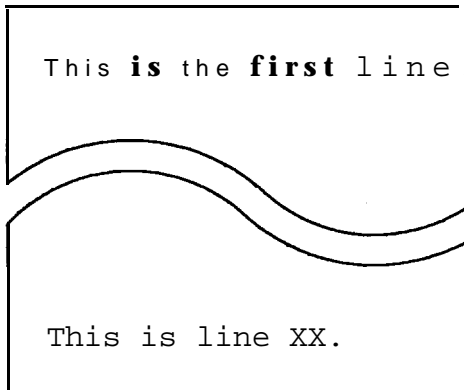
1. Make sure that the printer is turned off and paper is in the bin. Check that the cut sheet feeder mode is selected and the paper release lever is pushed to the rear.



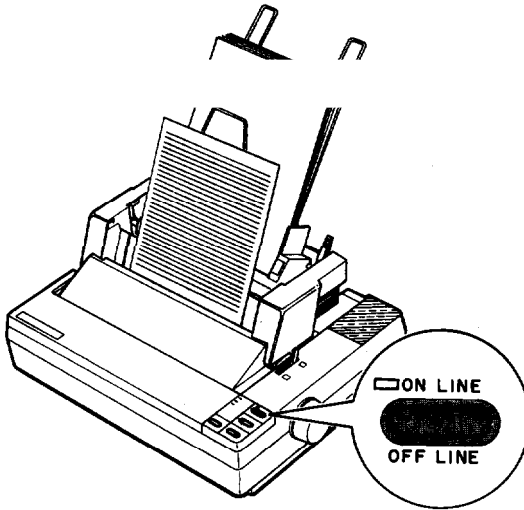
- 2. While holding down the LINE FEED button, turn on the printer. (For an NLQ mode test, press the FORM FEED button instead of the LINE FEED button.)**



A portion of the printout of the first page of the self test is shown below. The printout of the second page is similar to the original self test described in Chapter 1.



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, press the LOAD/EJECT button if necessary to eject any loaded sheets. 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.

Note: If a sheet is not ejected properly when the cut sheet feeder mode is on, the beeper sounds repeatedly.

Paper out condition

When the printer is on line and receives print data from the computer, the first sheet is automatically loaded. Subsequent sheets are automatically loaded 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 paper bin is empty, the printer automatically goes off line and the beeper sounds repeatedly. Also, the PAPER OUT light goes on. 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.

Control panel operation

To operate the cut sheet feeder manually from the control panel when the printer is in the cut sheet feeder mode, 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

You can use the ESC EM command to turn on or off the cut sheet feeder mode. This command can be used to override the cut sheet feeder mode setting made by the DIP switch 2-2. The FF command causes the printer to eject the sheet in the printer without loading the next sheet.

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

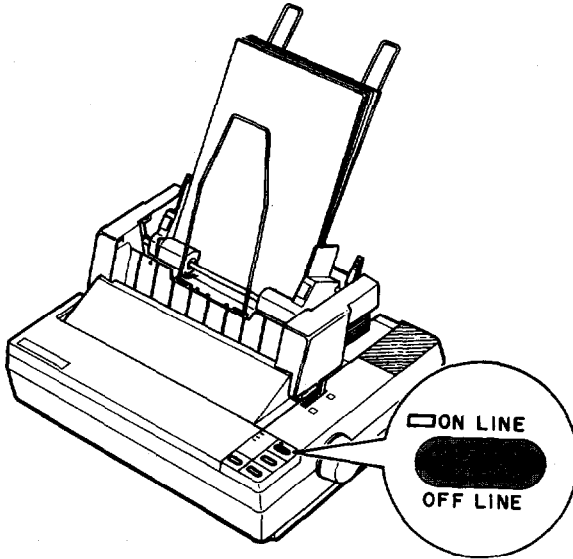
ESC J: Line feed by $n/216$ th of an inch

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.

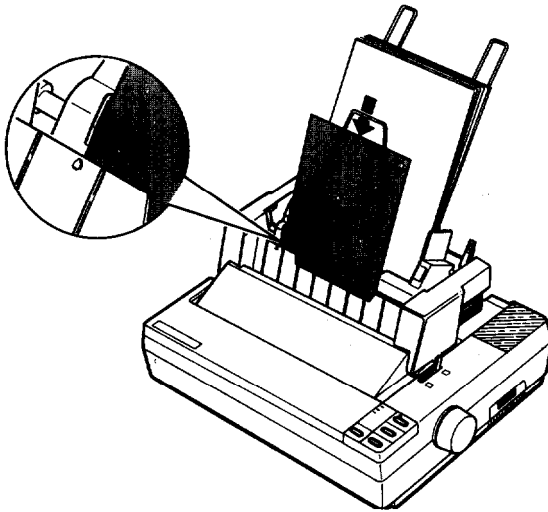
Single sheet insertion

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.

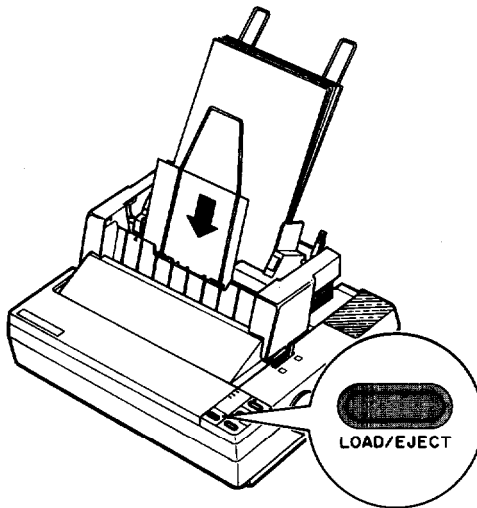
1. Press the ON LINE button to set the printer off line.



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.**

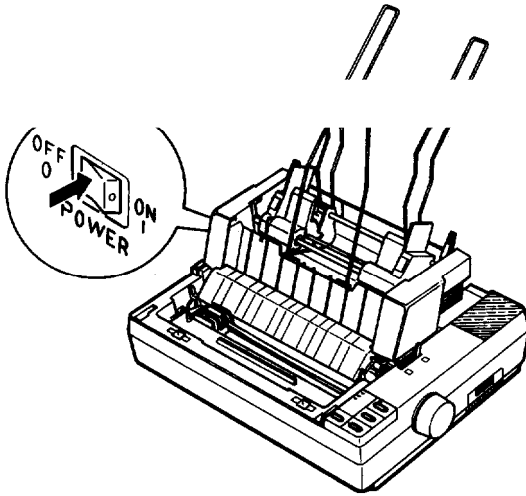


3. **Press the LOAD/EJECT button to load the sheet.**

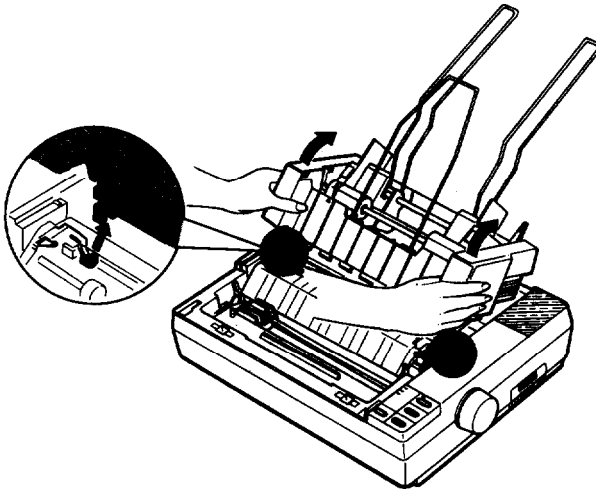


Removing the cut sheet feeder

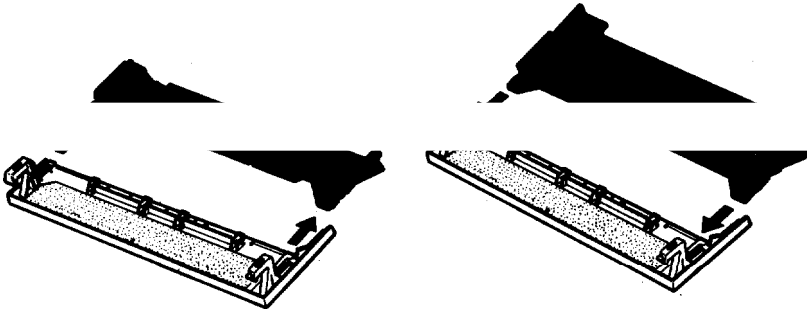
1. **Make sure that the printer is turned off and remove the cut sheet feeder cover. If any paper remains in the bin, remove it.**



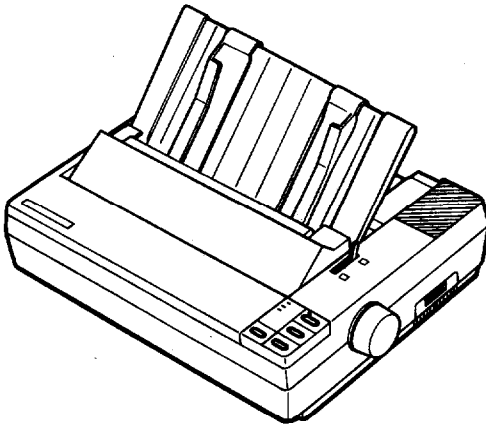
2. **Tilt the front part of the cut sheet feeder backward to release its notches from the pins in the printer and remove the cut sheet feeder.**



- 3. Separate the cut sheet feeder cover from the printer cover and attach the back half of the printer cover.**



- 4. Install the paper guide and printer cover.**



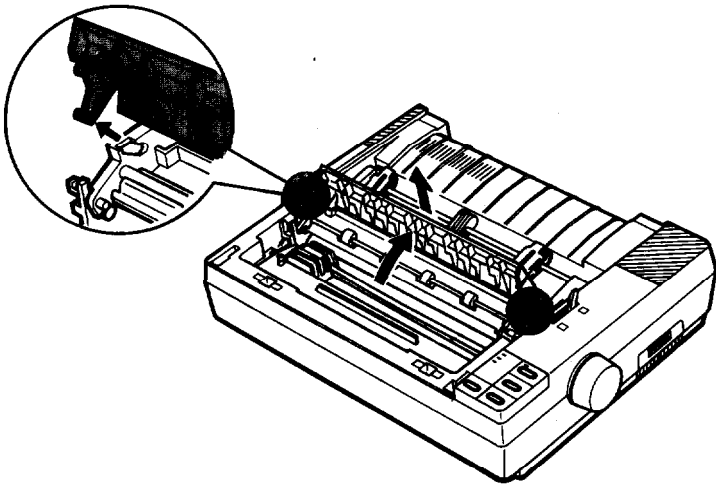
Removal of the cut sheet feeder is now completed. Be sure to store the removed cut sheet feeder in its original box and packing materials

Pull Tractor

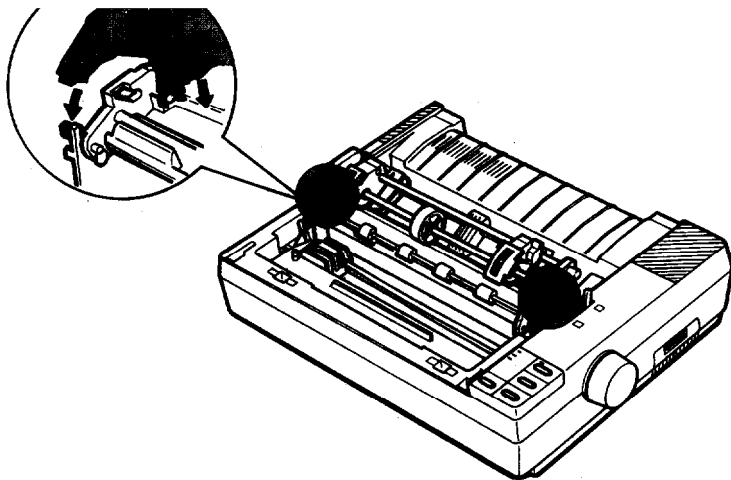
The optional pull tractor (C800061) provides optimum continuous paper handling. The pull tractor is especially useful with continuous multi-part forms and labels. For best results, use the pull tractor along with the built-in push tractor as described in this section.

Installing the pull tractor

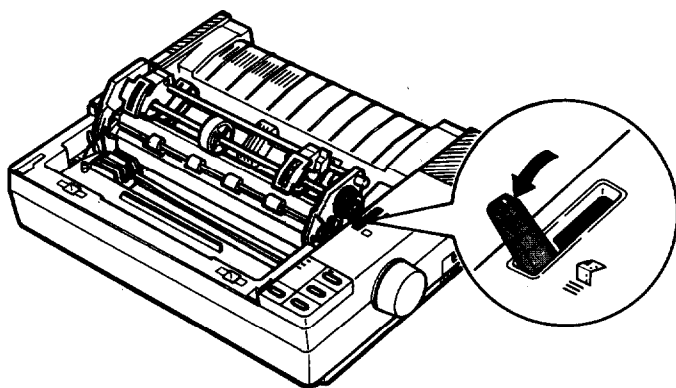
1. **Make sure that the printer is turned off. Then remove the printer cover and paper guide.**
2. **Remove the paper tension unit cover.**



3. **Fit the rear notches on the tractor unit over the rear mounting pins in the printer. Then, tilt the tractor unit toward you until the front latches click in place over the front mounting pins. Push down on the front latches to be sure they are firmly seated.**

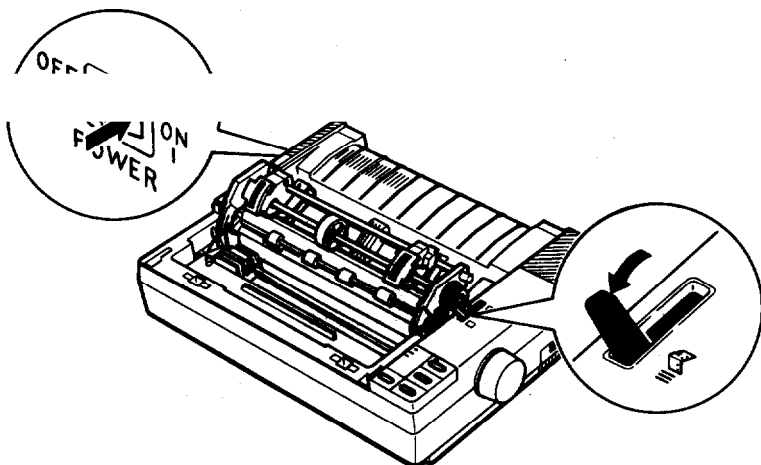


4. **Pull the paper release lever to the continuous paper position.**

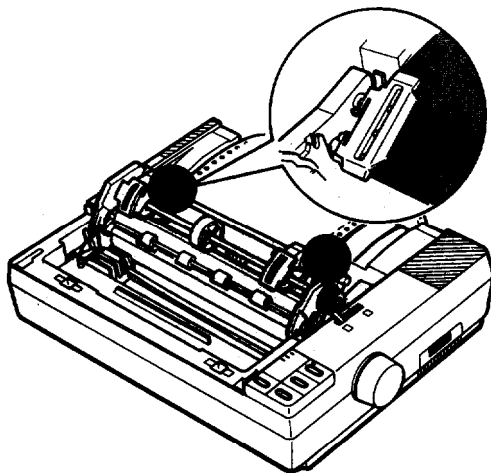


Paper handling

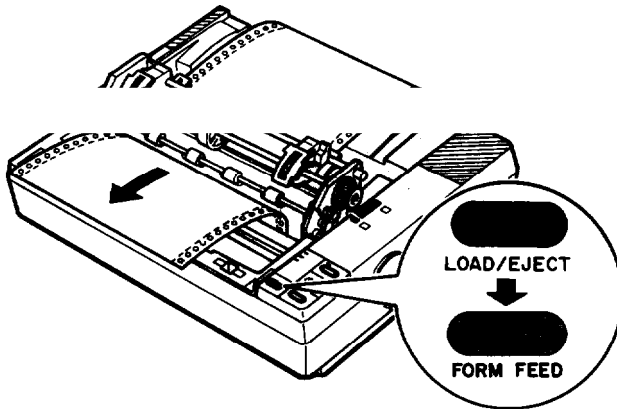
- 1. Make sure that the paper release lever is set forward to the continuous paper position, and then turn on the printer.**



- 2. Position the left sprocket unit of the push tractor about 1/4 of an inch from the left and lock it into place. Then load the continuous paper onto the push tractor as described in Chapter 2.**

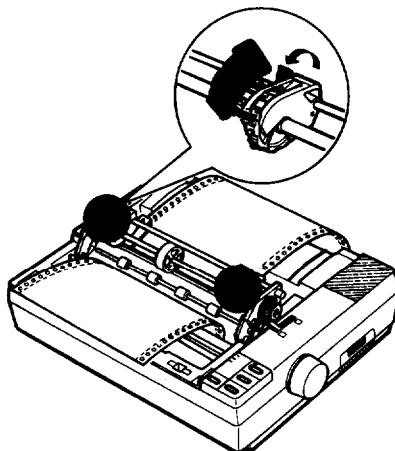


3. Press the **LOAD/EJECT** button to load the continuous paper; then press the **FORM FEED** button. This advances the paper one page so that you can fit the paper onto the pull tractor.

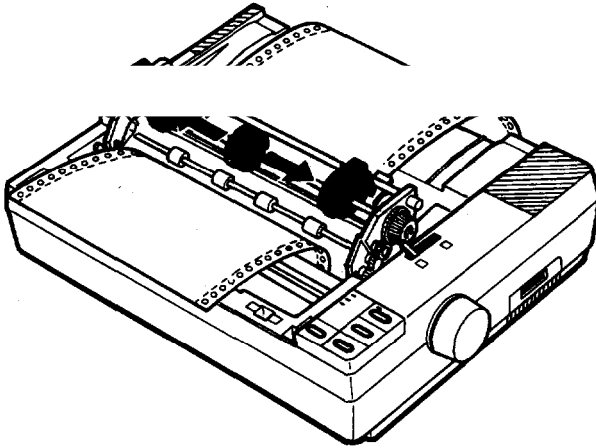


CAUTION: Never use the platen knob to feed the paper while the printer is turned on. If you need to adjust the loading position, be sure to use the micro-adjustment feature described in Chapter 3.

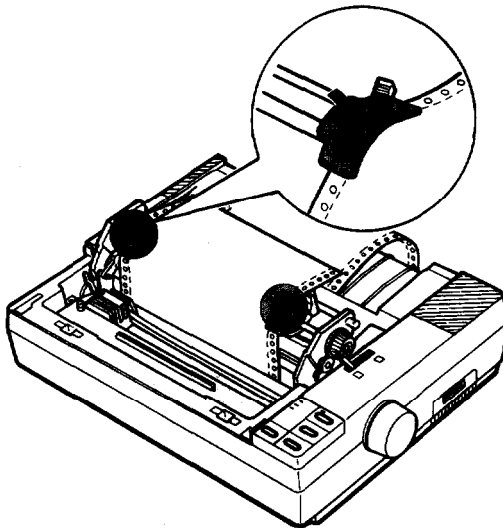
4. Open the sprocket covers of the pull tractor and pull the sprocket lock levers toward you to release them.



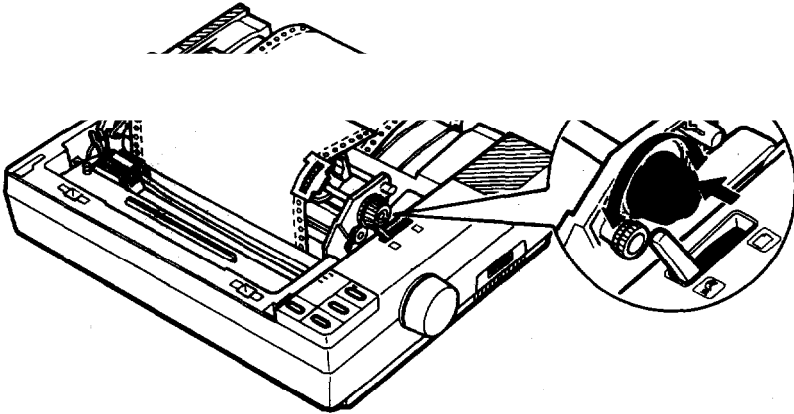
5. **Adjust the sprocket units to match the width of the paper, then adjust the paper supports so that they are evenly spaced between the sprocket units.**



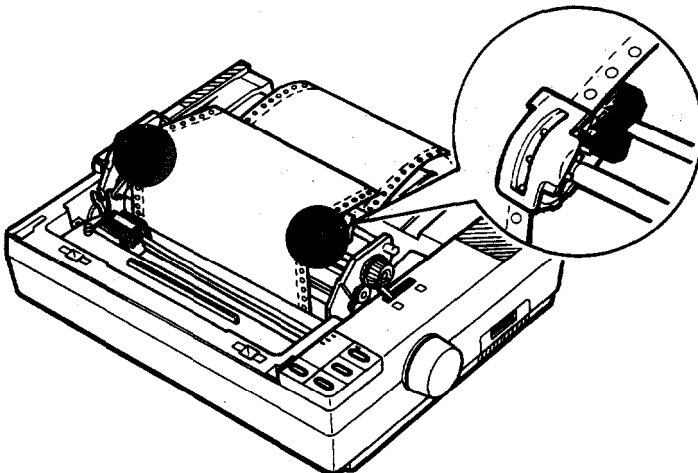
6. **Fit the holes in the paper over the tractor pins on the sprocket units and close the sprocket covers.**



7. If the paper does not fit exactly onto the tractor pins, press in on the pull tractor knob and turn it in the desired direction until the paper fits properly.

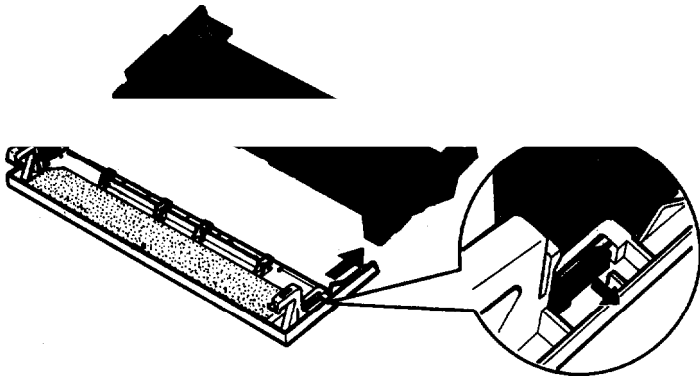


8. Make sure the paper is not crooked or wrinkled and lock the sprocket units in place.

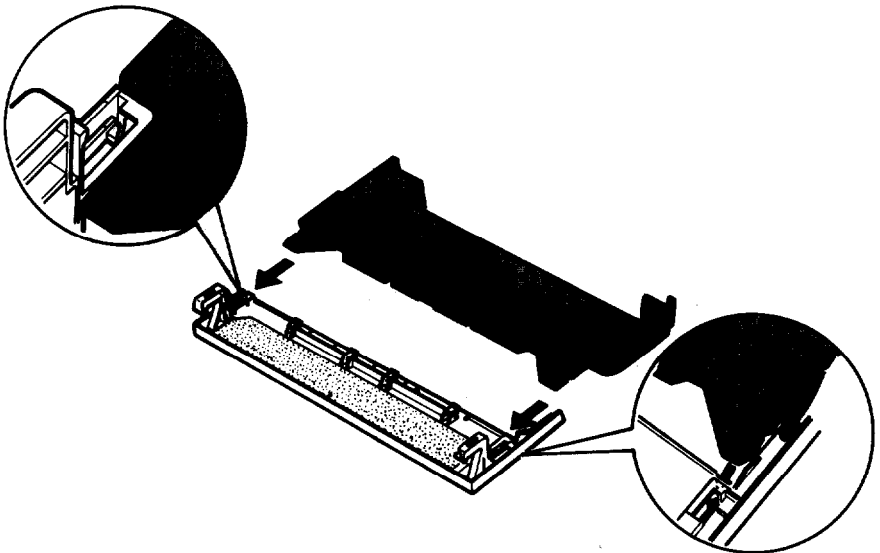


CAUTION: Make sure that the sprocket frames of the two tractor units are properly aligned.

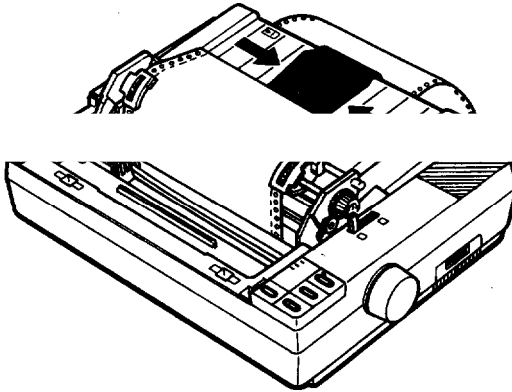
- 9. Separate the two halves of the printer cover by pressing on the tabs and sliding the clear plastic half of the printer cover off.**



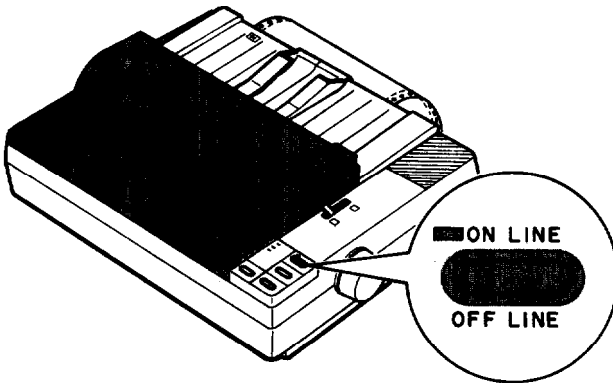
- 10. Attach the tractor cover to the front half of the printer cover.**



- 11. Install the paper guide; then slide the edge guides together so that they meet at about the center of the paper's width.**



- 12. Install the pull tractor cover as shown below and press the ON LINE button to set the printer on line.**

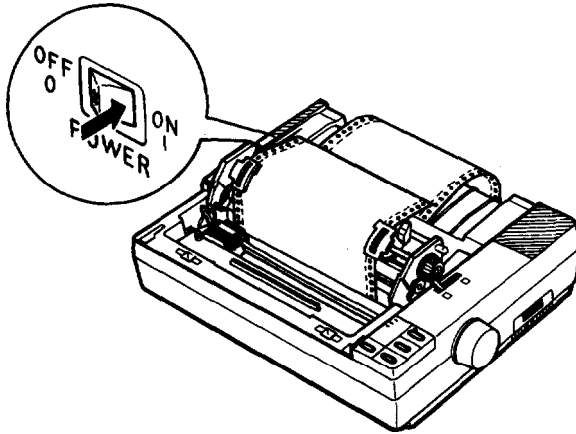


While the pull tractor can be used in combination with the built-in push tractor as described above, the pull tractor can also be used by itself. Instead of setting the paper on the pins of the push tractor, simply insert it through the same paper path as you would use with single-sheet paper.

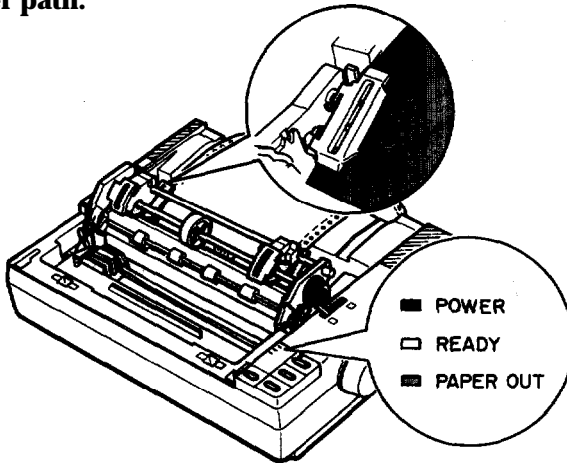
Note: Do not use the short tear-off feature with the pull tractor.

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.

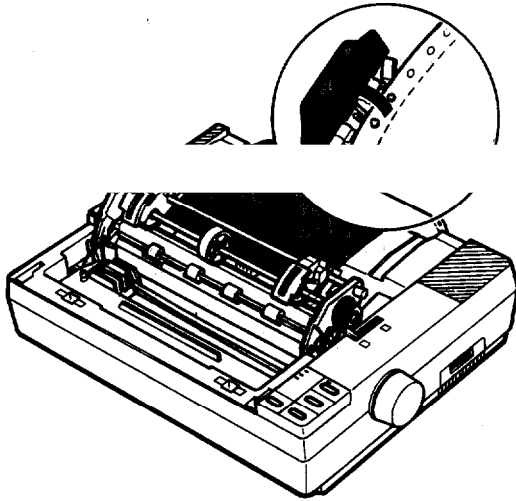


2. Press the ON LINE button to set the printer off line. Then, press the LOAD/EJECT button until the continuous paper feeds backward out of the paper path to the standby position. The PAPER OUT light comes on when the paper is completely out of the paper path.

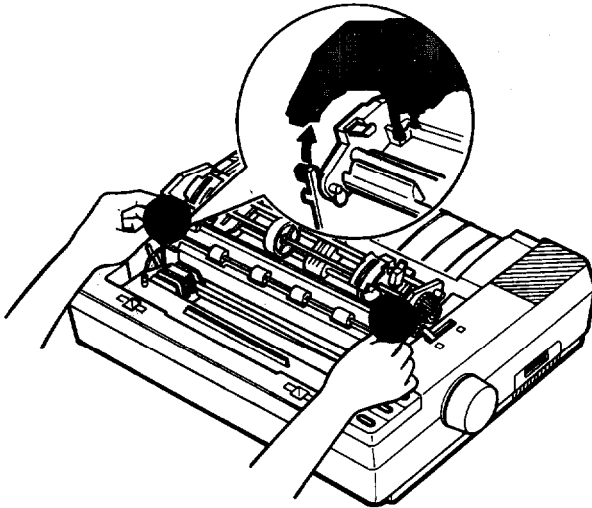


WARNING: Never feed labels backward through the printer

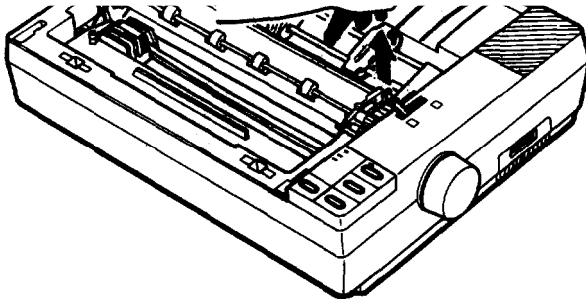
3. **Remove the continuous paper from the push tractor unit.**



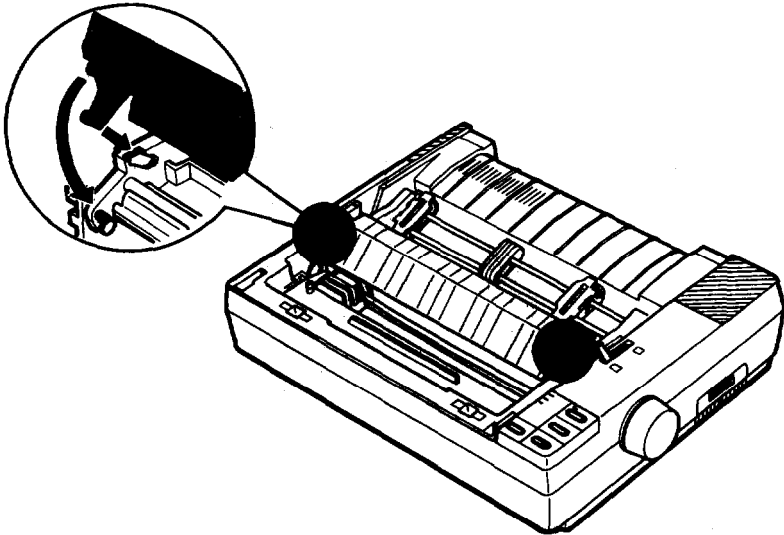
4. **Hold both ends of the tractor unit and slowly tilt the unit back until the front latches of the unit snap free from the front mounting pins.**



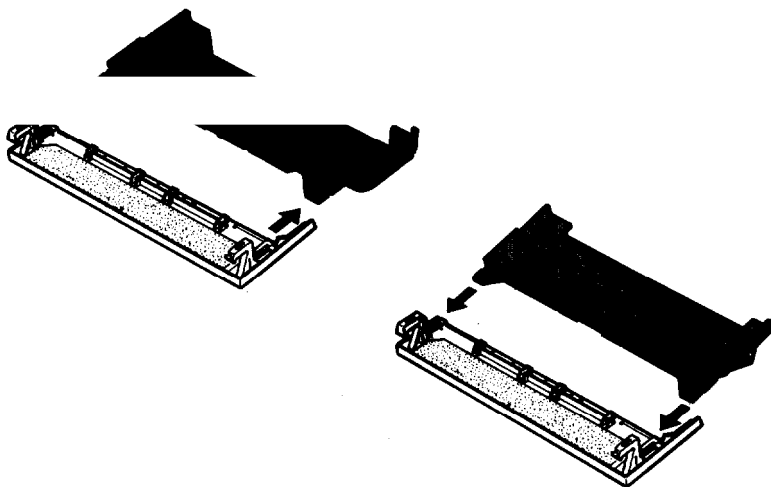
- 5. Lift the tractor unit up and off.**



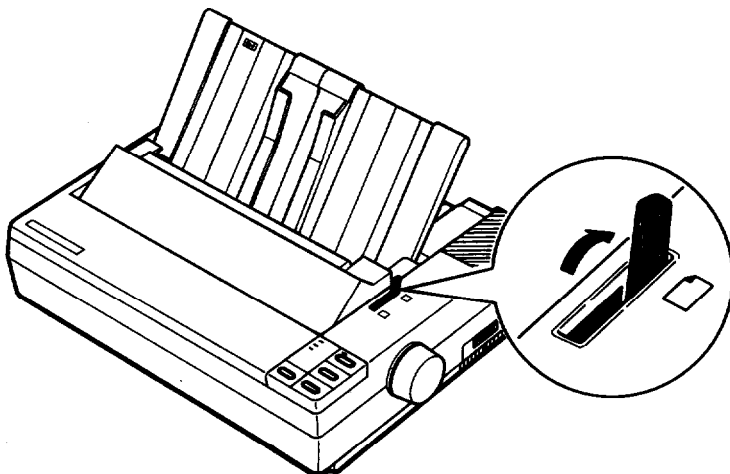
- 6. Replace the paper tension unit cover as shown below.**



7. **Separate the tractor cover from the printer cover and attach the back half of the printer cover.**



8. **Install the paper guide and printer cover. Then, push the paper release lever to the rear.**

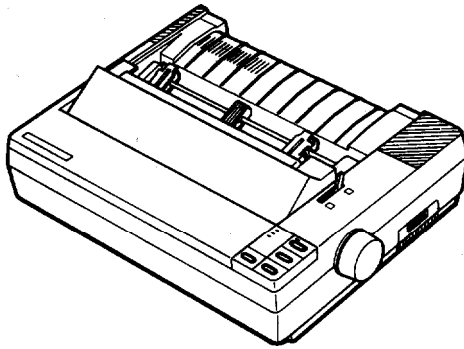


Roll Paper Holder

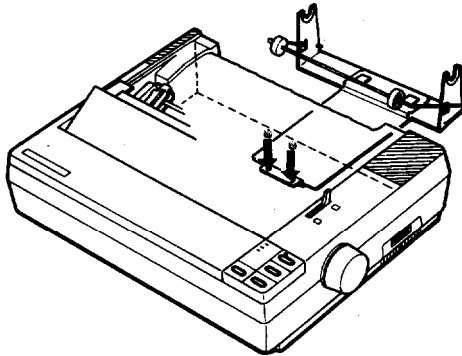
The optional roll paper holder (#8310) allows you to use your printer with 8.5-inch roll paper like that used with telex machines. This provides an inexpensive alternative to continuous paper for applications requiring variable paper lengths.

Installing the roll paper holder

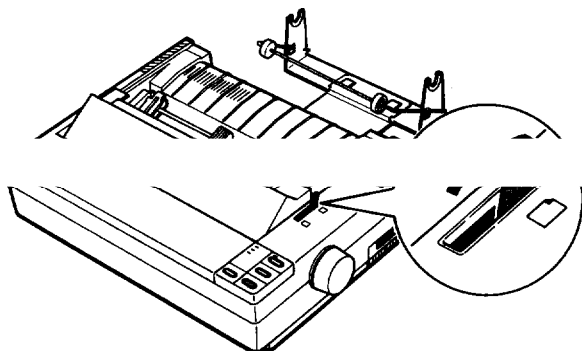
1. Make sure that the printer is turned off, then remove the paper guide.



2. Position the roll paper holder underneath the printer as shown below. The holes in the base should fit onto the two corresponding positioning pegs on the bottom of the printer.



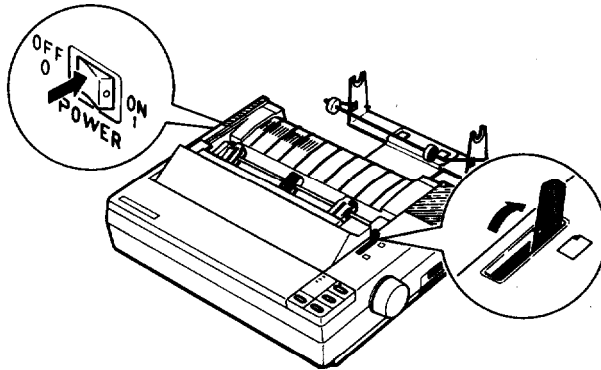
3. Push the paper release lever back to the single sheet position.



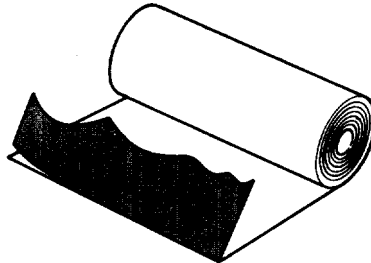
CAUTION: During use, the roll paper holder is held in place by the weight of the printer. The positioning pegs only serve to keep the holder from slipping out of position. If you pick up the printer, be careful to avoid dropping the roll paper holder.

Paper handling

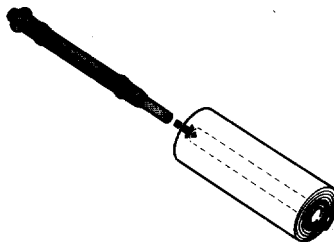
- 1. Make sure that the printer is turned off, and the paper release lever is set to the single sheet position.**



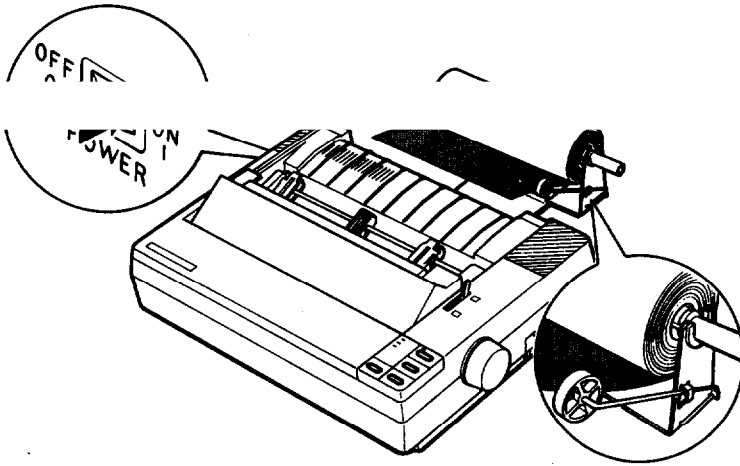
- 2. Cut the loading edge of the roll paper straight across.**



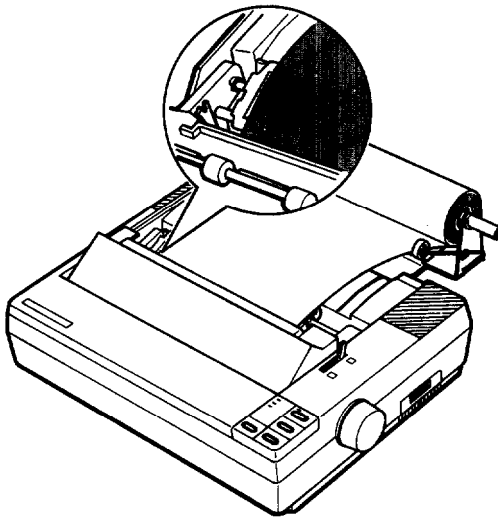
- 3. Insert the roll paper holder shaft into the center of the paper roll as shown.**



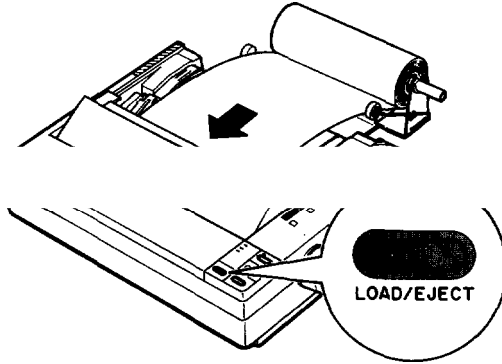
4. Set the shaft and paper roll onto the roll paper holder. The roll should be oriented so that paper feeds from the bottom of the roll. Then turn on the printer.



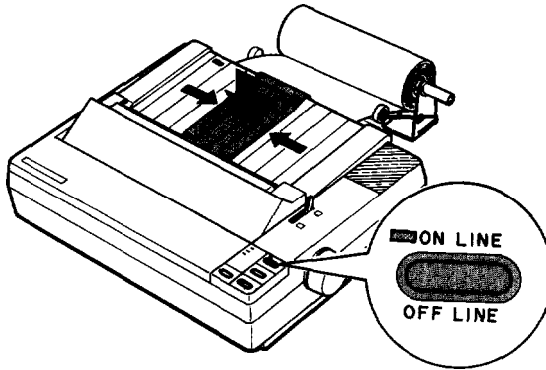
5. Bring the leading edge of the paper up over the paper path guide and insert it into the printer path until you feel resistance.



6. Press the LOAD/EJECT button to load the paper.



7. Install the paper guide and slide the edge guides together so that they meet at about the center of the paper's width. Then press the ON LINE button to set the printer on line.



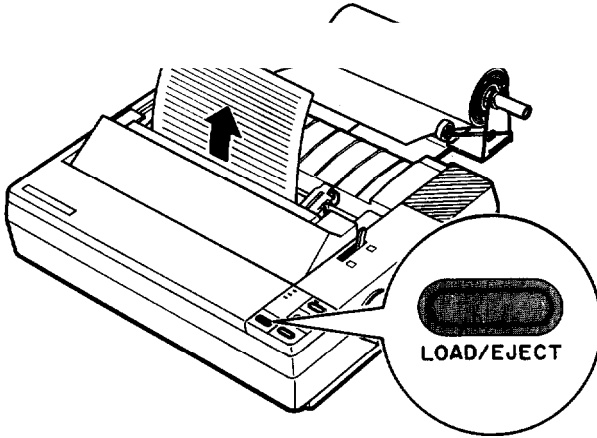
Note: When you finish printing, set the printer off line, press the LINE FEED button to advance the paper by a suitable amount, and then tear off the paper against the tear-off edge of the printer cover.



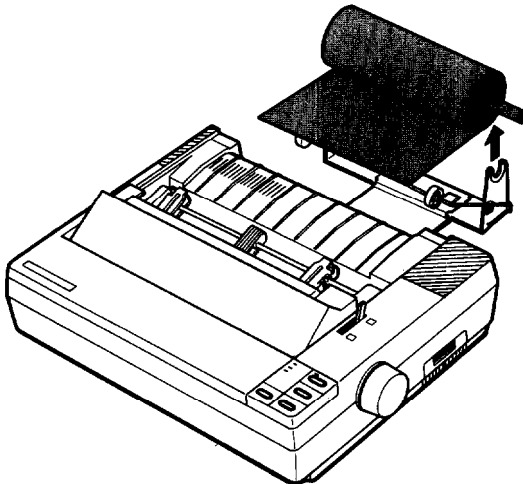
CAUTION: Roll paper cannot be fed backward by pressing the LOAD/EJECT button.

Removing the roll paper holder

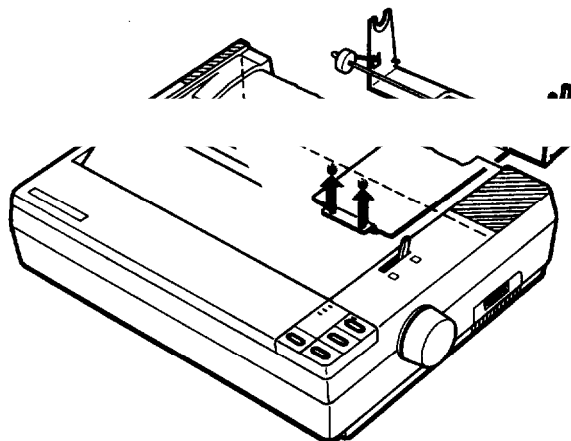
1. Cut across the paper behind the point where it feeds into the printer. Then use the LOAD/EJECT button to eject the remaining paper.



2. Turn off the printer.
3. Remove the paper roll and shaft from the roll paper holder.



- 4. Lift the printer up and separate the roll paper holder from the printer.**



Be sure to store the roll paper holder in its original box and packing materials.

Interface Boards

A number of optional interfaces are available in case your computer is not provided with a parallel interface.

Choosing an interface

Optional interfaces can be divided into two main categories which are briefly described 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.**
- **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 X-ON/X-OFF data communications protocol.**

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 printer. Note that some of these interfaces may not be available in your country or region.

Interface number	Name
#8143	New Serial interface
#8148	Intelligent serial interface
#8165	Intelligent IEEE-488 interface

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

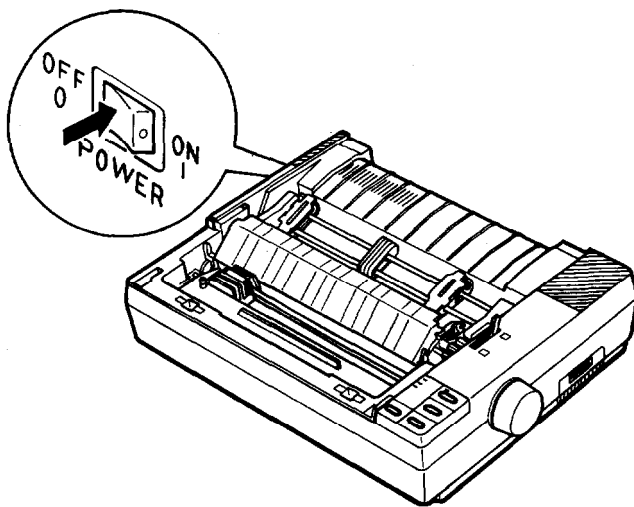
Installing the interface board

Removing the upper case



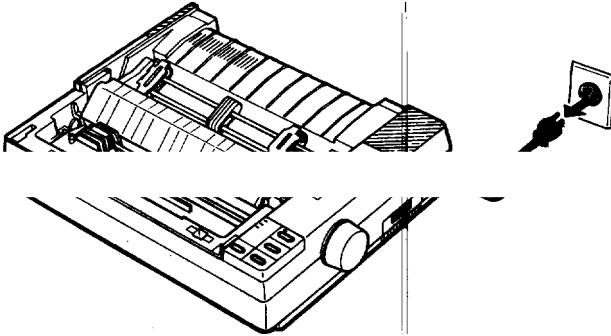
CAUTION: Use caution when removing or attaching the upper case to avoid damaging the printer.

1. Make sure that the printer is turned off, then remove the printer cover and paper guide.



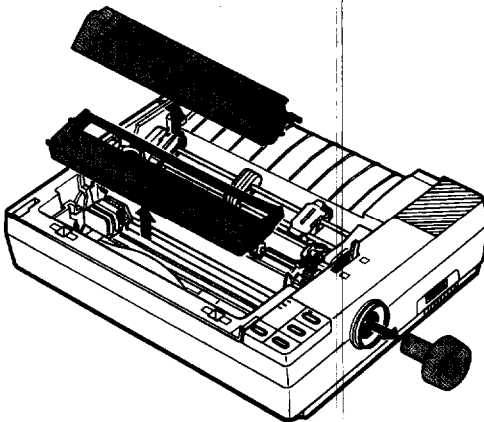
WARNING: Turn the printer off before unplugging the power cable from the AC outlet.

2. Unplug the power cable from the electrical outlet.

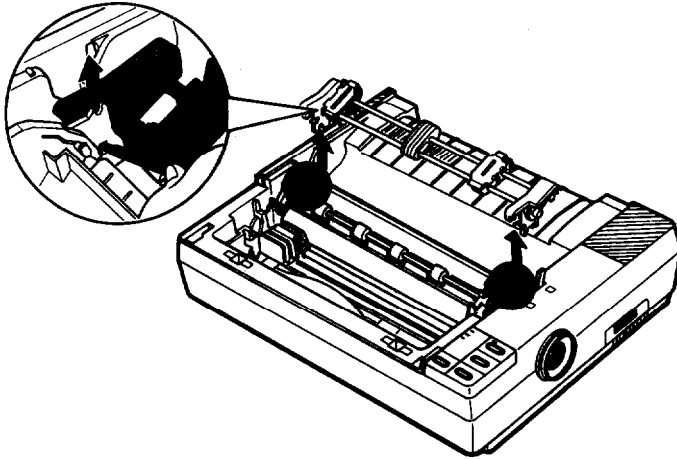


WARNING: High voltages are present inside the printer when the power is on. Do not attempt to remove the upper case unless the printer is turned off and the power cord is unplugged. Also, try not to touch contacts on the circuit board of the printer because many of the components can be destroyed by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

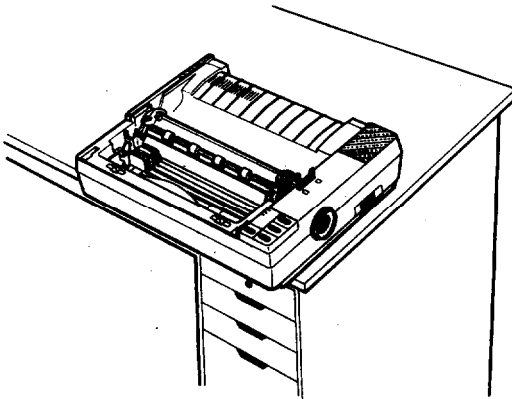
3. Remove the paper tension unit cover, ribbon cartridge, and platen knob.



4. Remove the push feed tractor by pressing the tabs on both sides using a pointed object.

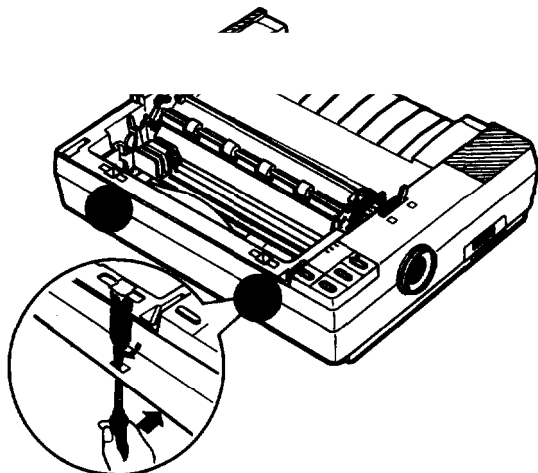


5. To remove the upper case, first position the printer so that its front extends slightly over the edge of a table, allowing access to the openings on the front, underside of the printer.

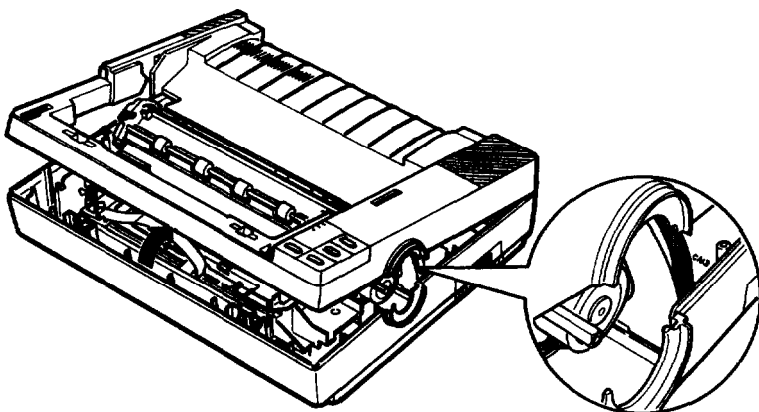


WARNING: Make sure that the printer is not so far forward that it is in danger falling off the table.

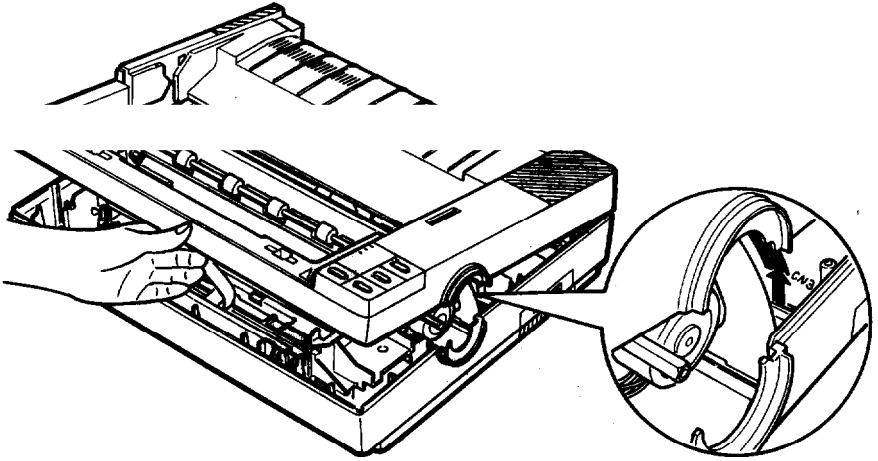
6. **Insert a screwdriver into the openings on the underside of the printer. Push the screwdriver up, press the handle of the screw driver toward the back of the printer to release the clips on the case.**



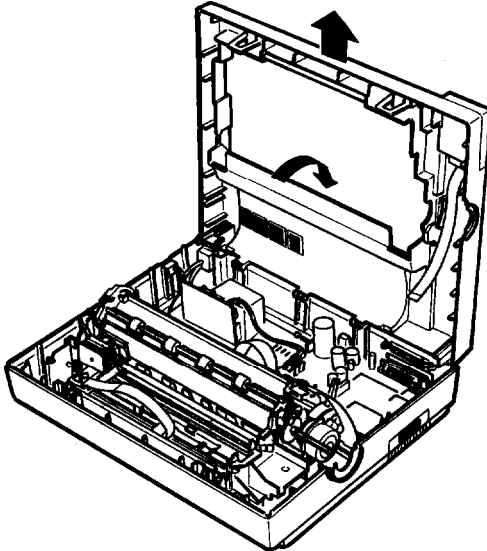
7. **Partially raise the upper case, taking care not to strain the flat cable attached to the control panel.**



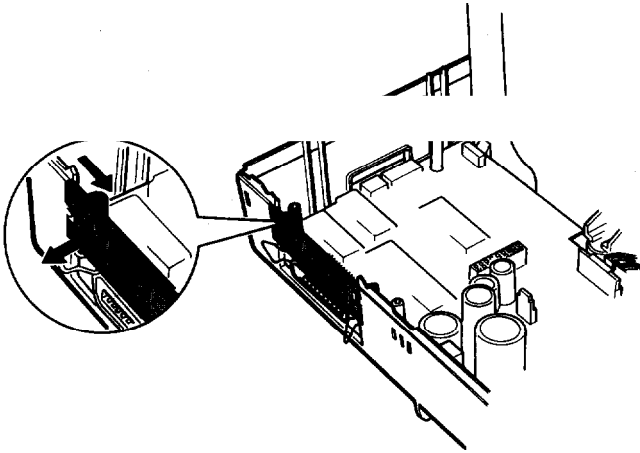
- 8. Carefully disconnect the flat control panel cable from the connector labeled CN3 on the main board.**



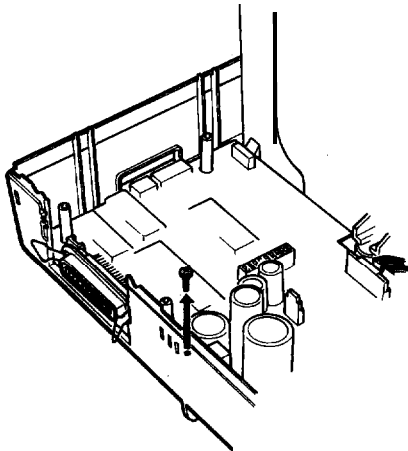
- 9. Tilt the upper case backward and remove it from the printer.**



10. Remove the shield plate by pressing in on the plastic clips located at the back of the plate.

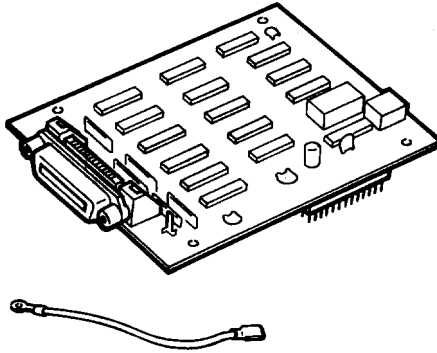


11. Using a cross-head screwdriver, remove the screw labeled CG from the main board.

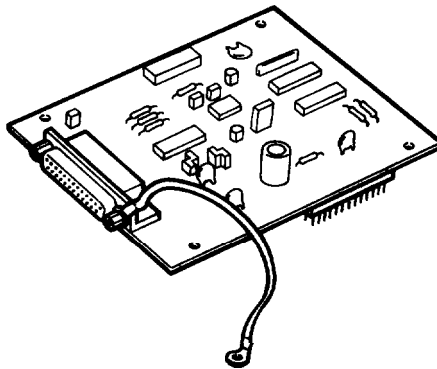


Installing the board

There are two basic interface board designs, which differ with respect to how the frame ground (FG) wire is 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.



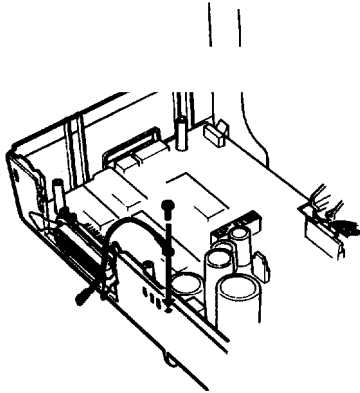
FG wire not attached
See the next page



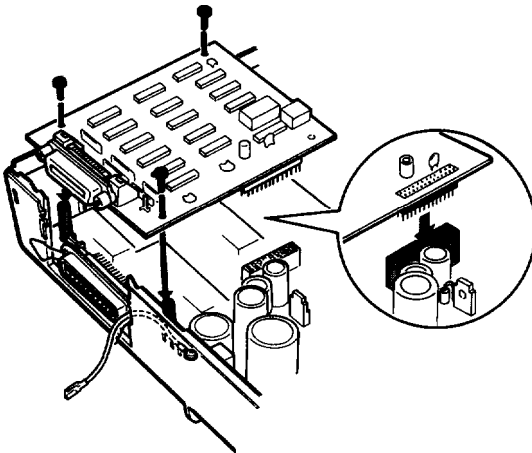
FG wire attached
Skip to page 5-47

FG wire not attached

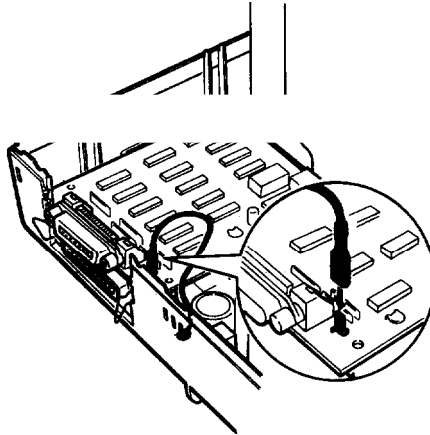
- 1. Use the CG screw to attach the round end of the FG wire to the main board and position the other end as shown.**



- 2. Carefully insert the pins on the optional interface board into the mating connector on the main board; then secure the board with the three screws provided.**



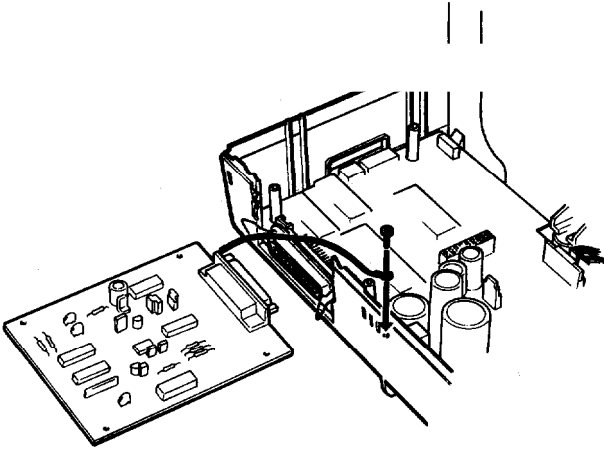
- 3. Attach the plug end of the FG wire onto the FG pin located on top of the interface board.**



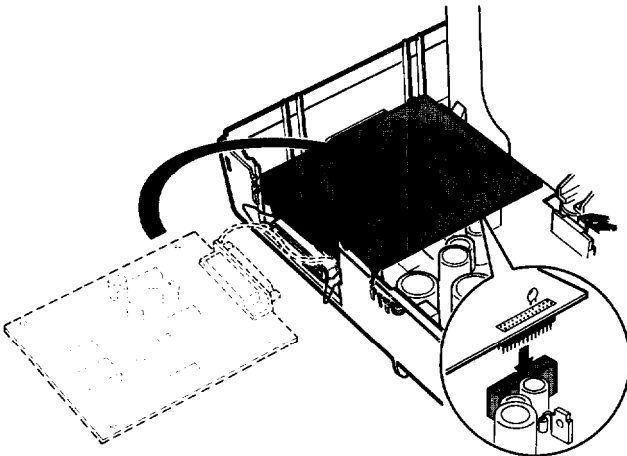
- 4. If you have the #8148 or #8165 interface boards, set the interface DIP switches according to the accompanying manual. If you have the #8143; see page 5-52.**
- 5. Reattach the upper case as described in the section beginning on page 5-49.**

FG wire attached

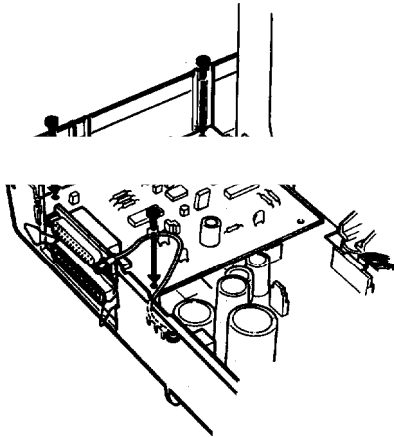
1. **Carefully place the interface board next to the printer as shown below. Use the CG screw to connect the round end of the FG (frame ground) wire to the main board.**



2. **Holding the interface board level, rotate it clockwise into position and attach it to the main board. Make sure that the connector pins are properly inserted into the mating connector.**



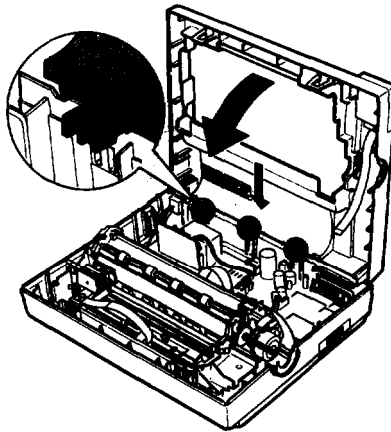
- 3. Secure the board with the three screws provided.**



- 4. If you have the #8148 or #8165 interface board, set the interface DIP switches according to the accompanying manual. If you have the #8143, see page 5-52.**
- 5. Reattach the upper case as described in the following section.**

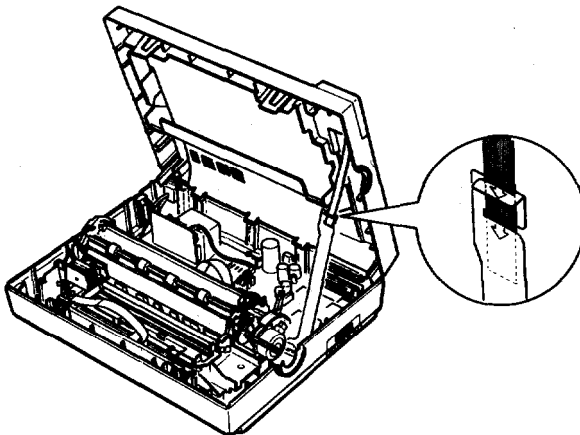
Attaching the upper case

1. Fit the hinges of the upper case into the openings in the lower case; then partially lower the upper case.

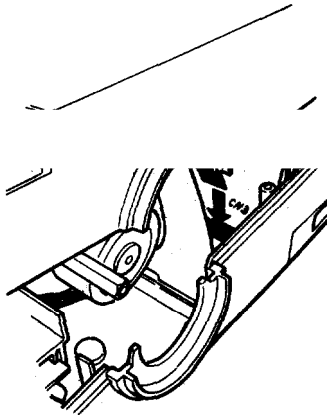


CAUTION: Take care not to pinch the FG wire between the upper and lower cases.

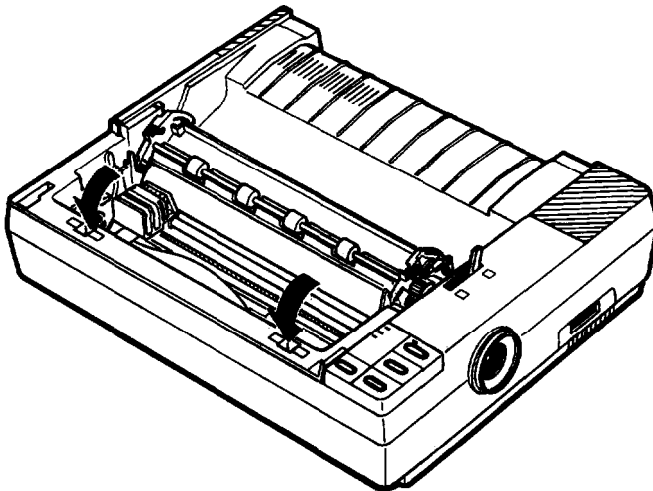
2. Thread the control panel cable through the metal plate as shown below.



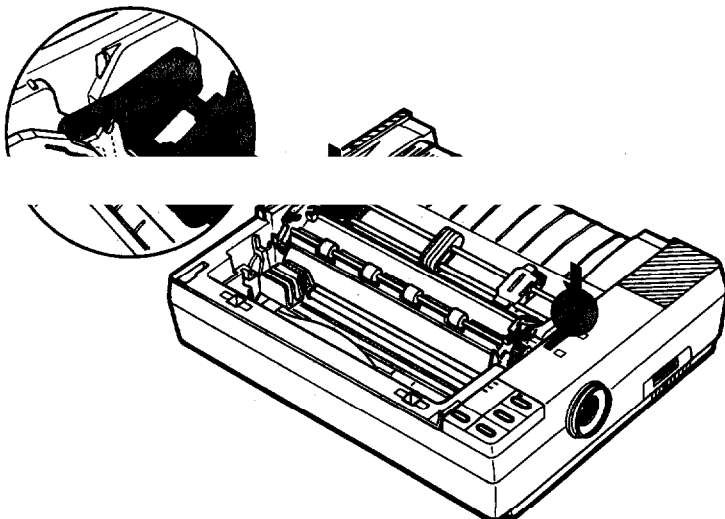
- 3. Carefully insert the control panel cable into the connector labeled CN3 on the main board.**



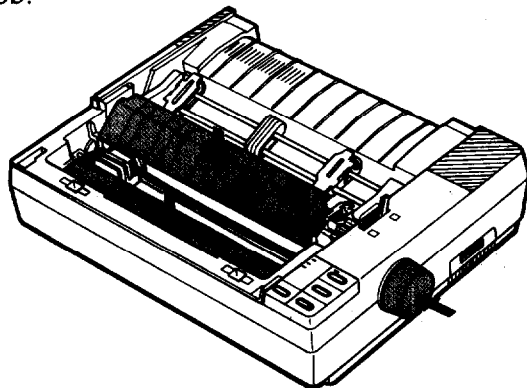
- 4. Close the upper case. Make sure you press down on the front of the case until it locks into place.**



5. Reattach the push feed tractor.



6. Reattach the ribbon cartridge, paper tension unit cover, and platen knob.



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.

7. Reattach the printer cover and paper guide.

#8143 New Serial Interface board

If you are using an optional interface, it may be necessary for you to alter the communications 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 with the printer, make sure that you read through the sections below on baud rate selection and handshaking timing.

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 9600 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).

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.

Once the vacant area for data in the buffer recovers to 528 bytes, the printer outputs an X-ON code or sets the DTR flag to "0" (SPACE) indicating that it is ready to receive data.

Chapter 6

Maintenance

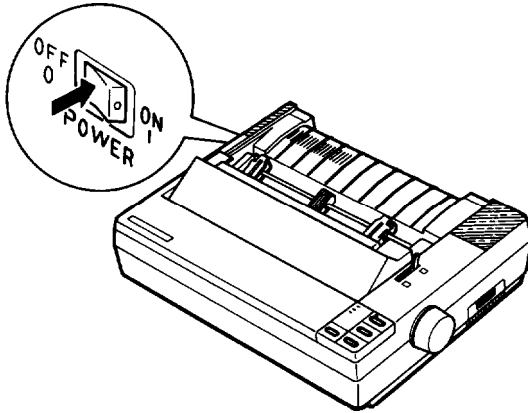
Cleaning the Printer	6-2
Replacing the Ribbon	6-4
Transporting the Printer	6-9



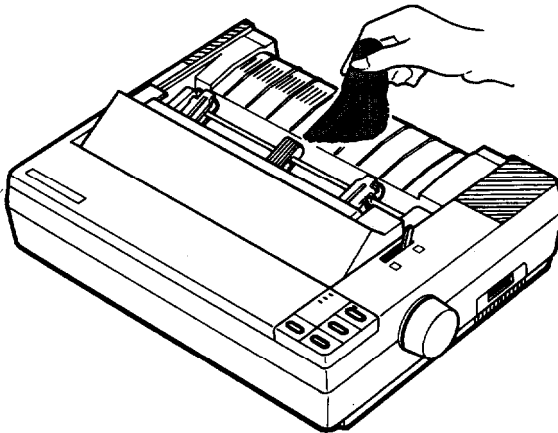
Cleaning the Printer

To keep your printer operating at its best, you should clean it thoroughly several times a year as follows:

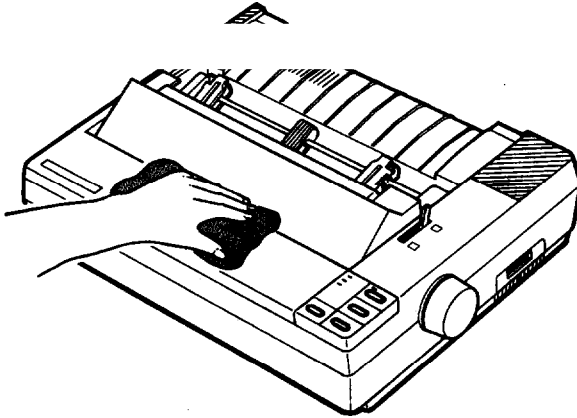
1. Make sure that the printer is turned off, then remove the paper guide or, if it is installed, the cut sheet feeder.



2. Use a soft brush to 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.



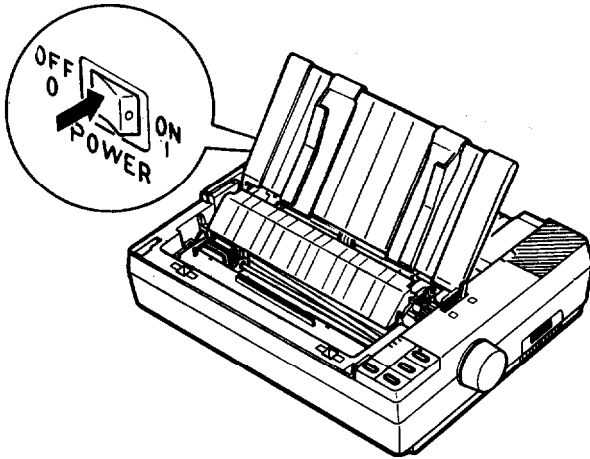
WARNINGS:

- 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 the printer mechanism or electronic components wet.
- 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.

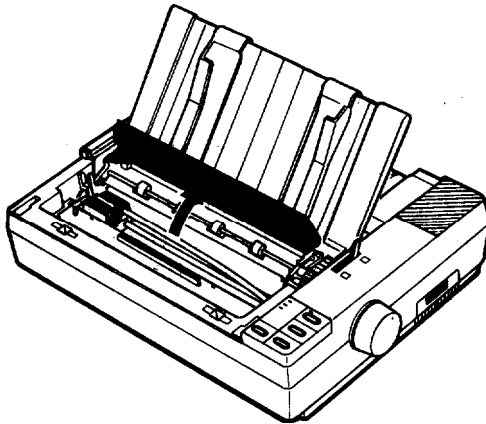
Replacing the Ribbon

Replace the ribbon when the printout becomes too faint to read. Use only the #8750 standard ribbon cartridge for your printer.

1. Make sure that the printer is turned off, then remove the printer cover.



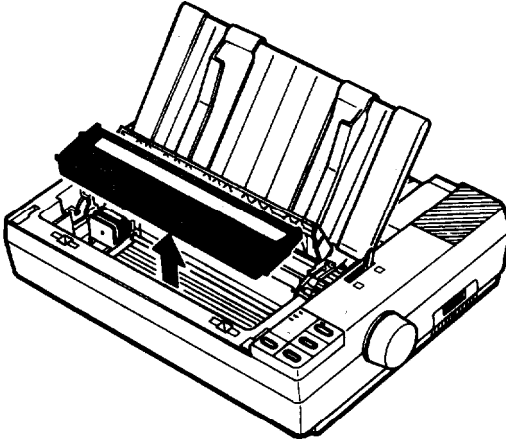
2. Open the paper tension unit cover.



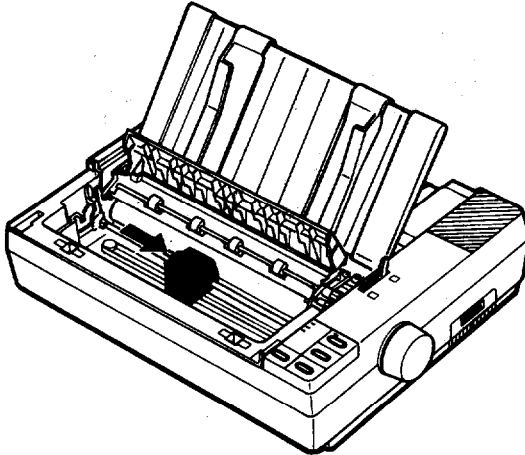


WARNING: If the printer has just been used, the print head may be hot. Let it cool before attempting to replace the ribbon.

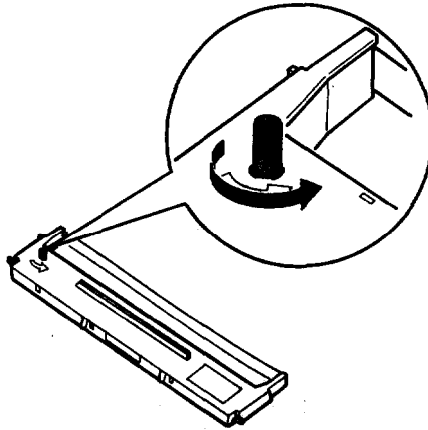
- 3. To remove the ribbon cartridge, grip it by the black plastic tab and lift the cartridge straight up and out of the printer.**



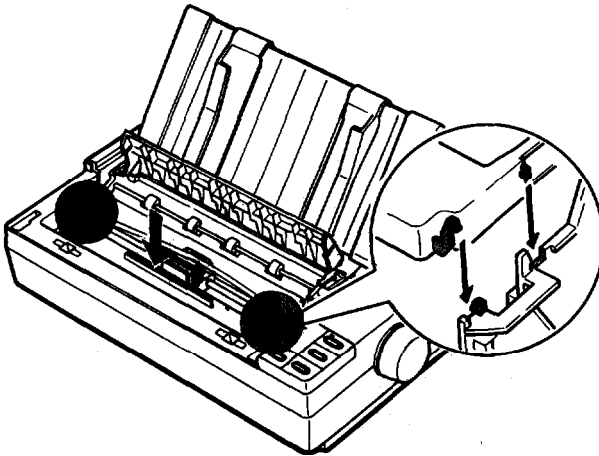
- 4. Slide the print head to the middle of the printer.**



- 5. To remove excess slack in the new ribbon, turn the ribbon-tightening knob in the direction of the arrow.**

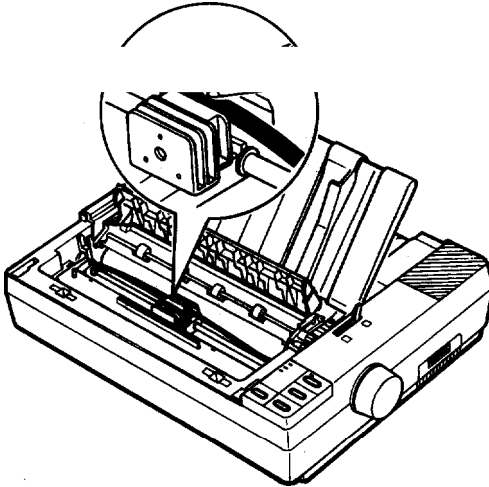


- 6. Push the new ribbon cartridge firmly into position, making sure the plastic hooks fit into the slots, as shown below.**

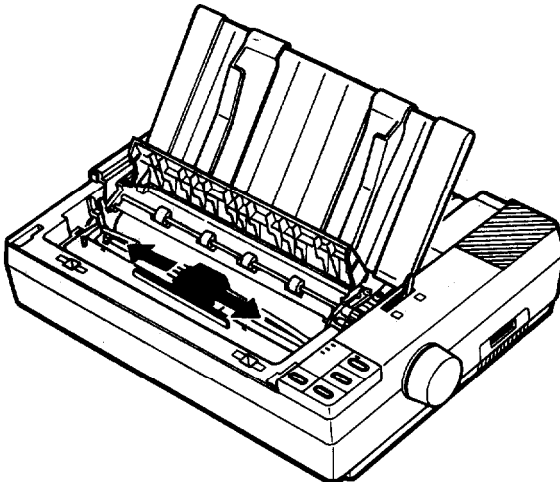


Note: Press lightly on both sides of the cartridge to make sure the hooks are properly inserted.

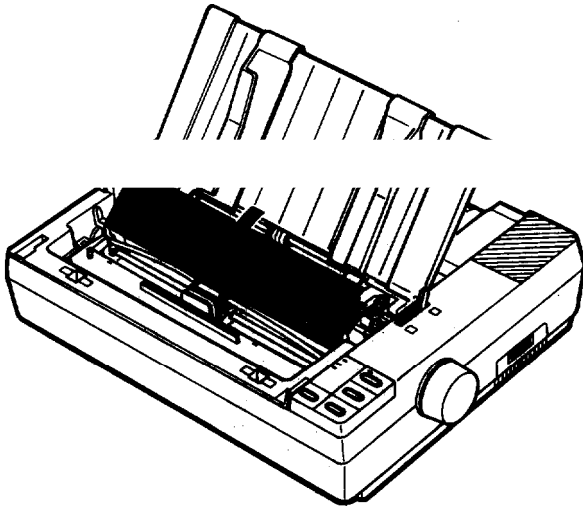
7. Use a pointed object, such as a ball-point pen, to guide the ribbon into place between the print head and ribbon guide while you turn the ribbon-tightening knob. Be careful not to puncture the ribbon.



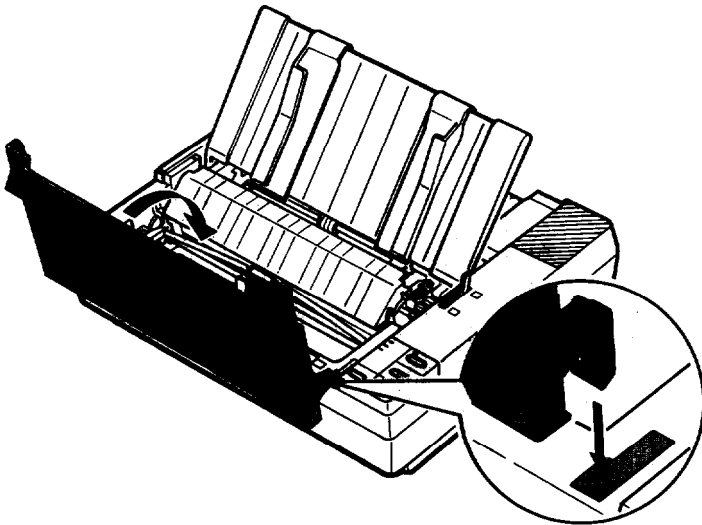
8. Slide the print head from side to side to make sure that it moves smoothly. Also make sure the ribbon is not twisted or creased.



9. Close the paper tension unit cover.



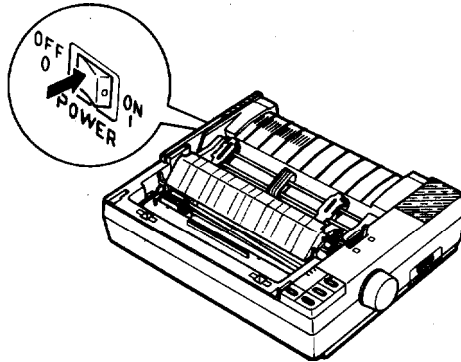
10. Insert the hooks of the printer cover into the printer, then tilt the printer cover back into place.



Transporting the Printer

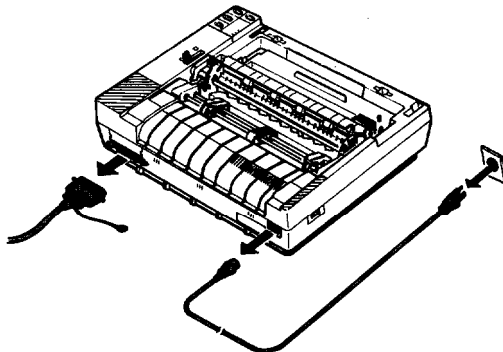
Before you transport your printer some distance, carefully repack it in the original box and packing materials according to the following instructions.

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

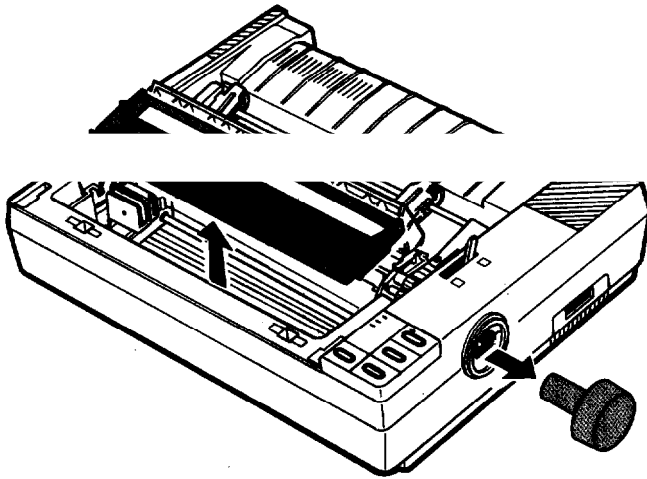


WARNING: Turn the printer off before unplugging the power cable from the AC outlet.

2. Unplug the power cable from the electrical outlet and from the back of the printer. 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. Reattach the printer cover. Then, replace the packing materials and put the printer in its box.**

Chapter 7

Troubleshooting

Problems and Solutions.....	7-2
Power Supply..	7-3
Printing.....	7-4
Paper Handling..	7-14
Options.	7-22



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 refer to the appropriate page for the solution.

Power supply

- Power is not being supplied. Refer to 7-3

Printing

- The printer does not print. Refer to 7-4
- The print is faint or uneven. Refer to 7-5
- Dots are missing in the printed characters or graphics. Refer to 7-6
- Printed characters are not what you expected. Refer to 7-6
- The print position is not what you expected. Refer to 7-9

Paper handling

- Single sheets do not feed properly. Refer to 7-14
- Continuous paper does not feed properly. Refer to 7-16
- Switching between continuous paper and single sheets cannot be performed properly. Refer to 7-20

Options

- Using the cut sheet feeder, paper does not feed properly. Refer to 7-22
- Using the pull tractor with the push tractor, continuous paper does not feed properly. Refer to 7-26
- Using the roll paper holder, paper does not feed properly. Refer to 7-29
- Using an optional interface, the printer does not operate properly. Refer to 7-31

Power Supply

Problem

Solution

Power is not being supplied.

The POWER light does not go on.

The POWER light comes on briefly and then goes off. The light stays off even when the power is switched on again.

The power cable may be loose or not properly plugged into the electrical outlet. Turn off the printer and check the power cable connections between the printer and the electrical outlet.

The power switch is off. Turn on the switch.

Power is not being supplied to the electrical outlet. Check to see if the electrical outlet is controlled by an outside switch or automatic timer; if so, use a different outlet. Plug another electrical device into the outlet to determine whether the outlet is working properly.

The voltage may not be correct for your printer. Check the label on the printer's rear panel and confirm that the printer's voltage rating matches the voltage of your electrical outlet. If the voltages do not match, unplug the printer and contact your Epson dealer immediately. Do not reconnect the power cable to an electrical outlet. Refer to 1-15.

The problem may lie with the electrical outlet. Plug another electrical device into the outlet to determine whether the outlet is operating properly.

Printing

Problem

Solution

The printer does not print.

The ON LINE light is on but nothing is printed.

The ON LINE light is off.

The PAPER OUT light is on.

The software may not be installed properly for your printer. Check the printer settings and make the necessary changes. Refer to 1-29.

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. Refer to 1-26.

You may not be using the correct interface cable. Make sure your interface cable meets the printer and the computer specifications.

The printer may be off line and cannot receive data. Press the ON LINE button. The ON LINE light should go on. Refer to 3-3.

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. Refer to 2-4.

The printer may be out of paper. Load more paper into the printer. Refer to 2-2.

Problem**Solution**

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. Refer to 1-8.

The printer makes a strange noise, the buzzer sounds several times, and the printer stops abruptly.

The ribbon may be worn. Replace the ribbon cartridge. Refer to 6-4.

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 print is faint or uneven.

Printed characters have parts missing at the bottom as shown here.

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. Refer to 1-8.

ABCD

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 as soon as possible. Refer to 6-4.

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. Refer to 2-22.

Problem

Solution

Dots are missing in the printed characters or graphics.

A line of dots is missing in the printout.

A B C D

Dots are missing in random positions.

A B C D

Printed characters are not what you expected.

The typestyle or characters that are set by the software cannot be printed.

The print head is damaged. Stop printing and contact your Epson dealer to have the print head replaced.

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. Refer to 1-8.

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.

Problem

The Roman, Sans Serif or draft font is selected in your software, but the characters are printed in a different font.

Italic characters are printed instead of the selected graphic "line" characters.

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

Solution

The wrong font is selected. If your program accepts control codes, set the codes to the values below to select the fonts:

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

Refer to 3-19, 9-22.

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 1. Refer to 9-31.

You can also select the graphics character table by changing a DIP switch setting. To do this, turn off the power, set DIP switch 1-3 to ON, then turn on the power. Refer to 3-25.

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. Refer to 9-31.

You can also select the italic character table by changing a DIP switch setting. To do this, turn off the power, set DIP switch 1-3 to OFF, then turn on the power. Refer to 3-25.

Problem

Solution

Printed characters are not what you expected (continued).

The wrong international characters are being printed.

The characters printed are smaller than expected.

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. Refer to 9-31.

You can also select the international character set by changing the DIP switch setting. To do this, turn off the power and set DIP switches 1-6, 1-7 and 1-8 to the correct positions for the character set you want. Refer to 3-23.

The condensed mode may be set. Set the printer on line and press the CONDENSED button once or twice to cancel the mode. The beeper sounds twice to indicate that the condensed mode is canceled. Refer to 3-19.

If your application program is capable of sending control codes, you can cancel the condensed mode by sending the DC2 code to the printer. Refer to 9-24.

Problem**Solution**

The font 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. Make sure that the printing commands used in the software are correct, then try printing again.

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. Refer to 3-12. If the problem persists, check the top margin set by your application software and adjust it.

Line spacing is incorrect.

Line spacing is too tight or too far apart. If your application program is capable of sending control codes, specify the line spacing using ESC 0, ESC 1, ESC 2, ESC 3 or ESC A. Refer to 9-15, 9-16.

Problem

Solution

The printed position is not what you expected (continued).

One line of printing has taken up two lines.

All the text is printed on the same line.

The text is printed with an extra blank line in between.

The margins may not be set correctly. If your application program is capable of sending control codes, set the left and right margins using ESC 1 or ESC Q. Refer to 9-19.

In BASIC, enter either of the following statements:

WIDTH LPRINT 255

or

WIDTH "LPT1:", 255

If the printer still does not print properly, set the right margin to the maximum setting using ESC Q.

A line feed signal is not being sent at the end of each line. Set DIP switch 2-4 to ON so that the printer automatically adds a line feed code to each carriage return. Refer to 3-8.

Two line feed signals are being sent. Set DIP switch 2-4 to OFF.

Problem**Solution**

The number of lines printed does not match the length of the paper.

The page length may be set incorrectly. Change the page length setting with DIP switch 2-1. Refer to 3-9. If your program allows you to send control codes to the printer, specify page size by sending ESC C or ESC C 0. If this does not resolve the problem, 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. Refer to 5-9.

Regular gaps occur in the printout.

One inch skip over perforation may be set. Set DIP switch 2-3 to OFF. If your program allows you to use control codes, use ESC 0 to cancel skip over perforation. Refer to 3-10.

Skip over perforation is set, but the perforation does not fall in the center of the skip.

The page length for continuous paper may be set incorrectly. Make sure the setting of DIP switch 2-1 matches your paper length. Refer to 3-9. If your program allows you to use control codes, you can also use ESC C or ESC C 0 command to set the page length. Refer to 9-13.

Problem

Solution

The printed position is not what you expected (continued).

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. Refer to 3-12.

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. Refer to 3-10.

Vertical printed lines do not align.

The printer may be set for bidirectional printing. This can cause a slight misalignment of graphics characters. When precise printing of vertical lines is necessary, select the unidirectional print mode by sending ESC U or ESC < to the printer. Refer to 9-9, 9-10. Unidirectional printing is somewhat slower.

Note: You can also use the data dump mode to find the cause of communication problems between the printer and your application programs. In data dump mode, an exact printout of the codes reaching the printer is produced. See the section on the 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, pull tractor, or roll paper holder, refer to the section on Options starting on 7-22.

Problem	Solution
<p data-bbox="83 409 387 474">Single sheets do not feed properly.</p> <p data-bbox="83 514 387 713"><i>When the LOAD/EJECT button is pressed, the platen does not rotate and paper does not feed.</i></p> <p data-bbox="83 948 387 1114"><i>When the LOAD/EJECT button is pressed, the platen rotates but paper does not feed.</i></p>	<p data-bbox="401 514 967 745">You may be trying to feed paper 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. Refer to 3-3.</p> <p data-bbox="401 771 967 905">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.</p> <p data-bbox="401 948 967 1082">The paper release lever may be pulled forward to the continuous paper position. Push the paper release lever back to the single sheet position. Refer to 2-2.</p> <p data-bbox="401 1102 967 1268">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. Refer to 2-4.</p>

Problem

The paper feed is crooked or the paper jams.

The paper does not fully eject.

Solution

The paper may not be inserted firmly enough: When feeding thicker than normal paper, such as envelopes, press down lightly on the top of the envelope while pressing the LOAD/EJECT button.

The cut sheet feeder mode may be turned on (DIP switch 2-2 is on). When the cut sheet feeder is not in use, DIP switch 2-2 should always be off. Refer to 3-7.

The edge guides may be too far apart. Adjust the edge guides to the width of the paper. Refer to 2-4.

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. Refer to 2-25, 8-4.

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. Refer to 2-2.

You may be trying to eject the paper using the FORM FEED button. The paper may not be fully ejected if you use 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.

When the LOAD/EJECT button is pressed, the platen rotates but paper does not feed.

The paper feed is crooked or the paper jams.

You may be trying to feed paper 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. Refer to 3-3.

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. Refer to 2-8.

Continuous paper may have 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.

The paper supply may be obstructed by a cable or some other object. Make sure that the paper feeds smoothly into the printer. Refer to 2-7.

Your supply of continuous paper may be too far from the printer. Position your paper supply within 3 feet (1 meter) of the printer.

Problem

Solution

The position of your paper supply may be preventing it from feeding straight. Refer to 2-7.

The paper may be caught on the edge guides. When using continuous paper, make sure that the paper guide is installed over the paper and that the edge guides are positioned at the center of the paper's width. Refer to 2-13.

The holes on the sides of the paper may not be aligned with each other. Reposition the paper on the tractor pins. Refer to 2-11.

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. Refer to 2-12.

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. Refer to 2-12.

The paper thickness lever may be in the wrong position. For printing on ordinary paper, always set the lever to position 2. Refer to 2-22.

Problem

Solution

Continuous paper does not feed properly (continued).

The paper dimensions may exceed the specified limits. Use only paper sizes that are within the specified range. Your printer can print on continuous multi-part forms consisting of 1 original and 2 copies. Refer to 2-25, 8-4.

Regular gaps occur in the printout.

Skip over perforation may be interfering with your application program settings. Set DIP switch 2-3 to OFF. If your program allows you to use control codes, you can instead use ESC 0 to cancel skip over perforation. Refer to 3-10, 9-14.

Skip over perforation does not function.

You may not have turned off the power after setting DIP switch 2-3 to ON. To make new DIP switch settings effective, turn the power off, then on again. Refer to 3-6.

Skip over perforation is set, but the perforation does not fall in the center of the skip.

The page length for one page of continuous paper may be set incorrectly. Set DIP switch 2-1 or use control codes ESC C or ESC C 0 to set the page length correctly.

Problem**Solution**

The loading position of the paper shifts slightly while printing several pages.

After printing stops, the paper automatically feeds forward.

The short tear-off function is selected (DIP switch 1-4 to OFF) but it does not work.

The loading position of the paper may be too high or too low. Use the micro-adjustment feature to reset the loading position.

The paper you are trying to feed may be too heavy for the built-in push tractor. When highly accurate paper feeding is necessary, such as when printing carbon copies, use the optional pull tractor.

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 1-4 to ON. Refer to 3-15.

You may not have turned off the power after changing the DIP switch setting. To make new DIP switch settings effective, turn the power off, then on again. Refer to 3-6.

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 unrelated codes from being sent to the printer. Refer to 3-15, 9-13.

Problem

Solution

Continuous paper does not feed properly (continued).

When the LOAD/EJECT button is pressed to eject the paper, the paper does not fully eject or it jams.

Switching between continuous paper and single sheets cannot be performed properly.

When the LOAD/EJECT button is pressed to load a single sheet from the paper guide, the platen rotates in reverse, the single sheet does not load, and the continuous paper comes off the sprockets.

You may have tried to reverse-feed too many pages. Before ejecting the paper, always tear off the last printed page. Refer to 2-15.

You may be trying to eject labels. Labels jam when they are fed backward, so always use the FORM FEED button to eject labels. Refer to 2-26.

Push the paper release lever back to the single sheet position, reattach the continuous paper, then press the LOAD/EJECT button.

Problem

Even with the paper release lever set correctly to the single sheet position, the single sheet and continuous paper feed together and jam.

When the LOAD/EJECT button is pressed to load continuous paper, the platen does not rotate and paper is not loaded.

The paper release lever is correctly switched to the continuous paper position, but when the LOAD/EJECT button is pressed, the platen rotates backward and the paper comes off the sprockets.

When the paper release lever position is changed, the printer beeps continuously.

Solution

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. Refer to 2-15.

The paper release lever may not be in the proper position. Pull the lever forward to the continuous paper position. Refer to 2-20.

A single sheet may be in the paper guide, causing the continuous paper to come off the sprockets. When using continuous paper, always make sure to remove any single sheets remaining in the paper guide, and make sure that the paper guide is in the lowered position. Refer to 2-20.

You may have changed the paper release lever position with paper in the paper path. Remove the paper from the paper path or return the paper release lever to the previous position. Refer to 2-17, 2-20.

Options

Problem

Solution

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

When the LOAD/EJECT button is pressed, the platen does not rotate and paper does not feed.

After a print command is sent from the computer, the platen does not rotate and the paper does not feed.

When a print command is sent from the computer, the platen rotates but paper does not feed.

You may be trying to feed paper while the printer is on line. Always put the printer off line before feeding paper. Paper feeds automatically when the cut sheet feeder receives a print command from the computer (only while the printer is on line). Refer to 5-12.

The printer may be off line. Press the ON LINE button to put the printer on line. Refer to 3-3.

The cut sheet feeder (CSF) mode may be off. Set DIP switch 2-2 to ON. If your program allows you to use control codes, use ESC EM4 to set the CSF mode. Refer to 5-5, 9-11.

DIP switch 2-2 may be set to OFF. DIP switch 2-2 must be set to ON in order to use the cut sheet feeder. Refer to 3-7, 5-5.

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. Refer to 5-2.

Problem**Solution**

The cut sheet feeder may be out of paper. Load more paper in the cut sheet feeder's bin. Refer to 5-7.

The paper release lever may be forward to the continuous paper position. Push the lever back to the single sheet position. Refer to 5-3.

The paper set levers may be pulled forward. After loading a stack of paper into the cut sheet feeder, push the paper set levers backward. Refer to 5-8.

The left and right paper guides may be too close together, preventing smooth paper feeding. Adjust the position of the paper guides so that the paper can move up and down freely. Refer to 5-8.

Paper may be jammed near the print head. Remove the jammed paper (temporarily remove the cut sheet feeder if necessary).

You may have loaded too many sheets in the cut sheet feeder's bin. Remove some of the sheets. Refer to 8-13.

There may be only one sheet left in the bin. (The last sheet in the bin usually does not feed.) Add more paper. Refer to 5-7.

Problem

Solution

Using the cut sheet feeder (continued).

Two or more sheets feed at the same time.

You may have loaded too many sheets in the cut sheet feeder's bin. Remove some of the sheets. Refer to 8-13.

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. Refer to 5-7.

The paper feed is crooked.

The paper may be old or creased. Use only 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. Refer to 5-8.

There may be too much paper in the stacker. Never let more than 80 sheets of paper accumulate in the stacker. Refer to 8-13.

The weight of your paper may be too heavy or too light for the cut sheet feeder. Refer to the specifications on page 8-14 and make sure that your paper is the proper size and quality.

Problem

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

One page of printing has spread to two pages.

Solution

The single sheet may have been inserted in the wrong place. Check the position of the paper and try again. Refer to 5-14.

Your document may be more than one page long. If so, the first page can be fed manually, but subsequent pages will feed from the cut sheet feeder bin. If you need to print more than one page using manual feeding, pull the paper set lever forward.

The page length setting may be wrong. Run a self test in CSF mode. The printer will automatically measure the paper loaded and set the correct page length. Refer to 5-9.

Problem

Solution

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

When the FORM FEED or LINE FEED button is pressed, platen does not rotate and paper does not feed.

Paper feed is crooked or the paper jams.

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

Something may be obstructing the paper feed. Make sure that the paper can feed smoothly into the printer.

The supply of paper may be too far from the printer. Position the paper supply so that it is no more than 3 feet (1 meter) from the printer.

The paper may be caught on the edge guides. When using continuous paper, make sure that the paper guide is lowered over the paper and that the edge guides are positioned at the center of the paper's width. Refer to 5-25.

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**

Several lines of space occur in the printout.

Skip over perforation is set, but does not work.

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 paper may have too much 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 feed knob on the right. Refer to 5-23.

The paper thickness lever may not be set correctly. Set the paper thickness lever to match the thickness of your paper. Refer to 2-22.

The paper may not meet the specifications. Check that your paper is of the proper size, weight, and thickness. Refer to 8-3.

Skip over perforation may be set. Set DIP switch 2-3 to OFF.

You may have changed the DIP switches with the power on. To make new DIP switch settings effective, turn the power off, then on again.

The page length for one page of the continuous paper may be set incorrectly. Set DIP switch 2-1 or use control codes ESC C or ESC C 0 to set the correct page length. Refer to 3-10, or 9-13.

The loading position of the paper may be too high or too low. Use the micro-adjustment feature to reset the loading position. Refer to 3-12.

Problem

Solution

Using the pull tractor with the push tractor (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.

When the LOAD/EJECT button is pressed to eject the paper, the paper 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 1-4 to ON.

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.

Problem**Solution**

Using the roll paper holder, paper does not feed properly.

When the LOAD/EJECT button is pressed, the platen does not rotate and paper does not feed.

When the LOAD/EJECT button is pressed, the platen rotates but paper does not feed.

The paper feed is crooked or the paper jams.

You may be trying to feed paper 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. Refer to 3-3.

The paper release lever may be pulled forward to the continuous paper position. Push the paper release lever back to the single sheet position. Refer to 5-31.

The position of the roll paper may be wrong. Position the paper roll so that the paper feeds off of the bottom of the roll. Refer to 5-33.

The roll paper holder may not be installed correctly. Check that the holes in the base fit onto the two corresponding pegs at the bottom of the printer. Refer to 5-30.

The shaft with the paper roll may not be properly mounted on the roll paper holder. Make sure the shaft fits securely onto the roll paper holder. Refer to 5-33.

Problem

Solution

Using the roll paper holder (continued).

The position of the roll paper may be wrong. The roll should be oriented so that paper feeds from the bottom. Refer to 5-33.

The paper may be caught on the edge guides. Make sure that the paper guide is installed over the paper and that the edge guides are positioned at the center of the paper's width. Refer to 5-34.

The paper guide may be in the upright position. Make sure that the paper guide is in the lowered position so it can act as a paper separator. Refer to 5-34.

The paper may be creased. Make sure the leading edge of the roll paper has a clean, straight edge. Refer to 5-32.

The roll paper may not meet the specifications. Be sure to use only paper sizes or weights that are within the specified range. Refer to 8-5.

Problem

Using an optional interface, the printer does not operate properly.

The printer does not print or the printout is not what you expected.

Solution

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. Refer to 5-45, 5-47.

You may not be using the correct interface. Check the specifications to make sure that you can use the interface with this printer. Refer to 5-37.

You may not be using the correct cable. Make sure that the cable matches the specifications of the interface.

The DIP switches or jumpers on the interface board may not be set correctly. Refer to the interface manual for the correct settings.

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

Chapter 8

Technical Specification

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Printer Specifications

Printing

Print method: **9-pin impact dot matrix**

Print speed:

Quality	Character per inch	Character/second/line
High-speed draft	10	200
Normal draft	10	150
	12	180
NLQ	10	25
	12	30

Printing direction

Bidirectional logic-seeking for text printing. Unidirectional for graphics (can also be switched to bidirectional by using the proper software command).

Line spacing:

1/6 or 1/8 inch, or programmable in increments of 1/216th of an inch.

Paper feed speed:

**Approx. 75 ms/line at 1/6-inch line spacing during continuous feeding.
Approx. 95 ms/line at 1/6-inch line spacing during intermittent feeding.**

Printable columns:

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

Input buffer: **4K byte**

Character fonts:

Font	Available sizes (Character per inch)
Epson High-speed draft	10
Epson Draft	10, 12
Epson NLQ Roman	10, 12
Epson NLQ Sans Serif	10, 12

Characters:

96 standard ASCII character set (including italic characters)

13 international character sets (including italic characters)

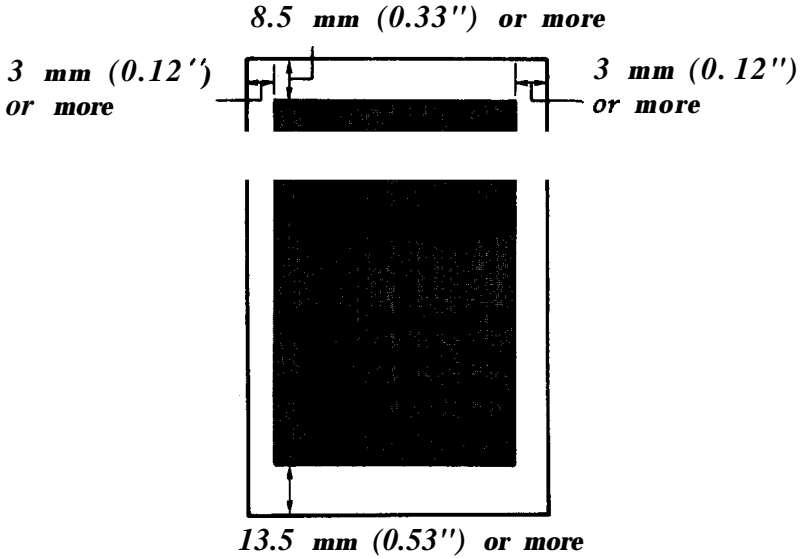
Epson Extended Graphics character set

Paper

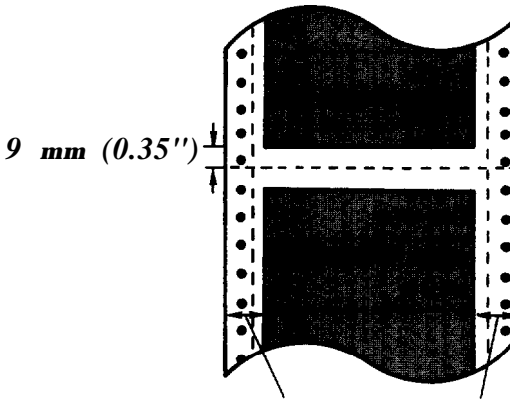
Paper width and length:

Paper	Width and length	
Single sheet	Width:	182 to 257 mm (7.2 to 10.1")
	Length:	182 to 364 mm (7.2 to 14.3")
Continuous paper	Width:	101 to 254 mm (4.0 to 10.0")
Roll paper	Width:	216 ± 3 mm (8.5 ± 0.12")
	Diameter:	127 mm (5.0") maximum
Envelope	No.6	166 X 92 mm (6.5 X 3.6")
	No.10	240 X 104 mm (9.4 X 4.1")
Labels		63.5 X 23.8 mm (2.5 X 0.94") minimum

Printable area: Single sheet

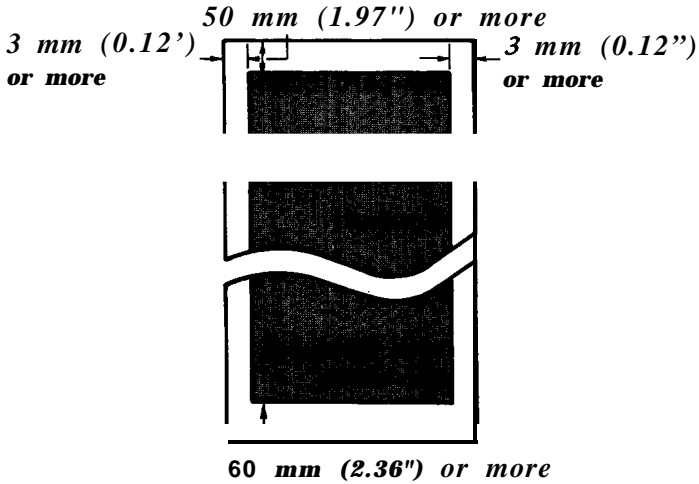


Continuous paper

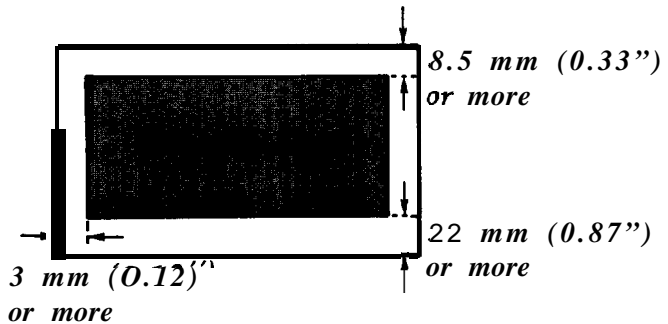


13 mm (0.15") or more (both sides) when the 101 mm to 242 mm (4 to 9.5") width paper is used. 26 mm (1.02") or more (left side) and 24 mm (0.94") or more (right side) when the 254 mm (10") width paper is used.

Roll paper



Envelope



- **Envelope printing is only available at normal temperature.**
- **Keep the longer side of the envelope horizontally at setting.**
- **Align the left edge of the envelope to the guide mark of the paper guide.**

- Paper weight:**
- Single sheet:** 14 lb to 24 lb
(52 g/m² to 90 g/m²)
 - Continuous paper:** 14 lb to 22 lb
(52 g/m² to 82 g/m²)
 - Multi-part forms:** [12 lb to 15 lb] X N
([45 g/m² to 58 g/m²]
X N)
N ≤ 3
 - Roll paper:** 14 lb to 17 lb
(52 g/m² to 64 g/m²)
 - Envelope:** 12 lb to 24 lb
(45 g/m² to 90 g/m²)
- Paper thickness:**
- Single sheet:** 0.065 to 0.140 mm
(0.0025 to 0.0055")
 - Continuous paper:** 0.065 to 0.250 mm
(0.0025 to 0.0098")
 - Roll paper:** 0.070 to 0.090 mm
(0.0028 to 0.0035")
 - Envelope:** 0.160 to 0.520 mm
(0.0063 to 0.0197")
 - Label:** 0.160 to 0.190 mm
(0.0063 to 0.0075")
including the base sheet
- Copy capacity:** Up to 3 sheets including the original. Total thickness must not exceed 0.25 mm (0.0098").
- 24 lb paper printing is only available at normal temperature.
 - Label with a pressure sensitive paper jointed by dotted or pasting and its total thickness is less than or equal to 0.3 mm (0.0118") can be printed out under the condition of 5°C to 35°C and 10% to 80% RH.

Mechanical

Paper feeding methods:

**Friction
Push tractor
Cut sheet feeder (optional)
Pull tractor (optional)
Roll paper holder (optional)**

Ribbon:

**Cartridge ribbon, available in black:
#8750
Life expectancy at 14 dots/character:
3 million characters**

MCBF:

**For all components excluding print head:
3 million lines**

MTBF:

4000 power-on hours (duty 25%)

Print head life:

200 million strokes/wire

Dimensions and weight:

**Height: 141 mm
Width: 418 mm (excluding platen knob)
Depth: 339 mm
Weight: approx. 5.8 kg**

Electrical

Voltage:

**120 VAC \pm 10% (120 V model)
220 VAC \pm 10% (220 V model)
240 VAC \pm 10% (240 V model)**

Power consumption:

28 W (self test printing: draft mode)

Frequency:

50.0 \pm 0.5 Hz, 60.0 \pm 0.5 Hz

Insulation resistance:

10M ohms between AC power line and chassis

*Dielectric strength
(between AC line and
chassis):*

**120 V model can withstand 1.00 kV rms
applied for one minute.**

**220/240 V model can withstand 1.25 kV
rms applied for one minute.**

Environment

Temperature:

Operation: +5°C to +35°C

Storage: -30°C to +60°C

Humidity:

**Operation: 10% to 80%
(without condensation)**

**Storage: 5% to 85%
(without condensation)**

Shock:

Operation: Up to 1 G within 1ms

Storage: Up to 2 G within 1ms

Vibration:

**Operation: Up to 0.25 G at up to
55Hz**

**Storage: Up to 0.50 G at up to
55Hz**

Operation angle:

**Less than 15" (without cut sheet feeder)
0° (with cut sheet feeder)**

Interface Specifications

Your printer is equipped with an 8-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	$\overline{\text{STROBE}}$	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 of 8 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	OUT	
10	28	$\overline{\text{ACKNLG}}$	OUT	About a 12 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) When off line 3) During printer-error state
12	30	PE	OUT	A HIGH signal indicates that the printer is out of paper.

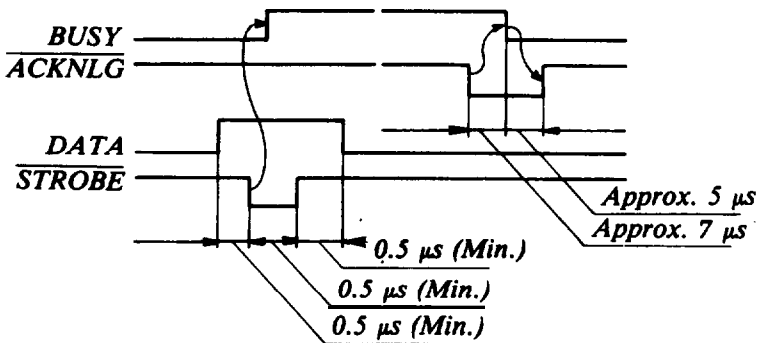
Interface Specifications

Signal Pin	Return Pin	Signal	Direction	Description
13	—	—	—	Pulled up to + 5 volts through 3.3K ohm resistance.
14	—	$\overline{\text{AUTO FEED XT}}$	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	—	Unused.
16	—	0V	—	Logic ground level.
17	—	CHASSIS GND	—	Printer's chassis ground, which is isolated from the logic ground.
18	—	NC	—	Unused.
19-30	—	GND	—	Twisted-pair return signal ground level.
31	—	$\overline{\text{INIT}}$	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 usually HIGH; its pulse width must be more than 50 microseconds at the receiving terminal.
32	—	$\overline{\text{ERROR}}$	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	—	Unused.
35	—	—	—	Pulled up to + 5V through 3.3K ohm resistance.
36	—	$\overline{\text{SLCT IN}}$	IN	The DC1/DC3 code is valid only when this signal is "HIGH" (Internal fixing can be carried out with Jumper J1.)

- The column heading “Direction” refer 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 $\overline{\text{ACKNLG}}$ or BUSY signal. Data transfer to this printer can be carried out only after receipt of the $\overline{\text{ACKNLG}}$ 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)	$\overline{\text{SLCT IN}}$	DC1/DC3 (Data on/off control)	$\overline{\text{ERROR}}$	BUSY	$\overline{\text{ACKNLG}}$	Printing (Disabled/enabled)
ON-LINE	Low (J1/interfce)	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:*

**444 mm (W) x 434 mm (D) x 423 mm (H)
(mounted on the printer)
Approx. 1.1 kg**

Bin capacity:

**Single sheet: Up to 100 sheets of
90 g/m² (24 lb) paper
Up to 150 sheets of
82 g/m² (22 lb) paper
Up to 185 sheets of
64 g/m² (17 lb) paper
(Total thickness should not exceed 15 mm)**

Stacker capacity:

**Single sheet: Up to 55 sheets of
90 g/m² (24 lb) paper
Up to 80 sheets of
82 g/m² (22 lb) paper
Up to 100 sheets of
64 g/m² (17 lb) paper**

MCBF:

100,000 cycles

*Environmental
condition:*

Temperature

Operation: +5°C to +35°C

Storage: -30°C to +60°C

Humidity

**Operation: 15% to 80%
(without condensation)**

**Storage: 5% to 85%
(without condensation)**

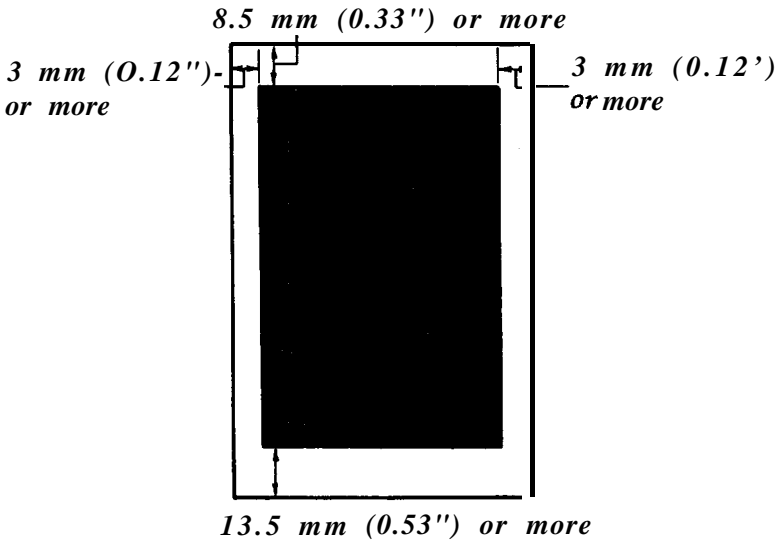
Option Specifications

<i>Paper:</i>	Width:	182 to 216 mm (7.17 to 8.50")
	Length:	257 to 364 mm (10.12 to 14.30")
	Thickness:	0.07 to 0.14 mm (0.0028 to 0.0055")
	Weight:	64 g/m² to 90 g/m² (17 lb to 24 lb)

*Storage condition
of paper:*

Temperature:	+18°C to +22°C
Humidity:	40% to 60%

Printable area:



Initialization

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

Hardware initialization	. The power is turned on. . The printer receives an 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	1/6-inch line spacing
Vertical tab position	Cleared
Horizontal tab positions	Every eight characters
VFU channel	Channel 0
Font selection	The current Selectype setting
Condensed mode	The current SelecType setting
Character spacing	The current DIP switch setting
Justification	Left justification
Special printing effects	Cancelled
Graphic mode assignment	ESC K = ESC * O, ESC L = ESC * 1, ESC Y = ESC * 2, ESC Z = ESC * 3

Initialization

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

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Using the Command Summary

This chapter lists and describes all the commands available on the printer.

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
- Data control
- Vertical motion
- Horizontal motion
- Overall printing style
- Print size and character width
- Print enhancement
- Word processing
- Character sets
- User-defined characters
- 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 can use control key sequences. See the Control key chart on page 9-4 for information on using these.

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: OF

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 or 0, 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$(1)
LPRINT CHR$(27);"W";CHR$(1)
```

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 W, ESC S, ESC s, ESC -, and ESC %

For example, in BASIC you can select the draft mode with either of these statements:

```
LPRINT CHR$(27);"x";CHR$(0)
```

```
LPRINT CHR$(27);"x";"0"
```

Control key chart

Some application programs use control key codes for decimal values 0-27. 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 the 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
0	00	@
1	01	A
2	02	B
3	03	C
4	04	D
5	05	E
6	06	F
7	07	G
8	08	H
9	09	I
10	0A	J
11	0B	K
12	0C	L
13	0D	M

Dec.	Hex.	Ctrl. Key
14	0E	N
15	0F	O
16	10	P
17	11	Q
18	12	R
19	13	S
20	14	T
21	15	U
22	16	V
23	17	W
24	18	X
25	19	Y
26	1A	Z
27	1B	[

Commands in Numerical Order

The following list shows control codes and ESC sequences (with their decimal and hexadecimal values), and the page number where the complete command can be found.

ASCII	Dec.	Hex.	Description	Page
BEL	7	07	Beeper.....	9-11
BS	8	08	Backspace	9-20
HT	9	09	Tab Horizontally	9-21
LF	10	0A	Line Feed.....	9-15
VT	11	0B	Tab Vertically.....	9-17
FF	12	0C	Form Feed	9-13
CR	13	0D	Carriage Return	9-12
SO	14	0E	Select Double-wide Mode (one line)	9-25
SI	15	0F	Select Condensed Mode	9-24
DC1	17	11	Select Printer.....	9-8
DC2	18	12	Cancel Condensed Mode	9-24
DC3	19	13	Deselect Printer	9-9
DC4	20	14	Cancel Double-wide Mode (one line)	9-25
CAN	24	18	Cancel Line	9-12
DEL	127	7F	Delete Character.....	9-12
ESC SO	14	0E	Select Double-wide Mode (one line).....	9-25
ESC SI	15	0F	Select Condensed Mode.....	9-24
ESC EM	25	19	Turn Cut Sheet Feeder Mode On/Off.....	9-11
ESC !	33	21	Master Select	9-23
ESC %	37	25	Select User-defined Set	9-33
ESC &	38	26	Define User-defined Characters (draft mode).....	9-32
			Define User-defined Characters (NLQ mode)	9-33

ASCII	Dec.	Hex.	Description	Page
ESC *	42	2A	Select Graphics Mode	9-35
ESC -	45	2D	Turn Underlining Mode On/Off	9-29
ESC /	47	2F	Select Vertical Tab Channel	9-18
ESC 0	48	30	Select 1/8-inch Line Spacing	9-15
ESC 1	49	31	Select 7/72-inch Line Spacing	9-15
ESC 2	50	32	Select 1/6-inch Line Spacing	9-16
ESC 3	51	33	Set n/216-inch Line Spacing	9-16
ESC 4	52	34	Select Italic Mode	9-28
ESC 5	53	35	Cancel Italic Mode	9-29
ESC 6	54	36	Enable Printable Characters	9-32
ESC 7	55	37	Enable Upper Control Codes	9-32
ESC 8	56	38	Disable Paper Out Detection	9-10
ESC 9	57	39	Enable Paper Out Detection	9-10
ESC :	58	3A	Copy ROM to RAM	9-33
ESC <	60	3C	Select Unidirectional Mode (one line)	9-9
ESC ?	63	3F	Reassign Graphics Mode	9-36
ESC @	64	40	Initialize Printer	9-8
ESC A	65	41	Set n/72-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	9-21
ESC E	69	45	Select Emphasized Mode	9-26
ESC F	70	46	Cancel Emphasized Mode	9-26
ESC G	71	47	Select Double-Strike Mode	9-27
ESC H	72	48	Cancel Double-Strike Mode	9-27
ESC J	74	4A	Perform n/216-inch Line Feed	9-17
ESC K	75	4B	Select Single-density Graphics Mode	9-34
ESC L	76	4C	Select Double-density Graphics Mode	9-34
ESC M	77	4D	Select 12 cpi	9-23
ESC N	78	4E	Set Skip Over Perforation	9-14
ESC 0	79	4F	Cancel Skip Over Perforation	9-14

ASCII	Dec.	Hex.	Description	Page
ESC P	80	50	Select 10 cpi.....	9-23
ESC Q	81	51	Set Right Margin..	9-19
ESC R	82	52	Select an International Character Set	9-31
ESC S 0	83	53	Select Superscript Mode..	9-27
ESC S 1	83	53	Select Subscript Mode	9-28
ESC T	84	54	Cancel Superscript/Subscript Mode	9-28
ESC U	85	55	Turn Unidirectional Mode On/Off. ..	9-10
ESC W	87	57	Turn Double-width Mode On/Off. ..	9-26
ESC Y	89	59	Select High-Speed Double-density Graphics Mode	9-34
ESC Z	90	5A	Select Quadruple-density Graphics Mode.....	9-35
ESC ^	94	5E	Select 9-pin Graphics Mode	9-36
ESC a	97	61	Select Near Letter Quality Justification	9-30
ESC b	98	62	Set Vertical Tabs in Channels	9-18
ESC e	101	65	Set Tab Increments	9-20
ESC f	102	66	Horizontal/Vertical Skip	9-21
ESC k	107	6B	Select Typestyle Family..	9-22
ESC l	108	6C	Set Left Margin	9-19
ESC s	115	73	Turn Half-Speed Mode ON/Off.	9-9
ESC t	116	74	Select Character Table.....	9-31
ESC x	120	78	Select Near Letter Quality or Draft...	9-22

Commands Arranged by Topic

The following lists and describes all the commands by topics. See the Quick Reference Card-at the end of this book for the 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:

Return the printer to the selected state if it has been deselected by the printer deselect code (DC3). Does not select the printer if it has been switched to off line by pressing the ON LINE button.

DC3

Deselect Printer

Format:

ASCII code:	DC3
Decimal:	19
Hexadecimal:	13

Comments:

Puts the printer into the deselected state until select printer code (DC1) is received. The printer cannot be reselected with the ON LINE button.

ESC s

Turn Half-speed Mode On/Off

Format:

ASCII code:	ESC	s	n
Decimal:	27	115	n
Hexadecimal:	1B	73	n

Comments:

The following values can be used for n.

1: Mode is turned ON.

0: Mode is turned OFF.

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.

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

ASCII code:	ESC	U	<i>n</i>
Decimal:	27	85	<i>n</i>
Hexadecimal:	1B	55	<i>n</i>

Comments:

The following values can be used for *n*:

1: Mode is turned ON.

0: Mode is turned OFF.

Text printing is normally bidirectional. This command selects unidirectional printing for more accurate positioning.

ESC 8 **Disable Paper Out Detection**
Format:

ASCII code:	ESC	8
Decimal:	27	56
Hexadecimal	1B	38

Comments:

Disables paper out detection. When disabled, the printer does not stop printing even when it runs out of paper.

ESC 9 **Enable Paper Out Detection**
Format:

ASCII code:	ESC	9
Decimal:	27	57
Hexadecimal:	1B	39

Comments:

Enables paper out detection. When paper out detection is enabled, the printer automatically stops printing when it runs out of paper.

ESC EM

Turn Cut Sheet Feeder Mode On/Off

Format:

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

Comments:

The following values can be used for n:

4: Mode is turned ON.

0: Mode is turned OFF:

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

The ON/OFF status of cut sheet feeder mode can also be selected by DIP switch 2-2.

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 buffer and returns the print position to the left margin. A line feed may be added if DIP switch 2-4 is ON or the AUTO FEED XT line on the parallel interface is held LOW.

CAN

Cancel Line

Format:

ASCII code: CAN

Decimal: 24

Hexadecimal: 18

Comments:

Removes all text on the print line, but does not affect control codes.

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.

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.

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 1-127. The top of form position is set 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 1-22. The top of form position is set to the current line. Overrides the DIP switch page length setting.

ESC N **Set Skip-over-perforation**

Format:

ASCII code:	ESC	N	<i>n</i>
Decimal:	27	78	<i>n</i>
Hexadecimal:	1B	4E	<i>n</i>

Comments:

The variable *n* is the number of lines skipped between the last line printed on one page and the first line of the next page. For example, with the standard settings for line spacing (1/6-inch), and page length (66 lines), ESC N 6 cause the LX-810 to print 60 lines and then skip 6. DIP switch 2-3 performs the same function. This setting is cancelled by ESC 0 and also by ESC C or ESC C 0. The value of *n* must be from 1-127. Overrides the DIP switch 2-3 for the 1-inch skip-over-perforation setting.

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. Also, cancels the DIP switch 2-3 for the 1-inch skip-over-perforation setting.

LF **Line Feed****Format:**

ASCII code: **LF**
Decimal: **10**
Hexadecimal: **0A**

Comments:

When this commands 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:

Set the line spacing to 1/8 of an inch for subsequent line feed commands. The 0 is the character zero and not ASCII code 0.

ESC 1 **Select 7/72-inch Line Spacing****Format:**

ASCII code: **ESC** **1**
Decimal: **27** **49**
Hexadecimal: **1B** **31**

Comments:

Sets the line spacing to 7/72 of an inch for subsequent line feed commands. The 1 is the character one and not lower case L or ASCII code 1.

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 1/6 of an inch for subsequent line feed commands. The “2” is the character two and not ASCII code 2. This is the default at power on.

ESC 3

Select n/216-inch Line Spacing

Format:

ASCII code:	ESC	3	<i>n</i>
Decimal:	27	51	<i>n</i>
Hexadecimal:	1B	33	<i>n</i>

Comments:

Sets the line spacing to n/216 of an inch for subsequent line feed commands. The “3” is the character three and not ASCII code 3. This is the value of *n* must be from 0-255.

ESC A

Select n/72-inch Line Spacing

Format:

ASCII code:	ESC	A	<i>n</i>
Decimal:	27	65	<i>n</i>
Hexadecimal:	1B	41	<i>n</i>

Comments:

Sets the line spacing to n/72 of an inch for subsequent line feed commands. The value of *n* must be from 0-85.

ESC I

Perform $n/216$ -inch Line Feed

Format:

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

Comments:

Advances the paper $n/216$ of an inch. The value of n must be from 0-255. 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 tab setting. If no vertical tabs have been selected, 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 1-255, in ascending order. The 0 character indicates the end of the command. All settings are stored in channel 0 (see ESC b). ESC B0 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 between 0-7. 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 0-7. All subsequent VT commands use the channel selected by this command.

Horizontal motion

ESC 1

Set Left Margin

Format:

ASCII code:	ESC	1	<i>n</i>
Decimal:	27	108	<i>n</i>
Hexadecimal:	1B	6C	<i>n</i>

Comments:

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

ESC Q

Set Right Margin

Format:

ASCII code:	ESC	Q	<i>n</i>
Decimal:	27	81	<i>n</i>
Hexadecimal:	1B	51	<i>n</i>

Comments:

Sets the right margin to *n* columns in the current size. 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 width 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 can be performed up to, but not beyond, the left margin setting. The BS code is also ignored if ESC a2, or a3 has been sent. If this code is received immediately after graphics printing, the print position of subsequent data is moved back to the point at which graphics printing started.

ESC e

Set Tab Increments

Format:

ASCII code	ESC	e	<i>n</i>	<i>s</i>
Decimal:	27	101	<i>n</i>	<i>s</i>
Hexadecimal:	1B	65	<i>n</i>	<i>s</i>

Comments:

This command sets the horizontal or vertical tab increments. When *n* is 0, the horizontal tabs are set at intervals of *s* spaces. Maximum values are 21 in 10 cpi, 25 in 12 cpi and 36 in condensed text modes. When *n* is 1, the vertical tabs are set to *s* line feeds .

ESC f **Horizontal/Vertical Skip**

Format:

ASCII code:	ESC	f	<i>n</i>	<i>s</i>
Decimal:	27	102	<i>n</i>	<i>s</i>
Hexadecimal:	1B	66	<i>n</i>	<i>s</i>

Comments:

Prints spaces or line feeds without carriage returns. When *n* is 0, *s* spaces will be inserted up to a maximum of 127. If *n* is set to 1, *s* line feed will be performed.

HT **Tab Horizontally**

Format:

ASCII code:	HT
Decimal:	9
Hexadecimal:	09

Comments:

Advances the print position to the next horizontal tab setting.

ESC D **Set Horizontal Tabs**

Format:

ASCII code:	ESC	D	<i>n1</i>	<i>n2</i>	.	.	.	.	.	0
Decimal:	27	68	<i>n1</i>	<i>n2</i>	.	.	.	.	.	0
Hexadecimal:	1B	44	<i>n1</i>	<i>n2</i>	.	.	.	.	.	00

Comments:

This command allows setting of up to 32 horizontal tabs, which are entered as *n1*, *n2*, *n3*, etc (from 1-137) with the 0 character terminating the command. ESC D 0 clears all tabs. The settings on power up or after an ESC @ command are every eight characters. The tab settings do not change if the character size is changed.

Overall printing style

ESC x

Select NLQ or Draft

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

Comments:

The following values can be used for n:

0: Selects the draft mode.

1: Selects the Near Letter Quality (NLQ) mode.

ESC k

Select NLQ Font

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

Comments:

This command affect only the Near Letter Quality typestyle, not draft.

The following values can be used for n:

0 = Roman

1= Sans Serif

ESC !**Master Select****Format:**

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

Comments:

Select any valid combination of the following modes: **10 cpi**, **12 cpi**, **condensed**, **emphasized**, **double-strike**, **double-wide**, **italic**, and **underlined**. For details on how to set n, see the section on selecting type styles with Master Select 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 cpi** (10 characters per inch). This command is normally used to cancel **12 cpi**.

ESC M**Select 12 cpi****Format:**

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

Comments:

Select **12 cpi** (12 characters per inch).

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. NLQ mode cannot be condensed, and NLQ will override condensed.

ESC SI **Select Condensed Mode**

Format:

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

Comments:

Duplicates the SI command.

DC2 **Cancel Condensed Mode**

Format:

ASCII code: **DC2**
Decimal: **18**
Hexadecimal: **12**

Comments:

Cancels condensed printing set by SI or ESC SI.

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

Format:

ASCII code: **SO**
Decimal: **14**
Hexadecimal: **0E**

Double-wide mode doubles the width of all characters. This mode is cancelled by a carriage return or DC4.

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

Format:

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

Comments:

Duplicates the SO command.

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

Format:

ASCII code: **DC4**
Decimal: **20**
Hexadecimal: **14**

Comments:

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

ESC W

Turn Double-wide Mode On/Off

Format:

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

The following values can be used for n:

1: The mode is turned ON.

0: The mode is turned OFF.

Double-wide mode doubles the width of all characters.

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 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 emphasized, the mode selected by ESC E or ESC !.

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. In high-speed draft and NLQ, the mode is not available, but is not cancelled.

ESC H **Cancel Double-strike Mode**

Format:

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

Comments:

Turns off the double-strike mode selected by ESC G or ESC !.

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 height in the upper part of the character space.

ESC S 1 **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 height in the lower part of the character space.

ESC T **Cancel Superscript/Subscript**

Format:

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

Comments:

Cancels either superscript or subscript.

ESC 4 **Select Italic Mode**

Format:

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

Comments:

Causes characters from the italic character set to be printed. This command is valid even if the Epson Extended Graphics character set has been selected by ESC t or the DIP switch 1-3, but character graphics cannot be 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 or ESC !.

ESC -

Turn Underlining Mode On/Off

Format:

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

Comments:

The following values can be used for n:

1: Mode is turned ON.

0: Mode is turned OFF.

This mode provides continuous underlining, including spaces.

Word processing

ESC a

NLQ Justification

Format:

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

Comments:

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 or when one of the following is received: CR, VT, LF, FF. The commands DEL, HT, BS, CAN, and ESC f 0 are invalid in $n = 3$ mode. For $n = 3$ there must be no carriage returns within a paragraph. Justification can be used in NLQ only, not draft.

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 128-255. Selecting Epson Extended Graphics 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.

1: Selects Epson Extended Graphics.

Duplicates the function of DIP switch 1-3. Note that the value of n must equal 00 hex or 01 hex.

ESC R

Select an International Character Set

Format:

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

Comments:

The following values can be used for n:

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

ESC 6 **Printable Code Area Expansion**

Format:

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

Comments:

Enables the printing of codes 128 through 159 (decimal) as characters, not control codes. This allows the use of these characters for user-defined characters. See the Appendix for characters printed.

ESC 7 **Enable Upper Control Codes**

Format:

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

Comments:

This code caused codes 128 through 159 to be treated as control codes. This is the default.

User-defined characters

ESC & **Define User-defined Characters (draft mode)**

Format:

ASCII code:	ESC & 0	<i>n1</i>	<i>n2</i>	<i>a1</i>	<i>d1</i>	<i>d2</i>	. . . . .	<i>dn</i>
Decimal:	27 38 0	<i>n1</i>	<i>n2</i>	<i>a1</i>	<i>d1</i>	<i>d2</i>	. . . . .	<i>dn</i>
Hexadecimal:	1B 26 00	<i>n1</i>	<i>n2</i>	<i>a1</i>	<i>d1</i>	<i>d2</i>	. . . . .	<i>dn</i>

Comments:

This command allows characters to be redefined in ‘the draft mode. The variables *n1* and *n2* must be between 58 and 63 (3A through 3F hex).

ESC & Define User-defined Characters (NLQ mode)

Format:

ASCII code: ESC & 0 *n1 n2 a0 a1 a2 d1 dn*
Decimal: 27 38 0 *n1 n2 a0 a1 a2 d1 dn*
Hexadecimal: 1B 26 00 *n1 n2 a0 a1 a2 d1 dn*

Comments:

This command allows characters to be redefined in the NLQ mode. The variables *n1* and *n2* must be between 58 and 63 (3A through 3F hex).

ESC : Copy ROM into RAM

Format:

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

Comments:

This code copies the characters in the ROM into RAM so that specific characters can be redefined. One of the NLQ fonts is copied depending on the value specified for *n*.

- 0 = Roman
- 1 = Sam Serif

ESC % Select User-defined Set

Format:

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

Comments:

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.

Graphics

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

ESC K Select Single-density Graphics Mode

Format:

ASCII code:	ESC	K	<i>n1</i>	<i>n2</i>
Decimal:	27	75	<i>n1</i>	<i>n2</i>
Hexadecimal:	1B	4B	<i>n1</i>	<i>n2</i>

Comments:

Turns on eight-pin single-density graphics mode. The total number of columns = $n1 + (n2 \times 256)$

ESC L Select Double-density Graphics Mode

Format:

ASCII code:	ESC	L	<i>n1</i>	<i>n2</i>
Decimal:	27	76	<i>n1</i>	<i>n2</i>
Hexadecimal:	1B	4C	<i>n1</i>	<i>n2</i>

Comments:

Turns on eight-pin low-speed double-density graphics mode. The total number of columns = $n1 + (n2 \times 256)$.

ESC Y Select High-speed Double-density Graphics Mode

Format:

ASCII code:	ESC	Y	<i>n1</i>	<i>n2</i>
Decimal:	27	89	<i>n1</i>	<i>n2</i>
Hexadecimal:	1B	59	<i>n1</i>	<i>n2</i>

Comments:

Turns on eight-pin high-speed double-density graphics mode. The total number of columns = $n1 + (n2 \times 256)$.

ESC Z **Select Quadruple-density Graphics Mode**

Format:

ASCII code:	ESC	Z	<i>n1</i>	<i>n2</i>
Decimal:	27	90	<i>n1</i>	<i>n2</i>
Hexadecimal:	1B	5A	<i>n1</i>	<i>n2</i>

Comments:

Turns on eight-pin quadruple-density graphics mode (24 dots per inch). The total number of columns = $n1 + (n2 \times 256)$.

ESC * **Select Graphics Mode**

Format:

ASCII code:	ESC	*	<i>m</i>	<i>n1</i>	<i>n2</i>
Decimal:	27	42	<i>m</i>	<i>n1</i>	<i>n2</i>
Hexadecimal:	1B	2A	<i>m</i>	<i>n1</i>	<i>n2</i>

Comments:

Turns on graphics mode *m*. Set the table below for details on the available modes. The total number of columns = $n1 + (n2 \times 256)$.

Option	Alternate Code	| <i>m</i> |	Horiz. density (dots/in.)
Single-density	ESC K	| 0 |	60
Double-density	ESC L	| 1 |	120
High-speed double-density*	ESC Y	| 2 |	120
Quadruple-density"	ESC Z	| 3 |	240
CRT I	none	I4 |	80
Plotter (1: 1)	none	| 5	72
CRT II	none	| 6	90

* Adjacent dots cannot be printed in this mode,

ESC ?**Reassign Graphics Mode****Format:**

ASCII code:	ESC	?	S	<i>n</i>
Decimal:	27	63	S	<i>n</i>
Hexadecimal:	1B	3F	S	<i>n</i>

Comments:

Changes one graphics mode to another. The variable *s* is a character (K, L, or Z), which is reassigned to a mode *n* (0-6).

ESC**Select 9-Pin Graphics Mode****Format:**

ASCII code:	ESC		<i>m</i>	<i>n1</i>	<i>n2</i>
Decimal:	27	94	<i>m</i>	<i>n1</i>	<i>n2</i>
Hexadecimal:	1B	5E	<i>m</i>	<i>n1</i>	<i>n2</i>

Comments:

Turns on 9-pin Graphics Mode. For this command the variable *m* defines density of print (0 for single and 1 for double). The total number of column = $n1 + (n2 \times 256)$. This mode requires two data items for each column of print.

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Character Tables

Italic character table

	Hex NO.	0	1	2	3	4	5	6	7	6	9	A	B	C	D	E	F
Hex No.	Binary No.	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1100	1111
0	0000	NUL 0		SP 16 32	0 48	⓪ 64	P 80	` 96	p 112			SP 180	0 176	⓪ 192	P 208	` 224	p 240
1	0001		DC1 1	! 17 33	1 49	A 65	Q 81	a 97	q 113			! 181	I 177	A 193	Q 209	a 225	q 241
2	0010		DC2 2	" 18 34	2 50	B 66	R 82	b 98	r 114			" 182	2 178	B 194	R 210	b 226	r 242
3	0011		DC3 3	# 19 35	3 51	C 67	S 83	c 99	s 115			# 183	3 179	C 195	S 211	c 227	s 243
4	0100		DC4 4	\$ 20 36	4 52	D 68	T 84	d 100	t 116			\$ 184	4 180	D 196	T 212	d 228	t 244
5	0101			% 21 37	5 53	K 69	U 85	e 101	u 117			% 185	5 181	K 197	U 213	e 229	u 245
6	0110			& 22 38	6 54	F 70	V 86	f 102	v 118			& 186	6 182	F 198	V 214	f 230	v 246
7	0111	BEL 7		' 23 39	7 55	G 71	W 87	g 103	w 119			' 187	7 183	G 199	W 215	g 231	w 247
8	1000	BS 8	CAN 24	(40	8 56	H 72	X 88	h 104	x 120			(188	8 184	H 200	X 216	h 232	x 248
9	1001	HT 9	EM 25	) 41	9 57	I 73	Y 89	i 105	y 121			) 189	9 185	I 201	Y 217	i 233	y 249
A	1010	LF 10		* 26 42	:	J 58 74	Z 90	j 106	z 122			* 170	:	J 186	Z 202	j 218	z 234
B	1011	VT 11	ESC 27	+ 43	;	K 59 75	[91	k 107	{ 123			+ 171	;	K 187	[203	k 219	{ 235
C	1100	FF 12		, 44 60	<	L 76 92	\ 108	l 124	!			, 172	<	L 188	\ 204	l 220	!
D	1101	CR 13		- 45 61	=	M 77 93	] 109	m 125	}			- 173	=	M 189	] 205	m 221	}
E	1110	SO 14		. 46 62	>	N 78 94	^ 110	n 126	~			. 174	>	N 190	^ 206	n 222	~
F	1111	SI 15		/ 47 63	?	O 79 95	_ 111	o 127	DEL			/ 175	?	O 191	_ 207	o 223	DEL

Epson Extended Graphics character table

	Hex. No.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Hex. No.	Binary No.	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1100	1111
0	0000	NUL 0	SP 16	0 32	● 48	P 64	· 80	p 96	p 112			á 160	||| 176	L 192	ll 208	α 224	≡ 240
1	0001		DC1 17	! 33	1 49	A 65	Q 81	a 97	q 113			í 161	||| 177	L 193	T 209	β 225	± 241
2	0010		DC2 18	" 34	2 50	B 66	R 82	b 98	r 114			ó 162	||| 178	T 194	π 210	Γ 226	∑ 242
3	0011		DC3 19	# 35	3 51	C 67	S 83	c 99	s 115			ú 163	| 179	† 195	ll 211	π 227	≡ 243
4	0100		DC4 20	\$ 36	4 52	D 68	T 84	d 100	t 116			ñ 164	| 180	- 196	l 212	Σ 228	∫ 244
5	0101			% 37	5 53	E 69	U 85	e 101	u 117			ñ 165	† 181	† 197	F 213	σ 229	J 245
6	0110			& 38	6 54	F 70	V 86	f 102	v 118			á 166	||| 182	† 198	π 214	ll 230	+ 246
7	0111	BEL 7		' 39	7 55	G 71	W 87	g 103	w 119			Q 167	π 183	π 199	T 215	π 231	≈ 247
8	1000	BS 8	CAN 24	(40	8 56	H 72	X 88	h 104	x 120			ó 168	† 184	ll 200	† 216	⊕ 232	° 248
9	1001	HT 9	EM 25	) 41	9 57	I 73	Y 89	i 105	y 121			∫ 169	||| 185	π 201	J 217	θ 233	° 249
A	1010	LF 10		* 42	: 58	J 74	Z 90	j 106	z 122			∫ 170	||| 186	ll 202	∫ 218	Ω 234	° 250
B	1011	VT 11	ESC 27	+ 43	; 59	K 75	[91	k 107	{ 123			½ 171	π 187	π 203	■ 219	δ 235	∫ 251
C	1100	FF 12		, 44	< 60	L 76	\ 92	l 108	¡ 124			¼ 172	∫ 188	π 204	■ 220	∞ 236	" 252
D	1101	CR 13		- 45	= 61	M 77	] 93	m 109	} 125			í 173	∫ 189	= 205	■ 221	ø 237	° 253
E	1110	SO 14		. 46	> 62	N 78	^ 94	n 110	~ 126			◀ 174	∫ 190	■ 206	■ 222	€ 238	■ 254
F	1111	SI 15		/ 47	? 63	O 79	_ 95	o 111	DEL 127			▶ 175	∫ 191	∫ 207	■ 223	∩ 239	

Note: Characters in the shaded areas can not be printed unless the ESC 6 command is sent to the printer. Until then, the shaded area contains the same control codes found in the range of 0 to 31 and 127.

Glossary

The following definitions apply specifically to printers. Many words used in a definition may themselves be defined elsewhere in this glossary.

application program

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

ASCII

Acronym for 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, the printer automatically feeds the paper one line after receiving a carriage return (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, this increases the overall printing speed by eliminating wasted (non-printing) movement.

binary

See number systems.

bit

A binary digit (0 or 1), which is the smallest unit of information used by a printer or computer. See also *number systems*.

buffer

See *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 actually 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.

character table

A portion of the printer's standard ASCII character set that can be used for either graphic symbols or italic characters. See also *Epson Extended Graphics character table* and *italic*.

characters per inch (cpi)

A measure of the size of text characters.

condensed

Printing in which each character is approximately 60 percent of the width of standard characters. For example, condensed 10 cpi printing actually has 17 characters per inch. Useful for fitting wide tables or spreadsheets onto the paper.

continuous paper

Paper that 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.

cpi

See characters per inch.

cut sheet feeder (CSF)

An optional, detachable device that automatically feeds single-sheet paper into the printer.

data dump

Sometimes called hex dump. A troubleshooting feature. When the printer is in data dump mode, it prints both the hexadecimal value and the ASCII character for each code that it receives. Non-printable control codes (0-21 hex) are depicted by dots in the ASCII portion of the printout.

decimal

See number systems.

default

A value or setting that takes effect when the printer is turned on, reset, or initialized.

DIP switches

Small switches in the 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-strike printing

A way of producing bolder characters. Each character is printed twice in a single pass of the print head; the second time, the dots are printed slightly below the original dots. Can be used only in draft mode.

double-wide printing

A print width in which each character is twice as wide as normal characters.

draft

One of three print qualities available on your printer. Draft uses fewer dots per character for faster printing. See also *near letter quality*.

emphasized printing

A way of producing darker characters. Each character of a line is printed in two passes of the print head; the second time, the dots are printed slightly to the right of the original 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 applications 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 system.

initialize

To completely reset the printer settings to their initial default status by turning the printer on or by sending an INIT signal. This also clears the input data buffer.

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.* Also, a character table that contains italicized character and symbols.

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.

near letter quality (NLQ)

One of three print qualities available on your printer. Near letter quality reduces the print speed and increases the number of dots per character to produce high-resolution characters. See also *draft*.

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 decimal 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, causing the PAPER OUT light to go on, and informing the printer and computer that there is no paper loaded.

paper tension unit

The part of the printer that fits above the platen to assure proper paper tension.

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 near letter quality (NLQ). Draft is for high-speed, draft-quality jobs; Near letter quality is used to produce more polished documents.

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.

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 completely reset the printer settings to their initial default status using the ESC @ command. Unlike initializing the printer, however, a reset does not clear the user-defined character set from the input data buffer.

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 for removal and then draws the paper back to the loading position. This position can be adjusted using the micro-adjustment feature. See *also micro-adjustment and loading position*.

slashed zero

Your printer can print two shapes of zero: slashed zero (Ø) and open zero (0). Useful for clearly distinguishing between upper case O and zero when printing program lists, etc.

standby position

The position of continuous paper after you manually load it onto the first few pins of the tractor sprockets or after you eject loaded continuous paper using the LOAD/EJECT button. When continuous paper is in the standby position, you can load single sheets.

subscript

Printing in which each character is printed about two-thirds of the normal height in the lower part of the character space.

superscript

Printing in which each character is printed about two-thirds of the normal height in the upper part of the character space.

10 cpi

A character spacing with 10 characters per inch, sometimes called pica pitch. This is often the standard or default spacing.

tractor

The part of the printer that feeds continuous paper through the printer by gripping holes along the paper's edge.

12 cpi

A character spacing in which each character is slightly narrower than normal, so that there are 12 characters per inch across the page. Sometimes called elite pitch.

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.

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Quick Reference

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
ESC s	115	73	Turn Half-weed Mode On/Off	9-9
ESC <	60	3C	Select Unidirectional Mode (one line)	9-9
ESC U	85	55	Turn Unidirectional Mode On/Off	9-10
ESC 8	56	38	Disable Paper Out Detection	9-10
ESC 9	57	39	Enable Paper Out Detection	9-10
ESC EM	25	19	Turn Cut Sheet Feeder Mode On/Off	9-11
BEL	7	07	Beeper	9-11

Data Control

ASCII	Dec.	Hex.	Description	Pg.
CR	13	0D	Carriage Return	9-12
CAN	24	18	Cancel Line	9-12
DEL	127	7F	Delete Character	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	9-15
ESC 0	48	30	Select 1/8-inch Line Spacing	9-15
ESC 1	49	31	Select 7/72-inch Line Spacing	9-15
ESC 2	50	32	Select 1/6-inch Line Spacing	9-16
ESC 3	51	33	Select n/216-inch Line Spacing	9-16
ESC A	65	41	Select n/72-inch Line Spacing	9-16
ESC J	74	4A	Perform n/216-inch Line Feed	9-17
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 I	108	6C	Set Left Margin	9-19
ESC Q	81	51	Set Right Margin	9-19
BS	8	08	Backspace	9-20
ESC e	101	65	Set Tab Increments	9-20
ESC f	102	66	Horizontal/Vertical Skip	9-21
HT	9	09	Tab Horizontally	9-21
ESC D	68	44	Set Horizontal Tabs	9-21

Overall Printing Style

ASCII	Dec.	Hex.	Description	Pg
ESC x	120	70	Select Near Letter Quality or Draft	9-22
ESC k	107	60	Select NLQ Font	9-22
ESC !	33	21	Master Select	9-23

Print size and Character Width

ASCII	Dec.	Hex.	Description	Pg
ESC P	80	50	Select 10 cpi	9-23
ESC M	77	4D	Select 12 cpi	9-23
SI	15	0F	Select Condensed Mode	9-24
ESC SI	15	0F	Select Condensed Mode	9-24
DC2	18	12	Cancel Condensed Mode	9-24
SO	14	0E	Select Double-wide Mode (one line)	9-25
ESC SO	14	0E	Select Double-wide Mode (one line)	9-25
DC4	20	14	Cancel Double-wide Mode (one line)	9-25
ESC W	87	57	Turn Double-wide Mode On/Off	9-26

Print Enhancement

ASCII	Dec.	Hex.	Description	Pg
ESC E	69	45	Select Emphasized Mode	9-26
ESC F	70	46	Cancel Emphasized Mode	9-26
ESC G	71	47	Select Double-strike Mode	9-27
ESC H	72	48	Cancel Double-strike Mode	9-27
ESC S0	83	53	Selects Superscript Mode	9-27
ESC S1	83	53	Select Subscript Mode	9-28
ESC T	84	54	Cancel Superscript/Subscript Mode	9-28
ESC 4	52	34	Select Italic Mode	9-28
ESC 5	53	35	Cancel Italic Mode	9-29
ESC -	45	2D	Turn Underlining Mode ON/Off	9-29

Word Processing

ASCII	Dec.	Hex.	Description	Pg
ESC a	97	61	NLQ Justification	9-30

Character Tables


ASCII	Dec.	Hex.	Description	Pg
ESC t	116	74	Select Character Tables	9-31
ESC R	62	52	Selects an International Character Set	9-31
ESC 6	54	36	Enable Printable Characters	9-32
ESC 7	55	37	Enable Upper Control Codes	9-32

User-defined Charactera

ASCII	Dec.	Hex.	Description	Pg
ESC &	38	26	Define User-defined Characters (draft mode)	9-32
ESC &	38	26	Define User-defined Characters (NLQ mode)	9-33
ESC :	58	3A	Copy ROM to RAM	9-33
ESC %	37	25	Select User-defined Set	9-33

Graphics

ASCII	Dec.	Hex.	Description	Pg
ESC K	75	4B	Select Single-density Graphics Mode	9-34
ESC L	76	4C	Select Double-density Graphics Mode	9-34
ESC Y	89	59	Select High-speed Double-density Graphics Mode	9-34
ESC Z	90	5A	Select Quadruple-density Graphics Mode	9-35
ESC *	42	2A	Select Graphics Mode	9-35
ESC ?	63	3F	Reassign Graphics Mode	9-36
ESC ^	94	5E	Select 9-pin Graphics Mode	9-36



DIP Switch Settings

DIP Switch 1

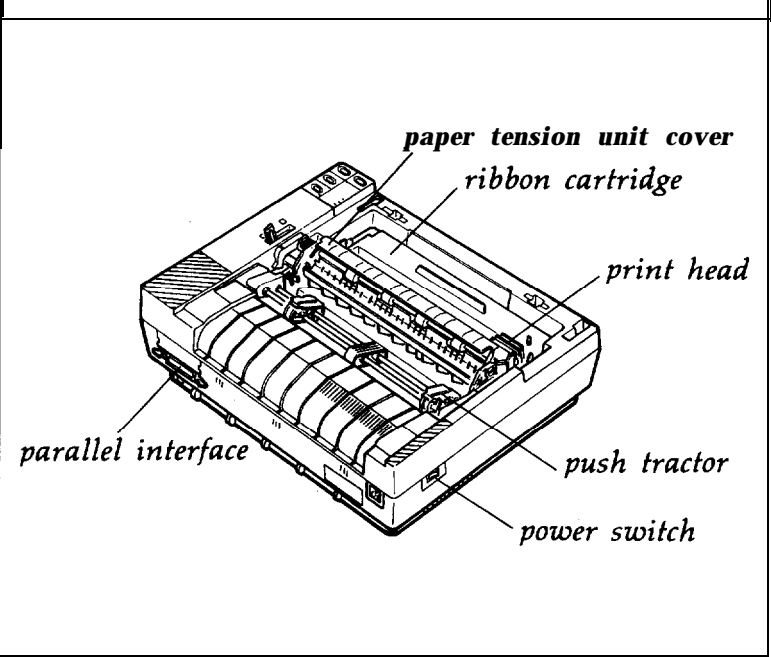
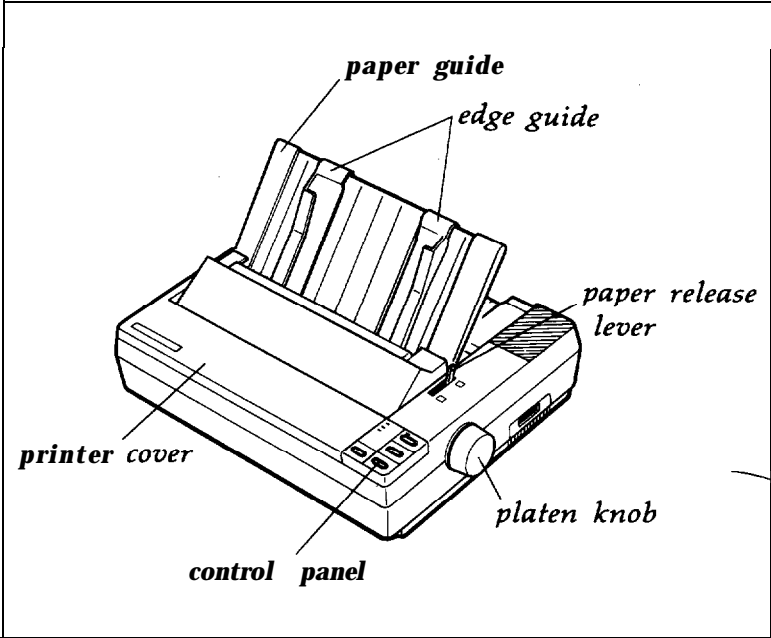
SW	Description	ON	OFF
1-1	Character spacing	12 cpi	10 cpi
1-2	Shape of zero	Slashed	Not slashed
1-3	Character table	Graphics	Italics
1-4	Short tear-off	Invalid	Valid
1-5	Draft printing speed	Normal	High
1-6	International character set	See the table below	
1-7			
1-8			

DIP Switch 2


SW	Description	ON	OFF
2-1	Page length	12 inches	11 inches
2-2	Cut sheet feeder mode on/off	ON	OFF
2-3	1-inch skip over perforation	ON	OFF
2-4	Auto line feed	ON	OFF

International Character Sets

Country	SW 1-6	SW 1-7	SW 1-8
USA	ON	ON	ON
France	ON	ON	OFF
Germany	ON	OFF	ON
UK	ON	OFF	OFF
Denmark 1.	OFF	ON	ON
Sweden	OFF	ON	OFF
Italy	OFF	OFF	ON
Spain 1	OFF	OFF	OFF



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Printed in Japan 89.03.S.5A

C-01