EPSON®

P-80 PORTABLE PRINTER

User's Manual

FCC COMPLIANCE STATEMENT
FOR AMERICAN USERS

This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. It has been type tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or 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 computer with respect to the receiver
- Plug the computer into a different outlet so that the computer 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:

"How to Identify and Resolve Radio-TV Interference Problems."

This booklet is available from the U.S. Government Printing Office, Washington, DC 20402. Stock No. 004-000-00345-4.

WARNING
The connection of a non-shielded printer interface cable to this printer will invalidate the FCC Certification of this device and may cause interference levels which exceed the limits established by the FCC for this equipment.

Contents

List of Figures

List of Tables

Introduction

The Epson P-80 is a portable, battery-operated printer that enables you to print anywhere you go. It adds state-of-the-art thermal transfer technology to other features that have made Epson printers so popular.

P-80 Features

Because the P-80 is lightweight and portable, it is ideal to take along with you anywhere, yet it still functions as a full-sized printer. Here are some of the features:

- Uses plain or thermal paper

- Contains various print modes that can be combined to produce different print styles. These include:

    Roman and Italic print fonts
    Four different print pitches
    Bold printing

- Has an easy-to-use Underline mode

- Creates graphics with two densities and has a special graphics character set to let you create your own charts, diagrams, figures and illustrations

- Generates eight international character sets

About This Manual

Although the P-80 is simple to operate, you will need to take some time to read this manual and learn about the functions of the printer. This user's manual is not long, but it contains a lot of important information.

The first three chapters of this manual help you set up, operate, and maintain your printer. Chapter 4 contains information on how to use control codes with your printer. Chapter 5 shows you how to combine print modes and Chapter 6 explains the printer's graphics features.

The appendixes contain helpful information about selecting print styles and character sets and about using control codes to obtain certain printer functions. Appendix A lists the control codes and the possible terms for each code. Appendix A also shows the character sets available on the P-80. Appendix B summarizes the control codes and Appendix C lists the codes by function. Appendix D gives information on how to use your P-80 with the Geneva™PX-8™. Finally, Appendix E provides the specifications for the P-80.

Chapter 1
Setting Up Your P-80

In this chapter, you'll learn how to prepare your printer for operation and how to connect it to your computer. But first, take inventory. With your P-80 you should receive the items shown in Figure 1-1. They are:

1. Your P-80 printer

2. Two thermal ribbon cassettes

3. An AC adapter

4. Five sheets of paper

5. This P-80 *Printer User's* Manual

Remove any packing adhesive or packing pads that you see. It's a good idea to save all your packing materials. You may want to store or ship your printer someday.

Printer Preparation

Once you have verified that all the items for the printer are included, you're ready to prepare the printer for operation. Start by identifying the printer's main parts (see Figure l-2). Take a couple of minutes to familiarize yourself with these parts and their names. Figure l-2 shows how the printer will look when you finish preparing it for operation.

Note: Do not turn on the P-80 until you complete the printer preparation.
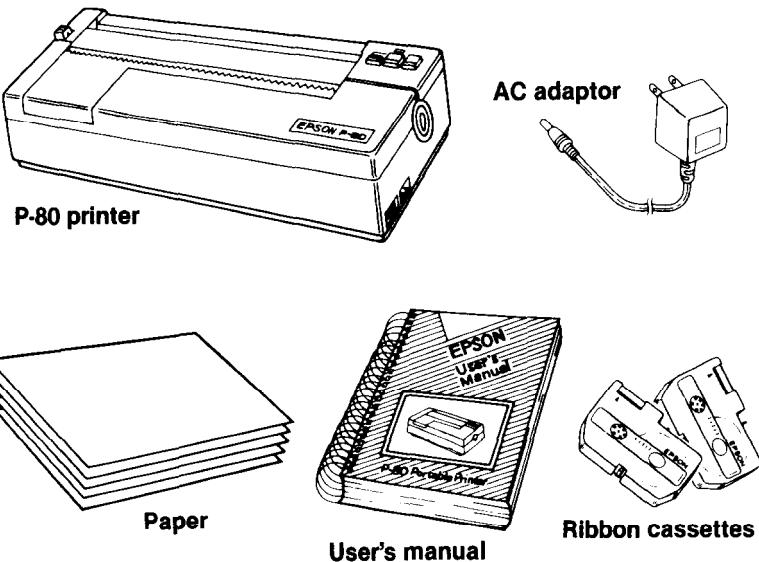
Figure 1-1. Unpacking the P-80
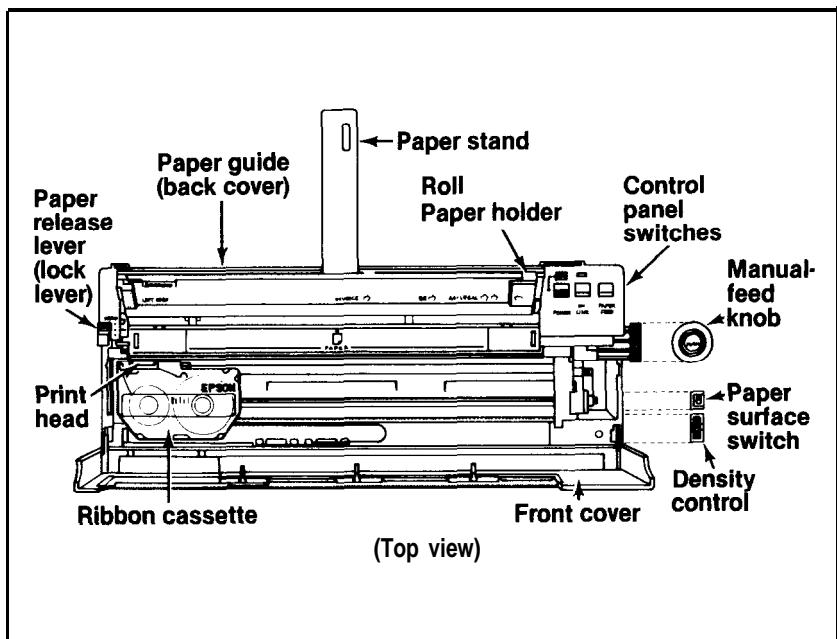
Figure 1-2. Identifying the printer parts

Covers

The front and back covers are designed to keep your P-80 free from dust. It is a good idea to keep them closed **when** your printer is not in ***use.***

The front cover protects the print mechanism and reduces the noise level when the printer is on. The serrated edge serves as a convenient tear-off point.

It's a good idea to keep the front cover closed while printing as it helps guide the paper out of the printer. You only need to lift this cover when you are installing a ribbon cassette.

There is a plastic gray lever on the left side of your printer. This lever holds the back cover shut. Notice the words OPEN and LOCK. Ignore the words FEED and FREE, above and below the lock lever, for now. They deal with paper installation functions (discussed in Chapter *3).*

To unlock the back cover, push the lever to the open position (see Figure **l-3).** To lock it, hold the back cover shut and pull the lever to the lock position.
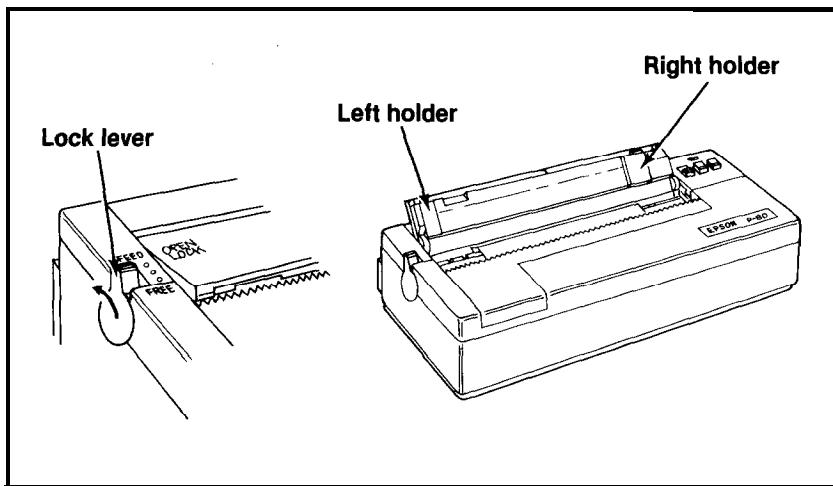
Figure 1-3. Locking lever

When you release the lock lever, the back cover pops up slightly. Push the cover back until it stands vertically as shown in Figure *1-3.* The back cover now has a new function. It serves as your paper guide.

Note: Before you continue, take a moment to look inside your printer. You will see a gray bar with a line and the word *paper.* Remove the thin transparent strip covering this bar.

Paper guide

As mentioned above, when the back cover is vertical, it serves as a paper guide. The paper guide helps you align your paper correctly to ensure that it feeds properly through the printer.

Find the arrow marked PAPER STAND on the upper left comer of the paper guide. Notice the metal paper stand. To lift the paper stand, place your thumb where the arrow indicates. With slight pressure, pull up on the stand until it is vertical. The function of the paper stand is to keep the paper straight.

There is a plastic paper holder at each side of the paper guide. These holders keep your paper from sliding. The holder on the left is stationary and is labelled LEFT EDGE. The right holder is a sliding scale that will accommodate paper from 5½ to 8½ inches wide. When closing the back cover, make sure the right holder is pushed all the way to the right. Otherwise, the cover will not close properly.

Three arrows indicate the paper widths most often used. The first one is marked INVOICE, the second B5, and the third A4•LEGAL. The A4•LEGAL is the one you use for 8½-inch wide paper.
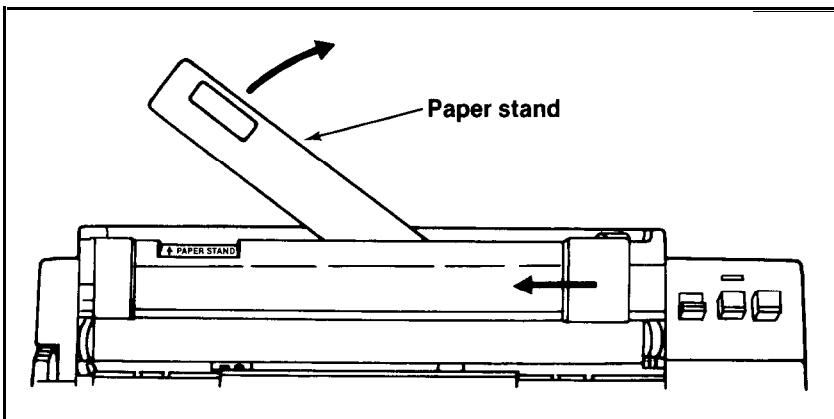
Figure 1-4. Paper guide

Ribbon installation

When you are using thermal paper, you do not have to install the ribbon cassette. With any other type of paper, install the ribbon cassette as described below. Chapter 3 gives an explanation of the types of paper to use.

Before installing the ribbon cassette, you need to lift the front cover (Figure l-5). Firmly grasp both sides of the cover and pull up. It should tilt toward you easily. If you happen to lift the cover off completely, replace it by positioning the hinge at each end of the cover over the hinge posts at the front of the printer. The hinges allow you to easily open and close the cover without removing it.
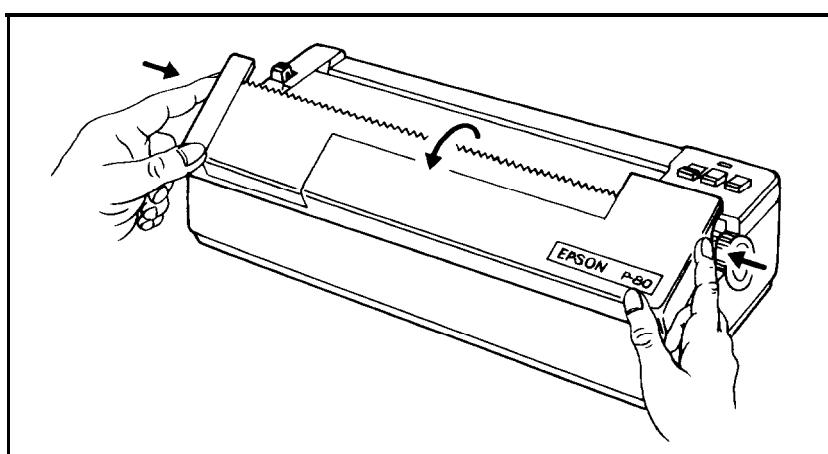
Figure l-5. Lifting the front cover

The P-80's ribbon cassette is easy to install. You never have to worry about getting ink on your hands. Just follow these simple steps and refer to Figure 1-6 for quick installation:

1. Make sure the printer is OFF.

2. Remove the orange tab holding the ribbon by pulling up on the end indicated by the arrow.

3. As Figure 1-6 shows, take up any slack in the ribbon by turning the ribbon counterclockwise until it is taut.
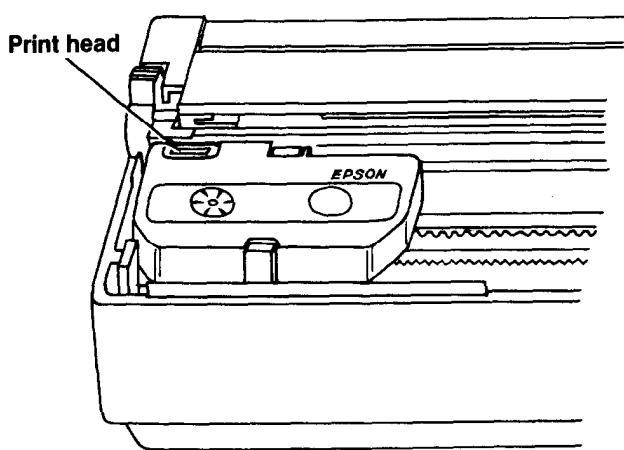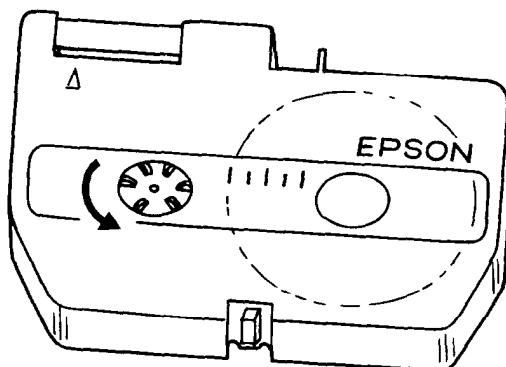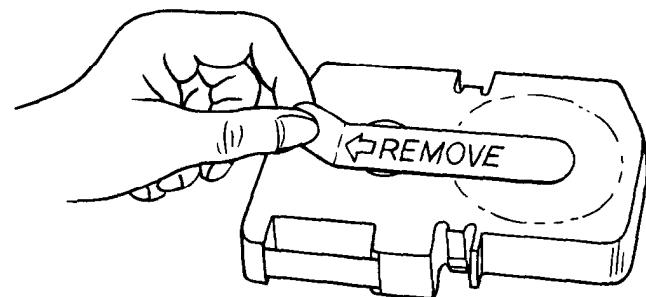
Figure 1-6. Installing the ribbon

4. Hold the cassette so that the exposed ribbon is on the left side and the closed ends of the ribbon holes are on top. Place the cassette over the print mechanism. Make sure the ribbon is placed in front of the silver print **head.** Press down and snap it into place.

That's all there is to it. Now just close the front cover.

Manual-feed knob

The manual-feed knob is used to advance the paper manually. It is located on the right side of your printer. When your printer is packed, the knob is pushed in flush with the right side. To bring it out, push the center of the knob in and release it. The knob should pop out. To feed the paper manually, turn the knob clockwise. See Figure 1-7.
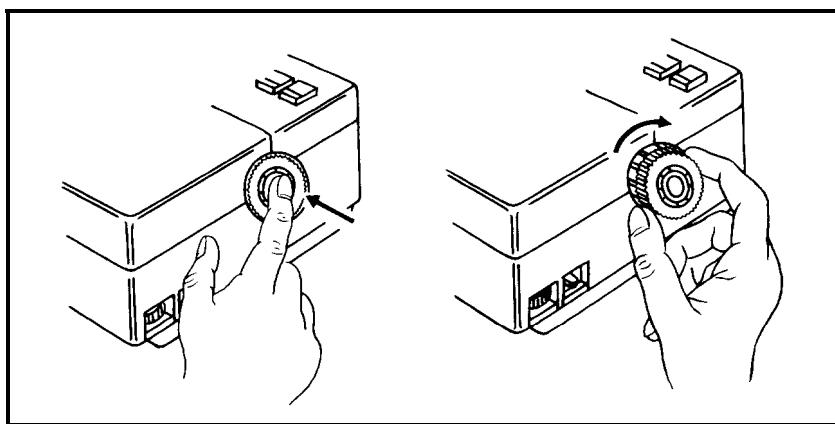
Figure 1-7. Manual-feed knob

DIP Switches

Two groups of switches, called **DIP switches,** are located at the back of your printer (Figure 1-8). The first group of four switches is referred to as switch 1 and the second group of eight switches is referred to as switch 2. These switches are set at the factory, and you probably won't need to touch them. You may, however, want to take the time to learn about the switches and their functions in case you need to make adjustments.
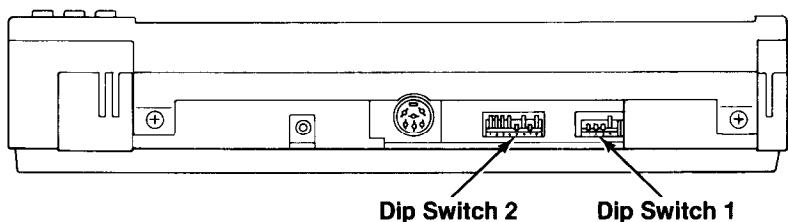
Figure 1-8. DIP switches

Note: Make certain the printer is turned OFF when you change DIP switch settings. The P-80 checks these settings only at power-up and it will ignore any changes made with the power on (until it is turned off and back on).

Switch 1

The functions of the four switches that make up switch **1** are summarized in Table 1-1.

Table l-l. Settings **for** *switch 1*

Switch No.	Function	OFF	ON	Factory setting
1-1	International Character Sets (See Table 1-2.)			ON
1-2				ON
1-3				ON
1-4	Auto line feed (AUTO FEED XT signal)	No auto line feed	Auto line feed with CR	OFF

Switch 1-1, 1-2, 1-3 - These switches are used to determine the default international character set. The factory-set condition is for the U.S.A. characters. Table 1-2 shows the required switch settings for each set. Appendix A shows the characters included in each of the character sets.

10

You can also access the International characters by using a ***control code.*** **See** Chapter *4* for an explanation of control codes and Appendix B for the appropriate code.

Table 1-2. International character switch settings

Country	SW 1-1	SW 1-2	SW 1-3
U.S.A.	ON	ON	ON
France	OFF	ON	ON
Germany	ON	OFF	ON
England	OFF	OFF	ON
Denmark	ON	ON	OFF
Sweden	OFF	ON	OFF
Italy	ON	OFF	OFF
Spain	OFF	OFF	OFF

Switch *1-4* **-** This switch controls the automatic line feed. The factory-set condition is OFF which means the computer must send line feeds. When this switch is ON, the printer performs an automatic line feed with each carriage return.

If you are not sure if your computer sends a line-feed code to the printer at the end of each print line, leave the switch the way you find it. You can change this switch if your first printing occurs all on one line or with the lines spaced twice as far apart as you requested.

Switch 2

The P-80 uses the **RS-232C** serial interface to communicate data from your computer to the printer. The switches which make up switch 2 are used to set up the proper serial communications for the RS-232C serial port.

The factory-set condition is shown in Table l-3 and should be appropriate for most computers. If you have any problems getting data to print correctly from your computer, consult your computer manual or ask your dealer.

Table 1-3. Settings for Switch 2

Switch No.	Function	OFF	ON	Factory setting
SW-2-1	Data bit length	8 bits	7 bits	OFF
2-2	Party check	No	Yes	OFF
2-3	Parity	Odd	Even	OFF
2-4	Stop bit	2 bits	1 bit	OFF
2-5	Baud rate setting (See Table I-4.)			O N
2-6				OFF
2-7				ON
2-8				OFF

The factory-set baud rate for the P-80 is 4800. If your computer requires another baud rate, the following chart gives the appropriate DIP switch settings.

Table 1-4. Baud rate switch settings

DIP2-5	DIP2-6	DIP2-7	DIP2-8	Bit rate (bps)
ON	ON	ON	ON	*75*
OFF	ON	ON	ON	110
ON	OFF	ON	ON	134.5
OFF	OFF	ON	ON	150
ON	ON	OFF	ON	*200*
OFF	ON	OFF	ON	*300*
ON	OFF	OFF	ON	*600*
OFF	OFF	OFF	ON	1,200
ON	ON	ON	OFF	1,800
OFF	ON	ON	OFF	*2,400*
ON	OFF	ON	OFF	*4,800*
OFF	OFF	ON	OFF	*9,600*
ON	ON	OFF	OFF	*300*
OFF	ON	OFF	OFF	1,200
ON	OFF	OFF	OFF	*2,400*
OFF	OFF	OFF	OFF	*9,600*

Connecting the P-80 to Your Computer

Your printer preparation is almost complete. Now it's time to connect your printer to your computer. First make sure the power switches for your printer and your computer are turned OFF.

12

For many computers, you merely plug the printer cable into your computer. However, some computers require a printer interface card, either mounted inside or outside the computer. Check your computer installation or operations manual for details on how to connect your computer to your printer, or consult your dealer.

As mentioned above, the P-80 uses the RS-232C serial interface (but the connector is a 6-pin DIN type). Figure 1-9 shows where you connect the cable to the printer. Make sure that the connector is aligned correctly. Don't force it into the socket.

Your Epson dealer stocks a variety of cables as well as interface boards.
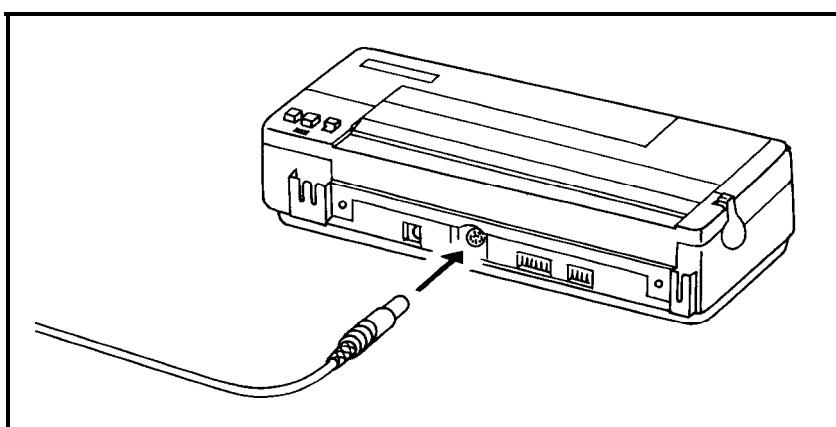
Figure 1-9. Connecting the printer cable

Chapter 2
Operation and Maintenance

Your P-80 is now connected to your computer and ready for operation. In this chapter you'll learn how to use the controls and indicators on **the** printer to operate it correctly. You'll also learn how to recharge the battery and maintain your P-80 to keep it printing smoothly for a long time.

Switches and Indicators

The few switches and indicators on the P-80 require a brief explanation **so that** you can have a better understanding of how to use them. The printer does not have to be connected to your computer to test **these** switches.

The control panel

The control panel switches are located on the top (right comer) of your printer (Figure *2-l).* These switches control the main functions of the printer. Here is what they do:
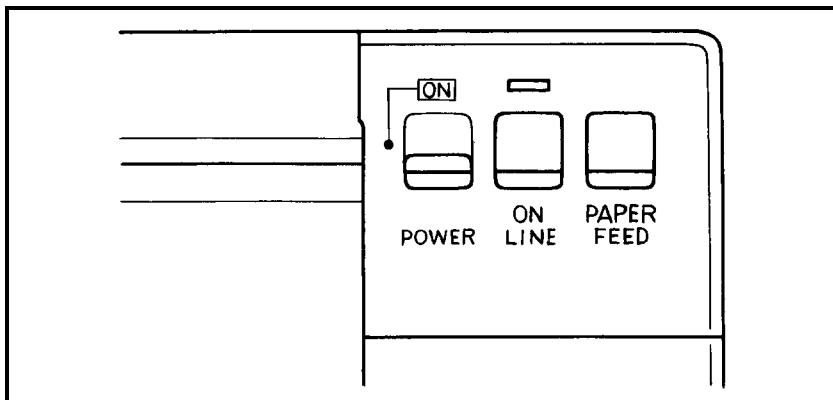
Figure 2-1. Control panel switches

POWER switch — This switch activates the power when it is in the ON position. Push this switch on and you will hear the print head prepare itself for printing.

ON LINE switch — This switch allows you to switch back and forth from on-line to **off-line** status. When the printer is on-line, it is ready to receive data from the computer. When the printer is off-line, it is not ready.

ON LINE light — The red light, located above the ON LINE switch, indicates whether the printer is on or off line. The light glows red when the printer is on-line, and when the light is off, the printer is off-line. If you turn the power ON without any paper in the printer, the ON-LINE light will not glow, even if you press the ON-LINE switch.

   The ON LINE light blinks when the motor has locked or the battery is low. When the light is blinking, first check to see if the paper or ribbon cassette is stuck. If either of these is stuck, turn the power off and correct the problem. The ribbon cassette should return to the starting position on the left side when you turn the power back on. If you can not find anything wrong with the printer, the blinking light is indicating that your battery is low. Turn the power OFF and plug in the AC adapter as described later in this chapter.

PAPER FEED switch — This switch allows you to automatically advance the paper one line at a time. You can only activate this switch when the printer is off-line. Tap this switch to advance the paper one line at a time. Hold the switch down to advance the paper several lines at once.

Paper control switches

   There are two switches located on the right side of your printer (Figure 2-2). These switches allow you to make certain adjustments to improve the print quality on your paper.

DENSITY switch — This switch makes the print lighter or darker. Move the switch toward the back of the printer to make the print lighter; move the switch toward the front of the printer to make it darker.
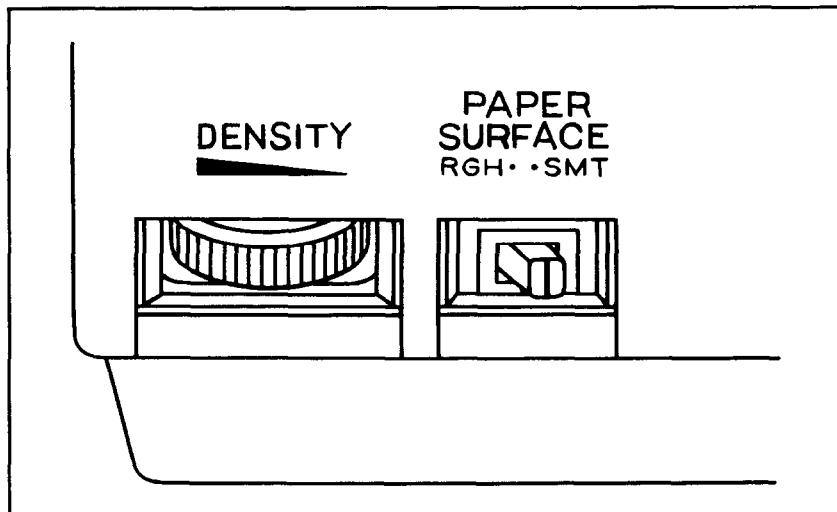
Figure 2-2. Paper control switches

PAPER SURFACE switch — This switch adjusts the print head speed to improve the print quality on standard paper. Push this lever toward the front when using coarse paper; push it back when using smooth or thermal paper.

Note: You have to set the paper surface switch with the power OFF for the change to take effect.

Paper-out sensor

The P-80 is equipped with a device that warns you when the printer is at the end of the paper. When your paper reaches the end, the ON LINE light goes off and printing stops.

To resume printing, place another sheet of paper into the printer, and press the ON LINE switch. If you do not want to resume printing, turn the power OFF and back ON again. Each time the printer is turned ON, it reinitializes-resets to its settings at start up.

The Battery and AC Adapter

Note: Charge the battery with the AC adapter before using your printer for the first time. To do this, follow the instructions given below for charging the battery.

The P-80 will print approximately 60,000 characters (or 30 pages on 8½ by **11** paper with 2,000 characters each) on a fully charged battery.

17

The battery needs charging when **the** print becomes very slow and the ON LINE light blinks. To charge the battery, first turn the power OFF. Then plug the AC adapter into the back of **the** printer as shown in Figure 2-3. The battery charges in six to seven hours.
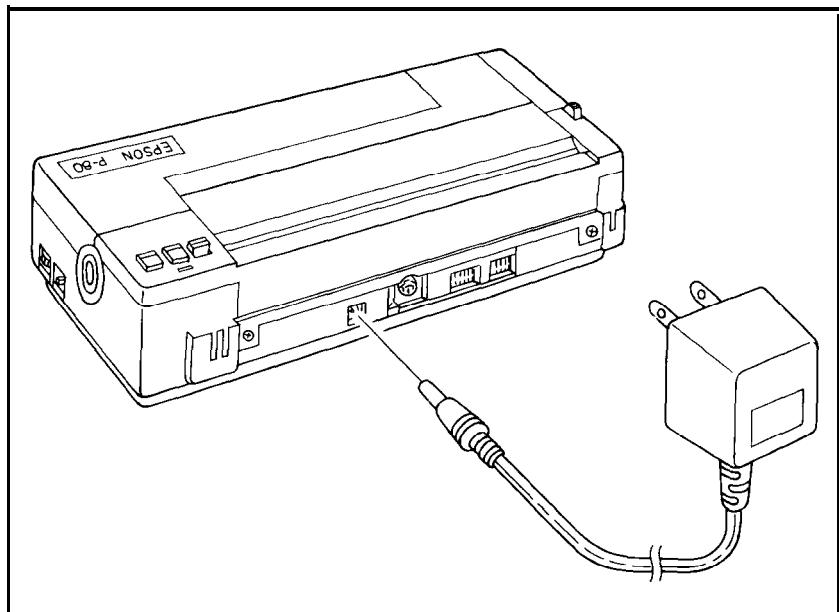
Figure 2-3. Plugging in the AC adapter

The printer can be used with the AC adapter connected without waiting for the battery to charge. However, when you are finished printing, switch the power off and charge the battery for six to seven hours.

Once you unplug the adapter, let the printer run on its own until it needs recharging. Recharging the battery more often than needed can weaken it.

WARNING: **Do not charge the battery for more than 24 hours. Also, do not leave the power switch ON when recharging the battery and the printer is not in use. Doing either of these may severely shorten the battery life.**

Battery Replacement

Your P-80 uses a nickel cadmium battery. If the red light keeps flashing after the battery has been charged, the battery has come to the end of its life and must be replaced. Nickel cadmium batteries are available through your Epson dealer.

To replace the battery, follow the steps below.

1. See that the power switch is OFF,

2. Remove the two screws on the **battery holder cover** at the back of the printer by using a Phillips screwdriver (Figure 2-4).
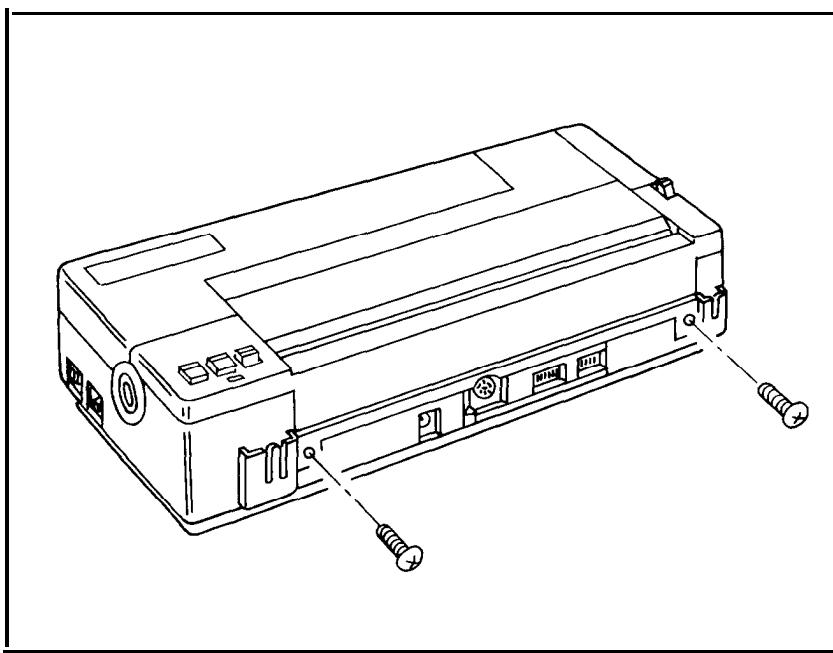
Figure 2-4. Removing the screws

3. Carefully lift the battery holder cover by placing your index fingers at the top of the cover as shown in Figure 2-5, and your thumbs underneath the ridge at the bottom of the cover.
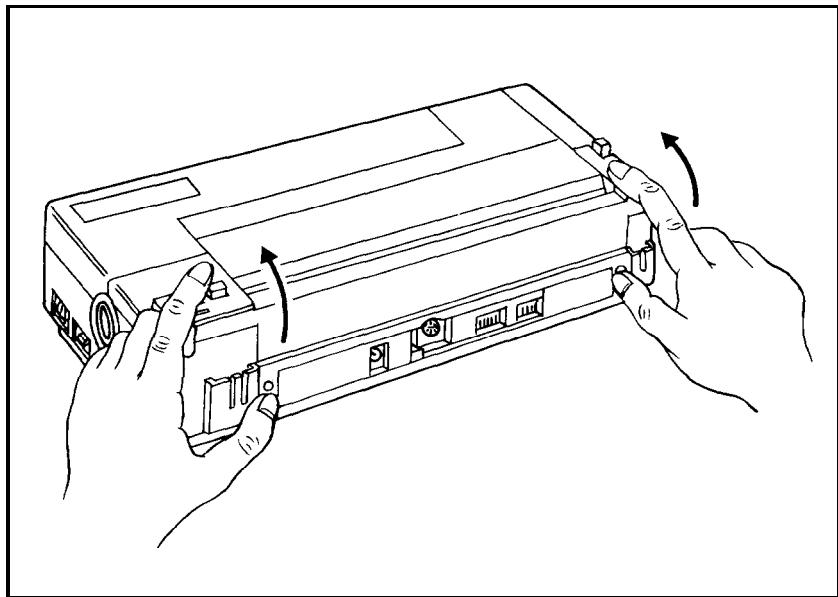
Figure 2-5. Lifting the cover

4. With the battery holder cover open, locate the battery connector near the POWER switch. It is marked CN7. Unplug the battery connector noting the direction of insertion. Remove the battery with a screwdriver as shown in Figure *2-6.*
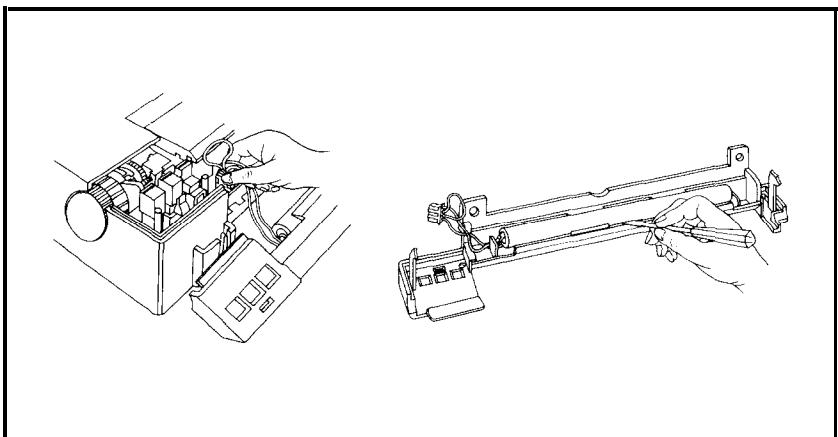
Figure 2-6. Removing the battery

5. Place the new nickel cadmium battery into the battery holder with the connector cable at the bottom. Insert the battery connector into the slot marked CN7.

6. To reinstall the battery holder cover, you first need to remove the front cover.

7. Push the battery holder cover back into place, at the back of the printer, seeing that the tabs on each side are inside the cover, and the switches and indicator light fit properly in their slots (Figure *2-7).*
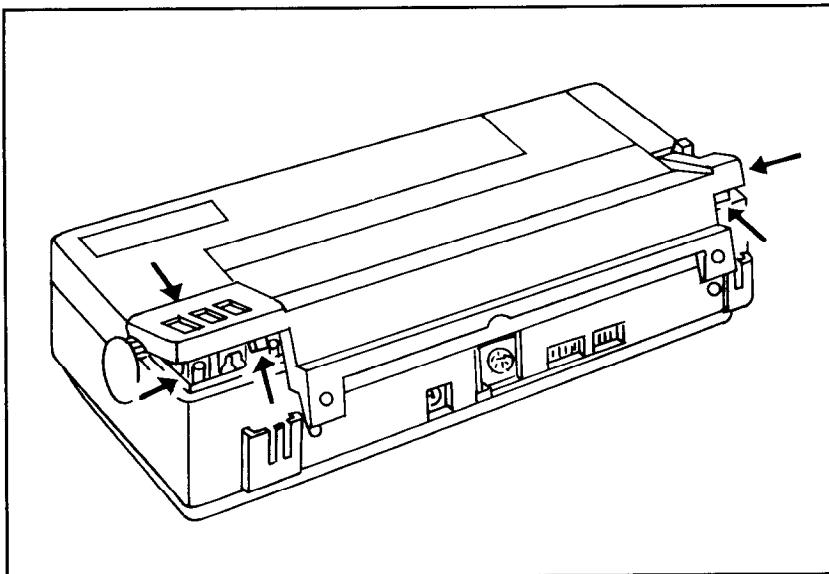
Figure 2-7. Replacing the battery holder cover

8. Replace the two screws at the back of the cover and replace the front cover.

WARNING: Do not disassemble the battery or throw it into a fire.

Maintenance

As with any mechanical device, the best maintenace of your P-80 is preventive maintenance. Here are some general guidelines to follow:

1. Keep your printer in a safe, clean location away from extreme temperatures.

2. Clean particles and dust from the printer with a soft cloth or brush.

3. Clean the outside of the printer with a mild cleanser when it appears dirty.

4. If your printer is not operating correctly, do not attempt to repair it yourself. Take your printer to an authorized Epson dealer for service.

Although your P-80 is solidly built, it's not indestructible. If you treat your printer with care, it should give you years of reliable service.

Chapter 3
Installing Paper

By this point, you're probably anxious to start printing. In this chapter, you'll learn the different types of paper your P-80 can use and how to install the paper. Then you can start to print by having the printer perform a self-test.

Paper Types

The type of paper to use with your P-80 is thermal paper. It will give you the best quality print. Since thermal paper is heat-sensitive, you do not need to use the ribbon cassette.

Thermal paper prints only on the glossy side, the side that is slightly darker. If the glossy side is not facing the print head, nothing prints.

Observe the following precautions in handling and storing thermal paper:

- Do not attach plastic adhesive tape to the paper.

- Handle the paper carefully so as not to bend or stain it. Damaged areas may become discolored or fail to print.

- Do not store the paper in hot, humid places (cars, heaters, direct sunlight).

When you are printing rough drafts, you can use smooth finish paper like the sample sheets included with your printer. It is necessary to use a ribbon cassette with this type of paper. Your Epson dealer can assist you with the correct types of paper to use with your P-80.

Remember to adjust the PAPER SURFACE switch for the type of paper you are using. For coarse paper, set the switch to RGH; for smooth or thermal paper, set the switch to SMT.

Paper sizes

The printer uses single-sheet paper and handles any paper the width of the platen (8½ inches) or narrower. You can also use continuous-feed paper or roll paper.

The right paper holder will not hold paper narrower than 5½ inches. When you use paper that is narrower than 5½ inches, make sure that the paper stays straight as it is feeding through the printer. Otherwise, your print lines may slant across the paper.

Paper Release Lever

The lock lever on the left side of your printer serves as a paper release lever. Notice the words FEED and FREE above and below the lever. In the FEED position, the roller inside the printer holds the paper and causes it to feed through the printer. The FREE position allows you to make adjustments if the paper is not aligned correctly in the printer.

Paper Loading

There are a couple of adjustments to make before loading your paper. Check to see that the lock lever is in the FEED position and the paper stand is all the way up. Slide the right holder all the way to the right side of the printer. Follow these steps to load your paper:

1. Place your paper at the top of the paper guide and slide it underneath the left holder (Figure 3-l).

2. Adjust the right holder to the width of the paper (unless your paper is less than 5½ inches wide).

3. Make sure the paper is straight and placed in the printer as far as it can go.
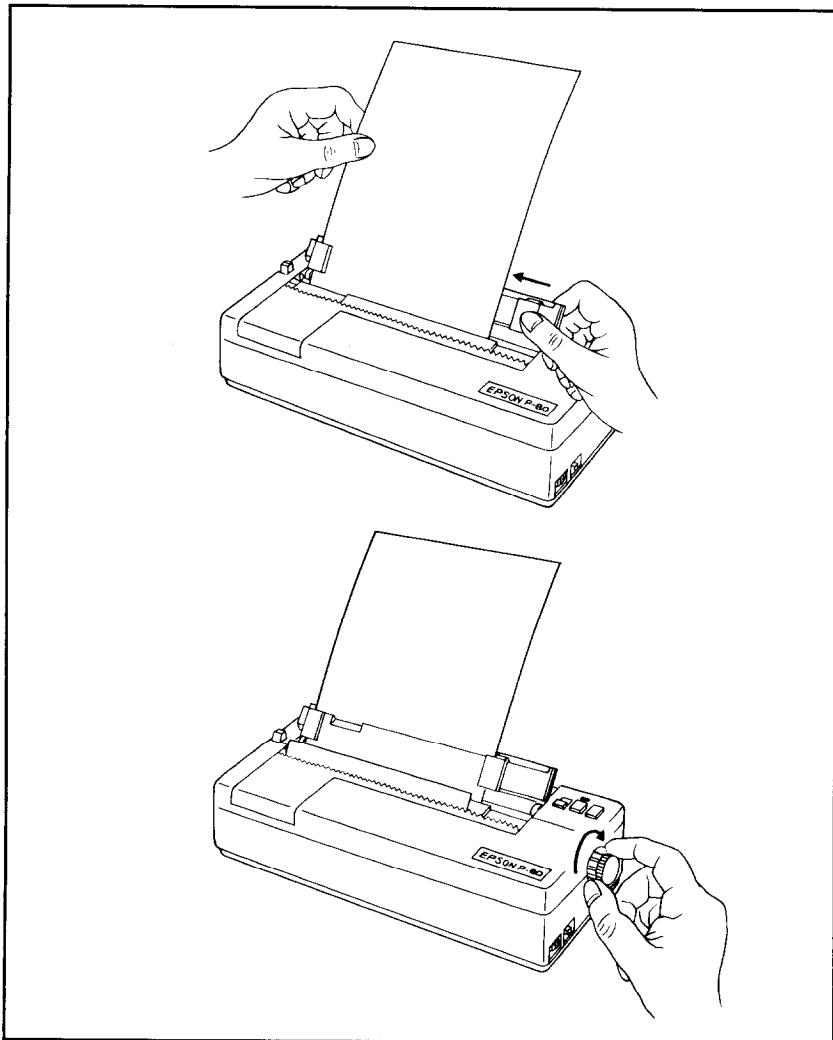
Figure 3-1. Loading the paper

4. Turn the manual-feed knob clockwise until the paper feeds through to the front as shown in Figure 3-1.

5. Put the power switch in the ON position if you have not done so already.

You are now ready to print.

Removing the paper

When you are finished printing, remove the paper by using the manual-feed knob. If your paper is almost out of the printer, you can release it by placing the lock lever in the FREE position.

The P-80 Self-Test

It's time to see how your P-80 operates. The *P-80* self-test is a built-in program that prints all the standard characters. It provides an opportunity to test the ribbon and the paper installation without having to request a printout from your computer. If fact, you don't even need a computer to perform the self-test.

Start by placing a sheet of 8½-inch wide paper in your printer. With the power OFF, hold down the PAPER FEED switch and turn the power ON. Release the PAPER FEED switch when the *P-80* starts printing. The characters will be printed as shown in Figure 3-2. The printer will continue indefinitely until you turn the power OFF or run out of paper.

Figure 3-2. The P-80 self-test

Note: If you turn the printer off in the middle of printing, the print head may be in the printing position. (The print head is pressed into the paper.) When this occurs, turn the power ON for a few seconds to allow the print head to return to its starting position at the left.

Chapter 4
Control Codes

This chapter explains how a computer uses control codes to send instructions to your printer. Specifically, you'll learn how the control codes work with the P-80. (Appendix A shows a complete listing of all the P-80 control codes.)

If you are going to use your printer with commercial software packages, it is not necessary for you to read this chapter. You can follow the printer installation instructions given in your computer or software manual. Most software packages include installation routines for dot matrix printers. It may be that you only have to specify which type of printer interface, such as RS-232C, you are using.

Note: As mentioned in Chapter 1, the P-80 uses the RS-232C serial interface. If your software asks for specifications you do not understand, consult your dealer for assistance.

ASCII Codes

Since there are many different kinds of computers and many different kinds of printers, almost all computers use a standard set of codes to communicate with printers. This set of codes is called the ***American Standard Code for Information Interchange*** (ASCII).

Pressing a character key on your computer produces a bit pattern representing a particular ASCII (pronounced "ask-ee") code. The code is interpreted by the printer, which responds by printing the letter, number, or symbol desired. ***Control codes*** control specific printer functions.

Most of the 256 ASCII numbers are codes for specific characters. Typically, codes 32 through 126 are reserved for the standard set of

alphanumeric characters and special symbols. For instance, 65 represents the capital letter "A", while 90 represents the capital letter "Z." On the P-80, the graphics character set is stored at codes 128 through 159. Other ASCII numbers control computer and printer functions.

Table 4-1 summarizes the range of the ASCII codes used by the P-80. Appendix B summarizes the functions for each of the ASCII control codes.

Note: Codes can be expressed in binary, hexadecimal, or decimal form. For ease of understanding, we use the decimal form.

Table 4-1. *The P-80 and ASCII Codes*

ASCII code group	P-80 Interpretation
1 to 32	Printer control codes
33 to 126	Standard (roman) character set
128 to 159	Graphics character set

In summary, some ASCII codes produce standard characters and special symbols, some produce graphics characters, and others control the printer's functions.

Using Control Codes

Most of the time you don't have to give this code system much thought. When you are using a word processing system, you press the letter **A** on the keyboard, and the computer prints the letter A on the printer.

Some ASCII codes, however, don't have characters on the keyboard. The most important of these are the ASCII codes that have values less than 32. As mentioned above, these codes are the printer control codes. Most keyboards can produce these codes by holding down the control key (often marked **CTRL)** while pressing a letter key. The combination of **CTRL/M** produces ASCII 13, which is the code to start a new line, and referred to as a *carriage return.* The

following chart shows many different ways of referring to the code for **the carriage** return function.

Carriage return	Its common name
CR	The abbreviation of its name
13	The decimal ASCII code
0DH	Its hexadecimal ASCII code
CTRL/M	Its control-code name
CHR$(13)	Its usage in BASIC

As you can see there are many different ways to refer to a single code. This information helps you identify what code is being referenced. Your computer manual may refer to ASCII 13 while your software program refers to CTRL/M. You now know that both refer to the same code.

ASCII Codes as CHR$(n)

The ASCII codes take on a new form when you use them with programming languages. For example, in BASIC, the ASCII codes take the form of CHR$(n), where n represents **the** desired code. The capital letter A, which is the ASCII code 65, is CHR$(65). You are telling the computer which code you **want** by inserting the number within the parentheses following the CHR$. Depending on the code, you instruct your printer to print a character, or perform a function (such as execute a line feed or print italics).

The ESCape code

So many features have been added to printers that even 256 ASCII codes are inadequate if only single-code CHR$ instructions **can** be used. Because of this, the logic of the P-80 has been designed to understand special sequences of control codes, the ESCape code sequences. This permits major expansion to the availability of control codes.

Each ESCape code sequence consists of **the** ESCape code (usually abbreviated (ESC)), which is CHR$(27), plus one or more of **the** other P-80 CHR$ codes. You use these code sequences to select one or more printing features, or modes.

For example, the ESCape code used to turn the italic print function on is <ESC>"4". The (ESC) is the abbreviation for CHR$(27) and the numeral 4 is the ASCII equivalent of CHR$(52). The <ESC>"4" is easier to remember than CHR$(27)CHR$(52).

You will have a better understanding of how the (ESC) codes work when you use them in your programming. Appendix A lists all the ASCII codes and Appendix B summarizes their functions.

A BASIC example

Keep in mind that the ASCII codes and the ESCape sequences are mostly used with programming languages. One example is to use your printer to print listings of your programs.

Different computer systems access the printer in different ways. For example, most computers that use Microsoft BASIC send PRINT or LIST commands to the printer by adding a leading L to a screen command: LPRINT, LLIST. Your computer may not use these commands. If you are not familiar with your computer's command conventions, check its manual.

We use BASIC in the following programs since it is widely used in portable computers. If necessary, substitute the commands required by your computer.

Once you have discovered how your computer communicates with the printer using BASIC, enter the following program lines into your computer.

```
10 LPRINT CHR$(27);"-1";
20 LPRINT "Underline"
```

Now list the lines on the printer using your computer's version of the LLIST command. RUN the program, and you'll get this:

<u>Underline</u>

With the underline mode, you can underline characters or blank spaces, which is useful when creating forms that have lines for signatures or data. See this for yourself by adding these lines to your program. Enter 10 blank spaces in line 30 and 15 blank spaces in line 40.

```
30 LPRINT "                "
40 LPRINT "                    "
```

Run your program. The result is:

Underline
<u>   </u>

Underline mode does not use the underline character which is probably used in your word processing software. Since the underline character is only five dots wide, it does not print in the space between each text character. Type and run a new program:

```
NEW
10 FOR X=1 TO 41: LPRINT CHR$(95);: NEXT X
20 LPRINT CHR$(13);
30 LPRINT "THIS PROGRAM USES THE UNDERLINE
   CHARACTER"
```

THIS PROGRAM USES THE UNDERLINE CHARACTER

The printer's underline mode, used in the example on the previous page, provides you with an idea of how a programming language can be used. There are many tutorial books available if you would like to learn more about using BASIC with your printer.

Chapter 5
Combining Print Modes

One of the most pleasing aspects of your P-80 printer is its variety of print modes that can be combined to make different typestyles. You access these print modes through programming languages such as BASIC. You can also access them through your word processing program, if your program allows you to insert print commands in the text (for example, Portable WordStar'").

This chapter gives a short explanation of how dot matrix characters are formed, briefly describes the different print modes, and then shows you how the print modes can be combined.

Dot-Matrix Printing

The P-80 uses a dot matrix to plot the characters it prints. Vertically, the matrix consists of 6 main and 5 intermediate columns. Horizontally, the matrix consists of 9 rows.

The P-80 characters are designed to be five or fewer columns wide. The sixth column is left blank to allow for space between text characters (some of the graphics characters use the sixth column).

Because the use of 5 dots does not give enough detail for the highest quality characters, the P-80 prints some dots half way between the main columns in the 6-dot-wide matrix. This enhancement results in a matrix grid that is actually 11 dots wide-6 main columns with 5 intermediate columns. You can count the 11 positions on the grid shown in Figure 5-1.
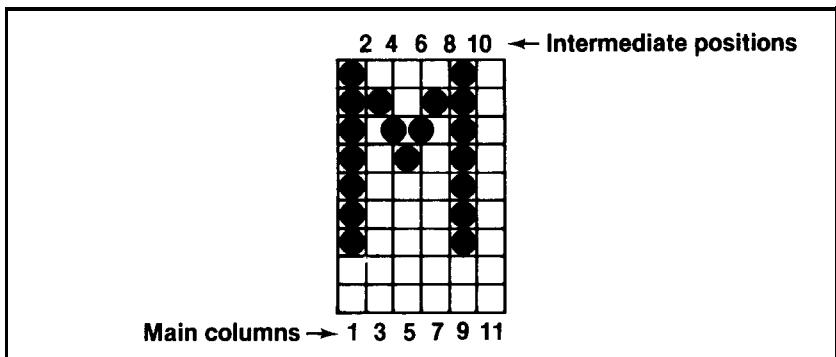
Figure 5-1. Main columns and intermediate positions

   Although each P-80 character is designed to be five or fewer col-
umns wide, dots can also be placed midway between **each** main col-
umn. This means that the dot pattern is printed twice, shifted one half
dot to the right. Figure 5-2 shows how the dots printed in these inter-
mediate columns actually overlap with those in the main columns.
You can see this difference between the dots **shown** in Figure 5-1 and
the overlapping dots in Figure 5-2. (An example of a print mode using
overlapping dots is shown later in this chapter.)
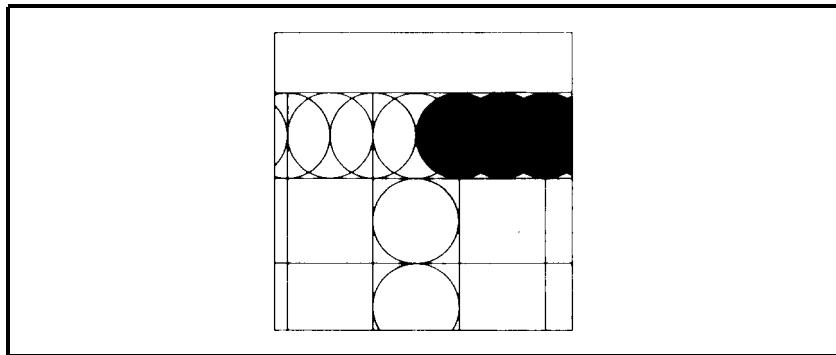
Figure 5-2. *Overlapping dots*

Print Pitches

   There are two print pitches (or widths) available on the P-80. They
are Pica and Compressed. Pica is a standard character width used on
typewriters and prints 10 characters per inch. Compressed pitch prints

just over 17 characters per inch. The smaller characters allow for spreadsheets, or other work that requires compact printing, to be squeezed on an 8½-inch page.

In Figure 5-3, you can see the difference in the two pitches. Pica is the default, the pitch in effect when the printer is turned on.

Figure 5-3. Comparison between print pitches

Pitch Mode Combinations

Expanded is a print mode that can be used with either Pica or Compressed print pitches. You can add this mode to your program to print-out for one line only or for longer passages. Expanded can also be used with most of the other modes.

Expanded mode

Expanded mode doubles the width of the current pitch mode. It does this by printing twice as many dots, twice as wide, as you can see in Figure *5-4.*
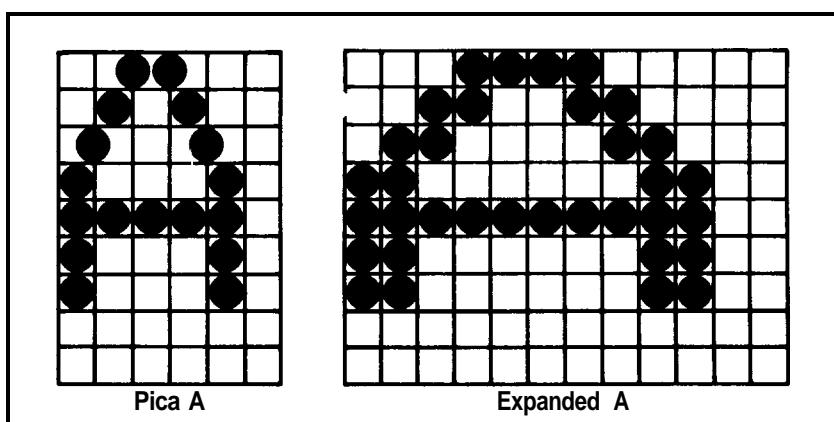
Figure 5-4. Pica and Expanded letters

Print Quality Modes

There are two modes that produce boldface (darker) characters which make your printout more distinctive. These modes are Double-Strike and Emphasized. Each gets its bold effect by printing overlapping dots as explained earlier in this chapter. Figure 5-5 shows the difference between Single-Strike (the default), and Emphasized.

On the P-80, Double-Strike and Emphasized produce the same result. Double-Strike may produce a slightly different result **when** printed through your software.
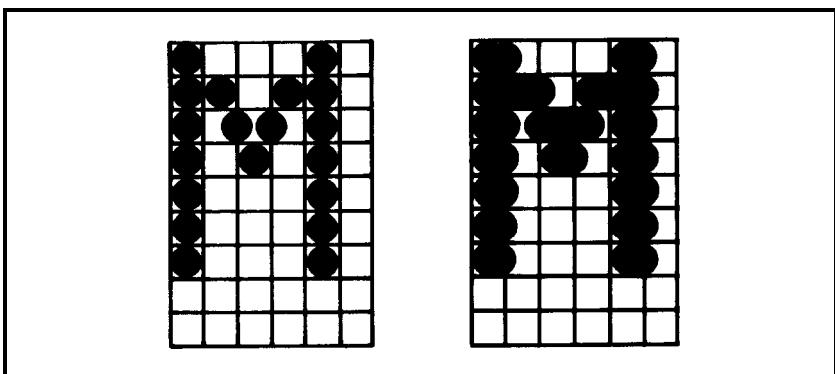
Figure 5-5. Print quality differences

Dress-up Modes

There are two more modes you can mix with any of the other modes to give your printouts a finished touch-Italic and Underline.

Italic characters are printed in a typeface completely different from the more usual Roman characters. Any computer system can select Italic mode without software adjustments.

The P-80 has a built-in Underline mode making it easy for you to underline anything. You can underline characters or blank spaces as demonstrated in Chapter 4.

Mode Conflicts and Priorities

Print modes have an order of priority; some modes are assigned greater value than others. Also, certain modes can be combined and others cannot. If two modes which are not equal in value are used

together, the one with less priority is temporarily ignored. Only when the higher priority mode is turned off, will the lower priority mode take effect.

For example, suppose you activate both Emphasized and Compressed. Since these modes cannot be combined, the printer must make a choice. In this case, the printer **chooses** Emphasized because it is assigned higher priority (see Table 5-l).

Table 5-1. Summary **of** *modes*
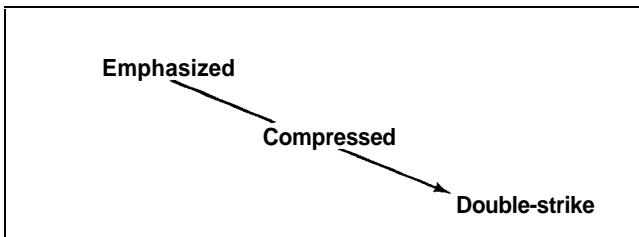
Mixing Modes

Not all mode combinations create conflicts. You can combine most modes to produce the different typestyles shown in Table **5-2 at the** end of this chapter. Appendix B gives you the commands needed to instruct **the** printer to print any combination of **these** modes.

Summary Notes

1. Pica is the default pitch and is active when Compressed is turned off.

2. The two modes that produce boldface characters are Double-Strike and Emphasized. Single-Strike is the default.

3. Double-Strike and Emphasized produce **the** same result.

4. When two modes conflict, the one of lesser priority is masked (not cancelled). For example, Compressed and Emphasized cannot be printed at the same time. When both are active, printing is in Emphasized. When Emphasized is cancelled, printing is in Compressed.

5. When Expanded is active, Compressed takes priority over Emphasized.

6. Emphasized and Double-Strike will not mix with Compressed.

7. Italics, Underline, and Expanded modes combine with any print mode.

Table 5-2. Typestyles

	Normal Print	Italic	Under-line	Italic Under-line
Single-Strike Pica	ABCD	ABCD	AECD	*A B C D*
Single-Strike Compressed	ABCDEFG	ABCDEFG	ABCDEFG	ABCDEFG
Single-Strike Emphasized Pica	ABCD	*A B C D*	ABCD	ABCD
Double-Strike Pica	ABCD	*A B C D*	ABCD	ABCD
Single-Strike Expanded Pica	A B	*A B*	AB	*AB*
Single-Strike Expanded Compressed	A B C	A B C	*A B C*	A B C
Single-Strike Emphasized Expanded Pica	A B	*A B*	*A B*	A B
Double-Strike Expanded Pica	A B	*A B*	*A B*	*A B*

Chapter 6
Graphics

Your P-80 is capable of printing special graphics characters and dot graphics, but you do need some programming knowledge to use these graphics features. This chapter is included for those who wish to design their own programs to take advantage of the printer's graphics capabilities.

Some computers allow you to draw figures on the screen using graphics characters and then dump them to the printer using a screen dump command. Check your computer's documentation to see if it contains this feature.

Graphics Characters

The P-80 contains a set of special graphics characters which are the same graphics characters available on the Geneva™ PX-8™. The graphics characters are accessed with ASCII codes 128 through 159. If your computer cannot access codes greater than 127, you will not be able to use the graphics characters.

To access the graphics characters in BASIC, you use CHR$(n) where n is an ASCII code between 128 and 159. The following program prints out all of the special characters in Expanded mode. Type the program in exactly as shown and RUN it.

```
10 LPRINT CHR$(27)"W1"
20 FOR X=128 TO 138
30 LPRINT CHR$(X)" ";
40 NEXT X: LPRINT
50 FOR X=139 TO 149
60 LPRINT CHR$(X)" ";
70 NEXT X: LPRINT
```

```
80 FOR X=150 TO 159
90 LPRINT CHR$(X)" ";
100 NEXT X: LPRINT
110 LPRINT CHR$(27)"@"
```


Remember that you can print these characters in different pitches
and weights. For example, if you want to see them in Pica, delete line
10 from your program to produce the result below.

You probably can think of many uses for the graphics characters
that represent objects and symbols. The program below gives you an
idea of how the line graphics characters (shown in the first row
above), can be combined to create artworks or business forms. Type
in the following lines but do not run the program yet:

```
10  LPRINT  CHR$(27)"A"CHR$(7)CHR$(27)"E"CHR$(27)"W1"
20 READ R
30 IF R>0 THEN LPRINT CHR$(R);: GOTO 20
40 IF R=0 THEN LPRINT: LPRINT CHR$(27)"@": END
50 IF R=-1 THEN LPRINT: GOTO 20
60 N=-R: READ R: FOR K=1 TO N: LPRINT CHR$(R);
70 NEXT K: GOTO 20
```

Line 10 turns on Emphasized and Expanded Modes as well as special
line spacing (discussed later in this chapter). The next six lines print
graphics characters using DATA from the lines to be added in the next
stage of the program.

Add these DATA lines to produce a four-part box with graphics
characters in each part:

```
80  DATA  135,-6,133,130,-6,133,136,-1
90 DATA 134,-6,32,134,32,154,32,,154,32,154,134,-1
100 DATA 134,144,143,144,143,144,143,134,-6,32,134,-1
110  DATA  132,-6,133,128,-6,133,131,-1
```

```
120 DATA  134,-6,32,134,-6,149,134,-1
130 DATA   134,152,32,152,32,152,32,134,-6,32,134,-1
140 DATA 137,-6,133,129,-6,133,138,0
```


Now that you have seen the program work, you can substitute your own DATA lines to make it print **any** combination of graphics characters **you** need. Notice **that** each DATA line corresponds to a print line, and each ends with -1, except for the last, which ends the program with a zero. For spaces, you use 32, the ASCII code for a space. You can repeat any character, including the space, by entering **the** number of repetitions as a negative number followed by the number of the character to be repeated. For example, the first part of line 90 supplies the DATA for one vertical line (character 134), six spaces, and another vertical line.

Dot Graphics

Think of your piece of paper as an artist's canvas waiting for the images you create. With dot graphics, you use dots instead of brush-strokes to form your pictures and designs. If you plan carefully where you want the dots to appear and use your computer to give the printer the proper instructions, your P-80 will generate nearly any pattern or figure you wish.

Printing high-resolution graphics on **the** P-80 requires a mode that is very different from text modes. In dot graphics mode, none of the predefined characters or symbols in the printer's memory is used. Instead, you create the patterns of dots that are printed. Thus, you control where each and every dot is printed.

Print Head

For each column position on a print line, the print head impresses the pattern of dots **that** you have specified. Before you can start designing these patterns, you need to know a little more about the way **the** print head works.

Each time the print head makes a horizontal pass, it prints a pattern of dots. To print figures taller than 7 or 8 dots, the print head must make more than one pass. Each pass of the print head contains one piece of **the** total pattern, which can be as tall or short as you desire. You don't **have** to use the whole page or even an entire line for your graphics figures. In fact, you can use as little or as much space as you like for a figure-and put it anywhere on the page.

Graphics Mode

The command to enter the Graphics mode is quite different from **the** other commands covered so far in this manual. For graphics, you must specify not only that you want to use graphics mode, but also in what density and for how many columns.

There are two graphics densities, single and double. The format for entering Single-Density Graphics mode is:

```
LPRINT CHR$(27)"K"CHR$(n₁) CHR$(n₂);
```

The CHR$(27)"K" specifies Single-Density Graphics, and the two numbers (n_1 and n_2) determine the number of columns reserved for graphics. The format is the same as above for Double-Density, except you use CHR$(27)"L".

Column reservation numbers

The graphics mode requires two numbers to specify how many columns of graphics you want because the CHR$ function in BASIC is limited to the numbers between 0 and 255. Since you can specify 480 dot positions in Single-Density and 960 in Double-Density, you need more than one CHR$ number. Therefore, the Graphics mode command is designed to use two CHR$ numbers for reserving columns, and you must supply two numbers even if you only need one.

The first number that you specify (n_1) indicates a number of columns (0-255). A 255 in **that** position says "reserve 255 columns for graphics." If you don't need more than 255 columns, you use a 0 for n_2.

To reserve more than 255 columns for graphics, the second number (n_2) must be greater than 0. But n_2 does not represent a number of single dots; it represents a number of groups, each of which contains 256 dots. Using a 1 in the second slot means reserve 1 group of 256 dots plus whatever is in the first slot. For Double-Density Graphics,

you can use a 2 or 3 for n_2. A 2 in the second slot means reserve 2 groups of 256 dots (512) plus whatever is in the first slot and so on-up to 3 times 256 (or 768) dots.

An easy way to determine the correct numbers for n_1 and n_1 is to figure the maximum number of dots per line in the density you want to use (480 in Single-Density and 960 in Double-Density), then use that number to calculate the number of columns you need. For example, if you want a line half a page wide in Double-Density, the maximum number of dots in that density is 960, so you will want to reserve half that number of columns-480. To calculate the numbers for n_1 and n_2 that will reserve 480 columns, divide 480 by 256. The number of times that 256 will go into 480 is the number to use for n_2 and the remainder is the number to use for n_1. Therefore, n_2 would be 1, and n_1 would be 124.

If fact, you can have your program do the calculations for you with the following format:

```
LPRINT CHR$(27)"L"CHR$(N MOD 256)CHR$(INT(N/256));
```

N is the total number of columns you want to specify. The BASIC MOD (modulus) function calculates the value for n_1, and the INT (integer) function calculates the value for n_2.

This format can be used with either graphics density and with any value of N up to the maximum number of columns per line for that density.

Labelling Elements

Once you put the printer into Graphics mode, your next step is to tell the print head which elements to fire in each column. You do this by sending numbers via the CHR$ function. Each number that you send represents a unique combination of dots.

Since computers use the binary numbering system (0s and 1s only), each element corresponds to the decimal equivalent of one bit in an 8-bit binary number: 1, 2, 4, 8, 16, etc. (see Figure 6-l).
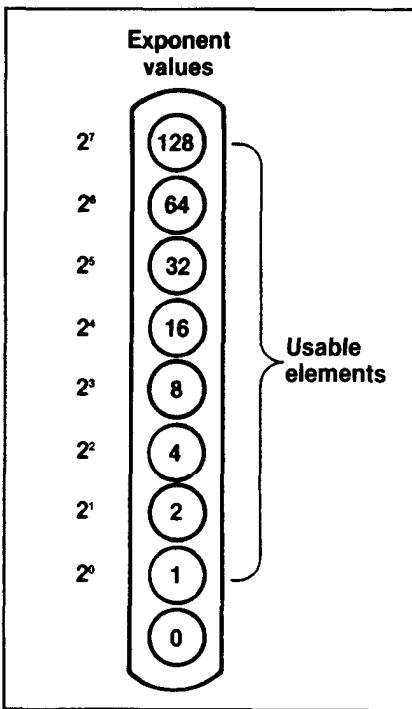
Figure 6-1. *Labelling elements*
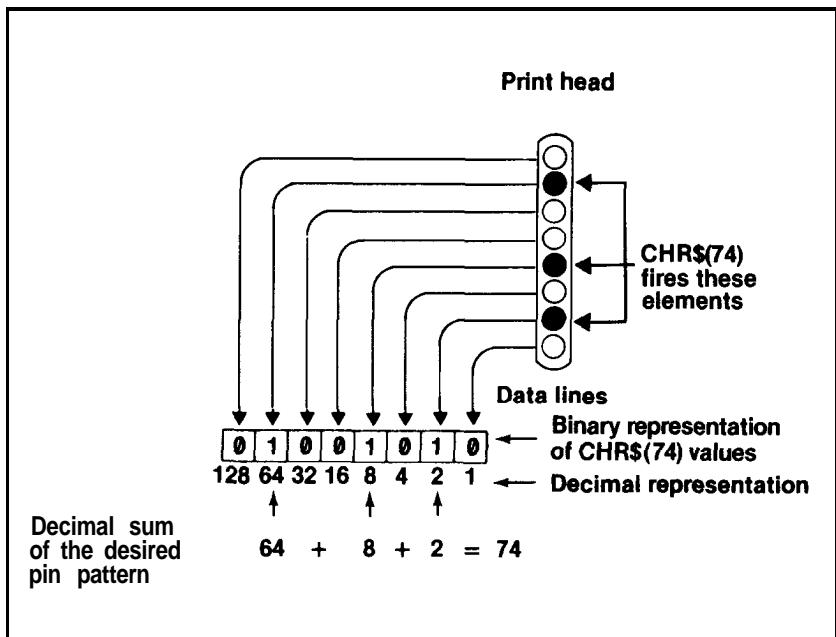
Figure 6-2. Element combinations

The place values in a binary number are powers of two. Figure 6-2 shows how you use a decimal sum—74—to fire a particular pattern. If you try adding several numbers together, you'll see that with this system you get no duplicates. The number 6 represents elements 2 and 4 (since 2 + 4 = 6) and there is no other way to get 6 by adding powers of two. This means that any combination of the eight elements adds up to a unique decimal number that falls within the range 0 to 255.

With this labelling system, you fire the top element by sending LPRINT CHR$(128). To fire the bottom graphics element, you send LPRINT CHR$(1). If you want to fire only the top and bottom elements, you simply add 128 and 1, then send LPRINT CHR$(129). By adding the appropriate label numbers together, you can fire any combination of elements you want.

Note: If your computer system cannot send ASCII codes above 127, you will not be able to fire the top element.

A Graphics Program

Now that we have discussed how Dot Graphics works, the following program gives you an example of what you can do. This program creates a series of space invaders. Type the program in exactly as you see it.

```
10  WIDTH LPRINT 255
20 INPUT "GRAPHICS CODE (K, L)";CODE$
30 INPUT "n1 and n2 PLEASE";N1,N2
40 INPUT "HOW MANY GRAPHICS DATA";DCOUNT
50 DIM D(DCOUNT)
60 FOR J=1 TO DCOUNT
70 INPUT "DATA";D(J)
80 NEXT J
90  LPRINT  CHR$(27);CODE$;CHR$(N1);CHR$(N2);
100 FOR L=1 TO (N1+N2*256)/DCOUNT
110 FOR K=1 TO DCOUNT
120 LPRINT CHR$(D(K));
130 NEXT K
140 NEXT L
150 END
```

When you RUN the program, it will first ask you to enter the control code that you want to use for dot graphics. Your choices are <ESC> K or <ESC> L. Enter K to run the program in Single-Density.

The width of one space invader in this program is 12-dot positions (plus one blank space). This means that 13-dot positions are enough data to describe a single invader. We will use a series of 20 invaders for this program. This gives you a total of 260 (13 x 20) dot positions for data.

To find n_1 and n_2, divide 260 by 256 and you get a quotient of **1** with a remainder of 4. Enter 4 as the value for n_1, and **1** as the value for n_2. Enter these values with a comma between them.

The program then asks you how many data per space invader. Enter **13** and press **RETURN.**

The program now asks the order of the data for a single invader. The data numbers are shown at the bottom of Figure 6-3. Enter them one at a time, pressing **RETURN** after each data number. The program prompts you by showing DATA? each time. Once you enter the last data number, the program prints out.
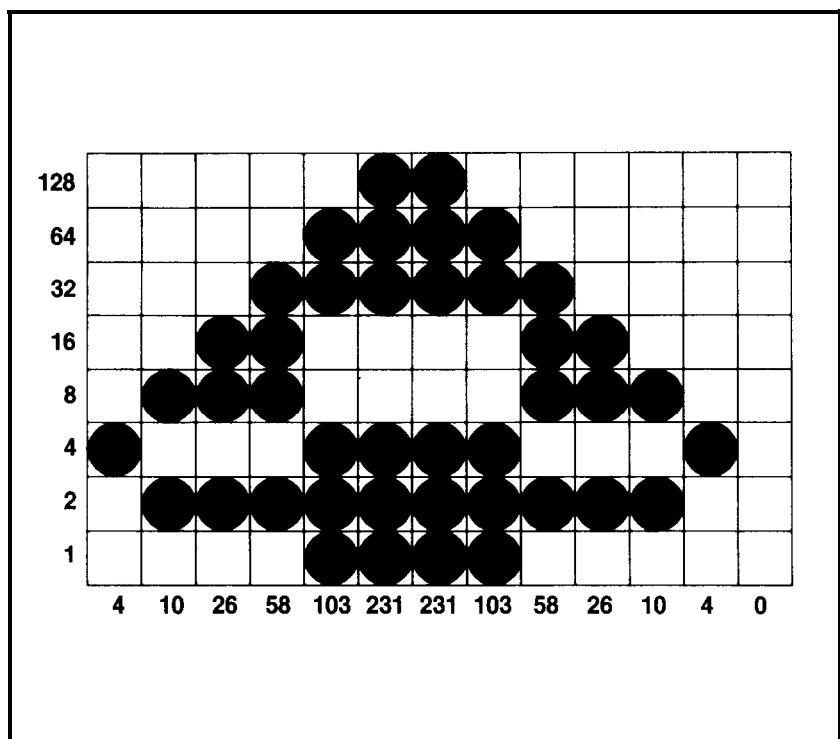
Figure 6-3. Data for space invader

Note: If you don't understand how the numbers were determined, refer to Figures 6-1 and 6-2.

It takes a while for your system to compute the data so be patient. Your printout should look like this:

Run the program once more, but this time use Double-Density mode. When the program asks you for a control code, enter **L.** Enter the rest of the data exactly as you did with Single-Density mode. You should achieve the following result.

If your printout does not look like this one, be sure you are entering the correct values for n_1 and n_2. If the values are not correct, and more data is sent to the printer than it was told to expect, it will interpret values as character codes,

Graphics Programming Tips

The information in this section will provide you with a few elements to keep in mind when programming in graphics.

Line spacing

To print figures taller than 7 or 8 dots in Graphics mode, the print head must make more than one pass. If you use the default 12-dot (1/6 inch) line spacing, the print head will leave gaps between the graphics lines, just as it does between the text lines. To avoid such gaps in your patterns, adjust the line spacing to 8-dot with ESCape"A"CHR$(8) and print consecutive lines until the figure is complete.

ESCape "A"CHR$(n), where n represents n/72-inch, changes the distance that a line feed covers to n dots. The ESCape "A"CHR$(n) command sets the line spacing to n/72-inch if the n is any number from 0 through 85. If n is between 85 and 128, the line spacing *is* 85/72-inch.

47

WIDTH statements

Many computer systems automatically insert a carriage return and a line feed after every 80 characters. This insertion usually causes no problem with text, but it can spoil your graphics. In the Graphics mode, some systems insert the control codes after 120 columns, which may be in the middle of a line.

You can usually prevent these unwanted control codes with a WIDTH statement such as the one below:

```
WIDTH LPRINT 255
```

The format for your system may differ. Consult your computer's documentation to find the correct format for your system. Then put a WIDTH statement in one of the first lines of all your graphics programs. It is easier to put a WIDTH statement in all but the simplest of your programs than to examine each one to see whether it needs such a statement.

Semicolons and command placement

After the graphics command is issued, every number sent to the printer is interpreted by the P-80 as a dot pattern and is printed on the paper. Therefore, you must be careful where you put the graphics command in your program, and you must not put another command between the graphics command and the graphics data.

For example, suppose you want to print a 50-column graphics line and you want to set the line spacing to o-dot for future additions to the program. You might enter the following program:

```
20 LPRINT CHR$(27)"K"CHR$(50)CHR$(0)
30 LPRINT CHR$(27)"0"
40 FOR G=1 TO 50: LPRINT CHR$(74): NEXT G
```

This program has all the necessary elements. Line 20 has the command for Single-Density Graphics and specifies 50 columns. (Remember that you must use two CHR$ numbers to reserve columns even if you only need the first one.) Line 30 has the correct command for 9-dot line spacing, and line 40 calls for the printing of a pin pattern 50 times.

Although this program has all the necessary elements, it will not give you the printout of a single pattern that you want, as you can see in the partial printout in Figure 6-4.
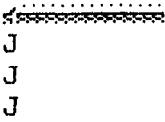
Expected pattern | **Actual result**

Figure 6-4. Result of incorrect program

Once the graphics mode is in effect, every number sent to the printer is interpreted as a dot pattern and printed on the paper. Since no semicolon appears at the end of line 20, the numbers 13 and 10-the codes for carriage return and line feed-are sent to the printer after CHR$(0), and interpreted as dot patterns.

Line 30, the command for 9-dot line spacing is also interpreted as a dot pattern. Since no semicolon appears at the end of this line, the numbers 13 and 10 are sent again and printed as pin patterns as well.

In line 40 nothing is sent to the printer until after the LPRINT. Then the desired dot pattern-CHR$(74)-is finally sent. Again, since no semicolon is after CHR$(74), 13 and 10 are sent each time the loop is executed.

After the P-80 has received all the numbers that are reserved by the graphics command-50 in this case-it leaves the Graphics mode and resumes interpreting numbers in the normal way. Because the incorrect program has sent many extra numbers, mainly 10s and 13s, the 50 reserved columns are filled before the loop in line 30 has been executed 50 times. Therefore, during the last passes of the loop, the P-80 interprets CHR$(74) as the ASCI code for "J". It prints a "J" and issues a carriage return and line feed for each of the last 35 passes of the loop.

To make the program work correctly, put the line-spacing command in line 10, delete line 30, and add two semicolons: one at the end of line 20 and one between CHR$(74) and the colon in line 40.

This program is explained in detail so that you remember two important points about using the graphics command:

- Use semicolons to prevent the P-80 from printing carriage return and line feed codes as pin patterns.

- Do not put any other commands between the graphics command and its data.

We hope this example helps you identify errors if one of your own programs gives you unexpected results.

Appendix A
ASCII Codes and Character Sets

This appendix provides information about the ASCII codes used on the P-80 printer. The first section shows the available codes between 0 and 32 with their decimal and hexadecimal numbers, abbreviations, and the control keys associated with each code. The first section also displays, in ASCII order, the decimal and hexadecimal numbers and a printout of each character in the USA Roman font. The characters for the Roman font that make up the USA character set occupy ASCII positions 33 through 126.

The second section shows the international characters available on the P-80 and their corresponding ASCII codes. The international characters can be selected by changing the DIP switches as mentioned in Chapter 1, or they can be selected by using <ESC>"R" (see Appendix B). The second section also shows the graphics character set. The graphics character set occupies ASCII positions 128 through 159.

Included in the second section are some special characters in the USA character set that are worth noting. These characters may not appear on your computer's keyboard but you can access them by using the appropriate ASCII code.

ASCII Codes

Decimal	Hexadecimal	Abbreviation	Control key
9	09	<HT>	Control-I
10	0A	<LF>	Control-J
12	0C	<FF>	Control-L
13	0D	<CR>	Control-M
14	0E	<SO>	Control-N
15	0F	<SI>	Control-O
18	12	<DC$_2$>	Control-R

Decimal	Hexadecimal	Abbreviation	Control key
20	14	<DC4>	Control-T
27	1B	<ESC>	Control-)
32	20	<SP>	

Decimal	Hexadecimal	Character	Decimal	Hexadecimal	Character
33	21	!	72	48	H
34	22	"	73	49	I
35	23	#	74	4A	J
36	24	$	75	4B	K
37	25	%	76	4C	L
38	26	&	77	4D	M
39	27	'	78	4E	N
40	28	(	79	4F	O
41	29	)	80	50	P
42	2A	*	81	51	Q
43	2B	+	82	52	R
44	2C	,	83	53	S
45	2D	—	84	54	T
46	2E	.	85	55	U
47	2F	/	86	56	V
48	30	0	87	57	W
49	31	1	88	58	X
50	32	2	89	59	Y
51	33	3	90	5A	Z
52	34	4	91	5B	[
53	35	5	92	5C	\
54	36	6	93	5D	]
55	37	7	94	5E	∴
56	38	8	95	5F	—
57	39	9	96	60	`
58	3A	:	97	61	a
59	3B	;	98	62	b
60	3C	<	99	63	c
61	3D	=	100	64	d
62	3E	>	101	65	e
63	3F	?	102	66	f
64	40	@	103	67	g
65	41	A	104	68	h
66	42	B	105	69	i
67	43	C	106	6A	j
68	44	D	107	6B	k
69	45	E	108	6C	l
70	46	F	109	6D	m
71	47	G	110	6E	n

Decimal	Hexadecimal	Character	Decimal	Hexadecimal	Character
111	6F	o	120	78	x
112	70	p	121	79	y
113	71	q	122	7A	z
114	72	r	123	7B	{
115	73	s	124	7C	|
116	74	t	125	7D	}
117	75	u	126	7E	~
118	76	v	127	7F	none
119	77	w			

International Characters

	35	36	64	91	92	93	94	96	123	124	125	126
USA	#	$	@	[	\	]	^	`	{	|	}	~
FRANCE	#	$	à	°	ç	§	^	`	é	ù	è	¨
GERMANY	#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
U.K.	£	$	@	[	\	]	^	`	{	|	}	~
DENMARK	#	$	@	Æ	Ø	Å	^	`	æ	ø	å	~
SWEDEN	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
ITALY	#	$	@	°	\	é	^	ù	à	ò	è	ì
SPAIN	₧	$	@	¡	Ñ	¿	^	`	¨	ñ	}	~

Graphics Characters

128	129	130	131	132	133	134	135	136	137	138
┼	┴	┬	┤	├	─	│	┌	┐	└	┘

139	140	141	142	143	144	145	146	147	148	149
▨	■	▬	▮	●	○	♠	♥	♦	♣	♪

150	151	152	153	154	155	156	157	158	159	
♒	♣	♫	♉	♈	↑	↓	✕	÷	±	

Special Characters

ASCII Code	Symbol	Character
91	[	Left bracket
92	\	Back slash
93	]	Right bracket
94	^	Caret
96	`	Accent grave
123	{	Left brace
124	¦	Flat colon
125	}	Right brace
126	~	Tilde

Appendix B
Control Code Summary

This appendix gives a brief summary of the P-80 control codes. You cause a control code to be sent to an output device by using another command. The most common command for sending a code to the screen is PRINT and to the printer is LPRINT. If your computer does not use these commands, check its reference manual and substitute the statements required by your computer.

Using BASIC as an example, you can activate a control code on most computer systems by using LPRINT CHR$(27) followed by CHR$(n), where n is a number from the decimal (DEC) column below. For a few codes, those with a dash in the ESC column, you omit the (ESC) code-CHR$(27). The (ESC) sequence may be shortened by using (in quotation marks) the character in the symbol column instead of CHR$(n). For example, the command for turning on Emphasized can be entered as:

```
LPRINT CHR$(27)CHR$(69) or LPRINT CHR$(27)"E"
```

If you are using another programming language or command, be sure to check your system documentation for the proper syntax to send codes to the printer.

Abbreviations: cpi = characters per inch
                cps = characters per second

ESC Dec Hex Symbol Function

—   9   09   HT   Horizontal tab. Empties the printer buffer, then moves the print head to the next tab stop.

ESC	Dec	Hex	Symbol	Function
-	10	0A	LF	Line feed. Empties the printer buffer, performs a line feed at the current line spacing, and resets the buffer character count to 0.
-	12	0C	FF	Form feed. Empties the printer buffer, then advances the paper to the next top of form.
-	13	0D	CR	Carriage return. Prints the contents of the buffer and resets the buffer character count to 0.
-	14	0E	SO	Shift out. Turns Expanded mode ON for the length of the line. Can be cancelled by CHR$(20) or CHR$(27)"WO". Works with Pica or Compressed mode.
-	15	0F	SI	Shift in. Empties the buffer and turns Compressed mode (17.16 cpi) ON. Cannot work with Emphasized or Double-Strike mode.
-	18	12	DC2	Device control 2. Turns Compressed mode OFF
-	20	14	DC4	Device control 4. Turns the Expanded mode set by CHR$(14) OFF Can also be cancelled with LF
-	27	1B	ESC	ESCape. Prepares the printer to receive control codes.
ESC	45	2D	-	Turns Underline mode ON. Format: CHR$(27)" - "CHR$(n) where n toggles Underline on and off: 0 turns it OFF 1 turns it ON.
ESC	48	30	0	Sets line spacing to 1/8-inch (9-dot).
ESC	50	32	2	Returns line spacing to the default of 1/6-inch (12-dot).
ESC	51	33	3	Sets line spacing to n/144-inch and stays on until changed. Format: CHR$(27)"3"CHR$(n) where n = 0 - 255.

ESC Dec Hex Symbol Function

ESC   52   34   4   Turns Italic mode ON.

ESC   53   35   5   Turns Italic mode OFF

ESC   64   40   @   Reset Code, which resets the printer to its
                           power-up state, including resetting top of
                           form. Clears all text and control codes from
                           the print buffer.

ESC   65   41   A   Sets line spacing to n/72 inch (n-dot). Format:
                              CHR$(27)"A"CHR$(n)
                           where n = 0 - 127.

ESC   67   43   C   Sets the form length to n *lines* in the current
                           line spacing. The default is 66 lines. Also
                           resets top of form. Format:
                              CHR$(27)"C"CHR$(n)
                           where n = 1 - 127.

ESC   67   43   C   Sets the form length to n *inches,* regardless
                           of the current line spacing. The default is 11
                           inches. Also resets top of form. Format:
                              CHR$(27)"C"CHR$(0)CHR$(n).
                           where n = 1 - 22.

ESC   69   45   E   Turns Emphasized mode ON. Cannot mix with
                           Compressed mode or Double-Strike mode.

ESC   70   46   F   Turns Emphasized mode OFF

ESC   71   47   G   Turns Double-Strike mode ON. Cannot mix
                           with Emphasized and Condensed modes.

ESC   72   48   H   Turns Double-Strike mode OFF

ESC   75   4B   K   Turns Single-Density Graphics mode ON.
                           Prints 480 dots per 8-inch line. Format:
                              CHR$(27)"K"CHR$(n_1)CHR$($n_2$)
                           followed by n data numbers, where
                              n = total number of dot columns,
                              n_1 = n MOD 256,
                              n_2 = INT (n/256).
                           For example, to print 480 dots, n_1 = 224,
                           n_2 = 1.

ESC Dec Hex Symbol Function

ESC 76 4C L   Turns Double-Density Graphics mode ON.
                        Prints 960 dots per 8-inch line. Format:
                            CHR$(27)"L"CHR$(n_1)CHR$($n_2$)
                        followed by n data numbers, where
                            n = total number of dot columns,
                            n_1 = n MOD 256,
                            n_2 = INT (n/256).
                        For example, to print 960 dots, n_1 = 192,
                        n_2 = 3.

ESC 82 52 R   Selects an international character set by its
                        country's number. Format:
                            CHR$(27)"R"CHR$(n)
                        where n = 0 - 7.

n	Country
0	U.S.A.
1	France
2	Germany
3	England
4	Denmark II
5	Sweden
6	Italy
7	Spain

ESC 87 57 W   Turns Expanded mode ON; stays ON until
                        turned OFF Cannot be turned off with
                        CHR$(20). Format:
                            CHR$(27)"W"CHR$(n)
                        where n toggles the mode on and off:
                        0 or 48 turns it OFF 1 or 49 turns it ON.

Appendix C
Control Codes by Function

This appendix shows the same control codes as Appendix B; they are arranged by categories and by ASCII order within the categories.

Character Width (Pitch)

CHR$(5)	Turns Compressed Mode ON.
CHR$(18)	Turns Compressed Mode OFF.
CHR$(14)	Turns One-Line Expanded Mode ON.
CHR$(20)	Turns One-Line Expanded Mode OFF.
CHR$(27)"W0"	Turns either Expanded Mode OFF.
CHR$(27)"W1"	Turns Continuous Expanded Mode ON.

Character Weight

CHR$S(27)"E"	Turns Emphasized Mode ON.
CHR$(27)"F"	Turns Emphasized Mode OFF.
CHR$(27)"G"	Turns Double-Strike Mode ON.
CHR$(27)"H"	Turns Double-Strike Mode OFF.

Print Enhancement

CHR$(27)"-0"	Turns Underline Mode OFF.
CHR$(27)"-1"	Turns Underline Mode ON.

Mode and Character-Set Selection

CHR$(27)"4"   Turns Italic Mode ON.
CHR$(27)"5"   Turns Italic Mode OFF.
CHR$(27)"@"   Reset Code.
CHR$(27)"R" CHR$(n)
                     Selects an international character set.

Line Spacing

CHR$(27)"0"   Sets line spacing to l/S-inch.
CHR$(27)"2"   Sets line spacing to 1/6-inch (default).
CHR$(27)"A"CHR$(n)
                     Sets line spacing to n/72-inch.
CHR$(27)"3"CHR$(n)
                     Sets line spacing to n/l&inch.

Forms Control

CHR$(9) or CHR$(137)
                     Activates a horizontal tab.
CHR$(12)   Produces a form feed.
CHR$(13)   Produces a carriage return.
CHR$(27)"C"CHR$(0)CHR$(n)
                     Sets the form length in inches.
CHR$(27)"C"CHR$(n)
                     Sets the form length in lines.

Dot Graphics

CHR$(27)"K"CHR$(n_1)CHR$(n_2)
                     Turns Single-Density Graphics Mode ON.
CHR$(27)"L"CHR$(n_1)CHR$(n_2)
                     Turns Double-Density Graphics Mode ON.

Appendix D
Using Your P-80
with the Geneva™ PX-8™

Since your P-80 is a portable printer, it is a suitable companion for any portable computer. With the P-80, you can print anywhere, thus eliminating the need to wait until you have access to a desktop printer.

The Geneva is one example of a portable computer. It comes with a pre-installed *utility ROM capsule* with CP/M-80™ and a pre- installed BASIC ROM capsule. Additional ROM capsules containing Portable WordStar™, Portable Calc, and Portable Scheduler'" are also included. Instructions on how to print data from each of these software applications can be found in their accompanying documentation. Check the index under printing for the appropriate pages.

P-80 and WordStar

To print the desired results from some of these programs such as WordStar, some modifications may be necessary. For example, the P-80 stops printing when no paper is in contact with the paper-out sensor (a reed switch located on the paper guide).

The paper-out sensor keeps the printer from printing after the paper has run out, but it also keeps you from printing page numbers near the bottom of the page. To compensate for this, you can either change the page length *or* footing margin, place your page numbers near the top of the page, or omit the page numbers. All of these can be done by using dot commands in WordStar. See Chapter 7 in your Geneva *Portable WordStar Reference Manual.*

Note: If you do not use a dot command, or omit page numbers, as described above, the P-80 stops printing near the bottom of the page. Although printing has stopped, the printer and the computer remain in the print stage. To end your print session, in WordStar, press the **P** to stop print and then Y to abandon print.

If you are going to be using WordStar most of the time, you can tape a business card or a small piece of paper over the paper-out sensor. Then you can easily print to the bottom of your page.

When you are using single-sheet paper and have more than one page in a document, you will need to activate the print pause command. The print pause command keeps the printer from printing without any paper and allows you to, change sheets. The print pause command is one of the print options displayed when you press **P** to print-from the main menu in WordStar. Select Y for yes for the printer to pa&e between pages. You can also insert a print pause code in your document. See Chapter 7 of your Geneva Portable WordStar Reference Manual. Be sure to line the top of your sheet of paper with the serrated edge on the printer as the printer expects 66 print lines (the default in WordStar).

If a particular function exists on WordStar, but not on the P-80, the printer will ignore the command to execute this function. For example, if you want to print in Elite, the P-80 will ignore this command since it does not have this capability. Before using print commands in your software applications, check to see that they are available on the P-80 by consulting Appendix C in this manual.

Connecting the Geneva to the P-80

The P-80 uses the RS-232C serial interface and is factory set at 4800 baud. This is the appropriate setting for use with the Geneva. Your Geneva can be set to the RS-232C or serial interface using the CONFIG command. Consult your Geneva User's Manual. RS-232C is the factory setting for the Geneva.

You need Epson cable #723 to connect the Geneva to your P-80 as shown in Figure D-l. When you plug the cable into your Geneva, be sure you insert it into the serial port designated in the CONFIG command. If the designation is RS-232C, plug the cable into the serial port marked RS-232C.
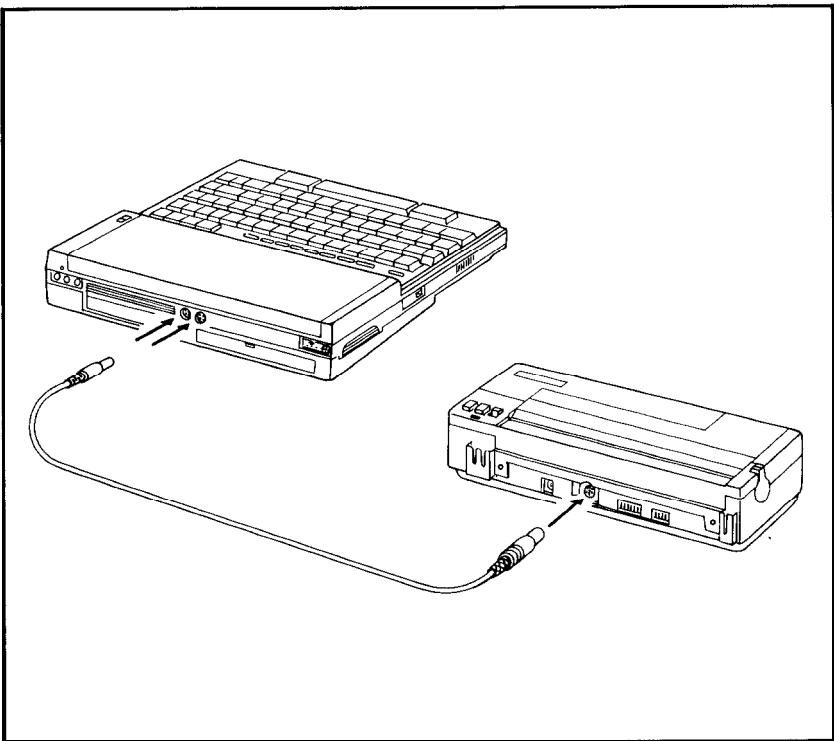
***Figure D-l. Connecting the Geneva to the P-80***

Be sure you have properly connected your printer and it is ON and on-line before you begin to print. If the P-80 won't respond to any of the computer's print commands, hold down **CTRL** and press **STOP** on the Geneva. Then check to see that you have the proper serial port connection, the cable is connected correctly, and the printer is ON and on-line.

Appendix E
Specifications
of the P-80

Printing

Printing Method   Thermal transfer

Printing Direction   Unidirectional (left to right)

Paper feed speed   2 lines per second (at 1/6 inch/line)

Character Sets   96 Roman characters
96 Italic characters
32 Graphics characters
 8 International character sets

Line Spacing   1/6 inch (default), 1/8 inch or programmable
in increments of 1/72 inch and 1/144 inch

<div align="center">***Table E-1*** Characters</div>

Print mode			Number Of Columns CPL	Character pitch CPI	Print speed CPS	Character spacing CPI	Character size (in)	
							Width	Height
Pica			80	10	45	10	.083	.096
Pica	Expanded		40	5	22.5	5	.166	.096
Pica	Emphasized		80	10	22.5	5	.091	.096
Pica	Emphasized	Expanded	40	5	11.25	5	,182	.096
Pica	Condensed		136	17 1/7	38.6	17 1/7	.043	.096
Pica	Condensed	Expanded	68	8 4/7	19.3	8 4/7	.083	.096
Italic			80	10	22.5	10	,110	.096
Italic	Expanded		40	5	11.2	5	.193	.096
Italic	Emphasized		80	10	22.5	10	.118	.096
Italic	Emphasized	Expanded	40	5	11.25	5	.209	.096
italic	Condensed		135	17 1/7	38.6	17 1/7	,079	.096
Italic	Condensed	Expanded	68	8 4/7	19.3	8 4/7	,110	,096

CPL= characters per line
CPI = characters per inch
CPS = characters per second

Paper

Paper types	Single-sheet or roll paper, up to 8.5 inches wide
	Thermal or Standard

Printer

Dimensions	Height: 2½ inches (62.2 mm) Width: 11¾ inches (297 mm) Depth: 4¼ inches (107 mm)
Weight	2.4 lbs (1.1 kg)
Power required	Voltage: 4.8 VDC (TYP) 4 Ni-Cd batteries Ni-Cd battery: Pen light (AA) size nominal capacity: 500 mAh Battery life: 300 recharging cycles possible (avg.) Power consumption: 3 W avg. during use AC adapter (HOOCAA): 6V output DC 700 mA

|	Printing capability with fully charged batteries: 60,000 characters (approximately 30 pages on 8½ by 11 paper with 2,000 characters per page)
Environment	Temperature: 5°C to 35°C Humidity: 10% to 80% RH
Ribbon	Cassette ribbon, black, model #8760
Ribbon life expectancy	40,OOO characters (approximately 20 pages with 2,000 characters per page)
Printer MCBF	500,000 lines (excluding print head life)
Print head life	20 million characters
Buffer memory	240 bytes

Interface

The P-80 has an RS-232C serial interface

Specifications

Bit rate	Set with DIP switches on the back of the printer
Synchronization	Asynchronous
Handshaking	With DTR signal
Logic Levels	Voltage Logic Value +3V to +18V Space 0 (ON) -3V to -18V Mark 1 (OFF)
Data Format	Dip switch selectable

Interface Connector

Plug   6-pin DIN type
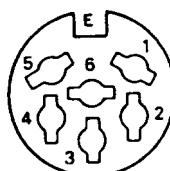
Interface Signals

Pin No.	Signal	Source	Description
1			
2	DTR	Printer	Printer is busy.
3	RXD	Host computer	Serial input data
4			
5	GND		Printer control circuit ground
6			
E	FG		Frame ground

Index

A

A4 • Legal6
AC adapter 17-18
Arrows 6
ASCII (American Standard Code for Information Interchange) 27-30,
  A-l
codes and graphics 39, A-3
    codes and international characters A-3
    codes and special characters A-4
    codes listed for all characters A-2 -A-4
    codes on the P-80 28
Automatic line feed **11**

B

Baud rate **12**
B56
Back cover 5
BASIC **30-31, 33, 39, 42, B-l**
Battery **16-21**
Battery holder cover 19-22
Battery replacement 19-22
Bold printing. See Double-Strike, Emphasized

C

Cable, connection of 13
Carriage return 28-29, B-2, C-2
Cassette, ribbon See Ribbon cassette
Characters, graphics See Graphics characters
Characters, international See International character set
Characters, specifications of E-2
CHR$29, 39
Codes. See ASCII codes; Control codes; ESCape
Compressed mode 34-35, 37, B-2, C-l
Computer, connecting printer to 12-13
Control codes 27, 28
  listed by function C-l -C-2
  listed by number B-l -B-4
  See also specific modes and functions
Control key (CTRL) 28
Control panel 15
Covers, front and back 5
CTRL 28

D

E

F

G

M

0

P

T

Technical specifications E-l-E-4
  characters E-2
  interface E-2-E-4
  paper E-2
  printer E-2-E-3
  printing E-I
Temperature, of printer 22, E-3
Test. See Self-test
Typestyles chart D-2

U

Underline mode 30, 36, 38, B-2, C-l

W

Weight, of printer E-2
Width
  See Characters, specifications of
  statement 48

EPSON®

Quick Reference

Char
CHR$
CHR$
CHR$
CHR$
CHR$
CHR$

Char
CHR$
CHR$
CHR$
CHR$

Print
CHR$
CHR$

Mod
CHR$
CHR$
CHR$
CHR$

Line
CHR$
CHR$
CHR$

CHR$

Form
CHR$

CHR$
CHR$
CHR$

CHR$

Dot C
CHR$

CHR$

P-80 Portable Printer

ASCII Code Summary

Dec	Hex	CHR	Dec	Hex	CHR	Dec	Hex	CHR
0	00	none	53	35	5	106	6A	j
1	01	none	54	36	6	107	6B	k
2	02	none	55	37	7	108	6C	l
3	03	none	56	38	8	109	6D	m
4	04	none	57	39	9	110	6E	n
5	05	none	58	3A	:	111	6F	o
6	06	none	59	3B	;	112	70	p
7	07	none	60	3C	<	113	71	q
8	08	none	61	3D	=	114	72	r
9	09	HT	62	3E	>	115	73	s
10	0A	LF	63	3F	?	116	74	t
11	0B	none	64	40	@	117	75	u
12	0C	FF	65	41	A	118	76	v
13	0D	CR	66	42	B	119	77	w
14	0E	SO	67	43	C	120	78	x
15	0F	SI	68	44	D	121	79	y
16	10	none	69	45	E	122	7A	z
17	11	none	70	46	F	123	7B	{
18	12	DC2	71	47	G	124	7C	|
19	13	none	72	48	H	125	7D	}
20	14	DC4	73	49	I	126	7E	~
21	15	none	74	4A	J	127	7F	none
22	16	none	75	4B	K	128	80	
23	17	none	76	4C	L	129	81	
24	18	none	77	4D	M	130	a2	
25	19	none	78	4E	N	131	a3	
26	1A	none	79	4F	O	132	a4	
27	1B	ESC	80	50	P	133	a5	
28	1C	none	81	51	Q	134	86	
29	1D	none	82	52	R	135	a7	
30	1E	none	83	53	S	136	88	
31	1F	none	84	54	T	137	a9	
32	20	space	85	55	U	138	8A	
33	21	!	86	56	V	139	8B	
34	22	"	87	57	W	140	8C	■
35	23	#	88	58	X	141	8D	
36	24	$	89	59	Y	142	8E	
37	25	%	90	5A	Z	143	8F	
38	26	&	91	5B	[	144	90	
39	27	'	92	5C	\	145	91	
40	28	(	93	5D	]	146	92	
41	29		94	5E		147	93	
42	2A	)	95	5F	—	148	94	
43	2B	+	96	60	`	149	95	
44	2C		97	61	a	150	96	
45	2D	'	98	62	b	151	97	
46	2E	.	99	63	c	152	98	
47	2F	/	100	64	d	153	99	
48	30	0	101	65	e	154	9A	
49	31	1	102	66	f	155	9B	
50	32	2	103	67	g	156	9C	
51	33	3	104	68	h	157	9D	
52	34	4	105	69	i	158	9E	
						159	9F	±

International Characters

	35	36	64	91	92	93	94	96	123	124	125	126
USA	#	$	@	[	\	]	^	`	{	|	}	~
FRANCE	#	$	à	°	ç	§	^	`	é	ù	è	ß
GERMANY	#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
U.K.	£	$	@	[	\	]	^	`	{	|	}	~
DENMARK	#	$	@	Æ	Ø	Å	^	`	æ	ø	å	~
SWEDEN	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
ITALY	#	$	@	°	\	é	^	ù	à	ò	è	ì
SPAIN	₧	$	@	¡	Ñ	¿	^	`	¨	ñ	}	~

Graphics Characters

128	129	130	131	132	133	134	135	136	137	138
┼	┴	┬	┤	├	—	│	┌	┐	└	┘

139	140	141	142	143	144	145	146	147	148	149
▓	■	▬	▮	●	○	♣	♥	♦	♠	♪

150	151	152	153	154	155	156	157	158	159
					↑	↓	✂	÷	±

Special Characters

ASCII Code	Symbol	Character
91	[	Left bracket
92	\	Back slash
93	]	Right bracket
94	^	Caret
96	`	Accent grave
123	{	Left brace
124	|	Flat colon
125	}	Right brace
126	~	Tilde

Character Width (Pitch)

CHR$(15)	Turns Compressed Mode ON.
CHR$(18)	Turns Compressed Mode OFF.
CHR$(14)	Turns One-Line Expanded Mode ON.
CHR$(20)	Turns One-Line Expanded Mode OFF.
CHR!$(27)"W0"	Turns either Expanded Mode OFF.
CHR$(27)"Wl"	Turns Continuous Expanded Mode ON.

Character Weight

CHR$(27)"E"	Turns Emphasized Mode ON.
CHR$(27)"F"	Turns Emphasized Mode OFF.
CHR$(27)"G"	Turns Double-Strike Mode ON.
CHR$(27)"H"	Turns Double-Strike Mode OFF.

Print Enhancement

CHR$(27)"-0"	Turns Underline Mode OFF.
CHR$(27)"-1"	Turns Underline Mode ON.

Mode and Character-Set Selection

CHR$(27)"4"	Turns Italic Mode ON.
CHR!$(27)"5"	Turns Italic Mode OFF.
CHR$(27)"@"	Reset Code.
CHR$(27)"R" CHR$(n)	
	Selects an international character set.

Line Spacing

CHR$(27)"0"	Sets line spacing to l/8-inch.
CHR$(27)"2"	Sets line spacing to l/6-inch (default).
CHR$(27)"A"CHR$(n)	
	Sets line spacing to n/72-inch.
CHR$(27)"3"CHR$(n)	
	Sets line spacing to n/144-inch.

Forms Control

CHR$(9) or CHR$(137)	
	Activates a horizontal tab.
CHR$(12)	Produces a form feed.
CHR$(13)	Produces a carriage return.
CHR$(27)"C"CHR$(0)CHR$(n)	
	Sets the form length in inches.
CHR$(27)"C"CHR$(n)	
	Sets the form length in lines.

Dot Graphics

CHR$(27)"K"CHR$(n$_1$)CHR$(n$_2$)	
	Turns Single-Density Graphics Mode ON.
CHR$(27)"L"CHR$(n$_1$)CHR$(n$_2$)	
	Turns Double-Density Graphics Mode ON.

er

EPSON AMERICA, INC.
LIMITED WARRANTY

Epson America, Inc. hereby warrants that it will repair or replace, at its option, any part of the Epson product with which this warranty is enclosed which proves defective by reason of improper workmanship and/or material, without charge for parts or labor, for a period of one (1) year. This warranty period commences on the date of original purchase by the buyer other than for purposes of resale, and this warranty applies only if such original purchase by the buyer was made in the United States.

To obtain service under this warranty you must return your Epson product, properly packaged in its original container or an equivalent, to the nearest authorized Epson Service Center or the Dealer from whom the product was purchased. Any postage, insurance and shipping costs incurred in presenting or sending your Epson product for service are your responsibility.

The Dealer's original bill of sale or other satisfactory proof of the date of the original buyer purchase of your Epson product must be made available to obtain service under this warranty.

This warranty applies only if your Epson product fails to function properly under normal use and within the manufacturer's specifications. Batteries, as well as optional software packages (ROMs) not contained in the original container of your Epson product, are excluded from coverage under this warranty. This warranty does not apply if the Epson label or logo, or the rating label or serial number, has been removed from your Epson product, or if, in the sole opinion of Epson, your Epson product has been damaged by faulty or leaking batteries not supplied by Epson, or by accident, misuse, neglect, or improper packing, shipping, modification or servicing, by other than Epson or an authorized Epson Service Center.

SOME EPSON PRODUCTS HAVE A COMPARTMENT CONTAINING STATIC-SENSITIVE ELECTRONIC CIRCUITRY. THIS COMPARTMENT IS CLEARLY LABELED. DO NOT OPEN IT! THIS WARRANTY WILL BECOME VOID IF YOU ATTEMPT TO MODIFY OR ADJUST ANY ROM OR OTHER PART OR DEVICE IN SUCH A COMPARTMENT OR IF YOU ATTEMPT TO ADD OR INSERT ANY ROM OR OTHER PART OR DEVICE. IF ANY OF THESE STEPS IS REQUIRED, BRING YOUR EPSON PRODUCT TO AN AUTHORIZED EPSON DEALER.

THE DURATION OF ANY IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR OTHERWISE, ON YOUR EPSON PRODUCT SHALL BE LIMITED TO THE DURATION OF THE EXPRESS WARRANTY SET FORTH ABOVE. IN NO EVENT SHALL EPSON AMERICA, INC. OR ITS AFFILIATES BE LIABLE FOR ANY LOSS, INCONVENIENCE OR DAMAGE WHETHER DIRECT, INCIDENTAL, CONSEQUENTIAL OR OTHERWISE, OR WHETHER CAUSED BY NEGLIGENCE OR OTHER FAULT RESULTING FROM BREACH OF ANY EXPRESS OR IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR OTHERWISE, WITH RESPECT TO YOUR EPSON PRODUCT, EXCEPT AS SET FORTH HEREIN. SOME STATES DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS AND SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATIONS AND EXCLUSIONS MAY NOT APPLY TO YOU.

You may request information on how to obtain service under this warranty by contacting the Dealer from whom your Epson product was purchased, or by contacting Epson America, Inc. at the address printed below:

Epson America, Inc.
Service Division
23155 Kashiwa Court
Torrance, CA 90505
(213) 534-0360

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.