EPSON®

Printer Interface Cartridge

for the Commodore 64™ and the VIC-20™

Operation Manual

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Introduction

The Epson HomeWriter- printer combines low price with the high quality and advanced capabilities formerly available only on more expensive printers.

HomeWriter- Features

In addition to the reliability and quality you've come to expect from Epson printers, the HomeWriter- has many features. A few of the highlights are:

- Draft mode for quick printing of ordinary work

- Near Letter Quality mode for top quality printing

- A variety of print styles, including expanded, reversed, and two kinds of bold printing

- Graphics for charts, diagrams, and illustrations

- Easy paper loading

- Ribbon cassette for quick and clean ribbon changing

About This Manual

The HomeWriter-10 Setup Instructions tell you how to set up your printer. This ***Printer Interface Cartridge Operation Manual gives you*** the specific information you need to use the HomeWriter- with your Commodore computer.

We're not going to waste your time with unnecessary information, but we won't neglect anything you need to know about the HomeWriter- and its many features.

You can read as much or as little of this manual as you wish. If you have used printers before and have a specific program that you want to use with the HomeWriter-10, a quick reading of the first chapter may be all you need.

For a preview of what your HomeWriter- can do, look at the following samples of graphics and typestyles:

Your HomeWriter- **can produce:**
E X P A N D E D   P R I N T I N G
REVERSED   PRINTING
Emphasized printing
Double-strike printing
Compressed printing
The Near Letter Quality mode offers
high quality, typewriter-style print.
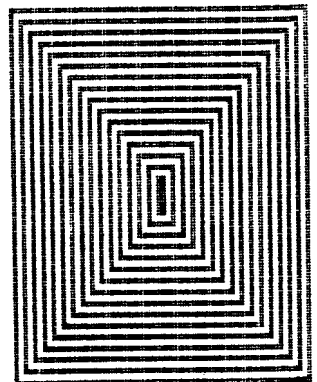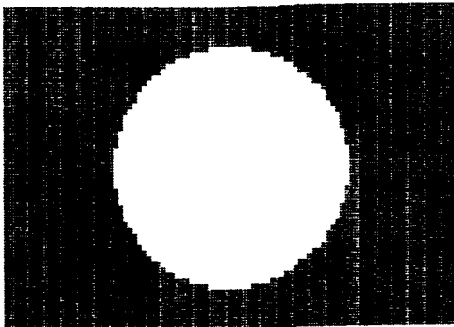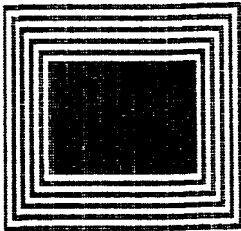
Chapter 1

Installation and Operation

After you have set up your printer and loaded the paper (following the directions in the Setup Instructions), you are ready to plug in your Printer Interface Cartridge (PIC™) and begin printing.

Inserting the Printer Interface Cartridge

Inserting the PIC is easy. Simply follow the directions on the HomeWriter- instruction card. Once the PIC is installed, you are ready to test your printer.

Caution: Be sure you turn OFF all your computer equipment and printer before inserting or removing the cartridge.

Printing the Test Patterns

It's time to see the HomeWriter- in action. You'll start with a test pattern. Don't connect the printer to your computer yet-just follow these steps:

1) Make sure that your printer has paper in it and that the power switch (on the right side of the printer) is off.

2) Press LF on the control panel while you turn the printer on with the power switch.

The HomeWriter- will begin printing letters, numbers, symbols, and graphics characters in the draft mode. It won't stop until you turn it off or until it gets near the end of the paper.

To see the same test in the NLQ (Near Letter Quality) mode, turn the printer on while pressing FF. Figure l-l shows what both test patterns look like.

Figure 1-1. Test patterns

Connecting the Printer to Your Commodore

Before connecting the HomeWriter-10, be sure that all your computer equipment is turned off.

If you have a disk drive, plug the cable into the serial bus port in the back of the disk drive. If you do not have a disk drive, plug the cable into the serial port connector in the back of your computer. See the manual for your computer or disk drive if you are not sure which connection to use.

Control Panel

When your HomeWriter- is connected to your computer system, turn on the printer and look at the control panel on the top.
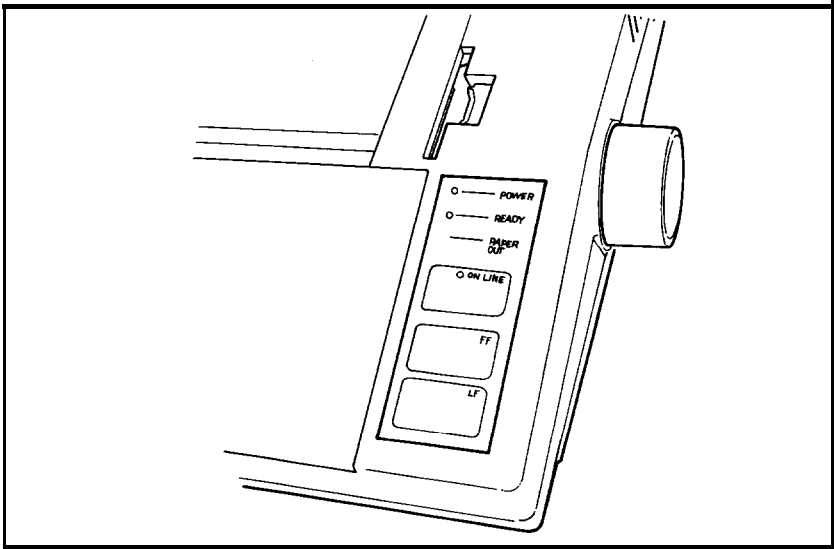
Figure 1-2. Control panel

You have already used the touch-sensitive control panel for a special purpose, printing the test patterns. Here are the main functions of the lights and rectangles on this panel:

- The POWER light glows green when the power is on.

- The READY light glows green when the printer is ready to accept data. Don't worry if this light flickers somewhat during printing; such flickering is normal.

- The PAPER OUT light glows red when the printer is out of paper or the paper is loaded incorrectly.

- The ON LINE light glows green when the printer can receive data. (If it does not come on when you turn the printer on, check to see that the computer and disk drive are on.)

In addition to the lights, the control panel has three touch-sensitive rectangles. Their functions are:

- ON LINE switches the printer between on-line and off-line status. When the printer is on-line, the ON LINE light glows and the printer is ready to accept data.

The following two functions work only when the ON LINE light is off. If the ON LINE light is on, press ON LINE before you use these.

- FF (Form Feed) advances continuous paper to the top of the next page.
- LF (Line Feed) advances the paper one line at a time.

The control panel can also be used to turn on several printing functions using a feature called SelecType, which is described in the next chapter.

Using Your Printer

If you have a word processing or other commercial software program, just load the program in your computer, follow the printing instructions, and watch your HomeWriter- print.

If you plan to use your HomeWriter- for printing program listings, load a program and use the appropriate listing command for the programming language you are using. For the BASIC that is built in to the Commodore computer, type the following:

```
OPEN9,4: CMD9: LIST
```

After the printer has listed the program, restore normal operation by typing this:

```
PRINT#9: CLOSE9
```

You can now begin using the HomeWriter-10 with your software, or you can find out about the special features of the printer in the next chapters.

Note: If you need to print on the last 2 inches of single-sheet paper, see Appendix C.

Chapter 2
SelecType

Your HomeWriter- offers several methods of enhancing your printing. In addition to reversed and expanded print, which are standard on Commodore printers, your Epson printer has four special typestyles. These typestyles are especially easy to use with Epson's SelecType feature.

Choosing print modes on the HomeWriter- with SelecType is simple. This feature changes the function of the three touch-sensitive rectangles on the control panel-ON LINE, FF, and LF. After turning on SelecType, you can use a few taps on the panel to change from

```
standard single-strike printing to
```

Near Letter **Quality,**
emphasized,
d o u b l e - s t r i k e , o r
compressed printing.

You can also turn on these typestyles with switches in the back of the printer. See Appendix C for information on these switches.

Dot Matrix Printing

To understand the difference between standard printing and the four typestyles available with SelecType, it will help to know something about dot matrix printing-the printing method of the HomeWriter-10.

In dot matrix printing all letters, symbols, and graphics are made up of patterns of dots. The standard printing mode uses 10 to 15 dots for most letters. In this mode the letters are clear and readable and the printing is extremely fast.

Near Letter Quality

The Near Letter Quality (NLQ) mode uses many more dots for each character than the standard mode does. This makes the letters more fully formed, as you can see in the printout below, but it does decrease, the speed of your printing.

```
This  is  standard  printing,  and
```
this is Near Letter **Quality   (NLQ)   printing.**

With the two modes, draft and NLQ, the HomeWriter- gives you a choice of high speed or high quality each time you print. You can print your ordinary work or preliminary drafts quickly in the draft mode and use the NLQ mode for final copies or special purposes.

Because the NLQ mode is designed for printing words and numbers, you can't print pictures or graphics characters in this mode. Therefore, be sure that there are no graphics characters in the documents or files you print in the NLQ mode.

Emphasized

In the emphasized mode, the HomeWriter- prints each dot twice, with the second dot slightly to the right of the first. This mode produces letters that are darker and more fully formed than standard ones, as shown in the printout below.

```
This  is  standard  printing,  and
this  is  emphasized  printing.
```

Because emphasized is faster than the NLQ mode, for some purposes you may want to use it instead of NLQ.

Double-Strike

In the double-strike mode, the HomeWriter- prints each line twice, with the second slightly below the first. Therefore, it is like emphasized except that the dots are offset vertically rather than horizontally. Both modes are bolder than standard printing-you can look at the printout below and decide which one you prefer.

```
This is standard Printing, and
this is double-strike printing, and
this is emphasized printing.
```

Compressed

In the compressed mode, the HomeWriter- squeezes the dots together horizontally to make each letter narrower. With this mode, over 130 characters (instead of 80) will fit on a standard eight-inch line.

```
This is standard printing, and
this is compressed printing.
```

SelecType Operation

SelecType lets you use the Epson typestyles discussed above whether or not your word processing or business program supports them.

For example, you can print the first draft of a letter or report in the standard mode and print the final version in the NLQ mode without putting any print codes in the document.

SelecType is also handy for selecting compressed printing to squeeze more information on a line.

Using SelecType is a simple four-step process:

1) Turn SelecType on.
2) Select a print function.
3) Set the function.
4) Turn SelecType off.

Turning SelecType mode on

To turn SelecType on make sure that the printer is on (with the POWER, READY, and ON LINE lights all on), and then press both ON LINE and FF **at the same time,** as illustrated in Figure 2-l. The HomeWriter- beeps to signal that the SelecType mode is on; the READY light turns off; and the ON LINE light begins flashing. Now that SelecType mode is on, the panel has new functions (also shown in Figure 2-l).
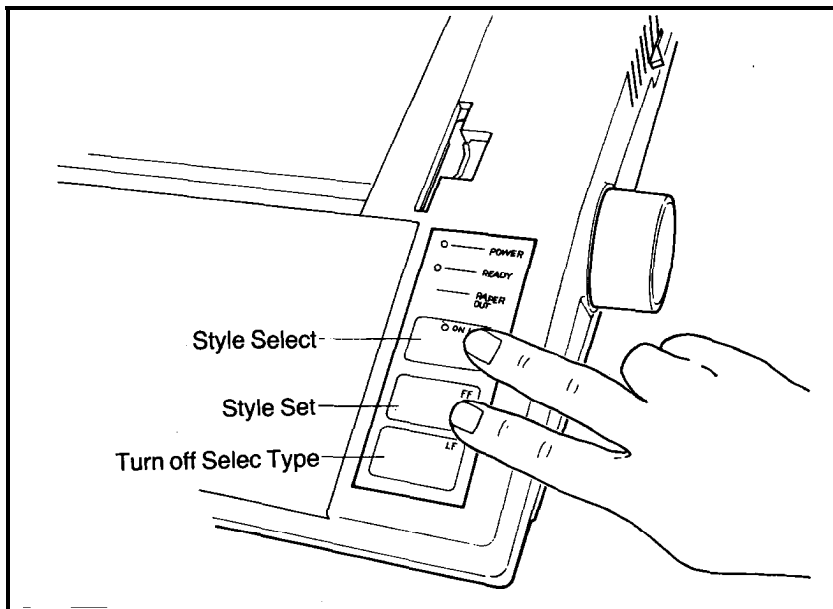
Figure 2-1. SelecType setting and functions

In SelecType, each touch-sensitive rectangle has a function: ON LINE *selects* typestyles, FF *sets* the styles, and LF turns SelecType off, returning the panel to its standard operation.

Using SelecType

Once you have turned on SelecType, you select the typestyle you want according to Table 2-l. The mode number in the table is the number of times you press ON LINE to select each function. Each time you press ON LINE, the printer beeps.

Table 2-1. SelecType modes

Mode		Function
1	NLQ	**ABCDEFGHIJKLMnopqrstuvwxyz**
2	Emphasized	**ABCDEFGHIJKLMnopqrstuvwxyz**
3	Double-strike	ABCDEFGHIJKLMnopqrstuvwxyz
4	Compressed	ABCDEFGHIJKLMnopqrstuvwxyz

After you press ON LINE the required number of times, you press FF to set your selection. Then you press LF to turn off SelecType and return the panel to its standard operation. After returning the control panel to its standard operation, press ON LINE so that the printer will be ready to print.

SelecType practice

For practice in using SelecType, try setting emphasized. First turn the printer off and back on with the switch on the right side of the printer.

Now press ON LINE and FF at the same time. The HomeWriter- beeps to tell you that SelecType is on, the READY light turns off, and the ON LINE light begins blinking. Then press ON LINE two times to select emphasized. (The printer beeps each time you press ON LINE while SelecType is on.) Finally, press FF once to set the function.

Emphasized mode is now set. Press LF once to turn SelecType off. Now your panel returns to its normal operation, but your printer is in the emphasized mode. Since this is only an exercise, turn the HomeWriter- off and back on again to cancel all settings and prepare for the next exercise.

SelecType exercise

You will probably use SelecType mainly with commercial software (although you can also use it with BASIC or other programming languages). Since we don't know what software you'll use, our sample exercises are in BASIC because every Commodore computer has BASIC built in.

You don't need to know anything about programming for this exercise. It is merely for practice. If you would rather not use BASIC, use your word processing or business program to create a short file or document of the type you will usually print. When you create your file, remember that SelecType is designed for letters and numbers rather than graphics.

If you do want to use BASIC for this exercise, simply turn on your computer, printer, (and disk drive if you have one). Then type the short program listed below. Only the words inside the quotation marks will be printed. You can put anything you want there.

```
10 OPEN3,4
20 PRINT#3,"THE LETTERS IN THIS EXAMPLE"
30 PRINT#3,"ARE MADE UP OF TINY DOTS."
50 CLOSE3
```

Now, run the program by typing RUN and pressing **RETURN,** or print your file or document by following the printing instructions of your software. The HomeWriter- will print your example in standard single-strike printing, as shown below:

> THE LETTERS IN THIS EXAMPLE
> ARE MADE UP OF TINY DOTS.

Now that you have created a sample, follow these steps to print it in compressed mode:

1) See that both the ON LINE light and the READY light are on.

2) Press ON LINE and FF at the same time. You hear a beep to signal that SelecType is on.

3) As you see in Table 2-1, the code for compressed is four. Therefore, press ON LINE four times. (Remember that you hear a beep each time you press ON LINE when you are in SelecType mode).

4) Now that you have *selected* the compressed mode, push FF once to *set* it.

5) Push LF once to return the panel to its standard operation.

Now you have set the HomeWriter- to print in compressed mode. Merely push ON LINE to put your printer back on-line and print your sample once more. It should appear in compressed mode just as ours does below:

```
THE LETTERS IN THIS EXAMPLE
ARE MADE UP OF TINY DOTS.
```

Turn off your printer to cancel the compressed setting, and-if you wish-try this exercise with other modes.

Mode combination

Two of the SelecType modes (NLQ and emphasized) can be combined to create a striking effect. If you want to see how this combination looks, follow the instructions below:

1) See that the ON LINE and READY lights are on.

2) Press ON LINE and FF at the same time.

3) Press ON LINE once and then FF once.

Since one is the code for NLQ, you have now set the HomeWriter-for that mode.

4) Press ON LINE one more time and then FF once again.

This makes a total of two times, and thus sets the HomeWriter- for emphasized also.

5) Press LF to return the panel to its standard operation.

6) Press ON LINE to put the HomeWriter- on-line.

Now print your sample document or run your sample program. If your printing appears in

emphasized Near Letter Quality

as you see here, you have successfully combined the two modes. If you get any other results, turn your printer off and back on and then try the steps again.

SelecType Tips

Any mode you turn on with SelecType usually stays in effect until the printer is turned off. If, for example, you use SelecType to print a document in emphasized, anything you print after that will be emphasized unless you turn the printer off and back on first.

Remember that if you like one of the typestyles in this chapter well enough to use it most of the time, you can turn it on and keep it on with a special switch in the back of your printer. See Appendix C for instructions.

Chapter 3
HomeWriter-10 Features

In this chapter and the next we describe the printing and graphics features of the HomeWriter-10, but many of you won't need these chapters. How much of the rest of this manual you use depends upon three things:

- How much you already know about computers and printers

- What kind of printing you are interested in

- What software you plan to use.

If you have quite a bit of experience with computers, you may want to skip to Appendix B, which has a full description of the HomeWriter- commands. On the other hand, even if you are a computer novice, your software manual may contain all the printing instructions you need.

Just about any program for a Commodore computer that is designed to produce single-color printed copy will work with the HomeWriter-10.

Demonstration Programs

The demonstration programs included in these chapters are written in the BASIC programming language. Although we know that you will probably not use BASIC for most of your printing, we chose to include these programs because every Commodore has built-in BASIC.

You don't need to understand BASIC programming to run these programs. Although we supply a few notes about using Commodore BASIC with a printer in the next section, in most cases all you need to

do is turn on your computer and type in the programs exactly as you see them in this manual. If you have any questions, see your Commo-*dore User's Guide.*

Although all the example programs are in BASIC, you can of course change them to any programming language that you prefer to use. Simply follow the instructions in the manual for your programming language.

The HomeWriter- and BASIC

In order to send any information to the printer, you must first open a file for it. A sample statement for opening a file is:

```
10 OPEN1,4
```

The **1** in the line above is the file number, and the 4 is the device number. You can use any number from 0 to 255 for the file number, but the device number should be 4 unless you have two printers.

If you have two printers connected to your Commodore, you will sometimes use another device number. See Appendix C for further information.

After you have opened a file, you send information to the printer with a PRINT# statement, such as the sample below:

```
20 PRINT#1,"THE PRINTER PRINTS THIS"
```

The PRINT# statement is much like the PRINT statement in BASIC except that it must be followed by the number of a file that has been opened and a comma. Anything inside quotation marks after that will be sent to the printer and printed.

As you will see in programs later in this chapter, you can also send instructions to the printer with a PRINT# statement.

After you have finished with a file, you should close it using the format below:

```
30 CLOSE1
```

All you need for this statement is the word CLOSE and the file number. If you wish, type in and run the three lines above, which form one program.

Each time you want to see the results of a program, type RUN and then press **RETURN.**

There is also a direct mode for sending commands or text to the printer. To use this mode type the following without a line number before it:

```
OPEN1,4: CMD1
```

After you type this and press **RETURN,** everything that would normally be sent to the screen is sent to the printer instead.

To see how this mode works, type the following and press **RETURN.**

```
PRINT "DIRECT MODE"
```

The words DIRECT MODE will be printed on paper instead of on the screen.

When you are through with the direct mode, cancel it with the following line:

```
PRINT#1: CLOSE1
```

In the samples above, 1 is the file number and 4 is the device number. You can use any number between 0 and 255 as the file number, but be sure to use the same number in each statement.

One of the main uses for the direct mode is printing program listings. There are four steps to have your HomeWriter- print a listing of a program.

1) Load or enter the program.

2) Type OPEN1,4: CMDl and press **RETURN.**

3) Type LIST and press **RETURN.** The printer will now list your program.

4) Type PRINT#l: CLOSE1 and press **RETURN.**

Step 4 cancels the direct mode so that you will not accidentally send information to the printer when you want it to appear on the screen.

HomeWriter- Features

As you know, the Commodore computer can display graphic characters as well as letters of the alphabet. Given the right instructions, the HomeWriter- can print anything the computer can display on the screen, and it can also add several printing effects. These effects are described in the rest of this chapter.

Expanded printing

The expanded mode (sometimes called double width) of the HomeWriter- doubles the width of all the letters, symbols, and graphics characters. This mode produces striking headings and titles.

You can see printing in this mode by entering the following program.

```
10 OPEN1,4
20  PRINT#1,CHR$(14)"EXPANDED  PRINTING"
30 CLOSE1
```

When you have entered the program, type RUN and press **RETURN.** You should see the results below.

E X P A N D E D   P R I N T I N G

Once you have turned on expanded printing, it will stay on until you cancel it by using a cancelling code or by turning off the printer. You can prove this with another short program.

First erase the other program from your computer's memory by typing NEW and pressing **RETURN,** but don't turn off your printer. Then type in and run this program. Remember that you run each program by typing RUN and pressing **RETURN.**

```
NEW
10 OPEN2,4
20 PRINT#2,"THIS IS STILL EXPANDED"
30 PRINT#2,CHR$(15)"NOW EXPANDED IS OFF"
40 CLOSE2
```

T H I S   I S   S T I L L   E X P A N D E D
NOW EXPANDED IS OFF

As you can see, the first line is still in expanded printing, but the second one is not. The first is expanded because the previous program turned on expanded and it stays on until it is turned off. The second line is in standard printing because the code that turns off expanded, CHR$(15), comes before the words that are printed.

On the HomeWriter- printing modes are cancelled in three different ways:

- With a specific cancelling code, such as the CHR$(15) that you used to cancel expanded printing.

- By turning the printer off and back on.

- Automatically at the end of a line. Unlike expanded, most printing effects stay on only for one line. Therefore, you don't have to turn them off if you use them for one whole line.

Reverse printing

In reverse printing the letters and characters are white on a black background instead of the usual black on a white background. The code that turns this effect on is CHR$(18), and the one that turns it off is CHR$(146). Enter and run the following program to see this mode in action. Be sure to include the semicolon at the end of line 40. Again type NEW to erase the previous program before you enter this program.

```
NEW
10 OPEN3,4
20 PRINT#3,CHR$(18)"REVERSE  PRINTING"
30 PRINT#3,"REVERSE PRINTING OFF"
40 PRINT#3,CHR$(18)"REVERSE"CHR$(146);
50 PRINT#3," AND STANDARD PRINTING"
```

```
REVERSE PRINTING
REVERSE PRINTING OFF
REVERSE  AND  STANDARD  PRINTING
```

The printout above shows the two ways that reverse printing is turned off:

- By the ending of a print line

- By the CHR$(146) code.

The words in line 20 are in reverse printing because that effect was turned on with CHR$(18), but the next line is standard printing because reverse printing stays on for only one line unless it is turned on again. The first word of the last print line is in reverse printing, but the rest is in standard printing because reverse is turned off by CHR$(146).

Uppercase/Graphic/Lowercase   modes

As you know, the screen of your Commodore computer has two modes for displaying letters of the alphabet and graphics characters. They are the uppercase/graphic mode and the upper/lowercase mode.

In the uppercase/graphic mode (also called the cursor up mode), all letters are uppercase (capitalized) and many graphics characters are available. In the upper/lowercase mode (also called the cursor down mode), letters can be either upper or lowercase, but fewer graphics characters are available.

To change from uppercase/graphic to upper/lowercase on the screen, you press the **SHIFT** key and the **COMMODORE** key at the same time. This command affects only the screen. For the HomeWriter- to print in the upper/lowercase mode you must give it the command to use that mode.

If you do not give the printer any special instructions, it always prints in the uppercase/graphic mode. Therefore, all the examples so far in this chapter have been printed in the uppercase/graphic mode.

Before you type any programs that use the upper/lowercase mode, change the screen display to that mode by pressing the **COMMO-DORE** key and the **SHIFT** key at the same time. That way the letters will appear on your screen in the same mode that they are printed on paper.

No matter whether you print in the uppercase/graphic mode or the upper/lowercase mode, always have your screen display in the same mode that you plan to print to avoid confusion. If your screen is in the upper/lowercase mode and your printing is in the uppercase/graphic mode, you will get graphics characters when you want uppercase letters.

There are two ways to tell the HomeWriter- to use the upper/ lowercase mode:

- Using an extra number (sometimes called a secondary address) when you open a file

- Using the code CHR$(17)

For the first method, you use the number seven as the secondary address when you open the file for printing. This number goes after the device number, as shown in the example below.

```
new
10 open3,4,7
20 print#3,"This is upper/lowercase."
30 close3
```

When you run the program, you should get the following results:

> This is upper/lower case.

To test the CHR$(17) code, type and run the following program. See that your screen is in the upper/lowercase mode and be sure to include all the spaces and semicolons when you enter the program.

```
new
10 open3,4
20  print#3,chr$(17)"Upper/lowercase ";
30 print#3,"now it is off"
40 close3
```

Upper/lowercase NOW IT IS OFF

As you can see in the printout above, CHR$(17) lasts for only one PRINT# statement even with a semicolon after it. If you want more than one line in the upper/lowercase mode, use CHR$(17) for each line or use the secondary address method.

Tabs

The HomeWriter- has two types of horizontal tabs. The first type divides the page into 80 columns, each one character wide. For this type, you send the code CHR$(l6) followed by the number of the column where you want the printing to begin. This number, which must be two digits, goes inside the quotation marks, just before the text. The number tells the printer where to start printing, but it is not printed. For example, the program below uses CHR$(l6) along with the number 15 inside the quotation marks. This makes the printing start in the fifteenth column. The numbers in line 20 give you a reference point so that you can see exactly where the next line starts. Notice that the first column is numbered zero, not one.

```
NEW
10 OPEN6,4
20  PRINT#6,"012345678901234567890"
30 PRINT#6,CHR$(16);
40 PRINT#6,"15 THIS STARTS IN COLUMN 15."
50 CLOSE6
```

```
012345678901234567890
                  THIS STARTS IN COLUMN 15.
```

The second type of horizontal tab gives more exact spacing by dividing the page into 480 columns, each 1/6th of a character wide. This type uses CHR$(27) and CHR$(16) followed by two other CHR$ numbers. These other numbers specify the column where printing starts. The total number of columns is determined by adding the second number to 256 times the first number. Our samples in Table 3-1 illustrate the command.

Table 3-1. **Dot spacing commands**

Command	Number of columns
CHR$(27)CHR$(16)CHR$(0)CHR$(50)	50(0+ 50= 50)
CHR$(27)CHR$(16)CHR$(0)CHR$(186)	186(0+186=186)
CHR$(27)CHR$(16)CHR$(1)CHR$(50)	306 (256 + 50 = 306)

The following program shows how the three commands in Table 3-l space the word "TAB" across the page.

```
NEW
10 OPEN3,4
20 FOR T=1 TO 3
30 READ X
40 Y=INT(X/256): Z=X-(Y*256)
50  PRINT#3,CHR$(27)CHR$(16)CHR$(Y);
60  PRINT#3,CHR$(Z)"TAB";
70 NEXT T
80 PRINT#3
90 CLOSE3
100 DATA 50,186,306
```

```
        TAP                          TAB                     TAB
```

Line spacing

The CHR$(8) code turns on the graphics mode, which is discussed in the next chapter, but this code has another use. The CHR$(8) code also reduces the space between print lines.

For printing text you want space between the lines, but occasionally with graphics characters you will want the space between lines eliminated so that the characters can combine into larger figures. The next program shows what we mean.

Lines 20-50 in this program use several graphics characters. To be sure that the lines meet each other, press **SHIFT** and * at the same time for the horizontal lines and **SHIFT** and - for the vertical lines.

```
NEW
10 OPEN2,4
20   S$=CHR$(15): L$=CHR$(8)
30 PRINT#2,S$"                    "L$
40 PRINT#2,S$"                    "L$
50 PRINT#2,S$"                    "L$
60  PRINT#2,S$"                   "L$
70 PRINT#2,S$"                    "L$
80 CLOSE2
```

As you can see from the printout, the CHR$(8) code allows you to combine some of the graphics characters to form boxes. Without the CHR$(8) code, the vertical lines have gaps in them, as shown in the second printout.
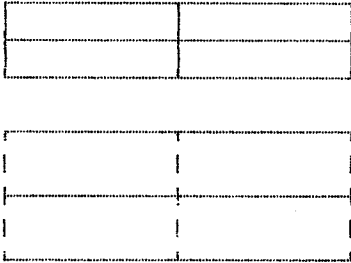
The commands for the modes used in this chapter are summarized in Appendix B.

Chapter 4
Introduction to Dot Graphics

The dot graphics mode allows your HomeWriter- to produce pictures, graphs, and charts. Instead of using the letters of the alphabet or the graphic characters from your keyboard, the graphics mode prints patterns of dots. You plan where you want the dots to appear and then use a program to tell the HomeWriter- where to put them.

Because many software programs use dot 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 chart on the next page, for example, was created and printed in about 10 minutes.

EXPENSES
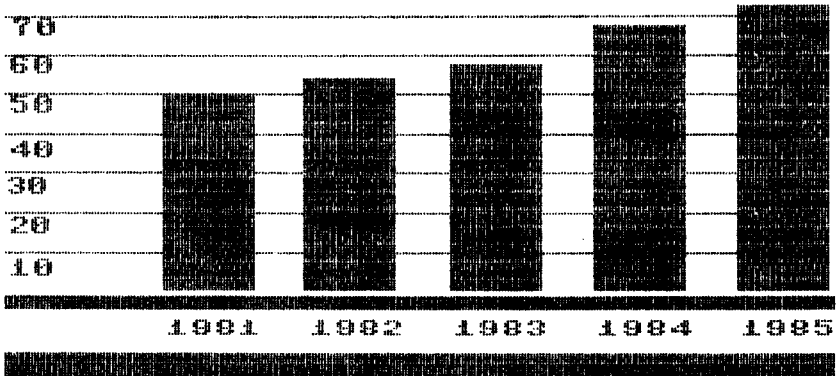
The quickest and easiest way to print graphics on your HomeWriter-10 is to use a commercial graphics program. With such programs you usually create an image on your monitor or TV screen and then give a command to send the image to the printer.

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 want to do your own programming or want to understand how the HomeWriter- prints graphics, read on.

Dot Patterns

Graphic images are formed on the HomeWriter- about the same way that pictures in newspapers and magazines are printed. If you look closely at a newspaper photograph, you **can see that** it is made up of many small dots.

The HomeWriter- also forms its images with patterns of dots, as many as 72 dots per inch vertically and 60 dots per inch horizontally. The images you print on the HomeWriter- can, therefore, be as finely detailed as the one on the first page of this chapter.

Pull out the paper guide at the back of the printer until you hear it click into place. This guide helps keep the incoming paper from catching on the printer cable, Then fit the notches in the bottom corners of the separator over the pins at the front of the paper slot. The separator keeps the paper that is coming out of the printer from being pulled back in.
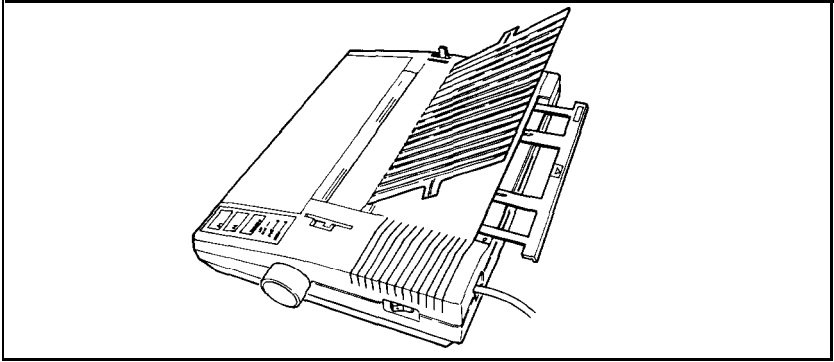
Figure 1-2. Paper separator and paper guide

When you want to use single sheet paper in your LX-SO, you can remove the tractor unit quite easily. Just push back the two tractor release levers shown in Figure l-3, tilt the unit backward, and lift it up,
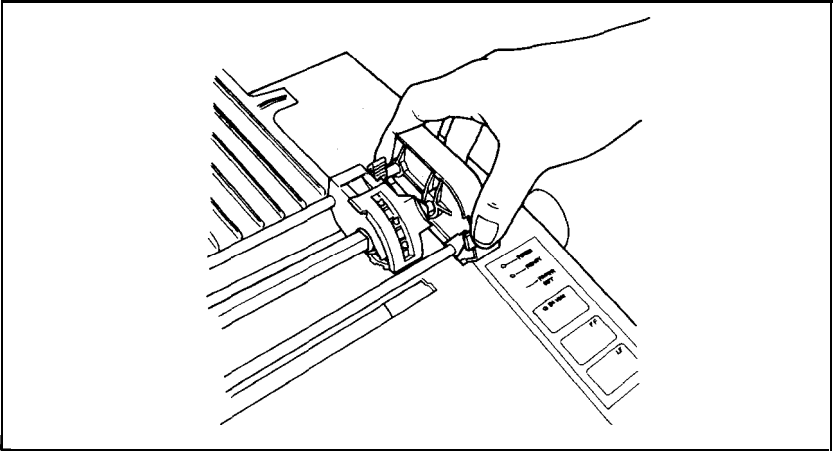
Figure 1-3. Tractor release levers

You will find the instructions for loading continuous paper in your Printer's Manual.

EPSON

Tractor Unit #8304G

This sheet describes the procedures for installing and removing the tractor unit option. This unit makes it possible to use continuous paper 4 to 10 inches wide.

Installation

To install the removable tractor unit, first pull the friction lever toward the front of the printer. Then hold the tractor with the gears to the right as shown in Figure l-l.
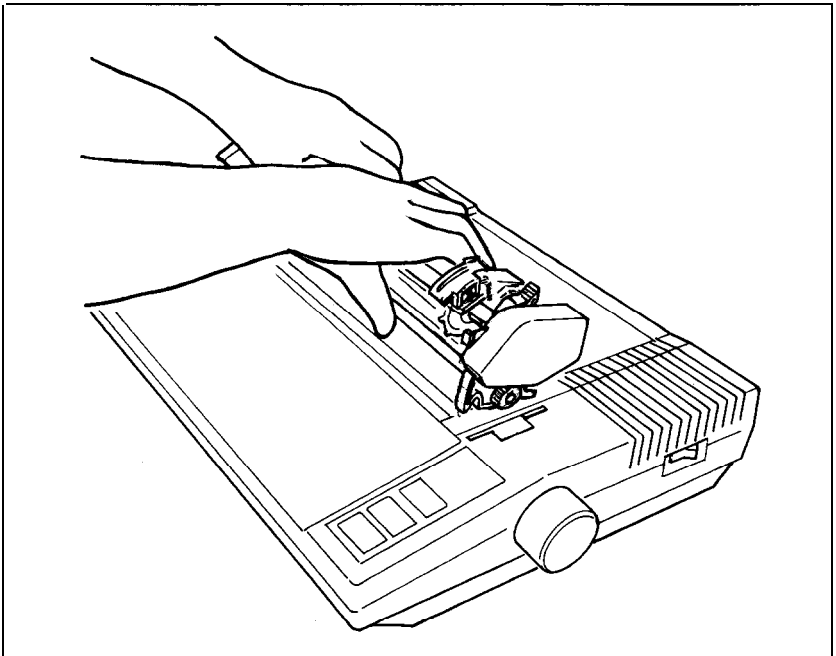
Figure 1-1. Tractor placement

In each tractor slot are two pegs that fit into the notches on the tractor fittings. Tilt the tractor back so that the rear notches fit over the rear pegs. Then tilt the unit forward until it clicks into place. That's all there is to it.

Now pull out the paper guide and install the paper separator (which is supplied with the printer, not with the tractor unit) as shown in Figure 1-2.

The Print Head

To understand how the graphics mode works, you need to know a little about the print head on the HomeWriter-10.

The print head has nine pins or wires mounted vertically. Each time a pin is fired, it strikes the inked ribbon and presses it against the paper to produce a dot. This dot is about 1/72nd of an inch in diameter, depending upon the age of the ribbon and the type of paper used.

As the print head moves horizontally across the page, these pins are fired time after time in different patterns to produce letters, symbols, or graphics.

In the graphics mode, the HomeWriter- prints one column of pins for each CHR$ number it receives, and it uses only the top seven pins.

Therefore, your graphics program must send CHR$ numbers for dot patterns, one number for each column in a line. For each of those columns, 1/60th of an inch apart, the print head prints the pattern of dots you have specified.

To print figures taller than seven dots, the print head makes more than one pass. It prints one line, then advances the paper and prints another, just as it does with text.

To keep the print head from leaving gaps between the graphics lines as it does between the text lines, the line spacing changes automatically to eliminate the space between lines. This change in line spacing enables the HomeWriter- to print finely detailed graphic images that give no indication that they are made up of separate lines, each less than l/10th of an inch wide.

Graphics Mode

The code that turns on the graphics mode is CHR$(8). After you send this code, you send numbers that tell the HomeWriter- what dot patterns you want the print head to print. The next section explains what numbers to use.

Pin Labels

Once the printer is in the graphics mode, your next step is to tell the print head which pins to fire in each column. There are 128 possible combinations of seven pins, and you send only one number for each column. The numbering system that allows you to use a single number to specify any one of the 128 possible patterns is shown in Figure 4-1. Because only seven of the nine pins are used in the graphics mode, only seven are shown in our diagrams.
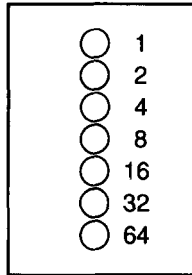
Figure 4-1. Pin **labels**

To fire any one pin, you send its number plus 128. To fire more than one pin at the same time, add up the numbers of the pins, add 128, and send the sum to the printer. Therefore, you fire the top pin by sending 129. To fire the bottom graphics pin, you send 192. If you want to fire only the top and bottom pins, you simply add 64, 1, and 128, then send 193.

By adding the pin numbers together, you can fire any combination of pins you want. Figure 4-2 shows you three examples of how to calculate the number that will fire a particular pattern of pins.
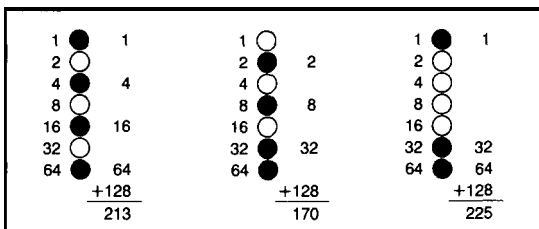
Figure 4-2. Calculating numbers for pin patterns

With this numbering system any combination of the seven pins adds up to a number between 128 and 255, and no numbers are duplicated.

Now that you know the principles of dot graphics, here are two simple exercises and a more complex example that shows you how to design your own graphics.

One-Line Graphics Program

Your first graphics exercise is a program that prints a single pattern of dots 40 times. Type it in first, and then read the explanation that follows.

```
NEW
10 OPEN4,4
20 PRINT#4,CHR$(8);
30 FOR X=1 TO 40
40 PRINT#4,CHR$(213);
50 NEXT X:PRINT#4
60 CLOSE4
```

Line 10 opens a file, as usual. Then line 20 sends the graphics command to the printer. Notice that this line ends in a semicolon. The semicolon keeps the graphics command on the same print line as the pin numbers that you will send in line 40. The graphics command stays on for only one print line. Therefore, you must be careful not to put it on a separate print line from the pin numbers, and you must send it several times if you are printing several lines of graphics.

Lines 30 and 50 set up a loop so that the pin number is sent 40 times. Line 40 contains the pin number (213) that is sent to the printer 40 times. In Figure 4-2 you can see the pattern that this number produces. Again be sure that you have typed in the semicolon in this line so that all 40 repetitions of the pin number will be on the same print line. Line 60 closes the file, as usual.

Now that you know how the program works, run it to see the result below. Although it does not look as interesting as the examples at the beginning of this chapter, the program does allow you to see exactly how the graphics mode works.

Multiple-Line Program

Here is a program that shows you how the HomeWriter- combines several lines of graphics for a figure taller than seven dots.

Start with a short program that prints two patterns alternately for 100 columns. Since there are two pin patterns in the loop, it needs to be executed only 50 times.

```
NEW
10 OPEN4,4
30 PRINT#4,CHR$(8);
40 FOR X=1 TO 50
50  PRINT#4,CHR$(213)CHR$(170);
60 NEXT X
70 PRINT#4
120 CLOSE4
```

If you run the program now, you'll see how one line of the pattern looks:

To see how several lines combine to form a figure, change lines 60 and 70 and add lines 20 and 80-110 to the previous program to produce the program below.

```
10 OPEN4,4
20 FOR R=1 TO 3
30 PRINT#4,CHR$(8);
40 FOR X=1 TO 50
50  PRINT#4,CHR$(213)CHR$(170);
60 NEXT X: PRINT#4
70  PRINT#4,CHR$(8);
80 FOR X=1 TO 50
90  PRINT#4,CHR$(170)CHR$(213);
100 NEXT X: PRINT#4: NEXT R
110 PRINT#4
120 CLOSE4
```

Now run the program to see the six print lines combine into a pattern:
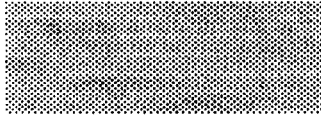
Notice that the graphics command can be in effect for only one print line. The command is in lines 30 and 60 so that it is issued each time a new print line is begun. You cannot print more than one line of graphics without having the graphics command issued more than once.

The PRINT#4 at the end of lines 60 and 100 causes the end of the print line. Without this command, the second graphics line would be printed to the right of the first one instead of below it.

Designing Original Graphics

The sample graphics program is not especially complicated, but it does include the same steps you would use for a more complex figure so that you have the basis for designing graphics on your HomeWriter-10.

There are four steps to printing an original design:

- Plan the figure with dots on graph paper.

- Divide the figure into separate print lines.

- Calculate the numbers for the pin patterns in each column.

- Put the numbers in your graphics program.

In the next pages you'll see this process in action with the development of the sample program.

Figure 4-3 shows the first step toward printing a design. It should point you in the right direction for your own designs.
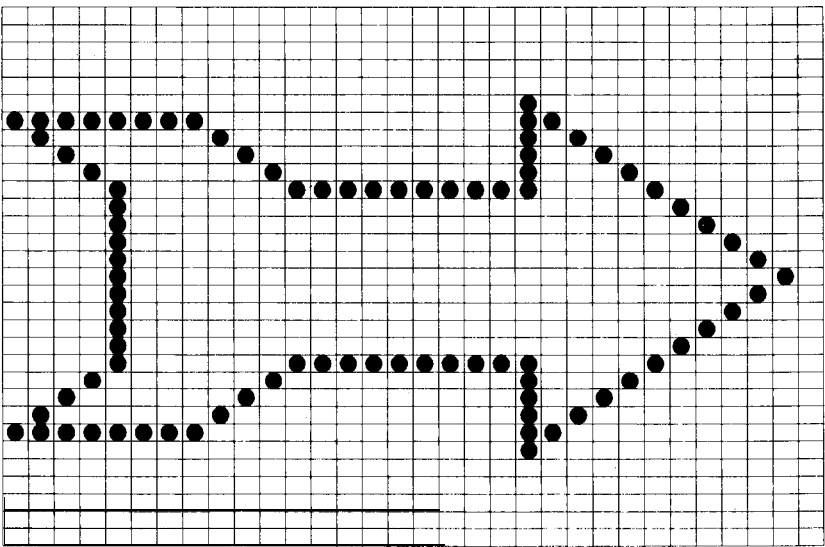
Figure 4-3. Arrow design

After finishing the design, you divide it into print lines and calculate the CHR$ numbers for each column.

The arrow design can be divided into three print lines, each seven dots high. Then you look at the pattern of dots in each column to calculate the CHR$ numbers. The results for the first print line are shown in Figure 4-4. The pin values are on the left side and the sums are at the bottom of each column.
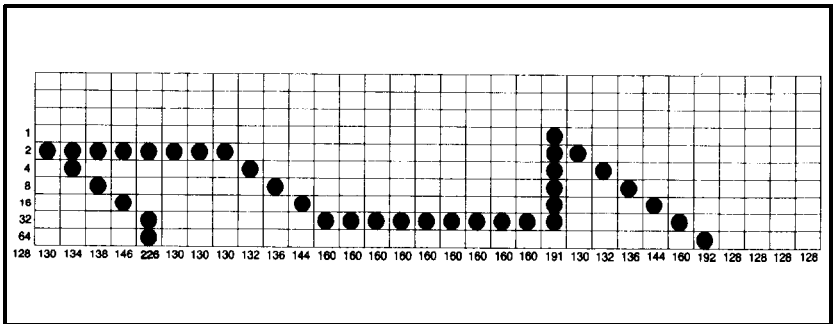
Figure 4-4. First line of arrow figure

The CHR$ number for each column is 128 plus the numbers of all the rows that have dots in them. For example, in the first column of the first line there is a dot in the 2 row, so you add 128 and 2 for a total of 130, which is the number at the bottom of the column. In the second column there are dots in the 2 row and the 4 row, so you add 128, 2, and 4 for a total of 134.

After figuring these numbers for each column in every print line, you put them into DATA statements in the arrow graphics program.

First, here's the whole program and its printout. Following the printout is an explanation of a method used to reduce the number of DATA numbers that have to be typed.

```
NEW
100 OPEN4,4
110 FOR K=1 TO 3
120 PRINT#4,CHR$(8);
130 READ N: IF N=0 THEN 200
140 IF N<0 THEN 170
150 IF N>127 THEN PRINT#4,CHR$(N);:
160 GOTO 130
170 READ P: FOR J=1 TO -N
180 PRINT#4,CHR$(P);: NEXT J
199 GOTO 130
200 PRINT#4: NEXT K
210 CLOSE4
220 DATA 130,134,138,146,226,-3,130
230 DATA 132,136,144,-9,160,191,130,132
240 DATA 136,144,160,192,-4,128,0
250 DATA -4,128,255,-22,128,193,162,148
260 DATA 136,0,160,176,168,164,163,-3
270 DATA 160,144,136,132,-9,130,254,160
280 DATA 144,136,132,130,129,-4,128,0
```


In this program the number 0 in the DATA statements signals the end of a print line. This is the reason for the IF-THEN statement in line 130. When a 0 is read, the program skips to line 200 and ends the print line.

Because several of the numbers are repeated many times, lines 140 and 170-190 are included to save typing. These lines use negative DATA numbers for repetitions. Line 140 tests for a negative number, and if it finds one, uses lines 170 and 180 to repeat the next DATA number. For example, in line 230, the minus 9 causes the next number (160) to be repeated 9 times.

Even with this shortcut, programming graphics printing in BASIC does require lots of data.

Repeating graphics data

The HomeWriter- has a special command for repeating a CHR$ number in simple graphics programs. To send one CHR$ number repeatedly, the command is CHR$(8)CHR$(26) followed by the number of repetitions and then by the data number to be repeated. For example, to send CHR$(213) forty times (as you did in the first graphics program in this chapter) you would delete lines 30-50 from that program and change line 20 as shown below:

```
20   PRINT#4,CHR$(8)CHR$(26)CHR$(40)CHR$(213)
```

This command is especially handy for making bar charts, as you can see in the program and printout below.

```
10 OPEN4,4
20 G$=CHR$(8)+CHR$(26): B$=CHR$(255)
30 R$=CHR$(15)
40 PRINT#4,"1982 "G$CHR$(50)B$R$
50 PRINT#4,"1983 "G$CHR$(72)B$R$
60 PRINT#4,"1984 "G$CHR$(80)B$R$
70 PRINT#4,"1985 "G$CHR$(120)B$
80 CLOSE4
```

```
1982  �xxxxxxxxxxxxxxxxx
1983  ▓xxxxxxxxxxxxxxxxxxxxxxx
1984  ▓xxxxxxxxxxxxxxxxxxxxxxxx
1985  ▓xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
```

Using string variables

Besides the new command, the previous program introduces a programming technique that you may want to use in graphics programming. So that you do not have to type CHR$(8), **CHR$(26), CHR$(255),** and **CHR$(15)** over and over again, you store them in string variables. First, you put the string variables G$, B$, and R$ in lines 20 and 30. Then you can type G$ instead of CHR$(8)CHR$(26), B$ instead of CHR$(255), and R$ instead of CHR$(15). Notice the plus sign that is necessary if you put more than one CHR$ number in a string variable.

The commands used in this chapter are summarized in Appendix B.

Appendix A
HomeWriter-10 Characters

This appendix is a listing of the characters produced by each of the decimal codes from 0 through 255. For each code we provide the decimal number (Dec) the hexadecimal number (Hex) and a printout of the character that is printed by that code (Char). If the code does not produce a printable character, the word none is in the Char column.

This listing is given twice, once for the uppercase/graphic mode and once for the upper/lowercase mode.

The codes for printer instructions, such as line feed and reversed printing, are presented in Appendix B.

Uppercase/Graphic (Cursor Up) Mode

Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char
0	00	none	32	20	blank	64	40	@	96	60	—
1	01	none	33	21	!	65	41	A	97	61	♣
2	02	none	34	22	"	66	42	B	98	62	|
3	03	none	35	23	#	67	43	C	99	63	—
4	04	none	36	24	$	68	44	D	100	64	—
5	05	none	37	25	%	69	45	E	101	65	—
6	06	none	38	26	&	70	46	F	102	66	—
7	07	none	39	27	'	71	47	G	103	67	|
8	08	none	40	28	(	72	48	H	104	68	|
9	09	none	41	29	)	73	49	I	105	69	➘
10	0A	none	42	2A	*	74	4A	J	106	6A	➘
11	0B	none	43	2B	+	75	4B	K	107	6B	➚
12	0C	none	44	2C	,	76	4C	L	108	6C	∟
13	0D	none	45	2D	–	77	4D	M	109	6D	➘
14	0E	none	46	2E	.	78	4E	N	110	6E	➚
15	0F	none	47	2F	/	79	4F	O	111	6F	Γ
16	10	none	48	30	0	80	50	P	112	70	⌐
17	11	none	49	31	1	81	51	Q	113	71	▦
18	12	none	50	32	2	82	52	R	114	72	—
19	13	none	51	33	3	83	53	S	115	73	♣
20	14	none	52	34	4	84	54	T	116	74	|
21	15	none	53	35	5	85	55	U	117	75	⌐
22	16	none	54	36	6	86	56	V	118	76	✕
23	17	none	55	37	7	87	57	W	119	77	○
24	18	none	56	38	8	88	58	X	120	78	♣
25	19	none	57	39	9	89	59	Y	12-l	79.	|
26	1A	none	58	3A	:	90	5A	Z	122	7A	♦
27	1B	none	59	38	;	91	5B	[	123	7B	+
28	1C	none	60	3C	<	92	5C	£	124	7C	▨
29	1D	none	61	3D	=	93	5D	]	125	7D	|
30	1E	none	62	3E	>	94	5E	↑	126	7E	π
31	1F	none	63	3F	?	95	5F	←	127	7F	◢

Uppercase/Graphic (Cursor Up) Mode

Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char
128	80	none	160	A0	blank	192	C0		224	E0	blank
129	81	none	161	A1		193	C1		225	E1	
130	82	none	162	A2		194	C2		226	E2	
131	83	none	163	A3		195	C3		227	E3	
132	84	none	164	A4		196	C4		228	E4	
133	85	none	165	A5		197	C5		229	E5	
134	86	none	166	A6		198	C6		230	E6	
135	87	none	167	A7		199	C7		231	E7	
136	88	none	168	A8		200	C8		232	E8	
137	89	none	169	A9		201	C9		233	E9	
138	8A	none	170	AA		202	CA		234	EA	
139	8B	none	171	AB		203	CB		235	EB	
140	8C	none	172	AC		204	CC		236	EC	
141	8D	none	173	AD		205	CD		237	ED	
142	8E	none	174	AE		206	CE		238	EE	
143	8F	none	175	AF		207	CF		239	EF	
144	90	none	176	B0		208	D0		240	F0	
145	91	none	177	B1		209	D1		241	F1	
146	92	none	178	B2		210	D2		242	F2	
147	93	none	179	B3		211	D3		243	F3	
148	94	none	180	B4		212	D4		244	F4	
149	95	none	181	B5		213	D5		245	F5	
150	96	none	182	B6		214	D6		246	F6	
151	97	none	183	B7		215	D7		247	F7	
152	98	none	184	B8		216	D8		248	F8	
153	99	none	185	B9		217	D9		249	F9	
154	9A	none	186	BA		218	DA		250	FA	
155	9B	none	187	BB		219	DB		251	FB	
156	9C	none	188	BC		220	DC		252	FC	
157	9D	none	189	BD		221	DD		253	FD	
158	9E	none	190	BE		222	DE		254	FE	
159	9F	none	191	BF		223	DF		255	FF	

Upper/Lowercase (Cursor Down) Mode

Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char
0	00	none	32	20	blank	64	40	@	96	60	─
1	01	none	33	21	!	65	41	a	97	61	A
2	02	none	34	22	"	66	42	b	98	62	B
3	03	none	35	23	#	67	43	c	99	63	C
4	04	none	36	24	$	68	44	d	100	64	D
5	05	none	37	25	%	69	45	e	101	65	E
6	06	none	38	26	&	70	46	f	102	66	F
7	07	none	39	27	'	71	47	g	103	67	G
8	08	none	40	28	(	72	48	h	104	68	H
9	09	none	41	29	)	73	49	i	105	69	I
10	0A	none	42	2A	*	74	4A	j	106	6A	J
11	0B	none	43	2B	+	75	4B	k	107	6B	K
12	0C	none	44	2C	,	76	4C	l	108	6C	L
13	0D	none	45	2D	─	77	4D	m	109	6D	M
14	0E	none	46	2E	.	78	4E	n	110	6E	N
15	0F	none	47	2F	/	79	4F	o	111	6F	O
16	10	none	48	30	0	80	50	p	112	70	P
17	11	none	49	31	1	81	51	q	113	71	Q
18	12	none	50	32	2	82	52	r	114	72	R
19	13	none	51	33	3	83	53	s	115	73	S
20	14	none	52	34	4	84	54	t	116	74	T
21	15	none	53	35	5	85	55	u	117	75	U
22	16	none	54	36	6	86	56	v	118	76	V
23	17	none	55	37	7	87	57	w	119	77	W
24	18	none	56	38	8	88	58	x	120	78	X
25	19	none	57	39	9	89	59	y	121	79	Y
26	1A	none	58	3A	:	90	5A	z	122	7A	Z
27	1B	none	59	3B	;	91	5B	[	123	7B	+
28	1C	none	60	3C	<	92	5C	£	124	7C	▩
29	1D	none	61	3D	=	93	5D	]	125	7D	I
30	1E	none	62	3E	>	94	5E	↑	126	7E	▦
31	1F	none	63	3F	?	95	5F	←	127	7F	▨

Upper/Lowercase (Cursor Down) Mode

Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char
128	80	none	160	A0	blank	192	C0		224	E0	blank
129	81	none	161	A1	▌	193	C1	A	225	E1	▌
130	82	none	162	A2	▄▄	194	C2	B	226	E2	▄▄
131	83	none	163	A3	⎺	195	C3	C	227	E3	⎺
132	84	none	164	A4	▁	196	C4	D	228	E4	▁
133	85	none	165	A5	▎	197	C5	E	229	E5	▎
134	86	none	166	A6	▒	198	C6	F	230	E6	▒
135	87	none	167	A7	▏	199	C7	G	231	E7	▏
136	88	none	168	A8	▒	200	C8	H	232	E8	▒
137	89	none	169	A9	▒	201	C9	I	233	E9	▒
138	8A	none	170	AA	▏	202	CA	J	234	EA	▏
139	8B	none	171	AB	├	203	CB	K	235	EB	├
140	8C	none	172	AC	▐	204	CC	L	236	EC	▐
141	8D	none	173	AD	∟	205	CD	M	237	ED	∟
142	8E	none	174	AE	⌐	206	CE	N	238	EE	⌐
143	8F	none	175	AF	▄▄	207	CF	O	239	EF	▄▄
144	90	none	176	B0	⌐	208	D0	P	240	F0	⌐
145	91	none	177	B1	⊥	209	D1	Q	241	F1	⊥
146	92	none	178	B2	⊤	210	D2	R	242	F2	⊤
147	93	none	179	B3	⊣	211	D3	S	243	F3	⊣
148	94	none	180	B4	▏	212	D4	T	244	F4	▏
149	95	none	181	B5	▊	213	D5	U	245	F5	▊
150	96	none	182	B6	▊	214	D6	V	246	F6	▊
151	97	none	183	B7	⎺	215	D7	W	247	F7	⎺
152	98	none	184	B8	▄▄	216	D8	X	248	F8	▄▄
153	99	none	185	B9	▓▓	217	D9	Y	249	F9	▓▓
154	9A	none	186	BA	↙	218	DA	Z	250	FA	↙
155	9B	none	187	BB	▮	219	DB	+	251	FB	▮
156	9C	none	188	BC	▀	220	**DC**	▒	252	FC	▀
157	9D	none	189	BD	⌐	221	DD	▏	253	FD	⌐
158	9E	none	190	BE	▮	222	DE	▚	254	FE	▚
159	9F	none	191	BF	▀▊	223	DF	▒	255	FF	▚

Appendix B
HomeWriter-10 Control Codes

The control codes in this appendix are described and then listed in numerical order. The listings use the format for BASIC, but you can convert them to the proper format for any other programming language.

Control Codes by Function

Expanded *print* is turned on by CHR$(14) and off by CHR$(15).

Reverse print is turned on by CHR$(18) and turned off by CHR$(146), a line feed, or a carriage return.

Uppercase/graphic mode is the default. It is used unless upper/lowercase is turned on by one of the commands described below. If upper/lowercase is on, uppercase/graphic can be turned on by CHR$(145) and turned off by CHR$(17) or a line feed.

Upper/lowercase can be turned on by using the number seven as a secondary address or by CHR$(17). CHR$(145) will turn it off, and if it is turned on by CHR$(17), it will turn off at the end of the text in a PRINT# statement whether or not a semicolon is at the end of the program line.

A tab to a *character* column is activated by CHR$(16) CHR$(n1)CHR$(n2), where n1 is the first digit and n2 is the second digit of the number of the character column. The number of the character column can also be placed inside quotation marks at the beginning of the text to be printed. See Chapter 3 for an example.

A tab to a *dot* column is activated by CHR$(27)CHR$(16) CHR$(nl)CHR$(n2) where n = total number of dot columns
    nl = n MOD 256
    n2 = INT(n/256)

The line **spacing** is changed from the standard 6 lines per inch to 9 lines per inch by CHR$(8). CHR$(15) changes the line spacing back to 6 lines per inch.

The **graphics mode** is turned on by CHR$(8). When the graphics mode is on, all CHR$ numbers above 127 are printed as pin patterns. See Chapter 4 for the pin numbering system.

Graphics data can be repeated with CHR$(26). The format is:

CHR$(8) . . . CHR$(26)CHR$(nl)CHR$(n2)

where nl is the number of repetitions and n2 is the data number to be repeated.

Control Codes by Number

CHR$ Number	Function
8	Turn on graphic mode
10	Line feed
13	Carriage return
14	Turn on expanded mode
15	Return to standard printing
16	Tab setting
17	Turn on upper/lowercase (cursor down) mode
18	Turn on reverse printing
26	Repeat graphics data
27	Tab setting [with CHR$(16)]
145	Turn on uppercase/graphic (cursor up) mode
146	Turn off reverse printing

Appendix C
The DIP Switches

Several tiny switches called DIP (for Dual In-Line Package) switches are in the back of your HomeWriter- printer. They control a number of important printer functions. For most uses they can be left as they are set at the factory, but you may want to change some settings.

The design of the HomeWriter- gives you easy access to the switches. You can see them in the back of the printer as indicated in Figure C-l.
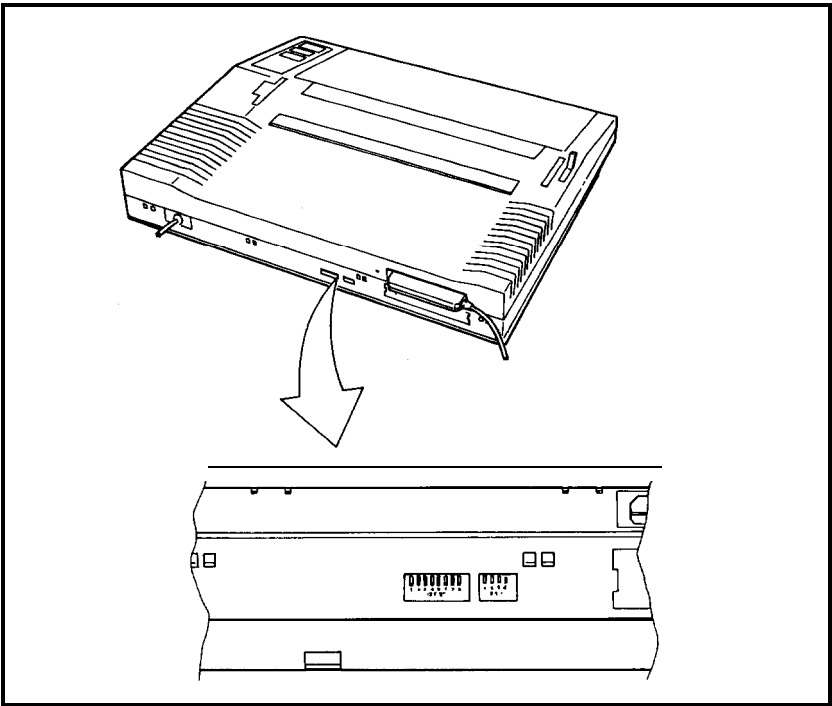

Figure C-l. DIP switch locution

Always turn the power OFF (with the switch on the right side of the printer) before you change the setting of any of these switches. Any changes made while the power is on will be ignored until you turn the printer off and back on. So set all switches with the power off.

In Table C-l we show you the functions of all the switches. Then we explain each of them.

Table C-1. DIP switch functions

Switch 1

No.	ON	Function	OFF
1-1	Compressed	Print mode	Standard
1-2	NLQ	Print mode	Draft
1-3	Active	Cut-sheet feeder	Inactive
1-4	12 inches	Page length	11 inches
1-5	Inactive	Paper end detector	Active
1-6	Emphasized	Print mode	Standard
1-7	Double-strike	Print mode	Standard
1-8	5	Device number	4

Switch 2

No.	ON	Function	OFF
2-1	0 (slashed)	Zero character	0
2-2		Not used	
2-3		Not used	
2-4	Mute	Beeper	Active

Note: The factory setting of all these switches is OFF:

Switch 1-1 selects standard or compressed printing. ON is compressed; OFF is standard. Even if the switch is off, you can use SelecType to choose compressed.

Switch 1-2 selects draft or Near Letter Quality printing. When it is ON, the printer prints in the NLQ mode. When it is OFF, it prints in the draft mode. If the switch is off, you can still choose the NLQ mode with SelecType.

Switch 1-3 controls the optional cut-sheet feeder. Leave it off unless you are using a cut-sheet feeder.

Switch 1-4 selects the page length. When it is OFF, the length is 11"; when it is ON, the length is 12".

Switch 1-5 controls the paper-end detector. When switch l-5 is ON, the detector is inactive, allowing printing to continue even when the printer is out of paper. When switch l-5 is OFF, the printer stops when the end of the paper passes the paper-end detector.

The paper-end detector is a small switch under the platen (the black roller) of your HomeWriter-10. With switch l-5 OFF, when the end of the paper passes this switch, it sends a signal that sounds the beeper and stops the printing. This saves wear on the print head, ribbon, and platen.

Because of the distance between the switch and the print head, the detector stops the printing about two inches from the bottom of the paper. Therefore, if you want to print on the last 2 inches of your paper, set this switch to ON.

Switch 1-6 selects standard or emphasized printing. When it is ON, the printing is emphasized; when it is OFF, printing is standard. Even if it is off, you can still choose emphasized with SelecType.

Switch 1-7 selects double-strike or standard printing. If it is ON, the printing is double-strike; if it is OFF, the printing is standard. Even if it is off, you can still choose double-strike with SelecType.

Switch 1-8 selects the device number for the printer. If you have only one printer connected to your computer system, this switch should be OFF, and you should use the number 4 for the device number when you open a file for printing. For example:

```
10 OPEN1,4
```

If you have two printers connected to your computer system, this switch should be ON on one of them. Then when you want to send information to that printer, use the number 5 for the device number. For example:

```
10 OPEN1,5
```

Switch 2-7 controls the printing of zeroes. When it is ON, the zeroes are slashed (0); when it is OFF, they are not.

Switches 2-2 and 2-3 are not used.

Switch 2-4 enables the beeper to sound when it is OFF; when it is ON, the beeper cannot sound.

Appendix D
Using the Optional Tractor Unit

With the optional tractor unit you can use continuous paper with pin feed holes along the sides. The unit is adjustable so that the continuous paper can be any width from 4 to 10 inches.

Printer Location

When you use the tractor and continuous paper, you must put your HomeWriter- where the paper can flow freely in and out of the printer. You can use a printer stand or any other arrangement that allows you to put the paper below the printer. One example is shown in Figure D-l. If you prefer, you can stack the paper behind the printer as shown in Figure D-2.
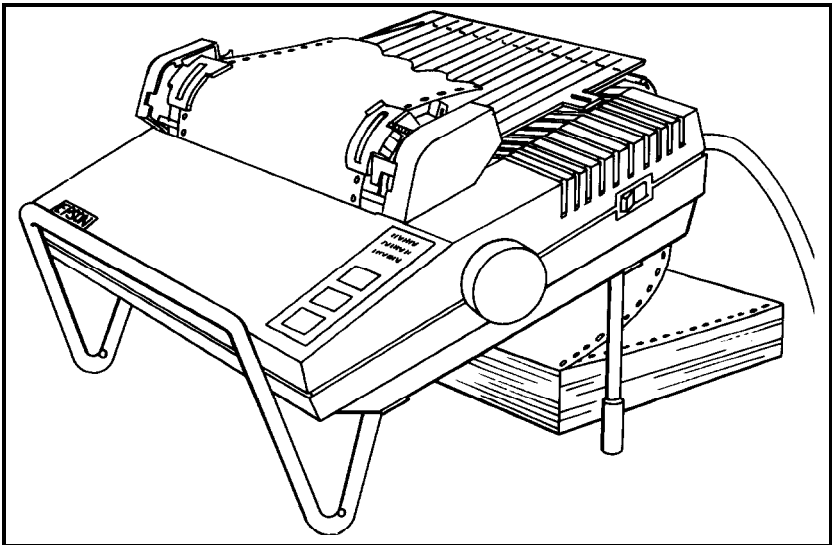
Figure D-l. Continuous paper with printer stand
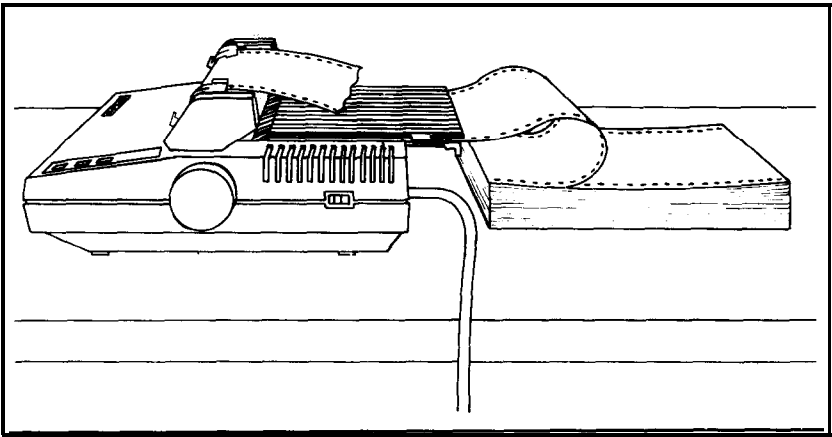
Figure D-2. Continuous paper without stand

Tractor Unit Installation

To install the removable tractor unit, first pull the friction lever toward the front of the printer. Then hold the tractor with the gears to the right as shown in Figure D-3.
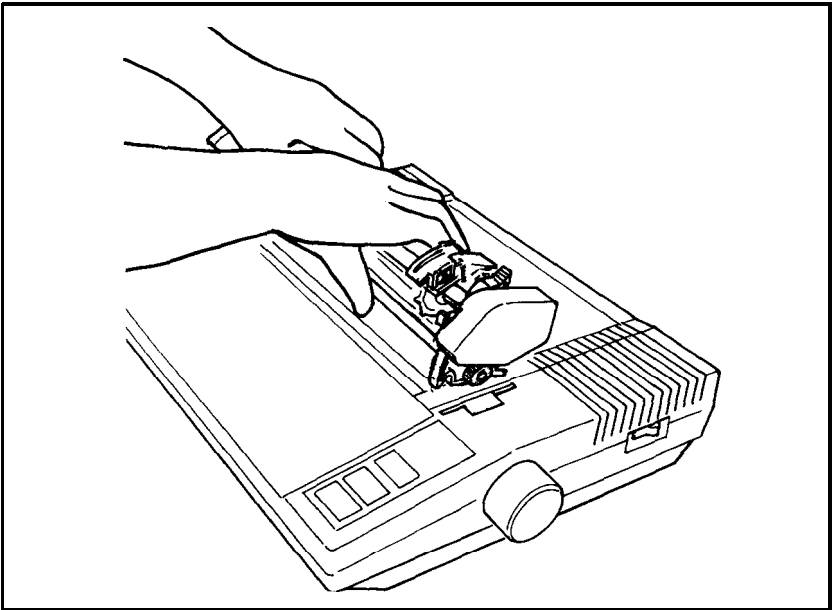
Figure D-3. Tractor placement

In each tractor slot are two pegs that fit into the notches on the tractor fittings. Tilt the tractor back so that the rear notches fit over the rear pegs. Then tilt the unit forward until it clicks into place. That's all there is to it.

Now install the paper separator and pull out the paper guide as shown in Figure D-4.

Fit the notches in the bottom corners of the separator over the pins at the front of the paper slot. The separator keeps the paper that is coming out of the printer from being pulled back in. Pull out the paper guide at the back of the printer.
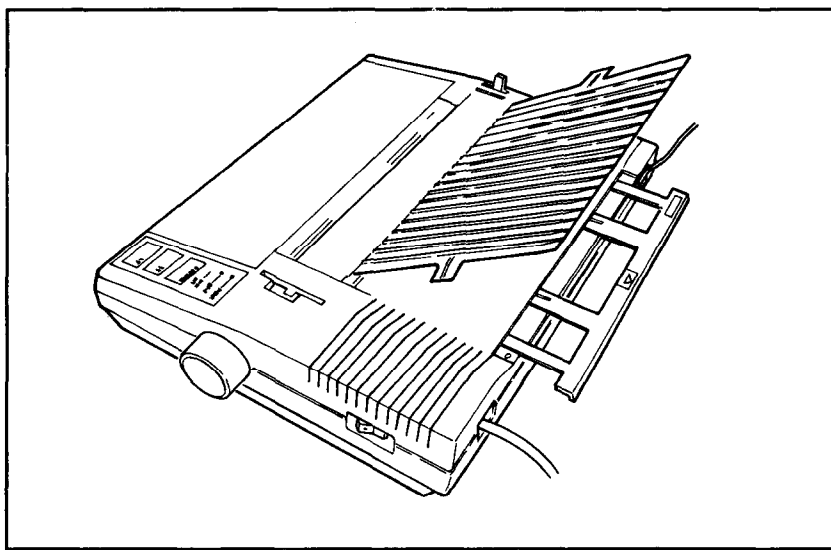
Figure D-4. Paper separator and paper guide

When you want to use single sheet paper in your HomeWriter-10, you can remove the tractor unit quite easily. Just push back the two tractor release levers shown in Figure D-5, tilt the unit backwards, and lift it up.
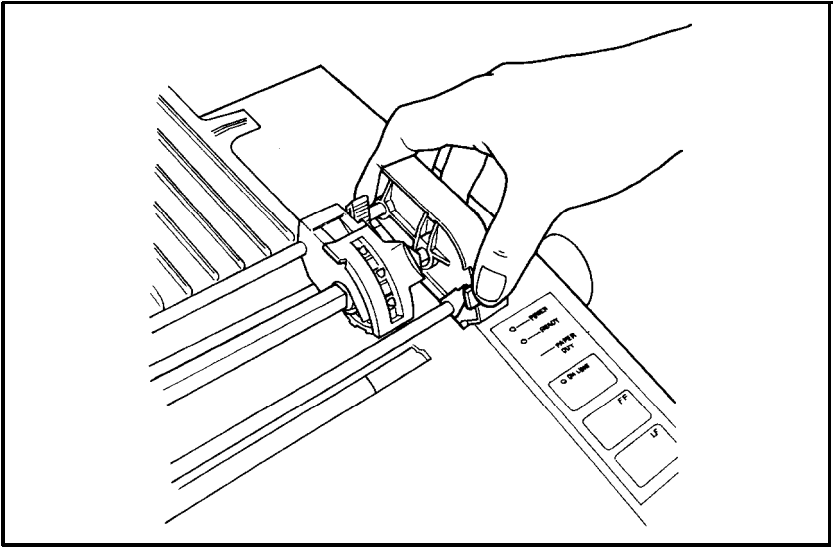
Figure D-5. Tractor release levers

Loading Continuous Paper

Once your tractor is installed, you can load continuous paper. See that the printer is turned off, and open the front lid. Then move the print head to the center of the printer, and pull the paper bail away from the platen (the black roller) just as you did for single sheet loading. (Look at the ***HomeWriter-10 Setup Instructions*** if you need to check on the names of any of these parts.)

Now, using Figure D-6 as your guide, pull the locking levers forward so that you can move the pin feed holders to the left and right. Put the left holder approximately 3/4 of an inch from the extreme left position and then push the locking lever back to lock that holder in place. Leave the other holder unlocked.
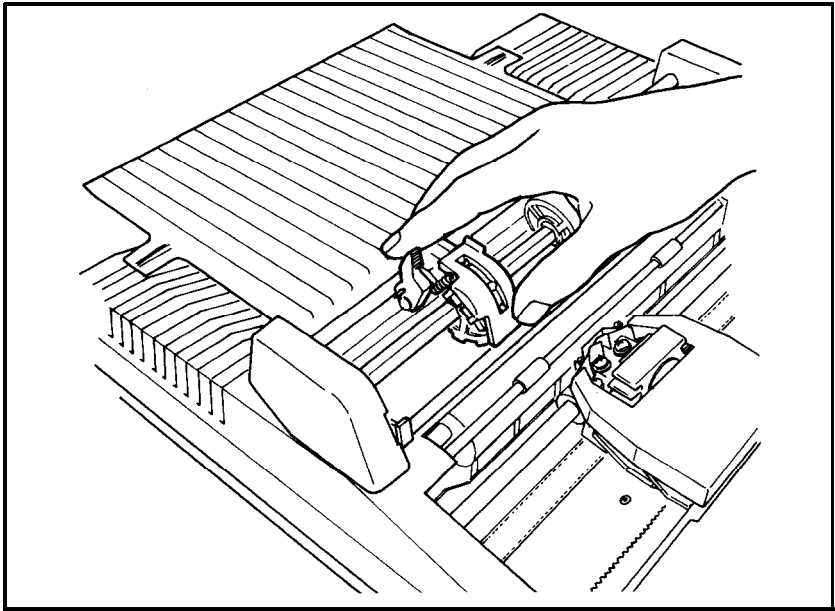
D-4

Figure D-6. Pin feed *holder adjustment*

Next, open the pin feed covers as shown in Figure D-7 and feed the paper under the paper separator and into the paper slot; push the paper through until it comes up between the ribbon guide and the platen.
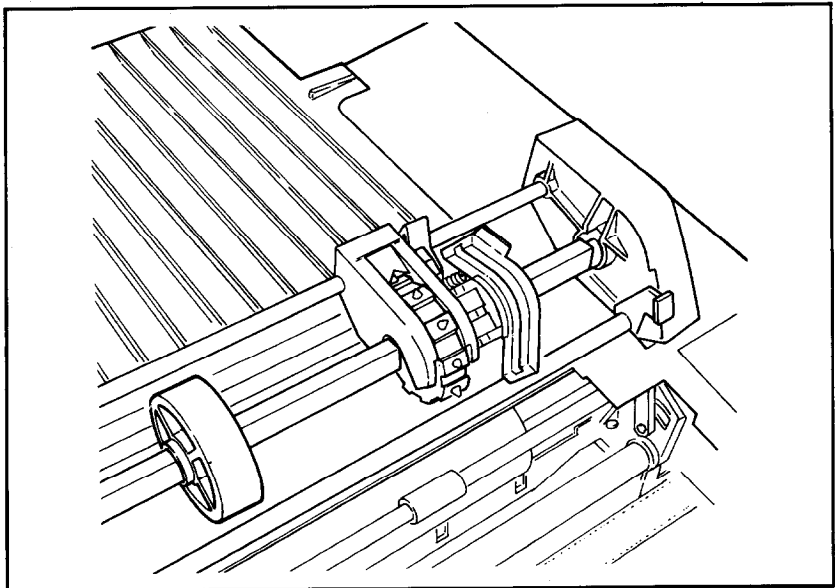

Figure D-7. Paper loading

Next pull the paper up until the top is above the pin-feed holders. Fit the holes on the left side of the paper over the pins in the left holder and close the cover. Now fit the right side of the paper in the right holder, moving the holder as needed to match the width of the paper. Close the second cover, make sure the paper has no dips or wrinkles, lock the right holder in place, and push the paper bail against the paper.

Now you are ready to set the top of page position. Turn the paper-feed knob to advance the paper until a perforation between sheets is approximately 1/8 of an inch below the top of the ribbon guide, as you see in Figure D-8.
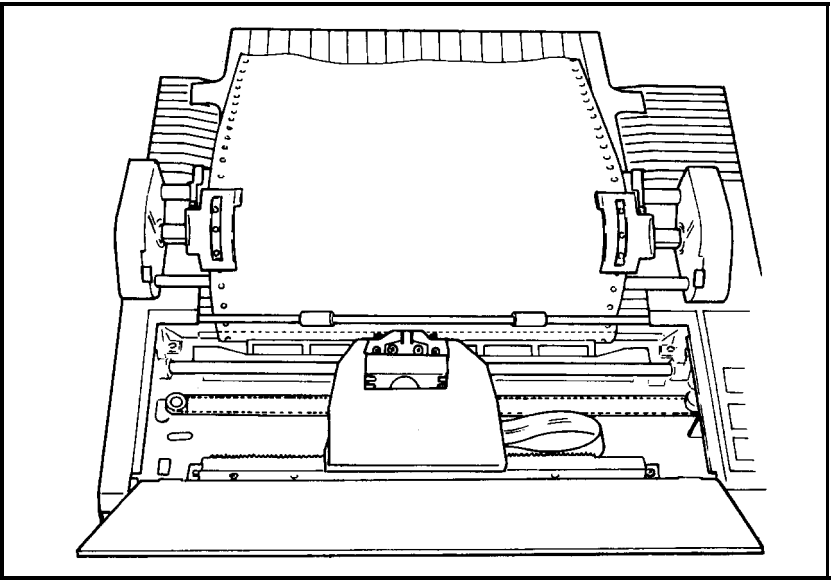

Figure D-8. Top of page position

When you turn on your HomeWriter-10, it will remember this top of page setting and will use it when any program tells it to move to the top of the next page. If you later find that your word processing or other applications program is putting your printing too high or too low on the page or is printing on the perforations, check to see that your top of page setting is correct.

Once you have set the top of page, each time you finish printing a document, push ON LINE to put the printer off-line and then push FF once to advance the paper so that you can tear off your just-printed pages and the paper will be in the right position to begin the next document.

Appendix E

Troubleshooting and Advanced Features

This appendix presents a few additional tips for using your HomeWriter-10.

Problem/Solution Summary

Difficult paper feeding and irregular print darkness can occur if you are printing self-adhesive labels and one comes off of the backing and sticks behind the platen. If this happens, take your HomeWriter- to a qualified service person; do not attempt to remove the label yourself.

If you can't print on the last 2 inches of single-sheet paper, change DIP switch l-5. See Appendix C.

If you have trouble saving a program with BASIC or an applications program, see that your HomeWriter- is turned on and is on-line.

Beeper Error Warnings

When the HomeWriter-10's beeper sounds, it usually indicates that the printer is out of paper. The beeper can also be sounded by certain error conditions in the printer.

If the printer beeps and stops printing when it is not out of paper, turn the printer off and check to see that the paper is loaded correctly. If the paper is loaded correctly, turn the printer back on and try to print again. If the printer beeps and does not print again, take it to a qualified service person.

Hex Code Dump Mode

The HomeWriter- has a special feature that makes it easy for experienced printer users to find the causes of problems. Called the hex code dump mode, it gives a printout of exactly **what** codes reach the printer.

Turn on this mode by turning on the printer while holding down **both** the FF and LF buttons. The printer responds by printing the words HEX CODE DUMP (CURSOR UP MODE). Then, when you run a program, either an applications program or one you have written in any programming language, the HomeWriter- prints one or more lines. Each line has two parts: the hexadecimal codes (up to 16 numbers) and the guide section (16 characters at the end of **each** line).

The hexadecimal numbers are the codes received by the printer, and the guide section helps you find a certain place in the list of codes. Each character in the guide section corresponds to one of **the** codes. If the code is for a printable character, that character is printed. If the code is for a non-printable character (such as the codes for line feed, expanded printing, or carriage return), a dot is printed.

Therefore, if you run the following BASIC program while your HomeWriter- is in the hex code mode, you produce the printout you see below it. The printer will print all but the last line and then stop. Press the ON LINE button to make **the** printer print the last line.

```
10 OPEN9,4
20  PRINT#9,CHR$(14)"EXPANDED"
30 PRINT#9,CHR$(18)"REVERSED"
40 CLOSE9
```

```
HEX CODE DUMP (CURSOR UP MODE)
0E 45 58 50 41 4E 44 45 44 0D 12 52 45 56 45 52        .EXPANDED..REVER
53 45 44 0D                                            SED.
```

You don't have to understand hexadecimal numbers to use them. In Appendix A you can find the decimal equivalent of each hexadecimal number, and Appendix B gives the meaning of the non-printable codes. An explanation of this printout will put you on the right track for using the data dump mode.

The first code in the first line is hex 0E, which is the same as decimal 14, which is the code for expanded printing. Since it is not a printable code, a dot is printed in the first position in the guide section. The next eight codes are for the letters EXPANDED, as you can see in the guide section. The next code (hex 0D, decimal 13) is for a carriage return, which ends the print line. Then when the BASIC program gets to line 30, it sends the code hex 12 (decimal 18), which is the code for reversed printing. Both the 0D and the 12 codes are represented by dots in the guide section.

The program continues with the codes for the letters REVERSED, which you see in the guide section. Then the program ends with a carriage return, hex 0D. Now you can follow a hex code dump printout on your own.

The hex dumping capability can help you debug a program quickly. Remember that Appendix A gives the decimal equivalents for hexadecimal numbers.

Installing Applications Programs

Some word processing and other applications programs give you a choice from a number of printer files to use. You may have to check in the manual to find out which one to use.

If you are using the PaperClip word processing program, choose 1525-P-ALF as the printer file.

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