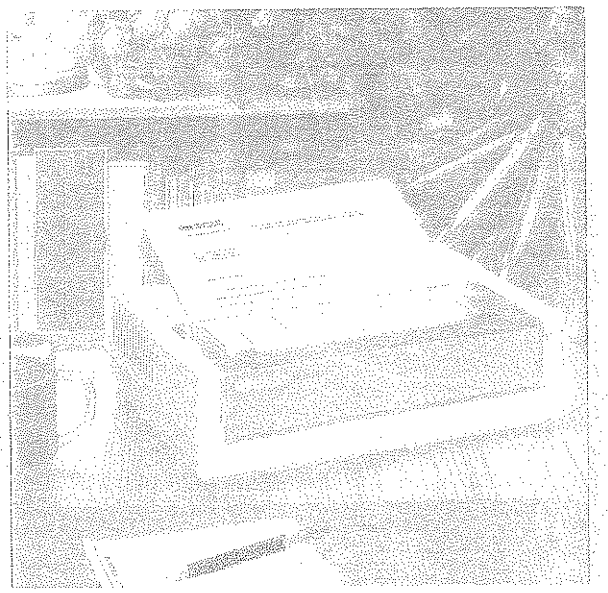
Personal Printer

ThinkJet



ThinkJet Printer

The Personal Printer from Hewlett-Packard

Reference Section

March 1987

Printed in Singapore

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General Information

Congratulations on your purchase of the Hewlett-Packard ThinkJet printer. Your printer is designed to give you years of trouble-free operation. Its small footprint uses little precious desk space. However, do not let its size fool you. It is fast (150 characters per second), intelligent, and offers a wide variety of easy-to-use print features.

The versatility and convenience of your printer are enhanced by the quietness of its ink jet printing. The ink jet print head cartridge contains sufficient ink to print approximately 500 pages. The cartridge is completely disposable and easy to replace. In addition, the ThinkJet printer uses a standard parallel printer interface to communicate with many different computers.

To set up your printer you will need a printer cable. You should have obtained a printer cable with either your computer or your parallel printer interface card. If you do not have one, contact your Hewlett-Packard dealer or an authorized sales representative.

How to Use Your Reference Manual

Chapters 1 and 2, "Using Print Features" and "More on Print Features," describe how to use the many advanced print features of the ThinkJet printer.

Chapter 3, "Maintenance and Troubleshooting," offers easy-to-use tips on how to keep your printer running smoothly.

The appendices contain reference guides where you can quickly find information about your printer. Also included in the appendices are the list of accessories and information on warranty and service.

Chapter 1

Using Print Features

The Operator's Section described how to set up and begin operating your ThinkJet printer. This chapter tells you how to use the more commonly selected print modes and form control features: print pitches, Quality mode, Bold printing, underlining, line spacing and perforation skip. Chapter 2 introduces more advanced print features.

Introduction to Control Codes and Escape Sequences

You may already have software which allows you to use many of the print features of your ThinkJet printer. If, however, you wish to use any of these print features on your own, the following two chapters provide you with examples of each of the print features and the data used to generate those examples.

The print features of your printer are controlled by "control codes" and "escape sequences." Control codes are data that, when sent to your printer, do not cause anything to be printed. They are commands which cause an action. An example of how control codes are written in this manual is [CTL] N, abbreviation for "Control N."

One of the control codes is named "escape," which appears in this manual as [ESC]. Escape sequences consist of the [ESC] control code followed by one or more other characters. For example, [ESC] & k 1 S is an escape sequence which changes the print pitch. None of the characters in an escape sequence is printed; together they form a command which is used to control a feature of your printer, just as a single control code is a command.

NOTE

When reading this manual, be very careful to not confuse O (uppercase oh) with 0 (zero) or *ℓ* (lowercase ell) with 1 (one).

Some features are controlled by both a mode select switch on the rear panel of the printer and an escape sequence. In these cases, the switch sets the default condition of the feature but the escape sequence will override the switch. If the printer is turned off and on, the feature will return to the setting selected by the switch.

To generate printouts using these print features, you will need to become familiar with the method used by your computer or software to send escape sequences and control codes to your printer. Some of the different methods commonly used are:

- Typing escape sequences and control codes directly from the keyboard.

  Many computer keyboards have a key labeled **ESC** and another key labeled **CNTL**, **CTL**, or **CTRL**. When the **ESC** key is pressed, it generates the escape control code. Other control codes are generated by holding down the **CTL** key while pressing a different key, just as holding down the **SHIFT** key while pressing another key generates special puncuation characters and uppercase characters. On some keyboards that do not have an **ESC** key, ESC can be generated as CTL [.

> **NOTE**
>
> If you are entering escape sequences in this manner, do not type any spaces between the characters of the escape sequence. In this manual spaces have been inserted in the escape sequences for readability; they are not part of the escape sequence.

- Specifying each control code, including ESC, by its ASCII* number.

  Some software packages require that you specify each control code by its ASCII number, usually preceded by a special character such as "\". For example, the escape sequence ESC & k 1 S would be specified as \027 & k 1 S. Appendix D contains the ASCII representation of each control code.

- Specifying each character of the escape sequence by its ASCII number.

  Some software packages require that you specify ESC and the characters following it by their ASCII numbers. The reference tables in Appendices B and C contain the ASCII representation of each escape sequence.

  As an example, the escape sequence ESC & k 1 S is represented in ASCII as 27 38 107 49 83.

*The ASCII (American Standard Code for Information Interchange) character tables in Appendix D assign a number between 0 and 255 to every character or control code recognized by the printer. Computers use these numbers when storing and communicating text material. Unless specifically noted otherwise, the numbers used in this manual are decimal numbers. A few software packages require you to enter ASCII numbers in "hexadecimal." The reference tables in Appendices B and C include the hexadecimal representation of each control code and escape sequence.

If you are using a software package such as a word processor or spreadsheet, refer to your software documentation to learn how to represent control codes and escape sequences.

If you are writing BASIC programs, you can generate control codes with the CHR$( ) function. For more information on the CHR$( ) function, refer to a BASIC programming manual.

In this manual, CHR$( ) is used to specify numbers which are ASCII numbers, not characters. For example, 83 and CHR$(83) are two different things. The first, 83, is a string of two characters: 8 and 3. CHR$(83) is a single character, uppercase "S".

Control Sequence Modes

The ThinkJet printer has two different control sequence modes: HP Control Sequence Mode (HP mode) and Alternate Control Sequence Mode (Alternate mode). The escape sequences and control codes which control the print features are different for the two modes. If the printer receives an escape sequence or control code which is invalid for the current mode, it will either ignore the command or produce unexpected results. However, do not be afraid of making mistakes. You cannot damage your printer with an invalid escape sequence.

Switch 5 on the rear panel of the printer determines which mode is currently being used. If switch 5 is down, the printer is in HP Control Sequence Mode; if switch 5 is up, the printer is in Alternate Control Sequence Mode. Page A-3 discusses choosing the appropriate control sequence mode for your computer system.

The following sections discuss both control sequence modes for each print feature. For reference purposes, Appendix B lists all of the HP mode control sequences; the control sequences for Alternate mode are listed in Appendix C.

Print Pitches

Your ThinkJet printer offers four print pitches: normal, expanded, compressed, and expanded-compressed.

```
This is compressed print.
This is normal print.
This is expanded-compressed print.
T h i s   i s   e x p a n d e d   p r i n t .
```

If switch 5 is DOWN (HP mode):

Table 1-1 provides the specific escape sequence for each print pitch.

Table 1-1
Print Pitches (HP Mode)

Print Pitch	Characters/Inch	Characters/Line	Escape Sequence
Compressed	21.3	142	ESC & k 2 S
Normal	12.0	80	ESC & k 0 S
Expanded-Compressed	10.7	71	ESC & k 3 S
Expanded	6.0	40	ESC & k 1 S

If more characters per line are sent than is allowed by the selected print pitch, the additional characters are normally ignored. To print those additional characters, you may use the wrap-around mode described in Chapter 2.

The data used to generate the preceding example is:

```
ESC &k2SThis is compressed print.
ESC &k0SThis is normal print.
ESC &k3SThis is expanded-compressed print.
ESC &k1SThis is expanded print.
```

If switch 5 is UP (Alternate mode):

Table 1-2 specifies the control codes which turn on or off each of the print pitches.

Table 1-2
Print Pitches (Alternate Mode)

Print Pitch	Chars/Inch	Chars/Line	Turn On	Turn Off
Compressed	21.3	142	CTL O	CTL R
Normal	12.0	80	default	
Expanded-Compressed	10.7	71	CTL N CTL O	CTL T CTL R
Expanded	6.0	40	CTL N	CTL T

The data used to generate the preceding example is:

```
CTL O This is compressed print. CTL R
This is normal print.
CTL N CTL O This is expanded-compressed print. CTL T CTL R
CTL N This is expanded print. CTL T
```

Print Quality

The ThinkJet printer can print characters in normal, Quality mode, or bold.

Quality Mode

Quality mode can be enabled in two ways as described below.

- **Through the Keypad**

Quality mode is enabled by holding down the blue button while turning ON the printer. Once Quality mode is enabled through the blue button, it can only be disabled by turning the printer OFF. See the example of Quality mode given below.

- **By Escape Sequence**

If switch 5 is DOWN (HP mode):

Quality mode is enabled by sending the escape sequence ESC (s1B. The printer will then print darker characters until Quality mode is disabled by sending the escape sequence ESC (s0B, or by turning the printer OFF.

```
Quality mode is used to print entire documents.
Quality mode can highlight a whole page or
several pages. The instructions on this page tell
you how to enable Quality mode in two ways.
```

The data used to generate the preceding example is:

```
ESC (s1BQuality mode is used to print entire documents. Quality
mode can highlight a whole page or several pages. The instructions
on this page tell you how to enable Quality mode in two ways.
ESC (s0B
```

If switch 5 is UP (Alternate mode):

Quality mode is enabled by sending the escape sequence ESC G. The printer will then print darker characters until Quality mode is disabled by sending the escape sequence ESC H, or by turning the printer OFF.

The data used to generate the preceding example is:

```
ESC GQuality mode is used to print entire documents. Quality mode
can highlight a whole page or several pages. The instructions on
this page tell you how to enable Quality mode in two ways.ESC H
```

NOTE

If Quality Mode has been enabled through the keypad be aware that some word processing software packages may not respond to "emphasized" commands.

Bold Print

Bold printing is enabled by sending an escape sequence.

```
Bold print can highlight single words.
Entire lines can also be highlighted.
```

If switch 5 is DOWN (HP mode):

Bold printing is enabled by sending the escape sequence ESC (s1B. The printer will then print darker characters until Bold printing is disabled by sending the escape sequence ESC (s0B, or by turning the power OFF.

The data used to generate the preceding example is:

```
Bold printing can ESC(s1Bhighlight ESC(s0B single words.
ESC(s1BEntire lines can also be highlighted.ESC(s0B
```

If switch 5 is UP (Alternate mode):

Bold printing is enabled by sending the escape sequence ESC E. The printer will then print darker characters until Bold printing is disabled by sending the escape sequence ESC F, or by turning the power OFF.

The data used to generate the preceding example is:

```
Bold printing can ESC Ehighlight ESC F single words.
ESC EEntire lines can also be highlighted ESC F
```

Underlining

Your ThinkJet printer can underline text as shown in the following example.

Underlining can be used for a single word.
Entire lines can be underlined.

If switch 5 is DOWN (HP mode):

Underline mode is enabled by [ESC] & d D. The printer will then underline all characters until underline is disabled by [ESC] & d @.

The data used to generate the preceding example is:

```
Underlining can be used for a [ESC]&dDsingle[ESC]&d@ word.
[ESC]&dDEntire lines can be underlined.[ESC]&d@
```

If switch 5 is UP (Alternate mode):

Underline mode is enabled by [ESC] - 1. The printer will then underline all characters until underline is disabled by [ESC] - 0.

The data used to generate the preceding example is:

```
Underlining can be used for a [ESC]-1single[ESC]-0 word.
[ESC]-1Entire lines can be underlined.[ESC]-0
```

Mixing Modes

The ThinkJet printer is capable of mixing any combination of print modes. For example, it can print in expanded and underlined mode. The printer does not limit the number of mode changes allowed in a single line.

Print modes can be mixed on a line.

If switch 5 is DOWN (HP mode):

The data used to generate the preceding example is:

```
Print modes can be mixed on a [ESC]&k1S[ESC]&dDline[ESC]&d@ [ESC]&k0S.
```

If switch 5 is UP (Alternate mode):

The data used to generate the preceding example is:

```
Print modes can be mixed on a [CTL]N [ESC]-1line[ESC]-0[CTL]T.
```

Perforation Skip

The ThinkJet printer is capable of automatically leaving top and bottom margins on every page. This is called "perforation skip mode" because, when printing, the printer does not print on the perforations, it skips over them.

The printer does not sense the perforations in the paper; you must tell it where to put the margins by setting top of form as described in the Operator's Section. When you set top of form, you specify the position of the first line of print: the line immediately following the top margin. The default "perforation skip length" (combined length of the top and bottom margins) is 6 lines. If top of form is set to the fourth line of the page, the printer will leave a margin of three lines at the top and bottom of each page.

Figure 1-1 shows top of form set correctly for equal top and bottom margins.

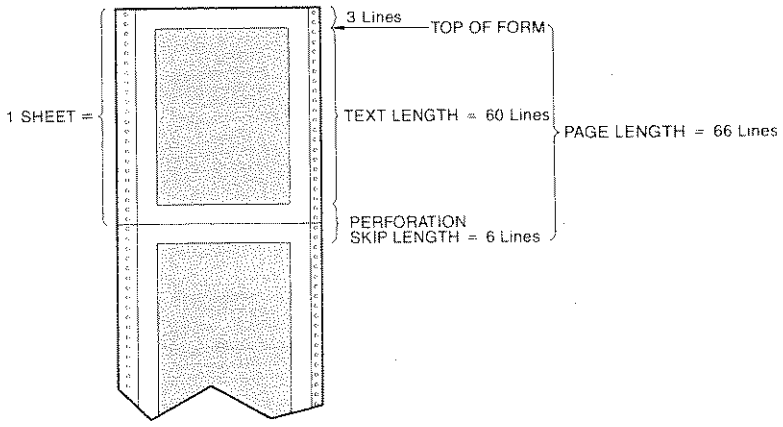


Figure 1-1 Top and Bottom Margins

Switch 3 on the rear panel of the printer determines whether perforation skip mode defaults on or off. If switch 3 is down, perforation skip mode defaults off; if switch 3 is up, perforation skip mode defaults on.

If switch 5 is DOWN (HP mode):

The escape sequence [ESC] & ℓ 1 L turns perforation skip mode on, [ESC] & ℓ 0 L turns it off. These escape sequences override switch 3.

The perforation skip length is not specified directly. If you wish to use a value other than the default, you must specify a new "text length," which is the number of lines to be printed on each page. The perforation skip length is the total length of each page minus the text length.

The escape sequence to set the text length is [ESC] &ℓ# F, where # is the text length specified in number of lines. For example, the escape sequence [ESC] &ℓ54 F sets the text length to 54 lines. If the printer is set for a page length of 66 lines (11 inch paper, 6 lines per inch), the perforation skip length is 66 minus 54: 12 lines. To get equal top and bottom margins of 6 lines, top of form must be set to the seventh line of the page.

Text length cannot be less than one line nor greater than the page length. The escape sequence [ESC] &ℓ0 F will set the text length back to the default, which is 1 inch less than the page length.

If switch 5 is UP (Alternate mode):

The escape sequence [ESC] N CHR$(#) sets the perforation skip length to # lines and turns perforation skip mode on. The number used to set the perforation skip length is the ASCII number associated with the character following "N." For example, [ESC] N 1 does not set perforation skip length to 1 line, the ASCII number for the character "1" is 48 (see Appendix D), so perforation skip length is set to 48 lines. To set the perforation skip length to 10 lines, look in Table D-1 of Appendix D and find that 10 is equivalent to [CTL] J. Then use the escape sequence [ESC] N [CTL] J.

The escape sequence [ESC] O turns perforation skip mode off.

These escape sequences override switch 3.

Page Length

The ThinkJet printer allows you to change the page length. The current value of page length determines how far the printer advances the paper when the form feed button is pressed or the printer receives a form feed control code. The printer also uses the value of page length, when perforation skip mode is on, to determine where to place the top and bottom margins.

Switch 4 on the rear panel of the printer selects the default page length. If switch 4 is down, page length defaults to 11 inches (279.4 mm), which is 66 lines at 6 lines per inch. If switch 4 is up, page length defaults to 12 inches (304.8 mm), which is 72 lines at 6 lines per inch.

If switch 5 is DOWN (HP mode):

The escape sequence ESC &ℓ# P sets the page length where # is the page length specified in number of lines. For example, ESC &ℓ50 P sets the page length to 50 lines. This escape sequence overrides switch 4.

Page length can be set to any number of lines from 1 to 255. The escape sequence ESC &ℓ0 P will reset the page length to the default.

The page length escape sequence automatically sets the text length to 1 inch (6 lines at 6 lines per inch) less than the new page length.

If switch 5 is UP (Alternate mode):

The escape sequence ESC C CHR$(#) sets the page length to # lines. The number used to specify the page length is the ASCII number associated with the character following "C." For example, ESC C 1 does not set page length to 1 line. The ASCII number associated with the character "1" is 48, so page length is set to 48 lines. To set page length to 70 lines, look up 70 in Table D-1 of Appendix D and find that 70 is equivalent to the character "F". Then use the escape sequence ESC C F.

The escape sequence ESC C CHR$(0) CHR$(#) sets the page length to # inches. The number used to specify the page length is the ASCII number associated with #.

These escape sequences also turn perforation skip mode off.

Line Spacing

The ThinkJet printer offers different line spacings as shown in the following example.

```
This group of lines is printed at a
line spacing of 8 lines per inch.  Notice that
they are close together.

These three lines are printed at
the default line spacing of
6 lines per inch.
```

If switch 5 is DOWN (HP mode):

To print at 8 lines per inch, send the escape sequence [ESC] &ℓ8D. To return to 6 lines per inch, use [ESC] &ℓ6D.

If line spacing is changed, page length and text length measured in inches remain the same. For example, if line spacing is 6 lines per inch and page length is 66 lines (11 inches), changing line spacing to 8 lines per inch will also change page length to 88 lines (11 inches).

The data used to generate the preceding example is:

```
[ESC]&ℓ8DThis group of lines is printed at a
line spacing of 8 lines per inch. Notice that
they are close together.[ESC]&ℓ6D

These three lines are printed at
the default line spacing of
6 lines per inch.
```

If switch 5 is UP (Alternate Mode):

To print at 8 lines per inch, send the escape sequence [ESC] 0. To return to 6 lines per inch, use [ESC] 2. To set line spacing to 7 dot rows (96/7 lines per inch), use [ESC] 1. [ESC] A CHR$(#) sets line spacing to # dot rows. The number used to set the line spacing is the ASCII number associated with the character following "A." For example, [ESC] A [CTL] T sets the line spacing to 20 dot rows because the ASCII value of [CTL] T is 20.

The data used to generate the preceding example is:

```
[ESC]0This group of lines is printed at a
line spacing of 8 lines per inch. Notice that
they are close together.[ESC]2

These three lines are printed at
the default line spacing of
6 lines per inch.
```

Chapter 2

More on Print Features

In the previous chapter we discussed the frequently used print features. In this chapter we will discuss some advanced print features.

Positioning the Print on the Page

Some of the control codes and escape sequences change the position at which the next character received will be printed. This position is called the "current active position." Each time the printer receives a printing character, the current active postion is moved one character to the right. The following control codes separate lines of print, cause the printer to overstrike characters, or cause the printer to advance the paper.

Unless specifically noted otherwise, these control codes and escape sequences are identical in HP mode (switch 5 down) or Alternate mode (switch 5 up).

- Carriage Return (CTL M): Moves the current active position to the first character position on the current line. Normally you do not need to send carriage returns explicitly; your computer system will send them automatically.

  Either switch 1 on the rear panel of the printer or the Automatic Line Termination escape sequence discussed on page 2-9 can cause the printer to perform a line feed in addition to each carriage return.

- Back Space (CTL H): Moves the current active position one character to the left. If the current active position is already the leftmost character position, no action is taken.

- Line Feed (CTL J): Advances the paper one line. Normally you do not need to send line feeds explicitly; your computer system will send them automatically.

  Either switch 2 on the rear panel of the printer or the Automatic Line Termination escape sequence discussed on page 2-9 can cause the printer to perform a carriage return in addition to each line feed.

- Half Line Feed (ESC =): Advances the paper half the distance of the current line spacing.

  This escape sequence is only valid if switch 5 is down (HP mode). If switch 5 is up (Alternate mode) you must change the line spacing and then send a line feed control code.

Half line feed is useful for printing subscripts and superscripts.

H_2O

$a^3=b^2+c$

The data used to generate the preceding example is:

```
H 0[ESC]=[CTL]M 2
  3  2[ESC]=[CTL]M a =b +c
```

- Form Feed ([CTL] L): Advances the paper to the top of the next form.

NOTE

The printer cannot sense the actual position of the paper. For form feed to advance the paper to the next perforation, top of form must be set correctly as described in the Operator's Section.

Overstrike

There are two methods of overstriking text:

- Sending two lines of text separated only by a carriage return. This causes the printer to print the second line over the first line.

  This method will work only if carriage return does not perform a line feed (see Carriage Return on page 2-1). If carriage return does perform a line feed, you must use the back space method for overstriking.

- Using back space. Each time the printer receives a back space control code, it moves the current active position one character position to the left before printing the next character. Therefore, if two characters are sent to the printer separated only by a back space, the second character is printed over the first.

Graphics

Many computer systems allow you to draw graphs or pictures on your computer display using the computer's capabilities and a graphics software package. The computer then handles the details of copying the graphics data to the printer. You may, however, be interested in writing your own graphics software program. The following information provides the details of the ThinkJet graphics capabilities.

The ThinkJet printer is capable of printing in two modes: text mode and graphics mode. In text mode, the printer interprets each data byte it receives from the computer as an ASCII character. It then looks that character up in its internal character table and prints the dot pattern which it finds. In graphics mode, however, the data received from the computer directly specifies the dot pattern which is to be printed.

The ThinkJet uses a form of graphics called "dot-image" graphics. In this system, the paper can be thought of as consisting of a grid of dot positions. Graphics data specifies which of the dot positions should be printed and which should be left blank.

NOTE

Some computers automatically add control codes, such as carriage returns and line feeds, or blanks to the data being sent to the printer. These characters are necessary when printing text. In graphics mode, however, they may be interpreted as graphics data and give unexpected results. Before writing programs which generate graphics, you should consult the manual for your computer to determine how to prevent your computer from sending this extra data to the printer.

If switch 5 is DOWN (HP mode):

Graphics Density

The ThinkJet is capable of printing graphics in two different dot densities. The default dot density is 96 dots/inch in both the horizontal and vertical directions; the print region is 640 dots wide. The higher dot density is 192 dots/inch in the horizontal direction and 96 dots/inch in the vertical direction; the print region is 1280 dots wide. The escape sequence used to select high density graphics is ESC *r 1280 S. To return to the default graphics density use ESC *r 640 S. Once the graphics resolution is specified, it stays in effect until it is explicitly changed or the printer is reset.

Raster Dot Row

Graphics data is sent to the printer one byte (8 bits) at a time. Each bit specifies one dot position. If a bit is zero, the corresponding dot position is left blank. If a bit is one, a dot is printed at the corresponding position. In HP mode, graphics data bytes are sent to the printer in groups, where each group contains the graphics data for one "raster" (horizontal) dot row. The first (most significant) bit of a graphics data byte specifies the leftmost dot; the last (least significant) bit specifies the rightmost dot.

The escape sequence to transfer the data for one dot row is ESC * b # W. The value field, #, specifies the number of graphics data bytes which follow the escape sequence. For example, if the printer receives ESC * b 20 W, it interprets the next 20 bytes of data as specifying 160 dots (20 x 8 bits) of the current dot row. If less data is sent for a dot row than will fit in the print region, the rightmost dots of the row are left blank. If more data is sent than will fit in the print region, the extra data is ignored.

Paper advance occurs automatically between graphics dot rows; it is not necessary to send any paper advance control codes.

Beginning and Ending Graphics Mode

If the printer has a partial line of text data in its buffer and it receives the raster dot row escape sequence, it terminates the line of text with a carriage return (but no line feed), prints it, and then accepts the graphics data. This may cause the graphics data to be printed over the text data.

To avoid printing graphics over text, send the escape sequence ESC * r A before sending any graphics data. This escape sequence causes any partial lines of text to be terminated with a carriage return and line feed. If there is no text in the buffer, this escape sequence has no effect.

When the printer receives graphics data, it places that data in its buffer. Normally the graphics data is not actually printed until the buffer contains 12 dot rows of default-density graphics or 6 dot rows of high-density graphics. To make sure all of the dot rows are printed and not still stored in the printer's buffer, send the escape sequence ESC * r B after sending all of the graphics data.

Sample Graphics Program

The following is an example of a simple HP BASIC program which prints graphics.

Enter	Description
10 PRINT CHR$(27)&"*r640S";	Select default graphics density
20 PRINT CHR$(27)&"*rA";	Begin raster graphics
30 FOR I=1 TO 55	55 dot rows will be printed
40 PRINT CHR$(27)&"*b5W";	Initiate a dot row of length 5 bytes 5 bytes = 40 dots
50 FOR J=1 TO 5	
60 PRINT CHR$(136);	Send 1 byte of graphics data 136 decimal = 10001000 binary
70 NEXT J	
80 NEXT I	
90 PRINT CHR$(27)&"*rB"	Terminate raster graphics

Printer output:

You may need to modify this program to make it run correctly on your computer. To produce the preceding graphics example using Microsoft BASIC, Version A2.00, use the following program:

Enter	Description
10 OPEN "LPT1:" AS #1	
20 WIDTH #1,255	Prevent the computer from sending CR, LF
30 PRINT #1, CHR$(27)+"*r640S";	Select default graphics density
40 PRINT #1, CHR$(27)+"*rA";	Begin raster graphics
50 FOR I=1 TO 55	55 dot rows will be printed
60 PRINT #1, CHR$(27)+"*b5W";	Initiate a dot row of length 5 bytes
70 FOR J=1 TO 5	5 bytes = 40 dots
80 PRINT #1, CHR$(136);	Send 1 byte of graphics data
90 NEXT J	136 decimal = 10001000 binary
100 NEXT I	
110 PRINT #1, CHR$(27)+"*rB"	Terminate raster graphics

If switch 5 is UP (Alternate mode):

In Alternate mode, each byte of graphics data specifies an 8-dot high column. The first (most significant) bit specifies the top dot of the column; the last (least significant) bit specifies the bottom dot of the column. If a bit is zero, the corresponding dot position is left blank. If a bit is one, a dot is printed at the corresponding position.

You can specify the horizontal distance between adjacent columns as either 1/96 inch or 1/192 inch. The escape sequence ESC K #1 #2 selects default-density graphics (1/96 inch between columns), ESC L #1 #2 selects high-density graphics (1/192 inch between columns).

The 2-byte value field (#1 and #2) specifies the number of following bytes which are to be interpreted as graphics data. #1 and #2 are not interpreted as ASCII characters; they form a 16 bit binary number where #2 is the most significant byte and #1 is the least significant byte. For example, ESC K CHR$(128) CHR$(1) specifies that the next 384 bytes (128 + (256 * 1) = 384) of data are graphics dot columns which are to be printed 1/96 of an inch apart.

Before sending any graphics data, line spacing should be set to 8 dot rows by the ESC A CHR$(8) escape sequence. After sending all of the graphics columns across one row, you must send a carriage return and line feed to the printer to cause it to advance the paper and return to the left margin.

Some computer systems do not have the capability of controlling the most significant bit of data bytes sent to the printer. If your computer system always clears this bit, you can still print graphics by setting line spacing to 7 dot rows (by either ESC 1 or ESC A CHR$(7)) before sending graphics data.

Selecting Unidirectional or Bidirectional Printing

The ThinkJet printer normally prints text bidirectionally. You can get slightly better alignment between lines of print by setting the printer to print unidirectionally (left to right only).

If switch 5 is DOWN (HP mode):

The escape sequence ESC & k 0 W will force unidirectional printing. To return to bidirectional text printing, use ESC & k 1 W.

This escape sequence does not affect graphics printing; the printer always prints graphics unidirectionally.

If switch 5 is UP (Alternate mode):

The escape sequence ESC U 1 will force unidirectional printing. To return to bidirectional text printing, use ESC U 0.

This escape sequence does not affect graphics printing; the printer always prints graphics unidirectionally.

End of Line Wrap-Around

If the printer is in wrap-around mode, the first character received which exceeds the line length of the printer forces a new line of print to be started. This causes long lines to be broken and printed as several lines. If the printer is not in wrap-around mode, characters which exceed the line length of the current print pitch are not printed.

If switch 5 is DOWN (HP mode):

The default is wrap-around mode disabled. The escape sequence [ESC] & s 0 C enables wrap-around mode, [ESC] & s 1 C disables wrap-around mode.

If switch 5 is UP (Alternate mode):

The printer is always in wrap-around mode; you cannot disable it.

Linking Escape Sequences

If switch 5 is DOWN (HP mode):

You can link several escape sequences into one escape sequence string. For example, you can enable perforation skip mode and set line spacing to 8 lines per inch by entering either [ESC] & ℓ 8 D and [ESC] & ℓ 1 L or [ESC] & ℓ 8 d 1 L.

The two rules to follow when linking escape sequences are:

- The first two characters after [ESC] must be the same. In the example above these are & and ℓ. [ESC] and the first two characters following it are used only once in a string of linked escape sequences.
- The final character of the internal escape sequences becomes lower case. In the example above, D becomes d.

If switch 5 is UP (Alternate mode):

It is not possible to link escape sequences; each one must be sent exactly as it is specified in this manual.

Display Functions Mode

Control codes and escape sequences are not normally printed; they are either recognized as commands and cause some action or they are ignored.

The display functions mode allows you to print control codes and escape sequences without executing them. This is useful if you are trying to determine exactly what control codes and escape sequences are being sent to your printer. The symbol which is printed for each control code can be found in Table D-1 of Appendix D.

```
In Display Funtions mode, control codes
are printed not executed.
%
+In %Display Funtions mode%, control codes%
+are printed %&dDnot%&d@ executed.%
+%Z
```

If switch 5 is DOWN (HP mode):

Display functions mode is enabled by [ESC] Y and disabled by [ESC] Z.

When in display functions mode, the only control codes or escape sequences executed are:

- Carriage Return, which is printed and then executed as a carriage return and line feed.
- [ESC] Z, which is printed and then executed.

The data used to generate the preceding example is:

```
In [CTL]N Display Functions mode[CTL]O, control codes
are printed, [ESC]&dDnot[ESC]&d@, executed.
[ESC]Y
In [CTL]N Display Functions mode[CTL]O, control codes
are printed, [ESC]&dDnot[ESC]&d@, executed.
[ESC]Z
```

If switch 5 is UP (Alternate mode):

There is no display functions mode; escape sequences and control codes are always executed.

Self Test

If switch 5 is DOWN (HP mode):

Your ThinkJet printer can perform a self test to ensure that it is operating properly. The escape sequence [ESC] z causes it to perform a test of the electronics and then print one page of characters.

In addition, the Operator's Manual explains how to perform a power-up self test.

If switch 5 is UP (Alternate mode):

There is no escape sequence to cause a self test. The power-up self test described in the Operator's Manual must be used.

Resets

The simplest way to return your printer to its default printing specifications is to turn the printer off for several seconds, then on. This causes the printer to read the mode select switches, reset all features to their default values, and set top of form to the current line.

If switch 5 is DOWN (HP mode):

The escape sequence [ESC] E causes the printer to print whatever data is in the print buffer, reset all features to their default values, and, if the paper is not at the top of form, execute a form feed.

This escape sequence does not cause the mode select switches to be read. The printer will use the value it read when it was turned on.

If switch 5 is UP (Alternate mode):

The escape sequence [ESC] @ causes the printer to reset all features to their default values.

This escape sequence does not cause the mode select switches to be read. The printer will use the value it read when it was turned on.

Ready to Print

The ThinkJet printer is now prepared for printing. The design of ThinkJet requires a minimum left and right margin of 1". This gives a fixed printing area of 6.7 inches, which can accommodate 80 characters in normal print mode. You can increase the margins (i.e., wider) by setting them from your computer. The printer is also pre-set to the following (default) printing specifications:

- 12 characters/inch
- 80 characters/line
- 6 lines/inch
- 66 lines/page

Automatic Line Termination

Most computers terminate each line with a carriage return and a line feed. However, there are computers which terminate with either a carriage return or a line feed, but not both. In order for your printer to operate normally with these systems, you need to change the definition of the carriage return and line feed control codes. This can be done with either switches 1 and 2 on the rear panel of your printer (see Appendix A) or with the escape sequences of Table 2-1.

If switch 5 is DOWN (HP mode):

Table 2-1
Automatic Line Termination Escape Sequences

Character* received by printer	Character(s) executed by printer	Escape Sequence
CR LF FF	CR LF FF	ESC & k 0 G
CR LF FF	CR, LF LF FF	ESC & k 1 G
CR LF FF	CR CR, LF CR, FF	ESC & k 2 G
CR LF FF	CR, LF CR, LF CR, FF	ESC & k 3 G

*NOTE: CR = Carriage Return
LF = Line Feed
FF = Form Feed

These escape sequences override switches 1 and 2.

If switch 5 is UP (Alternate mode):

There are no escape sequences to change the definition of carriage return, line feed, or form feed control codes. You must use switches 1 and 2 to specify their definition.

Chapter 3

Maintenance and Troubleshooting

Your ThinkJet printer is designed for durability. This chapter provides a few basic instructions on care and some simple troubleshooting instructions for printer malfunctions.

Environmental Conditions

Your printer should be maintained and operated under the following environmental conditions:

- Operate only at temperatures from 50°F to 104°F (10°C to 40°C).
- Store only at temperatures from −4°F to 140°F (−20°C to 60°C).
- Operate only in relative humidity from 10% to 90%.

Maintenance of the Print Head Cartridge

The print head cartridge is durable, disposable, and easy to maintain. Observe a few simple rules of care, and your print head cartridge should be trouble-free.

- Avoid touching the face of the print head cartridge with your fingers.
- Periodically check the ink level of the print head cartridge. Hold the cartridge up and view the bladder inside. If the bladder is collapsed, then the ink supply is nearly depleted and the cartridge needs to be replaced.

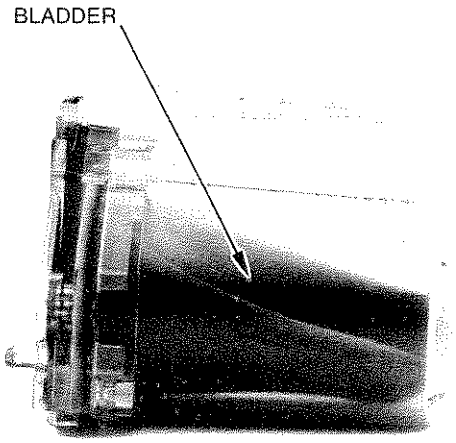


Figure 3-1 Empty Cartridge

- If the printer has not been used for a prolonged period, or if dust has accumulated on the face of the print head cartridge, wipe the face of the cartridge with a tissue to maintain best print quality. If print quality problems remain, see Table 3-1.

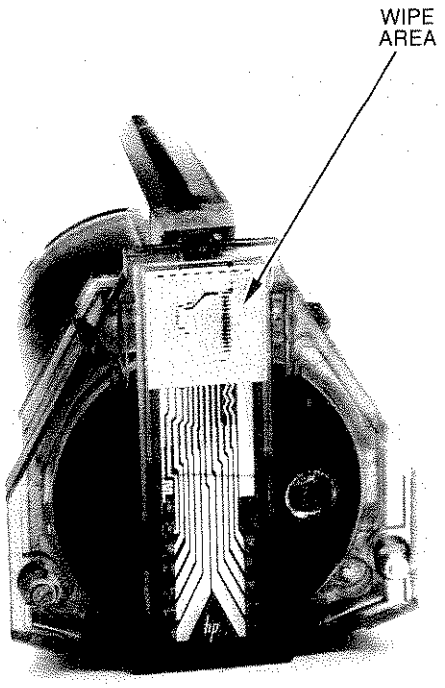


Figure 3-2 Wipe Area

- Avoid allowing the face of the print head cartridge to come into prolonged contact with other materials. This may cause the ink to wick out of the cartridge.
- Use the print head cartridge prior to the month and year of expiration printed on the package.

WARNING

The ink in the print head cartridge contains diethylene glycol which is HARMFUL IF SWALLOWED. Keep new or used cartridges OUT OF REACH OF CHILDREN.

Maintenance of the Printer

Ideally your printer should be stored and operated in a clean, dust-free environment. However, it can endure some rugged use.

To remove dirt and smudges, damp wipe with a mild solution of dishwashing detergent and water. Never use harsh chemicals to clean the printer. Unplug the printer prior to cleaning.

Periodically clean the paper dust out of the printer.

Troubleshooting

Table 3-1 contains some possible error conditions and recommended corrective action. In most instances, performing the corrective action described will eliminate the problem. If the problem persists, however, the printer should be returned for repair.

Table 3-1
Error Conditions

Error Condition	Correction Action
1. Red power light off.	• Ensure that the power module is plugged into a working outlet and the power switch is on. See Operator's Section (Power/ Interface). • Ensure that the correct power module is used. (See Appendix E.)
2. Yellow attention light on continuously.	• Load paper into the printer. The attention light will begin flashing. See Operator's Section (Loading ThinkJet Paper).

3. Yellow attention light flashing.	• Press the blue button. The carriage will move and the attention light will turn off. See Operator's Section (Loading ThinkJet Paper). • Remove any obstruction from around the carriage and press the blue button again. See Operator's Section (Loading ThinkJet Paper). • If the attention light continues flashing, the printer should be returned for repair.
4. Printer does not respond to computer.	• Ensure that the power light is on and the attention light is off. If this is not the case, refer to error conditions 1 through 3 above. • Verify that the printer is operational by running the self test. See Operator's Section (Self Test). • Your computer may be sending all data bytes to the printer with the high bit set. If you are using the Roman-8 character set, control codes with the high bit set are not recognized. Try using one of the 7 bit character sets such as US ASCII (see Appendix D).
5. The format of your printouts is incorrect. Lines may start in the wrong place or the top and bottom margins are excessive.	• Your printer is not correctly configured for your computer system. See Operator's Section (Power/Interface) for switch configurations or work through the instructions in Appendix A for setting the mode select switches of your printer.
6. Paper does not feed properly.	• Remove the paper from the printer and discard any that is crumpled. • If you are using fanfold paper, verify that it can travel freely without catching, and that the right-side pinwheel is adjusted correctly for the width of your paper. See Operator's Section (Loading ThinkJet Paper). • Reload the paper. See Operator's Section (Loading ThinkJet Paper).

7. Print quality is poor, rows of dots are missing from printouts, or the carriage moves but produces no print.	• If the print head stops printing after a few lines, it was probably jarred in shipment and needs to be activated. See Operator's Section (Maintenance). • Ensure that there is sufficient ink in the cartridge by viewing the bladder. If the bladder is collapsed, replace the cartridge. See Operator's Section (Maintenance). • Ensure that the carriage latch is fully closed. See Operator's Section (Loading Cartridge). • Ensure that you are using a recommended ink jet paper. • Wipe the face of the print head using a tissue to remove any accumulated dust. See Operator's Section (Maintenance). If the print head cartridge has not been used for a prolonged period, moisten the tissue with water before wiping. • Lightly wipe the electrical connector of the carriage using a cotton swab dipped in alcohol. See Operator's Section (Maintenance). • If the problem continues, replace the print head cartridge.

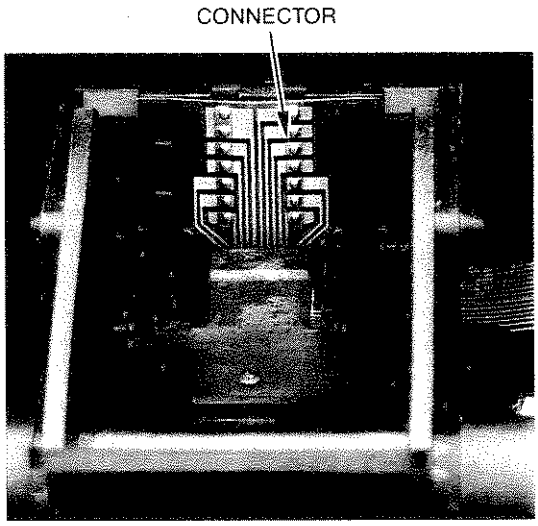


Figure 3-3 Carriage Electrical Connector

Appendix A

Mode Select Switches

The eight switches on the rear panel of the printer allows you to configure the default conditions of your printer for most computer systems and applications. These switches are numbered from 1 (closest to the power switch) to 8 (farthest from the power switch).

NOTE

The printer reads the switch settings only when it is first turned on. Therefore if you change any of the switch settings, you must turn the printer off for several seconds and back on before printing.

You cannot damage your printer by setting the switches incorrectly.

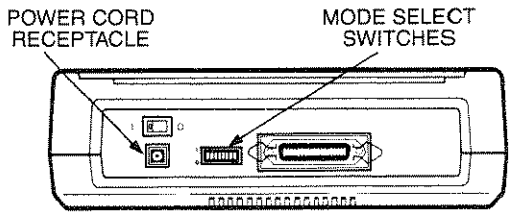


Figure A-1 Rear Panel

Table A-1
Mode Select Switches (1 through 5)

Switch number and name	Up	Down
1 CR* definition	CR does CR, LF	CR does CR only
2 LF* definition	LF does CR, LF	LF does LF only
3 Perforation skip mode	1″ perforation skip	no perforation skip
4 Page length	12″ (304.8 mm)	11″ (279.4 mm)
5 Control sequence mode	Alternate	HP

*NOTE: CR = Carriage Return
LF = Line Feed

Table A-2
Mode Select Switches (6 through 8)

Switch Settings			Character Set
6	7	8	
down	down	down	Roman-8
up	down	down	United States ASCII
down	up	down	Swedish
up	up	down	IBM 8
down	down	up	French
up	down	up	German
down	up	up	United Kingdom
up	up	up	Spanish

Setting the Mode Select Switches

The switch settings in Table A-3 can be used as a guide for configuring some computer systems.

Table A-3
Mode Select Configuration Guide
(8½″ x 11″ paper, English language)

Computer	Switch Settings							
	1	2	3	4	5	6	7	8
Hewlett-Packard	down	down	down	down	down	down	down	down
IBM PC/XT	down	down	down	down	*	up	up	down
Apple IIe	down	down	down	down	*	up	down	down

*This switch is software dependent, see mode switch 5 description in following text.

If your computer system is not included in Table A-3, or the format of your printouts is incorrect, the following instructions will help you correctly configure your printer.

Before using these instructions, you must obtain some printout from your computer and printer. If you are going to use your printer with software such as a spreadsheet program or a word processor, use your software to generate some printout. Alternatively you may generate printout with a short BASIC program such as the following example.

```
10 FOR I = 1 TO 10
20 LPRINT "This is a line of sample output for testing my printer."
30 NEXT I
40 END
```

If your printer does not respond to your computer at all, try setting switch 6 on the rear panel of your printer up. If you still get no response, refer to the owner's manual for your computer or parallel printer interface card.

NOTE

The printer reads the switch settings only when it is first turned on. Therefore if you change any of the switch settings, you must turn the printer off for several seconds and back on before printing.

The switches are numbered from 1 (closest to the power switch) to 8 (farthest from the power switch). The remainder of this section describes, for each switch, conditions which may cause you to change the switch setting. If none of the conditions apply, leave the switch at its current setting.

Switch 1 - Carriage Return (CR) Definition

If your printer does not advance the paper between lines of print, set switch 1 up. The printer will add a line feed to each carriage return it receives.

If your printout is double spaced, set switch 1 down. The printer will not add a line feed to each carriage return.

Switch 2 - Line Feed (LF) Definition

If some lines of your printout start too far to the right, or only the first line is printed, set switch 2 up. This causes the printer to add a carriage return to each line feed it receives.

If some lines of your printout start too far to the left, set switch 2 down. The printer will not add a carriage return to each line feed.

Switch 3 - Perforation Skip Mode

If you are listing programs or using software which does not provide top and bottom margins in your printout, set switch 3 up. This will put the printer in perforation skip mode. In this mode the printer automatically provides top and bottom margins.

If you do not want top and bottom margins or you are using software such as a word processor which already provides margins, set switch 3 down. This turns off perforation skip mode.

Switch 4 - Page Length

If you are using 12" (304.8 mm) paper, set switch 4 up. This sets the printer's page length to 12 inches (304.8 mm).

If you are using 11" (279.4 mm) paper, set switch 4 down. This sets the printer's page length to 11 inches (279.4 mm).

Switch 5 - Select HP or Alternate Control Sequence Mode

If you are using software such as a word processor or graphics package that does not expect a Hewlett-Packard printer but does expect one of the following printers;

- Epson MX-80
- Epson MX-100
- IBM 80 CPS Printer
- IBM Graphics Printer

set switch 5 up. This puts your printer in Alternate Control Sequence Mode which will work correctly with many software packages.

If you are using software which expects a Hewlett-Packard printer or you are writing your own software, set switch 5 down. This puts your printer in HP Control Sequence Mode.

Switches 6, 7, and 8 - Select Character Set

The ThinkJet printer contains 8 different character sets. Switches 6, 7, and 8 together select which character set is being used for printouts. The 8 character sets and the switch settings used to select them are contained in the following table.

Table A-4
Character Set Selection

Switch Settings 6	7	8	Character Set
down	down	down	Roman-8
up	down	down	United States ASCII
down	up	down	Swedish
up	up	down	IBM 8
down	down	up	French
up	down	up	German
down	up	up	United Kingdom
up	up	up	Spanish

If you are using an HP computer system which is already configured for the language you want printed, use the Roman-8 character set. Otherwise select the appropriate language character set from the list.

For more details on the character sets, see Appendix D.

Alternate Control Sequence Mode

The ThinkJet printer has two sets of control sequences: HP mode and Alternate mode. Mode selection is controlled by Switch 5 on the rear of the unit. Setting the swtich in the UP position selects Alternate mode. HP recommends that your software be written for HP mode for two reasons:

- Your software can be leveraged through both the present and future Hewlett-Packard printer produce line, and
- Your system can have better performance. For example, single density graphics is 50% faster in HP mode than in Alternate mode.

If your system already uses an Epson printer or an IBM Graphics Printer, the use of ThinkJet's Alternate mode may save you development time, since you may not need changes in your software. However, care must be taken to be sure that your software does not depend on the physical characteristics of the printer.

Implementation Differences

There are a few implementation differences between Epson printers and the HP ThinkJet's Alternate mode. The functional differences are noted here. Applications that mix alphanumeric text and graphical output together (using graphics to do strike-thru or underlining) will show the most mismatch. However, a graphics dump would just be scaled differently, and have a slightly altered aspect ratio.

Aspect ratio
ThinkJet's single density graphics is square [96 dpi]: both the horizontal and vertical dot-to-dot distances are the same. Epson single density graphics is not square.

Vertical resolution
One dot-row to ThinkJet is 1/96th of an inch high. One dot-row to an Epson printer is 1/72nd of an inch. In addition, ThinkJet can advance paper in one dot-row increments. The Epson printers can advance paper in one-third dot-row increments. The sequences: ESC 1, ESC 3, and ESC A are affected by this difference.

Horizontal resolution
ThinkJet's horizontal dot density is 96 or 192 dpi. An Epson MX-80 or IBM Graphics Printer's horizontal dot density is 60 or 120 dpi; the FX-80 has six different horizontal dot densities. ThinkJet does not support true quadruple density graphics; it maps Epson's quadruple density graphics into its own double density. ThinkJet has no restrictions in its graphics mode about how often dots may be fired. The sequences: ESC J, ESC K, ESC Y, ESC Z, and ESC * are affected by this difference.

Print pitches
In normal pitch, ThinkJet prints 80 characters across a 6.67-inch line; the Epson printers print 80 characters across an 8-inch line. In compressed pitch, ThinkJet prints 142 characters per line; Epsons print 137 characters per line. Any software that mixes pitches on a line **and** expects columns to line up vertically may have to be rewritten.

Expanded mode
If an Epson receives a SO or ESC SO to start expanded printing, a CR will stop expanded printing. ThinkJet continues expanded printing until a DC4 or ESC W is received; CR will not stop expanded printing.

Emphasized & Double-strike mode
The Epson printers provide two modes of darkened printing, known as Emphasized and Double-Strike modes. ThinkJet causes Quality mode and Bold printing to occur for these modes. If both have been turned on, turning off either will cancel both. The affected sequences are ESC E, ESC F, ESC G, ESC H.

IBM Graphics Printer Functions NOT in ThinkJet

Function	Control Sequence
Audible Alarm [Buzzer]	BEL
Horizontal Tabulation	HT
Clear print buffer	CAN
Print Characters 80-9F (hex)	ESC 6, ESC 7
Out-of-Paper Recognition	ESC 8, ESC 9
Home Printhead	ESC <
Linefeed in ⅓ dot-rows	ESC]
Subscripts & Superscripts	ESC S, ESC T

Appendix B

Table of HP Mode Print Features

You may use the escape sequences and control codes of this table only if switch 5 on the rear panel of the printer is down. If switch 5 is up, you must use the escape sequences and control codes found in Appendix C.

Print Feature	Escape Sequence or Control Code	ASCII Decimal Equivalent	ASCII Hexadecimal Equivalent
PRINT PITCHES			
Normal (default) (12 cpi, 80 cpl)	ESC & k 0 S	27, 38, 107, 48, 83	1B, 26, 6B, 30, 53
Expanded (6 cpi, 40 cpl)	ESC & k 1 S	27, 38, 107, 49, 83	1B, 26, 6B, 31, 53
Compressed (21.3 cpi, 142 cpl)	ESC & k 2 S	27, 38, 107, 50, 83	1B, 26, 6B, 32, 53
Expanded-Compressed (10.7 cpi, 71 cpl)	ESC & k 3 S	27, 38, 107, 51, 83	1B, 26, 6B, 33, 53
PRINT QUALITY			
Quality Mode ON	ESC (s1B	27, 40, 115, 49, 66	1B, 28, 73, 31, 42
Quality Mode OFF (default)	ESC (s0B	27, 40, 115, 48, 66	1B, 28, 73, 30, 42
Bold Print ON	ESC (s1B	27, 40, 115, 49, 66	1B, 28, 73, 31, 42
Bold Print OFF	ESC (s0B	27, 40, 115, 48, 66	1B, 28, 73, 30, 42
UNDERLINE			
Underline on	ESC & d D	27, 38, 100, 68	1B, 26, 64, 44
Underline off (default)	ESC & d @	27, 38, 100, 64	1B, 26, 64, 40
LINE SPACING			
6 lines/inch (default)	ESC & ℓ 6 D	27, 38, 108, 54, 68	1B, 26, 6C, 36, 44
8 lines/inch	ESC & ℓ 8 D	27, 38, 108, 56, 68	1B, 26, 6C, 38, 44
PERFORATION SKIP			
Perforation skip on	ESC & ℓ 1 L	27, 38, 108, 49, 76	1B, 26, 6C, 31, 4C
Perforation skip off (switch 3 sets default)	ESC & ℓ 0 L	27, 38, 108, 48, 76	1B, 26, 6C, 30, 4C
PAGE LENGTH			
# lines/page* (switch 4 sets default)	ESC & ℓ # P	27, 38, 108, #, . . . #, 80	1B, 26, 6C, #, . . . #, 50
TEXT LENGTH			
# lines/text area*	ESC & ℓ # F	27, 38, 108, #, . . . #, 70	1B, 26, 6C, #, . . . #, 46
END OF LINE WRAP-AROUND			
Wrap-around on	ESC & s 0 C	27, 38, 115, 48, 67	1B, 26, 73, 30, 43
Wrap-around off (default)	ESC & s 1 C	27, 38, 115, 49, 67	1B, 26, 73, 31, 43

Print Feature	Escape Sequence or Control Code	ASCII Decimal Equivalent	ASCII Hexadecimal Equivalent
DISPLAY FUNCTIONS MODE			
Display Functions on	ESC Y	27, 89	1B, 59
Display Functions off (default)	ESC Z	27, 90	1B, 60
UNIDIRECTIONAL OR BIDIRECTIONAL PRINT			
Unidirectional print	ESC & k 0 W	27, 38, 107, 48, 87	1B, 26, 6B, 30, 57
Bidirectional text print (default)	ESC & k 1 W	27, 38, 107, 49, 87	1B, 26, 6B, 31, 57
PRINT POSITION	**CONTROLS**		
Line Feed	CTL J	10	0A
Carriage Return	CTL M	13	0D
Back Space	CTL H	8	08
Half Line Feed	ESC =	27, 61	1B, 3D
Form Feed	CTL L	12	0C
GRAPHICS			
Select low density graphics	ESC * r 640 S	27, 42, 114, 54, 52, 48, 83	1B, 2A, 72, 36, 34, 30, 53
Select high density graphics	ESC * r 1280 S	27, 42, 114, 49, 50, 56, 48, 83	1B, 2A, 72, 31, 32, 38, 30, 53
Raster dot row*	ESC * b # W	27, 42, 98, #, ..#, 87	1B, 2A, 62, #, ..#, 57
Begin raster graphics	ESC * r A	27, 42, 114, 65	1B, 2A, 72, 41
End raster graphics	ESC * r B	27, 42, 114, 66	1B, 2A, 72, 42

AUTOMATIC LINE TERMINATION

Character** Received	Character(s) Executed	Escape Sequence or Control Code	ASCII Decimal Equivalent	ASCII Hexadecimal Equivalent
CR LF FF	CR LF FF	ESC & k 0 G	27, 38, 107, 48, 71	1B, 26, 6B, 30, 47
CR LF FF	CR, LF LF FF	ESC & k 1 G	27, 38, 107, 49, 71	1B, 26, 6B, 31, 47
CR LF FF	CR CR, LF CR, FF	ESC & k 2 G	27, 38, 107, 50, 71	1B, 26, 6B, 32, 47
CR LF FF	CR, LF CR, LF CR, FF	ESC & k 3 G	27, 38, 107, 51, 71	1B, 26, 6B, 33, 47
(switches 1 and 2 set default)				

SELF TEST			
Perform self test	ESC z	27, 122	1B, 7A
RESET			
Perform reset	ESC E	27, 69	1B, 45

*When using the decimal or hexadecimal form of these escape sequences, you must substitute the decimal or hexadecimal form of each digit of the value field (#). For example, the character "7" is represented in ASCII as 55 decimal or 37 hexadecimal; the character "2" is represented in ASCII as 50 decimal or 32 hexadecimal (see Appendix D). Therefore the escape sequence ESC & ℓ 72 P has a decimal form of 27,38,108,55,50,80 and a hexadecimal form of 1B,26,6C,37,32,50.

**NOTE: CR = Carriage Return
LF = Line Feed
FF = Form Feed

Appendix C

Table of Alternate Mode Print Features

You may use the escape sequences and control codes of this table only if switch 5 on the rear panel of the printer is up. If switch 5 is down, you must use the escape sequences and control codes found in Appendix B.

Print Feature	Escape Sequence or Control Code	ASCII Decimal Equivalent	ASCII Hexadecimal Equivalent
PRINT PITCHES			
Expanded on	CTL N	14	0E
Expanded off (default)	CTL T	20	14
Compressed on	CTL O	15	0F
Compressed off (default)	CTL R	18	12
Expanded-compressed on	CTL N CTL O	14, 15	0E, 0F
Expanded-compressed off (default)	CTL T CTL R	20, 18	14, 12
QUALITY MODE			
Quality Mode on	ESC G	27, 71	1B, 47
Quality Mode off (default)	ESC H	27, 72	1B, 48
BOLD PRINT			
Bold Print on	ESC E	27, 69	1B, 45
Bold Print off (default)	ESC F	27, 70	1B, 46
UNDERLINE			
Underline on	ESC -1	27, 45, 49	1B, 2D, 31
Underline off (default)	ESC -0	27, 45, 48	1B, 2D, 30
LINE SPACING			
6 lines/inch (default)	ESC 2	27, 50	1B, 32
8 lines/inch	ESC 0	27, 48	1B, 30
7 dot row line spacing	ESC 1	27, 49	1B, 31
# dot row line spacing	ESC A CHR$(#)	27, 65, #	1B, 41, (# Hex)
PERFORATION SKIP			
Set perf skip length (in lines)*	ESC N CHR$(#)	27, 78, #	1B, 4E, (# Hex)
Perforation skip off (switch 3 sets default)	ESC O	27, 79	1B, 4F
PAGE LENGTH			
# lines/page*	ESC C CHR$(#)	27, 67, #	1B, 43, (# Hex)
# inches/page* (switch 4 sets default)	ESC C CHR$(0) CHR$(#)	27, 67, 0, #	1B, 43, 0, (# Hex)

Print Feature	Escape Sequence or Control Code	ASCII Decimal Equivalent	ASCII Hexadecimal Equivalent
PRINT POSITION	**CONTROLS**		
Line Feed	CTL J	10 or 138	0A or 8A
Carriage Return	CTL M	13 or 141	0D or 8D
Back Space	CTL H	8 or 136	08 or 88
Form Feed	CTL L	12 or 140	0C or 8C
GRAPHICS			
Low density column graphics*	ESC K #1 #2	27, 75, #1, #2	1B, 4B, (#1 Hex), (#2 Hex)
High density column graphics*	ESC L #1 #2	27, 76, #1, #2	1B, 4C, (#1 Hex), (#2 Hex)
RESET			
Perform reset	ESC @	27, 64	1B, 40

*When using the decimal or hexadecimal form of these escape sequences, you must substitute the hexadecimal form of the value field (#). The character tables in Appendix D can be used to find the hexadecimal form of decimal numbers. For example, the escape sequence ESC C CHR$(48) is represented in decimal as 27, 67, 48. Table D-1 in Appendix D shows that the hexadecimal form of 48 is 30, so the hexadecimal form of ESC C CHR$(48) is 1B, 43, 30.

Appendix D

Character Sets

Your computer communicates with your printer by sending it a series of "data bytes" (numbers between 0 and 255). Each data byte value corresponds to either a control code (0-31, 127, 128-159, and 255) or a printing character (32-126, and 160-254).

When the printer receives a data byte corresponding to a printing character, it looks up the value in the current character table and prints the character which it finds. When the printer receives a data byte corresponding to a control code, it either executes the control code (8, 10, 12-15, and 27 are executed) or ignores it.

Some character sets are "7-bit" character sets, which only contain 128 characters. If the printer is using a 7-bit character set and it receives a data byte with a value greater than or equal to 128, it first subtracts 128 from the data byte and then looks the new value up in its character table. Other character sets are "8-bit" character sets, which contain 256 characters. If the printer is using an 8-bit character set, it does not modify the value of the data bytes before looking them up in the character table.

The ThinkJet printer contains eight different character sets, which are discussed in this appendix. Table A-4 of Appendix A shows the switch setting for selecting each of the different character sets.

Roman-8

The Roman-8 character set is an 8-bit character set. In addition to all of the characters of the standard ASCII character set, shown in Table D-1, it contains the international characters and symbols which are displayed in Table D-2.

Table D-1
Roman-8 Characters (ASCII)

CHAR.	DEC.	HEX.
CTL@	0	00
CTLA	1	01
CTLB	2	02
CTLC	3	03
CTLD	4	04
CTLE	5	05
CTLF	6	06
CTLG	7	07
CTLH	8	08
CTLI	9	09
CTLJ	10	0A
CTLK	11	0B
CTLL	12	0C
CTLM	13	0D
CTLN	14	0E
CTLO	15	0F
CTLP	16	10
CTLQ	17	11
CTLR	18	12
CTLS	19	13
CTLT	20	14
CTLU	21	15
CTLV	22	16
CTLW	23	17
CTLX	24	18
CTLY	25	19
CTLZ	26	1A
CTL[	27	1B
CTL\	28	1C
CTL]	29	1D
CTL^	30	1E
CTL_	31	1F
	32	20
!	33	21
"	34	22
#	35	23
$	36	24
%	37	25
&	38	26
'	39	27
(	40	28
)	41	29
*	42	2A
+	43	2B
,	44	2C
-	45	2D
.	46	2E
/	47	2F
0	48	30
1	49	31
2	50	32
3	51	33
4	52	34
5	53	35
6	54	36
7	55	37
8	56	38
9	57	39
:	58	3A
;	59	3B
<	60	3C
=	61	3D
>	62	3E
?	63	3F
@	64	40
A	65	41
B	66	42
C	67	43
D	68	44
E	69	45
F	70	46
G	71	47
H	72	48
I	73	49
J	74	4A
K	75	4B
L	76	4C
M	77	4D
N	78	4E
O	79	4F
P	80	50
Q	81	51
R	82	52
S	83	53
T	84	54
U	85	55
V	86	56
W	87	57
X	88	58
Y	89	59
Z	90	5A
[	91	5B
\	92	5C
]	93	5D
^	94	5E
_	95	5F
`	96	60
a	97	61
b	98	62
c	99	63
d	100	64
e	101	65
f	102	66
g	103	67
h	104	68
i	105	69
j	106	6A
k	107	6B
l	108	6C
m	109	6D
n	110	6E
o	111	6F
p	112	70
q	113	71
r	114	72
s	115	73
t	116	74
u	117	75
v	118	76
w	119	77
x	120	78
y	121	79
z	122	7A
{	123	7B
|	124	7C
}	125	7D
~	126	7E
■	127	7F

NOTE: Characters DEC. 0-31, 127-159 and 255 are only printed when display functions are enabled.

Table D-2
Roman-8 Characters (Roman Extension)

CHAR.	DEC.	HEX.
N_U	128	80
S_H	129	81
S_X	130	82
E_X	131	83
E_T	132	84
E_Q	133	85
A_K	134	86
$\underline{B}_L$	135	87
B_S	136	88
H_T	137	89
L_F	138	8A
V_T	139	8B
F_F	140	8C
C_R	141	8D
S_O	142	8E
S_I	143	8F
D_L	144	90
D_1	145	91
D_2	146	92
D_3	147	93
D_4	148	94
N_K	149	95
S_Y	150	96
E_B	151	97
C_N	152	98
E_M	153	99
S_B	154	9A
E_C	155	9B
F_S	156	9C
G_S	157	9D
R_S	158	9E
U_S	159	9F

CHAR.	DEC.	HEX.
	160	A0
À	161	A1
Â	162	A2
È	163	A3
É	164	A4
Ê	165	A5
Ì	166	A6
Í	167	A7
´	168	A8
`	169	A9
¨	170	AA
¨	171	AB
~	172	AC
Ù	173	AD
Ù	174	AE
₤	175	AF
¯	176	B0
	177	B1
	178	B2
°	179	B3
Ç	180	B4
ç	181	B5
Ñ	182	B6
ñ	183	B7
¡	184	B8
¿	185	B9
¤	186	BA
£	187	BB
¥	188	BC
§	189	BD
ƒ	190	BE
¢	191	BF

CHAR.	DEC.	HEX.
â	192	C0
é	193	C1
ô	194	C2
ü	195	C3
à	196	C4
ê	197	C5
ö	198	C6
û	199	C7
à	200	C8
è	201	C9
ò	202	CA
ù	203	CB
ä	204	CC
ë	205	CD
ö	206	CE
ü	207	CF
Å	208	D0
î	209	D1
Ø	210	D2
Æ	211	D3
å	212	D4
í	213	D5
ø	214	D6
æ	215	D7
Ä	216	D8
ì	217	D9
Ö	218	DA
Ü	219	DB
É	220	DC
ì	221	DD
ß	222	DE
Ô	223	DF

CHAR.	DEC.	HEX.
Á	224	E0
Ã	225	E1
ã	226	E2
Ð	227	E3
ð	228	E4
Í	229	E5
Ì	230	E6
Ó	231	E7
Ò	232	E8
Õ	233	E9
õ	234	EA
Š	235	EB
š	236	EC
Ú	237	ED
Ý	238	EE
ý	239	EF
Þ	240	F0
þ	241	F1
	242	F2
	243	F3
	244	F4
	245	F5
—	246	F6
¼	247	F7
½	248	F8
±	249	F9
ª	250	FA
«	251	FB
■	252	FC
»	253	FD
±	254	FE
■	255	FF

Table D-3
IBM-8 Characters (ASCII)

CHAR.		DEC.	HEX.
CTL @	$^{N}_{U}$	0	00
CTL A	$^{S}_{H}$	1	01
CTL B	$^{S}_{X}$	2	02
CTL C		3	03
CTL D		4	04
CTL E		5	05
CTL F		6	06
CTL G		7	07
CTL H	$^{B}_{S}$	8	08
CTL I	$^{H}_{T}$	9	09
CTL J	$^{L}_{F}$	10	0A
CTL K	$^{V}_{T}$	11	0B
CTL L	$^{F}_{F}$	12	0C
CTL M	$^{C}_{R}$	13	0D
CTL N	$^{S}_{O}$	14	0E
CTL O	$^{S}_{I}$	15	0F
CTL P	$^{D}_{L}$	16	10
CTL Q	$^{D}_{1}$	17	11
CTL R	$^{D}_{2}$	18	12
CTL S	$^{D}_{3}$	19	13
CTL T	$^{D}_{4}$	20	14
CTL U	$^{N}_{K}$	21	15
CTL V	$^{S}_{Y}$	22	16
CTL W	$^{E}_{B}$	23	17
CTL X	$^{C}_{N}$	24	18
CTL Y	$^{E}_{M}$	25	19
CTL Z	$^{S}_{B}$	26	1A
CTL [	$^{E}_{C}$	27	1B
CTL \	$^{F}_{S}$	28	1C
CTL]	$^{G}_{S}$	29	1D
CTL ^	$^{R}_{S}$	30	1E
CTL _	$^{U}_{S}$	31	1F

CHAR.	DEC.	HEX.
	32	20
!	33	21
"	34	22
#	35	23
$	36	24
%	37	25
&	38	26
'	39	27
(	40	28
)	41	29
*	42	2A
+	43	2B
,	44	2C
-	45	2D
.	46	2E
/	47	2F
0	48	30
1	49	31
2	50	32
3	51	33
4	52	34
5	53	35
6	54	36
7	55	37
8	56	38
9	57	39
:	58	3A
;	59	3B
<	60	3C
=	61	3D
>	62	3E
?	63	3F

CHAR.	DEC.	HEX.
@	64	40
A	65	41
B	66	42
C	67	43
D	68	44
E	69	45
F	70	46
G	71	47
H	72	48
I	73	49
J	74	4A
K	75	4B
L	76	4C
M	77	4D
N	78	4E
O	79	4F
P	80	50
Q	81	51
R	82	52
S	83	53
T	84	54
U	85	55
V	86	56
W	87	57
X	88	58
Y	89	59
Z	90	5A
[	91	5B
\	92	5C
]	93	5D
^	94	5E
_	95	5F

CHAR.	DEC.	HEX.
`	96	60
a	97	61
b	98	62
c	99	63
d	100	64
e	101	65
f	102	66
g	103	67
h	104	68
i	105	69
j	106	6A
k	107	6B
l	108	6C
m	109	6D
n	110	6E
o	111	6F
p	112	70
q	113	71
r	114	72
s	115	73
t	116	74
u	117	75
v	118	76
w	119	77
x	120	78
y	121	79
z	122	7A
{	123	7B
|	124	7C
}	125	7D
~	126	7E
■	127	7F

Table D-4
IBM-8 Characters (ASCII)

CHAR.	DEC.	HEX.
Ç	128	80
ü	129	81
é	130	82
â	131	83
ä	132	84
à	133	85
å	134	86
ç	135	87
ê	136	88
ë	137	89
è	138	8A
ï	139	8B
î	140	8C
ì	141	8D
Ä	142	8E
Å	143	8F
É	144	90
æ	145	91
Æ	146	92
ô	147	93
ö	148	94
ò	149	95
û	150	96
ù	151	97
ÿ	152	98
Ö	153	99
Ü	154	9A
¢	155	9B
£	156	9C
¥	157	9D
	158	9E
ƒ	159	9F

CHAR.	DEC.	HEX.
á	160	A0
í	161	A1
ó	162	A2
ú	163	A3
ñ	164	A4
Ñ	165	A5
ª	166	A6
º	167	A7
¿	168	A8
	169	A9
	170	AA
½	171	AB
¼	172	AC
¡	173	AD
«	174	AE
»	175	AF
	176	B0
	177	B1
	178	B2
	179	B3
	180	B4
	181	B5
	182	B6
	183	B7
	184	B8
	185	B9
	186	BA
	187	BB
	188	BC
	189	BD
	190	BE
	191	BF

CHAR.	DEC.	HEX.
	192	C0
	193	C1
	194	C2
	195	C3
	196	C4
	197	C5
	198	C6
	199	C7
	200	C8
	201	C9
	202	CA
	203	CB
	204	CC
	205	CD
	206	CE
	207	CF
	208	D0
	209	D1
	210	D2
	211	D3
	212	D4
	213	D5
	214	D6
	215	D7
	216	D8
	217	D9
	218	DA
	219	DB
	220	DC
	221	DD
	222	DE
	223	DF

CHAR.	DEC.	HEX.
	224	E0
ß	225	E1
	226	E2
	227	E3
	228	E4
	229	E5
	230	E6
	231	E7
	232	E8
	233	E9
	234	EA
	235	EB
	236	EC
	237	ED
	238	EE
	239	EF
	240	F0
±	241	F1
	242	F2
	243	F3
	244	F4
	245	F5
	246	F6
	247	F7
°	248	F8
	249	F9
	250	FA
	251	FB
	252	FC
	253	FD
■	254	FE
	255	FF

International Character Sets

The ThinkJet printer contains seven, 7-bit, international character sets. These character sets are all very similar to characters 0 through 127 of the Roman-8 character set, found in Table D-1. Table D-3 shows the differences between Roman-8 and the seven international character sets.

Table D-5
International Character Sets

Dec.	Roman-8	US ASCII	IBM-8	Swedish	French	German	UK	Spanish
35	#	#	#	#	£	#	£	£
36	$	$	$	¤	$	$	$	$
39	'	'	'	´	´	´	´	´
64	@	@	@	É	à	§	@	§
91	[	[	[	Ä	°	Ä	[	¡
92	\	\	\	Ö	ç	Ö	\	Ñ
93	]	]	]	Å	§	Ü	]	¿
94	^	^	^	Ü	^	^	^	^
96	`	`	`	é	`	`	`	`
123	{	{	{	ä	é	ä	{	°
124	|	|	|	ö	ù	ö	|	ñ
125	}	}	}	å	è	ü	}	ç
126	~	~	~	ü	¨	β	—	~

Appendix E

Power Modules

The power module supplied with your printer should match the plug requirement for your area. However, power modules with different plugs are available to operate printers in different countries. The part numbers for these power modules are listed below.

Table E-1
Power Modules

LINE VOLTAGE	AREA	PART NUMBER
100 Volts	Japan	82241AJ
120 Volts	USA/Canada	82241A
220 Volts	Europe	82241AB
240 Volts	United Kingdom	82241AU
240 Volts	Australia	82241AG
240 Volts	South Africa	82241AA

Appendix F

Parallel Interface Specifications

The ThinkJet printer uses a standard parallel printer interface which is compatible with many personal computers.

Printer Connector Pin Assignments

The printer interface connector is compatible with a standard Amphenol-type, 36-pin connector.

The direction conventions used in Table F-1 are:

"In" - The signal is received by the printer from the computer.

"Out" - The signal is transmitted by the printer to the computer.

Table F-1
Pin Assignments

Pin No.	Signal	Direction	Description
1	$\overline{\text{Strobe}}$	In	A LOW pulse of width greater than 0.5 µs causes the printer to read one byte of data.
2	DATA 1	In	Data bit 0
3	DATA 2	In	Data bit 1
4	DATA 3	In	Data bit 2
5	DATA 4	In	Data bit 3
6	DATA 5	In	Data bit 4
7	DATA 6	In	Data bit 5
8	DATA 7	In	Data bit 6
9	DATA 8	In	Data bit 7
10	$\overline{\text{Acknlg}}$	Out	The printer sends a LOW pulse to indicate that it has accepted a byte of data and is ready for more data.
11	Busy	Out	A HIGH logic level indicates the printer cannot receive data due to data entry, a full buffer, or error status.
12	OOP	Out	A HIGH logic level indicates the printer is out of paper.
13	Selected	Out	Always HIGH
14,15			Not used
16	Logic Gnd		

17,18			Not used
19 to 30	Logic Gnd		
31	$\overline{\text{Input}}$ Prime	In	A LOW pulse of width greater than 40 µs resets the printer and clears the print buffer.
32	$\overline{\text{Error}}$	Out	A LOW level indicates the printer has reached an error state: self test failed or carriage position lost.
33	Logic GND		
34 to 36			Not used

Printer Timing Diagram

The timing diagram, Figure F-1, illustrates the data and handshake lines during transfer of one data byte to the printer. DATA 1 through DATA 8 and the Strobe line are driven by the computer; the Acknlg line is driven by the printer.

Table F-2
Minimum and Typical Timing Intervals

Interval	Description	Minimum Value	Typical Value
t_D	Delay from DATA written to data $\overline{\text{Strobe}}$.	0.5 µs	
t_{SB}	Data $\overline{\text{Strobe}}$ width.	0.5 µs	
t_{ACK}	$\overline{\text{Acknlg}}$ pulse width.		5 µs
t_H	Duration of valid data after $\overline{\text{Strobe}}$.	0.5 µs	

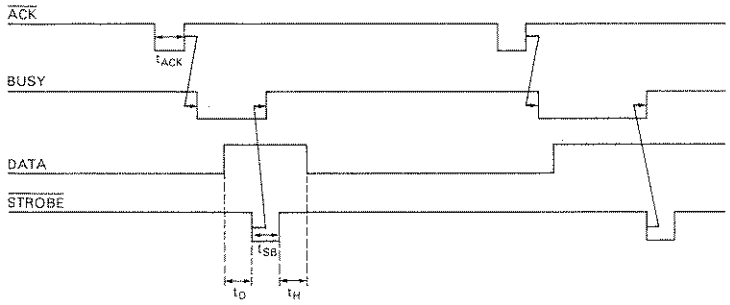


Figure F-1 Timing Diagram

Appendix G

List of Accessories and Supplies

Table G-1
Accessories and Supplies

Part No.	Description
92261A	Print Head Cartridge — Black only
51605R	Print Head Cartridge — Red only
51605G	Print Head Cartridge — Green only
51605B	Print Head Cartridge — Blue only
92261N	Ink Jet Paper — 2500 sheets, Z-fold
51630J	Ink Jet Paper — 500 sheets, single sheets
51630A	Ink Jet Paper — 500 sheets, Z-fold
92261S	Printer Stand — Clear Acrylic
	Power Modules — See page E-1.

Parallel [Centronics] Interface

The parallel interface has an Amphenol 36-pin female connector on the rear of the unit. The table below lists the cables used to connect your printer to some popular personal computers.

Table G-2
Cables to connect a Parallel ThinkJet to popular Personal Computers

PC	Cable P/N
HP 150 (w/45643A I/F)	HP 13242D
HP 80 Series	HP 82949A Parallel Printer I/F
HP 86	HP 82957A
IBM PC/XT	IBM Parallel Printer Cable
IBM PCjr	PCjr printer cable
Compaq	IBM Parallel Printer Cable
TI Professional	TI #2223106-001
Apple IIe Parallel Interface Card	Apple #590-0042

Fast phones for price and availability by location:

Austria: (0222) 25 00 or 615/616 • Belgium/Luxembourg: (02) 7 62 32 00 • Denmark: (02) 8166 40, Ext. 258 • Finland: (90) 4 55 0211 • France: (6) 9 28 32 64 • Greece: (01) 6473360-1 • Italy: (02) 92 36 91 or (06) 5 48 31 • Middle East: Athens – (01) 808-0359 • Norway: (02) 17 1180 • South Africa: Johannesburg – (011) 802 5111; Cape Town – (021) 53 7954; Durban – (031) 28 4178 • Spain: (01) 6 38 4013 • Sweden: (08) 750 20 28 • The Netherlands: (020) 47 0639 • Switzerland: (057) 312254/59 • United Kingdom: (0734) 69 72 01 • United States: 800-538-8787; California – 408-738-4133 • West Germany: 0130 33 22.

Appendix H

Warranty and Service Information

Warranty Information

The complete 1 year limited warranty statement is included in the front of this manual. Additional copies may be obtained from any authorized Hewlett-Packard dealer, or the sales and service office where you purchased your printer.

If you have any questions concerning this warranty, please contact an authorized Hewlett-Packard dealer or a Hewlett-Packard sales and service office, listed in the back of this manual. Should you be unable to contact them, please contact:

• **In the United States:**

Hewlett-Packard Company
Personal Computer Group
Customer Support
11000 Wolfe Road
Cupertino, CA 95014
Telephone: (503) 758-1010

Toll-Free Number: (800) FOR-HPPC (800 367-4772)

• **In Europe:**

Hewlett-Packard S.A.
150, route de Nant-d'Avril
P.O. Box CH-1217 Meyrin 2
Geneva
Switzerland
Telephone: (022) 83 81 11

Note: Do **not** send units to this address for repair.

• **In other countries:**

Hewlett-Packard Intercontinental
3495 Deer Creek Rd.
Palo Alto, CA 94304
U.S.A.
Telephone: (415) 857-1501

Note: Do **not** send units to this address for repair.

How to Obtain Repair Service

For information on service in your area, contact an authorized HP dealer, or the nearest Hewlett-Packard service facility listed in the back of this manual under Sales & Support Offices.

If your printer malfunctions and repair is required, you can help assure efficient servicing by having the following items with your printer at the time of service:

- A description of the configuration of the system you were using at the time of failure.
- A brief description of the malfunction symptoms for the service personnel.
- Printouts or other material that illustrate the problem area(s).
- A copy of the sales slip or other proof of purchase to establish the warranty coverage period.

Serial Number

Each printer carries an individual serial number. It is a good idea to keep a separate record of this number. Should your printer be stolen or lost, the serial number is required for insurance claims and is often helpful for tracing and recovery. Hewlett-Packard does not maintain records of individual owners' names and printer serial numbers.

General Shipping Instructions

Should you ever need to ship the printer, be sure that all components are packed in a protective package (use the original shipping case) to avoid in-transit damage. We suggest that you always insure shipments.

If you happen to be outside of the country where you bought your printer, contact the nearest authorized dealer or local Hewlett-Packard office for shipping instructions. All customs and duty charges are your responsibility.

Appendix I

Application Notes (Hardware and Software)

A variety of interface options and extensive software support allow you to use the ThinkJet Printer with most major personal computers– Hewlett-Packard Touchscreen PC's and The Portable, the IBM Family, and Apple's Macintosh, IIc and IIe, to name just a few. Feature definition and set up can vary between manufacturers. Because of this, specific hardware and software documentation has been specially written to facilitate the set up and use of your ThinkJet Printer with your application.

The following list of Application Notes is complete as of April, 1985. New Application Notes will be added on a periodic basis. Ask for the application notes that meet your needs at your local HP Dealer. Your HP Dealer will also have an updated list should you find that your application is not listed here.

Hardware Application Notes

IBM

Connecting the ThinkJet Printer:	
–to an IBM PC, XT (Serial Interface)	5954-2901(54)
–to an IBM PC XT (Parallel Interface)	5954-2905(54)
–to an IBM PCjr (Parallel Interface)	5954-2909(54)
–to an IBM PCjr (Serial Interface)	5954-2912(54)

Apple

Connecting the ThinkJet Printer:	
–to an Apple II+, Apple IIe (Parallel Interface)	5954-2902(54)
–to an Apple IIc (Serial Interface)	5954-2903(54)
–to an Apple II+, IIc (Serial Interface)	5954-2904(54)
–ThinkJet Works on Macintosh	5954-6121(54)

Hewlett-Packard

Connecting the ThinkJet Printer:	
–to an HP 150 A/B (Serial Interface)	5954-2906(54)
–to an HP 150 A/B (HP-IB Interface)	5954-2907(54)
–to an HP 110 (HP-IL Interface)	5954-2908(54)
–to an HP 150 A/B (Parallel Interface)	5954-2910(54)
–to an HP 150 A/B (HP-IL Interface)	5954-2911(54)

Software Application Notes

IBM (Serial Interface)

IBM Writing Assistant on the IBM PCjr	5954-6106(54)
IBM Filing Assistant on the IBM PCjr	5954-6107(54)
IBM Reporting Assistant on the IBM PCjr	5954-6108(54)
IBM Graphing Assistant on the IBM PCjr	5954-6109(54)
Lotus 1-2-3® on the IBM PCjr	5954-6110(54)
WordStar® on the IBM PCjr	5954-6111(54)
Multiplan® on the IBM PCjr	5954-6112(54)
Andrew Tobias Managing Your Money™ on the IBM PCjr	5954-6115(54)
Bank Street Writer® on the IBM PCjr	5954-6118(54)

Apple (Parallel Interface)

pfs®:write on the Apple IIE	5954-2917(54)
WordStar® on the Apple IIe	5954-2919(54)
pfs®:report on the Apple IIe	5954-2924(54)
Bank Street Writer® on the Apple IIe	5954-2934(54)
Apple® Writer II on the Apple IIe	5954-2941(54)
Multiplan® on the Apple IIe	5954-2942(54)
pfs®:file on the Apple IIe	5954-2944(54)
Apple® Works on the Apple IIe	5954-2945(54)
pfs®:graph on the Apple IIe	5954-2946(54)

Apple (Serial Interface)

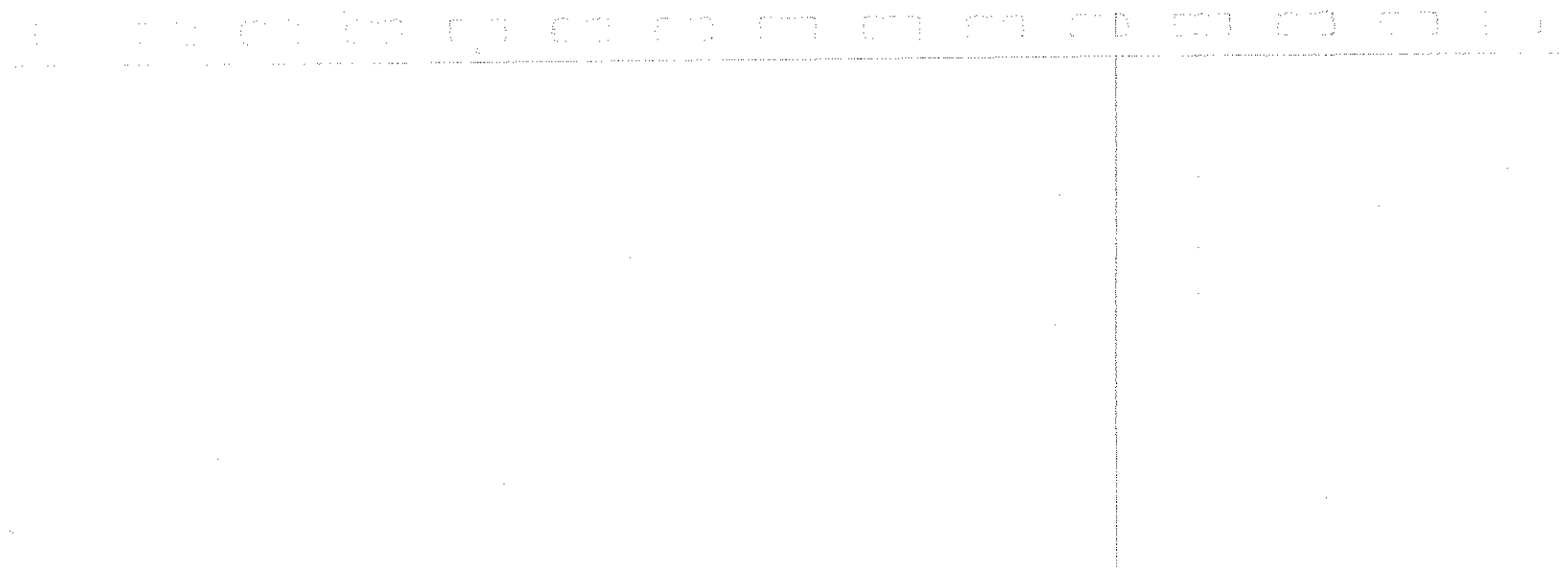
Homeword on the Apple IIc	5954-2913(54)
DOLLAR AND SENSE™ on the Apple IIc	5954-6113(54)
Bank Street Writer® on the Apple IIc	5954-6114(54)
Apple® Works on the Apple IIc	5954-6116(54)
The Home Accountant™ on the Apple IIc	5954-6117(54)
WORD JUGGLER™ on the Apple IIc	5954-6119(54)
WORD HANDLER II™ on the Apple IIc	5954-6120(54)

Hewlett-Packard (HP-IB Interface)

MultiMate™ on the HP 150 A/B	5954-2916(54)
Microsoft® Word on the HP 150 A/B	5954-2920(54)
MemoMaker on the HP 110 (HP-IL)	5954-2921(54)
WordStar® on the HP 150 A/B	5954-2922(54)
Lotus 1-2-3® on the HP 150 A/B and the HP 110 (HP-IL)	5954-2923(54)
dBase II™ on the HP 150 A/B	5954-2928(54)
Diagraph™ on the HP 150 A/B	5954-2929(54)
MemoMaker on the HP 150 A/B	5954-2947(54)
Multiplan® on the HP 150 A/B	5954-2949(54)
Picture Perfect™ on the HP 150 A/B	5954-2950(54)

IBM (Parallel Interface)

pfs®:graph on the IBM PC,XT	5954-2918(54)
pfs®:write on the IBM PC, XT	5954-2925(54)
MultiMate™ on the IBM PC, XT	5954-2926(54)
TK!Solver™ on the IBM PC, XT	5954-2927(54)
pfs®:file on the IBM PC, XT	5954-2930(54)
Lotus 1-2-3® on the IBM PC, XT	5954-2931(54)
Volkswriter Deluxe™ on the IBM PC, XT	5954-2932(54)
Multiplan® on the IBM PC, XT	5954-2933(54)
Symphony® on the IBM PC, XT	5954-2935(54)
pfs®:report on the IBM PC, XT	5954-2936(54)
Framework™ on the IBM PC, XT	5954-2937(54)
Microsoft® Word on the IBM PC, XT	5954-2938(54)
WordStar® on the IBM PC, XT	5954-2939(54)
dBase II™ on the IBM PC, XT	5954-2940(54)
dBase III™ on the IBM PC, XT	5954-2943(54)
EasyWriter II™ System on the IBM PC, XT	5954-2948(54)



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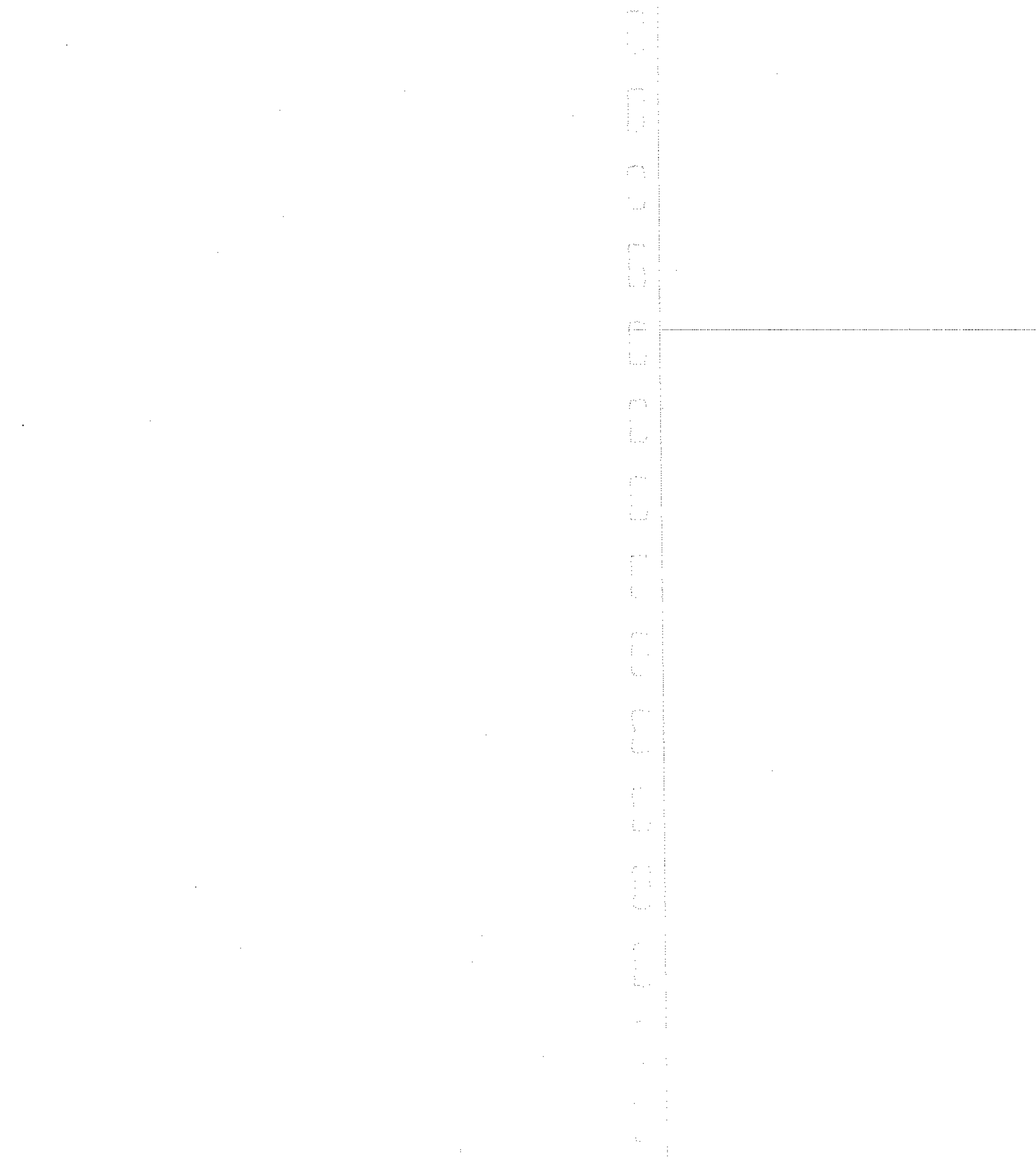
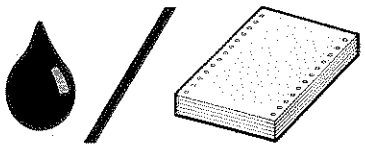
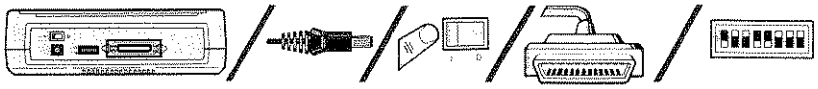
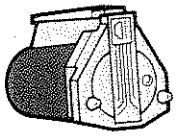
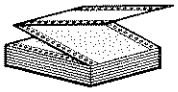
Page numbers in **bold** type indicate primary references; page numbers in standard type indicate secondary references.

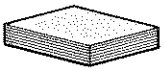













Aa
<=>?@ABC
=>?@ABCD
>?@ABCDE

The ink in the print head cartridge contains diethylene glycol which is HARMFUL IF SWALLOWED. Keep new or used cartridges OUT OF THE REACH OF CHILDREN.

Die Tinte der Druckkopfpatrone enthält Diäthylen Glycol. EINNAHME IST SCHADLICH! Bewahren Sie deshalb die Druckkopfpatronen ÄUβERHALB DER REICHWEITE VON KINDERN auf.

L'encre de la cartouche destinée à tête d'impression contient du glycol-diéthylène dont L'ABSORPTION EST DANGEREUSE. Conservez les cartouches neuves ou usagées HORS DE LA PORTEE DES ENFANTS.

La tinta que va en el interior de la cabeza impresora contiene dietilenglicol, el cual puede ser dañino si es ingerido. Mantenga las cabezas nuevas o usadas fuera del alcance de los niños.

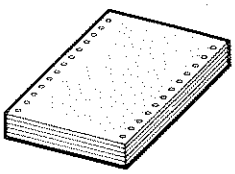
L'inchiostro nella cartuccia della testina di stampa contiene dietilen-glicole, una sostanza molto pericolosa se ingerita. Tenete le cartucce, nuove o usate, fuori dalla portata dei bambini.

De inkt in de inktpatroon bevat diethylene glycol, dat schadelijk is bij inwendig gebruik. NIEUWE OF GEBRUIKTE PATRONEN MOETEN BUITEN HET BEREIK VAN KINDEREN WORDEN GEHOUDEN.

Blækket i skrivehoved-beholderen indeholder diethylene glycol, hvilket er farligt at indtage. Opbevar brugte og ubrugte beholdere uden for børns rækkevidde.

Bläcket i skrivhuvudets behållare innehåller diethylen glykol som är farligt att förtära. Förvara dessa behållare utom räckhåll för barn.

Kirjoitinpääyksikön muste sisältää dietyleeni glykolia, joka on haitallista nautittuna. Pidä uudet tai käytetyt kirjoitinpääykosiköt POISSA LASTEN ULOTTUVILTA.



Use Hewlett-Packard ink jet paper for best print quality.

Benutzen Sie das ThinkJet-Papier von Hewlett-Packard, um eine hochwertige Druckqualität zu erreichen.

Pour obtenir une meilleure qualité d'impression, utilisez le papier spécial Hewlett-Packard pour imprimante à jet d'encre.

Use el papel especial de Hewlett-Packard para una mayor calidad de impresión.

Per una migliore qualitá di stampa usate la carta speciale della Hewlett-Packard per la tinkjet.

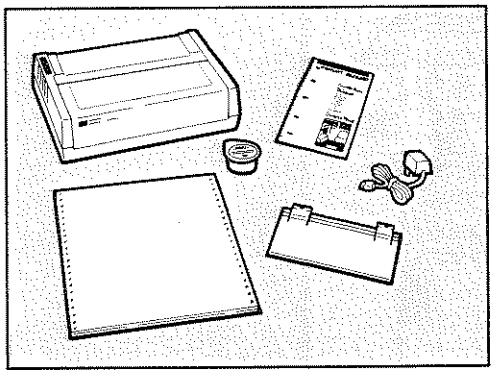
Gebruik Hewlett-Packard ThinkJet papier voor het beste afdrukresultaat.

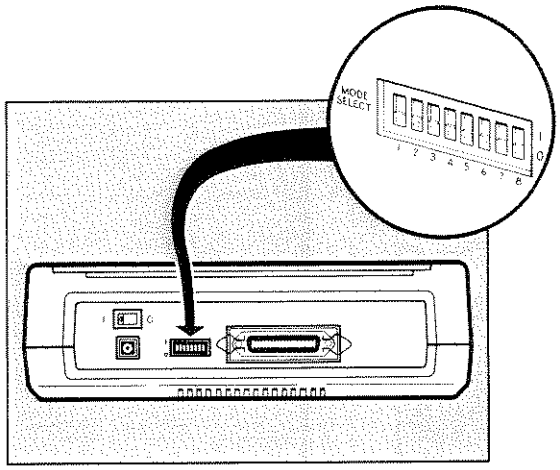
Anvend Hewlett-Packard ThinkJet papir for at opnå den bedste skrivekvalitet.

Bruk Hewlett-Packard's spesielle Thinkjet-papir for å oppnå best skrivekvalitet.

Hewlett-Packard speciella ThinkJet papper använd för bästa resultat vid utskrift.

Käytä Hewlett-Packard "THINKJET"-paperia parhaan kirjoituslaadun saavuttamiseksi.

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SELECT
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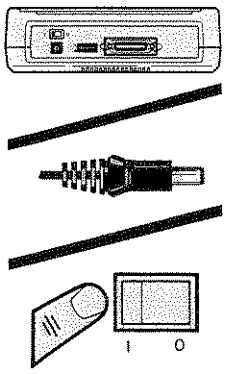
1 2 3 4 5 6 7 8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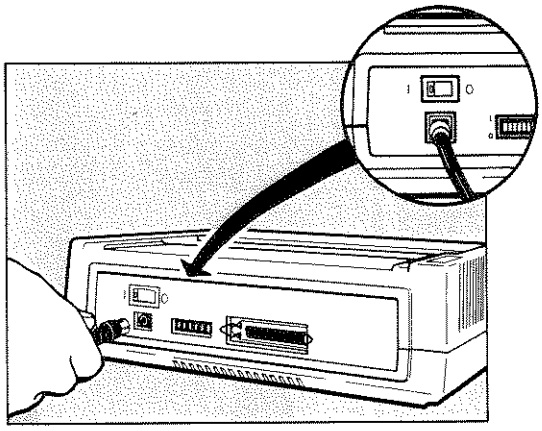
O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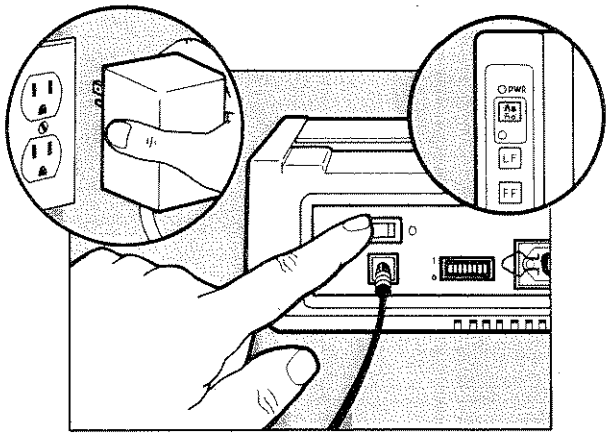
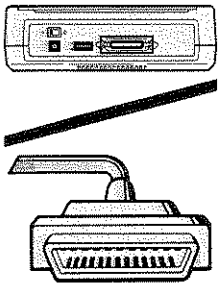
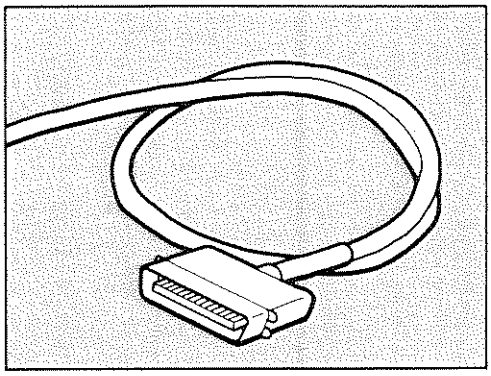
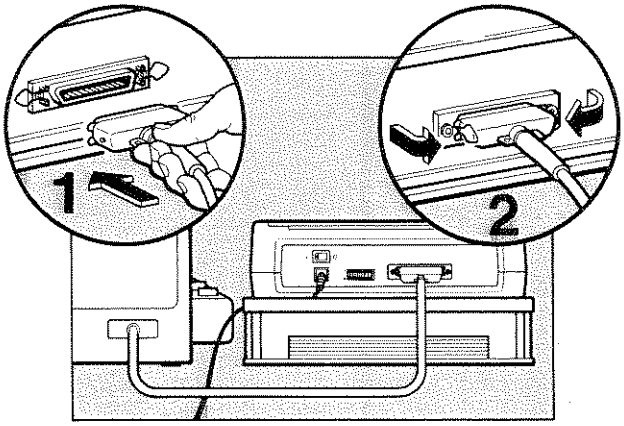

PWR
LF
FF
O



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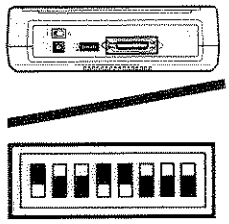
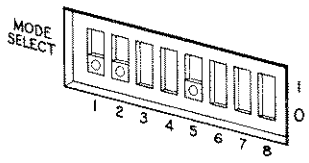
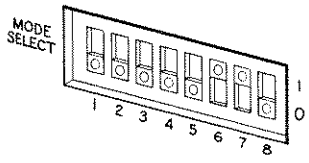


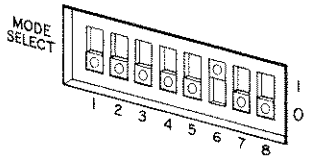
MODE SELECT SWITCHES
Wahl der betriebsart
Commutateur de selection de mode
Conmutadores de selección de modos
Selettori predisposizione modo operativo
Modus keuzeschakelaar
Status-kontaktsæt
Modus brytere
Funktionsval
Kirjoitintyypin valintakytkimet



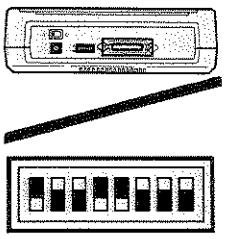
HEWLETT-PACKARD
HP 150
HP SERIES 80
HP SERIES 100
HP SERIES 200



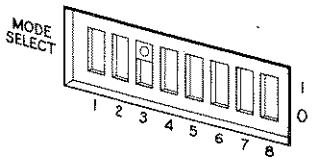
IBM PC
IBM PCXT

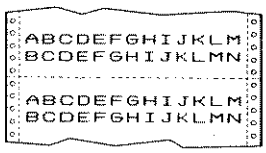


APPLE II
APPLE IIe

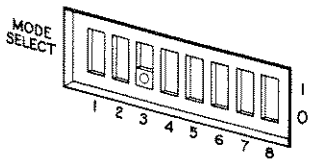


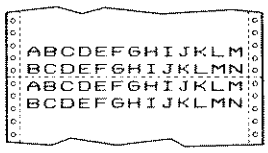
PERFORATION SKIP MODE (YES)
Automatischer vorschub vor der perforation (ja)
Mode saut de perforation (oui)
Modo salto de línea perforada (si)
Margine superiore e inferiore della pagina (si)
Perforatie sprong modus
Spring over perforering (ja)
Automatisk linjeskift (ja)
Skrivning över pappersskarv (ja)
Perforoinnin ylitys (kyllä)

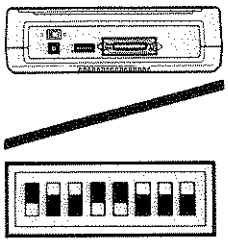




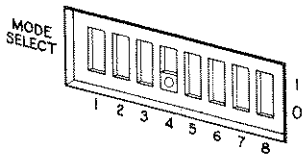
PERFORATION SKIP MODE (NO)
Automatischer vorschub vor der perforation (nein)
Mode saut de perforation (non)
Modo salto de línea perforada (no)
Margine superiore e inferiore della pagina (no)
Perforatie sprong modus
Spring over perforering (nej)
Automatisk linjeskift (nei)
Skrivning över pappersskarv (nej)
Perforoinnin ylitys (ei)

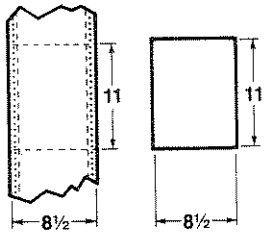


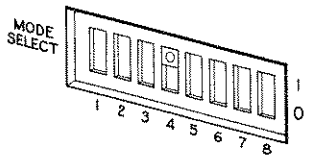


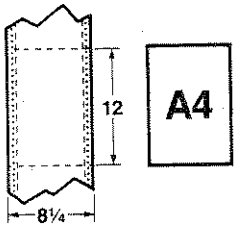


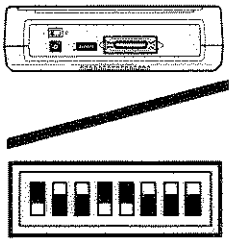
PAGE LENGTH SETTING
Einstellen der seitenlänge
Definition de la longueur de page
Fijación de la longitud de página
Dimensioni lunghezza pagina
Instelling papierlengte
Sidelængdeindstilling
Bestemmelse av arklengde
Val av papperslängd
Sivun pituuden asetus



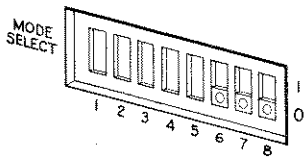




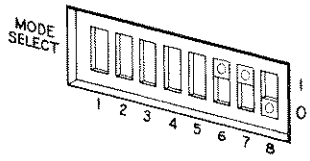




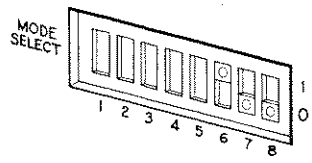
CHARACTER SELECT SWITCHES
Wahl des zeichensatzes
Commutateur de selection de caracteres
Conmutadores de selección de caracteres
Interruttori selezione caratteri
Tekenset keuzeschakelaar
Tegnsætsindstilling
Brytere for valg av tegnsett
Val av teckenuppsättning
Merkkivalikoiman valintakytkimet



ROMAN-8



IBM-8



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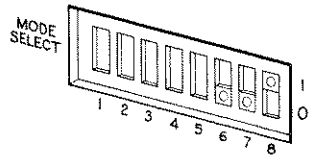
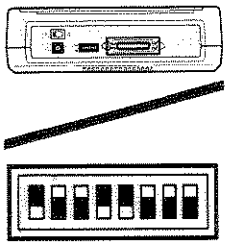
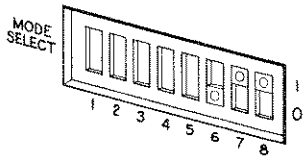


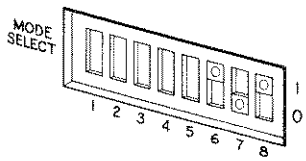
FRENCH



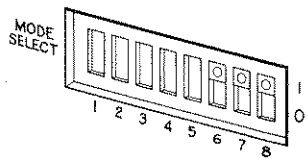
CHARACTER SELECT SWITCHES
Wahl des zeichensatzes
Commutateur de selection de caracteres
Conmutadores de selección de caracteres
Interruttori selezione caratteri
Tekenset keuzeschakelaar
Tegnsætsindstilling
Brytere for valg av tegnsett
Val av teckenuppsättning
Merkkivalikoiman valintakytkimet



UK



GERMAN



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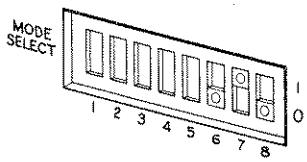
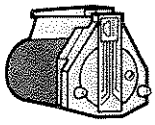
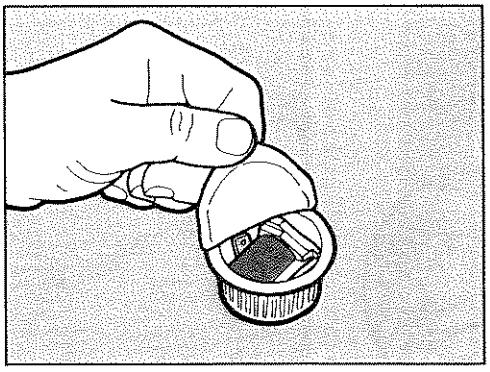
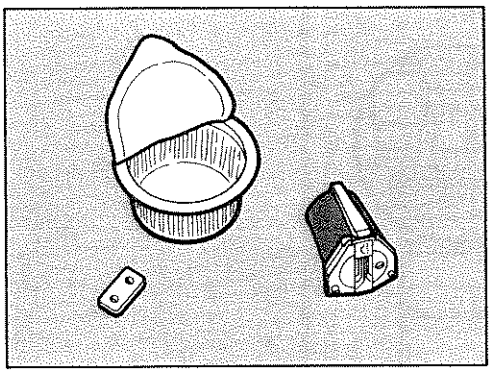
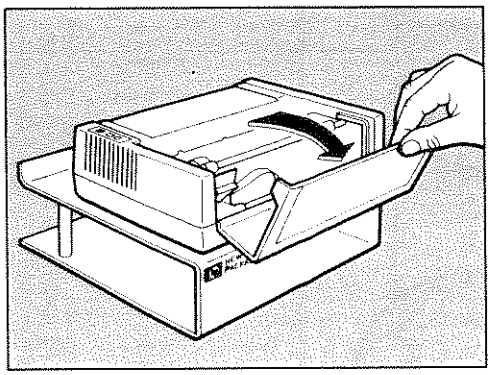


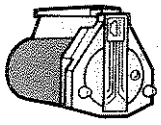
SWEDISH

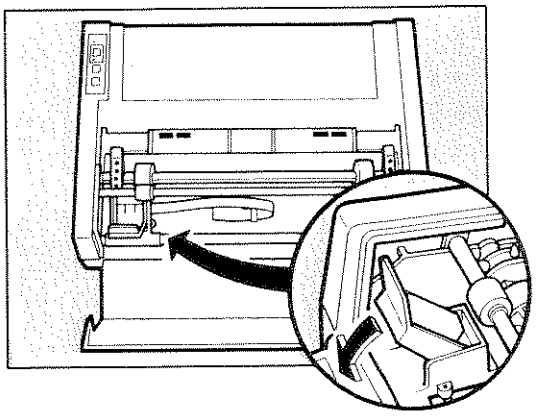


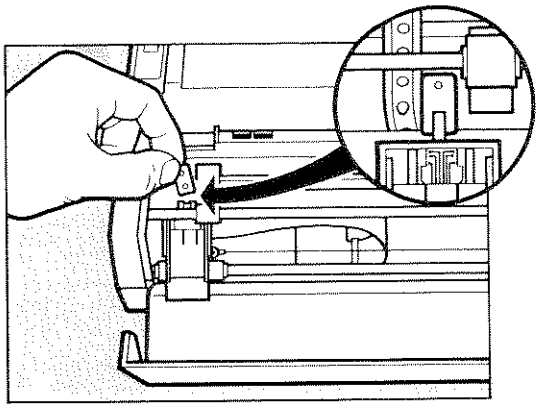


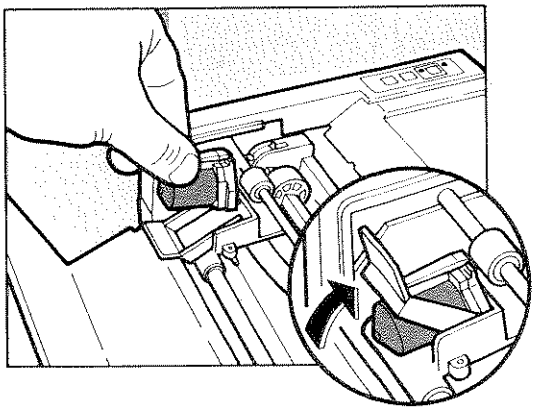


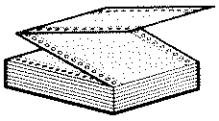


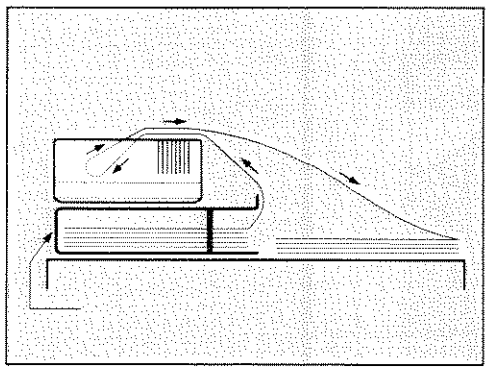


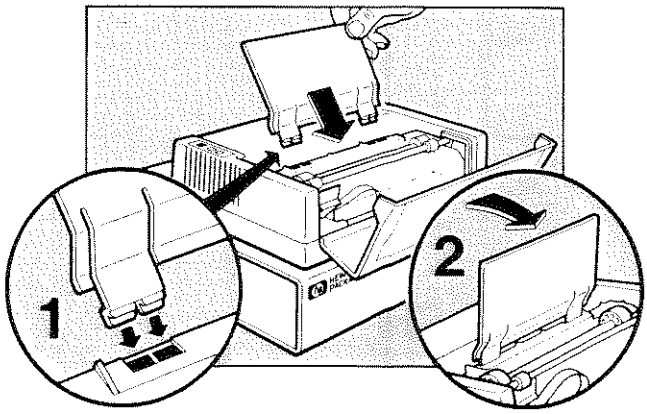








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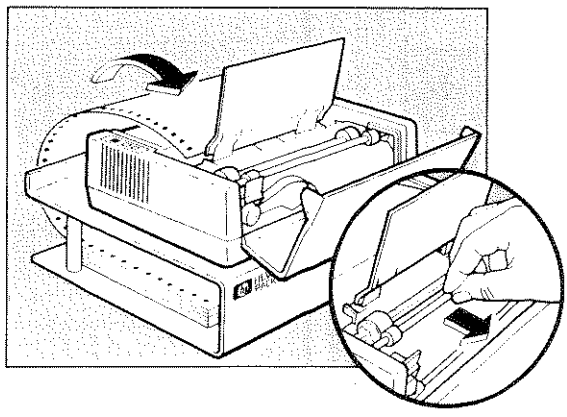

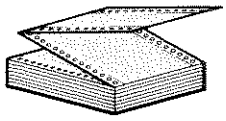

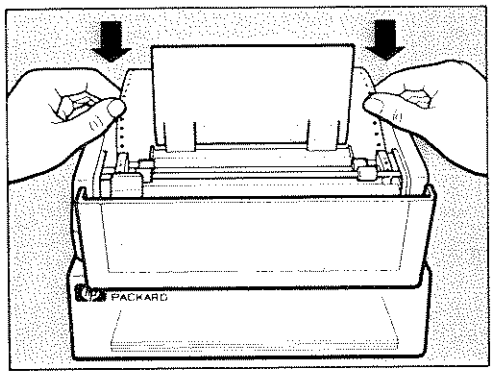
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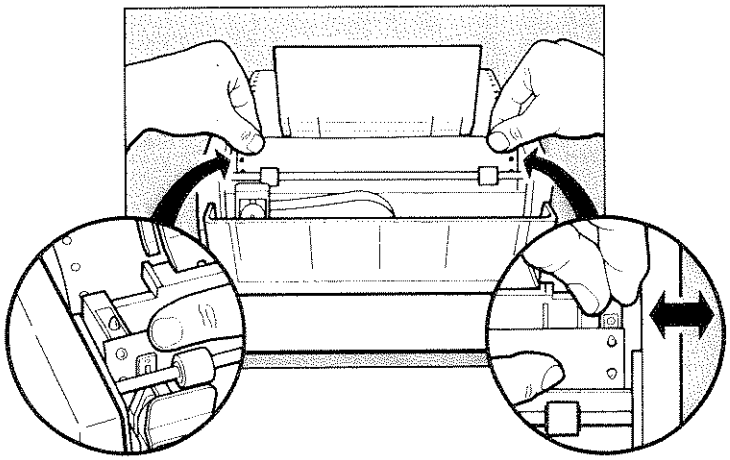

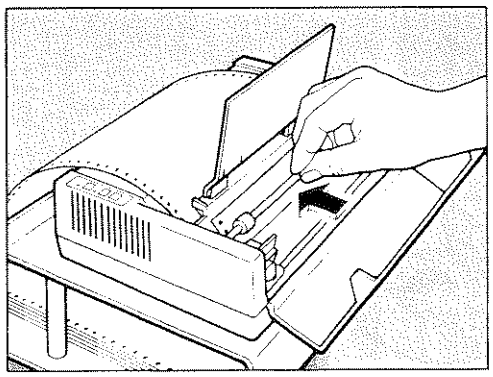

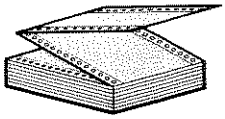

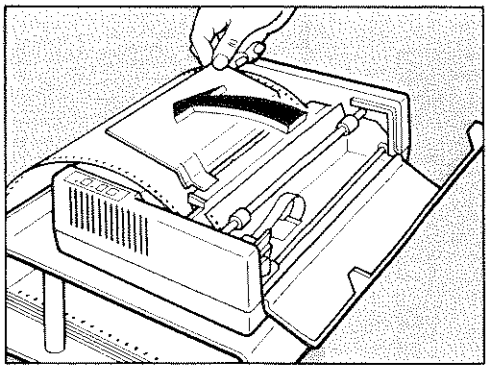

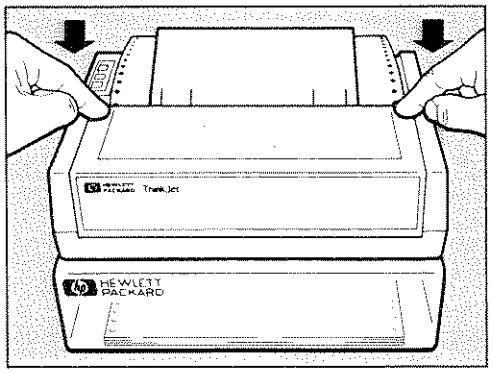
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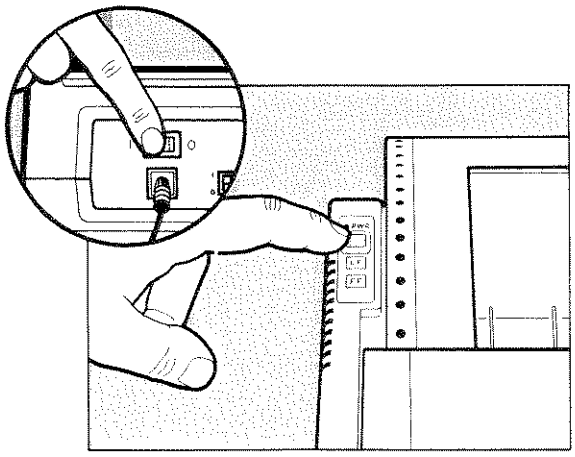

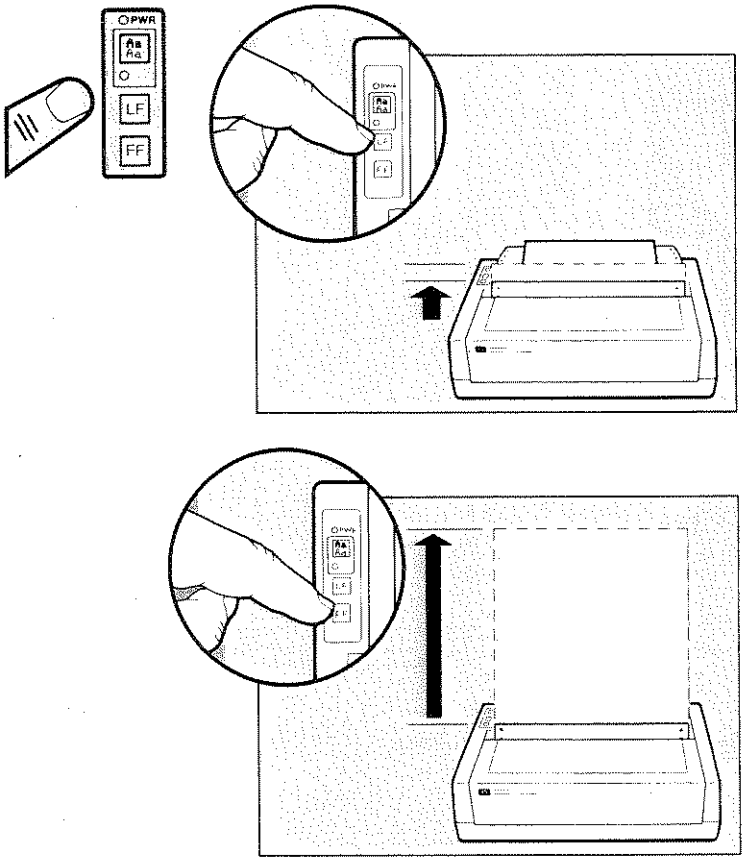
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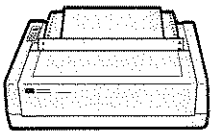

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L'imprimante se positionne en HAUT DE PAGE sur la ligne en cours à chaque remise en marche, ou à chaque fois que vous pressez la touche bleue.

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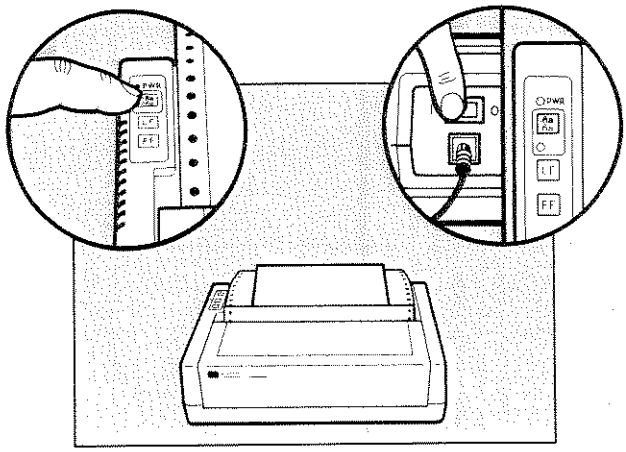

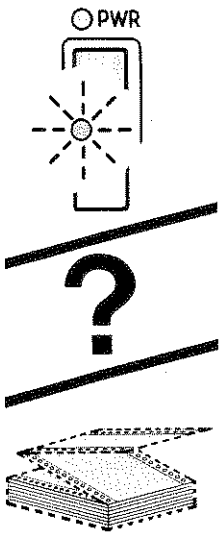
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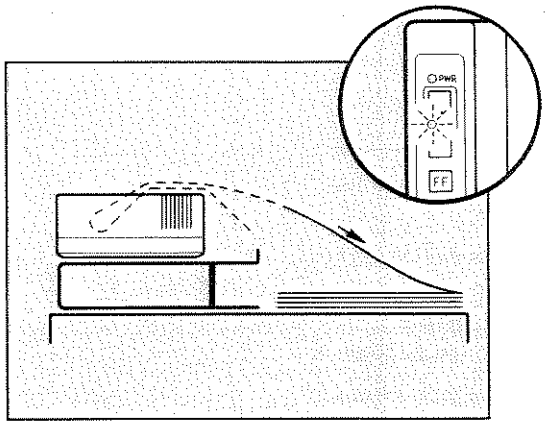
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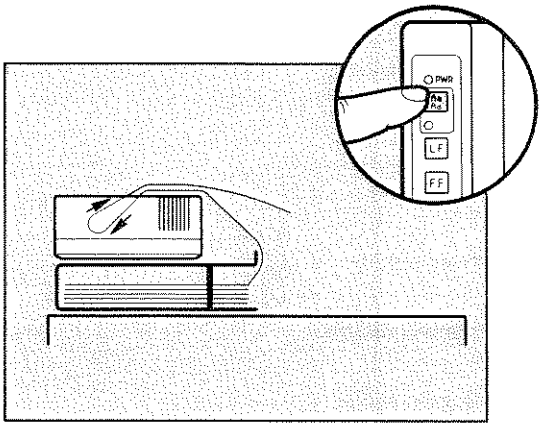
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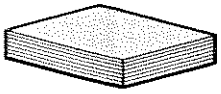

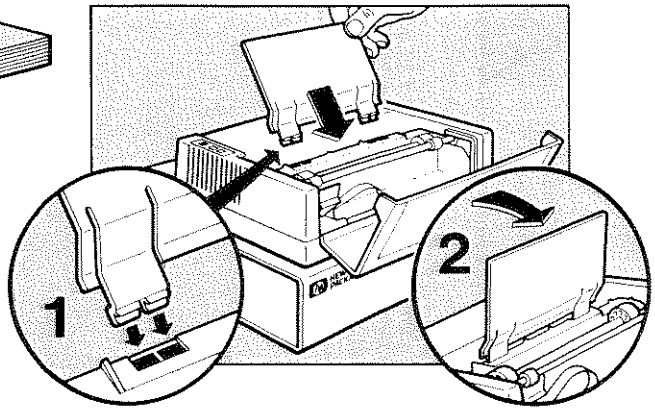
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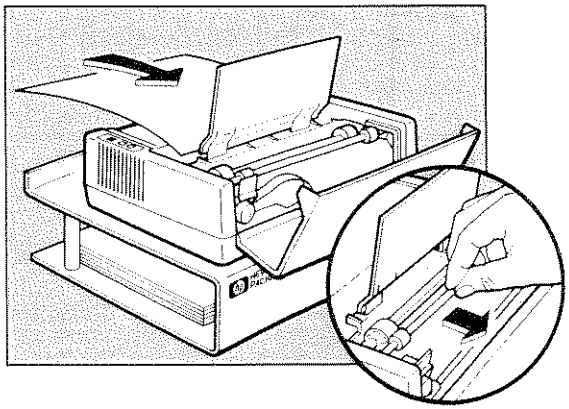

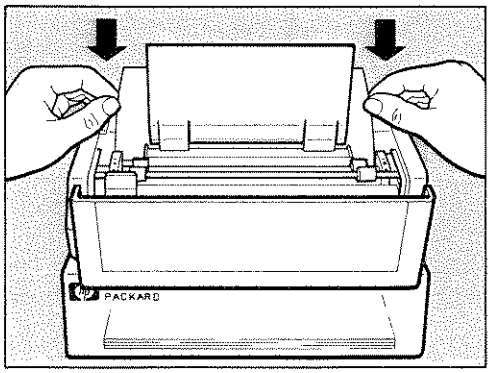
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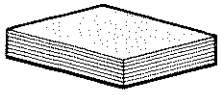

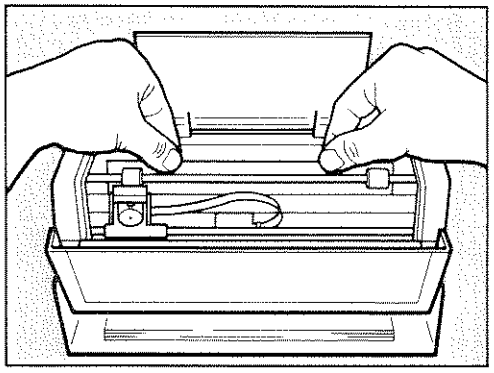

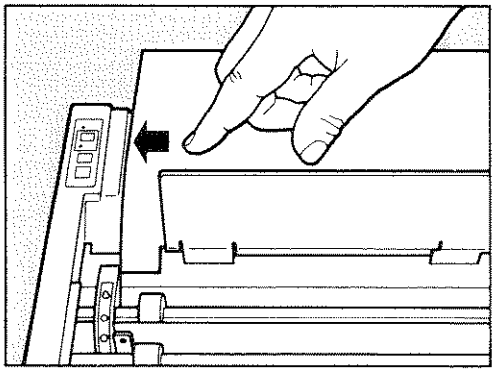

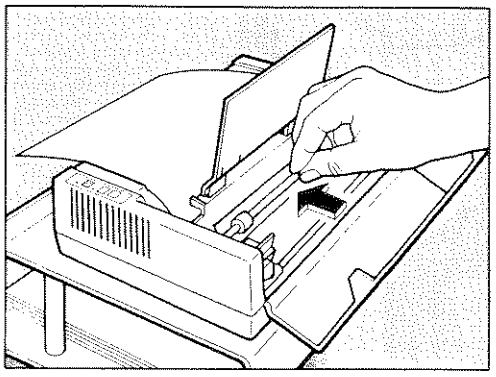

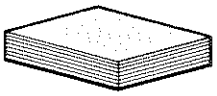

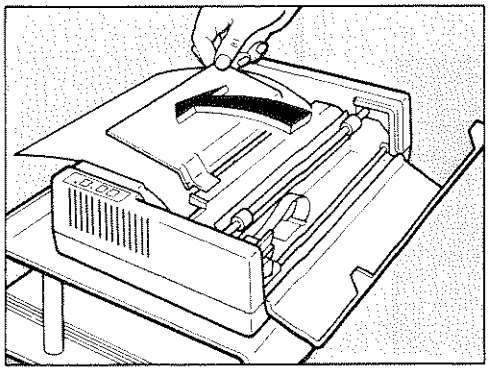

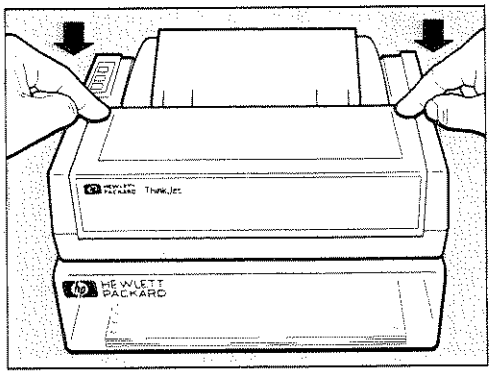
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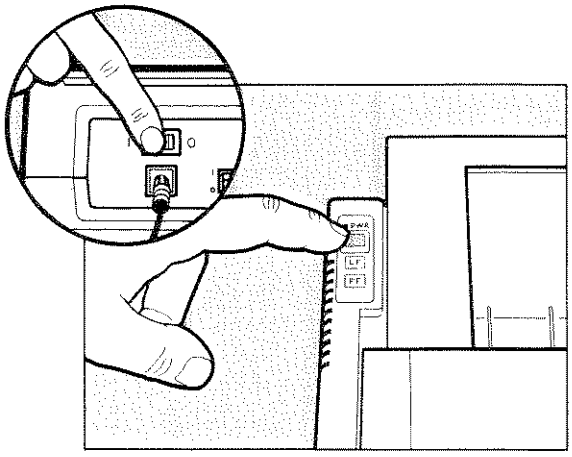
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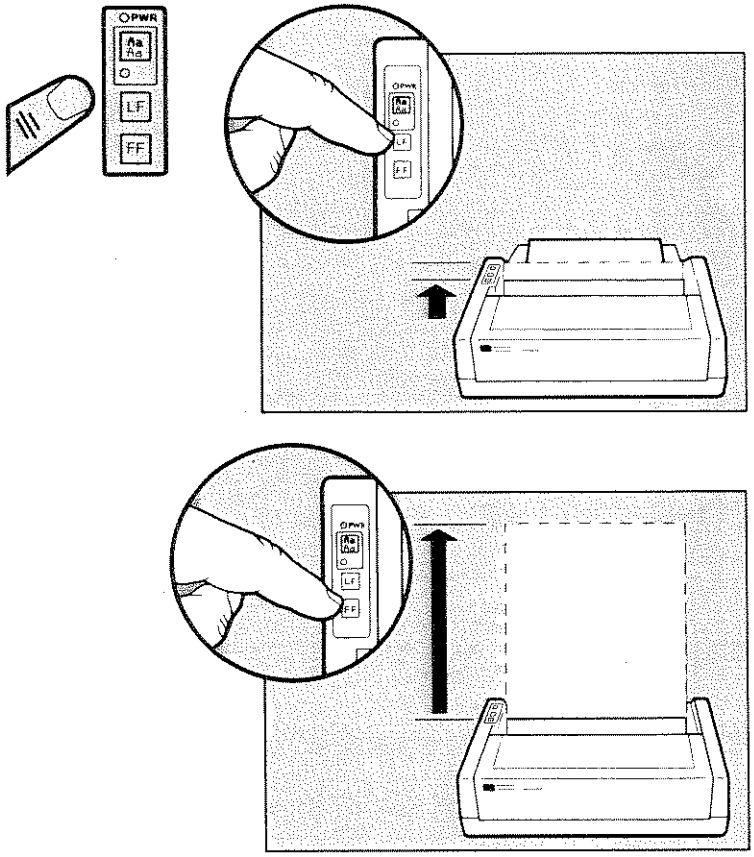
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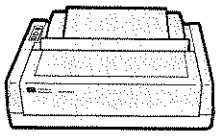

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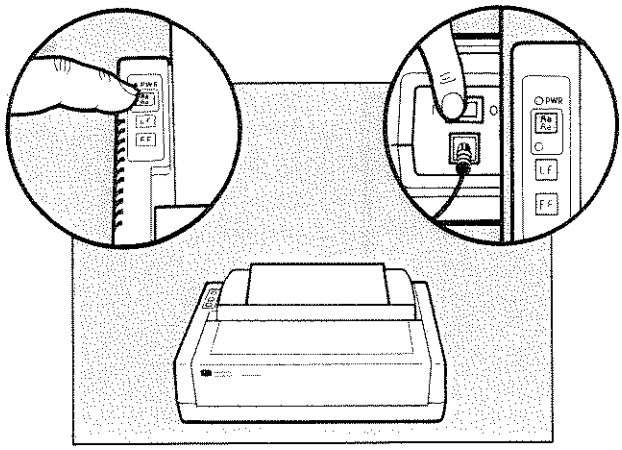

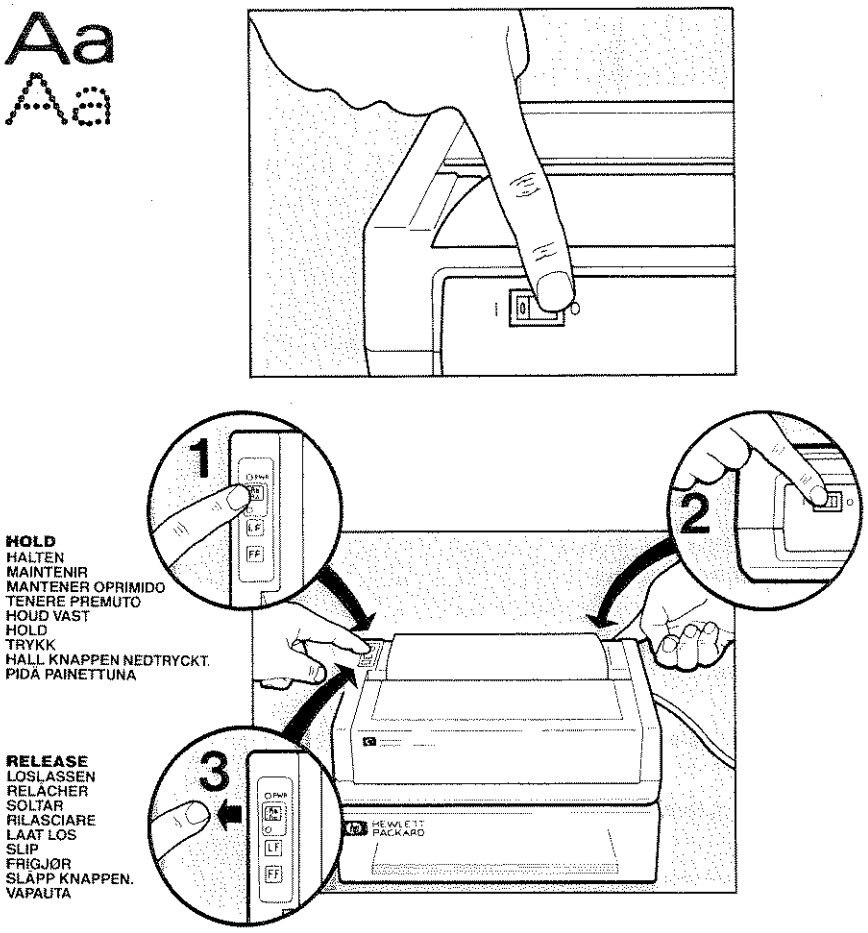

Quality mode is used to print entire documents. Quality mode can highlight a whole page or several pages. The illustrations above tell you how to enable Quality mode.

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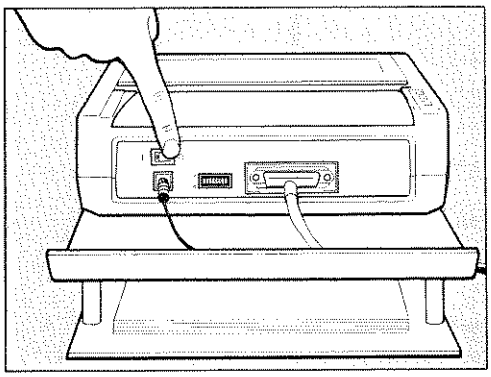
Self test
Eingnungspruefung
Test de diagnostic
Prueba de diagnóstico
Test diagnostico
Zelf proef
System test
Selvprøve
Kone testa
Selv eksamen



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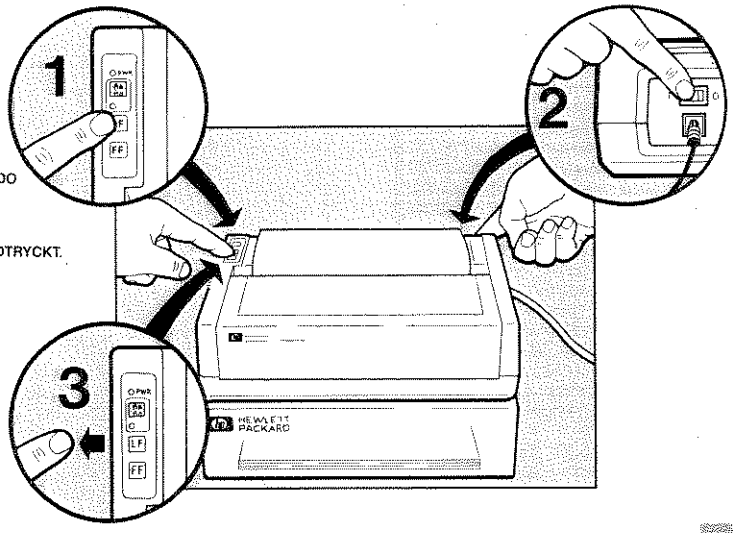

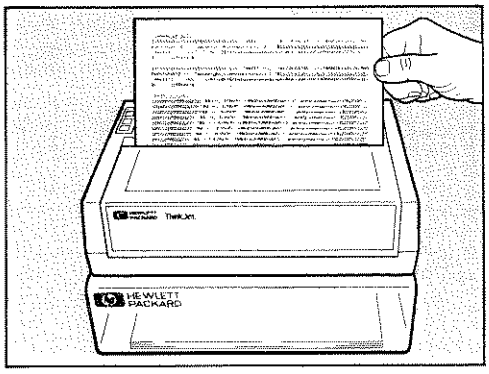

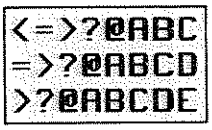

CHARACTER SETS

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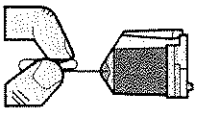

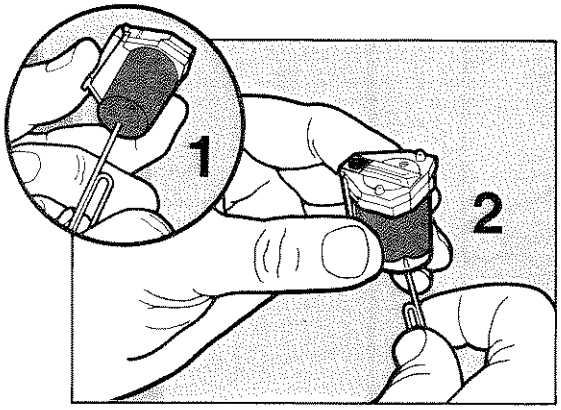
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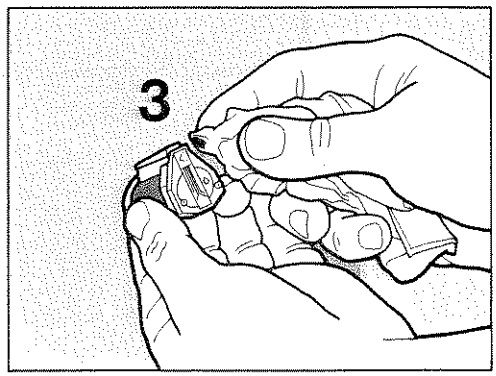
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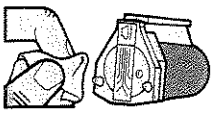

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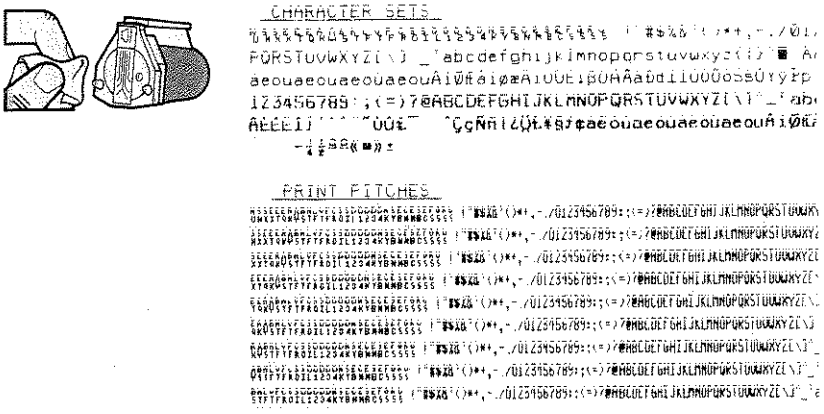

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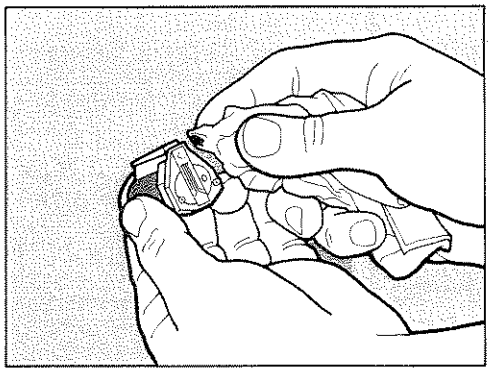

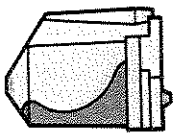

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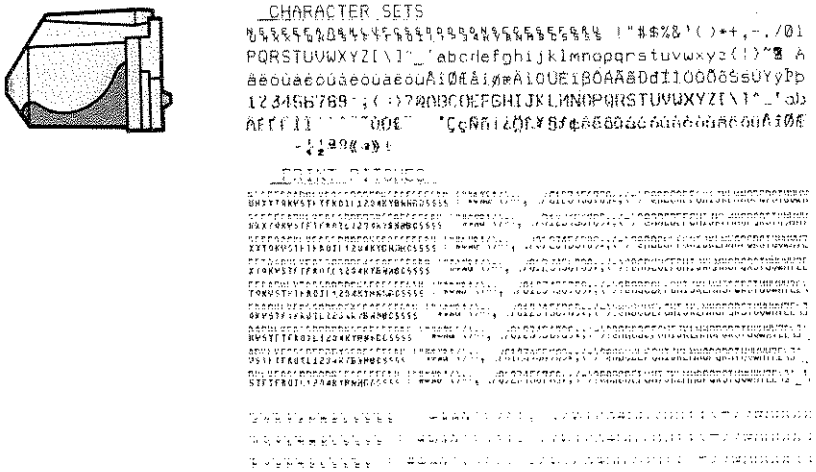

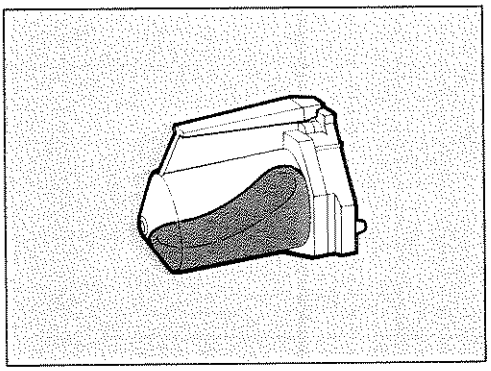

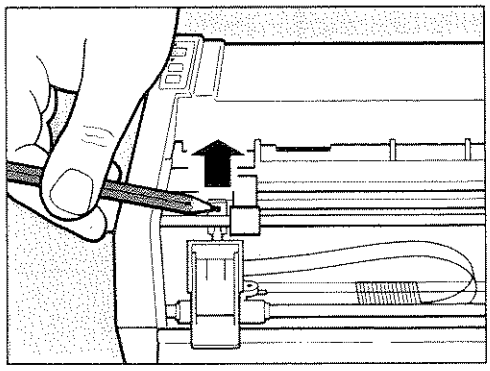

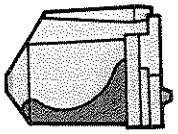

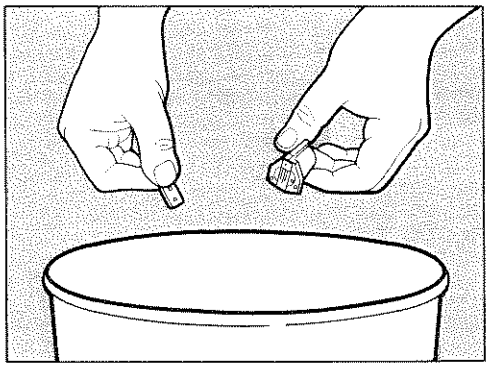

Potential for Radio/Television Interference

The ThinkJet printer generates and uses radio frequency energy and may cause interference to radio and television reception. Your printer complies with the specifications in Subpart J of Part 15 of the Federal Communications Commission rules for a Class B computing device. These specifications 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 the printer does cause interference to radio or television reception, which can be determined by turning the printer off and on, you can try to eliminate the interference problem by doing one or more of the following:

- Reorient the receiving antenna.
- Reorient the position of the printer with respect to the receiver.
- Move the printer away from the receiver.
- Plug the printer into a different outlet so that the printer and the receiver are on different branch circuits.

If necessary, consult an authorized HP dealer or an experienced radio/television technician for additional suggestions. You 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 D. C. 20402, Stock No. 004-000-00345-4.

WARNING

Use of a non-shielded printer interface cable will invalidate the FCC certification.

この装置は，第二種情報装置（住宅地域又はその隣接した地域において使用されるべき情報装置）で住宅地域での電波障害防止を目的とした情報処理装置等電波障害自主規制協議会（VCCI）基準に適合しております。

しかし，本装置をラジオ，テレビジョン受信機に近接してご使用になると，受信障害の原因となることがあります。

取扱説明書に従って正しい取り扱いをして下さい。

Table of Commonly Used Print Features

If switch 5 is DOWN (HP mode):

Print Feature	Escape Sequence or Control Code	ASCII Decimal Equivalent	ASCII Hexadecimal Equivalent
PRINT PITCHES			
Normal (default) (12 cpi, 80 cpl)	ESC & k 0 S	27, 38, 107, 48, 83	1B, 26, 6B, 30, 53
Expanded (6 cpi, 40 cpl)	ESC & k 1 S	27, 38, 107, 49, 83	1B, 26, 6B, 31, 53
Compressed (21.3 cpi, 142 cpl)	ESC & k 2 S	27, 38, 107, 50, 83	1B, 26, 6B, 32, 53
Expanded-Compressed (10.7 cpi, 71 cpl)	ESC & k 3 S	27, 38, 107, 51, 83	1B, 26, 6B, 33, 53
PRINT QUALITY			
Quality Mode ON	ESC (s1B	27, 40, 115, 49, 66	1B, 28, 73, 31, 42
Quality Mode OFF	ESC (s0B	27, 40, 115, 48, 66	1B, 28, 73, 30, 42
Bold Mode ON	ESC (s1B	27, 40, 115, 49, 66	1B, 28, 73, 31, 42
Bold Mode OFF	ESC (s0B	27, 40, 115, 48, 66	1B, 28, 73, 30, 42
UNDERLINE			
Underline on	ESC & d D	27, 38, 100, 68	1B, 26, 64, 44
Underline off (default)	ESC & d @	27, 38, 100, 64	1B, 26, 64, 40

If switch 5 is UP (Alternate mode):

Print Feature	Escape Sequence or Control Code	ASCII Decimal Equivalent	ASCII Hexadecimal Equivalent
PRINT PITCHES			
Expanded on	CTL N	14	0E
Expanded off (default)	CTL T	20	14
Compressed on	CTL O	15	0F
Compressed off (default)	CTL R	18	12
Expanded-compressed on	CTL N CTL O	14, 15	0E, 0F
Expanded-compressed off (default)	CTL T CTL R	20, 18	14, 12
PRINT QUALITY			
Quality Mode ON	ESC G	27, 71	1B, 47
Quality Mode OFF	ESC H	27, 72	1B, 48
Bold Mode ON	ESC E	27, 69	1B, 45
Bold Mode OFF	ESC F	27, 70	1B, 46
UNDERLINE			
Underline on	ESC -1	27, 45, 49	1B, 2D, 31
Underline off (default)	ESC -0	27, 45, 49	1B, 2D, 30

NOTE

When reading this manual, be very careful not to confuse O (uppercase oh) with 0 (zero) or ℓ (lowercase ell) with 1 (one).

02225-90077 (HP 2225C)
Printed in Singapore 3/87