Hewlett-Packard

HP 82905A

Printer

Owner's Manual

HEWLETT PACKARD

HP 82905A Printer

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May 1981

82905-90001

Printed in U.S.A.

Contents

Section 1

General Information

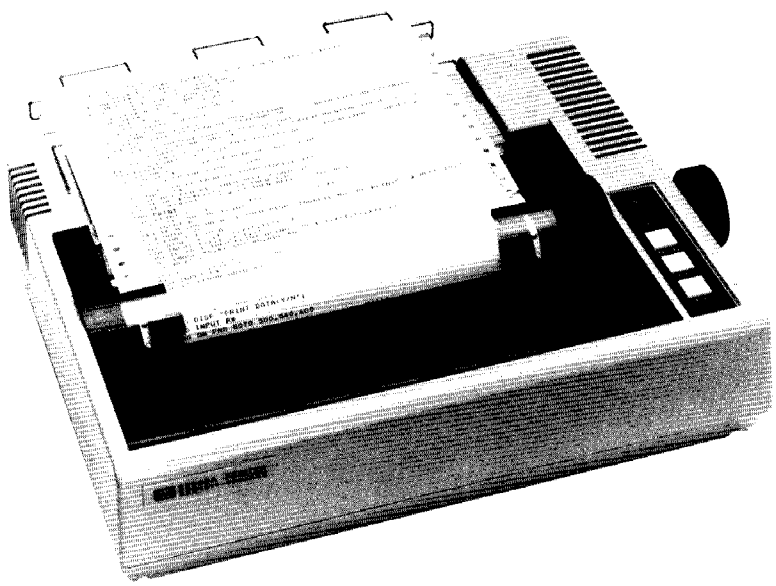
Introduction

The HP 82905A Printer is a general purpose printer featuring 80 character per second bi-directional printing. The printer utilizes a 9 × 9 dot matrix character format. It prints in 40, 48, 66, 80, 96, or 132 columns. And you can choose among normal, condensed, condensed-enlarged, or enlarged character size.

The printer has a graphics mode which gives you the ability to print illustrations, charts, graphs, block letters, etc. using patterns of dots under software control. You can also specify functions such as line spacing, form length, out-of-paper detection, and skip over perforation under software control.

Compatibility

The HP 82905A Printer conforms to IEEE Standard 488-1978. It may be connected to any Hewlett-Packard Series 80 computer. Connection to an HP-83 or HP-85 requires an HP 82937A HP-IB Interface module and a Plotter/Printer ROM (part number 00085-15002).



Specifications

Printer	
Printing Method	Impact dot matrix
Character Structure	
Text Mode	9 × 9 Dot matrix
Graphics Mode	72 × 60, 72 × 120 dots to the inch
Character Size	2.1 mm (0.083 inch) × 3.1 mm (0.120 inch)
Characters Per Line	40, 48, 66, 80, 96, 132
Paper Feed	Adjustable sprocket feed
Paper	Fanfold
Paper Width	101.6 mm (4 inches) to 254 mm (10 inches)
Copies	Original plus two carbons
Paper Thickness	0.3 mm (0.01 inch) maximum
Line Spacing	1/6-inch standard, programmable to various optional spacings
Printing Direction	Bi-directional with logic seeking (text mode)
Printing Speed	80 characters per second
Line Feed Repeat Rate	5 line feeds per second
Ribbon	Black cartridge ribbon
Environmental	
Operating Temperature	5° to 35° C (41° to 95° F)
Storage Temperature	−30° to 60° C (−22° to 140° F)
Operating Humidity	10 to 90 percent (no condensation)
Storage Humidity	5 to 90 percent (no condensation)
Power Requirement	
Power Supply	100V, 50/60 Hz 120V, 50/60 Hz 200V, 50/60 Hz 240V, 50/60 Hz
Maximum Power Consumption	100 W
Reliability	
MTBF (excluding printhead life)	5,000,000 lines
Printhead MTBF	70,000,000 characters
Physical Specifications	
Dimensions	374 × 305 × 107 mm (14.7 × 12.0 × 4.2 inches)
Weight	Approximately 5.5 kg (12 lb)

Notes

Section 2

Installation

Unpacking and Inspecting the Printer

Your printer was carefully inspected, both electrically and mechanically, before shipment. Remove it from the shipping carton and carefully inspect the printer for any physical damage that may have occurred during shipment. You should immediately notify your dealer and file a claim with any carriers involved if there is any such damage.

Check that you have received all of the standard accessories listed in appendix A. If any item is missing, contact the dealer or sales office where you purchased your printer.

Selecting an Operating Site

When selecting a site to operate your printer keep the following guidelines in mind:

- The printer should be placed on a flat surface, such as a tabletop, with enough room behind the printer for the paper separator.
- Don't expose the printer to direct sunlight or greasy dust. Greasy dust may cause the printhead to malfunction.
- Don't operate the printer at temperatures below 5° C (40° F) or above 35° C (95° F).

Removing the Shipping Screws

When your printer was shipped, shipping screws were installed to protect the printing mechanism from vibration during transportation. These screws must be removed before you operate the printer. Remove the screws by following the procedure below:

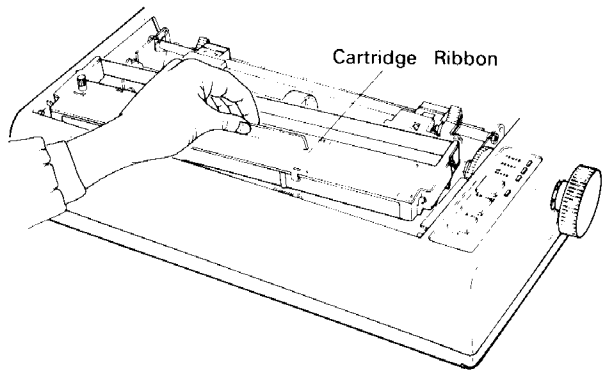
1. Carefully turn the printer over and place it on a flat surface.
2. Use a phillips head screwdriver to remove the two shipping screws on the bottom of the printer case.
3. Save the shipping screws for possible later use.

Installing the Ribbon Cartridge

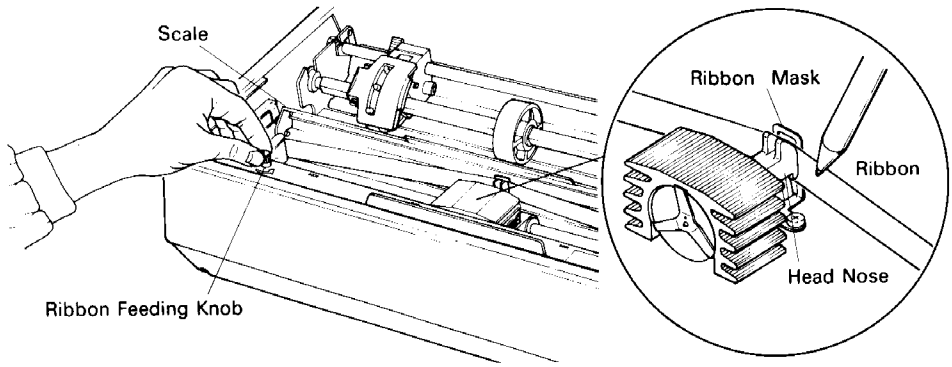
You can easily install the ribbon cartridge in the following manner:

1. Open the printer lid.
2. Make sure that the scale (paper retainer) is turned toward and touching the platen.

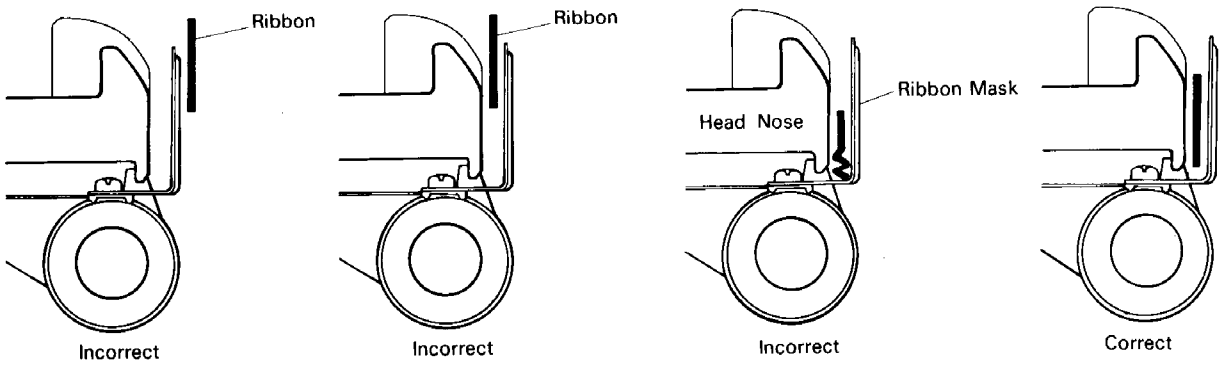
3. Grasp the projection at the center of the cartridge case and push the cartridge down onto the printer mechanism.



4. Place the ribbon between the printing head nose and the ribbon mask. Do this by turning the ribbon feeding knob on the cartridge case in the direction of the arrow while depressing the ribbon with a pencil (or similar tool).

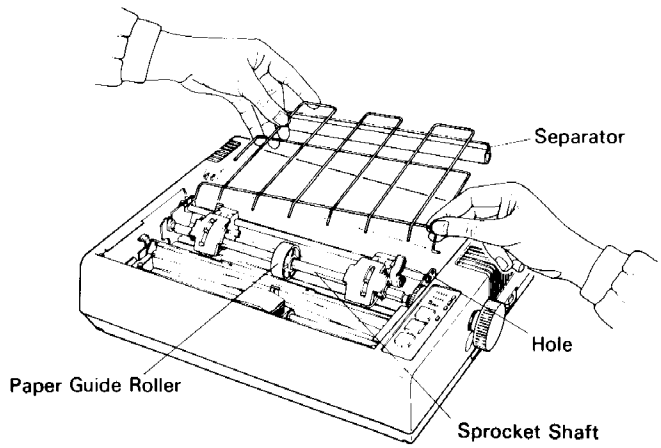


5. Make sure that the ribbon is not twisted or creased and the cartridge is in place. Then, tighten the ribbon by turning the ribbon feeding knob in the direction of the arrow.



Installing the Paper Separator

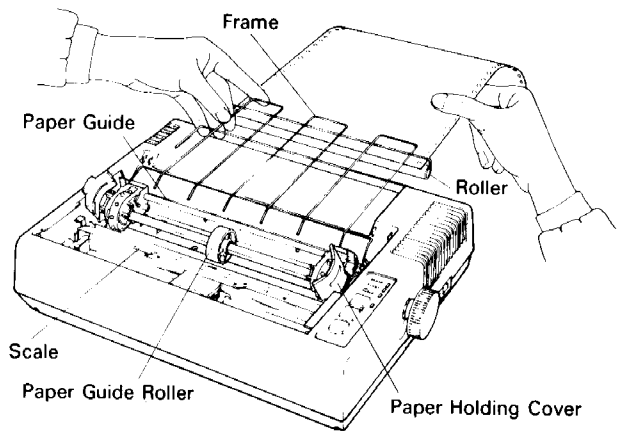
The paper separator helps maintain smooth paper flow through the printer. It is installed by inserting the protrusions on its front edge into the two holes located at the rear of the paper feeding mechanism.



Loading Paper

The printer accommodates fanfold paper from 4 inches to 10 inches wide. To load the paper:

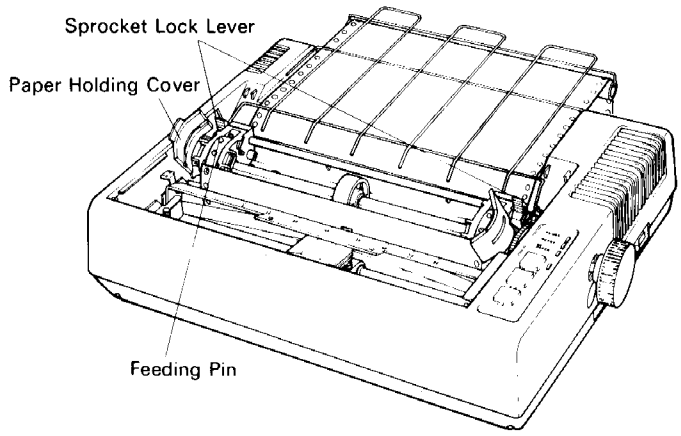
1. Raise the printer lid.
2. Move the scale toward the front of the printer and away from the platen.
3. If the paper guide roller is not at the center of the sprocket shaft, move it there.
4. Raise the two paper holding covers.
5. Insert the paper between the paper separator frame and the paper guide roller.



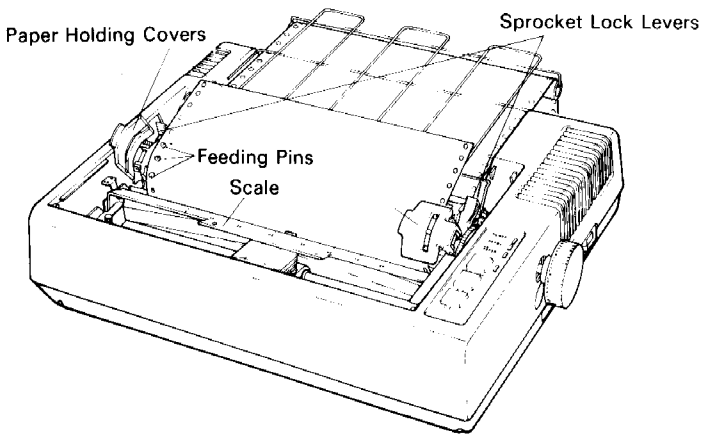
6. Push the paper into the slot between the paper guides at the rear of the printer mechanism. Be sure to pass the paper beneath the upper paper guide.

7. After the leading edge of the paper has emerged from under the platen, pull it through.

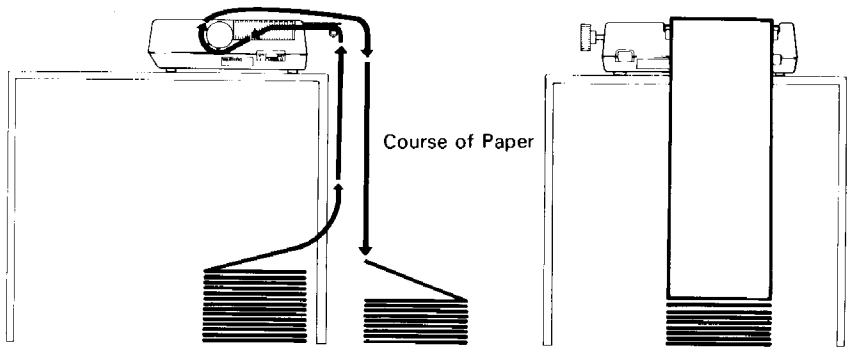
8. Release the two paper sprockets by raising the lock levers. Move the sprockets to the paper width. Lock the sprockets in place by lowering the levers.



9. Center the paper feed holes over the sprocket pins. Push the scale back against the paper and adjust the tension of the paper. Push the two paper holding covers back down into place.



When you operate the printer on a desk or a bench, arrange the paper supply in parallel with the printer as shown below. This arrangement permits the paper to fold in an accordian style.

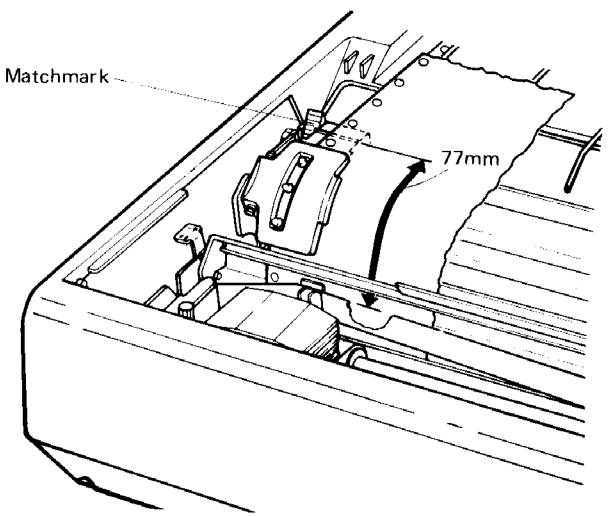


Setting the Top of Form

The printer has index marks on the paper sprockets which simplify setting the position of the first line of print on the paper (top of form). Use the marks as follows to establish the top of form:

1. Place a pencil mark on the edge of the paper 77 millimeters (3.08 inches) above the perforation and align this mark with the index marks.

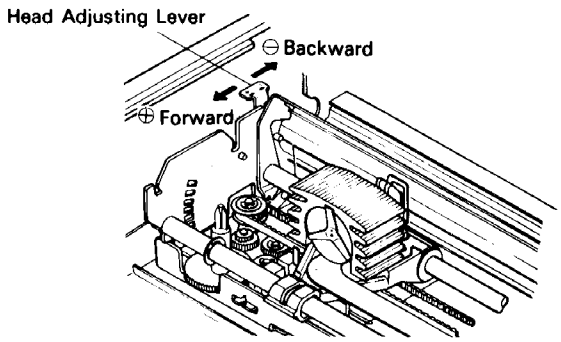
2. Place the power switch in the ON position. The printer will now recognize this position as the top of form.



Adjusting the Printer Head Gap

The gap between the printer head nose and the platen is adjustable. This adjustment is used to vary the printing pressure and to allow the printer to accommodate paper of various thicknesses.

To adjust the gap, move the head adjusting lever located on the left side of the printer frame. If you move the lever toward the front of the printer the gap will widen and, conversely, if you move it toward the rear of the printer the gap will narrow. For a single sheet of paper, the center position generally gives good print quality with minimum ribbon wear.



Connecting Your Printer to a Power Source

The HP 82905A Printer is pre-wired to operate with one of the following four ac power sources:

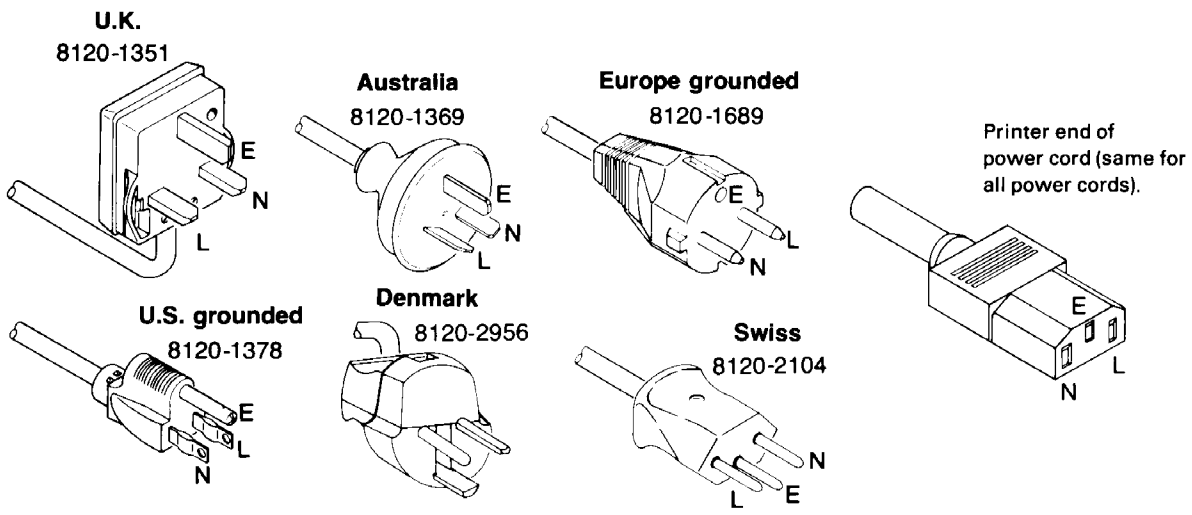
- 100 Vac, 50/60 Hz—Option 001
- 120 Vac, 50/60 Hz—Option 002
- 220 Vac, 50/60 Hz—Option 003
- 240 Vac, 50/60 Hz—Option 004

Before connecting your printer to a power source, check the label on the rear of the printer chassis to make sure the power rating is correct. If your printer has a power rating different from that of the available power source, do not attempt to operate the printer. Contact your dealer or Hewlett-Packard for a replacement unit with the correct power rating.

Power cords supplied for the printer should match the plug requirements in your area. However, power cords with different plugs are available and are illustrated below. If your printer has the wrong power cord for your area, please contact your local dealer or sales representative.

WARNING

Use only the power cord specified by Hewlett-Packard for your area. If it is necessary to replace the power cord, the replacement must have the same polarity as the original. Otherwise a safety hazard from electrical shock may exist. In addition, the unit could be extensively damaged.



Connecting the Printer to a Computer

If you are connecting your printer to an HP-83 or HP-85, use the following procedure. However, if you are connecting your printer to a different computer, refer to the interfacing guidelines for that particular system.

1. Be sure to turn the printer and the computer off before you install the interface module.
2. Plug the HP 82937A HP-IB Interface module into an I/O port on the computer.
3. Plug the HP-IB connector into the HP-IB receptacle on the printer.
4. Secure the connection with the two screws on the HP-IB connector.

Select Code Switch

The select code of the HP 82937A HP-IB Interface module is preset to 7 at the factory. If you need to change that setting, please refer to the *HP 82937A HP-IB Installation and Theory of Operation Manual* for instructions.

For computer systems other than the HP-83/HP-85, please refer to the HP-IB information for that system.

Device Address

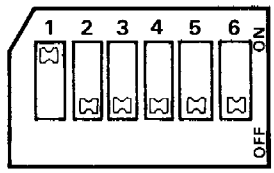
Each device used with the IEEE Standard 488 interface bus must have a unique address. The device address for the HP 82905A Printer is preset to 1 at the factory.

A six segment switch on the interface printed circuit assembly is used to assign the printer's address. Access to this switch is gained by removing the switch cover on the upper case of the printer. Before changing the switch setting make sure you turn off the printer.

The individual switch segments can be independently set to the ON or OFF position labeled on the switch with the tip of a pencil or similar tool. The ON position of each segment corresponds to binary 1 and the OFF position corresponds to binary 0. Segment six is not used so there are 31 (0 through 30) possible addresses. The following table shows the possible switch settings:

Switch Segment					Address
1 (LSB)	2	3	4	5 (MSB)	
0	0	0	0	0	0
1	0	0	0	0	1
0	1	0	0	0	2
1	1	0	0	0	3
0	0	1	0	0	4
1	0	1	0	0	5
0	1	1	0	0	6
1	1	1	0	0	7
0	0	0	1	0	8
1	0	0	1	0	9
0	1	0	1	0	10
1	1	0	1	0	11
0	0	1	1	0	12
1	0	1	1	0	13
0	1	1	1	0	14
1	1	1	1	0	15
0	0	0	0	1	16
1	0	0	0	1	17
0	1	0	0	1	18
1	1	0	0	1	19
0	0	1	0	1	20
1	0	1	0	1	21
0	1	1	0	1	22
1	1	1	0	1	23
0	0	0	1	1	24
1	0	0	1	1	25
0	1	0	1	1	26
1	1	0	1	1	27
0	0	1	1	1	28
1	0	1	1	1	29
0	1	1	1	1	30

The drawing below shows the switch set to an address of 1:



Self-Test

The HP 82905A Printer has a self-test feature that is useful in verifying proper operation of the printer. The self-test prints all the characters provided by the printer. It is a good idea to execute the self-test at the time of installation and at any other time you wish to confirm that the printing mechanism is operating properly.

```
789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefg
89:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefgh
9:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghi
:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghij
;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijk
```

To execute the self-test, place the POWER switch in the ON position *while* pressing the LF switch.

Section 3

Operating the Printer

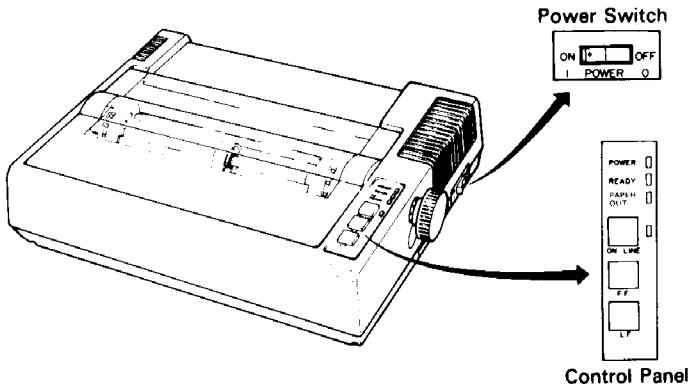
Introduction

This section gives you information on how to operate your HP 82905A Printer. Local operation as well as remote operation in the text and graphics modes is described.

Local Operation

Front Panel Switches and Indicators

There are three switches and four indicators (green LEDs) on the printer control panel and a power switch on the right side of the printer case.



The switches and indicators are listed along with their functions in the following table:

Switch/Indicator	Function
Switch	
POWER	Controls ac power to the printer.
ON LINE	When you press this switch, the printer enters the remote mode and can be used with a host computer. This switch does not function when the printer is printing. If ON LINE is pressed while data is being sent to the print buffer, all data received up to that point is immediately printed.
FF (Form Feed)	When you press this switch, the paper advances to the next top-of-form position. The FF switch is operational only in the local mode.
LF (Line Feed)	When you press this switch, the paper advances one line. The LF switch is operational only in the local mode.
Indicator	
POWER	When this indicator is lighted, the printer is receiving ac power
READY	When this indicator is lighted, the printer is ready to receive data.
NO PAPER	When this indicator is lighted, the paper supply is nearly exhausted.
ON LINE	When this indicator is lighted, the printer is in the remote mode and ready to receive data or control codes from the host computer.

Power ON

After all of the system connections are complete (refer to section 2) you can turn the printer ON using the power switch on the right side of the printer case. All of the system components should be turned on before the host computer is turned on.

Buzzer

A warning buzzer is located inside the printer case. The buzzer sounds for one second when it receives the ASCII code BEL.

Out-of-Paper Detection

When the out-of-paper detector (a reed switch on the paper guide) detects that the paper supply is low, printing stops. If this should happen, follow the instructions in section 2 and install new paper. To resume operation, press ON LINE.

Remote Operation

Preset Operating Conditions

When your printer was shipped from the factory its operating functions were preset to the following:

- Line Spacing: 6 lines per inch
- Form Length: 11 inches
- Columns per Line: 80

Text Mode

This is the normal operating mode for the printer and probably the one you will use most often. When the printer is first turned on it operates in the text mode until instructed to change to the graphics mode.

Control Codes

In text mode, all of the printer functions can be controlled by ASCII (American Standard Code for Information Interchange) codes (see appendix B) transmitted as data to the printer. These codes can be transmitted separately to initialize the printer for a given print job, embedded in the data to be printed, or as a combination of both methods. The control code "escape" allows additional characters to be transmitted as part of the code. The control codes recognized by the HP 82905A Printer are described in the following table. (Appendix C contains a quick reference guide to the control codes.)

Control Codes

Symbol	Key*	Decimal	Name	Description
CR	M^c	13	Carriage Return	Causes all data stored in the print buffer to be printed.
LF	J^c	10	Line Feed	Causes all data stored in the print buffer to be printed and advances the paper one line.
VT	K^c	11	Vertical Tab	Functions the same as LF.
FF	L^c	12	Form Feed	Advances the paper vertically to the next predetermined top of form position. The top-of-form position is determined when the printer is turned ON.
SO	N^c	14	Shift Out	Causes all data that follows it on the same line to be printed as enlarged (doublewidth characters).
DC 4	T^c	20	Device Control 4	Cancels the SO function.
SI	O^c	15	Shift In	Causes all data that follows it to be printed as condensed characters. It is set until it is cancelled (see R^c).
DC 2	R^c	18	Device Control 2	Cancels the SI function and the ESC M function.
BEL	G^c	07	Bell	Causes the buzzer to sound for about one second.
BS	H^c	08	Back Space	Cancels the last data byte in the print buffer.

*Lower case "c" indicates CONTROL key is depressed while typing the letter or symbol. The keys shown are for HP Series 80 computers. If you are using a different computer, check with the manufacturer's literature to determine the correct key for your system.

Escape Sequences

Form Length

Two escape sequences can be used to establish the length of the printing area on a page.

The first sequence specifies the form length by the amount (n) of predetermined line spacing ($1 \leqslant n \leqslant 127$). (When the form length is not programmed by one of the escape sequences, the form length defaults to 66 lines.) The format for this sequence is:

ESC C+n

Note: In this and following escape sequences, the "+" is inserted for legibility only and should not be input during actual operation. The letters "n" or "M" represent a seven-bit binary number. In the case of "ESC C+ 50", the actual output to the printer is (27) (67) (50) in ASCII code (decimal equivalent). Keep in mind that the method of input from the keyboard varies from computer system to computer system. For example, the command to set the form length to 50 lines with an HP Series 80 computer would be:

```
PRINT CHR$(27)&"C"&CHR$(50)
```

The second sequence specifies the form length in inches (M). The range of values for M is $1 \leq M \leq 22$. The format for this escape sequence is:

ESC C+0+M

For example, to set the form length to 2 inches with an HP Series 80 computer, enter the following:

```
PRINT CHR$(27)&"C"&CHR$(0)&CHR$(2)
```

Line Spacing

There are five escape sequences associated with the control of line spacing on the printer.

- The first sequence causes the line spacing to be set at 1/8 inch. It has the following format:

  ESC 0

- The second sequence causes the line spacing to be set at 1/6 inch. This sequence takes the following form:

  ESC 2

- The third sequence specifies the amount of line spacing in the line feed in increments (n) of 1/72 inch. The range of values for n is $1 \leq n \leq 85$. Since vertical spacing between the dot wires on the print head is 1/72 inch, any line spacing in increments proportional to the distance between the dot wires can be established. The sequence has the following format:

  ESC A+n

  This escape sequence merely stores the line spacing data in the printer memory. The printer will then space down the commanded increment when a line feed is received.

- The fourth sequence specifies the amount of skip over perforation by causing a number (n) of lines at the bottom of the form to be left unprinted. The range of values for n is $1 \leq n \leq 127$. Whenever paper is advanced vertically into this area of the form, it is moved to the next top-of-form position. This escape sequence takes the following form:

  ESC N+n

- The fifth sequence cancels the skip-over-perforation specification set by the ESC N+n command. It has the following format:

  ESC O

Columns/Line

This escape sequence sets the columns per line to 96. It can be input at any column position on a line. It has the following format:

ESC M

This command is cancelled by the DC 2 command.

Note: In this mode the printer's closed loop control system is inoperable so print quality may be reduced.

Out-of-Paper Override

There are two escape sequences that operate in conjunction with the out-of-paper detector.

- The first sequence allows data to be transmitted to the printer even though an out-of-paper condition exists. It has the following format:

  ESC 8

  This command functions only if it is sent to the printer before the printer runs out of paper.

- The second sequence cancels the ESC 8 command and takes the following form:

  ESC 9

Graphics Mode

The HP 82905A Printer has a graphics mode that gives you the ability to produce virtually any graphic display using patterns of printed dots under software control. When the graphics mode is invoked, the entire page becomes a matrix of dot positions. The print head can access all dot positions on a page.

The printer utilizes a raster scan technique of producing graphics which produces vertical columns of eight dots across the page during each pass of the print head. Dot patterns are the "image" of the binary equivalent of the ASCII characters transmitted to the printer.

The printer enters the graphics mode when it receives an ESC K or ESC L command. The escape sequence format is as follows:

ESC K + n_1 + n_2

or

ESC L + n_1 + n_2

In this context, "n_1" and "n_2" represent the number of data bytes transferred to the printer in the graphics mode. The number of data bytes is a sixteen-bit binary number; n_1 is the decimal equivalent of the eight low order bits of the number and n_2 is the decimal equivalent of the eight high order bits of the number. For example, to transfer 50 bytes of graphic data to the printer, the command is:

ESC K + 50 + 0 . . .

To transfer 256 bytes of graphic data, the command is:

ESC K + 0 + 1 . . .

If you are using an HP Series 80 computer, you can use the DIV and MOD operators to determine the values of n_1 and n_2. To transfer 50 bytes of graphic data as above, the command is:

```
PRINT CHR$(27)&CHR$(50 MOD 256)&CHR$(50 DIV 256)...
```

Likewise, to transfer 256 bytes of graphic data the command is:

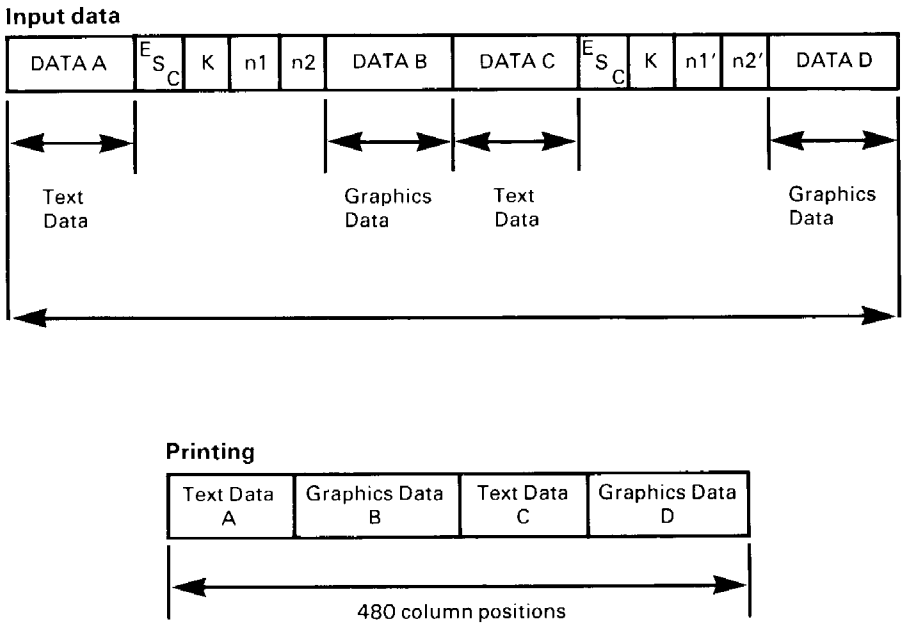
```
PRINT CHR$(27)&CHR$(256 MOD 256)&CHR$(256 DIV 256)...
```

The ESC K sequence specifies the standard graphics mode which has 480 printable dot positions on a line; and the ESC L sequence specifies the double-density graphics mode which can print 960 different positions on a line. The standard and the double-density graphics modes may be mixed on the same line.

CAUTION

Continuous printing of excessively dense graphics may damage the print head.

A simple diagram of a data transfer involving both text and graphics data is shown below:



In order for graphics lines to match vertically (without blank spaces between lines), the spacing should be adjusted using the ESC A + n command. For example, if a graphics print is eight dots high, the line feed amount should be set to 8/72 inch. With an HP Series 80 computer, the appropriate command is:

```
PRINT CHR$(27)&"A"&CHR$(8)
```

Upon completion of the graphics mode printing, the print head stops at the last print column, and the printer automatically returns to the text mode.

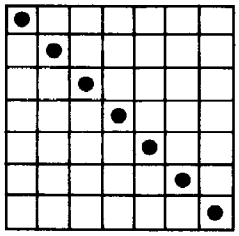
Graphics Print Examples

The first example shows the input from an HP Series 80 computer required to produce the slanted line in the drawing shown under the "output" heading below. In the example, seven data bytes are being transferred in the standard graphics mode.

Input:

```
PRINT CHR$(27)&"K"&CHR$(7)&CHR$(0)&CHR$(64)&CHR$(32)
&CHR$(16)&CHR$(8)&CHR$(4)&CHR$(2)&CHR$(1)
```

Output:

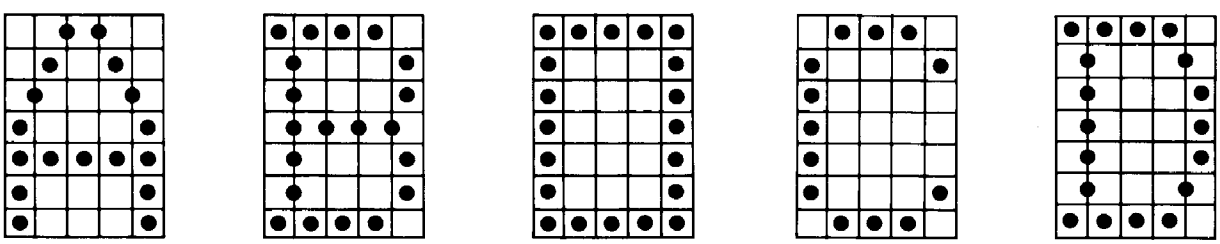


The second example is a short program that illustrates how you can create new letters using the graphics mode. The program prints the letters "AB", prints the new letter (a small box), and then prints the letters "CD":

Input:

```
100 DIM A$[100]
110 A$=CHR$(27)&"K"&CHR$(5)&CHR$(0)&CHR$(254)&CHR$(130)
&CHR$(130)&CHR$(130)&CHR$(254)
120 PRINT "AB";
130 PRINT A$;
140 PRINT "CD"
999 END
```

Output:



Appendix A

Accessories, Maintenance, and Service

Accessories

The following accessories are supplied with each printer:

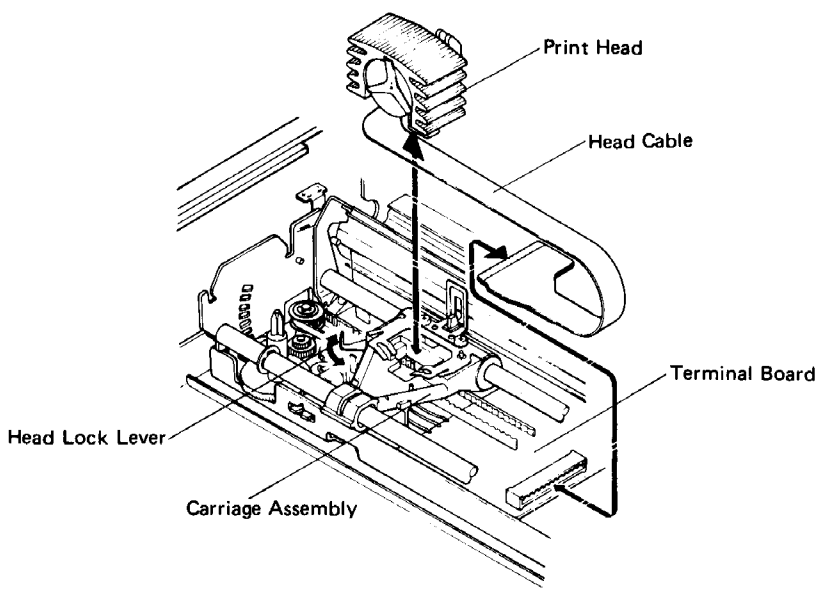
- Power Cord
- Owner's Manual
- Ribbon Cartridge

Maintenance

The HP 82905A Printer doesn't require any regular maintenance other than cleaning of the exterior surface. It should be cleaned with a soft brush to remove paper dust and particles approximately every two months. A mild detergent and water solution is recommended for cleaning.

Parts Replacement

Other than the ribbon cartridge, the printer has only one owner-replaceable part: the print head (HP 95154P).



If, for some reason, the print head must be replaced, use the following procedure:

> **CAUTION**
>
> The carriage assembly should not be moved while the print head is removed from the carriage.

1. Remove the printer lid and ribbon cartridge as described in section 2.
2. Turn the head lock lever clockwise and lift the print head out of the carriage assembly.
3. Carefully remove the cable connecting the print head to the terminal board.
4. Install a new print head on the carriage assembly and return the head lock lever to its original position.
5. Carefully insert the new cable into the terminal board connector.

Service

If at any time you suspect that your printer is malfunctioning (other than the print head), run the self-test (see section 2). The self-test exercises most of the printer mechanical functions and electronics. If the self-test fails, the printer requires service. However if the self-test passes, refer to the service information for your computer system. In the case of a printer that is being used with an HP-83/HP-85 system, refer to the appropriate owner's manual and programming guide for HP-83/HP-85 service and to the *HP 82937A HP-IB Installation and Theory of Operation Manual* for interface service information.

Warranty Information

The complete warranty statement is included in the information packet shipped with your printer. 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 questions concerning the warranty, and you are unable to contact the authorized dealer or the HP sales and service office where you purchased your printer, please contact:

In the U.S.:

Hewlett-Packard
Corvallis Division Customer Support
1000 N.E. Circle Blvd.
Corvallis, OR 97330
Tel. (503) 758-1010
Toll Free Number (6 a.m. to 6 p.m., Pacific Time):
(800) 547-3400 (except in Hawaii and Alaska). In
Nevada call (800) 992-5710.

In Europe:

Hewlett-Packard S.A.
7, rue du Bois-du-Lan
P.O. Box
CH-217 Meyrin 2
Geneva
Switzerland
Tel. (022) 82 70 00

Other Countries:

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

How to Obtain Repair Service

Not all Hewlett-Packard facilities offer service for the HP 82905A Printer. For information on service in your area, contact your nearest authorized HP dealer or the nearest Hewlett-Packard sales and service office.

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:

1. A description of the configuration of the system you were using at the time of failure.
2. A brief description of the malfunction symptoms for the service personnel.
3. Printouts or other material that illustrate the problem area(s).
4. 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 often necessary for tracing and recovery, as well as any insurance claims. Hewlett-Packard does not maintain records of individual owner's 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. If you saved the shipping screws as suggested in section 2, re-install them before shipment. 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 duties are your responsibility.

Potential for Radio/Television Interference

The HP 82905A 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.
- Change 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.

Notes

Appendix B

ASCII Character Set

EQUIVALENT FORMS					EQUIVALENT FORMS					EQUIVALENT FORMS					EQUIVALENT FORMS				
Char.		Binary	ASCII	Dec	Char.		Binary	ASCII	Dec	Char.		Binary	ASCII	Dec	Char.		Binary	ASCII	Dec
◆	@[c]	00000000	NULL	0		SPACE	00100000	space	32			01000000	@	64		KEY LABEL [s]	01100000	`	96
☺	A[c]	00000001	SOH	1	!		00100001	!	33	A		01000001	A	65	a		01100001	a	97
☻	B[c]	00000010	STX	2	"		00100010	"	34	B		01000010	B	66	b		01100010	b	98
♥	C[c]	00000011	ETX	3	#		00100011	#	35	C		01000011	C	67	c		01100011	c	99
♦	D[c]	00000100	EOT	4	$		00100100	$	36	D		01000100	D	68	d		01100100	d	100
♣	E[c]	00000101	ENQ	5	%		00100101	%	37	E		01000101	E	69	e		01100101	e	101
♠	F[c]	00000110	ACK	6	&		00100110	&	38	F		01000110	F	70	f		01100110	f	102
•	G[c]	00000111	BEL	7	'		00100111	'	39	G		01000111	G	71	g		01100111	g	103
◘	H[c]	00001000	BS	8	(		00101000	(	40	H		01001000	H	72	h		01101000	h	104
○	I[c]	00001001	HT	9	)		00101001	)	41	I		01001001	I	73	i		01101001	i	105
◙	J[c]	00001010	LF	10	*		00101010	*	42	J		01001010	J	74	j		01101010	j	106
♂	K[c]	00001011	VT	11	+		00101011	+	43	K		01001011	K	75	k		01101011	k	107
♀	L[c]	00001100	FF	12	,		00101100	,	44	L		01001100	L	76	l		01101100	l	108
♪	M[c]	00001101	CR	13	-		00101101	-	45	M		01001101	M	77	m		01101101	m	109
♫	N[c]	00001110	SO	14	.		00101110	.	46	N		01001110	N	78	n		01101110	n	110
☼	O[c]	00001111	SI	15	/		00101111	/	47	O		01001111	O	79	o		01101111	o	111
►	P[c]	00010000	DLE	16	0		00110000	0	48	P		01010000	P	80	p		01110000	p	112
◄	Q[c]	00010001	DC1	17	1		00110001	1	49	Q		01010001	Q	81	q		01110001	q	113
↕	R[c]	00010010	DC2	18	2		00110010	2	50	R		01010010	R	82	r		01110010	r	114
‼	S[c]	00010011	DC3	19	3		00110011	3	51	S		01010011	S	83	s		01110011	s	115
¶	T[c]	00010100	DC4	20	4		00110100	4	52	T		01010100	T	84	t		01110100	t	116
§	U[c]	00010101	NAK	21	5		00110101	5	53	U		01010101	U	85	u		01110101	u	117
▬	V[c]	00010110	SYNC	22	6		00110110	6	54	V		01010110	V	86	v		01110110	v	118
↨	W[c]	00010111	ETB	23	7		00110111	7	55	W		01010111	W	87	w		01110111	w	119
↑	X[c]	00011000	CAN	24	8		00111000	8	56	X		01011000	X	88	x		01111000	x	120
↓	Y[c]	00011001	EM	25	9		00111001	9	57	Y		01011001	Y	89	y		01111001	y	121
→	Z[c]	00011010	SUB	26	:		00111010	:	58	Z		01011010	Z	90	z		01111010	z	122
←	[[c]	00011011	ESC	27	;		00111011	;	59	[		01011011	[	91	{	/ [s]	01111011	[	123
∟	\[c]	00011100	FS	28	<		00111100	<	60	\		01011100	/	92	|		01111100	|	124
↔	][c]	00011101	GS	29	=		00111101	=	61	]		01011101	]	93	}	- [s]	01111101	]	125
▲	^[c]	00011110	RS	30	>		00111110	>	62	^		01011110	<	94	~	* [s]	01111110	~	126
▼	_[c]	00011111	US	31	?		00111111	?	63	_		01011111	—	95		+ [s]	01111111	DEL	127

Appendix C

Control Code Reference Tables

Control Codes

Description	Function	Symbol	Control Code
Carriage Control			
Print all data stored in the print buffer.	Carriage Return	CR	M[c]
Print all data stored in the print buffer and advance the paper one line.	Line Feed or Vertical Tab	LF VT	J[c] K[c]
Advance paper to the next top of form.	Form Feed	FF	L[c]
Cancel the last byte in the print buffer.	Back Space	BS	H[c]
Character Size			
Initiate doublewidth printing.	Shift Out	SO	N[c]
Cancel doublewidth printing.	Device Control 4	DC4	T[c]
Character Size			
Initiate condensed printing.	Shift In	SI	O[c]
Cancel condensed printing and ESC M.	Device Control 2	DC2	R[c]
Miscellaneous			
Sound the buzzer.	Bell	BEL	G[c]

*Lower case "c" indicates CONTROL key is depressed while typing the letter or symbol. The keys shown are for HP Series 80 computers. If you are using a different computer, check with the manufacturer's literature to determine the correct key for your system.

Escape Sequences

Description	Sequence
Form Length	
Specify form length by the number (n) of lines.	ESC C + n ($1 \leqslant n \leqslant 127$)
Specify form length in inches (M).	ESC C + 0 + M ($1 \leqslant M \leqslant 22$)
Line Spacing	
Set line spacing to 1/8 inch.	ESC 0
Set line spacing to 1/6 inch.	ESC 2
Specify line spacing by increments (n) of 1/72 inch.	ESC A + n ($1 \leqslant n \leqslant 85$)
Columns/Line	
Sets column/line to 96.	ESC M
Graphics	
Invoke graphics mode.	ESC K + n_1 + n_2
Invoke dual-density graphics mode.	ESC L + n_1 + n_2
Miscellaneous	
Skip n lines at the bottom of the form.	ESC N + n ($1 \leqslant n \leqslant 127$)
Cancel ESC N + n.	ESC O
Override out-of-paper condition.	ESC 8
Cancel ESC 8.	ESC 9

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