

2930 Series Printers

Owner's Manual



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LIST OF EFFECTIVE PAGES

The List of Effective Pages gives the date of the most recent version of each page in the manual. To verify that your manual contains the most current information, check the dates printed at the bottom of each page with those listed below. The date on the bottom of each page reflects the edition or subsequent update in which that page was printed.

Effective Pages	Date
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READ THIS FIRST ...

This manual contains material often found in two types of manuals: owner's/operator's, and reference. Because of the wide breadth of information this manual covers, each section was written to address the needs of a specific audience: the operator (clerk, secretary, word processor); the installer (the person who will actually be hooking up the printer to its host) and the system designer.

SECTION 1 contains routine operating information that is useful to the operator, the installer, and the systems designer.

SECTIONS 2 and 3 contain installation information that is useful to the installer and the system designer.

SECTION 4 contains information that is useful to the system designer.

SECTION 5 contains information that is helpful to all users.

SECTION 6 is the Appendix.

Consult the TABLE OF CONTENTS for specific topics covered under each section.

An Operator's Guide, which provides illustrated instructions on basic printer features such as loading paper, changing the ribbon, and use of the keypad, also has been supplied. The Operator's Guide should be kept with the printer at all times for quick reference.

**INTERFACE
CABLE
CONNECTOR**



**CHARACTER
CARTRIDGE SLOTS
(2933/34A)**

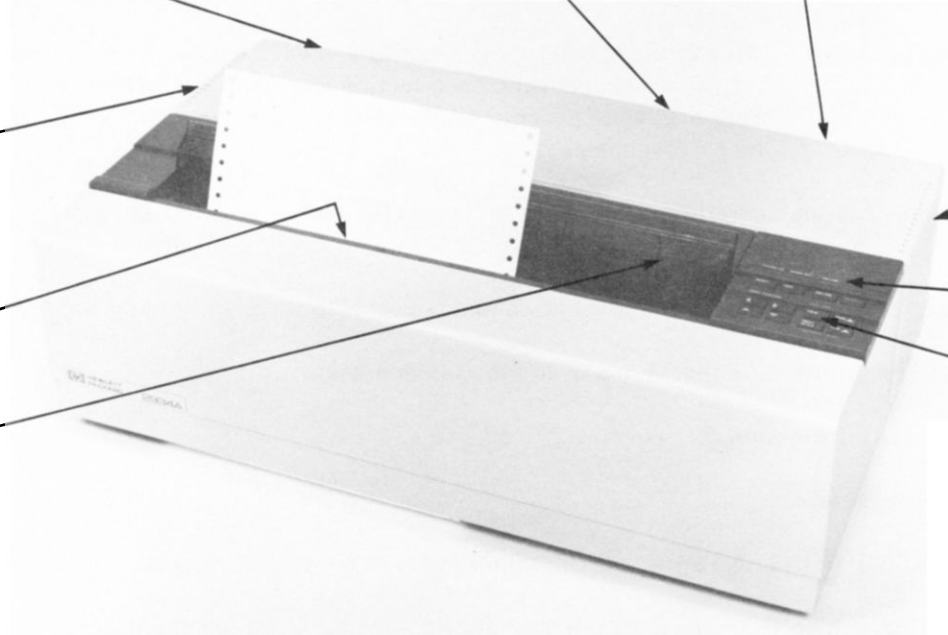
**ON/OFF SWITCH
FUSE BOX
POWER CORD**



**VENTILATION
GRILL**

**PAPER
SCALE**

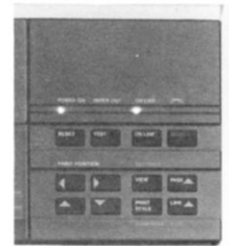
**PAPER
WINDOW**



**VENTILATION
GRILL**

**INDICATOR
LIGHTS**

KEYPAD



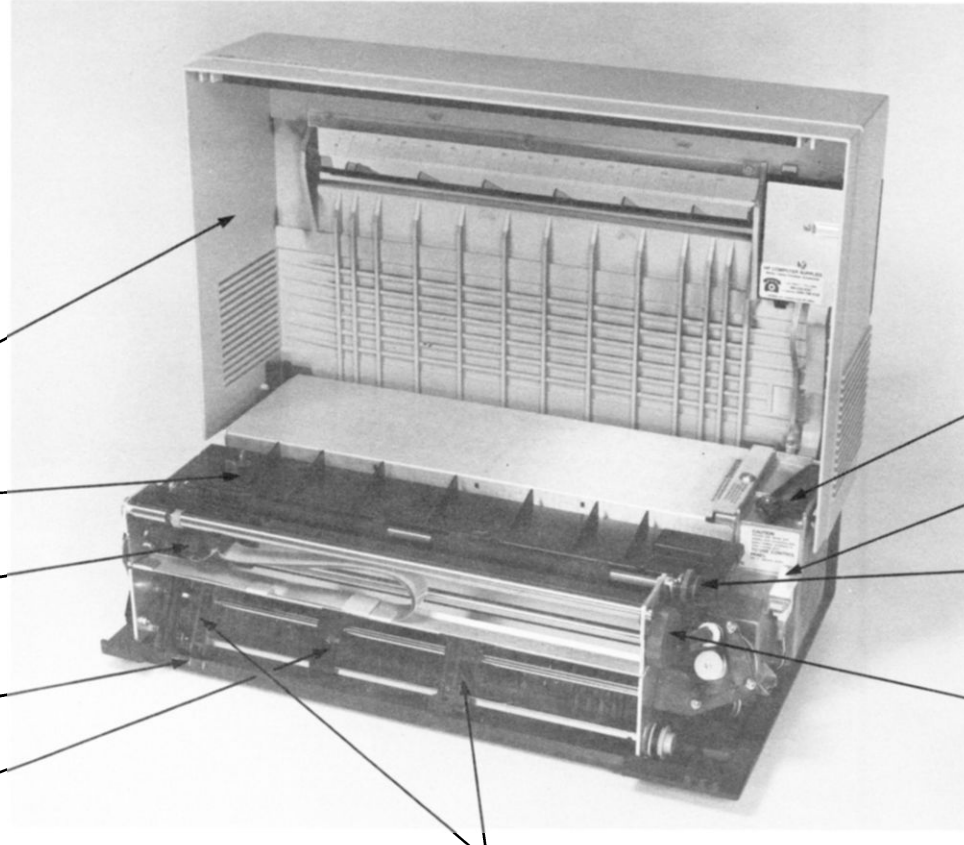
**TOP
COVER**

**RIBBON
CARTRIDGE**

**PRINT
HEAD**

**PAPER
EDGE
LINE**

**PAPER
GUIDE**



**COVER
LATCH**

**SAFETY
SWITCH**

**MANUAL
PAPER
ADVANCE
KNOB**

**PRINT
HEAD
ADJUSTMENT
KNOB**

**TRACTOR
FEED**

INTRODUCTION

MEET THE 2930 SERIES PRINTERS

and congratulate yourself for purchasing a Hewlett-Packard product. 2930 Series printers offer 200 character-per-second (cps) bidirectional printing, last-form tear off, programmable page and text length, easy forms handling, and many other features.

The 2932A general purpose printer offers the standard 2930 Series features: fast, high-quality 136-column impact printing, simplicity of operation, graphics capacity, and a strong set of transaction and technical printing features. The 2932A will easily meet single-user and distributed printing needs.

The 2933A factory data printer offers bar code and large character generation as standard features, in addition to the standard 2930 Series features described above. Simplicity of operation, graphics, bar codes, and long distance interface options allow this printer to meet the remote and distributed printing needs of manufacturing systems.

The 2934A office printer offers memo-quality printing at 200 cps, letter-quality printing at 67 cps, and increased letter-quality printing at 40 cps. The 2934A offers the standard 2930 Series features, plus all of the features of the 2933A. These attributes, along with many word processing features, allow this printer to meet the needs of personal and small business systems that require speed and flexibility.

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GETTING STARTED



WELCOME

You are probably anxious to get started using your new Hewlett-Packard printer, but there are a few things that you should do before proceeding any further.

- Check that the following items were shipped along with the printer:
 - Power cord
 - Owner's Manual
 - Operator's Guide
 - Ribbon
 - Fuses, fuse clips, voltage selector drum, and a key for opening the fuse box (in the bag attached to power cord)
 - Courier 10 Character Cartridge (2934A) (installed in printer)
- If any of these items are missing contact your HP sales and support representative.
- Unpack your printer and place it on a sturdy surface. Make sure that the ventilation grills on the printer's sides are not blocked.

Once the printer is set up, these steps must be followed:

1. Install the fuse, set the voltage selector drum to the proper voltage and install it in the fuse box. Make sure that the power switch is OFF before installing the fuse and drum.
2. Connect the power cord.
3. Connect the printer to the host.
4. Install the ribbon.
5. Load paper, forms, or cardstock.
6. Adjust the print head gap.
7. Run the self test.

Instructions on the following pages will help you accomplish these steps. The self test will provide you with a printing sample, as well as assure you that your printer is operating properly.

PRINTER POWER

Fuses and Voltage

The fuse box is located on the printer's rear panel (left side as viewed from the back). Two fuses, two fuse clips, a voltage selector drum, and a key for opening the fuse box were shipped in a plastic bag attached to the printer's power cord. Fuses must be installed in accordance with your area's voltage requirements before turning the printer on.

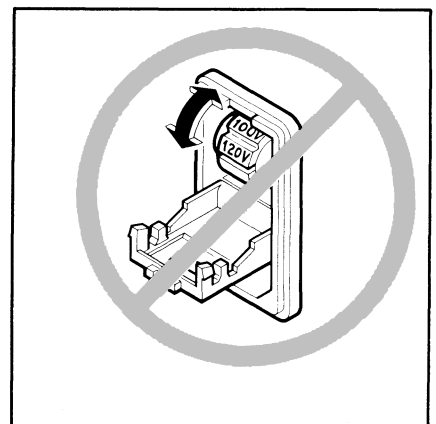
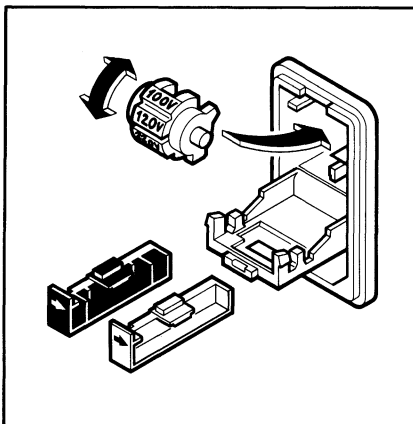
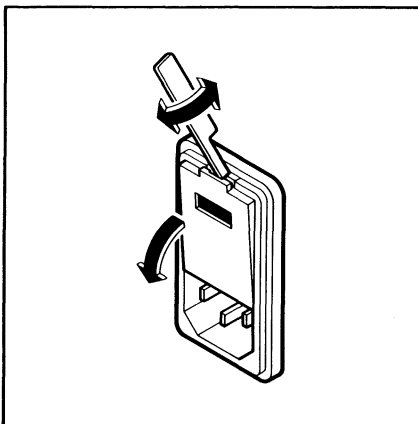
VOLTAGE SETTING

The voltage selector drum offers the option of 100, 120, 220, or 240 volt operation. These settings are marked on the drum.

1. Open the fuse box door with the key provided, or a small bit screwdriver.
2. REMOVE and rotate the voltage selector drum to the setting that corresponds to your area's voltage requirements.
3. Install the drum in the fuse box so that the selected voltage setting is visible through the window in the door when it is closed. **Do not rotate the drum after it is installed.**

WARNING

INCORRECT VOLTAGE SETTINGS OR FUSE MAY CAUSE DAMAGE TO THE PRINTER. READ AND FOLLOW ALL INSTRUCTIONS CAREFULLY.



FUSE SELECTION

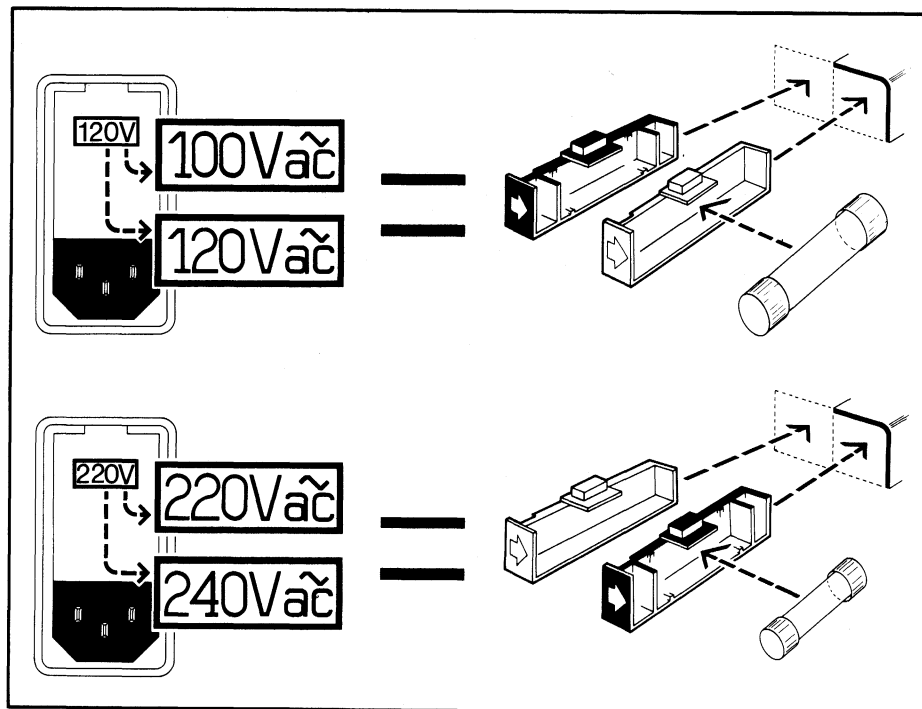
Your printer will accommodate two ratings of fuses, the 4 amp and the 3.15 amp. The 4 amp, 250V, 3AG style fuse is required for 100V and 120V operation. The 3.15 amp, 250V, 5 X 20mm European style fuse is required for 220V and 240V operation. Each fuse fits one fuse clip.

The correct fuse for your printer depends on the voltage requirements for your area. Fuse rating requirements are printed on the product rating label on the back of the printer.

1. Select the appropriate fuse and fuse clip for your voltage setting.
2. Put the selected fuse in the correct clip and slide the clip in the right-hand slot.
3. Make sure that the arrow on the fuse clip points in the same direction as those on the fuse box door.
4. Put the unused fuse clip in the left-hand slot.
5. Close the door.

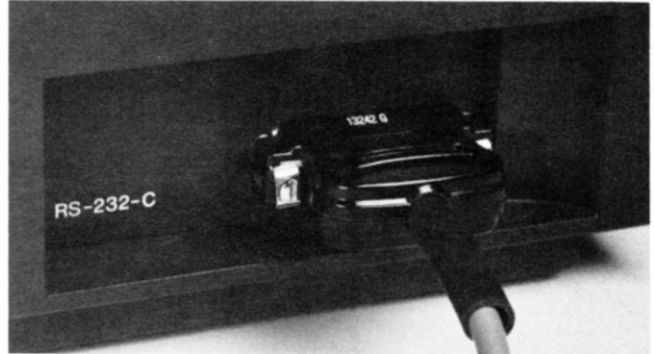
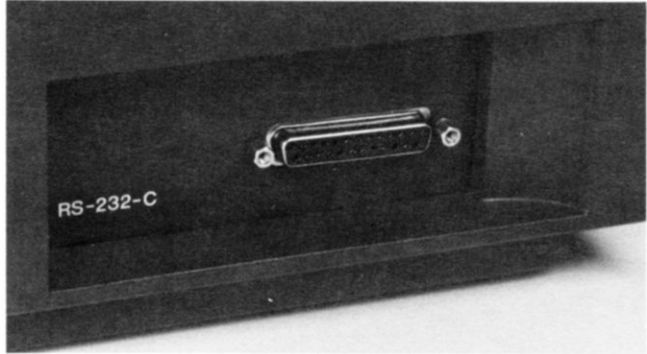
CAUTION

WHEN REPLACING A FUSE, MAKE SURE THAT IT IS REPLACED WITH ONE OF THE SAME TYPE (SIZE) AND RATING (AMPS), AND THAT THE VOLTAGE SELECTOR DRUM IS SET TO THE PROPER SETTING.



Interface Cable (HP-IB and Serial Interface cables not included)

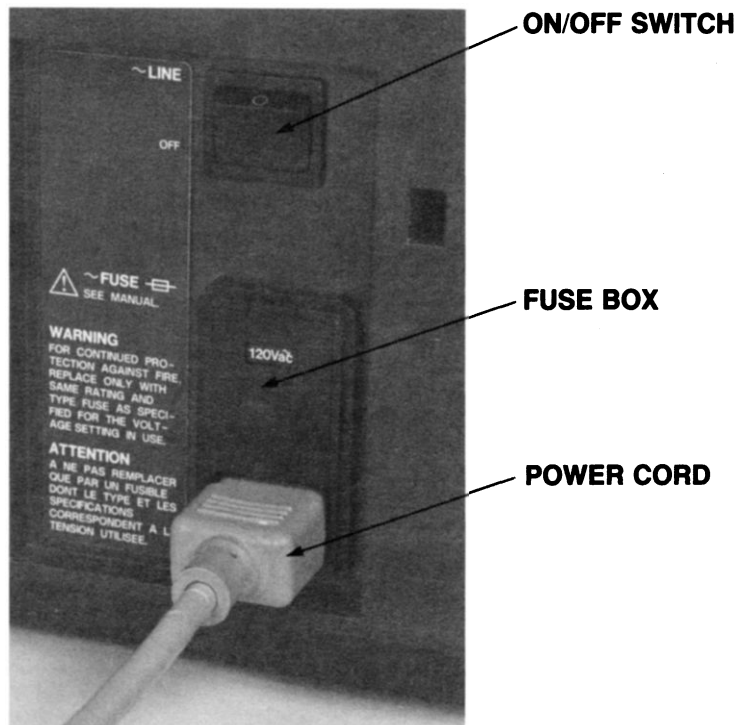
Connect the interface cable between the host and the printer to the connector on the printer's rear panel (right side as viewed from the back). Each interface cable is supplied with a fastener to ensure a good connection between the cable and printer.



RS-232-C interface cable shown for example.

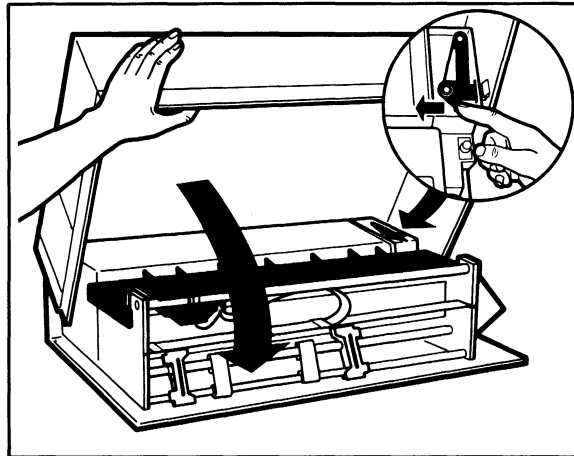
The Power Cord

Plug the power cord into the power receptacle on the printer's rear panel, (left side as viewed from the back) then into the wall outlet. Do not turn the printer on until you have made sure that the voltage selector drum matches your area's voltage requirements.



CAUTION

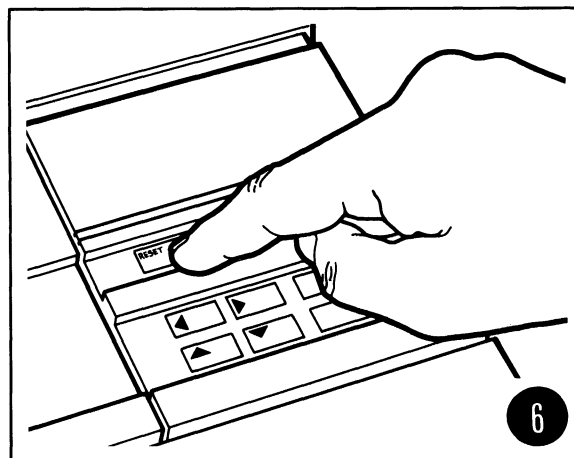
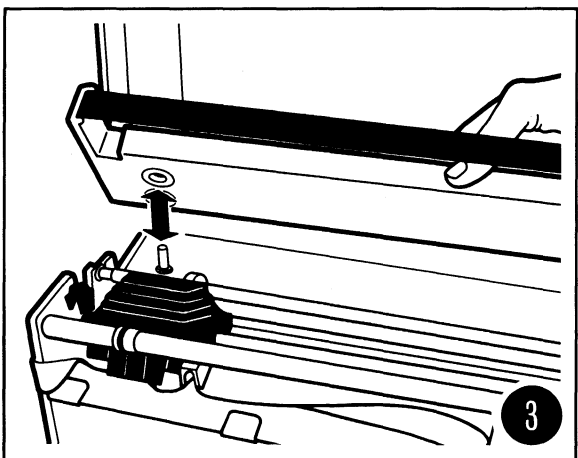
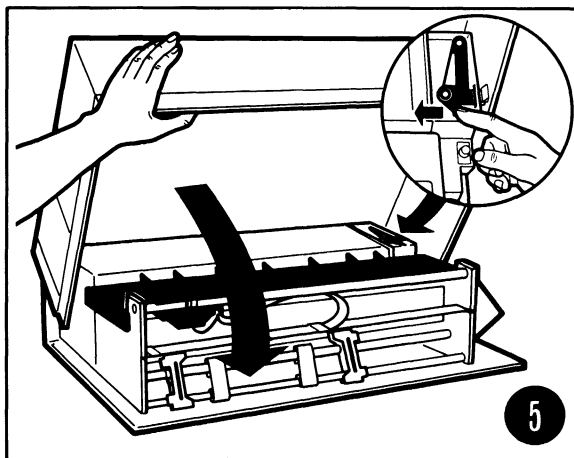
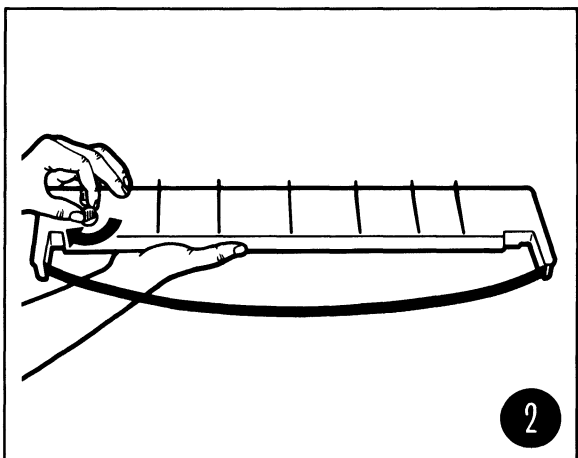
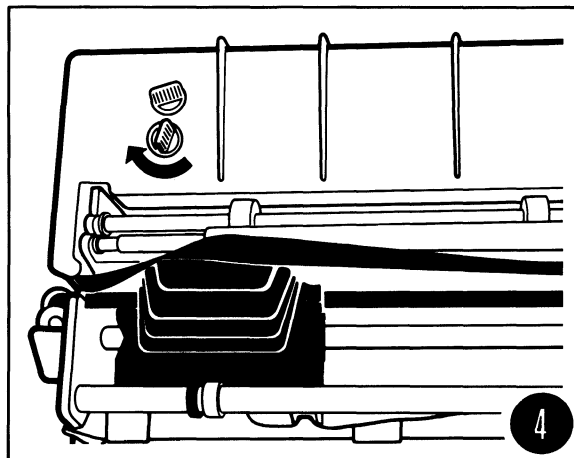
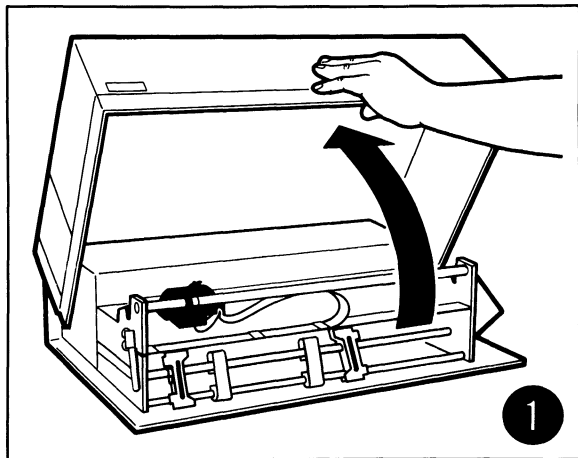
OPEN THE PRINTER'S COVER AND REMOVE THE CARDBOARD PACKING BEFORE TURNING ON THE PRINTER. CLOSE COVER WHEN DONE.



On/Off Switch

The power switch is located on the printer's rear panel (left side as viewed from the back). See previous page. To turn the printer ON rock the switch to ~ LINE. Don't be alarmed! When the printer is turned ON it will beep, the print head will sweep across the track, and the indicator lights on the keypad will flash.

Getting Started



READY!

INSTALLING THE RIBBON

1. Unpack the ribbon.
2. Turn on the printer and open the cover. (Illustration 1)
3. If there is any slack in the ribbon turn one of the green take-up knobs on the ribbon cartridge in the direction indicated by the arrows. (Illustration 2)
4. Align the hole in the bottom-left of the cartridge with the ribbon motor shaft. (Illustration 3) Do not move the print head.
5. Turn the take-up knob in the direction of the arrows until the cartridge slips down onto the shaft. (Illustration 4)
6. The ribbon may be twisted slightly with a portion of it resting face down on top of the print head. (Illustration 4) This is normal. (If the ribbon is twisted other than the way shown in illustration 4 it will not load. The ribbon cartridge should be removed and reinstalled.) Do not try to push the ribbon down into the ribbon path.
7. Close the printer cover, (Illustration 5) and press **RESET** twice. (Illustration 6). The print head will sweep across the track. (The printer will beep when **RESET** is pressed.) The ribbon will automatically load.
8. Check the print quality daily. When printing begins to lighten the ribbon should be changed.

NOTE

Because stopping the printer to change ribbons will cause loss of data waiting to be printed (a function of the **RESET** key), the condition of the ribbon should be checked before starting each printing job.

PRINT HEAD GAP ADJUSTMENT

The print head gap adjustment knob is located inside the printer, on the right hand side (as viewed from the front).

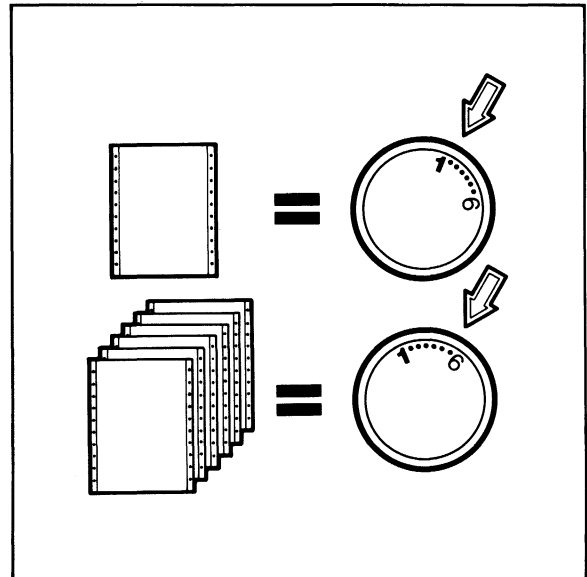
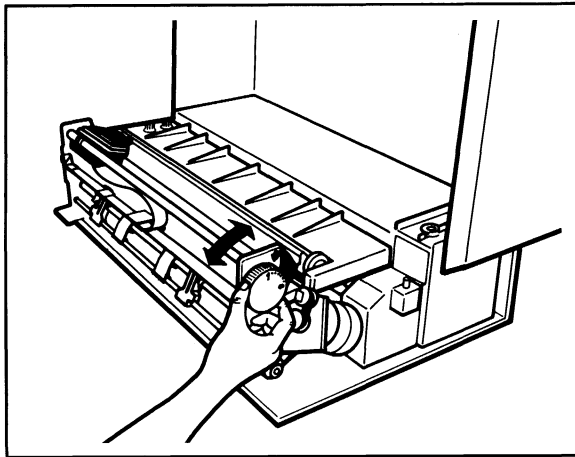
The print head gap adjustment knob is used to lighten or darken print and to adjust the print head so that the printer can accommodate up to six part forms. As the knob is turned the print head moves closer to, or further from, the printing surface. Thus, the numbers on the knob are used as relative indicators of form thickness: multipart forms require a wider gap between the print head and the printing surface (6), than does a single part form (1).

To adjust the print head gap:

1. For one-part forms set the gap adjustment knob to the first dot (nearest 1).
2. For six-part forms set the gap adjustment knob to the last dot (nearest 6).
3. Because forms can vary in thickness, you may occasionally need to adjust the printhead gap a few stops.

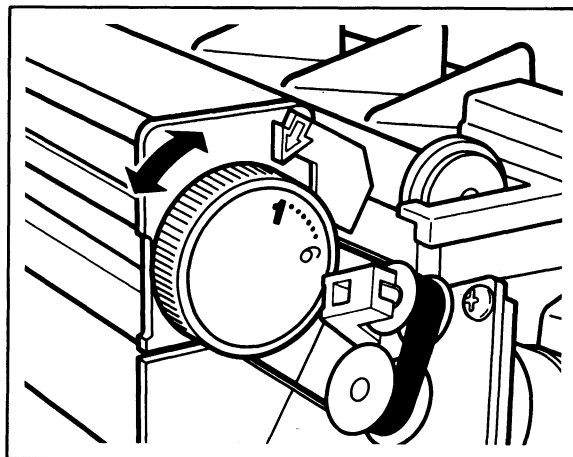
NOTE

Too narrow of a print head gap can cause the paper and ribbon to jam.



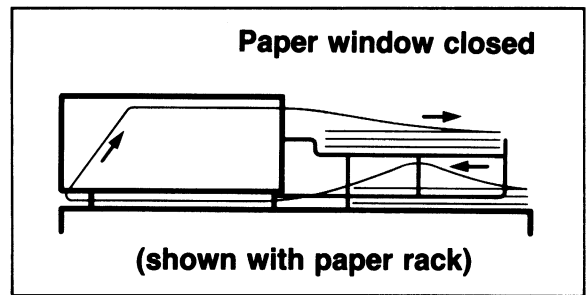
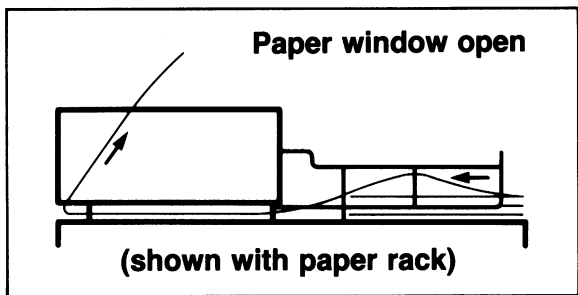
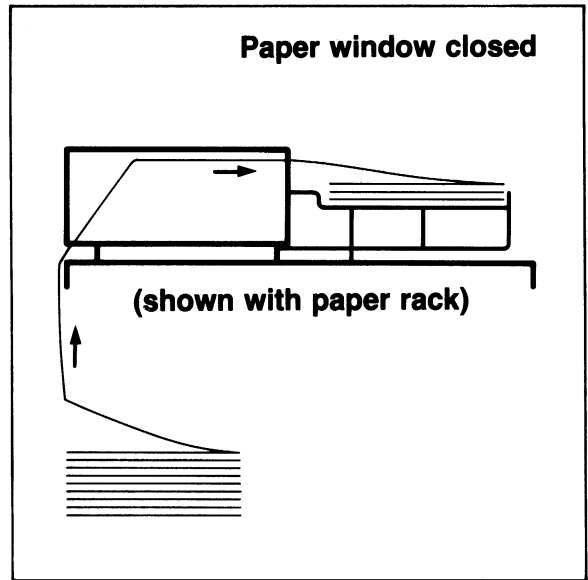
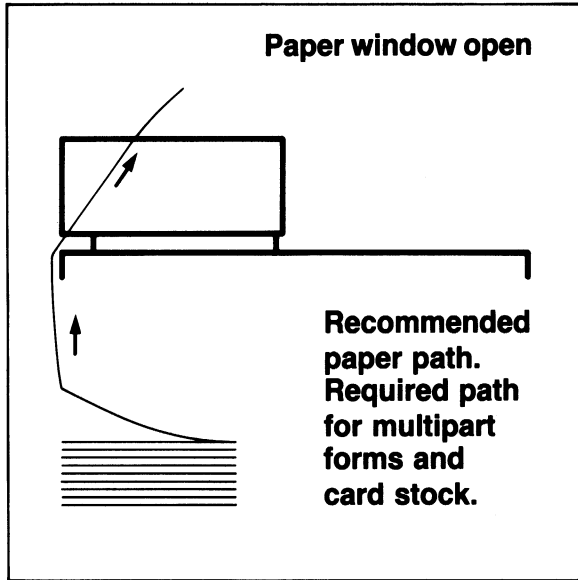
When loading multipart forms:

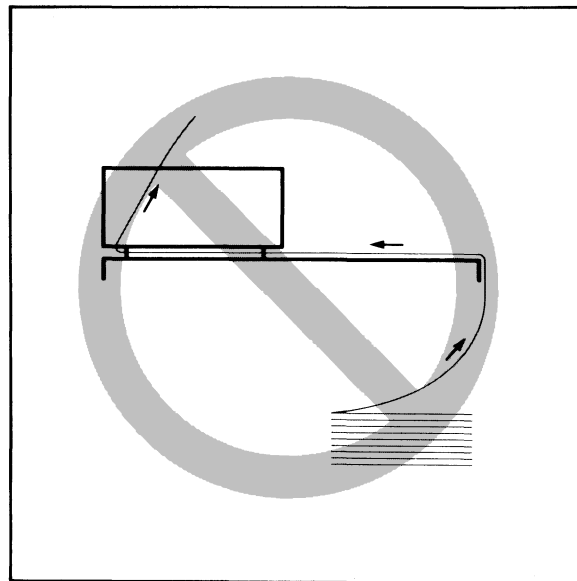
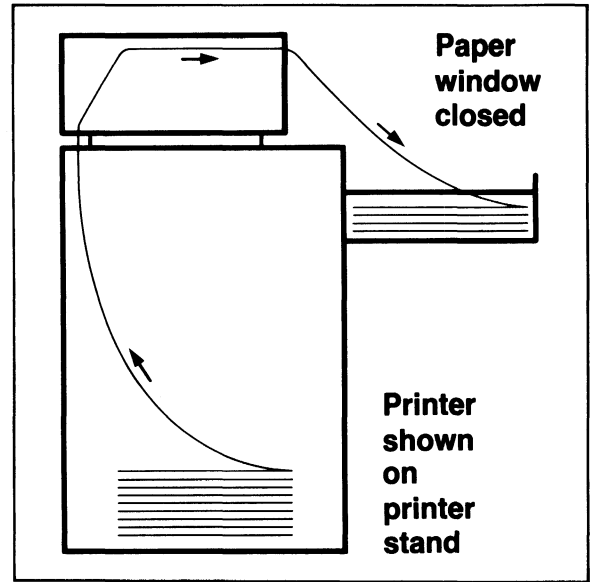
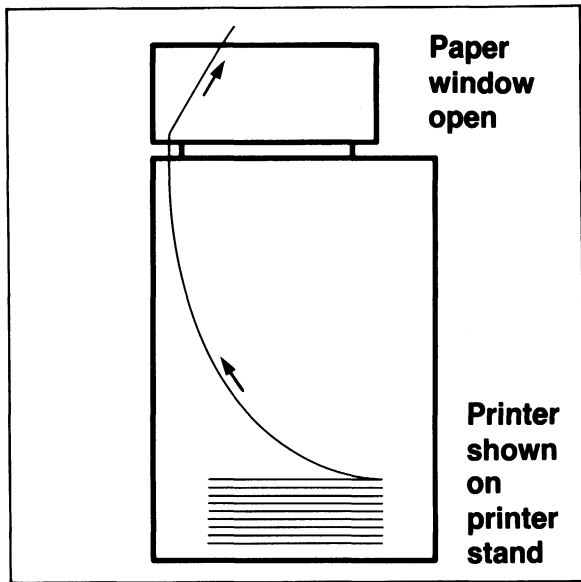
1. Turn the adjustment knob to the dot that corresponds to number of parts in the form you are using.
2. Load the form per instructions on page 1-13.
3. Run the printer's self test (described on page 1-18) to verify that the adjustment knob is set to produce the desired results.



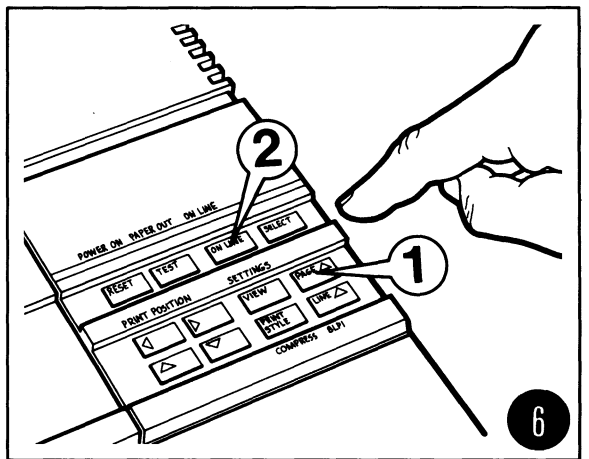
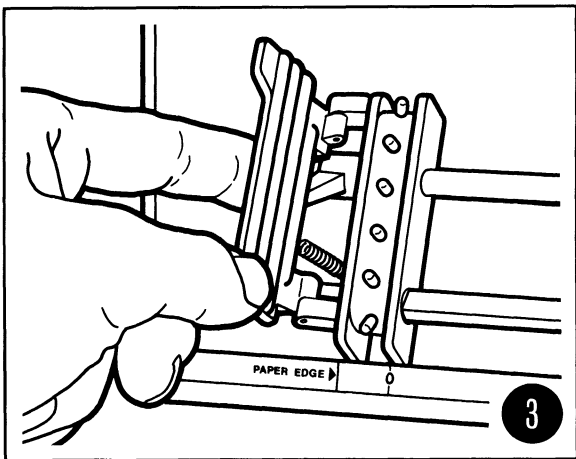
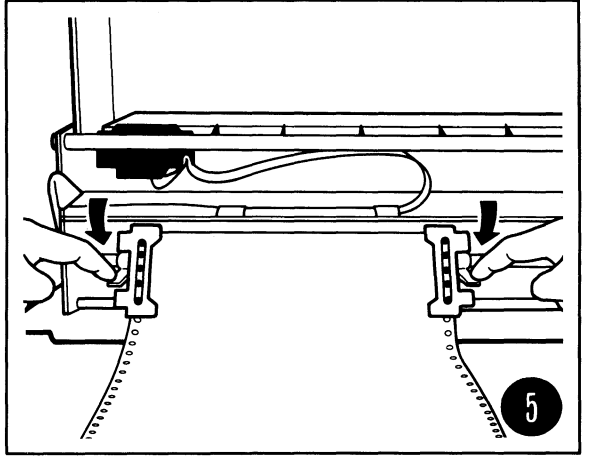
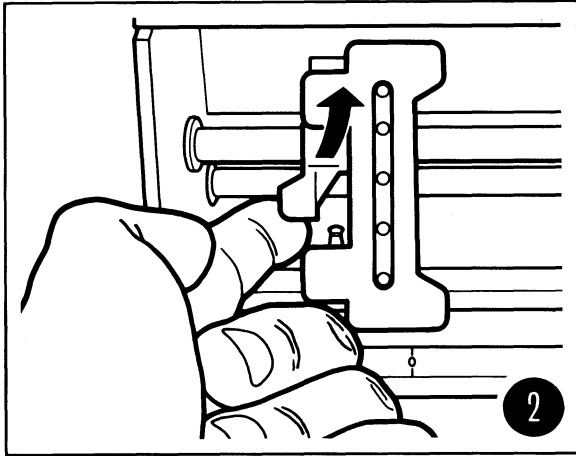
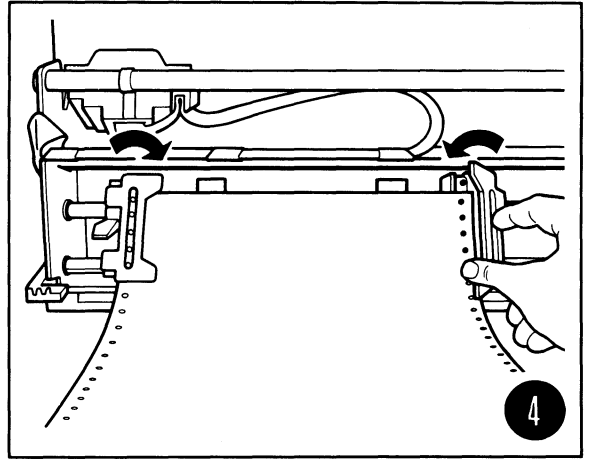
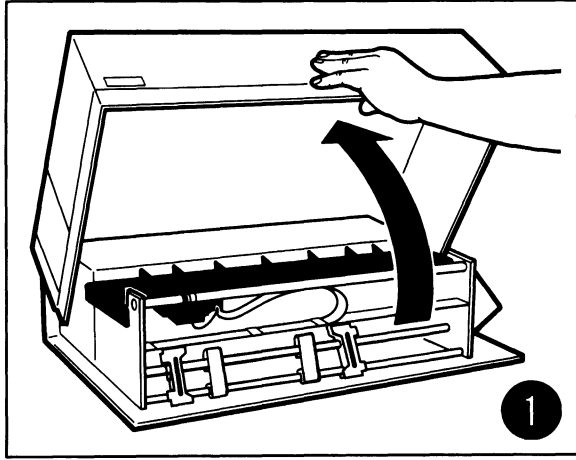
PAPER LOADING PATHS

Your printer can accommodate the following paper paths (indicated by arrows):





Getting Started





LOADING PAPER

See Print Head Gap Adjustment, page 1-8 before loading paper.

NOTE

When the printer is first turned on, the print head will sweep across the track, the PAPER OUT indicator light will blink (until paper is loaded), and the printer will beep for approximately 1 second (the beeping is a paper-out warning). In addition, the rollers on the 2933A and 2934A printers will turn several times.

1. Turn on the printer and open the printer cover. (Illustration 1)
2. Unlock the tractor feeds (Illustration 2) and open the tractor feed gates (Illustration 3).
3. Move the paper guide to the approximate middle of the paper that will be used.
4. Engage the paper in the tractors and close the gates. (Illustration 4) Do not load paper past the top pin on the tractor feeds.
5. Position the tractors so that the left edge of the paper lines up with the Paper Edge line on the printer's base. Lock the left tractor feed in place. (Illustration 5)
6. Adjust the right tractor to the right or left to put the proper tension on the paper. The paper should be taut enough that it will not wrinkle as the print head moves across it, but not so taut that the paper tears around the tractor feed pins as the print head strikes it. Lock the right tractor feed in place. (Illustration 5)
7. Close the cover. (See Illustration, page 1-5)
8. Open or close the paper window as necessary for the paper path you have chosen (see preceding pages for paper path options).
9. Press the  key. (Illustration 6) Paper edge will advance to the paper window.
10. Press the  key. (Illustration 6)

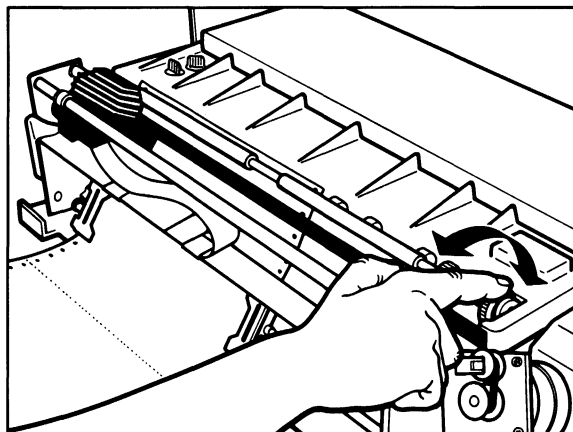
MULTIPART FORMS



To load multi-part forms:

1. See Print Head Gap Adjustment, page 1-6.
2. Complete steps 1-6 above.

Getting Started

3. Locate the manual paper advance knob (green thumb knob) on the right end of the carriage. (See illustration)

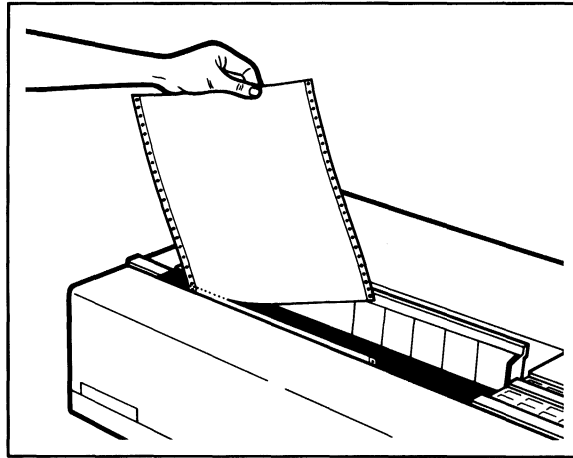


4. Advance the knob until the top edge of the form is even with the pressure rollers.
5. Close the printer's cover.
6. Open the paper window so that the forms can exit through the top of the printer.
7. Press the **ON LINE** key.
8. Use the  and  keys to further position the form for printing.

Setting Top-of-Form (and Last-Form-Tear-Off)




Setting top-of-form at the paper's perforation allows you to take advantage of last-form-tear-off. Last-form-tear-off lets you tear off perforated paper and forms cleanly at the perforation. To set the top-of-form at the perforation:

1. Follow instructions 1-9 for loading paper.
2. The TOF is set.
3. Press the **ON LINE** key.








For most applications setting TOF at the perforation is acceptable; however, other TOF positions may be set.

To set the TOF at 1/2 inch below the perforation:






1. Follow instructions 1-9 for loading paper.
2. Press **PAGE**  to advance the paper one page length.
3. Press the **VIEW** key.
4. Press the  and  keys until the paper perforation (or paper edge) aligns with the "1/2" mark on the paper window. (Paper windows on early models do not have the "1/2" and "0" marks.)
5. TOF is set at 1/2 inch below the perforation.
6. Press the **ON LINE** key.

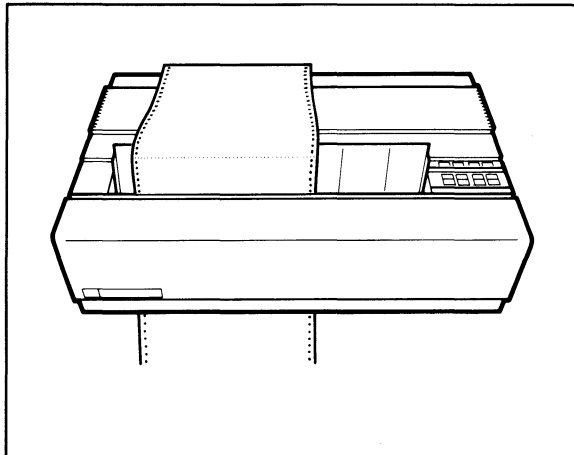
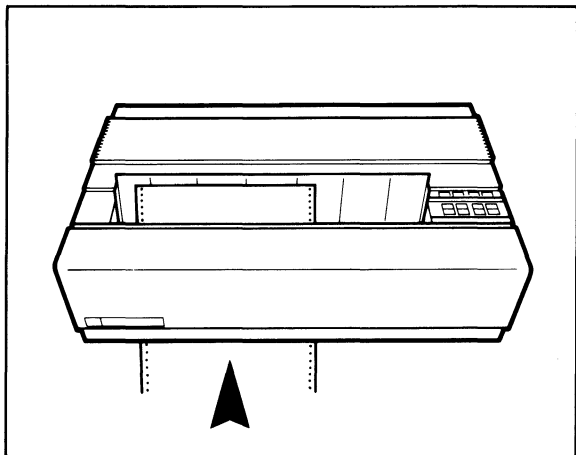
Getting Started

To set TOF at the first line below the perforation:


1. Follow instructions 1-9 for loading paper.
2. Press **PAGE**  to advance the paper one page length.
3. Press the **VIEW**  key.
4. Press the  and  keys until the perforation aligns with the "0" (zero) mark on the paper window.
5. TOF is now set at the first line below the perforation.
6. Press the **ON LINE**  key.

To set the TOF at any other position:

1. Follow instructions 1-9 for loading paper.
2. Press **PAGE**  to advance paper one page length.
3. Press the **VIEW**  key.
4. Press  or  keys until the line you wish printing to begin on aligns with the "0" (zero) mark on the paper window.
5. TOF is now set.
6. Press the **ON LINE**  key.





Recovering From Paper-Out During Printing

1. Follow instructions 1-9 for loading paper. Do not turn the printer off.
2. TOF is set at the position defined prior to the paper out.
3. Press the **ON LINE**  key. Printing will resume.



HAVING PROBLEMS WITH PAPER LOADING? CHECK SECTION 5 OF THIS MANUAL.





SET!

ESTABLISHING PRINT MARGINS

The printer begins printing at the left margin. When paper or forms are loaded in the printer it may be necessary to adjust the margin to line up with specific line, boxes, etc. on a form. This adjustment is done with the  and  keys.

NOTE

Once paper is loaded in the printer it cannot be physically adjusted from side to side, the print head is adjusted instead. Use the  and  keys to do the sideways adjustment.

1. To establish the position of the first printable character, press  for a short time. The print head will move quickly to the right, then move gradually as the key is pressed further.
2. Use the  and  keys to move the print head to the left or right until the yellow arrow on the top of the print head aligns with the desired column as indicated on the paper scale (on the printer's cover).
3. No further adjustments are required once the desired starting position is determined; however, these positions are "volatile". This means that when the printer is turned OFF or  is pressed twice these positions will be lost. Non-volatile margins are set through the printer's SETTINGS Mode. This is discussed in Section 2, Configuring Printer and Host.

NOTE

Do not attempt to align the print head by manually moving it. Doing so will effect the left-most printing position.

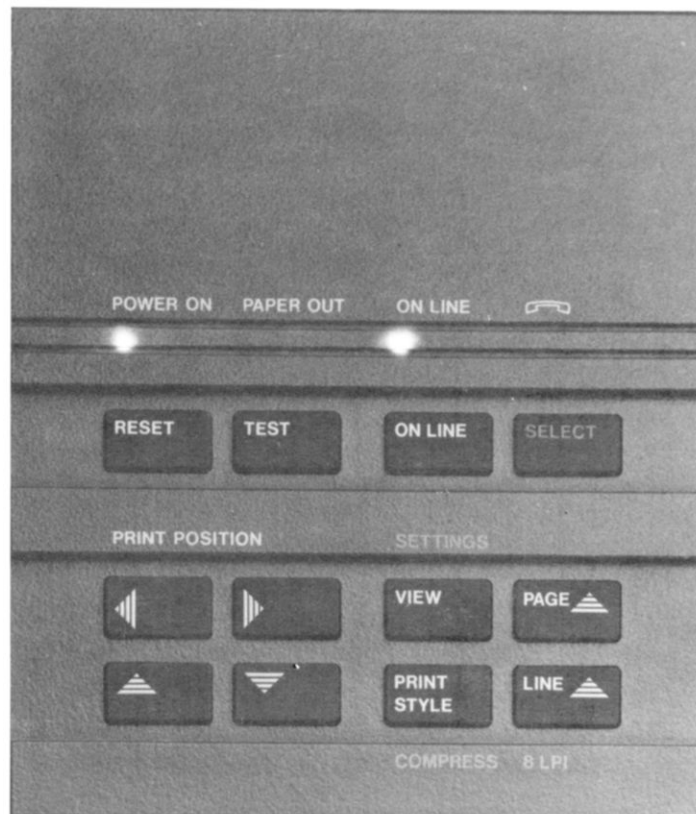
GO!

PRINTER SELF TEST:

1. Turn the printer on.
2. Press **TEST** once to perform the printer's internal self test. "SELF TEST PASSED" will print if the self test is passed. (If the self test is failed, "SELF TEST FAILED" will print. See Section 5 if the self test fails.)
3. The printer will automatically advance the paper to display the test results.
4. Use the printed test result to gauge density of the print. Adjust the print head gap knob, as described earlier, to lighten or darken the print as needed.

THE KEYPAD

There are twelve keys and four indicator lights on the keypad. They are described on the next page.



INDICATOR LIGHTS

1. The POWER ON light indicates that the printer is plugged in and turned on.
2. The blinking PAPER OUT light indicates that the printer is out of paper, or that the printer cover is ajar.
3. The ONLINE light indicates that the printer is ready to print.
4. The light under the telephone symbol indicates to the modem user that telephone charges are being incurred.

THE KEYPAD

Keypad keys fall into four categories: Printer Control keys, Print Position keys, Paper Control keys, and Feature keys.

Printer Control Keys:

RESET is pressed twice to do a "hard" reset. When a hard reset is performed all data waiting to print will be lost.

TEST is used to run the printer's self test, and to access the printer's test menu. When **TEST** is pressed once the printer will perform its self test. When **SELECT** is pressed, then **TEST** is pressed a test menu will print out. The Test menu is discussed in Section 5.

ON LINE (OFFLINE) is used to put the printer on-line (ready to print) or off-line (not ready to print, pause). For example, when the printer's cover is opened the printer will go off-line. To put the printer back on-line, press **ON LINE**. **ON LINE** is also used to put the printer off-line to stop printing.

SELECT is used in conjunction with other keys to select printer features.

VIEW is used to advance the paper so that the last few lines printed can be viewed. The paper will return to its former printing position when printing is resumed, or when **VIEW** is pressed again. **VIEW** is also used in conjunction with **SELECT** to enter the SETTINGS mode (discussed later), and when setting TOF.

PRINT STYLE - 2932A: Lets the user switch between two print styles, Cubic and Courier. If the printer is using the Cubic print style and **PRINT STYLE** is pressed, the current print style will change to Courier. The printer will continue to print in Courier until **PRINT STYLE** is pressed again, or the printer is turned off.

PRINT STYLE - 2933/34A: These two printers use character cartridges which contain various print styles and print speeds in addition to the Cubic and Courier print styles standard with the 2930 Series printers. The five indicators on the printer's cover correspond to the printer's standard print styles (STD) and the character cartridge slots on the printer's rear panel (1, 2, 3, 4). When **PRINT STYLE** is pressed the print head will move to the right and stop under the active style. If the print head stops under STD and **SELECT** is pressed the Cubic print style is selected. If **PRINT STYLE** is pressed the print head will move about 1/4 inch to the right under the Courier print style position. Pressing **SELECT** will select the Courier print style. To select a character cartridge press **PRINT STYLE** until the print head aligns with the indicator that corresponds to the slot that the cartridge is in ('1' represents slot 1). Press **PRINT STYLE** again to move the head to the next position to select a different print

Getting Started

speed, if desired. Press **SELECT** to select the print style and print speed. See the next page for details.

Print Position Keys:

|| and **||** are used to move the print head and establish the first or leftmost printable character position. They are also used when selecting character cartridges.

|| is used to move the print head to the left.

|| is used to move the print head to the right.

≡ and **≡** are used to move the paper to establish the first or uppermost printable line (TOF). See Top-of-Form feature discussed on pages 1-14 and 1-15.

Paper Control Keys:

LINE ≡ is used to advance the paper one line at a time. When the key is held down the printer will feed paper line-by-line until the key is released. This key cannot be used to adjust Top-of-Form.

PAGE ≡ is used to advance the paper one page length. It is also used when loading paper.

Feature Keys:

Three keys are provided to give you easy access to the features you may want to change most often. Notice that three keys on the keypad have words printed over or under them in green. Also notice that the **SELECT** key is printed in green. The green printing indicates that these three keys have the green labeled function when the **SELECT** key has been pressed just prior to pressing them.

SETTINGS: When **SELECT** then **VIEW** is pressed the printer is put into the mode in which current printer "settings" can be listed or modified. This feature is discussed in detail in Section 2.

COMPRESS: When **SELECT** then **PRINT STYLE** is pressed, you will switch from the print pitch currently in use to compressed. For example, if the printer is currently printing in normal pitch (10 characters per inch) when **SELECT** then **PRINT STYLE** is pressed the pitch will change to compressed (16.36 characters per inch). Press **SELECT** then **PRINT STYLE** again to return to the previous pitch.

8 LPI: When **SELECT** then **LINE ≡** is pressed, you will switch from the line spacing currently in use to 8 lines per inch (lpi). For example, if the printer is currently printing at 6 lpi, when **SELECT** then **LINE ≡** is pressed, the lines per inch will change to 8. Press **SELECT** then **LINE ≡** to return to the 6 lpi. When **RESET** is pressed twice, the line spacing will return to the line spacing selected through the **SETTINGS** mode. (Line spacing is described further in Section 2.)

Selections made through the **COMPRESS** and **8 LPI** keys are "volatile". This means that when the printer is turned off these selections will not be saved. Features will return to the state they were in before being changed.

Using the Character Cartridge

The 2933A and 2934A printers accommodate a variety of character cartridges which offer alternatives to the two print styles integral to the 2930 Series printers. A Courier 10 character cartridge is shipped with all 2934A printers.

The 2933A and 2934A printers accommodate up to four character cartridges at once. Each cartridge contains a print style with two print densities at printing speeds of 67 and 40 characters per second (cps). (The 2933/34A printers print in 200 cps Cubic or Courier without character cartridges installed.) The 2934A printer is shipped with a Courier 10 (10 characters per inch) character cartridge.

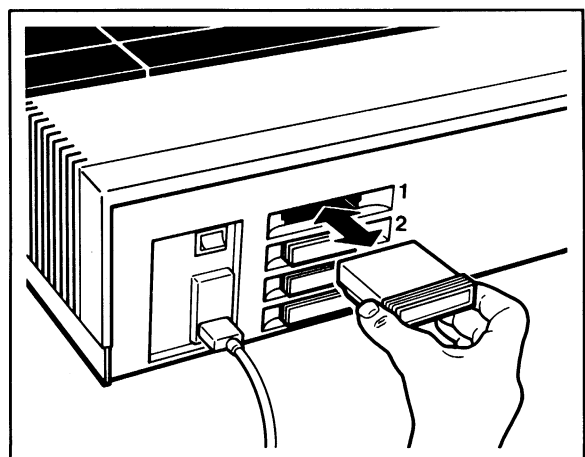
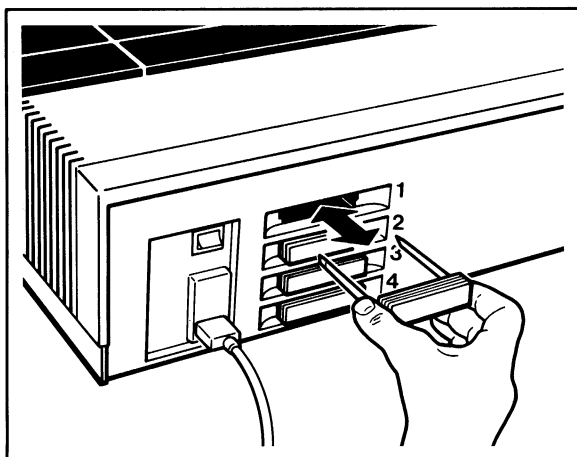
There are five selection indicators on the printer's cover: STD, 1, 2, 3, and 4. STD corresponds to the print styles which are standard with all 2930 Series printers. Indicators 1-4 correspond to the numbered slots on the printer's rear panel where the character cartridges are inserted. Each indicator has two positions under it. The two positions under the STD indicator are for selection of the Cubic or Courier print styles. The two positions under indicators 1-4 are for selection of the 67 characters per second (cps) printing speed, or the 40 cps printing speed. 40 cps printing offers higher density print than the 67 cps printing speed.

Installing the character cartridge:

1. Turn the printer OFF. INSERTING OR REMOVING CHARACTER CARTRIDGES WITH THE PRINTER ON MAY RESULT IN DAMAGE TO THE PRINTER AND TO THE CARTRIDGE.
2. Remove a dust cover from one of the four slots and insert the cartridge. Make sure that the cartridge is firmly seated in the slot to ensure good contact is made. (Dust covers should be replaced when the cartridge is removed.)
3. Insert additional cartridges in the same manner.

CAUTION

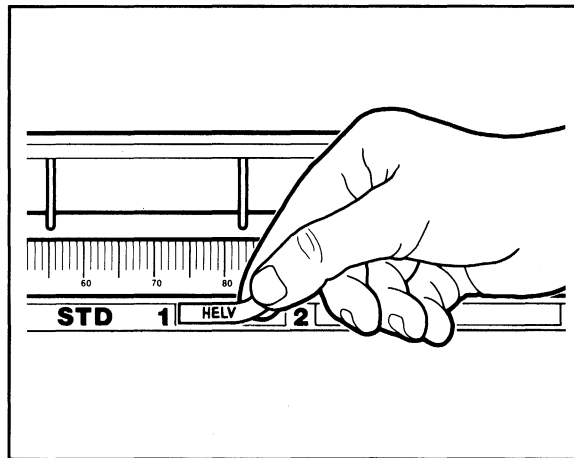
DO NOT TOUCH THE CONNECTOR ON THE BACK OF THE CARTRIDGE.
A RESULTING ELECTRO-STATIC DISCHARGE WILL SEVERELY
DAMAGE THE PRINTER'S CIRCUITRY.



Applying Character Cartridge Labels:

Each character cartridge comes with a label that is to be applied alongside the indicator (1-4) on the printer's cover that corresponds to the slot the cartridge is in. For example, if the Helv cartridge is installed in slot 1, the label should be applied to the space provided to the right of indicator 1.

1. Peel the backing from the label and carefully apply it alongside the indicator.
2. If a cartridge is moved to a different slot, or removed entirely, the corresponding label should be moved, or removed accordingly, to avoid confusion during cartridge selection.



Selecting the Character Cartridge:

1. Turn the printer ON.
2. Press **PRINT STYLE**. The print head will move to the right and stop under the indicator that corresponds to the active print style. (When the printer is used for the first time this will be the first position under the STD indicator. Upon subsequent use, it will be the position previously selected through the keypad (as discussed below), SETTINGS mode, or by escape sequences. NOTE: Selections made through the keypad are lost when the printer is turned OFF.)

This feature can be exited anytime before **SELECT** is pressed, by pressing **RESET** once.

3. Press **←** to move the print head under the indicator which corresponds to the slot the character cartridge is in.
4. The print head will be positioned under the 67 cps position. (The 67 and 40 cps positions are located about 1/4 inch apart under each indicator.) To select 67 cps, press **SELECT**.
5. To select 40 cps, press **→**. The print head will move to the right about 1/4 inch. (Press **←** to move back to the 67 cps position.)

6. Press **SELECT** . The chosen print style is activated (i.e., the type style, pitch, density, etc. of the cartridge will become active).

NOTE

The currently active character set will, in most cases, remain functional when a different external character font is selected.

Removing the Character Cartridge:

1. Turn the printer OFF.
2. Grasp the character cartridge and pull it out of the slot.
3. Insert a dust cover into the slot. (See page 1-21)

CONFIGURING PRINTER AND HOST



PART 1 — ENTERING SETTINGS MODE

Most printers have external switches which, when set, define a limited number of printer features and functions. On the 2930 Series printers, a variety of features and functions are selected through SETTINGS, a mode entered by pressing just two keys on the printer's keypad. A few of the features which can be defined through the SETTINGS mode are page length, margins, text length, lines per inch, characters per inch; and data communications considerations such as parity, baud rate, and handshakes.

Within the SETTINGS mode are two categories, LIST and MODIFY. LIST is entered to check current printer and interface settings; MODIFY is entered to change one or more of the current settings.



Features selected through the SETTINGS mode are stored in the printer's non-volatile memory. This means that the printer's memory retains the information until the information is changed, allowing the printer to "remember" what features should be active, even if the power has been turned off or there has been a power failure. Many features may be temporarily changed by escape sequences transmitted from the printer's host computer. Escape sequences are discussed in the Programming Section of this manual and are listed in the Appendix.


Keys Used To Select Printer Features

Selecting printer features is described on the next page.


SELECT and **VIEW** are used to enter the SETTINGS mode in which printer features can be listed or modified. Press **SELECT** then **VIEW** once to enter SETTINGS. Press **VIEW** again to exit SETTINGS.

SELECT is also used to select the option that appears immediately above the arrow on top of the print head. If the option selected is already enabled, pressing **SELECT** will turn the option off.

 and  is used to move the print head to the next category on the SETTINGS menu, or to another option within a chosen feature.

 is used to move back to the previous menu of the feature currently selected.

RESET is used to exit the SETTINGS mode without implementing changes.

When the "ALL" option on the SETTINGS menu has been selected,  is used to skip to the next feature without altering the current setting.

6. To select an option(s):

- a. Press **||** to position the print head under the option you wish to modify. If all of the options within the feature are to be modified, select the ALL option. All of the options for the chosen feature will be displayed; they can then be modified one at a time.

```

***** PAGE SETTINGS *****
Option > LINES PER    INCHES PER    PERFORATION    TEXT LINES    ALL
          INCH        PAGE        SKIP          PER PAGE
          6          11         off           60
    
```

LINES PER INCH: 6 8

*This menu reflects that
the "ALL" option was selected.*

INCHES PER PAGE: (A5) (A4)
 11 14 8.5 8.3 11.6 3 3.5 4 5 5.5 6 7 8 9 10 12 17

PERFORATION SKIP: off on

TEXT LINES PER PAGE -- SELECT ALL 3 DIGITS
 FIRST DIGIT SECOND DIGIT THIRD DIGIT
 0 1 2 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9

7. Press **SELECT** to select the option.

8. To exit settings, press **VIEW** once.

***** END OF SETTINGS *****

See the sample SETTINGS menus on the following pages. Printer Features are explained following the sample menus.

SAMPLE PRINTER SETTINGS MENUS (Factory Defaults Shown)

List Printer Settings

```
***** SETTINGS *****

***** LIST *****          ***** MODIFY *****
PRINTER      INTERFACE      PRINTER      INTERFACE

***** LIST PRINTER *****

PRINT SETTINGS    PAGE SETTINGS    MARGIN SETTINGS    OTHER SETTINGS    SET DEFAULTS

***** PRINT SETTINGS *****
PRIMARY          SECONDARY          PRIMARY          SECONDARY          PRIMARY          SECONDARY          ALL
PRINT PITCH      PRINT PITCH      STYLE            STYLE            CHARACTER SET    CHARACTER SET
10               10               Cubic            Cubic            Roman8           Line Draw

***** PAGE SETTINGS *****
LINES PER        INCHES PER        PERFORATION      TEXT LINES        ALL
INCH             PAGE              SKIP             PER PAGE
6                11                off              60

***** MARGIN SETTINGS *****
LEFT MARGIN      RIGHT MARGIN      ALL
0                135

***** OTHER SETTINGS *****
DISPLAY          HP TERMINAL        RESTRICTED        CR                LF,VT & FF        SUPPORT
FUNCTIONS        MODE               SEQUENCES        AUTO LF           AUTO CR           MODE
off             off               none              off              off              2932A
                                                2934A (2933/34A)
```

Modify Printer Settings

To change 2932A "Print Settings":

***** SETTINGS *****

***** LIST ***** ***** MODIFY *****
 PRINTER INTERFACE PRINTER INTERFACE

***** MODIFY PRINTER *****

PRINT SETTINGS PAGE SETTINGS MARGIN SETTINGS OTHER SETTINGS SET DEFAULTS

		***** PRINT SETTINGS *****				
PRIMARY	SECONDARY	PRIMARY	SECONDARY	PRIMARY	SECONDARY	ALL
PRINT PITCH	PRINT PITCH	STYLE	STYLE	CHARACTER SET	CHARACTER SET	
10	10	Cubic	Cubic	Roman8	Line Draw	

PRIMARY PRINT PITCH: 10 expanded compressed

SECONDARY PRINT PITCH: 10 expanded compressed

PRIMARY STYLE: Cubic Courier

SECONDARY STYLE: Cubic Courier

- | | | | | | |
|--------------------|------------------|------------|-------------|--------------|-------------|
| 1 Roman8 | 2 Kana8 | 3 USASCII | 4 Roman Ext | 5 Line Draw | 6 Math |
| 7 Norwegian/Danish | 8 United Kingdom | 9 French | 10 German | 11 JASCII | 12 Katakana |
| 13 Swedish/Finnish | 14 Spanish | 15 Italian | 16 HPL | 17 All blank | |

PRIMARY CHARACTER SET:

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

SECONDARY CHARACTER SET:

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

Modify Printer Settings

To change 2933/2934A "Print Settings":

***** SETTINGS *****

***** LIST ***** ***** MODIFY *****
PRINTER INTERFACE PRINTER INTERFACE

***** MODIFY PRINTER *****

PRINT SETTINGS PAGE SETTINGS MARGIN SETTINGS OTHER SETTINGS SET DEFAULTS

***** PRINT SETTINGS *****

PRIMARY PRINT PITCH	SECONDARY PRINT PITCH	PRIMARY STYLE	SECONDARY STYLE	PRIMARY CHARACTER SET	SECONDARY CHARACTER SET	ALL
10	10	Cubic	Cubic	Roman8	Line Draw	

PRIMARY PITCH: 10 12 Expanded Compressed Proportional

SECONDARY PITCH: 10 12 Expanded Compressed Proportional

0	Cubic	1	Cour						
2	Cubic	3	Cubic	4	Cubic	5	Cubic		
6	Cubic	7	Cubic	8	Cubic	9	Cubic		

PRIMARY STYLE:

0	1	2	3	4	5	6	7	8	9
---	---	---	---	---	---	---	---	---	---

SECONDARY STYLE:

0	1	2	3	4	5	6	7	8	9
---	---	---	---	---	---	---	---	---	---

1 Roman8	2 Kana8	3 USASCII	4 Roman Ext	5 Line Draw
6 Math	7 Norwegian/Danish	8 United Kingdom	9 French	10 German
11 JASCII	12 Katakana	13 Swedish/Finnish	14 Spanish	15 Italian
16 HPL	17 All blank			

PRIMARY CHARACTER SET:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----

SECONDARY CHARACTER SET:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----

Modify Printer Settings

To change "Page Settings":

***** SETTINGS *****

***** LIST ***** ***** MODIFY *****
 PRINTER INTERFACE PRINTER INTERFACE

***** MODIFY PRINTER *****

PRINT SETTINGS PAGE SETTINGS MARGIN SETTINGS OTHER SETTINGS SET DEFAULTS

***** PAGE SETTINGS *****
 LINES PER INCHES PER PERFORATION TEXT LINES ALL
 INCH PAGE SKIP PER PAGE
 6 11 off 60

LINES PER INCH: 6 8

INCHES PER PAGE: (A5) (A4)
 11 14 8.5 8.3 11.6 3 3.5 4 5 5.5 6 7 8 9 10 12 17

PERFORATION SKIP: off on

TEXT LINES PER PAGE -- SELECT ALL 3 DIGITS
 FIRST DIGIT SECOND DIGIT THIRD DIGIT
 0 1 2 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9

Modify Printer Settings

To change "Margin Settings":

```
***** SETTINGS *****
```

```
***** LIST *****          ***** MODIFY *****  
PRINTER      INTERFACE      PRINTER      INTERFACE
```

```
***** MODIFY PRINTER *****
```

```
PRINT SETTINGS   PAGE SETTINGS   MARGIN SETTINGS   OTHER SETTINGS   SET DEFAULTS
```

```
***** MARGIN SETTINGS *****  
LEFT MARGIN   RIGHT MARGIN   ALL  
0             135
```

LEFT MARGIN (COLUMNS) -- SELECT ALL 3 DIGITS

```
FIRST DIGIT      SECOND DIGIT      THIRD DIGIT  
0 1 2           0 1 2 3 4 5 6 7 8 9      0 1 2 3 4 5 6 7 8 9
```

RIGHT MARGIN (COLUMNS) -- SELECT ALL 3 DIGITS

```
FIRST DIGIT      SECOND DIGIT      THIRD DIGIT  
0 1 2           0 1 2 3 4 5 6 7 8 9      0 1 2 3 4 5 6 7 8 9
```


Modify Printer Settings

To change 2932A "Other Settings":

```

*****
***** SETTINGS *****
***** LIST *****      ***** MODIFY *****
PRINTER INTERFACE      PRINTER INTERFACE

***** MODIFY PRINTER *****

PRINT SETTINGS  PAGE SETTINGS  MARGIN SETTINGS  OTHER SETTINGS  SET DEFAULTS

***** OTHER SETTINGS *****
DISPLAY          HP TERMINAL  RESTRICTED  CR          LF,VT & FF  SUPPORT
FUNCTIONS        MODE         SEQUENCES   AUTO LF     AUTO CR     MODE
off              off          none        off         off         2932A
    
```

Choices for 2932A "Other Settings":

Display Functions	ON/OFF
HP Terminal Mode	ON/OFF
Restricted Sequences	None/Some/All
CR Auto LF	ON/OFF
LF, VT, & FF Auto CR	ON/OFF
Support Mode	2932A/2631B/2631G

Modify Printer Settings

To change 2933/34A "Other Settings":

```
***** SETTINGS *****
***** LIST *****          ***** MODIFY *****
PRINTER      INTERFACE      PRINTER      INTERFACE

***** MODIFY PRINTER *****
PRINT SETTINGS  PAGE SETTINGS  MARGIN SETTINGS  OTHER SETTINGS  SET DEFAULTS

***** OTHER SETTINGS *****
DISPLAY          HP TERMINAL  RESTRICTED  CR          LF,VT & FF  SUPPORT
FUNCTIONS        MODE          SEQUENCES  AUTO LF     AUTO CR     MODE
off              off           none       off         off         2934A
```

Choices for 2933/34A "Other Settings":

Display Functions	ON/OFF
HP Terminal Mode	ON/OFF
Restricted Sequences	None/Some/All
CR Auto LF	ON/OFF
LF, VT, & FF Auto CR	ON/OFF
Support Mode	2934A/WP/2631B/2631G

Modify Printer Settings

To set defaults or clear current settings to defaults:

```
***** SETTINGS *****
```

```
***** LIST *****      ***** MODIFY *****  
PRINTER      INTERFACE    PRINTER      INTERFACE
```

```
***** MODIFY PRINTER *****
```

```
PRINT SETTINGS  PAGE SETTINGS  MARGIN SETTINGS  OTHER SETTINGS  SET DEFAULTS
```

Clear current SETTINGS: Reset to DEFAULTS? no yes

SAMPLE INTERFACE SETTINGS MENU (Factory Defaults Shown)

List Serial Interface Settings

```
***** SETTINGS *****

***** LIST *****          ***** MODIFY *****
PRINTER INTERFACE          PRINTER INTERFACE

***** LIST INTERFACE *****

SERIAL

DATA SETTINGS          CONTROL SETTINGS          SET DEFAULTS

***** DATA SETTINGS *****
BAUD RATE          DATA BITS          PARITY          PARITY CHECK          STRIP NULL/DEL          ALL
2400              8              none              off              off

***** CONTROL SETTINGS *****
XON/XOFF          ENQ/ACK          BINARY ENQ/ACK          DTR/CD          (S)RTS/SCA          CTS/CB          RS/CH
on                off              off              High              Low              Ignore          Low
```

List HP-IB Interface Settings

```
***** SETTINGS *****

***** LIST *****      ***** MODIFY *****
PRINTER  INTERFACE      PRINTER  INTERFACE

***** LIST INTERFACE *****

***** HP-IB *****

SECONDARY COMMANDS  LISTEN ALWAYS  SERVICE REQUEST  ADDRESS  SET DEFAULTS
off                 off             on                1
```

List Centronics-Type Interface Settings

```
***** SETTINGS *****  
  
***** LIST *****          ***** MODIFY *****  
PRINTER INTERFACE          PRINTER INTERFACE  
  
***** LIST INTERFACE *****  
  
PARALLEL  
  
DATA BITS          INVERT DATA          SET DEFAULTS  
8                  off
```

List Multipoint Daisy Chain Interface Settings (2933/34A)

***** SETTINGS *****

***** LIST ***** ***** MODIFY *****
 PRINTER INTERFACE PRINTER INTERFACE

***** LIST INTERFACE *****

SYNCHRONOUS MULTIPOINT

ID SETTINGS DATA SETTINGS TRANSMIT SETTINGS SET DEFAULTS

***** ID SETTINGS *****
 GROUP ID DEVICE ID FIRST DEVICE
 A A no

***** DATA SETTINGS *****
 BAUD RATE PARITY CODE
 9600 none ASCII 7

***** TRANSMIT SETTINGS *****
 TRANSMIT TRANSMIT BLOCK CHECK AUTO STATUS
 TRANSPARENT ONLY INDICATOR CHARACTER
 no DSR CRC off

List Data Link Interface Settings (2933/34A)

```
***** SETTINGS *****

***** LIST *****          ***** MODIFY *****
PRINTER      INTERFACE      PRINTER      INTERFACE

***** LIST INTERFACE *****
                        DATALINK

ID SETTINGS      DATA SETTINGS      TRANSMIT SETTINGS      SET DEFAULTS

***** ID SETTINGS *****
GROUP ID      DEVICE ID
A              A

***** DATA SETTINGS *****
BAUD RATE      PARITY      CODE      STOP BITS      USE SYNC CHARACTER      ALL
9600           none       ASCII 7    1              no

***** TRANSMIT SETTINGS *****
TRANSMIT      TRANSMIT      BLOCK CHECK      AUTO STATUS
TRANSPARENT ONLY INDICATOR CHARACTER
no            DSR          CRC              off
```


PRINTER FEATURES EXPLAINED

Features and options of the printer's MODIFY PRINTER menu are briefly explained below.

PRINT SETTINGS

Primary Print Pitch: Primary Print Pitch is the pitch the printer will print in until it is instructed, through escape sequences, to print in the Secondary Print Pitch.

10 = 10 characters in a horizontal inch.
 12 = 12 characters in a horizontal inch (2933/34A).
 Expanded = 5 characters in a horizontal inch.
 Compressed = 16.36 characters in a horizontal inch.
 Proportional = proportional spacing of characters in a horizontal inch
 (2933/34A).

Secondary Print Pitch: Secondary Print Pitch is the pitch the printer will print in when instructed to "shift out" of the Primary Print Pitch. The options for Secondary Print Pitch are the same as for Primary Print Pitch.

Primary Style: Primary Style is the style of print the printer will print in until it is instructed, through escape sequences, to print in the Secondary Style.

Cubic = the san serif print style.
 Courier = the serif print style.

The 2933/34A menu reflects the two resident print styles as well as the styles of any character cartridges installed in the printer. Resident print styles are reflected as 0-Cubic, 1-Cour(ier). Each character cartridge installed is listed twice, reflecting the 67 and 40 cps print speeds offered on each cartridge.

NOTE

To print in any print style except Cubic and Courier a character cartridge must be installed in the printer.

Secondary Style: Secondary Style is the style of print the printer will print in when it is instructed to shift out of the Primary Style. The options for Secondary Style are the same as for Primary Style.

Primary Character Set: Primary Character Set is the character set (language) the printer will print in until it is instructed, through escape sequences, to print in the Secondary Character Set language. The character set is chosen by selecting the number on the menu that corresponds to the desired character set.

Roman8, Kana8, Line Draw, and Math are recommended character sets. The other character sets are offered for backward compatibility. Sets 7 - 15 are ISO character sets. Character set 16 is an APL subset. Character set 17 contains all blanks.

Secondary Character Set: Secondary Character Set is the character set the printer will print in when it is instructed to "shift out" of the Primary Character Set.

PAGE SETTINGS

Lines Per Inch: Specifies the number of text lines to be printed in a vertical inch.

6 = 6 text lines per inch.

8 = 8 text lines per inch.

Page Length: Specifies the number of inches from the top to the bottom of a physical page. Selecting 11 instructs the printer that the paper it is printing on is 11 inches long, and so on. (A4 and A5 are metric indicators.)

Perforation Skip: Instructs the printer to continue printing when it has reached the bottom of a text page (OFF), or to stop printing when the bottom of the text page has been reached, and advance to the next top-of-form (ON).

Text Lines Per Page: Instructs the printer to print a specified number of lines on a page. For example, to print 10 inches of text on an 11 inch page (60 lines), select 0,6,0. This will provide a 1/2 inch margin at the top and bottom of the page, if the Top-of-Form has been set at that point.

MARGIN SETTINGS

Left Margin: Printing can begin at the left margin at column zero. At 10 characters per inch, one column is equal to one character, therefore, 10 columns equal one inch. To specify a one inch left margin, select 0,1,0. Printing will begin in the eleventh column.

Right Margin: The printer can print up to 136 columns on a page. To specify no right margin select 1,3,5 (numbering begins at column zero). To specify a one inch margin on an 8 1/2 inch wide page, select 0,7,4 (remember, columns are numbered from zero, not one.) The last column that will contain a character will be column 74. The printer will not print in columns 75 - 85.

OTHER SETTINGS

Display Functions: This option allows the user to see the printable and executable data that has been sent to the printer, i.e. escape sequences.

On = Display printable and executable data

Off = Do not display printable and executable data.

HP Terminal Mode: This is explained fully in the Appendix.

Restricted Sequences: This is used in a multi-user EDP environment to prevent a user from accessing features that could adversely affect the printing environment for other users. Escape sequences that may be restricted when Some is chosen are listed at the bottom of page 4-12.

Some = Restrict some escape sequences.

None = Restrict no escape sequences.

All = Restrict all escape sequences.

CR Auto LF: This feature is provided for host systems that only send CR as a line terminator. The 2930 Series printers generate a linefeed when a CR is received as a line terminator.

- On = Display printable and executable data
- Off = Do not display printable and executable data.

LF, VT, & FF Auto CR: This feature is provided for hosts that are only capable of sending an LF, VT, FF as a line terminator. When a 2930 Series printer receives a LF, VT, FF as a line terminator it will generate a CR.

- On = generate a CR when LF, VT, FF is received as a line terminator.
- Off = do not generate a CR when LF, VT, FF is received as a line terminator.

Support Mode: Support Mode is explained fully in the Appendix.

SET DEFAULTS

This feature allows current printer settings to be cleared to their factory default settings. If YES is selected current printer features will be changed to their factory default settings and a list of the printer features will print.

- No = Do not clear current settings.
- Yes = Clear current settings; return settings to factory default settings.

Configuring Printer and Host

CR Auto LF: This feature is provided for host systems that only send CR as a line terminator. The 2930 Series printers generate a linefeed when a CR is received as a line terminator.

On = generate a linefeed when a CR is received as a line terminator.
Off = do not generate a linefeed when a CR is received as a line terminator.

LF, VT, & FF Auto CR: This feature is provided for hosts that are only capable of sending an LF, VT, FF as a line terminator. When a 2930 Series printer receives a LF, VT, FF as a line terminator it will generate a CR.

ON = generate a CR when LF, VT, FF is received as a line terminator.
OFF = do not generate a CR when LF, VT, FF is received as a line terminator.

Support Mode: Support Mode is explained fully in the Appendix.

SET DEFAULTS

This feature allows current printer settings to be cleared to their factory default settings. If YES is selected current printer features will be changed to their factory default settings and a list of the printer features will print.

NO = Do not clear current settings.
YES = Clear current settings; return settings to factory default settings.

HP-IB CONFIGURATION

**HP-IB
CONFIGURATION**

PART 2 - CONFIGURING HP-IB PRINTER AND HOST

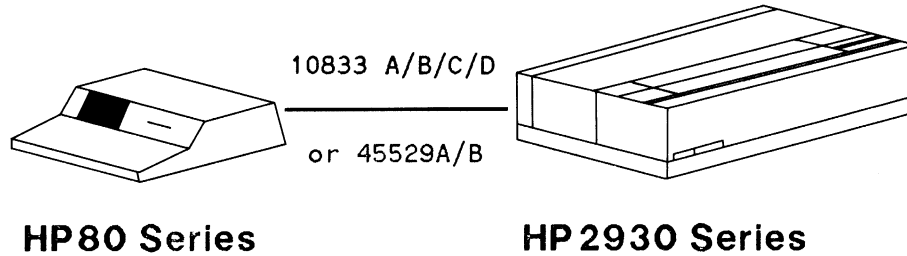
Information on the following pages may be used as a guide for determining the HP-IB interface settings on the printer and for configuring the host. Please refer to host user manuals for further information on using 2930 Series printers with Hewlett-Packard computers and terminals, and their software.

Using Your Printer With Application Software

Many Hewlett-Packard application software packages contain configuration "menus" that allow the user to select one of several printers for use as an output device. If your 2930 Series printer is not listed as a choice in a particular software "menu" you may choose "2631B" as your output device.

A few application packages require specific printer emulation for the application package to communicate properly with the printer. "Support Mode" is an option of the "OTHER SETTINGS" feature and can be used to emulate several different types of Hewlett-Packard printers.

HP80 Series to HP2930 Series With HP-IB Interface



HOST CONFIGURATION:

82937A HP-IB interface required on HP85 A/B and HP86A. Printer/plotter ROM required on HP85. Basic program statement "Printer is" or "Output" must specify same address as printer settings. For example:

```
"Printer is 701"   would correspond to the following
                   or
"Output 701"      printer settings listing the
                   printer HP-IB address as 1.
```

PRINTER SETTINGS:

```
*****          SETTINGS          *****

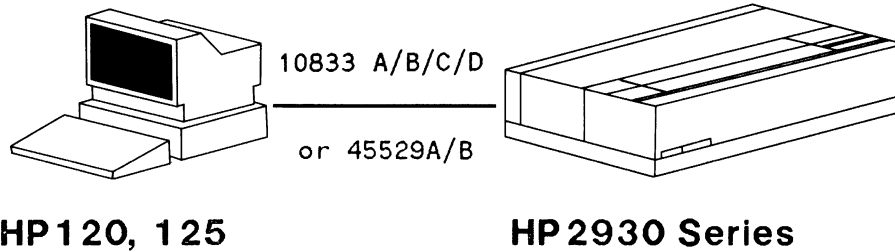
***** LIST *****          ***** MODIFY *****
PRINTER  INTERFACE          PRINTER  INTERFACE

*****          LIST INTERFACE          *****

*****          HP-IB          *****

SECONDARY COMMANDS  LISTEN ALWAYS  SERVICE REQUEST  ADDRESS  SET DEFAULTS
off                off              on                1
```


HP120, 125 to HP2930 Series With HP-IB Interface



HOST CONFIGURATION:

HP-IB should be turned "ON".
Others depend upon application.

OPSYS GENERAL LIST DEVICE

Display OFF

IntPtr OFF

Port 2 OFF

HPIB ON

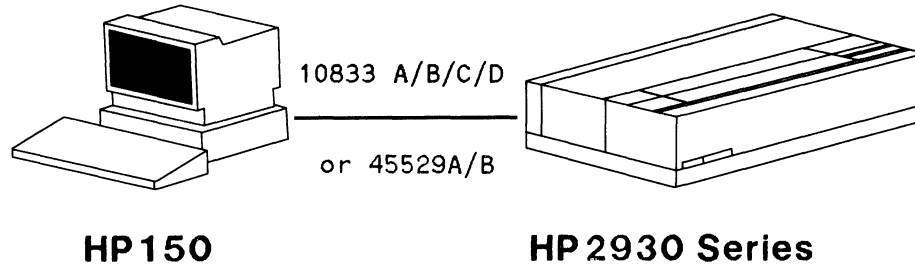
PRINTER SETTINGS:

```

*****          SETTINGS          *****
***** LIST *****      ***** MODIFY *****
***** PRINTER *****  ***** PRINTER *****
***** INTERFACE *****  ***** INTERFACE *****

***** LIST INTERFACE *****
***** HP-IB *****
SECONDARY COMMANDS  LISTEN ALWAYS  SERVICE REQUEST  ADDRESS  SET DEFAULTS
off                 off              on                1
    
```


Touchscreen / Touchscreen Max / HP150 to HP2930 Series With HP-IB Interface



HOST CONFIGURATION:

Recommended address of printer is "1".
Other settings depend on application.
Model choice shown is 2932A; use 2934A as choice when using 2933A or 2934A printer.

MS-DOS Device Configuration				Main		Active Values	
System Devices							
PRN:	Interface	Address	Model	Print Wheel	PLT:	Interface	Address
	HP-IB	1	2932A			Port2	
LST:	Internal		2674A		COM1:	Remote	
AUX:	Remote				COM2:	Port2	

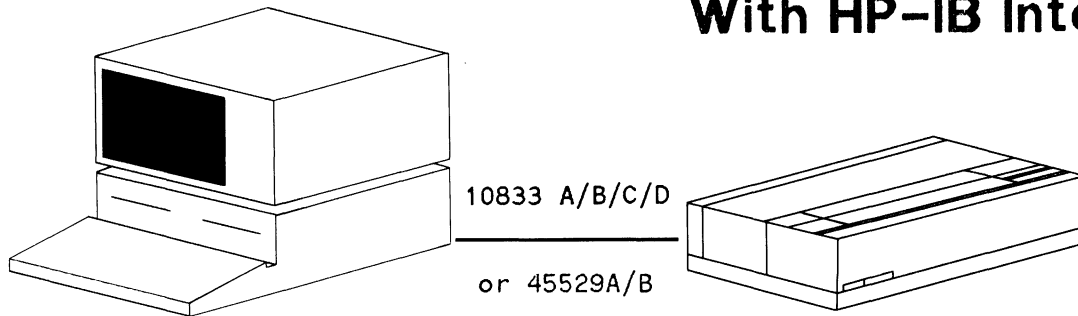
PRINTER SETTINGS:

When using the HP150 as an HP150 terminal, HP Terminal Mode, in the "OTHER SETTINGS" feature of the "Printer" subcategory, may be set to "ON".

```

***** SETTINGS *****
***** LIST ***** ***** MODIFY *****
***** PRINTER ***** ***** INTERFACE *****
***** LIST INTERFACE *****
***** HP-IB *****
SECONDARY COMMANDS  LISTEN ALWAYS  SERVICE REQUEST  ADDRESS  SET DEFAULTS
off                 off                 off                 1
    
```


Series 200 Desktop Computers to HP2930 Series With HP-IB Interface



HP9816, 9826, 9836, 9920

HP2930 Series

HOST CONFIGURATION:

Basic program statement "Printer is" or "Output" must specify same address as printer settings.

For example:

"Printer is 701"	would correspond to the following
or	printer settings listing the
"Output 701"	printer HP-IB address as 1.

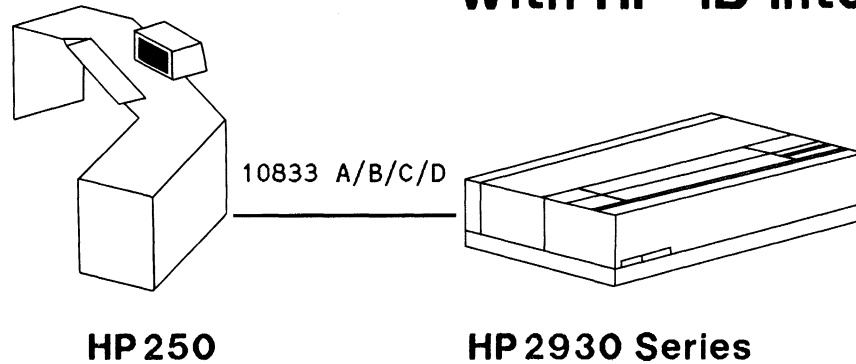
PRINTER SETTINGS:

```

*****          SETTINGS          *****
***** LIST *****          ***** MODIFY *****
PRINTER  INTERFACE          PRINTER  INTERFACE

***** LIST INTERFACE *****
*****          HP-IB          *****
SECONDARY COMMANDS  LISTEN ALWAYS  SERVICE REQUEST  ADDRESS  SET DEFAULTS
off                 off             on                 1
    
```


HP250 to HP2930 Series With HP-IB Interface



HOST CONFIGURATION:

This information is intended only to be a guide for configuring the HP2930 Series printers on the HP250. Please refer to the manuals provided with the HP250 for complete information and procedures, or contact your local Hewlett-Packard Customer Engineer.

HP-IB Interface:

- OS Revision: B.06.00 or greater
- DROMs Required: none
- HP-IB Address: Any unused address from 0 to 7. Up to 2 HP-IB printers may be configured, each on a separate address. An address of 6 is used as an example.

PRINTER SETTINGS:

```

*****          SETTINGS          *****

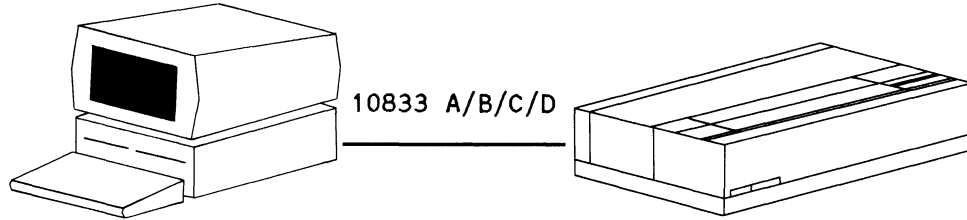
***** LIST *****          ***** MODIFY *****
PRINTER   INTERFACE          PRINTER   INTERFACE

***** LIST INTERFACE *****

*****          HP-IB          *****

SECONDARY COMMANDS  LISTEN ALWAYS  SERVICE REQUEST  ADDRESS  SET DEFAULTS
on                 off              off              6
  
```


HP1000 "A" Series to HP2930 Series With HP-IB Interface



HP1000 "A" Series

HP2930 Series

HOST CONFIGURATION:

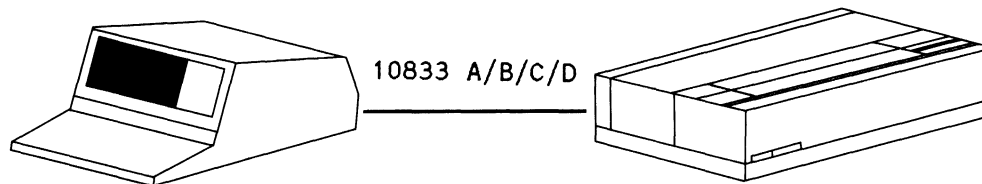
12009A HP-IB Interface
RTE-A Operating System
I/F DVR - ID. 37
Device Driver - %DD. 12
Printer Address - 6

PRINTER SETTINGS:

```
***** SETTINGS *****
***** LIST *****      ***** MODIFY *****
PRINTER  INTERFACE      PRINTER  INTERFACE

***** LIST INTERFACE *****
***** HP-IB *****
SECONDARY COMMANDS  LISTEN ALWAYS  SERVICE REQUEST  ADDRESS  SET DEFAULTS
on                  off              off              6
```


HP2647A, 2647F, 2648A, to HP2930 Series With HP-IB Interface



HP 2647A, 2647F, 2648A

HP 2930 Series

HOST CONFIGURATION:

13296A shared peripheral interface must be installed.

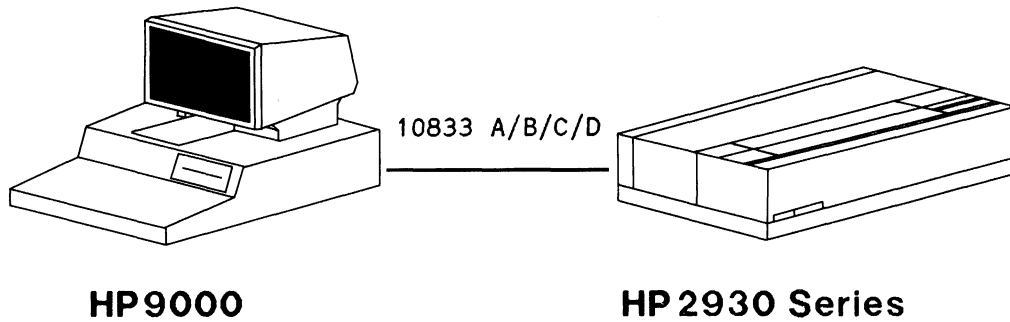
PRINTER SETTINGS:

HP Terminal Mode, in the "OTHER SETTINGS" feature of the "Printer" subcategory, should be set to "ON".

For 2648A printer, address must be "6" instead of "1" used in example below.

```
***** SETTINGS *****
***** LIST *****
PRINTER INTERFACE PRINTER INTERFACE
***** LIST INTERFACE *****
***** HP-IB *****
SECONDARY COMMANDS LISTEN ALWAYS SERVICE REQUEST ADDRESS SET DEFAULTS
off off on 1
```


HP9000 (500 Series) to HP2930 Series With HP-IB Interface



HOST CONFIGURATION:

Basic program statement "Printer is" or "Output" must specify same address as printer settings.

For example:

"Printer is 7,1" would correspond to the following
 or printer settings listing the
 "Output 7,1" printer HP-IB address as 1.

PRINTER SETTINGS:

```

*****          SETTINGS          *****

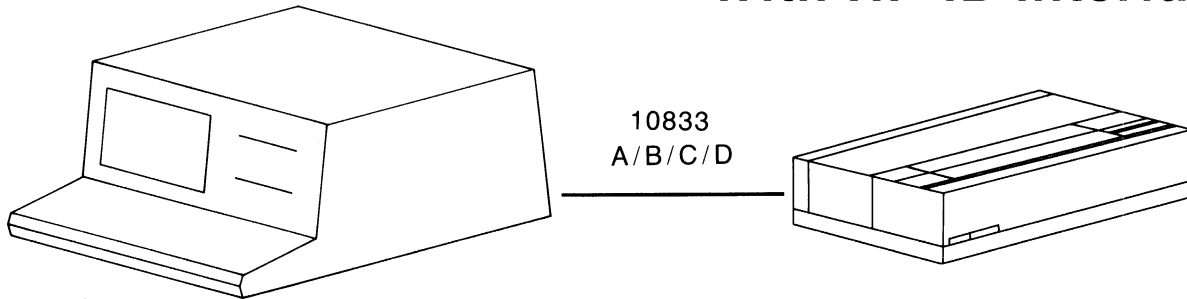
***** LIST *****          ***** MODIFY *****
PRINTER  INTERFACE          PRINTER  INTERFACE

***** LIST INTERFACE *****

*****          HP-IB          *****

SECONDARY COMMANDS  LISTEN ALWAYS  SERVICE REQUEST  ADDRESS  SET DEFAULTS
off                 off              on                1
  
```


HP64100, 64110 to HP2930 Series With HP-IB Interface



HP64100/64110

HP2930 Series

HOST CONFIGURATION:

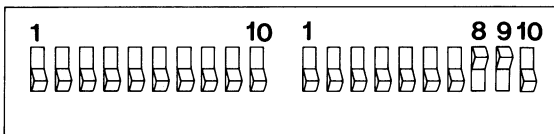
This information is intended only to be a guide for configuring the HP2930 Series printers on the HP64000. Please refer to the manuals provided with the HP64000 for complete information and procedures, or contact your local Hewlett-Packard Customer Engineer.

HP-IB Interface:

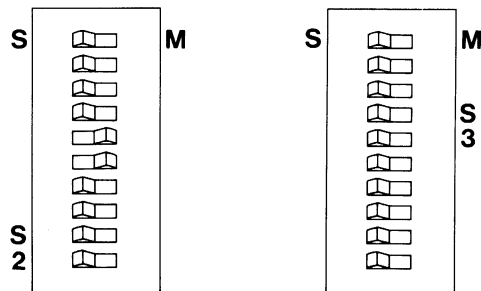
OS Revision: all versions are compatible.

On System Master Controller, set the MASTER/SLAVE switches as follows:

On 64100 rear panel:



On 64110 CPU board:



PRINTER SETTINGS:

```

*****  SETTINGS  *****

***** LIST *****          ***** MODIFY *****
PRINTER      INTERFACE      PRINTER      INTERFACE

          ***** OTHER SETTINGS *****
DISPLAY  HP TERMINAL  RESTRICTED  CR  LF,VT & FF  SUPPORT
FUNCTIONS  MODE  SEQUENCES  AUTO LF  AUTO CR  MODE
          off    off    none    off    off    26316

          HP-IB

SECONDARY COMMANDS  LISTEN ALWAYS  SERVICE REQUEST  ADDRESS  SET DEFAULTS
          on          off          off          1
    
```


SERIAL CONFIGURATION

**SERIAL
CONFIGURATION**

PART 3 - CONFIGURING SERIAL PRINTER AND HOST

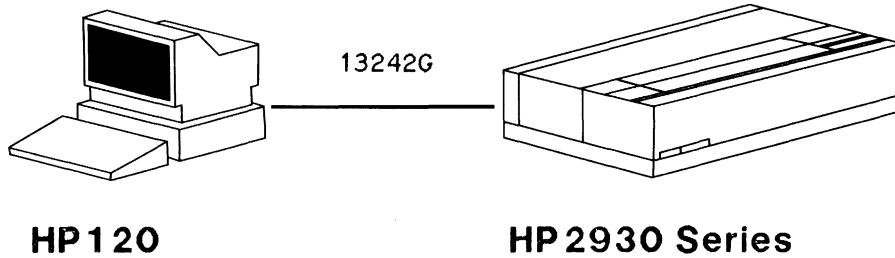
Information on the following pages may be used as a guide for determining the serial interface settings on the printer and for configuring the host. Please refer to host user manuals for further information on using 2930 Series printers with Hewlett-Packard computers and terminals, and their software.

Using Your Printer With Application Software

Many Hewlett-Packard application software packages contain configuration "menus" that allow the user to select one of several printers for use as an output device. If your 2930 Series printer is not listed as a choice in a particular software "menu" you may choose "2631B" as your output device.

A few application packages require specific printer emulation for the application package to communicate properly with the printer. "Support Mode" is an option of the "OTHER SETTINGS" feature and can be used to emulate several different types of Hewlett-Packard printers.

HP120 to HP2930 Series With Serial Interface



HOST CONFIGURATION:

DATA COMMUNICATIONS / SERIAL PRINTER Port 2

BaudRate	2400	Parity	None	Straps	xz	Hndsk	etX
PtrNulls	0	SRRXmit	OFF	SRRInvert	OFF	Xon/Xoff(X)	Xmit

OPSYS GENERAL LIST DEVICE

Display	OFF	IntPtr	OFF	Port 2	ON	HPIB	OFF
---------	------------	--------	------------	--------	-----------	------	------------

PRINTER SETTINGS:

```

***** SETTINGS *****
***** LIST *****          ***** MODIFY *****
***** PRINTER *****      ***** PRINTER *****
***** INTERFACE *****     ***** INTERFACE *****

***** LIST INTERFACE *****

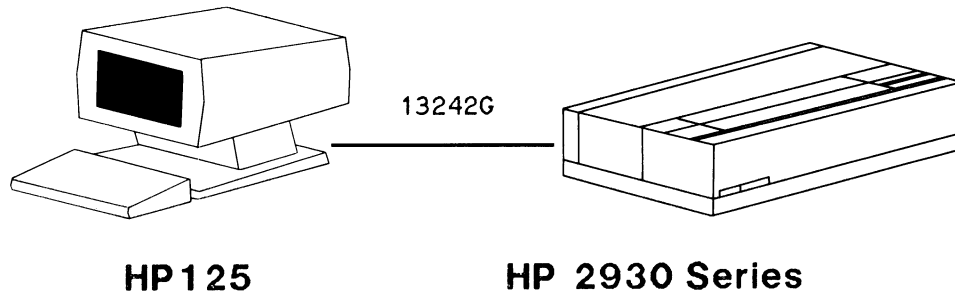
SERIAL

DATA SETTINGS      CONTROL SETTINGS      SET DEFAULTS

***** DATA SETTINGS *****
BAUD RATE  DATA BITS  PARITY  PARITY CHECK  STRIP NULL/DEL  ALL
  2400         8      none      off           off

***** CONTROL SETTINGS *****
XON/XOFF  ENQ/ACK  BINARY ENQ/ACK  DTR/CD  (S)RTS/SCA  CTS/CB  RS/CH
  on       off      off           High     Low           ignore  Low
    
```


HP125 to HP2930 Series With Serial Interface



HOST CONFIGURATION:

DATA COMMUNICATIONS / SERIAL PRINTER Port 2

BaudRate **2400**
PtrNulls **0**

Parity **None**
SRRXmit **OFF**

Straps **xz**
SRRInvert **OFF**

Hndsk **etX**
Xon/Xoff(X) **Xmit**

OPSYS GENERAL LIST DEVICE

Display **OFF**

IntPtr **OFF**

Port 2 **ON**

HPIB **OFF**

PRINTER SETTINGS:

```

***** SETTINGS *****
***** LIST *****          ***** MODIFY *****
***** PRINTER *****      ***** PRINTER *****
***** INTERFACE *****    ***** INTERFACE *****

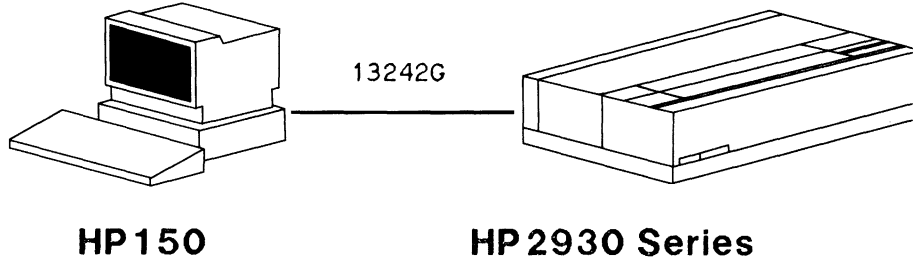
***** LIST INTERFACE *****
***** SERIAL *****

***** DATA SETTINGS *****
***** CONTROL SETTINGS *****
***** SET DEFAULTS *****

***** DATA SETTINGS *****
BAUD RATE  DATA BITS  PARITY  PARITY CHECK  STRIP NULL/DEL  ALL
2400       8          none   off           off

***** CONTROL SETTINGS *****
XON/XOFF  ENQ/ACK  BINARY ENQ/ACK  DTR/CD  (S)RTS/SCA  CTS/CB  RS/CH
on        off   off           High    Low          Ignore  Low
    
```


Touchscreen/Touchscreen Max/HP150 to HP2930 Series With Serial Interface



HOST CONFIGURATION:

Model choice shown is 2932A; use 2934A as choice when using 2933A or 2934A printer.

MS-DOS Device Configuration		Main		Active Values	
System Devices					
PRN:	Interface Port2	Model 2932A	Print Wheel	PLT:	Interface Port2
LST:	Internal	2674A		COM1:	Remote
AUX:	Remote			COM2:	Port2
FULL DUPLEX HARDWIRED Port 2					
BaudRate	2400	Parity	None	DataBits	8
Asterisk	Off	Check Parity	No	Stop Bits	1
TR(CD)	Hi			SR(CH)	Lo
EnqAck	No				
Clock	INT				
RecvPace	None	SRRXmit	No	RR(CF)Recv	No
XmitPace	Xon/Xoff	SRRInvert	No	CS(CB)Xmit	No
				DM(CC)Xmit	No

PRINTER SETTINGS:

When using the HP150 as an HP150 terminal, HP Terminal Mode, in the "OTHER SETTINGS" feature of the "Printer" subcategory, may be set to "ON".

```

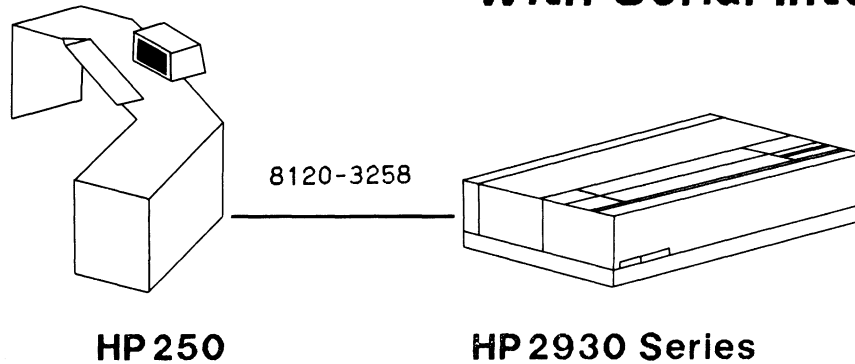
***** SETTINGS *****
***** LIST *****          ***** MODIFY *****
PRINTER INTERFACE          PRINTER INTERFACE

***** LIST INTERFACE *****
SERIAL
DATA SETTINGS      CONTROL SETTINGS      SET DEFAULTS

***** DATA SETTINGS *****
BAUD RATE  DATA BITS  PARITY  PARITY CHECK  STRIP NULL/DEL  ALL
2400      8          none   off          off

***** CONTROL SETTINGS *****
XON/XOFF  ENQ/ACK  BINARY ENQ/ACK  DTR/CD  (S)RTS/SCA  CTS/CB  RS/CH
on        off   off          High   Low          Ignore  Low
    
```


HP250 to HP2930 Series With Serial Interface



HOST CONFIGURATION:

This information is intended only to be a guide for configuring the HP2930 Series printers on the HP250. Please refer to the manuals provided with the HP250 for complete information and procedures, or contact your local Hewlett-Packard Customer Engineer.

RS-232-C Interface:

- OC Revision: B.06.00 or greater
- DROMs Required: TIO
- ASI Port: Any port, with each printer on a separate port if multiple
- Baud Rate Setting on ASI Board: The baud rate set on the ASI board must match the baud rate set on the printer. Check with your local Hewlett-Packard Customer Engineer to determine if the baud rate set on the ASI board is correct for your configuration. This example assumes 1200 baud.
- ASI Panel Strapping: The ASI panel must be strapped correctly. This strapping depends upon whether you have directly connected your printer or are using a modem with it. Refer to the HP250 manuals for more information, or contact your local HP Customer Engineer.
- RFIG Values:

```
Class:  Printer
Type:   293X
Format: 8N1
```

PRINTER SETTINGS:

```
***** SETTINGS *****
***** LIST *****      ***** MODIFY *****
***** PRINTER *****   ***** PRINTER *****
***** INTERFACE *****  ***** INTERFACE *****

***** LIST INTERFACE *****

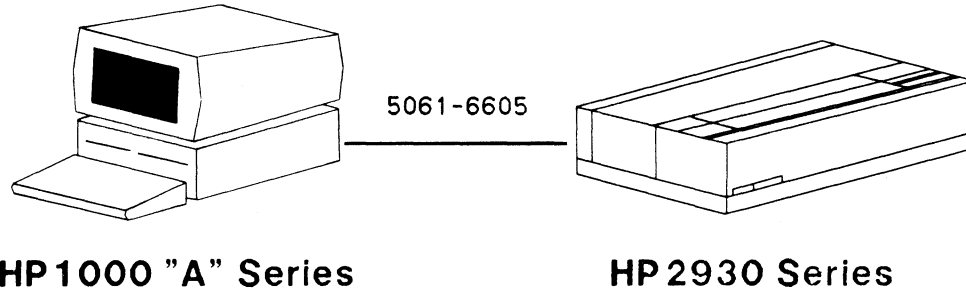
SERIAL

DATA SETTINGS      CONTROL SETTINGS      SET DEFAULTS

***** DATA SETTINGS *****
BAUD RATE          DATA BITS      PARITY          PARITY CHECK    STRIP NULL/DEL  ALL
1200                8               none            off              off

***** CONTROL SETTINGS *****
XON/XOFF          END/ACK         BINARY ENQ/ACK  DTR/CD          (S)RTS/SCA     CTS/CB          RS/CH
off                on              off             High            Low             Ignore          Low
```


HP1000 "A" Series to HP2930 Series With Serial Interface



HOST CONFIGURATION:

12005A Interface
 RTE-A Operating System
 I/F DVR - ID.00
 Device Driver - DD.00

PRINTER SETTINGS:

Match baud rate to switch settings on 12005A interface. This example assumes 2400 baud.

```

*****  SETTINGS  *****

***** LIST *****      ***** MODIFY *****
PRINTER  INTERFACE      PRINTER  INTERFACE

*****  LIST INTERFACE  *****

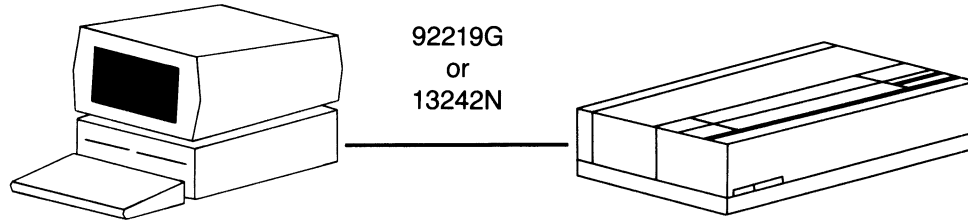
*****  SERIAL  *****

DATA SETTINGS      CONTROL SETTINGS      SET DEFAULTS

*****  DATA SETTINGS  *****
BAUD RATE      DATA BITS      PARITY      PARITY CHECK      STRIP NULL/DEL      ALL
2400           8              none       off                off

*****  CONTROL SETTINGS  *****
XON/XOFF      ENQ/ACK      BINARY ENQ/ACK      DTR/CD      (S)RTS/SCA      CTS/CB      RS/CH
off           on              off                High        Low              Ignore      Low
    
```


HP1000 "A" Series to HP2930 Series With Serial Interface



HP 1000 "A" Series

HP 2930 Series

With 12040B Multiplexer

HOST CONFIGURATION:

RTE-A Operating System
I/F DVR - IDM00
Device Driver - DD.00

PRINTER SETTINGS:

Match baud rate initialized on Multiplexer port

```

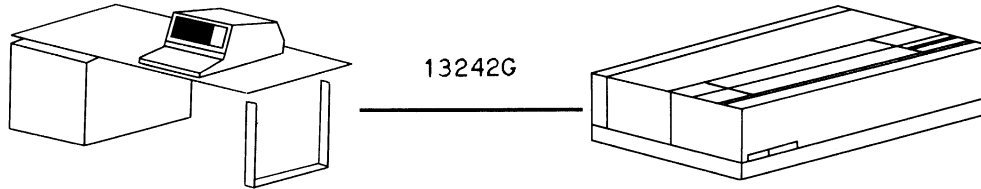
***** SETTINGS *****
***** LIST *****      ***** MODIFY *****
PRINTER      INTERFACE  PRINTER      INTERFACE

***** LIST INTERFACE *****
***** SERIAL *****
DATA SETTINGS      CONTROL SETTINGS      SET DEFAULTS

***** DATA SETTINGS *****
BAUD RATE      DATA BITS      PARITY      PARITY CHECK      STRIP NULL/DEL      ALL
2400           8           none        off               off

***** CONTROL SETTINGS *****
XON/XOFF      END/ACK      BINARY END/ACK      DTR/CD      (S)RTS/SCA      CTS/CB      RS/CH
off           on           off               High        Low              Ignore      Low
    
```


HP1000 M/E/F to HP2930 Series With Serial Interface



HP1000 M/E/F

HP2930 Series

With 12792A/B Multiplexer

HOST CONFIGURATION:

12792A/B Multiplexer
RTE Operating System
I/F DVR - DVM00
Device Driver - DDV12

PRINTER SETTINGS:

```

*****  SETTINGS  *****

***** LIST *****          ***** MODIFY *****
PRINTER  INTERFACE          PRINTER  INTERFACE

*****  LIST INTERFACE  *****

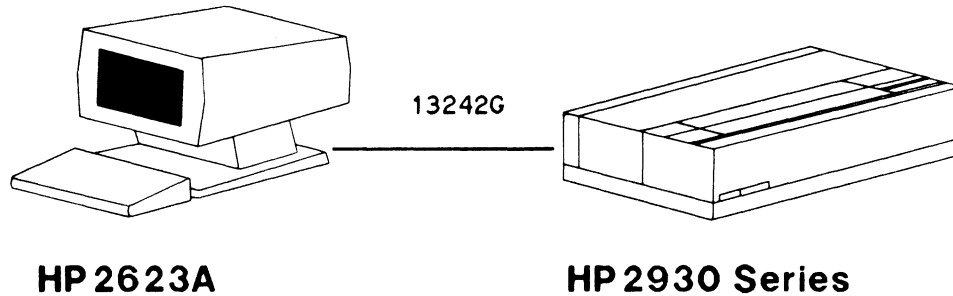
                                SERIAL

                                DATA SETTINGS          CONTROL SETTINGS          SET DEFAULTS

*****  DATA SETTINGS  *****
BAUD RATE  DATA BITS  PARITY  PARITY CHECK  STRIP NULL/DEL  ALL
  2400         8         none         off         off

*****  CONTROL SETTINGS  *****
XON/XOFF  ENQ/ACK  BINARY ENQ/ACK  DTR/CD  (S)RTS/SCA  CTS/CB  RS/CH
  off         on         off         High         Low         Ignore  Low
  
```


HP2623A to HP2930 Series With Serial Interface



HOST CONFIGURATION:

EXTERNAL DEVICE CONFIGURATION

BaudRate	2400	Parity	None	PrinterCode4	EXT	PrinterNulls	000
XmitPace	None	SRRXmit	NO	SRRInvert	NO	CS(CB)Xmit	YES

PRINTER SETTINGS:

HP Terminal Mode, in the "OTHER SETTINGS" feature of the "Printer" subcategory, should be set to "ON".

```

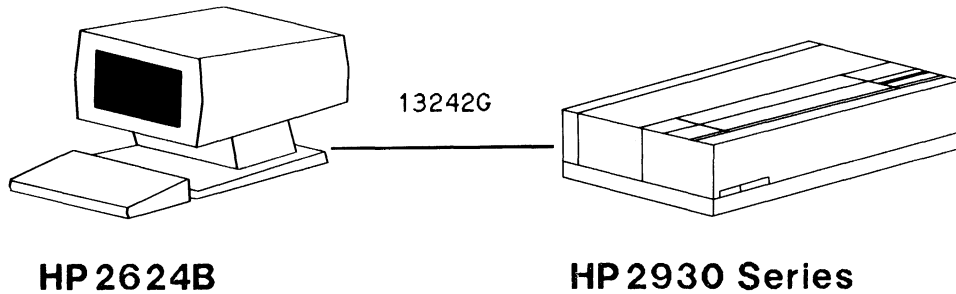
***** SETTINGS *****
***** LIST *****      ***** MODIFY *****
***** PRINTER *****  ***** PRINTER *****
***** INTERFACE *****  ***** INTERFACE *****

***** LIST INTERFACE *****
***** SERIAL *****
***** DATA SETTINGS *****  CONTROL SETTINGS  SET DEFAULTS

***** DATA SETTINGS *****
BAUD RATE  DATA BITS  PARITY  PARITY CHECK  STRIP NULL/DEL  ALL
2400       8          none   off           off             off

***** CONTROL SETTINGS *****
XON/XOFF  END/ACK  BINARY END/ACK  DTR/CD  (S)RTS/SCA  CTS/CB  RS/CH
off       off   off           Busy=Low  Low         ignore  Low
    
```


HP2624B to HP2930 Series With Serial Interface



HOST CONFIGURATION:

FULL DUPLEX HARDWIRED PORT 2

BaudRate	2400	Parity	None	DataBits	8	BufSize	255	Clk	INT
Asterisk	OFF	Chk Parity	NO	StopBits	1	EnqAck	NO		
TR(CD)	HI			SR(CH)	HI	StripNulDel	YES		
RecvPace	None			SRRXmit	NO	RR(CF)Recv	NO		
XmitPace	Xon/Xoff			SRRInvert	NO	CS(CB)Xmit	NO		

PRINTER SETTINGS:

HP Terminal Mode, in the "OTHER SETTINGS" feature of the "Printer" subcategory, should be set to "ON".

```

***** SETTINGS *****
***** LIST *****          ***** MODIFY *****
PRINTER INTERFACE          PRINTER INTERFACE

***** LIST INTERFACE *****

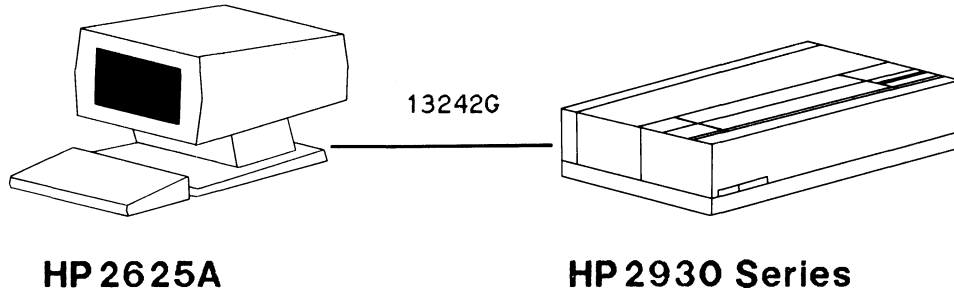
SERIAL

DATA SETTINGS          CONTROL SETTINGS          SET DEFAULTS

***** DATA SETTINGS *****
BAUD RATE          DATA BITS          PARITY          PARITY CHECK          STRIP NULL/DEL          ALL
2400              8              none              off              off

***** CONTROL SETTINGS *****
XON/XOFF          ENQ/ACK          BINARY ENQ/ACK          DTR/CD          (S)RTS/SCA          CTS/CB          RS/CH
on              off              off              High              Low              Ignore              Low
    
```


HP2625A to HP2930 Series With Serial Interface



HOST CONFIGURATION:

FULL DUPLEX HARDWIRED Port 2

BaudRate	2400	Parity	None	DataBits	8	Clock	INT
Asterisk	Off	Check Parity	No	Stop Bits	1	EnqAck	No
TR(CD)	Hi	SRRXmit	No	SR(CH)	Lo	RR(CF)Recv	No
RecvPace	None	SRRInvert	No	RR(CF)Recv	No	CS(CB)Xmit	No
XmitPace	Xon/Xoff	DM(CC)Xmit	No				

PRINTER SETTINGS:

HP Terminal Mode, in the "OTHER SETTINGS" feature of the "Printer" subcategory, should be set to "ON".

```

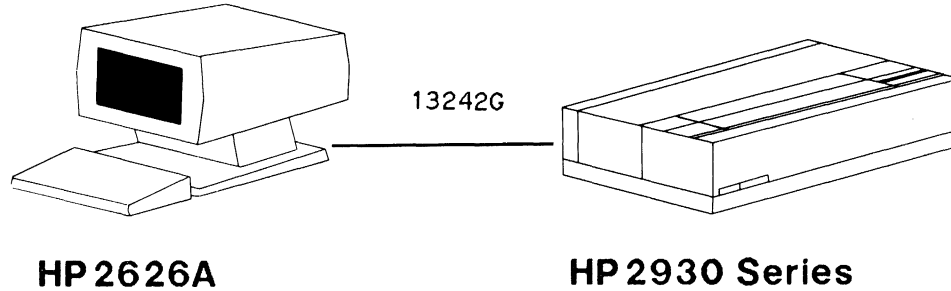
***** SETTINGS *****
***** LIST *****          ***** MODIFY *****
***** PRINTER *****      ***** PRINTER *****
***** INTERFACE *****    ***** INTERFACE *****

***** LIST INTERFACE *****
                               SERIAL
                               DATA SETTINGS      CONTROL SETTINGS      SET DEFAULTS

***** DATA SETTINGS *****
BAUD RATE  DATA BITS  PARITY  PARITY CHECK  STRIP NULL/DEL  ALL
  2400         8        none    off           off

***** CONTROL SETTINGS *****
XON/XOFF   ENQ/ACK  BINARY ENQ/ACK  DTR/CD  (S)RTS/SCA  CTS/CB  RS/CH
  on        off    off           High    Low         Ignore  Low
    
```


HP2626A to HP2930 Series With Serial Interface



HOST CONFIGURATION:

FULL DUPLEX HARDWIRED #2

BaudRate	2400	Parity	NONE	DataBits	8	BufSize	128	XmitClkSource	Int
Asterisk	OFF	Chk Parity	NO	StopBits	1	EnqAck	NO	RecvClkSource	Int
TR(CD)	HI			SR(CH)	HI	StripNulDel	YES	XmitClkOut	x16
RecvPace	None			SRRXmit	NO	RR(CF)Recv	NO	ExtClkIn	x16
XmitPace	Xon/Xoff			SRRInvert	NO	CS(CB)Xmit	NO		

PRINTER SETTINGS:

HP Terminal Mode, in the "OTHER SETTINGS" feature of the "Printer" subcategory, should be set to "ON".

```

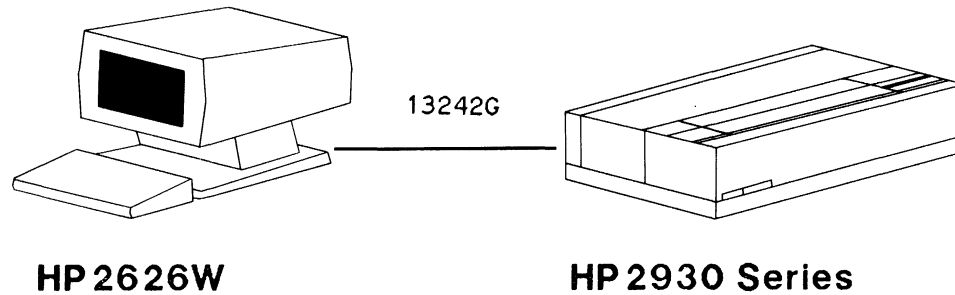
***** SETTINGS *****
***** LIST *****
PRINTER INTERFACE          ***** MODIFY *****
                              PRINTER INTERFACE

***** LIST INTERFACE *****
                              SERIAL
                              DATA SETTINGS    CONTROL SETTINGS    SET DEFAULTS

***** DATA SETTINGS *****
BAUD RATE    DATA BITS    PARITY    PARITY CHECK    STRIP NULL/DEL    ALL
  2400         8         none         off         off

***** CONTROL SETTINGS *****
XON/XOFF    ENQ/ACK    BINARY ENQ/ACK    DTR/CD    (S)RTS/SCA    CTS/CB    RS/CH
  on         off         off         High         Low         Ignore     Low
    
```


HP2626W to HP2930 Series With Serial Interface



HOST CONFIGURATION:

FULL DUPLEX HARDWIRED #2

BaudRate	2400	Parity	NONE	DataBits	8	BufSize	128	XmitClkSource	Int
Asterisk	OFF	Chk Parity	NO	StopBits	1	EngAck	NO	RecvClkSource	Int
TR(CD)	HI			SR(CH)	HI	StripNulDel	YES	XmitClkOut	x16
RecvPace	None			SRRXmit	NO	RR(CF)Recv	NO	ExtClkIn	x16
XmitPace	Xon/Xoff			SRRInvert	NO	CS(CB)Xmit	NO		

PRINTER SETTINGS:

HP Terminal Mode, in the "OTHER SETTINGS" feature of the "Printer" subcategory, should be set to "ON".

```

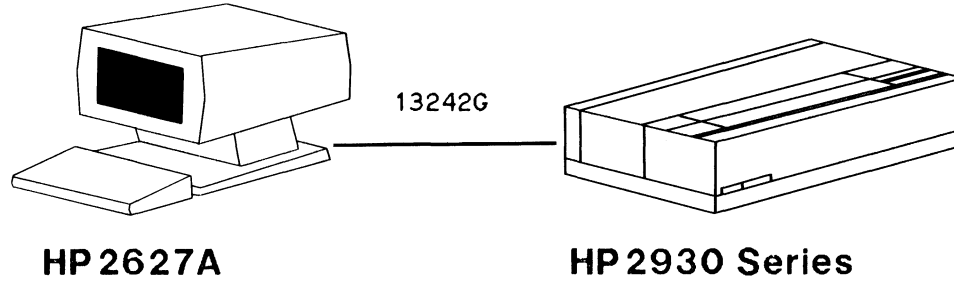
***** SETTINGS *****
***** LIST *****          ***** MODIFY *****
PRINTER  INTERFACE          PRINTER  INTERFACE

***** LIST INTERFACE *****
                                SERIAL
                                DATA SETTINGS  CONTROL SETTINGS  SET DEFAULTS

***** DATA SETTINGS *****
BAUD RATE  DATA BITS  PARITY  PARITY CHECK  STRIP NULL/DEL  ALL
    2400         8         none     off             off

***** CONTROL SETTINGS *****
XON/XOFF  ENQ/ACK  BINARY ENQ/ACK  DTR/CD  (S)RTS/SCA  CTS/CB  RS/CH
    on       off         off         High     Low          Ignore   Low
    
```


HP2627A to HP2930 Series With Serial Interface



HOST CONFIGURATION:

EXTERNAL DEVICE CONFIGURATION

BaudRate	2400	Parity	None	GraphContent	B&W	PrinterNulls	000
XmitPace	None	SRRXmit	NO	SRRInvert	NO	CS(CB)Xmit	YES

PRINTER SETTINGS:

HP Terminal Mode, in the "OTHER SETTINGS" feature of the "Printer" subcategory, should be set to "ON".

```

***** SETTINGS *****
***** LIST *****          ***** MODIFY *****
PRINTER      INTERFACE      PRINTER      INTERFACE

***** LIST INTERFACE *****

                SERIAL

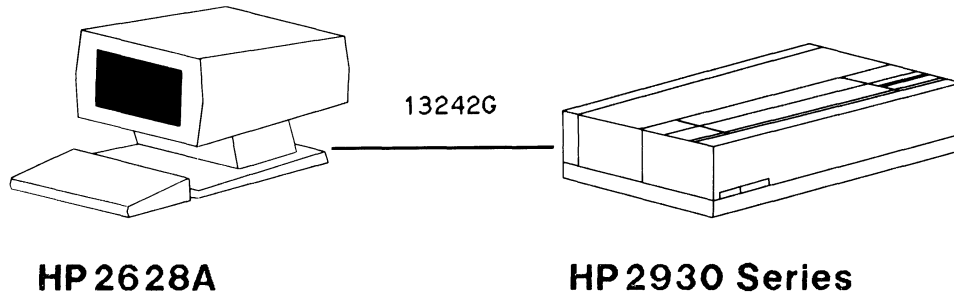
          DATA SETTINGS      CONTROL SETTINGS      SET DEFAULTS

          ***** DATA SETTINGS *****
BAUD RATE  DATA BITS  PARITY  PARITY CHECK  STRIP NULL/DEL  ALL
   2400         8      none      off           off

          ***** CONTROL SETTINGS *****
XON/XOFF  ENQ/ACK  BINARY ENQ/ACK  DTR/CD  (S)RTS/SCA  CTS/CB  RS/CH
  off      off      off      Busy=Low  Low      Ignore  Low

***** END OF SETTINGS *****
    
```


HP2628A to HP2930 Series With Serial Interface



HOST CONFIGURATION:

FULL DUPLEX HARDWIRED Port 2

BaudRate	2400	Parity	None	DataBits	8	EnqAck	No	Clock	INT
Asterisk	Off	Check Parity	No	Stop Bits	1				
TR(CD)	Hi			SR(CH)	Lo				
RecvPace	None			SRRXmit	No	RR(CF)Recv	No		
XmitPace	Xon/Xoff			SRRInvert	No	CS(CB)Xmit	No	DM(CC)Xmit	No

PRINTER SETTINGS:

HP Terminal Mode, in the "OTHER SETTINGS" feature of the "Printer" subcategory, should be set to "ON".

```

***** SETTINGS *****
***** LIST *****          ***** MODIFY *****
PRINTER INTERFACE          PRINTER INTERFACE

***** LIST INTERFACE *****

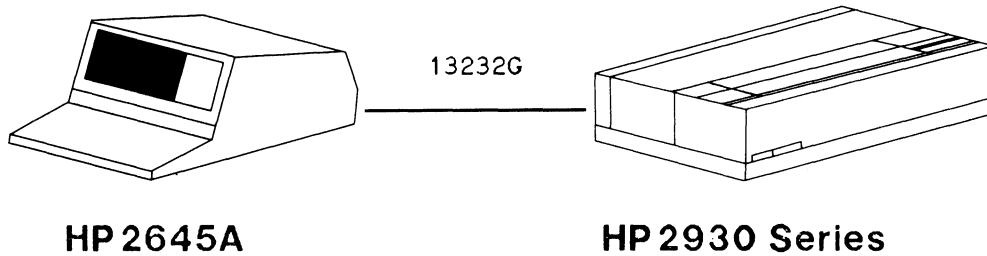
SERIAL

DATA SETTINGS          CONTROL SETTINGS          SET DEFAULTS

***** DATA SETTINGS *****
BAUD RATE          DATA BITS          PARITY          PARITY CHECK          STRIP NULL/DEL          ALL
2400                8                none           off                   off

***** CONTROL SETTINGS *****
XON/XOFF          ENQ/ACK          BINARY ENQ/ACK          DTR/CD          (S)RTS/SCA          CTS/CB          RS/CH
on                off              off                    High           Low                 Ignore         Low
    
```


HP2645A to HP2930 Series With Serial Interface



HOST CONFIGURATION:

1. 13261A Device Support ROM must be installed. (Already installed on units with cartridge tape drives or presently using a printer or plotter.)
2. 13250A or 13250B accessory must be installed in terminal. Refer to illustration on the following page for necessary switch settings on this interface accessory.

PRINTER SETTINGS:

HP Terminal Mode, in the "OTHER SETTINGS" feature of the "Printer" subcategory, should be set to "ON".

```

***** SETTINGS *****
***** LIST *****          ***** MODIFY *****
***** PRINTER *****      ***** INTERFACE *****

***** LIST INTERFACE *****
                SERIAL
          DATA SETTINGS      CONTROL SETTINGS      SET DEFAULTS

          ***** DATA SETTINGS *****
BAUD RATE  DATA BITS  PARITY  PARITY CHECK  STRIP NULL/DEL  ALL
    9600         7      even      on             off

          ***** CONTROL SETTINGS *****
XON/XOFF  END/ACK  BINARY END/ACK  DTR/CD  (S)RTS/SCA  CTS/CB  RS/CH
  off      off      off      Busy=Low  Busy=Low  Ignore  Low
    
```

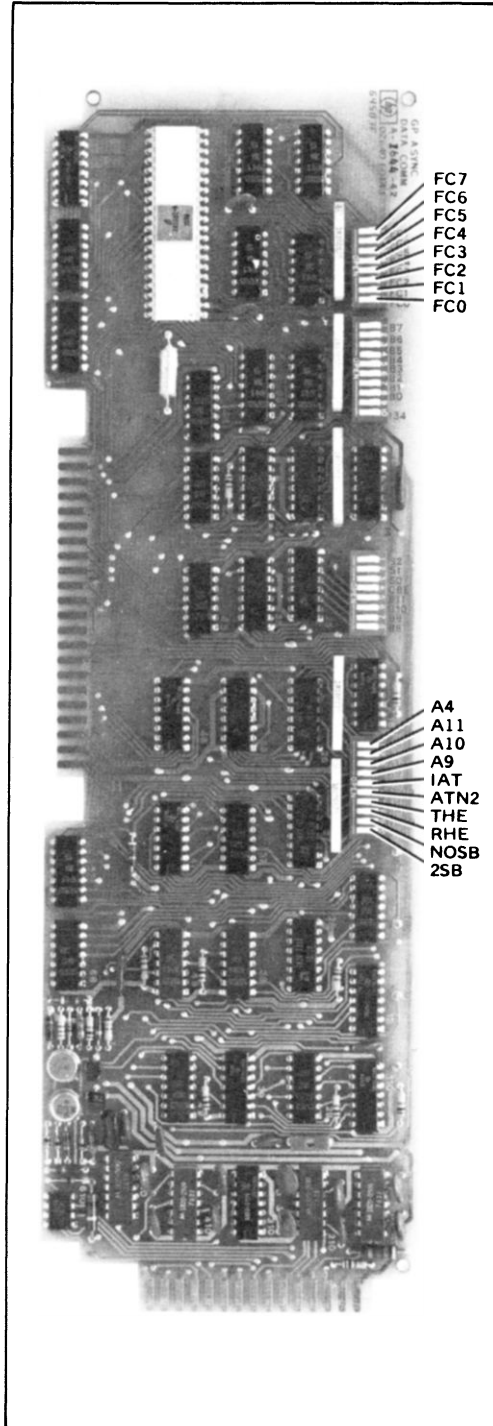
13250A/B

- FC7 - 0 Closed
- FC6 - 0 Closed
- FC5 - 0 Closed
- FC4 - 0 Closed
- FC3 - 1 Open
- FC2 - 1 Open
- FC2 - 1 Open
- FC1 - 1 Open
- FC0 - 1 Open

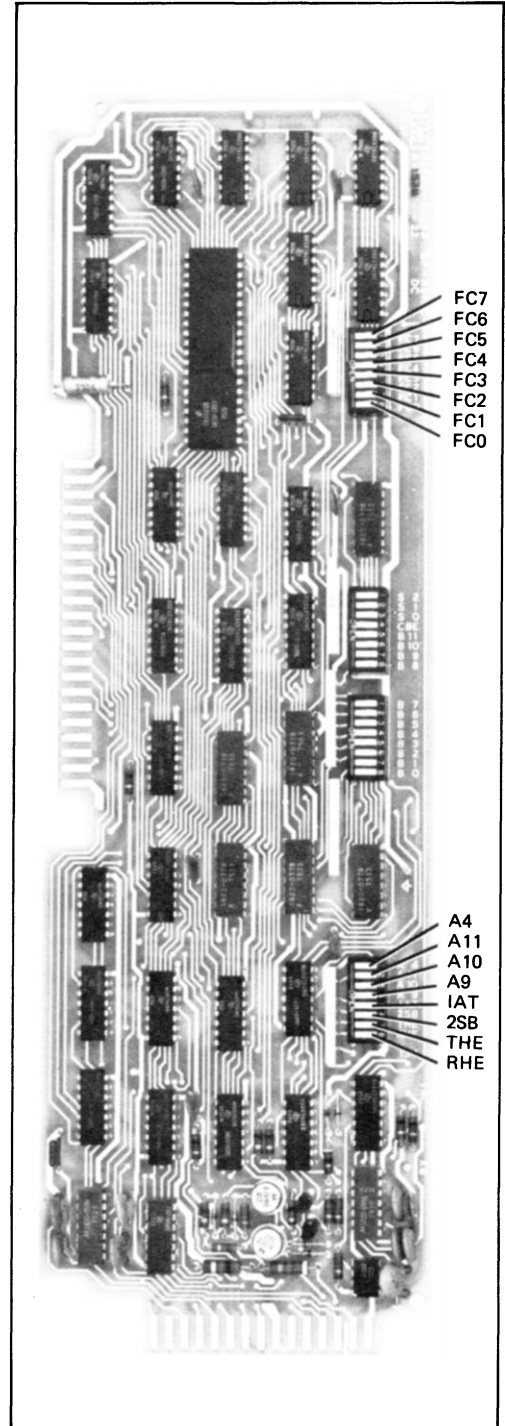
- A4 - 1 Open
- A11 - 0 Closed
- A10 - 1 Open
- A9 - 0 Closed

- IAT - 1 Open
- 2SB - 1 Open
- THE - 1 Open
- RHE - 1 Open

- (02640 - 60143)
- ATN2 - 1 Open
- NOSB - 1 Open

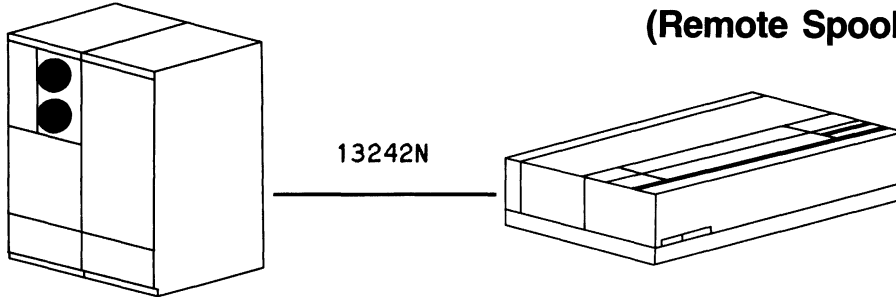


02640-60143 PCA Switch Locations



02640-60089 PCA Switch Locations

HP3000 4X, 6X, Series III to HP2930 Series With Serial Interface (Remote Spooled Only)



HP 3000 4X, 6X, Series III (MPE 4)

HP 2930 Series

HOST CONFIGURATION:

MPE CONFIGURATION:

```
LDEV? (provided by customer engineer)
DRT? (provided by customer engineer)
UNIT? (provided by customer engineer)
SOFTWARE CHANNEL? 0
TYPE? 32
SUBTYPE? 14 or 15
TERM TYPE? 19
SPEED? 240
REC WIDTH? 66
OUTPUT DEVICE? 0
ACCEPT JOB/SESSIONS? NO
ACCEPT DATA? NO
INTERACTIVE? NO
DUPLICATIVE? NO
INITIALLY SPOOLED? YES
DRIVER NAME? HIOASLPO (for use with ATP)
                HIOTERMO (for use with ADCC)
                IOTERMO (for use with Series III)
DEVICE CLASSES? (user's choice)
```

PRINTER SETTINGS:

```
***** SETTINGS *****

***** LIST *****          ***** MODIFY *****
PRINTER  INTERFACE          PRINTER  INTERFACE

***** LIST INTERFACE *****

SERIAL

DATA SETTINGS          CONTROL SETTINGS          SET DEFAULTS

***** DATA SETTINGS *****
BAUD RATE  DATA BITS  PARITY  PARITY CHECK  STRIP NULL/DEL  ALL
2400      7          odd      on          off

***** CONTROL SETTINGS *****
XON/XOFF  ENQ/ACK  BINARY ENQ/ACK  DTR/CD  (S)RTS/SCA  CTS/CB  RS/CH
on        off      off          High    Low          Ignore  Low
```


SOFTWARE APPLICATIONS

**SOFTWARE
APPLICATIONS**

PART 4 — SOFTWARE APPLICATIONS

USING THE HP2934A WITH HPWORD

NOTE: The information contained in this note applies only to revision 02.01 and later of HPWord.

The HP2934A may be used as a printer with HPWord by emulating an HP2601A Daisy wheel printer. The HP2934A can operate in a “WP” (word processing) mode which closely matches the operation of the HP2601A. As an attended printer, the HP2934A may be directly connected to the HP3000 or connected to Port 2 on an HPWord terminal.

The following HP2934A character cartridges are required for use with HPWord:

92188M	Prestige Pica
92188N	Prestige Elite 12

Other HP2934A character cartridges that may be used with HPWord:

92188H	Italic 10
92188J	Italic 12

Your Office Products Coordinator can assist you in making the best use of the HP2934A with HPWord.

Hooking Up Your printer

Slaved Off HPWord Terminal

Refer to Section 2, Part 3 — Configuring Serial Printer and Host. Use either HP2626W to HP2930 Series or HP2628A to HP2930 Series.

Configuring HPWord

The HP2934A should be configured as an HP2601A within HPWord. Note that HPWord has no way of determining that in fact an HP2934A is connected. Therefore, it is important that the HP2934A be configured into HPWord very carefully. For instance, the HP2934A uses only tractor feed (where the HP2601A allows several types of paper feed) and the HP2934A does not use a proportional spaced environment. The following menu describes the necessary configuration that can be performed by your Office Products Coordinator to add an HP2934A:

:Run HPWORD.PUB.SYS,WORDUTIL

HP32120A.02.01 HPWORD (C) HEWLETT-PACKARD CO. 1982, 1983

Select task:Config

File Name: (WORDCONF.WP.HPOFFICE) <cr>

HPWORD RIN: (16) <cr>

>Add Printer NEW2934

Type of Printer: (2617) 2601

Device Number: <ldn or
devclass>

Is This Printer Slaved? (NO) <as needed>

Attending Terminal: (67) <ldn>

Type of Paper Feed: (MANUAL) Tractor

Standard Form: (plain bond) <cr>

Special Form: (letterhead) //

10-Pitch Environment: (PICA01) <cr>

12-Pitch Environment: (ELITE01) <cr>

Proportional Environment: (PROP01) ELITE01

>Modify Station <ldn>

Is This Station Remote? (NO) <as needed>

Printer 1: (FIRSTP) <cr>

Printer 2: (SECONDP) <cr>

Printer 3: (//) NEW2934

Printer 4: (//) <cr>

>Save

File Name: (WORDCONF.WP.HPOFFICE) <cr>

File Saved.

Queue Files Created.

>Exit

Select task:Exit

END OF PROGRAM

:Bye

If replacing a 2601A printer, delete the 2601A from the configuration and perform the selections as noted above in Configuring HPWord. REMEMBER:

- Use only Pica01 and Elite01 environments
- DO NOT select proportional space environment, it WILL NOT WORK
- DO NOT select manual feed, dual bin or single bin, it WILL NOT WORK

COMMENTS

█ Name Printer Here

█ Enter ldn or devclass here

█ Yes or No

█ Attender's ldn

█ These are only supported environments.

█ No Prop. Spacing

█ Attending Terminal

█ Yes or No

█ Any other

█ printers configured

Configuring the HP2934A to “WP” Mode for HPWord

The HP2934A printer allows many features to be defined from the front panel through the SETTINGS mode. Changing the HP2934A to “WP” mode should be done only the first time the HP2934A is used with HPWord since this setting will be retained by the printer even when the printer is turned off.

To place the printer in “WP” mode:

1. Turn on the printer.
2. Press **SELECT** then **VIEW** and the printer will print the SETTINGS menu.
3. Press **|||** to position the print head under “PRINTER” of the Modify category of the menu.
4. Press **SELECT** and the printer will print the feature menu.
5. Press **|||** to position the print head under the “OTHER SETTINGS” feature.
6. Press **SELECT** and the printer will print the option menu.
7. Press **|||** to position the print head under “SUPPORT MODE” option.
8. Press **SELECT** and the printer will print the “SUPPORT MODE” choices.
9. Press **|||** to position the print head under “WP”.
10. Press **SELECT** to choose “WP” Mode.
11. Press **VIEW** to exit SETTINGS mode.

Usage and Limitations of the HP2934A on HPWord

The HP2934A used as an attended printer in “WP” mode will operate very much like an HP2601. Important differences are:

1. **ROMAN8 EXTENSION CHARACTERS** — HPWord documents must not contain ROMAN8 extension characters if the document is to be printed in “WP” mode on an HP2934A. Attempting to print such characters will cause the printer to operate unpredictably. If this occurs, press **RESET** to reset the HP2934A.
2. **INTERRUPTING AN HP2934A** — press the **ON LINE** key (which turns off the indicator light above the key) to stop printing; to resume printing press the **ON LINE** key again.
3. **PAPER HANDLING** — the HP2934A uses only tractor feed paper. Therefore other paper handling options such as manual feed, Single Bin, Dual Bin and envelopes cannot be used and should not be selected in any of the HPWord menus.
4. **PROPORTIONAL SPACE** — this feature is not implemented on the HP2934A when used with HPWord. The proportional space option should not be selected in either the HPWord Document Format menu or the Print Document menu.

Configuring Printer and Host

- 5. ALIGN TOP OF FORM** — the first print line may be easily adjusted to fit your application. Refer to “Setting Top of Form” in Section 1.
- 6. CHANGING PRINT WHEELS** — The HP2934A has no print wheels since it is a multi-pass dot matrix printer that uses character cartridges to change print pitch or style. Each character cartridge takes the place of a print wheel.

Changing Print Pitch or Style

Prior to printing with HPWord, you must select the character cartridge to be used by your HP2934A. Refer to “Using the Character Cartridge” in Section 1 for instructions on installing the character cartridge.

To select your character cartridge:

- Press **PRINT STYLE** and the print head will move to the right and stop under the indicator corresponding to the active character font in use.
- Press **||** or **||** to move the print head under the indicator which corresponds to the slot the desired character cartridge is in. Do not select either of the standard (STD) character fonts, they **WILL NOT WORK**.
- Each indicator has 2 positions under it which correspond to 67 CPS print quality (leftmost stop under each of the character cartridge label indicators) and 40 CPS print quality (rightmost stop). Choose the desired print speed and quality by pressing **SELECT**.

During Printing:

The printer will “beep” and the print attention indicator will flash if you are required to change the print pitch or style while printing a document.

- Press the **BREAK** key on your terminal “Change the printer wheel to _____ “ (Elite 12, Elite 12 Italic, Pica, or Pica 10 Italic) will appear on your screen.
- Proceed as above to select the character cartridge on your HP2934A.
- Press the Wheel Changed soft key on your terminal.

The printer will resume printing in the print pitch/style chosen.

PROGRAMMING



Important

Hewlett-Packard has standardized its features and control sequences, and has selected the following features for printers. These feature sets have been organized into four categories: features for convenience level printers, EDP/transaction level printers, document or word processing level printers, and page level printers. Each successive level of printer contains a unique set of new features plus all the features of the previous levels, from the lowest level (convenience printer) to the highest level (page printer).

The 2932A is an EDP/transaction level printer, and the 2933/34A is a document level printer; therefore the convenience, transaction, and document level features used in the 2930 Series printers are described in this section. The 2930 Series printers also contain features for backwards compatibility with the 2630 Series printers. Compatibility features are listed in the Appendix at the back of this manual. However, to ensure both compatibility of your applications with all printers of the level in which your application is written, and also forward compatibility with future printers, it is recommended that only the features listed in this section be used for new applications.

PRINTER COMMANDS

Printer commands discussed in this chapter appear in the form of escape sequences which are sent from the host device to the printer. Escape sequences select volatile features. These selections can be replaced by other escape sequences, by keypad selections, or they may be lost at hard reset or power on. The following paragraphs outline some of the main characteristics of escape sequence commands:

Escape Sequence Commands

NOTE

Spaces imbedded in the escape sequences contained in this manual have been added for clarity only.

Escape sequences contained in this manual are USASCII characters which can be incorporated into programming languages such as BASIC, PASCAL, etc. The method for generating escape sequences depends on the host device as well as the programming language used. It is assumed that users of this section have programming experience.

There are three types of escape sequences: two character, multiple character (also called parameterized), and binary. An escape sequence is composed of some or all of the following elements:

- The ASCII escape character ESC.
- A Prefix, comprised of two characters which define the general type of escape sequence (prefixes are found in multiple character escape sequences only).

Programming

- A Parameter (or Value), which appears right before the delimiter and specifies the exact meaning of the command. The parameter may be any decimal digit from 0 to 9 (parameters are found in multiple character escape sequences only). Note: In some escape sequences parameter values can be 0 to 9999. In addition, for some escape sequences, the parameter may be preceded by a + or - (plus or minus).
- A Delimiter which specifies a general command. Delimiters contained within an escape sequence are lower case alpha characters (delimiters are found in multiple character escape sequences only).
- A Terminator, always the last delimiter in a string of commands, which signals the end of the escape sequence. In a two character escape sequence the terminator is the second character in the escape sequence. In a multiple character escape sequence, the terminator is an upper-case letter.
- Binary data may follow the terminator character in some escape sequences. The number of data bytes which follow is specified in the parameter (value) field.
- Binary data is enclosed within < >. The <text> format is used in large character printing and bar code printing (2933/34A).

The following examples will provide additional explanation.

Example 1: ESC E is a two character escape sequence.

If the character following the escape is in the range 3/0 through 7/14 (0 through ~ on the Roman 8 symbol set chart) it is interpreted as a two character sequence.

Example 2: ESC & k 2 S is a parameterized escape sequence.

ESC & k, the prefix, indicates that the sequence is used to set a latching function.

2, the parameter, in conjunction with S, the delimiter, specifies compressed printing mode.

Example 3: ESC * b 5 W [binary data] 8-bit binary bytes. Binary transfers follow certain parameterized escape sequences.

ESC * b, the prefix, indicates that the sequence is a raster graphics binary transfer.

5, the value, in conjunction with W, the terminator, indicates five bytes of binary data will follow.

Example 4: ESC * c 5 M <text> Z is parameterized with binary data.

ESC * c, the prefix, indicates a large character transfer.

5, the value, in conjunction with M, the delimiter, indicates the large characters will be five times the normal character height (i.e. 60 dots high).

Text in conjunction with < >, and Z, the terminator, indicates binary data will follow where text is the binary data to be printed.

Parameters are optional and may be omitted. If a command is sent without specifying the parameter, the printer will set the value of the parameter at 0 (zero). If a parameter is specified in a command that does not require one, the printer will ignore the parameter.

COMBINING PARAMETERIZED ESCAPE SEQUENCES

Several commands with the same prefix may be combined into a single sequence, as in the example below. To combine escape sequences, begin the sequence with ESC and the rest of the shared prefix, then append the remaining characters from each command. The delimiters of the combined commands must appear in lower case, with the exception of the last delimiter, which must be in upper case, because it serves as the terminator for the sequence.

ESC & 1 66 P ESC & 1 60 F ESC & I 1 L
 may be combined to form ESC & 1 66 p 60 f 1 L

COMMAND ERRORS

When the printer finds an error in the midst of a combined string of escape sequences, it will stop interpreting the escape sequence and will look for a terminator. As soon as the printer receives a terminator for the string of commands, it will again be able to execute the commands as it receives them.

RECOMMENDED PROGRAMMING FEATURES

Hewlett-Packard printers support the control codes and escape sequences outlined below. Users of 2930 Series printers are encouraged to apply these features. (For reasons of backward compatibility a complete list of 2630 Series supported control codes and escape sequences is located in the back of this manual.)

Control Codes

BS (Back space): Moves the current active position backward one character position of the current pitch, unless already at the left margin.

LF (Line feed): Moves the current active position to the same character position on the next line.

FF (Form feed): Advances the current active position to the same character position in the first line of the next logical form.

CR (Carriage return): Moves the current active position to the first character position on the current line, i.e., the left margin.

SO (Shift out): Invokes the secondary symbol set which remains invoked until receipt of a SI (shift in), power off, or hard reset.

SI (Shift in): Invokes the primary symbol set which remains invoked until receipt of a SO (shift out).

ESC (Escape): Is a prefix for the characters which follow it.

SP (Space): Moves the current active position forward one character position on the pending line.

Specialized Printer Control

NOTE

The “#” inserted in the value field in many of the following escape sequences indicates a value that the user must enter. Also, for the sake of readability, spaces have been added between the alphanumeric characters of the escape sequences. Spaces are not part of the escape sequence, and should be omitted when used.

ESC E: This escape sequence is used to perform a hard reset on the printer. It resets the printer to its configured values, but will not disrupt data communications or discard buffered (unprinted) input data. This feature can be used as a job separator, because upon receiving the ESC E, the printer will do a form feed if it is not already at TOF.

ESC z: This escape sequence initiates self test within the printer. If no error is detected, the printer will remain on-line.

ESC Y: Turns display functions mode on.

ESC Z: Turns display functions mode off. The display functions mode shows all data - including escape sequences and control codes - the printer has received, both operator inputs and system commands. The display functions mode can be entered using the ESC Y. In the display functions mode, the printer prints representative character symbols instead of actually executing control characters. In this mode, the carriage return (CR) control character will cause a CR symbol to be printed and an actual carriage return and line feed to be performed. The display functions mode can be exited by sending an ESC Z sequence, or by pressing the **RESET** key once. The ESC Z will be printed before the mode is terminated. Display functions mode off is the printer default state.

ESC & p # X: This escape sequence prepares the printer to receive the number of bytes specified in the value field (#). This data is printed as though the printer were in display functions mode, except that no control codes or escape sequences are executed (including CR and ESC Y).

OTHER

ESC = Half line feed (2933/34A): Half line feeds can be used for superscripts and subscripts.

Page Formatting Features

The page formatting features of the printer set up the page boundaries for text printing. These boundaries include the logical page length, the text length, and the perforation skip modes. Page formatting defaults are defined in the SETTINGS mode and may be temporarily changed by escape sequences. Modifying page formatting features will override any programmed vertical forms controls (VFC's) with the default VFC settings.

LINE SPACING

The following escape sequences are used to set the line spacing to the value specified in the value field (lines per inch). All other page formatting features are dependent on line spacing.

Example: ESC & l # D Set line spacing
 ESC & l 6 D Set line spacing to 6 lines per inch.

USER DEFINABLE PAGE LENGTH

The logical page length feature allows page length to be specified. Although the SETTINGS mode specifies page length in inches, through escape sequences the page length is specified by number of lines. The printer internally computes page length in inches based on the current line spacing, i.e. 66 lines (page length) divided by 6 lines per inch (line spacing) yields an 11 inch page.

ESC & l # P Set page length (lines per page).

Example: ESC & l 66 P Set page length at 66 lines per page.

TEXT LENGTH

The length of the text to be printed within a logical page is defined by the user. Text length can be set through the SETTINGS mode or by escape sequence.

If the text length specified is greater than the number of lines in the logical page, the printer will ignore the command. If the logical page length is changed, the printer will automatically change the text length to the specified page length less one inch. Through escape sequences the text length is specified by page length minus bottom margin multiplied by lines per inch, i.e. an 11 inch page minus a one inch bottom margin multiplied by 6 lines per inch equals a text length of 60 lines.

Bottom margin is the space remaining when text length is subtracted from page length (see illustration, next page.) If the text length specified is greater than page length, the printer will ignore the command. If the page length is changed to be less than the text length, the printer will automatically change the text length to yield a one-inch bottom margin.

ESC & 1 # F Set text length (lines per form)

Page formatting examples:

ESC & 1 6 D Set line density to 6 lines per inch.

ESC & 1 66 P Set page length to 66 lines (= 11 inches)

ESC & 1 60 F Set text length to 60 lines (bottom margin = 1 inch)

PERFORATION SKIP

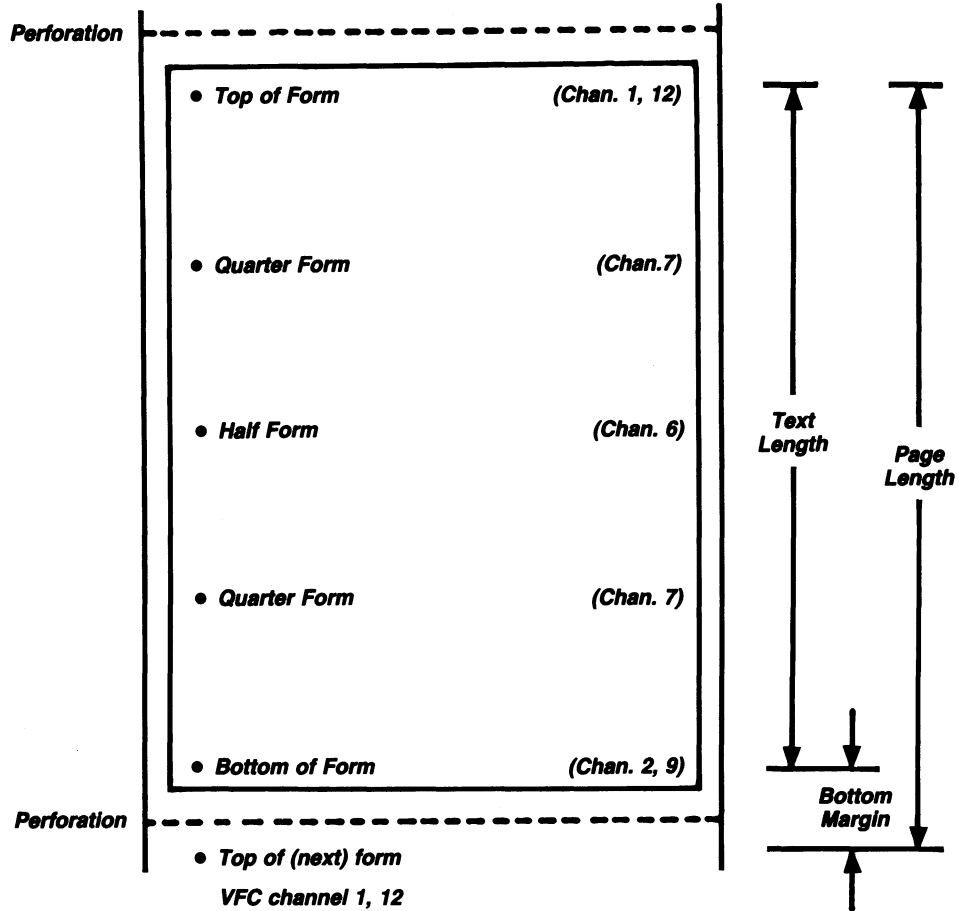
Perforation skip mode formats pages vertically by leaving a margin at the bottom of each page. The following escape sequences control automatic perforation skip mode. A 0 (zero) in the value field turns off perforation skip mode and a "1" turns it on. LF will always cause paper to move a distance equal to the inverse of the current line spacing unless the printer is in perforation skip mode and that motion would result in the current active position entering the perforation region. The perforation region is defined as that area outside the text but within the page. Text length bottom margin definitions are active only when perforation skip is enabled.

Text length and bottom definitions are activated whenever perforation skip is enabled. If a LF would cause paper motion into the bottom margin, an automatic move to the next Top of Form (TOF) will result.

When perforation skip is disabled the bottom margin boundary is ignored, paper motion and printing within the bottom margin can occur. See notes on next page.

ESC & 1 0 L Perforation Skip Disable

ESC & 1 1 L Perforation Skip Enable



Notes:

1. To position the TOF relative to the physical location of the paper perforation, see Section 1.
2. Default bottom margin is one inch.
3. Text length/bottom margin definition is active only when perforation skip is enabled.
4. Only selectable default VFC channels are shown.

Programming

16 CHANNEL VFC

Vertical forms control moves the current active position to the left margin of the next line referenced by the VFC channel selected in the value field. VFC positions are defined by the currently active line spacing.

ESC & 1 # V To select VFC channels 1-16.

The default definition for each of the 16 channels is:

Channel	Definition	Line Number
0	TOF unless at TOF	0
1	Top of Form	0
2	Bottom of Form	BOF
3	Single Space	0, 1, 2, 3 - BOF
4	Double Space	0, 2, 4, 6 - BOF
5	Triple Space	0, 3, 6, 9 - BOF
6	Half Page	0, BOF/2
7	Quarter Page	0, BOF/4, BOF/2, BOF/4
8	Tenth Line	0, 10, 20 - BOF
9	Bottom of Form	BOF
10	Bottom of Form - Minus 1 line	BOF - 1
11	Top of Form - Minus 1 line	TOF - 1
12	Top of Form (same as channel 1)	TOF
13	Seventh Line	0, 7, 14 - BOF
14	Sixth Line	0, 6, 12 - BOF
15	Fifth Line	0, 5, 10 - BOF
16	Fourth Line	0, 4, 8 - BOF

PROGRAMMABLE VFC

The programmable vertical forms control (VFC), when selected, replaces the fixed VFC with a programmable 16-channel VFC. This programmable VFC allows the operator to design special VFC channels for line stop positions.

An escape sequence prepares the printer to receive the number of bytes described in the value field. These bytes are used to program the VFC table, and should immediately follow the terminating character. The maximum byte count in the sequence will be 256. This allows up to 128 lines that are controlled by VFC. (Illegal channels cause a CR-LF.)

ESC & 1 <binary count> W <VFC Data> Prepare printer to receive described value field bytes. (<binary count> divided by 2 equals lines per page.)

When loading the VFC in printers with a serial interface, parity must be set to None, and some communications protocol other than ENQ/ACK must be used.

To program the VFC, VFC data bytes must be sent to the printer. The Programmable VFC Table on the next page shows how these data bytes may be presented. A binary 1 is a VFC stop position and a 0 (zero) allows slewing past that line position. This information is used to form the VFC Data which is sent following the escape sequence.

Two VFC data characters are sent for each line of text. These characters contain the VFC information for the 16 VFC channels for that line. For example, from the table, the first two lines would be sent in the order shown below. (The programmable VFC is replaced by default VFC whenever the page length is changed.)

```

                Line 0
          Byte 1      Byte 2
    11000100      00010011

                Line 1
          Byte 1      Byte 2
    10000011      00010101
    
```

The byte count is the total number of bytes sent which is twice the number of page lines.

PROGRAMMABLE VFC TABLE

	Byte 0								Byte 1							
	VFC CHANNELS															
PAGE LINES	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
0	1	1	0	0	0	1	0	0	0	0	0	1	0	0	1	1
1	1	0	0	0	0	0	1	1	0	0	0	1	0	1	0	1
2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
6	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
120	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
121	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
122	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
123	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
124	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
125	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
126	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
127	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
128	1	1	1	0	0	0	0	0	0	0	0	1	0	0	0	1

Text Formatting Features

The text formatting features of the printer include horizontal and vertical print positioning, left and right margins, print pitch, underlining, and character sets.

UNDERLINING

The printer can underline any line or a portion of a line on command. (The printer underscores text at the same time that it prints the text.) Once underlining is enabled, any text or spaces following will be underlined until explicitly turned off. Underlining will be active during forward horizontal motion, i.e. space, print positioning. It is temporarily disabled during reverse motion, i.e. backspacing, carriage return, print positioning, and during paper moves.

ESC & d D	Enable underlining
ESC & d @	Disable underlining

HORIZONTAL PITCHES (Print Modes)

2932A: The 2932A can print in any of three print pitches: normal (10 characters per inch), compressed (16.36 characters per inch), and expanded (5 characters per inch).

2933/34A: The 2933/34A can print in any of five print pitches: normal, compressed, expanded, 12 cpi, and proportional spacing. (Matrix letter quality (MLQ) printing (67 or 40 cpi) is not available in compressed or expanded print pitches.)

In the normal print mode the maximum line length is 136 characters. Lines containing more characters than the maximum line length will be truncated unless the end-of-line wraparound (ESC & s # C) feature is enabled. The maximum length for a line in the compressed print mode is 223 characters, 68 characters in the expanded mode, and 163 characters when using 12 cpi.

ESC & k 0 S	10 characters per inch (normal)
ESC & k 2 S	16.36 characters per inch (compressed)
ESC & k 1 S	5 characters per inch (expanded)
ESC & k 4 S	12 characters per inch (2933/34A)
ESC & k 9 S	Proportional spacing (2933/34A)

MARGINS

Power-on values of the left and right margins may be set through the SETTINGS mode or temporarily changed by escape sequence command. The margin settings define the first and last character positions of each print line. The printer remembers the margin setting as a physical position of the print head. That is, at the time the margin is defined, its location is determined by the current print pitch. Subsequent changes of print pitch do not move the margins.

The printer will not allow the left margin to be set to the right of the right margin, or the right margin to be set to the left of the left margin. In other words, the order in which the margins are changed may be regulated by the current settings of the margins.

ESC & a # L	Set left margin
ESC & a # M	Set right margin
ESC 9	Clear margins to maximum allowable (136 columns in 10 cpi, 223 columns in 16.36, etc.)

NOTE: Print position and margins are numbered from zero; that is, the left-most printer column is column zero.

PRINT POSITIONING

The horizontal print positioning sequence is used to move the active printing position to a new character position in a line. A plus (+) or minus (-) in front of the value field indicates the new position is relative to the current active position. No sign indicates the new position is absolute. If expanded print pitch is enabled, the print head will skip the amount of space equal to the number of expanded characters per inch, and so on for normal and compressed print pitch. This escape sequence must be reentered for each line indented. The print position may be moved outside of the currently active margins in this manner.

ESC & a # C	Absolute horizontal print positioning
ESC & a + # C	Relative print position to the right of current active position
ESC & a - # C	Relative print position to the left of current active position
ESC & a # H	Absolute horizontal print positioning along the X axis (2933/34A)
ESC & a + # H	Relative print position to the right along the X axis (2933/34A)
ESC & a - # H	Relative print position to the left along the X axis (2933/34A)

The vertical print positioning sequence is used to move the current active position to the same column position on a NEW line. This escape sequence must be reentered for each line affected. The print position may be moved beyond the maximum text length, beyond the current page, or within the bottom margin (defined by perforation skip) in this manner. The plus (+) in front of the value field indicates the new position is relative to (downward from) the current active position. Line positioning begins at column 0 (zero). Vertical positioning will be performed in the positive direction only.

ESC & a # R	Absolute vertical print positioning (positive paper motion only)
ESC & a + # R	Relative print positioned downward of current active position
ESC & a # V	Absolute vertical print positioning along the Y axis (2933/34A)
ESC & a + # V	Relative vertical print positioning downward along the Y axis (2933/34A)

Programming

Examples:

Margins	ESC 9	Clears all margins
	ESC & a 5 1 127 M	Set left margin at 6th column, right margin at 128th column.
Cursor	ESC & a 0 C	Position at first column of current line
	ESC & a +10 C	Position 10 columns to the right of current position.
	ESC & a -1 C	Position 1 column to the left of current position.
	ESC & a +3 R	Move down 3 lines. Do not change the current column position.

FONT DESIGNATION AND ATTRIBUTE SELECTION

A symbol set is a group of symbols which together represent all the letters or symbols of a particular language (such as USASCII) or function (such as Line Drawing or Math Symbols). Symbol sets can be selected through the SETTINGS mode, or by sending escape sequences.

Recommended printer features include these symbol sets: ROMAN8, LINE DRAWING, MATH, and KANA8. Symbol sets can be changed either through SETTINGS mode or by escape sequence command. (7-bit ISO substitution sets for 263X compatibility are located in the Appendix.)

A character code received by the printer will cause the printer to print the symbols of the active symbol set.

Set Designation

Two sets may be designated at any time within the printer: primary and secondary. To designate the primary symbol set use ESC (# ID. (# and ID designate language.)

```
ESC ( 8 U Select Roman8 as primary
ESC ) 0 L Select Line Draw as secondary
ESC ( 8 K Select Kana8 as primary
ESC ) 0 M Select Math as secondary
ESC ( 0 O Select OCR A as primary (2933/34A)
ESC ) 1 O Select OCR B as secondary (2933/34A)
ESC ( 8 G Select Greek8 as primary (2933/34A)
ESC ) 8 H Select Hebrew8 as secondary (2933/34A)
ESC ( 0 H Select Hebrew7 as primary (2933/34A)
ESC ) 8 T Select Turkish8 as secondary (2933/34A)
ESC ( 8 V Select Arabic8 as primary (2933/34A)
```

Set Selection

The primary symbol set is the symbol set in effect at power on. The secondary symbol set is invoked when the shift-out (SO) control code appears amid the data; symbols generated following the shift-out symbol will be from the secondary set. The shift-in control code is interpreted to mean "shift into primary," while the shift-out control code is interpreted to mean "shift out of primary." A shift-in (SI) control code will return you to the primary symbol set.

Roman8 provides all of the USASCII and Roman Extension symbols. Kana8 provides JISASCII and Katakana symbols. The Line Drawing symbol set helps you to create forms. When controlled by a device that supports the Line Drawing symbols set, the printer can reproduce a representation of the forms which you create on the screen, using the same symbol codes and shift-in/shift-out instructions.

Valid Symbol Set Selections

Primary	Secondary	Set
ESC (0 M	ESC) 0 M	Math
ESC (0 L	ESC) 0 L	Line Draw
ESC (8 U	ESC) 8 U	Roman8
ESC (8 K	ESC) 8 K	Kana8
ESC (8 G	ESC) 8 G	Greek8 (2933/34A)
ESC (8 H	ESC) 8 H	Hebrew8 (2933/34A)
ESC (0 H	ESC) 0 H	Hebrew7 (2933/34A)
ESC (8 T	ESC) 8 T	Turkish8 (2933/34A)
ESC (8 V	ESC) 8 V	Arabic8 (2933/34A)

Attribute Selection

Each of the following font attributes may be independently designated to the primary and secondary character sets. When the primary set is enabled all of the attributes designated to it are enabled also. When the printer is “shifted out” to the secondary set, the attributes designated to the secondary set are enabled.

For example: The following two escape sequences are sent to the printer.

- ESC (s 10 H Select 10 characters per inch as the pitch of the primary symbol set.

- ESC) s 16.36 H Select 16.36 characters per inch as the pitch of the secondary symbol set.

The printer is then sent data and begins printing in the primary symbol set at 10 cpi. When a “shift out” is encountered the printer switches to the secondary character set and continues printing. The print pitch is now 16.36 cpi.

Character Set Typeface

Designates font typeface. Typeface is a variation of one basic style of font. If the requested typeface is not present this attribute is ignored during font designation. See below. (Examples of these typefaces can be found in the Appendix.)

Value	Typeface	2932A	2933/34A
0	Cubic	X	X
3	Courier	X	X
4	Helv		X
6	Gothic		X
8	Prestige		X
10	Orator		X

ESC (s # T	Primary typeface
ESC) s # T	Secondary typeface

Character Set Pitch

The value field in the escape sequence specifies the pitch in characters per inch. If the size specified is not available in the designated font the next larger pitch (more characters per inch) will be designated. If a larger pitch does not exist the next smaller pitch will be selected. This pitch is superceded when proportional spacing is activated and available in the requested symbol set.

ESC (s # H Designate primary character set pitch
ESC) s # H Designate secondary character set pitch

Character Set Proportionally Spaced (2933/34A)

A 0 (zero) in the value field, the default state, specifies that a mono-spaced symbol set is designated. A 1 in the value field specifies that a proportionally spaced symbol set is designated.

ESC (s 1 P Designate primary character set proportionally spaced on
ESC (s 0 P Designate primary character set proportionally spaced off
ESC) s 1 P Designate secondary character set proportionally spaced on
ESC) s 0 P Designate secondary character set proportionally spaced off

Character Set Density (2933/34A)

Designates print density. Density does not affect the graphics representation of the font, rather it specifies the quality of the printed graphics representation. If the requested density is not present then the density which has the closest fit is designated.

Value	Quality
0	200 cps - Data processing quality
1	67 cps - Matrix-letter quality (10/12 cpi only)
2	40 cps - Improved matrix letter quality (10/12 cpi only)

ESC (s # Q Designate primary character set density
ESC) s # Q Designate secondary character set density

Character Set Style (2933/34A)—Italics

Designates font style. A 0 (zero) in the value field, the default state, specifies that an upright font is to be designated and a 1 in the value field specifies that an italic font is to be designated, if this cartridge is present. If the requested style is not present then this attribute is ignored during font designation.

ESC (s 1 S Designate primary character set style on
ESC (s 0 S Designate primary character set style off
ESC) s 1 S Designate secondary character set style on
ESC) s 0 S Designate secondary character set style off

Parameterized Font Designation Process

These five steps are performed in the following priority by the printer when evaluating font designation escape sequences:

1. If the requested symbol set exists then that symbol set is designated; if not then ignore this attribute. ESC (# I D
2. If proportional spacing is requested and is available in this symbol set then proportional spacing is designated, ESC (s # P; else if the print pitch requested is available in this symbol set and typeface then this print pitch is designated. If the requested pitch is not available then the next largest print pitch is designated. If a larger print pitch is not available then the next smallest print pitch is designated. ESC (s # H
3. If italics is requested and available in the symbol set, typeface, pitch, then italics is designated; if not then this attribute is ignored. ESC (s # S
4. If the requested typeface is available in the symbol set then that typeface is designated; if not then this attribute is ignored. ESC (s # T
5. If the requested density is not available, designate the closest density available in the symbol set, pitch, style and typeface. ESC (s # Q

The following examples illustrate this priority scheme.

```

Esc(8UEsc(s10h3t1Q = This is an example of Courier 10 at 67 cps
Esc(8UEsc(s12h3t2Q = This is an example of Courier 12 at 40 cps
Esc(8UEsc(s10h1s0t1Q = This is an example of Italic 10 at 67 cps
Esc(8UEsc(s12h1s0t2Q = This is an example of Italic 12 at 40 cps
Esc(8UEsc(s12h6t1Q = This is an example of Letter Gothic at 67 cps
Esc(8UEsc(s10h8t2Q = This is an example of Prestige Pica at 40 cps
Esc(8UEsc(s12h8t1Q = This is an example of Prestige Elite at 67cps
Esc(8UEsc(s10h4t2Q = This is an example of Helv at 40 cps
Esc(00Esc(s10h3t1Q = This is an example of OCR A at 67 cps
Esc(10Esc(s10h3t2Q = This is an example of OCR B at 40 cps
Esc(8GEsc(s10h3t1Q = This will select Greek8 at 67 cps
Esc(8GEsc(s10h3t2Q = This will select Greek8 at 40 cps
Esc(8HEsc(s10h3t1Q = This will select Hebrew8 at 67 cps
Esc(8HEsc(s10h3t2Q = This will select Hebrew8 at 40 cps
Esc(0HEsc(s10h3t1Q = THIS WILL SELECT HEBREW7 AT 67 CPS
Esc(0HEsc(s10h3t2Q = THIS WILL SELECT HEBREW7 AT 40 CPS
Esc(8TEsc(s10h3t1Q = This will select Turkish8 at 67 cps
Esc(8TEsc(s10h3t2Q = This will select Turkish8 at 40 cps
Esc(8VEsc(s10h3t1Q = This will select Arabic8 at 67 cps
Esc(8VEsc(s10h3t2Q = This will select Arabic8 at 40 cps
Esc(0QEsc(s12h10t1Q = THIS IS AN EXAMPLE OF ORATOR AT 67 CPS
Esc(0QEsc(s12h10t2Q = THIS IS AN EXAMPLE OF ORATOR AT 40 CPS

```


Large Character Printing (2933/34A)

Through escape sequences, the user may select a character magnification from 1 to 28 times the normal character height and width. ISO characters and all ROMAN8 symbols, with the exception of control codes (the first 32 ASCII characters) may be enlarged. Math, Katakana, and Line Drawing character sets cannot be enlarged.

Using the escape sequences outlined below, the user specifies the magnification and the horizontal position of the string of characters to be enlarged. The text to be enlarged is then included within the final sequence.

ESC * c # M	Specifies character size in # times the standard cell size. # can be 1-28 times, default value is 1. Values of 0 (zero) encountered will be rounded to 1. Values greater than 28 will default to 28.
ESC * c # C	Absolute character column in which to begin printing. Character column is determined by the present pitch, not by the large character size. If the print position is past the column specified, this portion of the escape sequence is ignored.
ESC * c # N	Move to next tab position. Value field is meaningless for this parameter and is thereby ignored.
ESC * c # X	Relative horizontal offset in dot columns. Negative signs are ignored and the value is always assumed positive. (1 dot column equals 1/90th of an inch.)
ESC * c <text> Z	String to be printed must appear enclosed in brackets. Left bracket indicates beginning of the string, and right bracket indicates end of string. To specify a bracket in the data, a left bracket must precede it.

For example: "<abc>" would appear in the escape sequence as "ESC*c<<<abc<>>Z".

The Large Character Printing example on page 6-13 of the Appendix was created by sending the escape sequence

```
ESC*c28m<P>z21m<R>z14m<I>z7m<N>z1m<T>Z
```

NOTE

Characters passed in the escape sequence text which are not valid will be ignored and replaced with a space.

All signs in the value fields are ignored and the values are assumed to be positive.

For proper alignment, when printing normal text with large characters the escape sequence ESC * c 1 M should be sent.

Bar Codes (2933/34A)

Bar code is a machine-readable form of printed information made up of bars and spaces of varying width. Bar codes are read with an optical sensor, such as a scanner or hand-held wand, which interprets the difference in light reflected from dark printed areas and light unprinted areas as bars and spaces. By comparing the widths of the bars and spaces, the bar code reader can recognize patterns that represent characters.

NOTE

Many optical sensors are sensitive to the print quality of bar codes. For optimum readability replace worn ribbons and adjust the print head gap to match your print stock.

When the printer receives an escape sequence with the string of characters to be encoded, it prints a bar code label in the selected code. Start and stop codes, which are patterns to signal the bar code reader that it is at the beginning or end of a label, are automatically generated. The optional check digit, which allows the bar code reader to compare what it read with what was printed, should be included in each label to help prevent read errors. The check digit, when included, is put in the label escape sequence prior to sending the sequence to the printer.

Code Types:

- Interleave 2 of 5
- Intermec Code 39
- Industrial 2 of 5
- Matrix 2 of 5
- User-defined codes

Interleave 2 of 5: is a numeric bar code which is bidirectional, continuous, and self-checking. A unique start and stop code are employed.

Each symbol uses a wide and narrow element to represent each character. These wide or narrow elements can be either a bar or a space. Wide elements are assigned a binary value of 1, and narrow elements are assigned a value of 0 (zero). The characters are interleaved together using the bars to represent the odd characters, starting with the first character after the start code, and spaces to represent the even characters. If an odd number of digits are to be encoded, a leading 0 (zero) should be added to the message.

Each meaningful encoded character is composed of 5 elements, 2 of which are wide, and 3 of which are narrow. Each character is represented by a modified binary coded decimal (BCD) code, and includes a parity bit. The bit weightings in each 5 element character are 1, 2, 4, 7, and parity. Note that the parity bit is added such that each encoded character has an even parity, i.e., the sum of the ones in each character is even. See next page.

Character	Code
0	00110
1	10001
2	01001
3	11000
4	00101
5	10100
6	01100
7	00011
8	10010
9	01010

The start and stop codes are encoded as follows:

Start code (bars) 00
 Stop code (bars) 10

The spaces imbedded in both the start and stop codes are "narrow." The start code includes a following narrow space.

Industrial 2 of 5: is a numeric bar code composed of a start code, a stop code, and ten characters (0-9). Each character is represented by a five-bar pattern containing two wide bars and three narrow bars. No data is encoded in the spaces, unlike other bar codes. The wide bars have a binary value of 1, and the narrow bars a binary value of 0 (zero).

Industrial 2 of 5 uses a modulo 10 check digit, which is printed as the last data character before the stop code. The check digit is calculated from right to left on the bar code, excluding the start and stop codes, using the following formula.

- Step 1: Add the numeric values of all the odd-position characters.
- Step 2: Add the numeric values of all the even-position characters, and multiply the total by three.
- Step 3: Add the resultant totals from Steps 1 and 2.
- Step 4: Divide the summed total from Step 3 by ten.
- Step 5: Subtract the remainder from Step 4 from ten. The numeric answer is your check digit.

Programming

Example: Check digit calculation, modulo 10.

Message with no start or stop codes:	476132815
The least significant digit is "5".	
Add odd-position characters (summed from right to left):	$1 + 2 + 1 + 7 = 11$
Add even-position characters and multiply by three:	$3(5 + 8 + 3 + 6 + 4) = 78$
Add the above two totals:	$11 + 78 = 89$
Divide the above sum by 10:	$89/10 = 8$ remainder 9
Subtract the remainder from 10:	$10 - 9 = 1$
The check digit is 1. The message with the check digit is:	4761328151

Matrix 2 of 5: is a numeric bar code composed of a start/stop code and ten characters (0-9). Each character is represented by a five-element pattern; three bars and the two spaces between the bars. Two of the elements of each character are wide, three are narrow. As before, a wide element has a binary value of 1, and a narrow element has a binary value of 0 (zero). The space between characters has no code value, even though spaces within each character do.

Each bar code label should contain a check digit to help prevent read errors. Matrix 2 of 5 code uses a modulo 10 check digit, just as Industrial 2 of 5. Refer to the instructions for Industrial 2 of 5 for calculating the check digit.

Code 39*: Code 39* is an alphanumeric bar code composed of a start/stop code and a set of 43 characters: 0-9, A-Z, period, space, dollar sign, slash, plus, and percentage. Each character is represented by nine elements: five bars and four spaces between the bars. Three of the elements are wide (with a binary value of 1), and the remaining six elements are narrow (binary value 0). The spaces between the characters have no code value.

Each bar code label should include a check digit to help prevent read errors. Code 39* uses a modulo 43 check digit. The check digit must be calculated by the application program and included at the end of the character string to be encoded. The check digit is calculated from left to right on the bar code, excluding the start and stop code, using the following formula.

- Step 1: Add the numeric values of all the characters in the label. (See the table on the next page.)
- Step 2: Divide the summed total by 43.
- Step 3: Find the character in the table that corresponds to the remainder from Step 2. That character is your check digit.

NUMERIC CHARACTER VALUES, CODE 39*

CHARACTER	ASSIGNED VALUE	CHARACTER	ASSIGNED VALUE
0	0	M	22
1	1	N	23
2	2	O	24
3	3	P	25
4	4	Q	26
5	5	R	27
6	6	S	28
7	7	T	29
8	8	U	30
9	9	V	31
A	10	W	32
B	11	X	33
C	12	Y	34
D	13	Z	35
E	14	—	36
F	15	.	37
G	16	space	38
H	17	\$	39
I	18	/	40
J	19	+	41
K	20	%	42
L	21		

*Code 39 is a registered trademark of Interface Mechanisms, Inc.

Example: Check digit calculation, modulo 43.

Message, without start/stop code.

12345ABCDE/

Add assigned numeric values.

1 + 2 + 3 + 4 + 5 + 10 +
11 + 12 + 13 + 14 + 40 = 115

Divide the summed total by 43.

115/43 = 2 remainder 29

The check digit corresponds with the remainder: 29, which is the character "T". The message, with check digit:

12345ABCDE/T

USER DEFINED CODES

User defined codes on the factory data printers are generated element-by-element. Four elements are available for use in a user-defined code: narrow space, narrow bar, wide space, and wide bar. The elements may be combined as they are sent to the printer to generate elements with widths other than those normally printed. In this manner, you may generate UPC-type bar code labels, which require four different element widths each, for both bar and space, rather than the standard two. In any application of user-defined code, readability should be tested before implementing the system; many code types have readability requirements which may not be met with a dot matrix printer.

To generate a bar code label in user-defined code, use the following escape sequence:

```
ESC * z<text>Z
```

The elements are defined as follows:

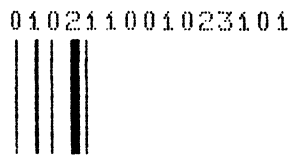
```
0 = Narrow Space  
1 = Narrow Bar  
2 = Wide Space  
3 = Wide Bar
```

The label placement and formatting parameters used for other bar codes may also be used here.

Example: If you send

```
ESC *z<0 1 02 11 00 1 02 31 0 1>Z
```

to the printer, the printer will print the bar code below. (NOTE: the spaces in the escape sequence above are included for purposes of clarity only).



Important things to remember as you generate user-defined labels:

- Parameter v must be defined as 3.
- Only valid element symbols specified in the string will be processed; all other symbols within the string will be ignored.
- Start and stop codes must be defined in the string, just like the other characters.
- Readability must be tested before implementing the system.

Generating Bar Code Labels

To program the 2933/34A printers to print bar codes, escape sequences must be sent to the printer, specifying the type of code, label location, size, and message. The generalized formula for this programming procedure falls into two steps.

Step 1: Select bar code printing specifications (i.e., code type, print density, header mode, label height).

Step 2: Position print head to desired label location, and send character string to be printed.

Each of the two programming steps requires an escape sequence beginning, ESC * z. The two steps may be combined into one escape sequence, as long as they keep to the sequential order in which they are listed above.

The paragraphs below outline the details of each of the programming steps and illustrate the effect of various control sequences.

STEP 1: SELECT

At power-on or after a hard reset, the printer will operate at its default settings for code type, print density, and header mode. During operation, you may reassign any of these print specifications by sending the proper control as part of a bar code printing escape sequence. These printing assignments "latch" as they are set; once you have changed a specification, all bar codes will print in that new form until either you make another change or the printer is reset.

Code Type Selection

As stated earlier, the 2933/34A printers can automatically generate Intermec Code 39, Industrial 2 of 5, Matrix 2 of 5, and Interleave 2 of 5. At power-on or after a hard reset, the printer is set to Intermec Code 39. During operation, the code assignment can be changed by sending an escape sequence that contains the code select command, which is known as parameter v:

ESC * z # V

The parameter number in the above sequence is the number which has been assigned to each bar code type. These numbers are shown below.

0 = Code 39 (default)
 1 = Industrial 2 of 5
 2 = Matrix 2 of 5
 3 = User-defined Code
 4 = Interleave 2 of 5

Once a code has been selected, all subsequent labels will be printed in that code until either a new code is selected or the printer is reset.

Example: To select Matrix 2 of 5, enter: ESC * z 2 V. All subsequent bar code labels will be printed in Matrix 2 of 5.

Programming

Bar Code Print Density Selection

The print density for bar code labels is independent of the code type and is selected separately. At power on or after a hard reset, the printer defaults to the recommended density setting in which Code 39 prints at 3.10 characters per inch, Industrial 2 of 5 at 3.46 characters per inch, and Matrix 2 of 5 at 5.0 characters per inch. This default setting provides the best readability for most applications.

Print densities other than the standard setting can be selected. A higher print density may be needed for applications requiring shorter label lengths. A lower print density may be needed for applications requiring optical scanning from a distance. In any instance, readability should be tested before implementing the system.

To change the print density, send the appropriate escape sequence specifying the dot widths of the bars and spaces. The densities of the four types of elements are defined through parameters r, s, t, and u, as shown below.

```
r = Wide bar width (number of dots)
s = Narrow bar width (number of dots)
t = Wide space width (number of dots)
u = Narrow space width (number of dots)
```

The format of the density select escape sequence is as follows:

```
ESC * z # r # s # t # U
```

The parameter number in the above sequence is the number of dots in each element's width. The width may be any number from 1 to 9.5, inclusive, in increments of 0.5.

Example: In the default density settings of the printer, the six parameters are defined in the following manner:

```
3r Wide bar = 3 dots
1s Narrow bar = 1 dot
3t Wide space = 3 dots
4t Wide space = 4 dots
1u Narrow space = 1 dot
2u Narrow space = 2 dots
```

Written in escape sequence form, the default assignments look like this:

```
ESC * z 3 r 1 s 3 t 1 U
```

When the zero follows the decimal, it may be included or left off; both forms are valid. Hence, the sequence above could also read:

```
ESC * z 3.0 r 1.0 s 3.0 t 1.0 U
```

The single most important factor in selecting the right print density is code readability. The following table shows possible density settings for use with the 2933/34A printers. The recommended densities shown are those which provide optimum readability for most applications. When using higher densities, we recommend that the spaces be set 1/2 to 1 dot wider than the bars for improved readability.

	Wide Bar r	Narrow Bar s	Wide Space t	Narrow Space u	Industrial 2 of 5 cpi	Matrix 2 of 5 cpi*	Intermec Code 39 cpi	Interleaved 2 of 5 cpi**
Higher density	2.5	1.0	3.0	1.5	5.81	8.57	5.29	9.73
	3.0	1.0	3.5	1.5	5.45	7.83	4.86	8.78
Lower density	3.5	1.5	3.5	1.5	4.78	7.00	4.33	7.91
	4.5	1.5	5.0	2.0	3.83	5.45	3.40	6.10
	5.0	2.0	5.0	2.0	3.46	5.00	3.10	5.62 (Default)

*Worst case

**Must be an even number of characters

The density values in the preceding table are calculated with the following formulas: (Start and stop characters are not included.)

$$1 \text{ dot width} = 1/90 \text{ inch} = 0.0111 \text{ inch} \sim 11/1000 \text{ inch}$$

$$\text{Density} = 1000/11 * 1/\text{dot count}$$

$$\begin{aligned} \text{Dot count} &= 2^* \text{WB} + 3^* \text{NB} + 5^* \text{NS} && \text{(Industrial 2 of 5)} \\ &= 2^* \text{WB} + \text{NB} + 3^* \text{NS} && \text{(Matrix 2 of 5)} \\ &= 2^* \text{WB} + 3^* \text{NB} + \text{WS} + 4^* \text{NS} && \text{(Code 39)} \\ &= (2^* \text{WB} + 3^* \text{NB} + 2^* \text{WS} + 3^* \text{NS})/2 && \text{(Interleave 2 of 5)} \end{aligned}$$

WB = Wide Bar
NB = Narrow Bar

WS = Wide Space
NS = Narrow Space

NOTE

Recommendations for optimum readability:

- The shaded density settings in the preceding table produce the most readable bar codes. Higher densities may be used, but will result in reduced readability with many bar code readers.
- Medium-resolution wands provide the best readability for bar codes from the 2933/34 dot matrix printers.
- Only bar code readers in the visible light spectrum (600-700 nm) should be used.
- Replace ribbons after 5 million characters for best results. (Use the ribbon counter as described on page 5-5.) Higher density settings may require more frequent ribbon replacement to maintain readability.
- The print head gap should be adjusted as needed to maintain dark, even bars.
- For best results replace print head after 150 million characters. (Note that for both print head and ribbon, "characters" refers to character counter totals, not to the count of symbols in the bar code label.)
- Occasional cleaning of the print head may be required. Clean clogged wires with a cotton swab and isopropyl alcohol, preferably after each ribbon change.
- Use recommended density and label height.
- OCR quality, single part fanfold paper with uniform thickness, opacity, and reflectivity is recommended. Best results are obtained with 20 lb. min., matte finish computer stock.

Header Mode Selection

A header is the alphanumeric equivalent of a bar code label, which is used for easy recognition of the label without use of a bar code reader. The enabled header mode, in which the header is automatically printed above the label, is the default setting of the printer for all codes including user-defined code. (Note: header mode may be used with a user-defined code as a debugging aid, but the header will contain the element string, and not the information encoded.)

The header mode may be enabled or disabled by sending the appropriate escape sequence, as shown below:

```
Enable Header Mode:   ESC * z 1 Q
Disable Header Mode:  ESC * z 0 Q
```

When the header mode is disabled, no alphanumeric equivalents of the bar codes will be printed.

Some applications may require the header to be printed below or off to one side of the label, rather than above. These different headers must be generated by the application program, as they involve more than a simple translating function. To print a header below the label, you must first generate the bar code label, then execute a print statement containing the header. Printing a header to one side of the label is slightly more complex. Instructions for mixing bar codes and text appear later in this section. Please turn to those instructions for guidance on printing a header below or beside its bar code label.

Label Height Selection

The height of a bar code label ‘‘latches’’ when it is set and will remain in effect until it is changed or the printer is reset. Label height is defined through parameter h, as shown in the escape sequence below.

```
ESC * z # H
```

The parameter number specifies the height of the label in increments of one-tenth of an inch. The power-up default is 0.6 inches. If a value of 0 (zero) is specified for the height parameter the height of the bar code will correspond to the current line spacing (e.g. 6 or 8 lpi).

For wand reading applications, the bar code label must be high enough to allow easy scanning. A height of ‘‘4h’’ (approximately 4 tenths of an inch) is best for labels that are six characters in length or shorter and are printed in standard density. For labels with more than six characters, a greater label height may be required to ensure that the label can be easily followed with a wand.

Some applications may require labels shorter than the recommended height. The amount of space available on a machine part or printed form, for example, may be too small to accommodate a standard-size label. In these cases, a shorter label height may work, but readability may be affected and should be tested.

STEP 2: POSITION AND SEND

This second portion of the bar code programming procedure falls into a single escape sequence, which assigns the location of the bar code, defines the string of characters to be encoded, and starts the printing.

Label Placement

The position of bar code labels may be set either by defining the size of the space to the left of the label (the offset), or by specifying a character column where the label is to begin.

Label Placement Through Column Selection:

To position the label using character columns, execute the following escape sequence:

```
ESC * z # C
```

The label will begin printing at the column number specified in the parameter number. This method of label positioning may be used for single labels or for several labels printed on the same line.

Columns are defined in terms of character spaces and will change relative position with changes in the print pitch. For example, a column defined as 1 5 will put the print head in a different position when the printer is set to print 10 characters per inch than when it is set to print 12 characters per inch. While printing bar codes and using columns for positioning, especially when mixing bar code and text, all changes in print pitch should be made at the extreme left column (column 0), or the resulting label may be out of alignment and therefore unreadable. To make sure that your print pitch changes are performed at column 0 (zero), perform a carriage return immediately before a print pitch change:

```
CR ESC ( s # H
```

Label Placement Through X-Offset (263X compatible feature):

A bar code label may also be positioned by defining its location through parameter x. Parameter x, which is defined in each label escape sequence, is the amount of space by which the bar code label is offset to the right. The value of x is measured in units of 1/90 of an inch. Therefore, to get an offset of two inches, specify ‘‘180x’’, and to get an offset of one-half inch, specify ‘‘45x’’.

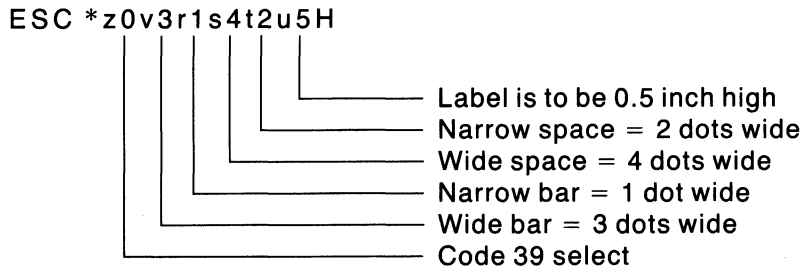
The primary difference between x-offset and columns is that columns allow labels to be positioned absolutely with respect to text columns, and x-offset allows labels to be positioned relatively with respect to each other.

SENDING THE STRING, PRINTING THE LABEL

The information compiled under Step 1 (Select) of this programming process may be combined in one escape sequence beginning, ESC * z. In the same manner, information from Step 2 (Position and Send), is combined in a single sequence, which also begins ESC * z. The process is shown on the next page.

Programming

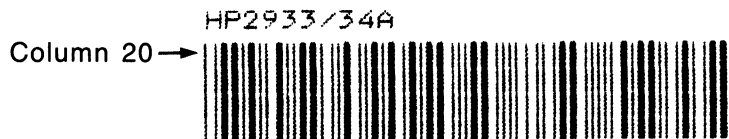
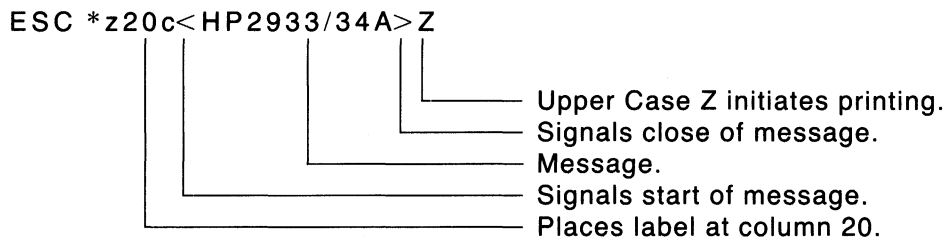
- Step 1. Before sending the character string to be encoded, you must define the print specifications. The sample escape sequence below, using the information presented earlier in these instructions, assigns Code 39 as the code type, the recommended (optimal) print density, and a label height of 0.5 inch.



NOTE

The last letter appearing in an escape sequence (“H” in the escape sequence above) is the terminator, and must be in uppercase. All letters prior to the terminator (as “v”, “r”, “s”, “t”, and “u” above) must be in lower case.

- Step 2. To generate the label, you need to specify the label position on the page and the contents of the label. The contents of the label must be appropriate for the code; all invalid characters will be ignored. In the escape sequence below, the label is to begin printing in column 20, and is to be encoded with the message, “HP2933/34A”.



Example: Print a bar code in Matrix 2 of 5 code at optimal print density: bar code without a header, beginning in column 3, containing the message, “142556”.

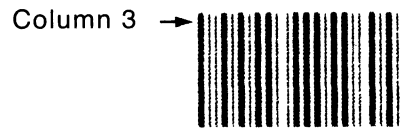
Using the information presented in this section, the following escape sequences would be used:

ESC * z 2 v 0 q 5 r 2 s 5 t 2 U Sets the subsequent bar codes to Matrix 2 of 5 at optimal density with no header.

ESC * z 3 c <142556> Z Defines label placement and content and initiates printing.

NOTE: These two escape sequences may be combined, as shown below.

```
ESC * z 2 v 0 q 5 r 2 s 5 t 2 u 3 C <142556> Z
```



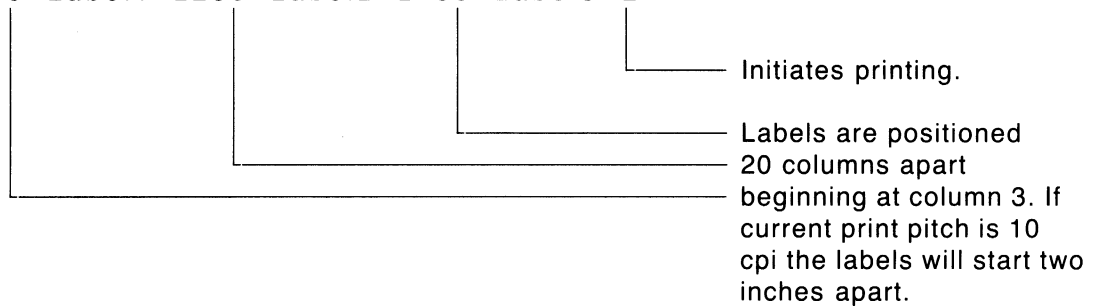
PRINTING SEVERAL LABELS ON THE SAME LINE

At some time you may wish to print several bar codes on the same line, as across the top of a page or onto a sheet of pre-cut labels. In such a situation, the general print specifications, such as code type and label type, are set as outlined above. The message and spacing are specified for each label in a single escape sequence.

Positioning several labels across a page works the same way as positioning a single label: column settings and x-offset are both valid options. The placement instruction for each label appears directly before the label message in the label escape sequence. The main restriction is imposed by the code reader: about a one inch gap must be left between labels for scanner recognition.

Example: To print three labels on a line, set the printer columns to the desired location for each label. After sending the appropriate sequence to set print specifications, send the following escape sequence.

```
ESC * z3c<Label1> z23c<Label2> z43c<Label3> Z
```



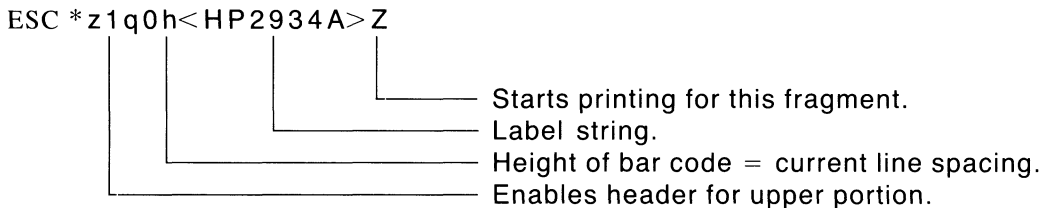
MIXING BAR CODES WITH TEXT

When printing bar codes, the printer automatically generates a carriage return and linefeed at the end of each label. Because of the auto-linefeed rule, mixing bar codes with text poses some potential problems, in that the two kinds of print may not be printed simultaneously. The 2933/34A printers overcome the possible problems by following a different method: it mixes the two types of printing by suspending the printing of one while overlaying the other.

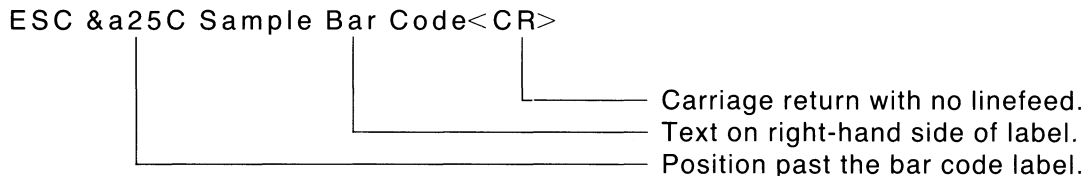
As a general rule, for each mixed line, the printer must print the line of text first, ending the line with a carriage return, but no linefeed, then overlay the bar code. In practice, this means that for each bar code that is mixed with text, the label information must be respecified for each line of text and bar code printed: once before the line of text, to print the upper half of the label, and again after the text's carriage return, to print the final part of the label.

The procedure involves a multiple-stage process, as shown below.

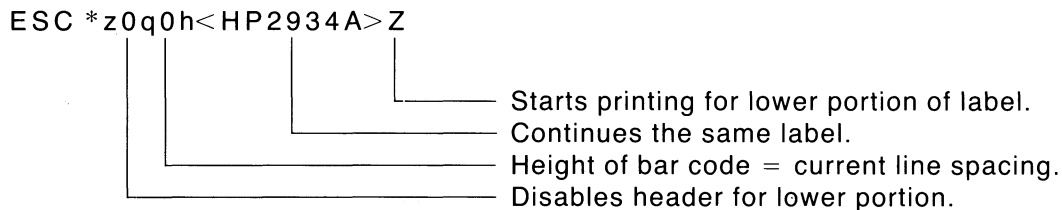
Stage 1: Printing the bar code with a header. (If header is not desired skip to Stage 2.)



Stage 2: Print the line of alphanumeric text.



Stage 3: Finish the bar code.



Repeat Stages 2 and 3 for additional lines of bar code.

SPECIAL CONSIDERATIONS FOR MIXED PRINTING

Columns and Print Mode

Because columns are used in the positioning of both bar codes and text in mixed printing, special considerations apply. Columns are defined in column numbers, which will change with changes in the print mode.

SUMMARY OF BAR CODE PRINTING RULES

1. Multiple labels must appear in a single escape sequence.
2. When printing bar codes, columns reference the currently-defined print mode.
3. When mixing bar code and text, the header must be suppressed when printing all but the first portion of the label, assuming a header is desired.
4. The printer must be in its default state (CR, Auto LF=off).

DATA COMMUNICATIONS INTERFACES



SERIAL INTERFACE (Pin-out Diagram is located in the Appendix)

The standard RS-232-C interface or the optional RS-232-C/422 interface provides serial data communications between the printer and a controller. Serial data communications differs from other forms of data communications in that serial data is transmitted one bit at a time, rather than a whole byte at once. In the serial data transmissions recognized by your printer, data is transferred in the following general format.

The start bit and stop bits frame each byte of data. The printer can receive data with one or more stop bits, but data transmitted by the printer will have only one stop bit.

Serial Data Communications Configuration

The data communications options available in the printer's SETTINGS mode include baud rate, parity, parity checking, handshakes, number of data bits, and stripping of fill characters. The following pages detail each of these options.

BAUD RATE

Factory Default Setting: 2400

The baud rate is the speed of data transmission measured in bits per second. For example, data transferred at 1200 baud is transferred at 1200 bits per second, which is equivalent to 120 characters per second (assuming a 10-bit character frame is used).

The 2930 Series printers provide a combined total of ten baud rates selectable through SETTINGS: 110, 200 (2932A), 300, 600, 1200, 2400, 4800, 9600, and 19200 and External (both 2933/34A). The baud rate selected for the printer must match the baud rate setting of the host device.

PARITY

Factory Default Setting: None

Parity is a means of checking incoming data for accuracy. The printer provides five parity options for selection through the SETTINGS mode: Even, Odd, Zeros, Ones, and None. These are described below.

Even parity

The parity bit is set to force an even number of ones in each byte.

Odd parity

The parity bit is set to force an odd number of ones in each byte.

Data Communications Interfaces

Zeros

The parity bit is set to zero.

Ones

The parity bit is set to one.

None

No parity bit is included in the data.

NOTE

The printer will send and expect to receive data with the configured parity setting.

PARITY CHECK

Factory Default Setting: Off

The parity check portion of the SETTINGS mode enables parity checking for Even, and Odd only. When parity checking is enabled, the printer responds to errors it encounters by printing a Delete (·) character.

If None, Ones or Zeros has been selected as the parity setting, the printer will not allow parity checking to be enabled.

HANDSHAKES

Handshakes are signals exchanged by the printer and its host to prevent data buffer overrun (data being transmitted faster than the printer's input buffer can accept it). The handshake needed for a specific application depends on the requirements of the host system.

The handshakes available through the SETTINGS mode of the printer are: X-ON/X-OFF (Transmission On/Transmission Off), ENQ/ACK (Enquire/Acknowledge), Binary ENQ/ACK, and Hardware (RS-232-C only). Any, several, or none of these handshakes may be enabled, as dictated by your system. The handshakes are described below.

NOTE

Data transmitted to the printer without the use of a handshake, especially at baud rates of 1200 or higher, may be lost. Transmitting data with handshakes is recommended.

X-ON/X-OFF

Factory Default Setting: On

The 2930 Series printers have a 2048 byte buffer. When the X-ON/X-OFF handshake is used, the printer keeps track of the number of characters in its buffer and signals the host device when it can and cannot accept data. These printers will accept data until there is room for just 100 more bytes in the

buffer. When the buffer has filled to that point, the printer will send the host an X-OFF character to stop data transmission. The X-OFF character used by your printer is an ASCII DC3.

After sending the X-OFF character, the printer will continue to print, pulling data from its input buffer. When the buffer has room for 150 more characters, the printer sends the host an X-ON character to restart data transmission. The X-ON character used by the printer is an ASCII DC1.

ENQ/ACK

Factory Default Setting: Off

The ENQ/ACK handshake is primarily an HP protocol. The handshake is always initiated by the host: the host transmits an ENQ and holds off data transmission until it receives an ACK control code from the printer. When the printer has room in its buffer for at least 150 bytes, it sends the host an ACK in response to the ENQ. The host will send data to the printer as soon as it recognizes the printer's ACK. The printer will respond to an ENQ every time it receives one unless the ENQ is embedded in a binary graphics data stream. (Raster graphics is explained in Section 3.)

BINARY ENQ/ACK

Factory Default Setting: Off

In systems that use a binary handshake, the first character following the W in the raster transfer escape sequence (Esc*b90W for example), programmatic VFC (ESC&l#W for example), or the X in the transparent binary transfer (Esc&p#X for example), will be an ENQ. The system will expect the printer to respond with an ACK before the raster transfer can be completed. If the printer is using only the regular ENQ/ACK protocol, it will not recognize an ENQ embedded in the raster transfer sequence, but will interpret it as graphics data. When the binary handshake is enabled, however, the printer will look at the first character following the W or X in the transfer sequence and respond with an ENQ appearing in that position (if an ACK has been sent). This ENQ character is not included in the byte count. Do not use the binary handshake if your system does not support handshaking during a binary transfer.

HARDWARE HANDSHAKE (RS-232-C non-modem only)

Factory Default Settings are listed on the next page.

Unlike character handshakes, the hardware handshake uses electrical impulses to signal its host that it is ready to receive data. (All other handshakes use characters sent in the data stream). The printer using the hardware handshake will accept data until the buffer has room for just 100 more bytes. When the buffer has filled to this point, the printer will turn off its hardware signal to the host device.

Hardware handshakes are: DTR/CD (Data Terminal Ready/CD); (S)RTS/SCA (Secondary Request to Send/SCA), CTS/CB (Clear to Send/CB).

The DTR/CD and (S)RTS/SCA hardware handshakes will accept data until the buffer has room for just 100 more bytes. When the buffer has filled to this point, the printer will turn off its hardware signal to the host device. This signal is carried on the Data Terminal Ready line (EIA CD or CCITT 108.2), or Secondary Request to Send (EIA SCA or CCITT 120).

After the handshake signal has been changed, the printer will continue to print, pulling data from its buffer. When the buffer has room for 150 more characters, the printer will change its signal again, allowing the host to transmit more data.

Data Communications Interfaces

Be aware that dropping the DTR line will disconnect a modem. If modem use is desired, the DTR line should be configured to remain high, and a different handshake should be used.

The CTS/CB hardware control line is set to Ignore or Require. If the CTS/CB (EIA CB or CCITT 106) line is set to Ignore, the printer sends response data as soon as it has data to send, regardless of the CTS line status. If the handshake is set to Require, the printer must be receiving the CTS signal before it sends response data to the host. This hardware handshake prevents overrunning the hosts input buffer.

The RS/CH hardware control line (EIA CH or CCITT 111) is used to control baud rate with European dual speed modems.

Factory default settings: DTR/CD - High
(S)RTS/SCA - Low
CTS/CB - Ignore
RS/CH - Low

DATA BITS

Factory Default Setting: 8

The data bits portion of the printer SETTINGS mode allows the number of data bits in each character to be defined. The number of data bits may be defined to be 7 or 8; however, 8 bits is required for Roman8, Kana8, graphics, programmatic VFC, and transparent binary transfer. If parity is None, 8 data bits must be selected (2932A).

STRIPPING FILL CHARACTERS (Strip Null/Del)

Factory Default Setting: Off

Some systems use null and delete characters as fill characters when handshakes are not available. In normal operation, the printer will discard each null as it pulls it out the buffer, because nulls are not usually printed.

If your system uses nulls and deletes as fill characters to adjust the timing of data transmission (often in lieu of a handshake), the printer must strip fill characters as it receives them to prevent data loss.

The Strip Null/Del portion of the SETTINGS mode sets the printer up to automatically strip the fill characters.

NOTE

DO NOT set the printer to strip fill characters when you will be printing graphics: the Null and Delete characters are often used in graphics, programmatic VFC, and transparent binary transfer data, and must not be stripped.

HP-IB INTERFACE (IEEE-488) (Pin-out Diagram is located in the Appendix)

The optional Hewlett-Packard Interface Bus (HP-IB) is one of the most common interfaces between two HP devices. The HP-IB is a 16-line bus consisting of:

- three handshake lines
- five control lines
- eight data I/O lines

A device on the HP-IB may function as a "listener", a "talker", or a "controller" (the host). A "listener" receives data that is sent over the bus. A "talker" transmits data to other devices on the bus. The "controller" regulates interaction of the devices on the HP-IB system.

Your printer is usually a "listener", but can function as a "talker", as explained later in this section. It cannot be a "controller".

Through the SETTINGS mode, the printer's HP-IB capabilities are defined: the printer can use the standard IEEE-488 features, or with the secondary commands enabled, the printer can use IEEE-488 plus secondary bus commands also supported by many HP systems.

Addressing

Factory Default Setting: 1

The HP-IB address is a number between 0 and 29 which identifies each device on the bus. Using the HP-IB addresses, the controller can talk to the various devices on the bus and individually address them to talk or listen.

Your printer can listen in either of two ways: First, the printer can "Listen Always". This means that the printer will receive everything that comes over the data lines even if it is intended for another device on the bus.

Secondly, the printer may be "Addressed to Listen". This means that the printer will receive only data that is sent specifically to its address and universal commands, and will ignore everything else coming over the bus.

Listen Always

Factory Default Setting: Off

The "Listen Always" mode is enabled through the SETTINGS mode. If "Listen Always" is enabled, the printer's address cannot be defined (the HP-IB address will not be used in sending data to the printer), nor can the Service Request be enabled (defined later in this section).

The "Listen Always" mode cannot be enabled if the secondary command mode is turned on.

Addressed to Listen

Factory Default Setting: 1

The printer's HP-IB address is used whenever data is sent to the printer over HP-IB, unless "Listen Always" is enabled. For example, to send text to the printer from an HP 2647 A/F terminal, the command "COPY ALL FROM DISPLAY TO HP-IB # ___" would be used. The number specified in the command corresponds to the printer's address.

To set the address of the printer, choose a number that is not already in use by a device on the HP-IB. Any number from 0 - 29 may be used.

NOTE

The printer's address must be in the range of 0 to 7 if Parallel Polling or secondary commands will be used.

Additional information on how the host addresses the printer to listen and talk appears in the portion of this section dealing with bus commands.

Service Request (SRQ)

Factory Default Setting: On

The service request is a signal that the printer sends the host to tell it that the printer requires some kind of attention. On some systems the service request cannot be used because the system does not recognize it.

When the SRQ is enabled, the printer will assert the SRQ control line whenever it runs out of paper, or its cover is opened. When it recognizes the signal, the host should respond by polling the devices on the bus to find out which of them requested service. (Polling is discussed in detail later).

The printer will assert the SRQ signal until the host performs a serial poll, or the fault condition is corrected.

NOTE

If Listen Always mode or secondary commands are enabled, the printer will not be able to assert SRQ.

Polling

The host on the HP-IB may run periodic checks of the devices on the bus to find out which, if any, of the devices require service. Also, a device may request service, which may prompt the host to check the devices on the bus. Two kinds of polling may be performed over HP-IB, serial and parallel.

Serial Poll

The host will perform a serial poll either in search of information or in response to an SRQ. In a serial poll, the host requests status of one specific device on the bus by addressing only that device to respond. The printer returns an eight-bit status byte, which is shown on the next page. Data In/Out (DIO) line numbers are given in parentheses.

	MSB							LSB
lines:	(8)	(7)	(6)	(5)	(4)	(3)	(2)	(1)
bits:	7	6	5	4	3	2	1	0
	0	1/0	0	0	0	1/0	0	0
		└─┬─┘				└─┬─┘		
		1 = Requested Service (RSV)				1 = Paper Out/Door Open		

If the printer requested service with an SRQ, bit six will be set to 1 (DIO line seven will be asserted). Commands used in serial polling: SPE (Serial Poll Enable, decimal 24), and SPD (Serial Poll Disable, decimal 25). Lines used in serial polling: ATN (Attention), DIO (Data In/Out) lines 1 through 8.

Parallel Poll

Parallel polling provides a fast way for a host to periodically check if any devices need service or to determine which device sent an SRQ. The host can perform parallel poll only on devices which have addresses of 0 to 7. Each of the eight devices is assigned a DIO line for polling, and the lines correspond to the addresses in the following manner.

Address:	0	1	2	3	4	5	6	7
Poll Line:	8	7	6	5	4	3	2	1

The host performs a parallel poll by asserting the EOI (End or Identify) and ATN (Attention) lines. Each device responds by asserting its assigned DIO line if it requires service.

When secondary commands are enabled (as discussed later in this section), the printer will respond to a parallel poll to request service for any of the following conditions: Ready for Data, Ready to Output Data, Power Failure Recovery, Paper Out/Door Open, or Self Test Complete. When secondary commands are disabled, the printer will respond to a parallel poll to request service only if it is out of paper or the paper door is open.

Lines used in parallel polling: EOI, ATN, and DIO lines 1 through 8.

Bus Commands

The devices on the HP-IB receive special instructions in the form of commands. To send a command over the bus, the host sets the bus into command mode by asserting the ATN line. Once the ATN line is asserted, the devices on the bus will understand that what follows will be a command, not data.

Data Communications Interfaces

The printer can respond to two different command structures: primary commands only (i.e. secondary commands are turned off) or primary with secondary commands (i.e. secondary commands turned on). Primary commands address each device as either a "talker" or a "listener". Secondary commands, which (when enabled) follow the primary commands, give the printer additional instructions as to what kind of talking or listening it will be required to do. No intermixing of modes is allowed.

Your printer can operate on systems that support secondary commands as well as on systems that do not. The primary and secondary commands are briefly outlined in the following paragraphs.

Primary Commands

Factory Default Setting: On

As stated above, primary commands put each device on the interface bus into either "listen" or "talk" mode by addressing the device as a listener or a talker.

When secondary commands are disabled through the SETTINGS mode, primary commands are used alone. When secondary commands are enabled, primary commands function as the first stage of a two-part command and must be accompanied by a secondary command.

Primary commands are: Talk = X 1 0 A A A A A

Listen = X 0 1 A A A A A

The "X" in the above commands stands for the parity bit. The "AAAAA" in primary commands represents the HP-IB address of the device the command is intended for.

Device Clear (DCL) X0010100

When the controller sends the printer a DCL (decimal 20), it is commanding the printer to "Go to a known state" which the printer interprets as "Clear any output pending to the HP-IB controller". (Output, if any, will be model number status information.) DCL clears all devices on the bus.

NOTE

If the intention of the DCL command is to reset the printer, ESC E should be used instead of the DCL.

Selected Device Clear (SDC) X0000100

SDC is used to clear selected devices on the bus. Only devices addressed to listen obey SDC. Except for this difference, SDC performs the same functions as a DCL.

Interface Clear (IFC)

The IFC line is used by the controller to override all bus operations and return the bus to a known inactive state. All pending output on the bus is cleared.

Secondary Commands

Factory Default Setting: Off

Secondary commands have a two-byte structure to carry their more detailed instructions. The first byte is one of the two primary commands, talk or listen, which sets up the second byte as either a "talk" or "listen" instruction. The second byte describes what type of "talk" or "listen" operation is to be performed.

Secondary commands are enabled through the SETTINGS mode. Secondary commands must be disabled whenever the printer is being used on a system that does not support secondary commands. Enabling secondary command mode automatically disables "Listen Always" and the service request.

Secondary commands fall into the categories of secondary "talk" and secondary "listen" commands and are defined in the following paragraphs.

NOTE

If secondary commands are enabled, the printer will require a secondary command for all "talk" and "listen" operations.

SECONDARY TALK COMMANDS

The printer will respond to five secondary talk commands: DSJ, I/O Status, Data, Loopback, and Read Self Test. These are briefly described below.

Talk Device Specified Jump (DSJ) X1110000

When the printer receives the primary talk command followed by the secondary DSJ command, it will respond by sending one data byte while asserting the EOI (End or Identify) signal. The returned byte will have a binary value of 0, 1, or 2, as shown below.

00000000 = Ready to receive data.

A printer response of Zero signals that the printer is ready to receive a data burst of up to 32 bytes. This mode maximizes throughput. The data bursts may be shorter than 32 bytes. Bytes additional to the first 32 in a burst will be processed at a slightly reduced rate.

00000001 = Ready to send data.

A response of One signals that the printer has data to send and is ready to be addressed to talk data. The appropriate system follow-up to this response is to send the primary talk command, followed by the secondary talk data command.

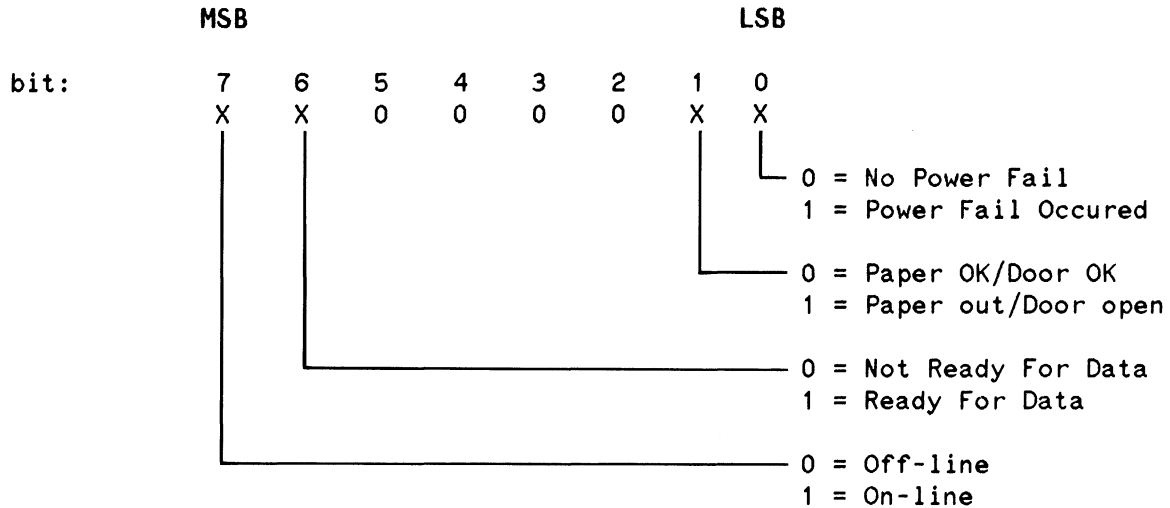
00000010 = Read status.

A response of Two signals that the printer is out of paper, it has been recently turned on (i.e. possible power failure), or has experienced another type of problem, and the system should check printer status.

Data Communications Interfaces

Talk I/O Status X1101110

The I/O Status check is a means for the host device to look at the current printer status. When the printer receives the primary Talk command followed by the secondary I/O Status command, the printer responds by sending the status byte shown on the next page with EOI (End or Identify) asserted.



Talk Data X1100000

The Talk Data secondary command instructs the printer to send data bytes over the bus. The data transmitted by the printer is usually status information. Data bytes transmitted by the printer are terminated with a carriage return, followed by a linefeed with the EOI (End or Identify) signal asserted.

If the printer receives the Talk Data secondary command, but has no data to send, it will transmit one Null (all zeros) data byte with EOI asserted.

Talk Loopback X1111110

The Loopback secondary causes the printer to return the loopback test bytes received with the listen loopback secondary. The last byte will be tagged with an EOI. If no prior listen loopback secondary was received, then a null byte with EOI asserted will be returned.

Read Self Test X1111111

The printer will respond with a one byte self test result as follows:

0000000 = Self Test Passed

0000100 = Self Test Failed

SECONDARY LISTEN COMMANDS

Your printer supports seven Secondary Listen commands: Device Clear (DCL), Print and Slew, Listen to Data, Listen Loopback, Listen Self Test, Programmable Sequences, and Poll Mask. These commands are briefly on the next page.

Listen Device Clear (DCL) X1110000

The Secondary Device Clear command instructs the printer to reset the interface to a known condition and clear any output pending to the HP-IB controller. This secondary command is followed by one additional byte, used by other devices for parity enabling, which the printer ignores. (To reset the printer, use an ESC E, not DCL.)

Listen Print and Slew X1101000

The print and slew secondary will be followed by one data byte that indicates whether a carriage return and up to 63 line feeds or VFC channels 1 through 8 is selected. The byte values are as follows:

BYTE	COMMAND
00000000	CR
00000001	CR+(1)LF
through	through
00111111	CR+(63)LF's
01000000	CR+VFC Channel 1
01000001	CR+VFC Channel 2
01000010	CR+VFC Channel 3
01000011	CR+VFC Channel 4
01000100	CR+VFC Channel 5
01000101	CR+VFC Channel 6
01000110	CR+VFC Channel 7
01000111	CR+VFC Channel 8

Listen to Data X1100000

The secondary Listen to Data command tells the printer that the bytes following the command represent data to be printed. For maximum throughput, the printer should receive data bursts of 32 bytes in length. The burst length can be shorter, but it must be terminated with an Unlisten command or a data byte with EOI asserted. Burst lengths may also be longer than 32 bytes; all bytes in excess of the first 32 in a burst will be processed at a slightly reduced rate.

Listen Loopback X1111110

The Loopback secondary command prepares the printer to receive up to 256 bytes of loopback data. The last byte is sent with EOI asserted.

Listen Self Test X1111111

Upon receipt of the self test secondary command, the printer will initiate the confidence self test. When the test is completed, the printer will again respond when polled. This command is equivalent to embedding an ESC z in the data stream.

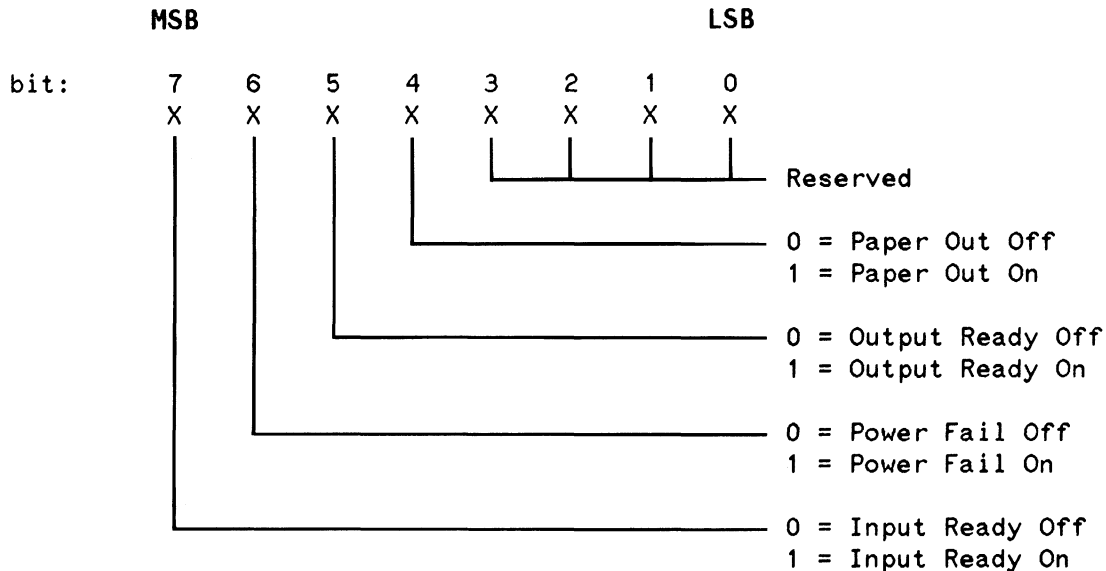
Listen Programmable Feature/Escape Sequence Mode Selection X1100010

The programmable feature/escape mode selection secondary enables the HP-IB command selection of some of the printer programmable features and also selection of the escape sequence modes. The programmable features/escape sequence mode selection secondary modifiers are listed below.

BYTE	INTERFACE RESPONSE	DESCRIPTION
00000000	Esc Y	Display functions on
00000001	Esc Z	Display functions off
00000010	Esc 1	Set horizontal tab
00000011	Esc 2	Clear horizontal tab
00000100	Esc 3	Clear all horizontal tabs
00000101	Esc E	Reset
00000110	Esc ^	Primary status
00000111	Esc n	No function
00001000	Esc o	Off-line
00001001	Esc) @	Default secondary set
00001010	Esc) A	Math symbols secondary
00001011	Esc (@	Default primary set
00001100	Esc (A	Math symbols primary
00001101	Esc & d @	Underline off
00001110	Esc & d D	Underline on
00001111	Esc & k 0 S	10 cpi print pitch
00010000	Esc & k 1 S	5 cpi print pitch
00010001	Esc & k 2 S	16.36 cpi print pitch
00010010	Esc & k 0 V	No function
00010011	Esc & k 1 V	No function
00010100	Esc & l 0 D	12 lpi spacing
00010101	Esc & l 1 D	1 lpi spacing
00010110	Esc & l 2 D	2 lpi spacing
00010111	Esc & l 3 D	3 lpi spacing
00011000	Esc & l 4 D	4 lpi
00011001	Esc & l 6 D	6 lpi
00011010	Esc & l 8 D	8 lpi
10000000		All escape sequences selected, normal mode
10000001		Restrict the following:
	Esc E	Esc z
	Esc n	Esc o
	Esc ^	Esc & a 1 ^
	Esc & k 1 ^	Esc & l 1 ^
	Esc & s 1 ^	Esc & r K
	Esc # s ^	Esc & l # P
	Esc & l # W	Esc & l # J
10000010		Restrict all sequences

Poll Mask X11000001

The poll mask secondary will modify the printer's response to polls. A one byte poll mask modifier follows the poll mask secondary. This modifier is used as a mask to turn on or off the printer's response for the various printer service conditions (except the self test service condition). Setting the service condition mask bit in the modifier to 0 (zero) will shut off the printer's response for that service condition; setting the bit to 1 will again enable that response. To find the current value of the mask, read the printer status byte 4. The service condition response bit mask locations are shown below.



UNRECOGNIZED SECONDARY COMMANDS

If the printer receives an unrecognized secondary command it will react in the following manner.

If the unrecognized command is a secondary Listen command, the printer will acknowledge the command as valid, then read and ignore all incoming data bytes until it encounters an Unlisten command or a data byte with EOI asserted.

If the printer receives an unrecognized secondary talk command, it responds by sending one all zeros data byte while asserting EOI.

UNIVERSAL IDENTIFY COMMAND

The Universal Identify Command is a means for the host device to identify devices on the bus. The command consists of two bytes: the first byte is the primary Untalk command, and the second is a secondary command addressing a specific device.

The printer responds to the Universal Identify Command with two data bytes. The first byte of the response is a general device classification, which tells the controller that the printer is a printer/terminal device. The second byte of the response tells the host device that the printer is an HP2932A, an HP2933A, or an HP2934A. These response bytes are shown on the next page.

Data Communications Interfaces

Byte 1: 00100000 (20 hex)
Byte 2: 00010001 (11 hex) (2933/34A)
 00010000 (10 hex) (2932A)
 00001001 (09 hex) (2631B Support Mode)
 00000010 (02 hex) (2631G Support Mode)
 00010001 (11 hex) (2602 Support Mode: 2934A)

CENTRONICS-TYPE INTERFACE (Pin-out Diagram is located in the Appendix)

The Centronics-type interface uses a 37-pin to 36-pin adaptor cable, rather than the 37-pin connector. The printer's hardware automatically takes care of the differences between the 36 and 37 pin cable.

Centronics-Type Interface Configuration

The configuration for the Centronics-type interface offers two data communications options: number of data bits and data inversion.

DATA BITS

Factory Default Setting: 8

Depending on the kind of data the printer will be receiving, 7 or 8 data bits may be chosen. However, if output includes Roman8, Kana8, or graphics data, the printer must be configured to receive 8-bit data.

INVERTED DATA

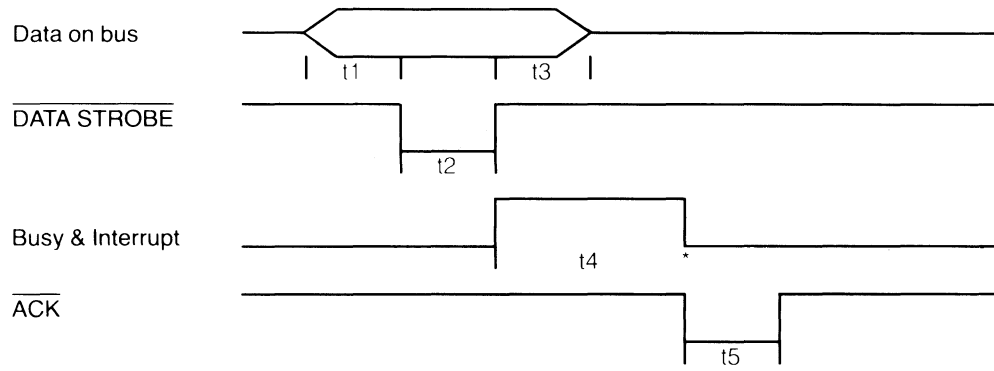
Factory Default Setting: Off

If the host is transmitting data that is inverted from the normal data used on the interface, the printer's normal data communications functions can be overridden by enabling the Invert Data portion of the datacomm configuration.

TIMING SPECIFICATION

The host data device puts its eight bits of true data onto the bus and then sends a negative pulse on -DATA STROBE. The pulse is latched into U204, which then raises the BUSY signal immediately. At the same time the data is latched in U205, thereby enabling the printer to release the data lines. The printer then reads the data, preparing U204 -DATA STROBE latch for the next pulse. The printer indicates to the host data device through an -ACKNLG pulse that the printer is ready to accept more data.

Data Communications Interfaces



t1: Data set-up time	1 μ s min.
t2: Data strobe width	1 to 500 μ s
t3: Data hold time	1 μ s min.
t4: Printer busy	2 sec. max.
t5: Acknowledge pulse width	4 μ s (approx.)
*: When data is read by printer	

NOTE

A low level on the RESET pin for approximately 10 micro-seconds will cause the printer to hard reset.

MULTIPOINT (2933/34A) (Pin-out Diagram is located in the Appendix)

The HP Multipoint protocol is similar to IBM synchronous communications in that it employs control characters (embedded in the data stream) to effect an orderly transfer of data between the host program and the various printers. The table on page 4-23 through 4-26 contains a list of the control characters used, along with a short description of each.

Multipoint operation requires the following:

- All communications follow a strict protocol, which is functionally half duplex.
- Each printer must have an address that is unique within its communication line.
- Data is transmitted in blocks.
- All data transfers are initiated by the host.
- All printers on the same communication line must use the same transmission format (synchronous) the same type of transmission code (ASCII7/ASCII8), the same type of parity (0's, Odd, or Even), and the same baud rate.

Multipoint Communications Configuration

The data communications options available in the printer's SETTINGS mode include the following.

BAUD RATE

Factory Default Setting: 9600

The baud rate is the speed of data transmission, measured in bits per second. The 2930 Series printers provide a combined total of ten baud rates selectable through SETTINGS mode: 110, 200 (2932 only), 300, 600, 1200, 2400, 4800, 9600, and 19200 and External (both 2933/34A). The baud rate selected for the printer must match the baud rate of the host system.

PARITY

Factory Default Setting: None

Parity is a means of checking incoming data for accuracy. The printer provides five parity options for selection through the SETTINGS mode: Even, Odd, Zero, Ones, and None. These are described below.

Even parity

The parity bit is set to force an even number of ones in each byte.

Odd parity

The parity bit is set to force an odd number of ones in each byte.

Zeros

The parity bit is set to zero.

Data Communications Interfaces

Ones

The parity bit is set to one.

None

No parity bit is included in the data.

NOTE

To receive 8-bit data, your printer must have a parity setting of **None**.

GROUP AND DEVICE ID

Factory Default Setting: A (both ID's)

The Group ID and Device ID portions of the printer's configuration allow you to set the identification for the printer. The lower-case value of the Group ID is used in select sequences.

CODE

Factory Default Setting: ASCII 7

The code portion of the Multipoint configuration allows selection of the kind of data the printer expects: 7-bit ASCII or 8-bit ASCII.

In general, the printer is set up to receive 8-bit data for any of the following reasons:

- The system uses the eighth-bit mode of character set selection.
- Graphics will be sent to the printer.

To set the printer up for 8-bit data, select the ASCII 8 configuration setting. The printer cannot use parity with 8-bit data, and if ASCII 8 is selected, parity must be set to **None**.

To set the printer up for 7-bit data, select the ASCII 7 configuration setting. Use the 7-bit setting if the data being sent carries a parity bit.

TRANSMIT TRANSPARENT ONLY

Factory Default Setting: No

Transmit Transparent is a feature of Multipoint (and Data Link) which allows the host or devices on the link to transmit 8-bit binary data. When this feature is enabled, the printer can transmit any bit pattern, including those codes which would normally be interpreted as control characters.

The Transmit Transparent feature applies to transmitted data only. The printer will always accept transparent data.

AUTO STATUS

Factory Default Setting: Off

The Auto Status feature allows the printer to inform the host system of any change in printer status. When Auto Status is enabled, the printer will send a WRU response to the first valid poll from the host if there has been a power-on, hard reset, or change in status since the last poll. When disabled, Auto Status has no effect on printer operation.

TRANSMIT INDICATOR

Factory Default Setting: DSR

This portion of the SETTINGS mode allows the user to choose whether or not the LED indicator under the telephone symbol on the printer's keypad is to function as a transmit indicator, and if so, which condition the transmit indicator is to reflect.

When "None" is selected the indicator will retain its usual function.

When "Line" is selected the indicator will reflect valid Polls and Selects of the printer. When the LED is lit, the host is either polling or selecting the printer.

When "DSR" is selected, the indicator will reflect the state of the Data Set Ready line. When the LED is lit, DSR is high.

DATA TERMINAL READY

Factory Default Setting: High

The Data Terminal Ready portion of the SETTINGS mode allows the user to select whether the RS-232-C Terminal Ready line will be high or low when the printer is in its power-on state. The printer's power-on state exists at power-on, after a hard reset, and after a disconnect.

RATE SELECT

Factory Default Setting: Low

The Rate Select portion of the printer's configuration allows the user to choose the state that the RS-232-C SR line will have as power-on or after a reset. This feature was included in the printer's SETTINGS mode for use by future versions of HP printers.

BLOCK CHECK CHARACTER

Factory Default Setting: CRC

By placing a check character at the end of each block of data, the controller and devices can make sure that data is transmitted and received without error. The 2933/34A printers provide two methods of block checking: the longitudinal redundancy check (LRC) and the cyclic redundancy check (CRC). Both methods provide a data integrity check at the end of each data block. Parity, as configured, is added to the checksum.

The block check character selected should be the same as that used by the host.

STOP BITS

Factory Default Setting: 1

The Stop Bits portion of the SETTINGS mode allows the number of stop bits required by the host system or carried by the data to be defined. The stop bit options offered by the printer are 1, 1.5, and 2 stop bits.

USE SYNC CHARACTER

Factory Default Setting: No

This setting allows the user to choose whether the printer will be using synchronous or asynchronous protocol. The printer's setting should match the protocol used by the host system.

If "Yes" is selected, the printer will emulate synchronous operation by sending SYN characters at appropriate points in the data stream.

If "No" is selected, the printer will follow asynchronous protocol.

Printer Addresses

Each printer in an HP Multipoint configuration must have an address that is unique on its particular communications line (the same address can, however, be used on two separate lines). An address is made up of a one character group ID (GID) and a one character device ID (DID).

DEVICE ID

The printer device ID is set using the "Device ID" field.

GROUP ID

The group ID's for polling and selecting are set using the "Group ID" fields of the printer's configuration menu. In order to use group functions, all printers in a group must be "daisy-chained" together (physically connected to one another so as to share the same modem or hardwired line).

Polling and Selecting

All data transfers are initiated by the host in one of two ways, polling or selecting. In both cases, group and device addresses are used to identify the desired printer or group of printers.

Note that both the group ID and device ID characters are transmitted twice to eliminate line errors during poll and select sequences. (These transmissions do not use Block Check Characters.)

The two group ID characters must be the same and the two device ID characters must be the same for a printer to accept a poll or select sequence.

POLLING

The host enables printers with data ready for transmission to begin sending it by individually "polling" each printer. The host may poll the printers in any order.

The general format of a poll sequence for synchronous configuration environments is illustrated below.

Synchronous

$\langle \text{SYN} \rangle \langle \text{SYN} \rangle \langle \text{PAD} \rangle \langle \text{GROUP ID} \rangle \langle \text{GROUP ID} \rangle \langle \text{DEV ID} \rangle \langle \text{DEV ID} \rangle \langle \text{PAD} \rangle$

*3 or more SYN characters.

**These PAD characters are optional, but if present, should be FF (hex).

The GROUP ID is used for polling.

GROUP POLLING

In order to reduce the time and programming required to poll each printer on a communication line, a group poll can be performed. This allows all of the printers in a group (printers having the same group ID) with queued output data to respond to a single poll sequence. The printers respond in order according to their position on the communication line (with those at the far end of the communication line being held off until all printers ahead of them on the line have completed their data transfers). When the last printer with queued output data is finished with its transmission it sends an EOT to the host to indicate that the group has finished.

The group poll sequence is similar to the normal poll sequence. The " character (042 octal) is used in place of the device ID character.

SELECTING

"Selecting" occurs when the host directs a specific printer or group of printers to accept a data transmission.

For example, the sequences illustrated below select device "D" in group "a".

SYNCHRONOUS

$\text{SYN SYN SYN SYN PAD SYN SYN a a D D PAD}$
 Group ID Device ID
 for select

*Optional, but if present, should be FF (hex).

When the printer is selected, any transmit data which has been queued up will be lost. This applies to group select and line select as well as specific select.

Data Communications Interfaces

If the group and device ID's are the same as the printer's, the printer responds with an ACK0. After receiving the first block of data correctly the printer responds with an ACK1.

GROUP SELECT

A "group select" sequence is used to send a single block of data to all of the printers in a group. The printers do not send any response to a group select. (Since there is no response there is no guarantee that the printers have received the text.) The text transmission is appended directly to the end of the group select sequence.

The group select is the same as a device select sequence except that the device ID character is replaced with a tilde (~) (octal 176).

LINE SELECT

A "line select" allows all of the printers on a communication line to be selected. This is also known as "Broadcast" mode. Both the group and device ID characters are replaced with tildes (~). As with group select, only a single block of data may be sent in each broadcast and the printers do not send any response.

CONFIGURATION STATUS - WHO ARE YOU (WRU)

The Who Are You (WRU) control sequence is a status request from the host to a printer group. It is similar to a group poll except that the printers respond with status information instead of the normal text data. All printers in the group that are turned on will send in their status. The illustration below illustrates the general format of the status request sequence for synchronous configuration environments. The right brace character (175 octal) is used in place of the device ID. This tells the printer that a status request is being made.

SYNCHRONOUS

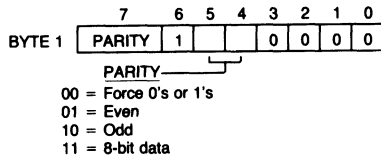
```
⋆3 ⋆15 ⋆PAD ⋆3 ⋆GROUP ID  
⋆GROUP ID } } ⋆15 ⋆PAD
```

* 3 or more SYN characters

**Optional, but if present, should be FF (hex).

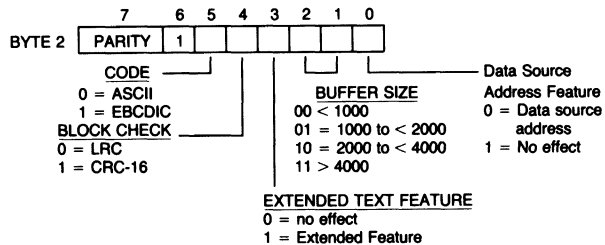
The Who Are You (WRU) sequence does NOT destroy any data that is queued up in any of the printers. Consequently, it is a good way to see if any of the printers have any data ready to send.

Three bytes of status information are returned for each responding printer. The status bytes contain printer hardware and firmware configuration information. The content of each status byte is explained on the next page.



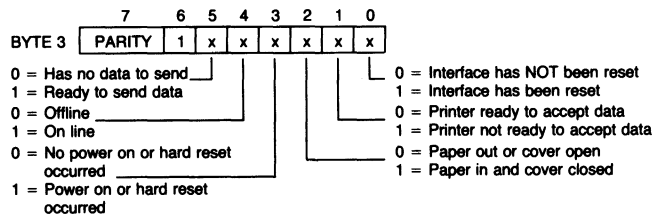
\$x GID DID "i"@P \$x BCC PAD

Example Status bytes "i" @ P would be interpreted as follows
 "i" = 1101000 = odd parity
 "@ " = 1000000 = ASCII, LRC, < 1000 byte buffers
 "P" = 1010000 = no data, terminal in remote



MULTIPOINT STATUS BYTES

@	100	0000	\	110	0000
A	100	0001	a	110	0001
B	100	0010	b	110	0010
C	100	0011	c	110	0011
D	100	0100	d	110	0100
E	100	0101	e	110	0101
F	100	0110	f	110	0110
G	100	0111	g	110	0111
H	100	1000	h	110	1000
I	100	1001	i	110	1001
J	100	1010	j	110	1010
K	100	1011	k	110	1011
L	100	1100	l	110	1100
M	100	1101	m	110	1101
N	100	1110	n	110	1110
O	100	1111	o	110	1111
P	101	0000	p	111	0000
Q	101	0001	q	111	0001
R	101	0010	r	111	0010
S	101	0011	s	111	0011
T	101	0100	t	111	0100
U	101	0101	u	111	0101
V	101	0110	v	111	0110
W	101	0111	w	111	0111
X	101	1000	x	111	1000
Y	101	1001	y	111	1001
Z	101	1010	z	111	1010
[	101	1011	{	111	1011
/	101	1100	|	111	1100
]	101	1101	}	111	1101
^	101	1110	~	111	1110
_	101	1111	•	111	1111



BLOCK MODE TRANSFERS

All data transfers between the host program and any of the printers in the Multipoint configuration employ data blocks made up of the following three parts:

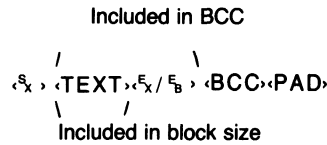
1. Block framing characters.
2. Text (0 to n characters, where n depends on the printer configuration).
3. Block check character(s).

The block check character (BCC) is used to verify that the data was received without error. If a data error is detected, the protocol will normally automatically attempt a retransmission of the block.

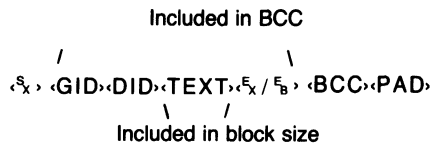
The block protocol is designed to operate using synchronous communications. Data transmission is done in multiple character blocks. The block size used is limited by the printer's communications buffer.

Two forms of text blocks are shown below. The first is a block received from a host. Note that no ID characters are used since the printer or printers to receive the data have already been identified by a select sequence. The second block is one sent from a printer. In Multipoint configurations, since more than one printer may have been polled, the first text block sent from each printer must have the printer ID included. The ID characters are not repeated (as in poll and select sequences) since they are included in the block check character.

(a) Received from the Computer



(b) Sent by the Printer



TEXT TERMINATION

When the printer is receiving text (Text-In Mode) it will accept only ETB (octal 27), ETX (octal 3), or ENQ (octal 5) as a text block terminator. An ETB indicates the end of a block with one or more blocks to follow. An ETX indicates the end of the current block and the end of the text transfer. An ENQ indicates the end of the current block and the end of the text transfer. An ENQ character indicates that the current block has been aborted. The printer will respond to the ENQ with a NAK to request the retransmission of the aborted text block. When the printer is sending data (Text-Out Mode), it will terminate text blocks with either an ETB or and ETX character.

Synchronous operation requires SYN or DLE SYN characters to be sent as fill characters if no text characters are ready for transmission. SYN insertion must also be performed at one second intervals within text blocks.

The printer may send an STX ENQ as a Temporary Text Delay (TTD) notification instead of the next block of data. This indicates that there is more text to come but that it is not ready to be transmitted. A TTD should be answered with a NAK to request the transmission of the text block, or an EOT to reset the printer to control mode.

DATA CHECKING

There are two types of data checking used with the multipoint protocol. The first is a check of each character as it is received and is called a vertical redundancy check (VRC) or parity. This check is only used for ASCII characters. The second is a check of an entire block of data and is called a block check. Two types of block checking are available. The first is a Longitudinal Redundancy Check (LRC). The second is a more complex method called a Cyclic Redundancy Check (CRC). Note that CRC is a more thorough form of data checking than LRC and that both the HP 1000 and 3000 computers use the CRC.

Character Checking

The vertical redundancy check is also known as a parity check. When an ASCII character is transmitted by the host or the printer, the high order (eighth) bit of each character is set to a "1" or a "0" to make the number of "1" bits in the character either even (Even parity) or odd (Odd parity). There is also a variety of VRC in which the parity bit is always set to a "0" and a variety in which the parity bit is always set to a "1". The parity must be the same for both the host and the printer. For example, if even parity is used the high order bit of each character would be set to cause the number of "1" bits in the character to be even.

Character checking is not done when ASCII8 codes are used or when operating in transparency mode.

Two types of VRC available for use in a multipoint configuration are: Even, Odd, Zeros (parity bit always zero), Ones (parity bit always one).

Block Checking

Each block includes a Block Check Character (BCC). The BCC is in addition to the parity bit associated with each character (VRC). The BCC can be either a one-character (LRC) or two-character (CRC16) check sum. To select the type of block checking to be performed, use the Block Check Character field of the configuration menu.

The LRC character is a 7-bit check sum obtained by exclusive "OR"ing the low order 7 bits of each character included in the text block. A parity bit (VRC) is then added to this character when it is transmitted. For ASCII8 all 8 bits are 'OR'ed together and no parity bit is generated for the LRC character.

BUFFER SIZE

The amount of printer memory allocated for use as input and output communications buffers must be set. When the printer is inputting data it uses this space for input buffers. The printer has two 1024-byte buffers.

When the printer is selected, any data waiting in the output buffers is lost. The output buffers then become input buffers to hold data sent from the host until the printer can process the characters.

The printer will respond to select sequences and incoming text blocks with a WACK when there are no input buffers available. The printer will respond with an ACK as soon as a buffer becomes available. Note that if too large a block is sent to the printer following the ACK it may result in a buffer overflow and an EOT will be returned. In such a case, merely retransmit the block.

If the host sends a block which overflows all of the memory area allocated for the buffers, then the printer will respond with EOT. This indicates that the printer and host are not configured with compatible buffer sizes.

Additional header and framing characters will be added to the output buffers depending upon other configuration parameters specified.

TRANSPARENCY MODE (BINARY OPERATION)

Transparency mode allows 8-bit binary data to be sent and received. This allows the sending of data bit patterns that might otherwise be interpreted as control characters.

This mode is controlled with the following character sequences:

DLE STX

Starts transparency.

DLE ETX or DLE ETB

Ends transparency.

DLE DLE

Allows one DLE character to be sent. Note that this will vary with the parity used.

Data Communications Interfaces

DLE SYN

Allows one SYN character to be sent (for synchronous operation). Not included in text or BCC.

DLE ENQ

Aborts current transmission. A BCC character is not expected.

Once in transparency mode, in order to send HP Multipoint protocol control characters and have them interpreted as control characters rather than binary data, the control character must be preceded by a single DLE character. Single DLE characters are seen as the beginning of control sequences rather than data. The first DLE character of the above sequences is never included in the BCC.

DLE insertion is NOT done for control characters that are not used as part of the protocol (such as CR, LF, HT, VT, DC1, or DC2.)

The printer always accepts transparent data. To cause it to send transparent data use the Transmit Transparent Only field of the SETTINGS menu. If this feature is enabled the printer will ALWAYS send transparent data.

Note that whenever control character sequences are used in transparent mode they must have proper parity or they will not be interpreted as control characters.

MULTIPOINT OPERATING STATES

A printer in an HP Multipoint configuration is always in one of the following three operating states:

Control Mode

In this operating state the printer is either waiting to be polled/selected or is in the process of being polled/selected.

Text-In Mode

In this operating state the printer has been selected and is actually receiving data. The printer remains in Text-In Mode until it sends or receives an EOT, at which time it then switches back to Control Mode.

Text-Out Mode

In this operating state the printer has been polled and is actually transmitting data. The printer remains in Text-Out Mode until:

1. It sends or receives at EOT; or
2. It passes control to a subsequent printer in the daisy-chained group.

In either case the printer then switches back to Control Mode.

HP MULTIPPOINT PROTOCOL CONTROL SEQUENCES

The HP Multipoint protocol requires specific control sequences to acknowledge text block transfers, terminate text transfers, or to inform the sender or receiver of status changes. These sequences consist of one or more data link control characters. The tables on the following pages contain a list of these control characters.

INSTALLING A MULTIPOINT CONFIGURATION

Before physically connecting a printer to an operational Multipoint daisy-chained line, be sure to first configure the printer for Multipoint operation.

Each printer within a daisy-chained Multipoint line has one HP Multipoint interface connected to it. The Multipoint interface is:

Option #034, Synchronous Daisy Chain Multipoint Interface. This module is used for connecting successive printers within a daisy-chained group to one another.

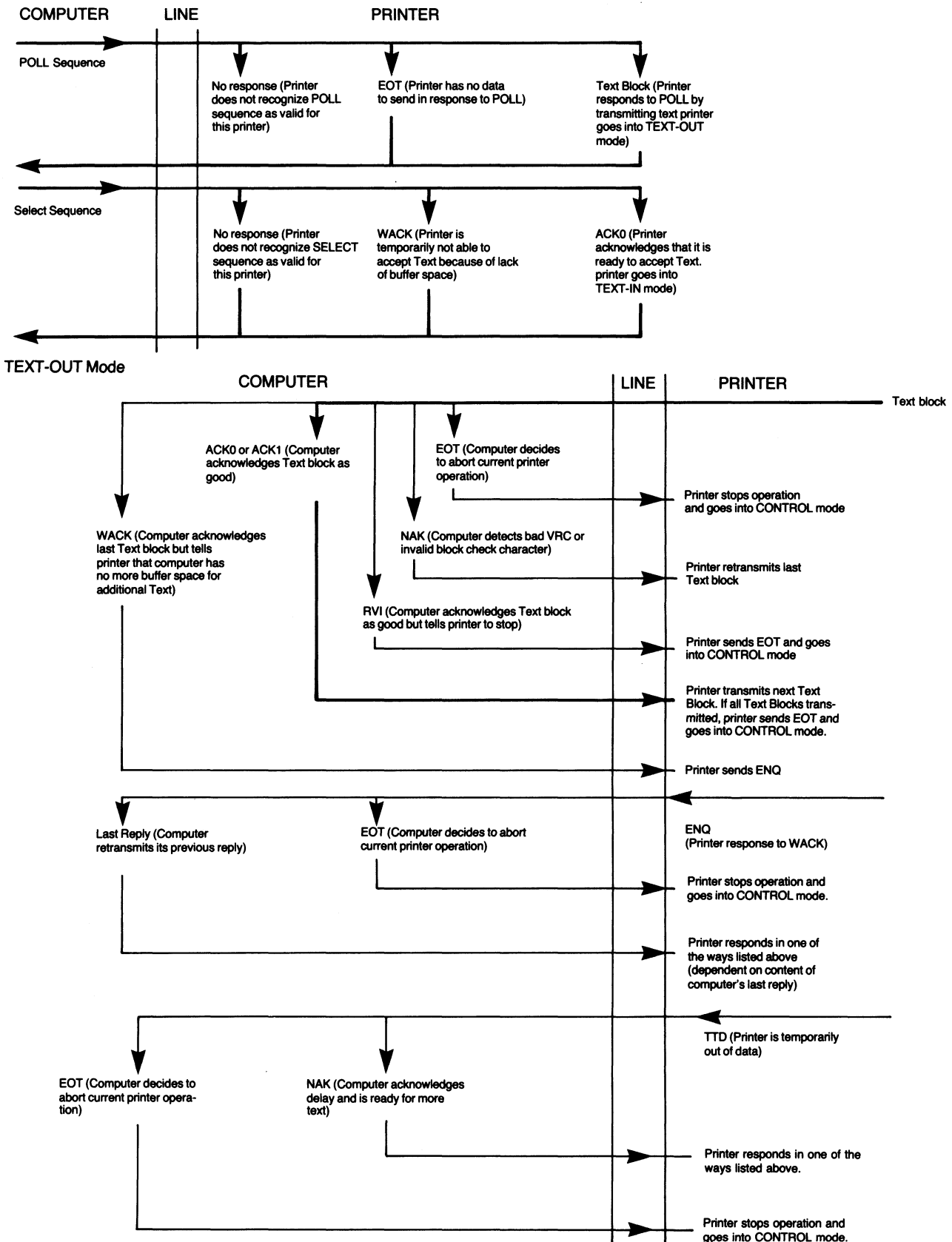
The daisy chain module has one connector on it which requires an adapter cable, part number 02934-60001, which is included with option #034. This cable provides both male and female daisy chain connectors.

Data Communications Interfaces

CONTROL CHARACTER	ASCII CODE (HEX)	DESCRIPTION
Data link control characters. These characters are used to frame messages and acknowledgements for both transmitted and received text blocks. They are also used to control all communications in an orderly fashion.		
DLE	10	Data Link Escape. This is the first character in two byte control characters. The DLE character is usually treated as data when used alone.
ACK0 (DLE 0)	10 30	Acknowledge 0. These control characters are sent by the printer after being selected to tell the computer that the printer is ready to accept a text block. They are also sent by the receiving station (computer or printer) after even text blocks (2, 4, etc.) to tell the sending station (printer or computer) that the block was received properly (see ACK1). The alternating ACK0/ACK1 sequence is initialized to ACK0 following select sequence or to ACK1 after a poll sequence.
ACK1 (DLE 1)	10 31	Acknowledge 1. These control characters are sent by the receiving station (computer or printer) after odd text blocks (1, 3, 5, etc.) to tell the sending station (printer or computer) that the block was received properly (see ACK0).
WACK (DLE ;)	10 3B	Wait Before Transmit. These characters are sent by the receiving station to indicate that the last block was properly received but that the receiving station requests that the sender wait before sending the next block. The sending station should then send an ENQ. The receiving station will then return an ACK0/1 if it is ready to receive data or a WACK in order to continue waiting. The printer will send the first WACK immediately. Subsequent WACKs will be sent two seconds after receipt of the ENQ.
NAK	15	Negative Acknowledge. This character is returned in response to a text block to indicate that the block was rejected because of a bad block check, parity error, framing error (async only), or character overrun. When received by the printer after it has sent a text block, the printer will retransmit the block.
ENQ	5	Enquiry. This character is always used to terminate a POLL or SELECT sequence. It is also used by the sending station to request a retransmission of the acknowledgement for the previous text block. When used as a block terminator, ENQ indicates that the computer has aborted the block (forward abort or TTD). The printer will respond with a NAK to acknowledge the abort command. The printer will not terminate a block in this manner, although it will send STX ENQ as a TTD.
STX	2	Start of Text. This character must be the first character in every text block. It tells the receiving station to begin accumulating a block check character. The STX character is not included in the block check.
ETB	17	End of Transmission Block. This character is used to tell the receiving station to stop accumulating a block check character and that the next character transmitted will be the block check character. The ETB character must follow the last character in all text blocks except the last text block of a message. The ETB character is included in the block check character accumulation. (See the ETX character.)

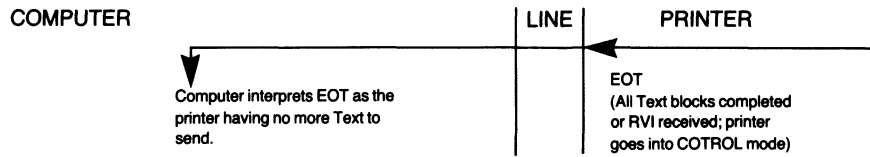
CONTROL CHARACTER	ASCII CODE (HEX)	DESCRIPTION
ETX	3	End of Text. This character must be the last character of the last (or only) text block in a message. It tells the receiving station to stop accumulating a block check character. The ETX character is included in the block check character. (See the ETB character.)
EOT	4	End of Transmission. When this character is sent or received by the printer, it causes the printer to switch to Control Mode. It is sent by the printer when it detects a data overrun condition while receiving text (buffer full), after sending the last text block of a message to the computer, or in response to a POLL sequence when it has no data to send. An EOT is sent by the computer following the last text block in a message to indicate that the computer has no more data to send or when the computer wants to abort the communication sequence.
RVI (DLE ·)	10 3C	Reverse Interrupt. This character is sent by the computer to acknowledge that the last text block was properly received (see ACK0 and ACK1) and at the same time to request that the printer stop sending as soon as possible. When this character is received by the printer the printer will immediately send an EOT to the computer.
TTD (STX ENQ)	25	Temporary Text Delay. This character is sent to inform the receiving station that the sender is temporarily out of text but that there is more to follow. The receiver must respond with a NAK for the sender to continue. This sequence will continue until the sender has more data to send. The first TTD will be sent immediately. Subsequent TTDs will be sent two seconds after receipt of the NAK.
Transmission control characters. These characters are used to initialize, synchronize, and terminate data without affecting data integrity.		
SYN	16	Synchronous Idle. This character is used to establish and maintain character timing between sending and receiving stations. At the beginning of each transmission a minimum of three SYN characters are required. During transmission two pair of SYN characters are inserted at one second intervals. SYN characters should also be inserted at one second intervals into all data sent to the printer, although the printer will only initiate error recovery if it does not receive a SYN character within three seconds.
PAD	7F or FF	PAD. This character is used to ensure that the last character of every transmission has time to be properly received before the receiving station begins transmitting. All transmissions must be terminated with a trailing PAD. (Note that accuracy of the PAD CHARACTER CANNOT BE GUARANTEED.) In addition a trailing PAD may be used after an EOT when it is used in a POLL or SELECT sequence. In this case, if the PAD is issued, it must be a 7F or FF (hex), although FF (hex) is preferred. If the trailing PAD character is not used, the communications interface will wait at least 40 msec before continuing to allow all data to be properly received. This may significantly slow communications.
DLE EOT	10 4	Disconnect. When this sequence is received by the printer instead of a normal response or text block, the printer will attempt to disconnect the modem attached to the communication line. This sequence should only used on switched lines.

CONTROL MODE

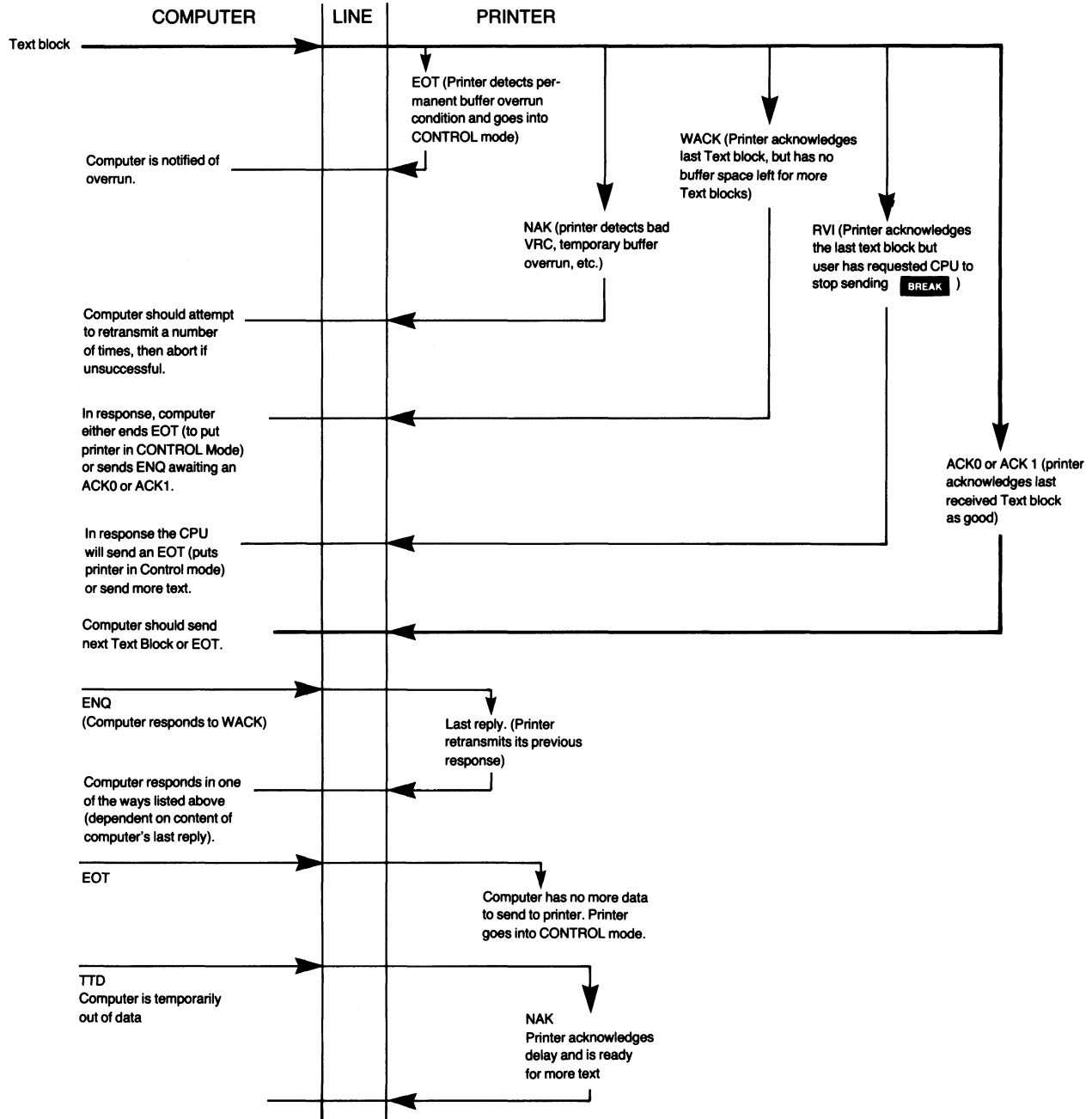


CONTROL MODE (Continued)

TEXT-OUT Mode



TEXT-IN Mode



DATA LINK (Pin-out Diagram is located in the Appendix)

Data Link is a communications capability that possesses many advantages over other systems: high noise immunity, up to 4 km (2.5 miles) between host and devices, and ease of installation, modification and use.

Data Link uses the same protocol as the Multipoint interface. The difference between Data Link and Multipoint interfaces is the hardware used. (See the preceding pages for information on the HP Multipoint interface.)

DATA COMMUNICATIONS ERRORS

Your printer recognizes and may be affected by two kinds of data communications errors: parity errors and framing errors.

Parity errors occur when some type of parity check is enabled through configuration, and the parity bit of the incoming data doesn't match the parity expected by the printer.

Framing errors occur when the printer fails to encounter a stop bit where it expects to find one. Framing errors often result from a printer baud rate setting that does not match the baud rate used by the host.

When the printer encounters an error, it prints a Delete character (⌫). If you are getting data communications errors, check the parity and baud rate settings in the data communications configuration. If the settings seem to be correct and you still get data communications errors, check the interface cable.

HELP!



PRINTER PROBLEMS

The following information is provided to help you solve problems that do not require the help of a trained service person. If the printer is not functioning properly after following the suggested instruction, please turn to **HOW TO GET HELP**, this section.

NO POWER:

1. Are the indicator lights on the printer's front panel on? If any of the lights are on the printer is being supplied power. If none of the indicator lights on the printer's front panel are on, check that the power cord is connected.
2. Does the fuse need replacing? Always replace the fuse with one of the same type and rating.
3. Is the fuse installed properly? Check instructions at the front of this manual for installing fuses.

PRINTER WON'T PRINT:

1. Is the printer out of paper or is the cover ajar? The PAPER OUT light will blink and the printer will beep when either of these conditions exist.
2. Press the **TEST** key to run the printer's self test. If the self test runs successfully the printer is OK. SELF TEST is discussed below and under Testing the Printer.
3. Printer may be OK but paper or ribbon isn't loaded properly, preventing "Self-Test Passed" from printing.
4. Print head gap may be too wide, preventing "Self-Test Passed" from printing.
5. Print head gap may be too close. Turn the print head gap adjustment knob toward 6.
6. If the printer is still not functioning press **RESET** twice.

SELF TEST WAS PASSED, BUT PRINTER DOESN'T COMMUNICATE WITH THE HOST:

1. Is the on-line light on? If not, press the **ON LINE** key to put the printer on-line.
2. Is the interface cable connected securely at both ends?
3. Is the baud rate set properly? Check other data communications settings (parity, etc.), also.
4. If you are still having problems check the host device.

Help!

PAPER JAMS:

1. The print head gap may need adjusting. Turn the print head gap adjustment knob toward 6.
2. Is the paper path obstructed?
3. Is the paper window closed? Multipart forms and cardstock must exit through the paper window at the top of the printer.
4. Tractor feeds may not be locked down.
5. Paper may not be taut between the tractor feeds.

PAPER WON'T LOAD AS INSTRUCTED:

1. Try to manually advance the paper through the pinch rollers by using the manual advance knob located on the inside right of the printer. (See the callouts in front of this manual for knob location.)
2. Print head gap may be too close. Turn the print head adjustment knob toward 6.
3. Paper may not be advancing in back of metal paper guide (attached to top of right tractor feed gate).

PRINTING IS TOO LIGHT:

1. The print head gap may need adjusting. Turn the print head adjustment knob toward 1.
2. Check the ribbon for signs of wear. It may need replacing.
3. The print head may not be locked in place.
4. The print head may need replacing.

PRINTING IS SMEARED OR SMUDGED:

1. The print head gap may need adjusting. Turn the print head adjustment knob toward 6.

PRINT HEAD MOVES BUT NOTHING PRINTS:

1. The print head may not be locked down.
2. The print head may need replacing.
3. The print head gap may need adjusting. Adjust the print head adjustment knob toward the 1.
4. The ribbon may not be loaded correctly.



DELETE (■) CHARACTERS ARE PRINTING:

1. Check that printer-host settings (baud rate, parity, handshakes, etc.) are compatible.

PAPER-OUT SIGNAL SOUNDS EVEN THOUGH PAPER IS LOADED:

1. Paper may be too far to the right to be detected by the paper sensor. Adjust the tractor feeds to line up the left edge of the paper with the Paper Edge Line.
2. Paper may have been loaded over the paper sensor. Check paper loading.

PRINT HEAD DOES NOT RETURN TO LEFT-MOST POSITION:

1. Margin may have been redefined by using the  and  keys. See Establishing Print Margins on page 1-17, Getting Started.

HOW TO GET HELP

If the printer continues to malfunction, contact your Systems Administrator or person responsible for the printer. For printer repair, contact your local HP support representative. A list of sales and support offices is located in the back of this manual.

MAINTENANCE

If you wish to clean the external printer surfaces, do so with a mild soap and water solution or clean with isopropyl alcohol.

Clean dirty pinch rollers with a cotton swab and isopropyl alcohol.

Clean print head wires clogged with ink with a cotton swab and isopropyl alcohol.

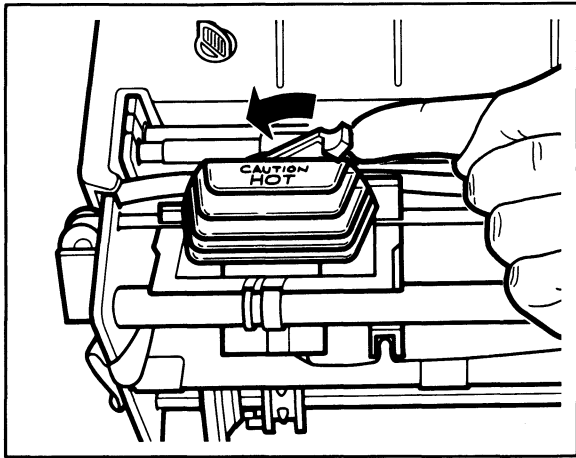
Vacuum out accumulated paper dust.

Help!

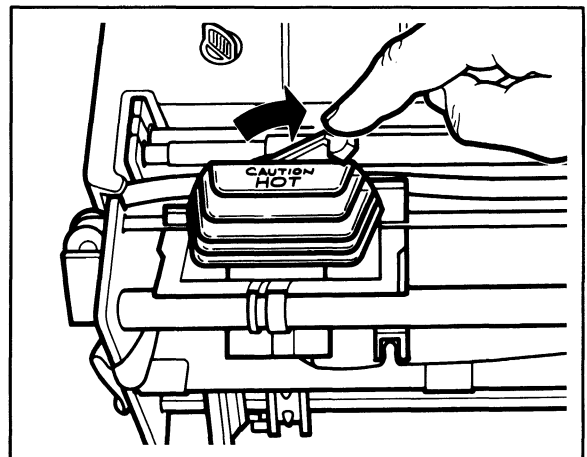
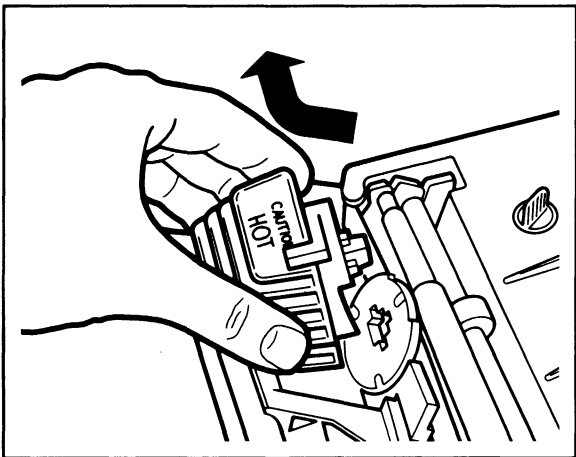
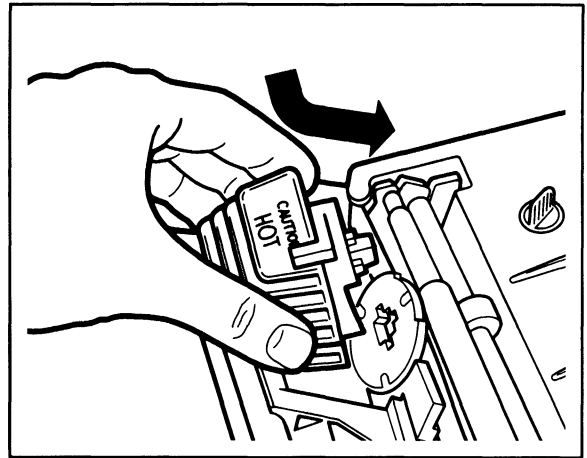
REPLACING THE PRINT HEAD

Turn off the printer before changing the print head. After replacing the print head check the ribbon for damage. A worn print head can damage a ribbon. Replace a frayed or damaged ribbon.

Removing Print Head



Installing Print Head



REPLACING THE RIBBON

To insure satisfactory print quality, especially in bar code applications, your printer uses an internal character counter to indicate the extent the ribbon has been used since it was last replaced.

The average ribbon life is 10 million equivalent characters and at least 5 million in bar code applications. However, the actual useful life of the ribbon depends on the requirements of your printing application. Bar code readability depends on both the quality of the reading equipment and the remaining ribbon life. This combination should be tested at regular intervals.

To replace the ribbon:

1. Open the printer cover.
2. Turn one of the green take-up knobs on the ribbon cartridge in the direction indicated by the arrows to release the cartridge from the ribbon motor shaft.
3. Lift the cartridge and ribbon up and out of the printer.
4. Install the new ribbon per the instructions provided in Section 1.
5. Reset the counter. This is described under Test Mode: COUNTERS.

Help!

TESTING THE PRINTER

Several tests are available on your printer.

Self Test

Press **TEST** once and the printer's self test will be performed. Upon successful completion of the test the following will print.

S e l f T e s t P a s s e d .

If Self Test fails, contact your local HP service office.

Test Mode

Further printer tests are available through the printer's test mode. These tests provide additional printer tests primarily for use by service personnel.

To enter the printer's test mode, press **SELECT** and **TEST**. The following menu will print.

M E C H A N I S M | C O N T R O L L E R | I N T E R F A C E | A L I G N M E N T | C O U N T E R S

To select a test, position the print head under the test desired (by using **||**) and press **SELECT**. After the test is performed the test mode is automatically exited, and must be reentered to perform each subsequent test.

MECHANISM:

In this test, the print mechanism controller is checked. Following this check, the print head scans back and forth to print all the symbol set patterns located in the symbol set ROM, a pattern of enhanced Compressed, Normal, and Expanded print, and the print mechanism alignment pattern (2933/34A).

CONTROLLER:

This test is similar to the self test but it performs a test on the RAMs (not NVRAM) that is destructive to all data contained in them. Upon successful completion of the test, "Self Test Passed" will print.

INTERFACE:

This test verifies the interface board installed in the printer. For HP-IB, the test is the writing and reading of the registers. The RS-232-C, RS-422, Data Link, and Multipoint interfaces will perform exhaustive internal loopback, baud rate, byte configuration, and interrupt testing. Upon successful completion of the test, "Self Test Passed" will print. RS-232-C and RS-422: The printer will not perform a complete interface test without the use of proper test equipment.

ALIGNMENT:

This test provides a vertical and horizontal dot alignment pattern for use by service personnel to align print. Because this is a continuous test, **RESET** must be pressed once to stop the test.

COUNTERS:

This test provides the number of characters that have printed since the ribbon was last changed. The figure under **TOTAL CHARACTER COUNT** indicates the total number of characters printed up to the time of the test, regardless of the number of times the ribbon has been changed. The characters used to print the test are included in this count. (One "Maintenance Contract" page is equal to 2,048 characters. Each character printed in letter quality printing (67 and 40 cps) will count as two characters because they are created by two passes of the print head. Graphics, bar codes, and large characters are recognized as characters and are included in the character page count.)

When a ribbon is changed, the operator should enter this test as described above, position the print head under the function performed (i.e. **REPLACED RIBBON**) and press **SELECT**. This will return the counter to zero so that a new count may begin. To exit this part of the Counters test, position the print head under **REPLACED NOTHING** and press **SELECT**.

Error Messages

Contact your local HP Sales and Support office if error messages (alphanumeric combinations or unusual LED blinking) occur during self test or at power on. Provide support personnel with the error code in question to aid them in diagnosing the problem.

APPENDIX



STATUS:

A DC1 transmit trigger is required for RS-232-C and RS-422. Your printer will respond to several different requests for status information.

Model Number Status

The Model Number Status Request is a means for the host system to accurately identify the printer by model number. When it receives a Model Number Request, the printer will respond with "293XA yyww" (year and week), CR-LF. A valid Model Number Request is ESC * r K. A transmit trigger must be sent immediately after the command over the serial interface. Model number status is not effective with Centronics-type interface. See Support Mode on page 6-35.

I/O Status

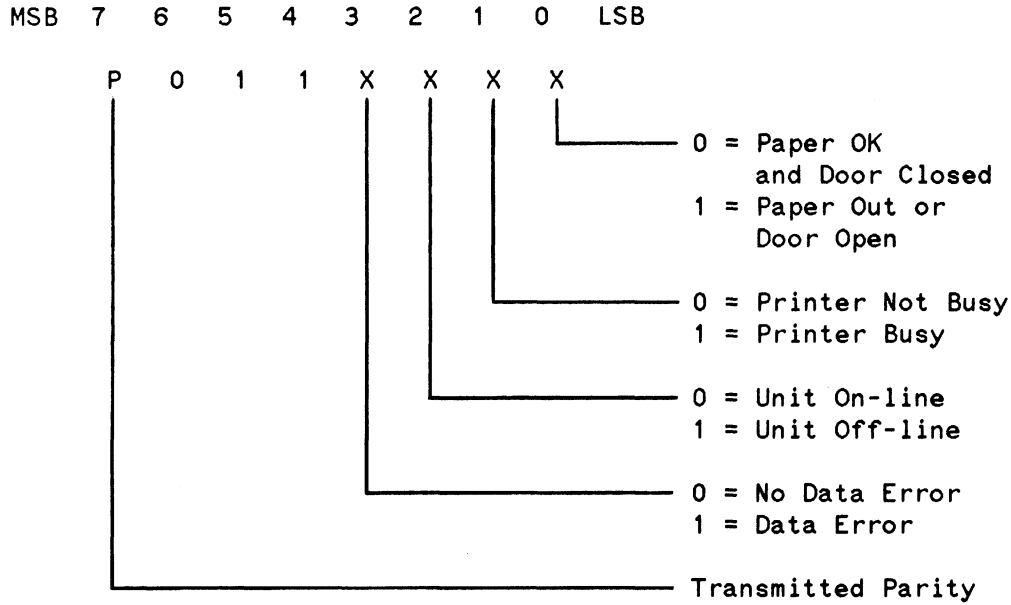
A request for I/O status returns a one-byte status that supplies information about off-line or out-of-paper-conditions. The format for the I/O status is unique for each I/O. When it receives the request for I/O status, the printer returns one data byte, followed by a CR and LF. This status byte may be interpreted as shown on the following pages.

RS-232-C/422 Interface

Serial interfaces will respond to an I/O status request and return vital information. The status will be returned even when the printer is off-line or in the midst of a binary transfer (binary raster graphics).

Appendix

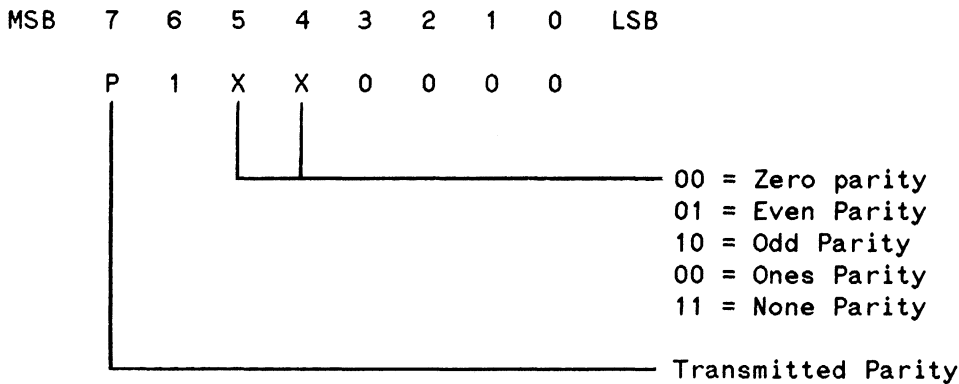
Serial I/O Status Request: ESC ? DC1
 Serial I/O Response:



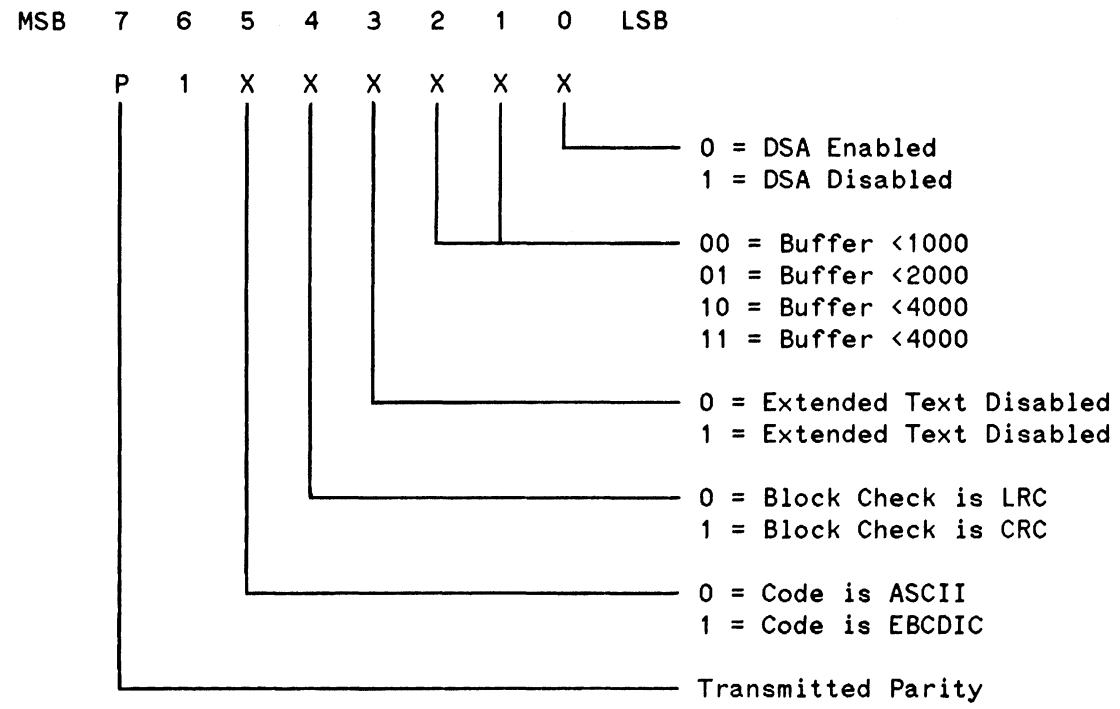
Multipoint Interface/Data Link (2933/34A)

The Multipoint and Data Link status responses return the data in the same format. The mechanism by which this is done is different due to hardware limitations.

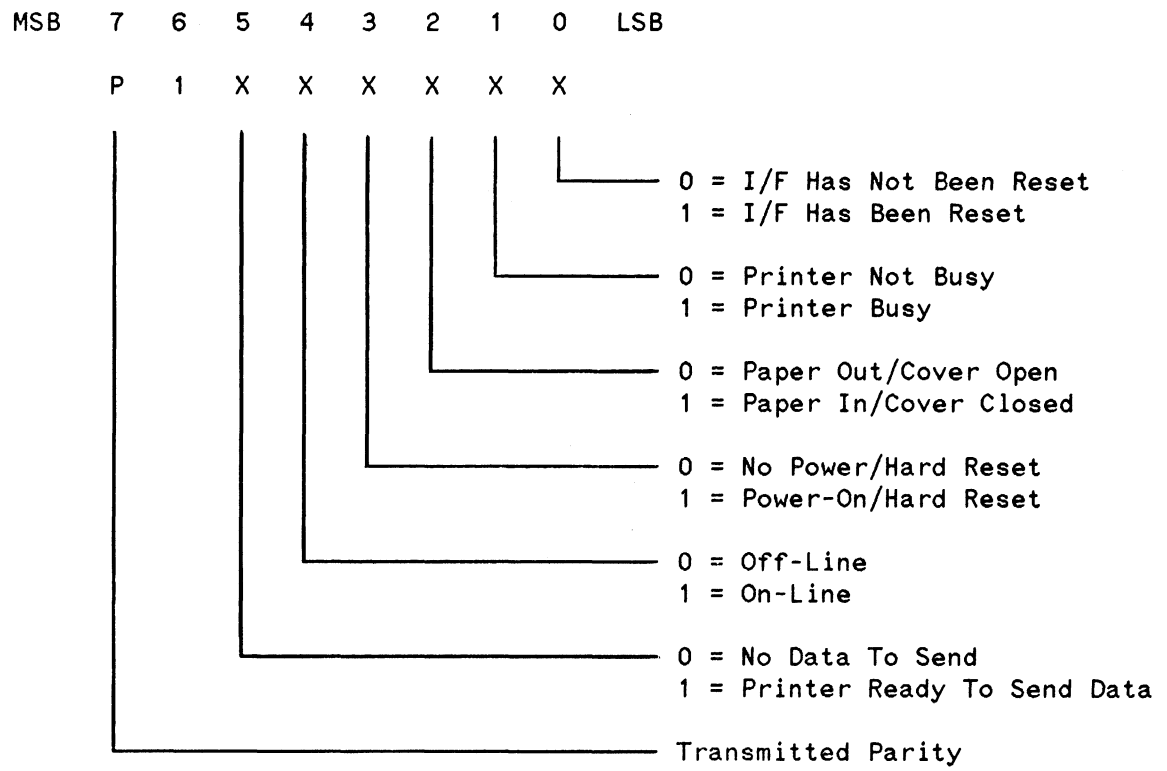
Multipoint I/O Status Response: WRU Byte 1



WRU Byte 2:



WRU Byte 3:



HP-IB Interface:

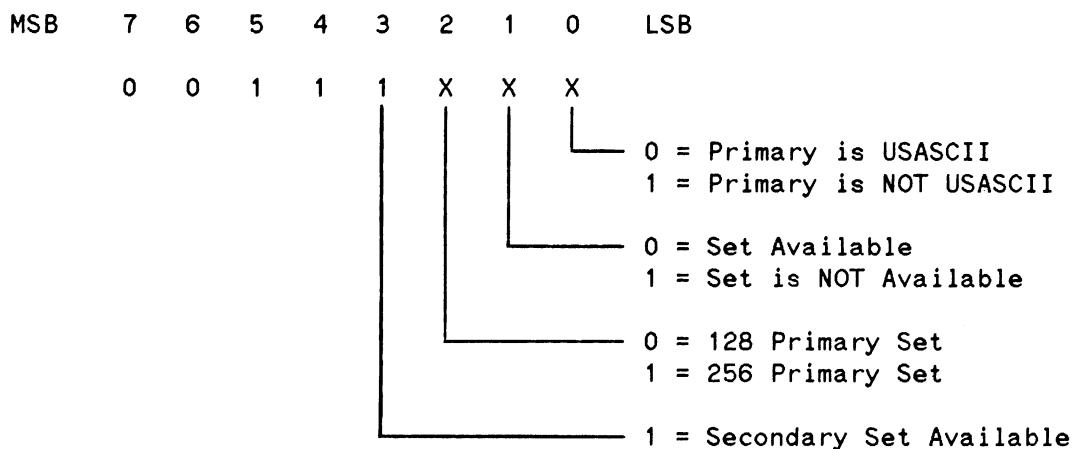
The HP-IB I/O status returned will be determined by whether secondary commands are enabled or not. If secondary commands are enabled, a status command secondary may be invoked; if not, a serial poll may be performed to attain printer status.

Primary Status

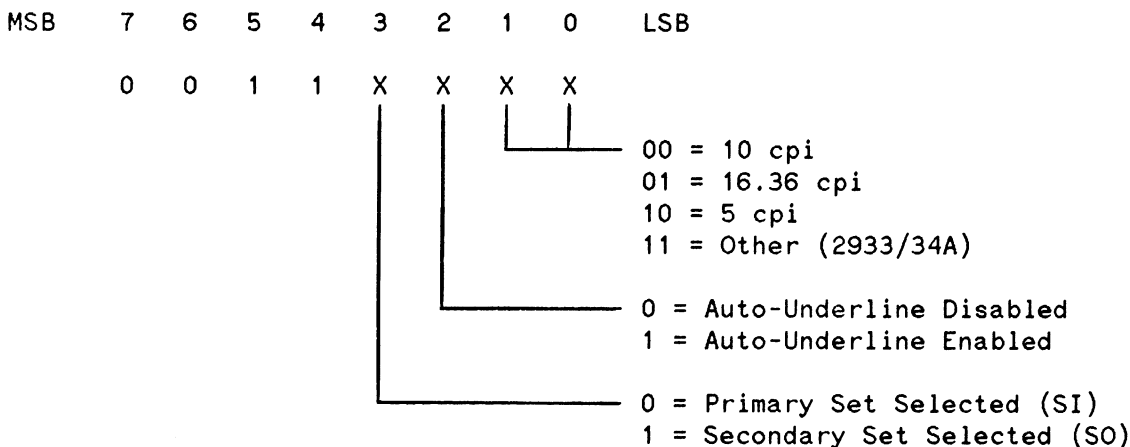
The Primary Status request, ESC ^, causes the printer to return information on symbol set status, print modes, line density, power-on configuration modes, and hardware status. The format for the status request and the general format of the printer response are shown below. Note: A DC1 transmit trigger is required in RS-232-C and RS-422 only.

Primary Status: Request ESC ^ (RS-232 requires the use of a DC1 trigger)
 Response ESC \ <six status bytes> CR-LF.

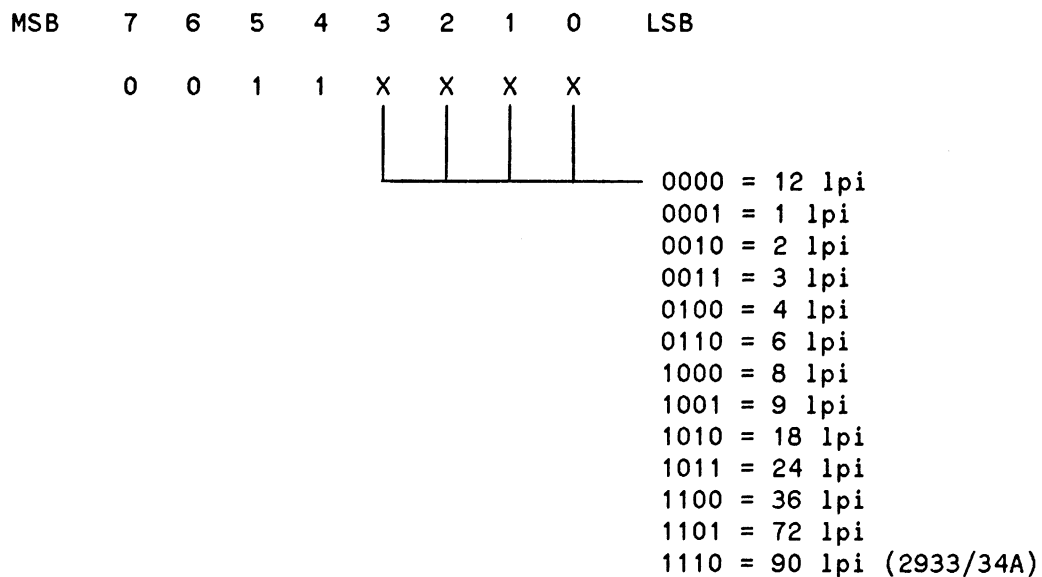
Primary Status BYTE 0:



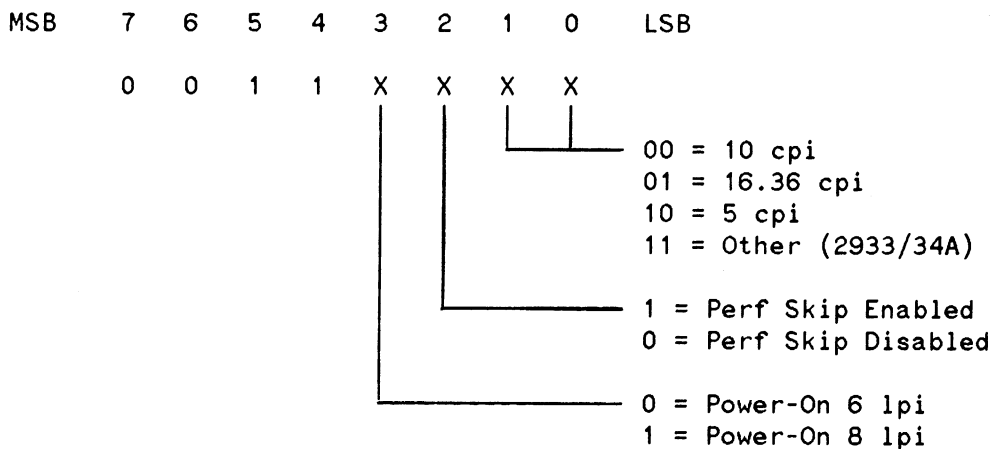
Primary Status BYTE 1:



Primary Status BYTE 2:

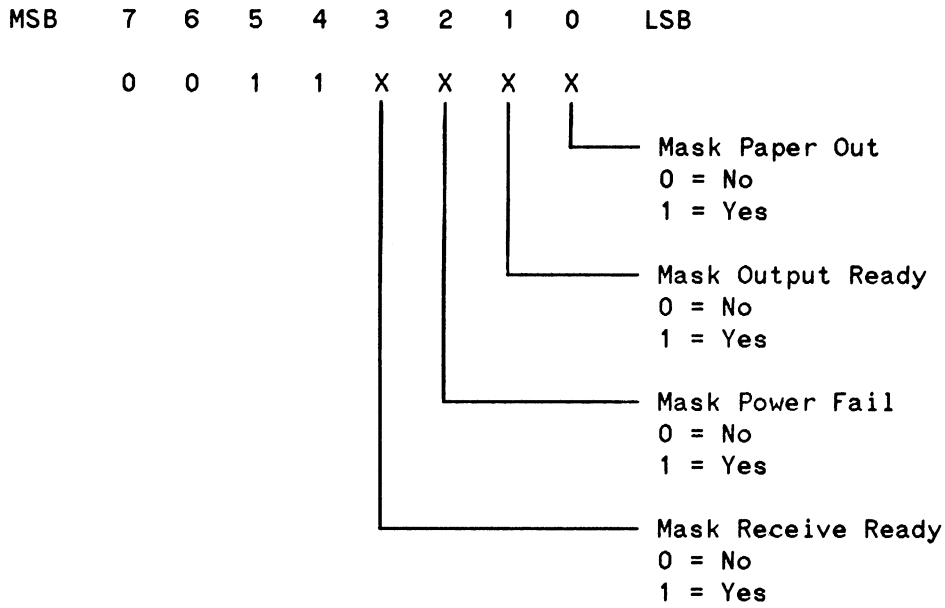


Primary Status BYTE 3:

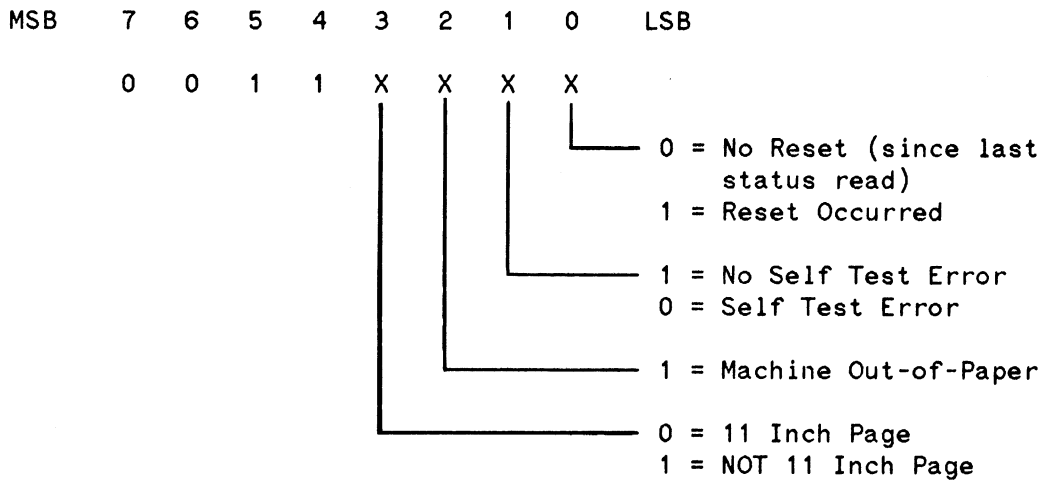


Appendix

Primary Status BYTE 4:



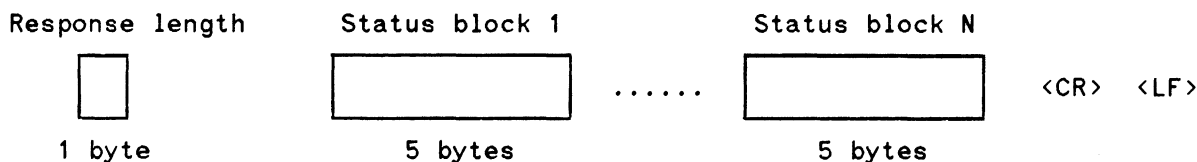
Primary Status BYTE 5:



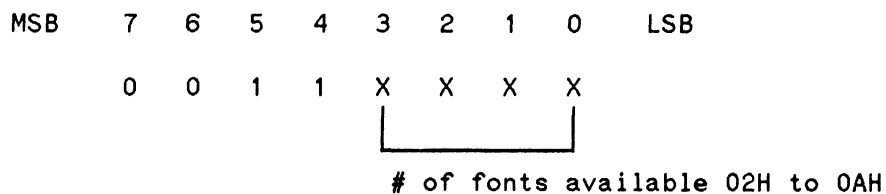
Font Status Request (2933/34A)

This sequence will cause the 2933/34A to report to the host the status of its built-in character fonts plus all the currently installed cartridge fonts. The response consists of a variable number of bytes, depending on the number of cartridges available. The first byte in the response data stream indicates how many blocks of data is to be transmitted. The data structure is described below.

Primary Status Request ESC (s # ^
 Secondary Status Request ESC) s # ^

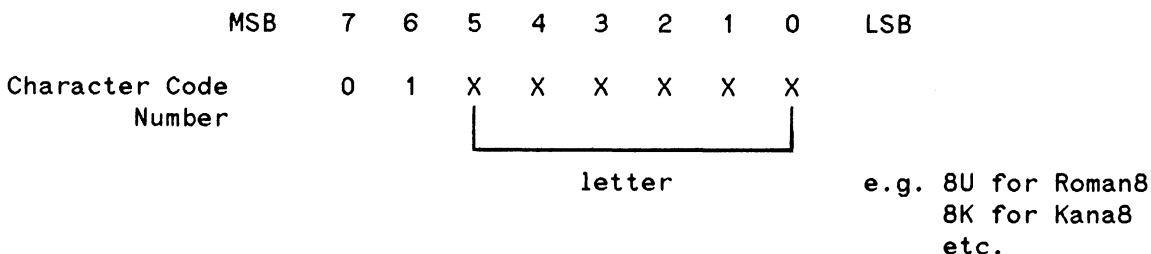
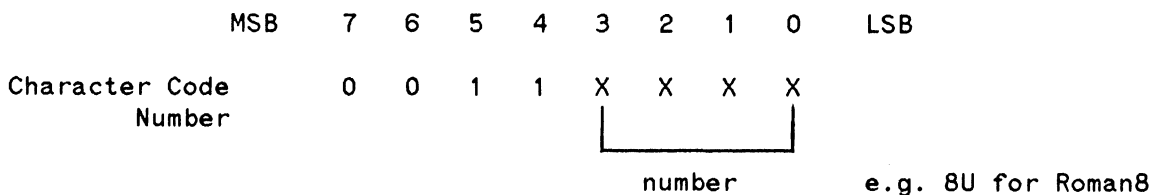


Response length:



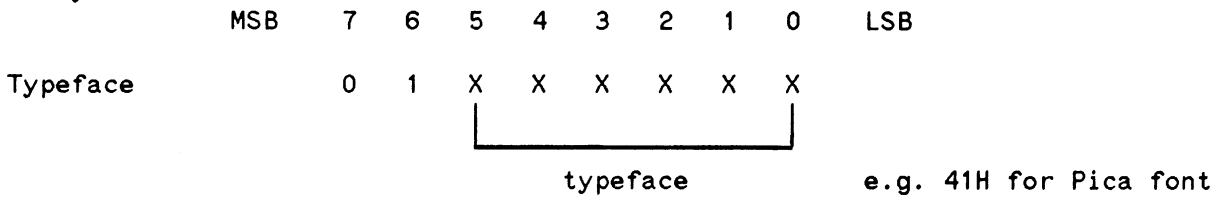
Status block:

Byte 1, 2:

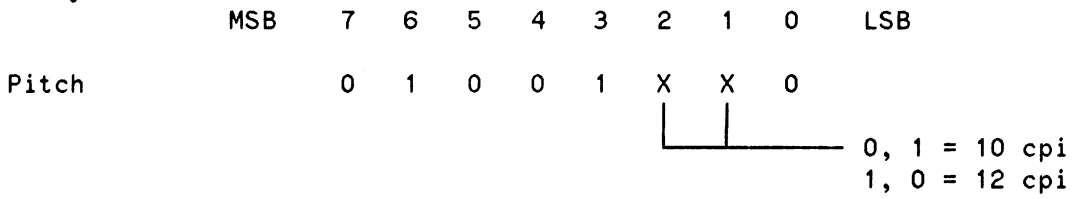


Appendix

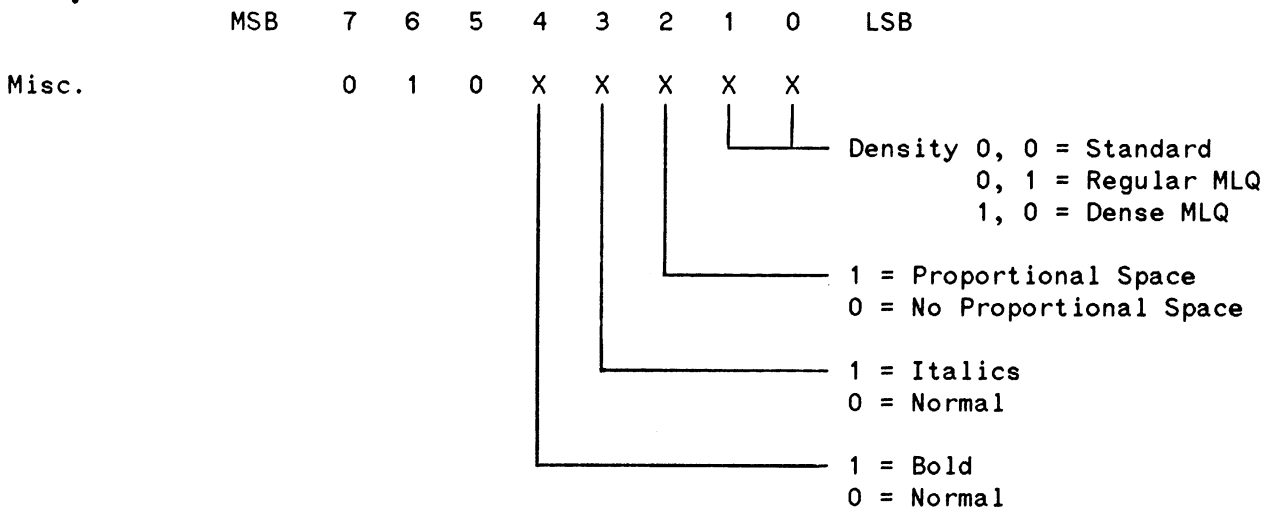
Byte 3:



Byte 4:



Byte 5:



PRINTER RESET

Pressing the **RESET** key twice within 2 seconds causes a "hard" reset.

A hard reset returns the printer to its power on state: the printer features are reset to the states stored in its non-volatile memory. Any data in the I/O buffers will be purged. Press **RESET** twice within 2 seconds to perform a reset.

A hard reset may be performed with the escape sequence ESC E. The escape sequence reset differs from the reset performed at the control panel in that it will not clear the I/O buffer, i.e. any buffered data following the ESC E will be undisturbed, and paper will be positioned at TOF.

NOTE

The settings retained in the printer's non-volatile memory will not be changed by a hard reset, or a power-off. They may be reset to their fixed system default settings only through the Set Defaults option in the SETTINGS mode.

PRINT SAMPLES

Standard

Characters per inch (cpi):

The 2930 Series printers offer different print pitches and line spacings. These features are selectable through the keypad or through program control.

10 cpi

The 2930 Series printers offer different print pitches and line spacings. These features are selectable through the keypad or through program control.

5 cpi

The 2930 Series printers offer different print pitches and line spacings. These features are selectable through the keypad or through program control.

16.36 cpi

Line spacings:

This is an example of 8 lines per inch line spacing.
This is an example of 8 lines per inch line spacing.
This is an example of 8 lines per inch line spacing.
This is an example of 8 lines per inch line spacing.

8 lpi

This is an example of 6 lines per inch line spacing.
This is an example of 6 lines per inch line spacing.
This is an example of 6 lines per inch line spacing.
This is an example of 6 lines per inch line spacing.

6 lpi

Print styles:

All 2930 Series printers can print in the two standard character styles, CUBIC and COURIER, at 200 characters per second. This is an example of CUBIC.

CUBIC

All 2930 Series printers can print in the two standard character styles, CUBIC and COURIER, at 200 characters per second. This is an example of COURIER.

COURIER

2933/34A

Characters per inch (cpi):

This is an example of Cubic typeface at 12 characters per inch.
12345678901234567890123456789012345678901234567890123

12 cpi

This line demonstrates regular spacing in Cubic.
This line demonstrates proportional spacing in Cubic.

Proportional

Left margin
|

Right margin
|

Auto Centering

Auto-centering centers the line
between the margins.

Left margin
|

Right margin
|

Justification

Justification expands the line so that
it reaches to the right margin.

Letter Quality Print:

This is an example of Courier Typeface at 67 CPS.

67 cps

This is an example of Courier Typeface at 40 CPS.

40 cps

Appendix

Additional print styles available with character cartridges (shown at 85% actual size at 40 cps quality).

92188A Courier 10

@ABC	DEFGHIJK	LMNOPQRS	TUVWXYZ[	!"# \$%&'()*+ ,-. /0123 456789:; <=>?
âëôù	áéóúàèòù	äëöüÀĪØÆ	áíøæÀĪÖÜ	ÉİΒΟΑΧΞΔ δfióóððš šúÿÿþþ ÇçÑñ;¿Ǽ ¥\$f¢ -¼½¾« »±■

92188B Courier 12

@ABC	DEFGHIJK	LMNOPQRS	TUVWXYZ[	!"# \$%&'()*+ ,-. /0123 456789:; <=>?
âëôù	áéóúàèòù	äëöüÀĪØÆ	áíøæÀĪÖÜ	ÉİΒΟΑΧΞΔ δfióóððš šúÿÿþþ ÇçÑñ;¿Ǽ ¥\$f¢ -¼½¾« »±■

92188E Helv 10

@ABC	DEFGHIJK	LMNOPQRS	TUVWXYZ[	!"# \$%&'()*+ ,-. /0123 456789:; <=>?
âëôù	áéóúàèòù	äëöüÀĪØÆ	áíøæÀĪÖÜ	ÉİΒΟΑΧΞΔ δfióóððš šúÿÿþþ ÇçÑñ;¿Ǽ ¥\$f¢ -¼½¾« »±■

92188H Italic 10

@ABC	DEFGHIJK	LMNOPQRS	TUVWXYZ[	!"# \$%&'()*+ ,-. /0123 456789:; <=>?
âëôù	áéóúàèòù	äëöüÀĪØÆ	áíøæÀĪÖÜ	ÉİΒΟΑΧΞΔ δfióóððš šúÿÿþþ ÇçÑñ;¿Ǽ ¥\$f¢ -¼½¾« »±■

92188J Italic 12

92188J 2403 SD HP_Ital 12	@ABC	DEFGHIJK	LMNOPQRS	TUVWXYZ[	!"# \$%&'()*+ ,-. /0123 456789:; <=>?
	âëôù	áéóúàèòù	äëöüÀĪØÆ	áíøæÀĪÖÜ	ÉİΒΟΑΧΞΔ δfióóððš šúÿÿþþ ÇçÑñ;¿Ǽ ¥\$f¢ -¼½¾« »±■

92188M Prestige Pica 10

@ABC	DEFGHIJK	LMNOPQRS	TUVWXYZ[	!"# \$%&'()*+ ,-. /0123 456789:; <=>?
âëôù	áéóúàèòù	äëöüÀĪØÆ	áíøæÀĪÖÜ	ÉİΒΟΑΧΞΔ δfióóððš šúÿÿþþ ÇçÑñ;¿Ǽ ¥\$f¢ -¼½¾« »±■

92188N Prestige Elite 12

@ABC	DEFGHIJK	LMNOPQRS	TUVWXYZ[	!"# \$%&'()*+ ,-. /0123 456789:; <=>?
âëôù	áéóúàèòù	äëöüÀĪØÆ	áíøæÀĪÖÜ	ÉİΒΟΑΧΞΔ δfióóððš šúÿÿþþ ÇçÑñ;¿Ǽ ¥\$f¢ -¼½¾« »±■

92188R Letter Gothic 12

@ABC	DEFGHIJK	LMNOPQRS	TUVWXYZ[	!"# \$%&'()*+ ,-. /0123 456789:; <=>?
âëôù	áéóúàèòù	äëöüÀĪØÆ	áíøæÀĪÖÜ	ÉİΒΟΑΧΞΔ δfióóððš šúÿÿþþ ÇçÑñ;¿Ǽ ¥\$f¢ -¼½¾« »±■

92188G OCR A

@ABC	DEFGHIJK	LMNOPQRS	TUVWXYZ[	!"# \$%&'()*+ ,-. /0123 456789:; <=>?
				ÇçÑñ;¿Ǽ ¥\$f¢ -¼½¾« »±■

92188T OCR B

@ABC	DEFGHIJK	LMNOPQRS	TUVWXYZ[	!"# \$%&'()*+ ,-. /0123 456789:; <=>?
				ÇçÑñ;¿Ǽ ¥\$f¢ -¼½¾« »±■

Appendix

Large Characters:

P

x28

R

x21

I

x14

N_T

x7 x1

Bar Codes:

INTERMEC CODE 39

2933



MATRIX 2 OF 5

2933



INDUSTRIAL 2 OF 5

2933




INTERLEAVED 2 OF 5

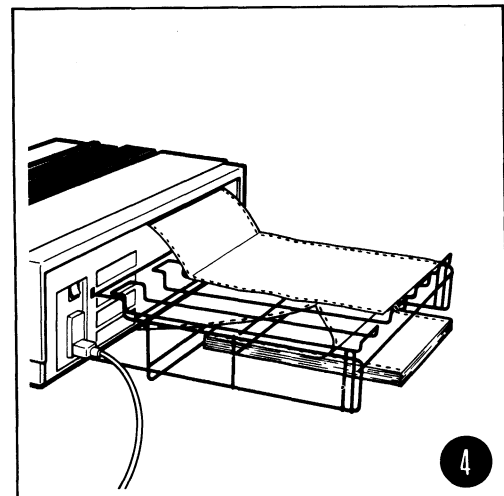
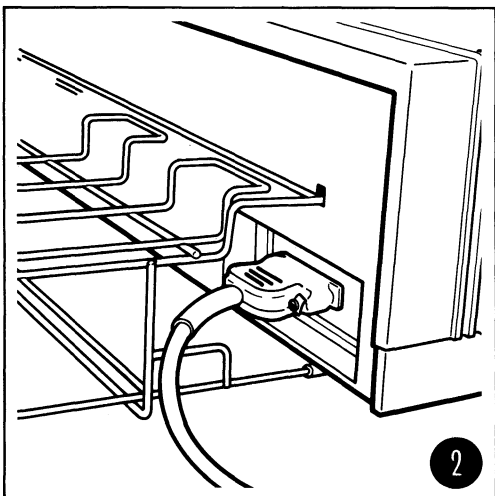
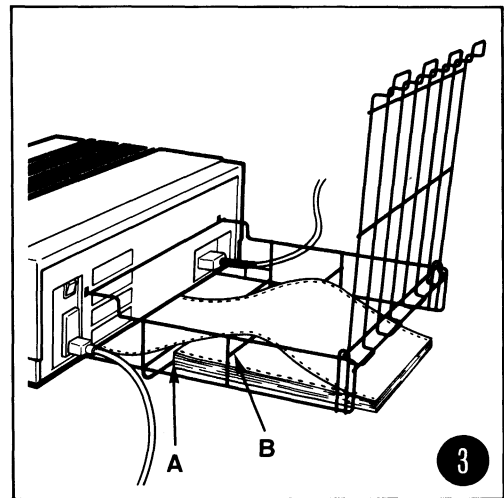
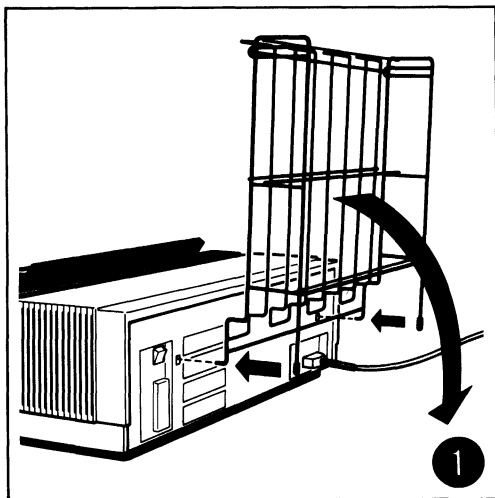
2933



ACCESSORIES

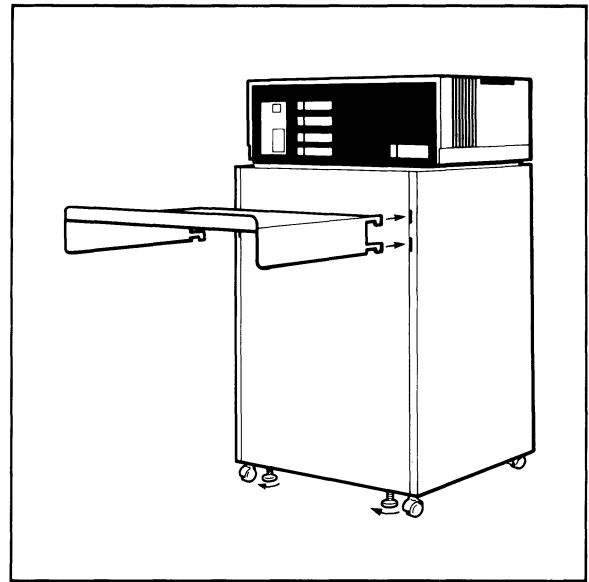
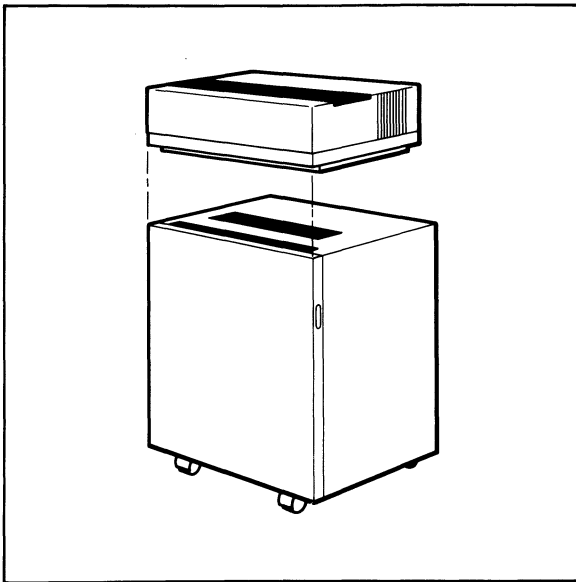
Installing the Paper Rack (Accessory)

1. Insert the two prongs on the paper rack into the rectangular holes on the printer's rear panel. Set the rack down, making sure that it does not rest on the interface cable.
2. Loading paper from the back: Open the rack and set the paper stack down with the heel of the stack resting against bar A.
3. Pull the paper up over bar B, and feed the paper under the printer.
4. Load paper as described in Section 1.
5. Press **PAGE**  to advance several sheets of paper onto the rack.



Installing the Printer Stand

1. Align the printer so that the front of the printer is even with the front of the stand, and so the sides of the printer are even with the sides of the stand.
2. Attach the paper tray to the rear of the stand (see illustration).
3. Once the stand is positioned, lower the leveler feet (glides) by rotating them counter-clockwise (see illustration).



Ordering Supplies and Accessories

Most supplies and accessories can be ordered via the HP Computer Users Catalog. For immediate price and availability information, in the U.S. dial, toll free, 800-538-8787. In California, Alaska, and Hawaii, call 408-738-4133; in Belgium/Luxembourg, (02) 762-32-00; in Canada, British Columbia, 112-800-387-3154, and other provinces, 1-800-387-3154; in France, (6) 928 32 64; in Italy, (02) 92 36 91, or (06) 5 48 31; in South Africa, 802-5111, 53-7954, or 28-4178; in Sweden, 08-7502027, or 08-7502028; in Switzerland, (057) 31 22 54, or (057) 31 22 59; in The Netherlands, 020-470639; in the United Kingdom, 0734-697201, or 0734-7929-59; in West Germany, 07031-142829, or 07031-223133.

SUPPLIES

	Ordering Number
Print Head — Customer installable print head has average life of 200 million characters.	92154B
Ribbons — Three ribbon pack, each ribbon cartridge provides an average life of 10 million characters.	92155L
Paper — Fanfold printer paper 8.5" x 11"	
(216mm x 279mm) 18 lb. bond	92157A
— Fanfold micro-perforated paper 8.5" x 11"	
(216mm x 279mm) 20 lb. bond	92157C
— Fanfold 132 column blue-bar paper 14.9" x 11"	
(378mm x 279mm) 18 lb. bond	9320-1515
2930 Series Manuals — Operator's Guide	02932-90006
— Owner's Manual	02932-90001
— Service Manual	02932-90007

ACCESSORIES

	Ordering Number
Sheet Feeder (2934A) —	29340S
Paper Rack — For table top	92171G
Paper Stand — Includes cabinet, paper catcher, and casters	92214P
Character Style Cartridges (2933/2934) —	
Courier 10	92188A
Courier 12	92188B
Helv 10	92188E
Italic 10	92188H
Italic 12	92188J
Orator	92188K
Prestige Pica 10	92188M
Prestige Elite 12	92188N
Letter Gothic 12	92188R
OCR A	92188G*
OCR B	92188T*
Arabic8	92188U
Greek8	92188V
Turkish8	92188W
Hebrew7	92188X
Hebrew8	92188Y

*Compatibility of OCR characters with reading equipment should be tested.

7-Bit Character Set Mapping

DECIMAL VALUE	Italian	Spanish	JASCII	Katakana	HPL	Math	Line Draw	OCR A	Hebrew 7	Roman Ext.	USASCII	Norwegian/Danish	United Kingdom	French	German	Swedish/Finnish	Orator
33	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!
34	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
35	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#
36	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
37	&	&	&	&	&	&	&	&	&	&	&	&	&	&	&	&	&
38	'	'	'	'	'	'	'	'	'	'	'	'	'	'	'	'	'
39	(((((((((((((((((
40)))))))))))))))))
41	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
42	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
43	,	,	,	,	,	,	,	,	,	,	,	,	,	,	,	,	,
44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
45	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
46	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
47	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
49	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
50	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
51	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
52	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
53	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
54	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
55	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
56	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
57	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
58	;	;	;	;	;	;	;	;	;	;	;	;	;	;	;	;	;
59	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<
60	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=
61	>	>	>	>	>	>	>	>	>	>	>	>	>	>	>	>	>
62	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
63	@	@	@	@	@	@	@	@	@	@	@	@	@	@	@	@	@
64	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
65	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
66	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
67	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
68	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
69	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
70	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
71	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
72	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
73	J	J	J	J	J	J	J	J	J	J	J	J	J	J	J	J	J
74	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
75	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
76	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M
77	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
78	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
79	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
80	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q

7-Bit Character Set Mapping

DECIMAL VALUE	Italian	Spanish	JASCII	Katakana	HPL	Math	Line Draw	OCR A	Hebrew 7	Roman Ext.	USASCII	Norwegian/Danish	United Kingdom	French	German	Swedish/Finnish	Orator
81																	
82																	
83																	
84																	
85																	
86																	
87																	
88																	
89																	
90																	
91																	
92																	
93																	
94																	
95																	
96																	
97																	
98																	
99																	
100																	
101																	
102																	
103																	
104																	
105																	
106																	
107																	
108																	
109																	
110																	
111																	
112																	
113																	
114																	
115																	
116																	
117																	
118																	
119																	
120																	
121																	
122																	
123																	
124																	
125																	
126																	
127																	

8-Bit Character Set Mapping

DECIMAL VALUE	Roman 8	Kana 8	Arabic 8	Greek 8	Hebrew 8	Turkish 8
33	!	!	!	!	!	!
34	="	="	="	="	="	="
35	#	#	#	#	#	#
36	%	%	%	%	%	%
37	%	%	%	%	%	%
38	®	®	®	®	®	®
39	-	-	-	-	-	-
40	((((((
41))))))
42	*	*	*	*	*	*
43	+	+	+	+	+	+
44	,	,	,	,	,	,
45	,	,	,	,	,	,
46	.	.	.	.	.	.
47	/	/	/	/	/	/
48	0	0	0	0	0	0
49	1	1	1	1	1	1
50	2	2	2	2	2	2
51	3	3	3	3	3	3
52	4	4	4	4	4	4
53	5	5	5	5	5	5
54	6	6	6	6	6	6
55	7	7	7	7	7	7
56	8	8	8	8	8	8
57	9	9	9	9	9	9
58	:	:	:	:	:	:
59	;	;	;	;	;	;
60	<	<	>	<	<	<
61	=	=	=	=	=	=
62	>	>	<	>	>	>
63	?	?	?	?	?	?
64	®	®	®	®	®	®
65	A	A	®	A	A	A
66	B	B	®	B	B	B
67	C	C	®	C	C	C
68	D	D	®	D	D	D
69	E	E	®	E	E	E
70	F	F	®	F	F	F
71	G	G	®	G	G	G
72	H	H	®	H	H	H
73	I	I	®	I	I	I
74	J	J	®	J	J	J
75	K	K	®	K	K	K
76	L	L	®	L	L	L
77	M	M	®	M	M	M
78	N	N	®	N	N	N
79	O	O	®	O	O	O
80	P	P	®	P	P	P

DECIMAL VALUE	Roman 8	Kana 8	Arabic 8	Greek 8	Hebrew 8	Turkish 8
81	Q	Q	®	Q	Q	Q
82	R	R	®	R	R	R
83	S	S	®	S	S	S
84	T	T	®	T	T	T
85	U	U	®	U	U	U
86	V	V	®	V	V	V
87	W	W	®	W	W	W
88	X	X	®	X	X	X
89	Y	Y	®	Y	Y	Y
90	Z	Z	®	Z	Z	Z
91	[[®	[[[
92	/	/	®	/	/	/
93]]	®]]]
94	>	>	®	>	>	>
95	>	>	®	>	>	>
96	|	|	®	|	|	|
97	a	a	®	a	a	a
98	b	b	®	b	b	b
99	c	c	®	c	c	c
100	d	d	®	d	d	d
101	e	e	®	e	e	e
102	f	f	®	f	f	f
103	g	g	®	g	g	g
104	h	h	®	h	h	h
105	i	i	®	i	i	i
106	j	j	®	j	j	j
107	k	k	®	k	k	k
108	l	l	®	l	l	l
109	m	m	®	m	m	m
110	n	n	®	n	n	n
111	o	o	®	o	o	o
112	p	p	®	p	p	p
113	q	q	®	q	q	q
114	r	r	®	r	r	r
115	s	s	®	s	s	s
116	t	t	®	t	t	t
117	u	u	®	u	u	u
118	v	v	®	v	v	v
119	w	w	®	w	w	w
120	x	x	®	x	x	x
121	y	y	®	y	y	y
122	z	z	®	z	z	z
123	{	{	®	{	{	{
124	|	|	®	|	|	|
125	}	}	®	}	}	}
126	~	~	®	~	~	~
127	®	®	®	®	®	®

8-Bit Character Set Mapping

DECIMAL VALUE	Roman 8	Kana 8	Arabic 8	Greek 8	Hebrew 8	Turkish 8
*						
161	À	ア	ا	Α	א	Ä
162	Á	イ	آ	Α	ב	Å
163	Â	エ	أ	Β	ג	Å
164	Ã	オ	أ	Γ	ד	Å
165	Ä	カ	أ	Δ	ה	Å
166	Å	キ	أ	Ε	ו	Å
167		ク	أ	Ζ	ז	Å
168		ケ	أ	Η	ח	Å
169		コ	أ	Θ	ט	Å
170			أ	Ι	י	Å
171			أ	Κ	כ	Å
172			أ	Λ	ל	Å
173			أ	Μ	מ	Å
174			أ	Ν	נ	Å
175			أ	Ξ	ן	Å
176			أ	Ο	ס	Å
177			أ	Π	ש	Å
178			أ	Ρ	ת	Å
179			أ	Σ		Å
180			أ	Τ		Å
181			أ	Υ		Å
182			أ	Φ		Å
183			أ	Χ		Å
184			أ	Ψ		Å
185			أ	Ω		Å
186			أ			Å
187			أ			Å
188			أ			Å
189			أ			Å
190			أ			Å
191			أ			Å
192			أ			Å
193			أ			Å
194			أ			Å
195			أ			Å
196			أ			Å
197			أ			Å
198			أ			Å
199			أ			Å
200			أ			Å
201			أ			Å
202			أ			Å
203			أ			Å
204			أ			Å
205			أ			Å
206			أ			Å
207			أ			Å
208			أ			Å

DECIMAL VALUE	Roman 8	Kana 8	Arabic 8	Greek 8	Hebrew 8	Turkish 8
209	ı	イ	ا	Ι	י	İ
210	İ	イ	آ	Ι	ב	İ
211	İ	イ	أ	Ι	ג	İ
212	İ	イ	أ	Ι	ד	İ
213	İ	イ	أ	Ι	ה	İ
214	İ	イ	أ	Ι	ו	İ
215	İ	イ	أ	Ι	ז	İ
216	İ	イ	أ	Ι	ח	İ
217	İ	イ	أ	Ι	ט	İ
218	İ	イ	أ	Ι	י	İ
219	İ	イ	أ	Ι	כ	İ
220	İ	イ	أ	Ι	ל	İ
221	İ	イ	أ	Ι	מ	İ
222	İ	イ	أ	Ι	נ	İ
223	İ	イ	أ	Ι	ן	İ
224	İ	イ	أ	Ι	ס	İ
225	İ	イ	أ	Ι	ש	İ
226	İ	イ	أ	Ι	ת	İ
227	İ	イ	أ	Ι		İ
228	İ	イ	أ	Ι		İ
229	İ	イ	أ	Ι		İ
230	İ	イ	أ	Ι		İ
231	İ	イ	أ	Ι		İ
232	İ	イ	أ	Ι		İ
233	İ	イ	أ	Ι		İ
234	İ	イ	أ	Ι		İ
235	İ	イ	أ	Ι		İ
236	İ	イ	أ	Ι		İ
237	İ	イ	أ	Ι		İ
238	İ	イ	أ	Ι		İ
239	İ	イ	أ	Ι		İ
240	İ	イ	أ	Ι		İ
241	İ	イ	أ	Ι		İ
242	İ	イ	أ	Ι		İ
243	İ	イ	أ	Ι		İ
244	İ	イ	أ	Ι		İ
245	İ	イ	أ	Ι		İ
246	İ	イ	أ	Ι		İ
247	İ	イ	أ	Ι		İ
248	İ	イ	أ	Ι		İ
249	İ	イ	أ	Ι		İ
250	İ	イ	أ	Ι		İ
251	İ	イ	أ	Ι		İ
252	İ	イ	أ	Ι		İ
253	İ	イ	أ	Ι		İ
254	İ	イ	أ	Ι		İ
255	İ	イ	أ	Ι		İ

* 128-160 currently blank for 2934A (8-Bit Sets)

SUPPORTED CONTROL CODES AND ESCAPE SEQUENCES

NOTE

Spaces imbedded in the escape sequences that follow have been added for clarity only.

Control Codes

Some of the control codes which cause no action within the printer may be used as part of a serial, data communications protocol. Thus, they cause some action in the interface of a printer, however, they will not cause action within the printer itself or within any interface which does not ordinarily support that feature.

NUL—(Null)

Causes no action in the printer.

SOH—(Start of Heading)

Causes no action in the printer.

STX—(Start of Text)

Causes no action in the printer.

ETX—(End of Text)

Causes no action in the printer.

EOT—(End of Transmission)

Causes no action in the printer.

ENQ—(Enquiry)

Some data communications interfaces may use this control code for line protocol.

ACK—(Acknowledge)

Some data communications interfaces may use this control code for line protocol.

BEL—(Bell)

Rings a bell.

BS—(Backspace)

Moves the current active position backwards to the previous horizontal position. If the active position is already at the left margin, then no action is taken. The distance moved upon receipt of a backspace character is defined by the width of the current pitch.

HT—(Horizontal Tabulation)

Moves the current active position to the next predetermined character position on the pending line. If no such position exists, then CR-LF will be executed in its place. If the predetermined position is outside the right margin, then the current active position will move to the first column to the right of the right margin. Tabs represent a logical position and thus refer to different positions for different horizontal print pitches.

LF—(Line Feed)

Advances the current active position to the same character position on the next line. The distance to the next line will be the inverse of the current line spacing. This feature will include perforation skip mode (see discussion of ESC & 1 # L).

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VT - (Vertical Tabulation)

Advances the current active position to the same character position on the next predetermined line. If no such line exists, then the first line of the next logical form will be used (i.e. a vertical tab position will always exist in the first line, line zero, of a form). Tabs will represent a logical position and thus refer to different positions for different vertical line spacings.

FF - (Form Feed)

Advances the current active position to the same character position in the first line of the next logical form.

CR - (Carriage Return)

Moves the current active position to the first character position on the pending line (i.e. the left margin).

SO - (Shift Out)

Invokes the secondary character set which remains invoked until receipt of a Shift In (SI).

SI - (Shift In)

Invokes the primary character set which remains invoked until receipt of a Shift Out (SO).

DLE - (Data Link Escape)

Causes no action in the printer.

DC1 - (Device Control 1) [X-on]

Causes no action in the printer.

DC2 - (Device Control 2)

Causes no action in the printer.

DC3 - (Device Control 3) [X-off]

Some data communications interfaces may use this control code for line protocol.

DC4 - (Device Control 4)

Causes no action in the printer.

NAK - (Negative Acknowledge)

Causes no action in the printer.

SYN - (Synchronous Idle)

Causes no action in the printer.

ETB - (End of Transmission Block)

Causes no action in the printer.

CAN - (Cancel)

Causes no action in the printer.

EM - (End of Medium)

Causes no action in the printer.

SUB - (Substitute)

Causes no action in the printer.

ESC - (Escape)

Provides supplementary control through code extension. The Escape character itself is a prefix for the characters which follow it.

FS - (File Separator)

Causes no action in the printer.

GS - (Group Separator)

Causes no action in the printer.

RS - (Record Separator)

Causes no action in the printer.

US - (Unit Separator)

Causes no action in the printer.

DEL - (Delete)

Some data communications interfaces may use this control code for line protocol.

SP - (Space)

Moves the current active position forward one character position on the pending line. If the active position is already at the right margin +1 and end-of-line wraparound is not enabled then the print position is not affected. If the active position is already at the right margin +1 and end-of-line wraparound mode is enabled then the active position is set to the left margin of the next line and then the space is processed.

Escape Sequences

ESC 1 - Set Horizontal Tab at Current Print Column

Sets horizontal tab at the current active position. It is possible to set a tab in every character position within a line. Tabs represent a logical position and thus refer to different positions for different horizontal print pitches. The default state is all horizontal tabs clear.

ESC 2 - Clear Horizontal Tab at Current Print Column

Clears a horizontal tab at the current active position, if one is set. Tabs represent a logical position and thus refer to different positions for different horizontal print pitches. The default state is all horizontal tabs clear.

ESC 3 - Clear All Horizontal Tabs

Clears all horizontal tabs. The default state is all horizontal tabs clear.

ESC 4 - Set Left Margin at Current Print Column

Sets the left margin to the current active position. Margins represent a physical position and thus correspond to different character positions for different horizontal print pitches. Changes in print pitch do not move the margin once it is defined. The current active position can move to the left of the left margin only via the print positioning escape sequences (ESC & a # c/C and ESC & a # h/H). For example, if a BS is received when the current active position is at the left margin, it is ignored. Attempts to set the left margin to the right of the right margin are ignored. Columns are counted beginning with zero. (See Support Mode for numbering from one.)

ESC 5 - Set Right Margin at Current Print Column

Sets the right margin to the current active position. Margins represent a physical position and thus correspond to different character positions for different horizontal print pitches. Changes in print pitch

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do not move the margin once it is defined. Upon printing a character at the right margin, the current active position moves to the right one character position. This position is non-printable. The current active position can move to the right of this position only via the print positioning escape sequences (ESC & a # c/C and ESC & a # h/H). For example, if thirty characters are received after reaching the right margin, only one BS is required to move the current active position back within the margin limits. Attempts to set the right margin to the left of the left margin are ignored. Columns are counted beginning with zero. (See Support Mode for numbering from one.)

ESC 9 - Clear Margins

Causes margins to be reset to their default (configuration) positions.

ESC ? - Serial I/O Immediate Status Request

Certain data communications interfaces may use this escape sequence to return status to the host.

ESC E - Hard Reset

Performs a hard reset on the printer (this is not a hardware reset). The reset includes:

- Printing any partial lines of data which may have been received.
- Moving paper to the physical top of page and move the print position to the left margin, if not already there.
- Resetting all programmable features to the default values.

The printer will remain on-line and no data is lost. This escape sequence has no effect on the I/O, nor does it cause any disruption in host-to-peripheral communication.

ESC I - Horizontal Tabulation

This escape sequence performs the same function as the horizontal tab character.

ESC Y - Turn Display Functions Mode On

Turns on display functions mode. When in display functions, all control codes and escape sequences are printed and not executed with the following exceptions:

- CR - is printed and then executed as CR-LF.
- ESC Z - Is printed and then executed.
- Serial protocol is executed and printed.

ESC Z - Turn Display Functions Mode Off

Turns display functions mode off following the printing of this escape sequence.

ESC ^ - Primary Status Request

A request for product dependent status. The information is in four-bit groups encoded as characters from column 3 of the ASCII table. The number of characters varies but the information returned is preceded by an ESC \ and is terminated by CR-LF.

ESC f - Modem Disconnect

Serial interface may respond to this escape sequence and cause the modem connected to the device to hang-up.

ESC o - Transfer to the Off-Line State

Transfers the printer to the off-line state if presently on-line. This escape sequence can be used by applications which require operator intervention.

ESC z - Initiate Self Test

Initiates self test within the printer. This command will not drastically alter the state of the printer. If no error is detected, the printer will remain on-line. If an error is detected, the printer will go to the off-line state.

ESC = - Half-line feed can be used for superscripts and subscripts (2933/34A).

ESC & a # c/C - Horizontal Print Positioning

Moves the current active position to a new character position on the pending line, according to the active print pitch. A plus (+) or minus (-) sign in front of the value indicates the new position is relative to (the right or left of) the current active position. No sign indicates the new position is absolute. The first column within a line is column zero. This sequence ignores margins and can therefore be used to set the current active position to any location along the present physical line. If a request is made for a location outside the printer's physical limits, the current active position will be moved to the appropriate limit.

ESC & a # h/H - Horizontal Positioning in Decipoints (2933/34A)

Moves the current active horizontal position to a new position along the X axis. If no such position exists then the printer moves to the appropriate limit. This sequence ignores margins and can move the active position anywhere along the X axis. The left most position is zero and the right most is set to the maximum size of the logical page. A plus sign (+) indicates the new position is relative to the right of the current active position. A minus sign (-) indicates the new position is relative to the left of the current active position. No sign indicates an absolute distance from the left boundary of the logical page.

The dimensional base is called a "decipoint", which is 1/720 of an inch, or one-tenth of a typographic point (1/72 of an inch).

NOTE

All positions should be kept in decipoint units and converted to dot positions for actual data placement including character widths. This will eliminate the effects of successive roundings or truncations.

ESC & a # l/L - Set Left Margin - Absolute

Sets the left margin to the column specified in the value field. The absolute position is calculated by the current print pitch and specified column setting. The first column within a line is column zero.* If the value field specifies a column greater than the current right margin, the command is ignored. If the current active position is to the left of the new left margin, then the current active position is moved to the new left margin. Margins represent a physical position and thus correspond to different character positions for different horizontal print pitches. Changes in print pitch do not move the margin once it is defined. The only way to move the current active position outside the margins is via the horizontal print positioning escape sequences. For example, if a BS is received when the current active position is at the left margin, it is ignored.

ESC & a # m/M - Set Right Margin - Absolute

Sets the right margin to the column specified in the value field. The absolute position is calculated by the current print pitch and specified column setting. The first column within a line is column zero*. If the value field specifies a column less than the current left margin, the command will be ignored. If the value field specifies a column greater than the physical limits of the device, then the right margin is set to the physical limit. If the current active position is to the right of the new margin, then the current active

* Configuration allows the user to count tabs and margins either beginning with 1 or with 0 (zero). 0 (zero) is the preferred base. 1 may be required by some application programs.

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position will be moved to the first column to the right of the new right margin. Margins represent a physical position and thus would correspond to different character positions for different horizontal print pitches. Changes in print pitch do not move the margin once it is defined. The only way to move the current active position outside the margins is via the horizontal print positioning escape sequences. For example, if thirty characters are received after reaching the right margin, only one BS is required to move the current active position back within the margin limits.

ESC & a # r/R - Vertical Print Positioning

Moves the current active position to the same column position on a new line based according to the active vertical spacing. A plus (+) sign in front of the value indicates the new position is relative to (down from) the current active position.

ESC & a # t/T - Set Horizontal Tab

Sets a horizontal tab at the column specified in the value field. The first column within a line is column zero*. If the specified column is greater than the physical limits of the device, then the command will be ignored. Tabs represent a logical position and thus refer to different positions for different horizontal print pitches.

ESC & a # u/U - Clear Horizontal Tab

Clears a horizontal tab at the column specified in the value field, if one is set. The first column within a line is column zero*. If the specified column is greater than the physical limits of the device, then the command will be ignored. Tabs represent a logical position and thus would refer to different positions for different horizontal print pitches.

ESC & a # v/V - Vertical Positioning in Decipoints (2933/34A)

Moves the current active vertical position to a new position along the Y axis. If no such position exists then the printer moves to the appropriate limit. The sequence is limited by the logical page boundaries. The active position can be anywhere on the logical page. The top position is zero and the bottom is determined by the length of the logical page. A plus (+) sign indicates the new position is relative downward from the current active position. A minus sign (-) indicates the new position is relative upward from the current active position. No sign indicates an absolute distance from the top of the logical page.

The dimensional base is called a "decipoint", which is 1/720 of an inch, or one-tenth of a typographic point (1/72 of an inch).

NOTE

All positions should be kept in decipoint units and converted to dot positions for actual data placement. This will eliminate the effects of successive roundings or truncations.

ESC & d D - Enable Underline Enhancement

ESC & d @ - Disable Underline Enhancement

In this mode, each printed character is automatically underlined. Imbedded spaces and columns for which no character is received are underlined. Once turned on, the underline enhancement will remain on until turned off.

* Configuration allows the user to count tabs and margins either beginning with 1 or with 0 (zero). 0 (zero) is the preferred base. 1 may be required by some application programs.

Esc & k # e/E - Display Enhancement Control (HP Terminal Mode)

Controls whether the underline is to work on a mode basis or a line-by-line basis. A zero in the value field enables underline on a line-by-line basis. This means that at the end of a line, if underline is turned on, it will be turned off. A one in the value field enables underline on a mode basis. The purpose of this feature is to allow compatibility with terminal devices.

ESC & k # f/F - SI/SO Control (HP Terminal Mode)

Controls whether the SI/SO feature is to work on a mode basis or a line-by-line basis. A zero in the value field enables the SI/SO feature to work on a line-by-line basis. This means that at the end of a line, if the printer was "shifted out", it will be "shifted in". A one in the value field enables SI/SO to work as a mode. The purpose of this feature is to allow compatibility with terminal devices.

ESC & k # g/G - Line Termination

Controls the manner in which the printer interprets line termination characters. The following modes are defined.

	CR	LF	FF	VT
0	CR	LF	FF	VT
1	CR-LF	LF	FF	VT
2	CR	CR-LF	CR-FF	CR-VT
3	CR-LF	CR-LF	CR-FF	CR-VT

ESC & k # s/S - Select Print Mode

Defines the print mode of a printer. The value field describes the mode which defines the horizontal print pitches for both the primary and secondary character sets. The preferred method is ESC (s # H and ESC) s # H.

Mode	Horizontal Pitch (Characters Per Inch)
0	10.00
1	5.00 (Expanded)
2	16.36 (Compressed)
4	12.00 (2933/34A)
9	Proportional Space (2933/34A)

ESC & l # d/D - Set Line Spacing

Set the line spacing to the value specified in the value field (lines per inch). If a programmed VFC is installed, it will not be removed. If a request is made for a line spacing which is not supported by the printer, the command will be ignored.

Line Spacing

Value	
0 = 12 lpi	8 = 8 lpi
1 = 1 lpi	9 = 9 lpi
2 = 2 lpi	18 = 18 lpi
3 = 3 lpi	24 = 24 lpi
4 = 4 lpi	36 = 36 lpi
5 = 5 lpi	72 = 72 lpi
6 = 6 lpi	90 = 90 lpi (2933/34A)

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ESC & 1 # f/F - Set Text Length

Set the length of the form within a logical page. The value field contains the number of lines in the form. The first line of the form is the same line as the first line of the logical page. If a text length greater than the logical page length is specified, the command will be ignored. If a text length of zero is received then the text length defaults to one inch less than the logical page length. The default form length, which is invoked anytime the logical page length is changed, is one inch less than the logical page length. If the logical page length is an inch or less, then the form length is set equal to the logical page length. The maximum form length allowed will be at least 128 lines. A default VFC is calculated using the new form and current logical page lengths (any programmed VFC is removed).

ESC & 1 # j/J - Auto Centering and Justification (2933/34A)

Right flush moves the entire line to the right margin. If the line is wider than the margins then no change is made to the line. The right flush parameter is not part of the auto centering and justification option, it may be implemented as needed.

Centering positions the line between the left and right margins. If the line is wider than the margins then no centering is performed.

Justification takes a line of data and expands it from the position of the first printable character to the right margin. Leading spaces, tabs or pen moves are not used in justification. The device may stretch only between the words or it may stretch the spacing between individual characters.

Code	Function
0	No centering of justification
1	Right flush
2	Centering
3	Justification

ESC & 1 # l/L - Perforation Skip Mode Enable/Disable

Controls automatic perforation skip mode. A zero in the value field turns off perforation skip mode and a one turns it on. LF will always cause paper to move a distance equal to the inverse of the current line spacing unless the printer is in perforation skip mode and that motion would result in the current active position entering the perforation region. In the latter case, paper will be moved to the top of the next text area. The perforation region is defined as that area outside the text but within the page. If a programmed VFC is enabled, the end of the text will be determined by the first occurrence of channel 2. If channel 2 is found to be completely clear, the end of text will equal the end of page (i.e. there is no perforation region).

ESC & 1 1 m/M - Set Vertical Tab - Relative

Sets a vertical tab in the current line. It is possible to set a vertical tab in every line within the logical page. Tabs represent a logical position and thus refer to different positions for different vertical line spacings.

ESC & 1 2 m/M - Clear Vertical Tab - Relative

Clears a vertical tab in the current line, if one is set. The tab at top of form cannot be cleared. Tabs represent a logical position and thus refer to different vertical line spacings.

ESC & 1 3 m/M - Clear All Vertical Tabs

Clears all vertical tabs except the tab at top of form.

ESC & 1 # p/P - User Definable Page Length

Set the length of the logical page. The value field contains the number of lines in the logical page. This command also defaults the form length to be one inch less than the logical page length, unless the logical page length is one inch or less, in which case the form length is set equal to the page length. If a request

is received for a page length greater than maximum, it will be ignored. If a page length of zero is received then the page length will be set to the configured value. A default VFC will be calculated using the new form and logical page lengths (any programmed VFC will be removed). The user's logical page position will be modulus the new user defined page length. Thus, if the user's logical page position is at line 46 and the user sets the page length to 30, the user's new logical page position will be 16 (i.e. $46 \text{ MOD } 30 = 16$).

ESC & l # r/R - Clear Vertical Tab - Absolute

Clears a vertical tab in the line specified in the value field, if one is set. The first line within a page is line zero. The vertical tab at top of form cannot be cleared. Tabs represent a logical position and thus refer to different positions for different vertical line spacings.

ESC & l # v/V - Print With Paper Motion Via VFC

Moves the current active position to the first character position of the next line referenced by the VFC channel selected in the value field. If a reference is not made to any line by the selected VFC channel, then the first line of the next logical form should be used. A 16 channel VFC is supported. If a nonexistent VFC channel is referenced (i.e. channel 17) the command will be mapped into a CR-LF. A special case is defined for a value field of zero. A command to select channel zero will cause the printer to move paper to the physical (or logical if physical is unknown) top of page, unless already there.

ESC & l # w/W <VFC data> - Define VFC Table

Prepares the printer to receive the number of bytes described in the value field. These bytes are used to program the VFC. They should immediately follow the terminating character. The data is binary packed words arranged by sending the most significant byte first, then the least significant byte. The most significant bit of the most significant byte describes channel 16 while the least significant bit of the least significant byte describes channel 1. These two bytes (one word) represent one line. A one in a bit position indicates that the line is referenced. The length of the logical page is set to one half the byte count and the text length is defaulted accordingly. If a command is received with an odd byte count, it will be ignored. The maximum byte count allowed is twice the maximum supported page length. If an illegal command is received, an attempt will be made to ensure that the associated data is not misinterpreted (i.e. it will be stripped and neither printed nor acted upon). If a logical page length or form length command is received, the programmed VFC will be removed and a default VFC calculated.

ESC & l # y/Y - Set Vertical Tab - Absolute

Sets a vertical tab in the line specified in the value field. The first line within a page is line zero*. If the specified line is greater than the physical limits of the device, then the command will be ignored. Tabs represent a logical position and thus refer to different positions for different vertical line spacings.

ESC & p # x/X <Transparent data> - Transparent Data Transfer

Prepares the printer to receive the number of bytes specified in the value field. This data will be treated as though the printer were in display functions mode, except control codes and escape sequences are not executed (i.e. even CR and ESC Z). This feature allows the printing of binary data which is required in certain applications (i.e. COBOL).

ESC & s # c/C - End-of-Line Wraparound

Controls automatic end-of-line wraparound mode. If a zero is received in the value field the mode is turned on, and if a one is received the mode is turned off. When this mode is enabled, the receipt of a character which would ordinarily appear to the right of the right margin causes a CR-LF to be executed. The character is then printed at the left margin of this new line.

* Configuration allows the user to count tabs and margins either beginning with 1 or with 0 (zero). 0 (zero) is the preferred base. 1 may be required by some application programs.

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ESC (# ID—Designates the Primary Symbol Set

Designates the symbol set for the primary font. If the requested symbol set is not present then the previously designated symbol set is retained.

Symbol Set	#	ID
Math Symbols	0	A
Line Draw	0	B
ISO Denmark/Norway	0	D
Roman Extension Characters	0	E
ISO United Kingdom	1	E
ISO France	0	F
ISO German	0	G
Hebrew7	0	H
ISO Italy	0	I
Japanese ASCII (JIS ASCII)	0	K
Katakana	1	K
Greek8	8	G
Hebrew8	8	H
Kana8	8	K
Line Draw Set (Same as 0B)	0	L
Math Symbols (Same as 0A)	0	M
OCR A	0	O
OCR B	1	O
ISO Sweden/Finland	0	S
ISO Spain	1	S
Turkish8	8	T
USASCII	0	U
HPL	5	U
Roman8	8	U
Arabic8	8	V
Blank Set	0	Z

Symbol Set	#	ID
Primary Default Set Designated to Primary	(0	@
Primary Default Set Designated to Primary	(1	@
Current Primary Set Designated to Primary	(2	@
Secondary Default Set Designated to Secondary	)0	@
Primary Default Set Designated to Secondary	)1	@
Current Primary Set Designated to Secondary	)2	@

ESC (s # h/H—Primary Character Set Pitch

Designates the pitch for the primary font. The value field specifies the pitch in characters per inch. The designated font will have the exact size specified, otherwise the next larger pitch (next smaller character size) will be designated. If a larger pitch does not exist, then the next smaller pitch will be designated. This attribute is ignored when proportional spacing (2933/34A) is activated and available in the requested symbol set. This attribute allows the value field to contain fractional portions of an integer (e.g. 16.36 H).

ESC (s # p/P—Primary Character Set Proportionally Spaced (2933/34A)

Designates the proportional spacing for the primary font. A zero in the value field, the default state, specifies that a mono-spaced symbol set is designated. A one in the value field specifies that a proportionally spaced symbol set is designated. If proportional spacing is requested but not available then a mono-spaced font with the current pitch specification will be designated. See pitch attributes.

ESC (s # q/Q - Primary Character Set Density (2933/34A)

Designates the print density for the primary font. Density does not affect the graphics representation of the font, rather it specifies the quality of the printed graphics representation. See the following figure for value field definition. If the requested density is not present then the density that has the closest fit is designated.

Value	Quality
0	200 cps
1	67 cps
2	40 cps

ESC (s # s/S - Primary Character Set Style (2933/34A)

Designates the style for the primary font. A zero in the value field, the default state, specifies that an upright font is to be designated, and a one in the value field specifies that an italic font is to be designated. If the requested style is not present then this attribute is ignored during font designation.

ESC (s # t/T - Primary Character Set Typeface

Designates the typeface for the primary font. Typeface is a variation of one basic style of font. If the requested typeface is not present then this attribute is ignored during font designation.

Value	2932A	2933/34A
0	Cubic	Cubic
3	Courier	Courier
4	—	Helv
6	—	Gothic
8	—	Prestige
10	—	Orator

ESC) # ID - Designates the Secondary Symbol Set

Designates the symbol set for the secondary font. If the requested symbol set is not present then the previously designated symbol set is retained. See previous page.

ESC) s # h/H - Secondary Character Set Pitch

Designates the pitch for the secondary font. The value field specifies the pitch in characters per inch. The designated font will have the exact size specified, otherwise the next larger pitch (next smaller character size) will be designated. If a larger pitch does not exist then the next smaller pitch will be designated. This pitch is superceded when proportional spacing (2933/34A) is activated and available in the requested symbol set. This attribute allows the value field to contain fractional portions of an integer (e.g. 16.36 H).

ESC) s # p/P - Secondary Character Set Proportionally Spaced (2933/34A)

Designates proportional spacing for the secondary font. A zero in the value field, the default state, specifies that a mono-spaced symbol set is designated. A one in the value field specifies that a proportionally spaced symbol set is designated. If proportional spacing is requested but not available then a mono-spaced font with the current pitch specifications will be designated. See pitch attributes.

ESC) s # q/Q - Secondary Character Set Density (2933/34A)

Designates the print density for the secondary font. Density does not affect the graphics representation of the font, rather it specifies the quality of the printed graphics representation. See the table under Primary Character Set Density for value field definition. If the requested density is not present then the density which has the closest fit is designated.

Appendix

ESC) s # s/S — Secondary Character Set Style (2933/34A)

Designates the style for the secondary font. A zero in the value field, the default state, specifies that an upright font is to be designated, and a one in the value field specifies that an italic font is to be designated. If the requested style is not present then this attribute is ignored during font designation.

ESC) s # t/T — Secondary Character Set Typeface

Designates the typeface for the secondary font. Typeface is a variation of one basic style of font. If the requested typeface is not present then this attribute is ignored during font designation.

ESC * b # w/W <Raster Data> — Raster Data Transfer

Prepares the printer to receive the number of bytes of binary data specified in the value field. These bytes will be interpreted as one line of raster graphics data. The data should immediately follow the terminating character of the escape sequence. Within raster graphics data, each bit describes a single pixel (or dot of print). The most significant bit of the first byte of data corresponds to the first (left most) pixel within that line. A one indicates the pixel is printed, and a zero indicates no pixel is to be printed. Upon completion of the execution of this escape sequence the current active position will be at the beginning of the next raster line.

ESC * c # c/C — Large Character Position

Value field specifies the absolute character column in which to begin printing. Character column is determined by the current pitch, not by the large character size. If the print position is past the column specified then this sequence is ignored.

ESC * c # m/M — Large Character Size

Value field specifies the magnification of the standard character size. The value field can be between 1 and 28. Default value is one. Values less than one will be set to one, and values greater than 28 will be set to 28.

ESC * c # n/N — Large Character Tab

Advance to the next tab position. The value field is meaningless.

ESC * c # x/X — Large Character Pixel Offset

The value field specifies the relative horizontal offset in pixels. Negative values are ignored and the value is always assumed positive.

ESC * <TEXT> z/Z — Large Character Print Data

The alphanumeric string contains print data for large character printing.

ESC * r a/A — Prepare for Raster Graphics

Informs the printer that a raster graphics dump follows. If a printer has received a partial line of ASCII data this command will cause the data to be printed and a CR-LF to be executed.

ESC * r b/B — Raster Graphics Complete

Informs the printer that all raster data has been transferred. This command causes all previously buffered raster data to be printed.

ESC * r # k/K — Return Model Number

Requests that the device return its Hewlett-Packard model number followed by CR-LF.

ESC * z # c/C — Bar Code Label Placement

Moves the print position to the specified column position on the current line. The value field specifies the absolute column position based on the active print pitch. A plus (+) or a minus (-) sign in the value field is illegal and will nullify the sequence. A value field whose position would be less than the current active position is ignored.

The user specifies the starting location of a bar code by specifying the column number based on the currently active print pitch. This minimizes the device dependencies due to varying dot densities and bar code widths.

ESC * z # h/H — Bar Code Label Height

Defines the height of the label in tenths of an inch. The default height is 6 (six-tenths of an inch). A value of zero implies the height of the bar code corresponds to the current line spacing (e.g. 6 or 8 lines per inch).

ESC * z # n/N — Bar Code Tabulate

Places the next bar code label one tab stop to the right of the end of the previous label. The value field is meaningless for this parameter. This escape sequence is supported for 2631G/200 compatibility (2631G/200 dot size is 1/72nd inch). One dot width on 2930 Series printers equals 1/90th inch.

ESC * z # q/Q — Bar Code Header Control

Controls the printing of the bar code header string.

Value	Label Location
0	Disable
1	Above (Default)

ESC * z # r/R — Bar Code Wide Bar Width

The value field specifies the width, in dots, of a wide bar. One dot width equals 1/90th inch.

ESC * z # s/S — Bar Code Narrow Bar Width

The value field specifies the width, in dots, of a narrow bar. One dot width equals 1/90th inch.

ESC * z # t/T — Bar Code Wide Space Width

The value field specifies the width, in dots, of a wide space. One dot width equals 1/90th inch.

ESC * z # u/U — Bar Code Narrow Space Width

The value field specifies the width, in dots, of a narrow space. One dot width equals 1/90th inch.

ESC * z # v/V — Bar Code Selection

Selects the bar code type which will be used in subsequent printing of bar code data. If an illegal or unsupported bar code type is selected, then the selection is ignored (i.e. the previously selected bar code type remains in effect).

Number	Bar Code	Number	Bar Code
0	Code 39 (Default)	3	User-defined (Optional)
1	Industrial 2 of 5	4	2 of 5 Interleaved
2	Matrix 2 of 5 (Optional)		

ESC * z # x/X — Bar Code Label X-Offset

Defines the relative horizontal offset in dots for the next label. The value field specifies the number of dots to the right to place the label. This escape sequence is supported for 2631G/200 compatibility (2631G/200 dot size is 1/72nd inch). One dot width on 2930 Series printers equals 1/90th inch.

ESC * z <Bar Code> z/Z — Bar Code Label

Bar Codes are sent to the device as an alphanumeric string enclosed in angled brackets specified by the ‘‘Z’’ parameter. Note: Upon termination of the bar code escape sequence the device will print all buffered bar code data.

Supported Features Implemented Differently

The following 263X "compatible" features are implemented differently on the 2930 Series printers.

- Physical set selection has no meaning in the 2930 Series printer. Sets are logically selected as follows:

```

ESC ( 0 @   Primary Default Set Designated to Primary
ESC ( 1 @   Primary Default Set Designated to Primary
ESC ( 2 @   Current Primary Set Designated to Primary
ESC ) 0 @   Secondary Default Set Designated to Secondary
ESC ) 1 @   Primary Default Set Designated to Secondary
ESC ) 2 @   Current Primary Set Designated to Secondary

```

- 8th bit data will act as a shift-out control only if both primary and secondary sets are 128 element sets (i.e. neither primary nor secondary may be Roman8 or Kana8). Otherwise, the 8th bit will access the set as selected by SI/SO; if the selected set is 128 elements, blanks will be accessed when the 8th bit is set; if the selected set is 256 elements (e.g. Roman8), the G1 portion will be accessed when the 8th bit is set.
- ESC E implementation now causes a top of form if not already there, does not flush buffered data, and leaves the printer on-line. It is intended as a job separator in spooled environments.
- Reset and power-on state is on-line.
- Tabs/margins are numbered from zero. See "Support Mode" for numbering from one.
- Partial lines will not print. Printing occurs only on receipt of a line terminator (CR, LF, etc).
- Model number request will return "2932A yyww CR-LF" (or "2934A yyww CR-LF"). See "Support Mode" for other model numbers.
- Metric paper lengths (A4 and A5) are supported and can be defined in SETTINGS mode only, not by escape sequence.
- Input buffer lengths are different (increased).
- Line feed and form feed keys are active whether on-line or off-line.
- In display functions mode, control codes received with 8th bit set will be printed from the current primary set and underlined. Control codes received as part of a serial data communications protocol (i.e. ESC ?) will be printed in display functions.

HP TERMINAL MODE

HP Terminal Mode is selectable through the OTHER SETTINGS feature of the printer's non-volatile configuration. The purpose of HP Terminal Mode is to provide compatibility with terminal devices.

When HP Terminal Mode is enabled, the following three features are activated. These escape sequences are discussed in more detail under Supported Escape Sequences.

- | | |
|-------------|---|
| ESC & k 0 E | Causes underlining to be turned off at the end of the line if it has been turned on. |
| ESC & k 0 F | If the printer was "shifted out" it is "shifted in" at the end of the line. |
| ESC & s 0 C | End-of-line wraparound is enabled. CR-LF is executed if printing overruns right margin. Overflow text begins at left margin on the next line. |

When HP Terminal Mode is disabled, underline and shift-out stay on until disabled with another escape sequence, and any extra characters beyond the right margin are truncated.

HP Terminal Mode "OFF" is the factory default.

SUPPORT MODE

Support Mode is selectable through the OTHER SETTINGS feature of the printer's non-volatile configuration.

The purpose of Support Mode is to provide additional backward support for 263X and WP (2933/34A) printers. This support consists of returning a different ID and Model number, and affects margins, horizontal tabs and vertical tabs. Support Mode also affects ESC 5 (2933/34A).

1) Second byte of HP-IB identity sequence

Mode	2933/34A	2932A
2933/34A	11H 17 Decimal	--
2932A	--	10H 16 Decimal
2631B	09H 9 Decimal	09H 9 Decimal
2631G	02H 2 Decimal	02H 2 Decimal
WP	11H 17 Decimal	--

2) Model number

Mode	2933/34A	2932A
2933/34A	2933/34A yyww CR-LF	--
2932A	--	2932A yyww CR-LF
2631B	2631B yyww CR-LF	2931B yyww CR-LF
2631G	2631G CR-LF	2631G CR-LF
WP	2602A CR-LF	--

3) Margins, Horizontal Tabs, Vertical Tabs

Mode	2933/34A	2932A
2933/34A	0 - relative	--
2932A	--	0 - relative
2631B	1 - relative	1 - relative
2631G	1 - relative	1 - relative
WP	0 - relative	--

Appendix

4) ESC 5 (2933/34A)

Mode	2933/34A
2933/34A	Set right margin at current column
2631B	Set right margin at current column
2631G	Set right margin at current column
WP	Enable forward print mode

Industry-Compatible Escape Sequences (only active in WP Mode)

WP Mode, and the use of those associated escape sequences, is intended only for instant integration onto systems with existing applications. Further use of these "industry-compatible sequences" (especially in conjunction with other HP sequences) is not recommended. All future user applications should be written using only the HP sequences in order to ensure future support on HP systems.

- ESC US <n> *Set Horizontal Motion Index (HMI);
n=HMI+1. The intercharacter spacing is interpreted as increments of (n-1)/120 inch.
- ESC RS <n> *Set Vertical Motion Index (VMI);
n=VMI+1. The line spacing is interpreted as increments of (n-1)/48 inch.
- ESC S Returns definition of Horizontal Motion Index to default setting (determined by print wheel in use).
- ESC 5 Forward print mode ON. (WP Support Mode on 2933/34A).
- ESC 6 Backward print mode ON.
- ESC 9 Set left margin at current position.
- ESC FF <n> *Set lines per page. Lines per page is interpreted as the number of lines specified.
- ESC LF Perform negative line feed.
- ESC CR P Initiate remote reset.
- ESC SUB I Perform immediate remote reset.

*n = ASCII character whose decimal equivalent is the value described.

ESC HT <n>	*Perform horizontal tab to specified position. The position is interpreted as the number specified minus one.
ESC VT <n>	*Perform vertical tab to specified position. The line number is interpreted as the number specified as minus one.
ESC U	Perform half-line feed.
ESC D	Perform negative half-line feed.
ESC P	Proportional space ON (clear with ESC S).
ESC Q	Proportional space OFF.
ESC E	Enable auto underlining.
ESC R	Disable auto underlining.
ESC O	Bold print ON (clear with CR).
ESC W	Shadow print ON (clear with CR).
ESC &	Bold/Shadow print OFF.
ESC X	Cancel all WP modes except proportional space.

= ASCII character whose decimal equivalent is the value described.

UNSUPPORTED ESCAPE SEQUENCES

The 2930 Series printers are designed to be backward compatible with the 263X product line. Exceptions to this follow.

The following print modes are deleted:

16.7 cpi
8.33 cpi
12.5 cpi
6.25 cpi
4.16 cpi

The following escape sequences are not implemented:

ESC & k # I Character set selection control
ESC & k # V Head view mode
ESC & k # W Bidirectional print
ESC & s # I Character set default
ESC & s # Q Character set selection
ESC (s # Q Select primary set density (2932A)
ESC) s # Q Select secondary set density (2932A)
ESC n On-line
ESC * z Bar Codes (2932A)

Extended raster graphics have been deleted:

ESC * b x/y/z (2932A)
ESC * r # c/d/e/i/j/m/n/p/q/x/y/Z (2932A)

Several status requests have been deleted:

ESC & a 1 ^ Request horizontal format status
ESC & k 1 ^ Request latching mode status
ESC & l 1 ^ Request VFC mode status
ESC & s 1 ^ Request strap status

Mute characters are not implemented. Mute character set ID's are not recognized when selected by escape sequences.

CONTROL CODES AND ESCAPE SEQUENCES

Control Codes

Codes	Description
ENQ	Enquire
ACK	Acknowledge
BEL	Bell
BS	Back Space
HT	Horizontal Tab
LF	Line Feed
VT	Vertical Tab
FF	Form Feed
CR	Carriage Return
SO	Shift Out
SI	Shift In
DC1	Device Control (X-ON)
DC3	Device Control (X-OFF)
ESC	Escape
SP	Space

Two Character Escape Sequences

Sequence	Description
ESC 1	Set Horizontal Tab at Current Position
ESC 2	Clear Horizontal Tab at Current Position
ESC 3	Clear All Horizontal Tabs
ESC 4	Set Left Margin at Current
ESC 5	Set Right Margin at Current
ESC 9	Clear Margins
ESC ?	Serial I/O Status Request
ESC E	Hard Reset
ESC I	Horizontal Tab
ESC Y	Turn On Display Functions Mode
ESC Z	Turn Off Display Functions Mode
ESC ^	Primary Status Request
ESC f	Modem Disconnect
ESC o	Off-line
ESC z	Initiate Self Test
ESC =	Half Line Feed (2933/34A)

Multiple Character Escape Sequences

Sequence	Description
ESC & a # C	Move Print Position to Absolute Column
ESC & a + # C	Move Print Position to Relative Column
ESC & a - # C	Move Print Positiin to Relative Column

ESC & a # H	Horizontal Print Positioning in Decipoints (1/720") (2933/34A)
ESC & a # L	Set Left Margin at Absolute Column
ESC & a # M	Set Right Margin at Absolute Column
ESC & a # R	Move Print Position to Absolute Row (Positive Paper Motion)
ESC & a + # R	Move Print Position to Relative Row
ESC & a # T	Set Horizontal Tab at Absolute Column
ESC & a # U	Clear Horizontal Tab at Absolute Column
ESC & a # V	Absolute Vertical Positioning in Decipoints (1/720") (2933/34A)
ESC & a + # V	Move Vertical Position to Relative Position (2933/34A)
ESC & d @	Turn Off Underline Enhancement
ESC & d D	Turn On Underline Enhancement
ESC & k 0 E	Permanent Enhancement Off
ESC & k 1 E	Permanent Enhancement On
ESC & k 0 F	Permanent Shift In/Shift Out Off
ESC & k 1 F	Permanent Shift In/Shift Out On
ESC & k # G	Line Terminator Mapping
ESC & k # S	Select Print Pitch
ESC & l # D	Select Line Spacing
ESC & l # F	Set Text Length
ESC & l 0 L	Perforation Skip Disable
ESC & l 1 L	Perforation Skip Enable
ESC & l 1 M	Set Vertical Tab at Current Row
ESC & l 2 M	Clear Vertical Tab at Current Row
ESC & l 3 M	Clear All Vertical Tabs
ESC & l # J	Auto Centering and Justification (2933/34A)
ESC & l # P	Set Page Length
ESC & l # R	Clear Vertical Tab at Absolute Row

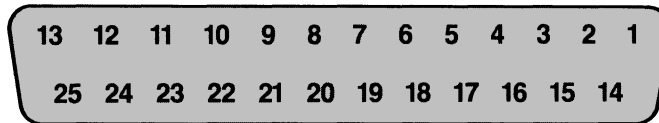
Vertical Forms Control (VFC):

ESC & l 0 V	TOF Unless Already at TOF
ESC & l 1 V	Top of Form
ESC & l 2 V	Bottom of Form
ESC & l 3 V	Single Space
ESC & l 4 V	Double Space
ESC & l 5 V	Triple Space
ESC & l 6 V	Half Page
ESC & l 7 V	Quarter Page
ESC & l 8 V	Ten Space
ESC & l 9 V	Bottom of Form
ESC & l 10V	BOF Minus 1 Line
ESC & l 11V	TOF Minus 1 Line
ESC & l 12V	Top of Form
ESC & l 13V	Seven Space
ESC & l 14V	Six Space
ESC & l 15V	Five Space
ESC & l 16V	Four Space

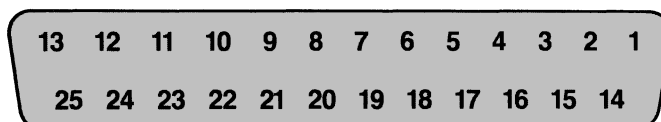
Appendix

ESC & 1 # W	<binary>	Define Programmable VFC Table
ESC & 1 # Y		Set Vertical Tab at Absolute Row
ESC & p # X	<binary>	Transparent Binary Transfer
ESC & s 1 C		End of Line Wrap Enable (263X compatible)
ESC & s 0 C		End of Line Wrap Disable (263X compatible)
ESC (A		Primary Set Select Logical – Math
ESC (B		Primary Set Select Logical – Line Drawing
ESC (0 D		Primary Designated to ISO Denmark/Norway
ESC (0 E		Primary Designated to Roman Extension
ESC (1 E		Primary Designated to ISO United Kingdom
ESC (0 F		Primary Designated to France (non-mute)
ESC (0 G		Primary Designated to ISO Germany
ESC (0 H		Primary Designated to Hebrew7 (2933/34A)
ESC (0 I		Primary Designated to Italian
ESC (0 K		Primary Designated to JASCII
ESC (1 K		Primary Designated to Katakana
ESC (0 L		Primary Designated to Line Draw
ESC (0 M		Primary Designated to Math Symbols
ESC (0 O		Primary Designated to to OCR A (2933/34A)
ESC (1 O		Primary Designated to OCR B (2933/34A)
ESC (0 Q		Primary Designated to Orator A (2933/34A)
ESC (0 S		Primary Designated to ISO Sweden/Finland
ESC (1 S		Primary Designated to ISO Spain (non-mute)
ESC (0 U		Primary Designated to USASCII
ESC (5 U		Primary Designated to HPL
ESC (0 Z		Primary Designated to All Blank
ESC (0 @		Primary Default Set Designated to Primary
ESC (1 @		Primary Default Set Designated to Primary
ESC (2 @		Current Primary Set Designated to Primary
ESC (8 G		Primary Designated to Greek8 (2933/34A)
ESC (8 H		Primary Designated to Hebrew8 (2933/34A)
ESC (8 K		Primary Designated to Katakana-8
ESC (8 T		Primary Designated to Turkish8 (2933/34A)
ESC (8 U		Primary Designated to Roman-8
ESC (8 V		Primary Designated to Arabic8 (2933/34A)
ESC (s # H		Primary Designated to Print Pitch Select
ESC (s # P		Primary Designated to Proportional Space (2933/34A)
ESC (s # T		Primary Designated to Typeface Select
ESC) A		Secondary Set Select Logical – Math
ESC) B		Secondary Set Select Logical – Line Drawing
ESC) 0 D		Secondary Designated to ISO Denmark/Norway
ESC) 0 E		Secondary Designated to to Roman Extension
ESC) 1 E		Secondary Designated to ISO United Kingdom
ESC) 0 F		Secondary Designated to France (non-mute)
ESC) 0 G		Secondary Designated to ISO Germany
ESC) 0 H		Secondary Designated to Hebrew7 (2933/34A)
ESC) 0 I		Secondary Designated to Italian
ESC) 0 K		Secondary Designated to JASCII

ESC) 1 K	Secondary Designated to Katakana
ESC) 0 L	Secondary Designated to Line Draw
ESC) 0 M	Secondary Designated to Math Symbols
ESC) 0 O	Secondary Designated to OCR A
ESC) 1 O	Secondary Designated to OCR B
ESC) 0 Q	Secondary Designated to Orator (2933/34A)
ESC) 0 S	Secondary Designated to ISO Sweden/Finland
ESC) 1 S	Secondary Designated to ISO Spain (non-mute)
ESC) 0 U	Secondary Designated to USASCII
ESC) 5 U	Secondary Designated to HPL
ESC) 0 Z	Secondary Designated to All Blank
ESC) 0 @	Secondary Default Set Designated to Secondary
ESC) 1 @	Primary Default Set Designated to Secondary
ESC) 2 @	Current Primary Set Designated to Secondary
ESC) 8 G	Secondary Designated to Greek8 (2933/34A)
ESC) 8 H	Secondary Designated to Hebrew8 (2933/34A)
ESC) 8 K	Secondary Designated to Katakana-8
ESC) 8 T	Secondary Designated to Turkish8 (2933/34A)
ESC) 8 U	Secondary Designated to Roman-8
ESC) 8 V	Secondary Designated to Arabic8
ESC) s # T	Secondary Typeface Select
ESC) s # H	Secondary Print Pitch Select
ESC * b # W <binary>	Raster Data Transfer
ESC * c # C	Large Character Position (2933/34A)
ESC * c # M	Large Character Size (2933/34A)
ESC * c # N	Large Character Tab (2933/34A)
ESC * c # X	Large Character Pixel Offset (2933/34A)
ESC * c <text> Z	Large Character Print Data (2933/34A)
ESC * r A	Prepare for Raster Graphics
ESC * r B	End Raster Graphics
ESC * r K	Return Model Number (293XA yyww CR-LF)
ESC * s ^	Return Model Number (293XA yyww CR-LF)
ESC * s 1 ^	Return Model Number (293XA yyww CR-LF)
ESC * z # C	Bar Code Label Placement (2933/34A)
ESC * z # H	Bar Code Label Height (2933/34A)
ESC * z # N	Bar Code Tabulate (2933/34A)
ESC * z # Q	Bar Code Header Control (2933/34A)
ESC * z # R	Bar Code Wide Bar Width (2933/34A)
ESC * z # S	Bar Code Narrow Bar Width (2933/34A)
ESC * z # T	Bar Code Wide Space Width (2933/34A)
ESC * z # U	Bar Code Narrow Space Width (2933/34A)
ESC * z # V	Bar Code Selection (2933/34A)
ESC * z # X	Bar Code Label X-Offset (2933/34A)
ESC * z <Bar Code> Z	Bar Code Label (2933/34A)
ESC - c 0 T	Disable Loopback Mode (2933/34A)
ESC - c 1 T	Enable Loopback Mode (2933/34A)

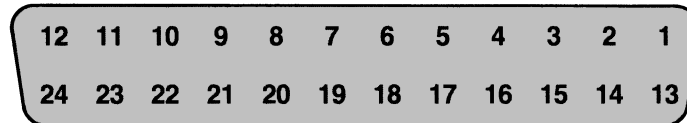
PIN-OUT DIAGRAMS**RS-232-C Interface**

PIN	FUNCTION	SIGNAL
1	Protective Ground (shield)	AA (101)
2	Transmitted Data	BA (103)
3	Received Data	BB (104)
4	Request to Send	CA (105)
5	Clear to Send	CB (106)
6	Data Set Ready	CC (107)
7	Signal Ground	AB (102)
17	Receiver Signal Element Timing — DCE Source	DD (115)
19	Secondary Request to Send	SCA (120)
20	Data Terminal Ready	CD (108.2)
24	Transmit Signal Element Timing — DTE Source	DA (113)

RS-232-C/RS-422 Interface

PIN	FUNCTION	SIGNAL
1	Shield Ground	SG
2	Transmitted Data	BA (103)
3	Receive Data	RDRDA
4	Request to Send	CA (105)
5	Clear to Send	CB (106)
6	Data Set Ready	CC (107)
7	Signal Ground	AB (102)
9	Send Data	SDA*
10	Not Send Data	SDB*
17	Receiver Signal Element Timing—DCE Source	DD (115)
18	Not Receive Data	RDB*
19	Secondary Request to Send	SCA (120)
20	Data Terminal Ready	CD (108.2)
24	Transmit Signal Element Timing—DTE Source	DA (113)

*Differential input signals for RS-422.

HP-IB Interface

PIN	FUNCTION	SIGNAL
1	Data Bus 1	D101
2	Data Bus 2	D102
3	Data Bus 3	D103
4	Data Bus 4	D104
5	End or Identify	EOI
6	Data Valid	DAV
7	Not Ready for Data	NRFD
8	Not Data Accepted	NDAC
9	Interface Clear	IFC
10	Service Request	SRQ
11	Attention	ATN
12	Earth Ground	SHIELD
13	Data Bus 5	D105
14	Data Bus 6	D106
15	Data Bus 7	D107
16	Data Bus 8	D108
17	Remote Enable	REM
18-24	Signal Ground	GND

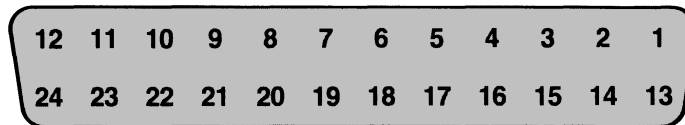
Centronics-Type Interface

18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1

36 35 34 33 32 31 30 29 28 27 26 25 24 23 22 21 20 19

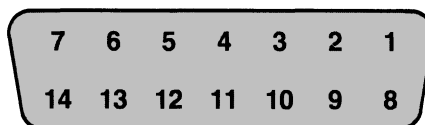
PIN	FUNCTION	SIGNAL	SOURCE	PIN	FUNCTION	SIGNAL	SOURCE
1	Pulse clocks data from Controller to printer	$\overline{\text{Strobe}}$	Controller	12	A "High" indicates printer is out of paper	Paper Empty	Printer
2	Input data levels. A "High" represents a binary one; a "Low" represents a binary zero	Data 1	Controller	13	A "High" indicates the printer is selected. Similar to ON-LINE	SELECT	Printer
3	Same function as Pin 2	Data 2	Controller	16	Logic Ground Level	GND	Printer
4	Same function as Pin 2	Data 3	Controller	17	Printer Chassis Ground	CHASSIS GND	Printer
5	Same function as Pin 2	Data 4	Controller	18	+5 V Power Bus	+5 V	Printer
6	Same function as Pin 2	Data 5	Controller	19-30	Signal Grounds	GND	Printer
7	Same function as Pin 2	Data 6	Controller	31	A "Low" clears the printer buffer and resets the printer to power-on conditions	$\overline{\text{INPUT PRIME}}$	Controller
8	Same function as Pin 2	Data 7	Controller	32	A "Low" indicates a fault condition such as printer de-select or paper out	$\overline{\text{FAULT}}$	Printer
9	Same function as Pin 2	Data 8	Controller				
10	Acknowledge pulse indicates printer has received data	$\overline{\text{ACKNLG}}$	Printer				
11	A "High" indicates printer cannot receive data	BUSY	Printer				

Multipoint Daisy Chain Interface



PIN	FUNCTION	SIGNAL
1	Received Data Input	BBI
2	Clear to Send Input	CBI
3	Transmitted Data Output	BAO
4	Request to Send Output	CAO
5	Receiver Timing	DDI
6	Signal Return	RETURN
7	Transmitter Timing Input	DBI
8	Signal Ground	AB
9	N.C.	SHIELD
13	Received Data Output	BBO
14	Clear to Send Output	CBO
15	Transmitted Data Input	BAI
16	Request to Send Input	CAI
17	Receiver Timing Output	DDO
18	Signal Ground	AB
19	Transmitter Timing Output	DBO
20	Signal Return	RETURN
21	Protective Ground	SHIELD

Data Link Interface



PIN	FUNCTION	SIGNAL
10	Upstream (-) Differential Signal	Link -
11	Upstream (+) Differential Signal	Link +
12	Shield, Floating Ground	SH
13	Downstream (-) Differential Signal	Link -
14	Downstream (+) Differential Signal	Link +

SPECIFICATIONS

General

POWER REQUIREMENTS

Input voltage
100, 120, 220, 240 volts AC (+5%, -10%) selectable from rear panel; 47.5-66 Hz

Power consumption
120 VA maximum non-printing
300 VA maximum printing

FORMS REQUIREMENTS

Paper widths (edge to edge)
Maximum width: 400mm (15.75")
Minimum width: 57mm (2.25")

Paper weights

Single part: 15 to 100 pound (56-380 gm./sq. meter)
Multipart: 12 pound (46 gm./sq. meter), up to six total copies; 8 pound carbons (30 gm./sq. meter); .51mm (.020") maximum pack thickness. All forms and card stock should be tested for satisfactory feeding, registration and print quality.

CONTROLS AND INDICATORS

Power on indicator
Paper out indicator
On line indicator/key

Modem indicator
Line and page advance keys

FORMS HANDLING

Forms tractors
Last-form tearoff (requires one inch top margin)
16 Channel vertical forms control
Programmable page and text length, margins, and tabs
Automatic perforation skip

GRAPHICS

90 x 90 dots per inch dot addressable raster graphics

ENVIRONMENTAL CONDITIONS

Temperature, free space ambient
0° to 55°C (32° to 131°F) operating
-40° to 75°C (-40° to 167°F) non-operating
Acoustics (per ISO DP7779 standard)
Sound power level— L_{WA} : 73dB(A)
Sound pressure level— L_{PA} : 63dB(A) (@ 1 meter bystander position)
Humidity
Top paper exit: 10% to 90% RH (non-condensing)
Rear paper exit: 10% to 70% RH (non-condensing)

PHYSICAL SPECIFICATIONS

365mm (14.37") D x 600mm (23.85") W x 185mm (7.28") H
20.4 kg (45 lbs.) net weight

PRODUCT CERTIFICATIONS

UL, CSA, IEC Compliance. FCC Class B certified per FCC Rules, Part 15, subpart J, when used with a Class B computing device.

PRINTING DUTY CYCLE

No duty cycle limitations.

STANDARD INTERFACE

RS-232C V.24 Full Duplex
Serial Protocol
ENQ/ACK, X-on/X-off and Printer Busy
2K Character Buffer
Bell 103 and 212 type modem support
Receive rates selectable up to 9600 baud (to 19200 baud on 2933A/2934A)
Parity
25 Pin EIA RS-232C Connector

2932A

PRINT SPEED

200 characters per second
Bidirectional, optimized path

CHARACTER STRUCTURE

9x12 character cell

CHARACTER SETS

HP Roman8 character set includes
128 USASCII (upper/lower case and control codes)
96 Roman Extension (French, Spanish, German, Italian, United Kingdom, Norwegian/Danish, Swedish/Finnish, JASCII)

ISO 7-bit languages

Kana8 character set

128 JASCII

96 Katakana

64 Line Drawing

64 Math Symbols

PRINTING FORMAT

Print pitch (characters per inch)

16.36—Compressed

10.0—Normal

5.0—Expanded

Line length (characters per line)

223—Compressed

136—Normal

68—Expanded

Variable line spacing (lines per inch)

1, 2, 3, 4, 6, 8, or 12

INTERFACE OPTIONS

Option Number	Interface
#035	RS-422
#042	Centronics-type Parallel
#046	HP-IB

2933A

PRINT SPEED

200 characters per second
Bidirectional, optimized path

CHARACTER STRUCTURE

9x12 character cell

CHARACTER SETS

HP Roman8 character set includes
128 USASCII (upper/lower case and control codes)
96 Roman Extension (French, Spanish, German, Italian, United Kingdom, Norwegian/Danish, Swedish/Finnish, JASCII)

ISO 7-bit languages

Kana8 character set

128 JASCII

96 Katakana

64 Line Drawing

64 Math Symbols

Large Characters (up to 28X magnification)

BAR CODE PRINTING

Code types

InterMec Code 39*, Industrial 2 of 5, Matrix 2 of 5, Interleaved 2 of 5, internally-generated. User-definable codes may be generated by user program. Bar code printing is designed to be compatible with HP Readers.

Throughput

650 labels per hour maximum for a 10-character

Code 39™ Alphanumeric bar code label 0.6

inches high, printed with the default density of

3.4 characters per inch.

Paper type

OCR quality single part fanfold paper with uniform thickness, opacity, and reflectivity. Paper should have a smooth, non-gloss surface finish. Recommend 20# minimum, white, matte finish computer stock.**

*Code 39 is a trademark of Interface Mechanisms, Inc.

**All forms and card stock should be tested for satisfactory feeding, registration, print quality, and readability.

PRINTING FORMAT

Print pitch (characters per inch)

16.36—Compressed

10.0—Normal

5.0—Expanded

Large character generation

Line length (characters per line)

223—Compressed

136—Normal

68—Expanded

Variable line spacing (lines per inch)

1, 2, 3, 4, 6, 8, or 12

INTERFACE OPTIONS

Option Number	Interface
#033	Multipoint Synchronous (1st terminal).
#034	Multipoint Synchronous (Nth terminal). Cable included.
#035	RS-422
#039	DSN/Data Link. Cable included.
#042	Centronics-type Parallel
#046	HP-IB

2934A

PRINT SPEED

200, 67, 40 characters per second
Bidirectional, optimized path

CHARACTER STRUCTURE

36x24 character cell (67/40 cps)

9x12 character cell (200 cps)

CHARACTER SETS

HP Roman8, character set includes
128 USASCII (upper/lower case and control codes)
96 Roman Extension (French, Spanish, German, Italian, United Kingdom, Norwegian/Danish, Swedish/Finnish, JASCII)

ISO 7-bit languages

Kana8 character set

128 JASCII

96 Katakana

64 Line Drawing

64 Math Symbols

Bar Code

Large Characters

WORD PROCESSING

Right justification
Auto centering
Proportional spacing
Underlining
Optional character cartridges

PRINTING FORMAT

Print pitch (characters per inch)

16.36—Compressed

10.0, 12.0—Normal

5.0—Expanded

Proportional

Line length (characters per line)

223—Compressed

136—Normal (at 10 characters per inch)

68—Expanded

Variable line spacing (lines per inch)

1, 2, 3, 4, 6, 8, or 12

INTERFACE OPTIONS

Option Number	Interface
#033	Multipoint Synchronous (1st terminal).
#034	Multipoint synchronous (Nth terminal). Cable included.
#035	RS-422
#042	Centronics-type Parallel
#039	DSN/Data Link. Cable included.
#046	HP-IB

SALES AND SUPPORT OFFICES

**SALES
AND
SUPPORT
OFFICES**

SALES AND SUPPORT

Product Line Sales/Support Key

Key Product Line

- A** Analytical
- CM** Components
- C** Computer Systems Sales only
- CH** Computer Systems Hardware Sales and Services
- CS** Computer Systems Software Sales and Services
- E** Electronic Instruments & Measurement Systems
- M** Medical Products
- MP** Medical Products Primary SRO
- MS** Medical Products Secondary SRO
- P** Personal Computation Products
- Sales only for specific product line
- ** Support only for specific product line

IMPORTANT: These symbols designate general product line capability. They do not insure sales or support availability for all products within a line, at all locations. Contact your local sales office for information regarding locations where HP support is available for specific products.

HP distributors are printed in italics.

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After Jan. 1, 1984
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26 Harbour Rd., Wanchai

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Eastern Technical Services
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**FEDERAL COMMUNICATIONS COMMISSION
RADIO FREQUENCY INTERFERENCE
STATEMENT (U. S. A.) ONLY**

"This equipment generates and uses radio frequency energy, and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. It has been type-tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of the FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Re-orient the receiving antenna.
- Re-locate the computer with respect to the receiver.
- Move the computer away from the receiver.
- Plug the computer into a different outlet so that the computer and receiver are on different branch circuits."

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the FCC helpful: "How to Identify and Resolve Radio-TV Interference Problems". This booklet is available from the U.S. Government Printing Office, Washington D.C. 20042, Stock No. 004-000-00345-4.

