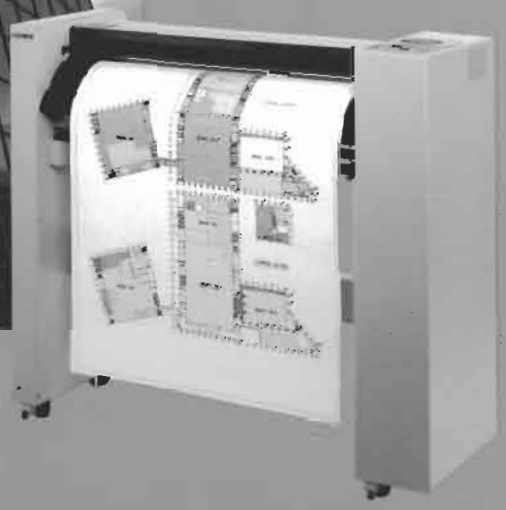
HEWLETT-PACKARD

HP DraftMaster Plotter User's Guide



HP DraftMaster Plotter User's Guide

HP DraftMaster Plotter
User's Guide

HEWLETT
PACKARD

Manual Part Number: 07595-90002

Printed in U.S.A., FEBRUARY 1988

16399 W. Bernardo Drive, San Diego, CA 92127-1899

Part No. 07595-90002

Printed in U.S.A.

First edition — December 1986
Second edition — November 1987
Third edition — February 1988

HP Computer Museum
www.hpmuseum.net

For research and education purposes only.

One-Year On-Site Hardware Warranty

Hewlett-Packard warrants your graphics peripheral hardware product against defects in materials and workmanship for a period of one year from receipt by the end user. If HP receives notice of such defects during the warranty period, HP will either, at its option, repair or replace products which prove to be defective.

Should HP be unable to repair or replace the product within a reasonable amount of time, customer's alternative exclusive remedy shall be a refund of the purchase price upon return of the product.

Exclusions

The above warranty shall not apply to defects resulting from: improper or inadequate maintenance by customer; customer-supplied software or interfacing; unauthorized modification or misuse; operation outside of the environmental specifications for the product; or improper site preparation and maintenance.

Obtaining Warranty Service

To obtain warranty service, customer must contact a local Hewlett-Packard Sales and Support Office or an Authorized HP Personal Computer Dealer Repair Center and arrange for on-site repair of the product. Customer should retain proof of purchase for warranty service; there is no warranty registration card.

Warranty Limitations

HP makes no other warranty, either expressed or implied, with respect to this product. HP specifically disclaims the implied warranties of merchantability and fitness for a particular purpose. Some states or provinces do not allow limitations on the duration of an implied warranty, so the above limitation or exclusion may not apply to you. However, any implied warranty merchantability or fitness is limited to the one year duration of this written warranty.

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

How to Use This Manual

This *User's Guide* contains the information you need to set up your plotter, connect it to a computer, and use a graphics software program. The manual is divided into two parts: Chapters 1 through 6 contain operating information, Chapters 7 through 9 will help you connect the plotter to your computer and use it with your software.

You do not need to read this manual from cover-to-cover. Begin by reading Chapters 1 and 2. When you understand the basics of operating the plotter, read the remaining chapters in whatever order suits your needs and level of experience. The following chapter summaries will help you find the information you need.

Chapter 1 **Getting Started** helps you develop the basic skills you must have to use your plotter, such as identifying plotter parts and learning to load pens and media. By the end of Chapter 1 you will be able to draw a demonstration plot.

Chapter 2 **Using the Front Panel** explains the functions of the front-panel buttons and menus.

Chapter 3 **Selecting Pens and Media** describes the types of pens and media recommended for your plotter and suggests pen and media combinations to fit your plotting needs.

Chapter 4 **Plotting with Roll Media** provides instructions for using roll media with the plotter.

Chapter 5 **Maintenance** contains cleaning instructions for your plotter and refillable drafting pens. Additionally, this chapter has instructions for replacing the paper cutter.

Chapter 6 **Troubleshooting** is a step-by-step guide to help you correct problems with your plotter, computer/software system setup, plot quality, and supplies.

Chapter 7	**Connecting the Plotter to a Computer** provides general instructions for connecting your plotter and computer via an RS-232-C or HP-IB (IEEE-488) interface. This chapter explains how to identify your system configuration and set interface conditions.
Chapter 8	**Computer/Plotter Interconnections** is a collection of step-by-step instructions for connecting the plotter to a variety of popular computers.
Chapter 9	**Using Software with the Plotter** discusses how to use graphics software packages with the plotter and what you'll need to write your own graphics programs.
Appendix A	**Technical Information** summarizes the front-panel menus and messages, plotter specifications, RS-232-C and HP-IB (IEEE-488) interfacing information, and cable schematics.
Appendix B	**Plotting for Precision** offers suggestions to help you obtain the most accurate plots possible.
Appendix C	**Accessories Available** lists accessories you can purchase for your plotter and gives ordering information.

Contents

Chapter 5: Maintenance (Continued)

Chapter 6: Troubleshooting

Chapter 7: Connecting the Plotter to a Computer

Chapter 7: Connecting the Plotter to a Computer (Continued)

Chapter 8: Computer/Plotter Interconnections

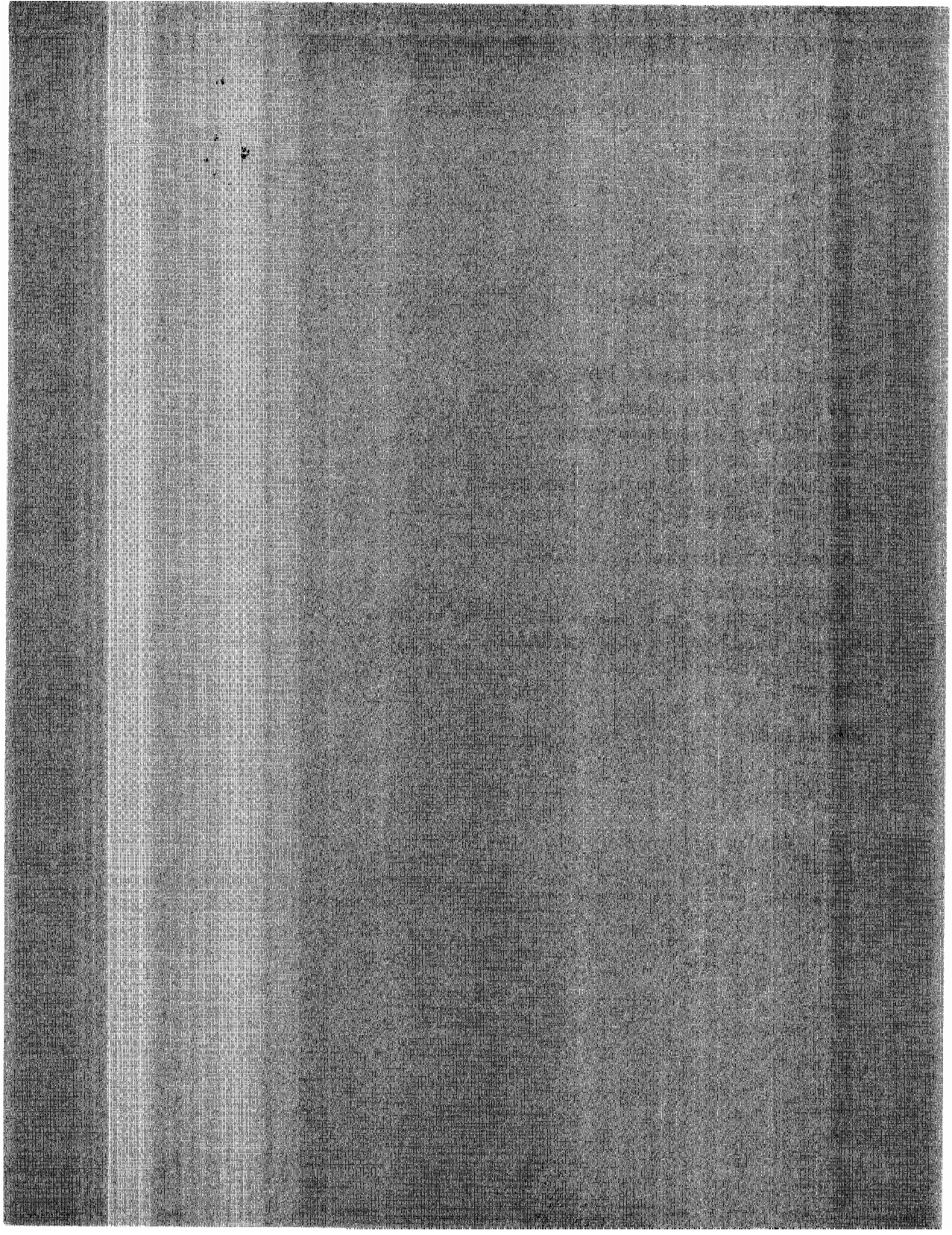
Chapter 9: Using Software with the Plotter

Appendix A: Technical Information

Appendix A: Technical Information (Continued)

Appendix B: Plotting for Precision

Appendix C: Accessories Available



1 Getting Started

What You'll Learn in This Chapter

This chapter shows you how to set up the plotter, load pens and media, and run the built-in demonstration plot. Run the demonstration plot to verify that the plotter is in good working condition.

Initial Inspection

The plotter and its accessories were inspected before being shipped and should be in good operating order. Carefully unpack and inspect the plotter and its accessories. If you receive the plotter in damaged condition, notify the dealer or HP Sales and Support Office where you purchased the plotter, and file a claim with the carrier.

Compare your accessories with those listed below. If any are missing, contact the dealer or HP Sales and Support Office where you purchased the plotter.

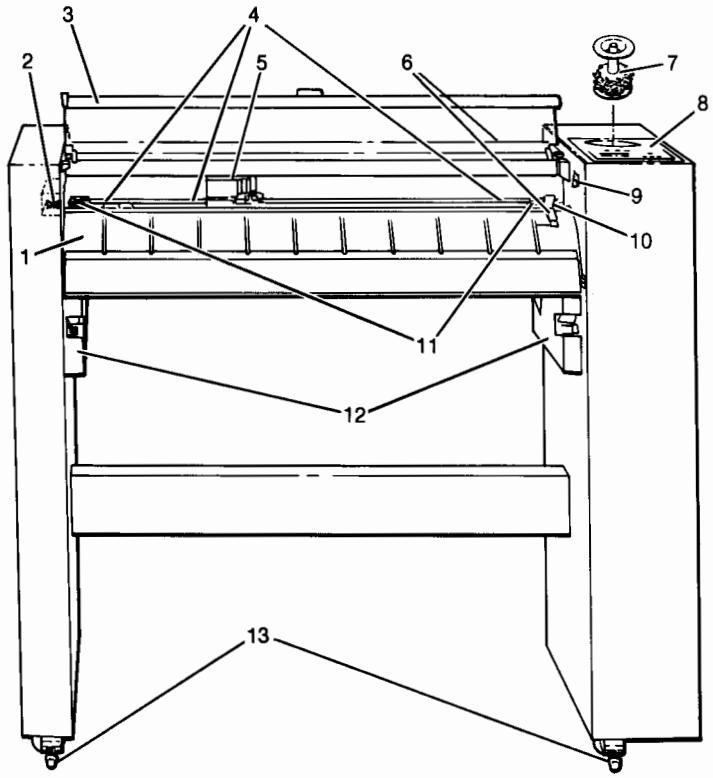
User's Guide
Power cable
Carousels for use with fiber-tip, roller-ball, and drafting pens
Grit wheel brush
Assorted pens and media
Roll media (DraftMaster II)
Take-up spool (DraftMaster II)
Media cutters (DraftMaster II)

For information on ordering additional supplies, including interface cables and the *Programmer's Reference* manual, refer to Appendix C.

NOTE: An interface cable (required to connect the plotter to a computer) is *not* included with your plotter and must be purchased separately. ■

Plotter Features (Front View)

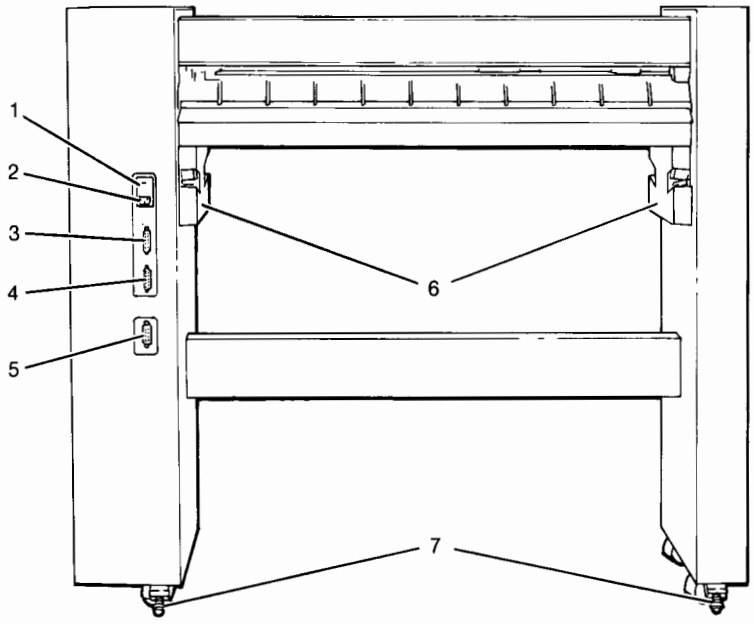
Look at the front of your plotter and identify the features numbered in the following figure.



1. **Platen —** Provides firm surface for plotting.
2. **Paper Cutter (DraftMaster II) —** Cuts off plots when you are using roll media without a take-up spool.
3. **Carriage Cover —** Prevents objects from blocking pen motion during plotting. Plotter will not operate with cover raised.
4. **Grit Wheels —** Move the paper back and forth during plotting.
5. **Pen Holder —** Selects, moves, and puts away pens during plotting.
6. **Paper Guides —** Help you position medium correctly on platen. (The rear guide is visible from the rear of the plotter.)
7. **Pen Carousel (removable) —** Holds up to eight pens.
8. **Control Panel —** Contains the buttons used to manually control various plotter functions. Additionally, includes display used to access menus.
9. **On/Off Switch —** Turns the plotter on and off.
10. **Paper Loading Lever —** Raises and lowers pinch wheels for loading and unloading plotting media.
11. **Pinch Wheels —** Hold media in place during plotting.
12. **Take-Up Spool Yoke (DraftMaster II) —** Accepts take-up spool for roll media.
13. **Stabilizing Feet —** Increase plotter stability.

Plotter Features (Rear View)

Look at the back of your plotter and identify the features numbered in the following figure.



1. **Fuse Box —** Contains the fuse and line voltage selector. The current voltage selection appears in the window.
2. **Power Socket —** Accepts the plug from the power cable.
3. **RS-232-C Interface Connector —** Accepts the RS-232-C/CCITT V.24 cable used to connect the plotter to a computer, modem, or RS-232-C DCE I/F. This is the **COMPUTER/MODEM** port.
4. **RS-232-C Interface Connector —** Accepts the RS-232-C/CCITT V.24 cable used to connect the plotter to a terminal or RS-232-C DTE I/F. This is the **TERMINAL** port.
5. **HP-IB (IEEE-488) Interface Connector —** Accepts the HP-IB interface cable used to connect the plotter to a computer.

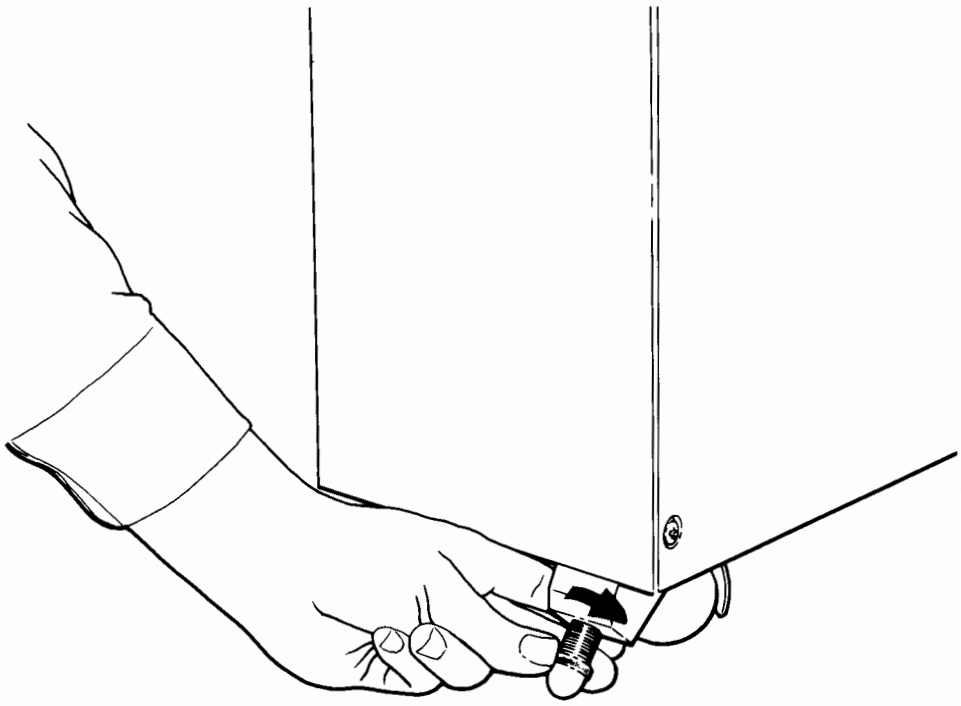
6. **Paper Spool Yoke (DraftMaster II) —** Accepts supply spool of roll media.
7. **Stabilizing Feet —** Increase plotter stability.

Setting Up the Plotter

Complete the steps described in the following sections to set up the plotter. Complete these tasks before connecting the plotter to your computer system. Select a level spot for your plotter and make sure nothing will obstruct paper movement during plotting.

Stabilizing the Plotter

After you unpack the plotter and move it to the area in which you'll be plotting, adjust each of the stabilizing feet, as shown in the following illustration. Adjusting the stabilizing feet will increase the stability of the plotter, in case it is jarred. Turn each foot in a clockwise direction to extend it. Extend each foot until all four castors are raised off of the floor approximately one-eighth of an inch (2 centimetres).



Before moving the plotter to a new location, turn each foot in a counter-clockwise direction until the castors touch the floor.

Turning the Plotter On

The plotter is shipped with the power cable and voltage setting appropriate for your area's power requirements. If the wall plug does not look familiar, refer to Appendix A for a table of power cord options.

1. From the rear of the plotter, make sure the voltage setting is set to the voltage required in your area. (In the U.S., the voltage setting on the rear panel should read 120V. Appendix A lists voltage settings for other countries.)
2. Plug the power cord into the power socket on the back of the plotter, then into the wall outlet.
3. From the front of the plotter, press the **On/Off** switch. If the carriage cover is raised, lower it. The plotter will *initialize*, indicated by movement of the pen holder and carousel. (Initialization simply means that certain standard conditions are established within the plotter.)

Press the **On/Off** switch a second time to turn the plotter off.

Having the Plotter Speak Your Language

The plotter's front panel can display messages in English, French, German, Spanish, Italian, and Japanese. To select a language, refer to the following table and press the corresponding **Pen Select** button as you turn on the plotter.

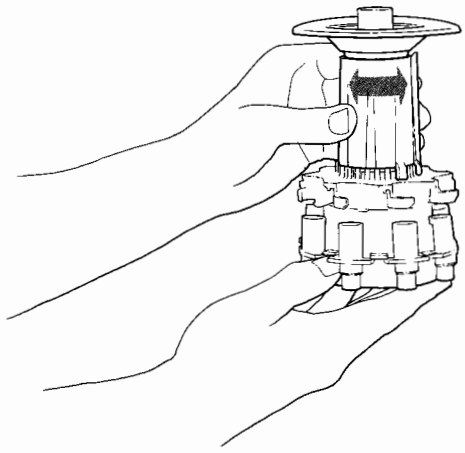
Pen Select +	On/Off Switch	=	Language
	+ 	=	English
	+ 	=	French
	+ 	=	German
	+ 	=	Spanish
	+ 	=	Italian
	+ 	=	Japanese

The plotter will display the language you select until you change it.

Using Pen Carousels

You can use the plotter's pen carousels with all five pen types: paper, transparency, roller-ball, and disposable and refillable drafting pens. This means you do not need a separate carousel for each pen type. Read the following section to learn how to use the carousel with different pen types.

1. Holding the carousel as shown below, turn the center column.



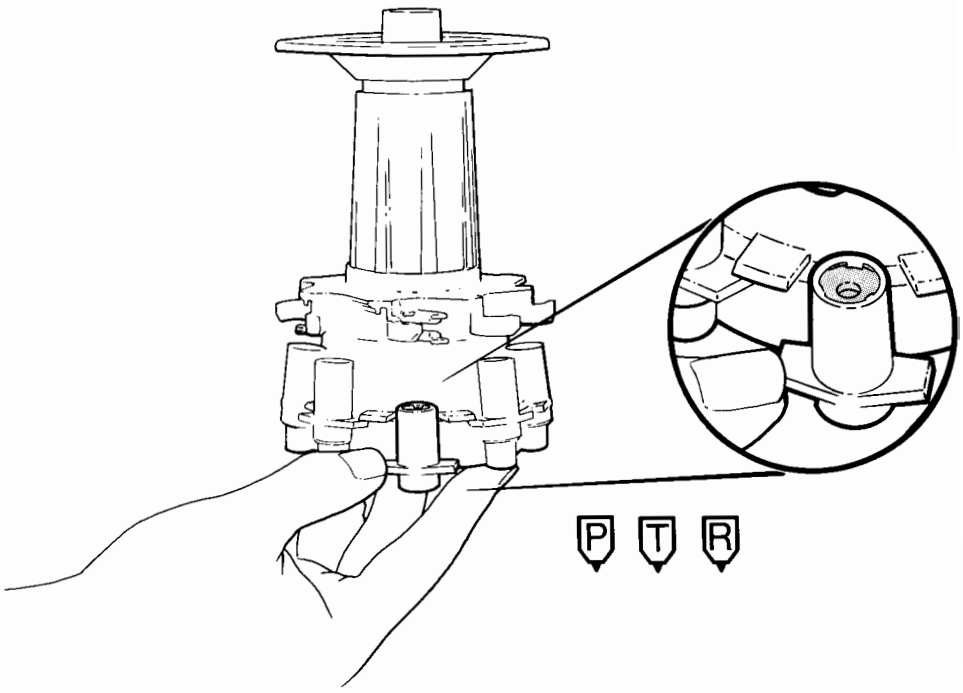
2. Looking at the carousel from the top, continue to turn the center column until the white tip of the pointer lines up with the symbol that corresponds to your pen type.

P	T	R	V	F
Paper pens	*Transparency pens*	*Roller-ball pens*	*Drafting pens for vellum and paper*	*Drafting pens for film*

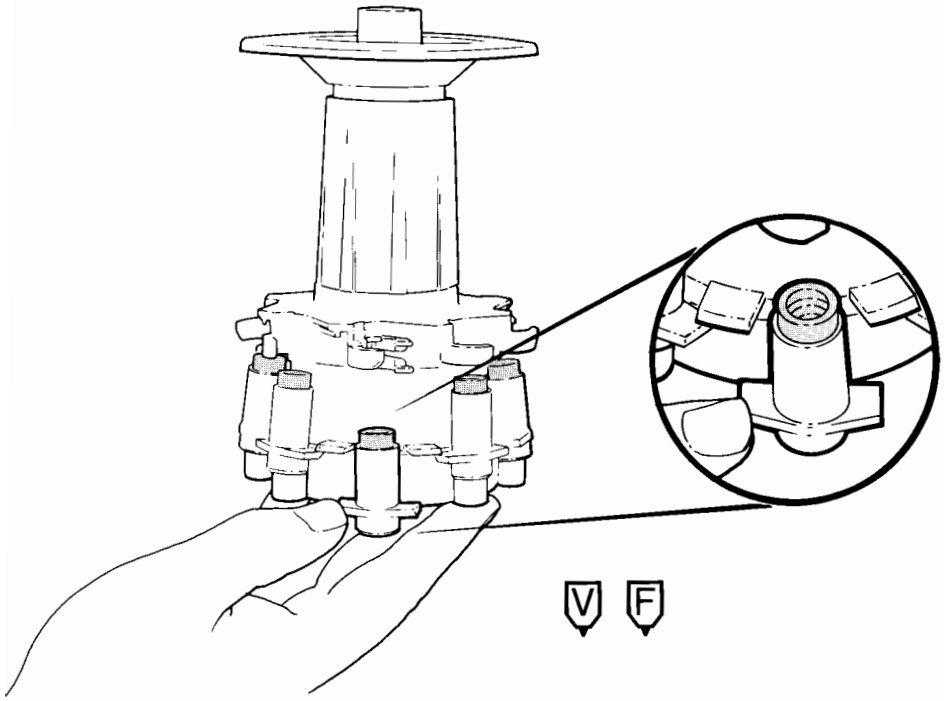
This sets the plotter to the optimum speed and force for your pen type. If you do *not* make this adjustment, it can affect the line quality of your plot.

3. Check each pen stall to make sure the correct pen boots are installed in your carousel, as shown below. Using the correct boots will prevent ink from drying out and will lengthen the life of your pens.

   a. For paper, roller-ball, and transparency pens, use the small boots that look like rubber washers.

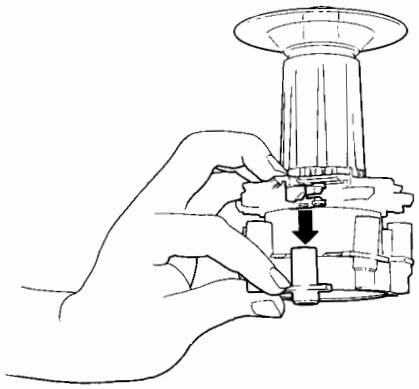


b. For refillable and disposable drafting pens, use the larger pen boots.



There may be times when you want to change the boots in a carousel from one type to another. For example, if you *only* use drafting pens, you can install drafting pen boots in both carousels. If you need to change the boots in a carousel from one type to the other, complete the following steps.

1. Turn the carousel so that a numbered stall is facing you. Pull down the stall's pen cap.



2. To remove drafting pen boots, pinch the rubber pen boot and pull up. To remove the small boots for use with paper, transparency, and roller-ball pens, insert the tip of a pen or pencil into the center of the pen boot and gently pull up. Store the pen boots for future use.

3. Place the correct boot in the stall's pen cap. Use a pen or pencil to push the boot down, until it is securely seated in place.

Repeat steps 1 through 3 for each of the eight pen stalls.

Loading Pens

Complete the following steps to load pens. Although you can draw the demonstration plot with any pen/media combination, it is recommended that you use fiber-tip paper pens with plotter paper the first time you run the demonstration plot.

1. Open a package of pens and remove the pens. Keep the package for storing pens when they are not in use. The ink color for each pen matches the color of the markings on the top of the pen. The number on top of the pen specifies the line width (in tenths of millimetres) that the pen will draw.
2. Remove the plastic pen caps from the pens. Save the caps for recapping pens when they are not in use.
3. Remove the carousel from the plotter. Simply grasp the carousel from the top and pull it straight up, out of the carousel well.
4. Turn the carousel's center column, until the white tip of the pointer lines up with the symbol that corresponds to your pen type.

Paper pens

Transparency pens

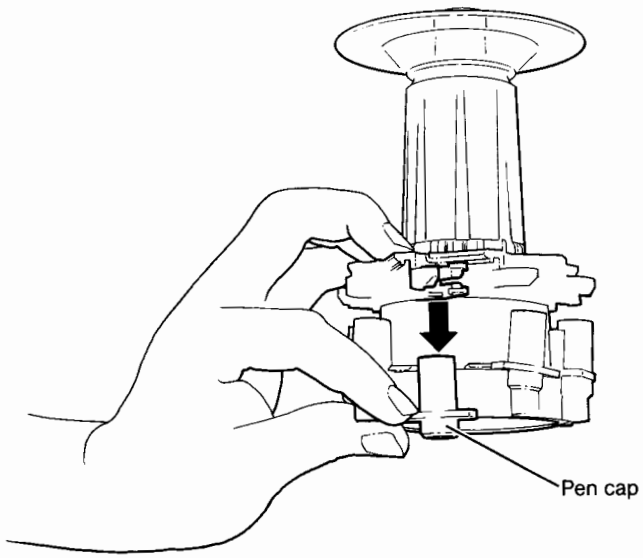
Roller-ball pens

Drafting pens for vellum and paper

Drafting pens for film

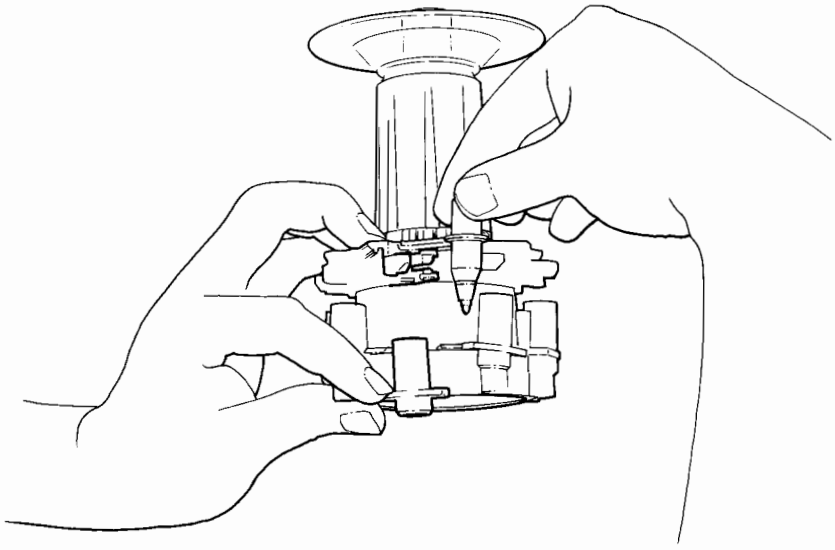
5. Hold the carousel with one hand and follow steps a through c.

   a. Turn the carousel so that a pen stall number is facing you. Use your index finger to push down the stall's pen cap.

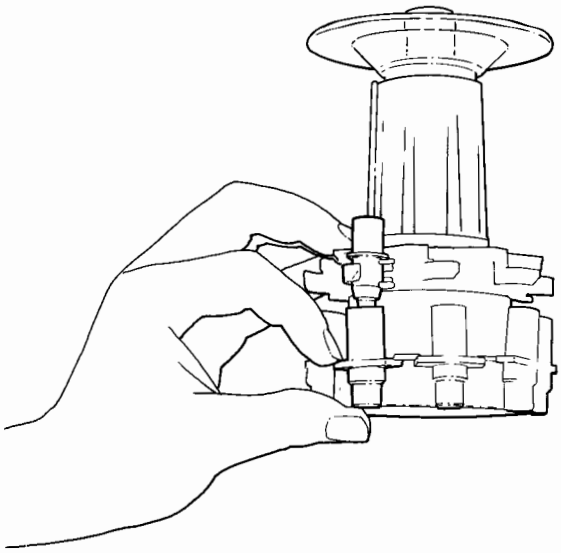


NOTE: If you are using drafting pens, make sure drafting pen boots are installed in each pen stall. If you need to change the boots, refer to the preceding section, *Using Pen Carousels.* ■

b. With your other hand, slide the pen into the stall's pen-holding jaws. The collar on the pen should rest on *top* of the jaws.



c. Release the pen cap slowly, letting the rubber pen cap cover the pen tip, as shown on the following page.



Repeat steps a, b, and c for each pen you want to load. The carousel does *not* need to be completely full for the plotter to work.

To remove a pen, reverse the loading procedure. Although the plotter will automatically cap pens that are loaded in the carousel, pens will last longer if stored out of the carousel and recapped. For maximum pen life, remove pens when you will not be plotting for several days. Refillable drafting pens require additional care, as explained in Chapter 5.

Inserting the Pen Carousel in the Plotter

The pen carousel fits into the carousel well located on the right side of the plotter. To insert the carousel, complete the following steps.

1. Turn on the plotter. This rotates the carousel spindle to its loading position. The message **PUT IN CAROUSEL** will display.
2. Lower the carousel into the carousel well, onto the spindle.

The message **CHECK CAROUSEL PRESS •** will display if any of the pens are not loaded correctly or if the carousel is incorrectly positioned. If this message displays, remove the pen carousel and check the positioning of each pen. When pens are correctly positioned, return the carousel to the carousel well.

Loading Single-Sheet Media

You can use single-sheet media in the following standard sizes:

- ANSI A, B, C, D, and E
- Architectural C, D, and E
- ISO A4, A3, A2, A1, and A0

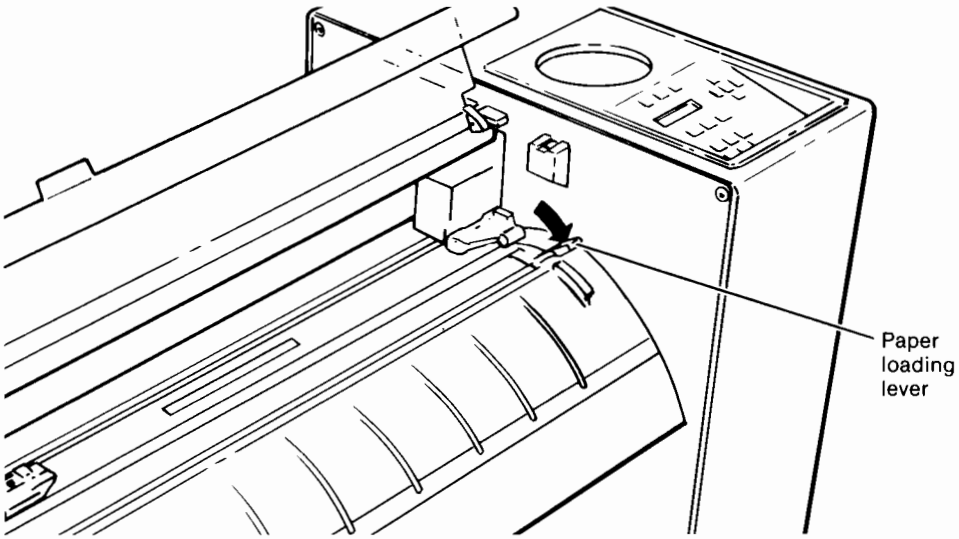
When you load media, the left edge of the medium must extend at least one-half inch (12.7 mm) over a grit wheel when the right edge of the medium is against both paper guides. Use the following table when loading media to determine whether to put the width or the length of the medium along the platen.

Standard Media Size	Media Loading Direction
A (8½ × 11 in.) A4 (210 × 297 mm)	media width or length along platen
B (11 × 17 in.) A3 (297 × 420 mm)	media width along platen
C (17 × 22 in.) Architectural C (18 × 24 in.) A2 (420 × 594 mm)	media length along platen
D (22 × 34 in.) Architectural D (24 × 36 in.) A1 (594 × 841 mm)	media width or length along platen
E (34 × 44 in.) Architectural E (36 × 48 in.) A0 (841 × 1189 mm)	media width along platen

Complete the following steps to load single-sheet media. (Chapter 4 provides instructions for loading roll media.)

1. Turn the plotter on. After a few seconds, the message **LOAD PAPER TO PLOT** will display on the plotter's front panel.
2. Raise the carriage cover. The message **LOWER COVER PRESS** • will display.

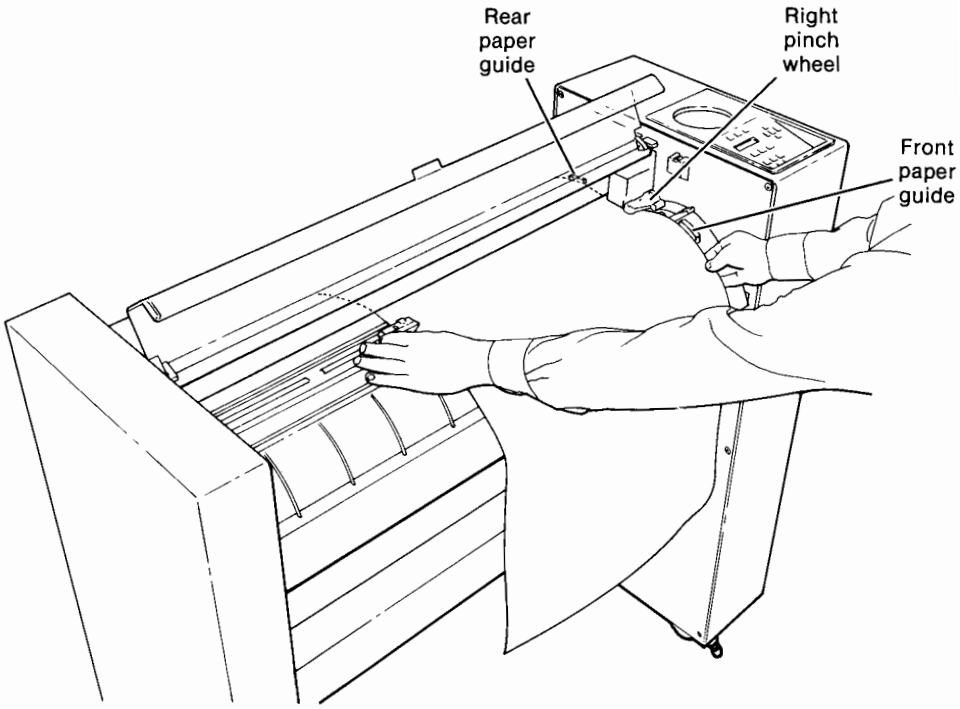
3. Pull the paper-loading lever towards you to raise the pinch wheels. Slide the left-hand pinch wheel to the left side of the platen.



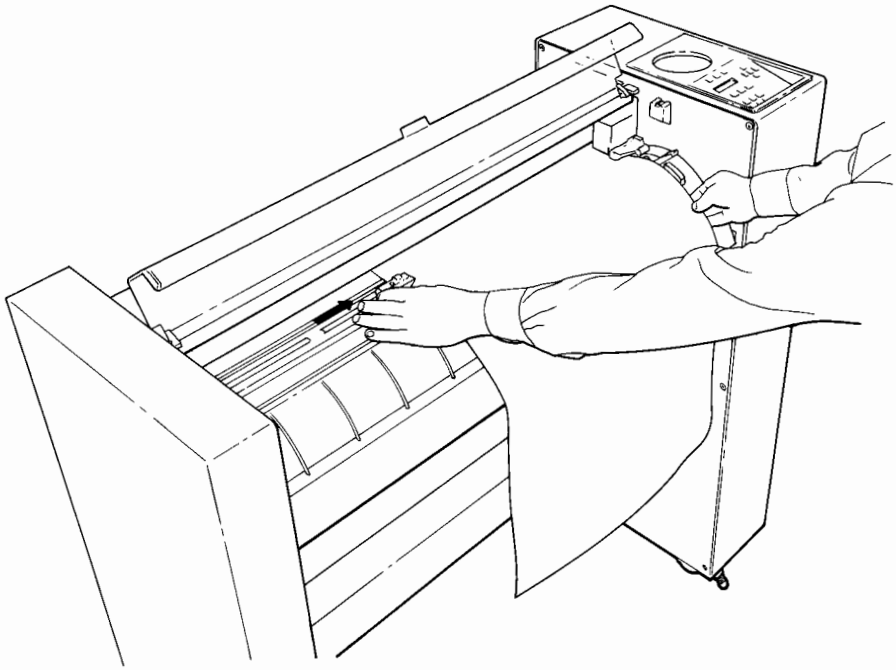
4. Hold a piece of plotter paper by the edges and slide it under the right pinch wheel. Slide the paper until approximately half of the sheet is hanging in front of and half behind the plotter.

1

Carefully align the right edge of the paper along both the front and rear paper guides. From the rear of the plotter, check the alignment with the rear paper guide. (When you become more experienced with paper loading, you'll be able to tell by feel if the page is aligned with the rear paper guide.)



5. Slide the left pinch wheel over the page, aligning the line on the pinch wheel with the left edge of the page.

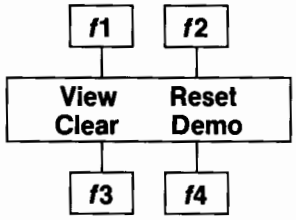


6. Push the paper-loading lever away from you to lower the pinch wheels — this will hold the medium in place.

   NOTE: Always raise the pinch wheels when you are not using the plotter. If left in the lowered position (lever raised), the side of the pinch wheel that rests on the platen will temporarily flatten. As a result, media will slip, causing wobbly lines. ■

7. Lower the carriage cover. The plotter will determine the size of the medium by moving both the pen holder and the medium.

If you properly loaded the medium, the following menu will display. This message indicates that the plotter is ready for plotting.



If the medium is not correctly loaded, the message **LOAD PAPER TO PLOT** will display. If you see this message, unload the medium and try again. Make sure the left edge of the medium extends over a grit wheel.

If the medium is loaded incorrectly the page may crumple when the plotter tries to determine the size of the medium. In this case, one of the following messages will display: **X-AXIS** (**Y-AXIS** or **Z-AXIS**) **FAILURE SEE MANUAL**. If this happens, remove the medium (including any torn scraps), turn the plotter off and then on again, and load a new sheet of media.

Drawing the Demonstration Plot

The demonstration plot checks most of the mechanical and electrical workings of your plotter. Although the demonstration plot can't check everything, it is a good way to verify that the plotter is working correctly. Draw the demonstration plot before connecting the plotter to your computer.

Although you can draw the demonstration plot on vellum, tracing bond, transparency film, or polyester film, it is recommended that you use plotter paper and fiber-tip paper pens the first time you run the demonstration plot. You can draw the plot on any size media.

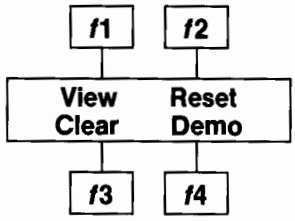
Complete the following steps to draw the demonstration plot.

1. Load three fiber-tip pens in the carousel and turn the center column until the white pointer lines up with the P symbol. The following pen colors are suggested.

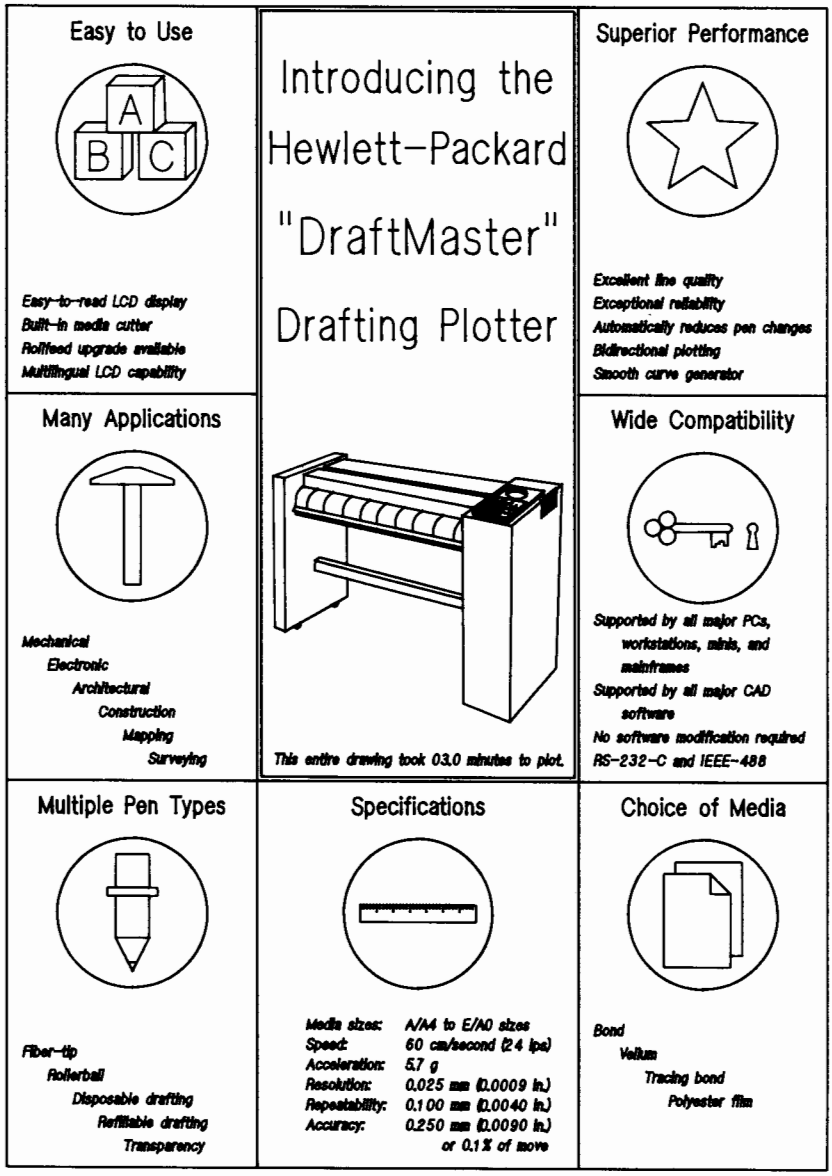
Pen Stall Number	Pen Type and Color
1	P.3, black
2	P.3, red
3	P.3, blue

2. Load a sheet of plotter paper, following the steps provided earlier in this chapter.

3. When the following menu displays, press the **Demo** function button (*f4*) to begin the plot.



When the demonstration plot is complete, the plotter will move it forward so you can see the results. The finished plot should look like the plot shown on the following page.



When the plot is complete, raise the carriage cover and pull the paper-loading lever towards you. Pull the plot out from under the pinch wheels.

2

Using the Front Panel

What You'll Learn in This Chapter

This chapter shows you how to use the plotter's front panel to perform the following tasks.

- select and move pens
- display menus
- select and store menu options

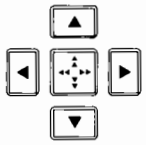
The following section provides an overview of the plotter's front-panel buttons. Detailed information about the plotter's menus is presented later in the chapter.

Front Panel Overview

Use the front-panel buttons to control pens and access the plotter's menus.

2

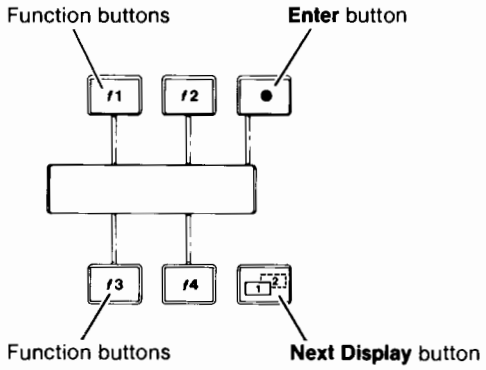
- **Pen-Control Buttons —** The plotter's pen-control buttons include five **Cursor Control** buttons, for controlling pen direction; and eight **Pen Select** buttons, for retrieving pens from the carousel pen stalls.



Cursor Control *Buttons*

Pen Select *Buttons*

- **Menu-Control Buttons —** The plotter's menu-control buttons include four function buttons (***f1*** through ***f4***), for selecting menu options; the **Enter** button, for storing menu selections; and the **Next Display** button, for paging through the plotter's primary menus.



Selecting and Moving Pens

Although software normally selects pens for you, you can also use the **Pen Select** buttons (numbered 1 through 8) to select pens from the carousel. Pressing a numbered **Pen Select** button selects a pen from the corresponding stall in the carousel. After retrieving a pen, the pen holder will return to its previous location.

Once you have selected a pen, you can move it using the **Cursor Control** buttons. The pen will move in the direction of the arrow marked on the button you push. If you press two adjacent buttons, the pen will move at a 45-degree angle between the two arrow directions. To move to a point at maximum speed, press the center cursor button while holding down an arrow button.

To return a pen to the carousel, press the **Enter** button and then press the **Pen Select** button corresponding to an empty carousel stall. To prevent drying, drafting pens will *automatically* be returned to the carousel after 15 seconds if they are not in use; fiber-tip paper, roller ball, and transparency pens will be returned after 65 seconds.

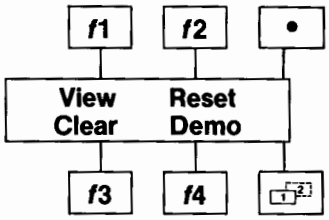
Working with the Plotter's Menus

In most cases you will want your program or software package to control plotter functions. However, you can use the plotter's front-panel menus in applications where you want to control features yourself. This chapter will teach you how to use the menus to raise and lower the pen, set pen speed and force, and draw the demonstration plot — along with many other functions.

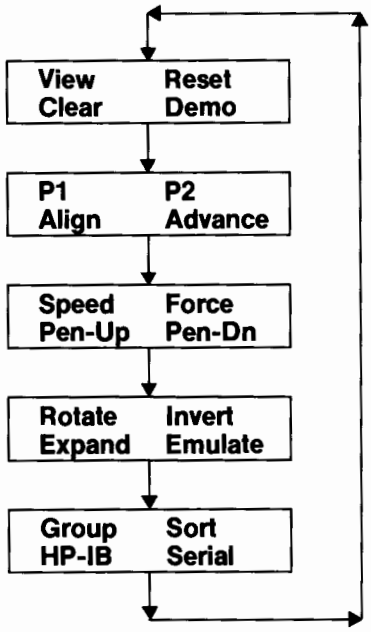
In addition to the five primary menus, there are several specialized menus used when connecting the plotter to a computer and debugging communication or programming errors. These menus are explained in Chapter 7.

Selecting a Primary Menu

The following primary menu displays when you turn the plotter on.



Press the **Next Display** button each time you want to page through the primary menus. To go back to the previous menu, press the **Enter** button and then the **Next Display** button. The following flowchart shows the plotter's primary menus.

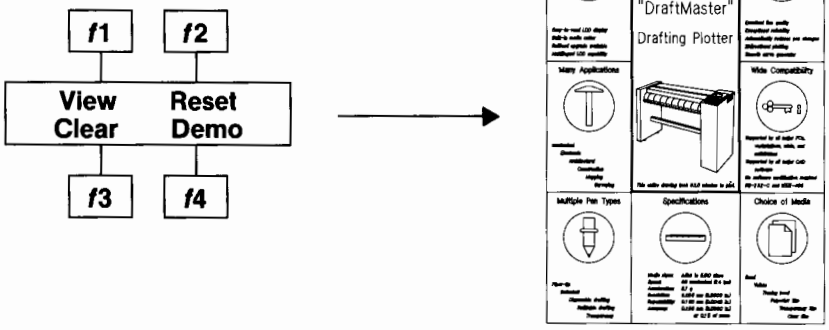


Selecting and Storing Menu Options

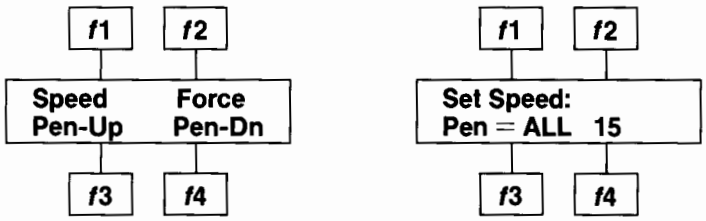
Use the plotter's function buttons (***f1*** through ***f4***) to access menus, submenus, and submenu options. When you press a function button the plotter will respond in one of the following ways.

- perform the action specified in the menu
- display a submenu
- display a submenu option

An example of a function button performing a specified action is the **Demo** function button. When paper and pens are properly loaded, pressing **Demo** (***f4***) activates the plotter's demonstration plot.



An example of a function button displaying a submenu is the **Speed** function button. When you press **Speed** (*f1*) the speed submenu displays, as shown below.



When a submenu displays, such as the speed submenu in this example, you can use the function buttons to view the options that are available. In this case the options are the pen numbers and pen speeds. Each time you press the corresponding function button (*f4*) a new pen speed option displays. The **Enter** symbol will flash in the upper-right corner of the display, to prompt you to store the selection. When the option you need displays, press the **Enter** button to store the selection.

NOTE: Although you can change menu settings while a plot is in progress, you should do so *before* beginning a plot. If you change settings while a plot is in progress, the plotter may not respond immediately. ■

Some options are stored continuously (until you change them), while others are stored temporarily (must be reset each time you turn the plotter off and on). The following sections discuss each menu in detail, and specify which options are stored in continuous memory.

Overriding Software Instructions

You can use the plotter's front panel to override software (or program) instructions. This means you don't have to be a programmer to control such functions as pen speed and force or the orientation of your plot.

The following front-panel menu items can override a software initialization instruction (IN). Like a front-panel **Reset**, an initialization instruction returns these settings to their default values.

- P1 and P2
- Speed and Force
- Rotate
- Invert
- Expand
- Group
- Sort

If you do not want to use the default setting of a front-panel menu, complete the following steps. (The default setting for each of the menus is given later in this chapter.)

1. Use **Reset** before you begin plotting to return settings to their default values. (This will not affect settings stored in continuous memory.)
2. Use the front panel to store the setting(s) you want to change.
3. When you have finished plotting, use **Reset** to return the front-panel menus to their default settings.

NOTE: There are software instructions that directly control the location of P1 and P2, pen speed and force, plot orientation, and pen grouping. If your software uses these instructions the plotter will respond and update the front panel accordingly. ■

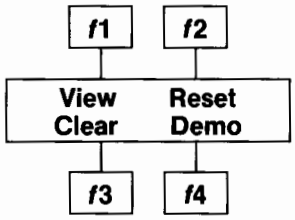
Getting Acquainted with Front-Panel Features

Try using the following front-panel menus while running the demonstration plot to see their effect: View, Reset, P1, P2, Speed, Force, Rotate, Invert, Group, and Sort. (Remember, if you change a setting while the plot is being drawn, the plotter may not respond immediately.) Each of the menus is explained next in this chapter.

Viewing a Plot in Progress

USE: Use **View** to temporarily halt a plot in progress without affecting the accuracy or completeness of the plot.

EXPLANATION: Press **View** (*f*1) to view a plot in progress.



After you press *f*1, **View** will flash on the display. The pen will return to the carousel and the plot will move so it is fully extended. You can check the progress of your plot or remove the carousel and change pens.

To restart the plot, press *f*1 again; the pen and paper will return to their previous positions, the display will stop flashing, and plotting will resume.

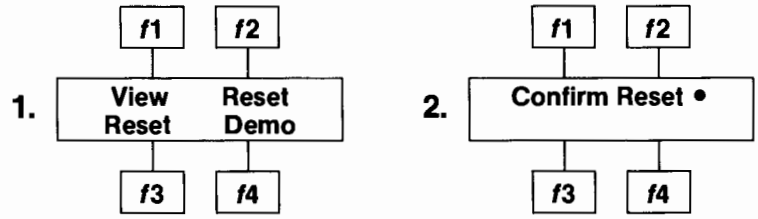
Another way to view a plot in progress is to raise the carriage cover.

NOTE: When **View** is activated, all other front-panel buttons are inactive. ■

Using Reset to Start Over

USE: Use **Reset** to stop a plot in progress, clear the plotter's buffer, and reset certain conditions to their default settings.

EXPLANATION: Use the following procedure to perform a **Reset**.



1. Press **Reset** (*f2*).

2. When **Confirm Reset** • displays, press the **Enter** button. The plotter's buffer will be emptied and the following menu items will be set to their default values: P1, P2, Rotate, Speed, Force, Sort, and Group. The pen will return to the carousel as soon as the buffer is empty.

   To exit without using **Reset**, press the **Next Display** button.

Reset will empty the plotter's buffer and cancel any changes you made to the front-panel P1, P2, axis alignment, rotate, pen speed, and pen force, sort, and group settings. **Reset** will *not* affect any conditions stored in continuous memory. To begin plotting again, replace the paper and rerun your program.

To return all settings to their default values — including those stored in continuous memory — hold down the center **Cursor Control** button while turning the plotter on.

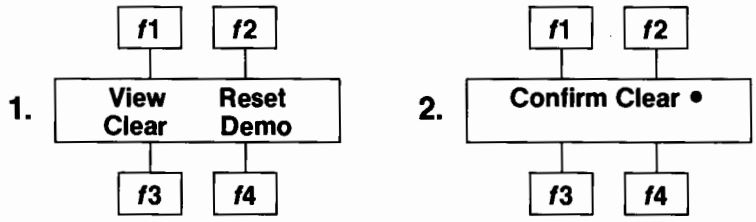
NOTE: Data that is cleared from the plotter's buffer will not be plotted; however, to completely terminate a plot, you must also stop your computer from sending any subsequent data. ■

Clearing the Plotter's Buffer

USE: Use **Clear** to stop a plot in progress and clear the plotter's buffer without changing front-panel menu settings.

2

EXPLANATION: Use the following procedure to clear the plotter's buffer.



1. Press **Clear** (*f3*).
2. When **Confirm Clear** • displays, press the **Enter** button.

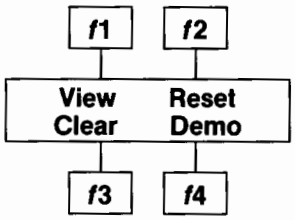
   To exit without clearing the buffer, press the **Next Display** button.

Clear empties the plotter's buffer, stopping the plot in progress. However, to completely stop the plot you must also stop your computer from sending any subsequent data.

Running the Demonstration Plot

USE: Use **Demo** to verify that the plotter is working correctly. If the plotter draws the demonstration plot correctly, the plotter is in good working condition.

EXPLANATION: To run the demonstration plot, load pens and media and press **Demo** (*f4*). The demonstration plot can be drawn on any size media, with any of the pen and media combinations recommended in Chapter 3.

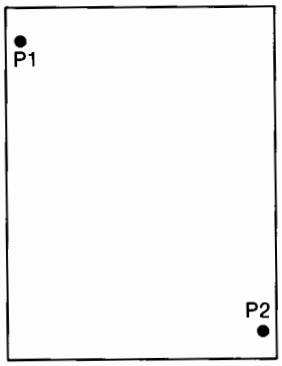


If your plotter doesn't complete the demonstration plot, or the demonstration plot looks different than the plot shown in Chapter 1, review the instructions in Chapter 1.

Working with Plot Boundaries

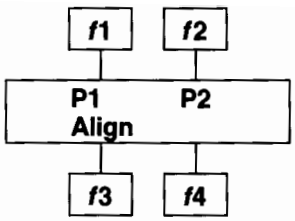
USE: P1 and P2 define plot boundaries. The P1 and P2 points determine the size and location of your plot when your program or software does scaling. (Scaling is dividing the plotting area into units convenient for your application.)

EXPLANATION: When you press **P1** or **P2** the pen moves to the location of the corresponding point. The default positions of P1 and P2 are shown in the following illustration.*



To use **P1** and **P2** to set the size and orientation of your plots from the front panel, complete the following steps. You will probably need to reposition P1 and P2 *only* when your software requires you to do so or when writing your own programs.

*Setting **Rotate**, **Invert**, **Expand**, or **Emulate** on can affect the positions of P1 and P2.



1. Press a **Pen Select** button to retrieve a pen from the carousel.
2. Use the **Cursor Control** buttons to move the pen to the desired P1 location.
3. Press the **Enter** button, then press **P1** (*f1*) to store the new P1 location.
4. To position P2, repeat steps 2 and 3 using the **P2** button instead of **P1**.

NOTE: When you change the position of P1, P2 automatically changes position to maintain the same position relative to P1. To move P2 to a specific location, set the position of P1 *before* setting P2. ■

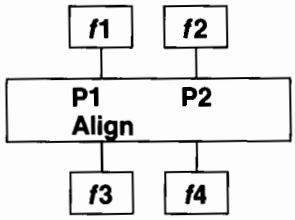
Aligning the Plotting Axes with Gridded Media

USE: Use **Align** if you need to align grids on printed media with the physical axes of the plotter.

2

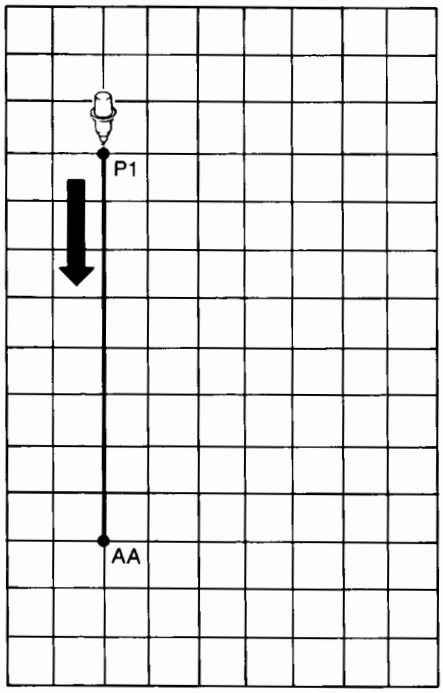
EXPLANATION: Use the following procedure to align grids on your media with the axes of the plotter. Although you can use a pen to make the alignment, a digitizing sight is recommended for increased accuracy. (Refer to Appendix C if you need to order a digitizing sight.)

1. Load the media into the plotter.
2. Remove the protective cap from the digitizing sight and load it into the carousel just as you would load a pen.
3. Press the **Pen Select** button corresponding to the carousel stall number where you put the digitizing sight.
4. Press **Next Display** once to display the menu shown below. Then, press **Align** (*f3*). The digitizing sight will move to the axis align point.

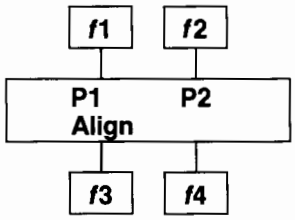


5. Press **P1** (*f1*). The digitizing sight will move to the P1 position.
6. Press the **Next Display** button. Then, press **Pen-Dn** (*f4*) to lower the digitizing sight. (This will help you to more precisely position the sight — if you are using a pen, you can keep it raised to avoid marking the paper.)

7. Use the **Cursor Control** buttons to position the dot in the digitizing sight directly over the nearest grid line running from P1 to the axis align point. Refer to the following illustration.



8. Press the **Enter** button and then the **Next Display** button to display the menu shown below. Press the **Enter** button and then **P1** (*f1*) to store the new P1 location.



9. Press **Align** (*f3*) to move the digitizing sight to the axis align point. (The sight will move in the "up" position.)

10. Press the **Next Display** button once, then press **Pen-Dn** (*f4*). Now use the **Cursor Control** buttons to position the dot in the digitizing sight directly over the same grid line.

11. Press the **Enter** button and then the **Next Display** button to return to the **Align** menu. Press **Enter** and then **Align** (*f3*) to store the new alignment point.

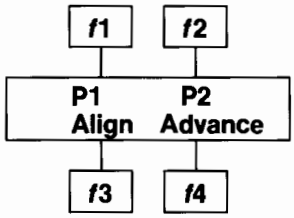
To check your results, press **P1** (*f1*) and make sure the digitizing sight follows the grid line as it moves to the P1 location. When you are satisfied with the result, remove the digitizing sight and begin plotting.

NOTE: To return P1 and P2 to their default locations after using **Align**, either turn the plotter off and then on again *or* load a new sheet of plotting media and use **Reset**. Loading a new *size* sheet of media will automatically return P1 and P2 to their default locations. ■

Advancing the Page (DraftMaster II only)

USE: Use **Advance** to advance roll media one page-length. Press **Advance** after completing a plot to begin a subsequent plot on a clean area of media.

EXPLANATION: When your plot is complete, press **Advance** to advance the media one page-length.



Advance displays only when roll media is loaded in the plotter. If you use roll media without a take-up spool installed, cut off each plot as it is completed *before* pressing **Advance**. When a take-up spool is installed **Advance** will wind plots onto the take-up spool. (Refer to Chapter 4 for details about using roll media.)

Controlling Pen Speed

USE: Use **Speed** to select the optimum pen speed for your plotting needs.

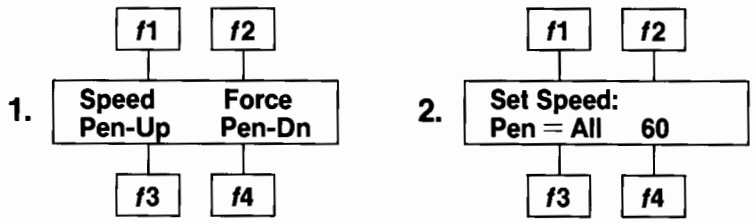
2

DEFAULT:

Carousel Position	Speed
Fiber-tip pen	50 cm/s
Roller-ball pen	60 cm/s
Drafting pen	30 cm/s
Transparency pen	10 cm/s

OPTIONS: Pens 1 through 8 or all pens. Pen speeds of 10 through 60 centimetres per second, in 5 centimetre increments.

EXPLANATION: Use the following procedure to change the speed of individual pens or of all the pens in the carousel.



1. Press **Speed** (*f1*) to display the **Speed** submenu.
2. Press *f3* to view each pen number *or* leave the setting on **All** to change the speed of all of the pens in the carousel.
3. Press *f4* to view each of the pen speed options.

4. Press the **Enter** button when both the correct pen number and speed display, to store the setting.

   To set the speed for individual pens, repeat steps 1 through 4 for each pen that requires a different value.

   To exit without changing the setting, press the **Next Display** button.

As shown in the **DEFAULT** table, the default pen speed varies according to the way you adjust the pen carousel. The defaults are satisfactory for most plotting situations. However, there are several reasons why you may want to change pen speed: your software may require a pen speed other than the default; reduced pen speed can improve line quality; greater pen speed reduces plotting time when line quality isn't critical.

Controlling Pen Force

USE: Use **Force** to select the optimum pen force (pressure on the media) for your plotting needs.

2

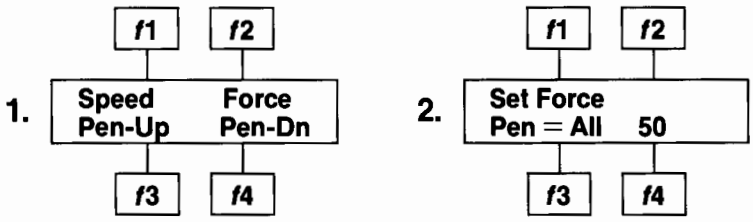
DEFAULT:

Carousel Position	Force
Fiber-tip pen	24 grams
Roller-ball pen	51 grams
Drafting pen	24 grams
Transparency pen	24 grams

OPTIONS:

Displayed Option	Associated Value
1	15 grams
2	24 grams
3	30 grams
4	36 grams
5	45 grams
6	51 grams
7	57 grams
8	66 grams

EXPLANATION: Use the following procedure to change pen force. You may change the force of individual pens or of all of the pens in the carousel.



1. Press **Force** (*f2*) to display the **Force** submenu.
2. Press *f3* to view each pen number *or* leave the setting on **All** to change the force of all of the pens in the carousel.
3. Press *f4* to view each force option. The displayed number is *not* the actual value that will be set — refer to the **OPTIONS** table for the force (in grams) associated with each number.
4. Press the **Enter** button when both the desired pen number and pen force display, to store the setting.

   To set the force for individual pens, repeat steps 1 through 4 for each pen that requires a different value.

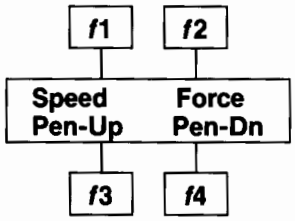
   To exit without changing the setting, press the **Next Display** button.

As shown in the **DEFAULT** table, the default pen force varies according to the way you adjust the pen carousel. The defaults are satisfactory for most plotting situations. However, there are several reasons why you may want to change pen force: you can lengthen pen life by decreasing pen force; increased pen force can result in improved line quality.

Raising and Lowering the Pen

USE: Use **Pen-Up** and **Pen-Dn** to raise and lower pens.

EXPLANATION: Use the following procedure to raise and lower the pen.



1. Press a **Pen Select** button to retrieve a pen from the carousel.
2. Press **Pen-Up (*f*3)** to raise the pen. Press **Pen-Dn (*f*4)** to lower the pen.

   To exit, press the **Next Display** button.

You can draw straight lines by lowering the pen and then using the **Cursor Control** buttons. You will also use **Pen-Up** and **Pen-Dn** when digitizing and while using **Align**.

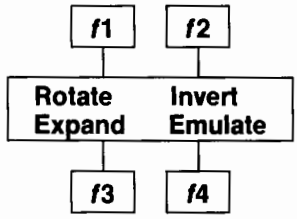
Rotating a Plot

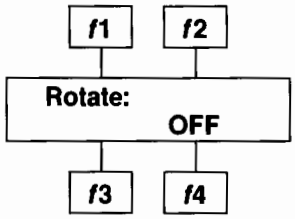
USE: Use **Rotate** to turn the X- and Y-axes of your plot 90 degrees counterclockwise.

DEFAULT: OFF

OPTIONS: OFF, ON

EXPLANATION: Use the following procedure to rotate your plot.

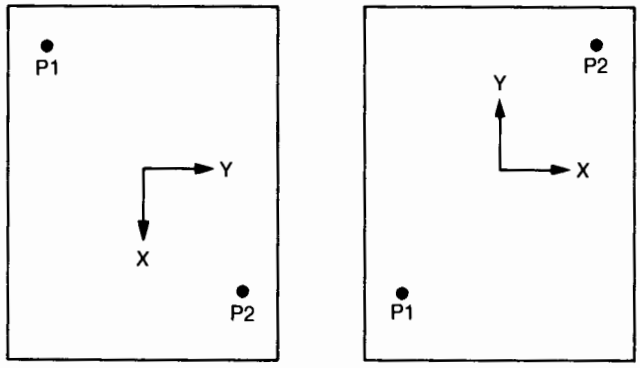
1. 

2. 

1. Press **Rotate** (*f1*) to display the **Rotate** submenu.
2. Press *f4* to display each **Rotate** option.
3. Press the **Enter** button when the option you need displays, to store the setting.

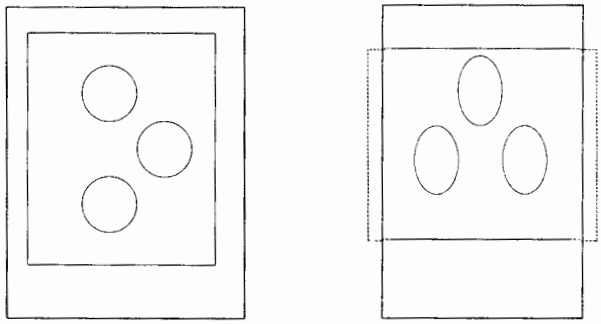
   To exit without changing the setting, press the **Next Display** button.

Normally, the X-axis runs along the longest edge of your paper.* Pressing **Rotate** turns the axes 90 degrees counterclockwise, so that the Y-axis runs along the length of the paper, as shown in the following illustration.



Rotate Off *Rotate On*

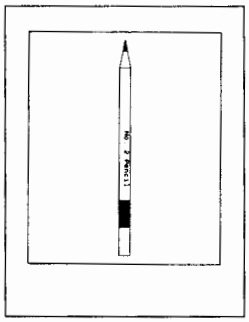
When you rotate a plot, the P1 and P2 points also rotate and move inward. Be aware that this may affect the proportions of your plot if your software uses scaling techniques. The circles shown in the following illustrations show the effect of scaling when P1 and P2 are moved.



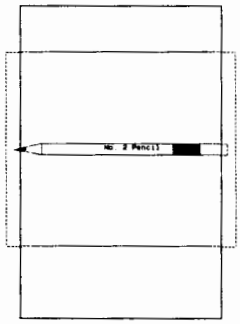
Original Plot *Rotated Plot*

*Orientation of the X-axis will be affected when **Emulate** is on.

If your program does not use scaling techniques, your plot may not entirely fit on the page when rotated. This effect (known as clipping) is shown with the pencil in the following illustration. The scaling instruction, SC, is discussed in the *Programmer's Reference* manual.



Original Plot



Rotated Plot

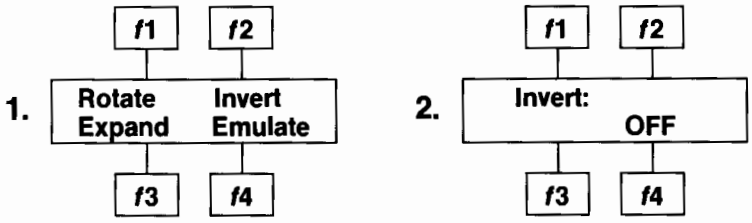
Inverting Plot Orientation

USE: Use **Invert** to change the orientation of a plot by 180 degrees. You can only use **Invert** when you are using sheet media.

DEFAULT: OFF

OPTIONS: OFF, ON

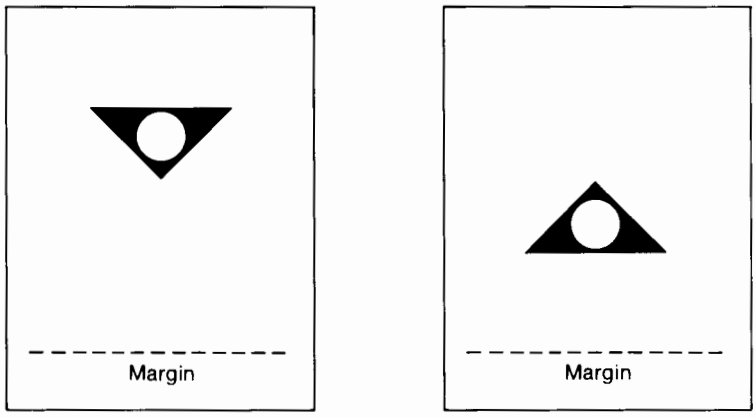
EXPLANATION: Complete the following procedure to invert a plot.



1. Press **Invert** (*f2*) to display the **Invert** submenu.
2. Press *f4* to view each **Invert** option.
3. Press the **Enter** button when the option you need displays, to store the setting.

   To exit without changing the setting, press the **Next Display** button.

When you are using sheet media, you can use **Invert** to reverse the orientation of your plot by 180 degrees. When **Invert** is on, your plot will look upside down in the plotter. Additionally, the widest "margin" (area you can't plot in) will be on the "top" edge of your plot, instead of on the bottom.



Normal Plot *Inverted Plot*

NOTE: You can use **Rotate** with **Invert** to provide various plot orientations. ■

Expanding the Plotting Area

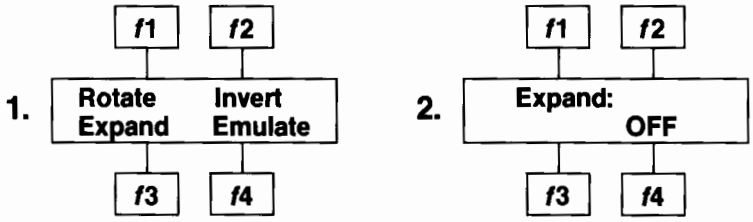
USE: Use **Expand** to plot closer to the edges of your paper.

2

DEFAULT: OFF

OPTIONS: OFF, ON

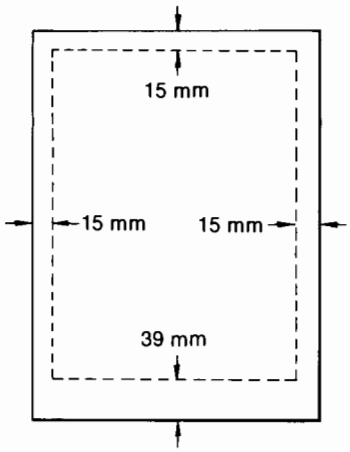
EXPLANATION: Use the following procedure to increase the plotting area.



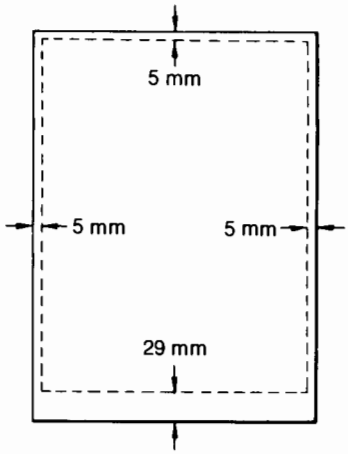
1. Press **Expand** (*f3*) to display the **Expand** submenu.
2. Press *f4* to view each **Expand** option.
3. Press the **Enter** button when the option you want displays, to store the setting in continuous memory. (The setting will remain in memory until you change it, even if you turn the plotter off.)

   To exit without changing the setting, press the **Next Display** button.

When **Expand** is on the plotting area increases by reducing the outer margins (non-plotting area) of the page. The following illustration shows the difference in size between the standard and expanded plotting area (margins shown are approximate; exact values may vary by a millimetre).



Standard Plotting Area



Expanded Plotting Area

NOTE: If ink smears when **Expand** is on, move P1 and P2 in, away from the edges of the page, *or* reduce pen speed. ■

Using Software Written for HP 7585 and HP 7586 Plotters

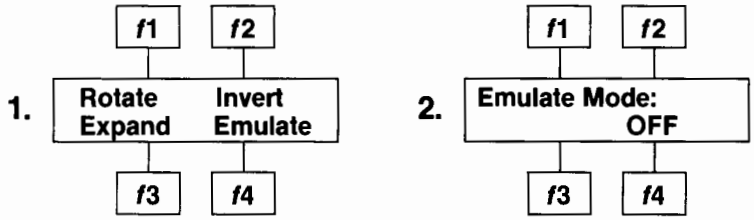
2

USE: Use **Emulate** to plot with software packages designed for the HP 7585 and HP 7586 plotters.

DEFAULT: OFF

OPTIONS: OFF, ON

EXPLANATION: Use the following procedure to activate **Emulate**.



1. Press **Emulate** (*f4*) to display the **Emulate** submenu.
2. Press *f4* to view each of the emulate options.
3. Press the **Enter** button when the option you want displays, to store the setting in continuous memory. (The setting will remain in memory until you change it, even if you turn the plotter off.)

   NOTE: If your software asks for a plotter name or model number, indicate that you are using an HP 7585 or 7586 plotter when **Emulate** is on; indicate that you are using the DraftMaster when **Emulate** is off. ■

   To exit without changing the setting, press the **Next Display** button.

If your software doesn't work with the HP DraftMaster, but does work with the HP 7585/7586 plotters, use **Emulate** on. When **Emulate** is on, plots may be oriented differently than when **Emulate** is off to make them look exactly like an HP 7585/7586 plot. To change plot orientation, use **Rotate** or **Invert**.

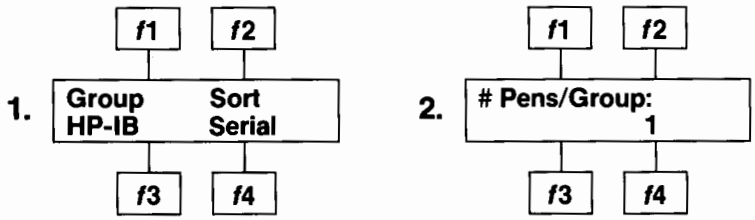
Minimizing Pen Reloading

USE: Use **Group** to prevent pens from running out of ink in the middle of large areas of solid-fill or when drawing multiple plots. When a group other than 1 is selected, each pen will draw for 100 metres before the next pen in its group is selected.

DEFAULT: 1

OPTIONS: 1, 2, 4, 8

EXPLANATION: Use the following procedure to group pens.



1. Press **Group** (*f1*) to display the **Group** submenu.
2. Press *f4* to view each **Group** option.
3. Press the **Enter** button when the option you need displays, to store the setting.

   To exit without changing the setting, press the **Next Display** button.

Leave the **Group** setting on 1 for most plotting applications. The settings are explained below.

Setting	Description
1	8 groups of 1 pen each (normal plotting)
2	4 groups of 2 pens each
4	2 groups of 4 pens each
8	1 group of 8 pens

The way you group your pens will affect the order in which you load pens in the carousel, as shown in the following table.

#Pens/Group	Carousel Loading Sequence
1	load carousel normally
2	pens 1 and 2 = 1 color pens 3 and 4 = 2nd color pens 5 and 6 = 3rd color pens 7 and 8 = 4th color
4	pens 1 through 4 = 1 color pens 5 through 8 = 2nd color
8	use one color for all 8 pens

You can use **Group** with your software packages. If, however, your software selects a pen number that is higher than the number of groups you have selected, the pen select request will be ignored. If this happens, set the plotter to use a smaller number of pens per group.

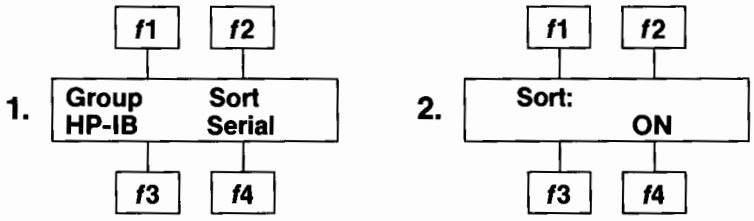
Increasing Plotting Efficiency

USE: Use **Sort** to increase plotting efficiency and decrease plotting time.

DEFAULT: ON

OPTIONS: ON, OFF

EXPLANATION: Complete the following procedure to change the **Sort** setting.



1. Press **Sort** (*f2*) to display the **Sort** submenu.
2. Press *f4* to view each **Sort** option.
3. Press the **Enter** button when the option you want displays, to store the setting in continuous memory. (The setting will remain in memory until you change it, even if you turn the plotter off.)

   To exit without changing the setting, press the **Next Display** button.

Pen sorting reduces plotting time by sorting the pen instructions in the plotter's buffer and grouping the instructions for each pen. When **Sort** is on, the plotter draws your plot by plotting all instructions for one pen before selecting the next pen. Additionally, the plotter processes the instructions in order to draw the plot in the most efficient way.

When **Sort** is off, plots are drawn in the order in which instructions are received. For this reason, turn **Sort** off when debugging programs you have written. If ink is smeared when shapes are outlined, try turning **Sort** off.

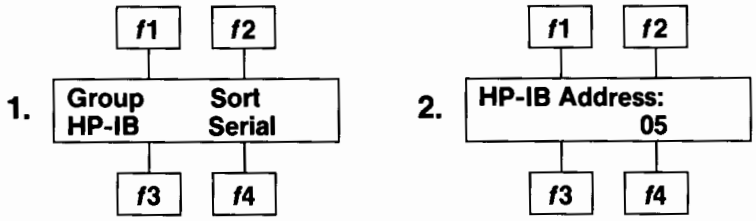
Setting an HP-IB Address

USE: If you are using the plotter's HP-IB (IEEE-488) interface, use the **HP-IB** menu to select an HP-IB address that is compatible with your computer. (This menu does not apply to RS-232-C interface users.)

DEFAULT: 05

OPTIONS: 0 through 30, LISTEN ONLY

EXPLANATION: Complete the following steps to set an HP-IB address.



1. Press **HP-IB** (*f3*) to display the **HP-IB** submenu.
2. Press *f4* to view each HP-IB address option.
3. Press the **Enter** button when the option you want displays, to store the setting in continuous memory. (The setting will be stored in memory until you change it, even if you turn the plotter off.)

   To exit without changing the setting, press the **Next Display** button.

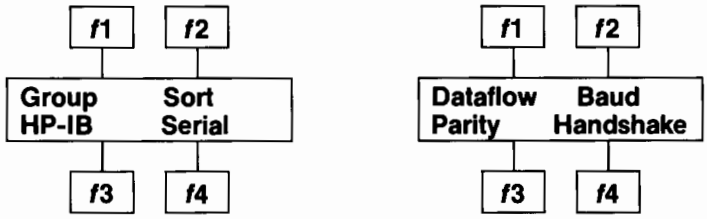
Set your plotter to use the HP-IB address that your computer expects. Refer to Chapter 7 if you need more detail about using the HP-IB interface.

NOTE: If you are using the plotter with an HP desktop computer, do not use address 21; this address is reserved for the computer. ■

Setting RS-232-C Interface Conditions

USE: Use **Serial** when connecting the plotter to a computer using the RS-232-C interface. (This menu does not apply to HP-IB interface users.)

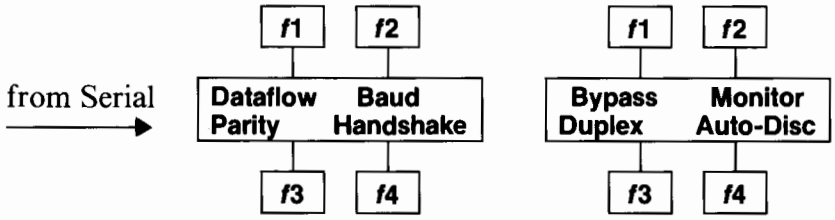
EXPLANATION: Pressing **Serial** displays a special menu you will use to set up RS-232-C conditions. This menu is explained in full in Chapter 7.



To exit, press the **Next Display** button twice.

Advanced Features

The plotter has one menu for specialized debugging and RS-232-C functions. The menu is illustrated below.



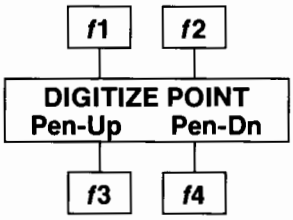
To exit, press the **Next Display** button.

This menu is discussed fully in Chapter 7. If you need to perform any of the following tasks: use debugging tools to correct communication problems between the plotter and your computer, use a duplex setting, or use a modem with the plotter, refer to *Using Advanced Features*, in Chapter 7.

Digitizing

If you are using a digitizing software package, complete the following steps to digitize with the plotter. Refer to the *Programmer's Reference* to write your own digitizing programs.

1. Install your software package, as directed by the software documentation.
2. Load the digitizing sight into the carousel just as you would load a pen. Although you can use a pen when digitizing, a digitizing sight is recommended for increased accuracy. (Refer to Appendix C for information on ordering a digitizing sight.)
3. Press the **Pen Select** button corresponding to the carousel stall number where you put the digitizing sight.
4. When the front panel displays the message **DIGITIZE POINT**, press **Pen-Up** (*f3*) to raise the pen.

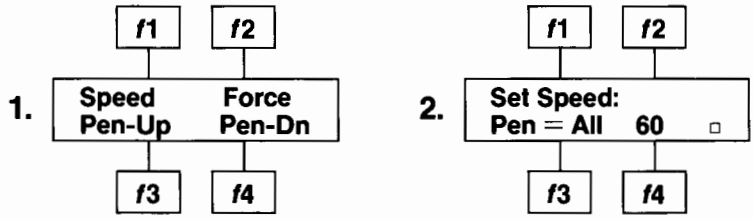


5. Use the **Cursor Control** buttons to position the dot in the digitizing sight directly over the point you want to digitize. When the digitizing sight is close to the correct position press **Pen-Dn** (*f4*) to lower the sight. Complete final positioning with the pen in the down position.
6. Press **Enter** to send the point to the computer. Depending on your software's requirements, you may need to press a key such as RETURN on your computer's keyboard.

Using Quiet Mode

In an environment where plotter noise is considered a distraction, use quiet mode to reduce plotting noise. When quiet mode is on plotting speed will be reduced.

Complete the following steps to use quiet mode.



1. Press the **Next Display** button until the **Speed** menu displays. Then press **Speed** (*f1*) to display the **Speed** submenu.
2. Press *f2* to toggle between quiet mode on and quiet mode off. When quiet mode is on, a square will display in the lower-right corner of the submenu.
3. Press the **Enter** button.

Although quiet mode will decrease your plotting speed, the speed submenu will not report your *actual* pen speed while quiet mode is on. Using **Reset** or turning the plotter off will cancel quiet mode.

3

Selecting Pens and Media

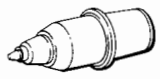
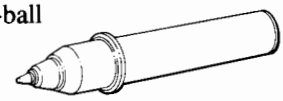
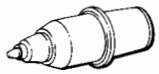
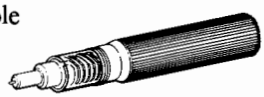
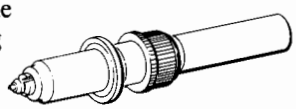
What You'll Learn in This Chapter

This chapter describes the pens and media that can be used with your plotter, and how to combine them for best results.

For the highest quality plots, use only Hewlett-Packard drafting supplies. Hewlett-Packard pens and media work together for optimal pen life, plot quality, and plotter performance. The chemical reaction between the pens and media is tested to ensure that fading and color changes are minimized. The smoothness of HP paper reduces abrasion on pen tips and produces a sharp, crisp ink line. For information on ordering supplies, refer to the *Drafting Supplies Catalog* shipped with your plotter.

Pens

The plotter can use fiber-tip paper pens, roller-ball pens, transparency pens, disposable drafting pens, and refillable drafting pens. The following table illustrates each pen type and lists its characteristics.

Pen Type	Characteristics
Fiber-tip Paper 	Easy to use, economic. Even ink flow produces high-quality characters and opaque lines. Disposable. Default plotting speed: 50 cm/s.
Roller-ball 	Convenient. Good line quality at the fastest plotting speed. Large ink capacity. Disposable. Default plotting speed: 60 cm/s.
Transparency 	Excellent color and line quality on overhead transparency film. Default plotting speed: 10 cm/s.
Disposable Drafting 	Very convenient, require no cleaning or refilling. Excellent quality. Available for polyester film and vellum/paper. Default plotting speed: 30 cm/s.
Refillable Drafting 	Highest drafting-quality pens. Long lasting tungsten carbide points. Require refilling and maintenance. Default plotting speed: 30 cm/s.*

*When using refillable drafting pens with tips smaller than .25 mm, use the front-panel menus to set the speed to 15 cm/s, and force to 2.

Fiber-tip paper pens will last at least 30 days stored in the carousel. However, to lengthen pen life remove the pens from the carousel and cap them if you do not plan to plot for several days.

Remove drafting pens and cap them immediately after use to prevent drying and clogging. Clean refillable drafting pens after use, as explained in *Maintaining Refillable Drafting Pens* in Chapter 5. Remember that ink dries as quickly in the drafting pen as it does on the plotting media. Here are the maximum times that ink can remain in a drafting pen in an average environment.

- 20 seconds if the pen is uncapped and not in use.
- One day if the pen is in a drafting pen carousel.
- One week if the pen is properly capped and stored in a vertical position.

Media

You can use plotter paper, vellum, tracing bond, double-matte polyester film, and transparency film with the plotter. The following table describes the characteristics of each of these plotting media.

Media Type	Characteristics
Plotter Paper	Smooth surface, clear line definition. Easy to handle, good for everyday use. Inexpensive.
Vellum	Surface coated for smoothness and ink receptivity. Also treated for strength and transparency. Stores well. Diazo reproducible. Moderately expensive.
Tracing Bond	Uncoated surface. Good for preliminary drawings. Inexpensive.
Double-matte Polyester Film*	Finely coated and translucent. Good for high-accuracy applications and archive storage. Dimensionally stable. Expensive.
Transparency Film	High-grade, clear plotting medium for overlays or presentations using an overhead projector.

*Use film of standard, 3-mil thickness for best results.

The plotter can use single-sheet media in the standard sizes listed below.

English	Architectural	Metric
A (8½ × 11 in.)	—	A4 (210 × 297 mm)
B (11 × 17 in.)	—	A3 (297 × 420 mm)
C (17 × 22 in.)	C (18 × 24 in.)	A2 (420 × 594 mm)
D (22 × 34 in.)	D (24 × 36 in.)	A1 (594 × 841 mm)
E (34 × 44 in.)	E (36 × 48 in.)	A0 (841 × 1189 mm)

Operating Considerations

Take the following precautions when working with plotter paper, vellum, tracing bond, transparency film, or polyester film.

- Handle media by the edges. Oil from fingerprints can prevent ink from adhering to the medium.
- Plotting media, particularly paper, can be affected by changes in temperature and humidity, which can result in plot distortions. Stabilize media by removing a sheet from the package and exposing it to air near the plotter for at least 15 minutes before plotting.
- Use media with square corners to allow the pinch wheels to grip and move the medium correctly.
- Periodically clean the tips of disposable and refillable drafting pens to remove lint.
- When using transparency film, load with the paper backing against the platen. For maximum plotting area, load film with the width of the media along the platen.
- Disposable drafting pens must be used and stored away from windows, heating, or air conditioning units.

Combining Pens and Media

Use the following table to select the types of pens and media that work best together.

Fiber-tip Pens 	**Plotter Paper:** Excellent quality for drawings. Good for solidly-filled areas. **Glossy Paper:** Excellent quality for business graphics, reports, and presentations.
Roller-ball Pens 	**Plotter Paper:** Good line quality at high speed. Use for fast preliminary drawings. **Tracing Bond:** Good line quality at high speed. Use for diazo reproductions at slow developing speed.
Transparency Pens 	**Transparency Film:** Excellent for overlays or overhead projection at meetings and presentations. **Glossy Paper:** Excellent quality for business graphics, reports, and presentations.
Disposable Drafting Pens 	**Plotter Paper:** Good for preliminary drawings.* **Vellum:** Excellent quality for final drawings.* Use for diazo reproductions at fast developing speed. **Polyester Film:** Convenient.** Excellent quality for high accuracy. Excellent for final, archive drawings.
Refillable Drafting Pens 	**Vellum:** Excellent quality for final drawings. Use for diazo reproductions at fast developing speed. **Polyester Film:** Excellent quality for high accuracy. Excellent for final, archive drawings.

*Use disposable drafting pens designed for vellum and paper.

**Use disposable drafting pens designed for polyester film.

4

Plotting with Roll Media

What You'll Learn in This Chapter

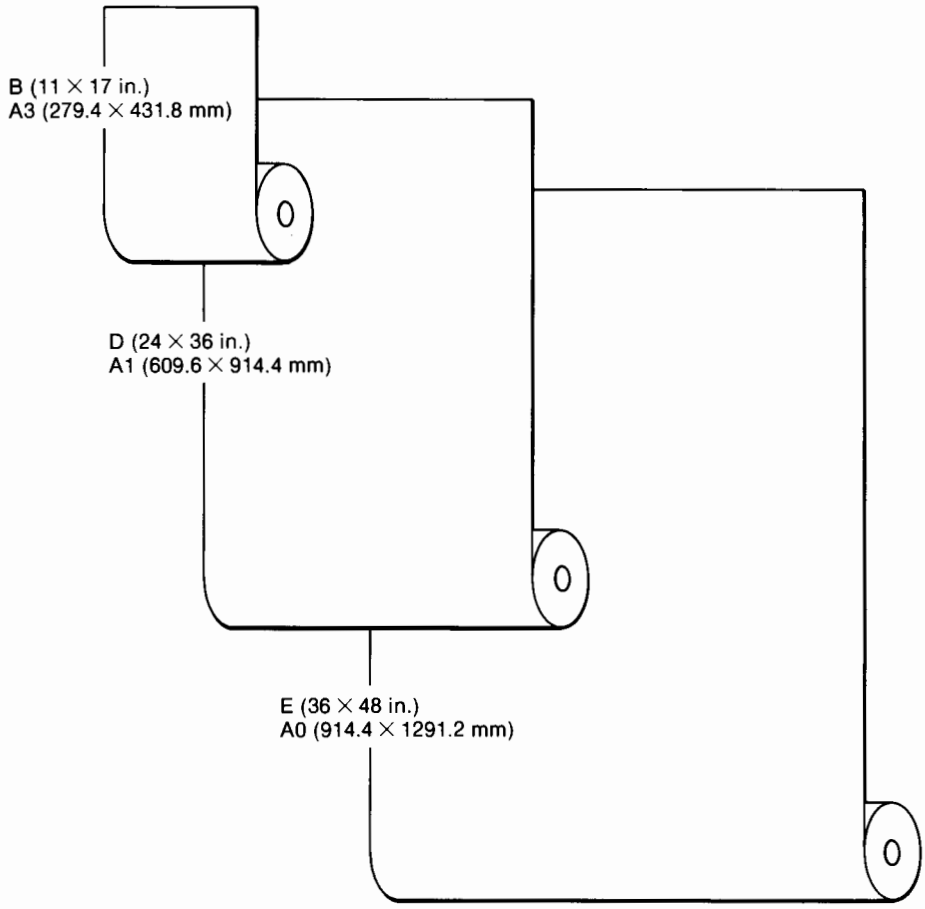
This chapter will teach you how to use the DraftMaster II to perform the following tasks.

- select roll media
- load and unload roll media
- advance the page

The pen and media recommendations given in Chapter 3 apply to roll media as well as sheet media. This chapter provides additional operating considerations that pertain to roll media.

Selecting Roll Media

DraftMaster II can use roll media in 11-, 24-, and 36-inch widths*. These three widths allow you to plot on ANSI standard page sizes B, D, and E, and ISO standard sizes A3, A1, and A0, as illustrated below. Additionally, you can use Architectural D and E sizes.



No matter what size you use, the left edge of the medium *must* extend at least one-half inch (12.7 mm) over a grit wheel when the right edge of the medium is against the paper guides.

*Roll media in 11-inch width is not available through Hewlett-Packard.

Loading Roll Media

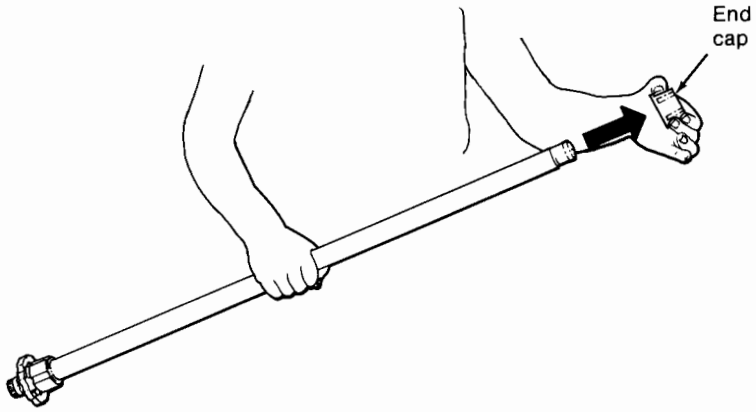
There are two ways to use roll media:

- Continuous feed with automatic take-up. Plots are rolled onto the front take-up spool as they are completed. (The front spool must be installed.)
- Continuous feed without take-up. Cut off each plot as it is completed. (Do not install the front spool.)

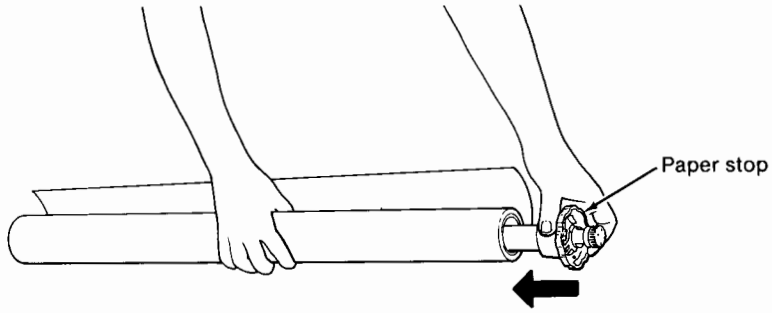
Loading Media onto the Spindle

Complete the following steps to load roll media onto the spindle.

1. Holding the spindle in one hand, grasp the end cap with your other hand and slide it off the spindle.

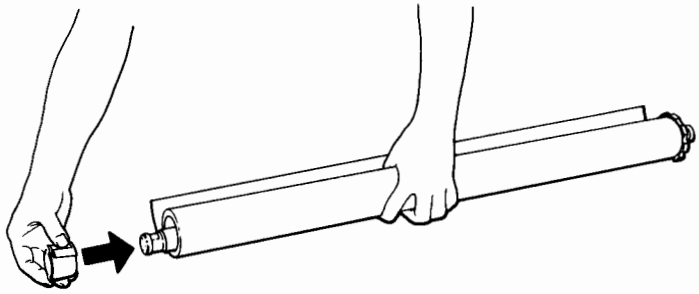


2. Orient the plotting medium as shown below, then slide the spindle into the roll of medium. Push the spindle until the core is flush against the notched paper stop. Use the same procedure to load the cardboard core* onto the second spindle.



4

3. Firmly push the end cap onto the opposite end of the spool.



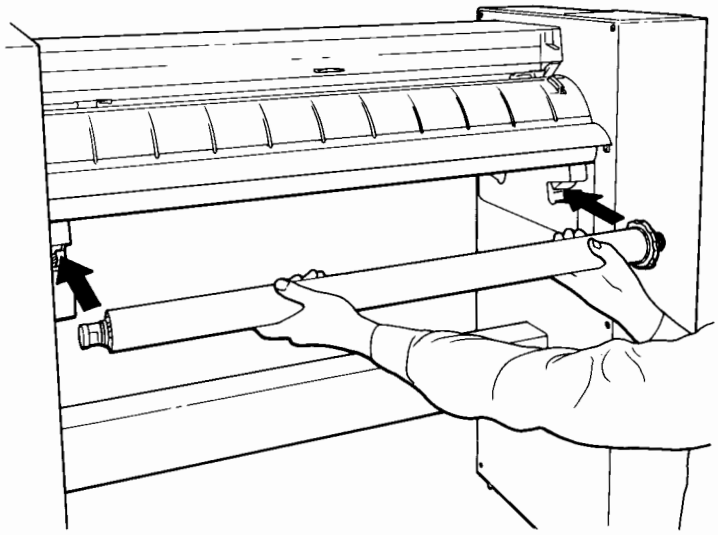
NOTE: If you drop a spindle and the paper stop disengages, align the notches on the inside of the paper stop with the raised knobs on the spindle. Press *firmly* until the paper stop snaps into place. ■

*Use the cardboard core supplied with the plotter. When you use up a roll of plotting medium, keep the empty cardboard core to use as your next take-up spool.

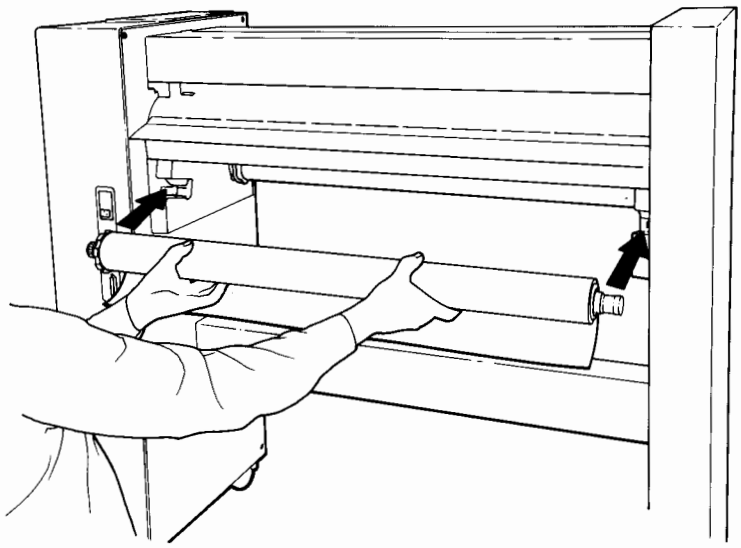
Loading Spools into the Plotter

Use the following procedure to load the spools into the plotter. Refer to the illustrations associated with each step. To use the plotter without automatic take-up, ignore the steps for installing the front take-up spool.

1. Turn the plotter on and raise the carriage cover.
2. Pull the paper-load lever toward you to raise the pinch wheels. Push the left pinch wheel to the far left.
3. From the front of the plotter, push the take-up spool into the yoke, inserting the side with the notched paper stop into the right yoke.

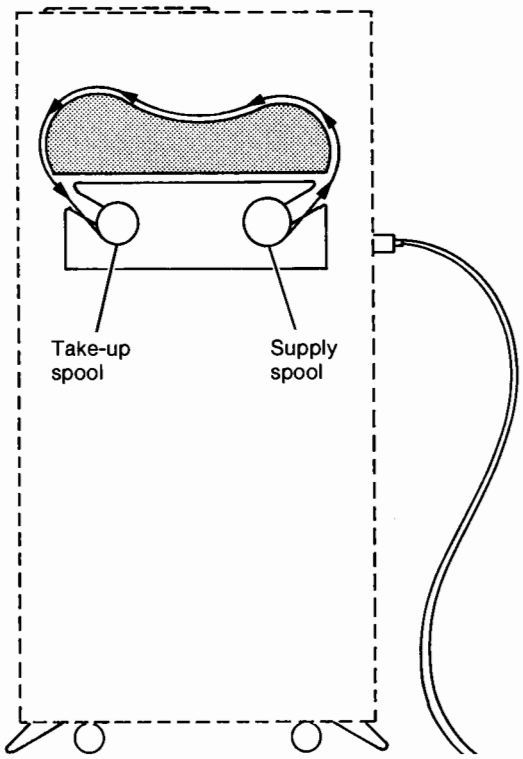


4. From the rear of the plotter, load the medium by pushing the spool into the yoke, inserting the side with the notched paper stop into the left yoke.



5. From the rear of the plotter, pull the medium up and thread it under the pinch wheels. Align the edge of the medium with both paper guides. The left edge of the medium must extend at least one-half inch (12.7 mm) over a grit wheel.

6. From the front of the plotter, pull the medium down to the take-up spool and tape it to the edges and middle of the cardboard core. Manually rotate the take-up spool two or three times to make sure the medium winds correctly. If the medium buckles, reposition it on the cardboard core. The following illustration shows the path of the medium, as viewed from the side of the plotter.

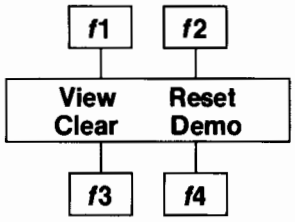


7. Slide the left pinch wheel toward the medium until the line on the pinch wheel is even with the left edge of the medium.

8. Push the paper-load lever away from you to lower the pinch wheels.

9. Lower the carriage cover. The plotter will determine the size of the medium by moving both the pen holder and the medium.

Once you successfully load the medium, the following menu will display. The plotter is now ready for plotting.



Roll paper, vellum, and tracing bond do not stabilize properly until unwound from the roll. For best results, advance the page (using the front panel or programmatically), then wait five minutes before plotting.

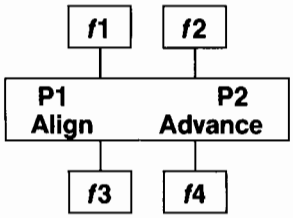
If the medium is not correctly loaded, the message **LOAD PAPER TO PLOT** will display. If you see this message, reload the medium. Make sure the left edge of the medium extends at least one-half inch (12.7 mm) over a grit wheel.

If the medium is incorrectly aligned with the paper guides and crumples during paper sensing, one of the following messages may appear: **X-AXIS FAILURE SEE MANUAL** or **Y-AXIS FAILURE SEE MANUAL**. If this happens, cut off crumpled medium, remove any torn scraps, turn the plotter off and then on again, and reload medium.

Advancing the Page

When a plot is complete, you can use the front panel to advance the medium a full page-length. Then continue plotting or cut off the finished plot.

Press **Advance** (*f4*) to advance the medium one page-length.



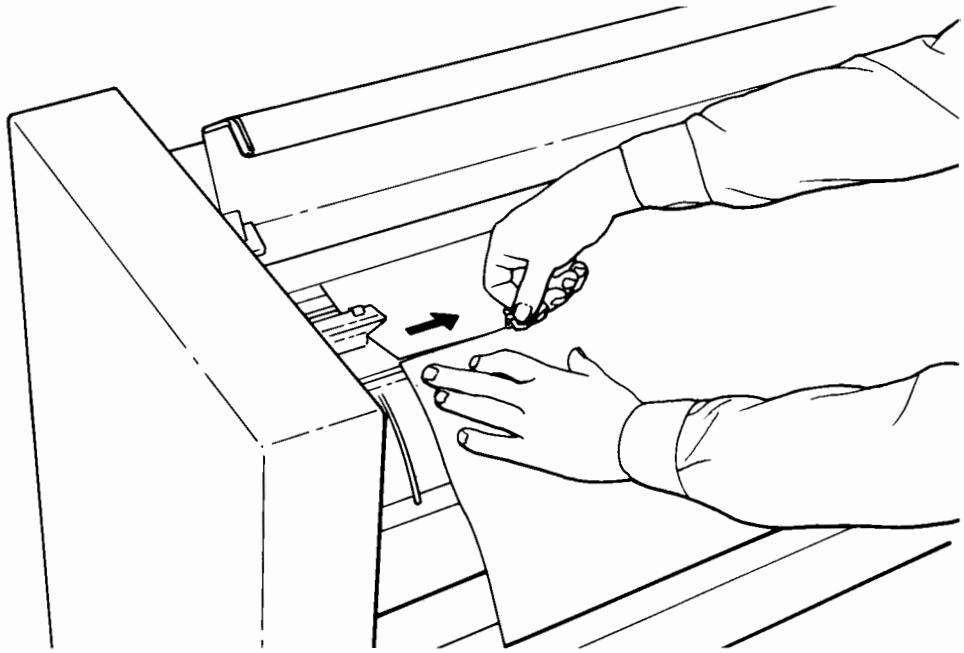
The width of the plotting medium determines how much medium will be advanced, as shown in the following table.

Medium Width	Amount Advanced
B size (8.1 to 15 in.) A3 size (207 to 381 mm)	17.9 inches 455.8 mm
D size (21.2 to 28.3 in.) A1 size (539 to 719 mm)	36.9 inches 938.4 mm
E size (29.4 to 36.5 in.) A0 size (747 to 927 mm)	48.9 inches 1243.2 mm

When you press **Advance** with a take-up spool loaded, the medium will advance one full page-length and the most recent drawing will wind onto the take-up roll. The new page will be established before the plotter is ready to plot.

To cut off the most recent drawing, use **Advance** without a front take-up spool. The medium will advance one page-length, and line up the border between your plot and the new page with the slot in the plotter's platen.

The message **CUT PAPER, THEN PRESS •** will display. Use the built-in media cutter to cut off the plot, as shown below. Then store the media cutter in the stall on the left side of the plotter.



4

Unloading the Spools

To remove a spool from the plotter, grasp both ends of the spool and pull toward you. The procedure is the same for both the take-up and the supply spool.

To remove the spool of medium from the spindle, hold the roll of medium in one hand, then grasp the end of the spindle with the notched paper stop in your other hand and pull up. Remove the end cap from the spool. Store the end cap with the spindle for future use.

Operating Considerations

Take the following precautions when using roll media. HP can guarantee plotter performance only when HP roll media is used.

- Do not allow loose media to crease during roll-feed operations. If creased, the medium will not spool properly, and your plot can wrinkle.
- Maintain relatively constant humidity. If conditions differ significantly between your media storage area and plotting area, roll media (vellum in particular) can develop a cone which can cause paper handling failure.
- Roll paper, vellum, and tracing bond can be affected by changes in temperature and humidity. To avoid plot distortions, advance the page and let media stabilize for five minutes before plotting.
- Prior to long-axis plotting, install a black 0.3-mm fiber-tip pen (for plotter paper) or a 0.35-mm drafting pen (for vellum or polyester film) in pen stall 8. Only these pens enable the plotter to detect the registration marks used for frame-to-frame alignment.
- Use media with a width variation of no more than ±0.06 inches (1.6 mm).
- Do not use media wider than 36.1 inches (919 mm).
- The inner roll core should be flush with the medium. Variation should be within 0.02 inches (0.5 mm).
- When you wind media onto the take-up spool, the medium should be flush against the roll core. Variation should be within 0.08 inches (2 mm).
- Use a roll core with an inner diameter of 2 inches (51 mm). Variation should be within ±0.01 inches (0.4 mm).

5

Maintenance

What You'll Learn in This Chapter

This chapter will help you to perform the following tasks.

- clean the plotter
- maintain refillable drafting pens
- replace the media cutter

Cleaning the Plotter

Plotter maintenance is limited to cleaning — all other maintenance must be performed by qualified service personnel. Periodically cleaning the carousels will remove ink that can accumulate on the rubber pen caps. Cleaning the grit wheels will help ensure accuracy while plotting. When cleaning the plotter, use the following instructions.

WARNING

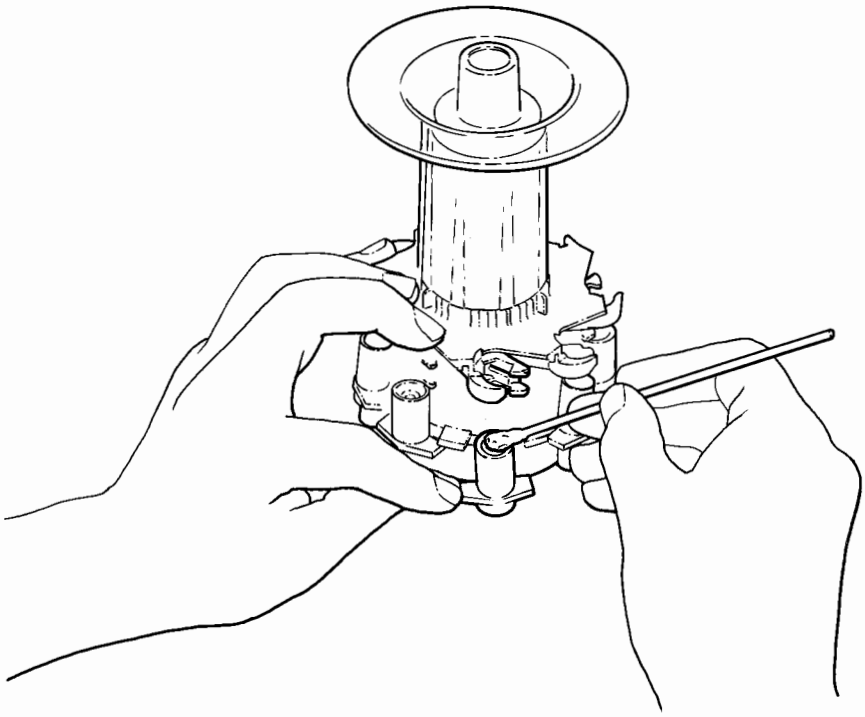
To prevent electrical shock, unplug the plotter before cleaning. Do not allow water to run inside the plotter.

---

1. Wipe the plotter surface with a damp sponge or soft cloth. If necessary, clean with a 50-50 solution of isopropyl alcohol and water. Wipe with water to rinse off any residue and dry with a soft lint-free cloth. *Do not use abrasive cleaners, cleaning solvents, or strong detergents.*

2. Use a cotton swab to wipe accumulated dust and lint from the surface of the pen holder.

3. Remove the pen carousel from the plotter and remove any pens. Clean the black rubber pen caps, using a cotton swab moistened with alcohol or pen cleaning solution. Let the carousel dry completely before inserting pens.

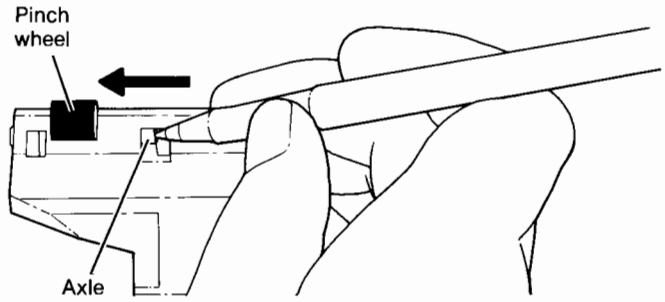


4. To maintain plotter accuracy, use the following steps to clean the grit wheels.

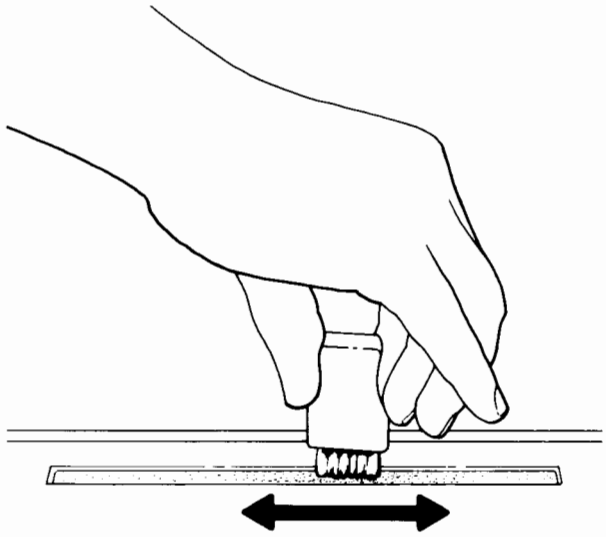
   a. Turn the plotter off and raise the carriage cover.

   b. Pull the paper-load lever towards you to raise the pinch wheels. Slide the left-hand pinch wheel to the far left.

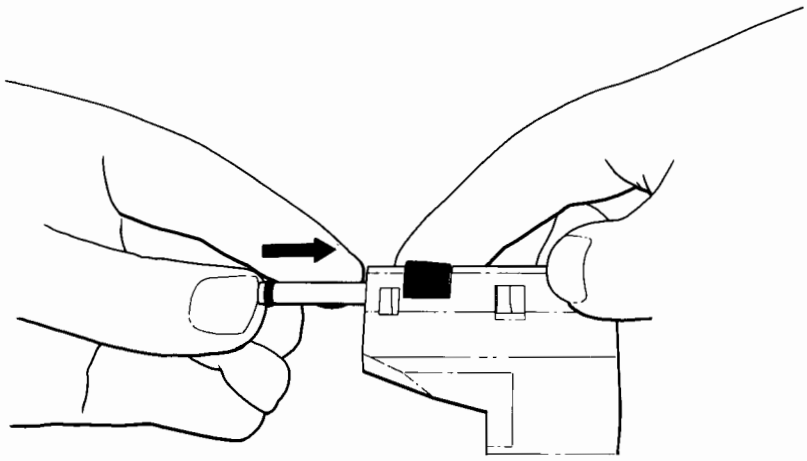
c. Remove the right pinch wheel by placing a pen in the slot on top of the pinch wheel arm and pushing the metal axle to the left. Take care not to lose the wheel or the axle. Refer to the following illustration.



d. Use the grit wheel brush supplied with your plotter to sweep paper dust from the grit wheel surface as you manually rotate the grit wheel.



e. To reinstall the right pinch wheel in the pinch wheel arm, gently hold the wheel in place while sliding the axle into the arm. Refer to the following illustration.

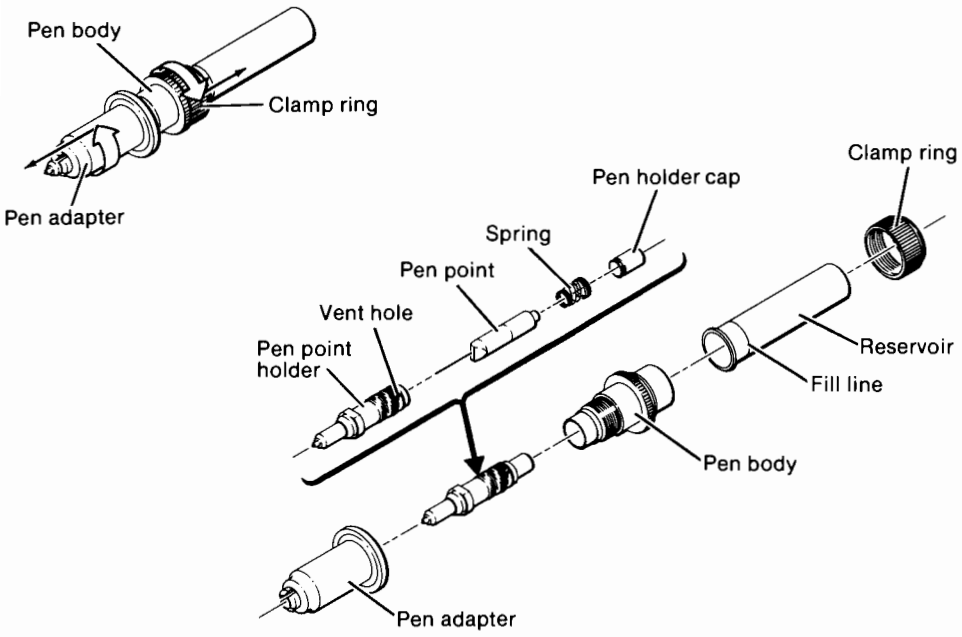


5

Maintaining Refillable Drafting Pens

For good line quality, clean your drafting pens after each plotting session. Maintaining your drafting pens will improve their reliability. Complete the following steps to disassemble, clean, and reassemble an HP drafting pen.

1. Unscrew each part to disassemble the pen as shown in the following illustration. **Take care not to bend the pen point.**



2. Thoroughly clean all parts under warm running water. A toothbrush and a very small bottle brush are helpful.
3. Dry all parts thoroughly with a tissue, inside and outside.
4. Holding the pen point holder, cover the vent hole with your finger and blow into the wide end. Repeat as necessary to remove all water.

5. Reassemble the pen as follows.

   a. Gently lower the pen point into the pen point holder.

   b. Place the spring in the pen holder cap, and press the cap onto the top of the pen holder.

   c. Screw the pen point holder into the pen body.

   d. Screw the pen adapter onto the pen body.

   e. Replace the reservoir on the pen body.

   f. Slide the clamp ring over the reservoir to the pen body and screw in place.

Filling the Drafting Pen with Ink

Complete the following steps to fill a pen with ink.

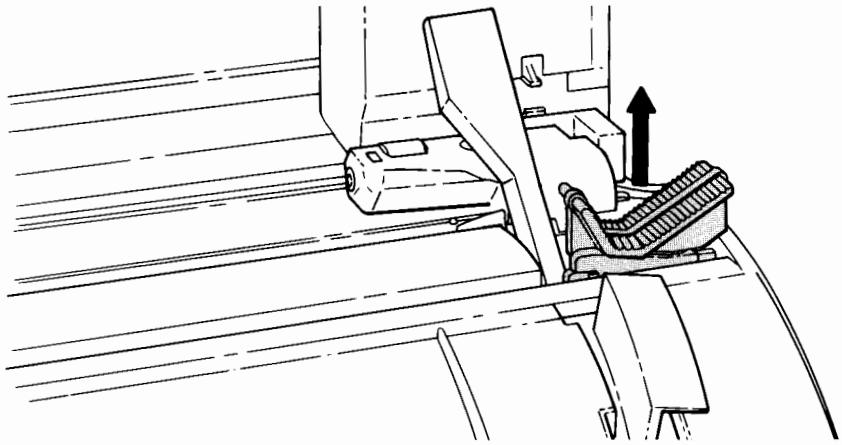
1. Unscrew the clamp ring and remove the reservoir from the pen body.
2. Hold the ink reservoir upright and add ink to the fill line. Don't overfill.
3. Gently insert the large end of the pen body into the open end of the reservoir. Replace the clamp ring.
4. Shake the pen (point down) to force ink into pen point.
5. Moisten the point and draw with the pen until ink appears.
6. Immediately cap or load the pen into the drafting pen carousel.

Replacing the Media Cutter

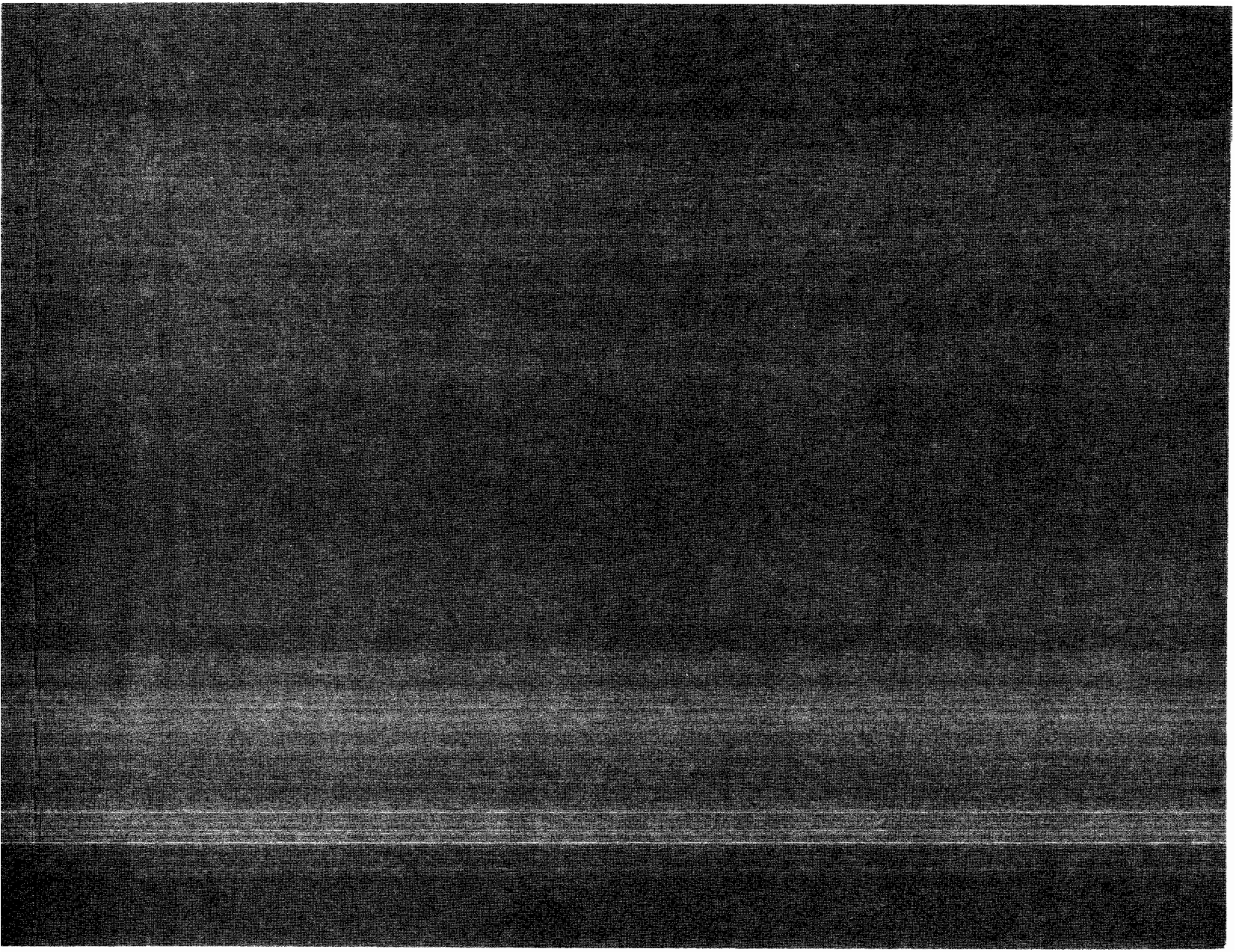
Rollfeed plotters come with a supply of media cutters. If you own a sheetfeed plotter, you can order media cutters as an accessory.

Complete the following steps to replace the media cutter when the blade gets dull.

1. Raise the carriage cover and remove any paper.
2. Push the paper-loading lever away from you.
3. Slide the media cutter from the left side of the plotter to the *far* right.
4. Pull the media cutter straight up, as shown below.



5. Put a new media cutter in the slot, making sure the blade faces the right side of the plotter. Slide the media cutter to the far left.



6

Troubleshooting

What You'll Learn in This Chapter

This chapter will help you correct some of the most-common problems that can occur in the day-to-day operation of the plotter. The chapter is divided into the sections listed below; turn to the section that addresses your problem.

Having the Plotter Serviced

Follow the instructions in this chapter to help determine if the plotter needs servicing. Before having your plotter serviced, use this chapter to make certain the malfunction is in your plotter and not the result of an interface problem or a malfunction in your computer or software.

If a repair is needed, contact the Hewlett-Packard dealer or HP Sales and Support Office where you purchased the plotter for complete service information.

Plotter Operation Problems

Use this section if the plotter does not turn on; the front-panel controls do not work; or if pens are not picked from or returned to the carousel.

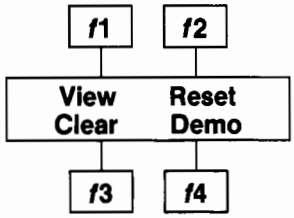
NOTE: If you do not hear the plotter but the front-panel display is on, the cooling fan has turned off. This is normal. ■

Plotter Does Not Turn On

Take the following steps if the plotter does not turn on.

1. Check the following:
   - The voltage box displays the correct voltage for your area's power requirements, as listed in Appendix A.
   - The power cord is properly plugged into an electrical outlet that you *know* works.
   - The power cord is properly plugged into the plotter's power socket.

2. Turn the plotter on by pressing the **On/Off** switch. Did the following menu display?



No — Have the plotter and power cord serviced.

Yes — Go to step 3.

3. Did the front-panel display stay on?

No — Have the plotter and power cord serviced.

Yes — Try using your plotter again.

Front Panel Does Not Work

Before using this section, make sure you understand the normal plotter response to each menu setting. Additionally, if you change a menu setting while a plot is being drawn, do not expect an *immediate* response.

If one or more buttons on the front panel are working improperly, take the following steps.

1. Check that your plotter is receiving power.

   Turn the plotter off and then on again. Does the front-panel display turn on and stay on when you turn on the plotter?

   No — Have the plotter and power cord serviced.

   Yes — Go to step 2.

2. Load a sheet of paper into the plotter. Push the paper-load lever away from you.

   Do the pinch wheels lower and move the paper back and forth?

   No — Go to step 3.

   Yes — Try using your plotter again.

3. Is anything obstructing the movement of the paper or the pen holder?

   No — Go to step 4.

   Yes — Remove any obstructions you find. Then, turn the plotter off and then on again. The pen holder should move to the left side, then return to the right side of the plotter.

   Try using the plotter again. If the problem persists, go to step 4.

4. Do buttons fail to respond while a plot is in progress?

   No — Go to step 5.

   Yes — This is normal. For best results, store menu settings *before* beginning your plot.

5. Review the description of how the buttons work in Chapter 2, *Using the Front Panel.* Try using the front-panel controls again.

   Do the buttons on the front panel work now?

   No — If you are having problems with the **Pen Select** buttons, refer to the following section, *Pens Are Not Picked From or Returned to the Carousel*; otherwise, have your plotter serviced.

   Yes — Try using your plotter again.

Pens Are Not Picked From or Returned to Pen Carousel

NOTE: If the message **CHECK CAROUSEL, PRESS •** displays, check the carousel and make sure that each pen is correctly loaded, as described in Chapter 1. Additionally, take care to replace the carousel in the carousel well correctly. ■

Take the following steps if any of the pens cannot be picked from or returned to their pen stalls.

1. Turn the plotter off and raise the carriage cover. Grasping the pen holder, gently slide it from one side of the plotter to the other. The drive belt that the pen holder is attached to should move freely with the pen holder. Remove any obvious obstructions.

   Do the pen holder and drive belt move freely?

   No — Have the plotter serviced.

   Yes — Go to step 2.

2. Lightly press the pen holder. The pen holder should move down, toward the surface of the paper. When you release the pen holder it should spring back in place.

   Does the pen holder move down toward the paper surface and spring back when released?

   No — Have the plotter serviced.

   Yes — Go to step 3.

3. Check that the spring-loaded jaws of the pen holder move outward. When you release the jaw of the pen holder, it should spring back in place.

   Does the jaw of the pen holder spring back when released?

   No — Have your plotter serviced.

   Yes — Go to step 4.

4. Remove the pen carousel. Check the pen stalls for damage. The spring-loaded jaws of each pen stall should move inward freely and spring back when released. The rubber pen-capping mechanism of each pen stall should move downward freely and spring back when released. Remove any obvious obstruction.

   Do the jaws and pen-capping mechanism of each pen stall move freely?

   No — Replace the carousel.

   Yes — Go to step 5.

5. Turn the plotter on and load a sheet of paper. Load the carousel with eight pens. Press each **Pen Select** button in turn. Is each pen picked from the carousel and returned properly?

   No — Have your plotter serviced.

   Yes — Try using the plotter again.

Plotter/Computer Communication Problems

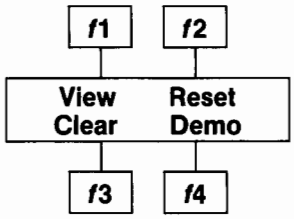
Follow the instructions in this section if your problem is an interfacing or communications problem.

Plotter Does Not Draw When Connected to Your Computer System

In order to find the problem, you'll need to check the individual pieces of your system, as follows.

1. Verify that the plotter is working. Check the following:

   Turn the plotter off and then on again. When you turn the plotter on, the following menu should display. If this menu does not display, refer to the section *Plotter Does Not Turn On*, earlier in this chapter.



   The front panel should work as explained in Chapter 2. If the front panel controls do not function properly, refer to *Front Panel Does Not Work*, earlier in this chapter.

2. Run the demonstration plot, as described in Chapter 1. Is the demonstration plot drawn correctly?

   No — Have the plotter serviced.

   Yes — Go to step 3.

3. Verify that your computer system works properly. Disconnect the plotter and run a simple test program (or software package) using your computer. If you are using a computer and a terminal they should both work together.

   Is your system working correctly?

   No — The problem is in your computer system. Refer to your system documentation. Do not connect your plotter to the system until the problem is solved.

   Yes — Go to step 4.

4. Connect your plotter to your computer system, according to the instructions in Chapter 7.

   Does the interconnection test program run correctly?

   No — Reread the instructions in Chapter 7. Make sure that you have followed the instructions and that you have entered the interconnection program *exactly* as instructed. Make sure your interface settings (HP-IB or RS-232-C) are set correctly. Verify that you are using the correct interface cable and that it is securely fastened to both the computer and plotter.

   Correct any problems and rerun the program. If the problem persists, have your interface cable checked. If your computer has an interface card, you should also have it checked.

   Yes — Your computer and plotter are communicating correctly. Try using the plotter.

Software Problems

Before adding software to your list of concerns, make sure your plotter and computer are communicating successfully. Run the interconnection test program as described in Chapter 7. If the interconnection test program does *not* work, follow the instructions in the preceding section, *Plotter/Computer Communication Problems.*

Plotter Doesn't Work with Software

1. Are you using a software package?

   No — If you have written a program which does not work correctly, make sure your program instructions are correct. If you are using an RS-232-C interface, pay particular attention to the device-control instructions; they are the instructions that establish RS-232-C conditions. In all cases, make sure you have included any communication statements (such as OPEN) required by your computer.

   Correct any problems and rerun the program. If the problem persists, go to step 2.

   Yes — Go to step 2.

2. Verify that the plotter's interface settings match the requirements of your program or software. If your software recommends specific settings — use them.

   Did you find a problem with the settings?

   No — Try running the software again. If the problem persists, go to step 3.

   Yes — Correct the settings, then turn the plotter off and then on again. Try running the software with the plotter again. If the problem persists, go to step 3.

3. Verify that the software supports (works with) your computer. Does your software documentation indicate that it will work with your computer?

   No — Contact the software vendor or manufacturer.

   Yes — Go to step 4.

4. Most software documentation lists the plotters that the software will work with. Does your software documentation list the HP 7585, 7586, or DraftMaster plotters? Or, are any of these plotters available as a menu selection?

   No — Your software *may not* support the plotter. Try running the plotter with **Emulate** on. If this does not work, try running the plotter with **Emulate** off. If the problem persists, check with the software vendor or manufacturer to see if the plotter is supported.

   Yes — If your software lists the HP DraftMaster plotter, set **Emulate** off and use the software menu to select DraftMaster (HP 7595 or 7596). If your software lists the HP 7585/7586 plotters as an option, you can set **Emulate** on and use the software menu to select HP 7585 or 7586.

   If the problem persists, go to step 5.

5. Does your software documentation recommend a cable other than the one you are using?

   No — Contact the software vendor or manufacturer.

   Yes — Turn the plotter and computer off and replace your cable with the recommended cable. Turn your equipment back on and try running the software with the plotter again.

   If the problem persists, contact the software vendor or manufacturer.

Plot Location Problems

Use this section if your plots are not oriented the way you'd like or if only part of your plot is drawn on the page.

Plot Is Not Oriented Correctly

1. The front-panel settings of **Rotate**, **Invert**, **Emulate**, or **P1** and **P2** may have been changed from their default values. Check the settings of each of these items or use **Reset** to return them to their default settings.

   If the problem persists, go to step 2.

2. Is the paper loaded correctly against the front and rear paper guides?

   No — Load a new sheet of paper, carefully aligning the right edge with both paper guides. Try running your plot again.

   Yes — Go to step 3.

3. Are you using a software package?

   No — Go to step 5.

   Yes — If your software allows you to select a paper size, make sure you have indicated the correct size for the paper you are using. Run the program again.

   If you are unable to select a paper size, or the problem persists, go to step 4.

4. Does your software offer menu selections of plotter names or model numbers?

   No — Check your software documentation, vendor, or manufacturer to determine if the software package supports (works with) the plotter.

   Yes — If your software lists the HP DraftMaster as an option, set **Emulate** off and use the software menu to select DraftMaster (HP 7595 or 7596). If your software lists the HP 7585/7586 plotters as an option, set **Emulate** on and use the software menu to select HP 7585 or 7586. (**Emulate** on will make plot orientation exactly like an HP 7585/7586 plot.)

5. If you are writing your own program, does your program include an HP-GL SC or IP instruction?

   No — Check that you have specified the correct X,Y coordinates in your program. If you are using absolute coordinates, verify the location of the origin for your paper size. If you get results on large paper, but not on small paper, you have exceeded the hard-clip limits of the paper size. Refer to the *Programmer's Reference* for details.

   Correct any program errors and rerun the program.

   Yes — Your problem may be related to scaling. Refer to the explanation of the SC and IP instructions in the plotter's *Programmer's Reference.*

Plot is Incomplete

1. Does the message **X-Axis**, **Y-Axis**, or **Z-Axis failure** display?

   No — Go to step 2.

   Yes — Remove the paper, including any torn scraps. Turn the plotter off and then on again. If the failure message continues to display, have your plotter serviced.

2. Does the paper move back and forth during plotting?

   No — Have your plotter serviced.

   Yes — Go to step 3.

3. Is **Rotate** on?

   No — Go to step 4.

   Yes — **Rotate** will cause some plots to be plotted off the page. (Refer to the description of **Rotate** in Chapter 2.) Try running the plot with **Rotate** off.

   If the problem persists, go to step 4.

4. Are you writing your own programs?

   No — If you are using a software package, go to step 6.

   Yes — Your problem may be buffer overflow. Refer to the plotter's *Programmer's Reference* and check your program instructions. Correct any program errors and rerun the program.

5. Does the message **7: Buffer overflow** display?

   No — Go to step 6.

   Yes — There is an error in your program. Refer to the *Programmer's Reference* for help. Correct any program errors and rerun the program.

6. Does the message **16: I/O buffer overflow** display?

   No — Go to step 7.

   Yes — If you are using the RS-232-C interface, the problem may be related to the handshake you are using. Make sure the plotter is using the same handshake that your computer and software require. If you are setting up a handshake programmatically, double-check the device-control instructions in your program.

7. Does your software recommend a cable other than the one you are using?

   No — Refer to Appendix C for the correct cable number. Obtain the correct cable for your computer, follow the interconnection instructions, and rerun the program.

   If the problem persists, go to step 8.

   Yes — Your cable may be defective. Go to step 8.

8. Is your cable working correctly?

   No — Your cable may be defective. Turn your equipment off. Replace your cable with a cable you know is working. Turn your equipment on and rerun the program.

   Yes — Remove your carousel and check for missing or damaged pens. Replace any worn or dried-out pens.

Plot Quality Problems

Use this section if you are not satisfied with the line quality of your plots. As a first step, check to make sure that you are using a correct pen/media combination, as recommended in Chapter 3. The quality of the supplies you use will affect final plot quality.

In addition, keep in mind that changes in humidity or temperature during the course of a plot can cause media to stretch or shrink, affecting plot quality. Always let media acclimate to your plotter's environment for 15 minutes prior to plotting.

Line Quality is Not Satisfactory

1. Pen speed and force can affect the quality of your plot. Make sure you are using the correct carousel for your pen type. Additionally, use **Reset** to ensure that the pen speed and force are at the default settings.

2. Is this an infrequent problem?

   No — Go to step 3.

   Yes — If the plotter is bumped while plotting, it can jar the pen, causing a misregistered line. Run the program again. If the problem persists, go to step 3.

3. Is paper movement obstructed?

   No — Go to step 4.

   Yes — Move the plotter to an area where paper movement will not be obstructed. Run the program again. If the problem persists, go to step 4.

4. Are lines of uneven quality?

   No — Go to step 5.

   Yes — Remove your carousel and examine pens. Replace any damaged or dried-out pens. Run the program again. If the problem persists, go to step 5.

5. Are lines of uneven widths or smeared?

   No — Go to step 6.

   Yes — Reducing pen speed can improve line quality. Use the front-panel **Speed** menu or the programming instruction, VS, to lower your pen speed. Run the program again. If the problem persists, go to step 6.

6. When filled areas are edged, are the outlines smeared?

   No — Go to step 7.

   Yes — Use the front panel to turn **Sort** off. If the problem persists, go to step 7.

7. Are lines sometimes "wobbly"?

   No — Go to step 8.

   Yes — Check your pinch wheels. If left in the lowered position (lever raised), the side of the pinch wheel that rests on the platen will temporarily flatten. As a result, media will slip, causing wobbly lines. Raise the pinch wheels (by pulling the paper-loading lever towards you) and allow the rubber time to return to its original shape before plotting. Always raise the pinch wheels when you have finished plotting.

8. Are the *outer* lines of your plot smeared?

   No — Go to step 9.

   Yes — If you have set **Expand** on, the plotter's pinch wheels may be rolling over the wet ink. To resolve this, you can move P1 and P2 away from the edges of the page using the **P1** and **P2** menus or the programming instruction, IP. Programming instructions are explained in the plotter's *Programmer's Reference.*

   If you do not need to plot to the outer edges of the page, use the plotter's front-panel controls to set **Expand** off.

9. Does the ink flake off of the medium?

   No — Go to step 10.

   Yes — If you have treated the media with a cleaning powder or other compound, the ink may be adhering to this powder. Load a new sheet of medium and run your plot again.

10. Are you using Hewlett-Packard pens and media?

No — HP pens and media are designed to work together with your plotter to produce sharp, clear lines. Use HP supplies for the highest quality plots.

Yes — If you have completed the preceding steps and are still not satisfied with the line quality produced by the plotter, refer back to Chapter 3, *Selecting Pens and Media.* Make sure you are using a recommended pen and media combination, quality supplies, and are following correct maintenance procedures for your plotter and drafting pens.

Supplies Problems

Use this section if pens aren't lasting as long as you would expect, or if the medium tears during plotting.

Pens Dry in the Carousel

Before following the steps in this section, note that in dry climates and at high altitudes, you can expect ink to dry out more rapidly than in humid environments. In a dry environment you must take extra care to cap pens.

1. Do you recap your pens after use?

No — If pens remain in the carousel over long periods of time, they tend to dry out. Remove pens from the carousel and replace the caps if you aren't going to be using the plotter over a period of several days. Remove disposable drafting pens if you won't be using them immediately. Store pens vertically with the caps up.

Yes — Go to step 2.

2. Remove the pen carousel and examine the rubber pen caps. Are any of the pen caps in the pen stalls damaged or loose?

   No — Go to step 3.

   Yes — Press loose pen caps into place. If any pen caps are damaged or missing, you can order replacement pen caps as instructed in Appendix C.

3. Are you using refillable drafting pens?

   No — Make sure pens have not been stored longer than the shelf life indicated on the package.

   Yes — Read the section *Maintaining Drafting Pens*, in Chapter 5. Follow maintenance instructions carefully.

Paper Tears During Plotting

1. Check the surface of your paper. Is your paper warped or otherwise defective?

   No — Go to step 2.

   Yes — Load a new, undamaged sheet of medium. Try running your plot again.

2. Are you using a recommended pen/media combination?

   No — Refer to the table in Chapter 3, *Recommended Pen/Media Combinations.*

   Yes — Make sure you are using high quality media. If you are using double-matte polyester film, check that it is 3-mil. When loading film place the side with the matte-coating on the platen surface.

3. Is your carousel set correctly for your pen type?

   No — Align the carousel's center column with the symbol that corresponds to your pen type. When you install the carousel, the plotter automatically uses the correct speed and force for the pen type.

   Yes — Make sure you are using the correct speed and force. If the speed and force have been changed from the front panel, you may not be plotting under the best conditions for your pen and media combination. Use **Reset** to return the speed and force to their default settings.

4. Remove the carousel and examine the pens. Are any pen tips damaged?

   No — Go to step 5.

   Yes — Replace any damaged pens.

5. Is your plot drawn with many closely-spaced lines?

   No — Recheck the recommendations given in Chapter 3. If the problem persists, have the plotter serviced.

   Yes — Use a tougher plotting medium or change plotting conditions to allow ink time to dry before more lines are drawn.

7

Connecting the Plotter to a Computer

What You'll Learn in This Chapter

This chapter will teach you how to perform the following tasks.

- set up an HP-IB (parallel) interconnection
- set up an RS-232-C (serial) interconnection
- use advanced plotter features

Additional technical information about interfacing is contained in Appendix A.

NOTE: All references to RS-232-C interface in this manual apply equally to RS-232-C, RS-422-A, and CCITT V.24 interfaces. The term RS-232-C is used for simplicity. ■

Using the Computer Interconnection Instructions

If you find your computer in the following list, you do not need to read the rest of this chapter. Go directly to Chapter 8 and follow the interconnection instructions for your computer.

DEC VAX Computer
HP 3000 Computer
HP 9000, Series 300 Technical Computer
HP Touchscreeen Personal Computer (HP 150)
HP Vectra Computer
IBM AT Computer
IBM PC/XT Personal Computer

If your computer isn't listed, and it supports an RS-232-C or an HP-IB interface, follow the HP-IB or RS-232-C interconnection instructions in this chapter. Additionally, you can contact your HP Sales and Support office to see if there is a *Set-Up Instruction* available for your particular computer.

Setting Up an HP-IB (IEEE-488) Interconnection

The HP-IB is a parallel interface, also known as IEEE-488. The following steps outline the process used to connect the plotter to your computer. For more detailed information about how the plotter's HP-IB interface functions, refer to Appendix A.

1. **Connect the equipment.** With both computer and plotter turned off, connect one end of the HP-IB cable (Part No. 10833A, B, C, or D) to the plotter's HP-IB port. Insert the other end of the cable into your computer's HP-IB port. Tighten the screws on both ends of the cable. Turn your equipment on.

2. **If you need a plotter address other than 05,** use the plotter's HP-IB menu to select a new address. (The plotter is set to an address of 05 at the factory.) If you need to change the address to work with your particular hardware or software, complete the steps described in the next section.

3. **Verify communication.** Use the appropriate read and write statements for your computer language to run the following program. This program instructs the plotter to print 7595A PLOTTER OK (or 7596A PLOTTER OK, depending on the plotter's model number). If the program runs successfully, it means that the plotter and your computer are communicating.

```
"IN;OI;"
ID$
"SP1;PA500,500;"
"LB"+ID$+" PLOTTER OK"+CHR(3)
"PA0,0;SP0;"
```

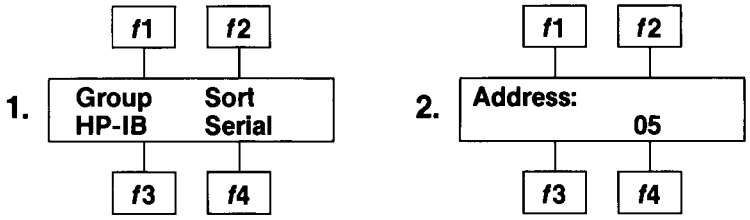
The following example shows the same program, with BASIC read and write statements included. The first line of the program establishes interface conditions, and may vary based on your computer's requirements. If you are not sure how your computer reads data, check your computer documentation. For further examples of read and write statements for various computers, refer to the sample programs in Chapter 8.

```
10 OUTPUT 705;"IN;OI;"
20 ENTER 705;ID$
30 OUTPUT 705;"SP1;PA500,500;"
40 OUTPUT 705; "LB"+ID$+" PLOTTER OK"+CHR$(3)
50 OUTPUT 705; "PA0,0;SP0;"
60 END
```

NOTE: The BASIC *CHR$(3)* string function returns the decimal code (3) for the ASCII character **ETX**. Check your computer documentation for the proper string function to use. ■

Selecting an Address

If you are using more than one peripheral with your computer, each must have a separate HP-IB address. Most systems use address 5 for the plotter; this is the plotter's factory-set address. To use an address other than 5, proceed as follows.



1. Press the **Next Display** button until **HP-IB** displays. Then, press **HP-IB** (*f3*) to view the address submenu.

2. Press *f4* to view each of the address options. You can use any one of 31 different addresses, ranging from 0 through 30 plus **LISTEN ONLY**. Choose an address that is compatible with your computer and software. When the address you need displays, press the **Enter** button to store the setting in the plotter's continuous memory. (The setting will stay in memory until you change it, even if you turn the plotter off.)

   To exit without changing the setting, press the **Next Display** button.

If you select **LISTEN ONLY**, the plotter will listen to all data transmitted on the interface but cannot respond to computer inquiries. This mode is useful in a system that has no controller but, instead, has a dedicated talker (such as a magnetic tape driver or other mass storage unit) transmitting information to the plotter.

If your computer system uses languages such as BASIC, FORTRAN, or COBOL, with high-level input/output (I/O) statements, the addressing procedure is taken care of by the computer's internal operating system — all you need to do is select an address. If, however, your computer

uses low-level I/O statements, you must directly control the addressing. If your computer systems fits this latter description, refer to *HP-IB Addressing Protocol*, in Appendix A, for help.

Setting Up an RS-232-C Interconnection

The following sections will help you establish RS-232-C (CCITT V.24) communication between the plotter and your computer. RS-232-C is also known as a *serial* interface.

The following steps outline the process used to connect the plotter to your computer.

- identify system configuration
- connect the plotter to your computer
- set the plotter's serial interface conditions
- verify communication

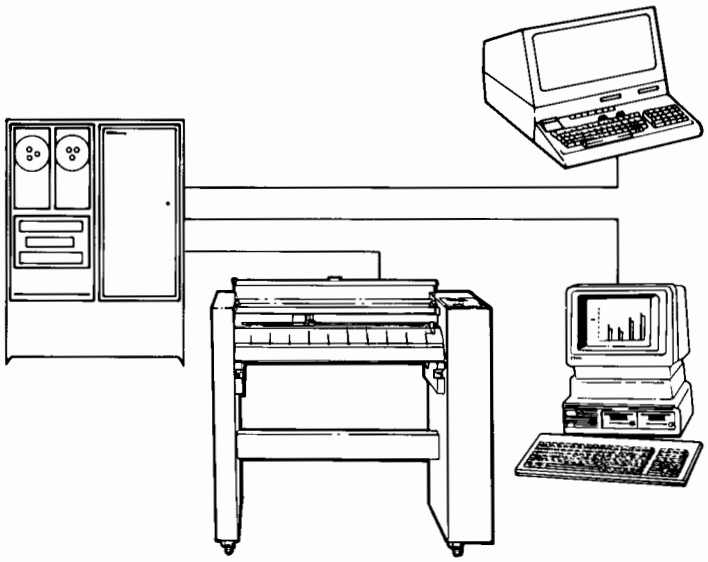
For RS-232-C cable schematics and additional technical information, refer to Appendix A. For additional information about interfacing and handshaking, the *RS-232-C Interfacing and Handshaking Guide*, Application Note 6 (Part No. (11)5953-9770) is available through HP Sales and Support Offices.

Identifying Your System Configuration

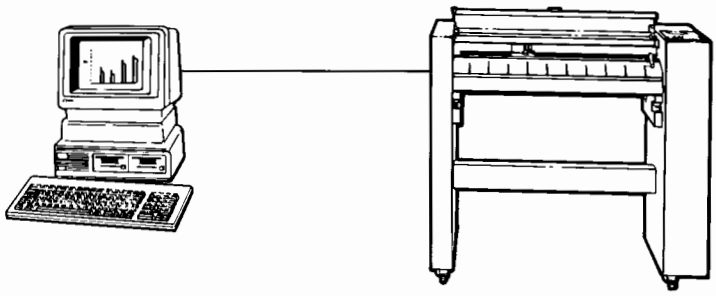
The term "system configuration" refers to the way the plotter is interconnected with the computer and other equipment. The plotter may be operated in an eavesdrop or standalone configuration and in a remote or local operating mode. The type of configuration and the operating mode, together, define a system configuration. Use the following sections to identify your system configuration. Then, read the section called *Connecting the Equipment* to learn how to connect the plotter to your computer.

Standalone Configuration

In a standalone configuration the plotter is connected to the computer via a separate (not shared) interface cable. The following illustrations show this arrangement for mainframe computers and for personal computers or "smart" (programmable) terminals.



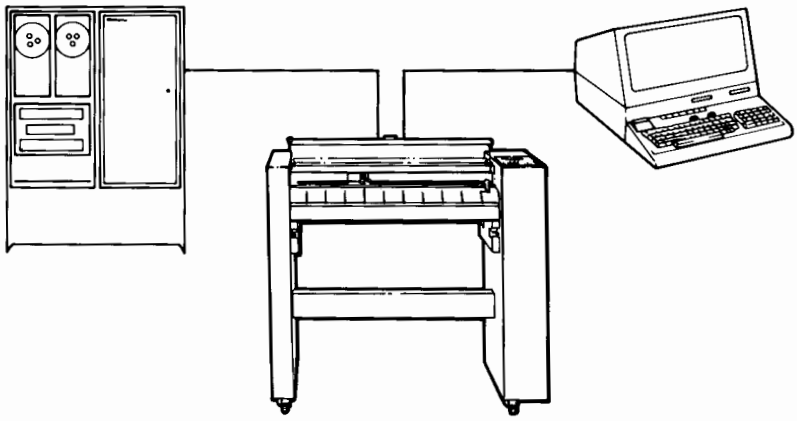
Standalone Configuration with Mainframe and Terminals



Standalone Configuration with Personal Computer

Eavesdrop Configuration

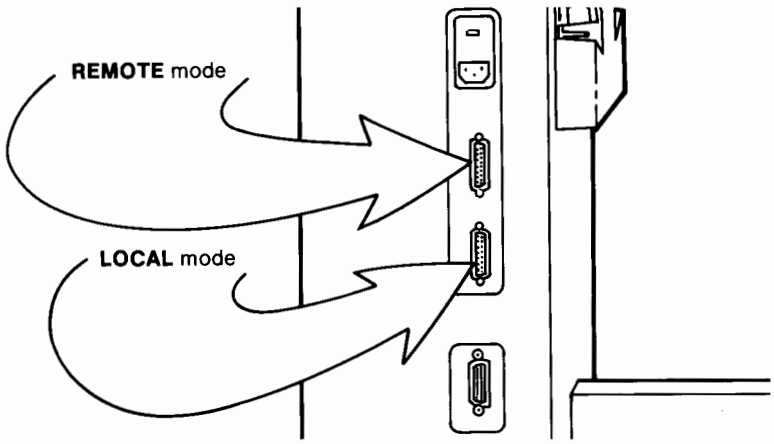
In an eavesdrop configuration the plotter is connected between a mainframe computer and a terminal, as shown in the following illustration. All communications between the mainframe computer and the terminal actually pass through the plotter.



Eavesdrop Configuration

Remote and Local Operating Mode

When you select an operating mode from the front panel, you are telling the plotter which of its RS-232-C ports the computer is plugged into. When the computer is connected to the **COMPUTER/MODEM** port, set the plotter to **Remote**. When the computer is connected to the **TERMINAL** port, set the plotter to **Local**. Refer to the following illustration.



Use **Remote** and the **COMPUTER/MODEM** port if you need to use a hardwire handshake (most personal computers and software packages use hardwire handshake). **Remote** is also recommended for mainframe computers in a standalone or an eavesdrop configuration.

If you use **Local** and the **TERMINAL** port, you cannot use hardwire handshake. **Local** is used primarily as a debugging tool, when using the plotter directly with a terminal.

The next section summarizes the typical uses of each mode.

System Configuration Summary

The following table summarizes the plotter/computer configuration options.

	Eavesdrop	Standalone
Remote	Recommended for mainframe computers serving many terminals and peripherals connected in series. Conserves computer port usage.	Recommended for mainframe computers where the plotter is a shared resource connected to separate computer port. Also recommended for single-users, personal computer connection.
Local	Sometimes used by mainframe computers serving many terminals and peripherals connected in series.	Sometimes used by individual personal computer users.

Connecting the Equipment

Once you have decided how to configure your equipment, connecting the plotter to your computer is easy. To select an RS-232-C cable appropriate for your computer, refer to Apendix C. If your computer can use the RS-422-A interface, you may want to use an RS-422-A cable. The advantage of the RS-422-A interface is that information can be transmitted over longer distances than with the RS-232-C interface.

With the plotter, your computer, and all of its components turned off, connect one end of the RS-232-C cable to the computer's RS-232-C port. Connect the other end of the cable to one of the plotter's RS-232-C ports — which port you use depends on the way you have configured your equipment. Tighten the screws on both ends of the cable and turn your equipment on.

NOTE: In some cases, you may need to install an RS-232-C (serial) interface card in the computer. If this is the case, your computer documentation should provide details. ■

Determining Serial Interface Conditions

After you have connected your equipment, you must tell the plotter what kind of configuration you are using. Additionally, you must set the plotter to use your computer's baud rate, parity, and handshake type. *To work together, your plotter and computer must use the same settings.*

Check your system's documentation to determine which baud rate, parity, and handshake your computer uses. Then, write your computer's requirements in the table below, in the *Computer Requirement* column. This should help you determine if you need to change plotter settings. If you are using a software package, you may need to make adjustments later, according to the requirements of the software.

RS-232-C Interface Condition Checklist

Condition	Plotter Factory Settings	Computer Requirement
configuration*	REMOTE/STANDALONE	**
baud rate	9600	_____
parity	0***	_____
handshake	Hardwire: ON	_____

*The name for the plotter's configuration menu is **Dataflow**.

This condition is not something you'll need to set on the computer, but your plotter's **Dataflow menu setting must reflect the way you have configured your equipment.

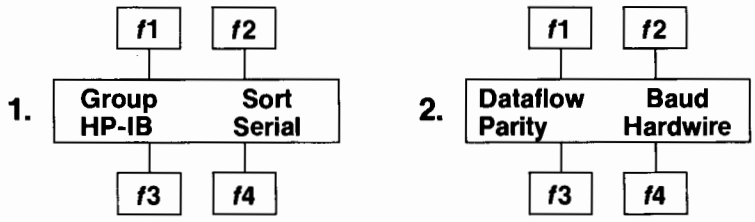
***This sets parity to off, the parity bit set to 0. (Also known as space parity.)

NOTE: The plotter generates 1 stop bit when set to a baud rate of 150 or greater; it generates 2 stop bits when set to a baud rate of 110 or 75. Most computers also use 1 stop bit as a default or at high baud rates and will not need to be reset. ■

The following section explains how to use the plotter's menus to change interface settings. The subsequent sections list the full range of plotter capabilities for each menu item.

Using the Serial Menus to Set Interface Conditions

Complete the following steps to use the plotter's serial menus.



1. Press the **Next Display** button until the **Serial** menu displays. Then, press **Serial** (*f4*) to display the **Dataflow** menu.
2. To access each of the four features; **Dataflow** (for configuration options), **Baud**, **Parity**, and **Hardwire**, press the associated function button.
3. Press the **Enter** button when the setting you need displays, to store the selection. All settings *except* **REMOTE**, **LOCAL**, and **STANDBY** are stored in continuous memory.

   To exit, press the **Next Display** button *twice*.

The full range of the serial options is discussed on the following pages. Read the sections pertaining to the settings you need to change.

Setting Your Plotter's Configuration — Dataflow

USE: Use **Dataflow** to tell your plotter what configuration you are using.

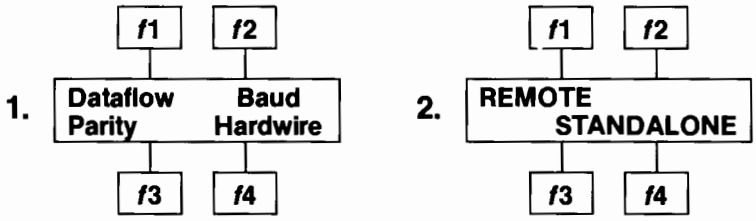
DEFAULT: REMOTE/STANDALONE

OPTIONS:

Configuration Options
REMOTE LOCAL STANDBY

Operating Modes
STANDALONE EAVESDROP

EXPLANATION: Complete the following steps to set configuration.



1. Press **Dataflow** (*f1*) to display the **Dataflow** submenu.
2. Use the **Dataflow** menu to set two options; configuration and operating mode. Press *f1* to view each of the configuration options (**REMOTE**, **LOCAL**, and **STANDBY**). Then, press *f4* to view each of the operating mode options (**STANDALONE** and **EAVESDROP**).
3. Press the **Enter** button when *both* the desired configuration and operating mode are displayed, to store the selection. All selections *except* **REMOTE**, **LOCAL** and **STANDBY** are stored in the plotter's continuous memory.

   To exit without changing the values, press the **Next Display** button.

Refer to the preceding section for an explanation of remote, local, eavesdrop, and standalone. Standby mode is a useful tool for locating data communication or interfacing problems when in an *eavesdrop* configuration. In standby mode, the plotter ignores all information received from both the **COMPUTER/MODEM** and **TERMINAL** ports. If you suspect that the plotter is interfering with the information you are sending between the computer and terminal, standby mode lets you "unhook" the plotter temporarily — without disconnecting cables or interfering with data transmission between the computer and terminal. Since standby is a temporary tool, it cannot be stored in the plotter's continuous memory.

Setting the Baud Rate

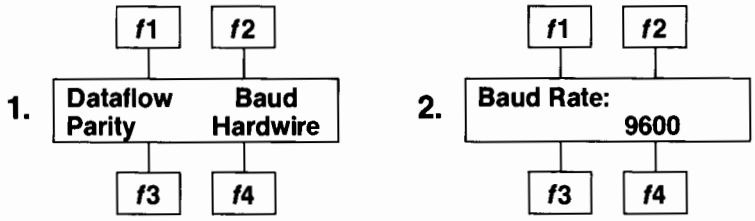
USE: Use **Baud** to set your plotter to the same baud rate that your computer uses.

DEFAULT: 9600

OPTIONS:

Baud Rate Settings
75
110
150
200
300
600
1200
2400
4800
9600
19200
External

EXPLANATION: Complete the following steps to select a baud rate.



1. Press **Baud**, (*f2*) to display the baud rate submenu.
2. Press *f4* to view each of the baud rate options. Press the **Enter** button when the option you want displays, to store the setting in continuous memory. (The setting will remain in memory until you change it, even if you turn the plotter off.)

   To exit without changing the baud rate, press the **Next Display** button.

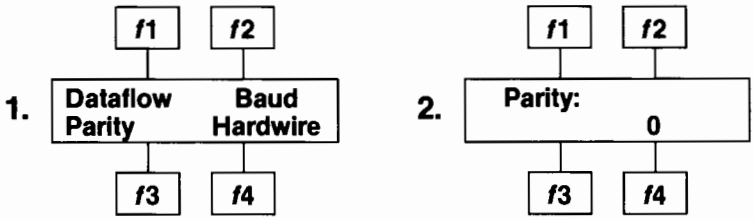
Setting the Parity

USE: Use **Parity** to set your plotter to the same parity that your computer uses.

DEFAULT: 0 (Off, parity bit 0)

OPTIONS: 0, 1, EVEN, ODD

EXPLANATION: Complete the following steps to select a parity.



1. Press **Parity** (*f3*) to display the **Parity** submenu.
2. Press *f4* to view each of the parity options.
3. Press the **Enter** button when the option you want displays, to store the setting in continuous memory. (The setting will be stored in memory until you change it, even if you turn the plotter off).

   To exit without changing the setting, press the **Next Display** button.

Setting parity to 0 sets the parity to off, parity bit 0 (also known as space parity). Setting parity to 1 sets the parity to off, parity bit 1 (also known as mark parity). If your computer requires parity, set the parity to ODD or EVEN, according to your computer's requirements.

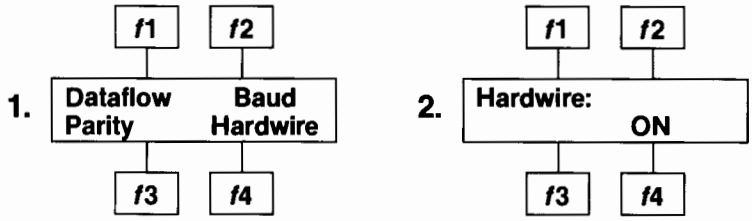
Selecting a Handshake

USE: Use **Hardwire** to select a handshake. Select a handshake setting that is compatible with your computer and software package.

DEFAULT: ON

OPTIONS: ON, OFF

EXPLANATION: Complete the following steps to turn hardwire handshake on or off.



1. Press **Hardwire** (*f4*) to display the **Hardwire** submenu.
2. Press *f4* to view each of the handshake options.
3. Press the **Enter** button when the option you want displays, to store the setting in continuous memory. (The setting will be stored in memory until you change it, even if you turn the plotter off.

   To exit without changing the setting, press the **Next Display** button.

Since the plotter's handshake must be compatible with the computer's handshake, check your system documentation for a handshake recommendation. (Most personal computers use hardwire handshake.) To use hardwire handshake, set the plotter to **Hardwire: ON**.

In addition to hardwire handshake, the plotter can use the Xon-Xoff handshake, the enquire/acknowledge handshake, and a software checking handshake. If your computer supports one of these handshakes, set the plotter to **Hardwire: OFF**. Use **Hardwire: OFF** if your

software controls the handshake or if you are using a modem. Refer to the *Programmer's Reference* for the programming instructions you'll need to set up an Xon-Xoff, Enquire-Acknowledge, or software checking handshake programmatically.

Verifying Communication

Use the appropriate read and write statements for your computer language to run the following program. This program instructs the plotter to print 7595A PLOTTER OK (or 7596A PLOTTER OK, depending on the plotter's model number). If the program runs successfully, it means that the plotter and your computer are communicating.

```
"IN;OI;"
ID$
"SP1;PA500,500;"
"LB"+ID$+" PLOTTER OK"+CHR(3)
"PA0,0;SP0;"
```

The following example shows the same program, with BASIC read and write statements included. The first line of the program establishes interface conditions, and may vary based on your computer's requirements. If you are not sure how your computer reads in data, check your computer documentation. For further examples of read and write statements for various computers, refer to the sample programs in Chapter 8.


```
10 OPEN "COM1:9600,N,8,1,RS,CS65535,DS,CD" AS #1
20 PRINT #1, "IN;OI;"
30 INPUT #1, ID$
40 PRINT #1, "SP1;PA500,500;"
50 PRINT #1, "LB"+ID$+" PLOTTER OK"+CHR$(3)
60 PRINT #1, "PA0,0;SP0;"
70 END
```

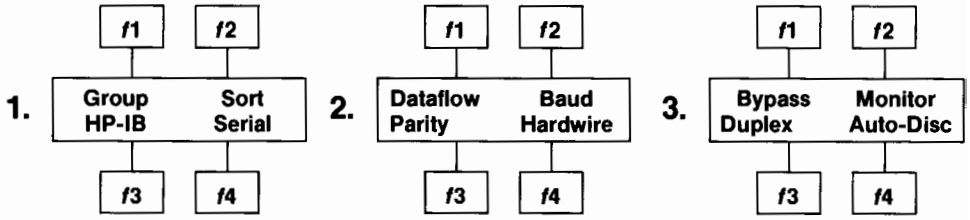
NOTE: The BASIC *CHR$(3)* string function sends the decimal code (3) for the ASCII character **ETX**. Check your computer documentation for the proper string function to use. ■

Using Advanced Features

The remainder of this chapter is designed to help you perform the following tasks.

- use debugging tools to diagnose communication problems between the plotter and your computer
- select a duplex setting
- use a modem with the plotter

In order to perform these tasks, you'll need to use the appropriate menus, as explained below.



1. Press the **Next Display** button until **Serial** displays. Then, press **Serial** (*f4*).
2. Press the **Next Display** button.
3. The advanced menu has four options; **Bypass, Monitor, Duplex,** and **Auto-Disc**. Press the function button associated with the menu you want to view.

   To leave the menu completely and display menu 1, press the **Next Display** button two times.

Each of the advanced features is discussed on the following pages. Read the sections pertaining to the settings you need to change.

Controlling Data Transfer

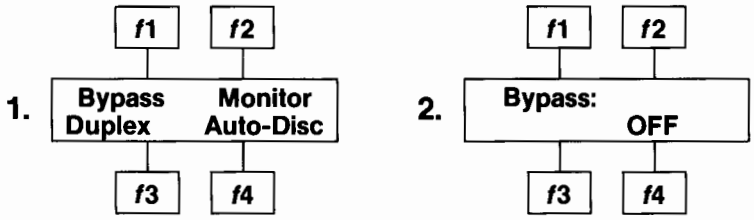
USE: In an RS-232-C *eavesdrop* configuration, you can use **Bypass** to control when the plotter receives data.

DEFAULT: OFF

OPTIONS: OFF, ON

EXPLANATION: When you set **EAVESDROP**, **Bypass** is automatically set on. In most cases, you can use **EAVESDROP** without changing the setting of **Bypass**.

Complete the following steps to use **Bypass**.



1. Press **Bypass** (*f1*) to display the **Bypass** submenu.
2. Press *f4* to view the bypass options.
3. Press the **Enter** button when the options you want displays. Since bypass is used as a temporary tool, you cannot store a bypass setting in continuous memory.

   To exit without changing the setting, press the **Next Display** button.

When you activate **EAVESDROP**, **Bypass** is automatically set on. When **Bypass** is on, the computer and terminal can communicate. When **Bypass** is off, the computer and plotter can communicate. When you turn **EAVESDROP** off (by activating **STANDALONE**), **Bypass** is automatically turned off.

For normal plotting in an eavesdrop configuration, leave bypass on. The computer and terminal will communicate until the plotter receives a plotter-on instruction, **ESC**.(or **ESC**.Y. If you are writing your own programs, they must contain the plotter-on instruction. (If you are using a software package designed for use with plotters, the plotter-on instruction will be taken care of by the software.) The plotter-on instruction turns bypass off, allowing the computer to send plotting instructions to the plotter.

When the computer is finished sending data to the plotter, bypass should be set on again by a plotter-off instruction, **ESC**.) or **ESC**.Z. (Software packages will do this automatically.) Refer to the plotter's *Programmer's Reference* for an explanation of the plotter-on and plotter-off instructions, and their syntax.

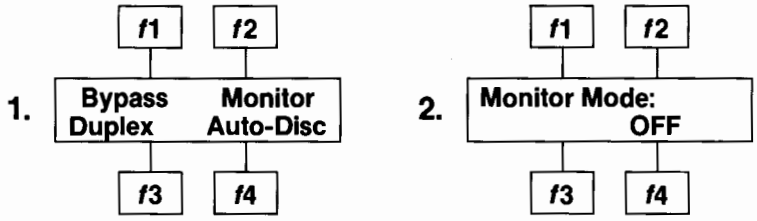
Detecting Communication Problems

USE: Use **Monitor** as an aid to diagnosing communication problems between the plotter and a computer.

DEFAULT: OFF

OPTIONS: OFF, PARSE MODE, RECEIVE MODE

EXPLANATION: Complete the following steps to use **Monitor**.



1. Press **Monitor** (*f2*) to display the **Monitor** submenu.
2. Press *f4* to display each of the **Monitor** options.

3. Press the **Enter** button when the option you want displays, to activate the mode. Since monitor is used as a temporary tool, you cannot store **PARSE MODE** or **RECEIVE MODE** in continuous memory.

   To exit without changing the setting, press the **Next Display** button.

Leave monitor mode off for normal plotting. If you are writing your own programs, set monitor mode to **PARSE MODE** or **RECEIVE MODE** for debugging. Both modes are explained below.

In both parse mode and receive mode, HP-GL and device-control instructions sent to the plotter are retransmitted to the terminal and displayed on the CRT screen.

In parse mode, instructions are displayed *as they are executed.* Device-control instructions are always executed immediately whereas HP-GL instructions go into the plotter's buffer before being executed. Therefore, device-control instructions may be displayed on the terminal before HP-GL instructions *even if they were sent after the HP-GL instructions.*

In receive mode instructions are displayed *as they are received,* allowing you to confirm that the plotter is receiving the instructions you send it intact.

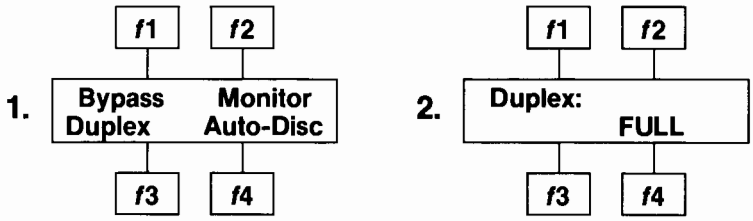
Setting Duplex

USE: If you are using the plotter in **LOCAL** mode with a terminal or have **Monitor** on, use **Duplex** to have your plotter use the duplex needed by your terminal.

DEFAULT: FULL

OPTIONS: FULL, HALF

EXPLANATION: Complete the following steps to select a duplex.



1. Press **Duplex** (*f3*) to display the **Duplex** submenu.
2. Press *f4* to display each **Duplex** option.
3. Press the **Enter** button when the option you want displays, to store the setting in continuous memory. (The setting will be stored in memory until you change it, even if you turn the plotter off.)

   To exit without changing the setting, press the **Next Display** button.

If you are using the plotter in **LOCAL** mode, set the plotter's duplex to match the requirements of your terminal.

Set the plotter to **Duplex: FULL** if your terminal's local echo is off. This will cause the plotter to echo all data it receives from the terminal back to the terminal.

Set the plotter to **Duplex: HALF** if your terminal's local echo is on. This will prevent the plotter from echoing data it receives from the terminal back to the terminal.

If you set the duplex incorrectly, you will either see two characters displayed on your terminal for every one typed, or none. Correct the problem by resetting the duplex.

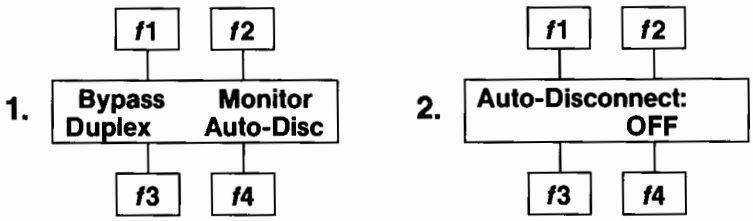
Using a Modem with the Plotter

USE: If you are using a modem with the plotter, use **Auto-Disc** (automatic disconnect) to access several modem features.

DEFAULT: OFF

OPTIONS: OFF, SWITCHED DATEX, LEASED LINE

EXPLANATION: Complete the following steps to access the **Auto-Disc** submenu.



1. Press **Auto-Disc** (*f4*) to display the **Auto-Disconnect** submenu.
2. Press *f4* to view each **Auto-Disconnect** option.
3. Press the **Enter** button when the option you want displays, to store the setting in continuous memory. (The setting will be stored in memory until you change it, even if you turn the plotter off.)

   To exit without changing the setting, press the **Next Display** button.

NOTE: When using a modem with the plotter, confirm that the baud rate reflects the requirements of the computer, modem, plotter, and terminal. ■

The **SWITCHED DATEX** and **LEASED LINE** settings allow you to automatically disconnect the modem at the end of any session conducted over phone lines. They are useful when no one is present to manually hang up the phone. These settings are most frequently used in Europe. Leave **Auto-Disconnect** off if you do not need this feature.

When set to **SWITCHED DATEX**, the plotter uses the CTS and DSR lines to control the DTR line and bypass function. As long as the control lines are high, the DTR line is high and the plotter is able to receive information (is set to **Bypass: OFF**). If any of the controlling lines goes low, the DTR line is also low; the plotter cannot receive information (switches to **Bypass: ON**), and the modem is automatically disconnected.

When set to **LEASED LINE**, the plotter uses the CTS, DSR, and DCD lines to control the DTR line and bypass. As long as the control lines are high, the DTR line is high, and the plotter is able to receive information (is set to **Bypass: OFF**). If any of the controlling lines goes low, the DTR line is set low, the plotter cannot receive information (switches to **Bypass: ON**), and the modem is automatically disconnected.

Notes

8

Computer/Plotter Interconnections

What You'll Learn in This Chapter

This chapter contains specific instructions for connecting the following computers to the plotter. If your computer is not in this list, refer to Chapter 7.

DEC VAX Computer
HP 3000 Computer
HP 9000, Series 300 Technical Computer
HP Touchscreen Personal Computer (HP 150)
HP Vectra Computer
IBM AT Computer
IBM PC/XT Personal Computer

Refer to Appendix C for cable ordering information.

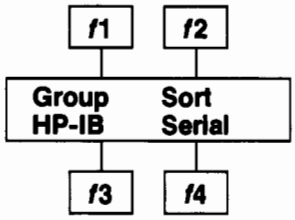
Using the Serial Menus

The following section describes how to use the plotter's menus to select and store serial interface settings. If you are using a plotter with an RS-232-C interface, this information will help you connect the plotter to your computer. If you are using the HP-IB interface, skip this section and go directly to your computer's instructions.

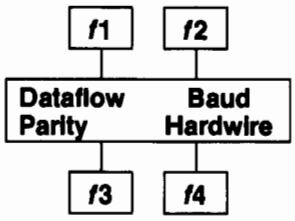
The following section tells you *how* to access and change menu items; for a full description of each option, refer to Chapter 7.

Complete the following steps to change serial conditions from their default settings.

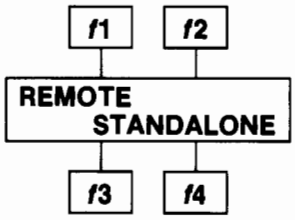
1. Press the **Next Display** button until the following menu displays.



2. Press **Serial** (*f4*) to display the following menu.



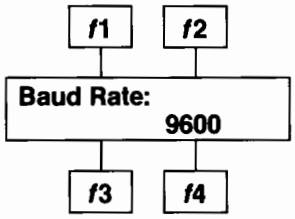
3. Press **Dataflow** (*f1*) to display the configuration submenu.



4. Press **REMOTE** (*f1*) to view the configuration options (**REMOTE**, **LOCAL**, and **STANDBY**). When the option you need displays, press **STANDALONE** (*f4*)to view the operating mode options (**EAVESDROP** and **STANDALONE**). When *both* the desired configuration and the operating mode display, press the **Enter** button. The menu shown in step 2 will display.

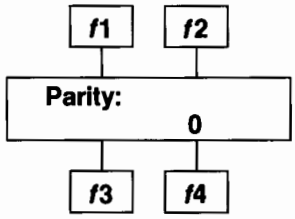
NOTE: When you change a setting while configuring the plotter, press the **Enter** button to store the new setting. With the exception of **LOCAL** and **STANDBY**, the setting will be stored until you change it — even if you turn off the plotter. This means you will not have to set your interface conditions every time you use the plotter. ■

5. Press **Baud** (*f2*) to display the baud rate submenu.



6. Press *f4* to view the baud rate options. (For a table of the baud rate options, refer to *Setting the Baud Rate*, in Chapter 7.) When the option you need displays, press the **Enter** button to store the setting in continuous memory. The plotter will display the menu shown in step 2.

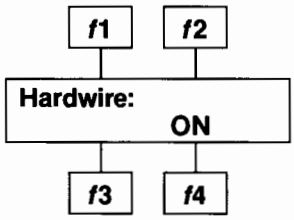
7. Press **Parity** (*f3*) to display the parity submenu.



8. Press *f4* to view the parity options (**0***, **1***, **EVEN**, **ODD**). When the option you need displays, press the **Enter** button to store the setting in continuous memory. The plotter will display the menu shown in step 2.

*Setting parity to 0 sets the parity off, parity bit 0 (space parity). Setting parity to 1 sets parity off, parity bit 1 (mark parity).

9. Press **Hardwire (*f4*)** to display the following submenu.



10. Press ***f4*** to view the handshake options (**Hardwire: ON**, **Hardwire: OFF**). (For a full discussion of the plotter's handshake capabilities, refer to *Selecting a Handshake*, in Chapter 7.) When the option you need displays, press the **Enter** button to store the setting in continuous memory. The plotter will display the menu shown in step 2.

To use a modem with the plotter or to select a duplex, refer to the preceding chapter. Otherwise, press the **Next Display** button twice to return to the plotter's primary menus.

Using the Interconnection Instructions

The following instructions are designed to help you get your plotter and computer connected and communicating as quickly as possible. Be aware that the listed computer and plotter equipment includes the *minimum* components necessary to establish communication. If you will be using graphics software, check your software documentation (or software supplier) for specific computer hardware and memory requirements.

Please verify that your computer and plotter work individually before attempting to connect them.

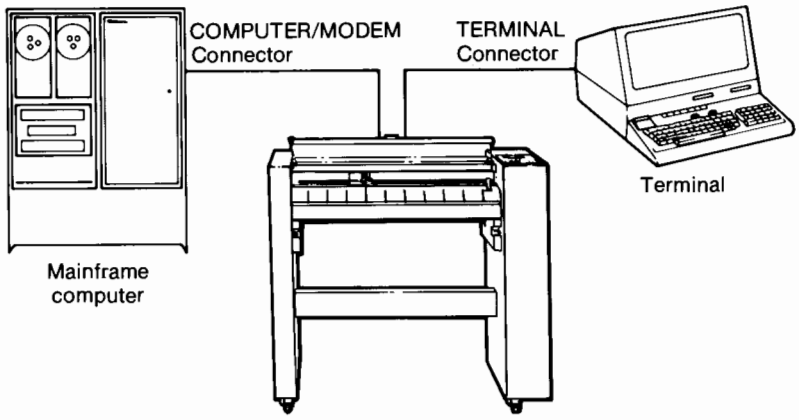
DEC VAX Computer (RS-232-C Interface)

Computer Equipment	Plotter Equipment
DEC VAX Computer Terminal Monitor	HP DraftMaster RS-232-C cable* (HP 17355M)

*The RS-232-C cable connects the plotter to the DEC VAX computer. You will need a second RS-232-C cable to connect the plotter to your terminal. The part number of this second cable will depend on the model number of your terminal.

Interconnection Instructions

1. Turn off your plotter and terminal.
2. Connect one end of the 17355M cable to the DEC VAX and the other to the **COMPUTER/MODEM** port on the back of the plotter.
3. Connect the second RS-232-C cable between the plotter and terminal. Attach one end of the cable to the back of the terminal, and attach the other end to the **TERMINAL** port on the back of the plotter. Refer to the following illustration.



4. Turn on your equipment and load a sheet of paper in the plotter.

5. Use the plotter's menus to store the following settings.

Dataflow	—	REMOTE, EAVESDROP
Baud	—	9600 (or computer baud rate)
Parity	—	0
Hardwire	—	OFF

Running the Test Program

To test the computer/plotter interface, enter and run the following FORTRAN program. (If you need help entering and running the program, refer to your computer documentation.)

```
      PROGRAM INTERCONNECT
      CHARACTER *5 ID
      INTEGER ESCAPE,ETX
      ESCAPE = 155
      ETX = 3
      WRITE (6,10) ESCAPE,ESCAPE,ESCAPE
10    FORMAT (1X,A1,".Y",A1,".I80;0;17:",A1,".N10;19:")
      WRITE (6,20) ESCAPE
20    FORMAT (1X,A1,".M;;10:IN;SP1;PA500,500;OI;");
      READ (5,30) ID
30    FORMAT (A5)
      WRITE (6,40) ID,ETX
40    FORMAT (1X,"LB",A5," PLOTTER OK",A1)
      WRITE (6,50) ESCAPE
50    FORMAT (1X,"PA0,0;SP0;",A1,".Z")
      STOP
      END
```

Your plotter will select pen #1 and print 7595A PLOTTER OK. If you are using a rollfeed plotter, the plotter will print 7596A PLOTTER OK.

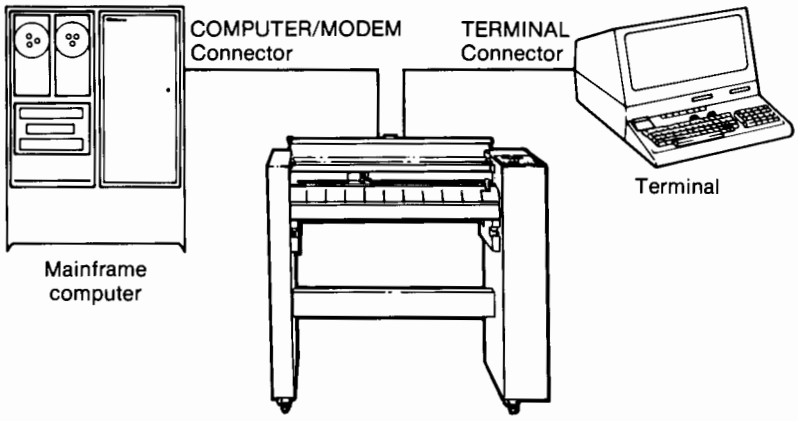
HP 3000 Computer (RS-232-C Interface)

Computer Equipment	Plotter Equipment
HP 3000 Terminal Monitor	HP DraftMaster RS-232-C cable* (HP 17355M)

*The RS-232-C cable connects the plotter to the HP 3000. You will need a second RS-232-C cable to connect the plotter to your terminal. The part number of this second cable will depend on the model number of your terminal.

Interconnection Instructions

1. Turn off your plotter and terminal.
2. Connect one end of the HP 17355M cable to the HP 3000 and the other end to the **COMPUTER/MODEM** port on the back of the plotter.
3. Connect the second RS-232-C cable between the plotter and terminal. Attach one end of the cable to the back of the terminal, and attach the other end to the **TERMINAL** port on the back of the plotter. Refer to the following illustration.



8

4. Turn on your equipment and load a sheet of paper in the plotter.

5. Use the plotter's menus to store the following settings.

Dataflow	—	REMOTE, EAVESDROP
Baud	—	9600 (or computer baud rate)
Parity	—	0
Hardwire	—	OFF

Running the Test Program

To test the computer/plotter interface, enter and run the following HP 3000 FORTRAN program. (If you need help entering and running the program, refer to your computer documentation.)

```
      PROGRAM INTERCONNECT
      CHARACTER*5 ID
      INTEGER ESCAPE,ETX
      ESCAPE = 27
      ETX = 3
      WRITE (6,10) ESCAPE,ESCAPE
10    FORMAT (1X,1R1,".(",1R1,".P2:IN;SP1;PA500,500;OI;")
      READ (5,20) ID
20    FORMAT (A5)
      WRITE (6,30) ID,ETX
30    FORMAT (1X,"LB",A5," PLOTTER OK",1R1)
      WRITE (6,40) ESCAPE
40    FORMAT (1X,"PA0,0;SP0;",1R1,".Z")
      STOP
      END
```

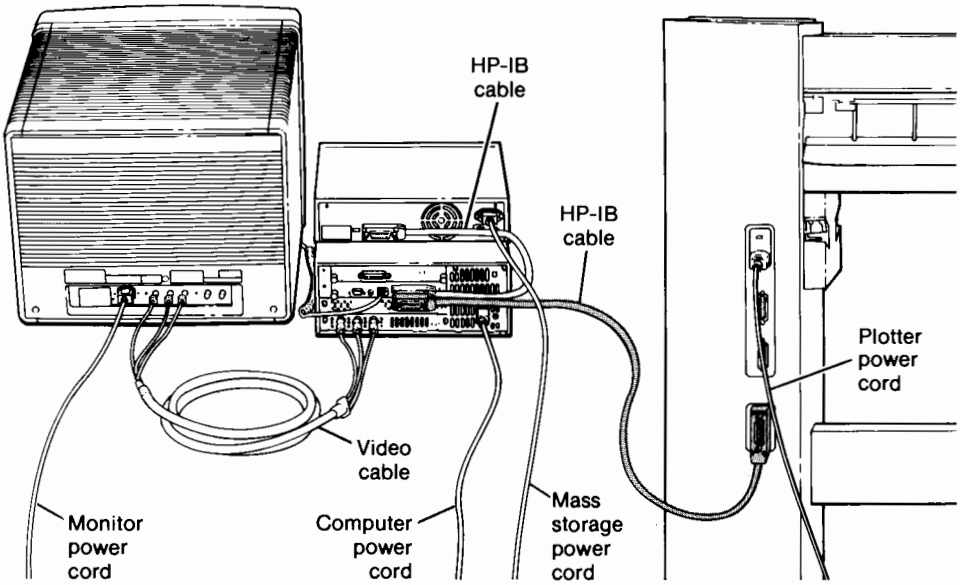
Your plotter will select pen #1 and print 7595A PLOTTER OK. If you are using a rollfeed plotter, the plotter will print 7596A PLOTTER OK.

HP 9000, Series 300 Technical Computer
(HP-IB Interface)

Computer Equipment	Plotter Equipment
HP Model 310 or 320 with keyboard, video board, monitor, mass storage, and operating system	HP DraftMaster HP-IB cable (HP 10833A, B, C, or D)

Interconnection Instructions

1. Turn off your plotter and computer equipment.
2. Connect the plotter to the computer using the HP-IB cable. Attach one end of the cable to the back of the computer, and attach the other end to the **HP-IB** port on the back of the plotter. Refer to the following illustration, an HP Model 320 computer is shown.



8

3. Turn on your equipment and load a sheet of paper in the plotter.
4. Use the plotter's **HP-IB** menu to verify that the HP-IB address is set to **05** (factory setting).

Running the Test Program

To test the computer/plotter interface, enter and run the following BASIC program. (If you need help entering and running the program, refer to your computer documentation.)

```
10 OUTPUT 705;"IN;OI;"
20 ENTER 705;Id$
30 OUTPUT 705;"SP1;PA500,500;"
40 OUTPUT 705;"LB"&Id$&" PLOTTER OK"&CHR$(3)
50 OUTPUT 705;"PA0,0;SP0;"
60 END
```

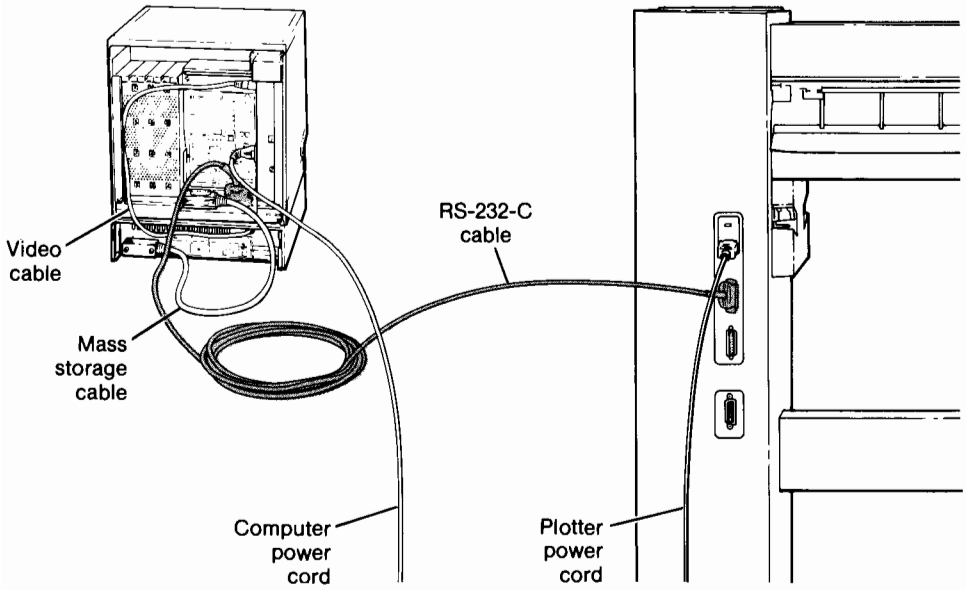
Your plotter will select pen #1 and print 7595A PLOTTER OK. If you are using a rollfeed plotter, the plotter will print 7596A PLOTTER OK.

HP Touchscreen Personal Computer (HP 150)
(RS-232-C Interface)

Computer Equipment	Plotter Equipment
HP Touchscreen II, Touchscreen, Touchscreen MAX, or HP 150 (includes monitor, keyboard, and disc drive)	HP DraftMaster Special RS-232-C cable (HP 17255M)

Interconnection Instructions

1. Turn off your plotter, computer, and all components.
2. Connect the plotter to the computer as shown in the following illustration. Attach one end of the RS-232-C cable to the connector on the back of the computer labeled **DATACOMM (PORT 2)**, and attach the other end of the cable to the plotter's **COMPUTER/MODEM** port. (The following illustration shows an HP Touchscreen MAX computer. The HP Touchscreen and Touchscreen II computers look slightly different.)



3. Turn on your equipment and load a sheet of paper in the plotter.

4. Use the plotter's menus to store the following settings.

   Dataflow — REMOTE, STANDALONE
   Baud — 9600
   Parity — 0
   Hardwire — ON

5. Configure your computer system as follows. (Refer to your computer documentation if you have difficulty with this step.)

   a. Load the MS-DOS System Disc. Touch **DEVICE CONFIG** on the P.A.M. menu. Then touch **Start Applic** to display the **MS-DOS Device Configuration** screen.

   b. Touch the **PLT** field, then use the **NEXT CHOICE** key to select **PLT: Port2**. Next, touch **Save Config**.

   c. Press the **User System** key on your keyboard twice to change the function key selections. Then select **config keys**.

   d. Select the **port2 config** key to display the **Port2** screen. Press the **system defaults** key, then the **DEFAULT VALUES** key. Use the **NEXT CHOICE** key to select **BaudRate 9600**. Then use the cursor controls to select the **CS(CB)Xmit** field. Use the **NEXT CHOICE** key to set the field to **Yes**.

   e. Touch **SAVE CONFIG** to save the new configuration. Hold down the **Shift** key and press the **User System** key once again. Press **Exit CONFIG** to return to P.A.M.

Running the Test Program

To test the computer/plotter interface, enter and run the following BASIC program. (If you need help entering and running the program, refer to your computer documentation.)

```
10 OPEN "O",1,"PLT"
20 PRINT #1, "IN;OI;"
30 CLOSE #1
40 OPEN "I",2,"PLT"
50 INPUT #2, ID$
60 OPEN "O",1,"PLT"
70 PRINT #1, "SP1;PA500,500;"
80 PRINT #1, "LB";ID$;" PLOTTER OK"+CHR$(3)
90 PRINT #1, "PA0,0;SP0;"
100 END
```

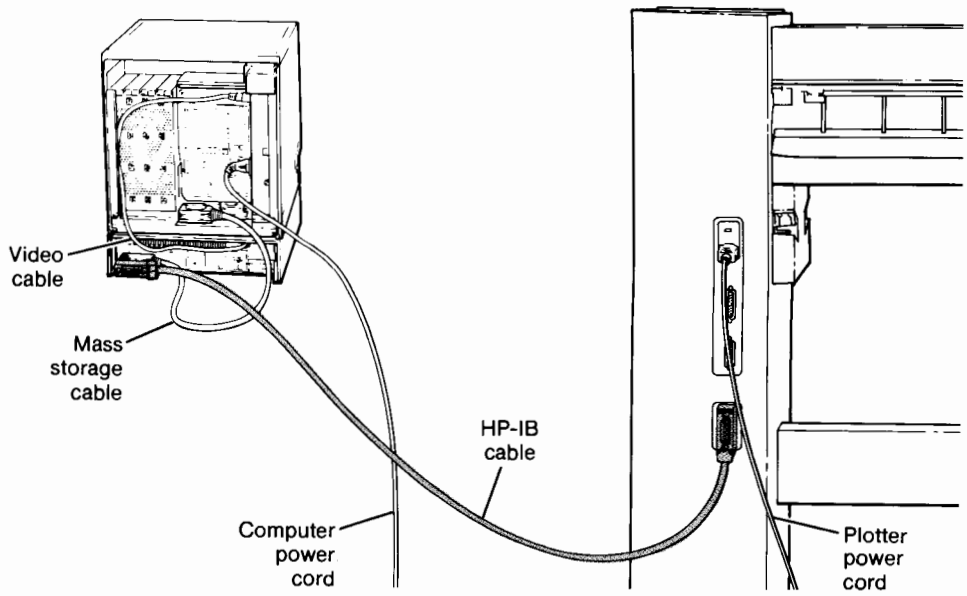

Your plotter will select pen #1 and print 7595A PLOTTER OK. If you are using a rollfeed plotter, the plotter will print 7596A PLOTTER OK.

HP Touchscreen Personal Computer (HP 150)
(HP-IB Interface)

Computer Equipment	Plotter Equipment
HP Touchscreen II, Touchscreen, Touchscreen MAX, or HP 150 (includes monitor, keyboard, and disc drive)	HP DraftMaster HP-IB cable (HP 10833A, B, C, or D)

Interconnection Instructions

1. Turn off your plotter, computer, and all components.
2. Connect the plotter to the computer using the HP-IB cable. Attach one end of the cable to the back of the computer, and attach the other end to the **HP-IB** port on the back of the plotter. (The following illustration shows an HP Touchscreen MAX computer. The Touchscreen and Touchscreen II computers look slightly different.)



3. Turn on your equipment and load a sheet of paper in the plotter.
4. Use the plotter's **HP-IB** menu to verify that the HP-IB address is set to **05** (factory setting).
5. Configure your computer system as follows. (Refer to your computer documentation if you have difficulty with this step.)
   a. Load the MS-DOS System Disc. Touch **DEVICE CONFIG**. Then touch **Start Applic** to display the **MS-DOS Device Configuration** screen.
   b. Touch the **PLT** field, then use the **NEXT CHOICE** key to select **PLT: HP-IB 5**. Next, touch **Save Config** to save the configuration.
   c. Press **Exit CONFIG** to return to P.A.M.

Running the Test Program

To test the computer/plotter interface, enter and run the following BASIC program. (If you need help entering and running the program, refer to your computer documentation.)

```
10 OPEN "O",1,"PLT"
20 PRINT #1, "IN;SP1;PA500,500;"
30 PRINT #1, "LBPLOTTER OK"+CHR$(3)
40 PRINT #1, "PA0,0;SP0;"
50 END
```

Your plotter will select pen #1 and print PLOTTER OK.

HP Vectra Personal Computer
(RS-232-C Interface)

Computer Equipment	Plotter Equipment
HP Vectra PC Graphics monitor Disc drive HP Serial/Parallel Interface Card (HP 24540A)* *or* HP Dual Serial Interface Card (HP 24541A)**	HP DraftMaster RS-232-C cable (use cable appropriate for interface card)

*Use with HP 9-25 pin cable, Part No. 24542G.

**Use with HP special RS-232-C cable, Part No. 17255M. It *is* possible to connect the plotter to the 9-pin port using HP cable 24542G; however, some software packages may not let you use the plotter on this port. If you must use the 9-pin connector on the Dual Serial Card, watch for the *NOTES*, below, which give specific instructions.

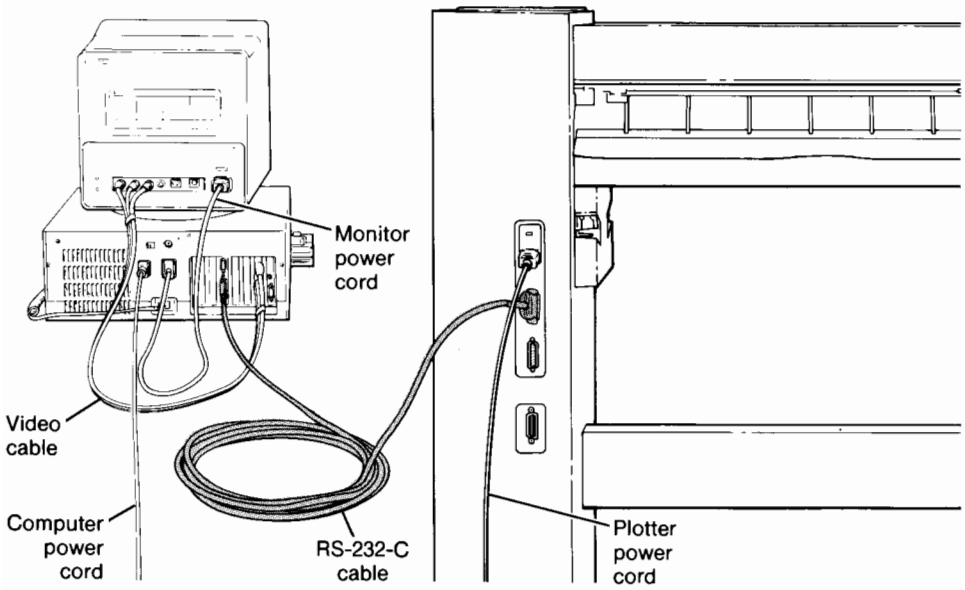
Interconnection Instructions

1. Turn off your plotter, computer, and all components.
2. Install one of the serial interface cards. (Refer to your computer documentation for details.) If you have already installed a serial card, go to step 3.

3. Connect the plotter to the computer as shown in the following illustration. If you are using the HP 24540A Serial/Parallel Interface card, connect the small end of cable HP 24542G to the 9-pin connector on the back of the computer, and attach the other end of the cable to the plotter's **COMPUTER/MODEM** port.

   If you are using the HP 24541A Dual Serial Interface Card, attach one end of the HP 17255M cable to the 25-pin connector on the computer and attach the other end of the cable to the plotter's **COMPUTER/MODEM** port.

   NOTE: To use the HP 24542G cable with the Dual Serial Interface Card, attach one end of the cable to the 9-pin connector on the computer, and attach the other end of the cable to the plotter's **COMPUTER/MODEM** port. ■



4. Turn on your equipment and load a sheet of paper in the plotter.

5. Use the plotter's menus to store the following settings.

Dataflow	—	REMOTE, STANDALONE
Baud	—	9600
Parity	—	0
Hardwire	—	ON

Running the Test Program

To test the computer/plotter interface, enter and run the following BASIC program. (If you need help entering and running the program, refer to your computer documentation.)

```
10 OPEN "COM1:9600,N,8,1,RS,CS65535,DS,CD" AS #1
20 PRINT #1, "IN;OI;"
30 INPUT #1, ID$
40 PRINT #1, "SP1;PA500,500;"
50 PRINT #1, "LB"+ID$+" PLOTTER OK"+CHR$(3)
60 PRINT #1, "PA0,0;SP0;"
70 END
```

NOTE: If you are using the HP 24541A Dual Serial Interface Card with the HP 24542G (9-pin connector) cable, replace COM1 in line 10 above with COM2. ■

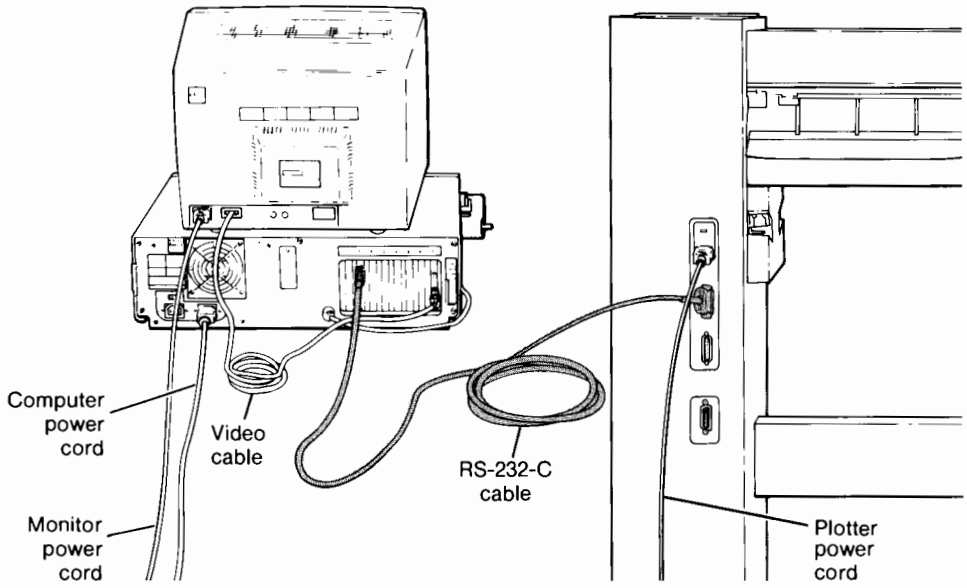
Your plotter will select pen #1 and print 7595A PLOTTER OK. If you are using a rollfeed plotter, the plotter will print 7596A PLOTTER OK.

IBM AT Computer (RS-232-C Interface)

Computer Equipment	Plotter Equipment
IBM AT System Unit Graphics monitor Disc drive and adapter	HP DraftMaster HP 24542G cable *or* Special RS-232-C cable (HP 17255D) for use with IBM Serial Adapter Cable (IBM Part No. 6450217 or 6450242)

Interconnection Instructions

1. Turn off your plotter, computer, and all components.
2. Connect the plotter to the computer using the RS-232-C cable and the IBM Serial Adapter Cable, as shown below. The small, 9-pin connector on the IBM Serial Adapter Cable connects to the 9-pin serial port on the back of the IBM AT. (The following illustration shows the HP 24542G cable.)



8

3. Turn on your equipment and load a sheet of paper in the plotter.

4. Use the plotter's menus to store the following settings.

   Dataflow — REMOTE, STANDALONE
   Baud — 9600
   Parity — 0
   Hardwire — ON

Running the Test Program

To test the computer/plotter interface, enter and run the following BASIC program. (If you need help entering and running the program, refer to your computer documentation.)

```
10 OPEN "COM1:9600,N,8,1,RS,CS65535,DS,CD" AS #1
20 PRINT #1, "IN;OI;"
30 INPUT #1, ID$
40 PRINT #1, "SP1;PA500,500;"
50 PRINT #1, "LB"+ID$+" PLOTTER OK"+CHR$(3)
60 PRINT #1, "PA0,0;SP0;"
70 END
```

Your plotter will select pen #1 and print 7595A PLOTTER OK. If you are using a rollfeed plotter, the plotter will print 7596A PLOTTER OK.

IBM Personal Computer (PC and PC-XT)
(RS-232-C Interface)

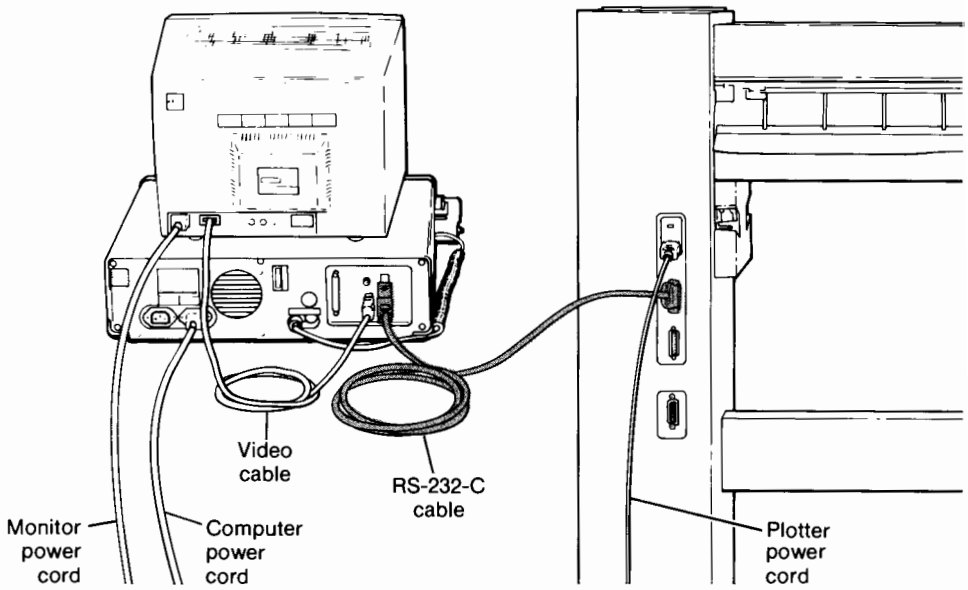
Computer Equipment	Plotter Equipment
IBM System Unit	HP DraftMaster
Graphics monitor	Special RS-232-C cable (HP 17255D)
Disc drive and adapter	
Asynchronous Communications Adapter (standard on the PC-XT)	
IBM color graphics adapter	

Interconnection Instructions

1. Turn off your plotter, computer, and all components.
2. Install the Asynchronous Communications Adapter (RS-232-C serial card) in your IBM PC (refer to your IBM documentation for instructions on installation). If you are using an IBM PC-XT or have already installed the serial card, go to step 3.

   NOTE: If you have two Asynchronous Communications Adapters installed in your computer, one of the adapters must be set for COM1 and the other for COM2. (Refer to your computer documentation for details.) The interconnection instructions listed here assume you will be connecting your plotter to the COM1 adapter. ■

3. Connect the plotter to the computer as shown in the following illustration. Attach the female end of the RS-232-C cable to the IBM Asynchronous Communications Adapter. Attach the other end of the cable to the plotter's **COMPUTER/MODEM** port.



4. Turn on your equipment and load a sheet of paper.

5. Use the plotter's menus to store the following settings.

   Dataflow — REMOTE, STANDALONE
   Baud — 9600
   Parity — 0
   Hardwire — ON

Running the Test Program

To test the computer/plotter interface, enter and run the following BASIC program. (If you need help entering and running the program, refer to your computer documentation.)

```
10 OPEN "COM1:9600,N,8,1,RS,CS65535,DS,CD" AS #1
20 PRINT #1, "IN;OI;"
30 INPUT #1, ID$
40 PRINT #1, "SP1;PA500,500;"
50 PRINT #1, "LB"+ID$+" PLOTTER OK"+CHR$(3)
60 PRINT #1, "PA0,0;SP0;"
70 END
```

Your plotter will select pen #1 and print 7595A PLOTTER OK. If you are using a rollfeed plotter, the plotter will print 7596A PLOTTER OK.

9

Using Software with the Plotter

What You'll Learn in This Chapter

This chapter will help you to use graphics software packages or programs with the plotter. Before using a software package, check the following.

- Your plotter should be in good working condition. If the demonstration plot runs, it is a good indication that the plotter is working correctly.
- Your computer system should be working correctly.
- Your plotter and computer should communicate effectively. Use the test program described in Chapter 7. If this program runs, communication has been established.
- Your software package should work with your plotter and computer. If your software documentation does not tell you that the software works with the DraftMaster plotter, but lists the HP 7585 and 7586 plotters, use **Emulate**, as described later in this chapter.

When you are sure that the components of your computer system are working properly, and that communication has been established between the computer and plotter, you are ready to use your software package.

Using Graphics Software Packages

Many software packages require you to *configure* the software so that it knows what type of plotter you are using, where the plotter is attached to your computer, and interface settings. This is usually done by typing or selecting answers on your computer, in response to questions asked by the software. If your software asks you configuration questions, answer them carefully to avoid communication problems. Read your software documentation when installing the software to avoid communication problems.

If your software documentation recommends specific plotter settings — use them, even if they differ from the settings recommended in Chapter 7. If your software lists possible choices *without* making a recommendation, use the settings recommended in Chapter 7.

The following two sections summarize information you may need when configuring or installing your software package. Read the section pertaining to the interface type you are using.

For RS-232-C (Serial) Interface Users

If your software or software documentation recommends specific plotter settings, use the plotter's menus to select and store the recommended settings, as explained in Chapter 7. The following table summarizes the information that the software package may request.

Plotter Configuration Options

Menu	Options
Dataflow	STANDALONE, EAVESDROP and REMOTE, LOCAL, STANDBY
Baud	75, 110, 150, 200, 300, 600, 1200, 2400, 4800, 9600, 19200, External
Parity	0*, 1**, ODD, EVEN
Hardwire*** (handshake)	OFF, ON

*Also known as NONE, OFF, or SPACE parity.

**Also known as NONE, OFF, or MARK parity.

***If your software uses a handshake other than hardwire, set **Hardwire** off.

If your software doesn't require configuring, or if plotter settings are not suggested in your software documentation, try leaving the serial settings as advised in Chapter 7. Be certain your software configuration matches the plotter's settings!

For HP-IB (IEEE-488) Interface Users

If you are using the plotter with an HP-IB interface, the plotter's address setting must match the HP-IB address used by the graphics software package. If your software requires configuring, select an HP-IB address of 5 and verify that your plotter's address is set to 5.

If you need to use an address other than 5, refer to the following table of address settings. Then, use the plotter's **HP-IB** menu to change the address setting to one that is compatible with your software. Refer to Chapter 2 for more details about using the HP-IB menu.

Plotter Address Options

Menu	Options
HP-IB	0 through 30 (inclusive) and LISTEN ONLY

Overriding Your Software

The following front-panel menu items can override a software initialization instruction (IN). Like a front-panel **Reset**, an initialization instruction returns these settings to their default values.

- P1 and P2
- Speed and Force
- Rotate
- Group
- Sort

If you do not want to use the default setting of a front-panel menu, complete the following steps. The default setting for each of these menus is given in Chapter 2.

1. Use **Reset** before you begin plotting to return settings to their default values. (This will not affect settings stored in continuous memory.)
2. Use the front panel to store the setting(s) you want to change.
3. When you have finished plotting, use **Reset** to return the front-panel menus to their default settings.

NOTE: There are software instructions that directly control the location of P1 and P2, pen speed and force, plot orientation, and pen grouping. If your software uses these instructions, the plotter will respond and update the front panel accordingly. ■

9

Using HP 7585/7586 Software Packages

If your software doesn't work with the HP DraftMaster, use **Emulate**. When **Emulate** is on, DraftMaster works like the HP 7585 and 7586 plotters. If your software asks for a plotter name or model number, indicate that you are using an HP 7585 or 7586 plotter when **Emulate** is on; indicate that you are using the DraftMaster (HP 7595 or 7596) when **Emulate** is off.

Writing Your Own Graphics Programs

If you want to write your own graphics programs using the HP-GL programming language, an extensive programming document — the *Programmer's Reference* — is available from Hewlett-Packard. Refer to Appendix C for ordering information.

Although most graphics software packages allow you to specify the labels you need for your graphs, there may be occasions when you want to add additional labels or graphics — a company logo, for example. The *Programmer's Reference* explains how you can write your own graphics programs that will add labels or graphics to software-generated graphs.

When debugging programs you have written, make sure that front-panel settings are not interfering with your program. Use **Reset** to return settings to their factory-set values. Additionally, turn **Group** and **Sort** off.

Notes

A

Technical Information

This appendix contains the following information.

- summary of front-panel menu settings
- front-panel flowchart
- front-panel prompts and error messages
- functional, physical, and environmental specifications
- RS-232-C specifications
- cable schematics
- HP-IB interfacing information

A

Front-Panel Summary

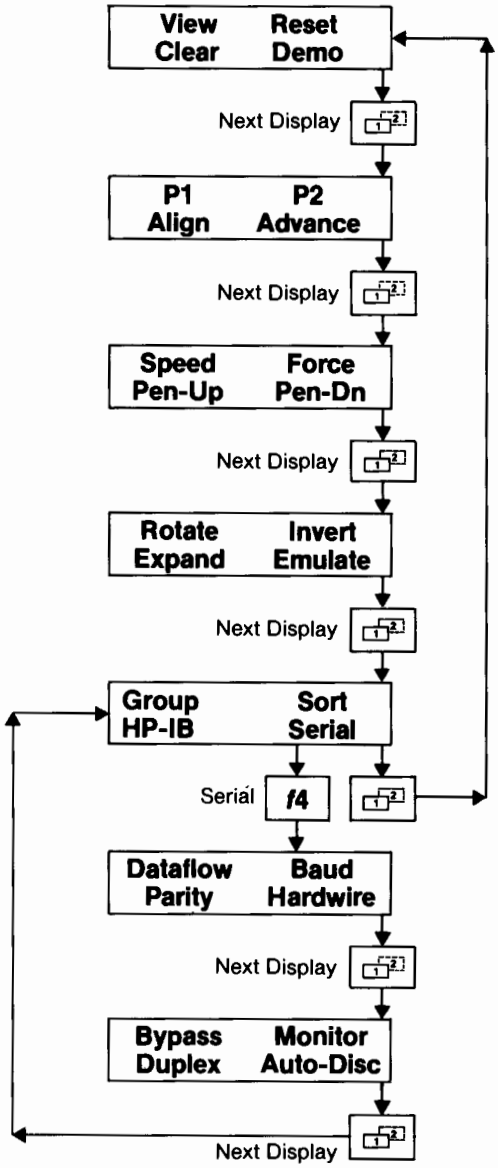
The following table lists the default setting of front-panel menu items, and indicates whether each setting is stored in temporary or continuous memory. Menus that cause a direct action (and cannot be stored) are not listed.

Front-Panel Menu	Default Setting	Memory Type
P1/P2	varies with paper size	temporary
Speed	varies with carousel type	temporary
Force	varies with carousel type	temporary
Rotate	off	temporary
Invert	off	continuous
Expand	off	continuous
Emulate	off	continuous
Group	1	temporary
Sort	on	temporary
HP-IB	05	continuous
Dataflow	Remote/Standalone	continuous
Baud	9600	continuous
Parity	0	continuous
Hardwire	on	continuous
Bypass	off	temporary
Monitor	off	temporary
Duplex	full	continuous
Auto-Disc	off	continuous

Use **Reset** to return settings stored in temporary memory to their default values. To restore settings stored in continuous memory to their default values, hold down the center **Cursor Control** button as you turn the plotter on.

Front-Panel Flowchart

The following flowchart illustrates the plotter's front-panel menus.



A

Front-Panel Messages

This section explains the plotter's front-panel messages.*

Message	Reason for Display
LOAD PAPER TO PLOT	Paper not loaded or loaded improperly.
PUT IN CAROUSEL	Carousel not loaded in plotter or loaded improperly.
PEN PUT FAILED	Pen not returned to carousel correctly. Remove carousel and remove any pens from the carousel well.
LOWER COVER PRESS •	Cover raised.
CHECK CAROUSEL PRESS •	Pens incorrectly loaded or carousel improperly loaded in carousel well.
CUT PAPER, THEN PRESS •	When using roll media without a take-up spool, this message appears after a page **Advance.**
DIGITIZE POINT • Pen-Up Pen-Dn	When digitizing, allows you to raise and lower the pen.
X-AXIS FAILURE (Y-AXIS FAILURE or Z-AXIS FAILURE) SEE MANUAL	Remove any obstructions from the platen. Turn the plotter off and then on again. Replace any badly-worn pens. If the plotter continues to display one of these messages, call for service.
100: SEE MANUAL	Turn the plotter off and then on again. If the message continues to display, the plotter needs to be repaired. Contact the HP Dealer or Sales and Support Office where you purchased the plotter for service information.
200: SEE MANUAL	Contact your Hewlett-Packard Dealer or the HP Sales and Support Office where you purchased the plotter for service information.
300: SEE MANUAL	Calibrate the plotter as described in Appendix B.

*Calibration messages are explained in Appendix B.

The following messages report programming and communication errors. If one of these messages displays, the plotter is not malfunctioning — the problem is in your program or software package. If you are writing your own programs, refer to the *Programmer's Reference* manual for help in correcting (and avoiding) such errors.

Programming Error Messages	
1: Command not recognized 2: Wrong number of parameters 3: Bad parameter 5: Unknown character set 6: Position overflow 7: Buffer overflow 10: Invalid I/O output request	11: Invalid byte following ESC. 12: Invalid byte in I/O control 13: Out of range I/O parameter 14: Too many I/O parameters 15: Error in I/O transmission 16: I/O buffer overflow 17: Transmit underrun 18: I/O error indeterminate

Functional Specifications

Number of Pens	8
Pen Types	fiber-tip paper pens roller-ball pens drafting pens transparency pens
Media Sizes	8½ × 11 in. (ANSI A) 210 × 297 mm (ISO A4) 11 × 17 in. (ANSI B) 297 × 420 mm (ISO A3) 17 × 22 in. (ANSI C) 420 × 594 mm (ISO A2) 22 × 34 in. (ANSI D) 594 × 841 mm (ISO A1) 34 × 44 in. (ANSI E) 841 × 1189 mm (ISO A0)

(Table continues)

Media Sizes	18 × 24 in. (Architectural C) 24 × 36 in. (Architectural D) 36 × 48 in. (Architectural E)
Media Types	plotter paper, vellum, tracing bond, double-matte polyester film
Maximum Plotting Area	Expand off: 3 margins 15 mm, 1 margin 39 mm* Expand on: 3 margins 5 mm, 1 margin 29 mm
Resolution	addressable step size: 0.025 mm (0.000984 in.)
Pen Speed	maximum 60 cm/sec (24 ips)
Acceleration	approximately 4 g

*Margins listed above are approximate; exact values may vary by a millimetre.

Physical Specifications

Size	depth: 20 in. (508 mm) width: 53 in. (1346 mm) height: 47 in. (1200 mm)
Weight	160 lb. (73 kg)

Environmental Specifications

Operating Temperature	0°C to 55°C
Operating Humidity*	Sheet media: 5 to 95% at 0 to 40°C Roll media: 30 to 70% at 10 to 30°C
Nonoperating Temperature	−40°C to 75°C

*Media must be acclimated to the plotting environment, according to the instructions given in Chapter 3.

Power Specifications

The following section lists the plotter's power requirements and options.

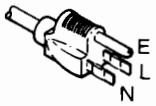
Requirements

Source	100, 120, 220, 240 V~ −10%, +5%
Frequency	48–66 Hz
Consumption	150 W maximum

Options

The power cord supplied with your plotter should match the plug requirement for your area. However, different power cords (international options) are available, as shown in the following table. To obtain a different power cable, contact your local Hewlett-Packard Sales and Support office or authorized dealer.

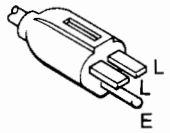
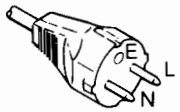
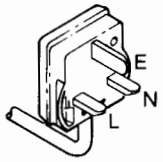
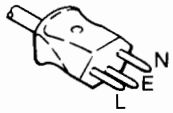
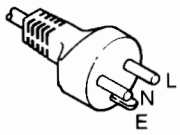
Power Cord Options

AC Plug Type*	AC Voltage	Country	HP Part Number (Option Number)
 NEMA 5-15P	100 or 120 V	Canada Japan Mexico Philippines Taiwan United States	8120-1378 (903)

*L = Line or Active Conductor (also called "live" or "hot")
N = Neutral or Identified Conductor
E = Earth or Ground

(Table continues)

Power Cord Options (Continued)

AC Plug Type*	AC Voltage	Country	HP Part Number (Option Number)
 NEMA 6-15P	220 or 240 V	United States	8120-0698 (904)
 CEE 7-VII	220 or 240 V	East and West Europe Egypt Saudia Arabia	8120-1689 (902)
 BS 1363A	220 or 240 V	United Kingdom	8120-1351 (900)
 ASC112	220 or 240 V	Australia New Zealand	8120-1369 (901)
 SEV 1011	220 or 240 V	Switzerland	8120-2104 (906)
 DHCK-107	220 or 240 V	Denmark	8120-2956 (912)

*L = Line or Active Conductor (also called "live" or "hot")
N = Neutral or Identified Conductor
E = Earth or Ground

RS-232-C Interface Specifications

The following sections present RS-232-C and RS-422-A pin allocations and cable schematics.

Pin Configurations

Interface connector pin configurations are identified and described in the following tables.

RS-232-C Interface on Computer/Modem Connector

The **Computer/Modem** connector is a DTE connector. Data is transmitted on Pin 2 and received on Pin 3.

Wire/Signal Name	Pin #	RS-232-C	CCITT V.24
Protective Ground	1	AA	101
Transmitted Data	2	BA	103
Received Data	3	BB	104
Request to Send	4	CA	105
Clear to Send	5	CB	106
Data Set Ready	6	CC	107
Signal Ground	7	AB	102
Data Carrier Detect	8	CF	109
Data Terminal Ready	20	CD	108.2
External Baud Rate Input	17	DD	115

RS-232-C Interface on Terminal Connector

The **Terminal** connector is a DCE connector. Data is transmitted on Pin 3 and received on Pin 2.

Wire/Signal Name	Pin #	RS-232-C	CCITT V.24
Protective Ground	1	AA	(none)
Transmitted Data	2	BA	103
Received Data	3	BB	104
Request to Send	4	CA	105
Clear to Send	5	CB	106
Data Set Ready	6	CC	107
Signal Ground	7	AB	102
Data Carrier Detect	8	CF	109
External Baud Rate Input	17	DD	115
Data Terminal Ready	20	CD	108.2

Wire/Signal Name	Pin #	RS-422-A
Send Data−	9	SD.A
Send Data+	10	SD.B
Receive Data+	18	RD.B
Receive Data−	3	RD.A
Signal Common	7	SG

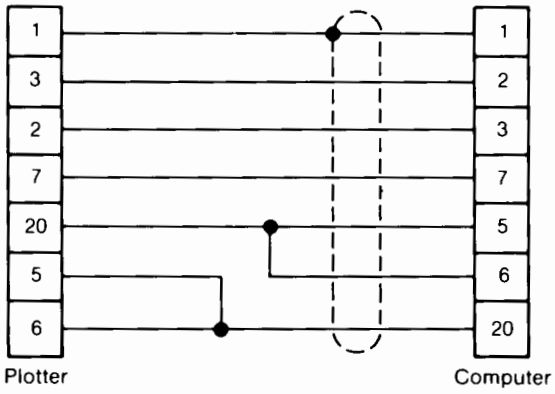
Cable Schematics

The following cable schematics are for Hewlett-Packard interface cables.

Modem Eliminator Cable

HP Cable Number	Connector Type (25-Pin)	
	Plotter End	Computer End
17255D	Male	Female
17255M*	Male	Male

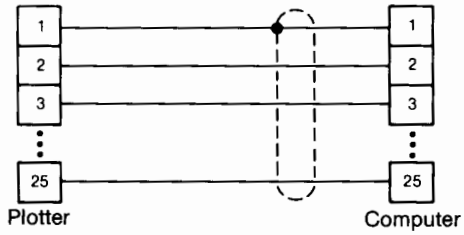
*Symmetrical; either end may be connected to the plotter.



Straight-through Cable

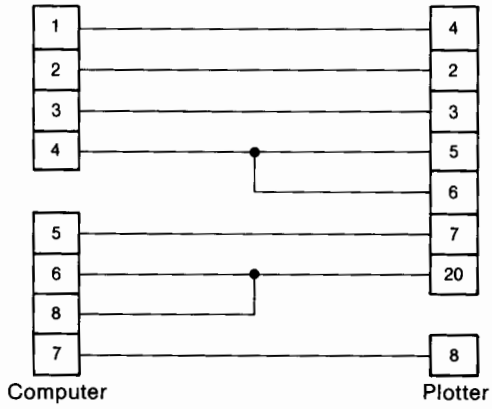
HP Cable Number	Connector Type (25-Pin)	
	Plotter End	Computer End
17355M*	Male	Male

*Symmetrical; either end may be connected to the plotter.



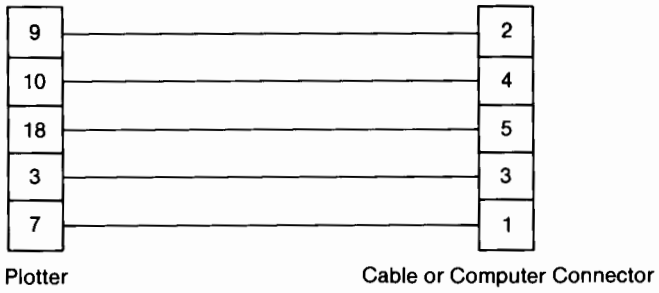
Serial Printer/Plotter Cable

HP Cable Number	Connector Type	
	Plotter End	Computer End
24542G	Male (25-pin)	Female (9-pin)



RS-422-A Adapter Cable

HP Cable Number	Connector Type	
	Plotter End	Computer End
17855M	Male (25-pin)	Male (5-pin)



A

HP-IB Addressing Protocol

Some computer systems use languages such as BASIC, FORTRAN, or COBOL, with high-level input/output (I/O) statements. In this case, the addressing procedure (talk, listen, unlisten) is taken care of by the computer's internal operating system. If your system fits this description, you need not read the remainder of this section.

Some computers use low-level I/O statements to address devices on the HP-IB bus. If your computer uses such statements, you'll need to direct the talking, listening, and unlistening activities. Be sure to review your computer's HP-IB addressing protocol.

One of the first things you must consider when directly controlling the HP-IB is addressing. Following is a typical addressing sequence.

<unlisten> <talk address> <listen address>

1. Unlisten — The universal bus command which uses the character ? to tell all devices to unlisten. After the unlisten command is received, no active listeners remain on the bus.

2. Talk Address — Instructs a device to talk. A new talk address automatically unaddresses the previous talker (the previous device cannot talk or listen).

3. Listen Address — Instructs one or more devices to listen.

The commands (unlisten, talk, listen) are implemented by putting data on the bus and setting the proper control line true (ON). The unlisten command (?) plays a vital role in this sequence. It is important that a device receive only the data intended for it.

The following table lists the address codes and the address characters used to direct talk and listen activities. To use this table, simply identify the address code of the device you wish to send a command to. Use the ASCII address characters to direct talk/listen activities and the ? character to unaddress all devices on the bus.

HP-IB Address Settings

Address Settings					Address Codes		Address Characters		
16	8	4	2	1	Decimal	Octal	Listen	Talk	
0	0	0	0	0	0	0	SP	@	
0	0	0	0	1	1	1	!	A	
0	0	0	1	0	2	2	"	B	
0	0	0	1	1	3	3	#	C	
0	0	1	0	0	4	4	$	D	
0	0	1	0	1	5	5	%	E	← Default
0	0	1	1	0	6	6	&	F	
0	0	1	1	1	7	7	'	G	
0	1	0	0	0	8	10	(	H	
0	1	0	0	1	9	11	)	I	
0	1	0	1	0	10	12	*	J	
0	1	0	1	1	11	13	+	K	
0	1	1	0	0	12	14	,	L	
0	1	1	0	1	13	15	−	M	
0	1	1	1	0	14	16	.	N	
0	1	1	1	1	15	17	/	O	
1	0	0	0	0	16	20	0	P	
1	0	0	0	1	17	21	1	Q	
1	0	0	1	0	18	22	2	R	
1	0	0	1	1	19	23	3	S	
1	0	1	0	0	20	24	4	T	
1	0	1	0	1	21	25	5	U	← Reserved for HP desktop computer
1	0	1	1	0	22	26	6	V	
1	0	1	1	1	23	27	7	W	
1	1	0	0	0	24	30	8	X	
1	1	0	0	1	25	31	9	Y	
1	1	0	1	0	26	32	:	Z	
1	1	0	1	1	27	33	;	[	
1	1	1	0	0	28	34	<	\	
1	1	1	0	1	29	35	=	]	
1	1	1	1	0	30	36	>	^	
1	1	1	1	1	31	37	?	-	← Sets listen-only mode

For example, to tell a computer at address 21 to talk to the plotter at address 5, the computer sets the proper control line true and sends the following sequence to the plotter.

?U%

where ? — tells all devices on the bus to unlisten
U — designates the device at address 21 as the talker
% — designates the device at address 05 as the listener

Interface Functions

The HP-IB offers 10 interface functions to support communication. The following table lists the HP-IB functions the plotter uses.

Mnemonic	Interface Function Name
SH1	Source Handshake
AH1	Acceptor Handshake
T6	Talker (or TE = Extended Listener)*
L3	Listener (or LE = Extended Listener)*
SR1	Service Request
RL0	Remote Local
PP0, 1, 2**	Parallel Poll
DC1	Device Clear
DT0	Device Trigger
C0	Any Controller

*Extended Talkers and Listeners use a two-byte address. Otherwise, they are the same as Talker and Listener.
**PP0 if LISTEN ONLY; PP2 if address < 8; PP1 otherwise.

B

Plotting for Precision

Precision counts when you need parallel lines, exact spacing between two points or lines, exact alignment between figures, or when measurements will be taken directly from your plot. This appendix explains your plotter's capacity for precision and offers suggestions for achieving the most exact plots possible. Additionally, instructions are provided for calibrating the plotter.

How Precise is Your Plotter?

Your plotter's precision is measured in three ways: accuracy, repeatability, and resolution. The following definitions clarify the meaning of each of these terms.

- **Accuracy** specifies how exactly the plotter can position one endpoint with respect to another endpoint.
- **Repeatability** measures how closely the plotter returns a pen to a previously plotted point.
- **Addressable resolution** is the smallest move you can specify programmatically.

The following table lists the amount of accuracy, repeatability, and addressable resolution you can expect from your plotter.

B

Accuracy (on 3-mil double-matte polyester film at 10–30° C)	0.085% of the move length or 0.25 mm (0.0098 in.), whichever is greater*
Repeatability for the same pen pen to pen	 0.1 mm (0.004 in.) 0.2 mm (0.008 in.)
Addressable Resolution	0.025 mm (0.000984 in.)

*Traceable to the National Bureau of Standards.

When the Plot Must be Accurate

The following conditions are necessary to achieve the specifications discussed in the preceding section.

1. **Use Hewlett-Packard 3-mil double-matte polyester film** for precise grit wheel movement and dimensional stability.

   - Hewlett-Packard warrants the plotter's specifications when using HP supplies.
   - Media thickness affects the distance the sheet moves with each rotation of the grit wheel. Film thicker than 3-mil increases the distance so lines are longer than specified. Thinner film has the opposite effect.
   - An antistatic surface placed against the platen prevents static build-up between the plotter's platen and the paper.
   - Polyester film is about 10 times more dimensionally stable than paper.

2. **Keep the room temperature between 10 and 30° C (50 and 86° F) during plotting.** All media can stretch or shrink slightly due to changes in temperature and humidity.

3. **Use the same pen for the entire plot.**

   - Pen concentricity varies from pen to pen.
   - Keep the pen in the pen holder (don't return it to the carousel) until the plot is completed. This eliminates concentricity problems with your pens.

4. **Operate the plotter on a level surface.**

Here are three final suggestions for drawing the most precise plots possible.

- Closely spaced lines are most accurate when drawn in the same direction; for example, left to right each time rather than back and forth. (You'll want to turn **Sort** off.)
- Draw your entire plot without unloading and reloading the medium. Reloading plotting medium in order to make additions to a plot can introduce repeatability errors.
- When making overlays, use the same plotter to draw the entire set of plots. Also use the same media for all overlays, and plot at similar room temperatures.

Calibrating the Plotter

Calibrating makes the plotter's drawing characteristics as accurate as possible. For greatest accuracy, calibrate your plotter if any of the following conditions have occurred.

- Plotter parts have been changed (pinch wheels, for example).
- The plotter has been subjected to physical stress.
- Your plotting environment differs considerably from the calibration environment at the factory (18 to 30°C, level floor).

How to Do the Calibration Procedure

The plotter is calibrated at the factory using E-size (A0) polyester film and a black drafting pen. If you recalibrate with another pen/media combination, this will result in different calibration constants being stored in and used by the plotter. For best results, recalibrate using the pen/media combination that you use when your need for precision is greatest.

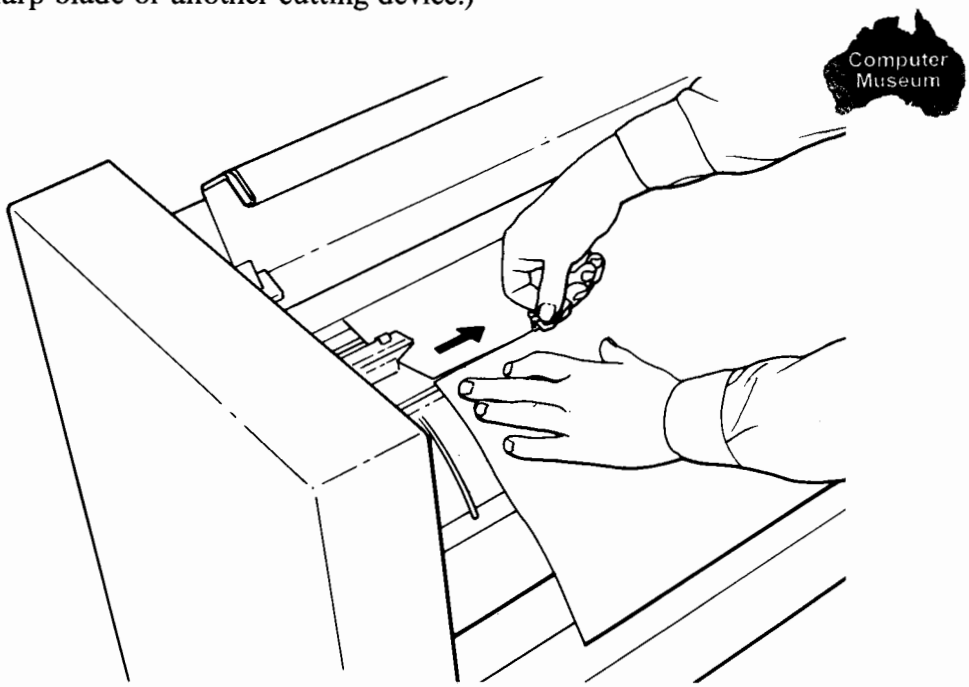
Complete the following steps to calibrate the plotter.

1. Turn the plotter off.
2. Load a black drafting pen in stall 8 of the pen carousel. Make sure the pen is in good operating condition and has a tip size of 0.35 or greater.
3. Load a sheet of E- or D-size polyester film in the plotter. Handle the film by the edges, so you don't get fingerprints on it. Take care to accurately align the left pinch wheel with the left edge of the medium.

4. Press **Pen Select** button **8** while turning on the plotter to begin the procedure.

   CALIBRATING... will display on the front panel and the calibration sequence will begin. The pen holder will move across the platen. Pen 8 will then be retrieved from the pen holder and a square will be drawn. When this process is complete, the plotter will display **CUT PAGE, ROTATE 90°**.

5. Raise the plotter's carriage cover. If you have a rollfeed plotter, use the paper cutter to cut off the bottom of the page, even with the slot in the plotter's platen. (If you do not have a paper cutter, use a sharp blade or another cutting device.)



6. Pull the paper-loading lever towards you to raise the pinch wheels. Remove the medium from the plotter. Rotate the page 90 degrees clockwise and reload the medium in the plotter. The cut edge of the medium should be along the left side of the plotter.

7. Carefully align the line on the left pinchwheel with the left edge of the medium. Raise the paper-loading lever.

8. Lower the carriage cover and press the **Enter** button.

   The message **CALIBRATING...** will display. The pen holder will move across the medium several times, sensing the corners of the square just drawn.

9. When the calibration procedure is complete, the message **CALIBRATION COMPLETE** will display. Turn the plotter off and then on again before plotting.

If the calibration fails, the message **CALIBRATION FAILED** will display. Turn the plotter off and then on again to clear the display. Then, check the following and start over: make sure your pen is operational; when reloading polyester film, place the writing surface face up; make sure the left pinch wheel is correctly aligned with the left edge of the plotting medium; when you cut and reload the medium, place the cut edge along the left side of the platen. Additionally, the white stripe on the platen must be clean. (This includes both the stripe and the white dots on either side.) Use a cloth dampened with water if you need to clean this surface.

Measuring Inaccuracy

Each of the preceding recommendations ensures accuracy. Not following a recommendation introduces a certain amount of error into your plots. These amounts are listed in the following table.

Source of Error	Magnitude of Error	Effect on a 1016 mm Line
Using paper instead of polyester film.	Changes up to 1% in paper-axis	10.16 mm (paper-axis)
Using polyester film thicker or thinner than 3 mil	0.021% of a paper-axis move per mil	0.212 mm (paper-axis) per mil
Plotting on polyester film at one temperature and measuring at a different temperature	0.017 mm/m/°C	0.017 mm/°C
Plotting on film at one humidity and measuring at a different humidity	0.006 mm/m/%RH	0.006 mm/%RH
Making overlays with more than one plotter	0.4% of move length or 1 mm (whichever is greater)	2.03 mm
Frame-to-frame repeatability	0.2 mm	N/A

C

Accessories Available

This appendix lists the accessories available for your plotter and tells you how to order supplies and accessories. Descriptions of the *Programmer's Reference* and *Programmer's Pocket Guide* are included.

Plotter Accessories

The following items are available and can be purchased using the appropriate part number. For information on available pen and media supplies, refer to the *Drafting Supplies Catalog* shipped with your plotter.

Plotter Accessories and Cables

Item	HP Part Number
HP DraftMaster Programmer's Reference	07595-90001
HP DraftMaster Programmer's Pocket Guide	07595-90003
HP DraftMaster User's Guide	
English	07595-90002
German	07595-90004
French	07595-90005
Spanish	07595-90006
Italian	07595-90007
Japanese	07595-90008
power cable	see Appendix A
RS-232-C cable (for use with IBM PC and PC/XT)	17255D (1.5 m)
RS-232-C cable (for use with HP Touchscreen and HP Vectra)	17255M (1.5 m)

(Table continues)

Plotter Accessories and Cables (Continued)

Item	HP Part Number
RS-232-C cable (for use with DEC VAX and HP 3000, series 64, 42, and 48)	17355M (3 m)
RS-232-C cable (for use with HP Vectra and IBM AT)	24542G (3 m)
RS-422-A cable (for use with HP 3000, series 64, 42, and 48)	17855M (5 m)
HP-IB cable (IEEE 488-1978), RFI shielded (for use with HP Series 200 and HP Series 300)	10833A (1 m), B (2 m), or C (3 m)*
pen carousel	5062-1576
disposable pen adapter	5061-7578
replacement boots for fiber-tip and rollerball pens	5061-7635
replacement boots for drafting pens (disposable and refillable)	5061-7636
digitizing sight	09872-60066
media cutters (5)	07596-60008
grit wheel brush	5062-1515

*The HP 31389 and HP 45529 cables are equivalent to the HP 10833.

The Programmer's Reference and Pocket Guide

The *HP DraftMaster Programmer's Reference* available for your plotter contains complete explanations and examples of the plotter's graphic and interfacing instructions. The *Programmer's Reference* is a valuable tool for writing your own programs using the plotter's programming instructions, HP-GL.

The *HP DraftMaster Programmer's Pocket Guide* is also available and provides a quick, convenient reference when programming in HP-GL. The *Programmer's Pocket Guide* is intended for those who are already familiar with the information contained in the *Programmer's Reference.*

How to Order Supplies and Accessories

You can order supplies and accessories in any of these three ways:

1. Call your local authorized HP dealer.
2. Contact your local HP Sales and Support office.
3. In the United States, use HP's Direct Order telephone service. The telephone number is provided in the *Drafting Supplies Catalog* shipped with your plotter.

For a complete list of Hewlett-Packard supplies and accessories, order the *Computer User's Catalog* (Part No. 5953-2450). You can obtain one by asking at your local HP Sales and Support office.

Notes

C

Glossary

ASCII — American Standard Code for Information Interchange. An 8-bit code that uses 7 bits to represent character data such as letters, punctuation, symbols, and control characters. Bit 8 can be used for parity.

Acceleration — The rate at which a pen reaches its maximum velocity. Acceleration is measured in centimetres per second per second.

Address — The address specifies the plotter's location on the HP-IB (IEEE-488) interface cable (bus).

BASIC — Beginner's All-purpose Symbolic Instruction Code; a programming language which uses common English words.

Baud Rate — For an RS-232-C interface, the data transmission rate between a computer and a peripheral (bits per second).

Buffer — A part or parts of computer or device memory where data is held until it can be processed. Usually refers to a memory area reserved for I/O operations.

Bus — Short for HP-IB (IEEE-488) interface.

Bypass	In an RS-232-C configuration, a mode that controls when the plotter can receive and process instructions. In bypass-on mode, all instructions received are ignored except the programmed-on instruction. In bypass-off mode, all instructions are received and processed.
CTS (Clear to Send) Lines	Communication lines used by a modem to indicate whether or not the modem is ready to transmit data.
Communication	Data exchange between two or more devices.
Configuration	The way in which computer equipment is interconnected and set up to operate as a system.
Continuous Memory	Plotter memory which stores certain plotter conditions even when the plotter is turned off.
DSR (Data Set Ready) Lines	Communication lines used by a modem to indicate communication status.
Data Communication	The exchange of data between devices.
Debug	To find and correct mistakes in a computer program.
Default	A value or condition that is assumed if no other value or condition is specified.
Device-Control Instruction	The portion of the plotter's instruction set that controls internal plotter conditions such as buffer size, input/output conditions, RS-232-C interface conditions and handshakes.
Digitize	The process of converting a physical location defined by X,Y coordinates into digital information a computer understands.
Eavesdrop	In an RS-232-C configuration, a state in which the plotter is physically connected between a computer and some other device such as a modem, a terminal, or another computer.

Handshake	RS-232-C communication between a computer and the plotter about the availability of I/O buffer space. A handshake ensures correct and complete data transfer.
Hewlett-Packard Graphics Language (HP-GL)	The graphics instruction set Hewlett-Packard plotters understand.
HP-IB	Short for Hewlett-Packard Interface Bus. Hewlett-Packard's version of IEEE Standard 488-1978 for interfacing programmable devices (e.g., computers, plotters, and printers).
IEEE 488-1978 Interface	A parallel interface standardized by Electronic Industries Association Standard 488-1978.
Initialize	To set plotter conditions to known default values.
Interface	Anything (a cable for example) used to join components of a computer system so they function in a compatible and coordinated fashion. Standards which allow systems to connect with each other; i.e., RS-232-C, HP-IB.
Interface Cable	The data transmission cable used to connect a peripheral device to a computer. Most devices require an RS-232-C, HP-IB (IEEE 488-1978), or Centronics interface cable.
I/O Error	A data transmission error between a computer and peripheral. Examples of I/O errors are mismatched interface conditions, such as baud rate and parity.
Literal String	When using BASIC, any sequence of letters, numbers, and symbols enclosed by quotation marks. The plotter can only accept literal strings or a specific set of ASCII control characters.
Local Mode	In an RS-232-C configuration, a mode in which the plotter accepts instructions through the cable inserted in the plotter's interface connector labeled **TERMINAL**.

Menu	Messages and options displayed on the plotter's front-panel screen.
Modem	A modulator-demodulator. A device that links a computer to another device by using telephones and/or telephone transmission lines. A modem acts as a data translator.
Monitor Mode	A functional state in which the plotter echoes instructions it receives back to a terminal or computer. *Parse* monitor mode echoes instructions after they have been parsed. *Receive* monitor mode echoes instructions and escape sequences as soon as they are received.
Operating System	The computer software or firmware that controls the execution of programs.
Overflow	To exceed the capacity of a buffer's storage space. When a buffer overflows, the excess data is lost.
P1	A scaling point the plotter uses that generally specifies the location of a plot's lower-left corner.
P2	A scaling point the plotter uses that generally specifies the location of a plot's upper-right corner.
Parallel Interface	An interface type in which a separate line is used for each data bit in a byte or word and all bits are transferred simultaneously.
Parity	An error-checking method for information transfer between a computer and a peripheral device. Parity is used to check the accuracy of binary data.
Parse	To subdivide an instruction into components that the plotter can more easily understand and use. An HP-GL instruction, for example, is parsed (divided) into a mnemonic, parameters, separators, and a terminator.

Peripheral (device)	A device separate from, but used with, a computer. For example, a disc drive, printer, or plotter.
RS-232-C Interface	A serial interface standardized by the Electronic Industries Associaton Standard RS-232-C.
Remote Mode	In an RS-232-C configuration, a mode in which the plotter receives instructions through the cable inserted in the plotter's male interface connector labeled **COMPUTER/MODEM**.
Repeatability	A measure of how closely a device can return a pen to the previously plotted point.
Resolution	A measure of image sharpness expressed as a number of lines per unit length. When referring to plotters, addressable resolution means the smallest move the plotter can make programmatically.
Scaling	Dividing the plotting area into units convenient for your application.
Scaling Points	Points assigned the user-unit values specified in the scale (SC) instruction. These points, also known as P1 and P2, define opposite corners of a rectangular area.
Serial Interface	A serial interface uses a single data line to transfer data bits sequentially between devices. RS-232-C is a serial interface.
Standalone Configuration	When using the RS-232-C interface, a configuration where the plotter is connected to the computer via a separate (not a shared) cable.
Stop Bit	In an RS-232-C configuration, one or two bits following a transmitted piece of information; used to notify the receiving device that the information is complete.

Notes

Index

Notes

HEWLETT PACKARD

PART NO. 07595-90002

PRINTED IN U.S.A., FEBRUARY 1988