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## HP DraftMaster SX/RX Plotter User's Guide



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# HP DraftMaster SX/RX Plotter User's Guide



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## Notice

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## Printing History

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New editions are complete revisions of the manual. Change sheets, which may be issued between editions, contain additional information. The dates on the title page change only when a new edition is published. Minor corrections that do not affect the function of the product may be made at reprint without a change to the print date.

Many product updates do not require manual changes and manual corrections may be done without accompanying product changes. Therefore, do not expect a one to one correspondence between product updates and manual revisions.

First Edition — October 1989

# **Warranty Statement**

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## **One-Year On-Site Hardware Warranty**

Except when purchased as part of a system, 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 (proof of purchase required). 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 refund of the purchase price upon return of the product.

If this product was purchased as part of an HP system in a coordinated shipment or as a system add-on, it is warranted against defects in material and workmanship during the same period as the HP system.

### **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; operation of non-supported media; or improper site preparation and maintenance.

### **Obtaining Warranty Service**

To obtain warranty service, customer must contact a 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 must supply proof of the purchase date.

### **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 of 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.

### **Obtaining Service During Warranty Period**

If your hardware should fail during the warranty period, read the *Troubleshooting* chapter in this guide, then contact your 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. Retain proof of purchase in order to obtain warranty service.

### **After the Warranty Period**

If your hardware should fail after the warranty period, read the *Troubleshooting* chapter in this guide, then contact an Authorized HP Personal Computer Dealer Repair Center or call an HP Sales and Support Office for details of the services available. If you have an HP Maintenance Agreement, request service under your agreement.

# Getting Help

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Hewlett-Packard has support services available to help you in case you have a problem with your HP DraftMaster SX/RX plotter. Following are suggestions of places to turn for this support.

Before you call for customer support, make sure you do the following.

1. Review Chapter 6, *Troubleshooting*, in this User's Guide.
2. Run the Demonstration plot as described on page 1-23.
3. Make sure you are using the correct interface cable and plotter interface configuration, as explained in Chapters 7 and 8, and Appendix A.
4. Check with your software vendor for help.

## Your Dealer

If you still have difficulty, begin by contacting the person from whom you purchased your HP DraftMaster SX/RX. Your sales representative is familiar with your needs, equipment, and software and should be able to provide you with the information you want.

## HP DraftMaster SX/RX Plotter Customer Assistance

If you don't get the answers to your questions from your dealer or sales representative, Hewlett-Packard has an HP DraftMaster SX/RX Customer Assist service available to you. The HP DraftMaster SX/RX Assist staff can help by answering questions on topics such as setting up your plotter and computer, and can help you find third party software solutions for your special plotting needs.

When you call the HP DraftMaster SX/RX Assist group, please have the following information available to help us answer your questions more quickly.

- Identify what computer you are using. \_\_\_\_\_  
\_\_\_\_\_
- Identify any special equipment or software you are using (for example, spoolers, networks, switch-boxes, modems, or special software drivers).  
\_\_\_\_\_  
\_\_\_\_\_
- Identify what cable you are using (by part number and manufacturer) and where you purchased it. \_\_\_\_\_  
\_\_\_\_\_
- Identify the type of interface used on your plotter (RS-232-C or HP-IB).  
\_\_\_\_\_  
\_\_\_\_\_
- Identify the software name and version you are currently using. \_\_\_\_\_  
\_\_\_\_\_

The HP DraftMaster SX/RX Assist service is available from 7 am - 4 pm (Mountain Standard Time), Monday through Friday.

**(208) 323-2551**

Should the plotter require service, please refer to Chapter 6 for instructions.



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## 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 RX)

Take-up spool (DraftMaster RX)

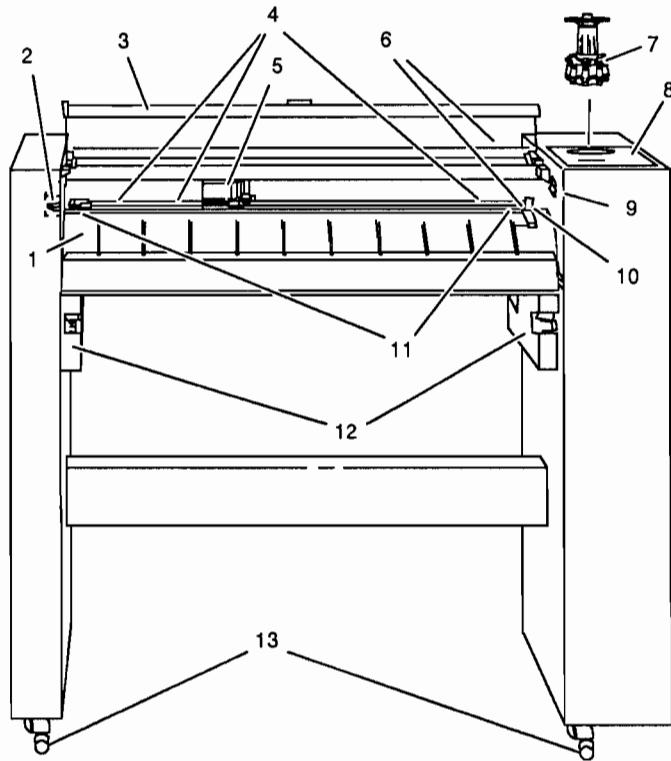
Media cutters (DraftMaster RX)

For information on ordering additional supplies, including interface cables, the *HP-GL/2 Reference Guide* and the *HP DraftMaster Programmer's Reference* (HP-GL), 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)

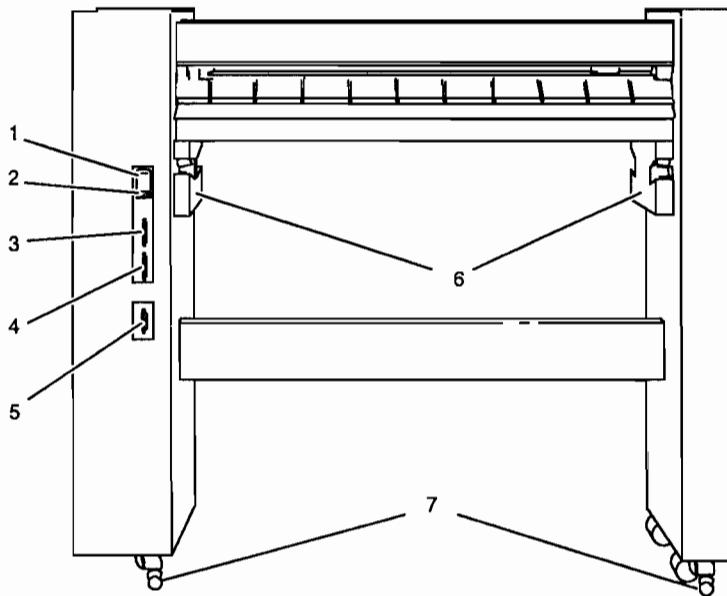
Look at the front of your plotter and identify the features numbered in the following figure.



1. **Platen** — Provides firm surface for plotting.
2. **Paper Cutter (DraftMaster RX)** — 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 media 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 RX)** — 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.

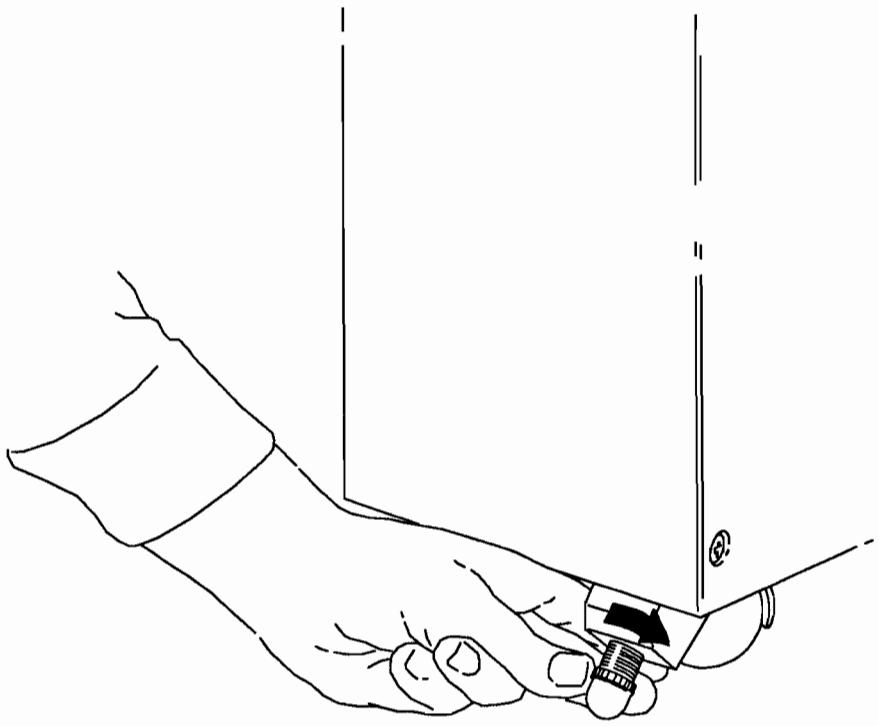
6. **Paper Spool Yoke (DraftMaster RX)** — Accepts supply spool of roll media.
7. **Stabilizing Feet** — Increase plotter stability.

## 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 centimeters).



Before moving the plotter to a new location, turn each foot in a counterclockwise 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 can draw the Demo plot and display front panel 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



+     

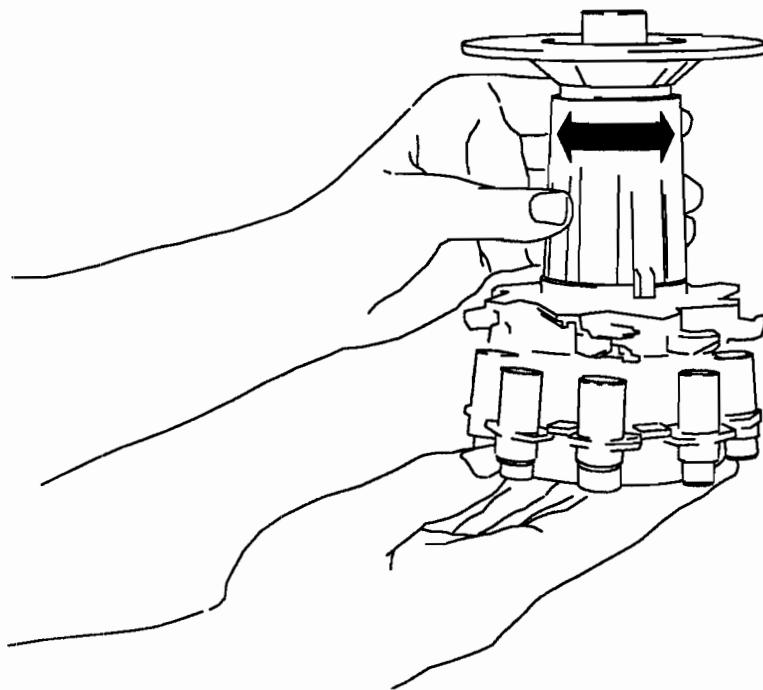
= Japanese

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.



Paper  
pens



Transparency  
pens



Rollerball  
pens



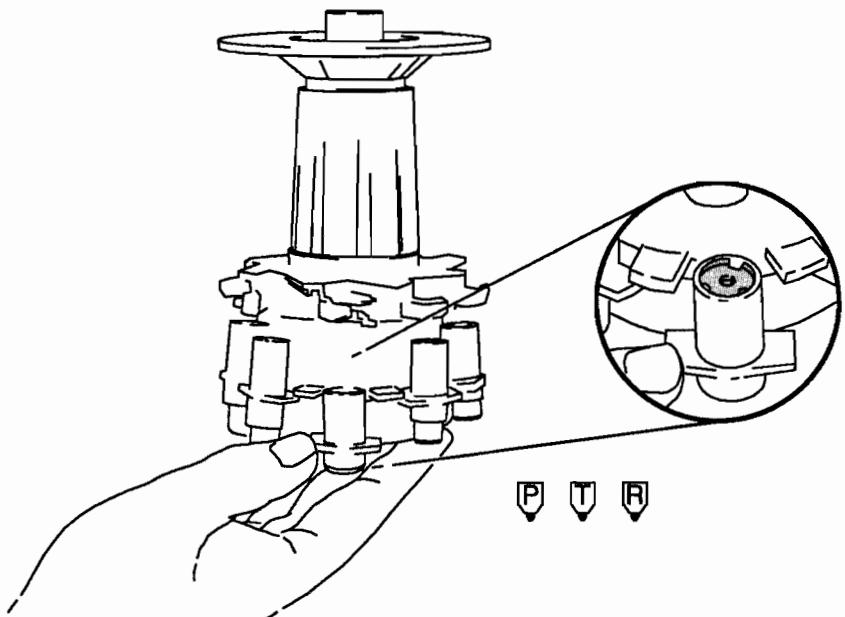
Drafting  
pens for vellum  
and paper



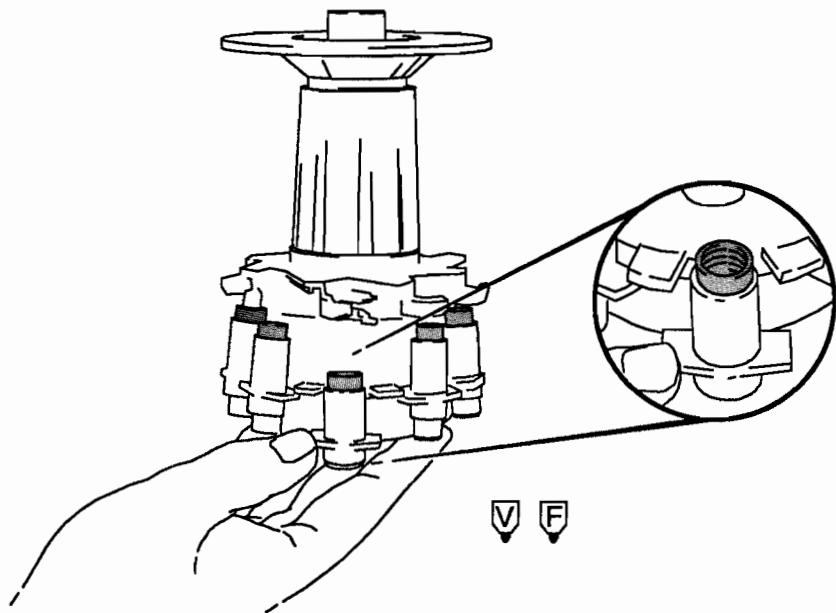
Drafting  
pens for film

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. (The pen boot is shaded in the illustration.) 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.



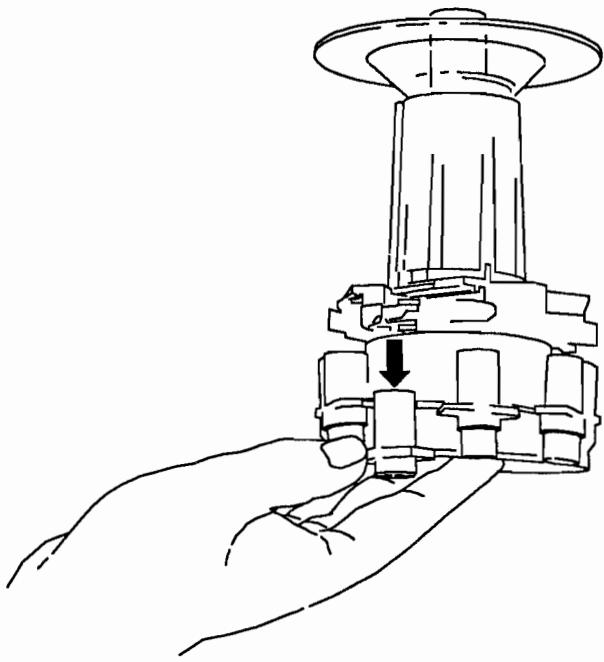
- b. For refillable and disposable drafting pens, use the larger pen boots.



**NOTE:** If you are using SurePlot pens for vellum and paper, you can use either the small or the large 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 film 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 recommended 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 millimeters) 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*



*Rollerball pens*

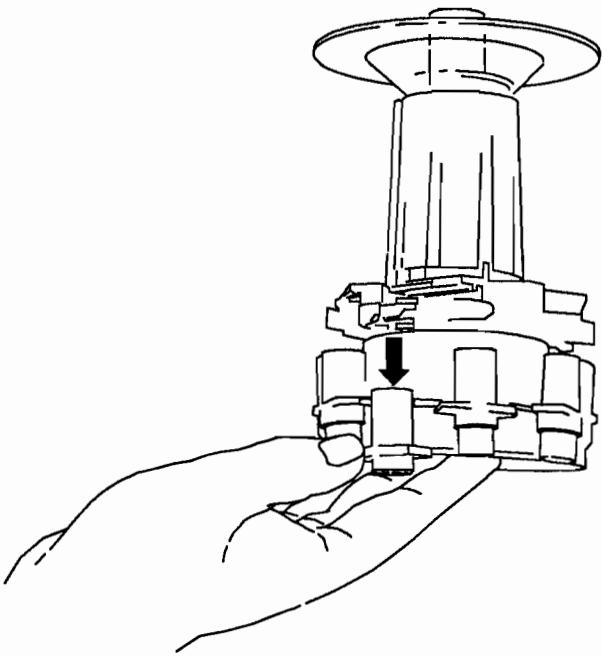


*Drafting pens for vellum  
and paper*



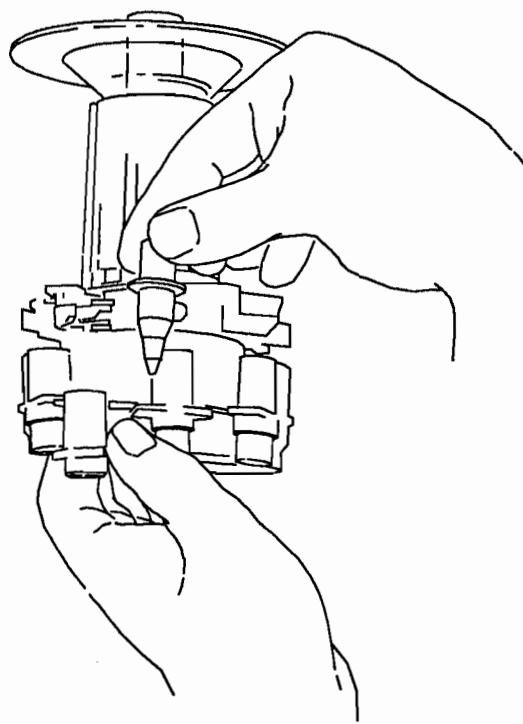
*Drafting pens for film*

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 thumb to pull down the stall's pen cap.

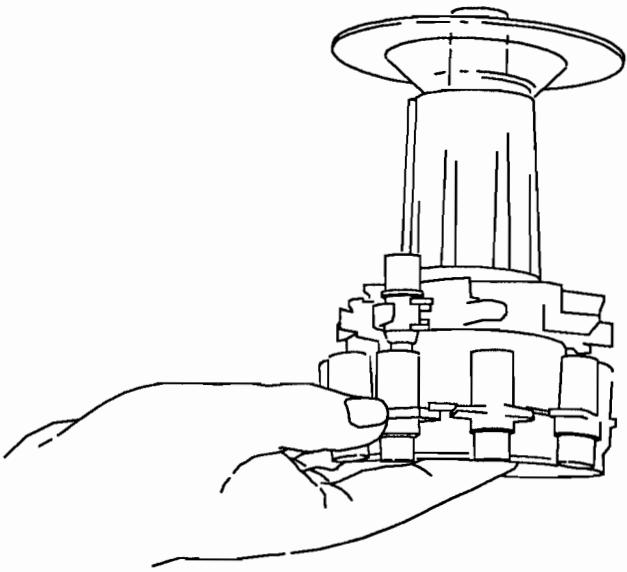


**NOTE:** If you are using film or refillable drafting pens, make sure drafting pen boots are installed in each pen stall. If you need to change the boots, refer to the preceding section, *Using Pen Carousels*. ■

- 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. The message **PUT IN CAROUSEL** will display.
2. Lower the carousel into the carousel well, onto the spindle. The carousel rotates automatically.

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 loaded, 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, 30 × 42 in., and E
- ISO A4, A3, A2, A1, and A0

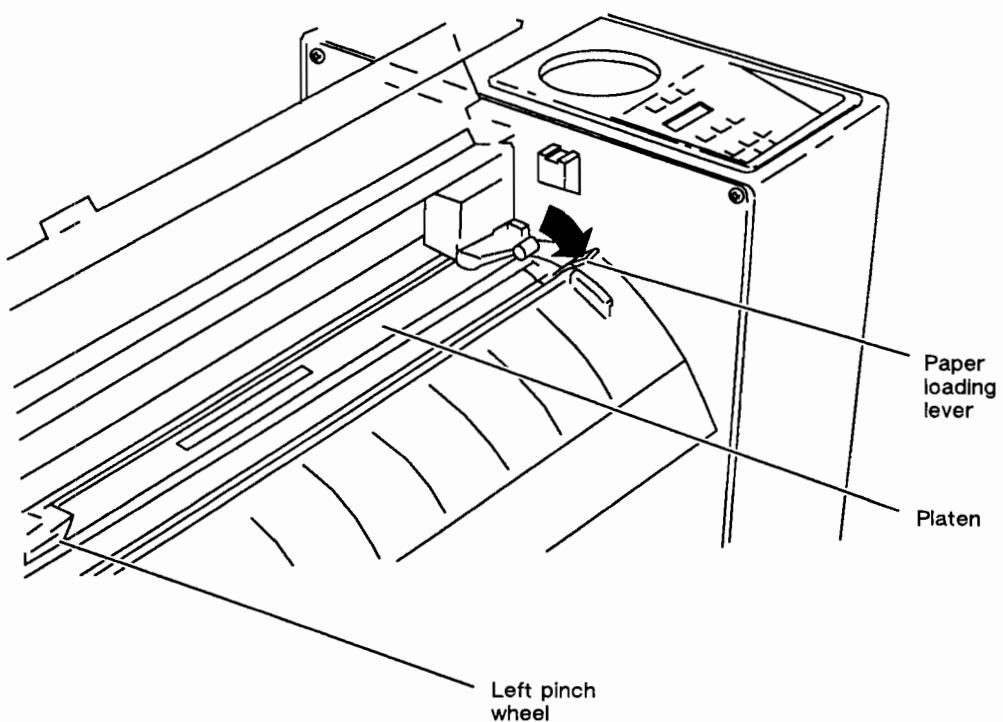
When you load media, the left edge of the media must extend at least one-half inch (12.7 mm) over a grit wheel when the right edge of the media is against both paper guides. Use the following table when loading media to determine whether to place the *width* or the *length* of the media along the platen.

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
30 × 42 in. 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.)

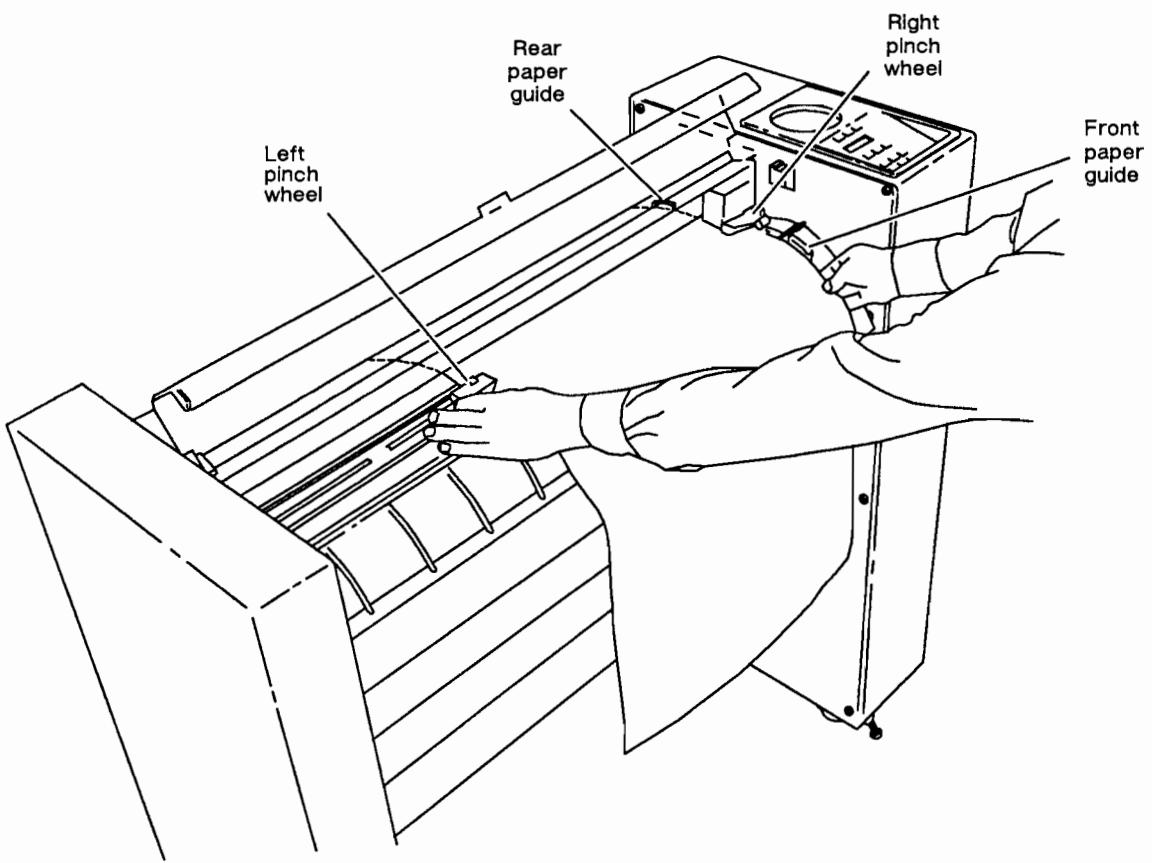
1. Turn the plotter on. After a few seconds, the message **LOAD PAPER TO PLOT** will display on the plotter's front panel. (A numeric code may also appear; this code is used by HP service engineers and may be ignored during normal operation.)
2. Raise the carriage cover. The message **LOWER COVER PRESS •** will display.

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

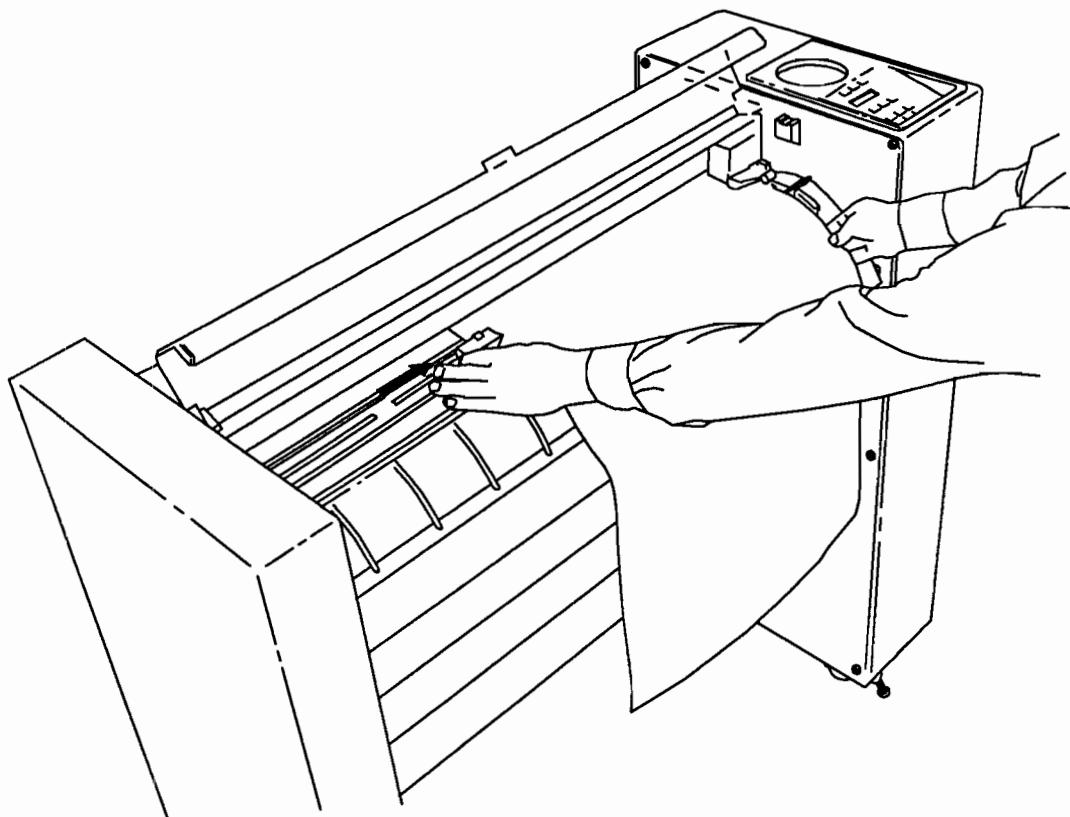


4. Hold a piece of plotter paper by the edges and slide it under the right pinch wheel. Slide the paper until approximately *half of the sheet* is hanging in front of and half behind the plotter.

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.

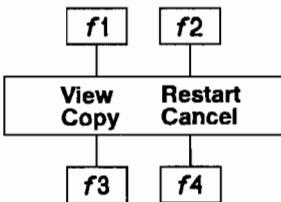


6. Push the paper-loading lever away from you to lower the pinch wheels — this will hold the media in place.

**NOTE:** Always raise the pinch wheels (lever pulled toward you) when you are not using the plotter. If the pinch wheels are left in the lowered position (lever pushed toward rear of plotter), the side of the pinch wheel that rests on the grit wheel will temporarily flatten. As a result, media may slip during plotting. ■

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

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



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

If the media is loaded incorrectly the page may crumple when the plotter tries to determine the size of the media. 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 media (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 recommended size media. To select a language for your demo plot, see *Having the Plotter Speak Your Language* earlier in this chapter.

While the demonstration plot is running, you can experiment with the **Copy**, **Restart**, and **Cancel** features.

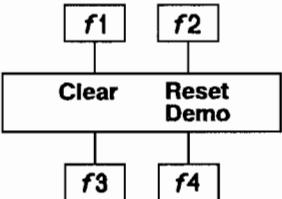
**NOTE:** Drawing the demonstration plot clears the plotter's buffer. Therefore, any plots currently plotting and waiting to be plotted will be erased when you start the demo. ■

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  symbol. The following pen colors are suggested.

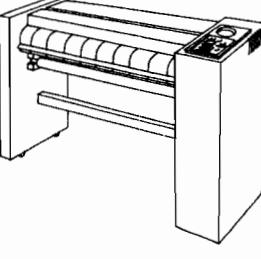
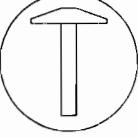
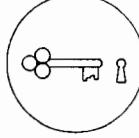
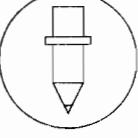
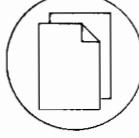
Pen Stall Number	Pen Type and Color
1	P.3, black
2	P.3, red
3	P.3, blue

2. Load a sheet of plotter paper, following the steps provided earlier in this chapter.
3. Press the **Next Display** button until the **Clear** menu displays as shown below. (For a complete flowchart of front-panel menus, see the *Quick Reference* card, Chapter 2, or Appendix A.)



4. Press the **Demo** function button (**f4**). When the message **Start Demo?** displays, press **Yes** (**f3**) to begin the plot.

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

<p><b>Easy to Use</b></p>  <p><i>Easy-to-follow LCD display Pen parameters optimized Rollfeed capability (RX only) Built-in media cutter (Rollfeed)</i></p>	<p><i>Presenting the</i></p>  <b>HEWLETT PACKARD</b> <p><b>DraftMaster SX and RX Drafting Plotters</b></p> 	<p><b>Superior Performance</b></p>  <p><i>Excellent line quality Fast plotting Frees up computer quickly Exceptional reliability</i></p>												
<p><b>Many Applications</b></p>  <p><i>Mechanical Electrical Architectural Construction Mapping Surveying</i></p>	<p><b>Specifications</b></p> 	<p><b>Wide Compatibility</b></p>  <p><i>New HP-GL/2 Language HP-GL Emulation Supported by all major CAD software RS-232-C and IEEE-488</i></p>												
<p><b>Multiple Pen Types</b></p>  <p><i>Fiber-tip Rollerball Disposable drafting Refillable drafting Transparency</i></p>	<p><b>Media sizes:</b> A/A4 to E/A0 sizes</p> <p><b>Speed:</b> 110 cm/sec (43ips) max</p> <p><b>Acceleration:</b> 5.7 g (maximum)</p> <p><b>Resolution:</b></p> <table> <tr> <td><b>Addressable:</b></td> <td>.025mm (.001 in)</td> </tr> <tr> <td><b>Mechanical:</b></td> <td>.00525 mm (.00025in)</td> </tr> <tr> <td><b>Repeatability:</b></td> <td>0.1 mm (.004 in)</td> </tr> <tr> <td><b>Accuracy:</b></td> <td>0.25 mm (.01 in) or .09% of move</td> </tr> <tr> <td><b>Memory:</b></td> <td>1 MB standard</td> </tr> <tr> <td><b>Warranty:</b></td> <td>One year, on site</td> </tr> </table>	<b>Addressable:</b>	.025mm (.001 in)	<b>Mechanical:</b>	.00525 mm (.00025in)	<b>Repeatability:</b>	0.1 mm (.004 in)	<b>Accuracy:</b>	0.25 mm (.01 in) or .09% of move	<b>Memory:</b>	1 MB standard	<b>Warranty:</b>	One year, on site	<p><b>Choice of Media</b></p>  <p><i>Bond Vellum Tracing bond Polyester film Transparency film Clear film</i></p>
<b>Addressable:</b>	.025mm (.001 in)													
<b>Mechanical:</b>	.00525 mm (.00025in)													
<b>Repeatability:</b>	0.1 mm (.004 in)													
<b>Accuracy:</b>	0.25 mm (.01 in) or .09% of move													
<b>Memory:</b>	1 MB standard													
<b>Warranty:</b>	One year, on site													

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



## Using the Front Panel

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

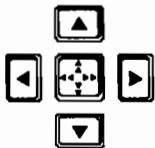
- select and move pens
- display menus
- select and store menu options

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.

- **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.

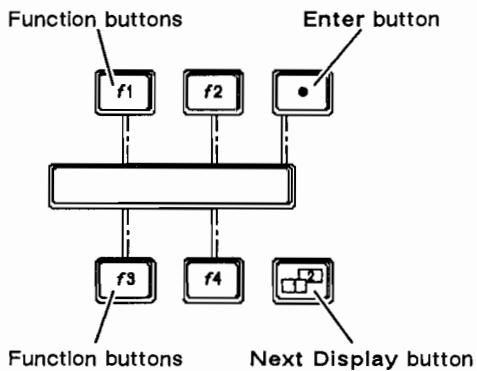


**Cursor Control Buttons**



**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 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.

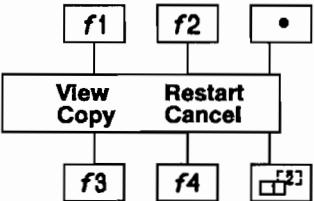
## Working with the Plotter's Menus

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, copy the last drawn plot, restart a plot, and draw the demonstration plot — along with many other functions.

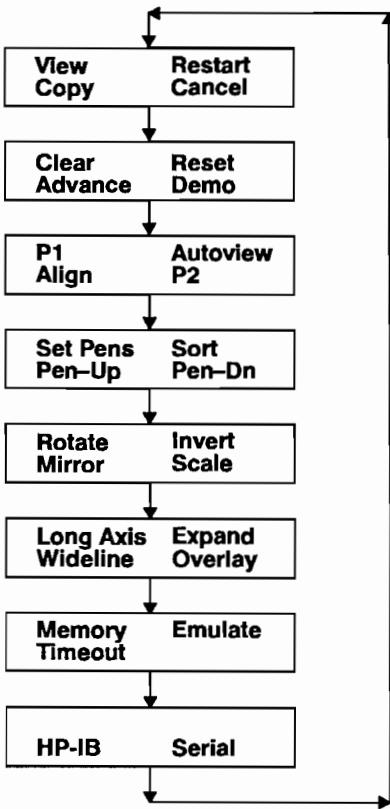
In addition to the eight primary menus, there are several specialized menus used when connecting the plotter to a computer and debugging communication or programming errors. These menus are explained in Chapter 7.

## Selecting a Primary Menu

The following primary menu (menu 1) 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.

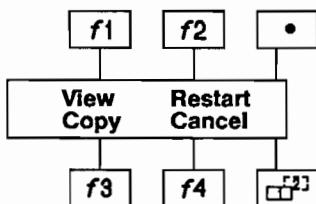


## Selecting and Storing Menu Options

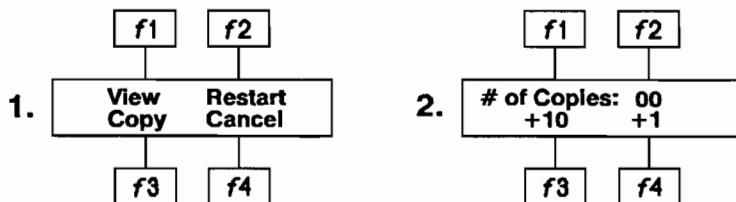
Use the plotter's function buttons (**f1** through **f4**) to access menus, submenus, and submenu options. When you press a function button, the plotter will respond in one of the following ways.

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

An example of a function button performing a specified action is the **View** function button. When the plotter is drawing, pressing **View** (**f1** on menu 1) temporarily halts the plot in progress and moves the media forward so you can check the drawing.



An example of a function button displaying a submenu is the **Copy** function button. When you press **Copy** (**f3** on menu 1), the copy submenu displays, as shown below.



When a submenu displays, such as the **Copy** submenu in this example, you can use the function buttons to view the options that are available. In this case the selections are 0 through 99 copies. Each time you press the corresponding function button (**f3** and **f4**) a new copy 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:** You can change menu settings while a plot is in progress, but some menus may not respond immediately. Turn on **AutoView** to automatically stop the plotter between plots to allow front-panel, pen and media changes. ■

Some options are stored continuously (even if you turn the plotter off), while others are stored temporarily (must be reestablished 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.

## About the Buffer

Because computers can transmit data faster than plotters can draw, you may need the use of your computer while it waits for some plotters to accept data. To reduce the use of your computer to you sooner, the DraftMaster SX and RX plotters have standard one megabyte buffers that are able to receive data as fast as the computer can send it. The buffer temporarily stores up to one megabyte of plot data (with a maximum of 40 plots) until the plotter is ready to accept more data. As the plotter finishes each plot, the buffer empties, enabling it to accept additional data from your computer.

In addition to keeping your computer free, the buffer retains the last-drawn plot in memory until a new plot begins. This enables you to request up to 99 additional copies of the drawing without resending it from your computer. You can also restart a drawing in progress without having to resend the plot from your computer.

**NOTE:** If your software requests the status of a plot that is waiting in the buffer and not currently being plotted, your computer may become inaccessible. To resolve this problem, turn **Memory** off to disable the buffer and send the plot again. (Turning **Memory** off erases any data in the plotter's buffer.) Or, send the plot to a plot file first and then send the plot file to the plotter. ■

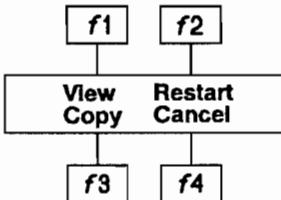
## Learning to Use the Front Panel Features

Try using the following front-panel features while running the demonstration plot to see their effect: View, Clear, 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 in the next section.

### 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 (f1 on menu 1)** to view a plot in progress.



After you press **f1**, **View** will flash on the display. The pen will return to the carousel and the media will move so it is fully extended. You can check the progress of your plot or remove the carousel and change pens. You can also change certain front panel menu settings.

To continue plotting, press **View (f1)** again; the pen and paper will return to their previous positions, the display will stop flashing, and plotting will resume.

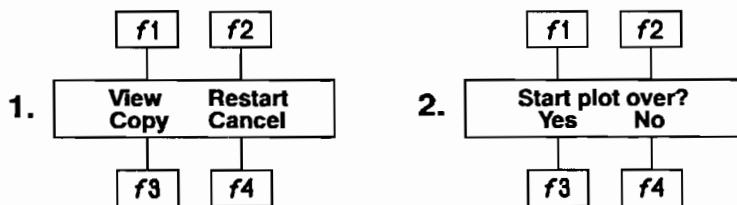
Another way to view a plot in progress is to raise the carriage cover.

**NOTE:** When **View** is activated, the **Group**, **Sort**, **Restart**, **Cancel**, **Clear**, **Reset**, **Advance** and **Demo** front-panel buttons are inactive. ■

## Restarting a Plot in Progress

**USE:** Use **Restart** to permanently stop a plot in progress and start it over from the beginning without resending the plot from your computer. **Restart** does not reset any front panel conditions.

**EXPLANATION:** Use the following procedure to restart a plot.



1. Press **Restart** (**f2** on menu 1).
2. When **Start Plot Over?** displays, press **Yes** (**f3**). Plotting will stop, but the plot remains in the plotter's buffer. The message **Load Paper to Plot** displays. After you load new media, the plotter will temporarily be in **AutoView** mode, allowing you to change front-panel settings\* and check pens.

When you are ready to redraw the plot, return to the main menu and press **Continue** (**f1**). The plotter immediately begins redrawing when you exit **AutoView** mode, so be sure to check pens and front-panel settings *before* pressing **Continue**.

To exit without stopping the plot, press **No** (**f4**) or **Next Display**.

Use **Restart** if, after starting the plot, a pen runs out of ink, you want to change the pen/media combination, or you want to adjust front-panel settings.

If you press **Restart** while the plotter is drawing, it may take several seconds for the plotter to respond.

**NOTE:** If the plotter redraws more than one file at a time, your software may not be sending the proper end-of-file commands. Experiment with various **Timeout** settings to determine which timeout value works best with your software and plotter driver. Refer to *Using Timeout to Identify Ends of Plots* later in this chapter for details. ■

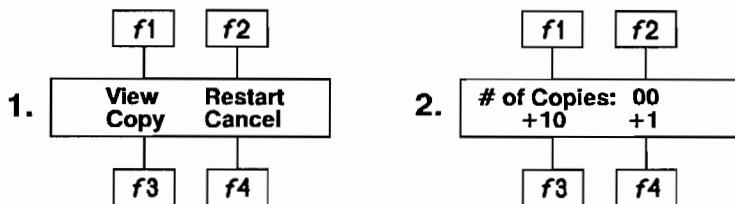
\* In View mode, the Group, Sort, Restart, Cancel, Clear, Advance and Demo buttons are inactive.

## Plotting Multiple Copies

**USE:** Use **Copy** to tell the plotter how many additional copies of the *current* plot to produce. (A plot is current until the plotter begins drawing the next plot.) **Copy** enables you to obtain multiple copies without resending the plot from your computer.

**OPTIONS:** 0 through 99 in increments of 1.

**EXPLANATION:** Use the following procedure to plot multiple copies of a drawing.



1. Press **Copy** (**f3** on menu 1).
2. Press **+1** (**f4**) to increment the copy value by one. Press **+10** (**f3**) to increment the copy value by ten. (If you increment the copy value farther than you need, continue pressing **f3** and/or **f4** to cycle through all the options and return to 0.)
3. Press the **Enter** button when the total number of copies you want displays in the upper-right corner of the **Copy** submenu.

To exit without requesting copies, press the **Next Display** button.

In some cases, the **Copy** submenu will reflect the number of copies requested through your software. However, a **Copy** value set on the front panel will override copies you request through your software.

If the plotter is plotting when you establish a copy value, it produces the requested number of copies of the current plot. If the plotter is not currently plotting but has already completed a drawing during the current session, it copies the last-drawn plot. If the buffer is empty, the message **Disabled: Buffer Empty** displays. If the plot is greater than one megabyte in size, the message **File Too Big: No Copies** displays.

When using sheet media, the plotter automatically enters **View** mode between each copy. Be sure to check pens and adjust front-panel settings *before* pressing **Continue**.

The **Copy** submenu reflects the number of copies remaining to be plotted. For example, if you requested six copies and the plotter has completed four of them, the value displayed by the **Copy** submenu will be 2.

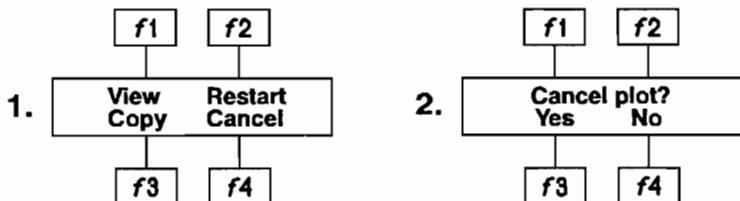
**NOTE:** If the plotter makes copies of more than one file at a time, your software may not be sending the proper end-of-file commands. Experiment with various **Timeout** settings to determine which timeout value works best with your software and plotter driver. Refer to *Using Timeout to Identify Ends of Plots* later in this chapter for details. ■

- \* In View mode, the Group, Sort, Restart, Cancel, Clear, Advance and Demo buttons are inactive.

## Cancelling a Plot in Progress

**USE:** Use **Cancel** to permanently stop a plot in progress without clearing other plots from the plotter's buffer. **Cancel** does not affect any front panel conditions or settings stored in continuous memory.

**EXPLANATION:** Use the following procedure to cancel a plot.



1. Press **Cancel** (**f4** on menu 1).

2. When **Cancel Plot?** displays, press **Yes** (**f3**). Plotting will stop

To exit without cancelling the plot, press **No** (**f4**) or **Next Display**.

**Cancel** stops a plot in progress without clearing other plots from the plotter's buffer. However, to completely stop the plot you must first stop your computer from sending any subsequent data.

Do not use **Cancel** if you want to redraw a plot, since **Cancel** may remove the plot from the plotter's memory. (Instead, use **Restart** to stop a plot and redraw it. See *Restarting a Plot in Progress* earlier in this chapter.)

If you press **Cancel** while the plotter is drawing, it may take several seconds for the plotter to respond.

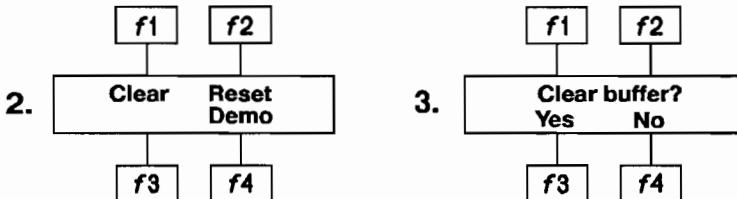
If the buffer is empty when you press **Cancel**, the message **Disabled: Buffer Empty** displays.

**NOTE:** In **View** mode, the **Cancel** button is inactive. ■

## Clearing the Plotter's Buffer

**USE:** Use **Clear** to empty all plots from the plotter's buffer without changing front-panel menu settings. **Clear** also cancels any plot in progress.

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



1. Press the **Next Display** button until the **Clear** menu appears.
2. Press **Clear** (f1).
3. When **Clear Buffer?** displays, press **Yes** (f3).

To exit without clearing the buffer, press **No** (f4) or the **Next Display** button.

**Clear** stops the plot in progress and empties all plots from the plotter's buffer. However, to completely stop the current plot you must first stop your computer from sending any subsequent data.

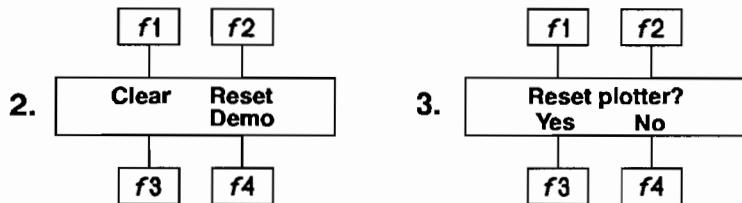
If you press **Clear** while the plotter is drawing, it may take several seconds for the plotter to respond.

**NOTE:** In **View** mode, the **Clear** button is inactive. ■

## Resetting the Plotter

**USE:** Use **Reset** to clear all plots from the plotter's buffer and return certain menu settings to their defaults. **Reset** also cancels any plot in progress.

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



1. Press the **Next Display** button until the **Clear** menu appears.
2. Press **Reset** (**f2**).
3. When **Reset Plotter?** displays, press **Yes** (**f3**). The plotter's buffer will be emptied and the following menu items will be set to their default values: Copy, P1, P2, Speed, Force, Thickness, Group, Sort, Rotate, Mirror, Scale, Digitize Mode, and Quiet. The pen will return to the carousel as soon as the buffer is empty.  
To exit without resetting the plotter, press **No** (**f4**) or **Next Display**.

**Reset** will not affect any conditions stored in continuous memory. To begin plotting again, replace the paper and resend your plot.

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.

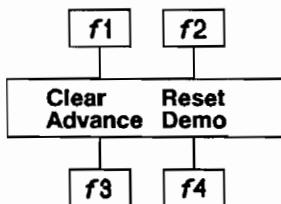
Data that is cleared from the plotter's buffer will not be plotted; however, to completely terminate a plot, you must first stop your computer from sending any subsequent data.

**NOTE:** In **View** mode, the **Reset** button is inactive. ■

## Advancing the Page (DraftMaster RX 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:** Press the **Next Display** button until the **Clear** menu displays. When your plot is complete, press **Advance (f3)** to advance the media one page-length.



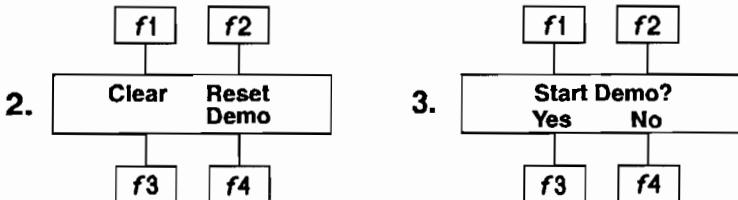
**Advance** displays only when roll media is loaded in the plotter. If you use roll media without a take-up spool installed, cut off each plot as it is completed *before* pressing **Advance**. When a take-up spool is installed, **Advance** will wind plots onto the take-up spool. (Refer to Chapter 4 for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

**NOTE:** In **View** mode, the **Advance** button is inactive. ■

## 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:** Use the following procedure to draw the demo plot.



1. Load pens and media. The demonstration plot can be drawn on any size media, with any of the pen and media combinations recommended in Chapter 3.
2. Press **Next Display** until the **Clear** menu displays.
3. Press **Demo (f4)**. The message **Start Demo?** will display.
4. Press **Yes (f3)**. The demonstration plot will begin.

To exit without starting the demo plot, press **No (f4)** or **Next Display**.

To select a language for the demo plot and front panel messages, see *Having the Plotter Speak Your Language* in Chapter 1.

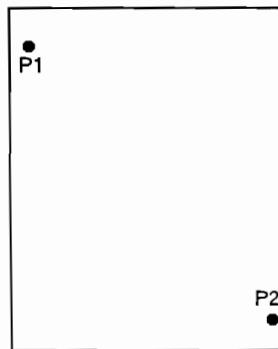
If your plotter doesn't complete the demonstration plot, or the demonstration plot looks different than those shown in Chapter 1, review the instructions in Chapter 1.

**NOTE:** In **View** mode, the **Demo** button is inactive. ■

## Working with Plot Boundaries

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

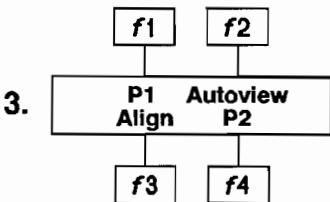
**EXPLANATION:** When you press **P1** or **P2** the pen moves to the location of the corresponding point. The default positions of P1 and P2 are shown in the following illustration.\*



To set the size and orientation of your plots from the front panel using **P1** and **P2**, 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.

\*Using Axis Align or setting Rotate, Invert, Mirror, Expand, or Emulate on can affect the positions of P1 and P2.

Use the following procedure to set **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**.

When you change P1's position, 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. Then move P2 and set the desired position.

When **HP-GL/2** emulation is on, P1 and P2 are set to the plotter's physical plotting (hardclip) limits; moving P1 may cause P2 to move outside the plotter's hardclip limits. To avoid clipping of your plot, adjust and set P2 *after* you set P1.

**NOTE:** When **7585B** or **7595A** emulation is on, P1 and P2 are set to 15 mm inside the plotter's hardclip limits. ■

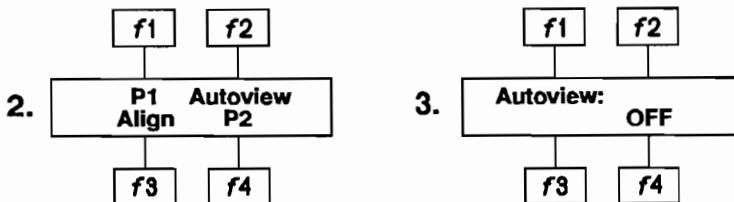
## Using AutoView to Stop Between Plots

**USE:** Use AutoView to automatically put the plotter into View mode between plots, enabling front panel, pen, and media changes. When the plotter is paused in AutoView mode, Continue flashes on the display.

**OPTIONS:** OFF, ON

**DEFAULT:** OFF

**EXPLANATION:** Use the following procedure to turn on AutoView.



1. Press the **Next Display** button until the **P1** menu displays.
2. Press **AutoView** (f2) to view the **AutoView** submenu.
3. Press **f4** to toggle **AutoView** on and off.
4. When the option you want displays, press the **Enter** button to store the setting in continuous memory. (The setting remains 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 the plotter is drawing when you turn on **AutoView**, the plotter will enter **View** mode before the next plot begins. When **AutoView** is on, **Continue\*** flashes between each plot, allowing you to change certain front-panel settings. The **Restart**, **Cancel**, **Clear**, **Reset**, **Group**, **Sort**, **Advance** and **Demo** features are inactive in **AutoView** mode.

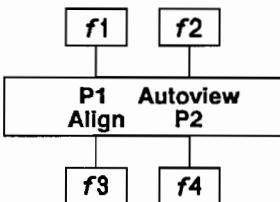
\* In **View** mode, **View** flashes on the display. In **AutoView** mode, **Continue** flashes on the display.

## 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.

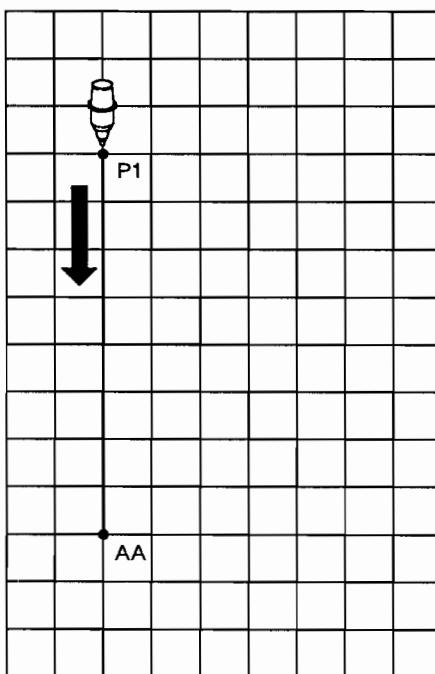
**EXPLANATION:** Use the following procedure to align grids on your media with the axes of the plotter. Although you can use a pen to make the alignment, a digitizing sight is recommended for increased accuracy. (Refer to Appendix C if you need to order a digitizing sight.)

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** twice to display the menu shown below. Then, press **Align** (**f3**). The digitizing sight will move to the axis align point.

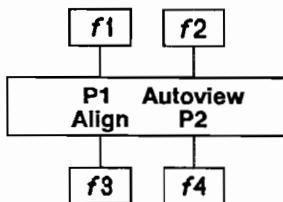


5. Press **P1** (**f1**). The digitizing sight will move to the P1 position.
6. Press the **Next Display** button. Then, press **Pen-Dn** (**f4**) to lower the digitizing sight. (This will help you to more precisely position the sight. If you are using a pen, you can keep it raised to avoid marking the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

**NOTE:** The angle between the edges of the media and the preprinted lines must be less than six degrees. If the angle is six degrees or greater, the alignment is rejected and the **ENTER** light continues to blink. Press **ENTER** to stop the light from blinking and try again. ■

To check your results, press the **Cursor Control** buttons 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.

In **HP-GL/2** emulation mode, P1 and P2 are set at the plotter's hardclip limits. Because axis alignment can cause P2 to move slightly, P2 may move outside the plotter's hardclip limits. To avoid clipping of your plot, adjust and set P2 *after* you set P1.

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 media and use **Reset**. Loading a new *size* sheet of media will automatically return P1 and P2 to their default locations.

## Controlling Pen Speed

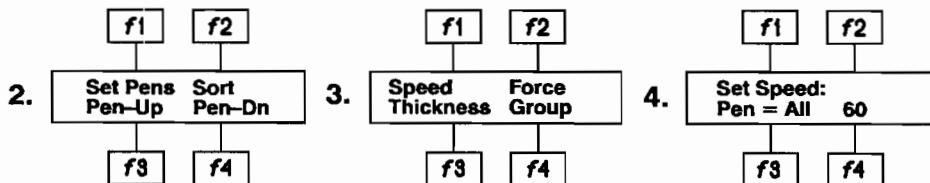
**USE:** Use **Speed** to select the optimum pen speed for your plotting needs.

### DEFAULT:

Carousel Position	Default Speed
Fiber-tip pen	50 cm/s
Roller-ball pen	110 cm/s
Disposable drafting pen	30 cm/s
Refillable drafting pen	30 cm/s
Transparency pen	10 cm/s

**OPTIONS:** Pens 1 through 8 or all pens. Pen speeds of 10 through 60 centimeters per second in 5 centimeter increments, and 60 through 110 in 10 centimeter increments.

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



1. Press the **Next Display** button until the **Set Pens** menu displays.
2. Press **Set Pens** (f1) to display the **Set Pens** submenu.
3. Press **Speed** (f1) to display the **Speed** submenu.

4. 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.  
If **All** is displayed and all pens do not have the same speed, then no speed value is displayed initially.
5. Press **f4** to view each of the pen speed options.
6. Press the **Enter** button when both the correct pen number and speed display, to store the setting.

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

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

Pen speeds established on the front panel will override pen speeds set through your software.

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 as critical.

## Controlling Pen Force

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

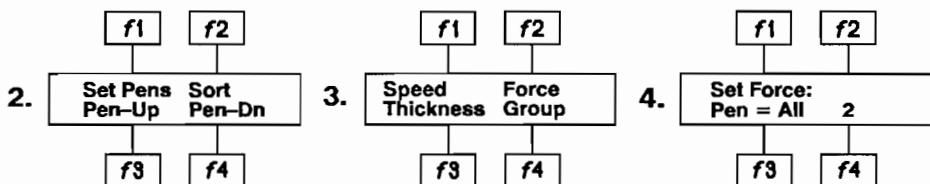
### DEFAULT:

Carousel Position	Default Force
Fiber-tip pen	24 grams
Roller-ball pen	36 grams
Disposable drafting pen	24 grams
Refillable 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 the **Next Display** button until the **Set Pens** menu displays.
2. Press **Set Pens** (**f1**) to display the **Set Pens** submenu.
3. Press **Force** (**f2**) to display the **Force** submenu.
4. 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.

If **All** is displayed and all pens do not have the same force, then no force value is displayed initially.

5. 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.
6. Press the **Enter** button when both the desired pen number and pen force display, to store the setting.

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

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

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.

## Identifying Pen Thickness

**USE:** Use **Thickness** to identify the thickness of the pens that are loaded in the carousel. The **Thickness** setting for each pen should match the thickness of the pen in the corresponding carousel position to ensure smooth area fills. (The defaults are satisfactory for most plotting situations.)

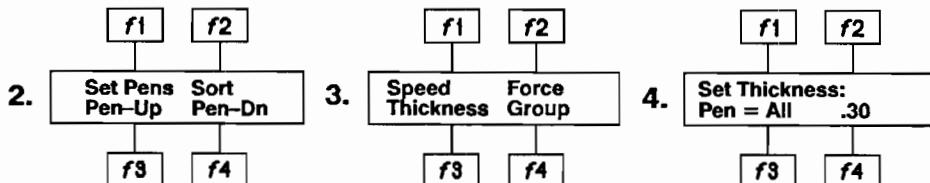
### DEFAULT:

Carousel Position	Default Thickness
Fiber-tip pen	0.30 mm
Roller-ball pen	0.30 mm
Refillable drafting pen	0.35 mm
Disposable drafting pen	0.35 mm
Transparency pen	0.30 mm

**OPTIONS:** Pens 1 through 8 or all pens. Pen thicknesses as shown in the following table.

Thickness Options
.18 mm
.25 mm
.30 mm
.35 mm
.50 mm
.70 mm
1.00 mm

**EXPLANATION:** Use the following procedure to set the thickness of individual pens or of all the pens in the carousel.



1. Press the **Next Display** button until the **Set Pens** menu displays.
2. Press **Set Pens** (**f1**) to display the **Set Pens** submenu.
3. Press **Thickness** (**f3**) to display the **Thickness** submenu.

4. Press **f3** to view each pen number or leave the setting on **All** to change the thickness of all pens in the carousel.  
If **All** is displayed and all pens do not have the same thickness, then no thickness value is displayed initially.
5. Press **f4** to cycle through the pen thickness options. Press **f2** to increment the value by 0.01 mm, and **f1** to decrease the value by 0.01 mm.
6. Press the **Enter** button when both the correct pen number and thickness display, to store the setting.

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

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

The **Thickness** setting for each pen should match the thickness of the pen in the corresponding carousel position. As shown in the **DEFAULT** table, the default pen thickness varies according to the pen types you load in the carousel. The defaults are satisfactory for most plotting situations. However, there are several reasons you may want to change pen thickness. For example, if too much overlap occurs in area fills, increasing the pen thickness can reduce the overlap; or your software may require a pen thickness other than the default.

Pen thickness established on the front panel will override pen thickness set through your software.

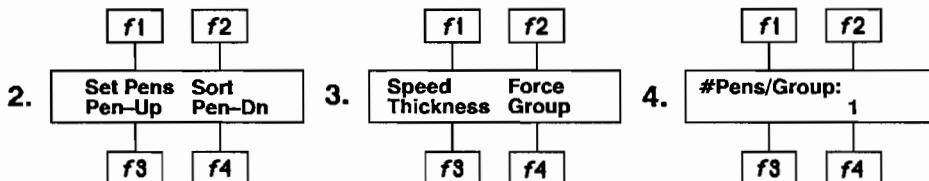
## Minimizing Pen Reloading

**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 setting other than 1 is selected, each pen will draw for 100 meters before the next pen in its group is selected. After the last pen in the group draws 100 meters, the first pen is selected again and the cycle repeats.

**DEFAULT:** 1

**OPTIONS:** 1, 2, 4, 8

**EXPLANATION:** Use the following procedure to group pens.



1. Press the **Next Display** button until the **Set Pens** menu displays.
2. Press **Set Pens** (f1) to display the **Set Pens** submenu.
3. Press **Group** (f4) to display the **Group** submenu.
4. Press f4 to view each **Group** option. Press f2 to view the previous option.
5. 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.

**NOTE:** In **View** mode, the **Group** button is inactive. ■

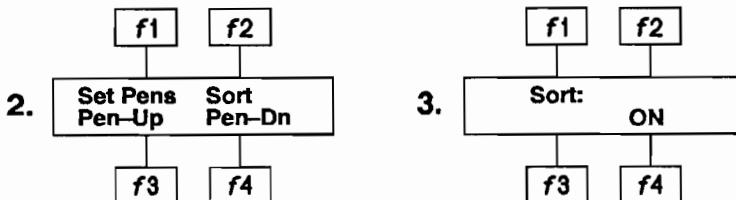
## Increasing Plotting Efficiency

**USE:** Use **Sort** to increase plotting efficiency and decrease plotting time for all plots in the plotter's buffer.

**DEFAULT:** ON

**OPTIONS:** ON, OFF

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



1. Press the **Next Display** button until the **Set Pens** menu displays.
2. Press **Sort (f2)** to display the **Sort** submenu.
3. Press **f4** to toggle **Sort** on and off.
4. 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 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.

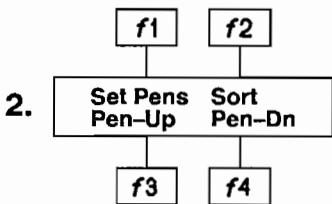
When **Sort** is off, plots are drawn in the order in which instructions are received. For this reason, turn **Sort** off when debugging programs you have written. If ink is smeared when shapes are outlined, try turning **Sort** off.

**NOTE:** In **View** mode, the **Sort** button is inactive. ■

## 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 the **Next Display** button to display the **Set Pens** menu.
3. Press **Pen-Up (f3)** to raise the pen. Press **Pen-Dn (f4)** 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**.

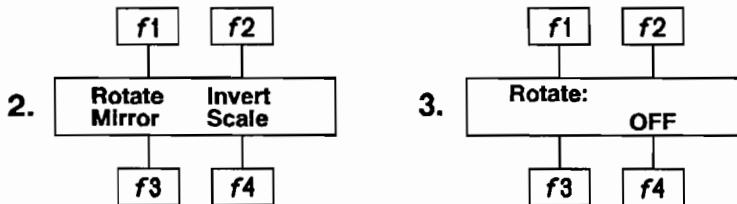
## Rotating a Plot

**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.

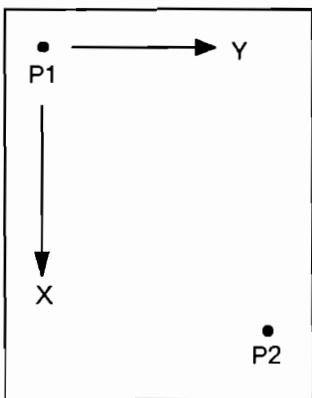


1. Press the **Next Display** button until the **Rotate** menu displays.
2. Press **Rotate** (**f1**) to display the **Rotate** submenu.
3. Press **f4** to toggle **Rotate** on and off.
4. Press the **Enter** button when the option you need displays, to store the setting.

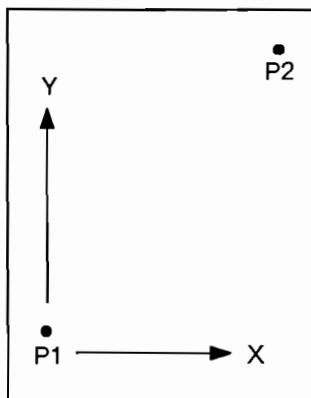
To exit without changing the setting, press the **Next Display** button.

**Rotate** affects the next plot drawn after you turn the feature on. If you change the **Rotate** setting while the plotter is drawing, the current plot is not affected.

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.

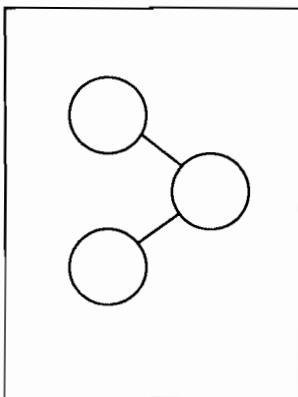


*Rotate Off*

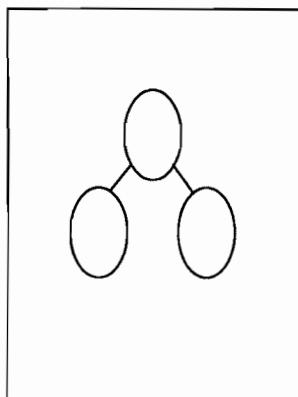


*Rotate On*

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 or if you use the front panel **Scale** feature. The circles shown in the following illustrations show the effect of scaling when P1 and P2 are moved.



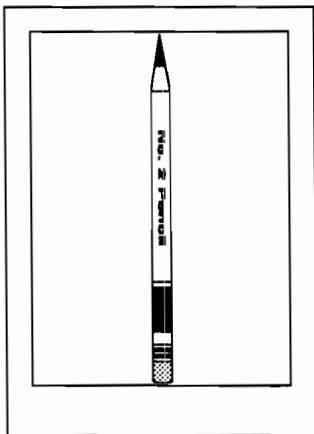
*Original Plot*



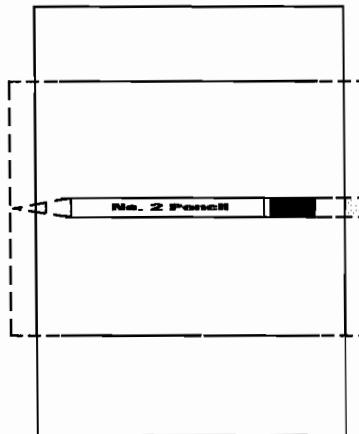
*Rotated Plot*

\*Orientation of the X-axis will be affected when 7585B emulation is on.

If your program does not use scaling techniques and you do not use the plotter's **Scale** feature, 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. See *Using Scale to Change Plot Dimensions* later in this chapter for details on the plotter's **Scale** feature. For information on the scaling instruction, SC, see the *HP-GL/2 Reference Guide*.\*



*Original Plot*



*Rotated Plot*

**NOTE:** You can use **Rotate** with **Invert** and **Mirror** to produce a variety of plot orientations. ■

\* If you are using the HP-GL programming language, see the *HP DraftMaster Programmer's Reference*.

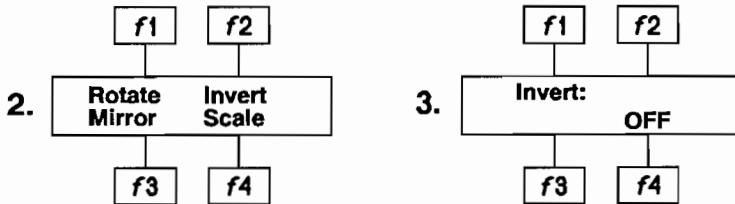
## Inverting Plot Orientation

**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.

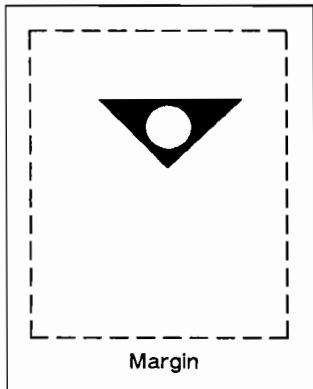


1. Press the **Next Display** button until the **Rotate** menu displays.
2. Press **Invert** (**f2**) to display the **Invert** submenu.
3. Press **f4** to toggle **Invert** on and off.
4. Press the **Enter** button when the option you need displays, to store the setting in continuous memory. (The setting remains in memory until you change it, even if you turn the plotter off.)

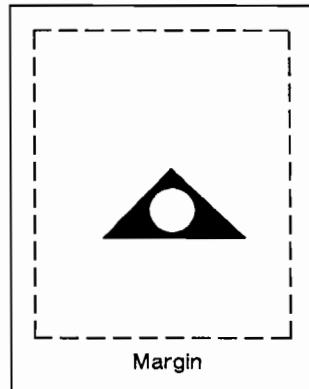
To exit without changing the setting, press the **Next Display** button.

**Invert** affects the next plot drawn after you turn the feature on. If you change the **Invert** setting while the plotter is drawing, the current plot is not affected.

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*

You can use **Rotate** with **Invert** and **Mirror** to provide various plot orientations.

**NOTE:** When **7585B** emulation is on, **Invert** is automatically turned on. You can turn **Invert** off after selecting **7585B**, if desired. ■

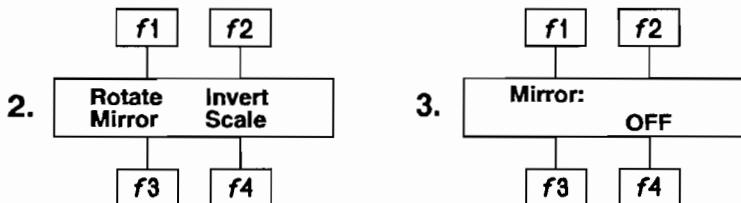
## Mirroring a Plot Image

**USE:** Use **Mirror** to produce a mirror image of your plot.

**DEFAULT:** OFF

**OPTIONS:** OFF, ON

**EXPLANATION:** Complete the following procedure to mirror a plot's image.

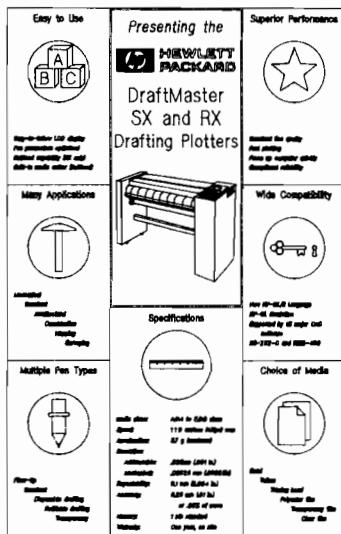
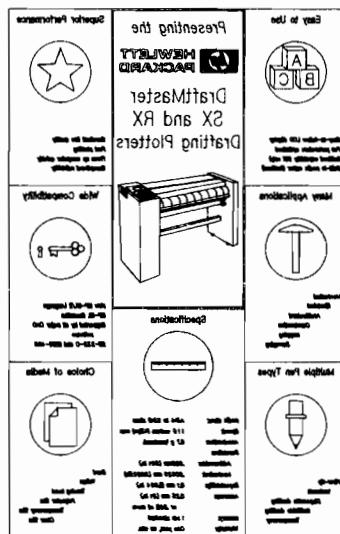


1. Press the **Next Display** button until the **Rotate** menu displays.
2. Press **Mirror** (**f3**) to display the **Mirror** submenu.
3. Press **f4** to toggle **Mirror** on and off.
4. Press the **Enter** button to store the setting when the option you need is displayed.

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

Using **Reset** or turning the plotter off will cancel **Mirror**.

**Mirror** takes effect immediately after you turn the feature on. If the plotter is drawing when you turn **Mirror** on, the remainder of the drawing will be mirrored.

*Normal Plot**Mirrored Plot*

**NOTE:** You can use **Mirror** with **Rotate** and **Invert** to produce a variety of plot orientations. ■

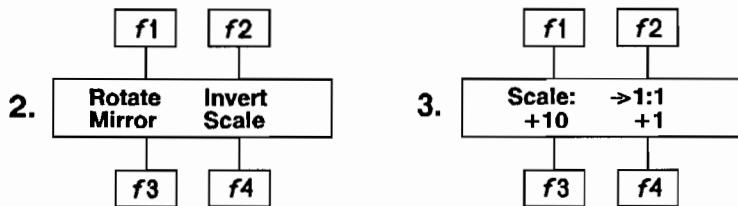
## Using Scale to Change Plot Dimensions

**USE:** Use **Scale** to proportionally increase or decrease the size of your plot in two dimensions.

**DEFAULT:** 1:1

**OPTIONS:** 1:1 through 99:99 in increments of 1 unit.

**EXPLANATION:** If your software does not offer a scaling feature, use the following procedure to have the plotter adjust the dimensions of your plot.



1. Press the **Next Display** button until the **Rotate** menu displays.
2. Press **Scale** (**f4**) to display the **Scale** submenu. An arrow points to the **Scale** numerator, indicating it is selected and can be changed.
3. Press **f4** to increment the numerator by one. Press **f3** to increment the numerator by ten. (If you increment the value farther than you need, continue pressing **f3** and/or **f4** to cycle through all the options.)
4. Press **f2** to select the **Scale** denominator. Then use **f3** and **f4** to adjust the denominator to the desired value.
5. Press the **Enter** button when the desired values display, to store the setting.

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

**Scale** changes the dimensions of your plot by the scaling factor you set. For example, if you send a  $17 \times 48$  in. plot and set **Scale** at 2:1, the plotter creates the drawing at twice its original dimensions ( $34 \times 96$  in.).

You can also use **Scale** to reduce the size of your plot. In the example above, if you set **Scale** to 1:2, the plotter draws the plot at half the size of the original ( $8.5 \times 24$  in.). Reducing plot size with **Scale** is useful for reducing plotting time and conserving ink and media.

If you increase the size of your plot to longer than your paper size, turn **LongAxis Frames** on to ensure that the entire plot is drawn. See *Drawing Long Axis Plots in Consecutive Frames* later in this chapter for details. If, before scaling, your plot is longer than your paper size, you may need a driver written specifically for HP-GL/2 plotters to draw the plot.

**Scale** affects the next plot drawn after the setting is changed, and remains in effect until the plotter is reset.

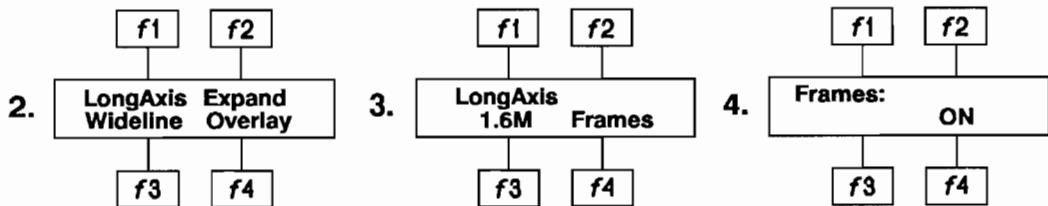
## Drawing Long-Axis Plots in Consecutive Frames

**USE:** Use **LongAxis Frames** to enable the plotter's automatic long-axis capability.

**DEFAULT:** ON

**OPTIONS:** ON, OFF

**EXPLANATION:** Use the following procedure to turn **Frames** on and off.



1. Press the **Next Display** button until the **LongAxis** menu displays.
2. Press **Long Axis** (f1) to display the **LongAxis** submenu.
3. Press **f4** to view the **Frames** submenu. Press **f4** to toggle **Frames** on and off.
4. Press the **Enter** button when the setting you want is displayed, to store it 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.

**Frames** affects the next plot drawn after the setting is changed, and remains in effect until the plotter is reset. It does not affect a plot that is being drawn when you change the setting. If media runs out during plotting, load enough new media for the entire plot, then use **Restart** to begin again.

By default (**Frames** on, **1.6m** off), the plotter draws plots in consecutive B-, D-, or E-size areas (frames), depending on the current paper width. The plotter divides long plots into frames and draws the data in one frame at a time. When one frame is complete, the plotter advances media, then plots the next frame. This procedure repeats until the entire drawing is complete. (You do not have to resend your plot between frames to complete the drawing.) You may need a driver written specifically for HP-GL/2 plotters to use the plotter's automatic long-axis capability (**Frames** on).

Turning **Frames** off causes the plotter to draw only the first frame of each plot. Plots longer than one frame are clipped.

You can increase the size of frames the plotter draws by turning **1.6m** on. (See *Increasing Frame Size* later in this chapter for details.)

The table below summarizes the various **Frames** and **1.6m** combinations and the effect each has on your drawing. (If **Expand** is on, frame size is slightly larger in all cases.)

Frames	1.6m	Effect on Plots
On	Off	Entire plot is drawn using B-, D-, or E-size frames. Plotter draws as many frames as are needed to complete the drawing. (This is the default mode.)
On	On	Entire plot is drawn using 1.6 meter frames. Plotter draws as many frames as are needed to complete the drawing.
Off	Off	One B-, D-, or E-size frame is drawn. Plots longer than frame size are clipped.
Off	On	One 1.6-meter frame is drawn. Plots longer than 1.6 meters are clipped to 1.6 meters.

**Frames** should be off if your application has its own long-axis framing capability (i.e., if the application advances the page and resends the plot during drawing of long plots).

If your software does not allow you to create long-axis plots, use **Scale** to have the plotter increase the plot's dimensions. See *Using Scale to Change Plot Dimensions* earlier in this chapter for details. ■

**NOTE:** You must place a .3 mm black pen in stall 8 when the plotter is drawing multiple frames. The plotter uses the pen to draw registration marks that ensure alignment of frames. ■

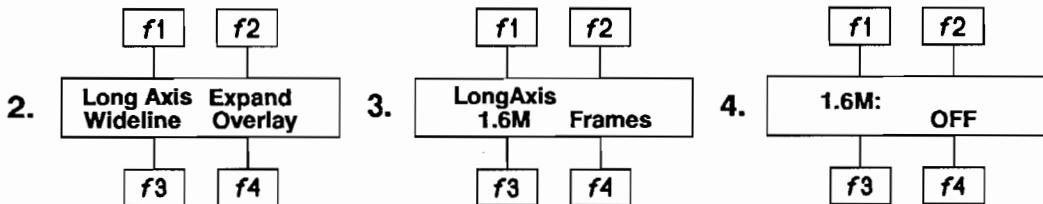
## Increasing Frame Size

**USE:** Use **LongAxis 1.6m** to increase the available plotting length for all plots to 1.6 meters.

**DEFAULT:** OFF

**OPTIONS:** ON, OFF

**EXPLANATION:** Use the following procedure to turn **1.6m** on and off.



1. Press the **Next Display** button until the **LongAxis** menu displays.
2. Press **Long Axis** (**f1**) to display the **LongAxis** submenu.
3. Press **f3** to view the **1.6m** submenu. Press **f4** to toggle **1.6m** on and off.
4. Press the **Enter** button when the setting you want is displayed, to store it 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.

**1.6m** affects the next plot drawn after you turn the feature on, and remains in effect until the plotter is reset. If you change the **1.6m** setting while the plotter is drawing, the current plot is not affected.

By default (**Frames** on, **1.6m** off), the plotter draws plots in consecutive B-, D-, or E-size areas (frames), depending on the current paper width. Turning **Frames** off causes the plotter to draw only the first frame of each plot. (See *Drawing Long-Axis Plots in Consecutive Frames* earlier in this chapter for details.)

You can increase the frame length by turning **1.6m** on. This setting controls frame length for all plots, independently of the **Frames** setting. When **1.6m** is off, frames are B-, D-, or E-size, depending on the current paper width. When **1.6m** is on, the plotter draws in 1.6-meter frames.

The table below summarizes the various **Frames** and **1.6m** combinations and the effect each has on your drawing. (If **Expand** is on, frame size is slightly larger in all cases.)

<b>Frames</b>	<b>1.6m</b>	<b>Effect on Plots</b>
On	Off	Entire plot is drawn using B-, D-, or E-size frames. Plotter draws as many frames as are needed to complete the drawing. (This is the default mode.)
On	On	Entire plot is drawn using 1.6 meter frames. Plotter draws as many frames as are needed to complete the drawing.
Off	Off	One B-, D-, or E-size frame is drawn. Plots longer than frame size are clipped.
Off	On	One 1.6-meter frame is drawn. Plots longer than 1.6 meters are clipped to 1.6 meters.

The table below shows how **Expand** affects frame size when **1.6m** is on.

<b>Expand Setting</b>	<b>Frame size with 1.6m on</b>
OFF	61.7 in. (1576.3 mm)
ON	62.9 in. (1598.3 mm)

See *Expanding the Plotting Area* later in this chapter for details on **Expand**.

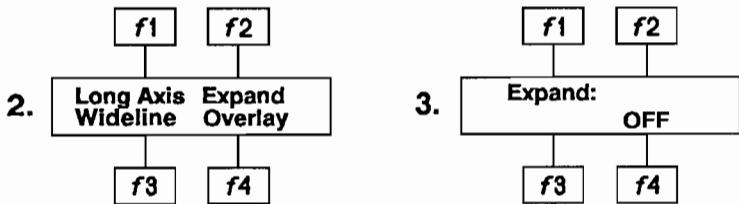
## Expanding the Plotting Area

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

**DEFAULT:** OFF

**OPTIONS:** OFF, ON

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

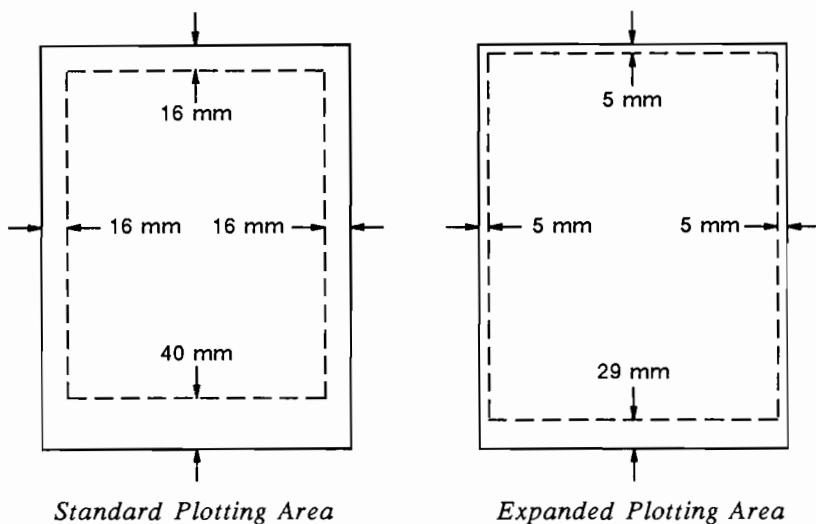


1. Press the **Next Display** button until the **LongAxis** menu displays.
2. Press **Expand (f2)** to display the **Expand** submenu.
3. Press **f4** to toggle **Expand** on and off.
4. Press the **Enter** button when the option you want displays, to store the setting in continuous memory. (The setting 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.

**Expand** takes effect on the next plot drawn after you turn the feature on. If you change the **Expand** setting while the plotter is drawing, the current plot is not affected.

When **Expand** is on, the outer margins (non-plotting area) of the page are reduced to increase the plotting area. 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 millimeter).



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

The table below shows how **Expand** affect frame size when **1.6m** is on. (See *Increasing Frame Size* earlier in this chapter for details on the **1.6m** feature.)

Expand Setting	Frame size (1.6m on)
OFF	61.7 in. (1576.3 mm)
ON	62.9 in. (1598.3 mm)

**NOTE:** To plot documents longer than 1.6 meters, see *Drawing Long Axis Plots in Consecutive Frames* earlier in this chapter. ■

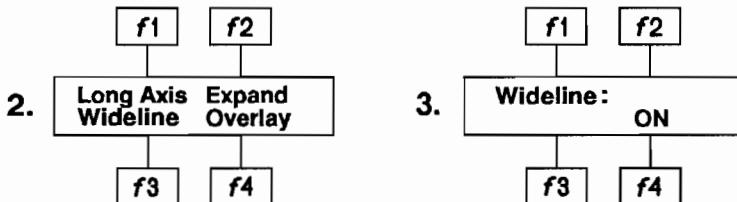
## Replacing Wide Lines with Single Strokes

**USE:** Turn **Wideline** off to replace any filled wide lines with single pen strokes. Use **Wideline** off to conserve pens and minimize plotting time.

**DEFAULT:** ON

**OPTIONS:** OFF, ON

**EXPLANATION:** Use the following procedure to turn **Wideline** off and on.



1. Press the **Next Display** button until the **LongAxis** menu displays.
2. Press **Wideline** (f3) to display the **Wideline** submenu.
3. Press **f4** to toggle **Wideline** off and on.
4. Press the **Enter** button when the setting you want is displayed, 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.

If your plot file contains any wide lines, using **Wideline** on causes the plotter to fill in the wide lines with multiple pen strokes.

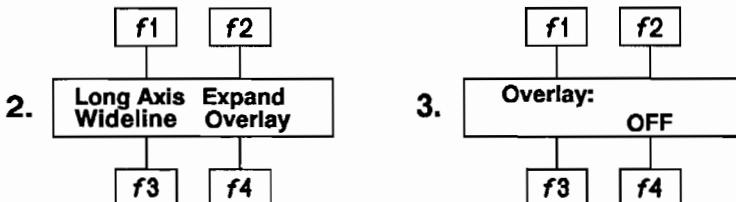
## Overlaying Plots

**USE:** Use **Overlay** to enable the plotter to draw over the previously drawn plot. This is useful for adding logos, producing multi-layered drawings, and darkening plots.

**DEFAULT:** OFF

**OPTIONS:** OFF, ON

**EXPLANATION:** Use the following procedure to turn on **Overlay**.



1. Press the **Next Display** button until the **LongAxis** menu displays.
2. Press **Overlay** (**f4**) to display the **Overlay** submenu.
3. Press **f4** to toggle **Overlay** on and off.
4. Press the **Enter** button when the setting 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 **Overlay** is on, roll media is not advanced and you are not prompted to load new sheet media. Subsequent plots in the buffer are drawn on the same area of media as the previous plots. **Overlay** takes effect immediately, and affects all plots until you turn it off.

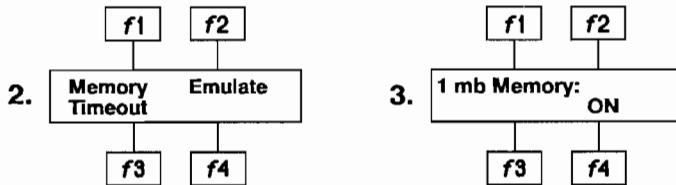
## Changing Memory Size

**USE:** Use **Memory** to control the size of the plotter's input buffer. This is useful if you use the plotter in a network that depends on timing to send data to the plotter.

**DEFAULT:** ON

**OPTIONS:** OFF, ON

**EXPLANATION:** Use the following procedure to turn **Memory** off and on.



1. Press the **Next Display** button until the **Memory** menu displays.
2. Press **Memory** (**f1**) to display the **Memory** submenu.
3. Press **f4** to toggle **1 megabyte Memory** on and off.
4. Press the **Enter** button when the setting 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.

With **Memory** off, the plotter's input buffer is limited to the same size as that of a DraftMaster 7595A. The computer sending data to the plotter is not freed until the plotter finishes drawing each plot. You may want to turn **Memory** off if you are using the plotter in a network so that the network's spooler can properly indicate the status of a plot.

The **Copy**, **Restart**, and **Cancel** features are not affected by the **Memory** setting.

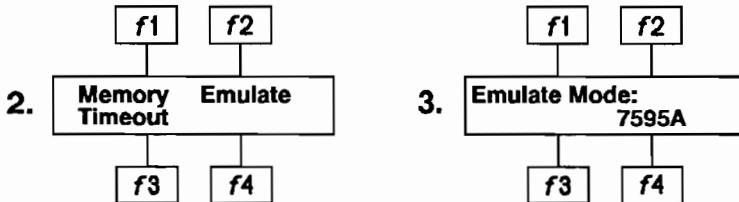
## Using Emulate to Plot with Various Software and Drivers

**USE:** Use **Emulate** to plot with drivers and software packages designed for the HP 7585B/7586B, HP 7595A/7596A, and HP-GL/2 plotters.

**DEFAULT:** 7595A

**OPTIONS:** 7585B, 7595A, HP-GL/2

**EXPLANATION:** Use the following procedure to select an **Emulate** mode.



1. Press the **Next Display** button until the **Memory** menu displays.
2. Press **Emulate (f2)** to display the **Emulate** submenu.
3. Press **f4** to view each of the **Emulate** options.
4. 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 the plotter receives a plot sent by an HP-GL/2 driver, it will temporarily switch into **HP-GL/2** mode from either of the other emulate modes. Therefore, in most cases you will not need to change the default emulate setting.

If you are using software or drivers written for the HP 7585B plotter, use the plotter in **7585B** emulate mode.

We recommend using HP-GL/2 drivers to achieve maximum benefit of the plotter's buffer, long axis capability, plot management features (**Copy**, **Restart**, **Cancel**), and for minimizing plot transmission time.

The following table summarizes the effects of each **Emulate** mode on your plots.

Emulate Mode	Effect on Plot
<b>HP-GL/2</b>	<b>P1</b> and <b>P2</b> are set to the plotter's hardclip limits. <b>Invert</b> is OFF.
<b>7595A</b>	<b>P1</b> and <b>P2</b> are set 15 mm inside the plotter's hardclip limits. <b>Invert</b> is OFF.
<b>7585B</b>	<b>P1</b> and <b>P2</b> are set 15 mm inside the plotter's hardclip limits. <b>Invert</b> is ON.

If your software asks for a plotter name or model number, use the following table to determine which selection to make.

In This Emulate Mode	Select This Plotter Through Your Software
<b>7585B</b>	HP 7585 or 7586
<b>7595A</b>	HP DraftMaster 7595A or 7596A
<b>HP-GL/2</b>	Hewlett-Packard HP-GL/2 device (or similar option indicating HP-GL/2 support)

The **Emulate** setting affects the next plot drawn after the setting is changed. If you change emulate modes while the plotter is drawing, the current plot is not affected.

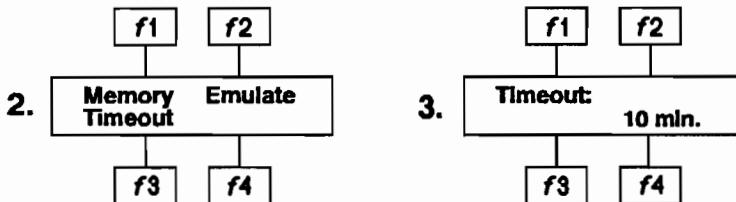
## Using Timeout to Identify Ends of Plots

**USE:** Use **Timeout** to tell the plotter how long to wait after data stops entering the buffer before marking the file "complete." Using the optimal **Timeout** setting ensures that the **Copy** and **Restart** features function correctly. The default setting should work well with most applications.

**DEFAULT:** 10 minutes

**OPTIONS:** Off, 5 seconds, 15 seconds, 30 seconds, 60 seconds,  
5 minutes, 10 minutes, 30 minutes

**EXPLANATION:** Use the following procedure to adjust **Timeout**.



1. Press the **Next Display** button until the **Memory** menu displays.
2. Press **Timeout** (**f3**) to display the **Timeout** submenu.
3. Press **f4** to view the **Timeout** options. Press **f2** to see the previous option.
4. Press the **Enter** button when the value 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.

If the plotter redraws or copies more than one file at a time, your software may not be sending the proper end-of-file commands and the **Timeout** setting may be too high. If the plotter does not draw complete files, the **Timeout** setting may be too low. Experiment with various **Timeout** settings or check your software's documentation to determine which value works best with your software and plotter driver.

If you turn **Timeout** off, be sure your software separates plots using end-of-file commands. For details on the proper HP-GL/2 usage, refer to the BP, PG, and RP commands in the *HP-GL/2 Reference Guide*. For the proper HP-GL usage, see the RP command in the *HP DraftMaster Programmer's Reference*.

**NOTE:** **Timeout** cannot be used to identify ends of plots if you send your plots in batch files. ■

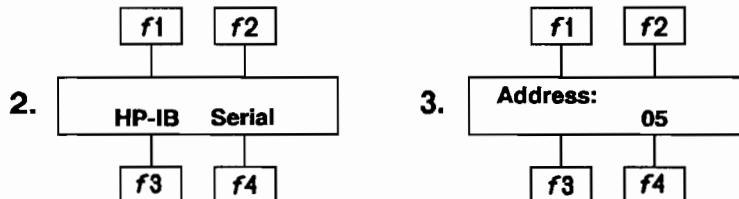
## Setting an HP-IB Address

**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 the **Next Display** button until the **HP-IB** menu displays.
2. Press **HP-IB** (f3) to display the **HP-IB** submenu.
3. Press **f4** to view each **HP-IB** address option.\*
4. 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.

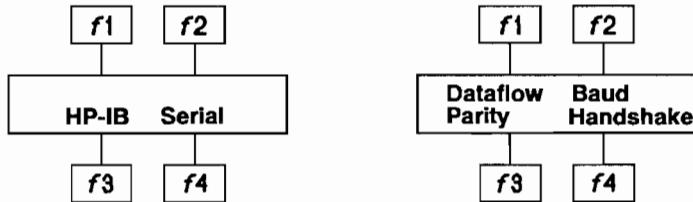
**NOTE:** If you are using the plotter with an HP desktop computer, do not use address 21; this address is reserved for the computer. ■

\* Press **f1** and **Enter** to turn on the **Disable Talk** feature. A small square displays in the upper-right corner of the **HP-IB** submenu when **Disable Talk** is on. **Disable Talk** is useful when running multiple plotters off a single controller. The plotter using **Disable Talk** listens only to the address set on the **HP-IB** menu.

## 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.)

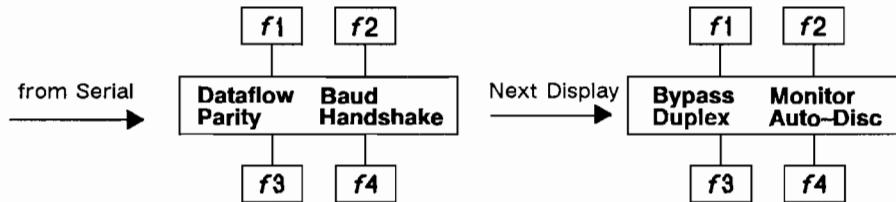
**EXPLANATION:** Pressing **Serial (f4)** displays a special menu you will use to set up RS-232-C conditions. This menu is explained in full in Chapter 7.



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.



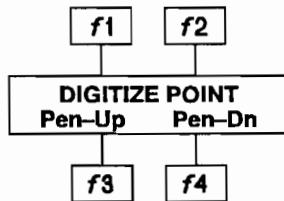
To exit, press the **Next Display** button.

This menu is discussed fully in Chapter 7. Refer to *Using Advanced Features* in Chapter 7 if you need to use debugging tools to correct communication problems between the plotter and your computer, use a duplex setting, or use a modem with the plotter.

## Digitizing

If you are using a digitizing software package, complete the following steps to digitize with the plotter. Refer to the *HP-GL/2 Reference Guide*\* 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.

If you leave the **DIGITIZE POINT** menu by pressing **Next Display**, you can return to the **DIGITIZE POINT** menu by continuously pressing **Next Display** to cycle through the menus.

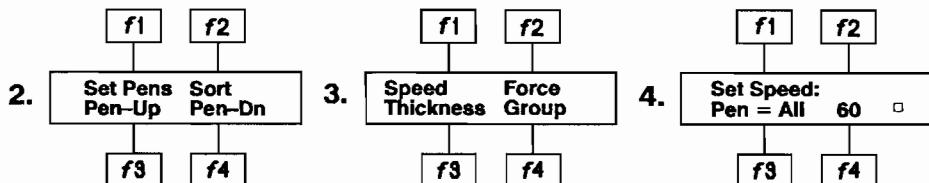
**NOTE:** If you need to use the **Copy** and **Restart** features while using a Digitizing program, turn **Timeout** off. ■

\* If you are using the HP-GL programming language, see the *HP DraftMaster Programmer's Reference*.

## 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 **Set Pens** menu displays.
2. Press **Set Pens (f1)** to display the **Set Pens** submenu.
3. Press **Speed (f1)** to display the **Speed** submenu.
4. Press **f1** 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.
5. 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.

## Selecting Pens and Media

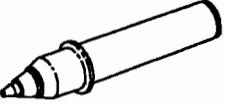
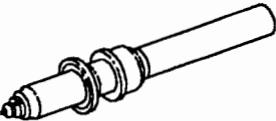
### What You'll Learn in This Chapter

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 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. Default force setting: 2.
Roller-ball	 Convenient. Good line quality at the fastest plotting speed. Large ink capacity. Disposable. Default plotting speed: 110 cm/s. Default force setting: 4.
Transparency	 Excellent color and line quality on overhead transparency film. Default plotting speed: 10 cm/s. Default force setting: 2.
Disposable Drafting	 Very convenient, require no cleaning or refilling. Excellent quality. Available for polyester film and vellum/paper. Default plotting speed: 30 cm/s. Default force setting: 2.
Refillable Drafting	 Highest drafting-quality pens. Long lasting tungsten carbide points. Require refilling and maintenance. Default plotting speed: 30 cm/s.* Default force setting: 2.

- \* 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 and SurePlot pens for vellum and paper will last at least seven 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 (except SurePlot pens for vellum and paper) 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 drafting pens *other than SurePlot pens* 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 with the tip up.

## Media

Use only Hewlett-Packard media for highest quality results. 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 definitions. 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 media 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.)	—	A2 (420 × 594 mm)
D (22 × 34 in.)	C (18 × 24 in.)	A1 (594 × 841 mm)
E (34 × 44 in.)	D (24 × 36 in.) 30 × 42 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 media.
- 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 media correctly.
- When using polyester film, place the side with the antistatic coating on the plotter's platen.
- 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 (except SurePlot pens) must be used and stored away from windows, and 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.

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



## Plotting with Roll Media

### What You'll Learn in This Chapter

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

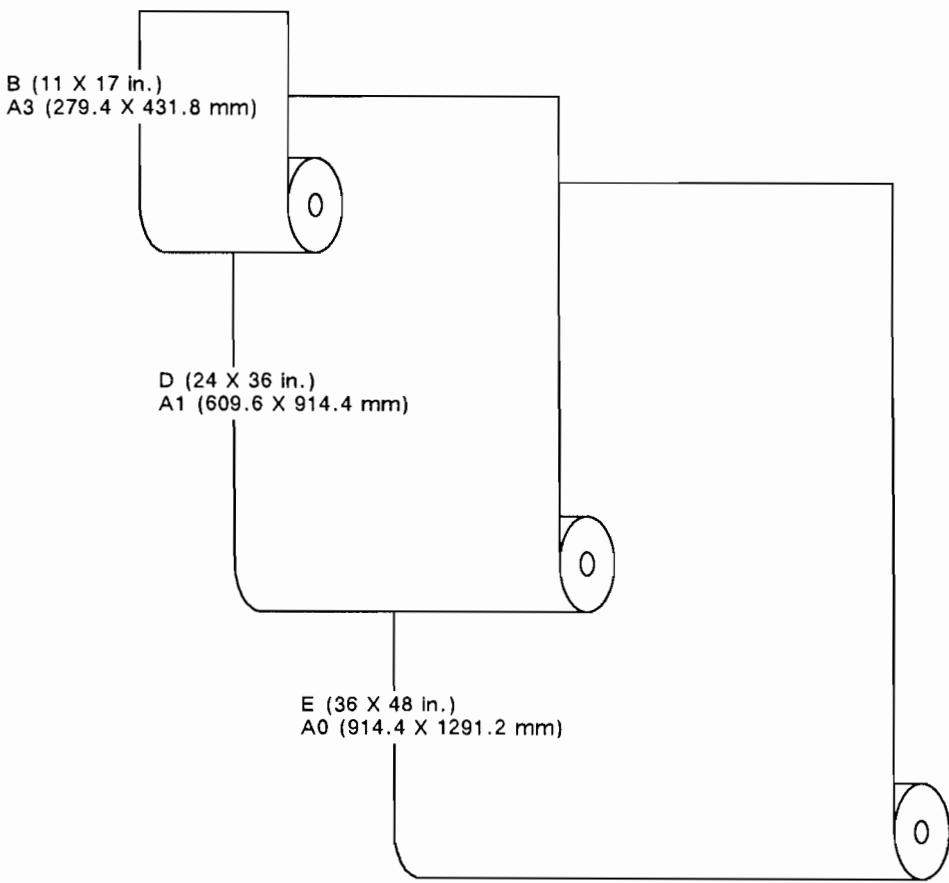
- select roll media
- load and unload roll media
- advance the page

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.

For information on long axis plotting, see *Drawing Long Axis Plots in Consecutive Frames*, *Increasing Frame Size*, and *Using Scale to Change Plot Dimensions* in Chapter 2.

## Selecting Roll Media

DraftMaster RX 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 media must extend at least one-half inch (12.7 mm) over a grit wheel when the right edge of the media 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:

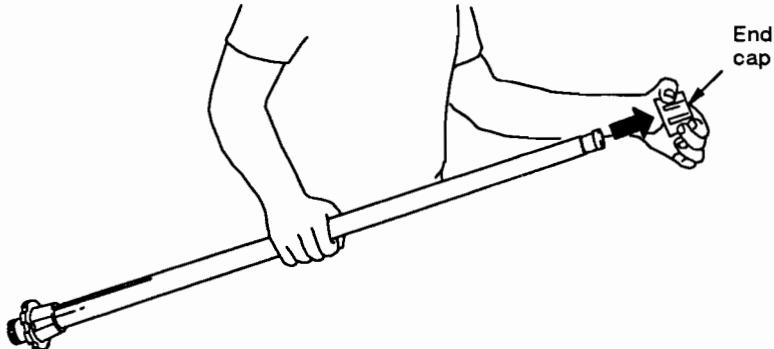
- Continuous feed with automatic take-up. Plots are rolled onto the front take-up spool as they are completed. (The front spool must be installed.)
- Continuous feed without take-up. Cut off each plot as it is completed. (Do not install the front spool.)

### Loading Media onto the Spindle

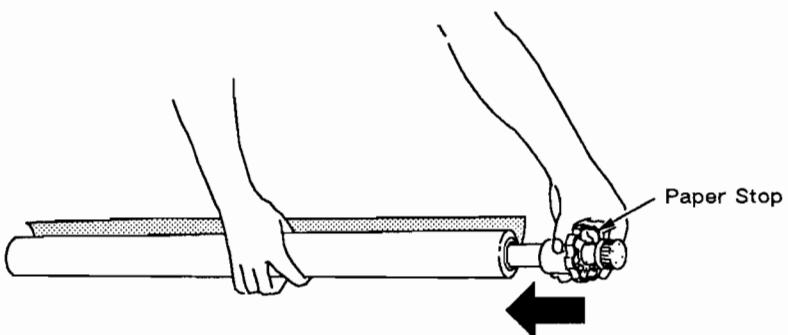
Complete the following steps to load roll media onto the spindle.

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

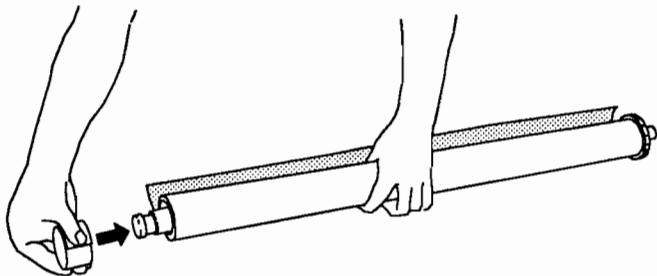
4



2. Orient the plotting media as shown below, then slide the spindle into the roll of media. 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.



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



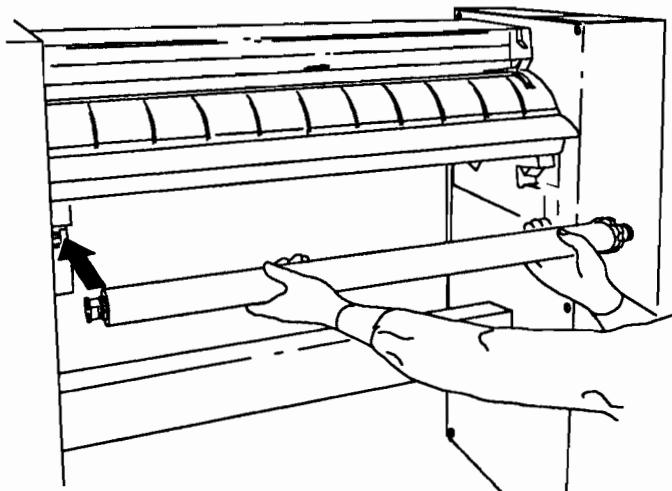
**NOTE:** If you drop a spindle and the paper stop disengages, align the notches on the inside of the paper stop with the raised knobs on the spindle. Press *firmly* until the paper stop snaps into place. ■

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

## Loading Spools into the Plotter

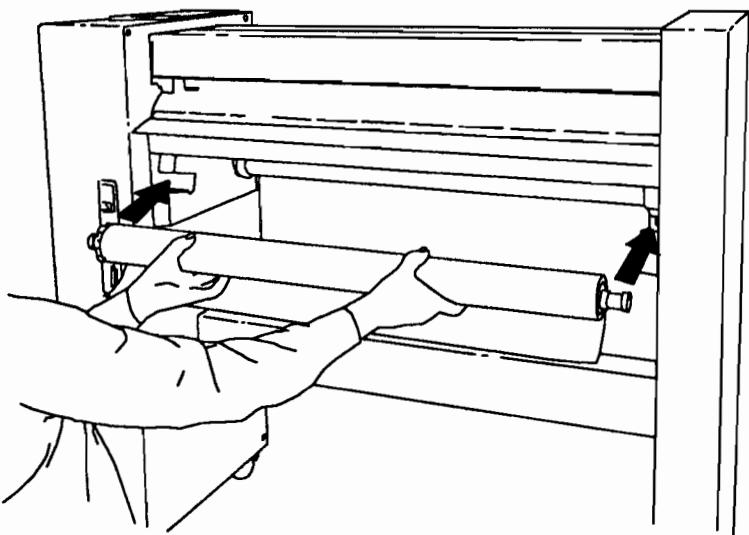
Use the following procedure to load the spools into the plotter. Refer to the illustrations associated with each step. To use the plotter without automatic take-up, ignore the steps for installing the front take-up spool.

1. Turn the plotter on and raise the carriage cover.
2. Pull the paper-loading 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.



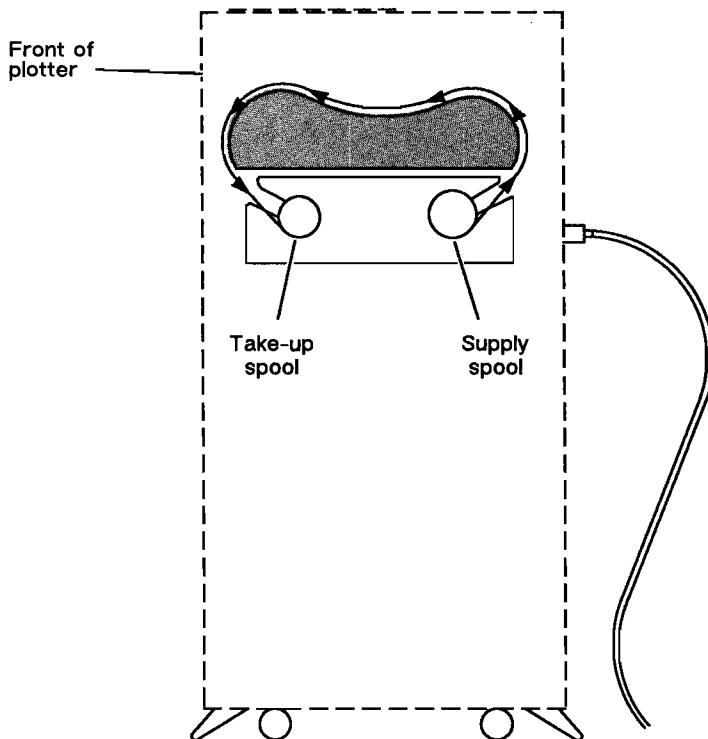
4

4. From the rear of the plotter, load the media 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 media up and thread it under the pinch wheels. Align the edge of the media with both paper guides. Looking from the rear of the plotter, the right edge of the media must extend at least one-half inch (12.7 mm) over a grit wheel.

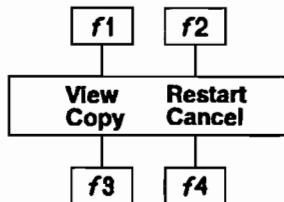
6. From the front of the plotter, pull the media down to the take-up spool and tape it to the edges and middle of the cardboard core. Manually rotate the take-up spool two or three times to make sure the media winds correctly. If the media buckles, reposition it on the cardboard core. The following illustration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



7. Slide the left pinch wheel toward the media until the line on the pinch wheel is even with the left edge of the media.
8. Push the paper-loading lever away from you to lower the pinch wheels.

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

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

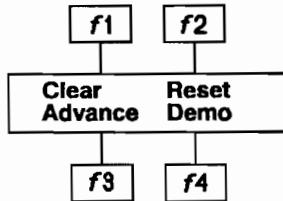
The message **LOAD PAPER TO PLOT** will also display if roll media runs out during plotting. Load a new roll of media and use **Restart** to start the plot over.

If the media 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 media, remove any torn scraps, turn the plotter off and then on again, and reload media.

## Advancing the Page

When a plot is complete, you can use the front panel to advance page-length. Then continue plotting or cut off the finished plots in the plotter's buffer, turn on **AutoView** to stop the plot.

Press **Advance** (**f3**) to advance the media one page-length.



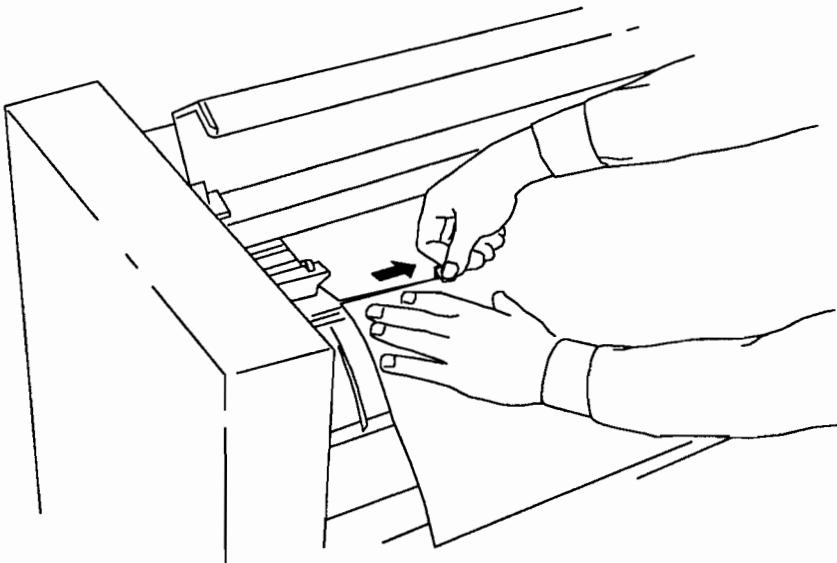
The width of the plotting media determines how much media will be advanced when **1.6m** is off, as shown in the following table.

Media Width	Amount Advanced (1.6m off)	Amount Advanced (1.6m on)
B size (8.1 to 15 in.) A3 size (207 to 381 mm)	17.9 inches 455.8 mm	64.3 inches 1633 mm
D size (21.2 to 28.3 in.) A1 size (539 to 719 mm)	36.9 inches 938.4 mm	64.3 inches 1633 mm
E size (29.4 to 36.5 in.) A0 size (747 to 927 mm)	48.9 inches 1243.2 mm	64.3 inches 1633 mm

When you press **Advance** with a take-up spool loaded, the media 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 media 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.

**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.



### **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 media from the spindle, hold the roll of media 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 media 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.

**NOTE:** If the plotter is unable to find the alignment mark before a frame advance, it places a “+” symbol where it expected to find the mark. If the plotter is unable to find the alignment mark after a frame advance, it draws an “X.” ■

- 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 media. Variation should be within 0.02 inches (0.5 mm).
- When you wind media onto the take-up spool, the media 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).



## 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.

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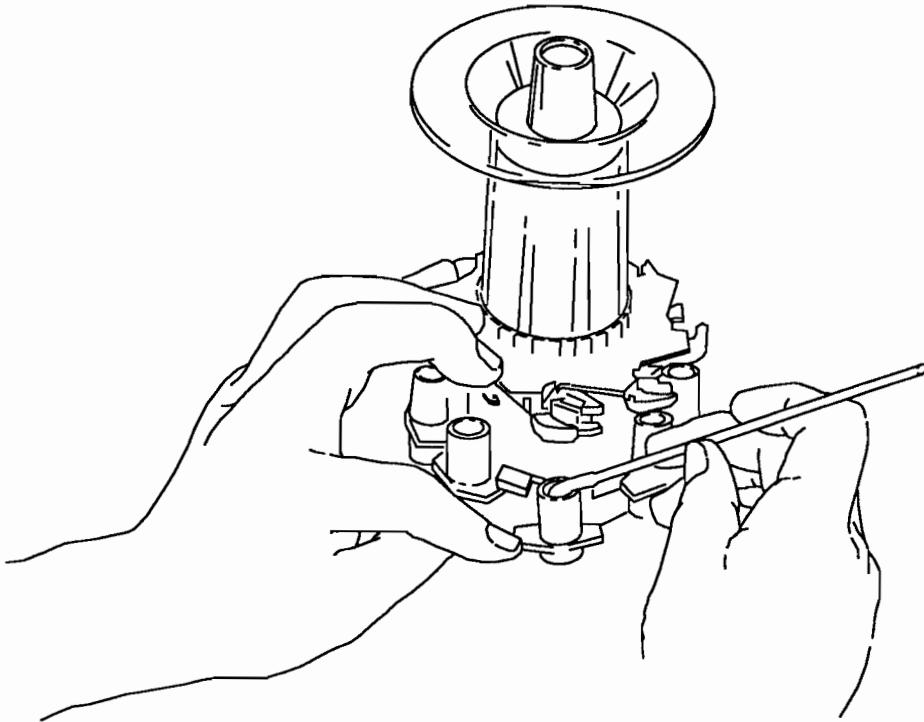
#### WARNING

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

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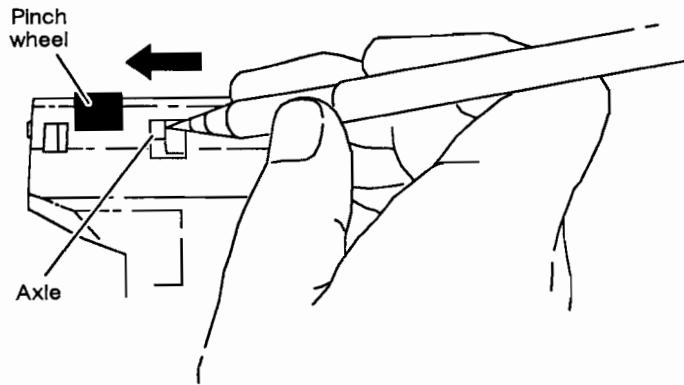
1. Wipe the plotter surface with a damp sponge or soft cloth. If necessary, clean with a 50-50 solution of isopropyl alcohol and water. Wipe with water to rinse off any residue and dry with a soft lint-free cloth. *Do not use abrasive cleaners, cleaning solvents, or strong detergents.*

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.

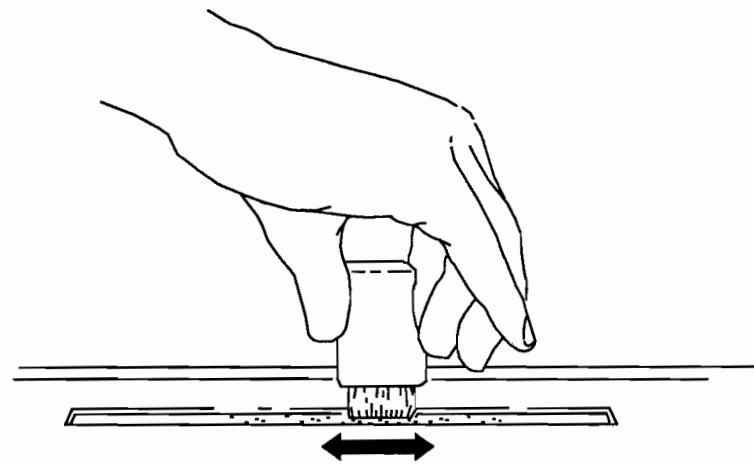


4. To maintain plotter accuracy, use the following steps to clean the grit wheels.
  - a. Turn the plotter off and raise the carriage cover.
  - b. Pull the paper-loading lever towards you to raise the pinch wheels. Slide the left-hand pinch wheel to the far-left.

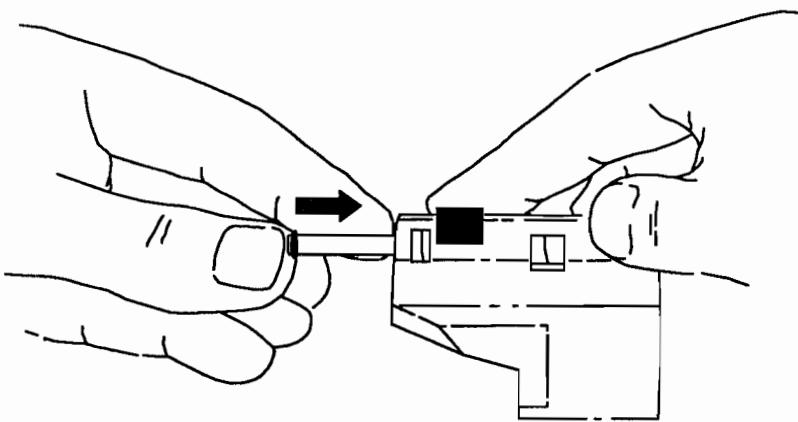
- c. Remove the right pinch wheel by placing a pen in the slot on top of the pinch wheel arm and pushing the metal axle to the left. Take care not to lose the wheel or the axle. Refer to the following illustration.



- 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.

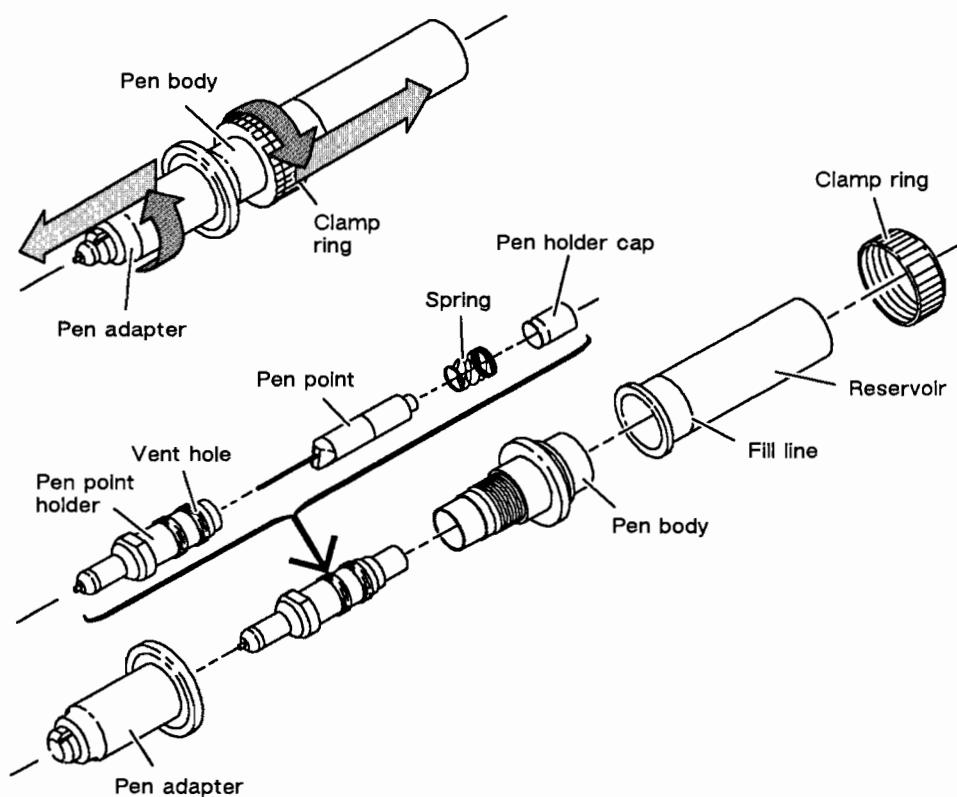


**NOTE:** Be sure the axle washer is fully seated, or the media may skew during plotting. ■

## 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.

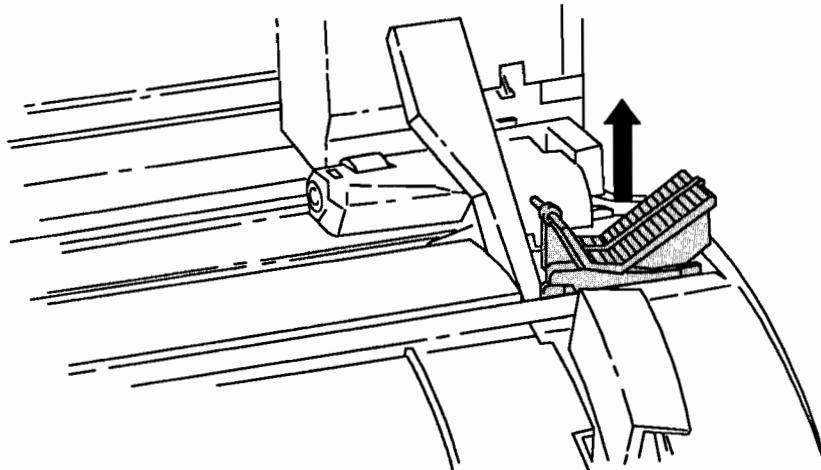
**NOTE:** Be very careful not to bend the pen point when you reload the pen in the pen carousel. ■

## 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.



## Troubleshooting

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### 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**

#### **Plotter Operation Problems**

- Plotter Does Not Turn On
- Front Panel Does Not Work
- Pens Are Not Picked From or Returned to the Pen Carousel

#### **Computer/Plotter Communication Problems**

- Plotter Does Not Draw When Connected to Your Computer System

#### **Software Problems**

- Plotter Doesn't Work with Software

#### **Plot Location Problems**

- Plot is Not Oriented Correctly
- Plot is Incomplete

#### **Plot Quality Problems**

- Line Quality is Not Satisfactory

#### **Supplies Problems**

- Pens Dry in the Carousel
- Paper Tears During Plotting

## 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.

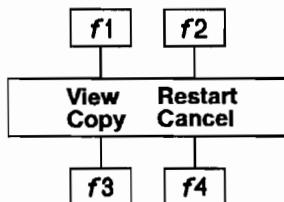
**NOTE:** If you do not hear the plotter but the front-panel display is on, the cooling fan has turned off. This is normal. ■

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

### 1. Check the following:

- The fuse box displays the correct voltage for your area's power specifications, as listed in Appendix A. To locate the fuse box, see *Plotter Features (Rear View)* in Chapter 1.
- 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-loading lever away from you and lower the safety cover. Be sure a carousel is installed. (See *Loading Single-Sheet Media* in Chapter 1 for instructions.)

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 some buttons have a delayed response while a plot is in progress?

No — Go to step 5.

Yes — This is normal for some menus. 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, then press the **Enter** button. 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.

**NOTE:** To avoid pen picking problems, use only Hewlett-Packard pens. ■

## Plotter/Computer Communication Problems

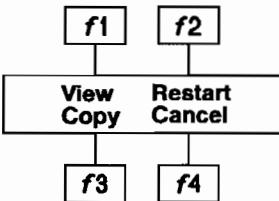
Follow the instructions in this section if your problem is an interfacing or communications problem.

### 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, HP DraftMaster 7595/7596, or HP DraftMaster HP-GL/2 (or any Hewlett-Packard HP-GL/2 device)? Or, are any of these plotters available as a menu selection?

No —Your software may not support the plotter. Try running the plotter in a different **Emulate** mode. If the problem persists, check with the software vendor or manufacturer to see if the plotter is supported.

Yes —If your software lists HP DraftMaster HP-GL/2 (or any HP-GL/2 device), set **HP-GL/2** emulation on and use the software menu to select the HP-GL/2 device. If your software lists HP DraftMaster 7595/7596 plotters, use the plotter's front panel to set **7595A** emulation on and select **HP 7595** or **7596** in the software menu. If your software lists HP 7585/7586 plotters, set **7585B** emulation 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**, **Mirror**, **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 HP DraftMaster 7595/7596 as an option, set **7595A** emulation on and use the software menu to select HP 7595 or 7596. If your software lists HP 7585/7586 plotters as an option, set **7585B** emulation on and use the software menu to select HP 7585 or 7586. (With **7585B** on, plot orientation is the same as in an HP 7585/7586 plot.) If your software lists HP DraftMaster HP-GL/2 (or any HP-GL/2 device), set **HP-GL/2** emulation on and use the software menu to select the HP-GL/2 device.

If you select this plotter through your software	Use this emulate mode
HP DraftMaster HP-GL/2 ( <i>or any option indicating HP-GL/2 support</i> )	HP-GL/2
HP DraftMaster (7596/7596)	7595A
HP 7585/7586	7585B

5. If you are writing your own program, does your program include an HP-GL or HP-GL/2 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 hardclip limits of the paper size. Refer to Appendix D and the *HP-GL/2 Reference Guide*\* 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 *HP-GL/2 Reference Guide*.\*

\* If you are using the HP-GL programming language, refer to the *HP DraftMaster Programmer's Reference*.

## Plot is Incomplete

1. Try using a different front-panel **Emulate** setting. (See *Using Emulate to Plot with Various Software and Drivers* in Chapter 2 for details.) If the problem persists, go to step 2.
2. Experiment with higher **Timeout** settings. (See *Using Timeout to Identify Ends of Plots* in Chapter 2 for details.) If the problem persists, go to step 3.
3. Does the message **X-Axis, Y-Axis, or Z-Axis failure** or **Check Pen and Paper** display?  
**No** — Go to step 4.

**Yes** — Remove the paper, including any torn scraps and check pens. Turn the plotter off and then on again. If the failure message continues to display, have your plotter serviced. If you are using drafting pens, be sure the adapter is screwed on tightly.

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

**No** — Have your plotter serviced.

**Yes** — Go to step 5.

5. Is **Rotate** on?

**No** — Go to step 6.

**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 6.

6. Are you writing your own programs?

**No** — If you are using a software package, go to step 7.

**Yes** — Your problem may be buffer overflow. Refer to Appendix D or the *HP-GL/2 Reference Guide*\* and check your program instructions. Correct any program errors and rerun the program.

\* If you are using the HP-GL programming language, refer to the *HP DraftMaster Programmer's Reference*.

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

**No** —Go to step 8.

**Yes** —There is an error in your program. Refer to Appendix D and the *HP-GL/2 Reference Guide\** for help. Correct any program errors and rerun the program.

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

**No** —Go to step 9.

**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..



9. 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 10.

**Yes** —Your cable may be defective. Go to step 10.

10. 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.

\* If you are using the HP-GL programming language, refer to the *HP DraftMaster Programmer's Reference*.

## 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, positioning, and repeatability.
- 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 to 30 minutes prior to plotting. The plotting environment must be stable.

### 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 toward you) and allow the rubber tire 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 **Expand** is 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 *HP-GL/2 Reference Guide*.\*

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 media?

**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 media 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.

\* If you are using the HP-GL programming language, refer to the *HP DraftMaster Programmer's Reference*.

## Supplies Problems

Use this section if pens aren't lasting as long as you would expect, or if the media 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.

**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 media. Try running your plot again.

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

**No** — Refer to *Recommended Pen/Media Combinations* in Chapter 3

**Yes** — Make sure you are using high quality media. If you are using double-matte polyester film, it should be 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 using 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 media or change plotting conditions to allow ink time to dry before more lines are drawn.

## 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 Touchscreen Personal Computer (HP 150)

Personal Computers (compatible):

HP Vectra, Vectra ES/12, QS/16 and RS/20

IBM PC, PC-XT, AT, and PS/2

Apple Macintosh, Macintosh Plus/SE/II

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 7595B PLOTTER OK (or a similar message, 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;"
```

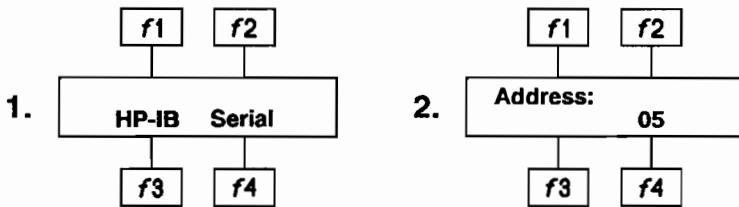
The following example shows the same program, with BASIC read and write statements included. The first line of the program establishes interface conditions, and may vary based on your computer's requirements. If you are not sure how your computer reads data, check your computer documentation. For further 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

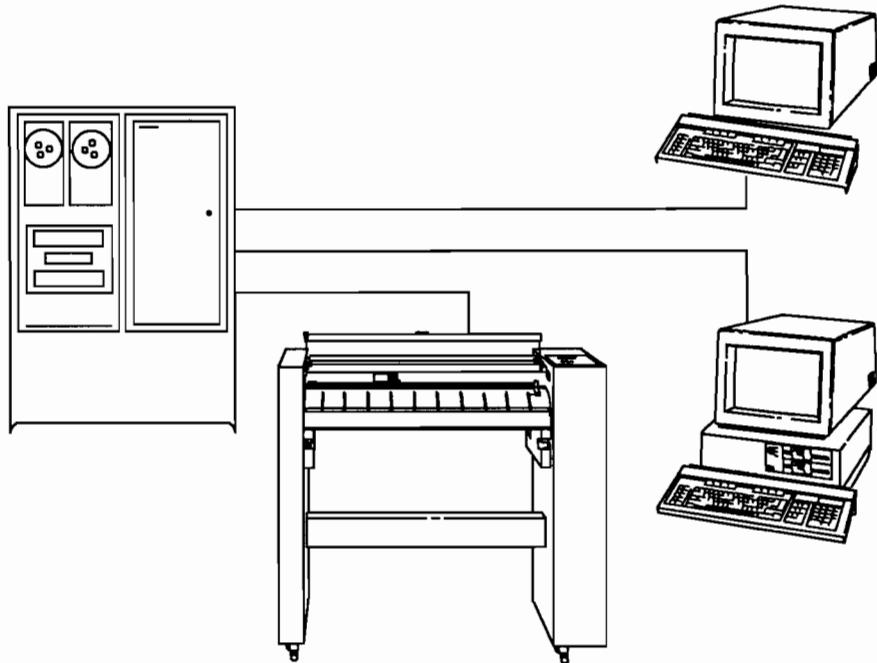
For RS-232-C cable schematics and additional technical information, refer to Appendix A. For additional information about interfacing and handshaking, the *RS-232-C Interfacing and Handshaking Guide*, Application Note 6 (Part No. (11)5953-9770) is available through HP Sales and Support Offices.

### Identifying Your System Configuration

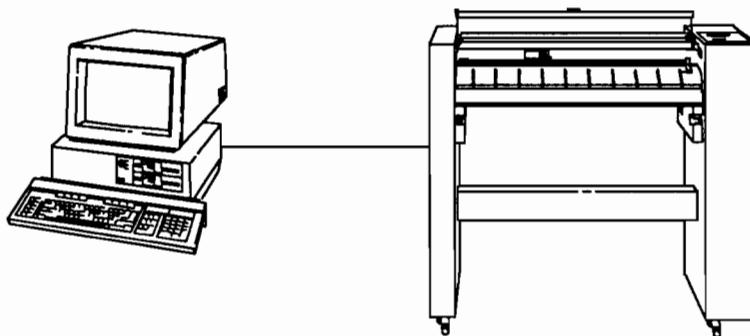
The term "system configuration" refers to the way the plotter is interconnected with the computer and other equipment. The plotter may be operated in an eavesdrop or standalone configuration and in a remote or local operating mode. The type of configuration and the operating mode, together, define a 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.



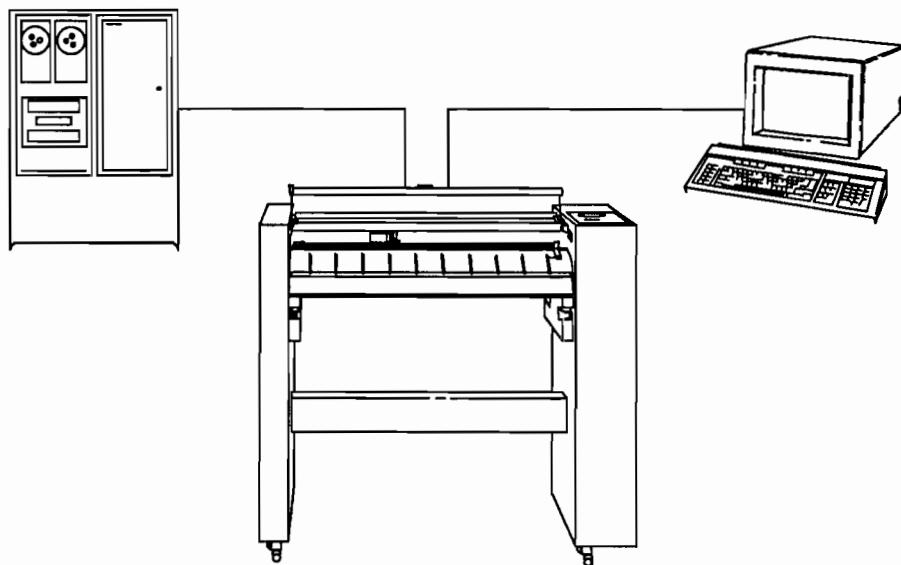
*Standalone Configuration with Mainframe and Terminals*



*Standalone Configuration with Personal Computer*

## ***Eavesdrop Configuration***

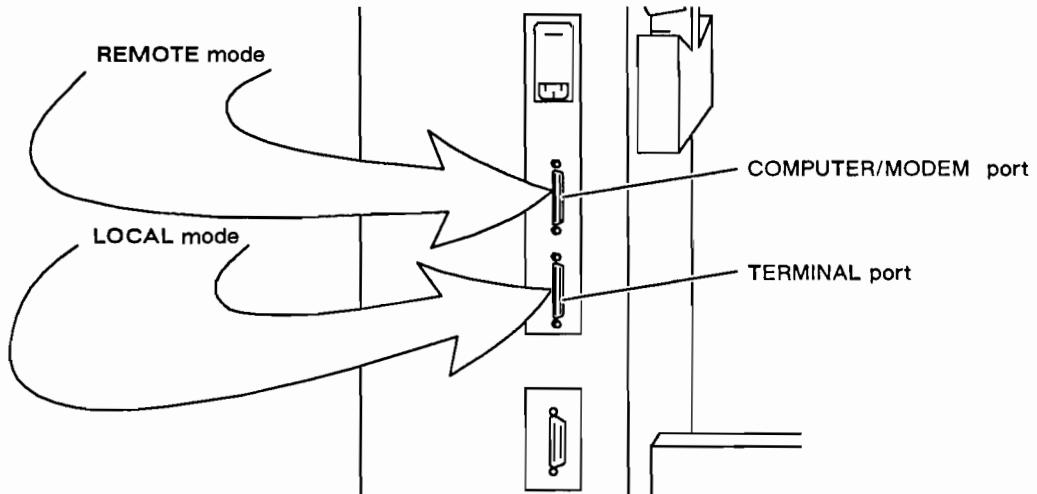
In an eavesdrop configuration the plotter is connected between a mainframe computer and a terminal, as shown in the following illustration. All communications between the mainframe computer and the terminal actually pass through the plotter.



*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.

	<b>Eavesdrop</b>	<b>Standalone</b>
<b>Remote</b>	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.
<b>Local</b>	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 Appendix 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 XON/XOFF: 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.

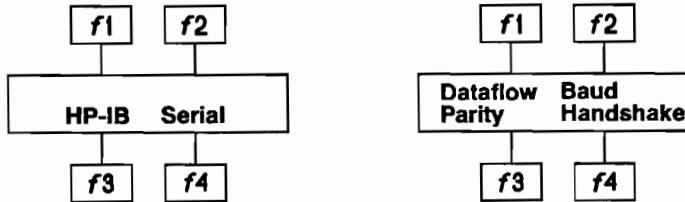
\*\*\*This sets parity to off, the parity bit set to 0. (Also known as space parity.)

**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 **Handshake** — 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

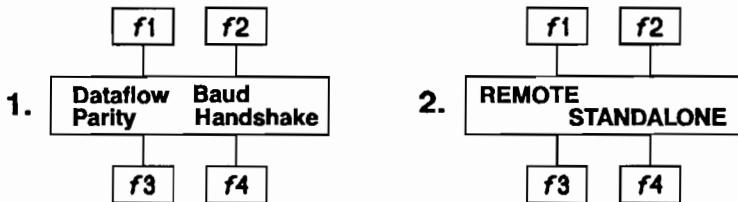
**USE:** Use **Dataflow** to tell your plotter what configuration you are using.

**DEFAULT:** REMOTE/STANDALONE

### OPTIONS:

Configuration Options	Operating Modes
REMOTE	STANDALONE
LOCAL	EAVESDROP
STANDBY	

**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

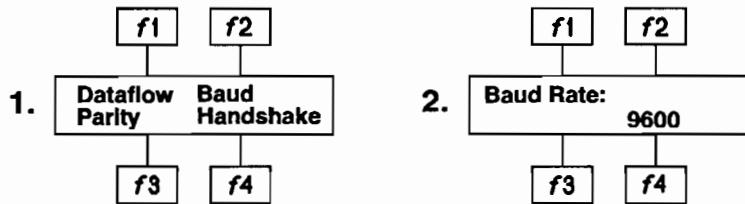
**USE:** Use **Baud** to set your plotter to the same baud rate that your computer uses.

**DEFAULT:** 9600

**OPTIONS:**

Baud Rate Settings	
75	
110	
150	
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 the baud rate options. Press **f2** to view the previous 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 baud rate, press the **Next Display** button.

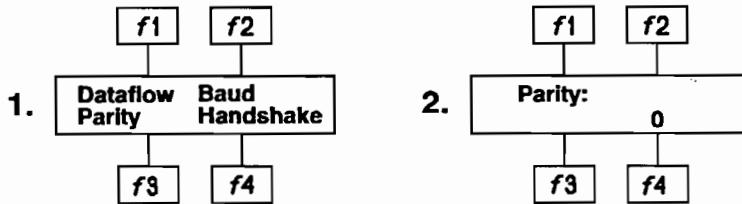
## Setting the Parity

**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 cycle through the parity options. Press **f2** to view the previous 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.

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.

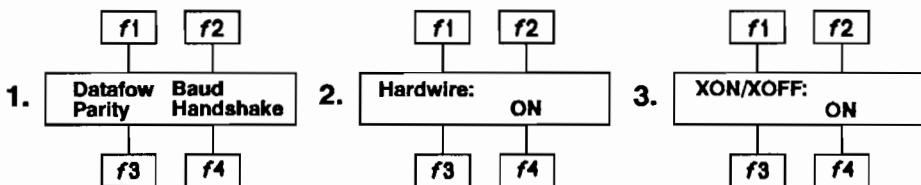
## Selecting a Handshake

**USE:** Use **Handshake** 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 and Xon/Xoff handshake on or off.



1. Press **Handshake** (**f4**) to display the **Handshake** submenu.
2. Press **f4** to toggle **Hardwire** on and off. Press the **Enter** button when the option you want is displayed, to store the setting in continuous memory.  
To exit without changing the setting, press the **Next Display** button. The **XON/XOFF** submenu displays when you exit the **Hardwire** submenu.
3. Press **f4** to toggle **XON/XOFF** on and off.
4. Press the **Enter** button when the option you want is displayed, 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.)

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 and Xon/Xoff handshakes, the plotter can use 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. To set up an Enquire-Acknowledge or software checking handshake programmatically, refer to Appendix D for the programming instructions you'll need.

## 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 7595B PLOTTER OK (or 7596B 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
```

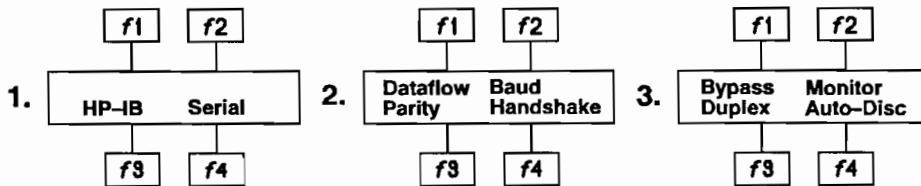
**NOTE:** The BASIC *CHR\$(3)* string function sends the decimal code (3) for the ASCII character **ETX**. Check your computer documentation for the proper string function to use.

## 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

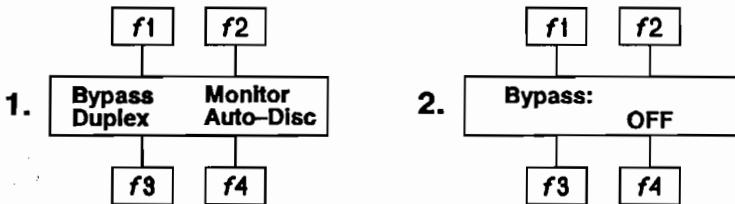
**USE:** In an RS-232-C *eavesdrop* configuration, you can use **Bypass** to control when the plotter receives data.

**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 each of the **Bypass** options.
3. Press the **Enter** button when the options you want display. 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 Appendix D for an explanation of plotter-on and plotter-off instructions (device control instructions) and their syntax.

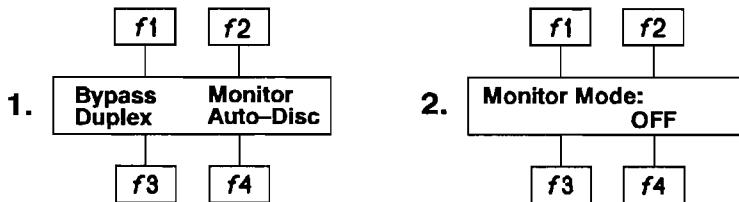
## Detecting Communication Problems

**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 (or HP-GL/2) 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 (or HP-GL/2) instructions go into the plotter's buffer before being executed. Therefore, device-control instructions may be displayed on the terminal before HP-GL (or HP-GL/2) instructions *even if they were sent after the HP-GL (or HP-GL/2) 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.

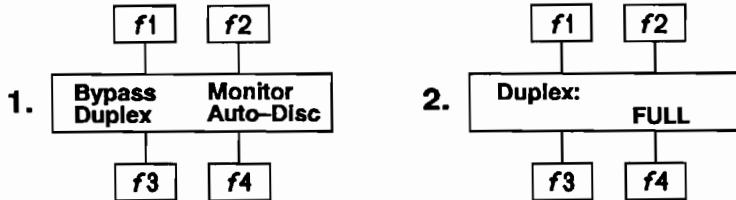
## Setting Duplex

**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 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.

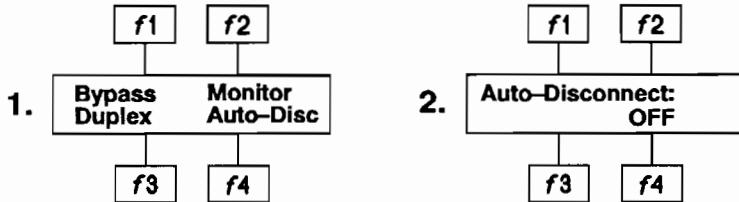
## Using a Modem with the Plotter

**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.



## 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)
- Personal Computers (Compatible):
  - HP Vectra, Vectra ES/12, QS/16 and RS/20
  - IBM PC, PC-XT, AT, and PS/2
  - Apple Macintosh, Macintosh Plus/SE/II

Refer to Appendix C for cable ordering information.

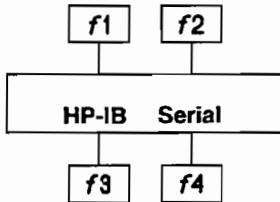
### Using the Serial Menus

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.

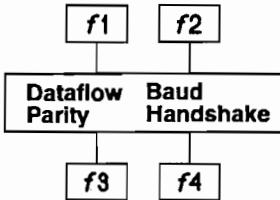
The following section tells you how to access and change menu items; for a full description of each option, refer to Chapter 7.

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

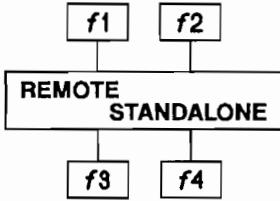
1. Press the **Next Display** button until the following menu displays.



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



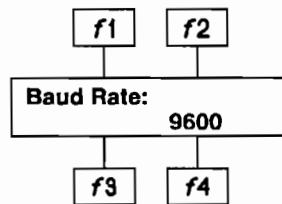
3. Press **Dataflow (f1)** to display the configuration submenu.



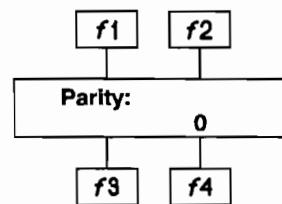
4. Press **REMOTE (f1)** to view the configuration options (**REMOTE**, **LOCAL**, and **STANDBY**). When the option you need displays, press **STANDALONE (f4)** to view the operating mode options (**EAVESDROP** and **STANDALONE**). When both the desired configuration and the operating mode display, 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.



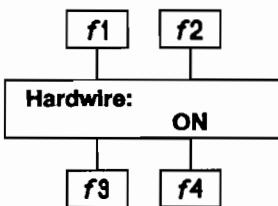
6. Press **f4** to view the baud rate options. Press **f4** to view the previous option. (For a table of the baud rate options, refer to *Setting the Baud Rate* in Chapter 7.) When the option you need displays, press the **Enter** button to store the setting in continuous memory. The plotter will display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



10. Press **f4** to view the handshake options (**Hardwire: ON, OFF; XON/XOFF: ON, 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.

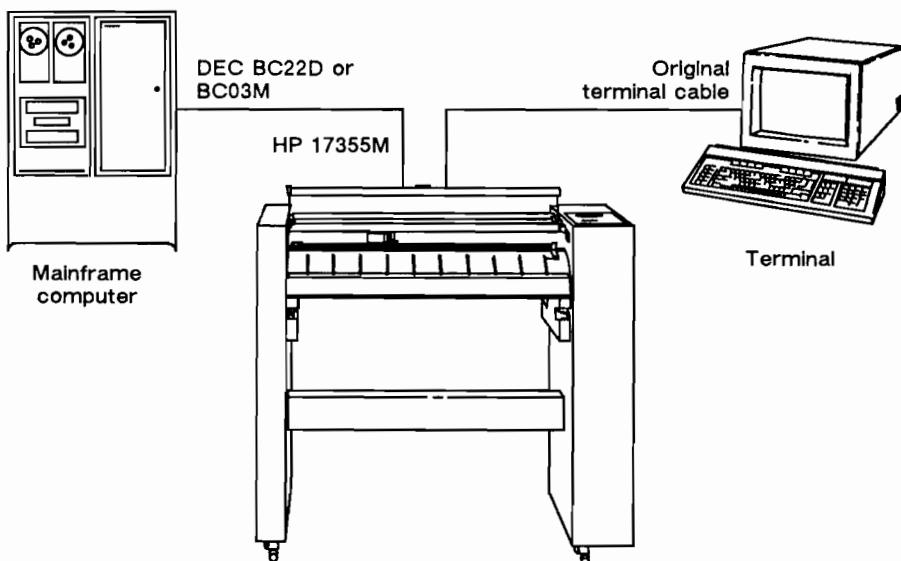
## DEC VAX COMPUTER (RS-232-C Interface)

Computer Equipment	Plotter Equipment
DEC VAX Computer	HP DraftMaster
Null modem cable (DEC BC22D or BC03M)	RS-232-C cable* (HP 17355M)

\* The RS-232-C cable connects the plotter to the DEC cable attached to the 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 DEC BC22D or BC03M cable to the VAX, and the other end to the HP 17355M cable. Attach the remaining end of the HP 17355M cable to the plotter's **COMPUTER/MODEM** port. Refer to the following illustration.
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. 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 7595B PLOTTER OK or 7596B PLOTTER OK (or a similar message, depending on which **Emulate** mode is on.)

**NOTE:** If you send the test commands to the plotter individually rather than running them in a FORTRAN program, turn **Timeout** off. See *Using Timeout to Identify Ends of Plots* in Chapter 2 for instructions. Don't forget to turn **Timeout** on again when you finish. ■

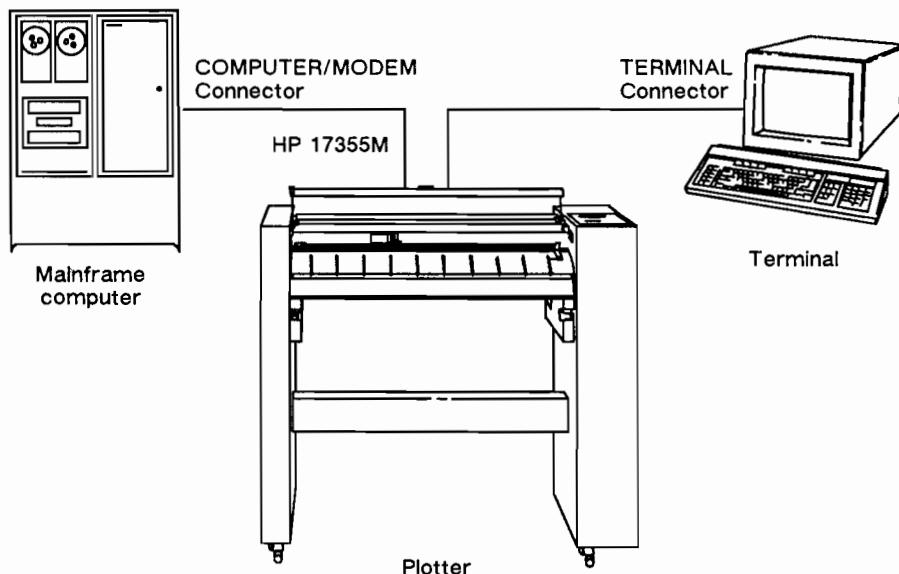
## HP 3000 Computer (RS-232-C Interface)

Computer Equipment	Plotter Equipment
HP 3000	HP DraftMaster
Terminal	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 plotter's **COMPUTER/MODEM** port.
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. Turn on your equipment and load a sheet of paper in the plotter.
6. 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 (IX,"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 7595B PLOTTER OK or 7596B PLOTTER OK (or a similar message, depending on which **Emulate** mode is on.)

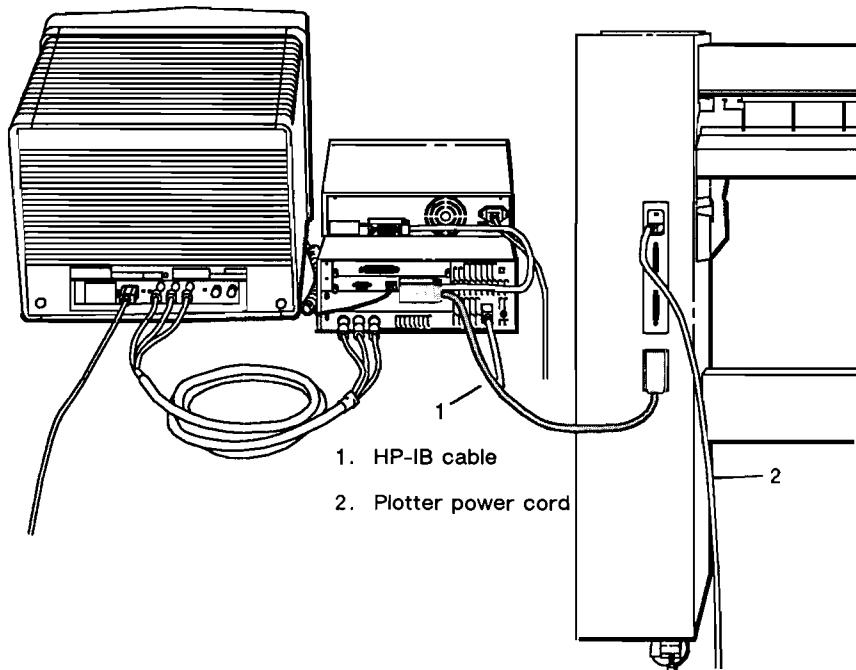
**NOTE:** If you send the test commands to the plotter individually rather than running them in an HP 3000 FORTRAN program, turn **Timeout** off. See *Using Timeout to Identify Ends of Plots* in Chapter 2 for instructions. Don't forget to turn **Timeout** on again when you finish. ■

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

Computer Equipment	Plotter Equipment
HP 300 Series 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. The following illustration shows an HP Model 320 computer.



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 7595B PLOTTER OK or 7596B PLOTTER OK (or a similar message, depending on which **Emulate** mode is on.)

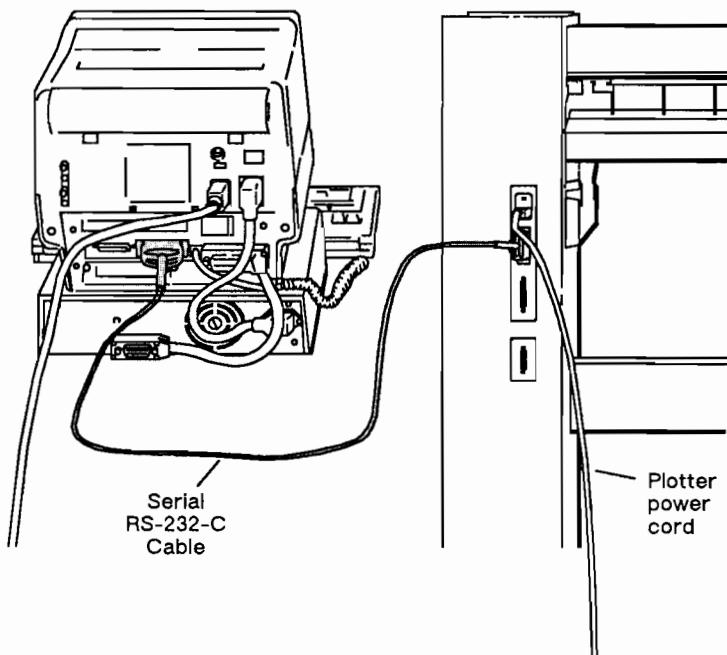
**NOTE:** If you send the test commands to the plotter individually rather than running them in a BASIC program, turn **Timeout** off. See *Using Timeout to Identify Ends of Plots* in Chapter 2 for instructions. Don't forget to turn **Timeout** on again when you finish. ■

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

Computer Equipment	Plotter Equipment
HP Touchscreen II, Touch-screen, Touchscreen MAX, or HP 150 (includes monitor, keyboard, and disc drive)	HP DraftMaster Special RS-232-C cable (HP 17255M or 13242G)

### 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 150 computer. The HP Touchscreen, Touchscreen II, and Touchscreen MAX 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 Disk. 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 7595B PLOTTER OK or 7596B PLOTTER OK (or a similar message, depending on which **Emulate** mode is on.)

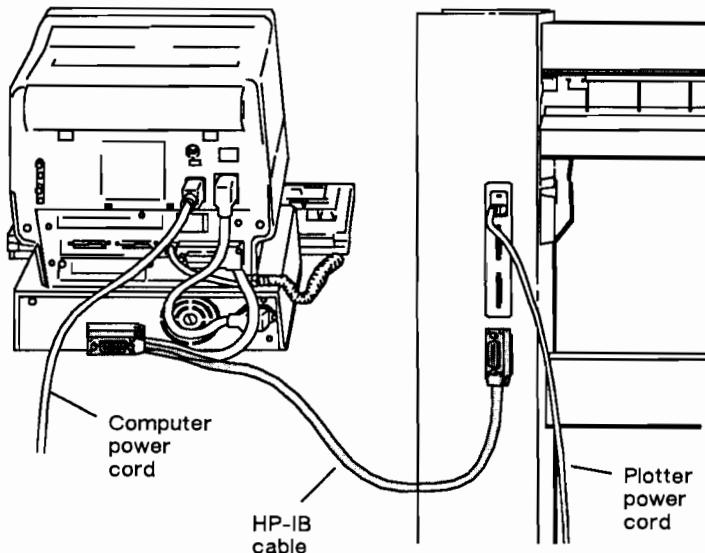
**NOTE:** If you send the test commands to the plotter individually rather than running them in a BASIC program, turn **Timeout** off. See *Using Timeout to Identify Ends of Plots* in Chapter 2 for instructions. Don't forget to turn **Timeout** on again when you finish. ■

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

Computer Equipment	Plotter Equipment
HP Touchscreen II, Touch-screen, 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 150 computer. The Touchscreen, Touchscreen II, and Touchscreen MAX 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 Disk. 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.

**NOTE:** If you send the test commands to the plotter individually rather than running them in a BASIC program, turn **Timeout** off. See *Using Timeout to Identify Ends of Plots* in Chapter 2 for instructions. Don't forget to turn **Timeout** on again when you finish. ■

## **Personal Computers (Compatibles using RS-232-C Interface)**

These instructions tell you how to connect your plotter to the following compatible computers.

- HP Vectra, ES/12, QS/16, and RS/20
- IBM PC, PC/XT, AT, and PS/2
- AT&T PC 6300
- COMPAQ DESKPRO 286 and 386/20

<b>Computer Equipment</b>	<b>Cable</b>
HP Vectra, ES/12, QS/16, RS/20 with HP 24540A or HP 24541A card using a 9-pin male connector	HP 24542G
with HP 24541A dual serial card using a 25-pin female connector	HP 17255M or HP 13242G
IBM AT, PC, PC/XT, PS/2 with standard serial interface using a 25-pin male connector	HP 17255D
with asynchronous communication adapter using a 9-pin male connector	HP 24542G
AT&T PC 6300	HP 17255D
COMPAQ 286 and 386	HP 17255D

## Interconnection Instructions

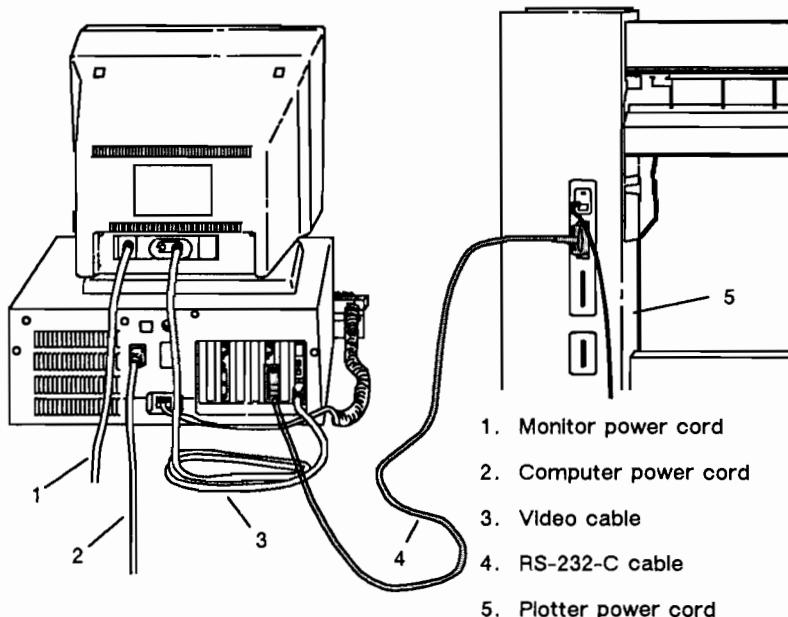
1. Turn off your plotter and computer equipment.
2. If necessary, install the serial interface card. (Refer to your computer documentation for details.) If you have already installed a serial card, go to step 3.

**NOTE:** If you have more than one serial port installed, you will need to know whether you're connecting the plotter to COM1 or COM2 (most software will not run on COM3). You will need this information for testing communications and for configuring your software. If you are using COM2, be sure to substitute COM2 for COM1 in the instructions. ■

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

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

4. Connect the plotter to the computer. The following illustration shows an HP Vectra PC. Be sure you are using the correct cable for your computer and plotter.



## **Testing Communication without BASIC**

To test the computer/plotter interface without using BASIC, turn on your computer and plotter, load pens and paper, then follow these steps.

1. At the DOS prompt, type the following (substitute COM2 for COM1, if necessary) and press **ENTER**.

```
MODE COM1:9600,N,8,1,P
```

This sets the RS-232-C port for 9600 baud, no parity, 8 data bits, one stop bit, and continuous error checking.

2. Type the following (substitute COM2 for COM1, if necessary) and press **ENTER**.

```
ECHO IN;SP1;PA0,0;PD0,1500,1500,1500,0,0;SP00>COM1
```

The plotter selects pen #1, draws a triangle on the page, and returns the pen to the carousel.

## **Testing Communication with BASIC**

To test the computer/plotter interface, turn on your computer and plotter, load pens and paper, then follow these steps.

1. At the DOS prompt, type the following (substitute COM2 for COM1, if necessary) and press **ENTER**.

```
MODE COM1:9600,N,8,1,P
```

This sets the RS-232-C port for 9600 baud, no parity, 8 databits, one stop bit, and continuous error checking.

2. Enter and run the following BASIC program (substitute COM2 for COM1, if necessary). (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
```

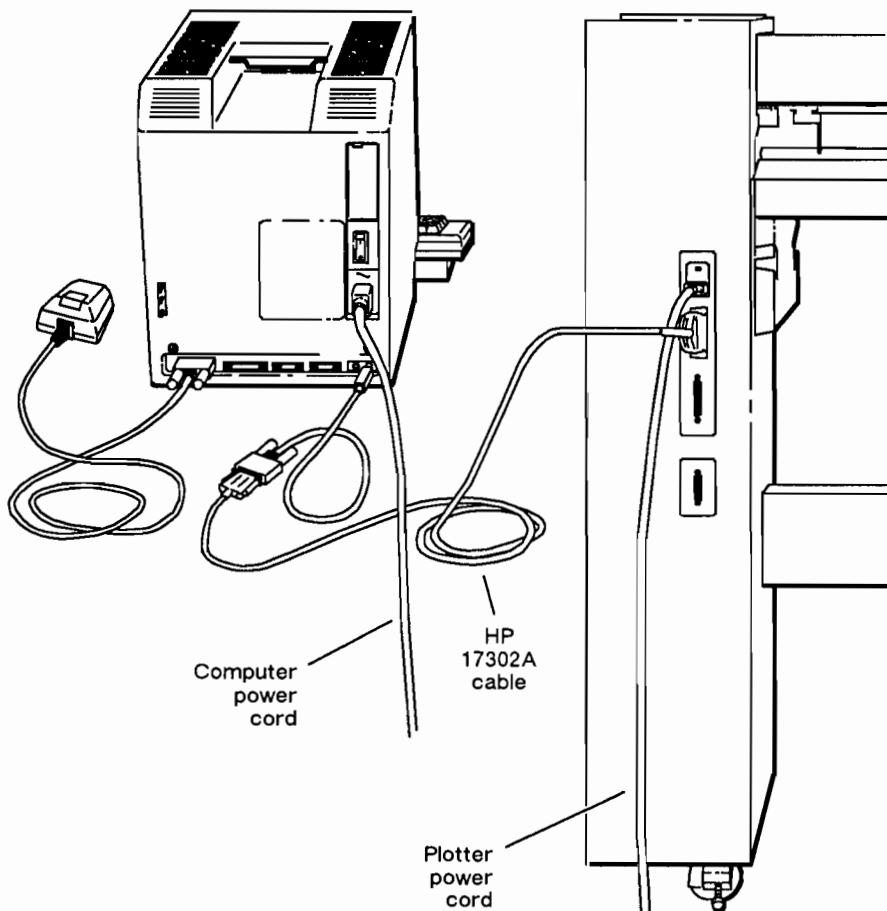
Your plotter will select pen #1 and print 7595B PLOTTER OK or 7596B PLOTTER OK (or a similar message, depending on which **Emulate** mode is on.)

**NOTE:** If you send the test commands to the plotter individually rather than running them in a BASIC program, turn **Timeout** off. See *Using Timeout to Identify Ends of Plots* in Chapter 2 for instructions. Don't forget to turn **Timeout** on again when you finish. ■

## Apple Macintosh/Macintosh Plus/SE/II (RS-232-C Interface)

Computer	Cable
Apple Macintosh Computer	HP 92219M
Apple Macintosh Plus	HP 17302A
Apple Macintosh SE	HP 17302A
Apple Macintosh II	HP 17302A

1. Turn off your plotter and computer equipment.
2. Connect the plotter to the computer. The following illustration shows an Apple Macintosh Plus Computer. Be sure you are using the correct cable for your computer.



## Testing Communication with BASIC

Hold down the **Cursor Control** button while turning the plotter on. The plotter's buffer will be emptied and your front-panel parameters will be set to the appropriate default conditions. These instructions assume a baud rate of 9600. If you are using a different baud rate, consult your computer documentation for instructions.

To test the computer/plotter interface, turn on your computer, load pens and paper, then enter and run the following BASIC (Macintosh BASIC 2.0 or higher) 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 7595B PLOTTER OK or 7596B PLOTTER OK (or a similar message, depending on which **Emulate** mode is on.)

If you send the test commands to the plotter individually rather than running them in a BASIC program, turn **Timeout** off. See *Using Timeout to Identify Ends of Plots* in Chapter 2 for instructions. Don't forget to turn **Timeout** on again when you finish.

**NOTE:** If you are not using BASIC, you will need a plotter driver to run a Macintosh computer with the plotter. Check with your computer or plotter dealer for available drivers. (Some packages may require the baud rate or configuration to be altered. Consult the software package manual before proceeding). ■



## 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 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 HP DraftMaster SX/RX in HP-GL/2 mode (or any HP-GL/2 device), but lists the HP 7585 and 7586 or DraftMaster 7595 and 7596 plotters, use one of the **Emulate** modes, 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, 300, 600, 1200, 2400, 4800, 9600, 19200, External
Parity	0*, 1**, ODD, EVEN
Handshake	Hardwire: OFF, ON XON/XOFF: OFF, ON

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

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

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

## Using Software Packages and Drivers

If your software doesn't work with your plotter, try a different **Emulate** mode. When **7585B** emulation is on, HP DraftMaster SX and RX work 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 **7585B** is on.

When **7595A** emulation is on, HP DraftMaster SX and RX operate in HP-GL mode; indicate in your software that you are using the HP DraftMaster 7595 or 7596 when **7595A** is on.

If your software specifically supports HP DraftMaster SX/RX in HP-GL/2 mode (or other HP-GL/2 devices), then set **HP-GL/2** emulation mode on and indicate in your software that you are using the HP-GL/2 device.

## Writing Your Own Graphics Programs

If you want to write your own graphics programs using the HP-GL/2 programming language, see the HP-GL/2 Syntax Summary in Appendix D of this manual. In addition, an extensive programming document — the *HP-GL/2 Reference Guide* — is available from Hewlett-Packard. For multi-product information, the *HP-GL/2 Comparison Guide* is available. Refer to Appendix C for ordering information.

If you want to write your own graphics programs using the HP-GL programming language, an extensive HP-GL programming document — the *HP DraftMaster Plotter 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 *HP-GL/2 Reference Guide* and the *Programmer's Reference* explain 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.

# A

# A

## Technical Information

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### What You'll Learn in This Chapter

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
- power specifications
- RS-232-C specifications
- cable schematics
- HP-IB interfacing information

## Front-Panel Summary

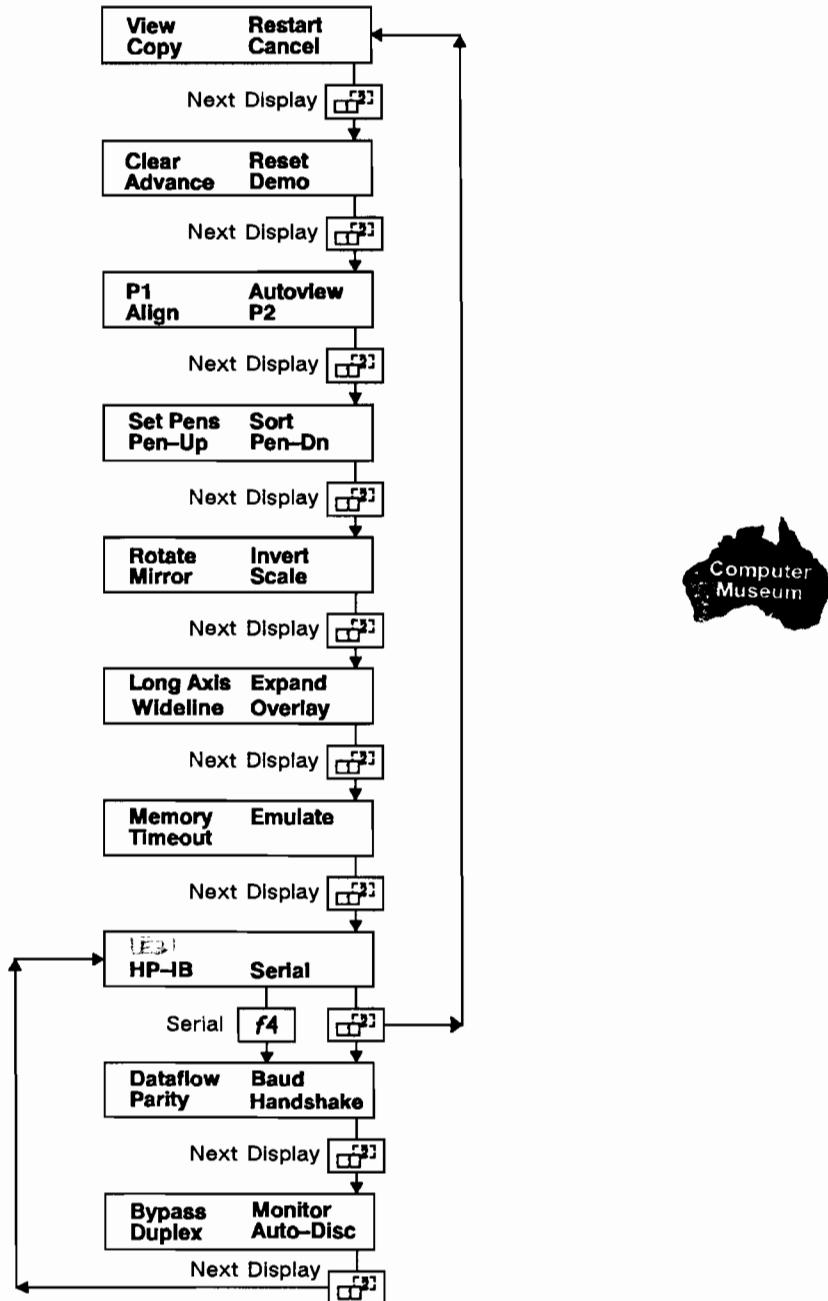
The following table lists the default setting of front-panel menu items, and indicates whether each setting is stored in temporary or continuous memory. Menus that cause an immediate action (and cannot be stored) are not listed.

Front-Panel Menu	Default Setting	Memory Type
Copy	0	temporary
P1/P2	varies with paper size	temporary
Autoview	off	continuous
Speed	varies with carousel type	temporary
Force	varies with carousel type	temporary
Thickness	varies with carousel type	temporary
Group	1	temporary
Sort	on	temporary
Rotate	off	temporary
Invert	off	continuous
Mirror	off	temporary
Scale	1:1	temporary
LongAxis		
Frames	on	continuous
1.6M	off	temporary
Expand	off	continuous
Wideline	on	continuous
Overlay	off	continuous
Memory	on	continuous
Emulate	7595A	continuous
Timeout	10 min.	continuous
HP-IB	05	continuous
Dataflow	Remote/Standalone	continuous
Baud	9600	continuous
Parity	0	continuous
Hardwire	on	continuous
XON/XOFF	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.



## 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. Also, media may be too thin.
DISABLED: BUFFER EMPTY	There is nothing in the buffer to copy or restart.
FILE TOO BIG NO COPIES	Current plot is too big to be copied or restarted.
LOAD PAPER TO COPY	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 is 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 <b>Advance</b> .
CLEARING BUFFERS...	Plotter's input and replot buffers are being emptied.
RESETTING PLOTTER...	Plotter's input and replot buffers are being emptied and certain menu settings returned to default.

\*Calibration messages are explained in Appendix B.

(Table continues)

FILE TOO BIG NO FRAMES	Current plot is too big to be plotted in frames.
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. If message continues to display, call your HP Dealer or Sales and Support Office for service.
CHECK PEN AND PAPER	Pen is badly worn, pen adapter is not secured to the drafting pen body, or pen is missing. Also, media may be torn. Check pens and paper. If message continues to display, call your HP Dealer or Sales and Support Office for service information.
DISABLED SECURITY ON	Security has been turned on through HP-GL graphics language.
100: SEE MANUAL	Turn plotter off and then on again. If the message continues to display, the plotter needs to be repaired. Contact your HP Dealer or Sales and Support Office for service information.
200: SEE MANUAL	Contact the HP Dealer or Sales and Support Office where you purchased the plotter for service information.
300: SEE MANUAL	Calibrate the plotter as described in Appendix B.
DIGITIZE POINT • Pen-Up Pen-Dn	When digitizing, allows you to raise and lower the pen.

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 Appendix D (and the *HP-GL/2 Product Comparison Guide* for multiproduct parameters) for help in correcting (and avoiding) such errors.

<b>Programming Error Messages</b>	
1: Command not recognized	11: Invalid byte following ESC.
2: Wrong number of parameters	12: Invalid byte in I/O control
3: Bad parameter	13: Out of range I/O parameter
5: Unknown character set	14: Too many I/O parameters
6: Position overflow	15: Error in I/O transmission
7: Buffer overflow	16: I/O buffer overflow
10: Invalid I/O output request	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)  18 × 24 in. (Architectural C) 24 × 36 in. (Architectural D) 30 × 42 in. 36 × 48 in. (Architectural E)
Media Types	plotter paper, vellum, tracing bond, double-matte polyester film

<b>Maximum Plotting Area</b>	<b>Expand off:</b> 3 margins 16 mm, 1 margin 40 mm* <b>Expand on:</b> 3 margins 5 mm, 1 margin 29 mm
<b>Resolution</b>	addressable step size: 0.025 mm (0.000984 in.)
<b>Pen Speed</b>	maximum 110 cm/sec (43 ips)
<b>Acceleration</b>	maximum 5 — 7 g

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

## Physical Specifications

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

## Environmental Specifications

<b>Operating Temperature</b>	0°C to 55°C
<b>Operating Humidity*</b>	Sheet media: 5 to 95% at 0 to 40°C Roll media: 30 to 70% at 10 to 30°C
<b>Nonoperating Temperature</b>	-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.

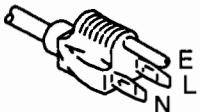
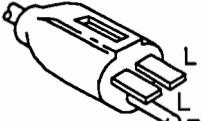
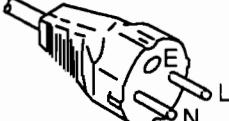
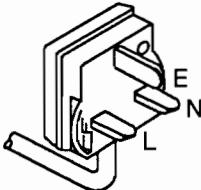
### **Requirements**

Source	100, 120, 220, 240 V~-10%, + 5%
Frequency	48 — 66 Hz
Consumption	125 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 table on the following pages. 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
 NEMA 5-15P	100 or 120 V	Canada Japan Mexico Philippines Taiwan United States	8120-1378
 NEMA 6-15P	220 or 240 V	United States	8120-0698
 CEE 7-VII	220 or 240 V	East and West Europe Egypt Saudia Arabia	8120-1689
 BS 1363A	220 or 240 V	United Kingdom	8120-1351

*(Table continues)*

### *Power Cord Options (Continued)*

AC Plug Type*	AC Voltage	Country	HP Part Number
 ASC112	220 or 240 V	Australia New Zealand	8120-1369
 SEV 1011	220 or 240 V	Switzerland	8120-2104
 DHCK-107	220 or 240 V	Denmark	8120-2956

\* 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

## RS-422-A Interface on Computer/Modem Connector

A

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 Part Number	Connector Type (25-pin)	
	Plotter End	Computer End
17255D 17255M or 13242G*	male male	female male

\*Symmetrical; either end may be connected to the plotter. Other pins are connected in the 13242G but do not affect plotter operation.

HP Part Number	Connector Type	
	Plotter End	Computer End
17302A	male (25-pin)	male (8-pin mini din)

```

graph LR
    P1[20] --- P2[2]
    P1 --- P3[3]
    P1 --- P4[2]
    P4 --- J(( ))
    J --- P5[3]
    J --- P6[5]
    J --- P7[4]
    P7 --- P8[8]
    style J fill:none,stroke:none
    
```

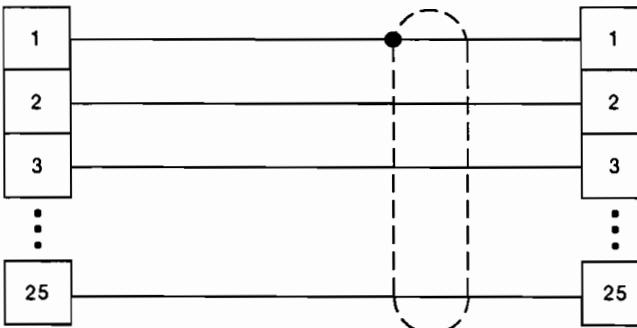
HP Part Number	Connector Type	
	Plotter End	Computer End
92219M	male (25-pin)	male (9-pin)

```

graph LR
    P1[1] --- P2[7]
    P1 --- P3[3]
    P1 --- P4[20]
    P1 --- P5[2]
    P5 --- J(( ))
    J --- P6[1]
    J --- P7[3]
    J --- P8[5]
    J --- P9[7]
    style J fill:none,stroke:none
    
```

## **Straight-through Cable**

HP Part Number	Connector Type (25-pin)	
	Plotter End	Computer End
17355D 17355M *	male male	female male

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

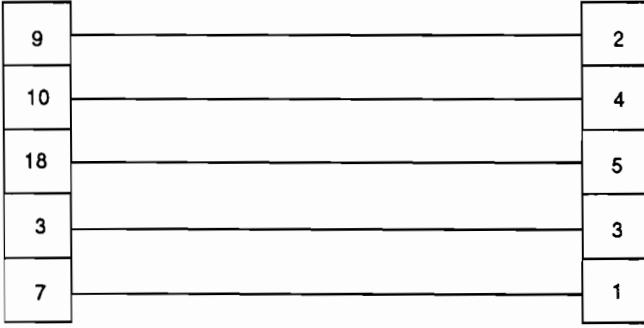
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## **Serial Printer/Plotter Cable**

HP Part Number	Connector Type	
	Plotter End	Computer End
24542G	male (25-pin)	female (9-pin)
 The diagram illustrates the wiring for a Serial Printer/Plotter Cable. It consists of two parallel columns of pins. The left column represents the Plotter End (25-pin male), and the right column represents the Computer End (9-pin female). The pins are numbered sequentially from top to bottom. Wires connect the following pins between the two ends: Plotter Pin → Computer Pin 4 → 1 2 → 2 3 → 3 5 → 4 6 → (no connection) 7 → 5 20 → 6 8 → 7 There are two intermediate connection points on the wires between the two sets of pins, located approximately halfway between pin 5 and pin 20.		

## **RS-422-A Adapter Cable**

HP Part Number	Connector Type (25-pin)	
	Plotter End	Computer End
17855M	Male (25-pin)	Male (9-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 Codes		Address Settings 16 8 4 2 1	Address Characters	
			Listen	Talk
Decimal	Octal	0 0 0 0 0	SP	@
1	1	0 0 0 0 1	!	A
2	2	0 0 0 1 0	"	B
3	3	0 0 0 1 1	#	C
4	4	0 0 1 0 0	\$	D
5	5	0 0 1 0 1	%	E
6	6	0 0 1 1 0	&	F
7	7	0 0 1 1 1	,	G
8	10	0 1 0 0 0	(	H
9	11	0 1 0 0 1	)	I

(Table continues)

*HP-IB Address Settings*

Address Codes		Address Settings 16 8 4 2 1	Address Characters	
Decimal	Octal		Listen	Talk
10	12	0 1 0 1 0	*	J
11	13	0 1 0 1 1	+	K
12	14	0 1 1 0 0	,	L
13	15	0 1 1 0 1	-	M
14	16	0 1 1 1 0	.	N
15	17	0 1 1 1 1	/	O
16	20	1 0 0 0 0	0	P
17	21	1 0 0 0 1	1	Q
18	22	1 0 0 1 0	2	R
19	23	1 0 0 1 1	3	S
20	24	1 0 1 0 0	4	T

*(Table continues)*

### HP-IB Address Settings

Address Codes		Address Settings 16 8 4 2 1	Address Characters	
Decimal	Octal		Listen	Talk
21	25	1 0 1 0 1	5	U
22	26	1 0 1 1 0	6	V
23	27	1 0 1 1 1	7	W
24	30	1 1 0 0 0	8	X
25	31	1 1 0 0 1	9	Y
26	32	1 1 0 1 0	:	Z
27	33	1 1 0 1 1	;	[
28	34	1 1 1 0 0	<	\
29	35	1 1 1 0 1	=	]
30	36	1 1 1 1 0	>	^
31	37	1 1 1 1 1	?	-

← Reserved for HP desktop computer

← Sets listen-only mode

A

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	Function Name
SH1	Source Handshake
AH1	Acceptor Handshake
T6	Talker (or TE = Extended Talker)*
L3	Listener (or LE = Extended Listener)*
SR1	Service Request
RLo	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.

## FCC Statement (U.S.A.)

The United States Federal Communications Commission (in 47 CFR 15.838) has specified that the following notice be brought to the attention of users of this product.

'This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try and correct the interferences by one or more of the following measures:

- reorient the receiving antenna
- increase the separation between the equipment and the receiver
- connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- consult the dealer or an experienced radio/TV technician for help

The user may find the following booklet prepared by the Federal Communications Commission helpful: How to Identify and Resolve Radio-TV Interference Problems. This booklet is available from the US Government Printing Office, Washington, DC 20402, Stock No. 004-000-00345-4.'

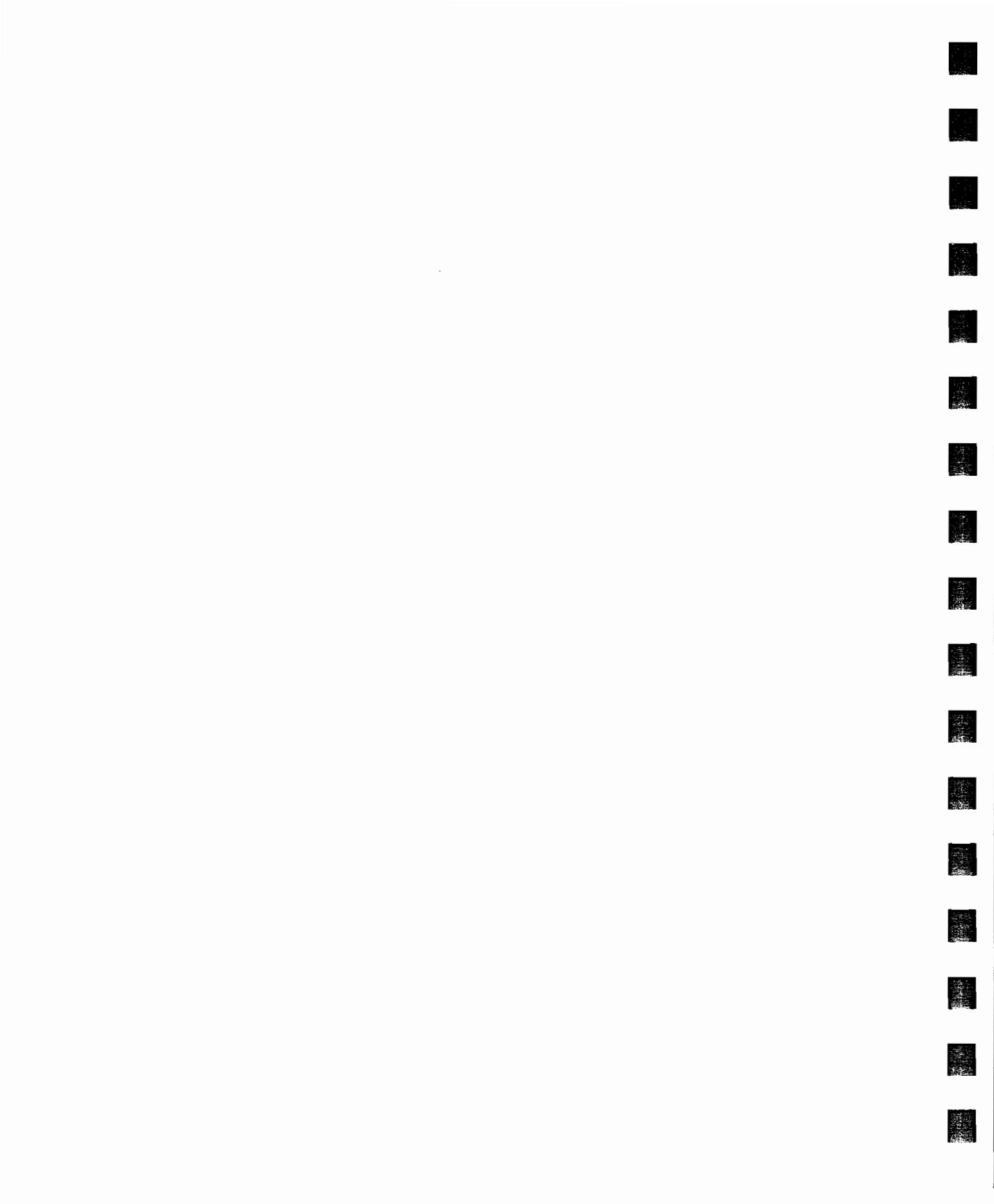
## DOC Statement (Canada)

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le present appareil numerique n'emet pas de bruits radioelectriques depassant les limits applicables aux appareils numeriques de la class B prescrites dans le Reglement sur le brouillage radioelectrique edicte par le ministere des Communications du Canada.

## Telecommunications General Approval (UK)

Pursuant to Section 22 of Telecommunications Act of 1984 this product is approved for secondary attachment to approved primary attachment devices connected to the telecommunication network under the General Approval (NS/G/1234/5/100003).



## Plotting for Precision

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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</b> (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*
<b>Repeatability</b> for the same pen pen to pen	0.1 mm (0.004 in.) 0.2 mm (0.008 in.)
<b>Addressable Resolution</b>	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.
  - 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. **Stabilize roll media.** To avoid plot distortions, advance roll media and let it stabilize for five minutes before plotting.

### 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 media. Reloading plotting media 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.

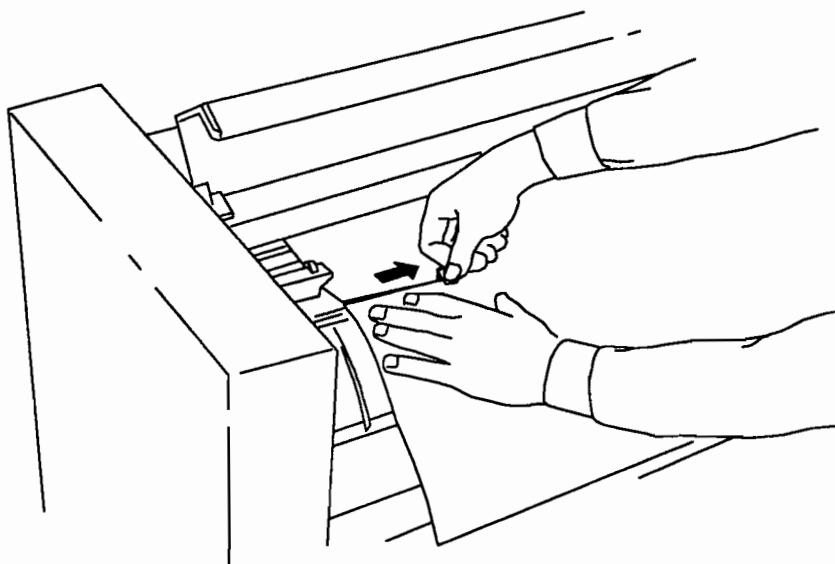
Complete the following steps to calibrate the plotter.

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-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 media.

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, then alignment marks and a square will be drawn. When this process is complete, the plotter will display **CUT PAPER AND 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 along the cut line, 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.)



**B**

6. Pull the paper-loading lever towards you to raise the pinch wheels. Remove the media from the plotter. Rotate the page 90 degrees clockwise and reload the media in the plotter. The uncut edge of the media should be against the paper stops.

7. Carefully align the line on the left pinch wheel with the left edge of the media. 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 media 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 media; when you cut and reload the media, 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. If calibration fails again, try repeating the procedure using a thicker pen.

## 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



## Accessories Available

This appendix lists the accessories available for your plotter and tells you how to order supplies and accessories. Descriptions of the *HP-GL/2 Reference Guide* and the *HP DraftMaster Programmer's Reference* 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 supplies catalog shipped with your plotter.

*Plotter Accessories and Cables*

Item	HP Part Number
<i>HP-GL/2 Reference Guide</i>	5959-9733
<i>HP-GL/2 Comparison Guide</i>	5959-9734
<i>HP DraftMaster SX/RX User's Guide</i>	
English	07595-90051
German	07595-90054
French	07595-90055
Spanish	07595-90056
Italian	07595-90057
Japanese	07595-90058
<i>HP DraftMaster Programmer's Reference</i>	07595-90001
<i>Rollfeed Upgrade Kit</i> Adds rollfeed capability to 7595A or 7595B	17520A
<i>DraftMaster Upgrade Kit</i> Upgrades 7596B (DraftMaster RX) to 7599 (DraftMaster MX). Includes 20 mb hard disk, four RS-232-C ports, plot management features.	17569A

(Table continues)

*Plotter Accessories and Cables (Continued)*

<b>Item</b>	<b>HP Part Number</b>
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)
RS-232-C cable (for use with DEC VAX and HP 3000, series 64,42, and 48)	17355M (3m)
RS-232-C eavesdrop cable (for use with DEC VAX and HP 3000, series 64, 42, and 48)	17455A
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 (1m), B(2m) or C(3m)*
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
dust cover	92259P

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

## The HP-GL/2 Reference Guide and HP-GL/2 Comparison Guide

The *HP-GL/2 Reference Guide* provides complete explanations and examples of the HP-GL/2 graphic and interfacing instructions. The *HP-GL/2 Reference Guide* is a valuable tool for writing your own programs using HP-GL/2.

The *HP-GL/2 Comparison Guide* presents detailed information on using the HP-GL/2 language for each Hewlett-Packard product that supports HP-GL/2. You will find an implementation matrix, driver development information, default conditions, and other information in this guide.

## The DraftMaster Programmer's Reference

The *HP DraftMaster Programmer's Reference* contains explanations and examples of the HP-GL graphics language. This guide is useful if you use software or drivers written for the following HP plotter models: 7585B, 7586B, 7595A, and 7596A.

## 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 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.



## HP-GL/2 Syntax Summary

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This appendix lists the syntax and parameter ranges for HP-GL/2, the graphics language instructions your plotter supports. HP-GL/2, in its entirety, is composed of two parts: the HP-GL/2 kernel instructions and extension instructions. The kernel instructions are supported on all HP plotters, the extensions are dependent on the device. Your plotter supports the HP-GL/2 kernel and three extensions: the Technical Graphics, Palette, and Digitizing extensions. All of the instructions in these groups are summarized below.

For a more complete description of these instructions and the entire HP-GL/2 language, along with special programming considerations, you can order the *HP-GL/2 Programmer's Reference* through your HP Sales and Support Office. If you are writing drivers to support more than one HP-GL/2 device, you may also want to order the *HP-GL/2 Comparison Guide*.

This appendix first explains briefly HP-GL/2 syntax conventions, then describes the instructions this plotter supports. The instruction summary lists the instructions from the HP-GL/2 kernel and the Technical Graphics, Palette, and Digitizing Extension in one alphabetical list.

The *HP-GL/2 Reference Guide* explains the HP-GL/2 instructions according to the kernel group or HP-GL/2 extension. For your help in referencing to the *HP-GL/2 Reference Guide*, this summary lists the functional kernel group or extension with which the instruction is associated. The following table list the HP-GL/2 kernel and the Technical Graphics Extension instructions.

## Key to HP-GL/2 Syntax

Optional syntax elements are enclosed in parentheses. The parentheses are not part of the HP-GL/2 instructions.

Individual parameters in each command must be specified using one of the data format types shown in the following table.

Data Type	Range
Integer	-8 388 608 to 8 388 607
Real	-8 388 608.999 9 to 8 388 607.999 9
Clamped Integer	-32 768 to 32 767
Clamped Real	-32 768 to 32 767
Current Unit	-8 388 608 to 8 388 607*
Character	8-bit character range 0 to 255
Newstring	character sequence with double quotes

\* Units are plotter units if scaling is off and user units if scaling is on. Plotter units are in the *integer* format, user units are in the *real* format.

## AA, Arc Absolute

(Vector Group)

**USE:** Draws an arc, using absolute coordinates, that starts at the current pen location and pivots around the specified center point (*XCENTER, YCENTER*).

**SYNTAX:** AAX*XCENTER, YCENTER, sweep angle, chord angle;*)

Parameter	Format	Functional Range	Default
<i>XCENTER, YCENTER</i>	current units	-8 388 608 to 8 388 607	—
sweep angle	clamped real	$\pm 360^\circ$	—
chord angle*	clamped real	$0.5^\circ$ to $180^\circ$	$5^\circ$

\* Chord angle is the default interpretation of chord tolerance. Deviation distance is defined as the distance between the drawn chord and the arc segment it represents. When you use the chord angle mode of chord tolerance, the circle or arc is always drawn with the same number of chords. When deviation distance mode is used, the number of chords changes with the size of the circle or arc. Change chord tolerance mode using the CT instruction.

## AC, Anchor Corner

(Line and Fill Attribute Group)

**USE:** Positions the starting point of any fill pattern. Use AC to ensure that the selected fill pattern will be positioned within the figure as expected.

**SYNTAX:** AC*X,Y();*  
or  
AC();

Parameter	Format	Functional Range	Default
<i>X,Y</i> coordinates	current units	-8 388 608 to 8 388 607	—

## AD, Alternate Font Definition

(Character Group)

**USE:** Defines an alternate character set and its attributes: font spacing, pitch, height, stroke weight, and typeface. Use AD to set up an alternate character set that you can easily access when labeling.

**SYNTAX:** AD*kind,value...,(kind,value;);*  
or  
AD();

Parameter	Format	Functional Range	Default
kind	clamped integer	1 to 7	no default
value	clamped real	kind dependent*	kind dependent*

\* Refer to the table following the parameter descriptions.

Attribute	Kind*	Value	Description
Character set	1	277 (0) 21 14 6 38 39 563 531 267 43 5 595 85 9 11 4 36 147 115 19 83 37	Roman8 (default) ANSI USASCII ECMA 94 Latin 1 French v1 French v2 German HP Drafting HP-GL/2 Download HP Kana8 HP Katakana HP Roman Extensions HP Special Symbols Intl. Ref. Version Italian JIS ASCII Norwegian v1 Norwegian v2 Portuguese Swedish Swedish Names Spanish United Kingdom
Font spacing	2	0 1	fixed spacing (default) variable spacing
Pitch	3	0 to 32 767.9999	characters per inch (default: 5.942)
Height	4	0 to 32 767.9999	font point size (default: 16)
Stroke Weight	6	-7 -3 0 3 7	very light light normal (default) bold very bold
Typeface	7	48 49 50	fixed vector (default) drafting fixed arc

\* Kind 5 is ignored.

## AR, Arc Relative

(Vector Group)

**USE:** Draws an arc, using relative coordinates, that starts at the current pen location and pivots around the specified center point ( $X_{INCREMENT}, Y_{INCREMENT}$ ).

**SYNTAX:** AR $X_{INCREMENT}, Y_{INCREMENT}, \text{sweep angle}(\text{,chord angle};)$

Parameter	Format	Functional Range	Default
$X_{INCREMENT}, Y_{INCREMENT}$	current units	-8 388 608 to 8 388 607	—
sweep angle	clamped real	$\pm 360^\circ$	—
chord angle*	current units	$0.5^\circ$ to $180^\circ$	$5^\circ$

- \* Chord angle is the default interpretation of chord tolerance. Deviation distance is defined as the distance between the drawn chord and the arc segment it represents. When you use the chord angle mode of chord tolerance, the circle or arc is always drawn with the same number of chords. When deviation distance mode is used, the number of chords changes with the size of the circle or arc. Change chord tolerance mode using the CT instruction.

## AT, Absolute Arc Three Point

(Vector Group)

**USE:** Draws an arc segment, using absolute coordinates, from a starting point through an intermediate point ( $X_{INTER}, Y_{INTER}$ ) to an end point ( $X_{END}, Y_{END}$ ). Use AT when you know these three points of an arc.

**SYNTAX:** AT $X_{INTER}, Y_{INTER}, X_{END}, Y_{END}(\text{,chord angle};)$

Parameter	Format	Functional Range	Default
$X_{INTER}, Y_{INTER}$	current units	-8 388 608 to 8 388 607	—
$X_{END}, Y_{END}$	current units	-8 388 608 to 8 388 607	—
chord angle	clamped real	$0.5^\circ$ to $180^\circ$	$5^\circ$

- \* Chord angle is the default interpretation of chord tolerance. Deviation distance is defined as the distance between the drawn chord and the arc segment it represents. When you use the chord angle mode of chord tolerance, the circle or arc is always drawn with the same number of chords. When deviation distance mode is used, the number of chords changes with the size of the circle or arc. Change chord tolerance mode using the CT instruction.

D

## BP, Begin Plot

## Technical Graphics Extension

**USE:** Indicates the beginning of a plot. Also lets you name plot files for queuing and spooling.

**SYNTAX:** BP(*kind,value...,(kind,value);*)  
or  
BP();

Parameter	Format	Functional Range	Default
kind	clamped integer	1, 2 , 3, or 4	—
value	<i>kind</i> dependent	<i>kind</i> dependent	<i>kind</i> dependent

The following table describes the values for the corresponding *kind* parameters.

Kind	Value
1	<b>Picture name:</b> Defaults to device-dependent sequence number or the time of day if a clock is available. This value can be used to identify the plot for the user.
2	<b>Number of copies:</b> Defaults to 1.
3	<b>File disposition code:</b> Controls replot capability. <b>0</b> Enables replot; saves the file if room exists. <b>1</b> Destroys file after printing (does not save in memory or on disk, disables use of RP afterward or retrieval of the file using the control panel).
4	<b>Render last page if unfinished:</b> <b>0</b> No (Erases the page). <b>1</b> Yes (Prints the page and advances the media).

## CI, Circle

(Polygon Group)

**USE:** Draws the circumference a circle using the specified radius and chord tolerance. If you want a filled circle, refer to the WG or PM instruction.

**SYNTAX:** CI<sub>radius</sub>(*chord angle*);

Parameter	Format	Functional Range	Default
radius	current units	-8 388 608 to 8 388 607	—
chord angle	clamped real	0.5° to 180°	5°

- \* Chord angle is the default interpretation of chord tolerance. Deviation distance is defined as the distance between the drawn chord and the arc segment it represents. When you use the chord angle mode of chord tolerance, the circle or arc is always drawn with the same number of chords. When deviation distance mode is used, the number of chords changes with the size of the circle or arc. Change chord tolerance mode using the CT instruction.

## CP, Character Plot

(Character Group)

**USE:** Moves the pen the specified number of character plot cells from the current pen location. Use CP to position a label for indenting centering labels.

**SYNTAX:** CP<sub>spaces,lines</sub>();  
or  
CP();

Parameter	Format	Functional Range	Default
spaces	clamped real	-32 767. 999 9 to 32 767. 999 9	—
lines	clamped real	-32 767. 999 9 to 32 767. 999 9	—

## CT, Chord Tolerance Mode

Technical Graphics Extension

**USE:** Determines whether the chord tolerance parameter of the AA, AR, AT, CI, EW, RT, and WG instructions is interpreted as a chord angle in degrees or as a deviation distance in current units.

**SYNTAX:** CT<sub>mode</sub>();  
or  
CT();

Parameter	Format	Functional Range	Default
mode	clamped integer	0 (chord angle mode) 1 (deviation distance mode)	0

D

## DC, Digitize Clear

Digitizing Extension

**USE:** Terminates digitize mode.

**SYNTAX:** DC;

## DF, Default Values

(Configuration and Status Group)

**USE:** The DF command returns the plotter to the default conditions as follows.

**SYNTAX:** DF();

Function	Equivalent Instruction	Default Condition
Anchor Corner	AC	Anchor set to lower-left corner of hard-clip limits.
Alternate Font Definition	AD	Roman8, fixed spacing, fixed vector typeface.
Character Fill Mode	CF	Solid fill, no edging.
Absolute Direction	DI	Character direction parallel to X-axis.
Define Label Terminator	DT	<b>ETX</b> and nonprinting mode.
Define Variable Text Path	DV	Text printed left to right with normal line feed.
Extra Space	ES	Turns off extra spacing.
Fill Type	FT	Solid bidirectional fill.
Input Window	IW	Hard-clip limits.
Line Attributes	LA	Butt caps, mitered joins, and miter limit = 5.
Label Origin	LO1	Standard labeling starting at current location.
Line Type	LT	Solid line, relative mode, pattern length = 4% of diagonal distance from P1 to P2.
Plotting Mode	PA	Absolute plotting.
Polygon Mode	PM0PM2	Polygon buffer cleared.
Raster Fill	RF	Solid black.
Scale	SC	User-unit scaling off.

Function	Equivalent Instruction	Default Condition
Standard Font Definition	SD	Roman8, fixed spacing, fixed vector typeface.
Character Size Absolute	SI	Turns off size transformation.
Character Slant	SL	No slant.
Symbol Mode	SM	Off.
Select Font	SS	Standard font selected.
Transparent Data	TD	Normal printing mode.
User-Defined Line Type	UL	Defaults all 8 line types.

## DI, Direction Absolute

(Character Group)

**USE:** Specifies the slope or direction in which labels are drawn, independent of P1 and P2 settings. The ratio of the two parameters *run* and *rise* determine the slope of the line along which labels will be drawn.

**SYNTAX:** DI*run,rise();*  
or  
DI();

Parameter	Format	Functional Range	Default
run (or cos θ)	clamped real	-32 767. 999 9 to 32 767. 999 9	1
rise (or sin θ)	clamped real	-32 767. 999 9 to 32 767. 999 9	0

## DL, Download Character

Technical Graphics Extension

**USE:** Allows you to design characters and store them in a buffer for repeated use. Use DL whenever you want to create characters or symbols not included in the plotter's character sets.

**SYNTAX:** DL*character number(up),X,Y.,(up),X,Y;*  
or  
DL*character number();*  
or  
DL();

Parameter	Format	Functional Range	Default
character number	clamped integer	33 to 126	—
up	clamped integer	-128	—
X,Y coordinates	clamped integer	-127 to 127 primitive grid units	—

## DP, Digitize Point

Digitizing Extension

**USE:** Places the plotter in digitize mode. Use the OD instruction to obtain the coordinates of a point on a plot.

**SYNTAX:** DP;

## DR, Relative Direction

(Character Group)

**USE:** Specifies the direction in which labels are drawn, relative to the scaling points P1 and P2. *Label direction is adjusted when P1 and P2 change so that labels maintain the same relationship to the plotted data.* The ratio of the two parameters *run* and *rise* determine the slope of the line along which labels will be drawn.

**SYNTAX:** DR*run,rise();*  
or  
DR $(\cdot)$

Parameter	Format	Functional Range	Default
run	clamped real	-32 767. 999 9 to 32 767. 999 9	1% of P2x-P1x
rise	clamped real	-32 767. 999 9 to 32 767. 999 9	0% of P2y-P1y

## DT, Define Label Terminator

(Character Group)

**USE:** Specifies the character to be used as the label terminator and whether it is printed. Use DT to define a new label terminator if your computer cannot use the default label terminator (**ETX**, decimal code 3).

**SYNTAX:** DT*label terminator(mode);*  
or  
DT $(\cdot)$

Parameter	Format	Functional Range	Default
label terminator	character	any character except <b>NULL</b> , <b>LF</b> , <b>ENQ</b> , and ; (decimal codes 0, 5, 27, and 59 respectively)	<b>ETX</b> (decimal code 3)
mode	clamped integer	0 or 1	1 (nonprinting)

## DV, Define Variable Text Path

(Character Group)

**USE:** Specifies either right, left, up, or down as the text path for subsequent labels and the direction of line feeds. Use DV to 'stack' characters in a column.

**SYNTAX:** DVpath(line);  
or  
DV();

Parameter	Format	Functional Range	Default
path	clamped integer	0, 1, 2, or 3	0 (horizontal)
line	clamped integer	0 or 1	0 (normal line feed)

## EA, Edge Rectangle Absolute

(Polygon Group)

**USE:** Defines and outlines a rectangle using absolute coordinates.

**SYNTAX:** EAX,Y();

Parameter	Format	Functional Range	Default
X,Y coordinates	current units	-8 388 608 to 8 388 607	—

## EP, Edge Polygon

(Polygon Group)

**USE:** Outlines the polygon currently stored in the polygon buffer. Use EP to edge polygons that you defined in polygon mode and with the fill rectangle and wedge instructions (RA, RR, and WG).

**SYNTAX:** EP();

## ER, Edge Rectangle Relative

(Polygon Group)

**USE:** Defines and outlines a rectangle using relative coordinates.

**SYNTAX:** ERX,Y();

Parameter	Format	Functional Range	Default
X,Y increments	current units	-8 388 608 to 8 388 607	—

## ES, Extra Space

(Character Group)

**USE:** Adjusts space between characters and lines of labels without affecting character size.

**SYNTAX:** *ESwidth(height;)*  
or  
*ES();*

Parameter	Format	Functional Range	Default
width	clamped real	-32 767. 999 9 to 32 767. 999 9	0
height	clamped real	-32 767. 999 9 to 32 767. 999 9	0

## EW, Edge Wedge

(Polygon Group)

**USE:** Outlines any wedge. Use EW to draw sectors of pie charts.

**SYNTAX:** *EWradius,start angle,sweep angle,(chord angle;)*

Parameter	Format	Functional Range	Default
radius	current units	-8 388 608 to 8 388 607	—
start angle	clamped real	$\pm 360^\circ$	—
sweep angle	clamped real	$\pm 360^\circ$	—
chord angle*	clamped real	$0.5^\circ$ to $180^\circ$	$5^\circ$

\* Chord angle is the default interpretation of chord tolerance. Deviation distance is defined as the distance between the drawn chord and the arc segment it represents. When you use the chord angle mode of chord tolerance, the circle or arc is always drawn with the same number of chords. When deviation distance mode is used, the number of chords changes with the size of the circle or arc. Change chord tolerance mode using the CT instruction.

## FP, Fill Polygon

(Polygon Group)

**USE:** Fills the polygon currently in the polygon buffer. Use FP to fill polygons defined in polygon mode and by the edge rectangle and wedge instructions (EA, ER, and EW).

**SYNTAX:** *FP();*

## FR, Frame Advance

Technical Graphics Extension

**USE:** Advances the media to align adjacently drawn frames, forming the equivalent of a long axis plot. The plotter treats each frame as a separate window and plots only the data falling within that frame. (Using the plot size (PS) instruction for long-axis plotting is simpler and faster than FR.)

**SYNTAX:** *FR();*

## FT, Fill Type

(Line and Fill Attributes Group)

**USE:** Selects the shading pattern used to fill polygons (FP), rectangles (RA or RR), characters (CF), or wedges (WG). Use FT to enhance plots with solid fill, parallel lines (hatching), cross-hatching, or patterned (raster) fill.

**SYNTAX:** FT *fill type*(,*option1*,*option2*;)  
or  
FT();

Parameter	Format	Functional Range	Default
fill type	clamped integer	1 to 4, 10, 11	1
option1, option2	clamped real	type dependent	type dependent

The following table shows how to interpret the *option1*,*option2* parameters according to the *fill type* parameter.

Fill Type	Description	Option1	Option2
1	solid bidirectional*	ignored	ignored
2	solid unidirectional*	ignored	ignored
3	hatched (parallel lines)	spacing of lines	angle of lines
4	cross-hatched	spacing of lines	angle of lines
10	shading	shading level	ignored
11	user-defined	raster-fill index	ignored

## IN, Initialize

(Configuration and Status Group)

**USE:** Resets most plotter functions to their default settings; IN is more powerful than the DF instruction.

**SYNTAX:** IN *n*();  
or  
IN();

Parameter	Format	Functional Range	Default
n	clamped integer	1*	no parameter

\* This is the only valid number for this instruction. Use this parameter to return the all plotter features and programmable functions to their factory default settings.

## **IP, Input P1 and P2**

(Configuration and Status Group)

**USE:** The IP command defines the position of the scaling points P1 and P2.

**SYNTAX:**  $IPP1X,P1Y,(P2X, P2Y);$   
or  
 $IP();$

Parameter	Format	Functional Range	Default
$P1x,P1y,(P2x,P2y)$	integer	-8 388 608 to 8 388 607	hard-clip limits

## **IR, Input Relative P1 and P2**

(Configuration and Status Group)

**USE:** Establishes new or default locations for the scaling points P1 and P2 relative to the hard-clip limits.

**SYNTAX:**  $IRP1X,P1Y,(P2X,P2Y);$   
or  
 $IR();$

Parameter	Format	Functional Range	Default
$P1x,P1y,(P2x,P2y)$	clamped real	-32 767.999 9 to 32 767.999 9	0,0,100,100%

## **IW, Input Window**

(Configuration and Status Group)

**USE:** Defines a rectangular area, or window, that establishes soft-clip limits. Subsequent programmed pen motion is restricted to this area.

**SYNTAX:**  $IW X_{LL},Y_{LL},X_{UR},Y_{UR};$   
or  
 $IW();$

Parameter	Format	Functional Range	Default
$X_{LL},Y_{LL},X_{UR},Y_{UR}$	current units	-8 388 608 to 8 388 607	hard-clip limits

## LA, Line Attributes

(Line and Fill Attributes Group)

**USE:** Specifies how line ends and joins (corners) are physically shaped. The LA instruction applies to lines drawn by the AA, AR, AT, CI, EA, EP, ER, EW, FP, PA, PD, PE, PR, RA, RR, RT, and WG instructions.

**SYNTAX:** LA<sub>1</sub>kind,value(<sub>1</sub>kind,value,<sub>2</sub>kind,value<sub>2</sub>);  
or  
LA();

Parameter	Format	Functional Range	Default
kind	clamped integer	1 through 3	1
value	clamped integer	kind dependent*	kind dependent*

\* Refer to the following table.

Attribute	Kind	Value	Description
Line Ends*	1	1	Butt (default)
		2	Square
		3	Triangular
		4	Round
Line Joins*	2	1	Mitered (default)
		2	Mitered/beveled
		3	Triangular
		4	Round
		5	Beveled
		6	No join applied
Miter Limit	3	0 to 32 767.999 9**	(Miter Length)/ (Line Width) default = 5

\* Lines with a width of 0.80 mm or less always have rounded caps, regardless of the current attribute setting.

\*\* Values less than 1.1 are set to 1.1 and do not cause an error.

D

## **LB, Label**

(Character Group)

**USE:** Plots text using the currently defined font. Use LB to annotate drawings or create text-only charts.

**SYNTAX:** LB *c . . . c* label terminator

Parameter	Format	Functional Range	Default
c . . . c label terminator	character character	any character(s) (see DT instruction)	— <b>ETX (ASCII 3)</b>

## **LO, Label Origin**

(Character Group)

**USE:** Positions labels relative to current pen location.

**SYNTAX:** LOposition();  
or  
LO();

Parameter	Format	Functional Range	Default
position	clamped integer	1 to 9 or 11 to 19	1

The following shows how the label position values affect the placement of the label.

L01            L04            L07

L02            L05            L08

L03            L06            L09

The label positions LO 11 through LO 19 differ from LO 1 through LO 9 only in that the labels are offset from the current pen location. (Offset is  $\frac{1}{2}$  the current character width and height.)

L011            L014            L017

L012            L015            L018

L013            L016            L019

## LT, Line Type

(Line and Fill Attributes Group)

**USE:** Specifies the line pattern to be used when drawing lines. Use LT to distinguish lines and enhance your plot. Note that the ends of dashed line segments in a line pattern are affected by current line attributes.

**SYNTAX:** LT*line type*(*,pattern length*(*,mode*);)

or

LT();

or

LT99();

Parameter	Format	Functional Range	Default
line type	clamped integer	-8 to 8 99	solid line restores previous line type
pattern length	clamped real	>0%	4% of the distance between P1 and P2
mode	clamped integer	0 or 1	0 (relative)

## MG, Message

Technical Graphics Extension

**USE:** Writes a message to the plotter's control panel.

**SYNTAX:** MG(*message*);

or

MG();

Parameter	Format	Functional Range	Default
message	newstring	any character	—

D

## MT, Media Type

Technical Graphics Extension

**USE:** Indicates the type of media loaded in the plotter.

**SYNTAX:** MT(*type*;  
or  
MT();)

Parameter	Format	Functional Range	Default
<i>type</i>	clamped integer	0, 1, 2, 3, 4, or 5	0 (paper)

The following lists the media type for each parameter value.

- 0 Paper
- 1 Transparency
- 2 Vellum
- 3 Polyester Film (such as Mylar)
- 4 Translucent Paper
- 5 Special Paper

## NP, Number of Pens

Digitizing Extension

**USE:** Sets the size of the HP-GL/2 palette.

**SYNTAX:** NP(*n*;  
or  
NP;)

Parameter	Format	Functional Range	Default
<i>n</i>	clamped integer	2, 4, 8, 16, or 32*	8

\* The plotter performs a modulo function when the pen number specified is greater than the number of pens that fits into the carousel.

## NR, Not Ready

Technical Graphics Extension

**USE:** Takes the plotter offline for a specified amount of time. This lets you set control panel conditions before starting your plot.

**SYNTAX:** NR(*timeout*;;)

Parameter	Format	Functional Range	Default
<i>timeout</i>	clamped integer	0 to 600*	0

\* This is the practical and recommended range. The actual range is 0 to 32 767.

## OD, Output Digitized Point and Pen Status      **Digitizing Extension**

**USE:** Outputs the X,Y coordinates and up/down pen position associated with the last digitized point. Use this instruction after the DP instruction to return the coordinates of the digitized point to your computer.

**SYNTAX:** OD;

## OE, Output Error

**Technical Graphics Extension**

**USE:** Outputs a number corresponding to the type of HP-GL/2 error (if any) received by the plotter after the most recent IN instruction, control-panel reset, or OE instruction. Use OE for debugging programs. (Do *not* use on networks or Centronics interfaces.)

**SYNTAX:** OE;

**NOTE:** You *must* use a terminator (;) with output instructions.■

Parameter	Response	Format	Range
none	error number	clamped integer	0 to 7

The following describes each error value.

Error Number	Description
0	No error
1	Instruction not recognized
2	Wrong number of parameters
3	out-of-range or invalid parameter
4	(Reserved)
5	(Reserved)
6	Position overflow (lost)
7	Buffer overflow (out of memory)

## OH, Output Hard-Clip Limits

**Technical Graphics Extension**

**USE:** Outputs the X,Y coordinates of the current hard-clip limits to the computer. Use OH to determine the plotter unit dimensions of the area in which plotting can occur. (Do *not* use on networks or Centronics interfaces.)

**SYNTAX:** OH;

**NOTE:** You *must* use a terminator (;) with output instructions.■

Parameter	Response	Format	Range
none	X <sub>LL</sub> ,Y <sub>LL</sub> ,X <sub>UR</sub> ,Y <sub>UR</sub>	integer	hard-clip limits

## OI, Output Identification

Technical Graphics Extension

**USE:** Outputs the plotter's identifying number. (Do *not* use on networks or Centronics interfaces.)

**SYNTAX:** OI;

**NOTE:** You *must* use a terminator (;) with output instructions.■

Parameter	Response	Format	Range
none	plotter ID	character string	up to 30 characters

The following shows the plotter ID string for each of the plotter's emulation modes.

Emulation Mode	DraftMaster SX ID String	DraftMaster RX ID String
HP-GL/2	7595B	7596B
HP-GL (759X)	7595A	7596A
HP-GL (758X)	7585B	7586B

## OP, Output P1 and P2

Technical Graphics Extension

**USE:** Outputs the X,Y coordinates (in plotter units) of the current scaling points P1 and P2 to the computer. (Do *not* use on networks or Centronics interfaces.)

**SYNTAX:** OP;

**NOTE:** You *must* use a terminator (;) with output instructions.■

Parameter	Response	Format	Range
none	P1x,P1y,P2x,P2y	integer	-8 388 608 to 8 388 607*

\* Note that P2 tracks P1 and can be outside this range.

## OS, Output Status

## Technical Graphics Extension

**USE:** Outputs the decimal value of the status byte. Use OS when debugging a program.  
(Do *not* use on networks or Centronics interfaces.)

**SYNTAX:** OS;

**NOTE:** You *must* use a terminator (;) with output instructions. ■

Parameter	Response	Format	Range
none	status number	clamped integer	0 to 255

The following describes the values of the status byte.

Decimal Value	Meaning	Bit Number
1	Pen is down.	0
2	P1 or P2 newly established; cleared by OP.	1
4	Not used (bit always set to 0).	2
8	Initialized; cleared by OS.	3
16	Ready for data buffer empty (bit always set to 1).	4
32	Error; cleared by OE.	5
64	Not used (bit always set to 0).	6
128	Not used (bit always set to 0).	7

## PA, Plot Absolute

(Vector Group)

**USE:** Establishes absolute plotting and moves the pen to the specified absolute coordinates from the current pen location using the pen's up or down position.

**SYNTAX:** PA X,Y (,...;)  
or  
PA();

Parameter	Format	Functional Range	Default
X,Y coordinates	current units	-8 388 608 to 8 388 607	—

## PD, Pen Down

(Vector Group)

**USE:** Lowers the plotter's physical or 'logical' pen and draws subsequent graphics instructions.

**SYNTAX:** PD  $X,Y,...;$   
or  
PD();

Parameter	Format	Functional Range	Default
X,Y coordinates/ increments	current units	-8 388 608 to 8 388 607	—

## PE, Polyline Encoded

(Vector Group)

**USE:** Incorporates PA, PR, PU, PD, and SP instructions into an encrypted format that substantially decreases the size of your file and the time required for data transmission. (This instruction is especially useful when using an RS-232-C interface.)

**SYNTAX:** PE(*flag*) (*value*)... (*flag*) (*value*);

**NOTE:** Parameter values are self-terminating; *do not use commas* with this instruction.  
Also, you *must* use a semicolon to terminate PE.■

Parameter	Format	Functional Range	Default
flag	character	'?', '<', '>', '=' or '7'	—
value	character	flag dependent*	—

The following tables further describe the flag parameter.

Flag	Meaning	Description
:	Select Pen	Indicates that the subsequent value is the desired pen number. A PE command without pen select defaults to the currently selected pen.
<	Pen Up	Raises the pen and moves to the subsequent coordinate pair value. (All coordinate pair values not preceded by a pen-up flag are considered pen-down moves.)*
>	Fractional Data	Indicates that the subsequent value specifies the number of fractional binary bits contained in the coordinate data. Default is zero.

Flag	Meaning	Description
=	Absolute	Indicates that the subsequent coordinate pair is defined by absolute coordinates.
7	7-bit Mode	Indicates that all subsequent coordinate pair values should be interpreted in 7-bit mode. Once you send a seven-bit flag, base 32 is used and eighth bits are ignored for the remainder of the command.

\* We recommend you always follow a pen up flag as a relative move of (0,0). This ensures that the next plotting coordinates will be drawn.

The value parameter specifies data according to the preceding flag. For example, a value following a select-pen flag should be a pen number; values following an absolute flag should be coordinate pairs. Instructions for encoding flag values follow the parameter descriptions.

Value	Format	Range
pen number	integer	0 to 8
number of fractional binary bits	integer	-26 to 26
X,Y coordinates	integer	*

## PG, Advance Page

(Configuration and Status Group)

**USE:** *Devices with page advance capability:* Terminates the plot being sent and draws it. Refer to the plot size (PS) instruction to specify page length.

*Devices without page advance capability:* If the media has been printed on, this instruction is equivalent to the Not Ready (NR) instruction.

**SYNTAX:** PG(*n*);  
or  
PG;

**NOTE:** The PG instruction, with or without parameters, *must* be terminated with a semicolon.■

Parameter	Format	Functional Range	Default
<i>n</i>	clamped integer	-32 767 to 32 767	—

## PM, Polygon Mode

(Polygon Mode)

**USE:** Enters polygon mode for defining shapes, such as block letters or any unique area, and exits for subsequent filling and/or edging. Fill polygons using the fill polygon (FP) instruction and/or outline them using the edge polygon (EP) instruction.

**SYNTAX:** PM*polygon definition();*  
or  
PM();

Parameter	Format	Functional Range	Default
polygon definition	clamped integer	0 (enter polygon mode) 1 (close current (sub)polygon) 2 (exit polygon mode)	0

## PR, Plot Relative

(Vector Group)

**USE:** Establishes relative plotting and moves the pen to specified points with each successive move relative to the current pen location.

**SYNTAX:** PR *X,Y,...;*  
or  
PR();

Parameter	Format	Functional Range	Default
X,Y (increments)	current units	-8 388 608 to 8 388 607	—

## PS, Plot Size

Technical Graphics Extension

**USE:** Sets the hard-clip limits to a given size and the X-axis along the longest edge of the plot.

**SYNTAX:** PS(*length, width;*)  
or  
PS();

Parameter	Format	Functional Range	Default
length	integer	-8 388 608 to 8 388 607	*
width	integer	-8 388 608 to 8 388 607	*

\* Dependent on paper size.

## PU, Pen Up

(Vector Group)

**USE:** Moves to subsequent points without drawing. Use PU to move between points without drawing a connecting line.

**SYNTAX:** PUX,Y(...;)  
or  
PU();



Parameter	Format	Functional Range	Default
X,Y coordinates/ increments	current units	-8 388 608 to 8 388 607	—

## PW, Pen Width

(Line and Fill Attributes Group)

**USE:** Specifies a new width for the logical pen. Subsequent lines are drawn in this new width. Use PW to distinguish lines and enhance your plots. Pen width can be specified as a fixed metric unit or relative to P1 and P2. The mode is set via the WU instruction (default is metric).

**SYNTAX:** PW*width*(*pen*);  
or  
PW();

Parameter	Format	Functional Range	Default
width	clamped real	-32 768.000 0 to 32 767.999 9	*
pen	integer	0 to 8	all pens

\* Dependent on the mode set by the pen width unit selection (WU) instruction: if mode is metric, default width is 0.35 mm; if mode is relative, default width is 0.1% of the diagonal distance from P1 to P2.

## QL, Quality Level

Technical Graphics Extension

**USE:** Sets 'draft' or 'final' mode for your output.

**SYNTAX:** QL(*quality level*);  
or  
QL();

Parameter	Format	Functional Range	Default
quality level	clamped integer	0 to 100	100

## RA, Fill Rectangle Absolute

(Polygon Group)

**USE:** Defines and fills a rectangle using absolute coordinates. Use RA to fill rectangular shapes in plots. To outline a rectangle using absolute coordinates, use the EA instruction.

**SYNTAX:** RAX,Y();

Parameter	Format	Functional Range	Default
X,Y coordinates	current units	-8 388 608 to 8 388 607	—

## RF, Raster Fill Definition

(Line and Fill Attributes Group)

**USE:** Defines a rectangular pattern that may be used in area fill. The DraftMaster Series plotters effectively NOP this instruction by defaulting the area fill to a hatch pattern approximating the density of the expected raster fill.

**SYNTAX:** RFindex(*,width,height,pen number,...pen number;*)  
or  
RFindex();  
or  
RF();

Parameter	Format	Functional Range	Default
index	clamped integer	1 to 8	1 (solid)
width	clamped integer	8, 16, 32, or 64	—
height	clamped integer	8, 16, 32, or 64	—
pen number	integer	0 to 32*	—

\* This is the practical range. While the plotter only handles eight physical pens, it uses a modulo function to let you specify different thicknesses for pens. The actual range is 0 to 67 108 863.

## RO, Rotate Coordinate System

(Configuration and Status Group)

**USE:** Rotates the plotter's coordinate system 90°, 180°, and 270° counterclockwise about the plotter-unit coordinate origin. Use RO to orient your plot vertically or horizontally, or to reverse the orientation.

**SYNTAX:** ROangle();  
or  
RO();

Parameter	Format	Functional Range	Default
angle	clamped integer	0°, 90°, 180°, or 270°	0°

## RP, Replot

(Configuration and Status Group)

**USE:** Draws multiple copies of plots. This is a device-dependent instruction. Your plotter must have an internal hard disk or designated buffer area to store the plotter.

**SYNTAX:** RP*n*();

Parameter	Format	Functional Range	Default
n	clamped integer	1 to 32 767	1

## RR, Fill Rectangle Relative

(Polygon Group)

**USE:** Defines and fills a rectangle using relative coordinates. Use RR to fill rectangular shapes in plots. To outline a rectangle using relative coordinates, use the ER instruction.

**SYNTAX:** RR*X,Y*();

Parameter	Format	Functional Range	Default
X,Y increments	current units	-8 388 608 to 8 388 607	—

## RT, Relative Arc Three Point

(Vector Group)

**USE:** Draws an arc segment, using relative increments, from a starting point through an intermediate point (*X<sub>INCR INTER</sub>,Y<sub>INCR INTER</sub>*) to an end point (*X<sub>INCR END</sub>,Y<sub>INCR END</sub>*). Use RT when you know these three points of an arc.

**SYNTAX:** RT*X<sub>INCR INTER</sub>,Y<sub>INCR INTER</sub>,X<sub>INCR END</sub>,Y<sub>INCR END</sub>*(*chord angle*);

Parameter	Format	Functional Range	Default
<i>X<sub>INCR INTER</sub>, Y<sub>INCR INTER</sub></i>	current units	-8 388 608 to 8 388 607	—
<i>X<sub>INCR END</sub>, Y<sub>INCR END</sub></i>	current units	-8 388 608 to 8 388 607	—
chord angle*	clamped real	0.5° to 180°	5°

\* Chord angle is the default interpretation of chord tolerance. Deviation distance is defined as the distance between the drawn chord and the arc segment it represents. When you use the chord angle mode of chord tolerance, the circle or arc is always drawn with the same number of chords. When deviation distance mode is used, the number of chords changes with the size of the circle or arc. Change chord tolerance mode using the CT instruction.

## SA, Select Alternate Font

(Character Group)

SYNTAX: SA();

## SC, Scale

(Configuration and Status Group)

USE: Establishes a user-unit coordinate system by mapping user-defined coordinate values onto the scaling points P1 and P2. Use SC to establish automatic isotropic scaling or to relocate the origin and set a specific ratio of plotter units to user units.

SYNTAX: SC<sub>XMIN,XMAX,YMIN,YMAX</sub> (*type(left,bottom);*)

or

SC<sub>XMIN,XFACTOR,YMIN,YFACTOR,type();</sub>

or

SC();

Parameter	Format	Functional Range	Default
X <sub>MIN,XMAX</sub> , Y <sub>MIN,YMAX</sub>	real	-8 388 608 to 8 388 607	—
type	clamped integer	0 (anisotropic), 1 (isotropic), or 2 (point factor)	0
left	clamped real	0 to 100%	50%
bottom	clamped real	0 to 100%	50%
XFACTOR, YFACTOR	real	-32 767. 999 9 to 32 767.999 9*	—

\* Excluding zero and values approaching zero

## SD, Standard Font Definition

(Character Group)

USE: Defines the standard character set and its attributes: font spacing, pitch, height, stroke weight, and typeface.

SYNTAX: SD<sub>kind,value...,(kind,value;)</sub>

or

SD();

Parameter	Format	Functional Range	Default
kind	clamped integer	1 to 7	—
value	clamped real	kind dependent*	kind dependent*

\* Refer to the table following the parameter descriptions.

Attribute	Kind*	Value	Description
Character set	1	277 (0) 21 14 6 38 39 563 531 267 43 5 595 85 9 11 4 36 147 115 19 83 37	Roman8 (default) ANSI USASCII ECMA 94 Latin 1 French v1 French v2 German HP Drafting HP-GL/2 Download HP Kana8 HP Katakana HP Roman Extensions HP Special Symbols Intl. Ref. Version Italian JIS ASCII Norwegian v1 Norwegian v2 Portuguese Swedish Swedish Names Spanish United Kingdom
Font spacing	2	0 1	fixed spacing (default) variable spacing
Pitch	3	0 to 32 767.9999	characters per inch (default: 5.942)
Height	4	0 to 32 767.9999	font point size (default: 16)
Stroke Weight	6	-7 -3 0 3 7	very light light normal (default) bold very bold
Typeface	7	48 49 50	fixed vector (default) drafting fixed arc

\* Kind 5 is ignored.

## SI, Absolute Character Size

(Character Group)

**USE:** Specifies the size of labeling characters in centimetres. Use SI to establish character sizing independent of P1 and P2.

**SYNTAX:** *SIwidth, height();*  
or  
*SI();*

Parameter	Format	Functional Range	Default
width	clamped real	-32 767. 999 9 to 32 767.999 9	*
height	clamped real	-32 767. 999 9 to 32 767.999 9	*

\* Dependent on the current pitch and font height set by the AD or SD instructions. If set to default values, the width is 0.285 cm and the height is 0.375 cm.

## SL, Character Slant

(Character Group)

**USE:** Specifies the slant at which labels are drawn. Use SL to create slanted text for emphasis, or to reestablish upright labeling after an SL instruction with parameters has been in effect.

**SYNTAX:** *SLtangent of angle();*  
or  
*SL();*

Parameter	Format	Functional Range	Default
tangent-of-angle	clamped real	-32 767. 999 9 to 32 767.999 9	0

## SM, Symbol Mode

(Line and Fill Attribute Group)

**USE:** Draws the specified symbol at each X,Y coordinate point with PA, PD, PE, PR, and PU instructions. Use SM to create scattergrams, indicate points on geometric drawings, and differentiate data points on multiline graphs.

**SYNTAX:** *SMcharacter();*  
or  
*SM();*

Parameter	Format	Functional Range	Default
character	label	most printing characters (decimal codes 33–58, 60–126, 161 and 254)*	—

\* Decimal code 59 (the semicolon) is an HP-GL/2 terminator and cannot be used as a symbol in any character set.  
Use it only to cancel symbol mode (i.e., (SM;)).

## SP, Select Pen

(Line and Fill Attribute Group)

**USE:** Selects the plotter's physical pen for subsequent plotting. An SP instruction *must* be included in each program or the plotter will not draw.

**SYNTAX:** SP*pen number*();  
or  
SP();

Parameter	Format	Functional Range	Default
pen number	integer	0 to 32*	0

\* This is the practical range. While the plotter only handles eight physical pens, it uses a modulo function to let you specify different thicknesses for pens. The actual range is 0 to 67 108 863.

## SR, Relative Character Size

(Character Group)

**USE:** Specifies the size of characters as a percentage of the distance between P1 and P2.

**SYNTAX:** SR*width height*();  
or  
SR();

Parameter	Format	Functional Range	Default
width	clamped real	-32 767. 999 9 to 32 767.999 9	0.75% of P2x-P1x
height	clamped real	-32 767. 999 9 to 32 767.999 9	1.5% of P2y-P1y

## SS, Select Standard Font

(Character Group)

**USE:** Selects the standard font (already designated by the standard font definition (SD) instruction) for subsequent labeling. Use SS to shift from the currently selected alternate font to the designated standard font.

**SYNTAX:** SS();

## ST, Sort

Technical Graphics Extension

**USE:** Specifies how the plotter sorts vectors for plotting.

**SYNTAX:** ST(*switches*);  
or  
ST();

Parameter	Format	Functional Range	Default
switches	clamped integer	-1, 0, 1 and 2	-1 (pen sorting and endpoint swapping)

## TD, Transparent Data

(Character Group)

**USE:** Specifies whether control characters perform their associated function or print their character when labeling. Use TD to access printable characters that, in normal mode, function only as control characters.

**SYNTAX:** TD*mode*(*)*  
or  
TD(*)*

Parameter	Format	Functional Range	Default
mode	clamped integer	0 or 1	0 (normal)

## UL, User-Defined Line Type

(Line and Fill Attributes Group)

**USE:** Creates line types by specifying gap patterns. Use the LT instruction to select the pattern you've defined using UL.

**SYNTAX:** UL index (*gap1*,...*gap20*;*)*  
or  
UL(*)*

Parameter	Format	Functional Range	Default
index	clamped integer	1 through 8	—
gaps	clamped real	0 to 32 767.999 9*	default line types

\* Gaps are converted to percentages of the pattern length parameter of the LT instruction.

## VS, Velocity Select

Technical Graphics Extension

**USE:** Specifies pen speed. Use VS to optimize line quality and pen life for each pen and media combination. Increase line quality and create a slightly thicker line on any media by slowing the pen speed.

**SYNTAX:** VS(*pen velocity*,*pen number*;*)*  
or  
VS;

Parameter	Format	Functional Range	Default
pen velocity	clamped integer	1 to 110 (cm/s)	*
pen number	clamped integer	1 to 8	all pens

\* The default pen velocity depends on the type of pen loaded. Refer to Chapter 2 for the table that lists default pen speeds for different pen types.

## WG, FILL Wedge

(Polygon Group)

**USE:** Defines and fills any wedge. Use WG to draw filled sectors of a pie chart.

**SYNTAX:** *WG**radius,start angle,sweep angle,(chord angle;)*

Parameter	Format	Functional Range	Default
radius	current units	-8 388 608 to 8 388 607	—
start angle	clamped real	$\pm 360^\circ$	—
sweep angle	clamped real	$\pm 360^\circ$	—
chord angle	clamped real	0.5° to 180°	5°

\* Chord angle is the default interpretation of chord tolerance. Deviation distance is defined as the distance between the drawn chord and the arc segment it represents. When you use the chord angle mode of chord tolerance, the circle or arc is always drawn with the same number of chords. When deviation distance mode is used, the number of chords changes with the size of the circle or arc. Change chord tolerance mode using the CT instruction.

## WU, Pen Width Unit Selection

(Line and Fill Attributes Group)

**USE:** Specifies how the width parameter of the pen width (PW) instruction is interpreted, in metric or relative units.

**SYNTAX:** *WU**type();*  
or  
*WU();*

Parameter	Format	Functional Range	Default
type	clamped integer	0 (metric) or 1 (relative)	0

## No Operation (NOP) Instructions

The following instructions belong to the HP-GL/2 kernel or Technical Graphics, Palette, or Digitizing extensions. Because these instructions do not logically apply to this plotter, they are NOP'd to provide compatibility. The plotter ignores the instructions and does not generate any errors.

### Technical Graphics Extension:

MC, Merge Control

### Palette Extension:

CR, Set Color Range for Relative Color Data

PC, Pen Color Assignment

SV, Screened Vectors

TR, Transparency Mode

D

## Device-Control Instructions

Device-control instructions (DCIs) are part of the I/O language. HP-GL/2 drivers should avoid DCIs if possible because of the following.

- DCI immediate status readback is difficult, if not impossible, in networked environments.
- DCIs cannot be mixed with the transparent data (TD) command in HP-GL/2.

Note, too, that we do not recommend the use of the **ESC.T** instruction when you regularly rely on the spooling feature of the plotter.

All HP-GL/2 devices use the same default Xon/Xoff handshaking, so DCIs will not be necessary in most cases. The default RS-232/422 configuration for all HP-GL/2 plotters is:

Handshake:	Xon/Xoff
Xon character:	decimal 17
Xoff character:	decimal 19
Xoff threshold level:	80 bytes

Output parameters:

Output terminator character:	decimal 13 (carriage return)
Output trigger character:	none
Output initiator character:	none
Turn around delay:	none
Intercharacter delay:	none

In some case, these defaults will not meet the need of a particular system, and DCIs will be necessary for applications running on these systems.

## **ESC.A, Output Identification**

**SYNTAX:** ESC.A

Parameter	Response	Format	Range
none	plotter ID firmware revision level	character string clamped integer	up to 30 characters 1 to 32 767

The following shows the plotter ID string for each of the plotter's emulation modes.

Emulation Mode	DraftMaster SX ID String	DraftMaster RX ID String
HP-GL/2	7595B	7596B
HP-GL (759X)	7595A	7596A
HP-GL (758X)	7585B	7586B

## **ESC.B, Output Buffer Space**

**SYNTAX:** ESC.B

Parameter	Response	Format	Range
none	available logical input buffer space	clamped integer	0 to 1024 bytes

## **ESC.E, Output Extended Error**

**SYNTAX:** ESC.E

Parameter	Response	Format	Range
none	error number	clamped integer	0, 10 to 18

## **ESC.H, Set Handshake Mode 1 (Software Enq/Ack)**

**SYNTAX:** **ESC.H** (data block size);(enquiry character);(acknowledgment string):  
or  
**ESC.H:**

Parameter	Format	Range	Default
data block size	clamped integer	0, 10 to 18	80 bytes
enquiry character	ASCII value	0 to 26, 28 to 31 (decimal codes)*	0 (no character)
acknowledge string	ASCII value	0 to 126 (decimal codes)	0 (no character)

\* Practical range; printable characters (ASCII codes 32 to 126) should be avoided as they are required to send the HP-GL/2 instructions.

## **ESC.I, Set Handshake Mode 2 (Operating System)**

**SYNTAX for Xon-Xoff:** **ESC.I** (*Xoff threshold level*);(*omitted*);(*Xon trigger character(s)*):

Parameter	Format	Range	Default
Xoff threshold level	clamped integer	0 to 1024	80 bytes
omitted	clamped integer	0*	—
Xon character(s)	ASCII value	0 to 126, 1 to 10 (decimal codes)	0 (no character)

\* You can designate the omitted parameter by entering a 0 or by putting the semicolon without a parameter.

**SYNTAX for Enquire/Acknowledge:** **ESC.I**(*data block size*);(*enquiry character*);  
(*acknowledgment string*):

Parameter	Format	Range	Default
data block size	clamped integer	0 to 1024 bytes	80 bytes
enquiry character	ASCII value	0 to 26, 28 to 31 (decimal codes)*	0 (no character)
acknowledge string	ASCII value	0 to 126, 1 to 10 (decimal codes)	0 (no character)

\* Practical range; printable characters (ASCII codes 32 to 126) should be avoided as they are required to send the HP-GL/2 instructions.

## **ESC.J, Abort Device-Control**

**SYNTAX:** **ESC.J**

## **ESC.K, Abort Graphics**

**SYNTAX:** **ESC.K**

## **ESC.L, Output Buffer Size When Empty**

**SYNTAX:** **ESC.L**

## **ESC.M, Set Output Mode**

**SYNTAX:** **ESC.M** (*turnaround delay*);(*output trigger*);(*echo terminator*);(*output terminator*);(*output initiator*):

<b>Parameter</b>	<b>Format</b>	<b>Range</b>	<b>Default</b>
turnaround delay*	clamped integer	0 to 32 767	0
output trigger	ASCII value	0 to 4, 6 to 26, 28 to 126 (decimal codes)	0 (no character)
echo terminator	ASCII value	0 to 4, 6 to 26, 28 to 126 (decimal codes)	0 (no character)
output terminator	ASCII value	0 to 4, 6 to 26, 28 to 126 (1 or 2 decimal codes)	13 (carriage return)
output initiator	ASCII value	0 to 126 (decimal codes)	0 (no character)

\* If the delay is odd, the plotter adds 1 to make it even.

D

## **ESC.N, Set Extended Output and Handshake Mode**

**SYNTAX:** **ESC.N** (*intercharacter delay*);(*handshake dependent parameter*):

Parameter	Format	Range	Default
intercharacter delay*	clamped integer	0 to 32 767	0
handshake dependent parameter for Xon-Xoff: Xoff trigger character(s)	ASCII value	0 to 126 (up to 10 decimal codes)	0 (no character)
for Enquire/Acknowledge: immediate response string	ASCII value	0 to 126 (up to 10 decimal codes)	0 (no character)

\* If the delay is odd, the plotter adds 1 to make it even.

## **ESC.O, Output Extended Status**

**SYNTAX:** **ESC.O**

## **ESC.P, Set Handshake Mode**

**SYNTAX:** **ESC.P** (*handshake*):

Parameter	Format	Range	Default
handshake	clamped integer	0 (none) 1 (Xon-Xoff) 2 (ENQ/ACK) 3 (hardwire)	0

## **ESC.R, Reset**

**SYNTAX:** **ESC.R**

## ESC.S, Output Configurable Memory Size

SYNTAX: **ESC.S n:**

Parameter	Format	Range	Default
n	clamped integer	0 to 6	0 (total memory)

Parameter Value	Memory Specification
0	total configuration memory
1	not used; 0 is output
2	polygon buffer
3	downloadable character buffer
4	0 is output
5	vector buffer
6	pen sort buffer

## ESC.T, Allocate Configurable Memory

SYNTAX: **ESC.T (physical I/O buffer);(polygon buffer);(downloadable character buffer);0;(vector buffer);(pen sort buffer):**

Parameter	Format	Range	Default
physical I/O buffer	clamped integer	1 024 bytes*	1 024
polygon buffer	clamped integer	4 to 40 882 bytes	6 144
downloadable character buffer	clamped integer	0 to 40 878 bytes	6 144
reserved	clamped integer	—	0
vector buffer	clamped integer	66 to 40 944 bytes	3 000
pen sort buffer	clamped integer	12 to 40 890 bytes	25 672

\* This buffer is set at 1 024 bytes and cannot be changed.

D

## **ESC.U, End Flush Mode**

**SYNTAX:** **ESC.U**

## **ESC.Y or ESC.(, Plotter On**

**SYNTAX:** **ESC.Y** or **ESC.(**

## **ESC.Z or ESC.), Plotter Off**

## **ESC.@", Set Plotter Configuration**

**SYNTAX:** **ESC.Z** or **ESC.)**

<b>Parameter</b>	<b>Format</b>	<b>Range</b>	<b>Default</b>
logical input buffer size	clamped integer	0 to 1 024 bytes	1 024
input conditions		0 to 32 767 bytes	1 024

## Glossary

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<b>Acceleration</b>	The rate at which a pen reaches its maximum velocity. Acceleration is measured in centimeters per second per second.
<b>Address</b>	The address specifies the plotter's location on the HP-IB (IEEE-488) interface cable (bus).
<b>ASCII</b>	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.
<b>ASCII Control Character</b>	A nonprinting ASCII character (decimal codes 0-32 and 127) that starts, modifies, or stops a device function. Control functions affect data processing, transmission, or interpretation.
<b>BASIC</b>	Beginner's All-purpose Symbolic Instruction Code; a programming language which uses common English words.
<b>Baud Rate</b>	For an RS-232-C interface, the data transmission rate between a computer and a peripheral (bits per second).
<b>Buffer</b>	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.
<b>Bus</b>	Short for HP-IB (IEEE-488) interface.
<b>Bypass</b>	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.

<b>Byte</b>	Eight bits; the size of a computer word. Used by ASCII binary code to represent alphanumeric characters.
<b>Communication</b>	Data exchange between two or more devices.
<b>Configuration</b>	The way in which computer equipment and software is interconnected and set up to operate as a system.
<b>CTS (Clear to Send) Lines</b>	Communication lines used by a modem to indicate whether or not the modem is ready to transmit data.
<b>Continuous Memory</b>	Plotter memory which stores certain plotter conditions even when the plotter is turned off.
<b>DSR (Data Set Ready) Lines</b>	Communication lines used by a modem to indicate communication status.
<b>Data Communication</b>	The exchange of data between devices.
<b>Debug</b>	To find and correct mistakes in a computer program.
<b>Default</b>	A value or condition that is assumed if no other value or condition is specified.
<b>Device-Control Instruction</b>	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.
<b>Digitize</b>	The process of converting a physical location defined by X,Y coordinates into digital information that a computer understands.
<b>DPI</b>	Dots per inch, the plotter's resolution of raster images on the media.
<b>Driver</b>	Configuration data used by software to control input and output between the computer and a peripheral device (e.g., a plotter).
<b>Eavesdrop</b>	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, terminal, or another computer.

<b>Emulate</b>	To imitate. For example, this plotter can emulate an HP 7586B. For more information, refer to Chapter 9, <i>Using Software with the Plotter</i> .
<b>Handshake</b>	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.
<b>HP-GL</b>	Hewlett-Packard Graphics Language. The graphics instruction set Hewlett-Packard plotters understand.
<b>HP-GL/2</b>	Hewlett-Packard's standard graphics language for its plotters.
<b>HP-IB</b>	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).
<b>IEEE 488-1978 Interface</b>	A parallel interface standardized by Electronic Industries Association Standard 488-1978.
<b>Initialize</b>	To set plotter conditions to known default values.
<b>Interface</b>	Anything (a cable, for example) used to join components of a computer system so they function in a compatible and coordinated fashion. Also, standards which allow systems to connect with each other (e.g., HP-IB, RS-232-C).
<b>Interface Cable</b>	The data transmission cable used to connect a peripheral device to a computer. Most devices require an HP-IB, Centronics, or RS-232-C interface cable.
<b>I/O Error</b>	A data transmission error between a computer and a peripheral. Examples of I/O errors are mismatched interface conditions, such as baud rate and parity.
<b>Literal String</b>	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.
<b>Local Mode</b>	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.

<b>Menu</b>	Messages and options displayed on the plotter's front-panel display.
<b>Modem</b>	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.
<b>Monitor Mode</b>	A functional state in which the plotter echoes instructions it receives back to a terminal or computer. <i>Parse</i> monitor mode echoes instructions after they have been parsed. <i>Receive</i> monitor mode echoes instructions and escape sequences as soon as they are received.
<b>Operating System</b>	The computer software or firmware that controls the execution of programs.
<b>Overflow</b>	To exceed the capacity of a buffer's storage space. When a buffer overflows, the excess data is lost.
<b>P1</b>	A scaling point the plotter uses that generally specifies the location of a plot's lower-left corner.
<b>P2</b>	A scaling point the plotter uses that generally specifies the location of a plot's upper corner.
<b>Parallel Interface</b>	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.
<b>Parity</b>	An error-checking method for information transfer between a computer and a peripheral device. Parity is used to check the accuracy of binary data.
<b>Parse</b>	To subdivide an instruction into components that the plotter can more easily understand and use. A graphics language instruction, for example, is parsed (divided) into a mnemonic, parameters, separators, and a terminator.
<b>Peripheral (device)</b>	A device separate from, but used with, a computer. For example, a disc drive, printer, or plotter.
<b>Remote Mode</b>	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 <b>COMPUTER/MODEM</b> .

<b>Repeatability</b>	A measure of how closely a device can return a pen to the previously plotted point.
<b>Resolution</b>	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.
<b>RS-232-C Interface</b>	A serial interface standardized by the Electronic Industries Association Standard RS-232-C.
<b>Scaling</b>	Dividing the plotting area into units convenient for your application.
<b>Scaling Points</b>	Points assigned the user-unit values specified in the HP-GL Scale (SC) instruction. These points, also known as P1 and P2, define opposite corners of a rectangular area.
<b>Serial Interface</b>	A serial interface uses a single data line to transfer data bits sequentially between devices. RS-232-C is a serial interface.
<b>Standalone Configuration</b>	When using the RS-232-C interface, a configuration where the plotter is connected to the computer via a separate (not a shared) cable.
<b>Stop Bit</b>	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.



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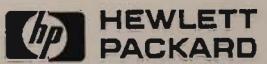
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