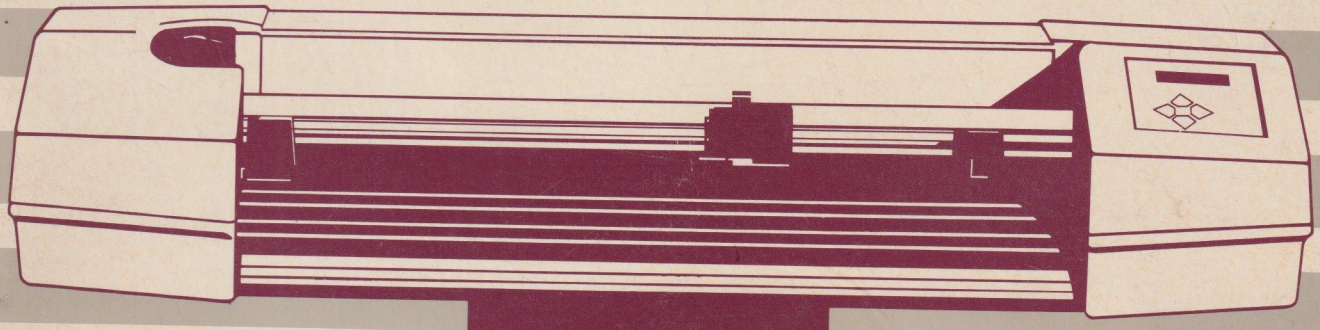
PACESETTER

User's Guide



CalComp

DEMONSTRATION PLOT

1. LOAD PENS
2. CHECK THE FOLLOWING:
   - MEDIA INSERTED AND ALIGNED
   - PINCH ROLLERS DOWN
   - MEDIA SIZED AND LOADED
3. MANUAL — Manual 000:00
4. Menu — Menu-Use arrow keys to change
5. Internal Plot: Off
6. Internal Plot: Demonstration
7. On Line — OnLine 000:00

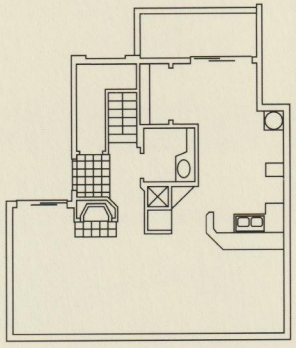
PACESETTER
BY CALCOMP

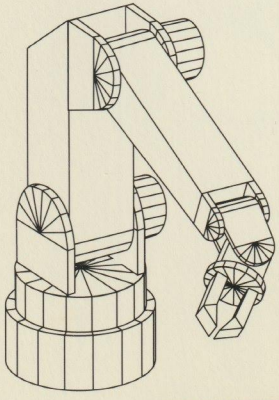
HIGH THROUGHPUT
- 1067MMPS, 42IPS, 2.8G
- PLOT MANAGER (TM)
- VECTOR LOOK AHEAD

NEW STANDARDS OF RELIABILITY
- FEWER PARTS
- LONG-LIFE PENS

EASY TO USE
- 32 CHARACTER LCD PANEL
- MULTIPLE LANGUAGES
- PANEL OR HOST SETUP
- USER SAVED DEFAULTS

TRADITIONAL CALCOMP PLOT QUALITY





BROAD COMPATIBILITY
- PCI, 960, HPGL PROTOCOLS
- ALL MAJOR CAD SOFTWARE

MANY APPLICATIONS
- ARCHITECTURAL / CIVIL
- MECHANICAL
- ELECTRICAL

TWO MODELS
- 2024 : A-D/A4-A1
- 2036 : A-E/A4-A0

MULTIPLE PEN AND MEDIA SUPPORT

DRAWINGS COURTESY OF AUTODESK (TM)

ORDER NUMBER MOO20-150-2 — P/N 17893-0012

Order No. M0020-530

TER

24/2036

IDE

mp
mpany

MENU SELECTIONS

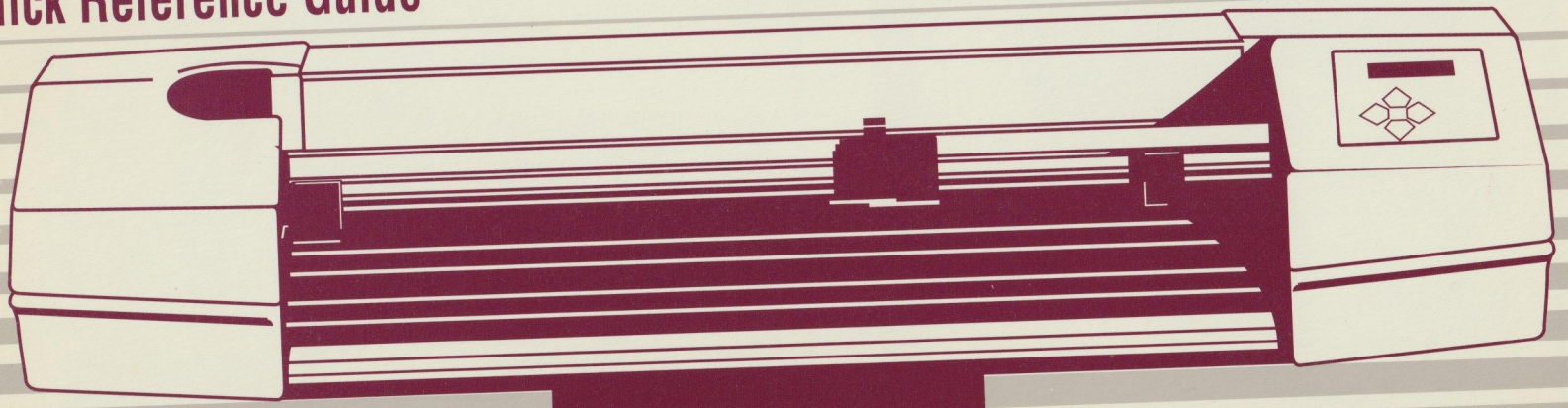
MENU ITEM	CONDITION	PARAMETER
PLOT STATUS:	DA	**PLOTTING, COMPLETE, CANCELED** HPGL/PCI/960 XSIZE = 0 TO 9999.9 MM XSIZE = 0 TO 999.9 IN. YSIZE = 0 TO 9999.9 MM YSIZE = 0 TO 999.9 IN.
CLEAR PLOT DATA:	DA	**NO**, YES
CLEAR OR REPLOT:	RE/OP	**NO**, YES
USER NUMBER:	NHD/NPD	**1**,2,3
PLOT MODE:		**FINAL PLOT**, QUICK PLOT, FINAL-LARGE PLOT
VELOCITY:	FINAL	**510 MMPS** (10 TO 1070) **20 IPS** (1 TO 42)
ACCELERATION:	FINAL	**2.8 G**, 0.7 G, 1.4 G, 2.1 G
ORIENTATION:	NPD	**AUTO**, 90 DEGREES, 180 DEGREES, 270 DEGREES, NORMAL
SCALE:	NPD	<999/999>
SET OR DISPLAY FORM ALIGNMENT:	NPD/ML	SEE USER'S GUIDE
PEN GROUPING:		**OFF**, 2 PENS IN GROUP, 4 PENS IN GROUP, 8 PENS IN GROUP
PLOT LIMITS:	NPD	**NORMAL**, EXPANDED
PLOT MANAGER:		**YES**, NO

MENU ITEM	CONDITION	PARAMETER
PORT TYPE:	NHD/OP	**RS-232C**, CENTRONICS
PROTOCOL:	NHD	**PCI**, HPGL LARGE FORMAT, HPGL SMALL FORMAT, 960
BAUD RATE:	NHD/SE	**9600**, 19.2K, 1200, 2400, 4800
# OF BITS-PARITY:	NHD/SE/PR	**7-EVEN**, 7-ODD, 8-EVEN, 8-ODD, 8-NONE
HANDSHAKE:	NHD/SE/PR	**ACK/NAK**, HARDWARE, XON/XOFF
SYNC # EOM CHK:	NHD/SE/PR	**A: 22 2 13 ON**, B: 02 1 03 ON, C: 02 1 03 OFF, SPECIAL FORMAT-1, SPECIAL FORMAT-2
PCI-# OF SYNC:	NHD/SF	**1**, 2
PCI-SYNC CHAR:	NHD/SF	**2** (1 TO 128)
PCI-EOM CHAR:	NHD/SF	**3** (1 TO 32)
PCI-CHECKSUM:	NHD/SF	**ON**, OFF
EOP TIMER:	NHD	**30 SEC**, 1 MIN, 2 MIN, DISABLED
SET OR DISPLAY P1 OR P2:	NPD/HP/ML	SEE USER'S GUIDE
LANGUAGE:		**ENGLISH**, FRENCH, GERMAN, ITALIAN, KATAKANA, SPANISH, SWEDISH
SAVE AS USER:		**NO**, 1,2,3
INTERNAL PLOT:	NHD/NPD	**OFF**, DEMONSTRATION, IMD

CONDITION	EXPLANATION
DA	DATA MUST BE PRESENT IN THE PLOTTER FOR THIS MENU ITEM TO APPEAR
FINAL	A FINAL PLOT MODE MUST BE SELECTED FOR THIS MENU ITEM TO APPEAR
HP	HPGL MUST BE SELECTED FOR THIS MENU ITEM TO APPEAR
ML	MEDIA MUST BE LOADED FOR THIS MENU ITEM TO APPEAR
NHD	HOST DATA MUST NOT BE PRESENT IN THE PLOTTER FOR THIS MENU ITEM TO APPEAR
NPD	THE PLOT MUST NOT HAVE BEGUN FOR THIS MENU ITEM TO APPEAR
OP	THE OPTION MUST BE PRESENT FOR THIS MENU ITEM TO APPEAR
PR	THE PROPER PROTOCOL MUST BE SELECTED FOR THIS MENU ITEM TO APPEAR
RE	REPLOT DATA MUST BE PRESENT IN THE PLOTTER FOR THIS MENU ITEM TO APPEAR
SE	THE SERIAL PORT MUST BE SELECTED FOR THIS MENU ITEM TO APPEAR
SF	A SPECIAL FORMAT MUST BE SELECTED FOR THIS MENU ITEM TO APPEAR

PACESETTER

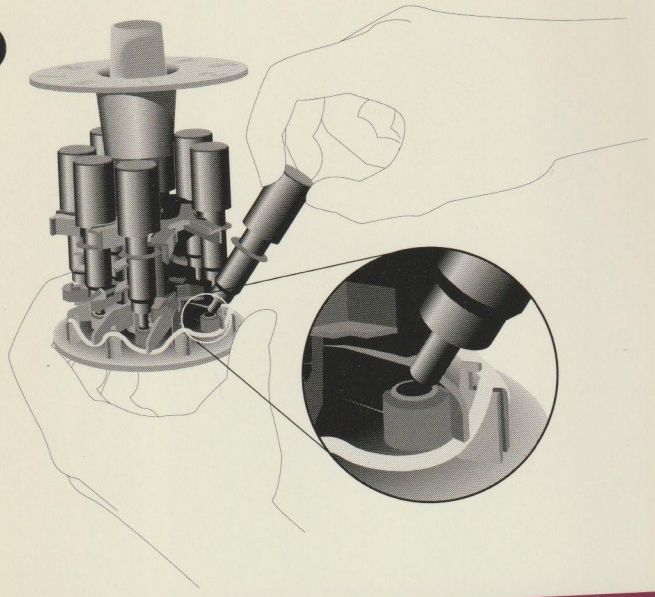
Quick Reference Guide



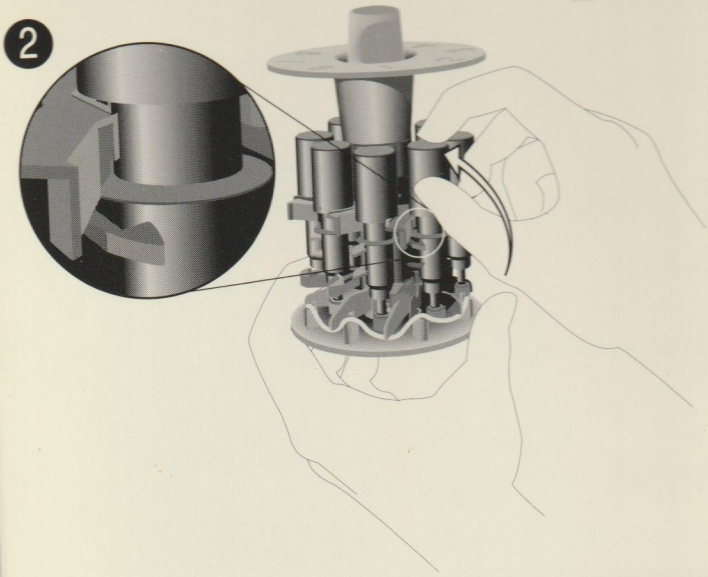
CalComp

PEN LOADING

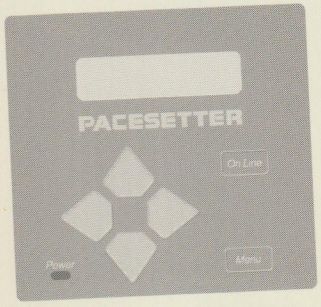
1



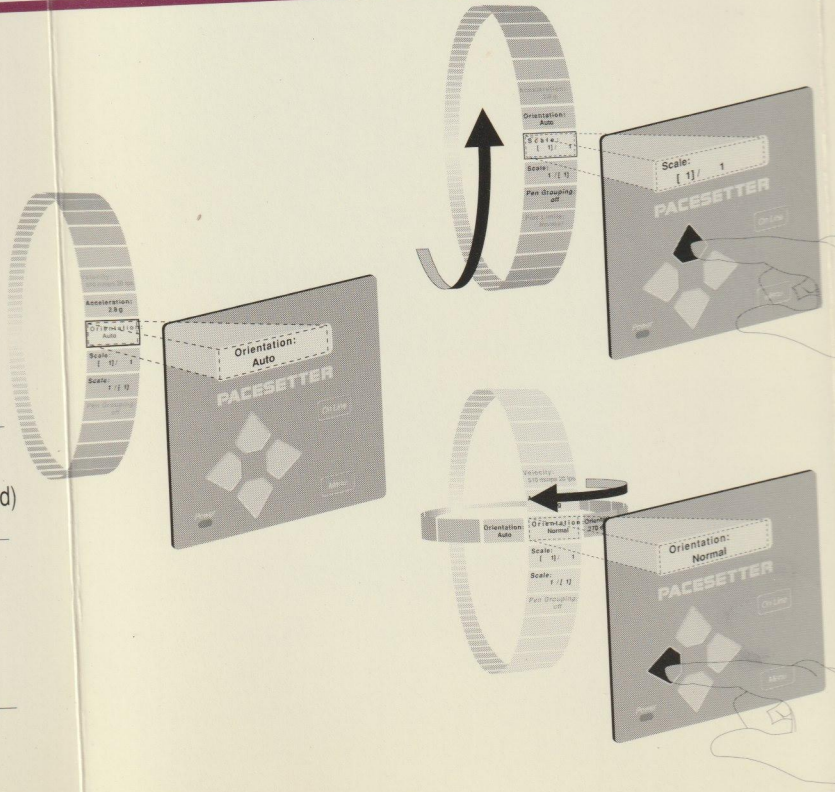
2



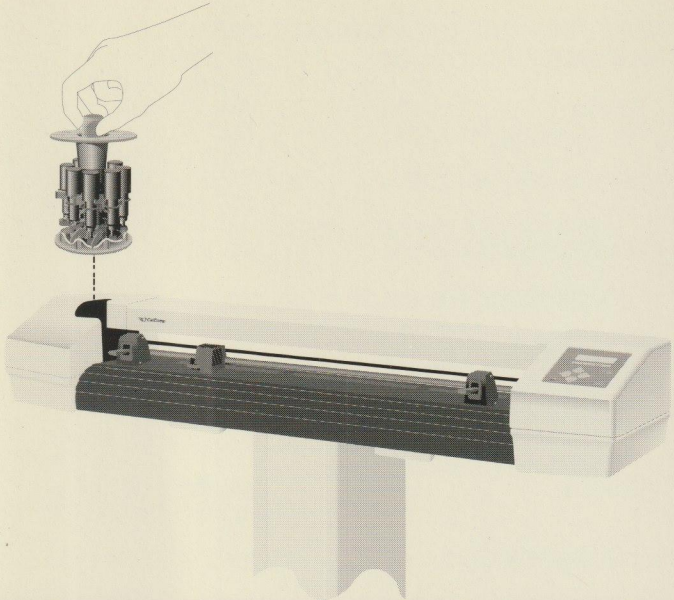
CONTROL PANEL AND MENU STRUCTURE

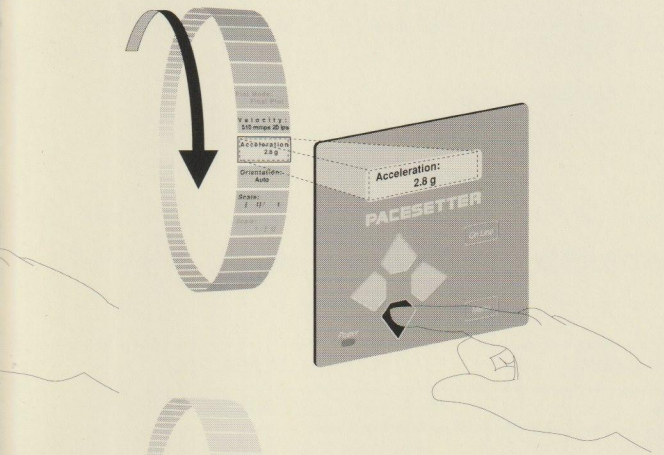


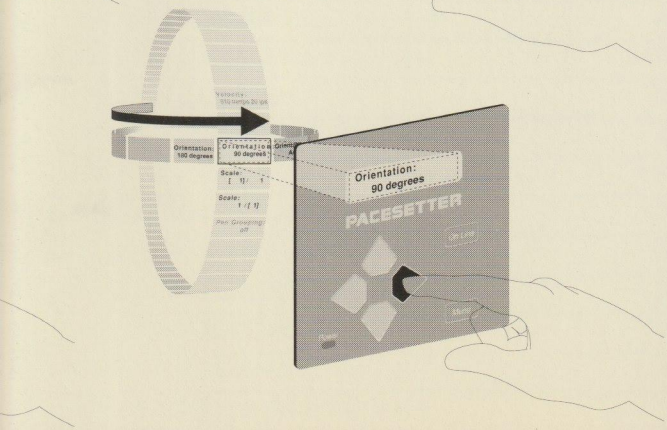
On Line	Toggle On Line/Manual Start media loading cycle Exit Menu
Menu	Enter Menu tree Toggle Menu/Manual (media loaded) Toggle Menu/load media display (media unloaded) Only functional key when media is unloaded
◆ ◆	Scroll Menu item selections Move drum or media in Manual mode
◆ ◆	Scroll Menu item parameter selections Move pen carriage in Manual mode
Power	Lit to indicate power is on



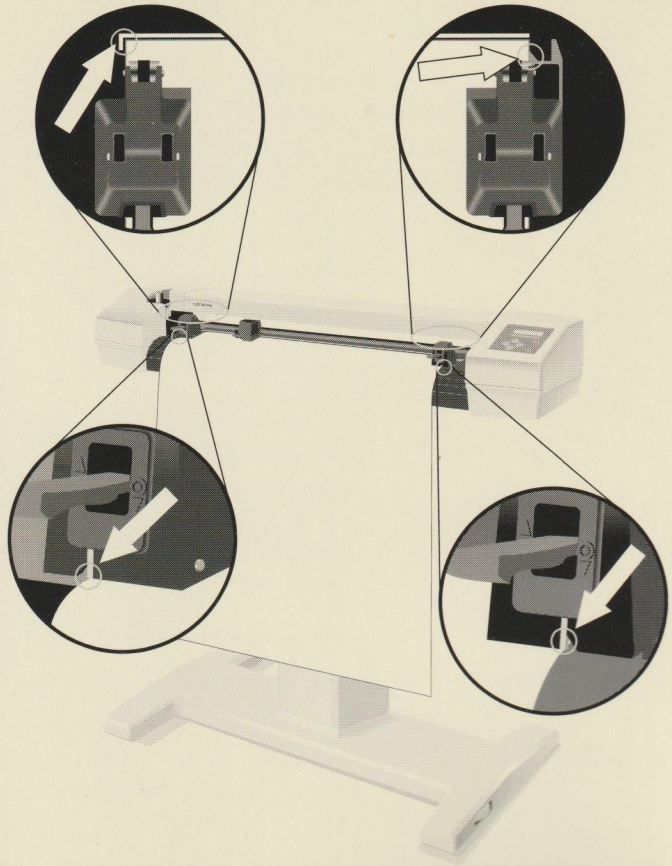
PEN TURRET LOADING



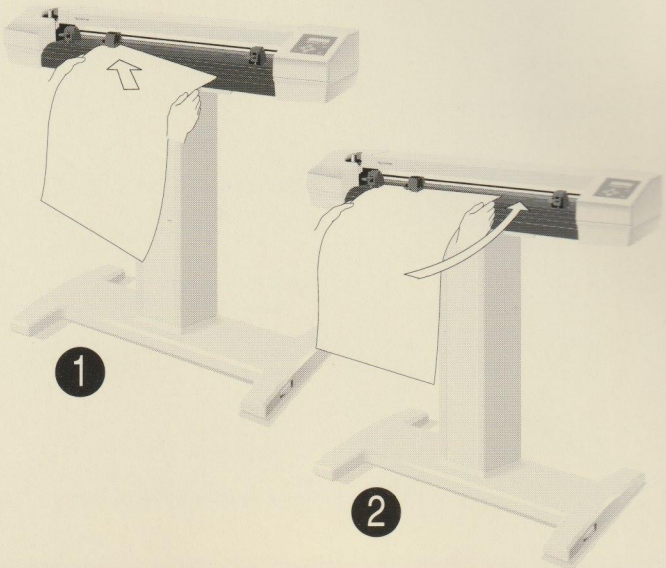




MEDIA LANDMARKS



MEDIA LOADING



Order No. M0020-530

PACESETTER

MODELS 2024/2036

USER'S GUIDE

Revision 3

July 1992

CalComp
A Lockheed Company

Publications Record

Revision	Notes
0	Initial release of manual
1	Beta site comments incorporated
2	New options and part numbers
3	Firmware changes incorporated

The United States Federal Communications Commission (in 47CFR 15.105) has specified that the following notice be brought to the attention of users of this product.

FEDERAL COMMUNICATIONS COMMISSION
RADIO FREQUENCY INTERFERENCE STATEMENT

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

- reorient the receiving antenna
- relocate the computer with respect to the receiver
- move the computer away from the receiver
- plug the computer into a different outlet so that computer and receiver are on different branch circuits

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful:

How to Identify and Resolve Radio-TV Interference Problems

This booklet is available from the U.S. Government Printing Office, Washington, DC 20402, Stock No. 004-000-00345-4.

USE SHIELDED CABLES

To comply with FCC Class B requirements, all external data interface cables and adapters must be shielded.

CANADIAN DEPARTMENT OF COMMUNICATIONS

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.

COMMUNICATIONS DU CANADA

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la class B prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministere des Communications du Canada.

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

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

取扱説明書に従って正しい取り扱いをして下さい。

NOTICES

No patent liability is assumed with respect to the use of information contained herein.

While every precaution has been taken in the preparation of this publication, CalComp assumes no responsibility for errors or omissions. Nor is any liability assumed for damages resulting from the use of the information contained herein.

Further, this publication and features described herein are subject to change without further notice.

This manual describes the latest configuration of the Pacesetter plotters as they are shipped from the factory. Equipment manufactured prior to the publication date of this manual may differ slightly from that described herein.

TRADEMARKS

Each of the following products is a trademark or a registered trademark of the company listed after the product name.

ANVIL-1000	MANUFACTURING AND CONSULTING SERVICES
APPLE	APPLE COMPUTER CORPORATION
ARTISAN	CALCOMP
AUTOCAD	AUTODESK, INC.
CADCOM	IDS, HERENTELS
CADKEY 4	MICRO CONTROL SYSTEMS, INC.
CADVANCE	ISICAD, INC.
CALCOMP	CALCOMP INC.
CASCADE	CASCADE GRAPHICS
CAEDS-CADD2000	RAET CV
CENTRONICS	CENTRONICS DATA COMPUTER CORPORATION
CIVIL SOFT	CIVIL SOFT
DATACAD	MICROTECTURE
EASY-DRAFT	BRIDGEPORT CONTROLS
EE DESIGNER	VISIONICS
FUTURE NET	FUTURE NET
HEWLETT-PACKARD	HEWLETT-PACKARD CORPORATION
IBM, XT, AT, AND PS/2	INTERNATIONAL BUSINESS MACHINES CORPORATION
MAC PLOT	MICRO-SPOT
MEDUSA	PRIME
MICRO CADAM	CADAM, INC.
MICROSTATION	BENTLY SYSTEMS
ORCAD	ORCAD
PCAD-PCB	PERSONAL CAD SYSTEMS
PERSONAL DESIGNER	COMPUTERVISION
PLOT MANAGER	CALCOMP
POINT LINE CADD	POINT LINE COMPANY
PRIMA VISION	PRIMA VERA SYSTEMS, INC.
PRO DESIGN II	AMERICAN SMALL BUSINESS COMPUTERS
REDLOG	RACAL REDAC
VERSACAD	VERSACAD CORPORATION

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LIST OF ILLUSTRATIONS

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GENERAL INFORMATION

INTRODUCTION

The Pacesetter plotters are high-performance, high-quality, low-priced pen plotters that are ideally suited for many computer-aided design (CAD) applications, including:

- Mechanical
- Electronic
- Piping
- Civil engineering
- Facilities management
- Mining
- Electrical
- Structural
- Mapping
- Architectural
- Program management
- Interior design

The plotters are easy to install and use. Their grit drums can handle several types and sizes of media. Each plotter is shipped preset for use with an IBM PC-compatible host at 9600 baud using AutoCAD. In addition, a variety of other CAD software packages can be used.

To start plotting, a new plotter needs only to be connected, powered up, and loaded with pens and media. The preset conditions can be changed easily through use of the control panel. For your convenience, charts are included in Appendix E to record parameter settings.

The plotters can use a variety of pen types. A rotating pen turret stores up to eight pens in any combination of type, color, or width. To change pens, a pen carriage moves to the turret and makes the exchange. The pen writes on the media over a vacuum groove. Plotting in a groove allows all pen types to run at the same pressure and automatically produces plots of the highest quality.

An optional memory expansion module provides one megabyte of data storage capacity. This allows plots to be downloaded to the Pacesetter and frees the host computer to perform other tasks while the Pacesetter is plotting. If AutoCAD is being used, an AutoDesk Interface (ADI) allows saving even more time by down-loading plots faster. The memory expansion module also allows a replot feature to redraw the last plot without involving the host.

The proprietary Plot Manager™ feature increases throughput by optimizing pen movement and pen changes.

ABOUT THIS DOCUMENT

This document is organized into the sections listed below. For initial installation, follow the procedures in Chapters 1 through 3. For subsequent operations, use the procedures in Chapters 4 through 7.

Chapter 1	**Getting Started** - Familiarizes the user with the plotter and describes how to load pens and media and run a confidence plot.
Chapter 2	**Connecting the Plotter** - Describes how to connect an appropriate RS-232C interface cable or the optional Centronics interface between the plotter and a host computer.
Chapter 3	**Configuring the Plotter** - Describes how to configure the plotter for host communications using a variety of software packages.
Chapter 4	**Operations** - Describes how to set up and operate the plotter. A brief tutorial is provided to guide the first-time user through the operation.
Chapter 5	**Pens and Media** - Describes how to select the appropriate pens and media combinations.
Chapter 6	**Maintenance** - Describes how to clean the plotter and maintain the grit drum.
Chapter 7	**Problem Solving** - Serves as a guide to solve problems as a result of indicated symptoms.

SAFETY INSTRUCTIONS

- Follow all warnings and instructions marked on the plotter.
- Unplug the plotter from the power outlet before cleaning. Do not use liquid or aerosol cleaners. Use a damp cloth for cleaning.
- Do not use the plotter near water.
- If the type of power is not known prior to installing the plotter, consult your authorized dealer or local power company.
- Plotters have a three-wire grounding-type plug (a plug having a third grounding pin). Such plugs fit into a grounding-type power outlet only. This is a safety feature. If you are unable to insert the plug into the power outlet, contact your electrician.
- Do not allow anything to rest on the power cord. Do not locate the plotter power cord where it can be walked on.
- If an extension cord is used with the plotter, ensure that the total of the ampere ratings on the products plugged into the extension cord do not exceed the extension cord ampere rating.
- Never push objects of any kind into the internal mechanisms of the plotter; fire or electric shock may result.
- Except as explained elsewhere in this guide, do not attempt to service the plotter yourself. Opening or removing covers that are marked "Do Not Remove" may expose you to dangerous voltage points or put others at risk. Refer all servicing as instructed in Appendix B.

- If any of the following conditions exist, unplug the plotter from the power outlet and obtain service as instructed in Appendix B.

  — The power cord or plug is damaged or frayed.

  — Liquid is spilled into the plotter.

  — The plotter is exposed to rain or water.

  — The plotter does not operate normally when operating instructions are followed. Adjust only those controls that are covered by the operating instructions. Improper adjustment of other controls may result in damage and require extensive work by a qualified technician to restore the product to normal operation.

  — The plotter is dropped or the cabinet is damaged.

  — The plotter exhibits a distinct change in performance, indicating a need for service.

Chapter One

PACESETTER

Getting Started

CHAPTER 1

GETTING STARTED

INTRODUCTION

This chapter familiarizes you with the Pacesetter plotter. Two versions of the Pacesetter are available: Model 2024 accommodates media up to 24 inches wide (D/A1 size) and Model 2036 accommodates media up to 36 inches wide (E/A0 size). Both models have the same controls and features; the only difference is in the size of the plotting media. Figure 1-1 illustrates the Pacesetter plotter and highlights the major landmarks.

- **Pen Turret** - Holds up to eight pens.
- **Pen Carriage** - Selects pen from pen turret.
- **Media Loadlines** - Are used during the media loading sequence to align a sheet of media. Media presence is sensed and used to turn on a vacuum system to hold media in position.
- **Pinch Rollers** - Holds media in place during sizing and plotting. Raising the lever raises pinch rollers. Lowering the lever lowers pinch rollers.
- **Control Panel** - Contains controls and display panel to allow you to control the various modes and options of plotter operations.
- **Platen** - Provides the surface for holding and guiding media while performing plotting.
- **Vacuum Openings** - Creates a vacuum to assist in holding media flat on platen during loading and plotting. Vacuum system is activated by positioning media under left pinch roller assembly.
- **Grit Drum** - Moves the media during plotting.
- **RS-232C Connector** - Accepts RS-232C interface cable connecting the plotter to a host computer.
- **Centronics Connector (Optional)** - Accepts Centronics (parallel) interface cable connecting the plotter to a host computer.
- **Voltage Selector and Fuse Holder** - Selects proper input voltage level for the plotter. Also holds plotter main power fuse.
- **AC Power Cord Receptacle** - Is the connector for the input power cable.
- **Parking Brakes** - Parks the plotter in position and prevents it from moving. Each wheel lowers a rubber-tipped foot to the floor and prevents normal plotter movement.

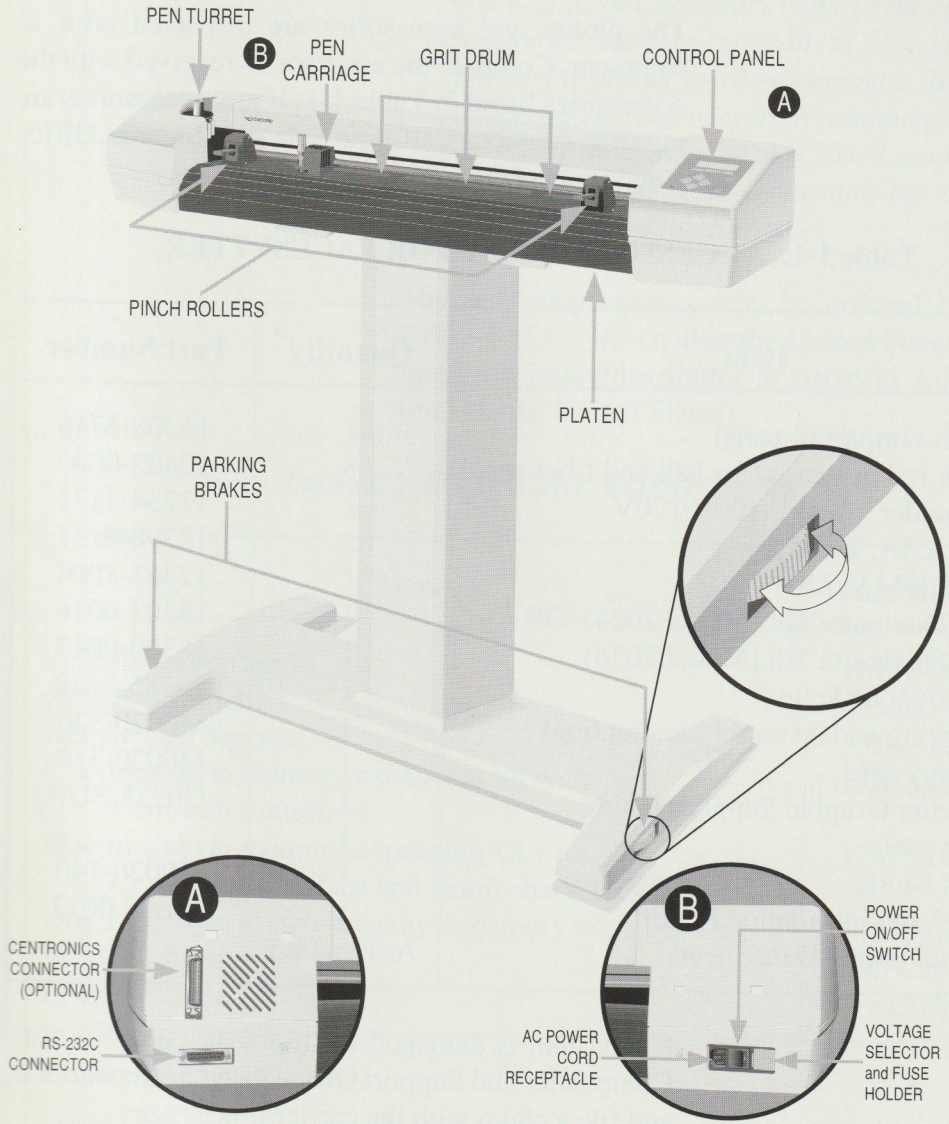


Figure 1-1. Pacesetter Plotter

1

INSPECTION

The plotter and accessories are inspected prior to shipment. Compare the accessories received with the accessories listed in Table 1-1. If any accessories are missing, contact a CalComp Sales and Support Office listed in Appendix B.

Table 1-1. ACCESSORIES LIST FOR PACESETTER

Item	Quantity	Part Number
XL pen sampler (4 pens)	1	16308-3710
Blue or red pen caps (for ball and fiber pens)	8	10482-0030
Fuse holder (Gray) 100V/120V	1	17234-7171
Fuses, 1.5A, 250V	2	12398-8131
Fuse, 800MA, 250V	1	12467-8004
Static Dissipator Kit (Model 2024) OR	1	18301-0016
Static Dissipator Kit (Model 2036)	1	18300-0017
ADI driver diskette	1	19785-0019
Unpacking and Assembly Instructions	1	M0020-320
Warranty card	1	M0020-310
Pacesetter Graphic Supplies Guide	1	G0235-SUP
Power cable	1	
User's Guide	1	M0020-140
Arrival and Installation Report	1	11698-0012
Material Safety Data Sheets	As required	

If any item is damaged in shipment, contact a CalComp Sales and Support Office listed in Appendix B, and file a claim with the carrier if necessary.

NOTE

An RS-232C or Centronics cable (if the optional Centronics interface is installed), is required to connect the plotter to a host computer. Because cable requirements vary from computer to computer, this cable must be purchased separately. Refer to Chapter 2 to determine the correct cable for your requirements.

The following options may be ordered by calling *1-800-CALCOMP* (within the United States) or your local subsidiary/distributor as listed in Appendix B (outside the United States).

Table 1-2. OPTIONAL EQUIPMENT

Item	Part Number
Additional pen turret	16710-0015
Reticle - Straight	654880-4
Reticle - 90 degrees	13112-0016
One-megabyte memory expansion kit with Centronics interface	18035-0019
One-megabyte memory expansion kit with Centronics interface and Kanji character set	17875-0014
One-megabyte to two-megabyte memory expansion kit	19570-0018
HCBS software	Call CalComp
Interface cable	See Chapter 2

1

POWERING ON THE PLOTTER

The plotter is shipped with the voltage selector in the input power module set to 240V (black fuse holder). The 100V/120V fuse holder (gray) and fuses (1.5A) are in the plotter box. See Figure 1-2 to set the input voltage selector and install the correct fuse for your input voltage.

Check the wall plug end of the power cable. If it does not mate with the wall outlet, contact a CalComp Sales and Support Office listed in Appendix B.

WARNING

Use the power cable with a properly grounded receptacle to avoid electrical shock.

To connect the power cable and turn on the plotter, proceed as follows.

1. Check that the number showing through the small window in the fuse holder matches the input voltage. See Figure 1-2 if it is necessary to change the voltage selector setting.

2. Insert the wall power plug (male) into a grounded power outlet.

WARNING

Keep long hair away from the grit drum when power is applied to the plotter.

3. At the left rear of the plotter, set the power switch to 1. Pressing the end marked 0 turns on power; pressing the end marked 1 turns off power.

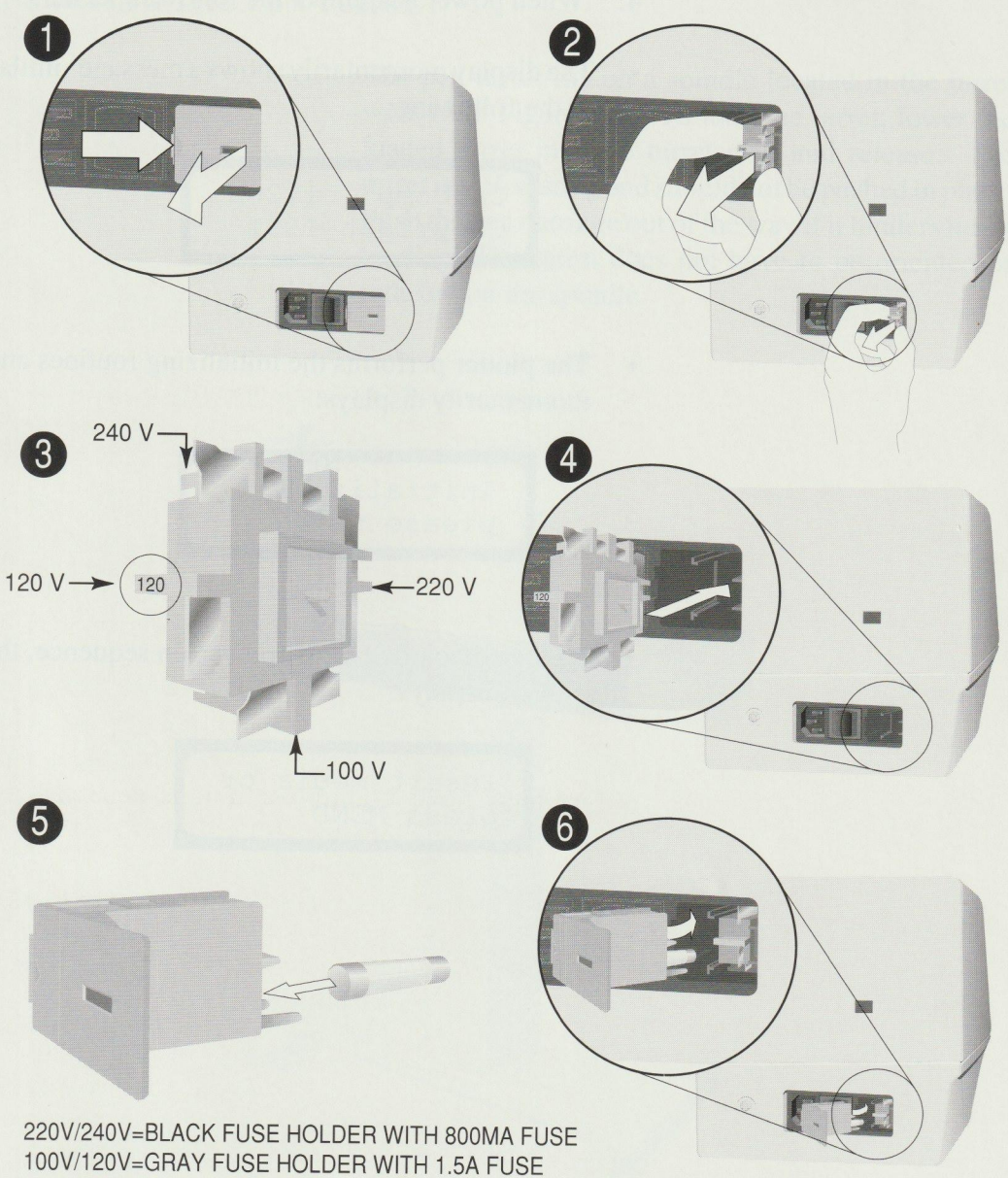


Figure 1-2. Input Voltage Selector and Fuse Installation

4. When power is applied, the following occurs:

- The display momentarily shows a message similar to the following:

```
CalComp   1.20E
Copyright 1991
```

- The plotter performs the initializing routines and momentarily displays:

```
Initializing,
please wait
```

- At the completion of the power-on sequence, the plotter displays:

```
Insert media or
press MENU
```

INSERTING THE PEN TURRET

The pen turret fits on a spindle located in the turret well. (See Figure 1-3.) To load the turret, lower the loaded turret into the turret well and release. The turret is self-seating and should not be pushed in place. Push the pen carriage out of the way if it hinders turret loading. The turret does not have to be oriented or indexed on the spindle.

Figure 1-3. Pen Turret

1

LOADING PENS

All pens used by the Pacesetter for plotting must be loaded into the pen turret. No pens are placed in the pen carriage. The plotter can operate with any of the pens specified in Chapter 5. However, for this procedure, use the pens from the accessories kit. Pens can be loaded in pen positions 1 through 8 on the pen turret. To load one or more pens, proceed as follows.

1. Lift the pen turret from its housing. (Refer to Figure 1-3.) Push the pen carriage to the right if it interferes with pen turret removal.

2. Select a liquid ink pen (marked XL2, XL3, XL4, or XL5) from the sample pen kit supplied with the plotter.

3. Load the pen into the turret as shown in Figure 1-4. If liquid ball or fiber tip pens are used, change the turret pen caps to blue or red caps. Refer to the procedure at the end of Chapter 5 for changing turret pen caps.

4. Repeat the procedure to load additional pens. The turret does not need to be fully loaded with pens to operate correctly.

NOTE

When using an applications program, note the pen color and type placed in each numbered pen position so that you can tell the software which pen to use for various parts of the plot.

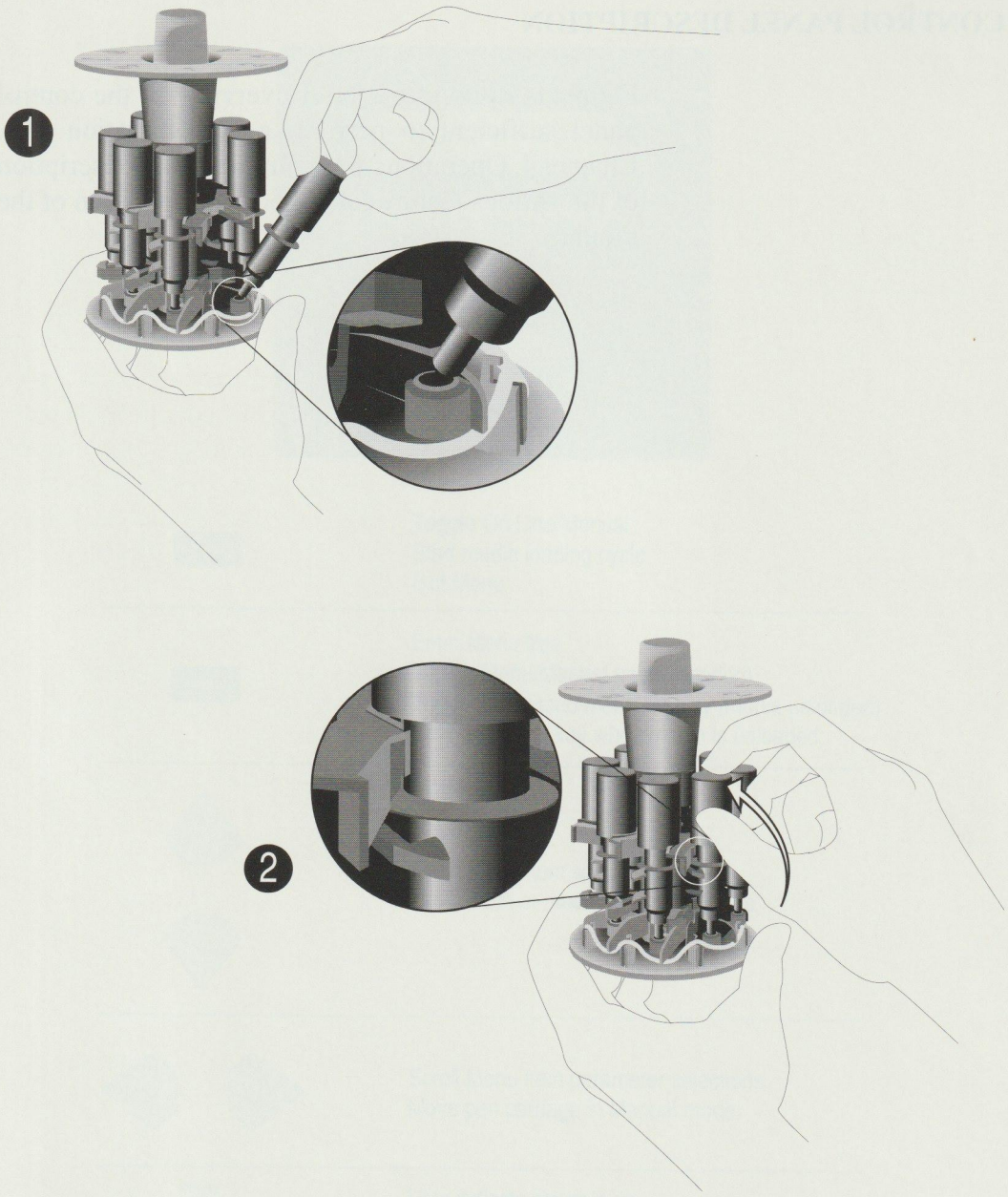


Figure 1-4. Loading Pens

CONTROL PANEL DESCRIPTION

Figure 1-5 provides a brief overview of the control panel sufficient to perform a demonstration plot. Chapter 4, Operations, contains a detailed description of the various features and modes of operation of the plotter.

On Line	Toggle On Line/Manual Start media loading cycle Exit Menu
Menu	Enter Menu tree Toggle Menu/Manual (media loaded) Toggle Menu/load media display (media unloaded) Only functional key when media is unloaded
	Scroll Menu item selections Move drum or media in Manual mode
	Scroll Menu item parameter selections Move pen carriage in Manual mode
Power	Lit to indicate power is on

Figure 1-5. Control Panel

ORIENTING PLOT MEDIA

The ANSI, ISO, and ARCH standard media sizes and their proper orientation for use on the Pacesetter are shown in Figure 1-6.

Media Length

Media length is normally limited to 36 inches for Model 2024 and 47 inches for Model 2036. Either model of the plotter allows media up to 64 inches in length to be loaded. However, plotter performance (accuracy, repeatability, and tracking) may not be within the factory specifications for media longer than 36 inches on Model 2024 and 47 inches on Model 2036.

NOTE

The plotter environment should be kept exceptionally clean if media that reaches the floor is used. Cleanliness prevents contamination of the grit drum and pinch roller assemblies.

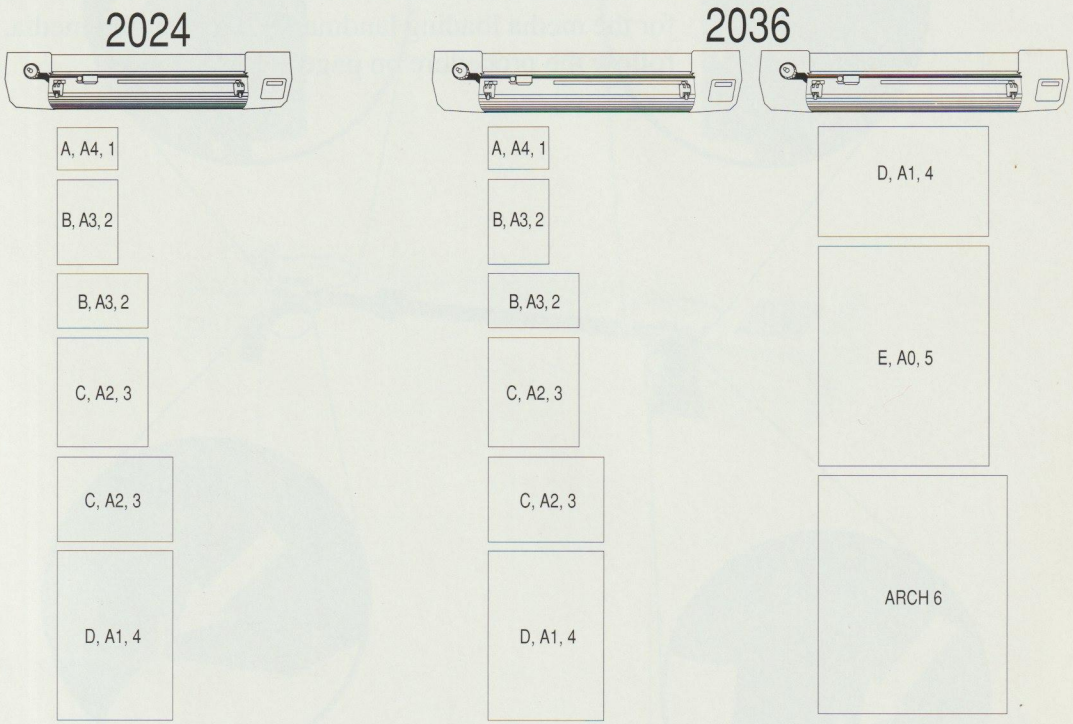


Figure 1-6. Plot Media Orientation

LOADING PLOT MEDIA

Plot media can be any of the material specified in Chapter 5. However, for this procedure, use a sheet of bond media or whatever is handy. Refer to Figure 1-7 for the media loading landmarks. To load plot media, follow the procedure on page 1-18.

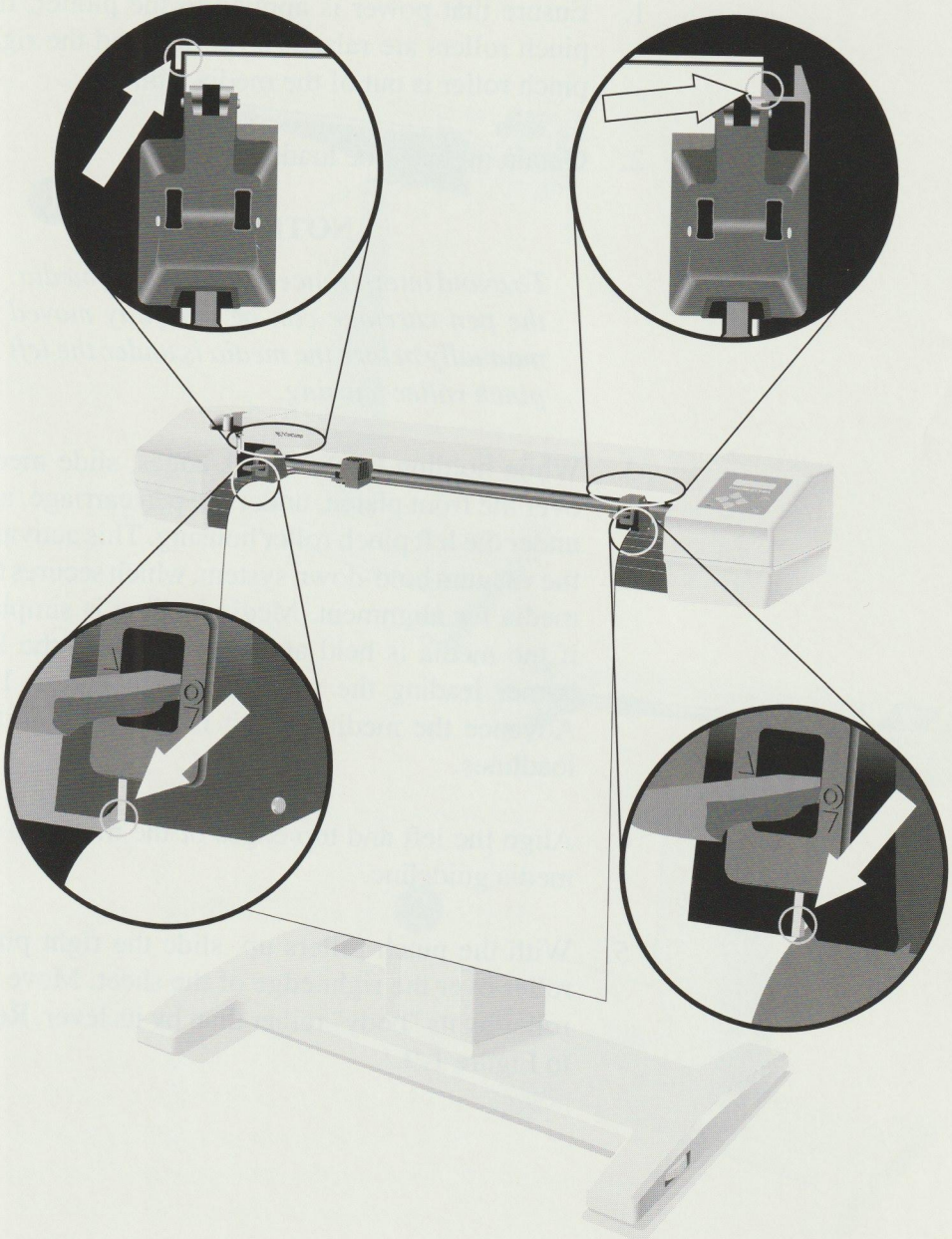


Figure 1-7. Media Loading Landmarks

1. Ensure that power is applied to the plotter, the pinch rollers are raised (lever up), and the right pinch roller is out of the media path.

2. Obtain media to be loaded.

NOTE

To avoid interference while loading media, the pen carriage can be carefully moved manually before the media is under the left pinch roller housing.

3. While holding media by its edges, slide media over the front platen, under the pen carriage, and under the left pinch roller housing. This activates the vacuum hold-down system, which secures the media for alignment. Media loading is simplest if the media is held at a diagonal with the left corner leading the way. Refer to Figure 1-8. Advance the media until it is aligned with the loadlines.

4. Align the left and top edges of the media to the media guideline.

5. With the pinch rollers up, slide the right pinch roller over the right edge of the sheet. Move the roller by its "body" rather than by its lever. Refer to Figure 1-9.

Figure 1-8. Media Loading

6. Position the right pinch roller such that the media loading landmarks are at the edge of the media. Refer to Figure 1-7.

NOTE

Touch only the top one-half inch of media when smoothing. Possible contamination could occur if the plot area is touched.

7. Smooth the media from center to both edges to remove any bubbles. Lower both pinch rollers (lever down).

NOTE

When the plotter is not in use, raise the pinch rollers to prevent the rubber rollers from developing flat spots.

8. The media is now aligned on the plotter. The following is displayed:

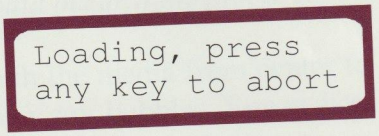
```
Press ONLINE or
arrows to load
```

9. The plotter is now ready to load and size the media. Pressing ONLINE causes the plotter to load the media and go Online when it is ready to receive data. Pressing an arrow key causes the plotter to load media and go into the Manual mode. For purposes of this procedure, press any arrow key.

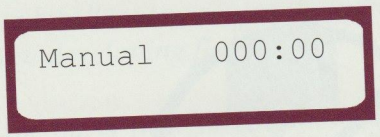
Figure 1-9. Pinch Roller

The following occurs:

- The plotter moves the pen carriage and media to determine the size of the media.
- During media sizing, the following is displayed:

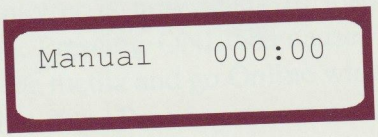


- After media sizing, the following is displayed:



During the load sequence, pressing any key aborts the load. This "any key" feature is useful in the event of a media jam.

At the completion of the media loading sequence, the plotter displays:



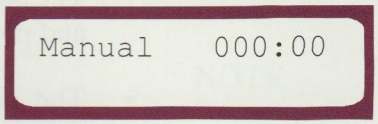
Proceed to the demonstration plot procedure on the following page.

RUNNING A DEMONSTRATION PLOT

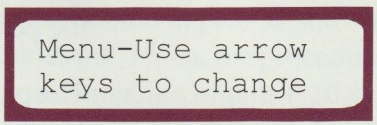
The demonstration plot is an internally stored program that is run to demonstrate the plotter is functioning. This plot is automatically scaled to fit the size of the media loaded. To run the demonstration plot, proceed as follows.

1. Ensure that the following conditions exist:

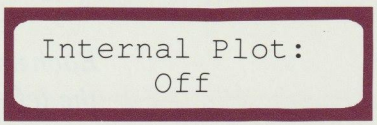
   - Turret with pen(s) is loaded into plotter
   - Media is inserted and aligned
   - Pinch rollers are down and engaged
   - Media loading sequence initiated by an arrow key is complete. The following is displayed:



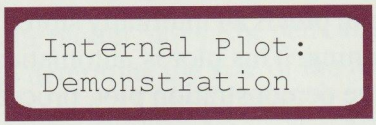
2. Press the Menu key. The plotter displays:



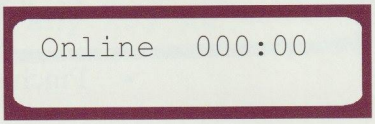
3. Press the up-arrow key. The plotter displays:



4. Press the right-arrow key. The plotter displays:



5. Press the ONLINE key. The plotter displays:



- The pen carriage takes the pen from the turret and positions the pen on the media surface.
- The plotter draws the demonstration plot using a combination of X- and Y-vector lines to create the plot. X-axis lines are created by rotation of the grit drum moving the media under the pen. Y-axis lines are created when the pen is moved along the vacuum groove.
- The plot timer, shown as a three-digit number (minutes), followed by a two-digit number (seconds), is incremented to keep track of plot time.

NOTE

Each time the media is removed from under the left pinch roller, control of the plotter returns to the sizing sequence.

- To view the plot in progress, press any key. This causes the plotter to go into the View mode. In the View mode, the plotter is changed to Manual, the plot timer stays at the time displayed when the View mode was entered, the media is moved all the way forward, and the pen is returned to the turret. To resume plotting, press Online.

6. After the demonstration plot is completed, the plotter goes into the View mode and the display typically shows:

```
Manual    002:47
End of plot
```

NOTE

Actual time displayed at the end of the demonstration plot is a function of the size of the media loaded.

7. The plot should appear as shown in Figure 1-10. If it does not, repeat the procedure. If the plot still does not look like Figure 1-10, call for service as listed in Appendix B.

1

PACESETTER
BY CALCOMP

HIGH THROUGHPUT
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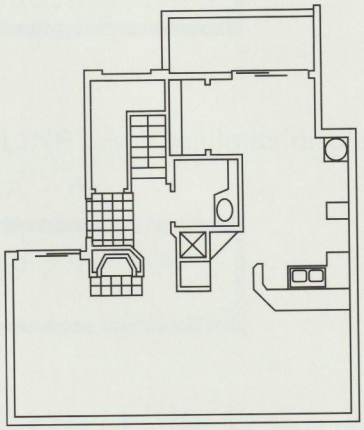
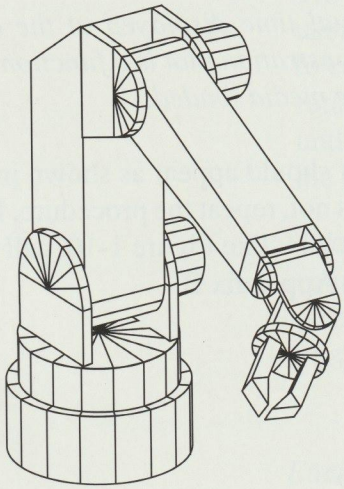
TRADITIONAL CALCOMP PLOT QUALITY





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- ALL MAJOR CAD SOFTWARE

MANY APPLICATIONS
- ARCHITECTURAL / CIVIL
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- ELECTRICAL

TWO MODELS
- 2024 : A-D/A4-A1
- 2036 : A-E/A4-A0

MULTIPLE PEN AND MEDIA SUPPORT

DRAWINGS COURTESY OF AUTODESK (TM)

Figure 1-10. Demonstration Plot

PACESETTER OPTIONS

Two optional expansion packages are available:

- One-megabyte memory expansion with Centronics interface.
- Kanji language character set with the appropriate offsets.

Memory Expansion with Centronics Interface

The memory expansion with Centronics interface option provides additional plotter memory and a Centronics (parallel port) interface. This option provides several features:

- Stores plot data from the host to the plotter. This enables the host to perform other operations while the plotter is plotting.
- Runs a replot of a stored drawing without having to send the plot data from the host again.
- Provides a Centronics input connector and the interface needed to use the Centronics port.

The procedures for using the features provided by the memory expansion with Centronics interface are contained in this User's Guide.

Kanji Language

This option provides the appropriate offsets for printing Kanji characters on plots.

Chapter Two

PACESETTER

Connecting the Plotter

CHAPTER 2

CONNECTING THE PLOTTER

INTRODUCTION

The Pacesetter plotter communicates with a host computer via an RS-232C (serial) or optional Centronics (parallel) interface. Since many variations of the RS-232C interface exist, the following variables must be considered when connecting the plotter to the host:

- Is the host interface configured for Data Terminal Equipment (DTE) or Data Communications Equipment (DCE)?
  - — DTE-Data is transmitted on pin 2 and received on pin 3.
  - — DCE-Data is transmitted on pin 3 and received on pin 2.
- Does the host interface use a 9-pin or 25-pin connector?
- Is the host connector male or female?
- Are all the RS-232C signals used or are only some of the signals used?
- Is the optional Centronics (parallel) interface installed?
- Does your software require a special cable configuration?

This chapter provides information to allow the user to connect the RS-232C (serial) or Centronics (parallel) interface between the plotter and the host computer.

Pacesetter plotters equipped with the optional Centronics (parallel) port should have only one data cable connected at a time. Either the RS-232C cable **or** the Centronics cable should be connected. Connecting both data cables to the plotter is not recommended because the input data ports do not have multiplexing capabilities.

PLOTTER INTERFACES

The standard Pacesetter RS-232C (serial) port interface is configured as Data Communications Equipment (DCE). The connector is a 25-pin female (Figure 2-1) and functions with the associated IBM-compatible cable. Table 2-1 shows the RS-232C (serial) pin assignments.

The optional Pacesetter Centronics (parallel) port interface uses a standard 36-pin female connector (Figure 2-2). Table 2-2 shows the Centronics (parallel) pin assignments.

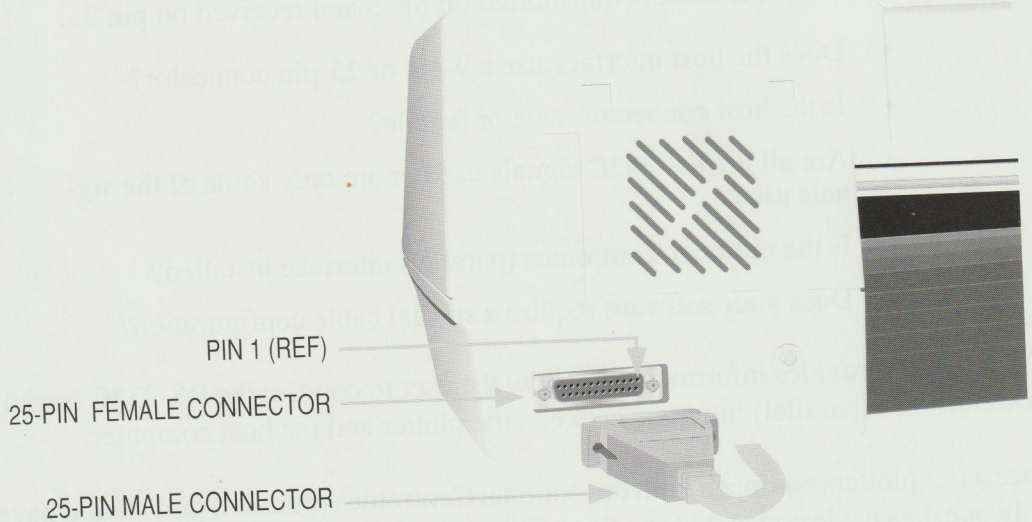


Figure 2-1. RS-232C (Serial Port) Connector

Table 2-1. RS-232C (SERIAL PORT) CONNECTOR PIN ASSIGNMENTS

Pin No.	Name	Description	Direction
1		Shield Chassis Ground	
2	TxD	Transmitted Data	Data to Plotter
3	RxD	Received Data	Data from Plotter
4	RTS	Request to Send	Signal to Plotter
5	CTS	Clear to Send	Signal from Plotter
6	DSR	Data Set Ready	Signal from Plotter
7	SGND	Signal Ground	
8	DCD	Data Carrier Detect	Signal from Plotter
9		Not used	
10		Not used	
11		Not used	
12		Not used	
13		Not used	
14		Test	Plotter internal use
15		Not used	
16		Test	Plotter internal use
17		Test	Plotter internal use
18		Not used	
19		Reserved (pull-up)	
20	DTR	Data Terminal Ready	Signal to Plotter
21		Not used	
22		Not used	
23		Not used	
24		Not used	
25		Reserved (pull-down)	

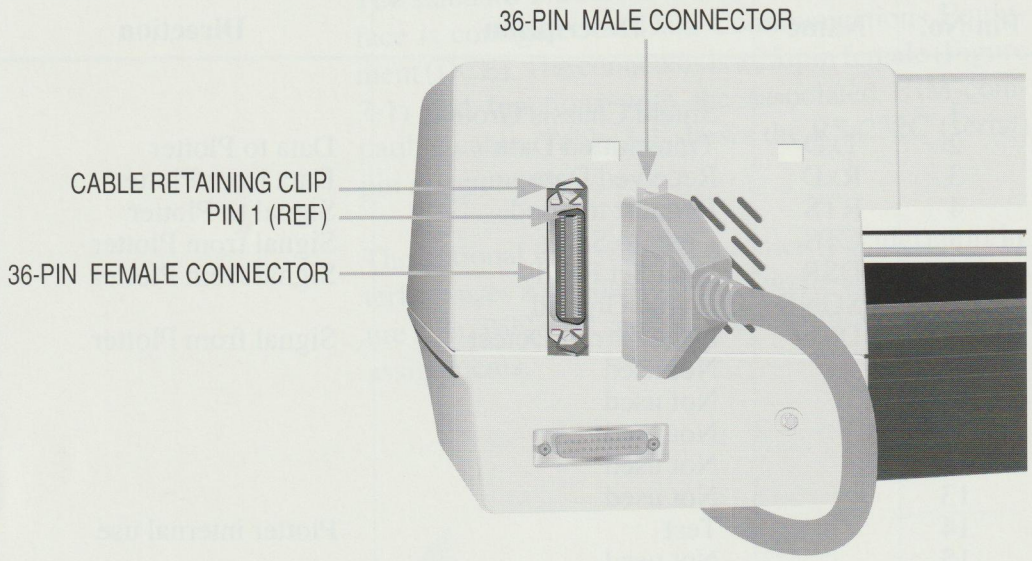


Figure 2-2. Centronics (Parallel Port) Connector

Table 2-2. CENTRONICS (PARALLEL PORT) CONNECTOR PIN ASSIGNMENTS

Pacesetter Connector Pin No.	Description	Signal Direction	PC Connector Pin No.
1	STROBE	←	1
2	DATA 1	←	2
3	DATA 2	←	3
4	DATA 3	←	4
5	DATA 4	←	5
6	DATA 5	←	6
7	DATA 6	←	7
8	DATA 7	←	8
9	DATA 8	←	9
10	- ACKNLG	→	10
11	+ BUSY	→	11
12	+ PAPER OUT	Not Used	12
13	+ SELECT	→	13
14	- AUTO FEED	Not Used	14
32	- ERROR	→	15
31	- INIT	←	16
36	- GROUND	———	17
33	GROUND	———	18
19	GROUND	———	19
21	GROUND	———	20
23	GROUND	———	21
25	GROUND	———	22
27	GROUND	———	23
29	GROUND	———	24
30	GROUND	———	25

12-foot cable - P/N 18735-0129
25-foot cable - P/N 717960-9

RS-232C (SERIAL PORT) CONNECTIONS

Host Computers

Information is provided to support the use of an RS-232C (Serial Port) with the following most commonly used host computers:

- IBM PC or equivalent (Figure 2-3)
- IBM XT or equivalent (Figure 2-3)
- IBM AT or equivalent (Figure 2-3)
- IBM PS/2 or equivalent (Figure 2-4)
- DEC VAX (Figure 2-5)
- Apple Macintosh II (Figure 2-6)

Cables/Connectors

Cable diagrams (IBM compatible) are provided for the following RS-232C (Serial Port) cable/connector configurations:

- 25-pin male (DCE) to 25-pin female (DTE) - Table 2-3
- 9-pin female adapter (DTE) to 25-pin male (DCE) - Table 2-4
- 25-pin female (DCE) to 25-pin male (DCE) - Table 2-5
- 8-pin male micro DIN (round) to DB-25 pin male (DCE) - Table 2-6

CENTRONICS (PARALLEL PORT) CONNECTIONS

Host Computers

Information is provided to support the use of a Centronics (Parallel Port) with the following most commonly used host computers:

- IBM PC or equivalent (Figure 2-7)
- IBM XT or equivalent (Figure 2-7)
- IBM AT or equivalent (Figure 2-7)
- IBM PS/2 or equivalent (Figure 2-8)
- DEC VAX (Figure 2-9)

Cables/Connectors

Cable diagrams are provided for the following Centronics (Parallel Port) cable/connector configurations:

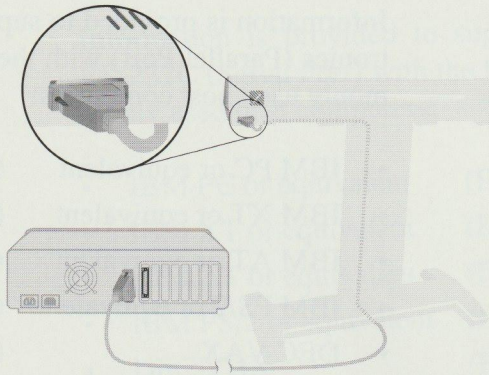
- 25-pin male (DCE) to 36-pin male - Table 2-2

CABLE CONNECTIONS

Using the information in Tables 2-2 through 2-6 and Figures 2-2 through 2-9, obtain or fabricate the appropriate cable and/or adapter. The RS-232C cable length must not exceed 50 feet; the Centronics cable length normally must not exceed 12 feet. The 25-foot CalComp double-shielded cable (part number 717960-9) is the only longer cable supported by CalComp.

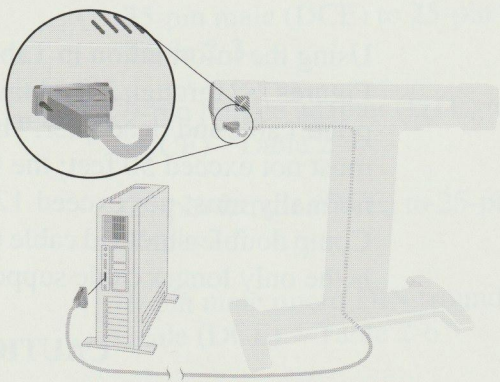
CAUTION

Double-shielded cables must be used. Failure to comply violates FCC and VDE Class B regulations.



CALCOMP CABLE P/N 11772-0102 (10 FEET)
CALCOMP CABLE P/N 11772-0250 (25 FEET)
(MAY REQUIRE 9-PIN TO 25-PIN ADAPTER)

Figure 2-3. RS-232C (Serial Port) with IBM PC, XT, AT, or Equivalent



CALCOMP CABLE P/N 11772-0102 (10 FEET)
CALCOMP CABLE P/N 11772-0250 (25 FEET)
(MAY REQUIRE 9-PIN TO 25-PIN ADAPTER)

Figure 2-4. RS-232C (Serial Port) with IBM PS/2 or Equivalent

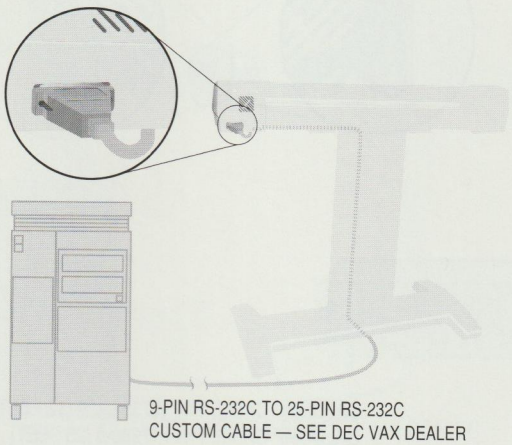


Figure 2-5. RS-232C (Serial Port) with DEC VAX

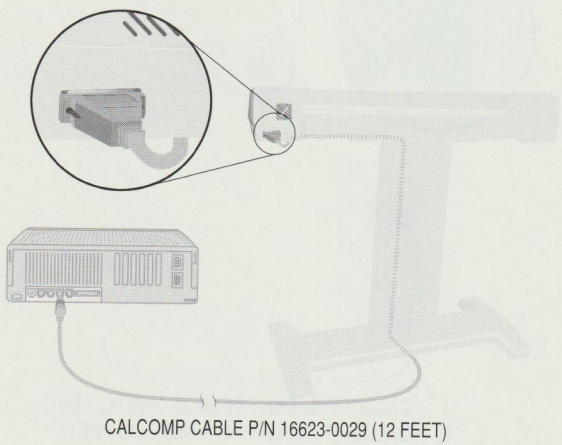


Figure 2-6. RS-232C (Serial Port) with Apple Macintosh II

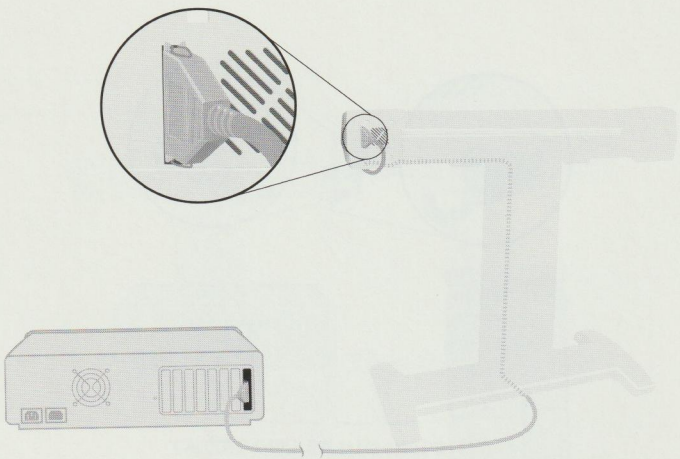


Figure 2-7. Centronics (Parallel Port) with IBM PC, XT, AT, or Equivalent

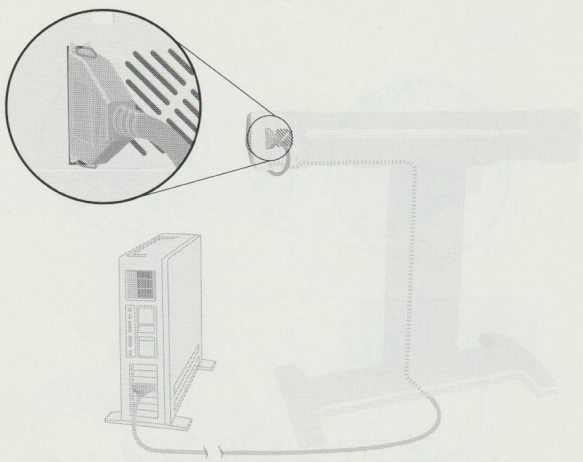


Figure 2-8. Centronics (Parallel Port) with IBM PS/2 or Equivalent

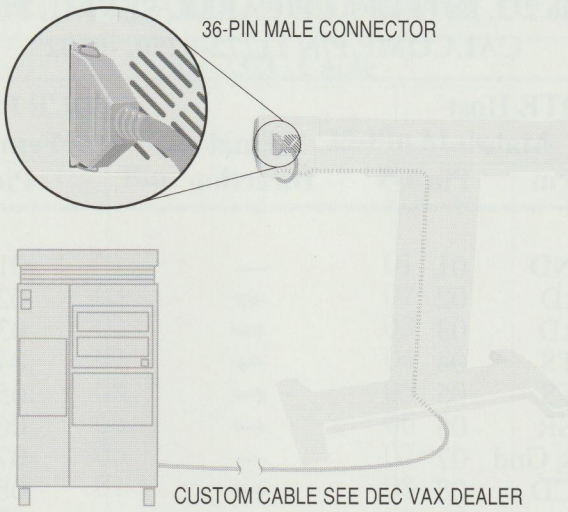


Figure 2-9. Centronics (Parallel Port) with DEC VAX

Table 2-3. INTERFACE CABLE, SERIAL PORT, CALCOMP P/N 11772-0250, -0102*

DTE Host Male		Signal Direction	DCE Plotter Female
Term	Pin		Pin
GND	01	—	01
TxD	02	→	02
RxD	03	←	03
RTS	04	→	04
CTS	05	←	05
DSR	06	←	06
Sig Gnd	07	—	07
DCD	08	←	08
	09		09
	10		10
	11		11
	12		12
	13		13
	14		14
	15		15
	16		16
	17		17
	18		18
	19		19
DTR	20	→	20
	21		21
RI	22	←	22
	23		23
	24		24
	25		25

All 25 pins are wired through, although not all 25 pins are used.

* -0250 = 25 feet
  -0102 = 10 feet

Table 2-4. INTERFACE CABLE, 9-PIN FEMALE TO 25-PIN MALE

DTE Host Male		RS-232C Cable			DCE Plotter Female
		9-Pin Female		25-Pin Male	
Term	Pin	Pin		Pin	Pin
				01	01
TxD	03	03	→	02	02
RxD	02	02	←	03	03
RTS	07	07	→	04	04
CTS	08	08	←	05	05
DSR	06	06	←	06	06
SG	05	05	—	07	07
CD	01	01	←	08	08
				09	09
				10	10
				11	11
				12	12
				13	13
				14	14
				15	15
				16	16
				17	17
				18	18
				19	19
DTR	04	04	→	20	20
				21	21
RI	09	09	←	22	22
				23	23
				24	24
				25	25

For IBM PC, XT, AT, PS/2 or equivalent.

2

Table 2-5. INTERFACE CABLE, 25-PIN FEMALE TO 25-PIN MALE CROSSOVER, CALCOMP P/N 17557-001

DCE Host Male		RS-232C Cable		DCE Plotter Female
		25-Pin Female	25-Pin Male	
Term	Pin	Pin	Pin	Pin
GND	01	01	01	01
RxD	02	02	02	02
TxD	03	03	03	03
RTS	04	04	04	04
CTS	05	05	05	05
DSR	06	06	06	06
SG	07	07	07	07
CD	08	08	08	08
	09	09	09	09
	10	10	10	10
	11	11	11	11
	12	12	12	12
	13	13	13	13
	14	14	14	14
	15	15	15	15
	16	16	16	16
	17	17	17	17
	18	18	18	18
	19	19	19	19
DTR	20	20	20	20
	21	21	21	21
	22	22	22	22
	23	23	23	23
	24	24	24	24
	25	25	25	25

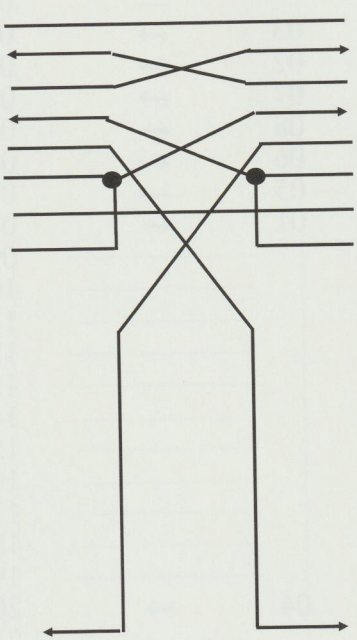
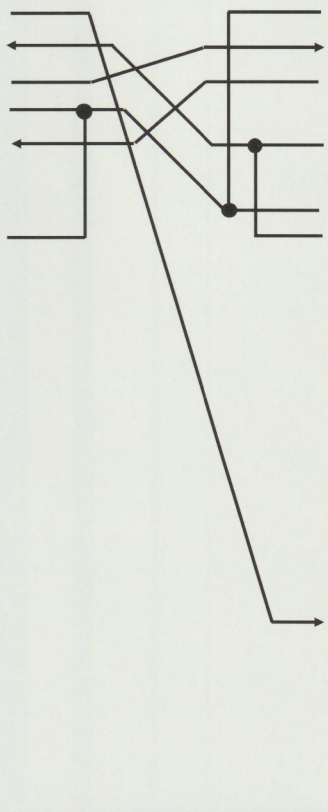


Table 2-6. INTERFACE CABLE, 8-PIN MALE TO 25-PIN MALE, CALCOMP P/N 16623-0029

Macintosh 8-Pin Male		Signal Direction	CalComp 25-Pin Male	
Term	**Pin**		**Pin**	**Term**
HSKo	01		01	CH GND
HSKi	02		02	RxD
TxD-	03		03	TxD
GND	04		04	
RxD-	05		05	CTS
	06		06	
	07		07	SIG GND
RxD+	08		08	
			09	
			10	
			11	
			12	
			13	
			14	
			15	
			16	
			17	
			18	
			19	
			20	DTR
			21	
			22	
			23	
			24	
			25	
Shield			Shield	

Chapter Three

PACESETTER

Configuring the Plotter

CHAPTER 3

CONFIGURING THE PLOTTER

INTRODUCTION

The plotter, when configured to match the host application software, is compatible with computer-aided design (CAD) programs that use any of the following formats:

- 960 Mode (CalComp 960 Data Format) - used with CAD programs supporting older plotters without imbedded controllers.
- PCI Mode (CalComp Online Controller Format) - used with CAD programs supporting newer model plotters with imbedded controllers.
- HPGL Mode (Hewlett-Packard Graphics Language) - used with CAD programs supporting only the Hewlett-Packard Graphics Language (HPGL).

HOST COMMUNICATION PARAMETERS

- Table 3-1 lists the RS-232C (serial port) parameters, associated specifications, and the factory defaults.
- Table 3-2 lists the optional Centronics (parallel port) parameters, associated specifications, and the factory defaults.
- Table 3-3 lists the 960-compatible software packages and associated parameters.
- Table 3-4 lists the various PCI-compatible software packages and associated parameters.

To change parameters, refer to Figure 3-1. Figure 3-1 is a flow diagram that guides you to the appropriate table and procedures to allow changes based on the software package installed. The CalComp ADI in Figure 3-1 is a CalComp-written driver for AutoCAD.

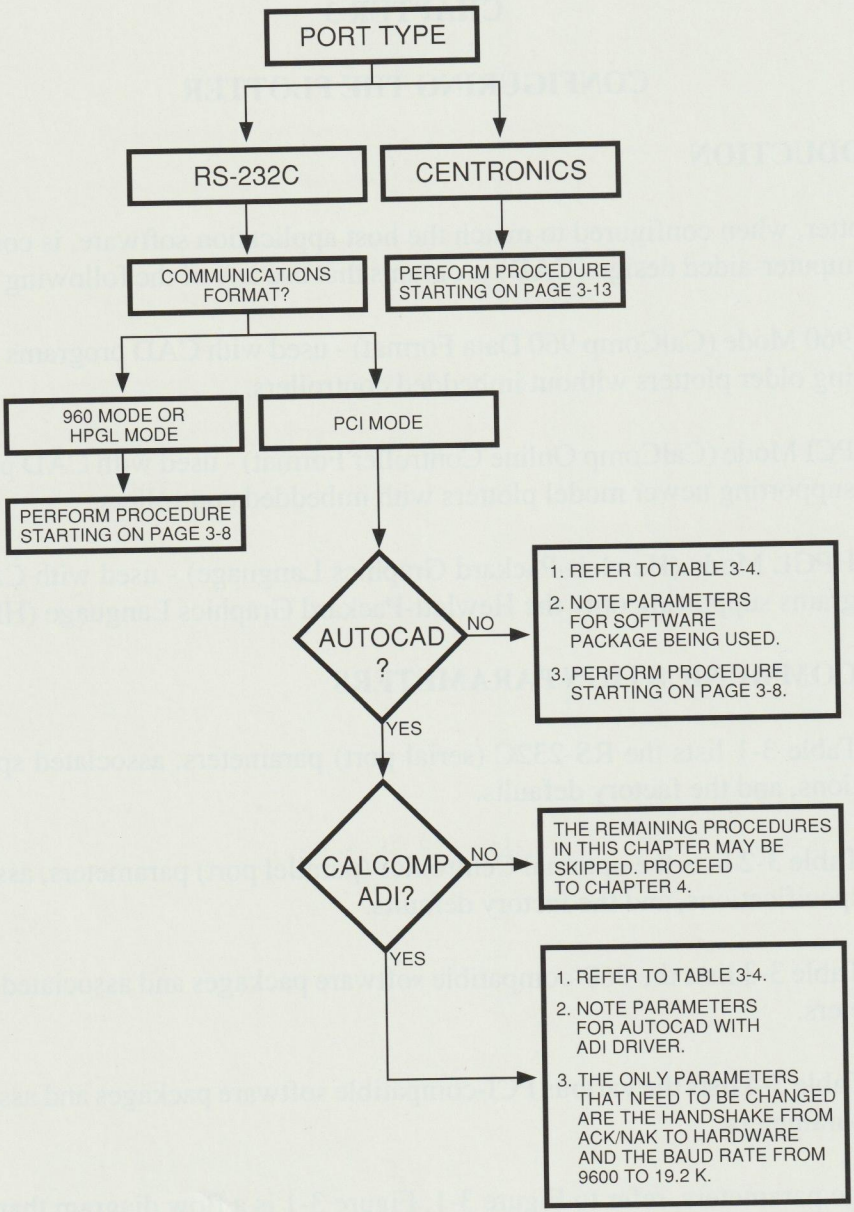


Figure 3-1. Configuration Guide

Use the applicable information in Tables 3-1 through 3-4 to configure the plotter to match the host CAD parameters. This match establishes communication between the host and the plotter.

Table 3-1. PACESETTER RS-232C (SERIAL PORT) COMMUNICATION PARAMETERS

Parameter	Specification	Default
Protocol*	PCI, 960, HPGL Large Format, HPGL Small Format	PCI
Baud Rate	1200, 2400, 4800, 9600, 19.2K	9600
Bits-Parity	7-even, 7-odd, 8-even, 8-odd, 8-none	7-even
Handshake	Ack/Nak, Xon/Xoff, Hardware	Ack/Nak
PCI Data Message Format		
Sync Char	0 to 127 (0-7F hex)	22
Number Sync	1 or 2	2
End of Message	0 to 31 (0-1F hex)	13
Checksum	on or off	on

* In HPGL Large Format, the Pacesetter emulates an HP model 7595B plotter. In HPGL Small Format, the Pacesetter emulates an HP model 7440 plotter.

Table 3-2. PACESETTER CENTRONICS (PARALLEL PORT) COMMUNICATION PARAMETERS

Parameter	Specification	Default
Protocol	PCI, 960, HPGL Large Format, HPGL Small Format	PCI
PCI Data Message Format		
Sync Char	0 to 127 (0-7F hex)	22
Number of Sync	1 or 2	2
End of Message	0 to 31 (0-1F hex)	13
Checksum	on or off	on

Table 3-3. 960 PARAMETERS

Company	Software Package	Baud Rate
ISICAD	CADVANCE	9600
Future Net	FUTURE NET	9600
Personal CAD Systems	PCAD-PCB	9600
Computervision	PERSONAL DESIGNER	9600
RACAL REDAC	REDLOG	9600

NOTE

CAD manufacturers reserve the right to change any of the application parameters without notice. Please check the CAD package documentation for the most recent parameters.

PCI PROTOCOL

The Data Message Format column of Table 3-4 (pages 3-6 through 3-7) corresponds with a PCI protocol setup menu of the Pacesetter. This menu item is shown in Figures 3-2 and 3-5, the PCI Protocol Setups. In essence, the required sync character, number of sync bits, end of message (EOM) code, and checksum have been consolidated into a letter code to cover the most frequently used message formats. The three codes are A, B, and C.

In addition, the Pacesetter allows two special Data Message Formats to be created. These special or custom formats are used if your application package is listed with a "Special" in the Data Message Format column of Table 3-4. By using the Special Format-1 or Special Format-2 menu items, the sync character, number of sync characters, end of message (EOM) code, and checksum can be set individually to any combination within the available range.

Table 3-4. PCI PARAMETERS

Name	Baud Rate	Bits/ Byte	Parity	Hand Shake	Data Message Format	Sync-Char	# of Sync	End of Message (EOM)	Check-Sum
ANVILL-1000	9600	8	none	Hardware	B	2	1	3	Enabled
AUTOCAD	9600	7	even	Ack/Nak	A	22	2	13	Enabled
AUTOCAD with ADI driver	19200	7	even	Hardware	A	22	2	13	Enabled
CADKEY (after 3.1)	9600	8	none	Xon/Xoff	C	2	1	3	Disabled
CADVANCE	9600	8	none	Hardware	C	2	1	3	Disabled
CASCADE	9600	8	none	Hardware	Special	2	1	13	Disabled
CIVIL SOFT (prior to 11/86)	9600	8	none	Ack/Nak	Special	2	2	3	Disabled
CIVIL SOFT (after 11/86	9600	8	none	Hardware	Special	2	2	3	Disabled
DATACAD (Prior to 3.0)	9600	8	none	Ack/Nak	B	2	1	3	Enabled
DATACAD (after 3.0)	9600	8	none	Hardware	B	2	1	3	Enabled
EASY-DRAFT MACINTOSH	9600	8	none	Ack/Nak	A	22	2	13	Enabled

Name	Baud Rate	Bits/ Byte	Parity	Hand Shake	Data Message Format	Sync-Char	# of Sync	End of Message (EOM)	Check-Sum
EASY-DRAFT NEC	9600	8	none	Ack/Nak	Special	2	2	13	Enabled
EE DESIGNER	9600	8	none	Hardware	C	2	1	3	Disabled
MACPLOT	9600	7	even	Hardware	Special	2	1	3	Disabled
MEDUSA	9600	8	none	Ack/Nak	B	2	1	3	Enabled
MICRO-CADAM	9600	8	none	Hardware	C	2	1	3	Disabled
MICRO-STATION	9600	8	none	Ack/Nak	C	2	1	3	Disabled
ORCAD	9600	8	none	Hardware	C	2	1	3	Disabled
POINTLINE	2400	8	none	Hardware	C	2	1	3	Disabled
PRIMA VISION	9600	8	none	Hardware	B	2	1	3	Enabled
PRO DESIGN II	9600	8	none	Hardware	C	2	1	3	Disabled
VERSACAD (prior to 5.3)	9600	8	none	Ack/Nak	Special	126	2	13	Disabled
VERSACAD (after 5.3)	9600	8	none	Xon/Xoff	C	2	1	3	Disabled

CHANGING COMMUNICATIONS PARAMETERS

The following paragraphs contain the procedures for changing the communications parameters. Each procedure is self-contained. For additional information on the use of the control panel and menu structure, refer to Figures 4-1 through 4-4 and the associated descriptions.

To change parameters, proceed as follows:

1. Power on the plotter.

2. Press the Menu key.

NOTE

The Port Type menu display only appears when the optional Centronics interface is installed. Skip this step and proceed to step 5 if the plotter only has an RS-232C (serial) port.

3. Press the up- or down-arrow key until the display shows:

```
Port Type:
 RS-232C
```

4. Press the left- or right-arrow key to display the desired port type: RS-232C or Centronics. If Centronics is selected, proceed to page 3-13 and continue with the procedure at that point.

RS-232C SETUP

5. Press the down-arrow key. The display shows:

```
Protocol:
    PCI
```

6. Press the left- or right-arrow key until the desired protocol is displayed.

NOTE

At this point, one of the following is displayed. Use the left- or right-arrow key to display the desired protocol. Locate the figure and page number that corresponds to your format and continue with the procedure at that point.

```
Protocol:
    PCI
```

Figure 3-2, page 3-10

```
Protocol: HPGL
  Large Format
```

Figure 3-3, HPGL Large Format - page 3-11

```
Protocol: HPGL
  Small Format
```

Figure 3-3, HPGL Small Format - page 3-11

```
Protocol:
    960
```

Figure 3-4, page 3-12

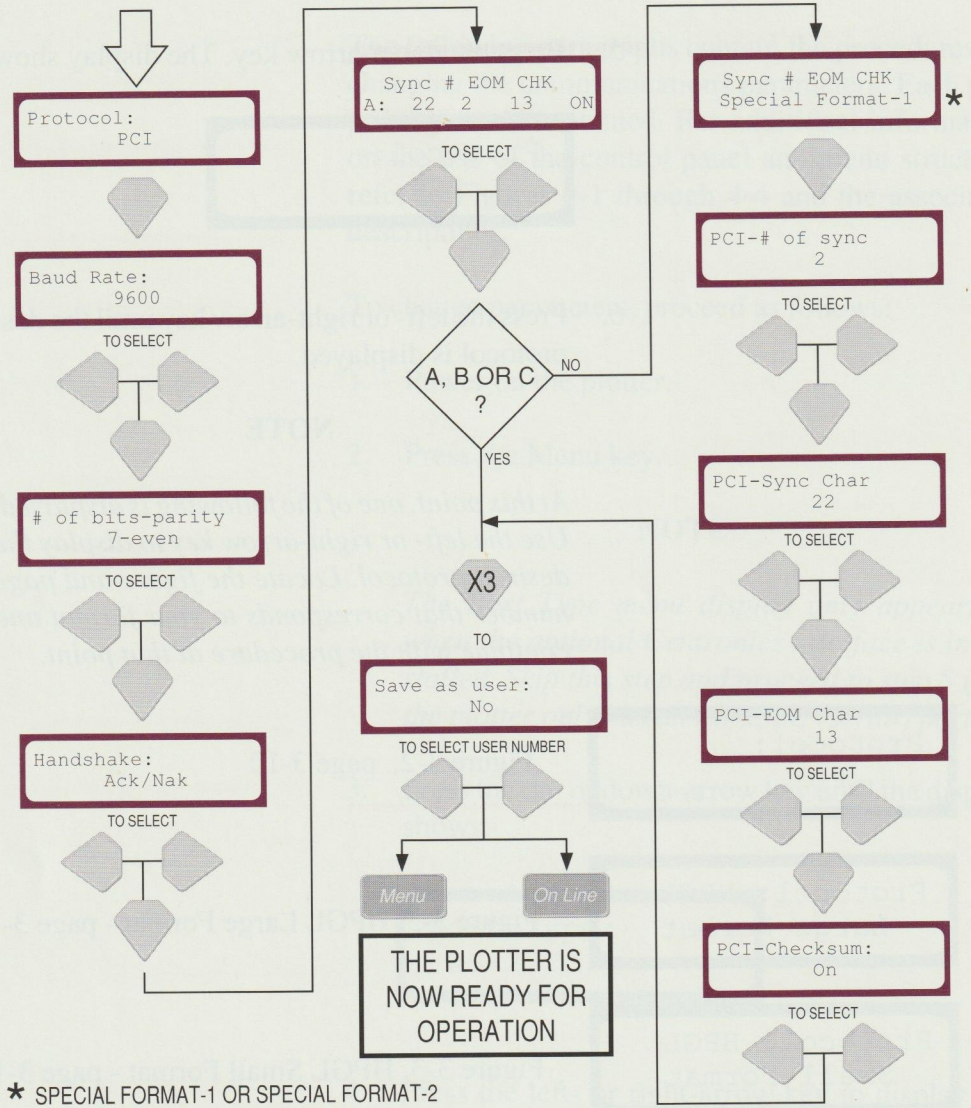


Figure 3-2. RS-232C Port PCI Protocol Setup

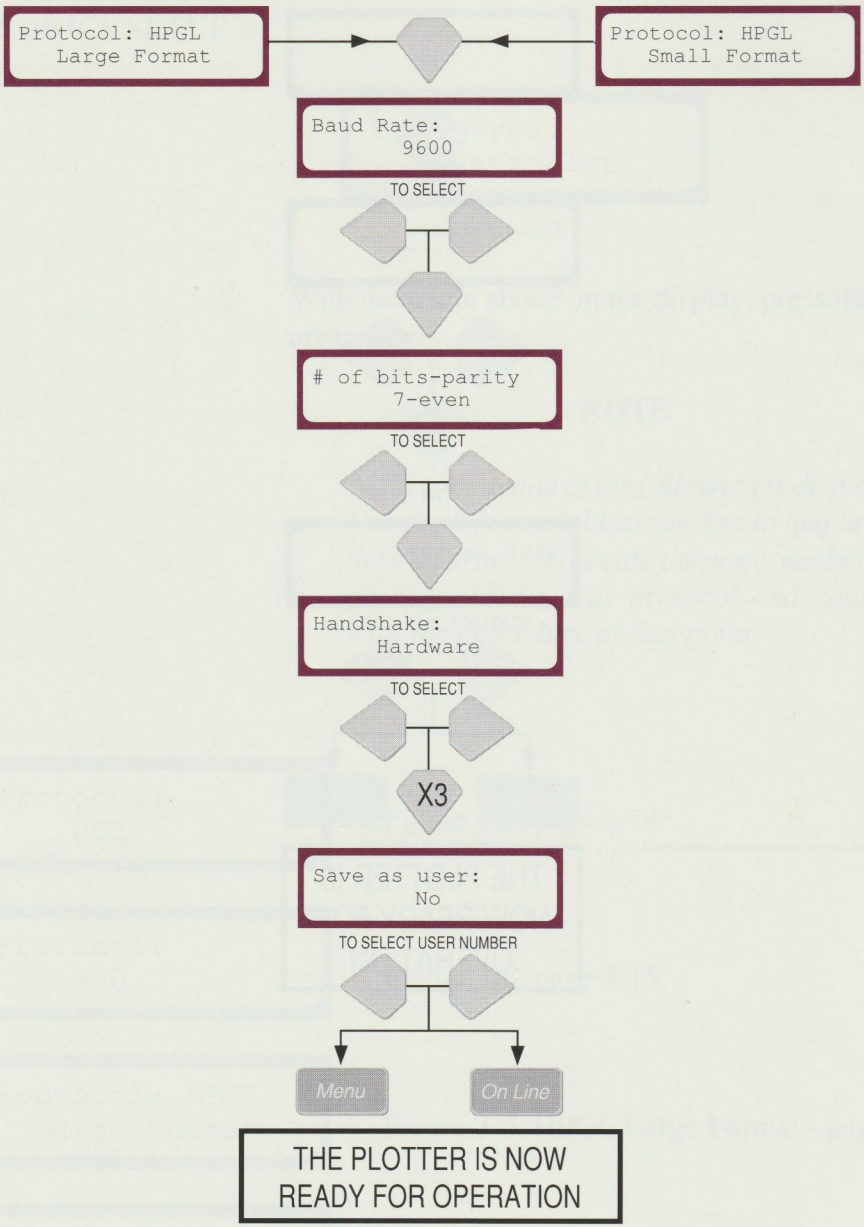


Figure 3-3. RS-232C Port HPGL Protocol Setup

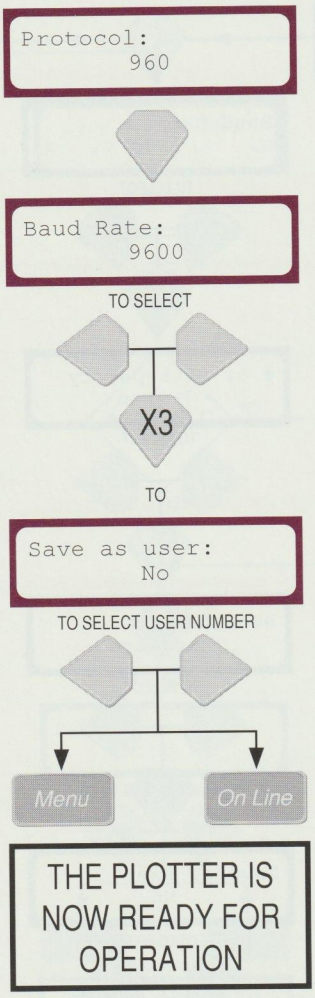
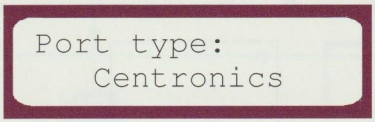


Figure 3-4. RS-232C Port 960 Protocol Setup

CENTRONICS SETUP



With the menu above on the display, press the down-arrow key.

NOTE

At this point, one of the following is displayed. Use the left- or right-arrow key to display the desired protocol. Locate the page number that corresponds to your protocol and continue with the procedure at that point.

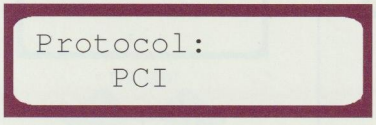


Figure 3-5, page 3-14

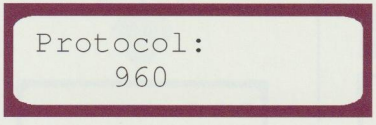


Figure 3-6, page 3-15

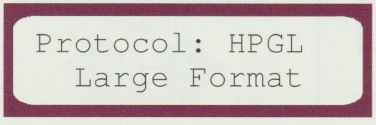


Figure 3-6, HPGL Large Format - page 3-15

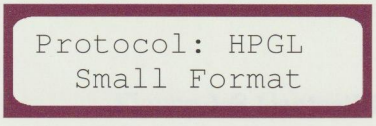


Figure 3-6, HPGL Small Format - page 3-15

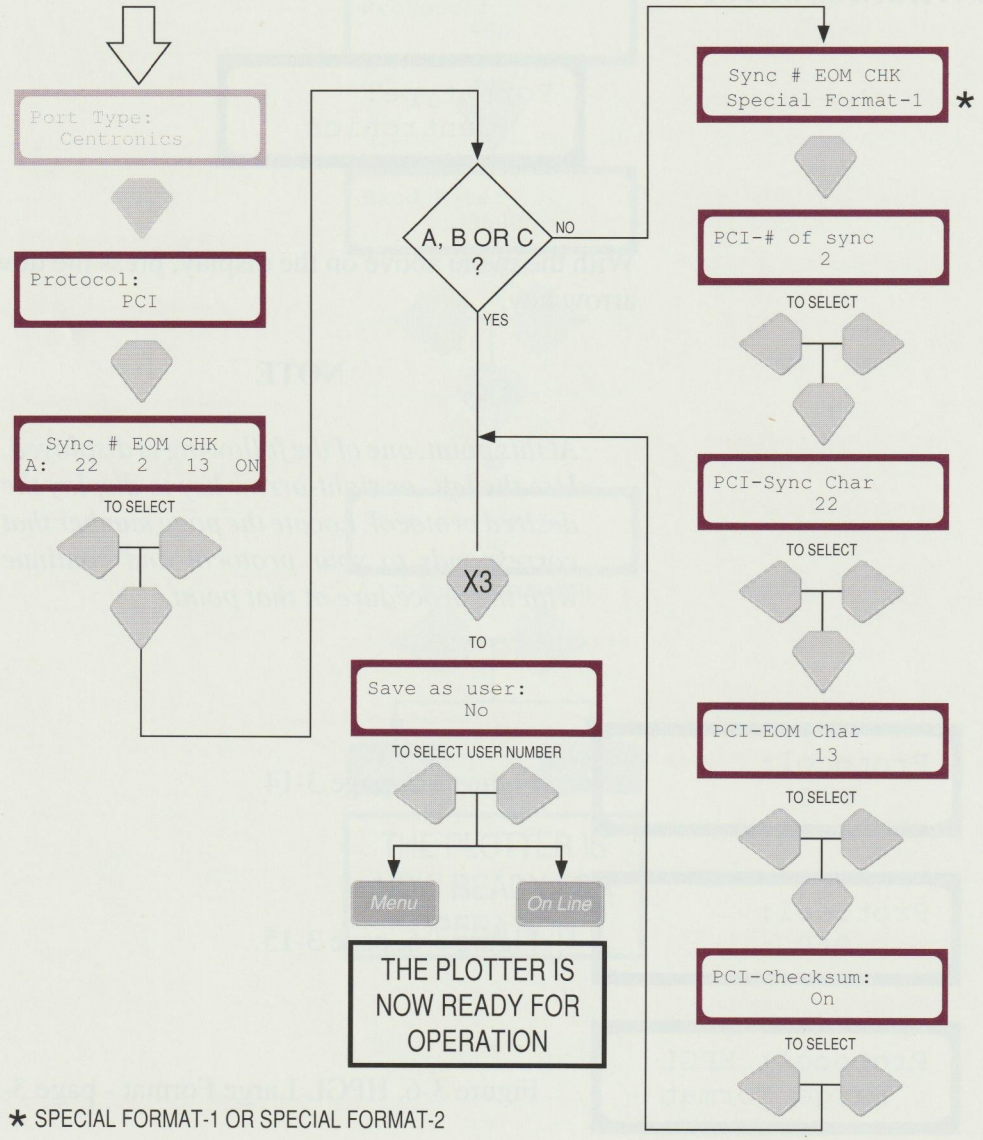


Figure 3-5. Centronics Port PCI Protocol Setup

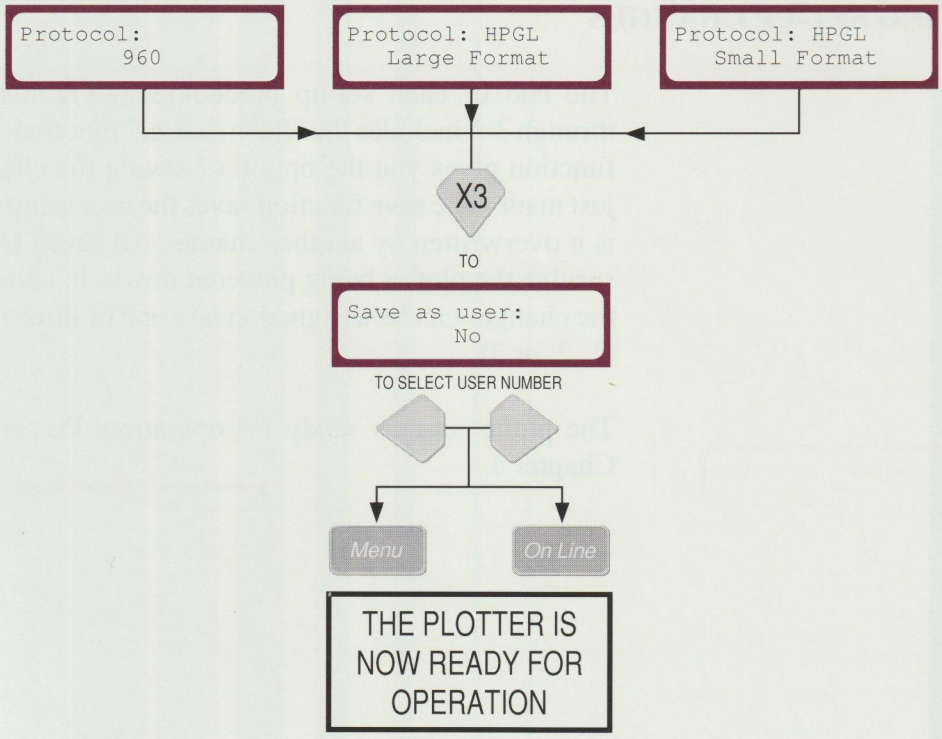


Figure 3-6. Centronics Port 960 or HPGL Protocol Setup

SAVING SET-UP CHANGES

The end of each set-up procedure in Figures 3-2 through 3-6 includes the "Save as user" function. This function gives you the option of saving the changes just made. The save function saves the user setup until is it overwritten by another change. All saved setups survive the plotter being powered down. In addition, the changes can be assigned to any one of three users (1, 2, or 3).

The plotter is now ready for operation. Proceed to Chapter 4.

Chapter Four

PACESETTER

Operations

CHAPTER 4

OPERATIONS

INTRODUCTION

This chapter describes the use of the control panel and all basic plotter set-up operations.

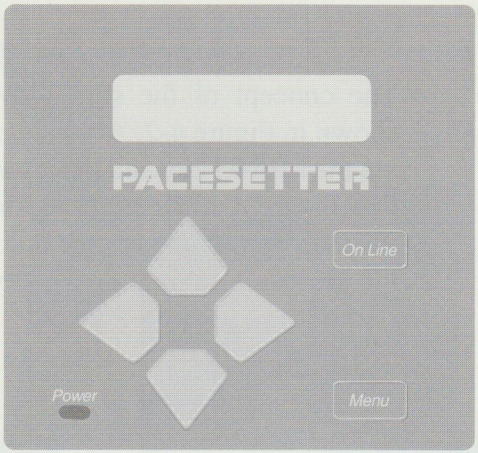
The Pacesetter has two main modes of operation:

- Online
- Manual

A brief tutorial is provided to familiarize you with both modes. A description of the features offered to you by the single-level menu is provided. Detailed procedures are also provided for those features which require several steps to use.

CONTROL PANEL

The control panel and the switch and indicator functions are described in Figure 4-1. The control panel has two main functions: a liquid crystal display (LCD) to inform you of plotter status, and a single-level menu structure to set the configuration of the plotter.



On Line	Toggle On Line/Manual Start media loading cycle Exit Menu
Menu	Enter Menu tree Toggle Menu/Manual (media loaded) Toggle Menu/load media display (media unloaded) Only functional key when media is unloaded
	Scroll Menu item selections Move drum or media in Manual mode
	Scroll Menu item parameter selections Move pen carriage in Manual mode
Power	Lit to indicate power is on

Figure 4-1. Control Panel

MENU STRUCTURE

The concept of the single-level menu structure is shown in Figure 4-2. All menu items can be accessed via the MENU key and the up- and down-arrow keys. See Figure 4-3. Once the desired menu item is displayed, the parameters for that item can be changed via the left- and right-arrow keys. See Figure 4-4.

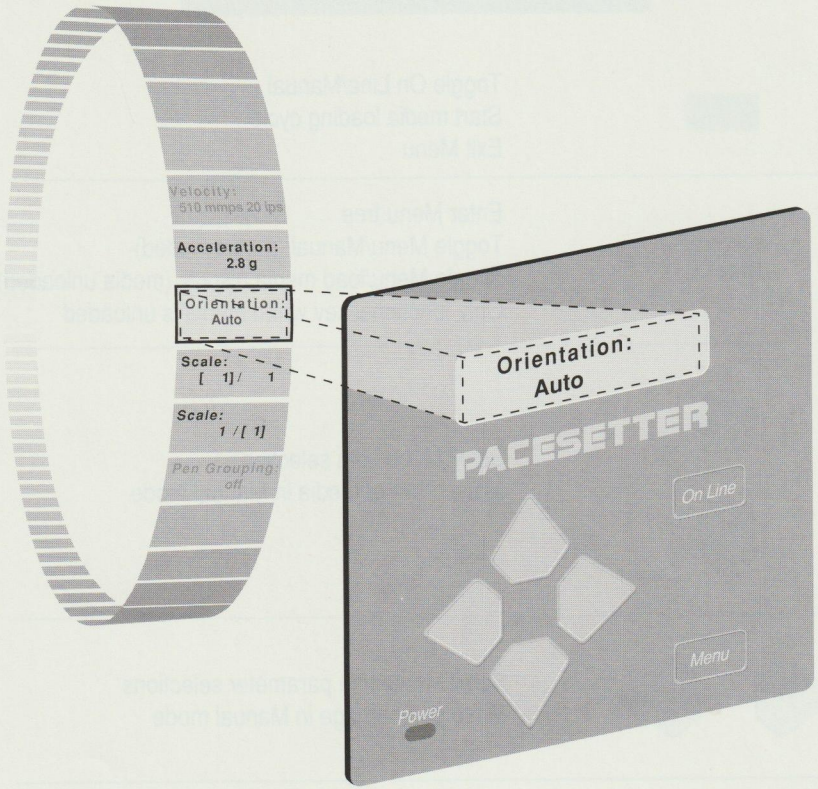


Figure 4-2. Menu Concept

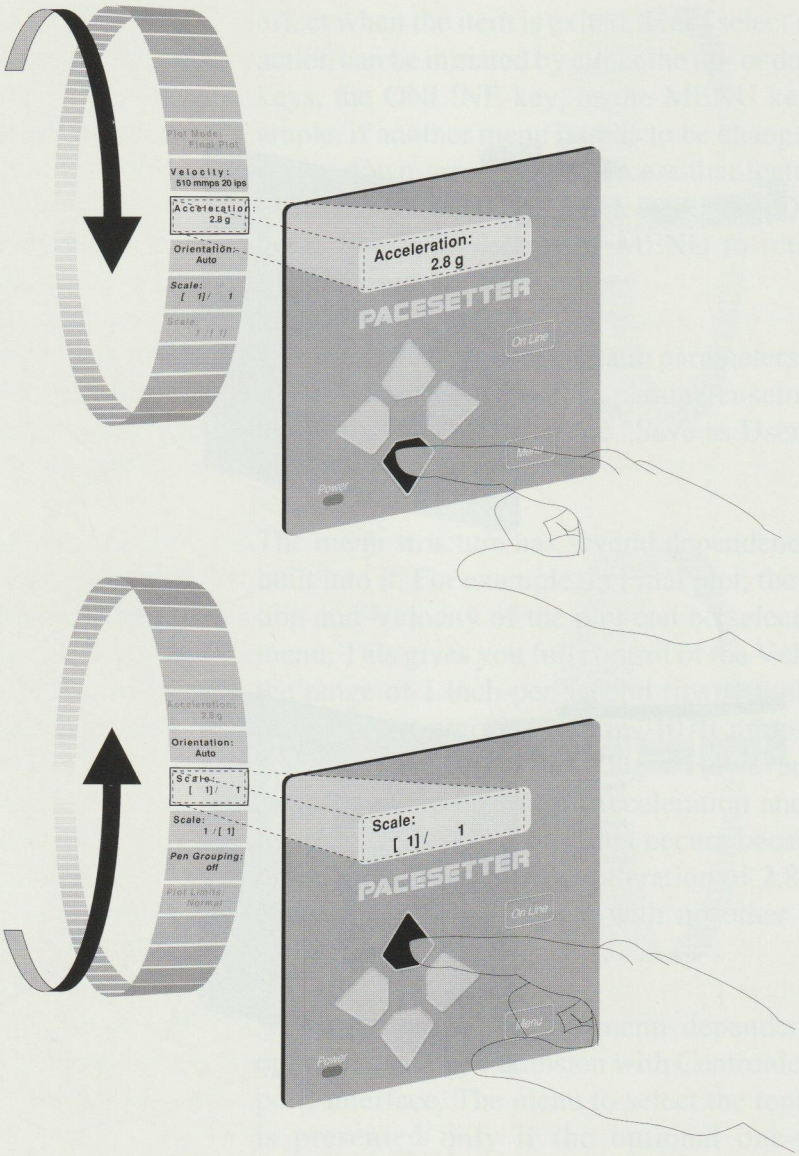


Figure 4-3. Use of Up- and Down-Arrow Keys in Menu

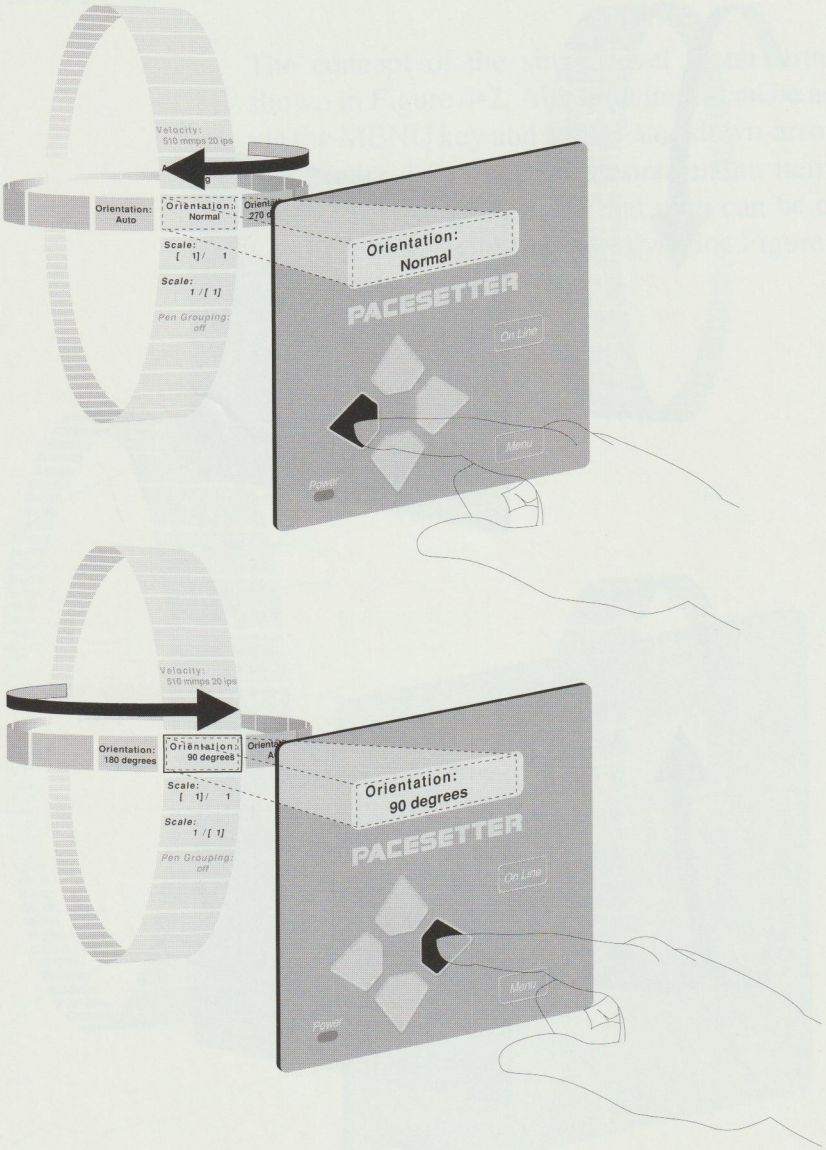


Figure 4-4. Use of Left- and Right-Arrow Keys in Menu

The selected item and associated parameter are in effect when the item is exited. This "select upon exit" action can be initiated by either the up- or down-arrow keys, the ONLINE key, or the MENU key. For example, if another menu item is to be changed, use the up- or down-arrow key to access that feature. If this is the last parameter to be selected, press ONLINE to go to the Online mode or MENU to return to the Manual mode.

The plotter returns to the default parameters whenever it is powered up, unless the parameter setup is saved to a User Number using the "Save as User Number" menu item.

The menu structure has several dependency features built into it. For example, in Final plot, the Acceleration and Velocity of the plot can be selected via the menu. This gives you full control of the Velocity over the range of 1 inch-per-second (ips)/10 millimeters-per-second (mmps) to 42 ips/1070 mmps and Acceleration from 0.7 g's to 2.8 g's. However, in Quick plot, the menu drops the Acceleration and Velocity features from the menu. This occurs because Quick plot is performed at an acceleration of 2.8 g's and a default velocity of 42 ips with no other selections allowed.

Another example of the menu dependency is the optional memory expansion with Centronics (parallel port) interface. The menu to select the replot feature is presented only if the optional one-megabyte memory is installed in the plotter. The same is true for the Centronics port menu. The Centronics port menu also only appears as a part of the plotter configuration setup when the option is installed.

OPERATING CONVENTIONS

- When Online, pressing any key places the plotter in Manual mode.

- The directional arrow keys can be used in Manual mode to position the pen carriage.

- A host communication character is displayed whenever the plotter is Online AND data is being transferred to the plotter from the host computer. The host communication character is located on the display midway between the word Online and plot timer numbers. This single-character location is active during data transfers from the host to the plotter. This host communication character informs the user if the host data is being received and understood by the plotter.

  When this character position alternates between a **+** and *****, the host data is being received and understood by the plotter. When this character position alternates between a **-** and **?**, the host data is not understood by the plotter. The communication protocol should be checked and reset if necessary at both the host computer and plotter. The plot data should be resent after communication is established. This character position is blank when data is not being received.

- A "Plot was clipped" message is displayed on the bottom line of the display during any plot where the plotter has been asked to plot beyond the plot limits. This can be caused by an incorrect point of origin or the wrong scale factor.

- The parameter shown on the control panel display is selected whenever the up-arrow key, the down-arrow key, the ONLINE key, or the MENU key is pressed. Pressing any of these keys places the displayed parameter in effect and overrides any previous selection made by that user. EXERCISE CAUTION WHEN BROWSING THROUGH THE MENU.

- All menu items ending with a colon (:) have a list of available parameters. This list ranges from the simple Yes or No parameters available with the Plot Manager feature to the 107 increments of Velocity available when setting

Final plot velocity. The left- and right-arrow keys move through the available parameters. The desired velocity is displayed and the up-arrow, down-arrow, ONLINE, or MENU key causes the displayed value to be selected for use.

- Parameter changes that affect the appearance of a plot or communication between the host and the plotter are not allowed to be changed once the plot has started. This notice is presented on the second line of the control panel display as "Plot in progress." The plot data must be cleared before any changes can be made.

- The plotter can store the set-up parameters for up to three users. It is recommended that a record of user numbers and associated parameters be maintained. Appendix E is designed for this purpose. This allows users quick access to different setups for different application packages.

- When long parameter lists (such as scale factor) are scrolled by holding down the left- or right-arrow key, the parameter changes slowly at first. If the key is held longer, the parameter changes faster.

- The origin is changed to a new origin only after the pen carriage reaches the old origin. Manual movements not reaching the present origin are ignored for purposes of origin selection.

- When media is advanced such that the trailing edge is no longer beneath the left pinch roller housing, a cycle is initiated to verify the media is still present. Every five seconds the plotter automatically cycles the media beneath the pinch roller housing to trigger the media sensor located there. This is done to confirm the loaded condition.

- All pens are loaded into the turret. No pens should be manually placed into the pen carriage.

- The plotter goes into the View mode after five seconds of nonuse. The View mode is defined as pen returned to turret, pen carriage to the parking location, and media all the way toward the front of the plotter. The plotter remains Online and begins plotting when data is received.

TUTORIAL

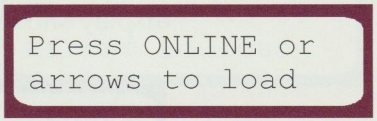
This tutorial is intended to familiarize you with the operation of the Pacesetter plotter.

Most features of the Pacesetter are implemented simply by finding the menu item and exiting with the selected parameter displayed. Exiting is done with the up- arrow key, the down-arrow key, the ONLINE key, or the MENU key. Examples of the various ways to exit a parameter menu display are as follows:

- Use the up- or down-arrow key to put that parameter in effect and go on to the next desired menu item.
- Use the ONLINE key to return to Online mode after all setups are finished. This is typically done when ready to plot data from the host computer.
- Use the MENU key to go to Manual mode after all setups are finished. This is typically done if a change of origin is desired before going Online and plotting.

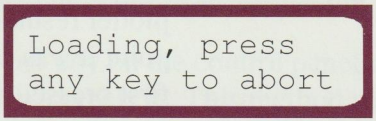
The Online mode is normally used to plot data from the host. This is the mode in which the plotter actually plots data. However, for purposes of this tutorial, it is not necessary to connect and communicate with the host. Follow the procedure on the next page.

1. Ensure that the plotter is powered on and pens and media have been inserted into the plotter in accordance with Chapter 1. The display shows:



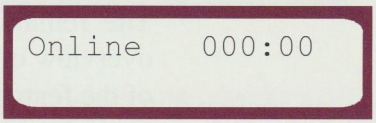
Online Mode

2. Press the ONLINE key. As the media size and friction are sensed by the plotter, the display shows:



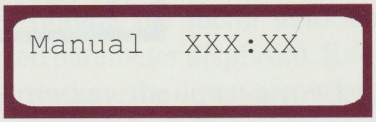
Any key on the control panel can be used to stop the load cycle. This method was chosen to allow quick intervention in the event of misaligned media or similar circumstances.

3. After the media is sized, the pen carriage obtains a pen from the pen turret and moves to the point of origin. The display shows:



If the host computer sent plot data, the plotter begins plotting and displays the plot time (in seconds) to indicate the time the plotter is busy drawing the plot.

4. To halt a plot in process, press the ONLINE or MENU key. Either key places the plotter in Manual mode, returns the pen to the pen turret, and moves the media all the way forward. The display shows:



The XXX:XX in the above display represents the time the plotter was busy drawing the plot. This time is held until the plot is continued or aborted.

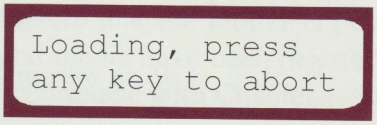
5. Press the ONLINE key to continue plotting. The plotter resumes plotting with the same pen at the point it was plotting when the ONLINE key was first pressed.

6. Press the ONLINE key to place the plotter in Manual mode, then press the MENU key again to enter the menu structure. To abort the plot, use the down-arrow key to display the Clear plot data feature and the right-arrow key to display the Yes parameter. Exit with the ONLINE key, the MENU key, or the up- or down-arrow key to clear the data.

   The remainder of this procedure provides an overview of the Manual mode and a description of the features available.

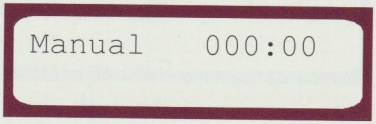
7. Ensure that the media and pens have been loaded in accordance with Chapter 1. The display shows:

8. Press any arrow key. As the media size and friction are sensed by the plotter, the display shows:



Any key on the control panel can be used to stop the load cycle. This method was chosen to allow quick intervention in the event of misaligned media or similar circumstances.

9. After the media is sized, the pen carriage returns to the parking location, the media is moved all the way forward, and the display shows:



10. At this point two options are available:

- move the pen carriage using the directional arrows
- scroll the menu structure using the MENU key and directional arrows

11. Pressing any of the arrow keys causes the pen carriage to move to the point of origin. This is the point on the media when the pen carriage is positioned when the plotter is placed Online.

    At this time, the directional arrow keys **do not** control the direction of pen carriage movement. Control of pen carriage direction is returned to the arrow keys after the pen carriage reaches the origin point. Refer to the Manual mode operations, Setting Point of Origin, page 4-18.

    NOTE

    If an arrow key is pressed in error at this time, press the ONLINE key twice rapidly to clear the errant movement. This action returns the pen carriage to the parking location.

12. Pressing the MENU key when the plotter is in Manual mode causes the display to show:

    ```
    Menu-Use arrow
    keys to change
    ```

    The up- or down-arrow keys are used to scroll through the menu items and the left- or right-arrow keys are used to scroll through each item's parameters. Refer to the Manual mode operations starting on page 4-19 for a complete description of menu items available.

Placing the Plotter Online

Online operations can be selected in two ways: 1) Prior to sizing the media, and 2) From any of the Manual or menu displays. Both methods are described here.

Prior to sizing media

This method is selected when all the communications and plotter parameters have already been established and you are ready to obtain a plot.

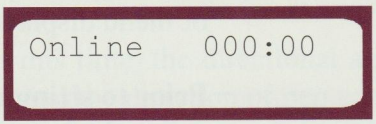
1. Ensure that the plotter is powered on and pens and media have been inserted into the plotter in accordance with Chapter 1. The display shows:

```
Press ONLINE or
arrows to load
```

2. Press the ONLINE key. As the plotter senses the media size and friction, the display shows:

```
Loading, press
any key to abort
```

3. After the media is sized, the pen carriage obtains a pen from the pen turret, moves to the point of origin, and the display shows:



4. The plotter is now Online waiting for plot data from the host. If the following has been performed properly, the host should start to send plot data and the plotter should start to draw the plot.

   - Pens properly loaded (Chapter 1)
   - Plotter connected to host (Chapter 2)
   - Plotter communications parameters set (Chapter 3)
   - Host applications software loaded and operating correctly

5. As the plotter draws the plot, the time display is incremented each second the plotter is busy. When the plot is removed from the plotter, the plot time is reset to 000:00.

NOTE

The plot time display is incremented only when the plotter is actively engaged in producing the plot. The plot timer shows when the last move was made.

From the menu

Placing the plotter Online from the menu, after the media has been sized, is simply a matter of selecting the last parameter and pressing the ONLINE key. The plotter positions the pen over the point of origin, awaiting plot data.

Interrupting a Plot

There are two ways to interrupt a plot:

- Press the ONLINE key
- Press the MENU key

Pressing either the ONLINE or the MENU key toggles the plotter to Manual mode. This returns the pen to the pen turret and moves the media all the way forward.

The plot time display is not incremented while the plot is interrupted.

To continue the plot, press the ONLINE key. The plot continues with the same pen from the point where it was interrupted. The plot time display is incremented.

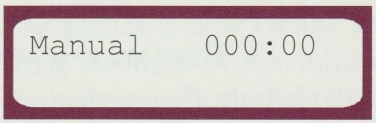
Enter the menu structure by pressing the MENU key while the plotter is in Manual mode.

To abort the plot, enter the menu, then use the arrow keys to access the "Clear plot data" item. Select the Yes parameter using the left- or right-arrow key. Exit this display using the up- or down- arrow, ONLINE, or MENU key.

SETTING POINT OF ORIGIN

1. Insert media, lower both pinch rollers, and press any arrow key.

2. After the media is sized, the pen carriage returns to the parking location, the media moves all the way forward, and the display shows:



3. Press any arrow key. Regardless of the arrow direction of the key used, the pen carriage moves to the existing point of origin. This is the point on the media where the pen carriage is positioned when the plotter is placed Online.

   At this time, the directional arrow keys **do not** control the direction of pen carriage movement. Control of pen carriage direction is returned to the arrow key after the pen carriage reaches the existing point of origin.

4. Use the arrow keys to position the pen carriage to the new point of origin.

5. Press the ONLINE key. The new point of origin is now set.

MENU FEATURES

The remainder of this chapter describes the menu structure and its various options. Most of the menu items do not require a rigid procedure in order to specify the parameter. If you are not familiar with the menu structure and operating conventions, please review the beginning of the chapter and the tutorial.

Most features of the Pacesetter are implemented simply by finding the menu item, selecting the correct parameter, and exiting with the parameter displayed. Exiting is done with the up-arrow key, the down-arrow key, the ONLINE key, or the MENU key. Examples of the various ways to exit a parameter menu display are as follows:

- Use the up- or down-arrow key to put that item in effect and go on to the next desired menu item.
- Use the ONLINE key to return to Online mode after all setups are finished. This is typically done when ready to plot data from the host computer.
- Use the MENU key to go to Manual mode after all setups are finished. This is typically done if a change of origin is desired before going Online and plotting.

When needed, procedural steps are included to guide you through the menu items.

The following menu items can be found within the menu structure. The description of each item is in the order listed below.

- Plot Status
- Clear Plot Data
- User Number
- Plot Mode
  - Final plot
  - Quick plot
  - Final-large plot
- Velocity
- Acceleration
- Orientation
- Scale
- Set or display form alignment
- Pen Grouping
- Plot Limits
- Plot Manager
- Language
- End of Plot Timer
- Save as User Number
- Internal Plot
- Set or Display P1 or P2

Plot Status

This is a display-only feature of the menu that shows the plot status and statistics.

Parameters: Plotting, Complete, Canceled
HPGL/PCI/960
Xsize=0 to 9999.9 mm
Xsize=0 to 999.9 in.
Ysize=0 to 9999.9 mm
Ysize=0 to 999.9 in.

Default: Plotting, Complete, Canceled

Clear Plot Data

This feature is used to clear all plot data, cancel the plot in progress, or replot data. The Clear all data menu feature empties the plotter of all plot data and initiates a five second data-flush period. That is, if the input data lines to the plotter are active with data, this data is flushed out of the plotter until the data lines are inactive for five seconds. The Replot data display, which allows the plot to be redrawn without having to be sent from the host again, is present only when the optional memory expansion is installed. After using the Clear all data feature, plot data must be sent before the Replot feature is functional. The Cancel plot menu feature cancels the plot in progress. The Cancel plot selection does not clear the plot data from the optional memory, so the plot data is still available for replot.

Parameters: No, Clear all data, Cancel plot, Replot data

Default: No

User Number

This feature assigns a set of plot parameters, including the host communications protocols, to a user. These user parameters are in effect until the plotter is powered down. To permanently save the parameters, use the "Save as User Number" feature described on page 4-34. The "Save as User Number" has certain restrictions which are fully explained on page 4-34.

Parameters: 1, 2, 3

Default: 1

Plot mode

Final plot

This mode allows you to set the velocity and acceleration of movements with the pen down to meet the plotting requirements. The Final plot defaults are a velocity of 510 mmps/20 ips and an acceleration of 2.8 g's.

Quick plot

The quick plot mode sets the velocity and acceleration to the maximum (1070 mmps/42 ips and 2.8 g's). This mode is used to produce check plots or whenever a plot is needed that does not require the highest plot quality. The velocity and acceleration menu displays are dropped from the menu when Quick plot mode is selected. This occurs because Quick plot is performed only at the plotter maximums.

Final-large plot

This mode allows you to set the velocity and acceleration of all movements (pen up or down) and is used

to correct tracking problems caused by humidity, temperature, or media thickness variations. These type of problems typically appear on large media plots, e.g., "E" size with long media movements. The Final-large plot mode of the Pacesetter changes the speed of media movement. In this mode, the speed of media movement is set such that the acceleration and velocity limits selected in the Final plot mode are enforced at all times. The net effect of these changes is to slow media movement and increase tracking accuracy.

Use of this mode should be restricted to those plots that cannot be accurately produced in any other mode. The Final-large plot mode reduces throughput; the actual reduction is determined by the vector combinations plotted. Typical throughput reduction on a 25-minute plot is less than ten percent.

Parameters: Final plot, Quick plot, Final-large plot

Default: Final plot

Velocity

Final velocity is the speed at which high quality plots are drawn. This feature allows you to balance plot quality versus throughput requirements. Both millimeters and inches per second are displayed for convenience.

Parameters:10 mmps/1 ips to 1070 mmps/42 ips in 10 mmps increments

Default:510 mmps/ 20 ips

Acceleration

Final acceleration is the acceleration at which high quality plots are drawn. This feature is another component of plot quality and allows you to balance quality versus throughput.

Parameters: 0.7 g, 1.4 g, 2.1 g, 2.8 g

Default: 2.8 g

Orientation

This feature is used to rotationally reorient plots. The plot orientation feature allows you to rotate the plot counter-clockwise in 90-degree increments. Auto orientation places the long dimension of the media along the X axis of the plotter. For example, if Auto is selected and the media is loaded in a landscape fashion (long dimension across the front of the plotter) the plotter rotates the plot by 90 degrees and the origin is moved to the upper right corner.

Each orientation has a different default starting point (the point on the media that the pen carriage is over when the sizing sequence is finished). For Normal orientation (0 degrees or no plot rotation), the default starting point is in the lower right corner. For 90 degrees, the default starting point is on the upper right corner. For 180 degrees, the default starting point is in the upper left corner. For 270 degrees, the default starting point is in the lower left corner.

When the plotter is placed Online, the pen carriage is placed over the default starting point defined by the plot orientation setting.

Parameters: Auto, Normal, 90 degrees, 180 degrees, 270 degrees

Default: Auto

Scale

This feature is used to change the dimension of a plot by changing the scale factor. The scale factor is selected as a fraction with the left number representing the numerator and the right number the denominator. The number enclosed in brackets is the one that can be changed by the left- or right-arrow key. After the numerator is selected, pressing the down-arrow key sets the numerator and shifts the menu display to the denominator field. When setting Scale, holding down the left- or right-arrow key causes the display to scroll slowly though the available range. Holding the key down longer causes the display to move faster.

Parameters: 999 / 1 - 1 / 999

Default: 1 / 1

Set or display form alignment

This feature allows the precise alignment of the plotter X and Y axes to the reference lines on gridded or custom-printed media. The form alignment feature also allows you to compensate for the expansion or contraction of the media due to changes in humidity. The form alignment compensation is limited to plus or minus five degrees from the uncompensated X and Y axes of the plotter.

A sighting device called a reticle is used to precisely locate the alignment points after the media is loaded. A reticle may be ordered as detailed in Appendix B. Two types of reticles are available. Part number 654880-4 is a straight down-view reticle; part number 13112-0016 is a reticle with a 90-degree prism (see Figure 4-5). Personal preference dictates the type chosen.

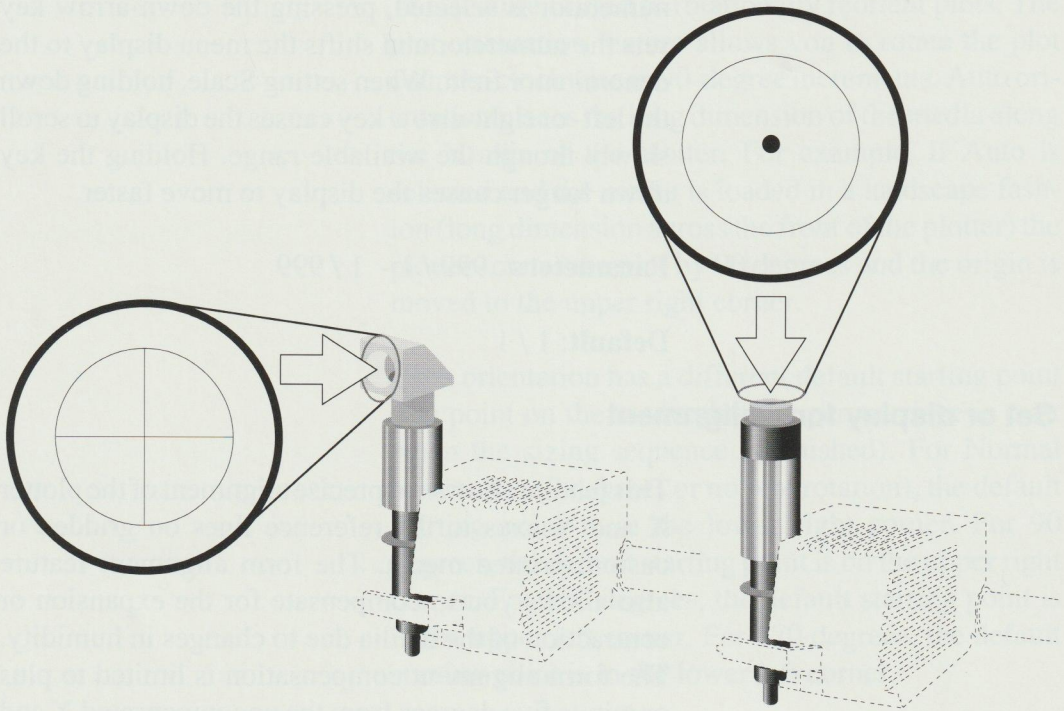


Figure 4-5. Reticles

This procedure requires locating three points on the gridded or form media that are parallel with the X or Y axi s (see Figure 4-6). These alignment points should be as far apart as possible for maximum alignment accuracy. After these three points are selected in the form alignment feature, the plotter rotates the next plot to match the specified coordinate frame.

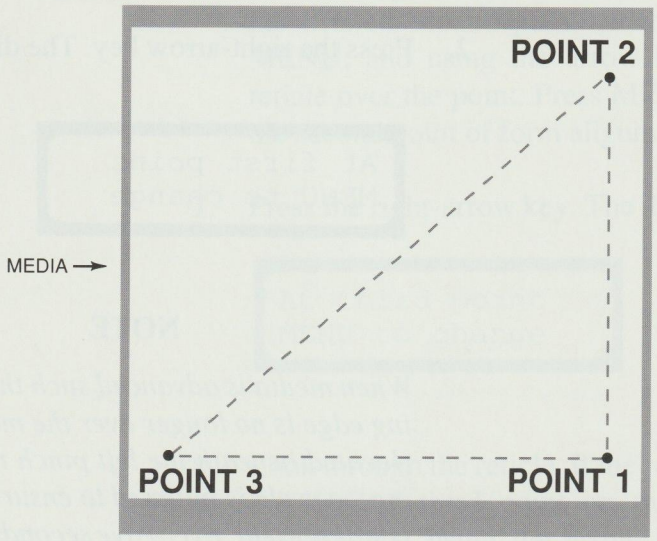


Figure 4-6. Form Alignment Points (Orientation = Normal)

NOTE

The resulting alignment from this procedure is unique to the media loaded. The factors for this procedure are not saved and must be repeated for each new sheet of media.

1. Press MENU and the up- or down-arrow key until the display shows:

```
Set or Display
form alignment
```

2. Press the right-arrow key. The display shows:

```
At first point
MENU to change
```

NOTE

When media is advanced such that the trailing edge is no longer over the media sensor (located beneath the left pinch roller housing), a cycle is initiated to ensure the media is still present. Every five seconds the plotter automatically cycles the media over the media sensor to confirm the loaded condition.

3. Install the reticle into the pen carriage as shown in Figure 4-5. It is made to go into the pen carriage the same way a pen does.

4. Look through the reticle. If the reticle is not over the desired first point on the media, press MENU, and using the arrow keys, move the reticle over the desired first point. Press MENU again to set the first point of form alignment into the plotter.

5. Press the right-arrow key. The display shows:

```
At second point
MENU to change
```

6. Look through the reticle. If the reticle is not over the desired second point on the media, press MENU, and using the arrow keys, move the reticle over the point. Press MENU again to set the second point of form alignment.

7. Press the right-arrow key. The display shows:

```
At third point
MENU to change
```

8. Look through the reticle. If the reticle is not over the desired third point on the media, press MENU, and using the arrow keys, move the reticle over the desired third point. Press MENU again to set the third point of form alignment. The plot image is now aligned to the X or Y axis of the gridded or preprinted media. However, the form alignment feature also allows correction or complensation values to be entered. To enter compensation values, proceed as follows.

9. Press the right-arrow key. The display shows:

```
Press MENU to
set length of X
```

10. Press the MENU key. The display shows the length of the X axis as set in the preceding steps.

```
X = XXXX.XX mms.
    XX.XXX ins.
```

This display and the following steps are used to enter correction factors for the X and Y lengths. This is necessary only when the lengths of the right triangle are known and differ from the displayed values, typically due to media changes.

11. Press the up- or down-arrow key or the MENU key when the correct X-axis length is displayed. the display shows:

```
Press MENU to
set length of X
```

12. Press the right-arrow key. The display shows:

```
Press MENU to
set length of Y
```

13. Press the MENU key. The display shows the length of the Y axis as set in the preceding steps.

```
Y = YYYY.YY mms.
    YY.YYY ins.
```

Use the left- or right-arrow keys to change the Y-axis length.

14. Press the up- or down-arrow key or the MENU key when the correct Y-axis length is displayed. The display shows:

```
Press MENU to
set length of Y
```

15. Press the right-arrow key. The display shows:

```
Press MENU to
clear alignment
```

NOTE

DO NOT *press MENU at this point unless you want to erase all the alignment points just entered and reset the form alignment values to the factory defaults.*

16. Pressing MENU at this point resets the form alignment to the factory default settings - points 1 and 3 at right angles to point 2 (Figure 4-6).

    Press the right-arrow key to establish the form alignment settings as just set and return to the Set or Display alignment menu display.

    If desired, the form alignment settings can be displayed by going to the emnu feature shown in step 1 detailed earlier and pressing the right-arrow key. Each time the right arrow key is pressed, the pen carriage moves to the form alignment point in effect at this time.

17. Remove the reticle.

Pen Grouping

Pen grouping allows the plotter to treat a group of pens as one pen number. This feature uses each pen to draw for 100 meters. At the 100 meter point, the active pen is automatically exchanged for the next pen in the same group. Grouping pens in this fashion helps to eliminate missing lines due to a pen running out of ink in the middle of a plot. Instead, all pens in a group run out of ink more or less simultaneously.

There is no counting of cycles or interrupting plotting after all pens in a group have been used for 100 meters; the plotter restarts the cycle with the first pen in the group. The distance each pen has plotted starts accumulating when pen grouping is enabled. The plotter resets the accumulated pen grouping distances to zero when the plotter is powered up, each time media is loaded, and whenever the plotter is placed in Manual

mode. The operator should periodically check the pens to ensure that they are not out of ink. The available pen grouping selections are Off, 2 pens in group, 4 pens in group, or 8 pens in group. The default is Off.

Pen Grouping Turret Loading

When pen grouping is selected, the turret must be loaded according to the pen grouping selected. Table 4-1 shows the order the pens should be loaded into the turret.

Table 4-1. Pen Grouping Turret Positions

Group Size	Turret Loading
2 pens in group	Pens 1 and 2—1st color Pens 3 and 4—2nd color Pens 5 and 6—3rd color Pens 7 and 8—4th color
4 pens in group	Pens 1 through 4—1st color Pens 5 through 8—2nd color
8 pens in group	Pens 1 through 8—same color
Off	As desired

From an applications software point of view, all pen turret positions within a given pen group are considered as one pen number. Pen number commands are treated as modulo pen groups. Basically, in modulo pen group selection, the input pen number command is repeatedly divided by the number of groups. The remainder is the effective pen grouping selection number. Refer to the following examples, however, note that in these examples it is assumed that the pen turret is fully loaded.

Parameters: Off, 2 pens in group, 4 pens in group, 8 pens in group

Default: Off

Example 1. Pen Grouping - 2 pens in group selected (4 groups)

Input pen number command	Pen group selected
1	1
2	2
3	3
4	4
5	1
6	2
7	3
8	4

Example 2. Pen Grouping - 4 pens in group selected (2 groups)

Input pen number command	Pen group selected
1	1
2	2
3	1
4	2
5	1
6	2
7	1
8	2

Example 3. Pen Grouping - 8 pens in group selected (1 group)

Input pen number command	Pen group selected
1	1
2	1
3	1
4	1
5	1
6	1
7	1
8	1

Plot Limits

The plot limits define the area of the plot image. The limits are shown in Figure 4-7.

In either Normal or Expanded plot limits, the origin or 0,0 point remains at the default location. The origin is not automatically moved into the expanded plot limit area when Expanded plot limits is selected. If a change of origin is desired, the origin must be manually moved into the expanded plot area using the arrow keys. This new origin setting, in the expanded plot area, is in effect until the media is removed. Refer to page 4-18 for a complete description of Setting Point of Origin.

Parameters: Normal, Expanded

Default: Normal

CAUTION

Continued use of Expanded Plot Limits can cause contamination of the pinch rollers by running over wet ink. Frequent cleaning of the pinch rollers is essential to prevent deterioration.

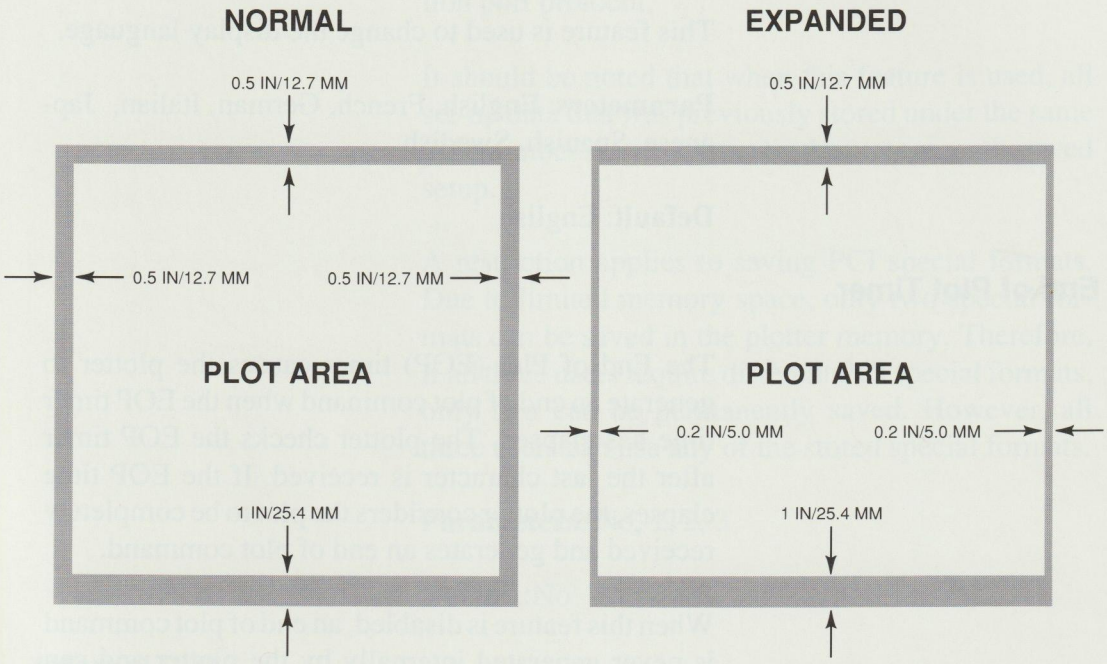


Figure 4-7. Plot Limits

Plot Manager

This feature is used to minimize plot time by optimizing pen movement and pen exchanges when drawing a plot.

Parameters: Yes, No

Default: Yes

Language

This feature is used to change the display language.

Parameters: English, French, German, Italian, Japanese, Spanish, Swedish

Default: English

4

End of Plot Timer

The End of Plot (EOP) timer causes the plotter to generate an end of plot command when the EOP timer time has elapsed. The plotter checks the EOP timer after the last character is received. If the EOP time elapses, the plotter considers the plot to be completely received and generates an end of plot command.

When this feature is disabled, an end of plot command is never generated internally by the plotter and can result in an infinite wait, no timeout.

Parameters: 30 Seconds, 1 Minute, 2 Minutes, Disabled

Default: 30 Seconds

Save as User Number

This feature allows you to assign a user number to the plotter setup and save it permanently in the plotter memory. If this feature is not used, current setups are in effect only until the plotter is powered down. In order for the setup to survive a power down, the setup must be saved to a user number using this feature.

All parameters are saved, including the communication port protocol.

It should be noted that when this feature is used, all set-up data that was previously stored under the same user number is overwritten by the most recently saved setup.

A restriction applies to saving PCI special formats. Due to limited memory space, only two special formats can be saved in the plotter memory. Therefore, if all three users require different PCI special formats, only two can be permanently saved. However, all three users can use any of the stored special formats.

Parameters: No, 1, 2, 3

Default: No

Internal Plot

This feature is used to plot either of the two internally stored plots: the Demonstration plot or the Input Monitor Dump (IMD) plot.

The Demonstration plot and the procedures for producing this plot are given in Chapter 1. The Input Monitor Dump plot is a diagnostic tool. The procedure for producing this plot is given in Chapter 7.

Parameters: Off, Demonstration, IMD

Default: Off

Set or Display P1 or P2

This feature is active only if HPGL has been selected as the communications format (Chapter 3) and the plot has not been started (no data present). Use this feature to do the following:

- Display the existing P1/P2 points
- Reset to the default P1/P2 points
- Set new P1/P2 points

The P1/P2 default positions are located 15 millimeters inside the normal or expanded plot limits in both the X and Y axes as shown in Figure 4-8.

If the plot orientation is changed, the P1/P2 points are set to their default positions, which are rotated with the X and Y axes.

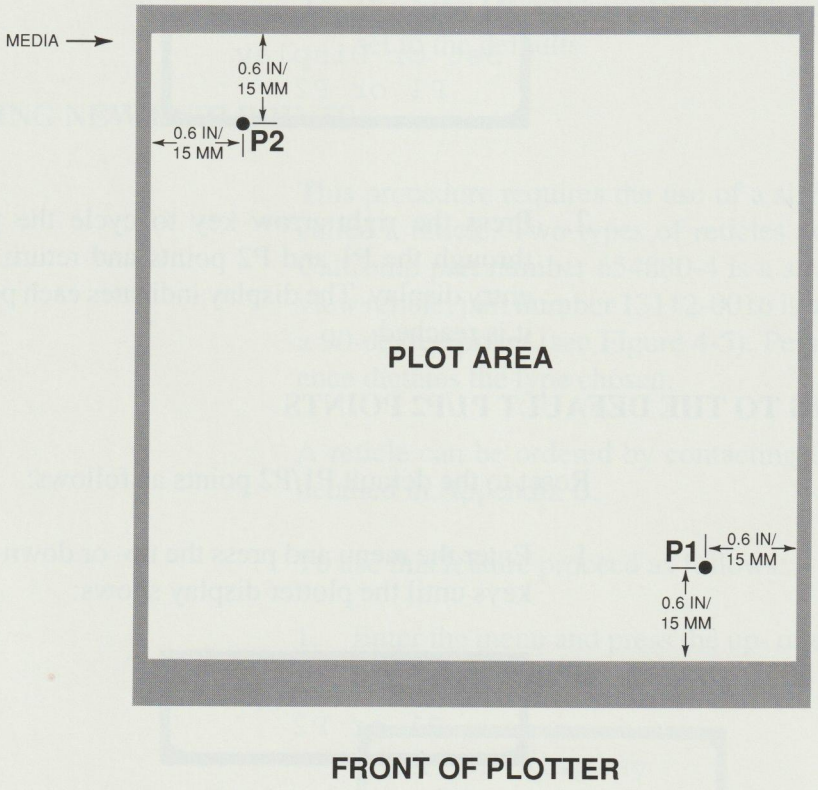
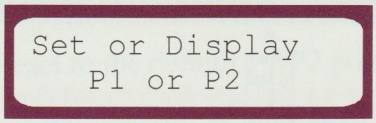


Figure 4-8. HPGL P1/P2 Default Points (Orientation = Normal)

DISPLAYING THE EXISTING P1/P2 POINTS

Display the existing P1/P2 points as follows:

1. Enter the menu and press the up- or down-arrow keys until the plotter display shows:

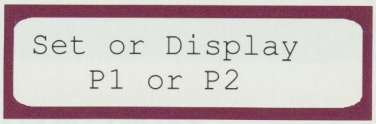


2. Press the right-arrow key to cycle the plotter through the P1 and P2 points and return to the entry display. The display indicates each point as it is reached.

RESETTING TO THE DEFAULT P1/P2 POINTS

Reset to the default P1/P2 points as follows:

1. Enter the menu and press the up- or down-arrow keys until the plotter display shows:



2. Press the right-arrow key until the display shows:

```
Use MENU to set
P1/P2 to default
```

3. Press the MENU key. The P1/P2 points are now set to the defaults.

SETTING NEW P1/P2 POINTS

This procedure requires the use of a sighting device called a reticle. Two types of reticles are available. CalComp part number 654880-4 is a straight down-view reticle; part number 13112-0016 is a reticle with a 90-degree prism (see Figure 4-5). Personal preference dictates the type chosen.

A reticle can be ordered by contacting CalComp as detailed in Appendix B.

To use this feature proceed as follows:

1. Enter the menu and press the up- or down-arrow key until the display shows:

```
Set or Display
   P1 or P2
```

2. Press the right-arrow key. The plotter moves the pen carriage and the display shows:

```
At P1 position
MENU to change
```

NOTE

When media is advanced such that the trailing edge is no longer beneath the left pinch roller housing, a cycle is initiated to ensure the media is still present. Every five seconds the plotter automatically cycles the media beneath the pinch roller housing to trigger the media sensor located there. This is done to confirm the loaded condition.

3. Press MENU, then load the reticle into the pen carriage as shown in Figure 4-5. It is made to go into the pen carriage the same way a pen does.

4. Using the directional arrow keys, move the reticle to the approximate location of P1. Look through the reticle and use the directional arrow key to precisely position the reticle at the P1 point. Press MENU to set the new P1 point.

NOTE

At this point in the procedure, the P1 point can be reset again if it is not at the precise location. Press MENU and follow the display prompts to reset the P1 point.

5. Press the right-arrow key. The plotter moves the pen carriage, and the display shows:

```
At P2 position
MENU to change
```

6. Press MENU, and using the directional arrow keys, move the reticle to the approximate location of P2. Look through the reticle and use the directional arrow key to precisely position the reticle at the P2 point. Press MENU to set the new P2 point.

NOTE

At this point in the procedure, the P2 point can be reset again if it is not at the precise location. Press MENU and follow the display prompts to reset the P2 point.

7. Press the right-arrow key. The display shows:

```
Use MENU to set
P1/P2 to default
```

8. Pressing MENU at this point resets the P1/P2 points to the default settings. Pressing the right-arrow key at this point leaves the P1/P2 points as just set and returns to the "Set or Display P1 or P2" display.

9. The new P1/P2 points are now set. If desired, the P1/P2 settings can be displayed by going to the menu feature shown in step 2 detailed earlier and pressing the right-arrow key. Each time the right-arrow key is pressed, the pen carriage moves to the point in effect at this time.

10. Remove the reticle.

Chapter Five

PACESETTER

Pens and Media

CHAPTER 5

PENS AND MEDIA

INTRODUCTION

This chapter describes the pens and media recommended specifically for use with the Pacesetter plotter. Tables provide the following information:

- Pen types and characteristics
- Media types and characteristics
- Cut-sheet media standards
- Pen/media combinations for specific applications
- Recommended pen speed for a given pen type

In addition, a procedure is provided at the end of this chapter for changing the turret pen caps.

CAUTION

Do not use double-sided gloss media (clay coat, chrome coat, etc.) on Pacesetter plotters. When using single-sided gloss media (clay coat, chrome coat, etc.), exercise extreme caution to ensure that the gloss or coated side is always up. Failure to observe either of these precautions could result in complete clogging of the grit drum.

CalComp plotter pens and media are designed to provide optimal pen life, plot quality, and plotter performance. For a complete listing of plotter supplies, refer to the following literature packed with the plotter.

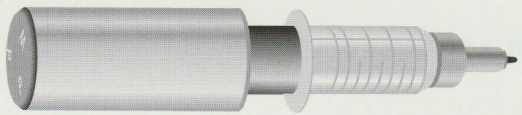
- Pacesetter Graphic Supplies Guide (for North America only) Order No. G0235-SUP

PEN TYPES

Table 5-1 lists Pacesetter pen types, line widths, and associated characteristics. The plotter uses the following disposable pen types:

- Liquid ball - **XLB** series
- Fiber tip - **XFF, XBF** series
- Liquid ink - **XL, XT** series

XLB-LIQUID BALL



XFF-FINE FIBER TIP
XBF-BROAD FIBER TIP

XL-LIQUID INK (PAPER)
XT-LIQUID INK (FILM)

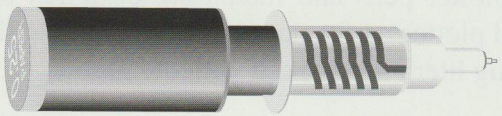


Figure 5-1. Pen Types

Table 5-1. PEN TYPES

Type	Line Width*			Characteristics
	Size	in	mm	
Liquid Ball XLB	Medium	0.012	0.30	1. Disposable 2. Inexpensive 3. Dense line 4. Good reproduction quality 5. High speed
Fiber Tip XFF	Fine	0.019	0.49	1. Disposable 2. Fine lines 3. Vivid colors 4. Excellent business graphics
Fiber Tip XBF	Broad	0.029	0.73	1. Disposable 2. Good for area fills 3. Vivid colors 4. Excellent business graphics
Liquid Ink XL	Ex Fine Fine Medium Broad	0.010 0.014 0.020 0.028	0.25 0.35 0.50 0.70	1. Disposable 2. No maintenance 3. Inexpensive 4. For paper/vellum only
Liquid Ink XT	Ex Fine Fine Medium Broad	0.010 0.014 0.020 0.028	0.25 0.35 0.50 0.70	1. Disposable 2. No maintenance 3. Inexpensive 4. For polyester film only

* Nominal

MEDIA TYPES

Table 5-2 lists Pacesetter media types and associated characteristics; Tables 5-3—5-5 list cut-sheet standards. The following media types can be used:

- Translucent
- Bond
- Vellum
- Polyester film (double matte)

Table 5-2. MEDIA TYPES

Type	Description
Translucent	Often called lightweight 15-pound bond, it is both economical and easy to use. Because of its translucency, this paper is suitable for good blueline reproduction.
Bond	An economical paper for preliminary drawings and check plots. Because of its opaqueness and high contrast, bond is excellent for photo reproductions.
Vellum	Resin impregnated, it is designed to have the best combination of stability, translucency, and ink acceptance. Vellum provides excellent blueline reproductions.
Polyester Film 3D DM (3 mil)	Double matte for plotting on either side. It possesses very high dimensional stability regardless of changes in temperature and humidity. This film is recommended for close-tolerance, high-accuracy applications such as overlays and master archival copies. It has excellent translucency and does not tear, crack, peel, or fade under normal use.

Table 5-3. ANSI CUT-SHEET STANDARDS

Sheet Size	Dimensions vert	x	horz	Borders vert	horz	Image Area width	x	length
A (horz)	8.5 in. 216 mm	x x	11.0 in 279 mm	.25 in	.38 in	8.00 in	x	10.24 in
A (vert)	11.0 in 279 mm	x x	8.5 in 216 mm	.38 in	.25 in	10.24 in	x	8.00 in
B	11.0 in 279 mm	x x	17.0 in 432 mm	.62 in	.38 in	9.76 in	x	16.24 in
C	17.0 in 432 mm	x x	22.0 in 559 mm	.50 in	.75 in	16.00 in	x	20.50 in
D	22.0 in 559 mm	x x	34.0 in 864 mm	1.00 in	.50 in	20.00 in	x	33.00 in
E	34.0 in 864 mm	x x	44.0 in 1118 mm	.50 in	1.00 in	33.00 in	x	42.00 in
F	28.0 in 711 mm	x x	40.0 in 1016 mm	.50 in	.50 in	27.00 in	x	39.00 in

Table 5-4. ISO CUT-SHEET STANDARDS

Sheet Size	Dimensions vert x horz	Borders	Image area width x length
A0	841 mm x 1189 mm 33.1 in x 46.8 in	20 mm	801 mm x 1149 mm
A1	594 mm x 841 mm 23.4 in x 33.0 in	20 mm	554 mm x 801 mm
A2	420 mm x 594 mm 16.5 in x 23.4 in	10 mm	400 mm x 574 mm
A3	297 mm x 420 mm 11.7 in x 16.5 in	10 mm	277 mm x 400 mm
A4	210 mm x 297 mm 8.3 in x 11.7 in	10 mm	190 mm x 277 mm

Table 5-5. ARCHITECTURAL STANDARDS

Sheet Size	Dimensions vert x horz
1	9 in x 12 in 229 mm x 305 mm
2	12 in x 18 in 305 mm x 457 mm
3	18 in x 24 in 457 mm x 610 mm
4	24 in x 36 in 610 mm x 914 mm
5	30 in x 42 in 762 mm x 1067 mm
6	36 in x 48 in 914 x 1219 mm

MEDIA STABILIZATION

Relative humidity is the biggest single factor affecting plot tracking and accuracy when plotting on larger sheets of paper media. Paper, which is made of wood or cotton fibers, is not a stable material. Paper is made by mixing water and pulp, along with other additives, that are processed until the desired moisture content is achieved. Variations in humidity and temperature cause paper to expand or contract due to moisture in the air. Changes in humidity and temperature have a big effect on stability of the paper and accuracy of the plotted drawings. A safe, general rule is that the paper changes less than one percent in a plotting environment of 40 to 60 percent relative humidity and a temperature of 65 to 75°F (18 to 24°C).

CalComp paper media is packaged at between 45 and 55 percent relative humidity. If the plotter environment relative humidity is between 45 and 55 percent, the exposed sheet of media generally stabilizes in 15 minutes or less. If tracking problems exist during plots on larger size paper media, check the relative humidity in the plotter environment. If the relative humidity is not between 45 and 55 percent, humidity control or media conditioning is required. If the relative humidity is not between 40 and 60 percent, media handling problems are very likely to occur. Consult your local heating and air conditioning expert for recommendations.

A good method of conditioning paper media is to expose individual sheets horizontally, out of the cellophane wrapper, in the same environment as the plotter for 48 to 72 hours before use. Generally, this

is sufficient time for the paper media to stabilize to the humidity of the surrounding environment.

Polyester film is a polymeric material. Variations in humidity and temperature have very little effect on its stability and permanence. Polyester film offers the highest stability and accuracy for plotting. Film is excellent for drawings requiring precision and long-term storage.

PENS/MEDIA COMBINATIONS

Table 5-6 lists the pen/media combinations by specific applications. The applications are listed at the top of the table and the pens/media are listed at the left side of the table. Recommended pen/media combinations are indicated by an "X." For specific details on pens and media, refer to Tables 5-1 or 5-2.

Table 5-6. PENS/MEDIA COMBINATIONS

Application / Pen/Media	Checkplots, good reproduction quality (Bond ,Trans)	Business graphics, pie charts borders (Bond, Trans)	Final drawings (Vellum)	Final drawings (Polyester Film)	Blueline or reproduction (Paper, Vellum)	Blueline or reproduction (Polyester Film)
XLB Liquid Ball	X					
XFF Fiber Tip		X				
XBF Fiber Tip		X				
XL Liquid Ink			X		X	
XT Liquid Ink				X		X
Translucent	X	X			X	
Bond	X	X				
Vellum			X		X	
Polyester Film				X		X

PEN SPEED

Table 5-7 lists the pen parameters for each pen type. The default parameters are listed with the recommended maximum limit. The Check Plot speed default is fixed at the plotter maximum. To draw the highest quality plot, set the pen speed at the lower end of the range. To draw many plots of lesser quality, set the pen speed to the higher end of the range. To change speed, refer to Chapter 4, Operations.

Table 5-7. PLOT SPEED

	VELOCITY			ACCELERATION		
Pen Type	**Check Plot Default**	**Final Plot Default**	**Final Plot Maximum***	**Check Plot Default**	**Final Plot Default**	**Final Plot Maximum***
Fiber Tip XFF, XBF	Do Not Use	Do Not Use	10 ips 260 mmps	Do Not Use	Do Not Use	2.8g's
Liquid Ball XLB	42 ips 1070 mmps	20 ips 510 mmps	42 ips 1070 mmps	2.8g's	2.8g's	2.8g's
Liquid Ink XL2, XL3 XT2, XT3	42 ips 1070 mmps	20 ips 510 mmps	42 ips 1070 mmps	2.8g's	2.8g's	2.8g's
XL4, XT4	Do Not Use	20 ips 510 mmps	42 ips 1070 mmps	Do Not Use	2.8g's	2.8g's
XL5, XT5	Do Not Use	Do Not Use	15 ips 390 mmps	Do Not Use	Do Not Use	2.8g's

ips = inches per second
mmps = millimeters per second
* = recommended maximums

TURRET PEN CAPS

The plotter is shipped with eight pen caps installed in the pen turret. Pen caps prevent the ink in the pens from drying out or evaporating when the plotter is not in use.

There are two types of pen caps; each type of cap is identified by its color.

- Blue or red - for fiber tip and liquid ball pens

If fiber tip or liquid ball pens are loaded into the turret, they must have blue pen caps installed to operate properly.

- Black - for liquid ink pens

If liquid ink pens are loaded into the turret, they must have black pen caps installed to operate properly.

CAUTION

Failure to match the pen caps to the type of pens loaded into the turret could result in pens leaking or drying out in the turret.

To load the pen caps or change pen caps, refer to Figure 5-2 and proceed as follows:

1. If necessary, remove existing pen caps from the pen cap holder.

2. Position the new pen cap against the pen cap holder pen. Push the pen cap into the groove between the holder brackets until the pen cap is held by the brackets.

3. Coax the pen cap into place using a ballpoint pen against the side of the pen cap. This operation may be easier if the spring beneath the pen cap mechanism is moved out of the way.

4. Ensure the cap holder brackets fit snugly into the pen cap groove.

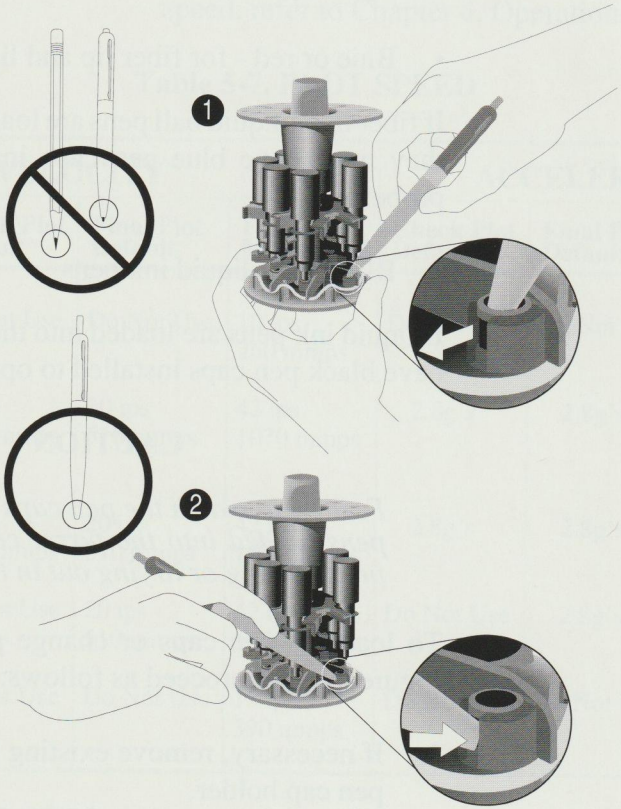


Figure 5-2. Turret Pen Caps

Chapter Six

PACESETTER

Maintenance

CHAPTER 6

MAINTENANCE

INTRODUCTION

This chapter includes procedures for cleaning the plotter, grit drum, and pinch rollers.

CLEANING THE PLOTTER

Plotter maintenance is limited to a thorough cleaning. All other maintenance must be performed by qualified service personnel. Periodically clean the plotter as follows:

1. Wipe the plotter surface with a lint-free cloth dampened very lightly with warm water. Do not use abrasive cleaners, cleaning solvents, or strong detergents. They can damage the surface of the plotter and its moving parts.

2. Wipe all dust and dirt from the pen carriage rails.

3. Wipe dust and dirt from the stand and base of the stand.

4. Use a cloth lightly moistened with water to clean the platen and pinch rollers. If the pinch rollers need a thorough cleaning, refer to the procedure on page 6-4.

5. Use several strong breaths to blow any accumulated dirt and media residue from beneath the left pinch roller housing.

6. Remove the pen caps from the turret and clean them with a cotton swab and water; replace any worn or cracked pen caps.

CLEANING THE GRIT DRUM

1. Turn the plotter off and position the pen carriage away from the area to be cleaned.

2. If the area to be cleaned is on the right, position the right pinch roller over the area of the grit drum to be cleaned. The left pinch roller is fixed in place. This procedure is used to clean the area beneath either pinch roller.

3. With the pinch roller up, slide an 8- to 10-inch length of tape, **sticky side down**, beneath the pinch roller and pinch roller housing as shown in Figure 6-1. One suggested tape is Highland™ 3M 6200 Permanent Mending Tape — a similar tape may work fine. However, masking tape does not work well.

4. Lower the pinch roller to trap the tape against the grit drum.

5. Raise the tape, and while holding the free ends of the tape away from the platen, slide the tape back and forth at least three inches, causing the grit drum to rotate.

6. Repeat as necessary to remove all residue from the grit drum.

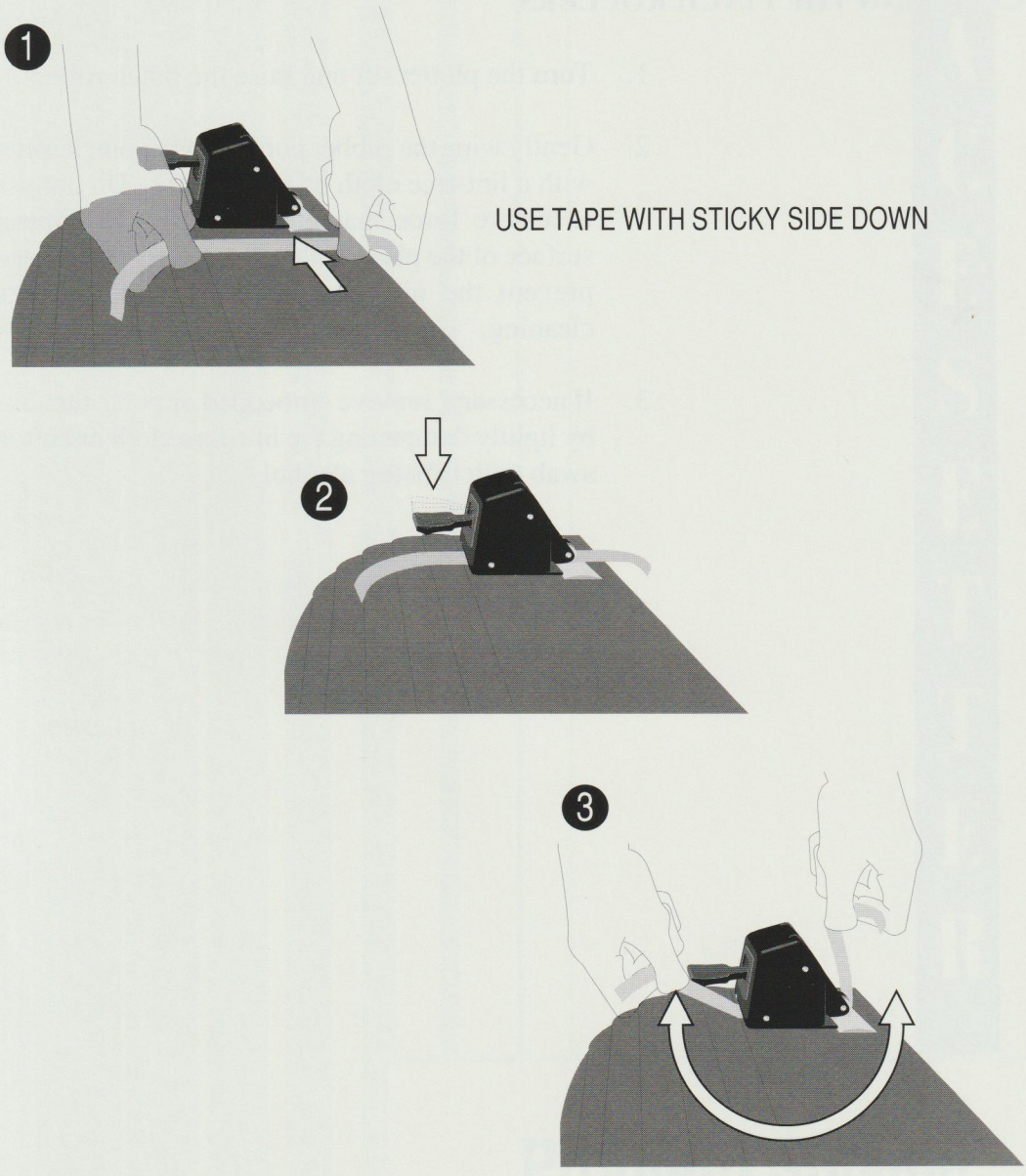


Figure 6-1. Grit Drum Cleaning

CLEANING THE PINCH ROLLERS

1. Turn the plotter off and raise the pinch rollers.

2. Gently wipe the rubber portion of the pinch roller with a lint-free cloth or cotton swab. Do not use excessive force that might abrade the contact surface of the pinch roller. Use finger pressure to prevent the pinch roller from rotating while cleaning.

3. If necessary, remove embedded or persistent dirt by lightly dampening the lint-free cloth or cotton swab with rubbing alcohol.

Chapter Seven

PACESETTER

Problem Solving

CHAPTER 7

PROBLEM SOLVING

INTRODUCTION

This chapter serves as a guide to help correct some of the most common day-to-day problems. The chapter is divided into the following areas:

- Nonoperational solutions
- Operational solutions
- Plot quality solutions
- Supplies solutions
- Host communications solutions
- Diagnostic information

NONOPERATIONAL SOLUTIONS

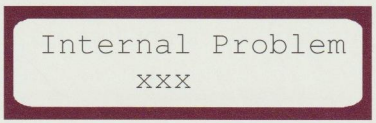
Plotter Does Not Operate

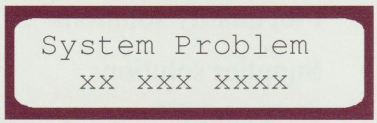
1. Does the plotter turn on?

   Yes — Go to step 2.

   No — Go to step 3.

2. Are any of the following error messages displayed?





Yes — Cycle the power switch off and on to see if the problem is of a permanent nature.

Ensure the voltage select switch is set properly (Refer to Chapter 1 for information on setting the voltage selector). If problem persists, call for service as listed in Appendix B.

No — Call for service as listed in Appendix B.

3. Check the following items:

   - Voltage selector is set to match wall outlet voltage.
   - Power cord is properly plugged into plotter and wall outlet.
   - Wall outlet voltage is proper level.
   - Plotter power fuse in voltage selector module is not blown. See Figure 1-2 for fuse location.
   - If the plotter still does not turn on, call for service as listed in Appendix B.

OPERATIONAL SOLUTIONS

These problems occur during operation and are usually caused by some mechanical problem or failure of some operation. Those error messages bounded by circular arrows are scrolled on the bottom line of the control panel display. These messages are scrolled until operator intervention occurs.

The error message is presented first, followed by a recommended action. If the recommended action does not produce a solution, call for service as listed in Appendix B.

Please check drum/media	There is an obstruction to the carriage or drum, or a plotter malfunction has been sensed. Correct the problem and press any key to continue.
Please check carriage/turret	
↻ Please install pens ↻	The plotter does not sense a pen in the pen carriage or the turret. Remove the turret and install at least one pen. Replace the turret.
Check line voltage select	The plotter detects a problem with the operating voltage. Refer to Figure 1-2 to set the input voltage selector to match the input line voltage.

Remove reticle or pen from carriage

The plotter senses a pen or reticle in the pen carriage and eight pens in the turret. Remove the extra pen or reticle. Press any key to continue.

Retry Failure

This message applies only to pen operations. The plotter has attempted to pick up or return a pen to the pen turret five times unsuccessfully. Removing the pen turret and reinstalling it on the spindle usually corrects the problem. Press any key to continue.

Load aborted, media problem

During the media load sequence, the plotter sensed a media problem or the media was not within the size limits. Maximum media length is 64 inches/1626 mm. Minimum media length is 8.27 inches/210 mm. Remove the media and verify that it is within the size range specified for the plotter. Replace media, lower both pinch rollers and start the media sizing sequence.

Plot was clipped

During the plot in process, the plot exceeded the current limits, that is, the plotter has been asked to plot outside the current media. After the plot is finished or canceled, put the plotter in Manual mode (offline) to clear this message.

IMD needs more media

During an Input Monitor Dump (IMD) operation, the output data requires an additional sheet of media to complete the dump. Load another sheet of media, press any arrow key to load, select IMD again using the menu, and press the ONLINE key to continue.

Please check pen turret

The plotter does not sense the presence of the pen turret. Please install the pen turret, or check that the turret is seated in the plotter by rotating it half a turn.

PLOT QUALITY SOLUTIONS

Use this section if the line quality of the plots is not satisfactory.

1. Are the correct pens and media being used as recommended in Chapter 5?

   Yes — Go to step 2.

   No — Use correct pens and media combinations.

2. Is media movement restricted?

   Yes — Move the plotter to an open area where media movement is not obstructed. Run the plot again. If the problem persists, go to step 3.

   No — Go to step 3.

3. Are lines of uneven quality?

   Yes — Remove the turret and examine the pens. Replace any damaged or dried-out pens. Run the plot again. If the problem persists, go to step 4.

   No — Go to step 4.

4. Are lines drawn with uneven widths or are they smeared?

   Yes — Reducing pen speed can improve line quality. Check the Final Plot velocity and acceleration setup in accordance with Chapter 4. Run the plot again. If the problem persists, go to step 5.

   No — Go to step 5.

5. Does the ink flake off the media?

   Yes — If the media has been treated with a cleaning powder or other compound, the ink may be adhering to this powder. Load new media and run the plot again.

   No — Go to step 6.

6. Are you using CalComp-supplied media and pens?

   Yes — If the plot quality is still not satisfactory, refer to Chapter 5 and ensure that the correct pens and media are being used for the application being performed.

   No — CalComp media and pens are designed to work with the plotter to produce sharp, clear lines.

SUPPLIES SOLUTIONS

Use this section if pens are not lasting as long as you would expect, or if media tears during plotting.

Pens Dry in the Turret

It is important to note that in dry climates, ink dries more rapidly than in humid climates. In dry climates, more care must be taken to cap pens.

1. Are pens capped after use?

   Yes — Go to step 2.

   No — Pens that remain in the turret over long periods of time tend to dry out. Remove fiber tip pens from the turret and cap them if the pens are not going to be used for several days. Remove liquid ink pens and cap them if they are not going to be used in the next 12 hours.

2. Remove the turret and examine the rubber pen caps. Are any of the pen caps damaged, worn, or loose?

   Yes — Press loose pen caps into place. If any pen caps are damaged or missing, replace them with new caps: black caps for liquid ink; blue or red caps for liquid ball or fiber tip.

   No — May be an isolated occurrence.

Media Tears During Plotting

1. Is a recommended pen and media combination being used?

   Yes — Go to step 2.

   No — Refer to Chapter 5, Pens and Media.

2. Are the edges of the media curled?

   Yes — Load the media with curled edges down. Run the plot again.

   No — Go to step 3.

3. Remove the turret and examine the pens. Are pen tips damaged or is the pen tip fully seated?

   Yes — Replace any damaged pens and/or fully seat pen tips into the reservoir.

   No — Go to step 4.

4. Is the plot drawn with many closely spaced lines?

   Yes — Use a stronger plotting media and/or change pen parameters to allow ink time to dry before additional lines are drawn.

   No — Ensure high-quality media is being used.

HOST COMMUNICATIONS SOLUTIONS

The error messages shown below are scrolled on the bottom line of the control panel display. This scrolling effect is indicated by the circular arrows on either side of the message. These messages are scrolled until operator intervention occurs.

↻ Communications error ↻

↻ 907/PCI/CCGL Command error ↻

↻ 960 Command error ↻

↻ HPGL Command error ↻

1. Are any of the messages in the left column displayed?

   Yes — Press any key to clear the message and send the plot from the host again. Go to step 2.

   No — Go to step 3.

2. Does the problem persist?

   Yes — Check the host communications set-up parameters in Chapter 3 and reconfigure the parameters if necessary.

   No — May be an intermittent problem.

3. A possible bad cable or connection exists between the plotter and host computer. Check the cable and connections. Does the problem persist?

   Yes — Go to step 4.

   No — Possible bad cable or connection.

4. Disconnect the cable connection between the plotter and the host computer and run the plotter demo plot. Is the demo plot OK?

   Yes — The plotter is OK. Check out the host computer and the applications software.

   No — The plotter has a problem. Call for service as listed in Appendix B.

DIAGNOSTIC INFORMATION

The following procedures can be used if diagnostic information is requested during a service call. Two types of information can be obtained from these procedures:

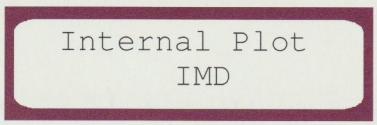
- Input Monitor Dump (IMD)
- Firmware Revision Level

Input Monitor Dump (IMD)

This feature prints the host communications set-up parameters and the plot data on plot media. The plot data is printed in hexidecimal and ASCII format and may occupy more than one sheet of media, depending upon the amount of plot data.

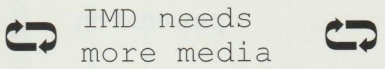
To use this feature, load media and suitable pens and proceed as follows:

1. Display the Internal Plot page of the menu.
2. Press the left-arrow key twice. The following is displayed:



3. Press the ONLINE key. The following occurs:
   a. The plotter prints the host communications parameters for the current user number.
   b. Plot data is sent from the host. The plotter prints the data.

4. If it is necessary to print more than one page of plot data, the following is scrolled on the display:



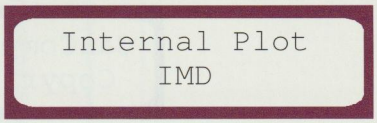
5. At this time, raise the pinch rollers and replace the existing media with a new sheet of media (subsequent page).

6. Press any arrow key to size and load the media.

7. After the media is sized and loaded, press the MENU key.

8. Press the up-arrow key to reach the Internal Plot page of the menu.

9. Press the left-arrow key twice. The following is displayed:



10. Press the ONLINE key. The plotter continues printing IMD data.

Firmware Revision Level

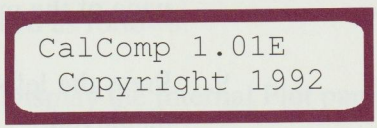
The revision level of the firmware residing in the plotter is displayed briefly each time the plotter is powered on.

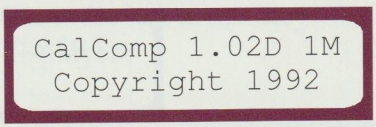
To find and record the firmware revision level, proceed as follows:

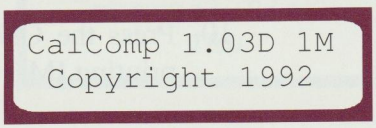
1. Have pencil and paper at hand.

2. Power off the Pacesetter.

3. Power on the Pacesetter and observe the CalComp copyright display. The numbers and letters that appear to the right of CalComp are what you need. Several typical examples are given below.







4. Repeat as required to record the complete information.

PACESETTER

Appendices

APPENDIX A

SPECIFICATIONS

	2024	2036
MEDIA WIDTH	ANSI A, B, C, D ISO A4, A3, A2, A1 Architectural 1, 2, 3, 4	ANSI A, B, C, D, E ISO A4, A3, A2, A1, A0 Architectural 1, 2, 3, 4, 5, 6
MAX MEDIA SIZE	25.1 x 36.0 in 635 x 914 mm	36.0 x 47.0 in 914 x 1194 mm
MAX PLOT AREA	24.7 x 34.5 in 627 x 876 mm	35.6 x 45.5 in 904 x 1155 mm
MAX MEDIA LENGTH	64 in/1626 mm	64 in/1626 mm
PLOT MARGINS	**Normal**	**Expanded**
Top of Media:	0.5 in/12.7 mm	0.5 in/12.7 mm
Left and Right Side of Media:	0.5 in/12.7 mm	0.2 in/5.0 mm
Bottom of Media:	1.0 in/25.4 mm	1.0 in/25.4 mm

PERFORMANCE

Resolution:	0.0005 in/.0125 mm, 2032 steps per inch
Acceleration:	2.0 g on axis, 2.8 g at 45° diagonal
Speed:	30 ips/762 mmps on axis, 42 ips/1077 mmps at 45° diagonal
Repeatability:	0.004 in/.01 mm, maximum deviation (single pen)
Accuracy:	0.1% of move or .01 in/0.254 mm, whichever is greater

A

PENS

Number of pens:	8
Pen Types:	Liquid ball (XLB Series) .012 in/.30 mm
	Liquid ink, for polyester film (XT Series) .010 in/.25 mm, .014 in/.35 mm, .020 in/.50 mm, .028 in/.70 mm
	Liquid ink, for paper vellum (XL Series) .010 in/.25 mm, .014 in/.35 mm, .020 in/.50 mm, .028 in/.70 mm
	Fiber tip, fine (XFF Series) .019 in/.48 mm
	Fiber tip, broad (XBF Series) .029 in/.74 mm

MEDIA TYPES

Translucent
Bond
Vellum
Polyester film, double matte

A

PHYSICAL DIMENSIONS

	2024	2036
Width:	43.0 in/1092 mm	54.0 in/1372 mm
Height:	44.0 in/1118 mm	50.0 in/1270 mm
Depth (plot head):	11.0 in/280 mm	11.0 in/280 mm
Depth (foot of base):	20.5 in/521 mm	25.3 in/641 mm
Weight:	75.0 lbs/34.1 kg	102.0 lbs/46.4 kg

POWER REQUIREMENTS

All lines single phase, line to neutral.

Voltage:	100-120 VAC, 50-60 Hz, 1.2 amp 220-240 VAC, 50-60 Hz, 0.6 amp
Frequency:	47 to 63 Hz
Current:	0.75 to 1.0 amp, (90 to 132 Vac) 0.40 to 0.6 amp, (180 to 264 Vac)
Power Dissipation:	120 peak watts, 65 watts nominal
Avg. Watts:	90
BTU/hr.:	306 BTU/77 kg-cal average per hour

ENVIRONMENT

Noise:	62 dBa (operating) 55 dBa (power-on idle, fan on)
Temperature	
Storage:	-20° to 158°F/-29° to 70°C
Operating:*	59° to 95°F/15° to 35°C
Humidity:*	20 to 60 percent relative, noncondensing
Altitude:	0 to 8,000 feet/0 to 2,400 m
EDS Immunity:	25 kV (no component damage)

SAFETY

Certification:	UL, VDE, VDE-B, FCC-B, CSA, IEC

*Practical limits are dependent upon media used.

MODELS 2024 AND 2036 STANDARD FEATURES

Eight-pen turret with automatic pen selection and capping
Automatic cut-sheet sizing
Automatic and user-definable pen speed
Pen grouping
Plot Manager firmware
ADI AutoCAD-optimized driver
RS-232C standard interface
PCI, 960, and HPGL format support
Nonvolatile memory for three programmable user setups
32-character LCD control panel
Internal demonstration plot
Package of four liquid ink pens
User's guide
Quick reference guide

OPTIONAL ACCESSORIES

Reticle
Additional pen turret
Memory expansion cartridge with Centronics interface
Memory expansion cartridge with Centronics interface and Kanji character set
HCBS software

INTERNATIONAL POWER CORD CONFIGURATIONS

The international power configuration has a detachable power cord. If the supplied power cord is not compatible with your power outlet, read the following:

- The power cord must have a CEE-22 female connector.

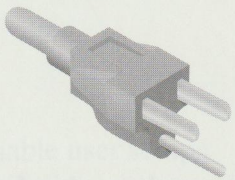
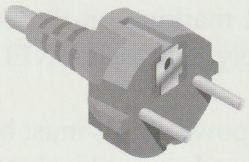
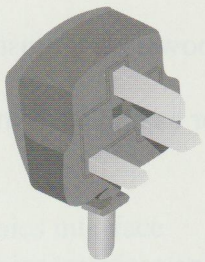
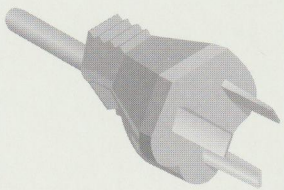
- Power cords used in Europe must be harmonized and designed with an HAR marking on the outside of the cord jacket. This is necessary to comply with the CENELEC Harmonized Document HD-21.

- U.S. power cords must be UL recognized or listed, type SJT, 16/3 AWG (stamped on cord jacket) and CSA certified (labeled on cord jacket).

- Any power cord must also conform to local safety standards.

See Table A-1 for examples of international power cords.

Table A - 1. INTERNATIONAL POWER CORDS

CORD TYPE	AC VOLTAGE	CONNECTOR	CALCOMP PART NO.
U.S. / Canada / Japan NEMA5-15P Male Connector UL Recognized, CSA Certified Cord type SJT 10 Amp, 18/3 AWG 4 meters	110 or 120 VAC 50 or 60 Hz Single-Phase		10124-1040
Continental Europe CEE 7/7 (Schuko) Male Connector Harmonized cord 10 Amp, 1.0mm Sq. 4 meters	220 or 230 VAC 50 Hz Single-Phase		16283-1044
Great Britain BS 1363 Male Connector with 13A ASTA approved fuse Harmonized cord 10 Amp, 1.0 mm Sq. 4 meters	240 VAC 50 Hz Single-Phase		16281-1046
Australia AS3191-1981 & AS3112-1981 Clear Male Connector SECV approved cord 10 Amp, 1.0mm Sq. 4 meters	240 VAC 50 Hz Single-Phase		16282-1045

A

APPENDIX B

OBTAINING SUPPLIES, TECHNICAL SUPPORT, AND SERVICE

Supplies

If you are within the United States, call ***1-800-CALCOMP***. If you are outside the United States, refer to the listing contained in this appendix and contact the office in your area.

Technical Support and Service

If you are within the United States and need technical support, contact the dealer from whom the plotter was purchased. If you require additional assistance, or need to schedule a service appointment, call CalComp at ***1-800-451-7568***. If you are outside the United States, refer to the listing contained in this appendix and contact the office in your area.

When requesting service from a CalComp office, please have the following information available:

- Customer number
- Plotter model number
- Plotter serial number
- Host computer/modem type attached to plotter
- Application software being used
- Media being used
- Dealer from whom the plotter was purchased
- If the warranty has expired, the date the plotter was purchased

Subsidiaries and Affiliates

Australia

CalComp Australia PTY Ltd.
7-9 Bridge Road
Stanmore, NSW, 2048
61 2 550-3933
FAX 61 2 550 6678

580 St. Kilda Road
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FAX 03 525 2343

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FAX (514) 336-5211

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FAX (403) 291-4102

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FAX 04101 2 9071

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Telex 522 929
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Service 8510307
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Telex 19496 blt DK

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P.O. Box 129
00701 Helsinki 70
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Telex 124416 merc sf
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74, Mesogion Avenue
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1 7785950
FAX 1 7798849

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McGrane Computer
Systems Ltd.
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Informatica e Telecomunicacoes
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Telex 18712 Baseld P

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Americas, Middle East, and Pacific Distributors

For the name and address of CalComp product distributors in the following territories/countries, please contact Budde International Inc.

Budde International Inc.
520 North Brookhurst Street
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TELEX: 1561141 BUDDE INC

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American Samoa
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Argentina
Aruba
Bahamas
Bahrain
Bangladesh
Barbados
Belize
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El Salvador
Egypt
Ethiopia
Fiji
Ghana
Grenada
Guadeloupe & Dependencies
Guam
Guinea
Guyana
Guatemala
Haiti
Honduras
India
Indonesia
Israel
Ivory Coast
Jamaica
Jordan
Kenya
Korea (South)
Kuwait
Laos
Lebanon
Liberia
Madagascar
Malawi
Malaysia
Maldives
Martinique
Mauritius
Mexico
Midway Islands
Morocco
Mozambique
Netherlands Antilles
New Caledonia
Nicaragua
Nigeria
Oman
Pacific Islands (Territory of)
Pakistan
Panama
Papua New Guinea
Paraguay
Peru
Philippines
Puerto Rico
Qatar
Sabah
Saint Christopher and Nevis
St. Helena & Dependencies
Saint Lucia
Saint Vincent & The Grenadines
Sarawak
Saudia Arabia
Seychelles
Singapore
Solomon Islands
Sri Lanka
Sudan
Swaziland
Syria
Tahiti
Tanzania
Thailand
Tokelau
Tonga
Trinidad
Tristan Da Cunha
Tunisia
Turkey
Tuvalu
Uganda
United Arab Emirates
Uruguay
Vanuatu
Venezuela
Virgin Islands, U.S.A.
Wake Island
Wallis and Futuna
Western Samoa
West Indies
Yemen
Zaire
Zambia
Zimbabwe

APPENDIX C

HPGL EMULATION

This appendix is a summary of the Pacesetter emulation of the Hewlett-Packard Graphics Language (HPGL) commands.

The Pacesetter is designed to connect to most Hewlett-Packard Graphics Language (HPGL) RS-232C (serial) or Centronics (parallel) sources (software programs). Some HPGL commands are not supported by Pacesetter. These are listed in Tables C-1 (unsupported A features) and C-2 (unsupported B features). The Pacesetter HPGL emulation command set is listed in Table C-3. Table C-3 includes the command symbol, the command operation, the operation type, and its compatibility to HPGL.

Pacesetter has HPGL compatibility with many Hewlett-Packard plotters. However, the Pacesetter responds to the OI command with only two model numbers. In HPGL Large Format (D and E sizes) protocol, the Pacesetter responds with 7595B. In HPGL Small Format (A, B, and C sizes) protocol, the response is 7440. HPGL Large Format origin is in the center of the media. HPGL Small Format origin is in the lower right-hand corner of the media.

Your CAD programs should communicate with the plotter using the appropriate graphics language without your intervention. Very few graphics packages allow you to embed your own commands. Therefore, under most circumstances, you never need to use these graphic commands. The three tables that follow are shown for reference only.

UNSUPPORTED HPGL A FEATURES

Table C-1 lists all HPGL A features not supported by Pacesetter.

Table C-1. UNSUPPORTED HPGL A FEATURES

Digitize Commands	
DC	Digitize Clear
DP	Digitize Point
OD	Output Digitized Point and Pen Status
User-Defined Character Command	
UC	User-Defined Character
Return Character Size and Shape Commands	
IC	Input Character for Sizing
OB	Output Box dimensions of character previously input via IC

C

UNSUPPORTED HPGL B FEATURES

Table C-2 lists all HPGL B features not supported by Pacesetter.

Table C-2. UNSUPPORTED HPGL B FEATURES

Characters	
DL	Down-Loadable Character
CM	Character Selection Mode
DS	Designate Character Set Into Slot
IV	Invoke Character Slot
RS-232C Device Control	
ESC.P	Set Handshake
ESC.Q	Set Monitor Mode
ESC.R	Reset
ESC.S	Output Memory Size
ESC.T	Configure Memory

If you have any other questions about unsupported HPGL features, contact a CalComp Sales and Support Office listed in Appendix B.

Differences Between Pacesetter Emulation and HPGL Command Sets

Some HPGL A features are not emulated exactly by Pacesetter. These differences are:

- The INPUT MASK (IM) command does not affect the Error LED since there is none on the plotter.
- Proportional spacing of text is not supported by Pacesetter. Character sets have similar but not identical shapes. Italic angles cannot exceed 45 degrees.
- The Pacesetter emulation coordinate system is oriented with +X going from center to bottom and +Y going from left to right. Some of Hewlett-Packard plotter coordinates are oriented in the same manner. However, other Hewlett-Packard plotter coordinates are rotated 180 degrees.
- The number of segments in the adaptive dash line may differ by one in some cases.
- There may be differences related to speed, number of pens, and other physical plotter differences.
- After receiving an effective window command, the pen is moved to the MIN position. The pen then moves to the MAX position and returns to the previous position instead of no action of HPGL.
- The following HPGL commands signal the end of plot:

  AF = Advance Full Page

  AH = Advance Half Page

  FR = Advance Frame

  NR = Not Ready

  PG = Page Feed

Pacesetter HPGL Emulation Command Set

Table C-3 lists the HPGL command set for Pacesetter. This table provides information on the operation feature, its command symbol, the type of operation it performs, and its compatibility to HPGL. Compatibility is one of the following:

Compatible	=	The Pacesetter operation is compatible with HPGL.
Different	=	The Pacesetter operation is similar to HPGL; for differences, refer to the prior section, Differences Between Pacesetter Emulation and HPGL Command Sets, and referenced Notes on pages C-10 and C-11.
No-op	=	This operation is not supported.
N/A	=	This operation is not available and the "HPGL command error" message is displayed.

Table C-3. PACESETTER HPGL COMMAND SET

Symbol	Operation	Operation Type	Compatibility
AA	Arc Absolute	Circles, Arc, Polygons	Compatible
AF	Advance Full Page	Plotting w/Roll Media	Different - Note 1
AH	Advance Half Page	Plotting w/Roll Media	Different - Note 1
AP	Auto Pen Pickup	Pen Control & Plotting	No-op
AR	Arc Relative	Circles, Arc, Polygons	Compatible
AS	Acceleration Select	Pen Control and Plotting	No-op
BL	Buffered Label String	Characters	Compatible
CA	Alternate Character Set	Characters	Different - Note 2
CC	Character Chord	Characters	Compatible
CI	Circle	Circles, Arc, Polygons	Compatible
CM	Character Select Mode	Other Character Mode Select	No-op
CP	Character Plot	Characters	Compatible
CS	Standard Character Set	Characters	Different - Note 2
CT	Chord Tolerance	Circles, Arc, Polygons	Compatible
CV	Curved Line Generator	Pen Control	No-op
DC	Digitize Clear	Digitizing	No-op
DF	Default	Device Control	Different - Note 3
DI	Absolute Distance	Characters	Compatible
DL	Down-Loadable Character	Characters	No-op
DP	Digitize Point	Digitizing	No-op
DR	Relative Direction	Characters	Compatible
DS	Character Set in Slot	Other Character Mode Select	No-op
DT	Define Label Terminator	Characters	Compatible
DV	Direction Vertical	Characters	Compatible
EA	Edge Rectangle	Circles, Arc, Polygons	Compatible
EC	Enable Cut Line	Plotting w/Roll Media	No-op
EP	Edge Polygon	Circles, Arc, Polygons	Compatible
ER	Edge Rectangle	Circles, Arc, Polygons	Compatible
ES	Extra Space	Characters	Compatible
ESC.(	Plotter On	RS-232C Device Control	No-op

Table C-3. PACESETTER HPGL COMMAND SET - Continued

Symbol	Operation	Operation Type	Compatibility
ESC.)	Plotter Off	RS-232C Device Control	No-op
ESC.@	Set Plotter Configuration	RS-232C Device Control	Compatible
ESC.A	Output Identification	RS-232C Device Control	Compatible
ESC.B	Output Buffer Space	RS-232C Device Control	Compatible
ESC.E	Output Extended Error	RS-232C Device Control	Compatible
ESC.H	Set Handshake Mode 1	RS-232C Device Control	Compatible
ESC.I	Set Handshake Mode 2	RS-232C Device Control	Compatible
ESC.J	Abort Device Control	RS-232C Device Control	Compatible
ESC.K	Abort Graphics	RS-232C Device Control	Compatible
ESC.L	Output Buffer Size	RS-232C Device Control	Compatible
ESC.M	Set Output Mode	RS-232C Device Control	Compatible
ESC.N	Set Extended Output Handshake	RS-232C Device Control	Compatible
ESC.O	Output Extended Status	RS-232C Device Control	Compatible
ESC.P	Set Handshake Protocol	RS-232C Device Control	N/A
ESC.Q	Set Monitor Mode	RS-232C Device Control	N/A
ESC.R	Reset	RS-232C Device Control	N/A
ESC.S	Output Memory Size	RS-232C Device Control	N/A
ESC.T	Configure Memory	RS-232C Device Control	N/A
ESC.U	End Flush Mode	RS-232C Device Control	N/A
ESC.Y	Plotter On	RS-232C Device Control	No-op
ESC.Z	Plotter Off	RS-232C Device Control	No-op
EW	Edge Wedge	Circles, Arc, Polygons	Compatible
FP	Fill Polygon	Circles, Arc, Polygons	Compatible
FR	Advance Frame	Plotting w/Roll Media	Different - Note 1
FS	Force Select	Pen Control and Plotting	No-op
FT	Fill Type	Circles, Arc, Polygons	Compatible
GC	Group Count	Plotter Information	No-op
GM	Graphic Memory	Memory Management	No-op
GP	Group Pen	Pen Control and Plotting	Compatible

Table C-3. PACESETTER HPGL COMMAND SET - Continued

Symbol	Operation	Operation Type	Compatibility
IM	Input Mask	Program Instructions	Compatible
IN	Initialize	Device Control	Different - Note 3
IP	Input P1/P2	Scale/Window/Rotate	Compatible
IV	Invoke Character Set	Other Character Mode Select	No-op
IW	Input Window	Scale/Window/Rotate	Compatible
KY	Define Key	Pen Control and Plotting	No-op
LB	Label	Characters	Different - Note 4
LO	Label Origin	Characters	Compatible
LT	Line Type	Plot Enhancement	Compatible
NR	Not Ready	Device Control	Different - Note 1
OA	Output Actual Position/Pen	Plotter Information	Compatible
OC	Output Commanded Position/Pen	Plotter Information	Compatible
OD	Digitized Point/Pen	Plotter Information	No-op
OE	Output Error	Plotter Information	Compatible
OF	Output Factors	Plotter Information	Compatible
OG	Output Group Count	Plotter Information	No-op
OH	Output Hard Clip Limits	Scale/Window/Rotate	Compatible
OI	Output Identification	Plotter Information	Compatible
OK	Output Key	Plotter Information	No-op
OL	Output Label Length	Characters	Compatible
OO	Output Options	Plotter Information	Compatible
OP	Output P1/P2	Scale/Window/Rotate	Compatible
OS	Output Status	Plotter Information	Compatible
OT	Output Turret Type	Plotter Information	Different - Note 5
OW	Output Windowing	Scale/Window/Rotate	Compatible
PA	Plot Absolute	Plotting with Variables	Compatible
PB	Print Buffered Label	Characters	Different - Note 4
PD	Pen Down	Plotting with Variables	Compatible

Table C-3. PACESETTER HPGL COMMAND SET - Continued

Symbol	Operation	Operation Type	Compatibility
PG	Advance Full Page	Plotting w/Roll Media	Different - Note 1
PM	Polygon Mode	Circles, Arc, Polygons	Compatible
PR	Plot Relative	Plotting with Variables	Compatible
PS	Page Size	Plotting w/Roll Media	Compatible
PT	Pen Thickness	Circles, Arc, Polygons	Compatible
PU	Pen Up	Plotting with Variables	Compatible
RA	Fill Rectangle Absolute	Circles, Arc, Polygons	Compatible
RO	Rotate Coordinates	Scale/Window/Rotate	Compatible
RR	Fill Rectangle Relative	Circles, Arc, Polygons	Compatible
SA	Select Alternate Set	Characters	Compatible
SC	Scale	Scale/Window/Rotate	Compatible
SG	Select Pen Group	Pen Control and Plotting	Different - Note 6
SI	Absolute Character Size	Characters	Compatible
SL	Character Slant	Characters	Compatible
SM	Symbol Mode	Plot Enhancement	Compatible
SP	Pen Select	Plotting with Variables	Compatible
SR	Relative Character Size	Characters	Compatible
SS	Select Standard Set	Characters	Compatible
TL	Tick Length	Plot Enhancement	Compatible
UC	User-Defined Characters	Characters	No-op
UF	User-Defined Fill Type	Circles, Arc, Polygons	Compatible
VS	Velocity Select	Pen Control and Plotting	No-op
WD	Write to Display	Plotting w/Roll Media	No-op
WG	Fill Wedge	Circles, Arc, Polygons	Compatible
XT	Tick X-Axis	Plot Enhancement	Compatible
YT	Tick Y-Axis	Plot Enhancement	Compatible

NOTES

Note 1 These commands are processed as an End-of-Plot command. A message is displayed and the plotter is in Manual mode. The plotter requires operator intervention to start the next plot.

Note 2 Pacesetter supports the following HPGL character sets:

1. 0 - 5 — Designates Fixed-Space Vector Font (same as Arc Font, but with 22.5 degree character chord tolerance)
2. 10 - 15 — Designates Fixed-Space Arc Font (Variable-Space) is not supported
3. 20 - 25 — Designates Fixed-Space Arc Font
4. 100 & 101 — Designates the two halves of the Kanji character set of Fixed-Space Vector Font

Note 3 These commands provide the same features, but initialize different parameters.

DF; - Sets the carriage return point for labeling instructions to the current pen position, clears the polygon buffer, uses normal hard-clip limits, and resets the plotter to the following conditions:

Function	Equivalent Instruction	Default Condition
Label Buffer	BL CHR$(3)	Cleared
Alternate Character Set	CA0;	Character set 0
Character Chord Angle	CC;	Chord angle of 5
Standard Character Set	CS0;	Character set 0
Chord Tolerance	CT;	Chord angle of 5
Direction Absolute	DI1,0;	Horizontal characters
Label Terminator	DT;	CHR$(3)/**ETX**
Direction Vertical	DV;	Horizontal characters
Extra Space	ES0,0;	No extra space
Fill Type	FT;	Type 1, solid bidirectional fill. Spacing determined by PT instruction. Zero degree angle

Note 3 - continued

Function	Equivalent Instruction	Default Condition
Input Mask	IM;	Recognizes all defined errors
Input Window	IW;	Set to hard-clip limits
Label Origin	LO1;	Standard labeling starting at current location
Line Type	LT;	Solid line
Plotting Mode	PA;	Absolute plotting
Pen Thickness	PT;	0.3 mm
Scaling	SC;	User-unit scaling is off
Character Size Absolute	SI;	Size as follows: Width = 0.285 cm; Height = 0.375 cm
Character Slant	SL;	No slant
Symbol Mode	SM;	Off
Select Standard Set	SS;	Standard set selected
Tick Length	TL;	tp = tn = 0.5% of [P2x - P1x] for X-tick, and 0.5% of [P2y - P1y] for Y-tick
User-Defined Fill	UF;	Solid bidirectional fill

IN; - sets the plotter to the same conditions as the **DF** instruction, plus the following conditions:

Function	Equivalent Instruction	Default Condition
Pen Up	PU;	Raises the pen
Rotate Coordinate System	RO;	Cancels programmatic 90-degree rotation
Input P1 and P2	IP;	Sets P1, P2, and the axis-align point to the X,Y coordinate value set when the hard-clip limts were established

Note 4 Character sets have similar but not identical shapes.

Note 5 Since the Pacesetter does not allow different carousel types, this command always outputs unknown carousel type and all stalls occupied.

Note 6 This command uses the control panel pen grouping selection.

APPENDIX D

USING CDCL

INTRODUCTION

CalComp Device Control Language (CDCL) is a command language that can be used to set the Pacesetter plotter data protocol. The language was designed with the following goals in mind:

1. The command file can be created on any standard text editor.

2. The command file can be transferred to the plotter using standard data transfer protocols.

3. The commands and their parameters are defined using English-like words. The underscore is used in the command as a word separator for ease of recognition.

Some of you may already be familiar with CDCL if you have other CalComp products. Because CalComp product lines vary in capabilities and functionality, not all CDCL commands are applicable to all products. This chapter contains all CDCL commands that can be used with the Pacesetter. At present, only the 960, HPGL, and PCI commands are supported. These commands allow the plotter data protocol to be set from the host computer.

In addition, some commands must be modified slightly to work with a specific product line. This chapter contains the appropriate values and correct syntax for the Pacesetter.

BASIC FILE FORMAT

CDCL commands are contained within a file bounded by a beginning and an ending sync code (first and last lines as shown in the sample file on the following page). These sync sequences must be in upper-case characters and spaced exactly as shown in the example.

There is one command per line within a file. Each line is a maximum of 128 characters and is terminated by a carriage return (cr) and/or line feed (lf) characters.

If the first non-space character of a line is an asterisk, the entire line is considered to be a comment. Comments may also be placed after the close parenthesis of a command line.

Spaces are not significant within the CDCL file. CDCL commands are not case sensitive. However all sync sequences must be given in upper case characters as shown in the sample file. All characters are contained in the printable ASCII character set (20 - 7F) with the exception of the end of line character(s).

Sample CDCL File

```
&&&&CALCOMP DEVICE CONTROL <eol>
* comment line
* comment line
command(param_1,param_2,..,param_n)...comment...<eol>
^^^^END OF FILE<eol>
```

Where "<eol>" is(are) the end of line character(s).

COMMAND DESCRIPTION

All commands consist of a command word followed by a list of parameters enclosed in parentheses. Parameters are separated by commas, colons, or slashes (front slash only, not back slash). Parameter strings are contained within an open and close parenthesis.

Any characters after the close parenthesis are ignored for the purposes of decoding the command and may be used for inserting comments if desired. Comment lines may be inserted in the file by making an asterisk the first non-space character of the line.

A parameter may be omitted by having two consecutive parameter delimiter characters. If a parameter is omitted, the default value for that parameter is assumed. If a parameter is erroneous, the default value is assumed.

Some CDCL commands require a numeric parameter to be specified. This number may be entered in decimal, octal, hexadecimal, or binary formats.

Hexadecimal numbers are written as an upper- or lower-case "x" immediately followed by the hex digits (0-F).

Octal numbers are written as an upper- or lower-case "o" followed by one or more octal digits (0-7).

Binary numbers are written as an upper- or lower-case "b" followed by one or more binary digits (0-1).

Any number not preceded by an "x", "o", or "b" is assumed to be decimal. If the parameter input requires a decimal point and/or a negative value, then only decimal numbers may be used to represent the value. Negative values are represented by a minus sign before the number.

Examples of the various formats are shown below:

Decimal:	**Octal:**	**Binary:**	**Hexadecimal:**
9	o764	b0001100	xFF6
5.987	O77765	B111100000111	XEO
75602	O12345670		X123456789ABCDEF0
-00075			x123456789abcdef0
1234567890			

CDCL COMMAND FORMAT

All commands go into effect upon receipt of the end-of-file sync of the CDCL file. Any parameter changes stay in effect until changed or the Pacesetter is powered down. Parameters may be changed by issuing another CDCL command file or using the control panel.

Following is a summary of the CDCL commands and parameters supported by the Pacesetter. The following format is used for command descriptions:

- Each command is given in bold letters.
- Command parameters follow and are enclosed in parenthesis.
- Each parameter is listed, followed by valid entries for that parameter. A brief description of the function of each parameter follows.

"Not Used" Parameters

Some parameters of CDCL are not used by the Pacesetter, but must be accounted for because of their location in the parameter string. In these cases, two consecutive parameter delimiter characters (such as commas) appear in the string, or any value can be entered in the appropriate sequence. These parameters are listed as "Not used" on the following pages.

For example, the command syntax to select the PCI processing mode is as follows:

```
PCI(syncs, num_syncs, cs, eob, resolution, protocol)
```

However, the resolution parameter, which is in the middle of the string, is not recognized by Pacesetter. A value such as a zero or blank space may be used, or no value may be entered, as long as two consecutive commas (or other delimiters) appear. Sample comands having the correct syntax are as follows:

```
PCI(22,2,YES,13, ,CTS)

PCI(X02,1,NO,X03,,CTS)
```

In each case, the presence of the parameter is acknowleged, but not specified as there is no correct value. CTS is the CDCL equivalent of Hardware control.

Typical CDCL Plotter Protocol Files

```
&&&&CALCOMP DEVICE CONTROL
* Used by autocad with ACKNAK handshake.
PCI(X16,2,YES,X00,,ACKNAK)
^^^^END  OF FILE

&&&&CALCOMP DEVICE CONTROL
* Used by cadvance with hardware handshake.
PCI(X02,1,NO,X03,,CTS)
^^^^END  OF FILE

&&&&CALCOMP DEVICE CONTROL
* Used by autocad with ADI or DOS copy.
PCI(X16,2,YES,X0D,,CTS)
^^^^END  OF FILE
```

D

COMMANDS/PARAMETERS

960(resolution, channel)

This command selects the CalComp 960 plot data processing mode. The 960 data may be transmitted through either the RS-232C (serial) or Centronics (parallel) port.

resolution	Not used	Number of plot steps needed to produce an on-axis line of 1 inch. Pacesetter resolution is fixed at 2032.
channel	Not used	

Default Value: 960

HPGL(plotter_type, protocol, channel)

This command selects the HPGL plot data processing mode. The Pacesetter then emulates Hewlett-Packard Graphic Language (HPGL).

plotter_type	7595B 7440	Indicates which Hewlett-Packard plotter is to be emulated. HPGL Large Format = 7595B HPGL Small Format = 7440
protocol		Plot data transmission protocol.
SERIAL PORT		
	XONOFF	
	CTS	
	ENQ_ACK	
PARALLEL PORT		
	CENTRONICS	
channel	Not used	

Default Value: HPGL(7595B,XONXOFF) - Serial port.
HPGL(7595B,CENTRONICS) - Parallel port.

PCI(syncs, num_syncs, cs, eob, resolution, protocol, channel)

This command selects the processing parameters for PCI mode. The data transmission protocol is also defined.

sync	X00-X7F	Indicates the begining print data sync character. This character cannot be the same as the "eob."
num_syncs	1,2	Sets the number of sync characters.
cs	NO, YES	Enables or disables checksum.
eob	X00-X1F	Specifies end-of-buffer code character. This character cannot be the same as the "sync."
resolution	Not used	
protocol		Plot data transmission protocol.
SERIAL PORT	XONOFF CTS ENQ_ACK	
PARALLEL PORT	CENTRONICS	
channel	Not used	

Default Value: PCI(X02,1,NO,X03,,XONXOFF) - Serial port.
PCI(X02,1,NO,X03,,CENTRONICS) - Parallel port.

APPENDIX E

USER PARAMETER CHARTS

USER NUMBER	1	2	3
APPLICATION			
Port Type			
Protocol			
Baud Rate			
# of Bits - Parity			
Handshake			
Sync # EOM CHK			
Special Format			
• PCI - # of syncs			
• PCI - Sync char			
• PCI - EOM char			
• PCI - Checksum			
SET UP			
Plot Mode			
Velocity			
Acceleration			
Orientation			
Scale			
Pen Grouping			
Plot Limits			
Plot Manager			
EOP Timeout			

USER NUMBER	1	2	3

APPENDIX F

MATERIAL SAFETY DATA SHEETS (MSDS)

INTRODUCTION

This appendix provides you with information regarding the Material Safety Data Sheet (MSDS) supplied for each chemical used with the Pacesetter plotter.

MATERIAL SAFETY DATA SHEETS

CalComp supplies a Material Safety Data Sheet (MSDS) for each chemical used with your Pacesetter plotter. Each MSDS contains detailed information about a specific chemical, informing you how to safely use, store, and dispose of the chemical.

CALCOMP
2411 WEST LA PALMA AVENUE
ANAHEIM, CALIFORNIA 92801 U.S.A.
IDENTITY: XLB PENS

MSDS SERIAL NO: 52
I/C NO:
P/N:

SECTION I

TELEPHONE NUMBER FOR INFORMATION: (714)821-2114 7:30 am to 4:00 pm PST	**EMERGENCY TELEPHONE NUMBER:** Chemtrec (800) 424-9300
DATE PREPARED: May 11, 1991	**PREPARED BY:** Craig Sundquist

SECTION II - HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

HAZARDOUS COMPONENTS (Chemical/Common Names)	%	C.A.S. #	OSHA PEL	ACGIH TLV
Formamide	20 - 70	75-12-7	20ppm	20ppm
N-Methyl-2-Pyrrolidinone	0 - 28	872-50-4	100ppm	100ppm
Dimethylformamide	0 - 5	68-12-2	10ppm skin	
C.I. Acid Blue 9 Dye*	4 - 6	3844-45-9	N.E.	N.E.
Formaldehyde**	0.05 - 0.1	50-00-0	1ppm	1ppm
Water & Non Hazardous	30 - 55	N.A.	N.A.	N.A.

*Blue & Green Colors Only
**Under normal ink use, Formaldehyde Gas exposure is less than 0.02ppm.
N.A.= Not Applicable; N.E.= None Established

SECTION III - PHYSICAL CHEMICAL CHARACTERISTICS

BOILING POINT: 100-210°C (212-410°F)	**SPECIFIC GRAVITY (H2O = 1):** 1.08 - 1.130
VAPOR PRESSURE (mmHg): Unknown	**MELTING POINT:** N.A.
VAPOR DENSITY (WATER=1): Unknown	**pH** 5.0 - 9.0
SOLUBILITY IN WATER: Complete	**PERCENT VOLATILE BY VOLUME:** N.A.

EVAPORATION RATE (n-Butyl Acetate = 1): Unknown

APPEARANCE AND ODOR: Black, Red, Blue, Green, Purple, Orange, Brown and Magenta colored liquids, slight odor of Formaldehyde.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLAMMABLE LIMITS: **LEL:** N.A. **UEL:** N.A.

FLASH POINT (METHOD USED): Not Flammable

EXTINGUISHING MEDIA: Use media to extinguish primary cause of fire.	**UNUSUAL FIRE AND EXPLOSION HAZARDS:** None.

SPECIAL FIRE FIGHTING PROCEDURES: Firefighters should be equipped with self-contained breathing apparatus and turn-out gear.

IDENTITY: XLB PENS

SECTION V - REACTIVITY DATA

STABILITY:
Stable

CONDITIONS TO AVOID: Decomposes at temperatures above 210° (410°F)

INCOMPATIBILITY (MATERIALS TO AVOID): Reacts with strong oxidizing agents.

HAZARDOUS DECOMPOSITION BYPRODUCTS: Carbon monoxide and Nitrous Oxide

HAZARDOUS POLYMERIZATION:
Will not occur.

CONDITIONS TO AVOID:
NONE

SECTION VI - HEALTH HAZARD DATA

ROUTES OF ENTRY: INHALATION: No. **ABSORPTION:** Yes **INGESTION:** Yes

HEALTH HAZARDS (ACUTE AND CHRONIC):
Skin: Irritation may occur.

Eyes: Irritation may occur.

Lungs: Irritation may occur.

Ingestion: Gastric disturbance may occur.

CARCINOGENICITY: NTP: No **IARC MONOGRAPHS:** No **OSHA REGULATED:** No

SIGNS AND SYMPTOMS OF OVEREXPOSURE: Unknown.

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE: Pre existing dermatitis and respiratory conditions may be aggravated by exposure.

EMERGENCY AND FIRST AID PROCEDURES:
Eye Contact: Rinse with water thoroughly. If irritation develops consult a physician.
Skin Contact: Rinse with water thoroughly. If irritation develops consult a physician.
Inhalation: Remove to fresh air, aid breathing if necessary and get medical attention.
Ingestion: If swallowed, dilute with water and induce vomiting. Get medical attention.

SECTION VII - TRANSPORTATION INFORMATION

PROPER U.S. DOT SHIPPING NAME AND HAZARD CLASS: Flash Point greater than 140°F and therefore non regulated, according to 49CFR173.120.

ICAO/IATA SHIPPING NAME AND HAZARD CLASS: Flash Point greater than 140°F and therefore non regulated, according to 49CFR173.120.

CONTAINER SIZE AND TYPE: 0.432 fluidram/1.6 milliliter in a plastic container (disposable pens).

IDENTITY: XLB PENS

SECTION VIII - PRECAUTIONS FOR SAFE HANDLING AND USE

RESPIRATORY PROTECTION NECESSARY: Use an organic vapor respirator, if vapors or mist is generated.

VENTILATION REQUIRED: No special ventilation is needed when used as intended with CALCOMP products. Normal office ventilation conforming to the American Society of Heating, Air Conditioning, and Refrigerating Engineers (ASHRAE) 1980 Standards is adequate under normal conditions of use. Under some conditions of use or combinations of equipment, office ventilation may not be adequate. Users should assure that ventilation is sufficient to prevent exceeding exposure limits. Users should consult a qualified Ventilation Engineer and/or Industrial Hygienist if a concern regarding exposure arises.

PROTECTIVE GLOVES: None required when used according to CALCOMP plotter instructions. To prevent discoloration of hands and clothing disposable gloves can be used.

EYE PROTECTION: None required when used according to CALCOMP plotter instructions, goggles recommended if danger of splatter entering eyes.

OTHER PROTECTIVE CLOTHING OR EQUIPMENT: None required when used according to instructions. Apron may be used to protect clothing from ink.

WORK/HYGIENIC PRACTICES: Wash hands and clean up any spills after use. Pregnant workers should keep exposure to a minimum.

SECTION IX - WASTE DISPOSAL INFORMATION

ACTION TO BE TAKEN IN THE EVENT OF SPILL OR LEAK: Wipe up with absorbing material and remove stains with soapy water.

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: Do not allow to freeze.

WASTE DISPOSAL SUGGESTIONS: In accordance with local regulations. Contact local and state regulatory agencies for instructions before any waste disposal action taken.

OTHER PRECAUTIONS: None.

IDENTITY: XLB PENS

SECTION X - SPECIAL COMMENTS

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM (HMIS):
HEALTH: 1 **FLAMMABILITY:** 0 **REACTIVITY:** 1
BASIS: Recommended by CALCOMP

TOXICOLOGICAL DATA:

Formanide (75-12-7)	LD50: 5.1 ML/KG (oral-rat), animal studies have shown birth defects
	LD50: 9.2 GM/KG (oral-rat)
N-Methyl-2-Pyrrolidinone (872-50-4)	LD50:4.2 GM/KG (oral-rat)
Dimethylformamide (68-12-2)	LD50: 2.8 GM/KG (oral-rat)
C.I. Acid Blue 9, Dye (3844-45-9)	Animal Carcinogen (IARC)
	LD50: 11.3 GM/KG (oral-rat)
Formaldehyde (50-00-0)	Animal Carcinogen (IARC)
	LD50: 800 MG/KG (oral-rat)
	LD50: 481 ppm x 4 hr. (INH-rat)

The data in this Material Safety Data Sheet is true and accurate to the best of CALCOMP's knowledge. However, since data, safety standards, and government regulations are subject to change and conditions of handling, use, or misuse are beyond CALCOMP's control, **CALCOMP MAKES NO WARRANTY, EITHER EXPRESS OR IMPLIED, WITH RESPECT TO THE COMPLETENESS OR CONTINUING ACCURACY OF THE INFORMATION CONTAINED HEREIN AND DISCLAIMS ALL LIABILITY FOR RELIANCE THEREON.** The **user** is required to comply with all laws and regulations relating to the purchase, use, storage and disposal of this product. Users must be familiar with and follow generally accepted safe handling procedures of chemicals, and is solely responsible for any effects caused by its misuse or mixing of this chemical with any other substance.

PACESETTER

Glossary

GLOSSARY

907 Language - A plot data format (also called PCI or CCGL).

960 Language - A CalComp plot command data format.

Acceleration - The rate at which the pen moves to maximum plot speed relative to the media.

Accuracy - The difference between the commanded end point and the actual end point.

Ack/Nak - A coded response from the plotter to the host sent via the RS-232C data line to control data flow. Ack = Data received from the host is ok. Nak = Data received from the host has an error, please send data again.

Baud Rate - The data transmission rate over an RS-232C communications path, usually expressed in bits per second (bps).

CalComp Color Graphics Language (CCGL) - A superset of 907 and PCI plot data formats.

Centronics - A parallel data port designation. A Centronics interface, originally used on Centronics printers, is a standard parallel data transmission format.

Checksum - A method of checking the integrity of a block of data by applying an algorithm to each byte in the data block. The resulting checksum character is appended as the last byte in the block. When data is sent from the host, the checksum character sent from the host is compared with a checksum character generated by the plotter. If the checksum characters match, it is assumed that the transmitted data is the same as the received data.

If the characters don't match, it is assumed the data is bad.

CTS/Hardware - An RS-232C protocol that uses high quality cabling that cannot exceed 50 feet.

Data Byte Format - Used in PCI and CPGL formats to set stop bits and parity.

DCE (Data Communications Equipment) - An RS-232C configuration where data is transmitted on pin 3 and received on pin 2.

Defaults - Operational selections that go into effect when you power on the plotter.

Demonstration Plot - A drawing stored in the plotter that can be plotted without using a host application. You can verify plotter operation by initiating the plot from the control panel.

Deskew - A feature of the Pacesetter used with gridded media and preprinted forms to align the media to the plotter's X and Y axes.

DTE (Data Terminal Equipment) - An RS-232C configuration where data is transmitted on pin 2 and received on pin 3.

End Bell - The equipment enclosures located on the right and left sides of the plotter.

End-of-Message Character - A character transmitted after each record is sent to indicate the end of a data block.

End of Plot (EOP) - The period of time that the plotter waits without receiving data before deciding to terminate a plot job.

Expanded Limits - A feature of the Pacesetter that expands the plotting limits into the area normally reserved for the pinch rollers.

Framing - PCI stop bits and parity.

Handshake - Any RS-232C communication protocol used to control data flow between a host and the plotter based on the availability of I/O buffer space.

Hardware Control/CTS - An RS-232C protocol that uses a positive or a negative voltage applied to a hardware line (usually CTS) to start or stop data flow. There is no error recovery with this protocol.

Hewlett-Packard Graphics Language (HPGL) - The graphics instruction set used for communication with Hewlett-Packard plotters.

Host - The source of data sent to the plotter—usually a computer.

Host Computer Basic Software (HCBS) - Software available from CalComp.

Input Monitor Dump (IMD) - A test used to indicate what plot data has been sent from the host computer.

ISO - International Standards Organization for Engineering drawings.

Limit - Defines an image area for the plot to be drawn. The image outside of the limits is excluded from the plot.

Material Safety Data Sheet (MSDS) - Data sheet supplied by CalComp to you regarding the chemicals used in the plotter. Specifically, an MSDS provides information about how to safely use, handle, and store the chemical.

Media - Material, such as paper and film, used by the plotter to create drawing images.

Menu - Items presented on the display that are used to select and change operations.

MSDS - See Material Safety Data Sheet.

Online/Offline - Plotter status is either online (available to host) or offline (available to control panel functions and media loading, etc.).

Origin - The 0,0 point of the plot. Also, the point the pen is over when the plotter enters Online mode.

P1 - A scaling point that generally specifies the location of a plot's lower left corner when using HPGL format.

P2 - A scaling point that generally specifies the location of a plot's upper right corner when using HPGL format.

Parallel Port - An interface designed to accept a complete byte of information, including control characters, at the same time. The parallel port on the Pacesetter is designated the Centronics port.

Parity - An error checking scheme that may be used when transferring binary data. Parity may be even, odd, or none. With odd parity, the parity bit for each character is set to a ZERO or a ONE to ensure there is an odd number of ONE bits in each character. With even parity,

the parity bit for each character is set to a ZERO or a ONE to ensure there is an EVEN number of ONE bits in each character.

PCI Mode - Plotter Communication Interface (an extended version of 907 formatted data).

Pen Grouping - A feature that allows the plotter to treat a group of pens as one pen number. This feature uses each pen to draw for 100 meters before the active pen is automatically exchanged for the next pen in the same group.

Plot - A drawing imaged by the plotter.

Plot Manager - A CalComp proprietary algorithm that minimizes pen changes and movement, thus enhancing throughput.

Plot Speed - Plot speed is expressed as Axial or Diagonal. Axial plot speed is the speed at which a plotter can draw a straight line on the X or Y axis. Diagonal plot speed is the speed at which the plotter can draw a line at 45 degrees.

Repeatability - A measure of how closely a device can return a pen to a previously plotted point.

Resolution, Addressable - The smallest move that the user can specify programmatically.

Resolution, Mechanical - The smallest move that the plotter can make in any direction.

Reticle - An optical device used to help position media accurately.

RS-232C - A serial data port designation. An RS-232C label on the port indicates that the interface meets the standard US format for serial data transmission.

Serial Port - An interface designed to accept data one bit at a time. Serial data transmission requires that the transmission protocol, i.e., baud rate, byte length, stop bits, parity, etc., be defined before communications can be established. This is necessary so that the receiving device, in this case the plotter, is able to recognize the data (See Chapter 3). The Pacesetter serial port is designated the RS-232C port.

Stop Bit - In asynchronous transmission mode, a bit that indicates the end of the data byte being transmitted.

Sync Character - A character placed at the beginning of a PCI block (or record) to notify the plotter that the following data is plot data.

Sync Character Value - The numeric value of the sync character.

User Number - A method of identifying a set of individual parameter selections through the assignment of a unique number.

Xon/Xoff - A coded response from the plotter to the host sent via the RS-232C data line used to control data flow. Xon = Send more data. Xoff = Data buffer full, do not send more data. There is no error recovery capability as in Ack/Nak protocol.

PACESETTER

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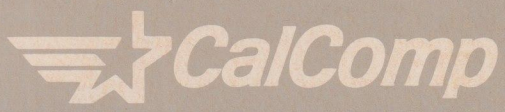
CalComp