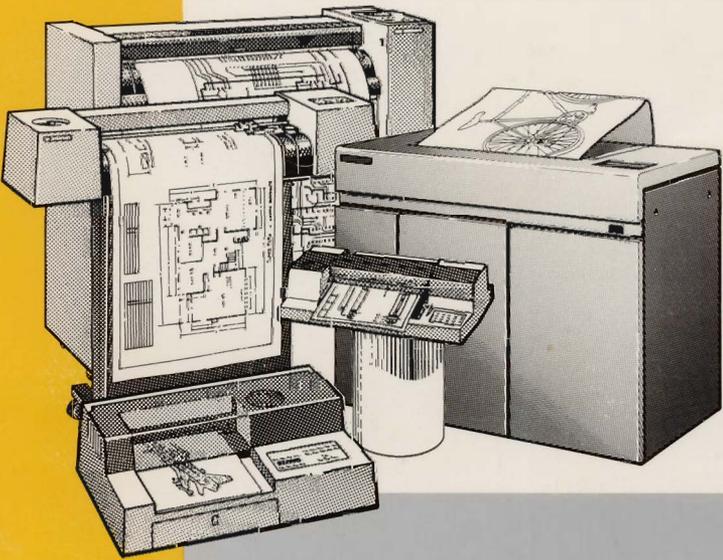


F. VAN GRIEKEN.

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PACKARD

HP Plotter Service Diagnostics User's Guide



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HP Plotter Service Diagnostics Users Guide



Revision 1.3



**HEWLETT
PACKARD**

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NOTES

Introduction

Welcome

Welcome to the HP Plotter Service Diagnostic Users Guide. This guide is designed as an instructional aid for the accompanying diagnostic disk to be used by the service representative involved in plotter maintenance.

Purpose

This guide and associated disk will provide the service representative the knowledge and resources to quickly and effectively isolate and repair any plotter problem by reducing time spent in IDENTIFYING and ISOLATING problems that may occur with plotters. Additionally, this guide and associated disk will serve as a universal standard diagnostic tool for plotter servicing.

Overview

This guide will provide the instructions required to set up your equipment and begin the service diagnostic process. The software utility disk was developed specifically to support those individuals who service HP plotters. Also, several plotter service related programs have been rewritten for use on the HP Portable Plus and are included on the disk. This Plotter Service Diagnostic tool is structured into four major sections as shown in the following paragraphs:

Plotter I/O Verification: In this section you will find procedures to verify proper communication links for HP-IB, RS-232-C and Centronics interfaces.

Plotter Performance Verification: In this section you will be given step-by-step instructions for checking overall plotter performance.

Plotter Calibrations: Directions for calibration and measurement routines for the HP 758x and 759x pen plotters are provided in this section.

Special Considerations: This section contains information on how to obtain output data from the plotter, send HP-GL commands to a plotter, a EEPROM read/write utility for DraftMaster plotters and a utility to download error map information to DraftMaster MX hard disks.

Equipment

The following equipment is required to effectively perform the steps given in this plotter service diagnostic tool:

RS-232-C;
One 92221P RS-232-C cable
One 92224P Gender converter (for 7550A)

HP-IB;
One HP-IB cable
One set of HP-IL cables
One 82169A HP-IL/HP-IB Interface w/power module

Centronics;
One Centronics cable
One 92221P RS-232-C cable
One PI005B Serial/Parallel converter (Black Box p/n 412-746-5500)
One PD-9500 AC adaptor

One 9114B HP-IL disk drive

Plotters Covered

This revision of the plotter service diagnostic tool has been checked for use with the following HP plotters:

HP 7440A (with enhancement cartridge)
HP 747xA
HP 757xA
HP 758xA/B
HP 759xA/B
HP C160xA
HP C162xA

Getting Started

Helpful Hints

You can learn more about each section by stepping through the program using the FUNCTION KEYS and by reading the information regarding these sections found later in this guide.

Each section is supported by its own optional HELP menu which is selected by pressing <F8> within the chosen section. The HELP menu will give you further detailed information about:

- how to use and run each section
- how to interpret results
- special hints
- how to set up the plotter and your PORTABLE PLUS

Pressing the <ESC> key will automatically return you to the previous menu.

***** NOTE *****

If the program should get into a LOST MODE, press the <CTRL> and <C> keys simultaneously. This allows you to exit the program and enter GWBASIC. When in GWBASIC, type SYSTEM and press the <RETURN> key.

GWBASIC is included on the Plotter Service Diagnostic (PSD) disk!

This will place you back into the Personal Applications Manager (PAM) menu where you can restart the "PSD" application.

Installing the Program

Before installing this program, make sure you have at least 210 Kbytes of disk space available on drive A (EDISK) of your Portable Plus. 250 Kbytes are needed if you also want the HELP screen files installed. You must have at least 164 Kbytes of main memory configured to run the programs.

Use the following steps to install the PSD application onto the PAM menu:

- Step 1) Have the Portable Plus connected to the 9114B disk drive and load the PSD disk into the drive.

Step 2) Enter DOS on the Portable Plus.

Step 3) Type in C: at the DOS prompt to switch to drive C (the 9114B).

Step 4) Type README at the DOS prompt and follow the instructions, or you may also type INSTALL instead of README to skip the README screen. Installation requires approximately 3 minutes.

Step 5) This will create a new directory "PSD" on your drive A and copy all files necessary to run this software. You will be given the option of not installing the HELP screen files. "PSD" will be added to the PAM menu as an application. To start PSD, choose the "PSD" application field within the PAM menu using the cursor keys and press <RETURN>.

Use the following steps to run "PSD" from the disk:

Step 1) Perform steps 1, 2 and 3 above.

Step 2) At the DOS prompt type START and then follow the screen instructions.

Plotter I/O Verification

Introduction

This section will verify proper operation of the following types of interfaces:

RS-232-C

HP-IB

Centronics

Whenever the interface supports TWO-WAY data communication (ie: HP-IB and RS-232-C), both data channels will be tested.

For interfaces supporting only ONE-WAY communication, the ONE-WAY verification will be performed by sending a small plot to the plotter.

USE THESE TESTS whenever you want to isolate problems that could be PLOTTER I/O or INTERFACE related, such as:

A proper communication link cannot be achieved between the plotter and computer.

The plotter indicates an I/O buffer overflow.

No response is received from the plotter.

Verify that the plotter is operating as configured.

IF THE PLOTTER PASSES THESE TESTS, any I/O related problems are probably caused by either the computing device or by the communication link. Further troubleshooting should be focused toward these potential problem sources.

IF THE PLOTTER DOES NOT PASS THESE TESTS, it most likely is a plotter problem, therefore perform the following steps:

Thoroughly recheck all configuration setups.

Run tests again with different I/O parameters.

Run the PERFORMANCE VERIFICATION section within "PSD".

Focus your repair activities towards the INTERFACE CONTROLLING sections of the plotter.

***** NOTE FOR ELECTROSTATICS *****

Models C1620A, C1625A and C1627A have DCI (Device Control Instructions) and DISPLAY FUNCTIONS modes which are selectable

from the front panel. DCI MODE must be "ON" and is accessed from the "Plotter Setup Menu". DISPLAY FUNCTIONS must be "OFF" and is selected from the "Diagnostic Menu".

RS-232-C Interface

Setup

- Step 1) Connect your PORTABLE PLUS to the plotter using the 92221P cable. The 7550 and 7510 plotters also require the use of the 92224F gender converter.
- Step 2) Load media into the plotter and set the plotter's BAUD RATE and HANDSHAKE parameters that you want to test. For DraftMaster MX, be sure that the USER ID configuration matches the port being tested. Parity should be configured OFF and "SPACE" parity used (eighth bit is always zero). Some plotters allow either "SPACE" or "MARK" parity to be selected.
- Step 3) Turn the plotter's PEN SORT feature OFF (if available).
- Step 4) Turn the plotter's MEMORY feature OFF (if available).
- Step 5) Set the plotter ONLINE (REMOTE).
- Step 6) Start the PSD I/O VERIFICATION TEST.
- Step 7) Select within the PSD menus the I/O parameters to match the plotter configuration.

Functional Description

In order to check proper TWO-WAY communication, PSD will send an "ESC.E" device control instruction to the plotter.

This triggers the plotter to send an ERROR STATUS RESPONSE back to the Portable Plus. The test fails if no response is received or the ERROR STATUS indicates a problem.

If the test passes, you will be prompted to run the HANDSHAKE TEST to verify proper XON/XOFF or HARDWIRE handshake functionality.

The HANDSHAKE VERIFICATION is performed by filling up the plotter's I/O buffer with data that causes the plotter to draw circles with different pens.

PSD will display the number of handshakes generated by the plotter and will automatically terminate this test after 3 successful handshakes have been identified. It is not necessary to have the plotter draw all the circles once TEST PASSED is indicated on the Portable Plus.

***** NOTE *****

Recycle power to the plotter after performing the XON/XOFF test as this handshaking mode can cause problems with other PSD applications.

In order to generate an early handshake, have the plotter's PEN SORT function OFF.

Handshakes may not be generated if EXTENDED BUFFERS or EXTERNAL BUFFER BOXES are being used, as the plotter is able to process the incoming data as fast as it is sent by the controller.

Centronics Interface

CENTRONICS I/O verification requires the GG-PI005B Serial-to-Parallel converter (Black Box corp.) For ordering, consult your local order processing or call Black Box at 412-746-5500.

Setup

Step 1) Configure the Converter Box as follows:

Data input: RS-232, 19200 baud, 8 bits, No Parity

Data output: CENTRONICS

Step 2) Connect the Portable Plus to the Converter Box using the 92221P cable.

Step 3) Connect the Converter Box to the plotter using the HP 40242D cable.

Step 4) Make sure the Converter Box is powered ON.

Step 5) Load media in the plotter and set the plotter ONLINE (REMOTE).

Step 6) Start the PSD I/O VERIFICATION TEST.

Functional Description

In order to verify proper data communication, a small plot is sent to the device.

The test fails if no plot is drawn or the device has been identified as "NOT READY".

***** NOTE *****

A PAGE ("PG;") command is sent to the plotter which may cause a "COMMAND UNRECOGNIZED" error on some plotters. The actual test should function properly.

HP-IB Interface

The HP-IB VERIFICATION requires the HP 82169A HP-IL/HP-IB INTERFACE CONVERTER.

Setup

- Step 1) Connect the Portable Plus to the 82169A using two HP-IL cables.
- Step 2) Set the Converter's HP-IB address to "five".
- Step 3) Connect the 82169A to the plotter using a standard HP-IL interface cable.
- Step 4) Apply power to the 82169A and press the RESET button.
- Step 5) Load media into the plotter.
- Step 6) Set the plotter's address to "five". For DraftMaster MX users, the HP-IB User ID is User E.
- Step 7) Set the plotter ONLINE (REMOTE).
- Step 8) Start the PSD I/O VERIFICATION TEST.

Functional Description

In order to check proper TWO-WAY communication, PSD sends an ESC.E command to the plotter.

This triggers the plotter to send an ERROR STATUS RESPONSE back to the Portable Plus. The test fails if no response is received or the error status indicates any problems.

Plotter Performance Verification

Introduction

This section checks overall plot performance related to the pen/media mechanics and the drive electronics of a pen plotter.

The test plot is composed of many individual plot modules which force the plotter into "worst-case" plot situations.

With this performance test, many common performance measures of pen plotters can be tested, such as:

- Overall repeatability
- Pen-to-pen repeatability
- Endpoint accuracy
- Mechanical deadband and backlash
- X/Y axis gain synchronization
- Pen damping



The entire performance test can be run **ONE TIME** or **CONTINUOUSLY** to isolate intermittent problems.

A status bar, on the Portable Plus display, indicates the percentage completed within the current run.

The total number of runs performed is reflected on both the display and the plot.

For media sizes smaller than A3(B)-size, the plot is split into 2 parts. "PSD" will prompt you to load a new sheet of media. Running continuously is not supported on these smaller media sizes or on electrostatic plotters.

The individual plot modules are labeled directly on the plot to provide an easy way to compare the results with the "Troubleshooting" section found later in this document.

USE THIS TEST whenever the actual **PLOT PERFORMANCE** of the device is in question or the plotter is operating outside the published specifications.

Communication Setup

Two interfaces are supported: HP-IB and RS-232-C.

Using RS-232-C

Connect your Portable Plus to the plotter using the 92221P cable (note that the 7550 and 7510 plotters additionally require the 92224F gender converter).

Using HP-IB

HP-IB requires the HP-IL/HP-IB Interface Converter HP P/N 82169A.

Connect your Portable Plus to the 82169A using two HP-IL cables. Set the 82169A address to "5" and connect the 82169A to the plotter using a standard HP-IB cable. Power on the 82169A and press the RESET button.

Plotter Setup

Configure the plotter's I/O parameters according to the interface used.

Load 0.3mm drafting pens or new .3mm fiber tip pens into the pen carousel.

Deactivate the PEN SORT feature if available.

Load media in the plotter. Larger media sizes give better results. In order to eliminate inaccuracies due to unstable media, it is recommended that HP 3 mil, double-matte polyester media be used when testing large format plotters.

Set the plotter ON-LINE (REMOTE).

Starting Performance Verification

Select the PERFORMANCE VERIFICATION option <F2> from the Main Menu.

Select the desired I/O interface (HP-IB or RS-232-C).

Choosing the RS-232-C will provide more options to setup proper communication configurations.

After selecting the interface and its optional parameters, PSD will automatically check for proper TWO-WAY communication.

After the communications test passes, select either SINGLE or CONTINUOUS RUN mode.

The PERFORMANCE VERIFICATION test then starts.

After completion of the test plot, the current date, plotter's model number and firmware revision are plotted on the test plot (this only works on plotters which understand the ESC.A instruction).

Helpful Hints

If the plotter fails to respond to an inquiry from the Portable Plus within a certain time period when using HP-IB, the program could time-out. The program has been written to avoid this situation. However, it is still possible to time-out if the plotter is using very slow pen speeds (under 30 cm/s) while drawing long vectors, or, if the processor is performing some other operation which keeps it too busy to respond within the time-out period (eg; such as a media load operation or PEN SORT is "ON"). The time-out problem does not necessarily indicate a problem with the plotter. Try running the program again if a time-out error is displayed on the Portable Plus.

When using RS-232, have XON/OFF handshaking turned "OFF", otherwise it could cause the program to hang. Also, you must use SPACE parity. This means that parity is set to "NONE" or "OFF" and the eighth bit of a word is always set to ZERO. Some plotters allow you to select MARK or SPACE parity.

For electrostatic plotters, DISPLAY FUNCTIONS mode must be "OFF" (selected from the Diagnostic Menu) and DCI (Device Control Instruction) mode must be "ON" (selected from the Plotter Setup Menu). These modes are not found on models C1600A or C1601A. If the NESTING feature is activated, you must press the <PLOT> button on the plotter's front panel after the plot is sent.

Some of the earlier model plotters (eg; 747x) will indicate an error light condition during the plot. This is normal because some higher level HPGL commands are used which are not understood by all plotters. The plot is not affected.

Troubleshooting and Interpretation

All test modules are labeled on the plot. Following is a list of how to interpret the results:

Frames

Two frames are drawn. The outer frame is drawn counter-clockwise and represents the hard clip limit area of the plotter (actual physical plotting area). Misalignment of the paper stops or mis-loading the media could cause different hard clip limits on the left- and right-hand sides. The inner frame is drawn in the clockwise direction approximately 3 mm inside the outer frame.

Check for:

- Actual hard clip limits should be within the stated specification.

- Parallelism between the inner and outer frames and corner areas.

Hard clip limits can be changed on some plotters by adjusting the paper stops and/or performing a calibration. Poor parallelism between frames and corners is typically caused by the pen carriage rocking back and forth on the Y-arm or slider rods. This can be caused by a mis-adjusted drive cable or belt, dirty bearing surfaces or a bad pen carriage assembly.

Stars

Four stars are drawn in each of the four corners at the beginning of the plot and then retraced at the end of the plot. This is a good test for REPEATABILITY because it tests the plotter's ability to return to a previously defined point. If the plotter performs properly, a clear area will be visible which is symmetrical about the center line (the center lines of two triangles used to draw each star should line up).

Any repeatability problems will cause this clear area to move away from this center line.

Poor repeatability could be caused by the following:

- Media expansion and/or shrinkage.

- Misregistration.

- Mechanical and/or electrical defects.

Media Expansion and Shrinkage

This is the most common cause of repeatability errors with pen plotters. It is the first thing which should be considered as a cause since there is nothing that can be done to the plotter to correct this.

Most medias (except for polyester film) are composed of individual fibers (either wood or cotton) held together via a bonding agent. Expansion/shrinkage occurs when these fibers absorb or loose

moisture. This process can occur while the plot is being drawn. Media stored in the original packaging or in drawers is not necessarily conditioned to the plotting environment. Media can be conditioned by exposing it to a STABLE plotting environment for approximately 20 minutes before using.

The best way to troubleshoot media expansion/shrinkage problems is by performing the plots on 3-mil, double-matte polyester film. The effect of the environment on film is small enough not to show up on the plot.

Typically one side of the media will move as the media grows/shrinks which causes only one pair of stars to show a displacement (but not always). Analysis of the micro-track would show one side bad and the other good (see misregistration).

Misregistration

Slippage of the media will occur when the media is unable to track consistently in the initial micro-track formed during initialization. The micro-track can be seen using a 10X magnifier. Random indentations indicate a good track. Bad tracks show patterned rows of indentations. The direction and number of slips can be determined by analyzing these indentation patterns.

All four stars should be displaced if the media is slipping.

Common causes for misregistration are:

- Dirty and/or worn grit wheel(s).

- Defective pinch wheel(s).

- Static.

- Broken pinch wheel mechanics (eg; yoke, liftarm, etc.).



Mechanical and Electrical Defects

Typically, a repeatability error caused by a mechanical or electrical defect will be in either the X or the Y axis only (not in both). Analysis of the micro-tracks will show them to be good. Most likely areas to troubleshoot would be:

- X/Y Axis Motors/Encoders.

- Loose or broken mechanics (eg; belts, gears, cables, etc.).

- Backlash.

Small Circles and Character Set

Small circles are drawn near the top of the plot and the character set along the right-side border.

These test can be used to diagnose pen lift, pen damping, pen claw/carriage problems or mis-matched motor gains.

Check characters for:

- Inconsistent line density.

- Missing portions of characters.

- Start and end points of circles don't match.

- Oval circles.

Pen-to-Pen Repeatability

A fully loaded pen carousel is needed for this test.

An array of large crosses is drawn using pen #2 through pen #8. The horizontal label indicates what column of large crosses had been drawn by what pen.

Another array of small crosses is drawn on top of the large ones using pens #1 though #7. The vertical label indicates what row of small crosses has been drawn by what pen. All possible pen combinations are checked this way.

Check for:

- Is there any pen that does not match with all the others?

- Re-allocate the pens in the carousel and check again.

If the centers of the crosses are displaced, it is an indication of poor pen concentricity (center of the pen nib is displaced) or the pen claw/holder is defective.

Scallop Test

For media sizes larger than A3(B)-size, several repetitions of this test are distributed in various areas of the plot.

The SCALLOP TEST consists of two circles. The outer circle is drawn at a coarse chord angle (quickly drawn) clockwise. The inner circle uses a finer chord angle (slowly drawn) in a counter-clockwise direction.

The cross pattern inside the circles is drawn by connecting line segments end to end. At the end of each leg, the pen is lifted and lowered without any X and Y motion.

Check for:

Are the circles properly closed?

Do you see any indications of pen bounce with the cross pattern?

Are the circles drawn smoothly?

Any problems could indicate a deadband or servo gain mismatch. Problems which are confined to certain local areas could be caused by bad spots on the gears, belts, Y-arm/slider rods and or pen carriage bearings.

Deadband Test

For media sizes larger than A3(B)-size, several repetitions of this test are distributed in various areas of the plot.

There are three different deadband tests for the X, Y and combined X/Y axis. In all tests, the process is the same. The first part of each scale is drawn with the pen approaching from a given direction. The second part finishes the scale from the opposite direction.

The distances between the lines of the first scale differs from those of the second scale by one plotter unit (.025 mm). The vectors should meet at "0". Progressive vernier offsets then occur to the left and right of this point. If the lines labeled "+3" match, there would be a deadband of about 3 times the scale unit for the given direction. The scale units are written on the plot (.025 mm for X and Y axis and .035 mm for diagonal). Compare the indicated deadband with the written specification.

Zig-Zag Test

This test runs at high speed. Use only good pens. This test should be used to check for deadband, servo or pen claw/carriage related defects.

Deadband problems will appear as small hooks at the corners. Pen or servo problems could cause the corners to appear rounded rather than orthogonal.

Check for:

Carriage rock and/or overshoot at the corners.

Rounded corners.

Lines not starting straight.

Wobble Box

This is also a high speed test. It is mainly used to check for the pen claw holding the pen loosely.

The inner box is draw counter-clockwise, the outer box clockwise.

Check for:

- Rounded corners.

- Orthogonality of corners.

- Varied spacing between inner and outer box.

Angle Test

This test can be used to diagnose servo gain mis-match between the X and Y axis motors. A mis-match between the X and Y axis will cause the lines to become less straight as they approach a 45 degree angle. Pure axis moves should be straight.

A mis-match problem can sometimes be corrected with an adjustment (eg; 758X) or by replacing X/Y motors and/or drive electronics. Also, any excessive friction in any axis will result in similar symptoms.

Endpoint Accuracy Test

On all large format performance test plots, two 500 mm lines are drawn in the X and Y directions. If checking Endpoint Accuracy, the plot should be drawn on 3-mil, double-matte polyester film. Thickness of media and media composition can affect line length.

Measurement should be taken from the centers of the tick marks at each end of the line. This is to account for the pen width.

If the plotter is out of specification, perform the Endpoint Accuracy Calibration (if available) and check again.

Plotter Calibrations

Introduction

This section contains calibration and measurement routines used to service the 758x pen plotters and to recalibrate borders of the DraftMaster plotters. The software routines referenced in the following paragraphs are intentionally kept similar to those of the 758x EAROM Calibration Tape (HP P/N 5010-2503) used with the HP-85 controller. The program is split into the following 5 sections.

Calibration of the 7585A Plotter:

Calibrates for straightness of the Y-Arm and the hardclip limits. Calculated values are stored in the EAROM. The border routine is also used for the 7580B/7585B plotters.

Calibration of the 7580B and 7585B Plotters:

Calibrates for X-axis scaling (VXS), Y-axis scaling (VYS), X and Y axis perpendicularity (VXA), Y-arm bow (VXB), grit wheel tolerances (VXC & VYC) and the hardclip limits. The calculated values are stored in the EAROM.

7585A and 758xB Border Calibration and Input the 7586B Rollfeed Label Value:

Performs recalibration of the plotter's hardclip limits and stores new values in the EAROM. This program can be used with the 7585A, 7580B, 7585B and 7586B plotters. For the 7586B, the Rollfeed label value (found under the right cover) is also stored into the EAROM. This value is necessary to use the 7586B Internal Accuracy Calibration feature.

758xB Accuracy Measurement:

Checks the plotters' accuracy. No calibration is performed and EAROM values are not altered.

***** NOTE *****

A problem was discovered during testing of sections 1 thru 4. When using the Portable Plus, the 758x and the HP-IB interface during an EAROM access, the plotter would sometimes leave the Calibration test 5 mode. This would be indicated by the rear panel LED turning ON. If this happens, Calibration test 5 can be reentered by simply pressing the Confidence Test button on the plotter's rear panel. If the Confidence Test Button is not pressed within the Portable Plus's time-out period, the program will indicate an error has been detected.

DraftMaster Borders Recalibration:

Calibrates the DraftMaster hardclip limits. This program may be used to change the DraftMaster's limits to match those of the 758x plotters. This program will work on the 7595A, 7596A, 7595B, 7596B and 7599A plotters.

Setup: Run the program using either the HP-IB or RS-232 interface.

RS-232: one 92221P cable.

HP-IB: two HP-IL cables one HP-IB cable and one HP-IL to HP-IB Converter (82169A) with power supply.

Connect the Portable Plus to the 82169A using 2 HP-IL cables.

Set the 82169A address to "5".

Connect the 82169A to the plotter using a standard HP-IB cable.

Power ON the 82169A and press the <RESET> button.

***** NOTE *****

Make sure that your Plotter and your Portable Plus are configured as described in the menus. Always make sure that any media initialization has been totally completed before proceeding with any consecutive steps of the program. For reliable calibrations, only use HP double-matte polyester film and .35 mm drafting pens.

Special Considerations

Introduction

This program is split into four sections:

1. Obtain output information from the plotter.
2. Send HP-GL commands to the plotter.
3. DraftMaster EEPROM read and write utility.
4. Hard disk error map for the HP 7599A DraftMaster MX.

Communications Setup for Sections 1 and 2

Two interfaces are supported, HP-IB and RS-232.

Using RS-232

Connect the Portable Plus to the plotter using the 92221P cable.
7550 and 7510 plotters also require the 92224F gender converter.

Using HP-IB

HP-IB requires the use of the 82169A HP-IL/HP-IB Converter.
Connect the Portable Plus to the 82169A using two HP-IL cables.
Set the 82169A address to "5".
Connect the 82169A to the plotter using a standard HP-IB cable.
Power "ON" the 82169A and press the <RESET> button.

1. Obtaining Output Information from the Plotter

Error and status information can be obtained from the plotter by sending special HP-GL or DCI (device control instructions) instructions that trigger the plotter to send ERROR and OPERATING STATUS INFORMATION codes back to the computer.

This can be very effective in troubleshooting problems or error conditions that come up while the plotter is processing data.

When to Use this Utility

If the plotter indicates an error condition and you want more detailed information.

To get information about the plotter's current firmware revision.

To obtain the plotter's identification.

To know the modes the plotter is operating in.

To learn about the plotter's memory configuration.

What the Softkeys do

<F1> - returns the error code condition which occurred during the previous operation using the "OE" and "ESC.E" commands. After reading out the error code, the error condition is reset in the plotter.

<F2> - returns the status and extended status using the "OS;" and "ESC.O" commands.

<F3> - returns the output identification and firmware revision using the "ESC.A" command.

<F4> - returns the configurable memory size using the "ESC.S" command.

<F5> - returns the plotter options using the "OO;" command.

***** NOTE *****

Some plotters may return status that could be misinterpreted if the returned status is obviously wrong. First consult the plotter's programming reference manual prior to changing any PCAs! Also, not all plotters understand the above output commands (ie; HP-GL/2 plotters will not understand the "OO" command).

2. Send HP-GL Commands to the Plotter

Use this utility to isolate and/or verify problems that could be HP-GL related. You may send any HP-GL command or DCI strings to the plotter and read any plotter response back in with the HP-GL Interpreter. This utility is provided with its own HELP MENU (Press <f8>).

When to Use this Utility

Whenever you suspect an HP-GL or DCI instruction or sequence to be causing problems and you want to verify it.

To identify software related problems.

To practice using HP-GL.

Here are some things to consider:

You may send several HP-GL commands on one line. (max 250 characters)

EXAMPLE: PA0,0;PD;PA0,1000,1000,1000,1000,0,0,0;

Commands that expect any data sent back by the plotter must have an asterisk <*> typed after the command terminator <;> (refer to HELP menu in the SEND HP-GL STRING section).

Output commands should be written on a separate line with an empty line following (pressing <RETURN> will generate lines).

EXAMPLE:

>> OH;*

>> (empty line)

>> (next HP-GL command line)

You may generate the "Escape" ASCII character (used for device control instructions ie; ESC.E) by typing either CHR\$(27) or simply typing ESC (the program will convert this into the actual "escape" ASCII character). (Refer to the HELP menu in the SEND HP-GL section). EXAMPLE: ESC.A or CHR\$(27).A is interpreted the same.

All non-printable characters can be sent using the CHR\$(..) format. For example: CHR\$(13)CHR\$(10) = (carriage return) (line feed).

All commands may be written in LOWER CASE or UPPER CASE.

You may SAVE, LOAD, EDIT, TRACE, RUN or LIST your HP-GL programs by means of the function keys.

The TRACE HP-GL command will allow you to step through your program.

The next command to be sent is first displayed on the screen. Pressing <RETURN> will then actually send the displayed command.

EXIT will bring you back to the previous menu.

***** NOTE *****

SECTIONS "3" AND "4" SUPPORT RS-232 AT 9600 BAUD ONLY.

3. DraftMaster EEPROM Read and Write Utility

This utility allows the user to read DraftMaster's Accuracy and Mechanical constants from the EEPROM and save them in a file on the Portable Plus. A hard copy of the constants can be printed on the plotter directly. The file, containing the plotter's constants, can later be loaded back to the EEPROM.

When to Use this Utility

To get a backup of the plotter's accuracy and mechanical constants to be downloaded later. This provides a means to calibrate the DraftMaster plotter after a repair or upgrade involving the EEPROM, without actually having to go through the calibration procedures. There are two scenarios when this could happen:

1. The Main Processor PCA is replaced and the EEPROM is not swapped from the old PCA to the new. In this case you would first read the EEPROM constants from the old EEPROM (if possible), perform the repair, then write the constants to the new EEPROM.
2. An "A" model DraftMaster is converted to the "B" model by replacement of the Processor PCA. In this case the EEPROM cannot be swapped as the EEPROMS are not electrically compatible between PCAs. First the "A" EEPROM should be read, then the new "B" PCA installed, and then the EEPROM constants written into the "B" EEPROM.

***** NOTE *****

For use with DraftMaster plotters only.

Read EEPROM

Enter the file name you want to store the constants in on the Portable Plus.

Type in the serial number of the plotter.

EEPROM data will be read and displayed on the Portable Plus.

Press <F1> to get a hard copy of the values.

Write EEPROM

Type in the name of the local file containing the constants.

The constants to be downloaded to the EEPROM will be displayed on the Portable Plus.

The constants will be written into the EEPROM.

4. Hard Disk Error Map for the HP 7599A DraftMaster MX

This utility will download error map information about unusable disk space of DraftMaster MX's internal hard disk (ST-225, 20 megabyte), that may not be identified by its internal disk format routine. This additional information is provided by the manufacturer of the hard disk by means of a small label attached to the top of the hard disk's housing.

After a disk has been replaced and DraftMaster MX's internal format process has been completed, run this utility to download the additional information to the disk. Also, whenever the internal FORMAT routine is run, the existing map is wiped clean and a new one created. If the customer begins to see disk errors after running the FORMAT, downloading the hard disk label error information using this utility may help.

When to Use this Utility

After installation of a new disk drive and after you have run the Internal Disk Format Routine.

If the plotter comes up with DISK READ/WRITE ERROR and reformatting does not help.

Anytime the Internal Format Routine is run, as this FORMAT will erase error map information originally input by the factory.

***** NOTE *****

For use with DraftMaster MX (HP 7599A) plotters only.

Setup for DraftMaster MX

Configure the DraftMaster MX for 9600 baud. Use the top RS-232 port and make all configurations for USER A.

Connect the Portable Plus to the DraftMaster MX using the 92221P cable.

Identify the little label on the hard disk that indicates the unusable areas and copy them down (cylinder and head).

Load a sheet of media (preferably A4/A-size) in the plotter and have the plotter ON-LINE (REMOTE).

Using PSD

Enter the SPECIALS menu.

Press <F5> to enter the DISK ERROR MAP section.

Type in the HEAD and CYLINDER numbers of the unusable disk areas as provided by the label on the hard disk.

Press <RETURN>. You will be given the choices to enter more data or quit.

The error map data is displayed. You should check to make sure it is correct. You are given the option to restart if it isn't.

Positive confirmation causes the program to write the data onto a reserved area of the disk that is read by the plotter's DOS on POWER UP.

The total amount of unusable disk space is read and displayed. If the number of unusable sectors is greater than 32, it is recommended to replace the disk drive.

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