

Getting Started

Introduction

This chapter details system hardware and software requirements, installation of software and hardware, loading and starting the HP 85071 software program, and basic operator interface techniques. The techniques cover how to use the keyboard, a mouse, softkeys, menus, and dialog boxes. The chapter also illustrates fundamental displays of the software program.

Section 1: MS-DOS of this chapter is for users of the MS-DOS (standard) version of the software. If your system supports Windows with MS-DOS on an HP Vectra computer or equivalent, continue with section 1, below.

Section 2: HP BASIC of this chapter is for users of the HP BASIC (option 300) version of the software. If your system uses HP BASIC on an HP 9000 series 300 computer or an HP Vectra PC with a BASIC language processor card, skip to section 2 of this chapter.

By the time you have finished this chapter, your materials measurement system should be up and running, you should understand how to use the software, and you should know how to manipulate measurement data. You will be ready to make the measurements given as examples in the "Measurement Tutorial" chapter.

Section 1: MS-DOS Version of the Software

To run the MS-DOS version of the HP 85071 software program, you must have a windows-compatible computer as defined below. Additionally, you should be familiar with basic Microsoft-DOS (MS-DOS) operations.

Refer to the MS-DOS manuals to:

- Copy files
- Display the directory of a floppy or hard disk
- Create directories on a floppy or hard disk
- Type commands at the DOS prompt

System Requirements

The system must use the computers, software, interfaces, printers, plotters, and network analyzers mentioned below.

Computer

The system computer should use a 80386 or 80486 microprocessor. The HP Vectra has been checked and is recommended. It must be configured with:

- 4 MBytes (minimum) of RAM (Random Access Memory)
- High-density, double-sided 3.5 inch flexible disk drive
- 20 MByte hard disk drive (minimum)
- Microsoft Windows compatible pointing device (a mouse)
- Coprocessor (recommended)

Software

- MS-DOS disk operating system (version 3.2 or higher)
- Microsoft Windows (version 3.0 or 3.1, NOT supplied)

IEEE-488 (HP-IB) Interface

The system computer must have one of these software-supported IEEE-488 interfaces to control the network analyzer:

- HP 82335B HP-IB Interface (recommended)
- National Instruments AT-GPIB Interface
- National Instruments GPIB-II or GPIB-IIA Interface

The HP-IB interface operates according to IEEE 488-1978 and IEC 625 standards and IEEE 728-1982 recommended practices.

Printers and Plotters

Any printer or plotter that is supported by Microsoft Windows will be supported by the HP 85071 software.

Printers can be used to get tabular listings of measurement results or printer facsimiles of displayed graphical data.

Plotters can also be used to get hardcopy graphical data.

Network Analyzer and Test Set

The HP 85071 software is designed to work with the network analyzer configurations described below. The default HP-IB address is 16.

- HP 8752A: this network analyzer contains a reflection/transmission test set as part of the analyzer. No other instrumentation is needed to make measurements. The network analyzer has these limitations:
 - "Ref/Tran u & e N-R" model: supported in the accurate sample position definition mode
 - "Ref/Tran e Prec'n" model: not supported
 - "Ref/Tran e Fast" model: supported in the accurate sample position definition mode
- HP 8753A, B, or C: these network analyzers need a companion test set for operation with the software. The following test sets are supported:
 - HP 85044A reflection/transmission test set (subject to the same limitations as the HP 8752A)
 - HP 85046A S-parameter test set
 - HP 85047A S-parameter test set

- HP 8719A or C; HP 8720A, B or C; HP 8722A or C: these network analyzers contain S-parameter test sets as part of the analyzer. No other instrumentation is needed to make measurements.
- HP 8510B or C: this network analyzer requires a companion test set and a synthesized source for operation with the software. Frequency range is determined by the test set and source. All test sets supported by the HP 8510B are supported by the software. The HP 8340, HP 8341, or HP 8360 family sources are supported by the software. HP 8510B or C firmware revision 5.0 or higher is required.

NOTE: the HP 8510A is not supported by the software but can be upgraded to an HP 8510C with the HP 85103C upgrade kit.

Installation

First Microsoft DOS, then Windows, and finally the HP 85071 software should be installed on the hard disk to run the materials measurement program.

Microsoft DOS Installation

Microsoft DOS must be installed on the computer's hard disk. If you are configuring the computer for the first time or installing a new version of DOS, refer to the Microsoft DOS installation documentation.

Microsoft Windows Installation

Microsoft Windows is an extension of the MS-DOS operating environment and features a sophisticated graphical user interface. Version 3.0 or 3.1 must be installed on the computer's hard disk to install and run the HP 85071 materials measurement software.

To install Windows, run the SETUP program provided with Windows. The SETUP program will ask what type of computer, keyboard, mouse, display, and peripherals are in the system. If the information provided by the SETUP program is insufficient or confusing, refer to the Windows documentation for details.

If you want to install your printer or plotter now, keep in mind the following:

- You must specify which printers and plotters are to be used when running the materials measurement program.
- You must load drivers for any printers or plotters with the SETUP program.

It is recommended that you let the SETUP program alter the system's AUTOEXEC.BAT file so that Windows can be run from any directory in the system.

1: MS-DOS

HP 85071 Software Installation

The HP 85071 software is provided on a floppy disk with these files:

- READ.ME describes the files on the disk and the installation procedure (repeated below).
- HP85071.HP is the software program designed to operate with the HP 82335B interface.
- HPIB.DLL is a second file (a dynamic link library) required for use with the above HP interface.
- HP85071.NAT is the software program designed to operate with the National Instruments AT-GPIB, GPIB-II, and GPIB-IIA interfaces.
- HPIBSTAT.EXE is a software program designed to check the HP 82335B interface card and recommend the correct memory exclusion address.

You must copy one or two files to the hard disk for program operation.

To copy the file(s) from the floppy disk (assumed to be system disk A) to the hard disk (assumed to be C), follow these instructions:

1. Insert the HP 85071 program disk in the floppy disk drive.
2. On the hard disk, make a directory dedicated for HP 85071 files.
At the DOS prompt, type:
MKDIR C:\MATERIAL
and press **ENTER**.

HP-IB and GP-IB Interface Card Installation

- HP 82335B Interface Card Users: continue with "For HP 82335B Interface Card Systems," next
- National Interface Card Users: continue with "For National Instruments AT-GPIB, GPIB-II, or GPIB-IIA Interface Card Systems," below

For HP 82335B Interface Card Systems

1. Copy the program from the floppy disk to the hard disk. At the DOS prompt, type:
COPY A:\HP85071.HP C:\MATERIAL\HP85071.EXE
and press **ENTER**

Note



The HPIB.DLL file must be copied into a directory included in the DOS PATH. (The DOS PATH is typically set up by the AUTOEXEC.BAT file during bootup of the PC.)

2. To see the directories in the DOS PATH, at the DOS prompt, type:
PATH
and press **ENTER**
3. Copy the HPIB.DLL file to a directory in PATH. For instance, to copy the file to the WINDOWS directory, at the DOS prompt, type:
COPY A:\HPIB.DLL C:\WINDOWS\HPIB.DLL
and press **ENTER**
4. Add an EMMEXCLUDE line in the [386ENH] section of your SYS.INI file to exclude the memory range of the HP-IB card.
 - a. Run the HPIBSTAT.EXE program.

- b. Add the recommended line. For example, with the card at select code 7, include this line:
EMMEXCLUDE=DC00-DFFF
5. If your system includes an EMM, modify the CONFIG.SYS file to exclude the memory range used by the interface card. Several examples follow, but each EMM uses its own syntax, so you may need to refer to the EMM documentation. The examples are for the HP-IB cards at select code 7:
- For HPEMMGR: DEVICE=HPEMMGR.SYS X=DC00-DFFF
For EMM386: DEVICE=EMM386.EXE X=DC00-DFFF
For HPEMM386: DEVICE=HPEMM386.SYS EXCLUDE=DC00-E000
For HPMM: DEVICE=HPMM.SYS EXCLUDE=DC00-E000
6. Put the original floppy disk away for safe keeping.
7. Use the Windows Setup Program to enable the Program Manager to run the HP 85071 application (see the Microsoft Windows User's Guide).

For National Instruments AT-GPIB, GPIB-II, or GPIB-IIA Interface Card Systems

1. Copy the program from the floppy disk to the hard disk. At the DOS prompt, type:
- COPY A:\HP85071.NAT C:\MATERIAL\HP85071.EXE
and press **(ENTER)**
2. Install the interface card by following the directions in *Using Your GP-IB Software with Microsoft Windows* (a manual supplied with the card).

Note



Both the interface card and the GP-IB software must be versions that operate under Windows 3.0 (or 3.1). In case of difficulty, or to arrange for an upgrade, contact National Instruments.

3. Put the original floppy disk away for safe keeping.
4. Use the Windows Setup Program to enable the Program Manager to run the HP 85071 application (see the *Microsoft Windows User's Guide*).

Hardware Installation

Connect the computer, network analyzer, cables, and peripherals, as shown below. For HP 8753 systems, refer to the network analyzer documentation to connect the test set. For HP 8510 systems, refer to the network analyzer documentation to connect the test set and source.

Different systems require various cables and adapters. These items are listed in HP's *RF, Microwave, & Millimeter Wave Measurement Accessories Catalog* and the *Test and Measurement Catalog*.

1: MS-DOS

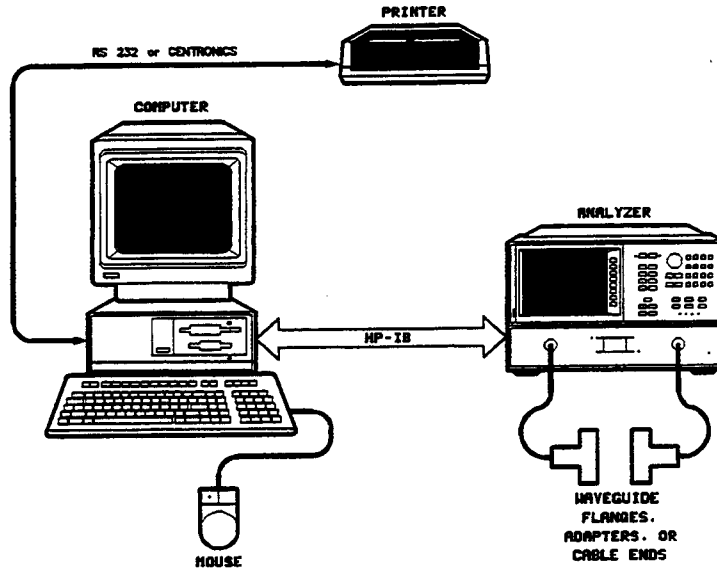


Figure 2-1. Typical MS-DOS System Connection Diagram

The connections for a typical system are shown above. Other systems are similar. Follow these suggestions:

- Computer system: connect keyboard, mouse, etc with instructions provided.
- Printer (or plotter): connect device to Centronics (parallel) connector, RS-232 (serial) connector, or HP-IB connector of computer.
- Network analyzer: connect to HP-IB connector of computer.
- Cables: connect to ports 1 and 2 of the network analyzer (or test set, if they are separate instruments).

If your system uses a printer (or plotter, the term is used generically) and you know how to connect it to the computer, do so now. Otherwise connect it later, when directed.

Starting the HP 85071 Software

1. Start up Windows; at the DOS prompt, type: WIN

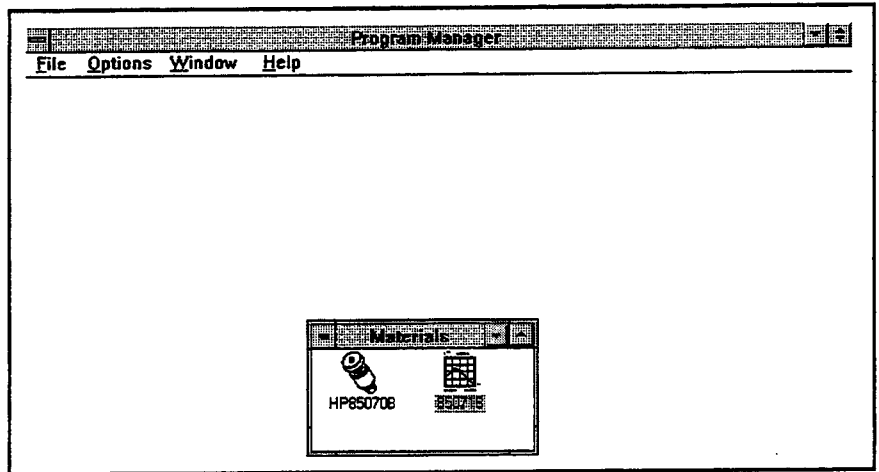


Figure 2-2. Windows Program Manager System

2. Double-click on the HP 85071 icon to start the program. The HP 85071 copyright screen appears with the copyright statement.
3. Click in the OK box. The main menu screen (below) replaces the copyright screen.

Windows Compatible Software Operation

The HP 85071 materials measurement software is ready for operation when the copyright statement is replaced with the main menu screen.

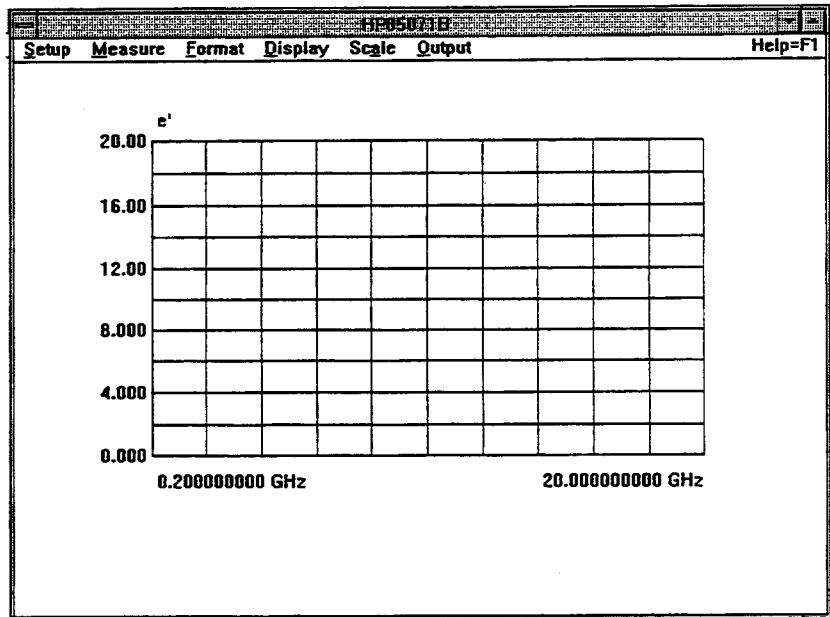


Figure 2-3. HP 85071 Main Menu Screen

1: MS-DOS

Microsoft Windows Basics

Using the HP 85071 materials measurement software is very similar to using other Microsoft Windows application programs. Windows techniques for running application programs include using a mouse, choosing commands from menus, working with dialog boxes, and selecting files. Documentation provided with Windows gives a complete description of the techniques for using Windows. In this section a very brief overview of basic Windows techniques is presented.

What Is a Window?

A window is an area on the screen that displays a running (open) application program. More than one application can run and be displayed at the same time. Additionally, open windows can be stored as icons at the bottom part of the screen. This way, an application can be kept open without showing it as a window in the work area. Each window is divided into several areas, as shown below.

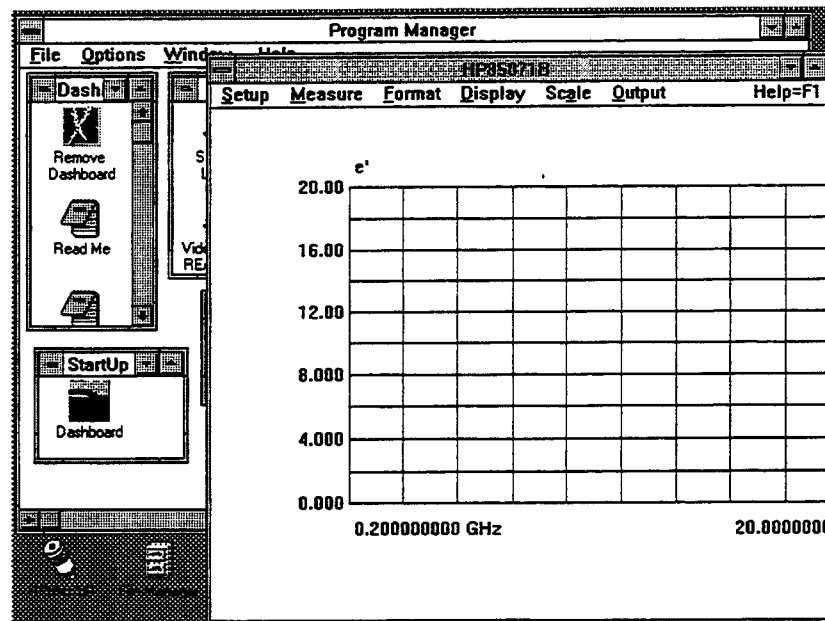


Figure 2-4.

Graphic Showing a Window, Work Area, and Application Icon

How to Use a Mouse

A mouse is a hand-held pointing device. As the mouse is moved across the desk, a pointer moves on the screen. Mice have one, two, or three buttons. All HP 85071 software actions require only one button, the main mouse button. This is the left-most button on the mouse. However, on multi-bottoned mice, you can use the right-most button to trigger a measurement.

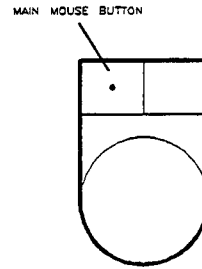


Figure 2-5. Mouse and Location of Main Mouse Button

These terms describe operations with the mouse:

- **Point** to move the tip of the mouse pointer on top of something on the screen.
- **Click** to quickly press and release the mouse button.
- **Double-click** to quickly press and release the mouse button twice in succession.
- **Drag** to hold down the mouse button, move the mouse until the pointer is at the desired location, then release the main button.
- **Release** to quit holding down the mouse button.
- **Select** to point on a menu.

How to Use Drop-Down Menus

Drop-down menus are lists of commands that drop down from the top of the screen when selected. The names of the software menus appear on the menu bar at the top of the window displaying the HP 85071 application program.

To select a menu, either

- Point to the name of the menu and click the mouse button, or
- Press **Alt** (the alternate key) and the underlined letter in the name of the menu. For example, press Alt and "s" for the Setup menu.

To choose a command, do one of the following:

- Point to the name of the command on the menu and click the mouse button
- Use an accelerator key on the keyboard: press **Ctrl** (the control key) simultaneously with the accelerator key. Accelerator keys are identified with a ^ symbol on menus to the right of some of the commands.
- Point to the desired menu with the mouse, drag the mouse downward to point to the desired command, and then releasing the mouse button.

Note



Commands that appear in gray do not currently apply and can not be chosen.

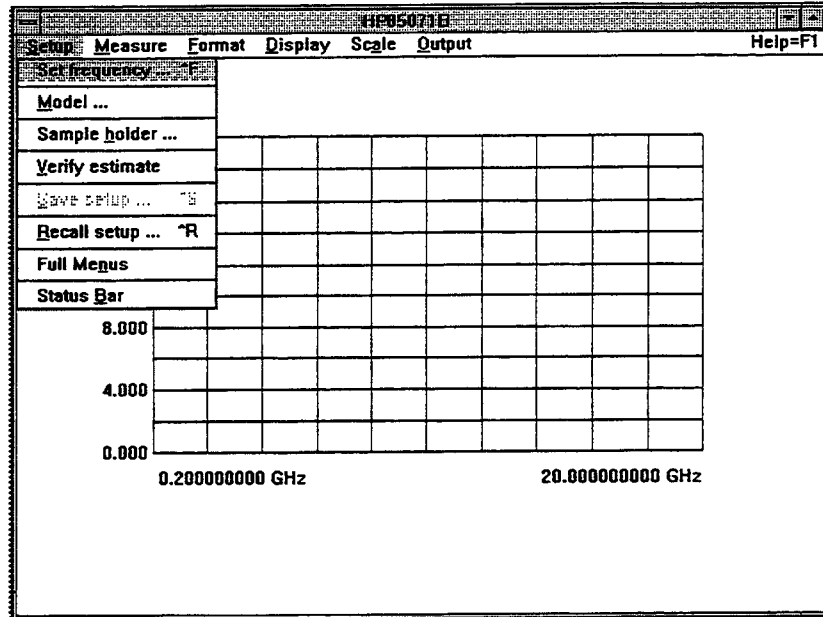


Figure 2-6. Drop-Down Menu and Highlighted, Selected Command
How to Use Dialog Boxes

A dialog box is a request from the program for information required to carry out a command. Commands that end in “...” (an ellipsis) indicate that a dialog box is presented when the command is selected. Dialog boxes must be filled in before proceeding with program operation. Some dialog boxes require that you type in text, others allow you to select options within the dialog box.

To exit a dialog box, select one:

- **OK** keeps all of the changes made in the dialog box
- **Cancel** leaves the dialog box without changing anything

How to Use Dialog Boxes with File Names

Any time a test setup or data file is to be saved or recalled from disk, the program displays a dialog box. Save and recall dialog boxes contain two other types of boxes.

List boxes display file names and directories on the chosen disk (drive).

- To change the disk drive, double-click on the drive name (for example, [-A-]).
- To scan the directory, click the arrows on the scroll bars.
- To display the files in a directory, double-click on the parent directory marker (the directory is one level higher in the system’s disk directory organization).
- To save or recall a file, double-click on the desired file name.
- Note: any of these operations can also be performed by clicking once in the list box then pointing the mouse to **OK** and clicking the mouse button.

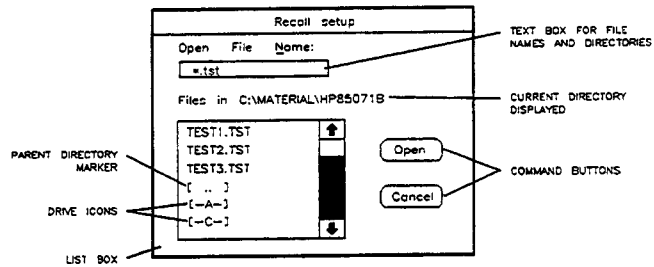


Figure 2-7. Example of Dialog Box

Text boxes provide a space to type directories or file names from the keyboard.

- To see all of the files in a new directory, type the directory name in the text box. Then click **OK**.
- A file name can be typed into the text box. It can begin with a drive letter followed, if needed, by a directory name. The file name itself is usually followed by a three-character file extension. A period separates the file name and extension. For example, C:WINDOWS\HP85071\TEST1.TST is a valid file name.

HP 85071 Windows Software Fundamentals

The HP 85071 materials measurement software program is a Windows application program. The techniques for using the HP 85071 software are the same as the techniques used for running other Windows application programs. The HP 85071 display window and its components are shown below.

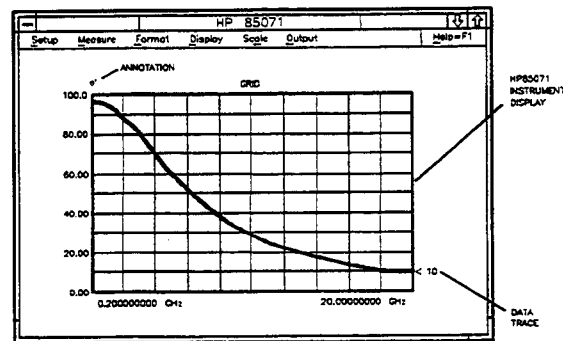


Figure 2-8. Principal Components of the Software Screen

Annotation is the text on the instrument display which describes the frequency range of the measurement, the permittivity of the MUT, the format of the display, the scaling of the display, and any display titles.

Grid is composed of the x-axis and y-axis lines on which the data is plotted.

Instrument display is always present in the window. Most of the time the instrument display presents measurement data as a graph. However the data can also be presented as a tabular listing.

Data trace is a graph of measurement data in the chosen format. It may be the current trace or one recalled from memory.

How to Exit the Program

To exit the program, point at the small box in the upper left-hand corner of the display and click the main mouse button.

Conclusion

Now that you have installed the software and hardware, loaded the program, and learned the basic operator interface techniques, you may be ready to make a measurement. If you still need to install a printer or plotter, continue with "Tips for Using Printers and Plotters under Microsoft Windows." Otherwise, continue with chapter 3, "Measurement Tutorial."

Tips for Using Printers and Plotters under Microsoft Windows

The following information applies generally to any printer (or plotter, the term is used generically) and any MS-DOS personal computers running Microsoft Windows. Therefore, it does not give exact instructions, but rather lists general issues that must be addressed to print successfully.

At best hooking up a printer to a computer is as simple as connecting the two with a cable. However, computers and printers are each designed for maximum flexibility, so that each can be configured for a particular system or purpose. Unfortunately, this means that both must be configured correctly to communicate with each other. Additionally, in the context of the HP 85071 software, the software, Windows, MS-DOS, logical and hardware ports, a cable, and the printer itself must all interact properly to achieve the desired results.

Software

Once you have set up your system, you will use only the interface of the HP 85071 software to measure materials and store or print the results. But now you must relate to other, normally invisible, parts of the system to set it up.

Setting Up Windows

At this time, Windows should have been installed on your computer by running a program named SETUP. If you have not already installed Windows, refer to section 1 of chapter 2 to do so. For now, skip the part of the SETUP program that installs printers by selecting continue.

Control Panel Settings

Through the Windows control panel, you can modify a number of printer parameters. Run the control panel application. It will let you install a driver for your printer. Drivers are programs that translate pictorial information (from an application running under Windows) into commands a printer can understand. Each different kind of printer has a separate driver designed for it.

Before actually running the control panel application, consult your printer manual to determine the following:

- Name and model number of printer (exactly)
- Connection type (serial or parallel)

- Handshake (usually hardware)
- For serial printers:
 - Baud rate (how fast it will accept information)
 - Word length (typically between 4 and 8)
 - Parity (odd, even, or none)
 - Stop bits (usually between 1 and 2)

Add New Printer

To install a driver, access the control panel and select the printer icon. Refer to Windows documentation under "Control Panel" for details. Documentation in the form of ASCII text files is often included on the disk containing the drivers. These are READMEx.TXT files.

To list these files, at the DOS prompt type (for example):

```
dir a:*.txt
```

To read a file, at the DOS prompt type (for example, on the HP PCL driver for HP LaserJets):

```
a:readmehp.txt|more
```

The purpose of all this is to install exactly the right driver for your particular printer. Microsoft supplies many driver programs on floppy disks with the Windows package. You must choose the driver for your printer and install it (from floppy disk to hard disk) before you can print. You can install more than one driver, and can have more than one printer connected to the system at one time; however, only one printer can be used at a time.

Drivers are updated from time to time, so it is possible that a newer and better driver is available (to use in place of the one supplied by Microsoft). Drivers may also be available for printers not supported by Microsoft.

Contact Microsoft at:

- Microsoft Product Support Services 1-206-454-2030

For HP printers and plotters, contact HP at:

- HP Customer Support Center 1-208-323-2551 or
- Boise Printer Division
Printer/Plotter SUPPORT
Building 21 Mailstop 516
11311 Chinden Blvd.
Boise, ID 83714 USA

Connections

After installing the drivers, Windows must be told which computer interface to associate (or connect) with each driver. Access the control panel to do so.

Here, you choose connections such as:

PCL / HP LaserJet on LPT1:

HP Plotter on COM1:

HP QuietJet on None

LPT1 and COM1 refer to the type of hardware interface (or port) through which computers and printers communicate. You must determine which type of interface your printer uses and enter that information. The two main types of interfaces also have associated logical ports. (A logical port is a specific address and interrupt level

which the computer associates with a physical port and through which it communicates.)

Table 2-1.

Interface	Common Name	Logical Ports
Serial	RS-232	COM1, COM2, COM3, COM4
Parallel	Centronics	LPT1, LPT2, LPT3

Logical ports are assigned to physical ports by setting small switches or jumpers on the interface card. These cards are loaded into a "slot" on the rear panel of the computer. Refer to the computer or interface documentation to determine what you have and select the logical port in the control panel accordingly.

A third type of hardware interface exists, called "HP-IB", IEEE-488, or GP-IB. The computer must also have this interface to control the network analyzer.

Communications Port

Control panel settings in Windows can change the serial (RS-232) communications protocol by overriding definitions in the AUTOEXEC.BAT file. AUTOEXEC.BAT is an automatically executed (on power up) batch file located on the root directory. It usually contains commands to configure the communications ports.

Windows ignores AUTOEXEC.BAT commands when controlling a printer via a serial port. However, if a printer was working successfully before installing Windows, it may help to examine AUTOEXEC.BAT (as explained below) and modify the communications port settings to match it.

Parallel ports are not affected by Windows.

Several parameters define the communications protocol used by serial (RS-232) ports. The protocol must match that of the printer. Some printers are capable of changing their serial protocol, via small switches or other controls. Refer to the printers manual for details. These are the parameters and most common values for HP printers:

- BAUD rate: 9600, 4800, 2400, 1200, 19200, 300
- Parity: None, Even, Odd
- Number of data bits (word length): 8, 7, 6
- Number of stop bits: 1, 1.5, 2
- Handshake type:
 - Hardware (DTR, Printer Busy)
 - None (XON/XOFF)

To change the communications protocol used by Windows, access the control panel and enter the changes.

The AUTOEXEC.BAT File

Commands that configure a serial port typically look like this: `MODE COM1:9600,N,8,1` If the printer is connected to a parallel port, the mode command may look like this: `MODE LPT1:,,P`

Note that the `MODE` command can also redirect the printer from one logical port to another. The default printer is usually assumed to be at `LPT1`. If the printer is a serial type, the printer data may be redirected via `LPT1` to `COM1` with this command: `MODE LPT1:=COM1:`

If needed, the `AUTOEXEC.BAT` file can be modified with `EDLIN` or other ASCII text editors. Refer to DOS documentation for details on the “`MODE`” command.

After editing `AUTOEXEC.BAT`, restart the computer to read and execute the edited file. Press `CTRL` + `ALT` + `DEL` to do so.

Other files can have an effect on printer performance, though not as often as `AUTOEXEC.BAT`. Those files are described below in “Other Files Worth Knowing About.”

Cables

A cable is needed to connect printer to computer. There are many cables to choose from. Do not assume that a cable with connectors that merely “mate” correctly at each end will work correctly; this is rarely the case.

The choice of cable is based on:

- Printer model
- Type of interface (serial RS-232, or parallel Centronics)
- Connector type at each end (e.g. 9-pin, 25-pin, or 36-pin)
- Sex at each end (male or female)

For HP printers, the *Computer Users Catalog* provides an excellent look-up table to help choose the correct cable. To request a catalog, or to order cables and adapters with a credit card, call:

HP DIRECT ORDERING at 1-800-538-8787 (toll-free from US)

Outside the US, similar services are usually available locally. Refer to your local phone directory under “HP”, or call these numbers (international toll call to the US):

U.S.A. 408-553-7800 (for information on local services)

U.S.A. 415-857-5027 (to place an order from a non-US country)

Printer Settings

Most printers can be configured or set by the user with small switches, jumpers, or buttons. Settings fall into two categories: serial and mode.

Serial settings select the protocol used by the serial port. The protocol includes BAUD rate, parity, word length, and handshake. See printer’s manual for recommendations, and see “Communications Port” to make sure the computer’s serial port protocol matches the printer.

Mode settings control how the printer responds to certain commands (after being received correctly via the communications port). Settings may affect: response to CR, response to LF, page size, font selection, font size, etc.

1: MS-DOS

Some HP printers have a mode switch that selects between "Alternate" and "HP" mode. Use the "HP" setting, unless using a non-HP driver.

"Define plot . . ." in the HP 85071 Software

Once you are running the HP 85071 software, select **Output** then **Define Plot . . .** to specify the printer driver you want to record measurement results. This selection points to a driver in Microsoft Windows, described above.

If that driver supports more than one printer, the printer must already have been chosen in the control panel. The control panel also selects the hardware port to which the output will be sent, and the protocol (used by a serial port). The port and protocol selected must match the actual port and protocol used (often user settable) on the printer.

Other Files Worth Knowing About

CONFIG.SYS is another file (on the root directory) containing commands which are executed when the computer is started. It may contain references to device drivers such as keyboard, mouse, display, hard disk, etc. CONFIG.SYS may act in the same way as AUTOEXEC.BAT, but it is more common to edit AUTOEXEC.BAT as explained above.

WIN.INI is a file that Windows reads when starting up. It is usually in the Windows directory. It stores default settings of the HP 85071 program such as frequency, number of points, type of sweep, etc.

To edit these settings:

1. Use a text editor.
2. Page down to [HP 85071B].
3. Edit as desired.
4. Save and exit.

Conclusion

This information is only a summary. If you are unable to successfully print or plot within the HP 85071 software program, do not hesitate to review the documentation of Windows, the printer, the cable, and the interface.

SECTION 2: HP BASIC Version of the Software

To run the HP BASIC version of the HP 85071 software program, you must have a HP BASIC-compatible computer as defined below. Additionally, you should be familiar with basic BASIC operations.

System Requirements

The system requires the computers, software, interfaces, printers and plotters, and network analyzers described below.

Computer

The HP 85071 software supports the HP Vectra PC (with BASIC language processor card) and all HP 9000 series 300 computers *except these*:

- HP 9817
- HP 9826
- HP 9837
- HP 9920

The minimum requirements for the computer are these:

- 2.0 MBytes (minimum) of RAM (Random Access Memory)
- High-density, double-sided 3.5 inch flexible disk drive
- HP 82300C (required for HP Vectra PC)
- HP 82304A high performance measurement co-processor (required for HP Vectra PC)

BASIC and Binaries

The computer must have BASIC operating system version 5.0 (or higher) and these binaries:

- COMPLEX
- CS80
- ERR
- GRAPH (GRAPHX if color CRT)
- HPIB
- IO
- MAT
- MS

Other binaries may be present in the BASIC operating system but, when additional binaries are present, the computer may require more than 2.0 MBytes RAM.

The HFS (hierarchical file system) binary can also be used to specify volumes and directories for saving program information.

The HP 85071 software will also run under the HP-UX system with HP-RMB-UX BASIC language support.

2: HP BASIC

IEEE-488 (HP-IB) Interface

The computer must have an HP-IB interface to control the network.

Printers and Plotters

An HP-IB printer can be used to produce tabular listings of measurement results or printer facsimiles of graphed data. A number of HP-IB printers may operate properly with the software but have not been tested. The following printer has been tested to insure compatibility with the program and is therefore recommended for use with the software:

- HP 2225A, ThinkJet printer with HP-IB interface option

HP-IB plotters can also be used to produce hardcopy graphs of the data. A number of HP-IB plotters may operate properly with the software but have not been tested. The following plotters have been tested to insure compatibility with the program and are therefore recommended for use with the software:

- HP 7440A ColorPro eight-pen plotter with HP-IB interface option
- HP 7470A two-pen graphics plotter with HP-IB interface option
- HP 7475A two-pen graphics plotter with HP-IB interface option
- HP 7550A graphics plotter

Network Analyzer and Test Set

The HP 85071 software is designed to work with the network analyzer configurations described below. The default HP-IB address is 16.

- HP 8752A: this network analyzer contains a reflection/transmission test set as part of the analyzer. No other instrumentation is needed to make measurements. The network analyzer has these limitations:
 - “Ref/Tran u & e N-R” model: supported in the accurate sample position definition mode
 - “Ref/Tran e Prec’n” model: not supported
 - “Ref/Tran e Fast” model: supported in the accurate sample position definition mode
- HP 8753A, B, or C: these network analyzers need a companion test set for operation with the software. The following test sets are supported:
 - HP 85044A reflection/transmission test set (subject to the same limitations as the HP 8752A)
 - HP 85046A S-parameter test set
 - HP 85047A S-parameter test set
- HP 8719A or C; HP 8720A, B or C; HP 8722A or C: these network analyzers contain S-parameter test sets as part of the analyzer. No other instrumentation is needed to make measurements.
- HP 8510B or C: this network analyzer requires a companion test set and a synthesized source for operation with the software. Frequency range is determined by the test set and source. All test sets supported by the HP 8510B are supported by the software. The HP 8340, HP 8341, or HP 8360 family sources are supported by the software. HP 8510B or C firmware revision 5.0 or higher is required.

Note

The HP 8510A is not supported by the software but can be upgraded to an HP 8510C with the HP 85103C upgrade kit.

Installation**HP BASIC Installation**

The Hewlett-Packard BASIC operating system (version 5.0 or higher) is required for the HP 85071 software. Additionally, the BASIC system must include the previously listed binaries for operation with the HP 85071 software. Refer to the computer's manual set for additional information on installing or configuring the BASIC operating system.

HP 85071 Software Installation

The HP 85071 software program resides in a single file on the HP 85071 program disk. The name of the file is HP85071B.

The HP 85071 program should be copied to a working disk so that the original disk can be stored as a back-up. Thus, if the (new) working copy is damaged or lost, the back-up is still available.

Use the COPY command in HP BASIC to copy the program to another disk drive. The syntax of the COPY command is:

```
COPY "FILENAME:MSUS" TO "FILENAME:MSUS"
```

where MSUS is short for mass storage unit specifier. MSUSs are typically of the form ",700,1" where ",700" is the drive address and "1" is the drive number. For example, to copy the program from drive address 700, drive 0 to drive address 700, drive 1, type:

```
COPY "HP85071B: ,700,0" TO "HP85071B: ,700,1"
```

Refer to the BASIC operating system manuals for more information of mass storage specifiers and the COPY command.

Hardware Installation

Connect the computer, network analyzer, cables, and peripherals, as shown below. For HP 8753 systems, refer to the network analyzer documentation to connect the test set. For HP 8510 systems, refer to the network analyzer documentation to connect the test set and source.

Different systems require various cables and adapters. These items are listed in HP's *RF, Microwave, & Millimeter Wave Measurement Accessories Catalog* and the *Test and Measurement Catalog*.

2: HP BASIC

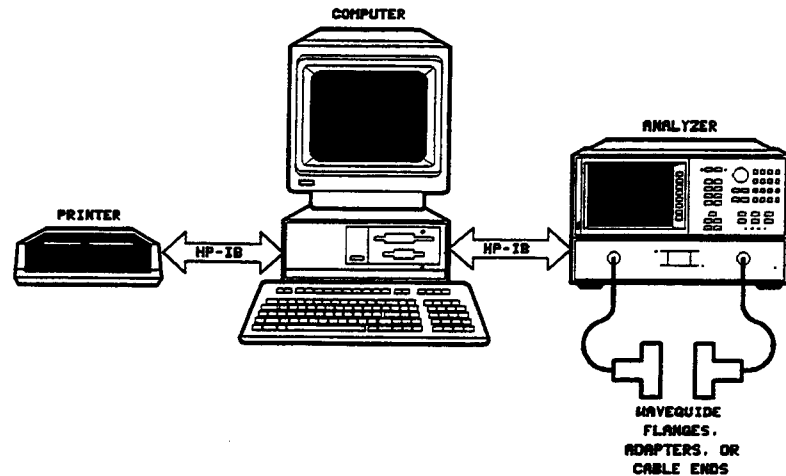


Figure 2-9. Typical HP BASIC System Connection Diagram

The connections for a typical system are shown above. Other systems are similar. Follow these suggestions:

- Computer system: connect keyboard, mouse, etc with instructions provided.
- Printer (or plotter): connect device to HP-IB connector of computer.
- Network analyzer: connect to HP-IB connector of computer.
- Cables: connect to ports 1 and 2 of the network analyzer (or test set, if they are separate instruments). Torque the connectors to five inch-pounds.

Starting the HP 85071 Software

To start the HP 85071 software program, follow these steps:

1. To load the software from the working copy into memory, type LOAD "HP85071B" and press **ENTER** or **RETURN**

When the disk access annunciator in the bottom right of the computer CRT goes out, the program is loaded. If the system does not respond as expected, change the mass storage unit with the MSUS command.

2. To run the program, type RUN or press **RUN**.

The HP 85071 program's copyright screen will now appear displaying the copyright statement.

3. To erase the statement and view the main menu screen, press **ENTER** or **RETURN**.

The HP 85071 software is ready for operation when the main menu screen (shown below) replaces the copyright statement.

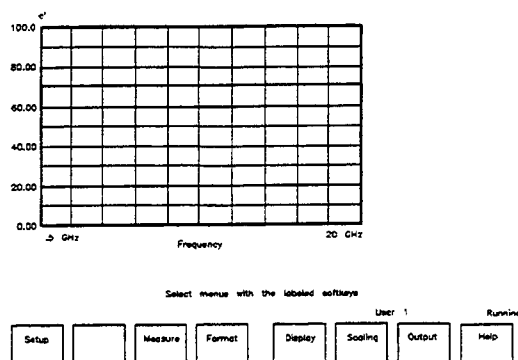


Figure 2-10. HP BASIC Main Menu Screen

HP BASIC Software Operation

As explained below, the HP 85071 software uses softkeys and menus to interact with the operator.

What are Softkeys?

Softkeys are keys which are relabeled to perform different functions as the program runs. The labels for the softkeys are located on the bottom of the computer display. The softkey labels correspond to the function keys (F1 through F8) on the computer keyboard.

The softkeys are labeled with the names of the menus in the program. Pressing a menu softkey brings up that menu of choices for working with the program. Any time the softkeys are labeled, they are active and can be used to select a menu. Sometimes during the program the softkeys are relabeled. When input from the keyboard is required, the softkeys are labeled with terminators for the entry. For example, if start frequency is being entered, the softkeys are re-labeled GHz, MHz, KHz, and Hz.

How to Use Menus

Menus are lists of commands or other menus or both. When a menu is selected in the HP 85071, menu choices, or commands are presented in the upper right portion of the computer's display. The various menus in the software are found on the softkeys at the bottom of the computer display.

To select a menu, press the function key on the keyboard that corresponds to the menu softkey on the computer display. The menu choices will appear on the upper right portion of the display with a cursor arrow pointing to one of the commands in the menu.

To choose a command, use the UP/DOWN cursor (arrow) keys to point the cursor arrow to the desired command. Then press **RETURN** or **ENTER** to select that command. Some commands take immediate action, for example the autoscale command. Other commands require additional keyboard input. Those commands present a menu of selections.

How to Make Menu Selections

Use the UP/DOWN arrow keys to point to the entry parameter or choice. Then press **RETURN** or **ENTER**.

If the choice requires keyboard entry (frequency entry, Y-axis scale entry, etc.), the software displays a prompt for input. The softkeys are labeled with terminator units for the input (GHz, MHz for frequency entry; etc.) Type the desired response to the prompt on the keyboard and use the appropriate softkey to terminate the entry.

To finish the selection, press one:

- **OK** to keep all of the new entries
- **Cancel** to leave the old entries unchanged

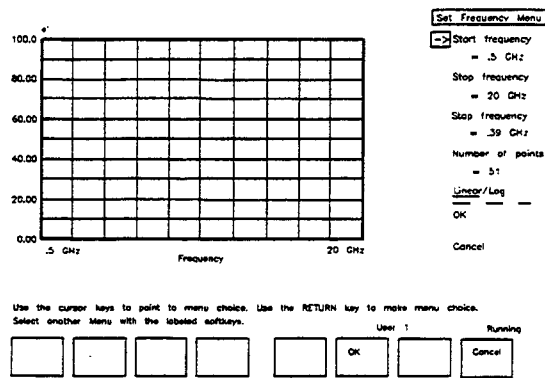


Figure 2-11. HP BASIC Sample Menu Selections

HP 85071 HP BASIC Software Fundamentals

The HP 85071 display window and its components are shown below.

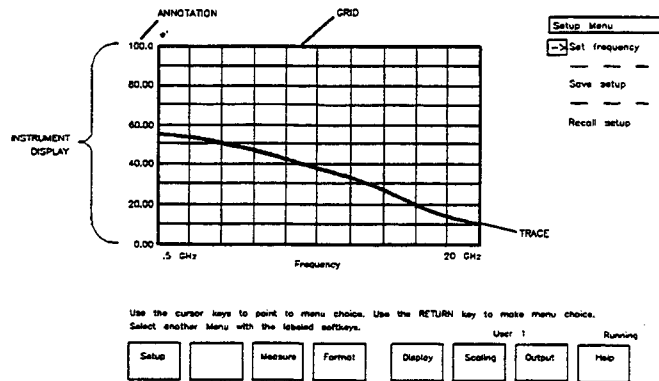


Figure 2-12. Main Menu Screen with Pull-Outs Describing Principal Functions of Components

The instrument display is always present. Most of the time the instrument display presents measurement data as a graph. But it can also present the data as a tabular listing.

These terms refer to parts of the instrument display: **Grid** is composed of the x-axis and y-axis graticules on which the data is plotted.

Traces are graphs of measurement data. They are the measured values of permittivity plotted on the grid. When the software first starts up, no measurement traces are presented.

Annotation is the text on the instrument display which describes the frequency range of the measurement, the format of the display, the scaling of the display, and any display titles.

Conclusion Now that you have installed the software and hardware, loaded the program, and learned the basic operator interface techniques, you are ready to make a measurement. Please continue with chapter 3, "Measurement Tutorial."

