User's Guide

Screen Capture for HP Analyzers

Screen capture software for transferring screen images and trace data from selected Hewlett-Packard RF and optical analyzers to a PC.



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Second Edition

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Screen Capture for HP Analyzers—At a Glance

Screen Capture for HP Analyzers is a powerful tool for further processing of measurement results and enhancing your measurement reports and records. Using Screen Capture for HP Analyzers, you can quickly capture the following information from your network analyzer or spectrum analyzer:

- Screen shots
- Trace-data values for import into spreadsheets

What is a screen shot?

Screen shots are graphics files of the analyzer's display. Screen Capture for HP Analyzers saves them directly on the hard drive of your PC. Graphics file formats and trace data column delimiters can also be selected. You can import captured images into word-processing documents, or add callouts to the images using a popular graphics editing program. You can choose from a variety of graphics formats that are compatible with almost any PC program.

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FROM:	Kent Brown
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Figure 1. Example of a screen shot in a memorandum.

What is a trace-data file?

In addition to screens, Screen Capture for HP Analyzers can save trace data into ASCII text files. It's easy to read these files into a spreadsheet for data analysis. Trace-data files contain the actual measurement data for each trace point along with the key measurement parameters.

For speed, use the QuickCapture mode

Screen Capture for HP Analyzers provides a QuickCapture mode. Because this mode can be pre-configured according to your capture needs, you can perform complicated captures with the click of one button. For example, you can capture a screen shot and a trace data file simultaneously.

Utilities provide command-line operation

Screen Capture for HP Analyzers comes with several utilities. These utilities allow you to save screen captures and trace-data files without displaying Screen Capture for HP Analyzers's graphical user interface and to change the format of the trace data files to fit your specific requirements. Refer to Chapter 3, "Utilities" for detailed information.



Figure 2. Trace-data file in Excel.

Typographical Conventions

The following conventions are used in this book.

Formatting	Information	
key type	Keys or text located on the keyboard or instrument.	
<i>softkey</i> type	Key names that are displayed on the instrument's screen.	
display type	Words or characters displayed on the computer's screen or instrument's display.	
user type	Words or characters that you type or enter.	
<i>emphasis</i> type	Words or characters that emphasize some point or that are used as place holders for text that you type.	

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Warranty Information

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Installing Screen Capture for HP Analyzers

1

What you'll find in this chapter

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Getting Started

Screen Capture for HP Analyzers is an MS-DOS[®] program. The program will run under Windows[®] 3.1, DOS, and Windows 95^{TM} . The program is *not* compatible with Windows NT. In order to run Screen Capture for HP Analyzers, your computer should meet the following minimum requirements:

- IBM 386 PC or better, or 100% compatible PC
- VGA video card or compatible
- MS-DOS 5.0 or greater, Windows 3.1, or Windows 95
- 2 MB of RAM
- 3 MB of hard disk space
- Mouse, optional but highly recommended. The mouse is available onlywhen running Screen Capture for HP Analyzers under Windows 3.1 or Windows 95. Assumes the mouse driver has been installed.

In addition to loading the software, if your analyzer doesn't have an RS-232 port, you'll need to install an HP-IB or GPIB card in your computer. The following cards are compatible with Screen Capture for HP Analyzers:

- HP 82335B or 82335I HP-IB interface cards (DOS based)
- National Instruments[™] AT-GPIB/TNT IEEE-488 interface card (DOS based), model number 776786-01 (National DOS based driver version 2.7 or higher only)
- National Instruments PCMCIA-GPIB IEEE-488 interface adapter, model number 776857-01 (National DOS based driver version 2.7 or higher only) (includes PCMCIA to GP-IB cable)
- Ines PCMCIA to GP-IB IEEE-488 interface adapter (Ines driver version 3.1 or higher) (includes PCMCIA to GP-IB cable)
- RS-232 serial interface (HP 859x series spectrum analyzers only)

A computer to HP analyzer interface cable is also required. Choose one of the following:

- HP 10833A HP-IB cable, 1 meter
- HP 24542U RS-232 cable, 3 meter (9 pin F to 9 pin F) (for HP 859x series analyzers with option 043 only)
- HP 24542G RS-232 cable, 3 meter (25 pin M to 9 pin F) (for HP 859x series analyzers with option 043 only)
- HP 13242G RS-232 cable, 5 meter (25 pin M to 25 pin M) (for HP 859x series analyzers with option 023 only)

CAUTION When capturing trace data files, greater than 1000 points long, from an optical spectrum analyzer connected to the computer via a National Instruments AT-GPIB/TNT card, you should exit Windows and run Screen Capture for HP Analyzers from the DOS prompt. Failure to do so can cause corruption of the trace data file.

When using the National Instruments card, the card's software drivers should be version 2.7 or greater. If you have problems running, upgrade the software to version 2.7 or above.

Because graphics file conversion and downloading are very disk intensive activities, always install Screen Capture for HP Analyzers on the local drive. While there are no limitations to installing the software on a network drive, the limited bandwidth of a network drive may significantly reduce the speed of the program.

Step 1. Install the hardware

1. Install a supported HP-IB or GPIB card in the computer.

Be sure to follow all the instructions in the installation manual that came with the card.

When running Screen Capture for HP Analyzers under MS-DOS, Windows 3.1, or Windows 95 with a National Instruments card, the Screen Capture for HP Analyzers software requires the National Instruments AT-GPIB for DOS drivers. You do not, however, have to install the Windows 3.1 or Windows 95 drivers.

The Ines card requires the DOS drivers even when the program is running under Windows. Edit the *autoexec.bat* file so it contains lines similar to the following:

c:\ines 4882\iepcmcia.exe -io 0 -int 0

c:\ines 4882\ieeeinst.exe /b

2. Connect an HP-IB cable between the computer and the rear panel of the analyzer.

In some installations, an optical spectrum analyzer module is installed in an HP 70001A mainframe and displayed on a separate HP 70004A display. If this is the case, be sure to connect HP-IB cables from *both* of the mainframes to the computer.

3. If using an optical spectrum analyzer, set the rear panel switches of the HP 70004A as shown in the following table:

Table 1-1. HP 70004A Switch Settings

Switch	Setting
HP-IB	ON
SYSTEM CONTROLLER	0

- 4. Turn on the analyzer.
- 5. Turn on the computer so the DOS prompt is displayed.

If you use an HP-IB card

When using Screen Capture for HP Analyzers with an HP 82335 HP-IB card, you do not need to install the software that is supplied with the card. Screen Capture for HP Analyzers contains all of the necessary drivers.

If your computer uses an expanded memory manager, be sure to exclude the address used by the HP-IB card as described in the manual for the card. Edit the line in the CONFIG.SYS file that installs the memory manager. For example, after editing the line might look like the following:

DEVICE=C:\DOS\EMM386.EXE X=DC00-DFFF

Step 2. Prepare for Windows (optional)

If you installed an HP 82335 card and are going to run Screen Capture for HP Analyzers in Windows 3.1 or Windows 95, place a line in the [386Enh] section of the SYSTEM.INI file so the address of the card is excluded. Refer to the installation manual for the card for a complete explanation. The following line is an example for the default select code:

emmexclude=dc00-dfff

Step 3. Install the software

Insert the setup diskette in the computer's diskette drive.

For MS-DOS installations:

1. Enter a:dossetup <destination directory>

Wait until the program is installed. This example assumes the diskette is placed in the computer's "A" drive.

2. Change to the directory where Screen Capture for HP Analyzers is installed.

Type **capture**, and press the Enter key to start.

For Windows 3.1 installations:

- 1. From the Program Manager File menu, select Run.
- 2. In the Run dialog box, enter **a:\setup**. Click OK and then wait until the program is installed.
- 3. Double-click on the Screen Capture for HP Analyzers icon to start the program.

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Figure 1-1. Screen Capture for HP Analyzers program group and icon.

For Windows 95 installations:

- 1. Select Start > Run.
- 2. Enter **a:\setup** in the Run dialog box. Click OK and then wait for the program to be installed.
- 3. Click on the Screen Capture for HP Analyzers icon to highlight it. Select File > Properties.
- 4. Select the Program tab by clicking on it. Select the Close on exit option. A check mark appears when the option is active. Click OK to close the dialog box.
- 5. Double-click on the Screen Capture for HP Analyzers icon to start the program.
- 6. The Information message shown in Figure 1-2 is displayed. Continue with "Step 4. Select the instrument" on page 1-10.



Figure 1-2. The Information message.

Step 4. Select the instrument

The first time Screen Capture for HP Analyzers is run, the Instrument indicator, located in the lower-right corner of the window, indicates no instrument is currently selected.



Figure 1-3. The Instrument Indicator shows no instruments are selected.

To select the HP instrument series from which you are going to capture data, select the desired analyzer on the Communications Setup dialog box.



Figure 1-4. Select the HP instrument and the type of interface.

Parameters	Compatible HP analyzers	
8560-65	HP 8560E, 8561E, 8562A,B, 8562E RF spectrum analyzers HP 8563E microwave spectrum analyzer HP 8564E, 8565E millimeter spectrum analyzer	
8591-96	HP 8591C cable TV analyzer HP 8591E, 8593E, 8594E, 8595E, 8596E spectrum analyzers	
8752-53	HP 8752C RF network analyzer HP 8753D, network analyzers	
70950-52	HP 70950A,B, 70951A,B, 70952A,B optical spectrum analyzers	

The next time the Screen Capture for HP Analyzers program is run it defaults to the last analyzer selected in the previous session. To select a different analyzer, click on the Instrument indicator, press F7, or use the Instrument menu.

Step 5. Configure the interface port

Use the Communications Setup dialog box to select the HP-IB or GPIB address (es) of the instrument with which the Screen Capture for HP Analyzers program will be used. This screen, shown in Figure 1-5, appears the first time you run Screen Capture for HP Analyzers. Select the brand of interface card to be used. Click Next to proceed.



Figure 1-5. The Communications Setup dialog box.

The Interface Select Code must be specified for HP 82335 cards. Cards from other manufacturers do not use an interface select code. Unless you have changed the switch settings on the HP 82335, you will want to use the factory default value of 7.



Figure 1-6. Setting the Interface Select Code for the HP-IB card.

The Ines card requires the card address and interrupt level be specified. When the computer is turned on, these values are displayed on the screen when the autoexec.bat file runs.

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Figure 1-7. Setting the card address and interrupt level for the lnes PC card.

For the HP 70950 series of optical spectrum analyzers:

- 1. Turn on the optical spectrum analyzer mainframe.
- 2. On the display module for the optical spectrum analyzer, press the DISPLAY key.
- 3. Press *Address Map.* This displays the address map showing the MS-IB column and row addresses. HP-IB addresses are located along the bottom of the map, in row 0. Refer to Table 1-2 for the factory default settings.
- 4. Rotate the front-panel knob to view the address of the display and the address of the optical spectrum analyzer module. The factory default values are shown in Table 1-2 below.

If you want to change the addresses used, refer to the optical spectrum analyzer's *Programmer's Guide*.

Settings	Default Values
Address of HP 70004A display	4
Address of HP 70950/1/2A,B,C series analyzer module	23

Table 1-2. Default Factory Settings for Optical Spectrum Analyzers

Note

Only optical spectrum analyzers have different bus addresses for the display and for the analyzer mainframe. For other analyzers it is important to set *both* addresses to the value obtained in the following procedure.

For the HP 8560 and HP 8590 series of microwave spectrum analyzers:

- 1. Turn on the spectrum analyzer.
- 2. Press the CONFIG key.
- 3. Press the *ANALYZER ADDRESS* softkey on the front panel of the analyzer. Note the HP-IB address displayed at the left side of the screen. The factory default is address 18.

For the HP 8750 series of network analyzers:

- 1. Turn on the network analyzer.
- 2. Press the LOCAL key.
- 3. On the front panel of the analyzer, press the SET ADDRESSES softkey.
- 4. To display the address of your instrument, press *ADDRESS:xxxx*, where *xxxx* is the model number of your analyzer.

The HP-IB address of the analyzer is displayed on the left side of the screen. The factory default is address 16.

For RS-232 communications

You must specify the COM port on the PC to which the 8590 series is connected. There is no analyzer address to specify.



Figure 1-8. Setting the COM port when using the RS-232 interface.

When either the RS-232 port of the National Instruments PC MCIA/GPIB interface is selected a warning message is displayed.



Figure 1-9. The RS-232 and National Instruments PC MCIA/GPIB warning message.

This completes "Step 5. Configure the interface port". Before moving on to "Step 6. Set the defaults", confirm the addresses listed in the Bus Settings for Instruments dialog box match the address setting(s) you just obtained.

Use the mouse, or left and right arrow keys, to change address values in the dialog box. Press Tab to move from one field to another. Press Enter when finished.

Step 6. Set the defaults

To enter the default settings, on the File menu, select Capture Defaults. The Capture Defaults dialog box is displayed.



Figure 1-10. The Capture Defaults dialog box.

Select the desired options:

Options	Description	
QuickCapture mode	Selects the type of data to be included in a QuickCapture: screen dump, trace points, or both.	
QuickCapture graphic format	Selects the graphics format for saving screen shots captured in the QuickCapture mode.	
Delimiter between columns	Selects the ASCII character, either commas or tabs, used to separate columns of information in trace-data files.	
Extension to save trace files under	Selects the file extension appended to the file names of trace-data files. The default extension is TXT.	
Include header descriptions	When active, this option adds a description to column headers, in addition to the number printed above each column. For example, "Resolution Bandwidth" and "Number of Points".	
Include tabulated X-axis values	When active, this option causes the corresponding frequency, wavelength, or time value to be printed next to each trace-data point. These values are placed in the first column of the file.	
Include softkeys in graphics	Includes softkeys in the captured image. Softkeys are the function labels displayed on each side of the display graticule. Not all analyzers recognize this option.	
Disable graphic preview	Normally, each image is displayed as it is saved. You can reduce the time required for captures by disabling the graphics preview. Not all analyzers allow HP-GL files to be previewed.	

2

Capturing Screens and Traces

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Capturing Images and Traces

In this chapter, you'll learn how to capture screen shots and trace-data files. Some practical tips and information on file formats are provided that won't take long to read but will help you to achieve the best results.



Figure 2-1. Captured screen.

Capturing Images

Before you start capturing images, determine which graphics format you need. Selecting the wrong format can waste valuable time! Screen Capture for HP Analyzers allows you to select from one of five graphics file formats:

Format	Description	
BMP™	Bitmap format used by MS Windows. Uses filename extension BMP.	
GIF	This bitmap format tends to have smaller file sizes than the other formats. This format is a product of CompuServe Incorporated. Uses filename extension GIF.	
HP-GL	This is a vector format originally designed for plotters. Uses filename extension HGL.	
РСХ	Bitmap format owned by ZSoft Corporation. This format is widely used and supported. Uses filename extension PCX.	
TIFF	Bitmap format owned by the Aldus Corporation. The TIFF files created by Screen Capture for HP Analyzers conform to version 5.0, class B with packbits compression. Uses filename extension TIF.	

Are you going to import your files into your word processor or desktop publishing software? First, capture one screen, and try importing it. Be aware that resizing a BMP, PCX, or TIFF image can degrade its viewed or printed image. The file itself should not be affected. This depends, of course, on the software you are using. If one format doesn't work well, try another one.

The images created by Screen Capture for HP Analyzers are black and white, except for those saved in the HP-GL format, which is color. If you need a color PCX or BMP file, refer to "To create a color PCX or BMP file" on page 2-7.

To view HP-GL files within Screen Capture for HP Analyzers, always add the HGL extension to the file name. If your application expects a different file extension, for example HPG, Screen Capture for HP Analyzers can still capture and save the screen, but will not be able to display it again.

HP-GL file colors may look strange

Sometimes, word processor or graphics programs display captured HP-GL screens using the wrong colors. This occurs because the HP-GL graphics format does *not* contain any color information. Because HP-GL was originally designed for drawing on plotters using default pen definitions, this format simply indicates which pen to use. Your word processor decides which color to assign to different pen numbers.

Another source of potential color problems is the ability to change the colors on some analyzer screens. For example, if you define trace A to be hot pink on the HP 70004A display, the file will not have a hot pink trace when imported and displayed in your word processor. Screen Capture for HP Analyzers views HP-GL images using a set of default colors, therefore the modified color will not be displayed in Screen Capture for HP Analyzers.

Translating files to another format

If you need a format not provided by Screen Capture for HP Analyzers, you can purchase one of the many graphics file translation programs available on the market today. To ensure your graphics file retains its quality, translate bitmap formats to bitmap formats and vector formats to vector formats. Avoid translating vector to bitmap or vice versa. The graphics file formats created by Screen Capture for HP Analyzers are bitmap, except for HP-GL, which is a vector format.

Do not save files directly to a diskette

Sometimes, you may need to place your captured files on a floppy diskette for transferring or storing data. Do *not* save the files directly on the diskette because there may not be enough diskette space available for proper program operation. Instead, save the files to a directory on the hard drive in your computer. Then, copy your files to the diskette. You'll find this method is more reliable and takes less time.

To capture a screen shot

1. From the Capture menu, select Default. The image will be captured and saved using the settings selected in "Step 6. Set the defaults" on page 1-17.

If the default settings are *not* configured, or if you want to save the image in a graphics file format other than the one defined in the Default menu, select one of the five available formats shown in the menu: BMP, GIF, HP-GL, PCL, PCX, or TIFF.



Figure 2-2. The Capture menu.

- 2. Screen Capture for HP Analyzers displays the image after capturing it, unless the Disable Graphic Preview option has been selected. Press the Enter key to continue.
- 3. Enter the name of the file.

Use the suggested file extension characters, or enter your own. HP-GL files must use the HGL extension in order to be viewed by Screen Capture for HP Analyzers. If another extension is used, for example PLT or HPG, you will be able to capture the image, but Screen Capture for HP Analyzers cannot display it.

When you are saving a file, you can change the targeted directory.

To create a color PCX or BMP file

This procedure requires that Screen Capture for HP Analyzers is running in Windows 3.1 or Windows 95.

- 1. Start Paintbrush^{TM 1}, and minimize it to an icon.
- 2. Run Screen Capture for HP Analyzers in a full MS-DOS window.
- 3. Use Screen Capture for HP Analyzers to capture and view an HP-GL file. (Make sure the Disable Graphic Preview option is not selected.)
- 4. While the file is displayed, press Alt-PrntScrn to copy the display to the Clipboard.
- 5. Press Alt-Tab to switch to the Paintbrush window.

You can use another graphics program to accomplish this task, or, you can simply paste the file into your favorite application and skip to Step 7 be low.

- 6. Maximize the window, and on the Edit menu select Paste to insert the file from the clipboard.
- 7. Save the file in the PCX or BMP format.
- 8. If you need another color bitmap format, use the *imgconv.exe* utility provided with Screen Capture for HP Analyzers. Refer to Chapter 3, "Utilities" for information on using this utility.

1. Paintbrush is a trademark of ZSoft Corporation.

To view a captured image file

Screen Capture for HP Analyzers was designed to view files created by Screen Capture for HP Analyzers.

Screen Capture for HP Analyzers may not be able to view files created by other programs.

- 1. On the File menu, select View. The Open File dialog box opens.
- 2. Enter the name of the file you wish to view in the Filename field.
- 3. The selected image will be displayed until you press the Enter key.

Capturing Trace Data

Captured trace-data files contain the actual measurement data for each displayed trace. For example, if traces A and B are displayed on the display of the spectrum analyzer, the corresponding trace-data file contains data for both trace A and trace B. Because trace-data files are ASCII files, you can import them into spreadsheets and edit them in word processors.

Trace files include a header

At the start of the file, before any trace data, there is a header section. The header consists of several lines that describe the file and the settings of the spectrum analyzer at the time the data was captured. By setting the defaults of the Screen Capture for HP Analyzers software, you can prevent descriptions from being added to the values listed in the header. Table 2-1, Table 2-2, and Table 2-3 show different possible file headers.

Trace data is placed in columns

After the header, the remaining lines contain trace data. Each data point is placed on a separate line. If the file contains data for more that one trace, for example trace A and trace B, the data is placed in separate columns. On each line, the columns of data are separated by a delimiting character. Although the default delimiter is the tab character, you can change it using the Capture Defaults dialog box. Refer to "Step 6. Set the defaults" on page 1-17 for information on setting the default options. You can also choose to add x-axis values to your trace-data files.

The frequency, or wavelength, of each trace point, *i*, is calculated according to the following formula:

$$f_i = f_{start} + \frac{i-1}{N} \times f_{span}$$

where N is the total number of points in a given trace. The actual number of trace points depend on the analyzer from which the data is taken.

If the x-axis units are time, the time value of each trace point, *i*, is calculated using the following formula:

$$t_i = \frac{i-1}{N} \times t_{sweep}$$

Table 2-1, Table 2-2, and Table 2-3 show example spreadsheet files. The application default values are listed in each table title. Notice that the values listed in the header on Table 2-1 are clearly labeled. Also notice that three traces are included and that a comma character was selected to separate the data between columns.

Number formats are not changed

Screen Capture for HP Analyzers does not alter the format of the data or the trace length. For example, if logarithmic data is displayed on the spectrum analyzer, the file will contain logarithmic data. Data values are listed without units. (If units were included, the spreadsheet program would interpret the data as text instead of numbers.) For example, -6.94 dBm is recorded in the file as -6.94. Linear data is listed using scientific notation. For example, the number 0.00192 is listed as 1.92E–3. All values are listed in SI units (International System of Units), such as meters and seconds, except power.

Customizing the format of the trace data

Each analyzer that Screen Capture for HP Analyzers supports has a corresponding file in the Screen Capture for HP Analyzers directory with the extension MOD. By modifying these MOD files with a text editor, you can tell Screen Capture for HP Analyzers to print trace data to a specific decimal position, to only print portions of a trace, and so forth. Refer to Chapter 3, "Utilities" for more information.

Simultaneous captures with QuickCapture

If you selected simultaneous image and trace-data file captures, Screen Capture for HP Analyzers does not prompt you for the name of the trace-data file. Instead it will use the base file name entered for the image file and append the appropriate file extension. For example, if you captured an image file named *test.tif*, Screen Capture for HP Analyzers would automatically create a tracedata file named *test.txt*.If a file with this name already exists, Screen Capture for HP Analyzers will prompt you for a new filename before overwriting it.

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Applitude units: JBN	
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Start were ender 177533745	
[14] C. H. M. LEWIS MANUAL PROPERTY AND INCOMENDATION AND INCOMENDATIONALIZIA AND INCOMENDATIONALIZIA AND INCOMENDATIONALIZIANA AND INCOMENDATIONALIZIA AND INCOMENDATIONALIZIA INCOMENDATICI AND INCOMENDATICI AND INCOMENDATICA AND INCOMENDATICA AND I	
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-stand - monthly address and - monthly	
Navelength (sp) Trace & Trace & Trace C	
1357 060631-59 36 -65 35 -62 51	
1357 25694, -61 46, -63 49, -63 56	
1357 50125 -57 94 -63 50 -69 19	
1357.7515662.9864.3463.86	
Git-2 Full F5 Defaults 75 Trace data (text)	

Figure 2-3. Captured trace-data file from an optical spectrum analyzer.

Table 2-1. Trace-data file with default options: [X] Include header descriptions [X] Include tabulated x-axis values

```
Tue Aug 15 15:55:25 1995
Instrument ID: ,HP70950A
Amplitude units: ,DBM
Start wavelength: ,1.3565E-6
Stop wavelength: ,1.5565E-6
Resolution bandwidth: ,2.00E-9
Reference level: ,-16.75
Sweep time: ,92.160E-3
Sensitivity: ,-57.54
Video bandwidth: ,19.3E+3
Trace A number of points: ,800
Trace B number of points: ,800
Trace C number of points: ,800
Wavelength (nm), Trace A, Trace B, Trace C
1356.50000, -57.80, -64.36, -63.06
1356.75031,-60.76,-63.28,-62.43
1357.00063,-59.36,-65.26,-62.91
1357.25094,-61.46,-63.49,-63.56
```

Table 2-2. Trace-data file with default options: [] Include header descriptions [X] Include tabulated x-axis values

```
Tue Aug 15 15:59:55 1995
HP70950A
DBM
1.3565E-6
1.5565E-6
2.00E-9
-16.75
92.160E-3
-57.54
19.3E+3
800
800
800
Wavelength (nm), Trace A, Trace B, Trace C
1356.50000,-57.80,-64.36,-63.06
1356.75031,-60.76,-63.28,-62.43
1357.00063,-59.36,-65.26,-62.91
1357.25094,-61.46,-63.49,-63.56
```

Table 2-3. Trace-data file with default options:

[X] Include header descriptions [] Include tabulated x-axis values

```
Tue Aug 15 16:01:53 1995
Instrument ID: ,HP70950A
Amplitude units: ,DBM
Start wavelength: ,1.3565E-6
Stop wavelength: ,1.5565E-6
Resolution bandwidth: ,2.00E-9
Reference level: ,-16.75
Sweep time: ,92.160E-3
Sensitivity: ,-57.54
Video bandwidth: ,19.3E+3
Trace A number of points: ,800
Trace B number of points: ,800
Trace C number of points: ,800
Trace A, Trace B, Trace C
-57.80,-64.36,-63.06
-60.76, -63.28, -62.43
-59.36,-65.26,-62.91
-61.46,-63.49,-63.56
```

To capture a trace-data file

- 1. On the Capture menu, select Trace Data (ASCII) or press F6. If the default settings are *not* configured, select Trace Data (Text).
- 2. Screen Capture for HP Analyzers displays the file after capturing it. You are prompted for a filename.
- 3. Enter the name of the file in the Filename entry field. When saving a file, you can change the targeted directory. When you are satisfied with your entry, press Enter.

To view a trace-data file

- 1. On the File menu, select View. The Open File dialog box opens.
- 2. Enter the name of the file you wish to view in the Filename field.
- 3. The selected trace data file will be displayed until you press the Enter key.

To import trace data into Microsoft Excel[™] 5.0

- 1. Capture a trace-data file. Refer to "To capture a trace-data file" above.
- 2. Start Microsoft Excel.
- 3. Select File and then Open.
- 1. On the File menu, select View. The Open File dialog box opens.
- 2. Select Text Files in the List Files of Type field.
- 3. The "Text Import Wizard" will step you through importing the file. Tracedata files *are delimited.*

To import trace data into Lotus 1-2-3 release 5

- 1. Capture a trace-data file. Refer to "To capture a trace-data file".
- 2. Start Lotus 1-2-3.

If you are using a Windows version:

- 3. On the File menu, select View. The Open File dialog box opens.
- 4. Select Text File in the List Files of Type field.
- 5. Click on Text Options.
- 6. Select either Separator TAB or Separator comma depending on the delimiter used in your file.
- 7. Click on OK.

Utilities

3

Utilities

What you'll find in this chapter

Contents

tracepts.exe 3-4 gxfile.exe 3-11 mkhpgl.exe 3-12 imgview.exe 3-13 viewhpgl.exe 3-14 imgconv.exe 3-15 When you installed Screen Capture for HP Analyzers, several utilities were copied into the Screen Capture for HP Analyzers directory. These utilities allow you to capture, convert, and view files from the MS-DOS command line. Because they don't display windows or menus, these utilities are ideal for applications such as MS-DOS batch files.

Utility	Description	
tracepts.exe	Downloads a trace-data file from the analyzer. The format of the trace- data file is determined by the .mod script for that instrument model.	
gxfile.exe	Downloads an HP-PCL or HP-GL file from the analyzer. Always run mkhpgl.exe on the captured file.	
mkhpgl.exe	Prepares downloaded HP-GL files for viewing and saving.	
imgview.exe	Displays BMP, GIF, PCX, and TIFF files captured by Screen Capture for HP Analyzers.	
viewhpgl.exe	Displays HP-GL files captured by Screen Capture for HP Analyzers.	
imgconv.exe	Converts raster data from the analyzer to one of the supported graphics file formats.	

Utilities tracepts.exe

tracepts.exe

Downloads a trace-data file from the analyzer, using the output-formatting and bus commands appropriate for that instrument model. The script language of the **.mod** file that tells tracepts.exe how to interact with each instrument is outlined below, for the benefit of users who wish to change how the trace data appears in the output file. (If no output filename is provided, the instrument writes the trace data to the console.)

Command

tracepts [/I][/P][/T][/D][/W][/H][/N] [/O<output filename>]
<model script filename>

Argument	Description	Default Value
/I <i>x</i>	Interface select code [0-16]	7
/P <i>x</i>	Primary address [0-30]	18
/Тх	Timeout (seconds). Zero disables timeout.	5.0
/Wx	Minus (–) prevents x-axis values from being added to the file. Plus (+) adds x-axis values.	plus (+)
/Hx	Minus (–) turns header labels off. Plus (+) turns header labels on.	minus (–)
/Dx	Delimiter [0-255]	comma (ASCII 44)
/N	Use National Instruments GPIB card	use HP 82335 HP-IB card
/Eaxb	Use Ines card at address <i>b</i> , interrupt <i>a</i>	
/x	Use RS-232 prot COM x	

Table 3-1. Command Arguments

Example

tracepts /I7 /P18 /W- /H- /D44 /Oc:\test.txt 859x.mod

Script Language Syntax

The utility program tracepts.exe does not have any knowledge of a particular instrument's bus command set, or other device-dependent information, such as how many traces the analyzer stores and how many data points are collected for each trace. This information is contained externally in a text file, so that it is easy to alter the program's behavior when interacting with a particular analyzer. The bus-oriented script language that the file is written in has features, such as conditional (if-else) statements and formatted printing, besides commands to coordinate the exchange of data between the PC and the analyzer.

The most basic script file would look something like:

```
buckets 101
send TRACE?;
transfer
dump
```

The first statement assigns the value 101 to the variable *buckets*. The second sends an ASCII command string across the bus to the analyzer. The third statement accepts from the analyzer 101 byte pairs representing the amplitude samples, which are printed out in tabular form by the fourth statement. The analyzer's "TRACE?" query was terminated with a semicolon (;), but it could just as well have been terminated with a linefeed (\n).

Utilities tracepts.exe

Variables

The following is a more complex script file, which queries a particular analyzer for the number of data samples in the trace, as well as their frequency range, and prints only the first ten samples in scientific notation with two significant figures beyond the decimal point:

```
send POINTS?;
buckets
send FSTART?;
lower
send FSTOP?;
upper
send TRACE?;
format %.2f
transfer
format %g
dump 0 9
```

In this case, values were assigned to three variables (*buckets, lower* and *upper*) by the analyzer itself. Each assignment was preceded by a query across the bus and, since the variable's name wasn't followed by a value, tra cepts.exe converted the analyzer's response into a real number and stored it in the variable. A fourth variable, *format*, was explicitly set twice: first to "%.2f" for the amplitude column and then to "%g" for the frequency column.

The *format* variable must be a valid conversion string for the standard C function printf(). A percent sign (%) indicates the start of the conversion; it may be followed by a field width. The presence of a decimal point followed by another number indicates how many digits after the decimal point are desired. A final "e" or "f" character forces real numbers to be printed in scientific notation or fixed-point, respectively. (If the last character is "g", they are printed in either scientific notation or fixed-point, whichever is the more compact.) The commands pop, transfer, and dump require this kind of format. A transfer ascii command, on the other hand, requires a string format, which means a percent sign (%), then a field width (optional), then a decimal point and the maximum number of characters from the string to print (optional), followed by an "s".

The only variable that tracepts.exe requires in order to perform a trace-data transfer is *buckets*. If no other ones are set, however, the data points for the trace will be printed exactly as they are returned from the instrument: as integers in arbitrary "measurement units" decided by the analyzer. For each two-byte integer *x*, tracepts.exe prints amplitude values according to the relation:

$$reflevel + (db/div) \cdot \left(afactor \cdot \frac{x}{fullscale} + aoffset\right)$$

where *reflevel*, *db/div*, *afactor*; *fullscale*, and *aoffset* are variables whose default values are 0, 1, 1, 1, and 0 respectively. The units to be printed at the top of the column of amplitude data can be assigned to the string variable *aunits*.

Similarly, the variable *funits* can be set to units other than "Hz," and the frequency value corresponding to the nth trace point is printed according to the following relation involving the variables *lower*, *upper*, *buckets*, *foffset*, and *ffactor*.

$$ffactor \cdot \left(lower + n \cdot \frac{upper - lower}{buckets - a} \right) + foffset$$

In summary, script language variables control the way frequency and amplitude values are transferred, converted into meaningful units or printed to the output file. Variables may be set in one of two ways: the variable's name may precede the assigned value (separated from it by at least one space) or the name may appear alone on the line, in which case its value is read from the analyzer. In the latter case, a send command querying the analyzer must precede the assignment.

Commands

The first sample script contained the commands send, transfer, and dump. Script commands are executed in order, and directly control either the activity on the bus or the output file content. The table below summarizes them.

Syntax	Example	Description
timestamp	timestamp	writes the current date and time to the output file.
print	print	prints the delimiter character (comma by default) to the ouput file. Ignored if the /H-option is specified.
print <text string=""></text>	print Trace A\n (i.e., "Trace A" plus a linefeed.)	prints <text string=""> to the output file. (if the /H- option is specified, onlyprint \n lines are processed.)</text>
include <filename></filename>	include generic.inc	processes script commands in <filename>, then resumes at the next statement in the current file.</filename>
send <bus command=""></bus>	send CLEAR;	sends <bus command=""> to the analyzer.</bus>
echo	echo	copies the next line output by the analyzer to the output file.
clear	clear	sends a "device clear" command to the interface card.
transfer [<skip1> [<skip2>]]</skip2></skip1>	format %10.4g transfer 10	transfers from the analyzer to the PC a series of two-byte integers, the number of which is determined by the <i>buckets</i> variable. The first <skip1> bytes and the last <skip2> bytes are ignored. The <i>format</i> variable's value must be of the form "%e", "%f", or "%g".</skip2></skip1>
transfer ascii [<conv. string="">]</conv.>	<pre>format %.10s transfer ascii %*[^,]%*c%s (ignore the first comma on each line from the analyzer and the characters preceding it, but transfer the next ten characters on the line.)</pre>	transfers from the analyzer to the PC a series of line-feed-terminated ASCII lines, the number of which is determined by the <i>buckets</i> variable. The <i>format</i> variable's value must be of the form "%s". If <conv string=""> is present, it must contain at least one "%[]" or "%s" to extract the desired characters, and may contain one or more "%*" that signify skipped portions of the line.</conv>

Table 3-2. Commands in the TRACEPTS.EXE Script Language

Syntax	Example	Description
dump [<start><end>]</end></start>	format %g dump 0 99	copies to the output file the data that was accumulated by any previous transfer commands. All data points from 0 to <i>buckets</i> -1 are copied unless <start> and <end> are specified. The <i>format</i> variable affects how the frequency values (i.e., the leftmost column) are printed. If the /W- option was specified, they are not printed at all.</end></start>
exit	exit	causes tracepts.exe to terminate and return control to DOS.
rpncalc + - * / ^ x	push 9 push 5 rpncalc + pop (will print "14" to the output file)	performs the indicated operation on the two real numbers most recently pushed onto the stack (with the push command described below). The result of the operation replaces them. "^" means exponentiation; "x" means swap the numbers, leaving them on the stack.
push [value]	push	as in the previous example, pushes a real number onto the stack. If no value follows the command, one is read from the analyzer in ASCII format.
рор	format %f pop	prints the topmost value on the stack to the output file. The value of the <i>format</i> variable must be of the form "%e", "%f", or "%g".

Table 3-2. Commands in the TRACEPTS.EXE Script Language (Continued)

Utilities tracepts.exe

Program flow

There are two additional script language statements that, instead of copying the analyzer's output in some way, take such output into consideration and decide which commands in the file get executed next. They are *if response* and *if matches*. Their syntax is as follows:

```
if <condition>
{
    * statements to process should <condition> be true
}
else
{
    * statements to process should <condition> be false
}
```

The *if* statement, the opening and closing braces, and the *else* statement each must appear on their own individual lines. An *if* statement must always be preceded by a *send* command that queries the analyzer for an ASCII response, since the purpose of the *if* is to cause tracepts.exe to behave differently depending on the status of the analyzer. Whether to use *response* or *matches* as the first keyword in the condition depends on whether the analyzer's reply to the last query is to be tested against a specific series of characters, or against its reply to a second query. An illustrative example is shown below:

```
send ID?;
if response HP856
{
   send FA?;
   if matches FB?;
   {
     * FA? and FB? generated the same response
     print Spectrum analyzer is in zero-span mode.\n
   }
}
else
{
   * ID? didn't generate a response like "HP8563E", etc.
   print Not a Hewlett-Packard 856x-series analyzer.\n
}
```

Note that an asterisk (*) begins a comment line, and that if statements can be nested.

Utilities gxfile.exe

gxfile.exe

Downloads an HP-PCL or HP-GL file from the analyzer. You must append an explicit command (from the analyzer's HP-IB command set) that instructs it to begin a print or plot of the data on its screen to the HP-IB bus. If the output file is in HP-GL format (in response to a plot command), always run mkhpgl.exe in order to make important modifications to the file.

To create BMP, TIFF, PCX, or GIF format files, first capture an HP-PCL file, use mkhpgl.exe to modify the file, and then use imgconv.exe to convert the modified HP-PCL file to the desired format.

Command

gxfile [/I] [/P] [/T] [/N] /S<command> <output filename>

Argument	Description	Default Value
/lx	Interface select code [0-16].	7
/Px	Primary address [0-30].	18
/Тх	Timeout (seconds). Zero disables timeout.	5.0
/S <command/>	Command from analyzer's HPIB command set that begins a print or plot. The command string may not contain any spaces.	none (mandatory)
/N	Use National Instruments GPIB card.	use HP 82335 card

Table 3-3. Command Arguments

Example

gxfile /I7 /P18 /T0 /SPRINT0;

Utilities mkhpgl.exe

mkhpgl.exe

This utility prepares downloaded HP-GL files for viewing and saving. To ensure successful captures, always use this utility on all HP-GL files. (Of course, all this is done automatically when Screen Capture for HP Analyzers is used.)

Command

mkhpgl.exe <input filename> <output filename>

Example

mkhpgl.exe temp.hgl fig1.hgl

Utilities imgview.exe

imgview.exe

Displays BMP, GIF, PCL, PCX, and TIFF files.

Command

imgvview <input filename>

Example

imgvview figl.pcx

Utilities viewhpgl.exe

viewhpgl.exe

Displays HP-GL files.

Command

viewhpgl <input filename>

Example

viewhpgl pict1.hgl

imgconv.exe

Converts files to a different graphics file format. If the **/F** argument is not specified, **imgconv** selects the file types based on the filename extensions.

Command

imgconv <input filename> <output filename> [/F]

Input and output files must be one of the formats listing in the following table.

Table 3-4. Command Arguments

Argument	Description
/FBMP	Creates a BMP file.
/FPCL	Creates a HP-PCL file.
/FTIF	Creates a TIFF file.
/FPCX	Creates a PCX file.
/FGIF	Creates a GIF file.

Example

```
imgconv test.pcl test.tif
```

or

imgconv test.pcx abcd.efg /ftif

Utilities

imgconv.exe

4

Reference

What you'll find in this chapter

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