

S26UT00
2782/PC UTILITY SOFTWARE

FOR

2782 SPECTRUM ANALYZER
with IBM PC/AT or COMPATIBLES

Please check for **CHANGE INFORMATION**
at the rear of this Manual

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Tektronix
COMMITTED TO EXCELLENCE

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General Information

Introduction

This 2782/PC Utility Software package (S26UT00) is an integrated package that consists of a Users manual and three S26UT00 floppy disks. This package enables you to simplify and automate many spectrum analyzer operations and measurements. You select applications and utility routines through menu-driven operation.

This software package works with a Tektronix PEP 301 or PEP 303 System Controller, IBM-AT compatible computer, or most other MS-DOS-compatible computers. The routines for this program are designed for a color monitor so the displays will be in color. Controller requirements, in addition to other instrument and software requirements, are listed in Table 1-1.

Some of the operations and measurements that can be performed with this software package and the 2782 Spectrum Analyzer are:

- Acquire waveforms from the 2782
- Graph waveforms on the display monitor
- Store waveforms to disk
- Recall waveforms from disk
- Send waveforms to the 2782
- Send commands or queries to the 2782
- Perform Spectral/Time Display (waterfall) routines
- Perform harmonic distortion measurements
- Perform fast band searches
- Perform precise band searches
- Perform fast spur searches
- Perform precise spur searches
- Recall band or spur search information from disk

General Information

The 2782/PC Utility Software package is designed to operate with a Color Graphics Adapter (CGA), Enhanced Graphics Adapter (EGA), or Video Graphics Array (VGA) card and a compatible color display monitor for a Tektronix PEP, IBM-PC, or compatible controller (computer). Menus and routines are selected with the keyboard cursor arrow keys or by typing the first letter of a menu selection.

The S26UT00 software may be copied to other floppy disks or to a hard disk. The software contains executable (.EXE) files, auxiliary files, and a run-time function library module (for Microsoft QuickBASIC). The procedure and information necessary for creating working floppy disks or for hard-disk installation is described under *Software Installation* in Section 2 of this manual.

Equipment and Accessories

Table 1-1

<p>REQUIRED</p>	
<p>Controller</p>	<p>Tektronix PEP 301, PEP 303, IBM PC/AT or compatible with Microsoft MS-DOS 3.0 (or higher) and at least 512 Kbytes of RAM memory.</p>
<p>Color Graphics Adapter & Monitor</p>	<p>Color Graphics Adapter (CGA), Enhanced Graphics Adapter (EGA), or Video Graphics Array (VGA) and compatible color or monochrome monitor.</p>
<p>Disk Drive(s)</p>	<p>One of the following configurations:</p> <ul style="list-style-type: none"> • One hard disk (20 Mbyte or larger recommended) and one 5.25 " floppy disk drive. • One 5.25 ", 1.2 Mbyte floppy disk drive. • One 3.5 ", 720 Kbyte floppy disk drive. • One 3.5 ", 1.44 Mbyte floppy disk drive.
<p style="text-align: center;"><i>NOTE</i></p>	<p><i>A second floppy disk drive is recommended on non-hard disk systems. 2782/PC Utility Software is supplied on 5.25 ", 360 K floppy disk media, so a 5.25 " floppy disk drive is necessary to build bootable floppy disks.</i></p>
<p>GPIB Interface</p>	<p>Tektronix S3FG120 or National Instruments PC2/PC2A card.</p>
<p>Spectrum Analyzer</p>	<p>Tektronix 2782.</p>
<p>GPIB Cable</p>	<p>Tektronix Part No. 012-0630-03.</p>
<p>OPTIONAL</p>	
<p>GPIB Interface Package</p>	<p>Tektronix S26UT00 Option 10.</p>
<p>Microsoft QuickBASIC</p>	<p>Tektronix S3FG500.</p>
<p>Color Copier *</p>	<p>Tektronix 4696 Ink Jet Color Copier.</p>
<p>Printer *</p>	<p>Any IBM graphics-compatible.</p>

* Optional equipment required to print hard copies

Getting Started

This section describes:

- Installing the 2782/PC Utility Software on a high-density floppy disk or hard disk
- Installing and interconnecting the equipment used with the software
- Preparing the program for initial operation.

Unpacking and Initial Inspection

Refer to the *2782 Operators* manual for unpacking and initial preparation instructions. Be sure that all the accessories required for this software package are included. (See *Table 1-1* for required equipment and accessories.)

To ensure best results, perform an operational performance check, as described in the *2782 Operators* manual, before the spectrum analyzer is connected to the system. If the spectrum analyzer does not perform properly, contact your service department or a Tektronix representative. Refer to the *Safety Summary* at the front of the *2782 Operators* manual before connecting it to a power source.

Software Installation

The following information describes the materials required and the procedures needed to create a S26UT00 bootable floppy disk and how to install the software on a hard disk. The floppy disks supplied by Tektronix with the 2782/PC Utility Software package will not boot and may not run the software properly. You will use these floppy disk files to build a working copy (DOS bootable) floppy disk or hard disk files. It is a good idea to make spare (backup) copies of the S26UT00 Master floppy disks.

Creating Working Copy Floppy Disks

The following procedure describes how to create a bootable "working copy" floppy disk. One of the Master floppy disks contains an ASCII **README.DOC** file with information not found in this manual. To view this file on your PC monitor screen, insert the Master disk in drive A and type:

TYPE A:README.DOC {↵Enter}

To print this file on your printer, type:

PRINT A:README.DOC {↵Enter}

After you have created a working copy of the S26UT00 software, we suggest you return the S26UT00 Master floppy disks to their protective envelopes and store them in a suitable place. We also suggest that you complete and return the Registration Card at the rear of this manual to receive any updates to the software and documentation.

Equipment and Materials Needed to Create a Working Floppy Disk

- a. A Tektronix PEP, IBM PC, or compatible controller with one 5.25 ", 360 Kbyte or 5.25 ", 1.2 Mbyte floppy disk drive **and** one floppy disk drive in one of the following high-capacity formats: 5.25 ", 1.2 Mbyte or 3.5 ", 720 Kbyte or 3.5 ", 1.44 Mbyte.
- b. One blank floppy disk whose format matches the high-capacity drive.
- c. DOS 3.0 (or later) version software.
- d. **FORMAT.COM** (a DOS utility file).

Creating a Bootable S26UT00 1.2 Mb Floppy Disk

NOTE

This section describes how to create a bootable 1.2 Mb floppy disk on a system containing an A drive (1.2 Mb) and a B drive (360 Kb). If your system is configured differently the following procedure will need to be modified. Skip this section if you are installing the 2782/PC Utility Software on a hard disk.

1. Place a DOS floppy disk into drive **A** and boot your system by switching the power on (hard boot), or by pressing **{Ctrl} {Alt} {Del}** simultaneously (soft boot).

NOTE

Hard-disk users can boot from the hard disk and change to a DOS directory where DOS files are kept.

2. Type **"FORMAT A: /S"** and press **{↵Enter}**.
3. At the prompt, place a blank or new floppy disk into drive **A**, and press **{↵Enter}**.

CAUTION *Any previously recorded data on the floppy disk in drive A will be destroyed by the following procedure.*

4. When the disk drive light goes out and the words **"System transferred"** appear on the screen, DOS has been loaded. When the question **"FORMAT ANOTHER DISK?"** appears, answer **"n"** and press **{↵Enter}**.
5. Insert the Tektronix S26UT00 System floppy disk (part of the 2782/PC Utility Software package) into drive B.
6. Type **"COPY B:.* A:"** and press **{↵Enter}**.

Getting Started

7. Replace the S26UT00 System disk in drive B with the S26UT00 Program Disk 1. With the formatted 1.2 Mb disk still in drive A, type "**COPY B:*. * A:**" and press **{↵Enter}**.
8. Replace Program Disk 1 in drive B with Program Disk 2. Type "**COPY B:*. * A:**" and press **{↵Enter}**. Store all three Master floppy disks in a safe place as a backup. Remove the floppy disk from drive A and label it "**S26UT00 BOOTABLE DISK.**"
9. To run the software, place the **S26UT00 BOOTABLE** disk in drive A, then simultaneously press **{Ctrl} {Alt} {Del}** to reboot. (Powering up the PC with the **S26UT00 BOOTABLE** floppy disk installed in drive A will automatically boot the software.) You are now ready to run the various 2782/PC Utility Software package routines.

Software Configuration for Hard Disk Users

The following information and procedures will configure your hard disk with the 2782/PC Utility Software. All S26UT00 Master floppy disks contain an "**INSTALL.BAT**" file that will install the software for you.

INSTALL creates a sub-directory in your hard disk home (root) directory called **2782**. **INSTALL** then copies the S26UT00 Master floppy disk files to the 2782 directory. It also returns to the hard disk home directory and copies a **CONFIG.SYS** file (to configure your system on bootup) as well copying **GPIB.COM** to the root directory. **2782.BAT**, which starts the software, is also copied to the root directory.

NOTE

Before running this configuration procedure, check your home directory for a **CONFIG.SYS** file. If you have a **CONFIG.SYS** file, rename it temporarily, then run the **INSTALL** program. Use **EDLIN** or another ASCII file editor to combine the contents of the **CONFIG.SYS** file that **INSTALL** creates with your existing **CONFIG.SYS** file.

Equipment and Materials Needed to Install S26UT00 on a Hard Disk

- a. A Tektronix PEP, IBM PC, or compatible controller with one 20 Mbyte (or larger) hard disk **and** one 5.25 ", 360 Kbyte or 5.25 ", 1.2 Mbyte floppy disk drive.
- b. DOS 3.0 (or later) version software.

Installing S26UT00 Software on a Hard Disk

1. Boot up the PC under DOS 3.0 (or later).
2. Insert the S26UT00 System floppy disk in drive **A** of the PC. Switch to the **A** drive. After the **A>** prompt is displayed, type:
 "**INSTALL (drive name) {↵Enter}**"
For example, type "**INSTALL C {↵Enter}**" to install the program on drive **C**. The **INSTALL** file, on each of the S26UT00 Master floppy disks, copies the files to the selected hard disk.
3. The **INSTALL** routine will prompt you to insert the S26UT00 Program Disk 1 in the **A** drive and press {↵Enter} when ready.

Getting Started

4. After Program Disk 1 has been installed, you will be instructed to insert Program Disk 2 and press **{-Enter}**.
5. After you have installed all three 2782/PC Utility Software floppy disks to the hard disk, you can run the software by rebooting and then typing:

"2782 {-Enter}"

This calls up the software from the "home" directory on the selected hard disk.

6. After installing the 2782/PC Utility Software package programs on your hard disk, return the S26UT00 Master floppy disks to their protective covers and store them in a safe place.

Note:

*If you are running the software from a hard disk, be sure that the **SELECT DISK** routine path is set to **C:\2782** in order for data to be stored to hard disk.*

The GPIB Interface

Communication between the 2782/PC Utility Software and the Tektronix 2782 Spectrum Analyzer is via the GPIB. A National Instruments PC2 or PC2A GPIB interface card must be installed in the controller to connect the controller to the spectrum analyzer. National Instruments routines are included with the Tektronix 2782/PC Utility Software package to support GPIB communication.

In the standard configuration supplied on the 2782/PC Utility Software Master diskettes, GPIB communication between the PC and the spectrum analyzer is transparent. It is taken care of automatically by the software. However, if you wish to change the GPIB address of the spectrum analyzer or to include other programmable GPIB instruments, you will need to reconfigure the GPIB related control file.

A GPIB communication file (supplied under license from National Instruments, Inc.) is provided with this software:

- **GPIB.COM**

The **IBCONF** program is used to edit file **GPIB.COM**, which is a GPIB configuration file used in addressing the spectrum analyzer at address 1, and a National Instruments PC2A card. In addition to these files, there are two other files supplied:

- **GPIBPC2.COM**
- **GPIBPC2A.COM**

GPIBPC2A.COM is simply a backup file for **GPIB.COM** – which is configured for the PC2A card. **GPIBPC2.COM** is similar to **GPIB.COM** but is preconfigured for the National Instruments PC2 card. If your controller contains the PC2A card, you shouldn't need to make any changes to the software. However, if your controller contains the PC2 card, you will need to copy **GPIBPC2.COM** to **GPIB.COM**. You will also need to reboot the computer in order for the newly configured **GPIB.COM** file to be loaded.

Making Hard Copies

If you are using a computer with a CGA (Color Graphics Adapter) card and monitor, you can make screen copies to a graphics compatible printer by pressing **[Shift] [Print Scrn]**. However, you must first copy the file **GRAPHICS.COM** to either your bootable 1.2 Mb 2782/PC Utility Software disk, or to the hard disk. (If **GRAPHICS.COM** is not in the root directory, a **PATH** to it must exist.)

Getting Started

If you are using a computer such as the Tektronix PEP 301 with an EGA (Enhanced Graphics Adapter) card and monitor, an EGA print screen driver will need to be used in place of **GRAPHICS.COM**. You will also need to modify **AUTOEXEC.BAT** or **2782.BAT** to call the EGA driver you have installed.

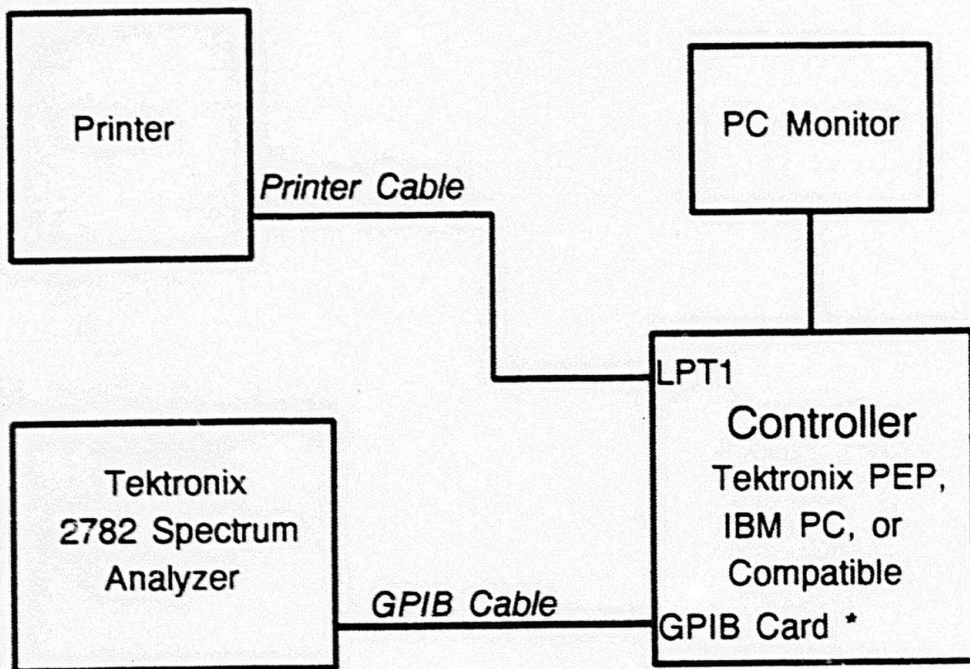
Equipment Preparation and Interconnection for Operation

Up to sixteen instruments can be connected to the IEEE-488 bus. If more than one 2782 Spectrum Analyzer is connected, only the 2782 set to address 1 can be controlled by the 2782/PC Utility Software. Make sure that one **and only one** 2782 is set to GPIB address 1 (which is the default factory setting).

1. Install the IEEE 488 interface board in the controller. The interface board – a PC2 or PC2A card from National Instruments – is included as part of the Tektronix GURU II package. Refer to the *GURU II* or *PC2/PC2A* manual for further instructions.
2. Verify that the 2782 is set to **GPIB Address 1**, that the analyzer is in **TALK/LISTEN** mode, and that **Message Terminator** is set to **EOI**.
3. Figure 2-1 shows the interconnection between system components for operation. Arrange all components so the monitor and PC are the focal point for your setup. Refer to either the equipment manual or these figures for nomenclature as you interconnect the instruments.

Instrument Set-up

- a. Connect the GPIB cable (Part No. 012-0630-01) between the rear panel **GPIB PORT 1** receptacle, on the 2782 Spectrum Analyzer rear panel, and the rear panel GPIB receptacle on the controller. Tighten the knurled screws finger tight. (If these screws are overtightened it could break the connector mount.)
- b. Connect the video cable for the monitor to the video output receptacle on the controller. Tighten the retaining screws on the connector so they are just snug.
- c. If a printer is used, connect it via a parallel (Centronics-style) cable to the LPT1 receptacle on the controller.



* GURU II, PC2, or PC2A

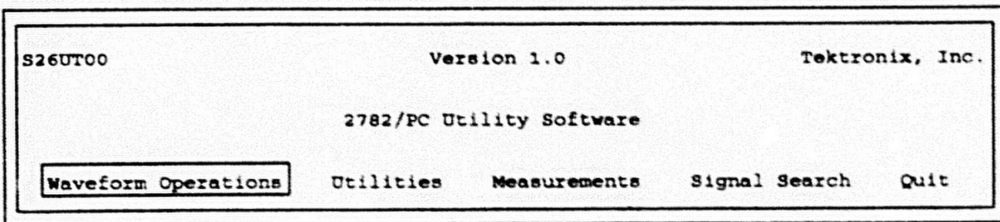
Figure 2-1. Instrument interconnection for 2782/PC Utility Software package operation.

Initial Preparation

1. Format the working copy floppy disk as per the procedures described under *Software Installation*, or configure the controller hard disk.
2. Switch on the power for the spectrum analyzer and other accessories (monitor, printer, etc.). At power up, the 2782 runs an internal self-test. Before running the software, ensure that the spectrum analyzer display is calibrated (front panel calibration). This is required for accurate graphing on the monitor and accurate readout of the measurement or display characteristics. To reduce the possibility of problems due to erroneous front panel control settings, press the **PRESET** push button (located to the left of the display). See *2782 Preset Instrument Settings* in the *Appendix* of this manual for more information.
3. If you are using the working copy floppy disk, insert the **S26UT00 BOOTABLE DISK** in the **A** drive and a blank formatted data floppy disk in the **B** drive of the controller. The data floppy disk is used to store waveforms or other data and must be installed for some routines to run.
4. Boot the system by switching the controller power on, or simultaneously press the **{Ctrl} {Alt} {Del}** keys.
5. After power up, you will be prompted by DOS for the date and time. Enter this data unless a real-time clock is installed in the controller, in which case press **{↵Enter}** after each prompt. If you are booting off of the floppy disk, the 2782/PC Utility Software will be invoked automatically (by **AUTOEXEC.BAT**). If you are booting from the hard disk, you will need to type "2782" and press the **{↵Enter}** key to invoke the software.

Getting Started

6. The system will now display the title and copyright information, and prompt you to press **{↵Enter}** to continue.
7. The controller will now load the 2782/PC Utility Software. The monitor screen will now clear and the Main Menu (see *Figure 2-2*) will appear. You are now ready to select one of the listed sub-menus.



- Press the first letter or use the arrow keys to move around.
- Press the **{Enter}** key to make selections.
- Press the **{Esc}** key to exit menus.

Figure 2-2. The *Main menu* lets you select **Waveform Operations**, **Utilities**, **Measurements**, or **Signal Search** functions. You may also **Quit** running the software.

Menu Operation

The 2782/PC Utility Software package is menu-driven software that provides access to various test routines within sub-menus of the Main Menu. The Main Menu lists the sub-menus. The sub-menus and their routines can be selected via the cursor movement (arrow) keys on the keyboard or by typing the first letter of the desired sub-menu. If you type a letter that isn't the first letter of one of the sub-menu items, your controller will beep. If two or more sub-menu items contain the same first letter, the 2782/PC Utility Software selects the first one in the list, then selects the second item the next time you type the same letter. Screen prompts direct you to the different routines and through routine procedures.

When a sub-menu is selected, the routines within the sub-menu are displayed under the "parent" item. Some routines require you to enter data, such as a frequency range or signal level.

NOTE

If at any time you lose control of the program, press the {Esc} key to return to the previous menu. Most modules can be interrupted via the {Esc} key.

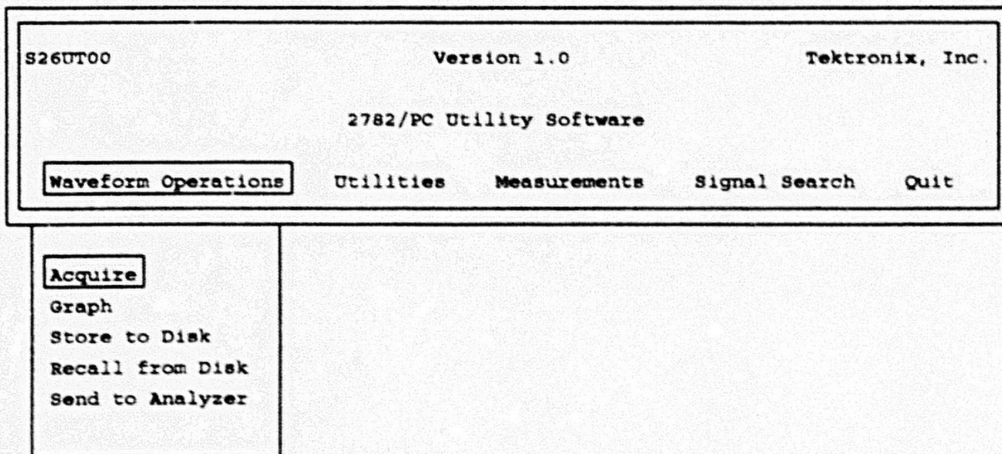
Getting Started

Waveform	Utilities	Measurements	Signal Search	Quit
Operations	Talk/Listen (Cmd)	Spectral/Time Display	Band Search	
Acquire	Enter Commands	Acq Time Delay	Storage/Display Parameters	
Acquire only	Save Settings	Disp. Time Delay	Display to Screen	
Screen	Recall Settings	Harmonic Distortion	Store to Disk	
Normal	Goto Local	Fundamental Freq	File Name	
Average	Local Lockout	No. of Harmonics	Search Parameters	
MaxHold	Exit		Start Frequency	
Math	Color Graphs		Stop Frequency	
A	Headings		Threshold	
B	Background		Maximum Signal Power	
Acquire and	Comments		Peak Type	
Graph	Normal Wfm		Peak Height	
	Average Wfm		Mixer Overdrive	
	MaxHold Wfm		Fast Search	
	Math Wfm		Print	
Graph	TraceA Wfm		Save	3]
Normal	TraceB Wfm		Comments	
Average	Select Disk		Search	
MaxHold	New Path		Exit	
Math			Precise Search	3]
A				
B				
Store to Disk				
Recall from Disk			Spur Search	
List of Files			Preliminary Search Parameters	
Send to Analyzer			Display to Screen	
Source			Store to Disk	
			File Name	
			Carrier Frequency	
Target			Search Position	
A			Minimum Offset	
B			Maximum Offset	
			Threshold	
			Maximum Signal Power	
			Peak Type	
			Peak Height	
			Mixer Overdrive	
			Fast Search	3]
			Precise Search	3]
			Recall Band Search	3]
			Recall Spur Search	3]

Figure 2-3. Main menu map showing all routines within each sub-menu.

Waveform Operations Menu

The Waveform Operations Menu contains functions to *Acquire*, *Graph*, *Store to Disk*, *Recall from Disk*, and *Send to Analyzer*. Waveforms stored to or recalled from disk use the disk and directory specified in the *Select Disk* function in the *Utilities* sub-menu. For more information, see *Select Disk* in Section 4 of this manual.



- Press the first letter or use the arrow keys to move around.
- Press the {Enter} key to make selections.
- Press the {Esc} key to exit menus.

Figure 3-1. The *Waveform Operations* menu lets you transfer to and from the 2782 (**Acquire** and **Send to Analyzer**), work with permanent files (**Store to Disk** and **Recall from Disk**), and display waveforms (**Graph**).

Waveform Operations Menu

Acquire

The *Acquire* function allows you to acquire (and graph, if you choose) up to four 2782 waveforms at one time. You may select any waveform, but only those that are currently displayed on the 2782 can be acquired. (The 2782/PC Utility Software does not set up waveform acquisitions in the spectrum analyzer.)

2782 ACQUIRE/GRAPH WAVEFORMS

This routine will acquire and graph a waveform or a set of waveforms.
You may choose a waveform or a set of waveforms from the list provided.

- Use the (↑) and (↓) arrow keys to move.
- Press the (Enter) key to select or unselect a waveform.
- Press the (Function) key to acquire and/or graph the waveform.

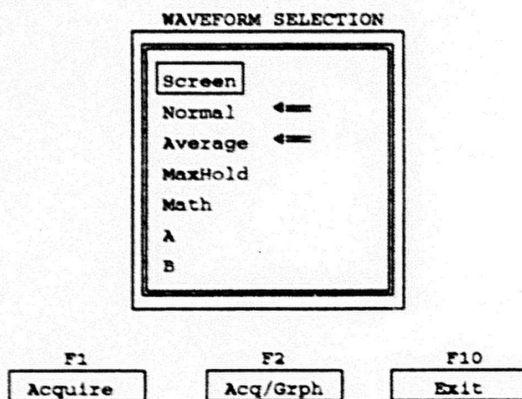


Figure 3-2. The *Acquire* menu prompts you for the waveform locations you wish to receive from the 2782. Only four can actually be transferred.

To make a selection, move the highlight box up and down with the (↑) and (↓) keys until the waveform label you want is highlighted, then press the (Enter) key which marks the label. Pressing (Enter) again removes marking.

Waveform Operations Menu

Press **{F1}** to acquire all marked waveforms (only waveforms that are currently displayed on the 2782 can be transferred). If you want to acquire *and* graph the waveforms, press **{F2}**. To leave the menu without taking any action, press **{F10}** or **{Esc}**.

If you select *Screen*, all waveforms currently displayed on the 2782 CRT screen are acquired. As mentioned earlier, a waveform **must** be displayed in order to be acquired by the 2782/PC Utility Software.

Any time you acquire a new waveform into a location, the old contents of that location are overwritten. For example, if you select *Normal* and press the **{F1}** (Acquire) button three times, you will have one waveform in memory – the last waveform acquired.

As mentioned earlier, up to four waveforms can be acquired at one time. If you select more than four waveforms, the first four **valid** choices are acquired. For example, if you selected all waveforms manually (that is, not using *Screen*) only the first four displayed waveforms are acquired.

Waveform Operations Menu

Graph

The *Graph* menu looks very similar to *Acquire*. *Graph* displays are identical to those when you select *Acq/Graph* under the *Acquire* menu. Up to six waveforms may be graphed at one time, but they must have extensions corresponding to their respective memory locations and must have identical file names (not including extension). For more information on file names, see *Store to Disk*, later in this section. For example, you can graph two *Normal* waveforms **only** if one or both of them is in the *A* or *B* locations. The same holds true for *Average*, *MaxHold*, and *Math* waveforms. In other words, **only A or B can contain any type of waveform.**

2782 GRAPH WAVEFORM

This routine displays the waveform currently available for graphing.
You may choose a waveform or a set of waveforms from the list provided.

- Use the { } and { } arrow keys to move.
- Press the {Enter} key to select or unselect a waveform.
- Press the {Function} key to graph the waveform.

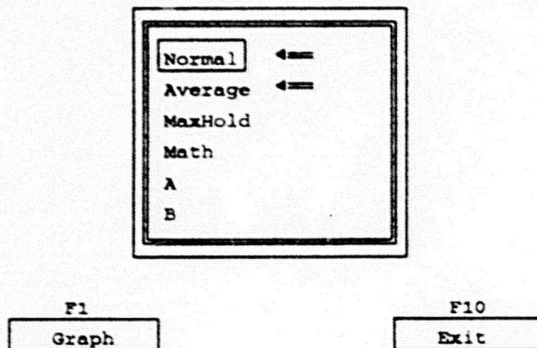


Figure 3-3. You can choose up to six waveforms to display from the *Graph Waveform* menu.

Waveform Operations Menu

You select waveforms to graph exactly as you make *Acquire* selections. The software will not allow you to select an empty waveform location. You may fill locations from the analyzer (see *Acquire*, earlier in this section) or from disk files (see *Recall from Disk* later in this section).

NOTE

You can acquire and graph **four** waveforms at a time. By acquiring and storing waveforms to disk in two passes, using the same file name, you can recall and graph **six** waveforms at a time.

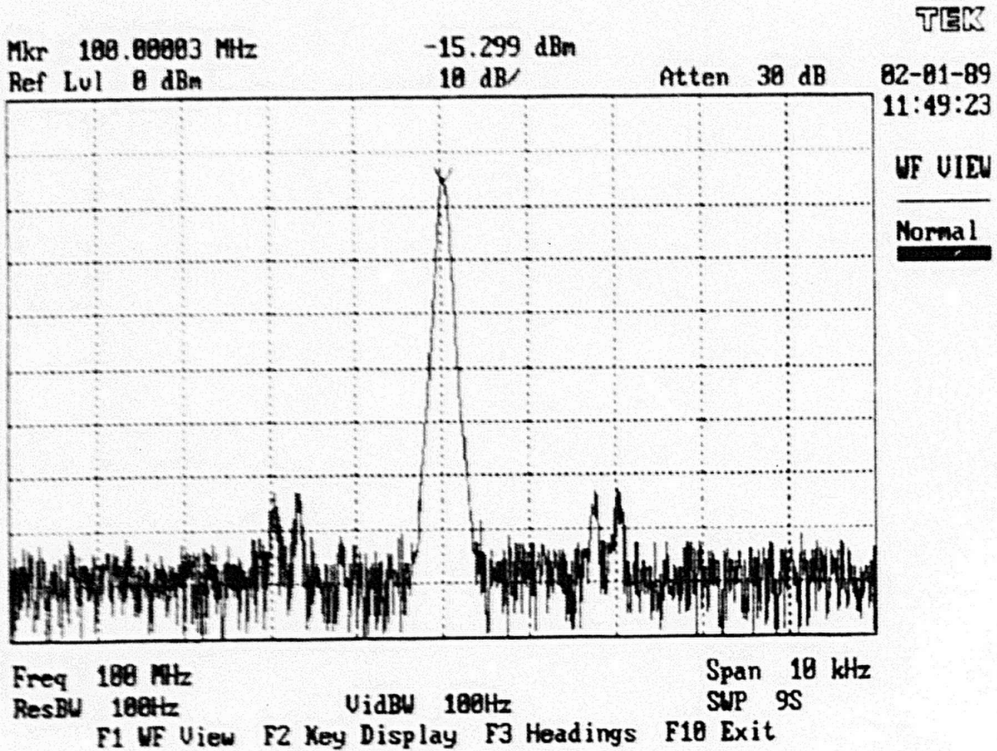


Figure 3-4. This display shows a "Normal" waveform including readout information. You can add a two-line *Heading* as well.

Waveform Operations Menu

You may label your graphs by pressing **{F3}** (Heading) then adding a one or two-line label or comments string. When you enter comments in *Heading* the cursor automatically wraps to the second line when you reach the end of the first line. To delete text press the **{←}** (Backspace) key. When you are finished entering the heading, press **{↵Enter}**.

You may graph waveforms in color if you have an EGA or VGA color display monitor. For information on setting graph screen colors see *Color Graphs* in Section 4 of this manual.

Store to Disk

Use *Store to Disk* to save 2782 waveforms on floppy or hard disk in the default disk and directory. (See *Select Disk* in the *Utilities* section of this manual for information on changing the default disk and directory.) You may store any or all of the waveforms that are currently in controller memory. The *Store to Disk* menu first lists all waveforms in the default disk and directory and prompts you for a file name. If you do not type a file name, a default is used. The menu then allows you to choose which waveform(s) to store. All waveforms in the same display will have the same name, but the file extension will differ to identify each waveform's memory location.

The default file name is the current month, day, hour, and minute. The file extension identifies the type of waveform: **.WNR** for *Normal*, **.WAV** for *Average*, **.WMX** for *MaxHold*, **.WMT** for *Math*, **.WAA** for *A*, and **.WBB** for *B*. For example, waveform file **FE011156.WNR** was stored **FE**bruary (0)1st at **11:56** am as a *Normal* waveform file. (For more information, see *Month-of-Year Abbreviations for File Names* in the *Appendix*.)

Waveform Operations Menu

CAUTION

The 2782/PC Utility Software assumes that waveforms with identical file names have the same settings. If you graph multiple waveforms that were acquired with *different* settings but with *identical* file names, the graph shows the settings of the last waveform in the recall sequence. The recall sequence is: Normal, Average, MaxHold, Math, A, and B.

2782 STORE WAVEFORM

This routine writes waveforms to the disk pathname specified in the SELECT DISK routine. The list below shows waveforms currently stored.

- Type the file prefix only. Each waveform has a predetermined suffix.
- If no prefix is entered then one is generated. (format: MMDDTTT).
- Press the (Enter) key to make the selection.

FE011156 WNR	FE011202 WNR	FE031702 WAV	FE031702 WNX
FE031702 WNR	JA061116 WNR	JA101057 WNR	JA191617 WAA
JA191617 WNT	JA191617 WNR	JA191720 WAA	JA191720 WMT
JA191720 WNR	MORRIS WNR	MORRIS1 WNR	MR131550 WNR
MR151756 WNX	MR161022 WNR	MY021016 WAV	MY021016 WNX
MY021016 WNR			

Figure 3-5. The *Store Waveform* menu displays all waveform files on the current drive and in the current directory. Type the file name you want or press the [↵Enter] key to tell the software to use the current date and time as the file name.

Waveform Operations Menu

NOTE

The 2782/PC Utility Software does not differentiate between waveforms that were acquired from the spectrum analyzer and those previously stored and recalled from disk.

Recall from Disk

This function retrieves a waveform file or files from the current disk and directory (as described by *Select Disk* in the *Utilities* section of this manual) to the corresponding controller memory location(s). This routine can also automatically graph the retrieved waveform.

Recall from Disk prints a list of the current waveform files in the default directory on the display monitor. Type the name of the waveform file you wish to recall, then press **{→Enter}**. To recall a set of related waveforms, type just the prefix (e.g. **WAVE1**). To recall a single waveform, type the prefix and suffix (e.g. **WAVE1.WNR**). If you wish to view the waveform, select *Graph* from the Waveform Operations menu. Select *Send to Analyzer* to send the waveform to the 2782.

Any time you recall a waveform or waveforms, current contents of all controller waveform memory locations are overwritten. This is because the software only graphs and stores groups of waveforms that were acquired together. This prevents confusion over scale factors. See the *CAUTION* statement in *Store to Disk*, above.

Waveform Operations Menu

2782 WAVEFORM RECALL

This routine recalls waveforms from the list provided.

- Type the file prefix to recall multiple waveforms.
- Type the file prefix and suffix to recall one waveform.
- Press the [Enter] key to make the selection.

FE011156 WNR	FE011202 WNR	FE031702 WAV	FE031702 WMX
FE031702 WNR	JAO61116 WNR	JA101057 WNR	JA191617 WAA
JA191617 WMT	JA191617 WNR	JA191720 WAA	JA191720 WMT
JA191720 WNR	MORRIS WNR	MORRIS1 WNR	MR131550 WNR
MR151756 WMX	MR161022 WNR	MY021016 WAV	MY021016 WMX
MY021016 WNR			

Figure 3-6. The *Waveform Recall* menu also displays all waveform files on the drive and directory chosen by *Select Disk*.

NOTE

The 2782/PC Utility Software assumes that waveform files are related **only** when they have identical file names. The software protects you from attempting to graph or send unrelated waveforms to the spectrum analyzer by not allowing unrelated waveforms in controller memory at the same time. The only way to get unrelated waveforms in memory at the same time is to exit to DOS then rename the files to the same file name. (Do not change the extension.)

Waveform Operations Menu

Send to Analyzer

Send to Analyzer allows you to transfer one waveform at a time to the 2782 A or B memory. This will over-write information in the respective analyzer memory location.

2782 SEND WAVEFORM TO ANALYZER

This routine will send one waveform to the spectrum analyzer. Specify a TARGET waveform and select a SOURCE waveform from the lists provided.

- Use the (↑) and (↓) arrow keys to move.
- Press the (Enter) key to select or unselect a waveform.
- Press the (Function) key to send the waveform.

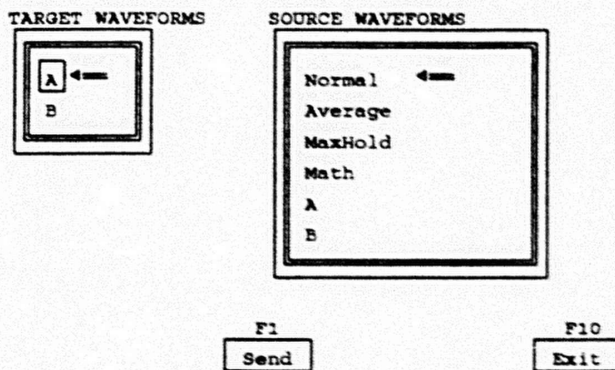


Figure 3-7. Use the *Send to Analyzer* function to send a waveform to the A or B 2782 memory. Sending a waveform overwrites any previously stored waveform.

The *Send to Analyzer* menu contains two windows: *Source Waveforms* and *Target Waveforms* that allow you to choose the source and target, respectively. Use the (↑) and (↓) keys to highlight a memory location and (←Enter) to mark the highlighted selection. Press (←Enter) a second time to unmark the selection. Press (F1) to send the waveform. If more than one source is marked, only the first one in the list will be sent.

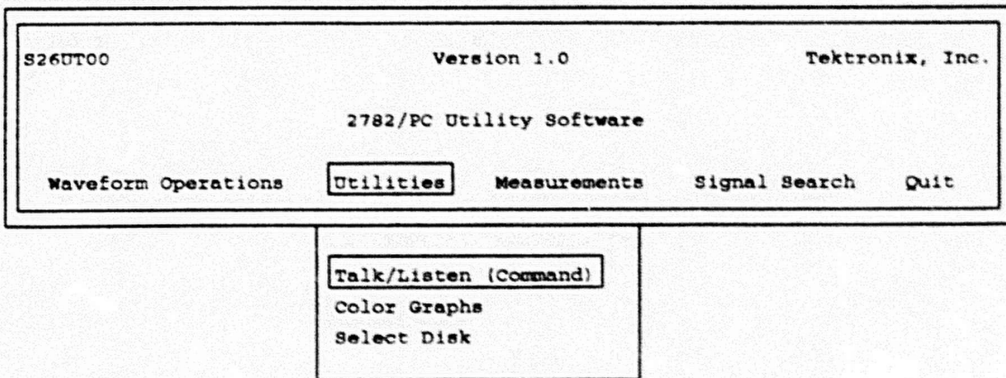
Waveform Operations Menu

NOTE

Current 2782 waveform parameters are **not** disturbed by **Send to Analyzer**, only **A** or **B** waveform data is overwritten. No waveform parameters are sent to the 2782.

Utilities Menu

The routines in the Utilities menu allow you to send commands to and receive queries from the 2782, save and recall analyzer settings, set local or remote front-panel operation, set waveform graph screen colors, and set the default disk and directory for waveform and settings file storage.



- Press the first letter or use the arrow keys to move around.
- Press the {Enter} key to make selections.
- Press the {Esc} key to exit menus.

Figure 4-1. *Utilities* functions allow you to communicate with the 2782, save settings, change graph colors, and select file storage locations.

Utilities Menu

Talk/listen and Settings Functions

The Talk/Listen menu contains:

- *Enter Commands* – sends commands to and receives responses from the 2782.
- *Save Settings* and *Recall Settings* – saves front-panel settings in disk files and restores those settings to the 2782.
- *Goto Local* – puts the 2782 in local mode. The front panel is active.
- *Local Lockout* – puts the 2782 in local lockout mode. Only the front-panel POWER switch is active.

2782 TALK/LISTEN

This routine allows the operator to interface with the 2782 using the PC as a controller. The PC can be used as a talker or as a talker/listener.

- Press the first letter or use the (') and (:) arrow keys to move.
- Press the {Enter} key to make the selection.

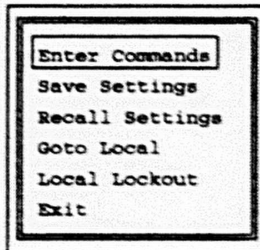


Figure 4-2. The *Talk/Listen* menu provides the link in controller-to-2782 communications. You may also put the 2782 in local (**Goto Local**) or remote (**Local Lockout**) GPIB operation.

Utilities Menu

The *Enter Commands* routine allows you to send any valid 2782 command or query to the analyzer. If you send more than one command or query to the 2782 at a time, the order that commands are sent may change. See *Talk/Listen Processing Sequence* in the *Appendix* for more information.

When any of the following conditions exist, a timeout occurs and the 2782/PC Utility Software prints an error message on the monitor screen:

- The 2782 is not connected to the controller
- The 2782 is not powered-up
- The 2782's address doesn't match the address expected by the software

2782 TALK/LISTEN COMMAND MODE

This routine accepts single or multiple commands which are sent to the spectrum analyzer. The response is listed separately.

- Press the (Enter) key to send a command or to end.

COMMAND INPUT

SPECTRUM ANALYZER RESPONSE

Figure 4-3. Use *Enter Commands* to change the 2782 settings or display. You can also send queries (any command ending with a "?") to find out spectrum analyzer settings or status.

Utilities Menu

Save Settings and *Recall Settings* selections are not available in this release of the 2782/PC Utility Software package.

Be sure to fill out the attached Software Registration Card and return it to Tektronix to receive future software updates.

Color Graphs

You may graph waveforms in color or black and white. When you select Color Graphs, a screen appears that prompts you for a **Y** (color) or **N** (black and white). If you choose black and white graph displays, the software sets the display to CGA resolution (640 X 200) even if you have an EGA or VGA graphics card and display monitor.

2782 COLOR GRAPHICS

This routine allows the waveform graphic display to be in color. An EGA or VGA card is required to display color graphs and a color printer or copier is required to render a hard copy.

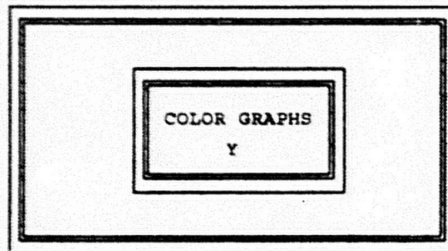


Figure 4-4. When you select *Color Graphs*, the software asks you if you want color or black and white graphs. Answer "Y" for color; "N" for black and white. You may answer "N" even if you have a color display monitor.

If you select color (Y), a second screen appears to allow you to change graphic screen colors. You may set colors for each of the six waveform types and for the screen background, foreground, headings and optional comments. (For more information on waveform comments, see the *Graph* portion of Section 3 of this manual.)

The 2782 *Color Graphics* menu contains a key showing all available colors. The number of choices you have depends on your color display monitor. EGA or VGA displays allow 16 colors; CGA displays do not display graphs in color, even though the menu allows you to choose colors.

To change colors, move through the list using the **{-Enter}** or **{Backspace}** keys then type a new color number.

After you make any changes, press the **{F1}** key to save your changes and exit the 2782 *Color Graphics* menu. If you do not want to keep any changes, press **{F10}** or **{Esc}**.

Utilities Menu

2782 COLOR GRAPHICS

- Press {Enter} or {Backspace} to move.
- Press {F1} to EXIT and SAVE the color settings displayed.
- Press {F10} to EXIT without saving the changes made.

HEADINGS	02	Normal	02
BACKGROUND	00	Average	04
FOREGROUND	06	MaxHold	12
COMMENTS	08	Math	09
		TraceA	13
		TraceB	11

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█

F1
Save

F10
Exit

Figure 4-5. If you want color graphics (see Fig. 4-4) the software allows you to choose the colors. Move the highlight box to each setting you want to change and type in a new value from the key at the bottom of the screen.

Select Disk

This routine allows you to change the specified disk drive and directory (path) for waveform and settings files. The 2782/PC Utility Software remembers the last setting, so you do not need to change the path each time you start the software. To check the current path, choose *Select Disk*. The software displays the current path. To exit the routine without changing the path, press {Esc}. To view all files in the current path, press the {↵Enter} key.

NOTE

The 2782/PC Utility **DOES NOT** create directories. The directory you choose in **Select Disk** must already exist.

2782 SELECT DISK

This routine allows the operator to specify a path for DATA storage. The path specification may include directory names. Any directories in the path must already be defined to MS-DOS. After the path is specified a listing of all files and available space will automatically be displayed.

CURRENT PATH

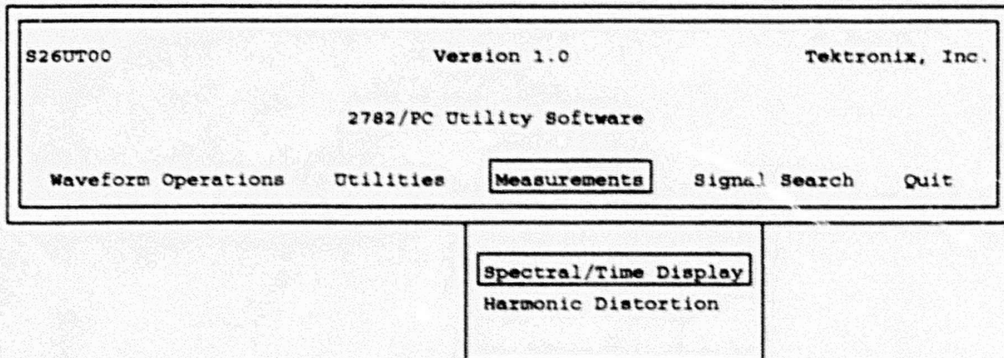
C:\2782\WFMS\

NEW PATH

Figure 4-6. Use *Select Disk* to choose the default disk and directory path for waveform and settings files. If you do not want to change the current path, press **Esc**.

Measurements Menu

The *Measurements* menu contains the *Spectral/Time Display* and *Harmonic Distortion* routines. Use *Spectral/Time Display* to view a series of up to 19 acquisitions on one screen. Use *Harmonic Distortion* to calculate total harmonic distortion (THD) and view the THD report.



- Press the first letter or use the arrow keys to move around.
- Press the {Enter} key to make selections.
- Press the {Esc} key to exit menus.

Figure 5-1. The *Measurements* menu contains the *Spectral/Time Display* and *Harmonic Distortion* routines.

Measurements Menu

Spectral/Time Display

The *Spectral/Time Display* provides a presentation of a series of acquired waveforms. Each successive waveform plots at a lower position and in a different color. (*Spectral/Time Display* requires an EGA or VGA color graphics adapter.)

You may choose the time between each successive acquisition (*Acquisition Time Delay*) and the time delay before the screen is erased (*Display Time Delay*). Default values are **1 second** for *Acquisition Time Delay* and **10 seconds** for *Display Time Delay*

2782 SPECTRAL/TIME DISPLAY

This routine acquires between 17 and 19 normal traces from the 2782 at a specified time interval and displays them for a specified time.

- Fill in the TIME parameters as necessary
- Press the (Enter) or (Backspace) keys to move
- Press the (Esc) key to abort the DISPLAY

ACQUISITION TIME DELAY	<input type="text" value="1"/>	seconds
DISPLAY TIME DELAY	10	seconds

F1
Display

F10
Exit

Figure 5-2. The *Spectral/Time Display* menu allows you to select the delay between each trace and the delay before a full screen is erased.

Measurements Menu

When you select *Harmonic distortion*, the *2782 Total Harmonic Distortion* sub-menu appears which allows you to set *Fundamental Frequency* and *Number of Harmonics*. Default settings are **100 MHz** for *Fundamental Frequency* and **5** for *Number of Harmonics*.

2782 TOTAL HARMONIC DISTORTION

This routine performs a TOTAL HARMONIC DISTORTION measurement of a specified fundamental frequency and any number of harmonics of that fundamental. The signal range is 100 Hz to 33 GHz.

- Fill in the parameters as necessary
- Press the {Enter} or {Backspace} keys to move
- Press the {Esc} key to abort

MEASUREMENT PARAMETERS

FUNDAMENTAL FREQUENCY	<input type="text" value="100"/>	MHz
NUMBER OF HARMONICS	<input type="text" value="5"/>	

F1
Measurement

F10
Exit

Figure 5-4. When you select *Harmonic Distortion*, you are given an opportunity to modify the THD parameters. Once your selections are complete, press **{F1}** to perform total harmonic distortion and view the results on screen.

Measurements Menu

2782 TOTAL HARMONIC DISTORTION REPORT
14:11:34 10-05-1989

FUNDAMENTAL FOUND 100.099998 MHz at -22.0 dBm THD 18.2%

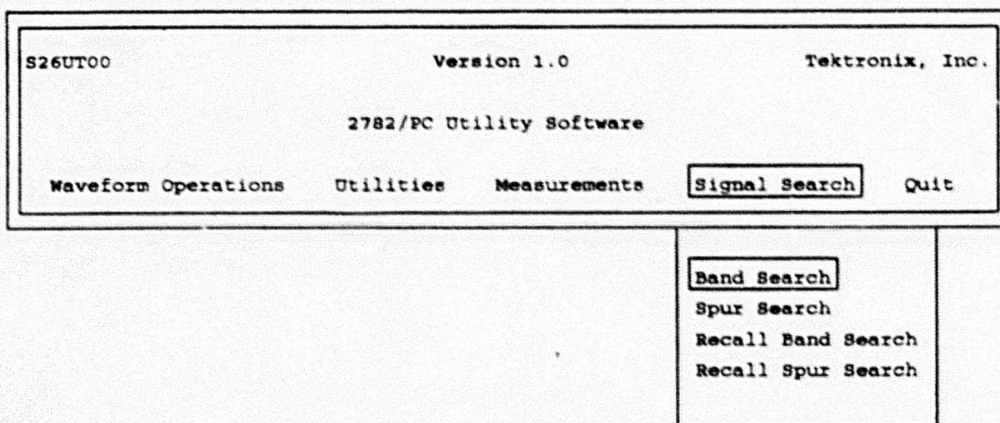
Harmonic	Frequency	dBm	dBc
2	200.1 MHz	-63.2	-41.2
3	300.1 MHz	-36.8	-14.2

F1	F4	F10
Print	Measure	Exit

Figure 5-5. After the 2782/PC Utility Software calculates *Harmonic Distortion*, it displays the results on screen. You can print the results to an optional printer by pressing **[F1]**, perform another set of harmonic distortion measurements by pressing **[F2]**, or leave the routine by pressing **[F10]**.

Signal Search Menu

The *Signal Search* menu allows you to perform Fast or Precise Band and Spur Searches. All *Signal Search* routines list those signals that it finds within frequency and amplitude levels you specify.



- Press the first letter or use the arrow keys to move around.
- Press the {Enter} key to make selections.
- Press the {Esc} key to exit menus.

Figure 6-1. *Signal Search* allows you to make a *Band Search* or *Spur Search* to parameters you choose. You may perform a *Fast Search* or *Precise Search* and save search results to disk.

Band Search

Select *Band Search* to perform a contiguous search between a start and stop frequency. The *Band Search* menu lets you set the search parameters: Start and Stop Frequencies, Threshold level, Maximum Signal Power, and Mixer Overdrive. You can choose to display the search report on-screen and also save the report on a disk file.

Signal Search Menu

To set *Search Parameters* and *Storage/Display Parameters*, use the {↵} key to move the highlight box to the parameter you wish to change, then type the new value. After reviewing and setting all parameters, press {F1} to perform a *Fast Search*, or {F2} to perform a *Precise Search*.

NOTE

Each time you make parameter changes, the **2782/PC Utility Software** saves the new parameters in a file called **BAND.DAT**. If the software cannot find **BAND.DAT**, it uses default parameters (see **Band Search Default Parameters in the Appendix**).

2782 BAND SEARCH

This routine performs a FAST SEARCH or a PRECISE SEARCH between a start and stop frequency within specified amplitude limits. It then will store and/or display the frequency and absolute amplitude of all signals found. The range for both the FAST and PRECISE SEARCH is 0 Hz through 33 GHz.

- Fill in the STORAGE and SEARCH parameters as necessary
- Press the {Enter} or {Backspace} keys to move
- Press the {Function} key to start a SEARCH, LIST FILES or EXIT
- Press the {Esc} key to abort a SEARCH

STORAGE/DISPLAY PARAMETERS	SEARCH PARAMETERS
DISPLAY to SCREEN <input checked="" type="checkbox"/> Yes	START FREQUENCY 88 MHz
STORE to DISK No	STOP FREQUENCY 108 MHz
	THRESHOLD -50 dBm
	MAXIMUM SIGNAL POWER -20 dBm
	PEAK TYPE All
	PEAK HEIGHT 6 dB
	MIXER OVERDRIVE 0 dB

F1	F2	F3	F10
Fast Search	Precise Search	List Files	Exit

Figure 6-2. The *Band Search* menu allows you to change *Search Parameters* and *Display/Storage Parameters*. You may select *Fast Search* or *Precise Search*.

Signal Search Menu

After the search is complete, you will get an on-screen report if you answered "Y" to *DISPLAY to SCREEN* and a disk report file if you answered "Y" to *STORE to DISK*. Report format is identical whether it is from a "live" search or a stored-on-disk report.

If the report is longer than one page, the message "Press {Enter} to continue the list" appears at the bottom of the first page(s).

2782 FAST SEARCH REPORT
09:24:57 07-27-1989

Number	Frequency	dBm	Number	Frequency	dBm
1	998.5 kHz	-71.8	21	1.0655 MHz	-72.3
2	1.0028 MHz	-71.7	22	1.0717 MHz	-70.6
3	1.0057 MHz	-73.1	23	1.0766 MHz	-69.0
4	1.0075 MHz	-73.5	24	1.0784 MHz	-71.5
5	1.0089 MHz	-73.4	25	1.0805 MHz	-71.5
6	1.0114 MHz	-74.1	26	1.0817 MHz	-74.0
7	1.0153 MHz	-70.6	27	1.0856 MHz	-71.7
8	1.0169 MHz	-67.2	28	1.0873 MHz	-74.8
9	1.0186 MHz	-71.5	29	1.0901 MHz	-73.1
10	1.0278 MHz	-72.0	30	1.0946 MHz	-71.4
11	1.0292 MHz	-72.3	31	1.1014 MHz	-71.4
12	1.0313 MHz	-70.9			
13	1.0368 MHz	-74.2			
14	1.0376 MHz	-73.8			
15	1.0391 MHz	-73.4			
16	1.0454 MHz	-74.2			
17	1.0491 MHz	-71.6			
18	1.0508 MHz	-70.0			
19	1.0559 MHz	-73.1			
20	1.0616 MHz	-74.4			

F1 F2 F3 F4 F10

Figure 6-3. The *STORAGE/DISPLAY PARAMETERS* determine where the 2782 Fast Search Report appears. When *DISPLAY to SCREEN* is **Yes** the report displays on-screen. The report is saved to a disk file when *STORE to DISK* is **Yes**.

Signal Search Menu

2782 PRECISE SEARCH REPORT

09:28:03 07-27-1989

Number	Frequency	dBm
1	1.000063777 GHz	-65.8
2	1.100000024 GHz	-62.6
3	1.200015783 GHz	-64.0
4	1.300045371 GHz	-66.3
5	1.400038004 GHz	-68.8
6	1.499826550 GHz	-73.9
7	1.599937916 GHz	-66.0
8	1.700000048 GHz	-58.0
9	1.799999952 GHz	-55.4
10	1.899999976 GHz	-51.4

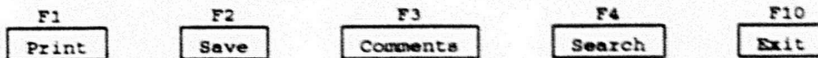


Figure 6-4. The 2782 *Precise Search Report* format is identical to the *Fast Search Report*.

After you view the report, you may press the **[F4]** key to return to the 2782 *Band Search* menu to change parameters and generate a new report. If the report was recalled from a disk file, you can return to 2782 *Band Search* to review the file's search parameters.

The Precise Band Search requires more time to execute than the Fast Band Search, but is more accurate because it uses the signal counter in the 2782 Spectrum Analyzer.

Spur Search

To set *Preliminary Search Parameters*, press the **{↵Enter}** key to move the highlight box to the parameter you wish to change, then type the new value. Press **{F1}** to perform a *Fast Search*, or **{F2}** to perform a *Precise Search*.

NOTE

When you make parameter changes, software saves the new parameters in **SPUR.DAT**. If the software cannot find **SPUR.DAT**, it uses defaults (see *Spur Search Default Parameters* in the **Appendix**).

Signal Search Menu

2782 SPUR SEARCH

This routine searches for signals between specified threshold levels and between a minimum and maximum offset from a specified carrier frequency. The search can either be FAST or PRECISE and the results can be displayed on screen and/or stored to disk.

- Fill in the PRELIMINARY SEARCH parameters as necessary
- Press the (Enter) or (Backspace) keys to move
- Press the (Esc) key to abort a SEARCH

PRELIMINARY SEARCH PARAMETERS

DISPLAY to SCREEN	<input checked="" type="checkbox"/>	Yes
STORE to DISK	<input type="checkbox"/>	No
CARRIER FREQUENCY	100	MHz
SEARCH POSITION	Above	

MINIMUM OFFSET	1	MHz
MAXIMUM OFFSET	100	MHz
THRESHOLD	-50	dBm
MAXIMUM SIGNAL POWER	-20	dBm
PEAK TYPE	All	
PEAK HEIGHT	6	dB
MIXER OVERDRIVE	0	dB

F1 Fast Search F2 Precise Search F3 List Files F10 Exit

Figure 6-5. Using *Spur Search*, you can change *Preliminary Search Parameters*. Like *Band Search*, you may select *Fast Search* or *Precise Search*.

The 2782 *Fast Spur Search Report* and 2782 *Precise Spur Search Report* take the same form as the 2782 *Fast Search Report* and 2782 *Precise Search Report*. The only difference is that the spur search reports show the carrier frequency and amplitude that was used for the spur search.

Like 2782 *Band Search*, you can press the [F4] key to return to the menu to change parameters and generate a new report. Likewise, you can return to 2782 *Spur Search* to review a *Recall Spur Search* file's search parameters.

Signal Search Menu

2782 FAST SPUR SEARCH REPORT
09:41:56 07-27-1989

Carrier Frequency 2.072046951 GHz Carrier Amplitude -14.099 dBm

Number	Frequency	dbc
1	2.072715 GHz	-4.2
2	2.073388 GHz	-21.2
3	2.074075 GHz	-28.6
4	2.074753 GHz	-33.5

F1 F2 F3 F4 F10

Figure 6-6. The 2782 *Fast Spur Search Report* displays on-screen when *DISPLAY to SCREEN* is set, and is saved to a disk file when *STORE to DISK* is set.

The *Precise Spur Search* requires more time to execute than *Fast Spur Search*, but is more accurate because it uses the signal counter in the 2782 Spectrum Analyzer.

Signal Search Menu

2782 PRECISE SPUR SEARCH REPORT

09:45:51 07-27-1989

Carrier Frequency 2.072046967 GHz Carrier Amplitude -14.199 dBm

Number	Frequency	dBc
1	2.072719812 GHz	-4.8
2	2.073392391 GHz	-21.5
3	2.074064970 GHz	-28.9
4	2.074737787 GHz	-33.9

F1 F2 F3 F4 F10
Print Save Comments Search Exit

Figure 6-7. The 2782 *Precise Spur Search Report* format is identical to the 2782 *Fast Spur Search Report*.

Recall Band Search and Recall Spur Search

You may want to review *Band Search* or *Spur Search* reports at a later time. Use *Recall Band Search* or *Recall Spur Search* in conjunction with the *STORE to DISK* option in either search menu. This creates a disk file in the default path. (For more information, see *Select Disk* in the *Utilities* section of this manual.) When you recall a search file, it overwrites any report that is in controller memory from an earlier "live" search. Since you are recovering a report and not the waveform, you cannot change search parameters. The search routines use the spectrum analyzer, not a waveform in controller memory, so you **cannot** modify search parameters on a recalled waveform.

Signal Search Menu

2782 BAND SEARCH RECALL

This routine will recall BAND SEARCH results from the list provided.

- Type both the file prefix and suffix to recall a file.
- Press the (Enter) key to make the selection.

AP101138 BFS	AP101258 BFS	AP101335 BFS	JIM	BFS
JIM	BFS	JIMTEST BFS	JIMTEST1 BFS	JIMTEST2 BFS
JIMTEST3 BFS	JIMTEST9 BFS	JL271829 BFS	KENT	BFS

Figure 6-8. Use *Recall Band Search* to view a band search file. After you display the search report, you may view the *Storage/Display Parameters* and *Search Parameters*.

Signal Search Menu

2782 SPUR SEARCH RECALL

This routine will recall SPUR SEARCH results from the list provided.

- Type both the file prefix and suffix to recall a file.
- Press the (Enter) key to make the selection.

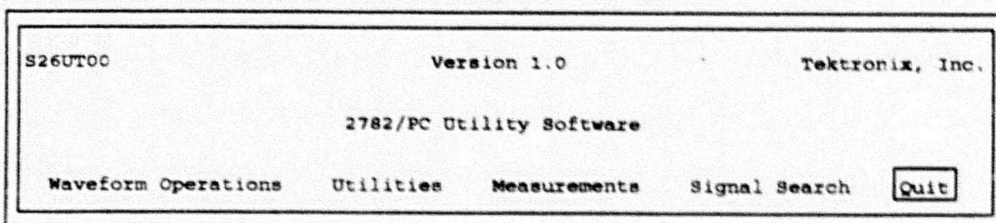
JIM	SFS	JIM	SPS	KENT1	SFS
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Figure 6-9. Recall Spur Search operates exactly like Recall Band Search.

Quit Function

Use the Quit function to leave the *2782/PC Utility Software*. When you select *Quit*, the software saves current configuration information and exits to DOS. *Quit* does not give you a second opportunity to stay in the software.



- Press the first letter or use the arrow keys to move around.
- Press the {Enter} key to make selections.
- Press the {Esc} key to exit menus.

Figure 7-1. Use the *Quit* menu when you want to leave the *2782/PC Utility Software*.

Appendix

Month-of-Year Abbreviations for File Names

JA	January	JL	July
FE	February	AU	August
MR	March	SE	September
AP	April	OC	October
MY	May	NO	November
JE	June	DE	December

2782 Preset Instrument Settings

- Clears and writes trace A
- Blanks trace B
- Couples resolution bandwidth, input attenuation, step size, sweep time, and video bandwidth
- Turns off A-B mode
- Sets start frequency and stop frequency
- Disables keyboard data entry
- Selects dBm amplitude units
- Turns on graticule and character display
- Selects 10 dB/div log scale
- Turns off markers and marker tracking
- Selects continuous sweep mode and free-run trigger
- Selects O3 output format
- Allows SRQ 110, which indicates broken hardware
- Sets minimum signal excursion to 6 dB
- Turns off marker pause mode

DAT Files

- DEFAULT.DAT – Disk and directory search path for all waveform files and search reports. The 2782/PC Utility Software creates this file if it does not exist.
- COLUR.DAT – Color map for graphs. The 2782/PC Utility Software prints an error message if it cannot find this file.
- BAND.DAT – Search settings for band and spur searches respectively. The 2782/PC Utility Software creates or updates these files at each search; the software uses internal defaults if the respective file does not exist.
- SPUR.DAT

Waveform File Structure

Each waveform has complete readout information as part of its contents. Whenever waveforms are stored in groups, their readout information will be identical. The exception to this rule is any waveform in the **A** or **B** Register. All waveforms are stored in displayable (ASCII) format.

Record	Contents
1 - 1001	Digitized waveform
1002	Reference level
1003	Vertical display
1004	RF attenuation
1005	Center frequency or start frequency
1006	Span or end frequency
1007	Resolution BW
1008	Video BW
1009	Sweep speed
1010	Frequency mode indicator (SPAN/START/NO)
1011	Time of acquisition (HH/MM/SS)
1012	Date of acquisition (MM/DD/YY)
1013	Heading line 1 from graph
1014	Heading line 2 from graph
1015	Average cursor position
1016	Marker frequency for heading
1017	Marker amplitude for heading
1018	Ref Marker X position for graph
1019	Ref Marker Y position for graph
1020	BW 1 or Delta Marker X position for graph
1021	BW Marker 1 or Delta Marker Y position for graph
1022	BW Marker 2 X position for graph
1023	Average sweep count
1024	Counter value
1025	Readouts on/off
1026	Settings label
1027	Waveform label

Talk/Listen Processing Sequence

This sequence applies **only** when multiple commands are sent at one time:

1. **MKSP** – Marker Span – Turns delta marker on.
2. All commands that start with **KS**.
3. **TROUT, TA, and TB** – Binary waveform transfers from the 2782 to the controller.
4. **IB and IA** – Binary waveform transfers from the controller to the 2782.
5. **PLOT** – Plots waveforms to 2782 IEEE Port 2.
6. **ANNOT** – Turns screen readout on or off.
7. **DSPROT** – Sets display rotation.
8. **OT** – Returns front-panel readout information. **OT** requires special processing but **ID** and **REV** do not have to be processed separately.
9. All other commands and queries.

Band Search Default Parameters

STORAGE/DISPLAY PARAMETERS

DISPLAY to SCREEN:	Yes
STORE to DISK	No

SEARCH PARAMETERS

START FREQUENCY	88 MHz
STOP FREQUENCY	108 MHz
THRESHOLD	-50 dBm
MAXIMUM SIGNAL POWER	-20 dBm
PEAK TYPE	All
PEAK HEIGHT	6 dB
MIXER OVERDRIVE	0 dB

Spur Search Default Parameters

PRELIMINARY SEARCH PARAMETERS

DISPLAY to SCREEN	Yes
STORE to DISK	No
CARRIER FREQUENCY	100 MHz
SEARCH POSITION	Above
MINIMUM OFFSET	1 MHz
MAXIMUM OFFSET	100 MHz
THRESHOLD	-50 dBm
MAXIMUM SIGNAL POWER	-20 dBm
PEAK TYPE	All
PEAK HEIGHT	6 dB
MIXER OVERDRIVE	0 dB

Spur Peak Type and Peak Height Definitions

- CW** Identifies continuous wave signals. Ignores spurious signals and impulses.
- Pulse** Identifies the peak of pulsed RF lobes for either line or dense spectra. (Lines must be <2 minor divisions apart.)
- All** Identifies all signals.
- Signal Threshold** Sets minimum visible signal level for marker functions.
- Peak Height** Setting (0-100) for size of excursion, in dB. Excursion is measured from the threshold or from the point at which the signal changes slope. Any excursions less than the setting will be ignored.

Band and Spur Search Error Messages

The following error messages may appear when performing a *Band Search* or *Spur Search*:

NO DEVICE WAS SPECIFIED TO STORE THE RESULTS OF THE SEARCH

Set *DISPLAY* to *SCREEN* or *STORE* to *DISK* to Yes.

START FREQ IS GREATER THAN STOP FREQ

Change *START FREQUENCY* or *STOP FREQUENCY*.

STOP FREQ IS GREATER THAN 33 GHz

Reduce *STOP FREQUENCY* below 33 GHz.

THRESHOLD UPPER LIMIT IS 30 dBm

Reduce *THRESHOLD* below 30 dBm.

THRESHOLD LOWER LIMIT IS -135 dBm

Increase *THRESHOLD* above -135 dBm. Check that *MAXIMUM SIGNAL POWER* is greater than *THRESHOLD*.

THRESHOLD IS WITHIN 5 dB OF NOISE CONTINUE WITH THE SEARCH (Y/N)

Search results may include many false (noise) signals. Increase *THRESHOLD*. Check that *MAXIMUM SIGNAL POWER* is greater than *THRESHOLD*.

THRESHOLD MUST BE LESS THAN THE MAXIMUM SIGNAL POWER ENTERED

Decrease *THRESHOLD* or increase *MAXIMUM SIGNAL POWER*.

THE POWER RANGE IS LIMITED TO 95 dB

POWER RANGE = MAX POWER - THRESHOLD

THRESHOLD and *MAXIMUM SIGNAL POWER* settings have exceeded the usable dynamic range of the 2782. Change *THRESHOLD* and/or *MAXIMUM SIGNAL POWER* so that they are within 95 dB of each other.

MAXIMUM SIGNAL POWER

UPPER LIMIT IS 30 dBm

Reduce *MAXIMUM SIGNAL POWER* below 30 dBm.

THRESHOLD IS TOO LOW FOR PRECISE SEARCH

Increase *THRESHOLD*.

**MAXIMUM SIGNAL POWER IS TOO HIGH
FOR THE FREQUENCY RANGE SPECIFIED**

Search parameters have exceeded the dynamic range of the 2782. Decrease *MAXIMUM SIGNAL POWER*.

**MAXIMUM FREQUENCY RANGE FOR
SIGNAL AMPLITUDE SPECIFIED IS**

value Hz

Search parameters have exceeded the dynamic range of the 2782. Decrease *MAXIMUM SIGNAL POWER*, increase *THRESHOLD*, or decrease center frequency.

**SWEEP TIME WILL BE 200 SECONDS
CONTINUE WITH THE SEARCH (Y/N)**

This warning appears at low sweep speeds. It is not an error condition.

**MAXIMUM MIXER OVERDRIVE ALLOWED
FOR THIS SETUP IS *value* dB**

Reduce *MIXER OVERDRIVE* below the *value* specified.

Spur Search Error Messages

The following error messages may appear when performing a *Spur Search*. They do **NOT** apply to *Band Search*:

CARRIER FREQ IS GREATER THAN 33 GHz

Reduce *CARRIER FREQUENCY* below 33 GHz.

CARRIER SIGNAL NOT FOUND or SIGNAL to NOISE is less than 15 dB CONTINUE WITH THE SEARCH (Y/N)

The search failed because there wasn't a valid carrier or because all carriers were within 15 dB of the noise. If the display appears to have valid carrier(s), increase *THRESHOLD*.

MINIMUM VALUE FOR THE MINIMUM OFFSET IS 15 Hz

Increase *MINIMUM OFFSET* above 15 Hz.

MAXIMUM VALUE FOR THE MINIMUM OFFSET IS 33 GHz LESS THE CARRIER SIGNAL

Decrease *MINIMUM OFFSET* so that the carrier found in the search plus *MINIMUM OFFSET* will be less than 33 GHz.