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9 April, 2009

From: Scott P. Chapman
Radiant Technologies, Inc.
To: Precision NGS Systems Testers Interface Owners

Subj: Tester Interface Configuration and Software Installation

Dear Precision Tester System Owner,

The information in this letter is essential to getting your Precision Tester test system fully operational. Please review all of the information below carefully. This installation guide applies to all of the following NGS family testers. This document covers the installation of Vision Version 4.1.0. Vision Version 4.1.0 is shipping as of February 14, 2008. Note that the Vision software is under constant development. The Radiant Technologies, Inc. website at www.ferrodevices.com should be checked often for updates to Vision, its subsidiary Tasks and, especially, the hardware driver.

With Version 4.1.0, any number of these testers, in any combinations of types, may be connected to the same host computer. Certain of the procedures described here will need to be repeated for the installation of each new tester. This document suffices for the Vision installation for the following testers:

- Precision LC's (shipped after February 2007)
- Precision RT66I USB interface for the Precision RT66A test head.
- Precision Premier II
- Precision RT66B
- Precision FH, FH-100
- Precision FP
- Precision SC

This letter accompanies the delivery of your new Precision NGS Ferroelectric Test System and its associated Vision software. The NGS tester may be connected to any host computer with a USB interface, running Windows 2000 or Windows XP. (Operation under Windows Vista has been verified, provided Vision is configured to execute in XP mode.) Vision Version 4.1.0 is the same software that runs on all Precision test systems. It has had nine years of development and maturity and has shown itself to be versatile and stable. Data produced on any Precision test system can be reviewed using the Vision installed on your Precision NGS interface host.

Accompanying this letter is a second letter that is specific to the tester that you purchased. That letter covers the hardware description and includes instructions for attaching the tester to High-Voltage Interfaces (HVI) and High-Voltage Amplifiers (HVA), if purchased.

The NGS Family Tester is simply connected to the host computer (as are many other peripheral computing accessories) using a USB (Universal Serial Bus) cable. Your host computer must be running Windows 2000 or Windows XP. (Operation under Windows Vista has been verified, provided Vision is configured to execute in XP mode.) You may also run Windows NT 4.0 provided you obtain a third party USB driver. Windows NT 4.0 does not officially support the USB protocol, but third party drivers are available. Radiant Technologies has not evaluated and does not recommend any third party USB drivers for NT.

NOTE: please ensure that the Vision program installation has been complete before connecting and/or applying power to any of your Radiant Precision NGS Testers.

For satisfactory viewing of the Vision program and all of its dialogs, some of which are quite large, a minimum of a 17" monitor is essential, with a minimum resolution of 1024 x 768 pixels.

Software Installation

The following pages present a detailed discussion of the installation process along with figures showing dialogs that appear at the various stages. A refined set of step-by-step instructions appears on page 15.

Before running the Vision program installer, copy it (Vision.exe) from the Vision Installer directory on the distribution CD to you host computer desktop. Run the installer from the desktop. Attempting to install directly from the CD is very slow. Furthermore, installation errors have been reported that indicate that there is insufficient hard disk space even though ample space exists. This error does not occur if the installer is run from the desktop. After installation, the installer may be removed from the desktop**.**

From the desktop, run Vision.exe. If you are using Vista, you should change the compatibility mode for Vision. To do so,

A. Place the mouse cursor over the Vision icon on the desktop and press the right mouse key.
B. A pop-up menu will appear. Select the “Properties”.
C. Go to the “Compatibility” page of the menu.
D. Set the compatibility of Vision to “XP with Service Pack 2”.
E. Press OK.

The Vision program is quite sophisticated and includes well over 100 files. Files are installed in the following directories.

- C:\ - File is xplorerDB.CPU. Holds configuration information for Vision
- C:\DataSets – Contains the DataSets and Word export file templates. DataSets are Vision database archives.
- C:\Program Files\Radiant Technologies\Vision – Contains the primary executable file. Also contains several program configuration files.
- C:\Program Files\Radiant Technologies\Vision\System – Primarily contains the Vision Tasks. Tasks are the basic operational functions of Vision. These are independent programs that are automatically loaded by Vision, provided they have a *.vld extension and are located in this file. The file also contains Customized Tasks. These are collections of Tasks configured by the user and stored for reuse as Tasks. There is also a template used to construct a DataSet's database. If the user has purchased any custom Tasks a file named Security.sec will appear in this directory and will allow the Task to be executed on the user's RT66I Interface.
- C:\Program Files\Radiant Technologies\Vision\Help – This folder contains all of the Vision documentation in HTML format. Help can be read by accessing any of these files directly or by pressing a *Help* button within Vision. Please see the discussion on Help, below.
- C:\User-Printable Help – This folder contains the entire Vision help pages saved in 90 Word-format documents. This is provided for the customer that prefers a printed manual. These files have been edited from the original export from HTML to Word and represent a reduced number of pages, with no loss of information. However, if all pages are printed, the resulting document is approximately 2700 pages. Care should be taken to ensure that only those files that are to be reviewed are printed.
- C:\WinNT\System32 – RTS_USB_Driver.DLL is written to this file. This is the USB driver that is specific to the RT66I
- C:\RT_USB – USB Drivers specific to the USB communications hardware internal to the Precision RT66I Interface. These include a NGS.inf file, several *.hex files, RTS_USB_Driver.dll and RT_USB.sys
- C:\NGS Documents – holds copies of the documents that are included in printed version with the delivery of the tester.

Do not attempt to move or rename any files or directories or install Vision into any but the default directory. In addition to creating and writing files to these directories, the installer performs the following actions:

- It places a Vision "Eye" icon on the desktop linked as a shortcut to the executable.
- It places a "Radiant Technologies->Vision" path in the start menu and links it to the executable.
- It writes critical file path information into the registry. Vision will not function properly without this information..
- It places shortcuts to various Vision folders – DataSets, System and User-Printable Help – on the desktop for easy access.

If you have purchased any Custom Tasks, these will be included in the shipment as a self-extracting executable on a separate floppy or CD. When executed, the file will automati-

cally extract the Task(s) and the Security.sec files to C:\Program Files\Radiant Technologies\Vision\System. Custom Tasks are:

- Piezo – Measures sample displacement concurrently with polarization response. This measurement requires that the user provide a displacement meter. The meter must output a voltage that is linearly related to the measured displacement. The voltage must fall in the ±10.0 Volt range. Radiant Technologies, Inc. recommends the MTI 2000 displacement meter.

  NOTE: If you are installing an RT66I interface and have purchased the DOS-based RT66A Piezo software for your RT66A, you should receive the Piezo Task on a CD automatically. If you do not, please notify Radiant Technologies, Inc. immediately. Vision will no longer make use of the multichannel extension attached to your RT66A or the computer board to which the multichannel extension connects. These can be removed or ignored. In order to run the Piezo Task under Vision, you will need to connect the displacement meter output to the SENSOR port on the rear panel of the RT66I.

- Piezo-D – Measures polarization switched in a sample in response to a force applied to the sample. This installation requires the purchase of a force meter/actuator that is being designed by Radiant Technologies.
- Custom Measurement – Performs a Hysteresis Loop using a variable-speed custom drive profile under the user's control. Please see the documentation in the help pages for more detail.
- Chamber, Ramped Chamber and Remanent Chamber – This set of Tasks measure sample thermal dependence of dielectric constant and spontaneous polarization to determine the pyroelectric coefficient. Measurements are made using either Pulse or Hysteresis test profiles, depending on the program. All three programs are provided to users that purchase Chamber. For proper use, the host computer must be connected to the thermal controller using a National Instruments GPIB board and NI-488.2 software. The connection may be direct or through a GPIB-RS232 converter. Please see the help pages for more detail.

Documentation and Help

As with all modern software systems, Vision relies on manuals that are electronic rather than printed. These manuals are created in HTML format and may either be accessed directly as individual files in C:\Program Files\Radiant Technologies\Vision\Help, or through the *Help* menu or *Help* buttons within Vision. If accessed through Vision, the Help will be directed to the immediate topic in question.

If you require printed documentation, the help files have been extracted and edited in Microsoft Word formatted documents. These are located on the CD in the "User-Printable Help" folder. They are also installed in C:\User-Printable Help.

USB Driver Installation

Note that the installation presented below was performed in Windows 2000. Dialogs presented in Windows XP may vary. In particular a dialog may appear that indicates that the hardware being installed has not been certified by Microsoft. You will be asked if you want to continue installation. You must indicate that the installation is to continue. Although dialogs may appear different to those shown, except for the certification, Windows XP installation will proceed in a fashion very similar to that described here.

When the Vision installer is finished executing, power up the NGS Tester before running Vision. Windows will indicate that new USB hardware has been detected (Figure 1) and start a "New Hardware" wizard.. You must load the driver. Follow the "New Hardware" wizard that appears. (**Figure 2** – The figures below are taken from the Windows 2000 wizard. Windows XP may differ somewhat.) On the wizard second page use the default option (**Figure 3**). On the third page, de-select *Floppy disk drives* and *CD-ROM Drives*. Select *Specify a location* (**Figure 4**). In the next dialog, click the "Browse…" button (**Figure 5**). In the browser, browse to C:\RT_USB. This directory was loaded by the installer. Select the RT66I.inf file. This is reflected in **Figure 6**. Click *Open* to select the driver as shown in **Figure 7**. Close the Browser (*OK*). Click *Next* > in the wizard page of **Figure 8** and *Finish* **Figure 9**. NOTE: These steps must be repeated for each tester type connected to the host computer.

Figure 1. Windows 2000 Found New Hardware Message.

Figure 2. 2000 New Hardware Wizard – Initial Page.

Figure 3. Windows 2000 New Hardware Wizard - Page 2 - Choose Installation Type.

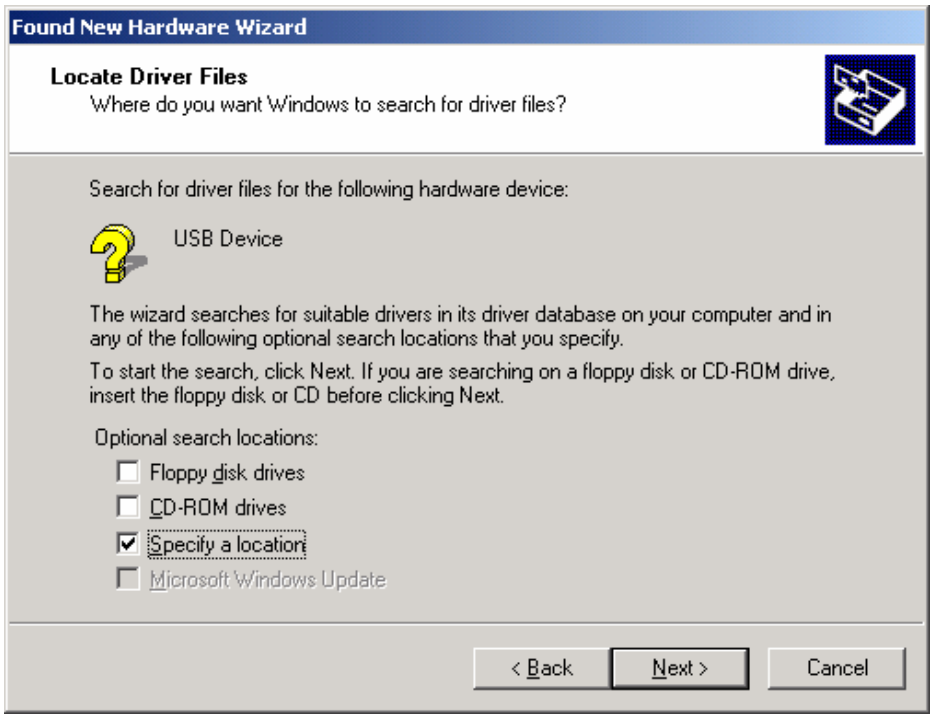

Figure 4. Where to Look for Driver.

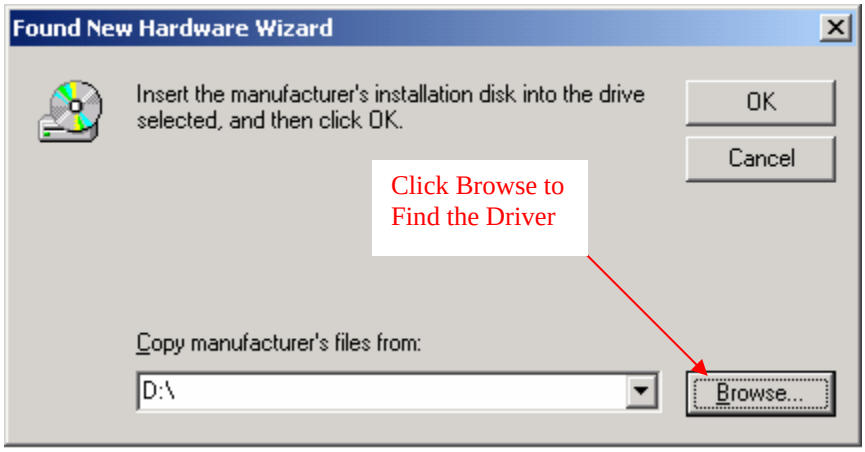

Figure 5. Driver Search Wizard Page.

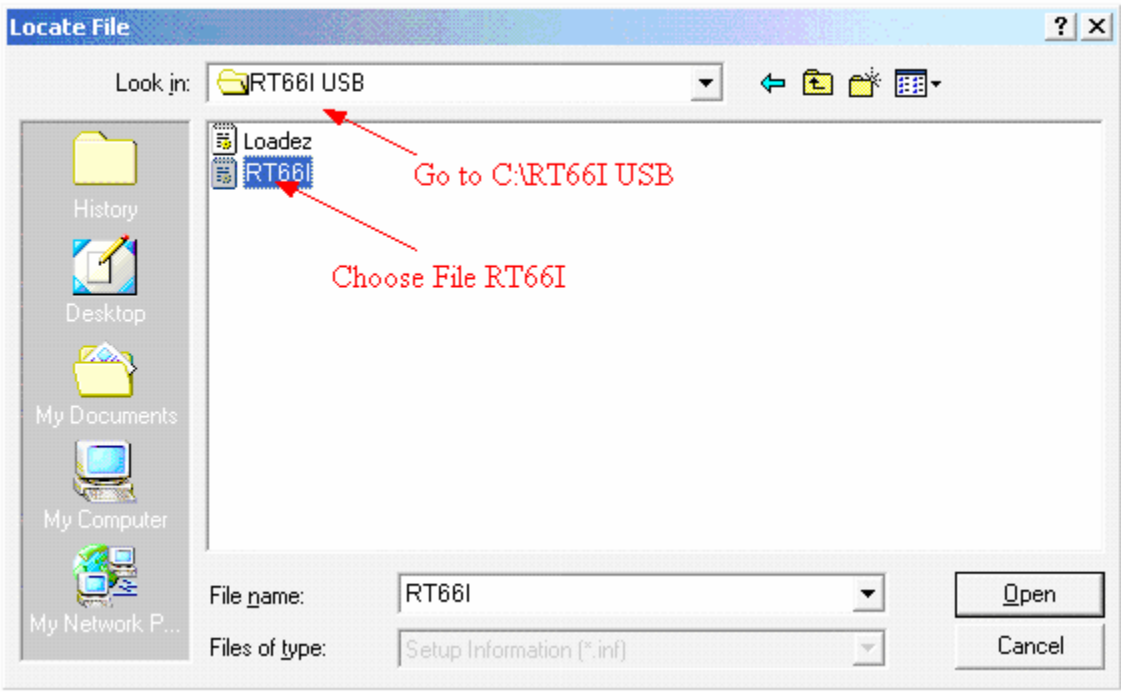

Figure 6. The Browser Window. Go to C:\RT_USB and Select NGS.inf. (Note that the directory in the figure is obsolete. C:\RT_USB and NGS are correct.)

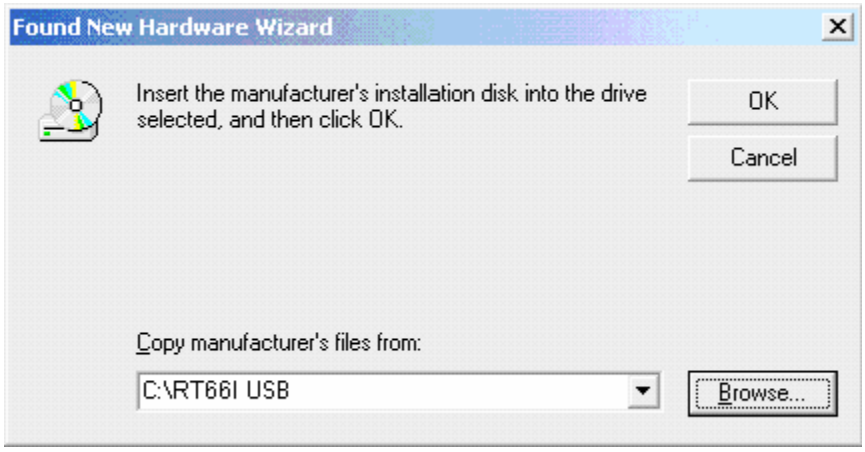

Figure 7. Wizard Search Page After Browsing. (Note that the directory in the figure is obsolete. C:\RT_USB is correct.)

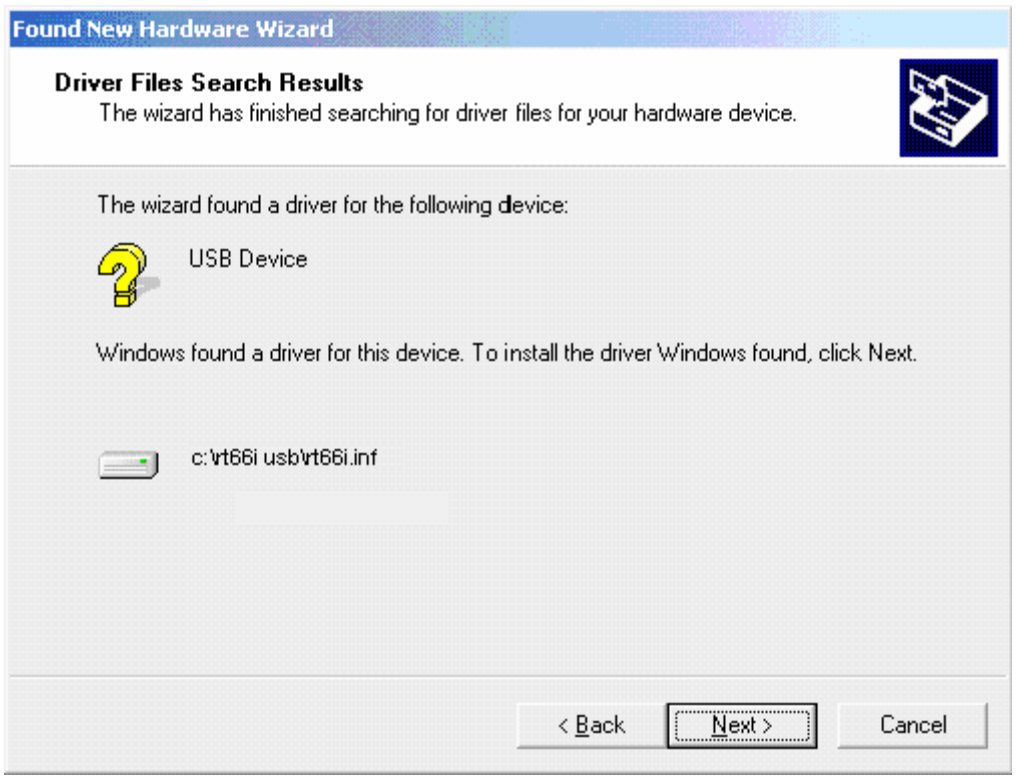

Figure 8. Driver Load Page.

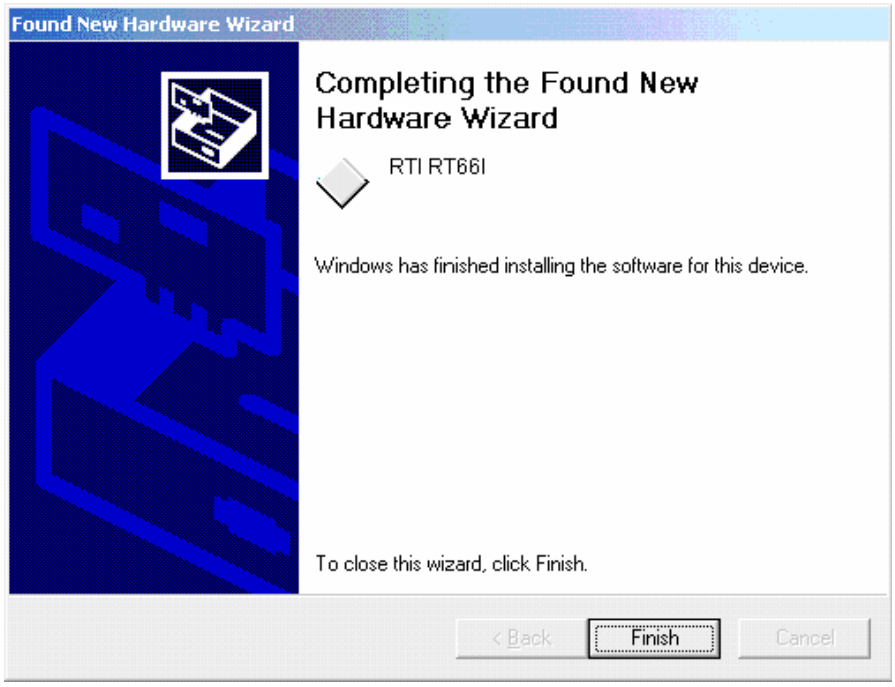

Figure 9. Final Wizard Page.

Vision Execution

NOTE: A fourth document is shipped to you with the Precision NGS tester system. This is a Vision training outline that is presented to customers during site training. That document provides a more in-depth discussion to supplement this section. Neither this section nor the companion document should be considered replacement training tools for the Vision help pages. On-site training may also be purchased from Radiant Technologies, Inc.

On first Vision execution, a dialog will appear that indicates that the database has been created. This appears to be a warning, but is normal operation. **NOTE: On Vision installations shipped after 1 May 2008, the database file is created by the installation process and this dialog will not appear.** Acknowledge the message and Vision will start. When Vision is started the green ACTIVE light on the tester will begin to blink rapidly. This is an indication that the software was properly installed and both the software and the tester are operating normally.

Figure 10. New Database Message on First Vision Startup.

When Vision starts it reports the testers that it finds connected to the host computer. Any number of testers of any type may be connected. The testers may be permanently assigned names by the user. This is a useful way of distinguishing testers of the same type. Only one tester may be operated at a time. That tester may be selected in the dialog that appears. If no tester is attached, that is reported in the dialog. That is not an error condition, but measurements will not report valid data.

Testers may be added or removed while Vision is running. In that case, the hardware configuration must be refreshed by selecting Tools->Hardware Refresh in the Vision menu (or click <Alt-W>). This will reopen the Tester Name and Selection dialog. This action may need to be repeated to ensure that the hardware is fully refreshed. The dialog that appears is shown both with and without tester attached in **Figure 11**.

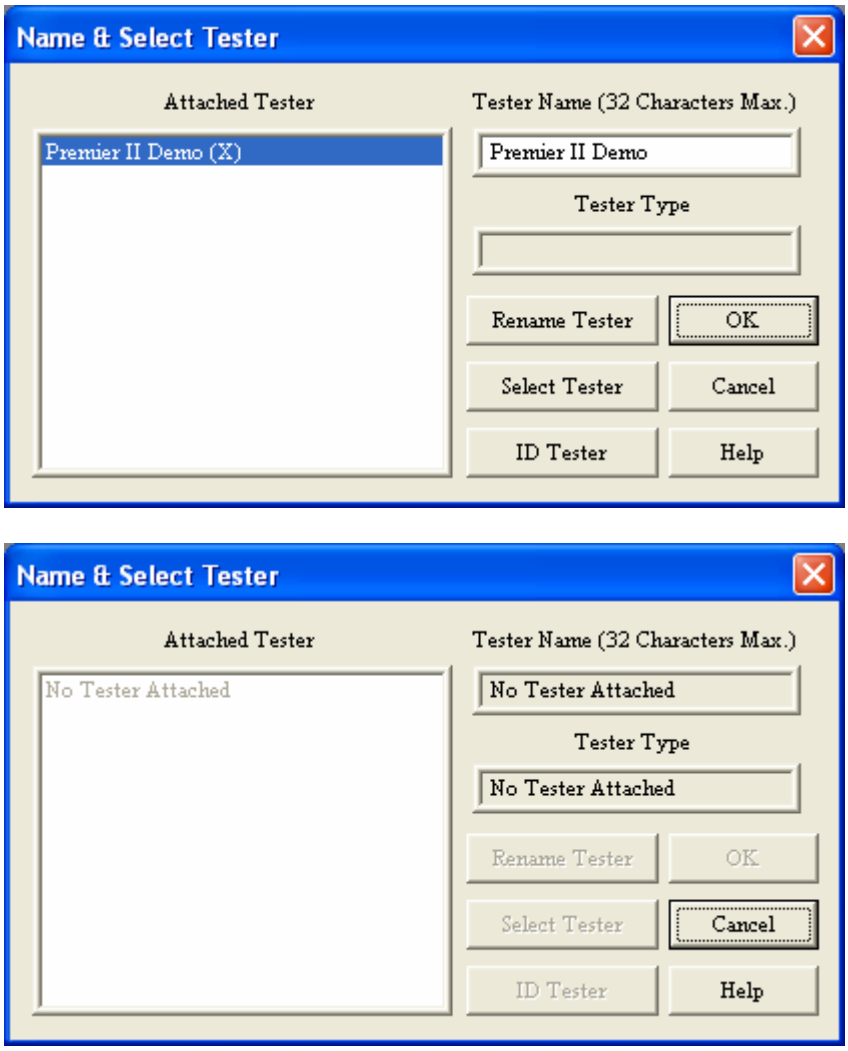

Figure 11 - Tester Identity Dialog

Vision is shipped with several tutorial DataSets. These will not appear in the DataSet Explorer. They must be registered. Go to Explorer->Register DataSet… (**Figure 12**). A dialog will open that will, by default, point to C:\DataSets. Select "tutorial #6a - parasitics.dst" (**Figure 13**) and click *Open*. The tutorial #6a DataSet will appear in the Explorer (**Figure 14**). Repeat for "tutorial #5a.dst" through "tutorial #1a.dst". You will duplicate these DataSets as you work your way through the tutorials in the Help Pages.

NOTE: On Vision installations shipped after 1 May 2008, the tutorial DataSet registration is performed by the installer. These steps are not required. The tutorial DataSets should appear as in Figure 14. This registration process is still appropriate when adding an existing unregistered DataSet to Vision.

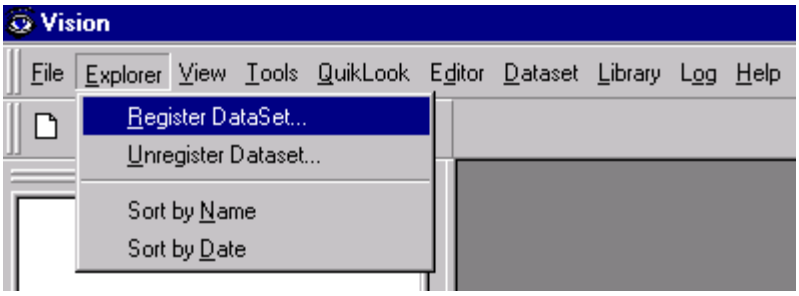

Figure 12. Register a DataSet

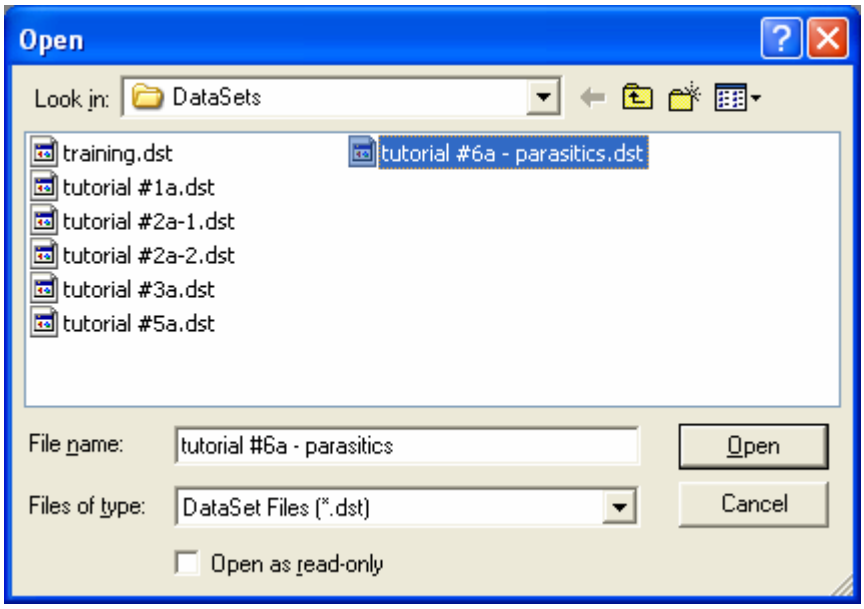

Figure 13. Browse to the DataSet.

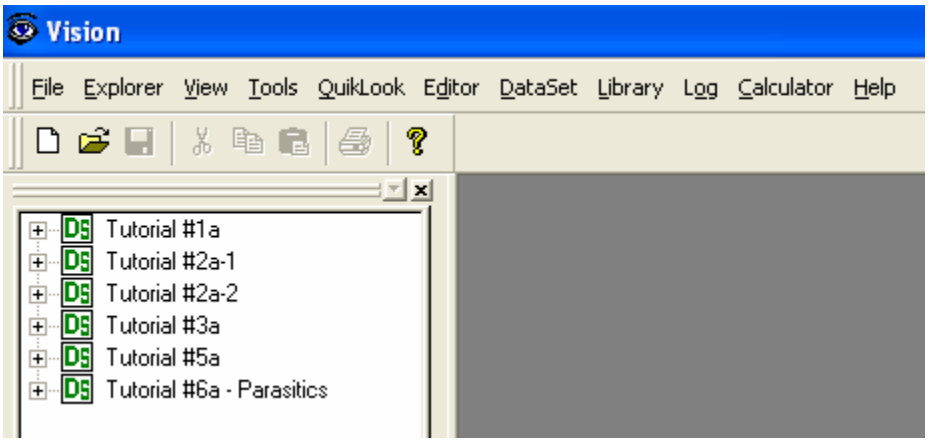

Figure 14. Registered DataSets in the DataSet Explorer.

In this case the DataSets appear at the root of the DataSet Explorer. They may be reorganized into folders and subfolders to reduce cluttering. (DataSets cannot be placed more than two levels deep in the DataSet Explorer tree.) Once the tutorial DataSets have been registered, go to DataSet->Update Folders in the Vision menu. A dialog opens that allows DataSets to be selected and their folder and subfolder names assigned or reassigned. Any number of DataSets may be altered in a single instance of the dialog. Once the dialog is closed, Vision must be stopped and restarted for the changes to take effect. **Figure 15** shows the sequence.

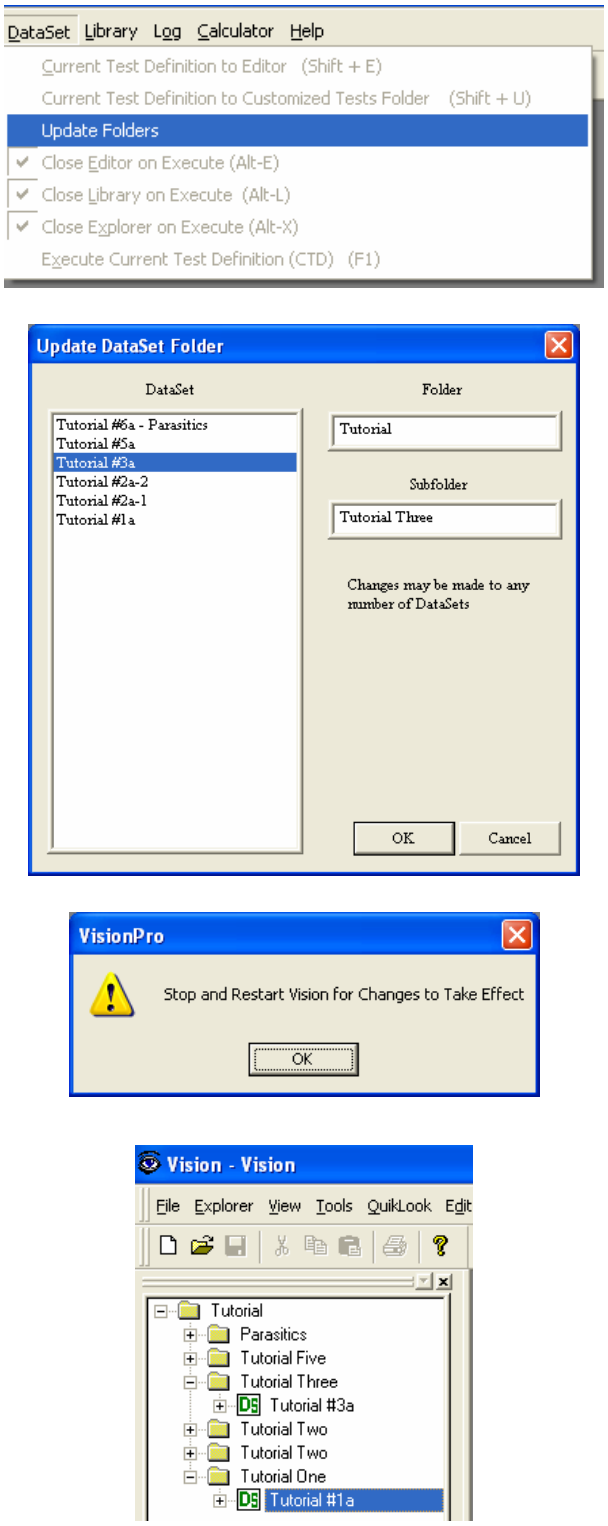

Figure 15 - Updating DataSet Folder and SubFolders

The next step is to verify the tester operation by making a QuikLook Hysteresis measurement. If you are running an RT66I, RT66B, FH, FP or SC, attach a commercial linear 1.0 nF capacitor to the NGS tester, with one terminal connected to the tester DRIVE port and the other to the tester RETURN Port. In Vision, select QuikLook->Hysteresis as in **Figure 16.** For the Precision LC and Premier II, continue.

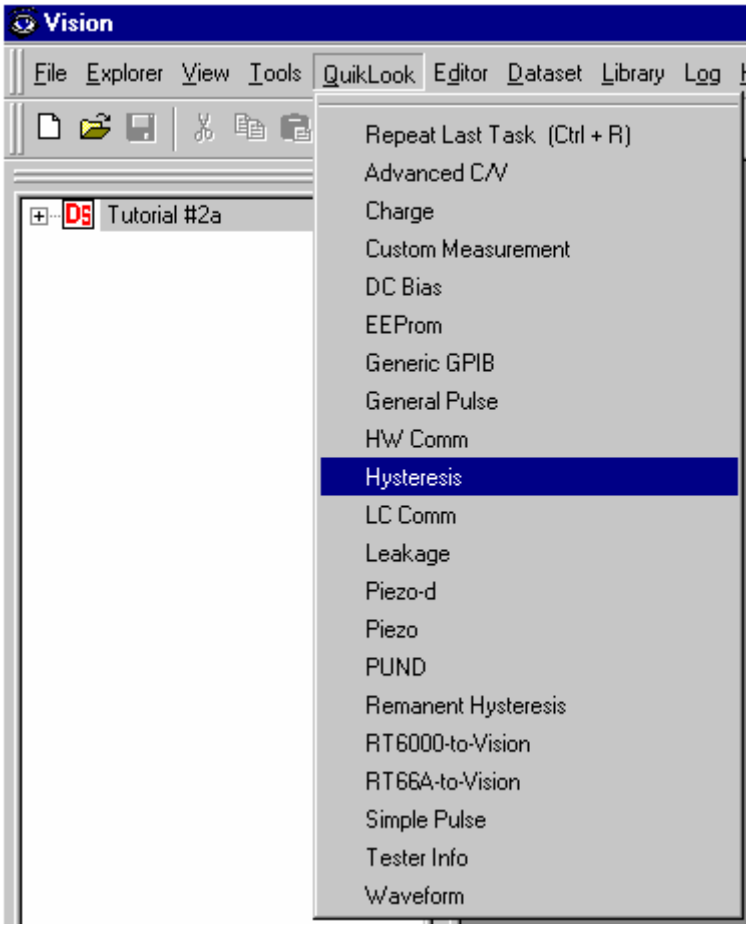

Figure 16. Select the Hysteresis Task from the QuikLook Menu.

The Hysteresis Task configuration dialog will appear as in Figure 17. Set the Task Name, if desired, but do not adjust any controls. If you are running the Precision LC or Premier II tester, check the control labeled *Enable Ref. Cap*. Click *OK* to start the measurement.

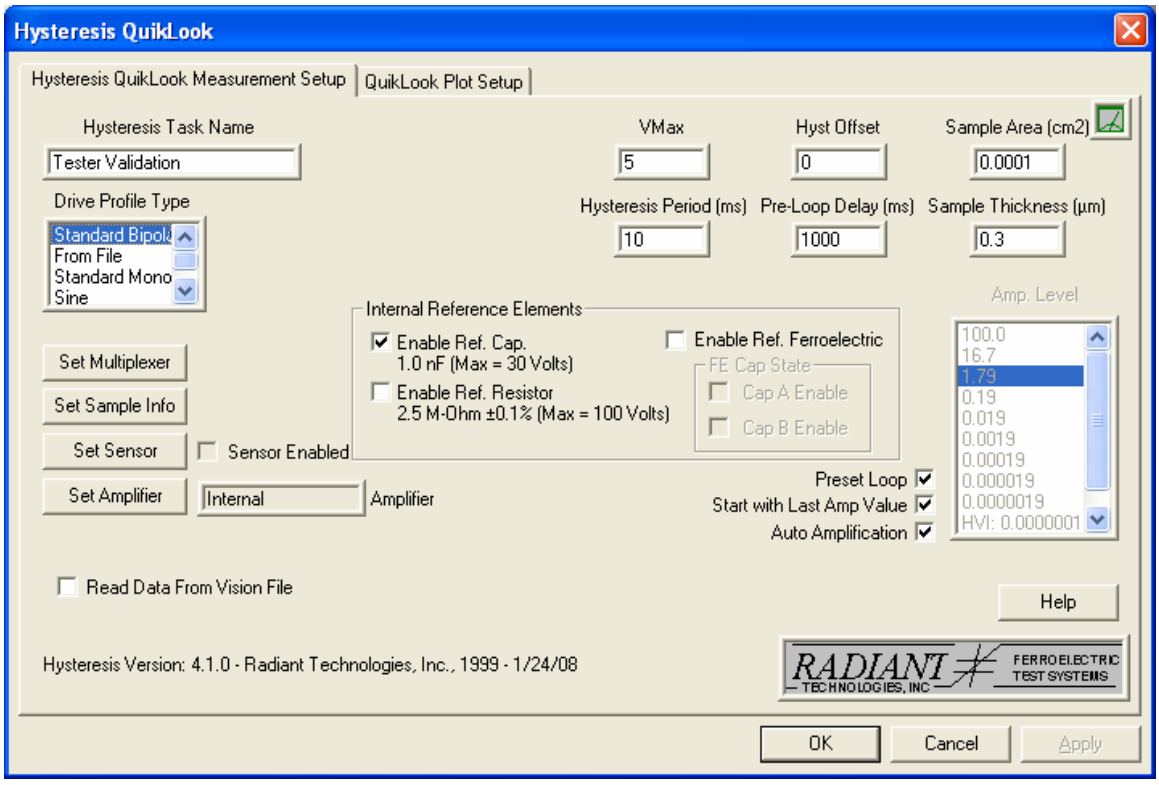

Figure 17. Hysteresis Task QuikLook Configuration Dialog. Enable the Reference Capacitor.

The software will pause while a Hysteresis measurement is made. Once the measurement is finished, the data will be displayed in a dialog as shown in Figure 18. The data will be linear going from –50.0 µC/cm^2 at –50.0 volts to +5.0 µC/cm^2 at +5.0 Volts as seen in the Figure. If the data differ in any way, please contact Radiant immediately. (Note that the results shown on Figure 18 are taken on a 100 pF capacitor and produce maximum polarization values at ±5.0 µC/cm^2.)

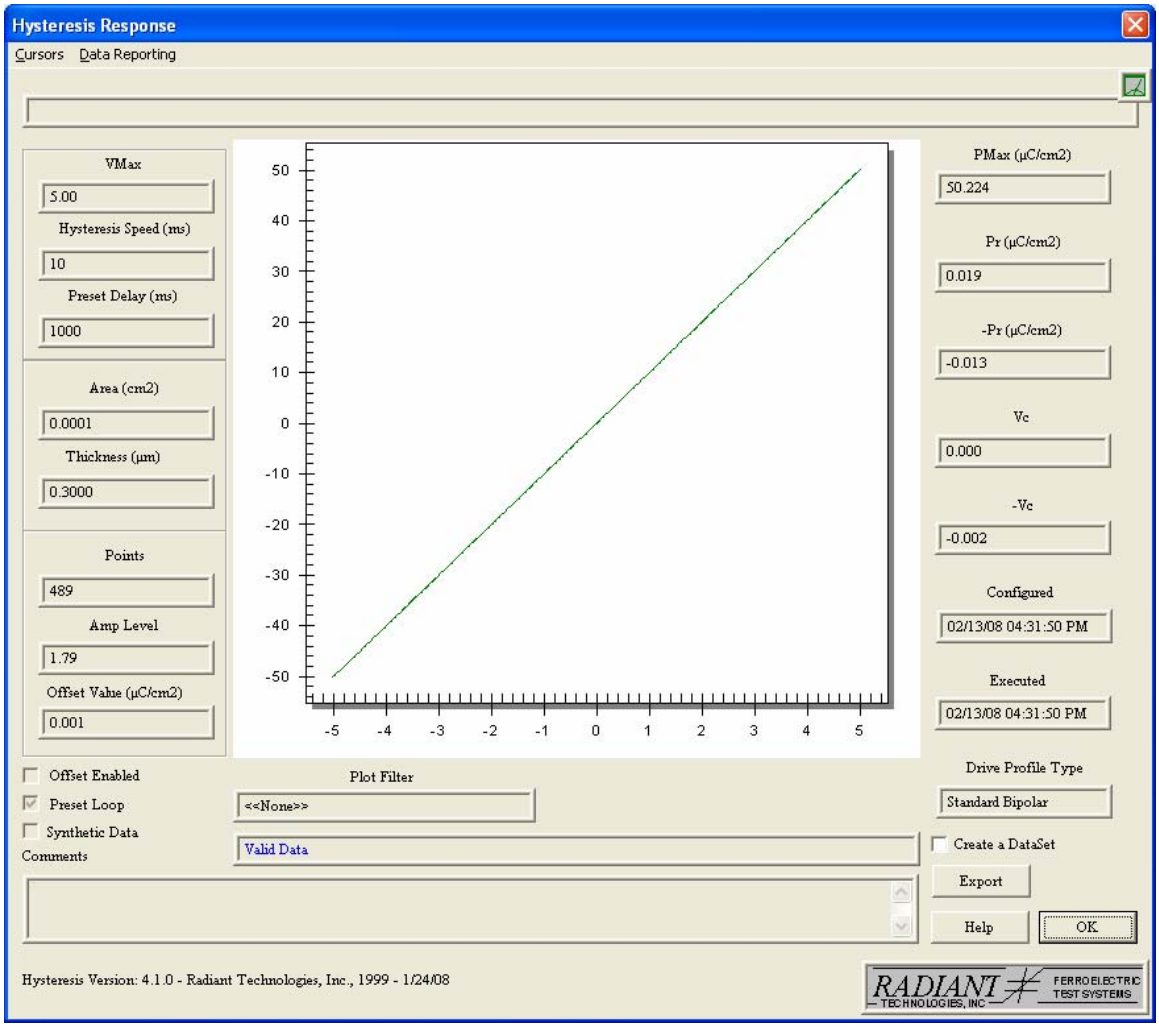

Figure 18. Hysteresis Task Measurement Results.

Once you have made this first measurement, the next step is to begin to investigate the capabilities of Vision and to learn to use them. Your next visit should be to the help pages. These pages are detailed and extensive. However, they are arranged so that the user that begins with the earliest entries will be guided simply through the Vision learning process. Go to Help->Help Topics in the Vision menu as in **Figure 19**.

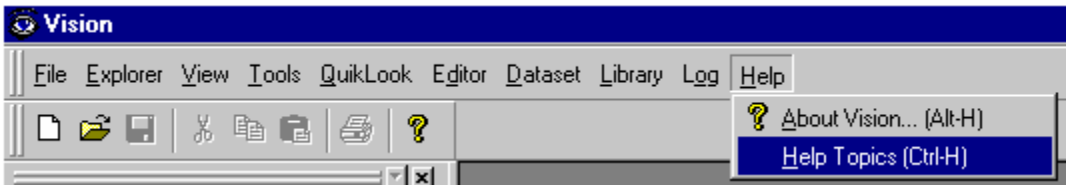

Figure 19. Accessing Vision Help Pages.

The first topic, an introduction, will appear along with a Table of Contents. The hardware specification should presents comparative specifications for older RTI tester families, but does not yet include all of the Precision tester models. The Main Manual will discuss program structure, terminology and execution. This should be the first point of your review. Each Task is detailed in this document, so that some sections may require only a cursory review at this time. This is an excellent starting point for an overall view of the program. The next main heading is a Tutorials section. These tutorials guide you through simpler, then more advanced DataSet and Customized Task operations. As you work through them you will be constructing duplicates of the DataSets and Customized Tasks found in your installation. With the tutorials you will very quickly become familiar with the capabilities and general operation of Vision. The next Help section presents a series of step-by-step instructions for performing Vision's most common operations. These three sections will form the basis of a full Vision education.

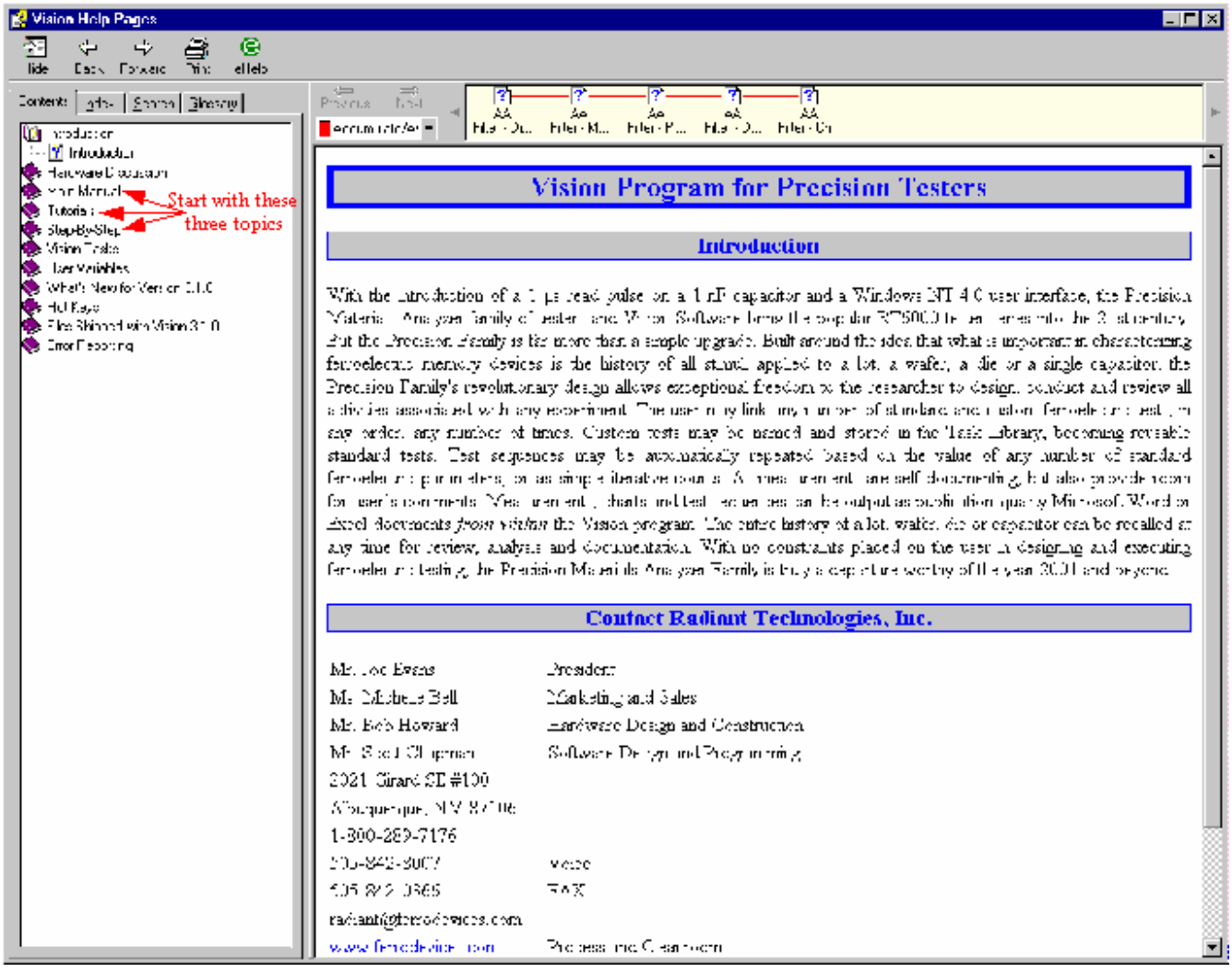

Figure 20. Vision Help Pages.

Subsequent sections of the Help pages present detailed Task configuration, execution and data analysis discussions in a formatted fashion. Every control on every dialog is presented in detail. Where pertinent, theory is presented with the Task discussion. These pages should be reviewed on an as-needed basis. As you have seen with the Hysteresis QuikLook configuration dialog, the configuration can be elaborate. Task-specific help can be accessed directly by clicking the *Help* button of any Task dialog.

Step-by-Step Installation

1. Connect the NGS Tester to the host computer using a standard USB cable. Leave the tester turned off.
2. Insert the installation CD.
3. From the "Installer – NGS" directory on the CD run "Vision.exe". Throughout the installation process allow several minutes for the installer to show progress.
4. Proceed through the various dialogs until the installation is complete.
5. If you have ordered custom Tasks such as Piezo or Chamber, insert the supplemental floppy in the host computer and run the self-extracting executable files located there.
6. Turn on the Tester.
7. Windows will detect the new hardware and run a Wizard that installs the driver.
8. When the wizard reaches the screen that needs to specify a file location, browse to C:\RT_USB and select the RT66I file. (See pages 5 though 9 for a detailed view of the wizard for Windows 2000.
9. With the Precision tester turned on, run Vision. Note that if you run Vision with the tester turned off, a message will appear that the driver is not found. This is normal. Vision will execute normally, but will replace measured values with meaningless synthetic data when measurement Tasks are executed. Note that when Vision is executed for the first time, a message will appear that a new Explorer DB has been created. This is also normal.
10. In Vision select Explorer->Register DataSet… In the browser dialog that appears select "tutorial2a.dst" and click *Open*. The browser will close and the Tutorial DataSet will appear in the DataSet Explorer.
11. Repeat 10 and open "tutorial1a.dst.
12. Open a tutorial DataSet by double-clicking on it. Ensure that the DataSet opens without error. A log window will appear and a second tab will appear on the DataSet Explorer. If errors occur they are an indication that the database entries in the registry were not properly entered during installation. Contact me at Radiant Technologies, Inc. immediately.
13. Attach a 1.0 nF commercial linear capacitor to the tester DRIVE and RETURN ports. (For the Precision LC and Premier testers, there is an internal 1.0 nF linear test capacitor that is switched into the signal path in software, or you may attach the external element.) From the Vision main menu, select QuikLook->Hysteresis. (For the Precision LC and Premier II, check the *Enable Ref. Cap.* Control.) A 5.0-Volt Hysteresis measurement will be made on the sample. Once the measurement is made, the results will be displayed on a dialog. The plotted values should be linear and range from –50.0 μC/cm^2 at –5.0 volts to +50.0 μC/cm^2 at +5.0 Volts, passing through the origin.

If you do not see these results and/or if the measurement indicates an error, contact Radiant Technologies, Inc. immediately.

14. The Precision NGS Tester is now ready for your use. Vision is a complex and highly capable program that allows you to construct you own experiments. To begin to learn to use the program, click on "Help->Help Topic (Ctrl-H)". A complete set of help pages will appear. The first several topics in the Table of Contents will provide in-depth discussion and training of the program. Main Manual presents a complete overview. In the Tutorials, you will recreate, step-by-step, the DataSets that are installed in your system, showing simple, then advanced Vision usage. The Step-by-Step section shows how to accomplish specific operations. Topic entries further down in the help pages discuss each Task in detail and describe every dialog control.

With the completion of the steps presented in this letter, you will have a fully configured Precision tester and will be operating its associated Vision software. You will have begun to understand the operation of the program and know where to go to find information. We wish you the best of luck in your research and experimentation. Please do not hesitate to contact me if you have concerns, questions, comments or difficulties.

Sincerely,

Scott P. Chapman
Computer Engineer