

Sure *CAL*[®]

Test Manager V5.

User's Guide

For use with Sure *CAL*[®]
Automated Metrology Systems

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PREFACE

VERSION UPDATES

Information in this manual relates to SureCAL® TEST MANAGER Version 5 and not to previous versions. Virtually all of the operating screens have remained unchanged and most of the operating steps are the same.

Users who have tailored their Reporting routine, SURE_4, need to select those tailored subroutines in the Configuration, Custom SURE_4 Routines menu to make them active.

Changes:

- Updated SureCAL Support email address references to reflect new “@ngc.com” domain name.
- Added Safe Harbor Agreement compliance information as related to safeguarding personal information.
- Replaced several Figures where screen images had undergone minor changes.
- Loading sequence for new SureCAL software installation was revised in section 2.0 GETTING STARTED, LOADING SOFTWARE OVERVIEW. Programming Support Package installation instructions remain in the Programmer’s Reference Manual to assure that HTBasic Developer software is properly loaded.
- Highlighted operator use of Manual Data Entry feature for recording observed measurement results.
- Added information about new ambient Temperature & Humidity monitoring capabilities. New Appendix H describes recommended Veriteq Spectrum 2000 Temperature & Humidity Data Logger setup.
- Reworded discussions related to label printing to accommodate a larger variety of labels and label printers.
- Section 7.0 Administrative Software, was rewritten to reflect the flexibility of SureCAL TEST MANAGER to operate in conjunction with a variety of laboratory administrative software packages. The previous capability to operate in conjunction with LabMate V3.5 has been preserved.

Version numbers with characters to the right of the decimal point reflect minor changes and bug fixes.

INTENDED USER

This manual is designed to help get operators started and to assist in the initial program tailoring. It is intended that users will make good use of the on-line help facility as both a training aid and refresher notes. TEST MANAGER was created for technicians who have minimal software experience. It is assumed, however, that the operator has basic personal computer skills and is experienced in testing and calibrating instruments and devices.

CONVENTIONS USED

The following notations and special symbols are used in this guide:

...	You may repeat the preceding entry.
<alt>+P	You must hold down the ALTERNATE (Alt) key then momentarily press the letter “ P ” key. This is the typical HTBasic and Windows menu bar selection action.
Exit	Single underlined characters in bold type face, indicated that you must hold down the CONTROL (Ctrl) key then momentarily press the underlined letter key (ex. X). This is the typical ^{Sure} CAL [®] menu bar selection action.
(Y/N):__	You must answer yes or no in the form of: Y, y, N, or n without pressing the Enter key. Clicking a mouse key implies a No response.
Esc	You must momentarily press the ESCAPE (Esc) key. This action usually allows you to back out of, or exit, the current function one screen at a time.

All numbers are decimal unless otherwise noted by a radix subscript such as: 27₈ octal, B3_H hexadecimal, and 0101₂ binary.

HOW TO CONTACT US

Orders

Please contact us directly to confirm the proper part numbers, packaging, delivery, and payment instructions. SureCAL® Software and Hardware may be ordered from:

SureCAL® Automated Metrology Systems
Northrop Grumman, Electronic Systems
PO Box 746, M/S-M-21
Baltimore, MD 21203-0746

Toll free (in USA): **1-(800) 913-3773**
In USA: 1-(410) 993-5000
Facsimile Transmissions: 1-(410) 993-5001
Internet: **SURECAL@NGC.COM**

Support

Users with Internet access can use the **Customer Support Email** feature to create and send email to us, or any other designated recipient. This feature also attaches some information to your email that is helpful in diagnosing problems and providing a quick response.

The **Customer Support Email**, in the SureCAL Configuration program, needs to be enabled to take advantage of this feature.

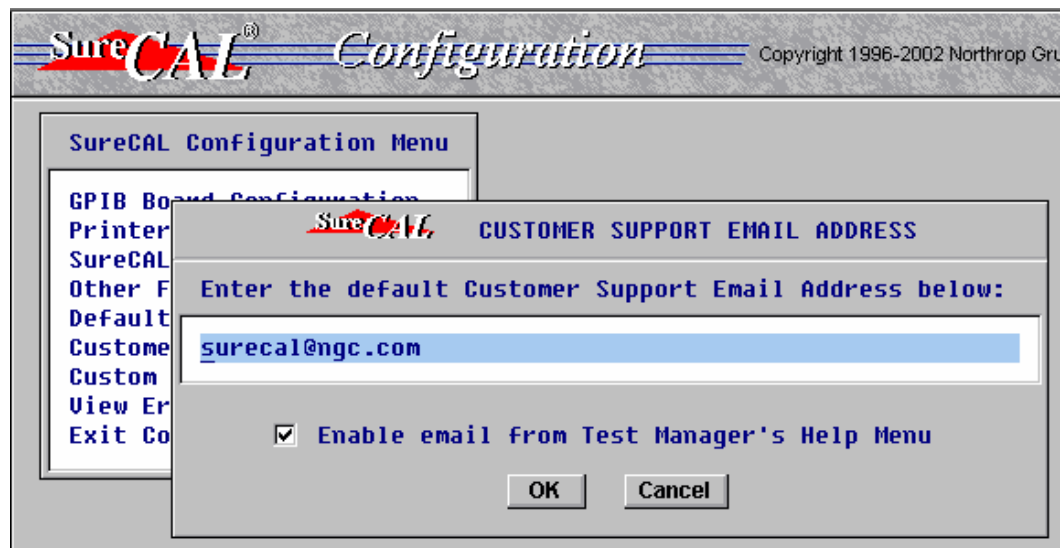
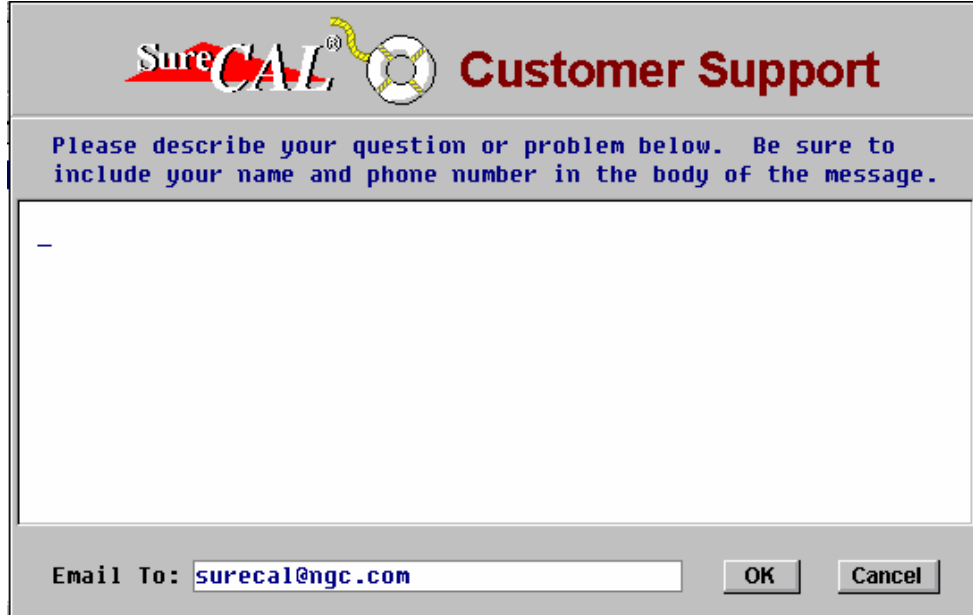


Figure: Customer Support Email setup


Any valid email address can be used in place of the default SureCAL Products email address. If the “**Enable email...**” box is checked, then users will be able to gain access to this feature from the TEST MANAGER **Help, Contact SureCAL Support** menu selection.

When “**email from Test Manager’s Help Menu**” is enabled, a SureCAL Customer Support dialog box will be presented for entering any questions or comments.



The image shows a dialog box titled "SureCAL Customer Support". At the top left is the SureCAL logo, which includes a stylized "S" and "C" with a yellow and red swirl. To the right of the logo is the text "Customer Support" in a bold, red font. Below the title bar, there is a blue instruction: "Please describe your question or problem below. Be sure to include your name and phone number in the body of the message." A large white text area is provided for the user's message. At the bottom, there is an "Email To:" field with the address "surecal@ngc.com" and "OK" and "Cancel" buttons.

Figure: Customer Support Email Form

Users will always have the opportunity to edit the default email address before clicking  to send their message.

Customers need to know that the default Password used for access to: Debug, Program Pause, Options, and Custom Reports is SURECAL in upper case characters. Once this password has been changed, it can only be reset using the new password or by contacting SureCAL Support to reset the program to the default password.

There are three types of help available for users of ^{Sure}CAL® software: operations help, programming help, and calibration help.

Operations Help

The ^{Sure}CAL® Automated Metrology Systems group is available, to assist you in operating or installing our software and hardware, weekdays from 8:30 AM to 3:30 PM Eastern Time. You may contact us at the **Orders** address given above or use the **Contact SureCAL Support** email feature.

Programming Help

Comprehensive programming assistance will be extended to those customers who have completed the ^{Sure}CAL® Programmers’ Training. Other arrangements for assistance are extended to those who have provided acceptable unit-specific calibration software for resale by Northrop Grumman, Electronic Systems.

Calibration Help

The metrology staff at Northrop Grumman, Electronic Systems stands ready to assist you in utilizing ^{Sure}**CAL**® products to perform instrument calibration. This consultation service is available at an hourly rate and may be contracted through the **Orders** address given above or use the **Contact SureCAL Support** email feature. Northrop Grumman, Electronic Systems also has an extensive field service organization with offices located throughout the world to assist all of its customers.

1.0 OVERVIEW

SureCAL® TEST PHILOSOPHY

The SureCAL® Automated Metrology System is based upon the philosophy that units are to be tested for their compliance to specifications and are not to be adjusted to nominal values if found to be in tolerance. Testing should verify the continued “adequacy” of the unit being checked for calibration accuracy. A retest mode has been provided, but the AS RECEIVED conditions must be determined prior to performing any retest. Adjustments or repairs are to be made after recording the As Received condition. The Data Sheet will contain the initial As Received data as well as any final test results.

If a measurement is found to be significantly out of tolerance (SOOT), based upon the specified Fail Ratio, it will be flagged. Some customers use this feature to differentiate major from minor failures.

All of our test methods strive to exceed a 4:1 Test Accuracy Ratio. When deviating from recommended standards, users should examine the Equipment Required list and heed the Minimum Required Specifications. Some busable calibrators and meters can report their specifications and SureCAL® procedures often make use of these to calculate actual Test Accuracy Ratios. TAR Compensation Options are available to help when the TAR falls between 4:1 and 1:1.

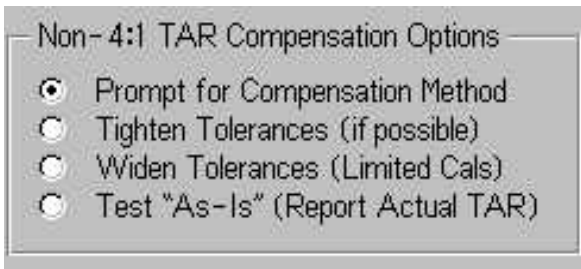


Figure: TAR Compensation Options

SureCAL® TEST MANAGER

The SureCAL® TEST MANAGER Software provides the main control for the SureCAL® Automated Metrology Systems. TEST MANAGER itself is not a calibration program but acts like a conductor that follows the instructions in a particular instrument specific Calibration Procedure to coordinate the interaction between files. TEST MANAGER can operate as a standalone workstation controller or in concert with laboratory administrative software. When SUPPORT Software is not included, the package is called SureCAL® TEST MANAGER LITE Software.

The design of TEST MANAGER allows for the control of various unique calibration setups. Five typical SureCAL® Automated Metrology System workstations arrangements provide calibration support for: Microwave and Low Frequency RF devices, Multimeters, Oscilloscopes, and miscellaneous devices such as Power Supplies, Shunts, and Decade Resistors. By tailoring the SureCAL® TEST MANAGER Test Configuration, users can tailor the software to operate a variety of peripherals in an environment comfortable to the user. The term Flexible Standards is used to describe the ability of TEST MANAGER to

control a selection of equivalent standards that will be used in a test setup for a particular model instrument, with a single Calibration Procedure.

Calibration Modules

To test particular instruments, the user must obtain model specific Calibration Modules. These Modules are simply an assembly of files that include a coordinating Calibration Procedure, plus any associated Test Subprograms, graphic files, and data files. The relationship between files and the editors required to change them is depicted in the Appendices. There have been hundreds of such modules developed, covering a broad range of instrument types and manufacturers. All of the ^{Sure}**CAL**[®] Automated Metrology Software is designed to help the user meet the calibration system requirements of MIL-STD 45662A, ANSI/NCSL Z540-1, ISO 10012, ISO-17025 and quality system requirements of ISO9001.

Calibration Procedures

In order to calibrate a particular unit, the operator first selects a ^{Sure}**CAL**[®] Calibration Procedure to match the unit. Calibration Procedures can be selected and retrieved by specifying the procedure number or matching the unit description. Where TEST MANAGER is operating in concert with a laboratory administration software package, all Calibration Procedures can be associated with a specific unit identifier (such as an asset number) and can therefore be retrieved automatically.

Each ^{Sure}**CAL**[®] Calibration Procedure coordinates the necessary files to perform the tests, prompts the operator with a list of required equipment, and usually provides a graphical display of necessary interconnections. After making the required connections, the operator starts the test cycle. Many tests function with minimal operator intervention. Recording of data is often automatic, with data being displayed to the operator as a pass/fail observation, line graph, or tabular chart form. One of the great benefits provided by ^{Sure}**CAL**[®] is its ability to quickly make and record multiple measurements that would be too laborious for manual testing. Another valuable benefit is the presentation of clear work instructions that assures every calibration is performed in a repetitive manner.

When there is an occasional need for manual data input, the operator can record the results in a predefined data template. This Manual Data Entry mode can be a powerful tool for collection of observed data.

Instrument Drivers

Instrument driver programs, for various standard instruments, have been supplied with **SureCAL®** TEST MANAGER and TEST MANAGER Lite, since Release 2.0. These software drivers provide the flexibility to use a variety of standards with a single Calibration Procedure Module, thereby avoiding the need to change calibration programs for each workstation setup of standards.

Instrument drivers act as agents that translate commands between test programs and programmable instruments. Generic Reference Commands are passed to this agent that converts them into specific instrument bus commands. Test programs can be made to converse with instruments being used in the current test setup, by matching the instruments being used to corresponding software instrument drivers.

Drivers can be written for the majority of all programmable instruments. **SureCAL®** has developed drivers for many of the programmable standards often used to calibrate instruments in the **SureCAL®** Library. Creating additional drivers is an ongoing process determined by instrument popularity and customer requests.

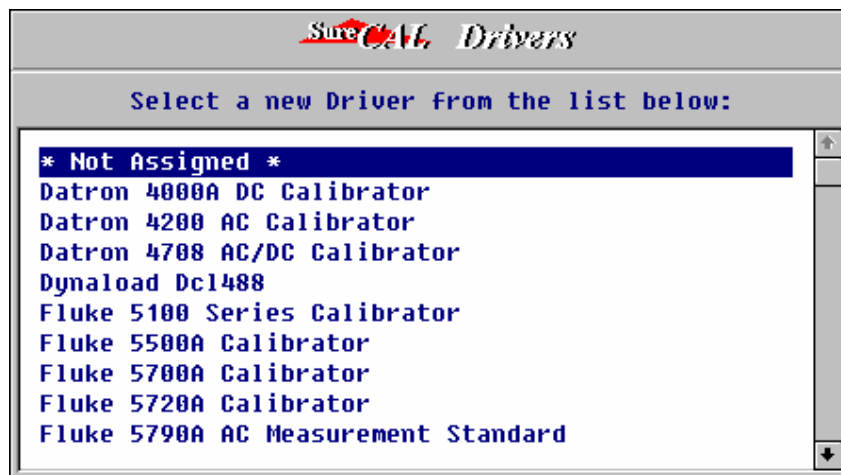


Figure: DRIVER Selection List

To use flexible standards at particular workstation, the operator must select and assign specific **SureCAL®** Instrument Drivers to generic instrument calls. Once standards are associated with calls in a Calibration Procedure Module they are retained for future reference. These Drivers are normally supplied on a separate diskette to maximize your flexibility in the use of standards for calibrating an instrument.

Reports

Several reports are available from **SureCAL**® TEST MANAGER including:

CALIBRATION RECORD,
CERTIFICATE OF CALIBRATION,
OUT OF TOLERANCE NOTICE,
SPECIAL CALIBRATION STATUS AUTHORIZATION, and
SPECIAL CALIBRATION STATUS REPORT,

plus several types of Calibration Labels. Reports are formatted for standard size paper and sent to a report printer. LABELS are formatted for small stickers and sent to a label printer. All of these default reports and labels can be tailored by the user to meet the needs and desires of each individual laboratory. Users are referred to the chapter titled CALIBRATION REPORTING for details related to reports and labels.

SUPPORT Software

SureCAL® SUPPORT Software provides development tools necessary to maintain software for **SureCAL**® Automated Metrology Systems. This SUPPORT Software facilitates the rapid creation or modification of Calibration Procedures and graphic displays.

SureCAL® TEST MANAGER LITE is configured with only a limited set of SUPPORT Software and run-time only HTBasic™ Application software, for those workstations where software development capabilities are not required.

The **SureCAL**® MAIN STARTUP MENU allows the user to quickly select several different functions by simply pressing the associated command button shown at the top of the screen. When running TEST MANAGER LITE some of these programs will not be available.

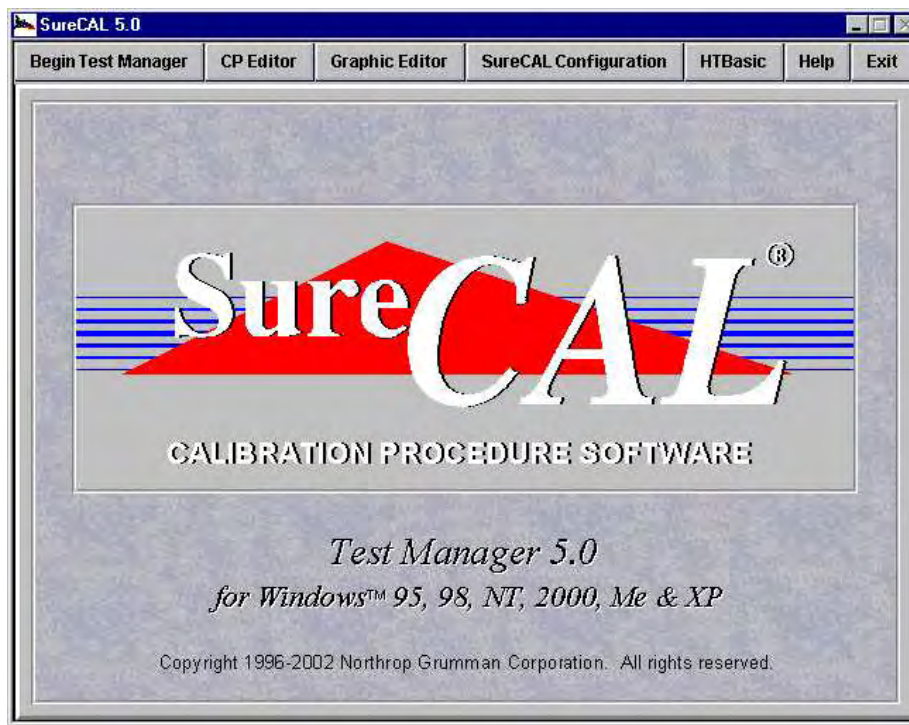


Figure: Main Startup Menu

Begin Test Manager

Initiates the **SureCAL**® TEST MANAGER program, allowing the user to install, select and run Calibration Procedures.

CP Editor

The **SureCAL**® CP EDITOR is used to edit Calibration Procedure files that define test parameters and test sequences. The CP EDITOR program is not supplied with TEST MANAGER LITE and therefore only discussed in the **SureCAL**® PROGRAMMER's REFERENCE Manual.

Graphic Editor

The **SureCAL**® GRAPHIC EDITOR is used to edit and print graphic image files that usually depict instrument setups and interconnections. This editor can be used to create and modify any graphic image used in the **SureCAL**® environment including logos for reports and screens. The GRAPHIC EDITOR program is not supplied with TEST MANAGER LITE and therefore only discussed in the **SureCAL**® PROGRAMMER's REFERENCE Manual.

SureCAL Configuration

Calls the **SureCAL**® CONFIGURATION program that allows the user to view or tailor the **SureCAL**® working environment and user preferred process options. Some feature selections are password protected.

HTBasic

Terminates the operation of **SureCAL**® software and initiates TransEra's HTBasic™ Interpreter. HTBasic™ must be used to create or edit Test Subprogram files, or any other HTBasic™ program files. These files are normally stored in binary form, not ASCII, therefore requiring the use of TransEra support software. The user is referred directly to TransEra's support documentation. TEST MANAGER LITE is supplied with a runtime version of HTBasic™ that does not include ability to save or store program files.

Help

Launches a help program that is displayed in an overlay window similar to other Microsoft Windows applications.

Exit

Simply terminates the operation of **SureCAL**® software and returns user to the current operating system environment or calling software.

USING THIS GUIDE

Chapter 2: GETTING STARTED tells how to install TEST MANAGER and associated Calibration Procedure files. This chapter also gives a brief summary of the main program actions. System managers and operators should read this chapter.

Chapter 3: Description of SureCAL CONFIGURATION program. Operators should read this chapter to gain an understanding of what operations are controlled by the configuration settings. Programmers need to pay particular attention to the information on file locations.

Chapter 4: Description of the GENERAL OPERATIONS performed by TEST MANAGER. Everyone should read and understand this chapter. It describes TEST MANAGER's Standard Operating Procedures.

Chapter 5: Description of CALIBRATION REPORTING. Everyone should read and understand this chapter as well. It describes various reports and labels that can be generated by TEST MANAGER. Test Programmers should read this chapter to gain an understanding of how to tailor all forms of printed output.

Chapter 6: Description of NON-SureCAL CALIBRATION PROCEDURES. Programmers should read this chapter to gain an understanding of how to setup for external applications. If done properly, operators will easily transition between external and ^{Sure}CAL style procedures.

Chapter 7: Description of ADMINISTRATIVE SOFTWARE. Programmers should read this chapter to gain an understanding of how laboratory administration software can interact with ^{Sure}CAL TEST MANAGER.

Chapter 8: An overview of FILE DESCRIPTIONS. Operators and Test Programmers should read this chapter to gain an understanding of various files and their use. Programmers need to setup some of these files with data unique to the laboratory.

WHAT YOU NEED

TEST MANAGER requires an IBM™ compatible personal computer. It must have the following **minimum** capabilities:

Processor: Pentium class, 200MHz

RAM: 32M bytes

Hard Drive: 300M bytes and controller; 30Mb for TEST MANAGER LITE, 20Mb for Programming Support Package, 30Mb for HTBasic, plus additional space (~200Mb) for your particular library of Calibration Procedure Modules.

CD-ROM Drive: 8X and controller to load ^{Sure}CAL software and periodic updates.

Display: VGA display adapter, color monitor, 256 colors, with 1Mbyte of video RAM, 14" VGA color monitor, non-interlaced at 640 x 480 pixels.

Keyboard: 101 key enhanced.

Software: Microsoft™ WINDOWS (95, 98, NT, Me, 2000, or XP) Operating System & utilities.

Interfaces: IEEE-488 Bus controller board for stimulus and measurement devices, parallel port for report printer and serial port for label printer (unless connected to a local area network). It is of special importance that the IEEE-488 Board be compatible with the processor speed, since slow boards do not work with fast computers.

Printers: for printing 8.5x11 inch page reports, and
for printing labels (optional).

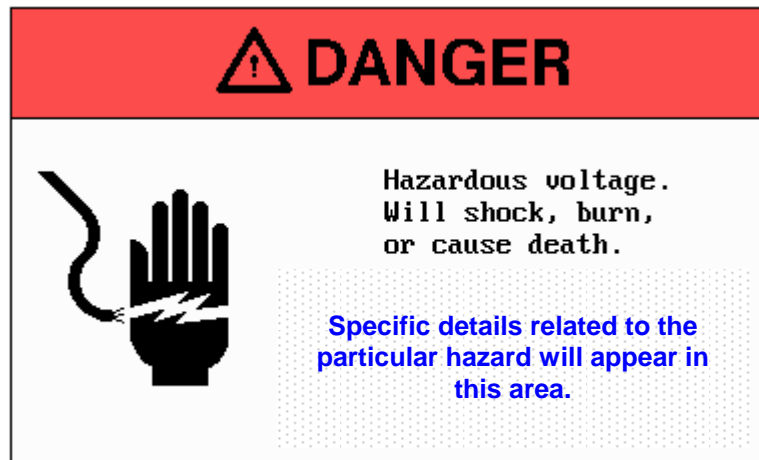
Supplies: Paper, standard 8.5 x 11 inch paper compatible with page printer.
Labels, compatible with selected printer (optional).

HAZARD WARNINGS

During the course of calibrating equipment, many unforeseen hazardous conditions could occur. Operators should be aware of these hazards and utilize precautions to prevent personal injury or equipment damage. The manufacturer's operating and maintenance manuals are the best source of hazard warnings and safe operating procedures. It is expected that operators have reviewed those manuals and have been trained in the safe operation of both the units under test and any calibration standards being used.

As an additional safeguard in the operation of ^{Sure}CAL[®] Automatic Metrology Systems, warning messages are displayed to the operator whenever hazardous conditions are known to exist. Calibration Procedures or Test Subprograms display various warning placards before commanding the instruments. Operators are expected to acknowledge these warnings before continuing the test.

Specific warnings used in ^{Sure}CAL[®] Calibration Modules are detailed in the PROGRAMMER'S REFERENCE Manual. These types of warnings should be used by all programmers to assure consistency in presentations to the operator. Typically placards are designed for three levels of hazards: CAUTION, WARNING, and DANGER. Commonly recognized graphic images are used for each type of hazard placard, such as the placard shown below for a voltage shock hazard.



PERSONNEL

This section identifies the categories of personnel who typically operate ^{Sure}**CAL**[®] Automated Metrology Systems. At many facilities these categories may overlap.

WORKSTATION OPERATOR

Workstation operators should be technicians that are familiar with typical calibration laboratory equipment and procedures. Special expertise related to the type of equipment being calibrated is necessary. Automation is never a substitute for understanding and experience. Normal responsibilities include equipment interconnections, setups, fixturing, adjustments, probing, certification of data, and application of labels.

Operators must become proficient at operating TEST MANAGER and should understand each Calibration Procedure being used. While it is not necessary that the details of each applicable Test Subroutine or Instrument Driver be known, it may prove helpful in performing adjustments or troubleshooting failures.

TEST PROGRAMMER

In general, Northrop Grumman, Electronic Systems provides Calibration Procedures, Test Subprograms, Instrument Drivers and Graphic files needed to test most equipment. For special applications you may want to have your test programmer create custom software. Test Programmers should be very familiar with the stimulus and measurement devices as well as the specific calibration requirements for the unit to be tested. Programmers will need to use the ^{Sure}**CAL**[®] CP Editor for creating calibration procedures and Graphics Editor for creating pictures. In addition a working knowledge of TransEra HTBasic™ is needed for creating Test Subroutines.

Programmers are expected to control instruments directly from their test subroutines, not ^{Sure}**CAL** Drivers. Obviously, proficiency with WINDOWS and its utilities is a necessity.

2.0 GETTING STARTED

LOADING SOFTWARE OVERVIEW

Loading ^{Sure}CAL[®] software is a simple and easy process that only requires a few steps as outlined here. Users are guided step-by-step through the installation process starting at the INSTALL COMMAND section.

NOTICE: If the Programming Support Package was purchased please refer to the Programmer's Reference Manual for different software installation directions.

- ❶ Insert CD-ROM for TEST MANAGER Lite (autostart will load necessary files). The default SureCAL directory is C:\Program Files\HTBWIN83\.
- ❷ Run ^{Sure}CAL[®] CONFIGURATION program to define your system, especially file locations. See Chapter 3 SureCAL CONFIGURATION, for other than the default system definitions.

NOTICE: If Calibration Procedures licensed to this site get loaded to a network drive they only need to be loaded once after the file configurations have been properly defined.

- ❸ Run ^{Sure}CAL[®] TEST MANAGER, selecting **Begin Test Manager** then **Install**. From the **Install** pull-down menu, first choose **Select Source Drive**, and then pick the CD-ROM drive to be used. Place the separate Calibration Procedures CD-ROM in the designated drive, and then select **Install New Procedures** to load the necessary files.

Additional or replacement Calibration Procedure Modules and Instrument Drivers can be loaded any time after the directory tree has been established (loading of TEST MANAGER and defining SureCAL File Locations). If existing Calibration Procedure Modules or Instrument Drivers have a more recent creation date than the file being loaded, the operator will be given a visual warning and be required to respond before overwriting the newer existing file.

Make sure that Microsoft WINDOWS™ is installed on your hard disk and running before you begin. Then follow the steps printed on the CD jewel case label to install ^{Sure}CAL[®] Software on your system. These instructions assume that the default hard drive letter is C, and that drive D accommodates CD-ROMs.

Your report printer should have already been selected from the WINDOWS Control Panel.

You may find it helpful to view the **README.1ST** file on the TEST MANAGER disk before installing this software. The Insufficient Memory Error note may prove helpful if you run into troubles. View the **README.1ST** using NOTEPAD™ or its equivalent.

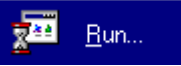
An HTBasic ROOT DIRECTORY, ...**HTBWIN83**, will be created on your hard drive by the TransEra setup program. ^{Sure}CAL[®] uses this HTBasic ROOT DIRECTORY to create an extensive subdirectory structure for storing TEST MANAGER software. Read the HELP screens provided in SureCAL CONFIGURATION before moving any files or changing pathnames.

INSTALL COMMAND

System Administrator rights may be required to install TransEra's HTBasic and SureCAL software because the install routine writes to the system registry of Windows NT based operating systems.

Insert the CD-ROM into the CD Drive and loading should begin automatically. If not, Click on



button on the Windows Task Bar then select  from the Start menu. Type the command string, as noted on the media being used (CD-ROM media in Drive **E**, being shown in figure below) into the text box.

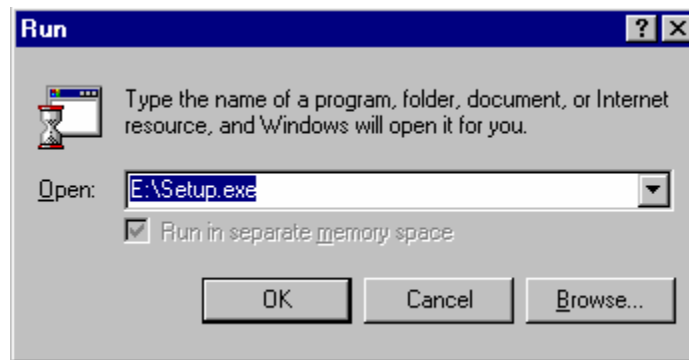


Figure: Run, Programs dialog box

SureCAL Test Manager and **SureCAL Configuration** application selections are loaded on the **SureCAL** submenu. If you have previously installed our Demonstration Program on this machine, the **SureCAL DEMO** selection may also be located here.

If the default directory structure is not acceptable, now is the best time to move subdirectories and files. **SureCAL® Configuration** program can be run to verify or define your system file locations. See the chapter titled **SureCAL CONFIGURATION**, to change pathnames from other than the default definitions before loading Drivers and Calibration Procedure Modules.

CAUTION: Altering pathnames after loading Drivers and CP Modules could force you to move a large number of files, which in-turn may produce havoc!

Take a few minutes to read the HELP screens provided in **SureCAL Configuration** before moving any files or changing any pathnames. Make a plan first, double check the rules and restrictions outlined in the **SureCAL Configuration, HELP** screens (F1) under **SureCAL File Locations** and **Other File Locations** menu selections, then proceed with care.

LOADING DRIVERS & PROCEDURES

The installation process continues from within TEST MANAGER to load Instrument Drivers and Calibration Procedures. Any time in the future new or updated SureCAL Drivers and Calibration Procedures can be loaded in this same fashion. From Windows click on SureCAL TEST MANAGER to start the program.


From the **SureCAL TEST MANAGER** main menu select the  command button to display the Test Executive Screen. From the top of this screen, click on the **Install** command to drop down the installation menu.



Figure: Installation Menu

First, verify that the proper disk drive has been defined by clicking on **Select Source Drive** and choosing the appropriate drive letter on the Select the Source Drive window.



Figure: Select Source Drive

Place the Calibration Procedure Module disk in the selected drive, then select **Install New Procedures**. All of the Calibration Procedures and Instrument Drivers on the disk will be loaded, and then control will be returned to the Test Executive screen.

When you are complete, always store your original software media in a safe place, preferably in another room.

IEEE-488 BUS CONTROLLER

With each ^{Sure}CAL[®] Automated Metrology Station, one IEEE-488 Bus controller board must be installed in the controlling computer and cabled to the unit being tested plus any stimulus and measurement devices. You may continue to operate without this board if you are not using IEEE-488 bus controlled instruments or only running the Editing or Demo software.

Many IEEE-488 control boards are supported by HTBasic loadable drivers. No matter what board is selected, the user must define the matching GPIB Driver by specifying the Board Type and Base Address in the SureCAL Configuration program. Users should run this program for more information about drivers and default addresses for various board types.

Bus Addresses are three digit numbers with the leading digit equal to an interface select code number. All bus addresses fall in the range of **700 to 731**. These addresses are referenced in your SureCAL Configuration (except for address 700 which is reserved for the controller). When instruments are added or removed from a workstation, you may be required to revise this Configuration.

CAUTION: The GPIB standard does not support connection (loading) of more than 15 instruments on a bus at one time, even though there are 31 addresses available.

A GPIB Bus Expander may be utilized to support the connection of up to 31 devices from a single interface select code. Installations with long cable runs that exceed the recommended maximum cable lengths may gain performance benefits from the use of a GPIB Bus Extender.

When creating unique hardware configurations, users must be aware of their particular Bus Addressing scheme. You may have to change the factory setting of the Base I/O Port Address selection switch to avoid any conflict with existing I/O Cards, such as a network controller card.

It must also be remembered that those ^{Sure}CAL[®] Calibration Procedures that utilize the IEEE Interface, expect specific hardware configurations and may not operate properly unless appropriately configured!

Users must also establish the linkage between IEEE-488 Bus Addresses and ^{Sure}CAL[®] Instrument Drivers. This linkage is established by selecting **E**dit from the menu bar, then **F**lexible **S**tandards from the drop down menu. Links to every bus controlled unit, not just the “traceable standards” are established using this dialog box. Usually only an address link, not an Instrument Driver link is applicable to the unit being calibrated.

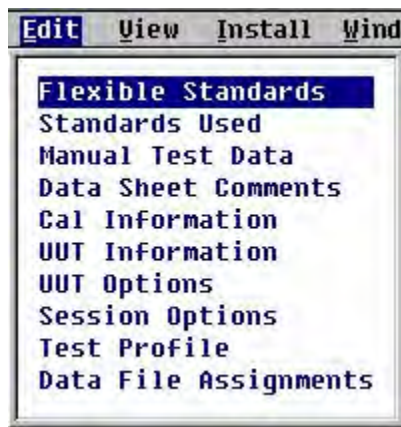


Figure: Edit, drop down menu

Ideally, all of the instruments to be used at a workstation should be gathered together around that workstation. Busable instruments should be given unique selection addresses then cabled together with the bus controller card.

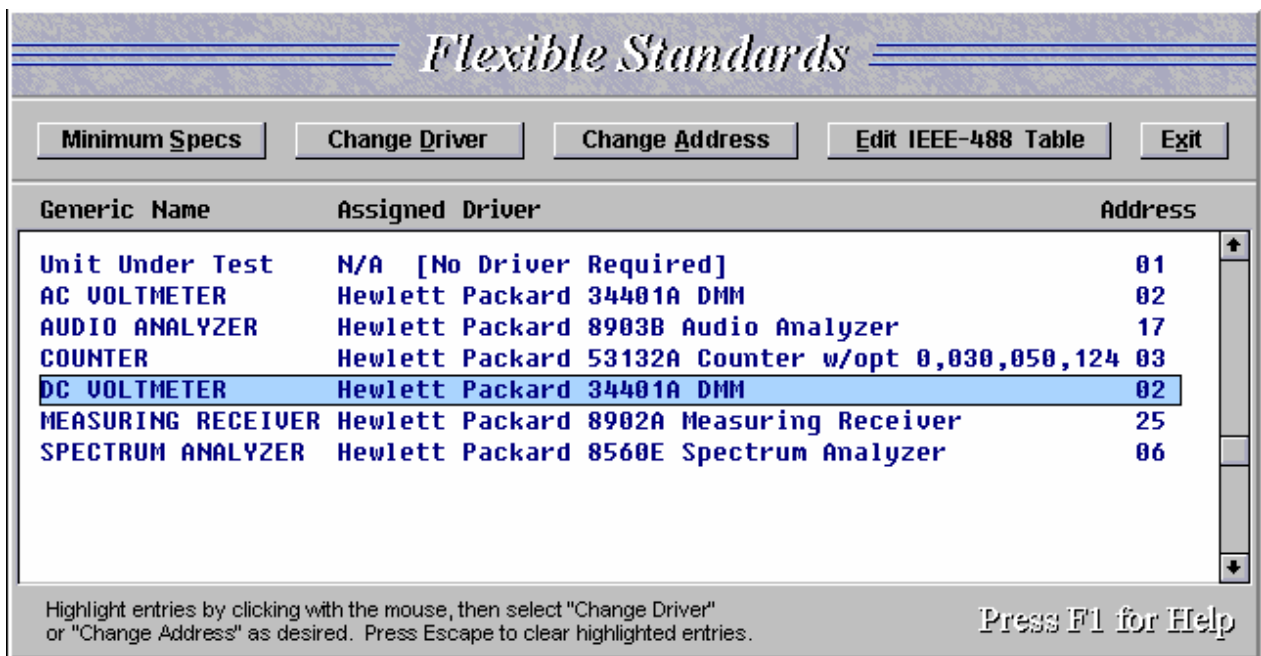


Figure: Generic References linked to Drivers & Addresses


With every recommended instrument connected to the bus and linked to its associated Driver, ^{Sure}CAL® can automatically associate Test Subroutine Generic References to Instrument Drivers without manual intervention. Every Calibration Procedure will be quickly and transparently linked to its based instruments.

PRINTER INSTALLATION

All report printer software driver installations and hardware connection definitions are handled by Windows. Normally your report printer will have already been defined for use by other applications and need no adjustments.

Labels, if desired, are printed by a dedicated label stock printer and usually require a special setup, since labels are typically an odd size and may be arranged on pin-fed stock.

All label printer software driver installations and hardware connection definitions are handled by Windows. Typically label printers are not in the common Windows printer driver set and require the loading of special software provided by the vendor.

From the SureCAL test executive screen, users can quickly access the **Windows Print Setup** dialog box by clicking on the printer with screwdriver icon  on the toolbar or pressing the **<alt>+P** keys. Usually the report printer has been correctly setup for other applications and no changes are necessary. Explicit, non ^{Sure}CAL related printer information can be found in the Windows documentation and on-line help facility.

TEST STAMP FILE

Serialized test stamps are commonly used by laboratory technicians to officially identify themselves as the collector of data and acceptor of test results. The ability to create data sheets and print labels using TEST MANAGER is controlled by test stamp data in the SureCAL® security file, **SECURE.TXT**, located in the HTBasic ROOT DIRECTORY.

Records are added as personnel are given authority to certify calibration tests. Other personnel may have access to your system, but they should not be allowed to apply “Test Stamps” to data sheets.

You may be able to ignore this file if you are running with a laboratory administration software package, since it may update this file from a master file every time control is transferred to TEST MANAGER. If you are running standalone then you must keep this file current.

Normally you define your existing workforce and assign security codes during the installation of TEST MANAGER and rarely change them. It is suggested that you always retain all name and number records once assigned, since you will always want to be able to associate a STAMP number on existing labels to a technician. When a person’s access needs to be denied simply change their SECURITY CODE.

You need to edit this file to agree with your unique situation. The default entry is shown in boldface type. You can use an ASCII text editor (NOTEPAD™ works well) to edit this file to delete the example technician and add your own.

```

column numbers:
  0      0          1          33          4
  1....6.....8          01          2
=====
01  DOE          PAT          PD
02  TECHNICIAN NEXT          E212001234 AA

```

Table: Test Stamp Sample File

Since column orientations are very explicit, always verify your current horizontal position.

<u>COL</u>	<u>WIDTH</u>	<u>DATA</u>	<u>USAGE</u>
01	5	STAMP Number	required
06	12	Last Name	prudent
18	12	First Name	optional
30	1	Middle Initial	optional
31	11	ID Number	optional
42	2	Security code	required

Table: Test Stamp File Layout

STANDARDS FILE

It is often useful to maintain a pick list of standards used at a workstation. This pick list allows the operator to quickly annotate a data sheet with references to the standards used during a calibration. If you are not running in concert with a laboratory administration program that provides standards used annotations, you may wish to use this file. Refer to the section titled STANDARDS DATA in the chapter on FILE DESCRIPTIONS, for details on initializing and updating this file.

Setting-up this file is optional, but needs to be done prior to running Calibration Procedures whenever it is desired to list the “standards used” references on TEST MANAGER generated Calibration Records and Certificates of Calibration.

RUNNING THE PROGRAM

Running TEST MANAGER:

To run TEST MANAGER, just click on the **SureCAL TEST MANAGER [LITE]** icon in the **SureCAL Programs Menu** subfolder. From the **SureCAL Main Menu** click on the **Begin Test Manager** command button then **File** from the menu bar to select a Calibration Procedure.

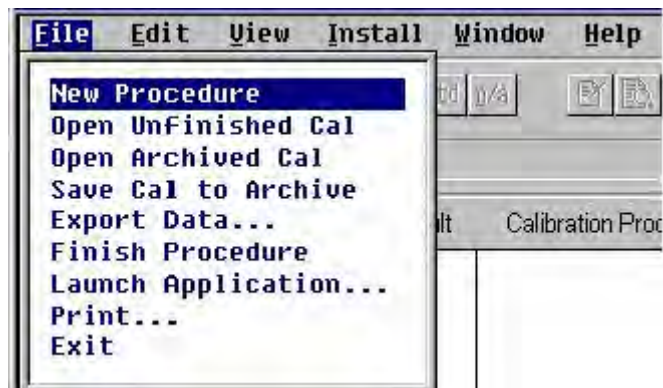


Figure: File Drop Down Menu

There are two ways to load a ^{Sure}CAL type procedure. Selecting **New Procedure** or **Open Unfinished Cal** from the File drop down menu, will both load a ^{Sure}CAL type CP File for running a calibration.

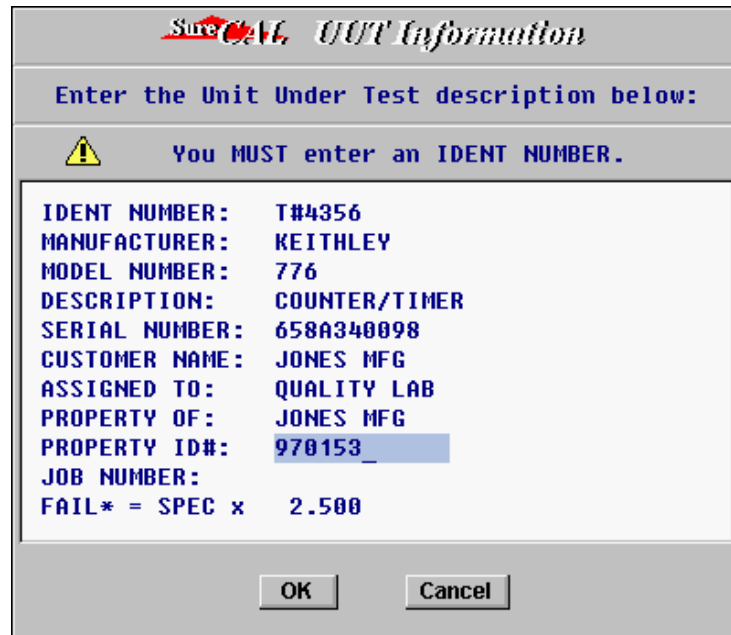


Figure: UUT Information

After selecting the particular procedure and completing the **UUT Information**, the Flexible Standards definition will be checked for completeness. If there are no errors detected the CP File will be displayed. Both the Flexible Standards and the Standards Used should be verified for correctness before proceeding with the first test.

As an absolute minimum, the **UUT Information** must include the IDENT NUMBER, and should include the MANUFACTURER, MODEL NUMBER & DESCRIPTION.

From this point it is a matter of following the Calibration Procedure instructions displayed on the test executive screen. Users are expected to start with the first test step and proceed sequentially to the last step. Setup instructions are presented to the operator as if the previous setups are in place and in some cases, data obtained from a previous Test Step is needed for a current Step.

STARTUP PROBLEMS

I/O Address Conflicts:

IEEE-488 Bus Controller Boards use interrupts plus I/O addresses in low memory. If conflicts arise on your system, you will need to change either the other hardware in your system or the Bus Controller board. If this occurs, run the SureCAL CONFIGURATION program to select drivers and default addresses for various commonly used board types.

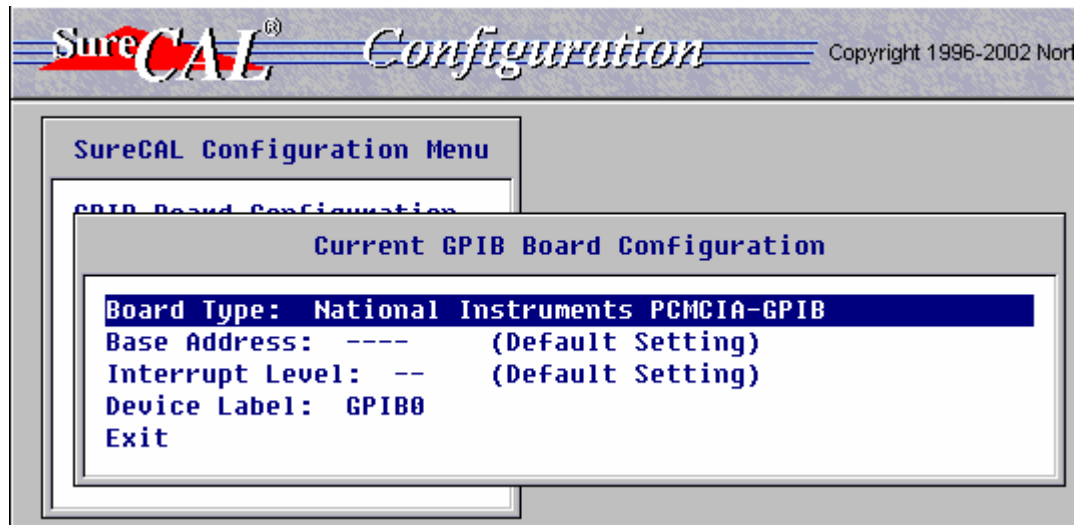


Figure: GPIB Configuration

Insufficient Memory Errors:

Refer to WINDOWS documentation from Microsoft™ for information related to memory errors.

Common hardware errors:

If an IEEE-488 GPIB has not been installed in your computer, you may see the following messages displayed momentarily in HTBasic screen:

* No IEEE-488 board found *
-No GPIB boards were found.

You can continue, but do not expect to control any instruments over the IEEE-488 bus until a board has been installed and defined in the SureCAL CONFIGURATION.

In addition, the **Rebuild DRIVERS.LST** selection on the **Install** menu will error if a board has not been installed. Expect to see the following error message:

ERROR 163 IN <line number> Interface not present

Other errors:

It is possible to interrupt the program by clicking on the stop sign while a test is in progress. This action halts the calibration procedure related Testsub and returns control to the TEST MANAGER screen.

If other unexpected errors should occur, such as a runtime memory overflow, right click the mouse and select one of the menu options.

If all else fails you can press **<ctrl>+Break**. This command causes a “hard reset” of HTBasic™ and can leave you stranded in the HTBasic™ operating environment. To restart TEST MANAGER after a hard reset, type **"QUIT"** followed by pressing **Enter**, to return to the Windows operating system.


From the HTBasic™ operating environment, you can also press the **F3** function key (**Run** command). TEST MANAGER should restart after attempting to recover previously recorded test data and resetting based equipment to a safe condition.

3.0 SURECAL CONFIGURATION

INTRODUCTION

The definition of *your* IEEE Board, connections of *your* printers, the location of *your* SureCAL[®] related files, and *your* preferred operating options are all described in the SureCAL[®] Configuration file. You must edit these parameters to agree with *your unique situation*. The as supplied (aka default) settings are shown below in boldface type.

To change your configuration parameters, click on the SureCAL Configuration icon on your

Windows Desktop or  command button from the SureCAL Main Screen. There will be a drop down menu and a **Press F1 for Help** prompt displayed on the initial SureCAL Configuration screen.

CONFIGURATION MENU

Users pick a selection by positioning the highlighted bar with the mouse or the up/down arrow keys. Clicking the right mouse button or pressing the **Enter** key will select the highlighted item. Each selection results in another menu, a pick list of suitable responses, or a dialog box.

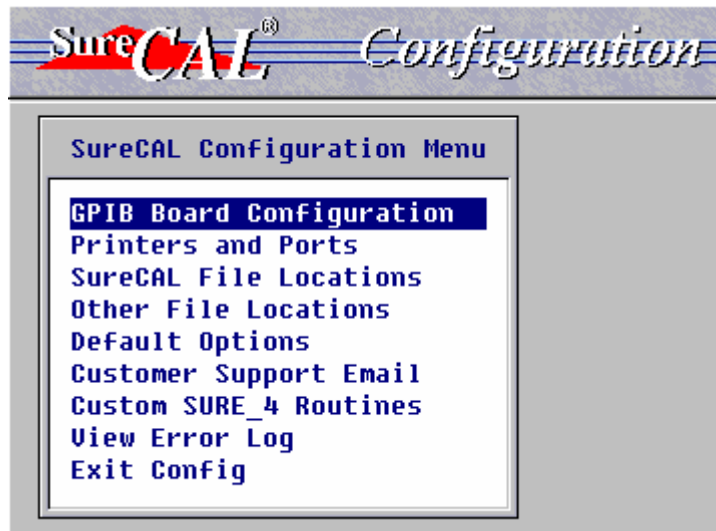


Figure: SureCAL CONFIGURATION Main Menu

Configuration Selection options are shown in tables where applicable, to help readers understand what information will be needed to complete the configuration definitions. Help is available by pressing **F1**. Other sections of this User's Guide provide additional background information and details for particular selection options. Table NOTES listed below are relative to all tables in this section.

NOTES:

- 1- Board selection list varies with the Operating System running on your PC.
- 2- Semicolon (;) indicates that your choice follows.
- 3- Commas (,) separate the limited available choices.
- 4- Carets (<>) delimit your variable input.
- 5- Braces ({}), surround comments on the results of a selection.
- 6- Specific default selections are shown in bold type face.
- 7- Arrow right (→) indicates that more options are available.
- 8- Arrow left (←) indicates control returned to previous menu.

It is highly recommended that you progress from the first to the last option to establish the configuration of ^{Sure}CAL TEST MANAGER that best matches your situation.

GPIB BOARD CONFIGURATION

There are a large variety of IEEE-488 General Purpose Interface Boards that can be used with SureCAL software. Users need to define the particulars related to their board.

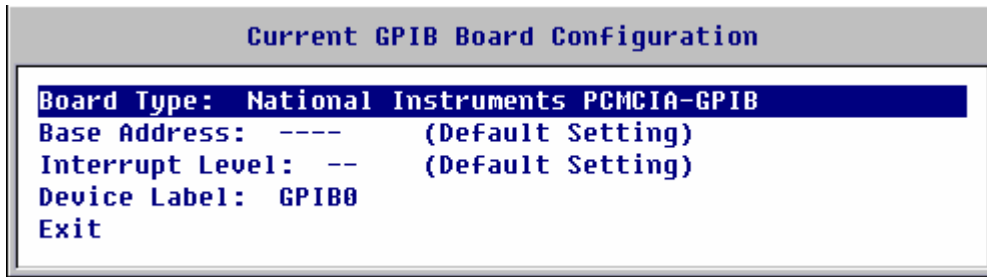


Figure: GPIB Board dialog box

Sure ^{CAL} CONFIGURATION SELECTION OPTIONS			
MAIN MENU	2 nd MENU	3 rd MENU	4 th MENU
GPIB Board Configuration →	Board Type:	[None Installed] Hewlett Packard 82340 ↓ <i>multiple selections</i> ↓ TransEra HM900	
	Base Address:	Enter New Address: default , <000-FFF> Use Default Address Exit ←	
	Interrupt Level:	Enter New Interrupt: default , <1-16> Use Default Interrupt Exit ←	
	Device Label:	<max. 8 character label>	
	Exit ←		

Table: GPIB Board Configuration Selections

PRINTERS AND PORTS

Parallel and serial I/O interface connections to the user's computer can be defined using the selection definitions provided. Usually the default settings can be left unchanged.

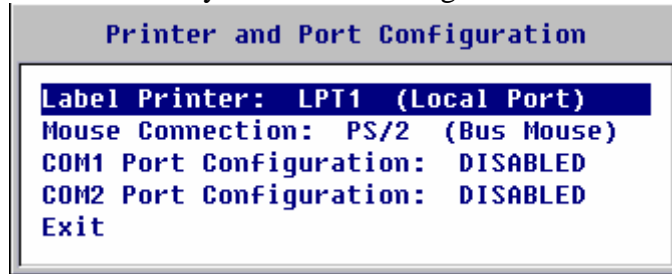


Figure: Printer and Ports dialog box

SureCAL CONFIGURATION SELECTION OPTIONS			
MAIN MENU	2 nd MENU	3 rd MENU	4 th MENU
Printers and Ports →	Label Printer:	LPT1 (Local Port)	
		LPT2 (Local Port)	
		LPT3 (Local Port)	
		COM1 (Local Port)	
		COM2 (Local Port)	
		Exit ←	
	Mouse Connection:	PS/2 (Bus Mouse)	
		COM1 (Local Port)	
		COM2 (Local Port)	
		Exit ←	
	COM1 Port Configuration →	COM1:	ENABLED, DISABLED
		Baud Rate:	300, 1200, 2400, 4800, 9600, 19200
		Parity:	ODD, EVEN, NONE
		Data Bits:	5, 6, 7, 8
		Stop Bits:	1, 2
		Exit ←	
	COM2 Port Configuration →	COM2:	ENABLED, DISABLED
		Baud Rate:	300, 1200, 2400, 4800, 9600, 19200
		Parity:	ODD, EVEN, NONE
		Data Bits:	5, 6, 7, 8
		Stop Bits:	1, 2
		Exit ←	
	Exit ←		

Table: Printer and Ports Configuration Selections

SureCAL FILE LOCATIONS

Each line may be changed to match you particular filing situation by clicking on the pathname. Each entry will be verified, after pressing **Enter**, to assure that the folders do in fact exist.

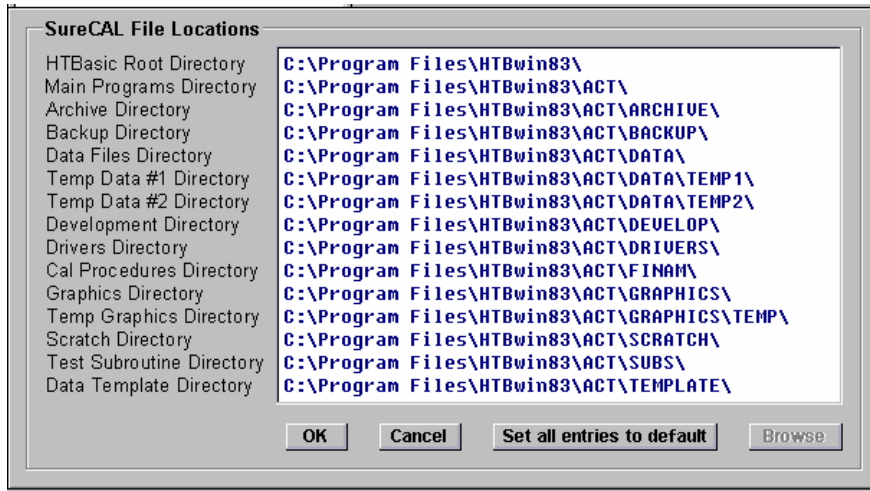


Figure: SureCAL File Locations dialog box

- Do not combine (i.e. use same pathname) any of these SureCAL directories.
- Do not share the following directories between multiple copies of SureCAL: HTBasic Root Directory, DEVELOPMENT Directory, and SCRATCH Directory.
- Do not use the SCRATCH Directory, it gets purged periodically.
- Do not use command lines or pathnames with more that 80 characters.

OTHER FILE LOCATIONS

Each line may be changed to match you particular filing situation by clicking on the pathname. Each entry will be verified, after pressing **Enter**, to assure that the folders do in fact exist.

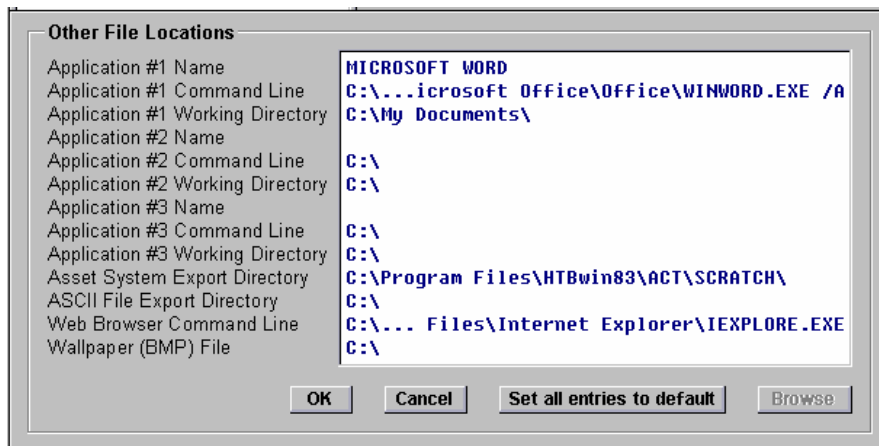


Figure: Other File Locations dialog box

- Do not use command lines or pathnames with more that 255 characters.
- Pathname for all print files is specified under **Other File Locations, ASCII File Export Directory**.

DEFAULT OPTIONS

The operating options selected in the **Default Options** dialog box should be the typical operating scenario for most calibrations. Most often used options include the reports to be printed after a calibration and the allowable Test Accuracy Ratio Compensation methods.

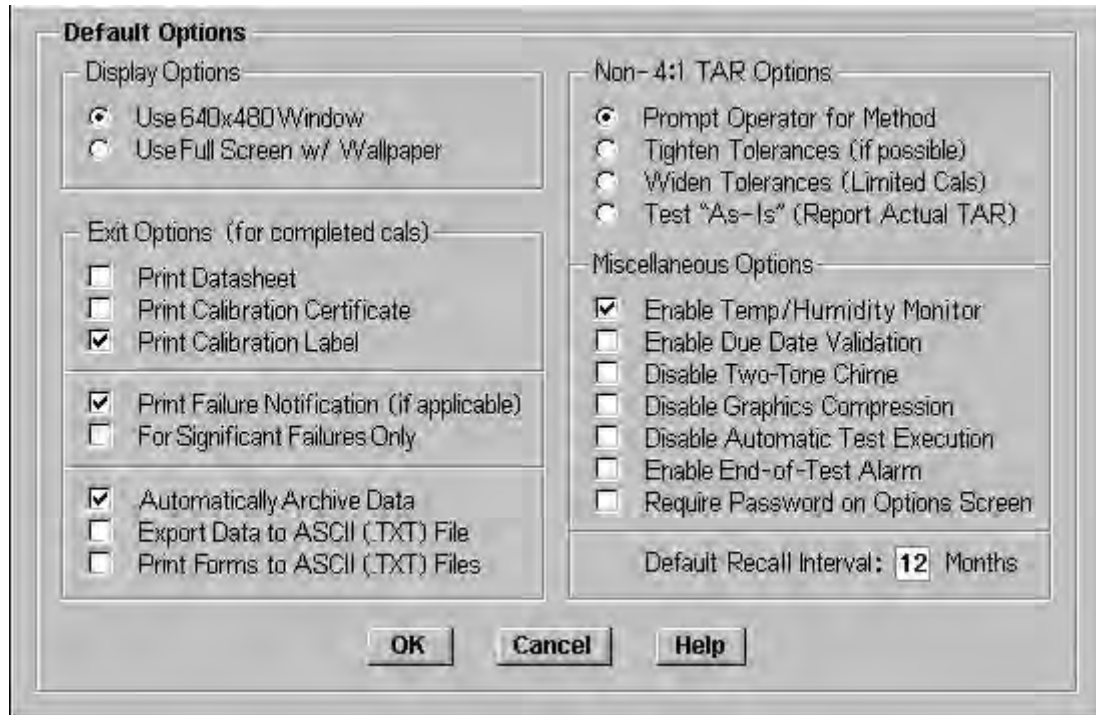


Figure: Default Options Menu

Access to the **Default Options** dialog box is through the SureCAL CONFIGURATION program, by selecting **Options** from the drop down menu. If **Require Password on Options Screen** has been set, an **ENTER / CHANGE PASSWORD** dialog box will be shown instead of this menu. Password entry is required to continue.

Display Options

Radio buttons allow the selection of one of two display options, either a movable **640x480 Window** or a fixed **Full Screen with Wallpaper** display. The fixed display is positioned in the upper left without the title bar and with the selected wallpaper revealed at the right and bottom. The size of the screen image can not be changed in either case. Selecting the fixed **Full Screen with Wallpaper** avoids clutter and reduces distractions (depending on the wallpaper design).

Exit Options

Check boxes are provided to select actions to be taken at the end of a successful calibration. Sure^{re}CAL offers more than just printing a data sheet, but the choice is normally the result of laboratory policy.

The only way to produce evidence of a calibration is to **Print Datasheet**, a.k.a Calibration Record, (to paper or a file), or **Archive Data**. Pathname for data sheet text files is specified in

the SureCAL Configuration program under **Other File Locations, ASCII FILE EXPORT DIRECTORY**. Pathname for archived files is specified in the SureCAL Configuration program under **SureCAL File Locations, ARCHIVE DIRECTORY**. Users will be warned of data loss upon exiting a procedure if neither of these selections are checked.

When only a few customers require Certificates Of Calibration, it is better to have the operator make a Session Option selection to **Print Calibration Certificate** a.k.a. Certificates Of Calibration.

Out Of Tolerance Notices (a.k.a. Failure Notices) can be generated whenever a Test Step failure is noted in the AS-RECEIVED DATA, or only when that failure is a significant out of tolerance failure (SOOT). All SOOT failures are flagged with an asterisk (ex. **F***, **FAIL*** or **Fail***). If the **Print Failure Notification** is not checked, the check box **For Significant Failures Only** is grayed out since the option is mute.

Non-4:1 TAR Compensation Options


Radio buttons allow the selection of a TAR (Test Accuracy Ratio) Compensation method to be used whenever the TAR of a measurement is determined to fall between 1:1 and 4:1. The first option allows the operator to decide each time by answering a selection prompt. The other three selections make the decision for the operator, usually the result of laboratory policy or concern for speed.

Miscellaneous Options

- Enable Temp/Humidity Monitor** collects and makes available temperature and humidity data, if the measuring device and software are installed. This process can be tailored (same as report tailoring) by modifying **Temp_humid** code in your **Sure_4** subroutine. Laboratory policy rules in this selection.
- Enable Due Date Validation** shortens the calculated Due Date to avoid expirations on weekends and typical holidays. Calendars can be tailored (same as report tailoring) by modifying **Test_date** code in your **Sure_4** subroutine. Laboratory policy rules in this selection.
- Disable Two-Tone Chime** turns off the audible alert that accompanies error messages.
- Disable Graphics Compression** speeds the display of graphic images, but requires lots of disk space! This selection is only valid for users with the GRAPHICS EDITOR. When graphic files are saved (in SureCAL format, not **.BMP** or **.GIF**) and Compression is disabled, the files will not be ZIPPED. Each uncompressed graphic uses about 300K bytes, so disk space will be significant after unzipping several CP Modules worth of graphic images.
- Disable Automatic Test Execution** prevents the next test step from starting automatically. Some Test subroutines are designed to automatically sequence to the next test step when the result can be recorded automatically and hookup changes are not needed (programmer's decision).
- Disable End-Of-Test Alarm** shuts off a chime (bing-bing-bing pause bing-bing-bing) that sounds at the end of each test step. This chime alerts an operator that a test step has ended. If the test subroutine is set to automatically advance to the next test step, then this alarm marks the beginning of a short wait before proceeding. Looping tests will not sound any alarms.

- Require Password on Options Screen** prevents an operator from altering either the Default Options or Session Options selections. This block may be useful to those who want tight controls on operator actions. You cannot get back to this Default Options menu without entering the Password, so use caution.

Session Options

Users can alter these same options temporarily through the **Session Options** dialog box. To access the **Session Options** dialog box from the test executive screen select **Edit, Options** or click on the toolbar screwdriver icon , or click the right mouse button and select **Options** from the pop up menu.

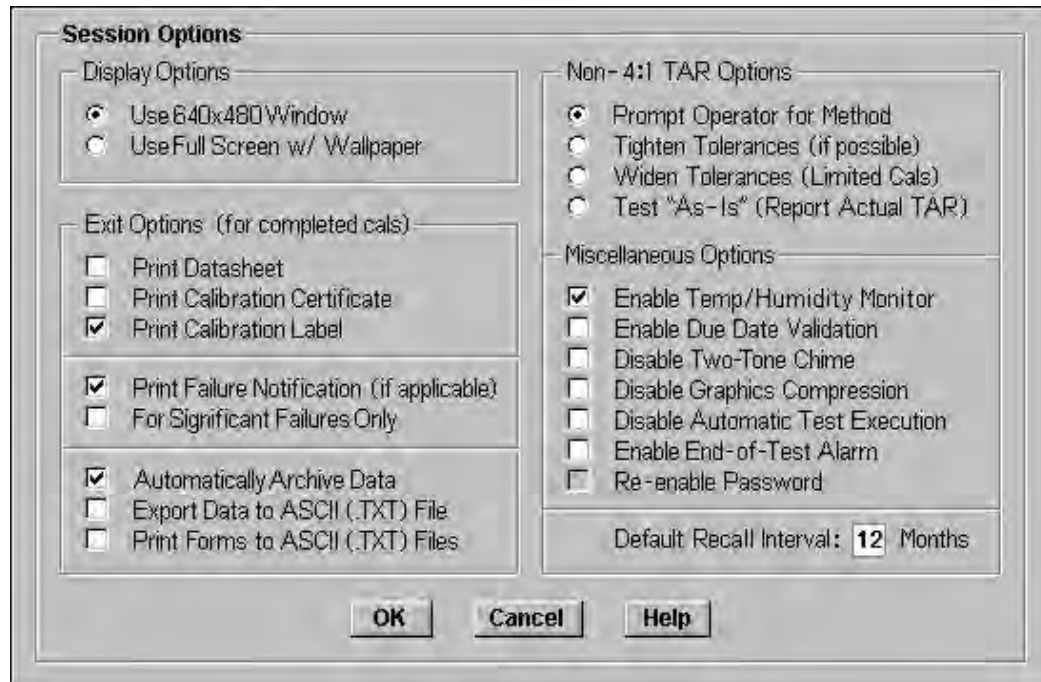


Figure: Session Options Menu

If **Require Password on Options Screen** has been set, an **ENTER / CHANGE PASSWORD** dialog box will be shown instead of this menu. Password entry is required to continue.

Some selections may not be available (greyed out) based upon a previously selected, **Default Options** screen decision. As an example, the **Session Options** screen, **Exit Options, For Significant Failures Only**, is not available because the **Default Options** screen, **Exit Options**, for this action was not checked. Therefore, if users desire to print Failure Notifications, they are blocked from printing Notifications for Significant Failures only.

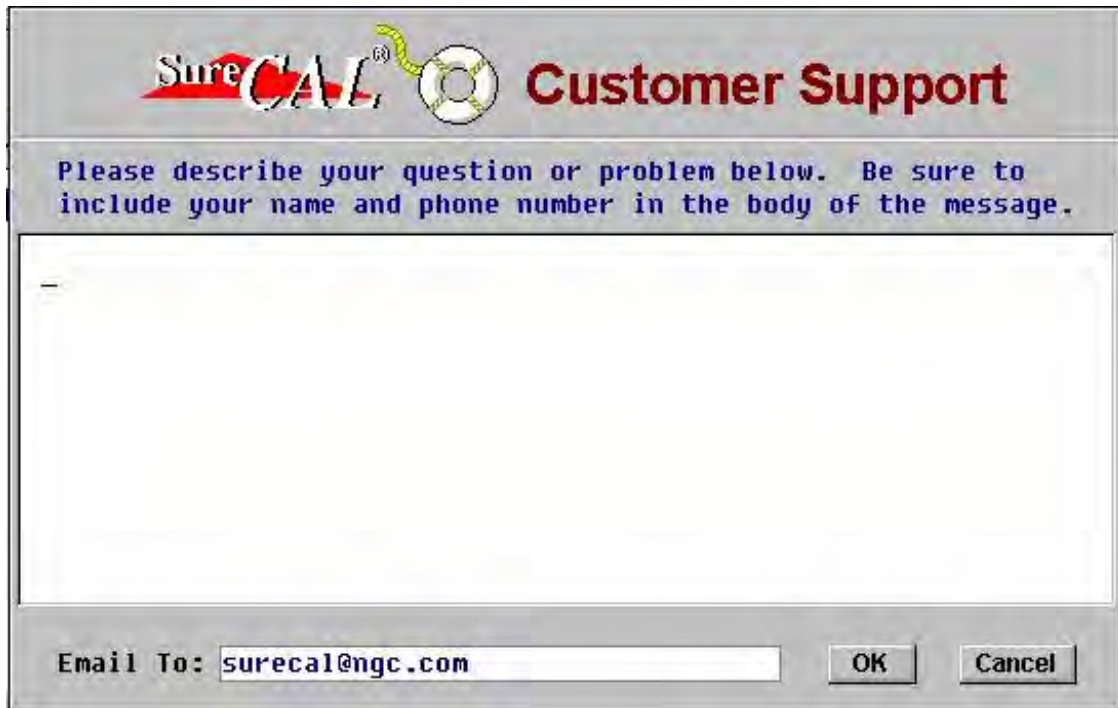
Re-enable Passwords gives a user that has temporarily gained access to Options editing, the ability to re-establish control by requiring a password for future edits.

CUSTOMER SUPPORT EMAIL

Users can generate Customer Support email directly from the TEST MANAGER screen under the **Help, Contact SureCAL Support** selection. Users must have an email application program such as Microsoft Outlook, running on their PC for this function to operate successfully.

CAUTION: Not having an active email application may cause the program to hang after clicking “OK”.

The default address is for SureCAL’s Product Support Team in Baltimore, MD. This address can be changed to send the help message anywhere. It is also possible to disable all access to this email feature by un-checking the Enable box, from the Configuration Menu, Customer Support Email screen.



The screenshot shows a dialog box titled "Customer Support" with the SureCAL logo. The main text area contains the instruction: "Please describe your question or problem below. Be sure to include your name and phone number in the body of the message." Below this is a large text input field. At the bottom, there is an "Email To:" label followed by a text box containing "surecal@ngc.com". To the right of the text box are two buttons: "OK" and "Cancel".

Figure: Customer Support email Address dialog box

Please note that data will be attached to emails in order to assist those responding to help requests. Users will always have the opportunity to decline the attaching of this data. A Privacy Notice will be presented after comments are entered, but before the email is actually sent.

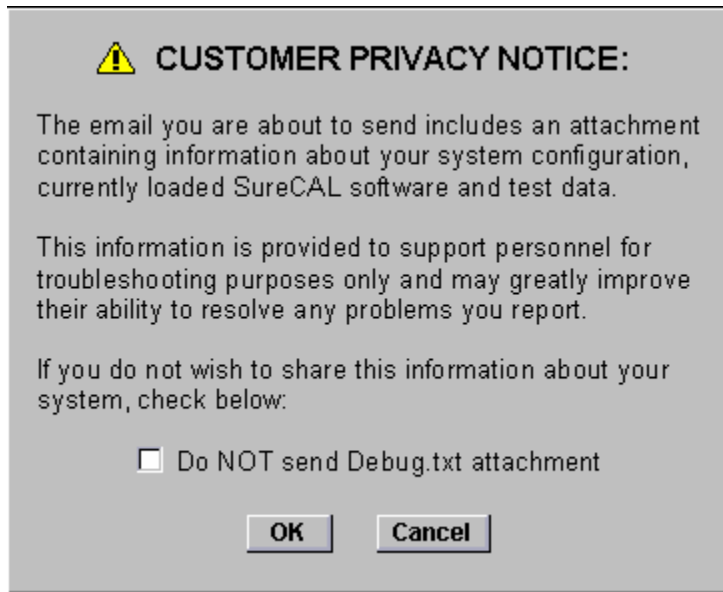


Figure: Customer Privacy Notice dialog box

Safe Harbor Agreement

At Northrop Grumman, our commitment to confidentiality and privacy has strengthened our reputation as a leader in the defense industry. By registering with the Department of Commerce, the company agrees to abide by the seven Safe Harbor principles and is deemed to have adequate data privacy standards. This means that Northrop Grumman can more easily receive, process and store personal information related to its EU employees, customers, and suppliers and, in some cases, transfer the information to third parties.

The Safe Harbor Agreement applies to the transmission and handling of any "personal information" that identifies an individual (including an employee, customer, supplier, vendor, etc.) in the EU, Norway and Switzerland. Types of "personal information" include, but are not limited to: Home address, home phone number, gender, age, photographs, and Passport/Citizenship information. Business contact information, such as information found on a business card, is not subject to the same degree of security in transmission.

The Safe Harbor principles are similar to the EU Directive's requirement for handling EU Data within its member countries.

Following are the seven principles of Safe Harbor data privacy that embody what Northrop Grumman is obligated to do:

1. **Notice.** Residents of EU countries are notified about the purposes for which information about them is collected and used.
2. **Choice.** Residents of EU countries may have the right to allow or disallow certain uses of their personal information.
3. **Onward Transfer.** The Company can transfer personal information to agents or third parties if there is an agreement in place for the agent or third party to abide by the applicable Safe Harbor principles in the use or transfer of personal information of EU employees, customers, suppliers and vendors.
4. **Access.** Residents of the EU have the ability to request reasonable access to their personal information maintained by Northrop Grumman and can require the information be corrected, amended, or deleted when it is inaccurate.
5. **Security.** Reasonable precautions must be taken to protect personal information from loss, misuse, unauthorized access, disclosure, alteration, and destruction.
6. **Data Integrity.** Personal information must be relevant for the purposes for which it is being used, and the information should be reliable, accurate, complete, and current for its intended use.
7. **Enforcement.** Northrop Grumman is committed to cooperating with the EU data protection authorities in the investigation of Safe Harbor compliance issues.

Customers, suppliers, and vendors can contact SureCAL Customer Support or the general ["Contact Us" email mailbox](#) on the Northrop Grumman Internet site to submit any complaints or feedback.

CUSTOM SURE_4 ROUTINES

This selection is password protected to preserve the integrity of the tailored code and report formats being used in the customer's facility. By selecting **Custom SURE_4 Routines**, report formats tailored to specific needs can be utilized. Users that have never tailored the default reports need to create and modify a **sure_4** file, from the **sure_5** template, using the Development Version of HTBasic provided with the ^{Sure}CAL Programming Support Package.

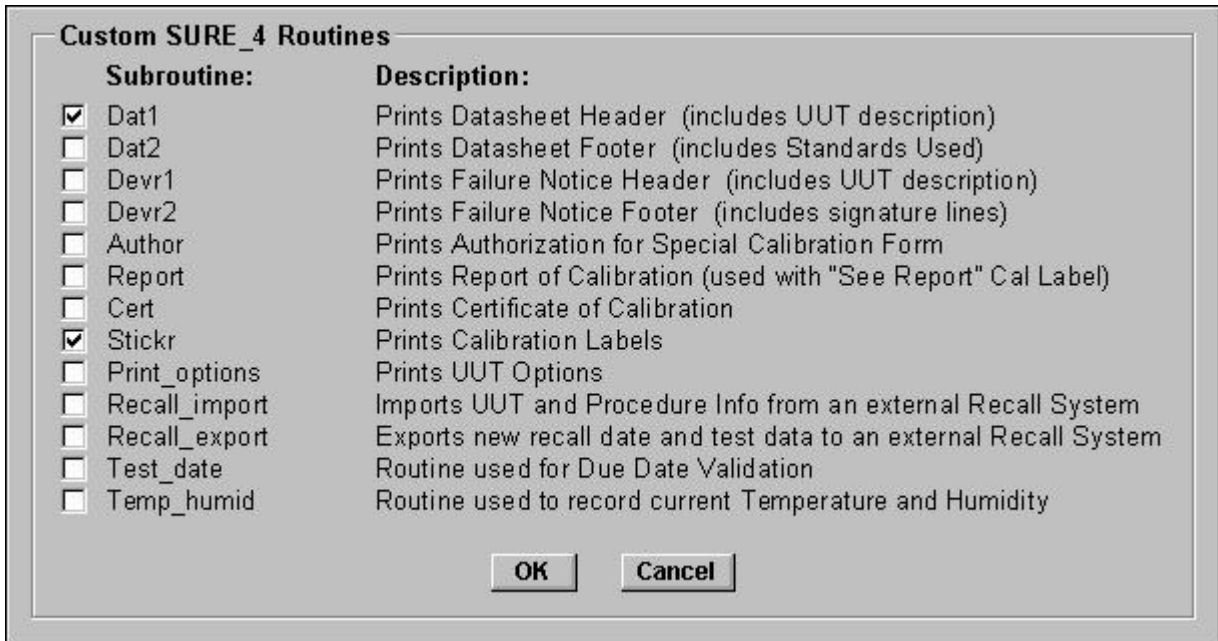


Figure: Custom SURE_4 Routines dialog box

The subroutines listed in the dialog box are located in the file **sure_5** and made available for tailoring by those who have the Programming Support Package. Tailoring is done by making a copy of **sure_5** and naming that copy **sure_4**. Checking a subroutine box, causes the default **sure_5** subroutine to be ignored in favor of the specific **sure_4** subroutine associated with that checked box. Un-checking a box causes the respective **sure_4** subroutine to be ignored. Unless those **sure_4** subroutines exist and are modified, users will not see any differences in the reports regardless if the boxes are checked or not.

CAUTION: The Sure_5 template file should never be altered or deleted.

^{Sure}CAL Products from time-to-time may update (overwrite) the **sure_5** template file in an effort to provide customers with new and improved reporting features.

If the "out-of-the-box" routines are acceptable, there is no need to check any boxes, copy any files, create a **sure_4** file, or modify any code.

VIEW ERROR LOG

When errors have occurred, they are logged into a file for future reference and troubleshooting assistance. This selection provides the user with the ability to review these errors. If the selection is grayed-out, there are no errors to view.

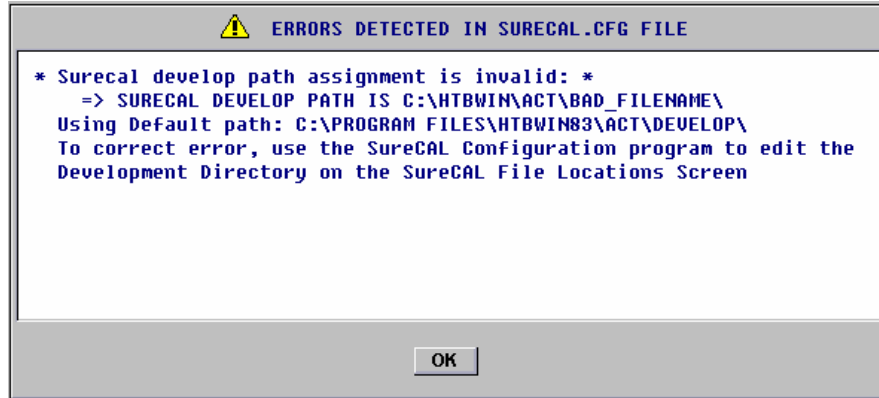


Figure: View Error Log dialog box

Shown here is an example of an invalid filename “BAD_FILENAME” message that was originally shown to the user and recorded when the Configuration program began.

EXIT CONFIGURATION OPTIONS

The selections in this dialog box provide for an orderly exit from the Configuration program.

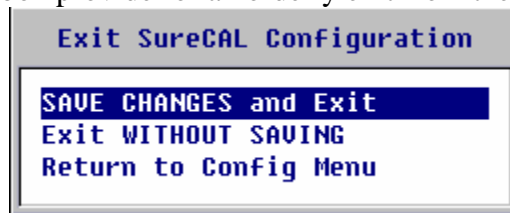


Figure: Exit Configuration dialog box

SAVE CHANGES and Exit, updates the SURECAL.cfg file then exits the Configuration program.

Exit WITHOUT SAVING allows users to exit the Configuration program without making any changes to the configuration settings. When reviewing configuration settings, this is the normal exit mode.

To continue with reviewing or setting configuration definitions, select **Return to Config Menu**.

4.0 GENERAL OPERATIONS

COMMON NAVIGATION TOOLS

Starting at the top of the screen, the SureCAL Program Title Bar has three common Windows command buttons to the right. Users can only reduce – a window to a recall button on the taskbar. The other two grayed out buttons: Maximize □ or minimize ☐ a display window, and close ✕ the current window are inactive.

Many of the command icons, on the application Toolbar, are shortcuts to menu bar drop down selections. As the menu bar selections are discussed, any applicable shortcut icon will be noted. Users can display the title of an active command icon by positioning the mouse pointer over that icon.

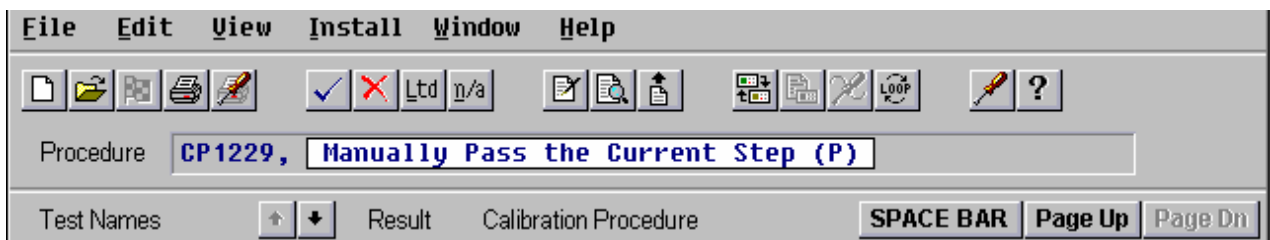




Figure: Title Tag for Toolbar  Icon



Grayed out icons are inactive as are grayed out (when highlighted) drop down menu selections.

An extensive Help facility can be accessed selecting Help, General Help from the menu bar, or by clicking on the toolbar question mark icon  , or by pressing **H**, or by pressing function key **F1**.

Pressing the **Ctrl** key along with a matching underlined letter from the menu bar, also drops down the corresponding menu.


Pressing the **Esc** key or clicking on an inactive area of the screen usually closes the current menu selection and steps the user back to the previous selection.



Since this HTBasic is not yet a true Windows product, some of the pseudo Windows displays and controls may not be as robust as desired. As an example, vertical scroll bars respond like true Windows scroll bars except that the scroll bar itself (sliding bar in the middle) can not be “dragged” to the desired position. The up/down arrows move the display one line and clicking on the area between the arrows moves the display one screen, both as expected.

Catastrophic HTBasic errors will be identified through a red warning window titled “HTBasic Error” that contains TransEra’s error message and number. Users will be prompted with options to  the operation that caused the error or to  the error. These errors will also be logged to the “**errorlog.txt**” file for future reference. Users should feel free to call for ^{Sure}CAL assistance if they are not able to quickly diagnose the problem.

MAIN SCREEN

The opening ^{Sure}CAL Main Menu with the large ^{Sure}CAL logo is the starting point for all ^{Sure}CAL activities from running a calibration sequence, to setting up the program configuration, to creating procedures and graphics. Selections from this screen essentially call separate programs into action.

When SureCAL is launched from a laboratory administration program, this opening screen and several other initial steps are skipped, as if the  command button had already been pushed. These initial screens are skipped because many pieces of information are passed directly from the launching program to TEST MANAGER. The Chapter on “Laboratory Administration Programs” provides more details on this topic.

There are seven command buttons in the applications menu bar plus a pop up menu that controls the program from this point. Two of the button selections:  , and  are associated with programmer functions. These buttons will be grayed out in TEST MANAGER Lite configurations since edit capabilities are supplied separately. Instructions related to these functions are discussed in the Programmer’s Reference Manual supplied with these edit functions.

From right to left, these command buttons initiate the following actions.



simply returns control to the Windows operating system.



brings up a dialog box that allows searching of topics for additional explanations or assistance.



exits from TEST MANAGER and runs TransEra’s technical programming language program. TEST MANAGER Lite configurations are supplied with a Runtime version of HTBasic, therefore users can not save or store program files.



allows the user to view and define hardware setups and general operating conditions.



initiates the main program that selects, runs and reports a calibration procedure.

Clicking the right mouse button drops down a menu of control selections from this opening screen and from the test executive screen:



Figure: Right Mouse Button Pop Up Menu

Refresh provides a quick method to correct any corruption of the color pallet (bad screen colors).

Minimize mimics the Windows reduce window icon – , removing the current window from the desktop and placing a recall button on the taskbar.

Options provides access to the Session Options dialog box, so that operating conditions for the current Calibration Procedure can be altered.

Debug provides access to a programmer’s troubleshooting tool and is locked with a password. This selection is only available (i.e. shown in the menu) from test executive screen, when a SureCAL type procedure is active. After selecting **Debug**, a DEBUG OPTIONS window is presented. More information related to this debugging tool is presented in the Programmer’s Reference Manual.

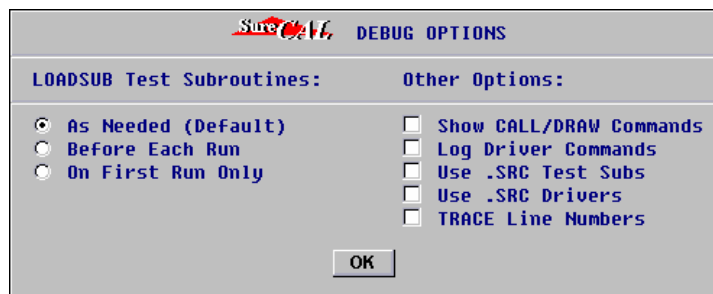



Figure: Debug Options Selection

STARTING TEST MANAGER

To perform a calibration, click on the  command button. TEST MANAGER starts by displaying the test executive screen. From this screen all calibration related activities take place. It is the main display and the one most often viewed.

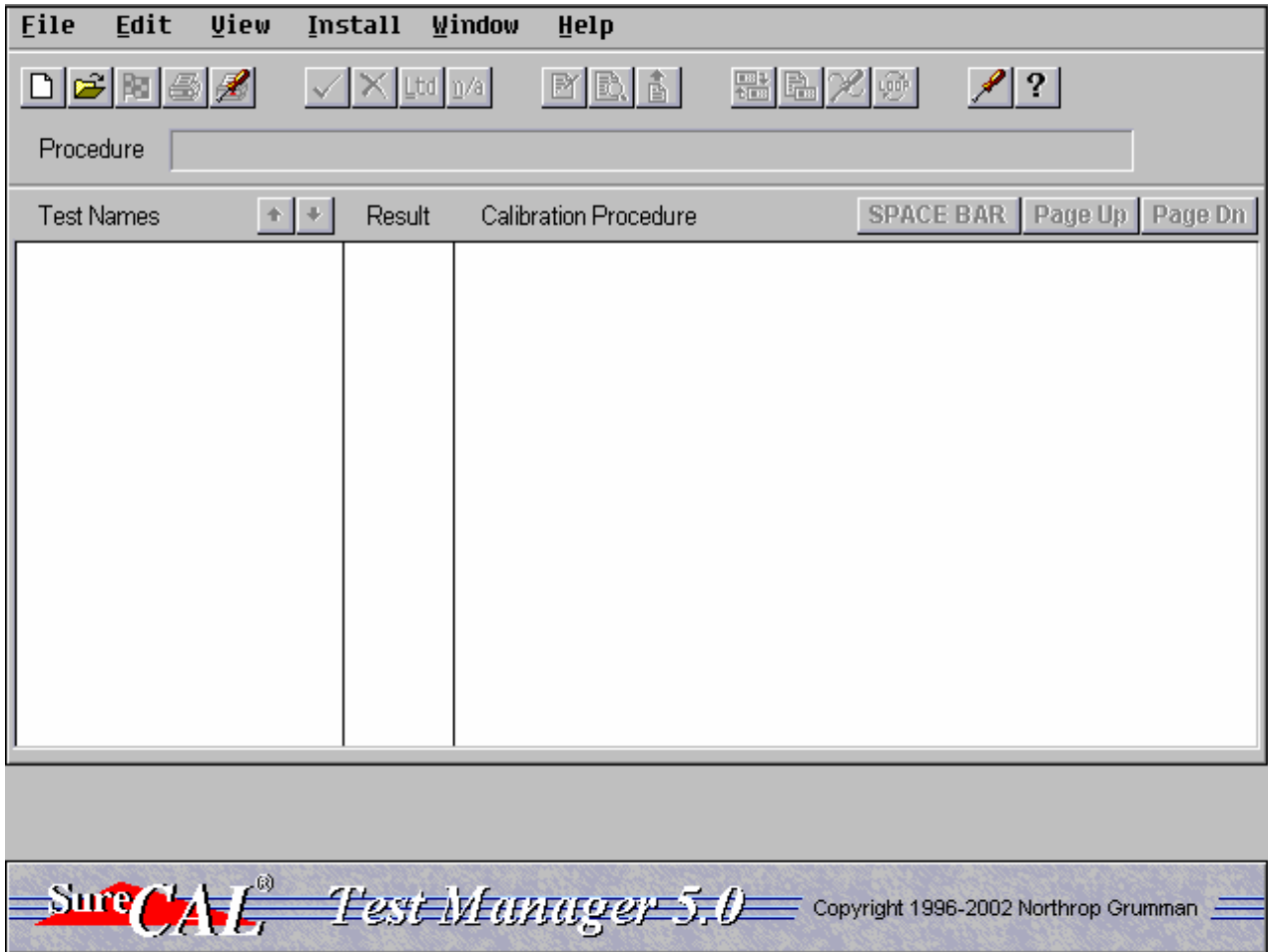


Figure: Test Executive Screen

Initially all that can be done is to select a calibration procedure (new or saved) or to change the current environment definitions.

SELECTING A PROCEDURE

By selecting **F**ile from the menu bar, a drop down menu of options is displayed.

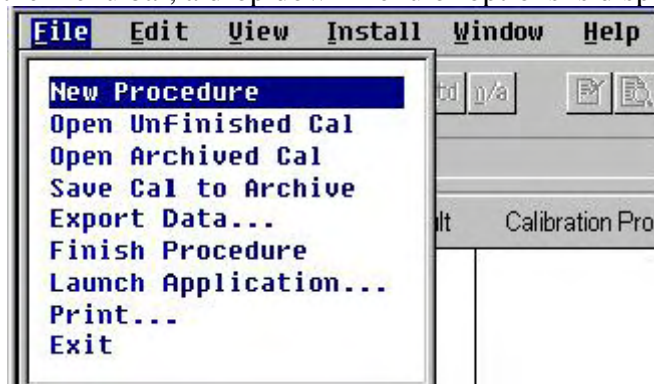



Figure: File Drop Down Menu

The user can select Calibration Procedures that are in any of three conditions: fresh with no data for the current unit, saved partially completed procedures with some data, and saved procedures that were archived. Usually the fresh or **New Procedure** is selected. The **Open Unfinished Cal** allows the user to pickup after interrupting and saving a calibration sequence. The **Open Archive Cal** allows the user to view (Read Only) data from a previously saved calibration sequence.

Selecting **File, New Procedure** from the menu bar, or by clicking on the blank page icon  from the toolbar, a second menu is dropped down with two ways to open SureCAL type procedures. Selections can be made by picking from a list of available procedures or by typing in the filename directly.

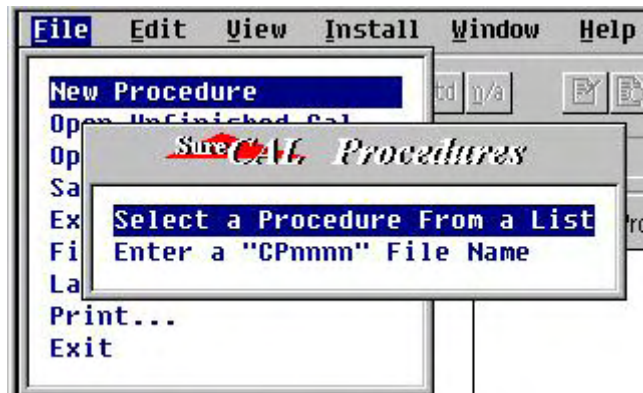


Figure: SureCAL type CP File Selection

There may also be as many as four other procedure applications listed under the **File, Launch Application** pick list. The existence (not grayed out) and length of this list depends on how the **SureCAL Configuration, Other File Locations, Applications #1, #2 & #3** were defined.



Figure: Launch External Applications Menu

Using this approach to launching external applications is somewhat crude, but gets the job done. Its only advantage is in focusing the file selections to a particular directory. Upon selection of the application, a pick list of files in the associated Working Directory will be displayed. Clicking on one of these files launches the application and opens the selected file.

A better approach to launching external applications is to create a ^{Sure}CAL type CP File that calls the external application, then returns to TEST MANAGER for report generation when finished. Details concerning CP File format (see subheading lines) and editing are discussed in the Programmer's Reference Manual.

Typically users select a New Procedure by locating and highlighting their selection from a list of available Calibration Procedure Modules. This new selection is followed by a Unit Under Test Description dialog box that prompts the user for unit identification and customer specific information.

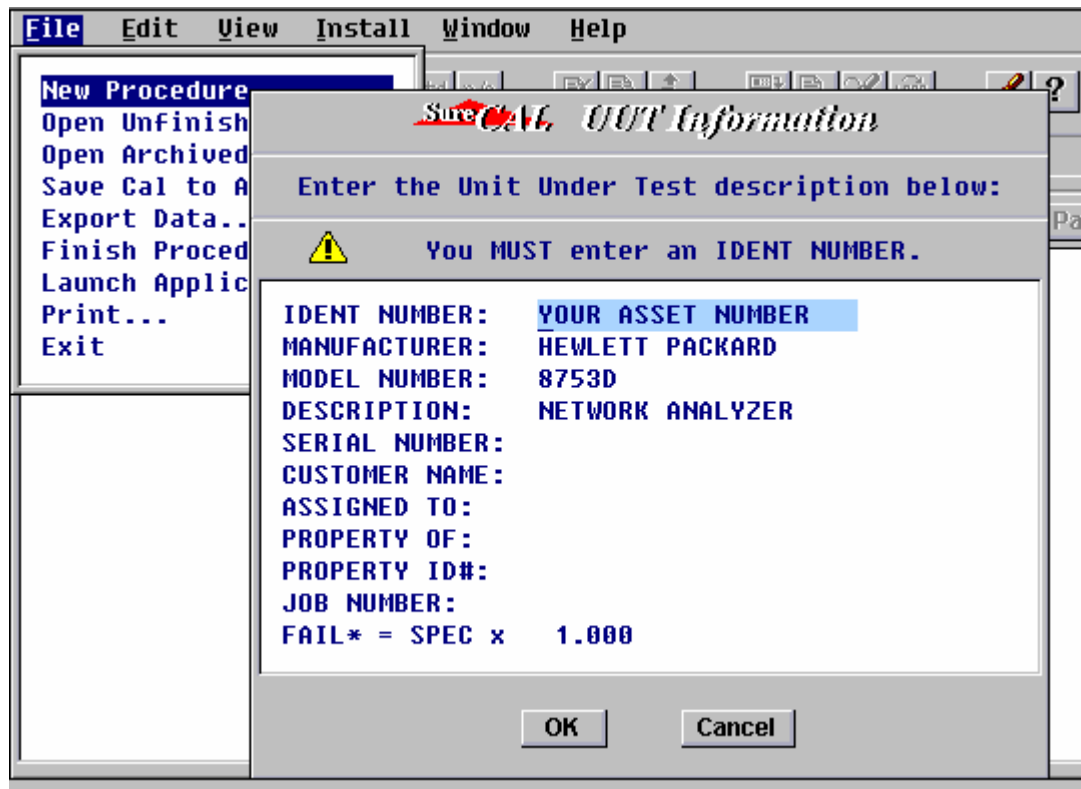


Figure: UUT Information

Since data is temporally saved in files related to the unit identification number, this **IDENT NUMBER** is mandatory. Some CP Modules are applicable to several models (example: 8024A&B, or 8484A&8481D) therefore the user should edit the **MODEL NUMBER** to reflect the exact model being calibrated (example: 8024B or 8481A).

At this time, the display returns to the test executive screen with the start of the selected procedure revealed. If the IEEE Bus connections (Flexible Standards) have never been defined, the user will be given the option to set it up before the selected procedure is revealed. All toolbar icons are now active and the procedure name is shown in a window below the toolbar.

If SureCAL has been launched by a laboratory administration program much of the previous data may have been passed to TEST MANAGER, so the program can begin at this juncture.

At this point all procedure related files are available, including those that define the IEEE Bus connections and standards to be used. These files will be empty if this CP Module has never been run (or at least these files never defined). In any case the user should verify the **Flexible Standards** (IEEE Bus connections) before running a new CP Module. Defining the **Standards Used** is optional, but since these standards get printed at the bottom of the data sheet along with their respective Due Dates, they provide a convenient method for documenting measurement traceability.

FLEXIBLE STANDARDS (IEEE Bus Setup)

When starting a new calibration procedure, operators need to review the Flexible Standards assignments to assure the instruments and addresses are correct. First, select **View, Equipment Required** from the menu bar.

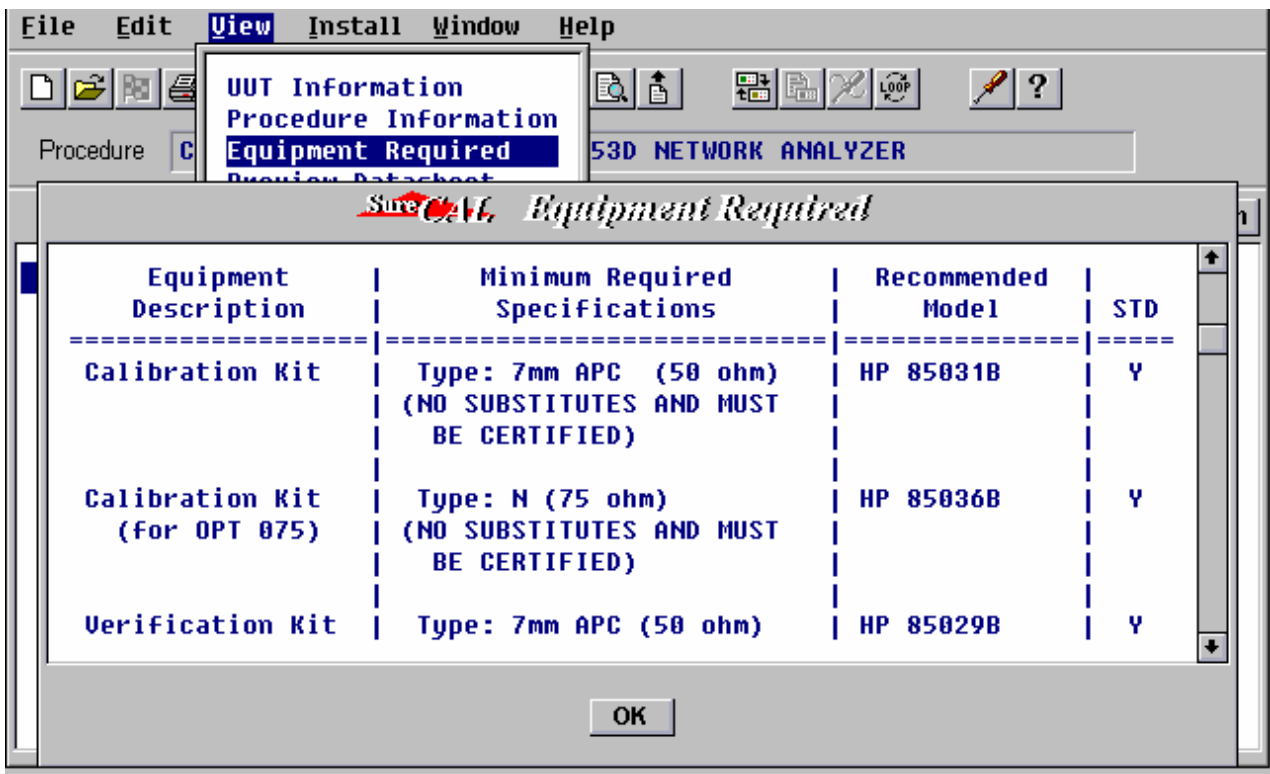



Figure: Equipment Required Table

This Equipment Required Listing shows all of the equipment recommendations for the current procedure. Specific equipment descriptions and Generic References are cross-referenced to Recommended Models of equipment. Users need gather this equipment (most users already have the equipment clustered in a workstation configuration) and make note of any cross references for use when editing the IEEE-488 Bus assignments. Equipment Required listing can be quickly reviewed by selecting the **Minimum Specs** button in the Flexible Standards dialog box. A printout of this list can be made by selecting **File, Print..., Print Equipment Required Table**, from the menu bar. Any deviations from the recommendations should adhere to the Minimum Required Specifications (these are minimums to achieve 4:1 TARs).

Selecting the **Edit, Flexible Standards** option, or clicking on the Swap Flexible Standards Toolbar icon , pops-up a Flexible Standards assignment dialog box that allows you define all of the instrument Drivers and IEEE-488 Bus Addresses to be associated with all of Generic function Names used by the current Test Subroutines. Not everyone of these items are necessarily true Standards with traceable parameters, and not all of the true Standards are controlled by an IEEE-488 Bus Interface. This window is used to assign Bus Addresses to all IEEE-488 Bus controlled items including, if applicable, the unit being calibrated. Each of the items assigned to an address needs to be associated with an Instrument Driver, except for the unit being calibrated. Most, but not all, of the units being calibrated are controlled directly from test subroutines, not indirectly through an Instrument Driver.

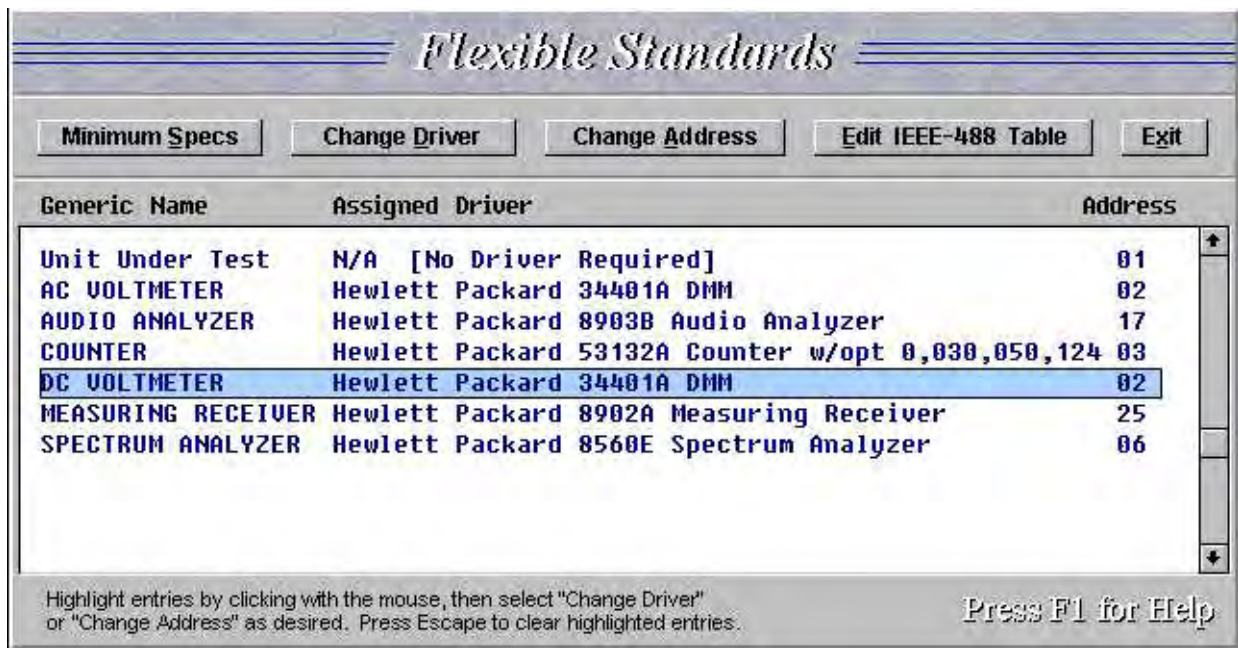


Figure: Flexible Standards Assignment Window

There are five option buttons across the top of the window that perform various functions. Across the bottom of the window there are brief instructions, plus a prompt to press **F1** for more assistance. In the middle of the window is a table that displays the linkages between the active Test Subroutine's Generic Names, Instrument Drivers, and IEEE-488 Bus Addresses. In the example shown, two of this Test Subroutine's functions have been linked to the same Instrument Driver and a single instrument at Address **02**.

The **Minimum Specs** button opens the same window as the **View, Equipment Required** pull down menu. From here you can quickly review the minimum required specifications (needed to achieve 4:1 TARs) listed in this Calibration Procedure for each Generic Name. Since the standard that you select must have the range, accuracy and functionality required, it is helpful to review this list before making any substitutions. Click on **OK** to return to the **Flexible Standards** window before making changes to Driver assignments.

To substitute a standard, highlight that standard then select the **Change Driver** button and select a Driver that matches the new standard.

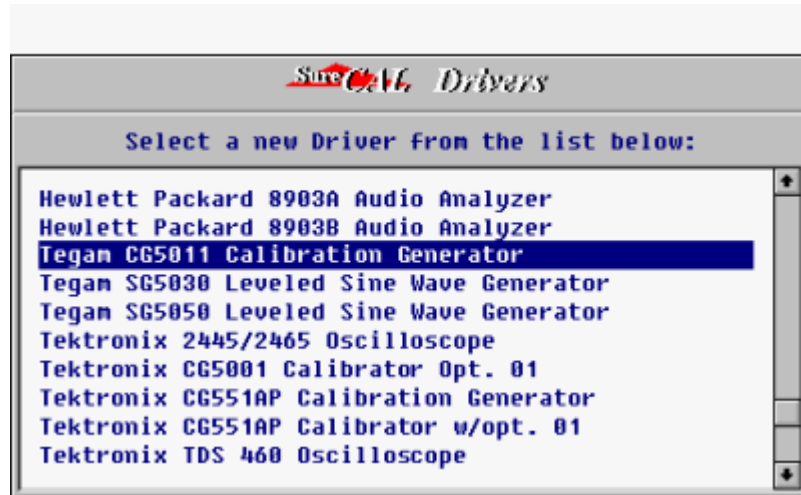


Figure: Driver Pick list

The Driver pick list that is popped up contains all locally available drivers. If you can not find your instrument in this list, call us, we may have recently created a driver that will satisfy your needs.

If the selected driver has not yet been linked to an IEEE-488 Bus Address a warning message will be displayed at the bottom left of the TEST MANAGER screen. Do not expect the program to execute properly until all Flexible Standard Generic References have been properly assigned to a Driver and Bus Address.

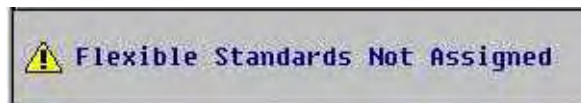


Figure: Flexible Standards warning

Selecting **Edit, Flexible Standards** will bring up the Flexible Standards assignment window.

If Drivers have been correctly linked to Generic Names, but the instruments have different addresses you will need to correct the addresses. This can be done by either changing the switch settings on the standards or changing the table linkages. To change the table highlight the Driver address(es) to be changed, then select the **Edit IEEE-488 Table** button to bring up the IEEE-488 Bus Address definition table with the names of the Drivers currently assigned to each address. Select an address corresponding to the standard being linked to that address and the link will be established.

Sometimes it is necessary to remove a Driver to Address link. This is done by selecting the **Edit IEEE-488 Table** button to bring up the IEEE-488 Address definition table with the names of the Drivers currently assigned to each address.

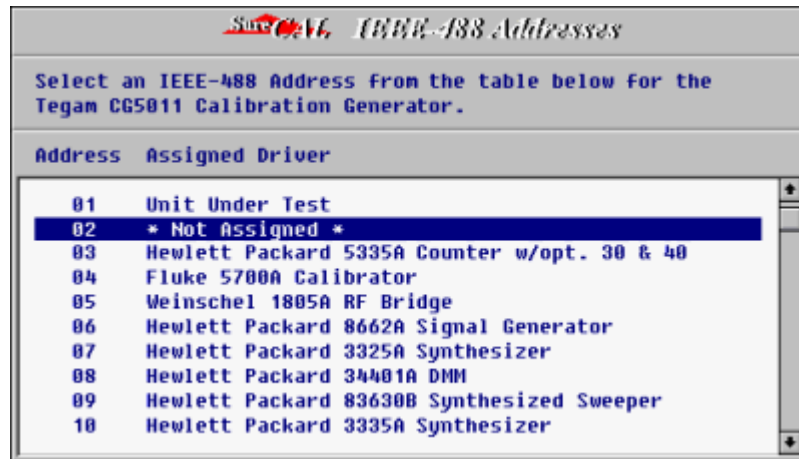


Figure: IEEE-488 Addresses

Selecting the Address(es) to be un-assigned will remove the Driver linkage. You must press **Esc** to return to the **Flexible Standards** window.

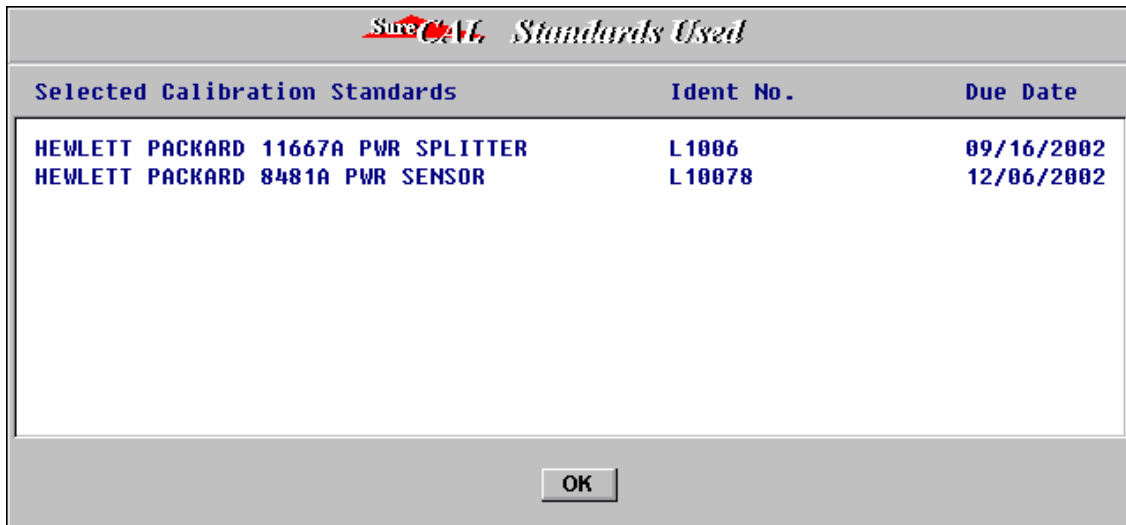
Selecting the button removes the **Flexible Standards** window and displays the pulled down **Edit, Flexible Standards** menu. Pressing **Esc** again, clears the pulled down menu.


STANDARDS USED

Viewing Standards Used

Choosing **V**iew, **S**tandards **U**sed displays a window of Equipment with Ident Numbers and Calibration Due dates.

CAUTION: This list is not automatically linked to previous Flexible Standards assignments.



The screenshot shows a window titled "Sure  Standards Used". It contains a table with three columns: "Selected Calibration Standards", "Ident No.", and "Due Date". The table lists two items: "HEWLETT PACKARD 11667A PWR SPLITTER" with Ident No. "L1006" and Due Date "09/16/2002", and "HEWLETT PACKARD 8481A PWR SENSOR" with Ident No. "L10078" and Due Date "12/06/2002". An "OK" button is located at the bottom center of the window.

Selected Calibration Standards	Ident No.	Due Date
HEWLETT PACKARD 11667A PWR SPLITTER	L1006	09/16/2002
HEWLETT PACKARD 8481A PWR SENSOR	L10078	12/06/2002

Figure: View, Standards Used

These are the standards that were previously recorded as being used to calibrate the currently selected instrument model. This sublist of standards is stored in a file (<CPnnnn>.STD) associated with the Calibration Procedure so as to be available whenever this particular Calibration Procedure is recalled. **Standards Used** selection will be grayed out if the sublist has never been created.

The default Certificate Of Calibration and Calibration Record (data sheets) are printed with this information, in a section labeled CALIBRATION STANDARDS USED.

If any of the previously recorded equipment was determined to be out of calibration, a warning would have been displayed earlier and the item would have been automatically removed from the **standard.dat** file. You will need to re-enter replacements using the **E**dit, **S**tandards **U**sed menu. If Standards have been removed, the standards list will be empty.

Every time a Calibration Procedure is selected the operator should view this sublist of selected standards and verify that it agrees with the current test setup. This is a quick and easy way to determine what equipment was previously used, especially if the exact recommended standards listed under the **V**iew, **E**quipment **R**equired menu were not used.

Edit Standards Used

Your laboratory administration software may automatically perform this edit function, thereby relieving the operator of this task.

Edit, Standards Used allows for the initial selection and subsequent changing of Standard Instruments to be used with this Calibration Procedure. Each specific Standard Used, at least those with traceable parameters related to the current calibration, should be entered in this list.

Calibration Standards: Manufacturer, Model & Description	Ident. Number	Due Date MM/DD/YYYY
HEWLETT PACKARD 11667A PWR SPLITTER	L1006	09/16/2002
HEWLETT PACKARD 8481A_PWR SENSOR	L10078	12/06/2002

Figure: Edit, Standards Used

This option also provides for the updating of CALIBRATION STANDARDS USED information whenever instruments are substituted or replaced by the operator. The updates are performed by either selecting from a pick list of all standards that are available or by typing-in your unique references to the standards being used.



If you have created a pick list of standards available in your laboratory (**STANDARD.LST**) you will be presented with that list in a pop-up selection window. Pressing the **Enter** key selects or de-selects a particular standard. Those standards that are highlighted are currently selected and will be transferred to the associated Calibration Procedure file sublist (**CPnnnn.STD**) when finished.

If you are not using a laboratory pick list then you will be presented with a pop-up window that allows the user to enter the standards being used. Data in this window will be transferred to the associated Calibration Procedure file sublist (**CPnnnn.STD**) when finished.

The pick list file with all of your standards to be “picked from” must be manually created and maintained, unless your laboratory administration software performs this function, or you wish to ignore this capability. Users are referred to the chapter on FILE DESCRIPTIONS for instructions on creating and updating the STANDARDS DATA file (**STANDARD.LST**).

SIGNIFICANT FAILURES (SOOT)

Some failures by their excessive nature are deemed to be significant or Significantly Out Of Tolerance (SOOT). ^{Sure}CAL flags these failures with an asterisk suffix after the result. Results such as **Fail***, **FAIL*** and **F*** are all indications of a SOOT condition.

Fail* represents a manual test result that the operator has determined to be significant and has recorded it by pressing the toolbar  icon or **F** key twice (re-select Test Step then press again). To fix an erroneous entry, simply press the  icon or **F** key again and the result will toggle back to a normal failure (**Fail**).

Automated tests record results (by programmer convention) in upper case, so that a **FAIL*** result is one determined by a test subroutine to be significant. Test Subroutines often flag specific pieces of data as being out of tolerance with an **F** or for a SOOT failure with an **F***.


Test Programs depend on the Fail Ratio that is stored with the **UUT Information** to determine if a failure is significant. The last line in the **UUT Information** dialog box has a six character field that contains a specification multiplier.

$$\text{Fail*} = \text{SPEC} * [\text{_____}]$$

SOOT failures are those with measured data exceeding the multiplied specification limit. Usually this multiplier is defaulted to **1.000** (implying that no failure is significant), but most secondary laboratories use **2.500** as the SOOT multiplier. Any Fail Ratio must be between 1.0000 and 99.999 to be acceptable.

SESSION SPECIFIC OPTIONS

Users may select session specific options that override **Default Options** selected through the **SureCAL Configuration** program. Often, the types of reports under **Exit Options** are changed to comply with special customer requirements.

From the menu bar select **E**dit, **O**ptions or from the toolbar click on the screwdriver icon , to display the **Session Options** dialog box. Users can also access this dialog box by clicking the right mouse button then selecting **O**ptions. See the **Default Options** under the **SureCAL Configuration** program for detailed descriptions of these selection options.

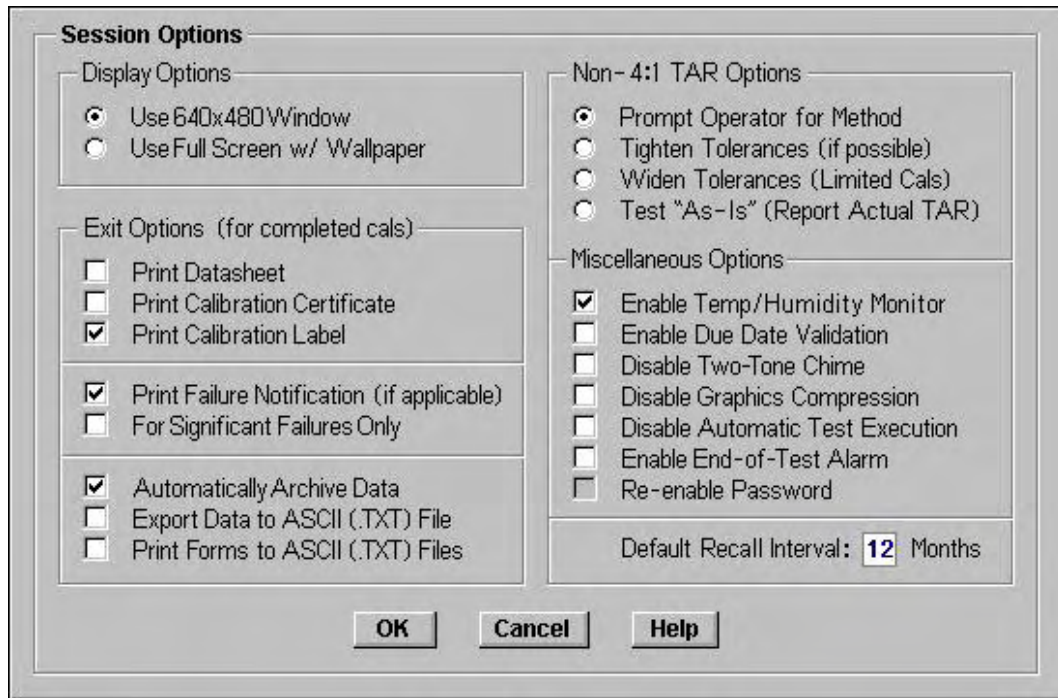





Figure: Session Options

THE CALIBRATION SEQUENCE

There are three sections to the procedure window on the test executive screen. From left to right they are the Test Names section, Results section, and the Calibration Procedure section. Running the calibration sequence is a matter of following the instructions displayed in the Calibration Procedure section, starting with the first Test Name and moving sequentially through the last test.

If the Preview Image shown in the Calibration Procedure section needs to be enlarged, just click on the **100%** icon . To return to the previous display press the **Esc** key. The next action to be taken will be described in the graphic (example: press **Page Dn** or **SPACE BAR**).

The Up/Down arrow   buttons (and keys) reposition the highlighted Test Name bar, thereby selecting a Test step. As a result, the first frame of Calibration Procedure instruction changes to match the first frame of the selected Test step. The arrow buttons will be unavailable and grayed out if there are no more test steps in a particular direction.





- The **SPACE BAR** button (and keyboard bar) starts an automated test. This button will be unavailable and grayed out for manual test steps. Often tests will step forward without any manual intervention after the first automated test step is completed. Whenever automated steps are in process, the **SPACE BAR** button will appear depressed, the phrase “**Test in progress...**” will be displayed on the right side of the menu bar and a red **STOP** sign icon will appear to the right of the tool bar. Mouse pointer now changes to an hourglass  whenever TEST MANAGER is not ready to accept user input.






Figure: STOP Automated Test Sign






Clicking on the  icon causes the automated program to halt and returns control to the test executive screen. Users may have to click and hold down the left mouse button until the test pauses (max. 3 seconds). If HTBasic is currently servicing an HTBasic Error or an I/O Timeout, this Stop Sign will not be recognized, while the mouse pointer is shown as an hourglass.

The  and  buttons (and keys) reposition the frame of Calibration Procedure instructions. The page control buttons will be unavailable and grayed out if there are no more instruction frames in a particular direction. Be sure to read all of the available frames for each test step.

Users will recognize the end of a calibration procedure when:


- an “**All tests complete!**” message is displayed at the bottom left of the TEST MANAGER screen,
- the toolbar finish flag icon  becomes highlighted,
- the down arrow button  is grayed out and
- the page down button  is grayed out.

Manual test results can be entered for all test steps by using the four result icons on the toolbar.

From left to right these icons are:  Pass,  Fail,  Limited Pass, and  not applicable. Pressing the **P**, **F**, **L** or **N** keys is the same as clicking on the equivalent toolbar icons. Pressing the Fail icon  twice (re-select Test Step then press again) adds an asterisk suffix, indicating a significantly out of tolerance (SOOT) failure. It should be noted that when a test subroutine makes a pass/fail decision the result is always displayed in upper case (example: “PASS”), but when an operator makes the decision the result is displayed in title case (example: “Pass”).

By following the Calibration Procedure instructions, making the required connections, settings, and readings, then entering any data or results, the user can complete the entire calibration sequence.

RECOVERING INCOMPLETE DATA

Under the **File** menu bar command, users can select **Open Unfinished Cal** from the drop down menu or the open folder icon  on the toolbar, to recover incomplete data. Data is temporarily

saved in the **Backup** subdirectory in a file named after the IDENT NUMBER being used. Only the most recent data file per IDENT NUMBER is saved (users could use a bogus IDENT NUMBER if necessary).


All calibration data is automatically saved during a calibration sequence to avoid inadvertent loss of results. Users can pause a calibration sequence after any Test Step for completion at a later time. End of shifts, lunch breaks, need for a particular standard, and change in priorities are all common reasons why a calibration sequence may need to be interrupted. After a calibration has been completed, saving of the final data is dependant upon Option Selections and operator actions.

VIEWING ARCHIVED DATA

Under the **File** menu bar command, users can highlight and select **Open Archived Cal** from the drop down menu, to recover saved test data. Archived data by nature is almost always the result of a fully completed calibration, but there may be a few exceptions.

Users can save calibration data by selecting **Save Cal to Archive** from the **File** menu. Data can be effortlessly archived at the completion of every calibration by checking **Automatically Archive Data**, in the **Exit Options** group of the **Options** dialog box.

TEST MANAGER saves test data in the Archive subdirectory under a coded filename. Users will need to manage the size of the Archive subdirectory and remove files occasionally to avoid excessive data storage, since the index is not able to manipulate more than 32,000 filenames. One suggested scheme is to create archive data subfolders for each year (ex. ...**ACT\Archive\2001**, ...**ACT\Archive\2002**, ...**ACT\Archive\2003**) and move files (less than 32,000 files), based on Date Modified, to those respective subfolders. Current year files just remain in the ...**ACT\Archive**\ folder. An index will be created in every archive folder so that any search sequence can be done quickly.

When all tests have been completed an “**All tests completed!**” message will be displayed at the bottom left of the TEST MANAGER screen and the toolbar finish flag icon  becomes highlighted.

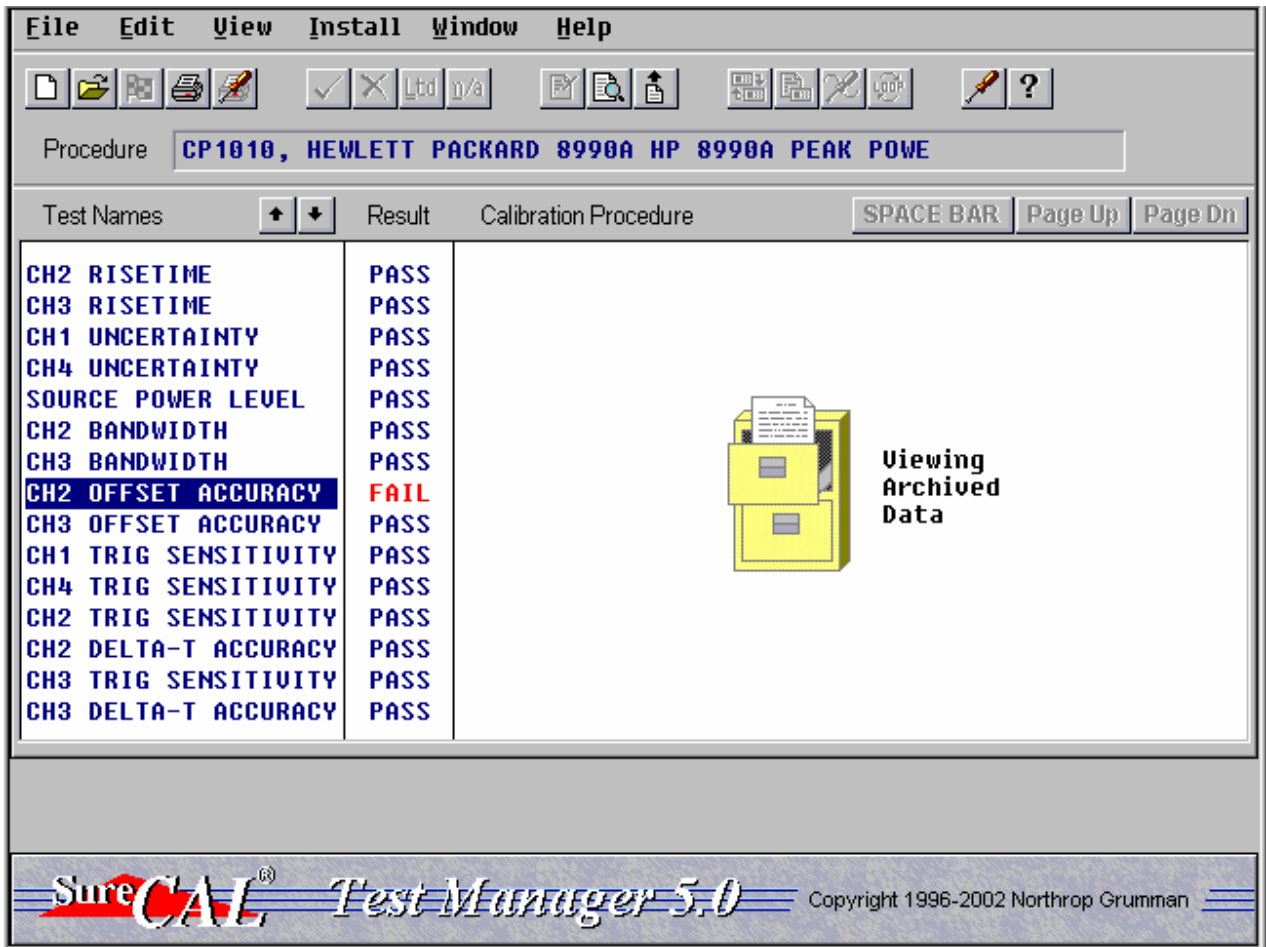



Figure: Archived Calibrations are Read Only

None of the data or results of an Archived Calibration may be altered. This is a view only mode.

STOPPING A PROCEDURE

For various reasons such as being finished, aborting or pausing users will need to stop a calibration sequence. From the menu bar select **File**, followed by the desired action (**Finish...**, **Exit**, etc.). Data is always automatically saved before exiting and can be retrieved by the applicable **File, Open Unfinished Cal** or **Open Archived Cal** selection (Read Only).

MANUAL DATA RECORDING

Some Calibration Procedure instructions direct the user to specifically enter data manually, but users may also enter data manually for any test step. Even recurring comments can be added at the user's discretion. The Manual Data Entry window is accessed through the **Edit, Manual Test Data** pull down menu. Pressing the **D** key or clicking on the Toolbar paper with data & pen icon  also works also works.

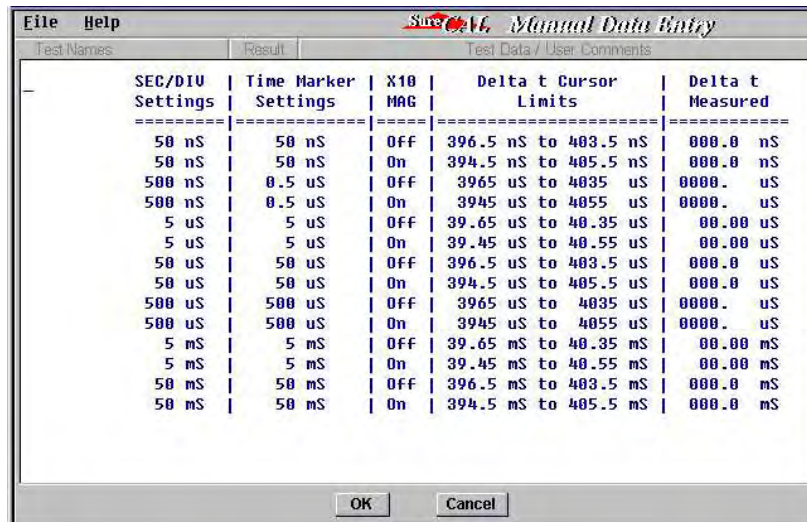



Figure: Manual Data Entry

User's not familiar with the editing and data entry commands can pull down a list of commands by selecting **Help** from the menu bar. These are basically the same commands used in the CP Editor as explained in the Programmer's Reference Manual. Templates needed in the future must be specifically saved (without data) by selecting **File, Save Data to a Template** from the Manual Data Entry screen menu bar.

PREVIEWING THE DATA SHEET

Users can look at the current data sheet at any time during the calibration sequence by selecting **View, Preview Datasheet** from the menu bar. Pressing the **V** key or clicking on the Toolbar paper with data & magnifying glass icon  also works. The data sheet will be displayed in a scrolling window at a position corresponding to the current Test Step. If data has not been recorded and manual data templates are not being used, then only the Test Names will be present.

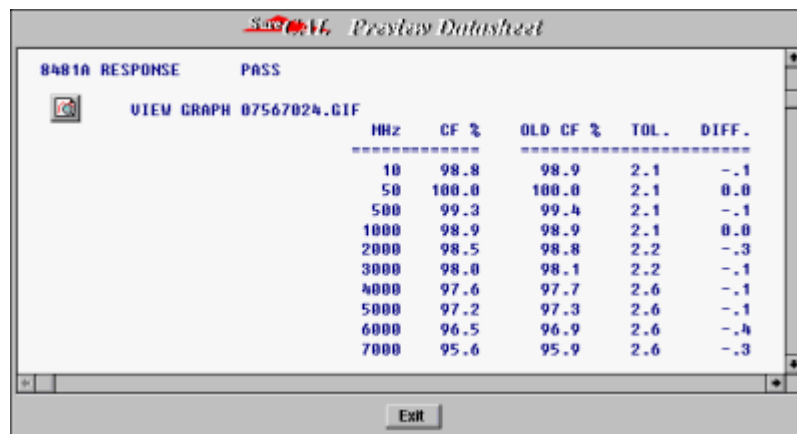



Figure: Preview Datasheet

If an x-y graph(s) has been created, a place marker will be present in the data sheet along with a display icon . Clicking on the icon will cause the x-y graph to be drawn on the display.

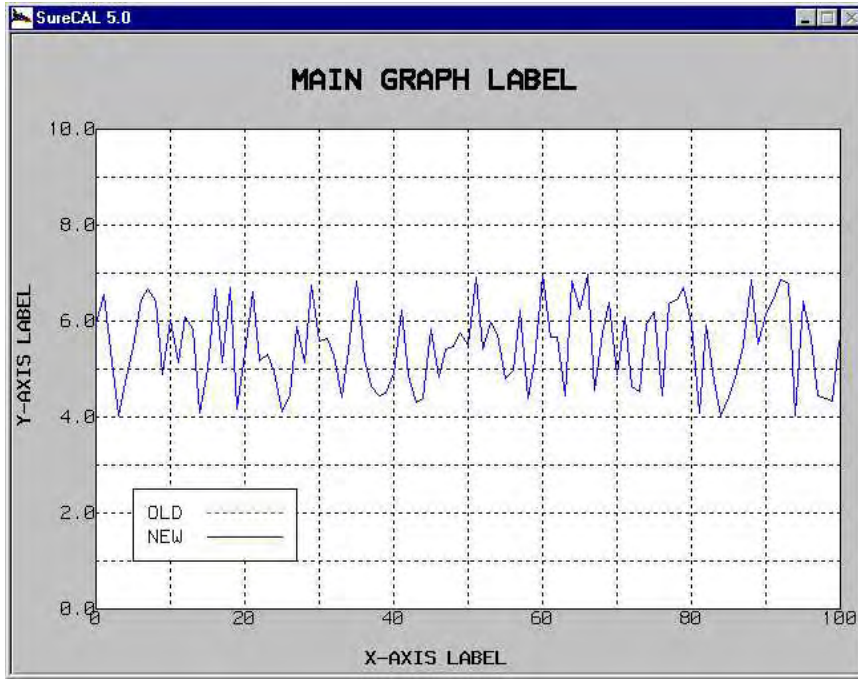


Figure: X-Y Graph

Pressing **Esc** returns the display to the data sheet. A second **Esc** command returns the user to the test executive screen.

RE-TESTING FAILURES

Re-testing failures should be done judiciously and with forethought, especially when AS-RECEIVED TEST DATA is being collected. A retest mode has been provided, but the AS-RECEIVED conditions should be recorded prior to performing any adjustments or repairs. The Data Sheet records and annotates the initial AS-RECEIVED TEST DATA as well as any POST-ADJUST TEST DATA.

PROCEDURE STEP	RESULT	TEST DATA / USER COMMENTS		
DC VOLTAGE	FAIL*	(As-Received)		
RANGE	APPLIED	5 ½ DIGIT MODE LIMITS		MEASURED
200 VDC	100.000 VDC	99.989 TO 100.011		100.007
1000 VDC	-990.00 VDC	-990.11 TO -989.89		-990.13 F
DC VOLTAGE	PASS	(Post-Adjust)		
RANGE	APPLIED	5 ½ DIGIT MODE LIMITS		MEASURED
200 VDC	100.000 VDC	99.989 TO 100.011		100.007
1000 VDC	-990.00 VDC	-990.11 TO -989.89		-990.06

Figure: As-Received & Post-Adjust Data

Great freedom is provided to the operator, so that “cockpit errors” can be easily remedied without destroying the data collected up to that point by forcing a re-start. Simply repositioning the Test Step to the desired Test Name then pressing the space bar will cause the step to be re-tested. Remember, only the latest data will be saved, regardless of the mode.

Operators control whether the data is saved as Post-Adjustment or As-Received data from a two line drop down menu under the **Window** command on the menu bar. This menu allows the operator to toggle between **As-Received Test Mode** and **Post-Adjust Test Mode** for recording test results.

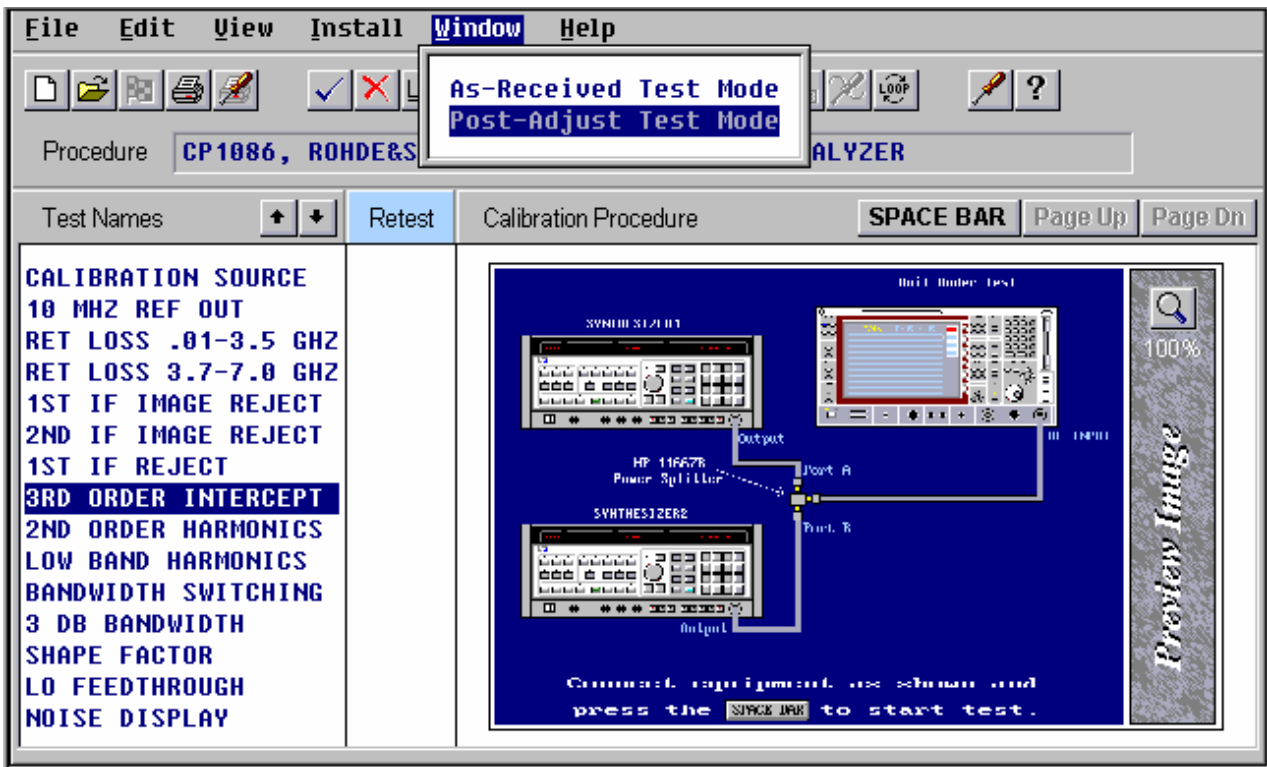



Figure: Post-Adjust Test Display

Operators will notice that the gray **Results** column header, on the test executive screen, will change to **Retest** and be highlighted in light blue during the Post-Adjust Test Mode. At no time can Post-Adjust Retest Results for a particular Test Step be recorded prior to recording As-Received Results for that Step. Users will be notified and prevented from any attempt to do so.

Toggling back and forth between these two modes is unrestricted.

LOOPING ON A TEST

The Loop on a Test feature allows an operator to repeat a single Test Step. This option is selected by clicking on the Toolbar “**LOOP**” icon . A Loop Test dialog box is presented that lets users select the number of loops, plus options to halt on a failure, or to log all data to an ACSII text file of their choice.

UUT INFORMATION

Any time during the calibration sequence it is possible to review or edit the UUT (Unit Under Test) Description information that was originally entered or automatically transferred in by a laboratory administration program. It is advisable to review this information at least once before printing reports or saving data.

To preview this description select **V**iew, **U**UT **I**nformation from the menu bar. To correct or supplement the description select **E**dit, **U**UT **I**nformation.

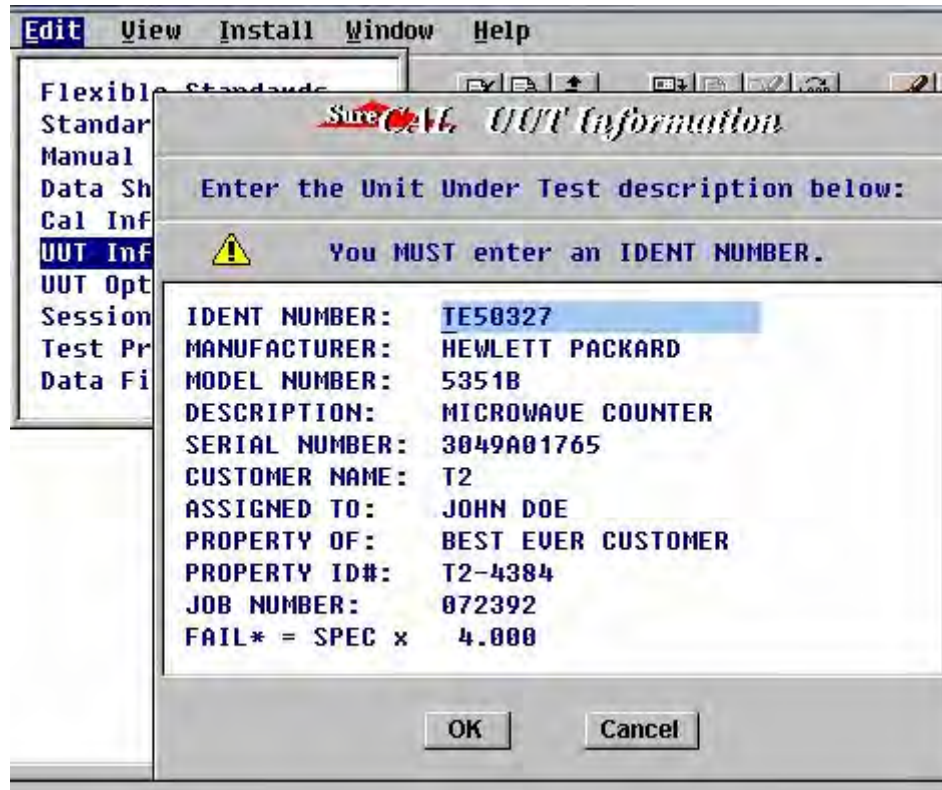


Figure: Edit, UUT Information

Most often the Model Number field will list several models (ex. 1061[62] /A&B) that can be calibrated with the same procedure. In this case users should edit the model number to agree with the unit being calibrated (ex. 1061B).

UUT OPTIONS

Any time during the calibration sequence it is possible to review or correct manually entered UUT (Unit Under Test) Options information by selecting **Edit, UUT Options** from the menu bar.

When UUT Options make a difference in the calibration sequence or specifications and the UUT cannot be queried to determine what options are present, manual intervention may be required. The **UUT Options** selection will be grayed-out when not available, and be unavailable until after the user has been prompted to select the options installed in the current unit under test.

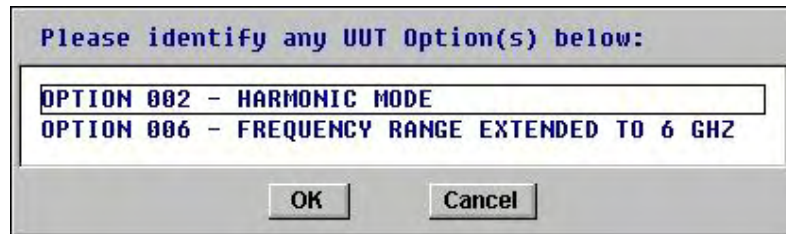


Figure: UUT Installed Option(s) Selection

The first time a unit like this is calibrated, its Calibration Procedure Module will prompt the user to select those installed options that make a difference. Options are selected by highlighting the corresponding description in a pop-up dialog box. After the options are initially identified, an options definition file named **<ident number>.opt** will be created in the **HTBasic Root Directory** and referred to in the future. Those options that were selected will remain highlighted until de-selected.

PROCEDURE INFORMATION

Any time during the calibration sequence it is possible to review the status of files associated with the current CP Module. File last modified Revision, Time & Date; file Size; plus Filenames for the CP File, Graphics files, Test Subroutine files, and instrument Driver files, are displayed in a scrolling window. TEST MANAGER creates this list on demand by finding filenames related to CALL and DRAW keywords in the CP File as well as the Driver filenames from the current **CPnnnn.tb1** file. This list is very useful when reporting problems, because the status of files is easily confirmed.

To preview this information, select **View, Procedure Information** from the menu bar.

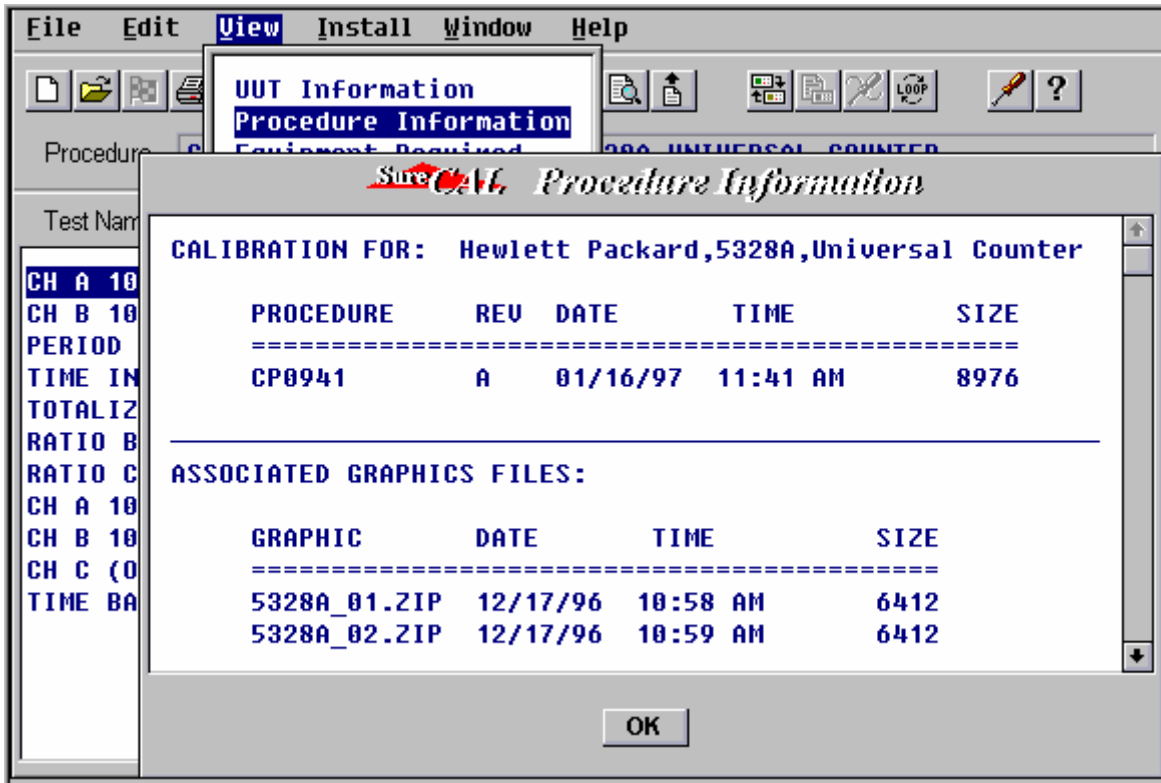


Figure: View, Procedure Information


PRINTING REPORTS

Upon completion of all Test Steps the user will be prompted to print CALIBRATION RECORDS (a.k.a. Data sheets) and CERTIFICATES OF CALIBRATION or OUT OF TOLERANCE NOTICES depending on the Pass/Fail conditions and selected Session Exit Options.

Certificate Of Calibration will be unavailable if any test step has failed. Like wise, Out Of Tolerance Notices (a.k.a. Failure Notices) will only be available if at least one test has failed.


Initially the user is prompted for: Interval, Due Date, Stamp Number, etc., all common information required for various reports. Afterwards other information may be collected relative to the specific reports requested. Just prior to printing any reports, a SELECT PRINT DESTINATION dialog box may be presented providing the opportunity to send that report to a file instead of the default printer. This box will not appear if the Options box for **Print Forms to ASCII (.TXT) File** has not been checked.

Users also have the option of printing several of the reports listed in the pop up pick list accessed by selecting **File, Print...** from the menu bar. These reports include: Calibration Record, Certificate Of Calibration, Out Of Tolerance Notice, CP File contents, Equipment Required Table, IEEE-488 Address Table, DRIVERS.LST file. Selections that are unavailable will be grayed out.

Users also have the option to click on the toolbar printer icon  to print a data sheet.

Refer to the section titled REPORTS in the Chapter on CALIBRATION REPORTING for more details.

PRINTING LABELS

Upon successful completion of all Test Steps the user may be prompted with a CALIBRATION LABELS dialog box (if Print Calibration Label is checked in the Session Exit Options). Radio buttons  are used to select the desired label type (usually NORMAL). The user must supply a valid STAMP NUMBER (or equivalent character string) plus his assigned password to sanction the printing of a label. There may also be additional text fields to complete for various labels.

Users can also select **File, Print..., Print Calibration Labels** from the menu bar to reach the SureCAL CALIBRATION LABELS dialog box or pick list for non-SureCAL type Labels.


Damaged, torn, smeared or otherwise unusable labels can be re-printed by simply responding “**Yes**” to the “**Do you want to print an extra label?**” prompt.

If printed labels are needed after exiting the procedure, there are two other options:

1. If the Calibration was archived and you want to reprint the exact same label data, just retrieve the calibration data using **File, Open Archived Cal** and print an exact duplicate label using **File, Print..., Print Calibration Labels**. The format of the label may have changed over time, but the data remains unchanged.
2. If the calibration was not archived,
 - load the “sample” or any other Calibration Procedure,
 - create a passing calibration by manually passing all of the steps;
 - select **File, Print..., Print Calibration Label** from the menu bar, after the **All Tests Complete!** message is displayed;
 - complete the **Cal Information** screen with the dates to be used on the label;
 - select the label type;
 - enter the stamp number and respond to the security code request; then
 - click **OK** to print a new label.
 - At this point you will again have the opportunity to respond to the “**Do you want to print an extra label?**” prompt.
 - When finished, exit completely from SureCAL to reset any default settings.
 - **DO NOT** select **File, Finish Procedure** or click on the finish flag icon. You do not want to save evidence of this “faked” calibration.

Refer to the section titled LABELS in the Chapter on CALIBRATION REPORTING for more details.

EXPORTING DATA

Portions of the data sheet can be exported to an ASCII text file for use by other applications (ex. MS-Word and Excel). Pathnames for text files are specified in the SureCAL Configuration program under **Other File Locations, ASCII FILE EXPORT DIRECTORY**. Users can select **File, Export Data...** from the menu bar, or click on the toolbar page with data plus arrow icon , or by press the **X** key.

Some test subroutines make use of TransERA’s DLL TOOLKIT to export data to files in various formats. This is not an option that can be selected by an operator, unless that particular test subroutine happens to request user decisions.

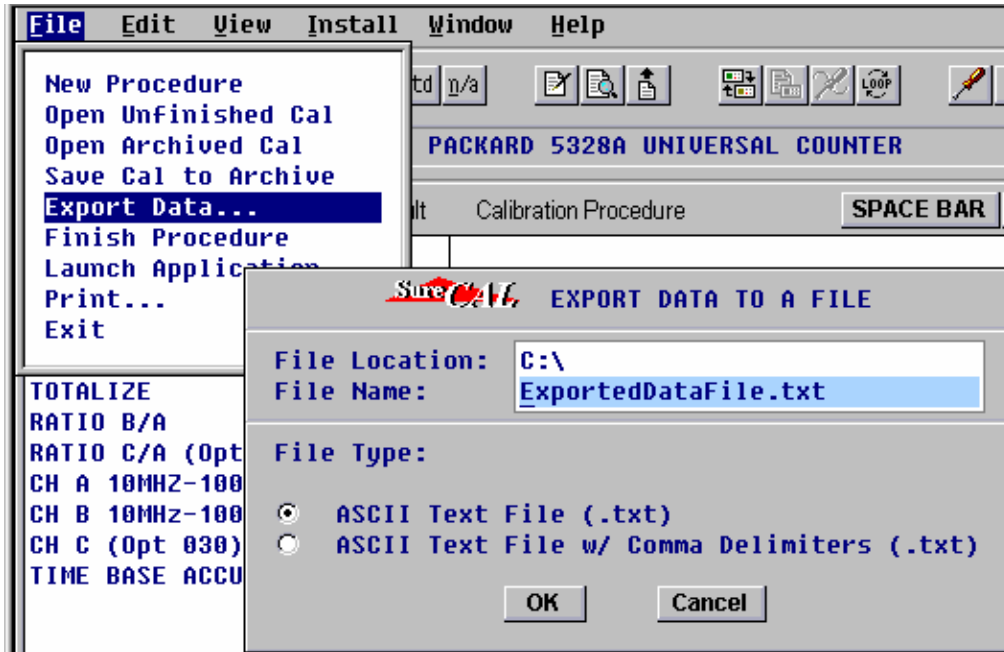


Figure: Export Data dialog box

An EXPORT DATA TO A FILE dialog box prompts the user for a pathname and file name to use in creating the export file. Each use is a new write not an append. A “.txt” extension will be added to the filename if none is specified. Users will be warned of possible overwrites of existing files. If the “...w/ **Comma Delimiters...**” radio button option is selected, each time the export is executed, commas will be placed after the: Test Name, Result, As-Received/Post-Adjust flag (1 or 2 respectively), and Test Data (columns 21, 28, 30 & 109). Beyond the last comma there may be a reference to an x-y graph filename.


<u>COL</u>	<u>WIDTH</u>	<u>DATA</u>	<u>USAGE</u>
01	20	Test Name	Step Ident.
21	1	comma	delimiter
22	6	Result Pass, Fail, Fail*	
28	1	comma	delimiter
29	1	1 or 2 1st or 2nd Result	
30	1	comma	delimiter
31	78	Test Data	measurements
109	1	comma	delimiter
110	~	graph name	file reference

Table: File Layout for Export Text Data w/ commas


Exported data consists of: the Test Name, Result, As-Received/Post-Adjust flag any test subroutine generated or manually entered data and any references to x-y graph files. Header information and standards used are not part of test data therefore they are not exported. Whole data sheets can be “printed” to a text file using the normal print options.

When parsing data with commas, users should be aware of the possibility of extra commas existing in the data stream besides those that are inserted as delimiters in specific columns.

EDIT DATA FILE ASSIGNMENTS

Selecting **Edit, Data File Assignments** from the menu bar or clicking the data sheet & equipment icon  on the toolbar, allows the user to modify the currently active data file assignments. The menu selection and toolbar button are only highlighted after the testsub has prompted the operator to supply at least one data filename for the current CP Module and unit under test.




EDIT TEST PROFILE


Selecting **Edit, Test Profile** from the menu bar or clicking the sinewave & screwdriver icon  on the toolbar, allows the user to modify a test profile for the currently selected Calibration Procedure Module. The menu selection and toolbar button are only highlighted if the testsub for the current Test Step makes use of test profiles. Access to this function is password protected so that production personnel can be blocked from making unauthorized changes.

Users are referred to separate documentation related to optional support packages (ex. Power Sensor Support Package) for specific details about this feature.

EXITING

There are several ways to exit the test executive screen, but data will always be saved thereby avoiding any loss of data. Users will recognize the end of a calibration procedure when:

- an “**All tests complete!**” message is displayed at the bottom left of the TEST MANAGER screen,
- the toolbar finish flag icon  becomes highlighted,
- the down arrow Test Names button  is grayed out and
- the page down Calibration Procedure button  is grayed out.

Completed calibrations await performance of exit actions by the operator. Normally the operator just clicks on the finished flag icon  or selects **File, Finish Procedure**. This action initiates the current “**Exit Options**,” closes the procedure and blanks the TEST MANAGER screen. Exiting usually involves setting a recall date, printing a data sheet, archiving data, printing a Cert. Sheet, and printing a label.

The various sequences of exit events are controlled by the **Session Options**, which are a copy of the **Default Options** unless specifically modified for the current **Begin Test Manager** session. Lab managers normally control this sequence by defining the Default Exit Options and users tailor this sequence by modifying the Session Exit Options. Typically the operator is required to respond to the **Cal Information** window that collects data required for selected reports. For more details, refer to the section titled SELECTION OPTIONS in the SureCAL CONFIGURATION chapter.

File, Exit, returns to the Main Startup Menu. Any data will be saved as an **Unfinished Cal** that can be retrieved at a later date.

ERROR HANDLING

Program errors are logged to the file **errorlog.txt** in the HTBasic Root Directory (ex. C:\HTBWIN\Errorlog.txt) for use in troubleshooting problems. This file is deleted and created new every time SureCAL TEST MANAGER is started. Users can view the contents of this file by selecting **View, Error Log** from TEST MANAGER, **View Error Log** from the SureCAL Configuration menu, or by using a text editor such as Notepad.

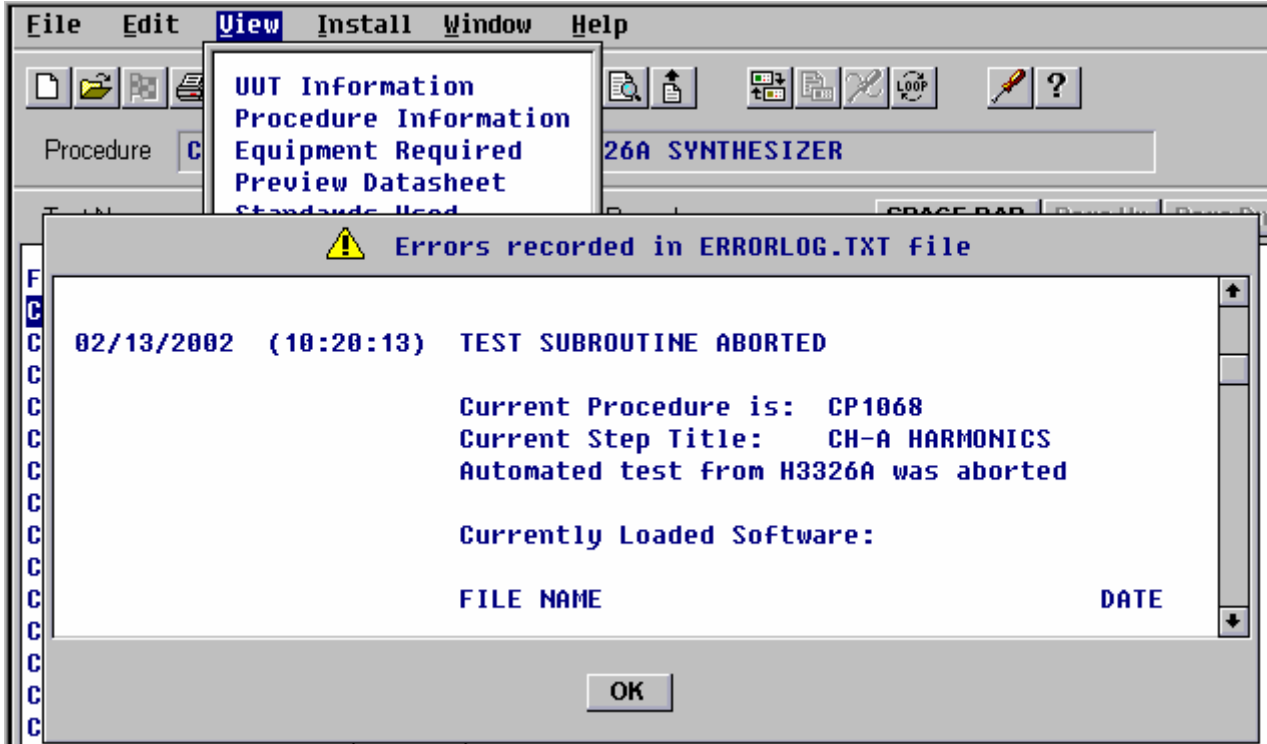


Figure: Error Log data, viewed from TEST MANAGER

It is very helpful if users do not restart TEST MANAGER or delete this file when requesting support from SureCAL Products.

5.0 CALIBRATION REPORTING

REPORTS

This section discusses reporting done specifically from TEST MANAGER. When TEST MANAGER is running in concert with a laboratory administration software package, similar reports can usually be run from that software package also.

As a reminder, if you want to be prompted to print reports, you must have enabled the printing of reports through the **Default Options**, or **Session Options, Exit Options (for completed calcs)**. **Default Options** are set by running the SureCAL CONFIGURATION Program and **Session Options** are set by selecting **E**dit, **O**ptions or clicking the right mouse button, then clicking **O**ptions. Laboratory administration software can also pass in the required reporting needs for each item being calibrated (i.e. Session Option modifications).

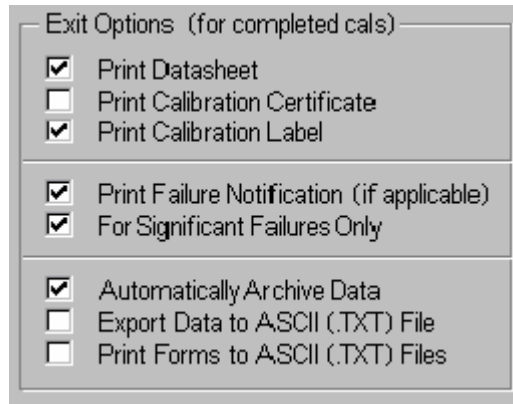


Figure: Exit Options for automatic Reports

TEST MANAGER can manually be directed to print any of these reports from the **F**ile, **P**rint... menu.

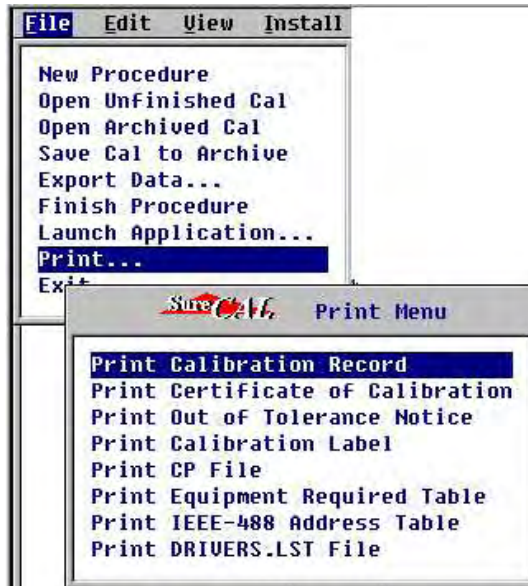


Figure: File, Print menu

All of these reports are usually directed by TEST MANAGER to your system's report printer (as defined by you when running the SureCAL CONFIGURATION Program). Users also have the option to print these forms to ASCII text files, as well as to export just the data, to an ASCII text file. To print to a file, select **Edit, Session Options** then check the **Exit Options, Print Forms to ASCII (.TXT) Files** box. Checking this box causes a Select Print Destination dialog box to be displayed when print requests are made.

Since the **IEEE-488 Address Table** and **DRIVERS.LST File** are already ASCII text files, users are not given the option to print these to an ASCII text file.

Several standard report forms are available from ^{Sure}CAL[®] TEST MANAGER to document the results of calibration actions:

- CALIBRATION RECORD (Calibration Data Sheet)
- CERTIFICATE OF CALIBRATION (Calibration Certificate)
- OUT OF TOLERANCE NOTICE (Equipment Failure Notice)

Two other standard report forms are associated with calibrations that have recorded Limited (**Ltd**) Results.

- SPECIAL CALIBRATION STATUS AUTHORIZATION
- SPECIAL CALIBRATION STATUS REPORT (Details of Special Cal.)

All of these "canned" reports are formatted for standard 8.5 x 11 inch paper.

Report formats can be customized by the user to reflect the needs of each Calibration Facility then activated by checking the corresponding report subroutine name box in the **Custom SURE_4 Routines** dialog box. For your convenience, the names of subroutines in the **SURE_4** program are listed in parenthesis after the report name. The PROGRAMMER'S REFERENCE Manual and in the header comments (including "Hot Tips") of **SURE_4**, provide the information required to modify these reports. The support software required to modify these reports is not supplied with TEST MANAGER LITE.

Calibration Record (Dat1 & Dat2)

CALIBRATION RECORD reports are simply test data sheets. There can be five sections to this report. At the top is a banner identifying title, date, time, and file reference (the ID# reprinted). Following the banner is a heading that identifies the unit, owner, workstation, operator, Calibration Procedure configuration, and calibration cycle. Final Test Data is listed after the heading. Every Procedure Test Step is listed with its corresponding result.

If any failures or out-of-tolerance conditions are detected for a Test Step during the calibration process, the “As Received Test Data” is reported and noted as such, followed by the “Post-Adjust” data also so noted. At the end of the report is a listing that identifies the standards used during this test.

See Appendices for a Sample: B- CALIBRATION RECORD REPORT.

Certificate of Calibration (Cert)

The CERTIFICATE OF CALIBRATION is a report that some customers use to summarize each calibration action and record the standards used.

See Appendices for a Sample: C- CERTIFICATE OF CALIBRATION REPORT.

Out Of Tolerance Notice (Devr1 & Devr2)

This report provides an Out Of Tolerance Notice when a Significantly Out Of Tolerance (SOOT) condition is detected during a calibration test. Whenever a Test Step failure is greater than the specified Fail Ratio, the operator is given the opportunity to print an OUT OF TOLERANCE NOTICE (a.k.a. Failure Notice) to document the out of tolerance condition of the unit. Typically, the owners of the unit are required to research the recent use of the unit to assure that product that had been tested with it has not been compromised (most laboratory administration software packages have this kind of research capability). The OUT OF TOLERANCE NOTICE provides owners with necessary notification and background information.

Most facilities file a copy of these reports with the final Data Sheet as evidence of notification. Multiple preaddressed copies can be printed. The first copy is usually addressed ‘To: DATA SHEET COPY’ (this is usually the filed original) followed by ‘To: QUALITY ASSURANCE ENGINEERING, and then other user-defined (modifications to SURE_4 code) addressees.

See Appendices for a Sample: D- CALIBRATION OUT OF TOLERANCE NOTICE.

Special Calibration Status Authorization (Author)

The SPECIAL CALIBRATION STATUS AUTHORIZATION confirms approval by the unit’s owner for this limited-use classification. Once the operator generates this report and has it approved, it should be placed on file for future evidence of this approval. This form

lists the revised specifications for a particular test and provides evidence that the range limitations or revised specifications are adequate for its current use.

When the operator selects a Test Result of **Ltd** (Limited use) it is an indication that your customer wants to supersede the normal specifications for a particular test. Often this is a widening of tolerances or a “Do Not Use This Function” condition. This approval form is associated with the SPECIAL and SEE REPORT calibration labels.

See Appendices for a Sample: E- SPECIAL CALIBRATION STATUS AUTHORIZATION.

Special Calibration Status Report (Report)

The Special Calibration Status Report, is associated with the SEE REPORT label. It lists the revised specifications for a particular test or limited use restrictions. If special calibration information is too lengthy to fit on the long SPECIAL label, users can select the **SEE REPORT** label along with its associated **Special Calibration Status Report**.

See Appendices for a Sample: F- SPECIAL CALIBRATION STATUS REPORT.

LABELS

Several label selections are available from ^{Sure}CAL[®] TEST MANAGER to identify the results of calibration actions. When TEST MANAGER is running in concert with a laboratory administration software package, labels can optionally be printed from that software package, or be produced by other means. This section discusses labels specifically selected from TEST MANAGER. As a reminder, if you want to be prompted to print labels, you must have enabled the printing of labels through the **Default Options**, or **Session Options**. All of these labels are directed by TEST MANAGER to your system’s label printer (as defined by you when running the SureCAL CONFIGURATION Program).

Label formats can be customized by the user to reflect the needs of each Calibration Facility by modifying the **Stickr** subroutine in **Sure_4** and checking the enable **Stickr** box in the **Custom SURE_4 Routines** dialog box. Users that have never tailored the default labels need to create and modify a **Sure_4** file, from the **Sure_5** template, using the Development Version of HTBasic provided with the ^{Sure}CAL Programming Support Package. The PROGRAMMER’S REFERENCE Manual and the subroutine header comments (including “Hot Tips”) provide the information required to modify these labels.

There is a **stickrx** subroutine that can be copied into **Sure_4** and renamed **stickr** that will replace the typical ^{Sure}CAL **Calibration Labels** window with a drop down selection list of “homemade” labels or some other customized user interface. The support software, from TransEra, required to modify these labels is not supplied with TEST MANAGER LITE.

Selection of a typical set of SureCAL “canned” labels is made through the **Calibration Labels** dialog box.

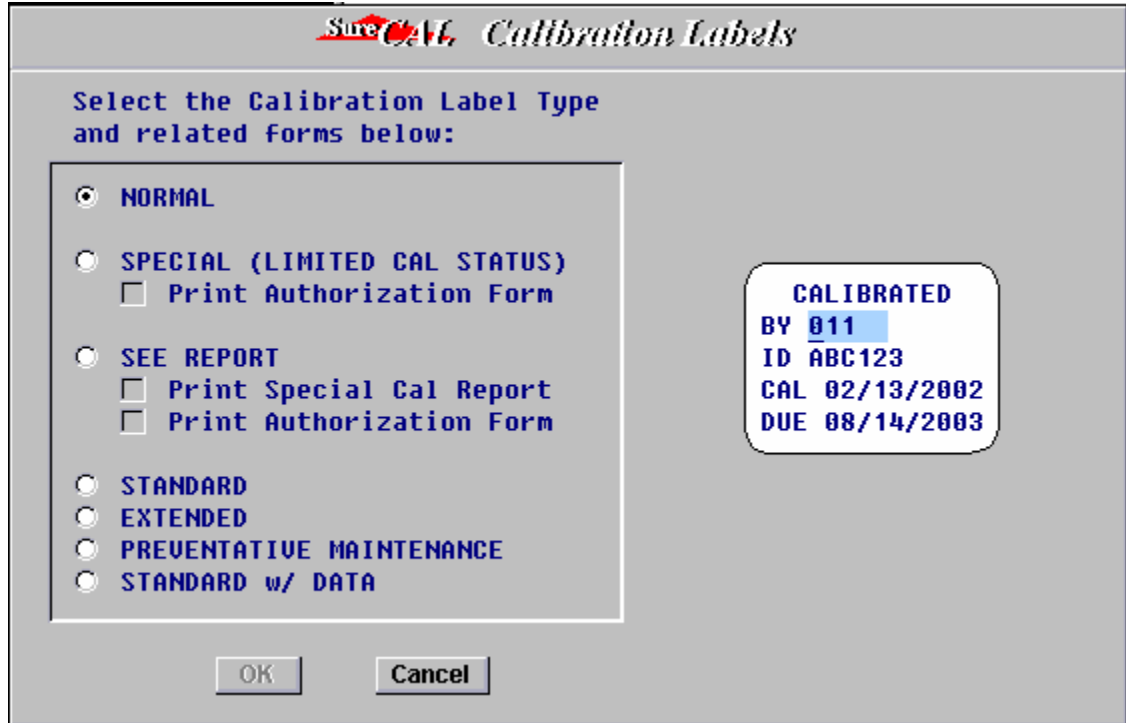



Figure: Labels dialog box [Example Only -exact image depends on user selections.]

Users select labels listed on the left through the use of radio buttons  then an image of the selected label is displayed on the right. Blue boxes on the white label image define fields for user-entered data. A gray box on the label image allows for the selection of a data filename and the titles of selected data columns to be included on this label.

The word **BY** precedes a blue box for a Technician’s STAMP NUMBER and will be followed by a pop-up window requesting an associated SECURITY Code.

SPECIAL, CALIBRATED w/ DATA, and STANDARD w/ DATA labels are large and have an additional text block for remarks. After entering the STAMP NUMBER a large blue box for data or comments is displayed on the label and the cursor is positioned in the upper left of this box. If data is to be selected from a file, then a gray window will be displayed.

Samples of various label formats are contained in the appendices: [G- LABELS...](#)

ENVIRONMENTAL MONITORING

SureCAL® Automated Metrology Software provides capability to monitor the calibration environment, log every reading to a journal, record those conditions, report measurements on reports, and warn of unacceptable conditions. These features are only available when supporting third-party hardware plus software is installed, and the **Default** or **Session Options, Miscellaneous Options, Enable Temp/Humidity Monitor** is checked (enabled).

As part of TEST MANAGER Lite, a SureCAL developed a temperature and humidity sampling program named **TempHum.exe** has been provided to interface with affordable off-the-shelf Veriteq hardware plus software. More information related to these Veriteq products and operation of this particular sampling program is contained in the appendices: [H- Temperature & Humidity Sampling -Veriteq](#).

To print environmental data on reports, the applicable report subroutine (usually: **Dat1**, **Cert**, and **Devr1**) must be tailored to place the desired; data label, data value plus, data unit of measure, on each report, and then enabled from the CONFIGURATION program, **Custom Sure_4 Routines** screen. Any tailoring of **Sure_4** report subroutines can be accomplished using the HTBasic Development application provided with the SureCAL Programming Support Package. Users also need to select **Default** or **Session, Exit Options** that enable the desired reporting actions: **Print Datasheet (Dat1)**, **Print Calibration Certificate (Cert)**, or **Print Failure Notification (Devr1)**.

The **Sure_4** user default **Temp_humid** subroutine must be modified to call an executable program that interfaces with an associated third-party temperature and humidity measuring software, other than the Veriteq product. Changes required for interfacing with other environmental monitoring equipment or to function in a different fashion can be made in the **Temp_humid** subroutine using the HTBasic Development application provided with the SureCAL Programming Support Package. Checking the CONFIGURATION program, **Custom Sure_4 Routines, Temp_humid** box enables a user-tailored version of the **Temp_humid** subroutine.

CUSTOMIZATION

SureCAL® Automated Metrology Software provides extensive latitude in customizing the appearance of all reports and labels to suit your facility. Printed reports from TEST MANAGER are formatted for standard 8.5 x 11 inch paper with a portrait orientation (nothing fancy). Labels are formatted for die-cut peel and stick labels on special narrow pin-fed backing (very fancy).

Details related to tailoring the format of reports and labels are discussed in the PROGRAMMER'S REFERENCE Manual, along with the necessary Support Software for making the changes. It is suggested that any tailoring of TEST MANAGER be left to the Test Programmer and that strict configuration controls be maintained.

6.0 NON SureCAL PROCEDURES

Users can configure ^{Sure}CAL to launch up to three different non-^{Sure}CAL applications from within TEST MANAGER. Applications include programs such as: MS-Word, Adobe Acrobat Reader, MS-Excel, MS-Notepad and others, plus a web browser of choice.

CONFIGURING FOR THE APPLICATION

In order to launch a non-^{Sure}CAL application the SureCAL Configuration needs to be setup for that application. Refer to the section on SURECAL CONFIGURATION for more details on setting up applications or a web browser. The following example shows settings to allow the use of the Microsoft Word application, to view Calibration Procedures written as Word documents:

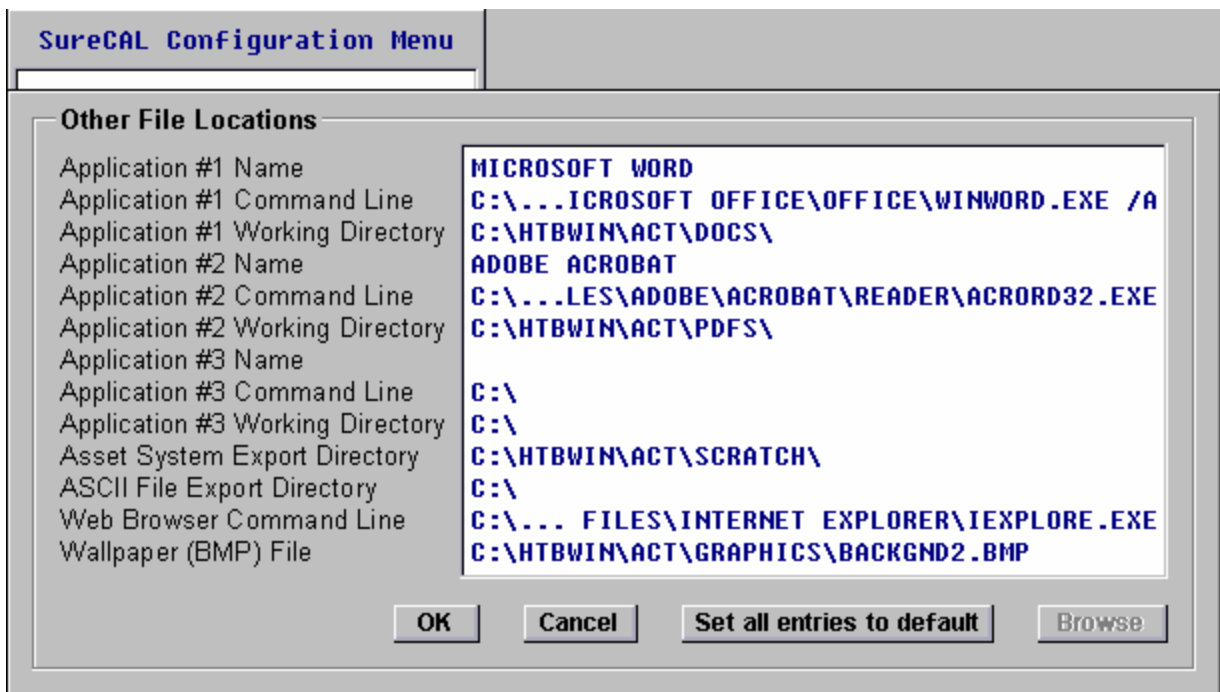


Figure: CONFIGURATION, Other File Locations extract

RUNNING THE APPLICATION

External applications can be called from ^{Sure}CAL type CP Files that reference external applications. When the CP is selected from a pick list, entered directly, or passed in by a laboratory administration program, it is displayed on the test executive screen. Control is then transferred out to the external application using the filename specified in the CP. When the application is terminated control returns to TEST MANAGER for posting of results and report generation. This is the preferred method for launching external applications. Details concerning CP File format (see subheading lines) and editing are discussed in the Programmer's Reference Manual.

Applications can also be selected from the test executive screen menu bar by clicking on **File, Launch Application...**, then the desired program from the **Launch External Application** pick list.

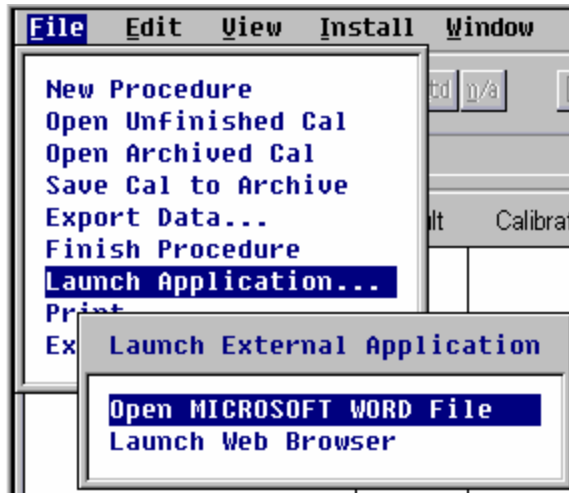


Figure: Launch External Applications Menu

There may be as many as four procedure applications listed under this pick list. The existence (not grayed out) and length of this list depends on how the **SureCAL Configuration, Other File Locations, Applications #1, #2 & #3** were defined. Control will be returned to this screen when the external application terminates. Pressing **Esc** then selecting **Exit** will return control to the current test executive screen.

This is the simplest approach to running an external calibration procedure. It is somewhat crude, but gets the job done. The only advantage to this second approach is in focusing the file selections to a particular directory. Upon selection of the application, a pick list of files in the associated Working Directory will be displayed. Clicking on one of these files launches the application and opens the selected file.

Another approach is to create a universal external application CP File that would be used to generate a data sheet with only a Pass/Fail result. It is also possible for a Calibration Procedure to instruct the user to launch an external application, then report the Pass/Fail results plus record data manually. In either case all ^{Sure}CAL CP Files are created with the CP Editor as described in the Programmer's Reference Manual.

7.0 ADMINISTRATION SOFTWARE

Laboratory administration software from various vendors can work in close cooperation with Northrop Grumman ^{Sure}CAL[®] calibration procedure software. When properly integrated, the administration software determines the unit under test description, and external calibration procedure information, which-in-turn calls SureCAL TEST MANAGER. When the calibration function has been completed, control and data is passed back to the administration software.

Each administration software package vendor typically provides an ancillary program that handles data exchange by various calibration procedure applications (including SureCAL). This two-way communication is often accomplished by passing information via ASCII text export and import data exchange files. Communication robustness between any administration software and SureCAL TEST MANAGER is dependent on capabilities of administration software and the tailoring of TEST MANAGER import and export routines.

RUNNING FROM ADMINISTRATION SOFTWARE

When an operator selects the run external procedure function from the administration software, data is made available for use by TEST MANAGER, and TEST MANAGER is automatically started. When TEST MANAGER terminates, data is made available for use by the administration software, and the operator is returned to the administration software for completion of the calibration administrative processes. This is the most common way to operate ^{Sure}CAL[®] TEST MANAGER and assures that all laboratory administration files are kept current.

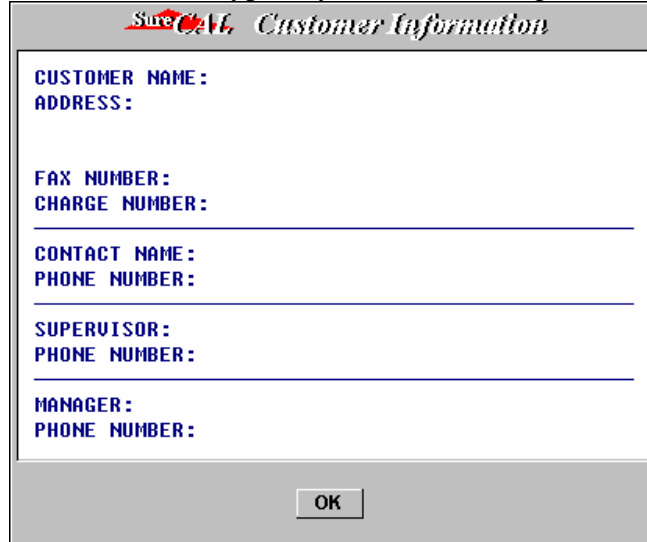
Most of the data being made available to TEST MANAGER is used for SureCAL procedure identification, plus SureCAL generated reports such as Calibration Records (data sheets), Certificates of Calibration, Out of Tolerance Notice, Recall Labels, etc. Since this data is administrative in origin, its accuracy should have been verified and corrected prior to initiating the calibration procedure.

By selecting **View, UUT Information** from the menu bar, you may see more complete information related to the unit under test than you would have normally expected, if you were not running from laboratory administration software.

The following additional preview selection(s) may be available on a drop down menu by selecting **View, Customer Information** on the menu bar, if you are running from laboratory administration software.

Customer Information

Provides a display of information from the administrative software related to the currently selected IDENT NUMBER. Customer name, address, and order number along with personnel contacts are typically available through this display.



The image shows a dialog box titled "SureCAL Customer Information". The dialog box has a white background and a grey border. At the top, the title "SureCAL Customer Information" is displayed in a serif font. Below the title, there are several fields for customer information, each with a label and a horizontal line for input. The fields are: "CUSTOMER NAME:", "ADDRESS:", "FAX NUMBER:", "CHARGE NUMBER:", "CONTACT NAME:", "PHONE NUMBER:", "SUPERVISOR:", "PHONE NUMBER:", and "MANAGER:", "PHONE NUMBER:". At the bottom center of the dialog box, there is an "OK" button.

Figure: Customer Information

CONFIGURING FOR LABORATORY ADMINISTRATION SOFTWARE

Users are referred to the Programmer's Reference Manual for detailed information regarding the one-time configuring of SureCAL TEST MANAGER to run with laboratory administrative software. The SureCAL Programming Support Package with HTBasic Developer software is needed to tailor the SureCAL administrative data exchange routines to meet the specific operating procedure needs of your laboratory. It is also necessary to understand user unique directory structures in order to place programs and files in particular folders for access by both applications.

The developers of your laboratory administrative software often supply an administrative software data exchange capability. If this is not the case, SureCAL Products is willing to assist administrative software developers with the implementation of this capability. As of this writing, the default administrative software is LabMate V3.5 written by Norfox Software, Inc. To use a tailored (or non-default) capability, **Custom SURE_4 Routines**, **Recall_import** and/or **Recall_export** subroutines must be enabled from the SureCAL CONFIGURATION program.

On the administrative software end, Calibration Procedures need to be identified and their pathnames defined to match the SureCAL File Locations, listed in the current ^{Sure}CAL Configuration. Each item requiring calibration must also be associated to the proper calibration procedure name. When this setup task is completed, selecting the "run external Procedure" function related to the unique instrument will launch the ^{Sure}CAL TEST MANAGER application. The desired Calibration Procedure and associated unit identification information will automatically be available to the operator on the ^{Sure}CAL TEST MANAGER test executive screen.

8.0 FILE DESCRIPTIONS

CALIBRATION PROCEDURES

Calibration Procedures are text files that are interpreted by the ^{Sure}CAL[®] TEST MANAGER program to perform test actions. Basically, these procedures define Test Step Names and provide test instructions. Test Steps can reference a Test Subprogram to be called by TEST MANAGER and often reference Graphic files that TEST MANAGER uses to display pictorial information (typically equipment setups).

Each unique piece of equipment being tested has its own distinct Calibration Procedure that performs all of the required tests and never chains to other Calibration Procedures. Each of these Calibration Procedures contains identification, configuration, and specification information that documents requirements and acceptance criteria. All ^{Sure}CAL[®] Calibration Procedures contain information necessary to meet the quality system requirements of ANSI Q9001/ISO9001 and the calibration system requirements of MIL-STD 45662A ANSI/NCSL Z540-1, and ISO10012-1. The specifications used in ^{Sure}CAL[®] Calibration Procedure Modules expect a typical laboratory environment, as specified by ISA RP52.1, Recommended Environments for Standards Laboratories, unless otherwise stated. Any user-created procedures should be written with these requirements in mind.

Users are reminded that all ^{Sure}CAL[®] Calibration Procedures, Test Subprograms, Instrument Drivers, and Graphic files are protected by copyrights and may not be duplicated in whole or part without the express written permission of Northrop Grumman, Electronic Systems.

FORMAT

^{Sure}CAL[®] Calibration Procedure filenames take the form of "CPnnnn," where the "CP" prefix indicates that the file is a SureCAL Calibration Procedure and "nnnn" are numerals that uniquely identify the file. Each Calibration Procedure file starts with a **Heading** section, followed by multiple **Test Step** sections. Each **Test Step** can be subdivided into a maximum 20 frames or windows of 15 lines each.

Heading Section

The Heading section contains identification and configuration information. This information is surrounded by vertical bars (ASCII 7C_H). Immediately following these initial text lines are special subheading lines. These subheading lines must be in a specific sequence and format in order to be properly accessed by TEST MANAGER. Test developers should review the ^{Sure}CAL[®] PROGRAMMER'S REFERENCE Manual for specific format details.

Test Step Section

Test Steps are divided into two columns reflective of the TEST DISPLAY AREA in the middle of the main TEST MANAGER screen. These two columns are called the **Test Name**

field and **Calibration Procedure** field. When running TEST MANAGER, each Test Step **Result** will be displayed between these two columns.

Test Name Field

The first field of 20 characters on the first line of each **Test Step** is reserved for the **Test Name** or Test Step title that is displayed in the **Test Names** column. In order to select a particular test, the operator may scroll up and down the list of **Test Names** with the UP/DOWN Arrow keys.

Calibration Procedure Field

Calibration Procedure instructions for both the operator and TEST MANAGER are listed in the remaining field of 50 characters. Columns 21 to 70 are free formatted into frames of text for the operator to view. Any instructions (or keywords) to TEST MANAGER start in column 21 and are on the initial lines of each **Test Step**, ahead of any operator intended text. Each **Test Step** frame starts with a display of 15 blank lines, and then is overwritten with the text provided. While running TEST MANAGER, the operator may scroll up and down multiple frames or windows of text for a Test Step with the PAGE UP/DOWN keys. With this page viewing in mind, each frame usually contains a logical group of instructions.

Operator Warnings

When ^{Sure}CAL® Calibration Procedures could potentially expose the operator to dangerous conditions, such as high voltage, laser light, microwave radiation, or high mechanical forces, clear warnings are displayed to that effect. Simple warning messages are written in uppercase and displayed in inverse video to draw the operator's attention. Graphical placards are also used to warn operators of potential hazards. All user-created Calibration Procedures should also follow this pattern.

Test Step Keywords

There are two TEST MANAGER instructions or keywords: CALL and DRAW. The keyword CALL is used to transfer control to a BASIC program. The keyword DRAW is used when it is desired to portray physical connections or arrangements to the operator. Lines with these Keywords are shown as blank lines, when TEST MANAGER displays the Calibration Procedure frame.

CALL Keyword

The only valid location for the keyword **CALL** is on the first line of a Test Step frame. Preceding the keyword is a three-character field representing the number of lines to be reserved on the Data Sheet for printing results from the current Test Step. Following the keyword is the filename of an external BASIC Test Subprogram to be called, plus any arguments required by that particular Test Subprogram. Transfer of control to a Test Subprogram is necessary whenever: the unit under test, stimulus device, or measurement device needs to be controlled by commands through an I/O Interface such as an IEEE-488 Bus.

Example:

```
0  -Step Title-      2  2      -Instructions-      7
1                                     1  4                                     0
|-----|-----...~...-----|
DC RANGE ACCURACY 05 CALL F8860A DC TEST
```

Table: CP File CALL Keyword extract

The presence of the **CALL** keyword on the first line of the first frame in a Test Step allows the operator to begin a test by clicking on (or pressing) the [**SPACE BAR**] during that particular Test Step. The **CALL** keyword may also appear on the first line of any frame, but since most Test Steps use only one frame of instruction, this is often a moot point.

TEST MANAGER reads this line and performs the actions requested at the proper time, but this is not a direct subroutine call. Initially, all Step Titles are displayed and the first frame of instruction text for the selected Test Step is displayed. At this time the operator is free to scroll between instruction text frames, if additional text frames are available. Usually the last line of instruction will prompt the operator to "**Press the SPACE BAR to begin test.**" It is after this that TEST MANAGER performs the actual test, including any Test Subprogram specified after the **CALL** keyword at the beginning of the current frame.

DRAW Keyword

The keyword **DRAW** can be on any line. Most often the **CALL** keyword occupies the first line and, if used, the **DRAW** keyword follows on the second line. Following the keyword and the filename of the external graphic data file to be used, may be an optional argument for graphic size. The argument "**, SMALL**" causes a corresponding portion of the graphic to be drawn in the Calibration Procedures frame. The absence of this second argument allows a large graphic, that covers the entire screen, to be drawn (after the Preview Image prompt).

Example:

```
0  -Step Title-      2          -Instructions-      7
1                                     1                                     0
|-----|-----...~...-----|
                                DRAW 8860_01
or
                                DRAW 8860_01, SMALL
```

Figure: CP File DRAW Keyword extract

TEST MANAGER displays multiple Test Step titles and displays the first frame of instruction text for the selected Test Step. At this time the operator is free to scroll between instruction text frames, if more frames are available. Frames that have the **DRAW** keyword without the **SMALL** argument, present an initial Preview Image in the Calibration Procedure frame. This Preview Image feature allows operators familiar with the instructions in the graphic to proceed

at a rapid pace. Clicking on the magnifying glass icon  labeled **100%** allows the image to be drawn full size on the screen.

When the setup is completed the operator will be prompted for the next action. To initiate the actual automated test sequence the following text will be displayed, "... **press the SPACE BAR.**" After pressing the space bar, TEST MANAGER starts the test, by loading and running the Test Subprogram specified by the **CALL** listed at the beginning of the current frame. The operator could also be prompted to "...**press PgDn.**" for more text instructions, which would cause the next Calibration Procedure text frame to be displayed.

The following is an example of part of a Calibration Procedure showing the heading section plus the first frame of the first Test Step.

Procedure Ref Name: CP0356 REV. A Date:06/01/95 Copyright 1996 Northrop Grumman. All Rights Reserved Procedure Name: CP0356 Reference Number: TXT-H1-0000CP0356 Latest Revision: 0/A Date: 06/01/95 Programmer: _____ Application: Performance Test of 7A26 Vertical Amplifier Equipment / Standards Required:			
Equipment Description	Minimum Required Specifications	Recommended Model	STD
Oscilloscope Mainframe	Bandwidth: 200 Mhz	TEK. 7904	N
Time Base plugin	SWEEP SPEED: <=2ns/div	TEK. 7B92A	Y
DCV STANDARD	Amplitude Accuracy: .5% Signal Amplitude: 20mv To 25VP-P	TEK CG551AP	Y
SCOPE CALIBRATOR	RISETIME: <=1.3 ns FREQUENCY: 100Khz AMPLITUDE: 40mVP-P	TEK CG551AP	Y
SIGNAL GENERATOR	FREQUENCY: 50Mhz AMPLITUDE: 40mVP-P	TEK SG5030	N
Tektronix,7A26,Vertical Amplifier Plug-in CP0356 A Per Manufacturers Instructions			
Data Sheet Ref. DC BALANCE	Result Test Data / Tech Comments Preliminary Procedure for Performance Check Install the 7A26 plug-in in the vertical compartment of the indicated Oscilloscope. Install a time base unit in a horizontal compartment. Set the VERT MODE and TRIG SOURCE switches on the oscilloscope to correspond to the compartments being used.		

Figure: CP File Example

TEST SUBPROGRAMS

Calibration Procedures frequently reference a call to a TEST SUBPROGRAM that performs an automated function such as controlling a unit under test, a stimulus device, or a measurement device. Ideally all devices are controlled over an IEEE-488 Bus or other I/O interface in order to provide a fully automated test.

TEST SUBPROGRAMS are referenced by CALL keywords in Calibration Procedures. Various arguments that follow the CALL keyword can be passed to the Test Subprogram. For example,

```
0  -Step Title-          2  2      -Instructions-          7
1                          1  4
|-----|-----~-----|
THIS STEP              07 CALL TEST1 SUB4
```

Table: CP File CALL Keyword with Argument extract

Here TEST1 is the Test Subprogram filename and SUB4 is one of the subroutines in the TEST1 Test Subprogram. THIS STEP is the test name and 07 reserves seven lines on the data sheet for the results of this step.

These TEST SUBPROGRAMS are written in TransEra's HTBasic™ and run under TransEra's HTBasic™ Translator with the SureCAL® TEST MANAGER. The SureCAL® LIBRARY of BASIC subroutines in the SURE_123 program is also accessed by these TEST SUBPROGRAMS.

When developing TEST SUBPROGRAMS, specific format requirements and commonly used conventions should be observed to assure that all software interacts properly. Test developers should review the SureCAL® PROGRAMMER'S REFERENCE Manual for specific conventions and the use of LIBRARY subroutines.

In most cases a TEST SUBPROGRAM is associated with the unit being tested and written to control this unit plus any necessary stimulus or measurement devices that are present at a particular workstation. Filenames of these TEST SUBPROGRAMS are typically constructed from the manufacturer's initial and model number of the unit being tested. As an example, the TEST SUBPROGRAM for a FLUKE 8840A Digital Multimeter, is named "F8840."

There are some commonly used TEST SUBPROGRAMS that are named after the device or function that they control. As an example, thermistor mounts for testing RF power sensors, are controlled by a TEST SUBPROGRAM named "MOUNT."

Several different Calibration Procedures could reference the same TEST SUBPROGRAM in order to perform similar tests. If, for example, the units to be tested were DC Volt meters, each of the unique meters will have a different Calibration Procedure. Each Calibration Procedure would use the same stimulus device-specific TEST

SUBPROGRAM in order to measure the same parameters with different values. Each of these differences would be specified in the unit under test specific Calibration Procedure, then passed to the common TEST SUBPROGRAM. This differentiation is often accomplished through arguments listed in the CALL SUBPROGRAM statement.

TEST SUBPROGRAM files are supplied in a secured format and not available for viewing or printing. A sample listing can be found in the ^{Sure}CAL[®] PROGRAMMER'S REFERENCE Manual, along with instructions for creating your own programs.

INSTRUMENT DRIVERS

Instrument Driver files provide the solution to flexible standards. These program files directly control stimulus or measurement devices. By altering the assignments of Instrument Drivers as defined by Flexible Standards, operators can select different instruments for a test setup. Ideally all of the required stimulus and the measurement devices are all controlled through Instrument Drivers, thereby allowing the greatest flexibility in providing stimuli and making measurements.

Instrument Drivers are called by special ^{Sure}CAL[®] Generic Reference commands in Test Subprograms. These Instrument Drivers are written in TransEra's HTBasic™ and run under TransEra's HTBasic™ Translator with the ^{Sure}CAL[®] TEST MANAGER.

Instrument Drivers must be assigned to stimulus or measurement devices that are present at a particular workstation. Operators can select Flexible Standards through the **Edit, Flexible Standards** command on the menu bar.

Filenames of these Instrument Drivers are typically constructed from the manufacturer's name plus model number of the unit being controlled, and a ".dvr" suffix. As an example the TEGAM CG5011 Programmable Calibration Generator for testing oscilloscopes, is controlled by an Instrument Driver file named "TEG5011.dvr."

Several different TEST SUBPROGRAMS could reference the same Instrument Driver Generic Reference commands in order to perform similar functions. If, for example, the function to be controlled was a DC Voltage Measurement, many TEST SUBPROGRAMS could state the same Instrument Driver Generic References to effect the measurement. Each TEST SUBPROGRAM would use the same Reference for measuring DC voltage with different parameters to measure different voltages. Each of these differences would be specified in the unit under test specific Calibration Procedure, then passed to the TEST SUBPROGRAM, which in turn would pass it to the selected INSTRUMENT DRIVER through its Generic Reference command.

INSTRUMENT DRIVER files are bundled separately and supplied in a secured format that prevents viewing or printing. All Drivers are located in the DRIVERS DIRECTORY and listed in file: **DRIVERS.LST**

DRIVER TABLES

There are several files associated with instrument drivers that will be discussed briefly in this Users Guide. Additional information is provided in the PROGRAMMER'S REFERENCE Manual.

Test Subroutine Generic Reference Tables (<testsub>.TBL) Every test subroutine that communicates with instruments through an instrument driver is supplied with an associated Generic Reference table file. Each file contains a list of the Generic References used in that particular test subroutine, and is filled with recommended instrument Driver filenames plus IEEE-488 bus addresses assigned to each Generic Reference. The same driver is often assigned to many different Generic References (because instruments often have many functions). All original Test Subroutine Generic Reference Tables remain unchanged.

CP Module Generic Reference Tables (<CPnnnn>.TBL) Every CP file that calls one or more test subroutines usually has an associated CP Module Generic Reference table file. Each file is a compilation of data in all Test Subroutine Generic Reference Tables used by that CP Module. This file is filled with Generic References and their current assignments to: instrument Driver filenames, and IEEE-488 bus addresses. CP Module Generic Reference Table data is changed whenever Drivers or IEEE Bus addresses are changed for that CP Module.

IEEE-488 Table (IEEE488.TBL) This file links IEEE-488 Bus addresses available at a particular workstation to the associated Instrument Drivers that will interface between various Generic Reference commands and the actual instruments set to those addresses (and connected to the bus). A driver should only appear once in this table, unless multiple instruments of the same model (very unlikely) are being used. The Equipment Description from the driver file is also listed in this table.

Drivers Listing A simple pick list (**DRIVERS.LST**) of driver filenames with instrument descriptions that are currently available on your system. Each record in this file contains a driver filename, revision date and equipment description (manufacturer, model and description). The latest Sure**CAL**[®] Instrument Driver diskettes contain the most complete and up-to-date list of available instrument drivers and a copy of this pick list.

GRAPHIC FILES


Graphic files contain images that can be displayed on the screen. Usually these are the setup or interconnection diagrams for a particular test. CP files with frames that have the **DRAW** keyword, without the **SMALL** argument, present a shrunken Preview Image in the Calibration Procedure frame. Viewing the actual full size graphic is left to the operator's discretion and can be somewhat unnecessary and time consuming when performing the same procedure repetitively. Clicking on the magnifying glass icon  labeled **100%** causes the image to be drawn full size on the screen. Frames with the **SMALL** argument cause a segment of the graphic (no size reduction) to be displayed in the Calibration Procedure frame area only. The following is an example of a typical graphic image.



Figure: Graphical hookup example

Graphic data is stored as a compressed binary data file. A typical graphic is about 90% repeated pixel data, which means that there are a lot of identical adjacent array elements in the file. A compressed data format has been used to reduce the size of stored graphics by about five times. This economy of disk space is achieved at the expense of converting the data back to the inefficient format the first time an image is drawn from the current Calibration Procedure. This does not take long, but the delay may be noticeable.

DATA FILES - GENERAL

There are many special-purpose data files in use throughout the ^{Sure}CAL[®] Automated Metrology System. They vary in format and content, but they can be categorized into a few basic groups. These groups are as follows: Driver Tables, Corrections Data, Historical Data, Reference Data, Standards Data and Miscellaneous Data files.

In general these files are free formatted with minimal requirements or conventions. Programmers often expect a data expiration date and the type of data file to be placed in some files after the key words “**EXPIRATION DATE:**” and “**DATA FILE TYPE:**” located at the beginning of the file and starting at the beginning of a line.

Another common convention used in data files is to insert several (usually 65) dashes (-----) on the line before data begins as a major demarcation point in the file. The line before the dash string holds the column titles. If parenthetical references exist after the title, they define the unit of measure for data in that column else the data is a character string. The position of the first character of each column title string marks the beginning of that column (and the end of the previous column. All of the lines from the beginning of the file to the column title line can be used for comments and it will still be easy to locate the beginning of real data.

As an example, the \ACT\DATA\SENSOR.dat file is setup to capture “Corrections data for power sensors.” Each file created is saved under a filename related to a particular power sensor, usually the Lab’s Ident. Number. The following figure shows a generic sample SENSOR data file. Note the conventions for Expiration Date, File Type, Unit of Measure symbols, and column markers.

```

SENSOR.DAT - Notepad
File Edit Format Help
EXPIRATION DATE: 01 JAN 2010
DATA FILE TYPE: SENSOR
Corrections data for power sensor ID#

                2-SIGMA
FREQUENCY(MHZ)  CALFACTOR(%)  UNCERTAINTY(%)  S11MAG(RHO)  S11PHASE(DEG)
-----
    50           100           2.1             0.0001       0.00
   500           99.8           2.1             0.0001       0.00
  1000           99.3           2.1             0.0001       0.00
  2000           98.6           2.1             0.0001       0.00
  3000           97.2           2.1             0.0001       0.00
  4000           96.1           2.1             0.0001       0.00
  5000           98.2           2.1             0.0001       0.00
  6000           98.2           2.1             0.0001       0.00
  7000           98.9           2.1             0.0001       0.00
  8000           98.3           2.1             0.0001       0.00
  9000           98.3           2.1             0.0001       0.00
 10000           98.5           2.2             0.0001       0.00
 11000           98.6           2.3             0.0001       0.00
 12000           98.3           2.4             0.0001       0.00
 13000           97.7           2.5             0.0001       0.00
 14000           97.5           2.6             0.0001       0.00
 15000           97.9           2.7             0.0001       0.00
 16000           96.2           2.8             0.0001       0.00
 17000           96.7           2.9             0.0001       0.00
 18000           99.1           3.0             0.0001       0.00
  
```

Figure: SENSOR.dat file

CORRECTIONS DATA

Corrections Data files provide offset values that can compensate for known errors while performing a particular test. For example, if an instrument is used as a calibration standard but its basic accuracy is insufficient to perform a test, its performance can be characterized to known errors.

Corrections Data files can counteract parameters that vary due to electronic conditions (such as a frequency) or physical conditions (such as temperature). The purpose is always to improve a measurement process by applying calibrated corrections. The key word here is ‘calibrated.’ Corrections Data files are worthless if they are not managed, therefore, each Corrections Data file should contain an expiration date to provide an indication of calibration status.

HISTORICAL DATA

Historical Data files contain the results of previous tests. They allow for automated comparisons to prior test results and facilitate the analysis of performance trends.

Historical Data files are used often and can be quite valuable. A good example of the use of these files can be found in the calibration of microwave power sensors. This type of device does not have a very predictable performance from unit to unit. No two sensors will operate exactly the same, so the results from one test do not absolutely guarantee that the device is working properly. It is just as important to know that current results are the same as previous results as it is to have current results.

In some cases, Historical Data files serve the dual purpose of Historical Data files and Corrections Data files. For example, historical results for an AC Voltage Standard are analyzed for drift trends to determine the expiration date of the most recent historical results. These recent results can then be used as corrections data. Just like Corrections Data, these types of Historical Data files should also contain an expiration date as an indication of calibration status.

Although not a strict filenaming convention, the names given to Historical Data files are normally the ID# of the device whose history is recorded.

REFERENCE DATA


Reference Data files are files that contain data that is essentially static. They typically contain a list of unit specifications that are not likely to change, for example, tolerances for mechanical gages.

Although not a strict filenaming convention, the names given to Reference Data files (ex. CRIMP, SPLUG, and THSPEC) are normally related to the generic description of the device (such as crimpers, set plugs, and thread plugs respectively) whose specifications it contains.

TEMPLATE FILES

The internal format of Template files is not fixed. Their individual structure is dependent on TEST MANAGER when it creates these files. One template file with a 20-line by 78-character frame associated with each individual Test Step can be created for every Calibration Procedure. All active template files are stored in the \ACT\TEMPLATE directory and are named after the Calibration Procedure that created them.

Example: **CPnnnnn**

Selecting **E**dit, on the menu bar then **Manual Test Data**, pressing the letter **D**, or clicking on the paper and pen toolbar icon  opens the frame in the template file associated with the current Test Step for editing.

When a template frame is created, it is usually a table with an empty column to be filled in with data by the operator each time the actual Test Step is run. These table forms with data will be transferred to the Data Sheet as the results of each Test Step are printed. Operators can also create frames in template files with any kind of information or data. If the template is to be used again, it must be saved (without data) by selecting **F**ile, **S**ave **D**ata to a **T**emplate from the Manual Data Entry screen menu bar.

STANDARDS DATA

An inventory of all standards used in a particular laboratory can be kept in a file, **STANDARD.LST**, for use as a pick list. When operators are running a particular Calibration Procedure they can update the current sublist of standards used with that Calibration Procedure, **CPnnnn.STD**, by selecting standards from this pick list. This list is accessed from the **E**dit command on the menu bar, followed by **S**tandards **U**sed. Use of this feature provides a neat and easy way to document the standards used during a particular calibration.

If your laboratory administration software keeps track of the standards used for every calibration, then this manual record keeping may never be necessary.

The STANDARDS DATA file (pick list of available standards) must be manually created and updated using the NOTEPAD™ program supplied with your operating system. This file is located in your SureCAL PROGRAM DIRECTORY. You may edit an existing STANDARDS DATA file under the name **STANDARD.LST**. To create this file initially you can paste in the heading lines from a convenient existing template file named **STANDARD.LS**.

column numbers					
0	3	4	6	8	9
1	2	9	8	9	9
-----	-----	-----	-----	-----	-----
MANUFACTURER	MODEL NO	DESCRIPTION	IDENT	DUE DATE	
=====	=====	=====	=====	=====	=====
FLUKE	5700A	CALIBRATOR	C3608	12/19/1997	
HEWLETT PACKARD	3458A	MULTIMETER	C3593	02/25/1998	
HEWLETT PACKARD	3458A	MULTIMETER	C3594	04/16/1998	
HEWLETT PACKARD	5340A	COUNTER	C2035	07/31/1998	

Table: STANDARD.LST file example

Data in this file is column position sensitive and the DUE DATE data must be in the **mm/dd/ccyy** format. Do not be confused when this date format is displayed as **mm/dd/yy** in pop-up windows for both the pick list and the current Calibration Procedure sublist.

<u>DATA</u>	<u>START COLUMN</u>
MANUFACTURER	1
MODEL NO	32
DESCRIPTION	49
IDENT	68
DUE DATE	89

Table: STANDARD.LST file layout

This file is expected to be kept current with valid calibration due dates. Expired dates will cause TEST MANAGER to halt during the Generate Data process and force the user to delete the standard with an expired date from the currently selected Calibration Procedure sublist (**CPnnnn.STD**). To update the DUE DATE for that standard the user must, pop-out to an editor, fix the **STANDARD.LST** file with a valid date, then return to TEST MANAGER and reselect the now valid standard using **Edit, Standards Used** pull down menu.

Using bogus, far in the future, forever valid, dates will cause these bogus dates to be reported with the calibration data. It is better to hand write the CALIBRATION STANDARDS USED information on the data sheets and not use this file, than to record false information.

If your laboratory administration software is tracking standards used with each Calibration Procedure then this **STANDARD.LST** file may never be created.

STANDARD.LS A simple header file to aid in creating a manual selection list of Standard instruments. File contains a header and a few sample entries to help align the data. See also STANDARDS DATA.

STANDARD.LST A manual selection list of Standard instruments. File contains a header plus entries for all available standards. See also STANDARDS DATA.

STANDARD.DAT A list of Standard instruments (same as STANDARD.LST) converted to BDAT format for easy access by TEST MANAGER. See also STANDARDS DATA.

<CPnnnn>.STD A list of those particular standards used with an associated CPnnnn file. See also STANDARDS DATA.

MISCELLANEOUS FILES

There are a number of data files that do not fit any of the previously mentioned categories. Except as otherwise noted, each can be changed by the NOTEPAD™ program supplied with your operating system.

Some special files are briefly discussed here to help you understand the operation of TEST MANAGER.

Special Displays TEST MANAGER occasionally makes use of special display data files to quickly unfurl screens and placards. These files can not be edited by commercially available editors because their individual structure and format are entirely dependent upon the ^{Sure}CAL® program that accesses them. Some examples are: **SURECFG.dat**, and **HAZARD.dat**.

Options Some test subroutines make use of “options installed” files that contain unit specific option information. These files can not be edited by commercially available editors because their individual structure and format are entirely dependent upon the TEST MANAGER routine that accesses them. Files are stored locally in the HTBasic Root Directory and use the following naming convention: **<ident#>.opt**

Debug Data The **DEBUG.txt** file contains snap-shots of important information that can assist support personnel or a programmer in troubleshooting problems that occur during a calibration. Typically these options are not set by the user.

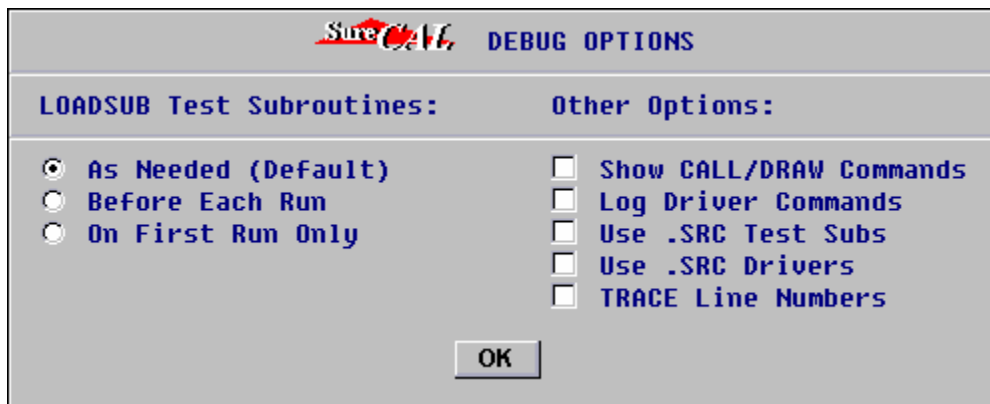


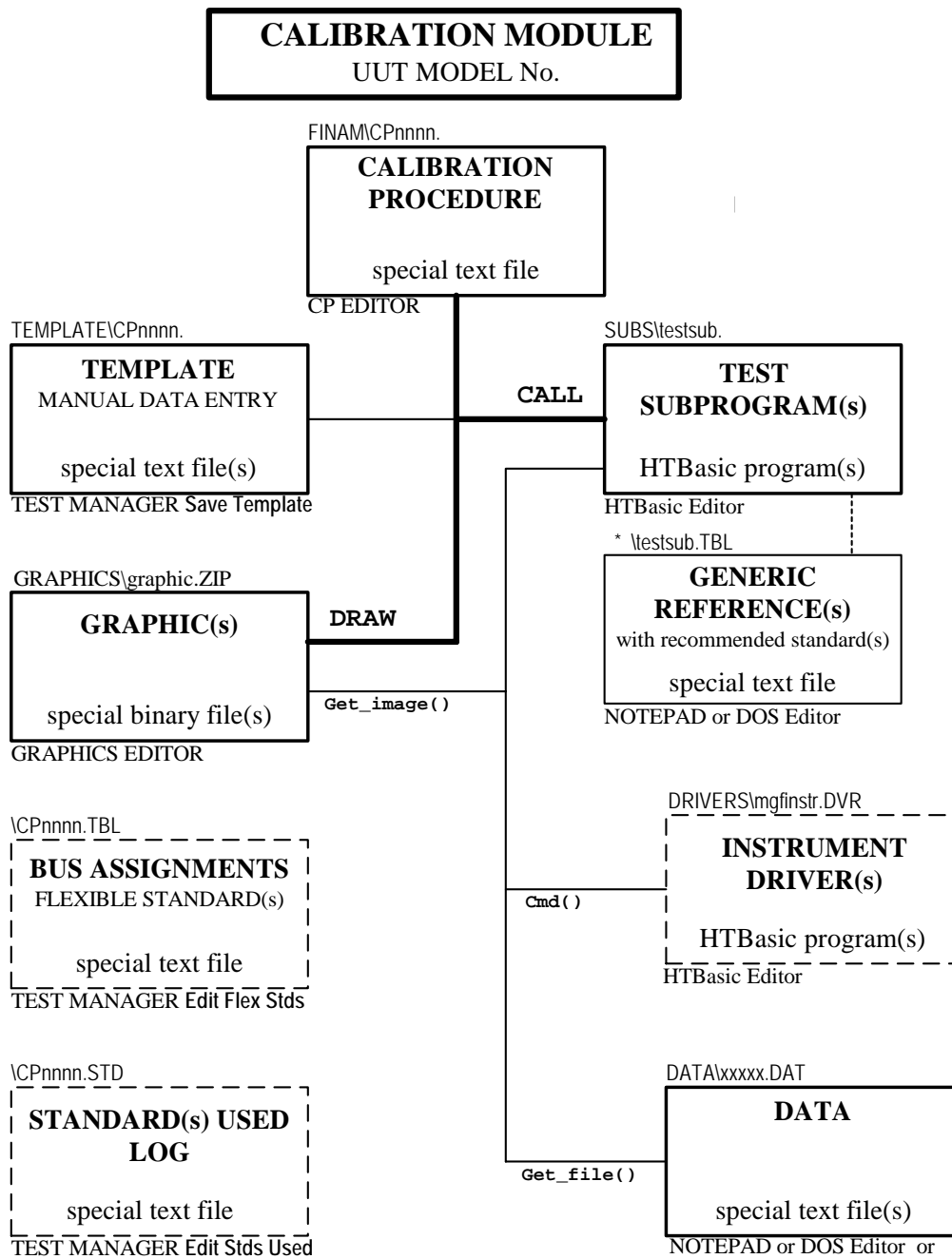
Figure: Debug Options Selection

Errors The **ERRORLOG.txt** file captures any system errors displayed to the operator. Select **View, Error Log** from the menu bar to so see any entries.

APPENDICES

A- CALIBRATION MODULE FILES

FILE RELATIONSHIPS



* Supplied in DRIVERS Directory, then copied to and used in the HTBasic ROOT DIRECTORY. All testsub generic reference table files for the same CP Module are also merged into one CPnnnn.tbl file that is edited through screens under the – Edit, Flexible Standards pull-down menu.

B- CALIBRATION RECORD REPORT

THIS PARTIAL EXAMPLE ILLUSTRATES ONLY A FEW TEST STEPS FOR THIS INSTRUMENT.



CALIBRATION RECORD

02/12/2002

ID#: AD4530
MFG: HEWLETT PACKARD
MODEL: 8568B

ID#: AD4530
Mfg: HEWLETT PACKARD
Model: 8568B
Description: HP 8568B SPECTRUM
Serial No: 2415A00279

Customer: T2
Assigned:
Owner: A438 TEST SET
Owner ID#: T2

Lab:
Station:

Procedure: CP1053 Rev: B
Interval: 6 months
Due Date: 08/14/2002 Stamp: 122

TEST DATA

PROCEDURE STEP:	RESULT	TEST DATA / USER COMMENTS
CENTER FREQUENCY	PASS	

FREQUENCY READOUT ACCURACY:

Freq (MHz)	Span (MHz)	Reading (MHz)	Spec (MHz)	Error (MHz)
100	100.00	99.70000	+/-2.0000	-.30000
500	100.00	499.70000	+/-2.0000	-.30000
1000	100.00	999.70000	+/-2.0000	-.30000
100	10.00	100.04000	+/- .2000	.04000
500	10.00	500.03000	+/- .2000	.03000
1000	10.00	1000.04000	+/- .2000	.04000
1500	10.00	1500.03000	+/- .2000	.03000
1000	1.00	1000.00400	+/- .0200	.00400
1000	.10	1000.00050	+/- .0020	.00050
1000	.01	1000.00004	+/- .0002	.00004

SPAN ACCURACY PASS

Center Frequency	Span Setting	Frequency Separation	Frequency Reading	Spec	Error
.75 GHz	1500 MHz	1.2 GHz	1.196 GHz	2.0 %	.33 %
.50 GHz	1000 MHz	800.0 MHz	797.000 MHz	2.0 %	.38 %
.50 GHz	500 MHz	400.0 MHz	398.500 MHz	2.0 %	.38 %
.10 GHz	100 MHz	80.0 MHz	79.800 MHz	2.0 %	.25 %
.10 GHz	20 MHz	16.0 MHz	16.220 MHz	2.0 %	1.38 %
.10 GHz	1 MHz	400.0 KHZ	401.000 KHZ	5.0 %	.25 %
.10 GHz	500 KHZ	200.0 KHZ	200.800 KHZ	5.0 %	.40 %
.10 GHz	100 KHZ	40.0 KHZ	40.100 KHZ	5.0 %	.25 %
.10 GHz	50 KHZ	20.0 KHZ	20.030 KHZ	5.0 %	.15 %
.10 GHz	10 KHZ	4.0 KHZ	3.990 KHZ	5.0 %	.25 %
.10 GHz	1 KHZ	400.0 HZ	399.000 HZ	5.0 %	.25 %

RESOLUTION BW PASS

Resolution Bandwidth Accuracy:

Res BW Setting	Upper -3dB Frequency	Lower -3dB Frequency	Measured -3dB Bandwidth	Bandwidth Spec	Error
3 MHz	71344000 HZ	68710000 HZ	2.634 MHz	+/- 20 %	-12.2 %
1 MHz	70370000 HZ	69418000 HZ	.952 MHz	+/- 10 %	-4.8 %
300 KHZ	70096200 HZ	69823800 HZ	272.400 KHZ	+/- 10 %	-9.2 %
100 KHZ	70045400 HZ	69945400 HZ	100.000 KHZ	+/- 10 %	0.0 %
30 KHZ	70012320 HZ	69983400 HZ	28.920 KHZ	+/- 10 %	-3.6 %

ID#: AD4530

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02/12/2002

Calibration Record (continued with pages 2 through 6 omitted.)

HARMONICS TEST PASS

HARMONIC NUMBER	HARMONIC SPEC (dBc)	MEASURED HARMONIC (dBc)
2nd HARMONIC	< -70	-82.0
3rd HARMONIC	< -75	-75.9

INTERMODULATION PASS

INTERMOD FREQ	Spec	Suppression
2F2-F1	<-70 dBc	-80.80 dBc
2F1-F2	<-70 dBc	-80.30 dBc
F2-F1	<-75 dBc	-76.50 dBc
F1+F2	<-75 dBc	-76.10 dBc

RESIDUAL FM PASS

Deviation	Filter Slope	Spec	Residual FM
-.130 dB	.5050	<3 HZ	.257 HZ

LINE SIDEBANDS PASS

Offset (HZ)	Spec (dB)	-SIDEBAND (dB)	+SIDEBAND (dB)
120	< -85	-91.80	-88.70
180	< -85	-93.10	-95.10
240	< -85	-95.60	-95.20

CAL OUTPUT LEVEL PASS

Nominal Power	Measured
-10 dBm +/- .2dB	-10.14 dB

CALIBRATION STANDARDS USED:	IDENT NO.	DUE DATE
HP 8340A SYNTHESIZER	E060577	04/17/2002
HP 8340A SYNTHESIZER	AE0346	03/26/2002
HP 3335A SYNTHESIZER	AD2395	08/23/2002
HP 436A POWER METER	AD4713	07/21/2002
HP 8116A GENERATOR	AD5043	08/21/2002
HP 3456A DMM	AD3306	03/25/2002
HP 8662A SYNTHESIZER	AD0619	05/31/2002
HP 5334A COUNTER	AD4715	01/29/2003

C- CERTIFICATE OF CALIBRATION REPORT



Certificate of Calibration

02/12/2002

ID#: AD4530
MFG: HEWLETT PACKARD
MODEL: 8568B

The following equipment has been calibrated using standards and instruments whose accuracies are traceable to the National Institute of Standards and Technology. The policies and procedures of this lab comply with MIL-STD-45662A. Alternate facilities, if used, have been audited to ensure their adequacy.

ID#: AD4530
Mfg: HEWLETT PACKARD
Model: 8568B
Description: HP 8568B SPECTRUM
Serial No: 2415A00279
Customer: T2

Calibration Lab:
Date Calibrated: 02/12/2002
Recall Interval: 6 months
Temperature: 23 °C
Humidity: 45 %
Procedure: CP1053 Rev: B

INSTRUMENT CONDITION:

Received: IN TOLERANCE
Action: None.
Returned: Meets manufacturer's specifications.

CALIBRATION EQUIPMENT USED:

EQUIPMENT DESCRIPTION	IDENT NO.	DUE DATE
HP 8340A SYNTHESIZER	E060577	04/17/2002
HP 8340A SYNTHESIZER	AE0346	03/26/2002
HP 3335A SYNTHESIZER	AD2395	08/23/2002
HP 436A POWER METER	AD4713	07/21/2002
HP 8116A GENERATOR	AD5043	08/21/2002
HP 3456A DMM	AD3306	03/25/2002
HP 8662A SYNTHESIZER	AD0619	05/31/2002
HP 5334A COUNTER	AD4715	01/29/2003

Prepared By: _____
Calibration Technician

Approved By: _____
Laboratory Manager

ID#: AD4530

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02/12/2002

D- CALIBRATION OUT OF TOLERANCE NOTICE



Out of Tolerance Notice

03/18/2002 11:36 AM

ID#: JS1188325410
MFG: HEWLETT PACKARD
MODEL: 83620A

The following equipment was found to be out of tolerance during its last calibration. The use of this equipment during the time since its previous calibration should be investigated to determine any potential impact on product. File one copy of this form with the equipment Calibration Record and forward the second copy to QUALITY ASSURANCE ENGINEERING.

ID#: JS1188325410
Mfg: HEWLETT PACKARD
Model: 83620A
Description: SYNTHESIZER
Serial No: 3108A00756

Customer: W55
Assigned: RF BENCH
Owner: NG
Owner ID#: 5-4483
Previous Cal Date: 03/18/2001

OUT OF TOLERANCE DATA

PROCEDURE STEP:	RESULT	TEST DATA / USER COMMENTS				
10 MHz TIMEBASE	FAIL* (As-Received)					
		NOMINAL	U/M	MINIMUM	MAXIMUM	MEASURED
		10000000.000	Hz	9999998.175	10000001.825	10000020.230 F*
10 MHz TIMEBASE	PASS (Post-Adjust)					
		NOMINAL	U/M	MINIMUM	MAXIMUM	MEASURED
		10000000.000	Hz	9999998.175	10000001.825	10000001.120

F indicates an out of tolerance condition
F* indicates a significant out of tolerance condition

COMMENTS: Adjusted TIME BASE.

Tech Stamp

Cal Lab Supervisor Bill Smith

E- SPECIAL CALIBRATION STATUS AUTHORIZATION



Special Calibration Status Authorization

ID#: JS118832496E
MFG: HEWLETT PACKARD
MODEL: 83620A

03/18/2002 10:18 AM

The equipment identified below is not calibrated to its full manufacturer's specifications.
Special Calibration Status is defined and authorized as indicated:

ID#: JS118832496E
Mfg: HEWLETT PACKARD
Model: 83620A
Description: SYNTHESIZER
Serial No: 3108A00756

Customer: W55
Assigned: RF BENCH
Owner: NG
Owner ID#: 5-4483
Calibration Stamp:

Description of Special Calibration Status:

10 MHz TIME BASE not in spec
use +/- .005%, not OEM spec

Last measured value was 9,999,986.48 Hz

Test Engineering Authorization: _____

Bill Smith 3/18/02
Calibration Lab Date

John Doe 3/18/02
Test Engineering Date

ID#: JS118832496E

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F- SPECIAL CALIBRATION STATUS REPORT



Special Calibration Status Report

ID#: JS118832496E
MFG: HEWLETT PACKARD
MODEL: 83620A

03/18/2002 10:18 AM

The equipment identified below is not calibrated to its full manufacturer's specifications.
Special Calibration Status is defined as indicated:

ID#: JS118832496E
Mfg: HEWLETT PACKARD
Model: 83620A
Description: SYNTHESIZER
Serial No: 3108A00756

Customer: W55
Assigned: RF BENCH
Owner: NG
Owner ID#: 5-4483
Calibration Stamp:

Description of Special Calibration Status:

10 MHz TIME BASE not in spec
use +/- .005%, not OEM spec

Last measured value was 9,999,986.48 Hz

ID#: JS118832496E

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03/18/2002

G- LABEL SAMPLES

Overview

Shown below are several examples of predefined labels that can be printed from SureCAL TEST MANAGER. These labels are only samples. Actual label images are presented in the SureCAL TEST MANAGER Calibration Labels window and depend on user selected setup conditions.

TEST MANAGER expects to use a dedicated label printer because of the abnormal sizes of label materials. Everyone likes to avoid changing-out paper/label stock, clumsy feed trays, and special guides.

NAME

SIZE

NORMAL (Calibration Recall)

small

This is a normal “CALIBRATED” by... label, with technician’s Stamp number, calibration date and recall date. This is the most commonly used label and is typically applied to the front of the unit.

PM (Preventative Maintenance Recall)

small

Similar to the NORMAL label but titled “PM.” Used for preventive maintenance recall actions such as functional checks, cleaning, or lubricating. Units are not calibrated!

SEE (Special supplemental) **REPORT**

small

This label is titled “SEE REPORT” and is used when there is an abundance of specific reference data, or other information that will not fit on the large SPECIAL label. It directs the customer to a supplemental “Special Calibration Status Report” with all of the necessary information.

**Normal
Calibration**

**Preventive
Maintenance**

**See Special
Report**

CALIBRATED BY CAL99 ID SAMPLE CAL 06/19/95 DUE 06/19/96
--

PM BY CAL99 ID SAMPLE CAL 06/19/95 DUE 06/19/96
--

SEE REPORT BY CAL99 ID SAMPLE CAL 06/19/95 DUE 06/19/96
--

Figure: Sample Images of Labels -A

STANDARD (Calibration Recall for a Standard) small

This label titled “STANDARD” contains the technician’s Stamp number, calibration date and recall date. This label is similar to the NORMAL label except it is used to identify your laboratory’s standards. This identification is helpful when the technician is recording the standards used at the conclusion of a test.

EXTENDED small

If local procedures allow you to extend the calibration due date for a short period, this label, titled “EXTENDED” may be utilized. This label is often used when your laboratory cannot meet the immediate turn around demands.

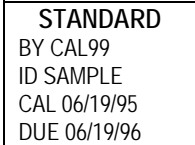
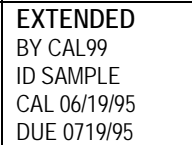
Calibration Standard	Extended Calibration
 <p>STANDARD BY CAL99 ID SAMPLE CAL 06/19/95 DUE 06/19/96</p>	 <p>EXTENDED BY CAL99 ID SAMPLE CAL 06/19/95 DUE 07/19/95</p>

Figure: Sample Images of Labels -B

SPECIAL (Label with minimal supplemental data) large

This label is titled “SPECIAL” and is used to imprint specific reference data, or other information such as a function not checked. Helps avoid pulling Calibration Records (data sheets) to determine values or limitations.

STANDARD (Report with Reference Data) large

This label is titled “STANDARD” and is used to imprint specific reference data, or other information such as a function not checked. Helps avoid pulling Calibration Records (data sheets) to determine values or limitations.

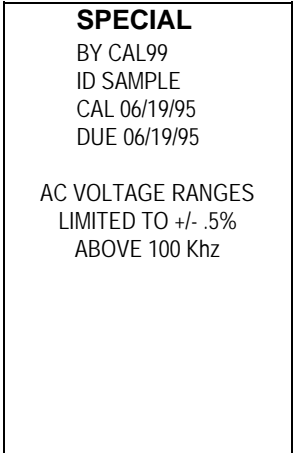
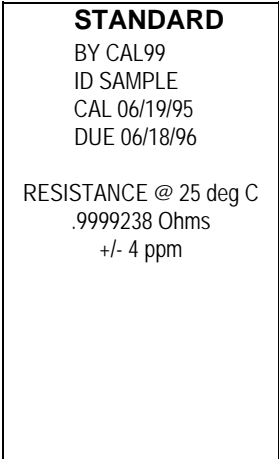
Special With Limited Data	Standard With Reference Data
 <p>SPECIAL BY CAL99 ID SAMPLE CAL 06/19/95 DUE 06/19/95 AC VOLTAGE RANGES LIMITED TO +/- .5% ABOVE 100 Khz</p>	 <p>STANDARD BY CAL99 ID SAMPLE CAL 06/19/95 DUE 06/18/96 RESISTANCE @ 25 deg C .9999238 Ohms +/- 4 ppm</p>

Figure: Sample Images of Labels -C

CALIBRATED (Report with Reference Data)

large

This label is titled “CALIBRATED” and is used to imprint specific reference data, or other characterization information. Helps avoid pulling Calibration Records (data sheets) to determine values or limitations.

STANDARD (Report with Reference Data)

large

This label is titled “STANDARD” and is used to imprint specific reference data, or other information such as a function not checked. Helps avoid pulling Calibration Records (data sheets) to determine values or limitations.

**Calibrated
With Reference Data**

**Standard
With Reference Data**

CALIBRATED	
BY CAL99	
ID SAMPLE	
CAL 06/19/95	
DUE 06/19/95	
FREQ(MHZ)	FACTOR(%)

50.000	95.00
500.000	93.50
1000.000	93.38
2000.000	92.94
3000.000	93.03
4000.000	93.11
5000.000	92.85
6000.000	92.40
S/N 4256A001659	

STANDARD	
BY CAL99	
ID SAMPLE	
CAL 06/19/95	
DUE 06/18/96	
FREQ(MHZ)	FACTOR(%)

50.000	95.00
500.000	93.50
1000.000	93.38
2000.000	92.94
3000.000	93.03
4000.000	93.11
5000.000	92.85
6000.000	92.40
S/N 4256A001659	


Figure: Sample Images of Labels -D

H- TEMPERATURE & HUMIDITY SAMPLING -Veriteq

Overview

The default SureCAL implementation of temperature and humidity sampling makes use of **Veriteq Spectrum 2000 Temperature and Humidity Data Logger** hardware and software from Veriteq Instruments, Inc., <http://www.veriteq.com>. These Veriteq products are not supplied with SureCAL Products. As part of TEST MANAGER Lite, a SureCAL developed Veriteq Spectrum 2000 specific temperature and humidity sampling program named **TempHum.exe** plus a Veriteq **Spectrum.dll** program have been provided to interface with these affordable (~\$400) off-the-shelf Veriteq products. Other sampling hardware and software can be integrated with SureCAL by replacing the call to **TempHum.exe** with a new user developed executable program in the **Temp_humid** subroutine.

Enabling

The default temperature and humidity sampling subroutine (**Temp_humid**) provided in **Sure_5** obtains temperature and humidity measurements then stores the results in COMMON plus a data file for use by other routines. Data is also recorded in a log file (**TempHum.dat**). This sampling subroutine, if enabled, is called by TEST MANAGER to sample the environment whenever the **Cal Information** screen is displayed (**File, Finish Procedure**, finish procedure icon , or **Edit, Cal Information** cause this screen display). Subsequent samplings may yield slightly different results because conditions change over time. In this implementation, the sample taken at the end of the calibration is the one that gets reported. Users can tailor the functions and operation of the **Temp_humid** subroutine to meet their needs.

Warning Message

In the default implementation of **Temp_humid** a check of “acceptable environmental conditions” happens each time a sample is taken. The sample is compared to upper and lower temperature limits, specified in a Laboratory Temperature Limits Configuration File (**Lablim.cfg**). If those limits are exceeded a “Laboratory Environment Out of Spec” warning is displayed to the operator.

Local Monitoring

With the default implementation of the **TempHum.exe** program, a Temperature & Relative Humidity pop-up window can be continuously displayed on the screen, independent of the SureCAL application. This assumes that the Veriteq hardware and software have been installed. Simply Open this executable program from the Windows Start Run menu.

...\HTBWIN83\ACT\TempHum.exe



Figure: Temperature & Humidity Window

User Defined Parameters

The user is responsible for modifying three configuration files to meet their unique laboratory requirements. Instructions in each file guide the user in modifying the files. Files can be modified using a text editor such as Microsoft Notepad.

Files are located in ...\\HTBWIN83\\ACT\\

FILE FUNCTION	FILENAME
Administrative Control	T&Hadmin.cfg
Local Control	T&Hlocal.cfg
Laboratory Temperature Limits	LabLim.cfg

Table: Veriteq Temperature & Humidity Configuration Files

Some laboratories may find it useful to place certain files on a shared network drive so that the lab administrator can control the limit specifications and view temperature and humidity logs from every workstation.

Setup Veriteq Sensor Hardware

These instructions apply to the Veriteq Spectrum 2000 Data Logger model **SP-2000**, plus PC Interface cable model **PC-IC**. This application uses one sensor per SureCAL workstation.

Connect the logger cable to the PC and position the sensor (magnetic mounting) near the Device Under Test.

- A- Using the Veriteq RS-232 serial port cable, connect the DB-9 connector to the serial port on the PC marked: **COM 1** or **Serial Port #1**. PCs with only a Universal Serial Bus (USB) port require a USB to DB-9 serial adapter between the cable and PC.
- B- Slowly and carefully connect the other end of this cable to the Veriteq sensor.
NOTICE: connector can be easily damaged. The connector marking "This Side Up" and the sensor description marking must be on the same plane during insertion.

Setup Veriteq Sensor Firmware

These instructions apply to the Veriteq Spectrum software with interface cable model **PC-SFW-IC**, (V3.5) supplied by Veriteq Instruments. One PC can be loaded with this software and used with the cable to setup all of your Data Loggers as well as to periodically calibrate/characterize all of them. Installing this software on a PC is normally done using the pathname: C:\Program Files\Veriteq Instruments\Spectrum\...

Run the **spectrum.exe** program and select **Setup** from the main **Logger** menu. In the **Logger Setup Window** define the following attributes:

- Description: <your description> (see constraints noted in **LabLim.cfg** file),
- Channel 1: C Temperature (Celsius), and
- Channel 2: RH Relative Humidity

From the main **Logger** menu select **Channels**. In the **Channels Window**, enable Channels 1 and 2 by checking the associated boxes.

Setup of the connected logger is now complete and the **spectrum.exe** program can be closed.

Last page