9932 Calibrate-it

User's Guide

Hart Scientific

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Figures and Tables

1 Before You Start

1.1 Symbols Used

Table 1 lists the International Electrical Symbols. Some or all of these symbols may be used in this user's guide.

Table 1 *International Electrical Symbols*

Symbol	Description
∿	AC
≂	AC-DC
▬	Battery
CE	CE
⎓	DC
▣	Double Insulated
⚡	Electric Shock
▭	Fuse
⏚	PE Ground
♨	Hot Surface
⚠	Read the User's Manual
○	Off
|	On

1.2 Customer Service Information

Hart Scientific can be contacted by writing to:

Hart Scientific, Inc.

799 E. Utah Valley Drive

American Fork, UT 84003-9775

Or by calling or faxing:

Telephone: (801) 763-1600

Fax: (801) 763-1010

Our World Wide Web site is: http://www.hartscientific.com

E-mail: support@hartscientific.com

When calling Hart Scientific Customer Service, please have the following information available:

- Model Number
- Version Number
- Computer Operating System and Version

2 Introduction

2.1 What is the Calibrate-*it* Software?

The Calibrate-*it* Software is temperature sensor calibration software that interfaces Reference Thermometers, Scanners, and Heat Sources to perform a typical comparison calibration of RTDs, thermistors, thermocouples, and other types of probes and thermometers. The software automates testing of multiple sensors simultaneously and supports multiple test instrument configurations.

The Calibrate-*it* Software uses Hart Scientific, Inc. thermometers, scanners, dry-wells, baths, and furnaces. These instruments can combine to calibrate up to 100 test probes at up to 40 temperature set-points.

A free demo version of this software is available on our web site: www.hartscientific.com. As we develop new instruments, support for these instruments will be added to all of our existing software (as applicable) by way of an upgrade or a Service Release. These upgrades or Service Releases will be available for download from our web site. Check our web site frequently for free demo software, Service Releases, updates, and information on new products and services.

2.2 Features New to Version 3

A list of new features and enhancements in version 3 of the Calibrate-*it* Software follows:

Version 3.3:

1. Supports the International or Regional Settings for dates, times and number formats as configured in the Control Panel. Prior to this version, the International or Regional Settings had to be set to U.S. standard settings for Calibrate-*it* to work properly. Because of this change, all dates must be selected from the drop-down calendar and cannot be typed in manually.

2. Allows the Reference Probe to be connected to a multiplexer channel when using the 1575 Super Thermometer or 1590 Super Thermometer II. This feature allows the Super Thermometer to use an external resistor on the reference channel instead of using the internal resistor, providing more precise measurements.

3. Allows the 1575 Super Thermometer or 1590 Super Thermometer II to be used as a scanner without requiring a 2575 or 2590

Multiplexer. Only one probe can be calibrated at a time using this feature.

4. All Hart Scientific single channel thermometers (Models 1502/1502A/1503/1504 and 1521/1522) can be used as the scanner. Only one probe can be calibrated at a time using this feature.

5. Support for the following instruments has been added:

References:
- 1529/1529-R/1529-T "Chub-E4" Thermometers

Scanners:
- 1502/1502A/1503/1504 "Tweener" Thermometers
- 1521/1522 Handheld Thermometers
- 1529/1529-R/1529-T "Chub-E4" Thermometer

Modules
- 2567 and 2568 RTD Modules

Heat Sources:
- 9009 Dual-well Drywell (each well counts as one heat source)
- 9007, 9023, 9127, and 9128 Drywells
- 6330 and 7320 Benchtop Baths
- 6038, 6039, 7038, and 7039 Baths
- 7004, 7005, and 7006 Baths

6. Increased the resolution of the Proportional Band setting on the Set-point Configuration dialog from three digits to six digits.

7. Increased the resolution of the reference and test probe readings on the main display from three digits to four digits.

8. The Recall Date is not printed on the Report of Calibration if the Calibration Interval setting on the Test Probe Configuration dialog is set to 0 days.

9. Prior to this release, an infinite loop occurred when communication could not be established with the Reference Readout when

selecting the Start Display option from the Graph menu. This bug has been fixed.

10. Improved the checking of recalibration dates of all test equipment when starting a test and when opening configuration file.

11. Prior to this release, there was a bug that caused the software to erroneously attempt to communicate with an external heat source when the "Preheat heat sources" check box was checked on the Test Information dialog. This bug has been fixed.

12. Prior to this version, the Calibrate-*it* main window would some-times be positioned outside of the viewable area of the screen when running the software. This bug has been fixed.

13. Prior to this version, when a configuration file was opened which contained an external heat source as the first heat source, the error "Error 91 - Object variable not set" would occur when the Heat Source Configuration dialog was displayed. This bug has been fixed.

14. No longer supports the following instruments:

    Reference:

    • 5501 Azonix Thermometer

    Scanner:

    • 5505 Azonix Scanner

15. Prior to this version, when Calibrate-*it* attempted to adjust a set-point on a Model 9112 or 9113 Furnace because the Refer-ence Probe readings were not within the Window setting for the current set-point, sometimes the Furnace would ignore the new set-point. This bug has been fixed.

16. Prior to this version, a test set-point would incorrectly appear on the Report of Calibration with the stability override marker if, dur-ing a test, the user displayed the Stability Override dialog, checked the "Take Readings Now" option, then clicked the Can-cel button. This bug has been fixed.

17. The Model and Serial Number fields on the Test Probe Configu-ration dialog now accept up to 20 characters. The Report of Cali-

bration has also been modified to display model and serial numbers up to 20 characters in length.

18. A new tab has been added to the Defaults dialog that allows the font name, size and style settings to be changed for the default Report of Calibration. The font settings for the report title and the body of the report can be set independent of each other.

19. The audible prompt feature of the Calibrate-*it* Software has been enhanced to include playing a WAV file. This feature is configured on the Defaults dialog. The user can now choose between the default system beep and playing a WAV file when the software is prompting the user to enter manual readings. **Note:** This feature requires that a sound card or other sound drivers be installed to work properly. If sound drivers are not installed or if the selected file does not exist, the software ignores this setting.

20. Reports of Calibration can now be saved to a file and opened later for viewing and printing. This feature enables the Report of Calibration to be sent via floppy disk or e-mail to others who may need to print or view the report. A Report Viewer Utility has also been added to the setup. This viewer can be installed on any computer and allows the report files to be viewed and printed. This utility can be installed on any computer and allows report files to be opened, viewed and printed without having to install the Calibrate-*it* Software. **Note:** There are some limitations to the report files. Please read details in the User Guide or online help topics concerning this feature before using it!

21. Prior to this release, there was a bug that caused the message "Incorrect scale" to appear when using a Model 9112 or 9113 Furnace and the "Use heat sources as reference" check box was checked on either the Heat Source Configuration dialog or the Reference Readout Configuration dialog. This bug has been fixed.

22. Prior to this release, there was a bug that caused the "Use heat sources as reference" check box to not be restored to the checked state when displaying Heat Source Configuration dialog. This bug has been fixed.

23. A new custom Report of Calibration is included with this release of Calibrate-*it.* This custom report includes a Tolerance column and a Pass/Fail column indicating the results of a calibration.

Version 3.2.0.8:

1. When attempting to use a Model 9112 or 9113 Furnace as the reference by checking the "Use heat sources as reference" check box on the Heat Source Configuration dialog, a message appeared when starting a test indicating that the scale of the readings does not match the selected scale. This bug has been fixed.

2. When checking the "Use heat sources as reference" check box on the Heat Source Configuration dialog, then closing the dialog and displaying it once again, the check box is unchecked. This bug has been fixed.

Version 3.2.0.7:

1. Prior to this version, the state of the Proportional Band check box on the Set-point Configuration dialog was not saved with the set-points in the set-point configuration file.

2. Prior to this version, the Shared Files Conflict dialog always appeared when running the software in Windows NT with the file COMMDLG.DLL listed. Even though the software works fine despite this file conflict, this problem has been fixed.

3. Prior to this version there was a bug that caused the software to always read 0.0 as the CJC temperature when calibrating thermocouple probes using the model 1560 Black Stack. This bug has been fixed.

4. Support for the 1522 LLL Handheld Datalogger has been added.

5. Prior to this release, when the reference probe was configured on a Black Stack module and there was more than one module of the same model, the Test Probe Configuration dialog incorrectly displayed the Reference Probe connected to the same channel on every module of that model number. This bug has been fixed.

Version 3.2:

1. Prior to this release, the software did not always send commands at the proper times to turn on/off the heaters and refrigeration in some Hart Scientific baths (models 60xx and 70xx) when running tests in °F. This bug has been fixed.

2. Prior to this release, the software did not read in the controller address for 9112 and 9113 furnaces from a configuration file. This bug has been fixed.

3. Prior to this release, the software would display a message when attempting to start a test stating that communication could not be established with the 9112/9113 furnace, even though communication could be established when clicking the Check Port button on the Heat Source Configuration dialog. This bug has been fixed.

4. The range of possible values of the Window and Tolerance values for each test set-point has been extended to allow more flexibility. **Note**: Be careful not to set window and tolerance values too small as the test may take a very long time to complete or may not be able to complete at all! You may have to use trial and error to determine the optimum settings for your application.

5. Support for the following instruments has been added:
   • 1521 Thermometer
   • 6012 and 6021 Baths
   • 7008-IR, 7009, 7042, 7050, 7108 and 7380 Baths

6. The file "VSVIEW2.VBX", with the date stamp 04/22/1999 has been updated and is now installed during setup.

Version 3.1.1.0:

1. Support for the following Heat Sources have been added:
   • Model 1502A "Tweener" Thermometer
   • Model 9210 Furnace (used as a comparison furnace)

2. Previous versions of the Calibrate-*it* software set the 1575 and 1590 digital filter type to "None" when a test started. The Calibrate-*it* software no longer changes the digital filter setting on these thermometers.

3. There was a bug in previous versions of Calibrate-*it* which limited the actual number of samples that could be taken to 12, even though the software allowed the user to choose up to 100. This bug caused an "Index out of bounds" error to occur when at-

tempting to take the 13th reading and the software crashed. This bug has been fixed.

Version 3.1:

1.   Support for the following Heat Sources
     •   6018/7018 Baths
     •   2100/2200/7900 Controllers
     •   9107 Dry-well
     •   9260 Furnace (used as a comparison furnace)

2.   Ability to specify how the software behaves when the Tolerance specification cannot be met - The user may now specify how the software should handle the situation where a heat source is unable to meet the Tolerance specification for a set-point. For more details on this feature, see Section 4.4.7.

3.   Added Gold Platinum Thermocouple (AuPt) probe type -The AuPt probe type has been added to the Reference Probe Configuration and the Test Probe Configuration probe type lists.

4.   Added new Reference Probes - Many new models have been added to the list of Reference Probes. As in previous versions of the Calibrate-*it* Software, the user may always add to this list as necessary.

5.   Addition of Heat Source cool down if test is aborted - In previous versions of the Calibrate-*it* Software, aborting a test left the heat source at the current set-point regardless of the setting of the "cool-down" option on the Heat Source Temperature Range dialog. In version 3.1, if the "cool-down" option is selected, the heat source is set to its cool-down temperature if a test is aborted.

Version 3.0

1.   Addition of ability to manually enter UUT readings - The software prompts the user to enter readings for each UUT at the appropriate time when a test is configured not to use a Scanner instrument. This feature allows calibration of instruments such as glass thermometers, mechanical gauges, and digital thermometers that don't interface to the system. For more details on using this feature, see Section 6.6.1.7.

2. Addition of Utilities menu Maintain Test Results option – This feature allows the user to validate the existence of test information and to remove old tests from the database. For more details on using this feature, see Section 9.4.

3. Reduction in time to print – The printing feature has been completely reworked to reduce the amount of time required to print a report. A new Print Preview window has also been added to the software. For more details on printing reports, see Sections 4.6 and 4.7.

4. Addition of the File menu Setup Printer option – The default printer can now be set from the File menu. For more details on using this feature, see Section 4.5.

5. Support for the 1590 Super Thermometer II and the 2590 "Mighty Mux II" Scanners - Up to five (5) model 2590 "Mighty Mux II" Scanners can be used with a model 1590 Super Thermometer II. For more details on using this feature, see Section 2.3.

6. Implementation of a real-time graph - A real-time graph has been implemented. The graph may be printed at any time during a test by selecting Print Graph from the Graph menu. For more details on using this feature, see Section 8.

7. Addition of a marker to designate the Reference Probe channel - When configuring test probes, a marker appears on the channel to which the Reference Probe is attached if the same instrument is being used as the Reference Readout and Scanner. For more details on this feature, see Section 6.4.

8. Addition of a Clear All button – A Clear All button has been added to the Test Probe Configuration dialog. Selecting this button removes test probe settings from ALL Scanner channels. For more details on using this feature, see Section 6.4.

9. List of all channels by their actual channel numbers - The Channels list box on the Test Probe Configuration dialog now lists all channels by the actual channel numbers. Previously, when using an instrument that supported Scanner Modules, the channels were always numbered from 1 to *n* for each Scanner Module where *n* was the number of channels on that Scanner Module. For more details on using this feature, see Section 6.4.

10. Addition of six new probe types – Six new probe types have been added to the list of possible choices. These probe types are: Other PRT/RTD, Other Thermistor, Other Thermocouple, Liquid in Glass, Bi-metallic, and Other. For more details, see Section 6.4

11. Heat Source Temperature Ranges - The user may now increase the temperature range of a Heat Source beyond the recommended range. For more details see Section 5.5.1, Temperature Range Configuration.

12. Stability override indication on Report of Calibration - If the stability override option is used on a set-point during a test, a footnote appears on the Report of Calibration for that set-point. For more details see Section 6.8, Stability Override, and Section 4.8, Default Report of Calibration.

2.3   Requirements

The Calibrate-*it* Software expects certain versions of the test equipment firmware, certain computer configurations, and other requirements as discussed below in order to execute properly.

2.3.1   Computer Hardware

The following minimum computer configuration is required to use the Calibrate-*it* Software.

- IBM Compatible 386 PC or later with 8MB RAM minimum (IBM Compatible 486 or later is recommended)

- VGA monitor or better

- CD-ROM or DVD Drive for installation (3.5" Floppy Disks available upon request)

- 1 - RS-232 Serial Communications Port

- Hard Disk with a minimum of 12MB of disk space for installation. The program requires additional disk space to store the calibration data as calibration tests are performed.

2.3.2   Computer Software

The Calibrate-*it* Software requires the following operating system:

- MS DOS 5.0 or later with Windows® 3.x

Or

- Windows® 95/98/NT4/2000

2.3.3 Test Equipment Instruments

The following list details the instruments that can be used with the Calibrate-*it* Software. If the firmware version installed in your instrument does not match the version listed below, please contact Hart Scientific, Technical Support. See the instrument's User's Guide for details on finding the firmware version.

Instrument	Version
1502	3.1 or later
1502A	4.40 or later
1503/1504	4.0 or later
1521	1.02 or later
1522	1.0 or later
1529/1529-R/1529-T	1.20 or later
1560	1.2 or later
2100	3.51 or later
2200	1.0 or later
2560	1.12 or later
2561	1.0 or later
2562	1.2 or later
2563	1.12 or later
2564	1.0 or later
2565	1.0 or later
2566	1.11 or later
2567	1.40 or later
2568	1.40 or later
1575/2575	3.1 or later
1590/2590	1.0 or later
6045	3.61 or later
6050/6050H	3.61 or later
6054	3.61 or later
6055	3.61 or later
All Other 60xx Baths	3.51 or later
6102	2.0 or later
All 63xx Baths	3.51 or later
All 70xx Baths	3.51 or later

Instrument	Version
7100	3.51 or later
7102	2.2 or later
7103	1.0 or later
7380	1.0 or later
All Other 73xx Baths	3.51 or later
7900	1.0 or later
9007	3.74 or later
9009	1.20 or later
9023	3.61 or later
9103	2.00 or later
9105/9122/9123	3.11 or later
9107	1.0 or later
9112/9113	All Versions
9127/9128	1.0 or later
9140/9141	1.21 or later
9150	2.0 or later
9210/9260	1.0 or later

2.3.4 Test Equipment Communications

All test equipment instruments, except the Model 9112 and 9113 Furnaces, must be set to communicate at 2400 baud, 8 data bits, no parity, and 1 stop bit. The Model 9112 and 9113 Furnaces must be set to communicate at 2400 baud, 7 data bits, even parity, and 1 stop bit.

2.3.5 Heat Source

If you are using a Hart Scientific Heat Source, set the following functions as described below before starting the Calibrate-*it* Software. See the instrument User's Guide for details on setting these functions.

- Scan to OFF

- Hold Mode to OFF

- Program Control to OFF

- Cut-out value to a temperature higher than the maximum set-point for the Heat Source

- Also, the user should be aware of the Approach setting

2.3.6   Other Test Equipment Connections

The following equipment is required to use the Calibrate-*it* Software.

Description	Qty
8-port SmartSwitch	1 (included)
25-pin extender cable	1 (included)
9-pin to 25-pin adapter	1 (included)
Other:	
25-pin to 9-pin null modem serial cable	Up to 6 (These cables are shipped with each instrument and not with the Calibrate-*it* Software. The number of cables required is dependent on the number of instruments being used. Call Hart Scientific Technical Support to order cables, model 2508.)

2.3.7   Start Calibration Test

The following information is required to start a calibration test.

- Test Equipment - Entered on the Reference Readout, Reference Module, Reference Probe, Scanner, Scanner Module, and Heat Source configuration dialogs.

- Test Probe Information (model number, serial number, manufacturer, description, calibration interval, current, and report units) - Entered on the Test Probe Configuration dialog.

- Customer Information (probe received condition, in-house calibration, check standard, customer order ID, customer name, and customer address) - Entered on the Customer Information dialog.

- Set-point, Uncertainty, Window, Duration, and Tolerance - Entered on the Set-point Configuration dialog. The defaults for the Uncertainty, Window, Duration, and Tolerance can be changed on the File | Defaults Set-points tab.

- Test Number, Calibration Range, Calibration Date, Ambient Temperature, Ambient Humidity, and Technician - Entered on the Test Information dialog.

- Reference Probe or Test Probe Coefficients - Entered manually by the user. The Calibrate-*it* Software does not support configuring the instrument coefficients.

2.3.8   Report of Calibration

The following additional information is required for the Report of Calibration to meet ANSI/NSCL Z540 requirements.

- Company Name and Address - Entered when the program is installed onto a computer. This information can be changed from the File | Defaults User tab.

2.4   Installation

A backup should always be made of your hard disk drive before installing any software and all running applications should be closed.

If a previous version of the Calibrate-*it* Software has been installed on this computer, this version should be installed to the same directory/folder. During the setup process, the test data collected with the previous version of Calibrate-*it* is preserved and copied from the current database to the new database.

Note: The setup process always creates a backup copy of the database containing existing test data and renames it to USERDRVR.XXX (where XXX is a sequential number).

If the Generate-*it* Software was purchased, the installation routine installs both the Model 9932 Calibrate-*it* and the Model 2932 Generate-*it* Software. If Generate-*it* was not purchased, the files needed to install Generate-*it* are not on the CD-ROM.

Note: The Calibrate-*it* Software now supports the International/Regional settings as set in the Windows® Control Panel Regional Settings or International icon. Before installing the Calibrate-*it* Software, make sure the date, time, and number formats are set according to how you want the dates, times, and numbers to appear. If test data is being copied from a previous version database, all data is formatted according to the current settings when the data is copied.

Installing from CD

1. Insert the Calibrate-*it* Software CD-ROM into your CD-ROM drive.

2. If you are using Windows® 95/98/NT4/2000, the Setup program should run automatically. If you are using Windows® 3.x, select File | Run from the Program Manager menu bar. In the dialog box that appears, type D:\CDSETUP.EXE (where D: is the drive corresponding to your CD-ROM drive) and click the OK button.

3.   Follow the instructions on the screen.

4.   The software files are copied to the specified directory/folder.

5.   After all files have been installed, a program group is created
      with icons for the software, the Help file, the README file, and
      an icon to uninstall the software. The installation process is com-
      plete.

6.   The README file can be displayed by checking the appropriate
      check box before the setup program finishes. Read this file for
      important information that was not available when the User
      Guide was printed.

Installing from Floppy Diskettes (available upon request)

1.   Insert Disk 1 of the Calibrate-*it* Software into your floppy drive.

2.   For Windows® 3.x, select File | Run from the Program Manager
      menu bar. For Windows® 95/98/NT4/2000, select the Run option
      from the Start menu on the Task Bar.

3.   In the dialog box that appears, type D:\SETUP.EXE (where D: is
      the drive corresponding to your floppy drive) and click the OK
      button.

4.   Follow the instructions on the screen.

5.   The software files are copied to the specified directory/folder. In-
      sert other floppy diskettes as prompted. If you chose to install the
      Generate-*it* Software, insert Disk 1 of the Generate-*it* Software
      when prompted.

6.   After all files have been installed, a program group is created
      with icons for the software, the Help file, the README file, and
      an icon to uninstall the software. The installation process is com-
      plete.

7.   The README file can be displayed by checking the appropriate
      check box before the setup program finishes. Read this file for
      important information that was not available when the User
      Guide was printed.

Uninstalling the Software

When the software was installed, an icon was created in the program
group to uninstall the software. To uninstall the software, simply dou-

ble-click this icon. The program files are removed from your system, with the following exceptions:

- USERDRVR.MDB database in the \Database directory (contains test data)

- DRIVERS.MDB database in the \Database directory

- Any configuration files (*.cfg, *.tpc, *.stc, *.stf, etc.) in the \Config directory

- Any Report files (*.rpt) in the \Reports directory

- Any Paragraph or Notes files (*.pgh, *.txt) in the \Reports directory

- Any other files created by the software since it was installed

The files mentioned above, along with the directories/folders that these files are in, must be manually deleted using File Manager or Windows Explorer to remove them from your system.

Note: Before deleting the USERDRVR.MDB file, make sure that you do not need to keep any of the data from tests that have been performed. Once this file is deleted, all test data is lost!

2.4.1   International/Regional Settings

As of version 3.3, the Calibrate-*it* Software recognizes and uses the International/Regional settings such as the date, time, and number formats as set in the Windows® Control Panel Regional Settings or International icon.

Prior to version 3.3, the Regional/International Settings had to be set to English (U.S.) in order for the Calibrate-*it* Software to function properly.

2.5   Running the Calibrate-*it* Software

Every time this software is run, it checks to make sure that all of the required .DLL and .VBX files are found on your computer. If the software detects that an older file has replaced one or more of these files or that

the file is not found, a dialog similar to the one below appears detailing the problems found.
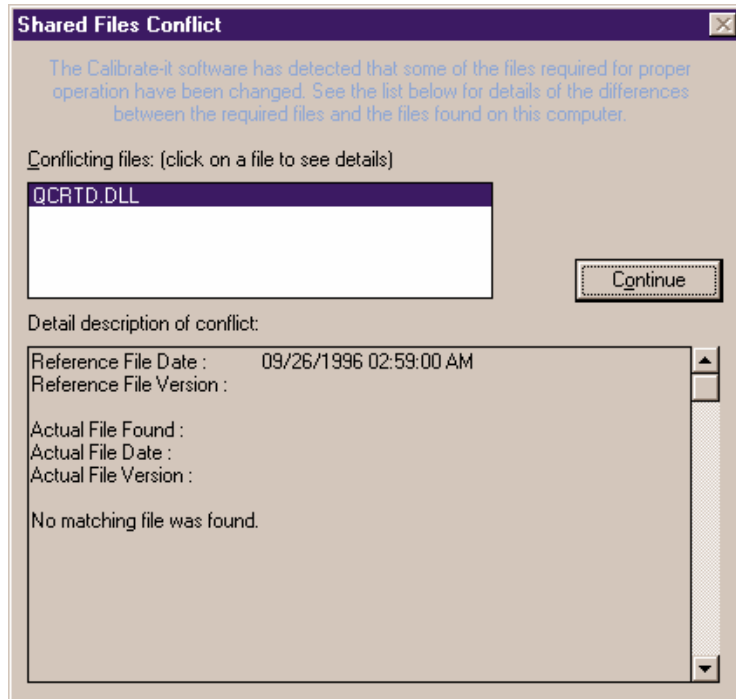
Figure 1 *Shared Files Conflict Dialog*

Every time you install any software on your computer, it is a good idea to make a backup of your important files, including all files in the \WINDOWS and \WINDOWS\SYSTEM (or WINNT\SYSTEM32) directories. Sometimes during the installation process, a file may be replaced with an older version that is not 100% compatible with the first. This may cause the software to perform unexpectedly or fail to run at all. Replacing a .DLL or .VBX file with a newer version does not usually cause any problems because these files are typically backward-compatible. There are, however, exceptions to this rule.

If the Shared Files Conflict dialog (Figure 1) is displayed when you run the Calibrate-*it* Software, a list of the files is shown in the Conflicting Files list. Select each of the files, one at a time, and read the information that appears in the bottom half of the dialog. Depending on the information given, you must decide what to do. The software may continue to run without problems, however there is no guarantee of this.

The .DLL and .VBX files are typically located in the \WINDOWS\SYS-TEM (or WINNT\SYSTEM32) directory. If you find it necessary to avoid conflicts, these files can be copied to the directory where the Calibrate-*it* Software was installed. Be sure to compare the files on your computer with the list of required .DLL and .VBX files.

2.6   Required .DLL and .VBX Files

The Calibrate-*it* Software requires certain .DLL and .VBX files. All required files are shipped on the installation CD or diskettes. A list of these files and their required date stamp follows:

.DLL Files	Date
CO1C40EN.DLL	09/20/1995
COMPOBJ.DLL	06/21/1995
CTL3DV2.DLL	05/17/1996
MFCOLEUI.DLL	04/27/1995
MSABC200.DLL	09/06/1994
MSAFINX.DLL	04/28/1993
MSAJT112.DLL	04/13/1994
MSAJT200.DLL	08/15/1995
OC25.DLL	05/17/1996
OLE2.DLL	06/21/1995
OLE2DISP.DLL	06/21/1995
OLE2NLS.DLL	06/21/1995
QCBASED.DLL	09/26/1996
QCRTD.DLL	09/26/1996
STORAGE.DLL	06/21/1995
TYPELIB.DLL	06/21/1995
VBDB300.DLL	02/01/1995
VBHOOK.DLL	09/26/1996
VBRTHOOK.DLL	09/26/1996
VBRUN300.DLL	05/05/1995
WOWGLUE.DLL	06/14/1994

.VBX Files	Date
CMDIALOG.VBX	04/28/1993

.VBX Files	Date
DWVSTAMP.VBX	03/18/1996
MSCOMM.VBX	05/12/1993
SPIN.VBX	05/05/1995
SSCALA.VBX	01/08/1999
SSDATA2.VBX	10/12/1995
TABPRO11.VBX	04/21/1995
THREED.VBX	07/11/1995
VSVIEW2.VBX	04/22/1998

2.7 Connection of Instruments

Before configuring the Calibrate-*it* Software for a test, the instruments to be used should be connected to the computer. An example of cable and instrument connections is shown in Figure 2. **Note:** The Calibrate-*it* Software can be configured in many ways. The example shown is only one possibility. Follow the instructions below to connect the instruments to the computer.

2.7.1 Computer to SmartSwitch

Locate a COM port on your computer. If the connector is a 25-pin connector, connect the female end of the 25-pin extender cable to it. If the connector is a 9-pin connector, connect the female end of the 25-pin extender cable to the 25-pin side of the 9-pin to 25-pin adapter, and then connect the 9-pin side of the adapter to the COM port. Connect the male end of the extender cable to the port labeled Master Port on the back of the SmartSwitch.

2.7.2 Reference Readout Device to SmartSwitch

To connect a Reference Readout device to the SmartSwitch:

Connect the 25-pin connector on one end of a null modem serial cable to the SmartSwitch port labeled Port A. Connect the 9-pin connector on the other end of the cable to the serial port connector on the instrument.

Select Port A as the reference port when configuring the reference in the Calibrate-*it* Software.
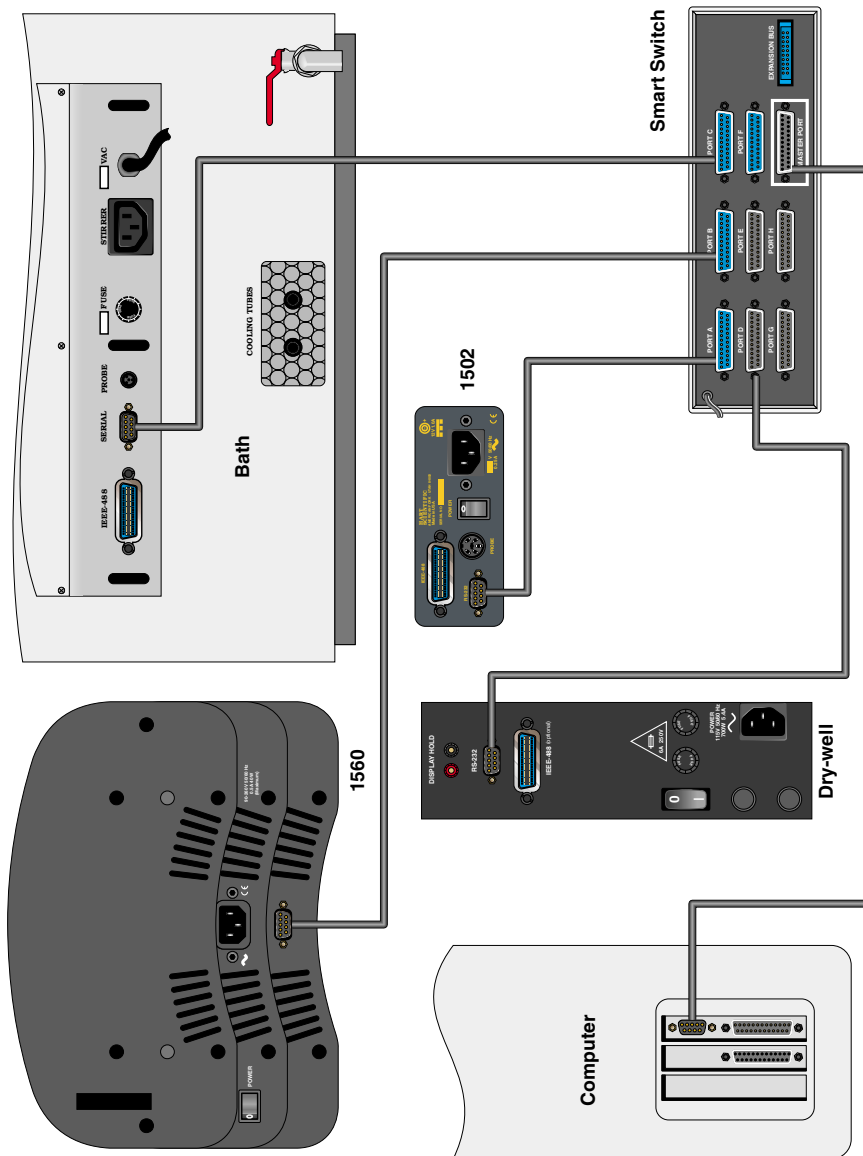
Figure 2   *Example Computer and Instrument Cable Connections*

2.7.3   Scanner to SmartSwitch

If the same instrument is used as both the Reference Readout device and the Scanner, additional scanner connections are not needed. Also, if a scanner is not to be used (all test probe readings are to be entered manually), this section can be skipped.

Connect the 25-pin connector on one end of a null modem serial cable to the SmartSwitch port labeled Port B. Connect the 9-pin connector on the other end of the cable to the serial port connector on the instrument.

Select Port B as the Scanner port when configuring the Scanner in the Calibrate-*it* Software.

2.7.4   Heat Sources to SmartSwitch

If you are using Hart Scientific, Inc. baths, dry-wells or furnaces as your Heat Sources, connect the 25-pin connector on one end of a null modem serial cable to a SmartSwitch port (C - H). Connect the 9-pin connector on the other end of the cable to the serial port connector on the instrument. Repeat for all heat sources to use.

Select the appropriate port(s) when configuring the Heat Sources in the Calibrate-*it* Software.

If you are using any other manufacturer's Heat Source, do not connect any cables to the SmartSwitch ports. When configuring the Calibrate-*it* Software, select "External" as the Heat Source model number. There is no direct communication between the software and external Heat Sources. You are prompted to manually set the temperature of all external Heat Sources during a test.

Note: External Heat Sources cannot be used as the Reference Readout.

2.8   Calibrate-*it* Main Display

The main display window (Figure 3) consists of the menu bar, toolbar and a workspace area.
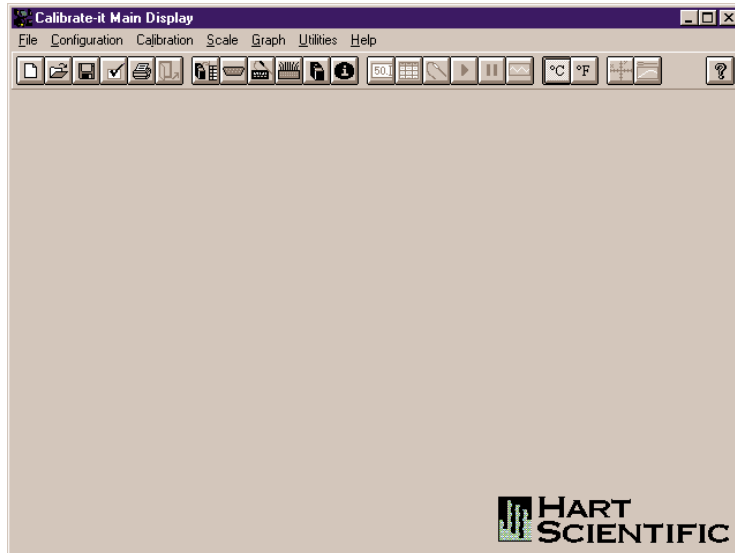
Figure 3 *Calibrate-it Main Display*

The menu bar allows access to the various features of the software. A general description of the options in each menu is given below:

File - Open and Save configuration files, change default settings, printing options, exit the software.

Configuration - Configure COM port, Reference, Scanner and Heat Sources.

Calibration - Configure Set-points and Test Probes, view current set-points, adjust uncertainties, start, stop, pause and resume a test, and override current set-point's parameters.

Scale - Change temperature scale.

Graph - Change graph settings, print graph, and graph Reference Probe.

Utilities - Compact and repair databases, maintain databases, and run Generate-it.

Help - Display help topics and About dialog.

Window Information

The Calibrate-*it* Main Display is the main window for the software. Once a Reference Readout and Reference Probe have been configured, the Ref-

erence Probe readings can be displayed and plotted on the graph by selecting the Graph | Start Display menu option.

2.9   ToolBar

The toolbar provides quick access to many of the most common functions such as instrument configuration, installing drivers, opening and saving configuration files and starting/stopping a test.

The function of each toolbar button can be found by placing the mouse pointer over the button and waiting for approximately 1/2 second. A help balloon appears indicating the function of the button. If a help balloon does not appear, make sure the "Show help balloons" check box on the File | Defaults General tab is selected.

The following buttons are available on the toolbar:

New - Create a new configuration

Open - Open a configuration file

Save As - Save the current configuration to a file

Defaults - Setup default settings

Print Report - Print a Report of Calibration

Close Test – Close the current test

Install Drivers - Install drivers required to use instruments

Communications Port - Setup the computer's COM port

Reference - Configure the Reference Readout, Reference Module, and Reference Probe

Scanner - Configure the Scanner and Scanner Module

Heat Sources - Configure the Heat Sources

Equipment Info - View the current configuration

|50.1| **Set-points** - Setup temperature set-points for the test

View Set-points - View the status of the set-points

Test Probes - Configure the Test Probes

▶ or ■ **Start/Stop Test** - Start or Stop the test

II or I▶ **Pause/Resume Test** - Pause or Resume the test

Stability Override - Override the current stability settings

°C **°C** - Change the temperature scale to °C

°F **°F** - Change the temperature scale to °F

Graph Settings - Setup the X and Y axes on the graph

Start Display - Graph the Reference Probe

Help - Open the help file

2.10 Calibrate-*it* Introduction

The Calibrate-*it* Introduction dialog (Figure 4) is displayed when the software is executed for the first time. This dialog is also displayed on con-

secutive executions if the "Show introduction dialog on startup" check box is selected on the File | Defaults General tab.
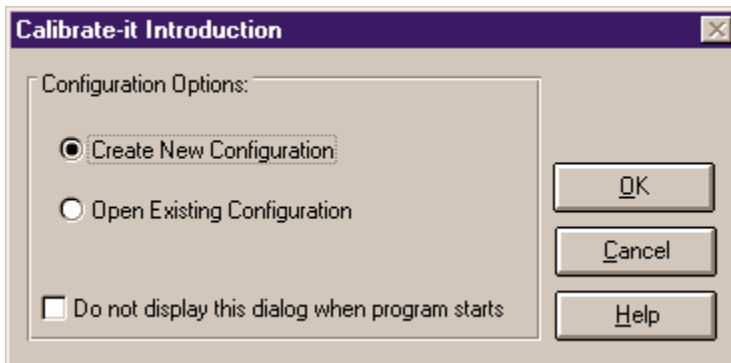
Figure 4 *Calibrate-it Introduction Dialog*

Enabled and Disabled

All controls are enabled.

Dialog Information

The Calibrate-*it* Introduction dialog provides a starting place for the user to configure a test. From this dialog an existing configuration file can be opened or a new configuration can be created.

To create a new configuration, select the "Create New Configuration" option and select the OK button. This option should be selected when executing the software for the first time. The Equipment Info dialog is displayed and a new configuration can be created. See Section 3, Configuring a Test, for additional information on creating a new configuration.

To open a configuration file that was previously created and saved to a .CFG file, select the "Open Existing Configuration" option and select the OK button. The Windows® Open dialog is displayed. Select the configuration file to open and select the OK button. See Section 4.2 for more information on opening a configuration file.

To disable the display of the Calibrate-*it* Introduction dialog when the software is executed, check the "Do not display this dialog when program starts" check box before selecting the OK button. This option can be enabled again on the File | Defaults General tab.

Selecting the Cancel button closes this dialog and displays the Calibrate-*it* Main Display.

2.11   Calibrate-*it* Test Display

When a test is running, the Calibrate-*it* Test Display window (Figure 5) displays information pertaining to the calibration test that is being performed.
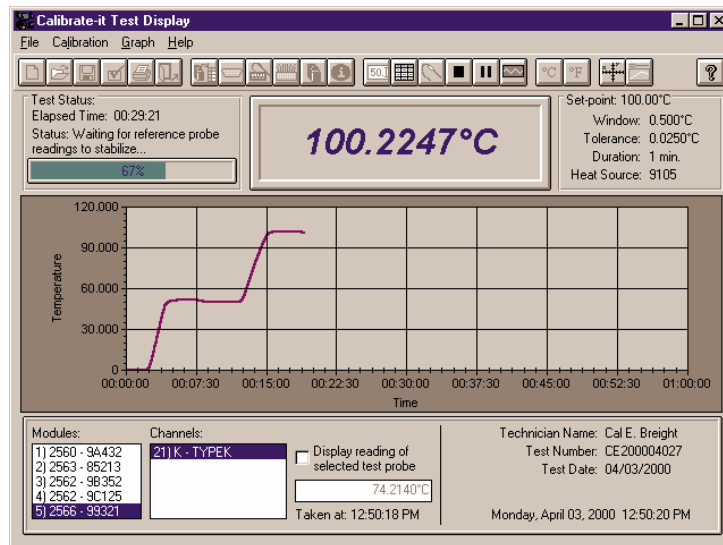
Figure 5 *Calibrate-it Test Display*

Enabled and Disabled

The following menu items and corresponding toolbar buttons are enabled:

- Calibration Menu - View Set-points, Stability Override, Stop Test, Pause Test
- Graph Menu – Graph Settings, Print Graph
- Help Menu - Contents, Search for Help on, Getting Started, Technical Support, About

Menu items and corresponding toolbar buttons are disabled:

- File Menu - New, Open, Save As, Defaults, Setup Printer, Print Report, Close Test
- Configuration Menu - Install Drivers, COM Port, Reference, Scanner, Heat Sources, Equipment Info
- Calibration Menu - Set-points, Test Probes, Start Test

- Scale Menu – Set to °C, Set to °F
- Utilities Menu - Compact Database, Repair Database, Maintain Equipment, Maintain Test Results, Run Generate-*it* Software
- Graph Menu - Start Display

Window Information

Once a calibration test is started, the Calibrate-*it* Main Display changes into the Calibrate-*it* Test Display.

The Test Status box in the upper left corner displays the elapsed time, current test status and a progress bar indicating the percentage of the test set-points completed.

The Set-point box in the upper right corner displays the current set-point, window, tolerance, duration, and the model of the Heat Source being used.

The bottom portion of the window displays a list of the modules or multiplexers (if applicable) and a list of test probes on the left side. The right side displays the name of the technician performing the test, the test date, test number and current date and time.

The current reading of the selected test probe can be displayed by selecting the "Display reading of selected test probe" check box. *This option should only be used when necessary because it may cause the test to run slower.* Checking the "Display reading of selected test probe" check box tells the software to take one measurement from the selected test probe and display the reading in the box provided. The time at which the measurement was taken appears below the box. This check box is automatically unchecked after the measurement is taken to prevent this feature from slowing down the test process. Selecting a different module, multiplexer, or test probe clears the reading box.

Note: These controls are all disabled if a Scanner is not being used for the current test.

A test may be paused at any time. To pause a test, select Calibration | Pause Test or select the Pause Test button on the toolbar. When the test is paused, the Pause Test menu option and toolbar button change to Resume Test and the Resume Test button respectively. The test should be paused anytime the computer needs to be used to perform another function while a calibration test is running. Pausing the test does not impact the outcome of the test, however, to ensure the integrity of the test, the test should not be paused for long periods of time. To resume the test, select Calibration | Resume Test or select the Resume Test button on the toolbar.

Note: The Pause Test menu option and toolbar button are disabled while the test probe and Reference Probe readings are being taken to ensure that all measurements are taken consecutively, without interruption.

The test may also be stopped (aborted) at any time by selecting Calibration | Stop Test or by selecting the Stop Test button on the toolbar. The user will be required to confirm stopping the test.

Once a test has finished successfully or has been stopped, the Reference Probe readings continue to be graphed until the test is closed. To close a test, select File | Close Test or select the Close Test button on the toolbar.

Test reports may be printed once the test has been stopped or finished successfully. To print a test report, select File | Print Report or select the Print Report button on the toolbar. When printing reports from the Calibrate-*it* Test Display, the graph of the Reference Probe readings should be paused first by selecting Calibration | Pause Test or by selecting the Pause Test button on the toolbar.

3   Configuring a Test

The Calibrate-*it* Software was designed to be very flexible. The user may select from a variety of test equipment and has control over most aspects of a test. Before the Calibrate-*it* Software can perform a test, the software must know the following information:

- What test equipment is being used?
- How is the test equipment connected?
- What type of probes are being calibrated?
- How many probes are being calibrated?
- What temperature set-points should be used?
- What scale the readings should be taken in?

The easiest way to create a new configuration is to use the Equipment Info dialog. This dialog visually displays the current configuration information and allows access to all of the dialogs necessary to create a configuration. The Equipment Info dialog (Figure 6) is displayed when the "Create New Configuration" option is selected on the Calibrate-*it* Introduction dialog, or by selecting the Configuration | Equipment Info menu option.

Follow the steps displayed on the Equipment Info dialog below to create a new configuration.
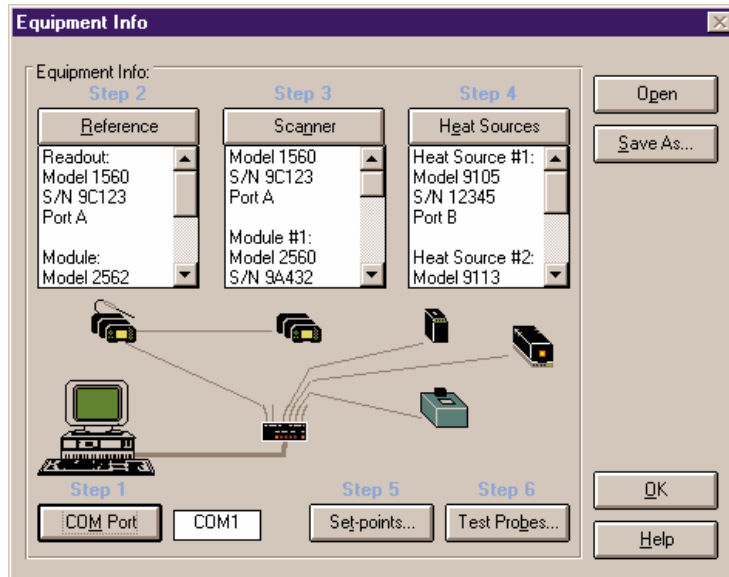
Figure 6 *Steps for Configuring a Test - Equipment Info Dialog*

1.   Define the communication settings for the instruments. The communication settings consist of the COM port to which the SmartSwitch is connected. The SmartSwitch must be connected to an available COM port on the computer and the baud rate for all instruments must be set to 2400 baud. Refer to Section 5.2 for details on configuring the communication settings.

2.   Define the test equipment to use as the Reference. The Calibrate-*it* Software requires a Reference. The Reference is the standard against which the test probes are compared. The software must be able to communicate with the Reference instrument. The software can use either a Reference Readout (thermometer) with a Reference Probe or it can use the Heat Source(s) as the reference. The Reference Readout instrument is the instrument to which the Reference Probe is connected. The software must know the model number of the instrument, some calibration information and the SmartSwitch port to which it is connected. The Reference Readout instrument and Reference Probe are defined by selecting the Reference button. Refer to

Section 5.3 for details on configuring the Reference Readout instrument and the Reference Probe.

3. Define the test equipment to use as the Scanner. The Scanner instrument is the instrument to which all of the test probes are connected. To calibrate LIG, bi-metallic, and other thermometers that cannot be interfaced with a readout device, or for test probes that are attached to a readout device that is not supported by Calibrate-*it*, the software can be configured to not use a scanner instrument (the user is prompted to manually enter all readings at the appropriate times during a test). If using a scanner instrument, the software must know the model number of the instrument, some calibration information and the SmartSwitch port to which it is connected. The Scanner instrument is defined by selecting the Scanner button. Refer to Section 5.4 for details on configuring the Scanner instrument.

4. Define the instruments to use as Heat Sources for the test. The Heat Sources are the instruments into which the Reference Probe and all test probes are inserted. The software can also be configured to use the heat source(s) as the Reference if desired. Heat sources are used to hold the temperature of the Reference Probe and test probes at a constant temperature so that comparison measurements can be taken. The Heat Sources are defined by selecting the Heat Sources button. Refer to Section 5.5 for details on configuring the Heat Source instruments.

5. Define the set-points for the test. The set-points are the temperatures at which comparison measurements are taken. The software must know the value and other specifications of each set-point. The set-points are defined by selecting the Set-points button. Refer to Section 6.1 for details on configuring the set-points.

6. Define the test probes. The test probes are the probes being calibrated. The software must know the type of probes, the scale of the readings, the channel of the Scanner instrument to which each test probe is connected and other information about each test probe. The test probes are defined by selecting the Test Probes button. Refer to Section 6.4 for details on configuring the test probes.

7. Save the current configuration. Once the above information has been entered, the current configuration can be saved. Select the Save As button to save the current configuration. The configura-

tion does not need to be saved to start a test. However, if the same equipment is going to be used to perform future tests, saving the configuration provides a quick method to setup the equipment. The Set-point and Test Probe information can also be saved by selecting the Save As button on the Set-point Configuration and Test Probe Configuration dialogs respectively.

8. Start the test. Select the OK button to close the Equipment Info dialog. Start the test by selecting Calibration | Start Test menu option. The configuration is checked for missing information and/or conflicts and the Test Information dialog is displayed. Finish filling in the information for this test and click the OK button to begin. Refer to Section 6.5 for details on the test process.

9. Close the test. When a test is complete it must be closed. Select File | Close Test menu option to close the test.

10. Print the report. To print the Report of Calibration for each of the test probes, select the File | Print Report menu option. Refer to Section 4.6 for details on printing a Report of Calibration.

4   File Menu
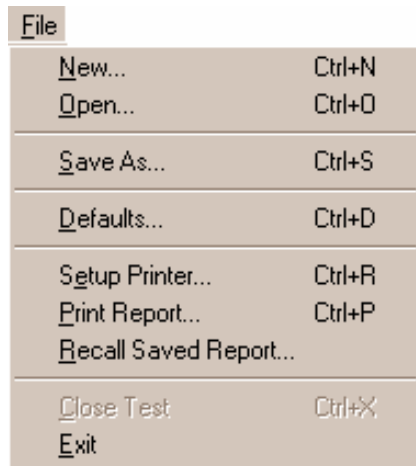
Figure 7 *File Menu*

The File Menu provides options for creating a new instrument configuration, opening an existing instrument configuration, saving a configuration file, setting up program defaults, setting up the printer, printing a test report, closing a test, and exiting the program.

Enabled and Disabled

The Close Test menu item is disabled when there is no test running. The Close Test item is enabled when a test has ended or has been stopped.

4.1   ☐   New

The New option discards the current configuration settings and displays the Equipment Info dialog for starting a new test equipment configuration. See Figure 6 on page 32.

4.2   ☑   Open

The Open option displays the Windows® Open dialog for selecting a configuration file to open.

The Calibrate-*it* Software allows the current instrument, set-point, and test probe configurations to be saved to configuration files. This feature is useful when the same set of instruments, set-points, and/or test probes are used repeatedly to perform many calibrations.

To allow for maximum flexibility, the instrument, set-point, and test probe configurations are saved separately and independently from each other. Each of these configuration files is explained below.

4.2.1 Instrument Configuration File

An instrument configuration file contains information concerning the communications settings, Reference, Scanner, and Heat Source instruments including model numbers, serial numbers, and other information required by the software. The default extension for an instrument configuration file is .CFG. These files are usually saved in the \CONFIG subdirectory.

Instrument configuration files can be opened by selecting the File | Open menu or by selecting the Open button on the Equipment Info dialog. ***Opening an instrument configuration file completely replaces the current instrument configuration information.*** When an instrument configuration file is opened, the Calibrate-*it* Software attempts to retrieve the driver and calibration information for each instrument. If any conflicts or errors are detected while opening an instrument configuration file, messages are displayed providing some information as to the problems found. The user must follow the instructions given by the messages to correct the problems before a test can begin.

Instrument configuration files can be saved at any point during the configuration process by selecting the File | Save As menu option or by selecting the Save As button on the Equipment Info dialog. The user is prompted to enter a filename for the configuration file. All instrument configuration files should be saved in the \CONFIG subdirectory with a .CFG extension

The default instrument configuration file, 9932LAST.CFG, is automatically saved every time a test starts and when the software terminates regardless of whether the user explicitly saves the configuration.

Note: The format of the instrument configuration file has changed slightly in this version of the Calibrate-*it* Software from previous versions due to enhancements and newly supported instruments. For this reason, the Calibrate-*it* Software may not be able to successfully read in instrument configuration files from previous versions. ***Therefore, any instrument configuration file from a previous version of this software should be saved in this version using the same filename.***

4.2.2   Set-point Configuration File

A set-point configuration file contains a set of set-points that can be used for a test. The default extension for a set-point configuration file is either .STC or .STF. Set-point configuration files with a .STC extension are for set-points in °C and .STF files are for set-points in °F. These files are usually saved in the \CONFIG subdirectory.

Set-point configuration files can be opened by selecting the Open button on the Set-point Configuration dialog. ***Opening a set-point configuration file completely replaces the current set-point configuration.*** Set-point configuration files contain the set-point values, window, tolerance, duration, uncertainty, and proportional band information for each set-point. Information regarding the Heat Source used is not saved in this file. If the configuration file being opened is not of the same temperature scale as the Heat Sources, a message is displayed. Select "Yes" to convert the Heat Sources to the same scale as the set-points or select "No" to abort.

When a set-point configuration file is opened, Calibrate-*it* automatically attempts to assign each set-point to a Heat Source if the "Prompt for Heat Source conflicts" check box on the File | Defaults Set-points tab is selected. If a set-point does not fall within the temperature range of any of the configured Heat Sources, a message is displayed and the set-point is excluded from the test. If the "Prompt for Heat Source conflicts" check box on the File | Defaults Set-points tab is not selected, set-points are not automatically assigned to Heat Sources. The user must manually assign the Heat Sources on the Set-point Configuration dialog. ***A test cannot begin until all set-points have been assigned to a Heat Source.*** If more than one Heat Source can be used for that set-point, the Set-point Options dialog is displayed. The user is asked to choose the Heat Source to use and/or the proportional band.

Set-point configuration files can be saved by selecting the Save As button on the Set-point Configuration dialog. The user is prompted to enter a filename for the configuration file.

4.2.3   Test Probe Configuration File

A test probe configuration file contains information concerning the set of test probes to be calibrated including Scanner channel information, probe model numbers, serial numbers and customer information. The default extension for a test probe configuration file is .TPC. These files are usually saved in the \CONFIG subdirectory.

Test probe configuration files can be opened by selecting the Open button on the Test Probe Configuration dialog. ***Opening a test probe configuration file completely replaces the current test probe***

configuration. Test probe configuration files are partially dependent on the Scanner instrument configuration. Because some Scanner information is saved in the test probe configuration file for compatibility reasons, attempting to open a test probe configuration file will most likely fail when the currently configured Scanner differs from the information in the configuration file. Warning and/or error messages may appear in this situation. When the Calibrate-*it* Software opens a test probe configuration file, it attempts to retrieve scale, current/CJC, customer name, and customer address information for each probe. If any conflicts or errors are detected while opening an instrument configuration file, messages are displayed providing some information as to the problems found.

The user must enter the Order ID number for each test probe when a configuration file is opened. If the "Prompt for Order ID when opening Test Probe Configuration file" check box on the File | Defaults Setup tab is selected, the Enter Order ID dialog appears. Enter the order number for each test probe. Selecting the "Use same Order ID number for all subsequent probes" check box on this dialog uses the same number on all subsequent test probes. If the "Prompt for Order ID when opening Test Probe Configuration file" check box on the File | Defaults Setup tab is not selected, the user must manually enter this information on the Customer Information dialog by selecting the Other Info button on the Test Probe Configuration dialog.

Test probe configuration files can be saved by selecting the Save As button on the Test Probe Configuration dialog. The user is prompted to enter a filename for the configuration file.

4.3   🖫   Save As

The Save As option displays the Windows® Save As dialog for saving a configuration file.

The Calibrate-*it* Software allows the current instrument, set-point, and test probe configurations to be saved to configuration files. This feature is useful when the same set of instruments, set-points, and/or test probes are used repeatedly to perform many calibrations.

To allow for maximum flexibility, the instrument, set-point, and test probe configurations are saved separately and independent from each other. Each of these configuration files is explained in Sections 4.2.1, 4.2.2, and 4.2.3.

4.4   ☑   Defaults

The Defaults menu option displays the Calibrate-*it* Defaults dialog (Figure 8) for selecting or modifying default settings. Default values or parame-

ters can be set by selecting one of eight tabs; General, Set-points, Setup, Graph, Reports, User, Test, or Fonts and Sizes. These defaults are used each time the program is started.
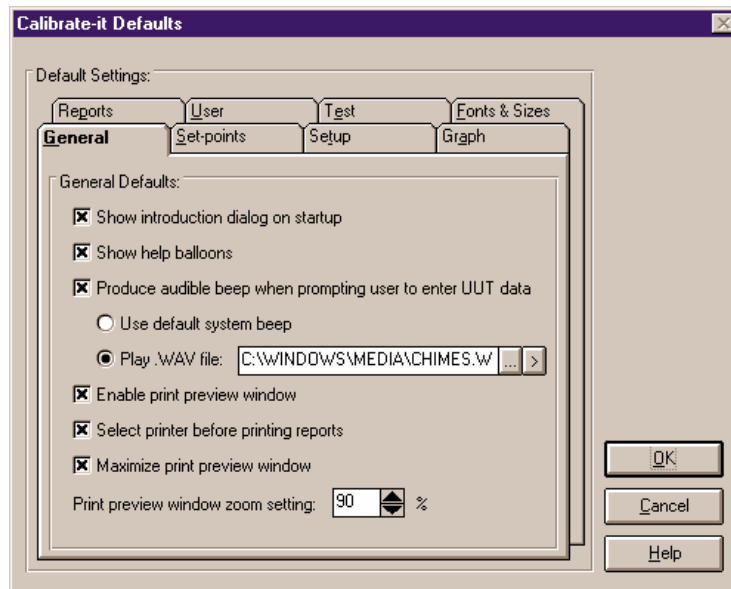
Figure 8   *Calibrate-it Defaults Dialog*

Enabled and Disabled

All tabs are enabled at all times.

Dialog Information

The Calibrate-*it* Defaults dialog allows the user to set default values or parameters by selecting one of the eight tabs; General, Set-points, Setup, Graph, Reports, User, Test, or Fonts & Sizes. The default values are used to initialize settings throughout the program.

4.4.1   General

The General tab (Figure 9) is for selecting general program defaults or preferences.
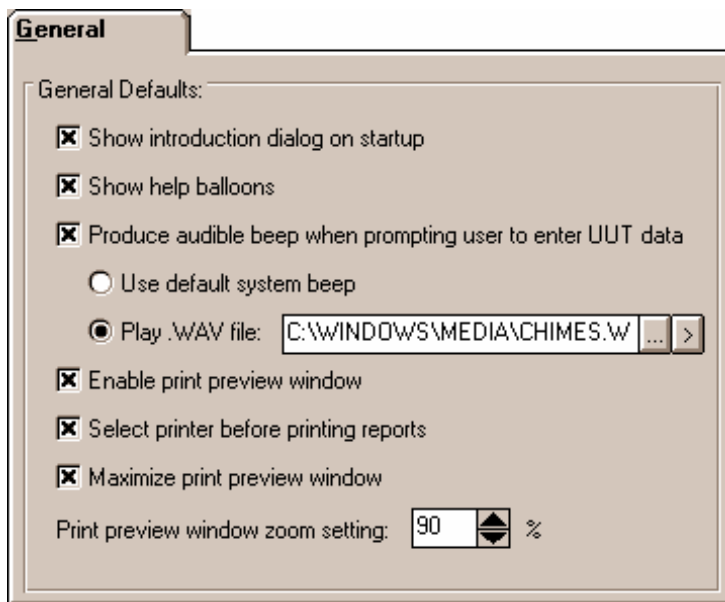
Figure 9 *File | Defaults General Tab*

Enabled and Disabled

All controls are enabled.

Dialog Information

If the "Show introduction dialog on startup " check box is selected, the Calibrate-*it* Introduction dialog is displayed each time the program is started. The default status for this check box is selected.

The "Show help balloons" check box turns on and off the help balloons. The default is selected which means the yellow help balloons are displayed when the mouse pointer is placed over a button on the toolbar.

The "Produce audible beep when prompting user to enter UUT data" check box determines whether the computer continually beeps or plays a .WAV file when the dialog for entering UUT readings is displayed. This dialog is only displayed when the Scanner instrument is not being used (i.e. for calibrating LIG or bi-metallic thermometers). If this check box is selected, the following options are available:

- Use default system beep - If this option is selected, the computer con-

tinually beeps using the system speaker when the dialog for entering UUT readings is displayed.

- Play .WAV file - If this option is selected, the computer plays the selected .WAV file when the dialog for entering UUT readings is displayed. Select the .WAV file to be played by clicking the "..." (Browse) button. To test the .WAV file, click the ">" (Play) button.

Note: The computer **must** have a sound card or other sound driver installed to play a .WAV file. If no drivers are installed the selected .WAV file cannot be played.

The "Enable print preview window" check box forces the reports to be displayed in a preview window on-screen when printing. If this check box is not selected, reports are printed directly to the printer when the print button is selected.

The "Select printer before printing reports" check box forces the software to display the Select Printer dialog when printing. The user can then select the printer to which reports are printed. If this check box is not selected, reports and tables are printed on the default printer. To change the default printer, use the File | Setup Printer menu option.

The "Maximize print preview window" check box determines whether the Print Preview window is maximized when displayed. If this check box is selected, the Print Preview window fills the entire screen.

The "Print preview window zoom setting" determines the default size of the report within the Print Preview window. The zoom setting is limited to 40% to 190%. The zoom setting can also be changed from the Print Preview window once it is displayed.

4.4.2 Set-points

The Set-points tab (Figure 10) is for selecting defaults specific to the set-points.
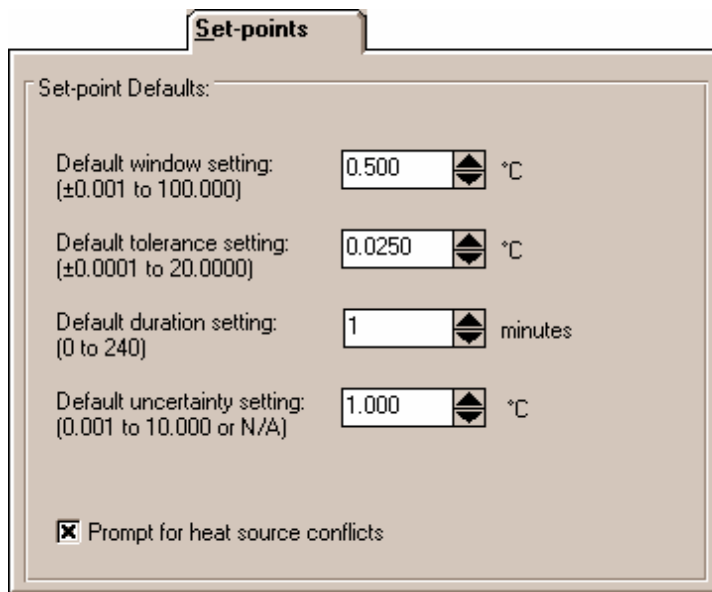
Figure 10 *File | Defaults Set-points Tab*

Enabled and Disabled

All controls are enabled.

Dialog Information

The default settings for the set-point window, tolerance, duration, and un-certainty can be set on this tab. The set-point window, tolerance, dura-tion, and uncertainty values are used when automatically or manually generating set-points. Use the spin buttons to change the values of each setting or type the new value into the box provided. To set the uncertainty to "N/A", clear the contents of the box and then click on another box or use the spin down button.

If the "Prompt for heat source conflicts" check box is selected, the user is prompted when opening a set-point file, when generating set-points auto-matically, or when displaying the Set-point Configuration dialog after the Heat Source configuration has changed. Also, if this option is selected, the user is prompted to enter a proportional band value for each set-point if the Heat Source is a bath.

4.4.3   Setup

The Setup tab (Figure 11) is for selecting defaults specific to configuring a test.
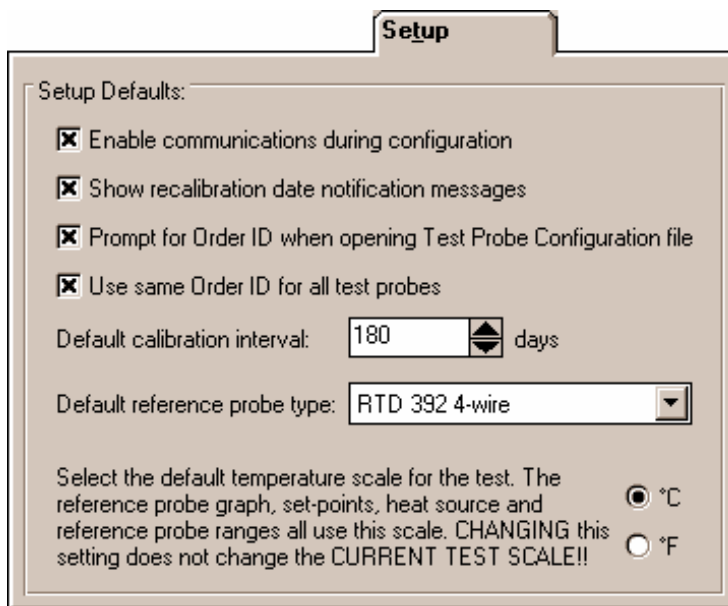
Figure 11 *File | Defaults Setup Tab*

Enabled and Disabled

All controls are enabled.

Dialog Information

If the "Enable communications during configuration" check box is selected, then the check box "Enable communications during configuration" on the Communications Port Configuration, Reference Readout Configuration, Scanner Configuration, and Heat Source Configuration dialogs is selected. The status of this check box does not change if the status of the "Enable communications during configuration" check box is changed on any of the configuration dialogs. The default status for this check box is selected. If selected, the assumption is made that the instruments are connected and powered on. Communication is initiated to the instruments during the configuration process.

If the "Show recalibration date notification messages" check box is selected, the user is prompted when configuring the test equipment if the

recalibration date has passed. The default status for this check box is selected.

The "Prompt for Order ID when opening Test Probe Configuration file" check box determines whether or not the user is prompted for an Order ID number when opening a test probe configuration file. The Order ID number is required to begin a test and can be entered manually from the Customer Information dialog.

The "Use same Order ID for all test probes" check box determines whether the software should automatically fill in the Customer Order ID box on the Customer Information dialog when configuring a new test probe (UUT).

The "Default calibration interval" setting allows the user to specify the calibration interval that is automatically filled in on the Test Probe Configuration dialog when configuring a new test probe (UUT).

The "Default reference probe type" is used on the Reference Probe Configuration dialog for selecting the default type of Reference Probe. If the selected default Reference Probe type cannot be used with the instruments configured, the user must select the Reference Probe type on the Reference Probe Configuration dialog.

The selection of °C or °F determines the scale of the Reference Probe reading display and graph as well as the default scale for the set-points, Heat Source range, and Reference Probe when the software is executed. The Scale menu allows the current temperature scale to be changed.

4.4.4 Graph

The Graph tab (Figure 12) is for selecting the X-Axis and Y-Axis defaults.
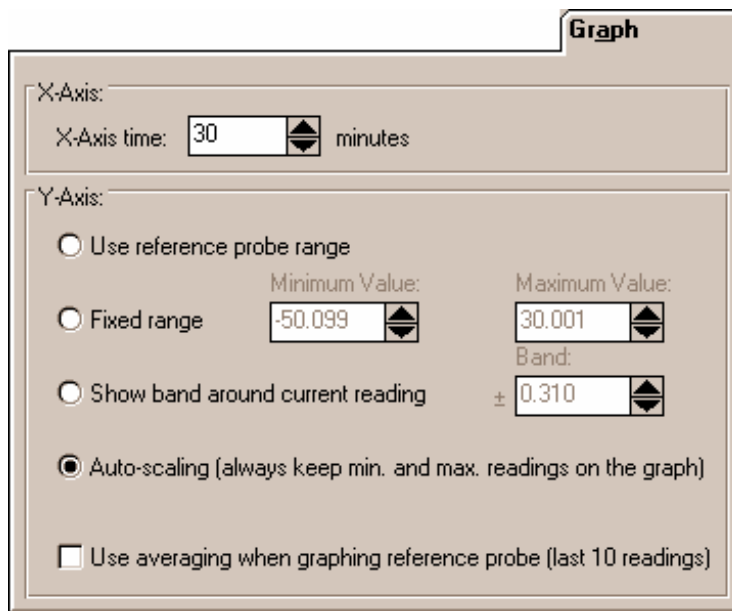
Figure 12 *File | Defaults Graph Tab*

Enabled and Disabled

The Minimum Value and Maximum Value boxes are enabled only when the "Fixed range" option is selected.

The Band box is enabled only when the "Show band around current reading" option is selected.

Dialog Information

The X-Axis is displayed as time. Select the amount of time the X-Axis should display.

The Y-Axis is always displayed in °C or °F. There are four options for setting the Y-Axis values.

- *Use reference probe range* - Sets the Y-Axis minimum and maximum values to the minimum and maximum temperature values entered on the Reference Probe Configuration dialog.

- *Fixed range* - Sets the Y-Axis to the minimum and maximum values entered by the user in the boxes entitled Minimum Value and Maxi-

mum Value.

- *Show band around current reading* - Allows the user to enter a value of a "band" to show around the most recent Reference Probe reading.

- *Auto-scaling (always keep min. and max. readings on the graph)* - Maintains the minimum and maximum values of the visible plot on the graph during the time shown.

If the "Use averaging when graphing Reference Probe (last 10 readings)" check box is selected, the last ten Reference Probe readings are averaged to produce the current point on the graph. Averaging provides a smoother looking graph. If not selected, each point read from the Reference Probe is graphed.

Note: If the instrument being used as the Reference Readout or Scanner is already configured to average its readings, you may want to disable this feature.

4.4.5   Reports

The Reports tab (Figure 13) is for selecting the default report settings.

Figure 13   *File | Defaults Reports Tab*

Enabled and Disabled

If the "Use custom report template" is not selected, the Custom Report Template box and Browse button are disabled.

Dialog Information

The upper portion of this tab specifies the default text file that contains the text to appear on the report as the Paragraph.

Selecting the Edit button opens the file specified in the Filename box, in the Text Editor so that it may be viewed or edited. If there is no file specified in the Filename box the Text Editor is displayed blank and ready for editing.

Selecting the Browse button displays the Windows® Open dialog. The user may select the file that contains the paragraph text.

The lower portion of this tab determines the default report template that will be used when printing a Report of Calibration. If the "Use default report template" option is selected, the software uses the Report of Calibration template that is built into the Calibrate-*it* Software. The Custom Report Template box and Browse button are disabled. This option is selected by default.

The Calibrate-*it* Software also allows custom report templates to be used when printing reports. If the default report template isn't exactly the type of report required for your application, contact Hart Scientific sales representatives for information on obtaining custom report templates designed to your specifications. If a custom report template has been purchased from Hart Scientific, the "Use custom report template" option allows the user to specify the file that contains the custom report template. The Custom Report Template box and Browse button are enabled. Use the Browse button to select the custom report template to use.

Calibrate-*it* now comes with one custom Report of Calibration which is installed automatically when Calibrate-*it* is installed. The custom report file is installed in the \REPORTS folder and is named 9932CUST.EXE. For more details on using this custom report, see Section 4.9, Custom Report of Calibration.

Note: Custom report template files MUST be located in the \REPORTS subdirectory of the C:\HART9932 directory (or the directory where the Calibrate-*it* Software was installed) in order to operate properly.

4.4.5.1   Text Editor

The Text Editor (Figure 14) allows the user to edit the Report of Calibration paragraph or notes.
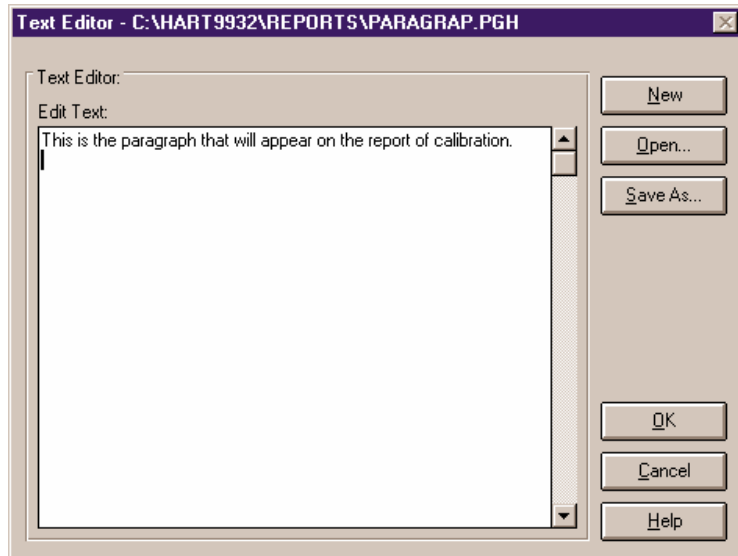
Figure 14 *Text Editor*

Enabled and Disabled

All controls are enabled.
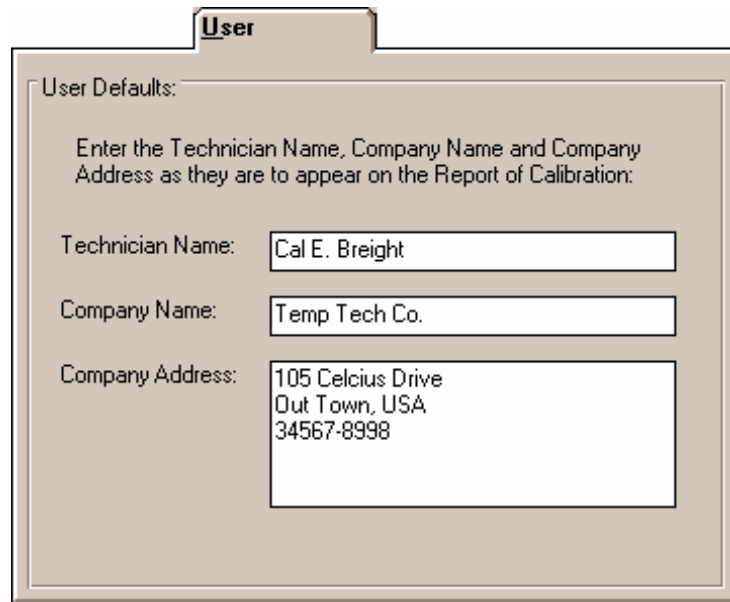
Dialog Information

Paragraph and note text files must be saved in order to appear on the Report of Calibration. Selecting the Open button can open an existing text file containing paragraph or note text. To save the text displayed in the text editor, select the Save As button. To create a new text file, select the New button.

Selecting the OK button closes the Text Editor. You will be prompted to save any changes made. Selecting the Cancel button closes the Text Editor and aborts any changes made to the text.

4.4.6   User

The User tab (Figure 15) is for configuring the default technician name, company name, and company address of the person performing the test.

Figure 15 *File | Defaults User Tab*

Enabled and Disabled

All controls are enabled.

Dialog Information

The information on this tab pertains to the individual performing the test and the individual's company name and address. This information was entered when the software was installed but may be changed at any time.

4.4.7   Test

The Test tab (Figure 16) is for selecting defaults specific to the test process.
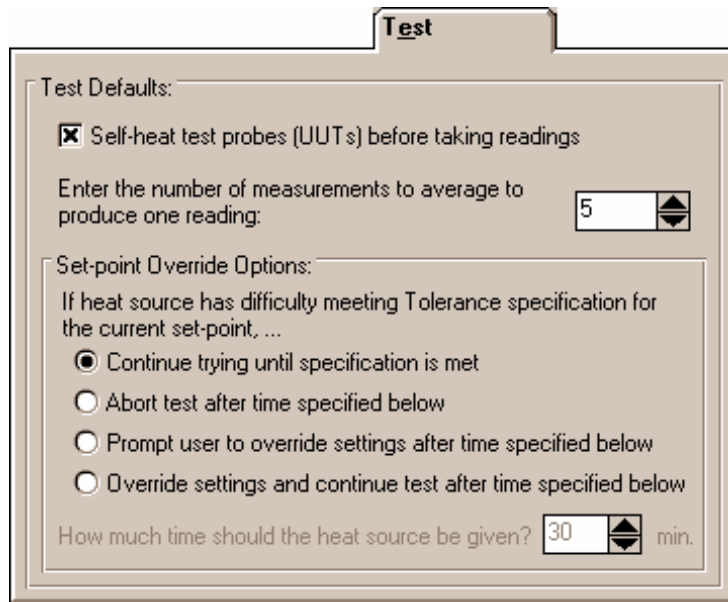
Figure 16 *File | Defaults Test Tab*

Enabled and Disabled

All controls are enabled.

Dialog Information

If the "Self-heat test probes (UUTs) before taking readings" is checked, the software allows the excitation current to run through the test probe for a period of one minute prior to taking readings. If not checked, the software bypasses the self-heat step of the test process.

The user is allowed to select the number of measurements to be averaged for each reading of a test. Once stability is reached at a set-point and the process of reading each test probe begins, the test probe and the Reference Probe are sampled the number of times specified here. The test probe readings and Reference Probe readings are then averaged to determine the value to be used for the set-point.

The Set-point Override Options section allows the user to determine what the software should do if the heat source is unable to achieve the Tolerance setting at a particular set-point. The user may select between the following options:

- Continue trying until specification is met

- Abort test after time specified below

- Prompt user to override settings after time specified below

- Override settings and continue test after time specified below

The "Continue trying until specification is met" option is the default. When this option is selected, the software continually monitors the reference probe readings until the Tolerance specification is met, regardless of how long it takes. The software does not take readings from the reference probe and UUTs until this specification is met. Prior to Release 3.1, the software behaved this way. This option may be recommended when test requirements are very strict.

The "Abort test after time specified below" option allows the user to automatically abort a test if the Tolerance specification is not met within a specific time frame. This time frame can be specified using the "How much time should the heat source be given?" box. The software begins to count down this time approximately one minute after the software changes the heat source set-point. This option may be recommended when the user is attempting to determine the best settings to use for specific set-points.

The "Prompt user to override settings after time specified below" option causes the software to display a message box (which pauses the test until the user selects the OK button) prompting the user to override the settings for the current set-point if the Tolerance specification is not met within a specific time frame. This time frame can be specified using the "How much time should the heat source be given?" box. The software begins to count down this time approximately one minute after the software changes the heat source set-point. The user can override the current set-point settings by selecting the Stability Override option from the Calibration menu. This option may be recommended when tests are not left unattended for long periods of time.

The "Override settings and continue test after time specified below" option causes the software to ignore the Tolerance specification for the current set-point if not met within a specific time frame and start taking measurements. This time frame can be specified using the "How much time should the heat source be given?" box. The software begins to count down this time approximately one minute after the software changes the heat source set-point. This option may be recommended when tests are left unattended for long periods of time.

The "How much time should the heat source be given?" box allows the user to specify the amount of time that must elapse before the action selected above occurs. The allowable range is from 1 minute to 120 min-

utes. The default setting is 30 minutes. Note: This time does not apply if the first option is selected.

4.4.8 Fonts & Sizes

The Fonts & Sizes tab is used for selecting the default font names, sizes and styles to be used when printing the default Report of Calibration and the custom Report of Calibration that ships with the Calibrate-*it* Software.
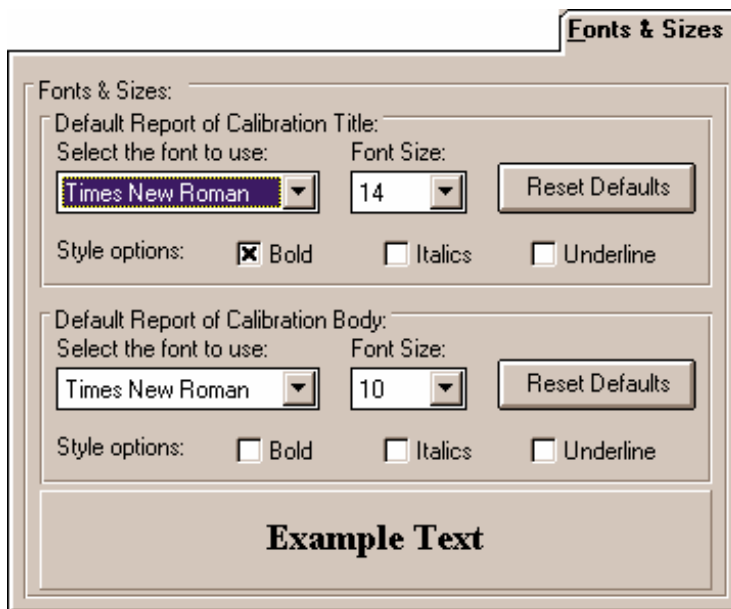
Figure 17 *File | Defaults Fonts & Sizes Tab*

Enabled and Disabled

All controls are enabled.

Dialog Information

To set the font that is used when printing the title on the default Report of Calibration and the included custom Report of Calibration, change the settings in the Default Report of Calibration Title section. To set the font that is used when printing the rest of the text (main body) on the default Report of Calibration and the included custom Report of Calibration, change the settings in the Default Report of Calibration Body section.

- Select the name of the font to use from the Select the font to use drop-down list.

- Increase or decrease the size of the font by selecting a setting from the Font Size drop-down list.

- Change the font style options by checking or unchecking the Bold, Italics and/or Underline boxes.

- The current settings are displayed in the Example Text box at the bottom of this tab.

The Reset Defaults button can be clicked to restore the default settings. The default settings are as follows:

- Title font settings - Times New Roman, 14 point, Bold

- Body font settings - Times New Roman, 10 point

Note: Changing these settings does **not** change the font settings used on custom Reports of Calibration that are not included with the Calibrate-*it* Software. The changes are applied **only** to the default Report of Calibration which is built into the Calibrate-*it* Software and to the custom Report of Calibration that ships with Calibrate-*it*.

4.5 Setup Printer

The Setup Printer menu option displays the Print Setup dialog that allows the user to select the default printer to which Reports of Calibration should be printed. If you are using the default report template, the Orientation must be set to Portrait. The Paper Size should be set to Letter 8 1/2 x 11 in.

4.6 ⊟ Print Report

The Print Report option displays the Print Test Report dialog (Figure 18).
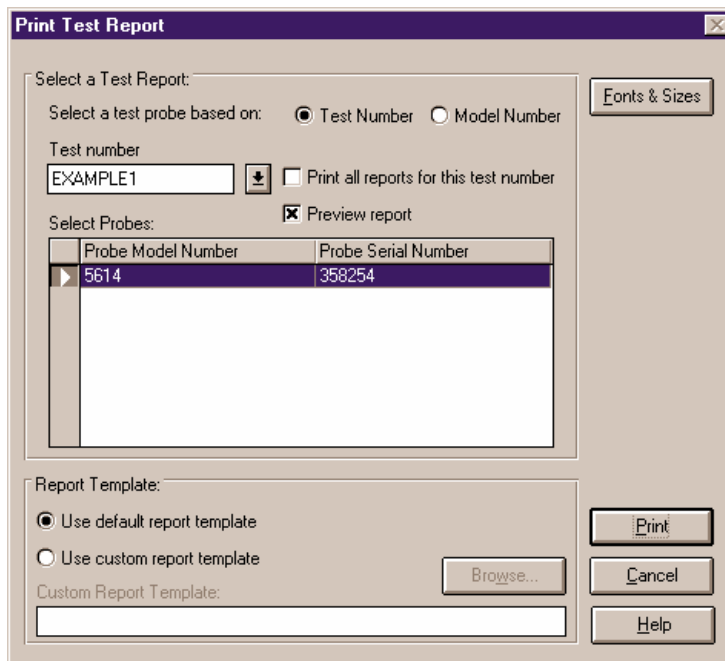
Figure 18 *Print Test Report Dialog*

Enabled and Disabled

If the "Use default report template" option is selected, the Custom Report Template box and Browse button are disabled.

The "Print all reports for this test number" check box is enabled only when selecting test probes based on a test number.

The Print button is disabled until either a test number or model number is selected and the report template exists for the Report of Calibration.

Dialog Information

To print a report for a test probe, you must select either a test number or a model number on which to base the test probe selection.

If the test number option is selected, a list of test numbers becomes available. Once a test number is selected, the probe model numbers and serial numbers appear below. From the list entitled "Select probes", select the probe model number and serial number.

If the model number option is selected, a list of probe model numbers becomes available. Once a model number is selected, probe serial numbers and test numbers appear below. From the list entitled "Select probes", select the probe test number and serial number.

Select the test probes in the "Select probes" list by clicking with the left mouse button. A probe may be deselected in the same manner.

If the "Print all reports for this test number" check box is selected, a Report of Calibration is printed for each of the test probes listed. If not selected, reports are printed only for the highlighted test probes in the "Select probes" list.

If the "Preview report" check box is selected, the report is displayed in a Print Preview window. To print the report, click the Print button on the Print Preview window toolbar. The Print Preview window **MUST** be closed before proceeding. To close the Print Preview window, click on the Close button on the left side of the Print Preview window toolbar.

If the "Preview report" check box is not selected, the report is sent directly to the printer.

If a test is invalid, meaning all of the required data to create a Report of Calibration does not exist in the database, a message is displayed and the report cannot be printed. The Utilities | Maintain Test Results menu option provides information for validating tests.

Figure 20 on page 60 shows an example of the Default Report of Calibration. If there is more information than will fit on one page, additional pages are automatically generated.

The lower portion of this dialog determines the report template that will be used when printing a Report or Calibration. If the "Use default report template" option is selected, the software uses the Report of Calibration template that is built into the Calibrate-*it* Software. The Custom Report Template box and Browse button are disabled.

The Calibrate-*it* Software also allows custom report templates to be used when printing reports. If the default report template isn't exactly the type of report required for your application, contact Hart Scientific sales representatives for information on obtaining custom report templates designed to your specifications. If a custom report template has been purchased from Hart Scientific, the "Use custom report template" option allows the user to specify the file that contains the custom report template. The Custom Report Template box and Browse button are enabled. Use the Browse button to select the custom report template to use, then select the Print button.

The Calibrate-*it* Software now comes with one custom Report of Calibration which is installed automatically when the Calibrate-*it* Software is in-

stalled. The custom report file is installed in the \REPORTS folder and is named 9932CUST.EXE. For more details on using this custom report, see Section 4.9, Custom Report of Calibration.

Note: Custom report template files MUST be located in the \REPORTS subdirectory of the C:\HART9932 directory (or the directory where the Calibrate-*it* Software was installed) in order to operate properly.

The Fonts & Sizes button allows the user to specify the names, sizes and styles of the fonts to be used when printing the default Report of Calibration. Clicking the Fonts & Sizes button displays the Calibrate-*it* Defaults dialog with the Fonts & Sizes tab selected. The font settings can be changed to produce a more customized look to the Report of Calibration or to keep the Report of Calibration from printing on more than a single page.

Note: The Fonts & Sizes options only apply to the default Report of Calibration and to the custom Report of Calibration that is included with the Calibrate-*it* Software.

The Browse button allows a custom report template file to be selected. Custom report templates can be designed to meet your specific needs. Contact Hart Scientific sales representatives for more information on ordering a custom report for the Calibrate-*it* Software.

The Print button prints the Report of Calibration for the selected probes if the "Use default report template" option is selected, or runs the custom report template program if the "Use custom report template" option is selected.

The Cancel button closes this dialog.

4.7   Print Preview Window

The Print Preview window (Figure 19) is used to view reports on the screen without having to print a hard copy. The Print Preview window is activated by selecting the "Enable print preview" check box on the File | Defaults General tab. Other settings on the General tab can be changed to manipulate the default behavior of the Print Preview window.
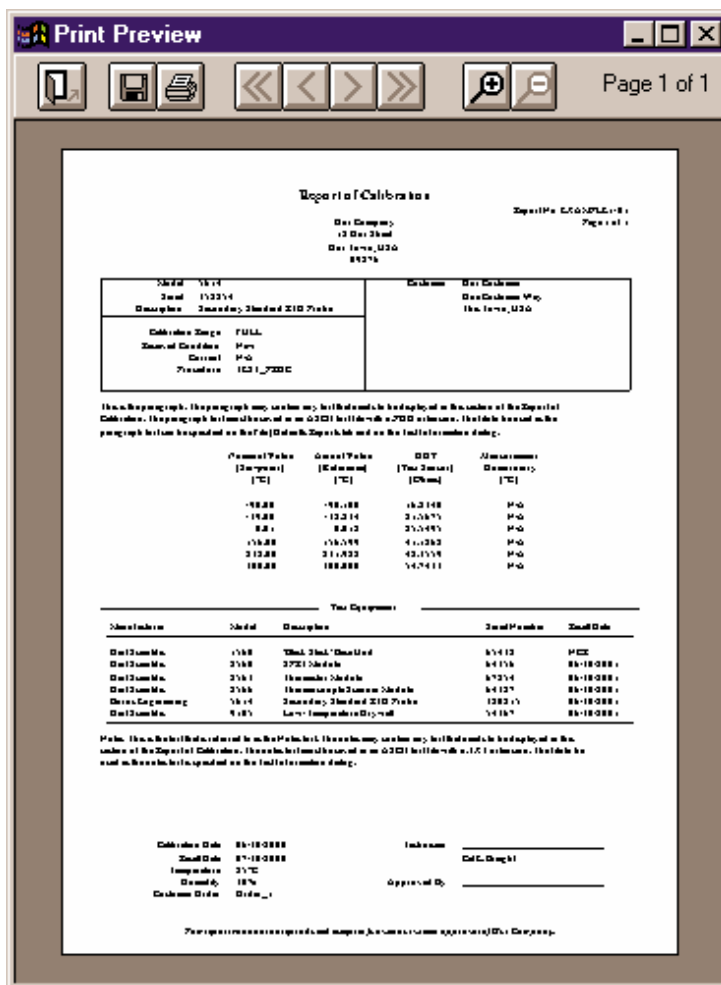
Figure 19 *Print Preview Window*

Enabled and Disabled

The enabled and disabled state of the navigation and zoom buttons change depending on the current state of the Print Preview window.

Window Information

The Print Preview window is displayed when printing reports if the "Enable print preview" check box on the File | Defaults General tab is se-

lected.

The Print Preview window toolbar buttons allow the user to print the report, navigate through all of the pages of the report (if applicable), zoom in and out, and close the Print Preview window. The current page and total number of pages is displayed on the right side of the toolbar.

The function of each toolbar button is explained below.

Close – Closes the Print Preview window

Save As – Saves the current Report of Calibration to a report file

Print – Prints all pages of the report in the Print Preview window

First Page – Navigates to first page of the report (if more than one page)

Previous Page – Navigates to previous page of the report (if more than one page)

Next Page – Navigates to next page of the report (if more than one page)

Last Page – Navigates to last page of the report (if more than one page)

Zoom In – Zooms in to (enlarge) the report

Zoom Out – Zooms out from (reduce) the report

The toolbar also indicates the current page and the number of pages in the current report.

4.8 Default Report of Calibration

The default Report of Calibration contains: the report number, the test probe information, calibration range, received condition, current, test procedure, customer name and address, calibration test paragraph and notes, the actual data collected, a list of the test equipment, calibration

date, recall date, ambient temperature and humidity, customer order ID, technician name, and a place for technician and approval signatures. The actual data collected consists of the nominal values (set-points), actual values (reference), UUT (test sensor) values, error (if applicable), uncertainty, and CJC readings (if applicable).

The fonts, sizes, and styles used on the default Report of Calibration can be changed on the Fonts & Sizes Tab of the Calibrate-*it* Defaults dialog.

Reports of Calibration can be saved to a report file from the Print Preview window and opened, viewed and printed by selecting the Recall Saved Report option from the File menu or by running the Report Viewer Utility. An example report is show in Figure 20 on page 60.

The report number is printed on each page of the Report of Calibration. The report number is a unique number consisting of the test number and the Scanner channel to which the test probe was connected. These two pieces of information are concatenated together with a dash.

The test probe information consists of the test probe model number, serial number and description. This information is printed at the top of the first page along with the calibration range, received condition, current, and test procedure number.

The paragraph text is the text entered as the paragraph text file from the File | Defaults Report tab (see Figure 13 on page 46) or the Test Information dialog (see Figure 49 on page 117).

The raw data section contains the readings taken by the software. If the Stability Override menu option was used on any set-point during the test, the set-point will be marked and a footnote appears at the bottom of the raw data section stating that the stability parameters were overridden for the set-points indicated.

The notes text is the text entered as the note on the Test Information dialog.

The calibration date is the date the test was started. This date is entered on the Test Information dialog.

The recall date is the date the test probe or test equipment is due for recalibration. For the test probe, this date is calculated by adding the calibration interval entered on the Test Probe Configuration dialog to the calibration date. For the test equipment, the user enters this date on the configuration dialogs. Recall Date is synonymous with Recalibration Date.

Note: If the calibration interval is set to 0 on the Test Probe Configuration dialog, the Recall Date does not print for that Test Probe.

The technician is the name of the person who performed the test. This in-

Report of Calibration

Report No: EXAMPLE1-01

Our Company
12 Our Street
Our Town, USA
09876

Page 1 of 1

Model:	5614	Customer:	Our Customer
Serial:	358254		One Customer Way
Description:	Secondary Standard RTD Probe		This Town, USA
			12345
Calibration Range:	FULL		
Received Condition:	New		
Current:	N/A		
Procedure:	TEST_PROC		

This is the paragraph. The paragraph may contain any text that needs to be displayed in this section of the Report of Calibration. The paragraph text must be saved in an ASCII text file with a .PGH extension. The file to be used as the paragraph text can be specified on the File | Defaults Reports tab and on the Test Information dialog.

Nominal Value (Set-point) (°C)	Actual Value (Reference) (°C)	UUT (Test Sensor) (Ohms)	Measurement Uncertainty (°C)
-90.00	-90.100	16.2340	N/A
-39.00	-38.834	21.5675	N/A
0.01	0.012	25.5495	N/A
156.00	156.599	41.1268	N/A
232.00	231.928	48.3559	N/A
300.00	300.000	54.7433	N/A

Test Equipment

Manufacturer	Model	Description	Serial Number	Recall Date
Hart Scientific	1560	'Black Stack' Base Unit	65432	NCR
Hart Scientific	2560	SPRT Module	64356	12/26/2001
Hart Scientific	2563	Thermistor Module	67854	12/26/2001
Hart Scientific	2566	Thermocouple Scanner Module	64387	12/26/2001
Burns Engineering	5614	Secondary Standard RTD Probe	380215	12/26/2001
Hart Scientific	9105	Low-Temperature Drywell	54367	12/26/2001

Notes: This is the text that is referred to as the Notes text. The notes may contain any text that needs to be displayed in this section of the Report of Calibration. The notes text must be saved in an ASCII text file with a .TXT extension. The file to be used as the notes text is specified on the Test Information dialog.

Calibration Date:	12/26/2000	Technician:	_____
Recall Date:	01/25/2001		Cal E. Breight
Temperature:	25°C		
Humidity:	30%	Approved By:	_____
Customer Order:	Order_1		

This report shall not be reproduced except in full without written approval of Our Company.

Figure 20 *Example Default Report of Calibration*

formation is entered on the Test Information dialog.

4.9   Custom Report of Calibration

The Print Custom Report of Calibration dialog (Figure 21) is displayed after selecting "Use custom report template", selecting the custom report that is shipped with the Calibrate-it Software, and selecting the Print button from the Print Test Report dialog.
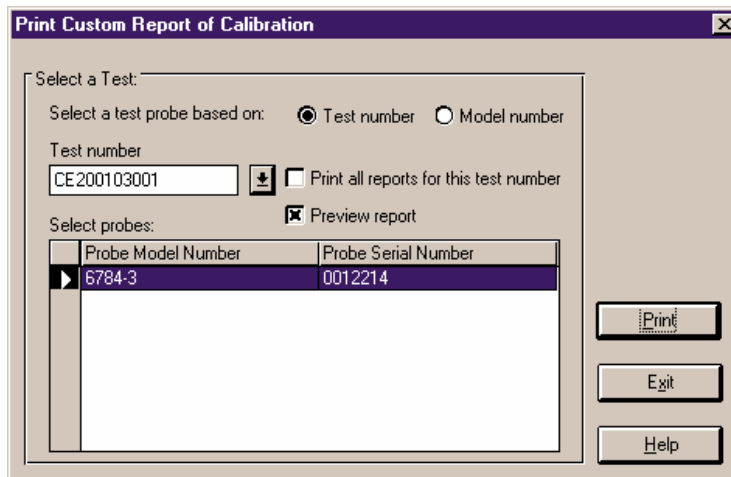
Figure 21   *Print Custom Report of Calibration*

Enabled and Disabled

The "Print all reports for this test number" check box is enabled only when selecting test probes based on a test number.

The Print button is disabled until either a test number or model number is selected.

Dialog Information

To use this custom report, you must select either a test number or a model number on which to base the test probe selection.

If the test number option is selected, a list of test numbers becomes available. Once a test number is selected, the probe model numbers and serial numbers appear below. From the list entitled "Select probes, select the probe model number and serial number.

If the model number option is selected, a list of probe model numbers becomes available. Once a model number is selected, the probe serial

numbers and test numbers appear below. From the list entitled "Select probes, select the probe test number and serial number.

Select the test probes in the "Select probes" list by clicking with the left mouse button. A probe may be deselected in the same manner.

If the "Print all reports for this test number" check box is selected, a Report of Calibration is printed for the selected test probes. If not selected, reports are printed only for the highlighted test probes in the "Select probes" list.

If the "Preview report" checkbox is selected, the report is displayed in a Print Preview window. To print the report, click the Print button on the Print Preview window toolbar. The Print Preview window must be closed before proceeding. To close the Print Preview window, click on the Close button on the left side of the Print Preview window toolbar.

If the "Preview report" check box is not selected, the report is sent directly to the printer.

The Print button prints the Report of Calibration (using the custom template) for the selected probes. If this is the first time this report is being printed using this custom report, the Tolerance dialog is displayed.

4.9.1 Tolerance Dialog

The Tolerance dialog (Figure 22) allows the Tolerance value for each set-point on the report to be entered. The Tolerance value must be entered exactly as it should be printed on the Report of Calibration. The allowable range for the Tolerance value is 0.0 to 1000.0. If all remaining set-points on the current report require the same Tolerance value, check the "Use this value for remaining set-points on this report" checkbox. Otherwise, this dialog is displayed once for each set-point on the report.
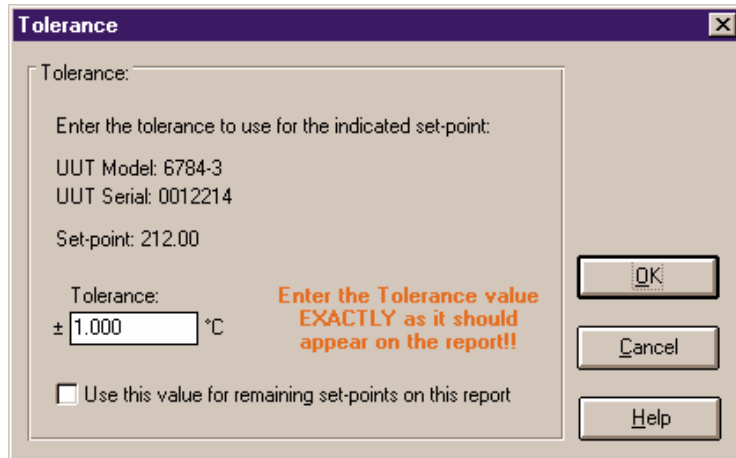
Figure 22 *Tolerance Dialog*

Select the OK button to save the Tolerance value. Once the Tolerance value is accepted, it is permanently associated with that set-point. If a value is entered incorrectly, see Section , Changing Tolerance Values.

The Cancel button closes the dialog without changing the current Tolerance value.

4.10   Changing Tolerance Values

On the custom Report of Calibration included with Calibrate-*it*, the tolerance values that appear on the report are manually entered by the user the first time the report is printed. Once entered, these tolerance values are saved and permanently associated with the respective set-points.

In case a tolerance value is entered incorrectly, there is a way to force the custom report to prompt the user to enter the tolerance values again. This procedure requires some basic computer knowledge. If you are unfamiliar with Windows® INI files, you may want to find someone who is to assist with this procedure.

To force the Tolerance dialog to appear when printing a custom report:

1.   Run the File Manager (Windows® 3.x) or the Windows Explorer (Windows® 9x/NT/2000).

2.   Locate and select the local hard drive and directory/folder where

Calibrate-*it* was installed (typically C:\HART9932).

3. In this directory/folder, locate the HART9932.INI file. This file contains many settings that dictate how Calibrate-*it* operates. Double-click this file to open it in a text editor.

4. Locate the `ForceTolerance` entry in the `[General]` section. This entry should currently be set to `False`.

5. Change the word `False` to `True` as shown below, then close and save the INI file.

6. If this entry does not exist in the `[General]` section, enter it now as shown below.

    Example:

    `[General]`

    `ForceTolerance=True`

Now, every time a custom report is printed, the Tolerance dialog will be displayed.

Note: We recommend that this procedure only be followed in case of a data entry error. After correcting the error, the `ForceTolerance` entry should be set back to `False`.

4.11   Example Custom Report of Calibration

The custom Report of Calibration that ships with the Calibrate-*it* Software is installed automatically when Calibrate-*it* is installed. The custom report file is installed in the \REPORTS folder and is named 9932CUST.EXE.

The custom Report of Calibration contains: the report number, the test probe information, calibration range, received condition, current, test procedure, customer name and address, calibration test paragraph and notes, the raw data collected, a list of the test equipment, calibration date, recall date, ambient temperature and humidity, customer order ID, technician name, and a place for the technician and approver to sign. The actual data collected consists of the actual values (reference), UUT (test sensor) values, error, tolerance, uncertainty, result (pass/fail), and CJC Readings (if applicable).

The fonts, sizes and styles used on this custom Report of Calibration can be changed on the Fonts & Sizes tab of the Calibrate-*it* Defaults dialog.

To use this custom report with the Calibrate-*it* Software, select the "Use custom report template" option on the Print Test Report dialog. Then use

Report of Calibration

Temp. Tech. Co.
Any Town, USA

Report No: CE200103001-003
Page 1 of 1

Model:	6784-3
Serial:	0012214
Description:	Type K Thermocouple
Calibration Range:	Full
Received Condition:	New
Current:	N/A
Procedure:	HST-098 - 1

Customer: Temp. Tech. Co.
Any Town, USA

This is the paragraph. The paragraph can contain any text that needs to be displayed in this section of the Report of Calibration. The paragraph text must be saved in an ASCII text file with a .PGH extension. The file to be used as the paragraph text can be specified on the File | Defaults Reports tab or on the Test Information dialog.

Actual Value (Reference) (°F)	UUT (Test Sensor) (°F)	Error (°F)	Tolerance (°F)	Result (Pass/Fail)	Uncertainty (°F)
214.59415	214.26200	-0.33215	±1.000	Pass	±0.005
351.15029	351.45400	0.30371	±1.200	Pass	±0.005
449.71677	450.45000	0.73323	±1.400	Pass	±0.005
547.27343	548.64000	1.36657	±1.600	Pass	±0.005
699.06899	701.33800	2.26901	±1.800	Fail	±0.005
799.00276	802.06200	3.05924	±2.000	Fail	±0.005
919.39732	923.33500	3.93768	±2.200	Fail	±0.005
1002.40580	1006.11400	3.70820	±2.400	Fail	±0.005
1100.78222	1104.41000	3.62778	±2.600	Fail	±0.005
1198.13944	1199.95700	1.81756	±2.800	Pass	±0.005

Test Equipment

Manufacturer	Model	Description	Serial Number	Recall Date
Hart Scientific, Inc.	1560	"Black Stack" Base Unit	12345	NCR
Hart Scientific, Inc.	2566	Thermocouple Scanner	52125	03/25/2001
Hart Scientific, Inc.	5629	Type Au/Pt Thermocouple	7-0001	03/25/2001
Hart Scientific, Inc.	9113	Calibration Furnace	95231	NCR

Notes: This is the text that is referred to as the Notes text. The notes can contain any text that needs to be displayed in this section of the Report of Calibration. The notes text must be saved in an ASCII text file with a .TXT extension. The file to be used as the notes text is specified on the Test Information dialog.

Technician: _____
Cal E. Breight

Calibration Date:	03/01/2001
Temperature:	25°C
Humidity:	42%
Customer Order:	54654223

Approved By: _____

This report shall not be reproduced except in full without written approval of Temp. Tech. Co..

Figure 23 *Example Custom Report of Calibration*

the Browse button to select the 9932CUST.EXE file in the \REPORTS folder. Selecting the Print button on the Print Test Report dialog launches this custom report. An example report is shown in Figure on page.

Reports of Calibration can be saved to a report file from the Print Preview window and opened, viewed and printed by selecting the Recall Saved Report option from the File menu, or by running the Report Viewer Utility.

Custom Report Features

This custom report includes the following features:

1.   This custom report requires the test probe readings to be taken in the same scale as the reference probe readings (°C, °F, or K). If the test probe readings are taken in resistance or voltage, this report cannot be printed.

2.   The "Tolerance" column in the raw data section of the report displays the values entered by the user on the Tolerance dialog. The scale of the values in this column is based on the scale of the values in the "UUT" column (°C, °F, or K). Each set-point on the report has its own tolerance value.

3.   The "Result" column in the raw data section of the report displays the pass/fail status of the test probe at each set-point. This column displays either the word "Pass" if the value in the "Error" column is within the value in the "Tolerance" column. Otherwise, the word "Fail" is displayed in this column.

4.12   Recall Saved Report

The Recall Saved Report option allows previously saved report files to be opened, viewed, and printed from the Print Preview window.

For more information on report files, see Section 11.2, Report Files.

4.13   Close Test

The Close Test menu option is enabled only after a test has completed or been aborted. Selecting this option terminates graphing the Reference Probe and returns to the Calibrate-*it* Main Display.

4.14   Exit

The Exit option exits the Calibrate-*it* Software. If any changes were made to the configuration, the user is prompted to save the current configura-

tion. The current configuration is always saved upon exit to the file
9932LAST.CFG.

5   Configuration Menu
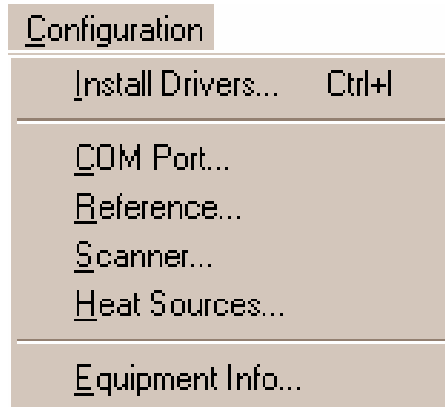
Figure 24   *Configuration Menu*

The Configuration Menu (Figure 24) allows installation of instrument drivers, setting up of all test equipment, and a graphical display of the test equipment.

Enabled and Disabled

The COM Port and Reference menu options are disabled when graphing the Reference Probe. To enable the COM Port and Reference menu options, stop the graph by selecting Graph | Stop Display menu option. This menu is not enabled when a test is running.

5.1   Install Drivers

The Install Drivers dialog (Figure 25) is displayed when the Configuration | Install Drivers menu option is selected or when the Drivers button is selected on the Reference Readout, Reference Module, Scanner, Scanner Modules, or Heat Source Configuration dialogs.
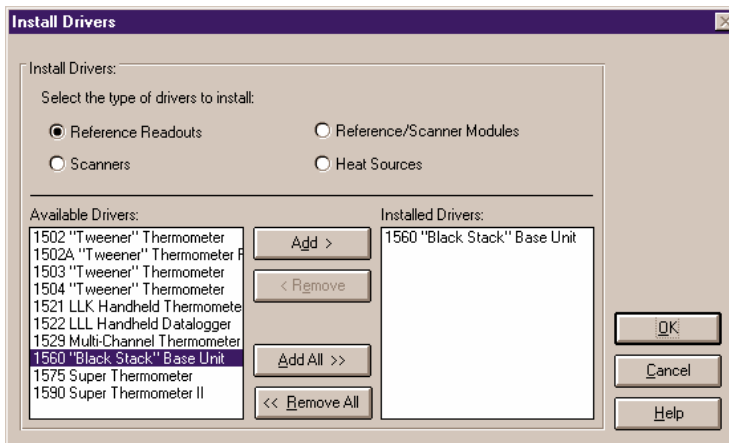
Figure 25   *Install Drivers Dialog*

Enabled and Disabled

The Add > button is only enabled when one or more items in the Available Drivers list are selected.

The < Remove button is only enabled when one or more items in the Installed Drivers list are selected.

Dialog Information

The Install Drivers dialog allows the communications drivers to be installed for the Reference Readout, Reference Module, Scanner, Scanner Modules, and Heat Sources.

Installing a driver for an instrument allows the software to display that instrument as a choice in the Model Number drop-down list on the Reference Readout, Reference Module, Scanner, Scanner Modules, and Heat Source Configuration dialogs. By the same token, uninstalling a driver removes that instrument from the Model Number drop-down list. To keep the Model Number drop-down list short, only install drivers for the instruments that are to be used.

The Available Drivers list shows all drivers available for the type of driver selected. The Installed Drivers list shows all drivers currently installed.

5.1.1 Add Drivers

To install (Add) drivers, follow the instructions below:

1. Select the type of drivers to install.

2. To install all drivers, select the Add All >> button.

    or -

    To install selected drivers, select the drivers in the Available Drivers list using the left mouse button and then select the Add > button. (Multiple drivers can be selected by holding down the CTRL key while clicking the left mouse button.)

3. If a driver for an instrument is already installed, a message is displayed asking for confirmation to replace the currently installed driver.

5.1.2 Remove Drivers

To uninstall (Remove) drivers, follow the instructions below:

1. Select the type of drivers to uninstall.

2. To uninstall all drivers, select the << Remove All button.

    or -

    To uninstall selected drivers, select the drivers in the Installed Drivers list using the left mouse button and then select the < Remove button. (Multiple drivers can be selected by holding down the CTRL key while clicking the left mouse button.)

The OK button closes the Install Drivers dialog. Selecting the Cancel button will ignore any changes made and close the Install Drivers dialog.

5.2 Communications Port Configuration

The Communications Port Configuration dialog (Figure 26) is displayed when the Configuration | COM Port menu option is selected.
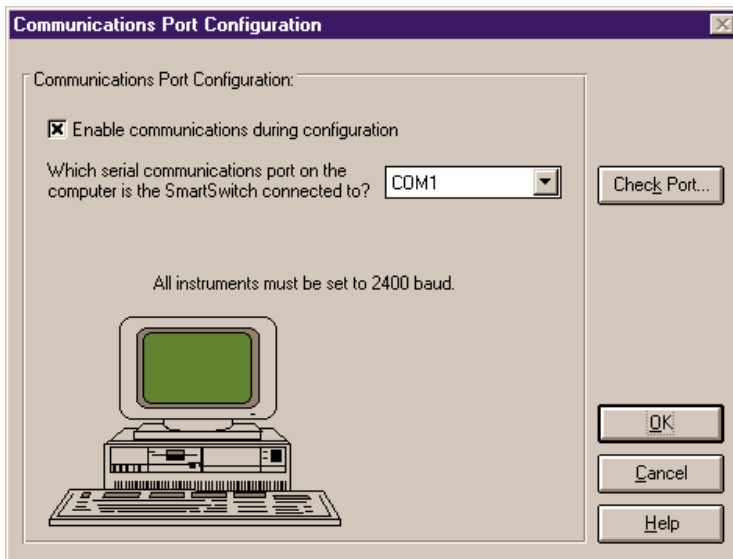
Figure 26 *Communications Port Configuration Dialog*

Enabled and Disabled

The Check Port button is disabled until the "Enable communications during configuration" check box and a COM port are selected.

Dialog Information

The drop-down box contains a list of all of the available COM ports. If a port is being used by another device, the port will not appear in the drop-down box. If there are no ports available, a message will be displayed and this software will not be able to perform a test.

The "Enable communications during configuration" check box is provided to verify communications between the computer and the SmartSwitch. This check box defaults to the same status as the "Enable communications during configuration" check box on the File | Defaults Setup tab. Unchecking the check box on this dialog does not change the status of the check box on the File | Defaults Setup tab.

When the Check Port button is selected, the Check SmartSwitch dialog (Figure 27) is displayed.

The OK button accepts the selected settings and closes this dialog. Selecting the Cancel button ignores any changes made and closes this dia-

log.

5.2.1   Check SmartSwitch

The Check SmartSwitch dialog (Figure 27) is displayed when the Check Port button is selected from the Communications Port Configuration dialog. The row of lights indicates which light on the SmartSwitch should currently be on. If the SmartSwitch lights do not follow the lights on the dialog, then the computer and the SmartSwitch are not communicating properly.
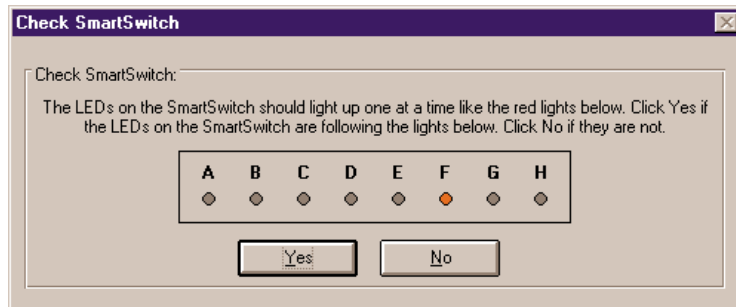
Figure 27   *Check SmartSwitch Dialog*

Click the Yes button if the lights on the SmartSwitch follow the lights on this dialog. Otherwise, click the No button.

When checking the communications, make sure the SmartSwitch and any applicable instruments are connected using the appropriate cables. Refer to Section 2.7, Connection of Instruments, for more information.

5.3   Reference

The Reference menu option displays the Reference Readout Configuration dialog for entering the Reference Readout, Reference Module, and Reference Probe information. This menu option is disabled if the graph or a test is running

5.3.1   Reference Readout Configuration

The Reference Readout Configuration dialog (Figure 28) is used to select the instrument used as the Reference Readout device (the instrument to which the Reference Probe is connected.)
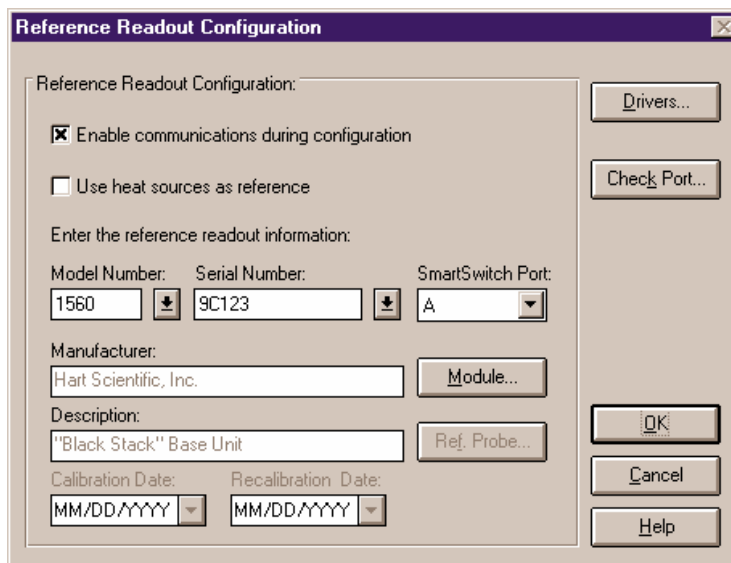
Figure 28 *Reference Readout Configuration Dialog*

Enabled and Disabled

The Reference Readout Configuration dialog can not be displayed while the software is graphing the reference readings.

The Check Port button is disabled until the "Enable communications during configuration " check box and a model number are selected.

If the "Use heat sources as reference" check box is selected, all the remaining controls on this dialog are disabled. To enable the controls, remove the check from this check box.

The serial number, SmartSwitch port, calibration date, and recalibration date text boxes and the Module and Ref. Probe buttons are disabled until a model number is selected.

If the selected model requires the use of modules (such as the 1560 Black Stack), information concerning the module to which the Reference Probe is attached must be entered. The Module button is enabled for entering module information. Otherwise, the Ref. Probe button is enabled.

The OK button is disabled until all required information has been selected and entered and if an invalid calibration or recalibration date is entered.

Dialog Information

The "Enable communications during configuration" check box is provided for verification of instrument communications during the instrument configuration process. This check box defaults to the same state as the "Enable communications during configuration" check box on the File | Defaults Setup tab. Unchecking the check box on this dialog does not change the state of the check box on the File | Defaults Setup tab.

The "Use Heat Sources as reference" check box is provided for specifying that a Reference Probe is not needed because the sensor(s) in the Heat Source(s) will be used as the Reference Probe.

Select the Reference Readout model number using the drop-down list provided. If the appropriate model number does not appear on the list, select the Drivers button to install the driver for the readout instrument. The Manufacturer and Description information is filled in automatically.

A new feature that has been added to Calibrate-*it* v3.3 (and later) allows the Reference Probe to be connected either to the readout instrument itself or to a module or multiplexer channel of certain Reference Readout instruments such as the Model 1575 and 1590 Super Thermometers. If an instrument that supports this feature is selected, a prompt is displayed asking where the Reference Probe is connected. If the Reference Probe is connected to the Reference Readout itself, the Ref. Probe button is enabled. Otherwise, if the Reference Probe is connected to a module or multiplexer channel, the Module button is enabled and the Reference Module information must be configured before configuring the Reference Probe.

Next, select the serial number from the drop-down list provided or enter the serial number in the Serial Number box if it has not been entered previously. The Calibrate-*it* Software records serial numbers, calibration dates and recalibration dates to avoid having the user reenter the same data over and over.

If the serial number was not selected from the drop-down list, the Calibration Date and Recalibration Date must be entered. These boxes will be disabled if the selected instrument does not require calibration.

If the recalibration date has passed and the "Show recalibration date notification messages" check box is selected on the File | Defaults Setup tab, the user is warned and must change the calibration and recalibration dates before the instrument can be used.

Select the SmartSwitch port to which the instrument is connected. If the instrument is connected and powered up at this time, make sure the "Enable communications during configuration" check box is selected and select the Check Port button. The Calibrate-*it* Software will attempt to

establish communications with the instrument. If the software is not able to communicate with the instrument, an error message is displayed. Otherwise, a message is displayed stating communication was established with the instrument.

The Module button displays the Reference Module Configuration dialog for entering module information. This button is enabled only if the selected instrument uses modules.

The Ref. Probe button displays the Reference Probe Configuration dialog for entering the Reference Probe information. This button is enabled only if the selected instrument does not use modules.

The Drivers button allows the user to install instrument drivers. If there are no models available in the Model Number drop-down list, you must install drivers using the Drivers button.

The OK button accepts the selected settings and closes this dialog. Selecting the Cancel button ignores any changes made and closes this dialog.

Note: The Reference Readout, Reference Module (if applicable), and Reference Probe must be configured to start a calibration test.

5.3.2   Reference Module Configuration

The Reference Module Configuration dialog (Figure 29) is displayed when the Module button on the Reference Readout Configuration dialog is selected. This dialog is only applicable when the selected Reference Readout instrument requires the use of modules or multiplexer.
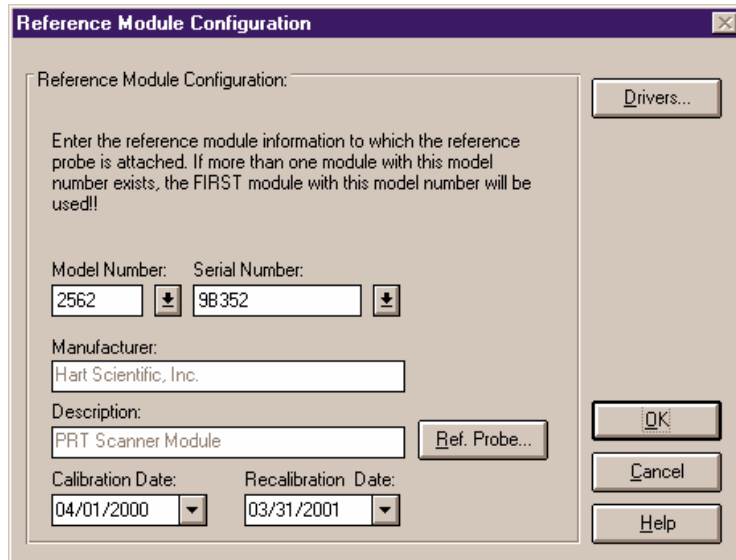
Figure 29   *Reference Module Configuration Dialog*

Enabled and Disabled

The serial number, calibration date, and recalibration date boxes and the Ref. Probe button are disabled until a model number is selected.

The OK button is disabled until all required information has been selected and entered and if an invalid calibration or recalibration date is entered.

Dialog Information

When the Module button is selected on the Reference Readout Configuration dialog and the "Enable communications during configuration" check box is selected, the software queries the selected Reference Readout instrument, when possible, to determine what modules are attached.

Select the Reference Module model number using the drop-down list provided. If the model number needed does not appear on the list, select the Drivers button to install the driver for the module. The Manufacturer and Description information is filled in automatically.

Note: If the Reference Readout instrument has more than one module of the same model number to which the Reference Probe is connected, the software assumes the Reference Probe is connected to the **first** module

with that model number. For example, if the Reference Readout instrument is a model 1560 Black Stack with three model 2560 SPRT modules, and the Reference Probe is to be connected to one of these modules, it must be connected to the 2560 module that is closest to the base unit.

Next, select the serial number from the drop-down list provided or enter the serial number in the Serial Number box if it has not been entered previously. The Calibrate-*it* Software records serial numbers, calibration dates and recalibration dates to avoid having the user reenter the same data over and over.

If the serial number was not selected from the drop-down list, the Calibration Date and Recalibration Date must be entered. These boxes will be disabled if the selected instrument does not require calibration.

If the recalibration date has passed and the "Show recalibration date notification messages" check box is selected on the File | Defaults Setup tab, the user is warned and must change the calibration and recalibration dates before the instrument can be used.

The Ref. Probe button displays the Reference Probe Configuration dialog for entering the Reference Probe information.

The Drivers button allows the user to install instrument drivers. If there are no models available in the Model Number drop-down list, you must install drivers using the Drivers button.

The OK button accepts the selected settings and closes this dialog. Selecting the Cancel button ignores any changes made and closes this dialog.

5.3.3   Reference Probe Configuration

The Reference Probe Configuration dialog (Figure 30) is displayed when the Ref. Probe button on the Reference Readout Configuration dialog or on the Reference Module Configuration dialog is selected.

Figure 30 *Reference Probe Configuration Dialog*

Enabled and Disabled

The Reference Probe model number can not be entered or selected until the probe type is selected.

The serial number, calibration date, recalibration date, channel, report units, manufacturer, description, minimum temperature, and maximum temperature values can not be selected or entered until a model number is entered.

The OK button is disabled until all required information has been selected and entered and if an invalid calibration or recalibration date is entered.

Dialog Information

The Reference Probe type **must** be selected before any other information can be entered. The Reference Probe type defaults to the probe type selected on the File | Defaults Setup tab. If the default probe type is not one of the available probe types for the selected Reference Readout (or Reference Module), then this box is left blank and must be selected from the available choices.

Select the Reference Probe model number using the drop-down list pro-

vided. The Manufacturer and Description information is filled in automatically. If the appropriate model number does not appear on the list, enter the model number in the Model Number box. Enter the manufacturer and description for the Reference Probe in the Manufacturer and Description boxes provided. The Calibrate-*it* Software records model numbers, manufacturer, and description information to avoid having the user reenter the same data over and over.

Next, select the serial number from the drop-down list provided or enter the serial number in the Serial Number box if it has not been entered previously. The Calibrate-*it* Software records serial numbers, calibration dates and recalibration dates to avoid having the user reenter the same data over and over.

If the serial number was not selected from the drop-down list, the Calibration Date and Recalibration Date must be entered. These boxes will be disabled if the selected instrument does not require calibration.

If the recalibration date has passed and the "Show recalibration date notification messages" check box is selected on the File | Defaults Setup tab, the user is warned and must to change the calibration and recalibration dates before this instrument can be used.
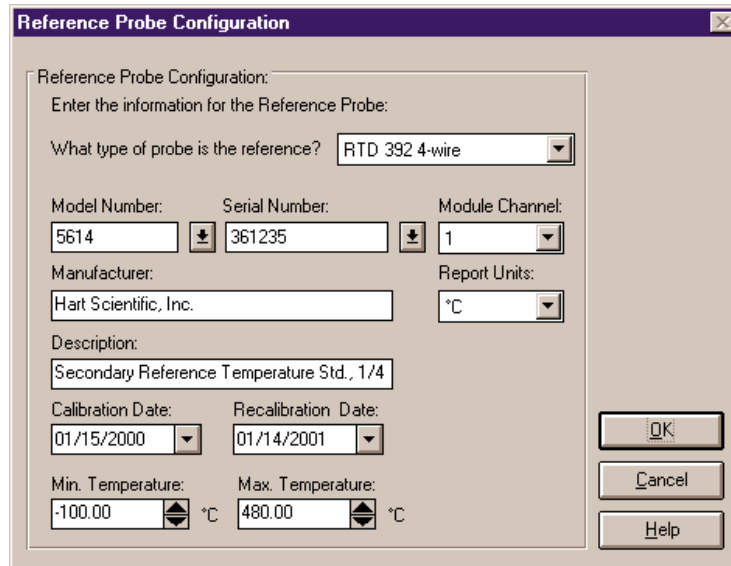
Select the report units for the Reference Probe using the Report Units drop-down list. The possible choices are:

- °C
- °F
- K

Select the channel of the Reference Readout instrument or Reference Module (or multiplexer) to which the Reference Probe is connected using the drop-down list provided. For Reference Modules, the channel selection is with respect to that module.

Enter the minimum and maximum range of the Reference Probe in the Min. Temperature and Max. Temperature boxes. The minimum temperature defaults to –330 and the maximum temperature defaults to 2650 when entering a new probe.

The OK button accepts the selected settings and closes this dialog. Selecting the Cancel button ignores any changes made and closes this dialog.

5.4   Scanner

The Scanner menu option displays the Scanner Configuration dialog for entering Scanner information. The Scanner is the instrument to which all

of the test probes are connected.

5.4.1　　Scanner Configuration

The Scanner Configuration dialog (Figure 31) is used to select the instrument to which the test probes are connected.
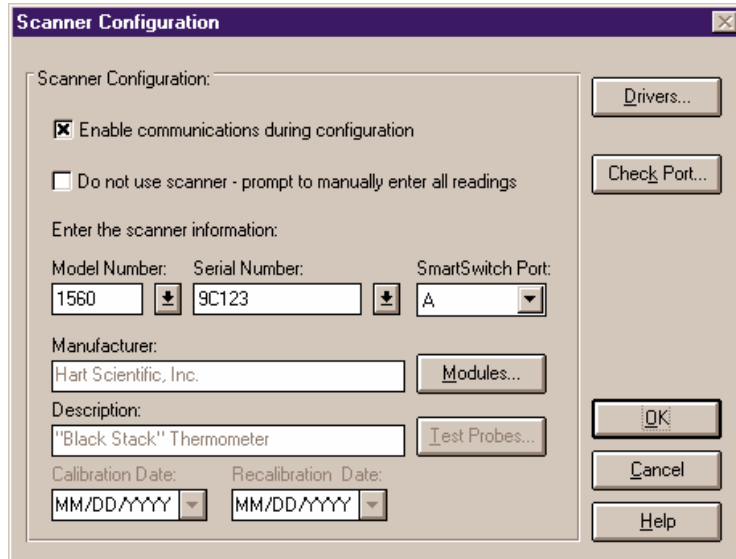
Figure 31 *Scanner Configuration Dialog*

Enabled and Disabled

If the "Do not use Scanner – prompt to manually enter all readings" check box is selected, all other controls on this dialog are disabled.

The Check Port button is disabled until the "Enable communications during configuration" check box and a Model Number are selected.

The serial number, SmartSwitch port, calibration date, and recalibration date boxes and the Modules and Test Probes buttons are disabled until a model number is selected.

If the selected model requires the use of Scanner Modules (such as the 1560 Black Stack), information concerning the Scanner Modules to which the test probes are attached must be entered and the Module button is enabled. Otherwise, the Modules button is disabled and the Test Probes button is enabled.

The OK button is disabled until all required information has been selected and entered and if an invalid calibration or recalibration date is en-

tered.

Dialog Information

The "Enable communications during configuration" check box is provided for verification of instrument communications during the instrument configuration process. This check box defaults to the same state as the "Enable communications during configuration" check box on the File | Defaults Setup tab. Unchecking the check box on this dialog does not change the state of the check box on the File | Defaults Setup tab.

When calibrating test probes that cannot be connected to a Scanner (such as Liquid in Glass thermometers) or probes that cannot be detached from a process control system or if a Scanner instrument that this software does not support must be used, check the "Do not use Scanner – prompt to manually enter all readings" check box. This feature disables the use of the Scanner instrument to automate the collection of readings from the test probes. The user is prompted to manually enter readings at the appropriate times during a test.

New to Calibrate-*it* v3.3 (and later) is the ability to use instruments such as the Model 1575 and 1590 Super Thermometers to calibrate a single probe without requiring the use of a multiplexer. If an instrument that supports this feature is selected, a prompt is displayed asking whether a multiplexer is being used or not. If a multiplexer is not being used (the Test Probe is connected to the Scanner itself), the Modules button is disabled. Otherwise, the Modules button is enabled and the Scanner Modules information must be configured before configuring the Test Probes.

Also, Calibrate-*it* v3.3 (and later) allows single-channel thermometers such as the Models 1502, 1503, and 1504 "Tweener" Thermometers and Models 1521 and 1522 Handheld Thermometers to be used as the scanner to calibrate a single test probe.

Select the Scanner model number using the drop-down list provided. If the model number needed does not appear on the list, select the Drivers button to install the driver for the Scanner instrument. The Manufacturer and Description information is filled in automatically.

Next, select the serial number from the drop-down list provided or enter the serial number in the Serial Number box if it has not been entered previously. The Calibrate-*it* Software records serial numbers, calibration dates and recalibration dates to avoid having the user reenter the same data over and over.

If the serial number was not selected from the drop-down list, the Calibration Date and Recalibration Date must be entered. These boxes will be disabled if the selected instrument does not require calibration.

If the recalibration date has passed and the "Show recalibration date no-tification messages" check box is selected on the File | Defaults Setup tab, the user is warned and must change the calibration and recalibration dates before the instrument can be used. If the serial number was not se-lected from the drop-down list, the Calibration Date and Recalibration Date must be entered. These boxes will be disabled if the selected instru-ment needs no calibration.

Select the SmartSwitch port to which the instrument is connected. If the instrument is connected and powered up at this time, make sure the "En-able communications during configuration" check box is selected and se-lect the Check Port button. The Calibrate-*it* Software will attempt to establish communications with the instrument. If the software is not able to communicate with the instrument, an error message is displayed. Oth-erwise, a message is displayed stating communication was established with the instrument.

The Test Probes button displays the Test Probe Configuration dialog (see Section 6.4) for entering test probe information. This button is enabled only if the selected instrument does **not** use Scanner Modules.

The Drivers button allows the user to install instrument drivers. If there are no models available in the model number drop-down list, you must in-stall drivers using the Drivers button.

The OK button accepts the selected settings and closes this dialog. Se-lecting the Cancel button ignores any changes made and closes this dia-log.

Note: The Scanner and Scanner Module (if applicable) must be config-ured to start a calibration test.

5.4.2   **Scanner Module Configuration**

The Scanner Module Configuration dialog (Figure 32) is displayed when the Modules button on the Scanner Configuration dialog is selected. This dialog is only applicable when the selected Scanner instrument requires the use of modules or multiplexers.
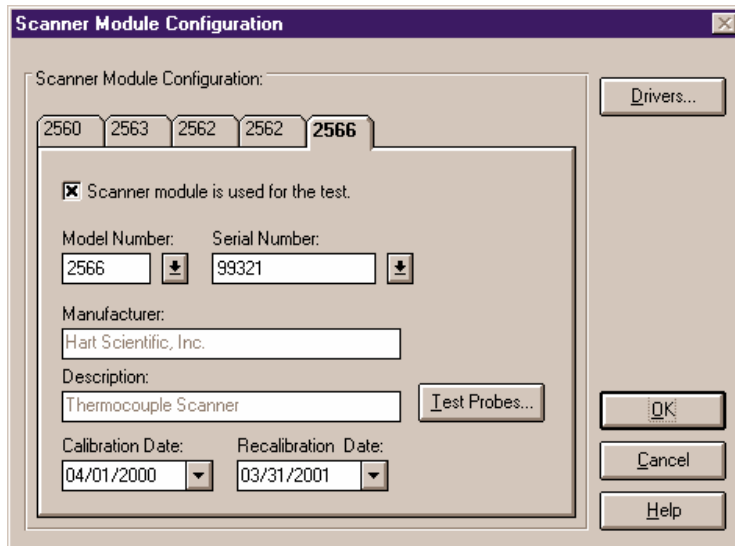
Figure 32   *Scanner Module Configuration Dialog*

Enabled and Disabled

The model number box is disabled until the "Scanner module is used for test" check box is selected.

The serial number, calibration date, and recalibration date boxes and the Test Probes button are disabled until a model number is selected.

The OK button is disabled until all required information has been selected and if an invalid calibration or recalibration date is entered.

Dialog Information

The Scanner Module Configuration dialog is displayed when the Modules button is selected on the Scanner Configuration dialog.

If the "Enable communications during configuration" check box is selected when the Modules button is selected from the Scanner Configuration dialog, the software queries the selected Scanner instrument (if possible) to determine what Scanner Modules are attached. The attached Scanner Modules' model numbers are automatically selected and displayed on the tabs if the query was successful.

All Scanner Modules are initially disabled by default. To use a module, it

must be enabled. To enable a Scanner Module, the user must select the "Scanner module is used for the test" check box. Once a Scanner Module is enabled, the Model Number box is enabled.

If the "Enable communications during configuration" check box is not selected when the Modules button is selected from the Scanner Configuration dialog, the Scanner Module Configuration dialog is displayed with a #1, #2, etc. on each of the Scanner Module tabs. Once a Scanner Module is enabled by selecting the "Scanner module is used for the test" check box, the Model Number box is enabled.

Select the tab for the first Scanner Module. Then select the Scanner Module model number of the first Scanner Module using the drop-down list provided. If the required model number does not appear on the list, select the Drivers button to install the driver for the Scanner Module. The Manufacturer and Description information is filled in automatically. The model number is also displayed on the tab.

Note: The Scanner Modules must be entered in the same order as they are attached to the Scanner instrument. If a particular Scanner Module is not to be used, **it still needs to be configured to act as a place holder**. This is done by selecting the "Scanner module is used for the test" check box, selecting the model number, then unchecking the check box.

Next, select the serial number from the drop-down list provided or enter the serial number in the Serial Number box if it has not been entered previously. The Calibrate-*it* Software records serial numbers, calibration dates and recalibration dates to avoid having the user reenter the same data over and over.

If the recalibration date has passed and the "Show recalibration date notification messages" check box is selected on the File | Defaults Setup tab, the user is warned and must change the calibration and recalibration dates before the instrument can be used.

The Test Probes button displays the Test Probe Configuration dialog for entering test probe information. This button is enabled only if the "Scanner module is used for the test" check box is checked.

The Drivers button allows the user to install instrument drivers. If there are no models available in the model number drop-down list, you must install drivers using the Drivers button.

The OK button accepts the selected settings and closes this dialog. Selecting the Cancel button ignores any changes made and closes this dialog.

5.5   Heat Sources

The Heat Sources menu option displays the Heat Source Configuration dialog (Figure 33) for entering Heat Source instrument information.
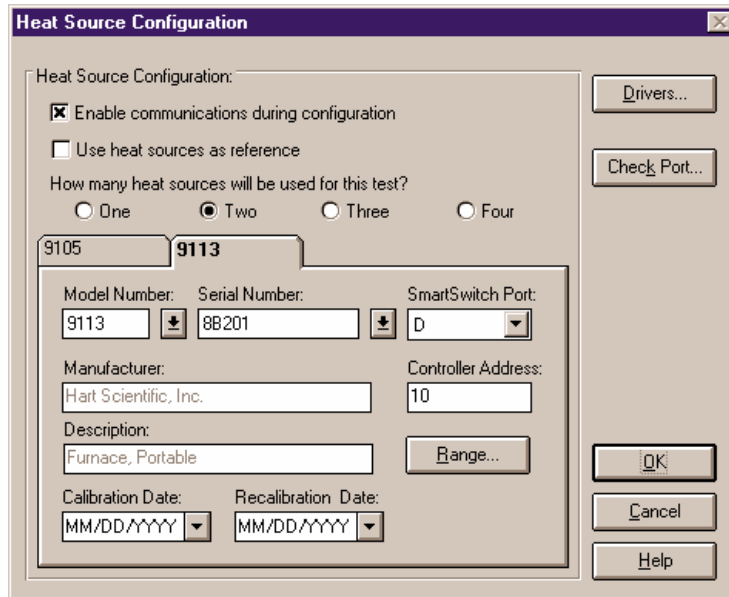
Figure 33   *Heat Source Configuration Dialog*

Enabled and Disabled

The Check Port button is disabled until the "Enable communications during configuration" check box and a Model Number are selected.

If the "Use heat sources as reference" check box is selected, the calibration and recalibration dates must be entered for all Heat Sources. Otherwise, the calibration and recalibration dates are optional.

The serial number, SmartSwitch port, calibration date, and recalibration date controls and the Range button are disabled until a model number is entered.

The OK button is disabled until all required information has been selected and entered and if an invalid calibration or recalibration date is entered when using the Heat Source(s) as the reference.

Dialog Information

The Calibrate-*it* Software can use up to four heat sources to perform a

calibration. The software expects the Reference Probe and all Test Probes to be placed in one of the heat sources. (The software only supports a single Reference Probe, therefore only one heat source can be used at a time.) Multiple heat sources are used to increase the possible temperature range of a calibration. When configuring the set-points for the calibration, each set-point must be assigned to a single heat source. When using more than one heat source, the software prompts the user throughout the calibration to move the Reference Probe and the Test Probes to the appropriate heat source.

The "Enable communications during configuration" check box is provided for verification of instrument communications during the instrument configuration process. This check box defaults to the same condition as the "Enable communications during configuration" check box on the File | Defaults Setup tab. Unchecking the check box on this dialog does not change the status of the similar check box on the File | Defaults Setup tab.

The "Use heat sources as reference" check box specifies that the Heat Source(s) entered are to be used as the reference (the sensor in the Heat Source acts as the Reference Probe). When using the Heat Source(s) as the reference, the calibration and recalibration dates are required.

Select the number of Heat Sources to be used. The maximum number of Heat Sources is four and the default is four. The number of tabs displayed corresponds to the number of Heat Sources selected.

Select the tab for the first Heat Source.

Heat Source model numbers must be selected from the drop-down list provided. The Manufacturer and Description information is filled in automatically. The model number is also displayed on the tab. If the Heat Source is external (which means the software is not able to communicate with the Heat Source), select "External" from the Model Number list and include the model number in the description. If the selected model number is a Hart Scientific Model 9112 or 9113, a field becomes visible under the SmartSwitch field for entering the controller address.

Next, select the serial number from the drop-down list provided or enter the serial number in the Serial Number box if it has not been entered previously. The Calibrate-*it* Software records serial numbers, calibration dates and recalibration dates to avoid having the user reenter the same data over and over.

The Calibration and Recalibration date information is only required if the "Use Heat Sources as reference" check box is selected. Otherwise, this information is optional.

If the recalibration date has passed and the "Show recalibration date no-tification messages" check box is selected on the File | Defaults Setup tab, the user is warned and must change the calibration and recalibration dates before the instrument can be used. The Calibration Date and Recalibration Date information is only required if the "Use heat sources as reference" check box is selected. Otherwise, this information is op-tional.

Select the SmartSwitch port to which the instrument is connected. If the instrument is connected and powered up at this time, make sure the "En-able communications during configuration" check box is selected and se-lect the Check Port button. The Calibrate-*it* Software will attempt to establish communications with the instrument. If the software is not able to communicate with the instrument, an error message is displayed. Oth-erwise, a message is displayed stating communication was established with the instrument. The SmartSwitch box is disabled if the selected model number is "External."

Note: For dual well heat sources such as the Model 9009 Drywell, each well must be configured as a separate heat source (Model 9009C and Model 9009H) with both heat sources assigned to the same SmartSwitch port. Calibrate-*it* allows the same SmartSwitch port to be assigned to more than one instrument for dual well heat sources.

The Controller Address is used only when the Heat Source selected is a Hart Scientific Model 9112 or 9113 furnace. The controller used in the Model 9112 and 9113 requires a 2-digit address when communicating through the serial port. Enter the controller address in the box provided. For more details, see the Model 9112 or 9113 User Guide.

The Range button displays the Temperature Range Configuration dialog (Figure 34) for entering the minimum and maximum set-points of the Heat Source, for enabling or disabling the cool-down temperature option, and for entering a cool-down temperature.

The OK button accepts the selected settings and closes this dialog. Se-lecting the Cancel button ignores any changes made and closes this dia-log.

Note: The Heat Source information is required and must be entered to start a calibration test. If you are using a Hart Scientific instrument as a Heat Source, set the Scan, Hold Mode, and Program Control to OFF (where applicable) and set the cut-out value to a temperature higher than the maximum set-point for the Heat Source before starting a test. Also, the user should be aware of the Approach setting. See the instrument User's Guide for details on setting these functions.

5.5.1   Temperature Range Configuration

The Temperature Range Configuration dialog (Figure 34) specifies the range of set-points for the designated Heat Source and can only be displayed from the Heat Source Configuration dialog.
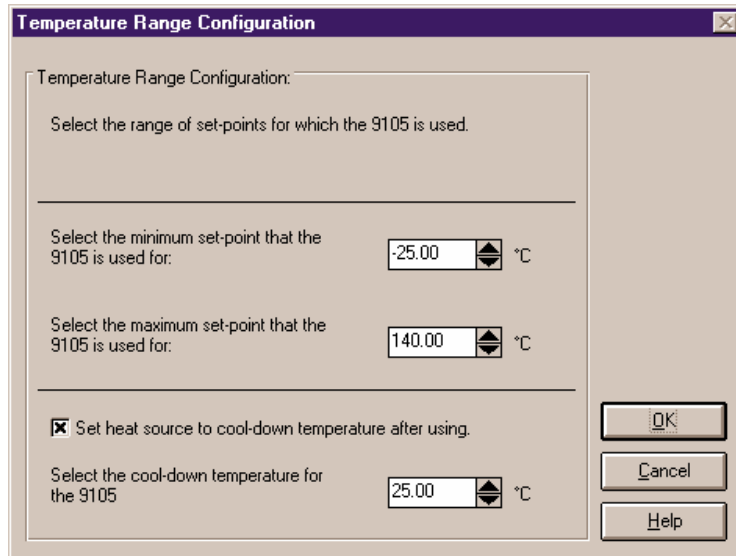
Figure 34   *Temperature Range Configuration Dialog*

Enabled and Disabled

The cool-down temperature is enabled only if the "Set Heat Source to cool-down temperature after using" check box is selected.

Dialog Information

The Temperature Range Configuration dialog specifies the usable temperature range for the selected Heat Source and allows a temperature to be entered for cooling down the Heat Source after its final set-point for a test.

The default minimum and maximum values for an external Heat Source are –330 and 2650 degrees, respectively. The default range for all other Heat Sources is defined by the driver for the Heat Source. The allowable range for all Heat Sources is –330 to 2650 degrees.

The minimum set-point defaults to the minimum temperature of the selected Heat Source. The maximum set-point defaults to the maximum temperature of the selected Heat Source. These settings may be

changed as desired to restrict the temperature range over which a heat source can be used.

Note: A warning message is displayed when the OK button is selected if the selected temperature range exceeds the default recommended temperature range for the Heat Source.

The cool-down temperature is the cool-down set-point sent to the Heat Source after the calibration test finishes using this Heat Source.

5.6 Equipment Info

The Equipment Info dialog (Figure 35) is displayed when the Configuration | Equipment Info menu option is selected or when the Equipment Info toolbar button is selected. This dialog graphically shows the configured equipment and allows the user to make or change equipment selections.

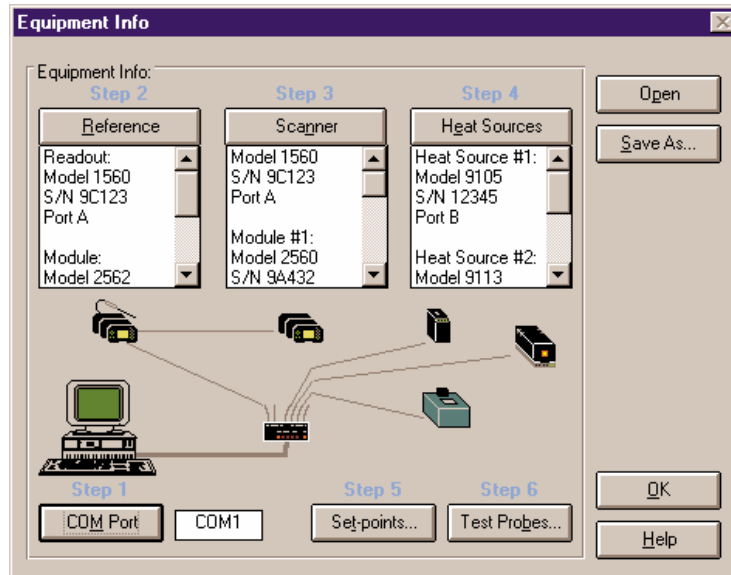**Figure 35** *Equipment Info Dialog*

Enabled and Disabled

The Set-points button is disabled until Heat Sources have been configured.

The Test Probes button is disabled until a Scanner and Scanner Modules (if applicable) have been configured.

Dialog Information

An existing configuration can be opened from this dialog by selecting the Open button.

The current configuration can be saved by selecting the Save As button. All current selections pertaining to the Communications Port, Reference, Scanner, and Heat Sources are saved to the configuration file. The set-points and the test probe configuration information are not saved in this configuration file, but can be saved into their own configuration files by selecting the Save As buttons from the Set-point Configuration and Test Probe Configuration dialogs respectively.

The test equipment, set-points, and test probes can all be configured through this dialog. To configure the test equipment, set-points, and test probes follow the steps indicated by the "Step *x*" indicators.

1. The Communications Port can be configured by selecting the COM Port button (see Section 5.2). The box on the right side of the COM Port button displays the currently selected COM Port.

2. The Reference Readout, Reference Module (if applicable) and Reference Probe can be configured by selecting the Reference button (see Section 5.3). The box below the Reference button displays the current Reference Readout, Reference Module (if applicable) and Reference Probe configuration information.

3. The Scanner and Scanner Module (if applicable) can be configured by selecting the Scanner button (see Section 5.4). The box below the Scanner button displays the current Scanner and Scanner Module (if applicable) configuration information.

4. The Heat Sources can be configured by selecting the Heat Sources button (see Section 5.5). The box below the Heat Sources button displays the current Heat Source configuration information.

5. The Set-points button can be used to configure the Set-points (see Section 6.1).

6. The Test Probes button can be used to configure the Test Probes (see Section 6.4).

Double-clicking on an instrument icon also displays the appropriate dialog for configuring the instruments.

The OK button closes the Equipment Info dialog and returns to the Calibrate-*it* Main Display.
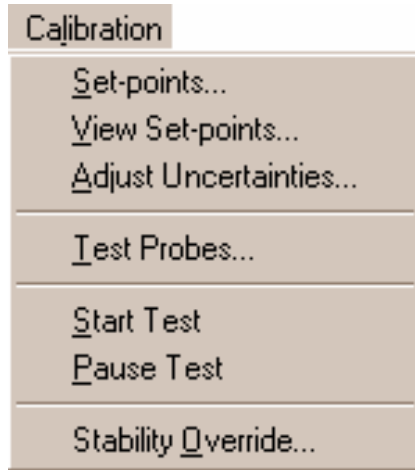
6 Calibration Menu

Figure 36 Calibration Menu

The Calibration Menu (Figure 36) provides menu options for selecting the calibration test set-points, viewing the status of the set-points, adjusting the uncertainty of each set-point, setting up the test probes, starting and stopping the calibration test, pausing and resuming the calibration test, and overriding the stability settings for the current set-point.

Enabled and Disabled

The Set-points menu option is disabled until the Heat Sources are configured.

The View Set-points and Adjust Uncertainties menu options are disabled until the set-points are entered.

The Test Probes menu option is disabled until the Scanner and Scanner Modules (if applicable) are configured.

The Start Test menu option and toolbar button are disabled until the COM port, Reference Readout, Reference Module (if applicable), Reference Probe, Scanner, Scanner Module (if applicable), Heat Sources, Set-points, and Test Probes are configured.

The Pause Test and Stability Override menu options are disabled until the calibration test is running.

6.1   50.I   **Set-points**

The Set-points menu option displays the Set-point Configuration dialog (Figure 37) for entering test set-points.
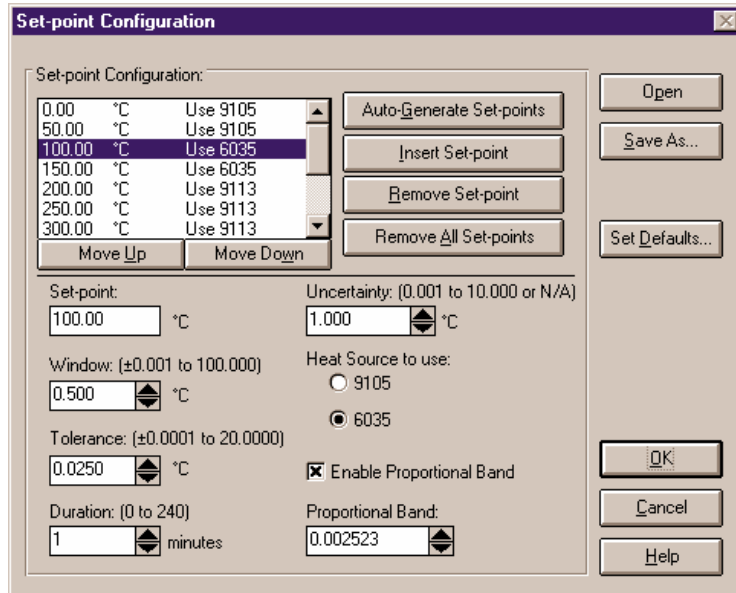
Figure 37   *Set-point Configuration Dialog*

Enabled and Disabled

The Move Up and Move Down buttons, Set-point, Window, Tolerance, Duration, Uncertainty, Heat Source, and Proportional Band controls are disabled until one or more set-points are entered in the list.

The Move Up and Move Down buttons are disabled if more than one set-point is selected.

The Heat Source to use options are displayed only when the selected set-point can be assigned to more than one Heat Source.

The Proportional Band controls are displayed only when the selected Heat Source is a bath.

Dialog Information

The user can configure up to 40 set-points for a test. The software allows set-points to be set to 2 decimal places of precision. Most Hart Scientific

heat sources can handle 2 decimal places. Some heat sources, however, cannot. The set-points for the Model 9112 and 9113 Furnaces are always rounded to the nearest degree.

By selecting a set-point in the set-point list, the set-point value, window, tolerance, duration, and uncertainty associated with that set-point appear in the appropriate boxes. If more than one Heat Source can be used for the set-point, the other Heat Source(s) are also shown. If the Heat Source to use is a bath, the "Enable Proportional Band" check box is displayed. If this check box is selected, the Proportional Band box is enabled. If not selected, the Proportional Band box is disabled.

A set-point is defined as the temperature that the Reference Probe should be reading before the software begins taking measurements from the Reference Probe and the Test Probes. Every set-point must be assigned to one of the configured Heat Sources. When the test processes a set-point, the Reference Probe and all Test Probes must be placed in the selected Heat Source for that set-point.

Each set-point has its own window, tolerance, duration, uncertainty, and proportional band settings that can be set independent from the other set-points. The software uses some of these parameters to determine when measurements can begin. Refer to Figure 38, Example of Duration, Tolerance, and Window Settings.

The window parameter defines the desired accuracy to the set-point value (allowable difference between the set-point and the Reference Probe reading). The Reference Probe must be within ± the value of the window parameter of the set-point value before the software will begin taking measurements. The actual set-point of the Heat Source may be adjusted by the software automatically in order to bring the Reference Probe readings within this window. For External Heat Sources the software prompts the user to adjust the Heat Source set-point.

The tolerance and duration parameters define the desired stability of the Reference Probe readings. These parameters are used by the software to determine when the Reference Probe has stabilized at the current temperature. The tolerance parameter defines how much the Reference Probe readings may vary and still be considered "stable". The duration parameter is the length of time that the Reference Probe readings must be "stable" before any measurements are taken.

The uncertainty parameter is not actually used by the software in any way. In order for the Report of Calibration produced by the software to meet the ANSI/NCSL Z540-1 specification, the uncertainty at each set-point must appear on the report. The value entered in the uncertainty box for each set-point appears on the Report of Calibration when printed. To determine the uncertainty at a set-point, the uncertainty of each piece
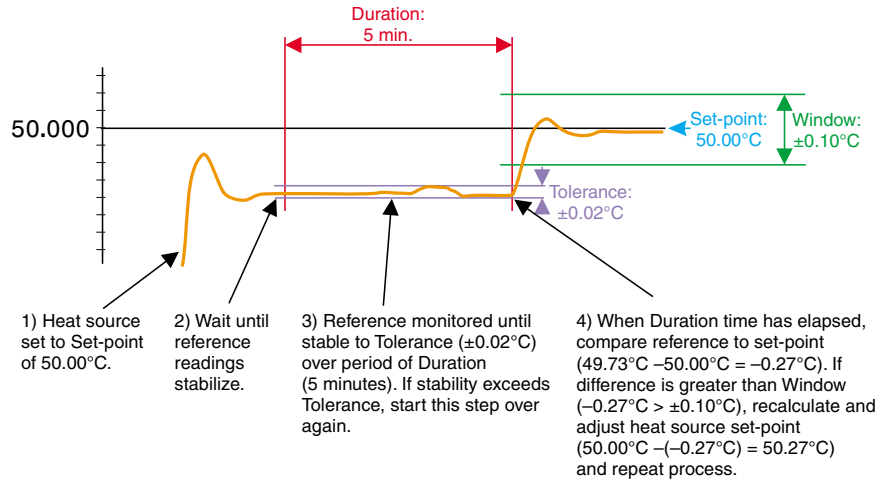
Figure 38 *Example of Duration, Tolerance, and Window Settings*

of equipment used to take measurements at the set-point (i.e. Reference Readout, Reference Probe, Scanner, Heat Source, etc.) must be known. The overall uncertainty is generally the sum of these individual uncertainties.

The proportional band parameter can be used only when the selected Heat Source for a set-point is a Hart Scientific bath. The controller for a bath can be "fine tuned" for optimal performance at a specific set-point by adjusting the proportional band parameter. By selecting the "Enable Proportional Band" check box, the software will set the proportional band parameter of the bath to the specified value when the test begins to process the respective set-point. If the "Enable Proportional Band" check box is not checked, the proportional band parameter of the bath will not be changed.

Set-points are entered in the same temperature scale (°C or °F) as the Heat Sources and reference scale. To change this scale, see the Scale menu option (Section 7). The default value for this scale can be changed on the File | Defaults Setup tab.

Set-points appear in the list in the order in which they will be used during the test.

Every time this dialog is displayed, each set-point is checked to make sure it falls within the range of the Heat Source that was previously selected for the set-point. If any of the Heat Source configuration information has changed, the user may be required to reselect the Heat Source to which each set-point is assigned.

Clicking the OK button performs a check to determine if every set-point has been assigned to a Heat Source. If so, the selected settings are saved and this dialog is closed. Selecting the Cancel button ignores any changes made and closes this dialog.

Note: The set-points and corresponding parameters are required to start a calibration test.

6.1.1   Adding Set-points

Set-points can be entered manually or generated automatically. The set-points appear in the set-point list in the same order that they will be used during a test.

When adding set-points, the window, tolerance, duration and uncertainty values default to the values defined on the File | Defaults Set-points tab. The File | Defaults Set-points tab can be accessed by selecting the Set Defaults button.

To add a set-point to the set-point list manually, select the Insert Set-point button. The cursor is placed in the set-point box. Enter the value of the new set-point and **press the Enter key**. *To abort inserting a new set-point, press the Escape key.*

To insert a set-point between two set-points, select the set-point before which the new set-point should be placed and click the Insert Set-point button.

To add a set-point to the top of the list, select the first set-point in the list.

To add a set-point to the end of the list, select the <new set-point> item in the list.

If the new set-point cannot be used by any of the Heat Sources a mes-sage box appears and the set-point is not added to the list. If two or more Heat Sources can be used for the new set-point the set-point is added to the list and the user must select the Heat Source for the set-point to use. If only one Heat Source can be used for the new set-point, the Heat Source is automatically chosen and appears in the set-point list with the set-point. Otherwise, all Heat Sources that can be used for the new set-point appear.

The default values for the window, tolerance, duration and uncertainty are filled in automatically.

If the values for the window, tolerance, duration or uncertainty need to be changed, select the appropriate box and enter the correct value. **Press the Enter key** to accept the new value.

If applicable, select the Heat Source to use for this set-point. *A Heat*

Source must be selected for each set-point.

If the Heat Source to use for this set-point is a bath, you can change the value of the proportional band. Check the proportional band check box and enter a value for the proportional band. If the proportional band check box is not checked, the proportional band value for the bath is not be changed for this set-point.

To automatically generate a list of set-points, select the Auto-Generate Set-points button. (See Section 6.1.7)

6.1.2   Removing Set-points

To remove a single set-point from the set-point list, follow the steps below:

1.   Select the set-point in the set-point list.

2.   Select the Remove Set-point button. A message box appears asking for confirmation to remove the selected set-point. Select "Yes" if you want to remove the set-point or select "No" to cancel.

To remove all set-points from the set-point list, select the Remove All Set-points button.

A message box appears asking for confirmation to remove all set-points. Select "Yes" if you want to remove all set-points or select "No" to cancel.

6.1.3   Editing Set-points

To edit the settings associated with a set-point, follow the steps below:

1.   Select the set-point in the set-point list.

2.   Make the changes in the boxes below and **press the Enter key** after each change to accept the new value.

To edit the settings for multiple set-points, follow the steps below:

1.   Hold down the control key while selecting set-points from the list.

2.   Type the new values in and **press the Enter key** after each change to accept the new value.

6.1.4   Moving Set-points

To move a set-point from one position in the list to another, follow

the steps below:

1. Select the set-point in the set-point list.

2. Press the Move Up or Move Down button.

3. Repeat step 2 until the set-point is in the desired position.

Note: Only one set-point can be moved at a time.

6.1.5 Saving Set-points to a File

To save set-points to a file, select the Save As button. The Save As button displays the Windows® Save As dialog. The current set-points and all associated information (window, tolerance, duration, uncertainty, etc.) can be saved to a file with your choice of filename. The extension of the set-point file is .STC for set-points saved in °C and .STF for set-points saved in °F. See Section 4.2.2, Set-point Configuration File, for additional information on saving set-points.

Note: The temperature scale in which the set-points were created is also saved in the set-points file.

6.1.6 Opening a Set-points File

To open a Set-points file, select the Open button. The Open button displays the Windows® Open dialog. A previously saved set-point configuration can be opened. See Section 4.2.2, Set-point Configuration File, for additional information on opening a set-point configuration file.

6.1.7 Auto-Generate Set-points

The Auto-Generate Set-points dialog (Figure 39) is displayed when the Auto-Generate Set-points button is selected from the Set-point Configuration dialog.
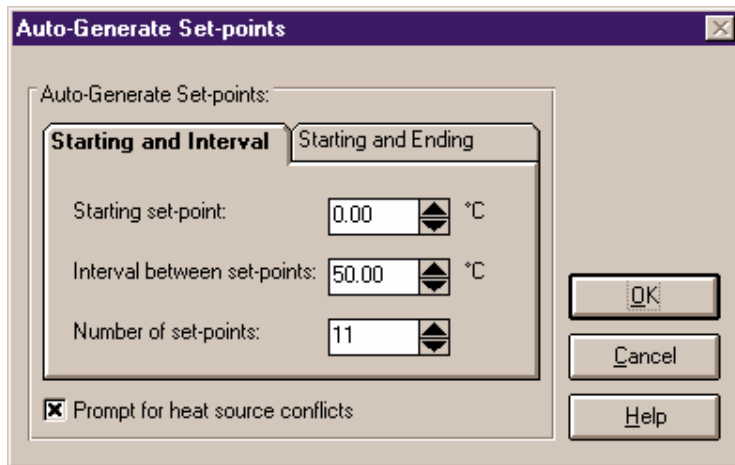
Figure 39 *Auto-Generate Set-Points Dialog*

Enabled and Disabled

All controls are enabled at all times.

Dialog Information

The Auto-Generate Set-points dialog provides two methods for automatically generating set-points. The two methods are: 1) Starting and Interval or 2) Starting and Ending. The user may also select whether to be prompted for heat source conflicts (if a set-point can be used by more than one Heat Source).
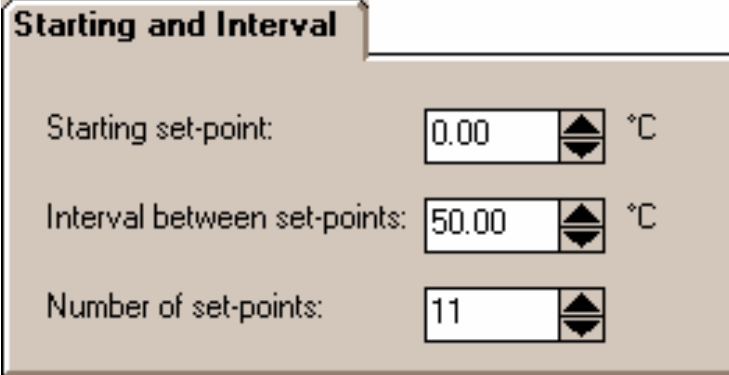
The "Prompt for heat source conflicts" check box allows the user to select the Heat Source to which a given set-point is assigned in the case that the ranges of two or more Heat Sources overlap. The default state of the "Prompt for heat source conflicts" check box is the same as the state of the "Prompt for heat source conflicts" check box on the File | Defaults Set-points tab.

When the "Prompt for heat source conflicts" check box is selected, each set-point is compared to the Heat Source ranges as it is generated. If the set-point can be used by more than one Heat Source, the Set-point Options dialog (Figure 42 on page 103) is displayed and a Heat Source must be chosen. If a bath is chosen as the Heat Source to use, the proportional band check box and value are shown. If the set-point can only be achieved by one Heat Source, that Heat Source is automatically as-

signed to the set-point. If none of the Heat Sources can achieve the set-point, a message is displayed and the current set-point is not added to the list. Auto-generation continues with the next set-point value.

6.1.7.1   Starting and Interval

The Starting and Interval tab (Figure 40) is for generating set-points based on a starting set-point, an interval between set-points, and the number of set-points.

Figure 40   *Starting and Interval Tab*

Enabled and Disabled

All controls on the Starting and Interval tab of the Auto-Generate Set-points dialog are enabled when the tab is displayed.

Dialog Information

The Starting Set-point is the first set-point to be generated. If the starting set-point is not within the range of the Heat Sources, the user is notified when the OK button is selected. The Interval Between Set-points is the "space" between consecutive set-points. The number of set-points is the total number of set-points to be generated.
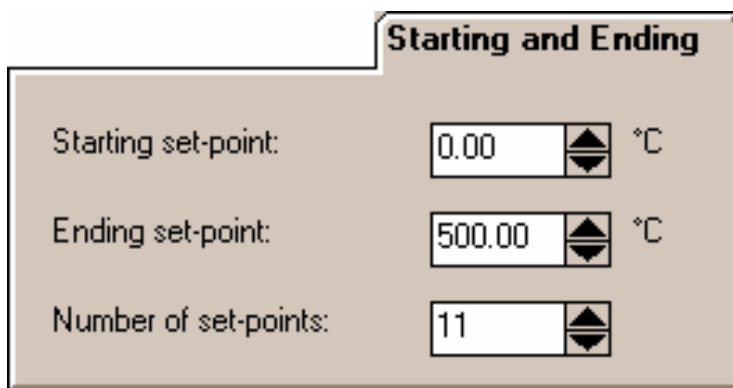
To automatically generate set-points using the Starting and Interval tab, follow the steps below:

1.   Select the Starting and Interval tab.

2.   Enter the starting set-point. Press the Enter key. *The starting set-point must fall within the range of one or more Heat Sources.*

3. Enter the interval between the set-points. Press the Enter key. (For decreasing set-points, this value may be negative.)

4. Enter the number of set-points to generate (2–40). Press the Enter key.

5. Select the OK button to generate the set-points.

6.1.7.2   Starting and Ending

The Starting and Ending tab (Figure 41) is for generating set-points based on a starting set-point, an ending set-point, and the number of set-points.

Figure 41   *Starting and Ending Tab*

Enabled and Disabled

All controls on the Starting and Ending tab of the Auto-Generate Set-points dialog are enabled when the tab is displayed.

Dialog Information

The Starting Set-point is the first set-point to be generated. If the starting set-point is not within the range of the Heat Sources, the user is notified when the OK button is selected. The Ending Set-point is the last set-point to be generated. If the ending set-point is not within the range of the Heat Sources, the user is notified when the OK button is selected. The number of set-points is the total number of set-points to be generated.

To automatically generate set-points using the Starting and Ending tab, follow the steps below:

1. Select the Starting and Ending tab.

2. Enter the starting set-point. Press the Enter key. *The starting set-point must fall within the range of one or more Heat Sources.*

3. Enter the ending set-point. Press the Enter key. *The ending set-point must fall within the range of one or more Heat Sources.*

4. Enter the number of set-points to generate (2 - 40). Press the Enter key.

5. Select the OK button to generate the set-points.

6.1.8   Set-point Options

The Set-point Options dialog (Figure 42) is used to resolve Heat Source conflicts for a given set-point when more than one Heat Source can be used for the set-point.

Figure 42 *Set-point Options Dialog*
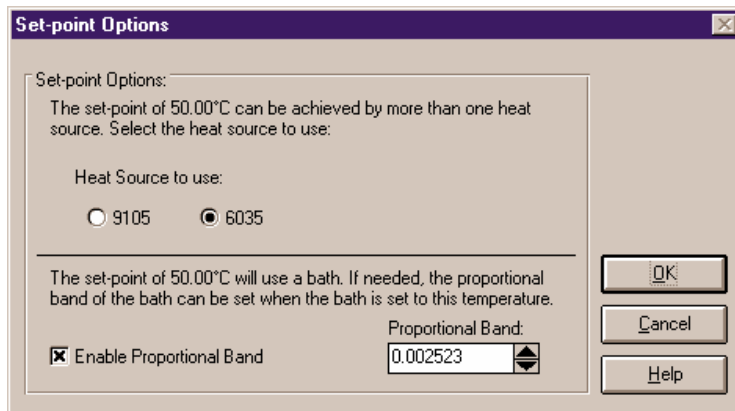
Enabled and Disabled

The proportional band section is displayed only when the selected Heat Source is a bath. The Proportional Band box is enabled only when the "Enable Proportional Band" check box is selected.

Dialog Information

The Set-point Options dialog is displayed when set-points are being automatically generated, read in from a file, or if any Heat Source configura-

tion information has changed that would require the user to select a Heat Source to use for a given set-point. This dialog is used to resolve which Heat Source to use for a given set-point when more than one Heat Source can achieve that set-point.
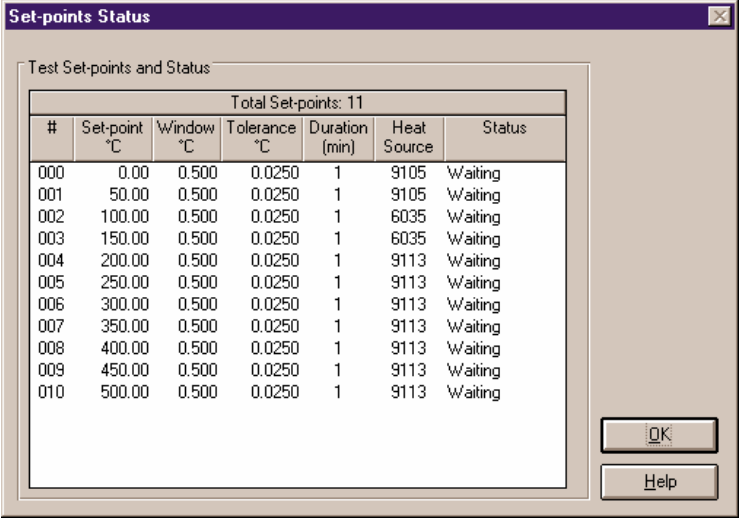
When selecting a Heat Source to use, selecting a Heat Source other than a bath immediately closes the dialog. This is done to speed up the process of selecting Heat Sources to use. If the selected Heat Source is a bath, the proportional band information is displayed and the user is allowed to setup the proportional band settings at this time. In this case, the OK button must be selected to accept the settings.

The "Enable Proportional Band" check box is visible only when the set-point has been assigned to a bath. If the "Enable Proportional Band" check box is selected a proportional band value is expected to be entered. The proportional band value is sent to the bath during the test process when the bath approaches the set-point.

The OK button returns to the Set-point configuration dialog and the next set-point is checked.

6.2 View Set-points

The View Set-points menu option displays the Set-points Status dialog (Figure 43) for monitoring the status of each set-point.

Figure 43 *Set-points Status Dialog*

Enabled and Disabled

Viewing the set-points is enabled only after the set-points are entered on the Set-point Configuration dialog.

Dialog Information

The Set-points Status dialog displays the number of set-points and the status of each set-point. The set-points appear in the order that they are used during a test. The set-point number, set-point value, window, tolerance, duration, the Heat Source used, and the status of the set-point are displayed.

If during the process of a test, a set-point is overridden by clicking the "Take Reading Now" check box on the Stability Override dialog, the tolerance and duration for that set-point contain the word "OVERRIDE" and a footnote will appear on the Report of Calibration stating that the stability parameters were overridden for the indicated set-points.

6.3   Adjust Uncertainties

The Adjust Uncertainties menu option displays the Adjust Uncertainties for Test dialog (Figure 44) for conveniently changing the uncertainty at each set-point.
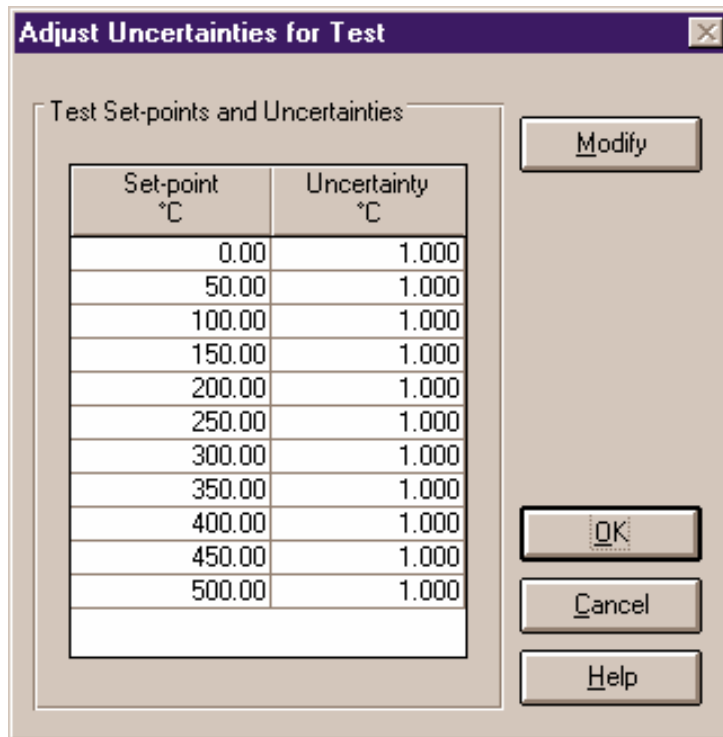
Figure 44 *Adjust Uncertainties for Test Dialog*

Enabled and Disabled

The Adjust Uncertainties menu option is enabled only after the set-points are entered from the Set-point Configuration dialog.

Dialog Information

The Adjust Uncertainties for Test dialog allows the uncertainty for each set-point to be changed conveniently. The uncertainties can be modified prior to running a calibration test or during the calibration test. After a set-point has been used during a test, changing the uncertainty for that set-point has no effect. If this set-point is used for another test, the new uncertainty is used for the set-point.

To adjust the uncertainty for a set-point, follow the steps below:

1. Use the scroll bar to find the set-point(s) for which the uncertainty is to be modified.

2. Select the Modify button. This button changes to a Save button.

3. Select the cell containing the uncertainty value to modify. Type in the new value. To set the uncertainty to "N/A", clear the contents of the appropriate cell, then use the arrow keys to move to another cell.

4. Repeat step 3 for other set-point uncertainties as needed.

5. Select the Save button to save the changes or select the Cancel button to cancel any changes.

Note: The Uncertainty parameter is not actually used by the software in any way. In order for the Report of Calibration produced by the software to meet the ANSI/NCSL Z540-1 specification, the uncertainty at each set-point must appear on the report. To determine the uncertainty at a set-point, the uncertainty of each piece of equipment used to take measurements at the set-point (i.e. Reference Readout, Reference Probe, Scanner, Heat Source, etc.) must be known. The overall uncertainty is generally the sum of these individual uncertainties.

6.4 Test Probes

The Test Probes menu option displays the Test Probe Configuration dialog (Figure 45) for entering the test probe information and can be displayed from the Calibration menu, Scanner Configuration dialog, or Scanner Module Configuration dialog.
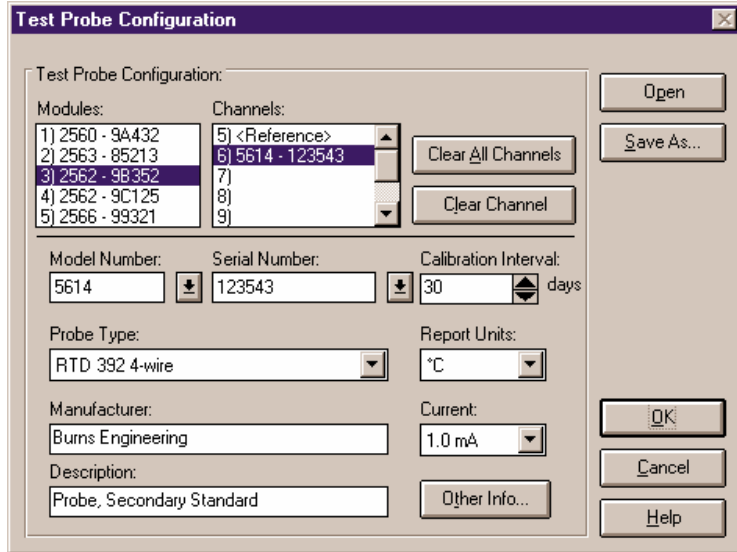
Figure 45 *Test Probe Configuration Dialog*

Enabled and Disabled

The Scanner/Modules list is disabled if the "Do not use scanner – prompt to manually enter all readings" option on the Scanner Configuration dialog is checked.

The serial number, calibration interval, probe type, report units, manufacturer, and description boxes as well as the Other Info button are disabled until a model number is entered.

All controls including the Clear Channel button are disabled if the channel with the Reference Probe marker, <Reference>, is selected.

Dialog Information

The Test Probe Configuration dialog is used for entering information pertaining to the test probes (UUTs) to be calibrated.

If the "Do not use scanner – prompt to manually enter all readings" check box on the Scanner Configuration dialog is selected, the list in the upper left corner is disabled and the list in the upper right corner is entitled "Probes". The Probes list contains entries for up to 100 test probes.

If the instrument selected as the Scanner uses Scanner Modules, the list

in the upper left corner is entitled "Modules" and displays all configured Scanner Modules. Otherwise, this list is entitled "Scanner" and displays only one item: the instrument selected as the Scanner. The list in the upper right corner is entitled "Channels". The Channels list box contains one entry for each channel on the selected Scanner instrument or Scanner Module.

If the same instrument is being used as the Reference Readout and the Scanner, the channel that is currently configured with the Reference Probe appears in the Channel list with the <Reference> marker. *A test probe cannot be configured on this channel.* When this channel is selected, the Clear Channel button, Model Number, Serial Number, and other controls on this dialog are disabled.

The Clear All Channels button removes all test probe configuration information from **all** channels, regardless of the Scanner or Scanner Module that is currently selected. This button may be used to make sure all channels are cleared before beginning to configure test probes.

The Clear Channel button removes test probe configuration information from the currently selected channel only.

If a Scanner instrument is being used, select the Scanner or Scanner Module and the channel to which the test probes are connected. The channels in the Channels list are numbered using the actual channel number of the Scanner instrument.

If a Scanner instrument is not being used, select any one of the entries in the Probes list. The order of the test probes is not important. The software will prompt the user to enter readings for test probes in the order they appear in the Probes list on this dialog. When prompting to enter readings, the probe model and serial number are displayed.

Next, select the test probe model number using the drop-down list provided. The Probe Type, Manufacturer and Description information is filled in automatically. If the model number does not appear on the list, enter the model number in the Model Number box. The software only displays probes of the type that can be used on the selected Scanner or Scanner Module. If a Scanner instrument is not being used, the user can select from all possible probe types. Select the probe type and enter the manufacturer and description for the test probe in the Manufacturer and Description boxes provided. The Calibrate-*it* Software records model numbers, probe type, manufacturer and description information to avoid having the user reenter the same data over and over.

The probe type must be selected from the list provided. Available probe types depend on the type of Scanner or Scanner Module selected. Possible probe types are:

- SPRT
- RTD 385 3-wire or 4-wire
- RTD 392 3-wire or 4-wire
- RTD 2-wire, 3-wire or 4-wire
- Other PRT/RTD
- Thermistor 3-wire or 4-wire
- Other Thermistor
- Thermocouple Types B, E, J, K, N, R, S,T, or AuPt
- Other Thermocouple
- Liquid in Glass (only if no Scanner is being used)
- Bi-metallic (only if no Scanner is being used)
- Other

Next, select the serial number from the drop-down list provided or enter the serial number in the Serial Number box if it has not been entered previously. Select the Calibration Interval, Report Units and Current or CJC Readings for the test probe. The Calibrate-*it* Software records serial numbers, calibration intervals, report units, and current/CJC settings to avoid having the user reenter the same data over and over.

The calibration interval is the number of days, from the date the probe is calibrated, until the next calibration is due. The calibration interval can be incremented in steps of 30 days or entered manually. The allowable range is 0 to 730 days (2 years). If the calibration interval is set to 0, the Recall Date does not print on the Report of Calibration.

The report units are the scale of the test probe readings. The possible choices are:

- °C
- °F
- K
- Ohms (except thermocouple, LIG, and Bi-metallic probes)
- mV (except resistance, LIG, and Bi-metallic probes)

During a test, the software attempts to verify that the test probe and reference probe readings are in the correct scale. For this reason, it is important to manually set each scanner channel to read in the appropriate scale before starting a calibration test.

Note: If the Generate-*it* Software is going to be used to calculate coeffi-

cients and generate tables, the test probe report units must be in one of the non-temperature scales (Ohms or mV).

The current setting is available if the test probe is a resistance type probe. This is the excitation current used when taking readings from the test probe. **Make sure the setting in the Scanner instrument matches the setting in the software for each channel before starting a test.** The current must be selected from the list provided. Available current settings depend on the type of Scanner or Scanner Module selected. Possible currents are:

- 2µA, 10µA, 30µA

- 0.05 mA, 0.1mA, 0.2mA, 0.5mA, 1mA, 1.4mA, 3mA, 5mA

- Auto

Note: The excitation current should be set manually in the Scanner instrument before starting the test because not all Scanner instruments support setting the current via serial communication commands.

The CJC reading setting is available if the test probe is a voltage type probe. This is the Cold Junction Compensation setting. This setting is used to tell Calibrate-*it* whether or not to take CJC readings at each temperature. Select "Enabled" if CJC readings should be taken, or select "N/A" if CJC readings are not required or compensation is handled internally within the Scanner instrument for this test probe.

Generally, the CJC option should be set to "N/A" when the report units for a given test probe are in temperature and "Enabled" when the report units are in voltage. Hart Scientific instruments automatically account for the CJC value when configured to display measurements in temperature, but do not account for the CJC value when configured to display measurements in voltage.

Note: For the Hart Scientific Model 1560 *Black Stack* and Model 1529 "Chub-E4", CJC readings are ALWAYS taken in °C. See the User's Guide for more information about the CJC settings.

The Other Info button displays the Customer Information dialog (Figure 48) for entering the received condition, for selecting the test probe as a check standard, for entering a customer order ID, and for entering customer name and address. See Section 6.4.1 for more information on this dialog.

Continue configuring the other channels, one by one, in this same manner.

Note: If the user attempts to select a new channel in the Channel list before completing the configuration for the current channel, the Incomplete Test Probe Setup dialog (Figure 46 on page 112) is displayed. Check the

list to determine what information still needs to be filled in. Then select the OK button and proceed to complete the test probe configuration for the current channel.
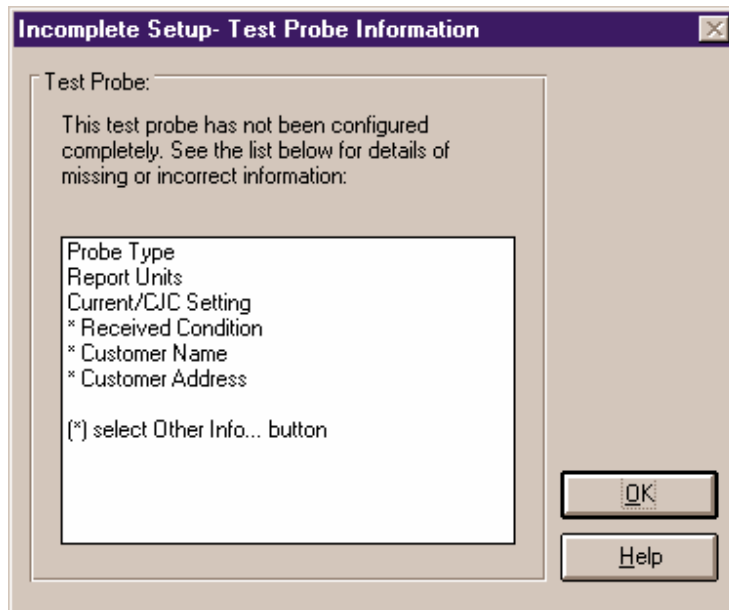
Figure 46 *Incomplete Setup - Test Probe Information Dialog*

The Open button can be used to open test probe configuration files. If the "Prompt for Order ID" check box is selected on the File | Defaults Setup tab, the Enter Order ID dialog (Figure 47) appears when a configuration file is opened, displaying the probe model and serial number. Enter the purchase order, production order, work order or other order identifying information. The maximum number of characters allowed is 10.
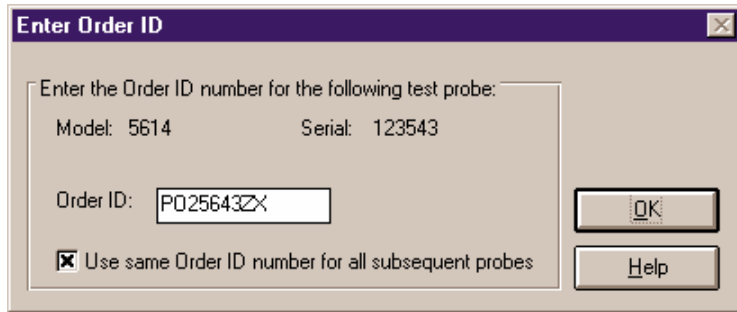
Figure 47 *Enter Order ID Dialog*

If the "Use same Order ID number for all subsequent probes" check box is selected, the number entered will be used for all test probes read in from the configuration file. If not selected, this dialog will appear for each test probe read in from the configuration file. The default setting of this check box is set on the File | Defaults Setup tab.
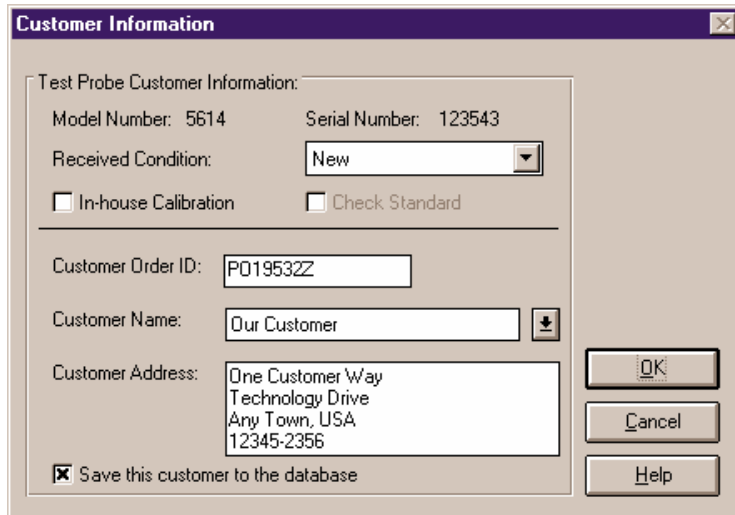
Selecting the OK button closes the Enter Order ID dialog and continues loading the configuration file.

The Save As button is used to save the current test probe configuration to a file. If the same set of test probes are always calibrated together, this provides a fast, convenient way to setup test probes.

The OK button accepts the settings and closes this dialog. If the settings for the current channel are incomplete, the Incomplete Setup - Test Probe Information dialog (Figure 46) is displayed. Check the list to determine what information still needs to be filled in. Then select the OK button and proceed to complete the test probe configuration for the current channel.

6.4.1   Customer Information

The Customer Information dialog (Figure 48) is for entering additional test probe information and can only be displayed from the Test Probe Configuration dialog.

Figure 48 *Customer Information Dialog*

Enabled and Disabled

The customer name and customer address boxes are disabled if the "In-house Calibration" check box is selected.

The "Check Standard" check box is disabled if the "In-house Calibration" check box is not selected.

Dialog Information

The Customer Information dialog is displayed from the Test Probe Configuration dialog by selecting the Other Info button.

The information on this dialog is required and must be entered before a calibration test can be started.

The received condition, customer order ID, customer name, and customer address are printed on the Report of Calibration.

The Received Condition is the condition of the probe prior to this calibration. The choices are:

- In Tolerance
- Out of Tolerance
- New

- Recalibration

The "In-house Calibration" check box is for designating the probe as belonging to the company performing the calibration. The customer name and address are automatically filled in with the company name and company address form the File | Defaults User tab if the "In-house Calibration" check box is selected.

The "Check Standard" check box is used to indicate that the probe on this channel is a statistical check standard. Selection as a check standard does not alter the measurement process but allows the Generate-*it* Software to identify the data for exporting.

The Customer Order ID provides a place for entering a purchase order, sales order, or other identifying information. The maximum number of characters allowed is 10.

The Customer Name is the name of the company for which the calibration is being performed.

The Customer Address is the address of the company for which the calibration is being performed.

The customer name and address are pre-filled with the company name and company address from the File | Defaults User tab if the "In-house Calibration" check box is selected.

If the "Save this customer to the database" check box is selected, the customer name and address are saved and can be used when configuring test probes for future calibration tests.

The OK button accepts the settings and closes this dialog. If the settings for the current channel are incomplete, the Incomplete Setup - Test Probe Information dialog (Figure 46) is displayed. Check the list to determine what information still needs to be filled in. Then select the OK button and proceed to complete the test probe configuration for the current channel.

Selecting the Cancel button ignores any changes made and closes this dialog.

6.5 ▶ Start Test / ■ Stop Test

The Start Test menu option checks for complete instrument configurations, checks communications with the instruments, and displays the Test Information dialog (Figure 49). The Start Test menu option changes to Stop test once a calibration test begins. Selecting the Stop Test menu option aborts the calibration test.

Enabled and Disabled

The Start Test menu option and toolbar button are disabled until the Reference, Scanner, Heat Sources, set-points and test probes are configured.

The Stop Test menu option is available only when a test is running.

Dialog Information

Before selecting the Start Test menu option, make sure each instrument is connected to the SmartSwitch port to which it was assigned. Make sure that the SmartSwitch is connected to the computer's COM port to which it was assigned.

When the Start Test menu option is selected, a number of checks are performed. First, the software checks the COM Port, Reference Readout, Scanner and Heat Source configurations to make sure no required information is missing. If there is any missing information, the Incomplete Setup - Setup Information dialog (Figure 50) is displayed. See Section 6.5.1.1 for more information about this dialog.

Next, the software checks the set-points and test probes for complete information. If there is any missing information, a message is displayed indicating what information needs to be completed.

The software then checks to make sure that every instrument is configured to its own SmartSwitch port. If more than one instrument is configured to a SmartSwitch port, the SmartSwitch Port Conflict dialog (Figure 51) is displayed. See Section 6.5.1.2 for more information about this dialog.

At this point, the software attempts to establish communications with each instrument (except External Heat Sources). If communications fail, a message is displayed indicating the instrument that was not responding. Check all cable connections, baud rate settings, SmartSwitch port, etc. then select the Retry button. If failure persists, select the Cancel button to return to the Calibrate-*it* Main Display. From the Configuration menu, select the menu option for the instrument that was not communicating. Use the Check Port button on the configuration dialog to attempt to communicate with the instrument.

If the current instrument configuration has not been saved, the software asks if the user wants to save this configuration. Selecting Yes will display the Windows® Save As dialog. Enter the filename and select the OK button. If this configuration does not need to be saved, select the No button.

Note: The current configuration is always saved at this point to a file named 9932LAST.CFG. Opening this configuration file will always restore

the configuration settings most recently used to run a test.

The Test Information dialog is then displayed.

6.5.1 Test Information

The Test Information dialog (Figure 49) is displayed when the Calibration | Start Test menu option is selected and the software determines that all required information has been entered and communication with all instruments has been established. This dialog prompts the user for some information specific to the test that will be performed.

Figure 49 *Test Information Dialog*

Enabled and Disabled

The Test number box is disabled if the "Generate test number automatically" check box is selected.

The OK button is disabled until the technician name, test procedure, test date, test number and ambient temperature and humidity have been entered.

Dialog Information

First, select whether or not the calibration to be performed is a full or partial calibration by selecting the appropriate option. Full calibration typically refers to a calibration performed over the full temperature range of

the test probes.

Enter the name of the technician performing this test. This name is automatically filled in using the name from the File | Defaults User tab. This name appears on the Report of Calibration below one of the signature lines.

The Test Date is the date the test begins and defaults to today's date. If the date is incorrect, check the clock on the computer.

In the Test Procedure box, enter the name or document control number of the in-house document that describes the method or procedure followed when performing this test.

Select whether or not to "Preheat heat sources". If the "Preheat heat sources" check box is selected, the software looks one set-point ahead during the test to determine if the next set-point is used by a different Heat Source than the current set-point. If so, the Heat Source for the next set-point is preheated to that set-point. If an External heat source is being used, the user is prompted to manually set the temperature of the heat source.

If the "Generate test number automatically" check box is selected, the test number is automatically generated by using the initials of the person performing the test, the four digits of the current year, two digits of the current month, and a three digit sequence number. The test number box is disabled.

If the "Generate test number automatically" check box is not selected, the test number box is enabled and the user must enter a test number.

Paragraph or Notes text files can be opened or saved from the Text Editor dialog (Figure 14 on page 48). If a Paragraph text file has been selected on the File | Defaults Reports tab, the file contents are displayed in the Text Editor. Otherwise, the Text Editor box is blank until the user begins typing or opens an existing file. Paragraph and Notes text files are specific to the calibration test and are displayed on every Report of Calibration for this test.

Note: Paragraph and Note text files **must** be saved to a file in order to appear on the Report of Calibration!

Enter the ambient temperature, temperature scale, and humidity in the boxes provided. This information is also printed on the Report of Calibration.

Selecting the OK button checks to make sure the test number is unique and then begins the test process.

Note: If the test number is not unique (a test already exists with that test number), the user is prompted to overwrite the existing test or to enter a

new test number. Selecting to overwrite the existing test must be confirmed because overwriting a test is permanent; all data from the existing test is deleted!

Selecting the Cancel button returns to the Calibrate-*it* Main Display without starting a test.

Note: The test number, calibration range, calibration date, ambient temperature, ambient humidity, and technician name are required to be filled in to start a calibration test. The Paragraph and Notes are optional.

6.5.1.1   Incomplete Setup

The Incomplete Setup - Setup Information dialog (Figure 50) appears after the Calibration | Start Test menu option or toolbar button is selected only if the test equipment configuration information is incomplete.
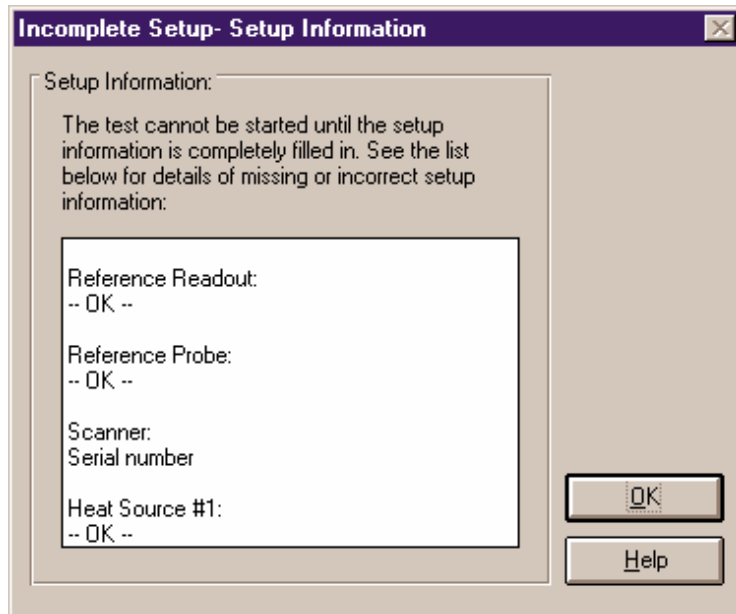

Figure 50   *Incomplete Setup - Setup Information Dialog*

Enabled and Disabled

All controls on this dialog are enabled.

Dialog Information

The list contains details of the missing information. Scroll through the list to see what information needs to be entered before a test can begin. To

complete the setup information, select the OK button. Then select the appropriate option from the Configuration or Calibration menu.

6.5.1.2 SmartSwitch Port Conflict

The SmartSwitch Port Conflict dialog (Figure 51) appears after the Calibration | Start Test menu option or toolbar button is selected and if the same SmartSwitch port has been selected for more than one instrument.
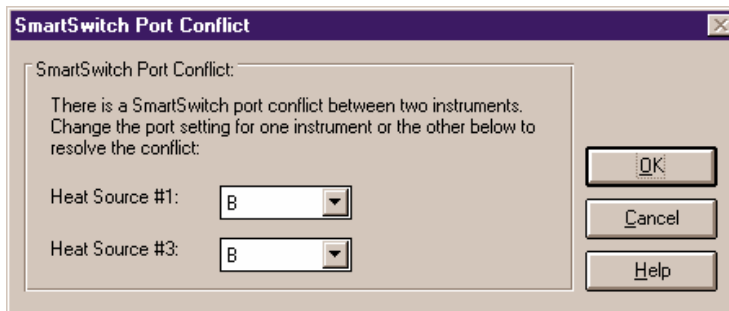

Figure 51 *SmartSwitch Port Conflict Dialog*

Enabled and Disabled

All controls on this dialog are enabled.

Dialog Information

The user must select a new SmartSwitch port for either the first or second instrument listed, then select the OK button.

Selecting the Cancel button returns to the Calibrate-*it* Main Display.

6.6 Test Process

The Test Process flowchart (Figure 52) details the process of performing a test. This process consists of setting up test parameters, performing various test functions, reading and graphing the reference, displaying the Unit Under Test (UUT) reading, and completing the test.

At this point, the user is prompted to make sure each Scanner channel has been configured to read the proper report units for the test probes. Before continuing, check each channel on the Scanner instrument to ensure proper configuration.

The only steps in the process that can be disabled by the user are the steps of displaying the UUT reading and of self-heating. The Read and
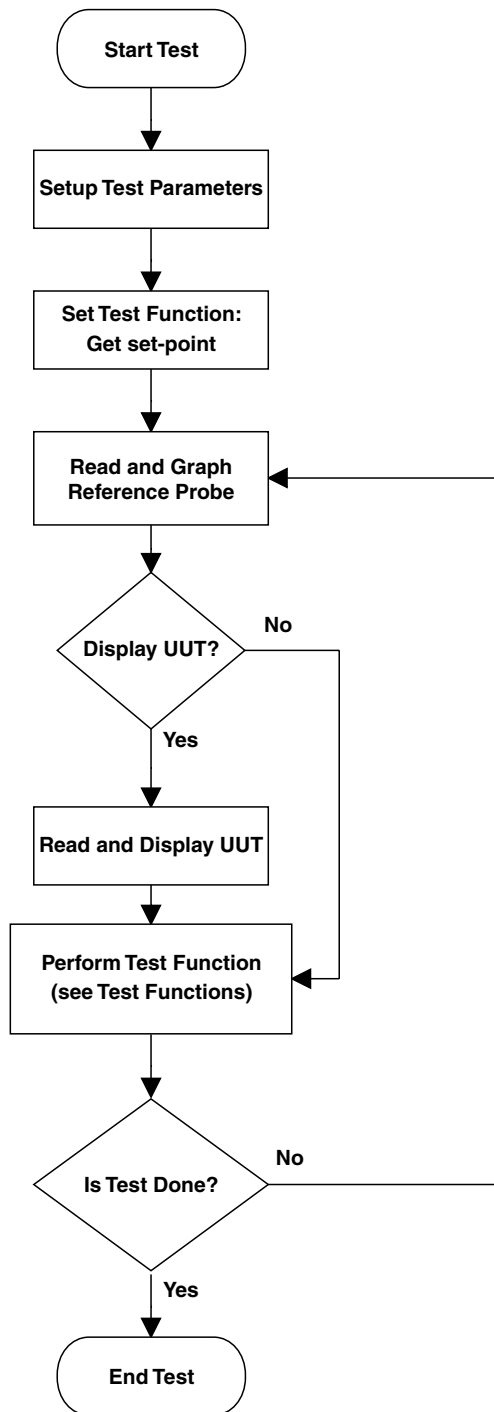
Figure 52 *Test Process Flowchart*

Display UUT reading step only occurs when the "Display reading of selected test probe" check box on the Calibrate-*it* Test Display is checked. This check box is automatically unchecked after one reading has been taken from the selected test probe. The self-heat test function is only used with resistance-based test probes. This function can be bypassed for all test probes by unchecking the "Self-heat test probes (UUTs) before taking readings" check box on the File | Defaults Test tab.

Each step of the test process is described below.

Setup Test Parameters - This section of the test checks the configuration and communications of the test instruments and prepares for starting a test.

Set Test Function - This operation sets a flag indicating the function to perform the next time through the test functions.

Read and Graph Reference Probe - This section of the test takes a reading from the Reference Readout device and updates the display and graph.

Display UUT? - This section of the test checks to see if a test probe reading should be taken and displayed. Test probe readings are enabled using the "Display reading of selected test probe" check box on the Calibrate-*it* Test Display.

Read and Display UUT - This section of the test takes a reading in the report units of the selected test probe and updates the display.

Perform Test Function - This section of the test checks the current test function and performs the tasks associated with that test function. See Section 6.6.1, Test Functions.

Is Test Done? - This section of the test checks to see if the test has been completed. A test is complete when readings for all test probes have been taken at every test set-point. A test can also be stopped manually by the user at any time.

6.6.1   Test Functions

The Test Function flowchart (Figure 53) shows the various test functions used in performing a calibration test. These functions are: Get set-point, Allow heat source to change, Monitor Reference Probe, Count down duration time, Setup UUT, Self-heat, and Sample UUT.

Each test function is described below.

6.6.1.1   Get Set-point

This function retrieves set-points and handles the communications with

Figure 53 Test Functions Flowchart

the Heat Sources. *During this function, the Read and Graph Reference function is not performed.*

When a test begins, this function retrieves the first set-point for the test. The user is then prompted to insert the Reference Probe and test probes into the appropriate Heat Source. The Heat Source is then set to that set-point (if the Heat Source is external, the user is prompted to set the temperature to that set-point). For Hart Scientific heated and refrigerated baths, other necessary commands are sent to allow the bath to reach the set-point. The Test Function is then set to "Allow heat source to change."

On successive iterations, this function retrieves the next set-point for the test. If the test probes and Reference Probes must be moved to another Heat Source, the user is prompted to move the probes. The Heat Source that was being used is set to its cool-down temperature (if enabled) and the new Heat Source is set to the next set-point. The Test Function is then set to "Allow heat source to change."

This function also takes care of preheating Heat Sources if that option is enabled on the Test Information dialog.

When there are no more set-points, the Test Function is set to "Test Done."

6.6.1.2 Allow Heat Source to Change

This test function allows the Heat Source to begin to heat or cool to the current set-point by waiting for a period of one minute to elapse before setting the Test Function to "Monitor Reference Probe."

6.6.1.3 Monitor Reference Probe

This function monitors the stability of the Reference Probe to determine when the Heat Source has stabilized at the current set-point so that the test may proceed.

The process of determining when the Reference Probe readings have stabilized is based on a Least Squares calculation of the last ten readings taken from the Reference Probe to determine the slope (rise over run) of the readings. Once the slope of the Reference Probe meets a certain specification, the Test Function is set to "Count down duration time."

The specification to which the slope of the Reference Probe readings are compared is calculated using the following formula:

$$Slope = \frac{Tolerance \times Slope\ Time}{Slope\ Factor \times Slope\ Duration}$$

- The Tolerance used here is the tolerance entered for the current set-point.

- The Slope Time is the interval in seconds between the first and last sample to be used in the calculation. This value is dependent upon the sample rate of the Reference Readout device and cannot be directly manipulated by the user.

- The Slope Factor is a constant and can not be changed by the user.

- The Slope Duration is the time period in seconds over which the slope is to be maintained. This value is dependent upon the sample rate of the Reference Readout device and can not be directly manipulated by the user.

Once the slope specification is met, the most recent Reference Probe reading is stored for use in making sure subsequent Reference Probe readings are within the specified tolerance for the current set-point.

6.6.1.4 Count Down Duration Time

This function counts down the specified duration time for the current set-point.

While the duration is counting down, the Reference Probe reading tolerance and stability are monitored to ensure that they stay within the given specifications. If either the stability or tolerance specification is exceeded during this time, the Test Function is reset to "Monitor Reference Probe."

Once the duration time has elapsed, the most recent Reference Probe reading is compared to the current set-point. If the difference between the current set-point and the Reference Probe reading is greater than the amount of the window for the current set-point, the set-point is recalculated, the Heat Source set-point is adjusted, and the Test Function is set to "Allow heat source to change."

For example,

Set-point: 50.00°C

Window: ±0.10°C

Reference probe reading: 48.935°C

Difference between set-point and Reference Probe reading: 50.00° - 48.935° = 1.065°

The difference of 1.065° is greater than the ±0.10° of the window, so the set-point is recalculated: 50.00° + 1.065° = 51.065° (round up to 51.07°) and the Heat Source is set to this new set-point. For Model 9112 and 9113 Furnaces, set-points are always rounded to the nearest degree.

If the difference between the current set-point and the Reference Probe reading is less than or equal to the window for the current set-point, the Test Function is set to "Setup UUT."

6.6.1.5 Setup UUT

This function retrieves test probe information and sets up the Scanner in preparation for taking test probe readings. *During this function, neither the Read and Graph Reference function nor the Read and Display UUT function are performed.*

On the first iteration for the current set-point, this function retrieves the information for the first test probe. If applicable, the current and number of probe wires for the Scanner channel to which the test probe is attached are configured.

On successive iterations for the current set-point, this function checks for more test probes. If there are no more test probes, the Test Function is set to "Get set-point." Otherwise, the information for the next test probe is retrieved. If applicable, the current and number of probe wires for the Scanner channel to which the test probe is attached are configured.

Note: If a model 1560 is being used as the Reference Readout device and as the Scanner, and a test probe is connected to the same Scanner Module (i.e. model 2560) as the Reference Probe, the Reference Probe uses the same setting for the current as the test probe!

If the next test probe is a resistance-based probe and the self-heat option on the File | Defaults Test tab was selected when the test started, the Test Function is then set to "Self-heat." Otherwise, the Test Function is then set to "Sample UUT."

6.6.1.6 Self-heat

This test function selects the test probe Scanner channel allowing current to pass through the test probe and self-heat before any readings are taken from that probe. After one minute has elapsed, the Test Function is set to "Sample UUT." For non-resistance based probes this function is skipped because self-heating is not necessary.

Note: This test function is skipped when using a scanner with only one channel (such as the Models 1502, 1502A, 1503, 1504, 1521, or 1522) or when using a scanner that supports simultaneous scanning (such as the Models 1529, 1529-R, and 1529-T).

6.6.1.7 Sample UUT

This function first determines whether the Scanner is disabled for this test. If so, the Enter Data dialog (Figure 54) is displayed. The user must manually enter the reading for the test probe in the scale shown. Otherwise, the software takes a reading form the Scanner channel for the test probe. This function then takes one reading from the Reference Probe.
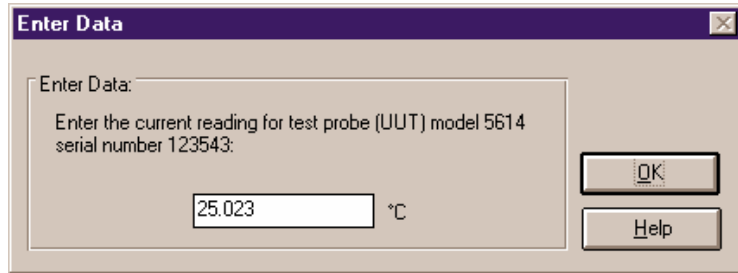
Figure 54 *Enter Data Dialog*

This test function is repeated the number of times specified on the File |
Defaults Test tab. Once all readings have been taken, the averages are
calculated and stored. *During this function, neither the Read and Graph
Reference function nor the Read and Display UUT function are per-
formed.*

If the test probe is a thermocouple and the CJC Readings option for this
probe is enabled, the software will prompt the user for or automatically
take a CJC reading at this time. For manually entered CJC readings, the
scale of the readings is not important (°C, °F, mV, etc.) but all CJC read-
ings should be in the same scale. All CJC readings **must** be in the same
scale if the Generate-*it* software is to be used to calculate coefficients us-
ing this data.

The Test Function is then set to "Setup UUT" to retrieve the information
for the next test probe.

6.7 ⏸ Pause Test / ⏵ Resume Test

Pause Test suspends execution of the calibration test. The Pause Test
menu option and toolbar button change to Resume Test once the test is
paused. Resume Test continues the test. The Resume Test menu option
and toolbar button change to Pause Test once the test continues.

Note: The test should not be paused for more than a few minutes at a
time. Pausing the test for long periods of time could jeopardize the integ-
rity of the test.

6.8 Stability Override

The Stability Override dialog (Figure 55) is displayed by selecting the
Calibration | Stability Override menu option or by selecting the Stability

Override toolbar button. This dialog allows the values used for determining set-point stability to be adjusted during the test.
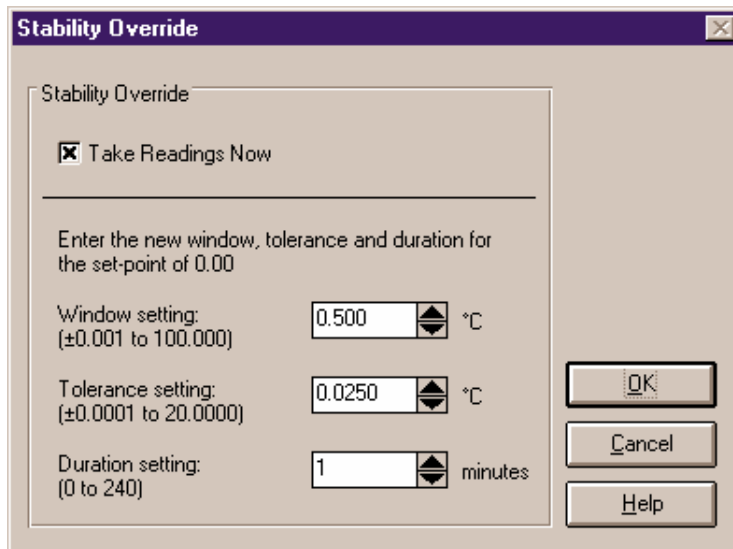

Figure 55 *Stability Override Dialog*

Enabled and Disabled

All controls are enabled at all times.

Dialog Information

The Stability Override dialog allows the user to take the reading now or to change the window, tolerance, or duration of the current set-point. If the "Take Readings Now" check box is selected, the stability process for the current set-point is overridden and the test readings are taken immediately. The tolerance and duration for the set-point are reported as "Overridden" and a footnote will appear on the Report of Calibration stating that the stability parameters were overridden for the indicated set-points.

If the window, tolerance, or duration settings are changed, the current set-point window, tolerance, and duration are adjusted to match these values. The stability process is started over based on these values. To view the changed values, select the View Set-points menu option or toolbar button.
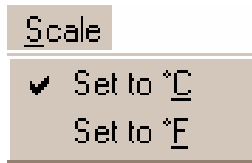
7   Scale Menu

Figure 56   *Scale Menu*

The Scale Menu (Figure 56) provides menu options for changing the Reference Probe, Set-points, and Heat Sources between degrees Celsius and degrees Fahrenheit.

Enabled and Disabled

The Scale menu is disabled when a calibration test is running.

7.1   °C   Set to °C

The Set to °C menu option converts the Reference Probe minimum and maximum temperatures, Heat Source ranges, and Set-points to degrees Celsius.

Note: Although this menu option can be selected after test instruments and set-points have been configured, the temperature scale should be selected before configuring a test.

To change the temperature scale that is selected by default when the Calibrate-*it* Software is executed, select the File | Defaults Setup tab. Selecting this menu option does not change the default temperature scale.

7.2   °F   Set to °F

The Set to °F menu option converts the Reference Probe minimum and maximum temperatures, Heat Source ranges, and Set-points to degrees Fahrenheit.

Note: Although this menu option can be selected after test instruments and set-points have been configured, the temperature scale should be selected before configuring a test.

To change the temperature scale that is selected by default when the Calibrate-*it* Software is executed, select the File | Defaults Setup tab. Selecting this menu option does not change the default temperature scale.
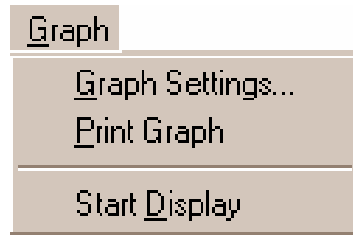
8   Graph Menu

Figure 57 *Graph Menu*

The Graph Menu (Figure 57) provides menu options for changing the scale of the X-axis and Y-axis, printing the graph, and for starting the display and graph of the Reference Probe.

Enabled and Disabled

The Graph Settings menu option and toolbar button are enabled once the Reference Probe is being graphed and while a test is running.

The Start Display menu option is enabled after the COM Port, Reference Readout, Reference Module (if applicable), and Reference Probe are configured. When the Reference Probe readings are being graphed, the COM Port, Reference Readout, Reference Module (if applicable), and Reference Probe Configuration dialogs are disabled.

8.1   Graph Settings

The Graph Settings dialog (Figure 58) is displayed by selecting the Graph | Graph Settings menu option. This dialog is used for adjusting the

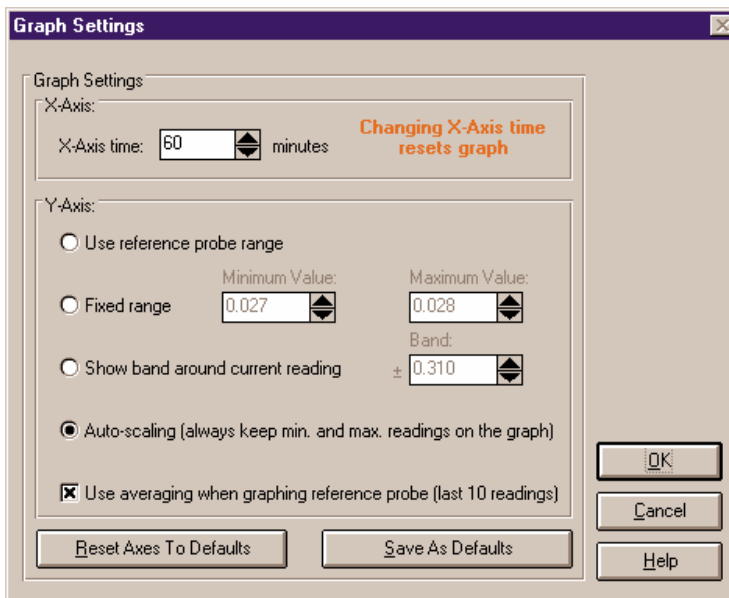X-axis and Y-axis. The default values for the X-axis and Y-axis are set on the File | Defaults Graph tab.

Figure 58   *Graph Settings Dialog*

Enabled and Disabled

The Minimum Value and Maximum Value boxes are enabled only if the "Fixed range" option is selected for the Y-axis.

The Band box is enabled only if the "Show band around current reading" option is selected for the Y-axis.

Dialog Information

The Graph Settings menu option allows the user to change the X-axis and the Y-axis values. These two settings affect the display of the graph.

The X-axis is displayed as time. Select the amount of time the X-axis should display. Changing the X-axis value resets the graph.

The Y-axis is always displayed in °C or °F. There are four options for setting the Y-axis values.

- *Use reference probe range* - Sets the Y-axis minimum and maximum values to the minimum and maximum temperature values entered on the Reference Probe Configuration dialog.

- *Fixed range* - Sets the Y-axis to the minimum and maximum values entered by the user in the boxes entitled Minimum Value and Maximum Value. These two boxes are enabled when this option is selected.

- *Show band around current reading* - Allows the user to enter a value of a "band" to show around the most recent Reference Probe reading. The box entitled Band is enabled when this option is selected.

- *Auto-scaling (always keep min. and max. readings on the graph)* - Maintains the minimum and maximum values of the visible plot on the graph during the time shown.

If the "Use averaging when graphing reference probe (last 10 readings)" check box is selected, the last ten Reference Probe readings are averaged to produce the current point on the graph. Averaging provides a smoother looking graph. If not selected, each point read from the Reference Probe is graphed.

Note: If the instrument being used as the Reference Readout is already configured to average its readings, you may want to disable this feature.

The Reset Axes To Defaults button resets the X-axis and Y-axis values to their default values as defined on the File | Defaults Graph tab. The Save As Defaults button saves the current X-axis and Y-axis values as the default values.

8.2   Print Graph

The Print Graph menu option sends the current graph to the default printer. The Setup Printer dialog is displayed for selecting printer settings.

8.3   Start Display / Stop Display

The Start Display menu option begins displaying and graphing the Refer-

ence Probe reading (Figure 59). The Reference Probe is displayed and graphed in °C or °F only.
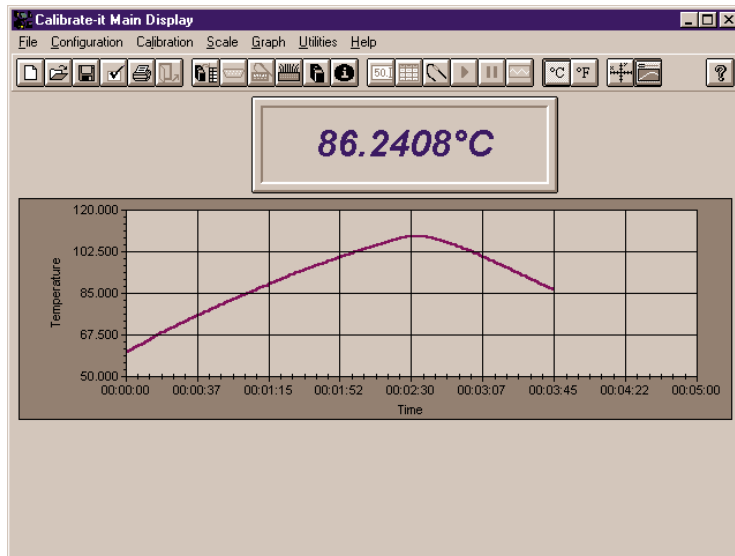

Figure 59   *Display and Graph of Reference Probe Reading*

The Start Display menu option changes to Stop Display once the Reference Probe reading is being displayed and graphed. The Stop Display menu option stops the Reference Probe reading form being displayed and graphed.

This menu option is enabled after the Reference Readout, Reference Module, Reference Probe, and COM Port are configured. When the Reference Probe readings are being graphed, the COM Port, Reference Readout, Reference Module, and Reference Probe Configuration dialogs are disabled.
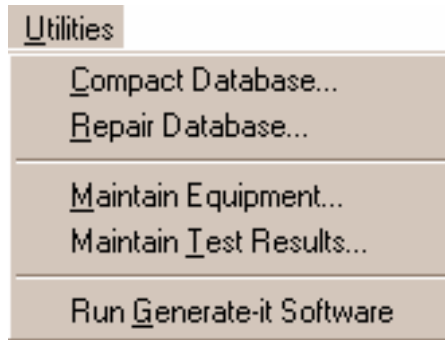
9   Utilities Menu

Figure 60   *Utilities Menu*

The Utilities Menu (Figure 60) allows the user to compact and repair the databases, to maintain the tables used for storing the test equipment and test results, and to run the Generate-*it* Software (if installed).

Selecting the Repair Database menu option attempts to fix an invalid database and then to compact the database.

Selecting the Maintain Equipment menu option allows the user to remove test equipment from the database.

Selecting the Maintain Test Results menu option allows the user to validate tests and to remove old or invalid tests from the database.

The Run Generate-*it* Software menu option provides an easy was to launch the Generate-*it* Software. If you purchased and installed the Generate-*it* Software, selecting this option runs the software. If the Generate-*it* Software is not found, the user is prompted to select the location of the Generate-*it* Software executable (.EXE) file.

Note: The Generate-*it* Software must be installed to the same directory as the Calibrate-*it* Software because both applications require access to the same databases. If the Generate-*it* Software is not installed into the same directory, it will not run properly.

Enabled and Disabled

All menu options are enabled.

9.1 Compact Database

As data changes in a database, the file becomes fragmented. Compacting the database removes unused data making data access quicker.

Selecting the Compact Database menu option displays the Windows® Open dialog. Select the database file to compact, then select the OK button. To abort the compact operation, select the Cancel button.

The following details outline the compact process:

1. The selected .MDB file is compacted to a file of the same name with a .CMP extension.

2. If a file of the same name with a .BAK extension exists, it is deleted.

3. The original .MDB file is renamed with a .BAK extension.

4. The .CMP file is renamed with a .MDB extension.

9.2 Repair Database

Repairing the database attempts to fix an invalid database. A database may become invalid if the application terminates irregularly due to a power outage or a computer shutdown. The software attempts to compact the database after it has been repaired.

9.3 Maintain Equipment

The Maintain Equipment dialog (Figure 61) is displayed when the Utilities | Maintain Equipment menu option is selected. As instrument, Reference Probe, and test probe serial numbers are entered on the configuration

dialogs they are added to the database. To remove any of these instruments from the database, use the Maintain Equipment menu option.
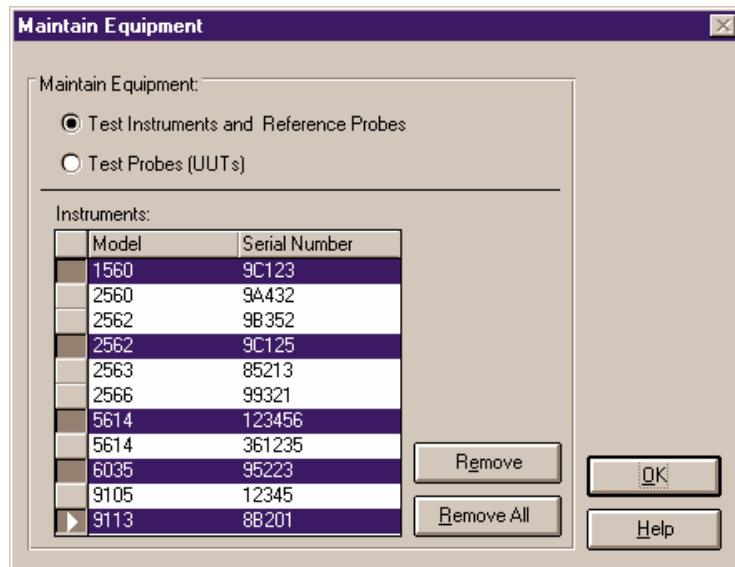

Figure 61 *Maintain Equipment Dialog*

Enabled and Disabled

The Remove button is disabled until one or more instruments are selected.

The Remove All button is disabled if there are no instruments in the list.

Dialog Information

Select the "Test Instruments and Reference Probes" option to see the list of test equipment instruments and Reference Probes. Select the "Test Probes (UUTs)" option to see the list of test probes.

To remove one or multiple instruments or test probes, select the instruments or test probes to be removed from the list and select the Remove button. To remove all the instruments or test probes, select the Remove All button.

Select the OK button to return to the Calibrate-*it* Main Display.

9.4　Maintain Test Results

The Maintain Test Results dialog (Figure 62) is displayed when the Utilities | Maintain Test Results menu option is selected. The results of tests performed by the Calibrate-*it* Software are stored in a database. Over time, this database can become very large and very slow. The Maintain Test Results menu option allows the user to remove old or unwanted tests from the database.
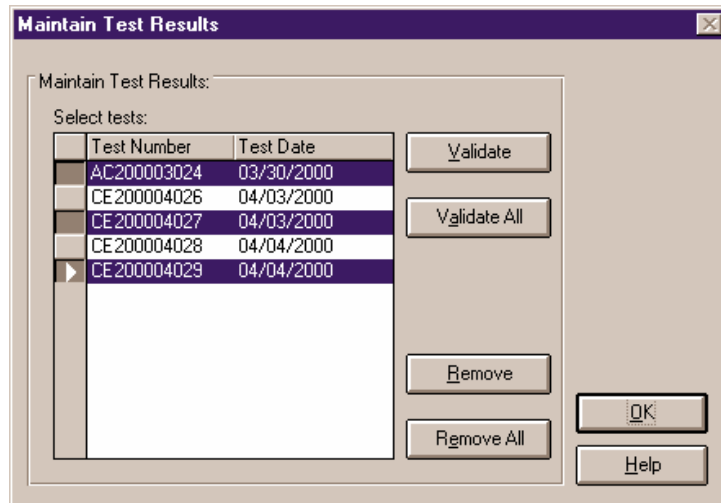

Figure 62　*Maintain Test Results Dialog*

Enabled and Disabled

The Validate and Remove buttons are disabled until one or more tests are selected.

The Validate All and Remove All buttons are disabled if there are no tests.

Dialog Information

This dialog allows the user to determine the validity of tests and to remove tests from the database. To validate or remove a test from the database, select the tests from the list provided and select the Validate or Remove button. To validate or remove all tests, select the Validate All or Remove All button respectively. Test validation is explained in the following section.

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Note: Use caution when removing tests. Once a test has been removed it no longer exists! All data is deleted permanently. For this reason the user is asked to confirm the removing of tests from the database!

The Calibrate-*it* Software stores test data in separate tables within the database. If a test is stopped before any readings are taken, the table containing the readings has no records for that test. If the database becomes corrupt, some of the data for a particular test may be lost. These are a couple of the reasons why the user may need to validate the test.

The validation feature of the Calibrate-*it* Software can be used to determine if there are records for every test in every table.

Selecting the Validate or Validate All buttons on the Maintain Test Results dialog performs a check on the selected tests to see if there are records in each of the database tables for the test. If the software determines that a test is invalid, the Invalid Test dialog (Figure 63) is displayed. Otherwise, a message appears stating the validity of the tests.

Note: This feature does **not** determine the validity of readings taken by the software. It determines only if a test is valid based on the presence or absence of information for the test in the database.

9.4.1 Invalid Test

The Invalid Test dialog (Figure 63) displays information about the test that is being validated. The "Test is invalid for the following reasons" list shows the reasons why the test is invalid. If no readings were found for

one or more test probes, the "Probes associated with this test" list shows all test probes (UUTs) associated with the test.
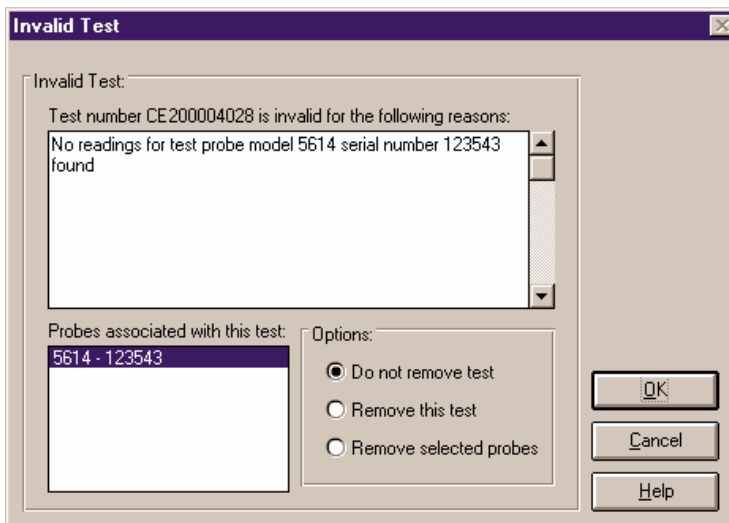

Figure 63   *Invalid Test Dialog*

Based on the information provided, the user must decide what to do with the test. The options available to the user are to not remove the test, remove the test, or remove selected probes. Selecting the "Do not remove test" option leaves the test as is. Selecting the "Remove this test" option permanently removes the entire test from the database. Selecting the "Remove selected probes" option allows the user to remove information specific to one or more test probes from a test while leaving the other test probes and the test itself intact. To use this option, select the test probe(s) that should be removed from the list on the lower left.

Selecting the OK button performs the selected option and continues on to the next test or returns to the Maintain Test Results dialog.

Selecting the Cancel button closes this dialog and ignores the selected option.

9.5   **Run Generate-*it* Software**

The Run Generate-*it* Software menu option is used for calculating coefficients and for generating Temperature vs. Resistance, Temperature vs. Ratio, or Temperature vs. EMF tables on the test readings taken from a calibration test. The Generate-*it* Software (Model 2932) is sold separately from the Calibrate-*it* Software (Model 9932). To purchase a copy of the Generate-*it* Software, contact Hart Scientific sales.

The Generate-*it* Software must be installed to the same directory as the Calibrate-*it* Software because both applications require access to the same databases. If the Generate-*it* Software is not installed into the same directory, it will not run properly.

For more information on installing and using the Generate-*it* Software, see the User's Guide that shipped with that software.

10   Help Menu

Figure 64   *Help Menu*

The Help Menu (Figure 64) provides a method for accessing help through the help file contents, searching on a specific topic, and on how to get started. The Technical Support phone numbers and software version number are also available from the Help menu.

Enabled and Disabled

All menu options are enabled at all times.

10.1   Contents

The Contents menu option displays the Calibrate-*it* Help contents.

10.2   Search for Help On

The Search for Help On menu option opens the Calibrate-*it* help file with the Windows® Search dialog open. Select or enter a keyword to search for a topic or select Cancel to go to the help file.

10.3   Getting Started

The Getting Started menu option opens the Help file to the Getting Started topic.

10.4   Technical Support

The Technical Support menu option displays the Technical Support information help topic.

Technical support for the Calibrate-*it* Software can be obtained by calling or faxing Hart Scientific Technical Support.

- Phone: 1-800-438-4278 or (801) 763-1600
- Fax: (801) 763-1010
- E-mail: suppport@hartscientific.com
- Internet: www.hartscientific.com (Check our website on the Internet regularly for answers to Frequently Asked Questions, updates, and Service Releases.)

Before calling for Technical Support, check the Help file topics listed below to see if the problem you are having is described there:

1.   Error Messages

2.   Informational Messages

3.   Requirements

4.   Connection of Instruments

If you are having a problem with one of the instruments being used for the test, please check the instrument User's Guide to make sure it is setup properly.

When calling or sending a fax, please send or have the following information ready:

1.   Name of Software (9932 Calibrate-*it* Software)

2.   Software version as found on the Help | About dialog

3.   Computer operating system and version

4.   Detailed description of the problem

5.   What you were doing when the problem arose

6.   Instruments being used (including firmware versions)

7.   The exact wording of any error message you received

8.   Any other information that may help to solve the problem

10.5   About

The About Calibrate-*it* dialog (Figure 65) states the software version number, the year the version was released, and some information about the computer.
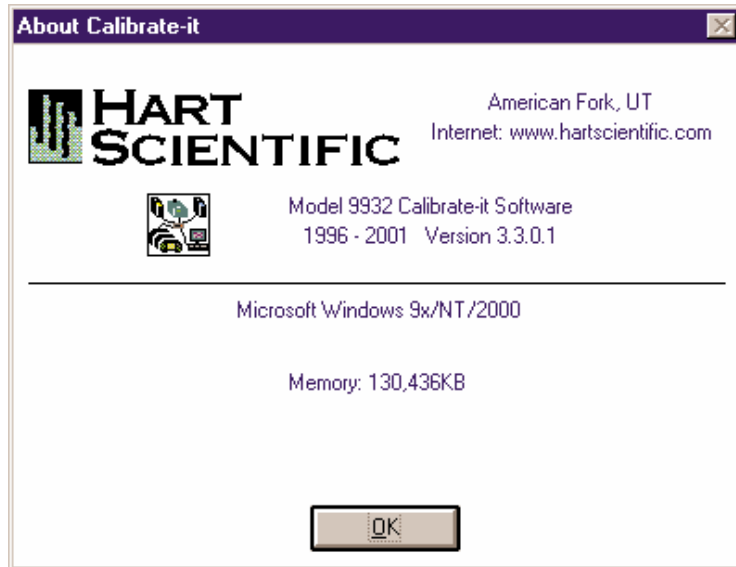

Figure 65   *About Calibrate-it Dialog*

11   Report Viewer Utility

A new feature in Calibrate-*it* v3.3 allows a Report of Calibration to be saved to a report file which can then be stored on diskette or e-mailed to someone else.

The Report Viewer Utility allows report files to be opened, viewed, and printed. This utility can be installed on any computer where report files need to be accessed.

The Report Viewer Utility (Figure 66) is very similar to the Print Preview window with a few enhancements. This utility allows a single report file to be opened and viewed at a time. The currently open report file must be closed before another file can be opened.

Figure 66 *Report Viewer Utility*

Report files can be saved only from the Print Preview window and have an extension of .RPT.

There are three menus: File, View, and Help.

File Menu - The File menu provides options for opening, saving, closing, and printing report files.

View Menu - The View menu provides options for navigating multipage report files and zooming.

Help Menu - The Help menu provides an option to view the About dialog.

11.1 Limitations

There are a few known limitations to using the Report Viewer Utility. Please read the following information to avoid potential problems:

- Report files are somewhat dependent on the currently selected Windows® printer driver. For this reason, select the driver for the printer that is used to print the report prior to saving the report to a file. For example, if the report file is being e-mailed to a person who prints the report on a Hewlett-Packard LaserJet 4MP printer, select this same print driver prior to previewing and saving the report to a file. Otherwise, reports may appear fine in the preview window but print incorrectly.

- Report files use a proprietary format and are not viewable by any other software such as Adobe® Acrobat Reader, word processors, or graphics applications. The Report Viewer Utility can be distributed freely to anyone who needs to view or print a report file. To create a distribution diskette for the Report Viewer Utility, please read the Making Report Viewer Utility Setup Diskette topic.

- Report files which contain a table (from the Generate-*it* Software) may contain one or more "blank" pages before the actual table data starts. This is done to preserve the correct page numbering as selected when the table was generated. To avoid "blank" pages, start the page numbering for the table at page 1. Otherwise, simply discard the "blank" pages after printing the table.

11.2 Report Files

A new feature in Calibrate-*it* v3.3 allows a Report of Calibration to be saved to a report file. Report files can be saved to a hard disk, floppy disk, burned onto a CD-ROM, or e-mailed to someone who may need to view or print the Report of Calibration.

The Recall Saved Report option was added to the File menu to allow report files to be opened, viewed and printed from within Calibrate-*it*.

Report files are stored in a proprietary file format. Report files cannot be viewed using Adobe® Acrobat Reader, word processors, or other graphics applications. For this reason, a special Report Viewer Utility has been included with Calibrate-*it*. For more information on installing and distributing this utility, see Section 11.3, Making Report Viewer Utility Setup Diskette.

Report files can only be saved from the Print Preview window. To save a Report of Calibration to a report file, follow the steps below:

1. Select the Print Report option from the File menu.

2. On the Print Test Report dialog, select the appropriate test and probe.

3. Make sure the Preview Report check box is selected.

4. Make sure the "Use default report template" option is selected.

5. Click the Print button to display the Report of Calibration in the Print Preview window.

6. When prompted, select the printer to which the Report of Calibration will be printed.

    Note: Selecting the appropriate printer before saving the report file is very important. Please read Section 11.1, Limitations before continuing!

7. When the Print Preview window is displayed, click the Save As button on the toolbar (the Save As button has a picture of a floppy diskette on it).

8. Select the destination and enter the name of the report file. Report files should always be saved with an .RPT extension. Click the OK button to save the file.

9. Close the Print Preview window by clicking the Close button.

11.3   Making Report Viewer Utility Setup Diskette

A new feature in Calibrate-*it* v3.3 allows a Report of Calibration to be saved to a report file which can then be stored on diskette or e-mailed to

someone else. The report file requires a special utility to open, view, and print the Report of Calibration. Report files cannot be viewed using Adobe® Acrobat Reader, word processors or other graphics applications.

For this reason, a special Report Viewer Utility has been included with Calibrate-*it*. This utility is automatically installed when the software is installed.

This utility may be freely distributed to anyone who may need to open, view, and print a Report of Calibration from a report file. To distribute this utility, a Report Viewer Utility Setup Diskette needs to be created. To create a setup diskette, follow the instructions below:

1.   Insert the Calibrate-*it* CD-ROM into your CD-ROM drive.

2.   Using the File Manager (Windows® 3.x) or Windows® Explorer (Windows® 9x/NT4/2000), locate the \9932\Viewer directory/folder.

3.   Copy all of the files from this directory to a blank floppy diskette. Label the diskette: **Hart Scientific Report Viewer Utility Setup Diskette**.

4.   From the floppy diskette, run the SETUP.EXE program to install the utility.

Optionally, you may create a ZIP file which includes all of the files from the \9932\Viewer directory to facilitate attaching the utility to an e-mail.

Note: The Calibrate-*it* Software may NOT be freely distributed!

12 Calibrate-*it* Messages

The Calibrate-*it* Software Messages are divided into two categories: Error Messages and Informational Messages. The Error Messages are all messages displayed because of an error due to input. The Informational Messages are those displayed as feedback or information to the user.

Note: Not all of the messages the Calibrate-*it* Software generates are explained in this section of the manual. This section attempts to explain some of the more difficult-to-understand messages.

12.1 Error Messages

The following messages may appear during the course of configuring or running a test.

12.1.1 General

Message "An error occurred while [*action*].

[Error: *error number - error description*]"

Remarks This is a general error message. The *action* describes what the software was attempting to do when the error occurred. The *error number – error description* describes the error that occurred.

12.1.2 Communications Error

Message "[Error #*error number*:]

Communication [with the *model*] [on SmartSwitch port *port letter*] is not working properly. Make sure that:

- *reason 1*

- *reason 2*

:

- *reason n*

[For Hart Scientific instruments manufactured prior to 1993, contact Hart Scientific, Inc. Technical Support .]"

Remarks This message appears when the software is not able to communicate with an instrument. The message content varies depending on the instrument that is not communicating. The Calibration | Start Test menu option was selected and the software can not communicate with the instrument described. Check all possible options provided in the message and try again. If communication still cannot be established, contact

Hart Scientific Technical Support. See Section 10.4 for information needed when contacting Technical Support.

12.1.3   Database

Message "An error occurred while attempting to [*action*] the database. [The database may be open by another application.][*other information*][Code: *code information*]

[Error: *error number - error description*]"

Remarks This error message appears when the software is not able to access the database. The *action* describes what the software was attempting to do when the error occurred. The *other information* gives more specific information as to the cause of the error. The *code information* describes the place in the software that the error occurred. The *error number – error description* describes the error that occurred. All of this information should be recorded when contacting Hart Scientific Technical Support for help.

Message "The database *filename* is currently locked by another application or computer. Select Retry to try again or Cancel to abort."

Remarks The Calibrate-*it* software is attempting to open the *filename* database which is locked because it is open exclusively either by another application on the same computer or, if on a network, by another computer. Close the database from the other application or computer, then select the Retry button. If the same error message appears again, the computer may need to be rebooted to unlock the database. Close all applications and reboot the computer.

Message "An error occurred attempting to connect to the databases. The databases may be corrupt.

[Error: *error number - error description*]

Select OK to attempt to repair and compact the databases or select Cancel to end."

Remarks This error message may appear when the Calibrate-*it* software is loading. The *error number – error description* describes the error that occurred. Most often, databases get corrupted by an unexpected power failure or other unexpected or fatal event. In most cases, repairing and compacting the database will fix this problem. Select the OK button. The Calibrate-*it* software must be restarted.

12.2   Informational Messages

The following messages may appear during the course of configuring or running a test.

12.2.1   Other Calibrate-*it* Messages

Message "The [set-points][test probes] information is missing or incomplete. Select [set-points][test probes] from the Calibration menu to setup the [set-points][test probes].[Select the Other Info... button to make sure that information is filled in.]"

— or —

"The following information must be entered before the test can begin:

[*item 1*]

[*item 2*]

…

[*item n*]"

Remarks When starting a test, the Calibrate-*it* Software checks the current configuration for missing information. A test cannot begin until required information has been filled in. This message indicates that some information is not complete. Return to the appropriate configuration dialog and finish filling in any missing information.

Message "The firmware for the *instrument type* model *model number* on SmartSwitch port *ssport* needs to be upgraded to version *firmware version* or better to operate properly. Contact Hart Scientific."

Remarks In order for the Calibrate-*it* Software fully automate the testing process, it needs to be able to communicate with all instruments involved in the test. Older instruments do not support some functions that the Calibrate-*it* Software requires in order to fully automate a test. Contact Hart Scientific Technical Support for information on receiving a firmware upgrade for your instrument. See Section 10.4.

Message "The *instrument type* was configured as a model *model number*. The instrument connected to SmartSwitch port *ssport* is not a model *model number*."

Remarks The Calibrate-*it* Software requires the use of "drivers" that specify how communication with each instrument occurs. This message indicates that the wrong driver has been selected for an instrument. Return to the appropriate configuration dialog and select the correct driver and make sure the serial cables are connected properly.

Message "The scale of the reading on channel *n* (*scale*) does not match the expected scale (*exp scale*). Check the configuration parameters on the instrument for channel *n* and select OK to continue."

Remarks The Calibrate-*it* Software has determined that the scale of the reading on channel *n* does not match the scale selected on either the Reference Probe or Test Probe Configuration dialogs. Depending on the instruments used, the Calibrate-*it* Software may not always be able to set the scale of the readings for a particular channel. Before the test starts, the user is prompted to manually configure the Reference Probe and Scanner channels for the correct readout scale (report units) as selected on the Reference Probe and Test Probe Configuration dialogs. Failure to do so may invalidate readings taken by the Software.

Message "The reference has been configured on the channel to which the Scanner must be connected. Move the Reference Probe to channel 2 and make sure the Scanner is connected to channel 1."

Remarks When using a Hart Scientific model 1575 Super Thermometer or model 1590 Super Thermometer II as the Reference Readout and Scanner instrument, all test probes must be attached to the model 2575 "Mighty Mux" Scanner or the 2590 "Mighty Mux II" Scanner respectively. The model 1575 and 1590 Super Thermometers require the model 2575 and 2590 Scanners be connected to channel 1. Therefore, the Reference Probe must be configured on channel 2 of the Super Thermometer using the Reference Probe Configuration dialog.

Message "A test probe has been setup on the same channel as the Reference Probe. Move either the test probe or the Reference Probe to another channel."

Remarks The Calibrate-*it* Software has detected that the Reference Probe and a test probe have been configured on the same channel. Check the settings on the Reference Probe Configuration and Test Probe Configuration dialogs to make sure all probes have been configured on the proper channels.

Message "The *instrument type* was configured as a model *model*. The instrument connected to SmartSwitch port *ssport* is not a model *model*."

Remarks The Calibrate-*it* Software attempted to communicate with the instrument connected to SmartSwitch port *ssport* and has determined that the instrument does not match the configuration information. Check the connection of all serial cables and return to the appropriate configuration dialog to select the driver for the correct instrument.

Message "Serial number *serial* for model *model* was not found. The calibration and recalibration dates need to be entered manually."

Remarks This message may appear when opening a configuration file if the calibration record for the specified *model* have been removed from the database. When the configuration file finishes loading, go to the appropriate configuration dialog and re-enter the calibration and recalibration dates. A new record will be created for this instrument.

Message "Module model *mod model* cannot be used with Scanner model *scan model*. The Scanner Modules must be reconfigured."

Remarks This message may appear when opening a configuration file if the Scanner Module model *mod model* is incompatible with the Scanner *scan model*. This configuration file should be replaced by manually configuring the instruments and saving the configuration.

Message "The name and address of the company performing the test must be entered on the File | Defaults User tab before a test can begin."

Remarks The Calibrate-*it* Software prints the name and address of the company that performs a test on the Report of Calibration. Select the Defaults option from the File menu, then select the User tab to enter the technician name, company name and address.

Message "The driver for model *model* was not found."

Remarks An attempt to install a driver for an instrument has failed because the Calibrate-*it* Software could not locate the driver. The Calibrate-*it* Software requires drivers to communicate with instruments. If a driver for an instrument is not listed, the Calibrate-*it* Software cannot use that instrument to perform a test. In the case of Heat Sources, ANY Heat Source can be used (select External for the model number), but the testing process will not be completely automated.

Message "This configuration file was saved with a previous version of this software. If any errors occur during load, you may need to reconfigure part or all of the settings. You should save the configuration file from this version to avoid this message in the future. Select the OK button to continue loading this configuration file."

Remarks The Calibrate-*it* Software has been changed and improved in many ways since its original release. If you upgraded from a previous version (known as Multi-Sensor Calibration Software prior to version 3.0) and attempt to open a configuration file that was created using the previous version, the Calibrate-*it* Software may not be able to successfully read the entire configuration file. If any error messages are displayed while opening the configuration file, make a note of the message(s). When the file finishes loading, go to the appropriate configuration dialogs and resolve the problems that were mentioned in the messages. SAVE THE CONFIGURATION using this version of the Calibrate-*it* Software to prevent the error messages from appearing next time.

Message "The report cannot be printed because there are no records in the *table name* table for test number *test number*."

Remarks The Calibrate-*it* Software cannot produce Reports of Calibration for a test if the information in the database is incomplete. This may be caused by stopping a test before readings were taken or a loss of data due to database corruption. A test can be validated (checked for incomplete information) and/or removed from the database using the Utilities | Maintain Test Results menu option. See Section 9.4.

Message "The temperature setting of the external Heat Source serial number *serial number* needs to be [increased][decreased] by *amount* to bring the Reference Probe reading within the window setting. Select OK after adjusting the temperature or select CANCEL to abort."

Remarks When using an external Heat Source, the user must manually adjust the temperature by the amount shown in *amount* in order to bring the readings of the Reference Probe into the set-point value ± the window setting for that set-point.

Message "The range of Heat Source model number *model number* serial number *serial number* was exceeded while attempting to adjust the current set-point to bring the Reference Probe within the window setting. Click OK and use the Calibration | Stability Override menu option to increase the window setting for this set-point or click CANCEL to abort."

Remarks The Calibrate-*it* Software was attempting to adjust the temperature setting of the Heat Source specified in order to bring the readings of the Reference Probe into the set-point value ± the window setting for that set-point. In doing so, the set-point exceeded the range of the specified Heat Source. The cause of this message may be due to not allowing the Heat Source to soak long enough at the set-point before taking a reading. The duration setting for this set-point may need to be increased and/or the Tolerance setting decreased to allow the Heat Source to soak longer before taking readings.

Message "The Generate-*it* Software was not found [in *path*]. Select Retry to specify the location of the Generate-*it* Software or select Cancel to abort."

Remarks The Generate-*it* Software is sold separately from the Calibrate-*it* Software. It uses the data collected by the Calibrate-*it* Software to calculate characterization coefficients for the test probes, to print reports including the coefficients, and to generate temperature vs. resistance, ratio and EMF tables using the coefficients. The Generate-*it* Software must be installed in the same directory as the Calibrate-*it* Software. If the Generate-*it* Software was not explicitly purchased, it will not be installed on the computer.

Message "An error occurred during a call to *function*."

Remarks This message appears when the Calibrate-*it* Software was attempting to work with the graph. Make sure the files QCRTD.DLL, QCBASED.DLL, VBHOOK.DLL and VBRTHOOK.DLL are all located in the \WINDOWS\SYSTEM (or WINNT\SYSTEM32) directory and have the date stamp as indicated in Section 2.6, .DLL and .VBX Files.

Message "The Reference Probe can be connected to a channel on the reference model itself or on a multiplexer channel. Is the Reference Probe connected to a multiplexer channel?"

Remarks This message appears when the selected Reference Readout instrument supports allowing the Reference Probe to be connected to the Reference Readout itself and also to a multiplexer channel. Select Yes if the Reference Probe is connected to a channel on the multiplexer. Otherwise, select No.

Message "The Test Probes can be connected to channels on the scanner model itself or on multiplexer channels. Are the Test Probes connected to multiplexer channels?"

Remarks This message appears when the selected Scanner instrument supports allowing the Test Probes to be connected to the Scanner itself and also to multiplexer(s). Select Yes if the Test Probes are connected to multiplexer channels. Otherwise, select No.

13   Glossary

Actual Value

The reading of the Reference Probe at the given set-point.

Ambient Temperature

The room temperature when the test was started.

Ambient Humidity

The room humidity when the test was started.

Auto-scaling

Maintains the minimum and maximum values for the visible plot on the graph during the time shown.

Band

A range of temperatures around the Reference Probe reading shown on the graph.

Calibration Date

The date on which the instrument or probe was last calibrated.

Calibration Interval

The number of days, from the date the probe is calibrated, until the next calibration is due.

Channel

The input on the Reference Readout, Reference Module, Scanner, or Scanner Module to which the Reference Probe or test probe is connected.

Check Standard

Used to indicate that the probe on this channel is a statistical check standard. The Generate-*it* Software identifies the check standard data for exporting.

Cold Junction Compensation

Refers to the temperature at the cold junction of a thermocouple probe.

Compact Database

Compacting the database speeds access to records in the database.

Company Address

The address of the company performing the test.

Company Name

The name of the company performing the test.

COM Port

The serial communications port on your computer.

Configuration File

The file containing instrument configuration information. The file has a .CFG extension and is normally stored in the \CONFIG subdirectory.

Controller Address

A two-digit number required by the controllers used in the Hart Scientific furnaces, Models 9112 and 9113. For more details, see the 9112 or 9113 User Manual.

Cool-down Temperature

The temperature to which the Heat Source is set after the final set-point for this Heat Source is completed.

Current/Compensation

The current is the amount of excitation or source current (in mA or µA) used when taking readings from test probes. The compensation is a measurement taken at the cold junction end of a thermocouple probe that is used to compensate for the reading taken from the hot junction end of the thermocouple.

1. For RTD and Thermistor probes:

Select the excitation current to use for this test probe. The list of choices depends on the selected Scanner and/or Scanner Module.

- 2µA, 10µA, 30µA
- 0.1mA, 0.2mA, 0.5mA, 1mA, 1.4mA, 3mA, 5mA
- Auto, N/A

2. For Thermocouple probes:

- Enable reading cold junction compensation (CJC) for this test probe by selecting "Enabled" from the list.
- Select "N/A" from the list to disable this feature.

Customer Address

The address of the company for which the calibration is being performed.

Customer Name

The name of the company for which the calibration is being performed.

Description

Any information to identify the instrument or probe.

Driver

A set of information specific to an instrument that contains details for the software to communicate with and control the instrument.

Duration

The amount of time that the Reference Probe readings must not vary by more than the specified tolerance before the software considers the reference "stable". The reference must be stable for the duration time before readings are taken. The allowable range of the duration is 0 to 10 minutes. The software default is 1 minute.

Elapsed Time

The amount of time that has passed since the test started.

Ending Set-point

The last set-point to be generated. The ending set-point must be within the range of the Heat Sources.

Equilibrate

The process of allowing the temperature of one object to heat or cool to match the temperature of another object.

Error

The difference between the reading of the UUT (Unit Under Test) and the actual value (reference reading).

External

Any Heat Source that cannot be controlled by the Calibrate-*it* system through the SmartSwitch.

Firmware

Code used to control an instrument that resides in an EPROM inside the instrument.

Heat Source

The instrument the Reference Probe and test probes are inserted into for calibrating at a specified set-point.

Help Balloons

The yellow boxes with words that appear below and to the side of the toolbar icons when the mouse is passed over them.

In-house Calibration

The calibration test is being performed on test probe(s) used internal to the company performing the calibration.

Interval Between Set-points

The interval between consecutive set-points.

Introduction Dialog

The dialog overlaid on top of the Calibrate-*it* Main Display screen when the software is executed to allow the user to create a new configuration file or open an existing configuration file.

Instrument Configuration File

A file containing the communications settings, Reference, Scanner, and Heat Source instruments including model numbers, serial numbers, and other information required by the software.

Manufacturer

The name of the company that manufactures the instrument or probe.

Model Number

The model number of the instrument or probe being used.

Module

An instrument to which the Reference Probe or test probe(s) can be connected. Modules required a Reference Readout such as the 1560 Black Stack.

Nominal Temperature

A set-point used for the calibration test. (See set-point.)

Notes

Any miscellaneous information pertaining to the test. The notes text MUST be saved to a text file in order to appear on the Report of Calibration.

Notification Message

A message notifying the user that the recalibration date has passed.

Number of Set-points

The total number of set-points to be generated.

Order ID

A number used to identify a test probe (i.e. work order, sales order, purchase order, etc.)

Paragraph

The paragraph should contain information specific to the traceability of the test equipment as well as conformity information. The paragraph MUST be saved to a text file in order to appear on the Report of Calibration.

Peak-to-Peak

The difference between the maximum and minimum readings taken over a given period of time.

Preheat

Setting the temperature of a Heat Source to a given set-point prior to using the Heat Source during a calibration test.

Probe Type

The type of probe being used. Available probe types are:

- Thermocouple Types B, E, J, K, N, R, S, T, and AuPt
- RTD 385 3-wire or 4-wire
- RTD 392 3-wire or 4-wire
- RTD 2-wire, 3-wire, or 4-wire
- Thermistor 3-wire or 4-wire
- SPRT
- Other PRT/RTD
- Other Thermistor
- Other Thermocouple
- Liquid in Glass (only if no Scanner is being used)
- Bi-metallic (only if no Scanner is being used)
- Other

Proportional Band

The value for the proportional band to be sent to the bath during the test process. See the instrument User's Guide for a complete description.

Range

The minimum and maximum temperatures for an instrument.

Recalibration Date

The date on which the instrument or probe is due for recalibration. Recalibration date is synonymous with recall date.

Recall Date

The date on which the instrument or probe is due for recalibration. Recall date is synonymous with recalibration date.

Received Condition

The condition of the test probe when it was received. The choices are:

- In Tolerance
- Out of Tolerance
- New
- Recalibration.

Reference Module

The instrument to which the Reference Probe is connected when the Reference Readout supports the use of modules.

Reference Probe

The probe used as the standard to which all test probes are compared.

Reference Readout

The instrument to which the Reference Module (if applicable) and Reference Probe are connected.

Reference Scale

The scale used for the Reference Probe reading display and graph as well as the scale for the set-points, Heat Source range, and Reference Probe. Reference Scale is synonymous with Test Scale.

Repair Database

Repairing the database attempts to fix an invalid database. A database may become invalid if the application terminates irregularly due to a power outage or a computer shutdown.

Report of Calibration

The Report of Calibration contains the test probe information, calibration range, received condition, current (if applicable), test procedure, customer information, paragraph, a listing of the test equipment, notes, calibration date, recalibration date, ambient temperature, ambient humidity, and technician name. The report also contains the nominal value, actual value, UUT, error (if applicable), and uncertainty.

Report Number

The number printed on the report of Calibration. The report number is a unique number consisting of the test number and the channel to which the test probe is connected. These two pieces of information are concatenated together with a dash.

Report Units

The repot units for a probe determines how the readings for that probe will be recorded. Allowable report units are °C, °F, K, and Ohms or mV.

Scanner

The instrument to which the Scanner Modules (if applicable) and the test probe(s) are connected.

Scanner Module

The instrument to which the test probe(s) are connected when the Scanner supports the use of modules.

Self-heat

The increase in sensor temperature due to running current through the sensor.

Serial Number

The serial number of the instrument or probe.

Set-point

A temperature where readings will be taken. A test can have between 1 and 40 set-points.

Set-point Configuration File

A file containing the set-points used for a calibration test. These files have either a .STC (set-point file in °C) or .STF (set-point file in °F) extension and are normally stored in the \CONFIG subdirectory.

Set-point Order

The order in which the set-points are processed for the calibration test.

Set-point Status

The state of a set-point. The possible states are Done, Current, or Waiting.

Slope Duration

The time period (in seconds) over which the slope is to be maintained. This value is dependent upon the sample rate of the Reference Readout device and cannot be directly manipulated by the user.

Slope Factor

A program constant used to determine the stability of the Reference Probe readings. This value cannot be changed by the user.

Slope Time

The interval in seconds between the first and last sample to be used in the calculation. This value is dependent upon the sample rate of the Reference Readout device and cannot be directly manipulated by the user.

SmartSwitch

A serial communications device that allows one computer to connect to eight serial devices through one serial communications port.

SmartSwitch Port

The ports located on the back of the SmartSwitch (labeled A-H) where each of the instruments are connected. The SmartSwitch port defaults to port (A) for the reference, (B) for the Scanner, and (C, D, E, & F) for Heat Sources.

Stability Override

The process of Overriding the tolerance, window, and duration settings for the current set-point with new values entered by the user or by taking the readings immediately.

Starting Set-point

The first set-point to be generated. The Starting Set-point must be within the range of the Heat Sources.

Technician Name

The name of the person performing the test. This information is required to run a test.

Test Date

The date the test is being performed. The test date defaults to today's date.

Test Functions

The functions the software performs during a calibration test.

Test Number

A set of numbers and/or characters that uniquely identifies the test being performed.

Test Probe

The probe(s) being calibrated. Test Probe is synonymous with UUT (Unit Under Test).

Test Probe Configuration File

A file containing a test probe setup. These files are normally stored in the \CONFIG subdirectory with a .TPC extension.

Test Procedure

The control number of the documented procedure used by your company to perform the calibration test.

Test Process

The process required to start and complete a calibration test.

Test Scale

The scale in which the test is being performed. Test Scale is synonymous with Reference Scale.

Test Status

The elapsed time and status of the test process.

Tolerance

The maximum amount of variation allowed in the Reference Probe readings over the time specified by the duration parameter before the software considers the reference "stable". The reference must be stable for the duration time before readings are taken. The allowable range of the tolerance is 0.0001° to 20.0000° in °C or °F. The software default is 0.2500°.

Toolbar

The strip of buttons immediately below the menu.

Uncertainty

The total measurement uncertainty for the UUT at the selected temperature. The Calibrate-*it* Software does not use this value in any way except to print on the Report of Calibration. This value must be calculated by the user. The allowable range of the uncertainty is 0.001° to 10.000° in °C or °F. The program default is N/A (not applicable).

User Information

Information that is entered about the technician and company performing the calibration tests. This

information is printed on the Report of Calibration.

UUT

Stands for Unit Under Test. On the Report of Calibration, UUT refers to the value read from the test probe.

Window

The window defines how close the reference readings must be to the set-point value before readings are taken. The software will recalculate the Heat Source set-point as needed to bring the reference readings within this value of the desired set-point. The allowable range of the window is 0.001° to 100.000° in °C or °F. The software default is 0.500°.

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