



CAPTURE

RAD7 data acquisition and analysis
Software for Windows and Mac OS X



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About CAPTURE v. 4.8.4

Introduction

Welcome to CAPTURE, a powerful RAD7 software tool for Macintosh and Windows. CAPTURE provides the ability to download radon data files from the RAD7. It renders sophisticated graphs of radon data, and makes it easy to monitor the status of one or more RAD7s and issue commands for performing a variety of sophisticated tasks.

CAPTURE can perform two-way communication with RAD7 devices containing RADLINK remote access software. Operating at up to 19.2 kBaud, RAD7 download operations are quick and easy. It is even possible to obtain RAD7 data remotely by connecting with CAPTURE over a network.

CAPTURE's extensive graphing features include advanced data navigation, context-sensitive statistics panels, and extensive selection options. Data may be exported to a variety of human-readable formats. High-resolution printer output is always just a click away.



First time CAPTURE users are encouraged to begin with the Basic CAPTURE Functionality section, which provides information on connecting to a RAD7, transferring data records to the computer, and displaying a radon data graph.

We appreciate your purchase of the RAD7, and we are pleased to offer CAPTURE to help you get the most out of your investment. More information on DURRIDGE Products, including the RAD7, is available at <http://www.durridge.com>.

Installing CAPTURE

System Requirements

CAPTURE is available for Windows and Macintosh. The Windows version of CAPTURE is compatible with Windows XP, Vista, and Windows 7. The Macintosh version of CAPTURE requires an Intel-based Macintosh running Mac OS X 10.5 or later. The computer must have at least 1 GB of memory, and a 1 GHz processor. A display resolution of 1024 by 768 pixels is required, but a larger display is recommended for viewing RAD7 data graphs in high detail.

For CAPTURE to obtain data from a RAD7 using the Keyspan USA-19HS serial to USB adaptor, it is necessary to install the Keyspan drivers, which are included on the DURRIDGE Software CD. These drivers are also available at the manufacturer's website.

Installing on Windows

To install CAPTURE on Windows, obtain the CAPTURE application installer from the DURRIDGE website or the DURRIDGE software CD. Launch the installer and follow the on-screen instructions to install the application. Shortcuts may be placed on the desktop and in the Start Menu if desired. The installer will offer to launch CAPTURE when the installation is complete.

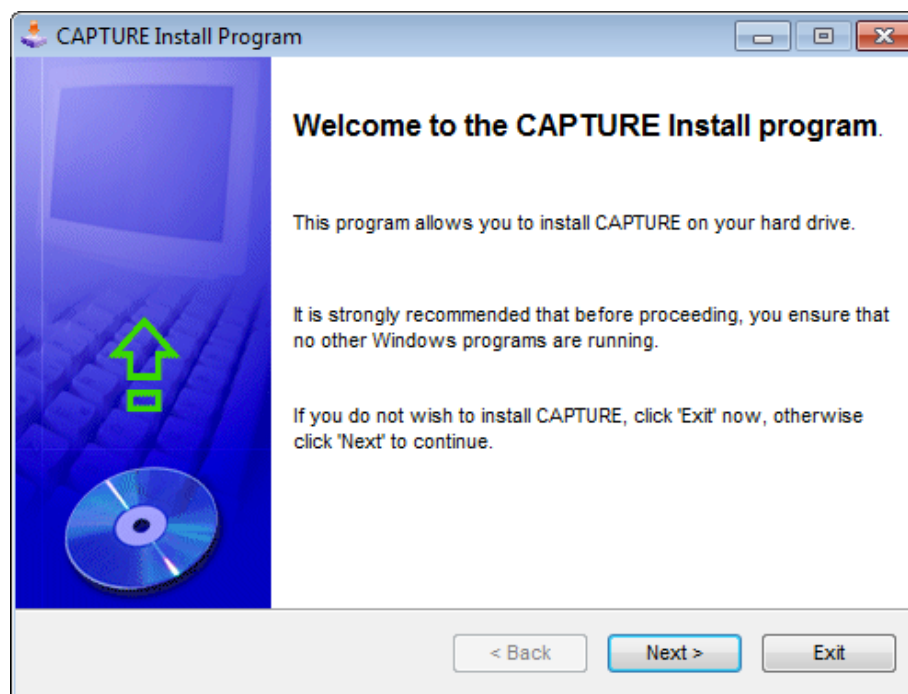


Figure 1: The CAPTURE install program on Windows.

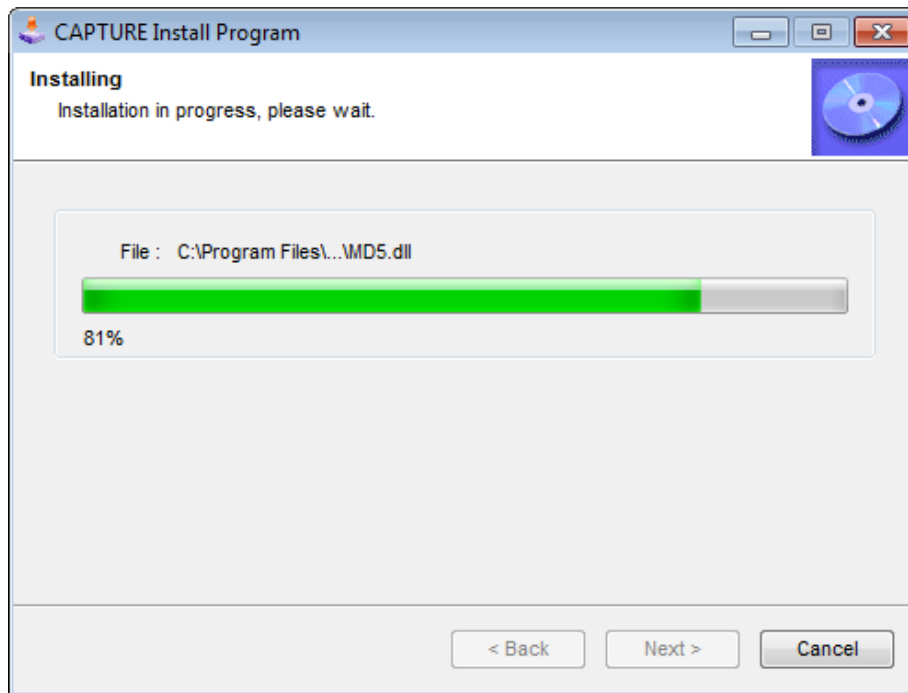


Figure 2: Installing CAPTURE on Windows.

Installing on Macintosh

To install CAPTURE on Macintosh, obtain the CAPTURE disk image from the DURRIDGE website or the DURRIDGE software CD, and mount it on your computer's desktop. Open the disk image, and drag the CAPTURE application icon onto the nearby alias of the Applications folder to copy it to your computer. Locate the CAPTURE application in the Applications folder and drag it to the dock for easy access if desired. Unmount the CAPTURE disk image after the application has been copied to your computer.



Figure 3: The CAPTURE Mac OS X disk image.

Basic CAPTURE Functionality

This section will introduce the CAPTURE user interface and provide instructions on connecting a RAD7 to the computer, obtaining data from the RAD7, and displaying a data graph.

Preparing the RAD7 Make sure the RAD7 contains several valid data records and that it is plugged into a stable power source and powered On. Use a null modem cable to connect the RAD7 to your computer's serial port. A USB to Serial adapter and compatible drivers should be used if your computer does not have a serial port. These materials are included with each RAD7. Alternatively a Bluetooth Serial adaptor may be used to connect to the RAD7 wirelessly, as explained in the Long Distance Connectivity section. DURRIDGE offers preconfigured Parani SD-1000 Serial to Bluetooth Adaptors as an optional RAD7 accessory.

The Main Window When CAPTURE starts up, the Main Window will appear. This window contains controls used for downloading RAD7 data and performing other RAD7 communication operations, as well as opening existing RAD7 data files from disk. When the window first appears, some controls will be disabled. These controls become active only when a connected RAD7 has been detected.

The process of connecting to the RAD7 differs depending on whether the device has RADLINK installed, as indicated by a sticker on the top of the RAD7. With RADLINK present, it is possible to download data without having to press any buttons on the RAD7 itself. If your RAD7 does not have RADLINK installed, it will be installed when you return the device for calibration.

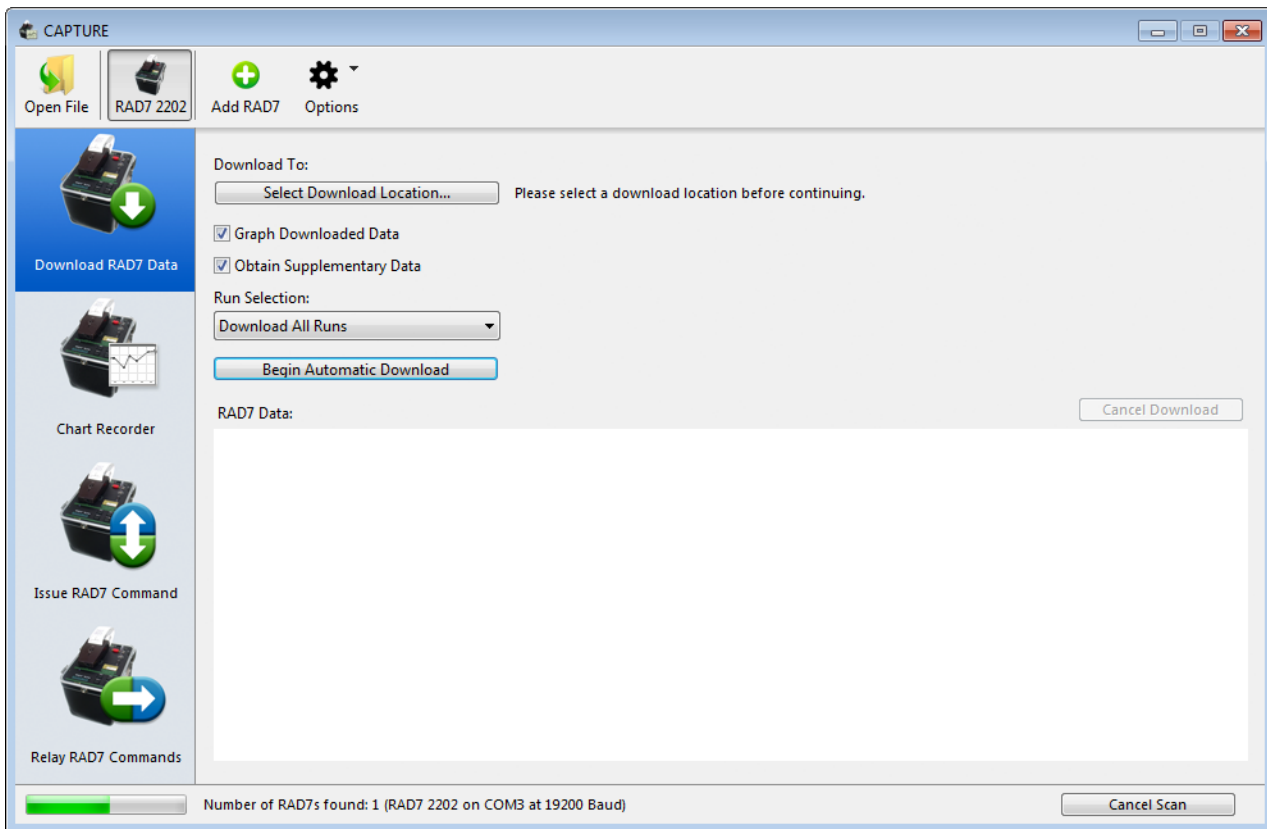


Figure 1: Scanning for connected RAD7s to add them automatically.

If RADLINK is present on the RAD7, CAPTURE should be able to detect it automatically. (If it does not, click the Scan For RAD7s button at the lower right corner of the main CAPTURE window.) A progress bar will appear, tracking the scanning process, and any detected RAD7s will be added to the window's toolbar, as shown in Figure 1, above.

If RADLINK is not present, click the ADD RAD7 button in the toolbar, which is shown in Figure 2, below. The Connection Panel will appear, containing controls for specifying the Connection Type, Serial Port, and Baud Rate, as shown in Figure 3. The Connection Type pop-up menu should be set to "Serial Port". The other options are for connecting to a RAD7 at a remote location using a dial-up modem or network connection. These options require additional configuration, and are discussed in the Long Distance RAD7 Communication section. (It is recommended that users first learn how to perform downloading operations via a direct serial port connection, before moving on to more advanced remote operations.) The Serial Port pop-up menu should be set to the name of the port to which the RAD7 has been connected. Finally, the Baud Rate pop-up menu should be set to the baud rate of the RAD7. For a RAD7 without RADLINK, this will always be 1200. Once the correct settings have been selected, click the Connect button.

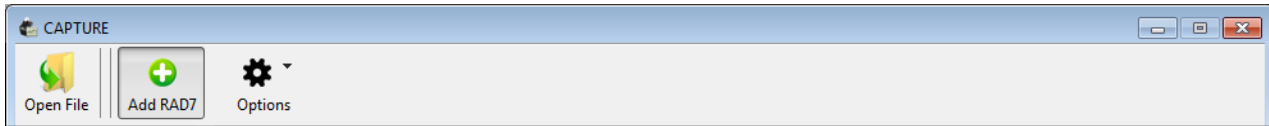


Figure 2: Adding a RAD7 manually by clicking the Add RAD7 button.

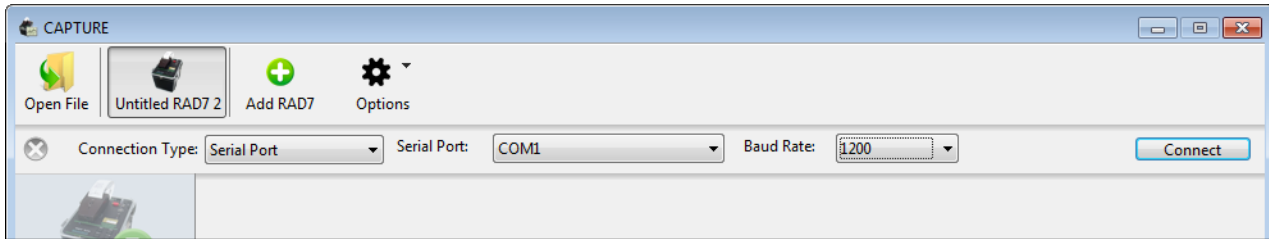


Figure 3: Specifying connection parameters for a RAD7 that was added manually.

Note that it is possible to manually add a RAD7 even if it has RADLINK installed (though it may be more convenient to let CAPTURE detect it automatically using the Scan for RAD7s button.) If RADLINK is installed, the RAD7's baud rate may be checked and altered using the RAD7's keypad. To do this select the Special menu command on the keypad and press [ENTER], and then navigate to the SetBaud command and press [ENTER] again. Use the left and right arrow keys to choose the desired baud rate, and press [ENTER] a final time to confirm the selection. When downloading manually, whichever baud rate is chosen on the RAD7 must also be chosen in CAPTURE. If RADLINK is not installed, the baud rate can not be checked on the RAD7, but it can be assumed that the baud rate will always be 1200.

Choosing incorrect settings may result in "garbage data" being received. This is generally not a major problem, since CAPTURE is able to identify such data and will permit the interruption of the downloading process before too much useless information accumulates.

Downloading RAD7 Data

Along the left side of CAPTURE's main window is a series of buttons connecting to panels used for performing various RAD7 communication operations. These include Download RAD7 Data, Chart Recorder, Issue RAD7 Command, and Relay RAD7 Commands. After CAPTURE has connected to a RAD7, a series of brief tests will be performed to determine which communication operations are possible. A RAD7 containing RADLINK and connected directly to the computer will permit all possible operations, while a RAD7 without RADLINK installed permits only the Manual Download operation.

Select the Download RAD7 Data panel if it is not already highlighted. A set of controls will appear for specifying the name and desired location of the downloaded RAD7 data, and whether to display the data in a graph. The Download RAD7 Data panel includes two additional controls, as shown in Figure 4: the Run Selection pop-up menu, for specifying which data run(s) to download, and the Obtain Supplementary Data checkbox, for specifying whether to obtain supplementary data. This additional data includes information about the RAD7 such as its serial number and calibration date, as well as the device's printer output records, which offer details that are not always present in the standard RAD7 records. A RAD7 data file containing this supplementary information will use the R7CDT file name extension, whereas files lacking this supplementary data use the R7RAW extension.

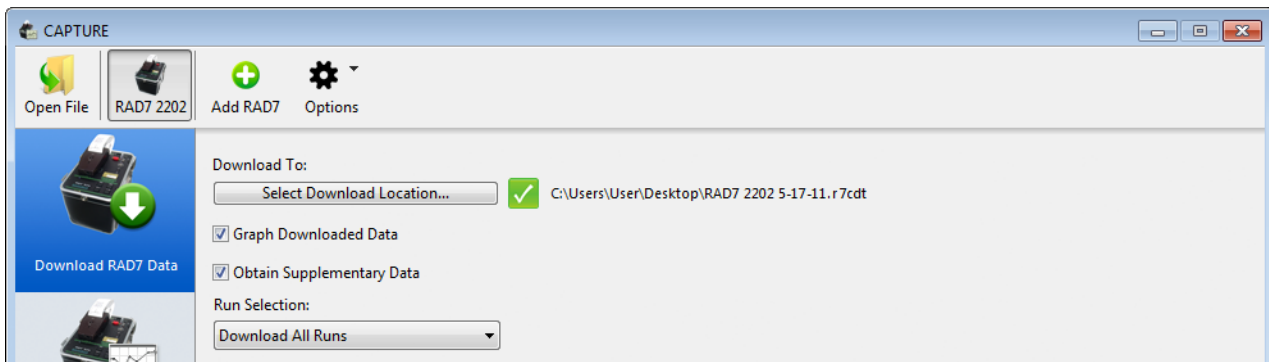


Figure 4: Configuring download settings in the Download RAD7 Data panel.

After specifying the appropriate download parameters, click the Begin Download button. If the RAD7 has RADLINK, the button will be labeled "Begin Download Automatically" and data will begin arriving almost immediately after clicking it, as shown in Figure 5, below. Otherwise it will be necessary to start the RAD7 manually.

To start the RAD7 manually, use the RAD7 keypad to choose Data, and then Com. Then key in the desired run number and press [ENTER]. You will have thirty seconds to complete this procedure before CAPTURE aborts the download due to an absence of incoming data.

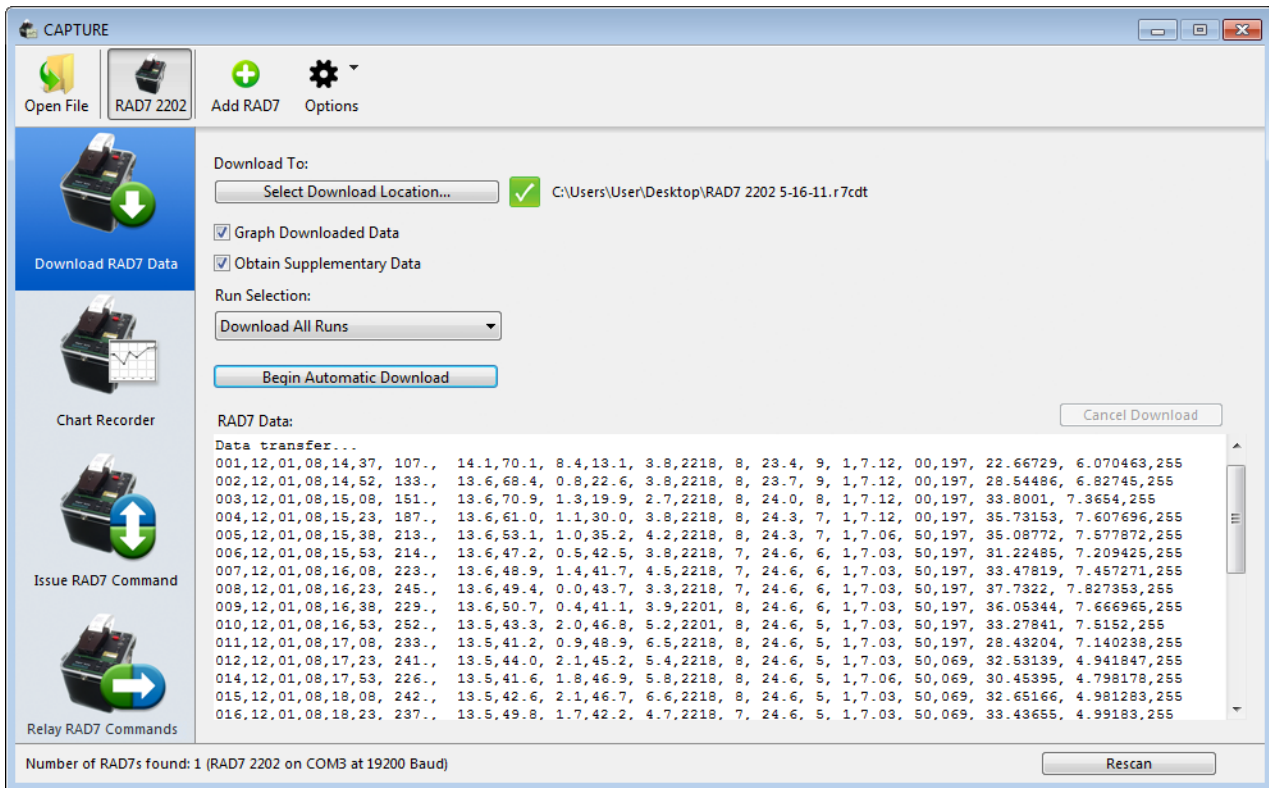


Figure 5: A RAD7 data download operation in progress.

As data records are received, they will fill the RAD7 Data text area at the bottom of the window as shown in Figure 5. When CAPTURE senses that the data retrieval process is complete, the acquired data will be saved to the specified location on disk. If the Graph Downloaded Data checkbox is checked, the Graph Window will appear, displaying the acquired data as shown in Figure 6, below.

If CAPTURE senses that one or more incoming RAD7 Data records are problematic, the Errors Window will appear containing details on the problem. This is described in depth in the RAD7 Data Errors section.

Downloading From All RAD7s

CAPTURE makes it easy to quickly download all of the raw data from each connected RAD7. Once the RAD7s have been discovered, the Download Data From All RAD7s command will become enabled in the Options menu located on the Main Window toolbar.

Upon selecting Download Data From All RAD7s, the dialog box pictured below will appear. Click the Select Download Location... button to select the folder into which the RAD7 data will be saved. Next click the Begin Download button. As raw data is obtained, a message on the lower left corner of the window provides details on the progress.

Once all of the data has been downloaded, the Begin Download button caption changes to Show Downloaded Files. Clicking this button closes the dialog box and opens the folder containing the downloaded files.

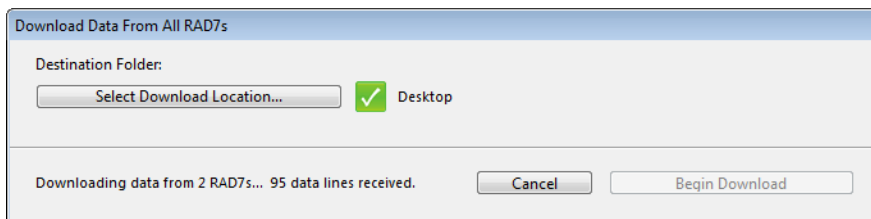


Figure 6: Downloading data from all connected RAD7s.

Graphing

The Graph Window displays radon concentration data across a timeline from left to right, with periods of higher radon concentration stretching further towards the top of the graph. In addition to radon, a graph may display thoron, temperature, and humidity data. A multitude of controls are available for navigating the RAD7 Data graph. These are discussed in the Graphing RAD7 Data section.

Because the data displayed in the Graph Window has been saved to disk, it is possible to reopen it at any time, using the Open Data File button on the toolbar, or the Open Data File... command in the File menu. It is also possible to export the graph data or the graph image for use in spreadsheets and presentations. For now, save the graph image by

selecting "Save Graph Picture..." from the File Menu. After entering the desired image size, complete the operation by specifying a name and location for the saved graph image.

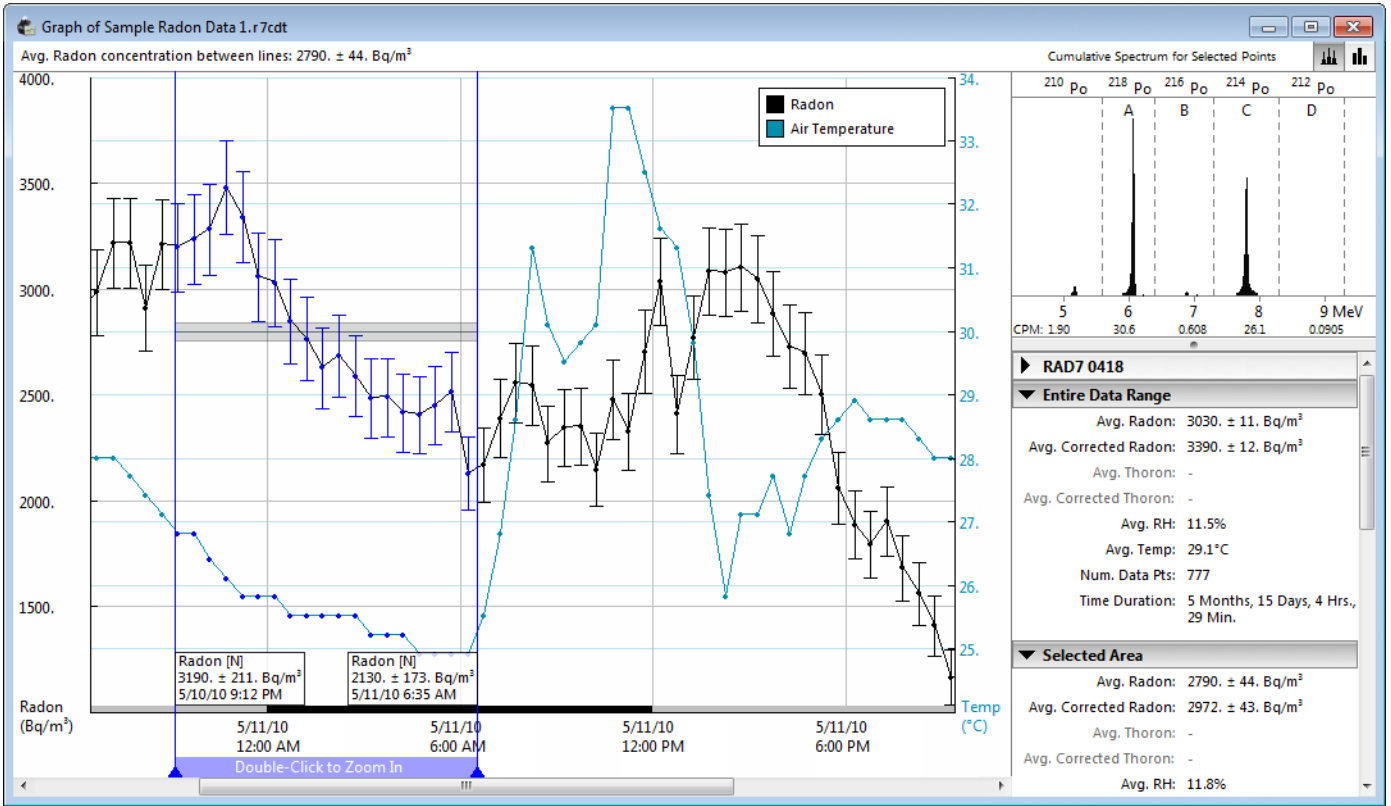


Figure 7: RAD7 data displayed in the CAPTURE Graph Window.

Opening Data From Disk

Besides being able to download data from the RAD7, CAPTURE can also open and graph existing RAD7 Data Files stored on disk. To do this either choose Open Data File... from the File menu, or click the Open File button on the Main Window toolbar, which is shown in Figure 1, below. The Open File dialog will appear, as shown in Figure 2. Here a RAD7 data file may be selected along with other parameters.

CAPTURE comes with a small collection of sample RAD7 data files, making it possible to explore the program's graphing features without having to first download data from your own RAD7. These are located in a folder alongside the CAPTURE application.

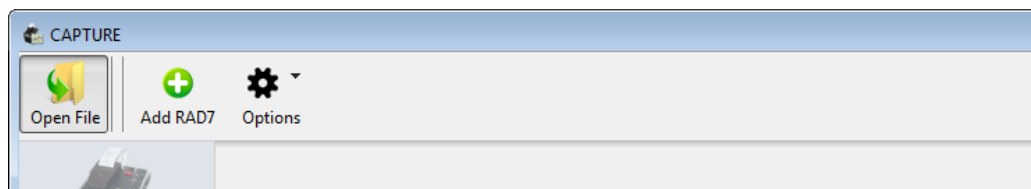


Figure 1: The Open File toolbar button.

Radon In Air

The Open File dialog contains a pop-up menu for selecting between multiple graphing procedures, each involving a different radon source. For graphing standard RAD7 data collected from the air, the Radon in Air option should be selected. Click the RAD7 Data File... button to select a R7RAW or R7CDT file to graph. (Information on the various types of RAD7 Data Files is available in the File Formats section.)

If you wish to open one of CAPTURE's sample files, they can be found in the Sample Data Files folder, which is located in the same folder as the CAPTURE application. Once a RAD7 data file has been selected, click the Display Graph button. If the file contains valid RAD7 data, the Graph Window will appear immediately. Information about navigating the Graph Window is available in the Graphing RAD7 Data section.

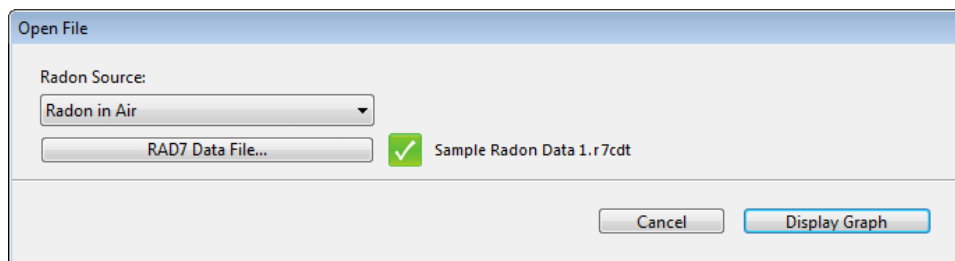


Figure 2: The Open File dialog, used for selecting a RAD7 data file to graph.

If there are problems with the selected RAD7 Data File but it is still partially readable, CAPTURE will graph any valid RAD7 Data records, and report a list of erroneous data lines. More information on handling problematic RAD7 Data is available in the Radon Data Errors section.

RAD AQUA or Water Probe

If the RAD7 was measuring radon in water using the RAD AQUA or Water Probe accessory, then it is necessary to specify not only the RAD7 data file, but also water temperature data, which is required to accurately calculate the concentration of the radon in the water. Water temperature data files are produced by temperature logging devices that may be present during the duration of the RAD7 test. Alternatively, a simpler approach is to supply a fixed water temperature value which will be applied across all records. CAPTURE supports both of these options. Note that temperature logger data files are produced by third party temperature probes. CAPTURE can only open a temperature data file if its exact format has been defined in the Profiles section of the Preferences Window.

First choose RAD AQUA or Water Probe from the Radon Source pop-up menu, as shown in Figure 3, below. Next choose the Temperature Source, either Temperature Data File or Fixed Temperature Value.

If Temperature Data File is selected, click the Temperature Data File button and select a text-based file containing temperature data records. Note that some temperature data probes save data to the PC in proprietary binary formats which can not be read by CAPTURE. These files can however be exported as plain text files using software provided by the device manufacturer. Once a temperature data file has been selected, identify its format using the Temperature Data Profile pop-up menu. CAPTURE contains built-in profiles for several common formats, such as those exported from Onset Computing's BoxCar and HOBOWare, and Lascar Electronic's EasyLog software. Profiles for other formats must be defined manually. The process of creating new Temperature Data Profiles is explained in the Preferences Window section.

If Fixed Temperature Value was selected, simply specify the temperature and unit (either Fahrenheit or Celsius), as shown in Figure 4.

After the appropriate settings have been selected, click the Display Graph button. The graph that appears will permit the display of Radon in Water, Thoron in Water, and Water Temperature graph lines, which are unavailable in conventional graphs.

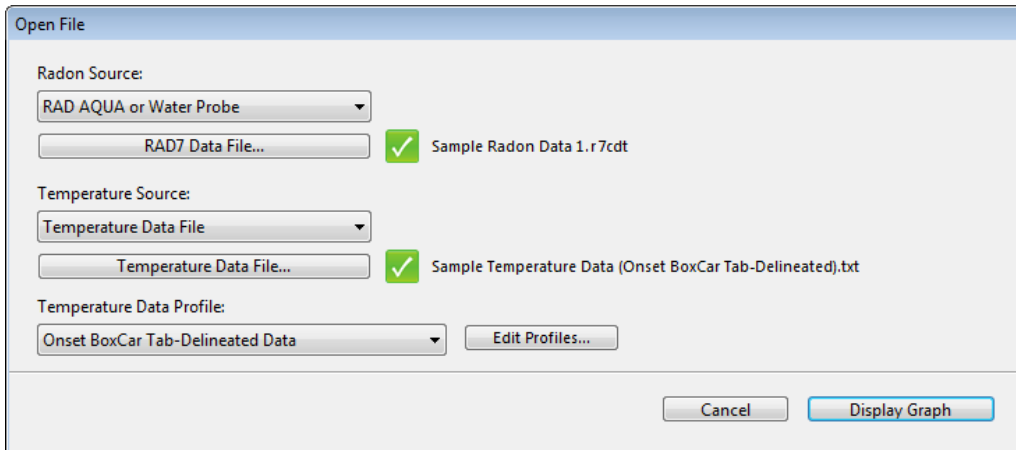


Figure 3: The Open File dialog with the Radon Source set to RAD AQUA or Water Probe, used for graphing radon in water. Here a temperature data file has been specified.

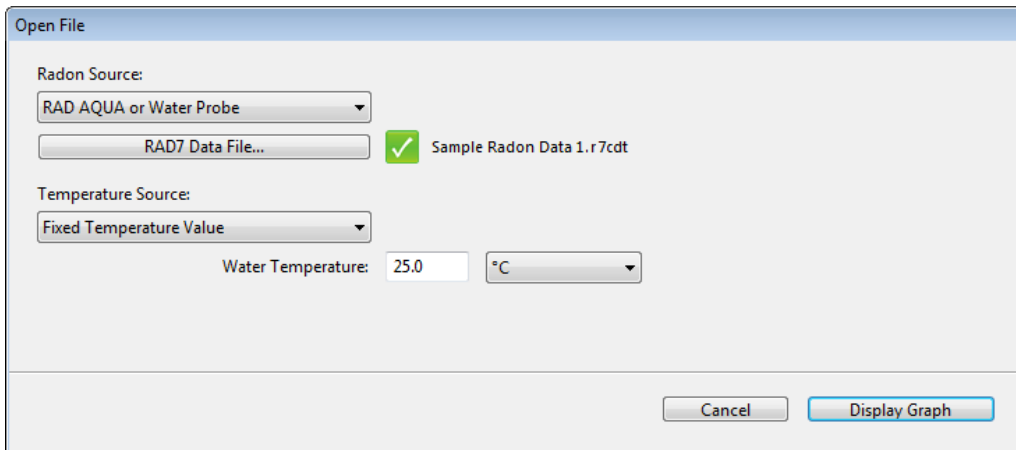


Figure 4: The Open File dialog with a fixed water temperature.

RAD H₂O

When opening RAD7 data that was obtained using the RAD H₂O accessory, the Radon Source should be set to RAD H₂O in the Open File dialog. Simply specify a R7RAW or R7CDT file and click Display Graph. Temperature data is not used.

When the graph appears, the Radon In Water graph line may be displayed, revealing valid WAT mode data points. (Note however that the concentrations of these Radon In Water data points will simply match the corresponding Radon In Air concentrations). The Water Temperature graph line may also be displayed, but the Thoron In Water graph line will be disabled because the brief half life of thoron means it will be undetectable by the time the water sample is aerated with the RAD H₂O.

See the RAD H₂O manual for detailed information on interpreting this data, and the Graphing RAD7 Data section for more information on CAPTURE's graphing features.

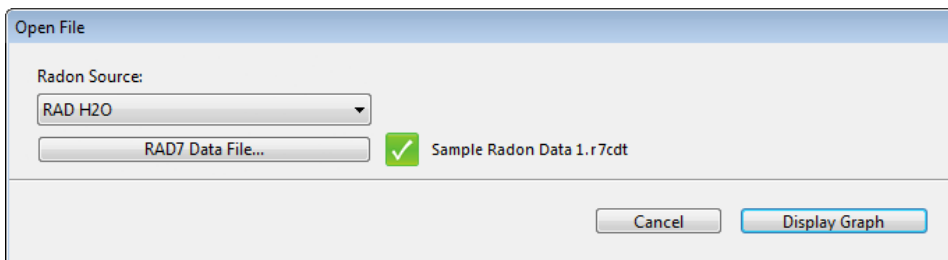


Figure 5: The Open File dialog with the Radon Source set to RAD H₂O, used for graphing radon in water data obtained through the RAD H₂O RAD7 accessory.

BIG BOTTLE RAD H₂O

If the RAD7 was measuring radon in water using the BIG BOTTLE RAD H₂O accessory, then it is necessary to specify the RAD7 data file and water temperature data as described in the RAD AQUA or Water Probe section above, as well as additional information on the specific BIG BOTTLE RAD H₂O configuration used to obtain the data.

To graph RAD7 data collected with the use of the BIG BOTTLE RAD H₂O, first choose BIG BOTTLE RAD H₂O from the Radon Source pop-up menu, as shown in Figure 5, below, and select a R7RAW or R7CDT RAD7 data file. Configure the temperature data settings as described above in the RAD AQUA or Water Probe section, using either a temperature data file or a fixed temperature value.

Next specify the RAD7 Type. This may be either a standard RAD7, or a RAD7 with an oversized dome. Also specify the Drying Unit, which may be one of the following:

- Laboratory Drying Unit
- Active Drystik
- Small Drying Tube
- Active Drystik and Small Drying Tube
- Custom
- None (Not Recommended)

If the Custom drying unit is selected, it is necessary to specify the volume of the drying unit in Liters. The None option is not recommended, because it increases the risk of moisture entering the RAD7.

After selecting the drying unit, specify the Tubing Volume, Bubble Trap Volume, Head Space, and Bottle Volume. All of these settings affect the calculation of radon in water with regard to the volume of air inside the testing apparatus. When using the BIG BOTTLE RAD H₂O system in its recommended configuration, these four values may be left at their defaults.

After the appropriate settings have been entered, click the Display Graph button. The graph window that appears will permit the display of Radon in Water and Water Temperature graph lines, which are unavailable in conventional graphs. The graph should indicate a Radon In Water concentration somewhat lower than the Radon In Air concentration, as shown in Figure 6. Because of thoron's very brief half life, it is not possible to graph Thoron in Water concentrations obtained using the BIG BOTTLE RAD H₂O. See the BIG BOTTLE RAD H₂O manual for detailed information on interpreting this data, and the Graphing RAD7 Data section for more information on CAPTURE's graphing features.

Radon Source:
Big Bottle RAD H₂O
RAD7 Data File... ✓ Big Bottle Data 2011-12-23.r7cdt

Temperature Source:
Temperature Data File
Temperature Data File... ✓ Bathroom Calibration Temperatures 2011-12-20 thru 24.txt

Temperature Data Profile:
Lasca Electronics EasyLog Data Edit Profiles...

RAD7 Type:
Standard RAD7

Drying Unit:
Laboratory Drying Unit

Tubing Volume: 54 ml
Bubble Trap Volume: 51 ml
Head Space: 15 ml
Bottle Volume: 2.5 L

Specify Ambient Air Radon:
0.5 pCi/L

Cancel Display Graph

Figure 6: The Open File dialog with the Radon Source set to BIG BOTTLE RAD H₂O, used for graphing radon in water data obtained through the BIG BOTTLE RAD H₂O RAD7 accessory

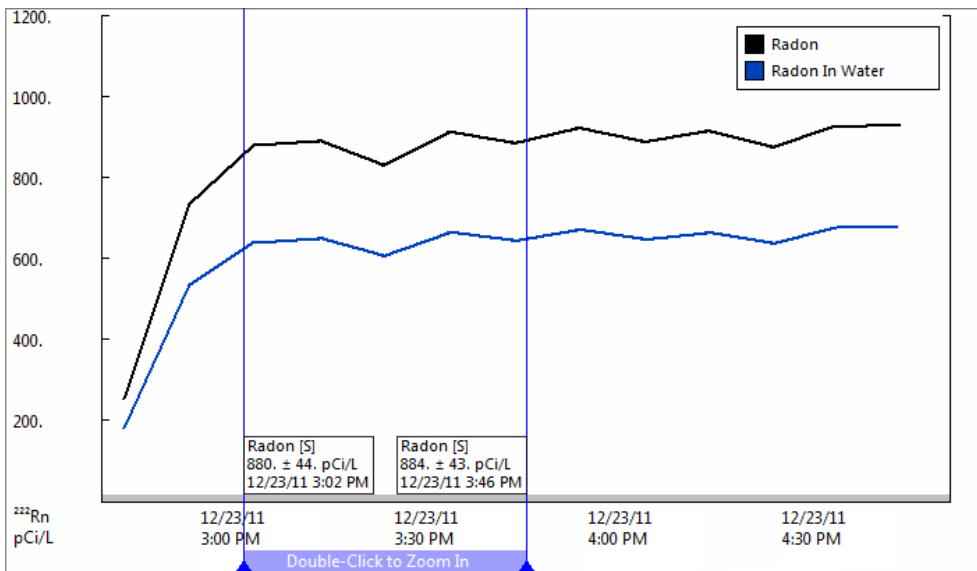


Figure 7: Typical graph of data obtained with the use of the BIG BOTTLE RAD H₂O RAD7 accessory. Radon in Water is represented by the blue graph line. The selected area represents the crucial 20-60 minute range.

Quick Open

CAPTURE offers some quick and easy ways to open RAD7 data files. Before connecting to a RAD7, the Main Window will display an Open File button and an Open Recent pop-up menu, as shown in Figure 4, below. A list of recently opened files appears in this button, and is also provided by the Open Recent command in the File menu. Up to ten recently opened files will be remembered, with the newest items placed at the top of the list. R7RAW or R7CDT data files may also be opened by dragging them onto the CAPTURE icon, or by simply double-clicking them. Note that when performing these operations or the Open Recent command it is assumed that the Radon Source is Radon In Air, and that the Radon in Water, Thoron in Water, and Water Temperature graph lines are therefore not able to be displayed. To open a RAD7 data file with temperature data applied, use the Open File command dialog as explained above.

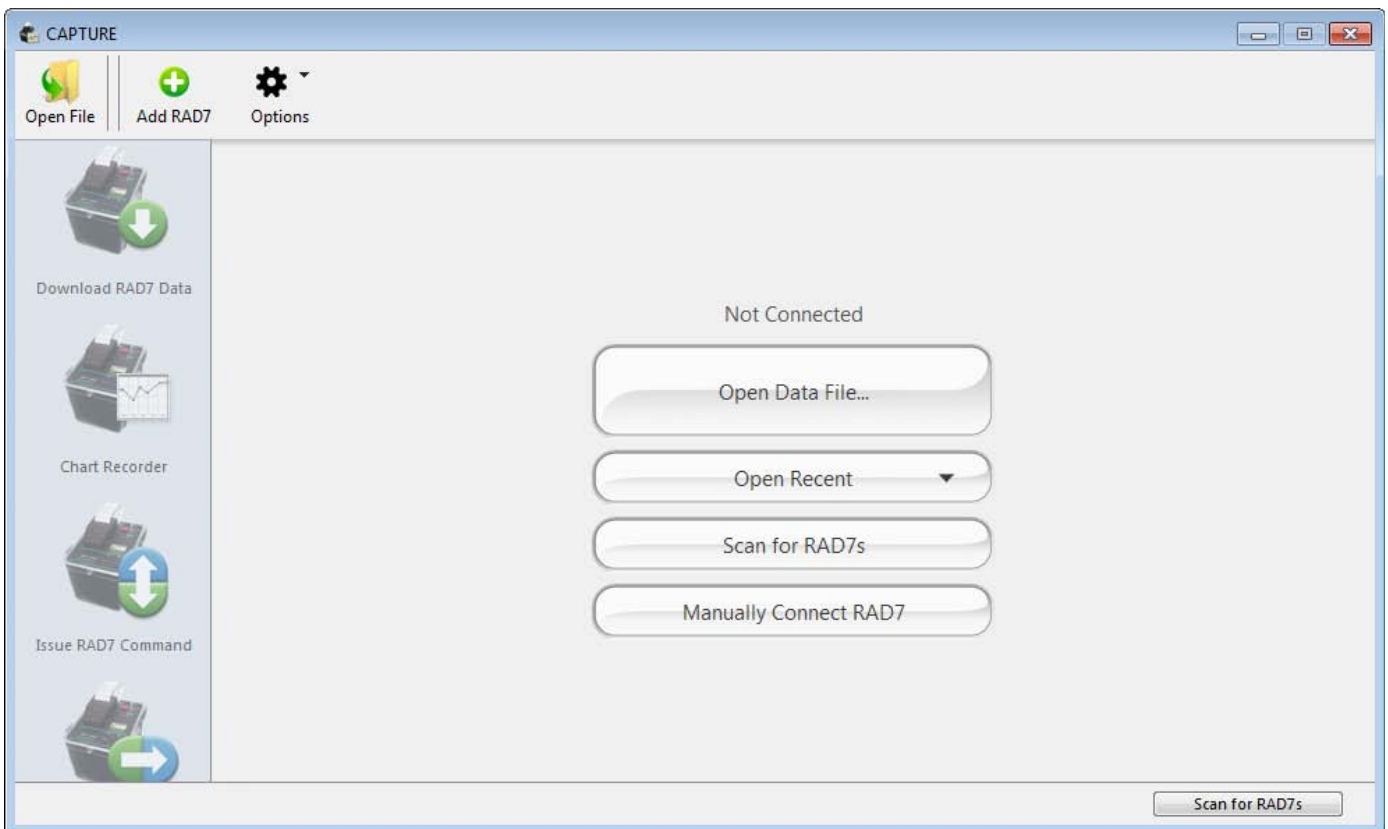
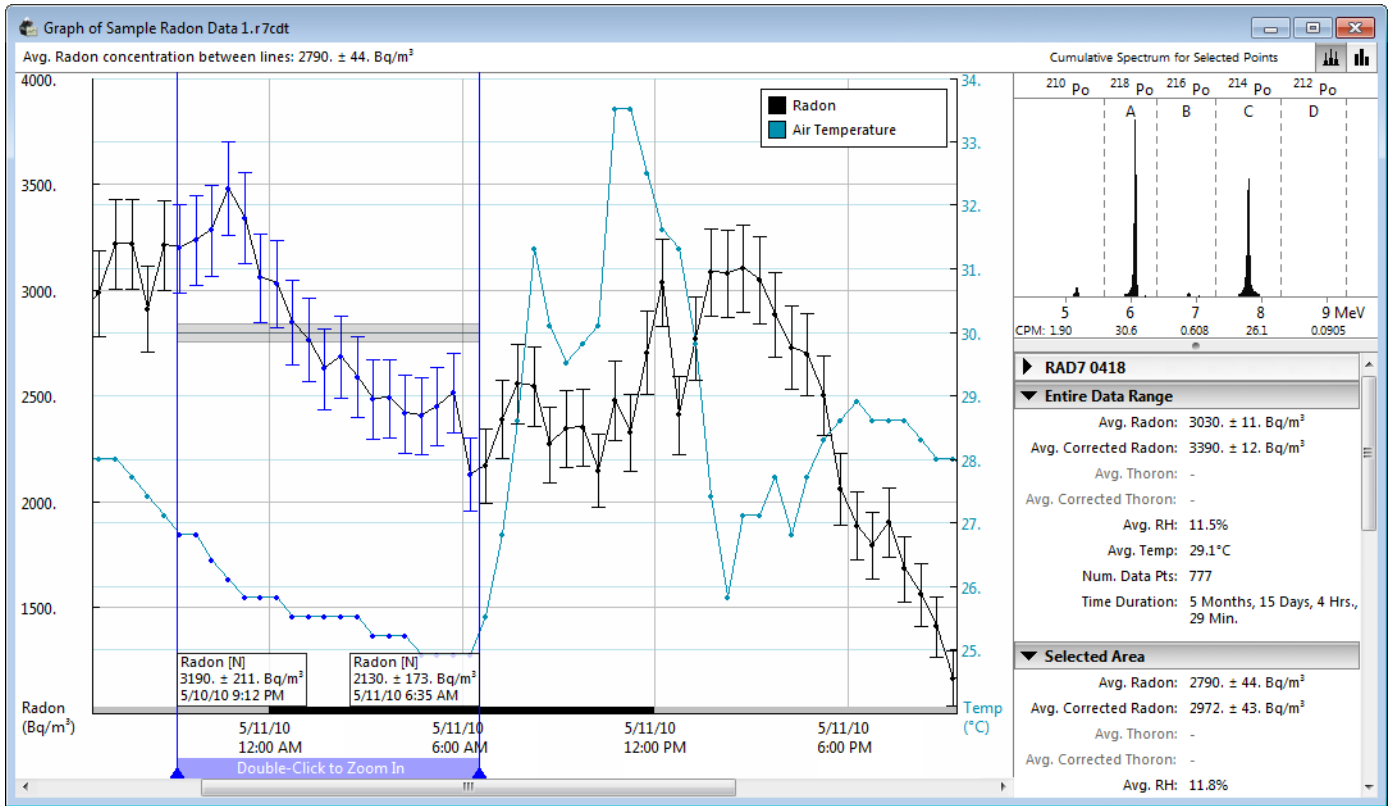


Figure 8: The Open File button and Open Recent pop-up menu in the Main Window.

Graphing RAD7 Data

The Graph Window may appear when new RAD7 Data is downloaded or when an existing RAD7 Data File is opened. The Graph Window consists of several interface components, plus side panels containing a Spectrum display and Statistics. Navigational controls appear in an auxiliary floating window. Each of these elements are described below.

The Graph Window The Graph Window displays radon data along a coordinate plane, with the X axis representing time, and the Y axis indicating the radon concentration in any of several different unit types. RAD7 Data itself appears as a black line, or as a red line in areas of high relative humidity. (This can be changed in the preferences.) Other graph lines representing such things as thoron, air temperature, and humidity, may be toggled on and off using the Graph Controls Window, which floats alongside the Graph Window. This is explained further below. Gaps in the data occur in areas where no radon samples were recorded.



Graph Navigation The Graph Window contains simple but powerful navigational controls which make it possible to select data points, scroll horizontally through data, and zoom the graph.

Selecting Data

To view a specific portion of the graph in detail, it is first necessary to adjust the selection. The vertical blue lines in the above screen are called Selection Bars. These lines frame the selected area. Information pertaining to the selected area is displayed in a panel in the Statistics panel, which is located alongside the Graph Window. To create a new selection, simply drag the mouse across a portion of the graph. The selection can then be modified by dragging either of the Selection Bars. Dragging while holding the Alt (Option) key will cause the selection to grow from the center.

Zooming the Graph

Double-click on the selected area to zoom in. Once the view has been magnified, the selected data will be visible in greater detail, and a red bar will appear under the Selection Bars. Double-clicking on the Selection Bars when they are red causes the view to zoom out to its previous state. If the red Selection Bars are dragged, they will turn blue again and the selection may be changed. At that point, double clicking will cause the view to zoom in further for still greater detail.

Zooming in and out may also be achieved by using the Zoom Slider which is located on the floating Graph Controls Window, which appears to the left of the Graph Window by default. (The Graph Controls Windows is described in greater depth below.) Additionally, the View menu in the menu bar contains Zoom In and Zoom Out commands, which can be used repeatedly to move in and out through a wide range of zoom states.

Scrolling the Graph

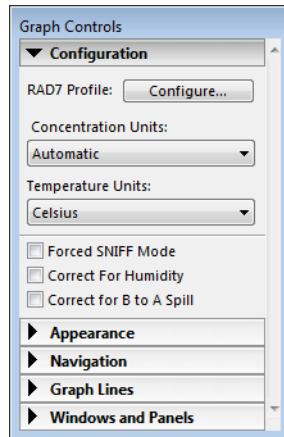
Whenever the graph is zoomed in, the scroll bar at the bottom of the window will become enabled, and it will be possible to navigate forwards and backwards through time.

It is also possible to scroll the graph using the Selection Bars. Position the cursor between the Selection Bars, and hold the Shift key. With the Shift Key pressed, drag the mouse to the left or right, off the edge of the graph. The graph will scroll to keep up with the movement of the mouse.

Graph Controls Window

The Graph Controls Window is used to navigate the graph and change its behavior and appearance. Although much of its functionality is also accessible from within the menu bar, you may find that the Graph Controls Window provides easier access to commonly used functions. This scrollable window consists of a series of panels, labeled Configuration, Appearance, Navigation, Graph Lines, and Windows and Panels. These may be expanded or collapsed by clicking on its heading. Each panel is described below.

Configuration Panel



RAD7 Profile Pop-Up Menu

Use this pop-up menu to identify the four-digit serial number of the RAD7 that was used to collect the data being graphed. This associates the appropriate RAD7 Profile with the graphed data, allowing for the more accurate display of radon and thoron information. The collection of RAD7 Profiles may be edited in the Preferences Window, as described in the Preferences section.

Concentration Units Pop-Up Menu

Determines the unit of measurement used to denote radon and thoron concentrations on the graph. The available options include Automatic, Bq/L, Bq/m³, dpm/L, and pCi/L. The Automatic option causes radon and thoron concentrations to be presented in the unit in which they were originally recorded inside the RAD7.

Temperature Units Pop-Up Menu

Determines the unit of measurement used to denote air and water temperatures on the graph. The available options include Automatic, Celsius, Fahrenheit, and Kelvin. The Automatic option causes temperatures to be presented in the unit in which they were originally recorded inside the RAD7.

Forced SNIFF Mode Checkbox

Determines whether the graph data is forced to be displayed as if it was recorded in SNIFF Mode. This checkbox is enabled whenever there exists at least one record that truly was recorded in SNIFF Mode. Such records are analyzed to determine the necessary SNIFF sensitivity data.

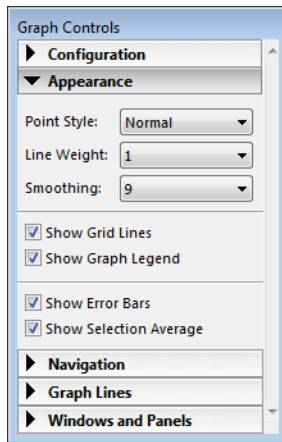
Correct For Humidity Checkbox

Determines whether the graph data is corrected for humidity. When relative humidity is high, radon concentration values are often underreported. Humidity correction compensates for this.

Correct for B to A Spill Checkbox

Determines whether correction is applied based on the spill from the B to A windows. Significant spill occurs when the thoron concentration is high relative to the radon concentration. Under these conditions it is recommended that the data be corrected to compensate.

Appearance Panel



Point Style Pop-Up Menu

Determines the appearance of the data points on the graph. The options are Normal, Shapes, B&W (Black and White) Shapes, and Hidden. The B&W Shapes option causes the graph to be rendered in black and white, which is useful when graph image is printed on a non-color printer.

Line Weight Pop-Up Menu

Determines the thickness of the graph lines, as measured in pixels. This value may range from 1 to 4, or the graph lines may be hidden. A thicker line may be easier to read, but is somewhat less precise than a single-pixel line.

Smoothing Pop-Up Menu

Determines the degree of smoothing applied to the graph line. This value may range from 1 (no smoothing) to 9 (high smoothing). When the degree of smoothing is greater than 1, the original, non-smoothed graph line appears faded in the background.

Show Grid Lines Checkbox

Determines whether horizontal and vertical grid lines are visible on the graph.

Show Graph Legend Checkbox

Determines whether the legend is visible on the Graph Window. The legend indicates the significance of the colors that appear on the graph.

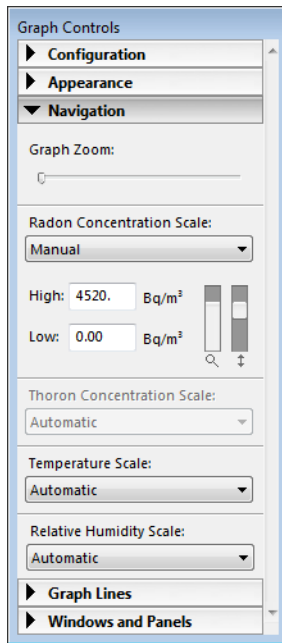
Show Error Bars Checkbox

Determines whether error bars are visible on the graph. Error bars indicate the uncertainty of radon and thoron readings.

Show Selection Average Checkbox

Determines whether a representation of the uncertainty in the average of the selection is displayed between the Selection Bars.

Navigation Panel



Graph Zoom Slider

Zooms the radon graph in and out. When this slider is dragged all the way to the left, the entire collection of data is made visible, and no horizontal scrolling is required to see data points.

Scale Popup Menus

The Radon Concentration Scale pop-up menu determines whether the Y scale of the radon graph is determined automatically or manually. If Automatic is selected, the graph's Y scale will be configured such that the visible radon points will occupy the entire available vertical space. Selecting Manual makes it possible to control the Y scale region yourself.

Also appearing in the Navigation panel are pop-up menus for specifying the Thoron Concentration Scale, the Temperature Scale, and the Relative Humidity scale. Each behaves similarly to the Radon Concentration Scale pop-up menu, and may be set to either Automatic or Manual.

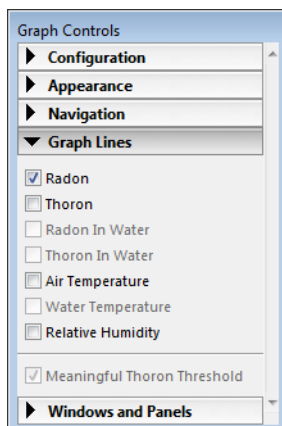
Concentration Scale High and Low Fields

When a Scale pop-up menu is set to Manual, a set of controls for specifying the scale parameters appears. The High and Low fields represent the highest and lowest element values visible on the graph respectively. Separate sets of High and Low fields are present for radon, thoron, temperature, and relative humidity.

Concentration Zoom and Scroll Sliders

To the right of each pair of High and Low fields are a set of controls for zooming and scrolling the graph's Y Scale. The Zoom Slider, on the left, is controlled by clicking or dragging the filled region to the desired level; higher levels represent increased zoom. The Scroll Slider, on the right, operates like any scroll bar; simply drag the box up or down until the desired region scrolls into view. The height of the scroll box is proportional to the scope of the currently visible region. As with the High and Low fields, separate sets of Zoom and Scroll sliders are present for radon, thoron, temperature, and relative humidity.

Graph Lines Panel



Radon Checkbox

Determines whether radon data is shown on the graph. The values of the radon data points may be affected by any corrections applied in the Configuration panel, as described above.

Thoron Checkbox

Determines whether Thoron data is shown on the graph. When displaying thoron for the first time, a dialog box may appear entitled "RAD7 Profile: Thoron Settings", where you will be prompted to enter Thoron calibration values for the current graphing session. If you are graphing data for the first time, and are simply learning how to use the program, it is OK to accept the suggested default values. However we urge you to contact DURRIDGE Company to receive the optimal Thoron calibration values consistent with the serial number of your specific RAD7 device. Once these values are known, a series of RAD7 Profiles may be established, as described in the Preferences Window section.

If Thoron data does not appear when this box is checked, a button labeled "Thoron Details" will appear at the upper right corner of the Graph Window. Clicking this button will provide an explanation as to exactly why Thoron is not visible, and the option to display Thoron anyway will be made available.

Radon In Water Checkbox

Determines whether radon in water data is shown on the graph. This checkbox is only enabled if a temperature data file containing water temperature information has been loaded along with the basic RAD7 data. This is because it is impossible to determine how much radon is in water without knowing the water's temperature.

Thoron In Water Checkbox

Determines whether thoron in water data is shown on the graph. As with the Show Thoron checkbox, clicking this box may result in the "RAD7 Profile: Thoron Settings" dialog or "Thoron Details" button appearing. As with the Radon In Water checkbox, this box is only enabled if a temperature data file containing water temperature information has been loaded along with the basic RAD7 data.

Air Temperature Checkbox

Determines whether air temperature data points are visible on the graph. The temperature unit used here may be set in the Configuration panel, as described above.

Water Temperature Checkbox

Determines whether water temperature data is visible on the graph. As with the Radon In Water checkbox, this box is only enabled if a temperature data file containing water temperature information has been loaded along with the basic RAD7 data.

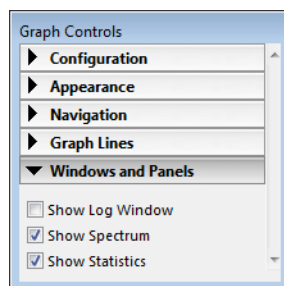
Relative Humidity Checkbox

Determines whether relative humidity data is visible on the graph. Relative humidity values are stored as whole integers. Areas of excessive humidity will be identified with a differently colored radon graph line.

Meaningful Thoron Threshold Checkbox

Determines whether a shaded area will appear representing the area under the meaningful thoron concentration range. A thoron reading may only be considered meaningful if the data point appears above this shaded area. If one or more thoron data points are found to be under the minimum threshold, a dialog box will appear explaining the situation. Non-meaningful thoron data has high uncertainty, resulting from excessive spill between the RAD7's C and B windows.

Windows and Panels



Show Log Window Checkbox

Determines whether the Log Window is visible. This window contains a listing of all of the actions that CAPTURE has performed since the application was launched, plus a record of the data that has arrived through each serial port.

Show Spectrum

Determines whether the Spectrum panel is visible. This panel displays a graph emulating the spectrum printed out by the RAD7.

Show Statistics

Determines whether the Statistics panel is visible. This panel displays a range of information on the data being displayed on the graph, as well as whichever data lies within the selected portion of the graph.

Statistics Panel

The Statistics panel consists of four sub-panels, labeled RAD7, Entire Data Range, Selected Area, and Point Nearest to Cursor. Each of these may be independently expanded or collapsed as viewing area permits. The Statistics panel itself may be resized and scrolled as desired. The contents of each panel are described below.

RAD7 Panel

▼ RAD7 0418
Calibration Date: 5/9/11
Firmware Version: 2.5f 991128
Model: 710
RADLINK Version: 0252
'NORMAL' Sensitivity: 0.0147 cpm/(Bq/m ³)
'SNIFF' Sensitivity: 0.00728 cpm/(Bq/m ³)
Thoron Sensitivity: -
Avg. Pump Current: 44 mA
Avg. Battery Voltage: 7.05 V
Avg. High Voltage: 2230. V
Avg. HV Duty Cycle: 6.64%
Avg. Leakage Current: 1.94 at 29.1°C
Lowest Battery Voltage: 6.97 V
BA Spill Factor: 0.0300
CB Spill Factor: 0.0150
► Entire Data Range
► Selected Area
► Point Nearest To Cursor

The first sub-panel in the Statistics panel shows information about the RAD7 from which the current graph data was obtained. Its heading contains the RAD7's serial number, if it is known. Note that this and other items may be listed as '[Unknown]' because not all RAD7 data files contain supplementary information with details on the device itself. Generally files with the R7CDT file name extension offer this supplementary data, while files with the R7RAW file name extension do not. The exception to this occurs when a R7RAW data is exported as "Cleaned Up Data"; in this case the resulting R7CDT file contains only what was able to be synthesized from the original R7RAW data.

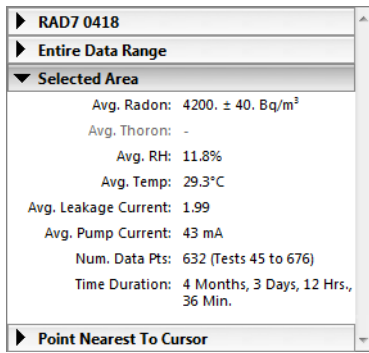
Entire Data Range Panel

The second sub-panel in the Statistics panel contains information summarizing the entire range of data contained in the graph, including the average radon, thoron, temperature, and humidity, as well as the total number of data points and time duration of the data set.

► RAD7 0418
▼ Entire Data Range
Avg. Radon: 4030. ± 11. Bq/m ³
Avg. Thoron: -
Avg. RH: 11.5%
Avg. Temp: 29.1°C
Num. Data Pts: 777
Time Duration: 5 Months, 15 Days, 4 Hrs., 29 Min.
► Selected Area
► Point Nearest To Cursor

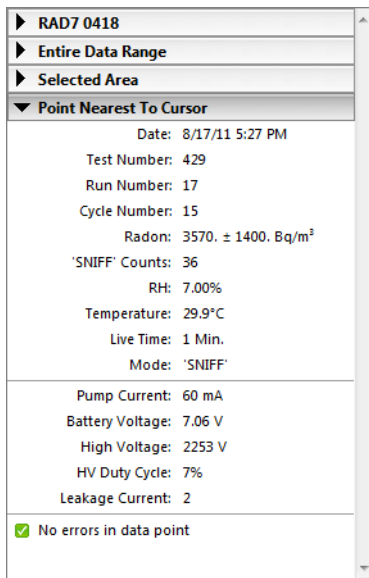
Selected Area Panel

The third sub-panel in the Statistics panel displays information on the selected records, i.e. those lying between the Selection Bars. This includes the selection's average radon, thoron, temperature, and humidity, as well as the number of data points selected and time duration of the selected range.



Point Nearest To Cursor Panel

The fourth sub-panel in the Statistics panel displays statistics on the data record that the cursor is touching, if there is one. This includes the record's date, test number, run number, and cycle number, plus radon and thoron concentrations, as well as temperature and relative humidity data. Information on the state of the RAD7 at the time of the test is also provided. If the graph contains raw RAD7 data lacking supplementary information, the Run and Cycle values will be based on estimates. Any problems with the data point will be reported in the bottom section of the panel.

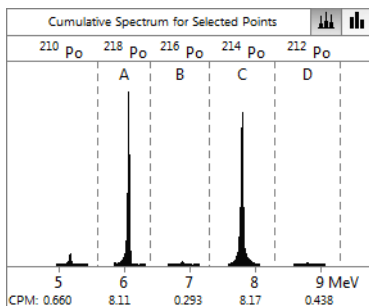


Spectrum Panel

The Spectrum panel emulates the spectrum printed out by the RAD7. It is based on the total counts in each of the windows A, B, C, and D for the selected points in the display. The count rate is displayed under each peak, and the polonium isotope whose decays contribute to the peak is indicated at the top.

CAPTURE's Spectrum display is useful for visualizing the growth of counts in window C as time progresses in a measurement run. Note however that it is not always identical to the spectrum printed by the RAD7. Specifically, there are various pathological spectra that may be generated by a malfunctioning RAD7 in which the peaks are not in their correct position and/or there are spurious points within and outside the primary windows that are distributed randomly across the entire spectrum (see chapter 3.13.4 of the RAD7 manual). These symptoms would be manifest in a real spectrum printed by the RAD7 but not in the synthetic CAPTURE spectrum.

Two buttons near the top right corner of the Spectrum panel may be used to display the spectrum in its normal form, or as a simplified bar chart. Detailed information on the spectrum is available in the RAD7 User's Manual, Chapter 3.7.



The Chart Recorder

The CAPTURE Chart Recorder displays a real-time graph of RAD7 data as it is recorded. As a radon test progresses, a set of virtual pens plot radon concentration, temperature, and humidity data on the right side of the display, while older readings scroll to the left.

The Chart Recorder is accompanied by a Button Bar for starting and stopping tests and configuring RAD7 settings. Below the Button Bar is a Status Display panel which indicates the current state of the RAD7. A nearby panel of Chart Recorder Controls is used to adjust the appearance and range of the Chart Recorder. These features are described in detail below.

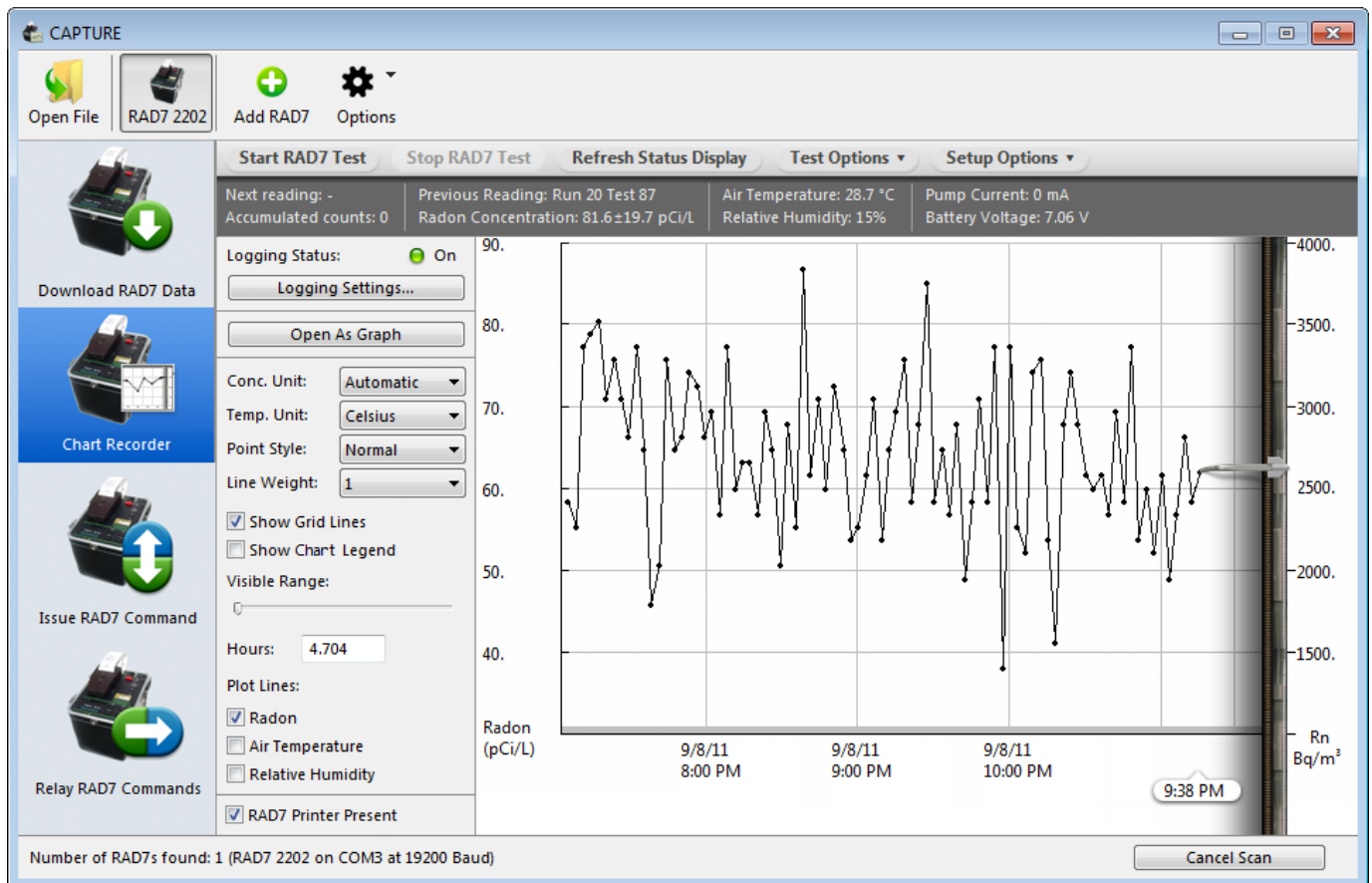


Figure 1: The CAPTURE Chart Recorder.

Button Bar

The Chart Recorder's Button Bar contains controls for starting and stopping the RAD7, refreshing the Status Display and Chart, and configuring RAD7 settings.



Figure 2: The Chart Recorder Button Bar.

The Start RAD7 Test button begins a RAD7 test and initiates real time data tracking. This button has the same effect as selecting Test Start on the actual RAD7. Likewise, the Stop RAD7 Test button emulates the RAD7's Test Stop function.

The Refresh Status Display button will update the statistics shown in the Chart Status Display, and will cause the Chart Recorder image to be refreshed. Normally this occurs automatically every 60 seconds, but the Refresh Status Display button is useful when an immediate status update is desired.

The Test Options and Setup Options menus, to the right of the Refresh Status Display button, contain commands found in the RAD7's Test and Setup menus. Selecting one of these commands will have the same result as entering the corresponding command on the actual RAD7. These commands are described in Chapter 2 of the RAD7 User's Manual. Note that Setup menu commands ending with ellipses (...), such as "Units..." and "Clock..." will present dialog boxes for specifying command parameters, as demonstrated in figures 3 and 4, below.

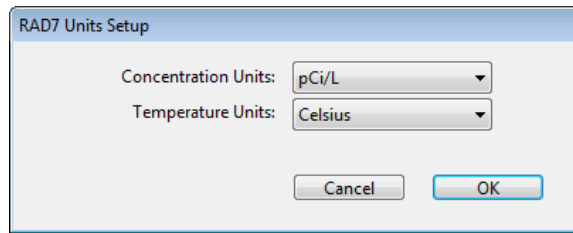


Figure 3: The Chart Recorder RAD7 Units Setup dialog.

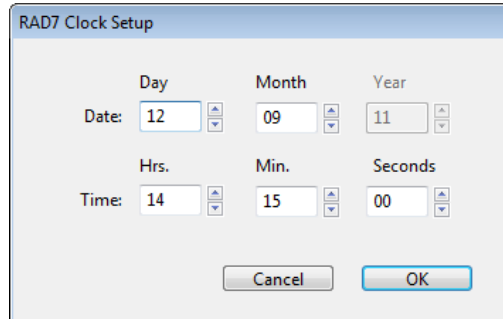


Figure 4: The Chart Recorder RAD7 Clock Setup dialog.

Chart Status Display The Chart Status Display maintains real-time statistics on the state of the RAD7, including the date and time of the next RAD7 reading, the counts that have accumulated since the last reading was recorded, the previous reading's run number, test number, and radon concentration, plus the current air temperature, relative humidity, pump current, and battery voltage.

The Status Display is automatically updated every 60 seconds, notwithstanding the immediate update that occurs when clicking the Refresh Status Display button. Each time an update is initiated, it takes about 5 seconds for the latest status information to be obtained and displayed.

Next reading: -	Previous Reading: Run 20 Test 87	Air Temperature: 28.7 °C	Pump Current: 0 mA
Accumulated counts: 0	Radon Concentration: 81.6±19.7 pCi/L	Relative Humidity: 15%	Battery Voltage: 7.06 V

Figure 5: The Chart Recorder Status Display.

Chart Recorder Controls

To the left of the Chart Recorder is a panel of controls similar to those accompanying the Graph Window, but simplified in functionality. The use of each control is explained below:

Open As Graph Button

Click the Open as Graph button to view the content of the Chart Recorder in a Graph Window. This makes it possible to examine the data in more detail, apply corrections, and export it in a variety of formats.

Concentration Units Pop-Up Menu

Determines the unit of measurement used to denote radon concentrations on the chart. The available options include Automatic, Bq/L, Bq/m³, dpm/L, and pCi/L. The Automatic option causes radon concentrations to be presented in the unit to which the RAD7 has been set.

Temperature Units Pop-Up Menu

Determines the unit of measurement used to denote air temperatures on the chart. The available options include Automatic, Celsius, Fahrenheit, and Kelvin. The Automatic option causes temperatures to be presented in the unit to which the RAD7 has been set.

Point Style Pop-Up Menu

Determines the appearance of the data points on the chart. The options are Normal, Shapes, B&W (Black and White) Shapes, and Hidden. The B&W Shapes option causes the graph to be rendered in black and white.

Line Weight Pop-Up Menu

Determines the thickness of the chart lines, as measured in pixels. This value may range from 1 to 4, or the chart lines may be hidden. A thicker line may be easier to read, but is somewhat less precise than a single-pixel line.

Show Grid Lines Checkbox

Determines whether horizontal and vertical grid lines are visible on the chart.

Show Chart Legend Checkbox

Determines whether the legend is visible on the chart. The legend indicates the significance of the colors that appear on the chart.

Visible Range Slider and Hours Field

The Visible Range slider zooms the Chart Recorder view in and out. When this slider is dragged all the way to the left, the entire collection of data is made visible. When the slider is dragged all the way to the right, only the most recently recorded data points remain visible. The Hours field can be used as an alternative to the slider: input the desired number of hours and press Enter to set the chart range. Note that the right edge of the chart always represents the current time.

Radon, Air Temperature, and Relative Humidity Checkboxes

These checkboxes determine whether radon, relative humidity, and air temperature points are visible on the chart. The radon concentration data that is plotted on the chart is always taken directly from the RAD7, with no corrections made with respect to spill, humidity, or other factors.

RAD7 Printer Present Checkbox

The RAD7 Printer Present checkbox is used to specify whether an infrared printer has been positioned on the RAD7. If this box is checked, CAPTURE will allow printing to proceed uninterrupted after each record is recorded. If this box is not checked, updates to the Status Display will be given higher priority, potentially interrupting end-of-cycle RAD7 printing operations.

Logging Chart Recorder Data

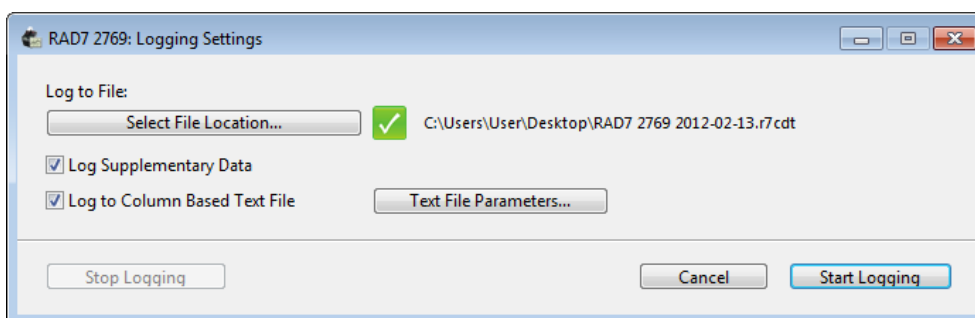
When the Chart Recorder is active, chart data may be logged to disk in any of several formats. Clicking the Logging Settings button, which is visible to the left of the chart, brings up the Logging Settings dialog box, which is shown below. This dialog will appear automatically when switching to the Chart Recorder of a RAD7 that is currently recording a test, or when initiating a test while the Chart Recorder is already visible.

Within the Logging Settings dialog box, the Select File Location button is used to specify the name and location of the logged data. Logged data is saved to a .r7raw file, which may be opened as a graph in CAPTURE at any time. The Log Supplementary Data checkbox controls whether additional printer output is logged. If this box is checked, a .r7cdt file with more complete records will be created alongside the r7raw file. The Log to Column Based Text File checkbox makes it possible to log a column or tab-delineated text file, which may be opened as a spreadsheet for further computation and analysis.

After specifying the desired settings, click the Start Logging button. The Logging Status light on the Chart Recorder will turn green to indicate that logging is active. It is possible to return to the Logging Settings dialog at any time by clicking the Chart Recorder's Logging Settings button. If logging is active, it may be disabled with the Stop Logging button, found at the lower left corner of the Logging Settings dialog.

Upon disconnecting a RAD7 or exiting CAPTURE, the program will save any outstanding chart recorder data. This process will normally take several seconds, but may be cancelled if it is necessary to exit CAPTURE immediately.

Note that even if logging is not specifically enabled, CAPTURE will maintain records of raw Chart Recorder data in the Preferences folder. These files can be revealed at any time by selecting Show Chart Recorder Logs from the File Menu.



Special File Operations

The File menu contains commands for performing special operations upon RAD7 Data. These include exporting radon data, saving data summary reports, and combining multiple files into a single file containing an larger collection of data. These features are detailed in this section.

Exporting RAD7 Data

After RAD7 Data has been downloaded or opened from disk and made visible in a graph window, it may be exported in any of several formats.

The Export Selected Data command in the File menu includes several options for exporting different types of files, as described below. Each of these will involve only the selected records, which are those found between the two Selection Bars. More information on using the Selection Bars is available in the Graphing RAD7 Data section.

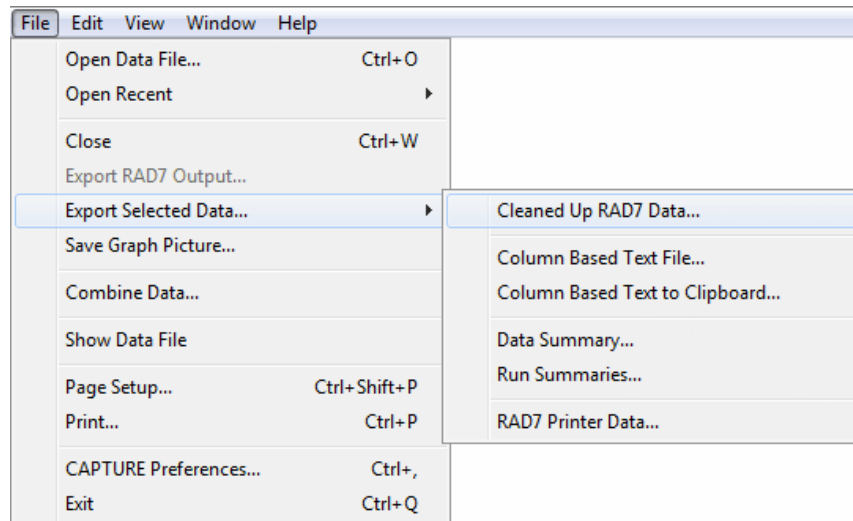


Figure 1: Export Selected Data options in the File menu.

Exporting Cleaned Up RAD7 Data

The Cleaned Up RAD7 Data submenu command exports a R7CDT or TXT RAD7 Data File containing only data that was able to be verified. This file will not produce any fatal error messages when opened for graphing. Choosing this option will present a Save As dialog box, in which the name and location of the exported file may be specified, as well as the file type. The R7CDT file type is native to CAPTURE, while the TXT file type is suitable for a word processing application. The chosen file type does not affect the actual content of the file.

Exporting Column Based Text

The Column Based Text File and Column Based Text to Clipboard submenu commands each produce textual data in a format suitable for importation into Microsoft Excel or similar spreadsheet application. The Column Based Text File command saves the data to a text file, while the Column Based Text to Clipboard command simply puts it on the clipboard, making it possible to paste it into another program.

Both of these operations require flagging the desired fields for inclusion in the exported data using the Export Column Based Text dialog, shown in Figure 2. Each included field is exported as a separate column of tab-delineated text. The details of this window are explained below.

Column Based Text File

RAD7 Fields Please select the data fields to export:

<input checked="" type="checkbox"/> Test Number	<input checked="" type="checkbox"/> Min.	<input checked="" type="checkbox"/> % Counts (C)	<input checked="" type="checkbox"/> Battery Voltage	<input checked="" type="checkbox"/> Radon
<input checked="" type="checkbox"/> Year	<input checked="" type="checkbox"/> % Counts (A)	<input checked="" type="checkbox"/> % Counts (D)	<input checked="" type="checkbox"/> Pump Current	<input checked="" type="checkbox"/> Uncertainty
<input checked="" type="checkbox"/> Month	<input checked="" type="checkbox"/> % Counts (B)	<input checked="" type="checkbox"/> High Voltage	<input checked="" type="checkbox"/> Leakage Current	<input checked="" type="checkbox"/> Units Byte
<input checked="" type="checkbox"/> Day	<input checked="" type="checkbox"/> Total Counts	<input checked="" type="checkbox"/> HV Duty Cycle	<input checked="" type="checkbox"/> RH	
<input checked="" type="checkbox"/> Hr	<input checked="" type="checkbox"/> Live Time	<input checked="" type="checkbox"/> Air Temperature	<input checked="" type="checkbox"/> Flags Byte	

Derived Fields

<input checked="" type="checkbox"/> Full Date	<input checked="" type="checkbox"/> Run Number		
<input checked="" type="checkbox"/> Mode	<input checked="" type="checkbox"/> Cycle Number		
<input checked="" type="checkbox"/> Calculated Radon	Units: Automatic	<input checked="" type="checkbox"/> Include Uncertainty	
<input checked="" type="checkbox"/> Calculated Thoron	Units: Automatic	<input checked="" type="checkbox"/> Include Uncertainty	
<input checked="" type="checkbox"/> Radon In Water	Units: pCi/L	<input checked="" type="checkbox"/> Include Uncertainty	
<input checked="" type="checkbox"/> Thoron In Water	Units: pCi/L	<input checked="" type="checkbox"/> Include Uncertainty	
<input checked="" type="checkbox"/> Water Temperature	Units: Celsius		

Configuration

Apply Forced SNIFF Mode to Derived Fields

Apply Humidity Correction to Derived Fields

Apply B to A Spill Correction to Derived Fields

Delineation Tab Character

Figure 2: Export Column Based Text dialog

The RAD7 Fields section in the top portion of the Export Column Based Text dialog contains checkboxes representing the original 23 fields comprising each RAD7 data record. Below, the Derived Fields section contains additional checkboxes representing properties generated by CAPTURE. Note that any corresponding uncertainty values indicate statistical uncertainty; these values do not indicate the absolute uncertainty of the RAD7.

After selecting the desired data fields, use the checkboxes in the section of the window labeled Configuration to specify whether Forced SNIFF Mode, Humidity Correction, and/or B to A Spill Correction are applied to any derived data being exported.

Finally, use the Delineation pop-up menu to specify whether the columns of text will be separated by commas or tab characters. The appropriate choice here will depend on the requirements of the program that will be used to analyze the exported data.

Once all selections have been made, click the Next button. If a tab-delineated text file is being produced, the Save As dialog box will appear, where a name and location may be chosen for the resulting text file. Note that although this data can be imported into a spreadsheet application or opened in a word processing application, it will not be able to be reopened in CAPTURE.

Export Data Summary

The Export Data Summary command creates a textual Data Summary file, containing basic information about the selected records and the RAD7 used to record them. Choosing this option and clicking Next will present a Save As dialog box, in which the name and location of the exported file may be specified. A sample Data Summary file is shown in Figure 3, below.

```

RAD7 Data File:          RAD7_1.r7cdt
RAD7:                   2641
  Calibration Date:     7/5/10
  Firmware Version:    2.5f 991128
  Model:               712
  RADLINK Version:     0252
  'NORMAL' Sensitivity: [Unknown]
  'SNIFF' Sensitivity: 0.00956 cpm/(Bq/m3)
  Thoron Sensitivity:  0.177 cpm/(pCi/L)
  Avg. Battery Voltage: 7.10 V
  Avg. High Voltage:   2220. V
  Avg. HV Duty Cycle:  8.91%
  Avg. Leakage Current: 2.86 at 24.8 C
  Avg. Pump Current:   0 mA
  Lowest Battery Voltage: 7.03 V
  BA Spill Factor:     0.0300
  CB Spill Factor:     0.0150

Num. Data Pts:          103 (Tests 18 to 120)
  Time Duration:        2 Days, 3 Hrs., 18 Min.
  Avg. Radon:           26.2 +/- 2. Bq/m3
  Avg. Thoron:          65.3 +/- 4. Bq/m3
  Avg. RH:              3.42%
  Avg. Temp:            24.5 C
  Avg. Leakage Current: 2.80
  Avg. Pump Current:    0 mA

```

Figure 3: Sample Data Summary file

Export Run Summaries

The Export Run Summaries command creates a textual Run Summaries file, containing information on each run, as shown in Figure 4. Choosing this option will present the Run Summaries dialog box, as shown in Figure 5. This is used to specify the types of data included in the Run Summaries file, the type(s) of correction applied to the data, and the formatting of the columns in the file. Each of these parameters is explained below.

```

RAD7_data_60305.r7cdt Run Summaries

Parameters:
Concentration Unit: pCi/L
Starting Cycle: 1
Humidity Correction: Yes
Forced SNIFF Mode: Yes
BA Spill Correction: Yes

Run #   # Cycles  Run Start           Run Stop           Avg. Radon  Uncertainty
1       34       04/30/05 12:47 PM    05/03/05 08:47 AM    1820.       3.
2       111      05/05/05 09:33 AM    05/07/05 05:04 PM    16.2        0.3
3       91       05/10/05 11:16 AM    05/12/05 08:47 AM    59.1        0.7
4       4        07/16/05 06:31 PM    07/16/05 06:56 PM    1.6         1.4
5       3        08/09/05 08:55 AM    08/09/05 09:13 AM    1.          1.
6       180      08/09/05 04:37 PM    08/10/05 10:40 AM    0.92        0.16
7       3        08/12/05 07:50 PM    08/12/05 08:08 PM    0.5         0.7
8       33       09/30/05 11:44 AM    10/01/05 04:14 AM    0.99        0.17
9       16       11/10/05 03:08 PM    11/10/05 04:28 PM    2.3         0.8
10      28       11/16/05 01:21 PM    11/16/05 06:01 PM    2.0         0.4
11      28       11/18/05 09:12 AM    11/19/05 01:12 PM    4.95        0.26
12      28       11/22/05 08:21 AM    11/23/05 12:21 PM    52.4        0.8
13      28       11/23/05 06:21 PM    11/24/05 08:22 AM    171.        2.
14      15       12/01/05 11:22 AM    12/01/05 12:37 PM    1.8         0.7
15      4        12/01/05 02:51 PM    12/01/05 03:11 PM    811.        70.
16      4        12/01/05 03:23 PM    12/01/05 03:44 PM    706.        70.
17      3        12/01/05 03:57 PM    12/01/05 04:12 PM    5.7         3.4
18      4        12/01/05 04:41 PM    12/01/05 05:01 PM    500.        60.
19      24       12/02/05 10:55 AM    12/02/05 12:55 PM    2.3         0.7
20      4        12/02/05 01:17 PM    12/02/05 01:37 PM    350.        50.
21      4        12/02/05 01:55 PM    12/02/05 02:15 PM    3.6         2.2
22      4        12/02/05 02:28 PM    12/02/05 02:48 PM    170.        33.
23      3        12/02/05 02:59 PM    12/02/05 03:14 PM    1.6         1.6
24      4        12/02/05 03:27 PM    12/02/05 03:47 PM    6.9         6.
25      10       12/02/05 05:13 PM    12/02/05 06:34 PM    1.8         0.7
26      3        12/07/05 03:06 PM    12/07/05 03:39 PM    1.          2.

```

Figure 4: Sample Run Summaries file, Print Formatting.

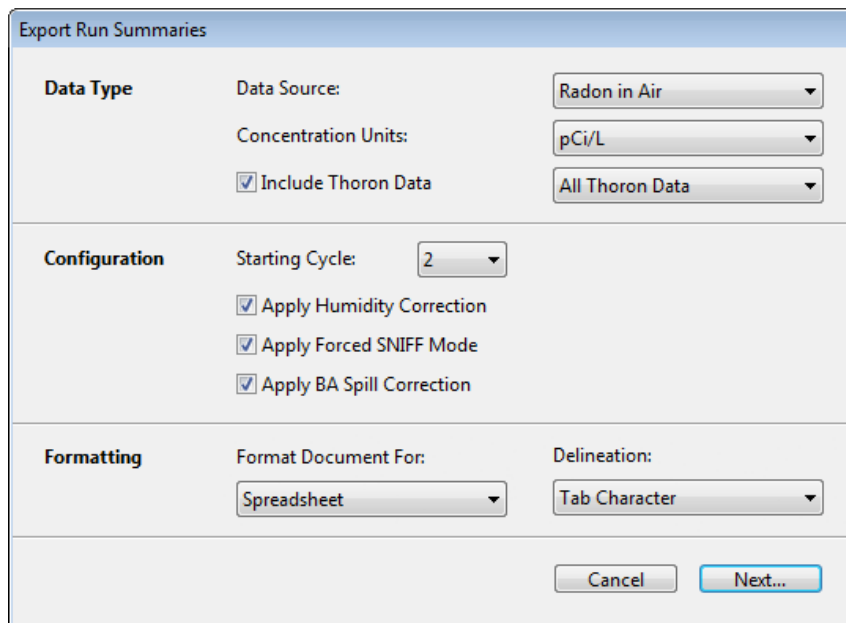


Figure 5: Export Run Summaries dialog

Data Type Controls

The Data Source pop-up menu is used to specify the source of the concentration averages included in the Run Summaries file. This may be set to either Radon in Air or Radon in Water.

The Concentration Units pop-up menu is used to specify the unit of the concentration averages in the file. This may be set to Bq/L, Bq/m³, dpm/L, or pCi/L.

The Include Thoron Data checkbox controls whether the Run Summaries file will contain columns listing thoron concentration averages, in addition to radon concentration averages for each run.

Configuration Controls

The Starting Cycle pop-up menu is used to specify the first cycle from each run that is included in the average. For example, if this menu is set to 3, then the reported concentration average for a run containing ten cycles would be calculated based on runs 3 through 10. Note that runs recorded in WAT mode or GRAB protocol are exempt from this rule.

The Apply Humidity Correction, Apply Forced SNIFF Mode, and Apply BA Spill Correction checkboxes determine which correction(s) are applied to the concentration averages reported in the Run Summaries file. Similar controls are found in the Graph Controls Window, and more information about corrections can be found in the Graph Controls Window section.

Formatting Controls

The Format Document pop-up menu has two options, Print and Spreadsheet. If Print is selected, the document will be laid out in an easy to read format, as shown in Figure 4. The Spreadsheet option produces a file that is not as easily readable, but better suited for data analysis applications. If this option is selected, the Delineation pop-up menu appears, making it possible to specify whether the document's columns will be separated by commas or tab characters.

Export Printer Data

The Export Printer Data command saves a textual Printer Data file, containing the supplementary printer data associated with each record. This information is not available for all data sets. Choosing this option will present a Save As dialog box, in which the name and location of the exported file may be specified.

Data

command from the File menu. The Combine Data window will appear as shown below.

The Combine Data Window contains a list of RAD7 data files to be combined. This list can be edited using the Plus and Minus buttons to add and remove RAD7 data files. The Maximum permitted record separation combo box is used to specify the threshold under which records from different files will be merged and averaged.

The Graph Combined Data and Save Combined Data to Disk checkboxes are used to specify whether the combined data will be graphed and saved, respectively. At least one of these options must be chosen, and at least two RAD7 data files must be added to the list in order for the combining process to proceed. If the combined RAD7 data is to be saved to disk, use the Select Location button to specify a name and location for the new RAD7 data file.

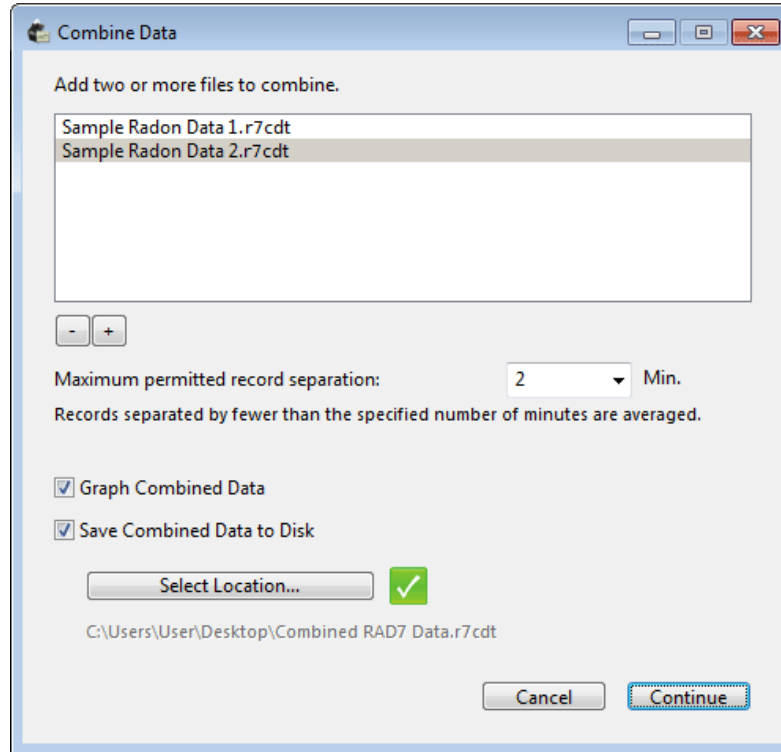


Figure 6: Combine Data dialog

Once the desired settings have been chosen, click Continue to complete the combining process. If there are any problems with the files being combined, the Errors Window will appear explaining the issue in detail. Only severe data formatting problems will prevent the combining process from being completed successfully. More information is available in the RAD7 Data Errors section.

Printing RAD7 Data When a Graph Window is visible, the radon graph can be printed at high resolution. CAPTURE's print commands are located in the File menu.

The Page Setup command is used to configure print settings. Before printing a radon graph, it may be useful to choose the Page Setup command and set the page orientation to Landscape, so that the graph will fill the page more effectively. The keyboard shortcut for this operation is Control/Command-Shift-P.

The Print command prints the current radon graph. On the Macintosh, the Print dialog box may also be used to save, fax, or email a cross-platform PDF version of the graph image. The keyboard shortcut for this operation is Control/Command-P.

Issuing RAD7 Commands

Any RAD7 that has had RADLink installed may be controlled by a computer. The computer may be connected to the RAD7 directly, or it may be connected via a local network, a dial-up modem, or the local network. RAD7 commands allow for much more than the simple downloading of data: it is also possible to start and stop testing runs, obtain data summaries, configure the RAD7's numerous settings, and obtain the RAD7's serial number and calibration date. In fact, any command available on the RAD7's physical keypad may be issued from within CAPTURE, whether the machine is located across the room or across the continent.

Setting Up

The easiest way to issue RAD7 commands, albeit the most restrictive, involves connecting the computer directly to the RAD7 by means of a serial cable, and, if necessary, a serial to USB adaptor. This configuration is identical to that used when downloading RAD7 data, and it is described in in the Basic CAPTURE Functionality section.

Issuing commands from a more distant location can be achieved through the use of local area networks, dial-up modems, and a local network. It is not practical to describe every one of the myriad possible modem and network configurations, but typical connection scenarios are explained in the Long Distance RAD7 Communication section. It is recommended however that users first learn how to issue RAD7 commands via a direct serial connection, before moving on to more advanced operations involving dial-up modems or networks.

Capture Settings

After connecting the RAD7, launch CAPTURE and select Issue RAD7 Command from the Main Window's Category panel. The Connection Method pop-up menu should be set to the appropriate connection interface, normally Serial Port, in which case the Serial Port pop-up menu should be set to the port containing the RAD7. If no ports are listed in this menu, click the Scan for RAD7s button, in the lower right corner of the Main Window. Any connected RAD7s containing RADLink will be detected and added to the menu. Once a valid serial port has been selected, a green checkmark icon will appear to the right of the Serial Port pop-up menu.

Next, choose one of the preset commands from the RAD7 Commands Combo Box. You may also enter RAD7 commands not present in the list of presets by typing them manually. A complete list of RAD7 commands is available in Chapter 2 of the RAD7 User's Manual. After a command has been selected or entered, click the Issue button to send the command to the RAD7.

The sent command will appear in the RAD7 Output text area, followed by any response. In the screen shown below, the user has issued the Special Status command, and the RAD7 has responded with details on its current condition.

For another typical example, suppose you wanted to obtain the information that the RAD7 normally sends to its wireless infrared printer. To achieve this, choose "Setup Format Long" from the RAD7 Commands menu and click Issue. Then to initiate the data transfer select "Special SprAll" and click Issue again. (Using the "Long" format ensures that all available details will be included in the transmission.)

Additional commands may be issued at any time, and the contents of the RAD7 Output text area may be copied to any text editor for archival or printing. Alternatively, the text may be saved to a file by choosing "Export RAD7 Output" from the File menu.

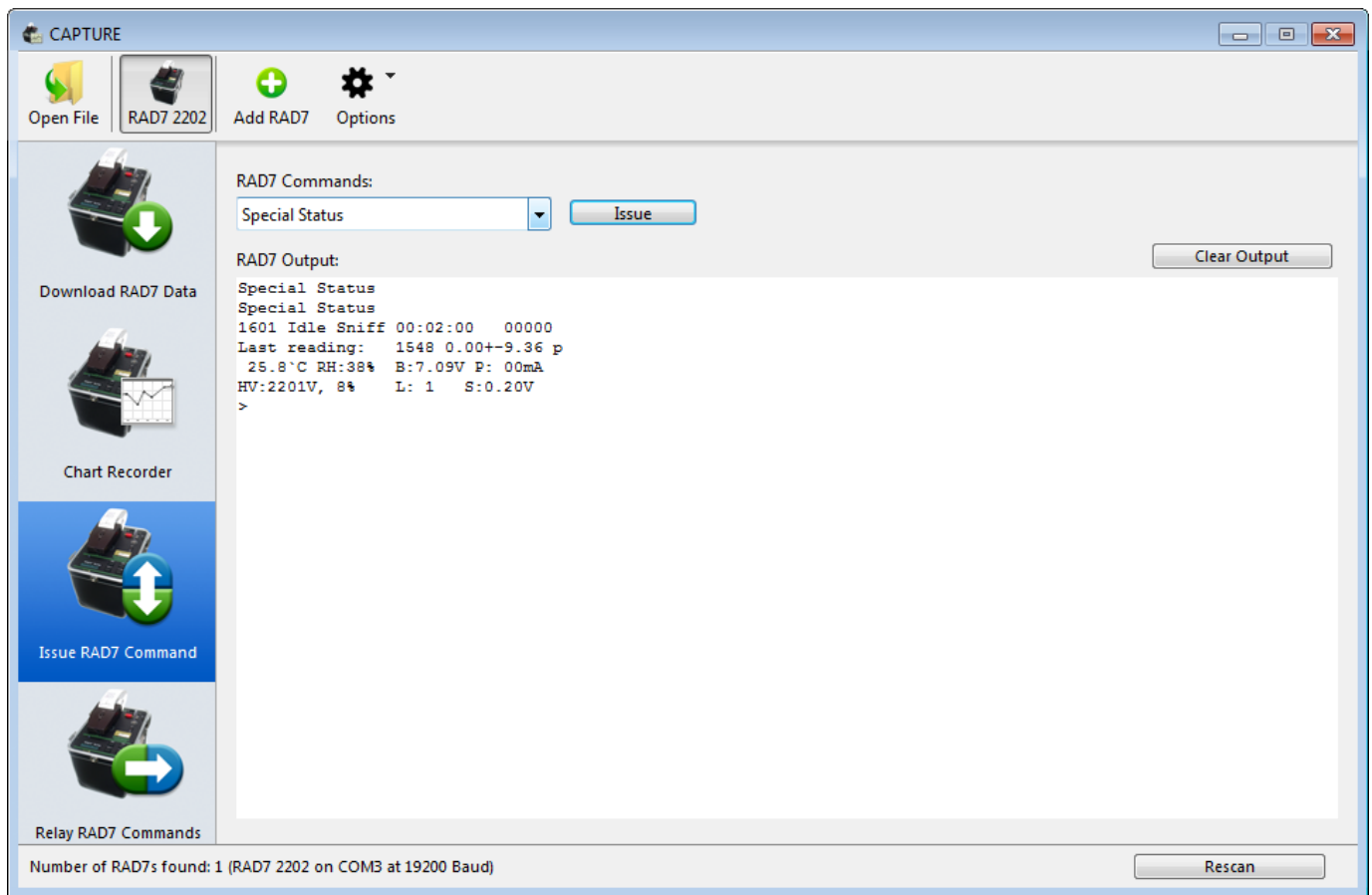


Figure 1: Issuing commands via a serial port

Finishing

When the session is complete, the RAD7 may be disconnected and shut off. Any information in the RAD7 Output text area may be copied to the clipboard and pasted into a word processor or other application for future reference.

Note that the above information applies to direct serial connections; additional steps are needed to initiate and complete communication sessions involving dial-up modems or networks. See the Long Distance RAD7 Communication section for details.

Long Distance Connectivity

Under normal circumstances the RAD7 will be connected to the computer running CAPTURE directly, using a null modem cable and a USB to serial adaptor, if necessary. When the RAD7 is in a dangerous or remote environment however, it may be desirable to connect to it from a distance. This can be achieved via a Bluetooth adaptor, a dial-up modem, or a network. This section explains how to properly configure the RAD7 and CAPTURE for long-distance communication.

Once CAPTURE has established a connection with a remote RAD7, CAPTURE operation such as downloading and chart recording will proceed as they would normally. While Bluetooth-enabled RAD7s may be detected by CAPTURE automatically, other long distance connection methods require clicking the Add RAD7 button and using the Connection Method pop-up menu located at the top of CAPTURE's Main Window to choose the desired connection protocol.

Bluetooth Communications

The simplest way to connect to a RAD7 remotely is through a Serial to Bluetooth adaptor attached to the RAD7's serial port. Since such adaptors create virtual COM ports in much the same way as a Keyspan USB to Serial adaptor, connecting to a Bluetooth-enabled RAD7 is as simple as clicking the Scan for RAD7s button in the CAPTURE window.

DURRIDGE offers the SENA Parani SD1000 Serial to Bluetooth adaptor, preconfigured for use with the RAD7, making the connection process very straightforward. Other adaptor products may be used as well, however they must first be set to operate at the RAD7's specific baud rate. Third party adaptors must also be configured as "discoverable", and any command response behavior must be disabled to avoid corrupting the RAD7 with garbage data. The procedure for completing this configuration will vary by adaptor. DURRIDGE provides detailed instructions on using the SENA Parani SD1000 Serial to Bluetooth adaptor with the RAD7. Please see the RAD7 Bluetooth Connectivity guide for details.

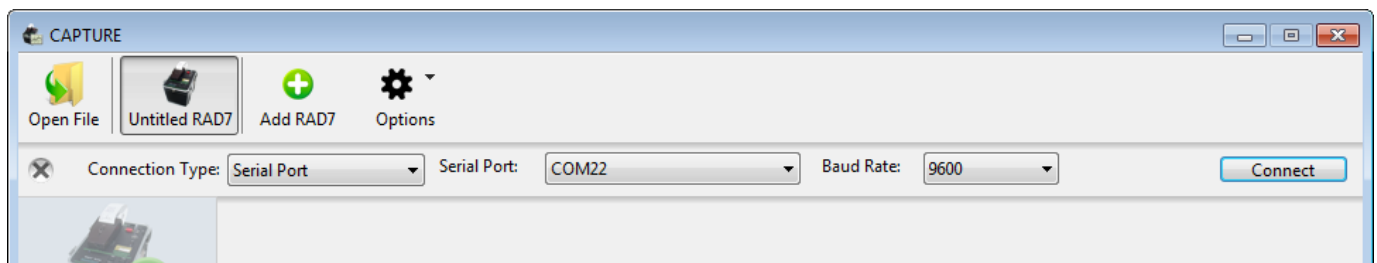


Figure 1: A RAD7 connected using a Serial to Bluetooth adaptor will appear on one of the computer's serial ports.

Dial-Up Modem Communications

Communicating with a RAD7 over a distance exceeding the 100 meter range of Bluetooth is perhaps best accomplished through the use of a pair of dial-up modems. This solution requires that active phone lines exist near both the RAD7 and the computer issuing commands. Dial-up Internet service is not required. One of the modems must contain a serial port connection so that it may be plugged into the RAD7. The other modem must be compatible with the computer issuing commands. An internal computer modem is perfectly adequate.

The modem attached to the RAD7 must first be configured to auto-answer, and its baud rate should be set to 9600. Additionally, command echoing should be disabled to avoid feeding garbage data into the RAD7. (Check your modem's instruction manual for details, as this process may vary depending on manufacturer.) This modem will be used to relay commands to the RAD7, and any responses will be relayed back to the computer issuing the commands. Before turning on the RAD7, Launch Capture on the remote computer and click the Add RAD7 button. The Connection Type pop-up menu should be set to "Dial Up Modem". Select the serial port to which the local modem is connected. Enter the phone number for the line to which the RAD7 is connected, and click Connect.

The RAD7 will respond to any command it receives, whether the command is valid or invalid. In fact, the RAD7 will even attempt to respond to any "noise" data that it overhears as the modems begin connecting to each other and engaging in the "handshaking" process. In such situations the RAD7 will send an error code back out through the attached modem, causing two-way data flow which can unfortunately disrupt the connection attempt. In severe cases, the RAD7's RADLink installation may even become corrupted. It is important therefore to keep the modem's command echoing off, or to keep the RAD7 itself turned off until the handshaking process has been completed, as signified by the ceasing of audible modem noise. A dialog box will appear when it is safe to turn on the RAD7.

Once the RAD7 is turned on, use its keypad to enter the Special menu. Select the SetBaud command and set the RAD7's baud rate to 9600. (Note that RADLink must be present on the RAD7.) Back in CAPTURE, perform the desired downloading or command issuing

operations, proceeding as you would when connecting to the RAD7 directly via a serial cable.

When finished, it is necessary to first turn off the RAD7, and then disconnect it from CAPTURE. At that point the session is complete and the modems may be powered off.

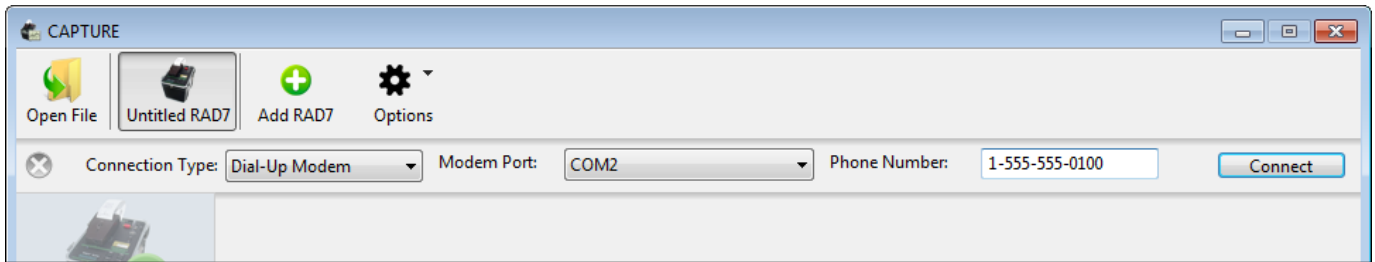


Figure 2: Connecting to a RAD7 using a dial-up modem.

Network Communications

Communicating with a RAD7 that is not directly attached to the computer running CAPTURE may also be achieved by connecting the RAD7 to a local area network. This may involve connecting the RAD7 to a nearby laptop or other computer, but for the sake of increased mobility and security the RAD7 may also be connected to a Lantronix WiBox® or similar portable Internet-enabled device. In either case, the machine connected to the RAD7 receives commands sent from a computer running CAPTURE, and immediately relays them to the RAD7. Once the RAD7 has received a command, the response is relayed back to the computer running CAPTURE.

We will assume for now that all of the required equipment exists within a local area network, or to the Internet by means of a nearby computer, and that the connections do not involve routers or other security equipment impeding communication between devices. (Contingency plans for dealing with routers are outlined later in this section.)

Launch CAPTURE on each computer. On the computer not connected to the RAD7, click Add RAD7. The connection panel will appear as shown in Figure 3, below. In the IP Address field, enter the IP address of the computer to which the RAD7 is directly connected. Determining a computer's IP address differs depending on the operating system and the scope of the network. The RAD7 Serial Number should be set to the serial number of the remote RAD7.

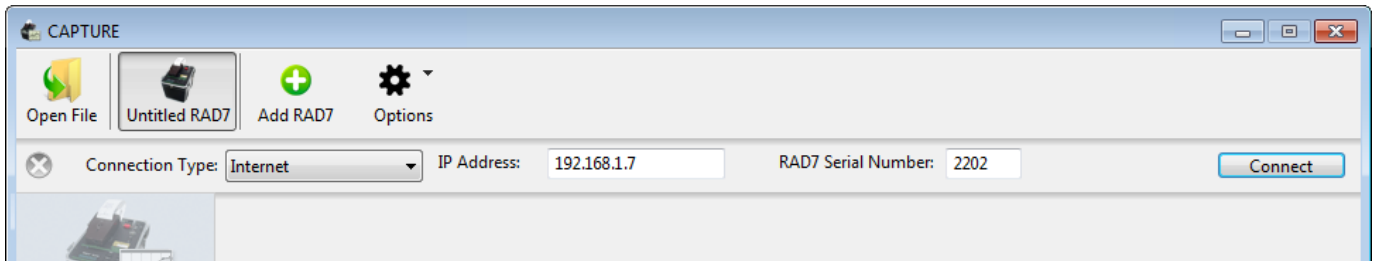


Figure 3: Connecting to a RAD7 using the Internet.

On the computer that is attached directly to the RAD7, enter the Relay RAD7 Commands panel as shown in Figure 4. Click the Listen button to prepare to receive remote commands. This will allow any commands received by the computer to be passed on to the RAD7, where they will be acted upon. Once CAPTURE is listening for incoming commands, the Listen button will change to Stop.

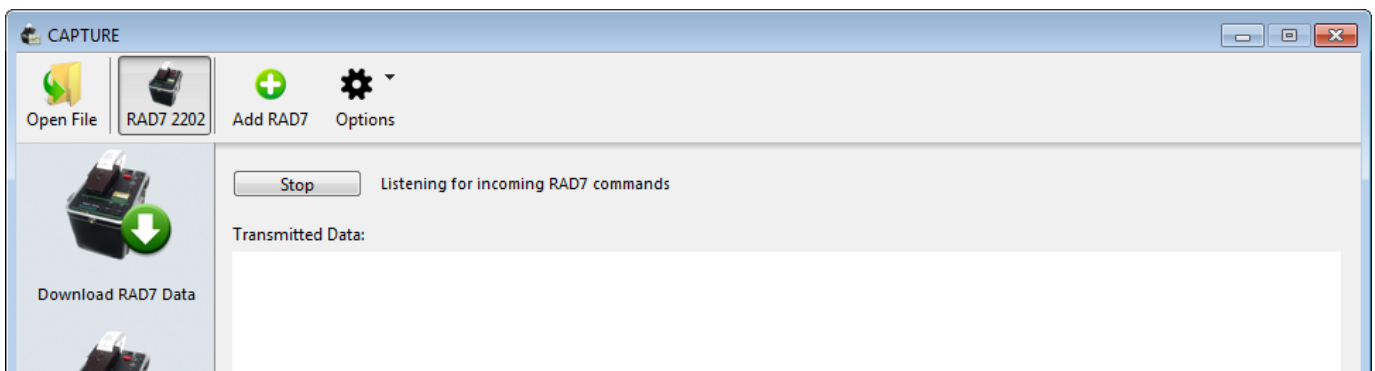


Figure 4: Relaying RAD7 commands.

Once the relaying computer is listening for incoming RAD7 commands, click Connect on the other computer. (It is important to click Listen first, then Connect, to avoid errors.) After the connection has become active, operations may be performed in the same manner as if there was a direct serial connection between the remote computer and the RAD7's. To end a session, either click the Disconnect button in the copy of CAPTURE that is running on the remote computer, or click Stop on the copy of CAPTURE that has been relaying the commands.

Advanced Configurations

Real world conditions are frequently more complex than those described in the above scenario. Often it is impractical to place a proper computer- even a laptop- in the field alongside a RAD7. This situation calls for the use of a WiBox® or similar portable Internet-enabled device which can be used to relay RAD7 commands. Since such devices may lack input controls and screens. They are normally configured via remote interfaces, the details of which are outside the scope of this manual. Once a device has been configured however, it will serve the same function as a computer that has been set up to relay commands, and the process of issuing those commands will be the same as when a full computer is performing the relaying role.

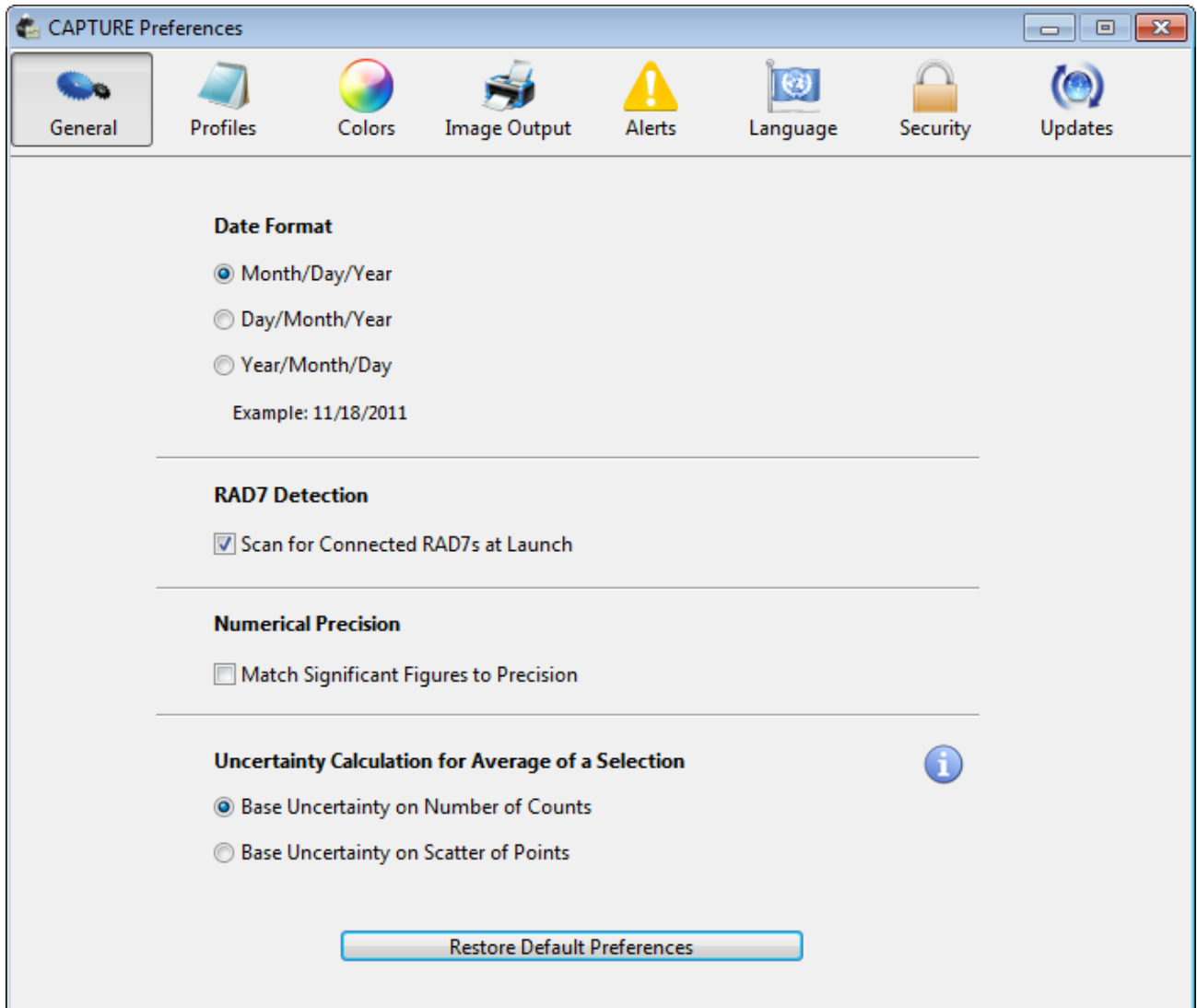
A second complicating factor is the presence of routers, on either the sending end or the receiving end of the connection. Routers isolate the devices under their command from the broader Internet, assigning them location-specific IP addresses that are meaningless to computers in the outside world. When sending data intended for a device behind a router, it must instead be sent to the router itself, which has a publicly meaningful IP address and which handles the responsibility of forwarding the information along to devices it has identified within its own network. Your network administrator can assist with specific routing needs.

The Preferences Window

Many important customization options are made available in the CAPTURE Preferences Window. This window is accessed from the File Menu on Windows, and from the Application Menu on the Macintosh. The Preferences window consists of multiple panels, the contents of which are described below.

General Panel

The General panel contains controls for specifying how CAPTURE behaves when connecting to RAD7s, downloading RAD7 data, and formatting the downloaded information. These controls are described in detail below.



Date Format

The radio buttons in the Date Format section is used to specify the format used to display dates throughout the application. Dates may be displayed with the year, month, and day figures ordered in any of three different arrangements.

RAD7 Detection

The Scan for Connected RAD7s at Launch checkbox in the RAD7 Detection section is used to specify whether CAPTURE identifies all connected RAD7s when it starts up. If this box is left unchecked, it will be necessary to click the Scan For RAD7s button in the Main

Window before performing an automatic download or issuing or relaying RAD7 commands.

Precision

The Match Significant Figures to Precision checkbox is used to specify whether the base values of reported concentrations are expressed using fewer significant digits when the associated uncertainties are high. If this box is checked, uncertainties of 15% or more will reduce the number of significant digits used by 1, while uncertainties of 150% or more reduce the number of significant digits used by 2.

Uncertainty Calculation

There are two Uncertainty Calculation options: Base Uncertainty on Number of Counts, and Base Uncertainty on Scatter of Points. Basing the uncertainty on the Number of Counts involves Poisson statistics, and is applicable even when there is a significant variation in radon concentration during the period of the measurement. Basing the uncertainty on the Scatter of Points is applicable when there are more than ten readings and it is known that the radon concentration was steady during the period selected.

Please note that the uncertainty, as displayed, refers only to the statistical uncertainty of the result. This is a measure of the precision of the reading. The result ignores any systematic bias due to uncertainty in the calibration, and traceability to national standards, which may be as much as $\pm 5\%$.

Profiles Panel

The Profiles Panel contains two tabs: RAD7 Profiles and Temperature Data Profiles. RAD7 Profiles define the characteristics of individual RAD7s and affect how the RAD7 data is interpreted. Temperature Data Profiles contain file format definitions that make it possible for CAPTURE to read the output of external third party temperature data loggers. This is necessary when measuring radon in water, because the temperature of the water must be known to derive its radon concentration. RAD7 Profiles and Temperature Data Profiles are explained in detail below.

RAD7 Profiles

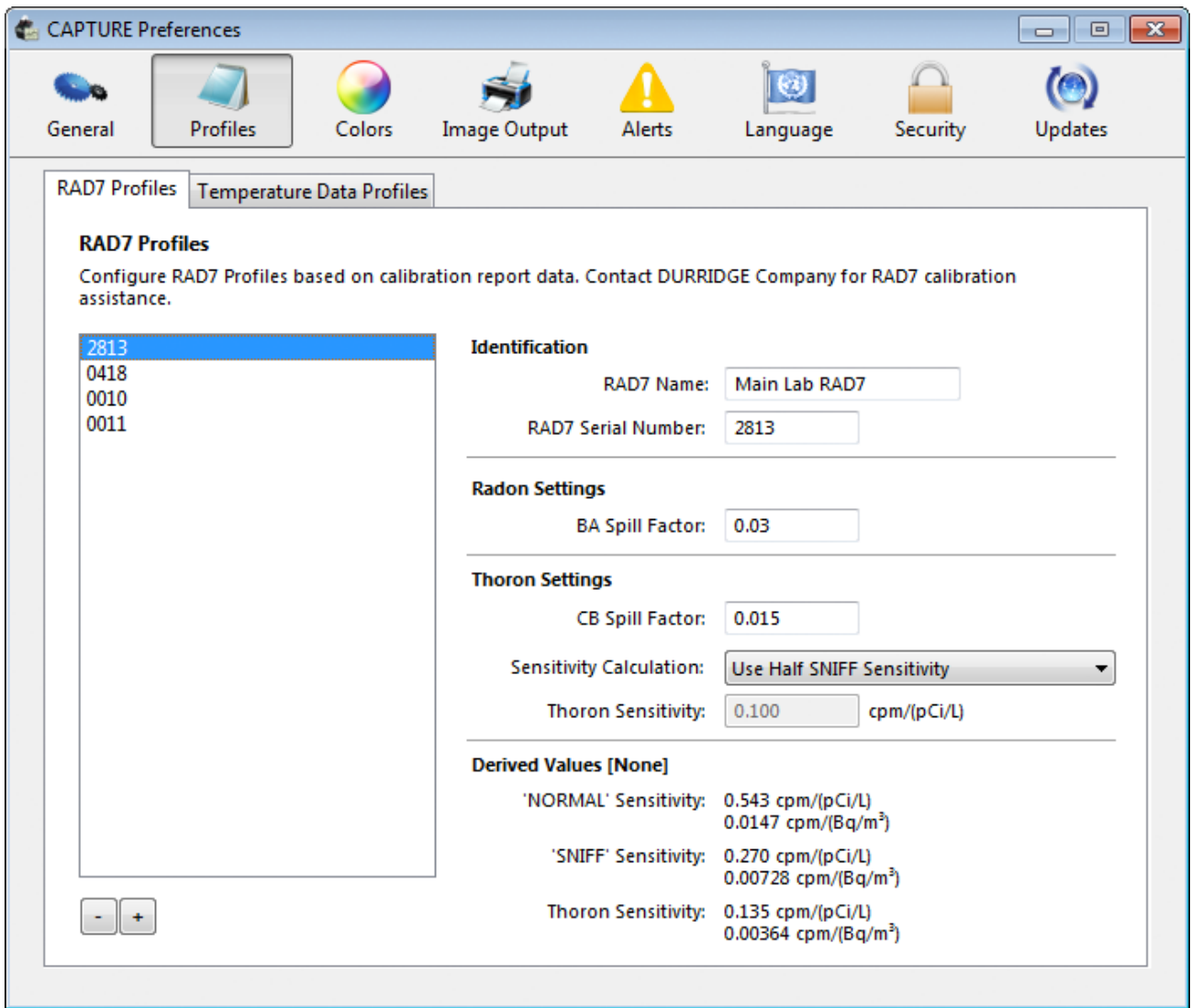
Data can be more accurately interpreted and displayed on the graph if certain information is available on the RAD7 that recorded the data. This RAD7 information is encapsulated in a RAD7 Profile, any number of which may be specified within the Preferences Window's RAD7 Profiles tab. The list box on the left side of the RAD7 Profiles tab contains the names of one or more RAD7 Profiles. Highlight a setting in this list to edit it. When graphing a particular RAD7's output, the associated RAD7 Profile should be selected in the Graph Controls Window, ensuring the accurate representation of data.

Although the supplied Default RAD7 Profile may be the correct match for your RAD7, it is recommended that users contact DURRIDGE to receive the exact profile specification for each RAD7 in use. Be sure to have your RAD7 serial number on hand when contacting DURRIDGE, as this number is used in determining the optimal values to be entered into the various fields of the RAD7 Profiles panel.

The Plus (+) and Minus (-) buttons under the list box are used to create and delete RAD7 Profiles. If more than one RAD7 device is commonly in use with the same computer, it may be beneficial to establish multiple RAD7 Profiles, each tailored toward a specific device.

Once you have established one or more RAD7 Profiles in the Preferences Window, the Thoron Settings dialog box will no longer appear each time a Graph Window is opened and Thoron is displayed. You may return to the Preferences Window at any point to modify the collection of RAD7 Profiles.

Each control in the RAD7 Profiles tab is explained below.



Identification

The Identification section consists of fields containing the name and serial number of the associated RAD7. The text entered in the RAD7 Name field will be used to label the RAD7 icon that appears in the Main Window toolbar. The RAD7 Name field may be left blank; an unnamed RAD7 will be referred to by its unique serial number. The appropriate serial number can be found by looking on the top face of the RAD7.

Radon Settings

The Radon Settings section contains a single field, BA Spill Factor. This factor allows for the correction of radon readings in the presence of high thoron.

Thoron Settings

The Thoron Settings section consists of the CB Spill Factor field and a set of controls for specifying Thoron Sensitivity. The CB Spill Factor field allows for the correction of thoron readings in the presence of radon. The Sensitivity Calculation pop-up menu is used to specify whether the Thoron sensitivity will be automatically set to half the SNIFF sensitivity, or whether it will be entered manually. If the RAD7 has been specifically calibrated for Thoron, select Apply Calibrated Thoron Sensitivity, and enter the thoron sensitivity value in the field below. Otherwise, leave the Sensitivity Calculation menu set to Use Half SNIFF sensitivity.

Derived Values

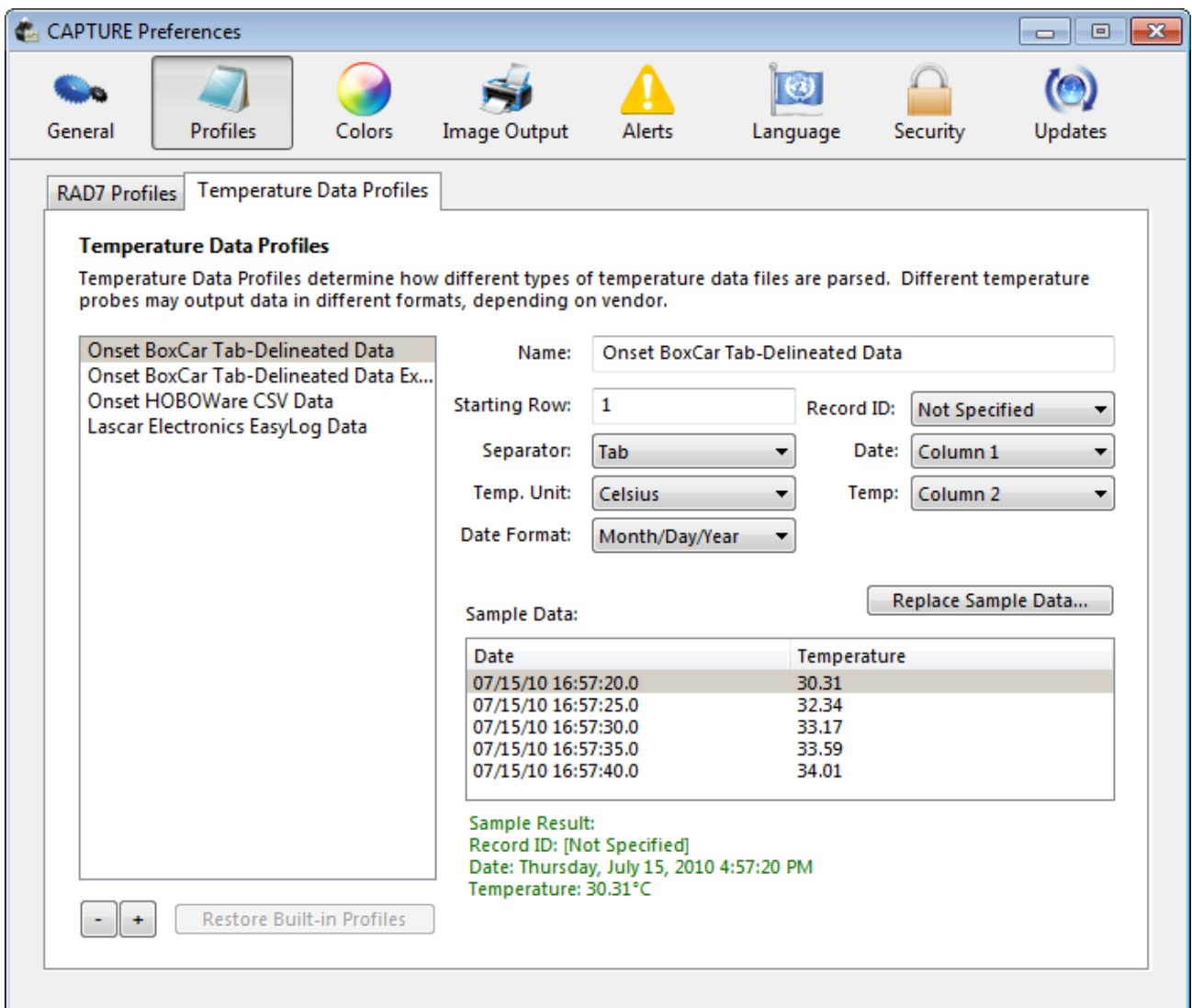
The Derived Values section contains values computed by analyzing the current graph window with respect to the selected RAD7 Profile. If no graph window is present the Derived Values will remain unspecified. The Derived Values may not be edited.

Temperature Data Profiles

When a RAD7 is used to collect radon data from an underwater source, the water temperature must be accounted for in order to determine the exact radon concentration. CAPTURE can perform the necessary calculations to achieve this, however the temperature data must be provided separately from the RAD7 data. The RAD7 itself is not equipped to record water temperatures.

Measuring the water's temperature can be achieved through the use of a third party temperature logging device with a serial or USB interface. Once temperature data has been recorded to the device, the data must be transferred to a computer and saved as a text-based data file. Software for achieving this is generally provided by the manufacturer of the logging device.

CAPTURE can only interpret temperature data properly if it is given a complete definition of the format in which the data is stored. The Preferences Window's Temperature Data Profiles tab provides controls for specifying these formats.



The Temperature Data Profiles list on the left side of the window contains the names of each profile. CAPTURE comes bundled with a small collection of built-in profiles, which allow it to read data exported from temperature loggers manufactured by Onset Computer Corporation and Lascar Electronics. Exporting features allow the data to be saved to a text file using either tab- or comma-delineation to separate the various data fields. Other suppliers of temperature logging devices offer similar software, but since CAPTURE lacks

an exhaustive collection of Temperature Data Profiles, it is sometimes necessary to define additional formats before temperature data can be utilized.

The Plus (+) and Minus (-) buttons under the list box are used to create and delete Temperature Data Profiles. Each profile consists of several properties, including Name, Starting Row, Separator, Temperature Scale. Profiles also contain information indicating which columns are used for storing the Record ID, the Date, and the Temperature data itself. All of these can be modified using the controls on the right side of the window, which are described below.

Name Field

The Name field contains the name of the selected Temperature Data Profile. Temperature Data Profiles should be given easily recognizable names, such as "Onset HOBOWare CSV Data". In this example, Onset is the name of the company that supplied the temperature logger, HOBOWare is the name of the software that is used to extract the data from the logger, and "CSV" indicates that the data is stored using the command Comma Separated Values delineation format.

Starting Row Field

The Starting Row Field indicates which row contains the first line of actual data. For example, if the first line of a data file contains the column headings, then the Starting Row is likely row 2. In some cases the file's header may occupy two or more lines, increasing the Starting Row accordingly.

Separator Pop-Up Menu

The Separator Pop-Up Menu is used to specify whether data fields are separated by commas or tab characters. Commas have become a popular delineation character in recent years, with the growth of the CSV ("Comma Separated Values") format.

Temp. Scale Pop-Up Menu

The Temp Scale Pop-Up Menu is used to specify whether temperature data is stored in the Fahrenheit or Celsius scale.

Record ID Pop-Up Menu

The Record ID Pop-Up Menu is used to specify which data column contains Record ID numbers. Record IDs are usually numbered in ascending order.

Date Pop-Up Menu

The Date Pop-Up Menu is used to specify which data column contains dates and times. This information should be in a standard format; for example 09/06/10 06:09:37.0.

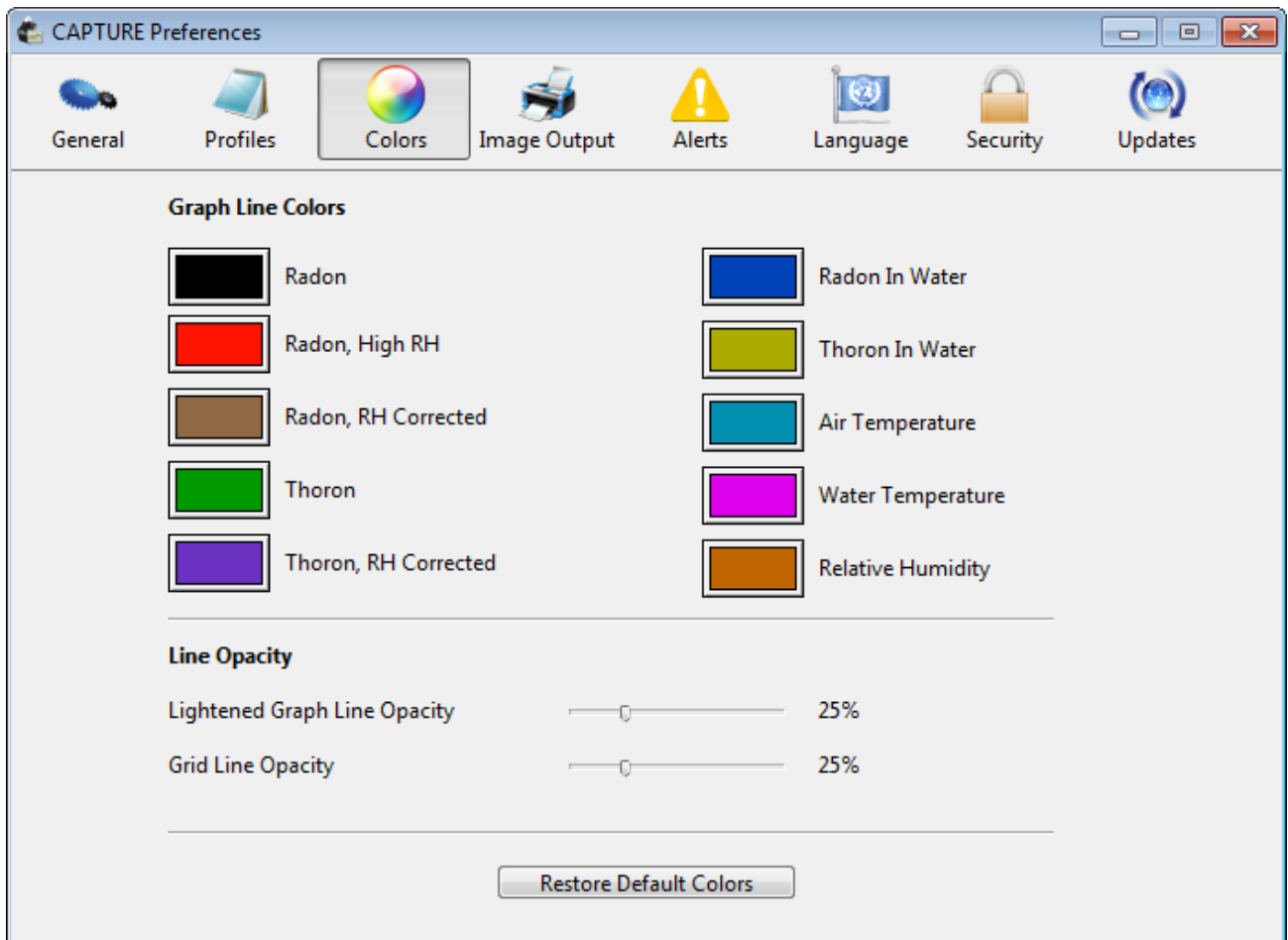
Temp. Pop-Up Menu

The Temp. Pop-Up Menu is used to specify which data column contains temperature data.

As you configure a Temperature Data Profile's properties, it may be useful to load sample temperature data for the purpose of validating the accuracy of the definition. To do this, click the Replace Sample Data button and select a text-based temperature data file. If the profile's properties have been specified correctly, the Sample Data chart will be filled with organized, identifiable data, and descriptive headings will appear at the top of each column. The Sample Result section at the bottom of the window will contain a reasonable summary of the selected Sample Data record.

Colors Panel

The Colors panel provides access to controls for customizing the colors used when rendering graph lines. The Colors panel also contains controls for adjusting the opacity of graph content, and restoring the default color settings.



Graph Line Colors

Colors for each graph line can be changed by clicking the corresponding rectangle and selecting a replacement color from the standard system color picker.

Lightened Graph Line Opacity Slider

The Lightened Graph Line Opacity Slider is used to control the opacity of the rough data lines that appear in the background of the graph when smoothing is enabled.

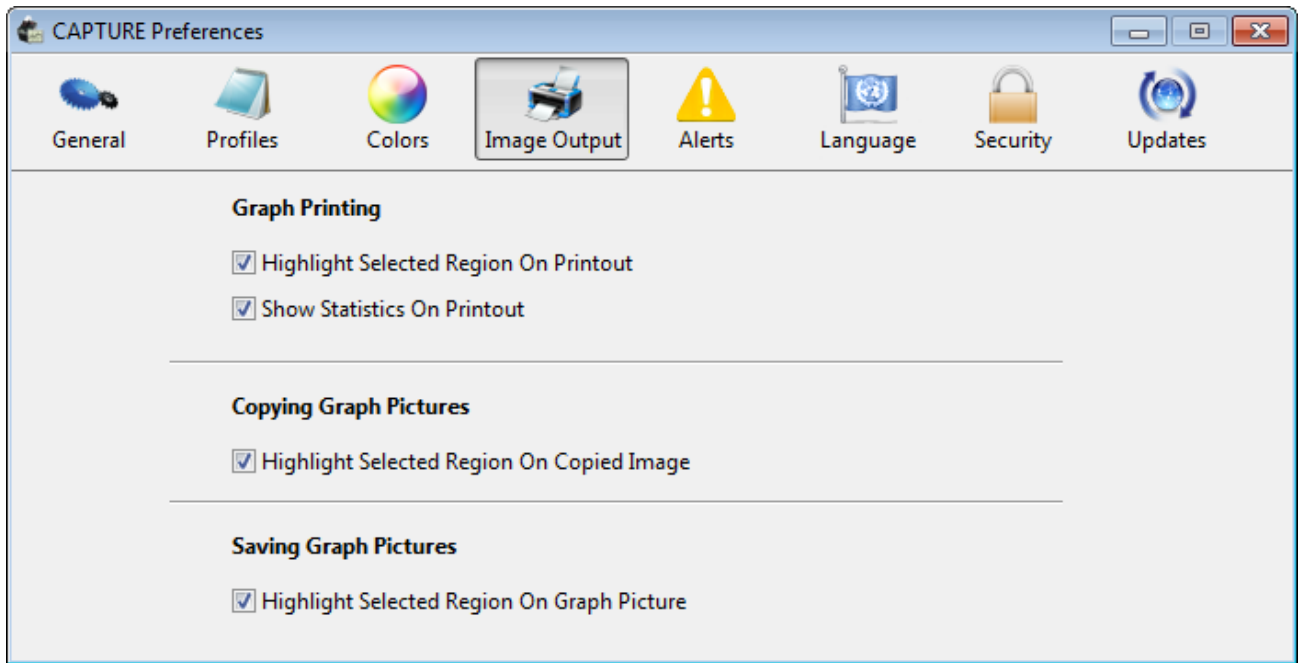
Grid Line Opacity Slider

The Grid Line Opacity Slider is used to control the opacity of the horizontal and vertical grid lines that may be displayed in the background.

Restore Default Colors Button

The Restore Default Colors button removes any custom colors and reverts to the original color settings.

Image Output Panel The Image Output panel provides access to controls for customizing the appearance of graph images that are printed and saved to disk.



Highlight Selected Region On Printout Checkbox

Determines whether the selected region is highlighted on the printed graph output.

Show Statistics On Printout Checkbox

Determines whether statistics pertaining to the selected region appear on the printed output. Note that these statistics can only appear if the printout uses a portrait orientation. Printed graphs that use the landscape orientation take up the entire page, leaving no room for statistics.

Highlight Selected Region On Copied Image Checkbox

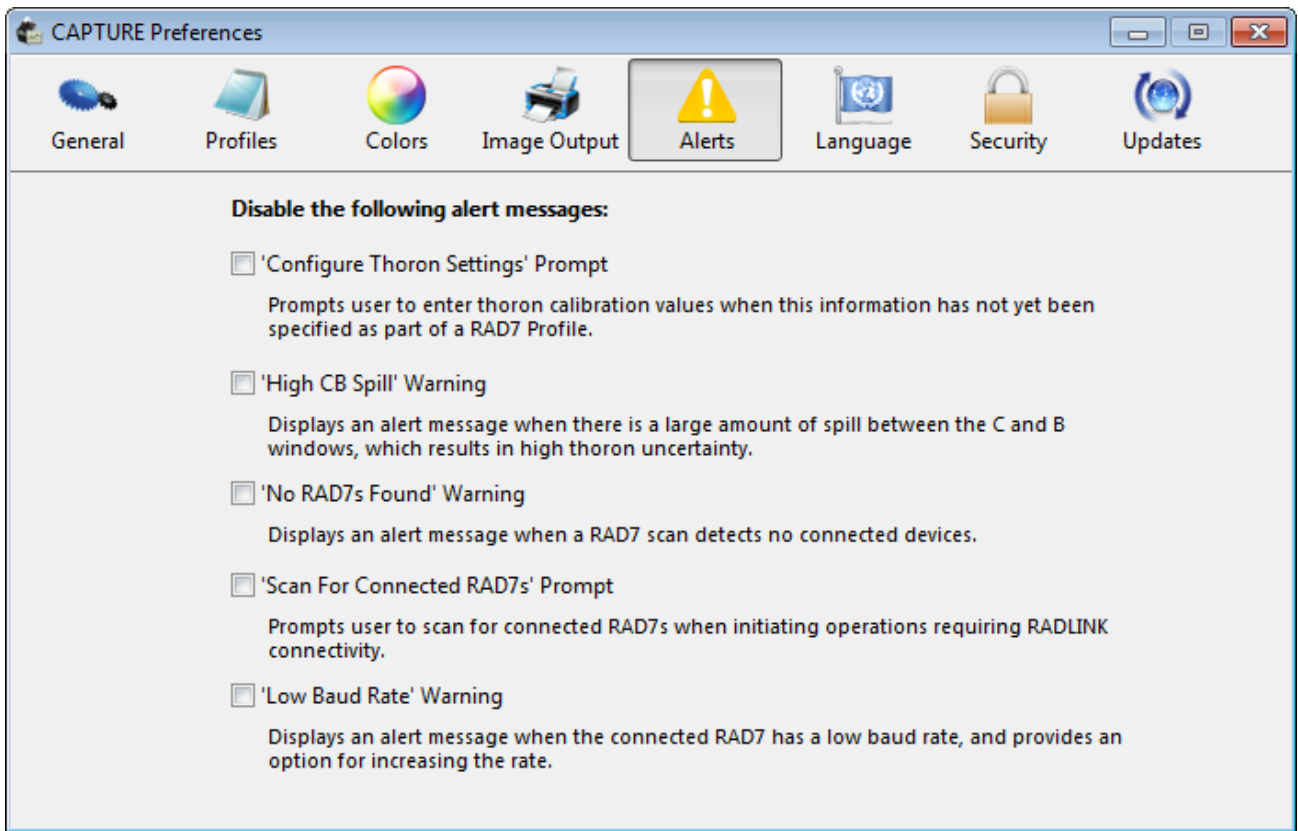
Determines whether the selected region is highlighted on the image when it is copied to the clipboard.

Highlight Selected Region On Graph Picture Checkbox

Determines whether the selected region is highlighted on the image when it is saved to disk.

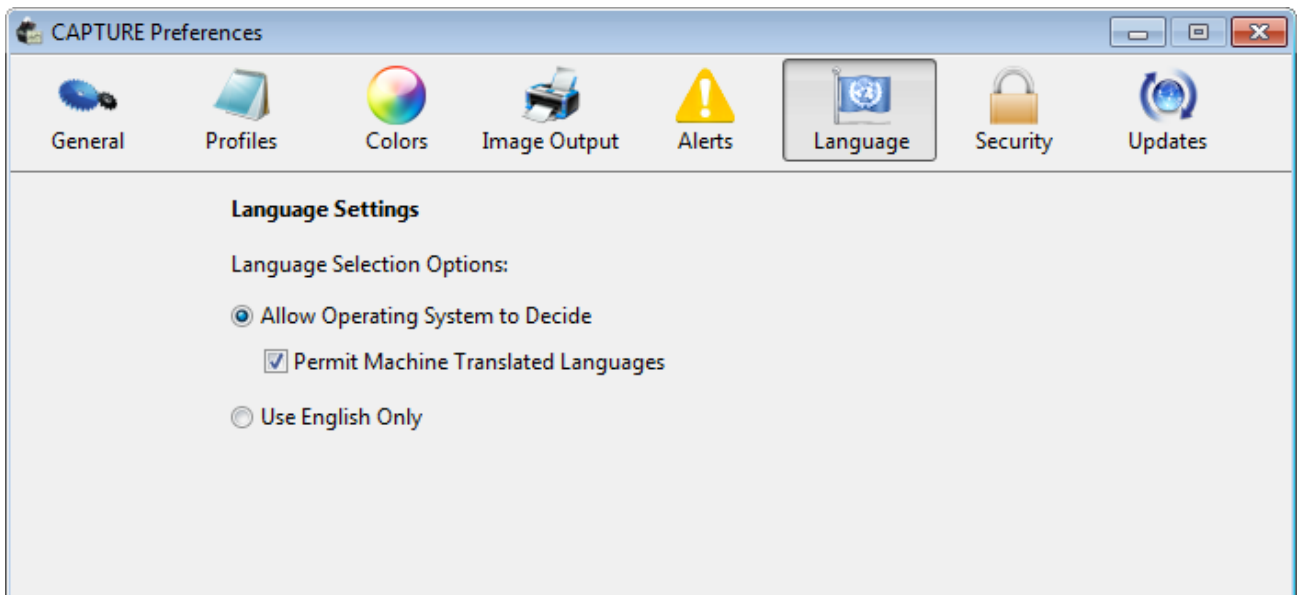
Alerts Panel

The Alerts panel contains controls used to specify which common alert messages are disabled. Each individual message can also be suppressed by clicking its "Do not show this message in the Future" checkbox before dismissing it. The purpose of each alert message is described under the checkbox used to disable it.



Language Panel

The Language panel provides access to controls for specifying which language(s) are available to CAPTURE.



Allow Operating System to Decide Radio Button

The Allow Operating System to Decide radio button allows the operating system to decide which language to use.

Permit Machine Translated Languages Checkbox

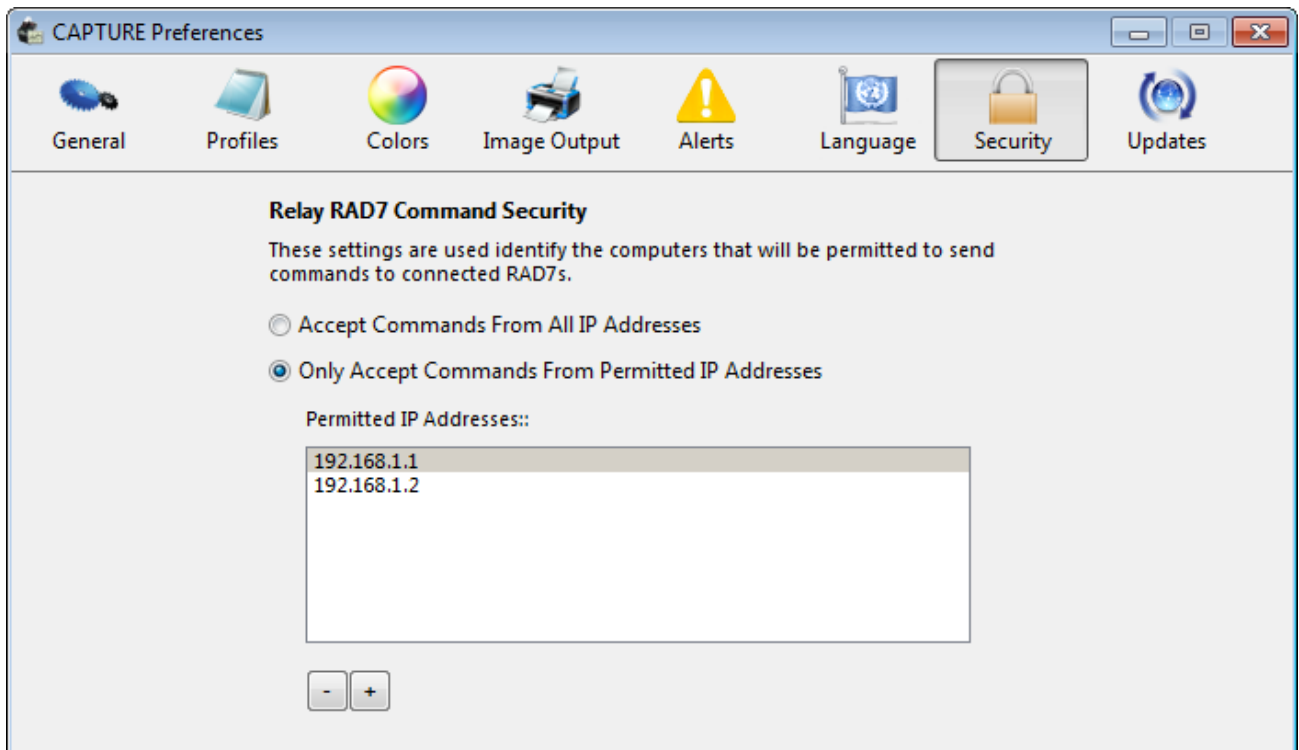
The Permit Machine Translated Languages checkbox permits machine translated languages to be used. Note that these languages may contain grammatical errors.

Use English Only Radio Button

The Use English Only Radio Button sets CAPTURE to use only the English language.

Security Panel

The Security panel provides access to controls for protecting RAD7s from commands issued by unauthorized Internet Protocol (IP) addresses.



Relay RAD7 Command Security

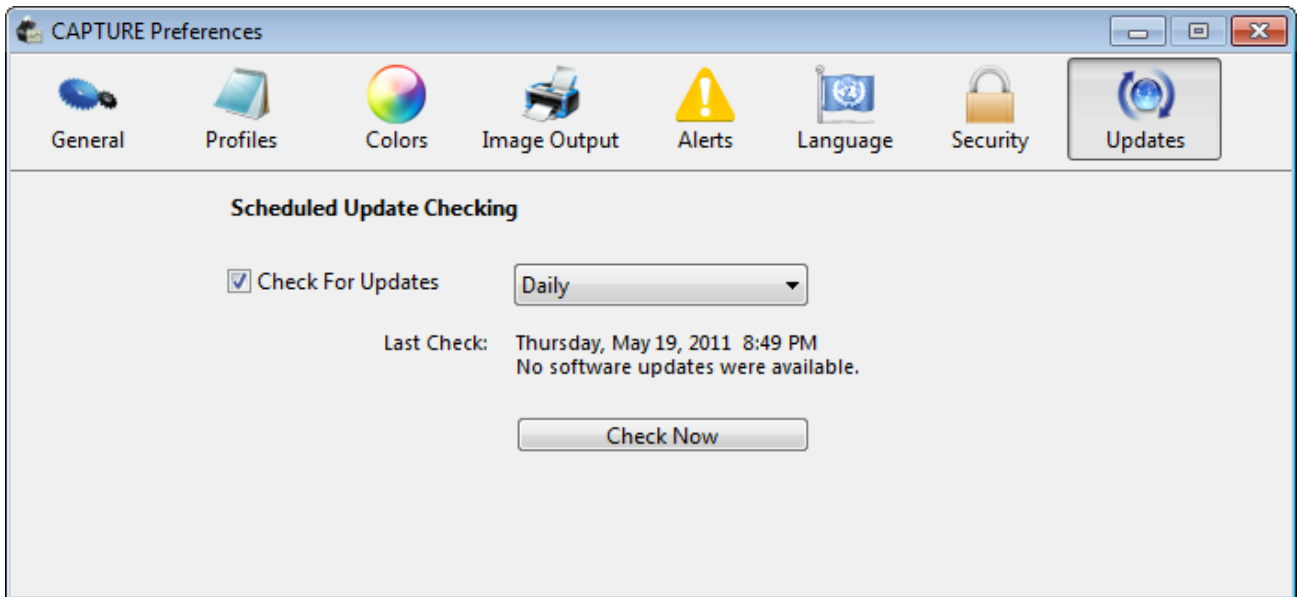
The Relay RAD7 Command Security controls are used to identify the computers that will be permitted to send commands to connected RAD7s.

If the Accept Commands From All IP Addresses radio button is selected, commands may be relayed to a connected RAD7 regardless of the IP address of the computer sending the commands.

If the Only Accept Commands From Permitted IP Addresses radio button is selected, then only computers using the IP addresses that have been entered into the Permitted IP Addresses list will be allowed to issue commands. Use the Plus (+) and Minus (-) buttons to add and remove addresses from the list.

Updates Panel

The Updates panel provides access to controls for checking to see if updates are available for CAPTURE. It is also possible to configure CAPTURE to check for updates automatically.



Check For Updates Checkbox

Determines whether CAPTURE will automatically check for updates at scheduled intervals. When an update becomes available, a button labeled Update Available will appear in the lower right corner of the Main Window. Clicking this button initiates the updating process.

Check frequency Pop-Up Menu

This pop-up menu determines how often CAPTURE performs automatic checks for updates. CAPTURE may be set to check for updates every time it opens, daily, weekly, or monthly.

Check Now Button

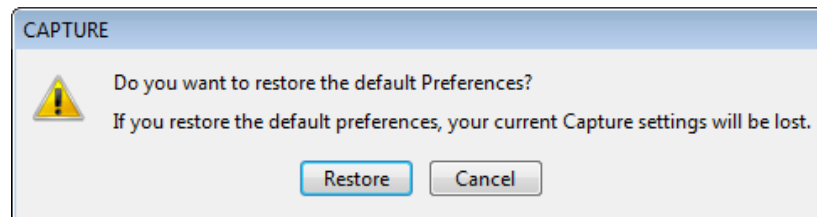
Checks for CAPTURE updates immediately, regardless of the above scheduled update settings.

Troubleshooting

The most common problems users encounter with CAPTURE involve the program failing to start up properly, the failure to detect connected RAD7s, and errors in downloaded RAD7 data. Solutions to these issues are described below.

CAPTURE Fails to Launch

If CAPTURE starts but fails to display the splash screen and the Main Window, it is often the result of a problematic preferences file. The solution is to restore the default preferences file. This is achieved by holding the Shift and Control keys as CAPTURE starts up. A dialog box will appear prompting for a confirmation to proceed with the operation.



If this dialog box is not immediately visible, check to make sure that it is not hidden behind a folder window. Once the preferences have been reset, CAPTURE will start up normally (although custom-configured RAD7 profiles and other settings will be lost.)

RAD7 Detection Failure

If CAPTURE is unable to detect a connected RAD7, check the following:

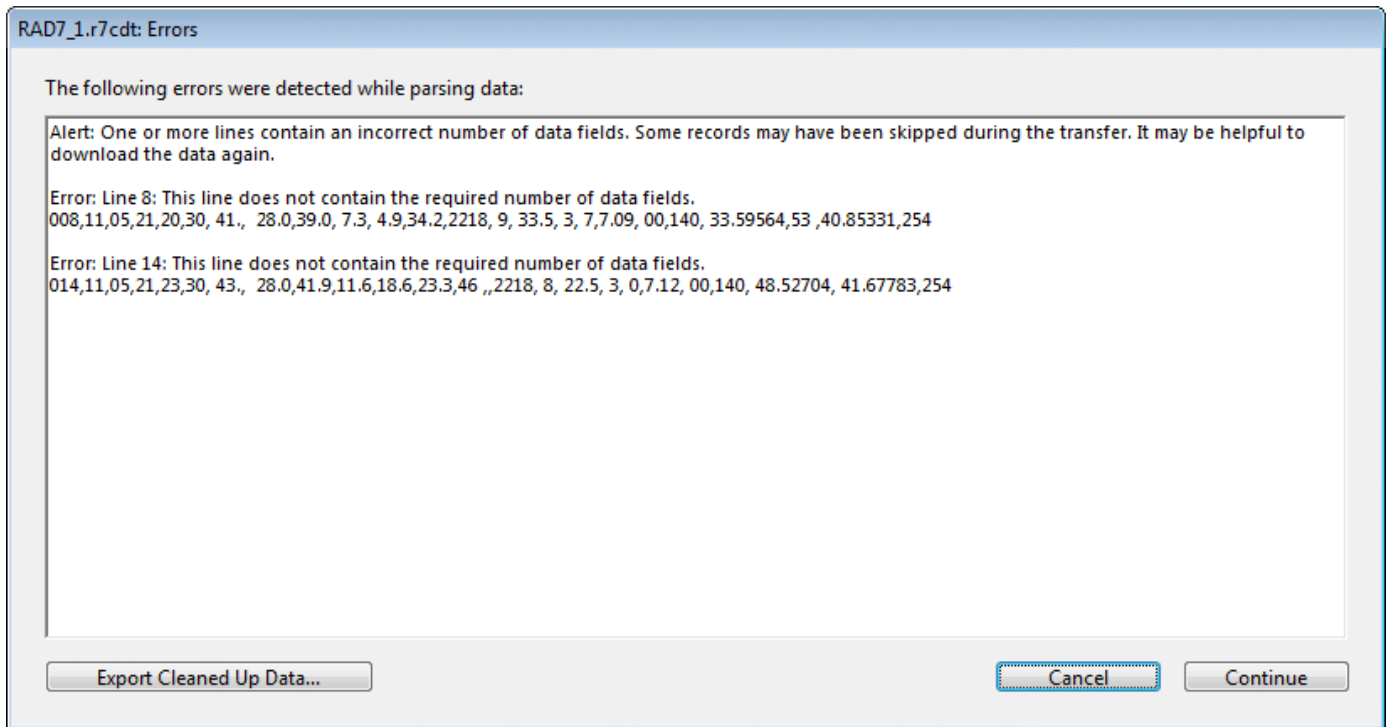
- Make sure the RAD7 is connected to a serial port using the supplied null-modem cable, or to a USB port using the supplied USB/RS232 adaptor and appropriate drivers.
- Make sure the RAD7 is turned on.
- Make sure the RAD7's battery is charged.
- Make sure the cable connections are secure.
- Make sure the RAD7 has RADLINK installed. (To verify that it is installed, use the keypad to navigate to the Special menu, and press Enter. If Special commands are available, then RADLINK is installed correctly.)
- Make sure no other application is communicating through the computer's serial ports.

After performing the above checks, if the RAD7 is still not recognized, try restarting the RAD7 and your computer. Note that it is possible to download data from a RAD7 that does not have RADLINK installed, using the Manual Download procedure described in the Basic CAPTURE Functionality section.

RAD7 Data Errors

Whenever RAD7 Data is opened from disk, downloaded from the RAD7, or merged using the Combine Data command, the data is evaluated and any problems are reported in the Errors Window. Though data that is thoroughly corrupted is of no use, CAPTURE is often able to salvage valid records and save them in a "Cleaned Up" R7CDT data file.

The Errors Window displays each line of corrupted data along with an explanation of the problem. Depending on the context of the problem, the Errors Window may contain up to three buttons, labeled Continue, Cancel, and Export Cleaned Up Data.



If RAD7 Data has just been downloaded, the Continue button saves the acquired data to disk. The data is saved as a R7RAW file, which includes all erroneous records in addition to valid data. If the Show Radon Graph checkbox had been checked in the Main Window, all of the valid RAD7 Data is then displayed in a graph. The Graph Window does not display any invalid records.

If data was not just downloaded, and an existing RAD7 Data File was simply reopened for graphing in CAPTURE, the Continue button causes the program to ignore invalid records and proceed to the Graph Window.

The Cancel button prevents any downloaded data from being saved to disk, and the Graph Window does not appear.

The Export Cleaned Up Data button makes it possible to save only valid RAD7 Data to disk, while discarding invalid data. Clicking this button brings up a Save As dialog, which prompts you to specify a name and location for the cleaned up data. The resulting file is saved in the R7CDT format, which differs from R7RAW data only insofar as it has been processed and stripped of problematic records.

Appendix A: Menu Commands

CAPTURE's menu bar houses several commands that are not accessible elsewhere in the user interface. The location of certain menu items may differ depending upon the platform on which CAPTURE is running. Several menu commands have keyboard shortcuts, which are listed below, under the description of each item. On Microsoft Windows, the Control key is used in conjunction with another key to trigger a keyboard equivalent, while the Macintosh utilizes the Command key for this purpose.

File Menu

Open Data File...

Opens an existing RAD7 Data File, in all supported formats. Keyboard shortcut: Control/Command-O.

Open Recent

Opens an recently opened RAD7 Data File, in all supported formats.

Close

Closes the window that is currently in front. If the Graph Window is in front, closing it, brings the Main Window to the front. Closing the Main Window causes CAPTURE to quit. Keyboard shortcut: Control/Command-W.

Export RAD7 Output...

Exports the contents of the RAD7 Output text area, which is located in the Issue RAD7 Command panel. This menu item is only available when in Issue RAD7 Command mode.

Export Selected Data...

Provides several RAD7 data export options. These include Cleaned Up Data, Column-Based Text to File, Column-Based Text to Clipboard, Data Summary, Run Summaries, and RAD7 Printer Data. This command is only available if RAD7 data has been downloaded or opened from disk, and if the selection contains one or more data points. Detailed information on these exporting options is available in the Exporting RAD7 Data section.

Save Graph Picture...

Saves the graph picture to disk. On Windows and Linux, the picture is saved as a BMP file. On the Macintosh, the picture is saved as a PICT file. Note that PICT files are not always readable on the Windows and Linux platforms. Therefore it is advised that PICT images be converted to a cross-platform format before being shared with Windows or Linux users. As an alternative to the Save Graph Picture command, Macintosh users may prefer to use the Print command to save graph images in the cross-platform PDF format, which described below. This command is only available if the Graph Window is visible.

Combine Data...

This command combines two or more data files on one graph. Records separated by fewer than a specified number of minutes are averaged. The combined data may be graphed and/or saved to disk. More information is available in the Special File Operations section.

Show Data File...

This command reveals the current RAD7 data file in Windows or in the Macintosh Finder.

Show Chart Recorder Logs

This command reveals the folder containing logged Chart Recorder data files. This data

accumulates automatically whenever CAPTURE's Chart Recorder is in use. The files may be safely moved or deleted at any time.

Page Setup...

This command is used to configure print settings. Before printing a radon graph, it may be useful to choose the Page Setup command and set the page orientation to Landscape, so that the graph will fill the page more effectively. This command is only available if the Graph Window is visible. Keyboard shortcut: Control/Command-Shift-P.

Print...

Prints the current radon graph. On the Macintosh, the Print dialog box may be used to save, fax, or email a cross-platform PDF version of the graph image. This command is only available if the Graph Window is visible. Keyboard shortcut: Control/Command-P.

CAPTURE Preferences

Displays the Preferences Window, which contains controls used to specify a wide range of options as described in the Preferences Window section. Note that on the Macintosh, the Preferences menu command is located under the Application menu. Keyboard Shortcut: Control/Command-Comma.

Exit

Exits CAPTURE. Note that on the Macintosh, the Exit menu command is labeled Quit and is located under the Application menu.

Edit Menu

Cut

The Cut command may be used while editing text in various fields throughout the application. Keyboard shortcut: Control/Command-X.

Copy Graph Picture

If the Graph Window is open, the Copy Graph Picture command puts the graph image on to the clipboard. Once the graph image is on the clipboard, it may be pasted into a graphics application where it can be edited or saved. Keyboard shortcut: Control/Command-C.

Paste

The Paste command may be used while editing text in various fields throughout the application. Keyboard shortcut: Control/Command-P.

Clear

The Clear command may be used while editing text in various fields throughout the application.

Select All

The Clear command may be used while editing text in various fields throughout the application. Keyboard shortcut: Control/Command-A.

View Menu

Concentration Units

Determines the unit of measurement used to denote radon concentrations on the graph. The available options include Automatic, Bq/m³, dpm/L, and pCi/L. The Automatic

option causes the radon concentration to be presented in the unit in which it was originally recorded inside the RAD7. This command is only available if the Graph Window is visible.

Temperature Units

Determines the unit of measurement used to denote temperature data on the graph. The available options include Automatic, Celsius, Fahrenheit, and Kelvin. The Automatic option causes the temperature data to be presented in the unit in which it was originally recorded inside the RAD7. This command is only available if the Graph Window is visible.

Forced SNIFF Mode

Determines whether the graph data is forced to be displayed as if it was recorded in SNIFF Mode. This menu command is enabled whenever there exists at least one record that truly was recorded in SNIFF Mode. Such records are analyzed to determine the necessary SNIFF sensitivity data.

Correct for Humidity

Determines whether the graph data is corrected for humidity. When relative humidity is high, radon concentration values are often underreported. Humidity correction compensates for this.

Correct for B to A Spill

Determines whether correction is applied based on the spill from the B to A windows. Significant spill occurs when the thoron concentration is high relative to the radon concentration. Under these conditions it is recommended that the data be corrected to compensate.

Point Style

Determines the appearance of the data points on the graph. The options are Normal, Shapes, B&W (Black and White) Shapes, and Hidden. The B&W Shapes option causes the graph to be rendered in black and white, which is useful when graph image is printed on a non-color printer.

Line Weight

Determines the thickness of the graph lines, as measured in pixels. This value may range from 1 to 4, or lines may be hidden. A thicker line may be easier to read, but is somewhat less precise than a single-pixel line. This command is only available if the Graph Window is visible.

Smoothing

Determines the degree of smoothing applied to the graph line. This value may range from 1 (no smoothing) to 9 (high smoothing). When the degree of smoothing is greater than 1, the original, non-smoothed graph line appears faded in the background. This command is only available if the Graph Window is visible.

Show Grid Lines

Determines whether horizontal and vertical grid lines are visible on the graph.

Show Graph Legend

Determines whether the legend is visible on the Graph Window. The legend indicates the significance of the colors that appear on the graph. This command is only available if the Graph Window is visible.

Show Error Bars

Determines whether error bars are visible on the graph. Error bars indicate the uncertainty of radon and thoron readings.

Show Selection Average

Determines whether a representation of the average of the selection is displayed between the Selection Bars.

Zoom In

Causes the radon graph to zoom in, displaying a shorter time range in greater detail. This command is only available if the Graph Window is visible. Keyboard shortcut: Control/Command-Plus.

Zoom Out

Causes the radon graph to zoom out, displaying a greater time range in lesser detail. This command is only available if the Graph Window is visible. Keyboard shortcut: Control/Command-Minus.

Radon/Thoron/Temperature/Relative Humidity Scale

These menu options determines whether the Y scales of each data type is determined automatically or manually. Manual Y scale settings for radon, thoron, temperature, and relative humidity may be configured in the Graph Controls Window.

Graph Lines

Determines which data lines are visible on the graph. The possible graph lines include Radon, Thoron, Radon in Water, Thoron in Water, Air Temperature, Water Temperature, and Relative Humidity.

Window Menu

Show Log Window

Determines whether the Log Window is visible. This window contains a record of the operations that CAPTURE has performed since the application was launched, plus a log of the data that has arrived through each serial port. Keyboard shortcut: Control/Command-L.

Show Spectrum

Determines whether the Spectrum panel is visible. This command is only available when the Graph Window is visible.

Show Statistics

Determines whether the Statistics panel is visible. This panel displays a range of information on the data being displayed on the graph. This command is only available when the Graph Window is visible.

Main Window

Opens the Main Window, if necessary, and brings it to the front.

Clean Up Window Arrangement

Moves each open window to its default location on the screen. If multiple graph windows are visible, they are arranged in a cascading pattern such that each window's title bar is visible.

Graph Window Menu Items

The Window Menu contains the names of each of the Graph Windows that is currently open. Selecting a Graph Window here brings it to the front.

Help Menu

CAPTURE Help...

Displays the CAPTURE User's Manual.

About CAPTURE...

Displays the CAPTURE About Box, which provides basic information about Capture, as well as buttons for accessing Help and Credits. Note that on the Macintosh, the About option is located under the CAPTURE Menu.

Appendix B: Toolbar Commands

CAPTURE's Main Window contains a toolbar providing quick access to important functionality. The toolbar can be used to open RAD7 data files, switch between connected RAD7s, and perform utility operations such as renaming a RAD7 and downloading data from all connected RAD7s.

These commands are described in detail below.

Open File Button

The Open File button brings up the Open Dialog, in which a RAD7 data file may be selected for graphing. Details are available in the Opening Data From Disk section.

RAD7 Selection Buttons

Each connected RAD7 is represented as a toolbar button, labeled with a serial number or custom RAD7 name. The content of the Main Window pertains to whichever RAD7 is currently selected in the toolbar.

Add RAD7 Button

The Add RAD7 button manually adds a new RAD7. It is necessary to add a RAD7 manually when it does not have RADLINK and can not be discovered automatically, or when the RAD7 is being reached via a dial-up modem or a local network. When a RAD7 is added manually, the Connection Settings panel appears. This panel is described in detail in the Main Window section.

Options Menu

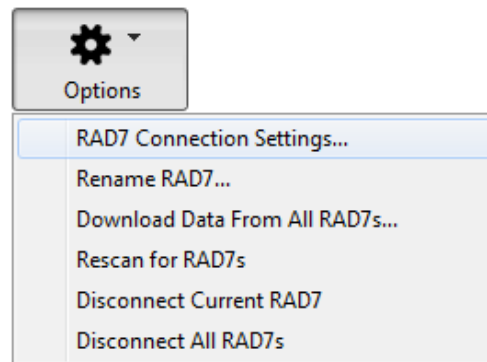


Figure 1: The Options Menu in the Main Window toolbar.

The Options Menu is labeled with a gear icon and consists of several commands:

RAD7 Connection Settings

The RAD7 Connection Settings command brings up the Connection Settings panel, which can be used to change the specified serial port and/or baud rate of the selected RAD7. It is also used when connecting to a RAD7 via a dial-up modem or a local network. The Connection Settings panel is described in more detail in the Main Window section

Rename RAD7...

The Rename RAD7 command brings up a dialog box in which a new name for the selected RAD7 may be entered. The specified name appears under the RAD7's icon in the toolbar. If no name is specified, the RAD7 is referred to by its serial number. RAD7 names may also be changed in the RAD7 Profiles panel in the Preferences Window.

Download Data From All RAD7s

The Download Data From All RAD7s command makes it possible to quickly obtain all of the raw data from each connected RAD7. This process is described in the Downloading From All RAD7s section.

Rescan for RAD7s

The Rescan for RAD7s command detects all of the RAD7s that are attached to the computer and adds them to the CAPTURE toolbar. Any RAD7s that were detected previously are removed, then rediscovered. The Rescan for RAD7s button at the lower right corner of the Main Window performs the same function as this menu command.

Disconnect Current RAD7

The Disconnect Current RAD7s command disconnects only the currently selected RAD7. It may later be restored by rescanning for RAD7s or by adding the RAD7 manually.

Disconnect All RAD7s

The Disconnect All RAD7s command disconnects all RAD7s, leaving the Main Window empty. RAD7s may later be restored by rescanning or by adding them manually.

Appendix C: File Formats

CAPTURE utilizes several file formats during the retrieval, editing, and exporting of RAD7 Data. Several legacy formats are also supported, ensuring compatibility with a wide range of existing data. Each supported RAD7 Data format and image file format is described below.

R7RAW Data

When radon concentration data is retrieved from the RAD7, it is normally recorded to disk in the R7RAW format. A R7RAW file is a plain text file containing up to 1000 rows of numerical data. Each row is divided into 23 unlabeled columns, separated by commas. Although this text is not easily human readable, it is well suited for graphing and analysis within CAPTURE. R7RAW files represent original, unedited data, straight from the instrument. As such, CAPTURE does not allow a R7RAW file to be modified and then saved back to disk under its original name, even for the purpose of removing unwanted flaws in the data. If a R7RAW data is modified in any way within CAPTURE, it is only saved back to disk in the R7CDT format, which represents changed, or "cleaned" data.

Note that CAPTURE can open files using unrecognized file name extensions. Users who have renamed their R7RAW data files using custom extensions such as DAT and CAP will still be able to view graphs of their RAD7 files.

Earlier versions of CAPTURE used the RAW file name extension instead of R7RAW. This has been changed to avoid conflicts with unrelated files that use the same extension.

R7CDT Data

The R7CDT file name extension represents either "complete data" or "cleaned-up data". R7CDT files contain RAD7 data has been downloaded and modified in such a way that it is no longer "raw" data. These modifications may include the removal of one or more lines of unreadable "garbage" information, or more significant changes, such as the cropping or combining of data, or the addition of RAD7 printer output and device information. R7CDT files containing this extra information are created when an Automatic Download procedure is performed with the "Obtain Supplementary Data" checkbox checked. R7CDT files may also be created using the File menu's Export Data command.

Earlier versions of CAPTURE used the CDT file name extension instead of R7CDT. This has been changed to avoid conflicts with unrelated files that use the same extension.

TXT Text Document

A TXT (Text) file is a plain text document that can be opened in any text editing or word processing application. The Export Data command provides the ability to save cleaned up, tab-delineated RAD7 Data to a text file. By inserting tab characters to separate columns of data, CAPTURE produces files whose contents can be imported directly into software such as Microsoft Excel for further analysis.

TXT files may also contain RAD7 Data acquired directly from a measuring device. These TXT files are functionally identical to R7RAW files, and can be opened and graphed in CAPTURE.

PNG Image File

When a graph image is saved using the Save Graph Picture command, CAPTURE produces a PNG image file. The PNG format uses compression to ensure small image file sizes, without sacrificing image quality.

PDF Document

The PDF file format is a cross platform format produced by the Macintosh version of CAPTURE when exporting graph images from within the Print dialog box. Since the system can save, fax, and email PDF documents using this dialog, it is sometimes preferable to export PDF graph images using the Print command, rather than exporting PNG graph images using the Save Graph Picture command on the Macintosh.

Appendix D: Version History

The following version history is presented with the most recent changes first.

Version 4.8.4:

- Humidity Correction is now applied to records using a checkbox in a manner similar to B to A Spill Correction and Forced SNIFF Mode.
- The new "Download data from All RAD7s" command makes it easy to quickly obtain the raw data from all connected RAD7s.
- RAD7s may now be renamed. When a RAD7 is detected, its custom name appears under its icon in the toolbar, making it easier to locate a particular device.
- CAPTURE no longer mistakes incompatible serial devices for RAD7s.
- RAD7 port and baud rate settings can now be changed with greater reliability.
- Date and time labels may now be formatted with either a 12 or 24-hour clock, overriding the operating system's settings. Custom date formatting may be used when exporting data to a column-based text file.

Version 4.8.3:

- The Windows version of CAPTURE now identifies serial ports and connects to RAD7s more quickly. Significant performance improvements have been achieved in configurations involving multiple RAD7s.
- The Statistics and Spectrum panels have been integrated into the Graph Window, resulting in a streamlined and more intuitive user interface.
- It is now possible to specify a custom drying unit volume when opening BIG BOTTLE RAD H₂O data.
- The Log Window now contains a set of lists showing the data that has been received through each serial port.
- The stability and responsiveness of CAPTURE have been improved on Windows. The screen now refreshes more quickly, without flickering.
- Humidity correction is now applied to calculated radon in water values.
- Automatic update checks may now be performed whenever CAPTURE launches. This has been made the default option.

Version 4.8.2:

- CAPTURE no longer crashes on the Macintosh. The Spectrum Window has been temporarily disabled to address this situation.
- Radon in Water graph points are now accurately rendered when graphing BIG BOTTLE RAD H₂O data.

Version 4.8.1:

- The Chart Recorder now logs RAD7 data to disk in real time.
- The Chart Recorder has been made more responsive and robust, obtaining data and refreshing itself in the background.
- Charts may now contain multiple data runs, including sequences of over 99 records.
- Printer output data is now preserved when combining RAD7 data sets.
- Thoron in Water concentration readings are now scaled to compensate for thoron's brief half life.

- When graphing RAD7 data acquired using the RAD AQUA or Water Probe, records lacking corresponding water temperature data may now appear on the graph.
- The Windows version of CAPTURE has been made significantly more stable.

Version 4.8:

- CAPTURE is now able to calculate Radon in Water concentrations for data obtained using the BIG BOTTLE RAD H₂O accessory for the RAD7.
- The Chart Recorder has been made more reliable and responsive.

Version 4.7.8:

- The new R7CDT and R7RAW file formats have been introduced to replace the CDT and RAW file formats, resolving conflicts with unrelated formats that share the same file name extensions.
- The synthetic peaks displayed in the Spectrum Window are now generated based on real-world data samples and rendered with high precision.
- File associations have been resolved in the Windows version of CAPTURE. It is now possible to open a RAD7 data file in CAPTURE by double-clicking it.
- The Chart Recorder now refreshes every 5 minutes instead of every minute. This makes CAPTURE's user interface more responsive and frees up the RAD7's CPU to process more counts per cycle.
- The functionality of the pop-up menus above the Chart Recorder has been restored.
- Exporting a selection as cleaned up RAD7 data no longer results in file corruption.

Version 4.7.7:

- Printer output containing radon concentrations in excess of 1 million units no longer compromises data integrity.
- The functionality of the Open Recent menu in the Main Window has been restored.

Version 4.7.6:

- An issue preventing multiple RAD7 data files from being merged has been resolved.
- The CAPTURE source code has been prepared for eventual compilation on the Mac OS X Cocoa platform.

Version 4.7.5:

- Printer data is now parsed more reliably: readings containing very high concentrations of Thoron no longer result in miscounted output records, and the time at which the record was recorded no longer impacts parsing accuracy.
- The Chart Recorder's status panel now properly recognizes when a RAD7 is performing WAT and GRAB operations.
- File info sets are now maintained for CDT files that include printer output, permitting graph viewing settings to be saved on a per-file basis more effectively.

Version 4.7.4:

- The Download RAD7 Data interface has been streamlined.
- When no RAD7 is connected, manual download and scanning functionality is now more easily accessible.

- The new 'Match Significant Figures to Precision' preference makes it possible to format highly uncertain values using fewer significant figures.
- It is now possible to export printer output from graphs created from within the Chart Recorder.
- High thoron concentrations and uncertainties are now parsed properly for records recorded in Thoron mode.
- CAPTURE is now better able to determine whether the pump was on during particular cycles.
- Unaltered raw RAD7 output and printer output are now stored as comments within CDT files.
- It is now possible to drag files onto the closed CAPTURE application icon on Windows.

Version 4.7.3:

- The horizontal grid lines are now drawn in the correct location on radon graphs.
- CAPTURE now scans for attached RAD7s automatically by default.
- Dense graph data is now more easily viewed when Error Bars are enabled.
- Dotted lines representing areas of unknown humidity are now rendered properly.

Version 4.7.2:

- The appearance and behavior of the real-time Chart Recorder have been improved. It contains more responsive interface controls, and the system now keeps track of which data points belong to which runs.
- The default window configuration and graph appearance have been simplified, making it easier to get started with CAPTURE.
- Most user preferences are now reset when opening a new version of CAPTURE for the first time, ensuring reasonable window positioning.
- Automatic and Manual downloading operations are now carried out from within the same panel in the Main Window.

Version 4.7.1:

- The Main Window no longer reappears unexpectedly when performing certain Graph Window operations.
- The Export Run Summaries feature now starts counting from the specified record.

Version 4.7:

- The new Chart Recorder panel contains real-time information about the state of each connected RAD7, including a graph of data points as they accumulate. Menus for starting, stopping, and configuring the RAD7 are also provided.
- Foreign language translations may now be restricted to human-translated languages or disabled entirely, overriding the operating system's settings.
- Run summary information may now be exported to a text file, as part of a streamlined Export interface.
- Graph appearance and rendering performance have been improved.
- It is now possible to display selection averages and uncertainties for Radon in Water and Thoron in Water.
- The information panel at the top of the graph window has been redesigned to display more pertinent data.

Concentration and uncertainty values are now formatted using the appropriate number of significant digits.

- The system for assigning RAD7 profiles to data files has been improved.
- Radon and thoron counts are now calculated more accurately.

Version 4.6:

- CAPTURE now supports multiple simultaneous RAD7 connections. Communication operations may be completed in parallel.
- A redesigned Connection Panel makes it easier to connect to local and remote RAD7s. The Main Window's toolbar provides convenient access to each connected RAD7.
- The connection framework is now more robust, for more effective network and modem-based communication.
- Security features now protect RAD7s from receiving communications from unauthorized remote computers.
- CDT files now include RAD7 printer output in a human-readable form.
- It is now easier to configure CAPTURE to relay RAD7 commands over the Internet.
- Stability and performance have been improved throughout the application.

Version 4.5.1:

- CAPTURE now tolerates inconsistencies between RAD7 data records and supplementary data obtained through printer output.
- Low concentration averages are now represented correctly on the graph.
- Combining RAD7 data files now works reliably. If the combined files are known to have been recorded using the same RAD7, the device data is retained.
- Exported CDT files now include any available supplementary data.
- Visual glitches have been addressed in the Preferences Window.
- Download operations may now be cancelled and restarted more reliably.

Version 4.5:

- Data pertaining to thoron and runs that was previously available only through the infrared printer can now be downloaded and stored in the CDT file format.
- It is now possible to download a specific run, in addition to all runs or the latest run.
- The thoron calculation algorithm has been improved. CAPTURE now displays a representation of the minimum meaningful thoron, and indicates when the CB spill is excessive and thoron can not be known.
- Error bars and selection uncertainty regions may now be displayed on the graph.
- The appropriate RAD7 Profile is automatically selected when viewing RAD7 records containing supplementary data.
- When exporting RAD7 data it is now possible to specify whether the derived concentration values are calculated with respect to Forced SNIFF Mode and B to A Spill Correction.
- The exported Data Summary file may now contain detailed RAD7 specifications.
- The Statistics Window now contains an expanded assortment of information pertaining to the RAD7 and the point nearest the cursor.
- Graphs may now display error bars indicating concentration uncertainties.
- Various warning messages may now be toggled on and off in the redesigned Preferences Window.

Support for records in WAT250 and WAT40 mode has been improved.

Version 4.4.10:

- CAPTURE now supports B to A spill correction. This option may be enabled in the Graph Controls Window.
- The Clean Up Window command now respects MDI settings on Windows.
- Graph points may now be displayed as shapes.
- Graphs may now be rendered in monochrome for compatibility with black and white printers.

Version 4.4.9:

- It is now possible to graph records containing unknown humidity data. Periods of unknown humidity are represented on the graph using dotted lines.
- Graph line smoothing now uses a superior distribution algorithm based on Pascal's Triangle.
- The RAD7 detection process now operates more reliably.
- Issuing certain commands on the RAD7 keypad no longer compromises subsequent download operations.
- Visual glitches in the Graph Controls Window have been addressed.

Version 4.4.8:

- Certain window layout configurations no longer prevent CAPTURE from starting up properly on Windows.
- Miscellaneous usability improvements have been implemented.

Version 4.4.7:

- CAPTURE can now automatically check for updates and download the necessary installer (Windows) or disk image (Macintosh).
- The RAD7 settings interface has been streamlined and is now more user-friendly.
- It is now possible to download the latest run from a RAD7 that is set to a low baud rate.
- RAD7 scanning performance has been improved; CAPTURE now begins by scanning at the baud rate at which a RAD7 was most recently found.
- Graph selection bounds no longer "drift" when dragging the Zoom Slider.
- Window layout has been improved on Windows 7 and on computers with smaller displays.
- The Clean Up Window Arrangement command displays application windows in cascading layout for easier access to each graph.

Version 4.4.6:

- Internal enhancements now allow for more streamlined RAD7 calibration and firmware configuration.

Version 4.4.5:

- Records with differing Flags Bytes and Units Bytes may now be combined and

averaged.

- The serial port detection process has been changed to eliminate unnecessary delays while launching CAPTURE.
- The new Show Data File command reveals RAD7 data files on disk.
- Humidity correction can now be applied to data recorded outside the standard range of dew point conditions.
- Corrected code logic for determining radon counts.
- Uncertainties may now be calculated using one of two formulas. Thoron uncertainties may now be viewed and exported.

Version 4.4.4:

- Graph navigation operations have been stabilized and streamlined.
- The uncertainty values of combined records are now computed more accurately.

Version 4.4.3:

- The Image Output preferences panel may be used to control print settings and to configure the appearance of saved graph images.
- It is now possible to create a new selection by dragging the cursor across the graph.
- A contextual graph menu provides quick access to common operations.

Version 4.4.2:

- Radon concentration uncertainty is now reported correctly for the point closest to the cursor.
- The humidity correction algorithm has been refined and is now more accurate.
- Printed graphs now include statistics. The graph legend and labels are now larger and easier to read.

Version 4.4.1:

- Concentration averages are now reported correctly when converting between units.

Version 4.4:

- Graphs may now display radon in water, thoron in water, air temperature, water temperature, and relative humidity.
- The Graph Controls Window now consists of multiple collapsible panels to make better use of screen space.
- The graph Y Axes may now be individually controlled for radon, thoron, temperature and humidity. Slider controls facilitate improved graph navigation.

Version 4.3.9:

- An issue preventing Manual Download button from becoming active has been resolved.

Version 4.3.8:

- Exporting RAD7 data that has been combined using the Combine Data operation

produces accurate uncertainty results.

- A more modular internal data structure improves CAPTURE's performance and scalability.
- On computers set to display Traditional Chinese text, CAPTURE will now use Simplified Chinese rather than English.

Version 4.3.7:

- It is now possible to perform automatic and manual downloading operations remotely via dial-up modem and Internet connections.
- Miscellaneous improvements have been made in the areas of usability, connectivity, and error reporting.

Version 4.3.6:

- The process of scanning for connected RAD7s is now more user-friendly.
- Error handling has been enhanced, with additional options providing greater flexibility.

Version 4.3.5:

- CAPTURE can now communicate with remote RAD7s that are connected to the Internet via computer or wireless serial communications device.
- It is now possible to configure CAPTURE to relay commands from a remote computer to a connected RAD7.
- A wide range of RAD7 data fields may now be exported as tab-delineated data.

Version 4.3.4:

- The Combine Data feature now allows the user to specify whether the combined data is graphed and/or saved to disk. The maximum permitted record separation value is now interpreted using a more advanced algorithm.
- Temperature Data Profiles now support dates formatted by Day/Month/Year and Year/Month/Day. This makes it possible to configure Temperature Data Profiles for Lascar Electronics EasyLog data files. Support for such files is now built-in.
- Any newly introduced built-in Temperature Data Profiles are automatically added to the user's collection of Temperature Data Profiles when an updated version of CAPTURE is used for the first time.
- Any built-in Temperature Data Profiles that have been deleted by the user can now be restored reliably using the Restore Built-In Profiles button in the Preferences Window.
- Numbers are now formatted with respect to the influence that insignificant digits exert over significant digits. Specifically, when a decimal value is displayed the final significant digit is now rounded up when the value of the first insignificant digit (the one immediately to the right of it) matches or exceeds 5.
- The graph label drawing code has been improved; label borders are now cropped to the ideal size.
- When translating from radon concentration in air to radon concentration in water, the uncertainty value is translated accordingly.
- CAPTURE now alerts the user when relative humidity readings are excessively high, and provides suggestions for possible corrective actions.

Version 4.3.3:

- CAPTURE now handles a more diverse range of temperature data file formats.
- Derived RAD7 data is now protected when the Combine Files feature is used. Previously this information could be lost.
- It is now possible to restore the built-in Temperature Data Profiles from within the Preferences Window.

Version 4.3.2:

- Temperature Data files may now be applied to RAD7 data recorded using the RAD AQUA accessory.
- It is now possible to download the latest run, as an alternative to downloading all RAD7 data.
- It is now possible to begin performing RAD7 communication operations while CAPTURE continues to scan for additional serial ports in the background.
- After downloading data from a RAD7 that is nearly full, CAPTURE offers to erase the RAD7 memory to make room for more records.
- RAD7 Data is protected from erasure until it has been downloaded in its entirety.
- SNIFF Sensitivity is now computed correctly for files whose radon values are stored using scales other than pCi/L.
- Download buttons are enabled even if a download location has not been chosen.
- The BA Spill Factor now defaults to 0.4 when creating a new RAD7 Profile.
- Appending downloaded RAD7 data to an existing file now works reliably.
- The default BA Spill Factor is now 0.05.

Version 4.3.1:

- The Main Window interface has been improved and simplified.
- CAPTURE now automatically detects any connected RAD7s and identifies each device's port and baud rate.

Version 4.3:

- RAD7 Data may now be downloaded remotely, without having to press any buttons on the RAD7 itself.
- Various other commands may be sent from CAPTURE to the RAD7.
- CAPTURE now supports the importing of temperature data files. Customizable Temperature Data Profiles allow any type of text-based temperature file to be imported. (Temperature and RAD7 data integration is forthcoming.)
- Numerous user interface enhancements make CAPTURE easier to use.

Version 4.2.4:

- Sensitivity readings are now reported correctly when listed in Bq/m³ units.

Version 4.2.3:

- CAPTURE now keeps track of associations between RAD7 Profiles and RAD7 Data Files. Beyond a limit of 1024 pairings, the least recently accessed pairings are purged.
- Graph rendering speed has been significantly increased, particularly when smoothing is enabled.

- Spectrum CPM labels are again visible.
- Selection Bar labels are again visible.
- Smoothed graph lines no longer appear near the start and end of runs. The exact smoothing threshold depends on the selected smoothing degree.
- Existing CAPTURE Preferences data is no longer discarded when updates are installed.

Version 4.2:

- New graphing feature: Forced SNIFF mode.
- An unlimited number of RAD7 profiles may now be configured in the preferences.
- RAD7 profiles now include the BA Spill factor.
- It is now possible to specify custom colors for each graph line.
- The Statistics Window now displays RAD7 information.
- The Statistics Window may now be scrolled, and individual statistics panels may now be independently collapsed and expanded.
- The Macintosh version of CAPTURE now saves graph pictures in a 64-bit compatible PNG format.
- Numerous bug fixes and improvements have been made to ensure cross-platform parity.

Version 4.1:

- CAPTURE now displays humidity-corrected Radon and Thoron.
- The user interface has been significantly enhanced.
- Multiple graphs may now be displayed simultaneously.
- A Spectrum Window has been added.
- The Statistics window now displays information on the point under cursor.
- Improvements have been made to the algorithms used to generate derived data.
- Numerous additional Export, Join, and Combine options.

Version 4.0:

- This is the first full-featured release of CAPTURE for Macintosh and Windows.

Versions 1.0-3.5:

The earliest versions of CAPTURE were made available for DOS. The software was capable of downloading RAD7 data, but graphing was not supported. Graphing was first implemented in internal test builds of CAPTURE, starting with version 3.0.