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**SPECWARE™ 6.0
FOR WINDOWS**

SOFTWARE USER'S GUIDE

Spectrum
Technologies, Inc.

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Software Installation

System Requirements

Specware requires a 486 (or better) processor with at least 8 megabytes of RAM running Windows 95 or better. You will also need a mouse and a free serial port and communications port to connect the logger to the computer.

Installing SpecWare on a Hard Drive

To install Specware software onto your hard drive, insert the Specware CD or diskette #1 into the appropriate drive of your computer and follow the on-screen instructions. If auto-start is not enabled on your computer, select **Run** from the **Start** menu and type **D:\setup** (Substitute the appropriate drive letter for your CD or floppy drive.). The default location for program installation is C:\Program Files \Specware but you can specify a different location if desired. If you have been using a previous version of Specware and want to have access to your old data using Specware 6.0, you have two options. Please read **Data Management** (p. 7) to better understand these installation options. The options are to specify installation into C:\Specware (or the current Specware location that contains the data subdirectories) or to install to the default location and then, prior to running Specware 6.0, use Windows Explorer to copy only the data subdirectories into the newly created default location.

Connecting to Your IBM Compatible

The logger is connected to your computer with an interface cable. The PC-3.5 cable is designed to connect directly between the IBM compatible's DB-9 (9-pin) serial port and the data logger. A DB-25 (25-pin) to DB-9 adapter (available at your local computer store) may be needed if your computer does not have an available DB-9 port.

Before Starting SpecWare

Before starting SpecWare make sure your computer's clock is set to the correct time. Each time the logger is launched, the logger uses your computer's clock setting to initiate its own internal clock setting.

Weather Monitor

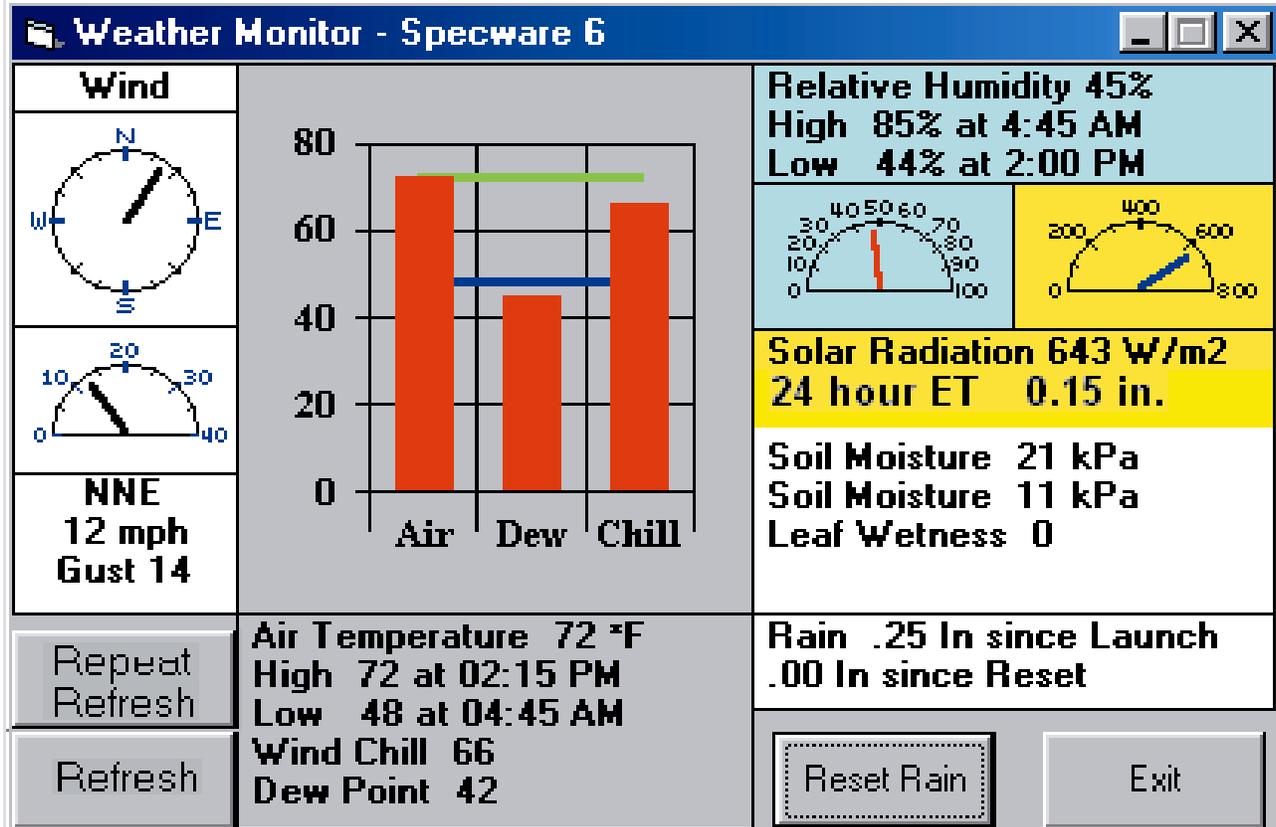
The first launch of a weather station will enable the **Weather Station Real-Time Monitor** option in the **Logger** menu and the Weather Station quick-button on the SpecWare 6.0 **Toolbar** screen (see p.7). Clicking either the option or the quick-button will display the monitor screen shown below. (Note: once **Weather Station Real-Time Monitor** is initialized, SpecWare 6.0 does not have to remain open to display the monitor screen.) The monitor screen displays the current weather conditions including readings from the sensors that are plugged into the external ports of the weather station.

***IMPORTANT:** For the Real-Time Weather Station Monitor to work correctly, the weather station must be connected to the computer using the optional hardware or remote PC connections.*

The data on the monitor screen is updated by clicking on the **Refresh** button on the lower left part of the screen. Clicking the **Repeat Refresh** button will cause the monitor screen to update every five minutes.

The amounts of **Rain** since the last download/launch and current **Rain** amount since the last **Reset** are displayed on the lower right corner of the monitor screen. There may be several rainfall events between the times that data is downloaded to the computer (see **Downloading Data**, p.14). Click the **Reset Rain** button to zero the currently accumulated **Rain** amount.

The bar graph is composed of **Air** temperature, **Dew** point and wind **Chill**. The green and blue horizontal lines on the bar graph are the daily high and low temperatures.



Preferences

Preferences must be specified when the software is first installed to allow the computer, the software, and the data logger to work together harmoniously. The **Preferences** screen can be accessed from the **File Menu** option (See p. 8). The **Preferences** screen is divided into 3 separate tabs: **General**, **Communications** and **Data Storage**.

General

Logger Support

Enables WatchDog or Onset/Spectrum logger communications.

Units

Allows you to choose whether temperature, rainfall, and wind speed data output is in english or metric units.

Degree Day Calculations

The degree day calculation method specified here will be used in all of the reports and in all of the insect and disease models. The **Single Sine Method** applies a smooth sine curve to estimate degree days using the daily high and low temperatures. The **Actual Degree Day Method** calculates degree days using the temperatures from each logged interval.

Data Redisplay Intervals

When displaying a graph from saved data files, you can specify a **Default Interval** (the default is initially 60 minutes). If the **Default Interval** results in over 6000 data points, a longer interval is substituted. A **Minimum Interval** can also be specified (the default is initially 15 minutes). This should be set to match your normal logger recording interval. Setting the **Minimum Interval** to the interval at which data was recorded keeps SpecWare from graphing more data points than you actually measured. For example, using data that was recorded every 30 minutes to create a graph that has a 15 minute **Minimum Interval** will cause SpecWare to display two points on the graph, 15 minutes apart, to represent the single recorded data point. In this case, specifying a 30 minute **Minimum Interval** will make the graph and text data display match your recorded data. (See **View and Print Menus**, p. 16)

The screenshot shows the 'Preferences' dialog box with the 'General' tab selected. The dialog has three tabs: 'General', 'Communication', and 'Data Storage'. The 'General' tab contains the following settings:

- Logger Support:** Two checked checkboxes: 'Watchdog Loggers' and 'Spectrum and Onset Loggers'.
- Units:** Two radio buttons: 'Metric (Celsius, mm, km/h)' (unselected) and 'English (Fahrenheit, in, mph)' (selected).
- Degree Day Calculations:** Two radio buttons: 'Use Actual Degree Days' (selected) and 'Approximate Degree Days using the Single Sine Method' (unselected).
- Data Redisplay Intervals:** Two dropdown menus. 'Default Interval' is set to '15 min' and 'Minimum Interval' is set to '15 min'.
- Graph Symbols:** One checked checkbox: 'Mark Points on Printed Graphs'.

Graph Symbols

The SpecWare graph can print individual data points or only the line that connects those data points.

Communication

Direct Connection

Allows you to select the port that SpecWare will use to communicate with the logger. You must select the communications port connected to your serial cable. (See **Identifying the Correct Com Port**, p. 6)

Wireless

Allows you to select the port that SpecWare will use to communicate with a WatchDog Weather Station. In most cases, this will be the same port that connects to the gray direct connection cable.

Modem Dial-Out

In the **Port** field, select the Com Port associated with your computer's internal modem. The **Modem Initialization String** field is set to a common default string. We have found that some Conexant/Rockwell modems (which are often the inexpensive WinModem included "free" with a new PC purchase) work better with a string of "insert string here" (omit the double quotes). Two of the more complete sites on the internet for modem information (including initialization strings) are www.modemhelp.org or www.modemhelp.net. Please reference these for other brands if the default string does not help.

Specify whether dialing is via touch-tone or pulse (the old rotary dial). Touch-tone is generally the correct option, though some office phone systems use pulse dialing to minimize costs. If after dialing (even with a push-button phone), you hear a long series of clicks, you will need to specify "pulse" dialing.

The time you wait after connection before communication with the weather station begins logger begins should generally be left as zero (the default). If the modem connection seems to be made, but the connection with the weather station fails, try setting the delay to 1 (second) to allow the modems time to finish handshaking before they are asked to transmit data.

Download Options

Allows you to specify how the software handles the data download from the WatchDog loggers or shuttle (See **Downloading Data**, p. 14). The options are **Normal**, **Auto Download for Shuttles** only or **Auto Download for all** loggers. The **Auto Download** options retrieve the data from the loggers or shuttle and automatically save that data to the appropriate, already-created **Logger Location(s)** (See pp. 7 and 9). By checking the **Auto Relaunch after Auto Download** box, the software will automatically relaunch your logger after the automatic download. The previously used name and recording interval are retained during an automatic launch. All **Auto** options proceed without user intervention.

NOTE: It is recommended that you choose **Normal** and confirm each step of the download, save, and relaunch process until you are familiar with how the software manages the data and the data logger.

The screenshot shows the 'Preferences' dialog box with the 'Communication' tab selected. It is divided into several sections: 'Direct Connection (Gray Cable)' with a 'Port' dropdown set to 'COM1', a 'Slowdown factor' slider at 100%, a 'Test Port' button, and a checked 'Hardware Flow Control (RTS)' checkbox; 'Wireless' with a 'Port' dropdown set to 'None'; 'Modem Dial-Out' with a 'Port' dropdown set to 'COM2', a 'Modem Initialization String' text box containing 'ATZ0Q0V1X4+MS=V22,0,1200,1200,1200,1', radio buttons for 'Touch Tone Dialing' (selected) and 'Pulse (Rotary) Dialing', and a 'Wait after Connect (seconds)' text box set to '0'; and 'Download Options' with radio buttons for 'Normal - Confirm each step' (selected), 'Auto download for Shuttles', and 'Auto download for all', and an unchecked 'Auto Relaunch after download' checkbox. At the bottom are 'OK' and 'Cancel' buttons.

Data Storage

Data Folder Location

Displays the directory where SpecWare was installed and where **Logger Location** directories are being saved. The default storage location is in the Specware directory. This screen allows you to specify whether or not data can be saved to diskettes. (See **Saving Data**, p.9)

Data File Locations

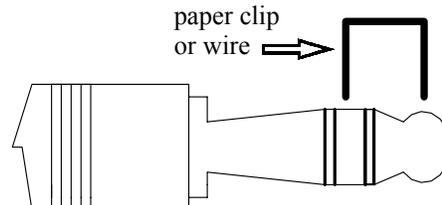
In this section, you can decide whether or not to limit the length of Logger Location names. The shorter length Logger Location names are better when using older Spectrum/Onset loggers.

The screenshot shows the 'Preferences' dialog box with the 'Data Storage' tab selected. The 'Data Folder Location' field contains 'C:\PROGRAM FILES\SPECWARE\'. Below it is a 'Change Location' button. The 'Allow Files to be saved to Diskette:' section has 'Drive A' checked and 'Drive B' unchecked. The 'Data File Locations (Folders)' section has 'Restrict Data Location (folder) names to 8 bytes' selected. The 'Logger Locations' dropdown menu shows 'SPECDEMO' and a 'Properties' button is next to it. 'OK' and 'Cancel' buttons are at the bottom right.

Identifying the Correct Com Port

The computer **Communications Port** to which the PC-3.5 serial cable is connected can be identified by using a paper clip (Refer to the **Communications** tab of **Preferences** screen p. 4).

1. Disconnect the logger from the serial cable.
2. Select the com port to be tested and click on the **Test Port** button. If the message "Connection OK" is displayed, another device (such as a modem) is probably connected to that port. If the message "No Connection" is displayed, this port may be the one connected to your serial cable and you can proceed to the next step.
3. Place a paperclip on the end of the serial pin so that it touches both the tip of the pin and the metal area between the two black rings. Again click on the **Test Port** button. If the message "Connection OK" now appears, this is the com port connected to your serial cable.



*NOTE: The dataloggers do not short-circuit the serial pin. Therefore, when the **Test Port** button is clicked while the logger is connected, the "No Connection" message will be displayed.*

Data Management

SpecWare 6.0

SpecWare offers significant advantages in data information management and decision-making tools. SpecWare simplifies your database with **Logger Location** directories. This permits easier analysis of trends and historical data.

The database is the permanent record of data stored on your hard drive. When you download the logger, SpecWare transfers all information in the logger memory to the computer and you have the option of saving to an existing **Logger Location**. It is also possible to create a new location to save the logger data. Suggestion: Use the "Data Identification" box that appears in the logger "Launch Options" screen as your **Logger Location** (e.g. North Orchard). Each **Logger Location** in SpecWare is a subdirectory in C:\Program Files\Specware. If you choose to save your downloaded logger data to a floppy diskette, it is important to use a separate floppy diskette for each location because of the way data files are built by SpecWare.

The software stores data to disk in monthly blocks; each is a separate file in a subdirectory named for the **Logger Location**. As new data is downloaded from the logger, it is appended to the appropriate month for the location you have specified. The name of the data file indicates the year and the month of the data. For example, SP200102.rnf is rainfall for February 2001.

CAUTION: The files in each **Logger Location** are given the same names as those in other **Logger Locations**. Therefore it is important to carefully choose the **Logger Location** when adding new data to existing locations or to floppy diskette to avoid mixing the data from separate locations.

Toolbar

After starting SpecWare, the menu bar will initially offer **File**, **Logger** and **Help** menu options. The quick-buttons, from left to right, allow the user to **Exit SpecWare**, **Open File**, **Save Logger Data**, **Launch WatchDog Logger**, **Readout WatchDog**, access a **Remote Connection**, **Launch/Readout Spectrum** and **Onset Loggers**, open the **Weather Station Monitor**, and specify **Large/Small Toolbar Buttons**.

NOTE: The **Weather Station Monitor** button is not present until the first time a weather station is launched. The **Remote Connection** button is only present if a Com port is selected in the **Wireless** or **Modem Dial-Out** options in the **Communication** tab of the **Preferences** screen (See **Preferences**, p. 4).



After a file is opened or a logger is downloaded, the **Edit**, **Print**, **View** and **Tools** menu options will appear and the **View Data as Text** quick-button will be activated.



Two additional quick-buttons, **Reset Zoom** and **Zoom Out**, will be activated if the graph zoom feature is used.



File menu

Open File

This allows the user to open previously saved data files.

Save File

This allows the user to save data to a **Logger Location** if one is not chosen immediately after downloading a datalogger.

Importing SpecWare 2 Logger File

Data files stored in the SpecWare 2.0 directory can be imported and merged together in the SpecWare 6.0 directory. Click on **Import SpecWare 2.0 Logger File** in the **File** menu. Open the file that you wish to import and save to a new or existing **Logger Location**.

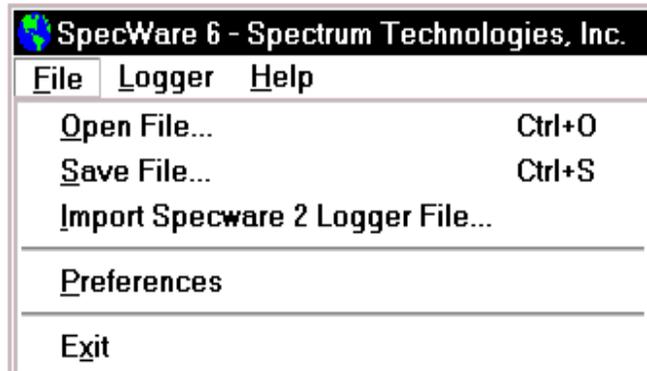
CAUTION: When importing data files, it is important to import the files in chronological order so they can be properly appended by SpecWare.

Preferences

This allows the user to identify the com port for use with the PC-3.5 serial cable, select english or metric units for temperature and rainfall, and enable or disable certain toolbar quick-buttons (See **Preferences**, p. 4).

Exit

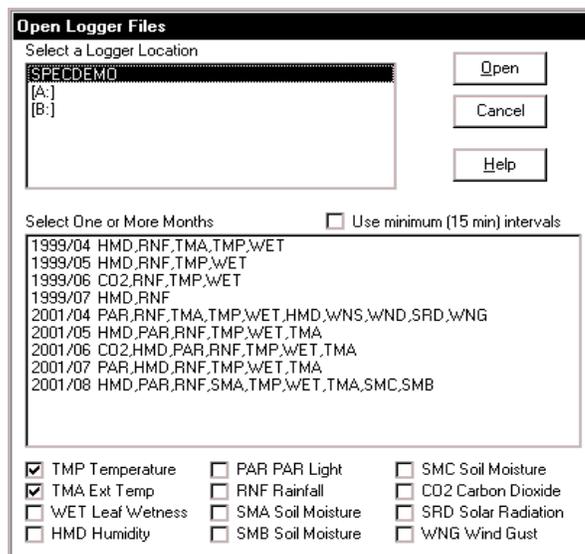
This terminates the SpecWare session.



Opening Files

Open File

After clicking this option, the **Open Logger Files** screen will appear. From the upper box, select the **Logger Location** where the file is located. Data files saved on a floppy disk can also be retrieved (A: or B: drive). Next, select one or more months of data. Multiple months can be selected by holding down the left mouse button and dragging the cursor or by selecting the first month and, while holding the shift key, selecting the other months with the arrow keys. Multiple sensors may be selected provided that only two units of measurement are involved (e.g. air temperature and multiple depths for soil temperature and soil moisture.) Check **Use minimum intervals** to specify that you want to use the minimum resolution specified on the **Preferences** screen (see p. 4). (Note: A maximum of 6000 data points can be graphed at one time. If more data points are available for the time period specified, the graphed time interval will be longer.) If left unchecked, the default interval as set in the **Preferences** screen will be used. Clicking the **Open** button will display the Graph/Data screen. The logger reading will be on the Y axis and time will be on the X axis. (See **Viewing Graphs**, pp. 17).



Saving Data

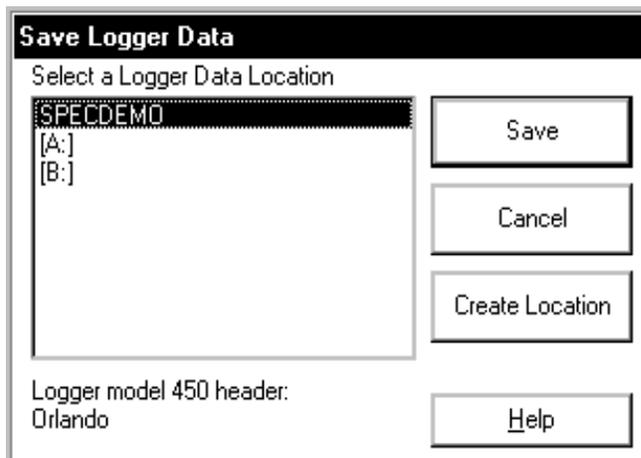
Save File

When you download the data from your logger, the **Save Logger Data** box will appear. Choose the directory where you want to save the file. You may append the datafiles into an existing **Logger Location**, save them to a newly created **Logger Location**, or save to a floppy disk. If you decide to create a new location, you will be prompted to name this location. Generally, the data will be saved to a logger location in the SpecWare directory on the drive where the software was installed. Files can also be saved to the floppy disk drive (A: or B: drive) if this option is selected in the **Data Storage** tab of the **Preferences** screen (see pg. 9). If you choose to not save your data at this time, click on the **Cancel** button to go directly to the graph screen. You can save the data later by selecting the **Save File** option from the **File** menu. Otherwise, you will be reminded to save the file if you attempt to open another file or exit from the program.

Using Your Data in Other Applications

SpecWare creates an ASCII file for use in other applications as soon as a download file is saved. The file is comma, colon, and space delimited for use in spreadsheets, word processors and other applications. These raw data files are located in the directory named for the **Logger Location**.

IMPORTANT: All new dataloggers require that you create a new **Logger Location**. Once this **Logger Location** is established, subsequent logger data readouts can be appended to this **Logger Location**.



Logger Menu

Launch WatchDog

This establishes a connection with the WatchDog logger and displays the **Launch Options** screen. This option is equivalent to clicking on the **Launch WatchDog Logger** quick-button on the toolbar. (See **Launching Loggers**, p.12)

Get WatchDog Data

This establishes a connection with the logger to download the data accumulated since the logger was last launched. This option is equivalent to clicking on the **Readout WatchDog Logger** quick-button on the toolbar. (See **Downloading Data**, p.14)

Contact Remote Weather Stations

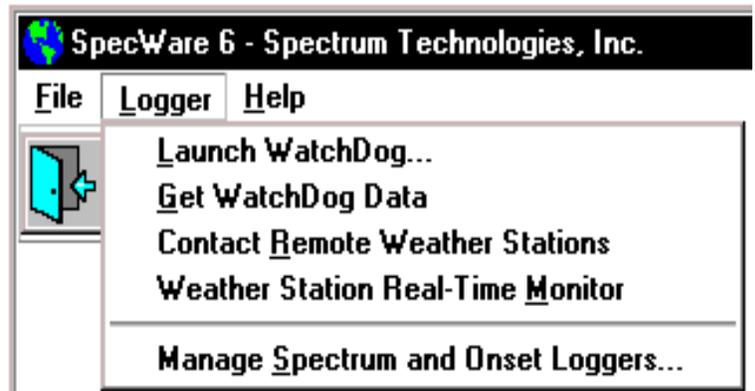
This establishes a connection with the logger via a telephone modem or wireless connection (see **Contacting Remote Weather Stations** p. 11)

Weather Station Real-Time Monitor

This launches the **Weather Monitor** screen (See p.3).

Manage Spectrum and Onset Loggers

This activates the **Spectrum/Onset Logger Manager** menu used when communicating with loggers other than WatchDogs. Examples are Spectrum's first-generation Leaf Wetness/Temperature loggers and Hobo Stowaway loggers. This is equivalent to clicking on the **Launch/Readout Spectrum and Onset Loggers** quick-button. (See **Spectrum/Onset Logger Manager**, p.10)



Spectrum/Onset Logger Manager

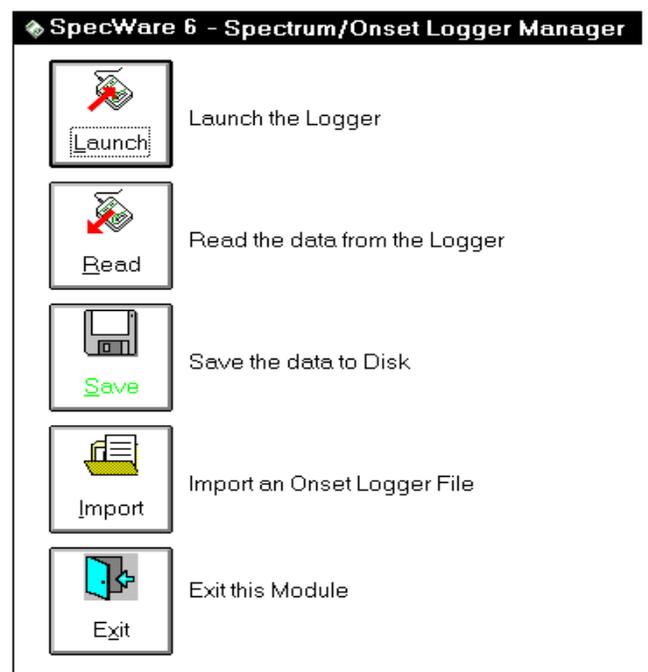
Spectrum's first-generation Leaf Wetness/Temperature loggers and Hobo Stowaway loggers can be launched and downloaded from this screen. To activate this screen, select **Manage Spectrum and Onset Loggers** in the **Logger** menu or click the **Launch/Readout Spectrum and Onset Loggers** quick-button.

Launch the Logger

This establishes a connection with the logger and displays the **Launch Options** screen. (See **Launching Loggers**, p. 12)

Read the data from the Logger

This establishes a connection with the logger and downloads data accumulated since the logger was last launched. (See **Downloading Data**, p. 14)



Save the data to Disk

This allows the user to save data to a **Logger Location** if one is not chosen immediately after downloading a datalogger. (See **Saving Data**, p. 9)

Import an Onset Logger File

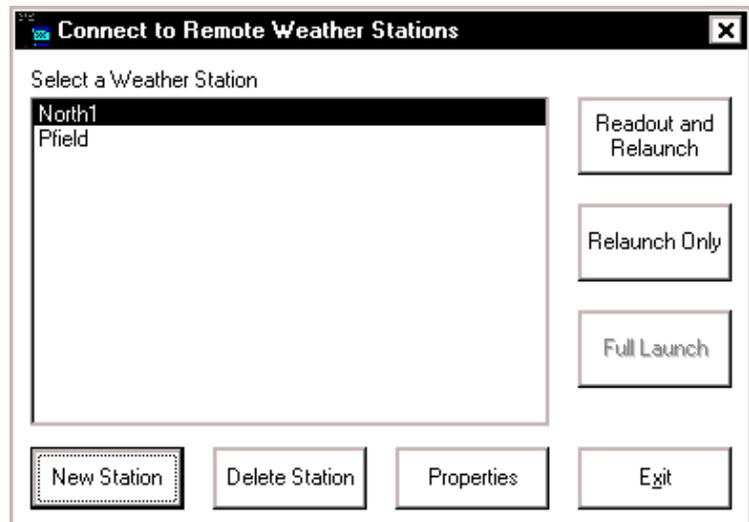
This allows older Onset logger files to be processed by SpecWare. (See **Importing Spectrum/Onset Data**, p. 15)

Exit the Module

Click this button to exit the **Spectrum/Onset Logger Manager** screen.

Contacting Remote Weather Stations

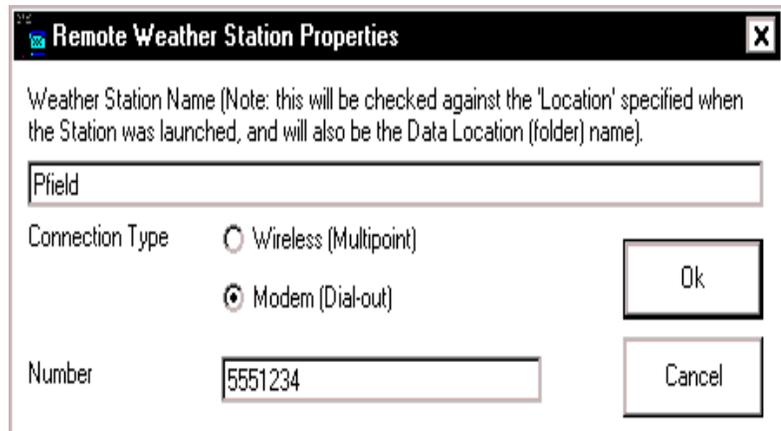
When communicating with a remote weather station via a telephone modem or with multiple stations connected via a wireless multipoint setup, download and launch functions are performed through the **Connect to Remote Weather Station** screen (See **Logger Menu**, p. 10). This screen allows you to download and relaunch a specific station as well as add and delete stations to your network.



It is not possible to bring up the **Launch Options** screen (See **Launching Loggers**, p.12) for remotely connected weather stations. The station is relaunched with the same configuration it had when it was downloaded. To access the **Launch Options** screen, connect your computer directly to the weather station display module with the gray PC cable.

When the station is downloaded, it is automatically relaunched. If you are not interested in downloading data, click **Relaunch Only** to relaunch the station.

The **Remote Weather Station Properties** screen is activated when adding a new station or when the **Properties** button is clicked on the **Connect to Remote Weather Station** screen. The weather station name must match the **Data Identification** name given to the weather station (See **Launching Loggers**, p.12). This will also be the **Logger Location** where the downloaded data will be saved.



The type of connection is selected by clicking in the adjacent circle. If you are using a dial-out modem, enter the phone number in the **Number** text box. When entering a telephone number, be sure to include any additional, preceding digits required by your phone system.

Launching Loggers

With the logger connected to the interface cable, initiate the launch process by using the **Logger** menu or by clicking the **Launch WatchDog Logger** or the **Launch/Readout Spectrum and Onset Loggers** quick-button (See p.7). The **Launch Options** screen will appear. Initially, the screen will display the current **Launch Configuration** (See p.21). Any of the **Launch Configuration** parameters can be changed except whether the data is output in English or metric units. (See **Preferences**, p. 4)

To launch the logger, click on the **Start** button. When the logger is actively reading, the LCD will indicate the logger status. On loggers lacking an LCD, a red LED will flash. (It will flash only dimly every four seconds during the delay period of a delayed launch.) Click the **Cancel** button to exit the **Launch Options** screen without launching the logger.

CAUTION: Clicking the **Start** button erases previously recorded data from the logger. Until **Start** is clicked, that data can be downloaded.

NOTE: **Do not** unplug the logger from the interface cable until SpecWare has indicated that the launch has been completed.

Launch Options
Spectrum Technologies, Inc. - WatchDog S/N 5131 02/18/2002 02:35 PM Model 550 v 2

Data Identification

Measurement Interval Maximum Duration 65 Days

Channel	Port	Enabled	Sensor / Units	Reading
1	A	<input checked="" type="checkbox"/>	Temperature (*F)	
2	B	<input checked="" type="checkbox"/>	Leaf Wetness (LW)	
3	C	<input checked="" type="checkbox"/>	Soil Moist-WM (kPa)	
4	D	<input checked="" type="checkbox"/>	Bar.Pressure (in-Hg)	

Alarm
 (Value)

Wrap around when full (overwrite oldest data)
 Delayed Start

Launch Configuration

Header

The top line of the dialog box gives a description of the logger and its serial number. Neither the description nor the serial number can be changed. The header will also show the current time on your computer. This time will be transferred to the logger when it is launched.

Data Identification

The text in this box can be used to identify the **Logger Location**. Up to 40 characters can be written in this area. The logger location entered will become the default location for saving the data.

Measurement Interval and Maximum Duration

The interval is the amount of time that elapses between measurements. After selecting the interval, the maximum duration (time it will take to completely fill the logger) is calculated and displayed by SpecWare.

Port Enabled

On the WatchDog Data Loggers and the Hobo 8k with external sensor, you can enable or disable the ports by checking or unchecking the appropriate boxes. For WatchDog weather stations, only the external channels can be disabled. The sensors that come standard (including the solar radiation sensor on the 900ET station) are always enabled.

Sensor/Units

These boxes allow you to select which parameter each logger channel will measure. Click on the arrow to display the list of possible parameters. Rain gauges must be assigned to Port A.

NOTE: There are three different soil moisture sensors that can be connected to WatchDog dataloggers. Ensure that the appropriate type of soil moisture sensor has been selected.

Additional Launch Features (See p. 13)

IMPORTANT: After a logger is downloaded, it must be relaunched if continued measurement is desired.

Additional Launch Features

Update

While connected to the computer, the **Update** button will cause the logger to take a reading. It will take about 20 seconds for the reading to appear. If no sensor is connected to a particular port, "N/A" will appear for that port. For the WatchDog (except model 100) and Hobo 8K loggers, the battery status will also be displayed. The battery should be replaced when battery power drops to 25%.

Alarm

The **Alarm** feature is only active with WatchDog Weather Stations. Select the desired channel or parameter in the first field. Indicate in the second field whether the alarm module is triggered when the measured parameter **Goes Above** or **Goes Below** the target value entered in field 3. See the **Alarm Output Module User's Manual** for more details.

Wrap Around

In the **Wrap around when full** box, you can determine how data will be handled if the logger is not downloaded before it reaches its dataholding capacity. Click in this box if you want the logger to write over the oldest data and continue reading new data. For example, if you launch for a 30 day duration, but do not recover the logger until much later, the data will reflect the most recent 30 days. If **Wrap around when full** is not checked, the logger will turn itself off when it is full and await recovery and readout.

Delayed Start

The **Delayed Start** box will appear for those loggers that are capable of using this option. It allows the logger to begin logging at a later, pre-specified time (up to 45 days after launching your logger). Insert the date in the first 3 boxes in the format mm/dd/yy. Insert the starting time in the next 3 boxes. For loggers with an LCD display, the letter “d” will appear followed by the number of minutes until launch. Loggers with an LED will flash dimly every four seconds until the delay has expired and the logger begins logging. The time uses a 12-hour format; you must enter “am” or “pm”.

NOTE: WatchDog Weather Stations are not capable of using the **Delayed Start** feature.

Downloading Data

Establish a connection between the datalogger and your computer. For mini data loggers and data shuttles, this is done with the gray serial cable. For weather stations, a connection can be made with the gray cable, a 100- or 200-ft direct connect cable, a short-range modem pair or with a remote, wireless connection.

Click the **Readout WatchDog** quick-button or **Get WatchDog Data** from the **Logger** menu to contact the WatchDog logger and initiate the download sequence. For Spectrum/Onset loggers, click the **Launch/Readout Spectrum and Onset Loggers** quick-button or **Manage Spectrum and Onset Loggers** from the **Logger** menu to get the **Spectrum/Onset Logger Manager** screen (See p. 10). On this screen, select the **Read the data from the Logger** button.

As the logger is downloading, a **SpecWare Progress** dialog box will be visible. When the data transfer is complete, a dialog box will appear indicating that readout and translation is complete. You may then disconnect the logger from the serial cable.

SpecWare will automatically prompt you to save the logger data. (See **Saving Data**, p. 15) All new dataloggers require that you create a new **Logger Location** the first time the logger is read out. Once this **Logger Location** is established, subsequent logger data readouts can be appended to this **Logger Location**. For weather stations connected via telephone modem or a multi-point wireless system, the data will automatically be downloaded into the **Logger Location** with the same name entered in the **Data Identification** field of the logger header (See **Launching Loggers** p.12 and **Contacting Remote Weather Stations** p. 11).

After downloading WatchDog loggers, the data will automatically be displayed in a graph with the logger reading on the vertical scale and time on the horizontal scale. A graph does not automatically appear after downloading Spectrum/Onset loggers.

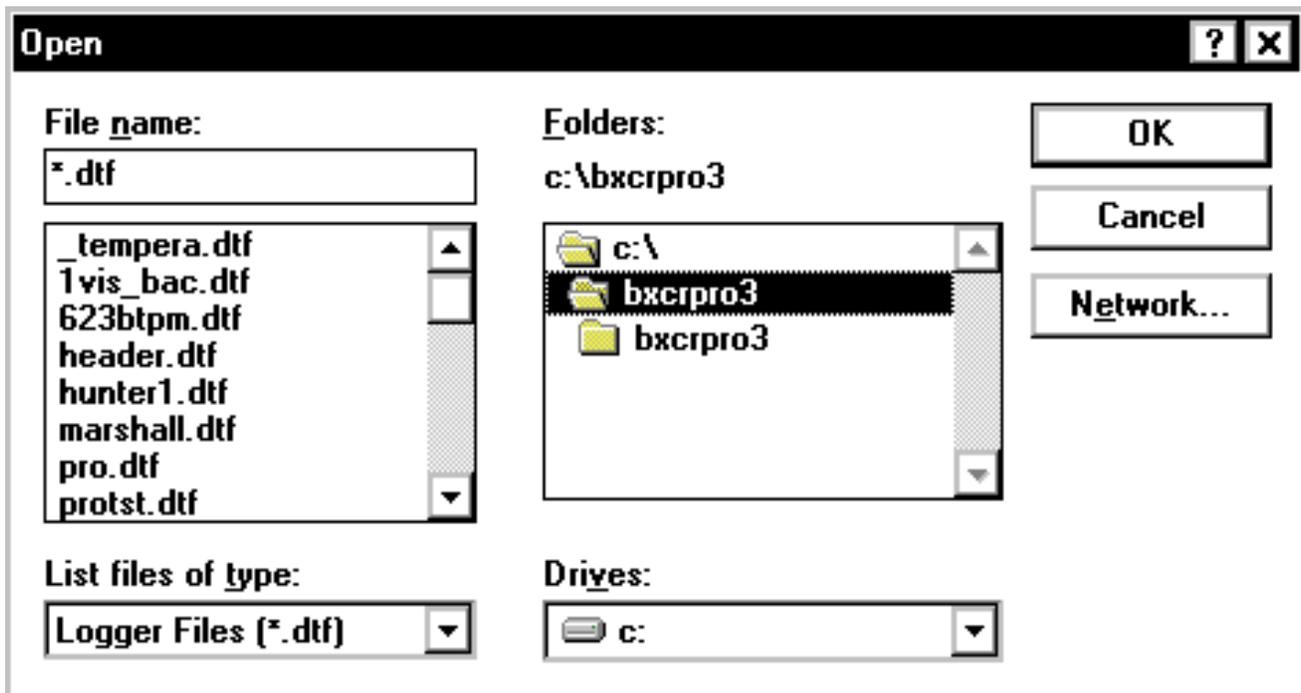
IMPORTANT: Until the logger is relaunched, the data remains on the logger and can be downloaded again. Once you have retrieved data, you must relaunch the logger to continue making measurements. Clicking **Start** to relaunch the logger erases the previously recorded data from the logger.

Importing Spectrum/Onset Data

SpecWare is able to import and process many files that were initially downloaded with Boxcar software. Specware is not able to handle files downloaded from the Hobo Pro series, Optic Stowaway loggers and Hobo multichannel loggers.

Select **Manage Spectrum and Onset Loggers** in the **Logger** menu or click the **Launch/Readout Spectrum and Onset Loggers** quick-button to bring up the **Spectrum/Onset Logger Manager** (See p.10) and click the **Import an Onset Logger File** button. A screen will appear that allows you to locate and select the desired files. Click on **OK** to transfer the file to the Specware directory. You will then be prompted to select the **Logger Location** where the data will be saved. You also have the option of creating a new **Logger Location**. The data will be displayed in text form in the **Spectrum/Onset Logger Manager** menu. To view the data in graphical form, close or minimize the **Spectrum/Onset Logger Manager** menu and open the file from the **File** menu. (See **Opening Files**, p. 9 and **View and Print Menus**, p. 16)

CAUTION: When importing data files, it is important to import the files in chronological order so they can be properly appended by SpecWare.



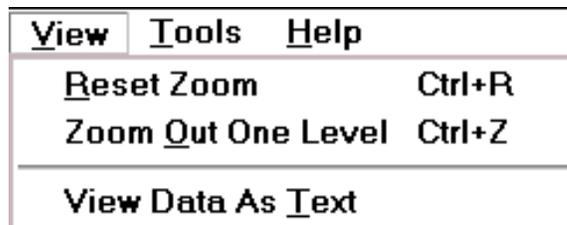
View and Print Menus

Viewing Your Data as a Graph

Upon downloading data or opening an existing file, a graph will be displayed. The graph legend will be shown in an information box to the right of the toolbar. As the cursor is moved across the graph, the time and data values are displayed at the bottom of the screen. When opening an existing file, checking **Use Minimum Interval** and selecting only one month results in the minimum interval being used for the graph (See **Preferences** p. 4 and **Viewing Graphs**, p. 17).

Viewing Your Data as Text

Click on the **View Data as Text** quick-button or on the **View Data as Text** command in the **View** menu. WordPad or Notepad (depending on what is available on your computer) will overlay the graph and display the numerical data for that graph.

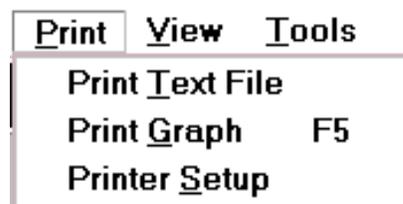


Printing Your Graph

Click on the **Print Graph** command under the **Print** menu to print the graph displayed on the screen.

Printing Your Data as Text

Click on the **Print Text File** command under the **Print** menu on the Graph/Data Screen to print the numerical data for the graph displayed on the screen.

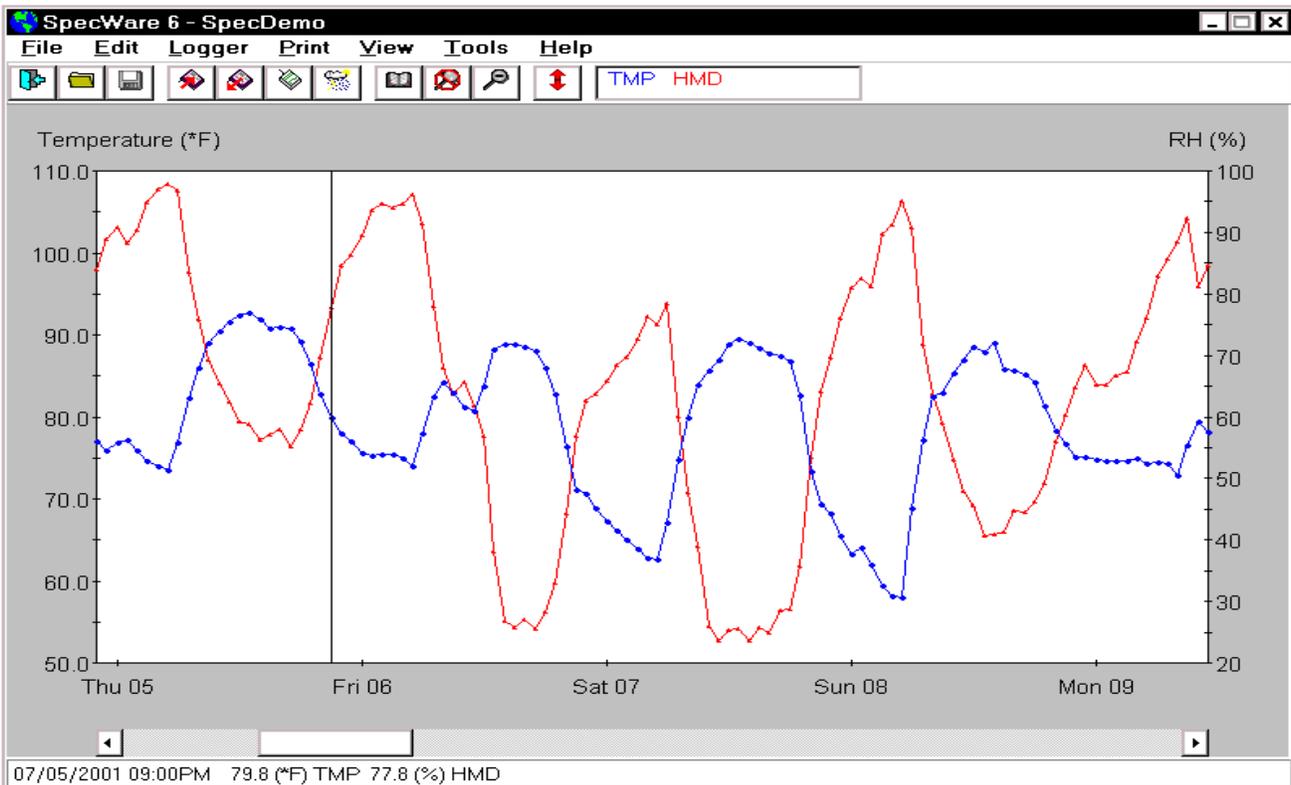


NOTE: The data displayed using the View or Print the Data as Text commands may not be the raw data as taken by the data logger. The data displayed has been adjusted to fit uniform time periods for the purpose of graphing. (See **Data Redisplay Intervals**, p. 4 and **Using Your Data in Other Applications**, p. 9)

Viewing Graphs

Zooming in on any Plot Selection

You can zoom in on any section of the plot. This function is particularly useful when the plot encompasses a large data set. Note that when the cursor is within the graph box, a vertical Tracker Bar appears. As the Tracker Bar is repositioned on the graph, the corresponding date, time, and associated data values appear in the status bar below the graph. To zoom in on a particular section of a graph, position the cursor at one end of the time interval of interest. While holding down the left mouse button, drag the Tracker Bar to the other end of the time interval. After releasing the mouse button, the software will display a graph of the chosen region.



Zooming Out One Level

To return to a previous graph after zooming in on your graph, click on the **Zoom Out** quick-button (magnifying glass without the red circle) or the **Zoom Out One Level** command in the **View** menu. Each time this button is clicked, the screen will return to the previous screen developed during the zooming-in process.

View	Tools	Help
Reset Zoom		Ctrl+R
Zoom Out One Level		Ctrl+Z
View Data As Text		

Returning to the Original Plot View

After zooming in on the data displayed in the graph screen, click on the **Reset Zoom** quick-button (magnifying glass with red circle) or the **Reset Zoom** command in the **View** menu to return to the original graph.

Copying Graph

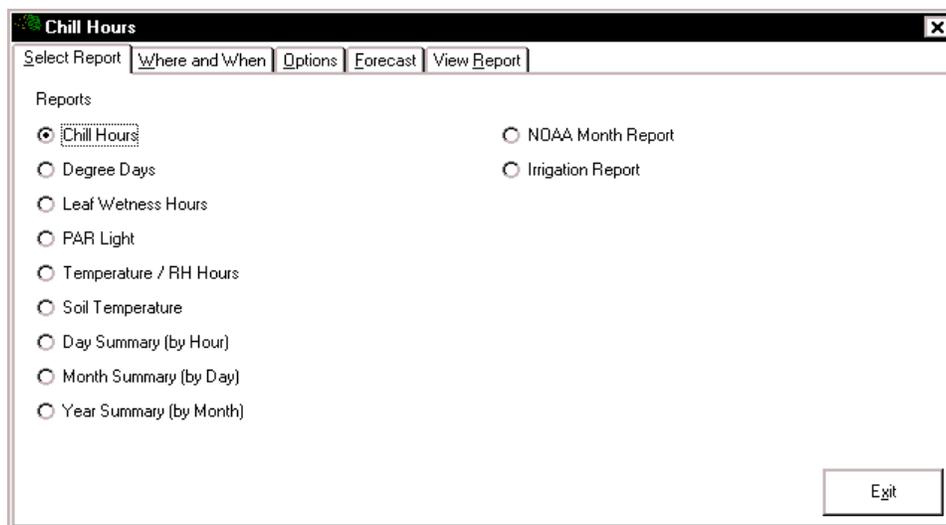
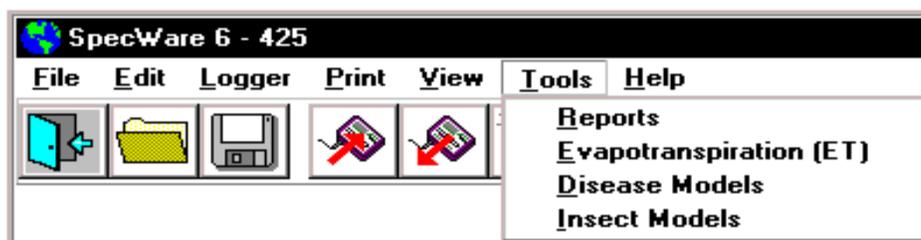
To copy the graph as a bitmap for use in other applications, select **Copy Graph** from the **Edit** menu.

Edit	Logger	Print	View	Tools
Copy Graph to Clipboard				Ctrl+C

Tools

After a **Logger Location** is opened, the **Tools** option will appear. Clicking this option will show the available Report, Evapotranspiration, Disease, and Insect options.

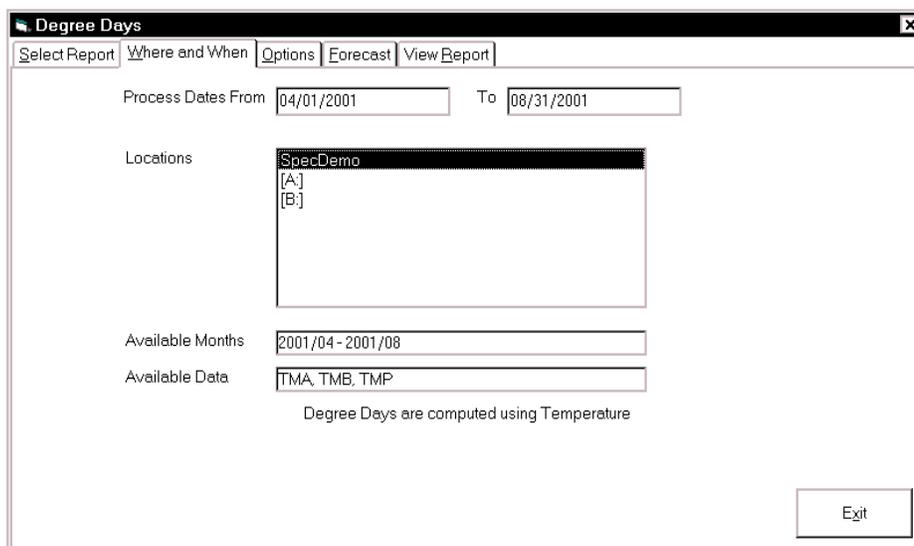
The **Reports** screen has 5 tabs; **Select Report**, **Where and When**, **Options**, **Forecast** and **View Report**.



Select Report
This screen allows the user to select the Report of interest.

Where and When

This screen allows you to produce reports for **Logger Locations** other than the one currently open. Initially the default values for the location and process dates are from the file that is currently open. To generate a report for another location or date, select a new **Logger Location** and enter the desired time period in the **Process Dates** boxes. The calculations can begin and end on any date within a single year. SpecWare will not use data outside the chosen time period. To generate a report that begins in one year and ends in the next (e.g. Chill Hours) you must calculate each year separately and manually sum the results.



IMPORTANT: For your chosen **Location**, make sure the **Process Dates** are included in the **Available Months** and that the **Available Data** include the appropriate parameters needed for the chosen **Report** or that are needed to drive the chosen disease or insect model.

Options

This screen allows modification of parameter ranges and boundary conditions specific to the Report, Disease, or Insect Model of interest. Environmental inputs may include temperature, humidity and leaf wetness limits. It may also be necessary to enter relevant biofix dates to indicate some visible stage of plant,

disease, or insect development. A spray date may be required to update infection potential calculations from that point on. If a generally accepted value for a parameter exists, it is shown as the default. Consult your State Agricultural Extension Service for assistance in determining the appropriate values for your area. Once an appropriate value for each of the parameters is determined, click on **Save Parameters** to avoid having to re-enter the values the next time the model is used.

		Low - Temperature - High		Hours above 90% RH	Rainfall	Wet Leaf Hours
<input checked="" type="checkbox"/>	08/31/2001	65	95	8	0.0	4
	09/01/2001	70	100	10	0.0	6
	09/02/2001	65	95	12	1.5	10
	09/03/2001					
	09/04/2001					
	09/05/2001					
	09/06/2001					
	09/07/2001					

Forecast

Forecast data is required for some disease and insect models. It is possible to include forecast data for some other reports and predict environmental conditions up to one week in the future. It is also possible to enter forecast data for the present date if

data for the entire day was not logged. Check the **Forecast Today** box and enter the expected values for today's **Low** and **High** temperature, **Hours above 90% RH**, **Rainfall** amount and **Wet Leaf Hours**. Likewise, enter a forecast for the next seven full days by entering values for these parameters on the line next to the appropriate date. When the report is viewed, an asterisk (*) will appear next to the forecasted dates to distinguish predictions based on forecasts from those based on actual measured data.

View Report

On this screen, Report parameters or the results from Disease or Insect models are displayed. If several different university models exist for a disease or insect, they are shown in separate columns on the same report.

You can save the current report by clicking the **Write Text File** button. In the **Save As** screen, type a filename and select the directory to use.

Date	H-L-A	Cum	Integral	Cum
08/29	18.8	2748.0	20.9	2702.5
08/30	14.6	2762.5	13.9	2716.4
08/31	30.0	2792.5	30.0	2746.4
09/01*	35.0	2827.5	35.0	2781.4
09/02*	30.0	2857.5	30.0	2811.4

* Future date; results based on entered forecast temperatures

Degree Days (using high-low-average temperature): 2857.5
 Degree Days (using integrated (hourly) temperature): 2811.4
 H-L-A = High-Low-Average
 Int = Integrated

Base Temperature 50.0
 Upper Temperature 86.0
 Development Target 200.0

Clicking **Print** will cause the report to be sent directly to the printer.

The **Copy to Clipboard** button allows the report to be copied and pasted into another document that has, for example, been created in a word processing or spreadsheet program.

Reports

Date	Hours	Cum Hours	
01/04	22.3	33.3	
01/05	24.0	57.3	
01/06	19.5	76.8	
01/07	18.8	95.5	
01/08	23.0	118.5	
01/09	12.0	130.5	
01/10	8.5	139.0	
01/11	16.0	155.0	
01/12	8.5	163.5	
01/13	12.3	175.8	
01/14	24.0	199.8	
01/15	18.0	217.8	Reached Minimum Chill Hours
01/16	9.0	226.8	
01/17	20.0	246.8	
01/18	17.8	264.5	

Chill Hours/Degree Days

SpecWare calculates the total chill hours or degree days accumulated. This report requires temperature data measured by the thermistor inside the WatchDog. External temperature sensors cannot be used to generate these reports. (See **Soil Temperature**, p. 21)

Three methods are used to calculate degree days. The High-Low-Average method considers only the high and low temperatures for the day to compute the total number of degree days acquired. This computation always shows up in the GDD Report. In addition to the High-Low average, either the Single Sine or Actual Degree Days is also displayed in the GDD report. The Single Sine method uses the day's maximum and minimum temperatures to generate a sine curve. The area between this curve and the lower threshold temperature is the GDD. The Actual Degree Days method employs a calculation similar to the High-Low but is done on the hourly values rather than on daily values.

Date	H-L-A	Cum	Integral	Cum
05/03	23.0	478.5	17.8	608.8
05/04	21.9	500.4	19.1	627.8
05/05	23.7	524.1	21.4	649.3
05/06	22.7	546.8	21.0	670.3
05/07	22.7	569.5	22.2	692.5
05/08	3.8	573.3	8.2	700.7

Degree Days (using high-low-average temperature): 573.3
 Degree Days (using integrated (hourly) temperature): 700.7
 H-L-A = High-Low-Average
 Int = Integrated

Base Temperature 50.0
 Upper Temperature 86.0
 Development Target 200.0

Leaf Wetness Hours

SpecWare calculates the total leaf wetness hours accumulated between an upper and lower temperature limit. This report requires leaf wetness and temperature data.

Date	Hours	Cumulative
05/02	9.3	248.0
05/03	2.3	250.3
05/04	10.8	261.0
05/05	10.0	271.0
05/06	8.5	279.5
05/07	3.3	282.8
05/08	0.0	282.8

Total Leaf Wetness Hours: 282.8

Leaf Wetness hours are a sum of all wetting hours during the day.

Base Temperature 50.0
Upper Temperature 120.0
Wetness Threshold 6.0

Date	Hours mol/m2d	A-Hours mol/m2d	B-Hours mol/m2d	C-Hours mol/m2d
01/17	2.3	4.4	2.3	4.4
01/18	2.0	4.5	2.0	4.5
01/19	4.5	9.0	9.8	36.2
01/20	6.0	16.2	12.5	43.6
01/21	6.3	17.8	9.0	21.8
01/22	0.0	1.4	11.3	34.7
01/23	0.0	3.3	6.8	20.7
01/24	6.5	18.8	8.3	16.5
01/25	4.5	6.8	12.3	45.0
01/26	6.0	19.3	12.3	44.2
01/27	6.3	16.6	12.5	47.5
01/28	4.0	5.8	12.0	48.1
Total	156.3	448.8	241.0	766.0

PAR Light Threshold: 200.0

PAR Light

SpecWare calculates photosynthetically active radiation (PAR) received. Reported parameters are total hours of accumulated PAR above a user-determined minimum light intensity and total

Temperature / RH Hours

SpecWare calculates the hours of relative humidity that occur above an optional minimum percent RH and between a user-specified base and upper temperature limit. The report shows the sum of hours in which both the temperature and relative humidity conditions were satisfied.

Date	Hours	Cumulative
05/06	11.0	422.0
05/07	7.8	429.8
05/08	5.5	435.3
05/09	11.0	446.3
05/10	12.3	458.5
05/11	8.5	467.0
05/12	10.3	477.3
05/13	6.3	483.5
05/14	0.8	484.3

Total High Humidity Hours: 484.3

Base Temperature 50.0
Upper Temperature 120.0
Relative Humidity Threshold 80.0

Date	High	Low	Mean DgDay
05/01	66.3	62.2	64.1
05/02	67.7	64.2	65.8
05/03	69.0	66.3	67.5
05/04	69.7	67.0	68.1
05/05	71.8	67.7	69.5
05/06	73.9	69.0	71.2
05/07	74.6	69.7	72.2
05/08	76.0	71.8	73.6
05/09	75.3	71.8	73.7
05/10	74.6	71.1	73.0
05/11	74.6	58.0	72.2
Total			604.9

Base Temperature 50.0
Upper Temperature 86.0

Soil Temperature

SpecWare reports the high, low, and mean soil temperature for each day. Integrated hourly degree days are calculated for each day using the user-specified lower and upper temperature limits.

Day, Month, or Year Summary

SpecWare summarizes the available data by hour for any single day, by day for any single month, or by month for any single year selected in the **Where and When** screen. For each summary, the temperature limits for calculating degree days and chill hours can be specified in the **Options** screen. The lower leaf wetness threshold and temperature range for calculating the hours of leaf wetness can also be specified.

Day Summary (by Hour) reports mean hourly values of temperature, relative humidity and PAR light, hourly accumulation of degree days, chill hours and rainfall and the length of time the leaves were wet during the hour. High and low temperatures for the time period of interest, as well as the time they occurred, are given at the bottom of the report. Only one day's data can be displayed.

Month Summary (by Day) reports the daily mean temperature, high and low RH, high and low temperatures and the time they occurred, daily accumulation of degree days, chill hours and rainfall and the length of time the leaves were wet during the day. Only one month's data can be displayed.

Year Summary (by Month) reports the monthly mean temperature, high and low temperatures and the day they occurred, monthly accumulation of degree days, chill hours, leaf wetness hours and rainfall, the length of time the leaves were wet during the month and the number of days that rain fell during the month. High and low temperatures for the year and the day they occurred are given at the bottom of the report.

Date	Temperature		Degree Days	Chill Hours	RH High	RH Low	Wet Hours	Rain-Fall			
	High	Time							Low	Time	Mean
25	75.3	02:30p	45.9	12:00a	58.0	8.3	4.8	97	25	0.0	0.00
26	76.7	02:45p	40.0	05:45a	56.6	9.5	10.3	100	21	0.3	0.00
27	76.7	12:45p	37.7	06:00a	55.7	8.7	8.8	100	21	7.3	0.17
28	75.3	02:00p	43.7	12:00a	57.5	8.2	7.5	100	22	1.3	0.00
29	78.1	01:45p	40.0	05:45a	57.2	9.9	9.5	100	21	0.5	0.00
30	82.3	02:45p	40.8	05:45a	60.3	12.1	9.0	100	21	1.5	0.00
Total						233.9	205.0			122.3	7.34

Calculation Parameters:
 Degree Day Base Temperature 50.0
 Upper Bound Temperature 86.0
 Chill Hours Maximum Temperature 50.0
 Leaf Wetness Minimum Temperature 50.0
 Maximum Temperature 120.0
 Sensor Threshold 6.0

NOAA Report

SpecWare summarizes weather station data in a format approved by the National Oceanic and Atmospheric Association. The NOAA report includes the daily mean temperature, high and low temperatures and the time they occurred, daily accumulation of integrated-hourly degree days, daily solar radiation in average watts meter⁻² day⁻¹, daily mean RH, daily rainfall, and the daily mean wind speed and maximum wind gust.

The **Options** screen is used to specify the temperature limits for calculating degree days. Only one month's data can be displayed.

Date	Temperature		Degree Days	Solar Rad	RH Mean	Rain-Fall	Wind				
	Mean	High					Time	Low	High	Speed	Gust
17	43.4	51.0	03:00p	34.6	05:00a	0.0	214.3	86	0.00	3.8	15.0
18	44.1	53.1	01:45p	37.7	12:00a	0.2	257.5	90	0.01	1.7	9.0
19	46.1	60.1	03:30p	30.6	05:30a	2.5	234.3	81	0.00	2.5	15.0
20	47.9	58.7	02:45p	33.0	06:00a	2.2	278.7	88	0.12	4.6	18.0
21	55.1	64.9	04:30p	47.4	06:00a	5.4	198.7	98	0.02	5.1	21.0
22	53.4	67.7	04:30p	47.4	09:45p	3.9	251.2	100	0.72	8.5	29.0
23	46.2	51.7	04:30p	38.5	12:00a	0.3	293.9	85	0.17	7.5	24.0
24	46.8	58.0	03:00p	35.4	06:15a	2.0	294.6	72	0.00	5.5	19.0
25	51.7	65.6	02:15p	35.4	06:00a	5.4	294.0	65	0.00	2.3	11.0
26	57.0	75.3	11:45a	42.3	04:00a	8.6	272.2	64	0.00	2.7	15.0
27	50.9	56.6	07:15a	46.7	12:00a	1.4	147.2	88	1.50	7.1	15.0
28	50.8	60.1	05:00p	45.9	04:30a	2.4	243.1	79	0.00	5.8	15.0
29	55.0	64.9	03:00p	43.7	05:45a	5.8	185.8	63	0.06	6.3	16.0
30	55.8	68.4	04:30p	40.8	05:45a	7.8	269.4	57	0.00	3.1	19.0
Total						133.3				5.49	

Irrigation Report

A summary of the daily mean soil moisture readings as well as the amount of time the soil moisture tension was above or below the user-specified soil moisture range. If data from a state sensor (item# 6451) is available, the last 2 columns will report the length of time the irrigation system was pressurized and how many gallons of water were applied to the field. The soil moisture range and irrigation flow rate are set in the **Options** tab (see **Options** p. 30).

Date	Soil Moisture A			Soil Moisture B			Irrigation	
	Mean	Above	Below	Mean	Above	Below	Hours	Gal
10/26	0.2	0.0	24.0	1.7	0.0	24.0	7.5	7.5
10/27	10.1	0.0	10.3	7.9	0.0	13.5	0.0	0.0
10/28	18.9	0.0	0.0	13.7	0.0	0.0	0.0	0.0
10/29	25.1	0.0	0.0	16.8	0.0	0.0	0.0	0.0
10/30	33.0	0.0	0.0	18.8	0.0	0.0	0.0	0.0
10/31	40.0	0.0	0.0	20.3	0.0	0.0	0.0	0.0
Total		48	235		0	271	120	120

Soil Moisture columns:
Mean is the daily average Soil Moisture sensor value.
Above is the number of hours the sensor read above the upper threshold.
Below is the number of hours the sensor read below the lower threshold.

Lower Moisture Threshold 10.0
Upper Threshold 60.0
Irrigation Flow Rate (Gal/Hr) 1.0

Evapotranspiration

The first launch of a 900ET Weather Station will enable the **Evapotranspiration (ET)** report option in the **Tools** menu.

Where and When

This screen allows you to produce reports for **Logger Locations** other than the one currently open. (See p. 18)

Crops

This screen allows you to build reports for multiple crops. To see what crops are already entered, click the triangle to expand the **Crops** field. After choosing a crop, the data that has been entered for that crop can be seen in the **Begin Dates - K Factors** field. To add a crop, left-click the **Add** button under the **Crops** field, enter the crop name, and click **OK**. Enter the *k* factor and first date that factor is to be used by

The screenshot shows the 'ET - Evapotranspiration' window with the following fields and buttons:

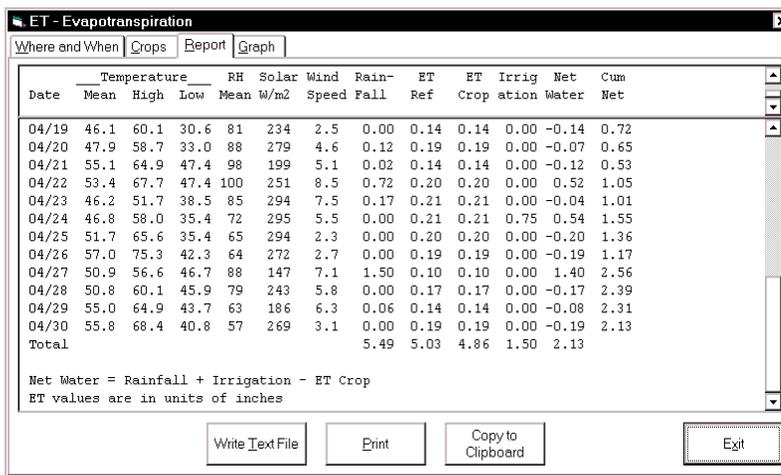
- Crops**: A dropdown menu with 'Reference' selected, and 'Add' and 'Delete' buttons below it.
- Begin Dates - K Factors**: A large empty box with 'Add' and 'Delete' buttons below it.
- Irrigation Dates and Amounts**: A large empty box with 'Add' and 'Delete' buttons below it.
- Start Date**: A text input field with a note: '(This will override the "Where and When" Start Date)'. Below it is a **Plant Date** text input field.
- Exit**: A button in the bottom right corner.

clicking the **Add** button under the **Begin Dates - K Factors** field. Multiple *k* factors and begin dates can be entered for each crop, allowing the user to track crop water status as plant water requirements change. The ET report can display the results of applied irrigation for each crop. Click the **Add** button under the **Irrigation Dates and Amounts** field and enter the irrigation date and amount of water applied.

To change or delete data entered for any crop, highlight the data to be changed and click **Delete**. Re-enter new or updated data as needed by using the **Add** button.

Report

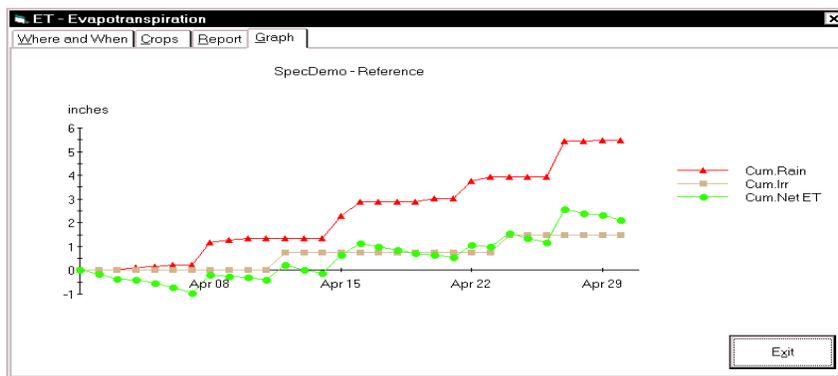
The **Report** screen lists the daily values for the parameters used to calculate ET. Daily **Reference ET** is displayed and the **Crop ET** is calculated using the *k* values entered on the **Crops** screen. Irrigation events are displayed as entered on the **Crops** screen and from the values for **Irrigation**, **Crop ET**, and **Rainfall**, the daily **Net Water** increase or decrease and the **Cumulative Net** water increase or decrease are displayed.



Date	Temperature			RH	Solar W/m2	Wind Speed	Rain-Fall	ET Ref	ET Crop	Irrig ation	Net Water	Cum Net
	Mean	High	Low									
04/19	46.1	60.1	30.6	81	234	2.5	0.00	0.14	0.14	0.00	-0.14	0.72
04/20	47.9	58.7	33.0	88	279	4.6	0.12	0.19	0.19	0.00	-0.07	0.65
04/21	55.1	64.9	47.4	98	199	5.1	0.02	0.14	0.14	0.00	-0.12	0.53
04/22	53.4	67.7	47.4	100	251	8.5	0.72	0.20	0.20	0.00	0.52	1.05
04/23	46.2	51.7	38.5	85	294	7.5	0.17	0.21	0.21	0.00	-0.04	1.01
04/24	46.8	58.0	35.4	72	295	5.5	0.00	0.21	0.21	0.75	0.54	1.55
04/25	51.7	65.6	35.4	65	294	2.3	0.00	0.20	0.20	0.00	-0.20	1.36
04/26	57.0	75.3	42.3	64	272	2.7	0.00	0.19	0.19	0.00	-0.19	1.17
04/27	50.9	56.6	46.7	88	147	7.1	1.50	0.10	0.10	0.00	1.40	2.56
04/28	50.8	60.1	45.9	79	243	5.8	0.00	0.17	0.17	0.00	-0.17	2.39
04/29	55.0	64.9	43.7	63	186	6.3	0.06	0.14	0.14	0.00	-0.08	2.31
04/30	55.8	68.4	40.8	57	269	3.1	0.00	0.19	0.19	0.00	-0.19	2.13
Total							5.49	5.03	4.86	1.50	2.13	

Net Water = Rainfall + Irrigation - ET Crop
ET values are in units of inches

Buttons: Write Text File, Print, Copy to Clipboard, Exit



Graph

The **Graph** screen is a pictorial display of pertinent information using the values from the **Report** screen.

Troubleshooting Laptop Computers

There are two issues that arise with laptop computers that make it difficult for Specware to communicate with WatchDog data loggers and weather stations. This will result in an inability to locate the logger (see **Identifying the Correct Com Port** p. 6) or to sustain a connection. In the first case, you will get a message such as “No logger was found on port COM 1.” In the second case, you will get a message such as “WatchDog Logger Timeout”. In addition to the troubleshooting suggestions on page 42, there are 2 other possible remedies you can try.

PMOn/Pmoff

When Specware6.0 is installed, 2 additional files are included in the Specware directory (located at C:\Program Files\Specware or C:\Specware) that can turn the laptop power management feature on or off. These files are named **PMOn** and **PMOff** respectively. Turning off the power management feature may facilitate communication through the RS-232 port. Read the **Power Management Instructions.txt** for instructions on how to use this feature.

Note: This patch may not work with Windows 2000 ME, NT or XP. It is not advisable to run the patch if you are not able to back up your registry.

USB-RS232 Serial Port Adaptor

With newer laptop computers, an RS-232 serial port may not be available. Where both a USB and RS-232 serial port are available, the USB port is the more robust of the two. If you can't establish communication with the serial port, a USB-RS232 serial port adaptor is the best option. These adaptors are available at electronics stores. The adaptor will require a driver to be installed on your machine and will work out of a different Com Port than the RS-232 port.

Disease and Insect Models

Optional Disease and Insect Models

SpecWare software includes models to predict infection events for the following diseases and for insects. These models are provided FREE for a 30 day evaluation. If the user desires continued use of any of the disease or insect models after the evaluation period, or if any model was purchased initially with SpecWare, the user must contact Spectrum Technologies, Inc. for a registration number.

Before calling Spectrum, click on the **Help** button on the main toolbar. Then click on "About SpecWare" A dialog box will appear with **both** the Serial Number and Registration Number. Call, fax, or e-mail Spectrum with this information. Currently, the optional disease and insect models are as follows:

	Catalog #
Apple Scab	3656 AS
Apple Sooty Blotch	3656 SB
Black Rot	3656 BR
Botrytis	3656 BT
Brown Patch	3656 BP
Cherry Leaf Spot	3656 LS
Dollar Spot	3656 DS
Downey Mildew	3656 DM
Early Blight	3656 EB
Fire Blight	3656 FB
Late Blight	3656 LB
Powdery Mildew	3656 PD
Pythium Blight	3656 PT
Tom-Cast	3656 TC
Insects	3656 IN

For detailed descriptions of each model, refer to the **SpecWare 6.0 Disease and Insect Guide**.

Commonly Asked Question

Q. When selecting *Launch* or *Readout*, the software gives the message “Can’t connect to data logger” or “WatchDog Logger Timeour”. What’s wrong?

A. This is probably a serial port problem:

1. Make sure that the interface cable is pressed all the way into the jack on the logger.
2. The interface cable must be connected to a working serial port. If the serial port was recently used for a network mouse, the port may still be configured as such. When removing a mouse, reboot your system.
3. If the logger still fails to connect, the battery could be low. Replace the battery and try to connect again.
4. Set and/or test the communications port settings through the **Preferences** screen in the **File Menu**.
5. Check if software for any external devices (such as a palm pilot) has been installed on your hard drive.
6. If you are using a laptop computer, the problem may be caused by the machine’s power management feature (see **Troubleshooting Laptop Computers** p. 40).

Help is available under
Help Topics during run time.

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IMPORTANT: The disease and insect models used by SpecWare have been validated by state university plant pathologists for the regions of the United States in which they were developed. To determine the validity and appropriate use of a particular disease model for your specific growing region, please consult with your State Agricultural Extension Service.

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