Temprecord for Windows
&
Temprecord for Palm

User's Manual

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Contents

Introduction

Welcome to the world of inexpensive, rugged, and accurate temperature and humidity logging. The **TEMPRECORD** range of loggers opens up new opportunities in the field of temperature and humidity logging and verification.

This manual describes how to use the **TEMPRECORD** logger, **TEMPRECORD READER INTERFACE**, the traditional **TEMPRECORD FOR WINDOWS** program, and your IBM-compatible PC to read the **TEMPRECORD** loggers and generate effective and professionally presented data from the results. The introduction and use of the **TEMPRECORD** Relative Humidity & Temperature logger and **TEMPRECORD READER INTERFACE** for the Palm PDA also features in this manual.

We recommend that you first take the time to read this manual through in its entirety before installing the **TEMPRECORD** program. This will minimise the chances of problems later on. In the unlikely event you do have problems, see the section 'When Things Go Wrong', on page 30.

The manual tries to present topics in roughly the same order as you will require them. It first deals with installing **TEMPRECORD FOR WINDOWS,** then setting up a **TEMPRECORD** logger to record temperature samples, starting and stopping the logger, reading the logged data, and finally viewing and printing the data.

The information within this manual is subject to revision and Temprecord International reserves the right to make improvements to the operation and/or specifications without notice. Significant changes to the software program will usually be detailed in the file README.TXT, found in the **TEMPRECORD FOR WINDOWS** program. The latest software version is available for download from the **TEMPRECORD** web site at http://www.temprecord.com

The Temprecord Logger Range

There are five main types of Temprecord temperature data loggers.

- The 'Single Use' model has a capacity of 7,937 samples (Inland) or 32,513 samples (Export). It is started and stopped by snap-off tabs and is not reusable.

- The 'Econolog' model provides an **economy option** with the same features as the 'Multi-trip' MKIII. It has an accuracy specification to within 0.5°C.

- The 'Multi-trip' model has a capacity of 7,937 samples, is started by a hand-held switcher, by pressing a button, or by the Temprecord program. It can be re-used.

- The 'Scientific' model has a capacity of 32,513 samples, is started by a hand-held switcher, by pressing a button, or by the Temprecord program. It can be re-used. The Scientific model also has a wider operating temperature range.

- The 'RH' model has a total capacity of 32,513 samples. It may record relative humidity, or temperature, or a combination of both.

Features

Note that all logger specifications are subject to improvement and change. Please consult the relevant specification sheet for current data, or visit http://www.temprecord.com.

The **TEMPRECORD** logger range has been enhanced and released as the **MK III TEMPRECORD** logger range of models. The Mk III logger contains many additional features, including:

- Programmable lower and upper temperature limits.

- LED indication of whether any logged sample has exceeded the preset temperature limits.

- Ability to start at a predetermined time and date.

- Faster data download (when used with the associated Mk II Reader Interface).

- Loop overwrite option, where the oldest samples are overwritten when the logger fills.

- The ability to use a button on the logger to insert event markers into the sample record.

- Starting and stopping with a button on the logger (Econolog, Multi-trip and Scientific models only).

- The option to prevent starting and stopping with the switcher or the button.

- Safe range entry option, where the samples are not checked against the limits until the temperature has been within the programmed limits for a certain number of samples.

- Non-volatile memory storage of recorded data (MKIII only) that may (in most cases) be recovered after the internal battery has failed.

Versions 3.28 and later of **TEMPRECORD FOR WINDOWS** support both the original **TEMPRECORD** Mk I and Mk II loggers and the current Mk III logger. Previous versions of **TEMPRECORD FOR WINDOWS** are not compatible with the newer Mk III loggers and the Relative Humidity RH logger.

Mk III loggers require version 3.28 or later of the **TEMPRECORD FOR WINDOWS** software. If a previous version of the software is used with these loggers, an error ('Logger is incompatible') is returned.

NOTE: The TEMPRECORD **data logger is a monitoring device only. It does not control, nor does it regulate temperature or humidity.**

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Installing the Temprecord Program

The instructions following assume that you have received the program in the form of the 3.5-inch installation diskette. If you have downloaded TEMPRECORD FOR WINDOWS **from the Internet, you will need to generate an installation disk image first as described in the section at the end of this chapter on page 5.**

In order to install and run the **TEMPRECORD FOR WINDOWS** program you will need an IBM®-compatible computer preferably with a minimum of 32MB RAM and a Pentium processor running Microsoft Windows 95/98/2000 or NT.

You will have received the following in your **TEMPRECORD** Reader Interface package:

- one copy of this manual

- one 3.5 inch floppy diskette

- one **TEMPRECORD** Reader Interface and attached cable

The diskette contains the **TEMPRECORD FOR WINDOWS** program. The **TEMPRECORD** Reader Interface plugs into your computer and in conjunction with the **TEMPRECORD FOR WINDOWS** program described in this manual, allows you to program and read your **TEMPRECORD** loggers.

The first step is to install the program. The following instructions are for the 'default' installation, which assumes that:

- your diskette drive is drive A:

- your hard disk is drive C:

- you want the **TEMPRECORD FOR WINDOWS** program to be placed in a subdirectory (folder) on your hard disk called C:\TRW

Unless you have good reason to change these defaults, we recommend you stick with them. If you already have **TEMPRECORD** for DOS installed on your computer, installation of **TEMPRECORD FOR WINDOWS** will not affect that program, and you can continue to use it if you wish.

If you are installing version 3.18, or later, on a computer which already has **TEMPRECORD FOR WINDOWS** installed, you can either install to a different folder or the same place as the existing program. If you choose to install it to the same place as the existing **TEMPRECORD FOR WINDOWS** installation, the existing version will be overwritten.

Installing under Windows 95/98/2000/NT/XP

- Click on **Start**.

- Click on **Run**.

- Type **A: SETUP**, and click **OK**.

- Follow the installation instructions displayed on screen. If the installation procedure asks whether your existing copy of TRW.INI should be overwritten, answer 'No'. This file contains all your personal preference settings when running **TEMPRECORD FOR WINDOWS**.

> **If your diskette drive is B: rather than A: substitute B: for A: above.**

Under Windows 95/98/2000/NT/XP, an entry **Temprecord for Windows** will be added to the **Programs** entry in your start menu. Within this entry will be entries for the **TEMPRECORD FOR WINDOWS** program, the on-line help system, the README.TXT file, and an entry for uninstalling **TEMPRECORD**.

As part of the installation process, an icon called README.TXT will be created in the **TEMPRECORD FOR WINDOWS** folder. You should read the contents of this file, as it may contain further information about **TEMPRECORD** operation that was not available at the time this manual was printed. To display the contents of the file double-click on the README.TXT icon and it will be opened with the Windows Notepad editor.

Adding a Shortcut to Temprecord for Windows

You may wish to start **TEMPRECORD FOR WINDOWS** from your desktop, or

from a folder that you work from frequently. The following procedure adds a 'shortcut' to **TEMPRECORD FOR WINDOWS**, which when double-clicked, will start the **TEMPRECORD FOR WINDOWS** program.

- Open the folder where you want the shortcut to appear.

- With the mouse cursor over the folder, click the right mouse button. If you want the shortcut on your desktop, right mouse click on the desktop.

- Select **New**.

- Select **Shortcut.**

- In the edit box called **Command Line**, enter the path to the **TEMPRECORD FOR WINDOWS** program file. On most computers, this will be 'C:\TRW\TRW.EXE' unless you have installed to a different folder, or your computer is on a network. Alternatively, use the **Browse** button to find the file TRW.EXE.

- Click **Next.**

- In the edit box called **Select a name for the shortcut** enter **Temprecord for Windows**.

- Click the **Finish** button.

Creating an Installation Disk

This section is only relevant if you have downloaded **TEMPRECORD FOR WINDOWS** via the worldwide web. **TEMPRECORD** is always distributed via electronic media as a single file, called a self-extracting archive. The name of the file always reflects the version of the program - for example, the file for version 3.20 is called TRW320.EXE. To create an installation disk:

- Download the file TRWnnn.EXE (where 'nnn' is the version number, e.g. TRW320.EXE) to a temporary folder on your hard disk.

- Run the file TRWnnn.EXE. This will create several more files in the same folder.

- delete or move the original file TRWnnn.EXE

- Copy the remaining contents of the temporary folder to a newly formatted, virus-free diskette.

This diskette will now serve as an installation diskette, and can be used to install the program on as many computers as you wish according to the instructions on page 3. Alternatively, you can run the setup program

SETUP.EXE from the temporary folder.

The latest version of Temprecord software can be obtained free of charge from http://www.temprecord.com.

Connecting the Reader Interface

Before starting the **TEMPRECORD FOR WINDOWS** program, if you wish to program or read the data from a **TEMPRECORD** Logger, you should connect the Reader Interface. Your PC should have connectors at the rear for one or more serial ports. These are known as 'COM' ports and may be labeled COM1 through COM4. Most computers have at least one port. The connector will either be a 9-pin male (DB-9M) or a 25-pin male (DB-25M). The Reader Interface is fitted with a DB-9F female connector. If your computer is only fitted with a 25-pin male connector, 9-to-25 pin adapters can be purchased from most computer stores if one was not supplied with the Reader Interface.

You can connect the Reader Interface to any available COM port. Your computer must have at least one unused COM port.

WARNING – This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

The most recent model SR2 Reader Interface has three LEDs, which can serve as an indication of current COM port activity.

- The LED marked Power should turn on as soon as the **TEMPRECORD** program is first asked to communicate with a logger and remain on as long as the program is running.

- The LED marked From PC will turn on whenever the PC is trying to communicate with a logger.

- The LED marked To PC will turn on whenever the logger is responding.

Under normal operation (e.g. when reading data from the logger, the two Communications LEDs will flash alternatively as the program alternatively asks for data from the logger and receives it.

Starting the Temprecord Program

Once installation has been completed, you can run TEMPRECORD FOR WINDOWS.

Windows 95/98/2000/NT/XP

- Click on **Start.**

- Click on **Programs.**

- Click on the **Temprecord for Windows** program folder.

- Click on **Temprecord for Windows.**

Alternatively, you can double-click on a shortcut if you have created one as described on page 4.

Using the HELP System

At any time while TEMPRECORD FOR WINDOWS is running, you can request help by various means:

- By pressing the **F1** key.

- By clicking on a button labeled **Help.**

- By opening the **Help** menu.

The help system is a comprehensive on-line manual that is fully 'context-sensitive'. This means that the help information you receive when **F1** is pressed or a **Help** button is pressed is normally directly relevant to the current operation.

If for example you attempted something that resulted in an error message - clicking on the **Help** button when the error message was displayed would give you a full description of the error, why it occurred, and what you might do to avoid it.

For general information on how to use the Windows Help system, press **F1** while the help window is open.

Opening the Menus

Across the top of the screen are displayed the five main groups of functions TEMPRECORD provides - **File**, **Program**, **View**, **Options** and **Help**. You can open each of these menus by clicking on them with the mouse, or pressing **Alt-F** for the file menu, **Alt-P** for the program menu, etc.
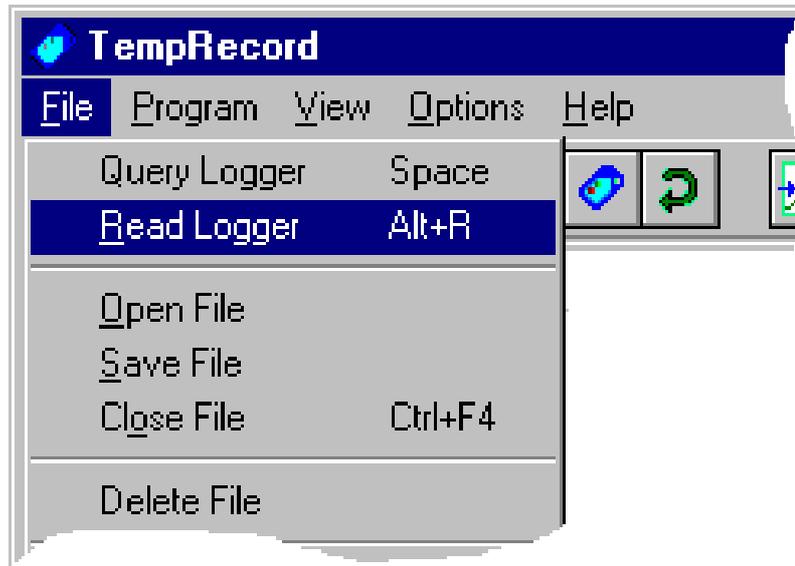
You will notice that some of the menu entries have keys alongside them, e.g. **File/Read Logger** has the key **Alt+R**. These keys are 'short-cut' keys that can be used to invoke that function. They are an alternative to opening the menus and selecting the function directly, in that they work from almost anywhere in the program.

Using the Speed-Buttons

Most of the common functions in TEMPRECORD can be accessed by means of the row of buttons (called 'Speed' buttons) below the main menu.
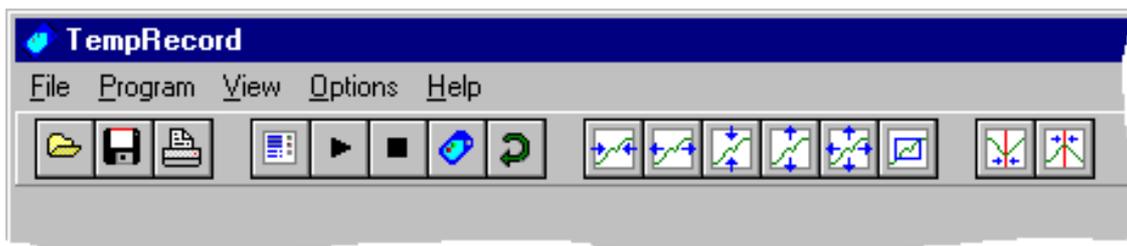
The graphic shown on each button is intended to provide a clue as to its functions, but if you can't remember, position the mouse cursor above the button for a few seconds and a 'hint' will appear telling you what that button's function is.

Using the Right-mouse Button

Clicking on the right-mouse button will bring up a local menu of the more common functions.
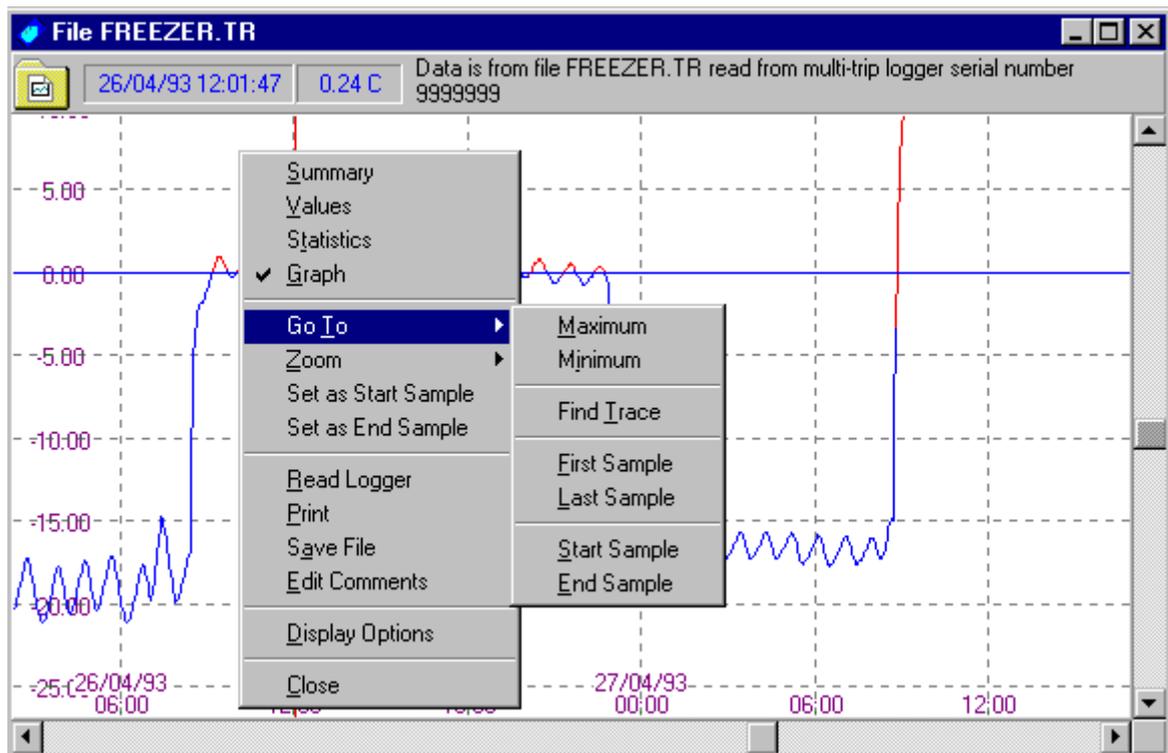
These local 'pop-up' menus are particularly useful for quickly changing the view mode of the current window.

Setting Up

Some setting up may be needed to tailor the operation of **TEMPRECORD FOR WINDOWS** to your particular needs. All of these options are contained, not surprisingly, in the **Options** menu. **TEMPRECORD FOR WINDOWS** provides a multitude of options, and these are presented as a series of tabbed pages. You can select each of the pages by clicking on the corresponding tab. The tabbed page corresponding to the option you selected from the menu is displayed in front of the others. If you open the **Options** menu and click on **COM Port**:
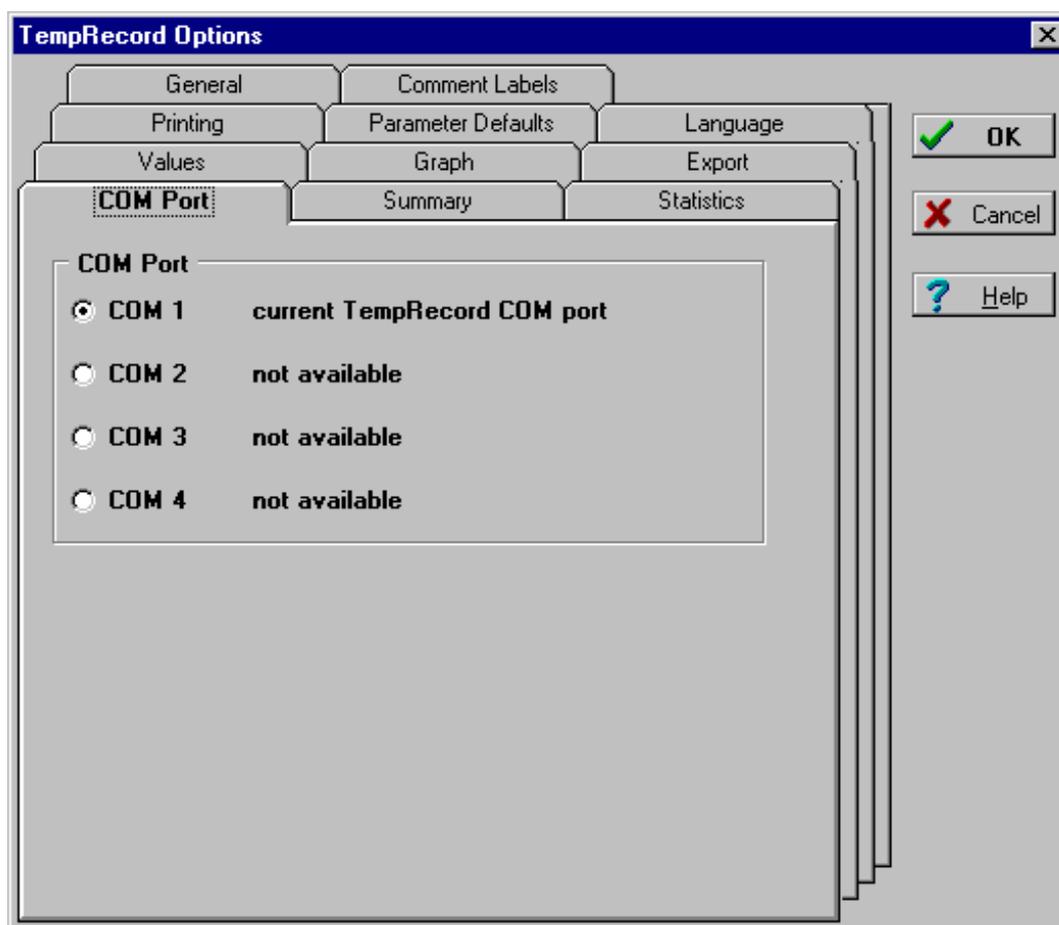
If your Reader Interface is connected to a COM port other than the one shown as Current **TEMPRECORD** Port, you will need to change the COM port setting. Click on the correct COM port number.

If you prefer temperature to be displayed in degrees Fahrenheit, click on the **General** tab and select **Degrees F**.

If you plan to print reports of the logged temperature, you should select the **Printing** tab and set up the various printing options.

When you have finished setting up your options, click on **OK** to close the
Options pages.

Note that TEMPRECORD FOR WINDOWS remembers all of these settings for
you, so there is no need to repeat this process every time you start up the
program. The remaining options are discussed later in this manual, when the
functions they pertain to are covered.

Checking for a Temprecord Logger

If you have a TEMPRECORD logger, place it in the Reader Interface. Click on
File, and then **Query Logger**. A window will open indicating TEMPRECORD
FOR WINDOWS is checking for the presence of a logger in the reader. If one is
found, after a second or two a window will open displaying a summary of the
data read from that logger. The program reads just enough data from the logger
to provide a summary of the logger contents.

If you receive the message 'Unable to access TEMPRECORD logger' make sure
the COM port is correctly set and the Reader Interface cable properly plugged
in. The logger itself must be pushed fully into the Reader Interface cavity.

TEMPRECORD FOR WINDOWS can be set up to automatically check for a logger
when the program starts, and you also can also make it check for a logger by
pressing **Space**. To have TEMPRECORD check for a logger on start-up, Select
Options, then **General**, and make sure **Check for Logger on Start-up** is
checked.

Programming a Logger

Programming is the general term applied to setting up the TEMPRECORD
loggers to perform their temperature logging function. All of the operations
described in this section assume there is a logger in the Reader Interface. Each
operation is described in the order you would normally perform it. Note that
some of the operations require knowledge of the logger's password, if this has
been set.

To program a logger's parameters prior to use, click on **Program**, then
Parameters. This will open the parameter form:

If the logger is protected with a password, you will be asked to supply this
before you can continue. The password will be a number of up to 8 digits. It

will not display as you type it.

When you open the Parameters form, some of the options may be shown grayed out. This will be for one of the following reasons:

- The option is not appropriate – for example you cannot program the start date and start time unless the **Enable Start on Date** option is checked.

- The option is not available because the logger the data was read from is an older Mk I logger and these loggers do not support that feature.
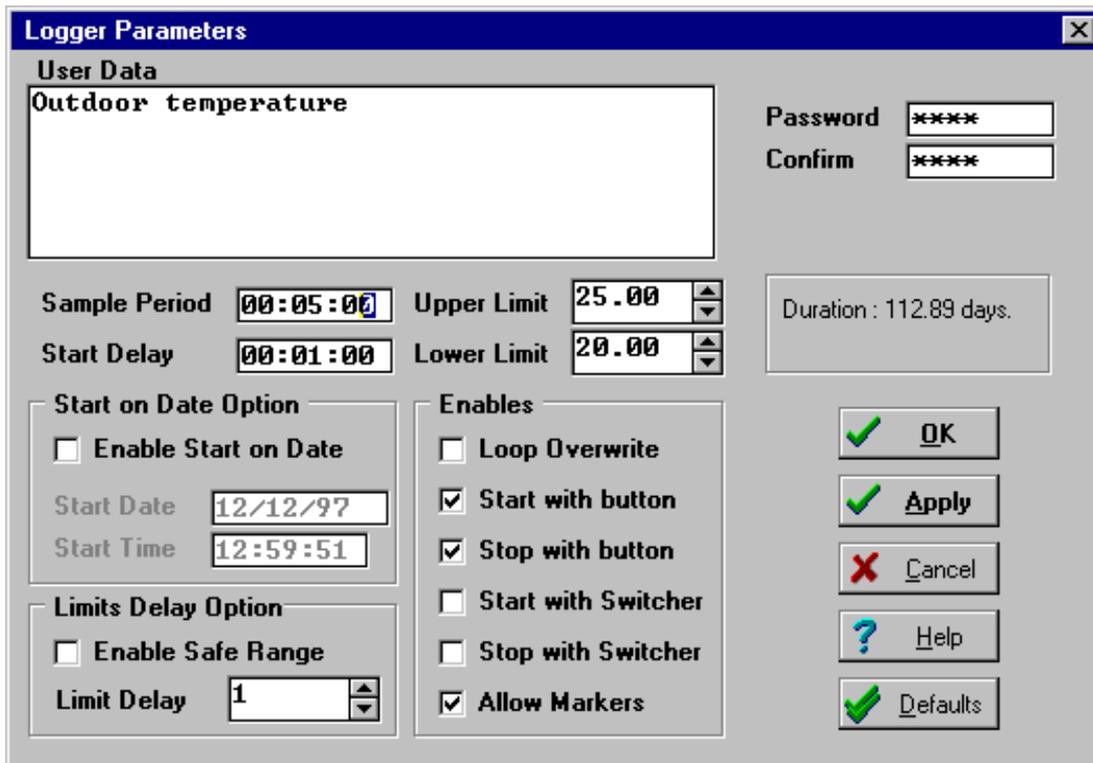
User Data

Each **TEMPRECORD** logger has the facility to record up to six lines of user data. These lines can each be up to 40 characters long. If the **TEMPRECORD** logger is being used for transportation monitoring, the user data might record information such as the shipper's name, the type of cargo being monitored, etc. You can type anything you like into the six lines of user data.

Password

If you want to change the password, you must enter the new password into BOTH of the password fields. Once again, the password will not display as it is typed. The new password will only take effect if both entries are filled in and they match, so take care in typing the password. If the passwords do not match,

or only one of the fields is filled in, you will receive an error message. Entering the password twice minimizes the possibility of a password unwittingly being incorrectly entered. Remember only digits (up to 8) are allowed in a password.

> **Do not forget your password. Without the password, the logger cannot be programmed or re-used.**

If you want to remove the password altogether (so anyone is able to program the logger, whether they know the password or not), then the password must be set to zero. Once again, both fields must be filled in with the number '0'. When the password is zero, no password is required to program the user data, change the password, set the start delay, set the sample period, or re-use the Econolog, Multi-trip or Scientific **TEMPRECORD** loggers.

> **Make sure you have set the user data and password correctly. Once the logger has been started, it is not possible to change these.**

Start Delay and Sample Period

The start delay is the time from when the logger is started until it actually begins to measure and record temperature values.

The start delay can be set to any value from ten seconds to 36 hours, in multiples of two seconds. During this time the logger cannot be read or stopped. The start delay is normally set at manufacture to one minute.

The sample period is the time that elapses between temperature samples.

> **Beware of undersampling! When plotting the temperatures,** TEMPRECORD **joins the sampled points with straight lines, but there is no way of knowing what the temperature was between the samples, particularly at longer sample periods. Make sure the sample period is set to a sufficiently short duration to catch the fastest expected variation in temperature.**

On the Inland, Econolog, and Multi-trip **TEMPRECORD** loggers, it can be set to any value from two seconds to 2.5 minutes, in multiples of two seconds. The sample period is set at manufacture to 2.5 minutes.

On the Export loggers, it can be set to any value from two seconds to 36 hours, in multiples of two seconds. The sample period is set at manufacture to 5 minutes.

On the Scientific loggers, it can be set to any value from two seconds to 36 hours, in multiples of two seconds. The sample period is set at manufacture to 2.5 minutes.

If you want to change the start delay or sample period, fill in the new values.

They are both specified in hours, minutes, and seconds.

> **When entering the sample period and start delay, you don't need to enter the separator characters (normally a colon (':') for times and a slash ('/') or hyphen ('-') for dates).**

After re-using an Econolog, Multi-trip or Scientific **Temprecord** logger you can change the sample period and start delay if you wish. If you do not change them after the logger is re-used, the start delay is set to the default value of one minute and the sample period remains set to the value last programmed.

You will receive an error message if you specify a seconds or minutes value above 59, or an overall time above the maximum allowed. Any time you do specify will be rounded to the nearest 2 seconds.

As you type in the new sample period value, the duration is calculated and displayed to the right of the sample period. The duration displayed assumes the logger will fill to capacity.

> **Make sure you have set the start delay and sample period correctly. Once the logger has been started, it is not possible to change these.**

Start at Time and Date

Instead of using the start delay to determine how long after starting before the logger starts recording samples, you can program **Temprecord** to start at a particular time and date. You must check the box **'Enable Start on Date Option'** before you can enter a time and date to start logging from.

The logger will start recording samples from within a few seconds of the time and date specified. The time and date you specify must be in the future or an error is reported when you try to update the logger parameters.

It is still possible to start the logger by any of the other means, i.e. with the switcher, the buttons, or by using the **Program/Start Logger** function of **Temprecord**. It is however possible to program the logger so that it cannot be started with the switcher and/or the button. This is discussed later in this section. If the logger is started by any of these means, the start time and date is ignored. If you only want the logger to start at the programmed time and date, make sure the other starting options are disabled.

Lower and Upper Limits

The Mk II/III **Temprecord** loggers have the ability to compare the logged temperatures against lower and upper limits, and report whether the limits have been exceeded via the red and green LEDs on the logger.

The **Program/Parameters** form allows you to specify these limits. You must enter the limits in the same units as the current setting of the **Units** option (°C or °F)

When **TEMPRECORD** reads the data from a Mk II/III logger and displays it in graph view mode, the limits that were programmed in the logger are shown on the graph. These limits are also used in the values view and statistics view.

Safe Range Entry

In some situations, the logger must be started while the temperature is outside the limits and it is undesirable for this situation to be reported as a temperature outside of the limits. Also, there are applications where a brief excursion outside the limits may be expected, but is not to be reported as an out-of-range condition.

If the **Enable safe range** option is not checked, logger samples are checked against the limits from the time when the logger is started. If the option is checked, the temperature must enter the 'safe range' (i.e. it must be less than the upper limit and greater than the lower limit) before it will be checked against the limits.

If the **Enable safe range** option is checked, comparison of the temperature values starts as soon as the number of temperature samples specified in the limit delay parameter have been inside the safe range. For example, if the **Limit delay** is set to 5, the checking of temperatures against limits will not start until five successive samples have been recorded as inside the safe range.

> **Enabling the safe range entry option does NOT mean that the logger does not start taking samples until the conditions for safe range entry are met. Enabling safe range entry means that the samples taken are not COMPARED against the limits until the conditions for safe range entry are met. The logger still takes samples from the time the start delay expires (or from the start time and date, if this is enabled).**

Limit Delay

This option determines the number of consecutive samples that must occur before a condition is met. If this value is set to 5 for example:

- 5 consecutive samples must be taken between the lower and upper limits before checking against the limits starts (provided **Enable safe range** above is checked).

- If **Enable safe range** is not checked then 5 consecutive samples outside the limits must occur before an out-of-range indication is given

by the logger.

- If **Enable safe range** is checked then <u>once the safe range has been entered</u>, 5 consecutive samples outside the limits must occur before the logger gives an out-of-range indication.

Loop Overwrite

Normally when TEMPRECORD has taken a number of samples equal to the logger capacity, recording of samples stops. It is possible however to program the logger so that when it is filled, the following samples overwrite the oldest sample. The logger will from that time on therefore always contain a record of the most recent 7937 samples (Inland, Econolog and Multi-trip loggers) or 32513 samples (Export and Scientific loggers).

You can turn the **Loop overwrite** option on and off in the **Program/Parameters** form. If this option is not checked, the logger will stop recording when it fills up. If this option is checked, after the logger has filled, subsequent samples taken overwrite the oldest sample.

Start and Stop with Button

You can determine whether the logger can be started and/or stopped with the button in the **Program/Parameters** form. If you want to be able to start the logger with the button, check the option marked **'Start with Button'**. If you want to be able to stop the logger with the button, check the option marked **'Stop with Button'**.

The button on the logger is used for both starting and stopping the logger, and also for recording markers in the sample record.

The button must be held down for at least 10 seconds to stop the logger. If **Allow Markers** is on, the logger will flash twice almost immediately to indicate a marker has been inserted and then about 10 seconds later it will flash 4 times to indicate it has been stopped. If **Allow Markers** is off, the logger will flash 4 times to indicate it has been stopped button after about 10 seconds.

Start and Stop with Switcher

You can determine whether the logger can be started and/or stopped with the switcher in the **Program/Parameters** form. If you want to be able to start the logger with the switcher, check the option marked **'Start with Switcher'**. If you want to be able to stop the logger with the switcher, check the option marked **'Stop with Switcher'**.

You cannot prevent starting and stopping with the switcher of the older

TEMPRECORD loggers.

Allow Markers

TEMPRECORD has the ability to record markers along with the temperature data. A marker is simply an indication of an event - no other information is stored other than the fact that the button was pushed, and the time it was pushed. The time recorded is that of the most recently taken sample.

To insert a marker, you must hold the button down for at least 2 seconds. The red LED on the logger will flash twice to confirm that a marker has been recorded.

This feature must be enabled by checking the **Allow markers** option in the **Program/Parameters** form. If this option is not checked, pressing the button has no effect, unless stop with button is also checked, in which case pressing the button for at least 10 seconds will stop the logger taking samples.

> **Once the marker has been recorded (i.e. when the LED flashes), be sure to release the button immediately. Remember that holding the button down for at least 10 seconds can also stop the logger!**

You can enter as many markers into the logger as you wish, but the TEMPRECORD program only displays the first 100 markers recorded.

Each marker occupies a sample position - i.e. for every marker you insert, the sample capacity of the logger is reduced by one for that use.

Updating the Logger

Once you have finished setting the programming parameters, you can update the logger by clicking **OK**. If you click on **Cancel** instead, no changes will be made to the programmed data in the logger.

If you wish to update the programming parameters in the logger, but you do not wish to exit the **Parameters** form, click on **Apply** instead of **OK**. You can think of the **Apply** button as being 'Save', and the **OK** button as being 'Save and Exit'. The **Apply** button can be useful where several loggers need to be set up with the same user data or sample period.

Default Parameters

TEMPRECORD FOR WINDOWS allows you to set up default parameters that can be loaded just by clicking on the **Defaults** button in the **Program**/**Parameters** form. This is useful if you always set up your loggers with the same sample period or start delay, or the six lines of user data are

always similar. To change the settings that are loaded when the **Defaults** button is clicked, select Options, then **Parameter Defaults**. Click **OK** when you have entered your default parameters.

Starting the Logger

> **Only the Econolog, Multi-trip, RH and Scientific model** TEMPRECORD **Loggers can be started with the** TEMPRECORD **program. If you are using the Inland or Export** TEMPRECORD **Loggers, you will need to break off the corner of the plastic case marked "START" to start these units.**

Once the logger has been programmed with the desired parameters it can be started. Open the **Program** menu and select **Start**. You may then be asked to confirm that you wish to start logging. Answer **Yes** to this prompt and after a few seconds the summary data displayed in the window should change to indicate the logger is in the 'start delay' mode, that is, it is counting down the start delay after which time it will begin logging. When the logger is started, the LED on the logger flashes 4 times to confirm this. It will flash again after the start delay period has elapsed and logging begins.

Remember that Mk II/III **TEMPRECORD** loggers can also be programmed to start at a particular date and time, and also by pressing the button.

> **Do not subject the Inland, Export, Econolog, or Multi-trip** TEMPRECORD **loggers to temperatures below -25°C (-13°F) or above 60°C (140°F). The Multi-trip Blue case, RH and Scientific loggers must not be subjected to temperatures below -50°C (-58°F) or above 75°C (167°F). Outside these temperatures the logger may fail and logged data could be lost. Models fitted with external probes are also subject to these limits, but the probe itself can withstand a range of -50°C to 110°C (-58°F to 230°F).**

You can determine whether **TEMPRECORD** asks you to confirm that you want to start the logger when you use the **Start** function from the **TEMPRECORD** program. Select **Options**, then **General**. If the box labeled **Prompt before Starting** is clear, you will not be prompted.

Stopping the Logger

> **Only the Econolog, Multi-trip, RH and Scientific model** TEMPRECORD **Loggers can be stopped with the** TEMPRECORD **program. If you are using the Inland or Export** TEMPRECORD **Loggers, breaking off the remaining corner of the plastic case stops marked "STOP" will stop these units recording.**

To stop an Econolog, Multi-trip, RH or Scientific **TEMPRECORD** logger, place

the unit in the Reader Interface, and click on **Program**, then **Stop**. You may then be asked to confirm that you wish to stop logging. Answer **Yes** to this prompt and the logger will flash four times to indicate it has been stopped.

> **If you have selected Loop Overwrite mode in a Mk II/III** TEMPRECORD **logger, stopping the logger is the only way of preventing old samples being overwritten once the logger has filled.**

Remember that Mk II/III TEMPRECORD loggers can also be stopped by pressing the button. The button needs to be held down for about 10 seconds to stop the logger.

You can determine whether TEMPRECORD asks you to confirm that you want to stop the logger when you use the **Stop** function from the TEMPRECORD program. Select **Options**, then **General**. If the box labeled **Prompt before Stopping** is clear, you will not be prompted.

The Temprecord Switcher

The Temprecord Switcher is a hand-held unit that provides an alternative method of starting and stopping the Econolog, Multi-trip and Scientific loggers. It looks very much like a Reader Interface, but it has no attached cable, and does not need to be plugged in to a computer in order to function.

To start the TEMPRECORD logger with the Switcher, the logger is placed in the cavity of the Switcher, and the Start button pressed. The LED on the switcher will turn on for approximately two seconds, and during this time, the TEMPRECORD logger should flash four times to indicate it has started. At this time, the start delay will begin counting down as normal.

To stop the TEMPRECORD logger with the Switcher, the logger is placed in the cavity of the switcher, and the Stop button pressed. As when starting, the LED on the switcher will turn on for approximately two seconds, and during this time, the TEMPRECORD logger should flash four times to indicate it has stopped.

> **Note that you cannot stop the logger until the start delay period has elapsed. If you want to prevent the logger being stopped accidentally after starting you should program the logger with a longer start delay time.**

If the LED on the Switcher should flash when either of the buttons is pressed, rather than remaining on continuously, this indicates the battery should be replaced as soon as possible, as the Switcher will soon fail to function reliably.

> **The Switcher itself gives no indication as to whether the** TEMPRECORD **start or stop operation was successful. However if the** TEMPRECORD **logger itself does not flash 4 times when the start or stop buttons are pressed, you can assume the operation was NOT successful. You can only start a logger that is new or that has just been re-used. You can only stop a logger while it is logging.**

Re-Using the Logger

The Econolog, Multi-trip and Scientific **TEMPRECORD** loggers can be re-used after each use.

In order to re-use a logger, you must know the password, or the password must be zero, and the logger must have been stopped. Place the stopped logger in the Reader Interface, click on **Program**, then **Re-use**. You may be asked to confirm that you wish to re-use the logger. If you answer **Yes** to this prompt the logger will be re-used. The logger is then ready to be programmed with new user data and sample period and start delay. A new password may be programmed also. If you do not alter the password, the existing one remains in force.

> **When a** TEMPRECORD **logger is re-used, the start delay is reset back to a default value of one minute. Make sure you program this again if your requirements are different from the default. The sample period is not altered when a logger is re-used. Whatever the sample period was for the last use will be the sample period after re-using, unless you alter it.**

You can determine whether **TEMPRECORD** asks you to confirm that you want to re-use the logger when you use the **Re-use** function. Select **Options**, then **General**. If the box labeled **Prompt before Re-using** is clear, you will not be prompted.

Reading a Temprecord Logger

In order to view temperature values, statistical data or a graph of the logged temperatures, the logger's data must be read. Click on **File**, then **Read Logger**.

While the logger is being read, a window will open and display a progress bar showing how far (in percent) the operation has progressed. Reading the data from a full logger can take a minute or two. You can abort the reading of a logger by clicking on **Cancel**.

Displaying the Logged Temperatures as a Graph

Once a logger has been read, the view mode of the window will change to Graph View. The resulting display will initially be scaled so that the entire logged temperature history is displayed on screen.
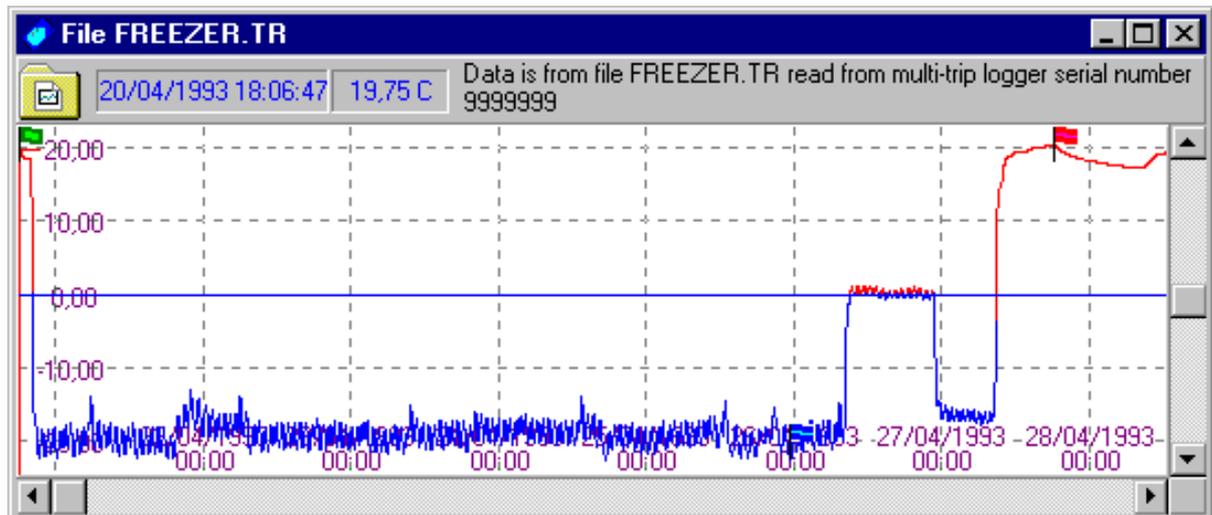
When the graph is displayed, there are various keys that can be used to navigate around the plot. These are described below. You can also press **F1** from the graph mode display for more help.

right-arrow	Moves the cursor one sample to the right. If the cursor is at the right-most position of the screen, the trace will scroll.
left-arrow	Moves the cursor one-sample position to the left. If the cursor is at the left-most position of the screen, the trace will scroll (unless you are already positioned at the start of the trace).
Ctrl-right-arrow	'Skips' the cursor to the right.
Ctrl-left-arrow	'Skips' the cursor to the left.
up-arrow	Scrolls up the graph, i.e. brings higher temperatures into view.
down-arrow	Scrolls down the graph, i.e. brings lower temperatures into view.
+, =	Expands the trace vertically about the cursor. The vertical magnification is increased, such that the position of the trace at the cursor remains in the

	same position on the screen. Use this key to examine small changes in temperature in more detail. If you are using a notebook computer without a dedicated **+** key, use the **=** key instead.
-	Contracts the trace vertically about the cursor. The vertical magnification is decreased, such that the position of the trace at the cursor remains in the same position on the screen.
Shift+, Shift=	Expands the trace horizontally about the cursor. The horizontal magnification is increased, such that the position of the trace at the cursor remains in approximately the same position on the screen. The trace cannot be expanded past the point where there are less than 4 samples across the screen. If you are using a notebook computer with a reduced keyboard, the Shift**+** key function is obtained by pressing Shift**=**.
Shift-	Compresses the trace horizontally about the cursor. The horizontal magnification is decreased, such that the position of the trace at the cursor remains in approximately the same position on the screen.
Home	Moves to the start of the logged temperatures.
End	Moves to the end of the logged temperatures.
F1	Displays help information about the View/Graph display.
F4	Scales the plot so that the entire record is visible onscreen. This is the same scaling as performed when a file is first viewed.
F5	Moves to minimum temperature and places the cursor there. Note that the search for the minimum and maximum values only takes place over the samples between the start and end markers. If you want to find the minimum or maximum value of the whole record, make sure the start marker is set to the first sample and the end marker to the last sample.
F6	Moves to maximum temperature and places the cursor there. See the comments for the **F5** key above.
F7, F8	Sets the start and end markers for the statistical functions, printing, and 'zoom between start and end markers' (see the **F9** key) functions. These markers are displayed on the trace as small flags, provided marker display is enabled. When a file or logger is read, these markers are set to the first and last samples.
F9	Zooms the trace between the start and end marker samples.

Notice that holding the **Shift** key down in conjunction with the cursor keys 'multiplies' the action of the key, e.g. Shift-right-arrow jumps the cursor to the right.

Numerous options control the way the graph view is presented. Select **Options**, then **Graph** to see these. You can set the colors used when displaying the graph for example.

Zooming and Presets

TEMPRECORD FOR WINDOWS provides numerous functions for changing the vertical (temperature) and horizontal (time) scales of the graph. The zoom functions are available from the **View** menu, or from the pop-up menu when the mouse cursor is over a graph.

Presets are a particularly useful function. They allow you to explicitly set the time and temperature span of a graph. This is especially handy when you want to view or print data from two different loggers and compare them.

You can set the preset times and temperatures explicitly from the **Options/Graph** page, or you can use the **View/Zoom/Assign Presets** function to assign the presets from the time and temperature span from the current graph window. You can then use the **View/Zoom/Zoom Preset** function to force the graph in any other window to show only that time and temperature range.

Printing a Graph

To print the currently displayed graph, click on **File**, then **Print**.

The region of data printed corresponds to the region currently displayed on the graph on screen, so you can obtain a printout of the whole data record, or any section of it, as desired. TEMPRECORD FOR WINDOWS has numerous printing options you can use to format your printed reports. For example, you can print any combination of the summary, statistics, values or graph. If the graph and/or values are printed, you may select whether the samples printed consist of all the samples, just those displayed in the graph in the window, or just those samples between the start and end markers. Select **Options**, then **Printing** to change these settings.

 If you are using a colour printer, the colors used will match those displayed on the screen, and may be changed under the options menu. A colour printer may

be forced to print black and white only if the printer driver allows for this.

Displaying the Logged Temperatures in Table Form

If you change the view mode to **Values**, you can display the logged temperatures in tabular form. Click on **View**, then **Values**, or open the pop-up menu with the right mouse button and select **Values:**


Note that the number of columns displayed across the window can be altered. Select **Options**, then **Values**, and change the **Columns** setting. You can also select whether the values wrap to the next line when they reach the right-hand edge of the window or not. This does not affect the number of columns used when printing the data in reports, or when exporting the data to a disk file in ASCII format. These are determined by separate options.

Statistical Data

Sometimes it is useful to obtain statistical data from the logged temperature. Click on **View**, then **Statistics** to change to the statistics view mode.
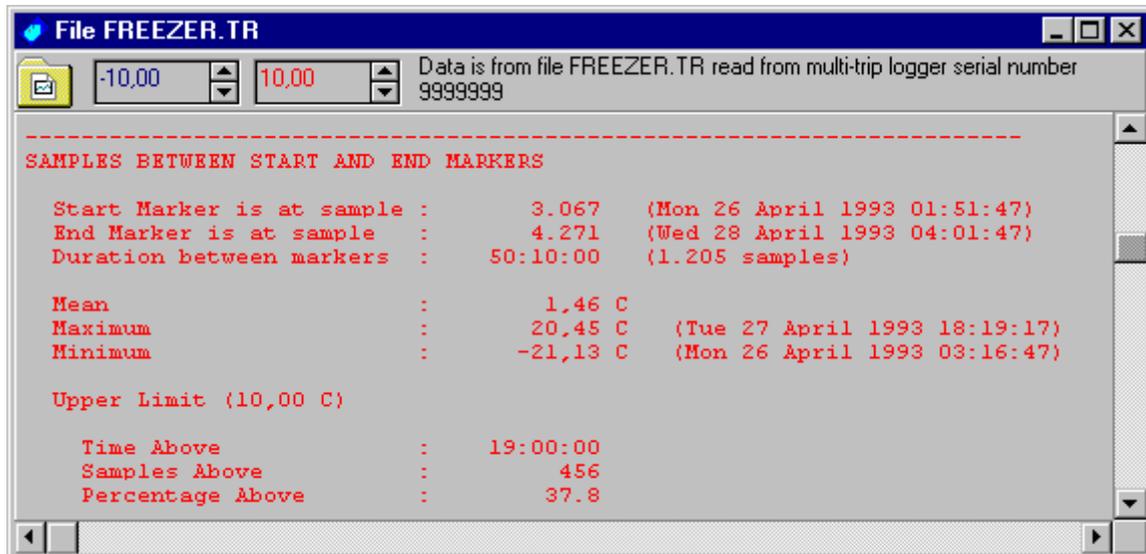
Statistics for all Samples

The statistical information displayed consists of:

- The mean temperature (i.e. the average temperature).

- the maximum temperature reached

- the minimum temperature reached

- The number and percentage of samples that were above the upper limit.

- The number and percentage of samples that were below the lower limit.

- The number and percentage of samples that were both above the upper limit and below the lower limit.

Statistics for Samples between Start and End Markers

The above parameters are calculated for all of the samples read from the logger. If you have set start and end samples that are different from the first and last samples in the logger, the above parameters are calculated again using only those samples between the start and end samples. This is useful when you want to exclude a portion of the data record, e.g. the time when the logger was not in a controlled environment.

PHI Statistics

TEMPRECORD FOR WINDOWS can also calculate and display PHI (Process Hygiene Index) statistics. To enable this facility, click on **Options/Statistics**, and make sure **Show Growth Statistics** is checked. The PHI statistics are displayed after the statistics for all samples and statistics for samples between the start and end samples are displayed. The PHI statistics are calculated between the start and end samples only.

> **The PHI statistics are presented as a guide only. They do not represent any actual measured growth of organisms present in the monitored environment. The statistics calculated are based on information and techniques developed by the Meat Research Institute of New Zealand.**

For more information on the derivation and application of PHI statistics, consult the appendix on page 33.

Printing Statistics

The information presented in the Statistics view can also be printed. Click on **Options/Printing** and make sure **Statistics** is checked. The statistics for the samples between the start and end samples are only printed if the start and/or end samples are set to samples other than the first and last samples. The PHI statistics are only printed if the **Show Growth Statistics** option is checked.

Saving a File

When the data has been read from a TEMPRECORD Logger, you will probably want to save that data, so that it can be examined or printed later without needing to read the data from the logger again. Click on **File**, then **Save** to save the TEMPRECORD Logger contents as a disk file. This disk file can be loaded back into the TEMPRECORD program at a later date and viewed or printed, just as if it had been just read from a logger.

You can give the data file a name that reflects the file's contents and thus makes it easy to locate and load at a later date. You should type in a name that

is relevant to the data contained in the file, e.g. 'STORE33' if the data file was from a logger placed in cool store number 33. The name can be up to 8 characters and must not contain any embedded spaces. An error message will result if the filename does not conform to the requirements.

Type in the name, and click on **OK**. TEMPRECORD will save the file and add a file type of '.TR', so the file in the example above would be called STORE33.TR. You can override the default file type if you want, but the TEMPRECORD program always assumes .TR if the file type is not specified and deviating from this convention could cause confusion.

If a file of the name you specified already exists, TEMPRECORD will ask you to confirm that you really wish to overwrite the existing file of the same name.

If you want to save the file into a different folder, specify the folder as well, or change to that folder first.

Loading Another File

Once you have saved a file in the manner described above, you can then load it at a later date. To load a TEMPRECORD data file, click on **File**, then **Open**. A dialog window will open allowing you to enter a filename.

Type in the name of the data file you wish to load, and click **OK**. If you cannot remember the name, you can scroll through the list of TEMPRECORD data files in the current folder and click on the one you are interested in.

Once a file is loaded, you can graph it and print it as if it had just been read from a logger.

You can open as many files as you like, and even open the same file more than once. Each data file is displayed in its own window. You can use the **View**/**Cascade**, **View**/**Tile Horizontally** and **View**/**Tile Vertically** functions to arrange the windows.

Picking a File

Each time you load or save a data file TEMPRECORD places the name of the file in a 'pick-list' of recently used files. This list is appended to the file menu. If you click on the name of a file on the **File** menu, TEMPRECORD will open the file. If it is already open, but hidden behind other windows, it will be bought to the front.

The files are listed in order of access, with the most recently accessed file at the top of the list.

Adding Comments to a File

It is a good idea to choose a filename that reflects the contents of the temperature data when saving a file, but it is not always possible to do this in the filename itself. For this reason **TEMPRECORD FOR WINDOWS** allows you to add 'comments' of up to 10 lines of 64 characters each to each file. These comments can be changed at any time and the file saved again. The comments can contain anything you wish.

To inspect (and if desired, change) the comment lines of a file, click on **File**, then **Edit Comments**.

The labels displayed on the left of the comment lines can also be changed. This is useful where particular information needs to be entered into the comment lines - the labels can serve as a 'prompt' for the user.

The comments are normally displayed in the Summary View, and also printed as part of the summary. If you do not normally use the comments facility you can prevent them being displayed or printed by un-checking the option **Print comment fields** in the Printing options.

> **The labels are assigned to the** TEMPRECORD **data at the time the logger is first read and cannot be altered from that point. Make sure the default labels are set up for your requirements before you read the logger. The comment fields can be edited at any time however.**
>
> **Data files created with earlier versions of the** TEMPRECORD **program only support a single comment line. If you load one of these files the label fields are ignored and you cannot enter anything in fields 2 through 10.**

Exporting Data (Saving a File in ASCII)

Sometimes it is necessary to save the data from a logger or a data file in a format that can be read from other programs, such as word-processors, spreadsheets, and database programs. This is sometimes called 'exporting' data to another program. **TEMPRECORD FOR WINDOWS** can save a file in 'ASCII' format for these purposes. Click on **File**, then **Export**.

A dialog window will open asking you for the filename. The sample range, the data format, and the number of samples to average over can all be changed in the **Export Options** page, along with other options for exporting data.

TEMPRECORD allows you to specify the format of the ASCII files so that it will be compatible with your spreadsheet, database program, etc. Click on **Options**, and select the **Export** page tab:
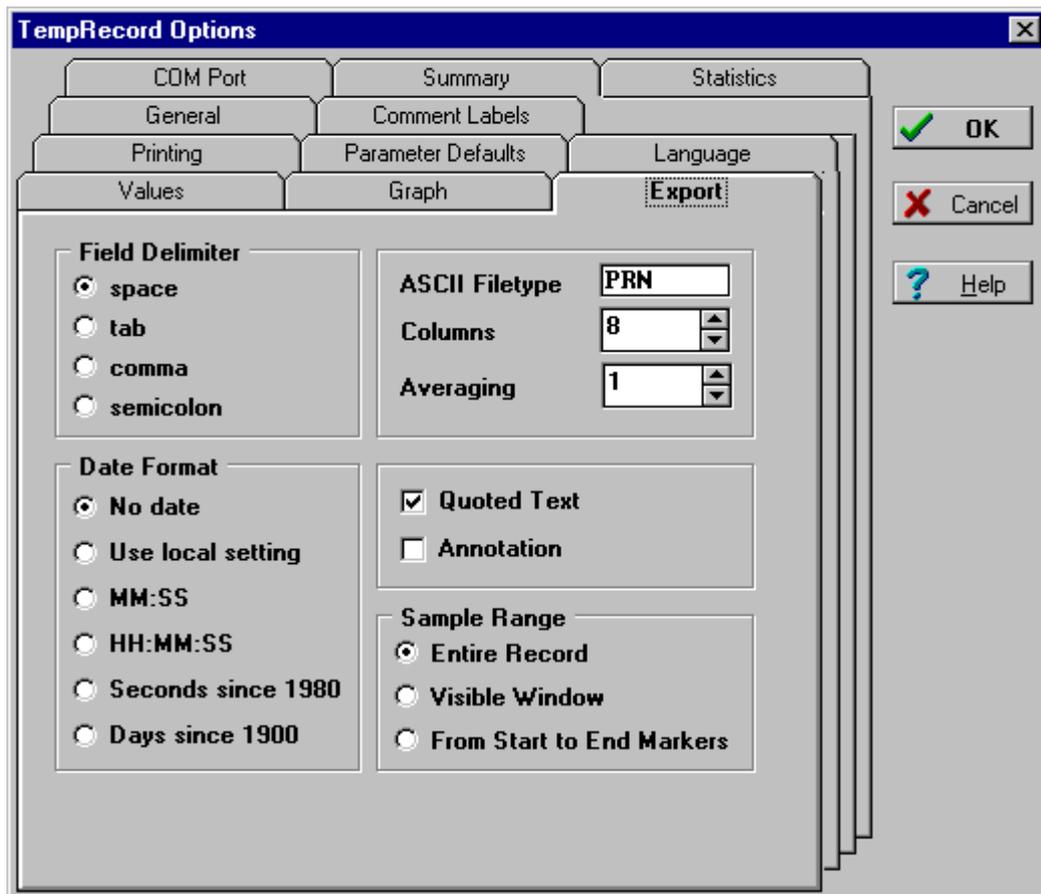
Exiting from the Temprecord Program

Once you have finished with **TEMPRECORD FOR WINDOWS,** you will want to exit the program. To do this, click on **File**, then **Exit Temprecord**. **TEMPRECORD FOR WINDOWS** may ask you to confirm you really want to leave the program. Click on **Yes**. If you have read a **TEMPRECORD** logger and have not yet saved the data to a disk file, you will be asked if you wish to do this before exiting. You should answer **Yes** to this question if you want to save the data. If you answer **No**, **TEMPRECORD** will exit without saving the data.

The **Alt-X** key can be used as a short-cut to exit from **TEMPRECORD FOR WINDOWS**. You can determine whether **TEMPRECORD** asks you to confirm that you want to exit the program when you close **TEMPRECORD**. Select **Options**, then **General**. If the box labeled **Prompt before Exit** is clear, you will not be prompted.

When Things Go Wrong

This section is a collection of common problems experienced by first time (and later!) **TEMPRECORD FOR WINDOWS** users, and the likely solution. Remember that most problems experienced during operation of **TEMPRECORD FOR WINDOWS** can be resolved by pressing **F1**, the help key. A Help topic dealing with common problems is also available from the program. Click on **Help**, then Common Problems.

I get a 'Sector not found' message during installation.

> Messages of this sort usually mean a faulty diskette or drive. If the drive reads other diskettes successfully, contact your dealer for a replacement **TEMPRECORD** diskette. Otherwise, try using a head-cleaning diskette in the drive and then attempt installation again.

I can't get the program to recognize the TEMPRECORD logger in the reader.

> Make sure the COM port setting in the Options menu matches the COM port you are using.

> Make sure the logger is fully inserted in the Reader Interface. It must be inserted with the snap-off tabs (or the corner hole, in the case of the Econolog, Multi-trip and Scientific loggers) facing towards you.

> The Reader Interface can be unreliable in conditions of bright light.

> Make sure your COM port is not being used by another program. Normally, **TEMPRECORD FOR WINDOWS** will report that it could not open the COM port if it is already in use by another program, but with some programs, particularly fax/modem reception software, your computer may become unresponsive. You may need to close the fax/modem reception program while you use **TEMPRECORD**.

> The **TEMPRECORD** logger itself could be non-operational. Check for this by inserting another **TEMPRECORD** logger in the Reader Interface and checking for its presence by pressing the spacebar. If that logger does not respond either, the problem is more likely to be confusion over COM ports.

> If you are using an additional RS-232 cable as an extension cable, all the RS-232 control signals must be wired. '3-wire' RS-232 cables cannot be used.

> Operation of the Reader Interface may be unreliable with some notebook-style computers. This is because the reduced voltage levels at the COM ports are insufficient to power the Reader Interface.

I get strange characters appearing when I print graphs.

Check that the selected Windows printer matches the actual printer you have. Check whether you can print with another application, e.g. a word-processing program. If this does not print properly either, the fault is with your printer setup.

There are known problems with some Windows 95/98 printer drivers. It may be necessary to select a driver for a printer similar to the one you are using. For example, the HP 600 series of printers may need to use the HP 310 driver to print.

Shift + doesn't expand the graph.

You cannot expand the graph past the point where there are less than 4 samples across the screen.

If you have a 'notebook' style computer with a reduced keyboard, you will need to use the **=** key instead of the **+** key to expand the graph.

I can't see the trace anywhere in the graph.

Press **F4** to scale the trace so that it fills the screen. If it is still not visible, you may have a data record with only one sample in it. You can also click on **View/Go To/Find Trace** to bring the trace into view.

The times displayed on the graph don't agree with what I expect.

Is the time and date on your computer set correctly? Was the logger data you are viewing recorded in another part of the world (i.e. in a different time zone)? Was daylight savings time in effect then, and it isn't now, or vice-versa? Any of these will result in a time difference. Remember that TEMPRECORD FOR WINDOWS displays all times with reference to the time of the **receiver**, i.e. the **viewer** of the data.

I can't move the cursor onto parts of the trace.

You can only place the cursor on sampled points. The data in between the sampled points does not exist in reality so TEMPRECORD skips over them to the next recorded temperature. See the note on page 13 concerning under-sampling.

My logger seems to 'lose' samples occasionally.

The TEMPRECORD logger can be read while it is still logging, but does not log any samples while actually being read. If you have a short sample period (e.g. 2 seconds) and you read the logger, it will effectively stop sampling for the time it takes to read the logger.

I can't get my Switcher to work

Your Switcher battery may be flat. If the LED on the switcher flashes when the buttons are pressed, or fails to come on at all, replace the battery.

You can't use the Temprecord Switcher to start and stop the Inland and Export type TEMPRECORD loggers. These can only be started and stopped by snapping off the tabs.

Your logger may have already been previously started or stopped.

Your logger may be faulty. Try placing the logger in a Reader Interface and check it with the TEMPRECORD program.

Some of the Options are 'grayed out' in the parameters form

Some of the parameters that can be programmed are only supported in the Mk II/III logger. You cannot alter these if the data was read from an older Mk I logger.

The 'High-speed Download' option is not available when running Windows 2000 or Windows NT.

Humidity Logger

Data from TEMPRECORD **RH loggers can only be viewed with** TEMPRECORD FOR WINDOWS **software version 3.28 and any new releases of Temprecord for Windows beyond version 3.28.**

The only noticeable difference apart from the cosmetics of the logger when visually comparing an **TEMPRECORD** RH logger to a temperature only logger is the presence of an aperture in the front of the RH logger case, this is where the humidity sensor is located.

TEMPRECORD Humidity loggers functionally are exactly the same to operate as the Temperature only loggers covered in the previous chapters of this manual.

Therefore when seeking instructions on how to Start / Stop and Download data and also access the other commonly used functions of the RH logger you should refer to the earlier chapters of this manual that cover these topics.

Setting up your Humidity Logger

The Parameters Dialog box for TEMPRECORD RH loggers can be accessed in the same manner as for Temperature only loggers.
Refer to page 11 - Programming a Logger.

From version 3.28 on there have been some new additions to the Parameters form of Temprecord for Windows software. These are used when setting up the humidity functions of the RH logger before recording.

The first of the new added controls in the **Parameters** form has the title **Logging**.

This control gives you the option to select whether the logger will record Temperature only, Humidity only or both Temperature and Humidity data.

Select the Logging option you require before starting the logger.
The second of the new controls added to the Parameters form of the software has the title **Humidity**.

Humidity Lower and Upper Limits

TEMPRECORD Humidity loggers have the ability to compare the logged Humidity against lower and upper limits, and report whether the limits have been exceeded via the red and green LED's on the logger.

The **Program/Parameters** form allows you to specify these limits. When TEMPRECORD reads the data from a Humidity logger and displays it in graph view mode, the limits that were programmed in the logger are shown on the graph. These limits are also used in the values view and statistics view.

For explanations of the other controls on the Parameters form above that have not been covered here, Refer to the earlier section between page 11 and page 18 of this manual headed **Programming a Logger**.

Displaying Humidity Data.

Graph view

You can view both Humidity and Temperature data simultaneously in graph view.
The numerical scale on the y-axis at the left-hand side of the graph is representative of the data values for both of the adjacent Temperature and Humidity data traces displayed on the screen.
The portion of the numerical scale of the y-axis adjacent to the Humidity trace is interpreted as a percentage between 0.00% and 100% RH.
The portion of the numerical scale of the y-axis adjacent to the Temperature trace should be interpreted in degrees Celsius or Fahrenheit depending on what you have selected in the **Units** selection control on the **Options / General** form.
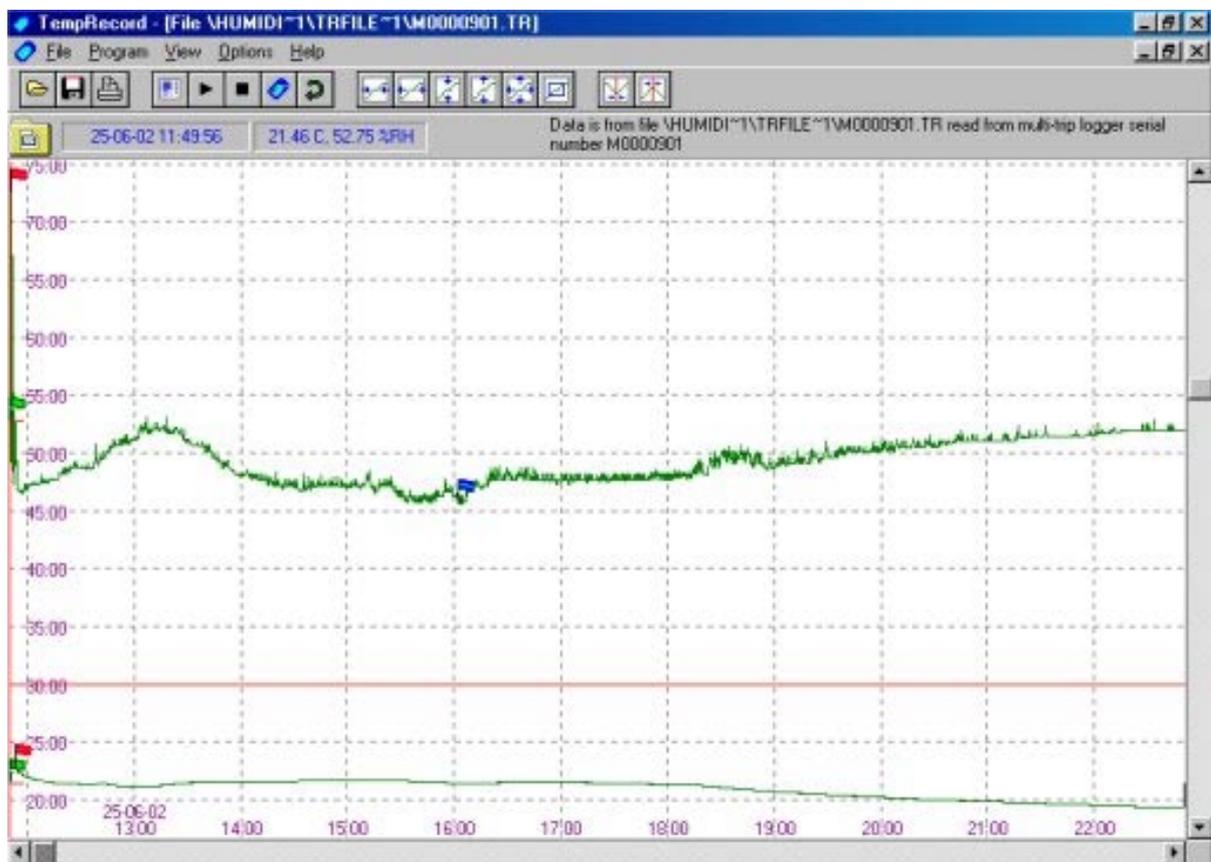
The numerical scale across the x-axis at the bottom of the graph is Date and time data. The format of the Date displayed on the graph is determined from the regional settings of the computer you are using.

Minimum and Maximum value speed buttons.
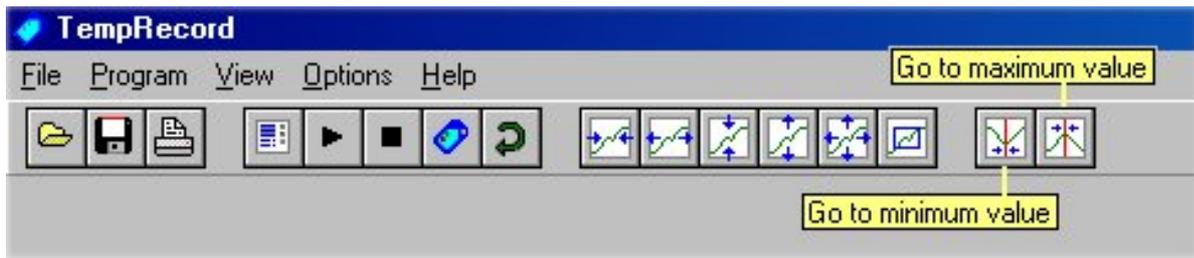
If you wish to quickly view the minimum and maximum values from the Temperature and Humidity graph displayed on screen you can do this by clicking on the minimum and maximum value speed buttons highlighted in the image above.

For instance if you wanted to check the minimum value on the graph click on the minimum value speed button and the red cursor line on the graph will jump to the minimum Temperature value.

If you click on the minimum value speed button again the red cursor line on the graph will jump to the minimum Humidity value.

Again if you click on the minimum value speed button the red cursor line will jump back to the minimum Temperature value, so you can see by clicking repeatedly on the minimum value speed button you can cycle between the minimum values from the displayed Temperature and Humidity data.

The same order of events applies when you click on the maximum value speed button that is if you have both Temperature and Humidity data displayed on screen.

Values view

The image of the **Values screen** on the next page shows the time the data values were recorded in the left-hand column, next the Temperature value is in the center column and finally the Humidity value is displayed the right hand column.

The four white boxes located just below the speed buttons are the lower and upper alarm limits that were set in the **Program / Parameters** form.

The pair on the left side is the Temperature lower and upper alarm limits.
The pair on the right side is the Humidity lower and upper alarm limits.
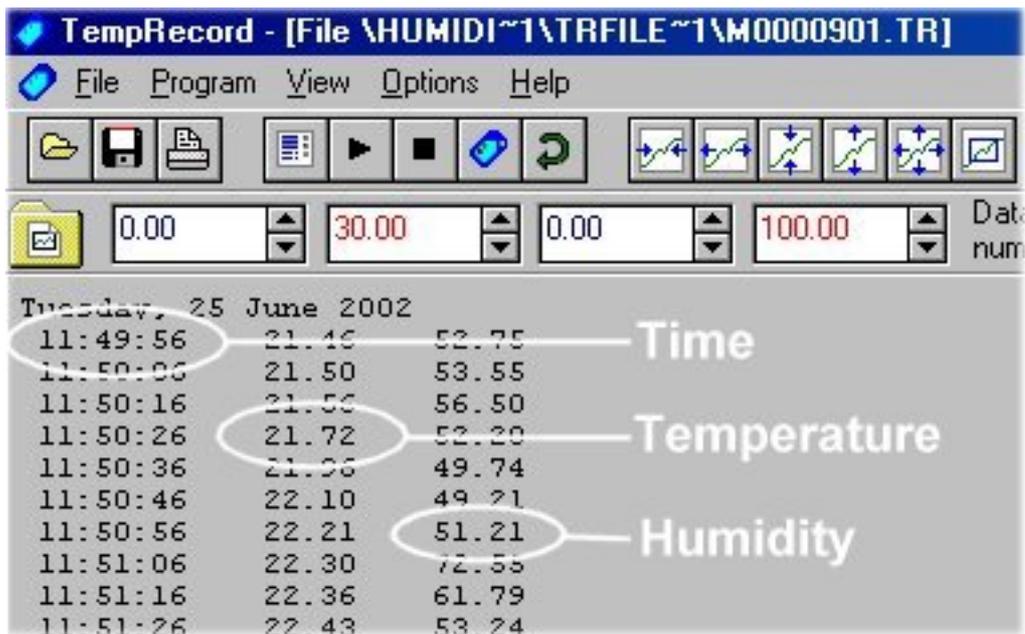
If you require multiple columns displayed on the **Values** screen go to the **Options / Values** menu and select the number of columns you require using the now open **Values** option form then click on **OK**.

Font Selection.

Another control available on the **Options / Values** form is **Font** selection this allows you to display the **Values** data in a font that is currently installed on the computer you are using.

Font Colors

Four individual Color selection controls give you the option to change the font color of the Temperature data, Humidity data, and also the Date and Time font color.

By using the forth Color selection control labeled **Markers** you can change the color of the data value that indicates when the Marker button was pressed.

The selected font color for the Markers value will only be displayed if the Allow Markers option was checked on the Parameters form before logging was started, and if the button on the logger was pressed for 2 seconds while the logger was recording data.

The red LED in the logger will flash twice to confirm a Marker has been inserted into the data stream after the button is pressed.
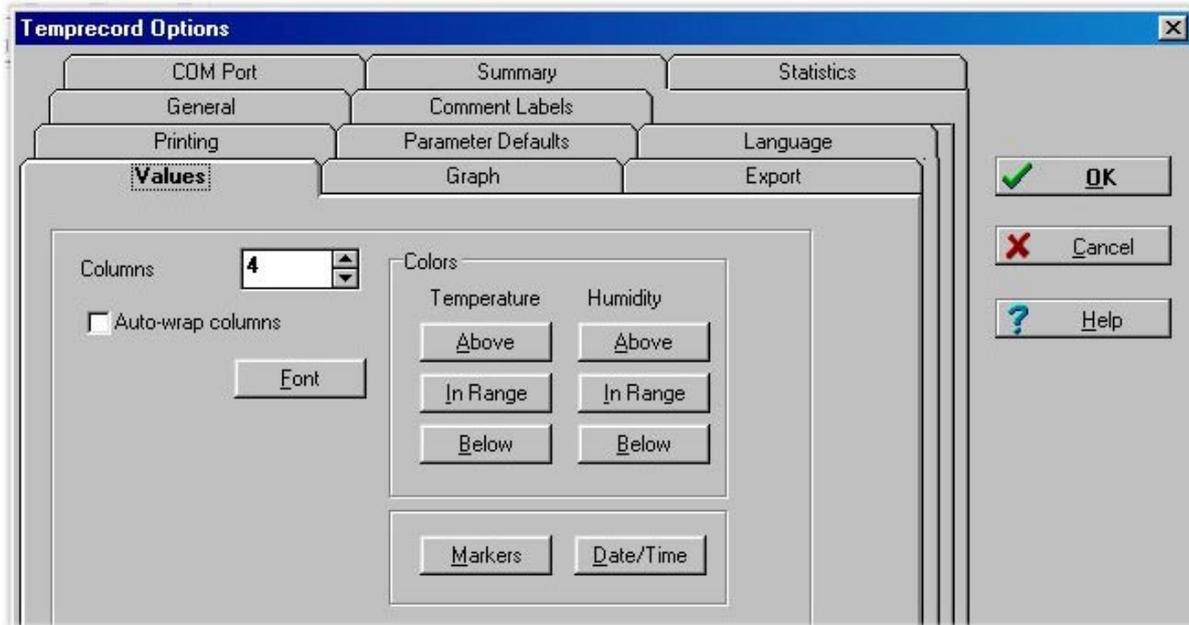
Columns / Font / Color selection controls on the **Options / Values** form.

Dust on the Humidity Sensor

> **To minimize the effects of airborne dust building up on the Humidity sensor use an optional dust cover to protect the Humidity sensor.**

Tests have proven that the proprietary dust cover that is shown below protecting the Humidity sensor does not affect the performance or accuracy of the Temprecord RH logger.

The dust covers have been designed and manufactured to allow maximum airflow to reach the Humidity sensor while at the same time preventing dust and other airborne contaminates settling on or around the RH sensor.

The dust covers simply slide over the logger and are held in place by the tight fit of the cover around the logger case.

When the dust cover becomes congested by dust, try washing the cover in warm water after removing it from the logger, then rinse the dust cover out thoroughly in clean water.
Make sure the cover is 100% dry before fitting it to your logger again.

If the dust cover becomes unusable because of damage or soiling you can obtain replacement dust covers from your TEMPRECORD distributor.

> **The dust covers are manufactured from a non-absorbent material. Do not use a substitute such as filter paper as other materials can become saturated with moisture. This will cause the RH logger to record far higher Humidity values and not the actual Humidity level present in the intended environment being logged.**

Drying the Humidity Sensor

> **NEVER USE A MICROWAVE OVEN TO DRY THE HUMIDITY SENSOR.**
>
> **Doing so will immediately void the warranty of the logger and seriously damage the electronics and battery inside the unit beyond repair.**

If the humidity sensor in the logger needs to be dried out the following procedure applies.

Place the logger face down for six hours in a **conventional oven** that has been set to 50 degrees Celsius / 122 degrees Fahrenheit. After that turn the logger over for the remaining 18 hours. There should be no more than 5% Relative Humidity present inside the oven during the drying process.
Leave the logger inside the oven for a minimum drying time of 24 hours to return the RH sensor to calibration conditions.
Never exceed 70 degrees Celsius / 158 degrees Fahrenheit during the drying process as this could damage the logger.
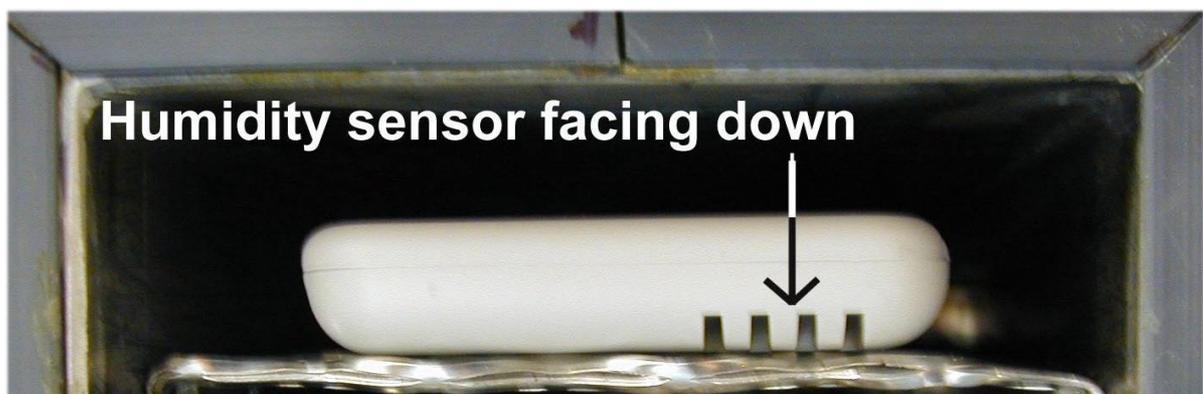
Drying the Humidity sensor in a **conventional oven** as recommended.

Appendix - Calculation and Use of Process Hygiene Index Values

Introduction

The following text is based on a document supplied by The Meat Research Institute of New Zealand. It describes how to apply the PHI values calculated by **TEMPRECORD FOR WINDOWS**.

Microbes and meat

Meat at slaughter is sterile (Gill, 1979). Microbes that can cause food poisoning and/or spoilage begin their activities after contaminating the exposed surfaces of meat. A typical organism often found associated with meat is Escherichia coli. This organism is an important pathogen. It also has growth characteristics that are similar to other mesophilic pathogens (viz. organisms that grow well in warm environments) such as the salmonellae. Measuring the ability for E. coli to grow on meat is therefore a useful indication of the potential for mesophilic pathogens to grow generally.

Bacterial growth

Bacteria grow and multiply on the meat surface at a rate determined by physiological capacity and the availability of water, space and nutrients. Fresh meat provides a moist and nutritious environment for bacteria to grow on. This means that bacterial growth will be effectively limited only by the cell physiology. Having said this, meat surface drying is sometimes used to control growth. However, it is difficult to prove effective application of drying on a non-uniform product such as fresh meat. Furthermore, the effect of drying is difficult to quantify. It should be assumed then, unless proven otherwise, that there will always be areas on the surface of meat that can allow unrestricted growth of bacteria. Manipulating the physiological growth capacity of the organisms then best effects control. This is best done using temperature.

Generally speaking, bacteria grow faster as the temperature rises. The faster they grow, the faster they can reach numbers that can result in disease or spoilage. Thus, by minimising initial bacterial numbers (using hygienic processing techniques), cooling meat quickly and maintaining low storage temperatures, food safety and storage potential will be maximized. To have confidence in the product such techniques need to be 'measured'. Initial bacterial numbers can be minimized by good manufacturing practice and assessed by classical microbiological techniques. The ability for the bacteria to grow during processing can be assessed by re-assaying meat at the process end.

This is, however, a slow process and does not give an indication as to how each processing step contributes to the overall microbial bio-load. An alternative method uses predictive microbiology in the form of the Process Hygiene Index (PHI).

The Process Hygiene Index

PHI is a means of assessing the potential growth of a microbial indicator organism during a process. The PHI is a numerical value that is equivalent to the growth of a microbial indicator organism (E. coli) over a process temperature history collected by an electronic data-logger. The higher the index value, the greater the potential for E. coli growth. For example, an index of 0 (zero) indicates no growth potential, 10 indicates a potential for 10 generations of growth (i.e. an E. coli cell has the potential to reproduce 10 times).

The probe

A special probe is manufactured for use in PHI applications. The logger probe is tapered and composed of Teflon. This allows easy insertion and retrieval from product (especially after freezing when other materials may stick). Teflon also is a poor conductor of heat so the probe tip, which contains the sensor, will allow a faithful measurement of the local temperature.

Positioning the probe

The probe is positioned to measure temperature at a site that reflects the process's greatest ability to allow bacterial growth. This means that the logger's probe must be attached to the warmest meat surface site (where bacterial contamination occurs) and the monitored meat must follow the process through its warmest path. Deep tissue temperature, whilst warmer than the surface during the initial carcass cooling phase, is NOT used because deep tissue is sterile and bacterial growth does not therefore need to be considered. If the warmest path is not known, or is variable, a number of samples (e.g. carcasses) are monitored that are representative of the load. For a carcass the slowest cooling site is adjacent to the aitch-bone pocket (bovine) or within the cavity adjacent to the 5th and 6th lumbar vertebrae (ovine). After cold boning, the probe should be placed on the surface of a small cut, which has the ability to re-heat at the fastest rate. After warm/hot boning a large cut is used because it will cool the slowest. After packaging (including offals) the probe is placed at the thermal centre of the load (e.g. between two cuts at the centre of a box in the centre of the load). Further specifications can be tailored for your own process or obtained from the appropriate regulatory literature.

Types of processes

Before calculating a process PHI an operator must decide what type of process they have monitored. This involves two considerations. Firstly, is the process one or two-phase? Secondly, is the process aerobic, anaerobic, or a mixture of the two?

One-phase or Two-phase?

Processes such as carcass cooling and offal cooling are termed 'single phase' processes because they are composed of a single cooling period containing no periods where product is handled requiring removal of the temperature logger. A temperature history is collected simply by attachment of the probe to the slowest cooling site. For surface sites, the probe is inserted into a stainless steel disc which is then pinned to the meat surface using a non-heat conducting (i.e. Teflon®) staple. The logger should be placed with the product as soon as possible. There may be regulatory requirements relating to your process describing when and where probes are placed. For carcass cooling, the surface temperature should be above 25° C at the beginning of the process and below 7° C at the end (which is the minimum temperature for E. coli growth). At the end of the process the logger is interrogated and a PHI produced. Note that 2 models of disc are available - one for beef and one for mutton.

> TEMPRECORD FOR WINDOWS **expresses PHI values both with and without lag. This lag refers to the period of time that bacteria need to adjust to a new environment before they can start to grow. For use with fresh meat processing DO NOT USE VALUES EXPRESSED AS 'WITH LAG'. This is because bacteria that contaminate meat are considered to have resolved their lag phase by the time process monitoring is commenced.**

When a single-phase process is followed by a second operation the overall process is termed 'two-phase'. An example is where a carcass is cooled (first phase), boned and the packaged cuts chilled (second phase). During this operation the temperature logger is used to measure the first phase as described for the single-phase operation. The logger is then removed for the boning operation and then placed with the packaged product to continue the monitoring process. There may be a regulatory limit on the maximum length of time the logger can be absent from the product between the phases (e.g. one hour for carcass/cuts assessment). The PHI value for a two-phase process can be calculated as follows:

> **Remember that you must have the Statistics option 'Show Growth Statistics' checked in order for** TEMPRECORD FOR WINDOWS **to display PHI statistics.**

1.   In Graph View, mark the start and end of the first phase of cooling. You can do this quickly by positioning the graph cursor at the start of the first

phase of cooling, and pressing F7. Then position the cursor at the end of the first phase of cooling and press F8.

2.   Switch to Statistics View. **TEMPRECORD FOR WINDOWS** will then show a value for the PHI for the first phase. The expressed PHI will either be for aerobic growth (e.g. carcass cooling) or anaerobic growth (e.g. offal cooling- although this will be a one-phase process only).

3.   Repeat step 1 for the second phase of cooling.

4.   Repeat step 2 for the second phase. The PHI will be either for anaerobic growth (e.g. warm-boned bulk packed meat or vacuum packaged cuts) or aerobic growth (e.g. unwrapped cuts).

5.   Manually calculate the potential for aerobic growth during the inter-phase period. This is done by firstly choosing the maximum temperature occurring at either the end of the first phase or the start of the second phase and then calculating the amount of potential aerobic growth for the inter-phase period using the following formula, used by the PHI software algorithm and presented in the paper of Reichel et. al. (1991).

$$Y = (0.0513x - 0.17)^2, \text{ when x is between 7 and 30°C}$$

$$Y = (0.027x + 0.55)^2, \text{ when x is between 30 and 40°C}$$

$$Y = 2.66, \text{ when x is between 40 and 47°C and}$$

$$Y = 0 \text{ when x is} < 7°C \text{ or} > 47°C$$

Example:

If the first phase ends at 7° C and the second phase starts 0.75 hr later at 12° C, you need to calculate 0.75 hours aerobic growth at 12° C.

$$((0.0513 \times 12) - 0.17)^2 = 0.2 \text{ generations potential growth}$$
per hour.

The inter-phase PHI is therefore 0.75 x 0.2 = 0.15

6.   The three PHI values (first phase, second phase and inter-phase) are then added together to give a process PHI.

7.   For two-phase processes that contain an aerobic first phase followed by an anaerobic second phase, results that are marginally (e.g. within 0.2 generation) above specified upper limits for the process, can be recalculated taking into consideration the short aerobic-to-anaerobic lag period during which cells cease to grow while converting their metabolisms to anaerobic respiration. This method is described in Reichel et al. It is a tedious process to accomplish manually and may not significantly influence your result - however it is an option for those

operators who want to keep their results faithful with those generated by MIRINZ AP1 software (presently incompatible with **Temprecord** loggers). A future release of **Temprecord for Windows** will produce a PHI value for a two-phase process and will calculate the lag automatically.

Uses for PHI

In addition to establishing if a process allows a potential for E. coli proliferation that is within certain guidelines the PHI technique can be used for:

- Comparing processes (e.g. chiller runs).

- Assessing the effect of process modifications on allowing microbial growth.

- HACCP (Hazards Analysis Critical Control Points) applications.

Inappropriate applications of PHI

PHI is not a method to calculate actual bacterial growth on product. A PHI value reflects the maximum potential for a process to allow the growth of E. coli and similar organisms. There may be reasons why actual E. coli growth is lower. For example, some product may have a pH unfavorable for maximum growth, some product may dry sufficiently to retard growth, while other product within the process may not be contaminated with E. coli.

The Future

MIRINZ and **Temprecord** are continuing to develop and improve software and hardware for extending the scope of the PHI. In addition to pursuing this application of predictive microbiology for food safety, they are also working on a similar application for predicting the growth of spoilage organisms. This will allow processors to monitor and optimize storage processes to minimise the growth of spoilage organisms and thus maximize the storage life of chilled product.

References/Further reading

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Temprecord for Palm.

Introduction

Thank you for using Temprecord for Palm software its availability now offers you even more flexibility in the range of options to choose from when downloading and viewing data from your Temprecord loggers.

Temprecord for Palm is an intuitive and easy to use program, however by using the instructions provided in this manual we will walk you through the installation of Temprecord for Palm software to your Palm.

Also covered are instructions on how to connect and remove your Palm to and from the SR3 Reader Interface.

With a SR3 Reader and Palm running Temprecord software you can perform the following tasks. Reset a logger, Start and Stop a logger and most importantly you can download and view the data from your logger as a graph.

Installing Temprecord for Palm software.

If you do not have an installation disk supplied with the Reader Interface or you just want to download the latest version of Temprecord for Palm you can get a copy of the program from our website www.temprecord.com/software.html

You will need a copy of Winzip available from www.winzip.com to unzip the archive file supplied on the floppy disk or downloaded from our website.

If you have a floppy disk with the **trpalmxxx.zip** file (where xxx is the version number) place it into the a:\ drive of your computer and copy the **trpalmxxx.zip** file to a temporary folder of your choice.

Go to the temporary folder and double click on **trpalmxxx.zip** file. Winzip will open with all of the trPalm setup files displayed. Go to step **(B)**.

If the install disk has 10 Palm installation files already listed instead of the single **trpalmxxx.zip** file go to step **(B)**.

(B) Locate from the list **Setup.exe** and double click on this file. This will start the install process, and as each of the four-individual message screens pop up during the setup process read the instructions and then click on the OK button to carry on with the install process.

On completion the install process will place the file **TempRecord.prc** into the Palms install folder.

This is the file for the Temprecord program that will run on your Palm.

Place your Palm into your HotSync cradle and do a HotSync. When that has completed Temprecord will now be installed on your Palm.

Fitting your Palm to the SR3 Reader Interface.

On your SR3 Reader interface there is a Palm connector already fixed to the Reader case and a piece of Velcro that is used to secure your Palm to the Reader case.

Remove the backing paper off the Velcro, and leave the two pieces of Velcro on the Reader attached to each other do not remove the Velcro off the Reader.

Next fit your Palm into the Palm connector on the Reader case, while doing this keep the top end of the Palm raised above the adhesive side of the Velcro on the Reader for the time being.

Now center the Palm over the Reader while still connected into the Palm connector and carefully lower the Palm onto the exposed adhesive of the Velcro patch so that the Velcro and the Palm stick together.

Lastly check that the DB9F plug from the Palm connector cable is secured into the back of the Reader.

> Note. **The cable connecting the SR3 Reader to your Palm is a proprietary item and should the cable be damaged through misuse it is not protected by the 12-month warranty term that covers the SR3 Reader Interface.**

Removing your Palm from the Reader Interface.

To remove your Palm from the SR3 Reader Interface lay the Reader on a flat surface and then **press the release button** on the top of the Palm connector that is attached to the Reader.

The Palm will eject forward about 2mm or ⅛", now you can separate the two Velcro halves by lifting the Palm up and away from the Reader case.

Note. We have found from trials that the Velcro patch fixed to your Palm does not interfere with the Palm unit while it is in the Palm docking cradle.

Starting Temprecord for Palm

Locate the **Palm TR icon** on the main screen of your Palm and tap on the icon with the stylus to open the Temprecord program.

See **image 1** to the right, the Palm TR icon can be seen in the third column on the third row of icons.
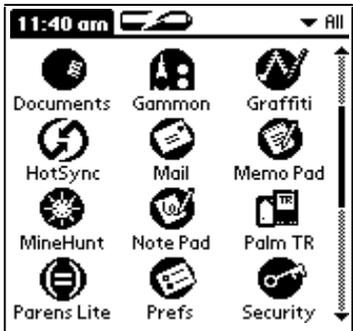
Temprecord for Palm software will now open with an opening screen as pictured in **image 2** below

Image 1
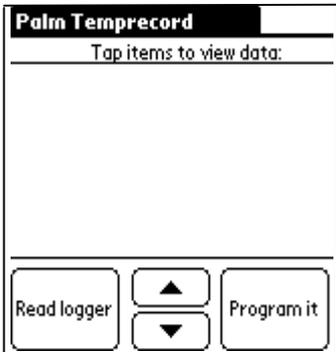
Viewing the data

Image 2

To read and view the data from the logger in the SR3 Reader Interface take the Palm stylus and tap on the **Read Logger** button located at the lower left-hand corner of the Palm screen.

Doing this will start communications between the logger in the SR3 Reader Interface and your Palm.

Note. Make sure the cable between the Palm and Reader is securely connected.

When data from your logger is being downloaded into your Palm you will see a message box informing you of the download progress similar to the one pictured to the right labeled **Image 3**.

Once the data download is complete another message box will briefly open telling you that the Palm is processing the data and it will then close.

Image 3

When that has finished you will see a screen similar to **Image 4** (Right) showing you the name of the TR files currently in the Palms memory and available for viewing as a graph.
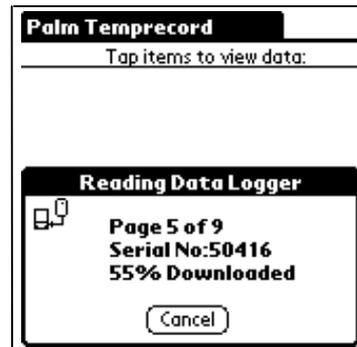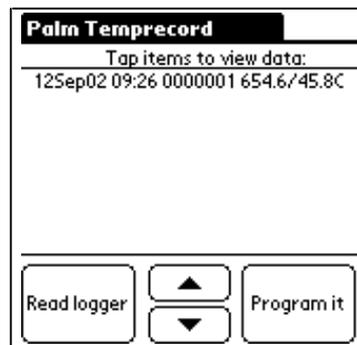

Image 4

To view the graph for a TR file from the file list take the Palm stylus and tap on the file from the list that you wish to view.

A graph of the data from the file you selected from the list will be displayed on the Palm screen.

Note. The RH / temperature files from Humidity loggers will show as two similarly named file entries in the file list joined together by square bracket symbol at the left-hand side of the two files.

The square bracket on the RH / Temperature files indicates to you that they are in fact one file.

The reason you have two files is one represents the temperature data and the other represents the RH data.

The Palm cannot display both RH and temperature graph traces at the same time.

You will need to select either the temperature or humidity file individually by tapping on the file name from the file list in the main screen to view the data you wish to look at.

Image 5 shows a typical graph output screen of the Palm, the Y axis displays temperature in this case the units are in Celsius, but Fahrenheit can be displayed by selecting Fahrenheit through the options menu.
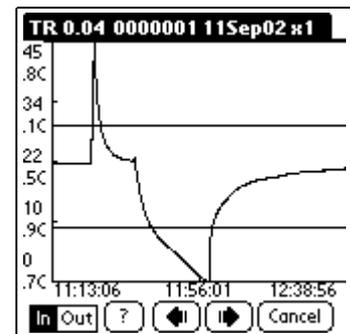
The X-axis displays the date and time scale, the axis information is displayed in the same format as you would see in Temprecord for Windows.

Image 5

Although it appears that the fine 0.01 temperature resolution is not displayed on the Palm screen it has been saved with the TR file and can be seen after you HotSync the file back to your PC and view the file in Temprecord for Windows software.

A copy of Temprecord for Windows software can be downloaded from
www.temprecord.com/software.html

Zooming in and out of the graph

To zoom in on a graph to get more detail use the Palm stylus to highlight the word **IN** on the zoom button located at the bottom left corner of the graph screen. See **Image 5** for detail.

When the word **IN** on the zoom button has been highlighted tap anywhere on the graph with the Palm stylus and the graph will zoom in. Keep tapping on the graph screen with the Palm stylus until you get the level of detail you want.

When the Palm beeps at you and no longer zooms the graph that means you have reached the maximum level that the Palm can zoom to.

To zoom out so the entire graph can be displayed on the Palm screen is a reversal of the zoom in process that is use the Palm stylus to highlight the word **OUT** on the zoom button located at the bottom left corner of the graph screen.

When the word **OUT** on the zoom button has been highlighted tap anywhere on the graph with the Palm stylus and the graph will zoom out.

Again the Palm will beep at you and no longer expand the graph out when the maximum level of graph expansion has been accomplished.

Scroll navigation arrows

If you look at the center bottom of the graph screen in **Image 5** on the previous page you can see two buttons each one has an opposite facing arrowhead graphic on it.

You use these navigation scroll arrows after you have zoomed in on a graph and you want to shift the graph display to the left or right.

Tap the scroll buttons with the Palm stylus to move the graph in the direction of your choice.

Status information screen.

The **Status information** screen pictured in **Image 6** gives you some basic information about the logger file you have open in Temprecord for Palm software.

The picture of the Status screen is pretty well self-explanatory the information given is. **Logger type**. Either temperature or humidity only or both temperature and humidity.
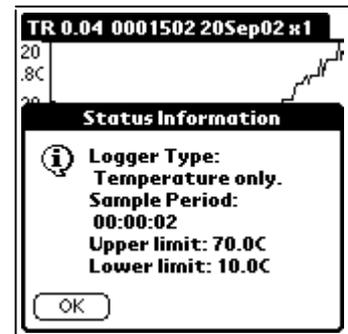
Image 6

Sample period. This is the sample period used by the logger for the file you have open. The format is **HH.MM.SS**.

Upper limit / Lower limit. If these were set into the logger during the **Program \ Parameters** setup in Temprecord for Windows.

They will be displayed on the graph as two horizontal lines adjacent to the upper and lower temperatures on the Y-axis. See **Image 5** for detail.

Programming a logger

Palm Temprecord

Select option below:

Start logging data

Stop logging data

Reuse Logger

EXIT
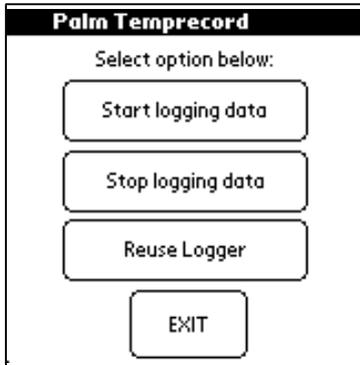
If you look at **Image 4** you will see a button located at the bottom right corner of the screen with the words **Program It**.

If you tap on the **Program It** button with the stylus a new screen will appear that looks like the one pictured to the left in **Image 7**.

Image 7

Start a Data Logger

With a logger in **Ready** to use mode you can start the logger by placing it into the Reader and tapping on the **Start logging data** button this causes the pre programmed **start delay** period to count down and then the logger will start.

Stop logging data

To stop a logger place it into the Reader and tap on the **Stop logging data** button doing this will stop the logger recording data.

Reuse Logger

This function must be used before you can restart a logger to record data. What happens to the logger during this process it is that all of the data stored in the logger is wiped from the memory and the logger is reconfigured with the same setup parameters i.e. sample rate that were used in the previous sampling of data.

The limitation here is you cannot change any of the setup parameters i.e. sample rate you will need to use Temprecord for Windows to make any changes to the settings of the logger before sampling of data can be started.

Exit

Tapping on the **EXIT** button with the stylus will return you back to the main screen of Temprecord for Palm it will not exit the program as you could be excused for thinking.

Options menu

The Options menu can be accessed in two ways. The first way is to take the stylus and tap on the menu icon located at the bottom left hand corner on the silk screen of the Palm.

Alternatively you can tap on the blue title bar at the top of the Palm screen this also will open the **Options** menu.
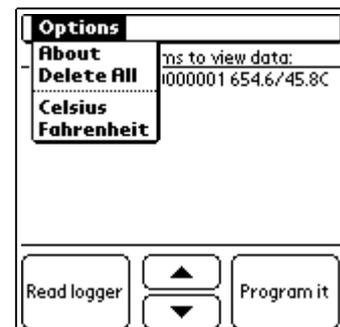

Image 8

The **Options** menu is not active while the graph is displayed. You will need to display the main screen before making any changes from the **Options** menu as pictured in **Image 8**.

About

From the **Options** menu if you tap on the **About** menu item you will get a screen similar to the one at the left. This screen displays the following information.

The version of Temprecord for Palm software you have installed.

Image 9

The Palm OS version your Palm is running.

The software copyright date.

Temprecord International Ltd contact information.

Delete All

Delete will delete all TR files from the file list on the main screen when used. You cannot delete individual files.

Image 10

Image 11

Delete All will only delete TR files displayed in your file list, it will not delete the Temprecord for Palm program. If you tap on the **Delete All** menu item the message pictured in **Image 10** will appear asking you to confirm or cancel the action. If you proceed by tapping on the OK button then the message in **Image 11** will appear telling you that all files have been deleted successfully.

Celsius and Fahrenheit

By tapping on either the Celsius or Fahrenheit menu items from the **Options** menu you can change the way the temperatures are represented on the graph.

Be aware that the menu items from the **Options** menu can only be activated from the main screen they cannot be changed while you are in graph view.

Transferring files from your Palm to your PC

The Palm HotSync process is used to transfer Temprecord data from your Palm to your desktop PC.

If you have TR data in your Palm this will be sent to a folder on your desktop called **C:\Palm\User name\TR**.

Where User name is the name you entered during the CD setup of Palm Desktop software.

Temprecord for Palm will create the TR folder for you at the first HotSync session between your Palm and your PC only after the Temprecord software has been installed on your Palm and assuming you have TR data files to transfer from your Palm to your PC.

Once the TR data files have been transferred to your PC you can go to **C:\Palm\User name\TR** folder and then copy or move the TR files to a folder of your choice.

Using Temprecord for Windows you can open the TR files from the folder you saved them to for further processing of the data.

Optional battery

The SR3 Reader Interface has the option to fit a 9-volt battery to boost the power in the Reader when required.

You will need to fit a 9V battery when the SR3 Reader Interface is used with computers that have a low serial port voltage at or below 6 volts dc.

Additionally the power management applications running in some laptop computers reduce the voltage to the serial port/s of the computer as the battery in the laptop starts to fade away.

If the serial port output voltage of the computer is less than 6 volts the SR3 Reader will cease to operate and a 9V battery will need to be fitted to the SR3 Reader to restore communications between the Reader and computer.

> **A 9-volt battery is only required when the computer or Palm communications port output is below 6 volts.**

Fitting the battery

The battery is located under the cover that has the Palm connector mounted on it. To replace the 9V battery start by disconnecting and removing the Palm from the SR3 Reader Interface.

Next unscrew and remove the DB9F serial cable plug from the serial connector at the rear of the SR3 Reader.

Using a square drive screwdriver remove the two screws from the small cover, it is the one with the LED visible and the Palm connector fitted to it.

Now lift the rear end of the small cover up and then back from the rest of the SR3 Reader case.

The battery can be Unclipped and removed from the Circuit board of the SR3 Reader Interface.

To replace the battery and cover is a reversal of the battery replacement procedure detailed above.

Replacing the battery cover screws

Important: **When replacing the battery cover do not over tighten the two retaining screws for the cover "just lightly nip them up". If you over tighten the screws you will strip out the thread in the plastic case of the SR3 Reader. If this happens you will no longer be able to secure the battery cover in place.**