PicoLog

Data Logger Software

User Manual

Version 2.0 rev 3

by

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1 Introduction

The PicoLog data logger is a powerful and flexible program which enables you to carry out data logging and analysis. It is designed to make full use of the facilities offered by the Pico range of data acquisition products.

To use PicoLog, you will need an IBM compatible PC and a Pico analog to digital converter. If you wish to print reports, you will also need an HP Deskjet or Laserjet printer, or an Epson FX or LQ printer.

This manual starts off with an overview of the functions provided by PicoLog, then it explains how to set up a couple of typical data collection runs. Finally, there is a detailed description of each of the menus and forms in PicoLog.

The content of some forms depends upon the type of ADC: see the manual for your ADC for a detailed description of the special features of PicoLog for your ADC.

We have tried to use the following typographical conventions throughout the manual:

Bold text is used for terms which have some special meaning within the manual, when they first appear, and for menu and field names:

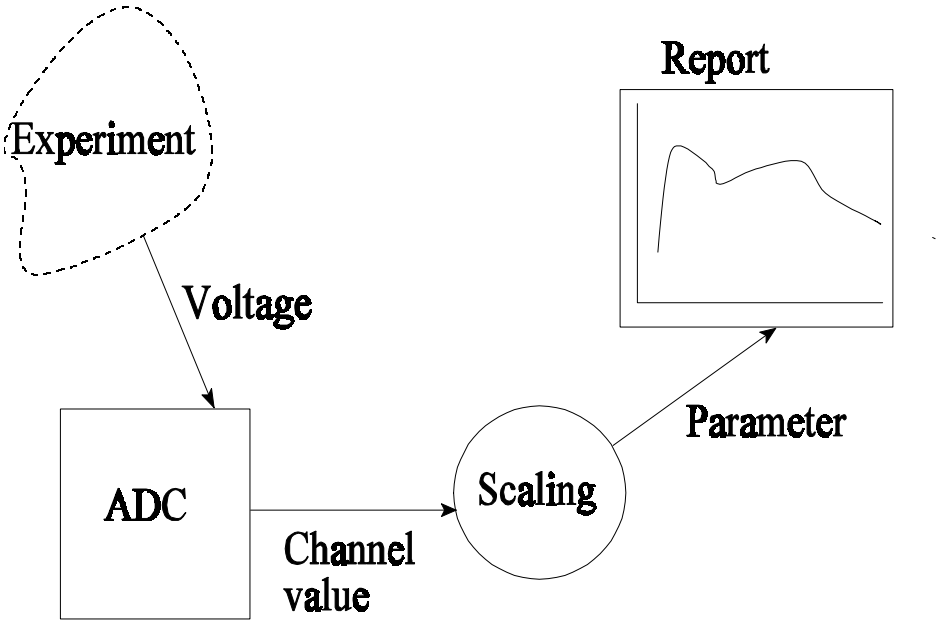
- ... has one or more **channels**
- the **Setup menu**

`Courier` text is used to indicate user input and also menu options, for example:

- ... enter a filename of `TEST1`
- select the `Display Voltages` option from the...

2 Basic principles

The PicoLog data logger collects sets of measurements from the channels of an analog to digital converter (ADC) and stores them on disk. It also provides tools to convert the ADC values to give parameters scaled in engineering units and to produce text and graphical reports.



An analog to digital converter has one or more **channels**: each channel is used to measure a voltage which is a representation of a real-world parameter like pressure or temperature.

The program takes a number of **readings** from a channel and combines them to form a **sample**. During each **sampling interval**, the program can do this on several channels. The program collects samples at regular time intervals (the sampling interval). It collects a specified maximum number of samples, then stops recording: you can stop it recording at any time

before the maximum number of samples. A sequence of samples is referred to as a **run**: each run is stored in a separate file on disk.

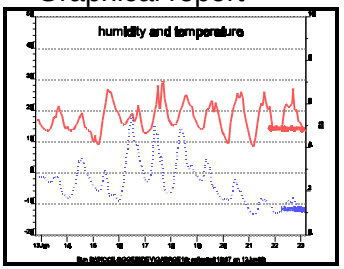
The program can scale the values for a channel to produce a **parameter**: a parameter is a real-world measurement derived from the channel values for a sample. You can use **linear** scaling, **table lookup** or an **equation** to convert the channel values into real-world units.

- Linear conversion is suitable for use with sensors which have a linear response (for example strain gauges and thermocouples)
- table lookup or equation scaling must be used when the sensor output is non-linear, for example a thermistor.
- Equation scaling can be used both for scaling channel data and for combining parameters- for example, you could measure two temperatures, then use an equation to evaluate the temperature difference.

Note: you can also add the values from a channel directly onto a report, if the values are already scaled correctly. There are also a number of special parameters (sample number, time since start of run, etc) which are generated automatically by the program.

A **report** is a text or graphical representation of the data for a run. Text reports can be displayed, printed or written to disk: graphic reports can be displayed or printed.

Graphical report



Text report

Indoor Temp degC	Outdoor Temp degC	Wind Speed km/h	Humidity %RH
16.2	18.0	1492	3890
16.3	18.5	1400	3193
16.3	18.1	1431	3113
16.3	17.8	1883	3080
16.2	17.6	1439	3044
16.2	17.6	1254	2988

Before, during or after collection of data, you can define a number of parameters and reports. During recording, you can display a report to

monitor what is happening: once the run is complete, you can print out reports and output text reports to a disk file.

Each repeat run will be stored in a separate file. The run file contains all details about the run: this includes channels, sampling details, data values, parameters and reports. You can read in a run file at a later date, then display or print existing reports, and new parameters, reports or notes. You can also repeat the run to obtain another set of data, then generate the same reports as for the first run.

3 Quick Guide

The rest of the manual explains in detail the operation of each menu and form in the system. First, here is a quick guide to the things that you are most likely to want to do.

3.1 Installing the PicoLog program

Insert the distribution diskette into drive A and type in a:install. The computer will first ask you what directory to install into, then it will offer you a menu of modules to install (drivers, PicoScope, PicoLog et cetera). If you just want to install PicoLog, make sure that there is Yes next to PicoLog and No next to the other modules.

3.2 Setting up for your computer

Use each of the options on the **Setup menu** to define the type of screen, display, printer and ADC, and the default locations for data and program files.

3.3 Collecting data for the first time

All of the options that you require to start a new run are on the **Collect menu**.

First, select the Define new run option: the computer will first ask for a filename for the new run, then the computer will ask for the sampling details (duration, number of samples), then the channels to collect data from. Once you have specified a filename, the computer will automatically update the file each time you change any of the run details and at regular intervals whilst collecting data.

You may wish to define the parameters to be derived from the data you collect (for example to convert ADC readings to temperatures) and then to define text or graphical reports to display this data while you are collecting data. Use the `Add or edit Parameter` and `Add or edit Report` options.

Next, select `Start collecting`. If you selected a sample interval less than 50ms, the computer will just display a message saying `collecting...` until all samples have been taken. For lower sampling rates, the computer will display the collecting menu, so that you can display reports or modify parameters and reports whilst you are collecting data. For sampling rates faster than one per second, changing the reports and parameters whilst collecting may interfere with data collection.

If you wish to terminate the run before the computer has collected the maximum number of samples, select the `Stop collecting` option. The computer will not let you out of this menu until you have stopped collecting.

3.4 Repeating a run

Once you have successfully carried out a run, it is very easy to repeat the run with the same parameters and reports.
If you exited from the program since you collected the data, you must first read in the run that you wish to repeat, using the `Load old run from disk` option on the **File management menu**.

Once you have loaded the run that you wish to repeat, all of the functions that you require are on the **Collect menu**.

Next, select `Repeat existing run` and specify a new filename for the run. Once you have done this, you can either start collecting with exactly the same samples, parameters, and reports, or you can first edit the details using the `Add or edit...` options.

You start the repeat run exactly the same as the first run, and all subsequent steps are the same.

Use the Edit Notes option to annotate reports with information about each particular run. You can attach the notes to reports: this will also appear if you request a file index for a directory.

3.5 Reports from an old run

If you wish to examine or print reports for an old run, you should first read in the run using the Load existing run option on the **File Management menu**. If you are not sure which run you require, use the File index option to check the notes, date and time and number of records in each of the files in a directory.

Once you have loaded a run, all of the functions that you require are on the **Generate reports menu**.

You can define new parameters and reports, then to print or display the reports. You can also write text reports to disk in a format suitable for entry into a spreadsheet or a database.

3.6 A simple example

The following is an example of a simple experiment, in which you wish to record the voltage across a battery as it discharges in a circuit using an ADC-12.

After you have installed PicoLog on your computer (see section 3.1), you need to set up the details about your system.

1. Type
   ```
   picolog
   ```
   and press Enter. the **main menu** appears.

3.6.1 Setting up the system

1. Select Setup (display, ADC, printer, paths). The **setup menu** appears.

2. To use a colour display, select the Graphics Screen (mono/colour) option.

3. Press the space bar change the screen type from Black and White to Colour.

4. Press F10 to accept this change.

> **Note:** this will not take effect until you next run the program. If you want to start using colour immediately, Press Esc twice to exit from the program, type in picolog again and then repeat steps 1 and 2.

5. Select Interface details (ADC type, port) the **SELECT ADC** form appears.

6. Press the space bar until ADC-12 appears.

7. Press F10 to accept this change. The **EDIT SETUP** form appears.

8. Press the space bar until the required printer port name appears.

9. Press F10 to accept this printer port: the **Setup menu** appears.

> **Note:** There are three more options on the setup menu. If you do not need printed reports and all of your data files will be in the current directory, it is not necessary to use these options. We will ignore them for the purposes of this example.

3.6.2 Checking the ADC

1. Press Esc to return to the main menu

2.Select Display Voltages. the **DISPLAY VOLTAGES** form appears.

if you have set up the interface correctly, the computer will display the ADC value and voltage. Connect your battery and check that the voltage reading is correct.

3. press Esc to return to the main menu.

3.6.3 Collecting data

1. Select Collect Data (new or repeat run): the **Collect menu** appears.

2. Select Define new run: the **DEFINE NEW RUN** form appears.

3. Type in a filename of TEST1

4. Press F10 to accept the filename. The **EDIT SAMPLING RATE** form appears.

5. Set **sampling interval** to 1 and **units** to minutes: this will take one sample every minute. If the maximum time to discharge the battery will be 8 hours, set the maximum number of samples to 480 (8 hours * 60 minutes).

6. Press F10 to accept the sampling details. The **EDIT CHANNEL** form appears.

7. Set the **Channel name** to Battery Voltage and change the **Measurement mode** to DC Volts: leave other fields as they are.

8. Press **F10**: the computer returns to the **Collect menu**.

9. Select **Start collecting**: the computer will say **press any key to start**.

10. Press a key: again, the computer goes back to the data collection menu. The number of samples in the top right window will increase once per minute.

3.6.4 Monitoring during the run

If you wish to see what data you are recording, you must first define a report. You can do this whilst the computer is still collecting.

1. Select `Add or edit report`: the **EDIT REPORTS menu** appears. This shows any reports that you have already defined and the option `<NEW>`.

2. Select `<NEW>` because we wish to create a new report: the **EDIT REPORT** form appears.

3. Set the **report type** to `monitor`. The report name is optional.

4. Press `F10`. The **EDIT MONITOR REPORT** form appears.

5. Move the cursor to the first parameter, then press the space bar until `sample no` is selected.

6. Move the cursor down, then press the space bar till `Battery Voltage` is selected.

7. Press `F10` to save these details. The **Collect menu** appears again.

8. Select `Display report`: the **Display report** menu appears.

9. Select the `monitor` report you have created: the computer will now display the current sample number and the voltage.

3.6.5 Stopping the run early

When the battery is discharged (the voltage has reached a suitably low value) you can stop the run early:

1. Press Escape to return to the **Collect menu**

2. Select Stop collecting to stop the run.

3.6.6 Additional reports on a completed run

You can define reports before, during or after you have collected the data. To add a graphical report once the run is completed:

1. Select Add or edit report. the **Edit Reports menu** appears.

2. Select <NEW> again.

3. Set the name to Battery voltage vs time

3. Change the **Report type** to Y vs time.

4. Press F10: the **EDIT Y VS TIME** form appears.

> **Note:** the **title** for the graph has been set automatically to Battery voltage vs time (the name you entered for the report). You can change it to something different if you wish.

6. Move down to the left axis **units** field and enter Volts.

7. Set **min Y** to 0 and **max Y** to the nearest whole number above the starting battery voltage (say 4).

8. Move down to the first parameter field and press the space bar until the parameter name is Battery voltage.

9. Press F10 to save the details: the **Collect menu** appears.

10. Select Display report: the computer displays a graph of battery voltage against time.

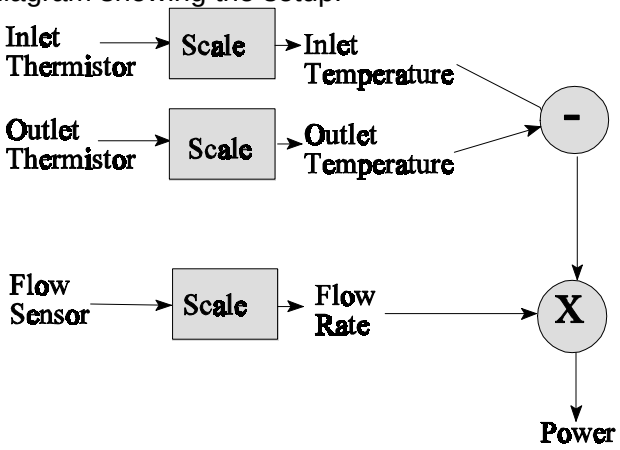
3.7 A more complex example

We shall now work through a complete example which demonstrates most of the functions of PicoLog. Suppose that you wish to carry out a number of experiments to determine the efficiency of a boiler, using various different fuels and burners.

The boiler has two thermistors attached- one to measure the inlet temperature and one to measure the outlet temperature. It also has a flow rate sensor which reports the amount of water flowing through the boiler. All three sensors are connected to an ADC-11.

Each experiment will last five minutes, in the course of which the pump will be manually adjusted to run at five different rates for about a minute each.

Here is a diagram showing the setup:



3.7.1 Checking the ADC

First, we wish to check that the sensors are working correctly.

1. From the **Main menu**, select `Display voltages` option: the computer displays the ADC counts and voltages for each of the channels on the ADC-11.

Channel 1 changes when we increase the inlet temperature, Channel 2 changes when the outlet temperature changes and the frequency of Channel 3 changes when the pump is turned on. See section 3.7.4 for how to check that the values are accurate.

2. Press `Escape` to return to the main menu.

3.7.2 Sampling details

1. Select `Collect data (new or repeat run)`: the computer displays the **Collect menu**.

2. Select `Define new run`. The computer displays the **DEFINE NEW RUN** form.

3. Type in a **Filename** of `BOILER1`

> **Note:** when we repeat this run for subsequent tests, the computer will automatically increment the filename- BOILER2, BOILER3 et cetera.

4. Press `F10` to accept the filename: the computer displays the **EDIT SAMPLING RATE** form.

5. Set the **sampling interval** to `1`

6. Set the **units** to `seconds`

7. Set the **number of samples** to `300` (300 seconds is 5 minutes).

8. Press F10 to accept: the computer now displays the **Edit channel menu**.

3.7.3 Specifying the channels

1. Select Channel 1: the computer displays the **Edit channel form**.

2. Set the **Channel name** to Inlet Thermistor

3. Set the **measurement mode** to ADC counts.

4. Press **F10** to accept these details: the computer displays the **Edit channel menu**.

> **Note:** the entry for channel 1 in the channel menu now says Inlet Thermistor. You can select this option again at any time to change the details for this channel.

5. Select **Channel 2**

6. Set the **channel name** to Outlet thermistor

7. Set the **measurement mode** to ADC counts.

8. Set the **number of readings** to 100: the outlet temperature could vary a lot as the heated water will be at various different temperatures, so it makes sense to take lots of readings and then average them.

9. Press F10 to accept these details and return to the **Edit channel menu**.

10. Select **Channel 3**

11. Set the **Channel name** to Flow meter

12. Set the **measurement mode** to Frequency: the flow meter generates pulses whose speed depends on the flow rate. The frequency measurement is effectively an average, so only one reading will be enough.

13. Press F10 to return to the **Edit channel menu**

13. Press Escape to return to the **Collect menu**.

3.7.4 Thermistor Scaling

We now need to define some parameters to convert the ADC readings into real-world values (degrees C, litres per second et cetera).

1. Select Add or edit parameters the **Edit parameters menu** appears.

2. Select <NEW>: the **EDIT PARAMETER form** appears.

3. Set the **Name** to Inlet temperature,

4. Set **Heading lines 1 and 2** to Inlet and Temp

5. Set **Units** to degC

> **Note:** the degrees symbol Eappears on the screen, but may not appear on all printers. 'deg' will be printed on all printers.

6. Set the **Scaling method** to Table lookup

7. Press **F10**: the **EDIT TABLE LOOKUP SCALING** form appears.

8. Set **Channel** to Inlet thermistor

9. We now need to do some sums. The thermistor input is a 30k ohm Betacurve device connected in series with a 30k resistor to 2.5V. The voltage input to the ADC-11 is (2.5 * Rt)/(Rt+30k). The following table shows the resistance of the Betacurve resistor at temperatures from 0 to C, and the resulting ADC values. and enter the values from columns 4 and 1 into the form as **raw** and **scaled** values

Temperature (degrees C) **SCALED**	Resistance form datasheet	Voltage 2.5*Rt/ (Rt+30k)	ADC counts V * 1023/2.5 **RAW**
0	105.3k	1.946	796
10	62.1k	1.686	690
20	38.1k	1.399	572
30	23.8k	1.106	453
40	15.3k	0.844	345
50	10.1k	0.630	258
60	6.78k	0.461	189
70	4.65k	0.335	137
80	3.24k	0.244	100

10. Press `F10` to save the table lookup values and return to the **Collect data** menu.

11. Select the `Add or edit parameters` menu option

12. Select the `<NEW>` menu option.

13. Set the **name** to `Outlet temperature`

14. Set **Heading lines 1 and 2** to `Outlet` and `Temp`

15. Set the **units** to `deg C`

16. Set the **Scaling method** to `Table lookup`

17. Press **F10** to save the details and go to the EDIT TABLE LOOKUP SCALING form.

18. Set the **Channel** to `Outlet thermistor`

19. Set the **raw** and **scaled values** to the same values as for the inlet temperature.

20. Press `F10` to save the scaling information and return to the **Collect data** menu.

3.7.5 Flow meter scaling

1. Select the `Add or edit parameters` menu option

2. Select the `<NEW>` menu option.

3. Set the **name** to `Flow Rate`

4. Set **Heading lines 1 and 2** to `Flow` and `Rate`

5. Set the **units** to `l/min`

6. Set the **Scaling method** to `Linear`

7. Press **F10** to save the parameter details: the computer will display the EDIT LINEAR SCALING form.

8. Set the **raw parameter** to `Flow Meter`.

9. Time for some more calculations. According to the data sheet, the flow rate sensor outputs a frequency which is 25Hz per litre per minute. Set the **offset** to `0` (litres per minute) and the **slope** to 1 / 25, which is `0.04` (litres per Hz).

10. Press `F10` to return to the **Collect menu**.

3.7.6 Power- a derived parameter

The last parameter to specify is the power, which we calculate from the temperature difference and the flow rate.

1. Select the `Add or edit parameters` menu option

2. Select the `<NEW>` menu option.

3. Set the **name** to `Power`

4. Set **Heading line 1** to `Power`

5. Set the **units** to `kW`

6. Set the **Scaling method** to `Equation`

7. Press `F10` to go to the **EDIT EQUATION SCALING** form.

8. Move the highlight to **parameter A** and press the space bar until **Inlet temperature** appears.

9. Likewise, set **B** to Outlet temperature

10. Set **C** to **Flow rate**.

11. Type in an **Equation** which is `(B-A)*C*4.192/60`: (B-A) is the temperature difference produced by the boiler, C/60 is the number of litres per second and 4.192 is the number of kiloWatt seconds required to heat a litre of water by one degree C.

12. Press `F10` to save the scaling information and return to the **Collect menu**.

3.7.7 Tabulation report

We are now ready to define some reports. We require a tabulation report to output the data to a spreadsheet, and a graph of power versus flow rate

to show how well the boiler works at each flow rate. Either report can be used to monitor progress whilst the experiment is running.

1. Select Add or edit report form the **Collect menu**: the **EDIT REPORT menu** appears.

2.Select <NEW>: the **EDIT REPORT** form appears.

3. Type in a **name** of Spreadsheet - just to remind your self what the report is for when you see it on menus.

4. Select the **Format** Tabulation report

5. Press **F10** to save these details: the **EDIT TABULATION REPORT** form appears.

6. There are two columns of fields below the line that says **Parameter**. Move the cursor to the first **Parameter** field, then select **Flow rate**.

7. Move to the next **Parameter** field and select **Power.**

8. Press F10 to save the details and return to the **Collect Menu**.

3.7.8 X vs Y graph

1. Select Add or edit report form the **Collect menu**: the **EDIT REPORT menu** appears.

2.Select <NEW>: the **EDIT REPORT** form appears.

3. Type in a **name** of Spreadsheet - just to remind your self what the report is for when you see it on menus.

4. Select the **Format** X vs Y graph

5. Press **F10** to save: the **EDIT X VS Y REPORT** form appears.

6. Type in a **Title** of `Power vs Flow Rate`.

7. Move to **Notes** and select `Notes 1`: we can use notes 1 for details of each run on the graph.

8. Move to **Mark points with shapes** and select `Yes`

9. Move to **Join points** and select `No`: for this graph, the connection between points is less important than their position on the XY graph.

10. Move to the **X axis Param** field and select `Flow rate`.

11. Move to the **X axis Min** and **Max** and type in `0` and `50` respectively: this gives a range of 0 to 50 degrees C on the X axis.

12. Move to the **Y axis Param** field and select `Power`.

13. Move to the **Y axis Min** and `Max` and type in `0` and `5000`. This gives a range of 0 to 5000 watts on the axis.

14. Press `F10` to save these details and return to the **Collect menu**.

3.7.9 Notes

To enter some notes for the first run:

1. Select `Edit notes` on the collect menu: this takes you to the **EDIT NOTES** form.

2. Move to the first line of **notes 1** and type in
```
burner type: Egremont AZ35
```

3. Move to the second line of notes 1 and type in
```
Fuel: MAXOIL 230
```

4. Press `F10` to save these details.

3.7.10 Collecting the data

1. Select `Start recording` on the **Collect menu**: the computer says

Press any key to start

2. press a key. The computer starts recording and returns to the **Collect menu**. You can see the sample number at the top of the screen increase once per second.

3. Select **Display report**

4. Select either **Spreadsheet** or **Power graph**: the computer will display the report you requested, and will update the report every time a new sample is taken.

5. Press `Esc` to exit from the report and return to the **collect menu**.

Once the full five minutes has elapsed, the computer will stop collecting data.

3.7.11 Spreadsheet files

Once the run is completed, you can write the spreadsheet to disk:

1. Press Esc to return to the **main menu**.

2. Select `Generate reports (old run)`.

3. Select `Write text report to disk`: the computer displays the **DISK REPORT** menu.

4. There is only one report that can be written to disk: select `Spreadsheet`.

3.7.12 Repeating the run

Once you have entered the details for a run, it is very easy to repeat the run.

1. Press Esc to return to the **Main menu**

2. Select Collect data (new or repeat run)

3. Select Repeat current run : the computer asks for a filename for the new run: it offers the old filename plus one (BOILER1 + 1 = BOILER2) as a default.

> **Note:** if you have just completed a run, PicoLog will assume that you wish to repeat the same run. If, however, you exit from PicoLog between runs, the computer will ask you which run you wish to repeat at this point.

5. Press F10 to save this filename.

6. Select **Edit notes**: the computer displays the **EDIT NOTES form**.

7. Move to the first line of **notes 1** and type in
   burner type: Gloucester AP20

8. leave the second line of **notes 1** still saying
   Fuel: MAXOIL 230

9. Press F10 to save these details and return to the **Collect menu**.

10. Select Start Collecting

11. Proceed as for the first run.

4 Running the program

To run the program, just type in **picolog** then press **Enter**. The program will then display the main menu. Selecting an option on the main menu will lead to other menus: these in turn will lead to forms or graphical displays.

4.1 Menus

```
?444444444444U MAIN MENU W4444444444444@
* Setup (display, ADC, printer, paths) *
* Display voltages                     *
* Collect data  (new or repeat run)    *
* Generate reports (old run)           *
* File management                      *
* Exit from program                    *
B44444444444444444444444444444444444444A
```

Each menu contains a number of options: one of the options is highlighted. Your can move the highlight up and down using the cursor keys, or by typing in the first few letters of the option that you wish to move to. When the highlight is on the option that you require, press `Enter`. To return to the previous level menu, press `Escape`.

> **Note:** some menus (for example lists of files) contain more entries than can be displayed at once: you can bring another page of options into view using the `PgUp` or `PgDn` keys. The `Home` and `End` keys move to the start or end of the menu.

For file menus, the program enables you to browse through all of the files on the computer. To do this, each file menu will contain three types of options:- **drives**, **directories** and **files**.

Drives appear as a single letter followed by a colon. For example, if you have two floppy disks and a hard disk, the letters `A:`, `B:` and `C:` will appear. Selecting a drive will show you the files in the current directory on that drive.

Directories are up to 8 letters long and are contained in angle brackets. The directories shown are sub-directories of the current directory. The

special directory <..> is the parent of the current directory. Selecting a directory will show you the files and sub-directories in that directory.

All other items are files: selecting a file will load it.

4.2 Forms

```
?4444U EDIT PRINTER SETUP W4444@
*                              *
* Printer:       Deskjet      *
* Port:          LPT1         *
* Resolution:    High         *
* Orientation:   Landscape    *
*                              *
B4444444444444444444444444444444A
```

When the computer needs a set of information from you, for example details about a trace, it will display a form on the screen. The form is made up of a number of fields- places where you can enter information and, sometimes, fields where the computer displays information that you cannot change. Normally, each field is preceded by a label which explains what to put into the field.

You can move between fields using the mouse, the cursor keys, Tab, Home and End. To save the details you have entered in a field, press F10: to exit without saving, press Escape.

There are three types of field- **text**, **numeric** and **pick**.

With a text field, you can type in any characters that you like. The backspace key deletes the character before the cursor and the delete key deletes the character at the cursor.

For a numeric field, you must enter a valid number. The computer will not let you move to another field or exit until all numeric fields contain valid numbers.

Pick fields are used when there is only a small number of values you could enter- like a menu, but you can only see one option at once. Press space to move to the next option, minus to move to the previous option and a

few letters to move to the next option beginning with those letters. You can press F2 for a menu showing all possible values for a pickfield.

4.3 Graphic Reports

If you display a graphical report after a run has completed, you can alter the scale, move about the display using the cursor keys and print the view that you have selected. To find out what you can do, press F1: the computer will display a list of options like this:

```
?4444444444444444444444444444444@
* Press cursor key or letter   *
* Keys  Action                 *
* Home  Automatic Scale        *
* < L   Pan Left (earlier)     *
*   H   Pan half left          *
* > R   Pan Right (later)      *
*   Z   Zoom X                 *
*   U   Unzoom X               *
*   +   Zoom Y                 *
*   -   Unzoom Y               *
* •      Pan Up                 *
* –      pan Down               *
*   P   Print graph            *
* Esc X Exit from graph        *
B4444444444444444444444444444444A
```

Once you can remember these options, you can type them in directly, without typing in F1 first.

5 Main menu

When you start up the PicoLog program, it first displays a copyright notice then it displays the main menu:

```
?444444444444U MAIN MENU W4444444444444@
* Setup (display, ADC, printer, paths) *
* Display voltages                     *
* Collect data  (new or repeat run)    *
* Generate reports (old run)           *
* File management                      *
* Exit from program                    *
B44444444444444444444444444444444444444A
```

Move the highlight to the option that you require, then press enter. Most options lead to sub-menus: when you exit from the sub-menu (by pressing escape), you will return to the main menu.

You will normally only need to use the `Setup` menu when you first install the unit.

`Display voltages` is useful to check that the electronics connected to ADC is connected and working properly.

The **Collect menu** contains all of the functions that you will need before and during data collection- specify a filename, define channels, parameters and reports, start and stop collecting and display reports whilst collecting.

The **Generate reports menu** is used once a run is complete, or after you have loaded an old run, to edit parameters and reports and to display or print reports.

The **File management menu** enables you to read in an old run, to copy or delete existing runs and to produce an index of the files in a directory.

The `Exit from program` option is used to exit from the program and return to DOS.

6 Setup menu

The setup menu is usually used only when you are installing the system. It enables you to define the hardware and software configuration for the logger program.

```
?4444444444U SETUP MENU W44444444444@
* Graphics screen (mono/colour)      *
* Interface details (ADC type, port)*
* Graphics Printer details           *
* Text Printer details               *
* Data and backup paths              *
B4444444444444444444444444444444444A
```

6.1 Graphics screen

```
?4444U EDIT SCREEN SETUP W4444@
*                                   *
* Graphics display: Colour          *
*                                   *
B4444444444444444444444444444444A
```

This option enables you to specify how graphs will appear on your screen. If you have a colour display, select `colour`: if you have a monochrome display, try both of the `black on white` and `white on black` options, then decide which looks best on your computer.

> **Note:** that PicoLog uses CGA screens in two colour mode (black and white) to get maximum resolution.

This also affects the use of colour on text displays. No harm will come from using the wrong type, but some menus or graphic symbols may be difficult to see or invisible. If you run into trouble (for example the menus become invisible), delete the file **PICOLOG.SET**.

6.2 Interface options

```
?44UINTERFACE OPTIONSW44444@
*                          *
* ADC:              ADC-16  *
*                          *
B4444444444444444444444444A
```

This menu option enables you to specify the type of interface and the base addresses for the analog and digital boards.

The interface can be the name of a type of Pico ADC, for example ADC-10, TC-08 or DEMO. The DEMO option will provide a set of dummy data for demo purposes, even when no instrument is connected. When you press F10, the computer will ask for more details about the device that you have selected, for example:

```
?444444444UEDIT SETUP 4444444@
*                            *
* Printer port:    LPT1      *
*                            *
B4444444444444444444444444444A
```

See the manual for your ADC for more information about the setup for your particular converter.

6.3 Graphics Printer details

```
?4444U EDIT PRINTER SETUP W4444@
*                              *
* Printer:        Deskjet      *
* Port:           LPT1         *
*                              *
* Resolution:     High         *
* Orientation:    Landscape    *
*                              *
B4444444444444444444444444444A
```

This menu option is used to specify the type of printer to be used for graphics output. You can also specify that you wish to write graphics output to a disk file (Warning! graphic files can be very big). it also enables you to select the quality of graphic reports.

If you have one of the printers listed, just select that option. If not, check your printer manual to see whether it is compatible with one of these types. It will do no harm to experiment, though you may end up with either no output or 30 pages of garbage. If you get really stuck, call Pico: we may be able to help.

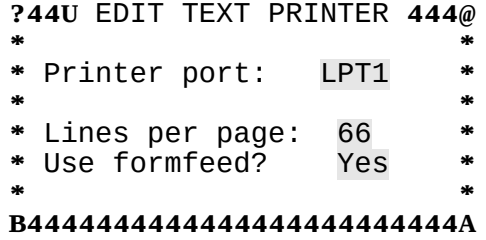
In addition to the standard graphics drivers supplied with PicoLog, there is a disk containing additional graphics drivers for other printer types, plotters and word processor graphics formats.

The printer **port** can be one of `LPT1`, `LPT2` and `File`.

The **resolution** can be `high`, `medium` or `low`. High resolution looks good in reports, but it can take a very long time to print. Low resolution is quicker to print, and its chunky appearance works well on overhead projector slides.

The **orientation** can be `Landscape`, `Portrait` or `Half portrait`. `Landscape` usually gives the best results.

6.4 Text Printer Details



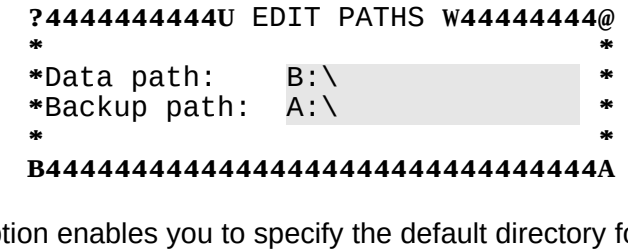
This menu option is used to specify the type of printer to be used for tabulation and other text reports.

The printer **port** can be one of `LPT1`, `LPT2` and `File`.

Lines per page specifies how many lines will fit onto a page, including any header and footer.

Use Formfeed specifies whether the printer can move to the start of a new page automatically when it is sent a Form Feed character. If `yes`, the lines per page can be any number up to the real lines per page. If `no`, you must set lines per page exactly to make the text fit on the page.

6.5 Data and backup paths



This option enables you to specify the default directory for data files, and the path to use for backups.

The **data path** is used when you use the `Load old run from disk` and `Display or print index` option on the **File management menu**. If you ask to load the file for an old run, the program starts by displaying this

directory, but it also offers the option to change to other directories or drives.

The **backup path** is used when you select the `Copy all runs to backup path` option on the **File management** menu: this option copies all run files in the data path to the backup path.

7 Display voltages

This option is useful to check that your system is connected up correctly before starting a run. It produces a continuous display of each of the values that you can measure with the type of ADC that you have specified in the setup. For example, for an ADC-10, the display looks like this:

```
?444444UDISPLAY  VALUES W444444@
*                              *
*    ADC value:   225          *
*    DC Volts:    2.62         *
*    AC Volts:    0.05         *
*    Frequency:   1050.5       *
*    dB           -23.8        *
*                              *
B4444444444444444444444444444A
```

See the manual for your ADC for a more detailed description of the display.

8 Data collection menu

```
?444444 COLLECT MENU W444444@
* Define new run             *
* Repeat current run         *
* Start recording            *
* Display report             *
* Stop recording             *
* Edit sampling rate         *
* Add or edit channels       *
* Add or edit parameters     *
* Add or edit reports        *
* Edit notes                 *
B4444444444444444444444444444A
```

This menu enables you to do all of the things that you might wish to do before or during a run. There are a number of restrictions on what you can do when using this menu. The principal restrictions are:

- you must specify a run filename before doing anything else
- you must enter sampling interval and channel details before starting a run
- you cannot change the sampling interval and channel details whilst a run is in progress or once the run has completed
- you cannot exit from this menu whilst a run is in progress.

Note: the `Define new run` option goes directly to the `Edit sampling rate` and `Add or Edit Channels` options.

8.1 Define new run

```
?4444U DEFINE NEW RUN W4444@
*                          *
* Directory: C:\LOGDATA     *
* Filename:  RUN25          *
*                          *
B4444444444444444444444444A
```

This option is used to specify the filename for a new run. The default path for the file is the one specified using the setup menu, but you can enter a different path if you wish. If you enter a filename that already exists, the program will ask you to confirm that you wish to overwrite the existing file.

This option clears all channel, sample, parameter and run information, so that you can start completely from scratch in defining the details for a new run.

When you press F10, it goes straight to the Edit sampling rate option, and then on to the Add or Edit channels option.

Once you have specified a filename, the computer automatically saves the run file every time you make a change to it.

8.2 Repeat existing run

```
?444444U REPEAT RUN W444444@
*                          *
* Directory: C:\LOGDATA     *
* Filename:  RUN25          *
*                          *
B4444444444444444444444444A
```

This option is used to repeat an existing run. The computer will assume that you wish to repeat the run that is currently loaded: if you wish to repeat a run that you did some time ago, use the Load old run option on the File Management menu.

When you select this option, the computer offers the current run filename with a number at the end incremented (for example, TEST1 becomes TEST2). You can change to a different name if you wish. If you enter a filename that already exists, the program will ask you to confirm that you wish to overwrite the existing file.

This option clears the samples for the existing run, but retains all channel, parameter and report information.

8.3 Start collecting

This option is used to collect data. Before using this option, you must have entered the following details:

- run filename
- sampling rate
- channels

If all of the details have been entered, the computer will display the following window:

```
?44444U COLLECT DATA W44444@
*                          *
*Press any key to start    *
*                          *
B4444444444444444444444444A
```

When you are ready to start recording, press a key. If the sampling rate is too fast to update reports at the same time, it will say **too fast for reports** and the **collect data** window will remain in place until all data has been collected. If the sampling rate is slow, it will return to the **collect data** menu: you can then edit and display reports whilst data is collected. The number of samples will appear in the window at the top right of the screen, and will be updated unless a report is active.

To stop the run before all samples have been taken, select the `Stop collecting` option on the **Collect data** menu.

8.4 Display report

```
?444444U DISPLAY REPORT W44444444@
*Temp diff        Y vs Time Graph *
*All temps        Tabulation      *
*Alarms           Monitor         *
B4444444444444444444444444444444A
```

When you select this option, the program gives you a menu containing the name and type of all of the reports suitable for display whilst data is being collected. Move the highlight to the report that you wish to display, and press Enter.

> **Note:** Monitor reports do not appear on this menu once the run is completed.

8.5 Stop collecting

This option is used to terminate sampling before the maximum number of samples has been collected. Once you have started a run, the program will not let you out of the **Collect menu** until you have stopped the run.

8.6 Edit sampling rate

```
?444444U EDIT SAMPLING RATE 4444444444@
*                                      *
*  Sampling interval:     1           *
*  Units:                 Second      *
*  Number of samples:     500         *
*                                      *
*  Action at end of run:  Stop        *
*                                      *
B4444444444444444444444444444444444444A
```

This option is used to set the interval between samples and the maximum number of samples to be taken. To select as sample every 5 minutes, set the **sampling interval** to 5 and the **units** to Minutes. The **sampling interval** must be a whole number, so if you wish to sample at half-minute intervals you must specify 30 seconds rather than 0.5 minutes.

The **units** can be milliseconds (ms), seconds, minutes, hours and days.

The **number of samples** defines the maximum number of samples to be taken: during data collection, you can stop sampling at any time before the maximum.

You must ensure that the **sampling interva**l is greater than the total sampling time which appears at the bottom of the edit adc-.. channel forms.

Action at end of run defines what to do when all of the samples have been collected. You can select either Stop, which stops collecting, or Repeat, which start a new run. It automatically increments the filename, so that each run file is successively numbered.

8.7 Add or Edit channels

This option is used to specify what data is to be collected for each channel. The format depends on the type of ADC: see the PicoLog section in the manual for your ADC for more details.

```
?4U EDIT ADC-11 CHANNEL W4@
*Channel 1 unused          *
*Thermocouple 1            *
*Thermocouple 2            *
*Channel 4 unused          *
*Channel 5 unused          *
*Channel 6 unused          *
*Channel 7 unused          *
*Channel 8 unused          *
*Channel 9 unused          *
*Channel 10 unused         *
*Channel 11 unused         *
B4444444444444444444444444A
```

For multi-channel ADCs, the computer first displays a menu showing which channels are already allocated. You can either select a channel that is already in use and change the settings, or you can select a new channel.

The computer next asks for information about the channel:

```
?4444444444444U EDIT ADC-10 CHANNEL W444444444@
*                                              *
* Channel name:                Thermocouple     *
*                                              *
* Heading line 1:              Thermo           *
* Heading line 2:              couple           *
*                                              *
* Measurement mode:            DC Volts         *
* Min Frequency:               100  Hz          *
*                                              *
* No of readings:              10               *
* Combination method:          Average          *
*                                              *
* Total sampling time:         1500 us          *
*                                              *
B4444444444444444444444444444444444444444444444A
```

The **channel name** will appear on parameter menus, so that you can use the channel in reports and as inputs to calculated parameters. The two lines of **heading** will appear in the headings of tabulation reports.

The **measurement mode** can be one of the following:

- `ADC counts` - single ADC conversion, scaled in ADC counts
- `Inst Volts` - single ADC conversion, scaled in volts
- `Frequency` - frequency in Hz
- `AC Volts` - RMS AC voltage, excluding any DC component
- `DC Volts` - Average voltage
- dB - AC voltage, expressed as dB (0dB=0.775V)

The `ADC counts` and `Inst Volts` values are derived from single readings. The other parameters are derived by measuring a block of approx 5000 conversions.

Min Frequency is present only when the measurement mode is `Frequency`, `ADC volts`, `DC volts` and dB. Set it to the minimum AC frequency you wish to measure (or ignore for DC volts). It is used to determine the period over which the block of samples is to be taken.

If you just wish to measure simple voltages, use `Inst Volts` if you are collecting data fast (sampling interval is milliseconds). If you are measuring slowly (seconds or longer), use `DC volts` to get a better average reading.

Data collected using measurement mode `ADC counts` occupies less space on disk: if you are collecting a lot of data, is worth while using this measurement mode, then defining a parameter to convert it to a scaled value.

When a channel value is used as a parameter, the units are set automatically according to the measurement mode.

The **number of readings** specifies how many readings will be taken for each sample. The **combination method** defines how the readings will be combined to form a sample. It can be `minimum`, `maximum` or `average`. `Average` is useful to reduce the effects of noise: `Minimum` and `Maximum` can be used to identify extreme values during the sample interval.

The **total sampling time** is the total time required to collect the readings for all channels. It must be less than the sample interval.

> **Note:** previous versions of PicoLog had a sensor minimum/maximum option. This option was not very useful, and has been removed.

8.8 Add or Edit parameters

```
?4U EDIT PARAMETERS W44@
*<NEW>                 *
*Air temperature       *
*Water temperature     *
B4444444444444444444444A
```

This menu enables you define new parameters and edit existing parameters. A parameter is a value calculated from one or more other parameters or channels: it is normally used as a way of scaling a channel

value in ADC counts, volts or Hz to give a parameter value in engineering units- for example degrees C, volts or kilowatts.

> **Note:** channel names do not appear on this menu because you cannot edit them other than as ADC channels, though channels may be used as parameters in nearly all other places.

Select the <NEW> option to add a new parameter, or one of the other entries to edit that parameter.

```
?444444444444U EDIT PARAMETER W444444444444@
*                                           *
* Name:           Air temperature           *
*                                           *
* Heading line 1: Air                       *
* Heading line 2: Temp                      *
* Units:          C                         *
*                                           *
* Field width:    5                         *
* Decimal places: 1                         *
*                                           *
* Scaling:        Linear                    *
*                                           *
B4444444444444444444444444444444444444444444A
```

The **parameter name** and **units** will appear on menus and on graphs. The **headings** and **units** will appear on tabulated reports.

The **field width** and **decimal places** are used to define the format of information in tabulated reports: With a field width of 6 and 2 decimal places, a number will appear as ddd.dd. **Field width** must be 1..8 and **decimal places** must be less than **field width**.

The **scaling** is usually used to convert a channel value into some engineering units, for example pressure or temperature. The scaling method can be `Linear`, `Table lookup` or `Equation`.

- `Linear` scaling is suitable for use when there is a linear relationship between the voltage produced by a sensor and the

parameter that it measures- for example, strain gauges and thermocouples.

C Table Lookup is useful when you have a set of input reading for different values of the parameter that you wish to scale.

C Equation can be used when it is possible to calculate the relationship between input reading and parameter value. You can also use equation scaling to evaluate a parameter which is derived from one or more other parameters- for example, to calculate shear modulus from stress and strain.

On pressing F10, the computer will present a form which asks for further details for the selected scaling method.

8.8.1 Linear scaling

```
?4444444U EDIT LINEAR SCALING W444444444@
*                                        *
* Scaled parameter: Air temperature      *
* Raw parameter:    Thermocouple 1       *
*                                        *
* Offset:          -127.50               *
* Slope:            3.56      per lsb    *
*                                        *
B44444444444444444444444444444444444444A
```

Linear scaling is the simplest way of converting a channel value (the raw parameter) into engineering units (the scaled value).

The **raw parameter** specifies the input parameter (usually a channel) that is used to calculate this parameter.

Note: don't forget to set the raw parameter.

The **slope** and **offset** is used to convert raw parameter into a scaled parameter value, using the formula

scaled = offset + slope * raw

If, for example, you use a thermocouple amplifier which outputs the temperature in degrees C at 10mV per degree C, with an ADC-11, the calculation is as follows.

The ADC-11 outputs an ADC value of 1023 at 2.5 volts (2500mV). so the slope is 2500/(10*1023)= 0.2444. If, for some reason, the thermocouple registers 3 degrees C when immersed in ice, it needs an offset of -3 degrees. The offset is therefore -3 and the slope is 0.2444.

The maximum and minimum ADC values are as follows.

> **Note:** bear in mind that Pico ADCs are typically 1% accuracy- see spec for more details.

ADC	Min voltage	Max voltage	ADC Range
ADC-10	0	5	0..255
ADC-11	0	2.5	0..1023
ADC-12	0	5	0..4095
ADC-16	-2.5	2.5	8 bit: -255..255 9 bit: -511..511 10 bit:-1023..1023 11bit: -2047..2047 12 bit:-4095..4095 13 bit:-8191..8191 14 bit:-16383..16383 15bit:-32767..32767 16bit:-65535..65535
ADC-22	0	2.5	0..1023
ADC-100	-range	+range	0..4095
TC-08	n/a	n/a	n/a

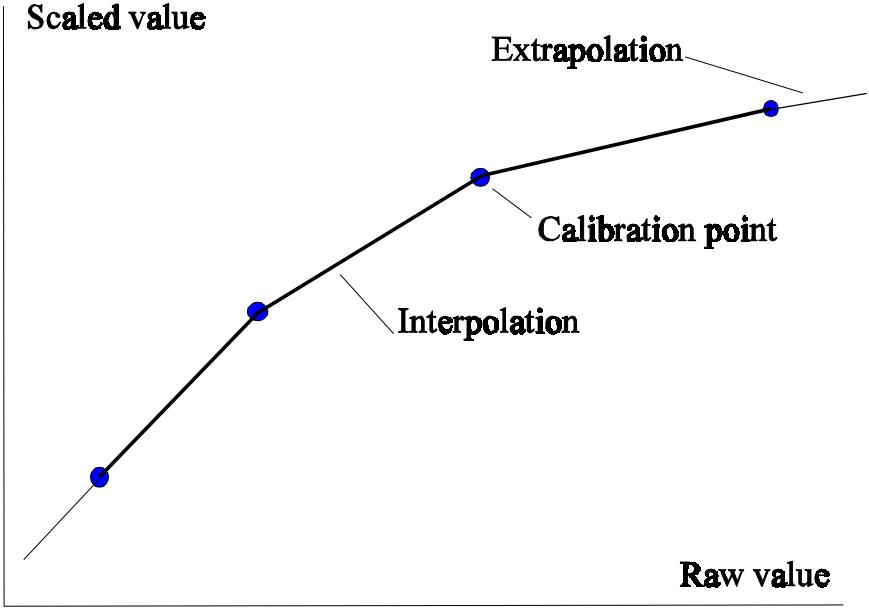
8.8.2 Table lookup scaling

```
?444U EDIT TABLE LOOKUP SCALING W4444@
*                                    *
* Parameter: Air temperature         *
* Channel:   Thermistor 1            *
*                                    *
* Extrapolate below:  Yes            *
* Extrapolate above:  Yes            *
*                                    *
* Raw value       Scaled value       *
*    1621             60             *
*    2204             55             *
*    3645             45             *
*    5870             30             *
*                                    *
B4444444444444444444444444444444444A
```

Table lookup scaling is a way of converting a channel value in ADC counts into a parameter value in engineering units. It works even if the relationship between raw and scaled values is not linear, for example with thermocouples. Before using this menu option, you need to have measured or calculated the raw values corresponding to a set of scaled values covering the range that you wish to measure.

The **channel** is used to select the channel that is used to calculate this parameter.

Extrapolate above/below specifies what to do if the raw value is outside the range of values supplied. If the value is below the minimum and extrapolate below is **Yes**, it will extrapolate downwards from the lowest two raw values. If extrapolate below is **No**, it will set the scaled value to **MISSING**.



The raw and scaled values are used to convert the raw channel value from ADC counts into a real-world parameter value. The computer selects the raw values immediately above and below the raw value which must be scaled, then uses linear interpolation between the two corresponding scaled values to estimate the parameter value. You can specify up to 10 raw/scaled value pairs.

> **Note:** next time you edit the values, the entries will have been sorted into increasing raw value order.

The raw and scaled values can either be calculated from details supplied with the sensor, or can be determined empirically by measuring a range of parameter values and noting the corresponding raw values.

> **Note:** the raw value will change if you change the resolution for a channel.

You can check whether your lookup table looks sensible by pressing F3 to display a graph of raw vs scaled values, or F4 to print the same graph.

8.8.3 Equation scaling

```
?44444444U EDIT EQUATION SCALING W444444444@
*    Parameter name                          *
* A: Cold water temp                         *
* B: Hot water temp                          *
* C: <NONE>                                  *
* D: <NONE>                                  *
* E: <NONE>                                  *
* Equation:                                  *
* (B - A) / 80                               *
*                                            *
B4444444444444444444444444444444444444444444A
```

Equation scaling is useful when it is possible to calculate the scaled value for a parameter from the raw data: it is also useful to derive parameters which are a combination of more than one channel or parameter.

A to **E** are the channels or parameters that are to be used in the equation. These parameters are referred to as **A**..**E** within the equation.

The equation can be any combination of the variables **A**..**E**, numbers, mathematical operators and the functions `exp`, `log`, `ln`, `power`, `mod`,`sqrt` and `abs`. For example, to convert the voltage across a 330 ohm resistor into a current (I = V/R), you could use the formula `A/330`.

8.9 Add or Edit reports

```
?44444444U EDIT REPORT W444444444@
*<NEW>                              *
*Temp diff        Y vs Time Graph  *
*All temps        Tabulation       *
*Alarms           Monitor          *
B4444444444444444444444444444444A
```

This menu option is used to specify the reports that you wish to use. If you specify reports before collecting data, you can view them whilst sampling is in progress. You can also define additional reports after sampling has been completed, or even after you have saved the report and reloaded it at a later date. Select the <NEW> option to add a new parameter, or one of the other entries to edit that parameter.

```
?4444444444444U EDIT REPORT W444444444444@
*                                          *
*Name:       Temp diff                      *
*                                          *
*Format:     Y vs time graph                *
*                                          *
B4444444444444444444444444444444444444444A
```

The report **name** will appear on menus. You don't have to give names to reports, but names are useful if you have more than one report of each type.

The **format** can be one of `Monitor`, `Tabulation`, `Y vs Time` or `X vs Y`.

- `Monitor` reports are useful during data collection: you can display the current value of up to 8 parameters, and set alarm limits on their values.

- A `tabulation` report is a text report with one sample per line. Each line contains the data values for up to 8 parameters.

- A `Y vs time graph` is a graph of up to 10 parameters against time.

- An `X vs Y graph` is a graph of any parameter against any other parameter. This is useful when the parameters are not time dependent, or to look for other relationships between parameters- for example temperature outdoors vs electricity used.

When you press `F10`, the computer will display a form which requests details for the specified report.

8.9.1 Monitor report

```
?444444444444444U EDIT REPORT W444444444444@
*                                            *
*Pos Parameter       Min alarm Max alarm     *
* 0  Sample no                               *
* 1  Air temp          10                    *
* 2  Water temp                    80        *
* 3  <none>                                  *
* 4  <none>                                  *
* 5  <none>                                  *
* 6  <none>                                  *
* 7  <none>                                  *
B4444444444444444444444444444444444444444444A
```

During data collection, a monitor report can be used to display the current values of up to 8 parameters, and to sound an alarm if any parameter goes out of limits.

Set one or more entries in the **parameter** column to the parameters that you wish to monitor. To set an alarm threshold, enter a value in the corresponding **min** or **max** column.

8.9.2 Tabulation report

```
?4444444444U EDIT TABULATION REPORT W4444444444@
*                                                *
* Title: Summary of temperatures                 *
* Notes: None                                    *
*                                                *
* First Sample:      1       Max columns: 80     *
* Last Sample:       65000   Justify:     Left   *
* One sample every:  1       Timestamp:   None   *
*                                                *
*  Parameter                                     *
*  Sample no                                     *
*  Air temperature                               *
*  Water temperature                             *
*  <none>                                        *
*  <none>                                        *
*  <none>                                        *
*  <none>                                        *
*  <none>                                        *
*                                                *
B4444444444444444444444444444444444444444444444A
```

A tabulation report can be used to provide a hardcopy listing of the measurements for a run, or to display the numerical results during the run. If you write a tabulation report to a disk file, you can then read it into a spreadsheet for further analysis.

A typical report looks like this:

```
                Weather report
                  Cromarty, 12Jun93
 Date      Time    Indoor  Outdoor  Wind   Humidity
                   Temp    Temp     Speed
                   degC    degC     km/h   %RH
12Jun93  18:42    16.2    18.0     1492   3890
12Jun93  18:47    16.3    18.5     1400   3193
12Jun93  18:52    16.3    18.1     1431   3113
12Jun93  18:57    16.3    17.8     1883   3080
```

The **title** will appear on each page of the tabulation report, as will the heading details for each of the parameters that you select.

The **notes** option can be either None, Notes 1 or Notes 2. This specifies whether any of the notes for this run are to appear in the heading. This is useful if you carry out a number of similar runs: the report title can be the same for every run, but the notes contain information specific to each run.

First sample and **Last sample** specify the range of samples that you wish to appear in the report.

One sample every is useful if you have a lot of samples: you can generate a report which contains only one sample every 10.

Max columns specifies how wide the report is to be: it only has any effect if you specify right or centre justify.

Justify affects the positions of the columns for each parameter across the page. It can be one of:

- left - display the parameters at the left hand side of the page
- centre - put the parameters in the middle of the page
- right - spread the columns evenly across the page.

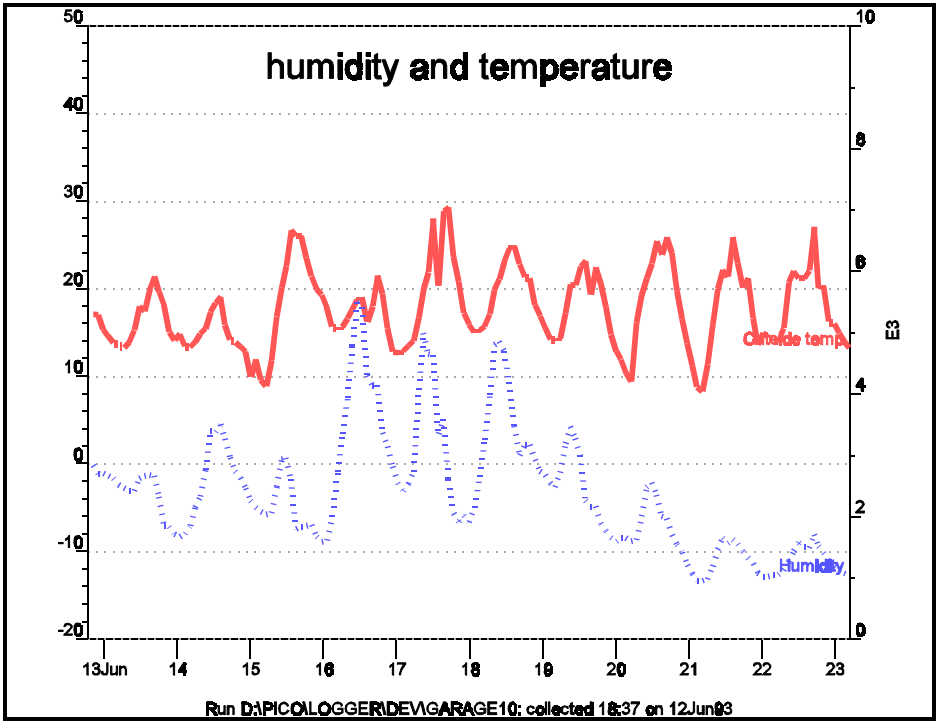
The **timestamp** provides a facility to display the time and/or date at which a sample was taken, at the start of each line. It can be None, Date, Time or Date and time.

Set one or more entries in the **parameter** column to the parameters that you wish to appear on the report.

If the run is in progress or completed, press F3 to display the report.

8.9.3 Y vs Time Report

A y vs time report is a graph of up to ten parameters against time. Here is a typical example:


humidity and temperature
50
40
30
20
10
0
-10
-20
10
8
6
4
2
0
E3
Outside temp
Humidity
13Jun
14
15
16
17
18
19
20
21
22
23
Run D:\PICO\LOGGER\DEV\GARAGE10: collected 16:37 on 12Jun03

```
?44444444444U EDIT Y VS TIME REPORT W444444444444444@
*                                                    *
* Title: Temperature vs time                         *
* Notes: None                                        *
*                                                    *
* One sample every: 1       Format:   Linear         *
* Min x:      0                                      *
* Max x:      5000                                   *
*                                                    *
*             Left axis     Right axis               *
* Enabled       Yes            Yes                   *
* Label         Temp           Diff                  *
* Units         deg C          deg C                 *
* Min y         5              -10                   *
* Max y         30             10                    *
*                                                    *
* Parameter           Axis   Parameter        Axis    *
* Air temperature     Left   <none>           Left    *
* Water temperature   Left   <none>           Left    *
* Temp difference     Right  <none>           Left    *
* <none>              Left   <none>           Left    *
* <none>              Left   <none>           Left    *
*                                                    *
B4444444444444444444444444444444444444444444444444A
```

This report enables you to plot a graph of up to ten parameters against time. You can attach a y axis to the left side, the right side or both. **Both** is useful if you have two parameters with different units, or with the same units but significantly different magnitudes.

The **title** and **notes** will appear at the top of the graph. The **notes** option can be either `None`, `Notes 1` or `Notes 2`. This is useful if you carry out a number of similar runs: the title can be the same for every run, but the notes can contain information specific to each run.

One sample every is useful if you have a lot of samples. You can generate a report which contains (say) only one sample every 10: this will display and print much quicker.

Min and **max x** specify the range to be displayed on the graph, in the units of the sampling interval (eg for a sampling interval of 500ms, the units are milliseconds). Once the run is completed, you can alter the x scale whilst displaying the graph.

The **format** defines for format for the scale on the X (time) axis. It can be `linear` (for example 0..5000 minutes) or `date/time` (for example 16:20 to 21:45 or 03Jul92 to 12Jul92).

> **Note:** the min and max X must still be specified in linear time, even if you select `date/time` format for the x axis scale.

The graph can have an axis scale on each side, so that parameters measured in different units can be displayed on the same graph. The parameters can then be assigned to either the left of the right axis. If all of the parameters have the same scale, only one axis is necessary.

The two **enabled** fields say whether an axis is to be displayed on the corresponding side. If, for example, all of your readings are temperatures, you can use the same scale for all parameters. If you want to display a voltage and a temperature use both scales.

Label and **units** are added as notes to the corresponding axis.

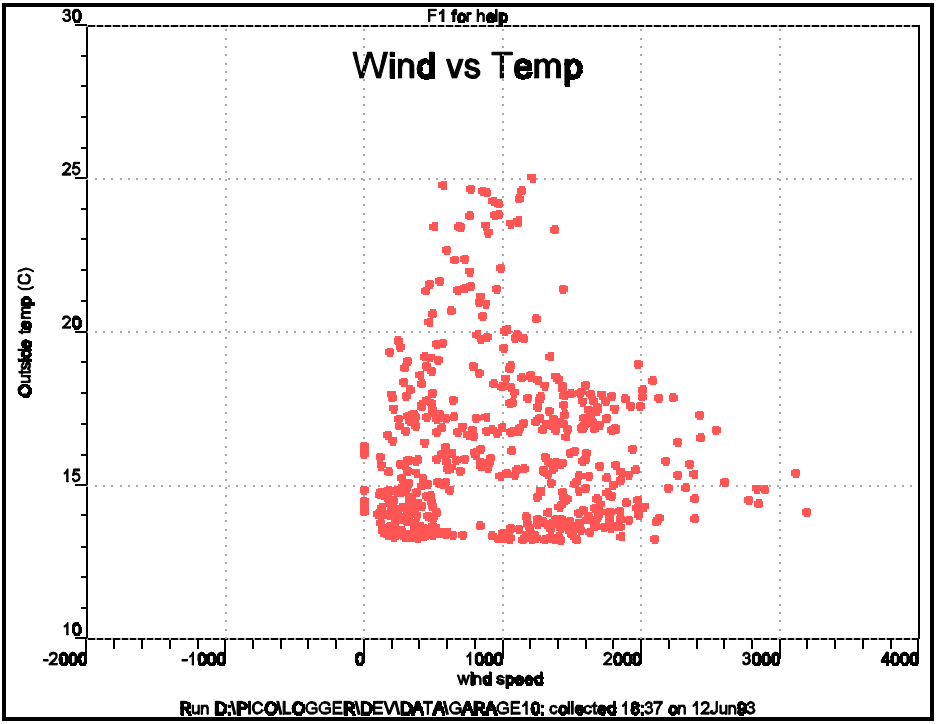
Min y appears at the bottom of the axis and **max y** appears at the top of the axis.

The four **parameter** options specify which parameters are to appear on the graph: unused parameters should be left at `<NONE>`. You can specify that the parameters are scaled using either the `left` axis or the `right` axis.

If data collection is completed, you can press `F3` to display the report. Press `F10` to save the details.

8.9.4 Edit X vs Y report

An X vs Y graph is a plot of one parameter against another. A typical graph looks like this:



This is the form to set up the graph:

```
?444444444U EDIT X VS Y REPORT W444444444@
*                                          *
* Title: Temperature vs Pressure            *
* Notes: None                               *
*                                          *
* Every nth point:       1                 *
* First sample:          1                 *
* Last Sample:       65000                 *
*                                          *
* Mark points with shapes:   Yes           *
* Join points with lines:    Yes           *
*                                          *
*         X axis           Y axis          *
* Param   Temperature      Pressure        *
* Min     20               0               *
* Max     80               200             *
*                                          *
B4444444444444444444444444444444444444444A
```

The **title** and **notes** will appear at the top of the graph. The **notes** option specifies whether any of the notes entered using the **Edit notes** option will be added to the title. It can be either `None`, `Notes 1` or `Notes 2`. This is useful if you carry out a number of similar runs: the title can be the same for every run, but the notes can contain information specific to each run.

Every nth point is useful if you have a lot of samples. You can generate a report which contains (say) only one sample every 10: this will display and print much quicker.

The **First point** and **Last point** specify the range of points to display.

Mark points with shapes and **Join points with lines** are two alternative ways of drawing the graph. Mark draws a symbol at every point: Join draws a line between successive points. Join is useful when there is some relationship between successive points. You can turn both of these on, but normally only one is necessary.

The **min** and **max** values specify the range to be displayed on the graph. Once the run is completed, you can alter the scale whilst displaying the graph.

8.10 Edit Notes

```
?44444444444444U EDIT NOTES W44444444444444@
*                                            *
*Notes 1:                                     *
* Readings taken 25th Aug 92                  *
* Strain gauge failed during test             *
*                                             *
*Notes 2:                                     *
*                                             *
*                                             *
*                                             *
B4444444444444444444444444444444444444444444A
```

This option enables you to view or enter a number of items of information about the current trace. The report editing options enable you to specify whether one or other sets of notes appear on the report.

9 Generate reports

```
?44444U GENERATE REPORTS W44444444@
* Add or edit parameters          *
* Add or edit reports             *
* Edit notes                      *
* Display report                  *
* Print reports                   *
* Write text report to disk       *
* Display run setup               *
B4444444444444444444444444444444A
```

This menu provides you with all of the functions that can be used once a run has been completed. You can add or edit parameters and reports, and display reports. In addition, you can print out reports and write text reports to disk. You can also display the run setup - full details of the channels, parameters and reports for the current run.

9.1 Add or Edit parameters

This menu option is identical to the `Add or edit parameters` option on the **Collect menu**.

9.2 Add or Edit reports

This menu option is identical to the `Add or edit reports` option on the **Collect menu**.

9.3 Edit notes

This menu option is identical to the `Edit Notes` option on the **Collect menu**.

9.4 Display report

```
?444444U DISPLAY REPORT W44444444@
*Temp diff       Y vs Time Graph *
*All temps       Tabulation      *
B4444444444444444444444444444444A
```

When you select this option, the program gives you a menu containing the name and type of all of the reports suitable for display once a run is completed. Move the highlight to the report that you wish to display, and press Enter.

> **Note:** Monitor reports do not appear on this menu once the run is completed.

If you display a graphical report, you can alter the scale of the graph and select which portion is displayed: press F1 for help while the graph is displayed. See section 4.3 for a description of this function.

9.5 Print report

```
?444444U PRINT REPORT W44444444@
*Temp diff     Y vs Time Graph *
*All temps     Tabulation      *
B4444444444444444444444444444444A
```

When you select this option, the program gives you a menu containing the name and type of all of the reports suitable for printing. Move the highlight to the report that you wish to display, and press Enter.

9.6 Write text report to disk

```
?444444U DISK REPORT W44444444@
*All temps     Tabulation      *
B4444444444444444444444444444A
```

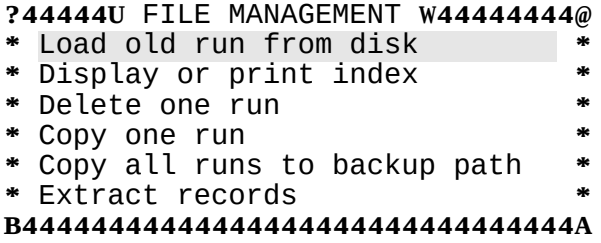
This option is used to write text to a disk file, so that you can import it into a word processor, spreadsheet or database.

When you select this option, the program gives you a menu containing the name and type of all text format reports. Move highlight to the report that you wish to display, and press Enter.

9.7 Display run setup

When you select this option, the program displays details of all channels, parameters and reports for this run. You can use it to check on the setup. If you press F5, the program will print out a hardcopy version of the setup.

10 File management



10.1 Load old run from disk

When you select this option, the program displays a menu of all of the run files in the data directory defined in the setup. It also displays all of the directories in this directory and all of the drives. You can either select one of the files in the current directory, or select a different directory or drive to see what run files there are in that directory.

10.2 Display or print index

When you select this option, the program produces a report showing details for each of the files in the data directory. The details displayed are the filename, date, time, number of samples and the first line of notes 1.

10.3 Delete one run

When you select this option, the computer displays a menu like the one to load a file. When you select a file, the program asks you to confirm that you wish to delete the file, then it deletes that file.

10.4 Copy one run

When you select this option, the program first displays a menu like the one to load a run. When you select a file, it displays the following form:

```
?4444444U COPY RUN TOW444444@
*                           *
*Directory: C:\LOGDATA       *
*Filename:  RUN25            *
*                           *
B44444444444444444444444444A
```

Type in the new filename and directory, then press F10. The computer will copy the file to the new directory and file.

10.5 Backup all runs

When you select this option, the computer will copy all files from the data directory to the backup directory. On completion, it will display a report showing the status of each copy.

10.6 Extract records

```
?4444U EXTRACT RECORDSW44444@
*                           *
*Directory: C:\LOGDATA      *
*Filename:  RUN25           *
*                           *
*First sample:    1         *
*Last sample:   2230        *
*                           *
B4444444444444444444444444A
```

This menu option is used to extract a range of samples from a file and to create a new file containing the samples. This is useful if you have collected several thousand samples in order to catch an event, but you wish to save only a couple of hundred points around the event.

When you select this option, the computer displays a form to ask for the details that you wish to extract.

The **filename**, **first sample** and **last sample** contain the details for the current file. You should change the filename to name of the file that you wish to create (for example, RUN25A in this case). Next, you should enter the sample number of the first and last sample that you wish to copy. Once you have entered these details, press F10 to start the copy.

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