PicoScope for Windows R5.06 user guide

This user guide contains over a hundred pages of information about the PicoScope for Windows program. Please take a few minutes to read chapters 1 and 2, as this will quickly give you an understanding of the features available.

Chapter 1:	**Overview**	Introduction and safety information
Chapter 2:	**Views**	Major functions (Scope, Spectrum, Meter...)
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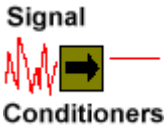
Glossary		A handy A to Z guide of terms used
Whats New		A quick overview of new features in R5.06

Other related documents



Chapter 1: Overview

- Introduction
- Getting Help
- What PicoScope does
- Screen layout
- Desktop
- Printing
- Exporting Data
- Triggering
- Customisation
- Legal and Licensing info
- Safety Warning- Grounding

Other chapters: Views How To... Menus Dialogs Control bars Technical information Glossary

Introduction

This document contains over a hundred pages of information about the PicoScope for Windows program. Please take a few minutes to read chapters 1 and 2, as this will quickly give you an understanding of the features available.
There are separate help files that contain information about Pico Signal conditioners and troubleshooting.

Getting help

When running PicoScope, you can get straight to the right topic in this help file in one of three ways:

- point the mouse cursor at the item you are interested in, then press the F1 button
- press the **Help** button in a dialog
- select either **Contents** or **Index** in the Help sub-menu

Once in this file, you can locate the information that you require as follows:

- Press the **Contents** button on the control bar above for a full list of the items covered in this file
- Press **Index** on the control bar above and then specify a keyword that describes what you are looking for.

What PicoScope does

Picoscope for Windows enables you to use your computer together with a Pico analog to digital converter (ADC) as an oscilloscope, a spectrum analyser and a meter. PicoScope uses an ADC to take sequences of voltage measurements from one or more inputs. It then displays the data in one or more views. These views can present the data in one of four formats:

- as an oscilloscope
- as a spectrum analyser
- as a meter.
- as an XY oscilloscope.

It is also possible to create a composite view, which shows a number of other views either side by side or overlaid.

Advantages

PicoScope replaces a number of bulky and expensive pieces of test equipment. This saves you money, and keeps your workbench clear for the equipment that you are working on.

Switching between instruments is quick and easy: the ADC is already connected, so you can start up a new instrument under software control.

PicoScope has many features not available on a conventional scope or spectrum analyser:

- auto-ranging
- on-screen display of voltages and times
- printing to high-quality printers
- save/restore traces
- etc...

Screen layout

The Picoscope window is divided into three areas:

- The central area (the Desktop) is initially empty and is used to display views of the data read from the ADC. You can display several views, each in a separate child window.
- The view bar along the top of the screen provides the most commonly used controls for the currently active view. Each type of view has a different view bar.
- The sample bar along the bottom of the window shows the current sampling status and provides controls for triggering.

Desktop

The desktop is the central area of the screen. It contains a number of views which show the data that you currently wish to display.

You can save the current desktop in three ways:

- save to a data file - you can then re-load the file to see the data again.
- save to a setup file - you can then re-load the file to use the same settings, but without the data. You can then read in more data using the same settings.
- use save settings - next time you start PicoScope for Windows it starts up with all of the same windows and settings.

You can also save the data for a particular view, in one of two formats:

- as a text file, suitable for importing into Excel
- as a graphics file (Windows Metafile), suitable for desktop publishing

Customisation

You can customise PicoScope in several ways:

- using the options on the File | Setup menu
- add a menu of standard tests or examples
- add custom ranges in units other than volts (for example, in pressure units)

Printing

You can print either one view (the active view) or all views. Each view appears on a separate page. The print-out can be in landscape or portrait format.

If you need a screen dump which shows all views on the same page, press the PrintScreen key to write the screen to the clipboard then paste the screen into the Paintbrush utility program. You can then print it from Paintbrush.

Exporting data

You can use the clipboard to export data from PicoScope so that you can use it in other applications.

For word processors, you will probably want to export the data in Graphical format so that it appears in your document as a picture. If you wish to use a spreadsheet to carry out some numerical processing on the data, you should use text format.

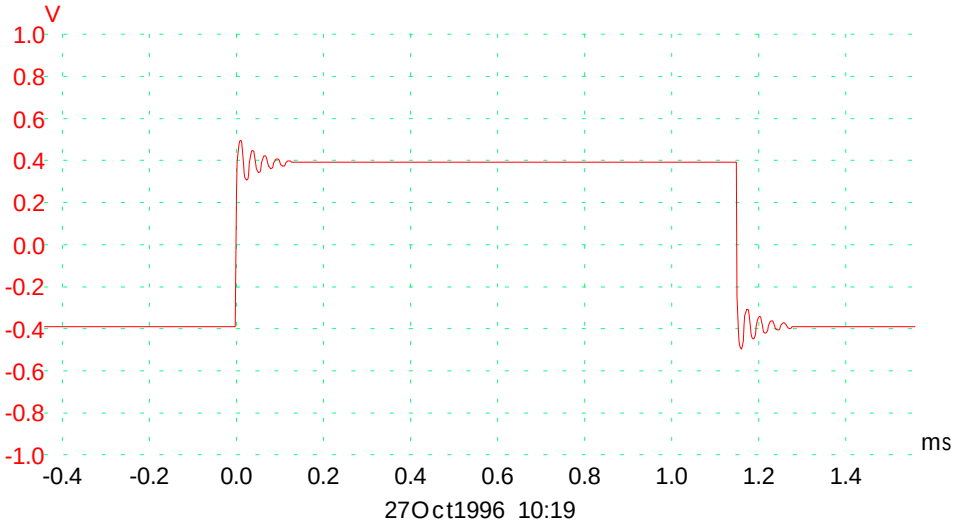
You can use Dynamic data exchange to continuously update the data in another application. The easiest way to do this is to use the **Edit | Paste** link option in the target application.

When you use the clipboard to copy text data, it copies only the data that is displayed. This will be affected by the X multiplier and by the maximum number of points that can be displayed. If you wish to transfer all readings to another application, use the **File | Save as** option and save the current view as a text file.
You can also use the **File | Save as** option to save the current view as in graphical format as a Windows Metafile.

Triggering

For scope and spectrum views, it is possible to specify a trigger event for collecting the block of data. The block of data can be collected immediately after the trigger event, or it can be a specified delay (expressed as a percentage of the scan time) after the trigger event. A negative trigger delay means that part or all of the data block is before the trigger event.

The trigger event occurs when the signal level for the specified channel crosses a threshold. It is possible to select whether the event is a rising or a falling as it crosses the threshold. The following diagram shows a rising trigger event, with a delay of -20%.



If the trigger event occurs only once, it is useful to be able to stop immediately after collecting the data for the trigger event. You can do this by checking the **Stop on trigger** option in the Trigger dialog, or by setting the trigger mode to **Single** in the sample bar.

Note: If you turn off auto-trigger when using a product other than the ADC-200, PicoScope locks the computer until a trigger event occurs. If PicoScope does become stuck, click on the Stop button in the sample bar, then press F9 (16-bit applications) or F10 (32-bit applications) to cancel the trigger.

If a particular event only occurs very occasionally, it is useful to leave PicoScope running with the **Save on trigger** option set. Each time a trigger event occurs, the data is written to a sequence-numbered file. You can later examine the data using the PgUp/PgDn keys to take you through the sequence of recorded events.

The same trigger settings apply to all views.

Safety Warning

For all Pico ADCs, except the ADC-101, the ground input of the ADC is connected directly to the ground of your computer, in order to minimise electrical interference.

Do not connect the ground input of the ADC to anything which may be at some voltage other than ground, as you may risk damage to the ADC and your computer. Furthermore, if you connect the ADC ground to something which is ‘live’, your computer chassis may become live.

If in doubt, check by connecting a channel input to the doubtful ground point, and check that there is no significant AC or DC voltage.

Legal info

Licensing
The demonstration version of PicoScope for Windows may be copied and used freely.

Each Pico Technology ADC includes a licence to use the production version of PicoScope for Windows. You can keep copies of PicoScope for Windows on more than one computer, as long as a Pico Technology ADC is attached to the computer while you are using PicoScope for Windows.

Liability
Pico Technology Limited does not accept responsibility for any loss or injury caused by the use of Pico Technology equipment or software. It is the user's responsibility to ensure that the product is suitable for the user's application.

Trade marks
Windows is a registered trademark of Microsoft Corporation.

Pico Technology Limited and PicoScope are internationally registered trade marks.

DrDaq is registered trade mark of Pico Technology Limited.

Whats New In R5.06

This section is intended for users who have upgraded from older software and want a quick overview of what has changed.

1. R5.06 adds a number of new measurements into the spectrum analyser view such as Total Harmonic Distortion (THD) and Signal to Noise Ratio (SNR). Consult spectrum measurement types for more details.
2. There are now two spectrum rulers (X and O) which can be either horizontal or vertical rulers.
3. There is a new facility to scroll and magnify the spectrum Y axis

Whats New in R5.05

1. Support for the DrDAQ data logger
2. New automated parameter measurments for the scope (rise time, pulse width, duty cycle...)
3. 'Drag and drop' control for trigger level
4. Improved spectrum analyser resolution (upto 4096 points)
5. Custom scaling now supports decimal points

Chapter 2: Views

- About views
- Scope View
- Spectrum view
- Meter view
- XY view
- Composite view

Other Chapters: Overview How To... Menus Dialogs Control bars Technical information Glossary

About Views

There are four basic types of view:

- an oscilloscope display, with all of the features of a modern storage oscilloscope
- a spectrum analyser, showing the power at each of a range of frequencies
- a meter, which can show the DC voltage, AC voltage, frequency or dB
- an XY oscilloscope display, which shows one channel against another (for Lissajous figures, phase analysis etc)

In addition to the basic views, there is a composite, which displays up to four other views within the same window.

You can have several views open on the desktop, though PicoScope will run slower if you have a lot of views. If Picoscope gets too cluttered, you can easily close down individual views, or you can close all views on the desktop. Alternatively, you can re-arrange the views, or convert them to icons then re-instate them when you need them.

If you have more than one view, it is worthwhile changing the title of the views to indicate what type of data they contain - you can set the title using the Options dialog for the view. The title appears in several places:

- on the bar at the top of the view window
- on print-outs of views
- on the Windows pull-down menu
- on icons for iconised views

One of the views on the desktop is the active view - the bar at the top of the window is dark, rather than the same colour as the background. You can switch between views using all of the usual Windows methods. For example, you can activate a view by clicking the left mouse button over the view.

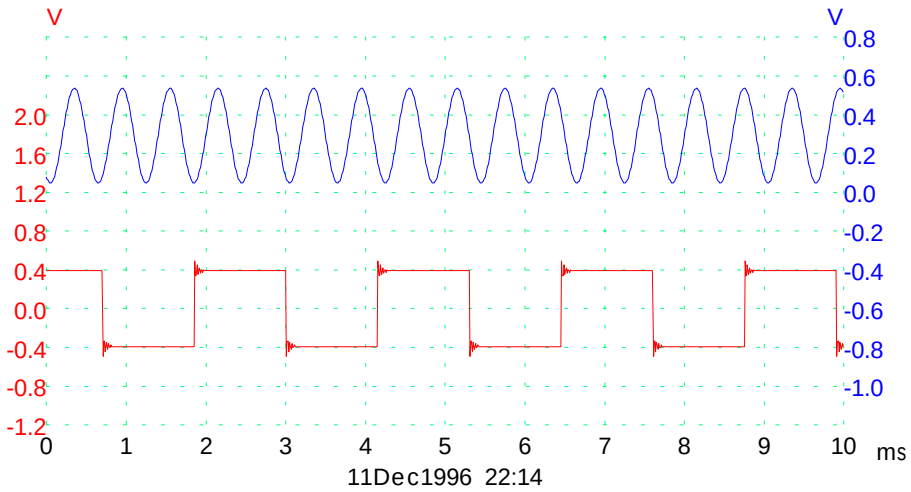
You can change the settings for data collection or display for any view, but you must first activate it. The commonly used settings for the current view are displayed on the View bar at the top of the display. To inspect or change the remaining settings, use the Settings menu on the main menu.

For some views, you can ‘zoom in’ on a small area of the display by setting the mutiplier for X or Y axis, or both, to a value other than one. With the multiplier set to **Off**, PicoScope shows you all of the data in the view. With the multiplier set to **x1**, PicoScope initially shows you all of the data, but you can move the data up and down - this is useful if you wish to separate two traces with similar voltages. With the multiplier set to **x2**, Picoscope shows you only half of the data but adds a scroll bar to the view so that you can select which half you can see.

The computer adds the date and time to each view and you can also add notes of your own.

You can print out views or write them to the clipboard or to files in graphical or text form.

Scope View



When the active view is a scope, the scope view bar is displayed at the top of the screen.

Timebase
The timebase controls the time interval across the scope display. Like a conventional scope, it is normally specified as a time per division. There are ten divisions across the screen, so the total time interval is ten times the timebase. If you are not accustomed to using a conventional scope, you may find it easier to specify the timebase as a time per scan (see the Scope preferences dialog).

Channels
For multi-channel ADCs, you can select which channels to display on the scope. With two channels, each channel has a separate axis and each trace and its axis are displayed in a different colour.

Voltage range
For the ADC-100 and ADC-200, it is possible to adjust the input voltage range. The ‘Auto’ option is useful if you are switching between different, but consistent, signals.
You can also add custom ranges so that the values are displayed in some other units, for example pressure or acceleration.

AC/DC
For some versions of the ADC-200, the AC/DC switches are software-selectable.

Grid
PicoScope displays a 10x10 grid. You can turn this grid off if it obscures important information.

Rulers
You can add either horizontal or vertical rulers to the graph using the mouse buttons. PicoScope reports the exact position of each ruler, and the difference between two rulers on the same axis.

Display types
The scope view can show you various combinations of the current data, the minimum, maximum and average of successive cycles. It can accumulate successive cycles on the screen. Note that it is not possible to print out an accumulated trace.

Measurements
Picoscope can take over 20 different measurements, using either the whole trace, the section between the cursors or the cycle around one cursor. You can select any combination of measurements, and specify error limits for each measure. The current value and various statistical measures (mean, standard deviation, etc) are displayed underneath the trace.

Slow sampling
When the time per scan is more than a second, the computer can work in three ways:

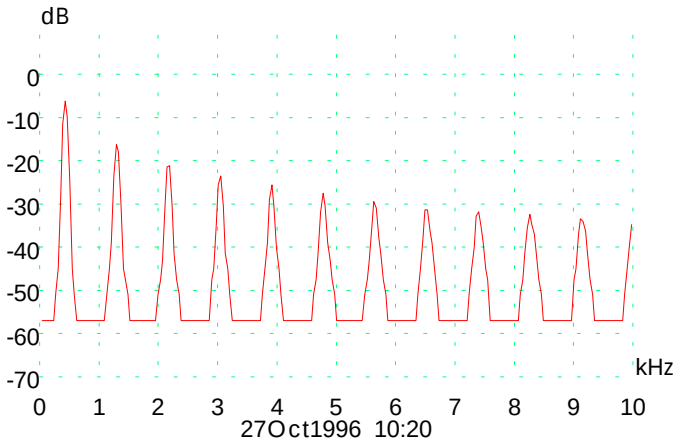
- **Standard mode** - it collects and displays the data for a complete scan, then starts again collecting and displaying the data for another complete scan.
- **Chart recorder mode** - it collects data continuously and displays the most data for the most recent scan interval. (Note that Chart recorder mode is not compatible with trigger modes other than **None**.)
- **Block mode** - it collects a block of data (no display update during collection) and then displays the whole block at once. There is no limit to the maximum number of samples, and there will not be gaps while the display is updated.

Note: In **standard** and **chart recorder** modes, the sampling is controlled by the computer and the maximum it can collect is one sample per millisecond. In addition, there may be gaps in the sampling while the display is updated.

Related topics:

- Scope Timebase Dialog
- Scope Options Dialog
- Measurements
- Trigger dialog
- Scope View Bar
- Sample bar

Spectrum View



The spectrum analyser view uses a Fast Fourier Transform (FFT) to convert a set of samples taken at fixed time intervals into a distribution showing the amount of energy in each of a number of frequency bands up to a maximum frequency. The maximum frequency is half the frequency corresponding to the sampling rate.

Like all digital signal analysis tools, PicoScope may give misleading results due to aliasing. Where possible, PicoScope uses oversampling to reduce aliasing effects.

Maximum frequency
PicoScope collects data to display a spectrum up to a certain maximum frequency. You can then display the spectrum for any range of frequencies up to this limit. The higher the frequency, however, the wider the interval between spectrum frequencies. Set the maximum frequency using the Spectrum Timebase Dialog or the Spectrum View bar.

Note: PicoScope needs to collect a large, contiguous block of data for spectrum analysis. If you specify a very low maximum frequency, this will take a long time to collect: when using the ADC100, PicoScope prevents normal Windows® operation during this data collection.

Y axis scaling
On the spectrum display, the Y axis represents the power at a specified frequency. The power can be expressed either as volts (RMS), or as decibels. Set the Y axis scaling using the Spectrum Options dialog.

X axis scaling
The X axis represents frequency. You can display the frequency either in linear or in logarithmic form. Set the X axis scaling using the Spectrum Options dialog.

Voltage range
The spectrum display may give confusing results if the signal exceeds the input voltage range: under most circumstances, we strongly advise using the **Auto** voltage range. If the signal is variable or intermittent, it may be advisable to use a scope view to determine the maximum required voltage range, and then fix the spectrum voltage range at that level.

Display type
In addition to displaying the current spectrum, you can also display the average or the peak value of successive cycles.

Windowing
PicoScope performs an analysis on a relatively short block of samples. The ‘cutting’ of this block from the data stream can introduce distortion which produces side-lobes on spectrum peaks. This effect can be reduced by multiplying the block of data by a set of factors which ‘rounds off’ the ends of the data. This technique is known as windowing.

PicoScope supports several different windowing methods: no windowing algorithm is guaranteed to eliminate all end effects, but switching between two methods can give a clue whether a particular peak is a side-lobe or a genuine peak. For general use, we recommend the Blackman window. Select a window type using the Spectrum Options dialog.

Ruler
You can use the mouse buttons to add a ruler to the spectrum view. The computer displays the frequency at the current ruler position, and the amplitude and phase of each trace at that frequency.

Related topics:
- Spectrum Timebase Dialog
- Spectrum Options Dialog
- Trigger dialog
- Spectrum View Bar
- Sample bar

Meter View

The meter view is used to display one or more parameters as numbers, together with an optional bar graph. The parameters can be:

- DC Volts
- AC Volts
- Decibels
- Frequency

If you add one or more custom ranges, the meter can also display values in some other units, for example pressure or acceleration.

The meter view comes in two forms. The simplest form displays a single number and an optional bar graph. The number is one parameter measured on one channel, for example AC volts on channel A. The parameter is displayed so that it fills the whole view.

{bmc metsing.wmf}

The more advanced form displays a set of numbers, which can be a selection of parameters from a selection of channels.

{bmc metmulti.wmf}

XY Scope View

{bml xy.wmf}

When the active view is an XY scope, the XY scope view bar is displayed at the top of the screen.

Timebase
The timebase controls the time interval for each scan. Ideally, it should be a little longer than a single cycle of the signal that you wish to observe.

Voltage range
For the ADC-100 and ADC-200, it is possible to adjust the input voltage range. The ‘Auto’ option is useful if you are switching between different, but consistent, signals.
You can also add custom ranges so that the values are displayed in some other units, for example pressure or acceleration.

Accumulate
If the data that you are displaying is repeated at regular intervals but is occasionally different, you can select ‘accumulate’. The computer then displays new traces without removing old ones. The normal traces are all drawn in the same place, but any unusual traces (glitches, missing pulses etc) stand out.

Grid
PicoScope displays a 10x10 grid. You can turn this grid off if it obscures important information.

Rulers
You can add either horizontal or vertical rulers to the graph using the mouse buttons. PicoScope reports the exact position of each ruler, and the difference between two rulers on the same axis.

Related topics:

- XY Scope Timebase Dialog
- XY Scope Options Dialog
- Trigger dialog
- XY Scope View Bar
- Sample bar

Composite View

A composite view can display copies of up to four other views. This is useful for comparing traces on the screen, and also for printing out more than one view on the same page.

The included views displayed within the composite can be a mixture of other view types, and can appear in a number of layouts:

- **Overlay** - useful if you wish to compare ‘before and after’ versions of two traces taken with the same measurement and scaling parameters
- **Side by side** - compare two traces with the same amplitude
- **One on top of another** - useful to collate the X (time or frequency) axis for several signals- maximum four views
- **Two by two** - Display up to four views in a square
- **Automatic** - select whichever format is appropriate, based on what the views have in common

The views within the composite can be scrolled using the scroll bars of the original views, or using a scroll bar for the composite view. The latter is particularly useful when using the **Overlay** or **One on top of another** formats.

Related topics:

- Composite View Options Dialog
- Composite View Bar

Chapter 3: How To...

- Get help
- Configure the ADC
- Create a view
- Change the settings for a view
- Export data to a spreadsheet
- Export graphs to a Word processor
- Print views
- Add a ruler
- Remove a ruler
- Use x10 scope probes
- Offset null
- Alter the vertical scale
- Add a menu of examples or standard tests
- Convert stored data files to text
- Display Measurements

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How to get help

Help on a dialog box...
1. Open up the dialog box that you wish to find out about
2. Use the mouse to point at the Help button
3. Double-click with the left mouse button
4. The computer will display help for the dialog box

Help on a menu option...
1. Highlight an option on the main menu
2. Press F1
3. The computer will display help information for that menu option.

How to configure your ADC

1. Select the **Settings | Port** dialog from the main menu.
2. Use the ADC Type combo box to set the type of ADC that you are using.
3. Set the Port combobox to the port that the ADC will be connected to.
4. Press the **OK** button

Is it set up correctly (ADC200)?
1. Connect the signal generator/External trigger output to channel A.
2. Select **Settings | Signal generator**
3. Check the 'Enable' box and enter a frequency of 1000 (Hz)
4. Create a scope view, and select 1ms/div
5. You should see a square wave with one square per division

Is it set up correctly (other ADCs)?
1. Create a meter view for DC volts and then connect the ADC to a battery. Check that the voltage is correct.
2. Create a scope view, then connect a scope probe and touch the probe with your finger. You should see a small 50Hz or 100Hz waveform on the scope view.

How to change the settings

1. Use the mouse to click on the view that you want to change
2. Select Settings from the main menu
3. Select the sub-menu item containing the features that you want to change

See Settings for more details about individual settings.

You can also change the most important settings for the current view using the view bar displayed at the top of the main window.

How to create a view

Using the main menu:
1. Select View from the main menu
2. Select the type of view that you wish to create (scope, spectrum or meter, XY scope, Composite)

For the three main view types you can use the view bar:
1. Press one of the three icons at the left of the view bar

 for scope

 for spectrum

 for meter

How to export to a spreadsheet

This explains how to export the data for the current view, in text format, to the clipboard so that you can perform further analysis on the data.

1. Use the mouse to click on the view that you want to copy
2. Select **Edit** from the main menu
3. Select **Copy as Text**
4. Go to the spreadsheet
5. Select **Paste** from the edit menu

If you want the information in the spreadsheet to be updated automatically each time PicoScope collects new data, select **Paste Link** or **Paste Special** rather than **Paste** as this creates a DDE link between the applications.

When you transfer data to another application via the clipboard, this writes only the data that is currently visible- a maximum of about 1000 values. If you wish to transfer all data, use **File | Save as**, and save the file in .TXT format.

How to export to a word processor

This explains how to export the data for the current view, in graphical format, to the clipboard so that you can paste a picture of the view into a word processor document.
1. Use the mouse to click on the view that you want to copy
2. Select **Edit** from the main menu
3. Select **Copy as Text**
4. Start the word processor program
5. Select **Edit**
6. Select **Paste**

You can also export data in graphical format by selecting **File | Save as**, and save the file in .WMF (Windows Metafile) format.

How to print a view

1. If you just want to print one view, use the mouse to click on the view
2. Select **File** from the main menu
3. Select **Print** from the sub-menu
4. To print the current view, check **Current view** and press the OK button
5. To print all views, check **All views**
6. Press the OK button

How to add a ruler

To add a vertical ruler...

1. Move the mouse to the approximate position for the ruler, near the top of the window
2. Press and hold down the left cursor button
3. Drag the mouse downwards
4. PicoScope displays a vertical ruler
5. Move the ruler left or right to set the required position.
6. Release the left mouse button

To add a horizontal ruler (scope only)...

1. Move the mouse to the approximate position for the ruler, near the left of the window
2. Press and hold down the left cursor button
3. Drag the mouse to the right
4. PicoScope displays a horizontal ruler
5. Move the ruler up or down to set the exact postion.
6. Release the left mouse button

If there are two Y axis, pressing the left mouse button associates a ruler with the left axis, and pressing the right mouse button associates a ruler with the right Y axis.

You can add up to two cursors: if you add more cursors, the computer will replace the oldest ones.

PicoScope will display the current positions of the cursors: if the two cursors are on the same axis, PicoScope will also display the difference in value between the two cursors.

Once a ruler is positioned, you can move it using the cursor keys. To re-select a ruler, so that you can move it, point the mouse cursor at the ruler and click the left mouse button.

How to remove a ruler

To remove rulers:
1. Point the mouse cursor at the ruler you wish to remove
2. Click the left mouse button to select the ruler
3. Press the delete key

How to use x10 probes

You can tell PicoScope that you are using a x10 scope probe: PicoScope then displays all voltages ten times higher. The range selections do not change, but traces and meter readings will be scaled correctly.

1. Select **Settings** from the main menu
2. Select **Probes** from the Settings menu
3. The computer shows a menu of x1/x10 for each channel
4. There is a tick next to the currently selected option for each channel
5. Check the option for chA x10 or chB x10

You can use the same method to use a x20 or x100 scope probe.

Safety note: you should use an isolated scope probe if you wish to work with, or near, high voltages.

How to offset null

When you are working at low input voltages, there may be a small offset on the ADC input. You can remove this offset until you exit the program by carrying out an Offset Null, as follows:

1. Disconnect or short the input (chA or chB)
2. Select **Settings** from the main menu
3. Select **Offsets** from the settings menu
4. Select the channel that you wish to offset null
5. Any offset will be automatically removed from all traces and meter readings.

How to change the axis scaling

If you connect a sensor that measures in units other than Volts (for example, a pressure or acceleration sensor), this is how to make PicoScope display the trace scaled in the appropriate units.

1. Select **Settings** from the main menu
2. Select **Ranges** from the settings menu
3. Press the '**Add**' button on the Custom range list dialog
4. Either select the Pico signal conditioner and sensor, or type in the millivolt and scaled values (see Edit custom range for more details)

The new custom range will appear after the voltage ranges in view bars and dialog boxes.

How to add a test menu

If you have a number of standard tests that you carry our regularly, you can add a menu to select the settings for these tests by name. You can also use this facility to add a menu of example files that show what particular signals look like.

To add a test menu, it is necessary to create a test menu file. The facility to create this file is not built into PicoScope: it is necessary to use a text editor like Notepad, or a Word processor.

See Test menu file format for more details.

How to convert data files to text

To convert a single file to text:

1. Select **File | Open** from the main menu
2. Select the file that you wish to convert
3. Select **File | Save** from the main menu
4. Change the file type to Text file (*.txt)
5. Enter a filename
6. Press **OK**

If you need to convert several files, you can do it as follows:

1. Close PicoScope for Windows
2. Open a DOS box
3. Go to the directory containing the files that you wish to convert to text
4. Type in the following command:

```
psw -t run*.psd
```

This command will convert any .PSD data file with run as the first three letters into the corresponding run*.txt.

How to display measurements on the scope

You can display a number of measurements (frequency, risetime, etc) at the bottom of the scope trace. To do this:

1. Open up a scope view
2. Select **Measurements** from the **Settings** menu
3. Click on **Add**
4. On the measurement details dialog, specify the details for the measurement
5. Click on **OK**
6. Click on **Options**
7. On the measurement options dialog, select the statistics that you require (average, standard deviation etc)
8. Click on **OK**
9. Click on **OK**

Chapter 4: Menus

- File menu
- Edit menu
- Settings menu
- View menu
- Window menu
- Help menu

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File Menu

File | New
This menu option clears the desktop.

File | Open
This menu option closes all active views and then opens a data or setup file.

If you open a data file, the settings and data are copied from the file and the data is displayed.

If you open a setup file, only the settings are recovered. No data is displayed until you start PicoScope running.

File | Open Next
When you use the save on trigger option, PicoScope saves tests in sequence-numbered files. Once you have read in one file in a sequence, you can use the Open Next/Open Previous options to load the next or the previous file in the sequence.

File | Open Previous
When you use the save on trigger option, PicoScope saves tests in sequence-numbered files. Once you have read in one file in a sequence, you can use the Open Next/Open previous options to load the next or the previous file in the sequence.

File | Merge
This menu option reads in the views from another file, whilst retaining the views currently being displayed.

File | Save
This menu option saves the desktop in the same file as last time. If the desktop has not yet been saved, it asks for a filename.

File | Save As
This menu option asks for a filename and then writes the desktop or the current view to a file.

If you save the desktop in a **Setup file**, only the settings are stored.

If you save the desktop to a **Data file**, both settings and data are stored.

You can also save the current view as a **text file**, or as a **Windows metafile**.

File | Print
This menu option is used to print the current view or all views. If you select all views, each view is printed on a separate page.

File | Delete

This menu option enables you to delete a settings file or a data file. Select the file and then press OK to delete it.

File | Save settings
This menu option saves the current desktop to a special file, settings.pss, which is loaded automatically next time you run PicoScope.

File | Setup

Language - the language to be used
Port - specify the converter type and printer port.
Colours - specify the trace colours
Display - various display options, for example display timestamp and notes
Scope - various scope options, for example maximum number of samples

File | Exit
This menu option exits from the program.

Edit Menu

Edit | Copy as text
This menu option copies the data for the current view to the clipboard, in text format. This is useful if you wish to transfer the data to a spreadsheet for analysis. You can simply copy the data once, or create a DDE link so that the data is updated continuously in the target application.

Edit | Copy as graph
This menu option copies the data for the current view to the clipboard, in graphical format, exactly as it appears on the screen. This is useful if you wish to transfer the data to a Word Processor or graphical package, so that you can incorporate the data view into a document.

Edit | Duplicate
This menu option makes a new view with all the same settings as the active view, then stops the old active view. If you then create a composite containing old and new views, you can overlay the two traces, so that you can compare the current trace with the old trace.

Settings menu

Settings | Timebase
This menu option enables you to set the timebase for a

- scope view
- spectrum view
- XY scope view

Settings | Channels
This option is used to select the channels for the active view.

Settings | Trigger
This option is used to set the parameters for the trigger event.

Settings | Options
This menu option enables you to specify the various options for the current view. The options depend upon the type of view.

See also:-
- scope options
- spectrum options
- meter options
- XY scope options
- composite options

Settings | Notes
This option can be used to enter some brief notes that will be displayed on the active view.

Settings | Offsets
When operating at the most sensitive input voltage ranges, there may be a small offset (perhaps a few millivolts) on the voltage readings.

To remove this offset, disconnect or short the input for a channel, select this option and then select the channel. PicoScope measures the voltage on the channel and then removes this offset. The offset is not stored, so it is necessary to repeat this procedure each time you start PicoScope.

Settings | Measurements
This option is used to specify a number of measurements to be displayed at the bottom of the scope trace.

Settings | Ranges
This option is used to define alternative ranges so that traces can be displayed in some units other than volts.

Settings | Signal Generator
This menu option is used to set the signal generator frequency on the ADC200 range of products.

Settings | Probes
This group of menu options enables you to specify whether you are using x1, x10, x20 or x100 probes. If you select x10, the range selections on the view bar do not change, but all displayed values are multiplied by 10.

View Menu

View | New Scope
This menu option creates a new scope view.

View | New Spectrum
This menu option creates a new spectrum analyser view.

View | New Meter
This menu option creates a new meter view.

View | New XY Scope
This menu option creates a new XY scope view.

View | New Composite
This menu option creates a new composite view. If there are less than four views on the desktop, all views are added to the composite.

View | Run/stop All
This menu option starts or stops data collection on all views that are not frozen. You can also do this by pressing the space bar or by using the mouse to press the Run/Stop button at the bottom left of the window.

View | Run/Stop View

This menu option starts or stops the active view. If the view is currently frozen, it both thaws and starts the view.

View | Freeze/Thaw view
This menu option freezes or thaws the current view. When a view is frozen, it is stopped and will not start even if the Run/Stop button is pressed.

View | Close
This menu option closes the active view.

View | Clear
This menu clears the active view. This means that it eliminates the data, while leaving the settings the same.

Window Menu

Window | Arrange Icons

If you have several views iconised, this menu option arranges the icons along the bottom of the main window.

Window |Tile
This menu option arranges all of the views so that they are equally spaced over the main window.

Window | Cascade
This menu option arranges all of the windows so that only the title bar of each window is visible.

Window | Close all
This menu option close all views, leaving the desktop empty.

Help Menu

Help | Help Index
This menu option takes you to an index for the PicoScope for Windows.

Help | Help Contents
This option takes you to the contents page for help for PicoScope for Windows.

Help | Help on test
This option takes you to the help information for the currently selected test or example.

Help | Help on Help
This option explains how to use Windows help

Help | Help about
This menu option gives you some details about the PicoScope program and the currently selected driver.

Chapter 5: Dialogs

- ADC Dialog
- Channels Dialog
- ScopeTimebase Dialog
- Scope Options Dialog
- Measurement List Dialog
- Measurement Details Dialog
- Measurement Options
- Scope measurement Types
- Spectrum measurement Types
- XY Scope Timebase Dialog
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- Language Dialog
- Display Preferences dialog
- Scope Preferences dialog
- Print Dialog
- Custom Range List Dialog
- Edit Custom Range

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ADC Dialog box

This dialog box is used to select the type of ADC you wish to use, and to specify which port it is connected to.

On some computers, the standard version of PicoScope for Windows does not work properly. The fields below the horizontal line on the ADC dialog box enable you to adjust PicoScope to work on these computers. Do not enter anything into these fields unless directed by Pico Technical Support.

Channels Dialog

This dialog box enables you to select which input channels to display in the current view and to set the input voltage ranges.

Channels
With an ADC-100 or ADC-200, you can collect data from just one of the two channels, or from both channels. If you collect data from both channels, you can use chop mode or alternate mode.

Voltage ranges
The ADC-100 and ADC-200 have a number of input voltage ranges. You can either specify an input voltage range, or select Auto, which means the ADC will automatically adjust the voltage range to suit the input signal.
Note that Auto mode does not give good results with trigger signals that occur only once, as PicoScope does not know in advance what range to use.
If you add custom ranges to scale the input from sensors (for example, pressure or acceleration), the custom ranges will appear here.

Y Multipliers
When a Y multiplier is **Off**, the computer displays the full voltage range over the height of the window.

If you change the Y multiplier to **x1**, the computer initially displays the full voltage range, but also displays a scroll bar at the left or right of the window. You can use this scroll bar to move the trace up or down, to move it away from other traces.

If you change the Y multiplier to **x2** or above, the computer displays only half of the voltage range, but twice as big. The scroll bar now controls which portion of the voltage range is displayed.

ScopeTimebase Dialog

This dialog box is used to set the timebase (the X axis) for the current scope view. These functions are duplicated on the Scope View Bar.

Timebase
If you selected 'Timebase is per division', the timebase field controls the time interval between the grid lines of the scope - equivalent to the 'time per division' used on conventional scopes. The screen is ten divisions wide, so the total time is 10x the time per division.

If you turned off 'Timebase is per division', the timebase field controls the total time interval for a sweep.

X Multiplier
When the X multiplier is 1, the computer displays all of the data that it has collected across the full width of the window. If you change the X multiplier to x2, the computer displays only half of the data, but twice as big. It also displays a scroll bar across the bottom of the window, which you can use to control which portion of the data is displayed.

Scope Options Dialog

This dialog box is used to set a number of optional features for the current scope view.
Note: these functions are not available on the Scope View Bar.

Title
This is used to set the title for the current view. It appears on the title bar of the window and on printed reports.

Display format
You can display several combinations of the following traces:

- **current** - the current cycle of data
- **average** - the average of all cycles since you started
- **minimum & maximum** - a shaded area representing the minimum and maximum of all cycles since you started
- **accumulate** - draw each current cycle without removing the previous one

Minimum and maximum on their own are particularly effective for detecting short transients within a long time period. To get the best results, you should also set the max scope samples field in the Scope Preferences dialog to as high a value as possible (eg 8000 for an ADC200-20, which has an 8k buffer).
When you are displaying average, minimum and maximum or accumulate, you can reset the results so far by pressing the stop button then the start button.
Note: When using the **accumulate** option, the computer accumulates traces on the screen but only the most recent trace is saved or printed. If you wish to save or print, you should use the min/max functions instead.

Slow sampling
When the time per scan is more than a second, the computer can work in three ways:

- **Standard mode** - it collects and displays the data for a complete scan, then starts again collecting and displaying the data for another complete scan.
- **Chart recorder mode** - it collects data continuously and displays the most data for the most recent scan interval. (Note that Chart recorder mode is not compatible with trigger modes other than **None**.)
- **Block mode** - it collects a block of data (no display update during collection) and then displays the whole block at once. There is no limit to the maximum number of samples, and there will not be gaps while the display is updated.

Note: In **standard** and **chart recorder** modes, the sampling is controlled by the computer and the maximum it can collect is one sample per millisecond. In addition, there may be gaps in the sampling while the display is updated.

Display grid
The computer normally displays a 10x10 grid on the Scope view. You can turn this off if it obscures important information.

Display scale
The computer normally displays the voltage along the Y axis and the time along the X axis. You can turn this off if you would like to have all of the window used for the trace itself.

Note: If you reduce the size of the window, the scale is no longer displayed.

Measurement list dialog

This dialog box displays a list of measurements to be displayed on the scope view.

Add
To add a new measurement, click on the **Add** button. The computer will display the Measurement details dialog.

Edit
To edit an existing measurement, either double-click on one of the measurements in the measurement list, or select a measurement and then click on the **Edit** button. In either case, the computer will display the Measurement details dialog.

Delete
To delete an existing measurement, select the measurement and then click on the **Delete** button. The measurement will be removed from the list.

Options
This button opens up the measurement options dialog.

Measurement details dialog

This dialog specifies the details for one measurement. It is accessed from the measurement list dialog.

Measurement
This selects the type of measurement required. See below for a full list of measurement types.

Channel
This specifies the channel to use for the measurement. For most parameters, a single channel is required. For phase angle, two channels are required.

Source
This specifies the part of the trace to use for the measurement. If one or more rulers are required, the rulers must be vertical.

The options for a scope measurement are:
- **Cycle at X ruler** - the cycle around the X ruler
- **Cycle at O ruler** - the cycle around the O ruler
- **Between rulers** - the area between the cursors
- **Whole trace** - the entire trace

The options for a spectrum measurement are:
- **At Peak** - take the measurement at the peak frequency (the strongest signal)
- **At X** - the frequency of the X ruler
- **At O** - the frequency of the O ruler
- **X to O** - this is used only for Intermodulation distortion

Use dB
This is used only for spectrum measurements. If checked, the result is displayed in dB, otherwise it is displayed in percent.

Limits
These are the minimum and maximum alarm limits. If the measured value goes outside this range, the alarm action specified in the Measurement Options dialog will be carried out.

See also:
- Scope measurement types
- Spectrum measurement types
- Measurement options

Measurement options

This dialog specifies a number of options that apply to all measurements.

Statistics
These checkboxes select the statistical values to be displayed underneath the scope trace. The options are:

- **Current value** - the most recent measurement
- **Average** - average of all measurements since reset
- **Standard deviation** - the standard deviation since reset
- **Minimum** - the minimum since reset
- **Maximum** - the maximum since reset
- **Pass/Fail** - the text Fail is displayed if the measurement is out of limits

No of readings
This specifies the number of readings to be used to update the statistics. The displayed values are updated continuously until the specified number of readings is reached. After this, the statistics freeze and an asterisk is displayed next to the average.

The statistics are reset if any parameter changes or if data collection is restarted by pressing the start button.

Default source
There are two default source fields- one for scope measurements and one for spectrum measurements. When a new measurement is added, the appropriate value is used as the default data source. See Measurement Details for more information about the options.

Error action
This specifies what action is to be take if a measurement is outside the alarm limits. The options are:

- **Beep** - an audible alarm signal
- **Modeless dialog**- a dialog that stays as long as the fault exists, but goes away on its own when the fault goes away
- **Modal dialog**- a dialog that stays until the OK button is pressed
- **Save to disk** - saves the trace to disk

Threshold
The threshold used for frequency and pulse width measurement is normally calculated automatically. This option can be used to specify a horizontal ruler to use as the threshold. The options are:

- **Automatic** - calculate the threshold automatically
- **X ruler** - use the X ruler as the threshold
- **O ruler** - use the O ruler as the threshold

Aggregate cycles
When this box is checked, the computer aggregates the values for all cycles in the trace. This gives a better current value but may give a misleadingly small variation for minimum, maximum and standard deviation. If the box is un-checked, the statistics are updated for each individual cycle, rather than for the aggregate of all cycles in a trace. The default is to use the aggregate.

Use dB
This is used as the default value for the Use dB field for spectrum measurements.

Max harmonics for THD
Some spectrum measurements, for example THD, calculate values using a fundamental frequency and its harmonics. This field selects the highest harmonic to be used for these calculations. For example, if Max Harmonics is set to Third, only the second and third harmonics will be considered for THD calculations.

Scope measurement types

The following measurements may be displayed at the foot of a scope trace. They can be added using the measurement details dialog.

Frequency
The frequency is the reciprocal of the time for one cycle.

High pulse width
This is the time that the signal is above the threshold.

Low pulse width
This is the time that the signal is below the threshold.

Duty cycle
This is the ratio of the time above the threshold to the time for one complete cycle, expressed as a percentage.

Cycle time
This is the time for one complete cycle.

DC Voltage
This is the average voltage for one complete cycle

AC Voltage
This the RMS sum of (reading - DC voltage) for one complete cycle

Minimum
This is the minimum value recorded

Maximum
This is the maximum voltage recorded

Risetime
The risetime is the time taken to go from 20% above minimum to 80% above minimum.

Falltime
The falltime is the time taken to go from 80% above minimum to 20% above minimum.

Rise rate
This is the slewing rate calculated using the two samples either side of the threshold on a rising edge.

$$\text{Rise rate} = (Vn - Vn\text{-}1) / (Tn - Tn\text{-}1)$$

Fall rate
This is the slewing rate for the two samples either side of the threshold on a falling edge.

$$\text{Fall rate} = (Vn - Vn\text{-}1) / (Tn - Tn\text{-}1)$$

Voltage at X ruler
The computer first identifies the samples immediately before and after the vertical ruler and then it interpolates the voltage at the ruler point.

Voltage at O ruler
See voltage at X ruler

Time at X ruler
This is the time in the current cycle at which the trace crosses the horizontal cursor.

Spectrum measurement types

This section describes the measurements available on spectrum views and the concepts involved in spectrum measurements.

General
Most measurements are based on a datum point. The datum point for measurements on the spectrum view can be one of the following:

- **Peak** - the position of the highest amplitude signal
- **At X** - the position of the X cursor
- **At O** - the position of the O cursor
- **O to X** - both cursors (intermodulation distortion only)

The datum point (aka Data Source) can be specified for each measurement.

Ratio measurements can be displayed as percent or dB: this can be specified for each measurement.

The default values for the datum point and percent/dB can be specified in the Measurement Options dialog.

For harmonic analysis, the harmonics are integer multiples of the datum point. The band number of the nth harmonic may be adjusted by ±n/2 bands to take account of rounding of the datum point to the nearest band. The number of harmonics to include can be specified in the Measurement Options dialog. If the specified number of harmonics is not available within the selected frequency range, any measurements that require the harmonics will be left blank.

Ideally if an FFT was performed on a perfectly pure sinewave, the frequency display would show only an infinitely thin spike at the fundamental frequency of that sinewave. In reality the frequency information tends to get spread out by the finite number of FFT points and end effects which leads to a broadening of the spike. The measurement calculations will use expected values for the spread. These will be a function of the number of points and the window type.

Another effect of the FFT process is to lump all the components which are varying more slowly than the entire sampling period into a band labelled as DC. This can lead to a false impression of the actual DC value. The measurement calculations deal with this by ignoring the first spread bands.

Peak Frequency
This will display the frequency of the datum.

Peak Amplitude
This will display the amplitude of the datum.

Total Power
This will display the total RMS power level for the entire spectrum.
Calculated by taking the root of the sum of each RMS-value-squared.

Total power = sqrt (sum (value ^ 2))

Total Harmonic Distortion (THD)
Total Harmonic Distortion (THD) - the ratio of the harmonic power to the power at the datum. In the following equation, v1 is the RMS value at the datum frequency and v2..v5 are RMS values at the harmonics

THD = sqrt (v2^2 + v3^2 + v4^2 +v5^2....) / v1

Total Harmonic Distortion + Noise (THD+N)
Total Harmonic Distortion + Noise (THD+N) - the ratio of the harmonic power plus noise to the fundamental power. THD+N values will almost always be greater than the THD values for the same signal.

THD+N = sqrt (sum of squares of RMS values excluding datum)
/ (RMS value of datum)

Spurious Free Dynamic Range (SFDR)

Spurious Free Dynamic Range is the ratio of the amplitude of the datum point (normally the Peak Frequency component) and the frequency component with the second largest amplitude (call it "SFDR frequency").

The component at the "SFDR frequency", is not necessarily a harmonic of the fundamental frequency component- for example it might be an strong, independent noise signal.

SFDR frequency
This is the frequency of the second largest amplitude signal.

Signal to Noise and Distortion Ratio (SINAD)
SINAD is the ratio in decibels of the signal-plus-noise-plus-distortion to noise-plus-distortion.

SINAD = sqrt (sum of squares of all RMS components)
/ sqrt (sum of squares of all RMS components except datum)

Note: Hanning or Blackman window is recommended because of its low noise quality.

Signal to Noise Ratio (SNR)
The Signal to Noise Ratio is the ratio of the signal peak power level to the total noise level.

SNR = RMS value of datum
/ sqrt (sum of squares of all values excluding datum and harmonics)

Note: Hanning or Blackman window is recommended because of its low noise quality.

InterModulation Distortion (IMD)
InterModulation Distortion (IMD) is a measure of the distortion caused by the interaction (mixing) of two tones.

When multiple signals are injected into a device, undesired modulation or mixing of these two signals can occur. For input signals F1 and F2, the two second order distortion signals will be found at (F1 + F2) and (F1 - F2). IMD is expressed as the dB ratio of the RMS sum of the two input tones to the RMS sum of the distortion terms. IMD can be taken to any term but the second term is most common.
For reference, the third order terms are (2F1 + F2), (2F1 - F2), (F1 + 2F2), (F1 - 2F2)

In the following equation, f1 and f2 are the two cursor positions.

Where
f3 = (f1+f2)
f4 = (f1-f2)

Note: Hanning or Blackman windows are recommended because of their low noise quality. An FFT size of 4096 or greater is recommended in order to provide adequate spectral resolution for the IMD measurements

Gain
This is the ratio of the power in channel A and in channel B at the datum point: it is used to check the gain of an amplifier.

XY Scope Timebase Dialog

This dialog box is used to set the timebase (the X axis) for the current scope view. These functions are duplicated on the Scope View Bar.

Timebase
The timebase field controls the total time interval for a sweep. You should select a timebase that is slightly longer than the cycle time that you wish to observe.

XY Scope Options Dialog

This dialog box is used to set a number of optional features for the current scope view.
Note: these functions are not available on the XY Scope View Bar.

Title
This is used to set the title for the current view. It appears on the title bar of the window and on printed reports.

Accumulate successive cycles
If you set PicoScope to trigger continuously on a certain event, it is sometimes difficult to spot an event that is slightly different to the usual. If you check this option, PicoScope draws each new trace without removing the previous trace. This is useful if you wish to see how much variation there is in successive traces, or if there is occasionally a trace that is different to the usual.

Display grid
The computer normally displays a 10x10 grid on the Scope view. You can turn this off if it obscures important information.

Display scale
The computer normally displays the voltage along the Y axis and the time along the X axis. You can turn this off if you would like to have all of the window used for the trace itself.

Note: If you reduce the size of the window, the scale is no longer displayed.

Notes Dialog

This dialog enables you to add some notes to the active view. The notes will be displayed at the bottom of the view (if you enable this in the Display preferences dialog) and will appear on printed reports.

Colours Dialog

This dialog enables you to select the colours for the various items on views. This may be useful on portable computers if the default colours are not clearly visible.

To change the colour of an item, click on the block of colour next to the item name - this will open a dialog in which you can select a new colour.

Note: On scope views, the trace A and trace B colours are used for both the Y axis scale and the trace.

Signal Generator dialog

This dialog box lets you set the frequency for the signal generator.

Check the enable box to turn on the signal generator and type in a frequency. If that frequency is not available, PicoScope selects and displays the nearest frequency.

The signal generator works up to 250kHz. At low frequencies, the signal is a square wave with a risetime of about 5us. Therefore, the signal is rounded and eventually becomes a triangle wave as the frequency increases.

Note: On the ADC200, the signal generator shares a connector with the external trigger input. It is therefore not possible to use the signal generator and the external trigger at the same time (unless you wish to trigger from the signal generator).

Spectrum Timebase Dialog

This dialog box is used to set the maximum frequency for the spectrum analyser. This function is duplicated on the Spectrum View Bar.

Maximum Frequency
The maximum frequency controls the sampling rate of the data collected for spectrum analysis. This, in turn, determines the highest frequency that the spectrum analyser can display.
Note: The lower the maximum frequency, the longer it takes to collect enough data to display a spectrum. At very low maximum frequencies, this may affect the response time of your computer to keyboard input.

X Multiplier
When the X multiplier is 1, the computer displays the entire frequency range across the full width of the window. If you change the X multiplier to x2, the computer displays only half of the frequency range, but twice as big. It also displays a scroll bar across the bottom of the window which you can use to control the frequency range that is displayed.

Spectrum Options Dialog

This dialog box controls a number of optional features of the current spectrum analyser view.
Note: these functions are not available on the Spectrum View Bar.

Y axis scaling
On the spectrum display, the Y axis represents the power at a specified frequency. The power can be expressed either as volts (RMS), or as decibels.
X axis scaling
The X axis represents frequency. You can display the frequency either in linear or in logarithmic form.

Display a grid
The computer normally shows a grid corresponding to the scale points of the power and frequency axes. You can turn this grid off if you feel that it obscures important features of the data.

Display phase on the ruler
If you check this box, the computer will display the phase of the frequency that the spectrum ruler is positioned over. Note that checking this box may slow down display update as additional calculations are required.

Display format
You can display the following traces:

- **current** - the spectrum for the current cycle
- **average** - a moving average of successive cycles
- **peak** - displays the maximum of all cycles since the start (reset by stop/restart)

Windowing
PicoScope performs an analysis on a short block of samples. The ‘cutting’ of this block from the data stream can introduce distortion which produces side-lobes on spectrum peaks. This effect can be reduced by multiplying the block of data by a set of factors which ‘rounds off’ the ends of the data. This technique is known as windowing.

PicoScope supports several different windowing methods. No windowing algorithm is guaranteed to eliminate all end effects but switching between two methods can give a clue to whether a particular peak is a side-lobe or a genuine peak. A rectangular window is generally best for estimating an exact frequency, whereas a Blackman window is often best for minimising side-lobes.

Number of bands
A fast fourier transform divides up a signal into a number of frequency bands. More bands gives higher resolution, but it is necessary to collect and process more data. This reduces the display update rate, and reduces effectiveness when dealing with impulse-type signals. You can select between 128 and 1024 frequency bands, in powers of two.

Meter Parameter List

If you turn off the ‘single parameter’ option on the Meter Options Dialog, you can display several parameters within the same meter view. This dialog box is used to add new parameters and to edit or delete existing parameters.

At the left of the window is a list of the currently specified parameters. At the right of the window are a number of buttons which enable you to add edit or delete parameters.

New
To create a new parameter, press the **New** button. The computer will display a Meter Parameter Dialog which contains default settings.

Edit
To edit an existing parameter, move the highlight to the parameter entry that you wish to change and press the **Edit** button. The computer will display a Meter Parameter Dialog which contains the current settings for this parameter.

Delete
To remove an existing parameter from the list, move the highlight to the parameter entry that you wish to change and press the **Delete** button.

Meter Parameter Dialog

This option is used to alter the settings for a meter parameter.

Name
This specifies the name that will appear next to the reading for a parameter

Channel
This specifies which channel to measure data from.

Range
This specifies the input voltage range to use.

If you have defined any custom ranges (for example, for a pressure sensor), these ranges will also appear in the option list.

Function
This specifies which function to use. The options are:

- **DC Volts** - The DC component or average input voltage
- **AC Volts** - The RMS AC voltage (note: this excludes any DC component)
- **dB** - AC volts converted to dB
- **Frequency** - Frequency of the AC component, in Hz.

Display bar graph
When this option is checked, the computer displays a bar graph showing the current reading for this meter parameter.

Meter Options Dialog

This dialog controls the options for the current meter view.

Title
This field is used to specify the title for the meter window.

Single Parameter
A meter view can work in two ways: single-parameter and multi-parameter.

In the simplest mode, the meter view displays a single parameter measured on one channel. When you select Meter Parameter, the computer goes straight to the Meter Parameter dialog for the single parameter.

In the more advanced mode, you can display a number of parameters, from more than one channel, in the same view. The computer displays the parameter name, value and units for each parameter, one parameter per line. When you select Meter Parameter, the computer first displays a Meter Parameter List for the view. When you pick New or Edit, the computer shows a dialog to enter details for the selected parameter.

Composite Views dialog

This dialog is used to select the views which will be included in a composite view.

The listbox shows the titles of all views - the ones that are currently included in the composite view are highlighted. To add or remove a view from the composite, use the mouse to point at the view title click the left mouse button.

Composite Options dialog

This dialog is used to specify the options for the active composite view.

Layout
The included views displayed within the composite appear in a number of layouts:

- **Overlay** - Useful if you wish to compare 'before and after' versions of two traces taken with the same measurement and scaling parameters
- **Side by side** - Compare two traces with the same amplitude
- **One on top of another** - Useful to compare the X (time or frequency) axis for several signals (maximum four views)
- **Two by two** - Display up to four views in a square
- **Automatic** - Select whichever format is appropriate, based on what the views have in common

X and Y Scroll
The views within the composite can be scrolled using the scroll bars of the original views, or using a scroll bar for the composite view. The latter is particularly useful when using the **Overlay** or **One on top of another** formats.

For each axis, it is possible to select whether to use the scroll bar of the original or the composite view, or to automatically select.

Trigger dialog

Triggering is used to select the moment at which PicoScope collects data to display. This is usually at some fixed time before or after a trigger event. The current settings for the trigger apply to all views (ie there is not a separate set of trigger settings for each view).

A trigger event occurs when a specified channel crosses a voltage threshold (rising or falling). PicoScope can start collecting data immediately after the trigger event or at a fixed time interval before or after the trigger event.

After PicoScope has collected a block of data and displayed it, PicoScope can either start looking for the next trigger event, or stop collecting, leaving the data after the trigger on the display.

Enable trigger
When this box is checked, PicoScope only collects data when the specified trigger conditions occur. If the box is not checked, it displays data continuously.

Trigger channel
This selects which channel is to be used as the trigger input.

Note: For the ADC-200, the external trigger is the same connector as the signal generator, so you cannot use both functions at the same time (unless, of course, you wish to trigger from the signal generator).

Trigger direction
The trigger direction can be either rising or falling. When rising is selected, the trigger event occurs when the voltage rises across the trigger threshold.

Trigger threshold
This shows the voltage (in mV, or in the units of the active view) that the trigger channel must cross in order for a trigger event to occur.

Auto-trigger after...
If auto trigger is disabled, PicoScope will be left waiting indefinitely for the event. This locks up the computer. If it is enabled, PicoScope triggers after the specified period of time, even if no trigger event occurs.

Note: If you turn off auto-trigger when using a product other than the ADC-200, PicoScope locks the computer until a trigger event occurs. If PicoScope does become stuck, click on the Stop button in the sample bar, then press F9 (16-bit applications) or F10 (32-bit applications) to cancel the trigger.

Trigger delay
This controls the time delay, as a percentage of the sweep time, between the trigger event and the start of collecting data. A negative delay means that the computer will show data that was recorded before the trigger event. For example, -50% places the trigger event in the middle of the collected data and -100% means that all data is before the trigger.

Stop after trigger
When this box is checked, PicoScope stops collecting once it has collected one block of data after a trigger event.

Save after trigger
When this box is checked, PicoScope saves the data to disk each time a trigger event occurs. This is useful if you wish to record all occurrences of an event which happens only occasionally. You can then use the Open Next/Open Previous menu options to look at each of the saved files.

Note: To prevent accidental filling of your disk with data files, there is a limit of 100 save-on-trigger files per session. To change this limit, see Ini file settings.

Language Dialog

This field enables you to select the language that PicoScope will use for dialogs and for help. If you change this parameter, it will take effect for new dialogs, but not for menus on the screen.

Display Preferences dialog

This dialog contains a number of options which affect how all views are displayed.

Displays per second
This controls the display update rate. The higher the number, the more frequently PicoScope collects data and updates the screen. At high update rates, the computer may be so busy that it is difficult to use other applications or even to control PicoScope.

Display notes
If you check this option, the computer displays any notes that you have entered for a view at the bottom of the view. This may be inconvenient in a small window. Notes always appear on print-outs.

Display timestamp
If you check this option, the computer displays the time and date that data was collected at the bottom of the view. This may be inconvenient in a small window. The timestamp always appears on print-outs.

Show view bar
You can select whether or not to have the view bar displayed at the top of the screen. It is useful to turn off the view bar if you wish to use PicoScope within a small window, or you wish to prevent operators from changing the settings.

Show sample bar
You can select whether or not to have the sample bar displayed at the bottom of the screen. It is useful to turn off the sample bar if you wish to use PicoScope within a small window, or you wish to prevent operators from changing the settings.

Scope Preferences dialog

Timebase is time per division
On a normal oscilloscope, the screen has a 10x8 grid and the timebase knob sets the time interval for one division of the grid. If you are familiar with this way of working, you can check this box to make PicoScope work exactly the same.

Unlike a normal scope, PicoScope displays actual times across the screen and has rulers to measure time intervals so it is not necessary to count grid lines. If you do not normally use a scope, you may find it easier to leave this box unchecked so that PicoScope lets you specify the scope timebase in terms of the time per complete sweep.

Max samples per scope trace
The computer can collect many more samples per scan than can be displayed on the screen. You can then zoom in on a small part of the trace to examine it in more detail. The default number of samples is 2000.

This option enables you to set the maximum value. If you select a larger number, you will see more when you zoom in. If you select a smaller number, the display will be updated more frequently. The computer may also be able to use the average of a number of readings for each sample, which will result in a smoother trace.

Max Oversample
This controls the number of readings taken from the ADC for each displayed sample - it can be between 1 and 16. With a value of 1, each displayed sample is made up of a single reading. With higher values, the displayed sample is the average of the specified number of readings. This reduces noise but increases the time taken to fill the display and may hide genuine features which exceed the actual sampling rate.

Print Dialog

This dialog box enables you to print either the current view or all views.

Custom Range List Dialog

This dialog is used to maintain a list of custom ranges. Custom ranges are used to display a trace in units other than voltage- for example, to display the output of a pressure sensor . The custom ranges appear after the voltage ranges in the channel dialogs.

At the left of the dialog is a list of custom ranges.

Add
This button opens a dialog to add a new custom range.

Edit
To edit an existing range, highlight the range in the list and then press this button.

Remove
To remove an existing range, highlight the range in the list and then press this button.

Edit Custom Range

This dialog is used to add or edit a new custom range.
Note that the signal conditioner information is derived from the Pico Signal Conditioner (PSC) files - you can create a user PSC file for sensors that you wish to use regularly. See the signal conditioner help for more information about these files or any other aspect of signal conditioners.

Using a signal conditioner:

1. Select the appropriate conditioner: the ‘Sensor’ box will then show a list of sensors for the selected conditioner.
2. Select a sensor, the computer fills in the minimum and maximum value and the units for this sensor.
3. You can, if required, alter the minimum and maximum values if you are using only part of the range. For example, Pt100 goes from -200 to 370C). But you may wish to display 0 to 100C. You can even create two Pt100 custom ranges- one for 0 to 100 and another for 0 to 200, if required.

Using your own sensor:

1. Leave the conditioner and sensor set to None
2. Type in pairs of raw and scaled values in the edit box. For example, if you are using a pressure sensor that produces 0mV at 0bar and 2000mV at 100bar, type in:

    0 0
    2000 100

The min and max values will be updated as you enter the values. For a sensor with a linear output, you should enter two pairs of values- the minimum and the maximum. If the sensor has a non-linear response, you should enter more pairs of values.

3. Type in the units (Bars in this case)

Chapter 6: Control Bars

- View bar
- Default View Bar
- Scope View Bar
- Spectrum View Bar
- Meter View Bar
- XY Scope View Bar
- Composite View Bar
- Sample bar

Other Chapters: Overview Views How To... Menus Dialogs Technical information Glossary

View bar

The view bar is displayed at the top of the main window, just underneath the menu. The view bar contains a set of buttons to create new views, and the most commonly used controls for the active view. The controls for each type of view are different, so the view bar changes to reflect the control types and settings for the active view.

See also:-

- Scope View Bar
- Spectrum View Bar
- Meter View Bar
- XY Scope View Bar
- Composite View Bar

Default View Bar

The default view bar appears when there are no active views.

 Press this to create a new scope.

 Press this to create a new spectrum view.

 Press this to create a new meter view.

Scope View Bar

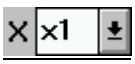
The scope view bar is used to control the settings for the current scope view.

 Press this to create a new scope.

 Press this to create a new spectrum view.

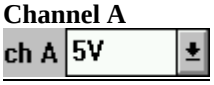
 Press this to create a new meter view.

Timebase



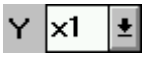
X multiplier

Channel A



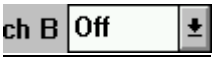
Range

AC/DC switch (ADC200 only)



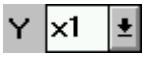
Y Multiplier

Channel B



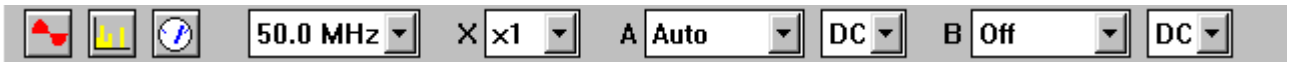
Range

AC/DC switch(ADC200 only)



Y Multiplier

Spectrum View Bar

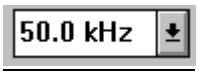


The spectrum view bar is used to control the settings of the current spectrum view.

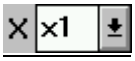

Press this to create a new scope.


Press this to create a new spectrum view.

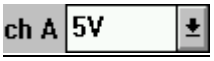

Press this to create a new meter view.



Maximum frequency

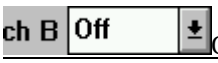


X multiplier



Channel A range

Channel A AC/DC switch(ADC200/100 only)



Channel B range

Channel B AC/DC switch(ADC200/100 only)

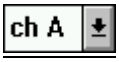
Meter View Bar

The meter view bar is used to control the settings of the current meter view. For multi-parameter views, the current parameter is marked with an asterisk.


Press this to create a new scope.

 Press this to create a new spectrum view.

 Press this to create a new meter view.



Channel

Voltage range

Function

AC/DC switch(ADC200/100 only)

XY Scope View Bar

The XY scope view bar is used to control the settings for the current scope view.

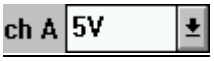
 Press this to create a new scope.

 Press this to create a new spectrum view.

 Press this to create a new meter view.

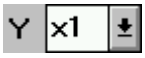
Timebase

Channel A



Range

AC/DC switch (ADC200/100 only)

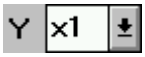


Y Multiplier

Channel B

Range

AC/DC switch(ADC200/100 only)



Y Multiplier

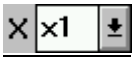
Composite View Bar

The composite view bar is used to control the settings for the current composite view.

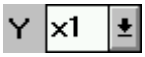
 Press this to create a new scope.

 Press this to create a new spectrum view.

 Press this to create a new meter view.

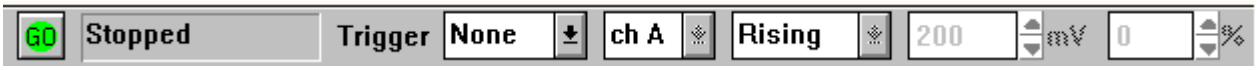


X multiplier for composite view



Y multiplier for composite view

Sample Bar



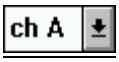
The sample bar provides three main functions:

- start/stop sampling
- display current sampling status
- set triggering

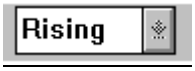
Start/Stop

Sampling status

Trigger mode



Trigger channel



Trigger direction

Trigger threshold

Trigger delay

Chapter 7: Technical information

- Dynamic Data Exchange (DDE)
- Ini file settings (preferences)
- Data file formats
- Scaling file formats
- Example/test menu file format

Other Chapters: Overview Views How To... Menus Dialogs Control bars Glossary

Dynamic Data Exchange (DDE)

Dynamic Data Exchanges is a way of transferring data between Windows programs so that when data changes in one application, it is automatically updated in another application. PicoScope for Windows acts as a DDE server by making available a number of pieces of information (Topics) which other applications (when acting as DDE clients) can request. This communication is called a DDE link.

The easiest way to set up a link is to use the clipboard. Here is a step by step guide:

1. Open a scope view and start it running
2. Select **Copy as text** from the Edit menu
3. Go to the client application (Eg Excel or Quattro Pro)
4. Select **Paste link** or **Paste Special** from the Edit menu
5. Click on the place in the spreadsheet where the data is to be placed
6. The scope data appears in the spreadsheet
7. Every few seconds, the data will be updated

Another alternative is to type into a spreadsheet cell the text necessary to create a link. To do this, it is necessary to know the Application, Topic and Item which defines the data that you require. These are as follows:

Application	Psw
Topic	View1 for first view, View2 for second view etc
Item	Text

Here are some examples:

Excel	=Psw!View1|Text
Quattro Pro	@ddelink([Psw|View1]”Text”)

There are a number of restrictions on the DDE functions available:

- Graphical DDE export is not supported
- Composite views do not export text, so cannot be used for DDE

Ini file settings (preferences)

When you first run PicoScope for Windows, it creates a section in WIN.INI called [PicoScope for Windows]. This section is used to hold information about your preferences when running the program.

If you wish to use a number of different sets of preferences, for example to use different converters, you can do so by creating a number of copies of PicoScope for Windows, each saved in a separate directory, and creating a file called PSW.INI in each directory. If, at startup, PicoScope for Windows finds this file, it will use the settings in PSW.INI rather than in WIN.INI.

Many of these preferences can be changed using the Setup option on the Files menu, however there are a number of additional options which can only be changed by editing WIN.INI directly. This section gives a summary of the preferences.

AccumulateLimit=10
When the accumulate option is selected, this defines the number of traces to accumulate before blanking the screen and starting again.

AllowEarlyTrigger=No
In slow sampling mode, the computer normally waits until it has collected a complete scan of data before waiting for the next trigger. If AllowEarlyTrigger is set to Yes, it will restart collecting if a new trigger occurs before the previous scan has completed.

ClipboardMono=No
Some applications cannot print embedded graphs which contain colour. If you wish to use the clipboard to transfer graphs to an application which does not print them correctly, set ClipboardMono to Yes.

Colour3=4259584
This specifies the colour for one of the display components.

Converter=101
This specifies the type of converter to use.

Display notes=Yes
This specifies whether any notes are to be displayed at the bottom of a view

Display Time=Yes
This specifies whether the time and date are to be displayed at the bottom of the view.

FirstTime=No
If FirstTime is missing or Yes, the computer displays a Welcome message.

Language=044
This specifies which language the program should use. It is the international dialling code corresponding to the country associated with the language.

MaxOversample=16
This specifies the maximum number of readings to take for each sample.

MaxScopeSamples
This specifies the maximum number of samples to take in a scope trace.

MaxSOTFiles=100
This specifies the maximum number of files to be collected using the save on trigger option.

Patches=f0:2
This specifies whether any patches are to be enabled in the converter driver routine, for example to allow for unusual printer ports. Do not change this unless instructed to do so by Pico technical support.

UpdatesPerSecond=2
This specifies the number of times the views will be updated. For converters other than the ADC200, a high update rate may slow down keyboard input and make the computer difficult to use.

Viewbar=Yes
This specifies whether a Control bar for the current view is to be displayed at the top of the main window.

Samplebar=Yes
This specifies whether a sample bar (trigger controls and Run/Stop button) are to be displayed at the bottom of the screen.

ScopeTimePerDiv=No
This specifies whether the scope timebase is shown as a time per division, or a time per scan.

SlowHoldoff=1000
When the scope is running at a second or more per scan in standard mode, this specifies the time, in milliseconds, to wait on completion of a scan before starting the next scan.

SpectrumFilterFactor=16
This controls the rate at which the spectrum filter is updated. The larger the number, the slower the update.

ZeroDb=776000
This specifies the level, in Micro-volts, that the meter and spectrum should use for zero dB.

PhaseOffset=0
This specifies an offset that will be added to the phase measured on the spectrum ruler.

File and clipboard formats

PSD and PSS files
The file formats for these two files are the same, but a PSS file contains no data.

A file is made up of a number of sections in the following format:

Header
Part 1
Part 2
Part 3...

The header is 8 bytes long and contains the following information:

- owner
- section type
- section number
- number of parts

The only useful items are the section type and the number of parts. Each part is preceded by a 32-bit byte count, which specifies the length of remainder of the part (ie the length excluding the byte count).

Most sections contain only one part but data sections usually contain two or more.

There are four types of data section:

- Single channel fast (section type =1)
- Double channel fast (section type = 2)
- Single channel slow- standard/chart recorder modes (section type =3)
- Meter (section type = 4)

For a single channel data block:

- Part 1 contains information about how the data was collected.
- Part 2 contains an array of 4-byte times
- Part 3 contains an array of 2-byte adc readings

A double channel data block is the same apart from a Part 4 which contains data for channel B.

Scope .TXT file
The same format is pasted onto the clipboard. Column 1 is the time, usually in micro-seconds or nanoseconds. Column 2 is the voltage, in either millivolts or Volts.

If there is more than one channel, the times and voltages for channel 1 appear first, then the times and voltages for channel 2 appear below, et cetera. This is because readings for different channels may be collected at different times.

Spectrum .TXT file
The same format is pasted onto the clipboard. Column 1 is the frequency, in Hz or kHz, and Column 2 is the power in Volts or dB.

Pico Signal conditioner (.PSC) file format

PicoScope and other Pico software are provided with a set of .PSC files that contain scaling information on a wide range of sensors. The Edit range dialog offers a choice of the sensors in these files.
Users can add their own scaling information by creating additional .PSC files - these will be used automatically.
See the Signal Conditioner help file for more information about these files.

Test menu file format

If you have a number of standard tests that you carry out regularly, you can add a menu to select the settings for these tests by name. You can also use this facility to add a menu of example files that show what particular signals look like.

To add a test menu, it is necessary to create a test menu file. The facility to create this file is not built into PicoScope, it is necessary to use a text editor like Notepad, or a Word processor.

When the selected language is English, PicoScope looks for a test file called TEST044.INI. For other languages, replace the 044 by the telephone dialling code for the required language (eg 049 for German). The test file is in the standard Windows .INI file format.

Simple example
A very simple file looks like this:

```
[General]
Menu=Examples
Path=c:\pico\examples

[Examples]
Noise=noise.psd
Distortion=distort.psd
```

The Menu line in the [General] section specifies that a sub-menu labelled ‘Examples’ should be placed on the PicoScope main menu.

The [examples] section says what options should appear in the Examples sub-menu. When a menu option is selected, the specified .PSD or .PSS file is loaded. For example, if the user selects Distortion, the computer will load a file called DISTORT.PSD from the specified test directory (in this case, c:\pico\examples).

Multi-layer menus
If no filename is specified, PicoScope creates a sub-menu for the option. The following example contains two sub-menus:

```
[Examples]
Amplifier=
CD player=

[Amplifier]
Noise=noise.psd
Distortion=distort.psd

[CD player]
White Noise=white.psd
PSU noise=psu.psd
```

Documentation

You can associate each menu option with either a document of some sort, or with a topic in a help file. PicoScope will display the specified help topic or document if the user presses the Test button on the help menu. If AutoShow is set to Yes, it will also display the information as soon as the test menu option is selected.

The following example shows how to do this:

```
[General]
Menu=Examples
Path=c:\pico\examples
```

AutoShow=Yes
Help=exam044.hlp

[Examples]
Noise=noise.psd,10000
PSU Noise=psunoise.psd,20000,psu.hlp
Distortion=distort.psd,notepad.exe distort.txt

A numeric item after the filename indicates that PicoScope should display a help topic: any other item is treated as a command line.

In the above example, when the Noise menu option is selected, PicoScope will load noise.psd, then it will display topic 10000 from the default help file (c:\pico\examples\exam044.hlp).

When the PSU noise menu option is selected, PicoScope will load psunoise.psd, then it will display topic 20000 from the specified help file (c:\pico\examples\psu.hlp).

When the Distortion example is selected, PicoScope will load distort.psd, then it will run notepad.exe to display distort.txt.

In Windows 95, you can specify ‘start distort.txt’ and it will then start the correct program for a .txt file.

Glossary

- AC/DC Switch
- ADC
- Alternate Mode
- Aliasing
- Channel
- Channel A/B
- Chop Mode
- Decibels (dB)
- Fast Fourier Transform
- Function
- Maximum Frequency
- Range
- Sampling status
- Start/Stop sampling
- Timebase
- Trigger channel
- Trigger delay
- Trigger Direction
- Trigger Mode
- Trigger threshold
- X Multiplier
- X Multiplier(Spectrum View Bar)
- Y Multipliers

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ADC

ADC
PicoScope for Windows supports a range of analog to digital converters, from the single-channel ADC-10 to the 100Msps ADC-200.

Channels
With an ADC-100 or ADC-200, you can collect data from just one of the two channels, or from both channels. If you collect data from both channels, you can use chop mode or alternate mode.

Voltage ranges
The ADC-100 and ADC-200 have a number of input voltage ranges. You can either specify an input voltage range, or select Auto, which means the ADC will automatically adjust the voltage range to suit the input signal. Note that Auto mode does not give good results with trigger signals that occur only once, as PicoScope does not know in advance what range to use.

Fast Fourier Transform

A Fourier transform is a process for converting a set of values which are measurements as a function of time into a set of values which are a function of frequency. PicoScope uses this technique to generate the Spectrum Analyser view.

Aliasing

When you take a set of samples from an input signal, any frequency in the input signal which is above the Nyquist frequency (half the sampling rate), appears to be at a frequency below the Nyquist frequency. This phenomenon is called Aliasing.

For example, if you take 20,000 samples per second, the Nyquist frequency is 10,000Hz. If the input signal contains a component at 11,000Hz, it will appear at 9,000 Hz.

It is easy to check for aliasing by changing the sampling frequency - real signals will stay at the same frequency, whereas aliased signals will move.

It is possible to reduce the effects of aliasing by taking several readings for each sample (oversampling), then applying a digital filter to attenuate signals above the Nyquist frequency. Clearly, this is only possible when the sampling rate is well below the maximum sampling rate that the ADC can operate at.

Decibels (dB)

Decibels are a measure of power. The decibel value is calculated as

    10 x log10 (power / power_zero_db)

If you work this out when power = power_zero_db, you will find that the dB value is zero.

As power is proportional to the square of the voltage, this formula can also be expressed as

    20 x log10 (voltage / voltage_zero_db)

There are a number of possible values for the zero dB voltage - we have chosen to use 1 volt peak (0.707V RMS).

Another measure is with respect to 0.775V RMS (1mW into 600 ohms) - this is sometimes called db(M).

See Ini file formats for how to change the zero-dB level.

Timebase

The timebase controls the time interval across the scope display.

If you select **Timebase is time per division** in the preferences dialog, this works like a normal scope. There are ten divisions across the screen, so the total time interval is ten times the timebase.

X Multiplier

When the X multiplier is 1, the computer displays all of the data that it has collected across the full width of the window. If you change the X multiplier to **x2**, the computer displays only half of the data, but twice as big. It also displays a scroll bar across the bottom of the window which you can use to control which portion of the data is displayed.

You can change the Y multiplier to expand the voltage range.

If you set the X multiplier to a large value (x10 or above), it may be worthwhile increasing the maximum samples on the scope trace.

Y Multipliers

When the Y multiplier is 1, the computer displays the full voltage range using the full height of the view.

If you change the Y multiplier to **x1**, the computer initially displays the full voltage range, but also displays a scroll bar at the left or right of the window. You can use this scroll bar to move the trace up or down, to move it away from other traces.

If you change the Y multiplier to **x2** or above, the computer displays only half of the voltage range, but twice as big. The scroll bar now controls which portion of the voltage range is displayed.

You can change the X multiplier to expand the time axis. (Not applicable for the XY Scope view)

AC/DC Switch

The AC/DC switches for the ADC200/100 operate under software control, rather than manually. When using an ADC200/100, one or two AC/DC combo boxes appear on the view bar.

Note that changing the AC/DC switch settings in one view will also change the settings in all views that are running.

Channel A/B

This allows you to specify an input voltage range, or select AUTO so that the ADC will automatically adjust the voltage range to suit the input signal. Select OFF to turn that channel off.

Maximum Frequency

The maximum frequency controls the sampling rate of the data collected for spectrum analysis. This, in turn, determines the highest frequency that the spectrum analyser can display.

Note: The lower the maximum frequency, the longer it takes to collect enough data to display a spectrum. At very low maximum frequencies, this may affect the response time of your computer to keyboard input.

X Multiplier(Spectrum View Bar)

When the X multiplier is 1, the computer displays the entire frequency range across the full width of the window. If you change the X multiplier to **x2**, the computer displays only half of the frequency range, but twice as big. It also displays a scroll bar across the bottom of the window which you can use to control the frequency range that is displayed.

Channel

This specifies which channel to measure data from.

Range

This allows you to specify an input voltage range, or select AUTO so that the ADC will automatically adjust the voltage range to suit the input signal.

If you have defined any custom ranges, they will appear in the list of options after the voltages.

Function

This specifies which function to use. The options are:

- **DC Volts** - The DC component or average input voltage
- **AC Volts** - The RMS AC voltage: note that this excludes any DC component
- **dB** - AC volts converted to dB with respect to 0.776V
- **Frequency** - Frequency of the AC component, in Hz.

Start/Stop sampling

At the left of the sample bar, there is a button which has two functions. When PicoScope is collecting data, a **STOP** button is displayed - pressing this button stops data collection and freezes all views. When sampling is stopped (either by pressing the **STOP** button or because of some trigger event), a **GO** button is displayed -pressing the **GO** button restarts data collection.

Sampling status

This window indicates whether PicoScope is currently collecting data.

You can press the Run/Stop button or press the space bar to start or stop collecting.

If the computer detects that no ADC is connected, a message will appear here. When you plug in the ADC and turn on power (if required) the status will change to ‘stopped’.

Trigger Mode

This is used to select the trigger mode. The trigger mode can be:

- **None** - No trigger event so it collects and displays data continuously
- **Auto** - Starts collecting when a trigger event occurs or after the auto-trigger time, whichever is sooner
- **Repeat** - Starts collecting only when a trigger event occurs. After displaying the data it waits for the next trigger event
- **Single** - Starts collecting only when a trigger event occurs and stops after displaying the data

If you select **None**, the remaining trigger options are shaded.

Note: If you select **Repeat** or **Single** when using a product other than the ADC-200, PicoScope locks the computer until a trigger event occurs. If PicoScope does become stuck, click on the Stop button in the sample bar, then press F9 (16-bit applications) or F10 (32-bit applications) to cancel the trigger.

Trigger Direction

This is used to select the direction in which the signal must cross the threshold for a trigger event to occur.

The trigger direction can be:

- **Rising** - Triggers when the trigger channel signal rises past the trigger threshold
- **Falling** - Triggers when the signal falls past the threshold

Trigger channel

This selects which channel is to be used as the trigger input.

Trigger threshold

This shows the voltage (in mV) that the trigger channel must cross in order for a trigger event to occur. You can type in a new value for the trigger threshold or adjust the current value using the Up and Down arrows at the right of the value.

Note: The trigger threshold is acted upon immediately. The **-** sign on its own is not valid so, if you want a negative trigger delay, type in a number then add the **-** sign.

Trigger delay

This controls the time delay between the trigger event and the start of collecting data. There is a number and a time units field. You can type in a new value for the number, or adjust the current value using the Up and Down arrows at the right of the value.

Chop mode

The computer takes a reading from one channel and then a reading from the other channel. This is useful for events that occur only once and you wish to see the same event in both channels. The disadvantage of chop mode is that the sampling rate on two channels is half the sampling rate with one channel.

Alternate mode

If the event you are observing is repeated, you can use alternate mode. This enables PicoScope to take a block of readings from one channel and then a block of readings from the other channel. Picoscope can take the readings from both channels at full speed.