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Reliable Instruments for an Unreliable World

# SMART

# Windmill Software Manual

# SMART – Windmill Software Manual

## 1. Installing Windmill

### 1.1 Introduction

Windmill is a suite of data acquisition and control software. It runs on a Windows PC and takes readings from many different types of measuring device. Each Windmill program concentrates on one task, data logging or charting for instance. Data can also be transferred to other Windows programs like Excel, either in real-time or after collection has finished.

The Windmill programs are ready-to-run: no programming in needed.
The standard Windmill package consists of:

- ConfIML
- SetupIML
- The Display and Control panels: AnalogOut, DigitalOut and DDE Panel
- Logger
- Chart

There are other, optional, Windmill programs such as Graphics for creating process mimics, Streamer for high speed logging, Test Sequence for automating control and IML Tools to speed up writing your own data acquisition and control applications. For details of these and other optional modules contact Windmill Software.

To use Windmill follow these steps.

1. Install Windmill and record the details of your measurement and control hardware (discussed in this chapter).

2. Run Windmill SetupIML and specify how you want to use your hardware– setting such details as channel names, alarm thresholds and input ranges. SetupIML is discussed in Chapter 2.

3. Run the other Windmill programs, such as DDE Panel, Logger or Chart. These are each discussed in their own chapters.

4. If you want to transfer data to other Windows applications in real-time, set up DDE links. These are discussed in the Appendix.

### 1.2 Installing the Software

You need a personal computer running Microsoft Windows 98 or later, with at least 8 MB RAM.

1. Insert the CD-ROM into the CD drive. Windows should detect the CD and automatically start the installation program. If it doesn't, run the setup.exe program on the CD.

2. At the end of installation, the Configuration program (ConfIML) starts. This asks you for details of your data acquisition hardware and the default working directory. See Section 1.3 for details.

#### 1.2.1 Upgrading From Earlier Versions of Windmill

You can run Windmill alongside earlier versions of the software. Once you are happy that you no longer need a previous copy of Windmill, simply run its "Uninstall" program to delete it.

### 1.2.2 Running Several Copies of Windmill

Unless you have bought a multiple license, you are only permitted to run one copy of the software at any one time. Please contact your supplier if you require a multiple license.

## 1.3 Configuring your System

The Windmill Configuration program, ConfIML, records the details of your data acquisition hardware. It runs at the end of installation, and you should run it again from Windows whenever your acquisition hard- ware changes—for example when you add or remove some hardware.
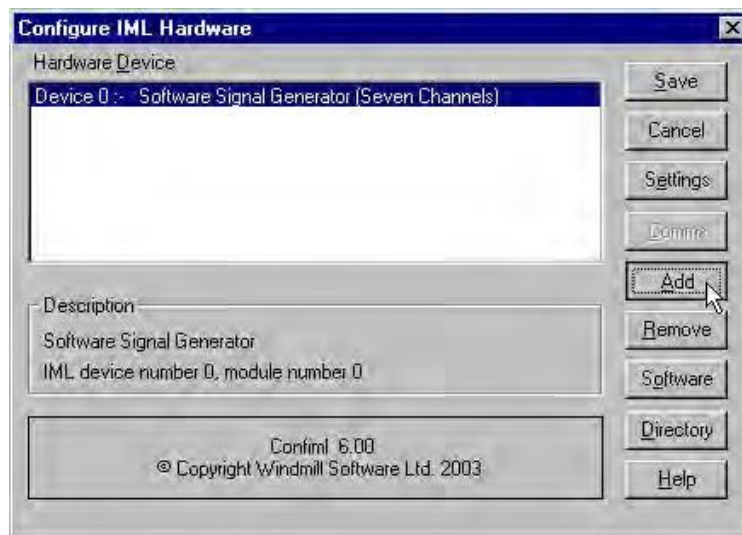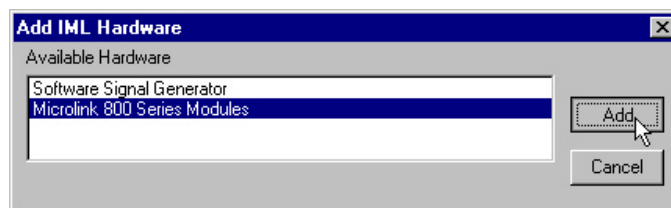


*The main ConfIML window.*

The first thing to do is press the Add button and include your data acquisition and control devices.

### Adding New Hardware

Press the Add button in the main window and a list of your measurement and control devices appears.

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*Adding New Hardware Devices to the Windmill System*

Select a device and press Add. If further information is required you will see the Hardware Settings dialogue.

Repeat for all the devices you plan to use. If a device isn't listed, you need to install its driver. Contact Windmill Software for advice.

## 1.3.1 Changing Hardware Settings

ConfIML may need further information about your hardware and present you with a list of questions. You must provide answers to all these. If in doubt press the Help button or refer to the *Windmill with "your" Hardware Manual*. The Default button will reset all the answers to correspond with the hardware manufacturer's default settings.

***Note: For serial devices handled by the COMIML driver, enter the hardware settings with the comDebug program instead of ConfIML.***

## 1.3.2 Setting the Working Directory

Windmill creates two types of files: those which hold data and those which hold the programs' settings. You can specify a default folder in which to store these files— known as the Working Directory. Initially the working directory is set to wherever you installed Windmill. To change this, press the Directory button.
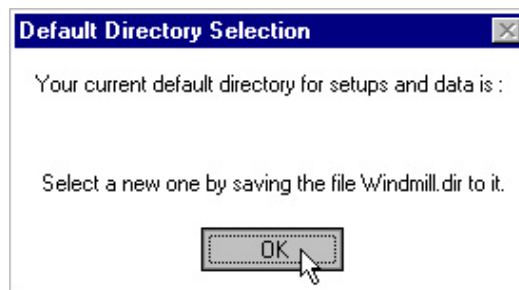


*Changing the Working Directory.*
*Press OK and a Save dialogue appears.*

Choose a new directory and press Save. Windmill will create two sub-directories under this choice, called setup and data. All the Windmill settings will be stored in "setup" and all the data you collect stored in "data".

## 1.3.3 The Software Signal Generator

In addition to data acquisition and control hardware, ConfIML lists the software signal generator. This is a special driver which simulates a device with seven channels, each channel producing a different signal. No special hardware is required, the data values are produced by calculation.

The software signal generator lets you experiment and practice with Windmill.

### 1.3.4  The ConfIML Main Window

The main ConfIML Window (page 1.3) shows the devices you have added.  You can now:

- Press Save to record the current configuration and close ConfIML

- Press Add to install more hardware

- Select a device and press Settings to adjust the settings you specified for that device (if any)

- Select a device and press Comms to adjust the communications protocol for that device (if any)

- Select a device and press Remove to delete that device from the list

- Press Software to authorize your software

- Press Directory to change your working directory

- Press Cancel to close ConfIML without saving the settings

You must save a configuration which lists at least one device before you can use any other Windmill programs.

After closing ConfIML start the SetupIML program and choose how you wish to use the hardware.  SetupIML will use the first device in the ConfIML Hardware Device list as Device 0, the default device.  For more on using SetupIML refer to Chapter 2.

Remember that if you make any changes to your data acquisition hardware you must re-run ConfIML and update the configuration.

### 1.3.5  The IML Device Icon

Whenever you run a Windmill program one or more IML Device icons will appear.  Different icons identify different hardware drivers.  The Windmill applications can't run without these, so don't close them whilst using Windmill.

**Windmill Software Ltd**

*Windows Engineering Software*

*March 2007*

**Configuring Technical Support Checklist for the COMIML Serial Driver**

**COMIML**

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COMIML lets Windows software read and control serial devices connected to the PC's COM port.  These include such diverse equipment as electronic balances used in a laboratory, GPS receivers used in the field and data loggers used in process plant.  The COMIML device driver can communicate over RS232, RS422, RS485 or Modbus.

The first thing to do with COMIML is configure it for use with your instrument.  You only need to do this once.  In THE future you can just run your Windmill logging, charting or display programs.
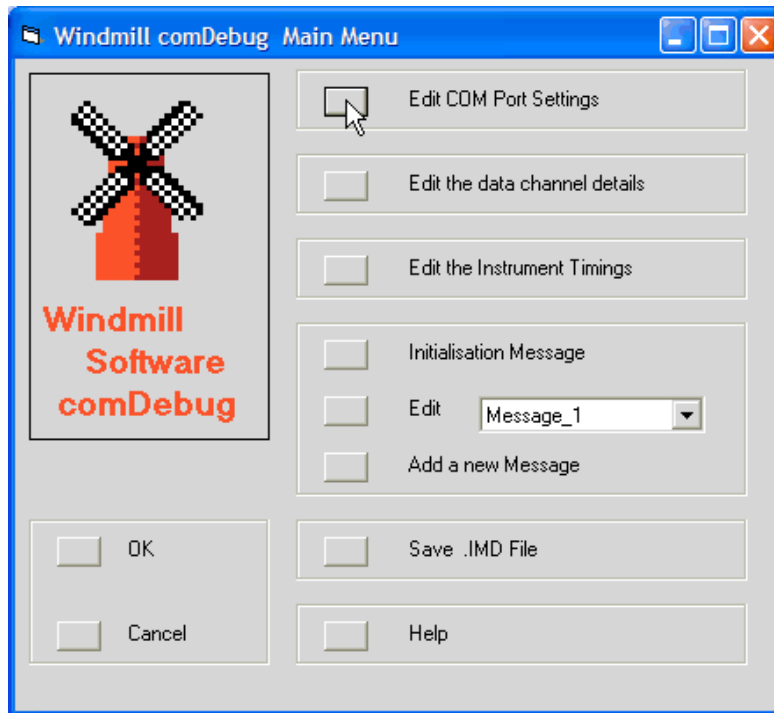
1. From the Windmill start menu select comDebug.  This utility lets you configure COMIML.
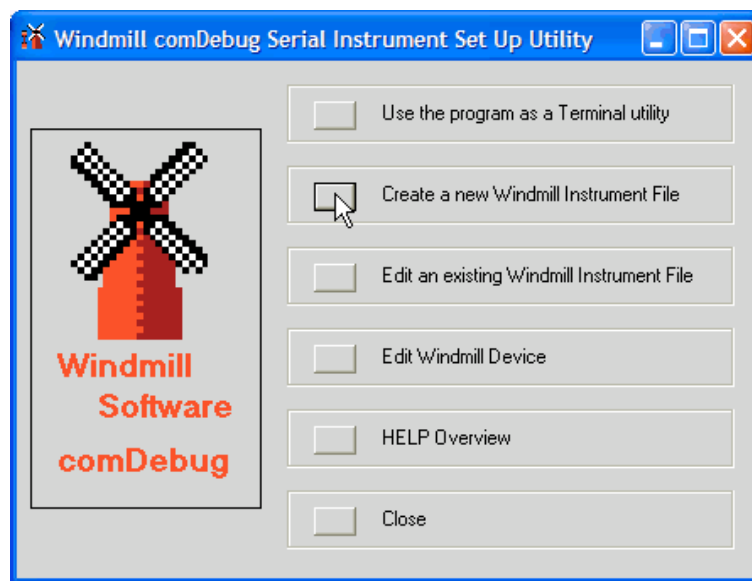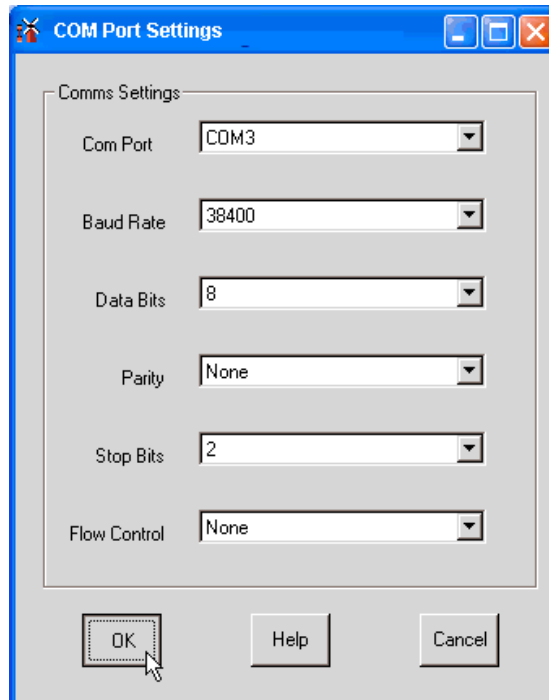


*The opening screen.*

2. From the opening screen select **Create a new Windmill Instrument File**. The main menu appears.

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*The Main Menu.*

3. Choose **Edit COM Port Settings** and enter your instrument's communications settings.  Click the Help button if you are not sure of the settings to use, or see our Making Measurements through the COM Port page.

*Choose the number of the COM port to which your instrument is attached, its baud rate, etc.   These settings must match those used by your instrument. If in doubt try 8 data bits, no parity and 1 stop bit.*

4.  Choose **Add a new Message** from the Main Menu.  This lets you send a message to your instrument and view its reply.
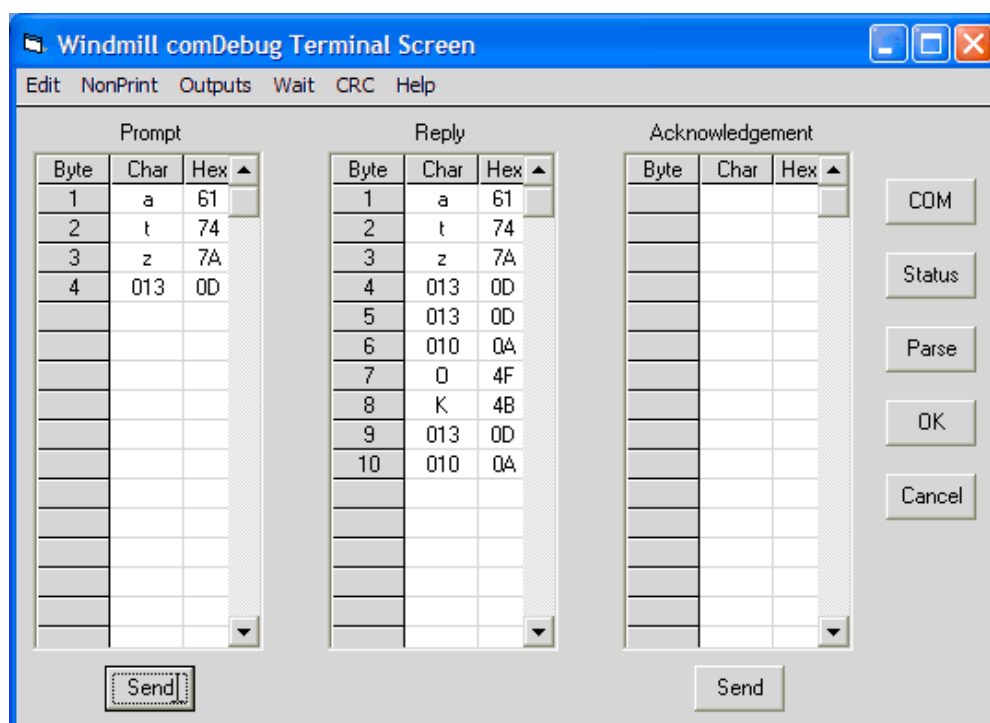


*The Terminal screen lets you send commands and data to the instrument, and view the reply.  For those instruments that require it, you can send an acknowledgement when the reply is received.*

a.  If your instrument needs to be sent a command to return data, then type this command into the Prompt grid.  If you need to enter characters not available from the keyboard, such as Returns or Linefeeds, you can Use the NonPrint menu, or Enter the Hexadecimal code into the Hex column, or Press the Num Lock key and, using the numeric keypad, enter the decimal code into the Char column.

b.  If your instrument does not need to be sent any commands then leave the Prompt grid blank.

c.  Select Send.  The instrument's reply is shown in the Reply grid.

5.  Extract the relevant data from the instrument's reply.  Click the Parse button.
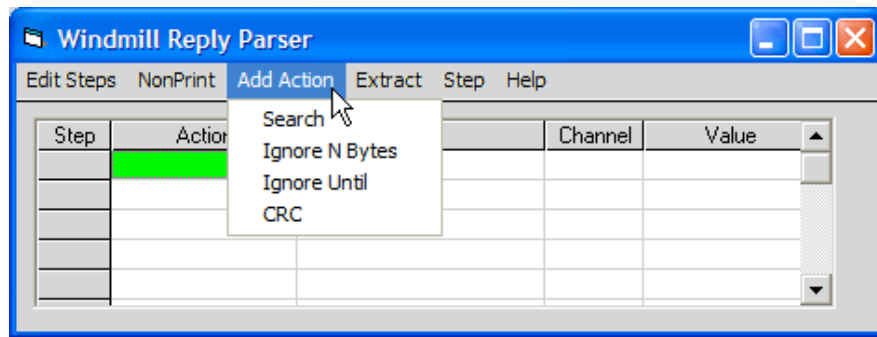
*Extracting Data from the reply: parsing the message.*

a. Click Add Action to search for or ignore characters.
b. Type the characters to search for, or the number of characters to ignore, into the Parameters box.
c. Click over the next row then select Extract. The Channel Details box appears.
d. You now need to create a channel to store the data which you are extracting. In the Channels Details box click Add Channel.
e. Click this channel in the grid and select it.
f. You are returned to the Reply Parser window and enter an Extract parameter. For instance, if you chose "Extract N Bytes" then type the number of bytes (characters) which you want to save as data.
g. Click Step to test the parsing. The data extracted is shown in the Value column.
h. If this looks right Click OK. Otherwise edit your settings.

6. Choose whether you want to continually take readings from your instrument in the background, or to take readings only when requested to do so. In the Main Menu choose **Edit the Instrument Timings**. If you have an instrument that sends data regularly without any prompting you would usually choose background reading.

7. Save your settings. From the Main Menu select **Save .IMD file**.

8. Repeat for your other instruments then click OK.

9. Windmill lists all your serial instruments as modules within a COMIML Device. In the opening screen click **Edit Windmill Device**. Press the Add button and select your instrument files.
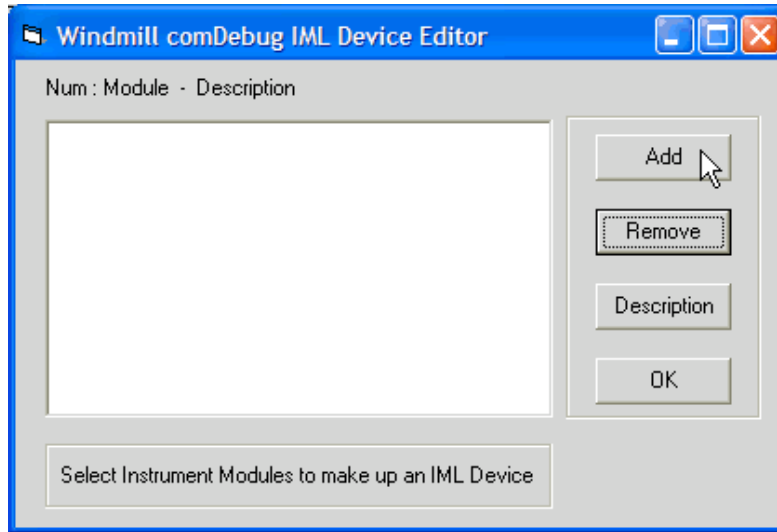
10. Run the Windmill ConfIML program and add the COMIML Serial Instrument Handler.

11. Run the SetupIML program.  This lets you specify how you want to use your instrument.  Select COMIML from the Device menu and double-click your channels to choose names, units, ranges and alarm levels.

12. You are now ready to use the Windmill logging, charting, display and control programs.  The next time you use Windmill you can go straight to this step.

To order Windmill COMIML Serial Driver go to
http://www.windmillsoft.com/comiml.html

**Further Reading**

The comdebug.hlp file contains full instructions on using COMIML.  Press the Help button during configuration then go to the Overview topic.

Issue 47 of *Monitor* used a real-world example of how to configure COMIML for use with a custom PLC.

Our Making Measurements through the COM port page goes into detail about communications settings: baud rate, parity, etc.  If you cannot persuade your instrument to send a reply then see the Trouble-shooting Serial Port Connections page.

Our FAQ answers your questions on using COMIML  (comDebug).

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## 2. SetupIML

### 2.1 Introduction

Windmill SetupIML lets you create customized setup files for your hardware. These contain all the details needed to automatically configure your devices. You can create a library of these files, with different setups for different applications.

Use SetupIML to:
- View the modules and channels in the hardware
- Choose which channels are involved in the current setup
- Give names to the channels
- Select the mode, range and data format for channels where appropriate
- Set alarm levels for channels
- set up engineering unit conversion where appropriate

When SetupIML is first loaded it interrogates the hardware and builds a default setup file. You can then edit this file, tailoring the system to your needs.

While SetupIML is running it constantly checks each operation with the hardware to spot any errors. Make sure that your data acquisition hardware is connected and switched on before starting SetupIML.

The rest of this chapter tells you how to start SetupIML, set channel parameters and save the setup file.

### 2.2 Starting SetupIML

In Windows click Start. Point to Programs then to Windmiill and click SetupIML.

The first time you start SetupIML you need to create a new setup file.
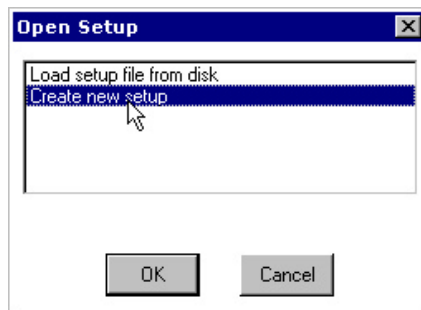


*Creating a new hardware setup file (*.ims). This will contain all the details needed to configure your measurement and control devices.*

### 2.2.1 Creating a New Setup File

When you select "Create new setup" you are asked to name the file. You can also enter a short description to remind you what the file does. You can always change or add this description later, as detailed in Section 2.4.

For example:
Name          MT37
Description    For testing machine type 37

Press OK. SetupIML interrogates the hardware and builds a default setup ready for editing. If you want to use the default settings just select Close from the File menu. You are now ready to use your Windmill applications.

However you may like to customize the file, giving the channels easily recognizable names and so on. For details on editing the setup file refer to Sections 2.3 to 2.8.

### 2.2.2 Loading a Setup File From Disk

In subsequent SetupIML sessions you can choose to open a file that you previously created. From the File menu select Open and choose "Load setup file from disk".

All the setup files (those with the extension .ims) in the working directory will be listed. Select a file and press OK.

### 2.2.3 Selecting a Setup File currently in use by other Windmill Applications

Setup files being used by Windmill are available directly from the Open Setup box. Note, however, that you will have to stop logging or charting whilst editing in SetupIML.

## 2.3 Selecting a Device

You might have several measurement and control devices attached to your PC, but SetupIML will only show one at a time. To select a different one use the Device menu. The device's modules and channels are shown and the Device Box confirms the current selection. A channel may hold data from an analog input, an analog output, a digital input, a digital output, a counter, a timer, etc. For example, with a GPS receiver you might have one channel of latitude data and one channel of longitude data.

Device 3 : type SigGen

*The Device box is at the top left of the SetupIML window. It shows the measurement and control unit on which you are currently working.*

You can also double-click the Device box to step through your hardware units.

If the list of devices is incomplete you need to re-run the ConfIML program. Refer to Chapter 1 for details.

Although SetupIML can only show one device at a time, operations such as Open, Save and Close work on all devices simultaneously, regardless of which device is being displayed.

## 2.4 Attaching a Description to a Setup File

You can edit the description you specified when you named the setup file or add one if you haven't already done so.

Either select Description from the main menu or double-click the Description Box. The new description is displayed in the main window and saved with the setup file.

Setup MT37 : For testing machine type 37

*The Description box runs across the SetupIML window.*

## 2.5 Configuring a Channel

You can now customize each channel, changing such things as its name, range and engineering units.

Make sure you're in Configure Channels mode. The current mode is shown in the Mode Box of the main window. If in Select Channels mode double-click the Mode Box to change to Configure Channels.

Mode : Configuring Channels

*The Mode box.*

Now select a channel either by double-clicking the mouse over the channel, or by using the arrow keys and Return.

There are 4 keyboard short cut keys:

Home   Jumps to top left-hand corner of current display
End     Jumps to bottom right hand corner of current display
Ctrl Home     Jumps to first channel of first module
Ctrl End     Jumps to last channel of last module

Depending on the type of channel you select, one of four configuration dialogues appears.

- An analog dialogue box for analog channels (discussed in Section 2.6).
- A digital dialogue box for digital channels (discussed in Section 2.7).
- A primary high speed clock channel for Microlink 770 and 3070 hardware (discussed in the *Windmill with Microlink Hardware Manual*).
- A secondary high speed clock channel for Microlink 3070 hardware (discussed in the *Windmill with Microlink Hardware Manual*).

Unless you are using partial setups - Section 2.8, you should not have grey, excluded, channels. If you do, double-click the Mode box to switch to Select Channels mode then double-click a channel to reinstate it. Make sure you return to Configure Channels mode afterwards. If you wish to disable a channel use its configuration dialogue rather than Select mode.

## 2.6 Configuring an Analog Channel

Double-click an analog or value channel in the main window and you are presented with these options.



*Configuring an analog channel.*

### 2.6.1 Naming Channels

A channel is originally named according to its device, module and channel number, but you can rename it to something more memorable. Simply erase the current name and type in a new one. The name can be a combination of letters, numbers and underscores.

### 2.6.2 Setting the Measurement or Transducer Type

The Measurement / Transducer list contains those types of measurement (such as voltage, resistance or frequency) and transducer (such as thermocouple types or strain bridge configurations), that the channel supports. Select one from the list. All the other analog settings will be reset to suitable default values, so you should set this before the other controls.

### 2.6.3 Setting the Engineering Units

The Windmill programs display values in engineering units. The standard units depend on the type of measurement, for example degrees Celsius for temperature, ohms for resistance and volts for analog voltages. If you wish, for measurements other than strain, the values can be scaled to any other units that are linearly proportional to the standard units. This uses the formula:

New Engineering Units = Scale x Standard Units + Offset

For example: if a pressure transducer produces 0 volts output at 1 atmosphere, rising smoothly to 10 volts at 5 atmospheres, then to obtain the reading in atmospheres you need:

$$scale = 0.4$$
$$offset = 1.0$$

Similarly, temperatures can be displayed in Fahrenheit by setting scale = 1.8, offset = 32; and voltages can be displayed in millivolts by setting scale = 1000, offset = 0.

To change the engineering units erase their name and type a new one. The name may be any combination of letters, numbers, under- scores, backslashes and percentage signs. For example: revs/min or %full. Now type in the scale and offset needed to convert the standard units to the new units.

Move the focus by clicking in the units name box for example and SetupIML shows the maximum and minimum values possible with your chosen scaling factors and range. If no maximum or minimum values are displayed then either your hardware can't supply this information, or your hardware drivers need updating contact your dealer for details of the latest drivers.

When measuring strain, the values are always in microstrain. The area normally used for scale and offset is used to enter the gauge factor of the gauge in use, and, if transverse as well as normal strain is being measured, Poisson's ratio for the material under test. These are required to calculate the answer in microstrain. If only normal strain is being measured, Poisson's ratio is not required. You should also use the zeroing facility for strain gauges, see Section 2.6.11.

### 2.6.4   Enabling and Disabling Channels

In the Usage area you can set the direction of the channel: input, output, input and output, or neither.

If a channel is set to just input then data can be read from it but not sent to it, and vice versa for output. Some input channels may need to be outputs in certain circumstances: for example, to reset a counter or to read values back from an output module in order to log output changes. In these cases set the usage to input and output.

Use this setting to disable channels you don't wish to use. This optimizes the performance of the Windmill programs.

### 2.6.5   Setting the Range

If this channel has ranges that can be selected from software, then the current range is shown in the Input Range / Mode box. Select the arrow at the end of the box to view other available ranges, and choose a different range if required.

For greatest accuracy you should select the smallest range that encompasses your signals. If you are using Streamer software don't pick automatic ranging; this takes time and is too slow for Streamer.

### 2.6.6   Setting the Settling Time

This the time allowed for the hardware to settle between connecting an analog input channel to the A-D converter and taking a reading from the channel.

Increasing the settling time may produce a more accurate reading, especially for small signals or signals from high impedance sources. However the software will run more slowly. Conversely, the software will run more quickly with a short settling time but the accuracy might suffer, especially if the low-pass filter is turned on or the signal source impedance is high.

To change the settling time erase the current value and type in a new one. If the settling time cannot be changed this control is disabled and shown in grey.

### 2.6.7 Setting the Low Pass Filter

The filter is used to limit the frequency response of analog input channels and so reduce the effect of high frequency noise. If you use the filter then you need a settling time of at least 3 mS. This control is disabled if a channel hasn't an optional filter.

### 2.6.8 Setting Alarm Thresholds

You can set two alarm thresholds for each input channel. You can also choose to output a digital signal if the channel enters an alarm zone. Channels in alarm will be highlighted in the other Windmill applications.

Press the Alarms button. If the button is grey and inactive your hardware doesn't support alarms.
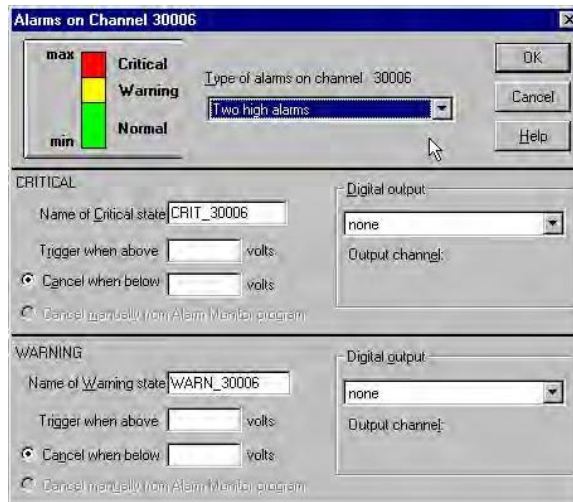


*Setting alarm thresholds on an analog channel.*

There are 7 different types of alarm settings. Select one from the drop-down list, or click the top left picture to step through the different types.

When you've chosen an alarm you can:
- name it;
- specify its thresholds;
- specify digital output settings, assuming you have suitable equipment.

**Naming an Alarm**

Enabled alarm states must have unique names of up to 12 letters, numbers or underscores. Default names are automatically allocated from the channel number and type of alarm, for example WARN_30006 and CRIT_30006. To change these simply erase them and type in your new ones. The names are used by the optional Alarm Monitor and Graphics programs.

**Setting Alarm Thresholds**

Type your chosen alarm trigger thresholds into the relevant boxes.  You can choose to cancel alarms automatically when the channel reading returns to a specified level, or to cancel manually from the Windmill Alarm Monitor program.  If you don't have Alarm Monitor in your system this option will be greyed out.

**Sending a Digital Signal on Alarms**

You can choose to automatically switch a digital channel when the analog channel goes into alarm, sounding a buzzer or switching on a light for example.  Three digital output options are available: None, Output high on critical alarm, Output low on critical alarm.

Select a channel from the list of enabled digital outputs.

More than one alarm can be directed to the same digital output, providing they all use the same state on alarm—all set to High on Alarm or all set to Low on Alarm.

Note that every alarm condition you define uses some memory and requires processing time to continually check whether the condition is true or false.  To optimize performance, only enable alarms where needed.

### 2.6.9  Copying Settings

The Copy button reduces the need for tedious repetitive operations on many channels.  Settings will be copied to the higher numbered channels in the same module.  You can choose to copy any or all of:

- Enable for input or output
- Measurement or transducer type
- Input range
- Engineering units and scaling
- Settling time and low-pass filter
- Alarm types and thresholds;
- Digital outputs on alarms.

Names are unique to channels and so cannot be copied.  Copying stops with an explanatory message if a channel is found which cannot support the settings.  The default names will be used for alarm states enabled by copying.  Remember that enabling alarms unnecessarily will reduce system performance.

### 2.6.10  Returning to the Default Settings

To return to the default settings, and cancel all the settings you have entered, select the Default button.  This also clears any alarms on the channel.
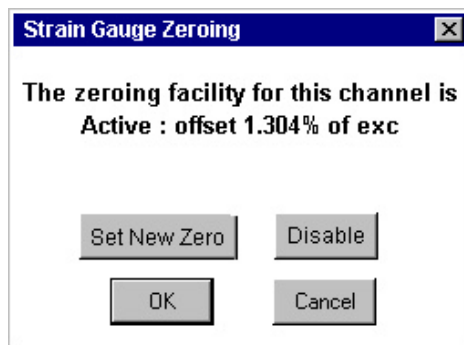
### 2.6.11 Zeroing (Balancing) a Strain Gauge Bridge

The Zero button is present when monitoring strain gauge bridges on hardware with an offset balancing feature. It is labelled "Special" on other types of hardware, see the next section for details.

The output from unstrained bridges can be large in comparison to the changes caused by strain. This requires a wide voltage range to be selected, the changes consequently being measured with poor resolution. The zeroing facility solves this problem.

First select the input range which covers the **change** in bridge output expected during the measuring period. Now press the Zero button.



*Zeroing a strain gauge bridge.*

Press "Set New Zero". This subtracts a suitable voltage from the input signal to make the current bridge output read approximately zero. This subtraction remains in force until you again press the Zero button and disable or alter it, so all future readings are as changes relative to the new zero level.

The voltage subtracted is actually a fraction of the bridge excitation voltage, so changes in the excitation do not affect the balance. The fraction of excitation being used to balance the output is displayed.

For example: Suppose a strain bridge produces 120 mV output un-strained and 150 mV fully strained. Without re-zeroing the bridge, you would have to use the 200 mV range, but the signal of interest would occupy only 15% of this range. Instead you should select the 50 mV input range and then use Set New Zero. This will result in apparent out-puts between 0 and 30 mV, using 60% of the available range and giving four times better resolution.

***Note: Changing the input range can invalidate the zeroing, so re-zero the bridge after changing the range.***

When the input is being used for simple voltage measurement, or absolute values are required, press the Disable button on the zeroing

dialogue.  This will leave input voltages unchanged and the true input signal can be observed.

### 2.6.12  Using Special Hardware Commands

If you see an active button labelled "Special", you can access features unique to your hardware.  For example, you may be able to choose the resolution of your analog-to-digital converter or set the interval between automatic hardware recalibrations.  Check your Hardware Manual for details of the options available.

After pressing the Special button, either pick a special command from the list that appears or type one directly into the edit box, adding parameters where appropriate.  Press the Execute button to send the command: the response is displayed.

## 2.7 Configuring a Digital Channel

Double-click a digital channel in the main window and you are presented with these options.



*Configuring a digital channel.*

### 2.7.1  Naming Channels

A channel is originally named according to its device, module and channel number, but you can rename it to something more memorable.  Simply erase the current name and type in a new one.  The name can be a combination of letters, numbers and underscores.

### 2.7.2   Grouping Channels

Each channel (line) is initially set to on or off by a single bit.  It is therefore said to be 1 bit wide.  This means that the state of the channels will be set or read individually.  You may, however, want to set several channels at the same time.  For example, you may want to open or close 4 relays at the same instant.  In this case set the width of the channel to 4 bits.  The digital channels which are being grouped together must be arranged consecutively.

To control a multi-bit channel use Windmill AnalogOut instead of DigitalOut.  This is because all 4 relays are controlled by a single value in the range 0 to 15, rather than by 4 separate ON/OFF values.

When a channel is multi-bit then other settings, name, usage and data format, are set for the channel as a whole using the first in a group, rather than for individual lines.  The other lines within a group cannot be individually accessed and names cannot be given to the digital states.

### 2.7.3   Naming the Two Digital  States

If the channel is 1 bit wide you can give brief names to the two states.  By default they are named On and Off corresponding to values of 1 and 0.  To change this just erase On and Off and type in your selection High and Low, for instance, or Open and Shut.  The names can be up to 5 characters long.

When a channel is multi-bit the name of state settings are disabled.

### 2.7.4   Setting the Data  Format

When you've grouped channels by setting the width greater than single-bit you can choose in which format to transmit data: either binary, hexadecimal or decimal.  For a channel width of 1 data is always transmitted as 1 for on and 0 for off, and the format option is disabled.

For example: A channel has a width of four bits with the first two lines being off and the other two lines on.   In binary this would have the value "1100", in decimal "12" and in hexadecimal "C".

### 2.7.5   Enabling and Disabling Channels

In the Usage area you can set the direction of the channel: input, output, input and output, or neither.

If a channel is set to just input then data can be read from it but not sent to it and vice versa for output.  You may want to read values back from an output channel, for example to log output changes. In this case set the channel usage to input and output.

Use this setting to disable channels you don't wish to use. This optimizes the performance of the Windmill programs.

### 2.7.6  Setting Alarms on Digital Inputs

You can set either digital state to trigger an alarm. Choose one of three options from the Alarm box: No alarm, Alarm when zero, Alarm when non-zero. If you choose an alarm setting then it must have a name. By default it will be allocated one from the channel number, for example DIG_00312. You can change this by simply erasing it and typing in a new name of up to 12 characters. The alarm name is used in the optional Alarm Monitor and Graphics programs.

Note that every alarm condition you define uses some memory and requires processing time to continually check whether the condition is true or false. To optimize performance only enable alarms where needed.

### 2.7.7  Copying Settings

The Copy button reduces the need for tedious repetitive operations on many channels. Settings will be copied to the higher numbered channels in the same module. You can choose to copy any or all of:

- Enable for input or output
- Names of 1 an 0 state
- Alarm type

Channel names, widths and data formats cannot be copied. If a channel is found which cannot support the settings copying will stop with an explanatory message. The default names will be used for alarm states enabled by copying. Remember that enabling alarms unnecessarily will reduce system performance.

### 2.7.8  Returning to the Default Settings

To return to the default settings, and cancel all the settings that you have entered, select the Default button. This also clears any alarms on the channel.

## 2.8 Sharing the Hardware Between Several Applications

When two or more Windmill systems are running concurrently on the same computer and sharing the same hardware, you may want to create a partial setup. This is useful when you have two independent tasks for your hardware. A partial setup controls a subset of the channels in the hardware; the rest being put into a different setup to be used by another application running simultaneously.

Don't create a partial setup if you just want to disable some channels from the current setup. Instead use the appropriate configure channel dialogue box as described in Sections 2.6.4 and 2.7.5.

To exclude channels use the Mode menu to go into Select Channels mode. Double-click the mouse over a channel to toggle between included and excluded.

Those channels included in the setup are shown in black and those excluded, in grey.

### 2.9 Saving and Closing the File

To close the current file but remain in SetupIML, select Close from the File menu. If you have saved all the changes the main window empties and the setup file can be used by the other Windmill applications.  If you haven't yet saved the file you will be asked if you want to do so.

You can also save the file minimizing SetupIML, or selecting Save or Save As from the File menu.

### 2.10  Opening a New File

To open a new file first close the current file then select Open from the File menu. The Open Setup dialogue appears, see Section 2.2.

### 2.11  Closing SetupIML

When you have finished creating setup files select Exit from the File menu.  If you've saved all your changes the window is closed.  If not you're given an opportunity to save your file.  You are now ready to run the Windmill display and control programs like DDE Panel, Logger and Chart.

## 4.  Logger

### 4.1 Introduction

Logger saves data to disk at regular intervals.  You can later open the saved data file in any software package that handles ASCII text files, such as Microsoft Excel.
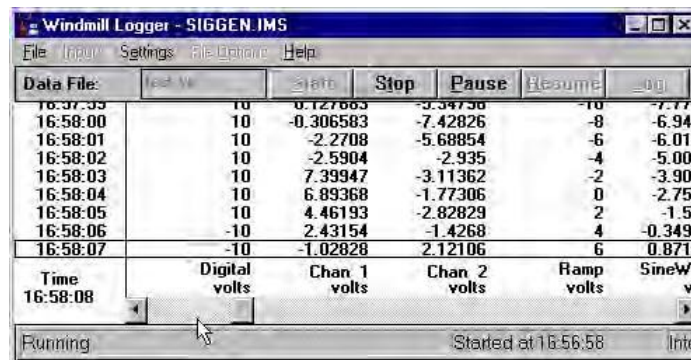


*Logging data to disk.*

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If you have specified alarm levels in SetupIML (Chapter 2), data is displayed on a blue background for warning alarm and a red back- ground for a critical alarm.

Each copy of Logger can read up to 100 channels.  You can log from more than one test rig, or from different channels at different rates, by loading more instances of Logger.

Other Windows applications can get data in real-time from Logger by means of Dynamic Data Exchange (DDE).  For full details see the Appendix.

The rest of this chapter tells you how to:
* Get started with Logger (Sections 4.2 to  4.8)
* Change the logging speed (Section  4.9)
* Specify how information is saved in the data file (Sections 4.10 to  4.12)
* Change the way Logger displays data (Sections 4.13 to 4.14)
* Save and restore Logger's settings (Sections 4.15 to 4.17)
* Optimize Logger's performance (Sections 4.18 to 4.20)

## 4.2 Starting Logger

In Windows click Start. Point to Programs then to Windmill and click Logger.  If you've already used Logger and saved its setup details, you can load it with these settings automatically restored, see Section 4.17.

The first time you use Logger you need to:
1. Configure the hardware by loading a setup file (Section 4.3).
2. Select which channels are to be logged (Section 4.4).
3. Name a file in which to save data (Section 4.5).
4. Press the Start button (Section 4.6).

## 4.3 Configuring the Hardware

You configure your data acquisition devices simply by sending them a hardware setup file (which you created with SetupIML).  Before you can display data you must choose which setup file to use.

1. From the File menu select Load Hardware Setup and choose an*.ims file.
2. You can now tell Logger which channels to display and log.

If you prefer you can automatically load the hardware setup file when you start Logger.  See Section 4.17 for details.

Note that if you are running several Windmill programs, and they have channels in common, you must specify the same setup file for each program.

## 4.4 Selecting Channels to Log

Before you can view or save any data you must select which input channels you want to connect to Logger.  Do this in the Channel Connections dialogue which appears when you choose a hardware setup file and when you select Inputs from the menu bar.  Stop logging be- fore selecting Inputs.

To connect a channel simply select it and choose the Connect but- ton. It moves to the Connected Channels list.  To disconnect a channel select it from the right-hand list and then press the Disconnect button.  Alternatively double-click on channels to toggle between connected and disconnected.

If 100 or less channels are included in the setup you can connect them all at once by selecting the Connect All button.  This button is greyed out if there are more than 100 channels the maximum Logger can handle.  To view data from more channels load another copy of Logger.

Select OK and all the channels in the Connected Channels box will be linked to Logger and sampled when you press Start.

## 4.5 Naming a File to Hold the Data

Before you can log data to disk you have to name a file in which to save it.  Type a name into the Data File box. A data file is generally given the extension .wl.

| Data File: | test.wl | **Start** | Stop | Pause | Resume | Log |

*Naming the data file.*

By default the file is saved in the working data directory you specified in ConfIML (for example c:\program files\windmill software\data\).  However, if you enter the full directory or folder path then the file will be stored there.  Your choice will become the default directory for this session.

If the Data File box is unavailable you have selected to log to screen but not to disk.  Select File Options from the menu bar and select to generate a single, or periodic, file.

***Note:  The File Options option is disabled until you've loaded a hardware setup file and connected at least one channel.***

## 4.6 Starting Logging

You can start logging data simply by pressing the Start button.  Logger collects data at regular intervals until you press the Stop or Pause button.

Other ways to start logging are:
- Start logging when you press a  key
- Start logging when an alarm  occurs
- Start logging when new data  arrives

If your data file already exists you are given three choices: Overwrite, Append and Cancel.  Select Append to add the new data to the existing contents of the file.  Select Overwrite to delete the old file and save new data under that name instead.  Select Cancel to return to the main window without logging any data, so giving you a chance to change the data file name.

### 4.6.1   Starting Logging when you Press a  Key

You can set logging to start whenever you press the space bar on the keyboard. It will continue for your chosen duration, or until you click the Stop or Pause button.

1.   Select Settings from the menu bar.
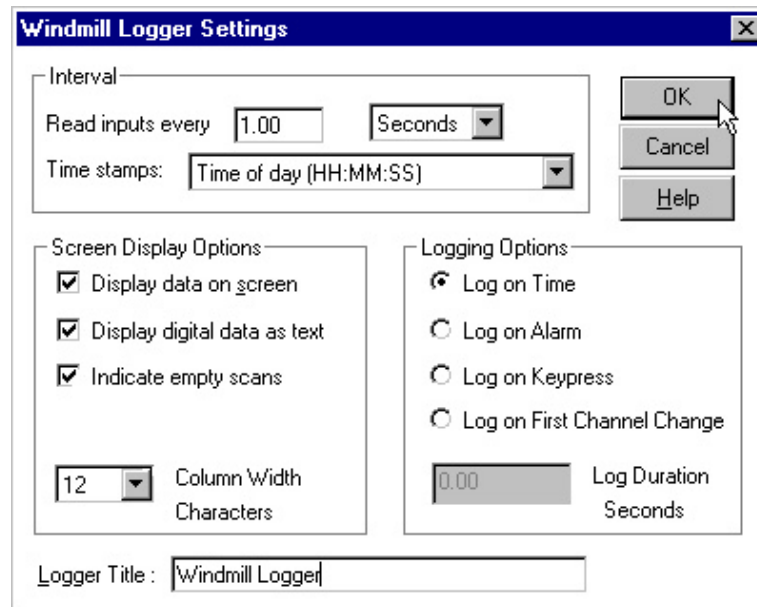


*Telling Logger when it should start logging, how fast to log and how it should display data.*

2.   Choose Log on Keypress and enter how long you want to continue logging.  Press OK.
3.   Press the Start button and then the Log button.  Logging starts and continues for your specified duration, or until you click Stop or Pause.
4.   Press the Space bar to restart logging.

Note, pressing the Space bar only works when the Log button has the "focus".  To give the Log button the focus either click it or press Alt L on the keyboard.  You should only need to do this once.

### 4.6.2 Starting Logging on an Alarm

You can tell Logger to start collecting data only when a channel goes into an alarm state. You set alarms with the SetupIML program.

1. Select Settings from the menu bar.
2. Choose Log on Alarm and enter the duration of logging. Press OK.
3. Press the Start button. Logger will start collecting data when an alarm threshold is crossed. It will continue for your chosen duration and then pause until another alarm occurs.

### 4.6.3 Starting Logging when New Data Arrives

You can tell Logger to start only when new data is available. This allows external events to control logging and is particularly useful with serial devices controlled by the COMIML driver.

1. Select Settings from the menu bar.
2. Choose Log on First Channel Change and enter the duration of logging. Press OK.
3. Press the Start button. Logging starts when the reading from the first channel changes. It continues for your chosen duration, according to your sampling rate.
4. To only log new data, choose a long sampling interval and a short logging duration.

The data does not have to change to be logged. Say you are recording a weight every time you press a button on a balance, and two consecutive measurements happen to be identical. Windmill flags the second as a new reading and Logger records the value.

## 4.7 Stopping or Pausing Logging

To stop sampling press the Stop button. The menu options that were greyed out are restored and if you were logging data the data file is closed.

If you select Pause, sampling is merely suspended until you select either Stop or Resume. If Resume then sampling continues and data is logged to the same file as before.

## 4.8 Viewing Data Without Logging

You can view data without saving it. To do this select File Options from the menu bar and choose Do Not Save To File.
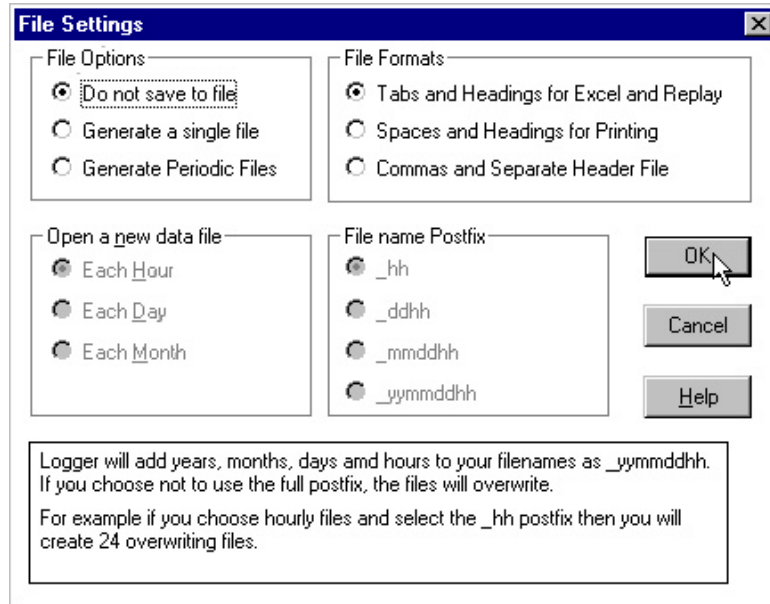
*Choosing whether or not to save data and if so the format of the data files.*

When you press Start, Logger will sample data from the connected channels and show the readings on screen, but will not save the data.

If no data is displayed then you may have turned the Display Data on Screen option off. Select Settings to turn it back on.

## 4.9 Changing the Speed of Logging

To change the logging interval select Settings from the menu bar.

Choose how often you want to read the input channels. The mini- mum logging interval is 0.02 seconds and the maximum 1440 minutes (24 hours). An interval of 0.02 seconds gives a sampling rate of 50 samples per second.

With a small logging interval and high sample rate Logger may not be able to meet the target exactly, or may miss scans altogether. The associated time stamp, however, will give the exact time of the scan. Reducing the computer work load will help Logger to reach its target and avoid losing data. For help on optimizing Logger's performance see Section 4.19.
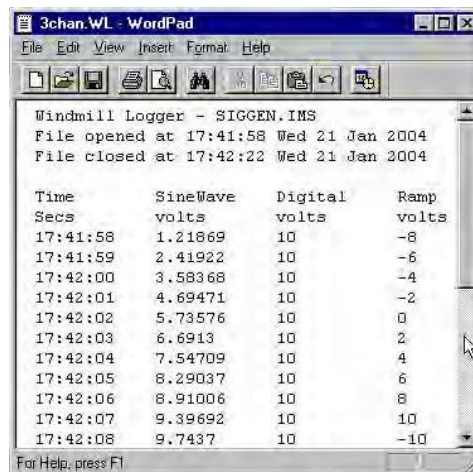
You can change the sampling interval at any time, even if logging is in progress.

### 4.10 Changing the Layout of the Data File

Data is saved to disk in ASCII text format.  You can choose the layout as follows.

- Columns of data are separated by tabs, and the file contains the column headings.  Useful when viewing the file in Excel, Windmill Replay or many other Windows programs.  The file generally has the extension  .wl.
- Columns of data are separated by spaces, and the file contains the column headings.  Useful when sending data to a printer or opening the file in a text editor like Notepad.  The file generally has the extension  .wl
- Columns of data are separated by commas, and the column headings are contained in a separate file (*.wh).



*Here a logged data file has been opened in Wordpad.  Depending upon your selection, the columns are separated by either tabs or spaces.*

### 4.11 Periodically Closing one Data File and Opening a New One

At regular intervals Logger can automatically close the data file and open a new one.  Rather than having all data saved in one file, this results in a new file every hour, day or week.  You can also choose to overwrite files after a time, so saving disk space.

1. Select File Options from the menu bar and select Generate Periodic Files.

2. Choose whether a new file is to be opened each hour, each day or each week.  Logger creates a file whenever a new hour, day or week begins not one hour, day or week after logging started.  Logger distinguishes between files by adding a time and date suffix to the file name.

3. Decide whether you want to keep all logged data files indefinitely, or want to save disk space by overwriting older files.  To keep all files choose the date format: _yymmddhh.  Each file will then have a unique name.  For example, if

your file name was "mydata.wl" then at 12:00 pm on the 7th of January 2004 Logger would create a file called "mydata_040712.wl". To overwrite older files choose one of the other options.

- To keep one year's data choose: _mmddhh
- To keep one month's data choose: _ddhh
- To keep one day's data choose: _hh.

## 4.12 Changing the Type of Time Stamp

Logger time stamps the data. Select Settings from the menu bar and choose from:

- Time of day
- Seconds since the start of sampling (the default value)
- Seconds and hundredths of seconds since the start of sampling
- Minutes and seconds since the start of sampling
- Date and time of day.

The format of the date and time (dd:mm:yy for example) is that used in Windows. To change it use Windows Control Panel and choose Regional Settings.

## 4.13 Selecting Display Options

You can choose how data is displayed in screen. Select Settings from the menu bar.

Display data on screen
You can choose to log data without displaying it. This allows faster logging to disk. Clear the Display data on Screen box.

Display digital data as text
Instead of displaying digital data as a 1 or a 0, you can choose to show the descriptions chosen in SetupIML. For example On or Off, Open or Close.

Indicate empty scans
You can choose whether to record or skip scans in which all channels fail to produce data. This is useful where remote instruments only produce data on some external event, and many scans would have no readings at all.

Setting the column width
You can change the width of the columns on screen. The full data values will be shown when the columns are 15 characters wide the default value. Reducing the column width to, say, 5 characters will let you see more channels, but the data values and channel names may be shortened. If so they will be marked with a >> symbol. The data values will be saved intact, regardless of the screen column width.

You may change the display options at any time, so you can dynamically alter the settings to best display incoming data.

### 4.14  Changing the Title of the Logger Window

You can change the title of the Logger window from "Windmill Logger" to one of your own choosing.  This is particularly useful when running more than one copy of Logger, making it easy to identify iconized Loggers.

Select Settings from the menu bar.  Erase the current title and type in a new one.

### 4.15  Saving Logger's Settings

You can save the details you specify in Logger, and later restore them.  Select Save Logger Setup from the File menu.

Type a name into the File Name edit box.  There is no need to specify an extension as .wlg will be added automatically.  Select OK and the details will be stored in this file in the working directory.

The Logger setup file contains the following details:
- Name of the hardware setup file to use
- Connected channels
- Sample interval
- Format of the time stamp
- Type of file
- Whether data is displayed or not
- How digital data is displayed
- Whether empty scans are recorded
- What triggers logging
- Column width
- Title of window
- Any advanced periodic settings
- Data directory and file name
- Size and position of the window on screen
- DDE service name

### 4.16  Restoring Logger's Settings

To restore previously saved settings select Restore Logger Setup from the File menu.  Choose a setup file and on selecting OK all the setup details are restored.

You can also automatically restore Logger's settings when you load Logger.  See Section 4.17 for details.

If Logger is engaged in a DDE conversation when you restore the setup file, the new DDE Service name will not be loaded.

### 4.17  How to Load Logger so it's Immediately Ready to Start

You can configure Logger to start with either a hardware setup file (*.ims) or a Logger setup file (*.wlg) already loaded.  So when you start Logger you also configure the hardware, position and size the window, connect channels and set all the logging options.  To do this:

1. On the Windows desktop right click the Logger icon.
2. Select Properties and choose the Setup tab.
3. Add the setup file name to the Target box.

For example, for a Logger setup file called mysetup.wlg the Target box might contain:
"C:\Program  Files\Windmill  Software\Windmill\Logger.exe"  Setups\mysetup.wlg

***Note that the path to the program is in inverted commas - "C:\Program Files\Windmill Software\Windmill\Logger.exe"***

This is because the path contains spaces.  The path is followed by a space, and then by the name of the setup file and its folder.  In this case, Setups is a sub-folder of Windmill Mysetup.wlg is at C:\Program Files\Windmill Software\Windmill\Setups\mysetup.wlg.  If the setup file was elsewhere, you would need to enter the full path here.

To load just a hardware setup insert the .ims file instead of the .wlg file.

### Automatic Logging

You can take the automation of Logger one step further, so instead of Logger waiting for you to press Start it begins sampling as soon as it is loaded.  To do this add /AUTO to the target, leaving a space between the setup file name and /AUTO.

When auto-starting the Logger will not warn you that the data file name already exists. If you're using a single data file the new data will be appended to the end of the existing file.

### 4.18  Why Logger may not get Data Values

There are two reasons why Logger may not be able to get data values:
1. The computer is too busy.
2. The data acquisition hardware cannot be read.
3. If there are several programs running simultaneously the computer may not be able to keep up with all the processing required.  In Logger's case this may mean that sampling falls behind schedule, or some of the data may be replaced by dashes: - - - - -. If this occurs try to reduce the computer's workload, for example by closing some windows.  Bear in mind that the fewer channels connected to Logger the faster it can go.  Turning off the screen display will also speed up logging (Section 4.13).
4. If Logger is unable to obtain data it will record an error code for the value.  This may mean that the hardware is not configured correctly or is faulty.  See Section 4.21 for error codes.

## 4.19  Optimizing Logger's Performance

A number of factors might slow Logger down.  To optimize Logger's performance try these remedies.

1.  Log data without displaying it on screen.  Turn off the "Display data on screen" option in the Logger Settings dialogue box.  No data will be shown in the Logger window, allowing faster logging than otherwise possible.

2.  Reduce the number of channels being logged.  The fewer channels connected to Logger the faster Logger can go.

3.  Remove alarms.  Every alarm condition you defined in SetupIML uses some memory and requires processing time to continually check whether the condition is true or false.  To optimize performance, return to SetupIML and remove any unnecessary alarms.

4.  Reduce the number of applications running.  If several programs are running simultaneously the computer may not be able to keep up with all the processing required.  Logger may therefore fail to meet its target logging speed. If this occurs try to reduce the computer's workload by closing some windows.

## 4.20  Altering the Hardware Setup File

Use SetupIML to change the configuration of the hardware.  If you wish you can move to SetupIML and change some of the details in the current setup file (*.ims), such as the range or units, without closing Logger as long as it's not currently logging.  When you next start sampling data the affected parameters will be updated.

If you rename a channel that Logger has been using it will be disconnected. Use the Inputs menu to reconnect it.

## 4.21   Error Messages

Error 100
The version of Logger you are running is a demonstration version, it will not log real data.

Error 104
The hardware failed to accept data.

Error 105
The hardware failed to supply data.

Error 106
The hardware failed to setup correctly.

Error 108
The input is out of range.

Error 113
The hardware configuration is incorrect.

Error 114
The data is not yet ready.

Error 311
The channel name is no longer available.

Error 313
The channel is not enabled.

Error 314
The channel cannot supply data.

## 5. Chart
### 5.1 Introduction

The Chart program lets you view a graph of data against time.  It replaces an actual chart recorder, which uses pens to trace channels on sheets of paper.  With Chart up to 8 "pens" can be in use at once, so 8 traces may be displayed by each Chart program loaded.  Each trace is drawn using a series of readings from one channel.  The traces are scrolled from right to left across the window, as if a roll of paper was passing behind the screen.  The latest readings always appear at the right of the window and the graph slides to the left to make room.

The chart can be drawn either with all traces superimposed on 1 axis, or with separate axes for each trace.



*The Windmill Chart window, with data from 4 channels superimposed on 1 axis.*

You can chart data from more than 1 test rig, or from different channels at different rates, by loading more copies of Chart.

Other Windows applications can send commands to Chart by means of Dynamic Data Exchange (DDE). For full details see the Appendix.

The rest of this Chapter gives a step-by-step guide to using Chart. It tells you how to:
- Get started (Sections 5.2 to 5.6)
- Print the chart (Section 5.7)
- Change the colors and layout of the chart (Sections 5.8 to 5.11)
- Change the range of the chart (Section 5.12)
- Change the speed of sampling and the time labels (Section 5.13)
- Save and restore chart's settings (Section 5.14 to Section 5.16)
- Optimize Chart's performance (Section 5.17)
- Use several chart recorders (Section 5.18)

## 5.2 Starting Chart

In Windows click Start. Point to Programs then to Windmill and click Chart. If you've already used Chart and saved its setup details, you can load it with these settings automatically restored (Section 5.16).

The first time you use Chart you need to:
1. Configure the hardware by loading a setup file (Section 5.3).
2. Select which channels to chart (Section 5.4).

## 5.3 Configuring the Hardware

You configure your data acquisition devices simply by sending them a hardware setup file (which you created with SetupIML). Before you can chart data you must choose which setup file to use.

1. From the File menu select Load Hardware Setup and choose an*.ims file.
2. You can now tell Chart which channels to display.

If you prefer you can automatically load the hardware setup file (*.ims) when you start Chart. See Section 5.16 for details.

Note that if you are running several Windmill programs, and they have channels in common, you must specify the same setup file for each program.

### 5.4 Selecting Channels to Chart

You have to connect the channels you wish to display to the Chart's "pens" (inputs). Do this in the Channel Connections dialogue which appears when you choose a hardware setup file, or when you select Inputs from the menu bar.

To connect a channel simply select it and choose the Connect but- ton. It moves to the Connected Channels list. To disconnect a channel select it from the right-hand list and then press the Disconnect button. Alternatively double-click on channels to toggle between connected and disconnected.

If 8 or less channels are included in the setup you can connect them all at once by selecting the Connect All button. This button is greyed out if there are more than 8 channels (the maximum Chart can handle). To view data from more channels load another copy of Chart.

When you select OK the paper advances to a new page and the main window is cleared of any previous graph. All the channels in the Connected Channels box are linked to Chart and graphed when you press Start.

Note that you cannot change channel connections while sampling is taking place.

### 5.5 Starting Charting

Click the Start button. The paper advances to a clean page (any previous chart is erased). Sampling starts and the chart begins. Most menu items are now unavailable. As the chart progresses the time since start of charting is shown on the X axis.

Note that the Start button is disabled until you've loaded a hardware setup file and connected at least one channel (Sections 5.3 and 5.4).
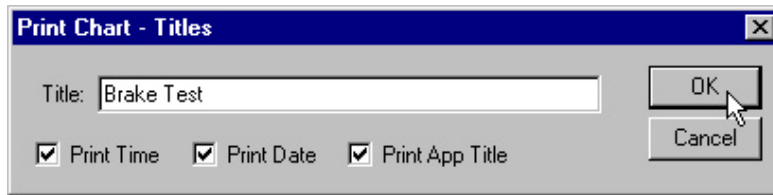
### 5.6 Stopping the Chart

Select the Stop button. Sampling ends and the paper stops moving. The chart will remain static on the screen until it is erased, for example by changing a channel connection or by starting a new chart.

### 5.7 Printing the Chart

Stop the chart then select Print Chart from the File menu. You can opt to include a title and other details on the print-out.

*When you print the chart you can add a title to the print-out and choose whether to include the time, date and title of the Chart window.*

The chart will be printed to the default printer, with its default set- tings. To change this use the Windows Printers option. Note that colors that look good on the screen may not come out as well on the printer take a test print before using important data. See Sections 5.8–5.10 for details of changing the colors and other display options.

You cannot print a moving chart but can copy it to the Clipboard. Press Alt + Print Screen any time when Chart is the active window. The whole window will be copied to the Clipboard and you can then paste it into your word processor, spreadsheet or graphics programs.

## 5.8 Superimposed or Separate Traces?

You can draw the chart either with traces from all channels superimposed on one Y axis or with each trace completely separate. If traces are separate you can also choose whether channels in alarm states are highlighted or not.

Stop the chart and select Display from the menu bar.
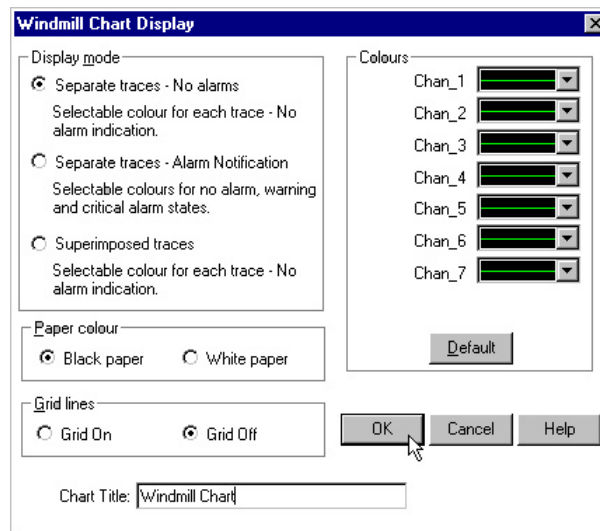


*Setting the appearance of the chart.*

If you choose not to display alarms Separate traces, No alarms, or Superimposed traces, you can select a different color for each trace.  To change the color of a trace click on the arrow at the right of the box and select a new color from the list.

If you choose Separate traces—Alarm Notification, you can select colors for no alarm, warning alarm and critical alarm states.  You set alarms with SetupIML.) For clarity each channel trace has the same colors for the various states.  Tick marks on the Y axis, in the alarm colors, show the position of alarm thresholds.

You can also opt to turn the grid on and off (Section 5.9), choose the paper color (Section 5.10) and choose the title of the Chart window (Section 5.11).

### 5.9 Turning the Grid On or Off

Stop the chart and select Display from the menu bar.  Choose grid on or off.

When the grid is on grey vertical lines are drawn at the time ticks and horizontal lines are drawn across the graph from the Y axis.  The number and position of the horizontal lines depends on the space avail- able.  When the grid is turned on the maximum plotting speed is slightly reduced.

### 5.10  Changing the Background Color

Stop the chart, select Display from the menu bar and choose black or white paper.

### 5.11  Changing the Title of the Chart Window

You can change the title of the Chart window from "Windmill Chart" to one of your own choosing.  This is particularly useful when running more than one copy of Chart.

Stop the chart and select Display from the menu bar.  Erase the current title and type in a new one.

### 5.12  Changing the Range of the Chart

The range of input values covered by each trace is defined by a maximum and a minimum value.  These are in the same units as those specified for the channel in the hardware setup file.

To change the range stop the chart and select Ranges from the menu bar.  One of two Range dialogue boxes appears, depending on whether you chose to display separate or superimposed traces (Section 5.8).

*Setting the Ranges of separate traces.*
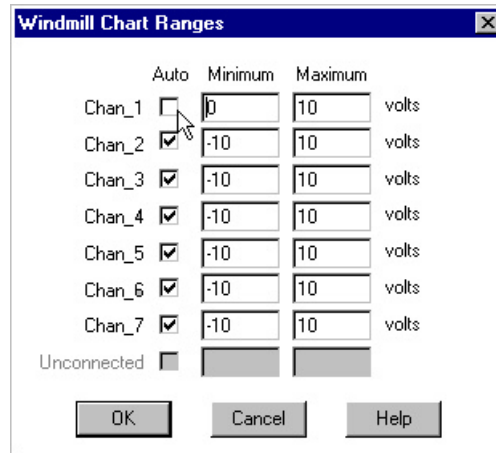


To set the range of the traces to the same as the channel's range (specified in SetupIML) check the "Auto" box (separate traces) or "Use automatic scaling" box (superimposed traces).  For **superimposed** traces, automatic scaling selects the smallest range that encompasses all the connected channels' ranges.  The maximum and minimum values of the range will be automatically displayed.  To set your own customized range just erase the maximum and minimum values and type new ones.

The maximum and minimum values are used as Y axis labels on the graph, unless the window is too small to display them.  Samples which are outside the range of the chart will be shown as a dotted line along the edge of the trace area.

You cannot change the range whilst the chart is being drawn.  Changing the range clears the chart and advances the paper to a new page.

### 5.13  Changing the Speed of Sampling and the Time Labels

Stop the chart and select Speed from the menu bar.
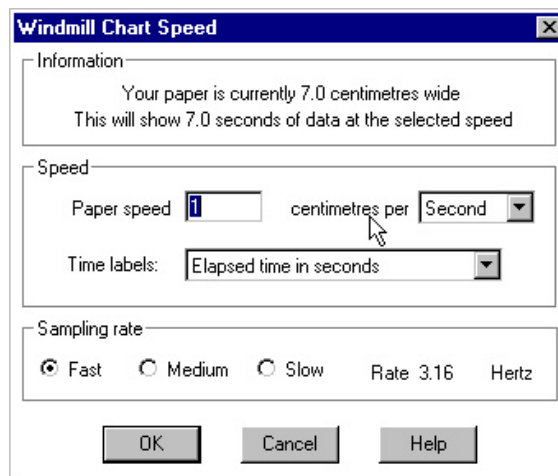


*Setting the speed of the Chart.*

Each time Chart takes a new set of readings the "paper" moves slightly to the left, so the speed of sampling is expressed as "paper speed"—the rate at which the paper moves across the screen.

The paper size is the width of the drawing area, and depends on the size of the Chart window. You can't directly alter these details, they are automatically updated each time you change the speed.

The paper speed can be expressed in centimeters per second, minute or hour. You can specify any value in the range 0.1 to 10, in increments of one decimal place. These centimeters assume a certain standardized screen size. They might not correspond to real centi- meters on your actual display.

For added flexibility you can set the sampling rate to Fast, Medium or Slow for any paper speed. Chart uses the Speed and Sampling rate settings to calculate and display the sampling rate in Hertz. This will be between 0.1 and 10 Hz.

You can also specify the format of the time labels on the X axis. Choose either time of day or elapsed time in seconds, minutes or hours.

When you're happy with the speed of sampling select OK. The paper will advance to a new page ready to start sampling at the new speed.

You can only change the speed when the chart is stopped.

## 5.14  Saving Chart's Settings

You can save all the details you specify in Chart, and later restore them. Select Save Chart Setup from the File menu.

Type a name into the File Name edit box. There is no need to specify an extension as .wch will be added automatically. Select OK and the details will be stored in this file in the working directory.

The Chart setup file contains the following details:
- Name of .ims file to use
- Connected channels
- Separate or superimposed traces
- Alarm indication
- Color of pens
- Color of paper
- Grid setting

- Title of window
- Range of each graph
- Speed of sampling
- Format of time label
- Size and position of window on screen
- DDE service name

### 5.15  Restoring Chart's Settings

To restore Chart's details from a previous session, select Restore Chart Setup from the File menu.

You can also automatically restore Chart's settings when you load Chart.  See Section 5.16 for details.

### 5.16  How to Load Chart Together with its Setup Details

You can configure Chart to start with either a hardware setup file (*.ims) or a chart setup file (*.wch) already loaded.  So when you start Chart you also configure the hardware, position and size the window, connect channels and set all the charting options.  To do this:

1.  On the Windows desktop right click the Chart icon.
2.  Select Properties and choose the Setup tab.
3.  Add the setup file name to the Target box.

For example, for a Chart setup file called mysetup.wch the Target box might contain:
"C:\Program Files\Windmill Software\Windmill\Chart.exe" Setups\mysetup.wch

Note that the path to the program is in inverted commas.  This is because the path contains spaces. The path is followed by a space, and then by the name of the setup file. In this case, Setups is a sub-folder of Windmill.  Mysetup.wch is at C:\Program Files\Windmill Software\Windmill\Setups\mysetup.wch.  If the setup file was elsewhere, you would need to enter the full path here.

To load just a hardware setup insert the .ims file instead of the .wch file.

#### Automatic Charting
You can take the automation of Chart one step further, so instead of Chart waiting for you to press Start it begins charting as soon as it is loaded.  To do this add /AUTO to the target, leaving a space between the setup file name and /AUTO.

### 5.17  Optimizing Chart's Performance
1.  Turn off the grid.  When the grid is turned on Display menu Chart's maximum speed is reduced.

2.  Reduce the number of channels being charted.  The fewer channels connected to Chart (Inputs menu) the greater Chart's maximum speed.

3.  Reduce the number of applications running.  If several programs are running simultaneously the computer may not be able to keep up with all the processing required.  Chart may therefore be unable to display all the data

and the traces will have gaps in them.  If this occurs try to reduce the computer's workload by closing some windows.

4. Remove alarms.  Every alarm condition you defined in SetupIML uses some memory and requires processing time to continually check whether the condition is true or false.  To optimize performance, return to SetupIML and remove any unnecessary alarms.

## 5.18  Using Several Chart Recorders

Each Chart program can display results from up to eight channels.
For more than eight channels simply start another copy of Chart.

The same channel can be traced in two instances of Chart.  As the two chart recorders can operate at different paper speeds you can see a detailed short-term view in one while the other tracks a long term trend.

## 5.19  Why you may get Dotted Lines Instead of Solid Traces

There are 2 reasons why you may get a dotted or broken line on your chart:
1. The computer is too busy.
2. The readings are out of range.
3. If there are several programs running simultaneously the computer may not be able to keep up with all the processing required.  If your chart has gaps in it try reducing the number of programs running, to reduce the workload.  Alternatively, try reducing the paper size or speed in Chart.  The trace may also become a dotted line if the computer was completely busy with some other activity, for example repositioning a window on the screen.
4. If the chart range is smaller than the channel range, then any out of range readings will appear as a dotted line on the extreme of the range.  You can check this by examining the DDE Panel, where the data is displayed numerically.  Adjust the chart range if necessary, as described in Section 5.12.

## 5.20  Altering the Hardware Setup File

Use SetupIML to change the configuration of the hardware.  If you wish you can move to SetupIML and change some of the details in the current setup file (*.ims), such as the range or units, without closing Chart as long as it's not currently charting.  When you next start sampling data the affected parameters will be updated.

If you rename a channel that Chart has been using it will be disconnected.  Use the Inputs menu to reconnect it.

### 5.21  Error Messages

Error 100
The version of Chart you are running is a demonstration version, it will not chart real data.

Error 105
The hardware failed to supply data.

Error 106
The hardware failed to setup correctly.

Error 108
The input is out of range. Return to the SetupIML program to alter the range.

Error 113
The hardware configuration is incorrect.

Error 114
The data is not yet ready.

Error 311
The channel name is no longer available.

Error 313
The channel is not enabled.

Error 314
The channel cannot supply data.