Webster C1000 Data Logger

User Manual

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Language: UK
Software Ver: 5.61
Manual Rev: 2.0
Date: 11/98

Contents

Webster C1000 Year 2000 compliance
The C1000 has been rigorously tested to ensure Year 2000 conformity. All dates are printed on reports using a 4-figure year. The C1000 software runs under MS-DOS 6.22 the most recent release of the Microsoft operating system. MS-DOS 6.22 uses four-figure dates in all places except for the MSBACKUP command where a 2-figure date is used. This is a deemed by Microsoft to be a relatively insignificant threat. For further details on MS-DOS 6.22 see the Appendix.

Author's note
This user manual has been designed to make it as easy as possible for the user to locate information and configure or carryout a test or other function. Should you have any suggestions or comments on how this manual can be improved please contact me on mrc@webtec.co.uk.

The C1000 hydraulic data acquisition system is designed and built by:

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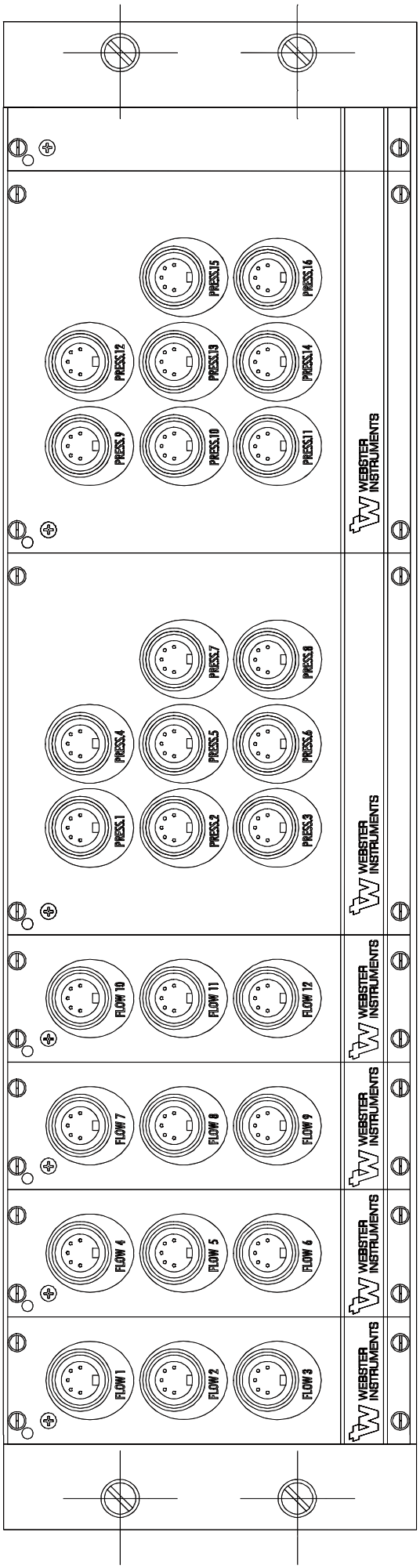
The tables below show details of your system inputs and how they have been mapped to the software.

Flow Cards

Sensor Type & Details	Serial Number	Flow Input no. *	Digi Line
		Flow 1	
		Flow 2	
		Flow 3	
		Flow 4	
		Flow 5	
		Flow 6	
		Flow 7	
		Flow 8	
		Flow 9	
		Flow 10	
		Flow 11	
		Flow 12	

Pressure Cards

Sensor Type & Details	Serial Number	Press Input no. *	ADC Line
		Press 1	
		Press 2	
		Press 3	
		Press4	
		Press 5	
		Press 6	
		Press 7	
		Press 8	
		Press 9	
		Press 10	
		Press 11	
		Press 12	
		Press 13	
		Press 14	
		Press 15	
		Press 16	



Layout of a 'full' C1000 system - your system may only contain some of the inputs shown below.

(*See previous table for details of which sensors are plugged into which inputs)

Getting Started

Welcome to the Webster C1000 Hydraulic Data Acquisition System

Summary: This section gives you a brief overview of the C1000, how to use it, and where to look for further information.

Entering the program

The C1000 program can be run in two different modes: edit mode and normal user mode. Edit mode allows you to access all of the C1000's functions and is designed for when the system is being configured. Once the C1000 has been configured it is recommended the program be run in normal user mode. The user mode gives the operator full functionality with the exception of the configuration settings which cannot be altered.

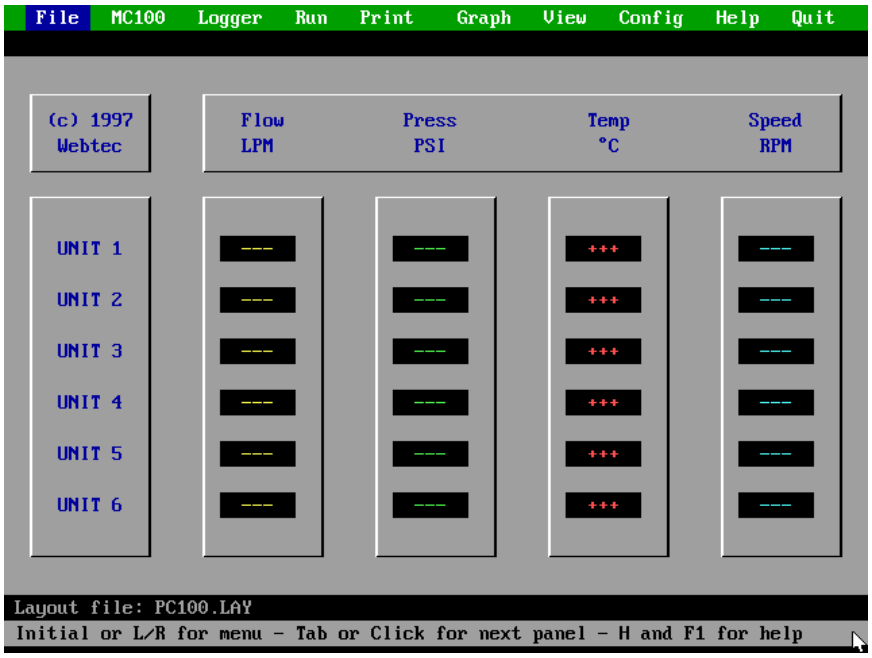
To start the C1000 in edit mode

At the C:\C1000> prompt type C1000 /e

To start the C1000 in normal user mode

At the C:\C1000> prompt type C1000

When the C1000 program starts-up you will see a title screen and then typically the normal panel display (shown below)



Handy Hints

Handy Hints

Controls

The menu bar across the top of the screen is always present. Each of the ten menus can be activated by typing the first letter of the name, ***F*** for ***File*** etc., or by clicking on the name with the left-hand mouse button. You can select an option from within a menu in the same way.

Some functions have *Hot keys*, that is a specially assigned key or keys that take you straight to a particular option. For example <F5> is a *Hot key* for ***View Last Graph***.

The C1000 uses a two-stage escape. That is if you press <Esc> once, the text you are entering will revert to how it was, pressing <Esc> a second time will cancel the menu or test and revert to the default display screen.

When entering text, like a name for example, press <Space> to clear the existing text, and press <Enter> to accept the text.

If there are a number of options for a function they will be displayed across the bottom of the screen. To scroll between these options press <Space>. To move down a list use the up and down arrows or <PgUp> and <PgDn>. To move across a table, like the ***Configure Flow*** table, press <Tab>.

The two foot-switches can also be used to provide fast hands-free control. The black foot switch is used to confirm an entry (like pressing space during a log on a key press, or choosing an option on the menu bar). The red foot switch is used to cancel an entry (equivalent to the <Esc> button). In this manner similar tests can be carried out in quick succession simply by using the foot switches to start and finish tests and log results.

Display screens

There are five display screens: the normal panel, super panel, line graph, histogram, and data table. The data table is only available if there is test data in memory. An example of each of these screens can be seen on the next page.

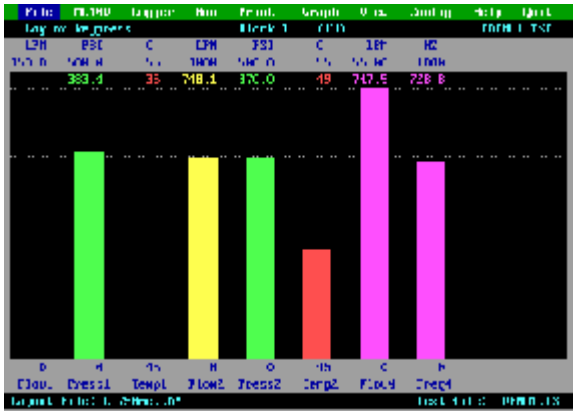
To scroll between the screens press <Tab> or click the left-hand mouse button.

Help

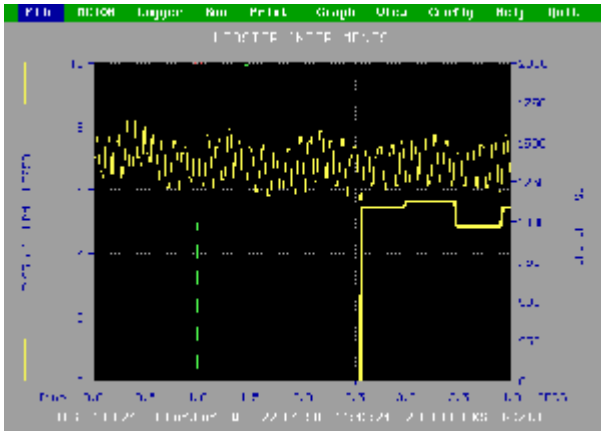
On the main menu bar there is a help menu. In addition pressing <F1> will activate on-line Help. This is always available unless:

1. Printing is in progress
2. Timed data logging is in progress
3. A file is being saved or loaded

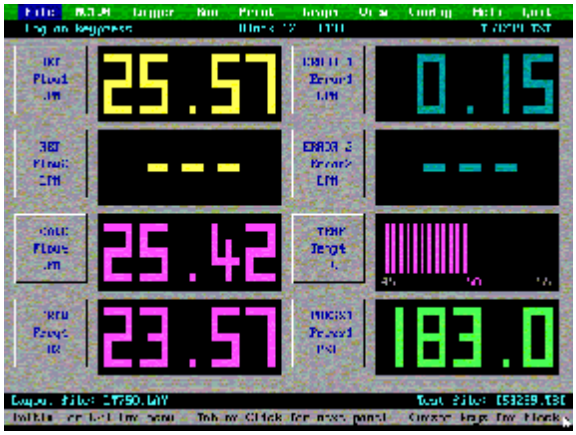
Normal Panel



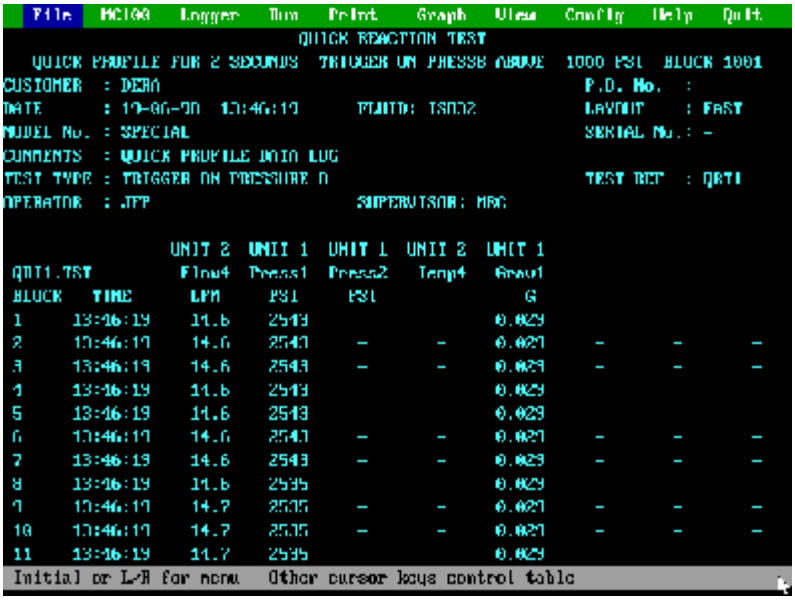
Super Panel



Line Graph



Histogram



Data Table

Handy Hints

Tutorials

The next section in the manual is Tutorials. There are twelve tutorials covering all aspects of setting up and using the C1000. A brief description of the tutorials is shown below.

Tutorial 1 - C1000 background - *Layout files* and sensor connections
Tutorial 2 - How do I configure the *hard* inputs: flow, speed, temperature, and pressure?
Tutorial 3 - How do I configure viscosity measurement, ViscoCorrect™ and VT type turbine flow meters?
Tutorial 4 - How do I configure *soft* and *virtual* inputs?
Tutorial 5 - How do I customise the *normal layout, super panel,* and *histogram*?
Tutorial 6 - How can I calibrate / re-calibrate an analogue sensor?
Tutorial 7 - Data logging
Tutorial 8 - How do I draw and print a graph?
Tutorial 9 - How do I print the results as a report?
Tutorial 10 - How can I transfer data from the MC100 to the C1000?
Tutorial 11 - How can I export results to a spreadsheet such as Lotus 1-2-3?
Tutorial 12 - Troubleshooting

It is recommended that you read Tutorial 1 and then whichever Tutorials are relevant to you.

Reference section

The third section of the manual contains an explanation of all of the C1000's functions as well as a glossary of terms. This section is cross-referenced with the tutorials and indexed alphabetically.

Appendix

The appendix contains information on ViscoCorrect™, useful equations and formulae to help you create virtual channels, and other background information.

Exiting and the MS-DOS environment

To exit the C1000 program select ***Yes quit*** from the ***Quit*** menu or press <Alt> and X together.

In emergency <Ctrl> C or <Ctrl> Break can be used.

On to the Tutorials

Handy Hints

Introduction to the tutorials

In order to help you familiarise yourself with the C1000 software as quickly as possible, there follows a series of twelve tutorials covering many typical situations. It is recommended that you read at least Tutorial 1.The remaining tutorials are designed to be read separately or as a series from 2-12, which ever suits you. In each tutorial there is a typical scenario with worked examples and screen pictures

Tutorial 1 gives you basic information on *layout files* and how to go about creating a custom *layout file*. Before going any further we recommend you read Tutorial 1.

Tutorials 2-6 provide information on how to configure *hard* inputs, configure viscosity and use ViscoCorrect™, configure *soft* and *virtual* inputs, customise the various screens, and calibrate analogue sensors.

Normally you will receive a ready-to-use layout file with the C1000 configured for your particular application, in which case you can skip Tutorials 2-6 until you need to create a new layout file.

Tutorials 7-11 cover data logging, graphs, reports, communicating with the Webster MC100, and exporting results to a spreadsheet.

Tutorial 12 provides information on troubleshooting should you have any problems with the C1000 software.

Nomenclature

Certain words within the tutorials have been written in different fonts / styles to highlight their meaning.

Config Italic and bold is used to show a word is referring to the name of a menu / function within the C1000 software.

CONFIGURATION Upper case bold is used to show a word is referring to the name of a menu / function within the MC100 software.

Soft input Italic is for used for words that are particular to the C1000 software and aren't common language. See the reference section for a full description.

RIG1T3 Upper case text is used to show text entered by the user - such as a test name.

<Enter> Pointed brackets are used to show the name of a key that must be pressed.

On to Tutorial 1

Tutorial 1

C1000 background
Layout files and sensor connections

Summary: This tutorial tells you about *layout files*: how they work, how to load a layout file, create a new layout file and how to go about customising a layout file. The tutorial finishes by explaining which sensors connect where and how signals are carried to the processor and subsequently displayed.

Handy Hints

Layout files

The C1000 software is extremely flexible allowing the user to easily add and remove inputs, create new channels, and customise display screens. All these adjustments are saved in a *layout file*. Because so many parameters can be adjusted, every test that is logged is specific to the layout file in which it was run. Thus if you create a layout called DEMO.LAY and log a test T1.TST, that test must in the future always be reviewed from DEMO.LAY.

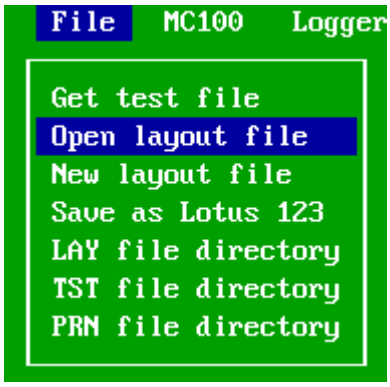
Why is this important?

If a test is logged from a particular *layout file* and subsequently the *layout file* is deleted, it will not be possible to reload the test file onto the C1000.

Good practice whenever you are copying test files is to also copy the appropriate *layout files*. Secondly if you do have a *layout file* that you have used to run tests and subsequently wish to modify the layout, save the file under a new name using ***New layout file*** prior to making any alterations. If this is not possible ensure you have backed-up the existing *layout file* before you make any modifications.

Loading an existing layout file

When you receive the C1000 it will already be loaded with at least three *layout files*: PC100.LAY, FAST.LAY, and a *layout file* particular to your system. To load one of these existing layouts click on ***File*** on the main menu bar using the mouse or press F, you will then see the ***File*** menu shown below.



There are two ways to load a layout file.

Handy Hints

1. If you know the name of the file, select ***Open layout file*** and enter the name of the file you wish to open.

2. If you wish to first view all the existing *layout files* then select one, choose ***LAY file directory*** and click on the name of the file you want to open using the mouse.

Creating a new layout file
Essentially when you create a ***New layout file*** you take the current *layout file* and save it under a new name. It is worth bearing this in mind so that you select an existing *layout file* as similar as possible to the one you want to create.

To create a new *layout file* based on PC100.LAY first load PC100.LAY as described above. Next select ***New layout file*** from the ***File*** menu and enter the new name you want to give to the layout (maximum 8 characters). You are now ready to make any modifications.

Where do I start?
Once you have made a new *layout file* you will want to start modifying it to suit your particular situation. See the flow chart below for what order to do things in, plus where to find more information.

How do I know where to connect the sensors?
The C1000 has two different size panels, one narrow 3 input panel, and one wide 8 input panel.

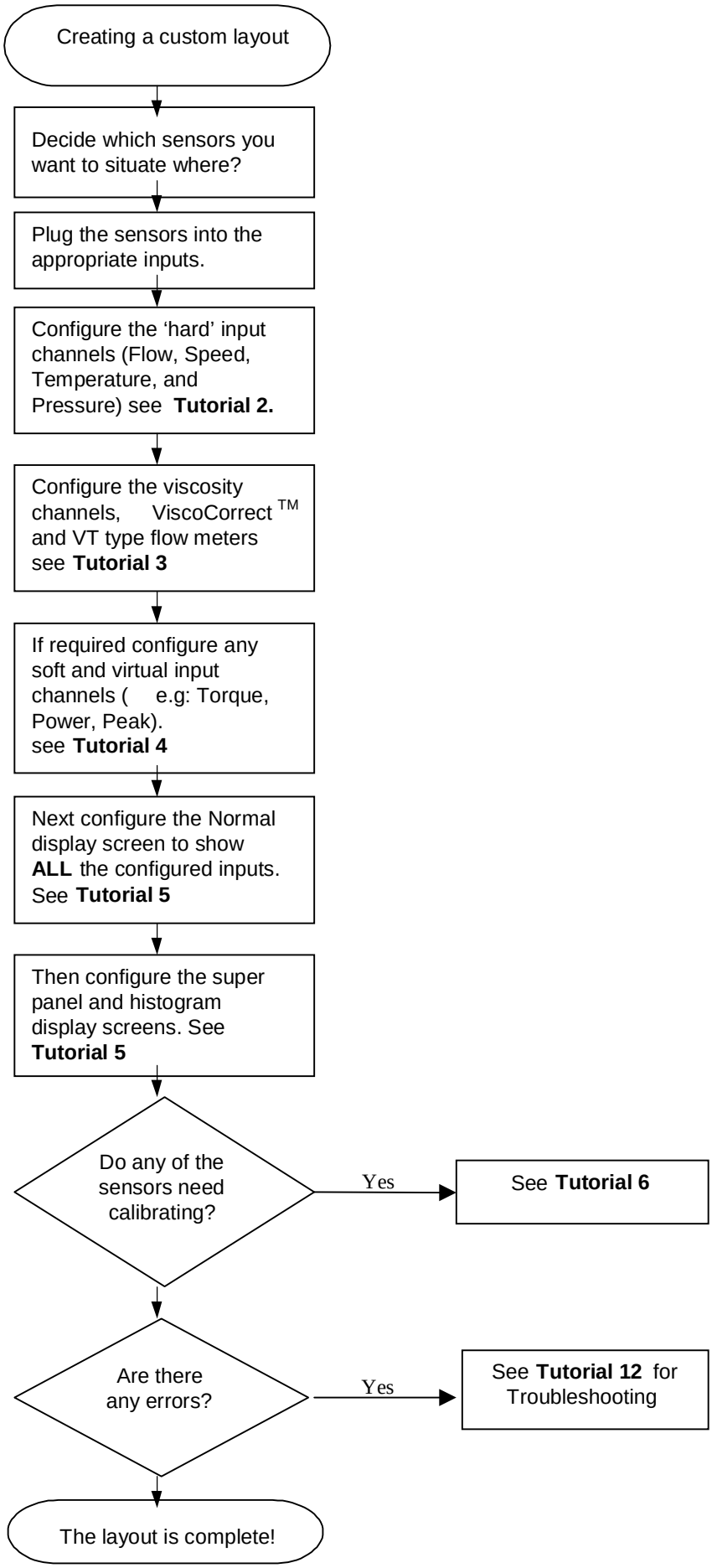
The narrow panel comes in 2 variations – LT to support LT type flow meters, and VT, to support VT type flow meters. Each of the 3 inputs carries both the **frequency** (digital) and **temperature** (analogue) signals from a flow meter. In addition these inputs can be used for just **temperature** (analogue), and just **frequency** (digital) signals. So the narrow panels are for:

1. Frequency (digital) and temperature (analogue) signals from **flow meters**
2. Frequency (digital) signals from **speed transducers**
3. Temperature (analogue) signals from **thermistors**

The wide 8 input panel accepts only analogue signals and is designed specifically for use with **pressure transducers**.

What are Digi lines and ADC lines?
Once a sensor has been plugged into the C1000, the signal is then conditioned and carried to the processor in one of two ways according to whether the signal is digital or analogue.

All digital signals are carried via *Digi lines* numbered from 1-12. Each Digi line number corresponds to the flow input number so ***Flow1*** is connected to ***Digi 1***.


Creating a custom layout
Decide which sensors you want to situate where?
Plug the sensors into the appropriate inputs.
Configure the 'hard' input channels (Flow, Speed, Temperature, and Pressure) see **Tutorial 2.**
Configure the viscosity channels, ViscoCorrect ™ and VT type flow meters see **Tutorial 3**
If required configure any soft and virtual input channels (e.g: Torque, Power, Peak). see **Tutorial 4**
Next configure the Normal display screen to show **ALL** the configured inputs. See **Tutorial 5**
Then configure the super panel and histogram display screens. See **Tutorial 5**
Do any of the sensors need calibrating?
Yes
See **Tutorial 6**
Are there any errors?
Yes
See **Tutorial 12** for Troubleshooting
The layout is complete!

Handy Hints

All analogue signals are carried via *ADC lines* numbered from 1-16. This causes a slight problem since there are potentially many more than 16 analogue inputs (16 pressure + 12 temperature), therefore how the temperature and pressure inputs are mapped to the *ADC lines* will depend on whether you need to measure more temperature or more pressure channels. Details of how your particular C1000 has been mapped are at the front of this manual.

How do I know which channel to display on the screen?
When you configure the screen to display temperature or pressure you must tell the C1000 which *ADC line* is carrying the signal. In the same way when you want to configure flow or speed you must tell the C1000 which *Digi line* is carrying the signal. In both cases the information can be found at the front of this manual.

On to Tutorial 2

Tutorial 2

How do I configure the *hard* inputs: flow, speed, temperature, and pressure?

Summary: This tutorial tells you about ***hard*** inputs: a typical scenario where they might be used, and how to configure the software for each type of input. See Tutorial 4 for details on how to configure VT type flow meters.

The standard or *hard* inputs for the C1000 are Webster **LT** type flow meters, magnetic speed pick-ups, temperature sensors, and pressure transducers.

Note: Where possible your C1000 system will have been set-up in house prior to shipment, in which case the steps below will already have been completed.

The following example demonstrates how to configure an **LT** type flow meter, a pressure transducer, and a magnetic speed pick-up.

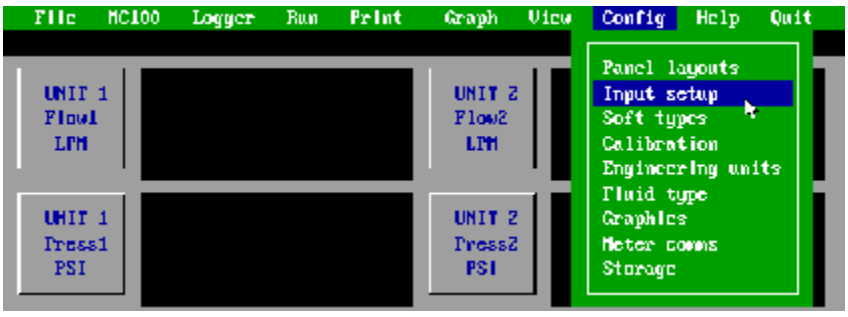
LT type flow meter (built-in temperature sensor)

1. Fit the **LT** type turbine flow meter and pressure transducer along with the magnetic speed pickup.

2. Next you need to connect the sensors to the conditioning rack. For example, connect the combined flow and temperature cable from the **LT** flow meter into ***Flow1***, the speed pick-up into ***Flow2***, and the pressure transducer into ***Press1***.

3. Switch on the C1000 in edit mode.

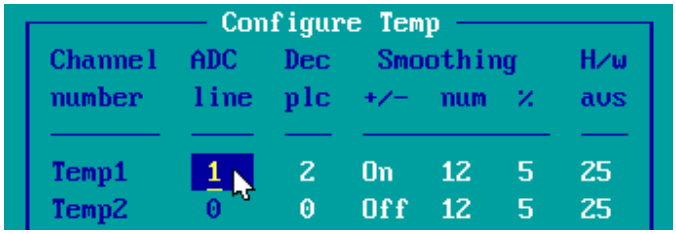
4. From the menu bar select ***Config*** and ***Input setup***.



5. Select ***Temp*** from the menu. The ***Configure Temp*** table (shown below) is then displayed.

Handy Hints

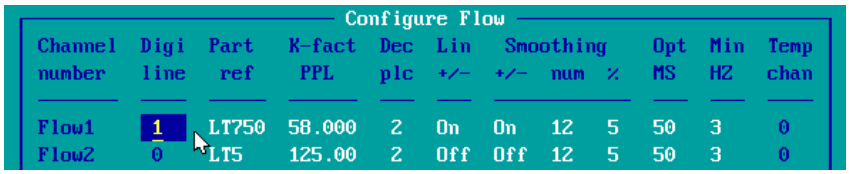
Handy Hints



6. Temperature like pressure is an analogue input. The C1000 will accept a maximum of 16 analogue inputs, for each input there is an analogue *input line* or *ADC line*. At the front of this manual you will find details of how your particular system has been mapped. In this situation since both the temperature and frequency signals from the flow meter are connected to ***Flow1***, let's assume ***Temp1*** is mapped to ***ADC 1*****,** as shown in the example above.

7. Click at the bottom of the screen / press <Enter> to leave this menu.

8. Now we need to set-up the flow. Choose ***Config*** again from the main menu and ***Input setup***. This time select ***Flow***. The ***Configure Flow*** table is shown below.



9. Both speed and flow are digital inputs and, in a similar way to the analogue inputs, each digital (frequency) input is allocated a ***Digi line***. Check the table at the front of this manual for details on how your particular system has been mapped. For example ***Flow1*** could be mapped to ***Digi 1***. The following two headings are used to identify the characteristics of the flow meter, scroll through the options under ***Part ref*** until you arrive at correct name (the ***Part ref*** is stamped on the front of the flow block), for example LT750. Under the heading ***K-fact PPL*** enter the correct K factor (also stamped on the front of the flow block). ***Dec plc***, the default number of decimal places is 2; this can be altered if necessary. Under ***Lin +/-*** you can enable / disable the linearisation; this is the processing carried out by the computer to accurately calculate the flow. Ensure this is switched to ***On***. Switch ***Smoothing*** on. Leave ***Temp chan*** set to zero (this is only required for ViscoCorrect™). The other columns do not need to be altered.

10. Press enter / click to close the ***Configure Flow*** table

Pressure transducer

11. Next we have to configure the pressure transducer.

12. From the menu bar select ***Config*** and ***Input setup***.

13. This time select ***Press*** from the menu. The ***Configure Press*** table is shown below.

Configure Press

Channel number	ADC line	Calib PSI	MV at zero	MV at calib	Dead %	Dec plc	Smoothing +/-	Smoothing num	Smoothing %	H/w avs
Press1	7	5800.0	0.6000	99.600	1	1	On	12	5	25
Press2	0	5000.0	0	100.00	1	1	Off	12	5	25

14. As mentioned previously when setting the temperature channel, each pressure channel is allocated an ***ADC line***. Once again check the table at the front of this manual for details on how your particular system has been mapped. For example ***Press1*** might be mapped to ***ADC line*** *7*. Next you will need to enter the calibration details for the transducer or see Tutorial 1 for information on calibrating analogue sensors. If the transducer is rated for example to 400 bar or 5800 psi, enter 5800 under ***Calib PSI***. Next enter the mV at zero pressure and mV at full scale in the respective columns. Switch ***Smoothing*** to on. Press enter / click to exit the 'Configure Press' table. The other columns do not need to be altered.

15. Lastly we have to configure the magnetic speed pick-up.

Magnetic speed pick-up

16. From the menu bar select ***Config*** and ***Input setup***.

Configure Speed

Channel number	Digi line	Pulses per rev	Dec plc	Smoothing +/-	Smoothing num	Smoothing %	Opt MS	Min HZ
Speed1	2	60.000	2	On	30	20	50	3
Speed2	0	1.0000	0	Off	30	20	50	3

17. This time select ***Speed*** from the menu. The ***Configure Speed*** table is shown below.

Handy Hints

Handy Hints

18. The same principle applies for speed as for flow, once again check how your system has been mapped. We can define Speed1 so that it takes the input from Flow2, to do this enter the appropriate Digi line, e.g. 2. ***Pulses per rev*** allows you to divide the incoming frequency by a number to calculate the revs per second. Thus for a 60 tooth gear, enter 60 in the column to correspond with the number of teeth. Set ***Dec plc*** to 2 and switch the ***Smoothing*** to ***On***. The other columns do not need to be altered. Press enter / click to exit the table.

19. The set-up is complete!

On to Tutorial 3

Tutorial 3

How do I configure viscosity measurement, ViscoCorrect™ and VT type turbine flow meters?

Summary: This tutorial tells you how to configure viscosity measurement, ViscoCorrect™ and VT type turbine flow meters. Viscosity measurement can be configured for any available temperature channel. Full details are provided on how to configure a VT type turbine flow meter to use ViscoCorrect™ and hence display viscosity corrected flow.

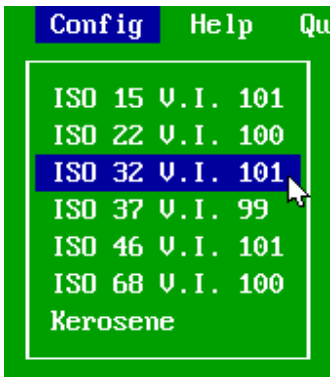
The C1000 allows you to quickly and easily monitor a fluid's kinematic viscosity, simply by measuring the fluid temperature. Viscosity can easily be displayed, recorded or used to calculate a virtual channel like Reynolds number. In addition viscosity is used for ViscoCorrect™ flow linearisation for VT turbine flow meters. The C1000 will continuously monitor both the fluid temperature and fluid velocity and compensate for changes in viscosity (providing accuracy of +/-1% of the indicated reading, over a large temperature range).

Note: Where possible your C1000 system will have been set-up in house prior to shipment, in which case the steps below will already have been completed.

To display fluid viscosity using a pre-defined temperature channel

1. Select the temperature channel you want to use to monitor the fluid viscosity. See Tutorial 2 for further details on configuring temperature channels.

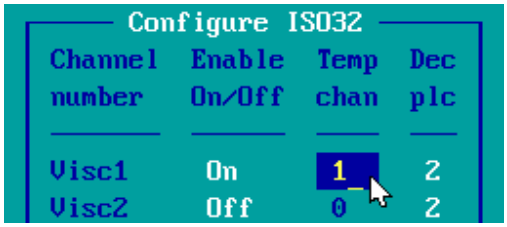
2. From the ***Config*** menu select ***Fluid type*** and the appropriate fluid from the menu. If your particular fluid is not present, please contact your nearest C1000 sales office.



Handy Hints

Handy Hints

3. Then select ***Input setup*** from the ***Config*** menu. Then select ***Visc***. You will then see the *Viscosity setup* menu below.



4. Enable the viscosity channel and enter the desired temperature channel number. (Where possible it is often a good idea to use the same channel number throughout. Thus if you are using Temp1, use Visc1 etc.)

The viscosity channel is now configured.

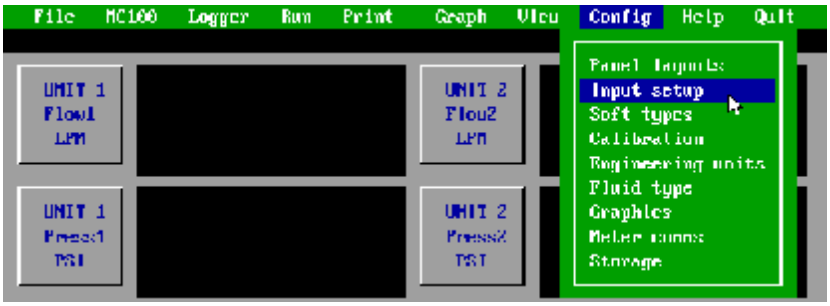
To configure a VT type flow meter to use ViscoCorrect™

1. Install the **VT** turbine flow meter.

2. Connect the flow block to the C1000 conditioning rack using the joint flow / temperature cable. For example the first available VT type flow input could be Flow4.

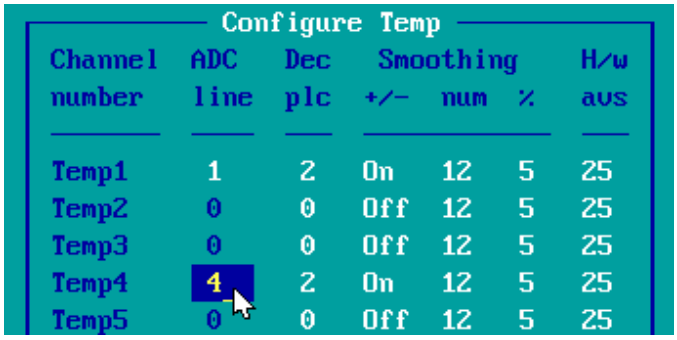
3. Switch on the C1000 in edit mode.

4. From the menu bar select ***Config*** and ***Input setup***.



5. Then select ***Temp*** from the menu. The ***Configure Temp*** table (shown below) is then displayed

Handy Hints



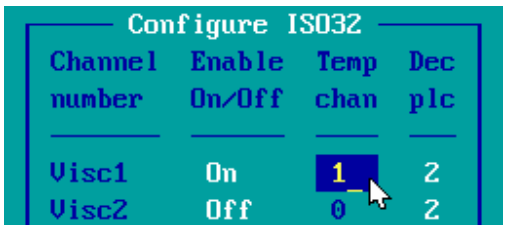
6. As described in Tutorial 1, there are 16 *ADC lines*, check the front of the manual to see your exact system set-up. In our example the VT flow meter is connected to Flow / Temp 4, mapped to ***ADC 4***. Therefore Temp4 is now the temperature measured at the flow meter. ***Dec plc*** changes the number of decimal places, the default is 2.

7. ***Smoothing*** switches on/off a buffer that averages the measured temperature to remove any small fluctuations. Switch this to ***On***.

8. Click at the bottom of the screen / press enter to leave this menu.

9. From the ***Config*** menu select ***Fluid type*** and the appropriate fluid from the menu. (If your particular fluid is not present, please contact your nearest C1000 sales office).

10. Select ***Input setup*** from the ***Config*** menu. Then select ***Visc***. You will now see the Viscosity set-up menu below.



11. Enable the viscosity channel 4 and enter temperature channel number 4. (Where possible it is often a good idea to use the same channel number throughout. Thus if you are using Temp1, use Visc1 etc.)

12. Next we need to set-up the flow. Choose ***Config*** again from the main menu and ***Input setup***. This time select ***Flow***. The ***Configure Flow*** table is shown below.

Handy Hints

Ensure ***Visc chan*** is set.

Configure Flow

Channel number	Digi line	Part ref	K-fact PPL	Dec plc	Lin +/-	Smoothing +/-	Smoothing num	Smoothing %	Opt MS	Min HZ	Visc chan
Flow1	1	LT750	58.000	2	On	On	12	5	50	3	0
Flow2	0	LT5	125.00	2	Off	Off	12	5	50	3	0
Flow3	0	LT5	125.00	2	Off	Off	12	5	50	3	0
Flow4	4	VT400	133.00	2	On	On	12	5	50	3	4
Flow5	0	LT5	125.00	2	Off	Off	12	5	50	3	0

13. Check the front the manual to see how your system's *Digi lines* have been mapped. Next to the channel Flow4 enter the correct *Digi line* number, e.g. 4. In order that the system recognises the characteristics of your flow meter you must fill in the next two columns. ***Part ref*** describes type of flow, scroll through the options until you arrive at the correct one (the ***Part ref*** is stamped on the front of the flow meter), for example VT400. You must also enter the correct K factor (the K factor is also stamped on the front of the flow block), for example 133.0. ***Dec plc***, the default number of decimal places is 2. Under ***Lin +/-*** you can enable / disable linearisation (**ViscoCorrect**™), ensure this is switched to ***On***. Also switch ***Smoothing*** to ***On***. The last column ***Visc chan*** lets the computer know which viscosity channel to use in calculating the accurate flow. Beforehand we configured Visc4 to the temperature channel measured at the flow block. Therefore ***Visc chan*** must also be set to Visc4.

14. Press enter / click to close the ***Configure flow*** table

15. The VT flow meter is now correctly configured.

On to Tutorial 4

Tutorial 4

How do I configure soft and virtual inputs?

Summary: This tutorial tells you about non-standard channels, so called *soft* and *virtual* channels; what they are, why you use them, and two worked examples showing how to create them.

Handy Hints

What are *soft* and *virtual* inputs?

Any input other than flow, temperature, pressure, and speed is a *soft* input since it is non-standard and not permanently configured in the program. By defining a *soft* channel you are telling the computer of the existence of a new measurement type. A soft channel can be defined in one of three ways: analogue, digital, or *virtua*l. Examples of analogue inputs are pressure and temperature whilst typical digital inputs are speed and flow. The third definition, virtual, allows you to carry out a mathematical operation on two other channels and display the result to the screen.

Some exceptions

There are a couple of exceptions that aren't technically soft or hard inputs, but are configured as soft inputs. These are viscosity (***Visc***) and peak pressure (***Peak***). In the case of viscosity, the channel is calculated from temperature and *Fluid type* (see Tutorial 3). Peak pressure is a separate input, but is linked to another pressure channel (see the front of the manual for your system specification). For example a 400 bar transducer on Press1 could be linked to Peak1. If the transducer is subjected to a 600 bar spike lasting only a few milliseconds, Peak1 would capture that maximum value, whilst Press1 would have saturated and probably only have recorded a value of ~ 420 bar.

Here are three scenarios:

a) Firstly to define a *soft* input (not pre-defined) like torque.

b) Secondly to combine two inputs to calculate a third, *virtual* input, like power.

c) To configure a *Peak* pressure channel.

We will look at each in turn.

Handy Hints

Worked example 1

Note: This must only be carried out by someone qualified in electronics as an incorrect voltage signal could cause permanent damage to the C1000 system. If in doubt contact your nearest sales outlet.

1. Should you wish to measure the output from a torque transducer, a new soft channel can easily be created to display Torque to the screen.

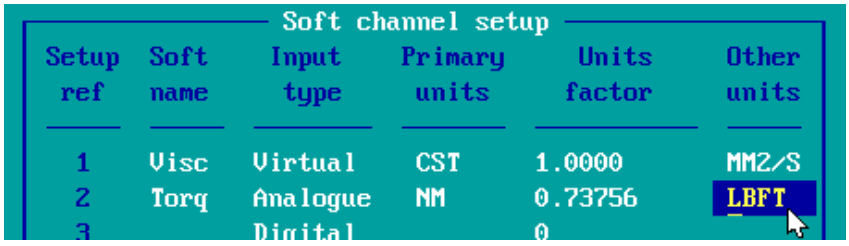
2. A typical output from a torque transducer might be 0 - 5 V. The C1000 pressure channels are designed to accept a 0 - 100 mV signal. Using a potential divider the transducer output can be brought from 5 V to 100 mV and safely connected into the pressure module.

3. With the C1000 in edit mode a new channel can now be defined.

4. From the ***Config*** menu select ***Soft types***.

5. Then select ***Soft types*** again from the next menu.

6. You will then arrive at the ***Soft channel setup*** shown below.



7. Under ***Soft name*** enter the name you want to give to this channel. Once named e.g. Torq, subsequent inputs will be numbered, i.e. Torq1, Torq2 etc.

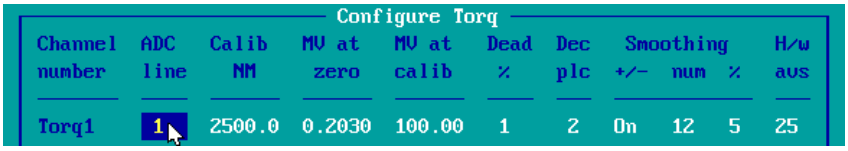
8. Under ***Input type*** scroll through the three options until you arrive at ***Analogue***. The ***Primary units*** are the default units, here they could be Nm. The ***Other units*** in this case could be lb.ft. Enter the appropriate conversion factor under ***Units factor***.

9. On completion press enter / click to close the table.

10. From the **Config** menu select **Input setup**.

11. Then select ***Torq*** from the next menu.

12. You will then see the ***Configure Torq*** table shown below.



13. There are two ways to configure a channel. If you know the mV values of the transducer they can be entered manually in the table. Alternatively the transducer can be calibrated against a known reference using the ***Calibration*** command - see Tutorial 6 for further details.

14. Under ***ADC line*** enter the appropriate number according to where the transducer is connected. See the front of the manual for details on how your system has been mapped. ***Calib Nm*** dictates the full-scale torque value. The mV values are the minimum and maximum values attainable by the transducer. The ***Dead %*** is the 'dead band' of the transducer represented as a percentage of full scale. Thus for a full-scale deflection of 2500 Nm, the transducer will read out of range over the initial 25 Nm (if ***Dead %*** is set to 1%). ***Dec plc*** indicates the number of decimal places, whilst smoothing removes any sudden spikes. ***H/w avs*** need not be altered.

Worked example 2

1. If you want to calculate the actual hydraulic power developed by a pump you can easily do so by using a virtual channel. One way of calculating power is to combine speed and torque.

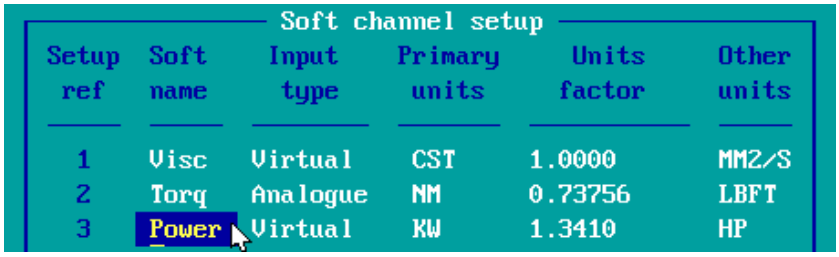
2. Start the C1000 in edit mode.

3. From the ***Config*** menu select ***Soft types***.

4. Then select ***Soft types*** again from the next menu.

5. You will then arrive at the 'Soft channel setup' shown below.

6. Under ***Soft name*** enter the name of the new measurement, in this case POWER.



7. Under ***Input type*** scroll through the three options until you arrive at ***Virtual***.

Handy Hints

If you need to calibrate / re-calibrate a pressure channel, first configure the input as usual, leave the min and max mV values at 0 and 100 mV. Once the channel is fully configured (Tutorials 2,4 & 5) it can be easily calibrated against a known reference (Tutorial 6).

If you wish to display negative values, for example with a pressure transducer measuring a vacuum, the dead zone must be set to zero.

Handy Hints

You can change the displayed units at any time by going into ***Config*** and selecting ***Engineering units***.

Remember all calculations use the primary units. For further information on equations and conversion factors see Appendix I.

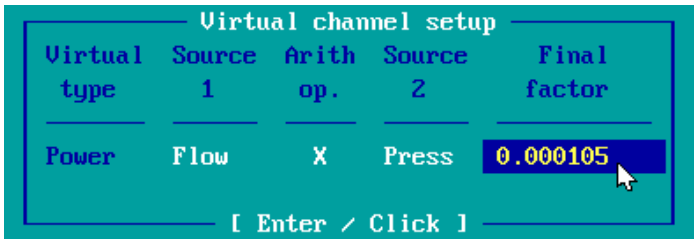
8. The primary units for power could be set to kilowatt (kW). Should you wish to have an option of whether power is displayed in kW or HP enter the relevant conversion factor under ***Units factor*** and the resulting unit, in this case HP, under ***Other units***.

9. On completion press enter / click to close the setup table.

10. From the ***Config*** menu select ***Soft types***.

11. Then select ***Virtual types*** from the next menu.

12. You will then arrive at the ***Virtual channel setup*** shown below.



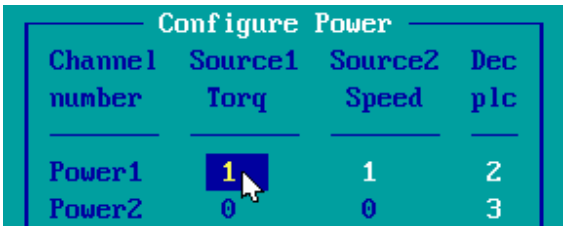
13. This table is used to enter the general formula. When doing any calculation you must use the primary units. For example the primary units of torque are configured as Nm, whilst the primary units of speed are Hz. As a result the equation will be:

$$\text{Power}\,(\text{kilowatt}) = \text{Torq}\,(\text{Nm}) \times \text{Speed}\,(\text{Hz}) \times \text{Factor}$$

To enter this formula select ***Torq*** under ***Source 1***, ***Multiply*** under ***Arith op.*** and ***Speed*** under ***Source 2***. The final factor works out at 0.00628 / n (where n is the number of pulses per revolution - in the example above n=60 hence 0.00628/60 = 0.000105).

14. Press enter / click to close the table.

15. From the ***Config menu*** select ***Input setup*** and then ***Power***, you will then see the ***Configure power*** menu shown below.



16. Under ***Source1 Torq*** and ***Source2 Speed*** enter the appropriate channel numbers.

17. Close the menu by pressing enter / clicking with the mouse.

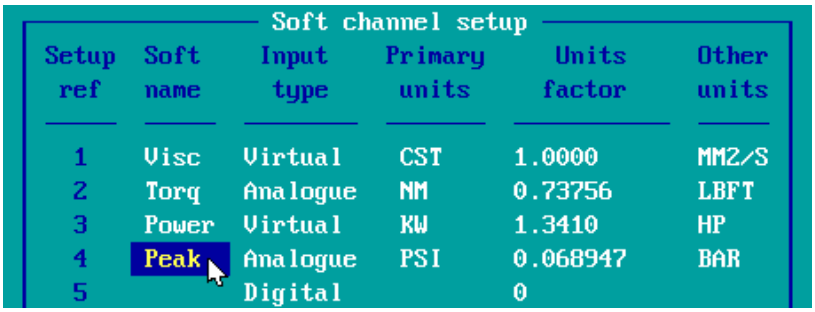
Worked example 3

1. The C1000 can have a maximum of two Peak pressure channels, these are hard wired to two pressure channels. Typically the **Peak** pressure channels are *ADC 15 & 16,* though check your system configuration at the front of the manual. To enable these channels within the software you must define the channel ***Peak*** as a *soft type*.

2. Start the C1000 in edit mode.

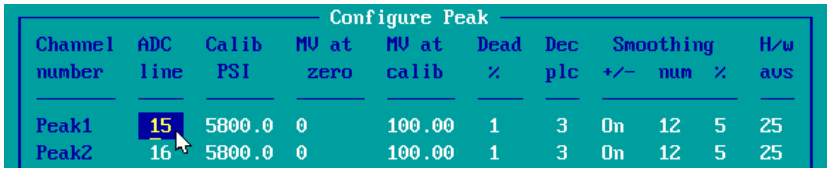
3. From the ***Config*** menu select ***Soft types***.

4. Then select ***Soft types*** again from the next menu.



5. Enter the name ***Peak*** under ***Soft name***, set the ***Input type*** to ***Analogue*** and enter the same units as for pressure.

6. Press enter to accept the new entry and then select ***Input setup*** from the ***Config*** menu. ***Peak*** will appear near the bottom of the list. Select ***Peak*** to enter the settings menu.



7. Enter the appropriate ***ADC line*** numbers next to Peak1 and 2 and set the ***Calib PSI*** to the same value as the associated pressure channel - 5800 psi for a 400 bar transducer.

Note: The peak circuit can then capture values up to twice the ***Calib PSI*** , i.e. up to 11600 psi in this case.

8. Close the menu by pressing enter / clicking with the mouse.

On to Tutorial 5

Handy Hints

If you need to calibrate / re-calibrate a pressure channel and associated Peak pressure channel, first configure the inputs as usual, leave the min and max mV values at 0 and 100 mV. Once the channels are fully configured (Tutorials 2,4 &5) they can be easily calibrated against a known reference (Tutorial 6).

Tutorial 5

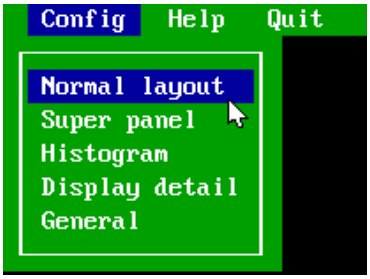
How do I customise the normal panel, super panel, and histogram?

Summary: This tutorial tells you how to customise the normal panel, the super panel, and the histogram to suit your particular application. The tutorial tells you about each display screen, and how to configure it.

What are the *normal panel*, *super panel*, and the *histogram*?
There are five display screens on the PC100: the *normal panel*, the *super panel*, the *histogram*, the *line graph*, and the *data table*. Examples of all of these are shown on the back page of this manual. The *normal layout* is capable of displaying a maximum of 44 inputs simultaneously whilst the *super panel* is designed to display 8 select channels in large numerals. The *histogram* can display a maximum of 10 channels graphically as a vertical bar chart. The *normal layout* must always be configured prior to the *super panel* and *histogram*.

1. From the ***Config*** menu select ***Panel layouts***.

2. From the ***Panel layouts*** menu select ***Normal layout***.



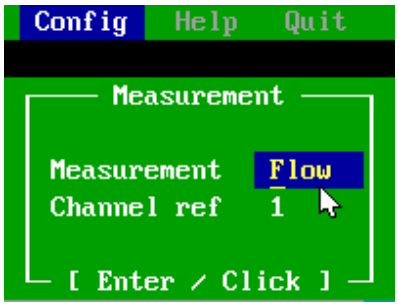
3. You will then arrive at the ***Panel layout editor*** (shown below).

Handy Hints

Handy Hints

4. The whole layout area is divided into cells. By clicking / pressing enter on any one of these cells, you will activate the ***Config*** menu (shown above).

5. The ***Config*** menu allows the user to freely design the layout to suit his / her particular application. To display a measured input to the screen (analogue, digital, or virtual) select ***Measurement*** from the menu and choose the relevant channel (for example ***Flow1***).



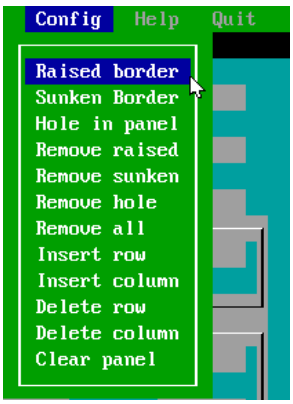
6. Using the ***Config*** menu text can be added in a variety of ways:

- as a ***Title***, like PUMP 1 in the figure above.
- as a ***Channel name*** like the left hand FLOW1 in the example above.
- as ***Eng. Units*** like LPM in the example above.

7. In each case you will be presented with a small menu, like the ***Measurement*** menu above. Scroll through the different types of input until you arrive at the one you want. Change the ***Channel ref*** to suit. Press enter / click to close the menu.

8. If you enter text or a measurement and then want to delete it, move to the cell you want to remove, press enter to activate the ***Config*** menu, and select ***Clear cell***.

9. The last item on the ***Config*** menu is ***Region***; this activates a menu giving a variety of options to customise the final look of the layout.



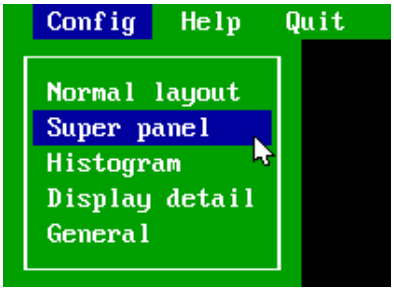
10. In the picture of the 'Panel layout editor' the normal panel has been customised in a variety of ways. The title 'Unit 1' is surrounded by a ***Raised border*** for example. A ***Sunken border*** surrounds the text '© 1998 Webtec'. The measurements, like Flow1, (on an all black background) are automatically set in a ***Hole in panel***. The area of unused cells above 'Block 1' and 'pump 1' was created by ***Insert row*** thus moving everything down the screen. In a similar way ***Insert column*** can be used to move everything to the right along the screen. Should you wish to remove individual raised areas use ***Remove raised***, similarly ***Remove sunken*** and ***Remove hole***. If you wish to remove all the raised and sunken areas as well as any holes use ***Remove all.*** Should you wish to start a fresh with a blank screen use ***Clear all***.

11. When you are satisfied with the layout, press escape to exit the editor.

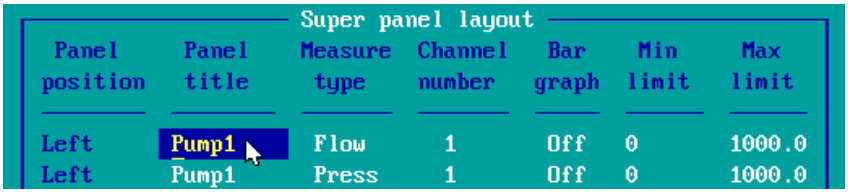
12. Now the normal layout is configured you can customise the *super panel* with your eight most important channels.

13. From the ***Config*** menu select ***Panel layouts***

14. From the ***Panel layouts*** menu select ***Super panel***.



15. You will then arrive at the ***Super panel layout*** table, as shown below.



16. Up to a maximum of 8 channels can be displayed. Sections not used will automatically be blanked off.

17. Under ***Panel title*** enter the name of the sensor / component location.

18. ***Measure type*** and ***Channel number*** together define the channel you wish to display. Thus Flow and 1 defines Flow1.

Handy Hints

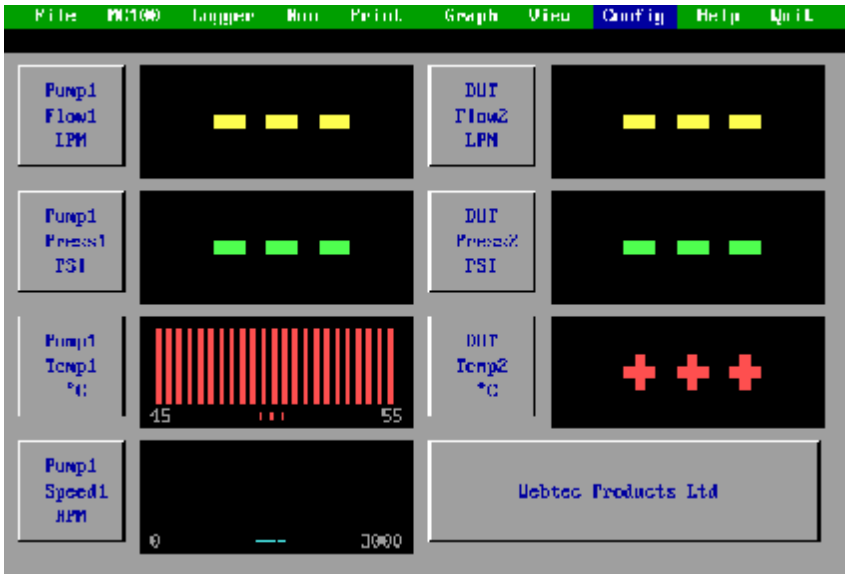
If on exiting a list of errors appears you have not correctly configured the channels – see Troubleshooting (Tutorial 12) for more information.

Handy Hints

19. Instead of displaying the numeric value you can display a bar graph and set the lower and upper limits. To do this switch ***Bar graph*** to ***On*** and type in the desired limits.

20. Once you have completed the set-up press enter / click to close the table.

21. You will now see the customised *super panel* as shown below.



22. With the *normal layout* and *super panel* configured you might also want to configure the *histogram*.

23. Select ***Panel layouts*** from the ***Config*** menu and then ***Histogram***.

24. The *histogram* is defined in a very similar fashion to the *super panel*. You can display ten channels simultaneously and for each channel you have to define the measurement type, channel number, lower and upper limits. The ***histogram layout*** menu is shown below.

Handy Hints

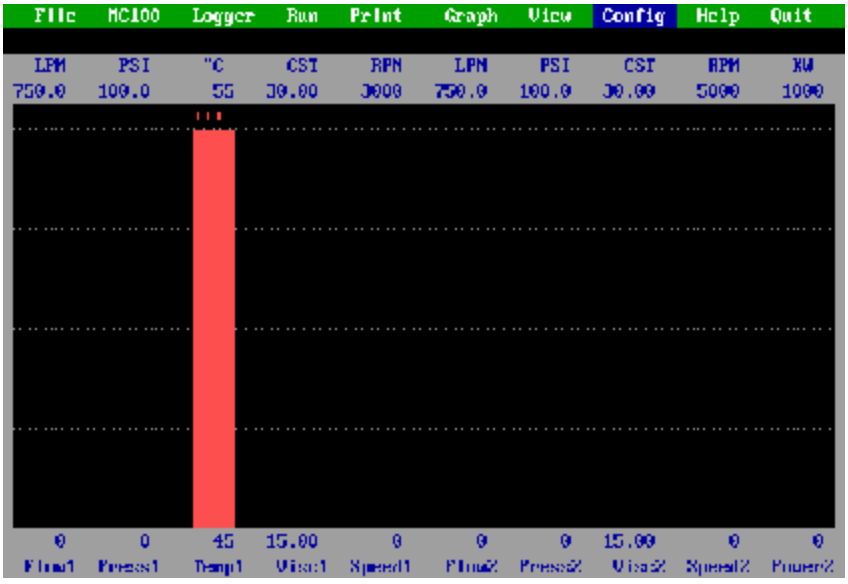
Histogram layout

Histogram position	Measure type	Channel number	Min limit	Max limit
1	Flow	1	0	750.00
2	Press	1	0	100.00
3	Temp	1	45.000	55.000
4	Visc	1	15.000	30.000
5	Speed	1	0	3000.0
6	Flow	2	0	750.00
7	Press	2	0	100.00
8	Visc	2	15.000	30.000
9	Speed	2	0	5000.0
10	Power	2	0	1000.0

[Enter / Click]

25. Once you have entered all the necessary channels press enter / click to accept the settings. Remember the *histogram* can only display channels that have previously been defined on the *normal layout*. If you wish to add a new channel it must first be added to the *normal layout* prior to the *super panel* or *histogram*.

26. The newly configured *histogram* is shown below.



On to Tutorial 6

Tutorial 6

How can I calibrate / re-calibrate an analogue sensor?

Summary: This tutorial explains how to use the C1000 to calibrate / re-calibrate analogue inputs, like pressure transducers. The tutorial includes a worked example.

All pressure and temperature sensors supplied by Webster Instruments with a C1000 will be calibrated in-house at the point of manufacture.

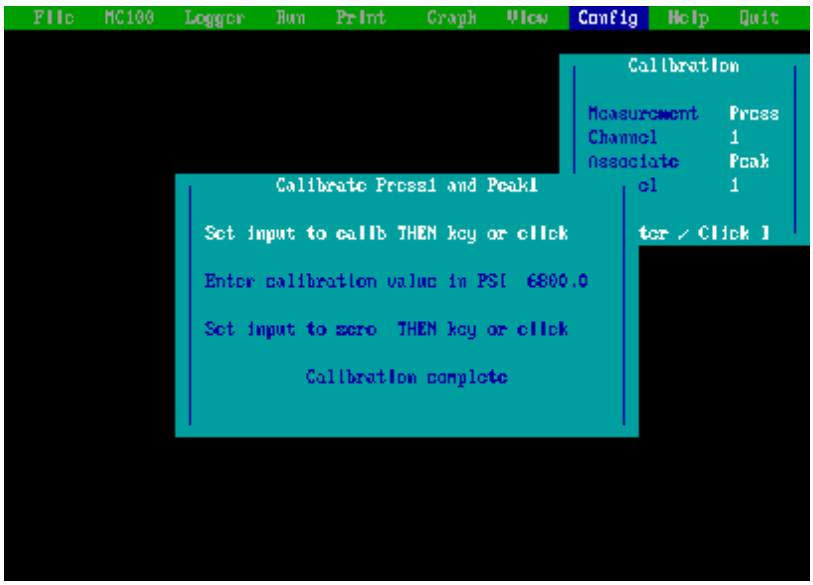
If you need to calibrate an analogue sensor by reference to a known input, this can easily be done using the C1000. For instance you might have a pressure transducer that needs re-calibrating. Given a known reference, a dead weight tester for instance, the C1000 can be use to quickly re-calibrate the pressure transducer and store the values, here's how:

1. Connect the pressure transducer you wish to calibrate to the correct input on the C1000.

2. Ensure the *pressure channel* is correctly configured (see Tutorial 2) - leave the min and max millivolt values at 0 and 100.

3. Configure a *Peak channel* if appropriate (see Tutorial 4).

4. From the ***Config*** menu select ***Calibration*.** Enter the channel number of the pressure transducer you are testing. If that channel is configured with *Peak pressure capture*, enter the number of the associated *Peak channel*. Press enter.



Handy Hints

Handy Hints

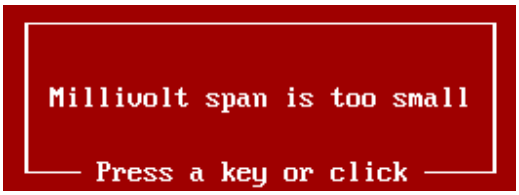
5. Attach the pressure transducer to a dead weight tester and load to its full-scale value. Once obtained press enter on the C1000.

6. Next enter the full-scale value in PSI. Press enter.

7. Then unload the pressure transducer so it is only exposed to atmospheric pressure. Press enter.

8. The calibration is now complete.

9. Note: if the difference between the max and min values recorded for the pressure transducer is less than 75 mV, the C1000 will display an error as shown below.



10. Ensure the transducer has 0 - 100 mV output and that the transducer is being exposed to the max and min pressures and repeat stages 1 to 8.

On to Tutorial 7

Tutorial 7

Data logging

Summary: This tutorial covers data logging: the methods available, which method to use when, and a worked example for each method. Note: Data logging using the MC100 is covered in Tutorial 10.

The C1000 offers five different methods of logging data to cover a wide variety of circumstances. The methods are:

1. ***Continuous log*** - records blocks of data at set time intervals of 1 second or less.

2. ***Periodic log*** - records blocks of data at set time intervals of 1 second or more.

3. ***Log on keypress*** - records one block of data each time a key / footswitch is pressed. You can review previous blocks during the test.

4. ***Profile log*** - records a maximum of 4 channels at a rapid rate with data capture triggered by an external event.

5. ***Online log*** - records blocks of data at a set rate, the measurements can be displayed simultaneously by any one of the four display screens.

In all methods of data logging the user is asked to enter a test name and fill out a test sheet.

Test name
A test will be stored to disk using the test name you have entered in the format **name.tst**. The test name can be entered in one of two ways but cannot exceed eight characters or include any spaces:

As Txxx, where the x represents a number (e.g.: T1001)
As a combination of letters and numbers (e.g.: RIG1T3)

If method one is used the C1000 will automatically assign the next consecutive test number.

Test Sheet
The ***test sheet*** is a useful way to record information about a test for future reference. This information is automatically printed on a report in narrow format, thus providing trace-ability for your own quality control (ISO 9001 / 2). The first line ***Title*** is automatically attached to the top of a line graph created from the data.

In order to help you get the most out of the data logger functions there are five examples below, one for each method of data logging.

Handy Hints

Unsure of which method to use? - See the Handy guide below. Each method has been designed with a specific requirement in mind.

Test numbers will only increment automatically from T1000 and above.

For security of data it is not possible to reuse a number of a test stored on disk.

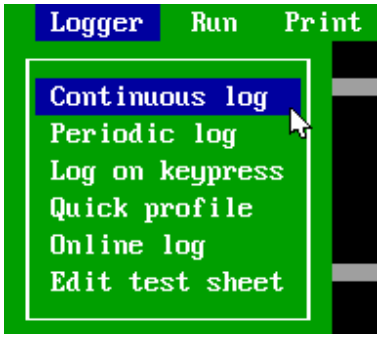
Which method?

Typical Situation	Example	Best method	No. of channels logged	See
To log a set of results which are not related to time.	Calibration of equipment by running a range of individual tests, e.g.: testing a pump at different pressures or speeds..	***Log on key press***	As many as are configured on the normal layout.	**7.3**
To rapidly log information over a set period of time – the user controls when the test begins.	Calibration of equipment by varying one or more factors over a period of time – e.g. testing of a machine cycle.	***Continuous log***	As many as are configured on the normal layout.	**7.1**
To very rapidly log information about an incident over a set period of time – the user has little control over when the incident occurs.	Diagnostics – to get detailed information about an unpredictable event or an event that happens too quickly to initiate manually, i.e. shock pressure.	***Quick profile log***	Four pre-selected channels.	**7.4**
To take a reading at regular intervals over a long period of time.	To record information about a piece of equipment in use or under development to ensure everything is correct.	***Periodic log***	As many as are configured on the normal layout.	**7.2**
To take readings whilst simultaneously viewing them on the screen in real time – preferably as a graph.	To monitor a piece of equipment in real time	***On line log***	As many as are configured on the normal layout.	**7.5**

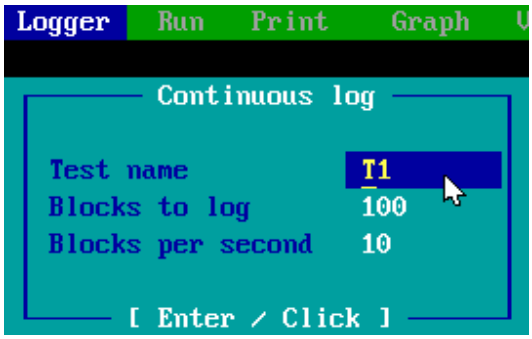
Worked example 7.1

How do I run a test using continuous log?

1. From the ***Logger*** menu select ***Continuous log***.



2. You will arrive at the ***Continuous log*** menu shown below.



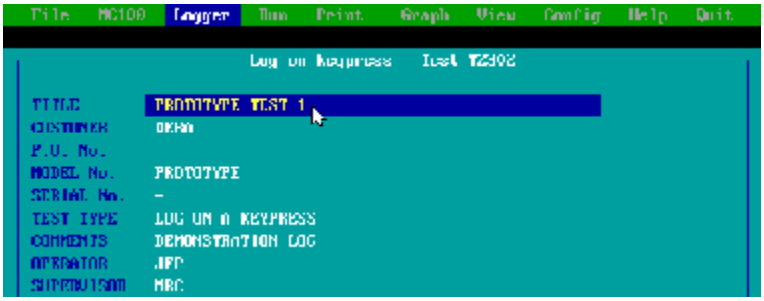
3. Enter the test name next to ***Test name*** or use the name suggested by the computer.

4. A continuous log will record between one and ten blocks per second and up to a maximum of 8000 blocks in total. (This limit could be slightly lower – depending on the amount of memory available).

5. Enter the total number of blocks to log and the number of blocks per second. The total test time is the number of blocks divided by the blocks per second.

6. Once complete press <Enter> / click.

7. You will now come to the ***Test sheet*** as shown below.



Handy Hints

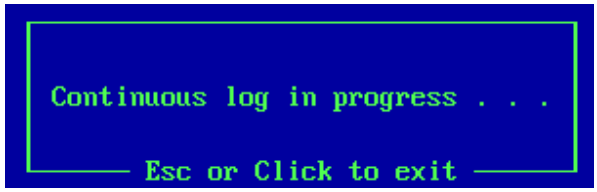
Handy Hints

Note: All active channels will be logged using the ***Continuous log*** however you will only see all of them under the *normal layout*, and as a *wide report* when printing – see Tutorial 9. The *data table* displays the same channels as the *super panel* (i.e.: a maximum of eight).

8. The ***Test sheet*** is purely a text document to record information about the test. The information can appear on reports and the first line – ***Title*** is used as a title on the *Line graph*.

9. Press <Enter> / click to start the test.

10. Across the top of the screen you will see the number of the block being logged, the total number of blocks to log and the number of the test. By pressing <Esc> you will terminate the test early.



11. Once the test is complete you will return to the ***Test sheet*** to add / change any details if necessary. Press <Enter> / click to close.

12. You will then see the table of test results with the ***Test sheet*** information laid out at the top, as shown below.

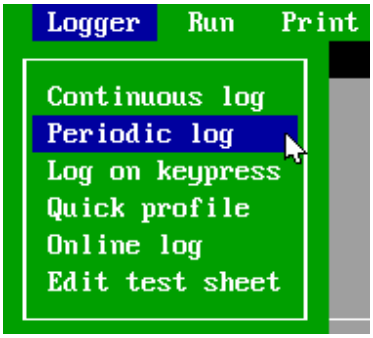
13. The ***Type of test***, ***Time***, ***Date***, ***Layout file name***, ***Fluid*** type and ***Test number*** are automatically included in the table of results.

14. You can review the test in any of the 5 screens, press <Tab> to switch between them.

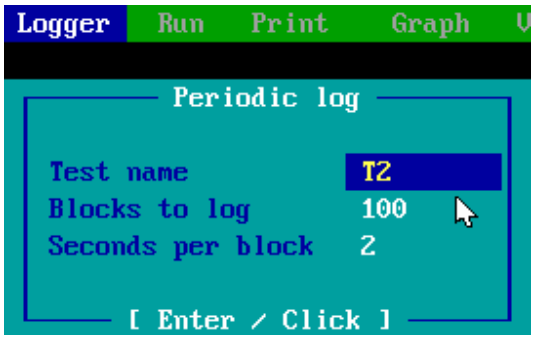
15. See Tutorials 8 & 9 respectively to see how to plot a graph and print reports.

Worked example 7.2
How do I run a test using periodic log?

1. From the ***Logger*** menu select ***Periodic log***.



2. You will then see the ***Periodic log*** menu shown below.



3. Enter the test name next to ***Test name*** or use the name suggested by the computer.

4. A ***periodic log*** will record a block at intervals between 1 and 600 seconds up to a maximum of 8000 blocks in total. (This limit could be slightly lower – depending on the amount of memory available).

5. Enter the total number of blocks to log and the number of seconds per block. The total test time is the number of blocks multiplied by the seconds per block.

6. Once complete press <Enter> / click.

7. The format is the same as for ***Continuous log***, you will have the ***test sheet*** to fill out, the test will start and on finishing you will have another opportunity to edit the test sheet prior to seeing the table of results. During the test you can toggle between screens by pressing <Tab>. Pressing <Esc> will terminate the test early.

8. See Tutorials 8 & 9 respectively to see how to plot a graph and print reports.

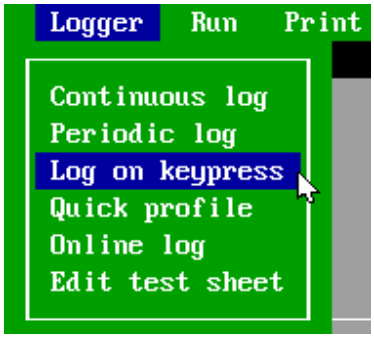
Handy Hints

See Scenario 7.1 steps 7-14

Handy Hints

Worked example 7.3
How do I run a test using log on a keypress?

1. From the ***Logger*** menu select ***Log on keypress***.



2. You will then see the ***Log on keypress*** menu. Enter the test name or use the name suggested by the computer.

3. Press <Enter> / click to close the menu

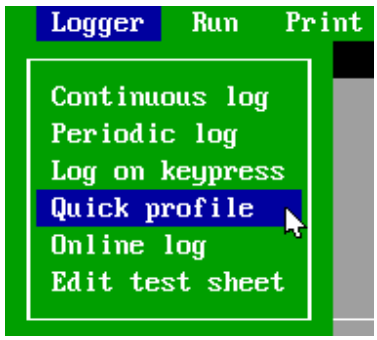
4 There after the test format is the same as for ***Continuous log***, you will have the ***test sheet*** to fill out, the test will start and once completed you will have another opportunity to edit the test sheet prior to seeing the table of results.

5 In order to log a block of results press <Space> or the black foot switch. You can log up to a maximum of 8000 blocks, or until the memory is full, whichever is sooner. During the test you can toggle between screens by pressing <Tab>. The help menu can be accessed by pressing <F1>. If you wish to review the blocks already logged press <Enter> and you can scroll through the blocks using the cursor keys. To resume testing press <Esc>. When you have completed testing press <Esc> to exit to the 'test sheet'.

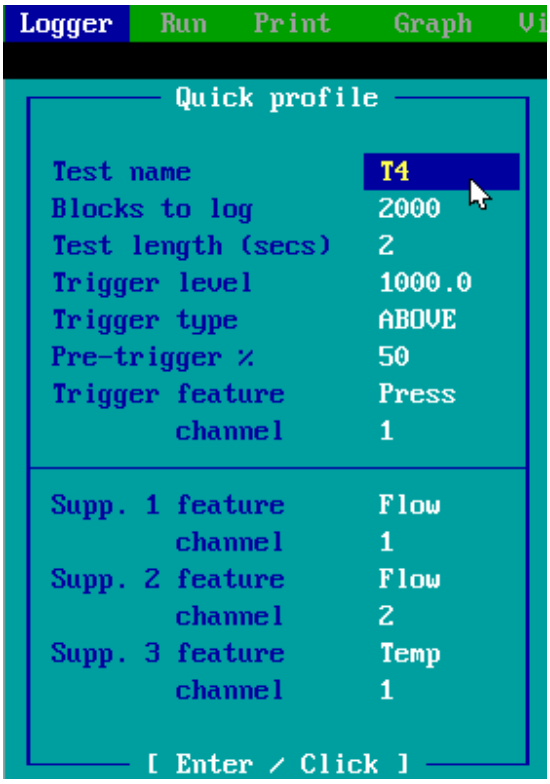
6 See Tutorials 8 & 9 respectively to see how to plot a graph and print reports.

Worked example 7.4
How do I run a test using 'quick profile log'?

1. From the ***Logger*** menu select ***Quick profile***.



2. You will then arrive at the ***Quick profile*** menu as shown below.



3. The ***Quick profile*** log differs from all the other methods of data logging in that up to 4 channels can be recorded at very high speed. To configure the test the user must fill out the ***Quick profile*** menu shown above.

4. In this example the pressure rising above 1000 psi triggers the start of the test whilst channels Flow 1, Flow 2, and Temp 1 are also logged.

Handy Hints

Handy Hints

5. The quick profile test starts recording information into a buffer as soon as the user exits the set-up menu. When the test is triggered a pre-set number of readings over a pre-set period of time are stored in a data table. In the example above 2000 readings are taken over a two second period with a 50 % pre-trigger. This means when the pressure measured by 'Press 1' rises above 1000 psi the test will be triggered. Since the test requires 50% pre-trigger, 1000 readings will be recorded in the second prior to the trigger, and 1000 readings in the second after the trigger.

6. The number of ***Blocks to log*** can be set between 10 and 2000 whilst the ***Test time*** can be between 1 and 300 seconds. If more than 2 channels are logged the minimum test time is 2 seconds.

7. Press <Enter> to exit the set-up menu. The computer will then display the test sheet as with other tests.

8. Press <Enter> / click to close the test sheet, the computer will then display the message '**Waiting for Trigger'**.

9. When the trigger conditions are met the test will start.

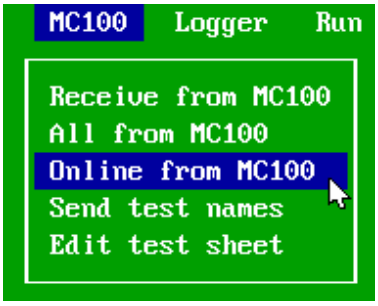
10. When the test is complete the message **processing** is displayed since the test speed is so fast all processing has to be carried out after the test.

You will then have another opportunity to edit the 'test sheet' prior to the results being displayed in the *data table*.

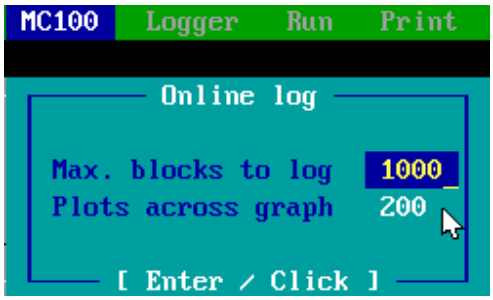
Worked example 7.5
How do I run a test using 'online log'?

1. An ***Online log*** is the default method of logging. Every time the C1000 is switched on, it will automatically start on-line logging. A test is only stored if you enter a name under ***Online log*.**

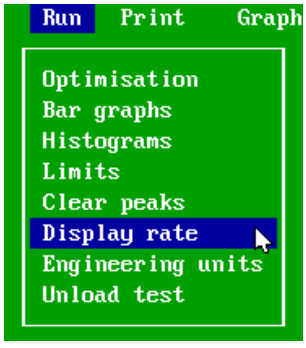
2. From the MC100 menu select ***online log*** as shown below.



3. You will then see the ***Online log*** menu, as shown below.



4. You can enter two parameters, the maximum number of blocks to log (between 20 and 2000) and number of plots across the page (between 10 and 1000). The number of plots across the page dictates the width of a line graph, thus in this example the graph would scroll 5 times to display 1000 blocks. When you have entered both parameters **PRESS <**Esc**>.**

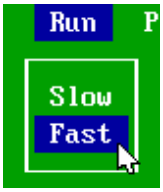


5. An online log will allow the user to choose between two speeds at which to record data; these are dictated by the ***Display rate***. Under the ***Run*** menu select ***Display rate*** as shown below. You can choose between ***Slow*** (every 1000 millisecond – 1 second) and ***Fast*** (every 333 millisecond, 1/3 second).

Handy Hints

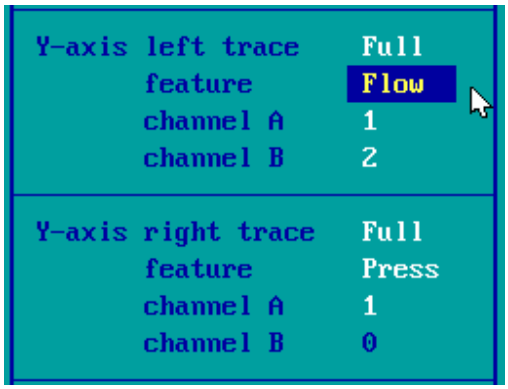
By changing the number of plots across the graph you can vary the graph resolution.

Handy Hints



6. Lastly you need configure the graph settings, which channels will be displayed to the screen on the *rolling graph*. From the ***Graph*** menu select ***Draw graph***.

7. Enter the channels you want to log by configuring the left and right y-axes. In each case you can log 2 channels of the same type. Scroll through the ***feature*** options until you arrive at the desired input, for example ***Flow***. Then enter the number of the Flow channels you wish to log next to ***channel A*** and ***channel B***. When you have completed the menu, press <Enter> / click and the computer will start logging immediately and display the results as a *rolling graph.*



Pressing any other key, apart from <Tab> will automatically cancel the test and start another one.

8. You can view the data in any of the four screens, simply press <Tab> to scroll between them.

9. The test will continue until the user either presses <Esc> or saves the test. To save test to a data file select ***Online log*** from the ***Logger*** menu at the top of the screen.

10. On the ***Online log*** menu enter the test name and press <Enter> / click. You will then have the opportunity to fill in the *test sheet* before the results are displayed as a *data table*.

11. See Tutorials 8 & 9 for information on creating and printing graphs and reports.

On to Tutorial 8

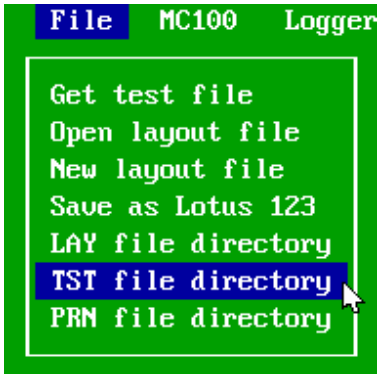
Tutorial 8

How do I draw and print a graph?

Summary: This tutorial covers taking an existing test and drawing and printing a line graph from the test results.

1. Have you just carried out a test? Assuming you have a data table in memory you can plot a graph straight away. If not you will need to load in a test file.

2. To load a test, select ***File*** from the menu bar and go to ***TST file directory*** as shown below.



3. Select 'PST.TST' or a test of your own using the mouse.

4. When the file is loaded you will see the data table with the test sheet information at the top.

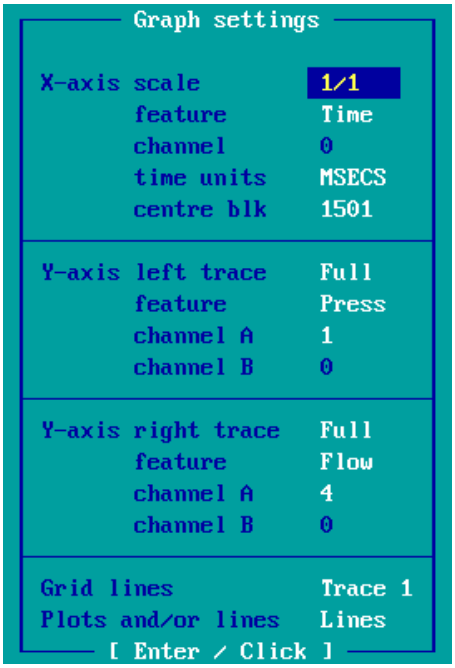
5. To draw a graph of the results select ***Draw graph*** from the ***Graph*** menu. You will then be presented with the ***Graph settings*** menu.

Handy Hints

If you don't have a mouse connected press <Esc> and select ***Get test file*** from the 'File' menu.

Handy Hints

You can only graph channels that appear in the data table for the test you have carried out. Sometimes (for instance when carrying out a quick profile log) less channels are logged than appear on the normal layout.



6. The ***Graph settings*** menu defines four parts of the graph:

- ü The x-axis
- ü The left hand side y axis
- ü The right hand side y axis
- ü The graph style

7. The x-axis has five parameters, these will be automatically set by the program to give a meaningful result, press <Enter> to accept the given parameters. Here is a description of each of the parameters should you wish to change some or all of them.

X-axis scale

Allows the user to stretch or compress the graph. ***Auto*** will fit a time-based graph to one page. ***1/1, 1/2, 1/3, 1/4*** are scale factors and reduce the length of the graph by only plotting every 2nd, 3rd, or 4th value. ***Band*** is only possible for non-time based graphs and will set the x-axis between the minimum and maximum values recorded.

X-axis feature

Used to set what the x-axis will represent, typically this will be time however this can be set to any measured quantity, e.g.: flow, temperature, pressure, speed, or any soft or virtual type.

X-axis channel

If the x-axis feature is a measured quantity (i.e.: not Time) then you must set this to the relevant channel. For example should you wish the x-axis to display ***Press 4*** set x-axis feature to ***Press*** and x-axis channel to ***4***.

X-axis time units
If the x-axis feature is ***Time*** then this parameter will set what the time units are: hours, mins, secs, msecs, or blocks.

X-axis centre block
This parameter need only be set if the x-axis feature is ***Time*** and the scale is not ***Auto***. Setting this parameter tells the program how to display the graph, the number of the block entered will be located centrally on the page.

8. Both the left and right y-axes each have four parameters.

Y-axis trace
This allows the user to control the y-axis scale. The options are full, band, limit, and off. ***Full*** sets the scale between zero and the maximum value. ***Band*** automatically sets the scale from the minimum to the maximum value recorded. ***Limit*** allows you to select the scale, the default is between zero and one thousand. ***Off*** switches the axis off.

Y-axis feature
This is used to set which measured input type you wish to display, press space to scroll through the options, these will include all standard, soft and virtual inputs.

Y-axis channel
If you wish to display ***Temp2*** then set y-axis feature to ***Temp*** and y-axis channel to ***2***. If you don't wish to have two traces set the second channel to zero.

9. The final set of parameters refers to graph style.

Grid lines
This is used to control whether you wish to display gridlines. The gridlines can be aligned with either the left axis (Trace 1) or right axis (Trace 2).

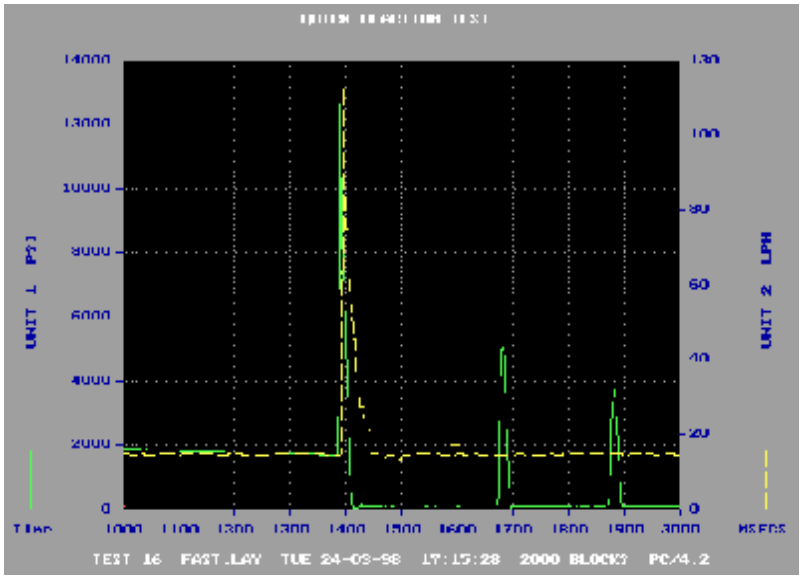
Plot marks
This enables / disables a marker to be displayed at each data point. Markers are ideal for short tests e.g.: log on a keypress. Where the x-axis is set to a measurement type, i.e.: not time, markers are always used.

Once you have set the parameters press enter / click to confirm the settings and to draw the graph. The graph below was defined using the settings shown above

Handy Hints

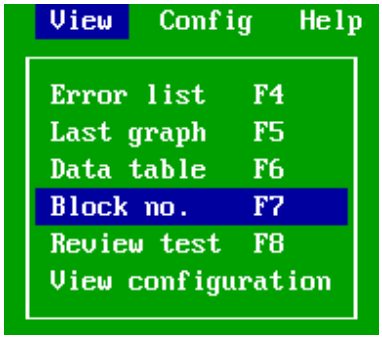
You can change the limits for each channel logged under ***Run - Limits - Channel***.

Handy Hints



10. In this example there are 2000 blocks yet we can only see half. In order to scroll along the graph use the <Ctrl> and left arrow to move left and <Ctrl> and right arrow to move right. Press <Tab> to scroll between the graph, data table and other screens.

11. After inspecting the graph you may wish to review the test or look more closely at a particular block. From the menu bar select **View** and you will see the menu below.



12. If from the graph you have identified an incident, for instance the main peak on the above graph, you might wish to know what was the maximum-recorded pressure? In the above test a reading was recorded every millisecond, thus say the peak occurs at approximately 1400 msecs, that will coincide with the 1400th block of data. From the view menu select ***Block no.*** and enter 1400.

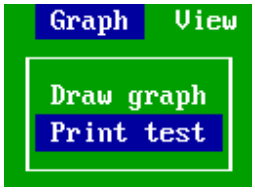
13. The data table will be displayed with the 1400th block centred on the page. To scroll up or down use the cursor keys or <PgUp>, <PgDn>.

	UNIT 2	UNIT 1		UNIT 1
QRT1.TST	Flow4	Press1	Press8	Grav1
BLOCK SECS	LPM	PSI	PSI	G
1390 1.389	14.6	11519	4508	28.05
1391 1.390	14.6	13769	4505	38.42
1392 1.391	14.6	13769	4505	38.89
1393 1.392	14.8	11876	4505	38.87

14. By scrolling up slightly you could identify that in the 1391st millisecond Press1 peaked at 13769 psi.

15. Alternatively you might wish to review the test a block at a time in one of the other screens. Press <Tab> to switch to a different screen and again use the up and down arrow keys to scroll through the test.

16. Once you have drawn a graph you can easily obtain a printed copy. From the ***Graph*** menu on the top menu bar select ***Print test*** as shown below.



17. You will then see the same ***Graph settings*** menu as before with the current settings. Assuming you wish the printed graph to look the same as the copy on the screen just press <Enter> / click to accept. You will then be asked to confirm the choice of printer.

18. Press ***Y*** to confirm and the program will start printing the graph. See Tutorial 9 for information on configuring the printer.

On to Tutorial 9

Handy Hints

Another way to do this would be to select 'Review test' from the 'View' menu.

Tutorial 9

How do I print the results as a report?

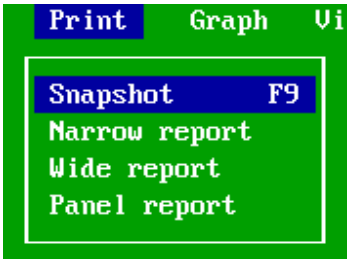
Summary: This tutorial tells you how to take a test file and create a variety of printed reports. The tutorial describes the different types of report, when to use which and how to configure your printer.

Once you have completed a test you can easily print out the results for your own records or for quality assurance purposes to supply to your customer.

1. When you run a test in all but the ***Quick profile*** log, all the current channels are logged. When you review a test the number of channels displayed will depend on the screen you are in, see the table below

Screen name	Number of inputs
Data table	8 channels (as per *super panel*)
Normal panel	All current channels (up to a maximum of 28)
Super panel	8 channels (as defined in ***Configuration***)
Histogram	10 channels (as defined in ***Configuration***)
Graph	4 channels (as defined in ***Graph settings***)

2. Similarly there are four ways of printing results and each method will present the results differently.



3. The first of the four methods is ***Snapshot***; this is a very quick way of printing a report and represents what is displayed on the screen at that moment. If you are in the *normal layout* the ***Wide report*** will be printed, in *super panel* a ***Narrow report***. The hot key <F9> can be pressed during or after a test.

Handy Hints

Handy Hints

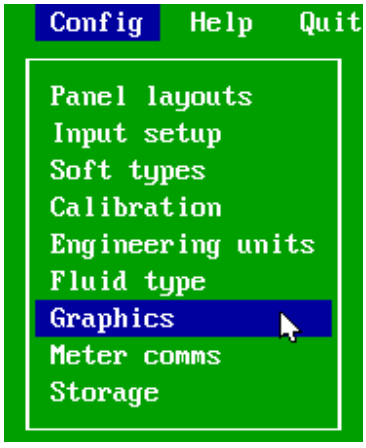
4. A ***Narrow report*** will print up to eight channels according to the configuration of the super panel. The report will be presented as a certificate of calibration and have the test sheet attached. The style of report is ideally suited to short tests like ***Log on keypress***. Typically a narrow report will run to one page, an example is shown at the end of the tutorial.

5. The ***Wide report*** will print all current channels as per the normal layout, thus often making this a much longer report. An example is shown at the end of the tutorial.

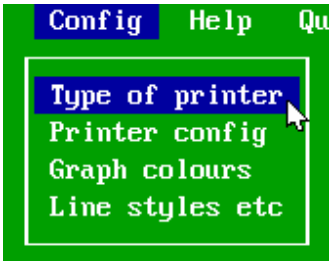
6. The ***Panel report*** is a print of the whole normal screen layout including titles, measurements, headers and footers for signature. A panel will be printed for each block of data, two panels are printed per page. An example is shown at the end of the tutorial.

7. To print any of the above types of report you must first ensure your printer is correctly configured and secondly have a test in memory.

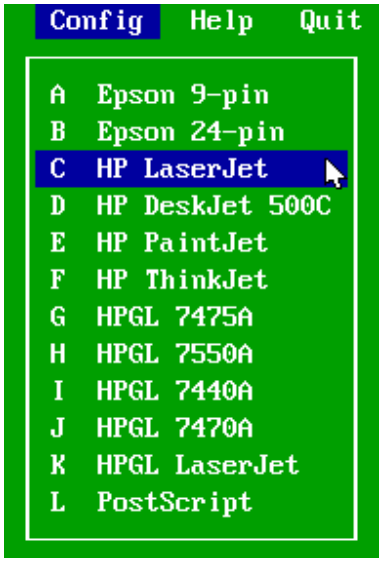
8. To set your printer configuration select the ***Config*** menu from the panel at the top of the screen.



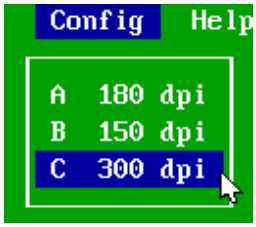
9. Then select ***Graphics*** and ***Type of printer***.



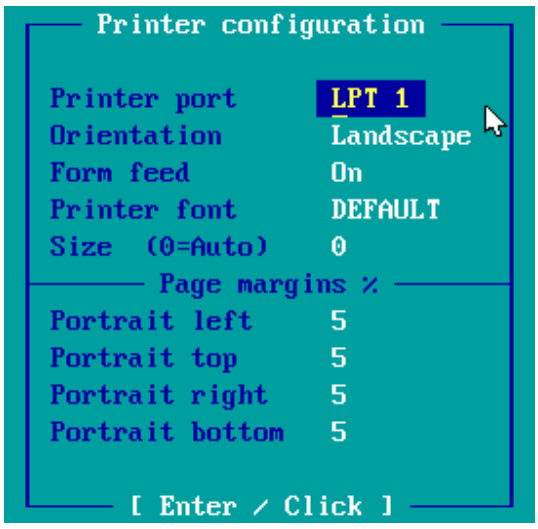
10. Then from the list of printers offered select the printer driver for your printer, for instance ***HP LaserJet***.



11. Once you have selected the printer type on certain printers you will be asked for the resolution.



12. The final menu covers the page layout and where the printer is connected.



13. Scroll through the port settings until the port matches where the printer is connected. Typically all further settings need not be altered. Orientation controls whether the print is portrait or landscape and depending on the printer type you will have a variety of fonts available.

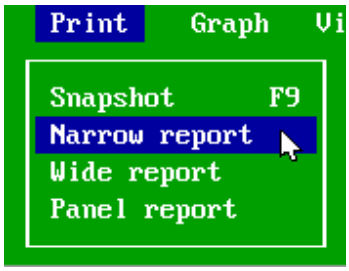
Handy Hints

Handy Hints

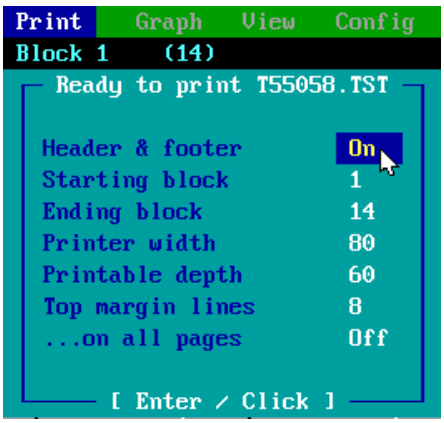
Top margin lines allows you to move the report down the page - 6 lines are equivalent to one inch.

14. Once you have configured the printer press <Enter> / click to return to the main menu. Now select ***Print*** from the menu bar.

15. Click on the type of report you wish to print, ***Narrow report*** for example.



16. You will then be presented with a *print settings* menu. The default settings are usually correct, however you might wish to limit the number of blocks you print. To do this you can enter the ***starting block*** and ***ending block*** numbers. Should you wish to print on to headed stationary, you can use ***Top margin lines*** to control how far down the page printing starts.



17. Ensure the printer is online then press <Enter> / click to accept the options and the printer will start printing the report.

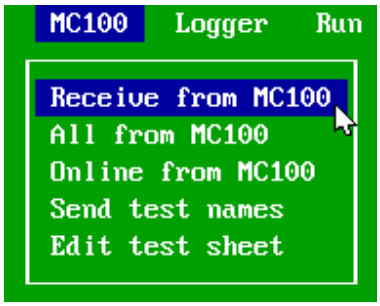
On to Tutorial 10

Tutorial 10

How can I transfer data between the C1000 and the MC100?

Summary: This tutorial tells you about the functions available on the C1000 for communicating and data logging with the MC100. Three functions are explained in some detail: ***Receive from MC100, Online from MC100,*** and ***Send test names***.

The C1000 is designed to be fully compatible with the MC100 portable data logger. The heading ***MC100*** on the menu bar lists how information can be exchanged between the C1000 and the MC100.The function, ***Receive from MC100*** allows the user to send one test from the MC100 to the C1000. ***All from MC100*** allows the user to send all the test files in the MC100 memory to the C1000.



Send test names allows the user to send a previously generated text file of test names to the MC100.

Online from MC100 is a type of data log. The last function ***Edit test sheet*** allows the user to edit information stored on the test sheet.

There are three worked examples covering how to ***Receive from MC100***, data log using ***Online from MC100*****,** and ***Send test names*** to the MC100.

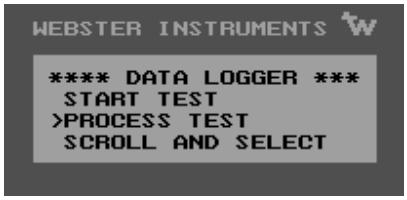
Worked example ***Receive from MC100***

1. Set up the MC100 close to the C1000 and connect the Webcomm cable between the RS232 port and COM1 / COM2 port on the C1000. Switch on the MC100.

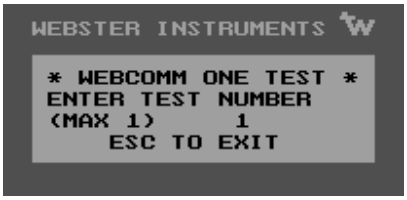
2. From the **DATA LOGGER** menu select **PROCESS TEST**.

Handy Hints

Handy Hints

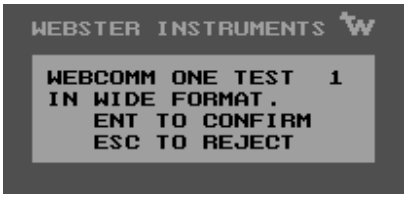


3. Then select WEBCOMM ONE TEST from the menu and the number of the test (the number of the most recent test will automatically be chosen for you)



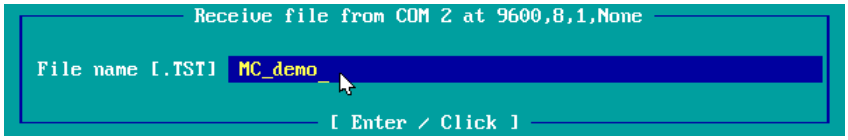
Do not press ENT yet

4. You will then see the screen below confirming your choice.

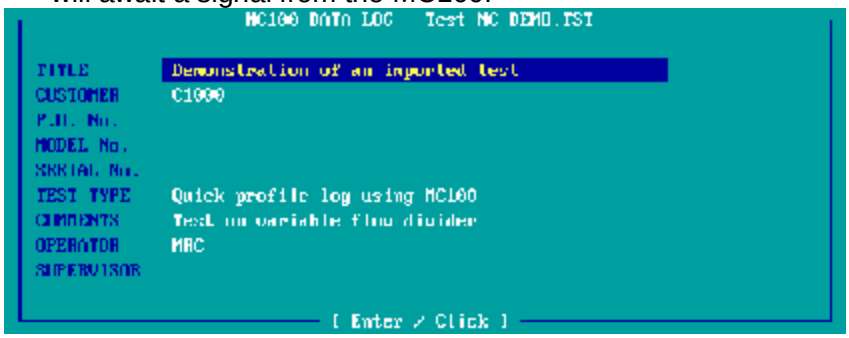


5. Return to the C1000 and from the main menu bar select ***MC100*** and then ***Receive from MC100*** as shown above.

6. Enter the name you want to give to the test you are importing from the MC100 and press <Enter>.



7. You will then be presented with the *test sheet* to fill in / modify, when you press <Enter> to accept the test sheet the C1000 will await a signal from the MC100.



8. Return to the MC100 and press <ENT> to initiate the transmission

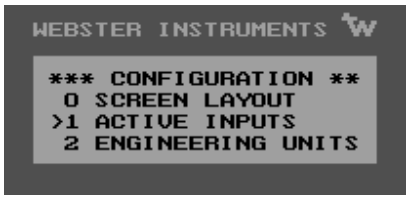
9. The C1000 will display a message to say it is receiving and another message when the transmission is complete.

10. When the test has been transmitted it will exist in three places, in the memory of the MC100, in the memory of the C1000 and also saved to disk on the C1000 under the name entered previously, in the case of the example 'MC_DEMO.TST'.

Worked example ***Online from MC100***

1. Set up the MC100 close to the C1000 and connect the **Webcomm** cable between the RS232 port and COM1 / COM2 port on the C1000. Switch on the MC100.

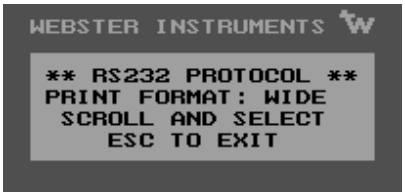
2. On the MC100 select **CONFIGURATION** from the main menu, then **ACTIVE INPUTS**.



3. To minimize the file size switch off any inputs that are not required.

4. Next you need to check that both the MC100 and C1000 are communicating using the same format. In both cases the default format is correct, if neither have been altered they will match. To check select **RS232** on the MC100 **CONFIGURATION** menu.

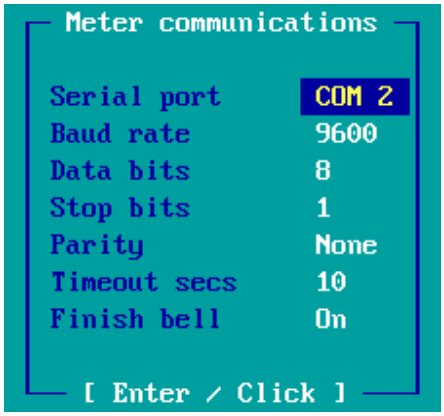
5. Then select **SET PROTOCOL** and check that the MC100 **PRINT FORMAT** is **WIDE**, **BAUD RATE** is **9600**, **PARITY** is **NONE**, **DATA BITS 8, STOP BITS 1**.



6. To check the C1000 is using a compatible format go *to* ***Meter Comms*** on the ***Config*** menu. The settings should be port (***COM1*** / ***COM2***), ***Baud rate 9600***, ***Data bits 8***, ***Stop bits 1***, ***Parity None***.

Handy Hints

Handy Hints



7. To start the test, on the MC100 main menu select **DATA LOGGER, START TEST**.

8. Select **ONLINE TEST** and pick the **TEST NAME**, the **NUMBER OF BLOCKS** to log and the **TIME BETWEEN BLOCKS**. You will then see the screen below. Do not press <ENT>, first you must set up the C1000 to receive.

9. On the C1000 select **Online from MC100** on the **MC100** menu.

10. Enter the ***Max. blocks to log***, equal to the number set on the MC100. Also enter the number of ***Plots across graph***, if this is set to the same as the ***Max. blocks to log*** the whole test can be viewed on one page.

11. Press <Enter> / click to confirm the settings and the C1000 will display the message 'Waiting for Online test'. Within 10 seconds press <ENT> on the MC100 to start the test.

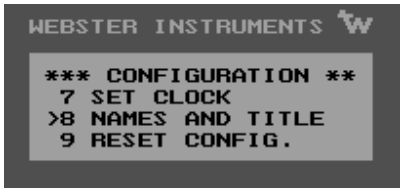
Worked example ***Send Test Names*** to the MC100

The C1000 can be used to send an existing text file of test names to the C1000. To create the text file you can use either a plain text editor or a word-processor and save the file as ASCII text. The following format must be adhered to:

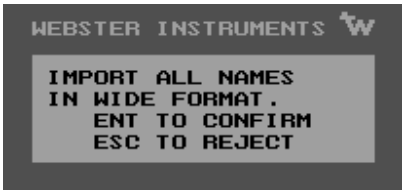
- There must be 21 lines of text
- The title of the file must be on the first line (20 chars max)
- The subsequent 20 lines must each hold a unique test name
- Test names must be a maximum of 14 characters long.

The file must be saved with a .TXT extension.

1. On the MC100 select **NAMES AND TITLES** on the **CONFIGURATION** menu.



2. Then select **IMPORT ALL NAMES** and press <ENT> the MC100 should then display 'Receiving'.



3. On the C1000 select **Send test names** from the **MC100** menu. Enter the name of the text file to send, e.g. NAMES.TXT.

4. Press <Enter> / click to accept the name and C1000 should display 'Transmitting'.

5. After a few seconds the MC100 screen should return to **NAMES AND TITLES**.

On to Tutorial 11

Handy Hints

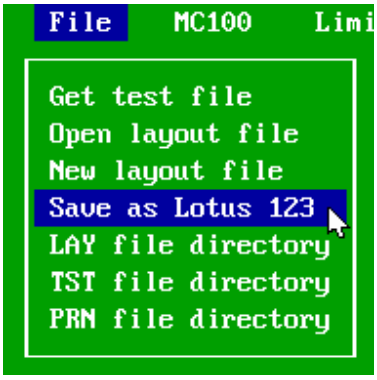
Tutorial 11

How can I export results to a spreadsheet such as Lotus 1-2-3?

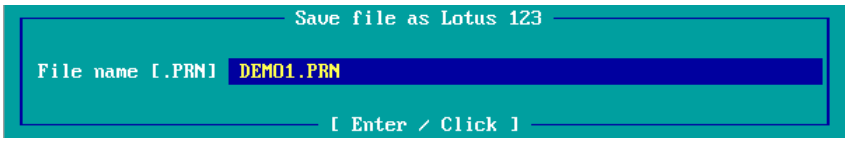
Summary: This tutorial tells you how to take a test file and export it into a spreadsheet package. The tutorial covers saving the file in the C1000 and then importing the file into Microsoft Excel ® or Lotus 1-2-3 ®

In some instances you might want to transfer data into a spreadsheet package such as Microsoft's Excel ® or Lotus' 1-2-3 ®. This can be quickly and easily done using the following steps.

1. From the main menu bar on the C1000 select ***File*** and ***Save as Lotus 123***.



2. Enter a new name or accept the name suggested (with a .PRN extension)



Importing into Excel ®

3. Exit C1000 and transfer the file onto a machine with Microsoft Excel.

4. Once within Excel open the file 'DEMO1.PRN' and Excel will present you with an 'Import Wizard'. Set the following parameters:

- ü The data is stored as 'Delimited'
- ü Origin as 'DOS'
- ü Delimiter type to 'comma'
- ü Data format to 'general'

Handy Hints

Tests saved as .PRN files are simply ASCII comma delimited, meaning the results can be read by any text editor.

Handy Hints

5. Your test results will then be correctly imported into Microsoft Excel © with each channel in a separate column and each reading in a separate cell.

Importing into 1-2-3 ®

1. Exit C1000 and transfer the file onto a machine with Lotus 1-2-3.

2. From within 1-2-3 open the file 'DEMO1.PRN' and you will be presented with an 'Import Wizard'. Set the following parameters:

3. Start a new column at each 'comma'

4. Set the character set to 'DOS'

5. Your test results will then be correctly imported into Lotus 1-2-3 ©

On to Tutorial 12

Troubleshooting

Errors and possible causes listed alphabetically

Error	Try	See also	Ref_address
ADC line not present	Check how your C1000 inputs have been configured (configuration list at front of manual) and compare this to how inputs have been mapped in the software (Config - Input setup - List inputs).	Tutorial 1	Errlist
Can't find family data file	The data required to linearise the flow meter selected is missing. Check the files 'turbines.ini' and 'lindata.ini' exist on the 'c1000' directory.	Appendix - File list	Turbine.c
Can't find fluids data file	The data required to calculate the fluid viscosity is missing. Check the file 'fluids.ini' exists on the 'c1000' directory.	Appendix - File list	Fluids.c
Can't find layout file	The layout file used to create the test file is not stored in the same directory as the test file. Check to see it has not been stored elsewhere. If you can't remember the name of the layout file, edit the test file using a normal text editor - the name of the layout file will be listed at the top.	Getting started	Filer.c
Can't find turbine data file	The data required to linearise the flow meter selected is missing. Check the files 'turbines.ini' and 'lindata.ini' exist on the 'c1000' directory.	Appendix - File list	Turbine.c
Can't initialise QC library	The printer driver library files cannot be found. Check to see the files 'qcprn1' and 'qcprn2' exist on the 'C1000' directory.	Appendix - File list	Pcmain.c
Can't overwrite existing test file	The test name you have chosen already exists. Either chose another name, delete the old test or save the test in a new directory	Tutorial 1	Logger.c
Channel specified not found	The channel is defined on the normal layout but has not been correctly configured.	Tutorials 1-4	Errlist

Error	Try	See also	Ref_address
Data method or version is incompatible	The data you are importing was created using a very early version of MC100. Contact your nearest sales outlet.		Mc100.c
Data-logged channel not on layout	You have tried to log a channel that has not been included on the normal and / or super panel layout	Tutorials 5 & 7	Errlist
Digi line not present	Check how your C1000 inputs have been configured (configuration list at front of manual) and compare this to how inputs have been mapped in the software (Config - Input setup - List inputs).	Tutorial 1	Errlist
Duplicate input line assignment	Flow and speed are both assigned Digi lines. Temp and Press are both assigned ADC lines. You have attempted to allocate an input line under two different names - e.g.: Digi1 -> Flow1 and to Speed1. - check under ***Config - Input setup - List inputs*** to locate the error.	Getting started	Errlist
Editing is not enabled	Exit the program (Alt and X) and re-enter the program in edit mode. (Type C1000 /e)	Getting Started	
EMM driver error	A problem occurred with expanded memory manager.		Image.c
Error in file	Try re-installing the appropriate file from the original disk. Contact your nearest sales outlet.	Appendix - File list	Turbine.c
Error in file 'fluids.ini'	Try re-installing 'fluids.ini' from the original disk. Contact your nearest sales outlet.	Appendix - File list	Fluids.c
Error in linearisation references	Contact your nearest sales outlet.		Lineariz.c
Error in port configuration	Check the cable from the MC100 is connected to the C1000. Checks under Config - Meter Comms - ensure the config is correct.	Tutorial 10	Mc100.c
Error writing to disk file	Check to ensure the floppy drive and floppy disk are working correctly.		Filer.c

Error	Try	See also	Ref_address
Error writing to file	Could be due to disk drive failure or due to an existing file being moved to a new location.		Filer.c
Exit by operator	The operation was interrupted by the operator pressing <Esc>	Tutorial 7	Filer.c
Expanded memory is not available	Your computer has not been fitted with an Expanded Memory Manager.		Pcmain.c
Incompatible layout	The layout used to create the test file has been altered since the test was carried out - as a result the layout is incompatible with the test data.	Tutorial 1	Filer.c
Invalid header record	The header record for this test has been altered within a text editor or is no longer compatible with the layout.	Tutorial 1	Filer.c
Layout file not found	The layout file used to create the test file is not stored in the same directory as the test file. Check to see it has not been stored elsewhere. If you can't remember the name of the layout file, edit the test file using a normal text editor - the name of the layout file will be listed at the top.	Tutorial 1	Errlist
Linearisation data not found	The data used to linearise the flow channels cannot be found. Check the C1000 directory for the files 'Turbines.ini' and 'Lindata.ini'. Contact your nearest sales outlet.	Appendix - File list	Errlist
Millivolt span is too small	When calibrating an input, the voltage span between min and max must be at least 75 mV.	Tutorial 6	
No measurement on channel	No measurement was recorded on the specified channel - check the sensor is connected and correctly configured and re-run the test.	Tutorial 7	Errlist
No measurements specified	You attempted to run a test without logging any channels. Re-configure the test and try again.	Tutorial 7	Errlist

Error	Try	See also	Ref_address
Premature end of file	The last line of test data is missing - the test file is incomplete.		Filer.c
Printer is not ready. Try again?	Check the printer is online and correctly connected.	Tutorial 8 & 9	Reports.c
Profile period too quick	You have tried to log too many channels in too short period. A maximum of 2 channels can be logged at the maximum speed of 2000 readings / second.	Tutorial 7	Errlist
Stopped by operator	The transfer of information from the Mc100 to the C1000 was interrupted by the operator pressing <Esc>	Tutorial 10	Mc100.c
Temperature source specified not found	The viscosity channel specified is using an invalid temperature channel - check under ***Config - Input setup - Temp.***	Tutorial 3	Errlist
Too many errors to list	Check the under ***Config - Input setup - List inputs*** and see where the errors have occurred.	Tutorials 2-5	Errlist
Too many inputs specified	You have configured more inputs than are available on your system. The maximum cannot exceed 12 digital and 16 analogue.		Errlist
Too many profile channels	You have tried to log too many channels in too short period. A maximum of 2 channels can be logged at the maximum speed of 2000 readings / second.	Tutorial 7	Image.c
Unknown fluid type	No information exists for the fluid type selected. Select another fluid type or contact your nearest sales outlet.	Appendix - File list	Errlist
Unknown turbine type	The turbine type you have selected has not been recognised. Check you have selected the correct type and that the files 'Turbines.ini' and 'Lindata.ini' exist in the C1000 directory.	Appendix - File list	Errlist
Virtual channel not allowed	Inappropriate line assignment. Try removing the last channel you assigned.	Tutorial 4	Errlist

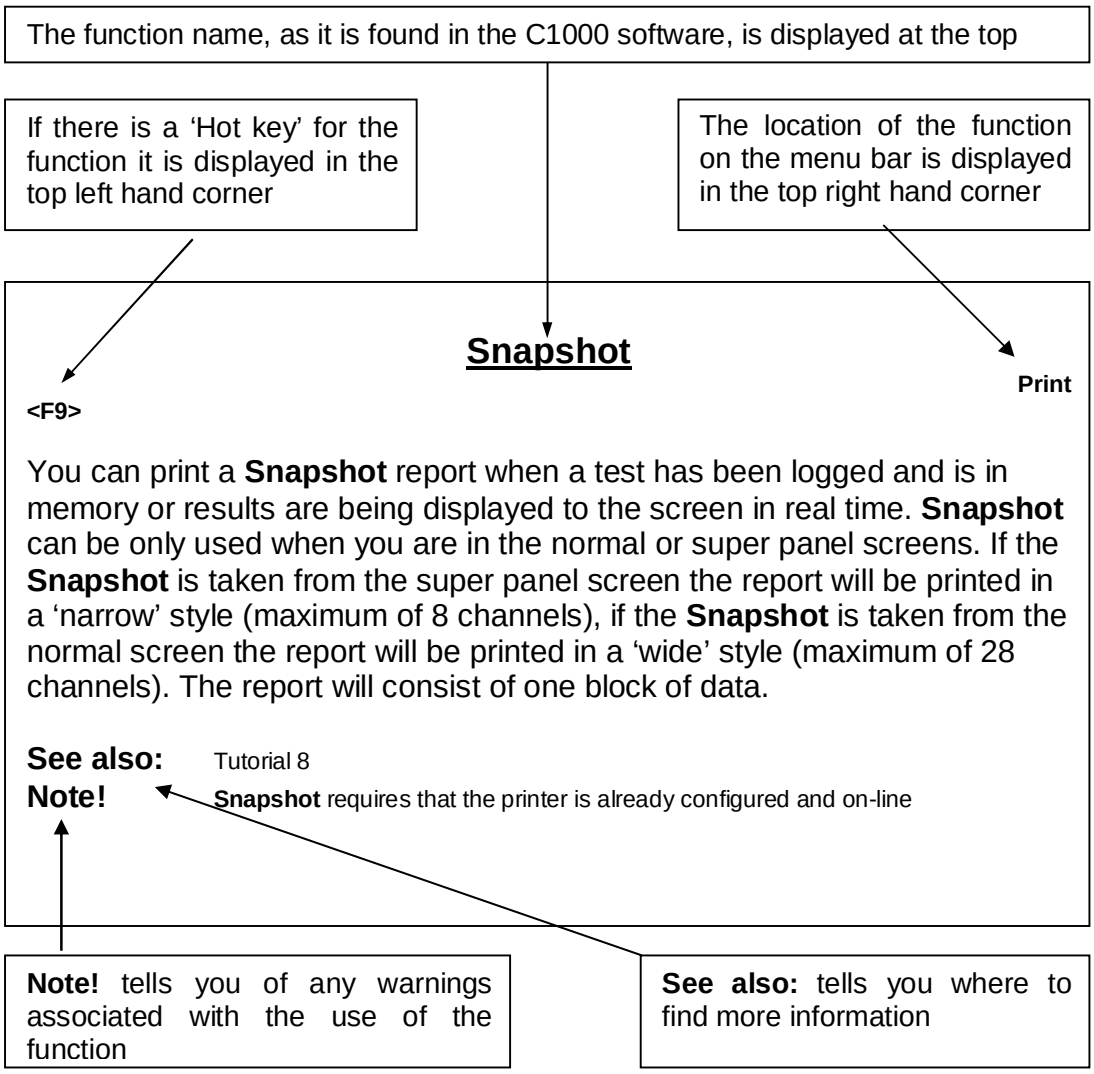
Error	Try	See also	Ref_address
Virtual source specified not found	Check you have defined the virtual channel correctly and that the source channels specified do exist.	Tutorial 4	Errlist
Virtual system is too complex	You are attempting to carry out overly complex calculations. Possibly you are nesting various virtual channels.	Tutorial 4	Errlist
Viscosity source specified not found	A VT type flow meter has been linked to an incorrect viscosity channel. Check specified viscosity channel is configured correctly. .	Tutorial 3	Errlist
Viscosity source specified not found	When defining a VT flow meter, the viscosity channel selected does not exist. Check under ***Config - Input setup - Visc***.	Tutorial 3	
Write protected file	The file has been set to read only. Try changing the 'ATTRIB'.		Filer.c

Glossary - Reference section - Index

This section is designed to be used in three ways:

1. As a glossary of terms
2. As a comprehensive reference section
3. As an index to guide you to a tutorial

Note: All the functions / terms are listed alphabetcally, an example of a function listing is shown below:



ADC line

Glossary

All analogue signals, like temperature and pressure are carried via *ADC lines* numbered from 1-16.

See also: Tutorial 1

Note!

All from MC100

MC100

This allows the user to import into the C1000 all tests currently held in the MC100. The user is not prompted for a file name instead each test is automatically stored with a consecutive number; the first test will be saved as MC1.TST, then MC2.TST etc. Should there already be files with the names MC1.TST, MC2.TST etc. saved on the C1000 you will be prompted to delete them. If you choose 'Yes' the program will remove all old test files from the C1000 with the name MC*.TST.

See also: Tutorial 10

Note!

Amplifier gain

Config Storage

This allows the gain to be set independently for each analogue input line.

See also:

Note! We recommend you do not alter this setting

Averaging period

Config Panel layouts General

Averaging period is the period in microseconds for reading any one analogue channel.

See also: General

Note! We recommend you do not alter this setting

Bar graphs

Run

This option refers only to the *super panel*. In place of a numeric value a measurement can be displayed as a *bar graph* between a lower and upper limit. Setting the *bar graph* changes the *super panel* display immediately. This setting is duplicated in ***Super panel*** under the ***Config*** menu. On exit the modified *super panel* display will be shown.

See also: Tutorial 5
Super panel

Note!

Block no.

View

<F7>

With a test in memory you can jump directly to a specific ***block number***. This function allows you to review a block of a test in any of four screens: the *data table, normal layout, super panel,* and *histogram*.
A block is a reading of every active channel during a test

See also: Tutorial 8
Tutorial 9

Note!

Calibration

Config

This is a short routine to calibrate analogue sensors to a known reference.

See also: Tutorial 6

Note!

Channel name

Config Panel layouts Normal layout

When configuring a *normal layout*, ***Channel name*** is used to select the channel you wish to display. This is done in two stages, firstly by selecting the ***Measurement*** type (flow, temp, press, etc.) and then the ***Channel ref*** - the number of the channel, (1,2,3).

See also: Tutorial 5

Note!

Clear cell

Config Panel layouts Normal layout

By positioning the cursor over a particular cell and selecting ***Clear cell*** the highlighted cell will be returned to a blank cell. This command removes any type of border, hole, or text.

See also: Tutorial 5

Note!

Clear panel

Config Panel layouts Normal layout Region

This clears the entire *normal layout* panel of all borders, holes, and text. The function is unaffected by the position of the cursor.

See also: Tutorial 5

Note! This cannot be undone!

Clear peaks

Run

Return the current values held in the *Peak channels* to zero.

See also: Peak channels
Tutorial 4

Note!

Config

Help

This help file gives a description of the ***Config*** menu and its functions

See also:

Note!

Config

Config

The ***Config*** menu allows you to configure input channels, screen layouts, printer options, display and print colours, text styles, etc. Changes can only be made to these settings when C1000 is run in edit mode. Save any test held in memory prior to modifying the configuration. The test will then have to be re-loaded after the modification has been made.

See also: Getting started

Note! This requires the C1000 to be run in edit mode

Context help

Help

<F1>

Pressing <F1> opens a help screen giving context help. If for example you are in the process of configuring the flow inputs, pressing <F1> will tell you the function of the parameter currently highlighted.

See also: Help

Note!

Continuous log

Logger

One of five types of data log, this method allows the user to take between 1 and 10 readings per second up to a maximum of 8000 blocks (dependant on the number of channels configured). Each block will contain all currently configured channels (up to 28). Once set-up the C1000 consecutively logs the required number of blocks at the required rate. The block number being logged is displayed at the top of the screen but to maximise the logging speed no readings are displayed. Pressing <Esc> during the test terminates it prematurely as if the maximum number of blocks had been reached.

See also: Tutorial 7

Note!

Data table

View

<F6>

When a test is in memory it can be viewed as a ***Data table***, a graphic representation of the *narrow report*. The table consists of the block number, time, and up to eight channels as defined by the *super panel*. In the case of a *profile log* up to a maximum of four channels will be displayed, irrespective of the *super panel* settings. The details from the *Test Sheet* are displayed at the top of the page. The user can scroll up and down the test using the U/D arrow keys, or PgDn / PgUp. You can jump straight to a particular data block by using ***Block no***. (also on the ***View*** menu), this is particularly useful in the case of long tests.

See also: Super panel
Test sheet
Block no.
Tutorial 9

Note!

Delete column

Config Panel layouts Normal layout Region

When editing a *normal layout* this deletes a complete column of cells forcing everything to the right of the column to be shifted one cell left. The column to be deleted is identified by highlighting any cell in that column

See also: Tutorial 5
Insert column

Note!

Delete row

Config Panel layouts Normal layout Region

When editing a *normal layout* this deletes a complete row of cells forcing everything beneath that row to be shifted up by one cell. The row to be deleted is identified by highlighting any cell in that row.

See also: Tutorial 5
Insert row

Note!

Digi line

Glossary

All digital signals, like frequency, flow, speed are carried via *Digi lines* numbered from 1-12.

See also: Tutorial 1

Note!

Display detail

Config Panel layouts

Display detail controls two factors:
1) The upper and lower limits of an input when viewed as a *histogram* or a *bar graph*.
2) The display colour of an input for all screens: line *graph, normal panel, super panel, histogram*, and *bar graph*.

See also: Tutorial 5
Histogram
Super panel
Graph colours

Note! The displayed and printed graph colours are controlled independently.

Display rate

Run Display rate

The ***display rate*** dictates the speed at which the screen is updated. There are two settings slow and fast; the default update times are every 1000 milliseconds (slow) and every 333 milliseconds (fast). This setting over-rides the startup modes but it is not permanent. The ***display rate*** setting does not affect the sampling rate of input signals, nor the refresh rate of bar graphs which are always updated continuously.

The ***display rate*** need not be altered unless you are carrying out an online log. Should you wish to vary the default values, this can be done under ***General***.

See also: Tutorial 7
General
Startup modes

Note!

Draw graph

Graph

<F5>

The ***Graph settings*** menu defines four parts of the graph: the x-axis, the left and right y-axes, and the graph style. All parameters are set automatically by the program to give a meaningful result.

X-axis scale allows the user to stretch or compress the graph. ***Auto*** will fit a time-based graph to one page. ***1/1, 1/2, 1/3, 1/4*** are scale factors and reduce the length of the graph by only plotting every 2nd, 3rd, or 4th value.

Band will set non-time based graphs between the min. and max. values recorded.

X-axis feature and channel are used to set what the x-axis will represent, typically this will be time but can be set to a measured quantity (any hard, soft or virtual channel). For example set x-axis feature to Press and x-axis channel to 1 for Press1.

X-axis time unit sets the time unit: hours, mins, secs, msecs, or blocks (only if the x-axis feature is Time). X-axis centre block tells the program the number of the centre block on the page (only if the x-axis feature is *Time* and scale is not *Auto*).

Both the left and right y-axes have 4 parameters: *full, band, limit*, and *off*. *Full* sets the scale between 0 and the max. value. *Band* sets the scale from the min. to the max. value. *Limit* sets the scale between the 0 and 1000. *Off* switches the axis off.

Y-axis feature and ***channel*** are used to set which measured input type you wish to display (hard, soft and virtual inputs allowed), e.g.: set y-axis feature to Temp and y-axis channel to 2 for Temp2. Set a channel to zero to switch it off.

Graph style, ***grid lines*** switches on / off the gridlines, these can be aligned with either the left axis (Trace 1) or right axis (Trace 2).

Plot marks enables / disables a marker to be displayed at each data point. When the x-axis is set to a measurement type markers are always used.

See also: Tutorial 8
Display detail
Graph colours
Line styles

Note!

Edit test sheet

MC100

The ***test sheet*** is designed to hold all information relevant to a test that you wish to be displayed on a test report. Use the up / down arrows to move through the fields. Press <Enter> to accept the entries and replace the previous test sheet. Press <Esc> to restore all the fields to their original state.

See also: Tutorial 10

Note!

Edit test sheet

Logger

The test sheet under ***MC100*** is identical to that under ***Logger*** but it is designed to be filled out when importing a test from the MC100. Use the up / down arrows to move through the fields. Press <Enter> to accept the entries and replace the previous test sheet. Press <Esc> to restore all the fields to their original state.

See also: Tutorial 7

Note!

Eng. units

Config Panel layouts Normal layout

By selecting the type of input you want to display the program will automatically display the current engineering units. Thus if you select Flow then the standard unit of flow (lpm) will be printed in the highlighted cell. To change the standard units see ***Engineering units***, under ***Config***.

See also: Tutorial 5
Engineering units

Note!

Engineering units

Run

This is a run-time menu that allows the user to adjust the *engineering units* even when editing is not enabled. Select the unit you wish to change and press <Space> / click to scroll through the options available. Press <Enter> to accept the new units. The display will be redrawn to reflect the new units. Changing the units will not effect any test already logged.

See also:

Note! This run time setting will revert to the default when the program is restarted.

Engineering units

Config

Virtually identical to the run time menu this can only be changed when editing is enabled. Once changed the configuration is saved to disk unlike the run time setting that will revert to the default when the program is restarted.

There are two types of engineering units: *primary* and *other*. The *primary units* are built into the system and are always used for calculations. Those units are: -

Flow in lpm
Pressure in psi
Temperature in C
Speed in Hz
Viscosity in cSt

For the purposes of display, reports, either *primary* or *other* units can be used. For the *standard* measurement types *other* units are automatically configured. For *soft* and *virtual* channels *other* units can be defined.

See also: Tutorial 5

Note!

Entries

Help

This is a help window giving details of how to enter a name or title or make a selection from a list. WYSIWYG - what you see is what you get.

See also:

Note!

Error list

View

<F4>

During the process of configuring a new virtual channel, layout, etc. an input could be configured on a layout prior to it being fully defined, this will result in one or more error messages. ***Error list*** can be viewed at any time and will display a list of any current errors.

See also: Troubleshooting

Note!

File

File

This menu covers loading, saving, and opening new files: *layout files, test files*, and *PRN files*.

See also: Getting started
Tutorial 1

Note!

Flow

Config Input setup

When a new flow sensor is added or an existing sensor recalibrated you will need to alter the flow configuration. The first thing to note is that flow meters fall into two categories: LT type and VT type.
Both *linearisation* and *smoothing* can also be set under the ***Run*** menu ***Optimisation***.

Channel number: by changing the *Digi line* you can assign any flow input to any channel number. Digi line: this assigns the specific digital input channel to the channel number. Set it to 0 to switch the channel off.
Part ref. and ***K-factor PPL*** are used by the program to correctly define the *linearisation* curve for a particular type of flow block. Every flow block has a *Part ref*., e.g.: LT400, and a *K-factor PPL*, e.g.: 132.0, stamped on the front of the block.
Dec plc defines the number of decimal places displayed.
Lin +/- enables / disables the flow *linearisation*; if enabled the *Part ref* and *K factor PPL* must be defined.
Smoothing +/- enables / disables smoothing; smoothing parameters must be set whatever.
Smoothing num is the sample size used for smoothing. We recommend you do not change this.
Smoothing % is the percentage change required for the smoothing to reset itself. We recommend you do not change this.
Opt MS is the optimum pre-scaler period in milliseconds for the hardware. We recommend you do not change this.
Min Hz is the minimum frequency that can be measured on the input. A frequency below this value will be displayed as *under-range*.
Visc chan is the number of the viscosity channel used by ViscoCorrect™ to automatically compensate for changes in viscosity. Only for VT type flow blocks

See also: Tutorial 2
Tutorial 3
Getting started
Optimisation
ViscoCorrect™

Note!

Fluid type

Config

This menu provides the user with a choice of six mineral oils and kerosene. The selection of the fluid type is only necessary when using *ViscoCorrect™* linearisation. Once the fluid type has been selected it will be remain set even if the program is re-started. Should the fluid you are testing not appear on the list please contact your nearest sales outlet with details of the fluid and the operating temperature range required, custom fluids can be added.

See also: ViscoCorrect™
Tutorial 3

Note! This must be set if you wish to calculate viscosity and / or use ViscoCorrect™

General

Config Panel layouts

The General configuration panel contains a list of seven parameters.

Display slow and ***Display fast*** refer to the *Display rate*. The default settings are 1000 and 333 milliseconds respectively. The maximum display rate is 200 ms. Adjusting these rates effects the rate of data capture for online logging.

Hysteresis period is set in milliseconds and effects the numeric display. The number of characters displayed in the normal and super panel is fixed at 4 plus a decimal place. This prevents dithering - for instance between a value of 99.99 and 100.2. The *hysteresis period* defines the lag time between displaying the two readings thus making it easier for the user to read the display.

Read period is the period in milliseconds for device sampling. We recommend you do not alter this setting.
Averaging period is the period in microseconds for reading any one analogue channel. We recommend you do not alter this setting.

Panel text controls the display colour of titles, channel names, and engineering units.

Table text controls the display colour of the data table and file names.

USA date allows the date to be printed mm-dd-yy instead of dd-mm-yy as is common in the UK.

Ignore bad date effectively allows the user to load a file dated pre 1970. This is the cutoff date for Year 2000 conformity.

See also: Tutorial 7

Note!

Get test file

File

Enter the name of the *test file* to be retrieved (maximum 8 characters), the extension .TST is assumed. The test file can only be loaded using the layout file in which it was created. The *layout file* must be stored in the same directory as the test file.

See also: Tutorial 1
Tutorial 8
TST file directory

Note! The correct layout file for the test you are loading must be stored in the same directory.

Graph

Graph

The menu allows you to draw and print a line graph using data from a previously logged test.

See also: Tutorial 8

Note!

Graph colours

Config Graphics

Graph colours defines the colour of all the permanent parts of the graph (e.g.: background, grid, axes etc.) and the **PRINT** colour of the value lines on the graph. The display colour of all inputs, whether on the line graph, histogram, normal panel, or super panel is controlled by ***Display detail***.

Border - defines the colour of the graph outer border
Grid - defines the colour of the graph grid lines
Axes - defines the colour of the x and y axes
Trace 1 - defines the print colour of the left hand y-axis traces and markers.
Trace 2 - defines the print colour of the right hand y-axis traces and markers.
Titles - defines colour of titles printed above and below the graph.

See also: Display detail
Tutorial 8

Note! The displayed and printed graph colours are controlled independently

Hard inputs

Glossary

All standard pre-defined inputs are classified as *hard* inputs, these are: Flow, Pressure, Temperature, speed, and Viscosity. All other inputs are either *soft* or *virtual*.

See also: Tutorial 2

Note!

Help

Help

<F1>

This menu provides help on various topics.

See also:

Note!

Histogram

Config Panel layouts

This defines which channels are displayed on the histogram. There can be a maximum of ten channels, for each channel the user must define: -

The ***measurement type*** (e.g.: Flow / Press / Temp)
The ***channel number***
The ***lower and upper limits*** (nominally set at 0 and 1000)

See also: Tutorial 5

Note!

Histograms

Run

Once a histogram has been configured the lower and upper limits can be varied here without having to return to edit mode. Changing either or both of the limits will automatically change the histogram configuration. On exit the histogram will be displayed with the updated limits.

See also: Tutorial 5
Histogram

Note!

Hole in panel

Config Panel layouts Normal layout Region

This creates a hole in the normal panel in the same way as a displayed measurement is automatically placed in a hole. Highlight the hole and select ***Remove hole*** to return the panel to normal.

See also: Tutorial 5
Remove hole

Note!

Hysterisis period

Config Panel layouts General

The ***hysteresis period*** defines the lag time between displaying the two readings thus making it easier for the user to read the display.

See also: General

Note!

Ignore bad date

Config Panel layouts General

Ignore bad date effectively allows the user to load a file dated pre 1970. This is the cutoff date for Year 2000 conformity.

See also: General

Note!

Insert column

Config Panel layouts Normal layout Region

Insert column will add an additional column of blank cells to the normal layout. All cells to the right of and including the selected column are moved to the right, the far right hand column is lost.

See also: Tutorial 5
Delete column

Note!

Insert row

Config Panel layouts Normal layout Region

Insert row will add an additional row of blank cells to the normal layout. All below and including the selected row are moved down, and the bottom row of cells is lost

See also: Tutorial 5
Delete row

Note!

Last graph

View

<F5>

This will display the last graph drawn using the test data currently in memory.

See also: Tutorial 8
Draw graph

Note!

LAY file directory

File

This is a list of all the files with extension .LAY in the directory from which C1000 is currently running. To select a layout file click on the name using the mouse and the file will automatically be loaded as per ***Open layout file***. If there are more files than can fit on one screen *(more)* will be displayed in the bottom right hand corner, to scroll through the files use the mouse, arrow keys or <PgDn> / <PgUp>. To return to the main screen press <Esc>.

See also: Tutorial 1
Open layout file

Note!

Layout files

Glossary

The C1000 software is extremely flexible allowing the user to easily add and remove inputs, create new channels, and customise display screens. All these adjustments are saved in a *layout file*. Because so many parameters can be adjusted, every test that is logged is specific to the layout file in which it was run.
Thus if you create a layout called DEMO.LAY and log a test T1.TST, that test must in the future always be reviewed from DEMO.LAY.

See also: Tutorial 1

Note!

Limits

Run

This allows the user to simultaneously alter the lower and upper limits of both the histogram and the bar graphs in the super panel.

See also: Tutorial 5

Note!

Line styles etc

Config Graphics

Line styles is used to control the frequency, thickness, and style of lines and markers on the graph. See ***Display detail*** and ***Graph colours*** for information on changing the colour of the text and lines.

Grid lines horizontal - press <Space> / click to scroll through the different types of line available.
Grid lines vertical - press <Space> / click to scroll through the different types of line available.
Panel background fill - switch *on* / *off* a solid panel border around the graph (screen only), if *on* it overwrites the graph borderline.
Online log plots - set the maximum number of blocks an ***Online log***.
Plots across page - set the number of plots that fit on one page for an ***Online log***.
Chan A line width - Channel A and B are distinguished by line width, this can be set to wide or narrow and controls the line width for channel A on both y axes.
Chan B line width - This can be set wide or narrow and controls the line width for channel B on both y axes. (If only channel B is configured then the program will allocate it a channel A line thickness).
Chan B line width - This can be set wide or narrow and controls the line width for channel B on both y axes. If only channel B is configured then the program will allocate it a channel A line thickness.
Plot markers are optional with line graphs to indicate the data points. If the x-axis is configured to show a measured input (i.e.: not time) a scatter graph will automatically be drawn (consisting of only markers and no lines).

To differentiate between different data points a different style of marker can be associated with each trace. Trace 1 refers to the left y-axis. Trace 2 refers to the right y-axis.

Plot mark size % - Allows the user to define the size of all the markers as a percentage of the standard size.

See also: Tutorial 8
Graph colours
Display detail

Note!

Linearisation

Glossary

Linearisaton has two functions: to provide accurate flow readings by compensating for the non-linearity of the flow meter, and secondly to compensate for the flow meter's sensitivity to changes in fluid viscosity. Both LT and VT type flow meters use *linearisation*, however only VT type flow meters are capable of compensating for changes in fluid viscosity using *ViscoCorrect*^{TM}.

When a Flow input is configured the user must enter the ***Part ref***., ***K factor***, and for *ViscoCorrect*^{TM} the associated ***Viscosity channel***. This information precisely defines the frequency-flow characteristics of the flow block. It is necessary to have this information since the relationship between frequency and flow for turbine type flow meters is non-linear.

See also: Tutorial 2
ViscoCorrect^{TM}
Tutorial 3
Optimisation

Note!

List inputs

Config Input setup

This is a very useful facility that allows the user to see at a glance what channels are configured and where. The list contains three columns, *digital, analogue,* and *virtual*.

The *digital channels* are numbered from 1 to 12, according to their *Digi line* settings. Every digital input is mapped to a digital input line or Digi line. In a similar fashion the *analogue inputs* are numbered from 1 to 16, where the number refers to the analogue input line or *ADC line*. *Virtual channels* are shown in the third column.

See also: Tutorial 1
Print configuration
Digi line
ADC line
Errors

Note!

Log on keypress

Logger

This is one of five types of *data logging* available. Once the test name has been entered the C1000 will proceed to log a block of data every time <Space> or a foot pedal is pressed. The screen displays the current readings and *block number* being recorded. You can continue to log results until the memory is full or you press <Esc>. Press <Tab> to toggle between the different screens and <F1> if you require help. If you wish to review the blocks already logged press <Enter> to temporarily suspend the test. When you wish to return to data logging press <Esc> to resume the test.

See also: Tutorial 7

Note!

Logger

Logger

This menu covers the different ways of data logging, and editing the test sheet. For information on using the MC100 with the C1000 for data logging, see ***Online from MC100***.

See also: Tutorial 10
Tutorial 7
Online from MC100

Note!

Lotus 1-2-3 ®

Glossary

A commercial spreadsheeting package designed by Lotus. Tests results can be exported to Lotus' 1-2-3 using ***Save as Lotus 123***.

See also: Tutorial 11
Save as Lotus 123

Note!

LT type

Glossary

Webster flowmeters are either *LT type* or *VT type*. The LT range includes both positive displacement and turbine flow meters covering flows from 0.1 lpm to 800lpm. The LT range of turbine flowmeters use ***Linearisation*** to attain accuracy of +/- 1% of the indicated reading over a large range of flows.

See also: Tutorial 2
Linearisation
VT type

Note!

MC100

MC100

The MC100 menu covers all the functions to do with sending and receiving information between the C1000 and the MC100.

See also: Tutorial 10

Note!

Measurement

Config Panel layouts Normal layout

Enter the name and number of the channel you wish to display on the normal panel. For example to display the Flow1 scroll through the ***Measurement types*** until you reach Flow and next to ***Channel ref***. type 1.

See also: Tutorial 5

Note!

Memory

Quit

This tells the user the breakdown of memory available: *Bytes available, Bytes minimum,* and *Expanded memory.*

See also:

Note!

Menus

Help

This is a help screen giving you information on how to move around the different menus on the C1000.

See also:

Note!

Meter Comms

Config

When using the C1000 to communicate with the MC100, ***Meter Comms*** must to be configured correctly. In the majority of cases the default setting will be correct and should read as follows: -

Serial port - COM1
Baud rate - 9600
Data bits - 8
Stop bits - 1
Parity - None
Timeout secs - 10
Finish bell - On

Timeout secs controls how long the C1000 will wait to receive a signal from the MC100 before timing out. The ***Finish bell*** rings when a test transmission has been completed, this can be switched off.

See also: Tutorial 10

Note!

Microsoft Excel ®

Glossary

A commercial spreadsheeting package designed by Microsoft. Tests results can be exported to Microsoft Excel using ***Save as Lotus 123***.

See also: Tutorial 11
Save as Lotus 123

Note!

Mouse

Help

This is a help screen providing information on how to use a mouse to control the menus in the C1000.

See also: Getting started

Note!

Narrow report

Print

A *narrow report* is a printed set of results similar in layout to the *data table*. The headings are drawn from the *super panel* display, thus a maximum of eight channels will appear on the report. If the report is based on the results from a *profile log*, only the profiled channels will appear on the narrow report, regardless of the super panel settings. Each block of data requires one printer line. The user can alter the following settings:

Header & footer - Set to 'On' to print full headings and the signatures footer
Starting block - The number of the first block of data you wish to print
Ending block - The number of the last block of data you wish to print
Printer width - The width of the printer in characters
Printable depth - The number of lines of text to include on one page
Top margin lines - The number of lines to leave blank before starting the report (for use with letter-headed stationary)
... on all pages - To enable / disable Top margin lines on subsequent pages of report

See also: Tutorial 9

Note!

New layout file

File

Enter the name (maximum of 8 characters) of the new *layout file* you wish to create. The new layout file will be identical to the file currently on the screen but will be saved with the new name. The extension .LAY will automatically be assigned to the name.

See also: Tutorial 1

Note!

Normal panel

Glossary

The *normal panel* shows all the current inputs displayed on one screen. The screen design can be quickly and easily customised using on-screen menus - see Tutorial 5.

See also: Tutorial 5

Note!

Notice

Quit

This is a text message displaying the manufacturer's name and the release version of the C1000 software.

See also:

Note!

Online from MC100

MC100

This is run-time menu allowing the user to set the configuration for an ***Online log*** with the MC100. Note the two parameters are duplicated in the ***Config*** menu under ***Line Styles***.

Max blocks to log - This value controls the length of the test by defining the total number of blocks to log.
Plots across graph - Often an *online log* will be run using the graph screen, set this value to the same as the maximum blocks to log to ensure the whole test will fit on to one page.

See also: Tutorial 10

Note!

Online log

Logger

The ***Online log*** is the default method of logging on the C1000. Once the logging parameters have been set, any time inputs are connected and readings are displayed to the screen the C1000 will start logging.

To configure an online log:
Set the ***Max blocks to log*** and the ***Plots across graph*** (number of plots that will fit on the graph) under the heading ***Online from MC100***.
Set the ***Display rate*** to either ***fast*** or ***slow***. The default settings are 333 and 1000 milliseconds respectively, see ***General*** to change the default value.
Select the channels you want displayed on the graph by configuring the graph settings menu under ***Draw graph***

Once these parameters are set the C1000 will automatically start logging. The graph will continually be reprinted to show the most recent data, the number of plots per page of the graph is set under ***Online from MC100.***
The user can scroll between the different display windows by presing <Tab>. Pressing any other button will cancel the test and start another. If the test exceeds the required number of blocks the test will be truncated to the set amount.

To save the test go select ***Online log***, enter the *test name* (or accept the name suggested) and the test will be saved. The test will stay resident in memory should you wish to print or view the results.

See also: Tutorial 7
Display rate
Unload test

Note! You must ***Unload test*** prior to starting another ***Online log***.

Open layout file

File

Enter the name of the *layout file* you wish to open (maximum of 8 characters), the extension .LAY is assumed. An alternative method of opening a layout file is to use ***LAY file directory***.

See also: Tutorial 1
LAY file directory

Note!

Optimisation

Run

There are two types of optimisation:
Linearisation - performed only on flow channels
Smoothing - performed on all channels except virtual

The type of *linearisation* is dependant on the type of flow meter, the *LT range* of flowmeters uses standard linearisation whilst the *VT range* of flowmeters use the more advanced ViscoCorrect™ method that automatically corrects for changes in viscosity.

Smoothing is responsible for constantly averaging the incoming signals to remove the dithering characteristic of many types of instrumentation. There are three settings for both *linearisation* and *smoothing*. These settings can also be set under ***Config*** - ***Storage*** - ***Startup modes***.

All off - switches optimisation off for all channels overriding the individual settings.
All on - switches optimisation on for all channels overriding the individual settings.
As set - optimisation is left as set under the individual settings menus.

See also: Linearisation
ViscoCorrect™
Smoothing
Startup modes
Tutorial 2 & 3

Note!

Overview

Help

This is a help screen giving a brief overview of the functions the C1000.

See also:

Note!

Panel / table text

Config Panel layouts General

Panel text controls the display colour of titles, channel names, and engineering units. ***Table text*** controls the display colour of the data table and file names.

See also: General

Note!

Panel report

Print

Panel reports are based on the *normal screen panel*, the printed report shows not just the readings but the whole panel. The report consists of a formal header, two panels per page with a footer for signatures at the bottom. Each panel displays one block of data. To edit the headings see ***Edit test sheet*** under ***Logger***.

See also: Tutorial 9

Note!

Peak channels

Run Clear peaks

The ***peak channels***, as their name suggests, continuously monitor two of the pressure channels and hold the highest recorded value. ***Clear peaks*** resets the *peak channels* to zero and a new peak value is then stored.

See also: Tutorial 4

Note!

Periodic log

Logger

There are three parameters to set before starting a ***periodic log***.

Test name - enter the test name (up to 8 characters, numbers or letters
Blocks to log - the total number of blocks to log, up to a maximum of 8000, though could be less depending on number of active channels and memory available.
Seconds per block - the time in seconds between consecutive readings between 1 and 600.

Press <Enter> to accept the settings and the C1000 will start logging at the set time interval until the specified number of blocks has been recorded. Readings are continuously displayed to the screen along with the number of the block currently being recorded. Press <Tab> to toggle between the different screens. To finish the test before the maximum number of blocks has been recorded press <Esc>. Help <F1> is not available during the test.

See also: Tutorial 7

Note!

Press

Config Input setup

This table defines the pressure inputs. There are eleven parameters the majority of which you will rarely need to change.

Channel no.- The channel number assigned to that input line for use within the program.
ADC line - The ADC line that is carrying the signal
Calib psi - The maximum rating of the pressure transducer in psi.
MV at 0 - The mV output of the transducer when unloaded.
MV at calib - The mV output of the transducer at the maximum pressure.
Dead % - The dead zone represented as a percentage of full scale.
Dec plc - The number of decimal places to display.
Smoothing (+/-) - Switch the smoothing on / off.
Smoothing num. - The sample size used for smoothing.
Smoothing % - The percentage by which an input must vary for the smoothing algorithm to reset itself - we recommend these parameters are not altered.
H/w avs. - The number of hardware averages used by the circuitry - we recommend this parameter is not altered.

See also: Tutorial 2
Smoothing

Note! Many of these parameters will not need altering

Print

Print

The ***Print*** menu covers four ways of printing reports of test data. See ***Print test*** for information on printing graphs.

See also: Tutorial 8
Tutorial 9
Print test

Note!

Print configuration

Config Storage

Once the C1000 has been configured the user can print a hard copy of the system configuration, this will include all the settings to do with inputs, communications, layouts, and displays. It is recommended that you use ***Print Configuration*** to record the settings for future reference once the system is configured.

See also:

Note!

Print test

Graph

Use ***Print test*** to send a copy of the graph to the printer. You will be presented with a menu of ***Graph settings*** identical to when the graph is drawn on the screen. See ***Draw graph*** for further information on defining the graph settings. To change the printer see ***Type of printe***r. To adjust the print colours see ***Graph colours***.

See also: Tutorial 8
Draw graph
Type of printer
Graph colours

Note!

Printer config

Config Graphics

Printer config incorporates two parts, the printer set-up and the page margins.

Printer configuration includes five parameters:
Printer port - Set the printer port used: LPT1, LPT2, COM1, COM2, or File.
Orientation - Either Portrait (long side vert.), Landscape (long side horiz.)
Form feed - Switch either On or Off
Printer font - Choose from Default, Triplex, Small, Sans Serif
Size (0=Auto) - Choose between 0 and 10, where font is set automatically if 0.

Page margins are relative to the page displayed in portrait irrespective of the actual orientation:
Portrait left - Can be set between 1 and 10 % of length of short side
Portrait top - Can be set between 1 and 10 % of length of long side
Portrait right - Can be set between 1 and 10 % of length of short side
Portrait bottom - Can be set between 1 and 10 % of length of long side

See also: Tutorial 8
Tutorial 9

Note!

Printer mode

Config Graphics Type of printer Printer model

Where applicable the user can select the desired print resolution, paper size, or font according to the printer model selected. To select the desired option either click with the mouse or enter the appropriate letter (e.g.: A 180 dpi).

See also: Tutorial 9
Type of printer

Note!

Printer model

Config Graphics Type of printer

The user can select from a list of printer models:

A - Epson 9-pin
B - Epson 24-pin
C - HP LaserJet
D - HP DeskJet 500C
E - HP PaintJet
F - HP ThinkJet
G - HPGL 7475A
H - HPGL 7550A
I - HPGL 7440A
J - HPGL 7470A
K - HPGL LaserJet
L - Postscript.

For each printer model the user can then select from a variety of ***Printer modes***.

See also: Tutorial 8
Tutorial 9

Note!

PRN file directory

File

PRN file directory shows all files in the current directory with the file extension .PRN. Once a file has been saved using ***Save as 123*** the resulting file will have the extension .PRN. Also if a test is printed to a file rather than directly to a printer, the print file will also have the extension .PRN.

See also: Tutorial 11

Note!

Quick profile

Logger

A ***Quick profile*** log records between 1 and 4 channels over a pre-selected time period. A test commences when a pre-set trigger event occurs. The log continues until the pre-set number of blocks has been recorded. Data is logged even before a test has been triggered; the amount of data stored prior to the trigger event is controlled by the ***% pre-trigger***.

A Quick profile log is performed in three stages:
1. Pre-trigger - Data is continuously stored in a circular buffer
   (Pressing <Esc> at this stage will exit the test).
2. Post-trigger - Data capture continues until the required number of readings has been taken
   (Pressing <Esc> at this stage will truncate the test).
3. Processing - In order to obtain the high speed of data capture the readings are processed after the test. (Pressing <Esc> at this stage will exit the test).

The Quick profile parameters are as follows:
Test number - The name under which the test will be saved to disk
Blocks to log - The number of blocks per test (between 10 and 2000)
Test length - The total length of the test (1 to 300 seconds) if more than two channels are profiled, minimum test time is 2 seconds.
Trigger level - The criteria the event must meet for the test to be triggered. (Note: engineering units are as set for that measurement type).
Trigger type - Either Above, Below, or Key (Key triggers the event when <Enter> is pressed).
Pre-trigger - This is the length of time, expressed as a percentage of the total test time, over which readings will be recorded prior to the trigger event.
Trigger feature - The measurement type that will trigger the test, e.g.: Pressure
Trigger channel - The channel number that will trigger the test - e.g.: 2 for Press2
Suppl. Features - Additional measurement types that you wish to log, up to a maximum of 4. Suppl.
Channels - Additional channels for the specified measurements.

See also: Tutorial 7

Note!

Quit

Quit

This menu allows you to exit the program, provides a notice about the program version, and information on the current memory status.

See also: Yes quit
Notice
Version

Note!

Raised border

Config Panel layouts Normal layout Region

This adds a border to the normal layout screen. A border is a line enclosing a rectangle of cells. To define a border highlight the cell where you wish the top left hand corner of the border to be, select ***Raised border*** then move the cursor to where you want the bottom right hand corner of the border to be. The border will then appear automatically.

See also: Tutorial 5

Note!

Read period

Config Panel layouts General

Read period is the period in milliseconds for device sampling.

See also: General

Note! We recommend you do not alter this setting.

Receive from MC100

MC100

This allows the user to send a test from the MC100 and receive it into the C1000. You are prompted for a file name to store the test on the C1000. You are then prompted to fill in / alter the *test sheet*. On pressing <Enter> the C1000 will display a message 'Waiting for ***.TST'. The test must now be exported by pressing <ENT> on the MC100. When the test has been received it will exist in three places, on the MC100, in the memory of the C1000 and saved to disk on the C1000.

See also: Tutorial 10
Meter comms

Note!

Remove all

Config Panel layouts Normal layout Region

This will remove all raised borders, sunken borders, and holes in panels (other than where measurements are displayed) regardless of the cell selected.

See also: Tutorial 5

Note! This is not reversible.

Remove hole

Config Panel layouts Normal layout Region

Removes a hole that includes the cell currently highlighted.

See also: Tutorial 5

Note!

Remove raised

Config Panel layouts Normal layout Region

Removes a raised border that includes the cell currently highlighted.

See also: Tutorial 5

Note!

Remove sunken

Config Panel layouts Normal layout Region

Removes a sunken border that includes the cell currently highlighted.

See also: Tutorial 5

Note!

Reset config

Config Storage

This resets the master configuration file PC100.INI to a set of standard defaults. The initialisation file contains graph colours and styles, the printer selection, and the current test and file layout names.

See also: Restore config

Note!

Reset layout

Config Storage

This resets the current layout to a set of standard defaults. The layout file contains panel data, soft / virtual channel specifications, engineering units, inputs and calibration settings.

See also: Restore layout

Note!

Restore config

Config Storage

This will restore previous configuration settings as stored in PC100.INI.

See also: Reset config

Note!

Restore layout

Config Storage

This will restore previous layout settings.

See also: Reset layout

Note!

Review test

View

<F8>

Once a test has been logged and saved to disk ***Review test*** can be used to, literally, review the test. The test can be viewed in any one of the 5 screens and you can scroll through each recorded block by using the Up / Down arrow keys. To scroll to the start of the test press <Home>, and to the end of the test press <End>. To switch between screens press <Tab>.

See also: Tutorial 8
Tutorial 9

Note!

Run

Run

This menu covers all the run time options on the C1000. In many cases the options are initially set in the ***Config*** menu and duplicated here in the ***Run*** menu. The run-time settings are not permanent, i.e: on exiting the settings will return to there previous state. This method allows permanent settings to be carefully controlled since the ***Config*** menu can only be altered when the C1000 is in edit mode.

See also: Config
Getting started

Note!

Save as Lotus 123

File

When a test is in memory it can be saved in *Lotus 123* format thus allowing the test data to be loaded into both Lotus 1-2-3 ® and Microsoft Excel ® spreadsheet packages.You will be prompted for a name, the default is identical to the existing name but with a .PRN extension, e.g. DEMO.TST is resaved as DEMO.PRN. Press <Enter> and the file will be saved to disk. Note .PRN files cannot be reloaded by the C1000.

See also: Tutorial 11

Note!

Send test names

MC100

Set the MC100 to ***Import all names*** and press <ENT>, the MC100 should display 'Receiving'. Select ***Send test names*** on the C1000 and enter the file name of the text file you wish to send. Press <Enter> and the message 'transmitting' will appear on the C1000 screen. When the transmission is complete the MC100 will return to the ***Names and titles*** menu.

See also: Tutorial 10

Note!

Sensors

Glossary

All measurement equipment: flow meters, pressure transducers, thermistors, and speed pick-ups are referred to as *sensors*.

See also:

Note!

Smoothing

Glossary

Smoothing is used to stop displayed readings continuously dithering, thus preventing the user from reading the actual value. Smoothing is controlled by three parameters: ***Smoothing +/-, Smoothing num***, and ***Smoothing %.***
Smoothing +/-: Enables / disables smoothing; smoothing parameters must be set whatever.
Smoothing num: The sample size used for smoothing. We recommend you do not change this.
Smoothing %: The percentage change required for the smoothing to reset itself. We recommend you do not change this.

See also: Flow
Optimisation

Note!

Snapshot

Print

<F9>

You can print a ***Snapshot*** report when a test has been logged and is in memory or results are being displayed to the screen in real time. ***Snapshot*** can be only used when you are in the *normal* or *super panel* screens. If the ***Snapshot*** is taken from the *super panel* screen the report will be printed in a *narrow* style (maximum of 8 channels), if the ***Snapshot*** is taken from the *normal screen* the report will be printed in a *wide* style (maximum of 28 channels). The report will consist of one block of data.

See also: Tutorial 9

Note! Snapshot requires that the printer is already configured and on-line.

Soft inputs

Glossary

In contrast to *hard* inputs, ***soft inputs*** are non-standard inputs. ***Soft inputs*** can be used to define a completely new input type with new units.

See also: Tutorial 4
Soft types
Virtual types
Peak

Note!

Soft types

Config Soft types

To configure a ***Soft Type*** you have to fill out the soft types set-up table.
Set-up ref. - The number of the soft type within the list, for internal reference.
Soft name - Enter a channel name of your own choice (5 chars max.).
Input type - Soft types fall into one of three categories: analogue, digital, and virtual.
Primary units - Name of the primary units, e.g.: psi, kW, etc.
Units factor - The conversion factor from primary units to other units.
Other units - Name of the other units, (other units = primary units * units factor)

See also: Tutorial 5

Note!

Speed

Config Input setup

The parameters for ***Speed*** are identical to those for ***Flow*** with the following exceptions:
Part Ref - Not applicable
Linearisation - Not applicable
Pulse per rev - This allows the user to measure speed from a toothed wheel, dividing the frequency by the number of teeth gives the rotation in revolutions per second.

See also: Tutorial 2
Flow

Note!

Startup modes

Config Storage

The ***Startup modes*** control the configuration of the C1000 when first switched on. All of the parameters set here can be over-ridden by the run time options.
Panel type - Which of the panels is displayed: normal panel, super panel, line graph, or histogram.
the ***Normal*** or ***Super panel*** screen is ***speed*** - Whether the display refresh rate is ***Slow*** or ***Fast***
Smoothing - Whether the input smoothing is ***All off, All on, or As set***
Linearisation - Whether flow linearisation is ***All off, All on, or As set***

See also: Optimisation
Display rate

Note!

Sunken border

Config Panel layouts Normal layout Region

This adds a border to the *normal layout* screen. A border is a line enclosing a rectangle of cells. To define a border highlight the cell where you wish the top left hand corner of the border to be, select ***Sunken border*** then move the cursor to where you want the bottom right hand corner of the border to be. The border will then appear automatically.

See also: Tutorial 5

Note!

Super panel

Config Panel layouts

Unlike the ***normal panel***, the physical layout of the ***super panel*** is predefined. For a measurement to be displayed on the ***super panel*** it must first exist on the ***normal panel***. The following parameters can be set on the super panel layout menu.

Panel position - left hand side top to bottom and right hand side top to bottom
Panel title - enter your own text to define the reading displayed (8 chars max)
Measure type - select the type of measurement e.g.: Flow, Press, Speed, Temp
Channel number - The number of the channel, e.g. 1 for Flow1
Bar graph - Enables / disables the bar graph in place of the numeric display
Min limit - Sets the lower limit of the bar graph
Max limit - Sets the upper limit of the bar graph

See also: Tutorial 5

Note!

Tables

Help

A help screen providing information on how to view data in a table.

See also: Help

Note!

Temp

Config Input setup

The ***Config Temp*** menu is identical to that for pressure except that the channels cannot be calibrated.

See also: Tutorial 2
Press

Note!

Test sheet

Glossary

The ***Test sheet*** is a useful way to record information about a test for future reference. This information is automatically printed on a report in *narrow format*, thus providing traceability for your own quality control system. The first line ***Title*** is automatically attached to the top of a line graph created from the data.

See also: Tutorial 7
Tutorial 10

Note!

Title

Config Panel layouts Normal layout

This allows the user to enter text on the *normal layout* screen at the position of the highlighted cell. The text can be entered with leading or trailing spaces, up to a maximum of 8 characters. Longer text can be split across multiple cells.

See also: Tutorial 5

Note!

TST file directory

File

This is a list of all the files with extension .TST in the directory from which C1000 is currently running. To select a test file click on the name using the mouse and the file will automatically be loaded as per ***Get test file***. If there are more files than can fit on one screen *(more)* will be displayed in the bottom right hand corner, to scroll through the files use the mouse, arrow keys or <PgDn> / <PgUp>. To return to the main screen press <Esc>.

See also: Tutorial 1
Get test file

Note!

Unload test

Run

In order to start a new ***Online log*** you must first ***Unload test*** to clear the memory of the current test.

See also: Tutorial 7
Online log

Note!

USA date

USA date allows the date to be printed mm-dd-yy instead of dd-mm-yy as is common in the UK.

See also: General

Note!

User's soft types

Config Input setup

All *soft* and *virtual* types created, like all pre-defined inputs, must be correctly configured. How the User's soft type is configured depends on whether it is an *analogue, digital,* or *virtual* input.

Analogue** soft type* - this is configured in the same way as ***Press.
Digital** soft type* - this is configured in the same way as ***Speed.
***Virtual** soft type* - this is configured by entering the channel numbers for source 1 and 2.

See also: Tutorial 4

Note!

View

View

This menu allows you to review different information: the ***Error list***, the ***Last graph***, the ***Data table***, ***Block no., Review test***, and ***View configuration***.

See also: Tutorial 8
Tutorial 9

Note!

View Config

View

This allows the user to view all of the configuration tables, but not to make any alterations. ***View config*** is equivalent to ***Print config*** except the configuration settings are displayed to the screen. The following settings can be viewed:
Amplifier gain
Configure flow
Configure press
Configure speed
Configure temp
Configure user's soft channels
Configure viscosity
Digiline / ADC line / Virtual channel allocation
Engineering units
Graph settings
Histogram layout
Line styles
Meter comms
Panels generally
Printer config
Soft channel setup
Startup modes
Super panel layout
Virtual channel setup

See also: Print config

Note!

Virtual inputs

Glossary

Virtual inputs allow you to carry out a mathematical operation on two other channels and display the result to the screen. A *virtual input* must first be defined as a ***soft type***.

See also: Tutorial 4
Virtual types
Soft types

Note!

Virtual types

Config Soft types

Virtual types allow the user to carry out a mathematical operation on two other channels to create a third, *virtual*, channel. A ***Virtual type*** must first be defined under ***Soft types*** as input type ***Virtual.***

On the ***Virtual channel setup*** table the following parameters must be set:
Virtual type - This name is automatically copied from the Soft types setup table
Source 1 - The first measurement type – use space / click to scroll through the different types
Arith op. - The arithmetical operation – add, subtract, multiply, divide
Source 2 - The second measurement type - use space / click to scroll through the different types
Final factor - The final factor required to put the result of the calculation in the primary units (as defined in ***Soft types***)

Virtual channel (primary units) = Source 1, Arith op, Source 2 * Final factor

See also: Tutorial 4

Note!

Visc

Config Input setup

Visc allows the user to measure a fluid's kinematic viscosity by knowing the fluid characteristics (see ***Fluid type***) and the fluid temperature. The necessary calculation is carried out automatically by the C1000.
In order for the viscosity to be displayed, a channel, like Visc1, must be enabled and the appropriate temperature channel linked to it. The number of decimal places can also be set under ***Dec plc***.
The ***fluid type*** is displayed at the top of the ***Visc*** menu. To alter the fluid go to ***Fluid type*** under the ***Config*** menu. If your chosen fluid is not available, please contact your nearest sales outlet - additional fluids can be added.

See also: Tutorial 3
Fluid type

Note!

ViscoCorrect™

Glossary

This is the more advanced type of linearisation that compensates both for the non-linearity of the turbine flow meter as well as for changes in the temperature and viscosity of the fluid being measured. The method requires that a *VT type* flow meter is used and four parameters are set in ***Config***: ***Fluid type***, ***Flow (Temp chan, Part ref, K-fact PPL).***

Fluid type tells the program the temperature / viscosity characteristics of the fluid used. ***Flow - Temp chan*** tells the program which temperture input to use in calculating the fluid viscosity. The fluid viscosity and flow meter frequency are then used to linearise the flow. The linearisation curve charateristics are defined by ***Flow - Part ref*** and ***K-fact PPL***.

See also: Tutorial 3

Note! Can only be used with VT type turbine flow meters

VT type

Glossary

Webster Instruments flowmeters are either *LT type* or *VT type*. The VT range of turbine flow meters covering flows from 2 lpm to 800 lpm. The VT range of turbine flowmeters use ***ViscoCorrect™*** to attain a constant accuracy over a large range of flows and for a range of different fluid viscosities.

See also: Tutorial 3
ViscoCorrect™

Note!

Wide report

Print

This is a printed report that can display up to 28 channels in every block (in contrast to only 8 on the ***Narrow report***). The print parameters are identical to a ***Narrow report***.

See also: Tutorial 9

Note!

Yes quit

Quit

<Alt> X

The C1000 program is closed and you are returned to the *MS-Dos* environment.

See also: Getting started

Note!

Equations

Virtual channels are a powerful tool on the C1000 allowing you to carry out simple equations in real-time and display the results to the screen. Here is a short list of some useful equations and conversion factors.

Remember virtual equations are carried out using primary units. If the equation requires units to be in anything other than primary units, an appropriate conversion constant must be included. The C1000 primary units are as follows:

Flow	litres per minute (lpm)
Speed	pulses per second (Hz)
Pressure	pounds per square inch (psi)
Temperature	degrees Celsius / Centigrade (°C)
Viscosity	centiStokes (cSt)

Hydraulic Torque

Theoretical

$$\text{Torque (Nm)} = \frac{\text{Pump displacement (m}^3\text{)} \times \text{Pressure drop (psi)} \times 6894.8}{2p}$$

$$\text{Torque (Nm)} = \text{Pump displacement (cm}^3\text{)} \times \text{Pressure drop (psi)} \times 0.0011$$

Actual

$$\text{Torque (Nm)} = \text{Mechanical efficiency (\%)} \times \text{Theoretical torque (Nm)}$$

Hydraulic Power

Theoretical

$$\text{Power (kW)} = \frac{\text{Flow (lpm)} \times \text{Pressure (psi)}}{600 \times 14.504}$$

$$\text{Power (kW)} = \text{Flow (lpm)} \times \text{Pressure (psi)} \times 0.0001149$$

Actual

$$\text{Power (W)} = 2p \times \frac{\text{Frequency (Hz)}}{\text{no. of teeth (n)}} \times \text{Torque (Nm)}$$

$$\text{Power(kW)} = \text{Frequency (Hz)} \times \text{Torque (Nm)} \times \frac{0.00628}{\text{n}}$$

Differential Pressure

$$P_d \text{ (psi)} = \text{Pressure 1 (psi)} - \text{Pressure 2 (psi)}$$

Conversion Factors

Multiply this		By this	To get this	
Unit	**Symbol**	**Conversion Factor**	**Unit**	**Symbol**
Bar	bar	14.50377	pounds per square inch	psi
Gallons per minute (UK)	GPM (UK)	4.546	litres per minute	lpm
Gallons per minute (US)	GPM (US)	3.785	litres per minute	lpm
Millimetre^2 per second	mm^2/s	1.0	centiStoke	cSt
Horsepower (550 ft-lb/s)	HP (imperial)	0.7457	kilowatt	kW
Horsepower (electric)	HP (electric)	0.746	kilowatt	kW
Horsepower (metric)	HP (metric)	0.7355	kilowatt	kW
Pound foot	lb.ft	0.73756	Newton metre	Nm
Foot	ft	0.3048	metre	m
Square foot	ft^2	0.0929	square metre	m^2
Cubic foot	ft^3	28.317	litres	l

Temperature

$$\text{Temperature °C} = \frac{(\text{Temperature °F} - 32)}{1.8}$$

Menu Tree

This is a tree of the menu structure, all top-level menus are on the far left, and each sub-menu is then indented to the right.

File
- **Get test file**
- **Open layout file**
- **New layout**
- **Save as Lotus 123**
- **LAY file directory**
- **TST file directory**
- **PRN file directory**

MC100
- **Receive from MC100**
- **All from MC100**
- **Online from MC100**
- **Send test names**
- **Edit test sheet**

Logger
- **Continuous log**
- **Periodic log**
- **Log on keypress**
- **Quick profile**
- **Online log**
- **Edit test sheet**

Run
- **Optimisation**
- **Bar graphs**
- **Histograms**
- **Limits**
  - **Flow**
  - **Press**
  - **Temp**
  - **Speed**
  - **Visc**
  - **Custom inputs**
- **Clear peaks**
- **Display rate**
- **Engineering units**
- **Unload test**

Print
- **Snapshot**
- **Narrow report**
- **Wide report**
- **Panel report**

Graph
- **Draw graph**
- **Print test**

- **View**
  - **Error list**
  - **Last graph**
  - **Data table**
  - **Block no.**
  - **Review test**
  - **View configuration**
- **Config**
  - **Panel layouts**
    - **Normal layout**
    - **Super panel**
    - **Histogram**
    - **Display detail**
      - **Flow**
      - **Press**
      - **Temp**
      - **Speed**
      - **Visc**
      - **Custom inputs**
    - **General**
  - **Input setup**
    - **Flow**
    - **Press**
    - **Temp**
    - **Speed**
    - **Visc**
    - **Custom Inputs**
  - **Soft types**
    - **Soft types**
    - **Virtual types**
  - **Calibration**
  - **Engineering units**
  - **Fluid type**
  - **Graphics**
    - **Type of printer**
      - **Printer resolution**
        - **Printer configuration**
    - **Printer configuration**
    - **Graph colours**
    - **Line styles etc.**
  - **Meter comms**
  - **Storage**
    - **Print configuration**
    - **Restore config**
    - **Restore layout**
    - **Reset config**
    - **Reset layout**
    - **Startup modes**
    - **Amplifier gain**

Help

- **Context help**
- **Overview**
- **Menus**
- **Entries**
- **Tables**
- **Mouse**
- **Config**

Quit

- **Yes quit**
- **Notice**
- **Memory**

Instructions for re-installing the C1000 software

Re-installing the C1000 software

1. Switch on the computer and ensure you have C:\> prompt
2. Insert the disk labelled 'Demonstration' into the disk drive
3. Switch to the floppy disk drive (usually A) by typing **A: <ENTER>**
4. Now type **install <ENTER>**
5. At the prompt **Copy from drive [A:]** type the letter of the floppy disk drive or accept A by pressing <ENTER>
6. At the prompt **Copy to drive [C:]** type the letter of the hard drive or accept C by pressing <ENTER>
7. Press <ENTER> again to start the installation. The C1000 software will be copied into a directory called C1000 on the C: drive.

Re-installing the C1000 layout files

1. Insert the disk labelled 'Layout files' into the disk drive
2. Switch to the floppy disk drive (usually A) by typing **A: <ENTER>**
3. Type **copy *.* C:\C1000 <ENTER>**
4. All files on the disk will be copied into the C1000 directory
5. Type **C:\C1000 <ENTER>** to return to the main directory.

Troubleshooting

If you are still having problems getting the C1000 to work, check the Config.sys and Autoexec.bat files. Examples of typical files are shown below. Should you require any further assistance please contact your nearest sales outlet.

Config.sys file

```
DEVICE=C:\DOS\HIMEM.SYS
DEVICE=C:\DOS\EMM386.EXE RAM
BUFFERS=15,0
FILES=30
DOS=UMB
LASTDRIVE=E
FCBS=4,0
DEVICEHIGH /L:1,12048 =C:\DOS\SETVER.EXE
DOS=HIGH
COUNTRY=044,,C:\DOS\COUNTRY.SYS
DEVICEHIGH /L:1,15792 =C:\DOS\DISPLAY.SYS CON=(EGA,,1)
```

Autoexec.bat

```
LH /L:0;1,45456 /S C:\DOS\SMARTDRV.EXE /X
@ECHO OFF
PROMPT $p$g
PATH C:\DOS
SET TEMP=C:\DOS
MODE CON CODEPAGE PREPARE=((437) C:\DOS\EGA.CPI)
MODE CON CODEPAGE SELECT=437
LH /L:1,16656 KEYB UK,,C:\DOS\KEYBOARD.SYS
cd\c1000
c1000 /e
```

Overview

This is a résumé of the C1000 (Ver 5.61) specification. Information on the C1000 has been combined with information on typical Webster sensors to provide an indication of overall system performance.

Accuracy

Flow	1% of Indicated Reading	21cSt	LT Turbines
	1% of Indicated Reading	1 – 40cSt	VT Turbines
	2% of indicated Reading	40 – 60cSt	VT Turbines
Pressure	0.5% of full scale		
Pressure Peaks	1ms peaks captured to 95% to peak value		
Temperature	Within 1°C up to 120°C		
Speed	1% of full scale		

Performance

Inputs	12 Digital (Flow/Speed) 16 Analogue (Pressure/Temperature) Plus up to 16 virtual channels	
Memory	224,000 (Digital & Analogue) plus 128,000 (Virtual) measurements each test.	
Scanning/Rate	Analogue Inputs 0.010 ms on one channel. Pulse inputs - period Clock 1MHz.	
Min. rec. time	0.5ms	
Graph reports	Up to four graphs from 44 channels (hard, soft or virtual) inputs can be printed on same graph. Automatic or selectable scaling with variable length graph provides high resolution.	
Selectable Unit:	Flow:	LPM, USgpm, UKgpm, %FSD
	Pressure:	PSI, BAR, MPa, KSC, %FSD
	Temperature:	°C or °F
	Speed:	Hz or RPM
	Viscosity:	cSt or mm²/Sec
	Note: Virtual channels can be used to obtain Power, Differential pressure, Load etc.	

Data logging

1. **Continuous Log for Machine Performance testing:**
   Accurately records data from all channels (max 44) at a time interval between 0.1 – 1 second and up to a maximum of 8000 blocks per test.

2. **Periodic Log for long duration tests:**
   Continuously records data from all channels (max 44) at a pre-selected time interval between 1 – 600 seconds and up to a maximum of 8000 blocks per test.

3. **Keypress Log for specific system conditions:**
   Continuously displays the active channels and accurately records data from all channels (max 44) each time a key is pressed, up to a maximum of 8000 blocks per test.

4. **Quick Profile Log for dynamic system testing:**
   Records from between 10 to 2,000 readings from between 1 and 4 channels over a time span as low as one second and up to 300 seconds. Recording commences automatically each time a user-defined trigger level occurs.

5. **On-Line Log:**
   Displays graphic and numeric data while the test is being carried out. Selectable screen resolution and graph scaling. The screen can be updated every 0.2 seconds

Pressure inputs

All 16 channels can be read in 100 milliseconds.

For **Shock Pressure Curves** select 'Quick Profile Test'. 4 channels can be graphed with the following response times:

Up to 2 channels and 2000 readings in 1 second – i.e. 0.5ms
Up to 4 channels and 2000 readings in 2 seconds – i.e. 1ms

For a Peak Pressure curve use a pressure transducer that has a full-scale value suitable for the maximum pressure you require to measure.

NOTE: Peak hold circuit only stores the numerical value of maximum pressure, with 2 to 1 over range. This can be displayed as a bar chart or numerical value. It cannot be data logged or graphed.

Two peak pressures can be specified on the order. These may be selected from any channel.
If peak is specified this uses a normal analogue (ADC) channel. The options are as follows:

16 pressure and no peak hold.
15 pressure and one peak hold.
14 pressure and two peak hold.

- **A print out of your complete C1000 software configuration as set at time of delivery**

Notes:

- **C1000 Brochure**
- **ViscoCorrect™ Data Sheet**

Notes:

Designed and produced by the Graphics Dept. Webtec Products Ltd. C1000USE–MA–ENG–1561.pdf 07/05