Webster MC100 & MC104
Portable Data Logger

User Instructions

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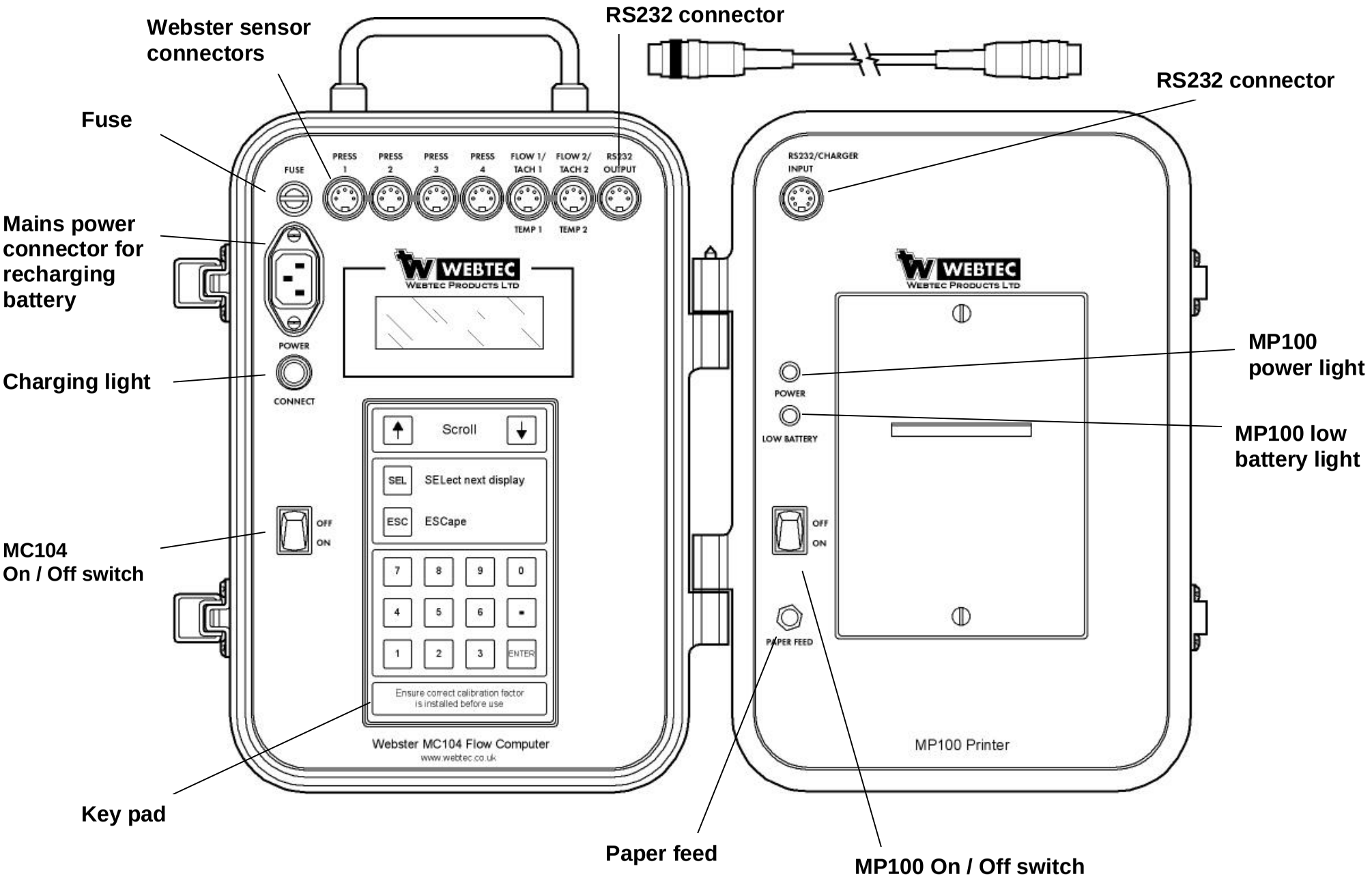
MC104 & MP100 Layout (layout will vary lightly for MC100)



Contents Page

Introduction

The MC100 series of portable data loggers comprises of two models, the MC100 and the MC104. The MC104 is similar to the MC100 in all respects, except for the number and type of inputs it accepts. Both models use a microprocessor housed within a rugged aluminium chassis, providing the service engineer with a powerful hydraulic diagnostics tool ideal for use in the field.

The MC100
Incorporates 8 channels: 2 flows, 2 pressures, 2 speeds and 2 temperatures.

The MC104
Incorporates 8 channels: 2 flows or speeds, 4 pressures and 2 temperatures.

Both models allow all readings to be displayed simultaneously in any of the normal engineering units. In addition there are separate peak pressure, differential pressure and power output displays.

The MC100 series offer a range of data logging facilities to allow the storage and retrieval of a variety of measurements. An RS232 serial communications port is provided which enables readings to be transmitted to a microcomputer or a printer. An optional 24 column dot matrix printer, the MP100, may be fitted into the carry case to obtain on-site hard copy and graphs.

The MC100 series have a 16 button membrane key-pad and a 4 line by 20 character liquid crystal display. An extensive menu system is provided which allows the channels to be configured to your exact needs and the appropriate calibration factors to be entered from the key pad. Once entered, these details are held in battery-backed RAM that provides non-volatile storage of the system configuration during power down, thus the system only needs to be configured once.

The MC100 series are powered by an internal rechargeable battery, which gives a minimum of 12 hours continuous use on a single charge. The battery may be charged from the mains using the power-input socket.

How to use this instruction manual

It is recommended that you start by reading section 2 – ‘Getting Started’, then dip into the other sections as and when necessary. The menu driven display is designed to be easy to operate, offering both default values and prompts for how to move between menus. A menu structure can be found in the Appendix; for many operators this is sufficient to use the MC100 series in the majority of situations.

Handy Hints

Handy Hints

Note: This manual covers both the MC100 and MC104 models. For simplicity only the MC100 model will be referred to unless there are specific differences in the method of operation between the two models. In this case both the MC100 and MC104 will be specifically mentioned.

- END OF SECTION 1 -

Getting Started – A Quick Guide

Switching on

When the unit is switched on, a display similar to figure 2.1 is seen. This indicates the software version, the amount of memory fitted and the linearisation data set version.

The MC100 incorporates a low battery detection circuit that monitors the state of the battery. When a low battery condition is detected the display flashes at a rate of around twice per second. The mains lead should be attached and the unit charged fully.

```
MC100 VERSION 5.0
128K ROM, 256K RAM
DATA SET 6
      PRESS ANY KEY
```

Figure 2.1: The opening display on the MC100

Initialisation

The MC100 contains a real time clock, and calibration values in memory. These are set in the factory and are normally preserved, but there are situations when you will have to initialise them:

- The on-board lithium battery has been disconnected.
- A software revision has been installed.

When one of these situations occurs, the default settings are copied into memory (see section Configuration - Reset config.) and you are taken through a series of operations. These are:

1. Set the date (Configuration - Set clock).
2. Set the time (Configuration - Set clock).
3. Reset hardware zero for pressure inputs (Calibration - Factory settings).

Menu operation

The main menu is shown in figure 2.2. This provides easy access to all of the MC100 functions. The menu structure is shown in the Appendix – Menu Tree and it is strongly recommended that you become familiar with it.

The cursor is indicated by the right arrow, '>', and points to the current option. Pressing **SEL** selects this option.

Handy Hints

Note: MC100 and MC104 software versions and data set numbers are shown on the title screen.

Handy Hints

Pressing one of the **ARROW** keys scrolls the display up or down through the 4 main menu options, with the cursor indicating the current option in the middle of the screen. Pressing **SEL** selects the current option. Detailed descriptions of these options may be found in section 3 – Taking Measurements and section 6 - Calibration respectively.

There is also a quick method of moving through the menus, provided that the number of the required option is known. Simply pressing the number of the required option places the cursor on it and then one further press of the number, or **SEL**, selects it.

```
* * * MAIN MENU * * *
  0     DISPLAY READINGS
>1      DATA LOGGER
  2     CONFIGURATION
  3     CALIBRATION
```

Figure 2.2: The Main Menu

Measurements

Pressing **ESC** from the main menu leaves the menu system and enters a real-time display that continuously measures and displays the readings from all of the selected inputs.

Full details of taking measurements may be found in section 3 – Taking measurements.

Pressing **ENTER** whilst in this display sends a numbered copy of the screen to the RS232 port. The copy number is reset to 1 upon entry to this display and is increased by 1 every time **ENTER** is pressed.

The measurement display continues to be updated until **ESC** is pressed once more whereupon control returns to the main menu.

Main menu options

The following menu options are available:

0 - Display Readings This option controls the real-time display of selected inputs, differential pressure and peak pressure. Refer to section 3 for further details.

1 - Data Logger This option gives you access to all of the data logging facilities. Refer to section 4 for further details.

2 - Configuration This option is used to select active inputs, engineering units and RS232 parameters. Refer to section 5 for further details.

3 - Calibration This option allows you to calibrate the input channels to different transducers. Refer to section 6 for further details.

Numeric keyboard entries

Where the numeric keys are used to enter a parameter, you are given a default; the current parameter value. If you press **ENTER** or **SEL**, you simply keep the value unchanged. As soon as you start typing digits, the default is replaced by the number you are typing.

When the entry field is full, the number is checked and the cursor wraps back to the start. If the number is out of range, it is replaced with the default. When **ENTER** or **SEL** are pressed, the number is checked and accepted if within range, and the operation ends. If out of range, the operation starts over with the default.

The **ARROW** keys can be used to scroll the number displayed up and down in steps of 1.0. When the value goes outside its valid range, it wraps to the other extreme.

There is a two-stage escape sequence. If the default is displayed when **ESC** is pressed, you quit right away, but if you have typed anything the first press of **ESC** restores the default - so press **ESC** again to quit.

Entry of millivolts at zero pressure may require entry of a negative number. There is no 'minus' key, so to get a negative number you must press **POINT** as the first character. Whenever **POINT** is first, it is treated as a minus sign.

A value > or = 1.0 is entered as expected, e.g.:
1.23 is entered as **1.23**

A positive value < 1.0 is entered with a leading **0**, e.g.:
.123 is entered as **0.123**

A negative value is entered with a leading **POINT**, e.g.:
-.123 is entered as **..123** or as **.0.123**
-1.23 is entered as **.1.23**

Although there is no minus key, you do 'see what you get', and only values less than 1 give cause for thought.

Alphabetical keyboard entries

Where the keyboard is used to edit a title, the keyboard range is extended by providing an alphabet on the display, from which you can select letters or a space. The current letter is highlighted by a pair of dashes, for example -A- is the initial position.

When you edit a title, the original will be displayed by default. Figure 5.12 shows an example display.

Handy Hints

Handy Hints

Numerals **0** to **9** and the **POINT** are typed as usual from the keyboard.

To copy the current alphabet letter into your title press **SEL**.

The **UP ARROW** advances the alphabet position. This is the letter used when you press **SEL**. When it reaches the end it wraps to the beginning.

The **DOWN ARROW** advances the cursor position. This is where the next letter or digit will be inserted in your title. When it reaches the end it wraps to the beginning.

There is a two-stage escape sequence. If the default is displayed when **ESC** is pressed, you quit right away, but if you have altered anything the first press restores the default - so press **ESC** again to quit.

Pressing **ENTER** accepts the message.

- END OF SECTION 2 -

Taking Measurements

Introduction

There are 4 main real-time measurement displays available on the MC100: Selected inputs, Differential pressure, Peak pressure and Power output. Each of these has a number of parameters that may be altered to suit your needs.

Before taking measurements, the active channels, units of measurement, screen format, and software averaging for each channel are all selected using the configuration menu. See section 5 Configuration for full details.

Quick access

A quick method of measuring all the active inputs is provided.

Pressing **ESC** whilst in the main menu leaves the menu system and immediately enters the real-time display which continuously measures and displays the readings from all of the active channels.

This is the equivalent of selecting Main menu option 0 - Display Readings followed by Selected inputs.

Measurements

Main menu option 0 - Display Readings gives a choice of Selected inputs, Differential Pressure, Peak Pressure and Power output.

Selected inputs

This is a continuously updating display of every active input channel.

The screen format (selected in the configuration menu) may be either 'Super channel' 1, 2 or 'All inputs', sample displays are shown in figure 3.1 and figure 3.2 respectively.

This display continues to be updated until **ESC** is pressed whereupon control returns to the main menu.

FLOW	1	3.71	IGPM
PRESS	1	2156	PSI
TEMP	1	24.7	°C
SPEED	1	83	RPM

Figure 3.1: Superchannel one display

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Handy Hints

3.71	4.67	IGPM
2156	1193	PSI
24.7	26.5	°C
83	86	RPM

Figure 3.2: All inputs display on the MC100

Differential pressure

Note: Special instructions for MC104

On the MC100 this continuously measures and displays pressure 1 and pressure 2 alongside the absolute differential pressure between them. The MC104 has a second screen to display pressures 3 and 4 and the differential pressure between them. To switch between the two screens press **SEL**.

A sample display is shown in figure 3.3.

Note that the differential pressure is displayed as an absolute value, hence it is always positive.

This display continues to be updated until **ESC** is pressed whereupon control returns to the main menu.

* * * DIFF. PRESSURE * * *		
PRESSURE 1	2156	PSI
PRESSURE 2	1193	PSI
DIFFERENCE	963	PSI

Figure 3.3: Differential pressure display

Peak pressure

Note: Special instructions for MC104

On the MC100 this option continuously measures and displays pressure 1 and -pressure 2 alongside their peak values. The MC104 has a second screen to display pressures 3 and 4 and their peak values. To switch between the two screens press **SEL**.

A sample display is shown in figure 3.4.

The peak values are reset upon entry to this display and thus reflect the highest peaks that have occurred since this option was selected.

The peak values may be reset at any time by pressing 1 or 2 to reset peak pressure 1 or peak pressure 2 respectively.

Handy Hints

This display continues to be updated until **ESC** is pressed whereupon control returns to the main menu.

```
        CHAN1   CHAN2
PRES     2156     1193     PSI
PEAK     2547     1205     PSI
    1 OR 2 RESETS PEAKS
```

Figure 3.4: Peak pressure display

Power output

This option continuously measures and displays the power output on active channels. Power is calculated from Flow1 and Press1 and Flow2 and Press2 (identical for both MC100 and MC104).

The flow channel and pressure channel must both be active.

A sample display is shown in figure 3.5.

```
        CHAN1   CHAN2
POWER  156.9     136.3     HP
POWER  117.1     107.1     KW
        ESC TO EXIT
```

Figure 3.5: Power output display

Screen copies

Pressing **ENTER** whilst in any of the above displays sends a numbered copy of the screen to the RS232 port. The copy number is reset to 1 upon entry to the display and is increased by 1 every time **ENTER** is pressed.

- END OF SECTION 3 -

Handy Hints

Data Logging

Introduction

The function of the data logger is to enable you to perform a number of tests on a hydraulic system and record the results into the memory. A real-time clock provides the timing information for each test. The stored data may be recalled to the screen, or alternatively it may be transmitted via the RS232 serial port to a microcomputer or a printer.

Note that the data logger always records data from the active channels using the current units. Hence you should ensure that these have been selected using the configuration menu prior to starting a test.

Definition of terms

Each log is called a TEST and comprises a number of BLOCKS. Each block contains one reading of every active channel (for example Flow 1, Pressure 1 and Temperature 1). Associated with each test is a TEST TYPE. This is a short phrase that is designed to remind you of the type of test that has been recorded. Each test is numbered consecutively in memory and this number is used to reference the required test.

Five different types of log are available: continuous log, periodic log, log on key-press, profile log and on-line log.

A **Continuous** log records data from all the active channels as quickly as possible until the required number of blocks has been read, or until interrupted by pressing **ESC**. If the log is interrupted in this way then all the blocks up to this point are recorded as normal. This provides a means of starting and stopping a log at the press of a key.

A **periodic** log records blocks of data at set time intervals (1 to 600 seconds) until the required number of blocks has been read, or until interrupted by pressing **ESC**.

Log on **key-press** continuously measures and displays the active channels. Pressing **SEL** will store one block. This process continues until the memory is full or **ESC** is pressed.

A **profile** log records from up to two channels over a selected time span. The test commences when a pre-set trigger event occurs. The log records between 100 and 2000 readings from a time window surrounding the trigger event.

An **Online** test transmits data from the active channels, to be logged and displayed by the 'Webcomm' utility program.
For each active channel three pieces of information are transmitted (MC100) :-

Handy Hints

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For FLOW1	FLOW1, FLOW3, FLOW5
For FLOW2	FLOW2, FLOW4, FLOW6
For SPEED1	SPEED1, SPEED3, SPEED5
For SPEED2	SPEED2, SPEED4, SPEED6
For TEMP1	TEMP1, TEMP3, TEMP5
For TEMP2	TEMP2, TEMP4, TEMP6
For PRESSURE1	PRESSURE1, PRESSURE3, PRESSURE5
For PRESSURE2	PRESSURE2, PRESSURE4, PRESSURE6

Note: Special instructions for MC104

On the MC104 the DIGI channels are configured either as flow or speed. In addition three pieces of information will be transmitted for pressures 3 and 4, as shown below:

For PRESSURE3	PRESSURE7, PRESSURE8, PRESSURE9
For PRESSURE4	PRESSURE10, PRESSURE11, PRESSURE12

The significance of the numbering system is as follows: -

For FLOW1
FLOW1= The current or actual value.
FLOW3= The minimum value during the last block time.
FLOW5= The maximum value during the last block time.

For FLOW2
FLOW2= The current or actual value.
FLOW4= The minimum value during the last block time.
FLOW6= The maximum value during the last block time.

And so on for TEMP, SPEED and PRESSURE.

Starting a test

Selecting the data logger option from the main menu leads to the display shown in figure 4.1.

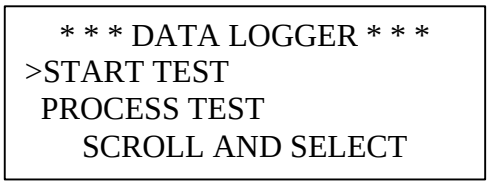

Figure 4.1: The data logger menu

Selecting the start test option will initiate the following sequence of events.

Choosing any of the log types leads to the test type selection. This allows a phrase to be chosen which best describes the test to be undertaken. These test names may be edited to suit the activities involved (see section 5 - Configuration). Note that the choice of phrase does not affect the test in anyway and the text is simply attached to the test to act as a reminder.

The next step differs according to the type of log chosen, each type of log is covered by one of the following sections.

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Continuous log

First select the test type and name as described above in 'Starting a test'.

You are then prompted for the number of readings to be taken (blocks to be logged). This may be up to 9999 provided that sufficient memory is available.

The unit then asks for confirmation and proceeds to record the required number of consecutive blocks without pausing between them. The screen displays the current block being recorded.

Periodic log

First select the test type and name as described above in 'Starting a test'.

You are then prompted for the number of readings to be taken (blocks to be logged). This may be up to 9999 provided that sufficient memory is available.

The unit then prompts for the number of seconds between readings. This may be anything from 1 to 600 seconds in steps of 1 second. After asking for confirmation, the unit proceeds to record the required number of consecutive blocks at the required time interval. The screen displays the current block being recorded.

Log on key press

First select the test type and name as described above in 'Starting a test'.

You are then asked for confirmation and the unit enters a real-time display shown in figure 4.2.

Pressing **SEL** will store one block of readings, together with the current time and the screen will briefly display 'OK' on the left.

This process continues until the memory is full or **ESC** is pressed.

SEL	3.71	4.67	IGPM
TO	2156	1193	PSI
LOG	24.7	26.5	°C
	83	86	RPM

Figure 4.2: Log on keypress display

Handy Hints

Profile log

First select the test type and name as described above in 'Starting a test'.

The display shows details of how the test will be done, as shown in figure 4.3. The example shows that PRESSURE 1 and FLOW 1 channels will be recorded during the Profile log. The test will be triggered when PRESSURE 1 exceeds 1800 PSI, 2000 readings will be taken over 2 seconds, 50% of which will be taken before the trigger event occurs.

```
2000 BLOCKS          2 SECS
TRIG PRESS1  +  FLOW1
ABOVE  1800  PSI        50%
SEL: EDIT        ENT: START
```

Figure 4.3: Profile Log Display

Pressing **ENTER** will start the test, which can be abandoned by pressing **ESC**.

Pressing **SEL** will prompt for editing of each item in turn. Enter data or scroll as appropriate for each item and press **SEL** to move on to the next item. Press **ESC** to return to the original display.

Each item is explained below -

Test time: The time (1 to 300 seconds) over which readings will be taken. Maximum test time is 300 seconds with 2000 blocks. This is reduced automatically when fewer blocks are recorded, e.g.: 20 seconds with 100 blocks. Time between blocks can be between 0.5 ms and 200 ms.

Trigger channel: The primary measurement channel. The level of this channel can trigger the test.

Supplementary channel: Optional measurement channel. Data from up to two channels can be logged.

Note: On the MC104 – temperature and pressure cannot be logged together for a profile log.

Trigger type: Specifies the event that triggers the test. There are three methods:

Above: Triggers the test when the level on the primary channel exceeds the trigger level specified.

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Below: Triggers the test when the level on the primary channel is less than the trigger level specified.

Key: Triggers the test when a key (but not **ESC**) is pressed.

Pre-trigger: This is the percentage of readings to be logged prior to the trigger event. The pre-set number of readings will be logged when the trigger event occurs, spread around the event.

Trigger level: The level for comparison by the 'Above' and 'Below' trigger methods. The item does not appear when the 'Key' method is selected.

Blocks: This is the number of blocks to be logged and can be from 100 to 2000, depending on the required test time.

Auto Repeat: When set to 'ON' the profile log will repeat until the memory is full or the number of tests exceeds 98 or the escape key is pressed.
In this mode the number of blocks to be logged per test and the number of tests that can be added to the memory are shown along with the test duration. See figure 4.4.

```
500 * 49.  2 SECS
TRIG PRESS1 + FLOW1
ABOVE 1800  PSI   50%
SEL: EDIT      ENT: START
```

Figure 4.4: Auto Profile Screen

Data storage

The blocks are stored in a way which ensures that in the event of the battery running flat during the data logging process, all the previously stored blocks are retained and may be recalled once the battery has been charged or the mains adapter attached. The tests are stored in Non-volatile RAM which means that the results are preserved even when the power to the unit is switched off. Hence a service engineer could perform a number of tests on site, turn off the unit and process the tests later as required.

The number of tests that may be recorded depends upon the number of blocks in each test and the number of active channels per block. The exact amount of storage used by each test may be calculated as follows:

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Continuous or periodic log

Storage used = 2 * A * B bytes

where A is the number of active channels and B is the number of blocks in the test.

Log on key-press

Storage used = ((2 * A) + 4) * B bytes

where A is the number of active channels and B is the number of blocks in the test.

Profile log

Storage used = 2 * A * B bytes
where A is 1 or 2 channels and B is the number of blocks in the test.

The RAM fitted as standard has around 96000 bytes of storage available for data. This is sufficient to store about 48000 readings. For example, 48 tests each containing 100 blocks of all 8 channels.

A maximum of 9999 blocks are allowed in each test (2000 for profile tests) and a maximum of 98 tests are catered for. Both of these numbers are subject to sufficient memory being available.

On-line Test

First select the test type and name as described previously in 'Starting a test'.

You are then prompted for the number of readings to be taken (blocks to be logged). This may be up to 9999.

The unit then prompts for the number of seconds between readings. This may be anything from 1 to 600 seconds in steps of 1 second. The 'Webcomm' utility should be running on your 'PC' and at this point should be set to receive an On Line test. When ready press **ENTER** and the Online test will start. See figure 4.5.

```
ONLINE TEST
IN PROGRESS
BLOCK  2      OF   100
       ESC TO EXIT
```

Figure 4.5: Online Test Screen

Processing a test

Selecting the process test option leads to a menu offering the options shown in figure 4.6. These options are discussed in detail on the following pages.

Handy Hints

```
  * * * PROCESS TEST * * *
  0  MEMORY USAGE
 >1  VIEW A TEST
  2  MP100 PRINT
  3  EXTERNAL PRINTER
  4  WEBCOMM ONE TEST
  5  WEBCOMM ALL TESTS
  6  DELETE LAST TEST
  7  CLEAR MEMORY
  8  MP100 GRAPH
```

Figure 4.6: Process Test Menu

0 - Memory usage This option displays the number of tests currently stored and the percentage of memory which is taken up by these tests. A sample display is shown in figure 4.7.

```
* * * MEMORY USAGE * * *
TESTS STORED     =    2
MEMORY USAGE     =   11%
       PRESS ANY KEY
```

Figure 4.7: Memory Usage Display

1 – View a test Selecting this option allows you to view any part of any test on the screen.

You are prompted first for the test number and then for the block number. A sample display is shown in figure 4.8.

Whilst in this display, pressing the **ARROW** keys will display the next block up or down respectively. Hence you may step through all the blocks in a test sequentially by repeatedly pressing the up key. This action is cyclic and therefore when the last block is reached, pressing the up key will display block number 1 and vice versa.

Pressing **ESC** will lead back to the prompt for a block number which allows quick access to another section of the same test.

```
TST      3.71      4.67   IGPM
1        2156      1193   PSI
BLK      24.7      26.5   °C
3          83        86   RPM
```

Figure 4.8: Viewing A Block

Handy Hints

2 - MP100 Print This option allows you to print the test results via the MP100 printer.

The unit prompts for the test number, asks for confirmation of the choice and then proceeds with the transmission. The transmission may be aborted at any time by pressing **ESC**.

3 - External Printer This option allows you to print the test results via an external printer. The printer should be configured as an 'EPSON'.

4 - Webcomm one test

This option allows you to export one test to a personal computer running the Webcomm graph plotting utility.

After selecting the test to export, you are prompted for confirmation before commencing. You should start Webcomm's receiving process before accepting the prompt.

5 - Webcomm all tests

This option allows you to export all the tests to a personal computer running the Webcomm graph plotting utility.

Note that prior to transmission, the RS232 protocol should be configured using the RS232 configuration menu.

You are prompted for confirmation before the MC100 memory is exported. You should start Webcomm's receiving process before accepting the prompt.

6 - Delete last test This option allows you to delete the most recent test, thus reclaiming a portion of memory which may then be used to store another test.

7 - Clear memory This allows you to delete all the tests currently stored in memory and reclaim the entire memory space which is allocated to the data logger.

Selecting this option prompts you for confirmation then deletes all the tests.

Handy Hints

It is recommended that this option be used when all the tests have been processed and need to be deleted. Note, however, that this is a powerful option and should therefore be used with care.

8 - MP100 graph This option allows you to print a graph of a logged profile test and also up to 2 channels of any other type of test.

The display shows details of how the graph will be printed, as shown in figure 4.9.

Pressing **ENTER** will start printing, which can be abandoned by pressing **ESC**.

Pressing **SEL** will prompt for editing of each item in turn. Enter data or scroll as appropriate for each item and press **SEL** to move to the next item. Press **ESC** to return to the original detail display.

Each item is explained -

Time scale: Sets the scale factor for the x-axis (time). For example, 1/4 means that every 4th block will be plotted. The scale is automatically set to1/1 if there are less than 100 blocks or if the centre block (next item) is more than 1.

Centre block: It is used to print one quarter of a large test at full scale(1/1). It defines the block number to be plotted at the centre of the x-axis. It is automatically adjusted to prevent the plot from overflowing at the ends, for example if the centre block is set to 100 of 2000 blocks, it will be adjusted to 251. When set to 1 the whole graph is plotted.

Trace 1: 1 or 2 traces are plotted. For each trace, there are three options -

Off: Trace is not plotted.
Full: The y-axis is ranged from 0.0 to the maximum reading.

Band: The y-axis is ranged from the minimum to the maximum reading.

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Trace 2: As 'Trace 1', but for the supplementary channel.

Channel 1: Enables you to select the input to use for trace 1.

Channel 2: Enables you to select the input to use for trace 2.

```
GRAPH  PRINT  TEST  1
1/1           PRESS1  FULL
BLOCK 1       FLOW1   FULL
SEL: EDIT          ENT:START
```

Figure 4.9: Graph Print Options

- END OF SECTION 4 -

Configuration

Handy Hints

Introduction

The MC100 has a number of parameters that may be changed to suit your requirements. The available options are listed in figure 5.1 and explained in detail below.

Selection is made in the normal way using the **ARROW** keys to scroll through the options and the **SEL** key to select an option. Pressing **ESC** returns to the main menu.

All configuration parameters are stored in non-volatile memory and are therefore retained even when the unit is switched off.

```
      * * * CONFIGURATION * * *
0       SCREEN LAYOUT
1       ACTIVE INPUTS
2       ENGINGEERING UNITS
3       SMOOTHING
4       LINEARISATION
5       SERIAL NUMBERS
6       RS232 PORT
7       SET CLOCK
8       NAMES AND TITLE
9       RESET CONFIG.
```

Figure 5.1: The configuration menu

Screen layout

This option allows you to select the type of screen display and the active inputs.

Select the type of display you want from the menu shown in figure 5.2.

Superchannel 1 displays Flow 1, Pressure 1, Temperature 1 and Speed 1 as shown in figure 3.1. Superchannel 2 is similar.

All inputs displays all eight channels and figure 3.2 shows a typical display.

```
* * * SELECT DISPLAY * * *
>ALL INPUTS
  SUPERCHANNEL 1
  SUPERCHANNEL 2
```

Figure 5.2: Screen Layout Menu

Handy Hints

Note: Special instructions for MC104.

The MC104 uses the channel names DIGI 1 and DIGI 2, as the channels can be configured as either FLOW or SPEED.

See section 6.4.

Active inputs

This option allows you to enable or disable readings on each of the input channels.

Each input is considered in turn. Each unused input may be disabled and will be designated 'OFF' on the display. Turning off unused inputs is recommended and will increase the update rate of the unit since the MC100 will not waste time measuring these inputs.

A sample display is shown in figure 5.3. The **ARROW** keys toggle the current channel ON or OFF and **SEL** fixes the current channel and moves on to the next one. This process is repeated with **SEL** cycling through all the possible inputs until **ESC** is pressed whereupon all the current settings are fixed and control returns to the configuration menu.

The MC104 differs from the MC100 in that it has two digital channels that can be configured for either flow or speed. The channels are named DIGI 1 and 2, for further information on setting these channels see section 6.4.

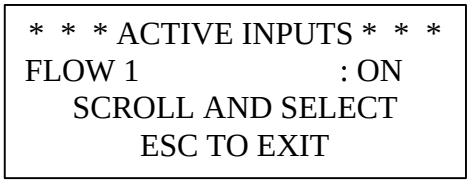


Figure 5.3: Active inputs selection on MC100

Engineering units

This option allows you to choose the units in which each reading is displayed.

The available units are:

- Flow: IGPM, GPM, LPM or Percentage.
- Pressure: PSI, BAR, KSC, MPS or Percentage.
- Temperature: degree F or degree C
- Speed: RPM

Percentage units

The 100% value for Pressure is the value entered for full scale during pressure calibration. The 100% value for Flow is factory pre-set as the Full Scale value for the Flow Turbine selected via Flow calibration, and is the numeric part of the turbine type number i.e. for the LT400 the 100% value would be 400 lpm.

Handy Hints

A sample display is shown in figure 5.4. The **ARROW** keys cycle through each possible unit type. Pressing **SEL** fixes the current unit and moves onto the next one. Flow, pressure and temperature units are dealt with in turn. When the desired units have been selected, pressing **ESC** will store them and return to the previous menu.

```
 * * * SELECT UNITS * * *
FLOW UNITS        : IGPM
   SCROLL AND SELECT
      ESC TO EXIT
```

Figure 5.4: Engineering units selection on MC100

Smoothing

This option allows you to turn the smoothing for each channel ON or OFF as required.

Smoothing or averaging is a method of stabilising the displayed result, thus avoiding the flicker associated with digital displays.

Consider, for example, an analogue meter that is monitoring flow. The pointer will often oscillate by a few per-cent due to actual fluctuations in the system (piston pumps, etc). However, the nature of the analogue dial makes it a simple task for you to accurately read the average result from the meter (the centre of oscillation). A digital meter experiencing the same input will display a rapidly changing reading and accurately determining the average result is more difficult.

The MC100 uses an adaptive twelve point moving average technique to ensure that a stable display of the average result is obtained. Note that if the input signal fluctuates by more than 5 per-cent some instability will still be observed.

If no averaging is carried out on a particular channel then a certain amount of instability will be observed in the display of that channel. This is due to actual fluctuations present in the hydraulic system.

A sample display is shown in figure 5.5. The **ARROW** keys toggle the averaging for the current channel ON or OFF and **SEL** fixes the current channel and moves on to the next one. This process is repeated with **SEL** cycling through all the possible inputs until **ESC** is pressed whereupon all the current settings are fixed and control returns to the configuration menu.

```
 * SELECT SMOOTHING *
FLOW 1            : ON
   SCROLL AND SELECT
      ESC TO EXIT
```

Figure 5.5: Smoothing selection on MC100

Handy Hints

Linearisation

This option allows you to turn the linearisation for each flow channel ON or OFF as required.

A sample display is shown in figure 5.6. The **ARROW** keys toggle the linearisation for the current channel ON or OFF and **SEL** fixes the current channel and moves on to the next one. This process is repeated with **SEL** cycling through the flow channels until **ESC** is pressed whereupon all the current settings are fixed and control returns to the configuration menu.

```
* * * LINEARISATION * * *
FLOW 1              : ON
   SCROLL AND SELECT
      ESC TO EXIT
```

Figure 5.6: Linearisation selection on MC100

Serial numbers

A sample display is shown in figure 5.7. This option allows you to enter a serial number for each of the attached sensors. Press **SEL** to cycle through all of the sensors i.e. PRESS1, FLOW1, etc.

```
* * * SERIAL NUMBERS * *
FLOW 1            : 00000000
   SCROLL AND SELECT
      ESC TO EXIT
```

Figure 5.7: Serial number entry – MC100

To enter a number type the number using the Numeric keys. The SCROLL keys act as a backspace to enable limited editing. If an entry is mistyped pressing escape once will return the number to its previous state.

These numbers are printed on the calibration printout to provide a record of which sensors were used during a test.

RS232 port

This option allows you to set the protocol for the RS232 port, select the output format for the data logger, and print hard copy of the calibration set up.

Selecting this option leads to the RS232 configuration shown in figure 5.8.

Handy Hints

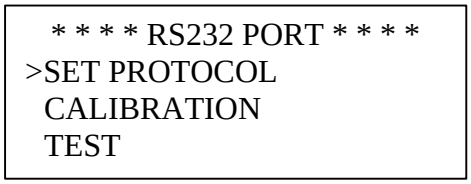


Figure 5.8: RS232 operations menu

Set protocol Selecting set protocol leads to the display shown in figure 5.9.

The item shown is the first of a list. Each item is edited with the ARROW keys, and SEL is pressed to select the next item in the list. The list is cyclic, when you reach the end it starts again from the first item.

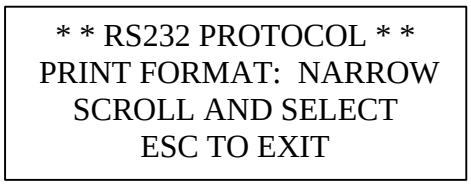


Figure 5.9: Output format selection

This is the list of items to configure:

Output format: This option sets the width of the report to 'narrow' or 'wide'. Narrow format gives output to the MP100 24-column printer. Each reading is transmitted on a separate line and therefore this can result in a lengthy printout.

Wide format gives an 80 column wide output that is suitable for standard width printers and computer screens. In this format each block fits on a single line, hence producing a compact table of data.

Baud rate: This option sets the baud rate. Figure 5.10 shows the output format display.

The rates available are 300, 600, 1200, 2400, 4800, 9600 or 19200 baud.

Parity: The parity can be set to none, odd or even.

Data bits: 7 or 8 data bits may be set.

Stop bits: 1 or 2 stop bits may be set.

Handy Hints

```
* * RS232 PROTOCOL * *
BAUD RATE          : 1200
SCROLL AND SELECT
ESC TO EXIT
```

Figure 5.10: RS232 protocol selection

Pressing **ESC** stores all the settings and returns to the RS232 configuration menu.

Calibration This option prints hard copy of the calibration set up. There port is always in narrow format.

Test This option sends a test pattern to the printer.

Set clock

This option displays the current time and allows you to change it. A sample display is shown in figure 5.11.

Pressing **SEL** will allow you to enter the hours, minutes and seconds. The hours should be entered in 24 hour format.

Pressing **ENTER** will allow you to enter the weekday, date, month and year. The year should be entered as two figures.

Pressing **ESC** returns to the configuration menu.

```
DATE      02-02-00   WED
TIME      10:52:35
      SEL TO SET DATE
      ENT TO SET TIME
```

Figure 5.11: The set clock display

Names and title

This option allows you to alter the names that are attached to the logged tests.

Edit test name:

This option allows you to alter the pre-set names that are attached to the logged tests. You can do this without affecting the test data itself.

Firstly select the test name from the list displayed, in the same way you would - select from any menu.

Handy Hints

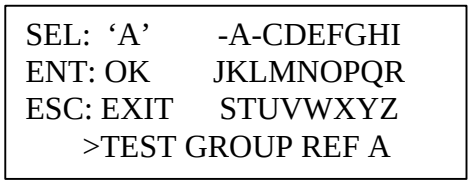


Figure 5.12: Editing a test name

The display shows an alphabet with the original name along the bottom - see figure 5.12. Edit the test name as required, referring to 'Getting started – Alphabetical - keyboard entries' for details of how to do this.

Name of title:

This option allows you to edit the title printed at the top of the reports and graphs. The process is similar to 'Edit test names' described above.

Import all names:

This option allows you to import test names from the 'Webcomm" utility to suit various needs.

Reset config.

This option allows you to reset the configuration back to the default factory settings.

Selecting this option asks you for confirmation, resets the configuration to the default settings listed below and returns control to the configuration menu.

The default settings are:

- Units: the engineering units vary with the Language implementation -
  - Britain: IGPM, PSI, °C and RPM.
  - America: GPM, PSI, °F and RPM.
  - France: LPM, BAR, °C and RPM.
  - Finland: LPM, BAR, °C and RPM.
  - Germany: LPM, BAR, °C and RPM.
- All inputs displayed
- All software averaging ON

Handy Hints

- All linearisation ON
- RS232 protocol is 1200 baud, no parity, 8 data bits and 1 stop bit
- RS232 format NARROW

- END OF SECTION 5 -

Calibration

Introduction

Each of the input channels except temperature has a number of calibration parameters associated with it.

All calibration parameters are held in non-volatile RAM and are therefore retained during power down.

The calibration menu is shown in figure 6.1. Selection is made in the normal way using the **ARROW** keys to scroll through the channels and **SEL** to select one to be changed. Pressing **ESC** returns to the main menu.

Note that all calibration procedures must be followed through to the end. Pressing **ESC** during any calibration process quits the operation, and the original values are restored.

```
   * * CALIBRATION * * *
>PRESSURE CHANNELS
  FLOW CHANNELS
  SPEED CHANNELS
```

Figure 6.1: The Calibration Menu

Pressure calibration

This option allows you to view the calibration figures for an existing pressure transducer or to calibrate a pressure channel to a new transducer.

The MC100 uses seven parameters for each pressure channel:

- nominal full scale in PSI.
- millivolts at zero pressure.
- millivolts at zero pressure, peak circuit.
- millivolts at nominal full scale pressure.
- millivolts at nominal full scale pressure, peak circuit.
- millivolts hardware zero offset.
- millivolts hardware zero offset, peak circuit.

The last two of these cannot be set from the menus (see Factory settings below).

Handy Hints

Note: on the MC104, FLOW and PRESSURE channels are both referred to as DIGI channels. See section 6.4 for calibrating DIGI channels.

Handy Hints

The other parameters may be entered from the keyboard (if known) or alternatively the MC100 may be calibrated against a precision pressure reference (for example a dead-weight tester). This reference must be capable of giving an accurate, stable pressure equal to the nominal full-scale pressure of the transducer.

Selecting the required channel displays the menu shown in figure 6.2.

Note: on the MC104, FLOW and PRESSURE channels are both referred to as DIGI channels. See section 6.4 for calibrating DIGI channels.

```
   * * CALIBRATION * * *
>PRESSURE CHANNELS
  FLOW CHANNELS
  SPEED CHANNELS
```

Figure 6.2: Pressure calibration

View calibration figures

This option allows you to view all of the calibration figures for a particular channel.

Selecting this option leads to a display similar to figure 6.3. Pressing any key except **ESC** will display the figures for the peak pressure channel. Pressing any key leads back to the previous menu.

```
PRESSURE CHANNEL 1
    0   PSI@     0.61   MV
 5800   PSI@   100.00   MV
      PRESS ANY KEY
```

Figure 6.3: View calibration Figures

Enter calibration figures

This option allows you to enter the calibration figures from the keypad.

The figures you should enter are those stamped on the transducer. Refer to section 2 - Getting started - Numeric keyboard entries, for details of how to type in values (negative values are entered by pressing **POINT** first).

The sequence is as follows:

1. Enter the nominal full scale pressure of the transducer, for example 5000 PSI.

2. Enter the number of millivolts relating to zero pressure.

Handy Hints

3. Enter the number of millivolts relating to the nominal full-scale pressure.

4. Enter the number of millivolts relating to zero pressure for the peak channel.

5. Enter the number of millivolts relating to the nominal full-scale pressure for the peak pressure channel.

Pressing **ESC** at any time during this procedure will abort the process and the previous values will remain intact.

Although the normal and peak circuits use the same transducer, you enter the values for each. This allows the opportunity to mix 'Calibrate by reference' and 'Enter calibration figures' for the normal and peak circuits. To do this, first calibrate by reference, then change values by the keyboard as described here.

Calibrate with reference

This option allows you to calibrate the pressure channels using a reference pressure.

The sequence is as follows:

1. Connect the correct pressure transducer to the corresponding channel and ensure that there is zero pressure at the transducer.

2. Enter the nominal full-scale pressure of the transducer. This is the value that is printed on the label attached to the side of the transducer, for example 5000 PSI.

3. Ensure that the pressure at the transducer is zero and then press any key except ESC. The MC100 will read and store the millivolts relating to zero pressure and zero peak pressure.

4. Set the pressure at the transducer to the nominal full-scale value and then press any key except **ESC**. The MC100 will read and store the millivolts relating to nominal full scale pressure and full scale peak pressure.

Handy Hints

Pressing **ESC** at any time during this procedure will abort the process and the previous values will remain intact.

Reset zero

This option allows you to re-zero the pressure transducer to account for temperature drift at zero pressure.

The sequence is as follows:

1. Connect the correct pressure transducer to the corresponding channel and ensure that there is zero pressure at the transducer.

2. Ensure that the pressure at the transducer is zero and then press any key except **ESC**. The MC100 will read and store the millivolts relating to zero pressure and zero peak pressure.

DIGI channels on the MC104

Note: on the MC104, FLOW and PRESSURE channels are both referred to as DIGI channels.

The MC104 uses DIGI channels that can be configured for either FLOW or SPEED. The MC104 displays refer to DIGI 1 and DIGI 2 throughout. Once configured for FLOW or SPEED, DIGI channels can be calibrated accordingly, see the sections below.

Flow calibration

This option allows you to calibrate the flow channels by entering the turbine type and the flow factors in pulses per litre (PPL). The PPL factor is supplied individually with every Webster flow block. Selecting the required channel displays the current turbine type as shown in figure 6.4. The **ARROW** keys scroll through the possible turbine types and **SEL** selects one.

The possible turbine types are: LT5, LT10, LT20, LT50, LT125, LT250, LT300, LT400, LT500 or LT750.

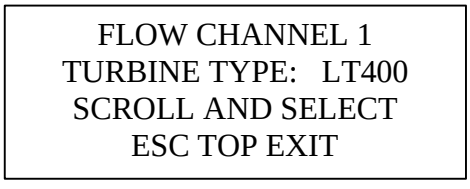


Figure 6.4: Turbine Type Display

The display (figure 6.5) now shows the current calibration factor and prompts you to enter the new factor in pulses per litre (PPL).

Refer to section 2 Getting started - Numeric keyboard entries, for - details of number entry.

```
      FLOW CHANNEL 1
ENTER PULSES PER
LITRE FACTOR.
FACTOR  =  125.00  PPL
```

Figure 6.5: Flow Calibration

Speed calibration

This option allows you to calibrate the speed channels by changing the number of pulses per revolution received from the tachometer unit. The number of pulses per revolution is equal to the number of reflective strips that will pass through the tachometer beam during one revolution of the shaft (1 to 99).

Selecting the required channel displays the current calibration factor and prompts you to enter the new factor as shown in figure 6.6.

Refer to section 2 - Getting started - Numeric keyboard entries, for details of number entry.

```
      SPEED CHANNEL 1
ENTER PULSES PER
REVOLUTION
PULSES  =  1.000
```

Figure 6.6: Speed Calibration

Factory settings

Each pressure input channel has a hardware zero calibration factor associated with it. This calibrates the hardware for 0 volts input.

The values are pre-set in the factory, and you need not usually be concerned with them, but when meter initialisation is necessary (see section 2 Getting started - Initialisation) you can calibrate them. In fact, it is the only opportunity to do so, because the operation is not available from the Menus.

The initialisation sequence takes you through setting the date and time, and then the display shown in figure 6.7 asks you if you want to calibrate the hardware zero values.

```
* * * *  RESET ZERO  * * * *
PRESSURE CALIB
      ENT TO CONFIRM
      ESC TO REJECT
```

Figure 6.7: Hardware calibration display

Handy Hints

Note: on the MC104, FLOW and PRESSURE channels are both referred to as DIGI channels.

Handy Hints

Pressing **ESC** skips the operation. Press **ENTER** to continue the following sequence:

1. Select the required channel, or press **ESC** when you have finished.

2. You are prompted by the display shown in figure 6.8.

3. Use a piece of wire to short together pins 2, 4 and 5 of the pressure input socket for the channel concerned.

4. Press any key except ESC to perform the calibration. If ESC is pressed the channel is not calibrated.

5. Repeat these steps for the other pressure channel.

Any channel not specifically calibrated will have its hardware zero value set to 5.2 mV.

```
 * * * *  CHANNEL 1  * * * *
JOIN TOGETHER PINS
2, 4, 5 ON PRESS CHAN.
       PRESS ANY KEY
```

Figure 6.8: Hardware zero calibration

- END OF SECTION 6 -

Serial Communications Port

Introduction

The MC100 unit is equipped with an RS232 serial communications port that enables it to communicate with a microcomputer or a serial printer.

The protocol for the RS232 port may be set using the RS232 configuration option. See section 5 - Configuration for further details.

Any combination of the following parameters is acceptable:

- Baud rate : 300, 600, 1200, 2400, 4800, 9600 or 19200.
- Parity : none, odd or even.
- Data bits : 7 or 8.
- Stop bits : 1 or 2.

Data format

All transmissions are in straight ASCII format and each line is terminated with a carriage return (decimal 13). The data is space-delimited and all fields are of constant length.

Downloading data to a computer is best accomplished by using a terminal emulation program to read the data and store it in unmodified format onto disk. The data may then be read into a spreadsheet for further processing. Many spreadsheets will import space-delimited data into a single column that must then be split into several columns before the data can be manipulated. Most spreadsheets have a function that will accomplish this, for example, 'DataParse' in Microsoft Excel. Refer to your spreadsheet documentation for further details.

Alternatively, data can be downloaded into Webcomm running on the PC. Webcomm can produce Lotus 1-2-3 format files, and can be used to plot graphs.

Serial printers will accept and print the data directly.

Connections

The RS232 connector is a 5 pin Din socket and the pin connections are shown in table 7.1.

It is envisaged that most serial communications will be between the MC100 and an IBM PC compatible microcomputer or an Epson compatible printer.

Handy Hints

Handy Hints

PC compatible computers may use either a 25 way D-type connector or a 9 way D-type connector and cable details for these are shown in figure 7.1 and 7.2 respectively.

Details of a typical printer cable are shown in figure 7.3. Refer to the printer manual for full details.

The serial cable that connects the MC100 to the MP100 portable printer is shown in figure 7.4.

In electrically noisy environments (for example factories) it is recommended that the cable length is kept as short as possible to avoid data corruption. A maximum length of around 5 metres should ensure good noise immunity in all environments.

- END OF SECTION 7 -

Table 7.1: RS232 connections

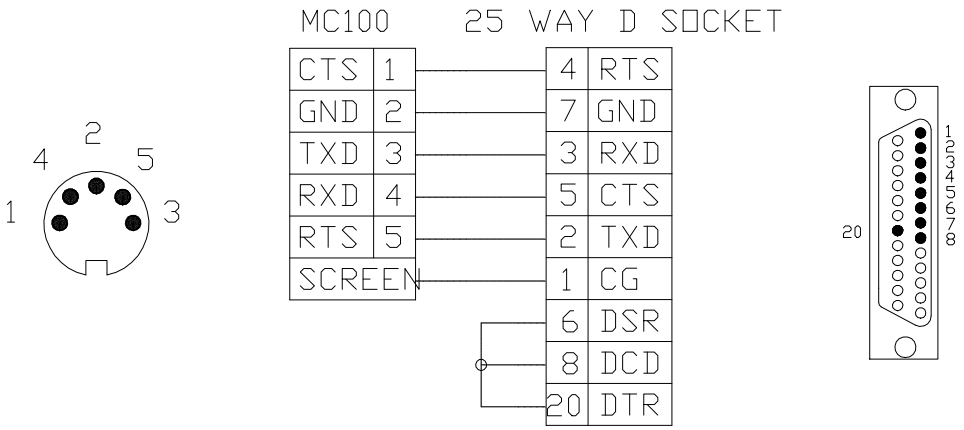


Figure 7.1: MC100 to PC (25 way) cable

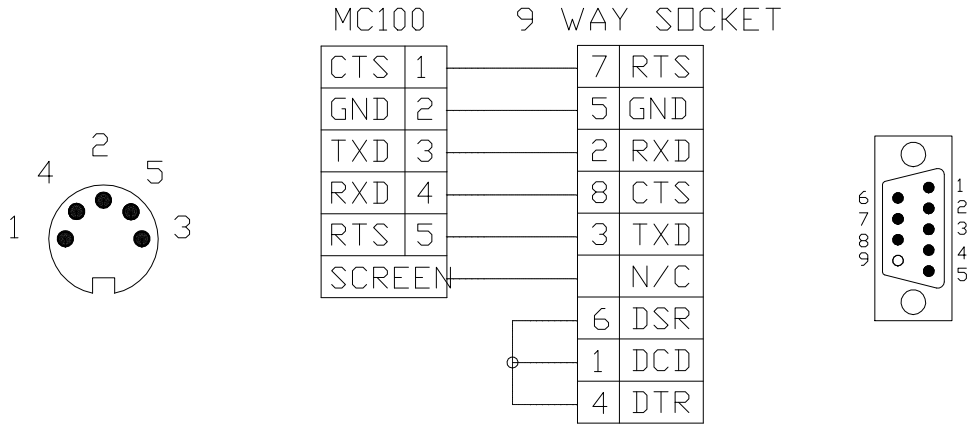


Figure 7.2: MC100 to PC (9 way) cable

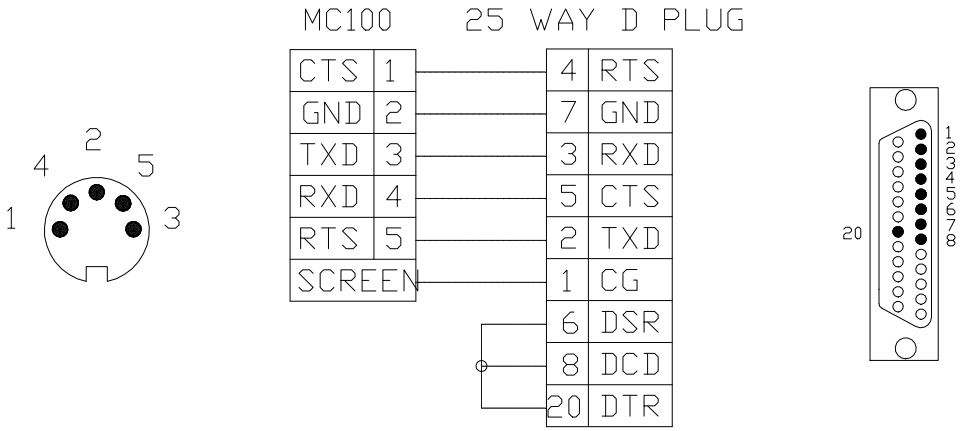


Figure 7.3: MC100 to printer cable

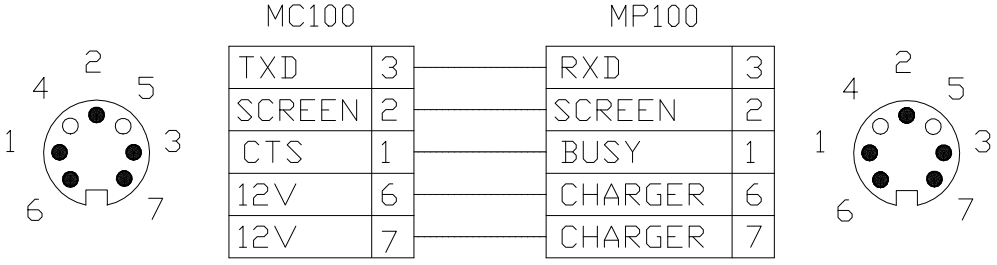


Figure 7.4: MC100 to MP100 printer cable

NOTE: All wiring diagrams shown from solder cup side

The MP100 Printer

Introduction

The MP100 is an optional 24-column dot matrix printer that may be fitted to the carry case.

It has a self-contained nickel cadmium power pack and uses standard paper rolls to provide on-site hard-copy.

Preparation

The MP100 has a standard RS232 interface with the protocol fixed at 1200 baud, no parity, 8 data bits and 1 stop bit.

The MC100 must be set to this protocol using the 'RS232 Config. - Set Protocol' option detailed in section 5.5. In addition the 'RS232 Config. – Output format' should be used to set the format to NARROW. This is also detailed in section 5.5.

This configuration need only be done once since the parameters are retained in non-volatile RAM when the MC100 is switched off.

The supplied serial cable should be connected from the MC100 RS232 socket to the MP100 RS232/DC IN socket.

Changing ribbons

1. Disconnect the serial lead and switch off the MP100.

2. Turn the two cover fasteners anticlockwise through 90 degree and remove the cover.

3. Remove the paper roll by gently pulling it back wards through the mechanism from the paper roll side.

4. To remove the ribbon cassette, push the portion marked PUSH such that the other side of the cassette rises.

5. Remove the cassette by rotating the risen end upwards about the end marked PUSH taking care that the fabric ribbon does not become caught in the mechanism.

6. To fit a new ribbon cassette, take up the slack in the ribbon by rotating the ribbon feed roller in the direction shown by the arrow. The ribbon feed roller is located on the ribbon cassette body.

7. Place the cassette such that the ribbon passes through the cut outs of the left and right frames of the mechanism and gently push the cassette down into position. Rotating the ribbon feed roller in the direction shown by the arrow will help locate the cassette in the mechanism.

8. Refit the paper roll and cover as described below.

Handy Hints

Handy Hints

Changing paper

1. Disconnect the serial lead and switch off the MP100.
2. Turn the two cover fasteners anti-clockwise through 90 degrees and remove the cover.
3. If necessary, remove the old paper roll by gently pulling it back wards through the mechanism from the paper roll side.
4. Trim the end of the new paper roll to give a straight, perpendicular edge.
5. Referring to figure 8.1 and paying particular attention to the orientation of the paper roll, place the paper roll in the paper holder.
6. Switch on the MP100.
7. Insert the free end of the paper into the back of the printer mechanism between the black plastic body and the silver metal lip.
8. Push the paper into the body until resistance is met, then depress the paper feed button with your free hand. The paper will be fed through the mechanism and out of the top.
9. Advance the paper until around 4 inches of paper has been fed through.
10. Feed the paper through the slot in the cover and replace the cover, taking care that the paper path doesn't become obstructed.
11. Lock the cover in position by turning the two cover fasteners clockwise through 90 degree.
12. Finally, check the installation by depressing the paper feed button for a few seconds. The paper should feed smoothly through the slot in the cover.

Using the MP100

To conserve power it is recommended that you only switch on the MP100 when it is required.

When the unit is switched on, the power light will illuminate. Depress the paper feed button for a second or two, observing the low power light. If this light illuminates or flickers, the MP100 should be charged prior to use.

The MP100 incorporates a low battery detection circuit to protect the print solenoids in the event of a microprocessor failure. Such a failure may occur when the battery voltage is too low.

Handy Hints

As the battery is discharged the low battery light on the front panel will illuminate. This indicates that the printer will print less than 100 more lines before the battery is totally discharged. It is recommended that the printer is switched off and charged fully when the current printout has been completed.

If you continue to use the printer, the protection circuit will eventually cut the power to the print head and the printer will stop. The power light and low battery lights will be illuminated and the paper feed button will have no effect. The MP100 is not damaged but will not function until the battery has been charged.

If the MP100 is switched on and left unattended for long periods of time, it is possible that the battery will become totally discharged and the front panel lights will not be illuminated. In this case switch off and charge the unit fully.

Note that the printing process can be interrupted at any time by pressing **ESC** on the MC100. This causes printing to cease immediately and control to revert to the previous display.

There are two ways of using the printer with the MC100.

1. Real-time screen copies

   Main menu option 0 - Display Readings gives access to any of four real-time displays; Selected Inputs, Differential Pressure, Peak Pressure or Power output.

   Pressing **ENTER** whilst in any of these displays sends a numbered copy of the screen to the MP100. The copy number is reset to 1 upon entry to the display and is increased by 1 every time ENTER is pressed.

   This provides a quick way of taking a snapshot of the system under test.

2. Transmitting data from the data logger

   Any of the tests currently stored in the data logger memory may be sent to the MP100 for hard copy. Prior to use the output format should be set to NARROW (24 columns) since the paper is 24 columns wide.

   Refer to section 4 - Data logging for full details of the data logger options.

Handy Hints

Charging

Charging should be carried out with the MP100 switched off.

Connect the MP100 RS232/DC IN socket to the MC100 RS232 Output socket, using the serial lead provided. Connect the MC100 Power Input socket to the mains supply.

Charging a fully discharged power pack will take around 14 hours.

Note: Due to this feature 12 Volts AC is present on pins 6 and 7 of the MC100 RS232 socket.

Figure 8.1 – Changing the paper in the MP100

- END OF SECTION 8 -

Warnings and Errors

Warnings

Warnings are given before the MC100 performs certain actions. For example, deleting the last test will prompt a warning before the data is deleted.

Errors

Errors may be divided into two categories, non-fatal and fatal.

Non-fatal errors Errors which occur when you attempt to do something out of context. For example, attempting to log a test when there is in sufficient memory available produces a message to this effect. Once the message has been displayed, control reverts to the previous menu and the unit may be used as normal.

Fatal errors Caused by hardware failure and once such a failure is detected execution of the program stops and the unit must be turned off.

If a fatal error is experienced then the best approach is to write down the full error description and then contact your sales office where a sales engineer will advise you on the best solution. A complete list of fatal errors is shown in figure 9.1.

0	DMA	0	INTERRUPT
1	DMA	1	INTERRUPT
2	CSI//O		INTERRUPT
3	ASCI	0	INTERRUPT
4	ASCI	1	INTERRUPT
5	INT	2	DETECTED
6	PRT	0	INTERRUPT
7	PRT	1	INTERRUPT
8	ADC		FAILURE
9	PAGE		STACK O/FLOW

SYSTEM FAILURE

Figure 9.1: List of fatal errors

- END OF SECTION 9 -

Handy Hints

Specification

General

The case is manufactured from 2mm deep drawn seamless aluminium pressings and machine finished alloy castings to ensure effective screening and shielding. It incorporates lift off hinges, a lockable latch and a handle. The case has a textured black powder coat finish and integral feet on both the base and lid.

Overall Dimensions	320 x 240 x 145 mm (L x W x H)
Weight	5.5 kg
Operating Temperature	0 to 40 ^{o}C
Storage Temperature	-5 to 70 ^{o}C

MC100 Inputs

Electrical connections to the sensors are via 6 five-pin DIN sockets and 1 seven-pin DIN socket. Flow 1 and Temperature 1 share a five-pin socket, as do Flow 2 and Temperature 2.

Pressure inputs (2 off)
Voltage range 0 - 100 mV
Resolution 0.1%
Excitation voltage 10 V

Peak pressure (2 off)
Voltage range 0 - 200 mV
Resolution 0.2%
Peak capture 100 mV, 1 ms wide pulse captured to at least 98%

Flow inputs (2 off)
Frequency range 10 - 2000 Hz
Sensitivity 10 mV (rms) at 10Hz, 80 mV (rms) at 2kHz

Temperature inputs (2 off)
To suit thermistor (type BETATHERM 30K6A1)
30,000 ohm at 25 °C

Speed inputs (2 off)
Transducer type Photo tachometer or magnetic pick-up
Frequency range 10 - 2000 Hz
Sensitivity 6 mV (rms)

Charger
Charger input Power supply via supplied mains lead
Charge time 14 hrs to fully charge
Voltage range 110, 220, 240 V AC, via internal soldered links

Handy Hints

Handy Hints

MC104 Inputs

Electrical connections to the sensors are via 6 five-pin DIN sockets and 1 seven-pin DIN socket. Flow 1 and Temperature 1 share a five-pin socket, as do Flow 2 and Temperature 2.

Pressure inputs (4 off)
Voltage range 0 - 100 mV
Resolution 0.1%
Excitation voltage 10 V

Peak pressure (4 off)
Voltage range 0 - 200 mV
Resolution 0.2%
Peak capture 100 mV, 1 ms wide pulse captured to at least 98%

Digital inputs (2 off)
Frequency range 7 Hz - 3 KHz
Sensitivity 6 mV

Temperature inputs (2 off)
To suit thermistor (type BETATHERM 30K6A1)
30,000 ohm at 25 °C

Charger
Charger input Power supply via supplied mains lead
Charge time 14 hrs to fully charge
Voltage range 110, 220, 240 V AC, via internal soldered links

Lithium battery cell

This MC100 and MC104 are fitted with an internal lithium cell (Lithium-TCL 3.7V 1/2AA).

The function of the lithium cell is to enable the unit to retain all programmed data when switched off.

Under normal working conditions the cell has a shelf life of 10 years. However the cell should be inspected to check its external condition at regular intervals which should be a maximum of every two years. If the cell shows sign of external leakage or corrosion the instrument should be returned to the distributor in order that the cell be disposed of in the proper manner, and a replacement cell be fitted in the unit.

To inspect the cell, remove the eight socket set screws fastening the cover to the case frame. Lift the cover off the unit, note the cover must be lifted from the bottom of the unit first. The cell is now visible from the bottom end of the unit, it is orange and black in appearance. Once inspected, replace the cover and screws.

Handy Hints

Warning

The cell should not be recharged, disassembled, incinerated, heated above 100 degree centigrade nor have its contents exposed to water as this may cause fire or explosion.

- END OF SECTION 10 -

Handy Hints

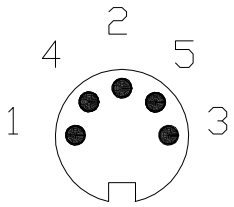
Appendix

Cables required
FT8383-UP Flow / Temp cable for use with the MC100 only
FT8525-UP Flow / Temp cable for use with the MC104 only
FT7951-UP (Pressure cable for MC100 and MC104)

Drawings
Input connections and wiring details

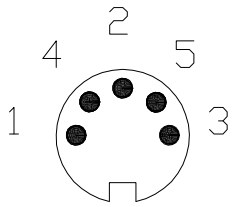
Menu trees
MC100 menu tree
MC104 menu tree

Handy Hints



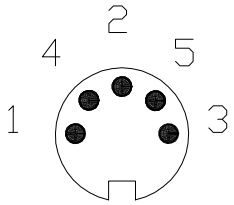
PIN	DESCRIPTION
1	FLOW INPUT
2	GROUND
3	TEMPERATURE INPUT
4	GROUND
5	GROUND

MC100 FLOW INPUT



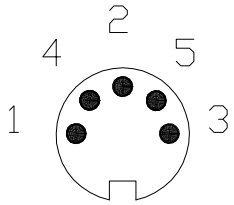
PIN	DESCRIPTION
1	FLOW +VE INPUT
2	SWITCHED 5V OUTPUT (MAX I=20mA)
3	TEMPERATURE INPUT
4	GROUND
5	FLOW −VE INPUT

MC104 FLOW/SPEED INPUT



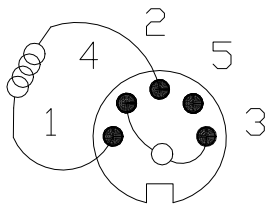
PIN	DESCRIPTION
1	TACH INPUT
2	GROUND
3	N/C
4	N/C
5	GROUND

MC100 SPEED INPUT



PIN	DESCRIPTION
1	GROUND
2	GROUND
3	SWITCHED 10V OUTPUT (MAX I=30mA)
4	PRESSURE −VE INPUT
5	PRESSURE +VE INPUT

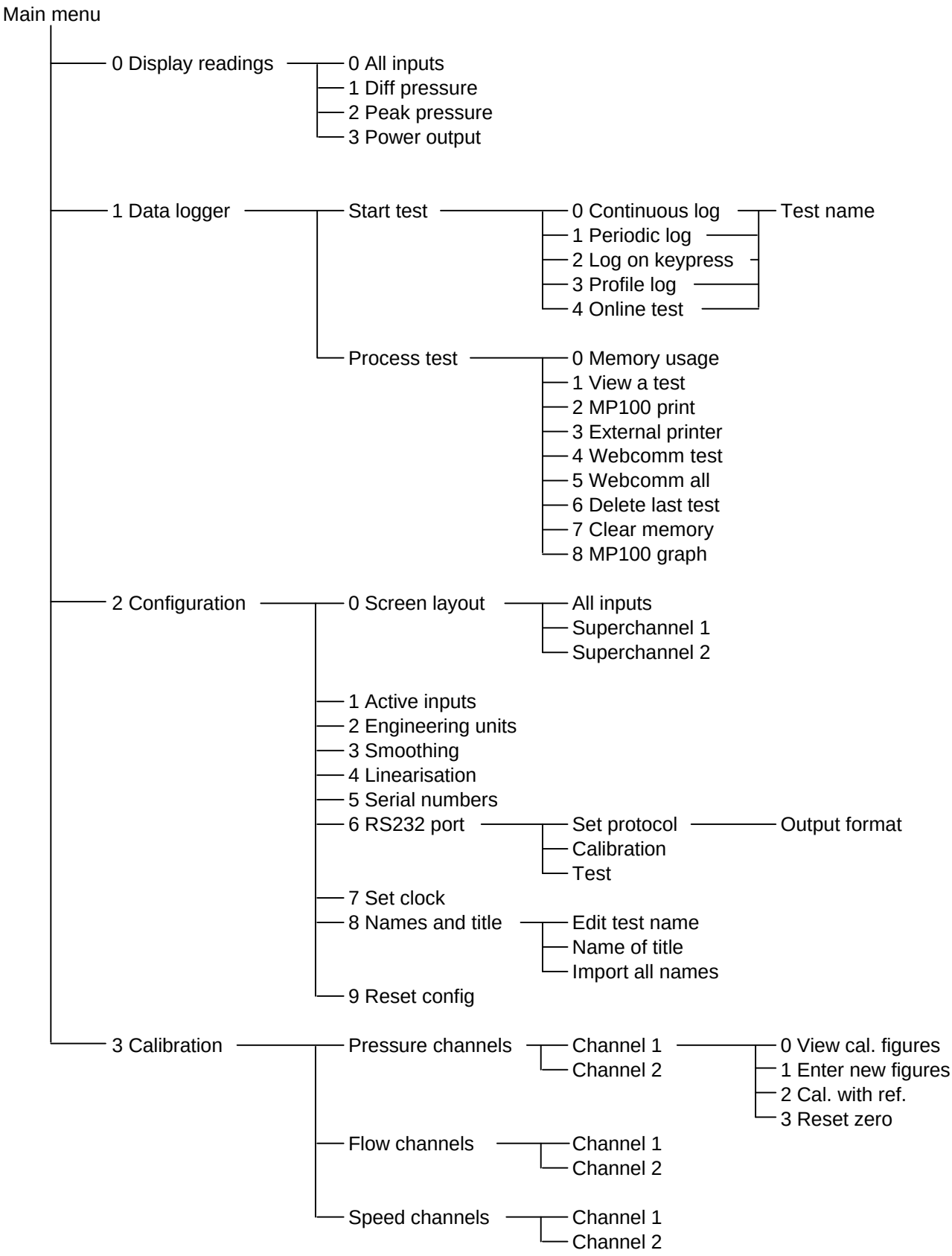
MC100/MC104 PRESSURE INPUT



PIN	DESCRIPTION
1	TXD COIL
2	TXD COIL
3	THERMISTOR
4	THERMISTOR
5	N/C

WEBTEC FLOW TURBINE CONNECTION

MC100 Menu Tree



MC104 Menu Tree