

User Manual



Teletrend
Multitrend
Circuitrend

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Chapter 1: Welcome to Honeywell V5

Safety

The **Honeywell V5™** range of instruments is compliant with the requirements of BS EN 61010-1:1993 "Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use". If the equipment is used in a manner NOT specified by **Honeywell**, the protection provided by the equipment may be impaired.

Symbols

One or more of the following symbols may appear on the recorder labelling

Symbol	Meaning
	Caution - refer to manual for instructions
	Caution - risk of electric shock
	Direct Current
	Protective conductor terminal
	Earth terminal

Static Electricity

All circuit boards and electronic modules associated with this recorder contain components which are susceptible to damage caused by electrostatic discharge. Should it be necessary to handle such components, appropriate precautions in accordance with BS CECC 00015 "Basic specification: Protection of electrostatic sensitive devices" should be observed.

Dos and Don'ts

1. Before any other connections are made to the recorder, the protective earth terminal shall be connected to a protective conductor.

WARNING

IMPROPER INSTALLATION

Any interruption of the protective conductor outside the recorder, or disconnection of the protective earth terminal is likely to make the recorder dangerous under some fault conditions. Intentional interruption of the protective conductor is prohibited.

In order to comply with the requirements of safety standard EN61010, the recorder shall have one of the following as a disconnecting device, located within easy reach of the operator, and clearly labelled as the disconnecting device:

- A switch or circuit breaker which complies with the requirements of IEC947-1 and IEC947-3.
- A separable coupler which can be disconnected without the use of a tool.
- A separable plug, without a locking device, to mate with a socket outlet in the building.

Failure to comply with these instructions could result in death or serious injury.

2. Whenever it is likely that protection has been impaired, the recorder shall be made inoperative and secured against operation. The manufacturer's service centre should be consulted.
3. Any adjustment, maintenance and repair of the opened recorder in a powered condition is prohibited.
4. Where conductive pollution such as condensation or conductive dust is present, adequate air conditioning, filtering and/or sealing must be installed.
5. This recorder contains a battery which must be treated and disposed of with care. The battery must not be short circuited. Batteries should be disposed of in accordance with local regulations; they must not be disposed of with normal refuse.

WARNING

IMPROPER INSTALLATION

Signal and supply wiring should be kept separate from one another. Where this is impractical, shielded cables should be used for the signal wiring. Where signal wiring is carrying, or could carry under fault conditions, hazardous voltages (defined as > 30 V rms and 42.4 V peak, or > 60 Vdc), double insulation must be used for all signal wiring.

Failure to comply with these instructions could result in death or serious injury.

6. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment might be impaired.
7. In the case of portable equipment, the protective earth terminal must remain connected (even if the recorder is isolated from the mains supply) if any of the measuring, communications or relay terminals are connected to hazardous voltages.

Hazardous Voltage

Hazardous Voltages are defined by EN61010-1 as follows:

Voltage levels above 30 Vrms and 42.4 V peak or 60 Vdc are deemed to be Hazardous Live.

Please refer to [“Appendix L - Battery Safety Data Sheet” on page 103](#) for further information.

Introduction

Honeywell V5, the 'Next Generation' of paperless chart recorders, is the latest development of the solid-state replacement for traditional paper chart recorders, originally pioneered by **Honeywell** in 1985.

Several options are available to meet a wide range of requirements within the water, process, gas and petrochemical industries, as well as power and environmental monitoring.

The **Teltrend V5™**, **Multitrend V5™** and **Circuitrend V5™** all incorporate thin-film transistor LCD technology, data storage on 3.5" floppy disk, and universal power capability. Depending on the model, a range of up to 9 traces can be displayed, with real time bargraph and digital readouts - each input channel also has the option of two alarms.

Additional features include alarm relay outputs, digital inputs, totalising, event markers, maths expressions, network communications, barcode reading and user-defined screen layouts.

Recorder configuration, export and archiving of data, trend analysis and printouts, and real time communications with the recorder are all provided by the **Honeywell TrendManager Pro™** software.

Description

Model	Details
Teletrend V5™	A 2, 4, 6 or 8 channel recorder with 5.5" LCD offering a low-cost version of the paperless chart recorder.
Multitrend V5™	A 6 or 8 channel recorder with 10.4" LCD for easier viewing from further distances.
Circuitrend V5™	The first paperless <i>circular</i> chart recorder incorporating 2, 4, 6 or 8 channels and a 10.4" LCD, with a panel-mounted or sealed-enclosure option.

Specifications

	Teletrend V5™	Multitrend V5™	Circuitrend V5™
Display Technology	5.5" TFT LCD	10.4" TFT LCD	10.4 " TFT LCD
Data Storage	3.5" 1.44 Mbyte floppy disk		
Dimensions (mm) : Bezel Size (w x h) Panel Depth Panel cut out	144x144 300 138x138	231x239 300 138x138	350x350 150 322x322
Number of Channels	2, 4, 6 or 8	6 or 8	2,4, 6 or 8
Input Signals Standard	0-20 mA, 4-20 mA, 0-5 Vdc or specified sub-ranges		
Universal Inputs Option	±100 mV, ±200 mV, ±1 V, ±10 V, ±10 mA, ±20 mA, PT100, Thermocouple		
Resolution	Standard analogue - 0.1 %; Universal analogue - 0.0015 %		
ac Power Supply	85-250 Vac 50-60 Hz	85-250 Vac 50-60 Hz	85-250 Vac 50-60 Hz
dc Power Supply	9 - 18 V, 18 - 36 V, 36 - 72 V		
Power Consumption (max)	27 VA(ac), 27 W(dc)	50 VA(ac), 50 W(dc)	
Alarms 2 per channel	Optional on all models - 3 A, 240 Vac relays.		
Communications	Optional isolated RS485 or barcode reader. Trendbus™ or Modbus™ protocols for remote data retrieval.		
dc Isolation	>90 V		
Relative Humidity	10 % to 90 % RH		
Operating Temp	0 to 50 °C		
Storage Temp	-10 to 60 °C		

Panel depth measurements do not include the thickness of the panel.

Chapter 2: Installation

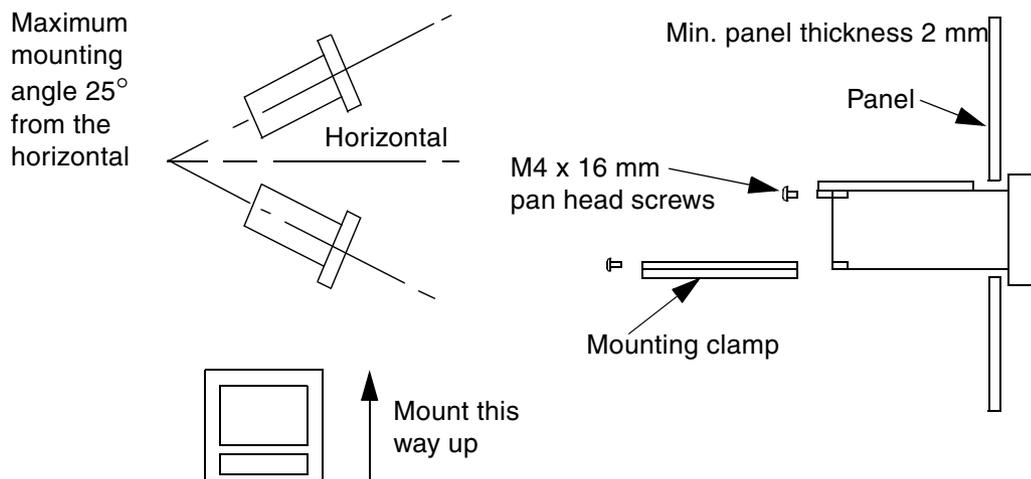
Unpacking

It is advisable to retain the packaging in which your recorder arrives, including the styrofoam packing, should the need to return your recorder arise. If the original packing is destroyed, then **ONLY** pack the recorder in polystyrene granules if the recorder is **FIRST** sealed in a strong plastic bag.

Mechanical

Teletrend V5/Multitrend V5

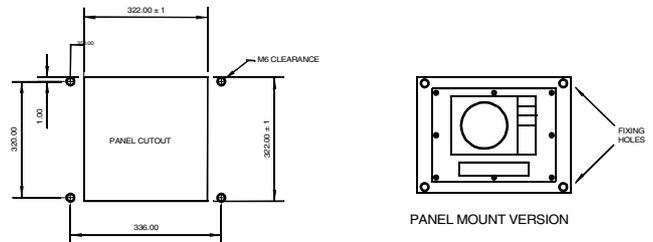
These units are all panel mounted in the same manner as shown in below. The recorder slides into the panel cut-out from the front and is held in place by two mounting clamps pressed against the rear of the panel by two M4 x 16 mm pan head screws.



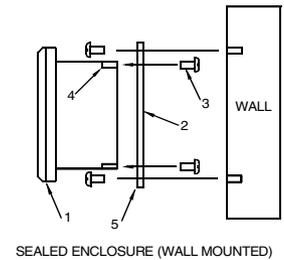
NB. Do not over tighten mounting clamp screws. Recommended torque is 0,2 to 0,5 N m (1.77 to 4.4 lbf in).

Circuitrend V5

The **Circuitrend V5** can be configured as a panel-mounted or sealed-enclosure option. The panel-mounted version is fitted to the panel via fixing holes on the front plate.



The sealed-enclosure version can be panel-mounted or wall-mounted. The hole positions for panel-mounting the sealed-enclosure (1) are the same as for the panel mounted version and are accessed by first opening the door of the enclosure. To wall-mount the enclosure a wall-mounting kit is required. This consists of a rear panel (2) and four bolts (3). The panel is fitted to the rear of the enclosure and held in place by inserting the bolts into the bosses on the rear of the enclosure (4). The unit can then be fitted to the wall via the fixing holes in the rear panel (5).



Electrical

All connections to the unit are made via the rear panel, the layout of which is shown opposite:

ac Power

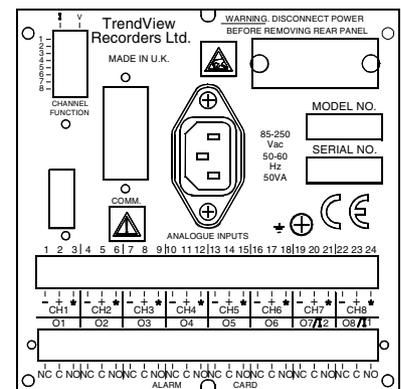
ac supply is connected via the standard configuration IEC chassis plug on the rear panel, labelled 85-250 Vac 50-60 Hz.

⚠ WARNING

ENSURE SAFETY EARTH CONNECTION

Always ensure that a 3-way earthed mains lead is used with a **Honeywell** unit when connecting to an ac supply.

Failure to comply with these instructions could result in death or serious injury.

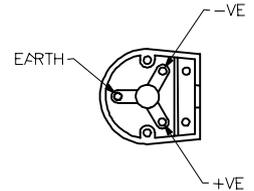
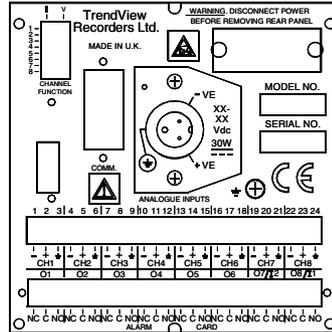


The **Honeywell** range is intended for panel-mount use and as such should be considered as permanently connected. Disconnection from the supply **MUST** be made possible by means of a switch, circuit breaker or other means of supply isolation. The disconnection device must be included in the panel installation, clearly marked, in close proximity to the **Honeywell** equipment, and within easy reach of the operator. [See “Safety” on page 1.](#)

In the case of portable equipment, the protective earth terminal must remain connected (even if the recorder is isolated from the mains supply) if any of the measuring, communications or relay terminals are connected to hazardous voltages.

dc Power

Power to a dc variant is connected by a 3 pin plug which should be wired as described below. There are three ranges available; 9 - 18 volts, 18 - 36 volts and 36 - 72 volts. Remove the cover from the plug by extracting the two screws. Connect the wires as shown below, replace the cover and holding screws.



Analogue Inputs

These should be connected to the 24-way screw terminal plug which fits into the PCB header labelled Analogue Inputs on the rear panel. Terminals are marked + (positive), - (negative), and * (function). The function connections provide the Transmitter Power Supply option (see below). This facility is not available on the Universal Analogue Card, which should be fitted to units with inputs other than the standard 0-5 volt, 1-5 volt, 0-20 mA or 4-20 mA signals.

The switch labelled **CHANNEL FUNCTION** is used for selecting the input type (current or voltage) for each channel. The input type must also be selected in the setup procedure (see **"Input Engineering Units" on page 31**).

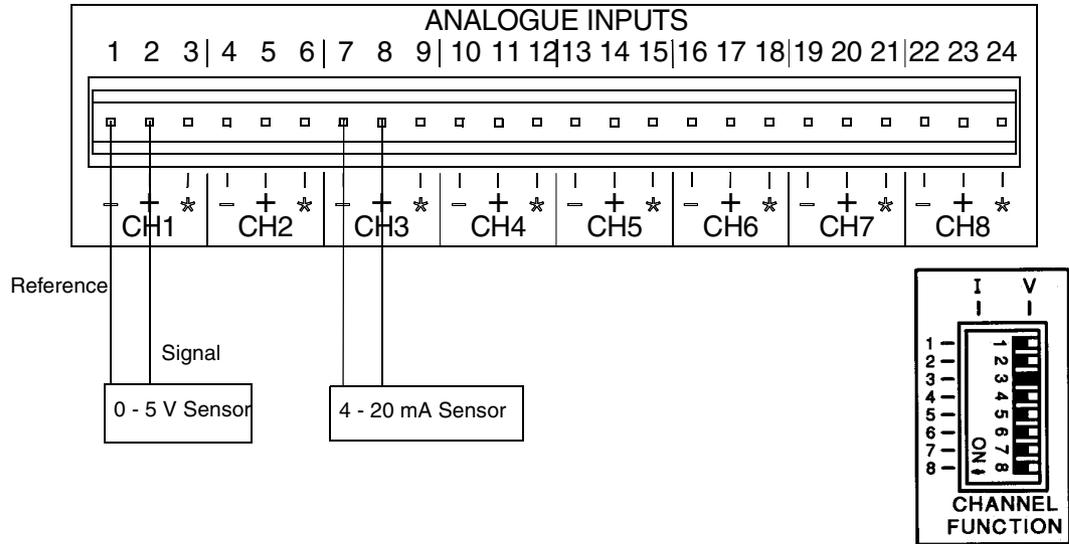
The number of channels that can be used depends on the model and the customer specification. Available channels start at channel 1 (CH1) and continue up to the number of channels specified.

An example of how to connect analogue inputs is shown overleaf.

Standard Analogue Card

This example shows a 0-5 Volt device (such as the **Honeywell** SGS 100 pressure transducer) connected to channel 1 and a 4-20 mA device (such as the **Honeywell** SGS 601 level transmitter) connected to channel 3. Notice the channel function switch positions - switch 3 is to the left thus selecting channel 3 as a current signal input.

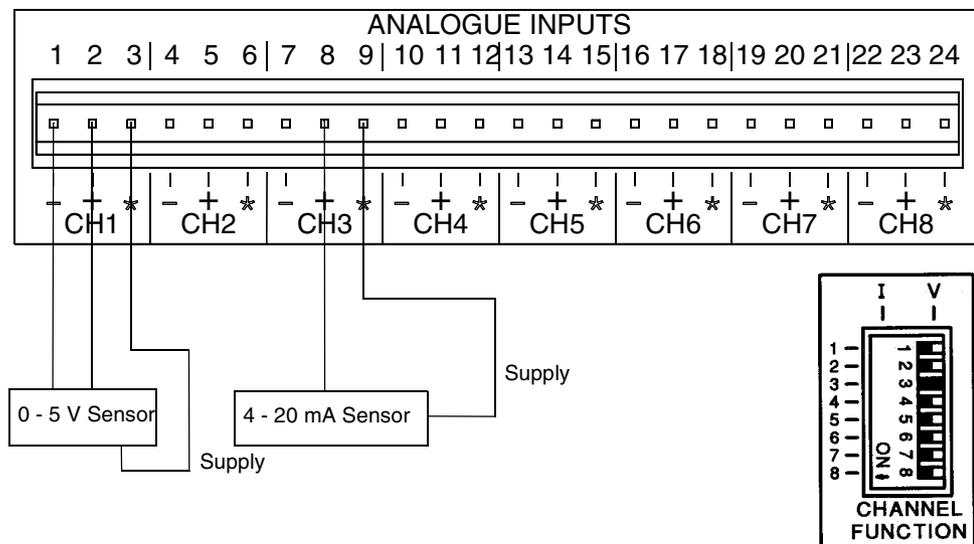
For 24-way connector; torque settings 0,4 N m/3.5 lbf in. Do not over tighten.



Transmitter Power Supply

(Optional Extra)

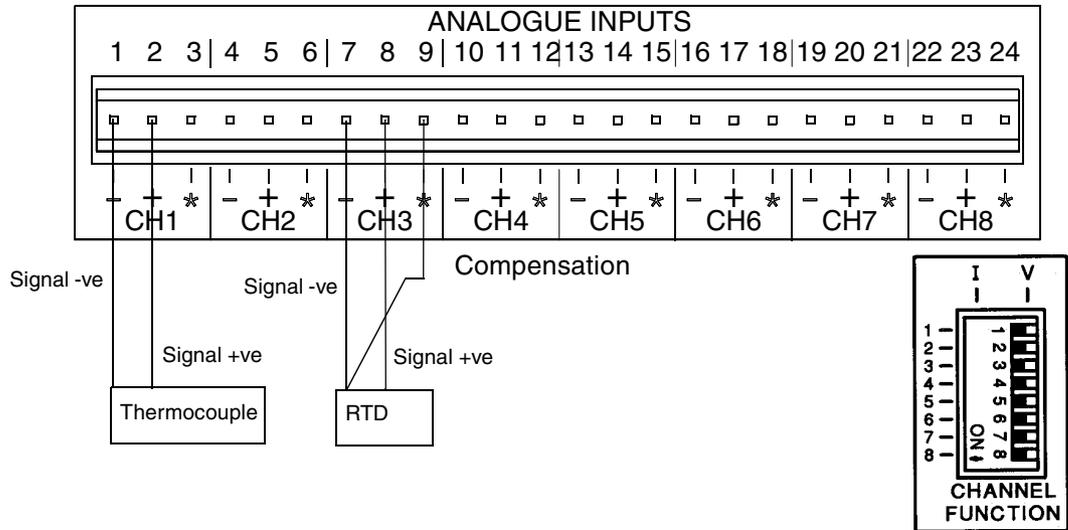
Units fitted with the standard analogue card are equipped with a Transmitter Power Supply. This means that the supply for sensor equipment can be taken from the **Honeywell** unit. An example is shown below.



For 24-way connector; torque settings 0,4 N m/3.5 lbf in. Do not over tighten.

Universal Analogue Card

The Universal Analogue Card is used for connecting a wider range of input signals to a unit, typically thermocouples or resistance thermometers. These are connected as shown in the example below. The thermocouple is connected for internal compensation - details on how to connect thermocouples using other forms of compensation are given in [“Appendix G - Thermocouple Connections” on page 93.](#)

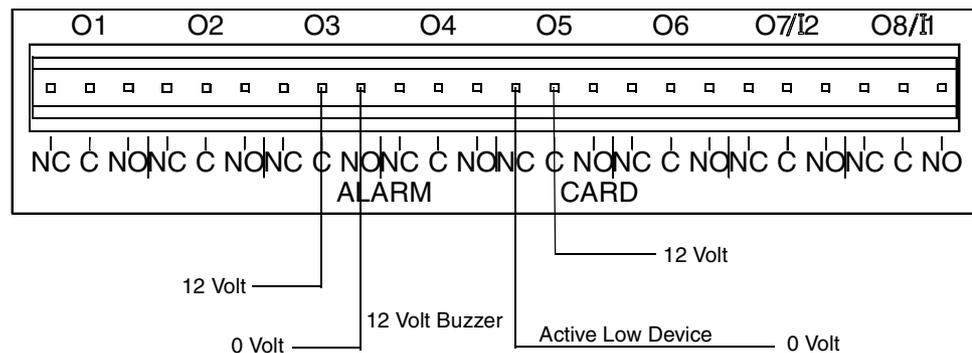


For 24-way connector; torque settings 0,4 N m/3.5 lbf in. Do not over tighten.

Alarm Outputs

4 and 8 Relay Alarm Card

The 24-way PCB header on the rear panel labelled Alarm Card connects to 3 A, 240 Vac SPCO relays. The pin-outs are labelled NO (normally open), C (common), and NC (normally closed). Devices driven by the relays are connected to a 24-way screw terminal plug as for the analogue inputs. Available alarm outputs start from alarm channel 1 (A1) up to the maximum number of alarms allocated. (NOTE: For a 4-channel Alarm card only Channels 1, 2, 3, and 4 are available.) An example of connecting devices to alarm relays is shown below.



NB. When installing an Alarm PCB ensure that you alter the hardware settings of your recorder in the Factory option of the Special Setups menu as described on page 47.

Where a device requires a voltage to operate it, such as a 12 Volt buzzer, connect it to the normally open NO contacts. Other devices may require a low signal to operate them,

and should be connected as shown for Alarm 5. The maximum voltage which may be used with the alarm relays is shown in the table in [“Specifications” on page 4](#).

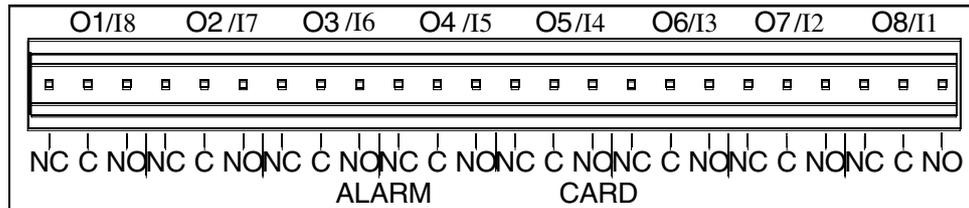
For 24-way connector; torque settings 0,4 N m/3.5 lbf in. Do not over tighten.

8 Input/Output Alarm Card

The 8 Input/Output Alarm Card has 1 A 24 Vdc rated relays connected via a 24-way PCB header at the rear of the unit.

Each channel can be set up as an input or an output. For output the relay is normally open and closed on alarm.

For 24-way connector; torque settings 0,4 N m/3.5 lbf in. Do not over tighten.

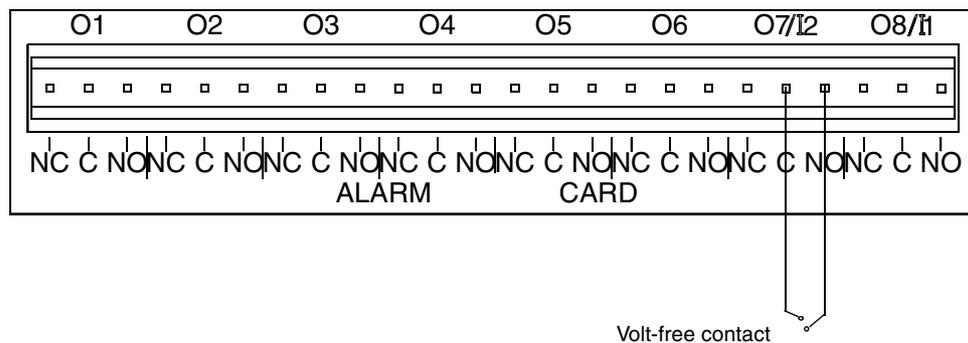


24 Vdc ONLY

Digital Inputs

On a standard 8-channel Alarm card, channels 7 and 8 may be used as digital inputs if they are not in use as alarm outputs. A digital input is provided by a volt-free contact between the normally open NO and common C terminals of an output relay as shown below.

NB. Alarm Relay output 8 corresponds to Digital Input 1, Alarm Relay output 7 to Digital Input 2, and so on.



NB. When installing an Alarm PCB ensure that you alter the hardware settings of your recorder in the Factory option of the Setups menu as described on page 47.

For 24-way connector; torque settings 0,4 N m/3.5 lbf in. Do not over tighten.

Serial Interface

All serial communications are made via the 9-way D-type plug labelled COMM. on the rear panel of the unit. Pin-outs for the different types of connections are shown in [“Appendix F - Serial Interface Connections” on page 91](#).

Chapter 3: Getting Started

Power Up

To set up a new unit, first check that the power supply connections to the rear panel are correct.

If the unit is cold allow time for it to warm up to 12 °C or leave standing for 1 hour at room temperature so that any condensation can evaporate before applying power.

⚠ WARNING

ENSURE SAFETY EARTH CONNECTION

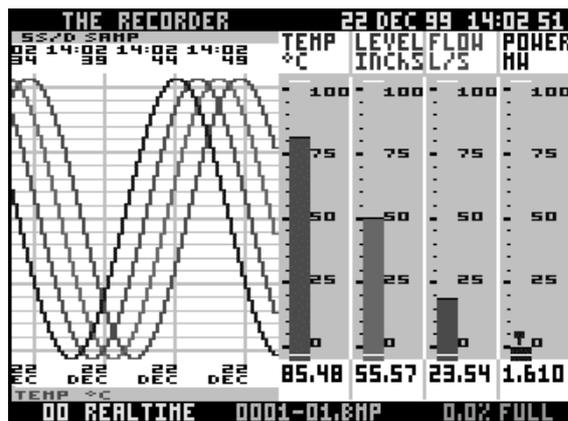
When using an ac supply ensure that a 3-way earthed mains lead is used to connect the unit.

Failure to comply with these instructions could result in death or serious injury.

Switch on the supply to the unit, the display will be illuminated.

The **Honeywell V5** logo and a message giving the model type of the unit and the status of the floppy disk drive will appear briefly. This is then followed by the chart display.

If a disk is in the floppy disk drive during power up, the unit will automatically load setups that have been stored on the disk. The unit will load the latest setups from the disk. The unit will then write those setups to disk under setup file names with the extension number incremented by one (see [“Writing To Disk” on page 67](#)). If a disk is not in the drive, the unit will load the latest setups stored in NV RAM. (For more information on NV RAM see [“Options Key” on page 69](#).)



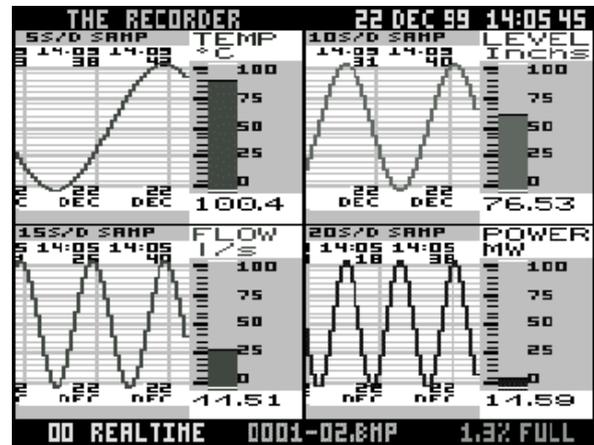
Conventional

Basic Keypad Operation

Changing Display Modes

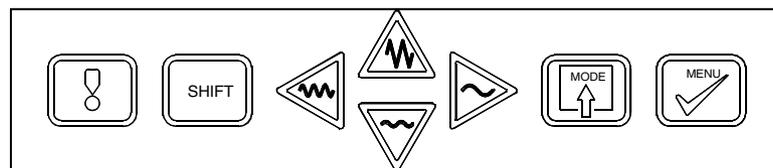
Chart displays may be seen in two main modes - conventional or tiled.

- **Conventional** Mode displays all traces on one chart background.
- **Tiled** Mode allocates an individual chart background for each trace. **Circuitrend V5** - also includes Circular mode as one of the basic modes (see "**Circuitrend V5 Features**" on page 19).



Tiled Mode

To change between the two screens press the **MODE** key.



Using Menus

To enter the Setup Menus press the **MENU** key on the front keypad. The Main Menu will appear on the screen. The selected item on the menu is indicated by the highlight.

- An **arrow pointing to the left** indicates that you can return to a previous page or display.
- An **arrow pointing to the right** indicates that you can go into a subsequent menu.
- An item displayed in **grey text** is not selectable with the unit in its current status.

To **move the highlight** press the **up** or **down arrow** key on the keypad. For example to move the highlight from **Quit** to **Disk** press the **down arrow** key twice.

To **move back** to the previous menu or display press the **left arrow** key. If you are unsure about your location within the menu hierarchy press this key continuously until the Main Menu appears.

Pressing the **left arrow** key while in the Main Menu causes the unit to exit the setup menus and redraw the chart display.

The **MENU** key acts as an **Enter** or **Return** key. Where an item is marked as having a subsequent menu, pressing the **MENU** key with that item highlighted will bring up the next menu.

When an item is not marked as having a subsequent menu, pressing the **MENU** key will select or deselect the highlighted item - these items are either functions or tick-selectable.

- A **tick-selectable** item is marked with a ✓ if it is selected.
- A **function item** is performed as soon as the **MENU** key is pressed.



Entering Text

Certain items in the setup menus when selected will bring up a prompt in which you are required to enter text. This can be in the form of either a name, number or time and date. The method of entering text is generally the same for all prompts. When a prompt appears, the character to be changed will be indicated by a cursor - either a flashing rectangle or a flashing underline. To **change the character** highlighted by the cursor, press the **up** or **down arrow** key. For each key press, the next option from a list of available characters will appear. Holding down a key will allow you to run through the list continuously. When you reach the end of a list, release the key and press again to restart the list.



```
Scale Major Div
025.0 °F
```

To **delete a character** and return to the beginning of a list, highlight the relevant character and press the **MODE** key.

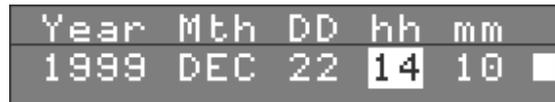
Others, such as the **UNIT DESCRIPTION** prompt, offer a list of numbers, lower and upper case letters, and some symbols.



```
Unit Description
" THE RECORDER "
```

NB. If you have altered the contents of a prompt but do not want those changes to take effect, escape from the prompt by pressing the SHIFT key - a red cross will appear in the top left corner of the prompt - then press the MENU key. The list of available characters will vary according to the prompt. Some prompts, such as the SCALE MAJOR DIV prompt, offer a list of numbers 0-9.

In the **TIME/DATE** prompt the whole item is covered by the cursor rather than each individual character. In this example, pressing the up arrow key with the cursor on **Mth** would change that item to JAN. Pressing the down arrow key with **Year** highlighted would change that item to 1998. Valid options only are selectable for each item - for instance, only the numbers 0 to 24 are available for **hh**. The colour of the text in which the time and date is displayed can also be selected by changing the colour of the square at the far right of the TIME/DATE prompt.



```
Year Mth DD hh mm
1998 DEC 22 14 10 ■
```

To **select the item** to be changed move the cursor over that item by pressing the right or left arrow key. When all items have been selected, press the **MENU** key to enter the text and return to the previous menu.

Software Reset

To reset the unit without removing the power supply, press and hold the **Softkey (!)**, and the **SHIFT** and **MENU** keys at the same time. The unit will respond as if the power supply to the unit had been disconnected i.e. the internal buffers will be cleared of data and the setups will return to default settings or load up from disk or NV RAM.

Other keypad operations for normal operation of the unit are described in [“Replaying Data” on page 56](#).

Circuitrend V5 and Multitrend V5 Text Entry

When entering text on a **Circuitrend V5** or **Multitrend V5** recorder, it is possible to call up the entire character map by pressing the **Softkey** from the text entry prompt. The cursor in the character map can be manipulated in all directions using the arrow keys on the keypad. Pressing the **MENU** key causes the highlighted character to be entered in the prompt, then the cursor jumps back to the character map ready for the selection of the next character.

To close the character map press the **Softkey** again. If you want to amend a character in the text entry prompt, move the cursor to the relevant character in the normal way, then press the **Softkey** to call up the character map again. Select a new character then close the character map as before. Not **all** characters are available in the character map - a full list of characters is given in [“Appendix E - Character List” on page 89](#).

If you wish to use a character not shown in the character map, you must select it in the normal way as described in [“Entering Text” on page 13](#). To close the character map press the **Softkey** again. If you want to amend a character in the text entry prompt, move the cursor to the relevant character in the normal way, then press the **Softkey** to call up the character map again.

If you wish to use a character not shown in the character map, you must select it in the normal way as described in [“Entering Text” on page 13](#).

Chapter 4: Display Setup Menus

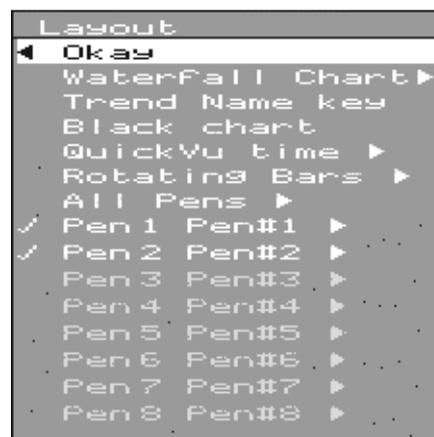
Layout

The **Layout** menu is used to select how data is shown on the screen. (This should not be confused with the Pen Setup menu described in “**Pen Setup Options**” on page 35 which deals with the way in which data is logged.



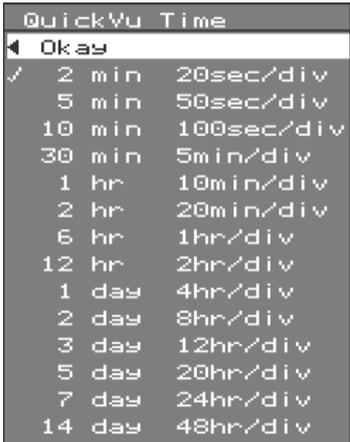
The options on this menu are:-

- **Waterfall Chart** (✓) - with this item selected trends will scroll vertically down the display. Waterfall chart also has certain associated options as follows:
 - **Wide Chart** (✓) - the chart area is stretched to occupy the full width of the display (i.e. no time and date stamp).
 - **No Scale** (✓) - removes the scale gradients and values from the bargraph(s).
 - **Scale on Bar** (✓) - draws the scale gradients and values over the bargraph indicator thereby reducing the overall width of each bargraph area. (This item cannot be selected with the No Scale option ticked.)
 - **Thin Bar** (✓) - reduces the width of bargraphs. No gradients or values are displayed along the bargraph in this mode.
 - **Time Stamp Rate** - select this item to call up the Time stamp sub-menu from which you can select how frequently you want the time stamp displayed.
- **Trend Name Key** - displays the name allocated to each visible trace at the top of the chart display. (Conventional mode only.)
- **Black Chart** (✓) - turns the background colour of the chart display to black.



- **QuickVu Time** - calls up the sub-menu opposite.

When the **Softkey** is pressed with the unit in real-time mode, the trends are shown instantly over a different time period selectable from the **QuickVu Time** menu. For example, if you selected a **QuickVu** time of 24 hours, pressing the **Softkey** shows the overall trends for the last 24 hours (see **“Softkey Operation”** on page 59).



QuickVu Time	
◀ Okay	
✓ 2 min	20sec/div
5 min	50sec/div
10 min	100sec/div
30 min	5min/div
1 hr	10min/div
2 hr	20min/div
6 hr	1hr/div
12 hr	2hr/div
1 day	4hr/div
2 day	8hr/div
3 day	12hr/div
5 day	20hr/div
7 day	24hr/div
14 day	48hr/div

- **Rotating Bars** - displaying several bargraphs means a reduction in chart area available for traces. An alternative solution is to use Rotating Bars, where a single bargraph is displayed at any time and the display switches through all the enabled bargraphs in turn. Selecting this item calls up the Rotating Bars sub-menu - from here you can select the time period each bargraph is displayed before being replaced by the next one, or disable this facility.
- **All** - select this item to set the same layout for all pens.
- **Pens 1-9** (followed by the trace name) - select one or more of these items to set individual pen display parameters (see **“Pen Display”** on page 23).

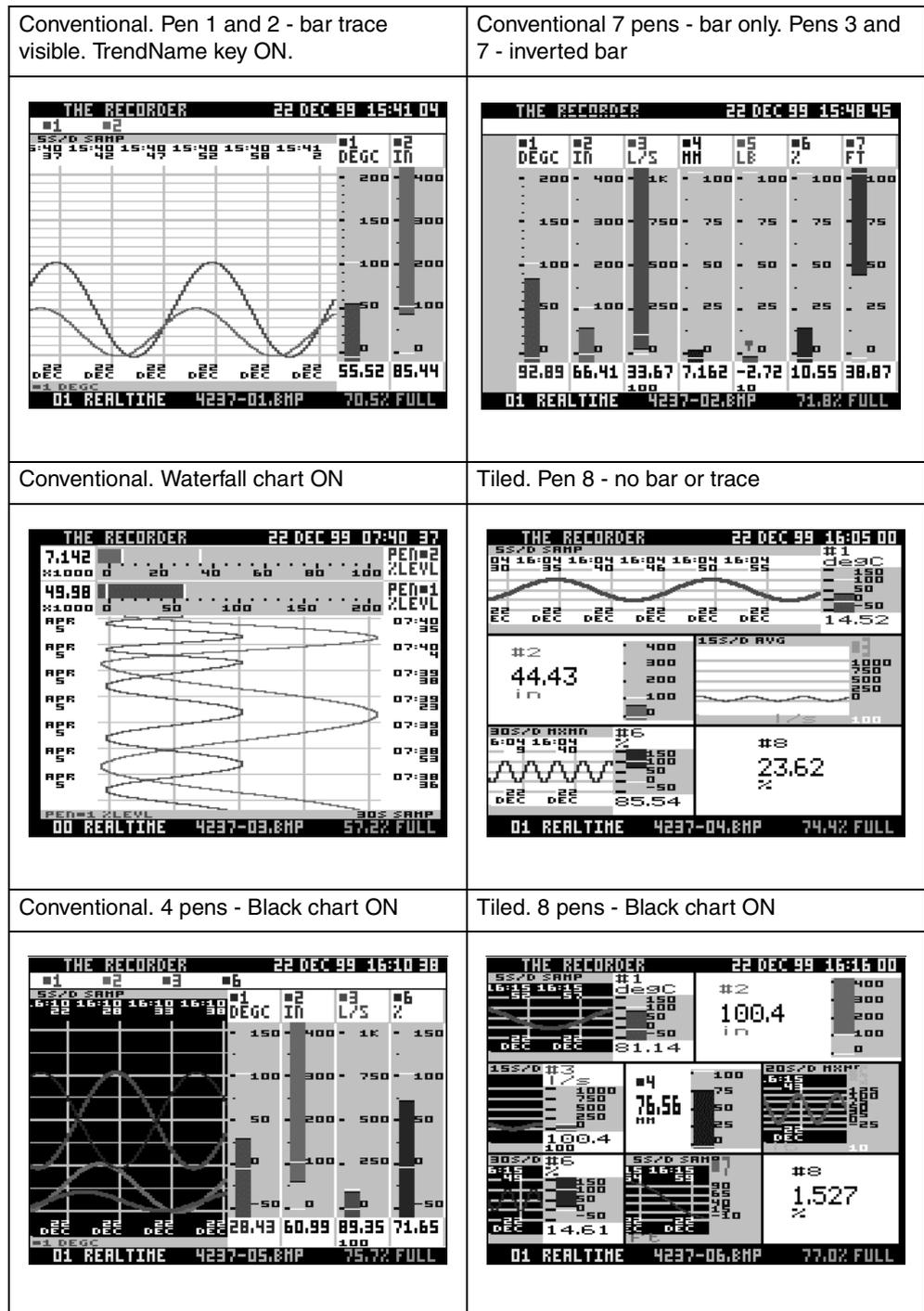
In the **Layout** menu, a tick to the left of a pen indicates that it has been denoted as visible on the display (unless the text is greyed out, in which case the pen is unavailable). Note that data may still be recorded on a pen even if it is not visible on the display (see **“Display Setup Menus”** on page 15 on how to enable a pen to log data).

Any changes to the layout will only be noticeable once you Quit the Main menu and the chart is redrawn.

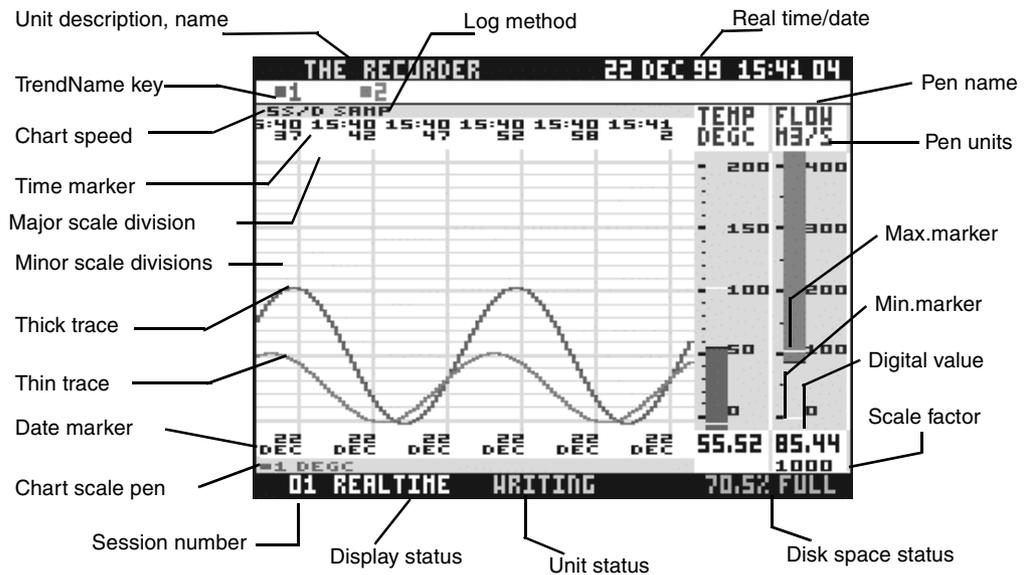
The layout of the display can be changed while the unit is still recording (unlike changes to the Setups, which require you to stop the recording). However, the layout changes made during a recording session will not be saved until a new session is started.

Some of the different formats of display are shown in **“Display Formats”** on page 17.

Display Formats



Display Features



- **Unit Description, name and ID Number** - These items scroll across the top line of the display in normal operation.
- **Trend Name Key** - Pen names of each visible trace.
- **Chart Speed** - Time between each division.
- **Time Marker** - Time stamp for data at that point.
- **Major/Minor Scale Divisions** - Fractions of chart scale.
- **Thick/Thin Trace** - User selectable for each pen.
- **Date Marker** - Date stamp for data at that point.
- **Chart Scale Pen** - Pen used to govern chart scale and speed in conventional mode.
- **Session Number** - Number of recording session.
- **Display Status** - Provides information on the contents of the display (e.g. whether the data on the screen is in real-time or a replay of recorded information).
- **Unit Status** - Provides information on the operation of the recorder.
- **Disk Space Status** - Indicates either the amount of disk space used up or any disk error messages.
- **Max/Min Markers** - see "Pen Display" on page 23.
- **Scale Factor** - see "Scale" on page 36.
- **Digital Value** - Digital value of trend - displayed in grey when the value is outside the pen scale.
- **Pen Name/Units** - see "Name" on page 35 and "Units" on page 37.
- **Real Time/Date** - Current time and date - user-adjustable.
- **Log Method** - see 'Log Method' on page 35.

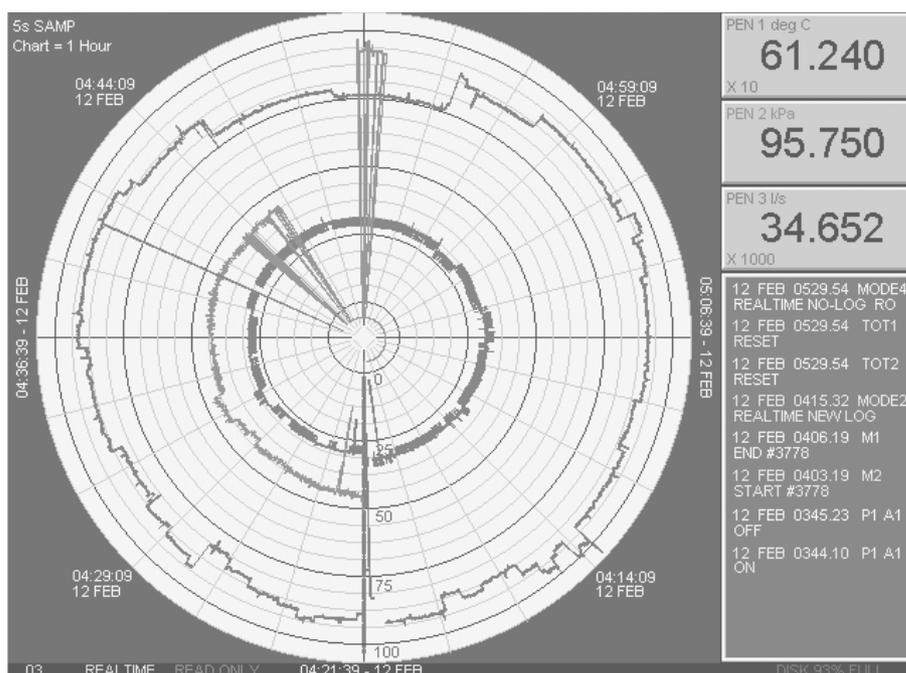
Chapter 5: Circitrend V5 Features

Special Features

The additional space afforded by the **Circitrend V5** display allows for further layout options beyond those offered elsewhere in the **Honeywell** range of recorders.

Data may be viewed in three standard modes; Conventional, Tiled (as for other **Honeywell** recorders) and Circular (not available on **Multitrend V5**). Within Circular mode, there are four main features; Pens, Digitals, Events and Totals.

Different layouts may be produced using these features in various combinations. Each feature, and its effect upon the display layout, is described below:



- **Pens** - at least one pen must be selected for the circular chart to be drawn. If no pens are selected the chart area of the display is either blank or occupied by **Events** (see below). In other modes of display, any number or combination of available pens may be selected to be drawn on the chart background.
- **Digitals** - a digital read-out is provided for each selected pen and is displayed in tabular form to the right of the circular chart area. If no pens or events are selected the display defaults to the maximum number of available pens.

- **Events** - when enabled, the list of events is displayed as follows:
 1. Where Pens and Digitals are enabled, Events are displayed in a column below the digital read-outs. The Events list will occupy as much space as is available. If nine pens are selected the digital readouts will take priority.
 2. Where Pens and Digitals are not enabled, Events will occupy the entire screen area.
 3. Where no Pens are selected, Events will occupy the chart area next to the digital read-outs in place of the circular chart.
- **Totals** - when enabled perform exactly as **Events** above. Both functions cannot be displayed at the same time, **Totals** only **OR Events** only may be selected.

Layout

The options include:-

- **Waterfall Chart** (✓) - if selected trends will scroll vertically down the display.
- **Tiled Mode** - allocates an individual chart background for each trace.
- **Circular Chart** - generates a Sub Menu which allows the scale and time details on a circular chart to be established.
- **Group Setup** - allows the user to set up several Layout configurations which are then stored as Groups. Once Groups have been selected navigation through the groups may be achieved either manually by pressing the **SHIFT** key or applying a digital input, or automatically at pre-set intervals. Alternatively a Group may be selected directly by using the Zoom Group function in the Quick Menu (see "**Zoom Group**" on page 62).
- **Trend Name Key** (✓) - produces a Sub Menu with the following options:
 - **OK**
 - **Enable**
 - **Pen Name** one of these must be selected
 - **Pen Description**

If **Pen Name** is ticked a 6 character name will display the traditional trend name key as standard product.

If **Pen Description** is ticked a 20 character pen description is displayed, in one line, as assigned to each pen. This is along the bottom of the screen in waterfall mode and along the top of the screen in conventional mode. If there are more than five pens with descriptions, these are displayed over two lines.

To set the pen description go to **Setup**, then **Pen**, select the required pen and under **Description** type in the description in the normal text entry manner. To set the pen name go to **Set up**, then **Pen**, select the required pen and under **Name** type in the name in the normal text entry manner. (See "**Entering Text**" on page 13).

Large Title Bar (✓) - (conventional mode and waterfall mode) if this is ticked the unit number, name, description, time and date relevant to the unit is displayed along the top of the screen in large font.

Duty Label Totals (✓) - (conventional and waterfall mode) if this option is ticked the totalised values for the current digital value, scale factor and the units for each pen are

displayed (in 12 characters) in a large font. Each pen is allocated one row across the screen. If this option is not selected for any particular pen the units total is removed from the screen rather than be displayed at zero. The totalised values for the pen will also be displayed in the Duty Label if the Duty Labels Totals option is ticked in the main Layout Menu.

Black Chart (✓) - changes the background colour of the chart display to black.

QuickVu Time - generates a sub-menu. When the **Softkey** is pressed with the unit in real-time mode, the trends are shown instantly over a different time period selectable from the QuickVu Time menu. For example, if a QuickVu Time of 24 hours is selected, pressing the Softkey shows the overall trends for the last 24 hours (see [“QuickView” on page 59](#)).

Rotating Bars - displaying several bargraphs means a reduction in chart area available for traces. An alternative solution is to use **Rotating Bars**, where a single bargraph is displayed at any one time and the display switches through all the enabled bargraphs in turn. Selecting this option produces a Rotating Bars sub-menu, from here select the time period each bargraph is displayed before being replaced by the next one, or disable this facility.

All - select this item to set the same layout for all pens.

Pens 1-9 (followed by the trace name) - select one or more of these items to set individual parameters (see [“Teletrend V5 Pen Display Parameters” on page 23](#)).

In the **Layout Menu**, a tick to the left of a pen indicates it has been denoted as visible on the display (unless the text is greyed out, in which case the pen is unavailable). Note that data may still be recorded on a pen even when not visible on the display. Any changes to the layout will only be noticeable after selection of **Quit** from the Main menu and the chart is redrawn.

The layout of the display may be changed while the unit is still recording (unlike changes made to **Setups**, which require the user to stop the recording). However, the **Layout** changes made during a recording session will not be saved until the start of a new session.

To configure a Group select **Layout** from the **Main Menu**, then select **Group Setup**. This generates the **Group Setup Menu** from which selection of **Group Modes** are available; Conventional, Tiled and/or Circular. For Conventional and Tiled modes, Digitals, Events and Totals are not applicable, thus changing between Groups will have the effect of changing the number of pens displayed.

Group Setups

Having specified in which modes the Group feature will operate, select **Setup Groups**. The list of Groups (with the current configuration) is displayed, select a Group to call up the Group Setup menu which offers the following options:-

- **Enabled** (✓) - tick this item to enable the Group settings. At least one Group must be enabled.
- **Group Name** - each Group may be given a user-defined name to make identification easier. Selecting this item results in a **GROUP NAME** prompt, which may be entered as a five-character text string (see [“Entering Text” on page 13](#)).
- **Events** (✓) - tick this item to display the list of Events for the Group.

- **Totals** (✓) - tick this item to display the Totals readings for the Group. Totals and Events cannot be selected at the same time. If **Totals with Events enabled** is selected then **Events** will automatically be disabled, and vice versa.
- **Panel Meter Digitals** (✓) - tick this item to display digital readouts for Pens in the Group.
- **Pens** - select this item to produce a list of Pens from which the user may specify the Pens to be drawn on the circular chart.
- **Set As Current** (✓) - tick this item to select this Group as the default Group i.e. the Group which will first appear when Exit is chosen from the Setup Menu.

The **Group Setups** menu also offers a **Cycle Groups** option from where a sub-menu offers:

- **Auto-Cycle** - selecting this item calls up a prompt in which a time interval is entered in minutes. The display will then automatically cycle through the Groups at this interval. If 0 minutes is entered this will disable the Auto-Cycle facility, and Groups must be cycled manually using the **SHIFT** key or by digital input (see below).
- **On Digital** - this facility allows the Groups to be cycled by applying a digital input. Selecting this item calls up a list of digital inputs – only one digital input may be enabled to cycle through the Groups. Applying the digital input has the same effect as pressing the **SHIFT** key and, in the same way that the SHIFT key must be released and then pressed again to cycle through the Groups, the digital input must be removed then re-applied to switch to the next Group (see “**Digital Inputs**” on page 10).

Once as many Groups as required are configured and the unit returns to normal display, the name of the current Group will appear at the top of the display (provided the display is in one of the modes that has the Group feature enabled).

Circular Charts

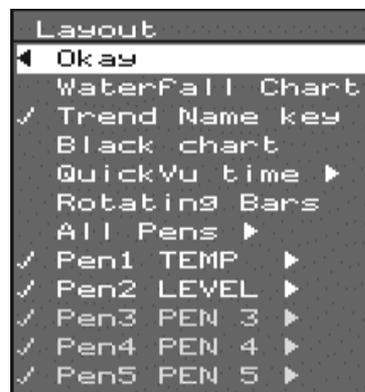
Further configuration of a circular chart is possible by selecting the **Circular Chart** option in the Layout Menu (**this item is not available on the Multitrend V5**). This produces a sub-menu which offers the following options:

- **Scale Details** (✓) - this option (if ticked) will show scale details for the first three available pens in addition to the scale details for the chart scale pen (see **Chart Scale** on page 23). A description of this feature may be displayed by selecting **Scale Details Help**.
- **Start Time/End Time** (✓) - one of these items may be selected to determine whether the start time or end time of the chart is displayed. The time not selected will be displayed in brackets next to the time that is selected on the chart area. A description of this feature may be displayed by selecting **Start/End Time Help**.

Chapter 6: Pen Display

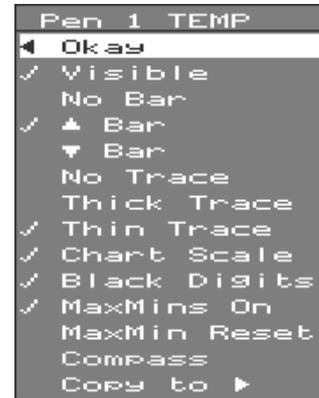
Teletrend V5 Pen Display Parameters

- **Visible** (✓) - enables the pen to be displayed.
 - **No Bar** (✓) - selecting this item will remove the bargraph from the screen.
 - **▲ Bar** (✓) - sets the lowest value of the bargraph display to the bottom of the bar.
 - **▼ Bar** (✓) - sets the lowest value of the bargraph display to the top of the bar.
 - **No Trace** (✓) - removes the trace from the screen.
 - **Thick Trace** (✓) - sets the trace to a thick line for easier visibility.
 - **Thin Trace** (✓) - sets the trace to a thin line for greater accuracy.
 - **Chart Scale** (✓) - selecting this item will cause all pens displayed on the screen in conventional mode to conform to the chart speed and scale of the selected pen. This item cannot be 'deselected' - a different pen must be set to Chart Scale instead.
- NB. If the Pen selected as the Chart Scale pen is NOT selected as a visible pen, the chart area on the display will be frozen and no traces will be drawn. Ensure that one of the visible pens is the Chart Scale pen.
- **Black Digits** (✓) - changes the digital display from the colour of the pen to black. Note that the digits turn grey when the value is outside the pen scale.
 - **Max Min ON** (✓) - the maximum and minimum values of the input signal since the unit was powered up (or since the last reset) are marked on the bargraph display by two white lines. These markers stay in a fixed position until their value is exceeded when they are then pushed to a new maximum or minimum value.
 - **Max Min Reset** (f) - resets the Max/Min markers to the current signal value.
 - **Compass** (✓) - this item displays the scale values as points of a compass. For example, if you set the scale to a bottom value of 0 and a top value of 180, with Major divisions of 45, the bargraph will read **N** as the bottom value, **S** as the top value and **NE**, **E**, and **SE** as the Major divisions. The

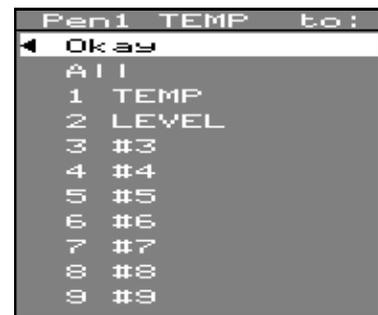


bottom scale value must be divisible by 45 and if a value other than 45 is selected for the Major divisions, they will be displayed numerically.

- **Copy to** - copies the display parameters of a pen to other selected pens. For example, to copy the pen display parameters of Pen 1 (**TEMP**) to Pen 4 and Pen 5, select **Copy to** from the Pen 1 menu, then select Pens 4 and 5. A tick will appear next to the selected pens.

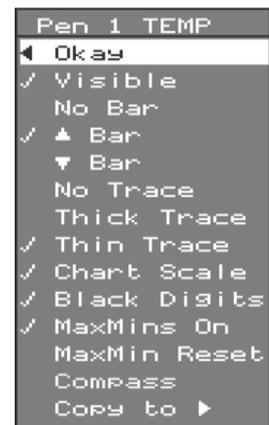


The **Copy to** function can only be reversed by going into the pen display parameters for the pen that you wish to change. For instance, if you did not want Pen 4 to have the same parameters as Pen 1 you would have to go back into the Pen menu (by pressing the **left arrow** key twice) then select Pen 4 and change the parameters from there.



Circuitrend V5 and Multitrend V5 Pen Display Parameters

- **Visible** (✓) - enables the pen to be displayed.
- **Add to Group** - this is a short-cut to Group Setup (See [page 19](#)).
- **No Bar** (✓) - selecting this item will remove the bar graph from the screen.
- **▲ Bar** (✓) - sets the lowest value of the bargraph display to the bottom of the bar.
- **▼ Bar** (✓) - sets the lowest value of the bargraph display to the top of the bar.
- **Zero Based Bar** (✓) - this option allows the user to set a bar anchored at the position of zero on the bargraph. If the scale is from -100 through 0 to +100 then the bargraph will be drawn from the centre of the bar tile.
- **No Trace** (✓) - removes the trace from the screen.
- **Thick Trace** (✓) - sets the trace to a thick line for easier visibility.
- **Thin Trace** (✓) - sets the trace to a thin line for greater accuracy.



- **Duty Label** (✓) - (conventional and waterfall modes) an **On** or **Off** option per pen which displays the pen name, the current digital value and the units for that pen on an additional large font panel. The information is displayed in the colour of the pen for easy identification at a maximum width of two across the top of the screen. Dependent on the number of pens to which this option is applied the graph area is proportionally reduced. The totalised values for the pen will also be displayed in the Duty Label if the Duty Labels Totals option is ticked in the main Layout Menu.
- **Chart Scale** (✓) - selecting this item will cause all pens displayed on the screen in conventional mode to conform to the chart speed and scale of the selected pen. This item cannot be 'deselected';- a different pen must be set to Chart Scale instead.

NB. If the Pen selected as the Chart Scale pen is NOT selected as a visible pen, the chart area on the display will be frozen and no traces will be drawn. Ensure that one of the visible pens is the Chart Scale pen.

- **Black Digits** (✓) - changes the digital display from the colour of the pen to black. Note that the digits turn grey when the value is outside the pen scale.
- **Max Min ON** (✓) - the maximum and minimum values of the input signal since the unit was powered up (or since the last reset) are marked on the bargraph display by two white lines. These markers stay in a fixed position until their value is exceeded when they are then pushed to a new maximum or minimum value.
- **Max Min Reset** (f) - resets the Max/Min markers to the current signal value.
- **Compass** (✓) - this item displays the scale values as points of a compass. For example, if the scale is set to a bottom value of 0 and a top value of 180, with Major divisions of 45, the bargraph will read **N** as the bottom value, **S** as the top value and **NE**, **E**, and **SE** as the Major divisions. The bottom scale value must be divisible by 45 and if a value other than 45 is selected for the Major divisions, these will be displayed numerically.
- **Copy to** - copies the display parameters of a pen to other selected pens. For example, to copy the pen display parameters of Pen 1 (TEMP) to Pen 4 and Pen 5, select **Copy** to from the Pen 1 menu, then select **Pens 4** and **5**. A tick will appear next to the selected pens.

The Copy to function may only be reversed by returning to the pen display parameters for that particular pen. For instance, if Pen 4 is not required to have the same parameters as Pen 1, return to the Pen menu (by pressing the **left arrow** key twice) then select **Pen 4** and change the parameters.

Chapter 7: Unit Setups

Disk

The options in the **Disk** menu are:-

- **Wipe** (f) - deletes the contents of the 3.5" disk currently in the disk drive.
- **Format HD** (f) - formats a high density disk.
- **Format DD** (f) - formats a double density disk.
- **New Recording** (f) - starts the recording of data.
- **End Recording** (f) - stops the recording of data.
- **Clear Error** (f) - clears the **CAN'T LOG** message displayed at the bottom of the screen. This message may be displayed in the event of a fault being detected in the disk or disk drive that is preventing the normal recording of data. (See [“Disk Drives” on page 73](#)) for more information on recording faults.)
- **Auto Sensing** (✓) - If the unit is in **READ ONLY** mode (i.e. NOT recording) it detects every 5 seconds whether there is a disk in the disk drive or the disk has been changed. Care should be taken with this option selected as a “replaced” disk may be identified as a “new” disk. Keypad response will be slower with this item selected. (See [“Disk Drives” on page 73](#) for more information on disk error messages.)



Unit Setup

The **Setup** options are:-

- **Unit ID** - is used to label each unit with its own ID number and name, as well as a description e.g. a site name.
- **Time** - allows the user to set the time and date.
- **Input** - refers to the actual measurement of the input signals. This is separate from the pen setups (described below).
- **Pen Setups** - deal with the processing of the measured input signal prior to its presentation to the display. (This is different from the Pen item in the Layout Menu which deals with the actual display of the pens on the screen as described in [“Layout” on page 15](#)).



- **Totaliser** - refers to setting up the Totaliser log interval.
- **Special** - contains less commonly used setups such as passwords, test programs and sound options.

ADVANCED SETUP OPTION - with the Advanced Setup item ticked in the Special Setups menu, a Digitals and a Session Start option will be added to the Setup menu (see **“Digitals” on page 51** and **“Session Start” on page 53** respectively).

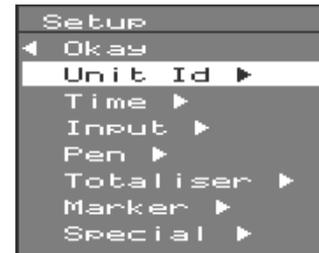
Unit ID

Selecting **Unit ID** will bring up the menu shown here.

All items on this menu bring up prompts when selected.

- **Number** - A four digit number is required.

```
Unit No
0001
```



It is good practice to ensure that each recorder has a unique ID number, especially when data is being transferred from a recorder to **TrendManager Pro**. The ID number also identifies the recorder when it is being accessed through the Comms port.

ID numbers are therefore not transferred to other recorders with setups that have been stored on disk. An ID number can, however, be loaded into a recorder from setups saved on disk in **TrendManager Pro**.

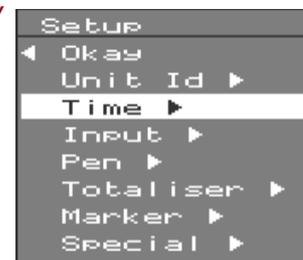
NB. If the unit is reset without a disk in the drive, the ID number will still be saved.

- **Name** - Any text up to 5 characters in length can be specified.
- **Description** - Any text up to 19 characters in length can be specified.

Time

Selecting **Time** on the Setup menu will bring up the **TIME/DATE** prompt. The flashing cursor highlights whole items that are selectable using the up or down arrow key - i.e. the year, month, day, hour (in 24 hour clock format), or minute.

```
Year Mth DD hh mm
1999 DEC 22 14 10
```



NOTICE

Pressing the MENU will set the displayed time and reset the seconds to zero. If you do not want to reset the clock, press the SHIFT key (a red cross will appear in the top left corner of the prompt) then the MENU key to escape. See **“Entering Text” on page 13**.

Chapter 8: Input to a Standard Analogue Card

The Input menu deals with the processing of analogue input signals and their conversion into a digital form which is suitable for later stages of the logging process such as the Maths and Pen blocks (see “[Appendix C - Signal Processing](#)” on page 79).



Selecting **Input** from the Setup menu generates the inputs option list. Depending on the model, only the number of analogue channels available can be selected starting with Input 1.

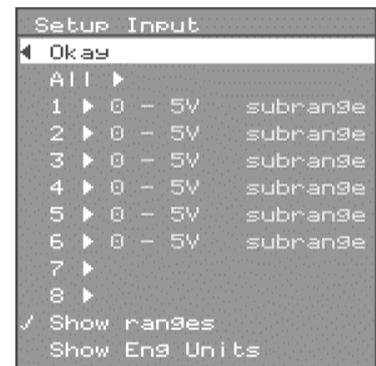
The current input selections are shown in green text.

You can either select:

- **Show Ranges** (✓) - to view the type and range of each input or
- **Show Eng Units** (✓) - to view the range in engineering units.

(See “[Input Block](#)” on page 80 of Appendix C for more information on the relationship between input signals and engineering units.)

All channels can be set to the same configuration or channels can be set up individually. In this example **Input 2** is being selected.



The inputs fall into two basic categories:

1. **Volts** or
2. **Current**.

These items are both tick-selectable but also contain sub-menus to allow further setups.

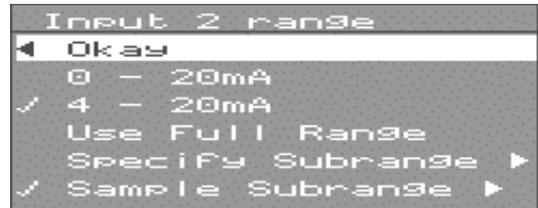


- **Square Root Ext** (✓) - when selected converts a non-linear input to a linear scale by means of square-root extraction, for example when using pitot flow transducers.
- The **Engineering Units** item allows you to select those units the input signal represents.
- The **Copy to** facility allows you to configure more than one input to the same parameters without configuring each input individually.

These items are described in more detail in the following sections.

Volts/Current

Select **Volts** or **Current** according to the type of input signal. Both selections call up sub-menus in a similar format - only the values and units are different. REMEMBER - a voltage or current input signal must also be selected by setting the **CHANNEL FUNCTION** switch on the rear panel to **I** or **V** (see “Analogue Inputs” on page 7).

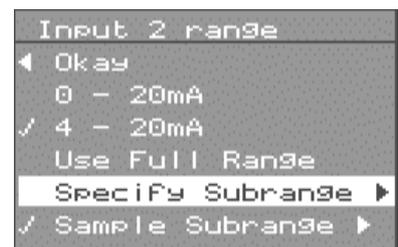


To demonstrate the various methods for setting up an analogue input, a 4-20 mA input is shown as an example; however, the procedures are the same for all inputs - substitute the appropriate zero and span values.

Selecting **Current** from an Input menu calls up the range sub-menu. From here you can select one of two standard signal ranges:

1. 0-20 mA or
2. 4-20 mA (0-5 V or 1-5 V if you select **Volts**).

Alternatively you can specify a range within one of the standard ranges. To do this select **Specify Subrange** to call up the Specify sub-menu.



From here, selecting **Zero** or **Span** will call up the relative prompt requiring you to enter the value required. In the example shown, the signal range is selected as 4-16 mA. These values will now be shown in green text next to the relative menu option in place of the **+4.00 mA** and **+20.00 mA** as shown in the Specify sub-menu.

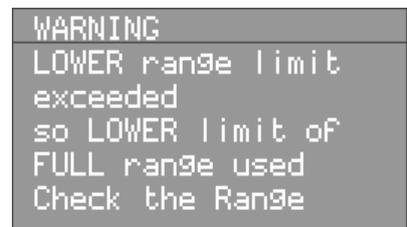


These values are internally calibrated which means that the zero and span values selected are referenced to known values within the unit. Only values up to 5.2 volts or 21 mA can be entered. If values are entered incorrectly warning messages appear on the screen as described below.



- Difference between selected zero and span values is less than 1 volt or 4 mA.
- Selected zero and span values are identical.
- A zero or span value outside the full range has been specified, so the range has been adjusted to a standard value.

You will also be provided with an information notice if you enter a span value that is lower or more negative than the zero value.



You will also be provided with an information notice if you enter a span value lower than the zero value.

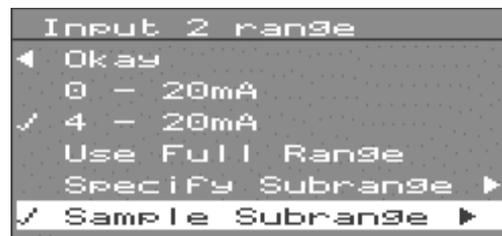
The notice also reminds you whether the engineering units currently selected have a span value greater than the zero value (not reversed) or a span value less than the zero value (reversed).

No corrective action is taken with this notice as there are applications where the span value may deliberately be set lower than the zero value.

Sample Subrange

Another method of setting up an input is to apply sample signals of known values to the input. Units can be calibrated by applying a known voltage or current to the inputs.

To do this first select your **zero** and **span** values as described above for specifying a subrange. Then select **Sample Subrange** from the Input menu - the Sample sub-menu is called up, similar to the Specify sub-menu. Selecting either **Zero** or **Span** will call up an instruction prompt. This will ask you to check the **CHANNEL FUNCTION** switch on the rear panel, apply the appropriate sample signal then press **MENU** to calibrate. You can escape from this prompt without altering the existing calibration by pressing the **left arrow key**.



You may use **Sample Signals** to calibrate a standard range (e.g. 4-20 mA) but it is not necessary to specify the range first - select the appropriate standard range from the Input menu.

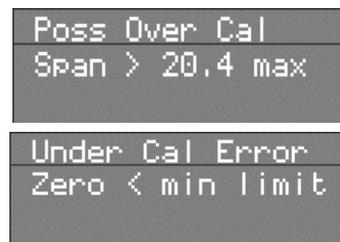
If external signals are not correctly applied to the unit during calibration warning messages will be displayed on the screen. These are the same as for the **Specify Subrange** option i.e. where:-

- the difference between the zero and span signals is too small,
- the same signal has been applied for zero and span calibration.

If you apply a span value that is less than the applied zero value, an information notice will be displayed in the same way as if you were specifying the input range.

Other additional warning messages used for the Sample option are described below.

- Applied span signal is too high - i.e. greater than 5.1 V or 20.4 mA.
- Applied zero signal is too low - i.e. below 0 volts or 0 mA.



For more information on unit calibration see [“Appendix H - Calibrating Analogue References” on page 97](#).

Square Root Extraction

This is a method of converting a non-linear input signal into a linear scale. The method is described in more detail on [“Appendix C - Signal Processing” on page 79](#).

Input Engineering Units

Units refers to the units name and value of the input scale. This is different from the pen scale described in [“Scale” on page 36](#). The relationship between the input scale and the pen scale is described in further detail in [“Pen Scales” on page 82](#).

Selecting the **Units** item brings up a sub-menu with the following items:-

- **Units** - which is the name for the engineering units of the input scale.

- **Zero Units** - which is the value of the bottom end of the input scale.
- **Span Units** - which is the value of the top end of the input scale.

Each of these items when selected calls up a prompt in which the relevant text or value can be entered (see **“Entering Text” on page 13**).

Copy to

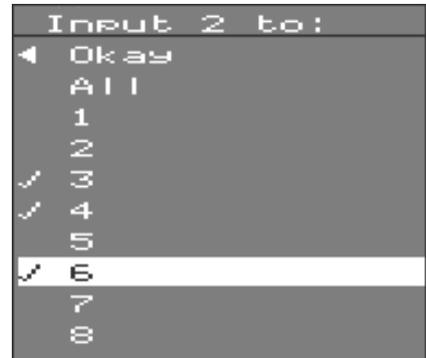
The **Copy to** facility is the same for inputs as for pens (see **page 23**). Highlight the input that you want to configure with the same setups as the input shown at the top of the menu box, and press **MENU** - a tick will appear next to the highlighted input.



In this example Inputs 3, 4, and 6 will be configured in the same way as Input 2.

As with the **Pen Setups**, to reverse the **Copy to** function you must go into the Input menus for the input that you wish to change and re-configure that input.

In this example if you wanted Input 6 to be different from Input 2, you would have to go back to the Inputs menu list (by pressing the **left arrow** key twice), select Input 6, and change the configuration from there.



Chapter 9: Input to a Universal Analogue Card

A unit fitted with a Universal Analogue Card will automatically adjust the Input menus. The procedure for setting up an input is almost the same for Standard and Universal Analogue cards.

As with standard analogue inputs, the type of input must be determined both in the **Setup menus** and on the **CHANNEL FUNCTION** switch on the rear panel. If you select a thermocouple or resistance thermometer, the **CHANNEL FUNCTION** switch should be set to **V** for that input. Details on connecting inputs are given in [“Universal Analogue Card” on page 9](#).

Selecting Volts or Current

This will generate respective Volts or Current options menu, which contain different standard ranges from the Standard Analogue Card menus. Select the appropriate voltage or current range for the inputs to your unit, and, if necessary, specify or sample a sub-range as you would for an input to the Standard Analogue Card.

Thermocouples

Select **Thermocouple** to call up the relevant options menu. This allows you to select the type of thermocouple and reference junction.

There are four different methods of providing a reference for a thermocouple and these are listed in the Ref. Junc. sub-menu:-

- **Internal Automatic** (✓) - uses the temperature reading from the sensor fitted to the rear of the recorder.
- **External 0°C** (✓) - uses a reference junction (effectively a second thermocouple) held at 0 °C to provide a 0 mV reference.
- **Ext Specify** (✓) - uses a reference junction held at a constant temperature; this temperature should be entered in the prompt that is called up when you select this item.
- **Ext Input** (✓) - the temperature of the reference junction is measured by a separate device (such as another thermocouple or RTD). The reading is then fed into a separate analogue input channel which should be specified in the External Input sub-menu.

For more information on thermocouple reference junctions see [“Appendix G - Thermocouple Connections” on page 93](#).

The other options in the Thermocouple menu are:-

- **Upscale Burnout** (✓) - with this item selected the reading will go to full scale in the event of the thermocouple burning out.
- **°C/°F/Kelvin** (✓) - selecting one of these items will determine the temperature scale.
- **Connection Info** - according to the type of thermocouple and reference junction chosen, information on how to connect the thermocouple will be displayed if you select this item.
- **Resistance Therm** calls up the RT sub-menu. As for a thermocouple, you can chose the temperature scale to which you would prefer to convert the input signal.
- **Connection Info** option works in the same way as for thermocouples - select this item and details on how to connect an RTD will be displayed. See **“Analogue Inputs” on page 7** for further information on connecting RTDs to a recorder.

NB. that the Units do not need to be specified for thermocouple or resistance thermometer inputs, and that Square Root Extraction is not offered. Units for voltage or current inputs are specified in the same way as for standard analogue inputs.

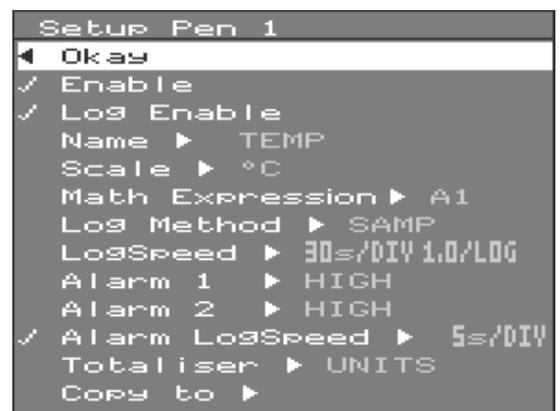
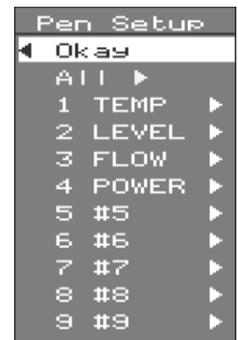
Chapter 10: Pen Setup Options

The Pen Setup menu is used for setups which affect the way data being represented by a pen is logged. Input signals which have been converted into engineering units are then processed in the maths and pen blocks (see [“Appendix C - Signal Processing” on page 79](#)).



Pen Setup

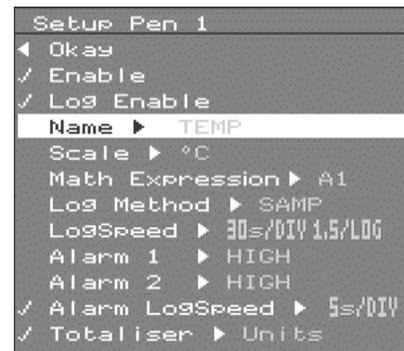
- **Enable** (✓) - selects whether a pen is functional.
- **Log Enable** (✓) - selects whether data displayed by a pen can be written to disk.
- **Name** - each pen can be allocated a user-defined name (e.g. TEMP1).
- **Scale** - the top and bottom values of the bargraph display for each pen are selected here, as well as the name of the units for the Pen scale and the divisions for the chart background.
- **Maths Expressions** - Analogue signals may have a mathematical function performed on them before they are represented as a pen.
- **Log Method** - generates a sub-menu from which you can select how logged data is presented as a pen.
- **Log Speed** - various logging rates or chart speeds can be selected for the trace of each pen. Different chart speeds are only relevant in tiled display mode - in conventional mode all traces conform to the chart speed of the pen set to Chart Scale (see [“Teletrend V5 Pen Display Parameters” on page 23](#)).
- **Alarm 1/2** - each signal may be allocated two different alarm levels.



- **Alarm Log Speed** (✓) - the unit can be configured so that in the event of an alarm it switches to a different logging rate. This allows more detailed analysis of data during an alarm condition.
- **Totaliser** (✓) - produces a sub-menu that allows you to set up the totaliser for each pen.

Name

Selecting **Name** from the individual pen setup menu brings up the **NAME** prompt. Type in a name for the pen as described in [“Entering Text” on page 13](#).

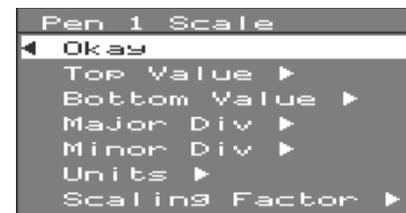


Scale

NB. When calibrating an input remember to set the Input Engineering units to the same value as the Pen scale units when the Maths block is not being used. See [“Appendix C - Signal Processing” on page 79](#) on the relationship between Pen Scale and Input setups.

Selection of **Scale** generates a sub-menu which includes the following options, all of which call up a prompt requiring a value to be entered (see [“Entering Text” on page 13](#)):

- **Top Value** - this allows the user to set the numerical value at the top of the bargraph display for a pen.
- **Bottom Value** - this allows the user to set the numerical value at the bottom of the bargraph display.
- **Major Div/ Minor Div** - the chart background is divided into major divisions (represented by thick grey lines) and minor divisions (represented by thin grey lines). The major divisions are also marked numerically on the bargraph. In this example both bargraphs have been set to a top value of **100**, a bottom value of **0**, with major divisions of **25** and minor divisions of **5**.



If any of these values do not correspond to the rest of the scale, a warning message is displayed. These are shown in one of the following formats:-

The value for the Major divisions has been set to a greater value than the span of the scale. If the value for the Minor divisions is greater than the span of the scale a message Minor Div > Span is displayed.

- The same value for the top scale as for the bottom scale has been selected.
- The value for the Minor divisions has been set to less than 1/60 of the span of the scale.
- The value for the Major divisions has been set to less than 1/10 of the span of the scale.

```
Warning
Top = Bot
```

```
Warning
Minor Div < Span/60
```

```
Warning
Major Div < Span/10
```

NB. If the warning messages are ignored, the unit will automatically correct the condition on leaving the Scale menu, and inform the user of the corrective action taken, e.g.:-

- A numerical value of 100 has been added to the selected top value, so that the top value is no longer equal to the bottom value.

```
Warning
Top = Bot
100 added to top
```

Other messages include:-

The value for the Minor divisions is now set to 1/60 of the total span.

```
Warning
Minor Div < Span/60
Minor set to span/60
```

The value of the Major divisions is now set to the same value as the span of the scale.

```
Warning
Major Div > Span
Major set to span
```

These changes are only seen on the display when the setups for the pen have been left completely and the chart is redrawn.

- **Units** - allows the user to select the name of the units for the scale e.g. volts, amps, °C, inches.
- **Scaling Factor** - to save having large numbers displayed on the bargraph, a factor by which the values on the scale can be multiplied to give the actual value being represented is shown at the bottom of the bargraph.

```
Scale Units
" °F "
```

The Scale Factor has no effect on the value being displayed - it is only for the user's reference.

```
Scale Factor
"x1000"
```

Maths Expressions

Maths expressions can be used to produce a pen that is derived from a mathematical function performed on one or more input signals.

Maths expressions are only available if enabled by the Option Key - see [“Options Key” on page 69](#).

In this example Pen 1 (**P1**) is representing the sum of the Input signals **A1** and **A2** divided by two (i.e. the average of **A1** and **A2**).

```
Math Expression P1=
"A1+A2/2"
```

Where you want a pen to be a pure representation of an input signal with no maths expressions performed, then enter **An**, where **n** is the channel number of the input signal to be displayed.

Enter a maths expression in the same way as you would text and as described in **“Entering Text” on page 13**.

For more information, please see **“Appendix D - Maths Expressions” on page 85**.

Log Method

Input signals are processed at 250 ms* intervals, and then, having been converted to engineering units and subjected to maths expressions, the readings are stored until each time the data is logged (i.e. written to disk or updated to the display). The interval between data logging is set in the **Log Speed** sub-menu, and during this time a number of readings are stored.

NB. 250 ms for Standard analogue cards, 1 s for 4 channel Universal analogue cards, and 1.5 s for 8 channel Universal analogue cards.

When the data is logged, the list of readings can be dealt with in certain ways, which can be selected from the Log Method sub-menu.

- **Sample** (✓) - logs the last reading taken.
- **MaxMin** (✓) - logs the highest and the lowest of the stored readings.
- **Average** (✓) - logs the average of all the readings stored.
- **Max** (✓) - logs the highest stored reading only.
- **Min** (✓) - logs the lowest stored reading only.

Log Methods are described in further detail in **“Appendix C - Signal Processing” on page 79**.

Log Speed

The **Log Speed** can be selected from a range of values between 5 seconds and 48 hours for every division on the chart. The choice of Log Speed depends on how much data needs to be recorded and to what level of accuracy. To monitor a signal that is fluctuating very often a fast log speed is required to capture the changes - however data stored at this log speed will quickly fill the floppy disk, so if that signal were to be monitored over a long period of time, and disk space was important, a slower log speed would be required.



Selecting **Log Speed** brings up an options menu offering three ranges of chart speed, with the current range indicated by a ✓. The chart speed is the time period between each vertical division of the chart

Chart Sec/div	
← Okay	
✓ 5	250ms/log
10	500ms/log
15	750ms/log
20	1s/log
30	1.5s/log
40	2s/log
50	2.5s/log
60	3s/log
100	5s/log
200	10s/log

Chart min/div	
← Okay	
1	3s/log
2	6s/log
3	9s/log
✓ 4	12s/log
5	15s/log
6	18s/log
8	24s/log
10	30s/log
15	45s/log
20	60s/log
30	90s/log
40	2min/log
60	3min/log
100	5min/log

Chart hr/div	
← Okay	
1	3min/log
2	6min/log
3	9min/log
✓ 4	12min/log
6	18min/log
8	24min/log
9	27min/log
10	30min/log
12	36min/log
16	48min/log
20	60min/log
24	72min/log
36	108min/log
48	144min/log

background and dictates the speed at which the chart scrolls across the display. Within each range is a selection of chart speeds, with the current selection indicated by a ✓.

From the chart speed the LogSpeed can be calculated by dividing the chart speed by 20 (since the chart shifts 20 times per division). This gives the rate at which the pen is updated. For convenience, the Log Speed is shown next to the chart speed. (See **“Appendix C - Signal Processing”** on page 79 for more information).

With a Universal Analogue Card fitted, the fastest chart speed that can be selected is 20 s/div (4 channels) or 30 s/div (8 channels).

Alarms

Each pen can be allocated two alarms. The procedure for setting an alarm is the same for **Alarm 1** and **Alarm 2**.

Alarms can be configured to trigger at specified levels and respond in various ways once triggered.

- **Enable Alarm** selecting this item calls up an options menu. The alarm will be disabled by default, but it can either be enabled permanently or enabled only when a particular digital input is detected. When you select **Enabled By Digitals** a list of digital inputs will be called up. If you select a digital input, for example, **D1** the message opposite will appear.

Alarm 1 Pen 1	
← Okay	
Enable Alarm ▶	
✓ Log Alarm Events	
Type ▶ HIGH	
Level ▶ 45.0	
Label ▶	
✓ Peaks ▶	
✓ Hysteresis	
✓ Damping ▶	
Relays ▶	

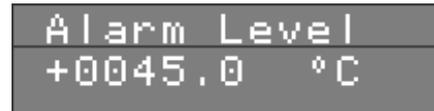
Alarm Enable	
← Okay	
Always Enabled	
Enabled By Digitals ▶	
✓ Disabled	

Alarm 1
Enabled By
Digital D1

This means that if a volt-free contact is applied to digital input 1, then Alarm 1 for Pen 1 will be enabled (see **“Digital Inputs”** on page 10 for information on connection).

- **Log Alarm Events** - with this item enabled, if an alarm occurs, the details of that alarm will be logged for analysis at a later date.

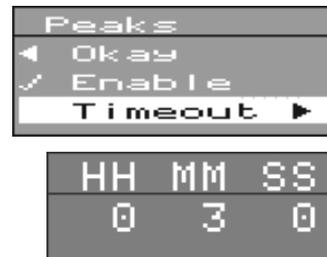
- **Type** - four different conditions will trigger an alarm:-
 - **High** - the measured input is higher than the specified alarm level.
 - **Low** - the measured input is lower than the specified alarm level.
 - **Rate Up** - the measured input has increased by more than the specified amount from the previous logged reading.
 - **Rate Down** - the measured input has decreased by more than the specified amount from the previous logged reading.
- **Level** - select this item to specify the value of the level for the alarm. If the value entered is outside the Pen scale (see **“Scale” on page 36**) a warning message will appear.



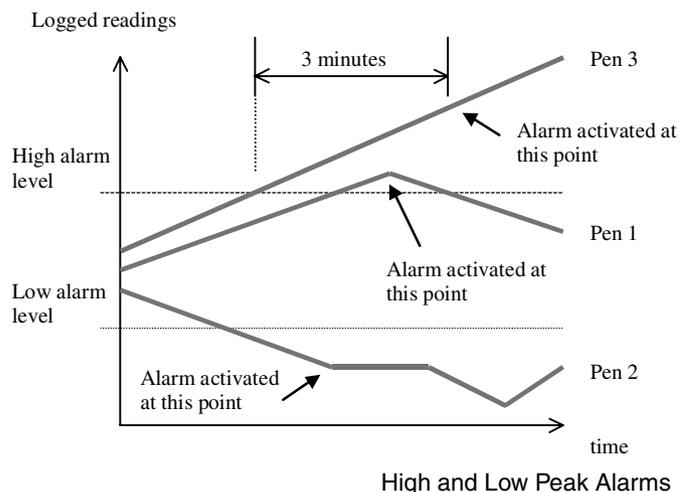
High or Low Alarms

Peaks

With this mode enabled an alarm will only be triggered when the alarm level has been breached and the logged data has reached a peak value. A logged reading is determined as being a peak value if it is unchanged from a previous reading or changes in the opposite direction from the changes in the previous readings.



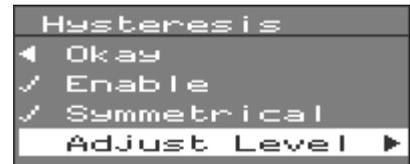
If a logged reading continues to change in the same direction then, when the time period specified in the **TIMEOUT** prompt has elapsed, the next logged reading will be considered a peak value. The traces from three pens are shown opposite with the points at which an alarm would be triggered. Pen 1 and 3 are set for a High alarm at the corresponding level and Pen 2 is set for a Low alarm. In the case of Pen 1 the alarm is not triggered until the value of the logged readings starts to decline. In the case of Pen 2 the alarm is triggered when the value of the logged readings levels out.



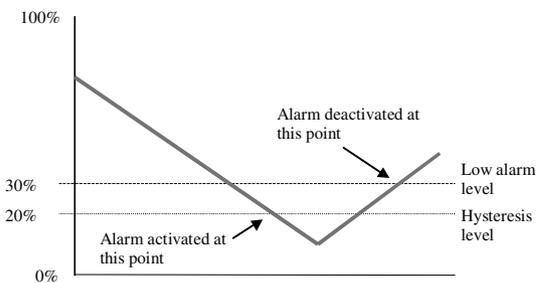
The value of the logged readings for Pen 3 continues to increase after the alarm level is breached so the alarm is only triggered when the Timeout period, in this case 3 minutes, has elapsed.

Hysteresis

This is effectively a tolerance level for an alarm level. Selecting **Adjust Level** allows you to specify a percentage value of full scale which is added on to an alarm level.



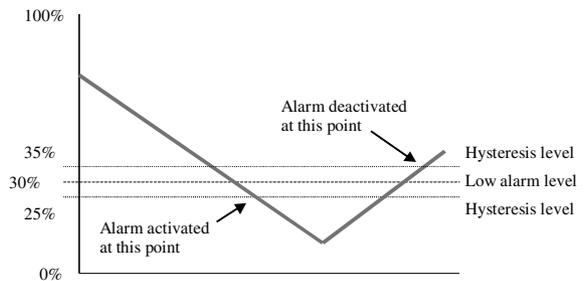
For example, if a **Low Alarm** is selected with a hysteresis value of 10 %, a logged reading will have to be below the alarm level by at least 10 % of the overall scale before an alarm is triggered.



Low Alarm - 10% Normal

Symmetrical

The hysteresis value is divided on either side of an alarm level. Using the above example again, if hysteresis was selected as Symmetrical then the logged reading would only have to drop as much as 5 % of full scale value below the alarm level to trigger the alarm. However, for the alarm condition to cease the logged reading would have to rise to over 5 % of the full scale value above the alarm level.

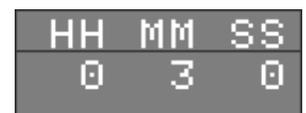


Low Alarm - 10% Symmetrical

Damping

With this facility enabled, an alarm level must be breached for a specified period of time before an alarm is triggered.

For example, if a High alarm with a Damping time of 3 minutes is set, the input signal must stay above the alarm level continuously for 3 minutes for the unit to activate an alarm. If the input signal drops below the alarm level before 3 minutes is up, the Damping timer will be reset and start again the next time the alarm level is breached.



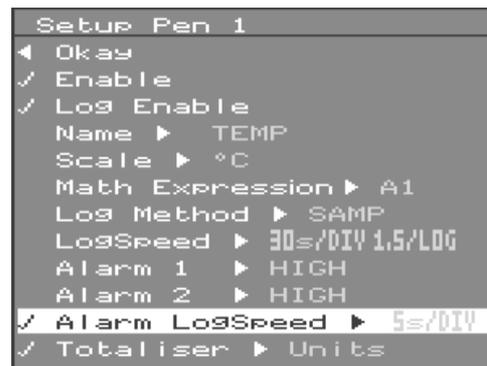
Relays

Selecting this item calls up the Relay State menu from which you can select which relays are to be closed in the event of that alarm being triggered. The relays currently selected are identified with a ✓. In this example, if Alarm 1 on Pen 1 was activated, Relays 1, 3 and 4 would close.

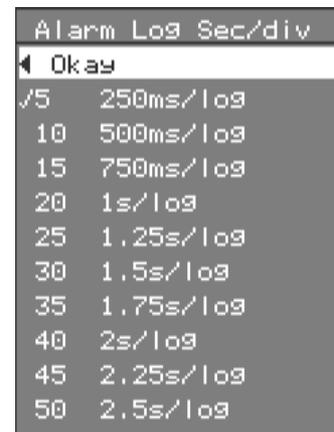
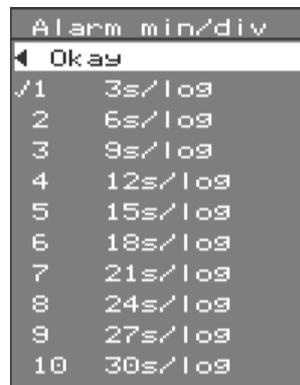
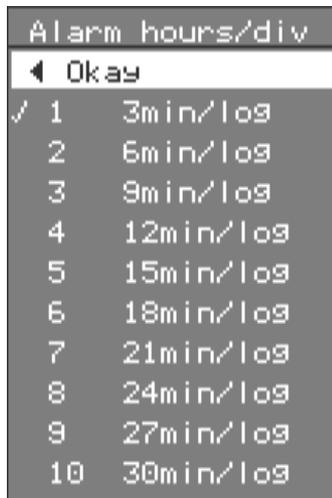
NB. For a 4-channel Alarm card only Channels 1, 2, 3, and 4 are available.

Alarm Log Speed

When an alarm is activated the unit will start logging data at the alarm log speed and continue to do so until the alarm is deactivated. When the unit is no longer in an alarm condition it will return to logging data at the normal Log Speed as described in “Log Speed” on page 38. Selecting **Alarm LogSpeed** will call up a sub-menu. Select **Enable Change** (✓) if you want this feature to be functional. To select the alarm log speed, select **Adjust Rate** and follow the same procedure as for selecting the normal log speed.



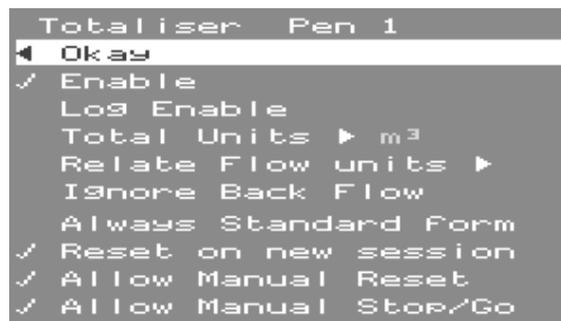
NB. With a Universal Analogue Card fitted the fastest Alarm Log Speed that can be selected is 20 secs/div (4 channels) or 30 secs/div (8 channels)



Totaliser Setup

Totalising is only available when enabled by the Options Key - see “Options Key” on page 69.

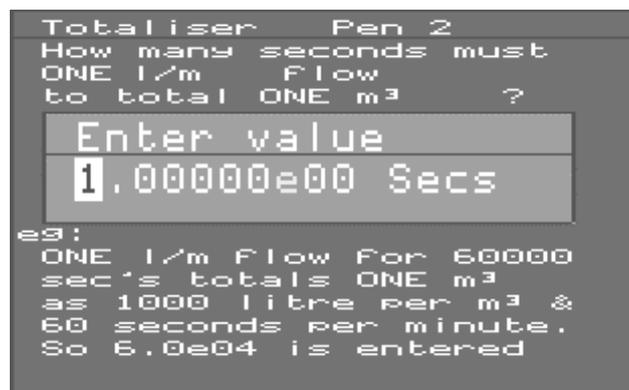
A totaliser is normally associated with flow-monitoring applications, where the input to the recorder would be a measure of flow rate (e.g in litres per minute), and you want to know the total amount that has flowed over a certain time period (e.g in cubic metres). Totalisers are assigned to individual pens. To set up the totaliser for a pen select **Totaliser** from the Pen Setup menu. This will generate the totaliser sub-menu which contains the following options:-



- **Enable** (✓) - select this item if you want a totaliser to be assigned to this pen.
- **Log Enable** (✓) -select this item if you want the totals for this pen to be logged in the totalisation file.
- **Total Units** - selecting this item calls up the Total Units prompt which allows you to enter the name of the units for your totaliser values as text (in this case cubic metres).



- **Relate Flow Units** - select this item to set up the conversion from pen input readings to totaliser value. You are required to enter a value in seconds. An example of how you calculate this value is given below the prompt. (This value can be calculated automatically using *TrendManager Pro* - see the on-line Help in *TrendManager Pro* for details.)



The example says that if your input reading is a constant 1 litres/minute, then 60,000 seconds will elapse before 1 cubic metre has flowed, therefore you must enter **6.0 e04** in the seconds prompt to ensure that your totaliser values are in m³ (the totaliser units).

The current input units and totaliser units are shown in the question above the prompt, in this case the pen is reading in l/m and this needs to be converted to **m³**.

- **Ignore Back Flow** (✓) - in some applications when the flow meter is switched off, the totaliser will start to subtract from the total value (e.g. when a 4-20 mA signal is being applied to an input, switching off the 4-20 mA source will give a reading of 0 mA - if 4 mA corresponds to 0 on the pen scale, 0 mA will give a negative pen reading which will result in a subtraction from the total value). To prevent the totaliser from doing this, select **Ignore back** flow so that the total value will be held while the flow meter is off.

- **Always Standard Form** (✓) - with this item selected total values will always be displayed in standard form (e.g. 2.76823e+09) regardless of the length of the number. (e+09 is the same as x 109.)
- **Reset on New session** (✓) - with this item selected the totals will be reset to zero every time a new recording is started.
- **Allow Manual Reset/Allow Manual Stop/Go** (✓) - these items enable the operations that are selected in the Totals sub-menu (see “View Totals” on page 61.)

In addition to setting up the totaliser for each pen, the Total log interval (which applies to all pens) must be selected (see the following section) and the totaliser must be operated (see “View Totals” on page 61.)

Totaliser Log Interval

Totalising is only available when enabled by the Options Key see (“Options Key” on page 69).

Although totalisers can be assigned to individual pens, they are combined for the purposes of display and recording into a single totaliser file. Selecting **Totaliser** from the **Setup** Menu generates the log interval sub-menu from which you can select the time period between each update of the totaliser.

See “Softkey Operation” on page 59 for information on operating and displaying the totaliser.



Markers

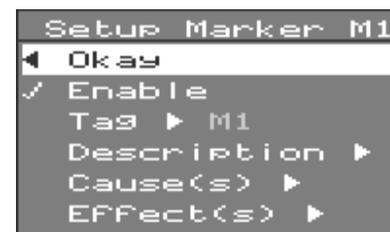
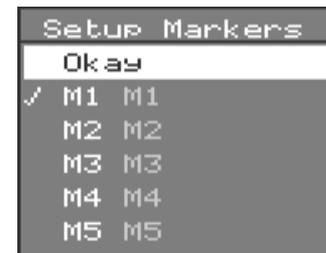
Event Markers are only available when enabled by the Options Key - see “Options Key” on page 69.

NB. The Event Marker functions within this recorder are extremely flexible and powerful. Always ensure that any control actions initiated by the Marker Cause and Effect facilities are fully tested and verified before using them live in any control application. Markers provide visual and recorded information on the occurrence of certain momentary events, as defined by the user.

This section deals with setting up markers. For information on viewing markers and events see “Softkey Operation” on page 59. To set up a marker, select **Marker** from the **Setup** menu, then select the marker that you want to configure.

Selecting a marker will call up the Marker Setup menu which contains the options as described below.

- **Enable** (✓) - an enabled marker is indicated by a ✓, both in this menu and the list of Markers.
- **Tag** - selecting this item calls up the Tag prompt which allows you to select a label for the Marker (as described in “Entering Text” on page 13).



- **Description** - selecting this item calls up the Description prompt which allows you to enter a description of the Marker that will identify it in the Events file.
- **Cause(s)** - selecting this item calls up the Causes menu as described below.
- **Effect(s)** - selecting this item calls up the Effects menu as described in the following section.

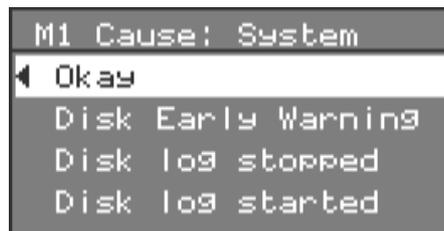
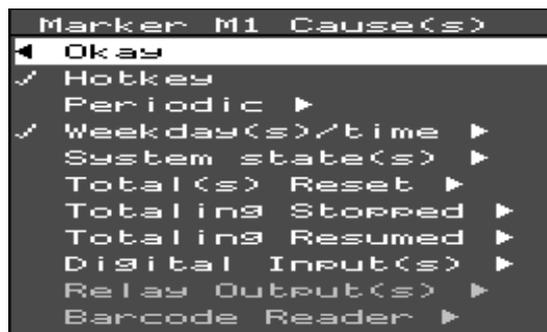
Causes

Markers are set up to be activated by certain causes or conditions. These conditions are selected in the Causes menu and are as follows:-

- **Hotkey** (✓) - with this item enabled you can manually set a marker from the Quick Menu as described in [“Softkey Operation” on page 59](#).
- **Periodic** - selecting this item calls up the Periodic time prompt, in which you can enter the time between markers. This time period is counted from the most recent marker, and the time period counter will restart every time the marker is set by any of the selected causes.
- **Weekday(s)/time** - this option allows you to specify the exact placement of a marker to the time and day on a weekly basis.
- **System State(s)** - selecting this item calls up the opposite sub-menu:-

From this sub-menu select a marker to be set according to certain conditions of the recorder, namely, if the 'disk full' alarm is activated, the unit has stopped recording or the unit has started recording.

- **Total(s) Reset/Stopped/Resumed** - the unit can be configured so that a marker will be set in the event of a totaliser being reset, stopped or resumed. (See [“Softkey Operation” on page 59](#).) Selecting any of these options will call up a sub-menu from which you can select which Pen will cause the marker to be activated. In this example, only Pen 1 has its totaliser enabled as the other pens are shown in grey text.
- **Digital Input(s)** - selecting this item calls up a sub-menu from which you can select a digital input that will cause a marker to be set when that input goes high (i.e. when a volt-free contact is made between the NO and C pins as described in [“Digital Inputs” on page 10](#)).
- **Barcode Reader** - selecting this item enables a reading from a barcode reader to set a marker. See [“Appendix K - Barcode Reader” on page 101](#) for more information.



Effects

Markers can be set up so that, on being activated, certain operations will be performed. These operations are selected from the **Effects** menu and are as follows:-

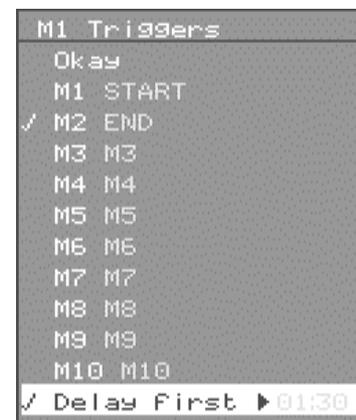
- **Mark on Chart** (✓) - with this item enabled, when a marker is set a vertical line will be drawn on the chart display at the exact time and date of the marker.
- **Start/Stop Recording** (✓) - a marker can be configured so that when activated it will cause the unit to either stop or start recording.
- **Alarm/Normal LogSpeed** (✓) - selecting items will enable a marker to switch the recorder into or out of respectively alarm log speed.
- **Total(s) Reset/Stopped/Resumed** - these operations, whilst being able to set a marker, can also be activated by a marker. Selections made in the **Causes** menu should be considered before selecting an option in the **Effects** menu - for example, there would be little point in a marker being set by a totaliser reset and then the same marker resetting the totaliser when it is activated.
- **Relay Output** - a marker can be configured so that when set it also activates certain relay outputs. Selecting this item calls up a sub-menu containing a list of available relays.
- **Serial Output** - this item is currently not available.
- **Counter** - selecting this item calls up the Counter sub-menu. From here you can select by how much the Counter is incremented every time the marker is set, and the starting value of the Counter. The Information option tells you how the Counter works and where the Counter readings can be viewed, namely in the Events list (see **“Softkey Operation” on page 59**).



When the Counter is enabled, the value of the Counter can be incorporated in the description of the marker by entering an exclamation mark in the description text. For example, if you want the counter value to represent a batch number, enter the text **BATCH NO.!** in the description field of the marker. The counter value will automatically be inserted in place of the exclamation mark every time that marker is set.

- **Another Marker** - a marker can be set up to trigger other markers when it is set. Selecting this item calls up a list of markers which can be set by the source marker. At the end of the list is the Delay first option. Selecting this item calls up a prompt asking you to enter a time. This is the time between the source marker being set and the other markers being subsequently triggered.

In this example Marker M1 will trigger Marker M2 1 minute and 30 seconds after it is set.



Chapter 11: Special Setups

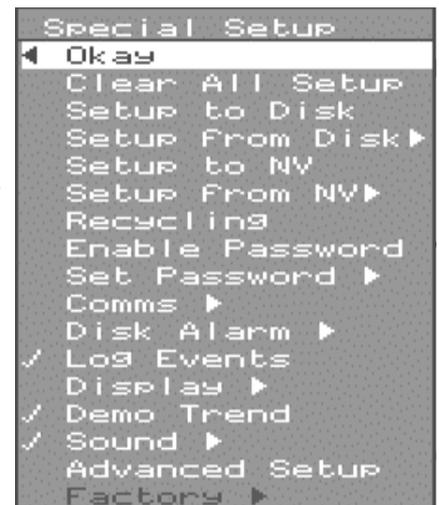
The Special Setup menu allows the user to access certain functions additional to the normal operation of the unit. The options in this menu are as follows:-

- **Clear All Setup** (f) - returns unit to default settings i.e. the setups to which the unit is configured when first powered up with no disk in the drive.
- **Setup to/from Disk** (f) - the setups of a unit can be stored on disk and then loaded to a unit from disk - this saves repeating the set up procedure when identical setups are required for more than one unit.



Selecting **Setup to disk** calls up a verification prompt.

The current setups of the recorder will be stored on disk under filenames with the extension **.OPC** (setup files created under *TrendManager Pro* are also given the **.OPC** extension). This distinguishes these setup files from those written to disk automatically by the recorder at certain stages of normal operation. (See **“Writing To Disk” on page 67** for more information on files stored on disk.) Selecting **Yes** will cause any existing .OPC files on that disk to be overwritten. Selecting **No** will return you to the Special Setup menu.



Selecting **Setup from disk** causes a sub-menu to be displayed, from which the following options can be selected.

- **Layout Only** - refers to pen display parameters (see **“Teletrend V5 Pen Display Parameters” on page 23**) stored on disk.
- **Setup Only** - refers to the pen setups (see **“Pen Setup Options” on page 35**) stored on disk.
- **Both** - both of the above options are loaded.



When Setup from disk is selected only files with the **.OPC** extension are loaded.

- **Setup to/from NV** - these functions are essentially the same as Setup to/from disk, except that the recorder setups are stored in non-volatile memory instead of on floppy disk. On power-up, in the absence of a disk, the recorder will load setups from its internal non-volatile memory.

- **Recycling** (✓) - with this mode selected the unit will continue to record on a full disk by overwriting the data on that disk, within the recording session currently in progress. (See “[Session Numbering](#)” on page 57.)

- **Enable Password** (✓) - access to Setup menus can be restricted by use of a password. This item is only selectable if a password has been set. Selecting this item causes the **RECITE PASSWORD** prompt to be displayed. Respond by pressing the password key combination. When you next leave the Setup Menu you will only be able to access it again by entering the password. If you no longer wish to use a password highlight **Enable password** and press the **MENU** to remove the ✓ next to that item. The unit is no longer password protected.



- **Set password** - selecting this item brings up the **NEW PASSWORD** prompt. Respond to this prompt by pressing any combination of four of the eight keys on the keypad. Each time a key is pressed # appears in the prompt. The same key may be pressed more than once in a password. When the fourth key is pressed the **RECITE PASSWORD** prompt appears asking you to repeat the key presses you have just used to select the password. This ensures that you have correctly entered and remembered the password. If you do not repeat the key presses correctly, the message **PASSWORD INCORRECT** appears and the password is left unchanged. Press the **MENU** to return the unit to the Special Setup menu.



- **Comms** - calls up a sub-menu from which you can select the baud rate required if you are using the recorder in a network configuration. The remainder of the Comms setups are performed in **TrendManager Pro** on the PC to which the networked recorders are connected.



- **Log Events** (✓) - tick this item for Events to be recorded (see “[List Events](#)” on page 61 for further information).

- **Display - Honeywell** recorders are fitted with a screen-saver facility. Selecting this item calls up the **BLANK TIME** prompt. The value entered here specifies the number of minutes after which, if there is no intervening key press, the display goes blank. To restore the display press the up arrow key. The display can also be manually switched off by pressing the **SHIFT** key then the **MENU**. During the time the display is blank the recorder continues to log data normally. In the event of an alarm, the display will switch on automatically.



- **Demo trend** (✓) - simulates a sinewave Analogue input on all channels.

NB. The Screen Saver facility is not available on **Circuitrend V5** or **Multitrend V5** or **Teletrend V5**.

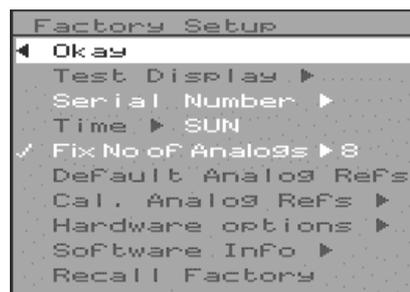
- **Sound** - selecting this item from the Special Setup Menu calls up a sub-menu which offers the following options for setting a sound which will be emitted whenever a key is pressed outside the Setup menus:-



- **Enable** (✓) - selects the sound option.
- **Longer** (✓) - selects the duration of the sound.
- **Ring** (✓) - selects the sound type.
- **Hi Freq** (✓) - selects the sound tone.
- **Advanced Setup** (✓) - tick this item to call up extra options in certain menus. These options are described on [page 51](#) and [page 53](#).
- **Factory** -

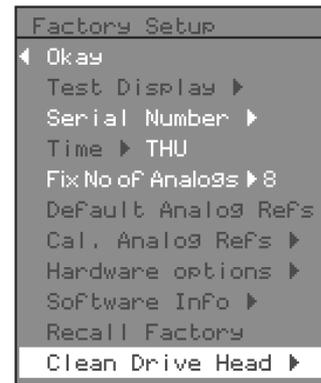
NOTICE

The Factory setups are intended for FACTORY USE ONLY but may be adjusted by the user. Any adjustments made can affect the accuracy of the recorder. Read the following section before attempting to use factory setups.



- **Test Display** - provides a series of test screens. Once this item is selected, you must scroll through each screen by pressing any key until the factory menu is displayed, then exit the Setup menus to return the unit to normal display.
- **Serial Number** - not accessible for the user.
- **Time** - performs the same function as the option described in [“Time” on page 28](#).
- **Fix No. of Analogs** - not accessible for the user.
- **Default Analog Refs** - resets the reference points of the ADC to factory-specified values. This facility may be used instead of Cal. Analog Refs described below, for instance if you do not have accurate external signals readily available, but the accuracy of these reference points is dependent on how close the signal conditioning characteristics of your recorder are to the average.
- **Cal. Analog Refs.** - this item is covered in [“Appendix H - Calibrating Analogue References” on page 97](#).
- **Recall Factory** - resets the unit to factory calibration settings (see [“Appendix H - Calibrating Analogue References” on page 97](#)).

- **Clean Drive Head** - insert a dry floppy head-cleaning disk, then select this option. Confirmation of cleaning taking place will be displayed including a count down from 30 seconds.



- **Hardware options** - this item should be selected when any changes have been made to the hardware configuration of the recorder, for instance when installing a Comms or Alarm card. A sub-menu will be called up and the current configuration of the recorder will be shown by the items with a ✓ next to them. (In this example, the recorder is not fitted with an Alarm (digital) card or a Comms card.) If you are installing new hardware you must select the corresponding item in this menu before that piece of hardware will function correctly.
- **Software Info** - provides diagnostic codes for factory use, such as checksums for firmware.



Chapter 12: Advanced Setups

Digitals

NB. The Digitals item only appears on the Setup menu if the Advanced Setups item has been selected in the Special Setups menu (see [“Special Setups” on page 47](#)).

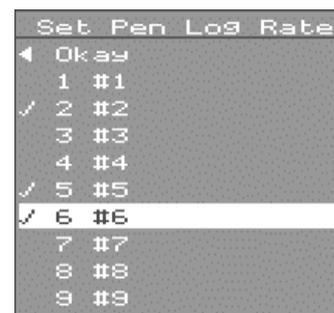


The standard 8-channel Alarm Card has the facility for digital inputs on channels 7 and 8 when they are not being used as relay outputs. A digital input is considered as ON when the NO and C pins are connected together (see [“Digital Inputs” on page 10](#)).

Digital inputs can be used in maths expressions (see [“Appendix D - Maths Expressions” on page 85](#)) and trigger various functions within the recorder. These are selectable from the *Digital Input* menu for each input.

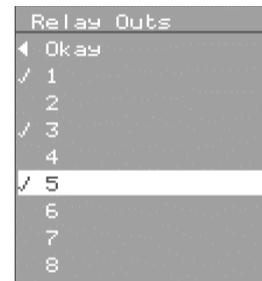
The options for digital inputs are:-

- **Enabled** (✓) - select this item to enable a digital input. **NOTE:** If a digital input is enabled it will be recognised by the recorder whether or not there is the hardware facility for that input. Only enable digital inputs that are actually being used.
- **Log As Event** (✓) - with this item selected, any change in the state of the digital input will be logged in the event file.
- **Recording Control** (✓) - with this item selected, switching a digital input **ON** will cause the unit to start recording and switching the digital input **OFF** will stop recording.
- **Set Pen Log Rate** - this facility allows you to set up a digital input so that when it is switched **ON** data will start being logged on any pen at the Alarm Log Rate as described in [“Alarm Log Speed” on page 42](#). In this example, when Digital Input 7 is switched ON, Pens 2, 5 and 6 will all start being logged at their respective alarm log rates.



When the digital input is switched **OFF** again, those pens will return to their normal logging rate providing no alarm condition exists.

- **Digital Label** - selecting this item calls up the **DIGITAL LABEL** prompt. A description of the digital input in alphanumeric text can be entered here (see “**Entering Text**” on page 13).
- **On/Off State Labels** - selecting either of these items calls up the **ON STATE LABEL** or **OFF STATE LABEL** prompts respectively. A description of the On or Off state of the digital input can be entered here in alphanumeric text (see “**Entering Text**” on page 13).
- **Relays Out** - digitals can be used to activate relay outputs. Selecting this item calls up a sub-menu - from here select **Enable** to use this facility. To select which Relay outputs are to be activated, select **Adjust**. This will call up a list of relay outputs - to select (or de-select) a relay, highlight the relay then press the **MENU**. Selected relays are indicated by a ✓. Switching a digital input **ON** (i.e. closing a contact across the input terminals) will activate the selected relays.



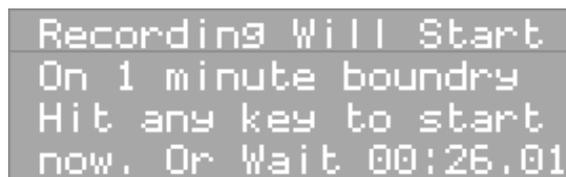
Session Start

NB. This item only appears in the Setup menu when Advanced Setup has been selected in the Special Setup menu (see [“Special Setups” on page 47](#)).

Selecting this item calls up a sub-menu from which you can select a delay time for the start of a recording session. Setting a delay time will start the recording on the nearest minute - this allows for data to be neatly segmented into whole minute blocks.

Discard Prior Data is only selectable if there is no time delay selected - otherwise it is automatically enabled. If this function is selected then any data in the temporary storage buffers will be deleted before a new recording session is started.

A countdown is displayed on the screen when a time delay leading up to the start of a recording is in operation. To ignore the time delay and start recording immediately press any key.



Circular Chart

This option is only available on Circitrend V5 recorders.

Selecting this item calls up a menu offering various circular chart time spans. When selecting a time span for the circular chart, ensure that the time span is greater than the time interval for one log of data on the chart scale pen (see [“Pen Setup Options” on page 35](#)). If an incorrect time span is selected the recorder will automatically adjust the time span to an optimum value.

About

Selecting **About** from the Main Menu calls up the information box shown opposite, which contains the model, number of inputs, type of analogue input card fitted, serial number and software version of the unit.

Peak stack and Peak Queue provide diagnostic information for factory use.

The About box also provides information on which of the Options Key facilities are enabled - Maths, Markers and Totals. See [“Options Key” on page 69](#) for further information.

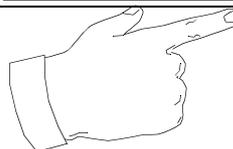
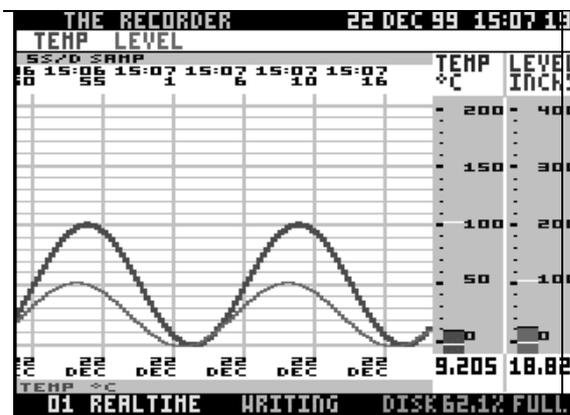


Chapter 13: Operation

Recording Data

To record the data being displayed on the screen, insert a 3.5" floppy disk, select **Disk** from the Main Menu, then select **New Recording** from the Disk menu (see “Disk” on page 27).

The message **WAIT, CHECKING DRIVE** appears followed by the status of the disk drive displayed below in the same message box. The message **READ ONLY** disappears from the Unit status section at the bottom of the display and the current set-ups of the unit are written to disk. The Disk menu is then displayed again.



The unit is now recording. The unit will store data in the internal buffers until they are full then the data will be written to disk. The message **WRITING** appears in the Unit status section of the display to indicate that this is happening.

The unit will not start recording if there is a **CAN'T LOG** message displayed in the Unit status section of the screen (see “Disk Operations” on page 65).

To end the recording go into the Disk menu and select **End Recording**. The unit will write the current readings to disk then stop recording - the message **READ ONLY** will re-appear in the Unit status section of the display.

If the disk is changed while the unit is in recording mode the message **DISK READ ERROR** appears in the Disk space status section of the display. To resume recording it is necessary to go into the Disk menu and select **Clear Error** then start a new recording.

CAUTION

CONTROL UNIT DAMAGE

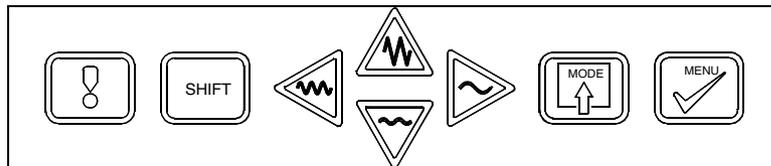
Do NOT eject the disk while a recording is in progress as this may result in damaging the disk drive and the disk itself. To remove a disk, stop the recording by selecting **End Recording** from the Disk Menu and wait until the recorder has completely finished writing to disk.

Failure to comply with these instructions may result in product damage.

NB. Floppy disks from the following manufacturers are recommended:-

- Verbatim
- Sony
- Maxell

Replaying Data



Keypad Operation

Data that has been written to disk can be recalled at any time while the unit is recording, provided that the display is in tiled mode (see “[Basic Keypad Operation](#)” on page 12).

To replay recorded data starting from the most recent item of logged data of the session in progress, press the left arrow key. The number of this session is displayed in the bottom left corner of the display. On pressing the left arrow key the message **REPLAY<** appears.



The unit will continue replaying backwards through the session until the beginning of the session is reached. The **black bar** moving across the base of the chart background indicates where in the session the data currently being displayed is located.

When the beginning of the session is reached the 'pause' symbol appears at the bottom of the display. To continue replaying the data through the next previous session, press the **down arrow key**.



The session number displayed will decrease by one and the unit will replay the data in that session until the beginning of the session is reached. If the 'pause' symbol is still displayed then there is no data to be replayed, so press the **down arrow key** to continue to the next session. You can continue replaying data from all the previous sessions in this way.

To review logged data from the beginning of the current session, press the **right arrow key** and the message **REPLAY>** appears. The unit will start replaying data from the beginning of the session through to either the most recent item of logged data (for a session still being recorded), or to the end of the session (for data recorded earlier). When the end of the session is reached the 'pause' symbol will appear. To continue replaying data in a subsequent session press the **down**

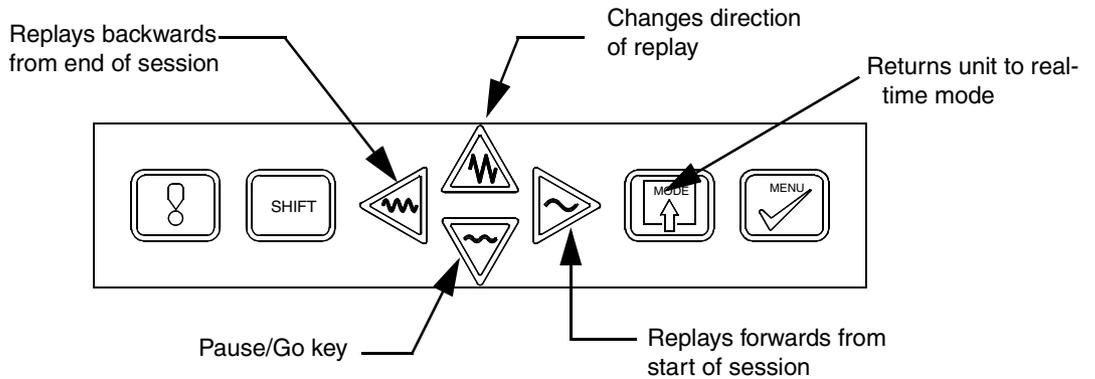


arrow key. If you are replaying the session still being recorded there will be no subsequent session so pressing the down arrow key will operate the freeze frame function (see **“Freeze Frame (Pause)”** on page 63).

During replay mode the direction in which the data is being replayed can be changed at any time by pressing the **up arrow key**. Each time the up arrow key is pressed the message in the Display Status section of the screen will alternate between **REPLAY<** and **REPLAY>**.

To return to real-time display (i.e. exit replay mode), press the **MODE** key.

A diagram outlining the replay functions in general is shown below.



Session Numbering

Data is recorded in sessions. If you start recording with a new unit and a blank disk, the first recording will be session 00. If at any time you change the set-ups of the unit, subsequent data will be recorded in session 01, then session 02 and so on.

Each time the set-ups are changed, or the recording is stopped then restarted, the session number is incremented by one. Logged data and Set-ups files stored on disk are identified by making the session number the filename extension.

For further information on Session numbering see **“Writing To Disk”** on page 67.

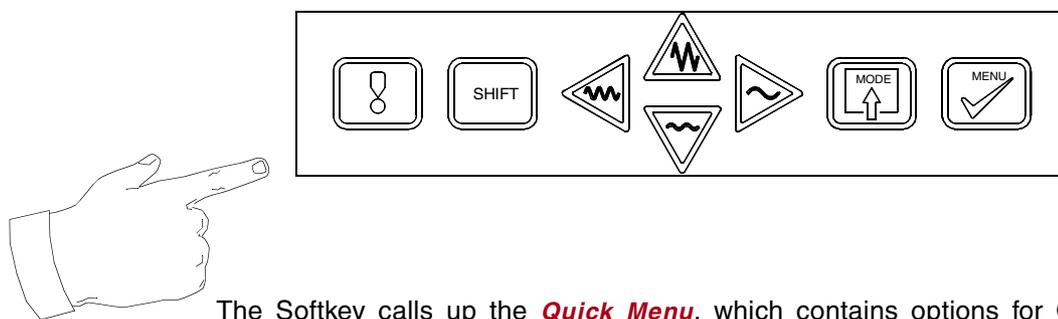


Chapter 14: Viewing Data

The **Honeywell** range has certain features that enable closer analysis of the contents of the display, while normal operation of the unit continues uninterrupted.

NB. this function is **ONLY** available whilst the recorder is in Conventional Mode.

Softkey Operation



The Softkey calls up the **Quick Menu**, which contains options for QuickView, Markers, Events list, Totaliser and Pen Zoom. These features are described in further detail below.

The **QuickView** option is selected by pressing the Softkey a second time. The other options are selected by moving the highlight then pressing the **MENU** key in the normal way. However, with the Add Marker option, once you have entered the sub-menus, any press of the left arrow key takes you straight back to the main display **NOT** the Quick Menu, and, where a marker is selected, it will be set immediately.

QuickView

The QuickView facility enables you to look at trends over a different time period from that dictated by the Chart speed. The **QuickVu Time** period is selected in the Layout menu described in [“Layout” on page 15](#).

To operate the QuickView facility, having called up the Quick Menu, press the **Softkey** a second time. In the example shown opposite, this action would change the display from showing trends more accurately at 15 seconds per division (Figure 1) to more general patterns over the last 10 minutes (i.e. 100 seconds per division - Figure 2). As an alternative to this example, if you are logging data at a Chart speed of 1 hour per division, you could set the QuickVu time period to 2 minutes - this would allow you to look at any unusual changes, such as glitches, in closer detail. This allows you to alternate between examining part of a trend in fine detail or looking for general patterns over a longer period of time.

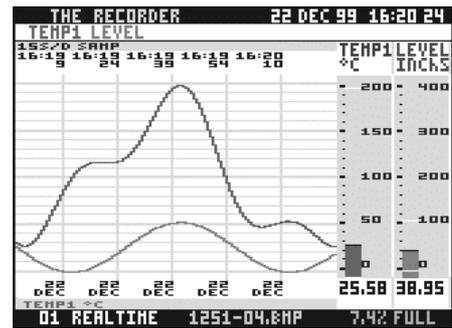


Figure 1

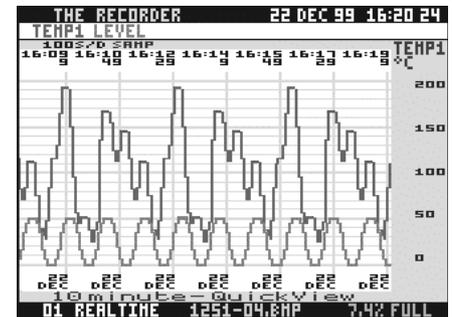


Figure 2

Add Marker

This function is set up as described in **“Markers” on page 44**. From the QuickView menu you can manually place a marker and edit the **Tag** and **Description** of the marker (as described in **“Markers” on page 44**).

Selecting the **Add Marker** option will call up a list of markers. Selecting one of these will immediately set that marker and return you to the main display.

Alternatively you can select the **Edit First** option. Again this calls up a list of markers from which you can select the one you want to edit.

Having selected a marker you will then be presented with the **Edit** sub-menu which contains an option to edit the Tag or Description. There is also an **Edit Only** option. If this is ticked, any changes you make to the Tag and Description will be implemented without setting the marker. If this option is not ticked, as soon as you exit this sub-menu the marker will be set.



NB. Markers and Totals are only available when enabled by the Options Key - see **“Options Key” on page 69** for further information.

List Events

The Events List contains all recorded events. Events are certain conditions or operations which are logged according to the time and date of occurrence, and can subsequently be reviewed in a list.

The types of condition or action that cause Events are summarised below.

- **Totaliser** - reset, stopped or resumed
- **Modes of Operation** - e.g. end of recording, change in setups
- **Disk** - various disk conditions such as disk full, disk changed etc.
- **Digital Inputs** - change in state
- **Relays** - change in state
- **Markers** - when set (if set up to cause an Event)
- **Alarms** - activated/deactivated

(A full list of Events is given in [“Appendix J - Events” on page 99.](#))

Where the list of Events is longer than one page, you can use the **up** and **down arrow** keys as **Page Up** or **Page Down** keys respectively.

DATE	TIME	TAG	EVENT DESCRIPTION
19FEB	1107.25	TOT3	RESET
19FEB	1107.25	TOT4	RESET
19FEB	1107.25	TOT5	RESET
19FEB	1107.25	TOT6	RESET
19FEB	1107.25	TOT7	RESET
19FEB	1107.25	TOT8	RESET
19FEB	1107.25	TOT9	RESET
19FEB	1107.25	MODE4	REALTIME NO-LOG RD
19FEB	1108.34	SYS06	1251-19.8MP WRITE
19FEB	1108.50	SYS08	DISK OKAY
19FEB	1109.15	SYS06	1251-20.8MP WRITE
19FEB	1109.32	SYS08	DISK OKAY
19FEB	1109.49	SYS06	1251-21.8MP WRITE
19FEB	1110.05	SYS08	DISK OKAY

View Totals

Details on how to set up the Totaliser are given in [“Totaliser Setup” on page 43](#) and [“Totaliser Log Interval” on page 44](#). This section describes how to display and operate the Totaliser.

Selecting **Totals** from the Main Menu calls up the Totals menu. The options here are:-

- **Okay View** - press the **MENU** key with this item highlighted to display the Totaliser. This consists of a list of all pens that have their totaliser enabled and the corresponding current total value. These totals values will be updated every second. The time period for the log interval is set up as described in [“Totaliser Log Interval” on page 44](#). To escape from the Totaliser press any key.
- **Reset** - to reset the totaliser for one of the listed pens, select **Reset** from the Totals menu, then select the pen that you wish to reset. Selected pens are indicated by a ✓.

NB. The pen you have selected will be reset to 0.00 as soon as the 4 appears in the menu.

- **Stop Totalling** - the totaliser for one of the listed pens can be stopped or paused using this facility. Select **Stop totalling** from the Totals menu then select the pen that you wish to stop totalling. Selected pens are indicated by a ✓.

When you have selected the pen or pens, press the **left arrow** key twice and the Totaliser will be displayed. Notice that a pause symbol **||** is now displayed next to the total value of the pen that you have stopped.

- **Resume Totalling** - to restart a totaliser that has been stopped, select **Resume totalling** from the Totals menu then select the pen that you wish to restart. Pens that have been stopped have no ✓ next to them.

To pause the Totaliser display, press the **down arrow key**. The totalisation process will continue while the display is paused, so that when you press the **down arrow** key again the totals values will be correctly updated.

The maximum number of digits that can be displayed is 9. A total can therefore be in the form of:-

- a 7-digit number to 2 decimal places
- an 8-digit number to 1 decimal place
- a 9-digit whole number
- a standard form number to 5 decimal places (e.g. 2.80759e+09 which is the same as 2.80759x10⁹)

Pen	Total	
PEN 1	26363221.7	UNITS
PEN 2	3632210.96	UNITS
PEN 3	1.72106e+12	UNITS
PEN 4	-1.7210e-12	UNITS

For a negative number the sign will occupy the first digit.

Zoom Pen

This facility allows you to single out a particular Pen for full-screen display, without interrupting the normal operation of the recorder either in **Real-time** or **Replay** mode.

Selecting **Zoom Pen** calls up a sub-menu from which you can select the Pen which you would like to see on its own. As soon as you select a Pen the chart area for that Pen is expanded to occupy the full chart background and the trace for that Pen only is displayed. If a Pen is already ticked then you are already in Zoom display for that Pen - you can still select another Pen to be displayed.

To return to the view which you were previously in press the **MODE** key. This facility is ideal for when you are replaying data and you want a closer look at a particular pen, or when a number of traces are displayed on top of each other.



Zoom Pen	
✓ 1	PEN 1
2	PEN 2
3	PEN 3
4	PEN 4
5	PEN 5
6	PEN 6
7	PEN 7
8	PEN 8
9	PEN 9

Zoom Group

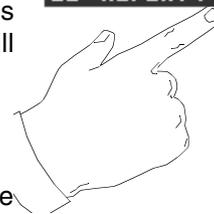
This feature is only available as standard on **Circuitrend V5** recorders, and optionally on **Multitrend V5** recorders.

Selecting the **Zoom Group** item calls up a list of Groups - stored profiles of various screen layouts. When you select one of the available Groups, the display will be configured to the settings specified in the Group. See **“Group Setups” on page 21** for further information.

Freeze Frame (Pause)

The contents of the display can be frozen at any time in replay or real-time mode by pressing the **down arrow** key.

The pause symbol (||) will appear at the bottom of the screen next to the Display status. With the unit in freeze frame mode, screen dumps are still possible and data will continue to be recorded. To return to normal viewing press the **down arrow** key again. The pause symbol will disappear.



Display Off

To preserve the life of the display, in addition to the screen-saver facility described in **“Special Setups” on page 47**, it is possible to manually switch off the display by pressing **SHIFT** and **MENU**.

The recorder will continue its normal operation while the display is off. To restore the display press the **up arrow** key.

NB. The Screen Saver facility is NOT available on **Circuitrend V5** or **Multitrend V5**.

Screen Dumps

The contents of the display at a particular moment in time can be written to disk in the form of a bitmap image. This can then be processed on a PC to produce a full-colour replica of the display on your monitor and a hardcopy printout.

To write a screen dump to disk press the **SHIFT** key then, at the moment you wish to capture the display, press the **MODE** key. Make sure the **SHIFT** key is on by looking for a yellow rectangle at the bottom left corner of the display.

If the disk in the drive cannot be written to, the message **NO SNAPSHOT, DISK OUT OR OTHER ERROR** appears on the display. Go into the Disk menu from the Main menu and select **Clear error**, then try to capture the display again. If the same message appears, check your disk (see **“Disk Operations” on page 65**).

If the screen dump is successful, the file name that it is stored under will appear on the screen. (The file name is also displayed on the bitmap image in the Unit status section of the display.) Press the **MENU** key to resume normal operation. See **page 67** for information on file names for screen dumps.

NB. The screen dump facility is NOT available on **Circuitrend V5** or **Multitrend V5** recorders.

Chapter 15: Disk Operations

There are a number of circumstances in which the condition of the 3.5" floppy disk will not allow normal recording of data.

In such circumstances the **CAN'T LOG** message will be displayed in the Unit status section of the screen. Some of these conditions can be rectified by going into the Disk menu (see **"Disk" on page 27**).

Disk Full

Two types of warning message will be displayed in the event of there being insufficient disk space for further recording.

The message **DISK FILE LIMIT** indicates that the maximum number of files that can be stored on disk has been reached. For high density disks a maximum of 224 files can be stored, for double density disks a maximum of 112 files can be stored.

The message **DISK 100% FULL** indicates that the disk contains the maximum amount of data that can be stored. When these messages are displayed the unit ends the recording automatically.



When 90% of the disk space is used up, the Disk space status changes colour from green to red. This indicates that disk space is running out and a new recording on a new disk should be started.

If the disk is to be stored for archiving, start recording on a new disk. If you wish to overwrite the disk with new data, use the Recycling facility described on [page 47](#). It is also possible to create space on a disk by only deleting certain files. For further information on disk files see ([See "Writing To Disk" on page 67.](#))

NB. Recycling only overwrites log files. Totaliser or Event files will NOT be overwritten, and will continue to increase in size, thereby reducing the amount of disk space available for recycling ([See "Writing To Disk" on page 67.](#))

Disk Unformatted

If you try to record data onto an unformatted disk a message will appear on the screen following the **WAIT, CHECKING DRIVE** message and **DISK UNFORMAT'D** will appear in the Disk Space Status section of the display.

To format the disk, go into the Disk menu from the Main menu. Check whether the disk to be formatted is High Density or Double Density and select **Format HD** or **Format DD** accordingly. The **FORMAT SURE?** prompt appears.

NOTICE
Formatting a disk will erase all data.

Select **YES** if you wish to format the disk.



Wiping Disks

If you start recording on a disk that already has some non required data on it, you may wish to erase the disk. To do this go from the Main menu into the Disk menu and select **Wipe** to erase the data on the disk. This will cause the **WIPE DISK SURE?** prompt to appear. Select **YES**.

All data will now be erased on this disk and a new recording can be started.



Disk Faults

Wrong Disk

Disk Out

Disk Read Error

These messages are displayed in the disk space status section of the screen when a disk has been removed or changed.

If the unit is in **READ ONLY** mode (i.e. when it is not recording) it will only detect that the disk has been removed or changed if **Auto Sensing** is enabled (see [page 27](#)). If **Auto Sensing** is **NOT** enabled the unit will only display a **DISK OUT** or **WRONG DISK** message if it is trying to write to the disk.

The **DISK READ ERROR** message is displayed when the disk has been changed and the unit is trying to read from the disk that was previously in the disk drive, for example if you change the disk while the unit is in record mode.



Chapter 16: Writing To Disk

Data is written to disk in five different formats - logged data, setups data, Totals files, screen dumps and events. All data is stored in files on a 3.5" floppy disk which can then be accessed by any PC with a 3.5" disk drive.

Logged Data



LOG03.005

This is written to disk under a file name in the format shown opposite.

- **LOG** - specifies that the data stored in that file is logged data.
- **03** - specifies the number of the pen that wrote that data to the screen.
- **.005** - is the file extension. This corresponds to the session number of the recording (000 to 099). See [“Session Numbering” on page 57](#) for more information.

Setups Data



SETUP.014



SETUP.0PC

When a recording session is started, the current setups of the recorder are automatically written to disk. The file name is **SETUP** with the recording session number as the file extension. In this example the setups for recording session 14 are contained in this file. When setups are stored to disk using the **Setup to Disk** facility in the Special Setup menu, the file extension becomes .0PC. (Setup files created under *TrendManager Pro* are also given the .0PC extension.) When the **Setup from Disk** facility is used, the unit will try to load the setups stored in a .0PC file first. If there is no .0PC file on the disk, the unit will then try to load the latest setup file it can find. (See [“Unit ID” on page 28](#) on how transferring setup files affects Unit ID numbers.)

Screen Dumps



1234-05.BMP

Bitmap images of the display are written to disk under a file name in the format shown opposite.

- **1234** - is the ID number of the unit from which the bitmap image was taken.

- **-05** - is the file identifier - the number is allocated by the unit. Numbering starts at 01 and for each screen dump to that disk the number is incremented by one.
- **.BMP** - specifies that the data stored in the file is a bitmap image. (For information see [“Screen Dumps” on page 63.](#))

The screen dump facility is NOT available on the **Circuitrend V5** or **Multitrend V5**.

Totaliser

TOTAL.008

Information from the Totaliser is stored in a file with the name **TOTAL.nnn**. The file extension corresponds to the number of the recording session in which the totals were logged.

Event File

EVENT.008

The list of logged Events is stored in a single file with a similar format as the Totaliser file, where the extension refers to the recording session.

Chapter 17: Options Key

Function One

NV RAM

The Options Key is an internal piece of hardware in the recorder that serves two functions. Firstly, it allows the setups of a recorder to be stored in non-volatile memory (**NV RAM**), so that in the event of a power failure, the recorder can continue operation as soon as power is returned to the unit, whether or not there is a floppy disk in the drive.

Function Two

Maths Expressions

Totalising

Event Markers

Group

Secondly, it enables certain powerful features of the recorder, namely **Maths Expressions**, **Totalising**, and **Event Markers**. It also enables the **Group** layout function on the **Multitrend V5**. These features are described in further detail in the following sections:

1. [“Maths Expressions” on page 37.](#)
2. [“Totaliser Setup” on page 43.](#)
3. [“Markers” on page 44.](#)
4. [“Group Setups” on page 21.](#)

Chapter 18: TrendManager Pro

Introduction

TrendManager Pro is a Windows-based PC package that accompanies the **Honeywell** range of recorders as a data acquisition and configuration tool.

Function

Data can be retrieved from recorders to be graphed, printed, archived and exported to other software packages. Using *TrendManager Pro* recorders can be configured to the setups described in “[Display Setup Menus](#)” on page 15.

TrendManager Pro runs under Windows 95™ and offers an easy-to-use graphical user interface, and all the benefits that Windows™ provides.

A step-by-step guide to using *TrendManager Pro* is included as an integral part of the package and can be called up using the Help facility.

Data Archiving

All configurations and settings are stored on the *TrendManager Pro* database, as well as all archive and real-time data retrieved from a recorder. System errors and alarm situations are also logged on the database.

Communications

Data exchange with a recorder is via the transfer of recorded information or setups to 3.5" floppy disk, or through RS485 serial communications which allow real-time down-loading and interrogation of recorders.

Chapter 19: Maintenance

The **Honeywell** range of recorders contains no parts serviceable by the user. In the event of a unit failure contact your nearest Service Department (or an authorised agent) to arrange for the return of the unit for repair.

Cleaning

Cleaning the unit should be done with a soft lint cloth and warm soapy water. Solvents and prolonged exposure to detergents can cause damage to the front panel. It is recommended that any cloth used for cleaning is damp but NOT wet, to avoid water collecting in the unit.

Disk Drives

DO NOT insert any object, other than a 3.5" floppy disk, or force a disk into the disk drive. Disks should be removed gently on a parallel plane to the opening of the disk drive. Avoid tilting the disk up or down during removal as it may damage the drive.

If the disk is impeded during ejection from the disk drive, it may jam. DO NOT pull the disk out if there is any resistance. To remove the disk, push it gently back into the drive and press the eject button again, ensuring the original cause of impediment to the disk is removed.

If the disk is still caught in the drive, DO NOT attempt to force it. Contact **Honeywell** or an authorised agent.

⚠ CAUTION

AVOID DISK DAMAGE

To avoid damage to disk drive heads, ensure diskette is removed prior to moving or transporting the recorder.

Failure to comply with these instructions may result in product damage.

Honeywell recommend the following manufacturers of floppy disks:

Verbatim	Sony	Fuji	Maxell
----------	------	------	--------

For optimum disk drive performance it is recommended that the disk drive heads are cleaned every six months. This can be done by inserting a dry floppy head-cleaning disk and selecting ***Clean Drive Head*** from the Factory menu (see ***“Special Setups” on page 47***).

The disk drive in your recorder is a highly reliable component that will give many years of trouble free operation if the following precautions are observed:

- Use only high quality pre-formatted diskettes as recommended above.
- Never use bulk supply "unbranded" diskettes and "badged" diskettes by a component wholesale organisation. Experience has shown that "unbranded" and "badged" diskettes, whilst often meeting ISO, ECMA or ANSI standards do not exhibit the longevity, or performance at temperature, available from diskettes sourced from reputable manufacturers.
- Every six months (or more often in excessively dusty or harsh environments), use a "dry" cleaning diskette on the recording heads. Suitable "dry" cleaning diskettes are available from **Honeywell**.
- Never use "wet" cleaning diskettes, these are not recommended by the disk drive manufacturer, and can cause more harm than good.
- For critical applications, do not continually use the same diskette.
- Do not enable auto sensing if not recording to disk. If left enabled, disk could become damaged.

Operating Temperature

Operating temperatures are described in "[Specifications](#)" on [page 4](#). Prolonged operation at temperatures over 50 °C will cause degradation of the display and may lead to other damage.

If the unit has been moved from a cold environment into a warm one, ensure that the unit has reached a minimum temperature of 12 °C or is left to stand for 1 hour at room temperature before applying power, to ensure no condensation remains in the unit.

Front Panel

Care should be taken with the front panel when handling the unit. Sharp and hard objects may pierce the front panel and damage the display. Abrasive materials will damage the front panel.

Keypad

The keypad is designed for finger operation only. Using a sharp object such as a pen or finger nail to press the keys will damage the key mechanism permanently.

Calibration

It is recommended that Recorder calibration is performed at least every year, or in accordance with industry regulations, to ensure maximum accuracy. See "[Appendix H - Calibrating Analogue References](#)" on [page 97](#) for more information.

Appendix A - Quality Approvals

Quality Assurance

The Quality Management System of **Honeywell** has been approved by Lloyd's Register Quality Assurance Ltd to the following standards:



Certificate No. 929041

ISO 9001 : 1994.

Development and maintenance of associated software in accordance with Tickit.

CE Mark

Honeywell recorders are compliant with the Low Voltage Directive 72/23/EEC as amended by 93/68/EEC, and EMC directive 89/336/EEC as amended by 92/31/EEC and 93/68/EEC.

Appendix B - Transmitter Power Supply

Current Output Transmitters

The transmitter power supply is primarily intended as a simple two-wire connection facility to any type of 4-20 mA transmitter (24 V nominally powered).

The output voltage from the recorder will be $>18\text{ V} < 28\text{ V}$ with respect to the -ve or +ve terminals of the input channel.

The two-wire connection can also be used to allow further instrumentation to be connected into the loop. The maximum resistance that may be inserted into the loop will depend on the specification of the transmitter used. Typically this will allow a maximum of $300\ \Omega$ into the loop. If further loading is required, you should verify the maximum resistive load for the transmitter used with the supply at 18 V.

Note:

1. The input resistance of the recorder when using a current input is $10\ \Omega \pm 2\ \Omega$ and has negligible effect on the loop loading.
2. The transmitter power supply is internally protected from short circuit conditions.
3. Each of the transmitter power supply channels is isolated from the others but NOT from the input terminals of that channel.

Voltage Output Transducers

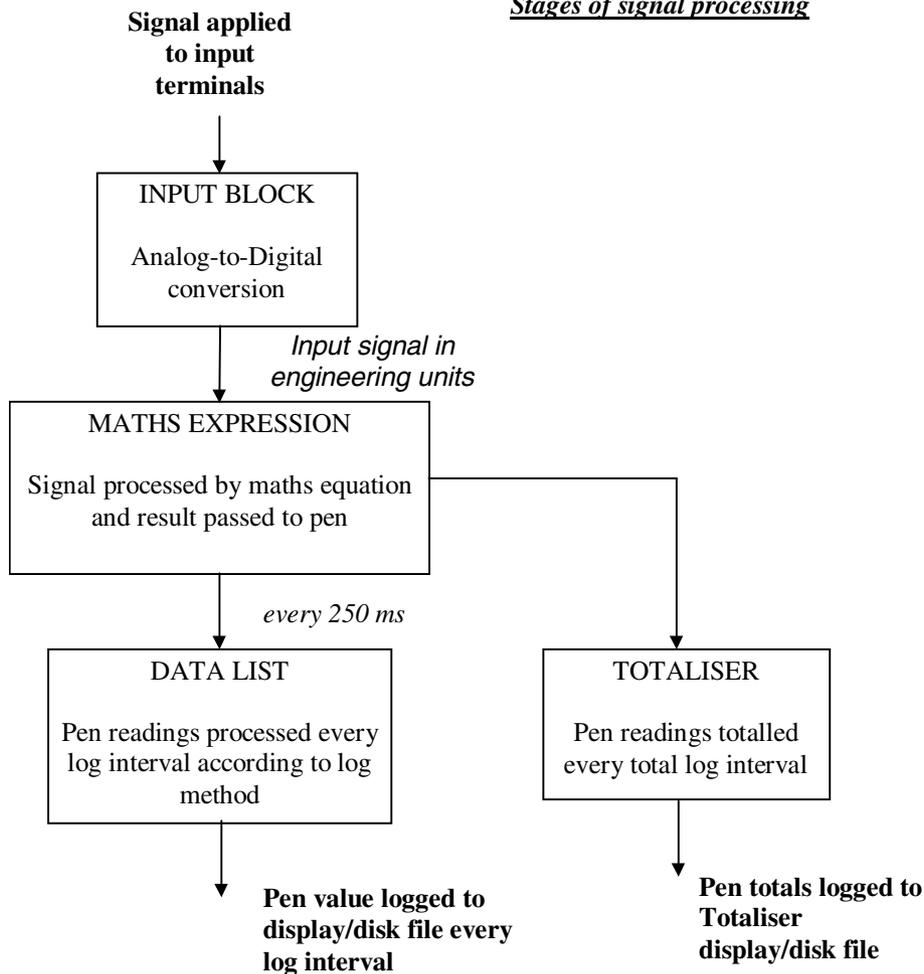
The transmitter power supply may also be used for 3-wire transducers giving a voltage output e.g. 1-5 Volts, provided the following is noted:-

1. The transmitter power supply voltage will be between 18 and 28 Volts (dependent on recorder type and tolerances).
2. The transmitter power supply is NOT isolated from the -ve and +ve terminals of the channel from which it is derived.
3. The maximum current taken by the transducer is not greater than 25 mA continuous under all conditions. The transmitter supplies are short circuit protected but can give currents higher than 25 mA for short periods (up to 1 Amp peak). Following a short circuit the transmitter supply will recover within one second, if the fault is removed.

Appendix C - Signal Processing

Analogue input signals are processed by being passed through various 'blocks' or stages which convert the electrical input signal to a value displayed on screen and logged to disk.

Stages of signal processing

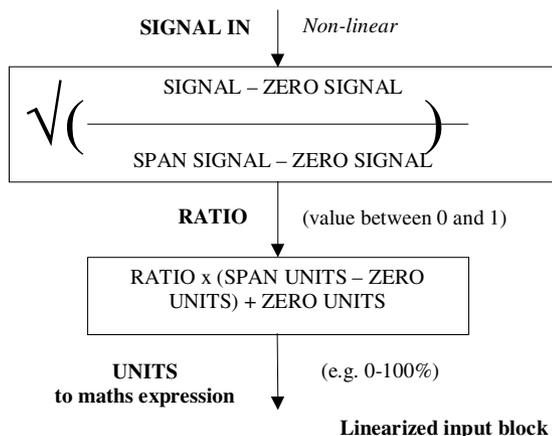
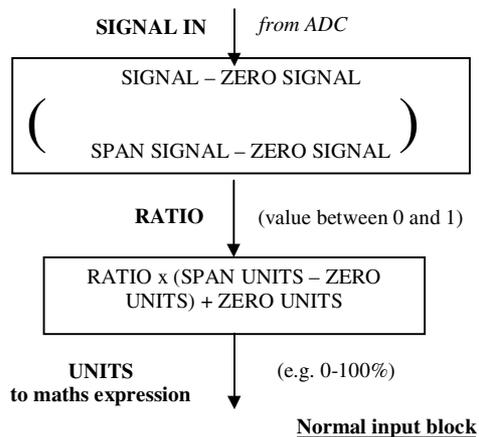


Input Block

Input signals are converted to a digital value by the A-to-D converter (ADC). Within the Input block this digital value is subjected to a mathematical function in order to present the signal as a ratio of the total span. E.g. if a 12 mA signal is applied within a 4 - 20 mA range, the ratio will be $(12 - 4) / (20 - 4) = 0.5$.

This ratio is then converted to engineering units as specified in the Inputs setup menus (see [“Input to a Standard Analogue Card” on page 29](#)). The zero and span engineering units (for example 0 and 100) create a scale on which the value of the input signal will lie. Using the same example, the ratio of 0.5 would be converted to $0.5 * (100 - 0) + 0 = 50$.

The same method is used for a non-linear signal except that when square root extraction is selected from the Input menu the square root of the ratio calculation is taken as being the ratio value.



Maths Expressions

The numerical value of the input signal (in engineering units) is now fed into a maths expression. This can be as simple as $P1 = A1$ (which will result in the signal from Analogue Input 1 being passed to Pen 1) or a more complicated combination of maths functions and readings from more than one input.



The result of the maths expression is passed to a pen via the data list. Maths expressions are selectable by the user and are described in greater detail in [“Appendix D - Maths Expressions” on page 85](#).

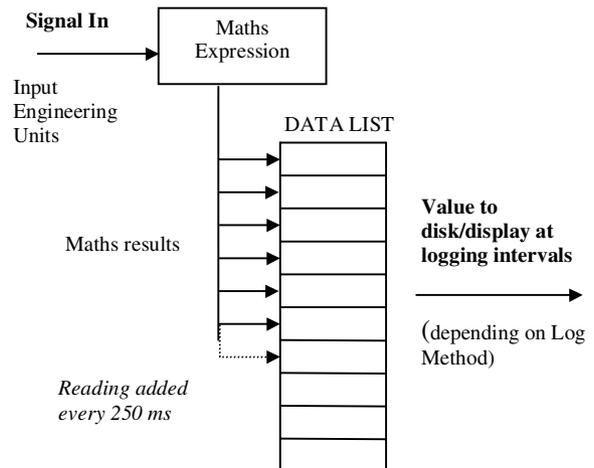
Data List

The results of maths expressions are fed into a data list every 250 milliseconds. This is a temporary store where the readings are kept until each log interval.

At each log interval the readings in the data list are processed according to the log method and the result (or results) are then passed to the appropriate pen (see “[Log Speed](#)” on page 38).

The different log methods are described below.

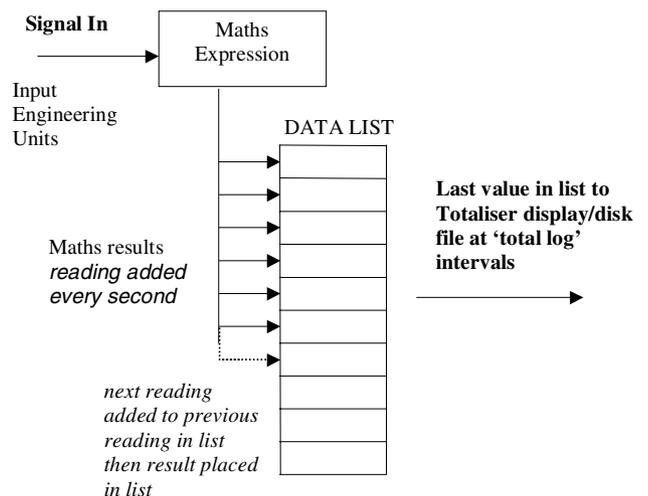
- If **Sample** is selected, the last reading from the Data List will be logged.
- If **MaxMin** is selected, two readings will be logged - the maximum and minimum readings held in the Data List - and a trace drawn between the two. Note that if the logging interval is 250 ms (i.e. the Log Speed is 5 secs/div) there would only be one reading in the list so to save disk space the Sample method would be more suitable.
- Alternatively, selecting **Max** will cause the maximum reading only to be logged and selecting **Min** will cause only the minimum reading to be logged.
- If **Average** is selected, the average of all the readings in the Data List will be logged.



Totaliser

The totaliser can be selected as an optional extra alongside the normal processing of an input. The totaliser takes the results of a maths expression and places them its own Data List in a similar way as a Pen except that it adds each reading to the previous reading in the list.

On each total log interval, the last reading in the list is taken as the logged reading. (See “[Totaliser Log Interval](#)” on page 44.)



Calibrating Analogue References

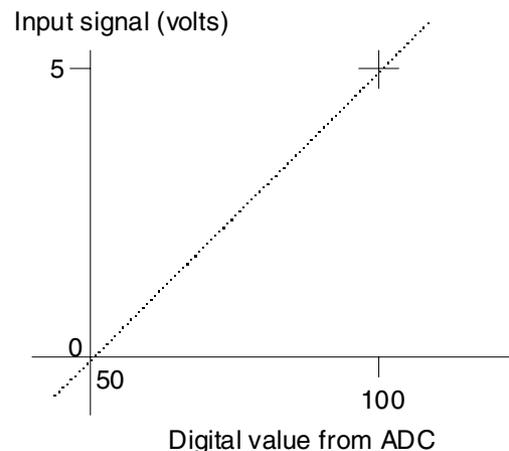
Before any of the above processing of an input signal takes place, the 'raw' analogue input must be converted to a digital signal.

To calculate the analogue input signal that corresponds to a given digital value it is necessary to use reference points. These are two digital values whose corresponding analogue input values are known (normally at either end of the signal range).

If these references are placed on a graph and a line drawn between the two, then for any digital value a corresponding analogue value can be read.

In the example shown opposite, readings from the ADC of 100 and 50 are given reference values of 5 and 0 volts respectively. From this information, if a value of 60 is read from the ADC then it is calculated that an input signal of 1 volt is being applied.

These reference points can either be **specified** (i.e. the recorder is 'told' that for a particular reading from the ADC the corresponding value is 5 volts and for another reading the value is 0 volts) or they can be **sampled** (i.e. set up from known external signals). The latter method is used to



Calibrate Analogue References as described in [“Appendix H - Calibrating Analogue References” on page 97](#).

As an example, if you were calibrating reference points for a 0-5 volt input, you apply a known 0 volt signal and instruct the recorder to use the reading from the ADC as a reference point for 0 volts, then repeat the procedure for a known 5 volt signal. Obviously, the accuracy of this method is highly dependent on the accuracy of the known signals being applied.

The **Default Analogue Refs** in the Factory menu (see [page 49](#)) will specify the reference points to values that are in-line with the average characteristics of the ADC. For most applications the accuracy of this method is sufficient, but should the characteristics of a particular ADC stray from the average then calibration to external signals will provide far greater accuracy.

For optimum accuracy all recorders are calibrated to external signals in the factory before being shipped. The **Factory Recall** option in the Factory menu will reset the unit to these calibration settings in the event of any drift in the A-to-D conversion of input signals.

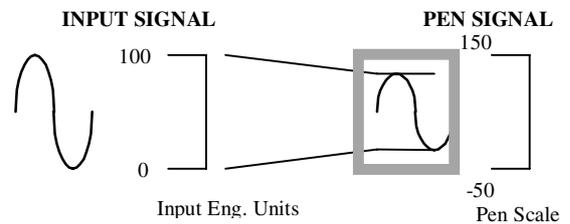
Pen Scales

Within the Pen block certain mathematical functions can be performed on the signal. These mathematical expressions of the signal must be considered when setting the Pen scale, as described in [“Scale” on page 36](#).

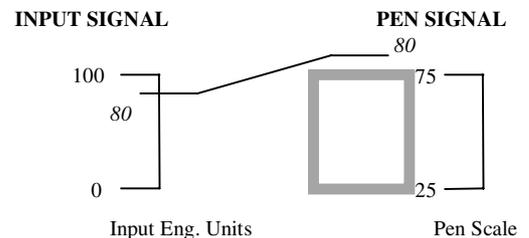
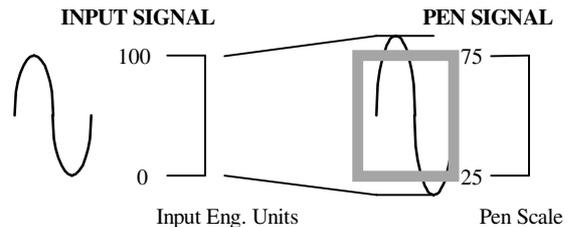
Setting the Pen scale dictates how the input signal is seen on the display. For example, if the Input scale is set at 0 to 100 in engineering units and the Pen scale at -50 to 150 units, the effect will be that of 'zooming out' from the signal i.e. the signal will appear

smaller. Alternatively, if a Pen scale of 25 to 75 is selected the effect will be 'zooming in' on the signal, and only a section of the signal will be seen.

The examples opposite show how a sinusoidal signal fluctuating over the full input range would appear for different pen scales. Where the input signal exceeds the range of the pen scale, the trace is displayed at full scale and the digital values are displayed in grey text.



For steadier signals the visible effect will be different. For example a constant input signal with a value of 80 units on the input scale would merely shift its position on the display according to the Pen scale settings. In this example, where the pen scale is 25 to 75, an input signal of 80 units would be displayed as full scale, as its value exceeds the range of the Pen scale. This only occurs on the display - the recorded value on disk would still be 80 units.

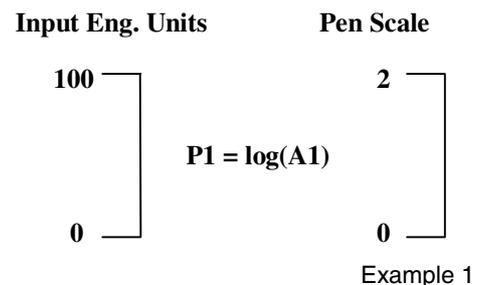


The relationship between Input and Pen scales should be considered when dealing with **Maths Expressions**. (For more information see [“Maths Expressions” on page 37](#) and [“Appendix D - Maths Expressions” on page 85](#)).

Some examples are shown below.

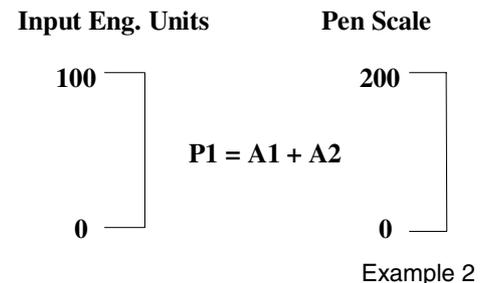
Example 1. A Maths Expression is entered as follows:- $P1 = \log(A1)$

This means that the signal displayed as Pen 1 will be the logarithmic value of the signal applied to Input 1. The scales should be set up accordingly. If the Input scale is 0 to 100 units then, for the full signal range and maximum resolution, the Pen scale should be set at $\log(0)$ to $\log(100)$, which is 0 to 2.



Example 2. A Maths Expression is entered as follows:- $P2 = A1 + A2$

This means that the signal displayed as Pen 2 will be the sum of the values of the signals applied to Input 1 and Input 2, i.e. 0 + 0 to 100 + 100, which is 0 to 200.



Appendix D - Maths Expressions

A maths expression is made up of a number of terms. A term is the smallest valid component in a maths expression and can be a variable, operator or function. Certain operators and functions have the same effect in a maths expression - for example, **\$** or **SQRT** will both perform the square root of an operand.

An operand may be a constant (i.e. a fixed number) or a **variable**. The variables that can be used are described below.

- **An** - The letter A followed by a number causes the reading taken from an analogue input (denoted by the number) to be inserted in the maths expression. In this example, the readings from Analogue Input 1 are being displayed on Pen 1.

```
Math Expression P1=
"A1"
```

- **In** - The letter I followed by a number causes the reading taken from a digital input (denoted by the number) to

```
Math Expression P9=
"I1*I2"
```

be inserted in the maths expression. In this example, the result of digital input 1 multiplied by digital input 2 is displayed on Pen 9. As digital inputs are read as either 1 or 0, the result of this maths expression will effectively be an AND function (i.e. digital inputs 1 and 2 must both be 1 for the value displayed on Pen 9 to be 1 - see **"Boolean Expressions" on page 88**).

- **On** - The letter O followed by a number causes the state of a Relay output (denoted by the number)

```
Math Expression P1=
"O1"
```

to be inserted in the maths expression. A Relay output is read as 1 when active and 0 when inactive.

- **Operators** - can be either unary or binary. A unary operator requires one operand after it to make a valid expression, whereas a binary operator requires an operand on either side. For example # is a unary operator, as in **#2** (2 squared), whereas * is a binary operator, as in **2*3** (2 multiplied by 3).

The available functions and operators for maths expressions are described below. Where a function and operator have the same effect they are listed together. A **U** after the operator denotes a unary operator and a **B** denotes a binary operator.

EXPRESSION	EXAMPLE	DISPLAY
Add Operator + (B)	Analogue Input 1 added to Analogue Input 4 displayed on Pen 1	Math Expression P1= "A1+A4"
Subtract. Operator - (B)	Analogue Input 1 subtracted from Analogue Input 2 displayed on Pen 1	Math Expression P1= "A2-A1"
Negate. Operator - (U)	The sign of the value Analogue Input 1 is reversed. A reading of 6 would be displayed as -6 and vice versa	Math Expression P1= "-A1"
Multiply. Operator * (B)	The value of Analogue Input 2 multiplied by two	Math Expression P1= "A2*2"
Divide. Operator: / (B)	Analogue Input 1 divided by Analogue Input 3	Math Expression P1= "A1/A3"
Square Root. Function: SQRT Operator: \$ (U)	Pen 1 displaying the square root of Input 3 added to Input 4	Math Expression P1= "SQRT[A3+A4]" Math Expression P1= "\$ (A3+A4)"
Square. Function SQ Operator: # (U)	The value of Input 3 squared and displayed on Pen 1	Math Expression P1= "SQ[A3]" Math Expression P1= "# A3"
Round. Function ROUND	The value of Analogue Input 2 divided by four and rounded to the nearest whole number	Math Expression P1= "ROUND[A2/4]"
Reciprocal. Operator ! (U)	The reciprocal of the value of Analogue Input 2 is displayed on Pen 1. (An alternative way of writing this expression would be 1 / A2).	Math Expression P1= "! A2"

EXPRESSION	EXAMPLE	DISPLAY
Absolute. Function ABS Operator: & (U)	The result of Input 4 subtracted from Input 1 is always considered as positive. If A1 = 2, and A4 = 3.5, the value displayed on Pen 1 would be 1.5 not -1.5.	<pre>Math Expression P1= " ABS[A1-A4] "</pre> <pre>Math Expression P1= " & (A1-A4) "</pre>
Logarithm to base 10. Function: LOG Operator: @ (U)	Logarithmic value (LOG10) of Input 1 displayed on Pen 1.	<pre>Math Expression P1= " LOG[A1] "</pre> <pre>Math Expression P1= " @A1 "</pre>
Natural logarithm. Function: LN	Natural logarithmic value (loge) of Input 2 displayed on Pen 1.	<pre>Math Expression P1= " LN[A2] "</pre>
Low value. Function: LO	Pen 1 displays whichever is the lowest value out of Input 1 and Input 3. Note the inputs being compared are separated by a comma.	<pre>Math Expression P1= " LO[A1,A3] "</pre>
High value. Function: HI	Pen 1 displays the highest value out of Input 1 and Input 3.	<pre>Math Expression P1= " HI[A1,A3] "</pre>
Root. Operator: ~ (B)	The third root value of Input 1 displayed on Pen 1.	<pre>Math Expression P1= " A1~ 3 "</pre>
Power. Operator: ^ (B)	The value of Input 2 to the power of 3 (or cubed) displayed on Pen 1.	<pre>Math Expression P1= " A2^ 3 "</pre>
Modulus. Operator: % (B)	The value of Input 2 is divided by 20 and the remainder ONLY is displayed on Pen 2. Therefore the signal will be within 0-19.	<pre>Math Expression P2= " A2%20 "</pre>
Rolling Average. Function: R	* A maximum value of 40 can be entered for this function. The value displayed on Pen 1 is the average value of the last eight samples taken from Input 2 (each sample being taken every 250ms.)	<pre>Math Expression P1= " R2[8] "</pre>

* See [“Appendix C - Signal Processing”](#) on page 79 for further information on sampling.

Boolean Expressions

Boolean expressions can be performed using Relay output (**O**) and Digital input (**I**) variables. At a basic level **AND** and **OR** functions can be performed by using the * and + operators respectively between the above variables. More significantly, these variables and operators can be used to enable or disable certain segments of a maths expression, as illustrated in the following example.

The temperatures of two adjacent kilns are being monitored. Kiln 1 is being monitored on Analogue Input 1 of a recorder, and Kiln 2 on Analogue Input 2. It is noticeable that when Kiln 1 reaches a temperature above 750 °C, the Kiln 2 temperature increases by 2 % of the Kiln 1 temperature. How can the recorder be set up so that this 2 % increase is ignored?

1. A high alarm on Analogue Input 1 is set so that when the temperature reaches above 750°C Relay output 1 is activated.
2. Set the maths expression for Analogue Input 2 as $P2 = A2 - (A1/50) * O1$. This means that when the temperature of Kiln 1 is below 750 °C, $O1 = 0$ so the above expression will be $P2 = A2$.

When the temperature is above 750 °C, $O1 = 1$ so the term $A1/50$ (which is 2 % of the value of $A1$) will be subtracted from the value of $A2$. This will give the temperature of Kiln 2 as it would be without the effect of Kiln 1.

Calculations are performed in the order in which they are written from left to right. So for the expression $P1 = A1 + A2/2 * A3$, the sequence of calculations would run as follows:-

```
A1 + A2
then r / 2
then r / A3
```

where 'r' is the result of the calculation performed on the preceding line. Use round brackets to change the order of precedence - e.g. $P1 = A1 + (A2/2) * A3$ would give a different result from the above example as $A2$ is divided by 2 **before** it is added to $A1$.

Spaces are not recognised in maths expressions and the expression can be written anywhere within the 19-character text field. (Up to 60-character maths expressions can be entered in *TrendManager Pro*, but only the first 19 characters will be displayed on a recorder.)

```
Math Expression P1=
"ROUND[$(A3)]"
```

More than one set of brackets can be used in a maths expression. For example, if you wanted the value of the square root of Analogue Input 3 to be rounded to the nearest whole number the expression would be written in one of three ways as shown opposite.

```
Math Expression P1=
"! (SQRT[A3])"
```

In the first and third example the round brackets surrounding **A3** can be omitted - they are included to make the expression easier to understand.

```
Math Expression P1=
"! ($A3)"
```

Appendix E - Character List

	!	“	#		\$	%	&	‘	()		*	+	,	-	.
/	0	1	2	3	4	5	6	7	8	9	;	:	<	=	>	?
	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
P	Q	R	S	T	U	V	W	X	Y	Z	[\]		^	±
—	³	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
p	q	r	s	t	u	v	w	x	y	z	<	{			>	}

The following characters will **NOT** appear on the display in Conventional Mode.

	~	10	0	-1	-2	-3	-4	-5	-6	-7	-8	-9	1
2	3	4	5	6	7	8	9	©	↑	↓	⋮	←	→

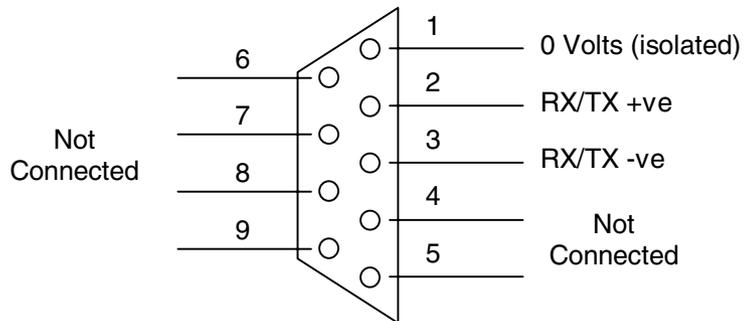
The characters contained in cells with a dotted border are only available for text.

The characters contained in shaded cells are only available for maths expressions.

Appendix F - Serial Interface Connections

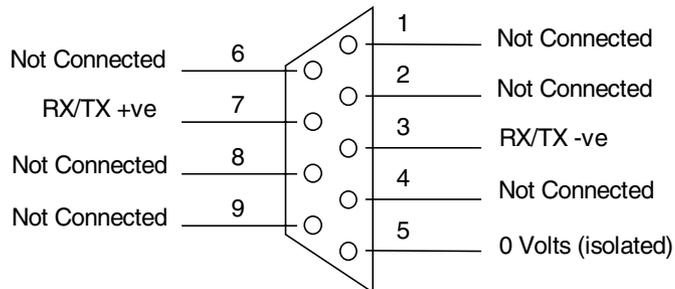
RS485 Trendbus™ network

Pin-outs for RS485 Trendbus™ serial connections are as follows:-



RS485 Modbus™ network

Pin-outs for RS485 Modbus™ serial connections are as follows:-

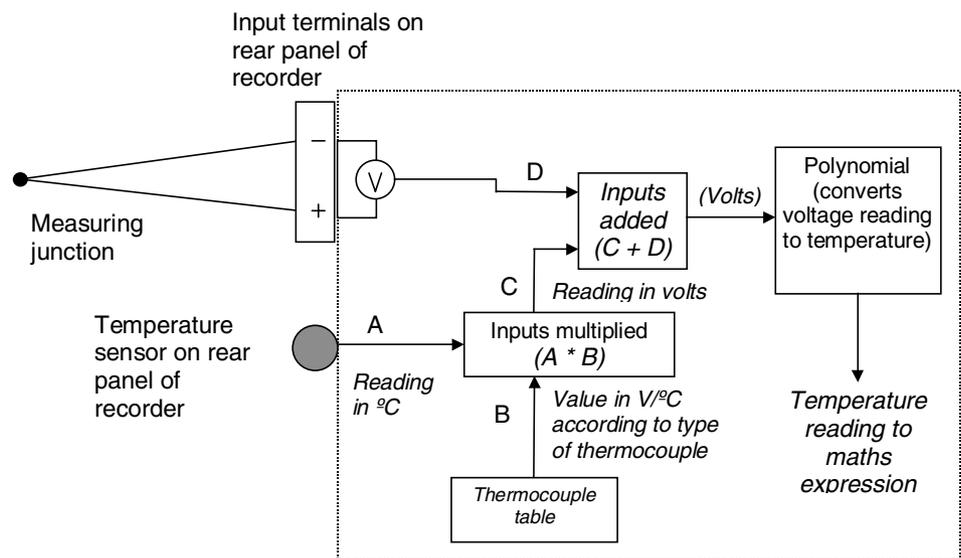


NB. The type of serial communications for each unit is factory selected according to customer specifications. Should you wish to change your serial comms configuration, please contact your nearest service centre.

Appendix G - Thermocouple Connections

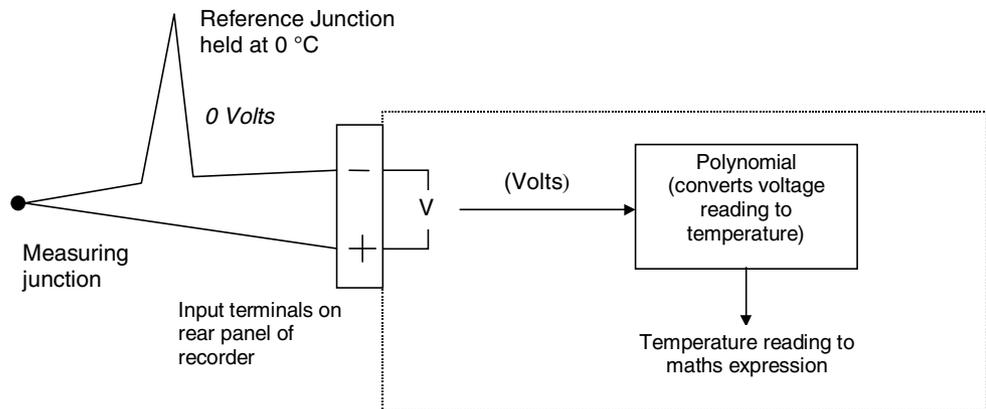
The different methods for connecting thermocouples according to the type of reference are shown below.

Internal Reference



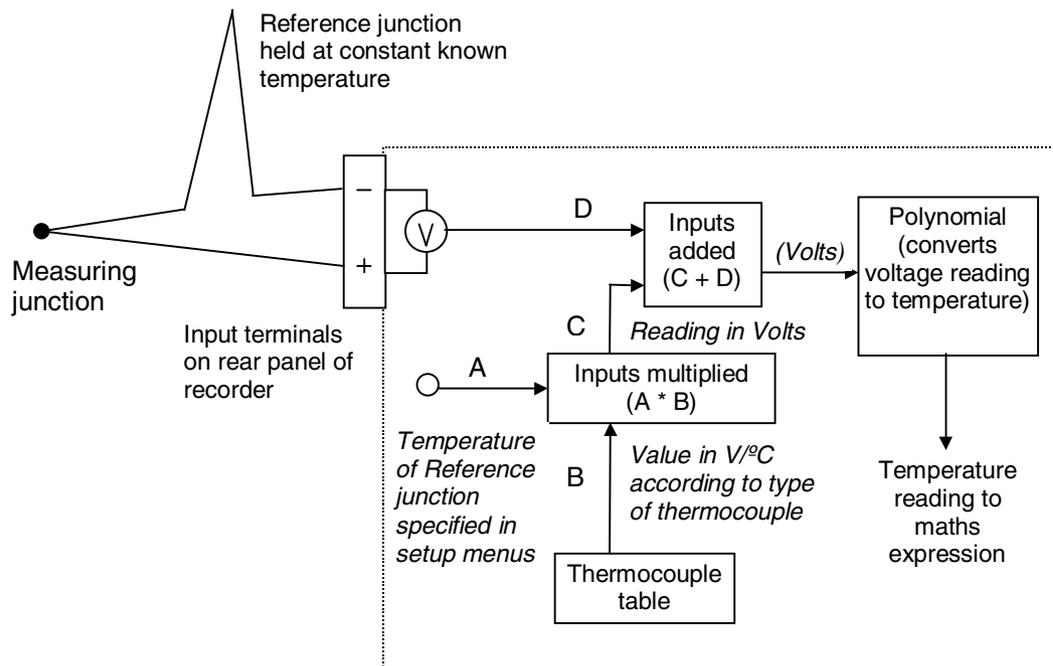
Internal Reference the reference junction is where the thermocouple is connected to the input terminals of the recorder, and the temperature at this junction is being measured by a temperature sensor on the rear panel of the recorder. The reading from this sensor is read off against a value taken from the thermocouple table, which corresponds to the type of thermocouple being used. (To specify the type of thermocouple, see [“Input to a Universal Analogue Card” on page 33.](#)) The corresponding reading in volts for the temperature measured by the sensor is then used as a reference for the reading from the thermocouple.

External Reference @ 0 °C



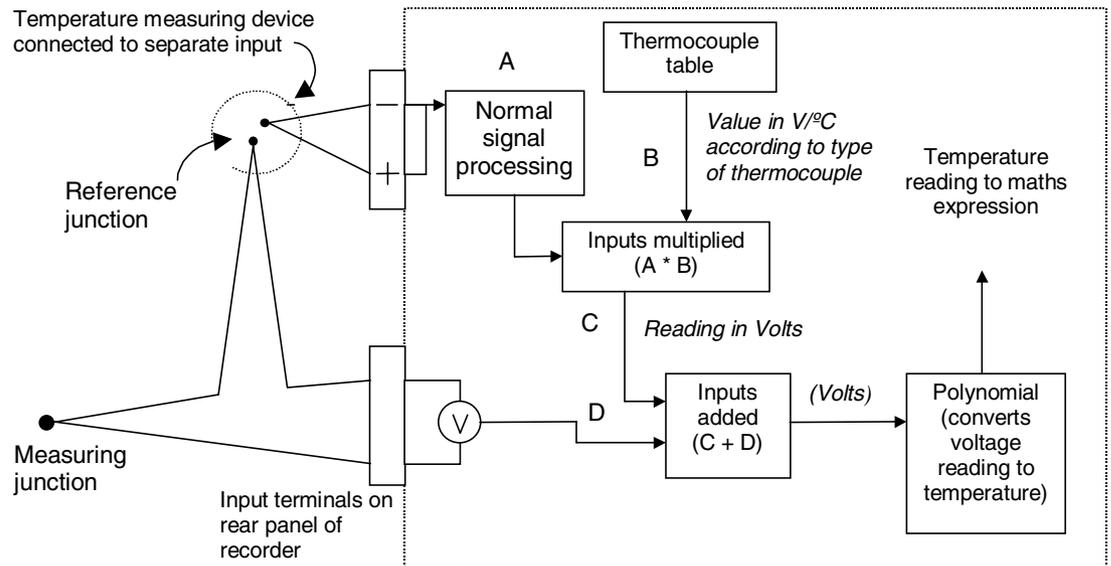
External Reference @ 0 °C by keeping the reference junction at 0 °C the negative input is acting as a 0 Volt reference so the voltage reading from the thermocouple can be passed directly to the polynomial where the corresponding temperature reading can be found.

External Reference @ Specified Temperature



External Reference @ specified temperature if the reference junction can be kept at a constant known temperature other than 0 °C this temperature can be specified in the setup menus as described in **“Input to a Universal Analogue Card” on page 33**. This reference temperature is then used in the same way as the reading from the temperature sensor using the Internal Reference method.

External Input Reference



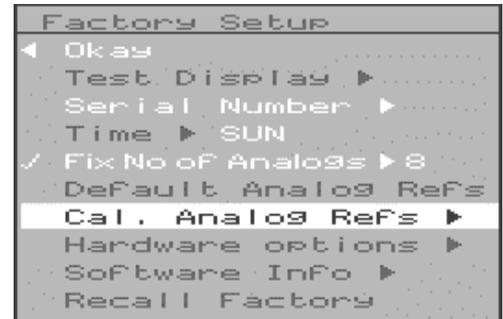
External Input Reference the reference temperature reading in this method is provided by a separate temperature measuring device connected to another input. This input is processed in the normal way and then passed back into the thermocouple signal processing system as a temperature reading.

Appendix H - Calibrating Analogue References

It may be necessary under certain conditions to use the **Cal. Analog Refs** facility in the Factory menu. Reasons for using this facility might be:-

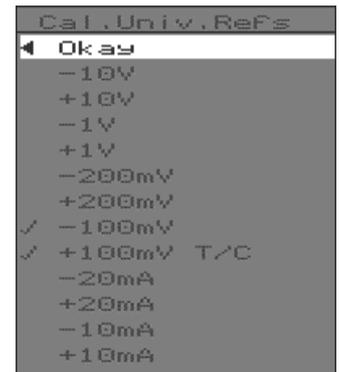
1. The recorder was not supplied already calibrated and the default references are not sufficiently accurate
2. Long-term drift has caused the reference points to lose their accuracy

Recorders are normally calibrated in the factory prior to being shipped and the values resulting from this calibration procedure are stored in the recorder. This is denoted by the letter F next to the input range. Selecting **Recall Factory** restores these values.



You may prefer to use your own signal source which **MUST** be at least an order of accuracy higher than the accuracy of the recorder. In this case you can re-calibrate the Analogue References by selecting **Cal. Analog Refs**.

A sub-menu will now be displayed with the signal levels that can be calibrated. The example opposite is for a recorder fitted with a universal analogue card. For a unit fitted with a standard analogue card, the option of 0 volt, 5 volt, 0 mA and 20 mA reference points is offered.

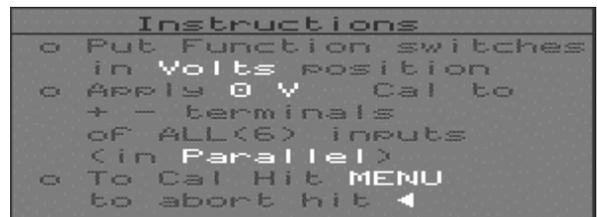


When you select a reference point an instruction prompt will appear which describes the calibration procedure for the reference you have selected and the hardware configuration of the recorder. In general, a known value signal (e.g. 0 volts) is applied to all the available inputs in parallel, and the corresponding reading from the internal A-to-D converter is used as a reference point.

A second reference point near the opposite end of the range is also required, and from these two reference points the recorder can calculate the corresponding value of any reading from the A-to-D converter.

A tick next to an input range denotes that the input value has been calibrated to external signals.

IF YOU ARE IN ANY DOUBT, consult your nearest service centre for further instructions on calibrating the Analogue References of a recorder.



Appendix J - Events

The following is a list of all conditions and operations that are logged as Events. It provides a description of the Event followed by the way in which the Event would appear in the Events List.

Condition/Operation		Log Syntax
Totaliser	Reset Stopped Resumed	TOT (pen number) RESET TOT (pen number) STOPPED TOT (pen number) RESUMED
Recording	Stopped Started	MODE1 REALTIME END LOG RO MODE2 REALTIME END NEW LOG
“CAN’T LOG” Displayed		MODE3 REALTIME CAN’T LOG
“NO LOG” Displayed		MODE4 REALTIME NO LOG RO
Recorder in Setup Mode		MODE5 SETUP (NO LOGGING)
Screen Dump Captured		SYS 06 (Screen Dump Number).BMP WRITE
Disk 90% Full		SYS 07 DISK>90%FULL
Disk	Out Protected Unformatted Wrong Disk Full File Limit Read Error Okay	SYS 08 OUT SYS 08 PROTECTED SYS 08 UNFORMATTED SYS 08 WRONG DISK SYS 08 FULL SYS 08 FILE LIMIT SYS 08 READ ERROR SYS 08 OKAY
Communications Error		SYS09 COMMS ERROR
Digital Input	Going High Going Low	I (Input Channel Number) ON I (Input Channel Number) OFF
Relay	Activated Deactivated	O (Relay Output Number) ON O (Relay Output Number) OFF
Marker Set		(Tag) (Description)
Alarm	Activated Deactivated	P (Pen Number) A (Alarm Number) ON (Alarm Type) P (Pen Number) A (Alarm Number) OFF (Alarm Type)

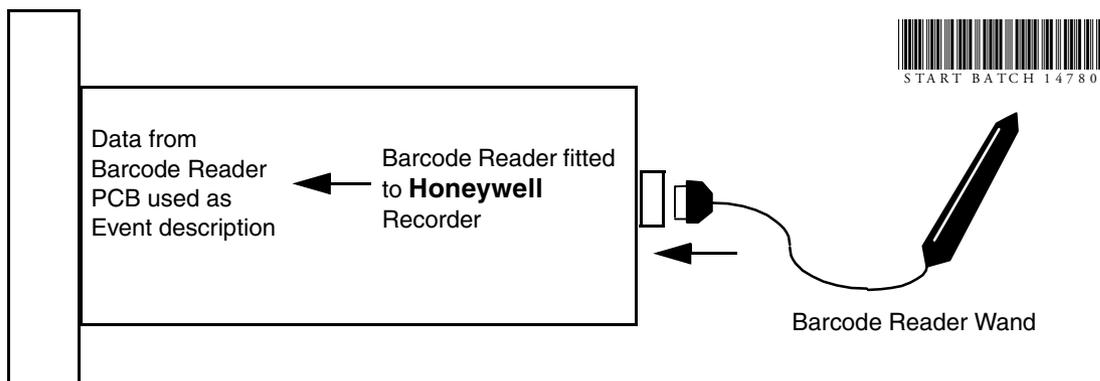
Appendix K - Barcode Reader

Introduction

The capabilities of the **Honeywell** range of recorders can be extended by a Barcode Reader PCB option, which allows the recorder to receive data from a standard compatible Code 39 barcode reader wand, such as the Hewlett Packard HBSW-8300.

Using *TrendManager Pro*, a barcode description of up to 19 characters may be entered and the barcode printed out. As the barcode is *swiped* by the wand, it can set a Marker, signal the beginning or end of an event, e.g. beginning to use particular stocks, or finishing those stocks. An event, in turn, may trigger an effect, such as Stop Recording. Trigger options available are indicated in the *TrendManager Pro* Marker Effect dialog box.

The example below shows a bar code for *Start Batch 14780* which is swiped by the wand. The event is added to the bottom of the Events List on the recorder. The information is saved to disk, then using *TrendManager Pro*, the event of *Start Batch 14780* is indicated on the graph.



Functional Diagram of Barcode Reader

Installation

The Barcode Reader PCB is fitted to a **Honeywell** recorder in the same way as an RS485 Comms card. Refer to the Comms Upgrade Manual for further instructions.

Configuration

With the Barcode Reader PCB installed, you must now configure your recorder to recognise the new hardware. To do this, go into the *Factory* option of the *Special Setup* menu (as described in “*Special Setups*” on page 47), select *Hardware Options*, then select the *Barcode Reader* option (this item will be ticked when enabled).

Utilisation

A Barcode Reader can be an effective mechanism in areas of Production Control; User/Operator ID, Batch Control, Work in Progress Reporting or as a Test Facility. Its use is unconstrained in circumstances where a start and stop time may have to be recorded and identified as an event. Elimination of human error in respect of e.g. transposing of figures may also be an influencing factor in the selection of this tool.

Operation

To configure the barcode reader wand to set a Marker, select the **Barcode Reader** option from the **Marker Causes** menu (see "**Causes**" on page 45). Each swipe of the barcode will then activate a Marker in the same way as any other Marker cause.

When a barcode has been successfully read, the recorder will emit an audible "beep". Select **Events List** from the **Quick Menu** (see "**List Events**" on page 61), to see the time and date of the swipe and the code in the Description field.

Barcode Reader Test Procedure

- In the Factory Hardware Options, ensure **Barcode Reader code 39** is selected.
- From the Marker menu choose and enable **Marker 1**.
- Set the Cause to be **Barcode Reader**.
- Check the Effect **Mark on Chart** is selected.
- Connect the Barcode Reader to the 9-way connector of the rear of the recorder.

The Barcode Reader should now have a red light visible in the tip. If this is not visible, there is a hardware fault. Once the light is visible swipe the barcode below, an audible "beep" should be heard.



- Press the **Quick Menu** key (!) and select **List Events**.
- Check the text on the above barcode is shown at the bottom of the list.
- If a "beep" is audible but the text is corrupt, return to the Factory menu, re-select the **Barcode Reader** and repeat the test.

To refresh the Events List, exit the list and re-select it. This will display the most recent events.

Appendix L - Battery Safety Data Sheet

Location : Processor Board

		<i>Approx Percentage (%) of total weight</i>
Active Materials	Maganese dioxide (mnO ₂)	29
	Propylen carbonate (PC)	4.3
	1,2 Dimethoxiethan (DME)	2.1
	Lithium metal (Li)	2
	Carbon (C)	0.9
	Lithium perchlorate (LiClO)	0.3
Passive Materials	Stainless steel	57.6
	Plastic	3.8

Safety Guideline

- Keep batteries out of the reach of children, especially those batteries fitting within the limits of the truncated cylinder as defined in ISO/DP 8124/ 2.2 page 17.
- In the case of ingestion of a cell or battery the person involved should seek medical assistance promptly.
- It is of extreme importance that batteries are inserted into equipment correctly with regard to polarity (+ and -).
- Do not attempt to revive used batteries by heating, charging or other means.
- Do not dispose of batteries in fire.
- Do not dismantle batteries.
- Newly purchased batteries should not be mixed with partially exhausted ones. Batteries of different electrochemical systems, grades or brands should not be mixed. Failure to observe these precautions may result in some batteries in a set being driven beyond their normal exhaustion point and thus increase the possibility of leakage.
- Do not short circuit batteries.

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Please take a moment to complete this questionnaire

1	Reputation
<p>How would you rate the reputation of Honeywell?</p> <p>Tick as appropriate</p> <p><input type="checkbox"/> A very reputable, successful company</p> <p><input type="checkbox"/> A reputable company</p> <p><input type="checkbox"/> A disreputable company</p> <p><input type="checkbox"/> No views either way</p>	

2	Service																																														
<p>How do you rate or perceive the following service levels provided by our sales staff?</p> <p>Tick as appropriate Excellent Good Fair</p> <table border="0"> <tr> <td>Response speed</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>Quality of response</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>Follow up response</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>Overall level of service</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> </table> <p>How do you rate or perceive the following service levels provided by our Technical Support Service?</p> <p>Tick as appropriate Excellent Good Fair</p> <table border="0"> <tr> <td>Response speed</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>Quality of response</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>Follow up response</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>Overall level of service</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> </table> <p>How could our service be improved upon?</p> <p>.....</p> <p>.....</p> <p>How many times do you receive a visit from one of our Sales representatives? Visits every:</p> <p>1-3 months <input type="checkbox"/> 3-6 months <input type="checkbox"/> 6-12 months <input type="checkbox"/></p> <p>How does that compare to our competitors?</p> <p>More <input type="checkbox"/> Less <input type="checkbox"/> The same <input type="checkbox"/></p> <p>Score on a level of 1-10, with 10 being the best</p> <table border="0"> <tr> <td>Quality of manuals / sales literature</td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>Administration / documentation and letters</td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>Technical expertise of our sales staff</td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>Sales staff ability to give informed advice</td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>The quality of the Honeywell sales team.</td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>Pricing</td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>Honeywell understanding of your industry.</td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> </table>		Response speed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Quality of response	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Follow up response	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Overall level of service	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Response speed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Quality of response	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Follow up response	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Overall level of service	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Quality of manuals / sales literature	<input type="checkbox"/>	Administration / documentation and letters	<input type="checkbox"/>	Technical expertise of our sales staff	<input type="checkbox"/>	Sales staff ability to give informed advice	<input type="checkbox"/>	The quality of the Honeywell sales team.	<input type="checkbox"/>	Pricing	<input type="checkbox"/>	Honeywell understanding of your industry.	<input type="checkbox"/>
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Pricing	<input type="checkbox"/>																																														
Honeywell understanding of your industry.	<input type="checkbox"/>																																														

3	Products
<p>How do you perceive our range of products?</p> <p>Tick as appropriate</p> <p><input type="checkbox"/> Products offered are better than those of competitors</p> <p><input type="checkbox"/> Products offered are worse than those of competitors</p> <p><input type="checkbox"/> Products offered are the same as those of competitors</p> <p>Any other comments</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>Are there any products that we do not provide that you would like us to provide - or any we could improve on?</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>Improvements to existing products.....</p> <p>.....</p> <p>.....</p>	

4	General
<p>If you are an existing or new customer, what made you choose Honeywell?</p> <p><input type="checkbox"/> Only on price</p> <p><input type="checkbox"/> Price plus a combination of factors</p> <p><input type="checkbox"/> Prefer to deal with a reputable company</p> <p><input type="checkbox"/> Honeywell offers more than the competition in terms of 'added value' over and above the product itself</p>	

<p>Thank you for completing this questionnaire.</p> <p>Please fill out your name and address below.</p> <p>Photo copy this form and Fax to us on</p> <p style="font-size: 1.2em;">+44 (0)1202 476501</p> <p>Name</p> <p>Company name</p> <p>Address</p> <p>.....</p> <p>County..... Postcode.....</p> <p>Tel:..... Fax.....</p> <p>Company business</p> <p>.....</p>	
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