

Grant

Working Instructions Oven Squirrel Meter/Logger (Models OQ-4P/4K and OQ-6P/6K)

These instructions are a step-by-step guide to the main functions of the Squirrel Meter/Logger. The quickest way to master the operation of the system is to go through these steps a few times. Instructions for using our computer programs are supplied with the programs.

Description

Recorder identification

The serial number plate gives details of the number of input channels, types of input and memory size, according to the following example:

- OQ8-4K 4 inputs for type K thermocouple probe
 8K memory to store 8,000 readings approx.
- OQ16-6P 6 inputs for Pt100 platinum resistance probe
 16K memory to store 16,000 readings approx.

Code letters and input types are as follows:

Code	Type of input	Socket/Plug	Input
P	Pt100 (2 wire)	3.5 mm Ø jack	Common Ground
K	Chromel-Alumel thermocouple	ISA min t/c	See Note *

Input ranges are given in the left-hand window of the serial number plate, e.g. 0 to 250°C.

***Thermocouple inputs** While a reading is being taken, these have both input terminals connected through a resistor network to Squirrel ground. At other times both terminals are floating.

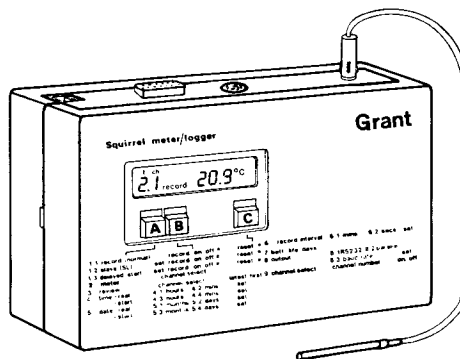


Fig. 1

Control buttons

(A, B, C are not marked on the buttons but are used here for clarity - see Fig. 1.)

Do not switch on at this stage.

Button A selects the recorder functions as shown in column 1 on the front of the instrument.

Buttons B and C have different effects according to the function selected by button A, and these are shown in columns 2 and 3 on the front of the instrument.

Fig. 2



Display

The display is shown with all its characters on in Fig. 2, although not all of these may be in use on your particular model.

The left-hand digit indicates the function number selected. Above it is the letter **f** (for function).

The next (second) digit has two separate uses. In functions 2 and 3 it shows which channel has been selected and in this case the letters **ch** come on above it (for **channel**). In functions 4 to 9 it is used to indicate a sub-function, e.g. in **4.1** hours and in **4.2** minutes can be set. Up to four digits can be shown in the right-hand block. These are used to display incoming and recorded readings and for other purposes as described in the next section 'Using the Squirrel Meter/Logger'.

The appropriate units of measurement appear at the right of the LCD with every reading displayed. Temperature is shown in conventional abbreviations (°C or °F as specified on ordering).

Also on the display are the words **record**, **reset** and **ready**. These are used as follows:

-**record** shows that a recording run is in progress with readings being taken at the preset interval.

-**reset** shows that the memory has been cleared and you can start a new recording run.

If neither **record** nor **reset** are on while the display is operating and function 1 is selected, then the memory already contains a completed recording run. If this run is required it must be played back to a computer (see function 8) or reviewed on the LCD display (see function 3) before the recorder is reset. Then another recording run can be started.

-**ready** comes on to show that a computer is connected and the Meter/Logger is ready to send its readings out at the request of the computer.

On/Off switch

When switched off, the recorder retains recorded data in its memory with the lowest possible power consumption. To switch off, select function 1 using button A, wait for the display to go off and then move the slide switch to the off position. (Note that the clock is switched off, so time and date will need resetting.)

Conditions of use

The Squirrel Meter/Logger can be used in ambient temperatures between -30 and $+65^{\circ}\text{C}$ with humidity up to 95% (non-condensing). Moisture may condense over the instrument if it is moved from a cold to a warm place, and may affect the operation of the recorder and the stored data. If operation is affected, allow the recorder to dry out with the battery disconnected and then replace it.

The amount of condensation can be reduced by sealing the recorder in a plastic bag before moving it, and leaving it inside until it has warmed up. This measure may be enough to prevent operation being affected.

Cleaning the case

Grease and dirt can be removed from the case with a cloth dampened slightly with water and a mild detergent. Be careful not to allow any water to penetrate into the logger as this will damage the circuit boards.

Battery

The Squirrel Meter/Logger is supplied with a battery already fitted and connected. When replacement is necessary it is accessible under the black cover on the back of the instrument. Use a PP3 size Alkaline battery, such as Duracell MN1604. If the wrong type of battery is used, the indicated battery life (see under function 7) will be incorrect.

To change the battery without losing stored readings, select function 1, wait for the display to go off and then move the slide switch to the off position. Disconnect the battery and replace as quickly as possible. If the batteries are exchanged within eight seconds, the stored readings will be preserved. The readings will be lost, however, if the battery is connected with the wrong polarity (the circuits are protected, but the memory contents will be lost).

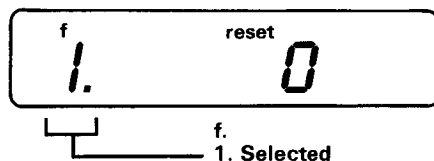
Using the Squirrel Meter/Logger

Switching on and selecting required function

Switch on using the slide switch on the top plate of the unit (use a screwdriver to help if necessary). The unit will have left the factory with function 1 selected. This means that the display will be off when the unit is switched on. To call up the display, hold button A until **f1** appears at the left-hand end of the display as shown in Fig. 3. If you press button A again within 2 seconds the function will immediately switch to the next one as shown at the start of each row printed on the case. Repeated pressing within 2 seconds will cause the Squirrel to cycle through all its functions. If you allow more than 2 seconds between one press and the next there will be a delay of up to 1 second before the instrument responds. If the Meter/Logger is left in function 1 for 10 seconds the display is automatically switched off to conserve the battery.

Switch through the functions using button A until this becomes clear.

Fig. 3.



If the logger has already been used and the display comes on when the unit is switched on, ask advice from the previous user or use button A to cycle to function 1. If neither **record** nor **reset** appear when function 1 is selected, this means that the memory already contains a completed recording run. If the word **record** appears on the display, this indicates that a recording run is in progress. To stop the recording run, press button B until **record** goes off. To start a new recording run, it is necessary to clear the memory first. If you wish to preserve the stored data before resetting, refer to function 8 for a description of how to transfer data to a computer. To review stored data, refer to function 3. To clear the memory, hold down button C in function 1 until **reset** appears on the display.

Function 2 - Use as a meter

The display can be used to show the present temperature reading from any of the channels. It is advisable to check the readings from all channels before starting a recording run, in order to ensure that all probes are properly connected and reading correctly. Meter readings can also be taken during recording.

Plug in the temperature probes and press button A to select **f2** (on 6-channel models it will be necessary to select the required channels in **f9** first - see function 9).

Use button B to select channel number to be displayed.

The channel number and **ch** will appear in the second position on the LCD, e.g. **ch2**.

The reading of the selected channel will appear on the right-hand side of the display.

The displayed value is updated every second. If the measured temperature is outside the range of the logger then the display will show **HI** for overrange or **LO** for underrange values. This display may also result from a fault in the probe or its connections. Note that an open circuit thermocouple input will produce a reading equivalent to the ambient temperature of the logger which will be displayed if it is within the range of the instrument.

When the display is no longer wanted, use button A to switch to function 1.

If this is not done, battery life will be reduced.

Function 1 - Record

To make an instantaneous start recording

Before starting a recording run, check the probe readings in function 2, ensure that the real time and date are set in functions 4 and 5, that the required recording interval is selected in function 6, and that there is sufficient battery life in function 7. In the case of 6-channel models, it will also be necessary to select the required channels in function 9.

Use button A to select record **f1**.

Hold button C down until **reset** appears on the display. (If **reset** is already on, omit this operation.) (Note that buttons B and C only have any effect while the display is on.)

Hold button B down until **record** appears and the display shows the present value of channel 1. If the switches are now left, the display goes off after two seconds and the Squirrel Meter/Logger records at the selected interval (see function 6). Every 20 seconds the display comes on showing the last recorded value of channel 1 and **record**.

While recording, the Meter/Logger can be used as a meter to show the present reading (see function 2 above), and the recordings already made can be displayed in sequence (see function 3 below) and battery life checked. None of these will affect the recording process. During a recording run it is not possible to send data to a computer, nor alter the recording interval, nor reset the clock.

To find out how many recordings have already been stored, use button A to select function 1. The display shows the number of stored readings followed after 1 second by the last recorded value of channel 1. On reaching 10,000 readings, the number is rounded down and displayed as 10.00 etc. If the memory is already full, the display will show the number of readings stored, but not the value of channel 1 and **record** will not come on.

To stop recording

Recording will stop automatically when the memory is full. Otherwise, recording may be stopped at any time as follows:

Use button A to select **f1**.

Hold button B down until **record** goes off. The display shows the number of readings stored in the memory.

Function 3 - To review recorded readings on the display

All stored readings can be reviewed at a rate of 1/sec, even while recording is taking place.

To review readings starting with the oldest, select **f3** using button A. Select channel number to be reviewed using button B. The oldest reading is displayed first, followed by the others. Finally the last reading is displayed until a new function is selected.

To review readings starting with the newest, select **f3** using button A. Select channel number to be reviewed using button B. Then press button C. Readings will be displayed as described above, but starting with the newest.

Interrupting the review. If you do not need to see all the readings you can press button B at any time to display readings from a different channel. Readings from the new channel will start with the oldest unless button C is pressed after button B.

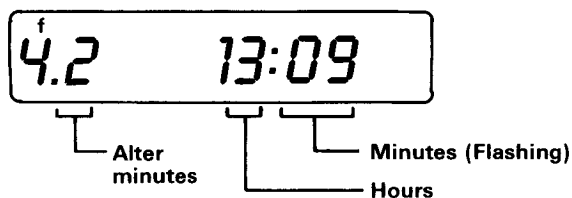


Fig. 4

Time 13.09

Function 4 - Time

Real time Use button A to select **f4**. The display now shows the real time in hours and minutes. To alter, use button B to select 4.1 hours (up to 24 hours) or 4.2 mins. (Note that if the Squirrel is recording, **record** will come on and the time cannot be altered). The value of whichever is chosen flashes and can be increased by repeated operation of button C. Hold down button C to increase the value rapidly if the required setting is a long way off. Figure 4 shows the display set for altering minutes.

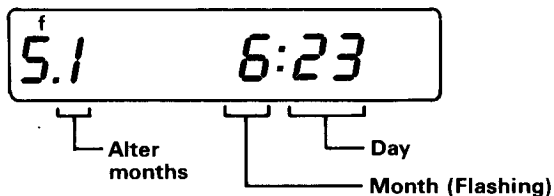


Fig. 5

Date 23 June

Function 5 - Date

Real date Use button A to select f5. The display shows real month and day. It is reset in a similar way to setting the clock (see function 4). Figure 5 shows the display set for altering months. (Note that if the Squirrel is recording, **record** will come on and the date cannot be altered.)

Please note that the Squirrel does not take account of leap years, i.e. it is not possible to select 29 February. The Squirrel will automatically go from 28 February to 1 March.

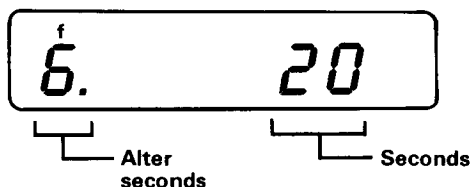


Fig. 6

Interval 20 seconds

Function 6 - To set the interval between recordings

Use button A to select f6. The display shows the interval in seconds. The interval can be set with button C to any value between 1 second and 120 seconds, in steps of 1 second. Hold down button C to increase the value rapidly. Figure 6 shows the display with the instrument set for altering seconds.

Function 7 - To display battery life

Use button A to select f7. The display gives a rough guide to how many days recording time (when used in function 1) are left in the battery with enough charge at the end of the run to play back the contents of the memory to a computer. The display works by measuring the battery voltage. This fluctuates with temperature and load, so the indication can go up as well as down.

As the power required to drive the Squirrel's display and the output to the computer is very much higher than that needed just for recording, the number of days recording time available can go down quite quickly in functions other than function 1. For this reason the Squirrel should always be returned to function 1 when the other functions are not being used. If necessary, the battery can be replaced without losing data, refer to page 3 Battery.

At operating temperatures below minus 20°C, the life of the batteries used starts to reduce. By minus 30°C it may be down to as little as one tenth indicated. Due to variation in battery performance with temperature, the Squirrel may give a higher indication of battery life after passing through an oven than it did beforehand. This effect is due to the heating of the battery.

Because of these variations in battery performance, please always ensure, before starting a logging run, that the battery life indicated is well in excess of the minimum that would be required for the run.

Function 8 - To send recorded data to a computer

Use button A to select **f8**.

If using RS232 serial output, use button B to select 8.3 and check that the required baud rate (usually 4800) is displayed. Alter it, if necessary, using button C.

Connect the computer and load the program. Select "Input from Squirrel" on the analysis program menu, and when prompted by the computer, use button B to select 8.1 for RS232 serial (or 8.2 for 8-bit parallel). When **ready** is displayed, run the computer. During transmission, **232** (or **8-P**) is displayed, and **ready** goes off.

Transmission must not be interrupted for more than 2 seconds as, after this time, the recorder is powered down automatically.

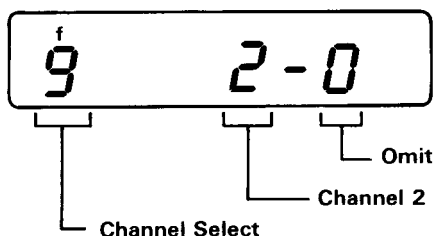


Fig. 7

6-Channel Models only

Function 9 - Channel Select (Available on 6-channel models only)

On 6-channel Squirrels, function 9 should be set up before starting recording.

Channel selection enables the Squirrel to be set to record only those channels needed. The memory is divided equally among selected channels. For example, if all six channels are selected with 16K memory available, then the Squirrel will be able to log approx. 2660 readings per channel. If four channels are selected, the number of readings per channel increases to approx. 4000.

Use button A to select **f9**. The part of the display normally used for reading values now shows channel number in the middle of the display and selected (1) or omitted (0) to the right. The channel number is increased by pressing button B, and button C is used to select or omit that channel from the recording sequence. Go through the channels one at a time selecting those required for recording. Fig. 7 shows the display with channel 2 set to be omitted. (Note that once a recording run is taking place you cannot alter the selection until the Squirrel is reset. **record** flashes when button C is pressed to indicate this).

You cannot leave function 9 unless at least one channel is selected.

Additional Features of 6-Channel Models

The logger will automatically switch off after 10 minutes have elapsed in any function without a button having been pressed. Nevertheless, to conserve the battery, the logger should still be returned to function 1 by pressing button A when the display is no longer required.

Six-channel thermocouple models have filtering to reject mains interference, and this may be set for mains frequencies of 50 or 60 Hz as appropriate. Select function 7 and hold button B until function 7.1 is displayed. The right-hand side of the display will show 50 or 60 corresponding to the filter frequency. Select the appropriate setting using button C.

Data analysis

Grant can supply analysis programs for IBM PC and compatible computers. Also available are portable analysis kits complete with portable computer, printer/plotter, analysis software and all necessary accessories. Please consult our Sales Department for details.

Guarantee

Oven Squirrel Meter/Loggers are guaranteed against faulty materials or workmanship for one year. Within the United Kingdom we make no charge for labour, materials or return carriage when equipment is repaired under guarantee. Batteries are not covered by the guarantee.

Service

The Squirrel Meter/Logger can be returned by post for repair, preferably using the carton in which it was supplied. In the United Kingdom return direct to us. In other countries our distributors provide an efficient repair service.

Grant Instruments (Cambridge) Limited

Barrington
Cambridge
CB2 5QZ
England

Telephone: (01763) 260811
Fax: (01763) 262410
Telex: 81328

Part 12972
Issue 1.0, May 1989