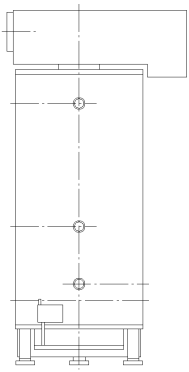

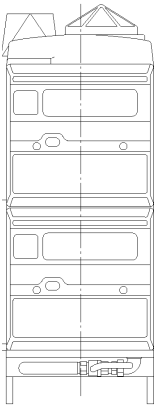

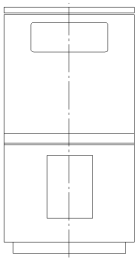

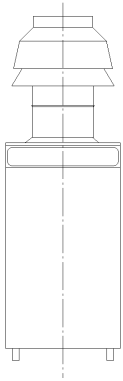

Milton

Boiler Sequence Control System for Fully Modulating, High/Low & On/Off Boilers with Optimum Start and Outside Temperature Compensation

User's Operating Instructions

IMPORTANT NOTE
THESE INSTRUCTIONS MUST BE READ AND UNDERSTOOD BEFORE INSTALLING, COMMISSIONING, OPERATING OR SERVICING EQUIPMENT

Hamworthy
HEATING & HOT WATER PRODUCTS

Customer Services

Technical Enquiries **01202 662527 / 662528**

To supplement the detailed technical brochures, technical advice on the application and use of products in the Hamworthy Heating range is available from our technical team in Poole and our accredited agents.

Site Assembly **01202 662555**

Hamworthy offer a service of site assembly for many of our products in instances where plant room area is restricted. Using our trained staff we offer a higher quality of build and assurance of a boiler built and tested by the manufacturer.

Commissioning **01202 662555**

Commissioning of equipment by our engineers, accredited agents or specialist sub-contractors will ensure the equipment is operating safely and efficiently.

Maintenance Agreements **01202 662555**

Regular routine servicing of equipment by Hamworthy service engineers inspects the safety and integrity of the plant, reducing rhe risk of failure and improving performance and efficiency. Maintenance agreements enable our customers to plan and budget more efficiently.

Breakdown service, repair, replacement **01202 662555**

Hamworthy provide a rapid response breakdown, repair or replacement service through head office at Poole and accredited agents throughout the UK.

Spare Parts **01202 662525**

A comprehensive spare parts service is operated from our factory in Poole, providing replacement parts for both current and discontinued products. Delivery of parts and components is normally from stock within seven days. However, a next day delivery service is available for breakdowns and emergencies.

MILTON

BOILER SEQUENCE CONTROL SYSTEM FOR FULLY MODULATING BOILERS WITH OPTIMUM START AND OUTSIDE TEMPERATURE COMPENSATION

USER'S OPERATING INSTRUCTIONS

NOTE: THESE INSTRUCTIONS SHOULD BE READ AND UNDERSTOOD BEFORE ATTEMPTING TO OPERATE THE MILTON BOILER SEQUENCE CONTROL SYSTEM.

THE MILTON BOILER SEQUENCE CONTROL SYSTEM IS INTENDED FOR USE ONLY IN COMMERCIAL / LIGHT INDUSTRIAL APPLICATIONS.

THIS BOILER SEQUENCE CONTROL SYSTEM COMPLIES WITH ALL RELEVANT EUROPEAN DIRECTIVES

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SOFTWARE VERSION V2.3 ONWARDS

CONTENTS

1.0 RUN MODE DISPLAY SCREENS

1.1 Clock Screen

The clock screen displays day, date and time and also shows the reading of the outside air temperature sensor if fitted.

If an outside air temperature sensor is not fitted, the display indicates this as shown.

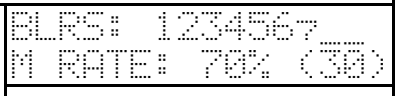
1.2 Primary Circuit Water Temperature Screen

This screen displays the primary circuit water temperature set point and actual primary circuit water temperature sensor reading.

Note: This screen is not displayed if the master control mode setting is set to 'BMS' for remote modulation control by an external building management system.

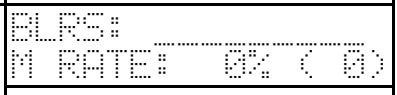
1.3 Boiler Status Screen

This screen displays the operation of each boiler, the boiler system modulation rate as a percentage of the maximum boiler system firing rate, and also the modulation rate of the individual boiler currently being modulated as a percentage of its maximum firing rate.

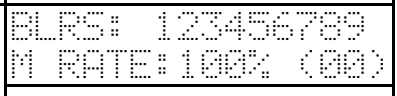


When the control is first switched on it automatically detects the boilers connected to it. This is indicated on the boiler status screen by the flashing message 'searching'.

A non-firing boiler is denoted by a '_' symbol. Status as shown denotes that the boiler system is currently shut down.



A boiler firing at full rate is indicated by a full size number. Note with all boilers firing at full rate the system modulation rate reading is 100%. The individual boiler modulation rate reading shows as '00' when the boiler is at full rate.



When the weekly lead boiler shift option is used the boiler firing sequence is indicated. In this example boiler '6' is the lead boiler.

1.3 Boiler Status Screen (continued)	
A boiler firing at a rate below full rate is indicated by a half size number. The example shown illustrates the 'cascade' modulation sequence as only boiler 7 is modulated below full rate. The boiler system modulation rate is 70% of the maximum boiler firing rate and boiler 6 is firing at 30% of its maximum firing rate.	BLRS: 123456 7 M RATE: 70% (30)
The example shown illustrates the 'unison' modulation sequence whereby all boilers are modulated at the same rate.	BLRS: 1234567 M RATE: 75% (75)
1.4 Primary Circuit Circulation Pump Status Screen	
This screen displays the operating mode of the primary circuit circulation pump. **Note:** This screen is not displayed if the master control mode setting is set to 'BMS' for remote modulation control by an external building management system. The status 'Normal Run' denotes operation of the circulation pump during normal boiler system operation.	CIRCULATION PUMP Normal Run
The status 'Overrun' denotes operation of the pump after the boilers have shut down in order to remove the residual heat present in the boilers. The display includes a timer counting down the remaining duration of the overrun period.	CIRCULATION PUMP Overrun: 20mins
The status 'Standby' denotes that the circulation pump is not operating.	CIRCULATION PUMP Standby
The status 'Maintenance Run' denotes brief operation of the circulation pump on a weekly basis to prevent seizing during long periods of boiler system inactivity.	CIRCULATION PUMP Maintenance Run
1.5 Heating Status Screen	
This screen displays the heating system operating mode, the room temperature set point and the actual room temperature sensor reading. **Note:** This screen is not displayed if the master control mode setting is set to 'BMS' for remote modulation control by an external building management system.	HTG:Preheat 20°C ROOM TEMP:12.5°C

1.5 Heating Status Screen (continued)	
The status 'Preheat' denotes operation of the heating system during the optimum start period, to heat the building to the desired room temperature set point.	
The status 'Active' denotes normal operation of the heating system during the occupancy period.	HTG:Active 20°C ROOM TEMP:19.5°C
The status 'Day Opt' denotes operation of the daytime optimization function which disables operation of the heating system when the desired room temperature is achieved.	HTG:Day Opt 20°C ROOM TEMP:20.5°C
The status 'Night SB' denotes operation of the night set-back function which operates the heating system during non-occupancy periods to maintain a minimum room temperature.	HTG:NightSB 12°C ROOM TEMP:11.5°C
The status 'Sumr SD' denotes operation of the summer shutdown function which disables the heating system when the outside air temperature reaches a set point.	HTG:Sumr SD 20°C ROOM TEMP:23.5°C
The status 'Standby' denotes that the heating system is shut down during non-occupancy periods.	HTG:Standby 10°C ROOM TEMP:16.5°C
The status 'Frost 1' denotes operation of the frost protection function based on the water temperature.	HTG:Frost 1 10°C ROOM TEMP:11.5°C
The status 'Frost 2' denotes operation of the frost protection function based on the outside air temperature.	HTG:Frost 2 10°C ROOM TEMP:11.5°C
If a room temperature sensor is not fitted, the display indicates this as shown.	HTG:Active 20°C ROOM TEMP:----
1.6 Override Status Screens	
There are 3 override status screens. **Note:** These screens are not displayed if the master control mode setting is set to 'BMS' for remote modulation control by an external building management system, or if the functions are individually disabled.	SAFETY INTLOCK normal 0

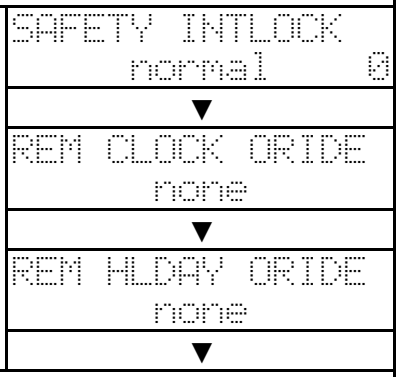
1.6 Override Status Screens (continued)	
The safety interlock circuit status screen shows the condition of the safety interlock circuit input. The screen also includes a counter which increments each time a fault is detected. The counter increments to '9' before returning to '0'.	SAFETY INTLOCK normal 0 SAFETY INTLOCK fault detected 1
The remote time-clock override status screen shows the condition of the remote time-clock override or external time-clock input.	REM CLOCK ORIDE none REM CLOCK ORIDE active
The remote holiday override status screen shows the condition of the remote holiday override input.	REM HLDAY ORIDE none REM HLDAY ORIDE active

2.0 RUN MODE FUNCTIONS

2.1 View Run Mode Screens	
a) To scroll through the run mode screens detailed in section 1.0 use the '⬅' and '➡' keys.	Fri 28-Sep-2000 15:31 Air: 17°C ▼ WTR SET PT:082°C WTR TEMP:078.5°C ▼ BLRS: 123456_ M RATE: 70% (30) ▼ CIRCULATION PUMP Normal Run ▼ HTG:Active 20°C ROOM TEMP:19.5°C ▼ SAFETY INTLOCK normal 0 ▼

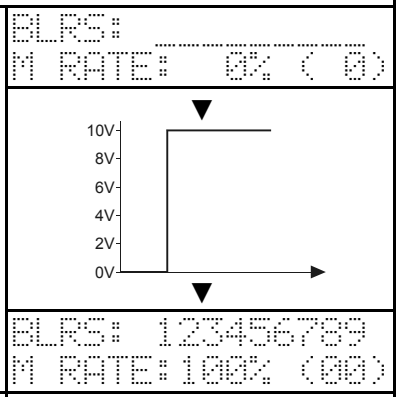
2.1 View Run Mode Screens (continued)

b) To view the 3 override status screens, use the '⬅' and '➡' keys to display the safety interlock circuit status screen, then use the '⬆' and '⬇' keys to scroll through the overrides status screens.

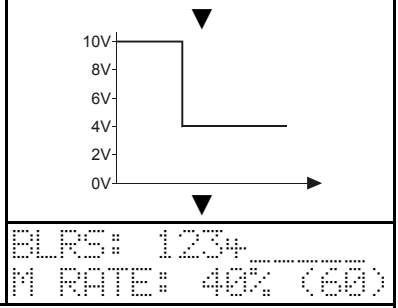


2.2 Remote Modulation Control Operation

a) A change of the level of the 0 to 10V signal from the external building management system, from 0V to 10V will cause the boiler system firing rate ('M RATE') to change from 0% to 100% and the sequence control will step all of the boilers on at 30 second intervals.

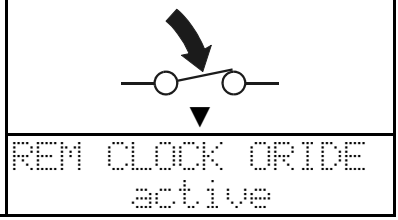


b) A subsequent change in the level of the 0 to 10V signal below 10V, to 4V for example, will cause the boiler system firing rate to change to 40%, and the sequence control will step / modulate the boilers to match the new firing rate.



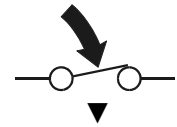
2.3 Remote Time-Clock Override Control Operation

a) Actuation of a remote time-clock override control connected to the Milton boiler sequence control will cause the boiler system to operate for the duration that the override control is actuated. The override status screen will appear as shown to indicate this.



2.4 Remote Holiday Override Control Operation

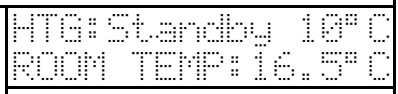
a) Actuation of a remote holiday override control connected to the Milton boiler sequence control will cause the boiler system to shut down for the duration that the override control is actuated. The override status screen will appear as shown to indicate this.



Note: The night setback, frost protection and circulation pump maintenance functions remain operational during remote holiday override control operation.

2.5 Programmed Holiday Override Operation

Refer to section 3.2.4 for holiday override programming details.



a) At the start of a programmed holiday period the boiler system is automatically overridden to the standby condition. At the end of the holiday period normal operation is automatically resumed.

Note: The night setback, frost protection and circulation pump maintenance functions remain operational during a programmed holiday period.

3.0 PROGRAMMING

3.1 Program Menu Overview

3.1.1 Introduction

The user's program settings include time-clock, holiday period, and room temperature settings. They also provide access to data logged in the memory of each boiler such as hours run, boiler starts, gas consumption and certain boiler fault conditions.

The user's settings are protected by a 4 digit numerical security code. This code is user adjustable via the user's settings menu, but is initially set to '1000'. The user's settings security code can also be accessed from the engineer's settings menu, should the code be forgotten (refer to the Milton boiler sequence control installation manual, HHL pt. No. 500001104 for details).

The user's settings consist of a main menu, with a numbered list of options, each of which lead to a submenu.

The submenus consist of a number of screens with various settings relevant to the particular submenu.

In order to simplify programming of the Milton control, settings which are not relevant to a particular installation are not shown. For example if the night setback function is disabled then the night room temperature set point setting screen is not shown.

3.1.2 Keypad Operation

The '⬆' and '⬇' keys are used scroll up and down through the menu lists and also to change setting values.

The '⬅' and '➡' keys are used to move the flashing cursor position on individual screens.

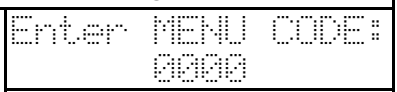
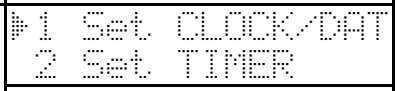
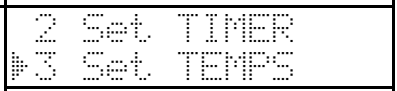
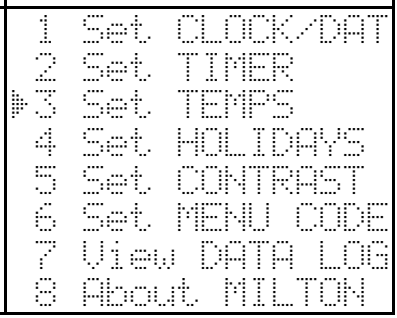
The '✓' key is used to select menu

items and to enter modified setting values.

The '×' key is used to initiate programming, return to the previous menu level or to exit the program settings.

3.1.3 Programming Screen Timeout

If no keys are pressed for 1 minute the sequence control will automatically return from the programming screens to the run mode screens.

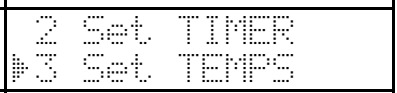
3.1.4 Overview - Enter user's settings menu and navigate submenus	
a) To enter the user's settings menu press the '×' key and the security code entry screen will be displayed. Note that the left hand code digit is flashing to indicate the cursor position.	
b) Use the '⬆' and '⬇' keys to enter the first digit of the code. Use the '⬅' and '➡' keys to move the cursor position to enter the remaining digits. **Note:** Initial user's settings security code is '1000'.	
c) To enter the code press the '✓' key. If the code entered was incorrect, a message to this effect will be shown on the display before returning to the code entry screen for another attempt. If the code entered was correct the main menu screen will be displayed.	
d) Use the '⬆' and '⬇' keys to scroll up and down through the main menu list. The '▶' symbol on the left of the screen indicates the currently selected menu item. **Note:** There are more than 2 menu items. The screen displays 2 at a time.	
e) The full main menu list is as shown. Note that depending on a number of the engineer's setting values some of the submenus may be hidden.	

3.1.4 Overview - Enter user's settings menu and navigate submenus (continued)

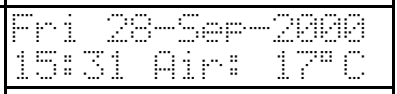
f) To select a menu item press the '✓' key. The submenu will be displayed. Note that the submenu setting title flashes to indicate the cursor position.

g) With the cursor on the setting title, use the '⬆' and '⬇' keys to scroll through the submenu screens.

h) To return to the main menu press the '✕' key.



j) To exit from the engineer's settings menu press the '✕' key. The run mode screen will be displayed.

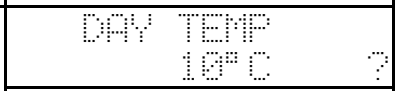


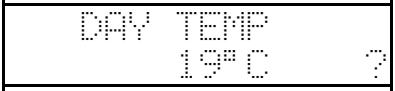
3.1.5 Overview - Modifying a setting value

a) Enter the user's settings menu and select the room temperature settings submenu as described above. Select the day room temperature setting screen.

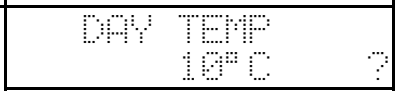
b) Use the '⬅' and '➡' keys to move the flashing cursor position from the setting title to the setting value. The cursor can be positioned on each individual digit of a numerical setting. Use the '⬆' and '⬇' keys to modify the value of each digit of a setting.

Note that when a setting is changed the '✓' symbol on the right of the screen changes to a '?' to indicate that the displayed value is not the current value programmed in memory.

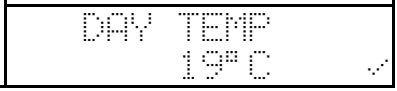




c) The sequence control will not allow a setting value outside the allowable range for each setting to be displayed. In this example the allowable setting range is 0 to 30°C. The control will not allow the first digit to be set to '3' until the last digit is set to '0'.



d) To enter the new setting value into the program memory, press the '✓' key. The '?' symbol on the right of the screen will change to a '✓'. The flashing cursor position will automatically return to the setting title.



3.1.5 Overview - Modifying a setting value (continued)

e) Further information relating to the programming of specific settings is given in the proceeding sections.

When all of the required settings in the submenu have been modified, use the '×' key to return to the main menu and then exit to the run mode screen.

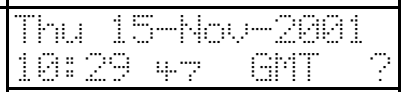
3.2 Program Settings

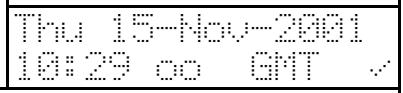
3.2.1 1-Time and Date Setting Submenu

a) This setting screen allows adjustment of the date and time.

The screen also displays the day of the week, which is automatically determined from the date, and whether the clock is on Greenwich mean time ('GMT') or British summer time ('BST'), which again is automatically determined and adjusted for based on the date.

b) Enter the correct time and date using the arrow keys and press the '✓' key to enter the new setting. Note that the clock seconds display is set to '00' as the '✓' key is pressed, in order to set the correct time precisely.

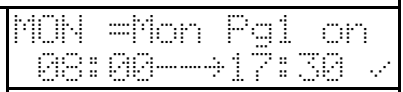




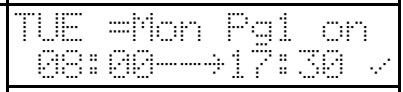
3.2.2 2-Time-Clock Setting Submenu

Note: This submenu is not displayed if the master control mode setting is set to 'BMS' for remote modulation control by an external building management system or if the external time-clock option is used.

a) Boiler system operational periods are programmed by entering a start and finish time for the period. Up to four individual periods can be programmed for each day of the week.



b) To select the day to enter program settings for, ensure that the flashing cursor is on the day setting ('MON'), and use the '⬆' and '⬇' keys to select the day. The current programmed times for that day will be displayed.



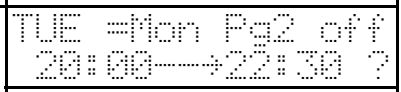
3.2.2 2-Time-Clock Setting Submenu (continued)

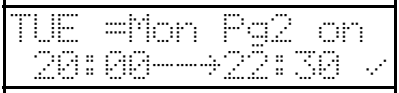
c) To select the program period ensure that the flashing cursor is positioned over the program number setting ('Pg1'), and use the '⬆' and '⬇' keys to select the program number.

d) Use the arrow keys to adjust the start and finish times for the selected program period. The '✓' symbol on the right hand side of the display will change to a '?' to show that the displayed values are not those currently programmed in the Milton control memory.

Note that for a program period to operate the 'on/off' setting in the top right of the display must be set to 'on'. This is a useful method to quickly enable/disable a time-clock program period that has already been set.

Press the '✓' key to enter the new setting.



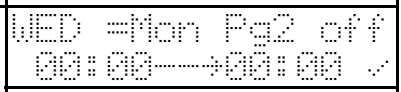


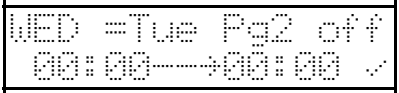
e) To save time it is possible to copy all four program period settings from any day to any other day.

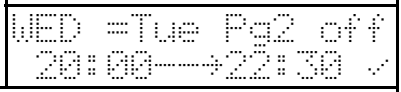
Select the day to copy **to** via the 'MON' day setting.

Select the day to copy **from** via the '=Mon' setting.

Press the '✓' key to copy all 4 program period settings.







3.2.3 3-Room Temperature Set Points Submenu

Note: This submenu is not displayed if the master control mode setting is set to 'BMS' for remote modulation control by an external building management system or if all of the optimiser functions are disabled.

a) Daytime Room Temperature Set Point Setting

Note: This setting is not available if the optimum start and daytime optimisation functions are disabled.

This setting represents the target room temperature for the optimum start function, and is also the set point at which the boiler system is shut down when the daytime optimisation function is utilised. The setting range is 0 to 30°C in 1°C steps.

3.2.3 3-Room Temperature Set Points Submenu (continued)

b) Night Time Room Temperature Set Point Setting

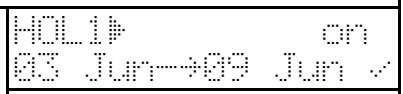
Note: This setting is not available if the night setback function is disabled.

This setting represents the minimum room temperature set point, below which the boiler system is operated, when the night set-back function is utilised. The setting range is 0 to 30°C in 1°C steps.

3.2.4 4-Holiday Settings Submenu

Note: This submenu is not displayed if the master control mode setting is set to 'BMS' for remote modulation control by an external building management system or if the external time-clock option is used.

a) Boiler system holiday periods are set by entering a start and finish date for the period. Up to five holiday periods can be programmed.

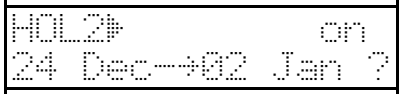


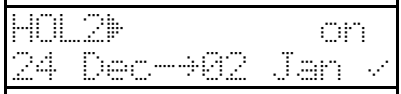
b) To select the holiday program period ensure that the flashing cursor is positioned over the program number, and use the '⬆' and '⬇' keys to select the program number. The current programmed dates for that period will be displayed.

c) Use the arrow keys to adjust the start and finish dates for this holiday program period. The '✓' symbol on the right hand side of the display will change to a '?' to show that the displayed values are not those currently programmed in the Milton control memory.

Note that for a holiday period to operate the 'on/off' setting in the top right of the display must be set to 'on'. This is useful method to quickly enable/disable a holiday period that has already been set.

Press the '✓' key to enter the new setting.





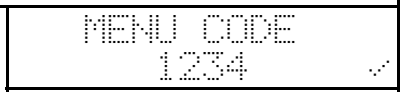
3.2.5 5-Screen Contrast Adjustment Submenu

a) This setting enables the adjustment of the Milton display contrast for the best clarity.

Use the '⬆' and '⬇' keys to adjust the value, observing the effect on the clarity of the display, until the most favourable condition is achieved.
Press the '✓' key to enter the new setting.

3.2.6 6-User's Settings Menu Security Code Setting Submenu

a) This setting enables the modification of the security code protecting the user's program settings. The current code is displayed. Should the security code be forgotten this setting can be accessed from the engineer's program settings menu.



3.2.7 7-Boiler Data Logging Submenu

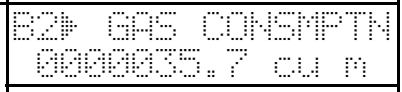
Note: This facility is only available from the Hamworthy Heating Limited fully modulating ranges of boilers.

a) General

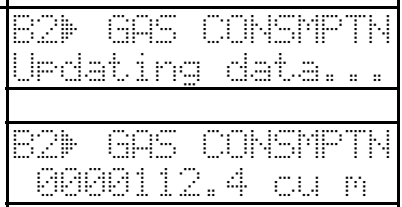
The Milton data logging function allows the user to view boiler performance data logged in the memory of each boiler.

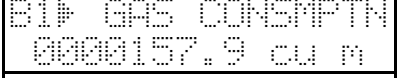
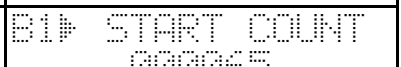
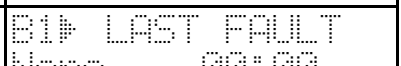
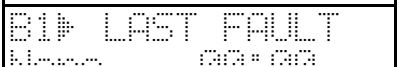
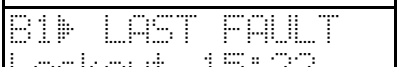
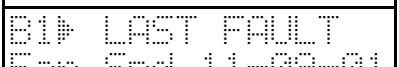
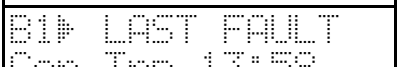
b) To select a boiler to view data from ensure that the flashing cursor is on the boiler number ('B1'), and use the '⬆' and down '⬇' keys to select the boiler.

c) To select a logged parameter ensure that the flashing cursor is on the parameter title and use the '⬆' and down '⬇' keys to select the desired parameter.



d) The value immediately displayed is the value currently held in the Milton's memory, not the current value in the boiler's memory. To update the reading ensure that the flashing cursor is on the parameter title and press the '✓' key. An updating message is displayed as the Milton communicates with the boiler, then the updated reading is displayed. This value is held in the Milton's memory until the next update.



3.2.7 7-Boiler Data Logging Submenu (continued)	
e) Boiler Hours Run Screen This screen displays boiler total hours run to nearest hour.	
f) Boiler Gas Consumption Screen This screen displays boiler total gas consumption to the nearest 0.1m³ of gas. **Note:** This is an approximate reading for guidance only.	
g) Boiler Operations Screen This screen displays boiler total operations count.	
h) Boiler Fault Log Screen This screen displays the fault type and time and date of occurrence of the last fault condition recorded by the boiler.	 
i) Boiler Fault Log Fault Types 1. No Fault - Indicates that no faults have been recorded by the boiler controls since the date displayed. 2. Lockout Fault - Indicates that a boiler ignition attempt resulted in a lockout condition at the time and date displayed. 3. Fan Speed Fault - Indicates that the boiler's dc servo fan was either running at a point in the ignition sequence when it should have been stopped, or was running at an incorrect speed. 4. Boiler Interlock Control Fault - Indicates the operation of a boiler safety device preventing firing of the boiler. The type of safety device will depend on the boiler model. Sherborne 70c - Condensate drain trap blockage monitoring switch. Ferndown 64 - Low system pressure switch. Wessex M Series - Low gas supply pressure switch (if fitted).	   

3.2.7 7-Boiler Data Logging Submenu (continued)	
5. High Limit Fault - Indicates the operation of the boiler safety temperature limiting thermostat at the time and date displayed.	B1▶ LAST FAULT Hi-Limt 24-08-01
6. Ignition Fault - Indicates the detection of a premature flame signal by the boiler ignition control box at the start of the ignition sequence.	B1▶ LAST FAULT Ignition 18-10-01
Note: The boiler fault log is intended as an aid to boiler fault diagnosis and should be used in conjunction with the boiler's installation, maintenance and servicing manual.	
3.2.8 8-About Milton Submenu	
This screen displays the software version of the Milton control, which should be quoted when obtaining technical assistance from Hamworthy Heating Limited.	HHL 2002 Milton v2.3

Notes

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Main switchboard tel: **0121 360 7000** fax: **0121 325 2309**

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Website

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