

Operation Manual

MaxSys

900 SERIES EMISSION SYSTEMS

MODEL 102 SYSTEM CONTROLLER SERIES III



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Version: 3.03

Part Number: 102/337050

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DOCUMENT HISTORY

ISSUE	DATE	AMENDMENT
3.00		
3.01		
3.02	28/10/97	3U re-design. Software version 2.91
3.03	12/11/98	Amendments to AK Protocol. Software version 2.91a
G:\MANUALS\HOST\337XXX\050-303.DOC		

1. UNPACKING INSTRUCTIONS

This instrument is packed for general freight purposes. It should withstand the occasional bumps and knocks which occur during transit.

Please check the instrument for damage, however, and report any damage within 24 hours to the factory or its Sales Office or Distributor.

1. Before any connection is made, unscrew the 4 cross-head screws on the instrument cover lid.
2. Slide the lid slightly back and to one side; press gently in the centre and lift out by the raised corner.
NOTE: Do not apply power to the instrument with the cover off.
3. Check that all PCBs are seated firmly in their sockets.
4. Check for any parts which may have broken or come loose in transit.
5. Replace the lid and slide until screw holes are aligned; secure it with the 4 cross-head screws.
6. Read through the rest of this manual thoroughly and then carry out the installation.

2. FOREWORD

This instruction book is for operational use only and is not a maintenance handbook. Maintenance handbooks are normal issue to distributors and service agents only but can be purchased by customers if they wish to carry out their own servicing. All warranty will cease, however, if a customer carries out his own servicing during the warranty period unless special arrangements have been made in writing.

3. INTRODUCTION

3.1 General Description

The Signal Model 102 System Controller is a high-speed micro-computer designed specifically to operate with Signal microprocessor-controlled gas analysers, blenders and test equipment. It is fitted into a compact 3U height case for convenient mounting in a standard 19" rack.

At the heart of the system is an Intel 80486 microprocessor and its associated 80487 mathematical coprocessor. The operating system is MS-DOS, and so, when the maintenance keyboard is attached, the Control Module can be used as an IBM Personal Computer.

The front panel of the System Controller is shown in Figure 1. There is a contrast adjustment for the LCD display and a PS/2 type keyboard socket for maintenance purposes.

The special purpose control panel allows all operations to be carried out by means of the front panel buttons. These are used in combination with menu displays which appear on the LCD screen at the left side of the front panel.

It is also possible to control the system from an external PC via one of the RS232 serial data ports, using ASCII coded commands. A list of these commands is given in Appendix A.

The System Controller is supplied with Signal Host Computer Software pre-loaded on the internal hard disk. The software is started automatically when power is applied.

A feature of the Signal Host Computer Software is the Configuration File. This is a text file containing many customer specific system parameters. It permits changes to be made to the configuration of the gas analysis system without the need for complex software maintenance tools. The structure of the Configuration File is described in the Maintenance Manual.

The System Controller comes with 8 RS232 communications ports and an RS485 converter.

3.2 Front and Rear Panels

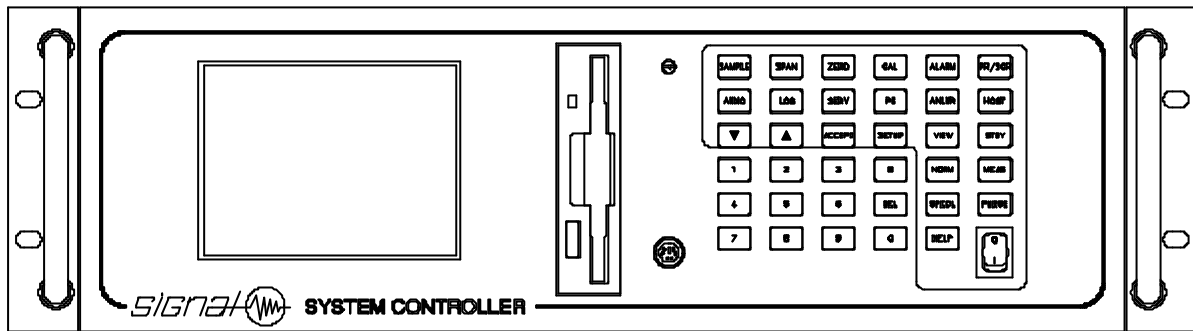


Figure 1 - Front Panel

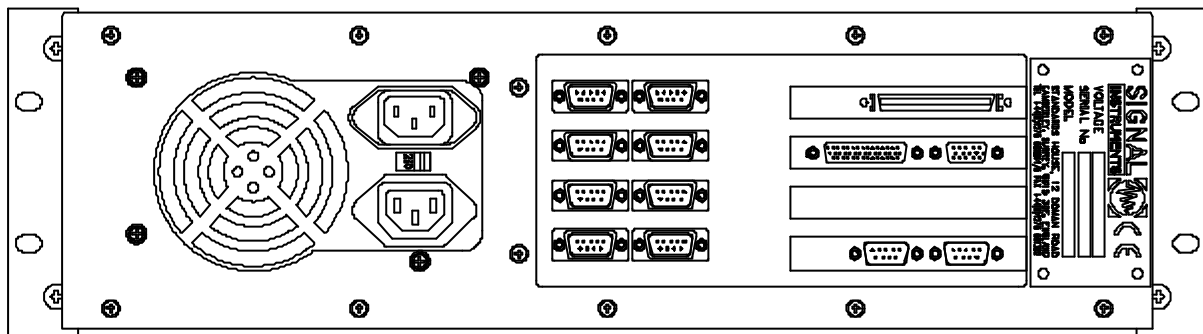


Figure 2 - Rear Panel connections

4. CONNECTION DETAILS

4.1 Pin connection tables

RS 232 PIN OUT (9 PIN D TYPE MALE)

2	RX
3	TX
5	GND

5. OPERATION

5.1 Start Up

The Signal Host Software will be started automatically when the System Controller is switched on. The System will be in Pause or Warm-up mode with the Normal Screen displayed.

5.2 Front Panel Buttons

The System Controller is controlled through the buttons on its front panel. Their functions are dependent upon the state of the system and the Screen being displayed. The Screens, their contents and meanings are described in subsequent sections; all the buttons are listed here for convenient reference.

UP/DOWN The Up and Down arrow keys are used to move around the various menus displayed on the VDU.

ACCEPT The Accept key is used to select an item from a menu or to confirm data entered using the numeric keys.

PURGE Sets the system mode to Purge. Only allowed if the control status is Host or Analyser and the system mode is Standby or Measure. The function is available from the Normal screen and View screens but not the Set-up menu or any Set-up screens.

STANDBY Sets the system mode to Standby. Only allowed if the control status is Host or Analyser and the system mode is Measure.

MEASURE Sets the system mode to Measure. Only allowed if the control status is Host or Analyser and the system mode is Standby. The function is available from the Normal screen and View screens but not the Set-up menu or any Set-up screens.

CAL Sets the system mode to Calibrate. Only allowed if the control status is Host or Analyser and the system mode is Standby or Measure. The function is available from the Normal screen and View screens but not the Set-up menu or any Set-up screens.

SPECIAL Loads a menu with 3 options:

Leak test which sets the system mode to Leak Test. Only allowed if the control status is Host or Analyser and the system mode is Standby or Measure. The function is available from the Normal screen only.

Check gas which sets the system, during Measure mode only, to use the check gas input instead of the sample.

NOXGEN which selects and performs a NOx conversion efficiency test on a NOx analyser.

SAMPLE, SPAN, ZERO

These buttons select the gas on all on-line analysers if the system is in the Host control state. Not allowed if the PC has control. The function is available from the Normal screen and the View screens but not the Set-up screens.

ALARM Selects the Active Alarms screen. Available from the Normal screen or current system mode screen e.g. Purge or Leak test. Pressing Alarm again returns to the current system mode screen.

SERVICE Selects the Service Log screen. Available from the Normal screen or current system mode screen. Pressing Service again returns to the current system mode screen.

LOG Sends selected data to the printer, log file and the chart recorder. Data to be logged can be chosen on the Set Log Data screen.

ANNOTATE Available during Measure mode only. Sends annotation data to the chart recorder.

PR/SCR Print Screen. Sends screen contents to the printer. Available at any time.

NORMAL Selects the Normal screen. Available at any time.

HELP Overlays the current screen with the contents of the relevant help file. Pressing Help again returns to the previous screen. Available at any time.

VIEW Loads a menu of view options and data. Pressing View again returns to the current system mode screen. Available from the Normal screen or current system mode screen i.e. Purge or Leak test.

SET-UP Loads a menu of set-up options. Pressing Set-up again returns to the current system mode screen. Available from the Normal screen only during Standby or Pause system modes.

HOST Sets the system control mode to Host. Available from the Normal screen or current system mode screen or any View screen but not a Set-up screen.

PC Sets the system control mode to PC i.e. an external computer has full control of the system. The host user can only view. Available from the Normal screen or current system mode screen or any View screen but not a Set-up screen.

ANLYR Sets the system control mode to Analyser, releasing the connected analysers for manual control. Available from the Normal screen or current system mode screen or any View screen but not a Set-up screen.

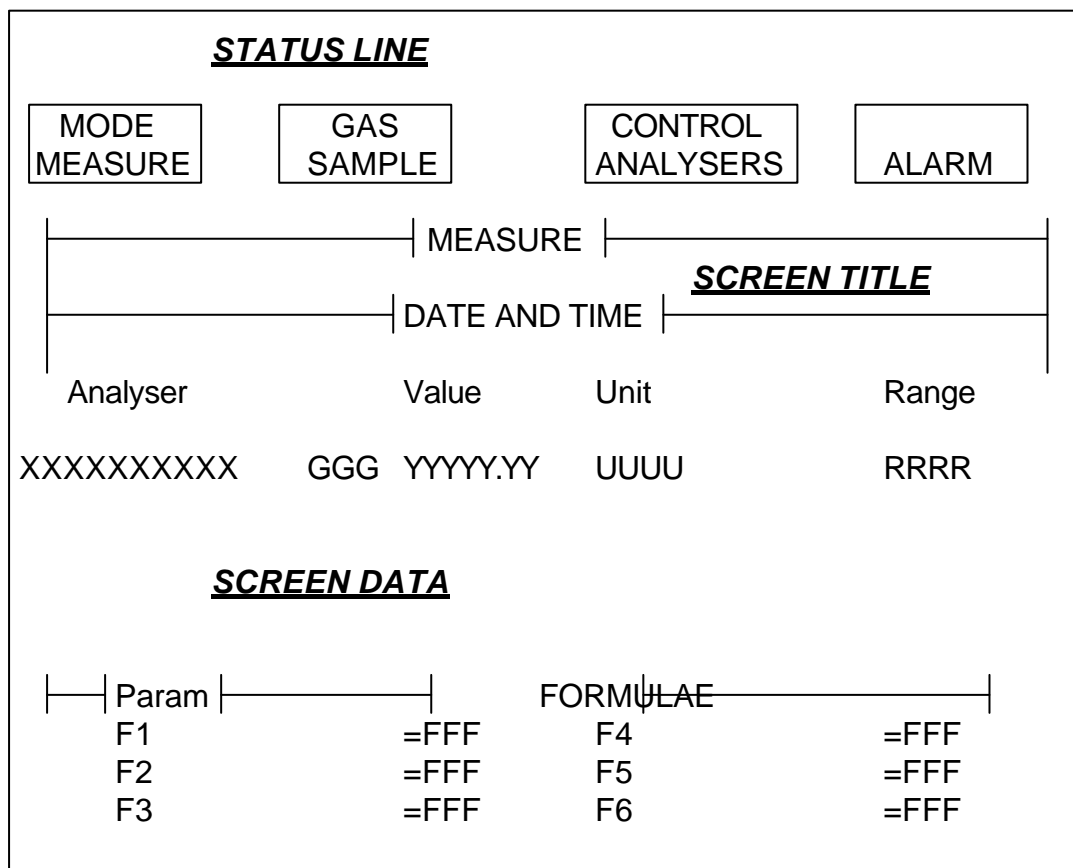
Numeric keys

Used to enter numbers in some of the set-up screens. The DEL key allows correction of errors.

5.3 Screen Displays

5.3.1 Normal Screen

On start-up, the Normal screen is displayed. This is laid out as shown below:



All screens follow the same scheme. The top 3 lines are the status lines. They are always displayed and show the user the current mode, selected gas, control status and the alarm status. Below the status lines is the current screen title and data. This changes to reflect the user current mode, for example View or Set-up. The screens are arranged in a hierarchical structure and are navigated via the front panel buttons.

5.3.2 Modes

PAUSE This means that system is in automatic shutdown, awaiting the pre-set start-up time. Start-up and shutdown times can be controlled from the Set-up menu.

WARM-UP The Warm-up period is set in the Configuration File. Only View operations are permitted during Warm-up.

STANDBY Ready for action. Analyser data is read at a slow rate and the values are displayed. The Host Software defaults to this mode.

PURGE System is being purged. Purge duration can be controlled from the Set-up menu.

MEASURE Operating. The System is accepting sample and reading live data from the on-line analysers.

CAL The analysers are being calibrated. Depending on the GAS selected, this will be a Zero-only, Span-only or a complete calibration.

NOx TEST A Model 4000 Analyser is undergoing an automatic NOx Converter efficiency test.

SPECIAL The System is undergoing an automatic gas path leak test.

LIN An analyser is being linearised by an externally connected computer.

5.3.3 Gases

SAMPLE All analysers select sample gas. Calibration, if selected, will be Span and Zero.

SPAN All analysers select span gas. Calibration, if selected, will be Span only.

ZERO All analysers select zero gas. Calibration, if selected, will be Zero-only.

5.3.4 Control States

ANALYSERS The analysers are in manual mode and can be controlled individually from their front panels.

HOST The host software has control of the analysers; they will not respond to their front panel controls.

PC An external computer has control of the system and its analysers.

5.3.5 Alarm Indicator

When there are no alarms present, then the indicator will be blank. If an alarm occurs, the word **ALARM** will appear and flash. If all active alarms have been acknowledged, the word **ALARM** will stop flashing. Alarms can be viewed and acknowledged using the Alarm screen.

5.3.6 Analyser Data

XX.XXXX Analyser name. Set in the configuration file.

GGG Gas mnemonic for multiple gas analysers. Number of gases and analyser model are set in the configuration file.

YYYY.YY The value last read from that analyser or OFF-LINE if the analyser has not been selected.

UUUU % or PPM, or INV for invalid.

RRRR The FSD of the range selected on the analyser or AUTO for auto range.

Param Optional user-controllable parameter affecting the operation of the formulae (e.g. Fuel Type).

F1-F6 The formula names set in the configuration file and selected from the Set-up menu.

FFF The results or state of the corresponding formula.

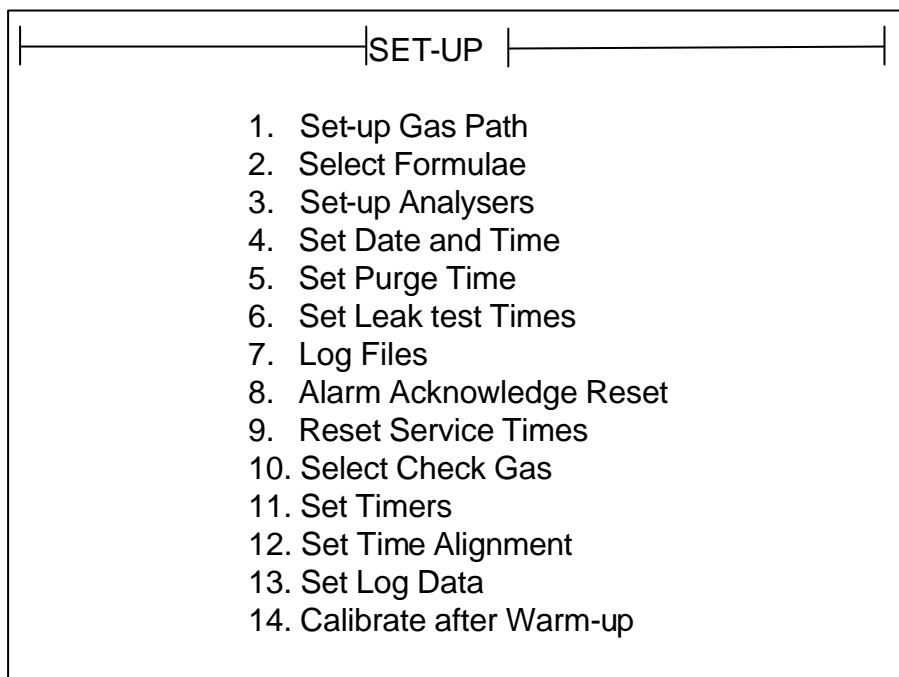
5.3.7 Changing the Analyser Data

Some of the data on the Normal Screen can be changed while the system is operating. The Gas Type on multiple-gas analysers (GGG), and the formula options (Param, F1-

F3, F6) can be changed by moving the highlight to the required part of the screen with the Up and Down arrow keys and then pressing Accept.

5.4 The Set-up Menu

The Set-up Menu is a list of the system configuration screens. It is selected by pressing Set-up in the standby or pause mode, when the Normal screen is being displayed. Pressing Normal or Set-up again will return to the Normal screen for the current system mode. Use the arrow keys to scroll up and down the menu and Accept to make the selection.



Some of the Set-up screens are also accessible from the View Menu. Where this is the case, changes to the data can only be made if entry was from the Set-up Menu. Exit from these screens back to the Normal screen is always possible using the Normal key. If entry was from Set-up, then the Set-up key can be used to return to the Set-up Menu. Likewise, if entry was from View, then the View key can be used to return to the View Menu.

5.4.1 GAS PATH Screen

XXXXX		
GAS PATH		
FILTER 1		Yes
FILTER 2		No
AMBIENT		No
MULTIPOINT	2	
MULTIPOINT	2	
CATALYST 1	No	
CATALYST 2	No	
CATALYST 3	No	
CATALYST 4	No	
CHECK GAS ROUTE 1		Yes
CHECK GAS ROUTE 2		No
CHECK GAS ROUTE 3		No
CHECK GAS ROUTE 4		No
PURGE ROUTE 1		Yes
PURGE ROUTE 2		No
PURGE ROUTE 3		No
PURGE ROUTE 4		No
GAS DIVIDER 1 (0-10)	5	
GAS DIVIDER 2 (0-10)	7	

XXXXX = SET-UP or VIEW

Use the arrow keys to scroll up and down the screen. Use Accept to make the selection or numeric keys to enter a number. The following describes how the selections affect one another.

Filters: Use Accept to select any of the 3 possible filters. This is a 1 of 3 selection so the current filter status column changes to No and the one selected changes to Yes.

Multipoints: Use Numeric keys to select the default value of the 2 possible multipoints. This is a number between 0 and the maximum set in the configuration file. As numbers are entered the multipoint status column changes value.

Catalysts: Use Accept to select any of the 4 possible catalysts. As Accept is pressed, highlighted catalyst status column changes from No to Yes and vice-versa.

Check gas route: Use Accept to select any of the 4 possible check gas routes. This is a 1 of 4 selection so the current check gas status column changes to No and the one selected changes to Yes.

Purge route: Use Accept to select any of the 4 possible purge routes. This is a 1 of 4 selection so the purge route status column changes to No and the one selected changes to Yes.

Gas dividers: Use Numeric keys to select the default value of the 2 possible gas dividers. This is a number between 0 and the maximum set in the configuration file. As numbers are entered the gas divider status column changes value.

All the names are set in the configuration file and may therefore differ from those shown. All options are controlled from the Configuration File; if they are not available, then the relevant line of the screen will be blank.

5.4.2 FORMULAE Screen

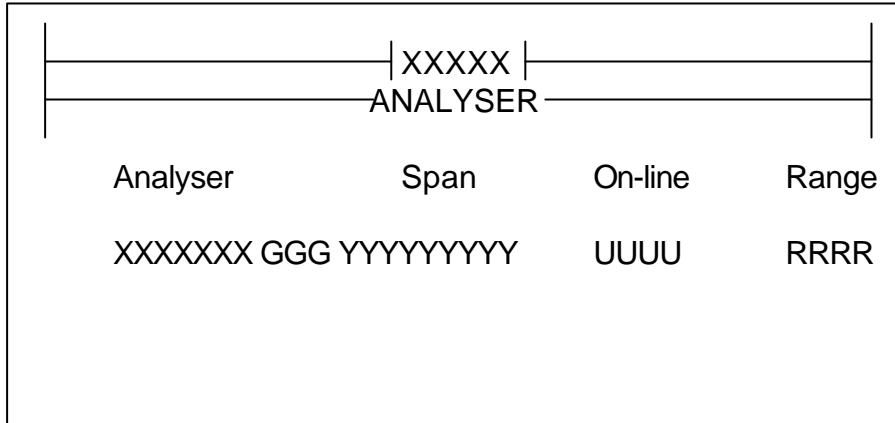
XXXXX	
FORMULAE	
AVERAGE	100
AFR (CO2)	Yes
AFR (CO2)	No
Pressure	No
AFR (O2)	No
AFR (O2CORR)	Yes
Temperature	No
AFR (CO2CAT)	No
AFR (CO2CAT)	No
Humidity	Yes
EPA	Off
Alignment	Off

XXXXX = SET-UP or VIEW

Use the arrow keys to scroll up and down the screen. Use Accept or numeric keys to set options. The screen is arranged in 6 sections: Average value (formula 4 on the Normal screen), three groups of 3 choices (formula 1-3 on the Normal screen), EPA correction state (formula 5 on the Normal screen), and the Alignment value (formula 6 on the Normal screen).

All the names are set in the configuration file and may therefore differ from those shown. All options are controlled from the Configuration File; if they are not available, then the relevant line of the screen will be blank.

5.4.3 ANALYSER SET-UP screen



XXXXX = SET-UP or VIEW

Use the arrow keys to navigate the screen. Use accept to choose options. The screen is arranged in 4 columns: analyser name and gas, span gas, on-line state and current range. Using accept in the analyser column changes the gas selected for multiple gas analysers. Using accept in the span column changes the span gas selected for that analyser when the span input is required. Using accept in the on-line column changes the analysers status from On-line to Off-line and vice-versa. When the analyser goes on-line the host will interrogate the analyser for its range information. Using accept in the range column changes the analysers range if it is on-line and the control status is HOST or PC.

All the names are set in the configuration file. All options are controlled from the Configuration File; if they are not available, then the relevant line of the screen will be blank.

5.4.4 SET TIME AND DATE screen

DATE & TIME SET DATE & TIME DD/MM/YYYY HH:MM
--

The set date and time is an overlay of the set-up screen. The screen displays the current date and time and is obtained from the set-up menu. Use the arrow keys to navigate the screen, and the numeric keys to edit the data. Use Accept to save the edited date and time. Pressing Normal or Set-up will return the screen to the Normal screen or the set-up menu respectively without saving any changes.

5.4.5 SET PURGE TIME screen

PURGE SET PURGE TIME XXXX Sec's

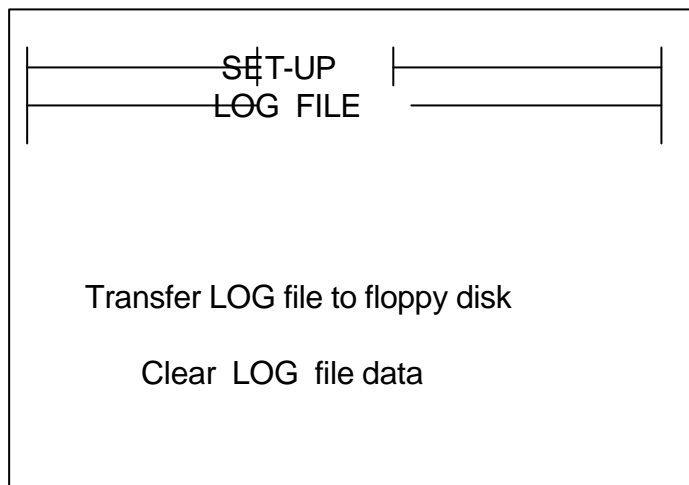
The set purge time is an overlay of the set-up screen. The screen displays the current purge time and is obtained from the set-up menu. Use the arrow keys to navigate the screen. Use numeric keys to edit the time. Use Accept to save the new purge time. Pressing Normal or Set-up will return the screen to the Normal screen or the set-up menu respectively without saving any changes.

5.4.6 SET LEAK TEST TIMES screen

LEAK TEST SET LEAK TEST TIMES Pump XXXX Sec's Switch XXXX Sec's
--

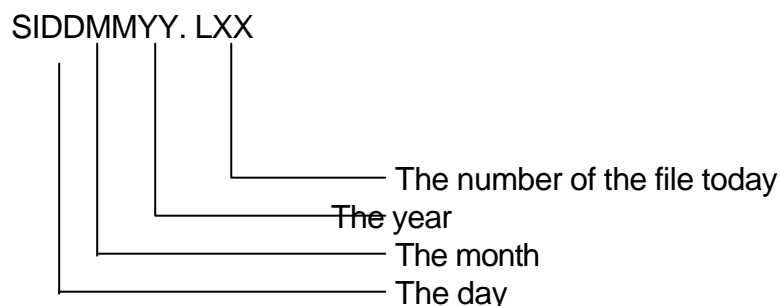
The set leak test times is an overlay of the set-up screen. The screen displays the current leak test times and is obtained from the set-up menu. Use the arrow keys to navigate the screen. Use the numeric keys to edit the time. Use Accept to save the new purge time. Pressing Normal or Set-up will return the screen to the Normal screen or the set-up menu respectively without saving any changes.

5.4.7 SET-UP LOG FILE screen



Use the arrow keys to select 1 of the 2 menu options. Use accept to select function.

The file moved to the floppy disk is named as follows:



The Log data in this file is stored as text records, one per Log event, with commas between the Log Items. This Format is known as CSV (Comma Separated Value) and it can be Imported by most Spreadsheet programs. The number of items in each record is dependent upon the system configuration, and the selections made on the Set Log Data screen (see section 5.5.3), but otherwise stays constant.

If the Log Header and Test Reference is selected, then each record begins with the following 17 items:

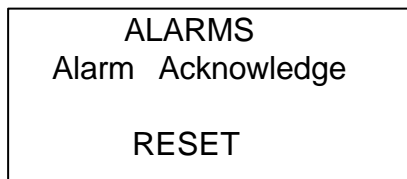
- Date
- Time
- Test reference
- System Mode
- Sample, Span or Zero Gas
- Alarm Status
- Filter selection
- Multipoint 1 setting
- Multipoint 2 setting
- Catalyst 1 setting

Catalyst 2 setting
Catalyst 3 setting
Catalyst 4 setting
Check gas route
Purge route
Gas Divider 1 setting
Gas Divider 2 setting

An example record is shown below. Note that the entire record is stored as one line of text.

03/06/1993, 13:08, 1122.345, STANDBY, SAMPLE, NO ALARMS,
CELL 1,02,,NO,,,CHECK ROUTE 1,PURGE ROUTE 1,,,
ANALYSER MEASUREMENTS, 67.4, 132.3, 46.1, 24715, 209000

5.4.8 ALARM ACKNOWLEDGE RESET screen



The alarm acknowledge reset screen is an overlay of the set-up screen. The screen is displayed while all acknowledged alarms are removed from the system and an entry goes into the alarm log. No keys are required, and the screen clears back to the set-up menu when finished.

5.4.9 RESET SERVICE TIMES screens

The Reset Service Times function is password protected. When this item is selected from the Set-up Menu, the Password screen appears:



The password is entered using the numeric keys and Accept. Failure to enter a correct password returns to the set-up menu. Success will load the Set Service Times screen. Pressing Normal or Set-up again will return the screen to the Normal screen or the set-up menu respectively.

Password is **2479**

SET SERVICE TIMES			
ITEM	RUN TIME	LIFE	STATUS
XXXXXXXX	HH:MM	hh:mm	SSSSS

Use the arrow keys to move up or down the service items. If more than 18 items exist the screen will scroll when the highlight reaches the bottom. Use the accept key on the highlighted item to zero the run time.

5.5 CHECK GAS Screen

XXXXXXXX	
CHECK GAS	
1. COCKTAIL GAS	Y
2. NO GAS 1	N
3. NO GAS 2	N
4. HC GAS 2	N
5. HC GAS 2	N
6. CO GAS 1	N
7. CO GAS 2	N
8. CO2	

XXXXXXXX = SET-UP or VIEW

Use the arrow keys to scroll up and down the screen. Use Accept to select the gas to be used in Measure with Check Gas mode.

All the names are set in the configuration file. All options are controlled from the Configuration File; if they are not available, then the relevant line of the screen will be blank.

5.5.1 TIMERS screen

	XXXXXX				
	TIMERS				
		ON	OFF	ON	OFF
MONDAY	SSS	hh:mm	hh:mm	hh:mm	hh:mm
TUESDAY	SSS	hh:mm	hh:mm	hh:mm	hh:mm
WEDNESDAY	SSS	hh:mm	hh:mm	hh:mm	hh:mm
THURSDAY	SSS	hh:mm	hh:mm	hh:mm	hh:mm
FRIDAY	SSS	hh:mm	hh:mm	hh:mm	hh:mm
SATURDAY	SSS	hh:mm	hh:mm	hh:mm	hh:mm
SUNDAY	SSS	hh:mm	hh:mm	hh:mm	hh:mm

XXXXXX = SET-UP or VIEW

Use the arrow keys to move around the screen. The highlight will first move down the column of states and then across the times for each day. Use Accept in the timer state column to select automatic or manual operation for each day of the week. The state can be set to OFF (remain in Pause mode), Timed (follow the times set), or ON (ignore times). When the highlight is on any of the times, use the numeric keys to set the hours and minutes.

5.5.2 TIME ALIGNMENT screen

XXXXXX		
SET ANALYSER ALIGNMENT		
Analyser	Time	Range
XXXXXXXXXXXX	GGG YYYx0.1s	RRRR

XXXXXXX = SET-UP or VIEW

Use the arrow keys to move up or down the time column. Use the numeric keys to enter a number between 0 and 200, representing 0 to 20 seconds alignment delay. This delay will be sent to the analyser and used by it to delay the instantaneous reading.

5.5.3 The SET LOG DATA Screen

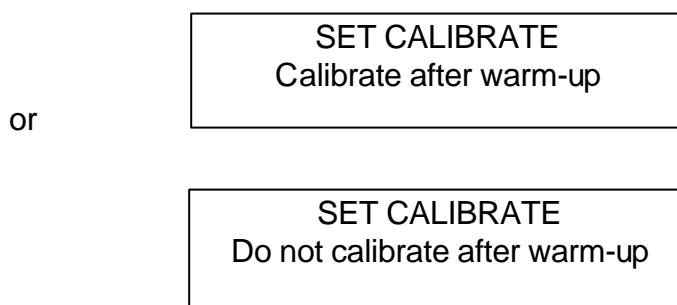
XXXX	
PREVIEW LOG DATA	
Printer and File Log Data	
Log Header and Test Reference	Yes
Analyser Measurements	Yes
Formula Results	No
Alarm Items	No
Service Items	No
Active Alarms	No
Analyser Readings (2 per sec)	No
Chart Recorder Log Data	
Analyser Measurements	Yes
Formula Results	No
Alarm Items	No
Service Items	No
Active Alarms	No

XXXXXX = SET-UP or VIEW.

Use the arrow keys to move up or down the screen. Use the Accept key to select or deselect the data to be logged. If Log Header and Test Reference is set to Yes, then the Log Reference screen will appear whenever the Log button is pressed. See section 5.8

If Analyser Readings (2 per sec) is set to Yes, then all the other options are set to No. However, the earlier selections are not lost, and will reappear when Analyser Readings (2 per sec) is set to No.

5.5.4 CALIBRATE AFTER WARM-UP screen



If desired, the System can initiate automatic analyser calibration at the end of the warm-up period. Use Accept to toggle between Calibrate and Do Not Calibrate.

5.6 The View Menu

The View Menu displays the time and date, the purge time, the leak test times and the annotation string, as well as having a menu for selecting other View screens. It is selected by pressing the View key in any system mode when the Normal screen is being displayed. Pressing Normal or View again will return to the Normal screen for the current system mode. Use the arrow keys to scroll up and down the menu and Accept to make the selection.

VIEW	
Time & Date HH:MM DD/MM/YY	PURGE xxxxS
	LEAK TEST PUMP xxxx VALVE xxxx
ANNOTATE STRING: sssssssssssssssssssssssssss	
1.	Gas Path
2.	Formulae
3.	Cal.values
4.	Analyser set-up
5.	Timers
6.	Time Alignment
7.	Log File
8.	Preview Log Data
9.	Check Gases

The following screens have already been described above:

Item	Screen	Section
1.	Gas Path	5.4.1
2.	Formulae	5.4.2
4.	Analyser Set-up	5.4.3
5.	Timers	5.5.1
6.	Time Alignment	5.5.2
8.	Preview Log Data	5.5.3
9.	Check Gases	5.5

5.6.1 VIEW CAL VALUES screen

VIEW MENU			
CALIBRATION VALUES			
Analyser	Span	Unit	Range
XXXXXXXXXXXX	GGG	YYYYY.YY	UUUU RRRR

This screen is used to view the span values read from the on-line analysers.

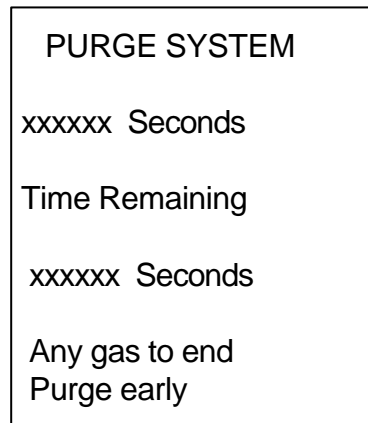
All the names are set in the configuration file. All options are controlled from the Configuration File; if they are not available, then the relevant line of the screen will be blank.

5.6.2 VIEW LOG FILE screen

VIEW
LOG FILE
UP/DOWN To Scroll

This screen is used to view the contents of the log file on the hard disk.

5.7 PURGE screen

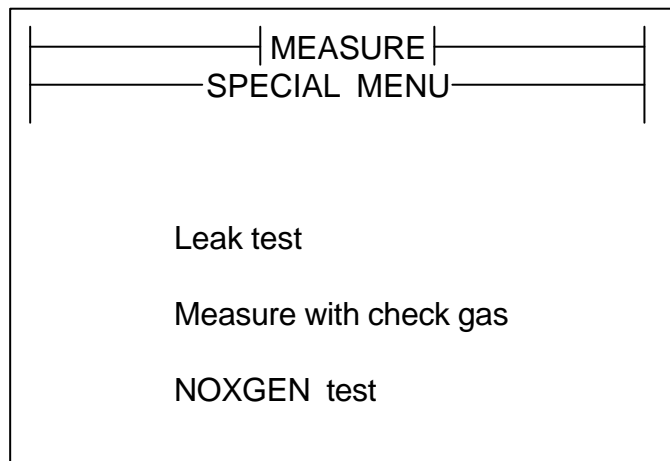


The purge screen is an overlay of the Normal screen. It displays the set purge time and the time to run.

Purge is obtained by pressing the Purge button during the Standby or Measure mode.

Selecting Span Zero or Sample will terminate the purge mode early. After Purge, the system mode changes to Standby and the overlay screen disappears.

5.7.1 The SPECIAL Menu



The Special screen is obtained by pressing the Special button whilst the Normal screen is being displayed and the system mode is in Standby or Measure. To exit from the Special menu, press the Normal key.

Use the up and down keys to select an item and Accept to perform the function.

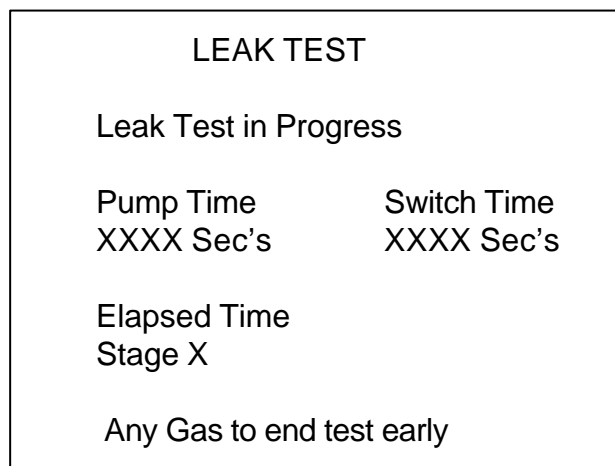
Leak test This performs a 4 stage test of the system gas path and is valid during the Standby or Measure mode. The test will either report a success, or it will give the most likely location of the leak.

Measure with check gas.

This connects the sample path to the check gas selected by the Set-up menu. This option is valid during Measure mode only.

NOXGEN This performs a NOx converter efficiency test on a selected model 4000 analyser. It is available during Standby or Measure mode.

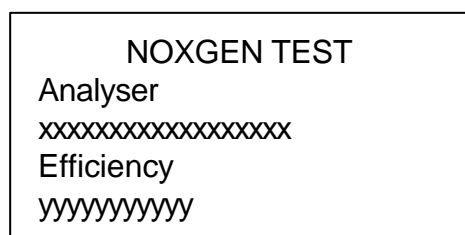
5.7.2 LEAK TEST screen



The leak test screen is an overlay of the Normal screen. The screen displays the set pump and switch times and the time to run.

Selecting any of the Span, Zero or Sample will terminate the leak test mode early. The system mode changes to Standby and the overlay screen disappears after a short delay, when the test is over.

5.7.3 NOXGEN TEST screen



The NOXGEN Test screen is an overlay of the Normal screen. The screen displays the selected analyser and whether it is a model 4000. If it is a model 4000 the efficiency is displayed.

Use the up/down keys to select the analyser and Accept to start the test. Note that if only one analyser is displayed, it is still necessary to press Accept before the test will begin.

While the test is in progress, various analyser readings will be displayed. Use the Normal key to terminate the NOXGEN test mode early.

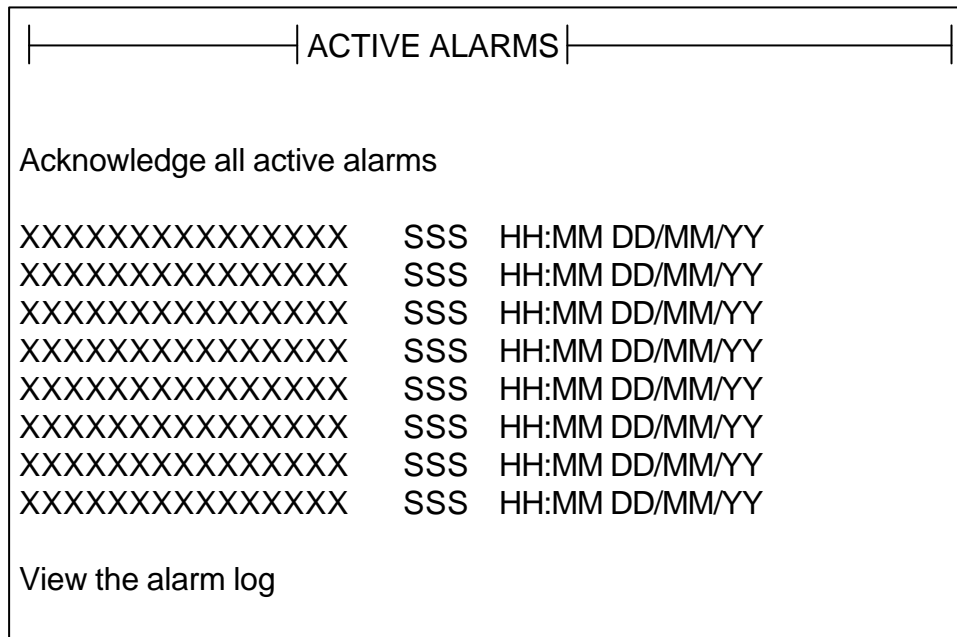
5.7.4 SERVICE LOG screen

SERVICE LOG			
ITEM	RUN TIME	LIFE	STATUS
XXXXXXXXXX	HH:MM	hh:mm	SSSS

The service screen displays the service items. It has 4 columns for name, runtime, life and status. The status can be OK or Alarm. The screen is selected by pressing the Service key in any system mode when the Normal screen is being displayed. Pressing Normal or Service again will return the screen to the Normal screen for the current system mode. Use the arrow keys to scroll the service items when more than 18 are in use.

Once the service life of an item has been exceeded then the appropriate maintenance action should be taken. Service runtimes can be reset from the Set-up menu, provided the password is known. Service lifetimes are controlled by the Configuration File.

5.7.5 ACTIVE ALARMS screen



XXXXXXXXXXXX = The description of the alarm
SSSSSSSS = ACK or ST,
DD/MM/YY = The date the alarm was reported.
HH:MM = The time the alarm was reported.

The active alarms screen displays the name, start time & date and the status of each active alarm. The status can be ST or ACK (Start or Acknowledged).

The screen is selected by pressing the Alarm key in any system mode when the Normal screen is being displayed. Pressing Normal or Alarm again will return the screen to the Normal screen for the current system mode.

Use the arrow keys to scroll up and down the list of alarm items. When the highlight reaches the bottom the alarm items start to scroll. Pressing Accept on the top line sets the status of all active alarms to Acknowledged. Pressing accept when the highlighted on an alarm item with status ST causes it to be Acknowledged. If accept is pressed when the highlight is on an item with status ACK, then the item is deleted. Note that if that alarm condition still exists, then the alarm item will soon reappear in the list status ST. Pressing Accept when the highlight is on the bottom loads the alarm log screen.

5.7.6 ALARM LOG screen

ALARM LOG		
XXXXXXXXXXXXXXXXXX	SSS	HH:MM DD/MM/YY
XXXXXXXXXXXXXXXXXX	SSS	HH:MM DD/MM/YY
XXXXXXXXXXXXXXXXXX	SSS	HH:MM DD/MM/YY
XXXXXXXXXXXXXXXXXX	SSS	HH:MM DD/MM/YY
XXXXXXXXXXXXXXXXXX	SSS	HH:MM DD/MM/YY
XXXXXXXXXXXXXXXXXX	SSS	HH:MM DD/MM/YY
XXXXXXXXXXXXXXXXXX	SSS	HH:MM DD/MM/YY
XXXXXXXXXXXXXXXXXX	SSS	HH:MM DD/MM/YY

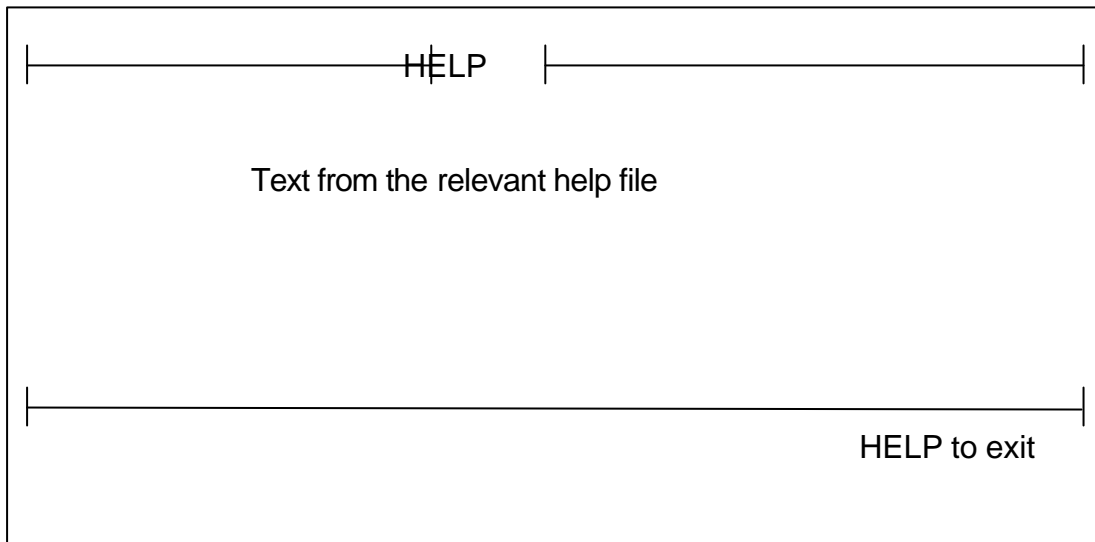
The alarm log screen displays the contents of the ALARM.LOG file kept on the hard disk. The screen is selected by pressing Accept on the bottom line of the active alarm screen. Pressing Normal or Alarm will return to the Active Alarm screen. Use the arrow keys to scroll the alarm log file items up or down.

5.8 LOG REFERENCE screen

LOG REFERENCE

This screen appears when the log button is pressed if Log Header and Test reference has been selected. The Log Reference can be up to 20 numbers or decimal points, entered from the keypad. The previous reference (if any) will be displayed and can be edited using Del and the other keypad keys. When the reference is correct, press Accept. To abandon logging, press Normal.

5.9 HELP Screen



The help screen can be obtained by pressing Help at any time. It gives context sensitive help. To exit Help and return to the previous screen, press Help again.

APPENDIX A - HOST SOFTWARE COMMAND PROTOCOL**EXAMPLE - Software Version 2.91****<CTRL-B> XXXX Kn <CTRL-C>**

where

	XXXX =	AK command
n	=	99 to address the 102 Host
n	=	1, 2, 3... to address an individual analyser
n	=	0 to address all attached analysers

EXAMPLE - Software Version 2.91a**<CTRL-B> XXXX Kn <CTRL-C>**

where

	XXXX =	AK command
n	=	0 to address the 102 Host
n	=	1, 2, 3... to address an individual analyser
n	=	99 to address all attached analysers

SRES		-	Reset
	data	=	NA
	results	=	NA

STBY		-	Standby
	data	=	NA
	results	=	NA

SPAU		-	Pause
	data	=	NA
	results	=	NA

SMGA		-	Measure Gas
	data	=	NA
	results	=	NA

SNGA		-	Zero gas
	data	=	NA
	results	=	NA

SEGA		-	Span gas
	data	=	NA
	results	=	NA

SSPL		-	Purge
	data	=	BACKWARDS or FORWARDS

	results	=	NA
SATK		-	Autocalibrate
	data	=	Range (Optional)
	results	=	NA
SREM		-	Remote
	data	=	NA
	results	=	NA
SMAN		-	Manual
	data	=	NA
	results	=	NA
SKOP		-	Converter test
	data	=	NA
	results	=	NA
AKWG		-	Converter efficiency
	data	=	NA
	results	=	Efficiency in %
ASYS		-	System time
	data	=	NA
	results	=	Value of system time
ASTZ		-	Host status (Software version 2.91a only)
	data	=	NA
	results	=	SXX1 SXX2
	where SXX1	=	[SREM SMAN]
	SXX2	=	[STBY SATK SMGA SNGA SEGA SSPL SPAU]
ESYZ		-	Set system time
	data	=	Time & Date
	results	=	NA
HRUS		-	Read user set data in host
	data	=	NA
	results	=	filter choice (1-30, alignment (0/1), epa (0/1), average (0-999), purge route (1-3), purge time (0-xxx), switch time (0-xxx)
HSUS		-	Set user settable data in host
	data	=	filter choice (1-3), alignment (0/1), epa (0/1), average (0-999), purge route (1-3), purge time (0-xxx), switch time (0-xxx).

	results	=	NA
HRTM		-	read the day of week timer
	data	=	Dx
	results	=	mode (0-2), hours on, mins on, hours off, mins off, hours on, mins on, hours off, mins off
	where x = day 0-6 = sun-sat		
HSTM		-	set the day of week timer
	data	=	Dx mode (0-2), hours on, mins on, hours off, mins off, hours on, mins on, hours off, mins off
	results	=	NA
	where x = day 0-6 = sun-sat		
HRAN		-	read the analyser data from the host
	data	=	Ax
	results	=	Ax <analyser name>, autorange (0/1), range (0-10), on-line (0/1), alignment (0-200) gastype (1-9)
	where x = analyser number 0-9		
	gastype =		
	1		NOx
	2		NO
	3		NO2
	4		THC
	5		CH4
	6		NMHC
	7		CO
	8		CO2
	9		O2
HSAN		-	set the analyser data used by the host
	data	=	Ax
	results	=	Ax autorange (0/1), fsd index (0-10), online (0/1), alignment (0-200)
	where x = analyser number 0-9		
HRAL		-	read the state of the alarm flag
	data	=	NA
	results	=	state (0-2)
	where 0=no alarms, 1=acked alarms, 2=active alarms		
HRCS		-	read the connection status
	data	=	NA
	results	=	state (0-2)
	where 0=ANALYSER, 1= HOST, 2=PC		

HRAM	-	read the results for all analysers
data	=	NA
results	=	ffff.ffff,.....ffff.ffff
		where ffff.ffff = floating point number
HRFR	-	read the results of the formulae
data	=	NA
results	=	ffff.ffff,.....ffff.ffff or <ON/OFF>
		where ffff.ffff = floating point number
HRA	-	read the annotation string
data	=	NA
results	=	<string of text>
HRAS	-	set the annotation string
data	=	<string of text>
results	=	NA
HRHF	-	read the high level function in use
data	=	NA
results	=	code (see HSHF below)
HSHF	-	set the high level function
data	=	code
results	=	NA
		where code =
		STANDBY_MODE 0
		PAUSE_MODE 1
		MEASURE_MODE 2
		CAL_MODE 3
		LEAKTEST_MODE 4
		WARMUP_MODE 5
		WARMUP_TO_CAL_MODE 6
		IGNORE_MODE 7
		PURGE_MODE 8
		LIN_MODE_1 9
		LIN_MODE_2 10
		LIN_MODE_3 11
		LIN_MODE_4 12
		LIN_MODE_5 13
		LIN_MODE_6 14
		LIN_MODE_7 15
		LIN_MODE_8 16
		LIN_MODE_9 17
		ANNOTATE_MODE 1000
		LOG_MODE 1001
		PRINTSCREEN_MODE 1002
		CLEAR_LOG_FILE_MODE 1003

TRANSFER_LOG_FILE_MODE 1004
 RESET_ACKED_ALARMS_MODE 1005
 ACK_ALL_ALARMS_MODE 1006

HSSS - set the system state
 data = code
 results = NA
 where code =

STANDBY_STATE	0
PAUSE_STATE	1
MEASURE_F_1_STATE	2
MEASURE_F_2_STATE	3
MEASURE_F_3_STATE	4
PURGE_1_F_1_STATE	5
PURGE_1_F_2_STATE	6
PURGE_1_F_3_STATE	7
PURGE_2_F_1_STATE	8
PURGE_2_F_2_STATE	9
PURGE_2_F_3_STATE	10
PURGE_3_F_1_STATE	11
PURGE_3_F_2_STATE	12
PURGE_3_F_3_STATE	13
PURGE_4_F_1_STATE	14
PURGE_4_F_2_STATE	15
PURGE_4_F_3_STATE	16
CHECK_1_F_1_STATE	17
CHECK_1_F_2_STATE	18
CHECK_1_F_3_STATE	19
CHECK_2_F_1_STATE	20
CHECK_2_F_2_STATE	21
CHECK_2_F_3_STATE	22
CHECK_3_F_1_STATE	23
CHECK_3_F_2_STATE	24
CHECK_3_F_3_STATE	25
CHECK_4_F_1_STATE	26
CHECK_4_F_2_STATE	27
CHECK_4_F_3_STATE	28
LEAKTEST_1_F1_STATE	29
LEAKTEST_1_F2_STATE	30
LEAKTEST_1_F3_STATE	31
LEAKTEST_2_F1_STATE	32
LEAKTEST_2_F2_STATE	33
LEAKTEST_2_F3_STATE	34
LEAKTEST_3_F1_STATE	35
LEAKTEST_3_F2_STATE	36
LEAKTEST_3_F3_STATE	37
LEAKTEST_4_F1_STATE	38
LEAKTEST_4_F2_STATE	39
LEAKTEST_4_F3_STATE	40

GAS_DIVIDER_1_STATE	41
GAS_DIVIDER_2_STATE	42
CATALYST_1_STATE	43
CATALYST_2_STATE	44
CATALYST_3_STATE	45
CATALYST_4_STATE	46
MULTIPOINT_1_STATE	47
MULTIPOINT_2_STATE	48
SPAN_STATE	49
ZERO_STATE	50
SAMPLE_STATE	51
CALIBRATE_STATE	52
LINEARISE_1_STATE	53
LINEARISE_2_STATE	54
LINEARISE_3_STATE	55
LINEARISE_4_STATE	56
LINEARISE_5_STATE	57
LINEARISE_6_STATE	58
LINEARISE_7_STATE	59
LINEARISE_8_STATE	60
LINEARISE_9_STATE	61

HRLI - read the log items selected

data = NA

results = file and printer analysers (0/1),
file and printer formulae results (0/1),
file and printer service items (0/1),
file and printer active alarm items (0/1),
chart analysers measurements (0/1),
chart formulae results (0/1),
chart alarm items (0/1),
chart service items (0/1)
chart active alarm items (0/1),
file and printer log hdr and test ref (0/1)

HRLI - set the log items

data = file and printer analysers (0/1),
file and printer formulae results (0/1),
file and printer alarm items (0/1),
file and printer service items (0/1),
file and printer active alarm items (0/1),
chart analysers measurements (0/1),
chart formulae results (0/1),
chart alarm items (0/1),
chart service items (0/1),
chart active alarm items (0/1),
file and printer log hdr and test ref (0/1)

results = NA

HRVD	-	read the variable data kept in the host
data	=	Vx
results	=	Vx <name> <text> max number value
where x=variable number		
HSVD	-	set the variable data in the host
data	=	Vx value
results	=	NA
where x=variable number		
HRSI	-	read the data for the service item
data	=	Sx
results	=	<service item name> <runtime><lifetime>
where x=service item		
HSSI	-	reset the runtime for the service item
data	=	Sx
results	=	NA
where x=service item		
HRAI	-	read the alarm item
data	=	Ax
results	=	<alarm item name> <low value> <high value> <current value>
where x=alarm item		
HRAA	-	read the active alarms
data	=	Ax
results	=	<Active Alarm line>
where x=active alarm item		
HRFL	-	read the field unit bit data from the host
data	-	Lx
results	=	<name><field_unit><address><bit><type> <direction><value><gain><offset>
where x=Field unit line		
HRFC	-	read formulae constant
data	=	Cx
results	=	Cx <value.value>
where x=constant number (see Appendix B)		
HSFC	-	set the formulae constant
data	=	Cx <value.value>
results	=	Cx
where x=constant number (See Appendix B)		

APPENDIX B - FORMULAE

The Signal Host Computer Software contains a method for displaying derived data continuously, while the system is in operation. This is principally intended for AFR measurements, but can also show Temperature, Pressure and Humidity, as well as EGR calculations. Two separate sets of formulae are provided, one for Gas Turbines, and the other for Piston Engines.

By default, the source of data for the formulae is the set of parameters held in the file CONSTANT.DAT. In any particular gas analysis system, the configuration file defines which real measurements are to be used instead of constant parameters. If, for example, a Dewpoint meter is present, then its reading can be used to determine Specific Humidity; if there is no Dewpoint meter then the Dewpoint Temperature from CONSTANT.DAT is used for the calculation.

There are two ways to change the contents of CONSTANT.DAT. If a PC is available to run the Supervisor software package, then the Formulae screen allows the parameters to be changed. If this is not convenient, then the DOS text editor EDIT can be used to change the required values. Care should be taken with this latter approach, as the parameters are numbered from 0, whereas the editor considers the first line of the file to be line 1.

1. FORMULA SET 1 - For Gas Turbines

1.1 **Parameter List**

No.	Parameter	Abbreviation	Default Value
0	Natural gas fx	fx	.06033
1	Natural gas f1	f1	-0.056478
2	Natural gas f2	f2	-0.117529
3	Natural gas fcv	fcv	47.7
4	Natural gas h2ocomb	h2ocomb	2.12
5	Gas oil fx	fx	.071416
6	Gas oil f1	f1	-.0335
7	Gas oil f2	f2	-.104932
8	Gas oil fcv	fcv	42.5
9	Gas oil h2ocomb	h2ocomb	1.18