Programmable Gas Sampling System Manual

SUMMARY

This particular system is a programmable gas sample system based on the PGS32 range of equipment and is used for the monitoring gaslevels within air samples taken from remote points.
This manual includes a system description, operation and maintenance details. It is intended to compliment the equipment and is therefore tailored to the specifications and operation procedure of the system supplied.

WARNING

The equipment described in this instruction manual may have mains voltages applied to it. Ensure correct safety procedures are adopted before working on the equipment.

The equipment described in this handbook is designed for detection of flammable and/or toxic gases. Ensure local safety procedures are adopted before carrying out any maintenance or calibration work.

The equipment described in this handbook may be connected to remote alarms and/or shutdown systems. Ensure that local operating procedures are adopted before carrying out any maintenance or calibration work.

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1. OVERVIEW

The supplied system is a Programmable Sample System to monitor levels of gas present in air samples taken from remote points. Samples are drawn from up to thirty-two 10mm sample tubes which are sequentially monitored. The air samples are conditioned by filters before passing over gas detectors. The gas levels are monitored by the GasScan program, which will operate output relays if any gases exceed pre-defined levels. A modem can be fitted to provide dial-out facilities using PC Anywhere software.
The system is supplied fully configured as per the drawings and specification sheets. If any parameters need changing to suit site conditions (i.e. sample/purge times, alarm levels etc.) please consult the Crowcon Commissioning Engineer. Alternatively, all information needed to implement any changes are included in this manual.

2. INTRODUCTION

The Programmable Sampling System supplied on this project is a microprocessor-controlled system for monitoring gas concentrations from up to 32 remote points by means of sample draw techniques. The system utilises a rack mounted IBM compatible PC which controls all sampling and alarming functions including pump operation, sampling sequence, and alarm relay drives.

The system is supplied complete with all necessary sample-conditioning components, such as particulate filters and water barriers, to ensure a consistently clean and dry sample at the detectors.

All the controlling and data logging software has been written by Crowcon and utilises Microsoft Windows™ 98 to allow quick and easy modification to the system parameters and to manually override the system functions.

3. SYSTEM DESCRIPTION

3.1 ENCLOSURE

The system is housed in a sheet steel enclosure designed for wall mounting and measures 1000mm high x 800 mm wide x 400 mm deep.

The enclosure houses the PC complete with flat screen LCD display and keyboard, the system power supply, output relays and a top entry gland panel for connection of all incoming and outgoing electrical signals. All terminals will accept up to 2.5-mm^2 cable.

The enclosure also houses the mechanical sampling system complete with detectors, left hand entry bulkhead fittings for incoming sample lines, air purge inlet, calibrate inlet, and drain connections. The exhaust connections are made on the right hand side of the cabinet. All inlet and exhaust connections are 10-mm o/d, except the Calibration inlet and Drain, which are 6mm o/d.

A cooling/extract fan ensures that the internal operating temperature remains stable and prevents the unit overheating. For systems detecting flammable gases, an internal cabinet gas detector is also provided which will shut down the system pumps in the event of gas being detected within the cabinet.

3.2 HARDWARE

The system is capable of accepting up to 32 sample lines, each of which can be up to 1 km in length. The sample pipe material used should be suitable for the application and, where necessary, laid in conduit for physical protection.

Using the internal pump and sample conditioning components, each sample is presented to the gas detectors. The configuration of sample line sequence and the sampling times for each inlet are set in software during commissioning and stored on the PC. Up to 99 different configurations can be selected. A vacuum transducer monitors for flow fail conditions i.e. a blocked sample line.

The sample system contains up to four eight-way valve blocks, each valve is connected to a 10 mm sample inlet bulkhead compression fitting. The sample outlet from the valve blocks is fed through particulate and condensate filters with an automatic drain, through the pump and then a flow regulator. From the flowmeter it passes across the detectors and out to exhaust. A backing pump is also fitted which is used to present fresh samples at the manifold ready for sampling by the main system.

Field terminals are provided for connection of a mains supply, and system outputs. Optionally, up to 4 I/O modules can be fitted, each of which can either be a Relay Module or an Analogue Module. The Relay Modules are fitted with 4 DPCO 5 A and 4 SPCO 10 A relays. The Analogue Modules include 8 inputs and 2 outputs, all of which are 4-20 mA rated at 800 Ω maximum load at 24 V dc.

3.3 PC SYSTEM

An industrial PC complete with keyboard / mousepad, colour LCD display, 3.5” disk drive and CD-ROM is mounted on the front of the enclosure.

The PC itself is an AMD 500 and is supplied with Windows™ 98 operating systems. The PC system includes an interface control module for communicating with the detectors and other analogue devices, such as pressure transducers.

3.4 SOFTWARE

Software supplied with the system includes the Crowcon *GasScan* System, and *Symantec PC Anywhere* on those systems where a modem is fitted, this system software controls the operational characteristics of the system, signals alarms, creates databases and can communicate with remote PCs.

When configuring the system, the software allows the user to set the sampling sequence, sampling times and the scanning period. It also allows scheduling for automatic transfer of data to a remote PC.

The system accepts up to 11 analogue inputs via the control module (additional analogue inputs can be connected via analogue modules). As standard these would comprise the detector, the vacuum transducer (line blockage), and internal gas detector. The remaining inputs can be used for a combination of parameters such as atmospheric pressure or ambient temperature.

Data received from these transducers can be displayed in tabular, graphic or mimic format, the mimic can be produced by the user using *Paintbrush* or by Crowcon at an additional cost. In addition historical data is stored on the internal PC hard drive for up to 1 million data points. Each data point comprises readings from each of the analogue inputs plus a time and date stamp. Using the optional package of the modem and the *PC Anywhere* software, this data can be accessed from a remote PC either on demand or be programmed to automatically download at regular intervals. System alarms can also be logged and transmitted to the remote PC.

All logged data is available for transfer to almost all current spreadsheet packages using the `.CSV` (comma separated variable) file format, as well as being available to print direct to hard copy. A Browse application allows viewing of stored data and graphs, etc.

Also included as part of the software is a maintenance package that allows functions such as manual sampling and zero and calibration adjustments to be carried out.

4. TECHNICAL SPECIFICATION

Sample System	**Sample Lines:**	10mm o/d, 8mm i/d-reinforced nylon, (HDPE or PTFE or PVDF for reactive/absorbent gases), ideally installed in a protective pipe.
	Max. line length:	Up to 1 km
	Exhausts:	10 mm o/d compression fitting
	Drains:	6 mm o/d compression fitting
	Flashback arrestors:	90 μm, 1.6 mm thick, 303 stainless steel
Cabinet	**Overall dimensions:**	1000mm (H) x 800mm (W) x 400mm (D)
	Weight:	100 KGs (220 IBS)approximately
	Temperature range:	10 to 35°C (50 to 95°F)
Electrical	**Power:**	mains ac 50/60 Hz
	Current consumption:	Typically 2Amps AC
	Inputs/Outputs:	Any combination of Relay and Analogue Modules, up to a maximum of 4 Modules. Relay Modules contain 8 output relays - 4 x SPCO 10 A and 4 x DPCO 5 A. All contacts rated at 250 V ac, non-inductive load. Analogue modules contain 8 inputs and 2 outputs, all 4-20 mA, rated at 800 Ω maximum load at 24 V dc.
	PC system:	AMD 500 with an internally mounted 3.5" 1.44Mb disk drive, CD-ROM, 12.5" flat screen colour display, and keyboard / mouse-pad. Microsoft Windows™ 98 Crowcon GasScan suite, PC Anywhere (if modem fitted)

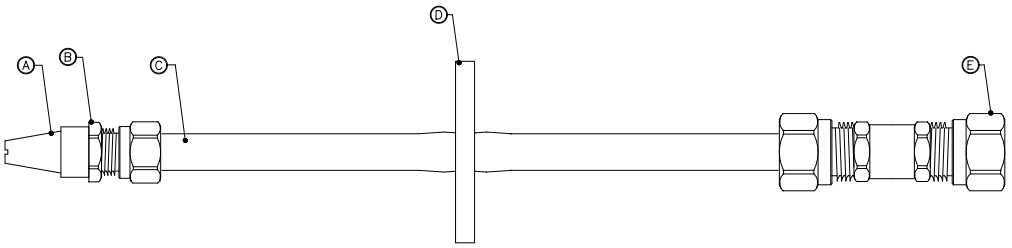
5. MECHANICAL INSTALLATION

Mechanical installation of the system is in three major parts:

1. Optional end of line probes
2. Sample pipes exhaust and drain lines
3. System cabinet

5.1 OPTIONAL END OF LINE BOREHOLE PROBES

These provide coarse particulate filtering and a water barrier to prevent dirt and moisture, being drawn into the sampling system. A typical arrangement is shown in the figure below. The filter assembly should, if possible be mounted facing downward to avoid ingress of rain, spray, etc. There is no limitation on the distance between the filter and the water barrier, however it is advisable to mount them as close as possible to minimise any accumulation of water in the pipe.



Stock Number	Part	Description
M02-190	A	Sinter Filter
M02-191	B	Compression Fitting
M04-326	C	10mm HDPE Tubing
M04-274	D	Water Barrier
M02-193	E	Compression Fitting

5.2 SAMPLE PIPES AND EXHAUST AND DRAIN LINES

The sample cabinet is supplied complete with a 10-mm compression fitting for each incoming sample line. All sample pipes should therefore be 10-mm o/d, 8 mm i/d. Pipe material should be suitable for the application, both in terms of the gas being sampled and the ambient atmosphere.

Maximum sample pipe length is 1 km. In any applications where the sample pipes are likely to be exposed, they should be installed in protective conduit, preferably metallic. Wherever possible, pipe lengths should be single pieces rather than joined. Joints are a potential leak source and can be particularly troublesome, especially when buried underground.

In applications where pipes, out of necessity, are joined or are back filled after laying, pressure testing should be undertaken prior to starting up the system to ensure that the pipes are not leaking or blocked.

Pipe runs should be designed with a minimum number of bends to reduce pressure drops. Piping manufacturers or suppliers should be contacted for information regarding minimum bend radii.

Each sample cabinet includes one or more sample exhaust connections, depending on the configuration of the system. Exhaust lines should be either returned to the process from which they were drawn, or vented to atmosphere. If the exhausts are to be vented to atmosphere, it is recommended to do so at high level and in a location that will not pose a gas exposure risk to plant or personnel. Exhausts use 10-mm compression fittings.

5.3 SYSTEM CABINET

The system enclosure contains the sample conditioning system, pumps and detectors. The actual configuration of the system will depend on the options specified at the time of purchase. This information is detailed in the Sampling System specification sheet, and on the drawings in Appendix B.

When installing the system, allow a minimum clearance of 0.5 metre underneath and either side of the enclosure for external connections and in order not to impede fan inlet and outlet plates.

6. ELECTRICAL INSTALLATION

All relay contacts are volt-free, rated for 5 A for DPCO relays and 10 A for SPCO relays at 250 V.

The main ac supply should be fed via a fused main spur. If an optional UPS has been supplied to power the PC in the event of an ac failure, suitable cabling will be supplied for interconnection to the sampling cabinet.

If a modem is fitted, it should be connected to a high integrity phone line. It must be a direct line, not via a switchboard.

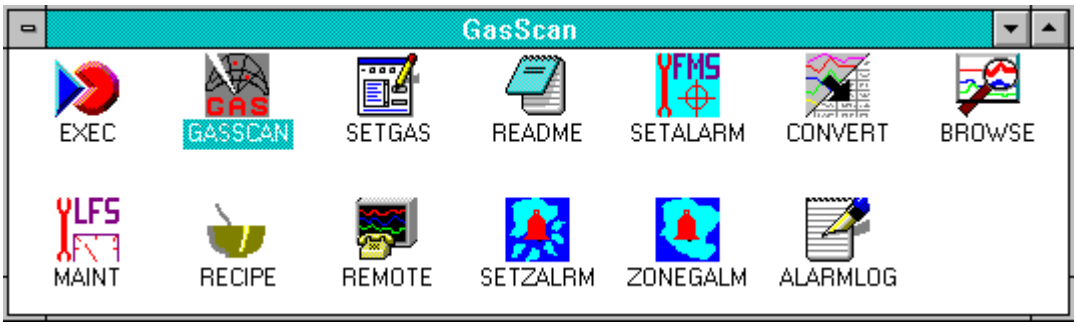
Note: Prior to switch on, check that all electrical connections are correct.

7. START-UP

Once all work detailed in Sections 4 and 5 have been carried out and power is applied, the system should be fully functioning. Configuration of the system was accomplished at the factory during the production and test phase of the system, and was set up to conform to the sampling system specification supplied with the system.

When powered up, the internal PC should automatically start Windows™ and open the *GasScan* program installed on the system.

The **GasScan** program group is shown below.



7.1 GASSCAN

This is the main operating program used for routine operation of the system. It is responsible for controlling, monitoring, displaying and logging functions on the system.

7.2 SETGAS

This module is used to set the configuration for the *GasScan* module. A new configuration file may be constructed, or an existing file modified. The settings for *GasScan* are entered via dialogue boxes and the file then saved. The name of the file that *GasScan* will use must be set in the `[gasscan.ini]` section of the `CROWCON.INI` file as `store-n=<name>.cfg`. See Appendix C for a full listing of system settings in the `CROWCON.INI` file. It is important that any changes are made to both the site and remote system (if applicable), to ensure both the system and analysis tools use the same data.

When supplied from the factory, the system will be loaded with a `.cfg` file developed from the information in the sampling system specification sheet. The filename, which it has been given, will be dependent on the customer, site details, etc., but only one `.cfg` file should exist.

To modify system parameters, double click on the **GasScan** group icon in **Program Manager**, then double click on the **SetGas** program icon. The following screen appears.

From the **Files** menu select **Open**. Select the one existing `.cfg` file and click OK. Selecting **Edit...** will allow the file to be modified. When the modifications have been made, selecting **Save** will overwrite the existing file, selecting **Save As...** will create a new file.

The menus are as follows:

Files menu includes the items as listed below:

New
Clears current settings from memory, ready to start a new configuration.

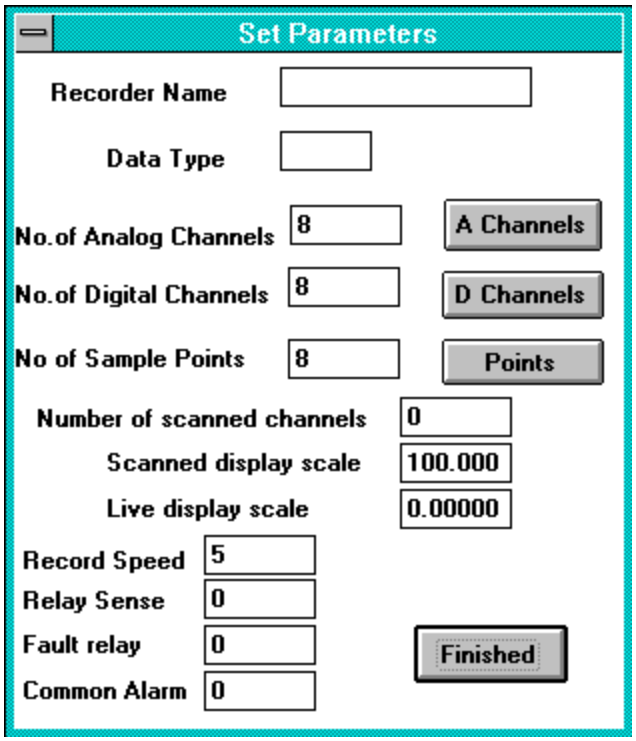
Open...
Allows existing configuration file to be loaded for inspection or modification. Files are saved as type `.cfg`.

Save
Saves settings using current file name. This will overwrite the file with any changes made. The changes will not take effect until the system is re-started.

Save As...
Allows the file to be saved with a different name. You may keep a large number of configurations, named differently, and use them when required by changing the current configuration file name in CROWCON.INI See system settings for more information.

Edit
Allows setting/changing values. This is where the setting of all parameters that guide the operation and display of the data recorder takes place.

The following **Set Parameters** dialogue box is produced, which sets elements that refer to the whole system.



Recorder Name is the name used in the display and in reports etc. to refer to the site.

Data Type is the legend used for the scale in graphs and tables (normally '%')

No of Channels is the number of physical data channels used by the system. The sampled channels only count ONCE. i.e. 3 sampled gases plus 5 auxiliary channels equals 8 channels.

Record Speed is the time between readings in seconds.(minimum 180 seconds)

Scanned display scale is the maximum scale value for the vertical axis in display graphs for the sample points.

Live display scale is the maximum scale value for the vertical axis in the live graph.

Number of scanned channels is the number of channels that will be interrogated from a different sample point each scan. E.g. if each sample point is used to monitor for methane, carbon dioxide and oxygen, the number entered will be three.

Number of Sample Points is the number of scanned points to be used from 1 to 32.

Relay Sense. The digital outputs that may be connected to alarms are factory defaulted to normally low. This operates the relays as normally de-energised. In this case the entry is zero. To change any channel to normally high (relay normally energised) a number must be put in this box. Calculate the required number using the following table.

Relay Number	Relay Sense Value
1	1
2	2
3	4
4	8
5	16
6	32
7	64
8	128

Example: If relays 1,4 and 5 are to operate normally energised, the value to enter is 1 + 8 + 16 = 25.

A Channels gives access to the analogue channel dialogue box shown on the next page.

D Channels gives access to the digital dialogue box shown later in this chapter.

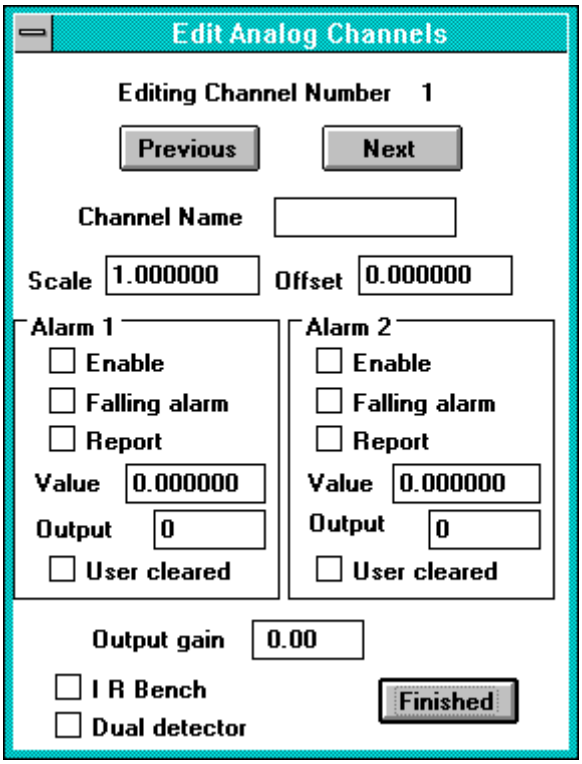
Sample Points gives access to the Sample Point dialogue box shown later in this chapter.

Finished terminates the edit session. Select this when all changes have been made.

Note: Remember to save any changes to a configuration file by using the Save option in the Files menu otherwise all changes will be lost when you exit the program.

7.2.1 Edit Analogue Channels

This allows the analogue input channels to be configured one at a time. The required channel is selected by means of the Previous and Next buttons. The selected channel is shown at the top.



Channel Name is that used in displays and reports.

Scale and **Offset** convert the physical value read from the converter into the appropriate readings. The general formulae are:

$$Scale = \frac{Maximum\ value\ for\ display\ scale}{Maximum\ input\ value\ -\ Minimum\ input\ value}$$

$$Offset\ =\ -\text{Minimum input value x } Scale$$

The *minimum input value* and *maximum input value* are expressed as values that are a proportion of 1000 (the actual input range is 1023, but for most purposes 1000 is accurate enough).

The *maximum value for display scale* is typically the full-scale range of the detector, e.g. for 0-50 PPM, enter 50.

Example: The channel needs to be set for 4-20 mA detector scaled 0-50 PPM.

$$Scale = \frac{50}{1000 - \left(\frac{4}{20} \times 1000\right)} = 0.0625$$

$$Offset = -200 \text{ x } 0.0625 = -12.5$$

Alarm 1 and **Alarm 2** groups set relevant elements of the alarms.

Enable activates the alarm

Falling alarm is only checked when the alarm is activated by a falling, rather than rising, gas concentration. Typically this is only normally required for oxygen deficiency alarms.

Report enters the alarm in the reportable alarms table.

Value sets alarm threshold values.

Output allocates the alarm to a specific relay, numbered from 1 to 8 on the relay module.

NOTE: Only two relay modules can be configured direct from *SetGas*. Up to two more relay modules can be used with each sampling cabinet, configuration for which is done using *ZoneAlarm*.

User cleared. When checked this will allow the user to reset the alarm while the alarm condition is still present. This is useful for audible outputs.

Output gain. This scales the analogue output from the channel so that the full-scale output from the transmitter corresponds to 20 mA. The value, with up to two decimal places, is determined by dividing 256 by the maximum value of the output.

Example: For a 0-50 PPM transmitter, the Output gain value should be set to 256 ÷ 50 = 5.12

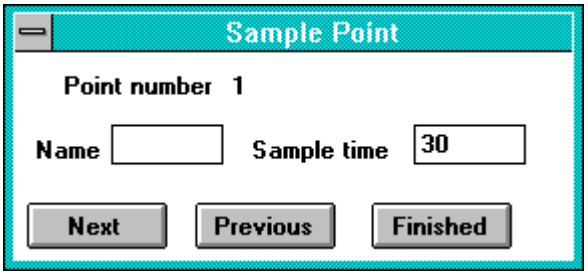
I R Bench is only ever checked if a Crowcon built infra red bench is installed as the detector on that channel.

Dual detector is only ever checked if two infra red detectors are installed in parallel for redundancy purposes.

Finished ends the setting of channels

7.2.2 Sample Point

The Sample Point dialogue box is follows:



Name allows the user to enter a four character descriptor that is used to define the sample point in reports and system configuration printouts.

Sample time defines the sampling time for that point in seconds.

NOTE:	**When setting sample times, due consideration should be given to factors such as transit time of the sample in the pipe (on systems where no backing pump is used) and the response time of the detectors.**

7.3 RECIPE

As well as performing a sequential reading program around the sampling points, a flexible pre-programmed sequence can be followed. Up to two hundred entries of the available sampling points, freely mixed, may be configured into a recipe. Up to 99 recipes can be available for operator selection.

7.3.1 Producing A Recipe

A recipe is made using a text editor (such as *Notepad*). The numbers of the sampling points required are entered, separated by commas, line feeds, spaces or other convenient symbol.

The contents will look like this:

`12,06,13,03,12,16,15,12,14,01,` etc.

The file is then saved as a `.txt` file with an appropriate name.

7.3.2 Installing A Recipe

A text file produced as above is installed as an available recipe as follows:

Start the *Recipe* application. Use **File Open...** to select the text file. The head of the window display will indicate the file in use. Select **File Save...** and save the recipe with a number between 1 and 99. This is the recipe number that the operator will select.

7.3.2.1 Recipe Errors

Recipe will not accept files with more than 200 entries and will truncate files that are longer. Entries outside the size of the sampling system will cause sample point 1 to be selected. Recipes should be held in the `GASSCAN` directory. Failure to locate a recipe will be reported by the system when an attempt is made to load it.

7.3.2.2 Restart

If *Recipe* was in operation when the system shutdown, the same recipe will be re-loaded when the system re-starts. The very first reading, however, may not match the first entry.

7.4 BROWSE

The *Browse* module is an off-line viewer of store files. It allows data gathered at another time and/or place to be viewed in the same form as originally recorded.

To access the *Browse* function double click on the **Browse** program icon. Menu functions are as follows:

File menu includes the two items as listed below:

Open Config...
Opens a configuration file (`.cfg`) that matches the store file to be browsed. The configuration file is that used by the system for its basic operating parameters. The store file (`.sav`) is where the historical data from the system is stored. Where installed, the mimic will also be loaded, if the name is the same as the configuration file.

Open Store
Opens the store file to be browsed.

To **Browse** any data select **Open Config...** from the **File** menu, then select the correct `.cfg` file. Select **Open Store...** from the **File** menu and select the `.sav` file with the same name as the selected `.cfg` file.

View
The **View** menu gives access to three of the four different formats in which the data may be displayed, as in the *GasScan* module. A scrollbar at the bottom of the screen allows moving forward and back through the recorded data. You may select a point in one display (extreme left of line in graphical display) and switch to another display to see the same point in another format.

The options within **View** are as follows:

Table
This is the default display and gives a ‘snapshot’ of the data at a particular reading. The scanned channels are displayed in columns at the left with sample points numbered down the left-hand side and channel names at the head of the columns.

Auxiliary inputs are named and shown in the columns on the right.

The scan rate and sample point that was being scanned are shown beneath the auxiliary inputs.

Live
This displays a line graph of the actual channels that were read. The auxiliary channels are a valid record of the values read. The sample point values are a 'mix' of all the sample point readings in scan order. The channel colours are shown at the left of the display, timing information at the bottom. A display of the value and time at the point being pointed to by the mouse are shown at the top.

Mimic
The mimic will be displayed for reference purposes, although no data will be included.

Sample
This produces a menu option for each sample point on the system. A graphic display appears similar to that given by the **Live** option, but showing the readings for only the selected point.

Display
The options within **Display** are as follows.

Update
This causes **Browse** to periodically check if the store file it is currently using has been added to.

Invert
Exchanges the graphical display between black or white background. This makes some traces more easily visible, and aids screen capture of graphs with some capture programs.

About
Gives current version information about the module.

7.5 CONVERT

This module performs two main functions:

Printing of data in tabular format.
Producing page(s) of data labelled at the column top with bore hole and gas names and in the first column with times. Units of measure, such as LEL or percentage, may be inserted.

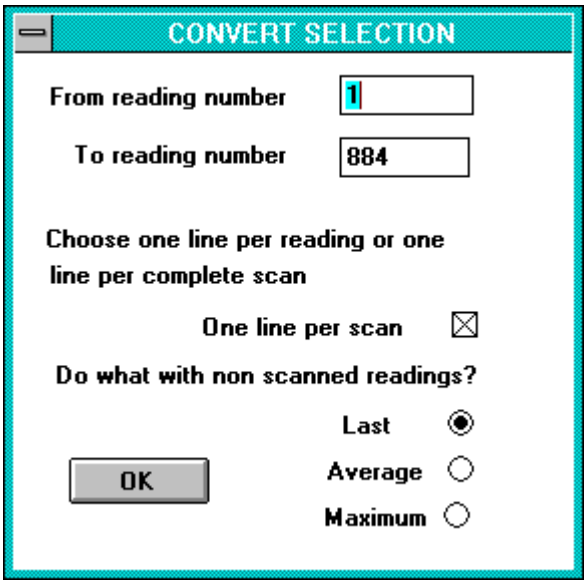
Conversion of data to spreadsheet format
Convert produces a `.csv` format file suitable for almost all spreadsheets. Headings are included and time converted to the common floating point representation. The normal sequence of operation with *Convert* is as follows.

Select **Open Config...** from the **File** menu and select the required file to convert. Click on the 

button

Select **Open Store...** from the **File** menu and select the conversion required. Click on the OK button

Convert
Selecting this option gives access to the conversion settings dialogue box, as below:



From reading number is the first reading of the block that will be converted.

To reading number is the last reading of the block that will be converted.

Both of the above settings are initially set to the whole of the file selected. They may be set to concentrate on a particular area of interest if so desired.

One line per scan gives one line (in the spreadsheet file or printout) for a complete set of bore holes. This gives all the sample point data in the most compact form. To produce one line per reading uncheck this box. If '**One line per scan**' is selected, then not all the data from auxiliary channels will be produced. Select how *Convert* should compress this data.

OK completes the selection.

NOTE: No data is produced until Print or Save As... is selected.

Save spreadsheet file OR **Print** results.

The options available within *Convert* are as follows.

File

Open Config...
Opens a configuration file (`.cfg`) that matches the store file to be converted.

Open Store...
Opens the store file (`.sav`) to be converted.

Save As...

Saves the data in spreadsheet format

Print
Prints the data in tabular form.

About
This displays current version information about the module.

8. ROUTINE MAINTENANCE

8.1 FILTERS

There are 4 types of filters used within the sample system:-

8.1.1 COALESCING FILTER

This filter performs two functions, firstly it collects any dirt/dust particles that may be in the gas sample and secondly it collects any water in the sample line. The water/dust mix collects in the bowl of the filter before being forced out of the filter during the purge/drain cycle. Minimal maintenance of this filter is required provided there are sufficient drain cycles, as it is self-cleaning. However, Crowcon recommends that the filter element is removed every 6 months, cleaned in warm water and allowed to dry before being re-assembled.

8.1.2 POLYCAP FILTER

This filter has a membrane fitted internally that forms a complete barrier to water but allows the gas sample to pass through. It is a disposable filter and will only need to be replaced when it is completely blocked, usually indicated by a discolouring of the internal membrane. A visual inspection on a 3 monthly basis should be sufficient.

8.1.3 ATMOSPHERIC FILTERS

These filters are fitted to the Purge and Calibration inlets and provide particulate filtration to protect the pump during purge or calibration. The filter elements should be inspected every 3 months and replaced every 6 months.

An early warning of filter elements becoming blocked is a visible reduction in the sample flow. The sample flow can be checked using the flowmeter mounted inside the sample system cabinet and the flow should be in the range of 500cc/min to 1000cc/min.

8.1.4 Cabinet Fan Filters

These square foam filters are fitted to the cabinet vent inlet, and fan outlet. The fan is required to regulate the internal temperature of the cabinet, by flowing air through via the vent inlet. The filters are fitted to prevent dust from being drawn into the cabinet. It is

essential that these filters are regularly replaced. If they become blocked by dust, the internal temperature of the cabinet will rise and the system PC may fail.

8.2 PUMP MAINTENANCE

The pumps used in this system are designed to require only minimal maintenance. They incorporate oil-less operation with permanently lubricated bearings and a long life Buna diaphragm with a Teflon liner. The Teflon liner protects the diaphragm from the corrosive effects of gases such as Hydrogen Sulphide. This liner should be inspected regularly and replaced if necessary. The pump is at risk if the sample system filters are breached, and then it is only likely that the pump diaphragm will be punctured. If this is the case the sample flow will reduce dramatically and the pump diaphragm will require inspection by removing four screws and the cover plate. Pump life is expected to be in excess of 2 years.

9. REMOTE CONTROL AND ALARM DIAL OUT

9.1 OVERVIEW

In the event of an alarm the system can be configured to dial out to a remote computer to inform of the event. This is achieved through a program called **Remote,** which runs on the sampling system and constantly monitors for the occurrence of an alarm. If an alarm is detected by Remote it will then proceed to dial the first of two numbers that can be set-up. This number would normally be a direct line (not through a switchboard) to a remote computer, which is running a program called **Monitor.** Monitor is a small program that can be minimised so that the computer can be used for other tasks. When Monitor receives a call from Remote it will automatically maximise and become the active window displaying a dialog box containing the alarm message. Once the message has been cleared the user can then call up the system using PcAnywhere for Windows and interrogate it to assess the degree of action necessary. Monitor keeps a record of alarms and the times that they were received in a file called alarmlog.txt. During a PcAnywhere remote control session it is also possible to transfer files to and from the system, this is especially useful for retrieving the systems data logs. The following sections describe the operation and requirements in greater detail.

9.2 HARDWARE REQUIREMENTS

The hardware required for alarm dial out and remote control is shown below. Crowcon would normally supply hardware for the sample system.

1. 386 SX or better IBM compatible computer.
2. 2 MB of RAM minimum.
3. 7 MB of free hard disk space.
4. Hayes compatible internal or external modem.

5. A direct BT telephone line (does not go through a switchboard).
6. One free serial communications port (must be either com1 or com2).

9.3 CONFIGURING REMOTE ALARM DIAL OUT

As described in the overview the system can be set-up to dial out to a remote computer to inform of alarms. The program responsible for instigating this is called **"Remote"** and is found in the GasScan Windows group with the icon shown above. This program runs only on the sample system itself and not on the remote computer. Normally the Remote icon would be copied into the Windows start-up group so that it is automatically loaded with Windows.

In order for Remote to operate correctly the following parameters need to be present in the Crowcon.ini file under the **[Remote]** heading. Crowcon.ini can be edited using Windows Notepad.

9.4 CROWCON.INI

[Remote]

Site = <*text*> This is the text that will appear on the remote computers screen and is normally the name of the site. A maximum of sixteen characters is allowed.

Modem = *n* Where n = the number of the COM port that the modem is to use (either 1 or 2).

Telephone = The first number that Remote is required to dial in the event of an alarm.

Tel2= The second number for Remote to dial if the first number is unobtainable. This is optional.

9.5 OPERATION

Remote will only dial out on alarms that are configured as reportable in the system Config file, (see the section on "SetGas" for more information). This means that the user can be selective about which alarms are reported remotely. In the event of a reportable alarm occurring Remote will dial out using the first telephone number and on a successful connection with the remote computer will transmit the message set by the **Site=** parameter in the Crowcon.ini file. The usual response from whoever is informed of the alarm would be to dial into the system using PcAnywhere for Windows in order to investigate the nature of the alarm and determine the course of action necessary. In the event that the first telephone number is unobtainable Remote will try five times and then repeat the dial out cycle using the second telephone number. If neither of these are successful then Remote will wait for one hour and then try again .In the event that a dial out fails to connect successfully to the remote computer then an error will be reported and displayed in the Remote window. The error codes and their meanings are shown below.

1	Communications line was in use by other software
2	Could not open communication port
3	Communication port setting error
4	Modem did not respond

5	No answer to call
6	No data request received
7	Data file not found
8	Next block request not received
9	End of data transfer not acknowledged

9.6 MONITOR CONFIGURATION

The **Monitor** program runs on the remote computer only, it should not be running on the sample system. The only parameter that needs to be set for Monitor is the COM port to use. The default COM port is com1 if com2 is required then place the following text in the **WIN.INI** file.

[Monitor]
Port=2

The **WIN.INI** file is found in the Windows directory and can be edited using Notepad or any text editor or word processor.

9.6.1 Operation

Monitor is a small windows program that runs on the remote computer. When it is active it monitors the serial port to which the modem is connected and on receiving an alarm message from the sample system it will maximise on the screen and display the alarm message. The user has to click the O.K box in order to accept the message. In addition to this a line will be written into a text file called alarmlog.txt this will include the name of the site and the date and time that the alarm was received as shown below.

Alarm Landfill Site on Fri Feb 28 10:32:47 1997
Alarm Landfill Site on Fri Feb 28 10:42:12 1997
Alarm Landfill Site on Fri Feb 28 10:49:10 1997

The text file Alarmlog.txt is found in the GasScan directory of the remote computer and can be viewed using Windows notepad or most word processors .

9.6.1.1 Controlling Monitor

Whilst Monitor is active the modem will be unavailable for use by any other software. Monitor has a control menu and this gives the option to suspend its operation allowing the COM port to be used by other software.
To suspend Monitor pull down the **Control** Menu and select **OFF,** the modem is now free to be used by other software such as PcAnywhere. To resume Monitors operation choose **On** from the control menu. When monitor is active **ON-AL** will be displayed on a red background in the monitor window. When Monitor is suspended **OFF** will be displayed on a green background.

9.7 SCREEN MESSAGES

A window containing text, up to approximately 10,000 words, can be triggered by any sample point alarm. Simply write a document using *Notepad* and save it in the `GASSCAN` directory with the name `opmess`*`NN`*`.txt` where *`NN`* is the number of the sample point (use leading zeros to make two characters e.g. sample point 3 is `opmess03.txt`). If any alarm for that sample point is triggered, the document will be displayed on the screen. This is ideal for giving instructions for non-technical staff.

Note:	**This is displayed at the end of the read cycle of the event triggering a new alarm, which may be up to two minutes after the display first shows that alarm. Care should be taken when using this feature, since the display of a large number of messages can consume system resources, slowing or even stopping the system. Messages should be closed after reading.**

9.8 PCANYWHERE FOR WINDOWS

For information on using PcAnywhere for Windows please refer to the PcAnywhere manual supplied with your copy of the software.

9.9 STORES FILES

If the `[gasscan]` section of the `crowcon.ini` file contains the message,

```
STOREDAYS=30
```

(and *Remote* is running) then files containing one month's data called `<name>.mth`, where `.mth` is the name of the month, will be created, and a new store file started. If the previous year's file is still there, then that file will be renamed to `OLD`*`nn`*`.mth` where *`nn`* is the year to which the data refers. If not removed, the `OLD`*`nn`*`.mth` will be overwritten the next year (two-year-old data). If *Remote* is not running then a file `<name>.str` will hold one month's data, and the `.SAV` file will hold all data after that.

10. COMMISSIONING AND SERVICE

Programmable Gas Sampling Systems are supplied factory calibrated and fully operationally checked, however Crowcon strongly recommend that gas sampling system installations are commissioned. Commissioning includes carrying out a full check of the equipment and its wiring as well as calibration and operation checks on all sample lines, ensuring that there are no leaks and that the system outputs are correctly configured to interface directly with any peripheral equipment.

Our Service department will also be pleased to advise on regular service and maintenance requirements and we can offer annual maintenance agreements.

11. TRAINING

Full system operating and calibration training can be arranged by our Service department. This can take the form of either on site training or a training seminar at our head office in Abingdon, Oxfordshire. Please contact our Service department for further details and a quote.

12. WARRANTY

Crowcon products are designed to give years of trouble-free life and our normal guarantee is one year. In the unlikely event of one of our systems failing within one year of delivery, and it is proved to be defective by reason of faulty workmanship or material we will repair and replace any faulty parts, free of charge, subject to our standard conditions below.

1. The guarantee will be rendered invalid if the system or any part of the system is found to have been altered, modified, dismantled or misused.

2. We accept no liability for consequential or indirect loss or damage arising and all liability in respect of any third party is expressly excluded.

3. The guarantee does not cover the accuracy of calibration after the system has been put into use if that calibration has not been undertaken by suitably trained personnel.

4. Our liability in respect of defective equipment shall be limited to the obligations set out in the guarantee and any further warranty, condition or statement, express or implied statutory or otherwise as to the merchantable quality of our equipment or its fitness for any particular purpose is excluded except as prohibited by statute. This guarantee shall not affect a consumer's statutory rights.

Appendix c: Spare Parts List

Description		Part Number
Pressure transducer		E01-422
Press Trans Bracket	PSS-2414-A4	M01-554
Flow Meter		M02-129
Flow Meter Bracket	FSA-1757-A4	M01-478
Non return Valve (Drain)		M04-641
3-Port Valve		E01-361
Solenoid Mounting Bracket	FSA-1756-A4	M01-477
Balston 914 Filter		M02-073
Balston 914Filter Element		M02-074
Polycap Filter	36 TF	M04-299
Coalescing Filter		M02-217
Coalescing Filter Element		M02-223
Sample Pump	230V	E01-478
Valve Block	8 Station	M02-259
Valve Block Driver Assy		S01-477
Industrial PC		E01-683
Keyboard / Mousepad		E01-750
Crowcon Power Supply	150W	E01-546
Relay Module		S01-476
Analogue Module		S01-580
Control Unit Assy		S01-474
End of line sample filter		M04-274

13. APPENDIX D: LIST OF ITEMS IN THE CROWCON.INI FILE

The `crowcon.ini` file contains a large number of parameters, which control the way in which the programmable gas sample system behaves. The listing of all the valid variables followed by the list of valid values and description is shown in the table below. These parameters should be located under the `[GasScan]` section of the file.

`Fastscan=1`
Enables the fast version of the software suitable for use with a backing pump.

`Mono=1`
Enables the monochrome display.

`Landfill=1`
Enables the *Landfill* name to be used for the program.

`purgecount=`n
Number of readings between purges.

`Purgetime=`nn
Time for purge cycle (minimum 60 seconds).

`Lineblow=`nn
Time for backpurge. This must be long enough to allow all lines to be purged.

`Watchdog=`n
n=1 enables the watchdog for the *Crowlog* Gasmonitor interface.
n=2 enables the watchdog for the *Eventlog* interface.

`Password=`xxxxxxxl
f this parameter is used *GasScan* cannot be closed without entering a password. Maximum length is 7 characters.

`Clamp=1`
Clamps analogue outputs if pressure transducer second alarm activates.

`Filesize=`n
Number of readings contained in store files. Maximum is 32000.

`Toggle=`n
Toggles between mimic and table displays at interval set by n seconds.

The following entries should be located under the `[Event]` section.

`LogTo=`n
n=1 Trigger remote alarming
n=2 Output to a parallel printer
n=3 Output to a serial port
n=4 Short form output to serial port
n=5 Output to text file (`EVENTLOG.TXT`)

Note: if data is to be sent to a printer via serial port 1, the line “printport=1” must be added to the `[Event]` section.

NOTES