Process Eye 1.6 Manual

SP104003 Rev 2.01
October 2000

As part of our continuous product improvement policy, we are always pleased to receive your comments and suggestions about how we should develop our product range. We believe that the manual is an important part of the product and would welcome your feedback particularly relating to any omissions or inaccuracies you may discover.

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Contents

Errata and addenda

19 Oct. 2000
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MKS Instruments name change only.

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Section 1.
Introducing Process Eye 1.6

This paper manual has been generated from the Process Eye 1.6 Help Manual reference LP105004 Rev 2.00 which is a paperless manual run on the Windows Help Viewer. Some of the formating has been changed but the text has not been altered, for this reason the section below makes little sense.

1.1. Process Eye 1.6 Help Manual

Document Title:	Process Eye 1.6 Help Manual
Document Reference:	LP105004
Current Issue:	Rev 2.00
Issue Date:	1 June 2000

We have always endeavoured to provide comprehensive and accurate manuals to accompany our entire range of instruments, using the most up to date Word Processing software to produce printed manuals. However, with evermore stringent standards in cleanrooms and laboratories the use of paper, even cleanroom paper, is at best frowned upon if not banned altogether.

This is a paperless form of the manual which was shipped with your software package and is based on the original manual:
LP101012 Rev 1.10
August 1998

1.2. Introduction

1.2.1. Process Eye 1.6

This manual has been written to accompany the Process Eye version 1.6 software package.
Process Eye 1.6 is designed to operate with Spectra Microvision Plus RGA control units and HPQ-2 instruments. It will not operate with any other control unit in the Spectra range.
Process Eye 1.6 will only run under the Windows 95 operating system, no other version of Windows is suitable.

1.2.2. Overview

The Process Eye package is designed to monitor partial pressures and, optionally, analog and digital inputs in a production environment where it is essential to observe and record the current status of the process, while simultaneously reviewing historical events in both the current and archived runs. In addition complex comparisons, including statistical comparisons, may be made in real time.

The data acquisition is fast and covers a wide dynamic range of pressures so that some or all of the partial pressures, along with analog and digital inputs, can be measured and stored while only data of interest is displayed.

The package is designed to be configured by the process engineer who can set up a number of pre-set configurations called "recipes" for various production requirements which can then be selected by an operator with a single *click* on a named button.

1.3. Getting Help

We are always pleased to provide assistance where we can. If you are experiencing any difficulties or need help please feel free to call your local Spectra facility and ask for the Customer Support Group. Please have the following information ready so that our technical staff may help you quickly and effectively:

the serial numbers of the analyser, Microvision Plus or HPQ-2 control unit; each of these numbers begins with the letters "LM"

the Process Eye software version number; this is written on the floppy disk which the software came on and can also be found on screen by selecting **Help | About** from the *menu bar* in the Process Eye - Select Mode window.

1.4. About This Manual

This manual was originally written to support version 1.60 Process Eye software, although, the information will be applicable to later 1.6 versions.

1.4.1. Text Conventions

As far as possible Process Eye uses a format and conventions common to other Windows software packages. The following text formatting conventions are used throughout this manual:

Italic type
Windows terms. You can refer to your Windows manual for more information

Bold type
names on buttons
names of file menus
Words or characters you should type. Example if the manual instructs you to type **cd spectra** you type the lowercase letters cd followed by a space and the lowercase letters spectra.
names within *dialog boxes*
names of keys on the keyboard

1.4.2. Keyboard Conventions

Function key names are written in uppercase letters. Example, the Control key is written **CTRL**, the Escape key **ESC**.

Where keys need to be pressed simultaneously the + sign is used. Example **ALT+F1** means hold down the **ALT** key while pressing the **F1** key.

Where keys are pressed in sequence commas are used. Example: **SPACE**, **C**, **D** would mean press the SPACEBAR then press C then press D.

Where one of the four arrow keys is referred to the appropriate symbol is used enclosed in parentheses. Example, up arrow is written (↑).

1.4.3. Mouse Conventions

Process Eye uses both left and right mouse buttons and we assume the mouse is configured in the standard manner.

Point
Position the mouse pointer so that it rests on the object to which you have been instructed to point.

Click

Press then immediately release the left mouse button without moving the mouse.

Double Click
Press then immediately release, press again then immediately release the left mouse button without moving the mouse.

Right click
Press then immediately release the right mouse button without moving the mouse.

Drag
Point to the object to be moved, press and hold down the left mouse button whilst moving the mouse to reposition the object.

1.5. Definitions

Below are descriptions of some of the common terms used in this manual.

Bar Graph
A histogram display of a scan measuring partial pressures for consecutive masses anywhere within in the mass range of the instrument.

Peak Jump
A histogram display of a scan measuring partial pressures for between one and fifteen non-consecutive masses. It may optionally include the measurement of analog and digital inputs.

Trend
This is a plot of the partial pressure, total pressure, analog input, digital input or user defined (Action) channel with time.

Scan Parameters
These refer to the fundamental scan settings and determine the range within which data will be acquired. It is not possible to view at any time data which does not fall within the Scan Parameter envelope. This includes masses, pressure ranges and duration of acquisition. The Scan Parameters are defined when a recipe is created (Added/Copied/Edited) and cannot be altered during a recipe run.

Start-up Options
There are some parameters which can automatically perform certain functions each time the process is run. The Start-up Options include:- waiting for a Trigger to become true, prompting the user before turning on the filament etc. They are defined when a recipe is created

(Added/Copied/Edited) and cannot be altered when the recipe is running.

Display Parameters

These parameters define how the scanned data is to be displayed. Default settings are defined when the recipe is created and they may be altered during the run. They include Axis type (Log/Lin), X and Y axis ranges time window in Trend etc.

Recipe

A Recipe consists of the Scan Parameters, start-up options and the Display Parameters.

Access Levels

This is the basis of the Process Eye security system which by using passwords allows three levels of access to the various features.

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Section 2.
Installation

2.1. Initial Checks

This section deals with installing and configuring the Process Eye 1.6 software and how to connect RGA control units to your PC. You should refer to the control unit manual for details of how to install the analyser into your vacuum chamber and how to connect up the analyser and control unit. Please follow each part of this section carefully and only skip those parts which do not specifically apply to your particular system. If you have any questions or experience any difficulties, please feel free to contact your local Spectra facility where help is available.

2.1.1. Unpacking

When you receive your equipment carefully check each item before removing the wrapping to ensure that no physical damage has occurred during shipment. Also make sure all items have been received by checking against the enclosed packing slip.

If there has been obvious damage during shipment or if there are items listed on the packing slip as shipped which are not in the box, immediately contact your local sales/service representative.

Most insurance claims for shipment damage must be placed within 7 days from the date of delivery - in **WRITING**. So don't delay **Check it out !!.**

The Process Eye 1.6 software is supplied on five High Density 3.5 inch floppy disks. The disks are shipped in clear plastic wallets held in the white, three ring manual binder. So, you should have found them on your way to this point in the manual.

2.1.2. Making backup disks

Before you do anything else you should generate backup disks from the program disks supplied. To do this use the MS-DOS DISKCOPY utility or Windows Explorer (or any other method you are familiar with) to make a copy of the original disks. Keep the original disks in a safe place and only

use the copies.

2.2. Overview

This section is designed to give an overall picture of the complete Process Eye system.

2.2.1. Instrument Architecture

The complete Process Eye 1.6 system has four basic elements:

Analyser
This is the part which fits into the vacuum chamber.

Control Unit
The Microvision Plus or HPQ-2 electronic unit containing the power supplies, including the RF power supply, and data acquisition system which plugs directly onto the analyser and connects to the PC via a serial cable

Control Unit Power Supply
An external mains power supply provides low voltage power to the Microvision Plus or HPQ-2 control unit, alternatively power may be provided by an RVC1A.

Computer
This is the PC which runs the Process Eye 1.6 software.

In this manual any references to the Microvision Plus control are equally applicable to the HPQ-2 control unit. Where there are differences these will be explained.

The minimum requirements for running Process Eye 1.6 with a single RGA control unit are listed in the table below. This is however only the minimum requirement and the overall performance of Windows 95 and hence Process Eye 1.6 can be improved considerably by increasing the specification of the PC. Multi-headed systems are likely to require a higher specification PC, please contact your local Spectra facility for advice.

Component	Description
Microprocessor	Pentium 100
RAM	16MB
Hard Disk	Required with at least 20MB of free space
Video	Standard VGA 640 x 480 16 colour
Microsoft Windows	Windows 95. True Type fonts installed.
Mouse	A mouse is required.
Serial Port	Required to connect the control unit to the PC.

2.3. PC to Control Unit Connection

The Microvision Plus control unit connects to the PC using a serial interface which may be RS232, RS422 or RS485.

2.3.1. RS232

CAUTION
You must only use RS232 cables supplied with the equipment. We cannot guarantee that other manufacturers cables will work correctly in Spectra RGA systems.

If you must use an RS232 cable not supplied with the equipment then use the cable supplied as an extension to your cable **ENSURING THE CABLE SUPPLIED WITH THE EQUIPMENT IS PLUGGED INTO THE PC.**

Most PCs are supplied with 2 serial ports called Com1 and Com2. The connectors for Com1 and Com2 are usually positioned on the rear of the PC and may be either 9-way or 25-way male D-type connectors. At the time of writing most PCs now seem to have a 9 way D-Type for Com1 and a 25 way D-Type for Com2. If you have a problem identifying these connectors you should refer to the documentation supplied with your PC or contact the PC manufacturer or distributor directly. Often Com1 is used to connect the mouse leaving Com2 free to connect peripheral devices. If a bus mouse is used both Com1 and Com2 will be free to connect peripheral devices.

If you are running a single Process Eye head you would normally use one of the standard serial ports (Com1 or Com2) on the PC. If they are both being used already then you will need to fit a 4 port serial card.

If you are configuring a two headed system then you can use the built-in ports Com1 and Com2 for the Process Eye control units if you are using a

bus mouse otherwise, you will need to fit a 4 port serial card.

If you are running three or more RGA heads you are going to have to fit at least one or maybe two 4 port serial cards in your PC.

If you do need to install a four port serial card you should do so now before proceeding to install the software. Once you have installed the 4 port serial card you will need to configure Windows 95 before you install the Process Eye 1.6 software, please see section Error! Reference source not found..

The PC to control unit connection is made using the serial cables supplied with the instrument. The standard cable to connect a Microvision Plus to the PC is a 9-way D plug to 9-way D socket RS232 cable and a 25-way D socket to 9-way D plug RS232 cable is available as an option. In all cases the standard cable length is 3 metres (9 feet) longer cables are available on request, please contact your local Spectra facility.

Once you have connected the PC to the Microvision Plus control unit(s) using the serial cable(s) make a note of the port(s) you have used, you will need this information later.

2.3.2. RS422

RS422 is a differential serial interface allowing greater transmission distance than RS232. If you are using RS422 you will need to use a 4 port serial card which has been configured for RS422 operation regardless of the number of Microvision Plus units being connected. The 4 port serial card used for RS422 is the same card used for RS232 BUT it is configured very differently. The RS422 serial cable is not the same as the RS232 cable and the two are not interchangeable.

The PC to RGA control unit connection is made using the RS422 serial cable supplied with the instrument. The RS422 cable to connect a Microvision Plus to the PC uses a 9-way D plug to 9-way D socket. Connect the 9 way D-plug to the 9 way D-socket labelled RS422 / 485 on the rear of the Microvision Plus. The standard cable length is 2 metres (6 feet) longer cables are available on request, please contact your local Spectra facility.

Once you have connected the PC to the Microvision Plus control unit(s) using the serial cable(s) make a note of the port(s) you have used, you will need this information later.

2.3.3. RS485

Process Eye 1.6 and Microvision Plus control units support multi-drop RS485 interface. With this system a theoretical maximum 30 Microvision Plus units may be daisy-chained together using RS485 cables and connected to a single RS485 port.

You must used an RS485 card supplied by Spectra, we cannot guarantee other manufacturers cards will work satisfactorily in Process Eye systems. you must use RS485 cables supplied by Spectra and these cables are not interchangeable with RS232 or RS422 cables. As more control units are added to the RS485 port the overall performance of the system will degrade since all data from all control units is multiplexed down a single cable. If you intend to connect more than 16 Microvision Plus control units to a single RS485 port please contact your local Spectra facility for advice.

The PC to Microvision Plus connection is made using the RS485 serial cable supplied with the instrument. The RS485 cable uses a 9-way D plug to 9-way D socket. Connect the 9 way D-socket to the 9 way D-plug on the interface card. Connect the other end of the cable to the 9 way D-socket labelled RS422 / 485 on the rear of the Microvision Plus.

Connect the second RS485 cable to the 9 way D-plug labelled RS422 / 485 on the rear of the first Microvision Plus. Connect the other end of the cable to the 9 way D-socket labelled RS422 / 485 on the rear of the second Microvision Plus. Carry on in this way until all the Microvison Plus units are connected. The last Microvision Plus unit will only have one RS485 cable connected to it.

The standard RS485 cable length is 2 metres (6 feet) longer cables are available on request, please contact your local Spectra facility.

The RS485 card will be supplied with its own manual and will be correctly configured for your system.

2.4. Four Port Serial Card

This section of the manual details the 4 port serial card which maybe supplied as part of systems using an RS232 or RS422 serial interface. This section does not apply to systems using RS485, such systems use a different type of serial interface card.

If you are using Com1 or Com2 you can skip this section.

2.4.1. Ports and Addresses

Before describing the 4 port serial card it is worth explaining a little about the physical address of a port and its logical name.

Each port is identified by a unique base address and an IRQ number which can be "shared" between ports. This information constitutes the physical address of a port and is configured on our 4 port serial card by setting jumpers. The possible settings for base address and IRQ selection are listed in the following tables.

Logical names take the form of COM1, COM2 etc. and are used by the PC as a short hand to refer to a physical address (base address and IRQ). In the IBM PC and compatible computers a traditional relationship exists for COM1 to COM4 which is shown in the table below. The relationship is not physically fixed and it is quite possible to change the physical address allocated to any of these logical names using software. In fact the Configure program supplied with Process Eye 1.6 allows you to do this and assign logical names to the 4 extra ports on our serial card.

Port	Address	IRQ
Com 1	03F8h to 03FFh	4
Com 2	02F8h to 02FFh	3
Com 3	03E8h to 03EFh	4
Com 4	02E8h to 02EFh	3

2.4.2. Card Description

The 4 port serial card (sometimes referred to as a Comms Card) has been designed to enable Spectra RGA control units to be connected to a PC for multi headed RGA applications. If you are installing a multi headed Process Eye system you will almost certainly need to fit a comms card in your PC. The card has been designed to provide either four RS232 or four RS422 ports. The configuration for the two interface standards is very different and the card will have been specifically setup for one or the other.

The majority of PCs have two built in serial ports, Com1 and Com2. Com1 is usually used to connect a mouse leaving Com2 free to connect an RGA control unit in single headed Process Eye system. If both Com1 and Com2 were being used a 4 port serial card would have to be fitted to run a single

head.

In two headed systems the control units will usually be connected to a 4 port serial card leaving Com1 for the mouse and Com2 free. If a bus mouse is used then it is possible to connect the two control units to Com1 and Com2 and not fit a serial card.

The 4 port serial card is a flexible serial interface board which may be set up in various configurations depending on the application. It should be supplied correctly configured for your application but before fitting the card it is worth checking the configuration. All the necessary information for configuring the card is given in the following section.

The 4 port serial card is populated according to the number of ports requested, one port is required for each control unit with four ports being available on a fully populated card. To determine how many ports are fitted look to see how many of the large 40 pin ICs (IC1, IC7, IC13, IC16) are fitted, one is required for each port. Also check that these ICs carry the identification PC16550DN or similar (only the numbers 16550 are important).

The 4 port serial card will have been set to the requested serial interface specification, RS232 or RS422. To check this, for RS422 IC5, IC9 and IC11 will not be fitted and links Lk1 to Lk8 will be fitted, otherwise, the board will be configured for RS232.

Also note the position of the connectors for the four ports on the serial card:

Port 1 PLG 5 mounted on the PCB closest to the edge connector
Port 2 PLG 4 mounted on the PCB furthest from the edge connector
Port 3 fitted to a flying lead connected to PLG 6 on the PCB
Port 4 fitted to a flying lead connected to PLG 2 on the PCB

2.4.3. Setting the physical address

The Physical Address is set by the three jumpers J8, J9 and J13. You should check against the following tables to ensure the required configuration is obtained.

Four setting options are available for the address decoding of the four ports. Jumper **J9** is used to select the required option:

BASE ADDRESS SELECTION (JUMPER J9)

J9	PORT 1	PORT2	PORT 3	PORT 4
no link	03F8	02F8	03E8	02E8
3 – 4	0280	0288	0290	0298
1 – 2	02A0	02A8	02B0	02B8
1 - 2 & 3 - 4	03E8	02E8	02A0	02A8

Note that there are 8 bytes per port.

Each of the four ports generates its own IRQ (interrupt request). Under normal circumstances the four IRQs are "ORed" together (something you cannot do with propietary serial cards) and connected to a single IRQ line. Jumper **J8** sets which IRQ line is selected. The table below shows the various options:

PORTS 1 to 4 IRQ SELECT

J8	IRQ
1 - 2	IRQ 3
3 - 4	IRQ 4
5 - 6	IRQ 5
7 - 8	IRQ 7
9 - 10	IRQ 2

The IRQ setting for Port 1 has the additional capability of connection to IRQ 4 or to the same IRQ as the other ports. This is governed by the setting of jumper **J13**:

PORT 1 IRQ SELECT J13

J13	IRQ
1 - 2	same as ports 2,3 and 4
2 - 3	IRQ 4

Jumpers: J1, J2, J3, J4, J5, J6, J7, J10, J11, J12, J14 & J15 control the handshaking lines for the various ports. The setting of these links should not be altered.

2.4.4. Choosing the configuration

The configuration you choose will depend on your PC as well as the number and type of peripheral devices you have connected. The two important things to note are:

you will have to allocate a Comms Port for each RGA control unit you want to connect

you need one IRQ for all the RGA control units connected (regardless of the number) but no other devices must use this IRQ.

The majority of PCs have two built in serial ports usually referred to as Com 1 and Com 2 and use addresses 03F8-03FF and 02F8-02FF respectively. The interrupt request lines used for Com 1 and Com 2 are IRQ4 and IRQ3 respectively.

Great care should be taken when selecting port numbers (Com1 to Com12) and IRQ lines since their use may vary from one type of "compatible" PC to another. Before fitting a 4 port serial card or attempting to install Process Eye you should be familiar with the configuration of your PC.

Our standard configuration for the 4 port serial card is:

J9	link 3 to 4	which sets
Port 1	address 0280 to 0287	
Port 2	address 0288 to 028F	
Port 3	address 0290 to 0297	
Port 4	address 0298 to 029F	
J13	link 1 to 2	which sets Port 1 to the same IRQ as Ports 2 to 4
J8	link 5 to 6	which selects IRQ 5 for the four Ports.

Unless you specified otherwise your serial card will have been supplied with the above configuration.

The serial card should be installed in accordance with the PC manufacturers instructions for the installation of plug-in cards. Note that you will need TWO free slots for each comms card.

2.5. Configuring Windows95

There is no software available for configuring serial cards under Windows 95. All the configuration can be done via the Windows95 control panel. Step 3 describes configuring one comm. port. For each card step 3 must be repeated upto 4 times (once for each port).

Select the 

icon from Control Panel.

At the first page in the Add New Hardware Wizard.....
click on the **Next>** button.

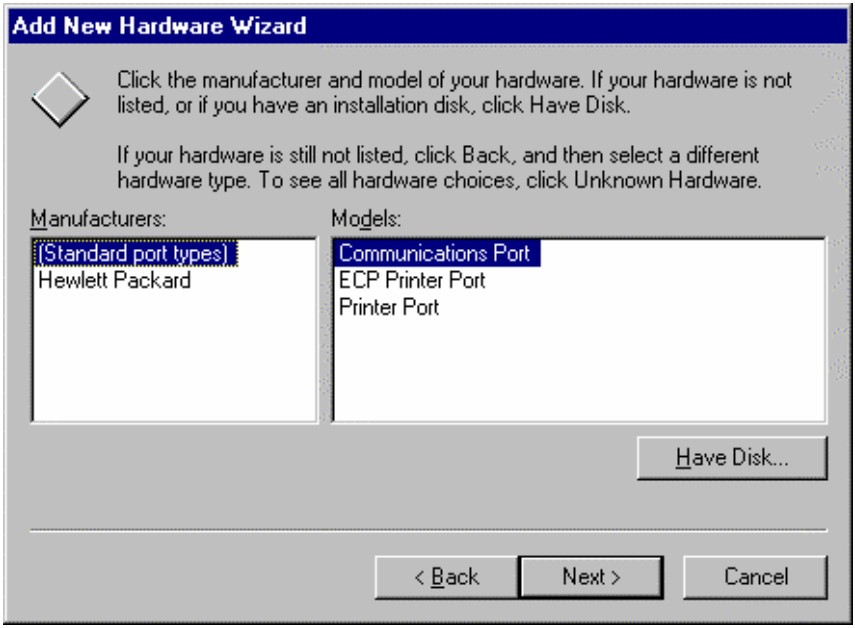
At the second page, select 'No' to the question 'Do you want Windows to search for your new hardware?'

and then select **Next>.**

At the third page select Ports (COM & LPT)

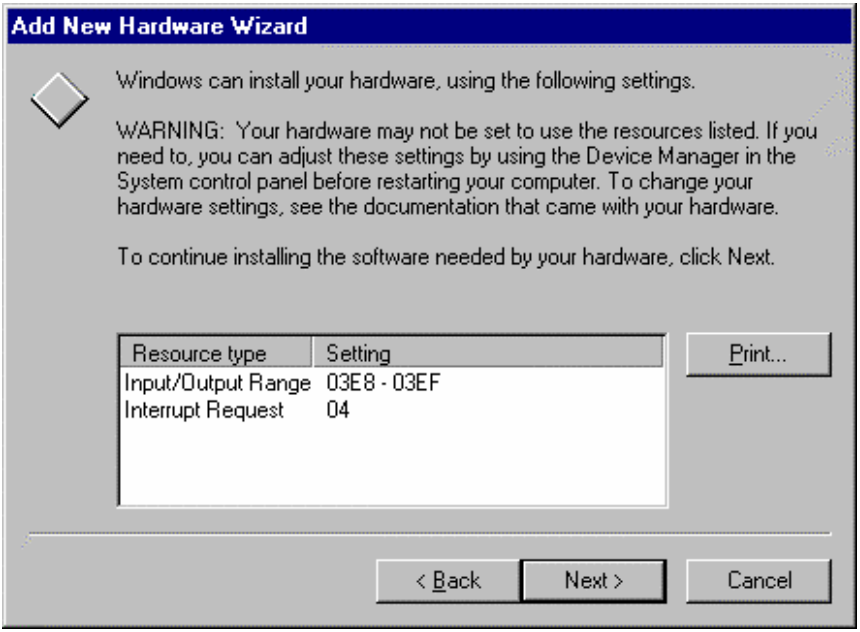
as the type of hardware to install, and then *click* on the **Next>** button.

At the fourth page, select (Standard port types) for the Manufacturer and Communications Port for the Model



and then select **Next>.**

At the fifth page Windows will come up with some likely hardware settings for the new port, these will most likely be wrong but at this stage they cannot be changed.

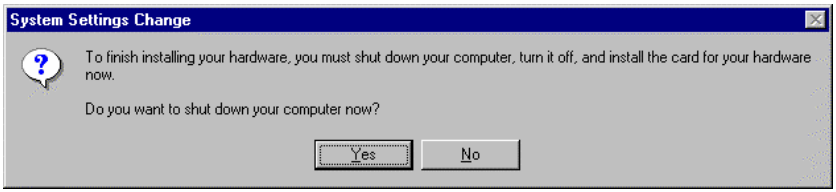


Just select **Next>** to accept the settings.

At the sixth and final page...

click on the **Finish** button.

You will see the following message;



Select **No** so that the machine does not re-boot.

Repeat the above steps for each comm. port that you want to add.

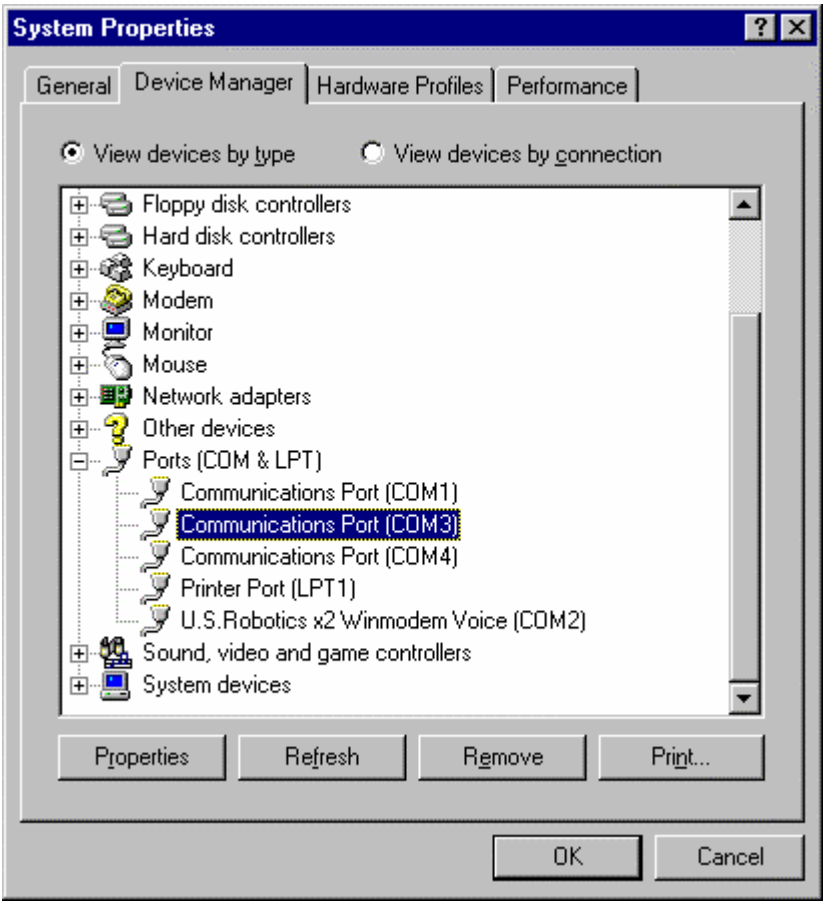
Once all the ports are added, all that remains is to configure the correct settings.

Select the 

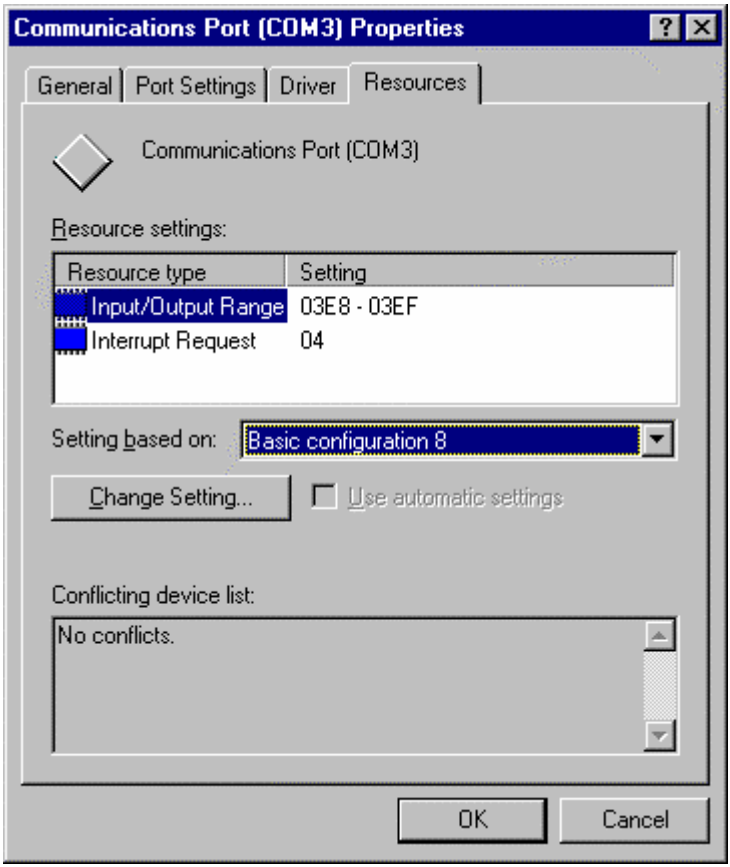
icon from Control Panel

Select the Device Manager tab at the top of the window and then expand the Ports (COM & LPT) branch by *clicking* on the + sign....

For each comm. port that you added in the previous steps, select it and carry out the following steps.

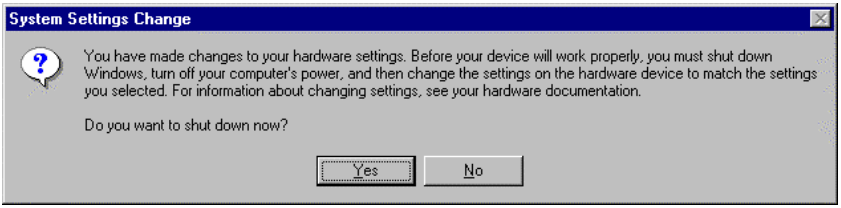


Click on the **Properties** button and select the Resources tab at the top of the window...



Change the **Setting based on:** setting to 'Basic configuration 8'. Once this is done you will be able to change the Input/Output Range (Base address) and Interrupt Request (IRQ) settings by *double clicking* them and selecting the appropriate values for the configuration of your comms card.

When the settings are correct, *click* the **OK** button. The following message will appear :



If you still have more ports to configure then choose **No** and repeat the steps above. If it is the last port left to configure then you can select **Yes** and the machine will shut down.

As long as the settings on the card match the settings that you have entered, when you reboot the ports will work **OK**.

2.6. Installing Process Eye

Versions of Process Eye 1.6 exist for both Windows 95 and Windows NT. Versions are not interchangeable and you must have the correct one for your operating system. Please refer to the relevant help topic.
Installation 95
Installation NT

2.7. Installation 95

Before installing the Process Eye software you should ensure that any serial cards required are installed in the PC and configured to run under Windows 95.

2.7.1. Running INSTALL

The SETUP.EXE program is included on program disk 1and should be used to install Process Eye onto your hard disk. To install Process Eye follow the procedure listed below:

Run up Windows

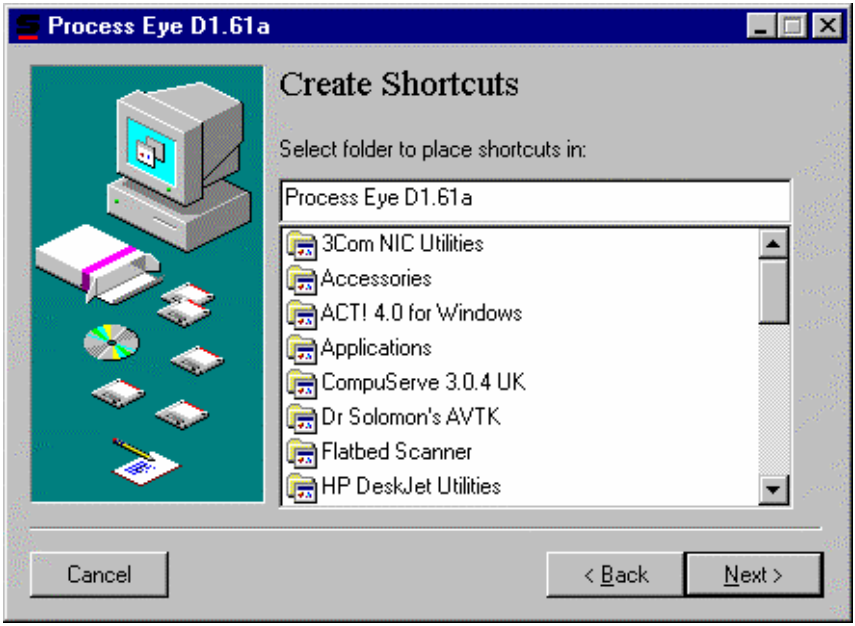
Insert program disk 1 in drive A (or B if you prefer)

Choose **Run …** from the Start Menu available by *clicking* on the Start button on the Taskbar.

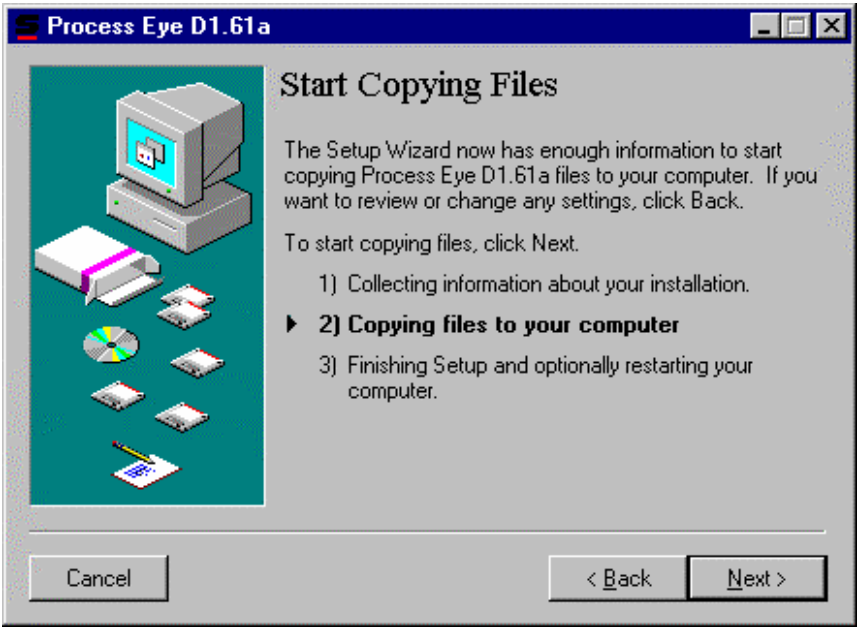
Type **a:setup** (or **b:setup** if you are using the B drive) or use the **Browse …** button to select the file SETUP.EXE

The first page of the Process Eye Setup Wizard will be displayed. Read the instructions and when you are ready *click* on the **Next>** button.

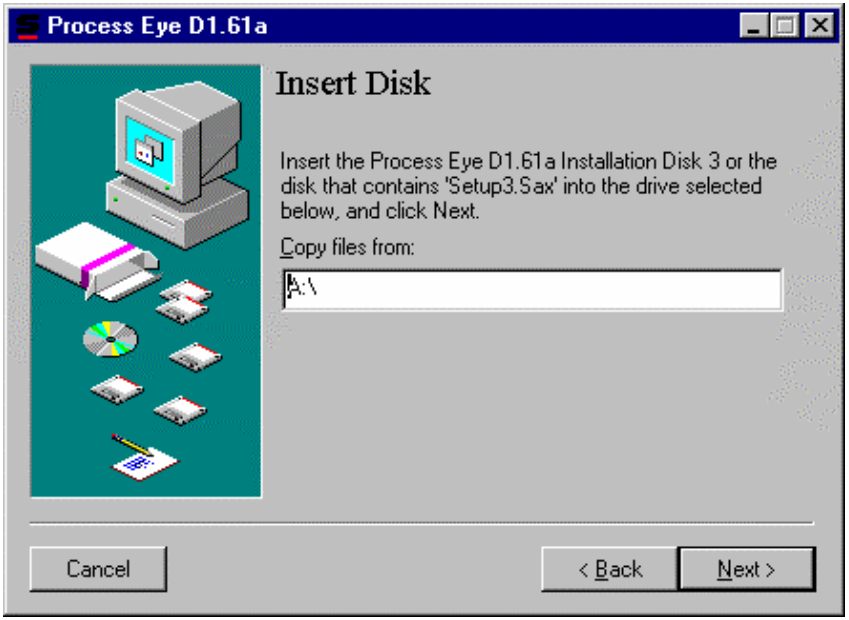
The second page of the Process Eye Setup Wizard will be displayed where you may specify the directory in which to install the Process Eye software. We strongly recommend you to use the default setting of C:\Program Files\Spectra\Process Eye. When you are ready *click* on the **Next>** button.



The third page of the Process Eye Setup Wizard will be displayed where you may specify the folder in which to place the Process Eye shortcuts. We strongly recommend you to use thje default setting of Process Eye D1.6xx. When you are ready *click* on the **Next>** button.



The fourth page of the setup wizard will be displayed after you have read the instructions click on the Next> button to begin installing the Process Eye software.



You will be prompted by the Insert Disk *dialog box* to use the other program disks. It is possible that you will not be required to use all five disks.

When the installation is complete the Configure *dialog box* will be displayed. Before you can use Process Eye the configuration procedure described in section Configuring Process Eye must be completed. You may wish to configure Process Eye at this stage in which case follow the instructions in the next section or close the Configuration window by *clicking* on the **Exit** button.

The final page of the setup wizard will be displayed. *Click* on the **Finish** button.

2.8. Installation NT

This Help Topic is a copy of the document LP103021 Rev 1.00 19 November 1998 titled Process Eye 1.61 for Windows NT Manual Supplement.

This section should only be used if you are installing Process Eye version 1.61 or later on a Windows NT computer.
This manual must be used in conjunction with the main Process Eye 1.6 Manual reference LP101012 Rev 1.10 or later. The information in this manual supplement replaces section 2.5 in the main manual.

2.8.1. System requirements

Process Eye V1.61 is designed for Windows NT 4.0 and either SP3 or SP4 must be installed.

A Pentium class IBM compatible PC with 32MB of RAM is recommended.

2.8.2. Before you install

To perform an installation you must be logged on with Administrator rights. If you are not then log off and log back on as an Administrator. When Process Eye for NT has been installed it may be operated by any user. We recommend creating a user with minimum permissions called “RGAUser” (without the quotes) and a blank password.

You must use “Custom” installation if the PCs serial ports are not to be used exclusively by the RGA(s) or if PC based Analog or Digital input/output is required.

The PC must be rebooted before communications may be established with an RGA (the Config program may be used to set Ports and Instruments but the "Connect" function will not work until the PC has been rebooted.) The install program will offer to reboot the PC at the end of the install.

Before installing the Process Eye software you should ensure that any serial cards required are installed in the PC and configured to run under Windows NT.

2.8.3. Running INSTALL

The SETUP.EXE program is included on program disk 1and should be used to install Process Eye onto your hard disk. To install Process Eye follow the procedure listed below:

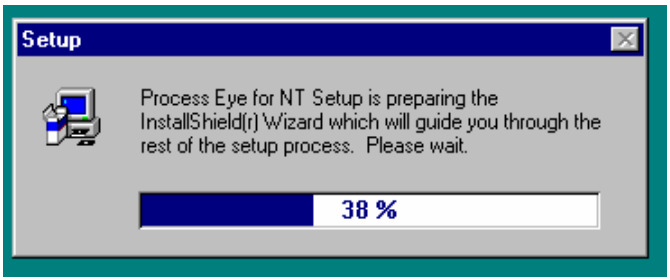
1 Run up Windows NT

2 Insert program disk 1 in drive A (or B if you prefer)

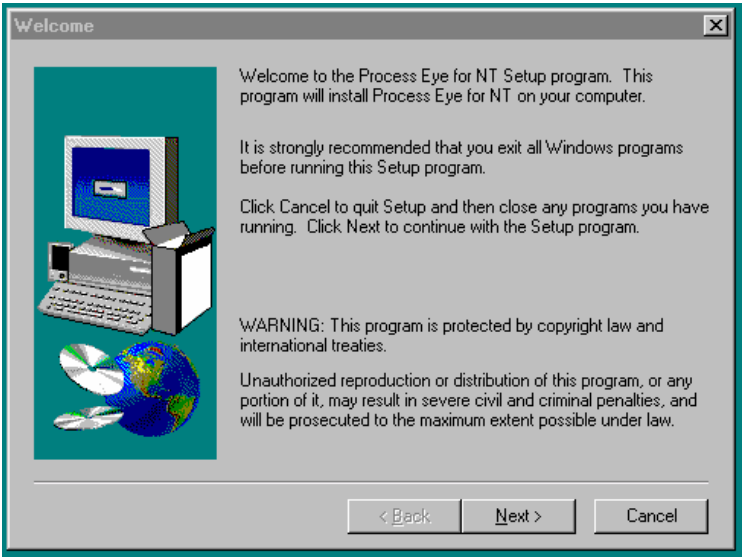
3 Choose **Run …** from the Start Menu available by *clicking* on the Start button on the Taskbar.

4 Type **a:setup** (or **b:setup** if you are using the B drive) or use the **Browse …** button to select the file SETUP.EXE

The first window in the Process Eye Setup Wizard will be displayed as shown in below.

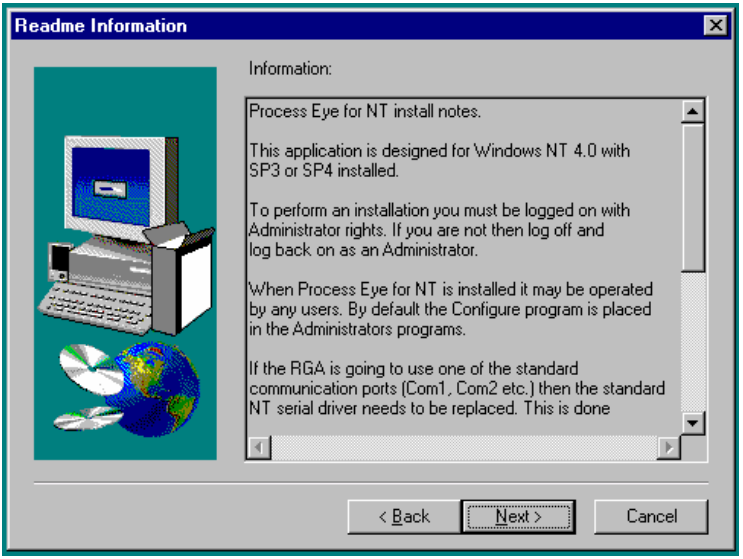


5. Once the InstallSheild wizard has been loaded the second window will be displayed as shown below.



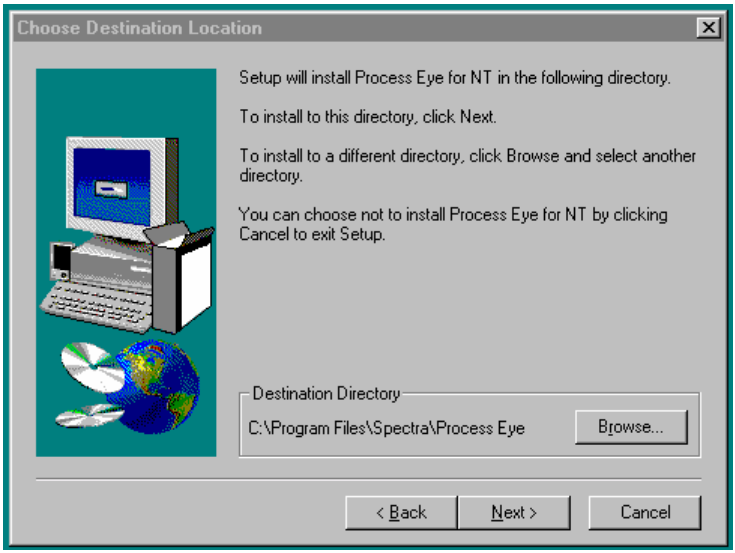
Read the instructions then *click* on the **Next>** button.

6. The third window in the Process Eye Setup Wizard will be displayed as shown in below.

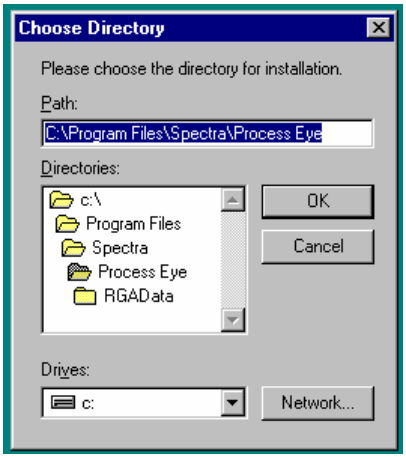


Read the installation notes carefully. If your system meets the requirements specified in the notes *click* on the **Next>** button to continue.

7. The fourth window (shown below) in the setup allows you to specify the directory where the Process Eye software will be stored.

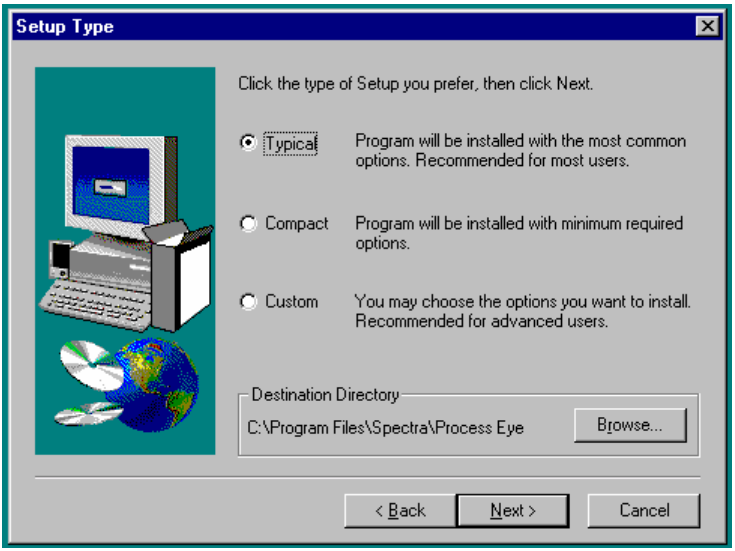


Click on the **Browse …** to open a standard Choose Directory window.



We recommend you to use the default directory C:\Program Files\Spectra\Process Eye

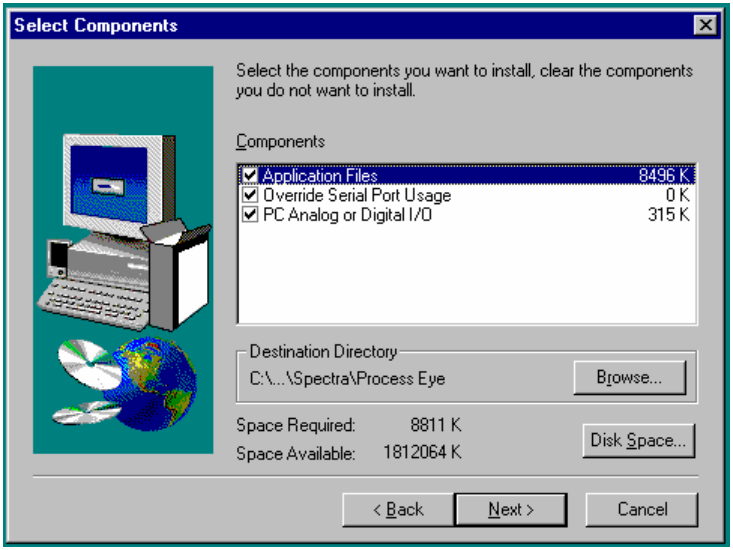
8. The fifth window shown below allows you to choose the type of installation you wish to perform.



Use “Custom” installation if the PCs serial ports are not to be used exclusively by the RGA(s) or if PC based Analog or Digital input/output is required otherwise, use the Typical install.

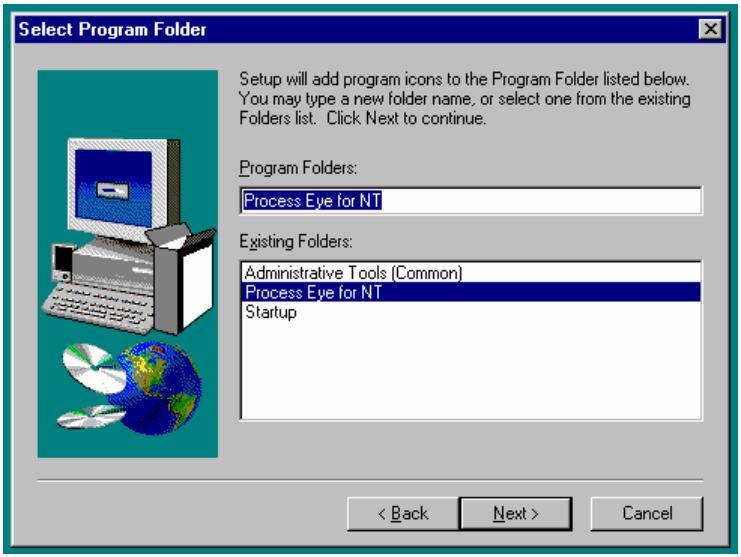
Click on the **Next>** button to display the Select Program Folder window. If you choose Custom install the Select Components window will be displayed as shown below.

If you have installed a Leda comms. card or an RS485 card un-check the Override Serial Port Usage check box.



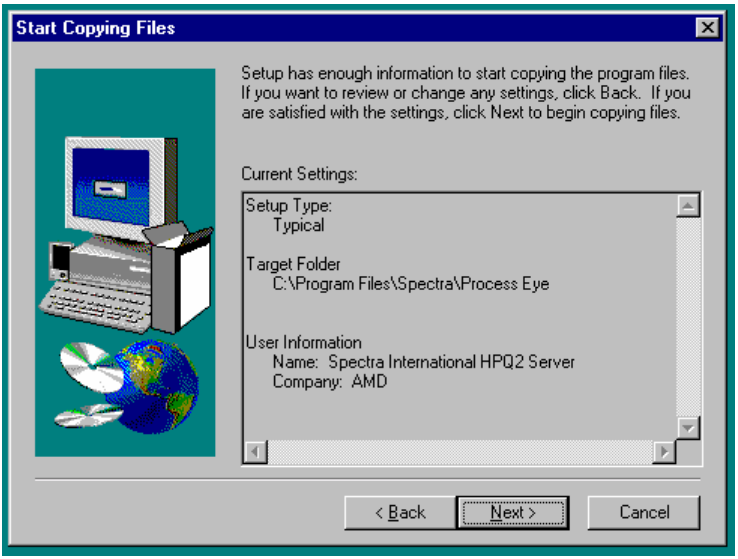
Click on the **Next>** button.

9. The Select Program Folder window allows you to change the name of the folder where Process Eye will be stored. The default setting is Process Eye for NT which we recommend you keep.



Click on the **Next>** button.

The last window of the setup will be displayed. The current setting will be shown which you may check. *Click* on the **Next>** button to continue.



You will be prompted to insert disks 2, 3 and 4 at the appropriate time.

Once the install is complete the Configure *dialog box* will be displayed. Follow the instructions in the main Process Eye manual.

You will be prompted to re-boot the PC to complete the installation when you close the Configure *dialog box*.

2.8.4. Serial port usage

Serial port usage under Windows NT is a little more complex than under Windows 3.1 or 95. If the RGA is going to use one of the standard communication ports (Com1, Com2 etc.) then the NT serial driver needs to be replaced. This is done automatically in the "Typical" and "Compact" installations. With the NT serial driver replaced by our own nothing except the RGA, e.g. a serial mouse can use the ports.

The "Custom" install allows the option to leave the standard serial ports under NT's control. If this is selected the RGA(s) must be connected either via non-standard RS232 communication port(s) such as the “Leda Comms” Card or via an RS485 card.

2.8.5. PC based analog and digital I/O

If PC based Analog or Digital I/O is required the "Custom" install option must be used and the "PC Based Analog or Digital I/O" option checked.

Any Macro using PeekPort and/or PokePort must be modified. The declaration of PeekPort and/or PokePort must be deleted and any references to PeekPort and/or PokePort replaced by references to NTPeekPort and NTPokePort respectively.

2.9. Configuring Process Eye

Before you can use Process Eye the system must be configured. The configuration program is a utility program that allow several important functions to be performed. Since it should not be necessary to use these functions regularly they have been kept separate from the Process Eye application. It is likely that these functions will only be used by a system administrator for installation, diagnosing and upgrading the system.

The configuration program allows you to easily perform the steps required to configure the RGA for use on your PC. It is necessary to configure the Process Eye software so that it is aware of the type and details of the serial interface which is to be used to communicate with the MicroVision Plus control unit. It also allows you to connect to a control unit and see the version numbers and title of the firmware running in the control unit. This is useful for testing that you have correctly configured the system. A download facility is also included which allows a new version of the firmware to be loaded if an upgrade is required.

The firmware in the control unit is comprised of two parts; the Core and the Application. The core is basically a simple operating system which provides basic services to the application. Under normal circumstances the core should not need upgrading. The application may change in the future if new features are added.

If you have purchased either a 4 port RS232 or 2 port RS485 card with your system then the software will automatically be configured to use the factory default settings for the type of card purchased. You should only need to alter these settings if they conflict with other hardware installed in your PC.

There are two parts to the configuration. The first is to select the serial port to be used and then to assign one or more MicroVision Plus control units to that port. If you are using a RS232 or RS422 serial port then you can only assign one control unit to it. However, if you are using the multi-drop RS485 then you may assign up to the theoretical maximum of 30 control units.

Note: As more control units are added to the RS485 port the overall performance of the system will degrade since all data from all control units is multiplexed down a single cable. When control units are added to a port the option to create shortcuts is available. Shortcuts may be added to the Desktop, to the start menu and to the program group.

As part of the RGA Process V1.60 installation process the Configure program will be run. It will also be installed and an shortcut created so that it may be run at any time in the future. The program file CONFIG.EXE will be copied into the install directory for Process Eye.

The following sections describe various standard Process Eye systems and are intended to allow the user to quickly configure their system. A more detailed explanation of the configure utility can be found in Detailed Configuration .

2.9.1. Quick Start

The following sections list the instructions for the various installation options. Choose the section that describes your installation and then follow the instructions listed. Perform each step in the order listed unless the instructions indicate otherwise.

During this process you may need to know the serial numbers of all the Microvision Plus control units and to which serial port they are connected. If you are performing a custom configuration you will also need to know the serial port's IRQ and base address. These settings can be obtained by checking the serial cards physical configuration (Jumper and/or Switch settings) against the documentation provided with the Serial card.

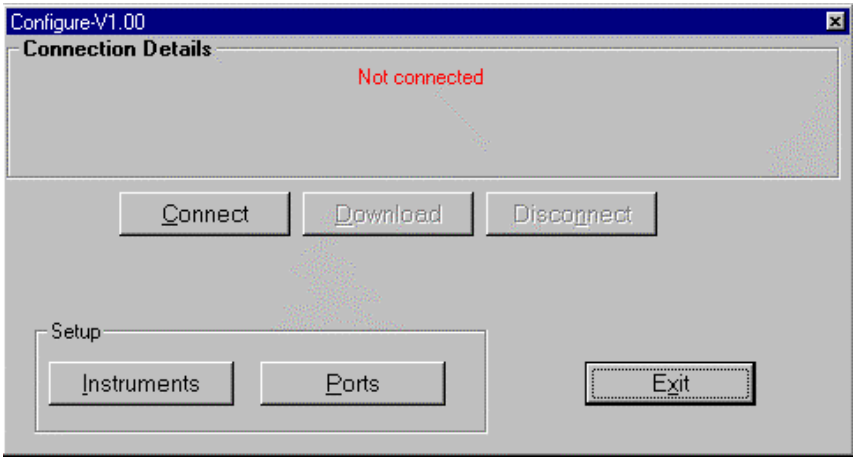
The following instructions assume that the Process Eye software has been installed using the default sub-directory and program group. If you installed it in a different location then substitute the appropriate sub-directory and group names were necessary.

One Microvision Plus
Two Microvision Plus Units
One Microvision Plus using RS485
Microvision Plus with a Comms Card

2.9.2. One Microvision Plus

The following instructions describe the installation of a single Microvision Plus control unit using one of the standard PC RS232 comms ports, Com1 or Com2.

Step 1
If Configure is not already running, start Configure from the Start menu. Configure should be located in **Start | Programs | Process Eye V1.61**



Step 2
Click on the **Ports** button in the Setup Panel. If RGAPort1 is listed proceed to step 4

Step 3
Click on the **Add** button. In the Name field type **RGAPort1** then *click* on

the **OK** button. It is essential that the name begin RGAPort.

Step 4
Click on the **Edit** button. Select either Standard Com1 or Standard Com2 as required from the Serial Port list box.

Step 5
Click on the **OK** button, then *click* on the **Close** button.

Step 6
Click on the **Instruments** button in the Setup panel. If the Instrument panel contains the serial number of your Microvision Plus then proceed to step 7a otherwise proceed to 7b

Step 7a
Highlight the serial number by *clicking* on it.
Click on the **Edit** button.
Enter a meaningful name in the Name (optional) field. Note this is the name that will appear on the Shortcut used to run up this head. If it is left blank then the serial number will be used. Typically this will be a tool or chamber number.
Check the required boxes in the **Create shortcut in** panel. Shortcuts to run the selected Microvision Plus can be placed in the 3 locations listed. We recommend that they should be created on the Desk top, in the Start menu and in the program group.

Click the **OK** button.

Proceed with step 8

Step 7b
Click on the **Add** button.

Enter the full serial number of the next MicroVision Plus e.g. LM70-00197001 in the Serial number field.

Enter a meaningful name in the Name (optional) field. Note this is the name that will appear on the Shortcut used to run up this head. If it is left blank then the serial number will be used. Typically this will be a tool or chamber number.

Check the required boxes in the Create shortcut in panel. Shortcuts to run the selected Microvision Plus can be placed in the 3 locations listed. We recommend that they should be created on the Desk top, in the Start menu and in the program group.

Click on the **OK** button.

Step 8
Click on the **Close** button.

Step 9
This step is optional and can be performed at a later stage if required. Proceed to step 11 to omit the test.

If you have the Microvision Plus connected and powered up then you can check that you can communicate with it by following these instructions.:-

Click on the **Connect** button.

Select (*click*) the serial number of the Microvision Plus to test from the Instruments panel.

Click on the **OK** button.

After a few seconds the Connect form will unload and the Connection details panel on the Configure form will indicate if the connection was successful. If a connection could be made then details about the Core and Application version will be displayed.

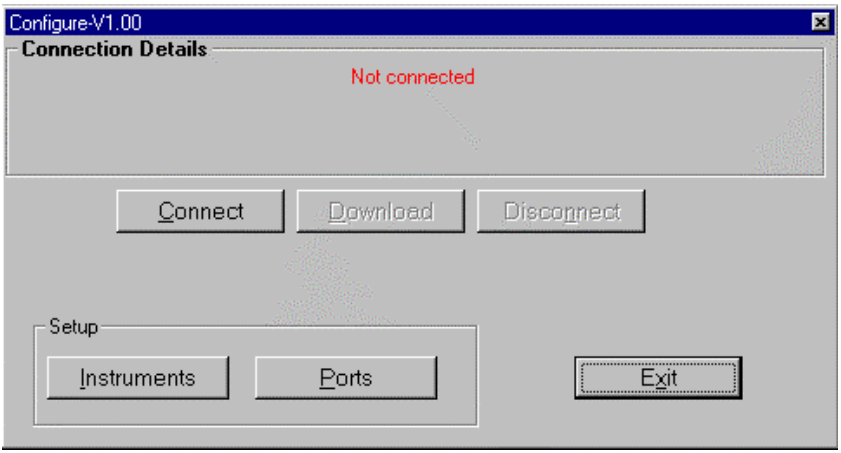
Step 10
Click on the **Disconnect** button.

Step 11
Click on the **Exit** button to close the configure program. The Process Eye software has now been configured for the Microvision Plus available

2.9.3. Two Microvision Plus Units

The following instructions describe the installation of two Microvision Plus control units using the standard PC RS232 comms ports, Com1 or Com2. Com1 and Com2 must be free which usually necessitates using a bus mouse.

Step 1
If Configure is not already running, start Configure from the Start menu. Configure should be located in **Start | Programs | Process Eye V1.61.** The Configure window will be shown.



Step 2
Click on the **Ports** button in the Setup Panel. If RGAPort1 and RGAPort2 are listed proceed to step 4

Step 3
Click on the **Add** button. In the Name field type **RGAPort1** then *click* on the **OK** button.
Click on the **Add** button. In the Name field type **RGAPort2** then *click* on the **OK** button.

Step 4
Select RGAPort1 in the Ports panel.
Click on the **Edit** button. Select Standard Com1 for RGAPort1 from the Serial Port list box.
Click on the **OK** button.
Select RGAPort2 in the Ports panel.
Click on the **Edit** button. Select Standard Com2 for RGAPort2 from the Serial Port list box.
Click on the **OK** button.

Step 5

Click on the **Close** button.

Step 6
Click on the **Instruments** button in the Setup panel. Select RGAPort1 from the Ports panel. If the Instrument panel contains the serial number of the Microvision Plus connected to that port then proceed to step 7a otherwise proceed to 7b

Step 7a
Highlight the serial number by *clicking* on it.
Click on the **Edit** button.

Enter a meaningful name in the Name (optional) field. Note this is the name that will appear on the Shortcut used to run up this head. If it is left blank then the serial number will be used. Typically this will be a tool or chamber number.

Check the required boxes in the **Create shortcut in** panel. Shortcuts to run the selected Microvision Plus can be placed in the 3 locations listed. We recommend that they should be created on the Desk top, in the Start menu and in the program group.

Click the **OK** button.

Proceed with step 8

Step 7b
Click on the **Add** button.

Enter the full serial number of the next MicroVision Plus e.g. LM70-00197001 in the Serial number field.

Enter a meaningful name in the Name (optional) field. Note this is the name that will appear on the Shortcut used to run up this head. If it is left blank then the serial number will be used. Typically this will be a tool or chamber number.

Check the required boxes in the Create shortcut in panel. Shortcuts to run the selected Microvision Plus can be placed in the 3 locations listed. We recommend that they should be created on the Desk top, in the Start menu and in the program group.

Click on the **OK** button.

Step 8
Repeat steps 7 and 8 for RGAPort2.
Click on the **Close** button.

Step 9
This step is optional and can be performed at a later stage if required. Proceed to step 11 to omit the test.

If you have the Microvision Plus connected and powered up then you can check that you can communicate with it by following these instructions.:-

Click on the **Connect** button.

Select RGAPort1from the Ports panel.

Select the serial number of the Microvision Plus to test from the Instruments panel.

Click on the **OK** button.

After a few seconds the Connect form will unload and the Connection details panel on the Configure form will indicate if the connection was successful. If a connection could be made then details about the Core and Application version will be displayed.

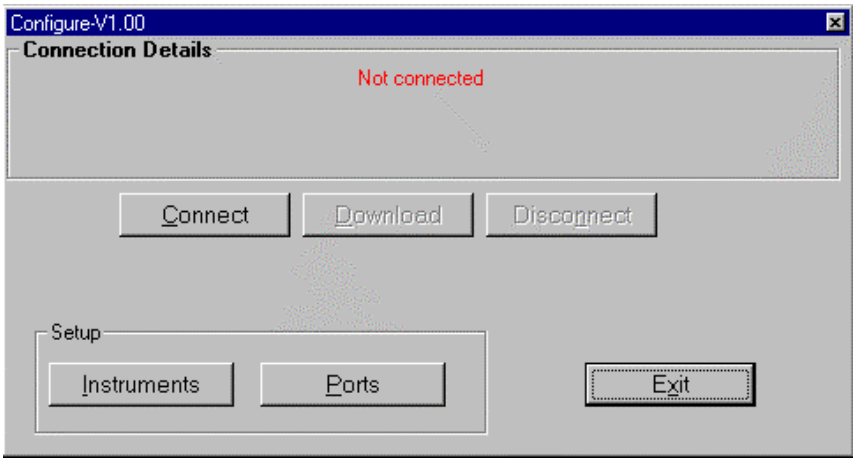
Step 10
Repeat Step 9 for RGAPort2.
Click on the **Disconnect** button.

Step 11
Click on the **Exit** button to close the configure program. The Process Eye software has now been configured for the Microvision Plus units available.

2.9.4. One Microvision Plus using RS485

The following instructions relate to configuring one or more Microvision Plus control units to run on a single multi-drop RS485 port.

Step 1
If Configure is not already running, start Configure from the Start menu. Configure should be located in **Start | Programs | Process Eye V1.61.** The Configure window will be shown.



Step 2
Click on the **Ports** button in the Setup Panel. If RGAPort1 is listed proceed to step 4

Step 3
Click on the **Add** button. In the Name field type **RGAPort1** then *click* on the **OK** button.

Step 4
Click on the **Edit** button. If you are using the factory default configuration for the RS485 card then go to step 5a otherwise go to step 5b.

Step 5a
Select RS485 (Factory default) from the Serial Port list box. Proceed to step 6.

Step 5b
Enter the base address as configure on the RS485 card (refer to the RS485 card manual for details)
Enter the IRQ as configure on the RS485 card (refer to the RS485 card manual for details)

Set the Baud Rate to 115.2k
Set the Retries to 3
Proceed to step 6

Step 6
Click on the **OK** button, then *click* on the **Close** button.

Step 7
Click on the **Instruments** button in the Setup panel.
If the Instrument panel contains the serial numbers of the Microvision Plus units then proceed to step 8a otherwise proceed to 8b

Step 8a
For each serial number listed in the Instrument panel do the following:
Highlight the serial number by *clicking* on it.
Click on the **Edit** button.
Enter a meaningful name in the Name (optional) field. Note this is the name that will appear on the Shortcut used to run up this head. If it is left blank then the serial number will be used. Typically this will be a tool or chamber number.

Check the required boxes in the Create shortcut in panel. Shortcuts to run the selected Microvision Plus can be placed in the 3 locations listed. We recommend that they should be created on the Desk top, in the Start menu and in the program group.

Click the **OK** button.

Proceed with step 9

Step 8b
For each Microvision connected to the port do the following.

Click on the **Add** button.

Enter the full serial number of the next MicroVision Plus e.g. LM70-00197001 in the Serial number field.

Enter a meaningful name in the Name (optional) field. Note this is the name that will appear on the Shortcut used to run up this head. If it is left blank then the serial number will be used. Typically this will be a tool or chamber

number.

Check the required boxes in the Create shortcut in panel. Shortcuts to run the selected Microvision Plus can be placed in the 3 locations listed. We recommend that they should be created on the Desk top, in the Start menu and in the program group.

Click on the **OK** button.

Proceed with step 9.

Step 9
Click on the **Close** button.

Step 10
This step is optional and can be performed at a later stage if required. Proceed to step 12 to omit the test.

If you have all the Microvision Plus units connected and powered up then you can check that you can communicate with each of them by following these instructions for each Microvision Plus in turn.:-

Click on the **Connect** button.

Select the serial number of the next Microvision Plus to test from the Instruments panel.

Click on the **OK** button.

After a few seconds the Connect form will unload and the Connection details panel on the Configure form will indicate if the connection was successful. If a connection could be made then details about the Core and Application version will be displayed.

Step 11
After the last Microvision Plus has been tested *click* on the **Disconnect** button.

Step 12
Click on the **Exit** button to close the configure program. The Process Eye software has now been configured for the Microvision Plus units available.

2.9.5. Microvision Plus with a Comms Card

The following instructions relate to configuring one or more Microvision Plus control units connected to a 4 port comms card.

Step 1
If Configure is not already running, start Configure from the Start menu. Configure should be located in **Start | Programs | Process Eye V1.61.** The Configure window will be shown.

Step 2
Click on the **Ports** button in the Setup Panel. If RGAPort1 through to RGAPort4 are listed proceed to step 7.

Step 3
Click on the **Add** button. In the Name field type **RGAPort1** then *click* on the **OK** button.

Step 4
Repeat step 3 three more times for RGAPort2 through RGAPort4

Step 5
Select RGAPort1 in the Ports panel.
Click on the **Edit** button.
Select User defined for RGAPort1 from the Serial Port list box.
Enter the Base address for RGAPort1. Enter the IRQ for RGAPort1.
Select a Baud rate of 9600.
Select a retry count of 3.
Click on the **OK** button.

Step 6
Repeat step 5 for RGAPort2 through RGAPort4.
Click on the **Close** button.

Step 7
Click on the **Instruments** button in the Setup panel.

Step 8
Select RGAPort1 from the Ports panel.
If the Instrument panel contains the serial number of the Microvision Plus connected to that port then proceed to step 9a otherwise proceed to 9b.

Step 9a
Highlight the serial number by *clicking* on it.
Click on the **Edit** button.

Enter a meaningful name in the Name (optional) field. Note this is the name that will appear on the Shortcut used to run up this head. If it is left blank then the serial number will be used. Typically this will be a tool or chamber number.

Check the required boxes in the **Create shortcut in** panel. Shortcuts to run the selected Microvision Plus can be placed in the 3 locations listed. We recommend that they should be created on the Desk top, in the Start menu and in the program group.

Click the **OK** button.

Proceed with step 10

Step 9b
Click on the **Add** button.

Enter the full serial number of the MicroVision Plus e.g. LM70-00197001 which is connected to that port in the Serial number field.

Enter a meaningful name in the Name (optional) field. Note this is the name that will appear on the Shortcut used to run up this head. If it is left blank then the serial number will be used. Typically this will be a tool or chamber number.

Check the required boxes in the Create shortcut in panel. Shortcuts to run the selected Microvision Plus can be placed in the 3 locations listed. We recommend that they should be created on the Desk top, in the Start menu and in the program group.

Click on the **OK** button.

Proceed with step 10.

Step 10
Repeat steps 8 and 9 for RGAPort2 through RGAPort4 or until all the

Microvision Plus units available have been entered.

Step 11
Click on the **Close** button.

Step 12
This step is optional and can be performed at a later stage if required. Proceed to step 15 to omit the test.

If you have the Microvision Plus connected and powered up then you can check that you can communicate with it by following these instructions.:-

Click on the **Connect** button.

Select RGAPort1from the Ports panel.

Select the serial number of the Microvision Plus to test from the Instruments panel.

Click on the **OK** button.

After a few seconds the Connect form will unload and the Connection details panel on the Configure form will indicate if the connection was successful. If a connection could be made then details about the Core and Application version will be displayed.

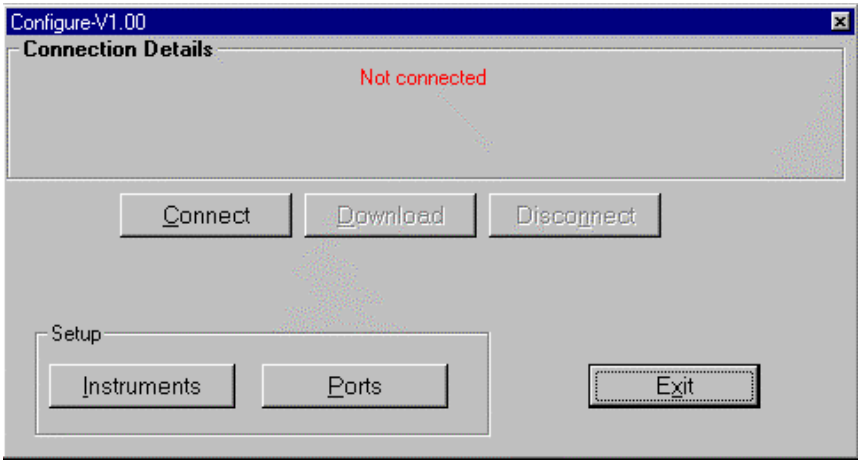
Step 13
Repeat Step 12 for RGAPort2 through RGAPort4 or until all the Microvision Plus units available have been tested.

Step 14
Click on the **Disconnect** button.

Step 15
Click on the **Exit** button to close the Configure program. The Process Eye software has now been configured for the Microvision Plus units.

2.10. Detailed Configuration

When Configure is run the window shown below will be displayed. The two buttons on the Setup panel, **Instruments** and **Ports**, are used to add and configure ports and instruments. These features are disabled while configure is connected to a Microvision Plus, the **Instruments** and **Ports buttons** will be *grayed out*.



You can use the **Connect** button to attempt to establish a link to a control unit. When a connection is made details about the control unit will be displayed in the connection details window. The download and disconnect features become available if the connect operation is successful and the **Download** and **Disconnect** buttons are no longer *grayed out*. Once connected it is possible to connect to another control unit without disconnecting first. The first control unit will automatically be disconnected before an attempt is made to connect to another control unit.

The **Exit** button will close the Configure program. If a connection has been made with a control unit it will automatically be disconnected before the program closes down.

2.10.1. Setup

Information relating to the serial ports to be used by Process Eye and the control units connected to the port(s) is stored in the Windows Registry. The two buttons in the Setup panel, **Instruments** and **Ports**, provide an easy way to view and configure the Registry settings needed by Process Eye. The

information is stored in a tree structure similar to the sub directories structures. You could think of the Ports as folders containing one or more instruments. The exact number of Ports and allocation of instruments to ports will depend on how the control units are physically connected. Two typical structures are described in the examples below:-

Example 1
Here one port is used to connect to 4 instruments. This implies that the 4 instruments are daisy chained together using a RS485 multi drop serial interface. RGAPort1 will be configured to use a specific IRQ, Base Address, Baud Rate and Retry count. Each instrument serial number may have an associated meaningful name.

Process Eye
    RGAPort1
        LM70-00197001
        LM70-00197002
        LM70-00197003
        LM70-00197004

Example 2
Here two ports are used, each port is connected to one instrument. This configuration would occur if the PC standard COM1 and COM2 RS232 ports are being used. RGAPort1 would be configured to use COM1 and RGAPort2, COM2. Note: Only one instrument can be connected a standard RS232 port. Again each instrument serial number may have an associated meaningful name.

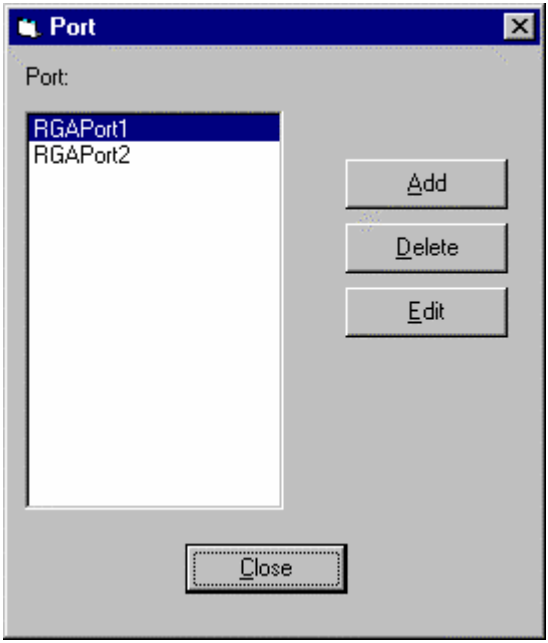
Process Eye
    RGAPort1
        LM70-00197004
    RGAPort2
        LM70-00197003

Ports are given an arbitrary name by which they can be referenced. We adopt the naming convention of RGAPort1, RGAPort2 etc. Port numbers allocated should be in sequence and the capitalization of RGAPort is important.

Instruments are referenced by their control unit serial numbers. These numbers are unique and are loaded into the Microvision Plus firmware during production. The serial number will begin LM70- as this is the engineering product number for Microvision Plus. The serial number is printed on a label which is fixed to the outside of the front (front being closest to the quadrupole analyser) panel. In addition to the serial number instruments can be allocated a meaningful name during configuration. If this name is not specified then the Instrument will be identified in Process Eye shortcuts by its serial number.

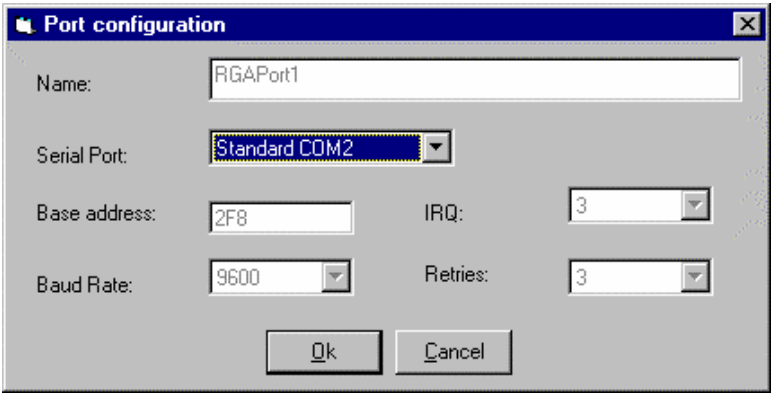
HPQ-2 serial numbers begin LM75-

2.10.2. Ports



The Port window is displayed as a result of *clicking* on the **Ports** button. All the available ports are listed in the Port panel. The **Edit** and **Delete** buttons will operate on the port highlighted in the Port panel. A Port is selected by *clicking* on it. A *double click* will select the port and enter the edit mode.

The **Add** button is used to add a new port definition.



The Port configuration window will be display as a result of *clicking* on either the **Edit** and **Add** buttons. When adding a new port to the list a Name must be supplied. If you are editing, this field displays the selected port name and it cannot be modified.

The serial port settings can be selected from a list of predefined options or if these are not applicable then the User defined option may be selected. If the User defined option is selected then you can enter the Base address, IRQ, Baud Rate and Retries.

Base address.
The base address is entered in hexadecimal and should match the base address setting on the serial interface card. The base address should not conflict with any other card fitted in the PC.

IRQ.
Again the IRQ should match the setting on the serial interface card. It should not conflict with any other IRQ. The only exception is when a 4 port serial card is fitted which is designed to share IRQ's.

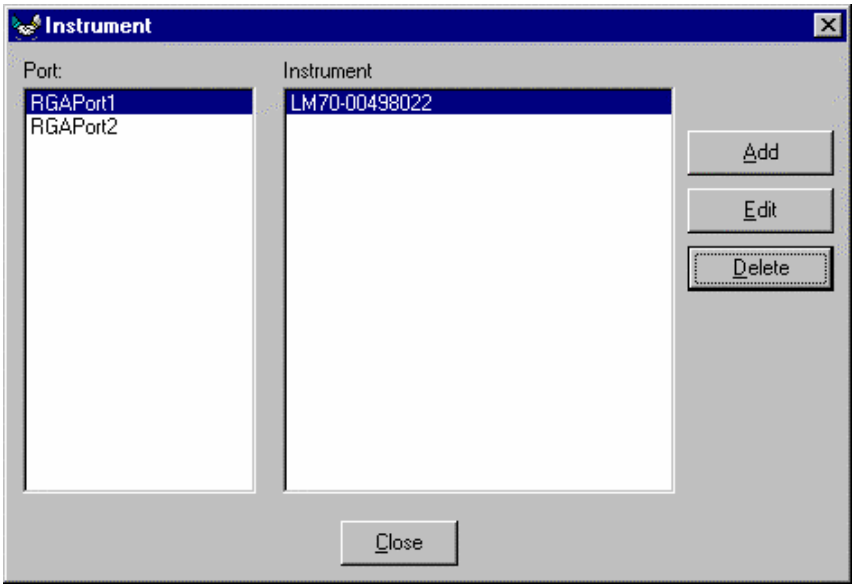
Baud Rate.
Generally a baud rate of 9600 is required for 1 head connected to a port. If more heads are connected then the baud rate should be increased in accordance with the information below.

Number of heads	Baud Rate
1	9600
2	14.4K
3	19.2K
4	28.8K
5	38.4K
6	57.6K
7 or more	115.2K

Retries

Data is transferred between the PC and the Control Unit using CRC checked packets. If an error is detected in a packet then it is automatically retried the preset number of times before raising an error in the PC application. The number of retries detected normally is very low and we recommend a setting of 3. In some environments this may need to be increased but if this proves necessary then the quality of the data link or the general level of electrical interference in the area should be investigated. The bandwidth of the link and hence the ability to transfer useful data is reduced as the number of retries increase.

Instruments

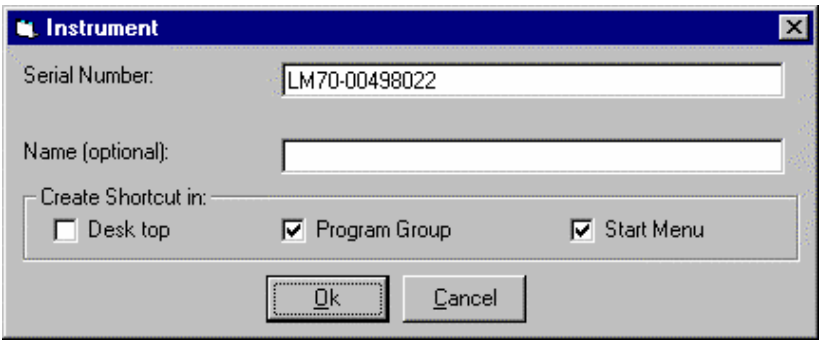


The Instrument window is displayed as a result of *clicking* on the

Instruments button. All the available ports are listed in the Port panel and the associated Instruments for the selected port are listed in the Instruments panel. To view the instruments associated with a particular port *click* on the required port. The Instrument list is then updated automatically.

The **Edit** and **Delete** buttons will operate on the Instrument highlighted in the Instrument panel. An Instrument is selected by *clicking* on it.

The **Add** button is used to add a new instrument definition to the selected port.

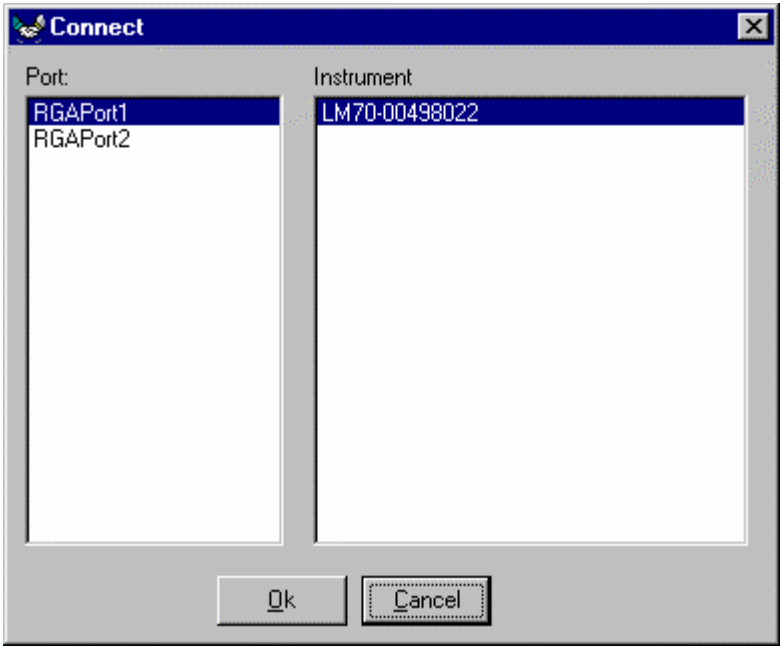


The Instrument configuration window will be displayed as a result of *clicking* on the **Edit** or **Add** buttons. When adding a new Instrument to the list a serial number must be supplied. If you are editing, this field displays the selected instrument's serial number and it cannot be modified. The Instrument configuration window is shown in above.

When adding an Instrument the serial number should be entered into the Serial Number field. You should enter a meaningful name into the Name (optional) field. The name should indicate the physical location of the control unit within your facility e.g. Tool name, Chamber number etc. This is the name that will be used on the Shortcut which will launch Process Eye for that control unit.

The Create Shortcut in: panel allows the automatic generation of Shortcuts to Process Eye for the that specific control unit. We recommend that they are installed in all three locations.

2.10.3. Connect

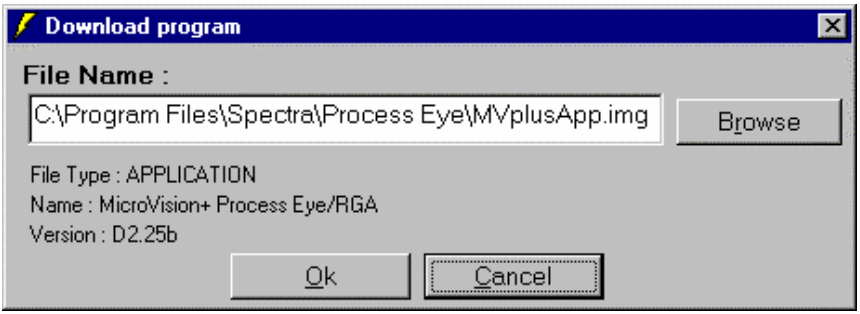


The connect feature allows the user to attempt to communicate with a control unit and if successful, obtain information about software and versions currently loaded in the control unit. This is a useful of testing that all control units and the PC are configured correctly.

When you *click* on the **Connect** button the Connect window will be displayed. To connect to a specific instrument, first *click* on the Port to which the Instrument is connected. Then select the required instrument from the **Instrument** panel and *click* the **OK** button or just *double click* on the instrument. After a short delay the Connect window will unload and the Connection details panel will be updated.

Once a connection has been made it is possible to connect to another instrument. The connection to the first instrument will automatically be terminated before the new connection is made. You may disconnect manually by *clicking* on the **Disconnect** button. You can also Download firmware to the control unit see below.

2.11. Download



There are two parts to the firmware running in the control unit. The first is the Core which acts as a simple operating system. This firmware should not need upgrading except in major software revisions. The Application firmware however may change more often as new features and performance enhancements are developed. It is possible to download both types of firmware using the download facility.

When you *click* on the **Download** button the Download Program window will be displayed. The file to be loaded must be entered in the File Name field or the Browse facility may be used to locate the required file. Once selected information about the firmware image is displayed. These should be checked to see that the file has the correct file type, program and version.

Click on the **Ok** button to start the download procedure. A progress indicator will be displayed as the file is downloaded. When complete the instrument will automatically disconnect and reconnect so that the Connection details in the main window are updated to display the firmware loaded.

CAUTION

Under no circumstances should the power to the PC or control unit be interrupted while downloading a new version of the core firmware. If the power fails then it will be necessary to install new preprogrammed flash EPROMs in the control unit. We suggest the use of a UPS capable of maintaining power to both the PC and control unit for a minimum of 15 minutes if this operation is to be performed.

2.12. Default Settings

The default factory configuration for 4 port RS232 & RS422 Serial cards.

Note the position of the connectors for the four ports on the comms card:
Port 1 PLG 5 mounted on the PCB closest to the edge connector
Port 2 PLG 4 mounted on the PCB furthest from the edge connector
Port 3 fitted to a flying lead connected to PLG 6 on the PCB
Port 4 fitted to a flying lead connected to PLG 2 on the PCB

Connector	Base address	IRQ
Port 1	280H	5
Port 2	288H	5
Port 3	290H	5
Port 4	298H	5

Default Factory configuration for 2 port RS485 Serial card.

Port 1 is the lower connector on the interface card
Port 2 is the upper connector on the interface card

Connector	Base address	IRQ
Port 1	280H	5
Port 2	288H	5

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Section 3.
Operation

3.1. Start Up

This section of the manual deals with running Process Eye 1.6. We assume that you have successfully installed the Process Eye 1.6 software and have the eleven factory recipes ready to run. Creating, editing and deleting recipes is covered in the next section of this manual.

Starting Process Eye depends to some extent on what you did during the configuration procedure. We have tried to give a degree of flexibility regarding *shortcuts* and names.

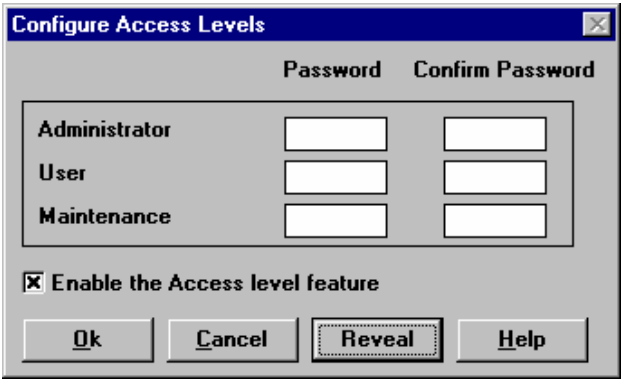
You may remember the description of the instrument configuration window where you could give an optional name to the Microvision Plus and specify where you wished to place *shortcuts* to start Process Eye for the specified control unit. It is possible to place *shortcuts* on the Desktop, in the Program Group and in the Start Menu.

To start Process Eye from the Desktop *double click* on the Process Eye icon for the control unit you wish to start. The icon consists of the Spectra logo with the name you specified for the control unit underneath the logo. If you did not specify a name the last eight digits of the control unit's serial number will be used. Remember, there will be one icon for each instrument you have installed.

To start Process Eye from the Program Group *click* on the **Start** button on the Taskbar, select **Programs | Process Eye** then *click* on the control unit you wish to start.

To start Process Eye from the Start menu *click* on the **Start** button on the Taskbar then *click* on the appropriate icon in the Start menu for the control unit you wish to run.

The Spectra loading window will be displayed then the **Select Access Level** window will be displayed, unless this feature has been disabled.



Select the Access Level by *clicking* on the relevant *radio button* then enter the password for that particular Access Level in the **Password** box then, *click* on the **Ok** button.

If you are running Process Eye for the first time after installing the software or the Access Levels feature has not been configured by the Administrator in **Configure Access Level** the **Password** box will not be shown in the Select Access level window. Access levels are described in Access Levels **.**

The Select Mode screen will be displayed from where you can access all the Process Eye features.

3.2. Filament Warning

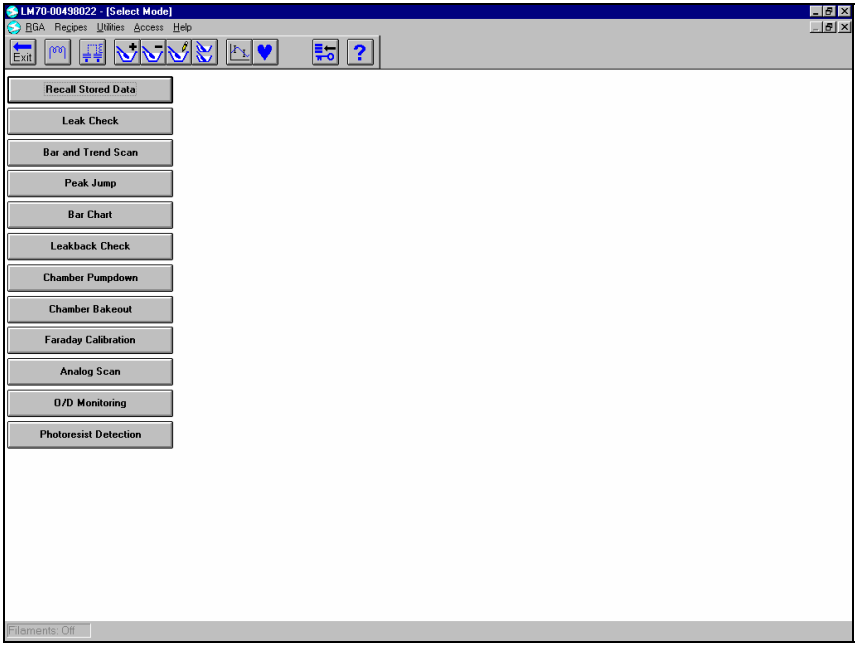
Initially (if configured in Preferences) a warning box will be displayed asking you if the pressure is low enough to switch the filament on. If you *click* on the **Yes** button the filament will be switched on, there will be a delay while the filament warms up, then the filament button and status bar will indicate that there is a filament on. If you *click* on the **No** button the filament will be left switched off.

A filament must be switched on in order to take any measurements with the

instrument. The quadrupole analyser is fitted with two filaments only one of which may be on at any one time. The filament may be switched on or off by selecting **RGA | Filament On** from the *menu bar* or by *clicking* on the Filament button or by *double clicking* on the Filament Status panel in the bottom left corner of the screen. The filament can also be switched on automatically when the recipe is run (if it is configured to do so). The Filament setting in **Utilities | Preferences** will determine whether Filament 1 or Filament 2 is switched on.

3.3. Select Mode

The Select Mode window is shown below. Click on the different areas of the picture for an explaination of the control or feature.



Many of the most frequently used functions can be performed by *clicking* on the appropriate button on the button bar. The graphic on the button indicates its function. To help you use the buttons, as you move the mouse pointer over the button a help box appears next to the pointer which gives the name of the particular button.

Exit Button
Click on the Exit button to quit Process Eye. A warning box is displayed to confirm you wish to close down Process Eye.

Filament Button
Filament button. *Click* on the Filament button to switch the filament on or off. The analyser is fitted with two filaments, which one is switched on is determined by the filament setting in the **Utilities | Preferences** *menu* see Filaments .

Degas Button
The Degas *dialog box* is opened by *clicking* on the Degas button. Degassing the ion source is described in Degas. DO NOT USE THIS FEATURE UNTIL YOU HAVE READ THAT SECTION.

Add Recipe Button
To add a new recipe *click* on the Add Recipe button. Adding a recipe is fully described in Adding Recipes **.**

Delete Recipe Button
To delete a recipe *click* on the delete recipe button. Deleting a recipe is described in Delete Recipe .

Edit Recipe Button
To edit a recipe *click* on the Edit Recipe button.

Copy Recipe Button
To copy an existing recipe *click* on the Copy Recipe button. Copy Recipe is described in Copying Recipes .

Create Baseline Button
Click on this button to open the **Create Baseline** *dialog box*. Creating a baseline is described in Baseline Settings **.**

Preferences Button
Click on the Preferences button to open the Preferences dialog box as described in Preferences

View Alarms Button

This button will be added to the button bar when data are on the screen and an Alarm Event has occurred. *Click* on the View Alarms button to display the **Alarms Event Viewer** window. See Alarm Event Viewer for more information.

Access Levels Button
Click on the Access Levels button to display the **Select Access Level** *dialog box*. Access Levels are described in Access Levels.

Help Button
Click on the Help button to enter the Process Eye Help files. The Help facility is described in Using Help .

Title Bar
The title bar will indicate which head you are connected to. This is very useful in multi-headed systems.

Menu Bar
All of the Process Eye functions can be accessed from the menu bar. Either click on the menu item in the menu bar or press ALT + the underlined character to open the appropriate menu.

Recipe Buttons
Click on the appropriate recipe button to run the required recipe, see Running a Recipe for more information. Initially there will be eleven recipe buttons for the eleven factory recipes supplied with Process Eye. If a recipe button is grayed out you do not have the necessary acces level to run it, see Access Levels for more information.

Recall Data Button
Click on the Recall Data Button to review data from previous recipe runs. More details can be found in Recall Stored Data .

Status Bar
The status bar gives information about the current operation of Process Eye.

3.4. Using Help

Process Eye has a comprehensive on-line help system. To access the help files:

click on the Help button
or
select **Help | Contents** from the *menu bar*
or
press **F1** on your keyboard.

When you open Help the contents page will be displayed, *click* on one of the green help topics for further information. At any time you may return to the contents page by *clicking* on the **Contents** button at the top of the Help window.

Click on the **Search** button to look for help topics by selecting key words.
The **Back** button allows the user to move backwards through previously selected help pages. The help page being displayed may be printed out by *clicking* on the **Print** button.

The >> and << buttons allow you to move forwards and backwards through the help topics.

Click on the **Glossary** button to display a list of commonly used vacuum terms.

Users may add their own notes to the help topics by selecting **Edit | Annotate**. Type the text you want to associate with the particular help topic and save it. A green paper clip symbol will be displayed, *click* on this to show the user notes.

More information on using help can be found by selecting **Help | Using Help** from the *menu bar*.

Selecting **Help | About** from the *menu bar* will cause the **About** window to be displayed where the version numbers of the software used in the Process Eye will be shown.

Note that this document is not the same as the on-line help. This "paperless manual" is based on the printed manual supplied with the software. We use the Windows Help format because it is common to all users.

3.5. Access Levels

Access Levels form the basis of Process Eye's security system. Various

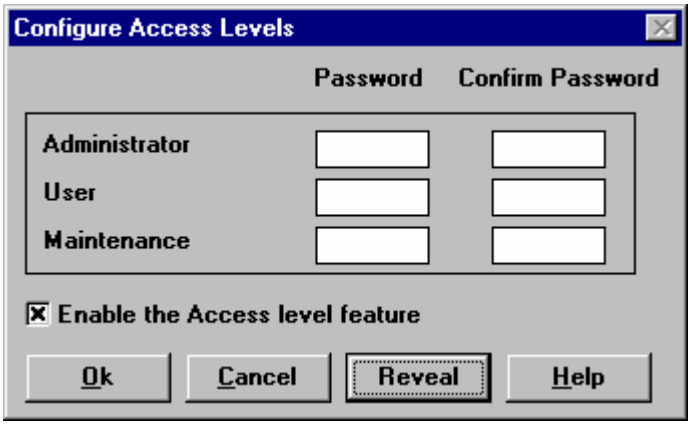
Process Eye features are available to the three Access levels; Administrator, User and Maintenance. Put another way certain Process Eye features are not available to User and Maintenance Access Levels. Recipes may be configured to only be available to certain Access levels. This is governed by the settings in the last step of the recipe set up.

Each of the three Access levels can have a password associated with it. With the Access levels feature enabled (you can disable it) at start up you select at which Access level you want to enter Process Eye and enter the appropriate password.

3.5.1. Configuring access levels

Configuring Access Levels is only possible if you have entered Process Eye with the Administrator Access Level. If you have entered as Maintenance or User the Configure Access Levels feature will not be available.

To configure the Access Levels:
select **Access | Configure Access Levels** from the *menu bar*, the Configure Access Levels *dialog box* will be displayed, as shown below.



The Access Levels feature may be disabled by clearing the **Enable the Access level feature** *check box*. When disabled the **Select Access Level** window will not be displayed when Process Eye is started.

In the Password box enter a password for each of the three Access levels. Enter each password a second time in the confirm password box, this helps eliminate typing errors from the passwords.

Passwords may be left blank in which case Process Eye may be started simply by *clicking* on the **OK** button in the **Select Access level** window. The same password may be used for all three levels. Neither of which is recommended.

Note that passwords are not case sensitive. Ideally, the person responsible for the Process Eye system adopts the Access Level of Administrator and enters the passwords for all three levels. The Administrator then only discloses the appropriate password to the people using the Process Eye system.

When all the passwords are entered correctly *click* on the **OK** button to accept the entries and close the **Configure Access Lev**els *dialog box*.

Click on the **Reveal** button to display the passwords. *Click* on the **Cancel** button to close the **Configure Access Levels** *dialog box* without any entries or changes being accepted.

Once Process Eye is running you may change the Access level but you will need the password for the level to which you wish to change.

To change the Access Level:
select Access | Select Access Level from the *menu bar*
click on the *radio button* for the level to which you want to change
enter the password in the **Password** box
click on the **OK** button.

3.5.2. Access level features

The following is a list of Process Eye features and to which Access Levels they are available:
Abort Recipe = ADMIN + MAINT
Alarm = ADMIN + MAINT + USER
Baseline = ADMIN
Comment = ADMIN + MAINT + USER
Degas = ADMIN + MAINT
Exit Program = ADMIN
Exit Recipe = ADMIN + MAINT + USER
Filament = ADMIN + MAINT + USER
Help = ADMIN + MAINT + USER
Lockout = ADMIN + MAINT

Preferences = ADMIN
Print = ADMIN + MAINT + USER
Recipe = ADMIN
RVC = ADMIN
Units = ADMIN

These permissions can be modified. Contact your local Spectra facility for further information.

3.6. Running a Recipe

This section assumes one or more recipes have been defined. If no recipes have been defined it will be necessary to add a recipe, as described in Adding Recipes . If you have just installed Process Eye the eleven factory recipes will be available.

In the Process Eye Select Mode screen the available recipes will be displayed as a series of buttons. Only those recipes available to the currently selected access level will be shown. To run a recipe *click* on the appropriate button.

Depending on the type of recipe and the recipe settings the following steps may be required:
Filament Confirmation:
If the filament is switched off when the recipe is started and Filament On Confirmation has been selected you will be prompted to confirm that the pressure is low enough for the filaments to be switched on.
File Name:
If User Defined File Name has been selected you will be requested to enter the file name under which this data will be stored. A standard Windows **Open** *dialog box* is used to enter the file name.
User Disk Header:
User defined information can be optionally entered if it has been configured in Preferences and Enabled in the recipe.

If no trigger has been selected the instrument will then run the recipe. Otherwise, Process Eye will go in to a holding pattern until the trigger is received and the **Trigger** warning box will be displayed. Depending on the recipe settings two buttons may be enabled in the Trigger warning box.
Click on the **Force Trigger** button to generate a trigger and start the recipe without waiting for the trigger event defined in the recipe set-up.

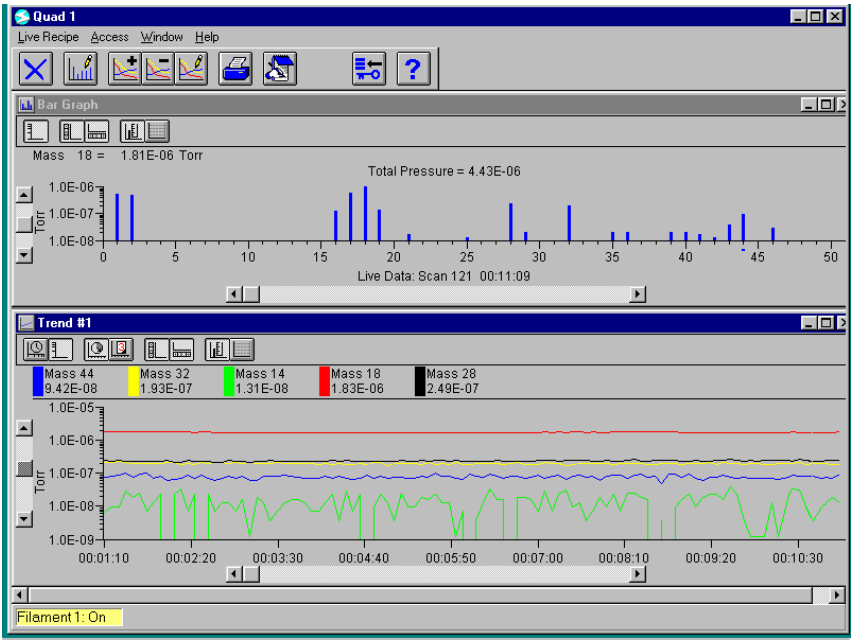
Click on the **Abort Recipe** button to close the Trigger warning box and return to the mode select window without running the recipe.

If a start delay has been specified the Start Recipe Delay warning box will be displayed and the delay will count down. The start recipe delay begins once the trigger has occurred.

The exact appearance of the screen will depend on the type of recipe and the parameters defined in the recipe. Details of the Analog Peaks, Leak Check, Faraday and Multiplier Calibration recipes can be found in section 5 of this manual. In the following sections details of the data acquisition recipes, Bar Graph and Peak Jump are given.

3.7. Running Data Acquisition Recipes

The screen will appear as it was saved at the end of the recipe set-up. It can show either a Bar Chart or a Peak Jump display and any Trend Displays which may have been specified.



A typical screen when a bar graph recipe is running such as the factory

recipe Bar and Trend Scan is shown above. Click on each of the nine buttons on the button bar to see a description of their function.

Abort Process Button
Clicking on the **Abort Process** button will stop the current recipe and return you to the Select Mode screen. If the recipe stores to disk completed scans will be stored and may be recalled. This button changes to the Exit button when the recipe has finished.

Edit Display Button
None of the settings relating to the acquisition of data may be altered, this is defined by the recipe. The way the data is displayed, however, can be changed whilst the recipe is running, if permitted by in the recipe set-up. To do this *click* on the Edit Bar Graph button if it's a Bar Graph recipe or the Edit Peak Jump button if it is a Peak Jump recipe. The **Display** *dialog box* will be shown. The Bar Graph and Peak Jump display settings are very similar and the differences are described in Bar Graph Display Settings and Peak Jump Display Settings. A short cut is to *right click* in the data display area you want to edit.

Add Trend Button
Trends are views of the scan data obtained using Bar Graph or Peak Jump. Each Trend display may have up to fifteen channels displayed and a maximum of sixteen trends may be added. There are no restrictions on how many times a partial pressure, total pressure, Action channel, digital or analog input may be displayed in one or more trends. This allows, for example, one trend to show partial pressures, another trend to show those same partial pressures with a background subtracted and yet another trend to show digital inputs. *Clicking* on the Add Trend button brings up the **Edit New Trend** *dialog box* where the various settings for the Trend are defined. This *dialog box* is the same as the **Edit Trend** *dialog box* displayed by *clicking* on the Edit Trend button and described in section **Trend settings**.

Edit Trend Button
To edit a Trend it must either be the currently active window when Edit Trend is selected (its title bar indicates it is active) or more simply *right click* anywhere on the graph. The **Edit Trend** *dialog box* will be displayed.

Note that *clicking* on the trend graph area will cause the Bar Graph or Peak Jump display to show the data for that particular time. To return the Bar Graph or Peak Jump to real time either choose Edit and select Live Data or

double click on the X-axis.

Delete Trend Button

To delete a Trend it must be the currently active window when Delete Trend is *clicked*. (Its title bar indicates it is active.)

Print Button

Click on the **Print** button to print a hard copy of the current display. The Bar Graph or Peak Jump scan and any Trend displays will all be printed. The current Printer settings set up in Windows Print Manager will be used.

Comment Button

Click on the Comment button to open the Comment *dialog box* where you may type text. This is useful for making notes relating to the current recipe. The comment is saved with the file and may be viewed or edited when the data is recalled. Once you have typed in the text *click* on the **Ok** button to close the *dialog box*. If disk storage has not been enabled the comments will be temporarily stored but will be overwritten the next time a recipe with no disk store enable is run.

3.7.1. Bar Graph Display

When a Bar Graph recipe is running the Bar Graph data will be displayed in a histogram format in its own window below the button bar. This window may be sized and positioned in the normal way. The bar graph display may be altered by *clicking* on the Edit Bar Graph button or *right clicking* anywhere on the Bar Graph display and changing the settings in the **Bar Graph Display** *dialog box*.

There are five buttons; Log peak height button, Peak Height Scroll Bar Button, Mass Scroll Bar Button, Cursor Button and the Grid Button and two scroll bars Peak Height Scroll Bar and Mass Scroll Bar in the Bar Graph window which will also affect the display. When you move the mouse pointer over the button its name will appear in a help box displayed next to the mouse pointer.

Log peak height button

The log peak height button allows you to change between a logarithmic and linear Y-axis. With the button depressed a log axis will be displayed otherwise the axis will be linear.

Peak Height Scroll Bar Button

Click on the button to enable or disable the peak height scroll bar displayed next to the Y-axis. When the button is depressed the scroll bar is displayed.

Mass Scroll Bar Button
Click on the Mass Scroll Bar button to enable or disable the mass scroll bar displayed below the X-axis. When the button is depressed the scroll bar is displayed.

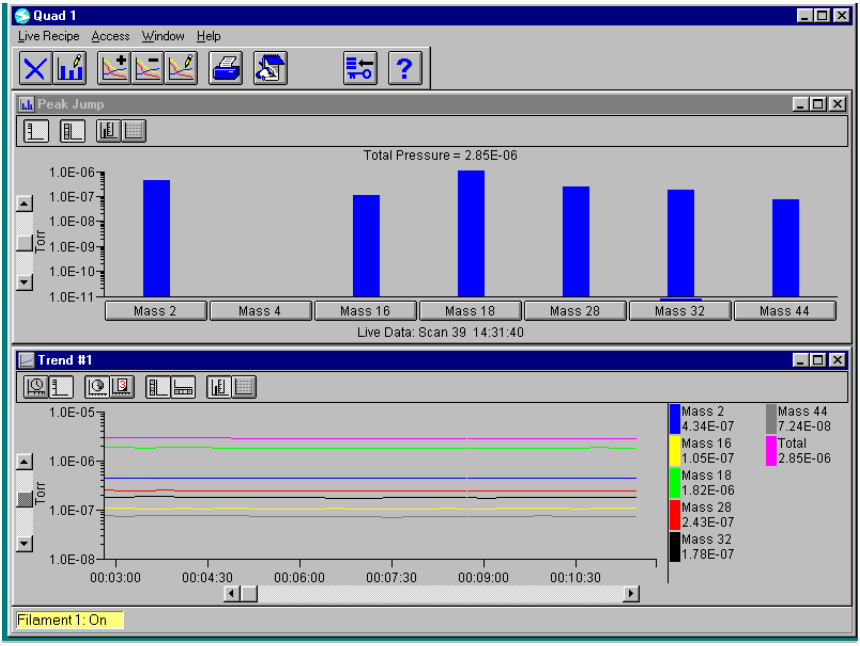
Cursor Button
Click on the Cursor button to enable or disable the cursor. When the button is depressed the cursor is enabled and the cursor data will be shown immediately below the buttons. Initially the cursor data will take the format Mass ??? = ??.??E??? since there is no data to display. *Click* on one of the peaks in the bar graph display and the cursor data will change to show the mass value and the pressure measurement. Each time the selected mass is scanned the cursor data will be updated.

Grid Button
Click on the Grid button to enable or disable the Grid. When the button is depress the Grid is enabled.

Peak Height Scroll Bar
The Peak Height Scroll Bar, when enabled, can be used increase and decrease the range covered in the Y-axis. Either *drag* the scroll button or *click* on the up or down arrow. If a linear Y-axis is being displayed you will scroll through successive decades. If a log Y-axis is being displayed the number of decades will be altered by using the scroll bar with the minimum displayed decade being fixed.

Mass Scroll Bar
The Mass Scroll Bar can be used to increase or decrease the range of masses displayed on the X-axis when viewing bar chart scans. Either *drag* the scroll button or *click* on the right or left arrow button. You can only move within the minimum and maximum mass values set in the Bar Graph Display settings.

3.7.2. Peak Jump Display



When a Peak Jump recipe is running the Peak Jump data will be displayed in its own window below the button bar. This window may be sized and positioned in the normal way. The peak jump display may be altered by *clicking* on the Edit Peak Jump button or *right clicking* anywhere on the Peak Jump display and changing the settings in the **Peak Jump Display** *dialog box*. There are four buttons; Log peak height button, Peak Height Scroll Bar Button, Cursor Button and Grid Button and one scroll bar; Peak Height Scroll Bar in the Peak Jump window which will also affect the display. When you move the mouse pointer over the button its name will appear in a help box displayed next to the mouse pointer.

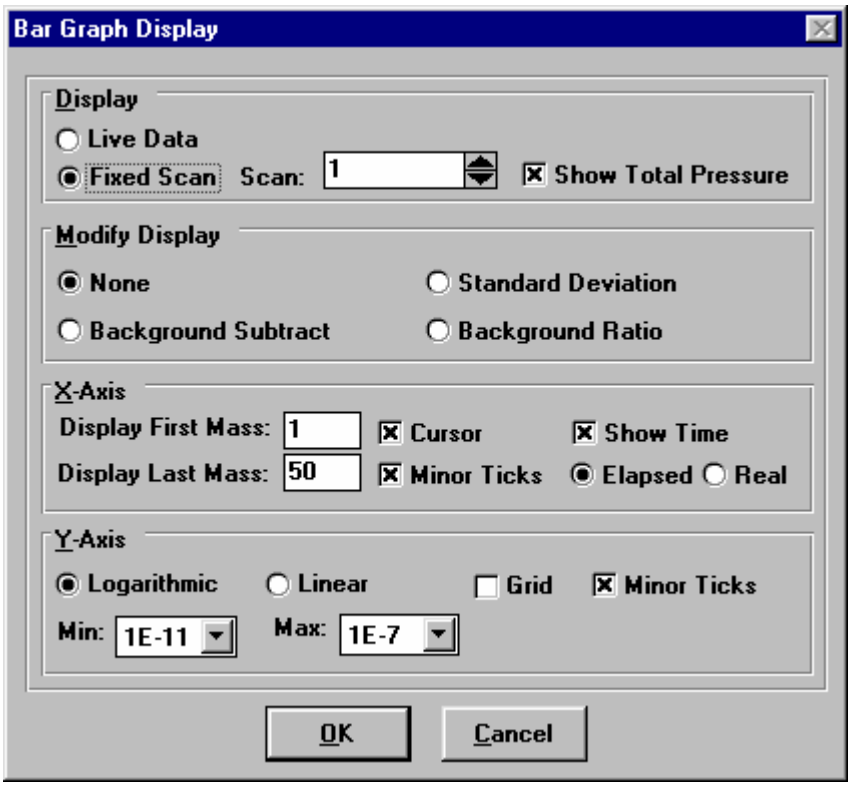
3.7.3. Display Edit

The Bar Graph or Peak Jump display may be altered by adjusting the settings in the Display *dialog box*. Remember, this only alters the display, the range of masses being scanned is defined in the recipe set up and cannot be altered. The Bar Graph Display *dialog box* or Peak Jump Display *dialog box* is shown by *clicking* on the Edit Display button or by *right clicking* on the Bar Graph or Peak Jump display. The various settings in the *dialog boxes* are described in the following sections. There are some differences

between Bar Graph and Peak Jump and these are noted.

Display
Live Data:
As each partial pressure is scanned it is updated on the graph. If data is being recalled from disk then the Live Data option will be *grayed out*.

Fixed Scan:
Any scan in the range from 1 to Maximum Scans (as defined in step one) may be viewed. If a scan number is selected that has not yet been scanned, then, when it is scanned, the display will be updated. If the mouse is clicked on a Trend display of data then Fixed Scan will be selected with the scan number at or less than the point of the cursor.



Scan:
If **Fixed Scan** is selected the **Scan:** box will be displayed. *Click* on the up or

down arrow to select the scan you wish to display or type in the scan number.

Show Total Pressure

If Show Total Pressure is *checked* the Total Pressure reading will be displayed otherwise, it will not be displayed and the screen space will be used by increasing the length of the y-axis. The Total Pressure will always be measured at the end of each scan whether it is displayed or not. Note that total pressure is the sum of the measured partials. If one or more significant peaks are not measured as part of the scan the total pressure may be inaccurate.

Modify display

As described in the sections on Background and Baseline (standard deviation) the measured signals (partial pressure, total pressure, analog inputs and, for Backgrounds only, digital inputs) may be displayed not in their "raw" format but modified in one of the following ways.

None:

No modifications (other than any calibration settings) are applied to the data.

Background Subtract:

The appropriate background value is subtracted from the data. This option will be *grayed out* if a background has not been selected. Usually a linear y-axis display with a decade setting close to the decade setting of the data being displayed is the most appropriate way to view Background Subtracted data as a negative minimum can be selected.

Background Ratio:

The Data is divided by the selected background data. This option will be *grayed out* if a background has not been selected. Usually a linear y-axis display with a decade setting of E+00 is the most appropriate way to view Background Ratioed data as the results will be 1.0 or close to 1.0 if the data tracks the background.

Standard Deviation:

The mean (or average) value at the corresponding scan number of a baseline file is subtracted from the data and the result is divided by the standard deviation at that point. Usually a linear y-axis display with a decade setting of E+00 is the most appropriate way to view Standard Deviation data as a negative minimum can be selected.

X-Axis (bar graph)

Display First Mass:

The First Mass actually scanned is defined by First Mass set in step one of Add/Edit recipe. However, the First Mass displayed may be any value from the First Mass scanned to the Last Mass scanned. The Display First Mass

must also be less than or equal to the Display Last Mass.

Display Last Mass:

The Last Mass actually scanned is defined by Last Mass set in step one of Add/Edit recipe. However, the Last Mass displayed may be any value from the Last Mass scanned to the First Mass scanned. The Display Last Mass must also be greater than or equal to the Display First Mass.

Minor Ticks:

The distance between major ticks on the x-axis will depend on the resolution of the screen and the size of the graph. Selecting Minor ticks allow smaller mass increments to be determined by eye.

Cursor:

When enabled the Cursor feature allows mass identification and precise readout of the partial pressure. Once enabled, to set the cursor to a particular mass *click* on the graph area and drag the cursor until the desired mass is shown in the area at the top of the graph. Once selected the cursor value will be updated as new data arrives.

Show Time:

Check the Show Time *check box* to display the time as part of the x-axis label. *Click* on the **Real** *radio button* to show the actual time or *click* on the **Elapsed** *radio button* to show the time elapsed since the start of the recipe.

X-axis (peak jump)

Cursor:

When enabled the Cursor feature allows Channel identification and precise readout of the partial pressure. Once enabled, to set the cursor to a particular Channel *click* on the graph area and *drag* the cursor until the desired Channel is shown in the area at the top of the graph. Once selected the cursor value will be updated as new data arrives.

Show Time:

Check the **Show Time** *check box* to display the time as part of the x-axis label. *Click* on the **Real** *radio button* to show the actual time or *click* on the **Elapsed** *radio button* to show the time elapsed since the start of the recipe.

Y-axis

Loarithmic:

Sets the Y-axis to be a logarithmic scale. The maximum and minimum values that can be displayed are set using Max and Min. The largest and smallest decades that can ever be displayed are set in **Utilities | Preferences** by selecting the desired Max Displayed Decade and Min Displayed Decade.

Linear:

Sets the y-axis to be a linear scale. The maximum and minimum values that can be displayed are set using Max and Min and Decade. The maximum and

minimum values can be positive or negative and the decade can be anywhere in the range Max Displayed Decade to Min Displayed Decade.

Min:

Sets the smallest value that can be displayed. If a Logarithmic y-axis has been selected it will be a pick list of decades (in the range Max Displayed Decade to Min Displayed Decade). If Linear y-axis has been selected it will be a text box where the value must be typed. Any value positive or negative is allowed. This setting is multiplied by the Decade setting to give the actual minimum. In linear Y-axis, Min must be 1 less than Max. If you want to display less than 1 on a given decade e.g. 0 (Min) to 0.5 (Max) E+00 (Decade) then simply select a lower decade i.e. 0 (Min) to 5 (Max) E-01.

Max:

Sets the largest value that can be displayed. If Logarithmic y-axis has been selected it will be a pick list of decades (in the range Max Displayed Decade to Min Displayed Decade). If Linear y-axis has been selected it will be a text box where the value must be typed, any value positive or negative is allowed. This setting is multiplied by the Decade setting to give the actual maximum. In linear Y-axis, Max must be 1 greater than Min. If you want to display less than 1 on a given decade e.g. 0 (Min) to 0.5 (Max) E+00 (Decade) then simply select a lower decade i.e. 0 (Min) to 5 (Max) E-01.

Decade:

This is only visible when Linear is selected. It sets the scaling factor applied to Min and Max, e.g. to display -5.00E-07 to +5.00E-07 set -5 as Min, 5 as Max and 1E-07 as Decade.

Grid:

Switches on a horizontal grid to assist in visually reading peaks. The values that have a grid line correspond to where the y-axis is labelled. This in turn will depend on the resolution of the screen and the size of the graph.

Minor Ticks:

Enables fine horizontal lines to be displayed. The values that have a grid line will depend on the resolution of the screen and the size of the graph.

Once all the settings are correct *click* on the **OK** button to close the Display *dialog box* and implement the changes. *Clicking* on the **Cancel** button will close the *dialog box* without any changes being made.

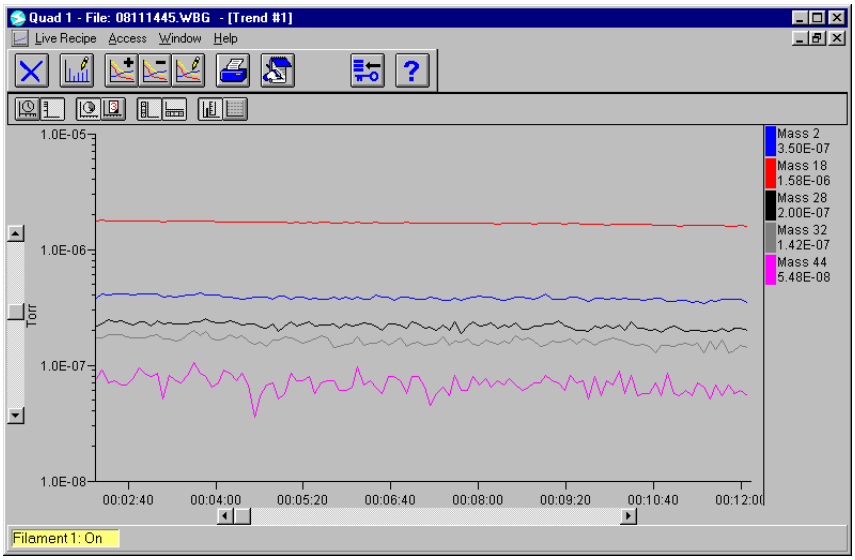
3.8. Trends

Trends are views of the scan data obtained using Bar Graph or Peak Jump. Each Trend display may have up to fifteen channels displayed and a maximum of sixteen trends may be added. There are no restrictions on how

many times a partial pressure, total pressure, Action channel, digital or analog input may be displayed in one or more trends. This allows, for example, one trend to show partial pressures, another trend to show those same partial pressures with a background subtracted and yet another trend to show digital inputs.

3.8.1. Add trend

To add a trend *click* on the Add Trend button or select **Live Recipe | Add Trend** from the *menu bar*. The **Edit New Trend** *dialog box* will be displayed where the various settings for the Trend are defined. This *dialog box* is the same as the **Edit Trend** *dialog box* displayed by *clicking* on the Edit Trend button and is described in section **Trend settings.**



3.8.2. Edit trend

To edit a Trend it must be the currently active window (its title bar indicates it is active). *Click* on the Edit Trend button or select **Live Recipe | Edit Trend** from the *menu bar* or *right click* anywhere on the data display area. The **Edit Trend** *dialog box* will be displayed, see section **Trend settings** for full details.

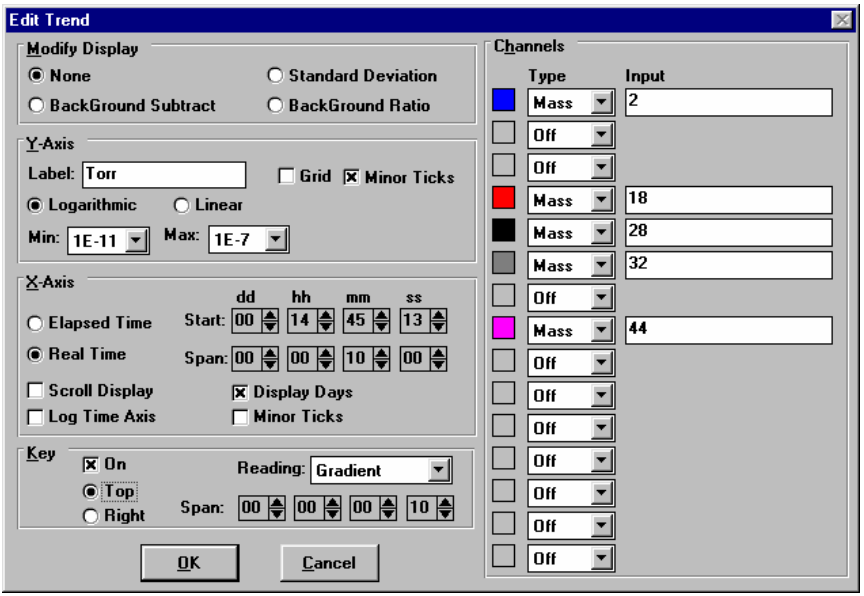
3.8.3. Delete trend

To delete a Trend it must be the currently active window when the Delete

Trend button is clicked or **Live Recipe | Delete Trend** is selected from the *menu bar*. (Its title bar indicates it is active.)

3.8.4. Trend settings

When you select Edit Trend the **Edit Trend** *dialog box* will be displayed. Selecting Add Trend will cause the **Edit New Trend** *dialog box* to be displayed. These two *dialog boxes* are the same and the various parameters are explained in the following sections.



3.8.5. Channels

The channels section defines what is to be trended. Up to fifteen channels may be used, the actual number is set in Trend Max Channels in **Utilities | Preferences**. By default fifteen channels are set to Trend Maximum Channels.

Type:
This is a *dropdown list box* which specifies the source of data for this trend line. It may be one of the following:

Off will switch the channel off.

Mass will display as a trend the mass whose value is entered in the Input box. The mass must be within the mass range being scanned for a bar chart recipe. For a peak jump recipe the mass must be one to which a channel is set.

Action will display as a trend one of the action channels defined in the recipe. If the recipe does not define any action channels then Action will not be available. Selecting Action in the **Type** box will cause the **Input** box to display all the available action channels as a *dropdown list*, *click* on the required one to select it.

Total will display a trend of the sum of all the partials in this scan.

Analog, where xxx is the (optional) analog input channel number, will show the analog input.

Digital, where xxx is the (optional) digital input channel number, will show the digital input.

Generally you would choose Analog and Digital inputs to be displayed on a different trend as they usually have widely varying values compared to partial and total pressure signals.

3.8.6. Modify display

As described in the sections on Background and Baseline (standard deviation) the measured signals (partial pressure, total pressure, analog inputs and, for Backgrounds only, digital inputs) may be displayed not in their "raw" format but modified in one of the following ways.

None:

No modifications (other than any calibration settings) are applied to the data

Background Subtract:

The appropriate background value is subtracted from the data. This option will be *grayed out* if a background has not been selected. Usually a linear y-axis display with a decade setting close to the decade the data is at is the most appropriate way to view Background Subtracted data as a negative minimum can be selected.

Background Ratio:

The Data is divided by the selected background data. This option will be *grayed out* if a background has not been selected. Usually a linear y-axis display with a decade setting of E+00 is the most appropriate way to view

Background Ratioed data as the results will be 1.0 or close to 1.0 if the data tracks the background.

Standard Deviation:

The mean value at the corresponding scan number of a baseline file is subtracted from the data and the result is divided by the standard deviation at that point. Usually a linear y-axis display with a decade setting of E+00 is the most appropriate way to view Standard Deviation data as a negative minimum can be selected.

3.8.7. y-axis

Label:

Define the label to be displayed next to the y-axis. Type in the label you require or leave it set to the default of Torr. If you delete the label and leave the **Label:** box empty the trend's x-axis will extend to utilise the extra space saved by having no y-axis label.

Logarithmic:

Sets the Y-axis to be a logarithmic scale. The maximum and minimum values that can be displayed are set using **Max** and **Min**. The largest and smallest decades that can ever be displayed are set in **Utilities | Preferences** by selecting the desired Max Displayed Decade and Min Displayed Decade.

Linear:

Sets the y-axis to be a linear scale. The maximum and minimum values that can be displayed are set using **Max** and **Min** and **Decade**. The maximum and minimum values can be positive or negative and the decade can be anywhere in the range Max Displayed Decade to Min Displayed Decade.

Min:

Sets, the smallest value that can be displayed. If Logarithmic y-axis has been selected it will be a pick list of decades (in the range Max Displayed Decade to Min Displayed Decade). If Linear y-axis has been selected it will be a text box where the value must be typed. Any value positive or negative is allowed. This setting is multiplied by the Decade setting to give the actual minimum. In linear Y-axis, Min must be 1 less than Max. If you want to display less than 1 on a given decade e.g. 0 (Min) to 0.5 (Max) E+00 (Decade) then simply select a lower decade i.e. 0 (Min) to 5 (Max) E-01.

Max:

Sets the largest value that can be displayed. If Logarithmic y-axis has been selected it will be a pick list of decades (in the range Max Displayed Decade

to Min Displayed Decade). If Linear y-axis has been selected it will be a text box where the value must be typed. Any value positive or negative is allowed. This setting is multiplied by the Decade setting to give the actual maximum. In linear Y-axis, Max must be 1 greater than Max. If you want to display less than 1 on a given decade e.g. 0 (Min) to 0.5 (Max) E+00 (Decade) then simply select a lower decade i.e. 0 (Min) to 5 (Max) E-01.

Decade:
This is only visible when Linear is selected. It sets the scaling factor applied to Min and Max, e.g. to display -5.00E-07 to +5.00E-07 set -5 as Min, 5 as Max and 1E-07 as Decade.

Grid:
Switches on a horizontal grid to assist in visually reading peaks. The values that have a grid line correspond to where the y-axis is labelled. This in turn will depend on the resolution of the screen and the size of the graph.

Minor Ticks:
Enables fine horizontal lines to be displayed. The values that have a grid line will depend on the resolution of the screen and the size of the graph.

X-axis
The X-axis is the time axis. There are a number of options not usually available with RGA software packages that allow, for example, the data to be displayed as a log time plot enabling pump down times to be predicted, with time windows as short as seconds or as long as days etc.

Start Time:
The beginning time at which to start displaying data. This is in hours (hh), minutes (mm), seconds (ss) and, if the Display Days option is *checked*, days (dd). The hours minutes and seconds will show in terms of an elapsed time from when this recipe (data run) was started if the Elapsed Time option is enabled or as a real 24 hour time if the Real Time option is enabled. The days, if displayed, are always shown as elapsed days from the recipe start regardless of which time mode is selected. This is not available if Scroll Display is enabled.

Time Span:
This is the period of time to be displayed starting at the Start Time. If Scroll Display is enabled it is the period of time displayed, where start time = current time. It is defined in hours (hh), minutes (mm), seconds (ss) and, if

the Display Days option is *checked*, days (dd). It should always be a positive number.

Elapsed Time:
When this option is *checked* the Start Time is defined in terms of time since the recipe began and the graph will be labelled in the same way. On the graph, if Display Days is enabled, the days will be displayed as elapsed days starting at zero.

Real Time:
When this option is *checked* the Start Time is defined in terms of a real (24 hour) time and the graph will be labelled in the same way. On the graph if Display Days is enabled the days will be displayed as a true date (e.g. mm/dd/yy in the USA) The actual format will be that defined in Windows Date settings found in the Control Panel. Real Time cannot be selected when a recipe is being defined, only when the recipe is running or when recalling data from disk.

Scroll Display:
If the **Scroll Display** box is *checked* the last scan will always be shown with the previous scans based on the Time Span setting. Earlier scans will scroll off the screen. When Scroll Display is *checked* the Start Time setting is not available.

Display Days:
If a run is going to last more than 24 hours or, when recalling data, you need to see the date when the data was stored Display Days may be used to show either elapsed days since the start of the recipe or the date. On the graph if Display Days is enabled and the Real Time option is selected then days will be displayed as a true date (e.g. mm/dd/yy in the USA) The actual format will be that defined in Windows Date settings found in the Control Panel. If the Elapsed Time option is selected the days on the graph will be days elapsed from the start of the recipe. When Display Days is enabled the Start Time and Time Span have an additional text box for days (dd).

Log Time Axis:
A simple pumpdown is essentially exponential in nature. Selecting the Log Time Axis option at the same time as the Log y-axis option allows an exponential function to be shown as a straight line which allows much easier prediction of when a desired pressure will be achieved. The position of a point on the Log Time Axis is calculated by taking the Log to base 10 of the

elapsed time in seconds. If the Gradient function is enabled the gradient will become dP/dLog10t or dLog10P/dLog10t instead of dP/dt.

Minor Ticks:
The software labels the X-axis at intervals that are round numbers and far enough apart so that the labels do not overlap. The Minor Ticks option places ticks between the time labels to assist in visually identifying a time.

3.8.8. Key

The Key function allows identification of the various channels, and a direct readout of either the signal or of the slope of the signal.

On:
Displays the Key either at the Top of the graph or at the right of it. The pressures or gradients for all channels will show ?.??E??? until the mouse pointer is placed on the graph and the left mouse button pressed down, the cursor will change to a vertical line. As the cursor is dragged the key is updated. Note that if the left mouse button is released while the cursor is in the active graph area then the Bar Graph or Peak Jump will be set into Fixed Scan display with the scan number being the scan that the cursor was on when the left mouse button was released.

Top:
Causes the Key to be displayed at the top of the graph. It will have no effect if the Key On is not enabled.

Right:
Causes the Key to be displayed at the right of the graph. It will have no effect if the Key On is not enabled.

Reading:
The cursor can read either signal intensity or the gradient (slope) of the graph. To read pressure (or analog or digital signal) select Value. To read the slope of the graph select Gradient. It is important to note that the gradient will use the displayed axis value to determine the slope, that is if log X and log Y-axis have been selected the slope will be based on the Log10 of the signals. For more details on gradient calculation see Span.

Span:
The gradient is calculated by taking all data points that fall within a user specified time window. A least squares algorithm is then used to calculate

the best straight line that fits these data points and the slope of that line is the gradient that is displayed. The time window is the time defined as the Span. The Span window will be centred about the cursor position. As at least two points are required for the slope to be measured if only one point falls within the Span window the gradient will show as ?.??E???.

Clicking the **OK** button will save all changes made to the Trend or insert the new trend if you are adding a trend.

3.9. Alarm Event Viewer

The Alarm Event Viewer is a window which is displayed as a result of an alarm condition occurring if Show Viewer has been enabled. The top part of the viewer window tells the user which Event of how many Events is currently being displayed. The up and down arrows allow the user to scroll through the alarm events when more than has occurred. The time and date when the alarm event occurred is displayed as is the step which caused the alarm. The message associated with the step in the alarm is displayed in the second part of the window.

The audio tone is switched off by checking the Sound Off *check box*.

With Auto Update *checked* the Alarm Event Viewer will be updated if further alarm conditions occur. If Auto Update is not *checked* subsequent alarms can be viewed by using the up and down arrow buttons.

Click on the **Hide Alarm Window** button to stop displaying the Alarm Event Viewer window. It can be displayed again by *clicking* on the View Alarms button on the button bar. If disk storage was not enabled for the recipe any alarm events will be stored in a temporary file that will be overwritten the next time a recipe that has no disk store enabled is run.

3.10. Recall Stored Data

You do not have to have a control unit running or even connected to recall data. To recall stored data *click* on the **Recall Stored Data** button in the Process Eye Select Mode screen. The **Open** *dialog box* will be displayed which is a standard Windows file select type *dialog box*.

Select the file to be recalled from the list in the **File Name**: list box, use the scroll bar to move through the list. The currently selected file name will be

shown in the box at the top.

Select the file type, either Bar Graph (*.WBG), Peak Jump (*.PKJ), Baseline (*.BL) or Zipped (*.ZIP) from the **List File of Type:** *dropdown list* box. The directory can be selected in the **Directories:** box as can the drive from the **Drives** *dropdown list box*.

If a file with the ZIP extension is chosen the original files will be unzipped and saved in a directory in the application directory (Process Eye by default) and recalled from there. When the recall window is closed the files will be deleted.
Once the required file has been selected *click* on the **OK** button or *double click* on the filename to display the data.

The Recall Data screen will look very similar to the Live Data screen displayed whilst the recipe was running. The screen will appear as it did when the recipe was saved. The two key differences are:
the file name will be displayed in the title bar
there will not be a scan dot in the Bar Graph or Peak Jump display.
The Bar Graph or Peak Jump display will be showing scan number 1 which will not change until you ask for another scan.
[See also section Stepping through files.]

3.10.1. Selecting scans

Initially the Bar Graph or Peak Jump display will be showing scan number one. To select another scan to be displayed:
click on the Edit Bar Graph or Edit Peak Jump button
or
select Recall | Edit Bar Graph or Recall | Edit Peak Jump from the *menu bar*
or
right click anywhere on the Bar Graph or Peak Jump.
The Bar Graph Display *dialog box* (or Peak Jump Display *dialog box*) will be shown. In the **Scan:** box use the up and down arrows to select the required scan or type in the required scan number. *Click* on the **OK** button to close the *dialog box* and display the newly selected scan.
If one or more Trends are displayed in the Recall Data window you may change the Bar Graph or Peak Jump scan by *clicking* on the trend at the point in time for the required scan.
You can also step through the scans with the ↑ (up arrow) and ↓ (down arrow) keys when the Bar Graph (or Peak Jump) is active and the Y-axis scroll bar is off.

3.10.2. Edit recall display

Edit Bar Graph or Edit Peak Jump, depending on the file type, allows the display to be modified. The data is not changed only the way it is displayed. *Click* on the Edit Bar Graph button (or Edit Peak Jump button) and the **Display** *dialog box* will appear. The settings in this *dialog box* are the same as those described in Display Edit**,** please refer to this section.

3.10.3. Add recall data trend

Clicking on the Add Trend button or selecting **Recall | Add Trend** from the *menu bar* will display the **Edit Trend** *dialog box* where the settings for the new trend may be defined. This is described in section **Trend settings** earlier in the manual, please refer to this section.

3.10.4. Edit recall data trend

The trend must be the active window before it can be edited, its title bar will show that it is active. *Click* on the Edit Trend button or *right click* anywhere on the graph or select **Recipe | Edit Trend** from the *menu bar* to display the **Edit Trend** *dialog box* which is described in section **Trend settings**.

3.10.5. Delete recall data trend

To delete a Trend it must be the currently active window when the Delete Trend button is *clicked* or **Recall | Delete Trend** is selected from the *menu bar*. (Its title bar indicates it is active.)

3.10.6. Print

Click on the Print button to print a hard copy of the current display. The Bar Graph or Peak Jump scan and any Trend displays will all be printed. The current Printer settings set up in Windows Print Manager will be used.

3.10.7. Comment

Click on the Comment button to display the **Comment** *dialog box* which will contain any comment text stored when the file was created. You may add to or modify the text in the Comment box. *Click* on the **Ok** button to close the *dialog box* and save the changes.

3.10.8. Exit

Click on the Exit button to return to the Select Mode screen.

3.10.9. Stepping through files

To help with data review of related files in a sub-directory you can change the file displayed without loosing the current display settings. *Click* on a trend display to make it active then pressing PageUp or PageDown.

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Section 4.
Recipes

This section of the Process Eye manual deals with creating, editing and deleting recipes.

Any number of recipes may be defined. Process Eye is supplied with eleven factory recipes which allow you to run some recipes without having to learn to create them, although this is very easy. Once defined recipes appear as buttons on the initial (Select Mode) page. To run a recipe simply *click* that recipe's button. If more buttons have been defined than can fit on the Select Mode page a scroll bar appears to allow access to them all. Recipes are created by Adding a new recipe, Editing an existing recipe or Copying an existing recipe and then Editing it. Six types of recipe are available: Bar Graph, Peak Jump, Analog Peaks, Leak Check, Faraday Calibration and Multiplier Calibration.

It is not necessary to have a Microvision Plus or HPQ-2 connected to the PC running Process Eye in order to create recipes (or to recall previously stored data). To force the program to run in the "Recall" mode it may be started with a /X on the command line. If no control unit is detected you will be given the option of running in recall mode.

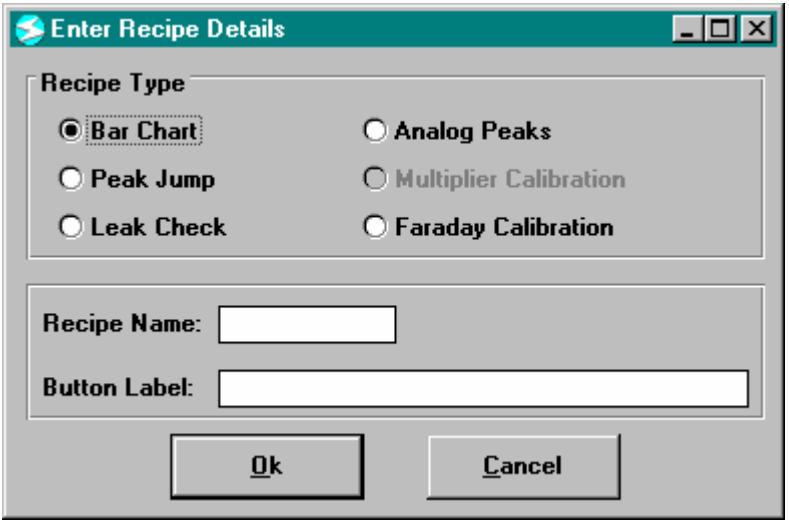
4.1. Recipe types

There are six types of recipe used in Process Eye. Data acquisition is done using bar graph and peak jump recipes which are each configured via eleven wizard style *dialog boxes*. Faraday and multiplier calibrate recipes are used to calibrate the Faraday and electron multiplier detectors respectively and are configured by two *dialog boxes*. Calibrate Multiplier recipes will not be available if your control unit is an HPQ-2 or your Microvision Plus does not have an electron multiplier detector. One of the most common uses for any RGA is vacuum leak checking. In Process Eye this is done by creating a leak check recipe using two wizard style *dialog boxes*. One of the factory recipes is a leak check recipe so, you do not have to create a recipe before you are able to start leak checking. The sixth type of recipe is an analog peaks recipe. Analog peaks is used to assess the condition of the quadrupole analyzer and make adjustments to the mass alignment and resolution

settings. Analog recipes are created using two *dialog boxes*, again one of the factory recipes in an analog recipe.

4.2. Adding Recipes

From the initial Select Mode page *click* on the Add Recipes button or select **Recipe | Add Recipe** from the *menu bar* to open the **Enter Recipe Details** *dialog box*, shown below.



Set the following items.

Recipe Type:

This will determine the type of recipe that is created. *Click* on one of the six *radio buttons*; Bar Graph, Peak Jump, Analog Peaks, Leak Check, Multiplier Calibration or Faraday Calibration.

Recipe Name:

The DOS filename that the Recipe will be saved as. Recipe names cannot include any of the following characters: forward slash (/), backslash (\), greater-than sign (>), less-than sign (<), asterisk (*), question mark (?), quotation mark ("), pipe symbol (|), colon (:), or semicolon (;), and must be limited to eight characters in length.

Button Label:

This is the text that will appear on the Recipe button. It may be any text and up to 34 characters long.

Select **Ok** to continue.

You will enter a Wizard style series of *dialog boxes* which are explained in the following sections.

4.3. Copying Recipes

An existing recipe may be copied. This is useful if you need to create a number of recipes with similar settings. To copy a recipe *click* on the Copy Recipe button or select **Recipes | Copy Recipe** from the *menu bar*. The Select a Recipe *dialog box* will be displayed, select a recipe from the list and *click* **OK** or *double click* the desired recipe. The type of recipe will be indicated in the **Enter Recipe Details** *dialog box*, enter a new unique Recipe Name and Button Label. *Click* on the **OK** button when finished.

4.4. Recipe Setup

When you add or edit recipes you do so by setting or accepting the parameters in a series of wizard style *dialog boxes*. Which *dialog boxes* are displayed will depend on the type of recipe. There are seventeen set up *dialog boxes* in total with a maximum of eleven used to configure any one recipe (Bar Graph and Peak Jump recipes). When you have configured the settings in the *dialog boxes* the previous steps may be reviewed and changed by moving backwards and forwards through them with the **<Back** and **Next>** buttons. When all settings are correct *clicking* on the **Finish** button will save the recipe or enter the display edit window in the case of Bar Graph and Peak Jump recipes. *Clicking* on the **Cancel** button will close the recipe create process and none of the settings will be saved.

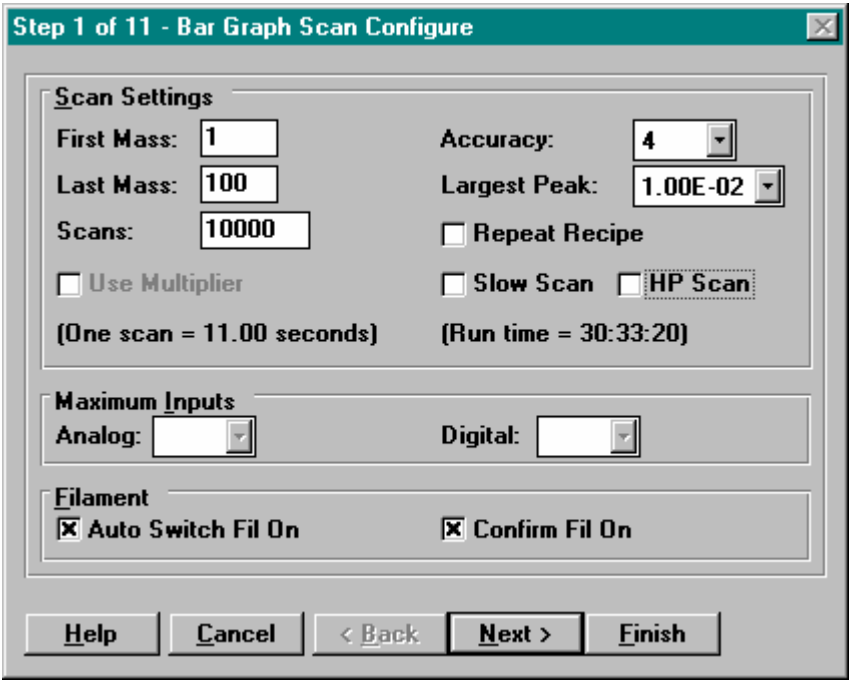
The following sections describe each of the seventeen set up *dialog boxes*.
Bar Graph Scan Configure
Peak Jump Scan Configure
Disk Store Settings
Trigger Settings
Hold Settings
Background Settings
Baseline Settings
Action Channel Settings
End of Scan Actions
Start and End of Recipe
Bar Graph Display Settings

Peak Jump Display Settings
Faraday Calibrate Settings
Multiplier Calibrate Settings
Leak Check Settings
Analog Settings
Set Access

4.4.1. Bar Graph Scan Configure

Used in recipes: Bar Graph

Selecting Bar Graph in the **Enter Recipe Details** *dialog box* will bring up the **Bar Graph Scan Configure** *dialog box,* as shown below which contains a number of sections. Set (or leave at the default setting) the following items.



Scan settings
First Mass:
This is the first mass scanned in the Bar Graph scan. It must be in the range 1 to the maximum mass range of the instrument. In addition the First Mass must be less than or equal to the Last Mass.

Last Mass:
The Last Mass scanned in the Bar Graph scan. Masses outside of the range First Mass to Last mass will not be measured.
Scans:
The Scans defines the maximum number of scans that will be measured and (optionally) stored to disk. The recipe that is being run may be terminated at any time (using the "**Abort**" button) so that fewer scans may be stored. The data that has been measured so far will be preserved if an Abort is performed.
Accuracy:
In any measurement there is a trade-off between speed and precision. The Accuracy defines the time that is spent taking each reading. Increasing Accuracy causes the scan to slow down and readings to become more precise. Accuracy is always in the range 0 (one reading per point) to 9 (512 readings per point). We recommend accuracy code 3 as a starting point.
Largest Reading:
The hardware and software in Process Eye allows upto six decades of information to be acquired in one scan. This range may be moved up and down by selecting the Largest Reading. The smallest valid reading will be upto six decades lower if a sufficiently high Accuracy has been selected. Selecting Scan All will cause two gain ranges to be used to give a wider dynamic range of pressures.
Repeat Recipe:
If the **Repeat Recipe** *check box* is *checked* when the recipe is complete (the required number of scans have been scanned) the recipe will be re-run after a short delay of about 2 seconds.
Use Multiplier:
If the optional Electron Multiplier is fitted *checking* **Use Multiplier** will cause it to be selected when the Recipe is run. Changing the detector will affect the largest peak that can be measured. The multiplier is appropriate for measuring smaller values of partial pressure.
Slow Scan:
The instrument has two methods of measuring the value of partial pressure at a mass. It can either scan in small mass increments from -0.5 AMU to + 0.5 AMU about the nominal peak position (Slow Scan) or it can take a single reading at the nominal peak position. When settling delays are taken into account the slow scan is about eight times slower than fast scan. Unless it is essential to scan quickly the slow scan method is recommended as any errors in Mass Alignment will have no effect in Slow Scan since the highest point in the peak is determined and used.
HP Scan:

This is only avaliable if your control unit is an HPQ-2.
Checking **HP Scan** causes measurements to be made using the High Pressure mode instrument settings. Otherwise, the RGA mode settings are used. See section Mode setting (HPQ-2).

Many of the Scan Settings effect the time taken for one scan and/or the recipe run time. The approximate time for one scan and the entire run are displayed at the foot of the Scan Settings area. They are updated each time a parameter changes.

Maximum Inputs

In addition to measuring partial pressures the Process Eye program can measure and log Analog and Digital signals. The appropriate hardware will need to be installed to allow Analog and Digital inputs to be enabled. Call your local Spectra facility for details of supported hardware. Note that analog and digital signals are measured at the end of the partial pressure scan and they are only displayed in trend views of the data.

Analog Inputs:

The number of ± 10 Volt (or ± 5 Volt) Analog inputs

Digital Inputs:

The number of TTL compatible Digital inputs

Filament

The mass spectrometer requires a filament to be on before valid readings may be taken. When a recipe is run the filament selected in Preferences may be automatically be switched on if is not already on. This option allows the user to be prompted to confirm that the vacuum system is at a low enough pressure to switch on the filament without damaging it. This option should always be enabled unless the "External Trip" input on the rear panel of the Microvision Plus or HPQ-2 is being used to protect the filaments.

The filament may also be switched on in Start/End of Recipe Actions. If the filament is to be used to measure a Trigger value it must be switched on before the recipe starts or, at this point. If, for example, an independent gauge is used for the (optional) trigger then it may be necessary to leave the filament off at this point, wait for the external gauge to act as a trigger (e.g. in a pumpdown) and then use the Start/End of Recipe Actions to turn on the filament with an optional delay to allow it to settle.

Auto Switch Fil On:

If the **Auto Switch Fil On** box is *checked* the Filament will automatically be switched on when the recipe is run. The user may be asked for confirmation depending on the setting of the **Confirm Fil On** *check box*.

Confirm Fil On:

If the **Confirm Fil On** box is *checked* a warning box will be displayed

before the filament is automatically switched on at the start of a recipe.

When all settings in the **Bar Graph Scan Configuration** *dialog box* have been entered *click* on the **Next>** button to open the **Disk Store** *dialog box*. Until the **Finish** button is *clicked* you may return to the **Bar Graph Scan Configuration** *dialog box* by *clicking* on the **<Back** button.

4.4.2. Peak Jump Scan Configure

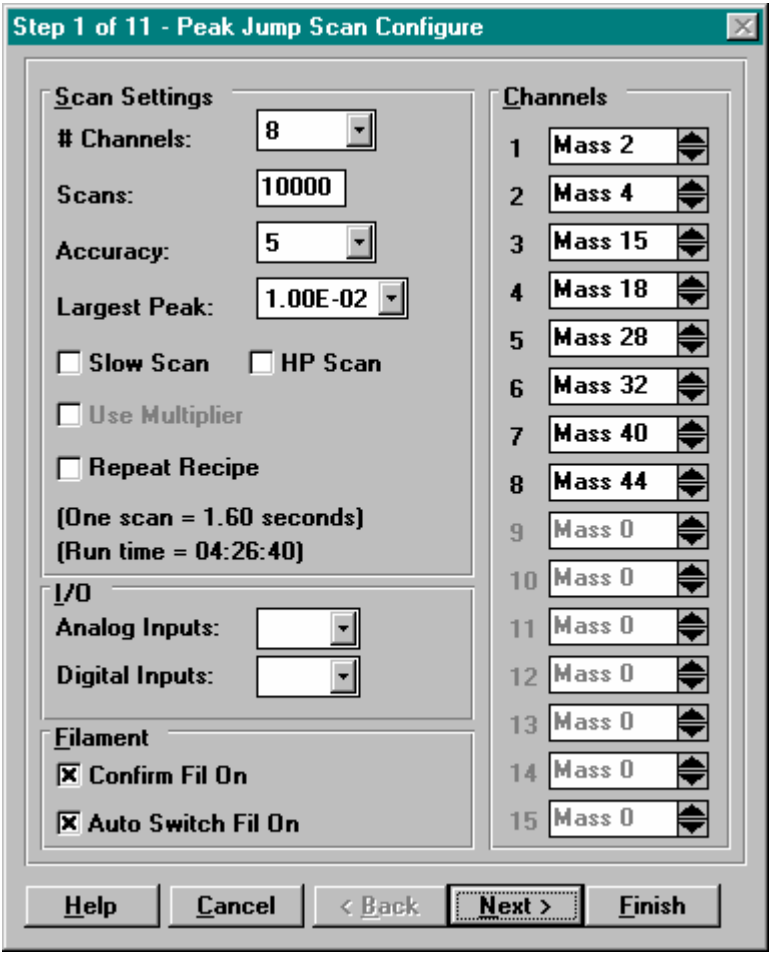
Used in recipes: Peak Jump

If Peak Jump is selected in the **Enter Recipe Details** *dialog box* the **Peak Jump Scan Configure** *dialog box* will be displayed, as shown below.

Set (or leave at default setting) the following items:
Scan settings
 # Channels:
The number of channels defines how many partial pressures will be measured. It is always in the range 1 to 15 inclusive. Channels higher than this number are disabled.

Scans:
The Scans defines the maximum number of scans that will be measured and (optionally) stored to disk. The recipe that is being run may be terminated at any time (using the Abort button) so that fewer scans may be stored. The data that has been measured so far will be preserved if an Abort is performed.

Accuracy:
n any measurement there is a trade-off between speed and precision. The Accuracy defines the time that is spent taking each reading. Increasing Accuracy causes the scan to slow down and readings to become more precise. Accuracy is always in the range 0 (one reading per point) to 9 (512 readings per point). We recommend accuracy code 3 as a starting point.



Largest Peak:
The hardware and software in Process Eye allows upto six decades of information to be acquired in one scan. This range may be moved up and down by selecting the Largest Reading. The smallest reading will be upto six decades lower if a sufficiently high Accuracy has been selected.

Slow Scan:
The instrument has two methods of measuring the value of partial pressure at a mass. It can either scan in small mass increments from -0.5 AMU to + 0.5 AMU about the nominal peak position (Slow Scan) or it can take a single

reading at the nominal peak position. When settling delays are taken into account the slow scan is about eight times slower than fast scan. Unless it is essential to scan quickly the slow scan method is recommended as any errors in Mass Alignment will have no effect in Slow Scan since the highest point in the peak is determined and used.

HP Scan:

This is only avaliable if your control unit is an HPQ-2.

Checking HP Scan causes measurements to be made using the High Pressure mode instrument setting. Otherwise, the RGA mode settings are used. See section Mode setting (HPQ-2).

Use Multiplier:

If the optional Electron Multiplier is fitted *checking* **Use Multiplier** will cause it to be selected when the Recipe is run. Changing the detector will affect the largest peak that can be measured. The multiplier is appropriate for measuring smaller values of partial pressure.

Repeat Recipe:

If the **Repeat Recipe** *check box* is *checked* when the recipe is complete (the required number of scans have been scanned) the recipe will be re-run after a short delay of about 2 seconds.

Many of the Scan Settings effect the time taken for one scan and/or the recipe run time. The approximate time for one scan and the entire run are displayed at the foot of the Scan Settings area. They are updated each time a parameter changes.

I/O

For each enabled channel (set using # Channels) a partial pressure mass is defined. In addition to measuring partial pressures the Process Eye program can measure and log Analog and Digital signals. The appropriate (optional) hardware will need to be installed in order for Analog and Digital inputs to be enabled. Note that analog and digital signals are measured at the end of the partial pressure scan and they are only displayed in trend views of the data.

Analog Inputs:

The number of ± 10 Volt (or ± 5 Volt) Analog inputs.

Digital Inputs:

The number of TTL compatible Digital inputs.

Filament

The mass spectrometer requires a filament on before valid readings may be taken. When a recipe is run the filament selected in Preferences will automatically be switched on if is not already on. This option allows the user to be prompted to confirm that the vacuum system is at a low enough

pressure to switch on the filament without damaging it. This option should always be enabled unless the "External Trip" input on the rear panel of the Microvision Plus or HPQ-2 is being used to protect the filaments.
The filament may also be switched on in Start/End of Recipe Actions. If the filament is to be used to measure a Trigger value it must be switched on before the recipe starts or, at this point. If, for example, an independent gauge is used for the (optional) trigger then it may be necessary to leave the filament off at this point, wait for the external gauge to act as a trigger (e.g. in a pumpdown) and then use the Start/End of Recipe Actions to turn on the filament with an optional delay to allow it to settle.

Switch Filament On:

If the **Switch Filament On** box is *checked* the filament will automatically be switched on when the recipe is run. The user may be asked for confirmation depending on the setting of the **Confirm Fil On** *check box*.

Confirm Filament On:

If the **Confirm Fil On** box is *checked* a warning box will be displayed before the filament is automatically switched on at the start of a recipe.

When all settings in the **Peak Jump Scan Configuration** *dialog box* have been entered *click* the **Next>** button to open the **Disk Store** *dialog box*. Until the **Finish** button is *clicked* you may return to the **Peak Jump Scan Configuration** *dialog box* by *clicking* the **<Back** button.

4.4.3. Disk Store Settings

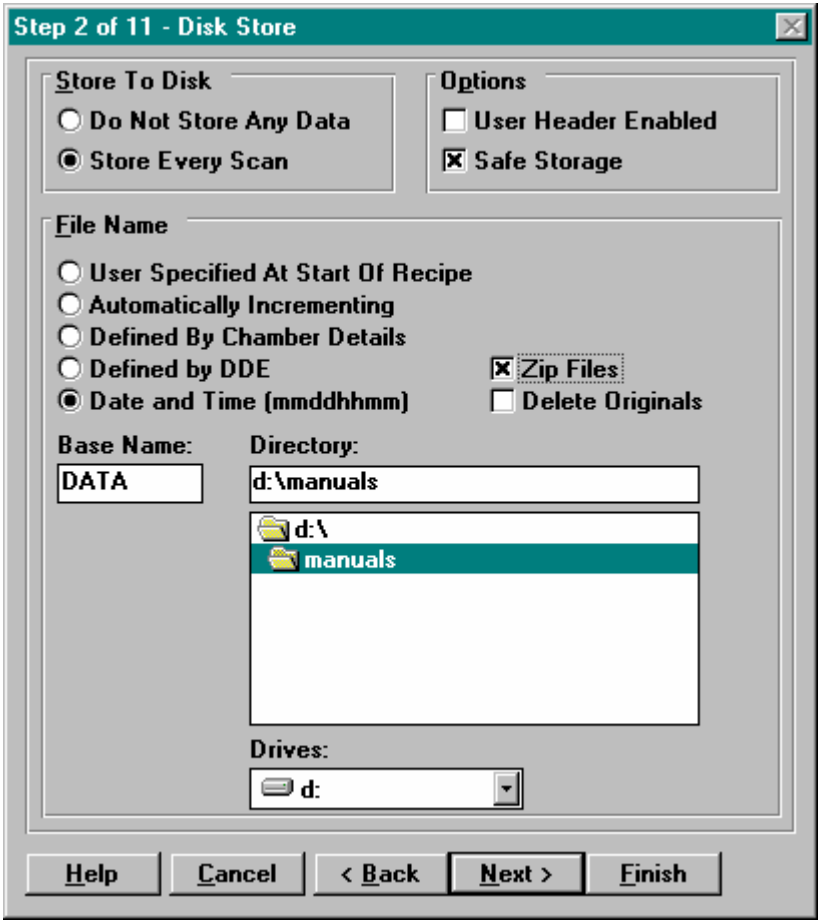
Used in recipes: Bar Graph, Peak Jump

Step 2 of creating a Bar Graph or Peak Jump recipe is to define the disk store parameters.

Store To Disk

Do Not Store Any Data:

Checking this option disables disk storing of data. Measured data will be displayed but it cannot be recalled at a later date. This option would not normally be used.



Store Every Scan:
At the end of each scan all partial pressures, the total pressure and any Analog, Digital or Action channel data will be stored to disk to either the user entered filename or the Automatically Incrementing filename.

File name
User Specified At Start Of Recipe:
If enabled when the recipe is run the operator will be prompted to enter a filename using a standard windows filename *dialog box*.

Automatically Incrementing:

If this option is enabled when the recipe is run the program will create a filename using the Base Name and a number which is increased by one with each file stored to disk.

Define By Chamber Details:
The filename is based on the serial number and chamber details for a specific PVD sputter system. This is specific to Applied Materials and is not generally used.

Defined by DDE:
The filename will be defined by the filename parameter associated with the RUN RECIPE DDE command. e.g. The DDE command:

RUN RECIPE,1,c:\data\head1\run001.wbg

would only store data in a file c:\data\head1\run001.wbg if recipe with number 1 (in Proc.ini / Procnnn.ini) had Define by DDE as the filename type. Note that the directory c:\data\head1 must exist before the recipe is run with the DDE Run Recipe command.

Date and Time (mmddhhmm):
The filename will be created automatically based on the time and date. The first two characters of the filename will be defined by the month, the second two by the day, the next two by the hour and the last two by the minutes. For instance, a Bar Graph recipe started at 9:40 pm on 19th March would have the filename 03192140.WBG. If the recipe is repeated within a minute, thereby calling for an identical filename, the user will be prompted to wait for a minute. We recommend the use of this method of automatically creating filenames.

Base Name:
When the filename has been set to Automatically Incrementing the program uses the Base Name as the root of the created file name. For example if a Base Name of DATA was chosen, the first data file will be named DATA0000.WBG the second file will be named DATA0001.WBG and so on.

Be aware of the DOS limitation of eight character filenames. In the above example a total of 10,000 files are possible (DATA0000.WBG to DATA9999.WBG). If the base name used seven characters you would only have a maximum of 10 distinct file names before older file names would be reused and the data overwriten.

Directory:
The DOS directory that the automatically created files will be placed in. This directory must already exist before an attempt to store data is made.

Drives:
The disk drive where the directory for automatically created files is located.

Zip Files:
When the recipe has finished running, the four files relating to it (the data file (.WBG for Bar Graph recipes .WPJ for Peak Jump recipes), the information file (.INF), the optional comment file (.TXT) and the optional alarm event file (.ALM) will be compressed into a single file with the same name but with the extension .ZIP. The ZIP file uses less disk space than the normal Process Eye data files and keeps all related files together.

Delete Originals:
Delete Originals is only available when **Zip Files:** is *checked* and will cause the original Process Eye data files to be deleted so that only the ZIP file is saved.

Options
User Header Enabled:
When a data file is stored to disk, header information is stored at the start of the file. This information includes such things as the time and date, software version numbers, number of scans etc. In addition to the information automatically recorded it is possible to configure the system to prompt the operator to enter additional fields of information which may later be accessed if the data file is loaded into a spreadsheet, database or word processor. To enable the User Header feature first configure the fields in the **Preferences** *dialog box* found in the **Utilities** menu.

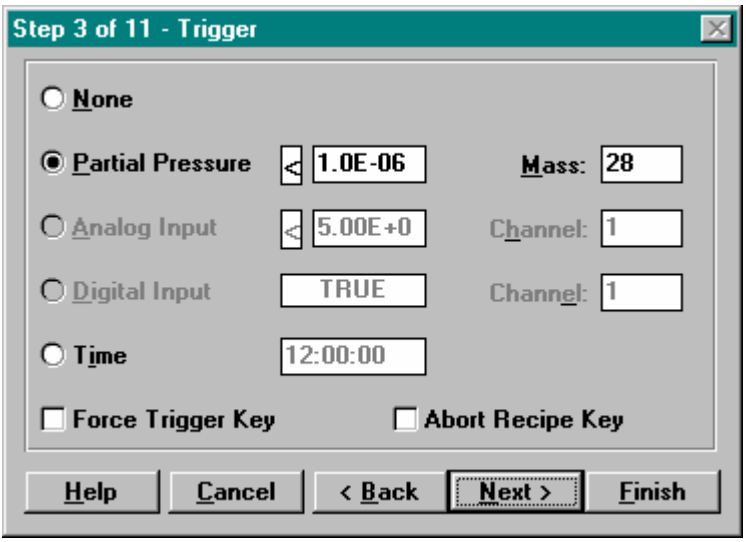
Safe Storage:
When the **Safe Storage** box is *checked* the disk file is closed after each scan. This means that if the computer shuts down say, due to lost of power, the data stored so far will not be lost. Unless you are running fast scans on a slow PC we recommend Safe Storage to be enabled as the overhead is very small.

Selecting **Next>** will display the **Trigger** *dialog box*.

4.4.4. Trigger Settings

Used in recipes: Bar Graph, Peak Jump

Step three of creating or editing a Bar Graph or Peak Jump recipe is to configure the Trigger settings. If the Trigger feature is enabled, then, when a recipe is started, it will initialize and then go into a holding pattern. The usual reason to do this is to synchronize the start of data storage with an external event. This becomes vital when multiple data files are to be combined into a Baseline. When waiting for a trigger condition to become true the current value and the Trigger point are displayed. There are a number of Trigger options.



None:
On starting the recipe, scanning and data storage (if enabled) start straight away.

Partial Pressure:
When selected, the recipe will hold until the partial pressure of the selected mass is either less than or greater than the programmed value. To toggle between < (less than) and > (greater than) *click* on the </> symbol. The programmed value is in the currently selected units. Enter the mass value in the **Mass:** box. The partial pressure will be measured at the same accuracy and the same scan type (slow or fast) as the Scan Settings for that recipe.

Analog Input:
If the optional Analog input hardware has been installed, configured and at least one Analog input has been selected in the Scan Settings then an Analog Input may be used as a Trigger. The trigger point may be toggled between < (less than) and > (greater than) by *clicking* on the </> symbol. If more than one Analog Input is available the desired one can be selected in the **Channel:** box.

Digital Input:
If the optional Digital input hardware has been installed, configured and at least one Digital input has been selected in the Scan Settings then a Digital Input may be used as a Trigger. The trigger point may be toggled between True (>2.4V) and False (<0.8V) by *clicking* on the True/False text. If more than one Digital Input is available the desired one can be selected in the **Channel:** box.

Time:
When enabled if the time exceeds the programmed value the recipe will start. The time is defined in twenty four hour format.

Force Trigger Key:
Checking the **Force Trigger Key** *check box* will cause the **Force Trigger** button to be available in the Trigger panel. The recipe may be started by *clicking* on the **Force Trigger** button when it is in a holding pattern waiting for the trigger event.

Abort Recipe Key:
Checking the Abort Recipe Key *check box* will cause the **Abort Recipe** button to be available in the Trigger panel. When the recipe is in a holding pattern waiting for the trigger event the Trigger window will be displayed and the recipe may be terminated by *clicking* on the **Abort Recipe** button.

If you enter a trigger condition that never occurs the only way to exit from the recipe is to use the **Abort Recipe** button or the **Force Trigger** button. We recommend you to enable the Abort Recipe Key at least until you are sure your recipe runs satisfactorily.

When the recipe is run Process Eye will go into a holding pattern waiting for the trigger to occur. During this time the software continuously monitors the trigger input to ensure a rapid response as soon as the trigger event occurs.

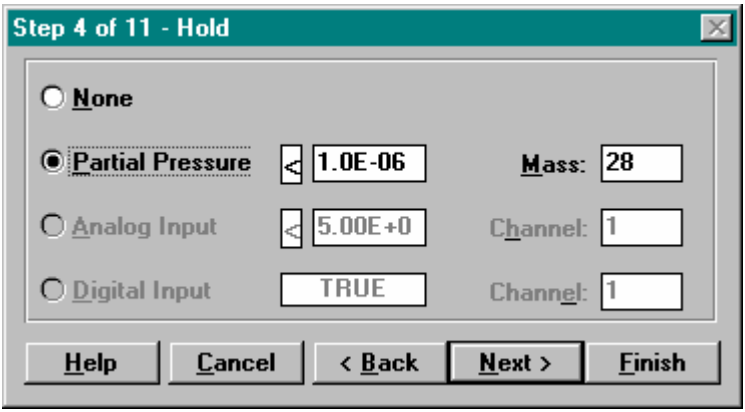
TIP
The trigger feature only allows a single input to start the recipe. If you want a more complex series of events such as, mass 28 > 5x10-7 Torr OR mass 18 > 1x10-7 Torr AND digital input 3 true you should create a recipe to determine the condition. The outcome of this recipe will simply be to start the main recipe.

Selecting **Next>** will display the **Hold** *dialog box*.

4.4.5. Hold Settings

Used in recipes: Bar Graph, Peak Jump

Step four of creating a Bar Graph or Peak Jump recipe is to define the hold parameters.



There may be periods during a recipe run when there is no need, or you don't want to store data. It is possible to temporarily stop the recipe and let it continue again based on one of the four parameters defined below.

None:
The Hold function is not used and the recipe will run continuously.

Partial Pressure:
When selected, the recipe will hold while the partial pressure of the selected mass is either less than or greater than the programmed value. To toggle

between < (less than) and > (greater than) *click* on the </> symbol. The programmed value is in the currently selected units. The partial pressure will be measured at the same accuracy and the same scan type (slow or fast) as the Scan Settings for that recipe.

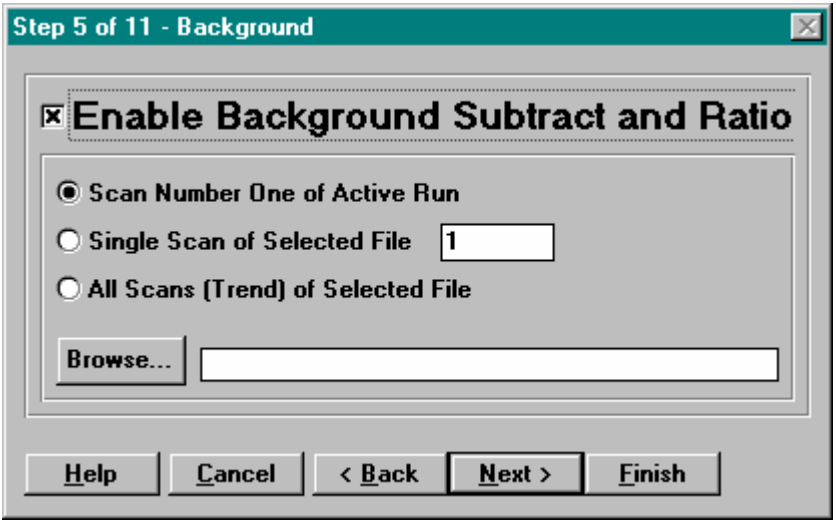
Analog Input:
If the optional Analog input hardware has been installed, configured and at least one Analog input has been selected in the Scan Settings then an Analog Input may be used as a Hold parameter. The trigger point may be toggled between < (less than) and > (greater than) by *clicking* on the </> symbol. If more than one Analog Input is available the desired one can be selected in the **Channel** box.

Digital Input:
If the optional Digital input hardware has been installed, configured and at least one Digital input has been selected in the Scan Settings then a Digital Input may be used as a Hold parameter. The trigger point may be toggled between True (>2.4V) and False (<0.8V) by *clicking* on the True/False text. If more than one Digital Input is available the desired one can be selected in the **Channel** box.

Selecting **Next>** will display the **Background** *dialog box*.

4.4.6. Background Settings

Used in recipes: Bar Graph, Peak Jump



Configuring the background settings is step five of creating or editing a Bar Graph or Peak Jump recipe. A background is defined in Process Eye as a data scan or scans that are used to modify either the data being measured or data previously stored. It is important to realize that it is only the display of the data that is modified, not the data itself. In fact it is possible to show data in its raw form and, simultaneously, in its modified state. It is possible to modify the Bar Graph and Peak Jump scanned data displays and Trend views. Data may have a background either subtracted from it or ratioed to it. There are three types of Background data:

Enable Background Subtract and Ratio:
To enable Backgrounds and access the settings **Enable Background Subtract and Ratio** must be *checked*.

Scan Number One of Active Run:
When selected the first scan of data in the current run is used as the Background data.

Single Scan of Selected File:
A single scan of a file selected using the **Browse . . .** button is used as the Background data. To ensure best results it is recommended that a file stored using a recipe the same as that which is being created is used as the Background file. To do this create a recipe, store the data file(s) and then use Edit Recipe to modify it.

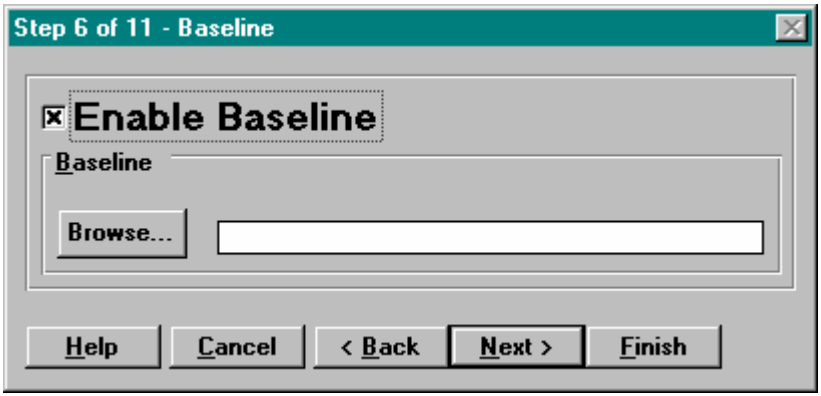
All Scans (Trend) of Selected File:
In this setting each scan in the data has a corresponding scan in the background file selected using the **Browse . . .** button. To ensure best results it is recommended that a file stored using a recipe the same as that which is being created is used as the Background file. To do this create a recipe, store the data file(s) and then use Edit Recipe to modify it.

Browse:
This button brings up a standard Windows file *dialog box* to let the desired file be selected.

Clicking on the **Next>** button will display the **Baseline** *dialog box*.

4.4.7. Baseline Settings

Used in recipes: Bar Graph, Peak Jump



This is step six of creating or editing a Bar Graph or Peak Jump recipe. A Baseline is defined in Process Eye as a statistical combination of one or more data files. A Baseline actually consists of two files, a Mean file and a Standard Deviation file. To help visualize a Baseline think of a single data file as a spreadsheet with consecutive rows corresponding to consecutive scans and readings of the same mass (or Analog or Digital channel) being in the same column. Multiple data files (spreadsheets) are then placed on top of one another and by "drilling" down through the sheets a series of numbers are obtained at each row/column intersection. These numbers are used to calculate the Mean and Standard Deviations. The Mean file has a default extension of .BL and the Standard Deviation file uses .SD. The Mean file is

in the same format as a regular data file and it may be viewed in the regular way. As a display modify option a Baseline is similar to Background Subtract and Ratio but the displayed data is now the difference between the data and the mean file and it is expressed in standard deviations. So if a particular point on a scan had a value of 2.2 E-06 and the corresponding Mean and Standard Deviation for that point were 2.1E-6 and 0.05E-06 then the modified point would have a value of +2.0 Standard Deviations from (2.2-2.1)/0.05.
However, in addition to acting as a display modifier the modified value can be used as an alarm. This is a powerful and efficient means of monitoring abnormal changes in gas or vacuum conditions.

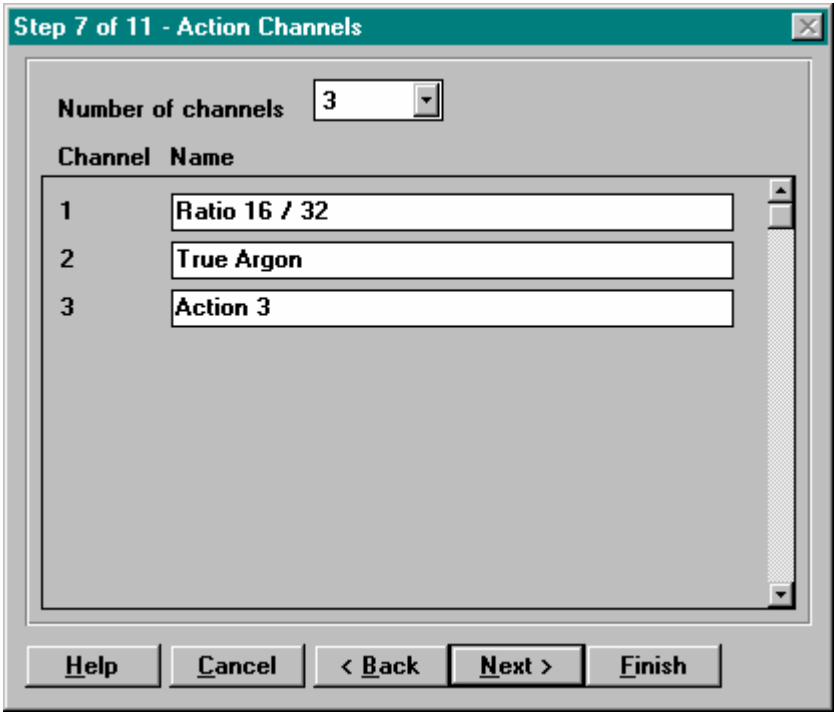
Enable Baseline:
To enable Baseline and access the settings **Enable Baseline** must be *checked*. Once a Baseline has been selected the data (in Bar Graph, Peak Jump or Trend) may be displayed in terms of standard deviations from the mean (the linear display with a Display minimum of -10, a maximum of +10 and a decade of E+00 usually gives the clearest display of data in the "Standard Deviation" display mode.

File Name:
The **Browse . . .** button allows the required Baseline file to be selected. Only the .BL file need be selected, the corresponding .SD file will automatically be used.

Click on the **Next>** button to display the **Action Channels** *dialog box*.

4.4.8. Action Channel Settings

Used in recipes: Bar Graph, Peak Jump



The seventh step in creating or editing a Bar Graph or Peak Jump recipe is to configure the action channels. An action channel is a user defined channel displayed and stored in Process Eye in the same way as a partial pressure. The action channel will usually be based on one or more partial pressures or external inputs (analog or digital or even other Action channels). For example you may wish to display as a trend the ratio of oxygen to nitrogen so you could set Action Channel 1 to mass 28 / mass 32. In this step we tell Process Eye the number of action channels we wish to use and then name them. The condition or calculation for the action channel is defined in the next step.

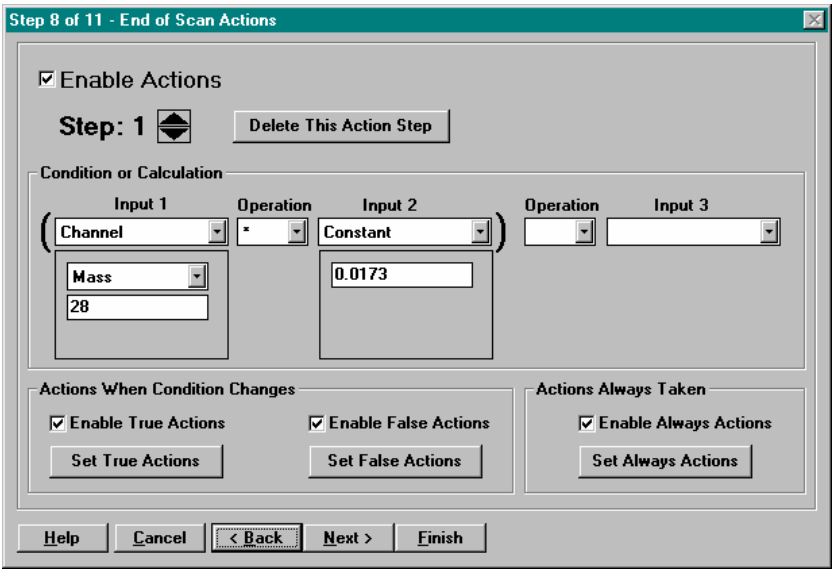
Click on the **Number of channels** *dropdown list box* then, *click* on the required number in the list. In the **Channel Name** section of the *dialog box* there will be one box for each channel. Position the cursor in the box and type the required name or, leave it set to the default.

If no Action channels have been defined the Save Calculation function in End of Scan Actions True/False/Always Actions will be disabled.

Click on the **Next>** button to display the **End of Scan Actions** *dialog box*.

4.4.9. End of Scan Actions

Used in recipes: Bar Graph, Peak Jump



The End of Scan Actions provides Process Eye with one of its most powerful features where complex conditions may be built up using a wide variety of parameters. The End of Scan Actions consist of an unlimited number of steps with each step being based on a condition statement or calculation. As a result of the condition statement certain actions may take place. The result of one step may be used as an input to another step enabling complex condition statements to be constructed. The evaluation of all the condition statements in all the steps occurs at the end of each scan when the recipe is running, hence the name, End of Scan Actions. Each condition statement contains up to three inputs and two operations. Each input can be for example, a partial pressure reading, a constant, mean, standard deviation or the result of a previous step. The operation can be a mathematical or a logic operation. When the defined condition is met or changes an action will take place. Actions can consist of displaying a message, enabling an audio alarm, setting a digital output, set the RVC, switch a filament, starting a recipe or providing a result for another step.

The steps are evaluated (step 1 first, then step 2 and so on) at the end of each scan. Note that the second operation and third input of each step are optional and may be left blank.

Enable actions
Click on the **Enable Actions** *check box* to enable the End of Scan Actions facility.

Delete action step
Click on the **Delete This Action Step** button to delete the action step. The **Delete This Action Step** button is only enabled when the last step is selected. A warning box will be displayed, *click* on the **OK** button to delete the step.

Enter the condition using up to three inputs and two operations. *Click* on the **Input 1** *dropdown list* (*click* on the down arrow to the right of the **Input 1** box) then *click* on the required input type. The various input types are described below. Depending on the input type one or two additional boxes may be displayed below the input box, these are also described below for each input type.

Click on the **Operation** *dropdown list* then, *click* on the required operation in the list. The operations are fully described below.

Repeat the above for Input 2.

A second operation and a third input can be added if required.

Each of the three input dropdown lists are identical as are the two operation dropdown lists.

Inputs
Channel
Select channel from the **Input** *dropdown list box* to use a channel input. A second *dropdown list box* will be displayed, from which the type of channel input should be selected and possibly another box, the variable box, will be displayed below this depending on the type of channel input. From the second *dropdown list box*, used to select the type of channel input, see NOTE below.

Abs (Std dev from mean)
A number of standard deviations from the mean. Only valid when a baseline file is loaded for the currently running recipe.

Mean
The average value for the specified input. Only valid when a baseline file is loaded for the currently running recipe.

Std dev
The standard deviation for the specified input. Only valid when a baseline file is loaded for the currently running recipe.

Background
The background value for the specified input. Only valid when a background file is loaded for the currently running recipe.

Gradient
The slope of a curve as a loglog slope defined for a channel for the specified input. By default the last 10 points are used to define the gradient.

Summation
The sum of the values from the start of the recipe to current scan for the specified input. By default all scans in the run are included in the summation calculation.

NOTE
Channel, Abs, mean, std. dev., background, gradient and summation all use a second *dropdown list box* where Mass, Total, Action, Analog or Digital may be selected. They all generate data corresponding to the current scan. Select Mass to use a partial pressure measurement in which case enter the mass number in the variable box. For Bar Graph recipes the mass must be within the mass range being scanned. For peak jump recipes the mass value must be the same as one of the enabled channels. Select Total to use the total pressure reading. There will be no variable box when this is selected. Select Action to use one of the action channels. The variable box will be replaced with a *dropdown list box* from which you should select the required action channel. The number and names of the action channels displayed in this *dropdown list box* will depend on the settings in step 7.

Constant
A constant value. The input is a free format so standard and scientific

formats are valid. i.e. to enter 100 either type 100, 100.00, 1E2, 1.00E+2 etc.

Step Result
The result of a previous step condition. Enter the number of the step in the variable box.

Variable
Process Eye supports any number of user defined variables. Variables allow complex condition statements to be built up using more than the three inputs allowed in a single condition statement. Before a variable can be entered as an input it must be used to save a result from a prior end of scan action step. Enter the number of the variable in the variable box. Variables are named 1, 2, 3 etc..

Timer
The number of seconds since a timer was started. Any number of timers are allowed, enter the timer number in the variable box. If a timer has not been started it will be given a value of 0.0. Timers are named 1, 2, 3 etc..

Scan Number
The current scan number. This will be 1 the first time a step is evaluated, two the second time etc. because steps are evaluated at the end of each scan.

Time from start
The time from the start of the recipe in seconds.

Operations
Below we assume the first operation is being used and therefore, being applied to inputs 1 and 2. The second operation is identical but will, of course, involve input 3.
There are two types of operations:
Mathematical such as + (add) and - (subtract) which take one or two numbers as inputs and generate another number as a result
Logical such as > (greater than) and = (equal) which take two numbers as inputs and generate either true (1) or false (0) as a result.

Some operators such as NOT (invert) and LOG (log base 10) only need a single input. In these cases the second input will be ignored.

+ Performs the mathematical add function. Adds input 1 to input 2.

- Performs the mathematical subtract function. Subtracts input 2 from input 1.

* Performs the mathematical multiply function. Multiplies input 1 by input 2.

/ Performs the mathematical divide function. Divides input 1 by input 2.

> Greater than. Evaluates whether input 1 is greater than input 2.

< Less than. Evaluates whether input 1 is less than input 2.

>= Greater than or equal to. Evaluates whether input 1 is greater than or equal to input 2.

<= Less than or equal to. Evaluates whether input 1 is less than or equal to input 2

= Equal to. Evaluates whether input 1 is equal to input 2.

Take care when using the = (equals) operator. For example do not use Timer 1 = 15 to do something because the first time Timer 1 is evaluated it may have a value of 14.6 say, the next time it is evaluated it may have a value of 15.6. Instead use Timer 1 > 15 or >= 15.

<> Not equal to. Evaluates whether input 1 is not equal to input 2.

AND Performs the logical AND function. Input 1 AND input 2.

OR Performs the logical OR operation. Input 1 OR input 2.

XOR Performs the logical exclusive OR operation. Input 1 XOR input 2.

NOT Performs the logical invert operation. There is no second input involved. Invert input 1.

LOG Calculates the logarithm to the base 10 of input 1. There is no input 2.

10^ Takes input 1 and raises it to the power 10. There is no input 2.

LN Calculates the logarithm to the base e of input 1. There is no input 2.

EXP Takes input 1 and raises it to the power of e. There is no input 2.

Once the condition you have specified is meet you will want some action to take place. The process of defining the action begins with the **Actions When Condition Changes** section of the *dialog box* and continues with the second page of the **End of Scan Actions** *dialog box*. See Enable Actions for more details.

Enable Actions
Enable True Actions
Check the **Enable True Actions** *check box* to allow the actions to take place when the condition statement changes from false to true. Once Enable True Actions is enabled the **Set True Actions** button will become available (cease being *grayed out*).

Enable False Actions
Check the **Enable False Actions** *check box* to allow the actions to take place when the condition statement changes from true to false. Once Enable False Actions is enabled the **Set False Actions** button will become available (cease being *grayed out*).

Set True Actions
Click on the **Set True Actions** button to open the second page of the End of Scan Actions *dialog box* where the actions to take place when the condition changes from false to true may be configured.

Set False Actions
Click on the **Set False Actions** button to open the second page of the **End of Scan Actions** *dialog box* where the actions to take place when the condition changes from true to false may be configured.

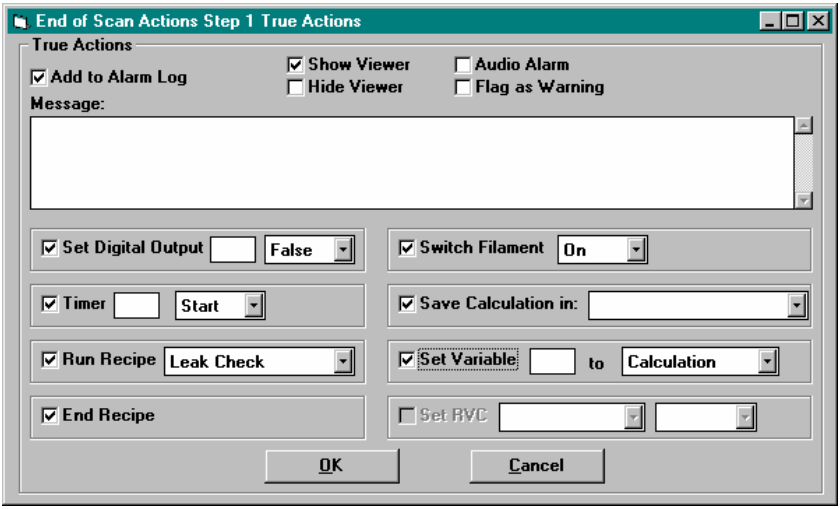
Note that the True and False Actions are only executed when the evaluation of the step changes from the previous step.

Enable Always Actions
Check the **Enable Always Actions** *check box* to allow the actions to take

place at the end of each scan. Once **Enable Always Actions** is *checked* the **Set Always Actions** button will become available.

Set Always Actions
Click on the **Set Always Actions** button to open the second page of the **End of Scan Actions** *dialog box* where the actions to take place at the end of each scan may be configured.

In the second page of the **End of Scan Actions** *dialog box* you set up the actions you want to take place at the end of each scan if you have *clicked* the **Set Always Actions** button, when the condition statement is true if you have *clicked* the **Set True Actions** button or when the condition statement is false if you have clicked the **Set False Actions** button. Whichever of the three buttons has been used the second page of the *dialog box* is the same.



Add to Alarm Log
The Alarm Log records all the alarms from the various steps you have set up. The Alarm Log is a file that can be viewed with the Alarm Event Viewer window both during a recipe run and when recalling data at a later date. When the **Add to Alarm Log** *check box* is *checked* the **Show/Hide Viewer**, **Audio Alarm**, **Flag on Warning** and **Message Box** options can be used.

Show Viewer
When *checked* the **Alarm Event Viewer** window will be displayed as soon

as an alarm condition occurs. If the Alarm Event Viewer window is already displayed, it remains so.

Hide Viewer
When *checked* this hides the **Alarm Event Viewer** window when an alarm condition occurs. If the Alarm Event Viewer window is not currently displayed, it remains so. This option is usually used to clear the Alarm Event Viewer window when setting false actions.

Audio Alarm
When the alarm condition is true an audio alarm tone will be generated by the PC if the **Audio Alarm** *check box* is *checked*. The alarm tone is turned off by *checking* the **Sound Off** *check box* in the Alarm Event Viewer window.

Flag as Warning
If the **Flag as Warning** *check box* is *checked* the Alarm Event Viewer window will be shown in yellow rather than red to indicate a warning rather than an alarm.

Message:
In the **Message** box enter the text you wish to appear in the Alarm Log and in the Alarm Event Viewer window displayed as a result of an alarm condition being true.

Set Digital Output
Check the **Set Digital Output** *check box* to use a digital output line when an alarm occurs. In the box enter the number of the digital output you wish to use. *Click* on the *dropdown list box* and select True to set the output to logic '1' when the alarm occurs or select False to set to output to logic '0' when an alarm occurs.

Switch Filament
Check the **Switch Filament** *check box* to switch the filament on or off. From the *dropdown list box* select On or Off as required.

Timer
Check the **Timer** *check box* to start or stop a timer. In the box you must enter the number of the timer (Process Eye allows any number of timers). The timers are used as inputs in subsequent alarm steps. From the *dropdown list box* select Start or Stop as required.

Save Calculation
Check the **Save Calculation** *check box* to store the result of the calculation done in this step of the end of scan actions in one of the Action channels. *Click* on the *dropdown list box* and select the required Action channel. You must have enabled at least one Action channel in the previous step of the recipe set up.

Run Recipe
As an end of scan action you may run another recipe. To do this *check* the **Run Recipe** *check box* and select from the *dropdown list box* the recipe you want to run.

Set Variable
Any number of user defined variables are allowed in Process Eye and they are used as inputs in the condition statements. In this way complex condition statements may be built up using more than the three inputs allowed in a single condition statement. To set a variable *check* the **Set Variable** *check box* then enter the number of the variable. From the *dropdown list box* select one of the items. Selecting **Calculation** will set the variable to the result of the condition calculation. The variable may be set to one of the three inputs or may be used as an incremental or decremental counter by selecting **Increase by 1** or **Decrease by 1**. Selecting **0.0** will set the variable to zero.

End Recipe
Check the **End Recipe** *check box* to terminate the recipe as a result of the end of scan action step.

Set RVC
Set RVC will only be available when a Remote Vacuum Controller is fitted. One of the six outputs on the RVC may be set on or off as a result of the End of Scan Action. *Check* the **Set RVC** *check box*, *click* on the **Output** *dropdown list* and select the required output (see table below) then, *click* on the second *dropdown list* and select On or Off.

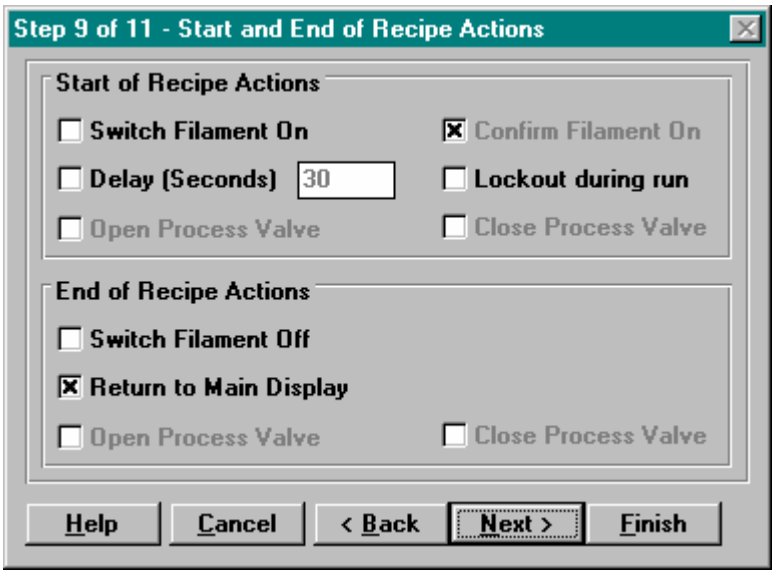
Output	Normal Use	RVC Skt 1 Contacts
0	Pumps	4 and 12
1	Valve 1	1 and 9
2	Valve 2	2 and 10
3	Alarm	3 and 11
4	Turbo Standby	6 and 14

When you have configured all the true actions *click* on the **OK** button to return to the first page of the End of Scan Actions *dialog box* where you can configure the next step of the alarm.

4.4.10. Start and End of Recipe

Used in recipes: Bar Graph, Peak Jump

The ninth step of creating or editing a Bar Graph or Peak Jump recipe is to define the Start and End of Recipe Actions.



Start of Recipe Actions
Switch Filament On:
If the **Switch Filament On** box is *checked* the filament will automatically be switched on when the recipe is run. The user may be asked for confirmation depending on the setting of the **Confirm Fil On** *check box*.

Confirm Filament On:
If the **Confirm Fil On** box is *checked* a warning box will be displayed before the filament is automatically switched on at the start of a recipe.

Delay (seconds):
Check the **Delay (Seconds)** *check box* and enter a value in the range 1 to 32000 seconds. When the recipe is run there will be a delay before the recipe is run. The Start Recipe Delay window will be displayed showing the time remaining. If a trigger has been set the delay will start when the trigger event occurs. A minimum delay of 30 seconds is recommended.

Lockout during run
This is used to stop people altering the display settings or stopping a recipe while it is running. *Check* the **Lockout during run** *check box* to disable the buttons on the Process Eye screen and the *menu bar* while a recipe is running. This option will only be enabled when **Return to Main Display** is *checked*.

Open Process Valve
This option is only available on systems fitted with a Remote Vacuum Controller.

Close Process Valve
This option is only available on systems fitted with a Remote Vacuum Controller.

End of Recipe Actions
Switch Filament Off:
When the recipe has finished the filament will be switched off if the **Switch Filament Off** box has been *checked*.

Return to Main Display:
If the **Return to Main Display** box is *checked* when the recipe has finished the display will return to the Process Eye Select Mode window. Otherwise, the data screen will remain displayed and the user must select Exit to continue.

Open Process Valve
This option is only available on systems fitted with a Remote Vacuum Controller.

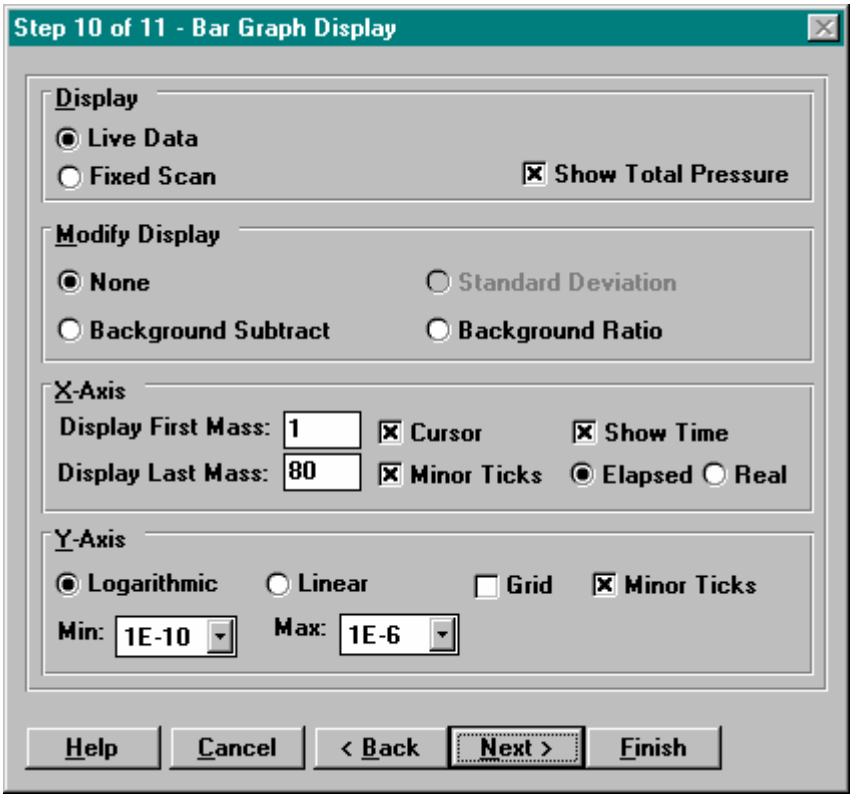
Close Process Valve
This option is only available on systems fitted with a Remote Vacuum Controller.

Selecting **Next>** will display the **Bar Graph Display** *dialog box* or the **Peak Jump Display** *dialog box*.

4.4.11. Bar Graph Display Settings

Used in recipes: Bar Graph

At this point the data that will be acquired during the scan has been defined. None of these settings may be changed "on the fly". The display however is allowed to be changed at any time. This step allows you to define how the data will initially be displayed when the recipe runs and when it is recalled from disk.



Display
Live Data:

As each partial pressure is scanned it is updated on the graph. If data is being recalled from disk then the **Live Data** option will be *grayed out*.

Fixed Scan:
Any scan in the range from 1 to Maximum Scans (as defined in step one) may be viewed. If a scan number is selected that has not yet been scanned, then, when it is scanned, the display will be updated. If you *click* on a Trend display of data then Fixed Scan will be selected with the scan number at or just before the point of the cursor.

Double clicking on the x-axis of the Bar Graph display is a short cut to switching from Fixed Scan to Live Data.

Scan:
If **Fixed Scan** is selected the **Scan:** box will be displayed. *Click* on the up or down arrow to select the scan you wish to display or type in the scan number.

Show Total Pressure
If Show Total Pressure is *checked* the Total Pressure reading will be displayed otherwise, it will not be displayed and the screen space will be used by increasing the length of the y-axis. The Total Pressure will always be measured at the end of each scan whether it is displayed or not. Note that total pressure is the sum of the measured partials. If one or more significant peaks are not measured as part of the scan the total pressure may be inaccurate.

Modify display
Backgrounds and Baselines (standard deviation) of the measured signals (partial pressure, total pressure, analog inputs and, for Backgrounds only, digital inputs) permit data to be displayed not just in their "raw" format but modified in one of the following ways.

None:
No modifications (other than any calibration settings) are applied to the data.

Background Subtract:
The appropriate background value is subtracted from the data. This option will be *grayed out* if a background has not been selected. Usually a linear Y-Axis display with a decade setting close to the decade the data is at is the most appropriate way to view Background Subtracted data as a negative

minimum can be selected.

Background Ratio:
The Data is divided by the selected background data. This option will be *grayed out* if a background has not been selected. Usually a linear Y-Axis display with a decade setting of E+00 is the most appropriate way to view Background Ratioed data as the results will be 1.0 or close to 1.0 if the data tracks the background.

Standard Deviation:
The mean (or average) value at a corresponding point of a baseline file is subtracted from the data and the result is divided by the standard deviation at that point. Usually a linear Y-Axis display with a decade setting of E+00 is the most appropriate way to view Standard Deviation data as a negative minimum can be selected.

X-Axis
Display First Mass:
The First Mass actually scanned is defined by First Mass set in step one. However, the First Mass displayed may be any value from the First Mass scanned to the Last Mass scanned. The Display First Mass must also be less than or equal to the Display Last Mass.

Display Last Mass:
The Last Mass actually scanned is defined by Last Mass set in step one. However, the Last Mass displayed may be any value from the Last Mass scanned to the First Mass scanned. The Display Last Mass must also be greater than or equal to the Display First Mass.

Minor Ticks:
The distance between major ticks on the X-Axis will depend on the resolution of the screen and the size of the graph. Selecting **Minor Ticks** allow smaller mass increments to be determined by eye.

Cursor:
When enabled the Cursor feature allows mass identification and precise readout of the partial pressure. Once enabled, to set the cursor to a particular mass *click* on the graph area and drag the cursor until the desired mass is shown in the area at the top of the graph. Once selected the cursor value will be updated as new data arrives.

Show Time:
Check the **Show Time** *check box* to display the time as part of the a-axis label. *Click* on the **Real** *radio button* to show the actual time or *click* on the **Elapsed** *radio button* to show the time elapsed since the start of the recipe.

Y-Axis
Logarithmic:
Sets the Y-axis to be a logarithmic scale. The maximum and minimum values that can be displayed are set using Max and Min. The largest and smallest decades permitted are set in **Utilities | Preferences** by selecting the desired **Max Displayed Decade** and **Min Displayed Decade**.

Linear:
Sets the Y-Axis to be a linear scale. The maximum and minimum values that can be displayed are set using Max and Min and Decade. The maximum and minimum values can be positive or negative and the decade can be anywhere in the range Max Displayed Decade to Min Displayed Decade.

Min:
Sets the smallest value that can be displayed. If Logarithmic Y-Axis has been selected it will be a pick list of decades (in the range Max Displayed Decade to Min Displayed Decade). If Linear Y-Axis has been selected it will be a text box where the value must be typed, any value positive or negative is allowed. This setting is multiplied by the Decade setting to give the actual minimum. In linear Y-axis, Min must be 1 less than Max. If you want to display less than 1 on a given decade e.g. 0 (Min) to 0.5 (Max) E+00 (Decade) then simply select a lower decade i.e. 0 (Min) to 5 (Max) E-01.

Max:
Sets the largest value that can be displayed. If Logarithmic Y-Axis has been selected it will be a pick list of decades (in the range Max Displayed Decade to Min Displayed Decade). If Linear Y-Axis has been selected it will be a text box where the value must be typed, any value positive or negative is allowed. This setting is multiplied by the Decade setting to give the actual maximum. In linear Y-axis, Max must be 1 greater than Min. If you want to display less than 1 on a given decade e.g. 0 (Min) to 0.5 (Max) E+00 (Decade) then simply select a lower decade i.e. 0 (Min) to 5 (Max) E-01.

Decade:
This is only visible when Linear is selected. It sets the scaling factor applied to Min and Max, e.g. to display -5.00E-07 to +5.00E-07 set -5 as Min, 5 as

Max and 1E-07 as Decade.

Grid:
Switches on a horizontal grid to assist in visually reading peaks. The values that have a grid line correspond to where the y-axis is labeled. This in turn will depend on the resolution of the screen and the size of the graph.

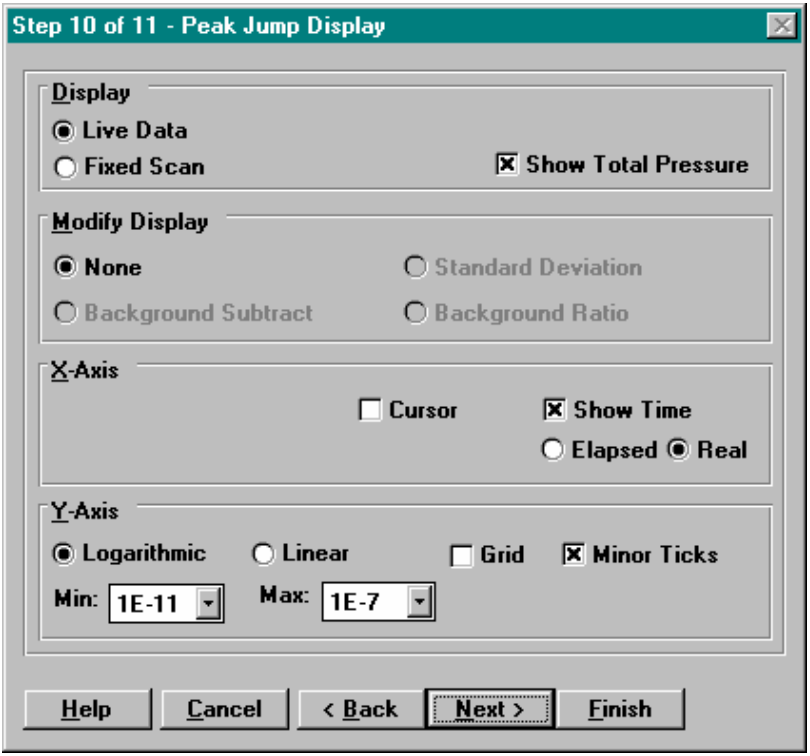
Minor Ticks:
Enables fine horizontal lines to be displayed. The values that have a grid line will depend on the resolution of the screen and the size of the graph.

4.4.12. Peak Jump Display Settings

Used in recipes: Peak Jump
At this point the data that will be acquired during the scan has been defined. None of these settings may be changed "on the fly". The display however is allowed to be changed at any time. Step ten allows you to define how the data will initially be displayed when the recipe runs and when it is recalled from disk.

Display
Live Data:
As each partial pressure is scanned it is updated on the graph. If data is being recalled from disk then the **Live Data** option will be *grayed out*.

Fixed Scan:
Any scan in the range from 1 to Maximum Scans (as defined in step one) may be viewed. If a scan number is selected that has not yet been scanned, then, when it is scanned, the display will be updated. If the mouse is *clicked* on a Trend display of data then Fixed Scan will be selected with the scan number at or just before the point of the cursor. *Double clicking* on the x-axis of the Peak Jump display is a short cut to switching from Fixed Scan to **Live Data.**
Scan:
If **Fixed Scan** is selected the **Scan:** box will be displayed. *Click* on the up or down arrow to select the scan you wish to display or type in the scan number.



Show Total Pressure
If **Show Total Pressure** is *checked* the Total Pressure reading will be displayed otherwise, it will not be displayed and the screen space will be used by increasing the length of the y-axis. The Total Pressure will always be measured at the end of each scan whether it is displayed or not. Remember that the total pressure is the sum of the measured partials. If one or more significant peaks are not measured as part of the scan the total pressure may be inaccurate.

Modify display
Backgrounds and Baselines (standard deviation) of the measured signals (partial pressure, total pressure, analog inputs and, for Backgrounds only, digital inputs) permiot data to be displayed not in their "raw" format but modified in one of the following ways.

None:

No modifications (other than any calibration settings) are applied to the data.

Background Subtract:
The appropriate background value is subtracted from the data. This option will be *grayed out* if a background has not been selected. Usually a linear Y-Axis display with a decade setting close to the decade the data is at is the most appropriate way to view Background Subtracted data as a negative minimum can be selected.

Background Ratio:
The Data is divided by the selected background data. This option will be *grayed out* if a background has not been selected. Usually a linear Y-Axis display with a decade setting of E+00 is the most appropriate way to view Background Ratioed data as the results will be 1.0 or close to 1.0 if the data tracks the background.

Standard Deviation:
The mean (or average) value at a corresponding point of a baseline file is subtracted from the data and the result is divided by the standard deviation at that point. Usually a linear Y-Axis display with a decade setting of E+00 is the most appropriate way to view Standard Deviation data as a negative minimum can be selected.

X-Axis (peak jump)
Cursor:
When enabled the Cursor feature allows Channel identification and precise readout of the partial pressure. Once enabled, to set the cursor to a particular Channel *click* on the graph area and drag the cursor until the desired Channel is shown in the area at the top of the graph. Once selected the cursor value will be updated as new data arrives.

Show Time:
Check the **Show Time** *check box* to display the time as part of the x-axis label. *Click* on the **Real** *radio button* to show the actual time or *click* on the **Elapsed** *radio button* to show the time elapsed since the start of the recipe.

Y-Axis
Logarithmic:
Sets the Y-axis to be a logarithmic scale. The maximum and minimum values that can be displayed are set using Max and Min. The largest and smallest decades permitted are set in **Utilities | Preferences** by selecting the

desired **Max Displayed Decade** and **Min Displayed Decade**.

Linear:
Sets the Y-Axis to be a linear scale. The maximum and minimum values that can be displayed are set using **Max**, **Min** and **Decade**. The maximum and minimum values can be positive or negative and the decade can be anywhere in the range Max Displayed Decade to Min Displayed Decade.

Min:
Sets the smallest value that can be displayed. If Logarithmic Y-Axis has been selected it will be a pick list of decades (in the range Max Displayed Decade to Min Displayed Decade). If Linear Y-Axis has been selected it will be a text box where the value must be typed. Any value positive or negative is allowed. This setting is multiplied by the Decade setting to give the actual minimum. In linear Y-axis, Min must be 1 less than Max. If you want to display less than 1 on a given decade e.g. 0 (Min) to 0.5 (Max) E+00 (Decade) then simply select a lower decade i.e. 0 (Min) to 5 (Max) E-01 (Decade).

Max:
Sets the largest value that can be displayed. If Logarithmic Y-Axis has been selected it will be a pick list of decades (in the range Max Displayed Decade to Min Displayed Decade). If Linear Y-Axis has been selected it will be a text box where the value must be typed, any value positive or negative is allowed. This setting is multiplied by the Decade setting to give the actual maximum. In linear Y-axis, Max must be 1 greater than Min. If you want to display less than 1 on a given decade e.g. 0 (Min) to 0.5 (Max) E+00 (Decade) then simply select a lower decade i.e. 0 (Min) to 5 (Max) E-01 (Decade).

Decade:
This is only visible when Linear is selected. It sets the scaling factor applied to Min and Max, e.g. to display -5.00E-07 to +5.00E-07 set -5 as Min, 5 as Max and 1E-07 as Decade.

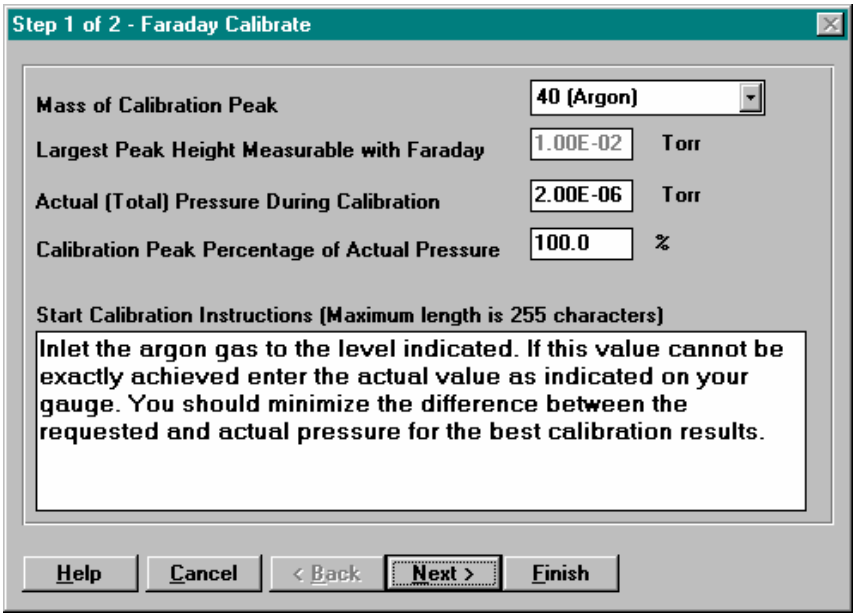
Grid:
Switches on a horizontal grid to assist in visually reading peaks. The values that have a grid line correspond to where the y-axis is labeled. This in turn will depend on the resolution of the screen and the size of the graph.

Minor Ticks:

Enables fine horizontal lines to be displayed. The values that have a grid line will depend on the resolution of the screen and the size of the graph.

4.4.13. Faraday Calibrate Settings

Used in recipes: Faraday Calibrate



This recipe is used to calibrate the partial pressure readings made using the instrument's Faraday detector.
Selecting Faraday Calibrate in the **Enter Recipe Details** *dialog box* will bring up the **Faraday Calibrate** *dialog box* which contains a number of sections. Set (or leave at the default setting) the following items.

Mass of Calibration Peak
This defines the mass to be used for the calibration. *Click* on the *dropdown list box* and select one of the standard gases from the list or, if the required mass is not available simply type in the mass number. Generally, this should be the major peak of the predominant gas present.

Largest Peak . . .
Largest Peak Height Measurable with Faraday is not used and will

always be *grayed out*. It should correspond to the highest pressure your system is designed to sample. If it is not correct please contact your local Spectra facility.

Actual (Total) Pressure . . .
In the **Actual (Total) Pressure During Calibration** box enter the desired value for the total pressure during the calibration routine. This should be the pressure the operator aims to achieve by regulating the flow of calibration gas. When running this calibration recipe you can enter the actual value measured on the total pressure gauge.

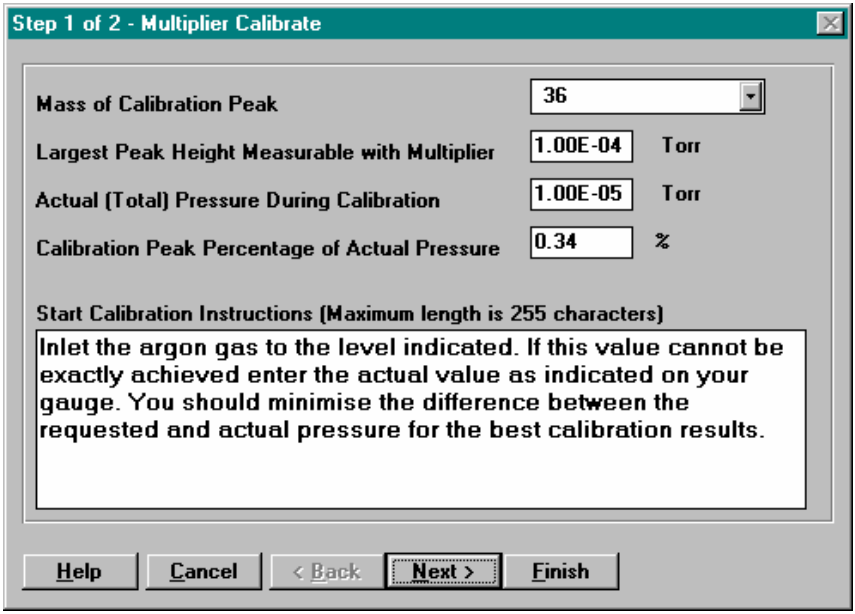
Calibration Peak Percentage . . .
In the **Calibration Peak Percentage of Actual Pressure** box enter the percentage the gas you are calibrating with makes to whole of the calibration gas mixture. e.g. if you are calibrating at mass 40 using a gas mixture of 50% Argon and 50% Nitrogen enter 50%.

Start Calibration Instructions
When you run the calibration recipe the calibration window will be displayed which incorporate an area for a message for the user. In the **Start Calibration Instructions** box enter the message you want to appear in the calibration window. The default message is, "Inlet the calibration gas to the level indicated. If this value cannot be exactly achieved enter the actual value as indicated on your gauge. You should minimize the difference between the requested and actual pressure for the best calibration results." The maximum length for the message is 255 characters.

4.4.14. Multiplier Calibrate Settings

Used in recipes: Multiplier Calibrate

This recipe is used to set the sensitivity of the multiplier detector and then calibrate the partial pressure peak heights of your instrument using the multiplier detector.
Selecting Multiplier Calibrate in the **Enter Recipe Details** *dialog box* will bring up the **Multiplier Calibrate** *dialog box* which contains a number of sections. If you have a Microvision Plus that is not fitted with a dual detector or if you have an HPQ-2, **Multiplier Calibrate** will be *grayed out* in the **Enter RecipeDetails** *dialog box*. Set (or leave at the default setting) the following items.



Mass of Calibration Peak
This defines the mass to be used for the calibration. *Click* on the *dropdown list box* and select one of the standard gases from the list or, if the required mass is not available simply type in the mass number.
This peak should be as large and stable as possible but still less than the value set in the **Largest Peak Height Measurable with Multiplier** box.

Largest Peak . . .
In the **Largest Peak Height Measurable with Multiplier** box enter the value for the largest peak that can be measured with the currently selected multiplier gain. Generally, this should be from 0.001 to 0.01 times the maximum pressure your system is designed to sample.

Actual (Total) Pressure . . .
In the **Actual (Total) Pressure During Calibration** box enter the desired value for the total pressure during the calibration routine. This should be the pressure the operator aims to achieve by regulating the flow of calibration gas. When running this calibration recipe, you can enter the actual value measured on the total pressure gauge.

Calibration Peak Percentage . . .

In the **Calibration Peak Percentage of Actual Pressure** box enter the percentage of the total pressure that is represented by the mass of calibration peak of the gas you are calibrating with.
e.g. If you are calibrating at mass 36 in a 100% argon gas, this value is .34, the isotopic abundance of mass 36 in argon.

Start Calibration Instructions
When you run the calibration recipe the calibration window will be displayed which incorporate an area for a message for the user. In the **Start Calibration Instructions** box enter the message you want to appear in the calibration window. The default message is, "Inlet the calibration gas to the level indicated. If this value cannot be exactly achieved enter the actual value as indicated on your gauge. You should minimize the difference between the requested and actual pressure for the best calibration results." The maximum length for the message is 255 characters.

4.4.15. Leak Check Settings

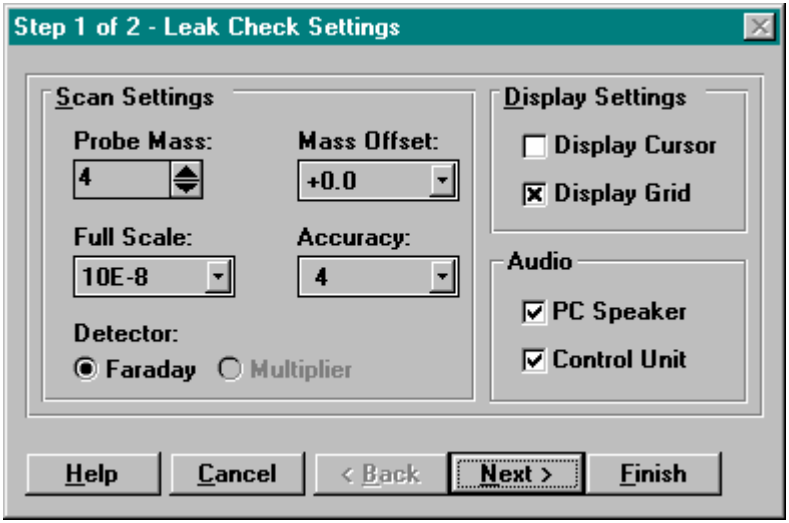
Used in recipes: Leak Check

Creating a Leak Check recipe consists of configuring the parameters in two *dialog boxes*. The first is the **Leak Check Settings** *dialog box*.

Scan settings
The scan settings define what is being measured and how.

Probe Mass:
This setting is used to define which gas is being used to look for the leak. By default helium (mass 4) is used but any mass in the range 1 to the maximum mass of the instrument can be used.

Mass Offset:
The leak check mode reads at a single point. To ensure the largest part of a mass peak is being used the mass offset (in fractions of an amu) can be selected until the largest point on the peak is found. Under normal circumstances this should be left set to 0.00.



Full Scale:
This sets the amplifiers to allow the given largest reading to be measured. If the largest reading is set to 1.00E-04 for example then the y-axis will show 0 to 10E-05. Increase or decrease as necessary to see the noise level on the screen.

Accuracy:
In any measurement there is a trade-off between speed and precision. The Accuracy defines the time that is spent taking each reading. Increasing Accuracy causes the scan to slow down and readings to become more precise. Accuracy is always in the range 0 (one reading per point) to 9 (512 readings per point). Accuracy 3 is a good starting point.

Detector:
To use the Faraday detector *click* on the **Faraday** *radio button*. To use the Multiplier detector *click* on the **Multiplier** *radio button*. The multiplier is best for small peaks.

Display settings
Three display settings exist for leak check.

Display Cursor:
Enables the cursor function that allows the instant pressure being measured to be displayed. If the left mouse button is *clicked* on the graph area it is

possible to read off the value of partial pressure anywhere in the graph.

Display Grid:
Draws a grid on the graph to assist in the visual reading of peak heights.

PC Speaker:
Check the **PC Speaker** *check box* to switch on the audio tone on the PC when leak check is run. The frequency (pitch) of the tone will increase as the partial pressure increases (a leak is detected). Using the audio tone means that you do not have to watch the screen to be able to trace leaks.

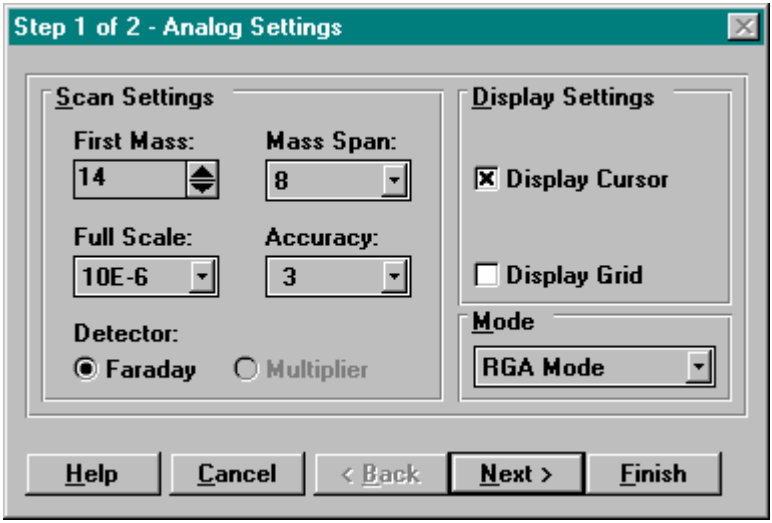
Control Unit:
Check the **Control Unit** *check box* to switch on the head-phone audio tone on the control unit when leak check is running. The frequency (pitch) of the tone will increase as the partial pressure increases (a leak is detected). Using the audio tone means that you do not have to watch the screen to be able to trace leaks.

When all the settings are correct *click* on the **Next>** button to display the **Set Access** *dialog box*.

4.4.16. Analog Settings

Used in recipes: Analog Peaks

You create an Analog recipe by setting the parameters in two *dialog boxes*, the first is the **Analog Settings** *dialog box*.
The **Analog Settings** *dialog box* is also displayed when you *click* on the Edit Settings button in the **Analog** window when an analog recipe is running.



Scan settings
The scan settings define what is being measured and how.

First Mass:
This setting is used to define where the analog scan starts. It can be anywhere in the range 1 to the maximum mass of the instrument minus the current Mass Span.

Mass Span:
This sets the number of AMUs that will be scanned. It can only take values of 8; 16; 32 or 64. As the Mass Span is increased the points per AMU is decreased. The Mass Span must be set to 8 to enable the calibration of the Mass Alignment and Resolution using the **QDAC Setting** *dialog box*.

Full Scale:
This sets the amplifiers to allow the given largest reading to be measured. If the largest reading is set to 1.00E-04 for example then the y-axis will show 0 to 10E-05.

Accuracy:
In any measurement there is a trade-off between speed and precision. The Accuracy defines the time that is spent taking each reading. Increasing Accuracy causes the scan to slow down and readings to become more precise. Accuracy is always in the range 0 (one reading per point) to 9 (512

readings per point). Accuracy 3 is a good starting point.

Detector:
To use the Faraday detector *click* on the **Faraday** *radio button*. To use the Multiplier detector *click* on the **Multiplier** *radio button*. The multiplier is most appropriate for small peaks.

Display settings
Display Cursor:
Enables the cursor function that allows the partial pressure of any point in the scan to be measured. *Click* and *drag* the cursor to the desired location on the graph. The display at the top of the graph shows the mass position of the cursor and the corresponding partial pressure.

Display Grid:
Draws a grid on the graph to assist in the visual reading of peak heights.

When all the parameters are set *click* on the **Next>** button to display the **Set Access** *dialog box*.

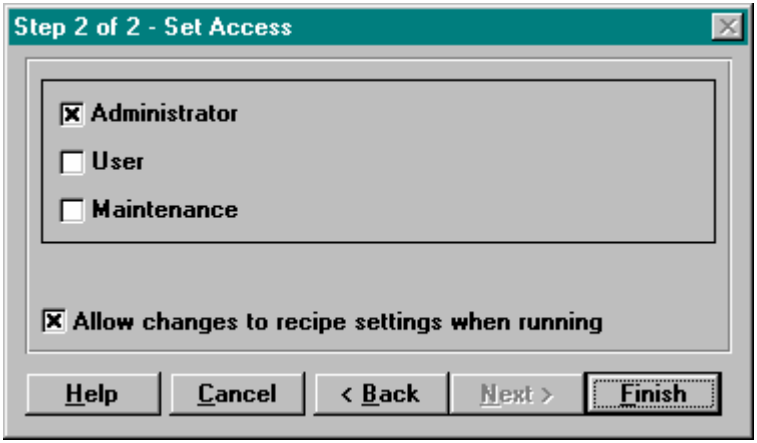
4.4.17. Set Access

Used in recipes: Bar Graph, Peak Jump, Faraday Calibrate, Multiplier Calibrate, Leak Check, Analog Peaks

The last step in creating any type of recipe is to define the which access level will be able to run the recipe. The recipe button will only be shown in the mode select window when the selected access level matches the settings in this step of the recipe set up.

Select to which of the three Access Levels the recipe will be available by *checking* the appropriate *check boxes*. One, two or all three access levels may be selected.

By default, recipe settings such as display parameters and aborting the recipe may be changed while the recipe is running. If you do not want recipe settings altered while the recipe is running clear the **Allow changes to recipe settings when running** *check box*.



When you have complete the configuration of the recipe *click* on the **Finish** button. You may go back to make changes to previous recipe steps by *clicking* on the **<Back** button.

4.5. Edit Display

The Display Edit window is only displayed when you are creating or editing Bar Graph or Peak Jump recipes. When you *click* on the **Finish** button, once the configuration of the recipe has been completed, the Display Edit window will be shown. Here you can see what the display will look like when you run the recipe and you can add Trends. The display settings can be modified by **clicking** on the Edit Bar Graph or Edit Peak Jump button
or by
selecting Configure Recipe | Edit Bar Graph or Configure Recipe | Edit Peak Jump
or by
right clicking on the Bar Graph or Peak Jump Display.

The Bar Graph or Peak Jump Display *dialog box* will be displayed, all the settings are explained in sections Bar Graph Display Settings and Peak Jump Display Settings .

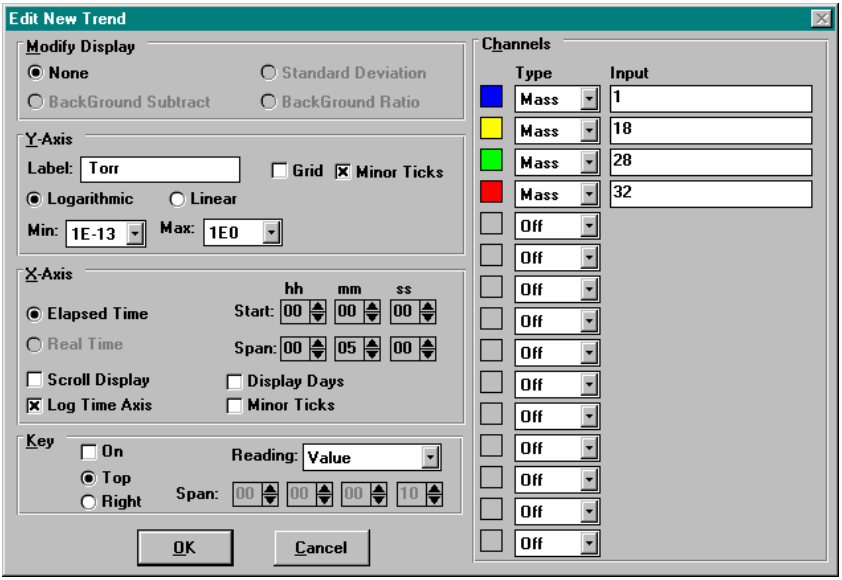
The display settings can be modified at any time when the recipe is running by *clicking* on the Edit Bar Graph or Edit Peak Jump button. However, only

the values in use when the recipe is saved after creation or editing are stored in the data files and set how recalled data are initially displayed.
When all required Trends (if any) have been added the Recipe may be saved by *clicking* Save and Exit.

If Cancel is selected and the following warning is ignored ALL settings entered for this recipe will be lost.

Selecting **Save and Exit** or **Cancel** will return you to the Recipes page.

4.6. Add Trend



A Bar Graph or Peak Jump display represents a single scan. Trends are views of the scanned data versus time. Using the spreadsheet metaphor a channel in a Trend display will be a column in a spreadsheet where each row corresponds to a scan. Each Trend display may have up to fifteen channels displayed and a maximum of sixteen trends may be added. There are no restrictions on how many times a partial pressure, total pressure, digital or analog input may be displayed in one or more trends. This allows, for example, one trend to show partial pressures, another trend to show those same partial pressures with a background subtracted and yet another trend to show digital inputs.

To add a trend *click* on the Add Trend button or select **Configure Recipe | Add Trend** from the *menu bar*. The **Edit New Trend** *dialog box* will be displayed.

Channels
The channels section defines what is to be trended. Up to fifteen channels may be used, the actual number is set in Trend Max Channels in **Utilities | Preferences**. By default fifteen channels are set to Trend Maximum Channels.

Type:
This is a *dropdown list box* which specifies the source of data for this trend line. It may be one of the following:

Off
will switch the channel off.

Mass
will display as a trend the mass whose value is entered in the **Input** box. The mass must be within the mass range being scanned for a bar graph recipe. For a peak jump recipe the mass must be one for which a channel is set.

Action
will display as a trend one of the action channels defined in the recipe. If the recipe does not define any action channels then Action will not be available. Selecting Action in the **Type** box will cause the Input box to display all the available action channels as a *dropdown list*. *Click* on the required one to select it.

Total
will display a trend of the sum of all the partials in this scan.

Analog
where xxx is the (optional) analog input channel number, will show that analog input.

Digital
where xxx is the (optional) digital input channel number, will show that digital input.

Generally you would choose Analog and Digital inputs to be displayed on a different trend as they have widely varying values compared to partial and total pressure signals.

Modify display
As described in the sections on Background and Baseline (standard deviation), the measured signals (partial pressure, total pressure, analog inputs and, for Backgrounds only, digital inputs) may be displayed not only in their "raw" format but modified in one of the following ways.

None:
No modifications (other than any calibration settings) are applied to the data

Background Subtract:
The appropriate background value is subtracted from the data. This option will be *grayed out* if a background has not been selected. Usually a linear Y-Axis display with a decade setting close to the decade the data is at is the most appropriate way to view Background Subtracted data as a negative minimum can be selected.

Background Ratio:
The Data is divided by the selected background data. This option will be *grayed out* if a background has not been selected. Usually a linear Y-Axis display with a decade setting of E+00 is the most appropriate way to view Background Ratioed data as the results will be 1.0 or close to 1.0 if the data tracks the background.

Standard Deviation:
The mean value at a corresponding point of a baseline file is subtracted from the data and the result is divided by the standard deviation at that point. Usually a linear Y-Axis display with a decade setting of E+00 is the most appropriate way to view Standard Deviation data as a negative minimum can be selected.

Y-Axis
Label:
Defines the label to be displayed next to the y-axis. Type in the label you require or leave it set to the default of Torr. If you delete the label and leave the **Label:** box empty the trend's x-axis will extend to utilize the extra space saved by having no y-axis label.

Logarithmic:
Sets the Y-axis to be a logarithmic scale. The maximum and minimum values that can be displayed are set using **Max** and **Min**. The largest and smallest decades that can ever be displayed are set in **Utilities | Preferences** by selecting the desired Max Displayed Decade and Min Displayed Decade.

Linear:
Sets the Y-Axis to be a linear scale. The maximum and minimum values that can be displayed are set using **Max**, **Min** and **Decade**. The maximum and minimum values can be positive or negative and the decade can be anywhere in the range Max Displayed Decade to Min Displayed Decade.

Min:
Sets the smallest value that can be displayed. If Logarithmic Y-Axis has been selected it will be a pick list of decades (in the range Max Displayed Decade to Min Displayed Decade). If Linear Y-Axis has been selected it will be a text box where the value must be typed. Any value positive or negative is allowed. This setting is multiplied by the Decade setting to give the actual minimum. In linear Y-axis, Min must be 1 less than Max. If you want to display less than 1 on a given decade e.g. 0 (Min) to 0.5 (Max) E+00 (Decade) then simply select a lower decade i.e. 0 (Min) to 5 (Max) E-01 Decade.

Max:
Sets the largest value that can be displayed. If Logarithmic Y-Axis has been selected it will be a pick list of decades (in the range Max Displayed Decade to Min Displayed Decade). If Linear Y-Axis has been selected it will be a text box where the value must be typed. Any value positive or negative is allowed. This setting is multiplied by the Decade setting to give the actual maximum. In linear Y-axis, Max must be 1 greater than Max. If you want to display less than 1 on a given decade e.g. 0 (Min) to 0.5 (Max) E+00 (Decade) then simply select a lower decade i.e. 0 (Min) to 5 (Max) E-01 Decade.

Decade:
This is only visible when Linear is selected. It sets the scaling factor applied to Min and Max, e.g. to display -5.00E-07 to +5.00E-07 set -5 as Min, 5 as Max and 1E-07 as Decade.

Grid:
Switches on a horizontal grid to assist in visually reading peaks. The values

that have a grid line correspond to where the y-axis is labeled. This in turn will depend on the resolution of the screen and the size of the graph.

Minor Ticks:
Enables fine horizontal lines to be displayed. The values that have a grid line will depend on the resolution of the screen and the size of the graph.

X-Axis
The X-axis is the time axis. There are a number of options not usually available with RGA software packages that allow, for example, the data to be displayed as a log time plot enabling pump down times to be predicted, time windows as short as seconds or as long as days, etc.

Start Time:
The beginning time at which to start displaying data. This is in hours (hh), minutes (mm), seconds (ss) and, if the Display Days option is *checked*, days (dd). The hours minutes and seconds will show in terms of an elapsed time from when this recipe (data run) was started if the Elapsed Time option is enabled or as a real 24 hour time if the Real Time option is enabled. The days, if displayed, are always shown as elapsed days from the recipe start regardless of which time mode is selected. This is not available if Scroll Display is enabled.

Span:
This is the period of time to be displayed starting at the Start Time. If Scroll Display is enabled it is the period of time displayed. It is defined in hours (hh), minutes (mm), seconds (ss) and, if the Display Days option is *checked*, days (dd). It should always be a positive number.

Elapsed Time:
When this option is *checked* the Start Time is defined in terms of time since the recipe began and the graph will be labeled in the same way. On the graph, if Display Days is enabled, the days will be displayed as elapsed days starting at zero.

Real Time:
When this option is *checked* the Start Time is defined in terms of a real (24 hour) time and the graph will be labeled in the same way. On the graph if Display Days is enabled the days will be displayed as a true date (e.g. mm/dd/yy in the USA). The actual format will be that defined in Windows Date settings found in the Control Panel. Real Time cannot be selected when

a recipe is being defined, only when the recipe is running or when recalling data from disk.

Scroll Display:
If the Scroll Display box is *checked* the last scan will always be shown with the previous scans based on the Time Span setting. Earlier scans will scroll off the screen. When Scroll Display is *checked* the Start Time setting is not available.

Display Days:
If a run is going to last more than 24 hours or, when recalling data, you need to see the date when the data was stored Display Days may be used to show either elapsed days since the start of the recipe or the date. On the graph if Display Days is enabled and the Real Time option is selected then days will be displayed as a true date (e.g. mm/dd/yy in the USA). The actual format will be that defined in Windows Date settings found in the Control Panel. If the Elapsed Time option is selected the days on the graph will be days elapsed from the start of the recipe. When Display Days is enabled the Start Time and Time Span have an additional text box for days (dd).

Log Time Axis:
A pumpdown is essentially exponential in nature. Selecting the Log Time Axis option at the same time as the Log Y-Axis option allows an exponential function to be shown as a straight line which allows much easier prediction of when a desired pressure will be achieved. The position of a point on the Log Time Axis is calculated by taking the Log to base 10 of the elapsed time in seconds. If the Gradient function is enabled the gradient will become dP/dLog10t or dLog10P/dLog10t instead of dP/dt.

Minor Ticks:
The software labels the X-axis at intervals that are round numbers and far enough apart so that the labels do not overlap. The Minor Ticks option places ticks between the time labels to assist in visually identifying a time.

Key
The Key function allows identification of the various channels, and a direct readout of either the signal or of the slope of the signal.

On:
Displays the Key either at the Top of the graph or at the right of it. The pressures or gradients for all channels will show ?.??E??? until the cursor is

placed on the graph and the left mouse button pressed down, the cursor will change to a vertical line. As the cursor is dragged the key is updated. Note that if the left mouse button is released while the cursor is in the active graph area then the Bar Graph or Peak Jump will be set into Fixed Scan display with the scan number being the scan that the cursor was on when the left mouse button was released.

Top:
Causes the Key to be displayed at the top of the graph. It will have no effect if the Key On is not enabled.

Right:
Causes the Key to be displayed at the right of the graph. It will have no effect if the Key On is not enabled.

Reading:
The cursor can read either signal intensity or the gradient (slope) of the graph. To read pressure (or analog or digital signal) select Value. To read the slope of the graph select Gradient. It is important to note that the gradient will use the displayed axis value to determine the slope, that is if log X and log Y-axis have been selected the slope will be based on the Log10 of the signals. For more details on gradient calculation see Span.

Span:
The gradient is calculated by taking all data points that fall within a user specified time window. A least squares algorithm is then used to calculate the best straight line that fits these data points and the slope of that line is the gradient that is displayed. The time window is the time defined as the Span. The Span window will be centered about the cursor position. As at least two points are required for the slope to be measured if only one point falls within the Span window the gradient will show as ?.??E???.

Clicking the **OK** button will save all changes made to the Trend.

4.6.1. Edit Trend

To edit a Trend it must be the currently active window when Edit Trend is selected (its title bar indicates it is active). *Click* on the Edit Trend button or select **Configure Recipe | Edit Trend** from the *menu bar* or more simply *right click* anywhere on the graph.
The **Edit Trend** *dialog box* will be displayed which is the same as the **Edit**

New Trend *dialog box* described in Add Trend .

4.6.2. Delete Trend

To delete a Trend it must be the currently active window (its title bar indicates it is active). *Click* on the Delete Trend button or select **Configure Recipe | Delete Trend** from the *menu bar*.

4.7. Delete Recipe

Any currently defined Recipe may be deleted by *clicking* on the **Delete Recipe** button, selecting a recipe from the list displayed and *clicking* **OK** followed by confirming the deletion.

Once a recipe is deleted there is no simple way to retrieve it.

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Section 5.
RGA Operations

5.1. Filaments

When the program begins the user is given the option of switching on the filament by confirming that the pressure the RGA can see is below the maximum pressure allowed. Generally to get the most accurate readings the filaments should have been switched on long enough to allow them to outgas and to allow any outgassing caused by the heat generated by the filaments to occur. In addition when a recipe is run if the filament is still off the user will be prompted that it will be switched on again if the user confirms the pressure is OK. In situations where the filament has not been switched on it may be switched on by selecting RGA | Filament On from the menu bar or *clicking* on the Filament button. The filament switched on will be the one selected in the Filament section of the Utilities | Preferences | Miscellaneous *dialog box,* see Preferences . Care should be taken in selecting the other filament as calibrations may be different for each filament. If a filament is already on selecting RGA | Filament On from the *menu bar* or clicking on the Filament button will switch the filament off.
To provide the best protection to the filament it is recommended that the External Trip input on the control unit be driven from a reliable total pressure gauge set to give either a TTL signal or the opening of a relay contact when the pressure exceeds $1x10^{-04}$ Torr.

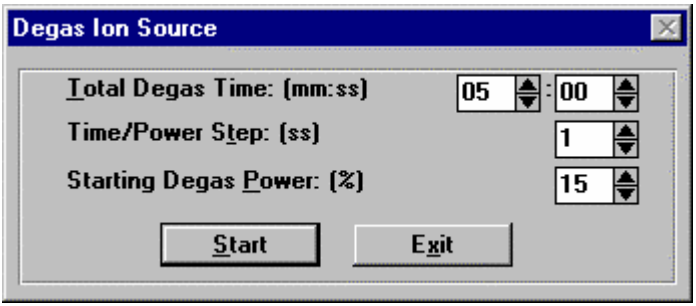
5.2. Degas

DEGAS is strictly a UHV operation. Only use this feature when the analyzer is under vacuum of less than $1x10^{-7}$Torr and will be used at total pressures of less than $1x10^{-8}$Torr. Do not use Degas to remove contaminants from the analyzer. That should be done by cleaning and/or baking.

Degas is the method by which absorbed atoms and molecules are removed from the analyzer ion source by means of high energy electron bombardment.

In order to limit stress on the filaments and to minimize gas load, a ramped degas method is used which allows the power to be increased over the degas period. It allows you to set a start power level (in the range 15% to 100%

full power), and the power ramp rate in power steps/second as well as the total degas period.



To enter the Degas Setup *dialog box* select RGA | Degas from the *menu bar* or *click* on the Degas button in the Mode Select screen. Before the *dialog box* is displayed, if the filaments are off, you will be given the option of turning on a filament before you proceed.

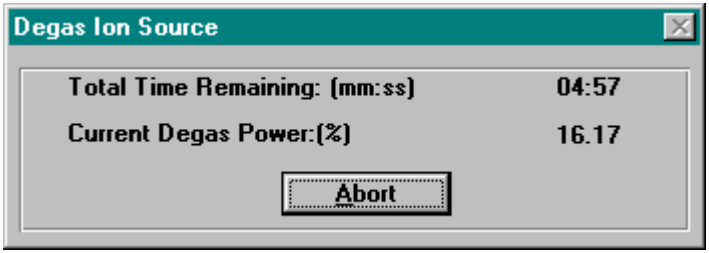
The Time/Power Step: (ss)
is the time, in the range 1 to 59 seconds, spent at each power level. There are 256 power levels within the range of 15% to 100% of full power. Thus, at a setting of 1 ramp-up from 15% to 100% will take approximately 2.25 minutes.

The Total Degas Time: (mm:ss)
period (regardless of Time/Power Step time) can be set in the range 1 to 59 minutes.

The Starting Degas Power: (%)
level may be set between 15% and 100% of full power in 1% steps.

To proceed to degas the ion source *click* on the **Start** button.

While degassing is in progress the **Degas Ion Source** window will be displayed as shown below. Click on the **Abort** button to stop the degas procedure.



5.3. Leak Check

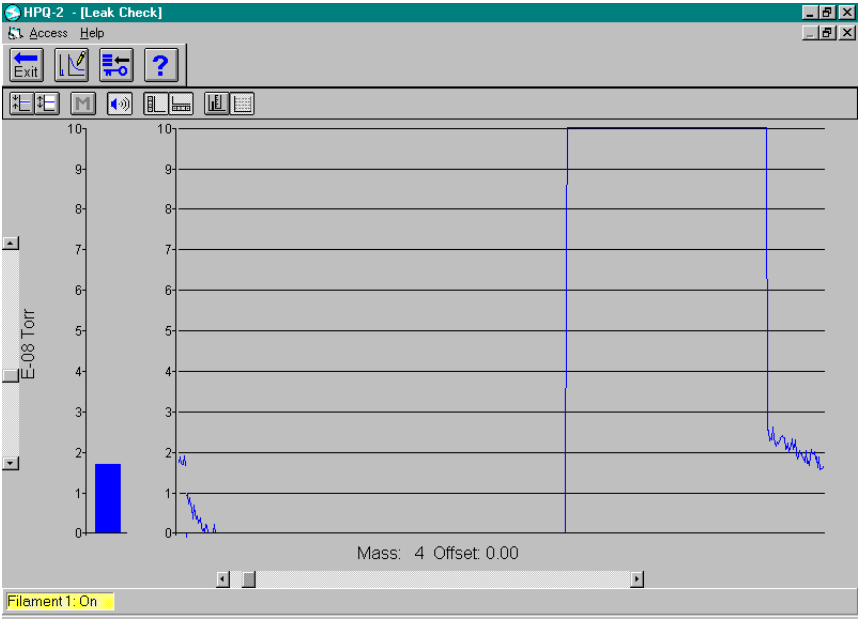
One of the major uses of RGAs is to troubleshoot for leaks. In Process Eye leak checking is done by first creating a leak check recipe and then running it. One of the eleven factory recipes is a leak check recipe which avoids having to create a recipe before being able to leak check.

Creating a leak check recipe is fully described in Recipe Setup

5.3.1. Running a leak check recipe

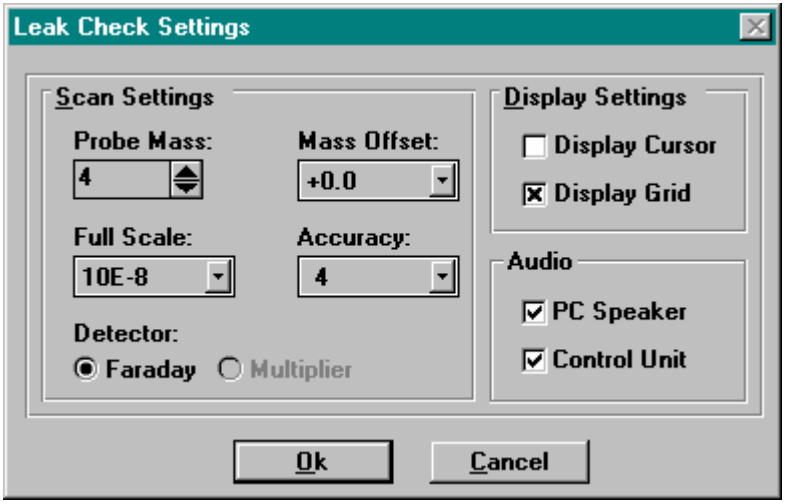
Leak check recipes are designed to allow leaks to be located using any probe gas, typically helium. The parameters such as probe gas and accuracy are defined in the recipe but you may be able to change them while the recipe is running. *Click* on the button for the leak check recipe you wish to run. The leak check recipe will first zero the amplifier and then start scanning using the settings defined in the recipe. A typical leak check window is shown in below.

The Leak Check mode displays its data both as a thermometer to show the instant value and as a trend to show how the pressure is changing with time. The following sections describe the various settings which may be adjusted while the recipe is running only if it is configured to allow this.



5.3.2. Edit settings

The scan settings define what is being measured and how. They can be changed in the **Leak Check Settings** *dialog box* which is displayed by *clicking* on the Edit Settings button or by *right clicking* anywhere on the graph. If the recipe has been configured not to allow changing the settings while the recipe is running this button will be *grayed out*.



Scan settings
Probe Mass:
This setting is used to define which gas is being used to look for the leak. By default helium (mass 4) is used but any mass in the range 1 to the maximum mass of the instrument can be used.

Mass Offset:
The leak check mode reads at a single point. To ensure the largest part of a mass peak is being used the mass offset (in fractions of an amu) can be selected until the largest point on the peak is found. Under normal circumstances this should be left set to 0.00.

Full Scale:
This sets the amplifiers to allow the given largest reading to be measured. If the largest reading is set to 1.00E-05 for example then the y-axis will show 0 to 10E-05

Accuracy:
In any measurement there is a trade-off between speed and precision. The Accuracy defines the time that is spent taking each reading. Increasing Accuracy causes the scan to slow down and readings to become more precise. Accuracy is always in the range 0 (one reading per point) to 9 (512 readings per point). Accuracy 3 is a good starting point.

Detector:

To use the Faraday detector *click* on **Faraday** *radio button* to us the multiplier detector *click* on the **Multiplier** *radio button*.

Display settings
Three display settings exist for leak check.
Display Cursor:
Enables the cursor function that allows the instant pressure being measured to be displayed. To read the pressure at any point on the graph, position the cursor at that point and *click.*

Display Grid:
Draws a grid on the graph to assist in the visual reading of peak heights.

Audio Enable:
Check the **Audio Enable** *check box* to switch the audio tone on when leak check is run. The frequency (pitch) of the tone will increase as the partial pressure increases (a leak is detected). Using the audio tone means that you do not have to watch the screen to be able to trace leaks.

When all settings are correct *click* **Ok** to make the changes or **Cancel** to return without any changes.

Leak check buttons
In the leak check display window there are a series of buttons and controls which are explained below. Note that these will only be displayed if the recipe has been configured to allow changes while it is running.

Exit Leak Check Button
Unlike some other recipes leak check recipes are open ended in that they do not stop after a certain number of scans. The leak check recipe will continue to run until you exit by *clicking* on the Exit button.

Leak Check Settings Button
Click on the Leak Check Settings button to display the Leak check Settings dialog box see Leak Check Settings .

Increase Leak Check Accuracy Button
This will cause the instrument to scan more slowly but the readings will tend to be more stable. This button has the same effect as increasing the Accuracy in the **Leak Check Settings** *dialog box*.

Decrease Leak Check Accuracy Button
This will cause the instrument to scan more quickly but the readings will tend to be less stable. This button has the same effect as decreasing the Accuracy in the **Leak Check Settings** *dialog box*.

Multiplier Detector Button
Click on this button to switch to the multiplier detector. When the button is depressed the multiplier detector is switched on. This has the same effect as selecting the Multiplier radio button in the Leak Check Settings dialog box. This is most commonly used for the higher sensitivity it provides.

Audio Button
When this button is depressed the audio tone will be enabled. This button has the same effect as the Enable Audio *check box* in the Leak Check Settings *dialog box*.

Peak Height Scroll Bar Button
Click on this button to display the Peak Height Scroll Bar.

Probe Mass Scroll Bar Button
Click on this button to display the Probe Mass Scroll bar.

Cursor Button
Click on this button to enable the cursor function. This has the same effect as checking Enable Cursor in the Leak Check Settings dialog box.

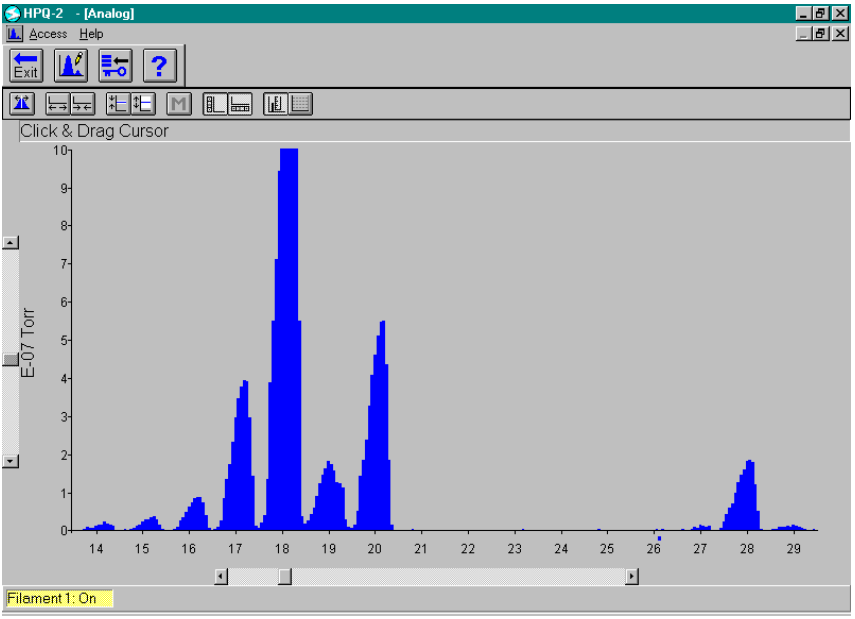
Grid Button
Click on this button to switch on the Grid. This is the same as enabling **Display Grid** in the **Leak Check Settifgs** *dialog box*.

Peak Height Scroll Bar
The Peak Height Scroll Bar may be displayed next to the Y-axis and allows the full scale measurement to be chafged. Either *drag* the scroll bar or *click* on the up or down arrow to make the change. This has the same effect as changing the **Full Scale:** setting in the **Leak Check Settings** *dialog box*.

Probe Mass Scroll Bar
The Probe Mass Scroll Bar may be displayed below the X-axis and allows the probe mass (usually set to 4 for Helium) to be changed quickly. Either *drag* the scroll bar or *click* on the up or down arrow to make the change.

This has the same effect as changing the **Probe Mass:** setting in the **Leak Check Settings** *dialog box*.

5.4. Analog



One of the common features of virtually all RGAs is an analog mode where the "true peak shape" can be studied. Process Eye's analog capability is achieved first by creating then running an analog recipe. One of the eleven factory recipes is an analog recipe so you do not have to create one before you can run in analog. You are likely to run an analog recipe for two purposes:

To allow the Mass Alignment and Resolution of the instrument to be measured and set.
To allow the health of the quadrupole analyzer to be assessed by viewing the peak shape.

Creating an analog recipe is described in Recipe Setup .

There are a series of buttons and controls in the Analog window which allow rapid changes to the settings to be made. Note that these will only available if the recipe is configured to allow changes to be made while it is running.

Exit Analog Button
Analog recipes are open ended in that they do not finish after a number of scans. The user must exit from the analog recipe by *clicking* on the Exit button to return to the Select Mode window.

Analog Settings Button
Click on the Analog Settings Button to display the Analog Settings dialog box explained in Analog Settings Dialog Box .

Enable Tuning Button
Click on this button to display the Tune Instrument *dialog box* in which changes to the mass alignment, resolution and ion source settings can be made. This is described in section Instrument Tuning **.**

Increase Mass Span Button
This will cause the mass span to increase and more AMU values will be displayed. The mass span can only take one of the following values: 8, 16, 32 and 64 amu.

Decrease Mass Span Button
This will cause the mass span to decrease and fewer AMU values will be displayed. The mass span can only take one of the following values: 8, 16, 32 and 64 amu.

Increase Analog Accuracy button
This will cause the instrument to scan more slowly but the readings will tend to be more stable. This button has the same effect as increasing the Accuracy in the **Analog Settings** *dialog box*.

Decrease Analog Accuracy Button
This will cause the instrument to scan more quickly but the readings will tend to be less stable. This button has the same effect as decreasing the Accuracy in the **Analog Settings** *dialog box*.

Use Multiplier Detector Button

When the button is depressed the multiplier detector will be used otherwise, the Faraday detector will be used.

Peak Height Scroll Bar Button Analog
Click on this button to display the Peak Height Scroll bar.

Mass Scroll Bar Button
Click on this button to display the Mass Scroll Bar.

Cursor Button
Click on this button to enable the cursor function. This has the same effect as *checking* Enable Cursor in the **Analog Settings** *dialog box*.

Grid Button
Click on this button to switch on the Grid. This is the same as enabling Display Grid in the **Analog Settings** *dialog box*.

Peak Height Scroll Bar
The Peak Height Scroll Bar may be displayed next to the Y-axis and allows the full scale measurement to be changed. Either *drag* the scroll bar or *click* on the up or down arrow to make the change. This has the same effect as changing the **Full Scale:** setting in the **Analog Settings** *dialog box*.

Mass Scroll Bar
The Mass Scroll Bar may be displayed below the X-axis and allows the first mass to be altered. Either *drag* the scroll bar or *click* on the left or right arrow to make the change. This has the same effect as changing the **First Mass** setting in the **Analog Settings** *dialog box*.

5.5. Analog Settings Dialog Box

If configured to do so in the recipe set up, the analog parameters may be changed by *clicking* on the Edit Settings button or by *right clicking* anywhere on the graph. This will result in the **Analog Settings** *dialog box* being displayed.

Scan settings
The scan settings define what is being measured and how.

First Mass:

This setting is used to define where the analog scan starts. It can be anywhere in the range 1 to the maximum mass of the instrument minus the current Mass Span.

Mass Span:
This sets the number of AMU that will be scanned. It can only take values of 8; 16; 32 or 64. As the Mass Span is increased the points per AMU is decreased. The Mass Span must be set to 8 to enable the calibration of the Mass Alignment and Resolution using the **QDAC Setting** *dialog box*.

Full Scale:
This sets the amplifiers to allow the given largest reading to be measured. If the largest reading is set to 1.00E-05 for example then the Y-axis will show 0 to 10E-05.

Accuracy:
In any measurement there is a trade-off between speed and precision. The Accuracy defines the time that is spent taking each reading. Increasing Accuracy causes the scan to slow down and readings to become more precise. Accuracy is always in the range 0 (one reading per point) to 9 (512 readings per point). Accuracy 3 is a good starting point.

Detector:
To use the Faraday detector *click* on the **Faraday** *radio button*. To use the multiplier detector *click* on the **Multiplier** *radio button*.

Display settings
Two display settings exist for the Analog mode.

Display Cursor:
Enables the cursor function that allows the partial pressure of any point in the scan to be measured. *Drag* the cursor to the desired location on the graph. The display at the top of the graph shows the mass position of the cursor and the corresponding partial pressure.

Display Grid:
Draws a grid on the graph to assist in the visual reading of peak heights.

Mode setting (HPQ-2)
This is only available if you are using an HPQ-2 instrument.

The HPQ-2 supports three modes of operation to provide optimum performance for various applications:
RGA mode for total pressures below 1x10-4Torr
HP mode for pressures greater than 1x10-4Torr
Leak mode for Leak Checking (especially at mass 4).
Select the mode to run.

When all settings are correct *click* on the **Ok** to make the changes or **Cancel** to return without any changes.

5.6. Instrument Tuning

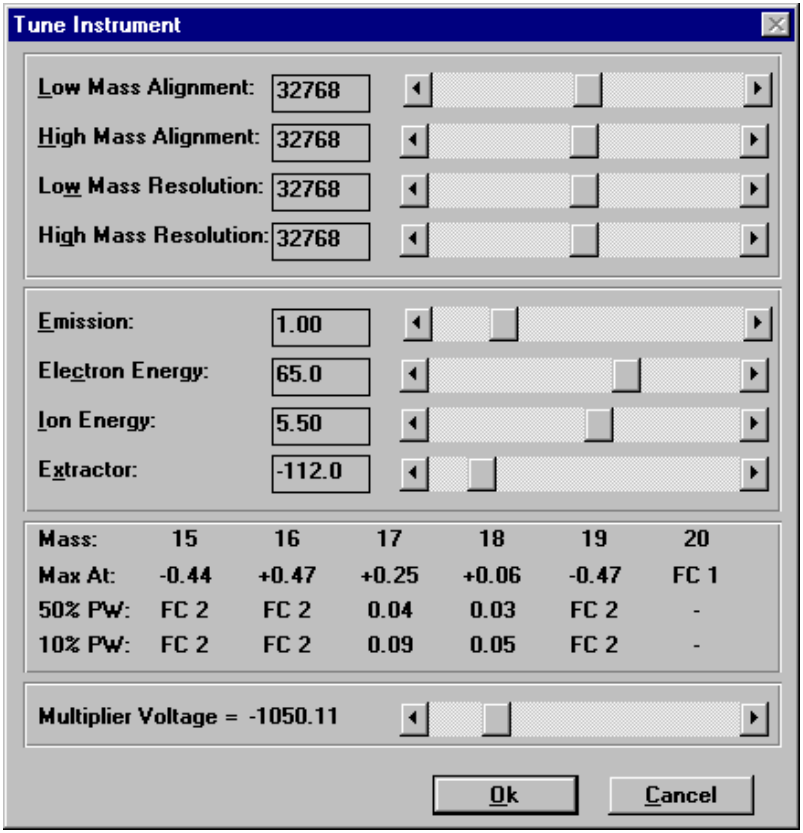
The mass span must be set to 8amu before any of the QDAC settings can be adjusted. *Click* on the Enable Tuning button to display the Tune Instrument *dialog box* below. If the mass span is not set to 8 amu a warning box will be displayed to tell you to adjust the mass span setting.

Low Mass Alignment:
High Mass Alignment:
Low Mass Resolution:
High Mass Resolution:

The Mass Alignment and Resolution of the instrument are controlled from the QDAC (Quad Digital to Analogue Converter.)
Separate settings for high and low mass alignment, high and low mass resolution are maintained for each of the two filaments. For HPQ-2 separate settings are also maintained for each of the three operating modes (RGA, HP and Leak). The settings for the currently selected filament and mode are displayed and may be adjusted.
If they have moved for any reason or if this instrument is being upgraded to run Process Eye then it may be necessary to configure the QDAC settings. To assist in setting the values, the point that the maximum occurs and the peak width at 50% of the peak height and 10% of the peak height are displayed. Note that the values are updated at the end of each scan and only the values for the central 6 peaks are calculated. If the Max At, 50% Peak Width or 10% Peak Width cannot successfully make a measurement one of the following fail codes will be displayed:

Fail Code 1 (FC 1) Peak less than 5% of full scale.
By forcing peaks to be larger than 5% before displaying the values any

errors due to noise will be minimized and greater precision ensured.



Fail Code 2 (FC 2) Peak Maximum greater than ± 0.33 AMU from center.
If the value of the largest reading in the peak is greater than ± 0.33 AMU from the nominal mass center position it needs adjusting. It is recommended that it be brought to within ± 0.15 AMU from the nominal center.

Fail Code 3 (FC 3) No value small enough found.
For the 10% peak width measurement a peak height value of less than or equal to 10 % of the maximum cannot be found within 0.75 AMU of the maximum on both sides of the peak.
For the 50% peak width measurement a peak height value of less than or equal to 50% of the maximum cannot be found within 0.75 AMU of the maximum on both sides of the peak.

Fail Code 4 (FC 4) Unexpected error in calculation.
The calculations involved in determining the peak width have failed due to a divide by zero. This should never occur under normal operation.

5.6.1. Setting the resolution

A number of ways of setting the resolution exist, the most commonly used are:
0.5 AMU peak width at 50% peak height.
This is generally the easiest to set.

1.0 AMU peak width at 10% peak height.
This is in line with the recommendations of the AVS on calibrating partial pressure gauges. It does however require isolated peaks at the upper and lower masses to be measured.

10% valley between peaks of equal height.
A definition commonly used by many vendors of RGAs but the need for peaks of equal height at low and high mass make it difficult to set an instrument accurately to this specification.

The method to set Mass Alignment and Resolution is to:

1. Set the Mass Alignment and Resolution at a low mass (typically Mass 2 or 4) using the Low Mass Alignment and Low Mass Resolution settings.
2. Set the Mass Alignment and Resolution at the highest mass that will be measured (or as close as possible to it) using the High Mass Alignment and High Mass Resolution settings.
3. Repeat the last two steps to iterate to a conclusion. It should converge after one or two iterations.

Emission:
Electron Energy:
Ion Energy:
Extractor:

The center panel in the **Tune Instrument** *dialog box* contains four controls to set ion source parameters.
Separate settings for high and low mass alignment, high and low mass resolution are maintained for each of the two filaments. For HPQ-2 separate settings are also maintained for each of the three operating modes (RGA, HP

and Leak). The settings for the currently selected filament and mode are displayed and may be adjusted.
Under normal circumstances none of these four settings should be altered.

Emission:
The emission current is the flow of electrons from the filament to the ion source cage. It is variable in the range 0 to 5mA and the default settings are:

1mA open ion source Microvision Plus
1mA PVD ion source Microvision Plus
0.7mA HPQ-2, RGA mode
0.1mA HPQ-2, HP mode
1.0mA HPQ-2, Leak mode

Electron Energy:
The electron energy is the energy of the electrons emitted by the filament and is controlled by varying the filament potential. Electron energy is variable in the range 0 to 100eV and the default settings are:

70eV open ion source Microvision Plus
40eV PVD ion source Microvision Plus
70eV HPQ-2, RGA mode
35eV HPQ-2, HP mode
88eV HPQ-2, Leak mode

Ion Energy:
Ion energy is the energy of the ions produced in the ion source and is governed by the potential applied to the ion source cage. Ion energy is variable in the range 0 to 10eV and the default settings are:

5.5eV open ion source Microvision Plus
7.0eV PVD ion source Microvision Plus
7.0eV HPQ-2, RGA mode
5.0eV HPQ-2, HP mode
10eV HPQ-2, Leak mode

Extractor:
The potential applied to the extractor/focus plate may be varied in the range 0 to -130V and the default settings are:

-112V open ion source Microvision Plus
-20V PVD ion source Microvision Plus
-110V HPQ-2, RGA mode
-58V HPQ-2, HP mode
-130V HPQ-2, Leak mode

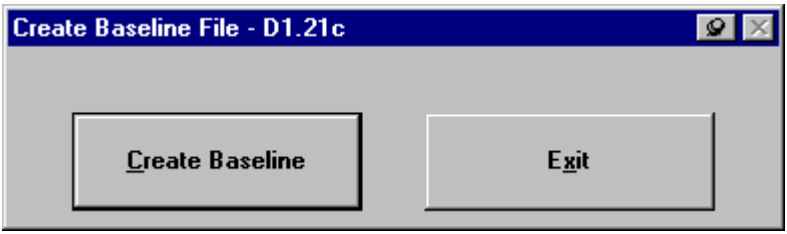
Multiplier Voltage:
Although it is generally recommended that the Multiplier Voltage be adjusted automatically in the **Run Calibration | Calibrate Multiplier** it is possible to set the Multiplier Voltage manually using the *scroll bar*. The *scroll bar* is only active when **Use Multiplier:** in the **Analog Settings** *dialog box* has been *checked*.

When all settings are correct *click* on the **Ok** to make the changes or **Cancel** to return without any changes. As these changes will fundamentally change all future pressure measurements made by the RGA you will be asked to confirm the changes.

5.7. Utilities

5.7.1. Build baseline

A Baseline is a reduction of multiple data files into two files; a mean (or average) and standard deviation. To create a baseline select **Utilities | Baseline** from the *menu bar* or *click* on the Create Baseline button. The **Create Baseline** *dialog box* will be displayed. *Click* on the **Create Baseline** button to open a standard windows open file *dialog box*.

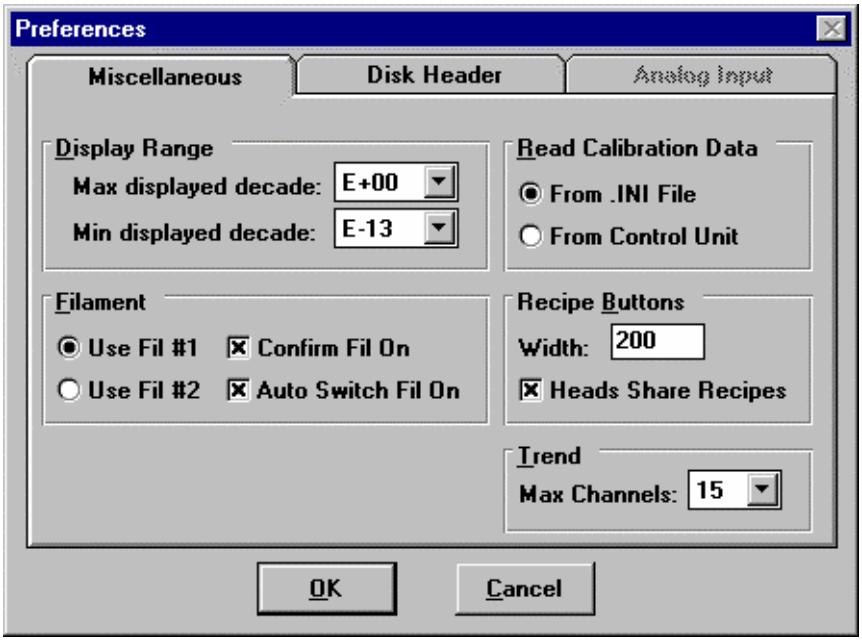


Selecting Create Baseline runs the Create Baseline program. When run you will be prompted to select all the files that will be analyzed. To select multiple files in a contiguous list, *click* the file name of the first file then hold the **SHIFT** key and *click* on the last file. To select many individual files, *click* on individual file names with the **CONTROL** key pressed. You

must select between two and two hundred fifty three file names. These files must have been stored with the same number of Action channels, masses, the same number (if any) of Analogue and Digital inputs and a comparable number of scans. Failure to meet these criteria will prevent the Baseline files being created. When complete *click* **OK**. You will then be prompted for a name of the Baseline file. By default the extension will be .BL and it is recommended that you leave it as this. The standard deviations will be stored in a file with the same file name but with an .SD extension. The means and standard deviations will be calculated and the percentage done will be displayed. If the files are large and there are many of them it may take a long time to calculate all the data.

5.8. Preferences

A number of settings may be defined in preferences. Select **Utilities | Preferences** from the menu bar or click on the Preferences button to open a multiple page dialog box.



5.8.1. Miscellaneous

If it is not already visible *click* on the Miscellaneous tab to switch to the Miscellaneous page of the *dialog box*.

Display Range
This defines the largest and smallest values that can ever be displayed.

Min Displayed Decade:
The smallest value that can be displayed. It is in the range E-20 to E+20 and should be smaller than the Max Displayed Decade.

Max Displayed Decade:
The largest value that can be displayed. It is in the range E-20 to E+20 and should be larger than the Min Displayed Decade.

Read Calibration Data
There are a number of settings which define the calibration of the instrument such as; the QDAC settings, multiplier voltage, multiplier and Faraday gain etc.. These settings (one for each filament in case they are different) are stored in an .INI file and in the control unit's memory.

From .INI File:
Click on the **From .INI File** *radio button* to use the calibration settings stored in the .INI file each time Process Eye is started.

From Control Unit:
Click on the **From Control Unit** *radio button* to use the calibration settings stored in the control unit's memory each time Process Eye is started.

Trend
Max Channels:
The maximum number of channels that may be displayed in a Trend can be set from one to fifteen.

Filament
The quadrupole analyzer is fitted with two identical filaments one of which needs to be switched on for readings to be taken. Two filaments are available to avoid having to remove the analyzer from the chamber if a filament blows. Only one filament is ever on at one time.

Use Fil # 1

Click on the **Use Fil # 1** *radio button* to use filament 1 when switch filament on is selected.

Use Fil # 2
Click on the **Use Fil # 2** *radio button* to use filament 2 when switch filament on is selected.

Confirm Fil On
If the **Confirm Fil On** box is *checked* a warning box will be displayed before the filament is automatically switched on at the start of a recipe.

Auto Switch Fil On
If the **Auto Switch Fil On** box is *checked* the Filament will automatically be switched on when the recipe is run. The user may be asked for confirmation depending on the setting of the **Confirm Fil On** *check box*.

Recipe Buttons
Width:
This controls the width of the recipe buttons displayed in the Select Mode window. Enter a value between 100 and 600 for the width of the buttons measured in pixels. The default setting is 200. The new value will not be used until the Select Mode window is re-drawn.

Heads Share Recipes:
In multi headed systems the user can decide if all RGAs share the same recipes (registered in the proc.ini file) or if each RGA uses recipes unique to it (registered in the procNNN.ini files where NNN is 1 to 999, the system number referred to in the start-up dialog (001 to 999) and the /S switch).
Check the **Heads Share Recipes** *check box* to allow different heads to use the same recipes.

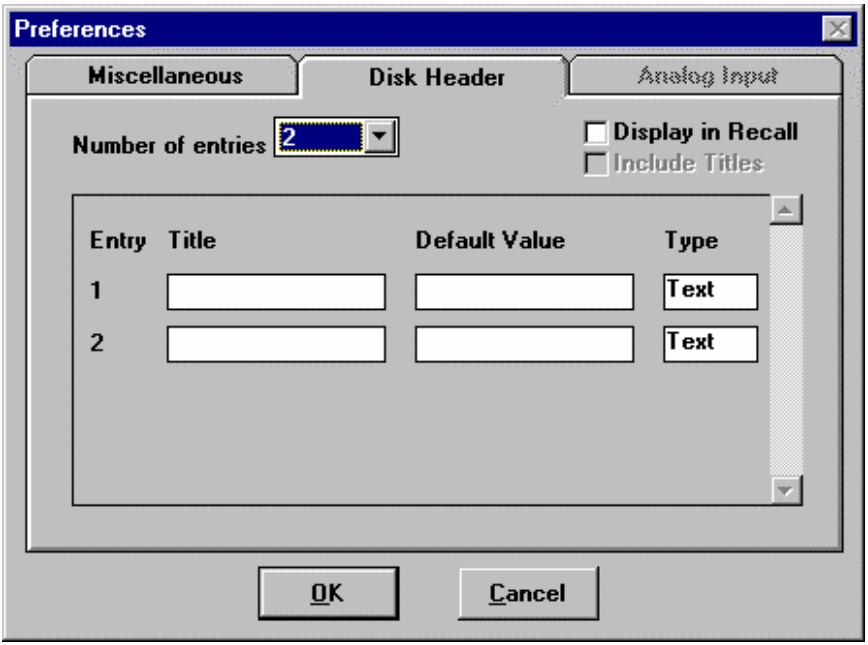
5.8.2. Disk header

User Disk Header:
The User Disk Header feature is designed to allow additional fields in the disk file header section of data files stored to disk. These fields can be given a title, a default value and they can be either numeric or text. Typically they are used to store parameters specific to each process run. Once a number of user fields have been defined the User Disk Header feature must be enabled in the Disk Store section of each recipe in which you wish to use it.

Number of Entries:

The number of User defined fields in the range 1 to 15.

Title:
This defines the text that will be used as a title in the disk file.



Default Value:
To save on typing it is possible to define a default value that will be entered for this field. If no default value is required simply leave this item blank.

Type:
The contents of a field may be either text or a number. The difference is that text will be delimited by quotation marks in the disk file and numbers will not.

Analog inputs
Click on the Analog Inputs tab to switch to the analog inputs page of the *dialog box*.
There are four analog inputs available on the control unit Aux. I/O port, see your control unit manual for further details. Each input may be configured for a number of pre-defined types of signal. *Click* on the **Type** *dropdown list*

box then, *click* on the appropriate type in the list. When the settings are correct *click* on the **Ok** button.

Click on **OK** to save the changes and return to the Select Mode window.

To add a custom analog input type the PROC.INI must be edited. In the section [ANALOG INPUT TYPE] change the line:
Number Of Types=n
to the new number.
e.g. if there are five types and you are adding one more type change the line from Number Of Types=5 to Number Of Types=6.
Then add the line to define the input in the form:

Type n=Label in dropdown;A;B;C;D;E;F

Look at the existing types as examples.

The six parameters A to F are defined below:

A = Linear offset
B = Linear scale factor
C = Log or Lin flag
D = Log base - used if C=1
E = Log offset
F = Log scale factor

If C = 0 then
LinResult = (ADC Reading - A) * B

If C = 1 then
LogResult = D^((ADC Reading-E)*F)

The new type you have defined will appear in the Type *dropdown list*.

5.8.3. Software switches

There are a number of "software switches" used to control the way in which Process Eye starts up. Normally the user does not have to concern himself with these as they are automatically inserted during the installation and configuration process.

We will assume you have used the default directory and head names for

Process Eye.
Click on the Start button and from the Start menu select **Settings | Taskbar . . .** *click* on the Start Menu Programs tab then *click* on the **Advanced . . .** button. The Exploring window will be displayed *click* on the + sign next to the programs folder then, *click* on the Process Eye folder then, *right click* on RGA Process in the contents list on the right of the window. From the menu now displayed *click* on **Properties** then *click* on the **Shortcut** tab. Any software switches should be added to the line in the **Target:** box.

Software switches

/X This forces Process Eye to run in the Recall mode.

/AL Run Leak Check when Process Eye is started

/C Add to the Configure Microvisions shortcut to enable the Configure button and the Configure window.

/M Enable the macro language.

5.8.4. RVC settings

In the Set RVC section of the End of Scan Actions the six Remote Vacuum Controller outputs may be switched off or on as a result of an action. The six outputs are by default:

Output 0 = Main Pumps	(Bit0 = 1)	RVC Skt 1 contacts 4 & 12
Output 1 = Valve 1	(Bit1 = 2)	RVC Skt 1 contacts 1 & 9
Output 2 = Valve 2	(Bit2= 4)	RVC Skt 1 contacts 2 &10
Output 3 = Alarm	(Bit3 = 8)	RVC Skt 1 contacts 3 & 11
Output 4 = Turbo Standby	(Bit 4= 16)	RVC Skt 1 contacts 6 &14
Output 5 = Heater Jacket	(Bit5 = 32)	RVC Skt 1 contacts 5 & 13

However, the RVC output Bits can be used for other purposes. You must not reassign bits that are currently used in your configuration. Typically, only bit 2 will be available for custom functions. Process Eye gives the user the ability to change the names of the outputs. To do this in the RVC section of the Procxxx.Ini file add the following items:

Number of Outputs = n
Line Name 0 = OutputName0

True Text 0 = TrueText0
False Text 0 = False Text0
Bit 0 = Bit0
Line Name 1 = OutputName1
True Text 1 = TrueText1
False Text 1 = FalseText1
Bit 1 = Bit1
.
.
.
Line Name n = OutputNamen
True Text n = TrueTextn
False Text n = FalseTextn
Bit n = Bitn

All a little confusing, hopefully the following example will help.

Suppose we have two of the RVC outputs under End of Scan Actions control. Valve 1 will be used as the Process valve and the Heater Jacket output will be used to signal an alarm via a lamp. You would add the following to the RVC section of the Procnnn.Ini file:

Number of Outputs = 2
Line Name 0 = Process Valve
True Text 0 = Open
False Text 0 = Closed
Bit 0 = 2
Line Name 1 = Alarm
True Text 1 = On
False Text 1 = Off
Bit 1 = 32

5.9. Copying Recipes Between PCs

One of the things you are likely to want to do is copy a recipe created on one PC to another PC. This will ensure you have exactly the same recipe and will save time by avoiding a lengthy creation process. Let's assume you have written a bar chart recipe called Monitor on the PC called Line 1 and you want to copy this to a PC called Line 2. The button name for the Monitor recipe is Normal Process Monitor. You have installed Process Eye on both

PCs using the default directory, folder and head names.

On the Line 1 PC, using Windows Explorer, open the Process Eye directory and copy the file monitor.rcp to a floppy disk. Make a note of the button name for the recipe Monitor.
On the Line 2 PC run up Process Eye and from the select mode window add a recipe. Give the recipe the name Monitor and the button the name Normal Process Monitor. *Click* on the **Ok** button, note that it does not matter which type of recipe you have created only the recipe name and button name are important. In the first set up *dialog box*, *click* on the **Finish** button then *click* on the Save and Exit button in the Display window (if it is a Bar Graph or Peak Jump recipe).
You should now be back to the Select Mode window and have a new recipe button called Normal Process Monitor. Exit from Process Eye.
Now, on the Line 2 PC open Windows Explorer and copy the **monitor.rcp** file from the floppy disk to the Process Eye directory. You will be told the file already exists (because you have just created it) and do you want to overwrite it, respond **Yes**.
When you run Process Eye and *click* on the Normal Process Monitor button it will run the recipe Monitor which you originally created on the Line 1 PC.

Section 6.
DDE Links

6.1. Introducing DDE

Dynamic Data Exchange (DDE) is a mechanism by which Windows programs running on the same computer may exchange information. Process Eye uses DDE in two ways: firstly it acts as a data server providing, for example, Peak heights, scan number etc., secondly it accepts commands e.g. Start recipe, Read Filament status etc.

When Process Eye is acting either as a DDE server or when it is accepting "Execute" commands it must be referred to using the Application/Topic/Item notation. The exact detail of how they are put together depends on the client application being used.

For example Microsoft Excel uses the form:-

```
{=Application|'Topic'!'Item'}
```

Quattro Pro for Windows uses:

```
@DDELINK([Application|Topic]"Item")
```

Visual Basic uses:

```
Control.LinkTopic = "Application|Topic"
Control.LinkItem = "Item"
```

Application
The application name used by Process Eye is :- PROCESS
It does not matter if uppercase or lowercase is used.

Topics
Topic Names
The following topics are supported:

SYSTEM for single headed systems
SYSTEMn where n is a number from 1 to 9 when Process is started with the /Sn command switch

All responses and errors are placed in the item: DDEData

All errors are reported by putting Err nnnn in the DDEData item where nnnn is the four digit error code. All the error codes are explained below.

All commands are case insensitive.

Error:
1000 Invalid command

6.2. DDE Commands

Read Peak Command
READ, scannumber, channel
e.g. READ1,1
Channels are: Partials, Total, Analogs, Digitals, Actions

Errors:
1100 Not scanning or recalling data
1101 Invalid scan number (less than 1)
1102 Invalid scan number (too large)
1103 Invalid peak number (less than 1)
1104 Invalid peak number (too large)
1105 Invalid peak number (scan OK but peak not read yet)

Write Port Command
PORT,portbyte
e.g. PORT,4

1=bit0, 2=bit2, 3=bit3, . . . 128=bit7

Errors:
1200 Invalid setting (outside range 0 - 255)

Run Recipe Command
RUN RECIPE, recipenumber [, filename]
e.g. RUN RECIPE, 1, DATA01
See the PROC.INI file or PROCx.INI file for the recipe number. In the recipe step 2 use Defined by DDE as the filename.

Errors:
1300 Invalid Recipe number

End Recipe Command
END RECIPE
e.g. END RECIPE

Errors:
1400 Not running recipe

Press Recipe Button Command
PRESS, recipeindex
e.g. PRESS, 2
The first listed recipe is recipeindex = 1, the second is 2 and so on. The recipeindex is NOT the same as the recipe number which is defined in the PROC.INI/PROCn.INI file.

Errors:
1500 Invalid Recipe Button number (less than 1)
1501 Invalid Recipe Button number (too large)

Read Live Data Command

Errors:
1600 Not running recipe
1601 Invalid peak Number (less than 1)
1602 Invalid peak Number (too large)

Get Parameter Command
GET, parameternumber
e.g. GET, 1
1 = Number of partials
Returns 0 - 300 in DDEData

2 = Number of analog inputs
Returns 0 to 32000 in DDEData

3 = Number of digital inputs
Returns 0 to 32000 in DDEData

4 = Number of action channels
Returns 0 to 64 in DDEData

5 = Filament state
Returns currentfilament, filamentstate e.g. 1, off or 2, on

6 = Current channel being measured
Returns 1 - maximum channel, maximum channel = Number of partials + Number of analogs + Number of digitals + Number of action channels + 1 (for total pressure)

7 = Current scan being measured
Returns 1 - maximum scan (defined in recipe step 1)

Errors
1700 Invalid parameter number

Move Command
MOVE, Top, Left, Height, Width
e.g. MOVE, 0, 0, 800, 600

All parameters are in pixels. It is possible to move the window off the screen. All parameters must be in the range -32767 to 32767

Errors:
1800 All positions (Top, Left, Height, Width) not sent.

Section 7.
Macros

7.1. Introducing Macros

The macro language feature is designed to do the things you need the RGA software to do but that we as RGA vendors forgot to put in. The macro language is fully Visual Basic for Applications VBA® compatible.

What to do if you are not proficient at Visual Basic or its cousin VBA? Well, basically you have two options a) give up now and get on with something more important, or b) grab a book on VB or VBA for beginners.

7.1.1. Macro Types

There are a number of different types of macros. Recipe Macros are linked to recipes, recipes may have no associated macro, a unique macro or a shared macro. The Reminder Macro is run each time the Select Mode screen is displayed. The Startup Macro is run once when the program begins and the Shutdown Macro is run once when Process Eye ends. In addition you can place common functions, subroutines and variables in a Hidden Macro that will be available to all other macros at all times.

7.1.2. Recipe Macros

Each recipe can have a macro associated with it. By default the recipe loader will look for a macro with the same name as the recipe file and an extension of .Bas. For example if a recipe has a filename Spectra1.Rcp it will run a macro called Spectra1.bas in the same directory. It is possible to change the macro name if, for example, you want to have a single macro for multiple recipes. To change the macro associated with a recipe edit the recipe (RecipeName.rcp) file with a text editor such as Notepad and add the following line to the [SYSTEM] section

Macro = your_macro_name Note: The macro should be stored (like the recipe) in the applications directory.

7.1.3. Reminder Macro

The usual purpose of this macro is to test if certain time dependent actions - such as changing a filament, performing a calibration etc. need to be

performed and if so notify the user. By default the name is Reminder.Bas and it must be stored in the applications directory. To change the macro run when the program starts edit the heads .INI file (e.g. Proc1.ini for head 1 with V1.4x or SerialNumber.Ini for V1.6x) file with a text editor such as Notepad and add the following line to the [SYSTEM] section:

Reminder Macro = your_remindermacro_name

7.1.4. Startup Macro

The usual purpose is to configure certain hard-coded variables (e.g. User Access Levels) and to put user defined dialog boxes up for your own nefarious purposes. The macros name is Process.Bas by default and it must be stored in the applications directory (usually c:\proceye\). To change the macro run when the program starts edit the heads .INI file (e.g. Proc1.ini for head 1 with V1.4x or SerialNumber.Ini for V1.6x) with a text editor such as Notepad.exe and add the following line to the [SYSTEM] section:

Startup Macro = your_startupmacro_name

7.1.5. Shutdown Macro

The usual purpose is to save information to disk to allow passing data from one run of Process Eye to the next. The macros name is Process.Bas by default and it must be stored in the applications directory (usually c:\proceye\). To change the macro run when the program starts edit the heads .INI file (e.g. Proc1.ini for head 1 with V1.4x or SerialNumber.Ini for V1.6x) with a text editor such as Notepad.exe and add the following line to the [SYSTEM] section:

Shutdown Macro = your_ shutdownmacro_name

7.1.6. Hidden Macro

To share functions, subroutines and variables across all macros create a file called ProcEye.Bas and save it in the application directory. Variables that are to be shared should be declared either Public or Global. Do not call any of the routines Main. To change the macro loaded (and hidden) when the program starts edit the heads .INI file (e.g. Proc1.ini for head 1 with V1.4x or SerialNumber.Ini for V1.6x) with a text editor such as Notepad.exe and add the following line to the [SYSTEM] section:

Hidden Macro = your_ hiddenmacro_name

7.2. Anatomy of a Recipe Macro

A Bar Chart or Peak Jump recipe macro has five distinct parts. Four of these are executed once in a recipe the other part is executed at the end of each scan. The five parts are:

PreTrigger
This is the first thing that is executed after the recipes settings have been read in. It may be used, for example, to open a valve if that is required for the trigger measurement to be made correctly.

Post Trigger
This is executed immediately after the trigger has been done (or pretty much straight after the PreTrigger if there is no Trigger defined in the recipe!)

PreRun
This is run just before the first scan starts but after all the displays have been setup. It gives an opportunity to configure the display to your taste.

End Of Scan
This is run when the end of scan is reached. It is where most of the real work will be done, for example calculating complex alarms, interacting with other programs etc.

PostRun
As the recipe closes down this is executed and it is a place where, for example, valves can be shut, summary data calculated and saved etc.

Each of these parts are written as a separate subroutine and called from the Main subroutine. Always use the MTMacro.Bas macro as the starting point for writing a recipe macro.

Anatomy of Calibration and Analog Recipe Macros
A calibration or Analog recipe macro has two parts. Code after Sub Main() and before PauseMacro executes before the recipe starts. Code after PauseMacro executes when the recipe is complete. The basic format is:

```
Sub Main()
‘ Your code that runs before the recipe.
PauseMacro
‘ Your code that runs as the recipe terminates
```

End Sub

Anatomy of the Startup, Shupdown and Reminder Macros
These macros are called once and are in the form:

```
Sub Main()
‘ Your code
End Sub
```

7.3. Writing a Macro

There are two ways of writing a macro for Process Eye - the hard way and the easy way.

The Hard Way
The hot shot programmers among you should just load the MTMacro.Bas file into your favorite text editor, add the stuff you need, save it as Recipe_name.Bas and it will run first time with no problems (but then if you are a hot shot you would never admit to knowing VBA in the first place so do it...)

The Easy Way
Those nice people as Sax Software who did most of the hard work in providing a macro language kindly provided an integrated development environment (IDE). Although it is usually hidden away, adding a /M switch on the command line for Process Eye (i.e. make it read C:\PROCEYE\PROCESS>EXE /Sx /M where x is the system (or head) number) will cause it to appear. Use the File open icon or *right click* anywhere on the Macro Code window to read in the MTMacro.Bas macro. Generally, most of the interesting things happen when a recipe is running. To write test code create a recipe that scans at an appropriate rate for what you are testing (DO NOT create a Recipe_name.Bas file yet as it will automatically be loaded at the start of a recipe run) and write some test code in Sub Main. Start up the recipe then the test code can be run, stepped through line by line, etc. See the Saxbasic help by pressing **F1** when the Macro Code window has the focus or *right click* and select help. This help file has a full list, broken down into groups, of the available VBA commands available to you.

7.4. Macro Function Extensions

A macro will consist of regular VBA commands mixed liberally with extensions, provided by us, which are specific to the RGA. The following gives a list of the RGA specific extensions to the VBA language. Extensions fall into three types: Functions – these return a value, Subroutines – these usually perform an action and Variables that allow settings of the RGA to be read and or written.

7.4.1. Functions

Functions always return a result and have zero or more parameters that are passed in parenthesis. The general syntax is:

Result = FunctionName (param1, param2....)

Read Data Functions

The two data functions are used to read channel data (i.e. partial pressures, total pressure, analog and digital inputs and action channels)

Function	Returns	Parameter	Description
ReadCurrent Data	Single	iType as Integer	iType 0 = Raw data 1 = Standard deviations from mean 2 = Mean 3 = Standard Deviation 4 = Background
		iChannel as Integer	iChannel The channel for which data is required. Always in the range 1 to MaxChannel. See below for details of how to calculate a channel number. Provides the capability of reading data from the current scan. There are four types of data available for each channel. If multiple types or multiple channels are required they must be requested separately. If either parameter is out of range a Zero will be returned
FindScanAt	Long	vScanTime As Variant	vScanTime Returns the scan number of the scan

		vArray as Integer	at or first scan before vArray (Optional: default = 1) 1 = Raw data 2 = Mean 3 = Standard Deviation 4 = Background
ReadHuge ArrayData	Single	iArray as Integer lScan as Long iChannel as Integer	iArray 1 = Raw data 2 = Mean 3 = Standard Deviation 4 = Background lScan Scan number. Always in the range 1 to MaxScan. iChannel: Integer The channel for which data is required. Always in the range 1 to MaxChannel. See below for details of how to calculate a channel number. See note 2.

Note 1
Provides the capability of reading data from the current scan. There are four types of data available for each channel. If multiple types or multiple channels are required they must be requested separately. If either parameter is out of range a Zero will be returned

Note 2
Provides the capability of reading any data from the RGA currently has stored in Huge Arrays. There are four types of data available for each channel. If multiple types or multiple channels are required they must be requested separately. Notice that no “Standard Deviations from Mean” is available, this is because it is a calculated number and provided for convenience in GetCurrentData only. If any parameter is out of range, or a Huge Array that is invalid is selected a Zero will be returned

Channel Functions
The data functions require a Channel number as a parameter. The Channels are always in the following order starting at 1.

Channel 1 to n: partial pressures
Channel n+1: Total Pressure (sum of partials or Ion Gauge for HPQ2S)
Next Channels are Analog Inputs (if enabled for this recipe)

Next Channels are Digital Inputs (if enabled for this recipe)
Next Channels are Action Channels (if enabled for this recipe)

If, for example, there are no Analog Channels defined for the current recipe then any Digital Channels will follow the Total Pressure Channel. The following functions convert a partial, total, analog, digital or action channel to a channel number suitable for using in the above functions. Selecting a channel out of the valid range or a channel for a channel type that is not used in the current recipe will cause a zero to be returned.

Function	Returns	Parameter	Description
MassTo Channel	Integer	iMass as Integer	iMass The Mass. It must be in the range First Mass to Last Mass for a Bar Chart Recipe or one of the defined masses for a Peak Jump Recipe. If it is out of this range then 0 (an invalid channel number) will be returned.
Total Channel	Integer		Simply returns the Total Pressure Channel.
Analog Channel	Integer	iAnalogChannel as Integer	iAnalogChannel The required Analog Channel in the range 1 to MaxAnalogChannel.
Digital Channel	Integer	iDigitalChannel as Integer	iDigitalChannel The required Digital channel in the range 1 to MaxDigitalChannel.
Action Channel	Integer	iActionChannel as Integer	iActionChannel The required Action Channel in the range 1 to MaxActionChannel.

Disk Functions

Function	Returns	Parameters	Description
RemoveExtension	String	sFilename as String	SFilename Returns sFilename with the extension removed.
OpenFile	Integer	sOpenPath As String sOpenFileName As String	SOpenPath The path of the existing data file to open. SOpenFileName The FileName of the existing data file to open A return value of 0 indicates a pass, non

zero values are fail codes.

NT I/O Functions

Function	Returns	Parameters	Description
NTPeek PortByte	Integer	iBaseAdress as Integer	IBaseAdress Offset from I/O Port address (0 to vPortCount –1) Returns a value in the range 0 – 255
NTPeek PortWord	Integer	iBaseAdress as Integer	IBaseAdress Offset from I/O Port address (0 to vPortCount –1) Returns a value in the range 0 – 65535. Note values greater than 32767 are returned as negative numbers – e.g. 65535 is returned as –1, 65534 as –2 etc.

7.5. Subroutines

Subroutines do not have a return value and may have zero or more parameters that are passed with no parenthesis. The general syntax for using a subroutine is:

SubRoutineName param1, param2....

7.5.1. Data Subroutines

Subroutine	Parameters	Description
WriteHugeArray Data	iArray as Integer lScan as Long iChannel as Integer sData as Single	iArray 1=Raw data 2=Mean 3=Standard Deviation 4=Background lScan Scan number. A Long number always in the range 1 to MaxScan. iChannel The channel for which data is required. Always in the range 1 to MaxChannel. See below for details of how to calculate a

		channel number. sData The data to write. It provides the capability of writing any data to the Huge Arrays. Although there are four types of huge arrays usually only the Raw Data Array will be used. Since you get a chance to write data at the end of a scan, if you change a partial pressures value it will be displayed on any trends with the modified reading but not on the Bar Chart or Peak Jump as that data will have already been displayed. The modified data will be written to disk.

7.5.2. Alarm Subroutines

Subroutine	Parameters	Description
AddAlarm Event	iWarning as Boolean iStep as Integer strMessage as String	IWarning A flag set true if this Alarm event is to be treated as a warning IStep This is used as a pointer to the type of alarm event. It is an arbitrary number defined by you. It is recommended that you call your first event 1 and continue up in steps of 1. StrMessage The text to be displayed to a user in the Alarm Event viewer window. This text will be written into the .INF file so it is available when the data is recalled. AddAlarmEvent adds a user defined event to the alarm log. It does not take any actions, these must be programmed separately.
ShowAlarmWindow	iVisible as Boolean iBeep as Boolean	IVisible Used to set the Alarm viewer window visible or hidden. IBeep Used to start and stop the PC beeping.

7.5.3. RVC Control Subroutines

Also See RVCStatus read only variable

Subroutine	Parameters	Description
SetRVC	iRVCBits as Integer	iRVCBits The logical OR of the bits that should be set to the state defined in iState. 1,2,4,8,16 corresponding to the 5 RVC control line.
	iState as Integer	iState True to turn the lines defined in iRVCBits on (open), false to turn them off (closed).

7.5.4. Input/Output Subroutines

Subroutine	Parameters	Description
SetDigital Output	iDigitalChannel as Integer	iDigitalChannel The channel to set true or false.
	iState as Integer	iState True (non zero) if digital output is to be set on (TTL high), False (zero) to set it off (TTL Low).

7.5.5. Recipe control Subroutines

Subroutine	Parameters	Description
RunRecipe	iRecipeIndex as Integer vInRecipe as variant vDelay as variant	iRecipeIndex The recipe number defined in the Proc.INI for shared recipes or in Procxxx.Ini for head specific recipes. This should be the last thing that happens in you macro as running a new recipe will involve loading up a new recipe with its associated macro and running the “Pre Trigger” code. vInRecipe (Optional: default = 1) Flag that should be set to 0 if you are attempting to run a recipe outside of a recipe. vDelay (Optional: default = 2)

		A delay in seconds that allow previous recipe to complete termination before starting the next. When vDelay is not defined a default of 2 seconds is used.
RunRecipe Name	sRecipeName as Integer vInRecipe as variant vDelay as variant	sRecipeName The recipe name as displayed on the Recipe button. vInRecipe (Optional: default = 1) Flag that should be set to 0 if you are attempting to run a recipe outside of a recipe. vDelay (Optional: default = 2) A delay in seconds that allow previous recipe to complete termination before starting the next. When vDelay is not defined a default of 2 seconds is used.
EndRecipe		Terminates the currently running recipe.
AbortRecipe		Aborts the currently running recipe.

7.5.6. Display control

Subroutine	Parameters	Description
SetAppWindow State	iWindowState as Integer	iWindowState 0 = Normal 1 = Minimized 2 = Maximized Sets the state of the applications main (outer) window.
SetApp Window Position	iLeftFraction as Single iTopFraction as Single iWidthFraction as Single iHeightFraction as Single	iLeftFraction The position of the Process Eye's windows left-hand side relative to the whole screen, i.e. to start one third across the screen set to 0.333. iTopFraction The position of the Process Eye's windows top relative to the whole screen, i.e. to start one quarter down the screen set to 0.25. iWidthFraction The width of Process Eye's windows relative to the whole screen, i.e. to be half of the screens width set to 0.5. iHeightFraction The height of Process Eye's windows relative to the whole screen, i.e. to be three quarters of the screens height set to

		0.75 Only valid if the applications WindowState has been previously set to Normal
SetDisplay WindowState	iWindow as Integer	iWindow The window to set. 1 = Bar Chart or Peak Jump, 2 = first Trend window, 3 = second Trend window ...
	iWindowState as Integer	iWindowState 0 = Normal 1 = Minimized 2 = Maximized Sets the state of the specified window when a Bar Chart or Peak Jump recipe is running.
SetDisplayWindow Position	iWindow as Integer	iWindow The window to set. 1 = Bar Chart or Peak Jump, 2 = first Trend window, 3 = second Trend window ...
	iLeftFraction as Single	iLeftFraction The position of the Process Eye's windows left-hand side relative to the whole screen, i.e. to start one third across the screen set to 0.333.
	iTopFraction as Single	iTopFraction The position of the Process Eye's windows top relative to the whole screen, i.e. to start one quarter down the screen set to 0.25
	iWidthFraction as Single	iWidthFraction The width of Process Eye's windows relative to the whole screen, i.e. to be half of the screens width set to 0.5
	iHeightFraction as Single	iHeightFraction The height of Process Eye's windows relative to the whole screen, i.e. to be three quarters of the screens height set to 0.75. Only valid if the display WindowState has been previously set to Normal.

7.5.7. Disk Subroutines

Subroutine	Parameters	Description
WriteCurrentScan	sFileName as String lScanNumber as Long	Appends the contents of the current scan to specified file using the defined scan number.
WriteUserScan	sFileName as String lScanNumber as Long vScanDateTime as Variant sScanData() As Single	Same as WriteCurrentScan but uses the data defined in the parameters.

7.5.8. NT I/O Subroutines

Subroutine	Parameters	Description
NTConfigIO	vDeviceNumber as Variant vPortAddress as Variant vPortCount as Variant	All parameters are optional and should not be used if the I/O device is the standard Analog/Digital I/O card.
NTPokePortByte	iBaseAdress as Integer iValue as Integer	iBaseAdress Offset from I/O Port address (0 to vPortCount –1) iValue Number in the range 0 to 255 to output to port
NTPokePortWord	iBaseAdress as Integer iValue as Integer	iBaseAdress Offset from I/O Port address (0 to vPortCount –1) iValue Number in the range 0 to 65535 to output to port. Not Numbers greater than 32676 must be sent as negative (2's complement) numbers – e.g. to send 65535 set iValue = -1

7.5.9. Miscellaneous

Subroutine	Parameters	Description
Ask the factory	iFeatureIndex as Integer iAccess as Integer	A sneaky way to change the Access levels defined by us.
PauseMacro		The mechanism to pass control back to the RGA program. Use it at your peril, it will almost certainly cause major problems.
EnableTriggerLoop		Enables the macro to be called each time around the Trigger loop. The variable Triggering should be tested and looped on in the same way that End Of Scan uses the Scanning variable

7.6. Macro Variables

7.6.1. Read Only Variables

A number of RGA parameters may be read as variables.

Name	Type	Description
ScanNumber	Long	The current Scan number
FirstMass	Integer	First Mass, only valid in a Bar Chart Recipe
LastMass	Integer	Last Mass, only valid in a Bar Chart Recipe
MaxPartials	Integer	LastMass + 1 - FirstMass in Bar Chart Number of partial pressure channels in Peak Jump
MaxAnalogChannels	Integer	The number of Analog input channels in the current recipe
MaxDigitalChannels	Integer	The number of Digital input channels in the current recipe
MaxActionChannels	Integer	The number of Action channels in the current recipe
MaxChannels	Integer	The sum of MaxPartials, MaxAnalogChannels, MaxDigitalChannels, MaxDigitalChannels and MaxActionChannels plus one for total pressure.
TrendCount	Integer	The number of Trend displays (0 - 16)
Scanning	Boolean	Flag set true when scans are progressing. Its main use is as a mechanism to stop the End of Scan Macro loop repeating.
ApplicationPath	String	The directory the application is running

		from
DataFileName	String	The name of the datafile being stored to disk
UserSettingsCount	Integer	The number of user settings
UserSettingsText (iIndex)	String	Text label of user setting i
UserSettingsValue (iIndex)	Variant	Value of user setting i
ScanStartTime (lScanNum)	Variant	Time Scan lScanNum occurred
RunStartTime	Variant	Time run started
CurrentRecipeFileName	String	The filename of the running recipe
CurrentRecipeName	String	The name, as displayed on the button, of the running recipe
AlarmWindow	Boolean	True when the Alarm Viewer window is visible
RVCStatus	Integer	Current RVC Status
Triggering	Boolean	When True the RGA is in a Trigger mode (only occurs if EnableLoopTrigger has been called first)
MaxScans	Long	Maximum number of scans for the current recipe.
AlarmCount	Integer	The number of Alarms generated during the current recipe
WarningCount	Integer	The number of Warnings generated during the current recipe
InSelectMode	Boolean	True if the Select Mode screen is active (i.e. not running a recipe or recalling data)

7.6.2. Read/Write Variables

The following variables may be read and written to.

Name	Type	Description
FilamentState	Integer	0 = Filament off -1 = Filament on
FilamentNumber	Integer	1 = Filament 1 2 = Filament 2 Make sure it is safe to switch a filament on or use the external filament protect mechanism.
Locked	Boolean	True = head cannot be accessed by mouse/keyboard False = unlocked

TriggerData	Single	The value the current pass around the trigger has read. The value measured may be replaced by writing a new value to it. This is useful where more than one source of data is required for a trigger or where the trigger parameter cannot be measured by the standard routine. (See also the EnableTriggerLoop sub and the Triggering variable)

There are a large number of functions, sub routines and parameters that are not currently exposed to the macro language. If there is something you need please contact your local Spectra facility as a newer version of Process Eye may include the item you need.

Appendix A.
Glossary of Vacuum Terms

Atomic mass unit (amu)
Exactly one twelfth the mass of a neutral atom of the most abundant isotope of carbon, 12C. 1 amu. = 1.660x10-27 kg.

Abundance sensitivity (Partial pressure analyser)
The smallest concentration of one gas that can be detected in the presence of another gas with a partial pressure analyser of a given design.

Active gas
A gas which reacts readily with some substances to form chemical compounds.

Background spectrum (Partial pressure analyser)
A mass spectrum of residual gas species in a system. It is usually obtained before a sample of interest is introduced and analysed in order to deduce, by subtraction of spectra, the true mass spectrum of the sample.

Backstreaming
The movement of gases or vapours under molecular flow conditions in the opposite direction to the intended gas flow or pumping.

Bakeout
The term used to describe the process of heating a vacuum system to reduce or eliminate condensable gaseous contaminants.

Base peak
The largest peak in the spectrum of a pure compound.

Cold trap
A vacuum vessel containing an inner vessel which may be filled with liquid nitrogen. Vapours in the vacuum system are condensed onto the cold surfaces reducing contamination. They also prevent backstreaming of diffusion pump oil into the vacuum system. Well designed cold traps will serve as an optical baffle to oil vapours so that liquid nitrogen is not required except to achieve very low temperatures.

Cracking pattern
Tabulation of the peaks in the mass spectrum of a pure compound. Usually the heights are normalized to the height of the base peak which is assigned a value of 100 (or 1000). For a particular type of mass spectrometer operated under a fixed set of conditions, the cracking pattern remains more or less constant.

Cryopump
Method for vacuum pumping by freezing out onto cold surfaces below 30K. This is a similar principle to that used for the pumping of water vapour on a liquid nitrogen trap at 77 deg.K.

Detector
A device which produces an output signal, usually an electrical signal, in response to an input signal.

Electron multiplier
A detector which consists of cascaded stages, each intensifying the current from the preceding stage. Electrons released from the first electrode, cascade through the device to provide a charge or a current amplification. Electrons are released from the first electrode by the impingement of photons and/or by sufficiently high velocity heavier particles, charged or neutral.

Electron emission (From Surfaces)
The release of electrons from a solid or liquid surface as a result of:-

i) atom and/or molecule impact (secondary electron emission)
ii) electron impact (secondary electron emission)
iii) electric fields (field emission)
iv) photon impact (photoelectric emission)
v) previous mechanical and/or radiative chemical disturbance of the surface (exoemission)
vi) thermal energy (thermionic emission)

Note: Thermionic emission is the method used to generate electrons in the source which in turn create ions.

Faraday cage
A charged particle detector consisting of a metal electrode, cup shaped, for the collection and detection of charged particles. This geometry is used to prevent reduction of signal by suppression of secondary emission current.

Fingerprint spectrum
A mass spectrum characteristic of a vacuum system, associated leak or processing environment.

Foreline trap
A vessel filled with molecular sieve (or activated alumina or metal wool) to trap backstreaming oil vapours. It is normally fitted between the high vacuum pump and rotary pump to prevent oil vapour backstreaming into the vacuum system.

Inert gas
A gas which does not normally react chemically with other substances.

Ion
Any atom or molecule which has resultant electric charge due to loss or gain of valence electrons.

Ion current
The rate of ion flow.

Ion repeller
The electrode in an ion source to which a potential is applied to provide an electric field which contributes to the initial acceleration of newly formed ions (See ion source).

Ion source
A combination of electrodes to which potentials are applied to generate ions and to accelerate them as a beam.

Isotope
One of a set of chemically identical species of atom which have the same atomic number but different mass numbers.

Leak rate
Designated as the quantity of gas passing through a leak in a given time, divided by that time. Leak-rate is a general concept whereas rate of pressure change is specific to the vacuum system volume. Leak-rate has therefore the advantage that component, or part leak-rates, can be added together to find an overall figure for a complete plant. A unit for leak-rate is the Millibar Litre per Second.

Mass range (Mass Spectrometer)
The interval between the smallest and largest masses which can be detected with a mass spectrometer.

Mass analyser
That portion of a mass spectrometer which separates the ion beam into its various mass to charge ratio components.

Mass spectrum
i) A recording of the ion current amplitude as a function of mass number obtained by scanning through all or part of the mass range.
ii) A tabulation or chart of peak ion current as a function of mass number.

Mass to charge ratio
The ratio of the mass to the charge of an ionised particle. (See Ion).

Millibar
Unit or pressure which approximates to 1/1000 of an atmosphere. The most widely used unit of pressure measurement in Europe.

Minimum detectable partial pressure
The smallest partial pressure the mass spectrometer can detect.

Molecular flow
The state of gas flow where the mean free path of the molecule is greater than the characteristic dimensions of the vacuum vessel so that molecules collide with the vessel wall more often than with other molecules. Typically occurs below 7.5x10-5 torr.

Partial pressure
The contribution that a gas component makes towards the total pressure.

Pressure (gas)
The average normal force per unit area exerted by gas molecules impacting on a surface.

Real leak
Ingress of gas (usually air) into the vacuum system from the atmosphere outside the vacuum system.

Relative sensitivity
The relative height of the base peak of a component compared to the nitrogen 28 peak measured at the same partial pressure. This difference is due to differences in ionisation efficiency for different gases and several instrument specific factors. The indicated partial pressure on a mass spectrometer should be divided by the relative sensitivity factor to obtain the true partial pressure.

Resolving power
The ability of a mass spectrometer to separate adjacent mass peaks.

Torr
Unit of pressure equal to 1mm column of mercury. 760 torr equals one atmosphere.

Total pressure
The sum of all the partial pressures present within the vacuum chamber.

Transition or knudsen flow
The flow of low pressure gas through a tube several mean free paths wide. The flow is neither viscous nor molecular. Under these conditions, the microscopic concept of viscosity needs to be modified since the resistance to motion is due primarily to molecular collisions with the passage walls.

Vacuum
"A space entirely devoid of matter"
In reality this cannot be achieved, hence one normally talks in terms of the degree of vacuum attained within the following pressure ranges.

Rough vacuum	1000 - 1.3 mbar.
Medium vacuum	1.3 - 1.3x10-3 mbar.
High vacuum	1.3x10-3 - 1.3x10-8 mbar.
Ultra-high vacuum	1.3x10-8 and higher vacuum.

Vacuum leak
Any fault on a vacuum chamber wall through which material can pass from higher to lower pressure regions.

Virtual leak
The effect caused by the outgassing of contaminants or residual atmosphere

relating to the contents within an otherwise leak-tight vacuum chamber.

Viscous flow
The state of gas flow where the mean free path is less than the characteristic dimensions of the vacuum vessel so that molecules collide with other molecules rather than with the vessel walls. Typically occurs above 1x10-2 mbar. There exists a region between 1x10-2 and 1x10-4 mbar where a mixture of viscous and molecular flow occurs.

Appendix B.
Interpretation of Data

When the mass spectrum of a vacuum system has been taken, the first question is probably "What do all those peaks mean?" Although at first sight they may appear complex, interpretation in fact is a relatively simple matter.

Major Peak
The first task is to identify the mass numbers of the major peaks in the spectrum (ignore all the smaller ones to start with). Search through a reference library for spectra with the same major peak.

Secondary Peaks
At some mass numbers there is the possibility of more than one component being present when using the base peak reference method of identification. With the exception of mass 28, identification is usually possible with the knowledge of which gases have been introduced into the vacuum system. For example, at mass 43 unless acetone or n-butane have been used in the system or the cleaning of vacuum components, it is unlikely that a peak at mass 43 is due to these compounds.

Comparing the secondary peaks from the reference library confirms the match and would show that the peak had most likely originated from rotary pump oil which can be confirmed by checking the presence of other peaks typical of this oil.

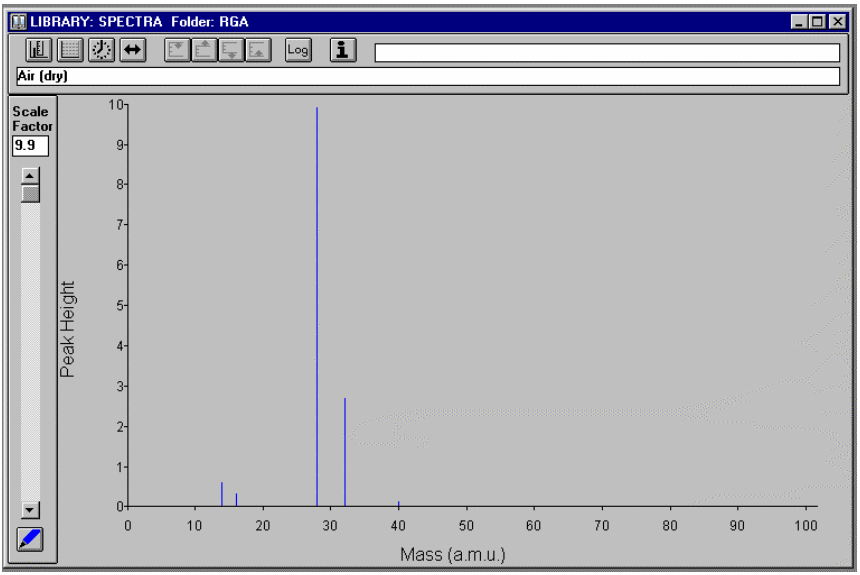
At mass 28, unless ethylene or ethane have been used in the vacuum system, the most likely source will be nitrogen or carbon monoxide, or a mixture of the two. Nitrogen is identified by checking mass 14, which is approximately 5% of the base peak intensity. The mass 28 contribution due to nitrogen can therefore be calculated. The remainder of mass 28 will be due to carbon monoxide, confirmed by the presence of a mass 12 peak of approximate intensity of 5% of the base peak. In practice, mass 28 is always present as it originates from chemical reactions of oxygen and carbon containing materials at the filaments of mass spectrometers, ion gauges, etc.

Typical Fingerprint Spectra
The fingerprint spectrum is a mass spectrum which is characteristic of the

vacuum system from which it is taken. The term is extended to include spectra which are characteristic of problems or faults commonly encountered in vacuum systems. The following fingerprints typify some of these problems and it should be remembered that the fingerprint of a vacuum system could show a combination of two or more of these conditions.

Air Leak

Characteristic spectrum of an air leak, masses 28 and 14 from nitrogen, 32 and 16 from oxygen, 40 from argon.

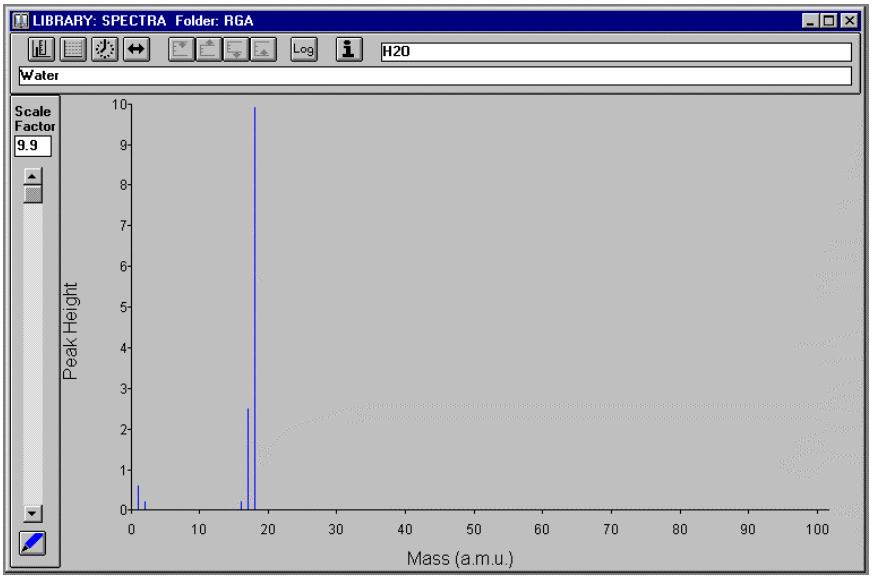


To locate the leak, tune the quadrupole to mass 4 (helium) and probe all joints, welds and feedthroughs etc., with helium. An increase in the helium peak on the mass spectrometer indicates the source of the leak. It is usually worth checking freshly made joints or newly added components first as these are the more likely sources of leaks on a previously leak-tight vacuum system.

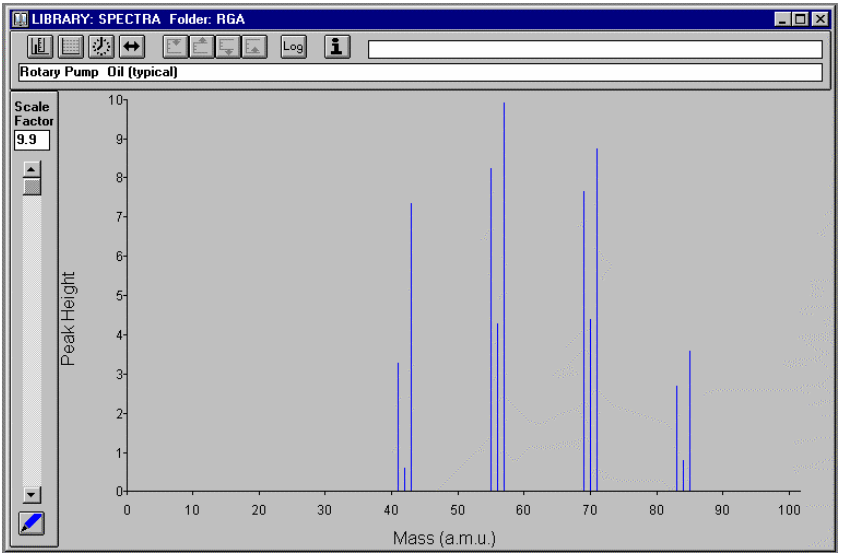
Water Vapour

Characteristic spectrum of water vapour in the vacuum system. The problem is solved by pumping for longer and, optionally, baking the system at an elevated temperature (e.g. between 100 and 250 deg. C) for some hours, preferably with an oven to ensure a uniform baking temperature. Remember

to avoid sudden large temperature changes on ceramic and glass components to prevent damage.

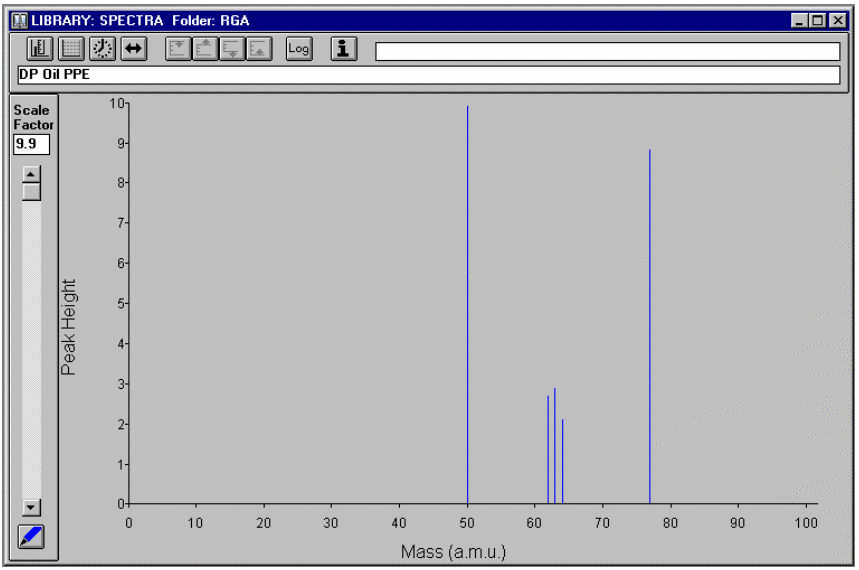


Rotary Pump Oil
Characteristic spectrum of rotary pump oil contamination, due to foreline trap not fitted or in need of reactivation. Solve by fitting or reactivating trap as appropriate and bake vacuum system.



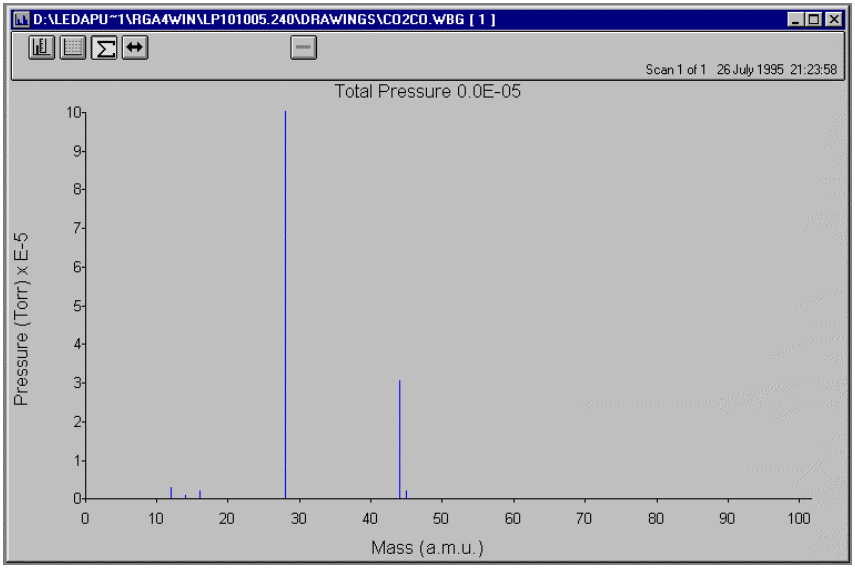
Polyphenylether diffusion pump oil

Characteristic of spectrum of polyphenylether diffusion pump oil. Solve by fitting efficient baffle or cold trap and bake.



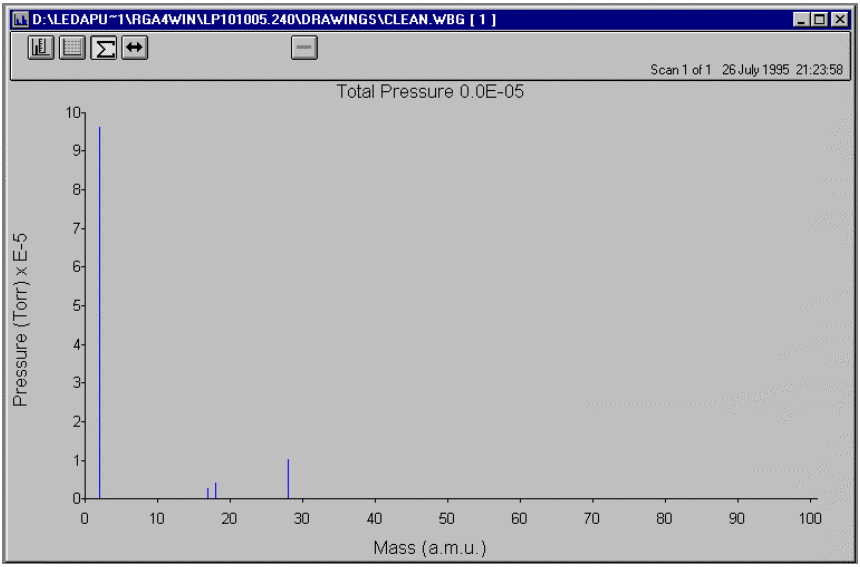
Carbon Monoxide and Carbon Dioxide

Characteristic spectrum of carbon monoxide and carbon dioxide outgassed by filaments and ion source. Solve by switching quadrupole into degas remembering to degas filaments of other equipment such as ion gauges.



Clean high vacuum

Characteristic spectrum of a clean high vacuum. Note the relatively high level of hydrogen which is desorbed from the metal walls of the vacuum system. Mass 28 due to carbon monoxide will always be present, the extent depending on how many filaments, and their types, are in operation.


D:\LEDAPU~1\RGA4WIN\LP101005.240\DRAWINGS\CLEAN.WBG [1]
Scan 1 of 1 26 July 1995 21:23:58
Total Pressure 0.0E-05
Pressure (Torr) x E-5
Mass (a.m.u.)
0
1
2
3
4
5
6
7
8
9
10
0
10
20
30
40
50
60
70
80
90
100

Appendix C.
Cracking Pattern Table

The following table lists some of the more common gases encountered in residual gas analysis along with their cracking patterns. The minor peaks are shown with their approximate intensity (Height) relative to the base peak which it is assumed equals 100.

COMPONENT	**Base Peak**	**MINOR PEAKS (Height)**		
		1	2	3
Hydrogen	2	1 (3)	-	-
Helium	4	-	-	-
Methane	16	15 (86)	14 (16)	13 (9)
Ammonia	17	16 (80)	15 (7)	14 (2)
Water	18	17 (21)	16 (1)	-
Neon	20	22 (10)	-	-
Ethylene	28	27 (64)	26 (63)	25 (12)
Carbon Monoxide	28	12 (5)	16 (2)	29 (1)
Nitrogen	28	14 (5)	29 (1)	-
Ethane	28	27 (34)	30 (24)	26 (23)
Methanol	31	32 (67)	29 (65)	28 (6)
Ethanol	31	45 (34)	27 (24)	29 (23)
Oxygen	32	16 (11)	-	-
Hydrogen Chloride	36	38 (32)	35 (17)	-
Argon	40	20 (13)	-	-
N-Butane	43	29 (38)	27 (28)	41 (28)
Acetone	43	58 (27)	27 (8)	42 (7)
Carbon Dioxide	44	16 (9)	28 (8)	12 (7)
Iso-Propyl Alcohol	45	43 (17)	27 (16)	29 (10)
Diffusion Pump Oil	45	59 (94)	43 (68)	41 (39)
Rotary Pump Oil	57	43 (73)	55 (73)	41 (33)
Sulphur Dioxide	64	48 (49)	32 (10)	16 (5)
Benzene	78	52 (19)	51 (19)	50 (16)
Trichloroethylene	95	130 (90)	32 (85)	60 (65)
Polyphenylether Diffusion Pump Oil	446	77 (79)	51 (28)	39 (10)

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Appendix D.
Software Versions

V1.65a
The latest release of Process Eye 1.6 is version 1.65a. This replaces V1.64 for Windows NT and V1.61 for Windows 95/98 so that V1.65a will operate on all Windows platforms. For this reason the Windows NT Supplement manual has been included into this Help Manual.

Process Eye V1.65a will operate with Microvision Plus, HPQ-2 and HPQ-2S control units fitted with the fllowing firmware:

Microvision Plus	Core:	V2.30e
and HPQ-2	Application:	D2.26d
HPQ-2S	Core:	V2.51a
	Application:	V2.50a

If you need to upgrade the firmware refer to 2.11. Download.

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Appendix E.
Version 1.64

This help topic was previously released as
Process Eye V1.64 Manual Addendum
PN 02095 (LP502095) Rev 1.00
30 June 2000

E.1 Overview

Process Eye V1.64 adds the following main features:

- E-mail generation option when an alarm is generated.
- E-mail generation at any time using the macro language
- Separate calibrations for low pressure, high pressure and leak check operation
- Support of the HPQ2S product – this is described separately in the document titled 'HPQ 2S User Manual Addendum'
- Optional millisecond timing resolution for disk data

It also includes a number of minor features (see the Miscellaneous Features section below) and fixes a number of bugs.

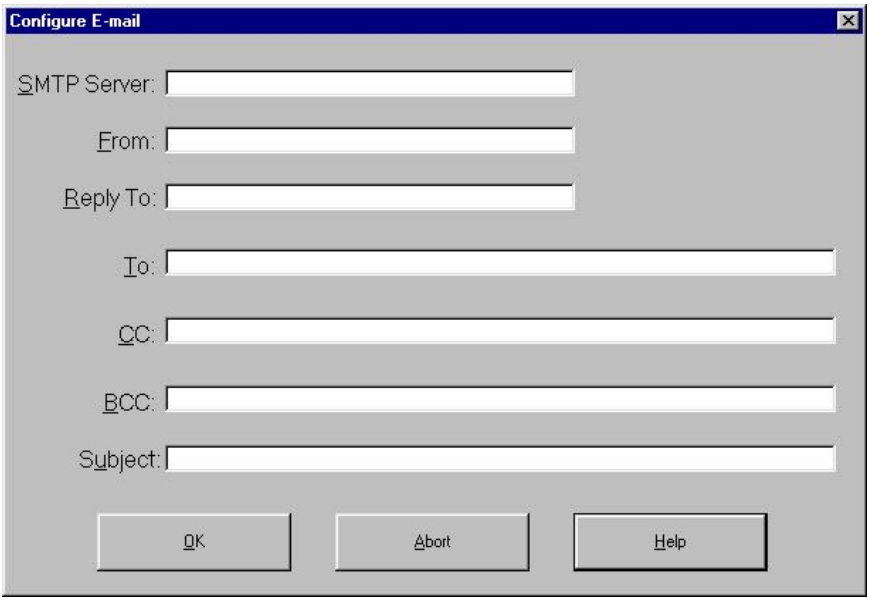
E.2 E-mail

Process Eye can be configured to send an E-mail message when running a recipe when an alarm is generated or at any time using the macro language. There are no facilities to receive E-mail within Process Eye. If you wish to receive E-mail Spectra recommends using the e-mail client that comes as part of Microsoft's Internet Explorer or Netscape's Navigator packages.

To send E-mail the Process Eye PC must be connected to an SMTP host. In addition most hosts will expect the client sending E-mail to have an account on that host. Your network administrator will provide the SMTP host name and account name if you do not know what they are.

E.2.1 Configuration

Before E-mail can be sent the E-mail configuration program CfgEmail must be run. Use it to set:



SMTP Server (required)
The E-mail server. It can be defined either as a name, for example

mail.yourdomain.com
or in dotted notation
208.123.123.1

From (required by many servers)
The E-mail address of the sender. It may also include the "friendly" name, for example

Your Name<yourname@yourdomain.com>

or just the senders address, for example

<yourname@yourdomain.com>

Note the < and > are required for this and other address entries. Typically the 'Your Name' and yourname values would reflect the tool and / or chamber that the RGA is mounted on, for example <spt04ch2@yourdomain.com>

Reply To (optional)
If return mail is expected this is the address it should be sent to, for example

<yourname@yourdomain.com>

if no return mail is expected it may be left blank. Note that reading of e-mail is not supported within Process Eye but may easily be accomplished by configuring your companies choice of e-mail client, for example Outlook, Outlook Express, Navigator, Eudora etc.

To (required)
The e-mail address or addresses that the E-mail should be sent to. Multiple addresses should be separated by a comma, for example

<engineer1@yourdomain.com>

or

<engineer1@yourdomain.com>,<LFayet@spectra-intl.com>

CC (optional)
Addition E-mail address or addresses that the E-mail should be copied to. The syntax is the same as the To setting.

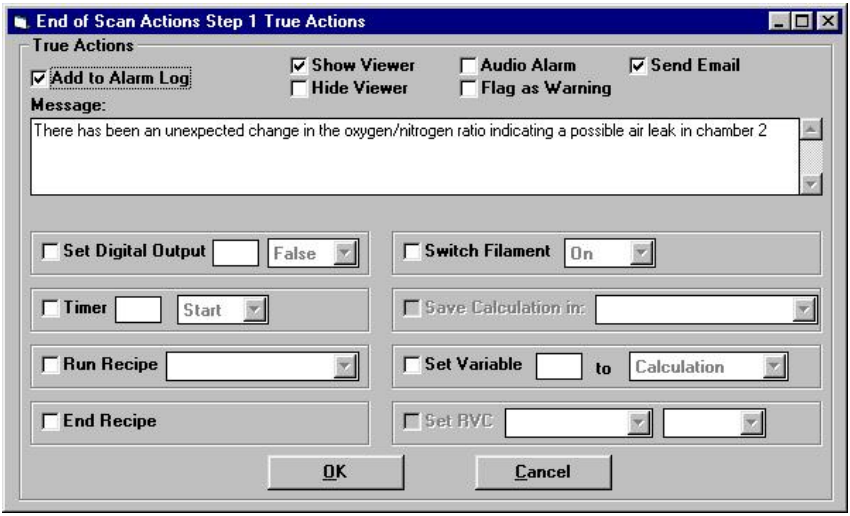
BCC (optional)
Addition E-mail address or addresses that the E-mail should be blind copied to. The syntax is the same as the To setting.

Subject (optional)
The text to place in the E-mail subject. Typically this would identify either the RGA or the tool the RGA was monitoring, for example

Alarm from RGA 3 on SPT06

E.3 Sending E-mail from a Recipe

Within a recipe an E-mail can be generated when a condition becomes True or False. Simply check the Send Email checkbox. The text of the E-mail will be the Alarm message and it will be sent to the address(es) defined in the E-mail configuration.



E.3.1 Sending E-mail using the Macro Language

E-mail may be sent using the SendEmail function:

SendEmail (EmailMessage)

SendEmail is a function that takes a string parameter containing the text of the message and returns a string that will be null ("") if the e-mail was successfully sent or contain a text string describing the error that occurred.

```
Dim Result as String
Result = SendEmail("Test message from RGA1")
If Result <> "" Then        ' If Result is not blank an error occured
MsgBox Result, vbExclamation, "Email Send Error"
```

End If

Usually the To, CC, BCC, Subject, Attachments, SMTP Host, Senders Address and Reply address are defined in the Email.Ini file (see the Configuration section above) but if required they may be set at the time the message is sent by the macro using the following optional syntax:

Debug.Print SendEmail(sEmailMessage As String, Optional EmailTo, Optional EmailCC, Optional EmailBCC, Optional EmailSubject, Optional EmailAttach, Optional SmtpHostName, Optional MyEmailAddr, Optional ReplyTo)

Notes
Calling SendEmail uses these parameters for the current E-mail message only.
All parameters are Variants of type string.
If some settings are to be taken from the Email.Ini file and others defined then parameters may be omitted from the end of the parameter list. I.e. if you wish to define one or more people to be BCC'd you must define the EmailTo and EmailCC.

E.4 Multiple Calibrations

Note that this applies only to configurations using HPQ 2 instruments i.e. HPQ 2, HPQ 2R and HPQ 2S. In the description below all HPQ 2 instruments will be generically referred to as an HPQ.

Overview
HPQ systems run in one of three states:
High Pressure (HP)
Residual Gas Analysis (RGA)
Leak Check (LC)

Not all scanning modes can be in all states.

Mode	HP	RGA	LC
Bar Chart	√	√	
Peak Jump	√	√	

Leak Check			√
Analog	√	√	√
Faraday Calibration	√	√	

Notes.
To achieve the best results calibrations should be performed at or near the expected operating pressures.

The settings for the analyser (Emission, Electron Energy, Ion Energy and Extractor) are factory configured and unless you fully understand the implications they should not be changed from the Analog mode.

The Leak Check calibration is the same as the RGA calibration with a factor of 3.5 to account for the increased sensitivity obtained by the analyser settings for Leak Check mode. It may be adjusted by the 'LC Faraday Factor' Item in the [FIL X CAL DATA] section of the SerialNumber.Ini file.

E.5 High resolution timing

In situations where data is being scanned at high rates the standard 1 second resolution of data stored to disk is insufficient. By setting 'Save Disk Hundredths = 1' in the [SYSTEM] section of the Proc.Ini file two things will happen. Firstly a high resolution timer will be used to measure time. On Windows NT the time resolution is around 10mS. Secondly data stored to disk will have the scan time saved with fractional seconds.

E.6 Miscellaneous additions

1. Units other than Torr may be used by:
   a. Entering a 'Type = x" item in the [UNITS] section of the SerialNumber.Ini file where valid values for x are: 0 = Amps, 1 = Torr (default), 2 = mBar, 3 = Pascal, 4 = microns, 5 = PSI
   b. Setting 'Largest Faraday Peak' in the [SYSTEM] section to the appropriate value in the desired units, for example in Pascal an HPQ 2 would be 0.133, an open ion source would be 0.0133, a 1000P

with no orifice would be 1.33 etc.

Note that any recipes defined in different units will become invalid and will need editing.

2. A number of Macro language commands and variables have been added – see the Macro manual for details.

3. The default Emission, Electron Energy, Ion Energy, Extractor and Leak Hunt Low Resolution for HPQ and HPQ2S in RGA, HP and Leak Hunt modes have been optimized.

4. By default HPQ heads are now prevented from running a recipe if the filament is off and any running recipe will be stopped if the filament turns off.
HPQ heads may be allowed to run without filament or non HPQ heads may be prevented from running without a filament being on by manually setting the 'Run Without Filament' item in the [SYSTEM] section of the SerialNumber.Ini file. It defaults to 0 for HPQ systems and 1 for all others.
Bar Chart & Peak Jump run as far as the Post Trigger Actions and then abort the recipe if the Filament is still off.
Calibrations will not terminate immediately but at their normal end.
A message will be displayed when the running of a recipe has been prevented due to the filament being off but only when SECS and GEMSECS are disabled.

5. The way "Largest Peak" in Bar Chart and Peak Jump recipes are calculated has changed to make them reflect the true values that can be measured more closely.
If no head is present just "Large" and "Small" will be displayed.
If HPQ 2S in HP mode "Large" will be 18mT (or appropriate units) and "Small" will be based on HP calibration and the relative values of the feedback resistors in the pre-amp.
For all others in Faraday Peak and "Small" will be based on RGA calibration and the relative values of the feedback resistors in the pre-amp.

6. Startup splash screen displays RGA, HPQ2 or HPQ2S in messages to give visual confirmation of the configuration found in the SerialNumber.Ini file

7. The writing of Log files when Bar Chart or Peak Jump recipes terminates is now performed before the ‘Post Run’ Macro executes.

8. A new Shutdown macro, default name Shutdown.Bas that executes just before Process Eye terminates can be defined. It may be renamed by setting the ‘Shutdown Macro’ item in the SerialNumber.Ini file [SYSTEM] section.

9. A new Hidden macro, default name ProcEye.Bas that allows common subs, functions and variables to be shared by all macros can be defined. It may be renamed by setting the ‘Hidden Macro’ item in the SerialNumber.Ini file [SYSTEM] section.

10. Calibrations have an AutoRun feature that can be enable when a calibration recipe is written. If enabled then when the recipe runs a calibration will be performed with no user input. If the calibration fails for any reason the user will have to acknowledge the failure.

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