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Section 1 Introduction to EpiVIEW

EpiVIEW software performs three primary functions:

- Process Control
- HMI – Human Made Interface
- SCADA – Supervisory Control and Data Acquisition

The EpiVIEW Main Operation Screen (Figure 1.1) displays an actual diagram of the VEECO System and serves as a Graphical User Interface (GUI). From this screen, User's can set valve positions and enter setpoints for system controls as well as monitor the process parameters.

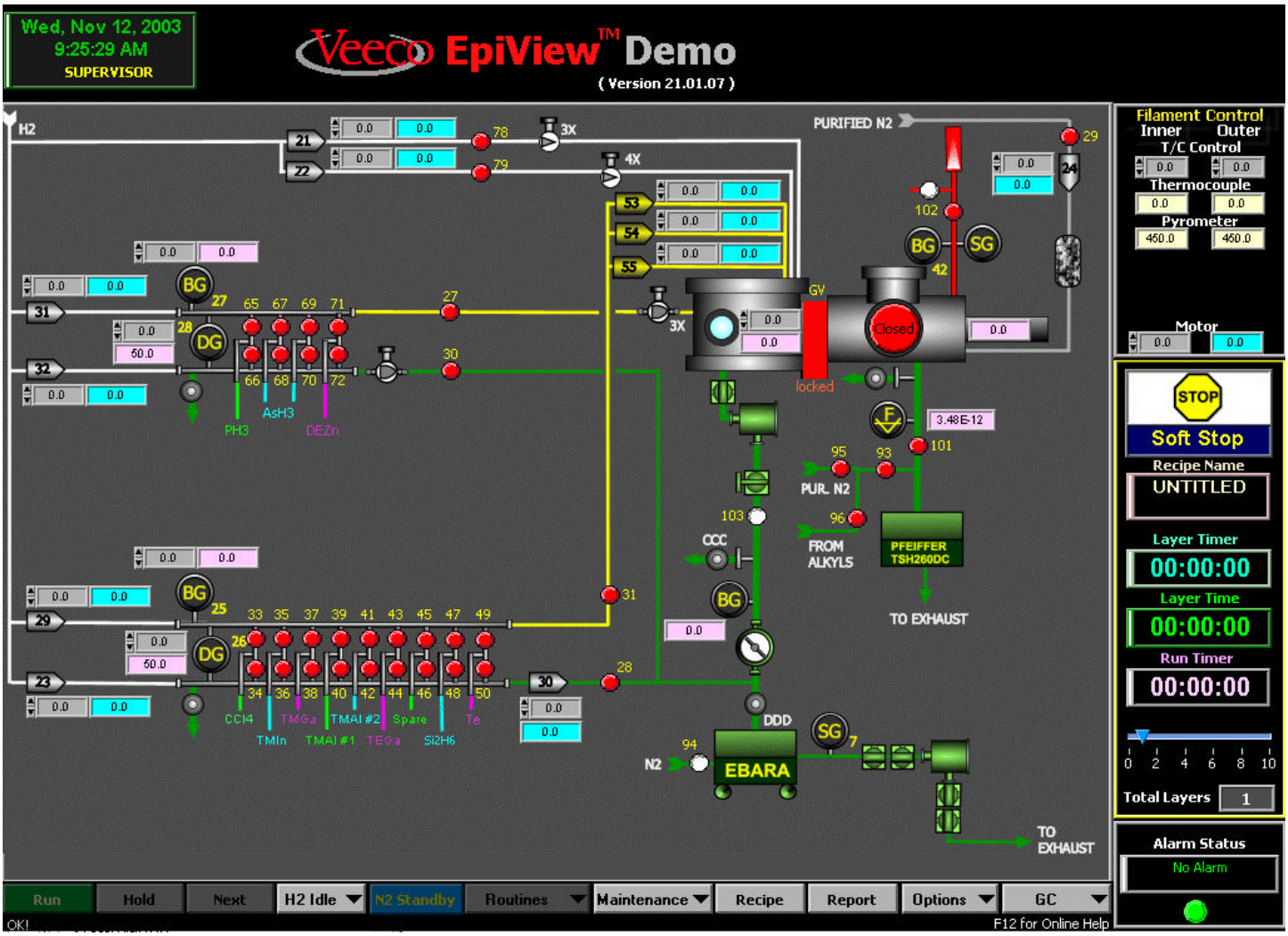


Figure 1.1: EpiVIEW Main Operating Screen

The Main Menu bar located at the bottom of the Main Operating Screen (Figure 1.2) contains command buttons that enable the User to start a process run, perform system routines (Gate Valve, Load Lock etc.), define a process or recipe and set system options. These functions are listed in Table 1.1. Subsequent sections of this manual will cover those commands in greater detail.

Figure 1.2. EpiView Main Menu Bar

Table 1.1. EpiView Main Menu Bar Functions.

Button Label	Description of Function
Run	When selected, this button begins a process run. If a recipe has not been loaded, pressing this button starts the Recipe program to allow the User to load the applicable recipe to run.
Hold/Resume	When selected during a run, this button holds the run at the current of the current layer. While the layer is on hold, **Resume** is displayed on the button. When **Resume** is selected, the layer continues to run for the length on time remaining when **Hold** was selected.
Next	When selected, this button jumps the run to the next layer in the recipe regardless of the time remaining in the current layer.
Hot Idle/H2 Idle	This button is used to place the system in the Hot Idle or H2 Idle modes.
N2 Standby	When selected, this button places the system in N2 Idle mode and is only active when the system is in H2 Idle mode.
Routines	This button is only available on Discovery systems with an added glovebox and is used to initiate the Antechamber routine.
Maintenance	This button, when selected, displays a list of maintenance routines that require actions by both the User and EpiVIEW to complete. The tasks listed depend on system type (Enterprise, Discovery or Pioneer) and material system (GaN or III-V).
Recipe	When selected, this button opens the RecipePlus program.
Report	When selected, this button opens the Report Generator.
Options	This button, when selected, displays a list of secondary tasks that include: changing login status, systems settings, Data Logging, file maintenance (zip_unzip) and design.
Select Screen	This button, when selected, displays the list of screens and menus used to operate EpiVIEW. This list includes (depending on system type) screens for system Hydrides, Alkyls and Growth Chamber, system status, analogs, data log, data view, source monitoring, alarm s tatus, active warnings, system event log, comments, RealTemp, utility screen and system transfer.

The process Status Box located in the lower right corner of the Main Operation Screen (Figure 1.3) system operating status (Run, Pause, Soft Stop, Shutdown, Maintenance etc.), file name of the currently running recipe, layer timer, layer time, run timer, number of the currently running layer within this recipe, total number of layers in a recipe, and the alarm status.

Figure 1.3. Process Status Box

The title box (Figure 1.4) is located up on top of the EpiVIEW screen and provides general, non-system related information and as well as the button used to exit the software application. An explanation of title box items is provided in Table 1.2.

Figure 1.4. EpiView Title Box

Table 1.2. EpiView Title Box Functions

Title	Function
Security Level	Displays current date/time and login level
Current Software Version	21 – EpiView Version 00 – Revision level of current version of EpiView 05 – Customer specific revision
EXIT Button	Only displayed and functional in **SHUTDOWN**

The Temperature Panel (Figure 1.5), located in the upper right hand of the EpiVIEW screen, allows the user to control and monitor variables such as temperatures and motor rotation. Indications are provided that display temperature as measured by thermocouples and pyrometer, as well current temperature control mode.

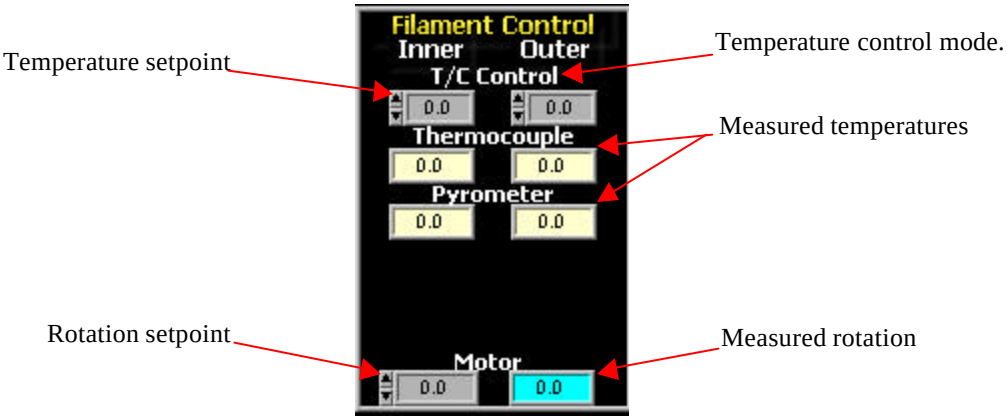


Figure 1.5. EpiView Temperature Panel

Section 2 EpiVIEW Login and Security

This section contains the following procedures:

2.1 *LOGIN SECURITY LEVELS*
2.2 *PASSWORD SCREEN*
2.3 *CHANGING PASSWORDS*
2.4 *CONNECTION MODE OPTIONS*

2.1 LOGIN SECURITY LEVELS

2.1.1 Operator Level

?? Ability to Start/Abort Runs (Hold and Next buttons are disabled)

2.1.2 Engineer Level

?? Ability to Start/ Abort/ Hold Runs and skip to Next (all buttons are enabled)
?? Ability to alter valve states and analog setpoints
?? Ability to modify recipes

2.1.3 Supervisor Level

?? Ability to Start/ Abort/ Hold Runs and skip to Next (all buttons are enabled)
?? Ability to alter valve states and analog setpoints
?? Ability to modify recipes
?? Ability to configure system parameters

2.2 PASSWORD SCREEN

When EpiVIEW is launched from Windows through **Start – Programs – EpiVIEW**, the **Password Screen** (Figure 2.1) appears first, requiring the user to log in.

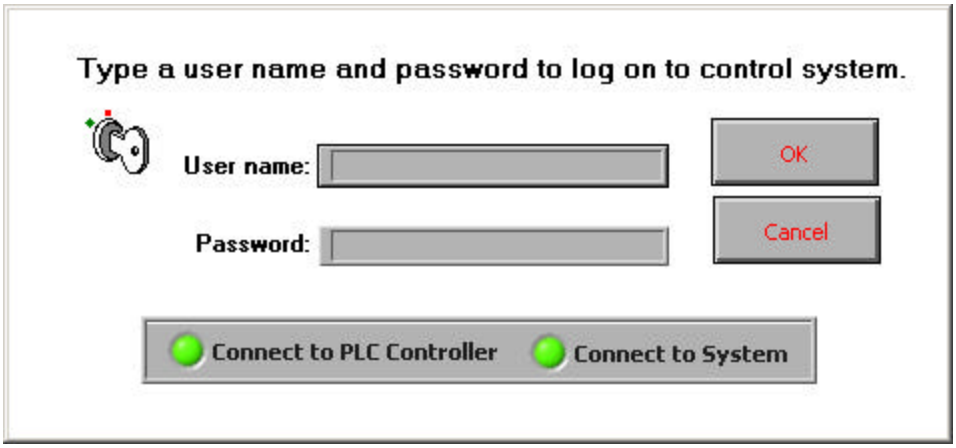


Figure 2.1. EpiVIEW Password Screen

2.2.1 Type in your user name in the **User Name** box.

2.2.2 Type in the password associated with the User Name in the **Password** box.

2.2.3 Choose the desired connection mode to run the software by checking the appropriate boxes. To check a box, click in the center of the box. When running the software on the system, verify that both boxes are checked. To run EpiVIEW in OFFLINE mode both boxes must be unselected.

2.2.4 Click on the **OK** button.

2.2.5 Once all the EpiVIEW components are loaded successfully, Main Operation Screen appears. EpiVIEW is now ready to accept user commands and perform monitoring and control functions.

2.3 CHANGING PASSWORDS

2.3.1 From Main Operation Screen, click on the **Options** menu button. From the pulldown menu that appears, click on **System**. From the menu that appears next, click the **Security** button. The **Users/Passwords** menu will then appear (Figure 2.2).

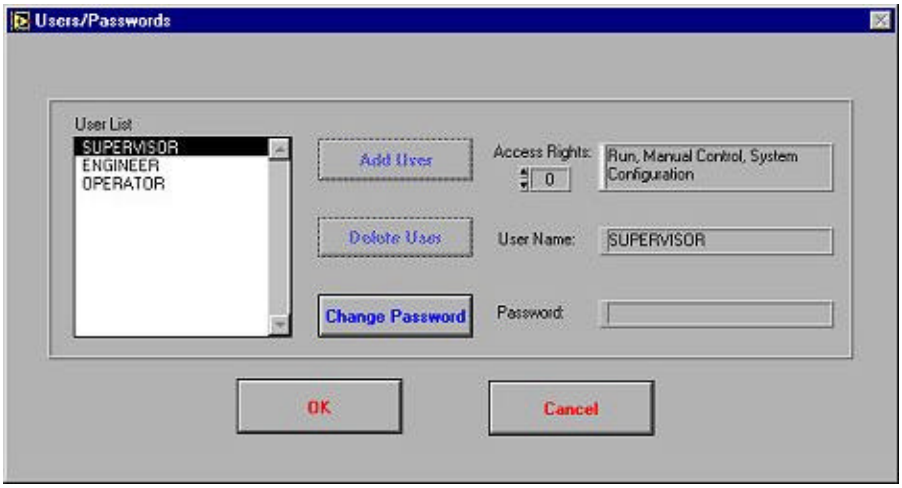


Figure 2.2: Users/ Passwords Menu

2.3.2 Highlight the desired user name in the **User List** box by clicking on it.

2.3.3 Click on the **Change Password** button.

2.3.4 Type in the new password in the **Password** box.

2.3.5 Click on the **Change Password** button.

2.3.6 Double click on the **OK** button, which prompts the **System** menu.

2.3.7 Click on the **Save As Default** button and then the **Exit** button.

2.4 CONNECTION MODE OPTIONS

The *Password Screen* (Figure 2.1) allows the User to select different software connection modes depending on the function(s) the User intends to perform. Three connection modes are available when the User logs onto the software: System Mode (also known as the Default Mode); 2700 Mode; and Software Test Mode.

2.4.1 System Mode – Default Mode

When the **Connect System** box is checked, the **Connect to PLC Controller** box will automatically be checked as well. In this mode, the PC will communicate with the PLC controller and with the system. The User therefore is able to control the system operation within his/her login level limitations. System control operations include toggling pneumatic valves, setting MFCs and pressure controllers, setting temperature and motor speed values and running recipes. Please note that if EpiVIEW is installed in OFFLINE mode the EpvIOMonitor can be used to simulate the communication with PLC controller, providing full functionality of the EpiVIEW software.

2.4.2 PLC Controller Mode

When the **Connect to PLC Controller** box ONLY is checked, the PC will only communicate with the PLC controller. The User will not be able to control the system using the software. This mode is used only to test the communication between the PC and PLC, and to test I/O data. . Please note that if EpiVIEW is installed in OFFLINE mode the EpvIOMonitor can be used to simulate the communication with PLC controller, providing full functionality of the EpiVIEW software.

2.4.3 Software Test Mode

When neither the **Connect System** nor the **Connect to PLC Controller** boxes are checked, the PC cannot communicate with the 2700 or with the system. This mode can be used to troubleshoot the software without affecting the control of the system. This mode can be used to simulate the operation of the tool without the use of EpvIOMonitor but some of the functionality will be disabled or limited.

2.5 LOGIN AS A DIFFERENT USER

Choosing **Login As** option from the **Options** pulldown menu or pressing F11 key brings up the **Password Screen** (Figure 2.1) to allow a different user to log in and/or select a different connection mode.

2.5.1 Go to the **Options** pulldown menu on *Main Operation Screen* and choose **Login As**.

2.5.2 Type in your user name in the **User Name** box.

2.5.3 Type in the password associated with the User Name in the **Password** box.

2.5.4 Choose the desired connection mode to run the software by checking the appropriate boxes. To check a box, click in the center of the box.

2.5.5 Click on the **OK** button.

2.5.6 The *Password Screen* will disappear as the *Main Operation Screen* remains in place. The User now has access to system configuration and controls within limitations of his/ her login level and chosen connection mode. In addition the current access mode will be displayed in the upper left corner of the title screen.

Section 3 Idle Settings

3.1 IDLE SETTINGS SCREEN

Before a process run can be performed, the system must be set up to run in Idle Mode with the growth chamber pumped down and carrier gas (hydrogen or nitrogen) flowing through the system. The *Idle States Settings Menu* allows the User to designate the valve positions and analog setpoints used when the system is in the run and idle states. It allows the User to conveniently establish values for the run state, without having to input these values into the recipe.

NOTE: The analog values and valve positions specified in the Recipe will override values specified in *the Idle Settings* screen. Analog values and valve positions not identified in the Recipe will be implemented according to the values specified in *Idle Settings* screen.

3.1.1 From *Main Operation Screen*, go to the **Options** menu > **System**. The *System* menu (Figure 3.1) will appear.

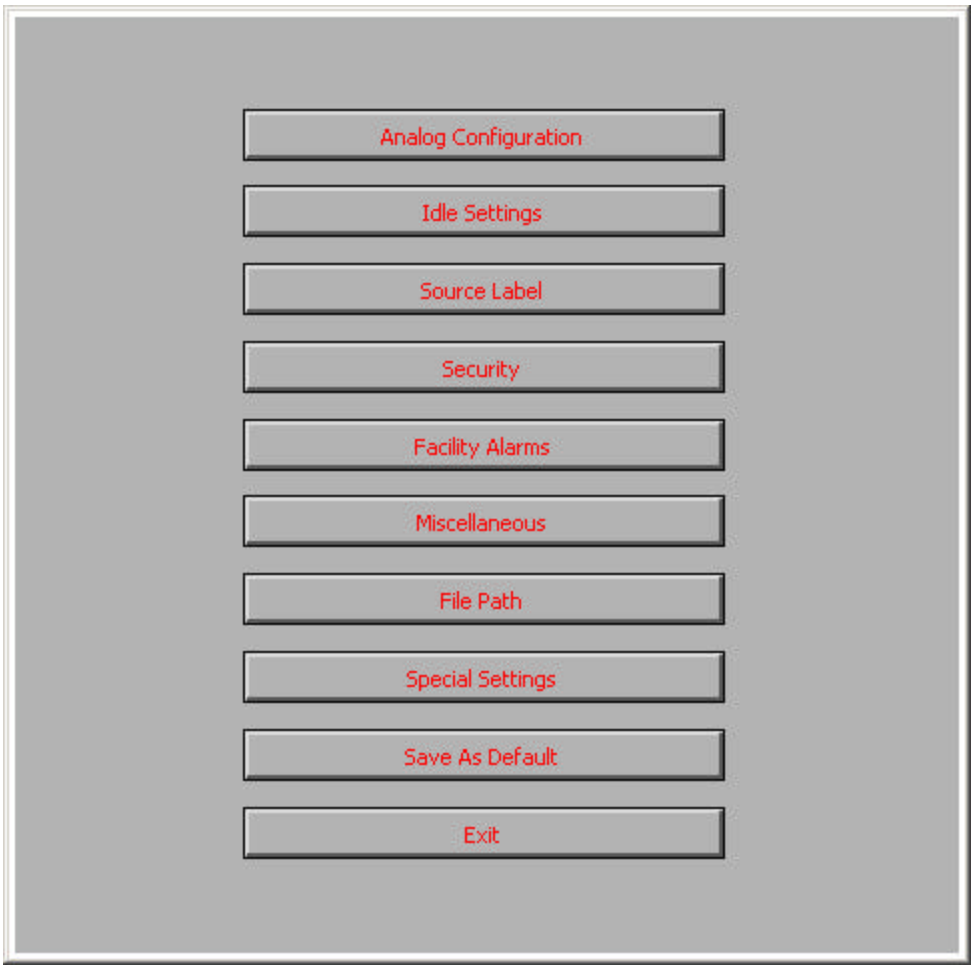


Figure 3.1. System Menu

3.1.2 In *System* menu, click on **Idle Settings**. The *Idle States Settings Menu* (Figure 3.2) will appear.

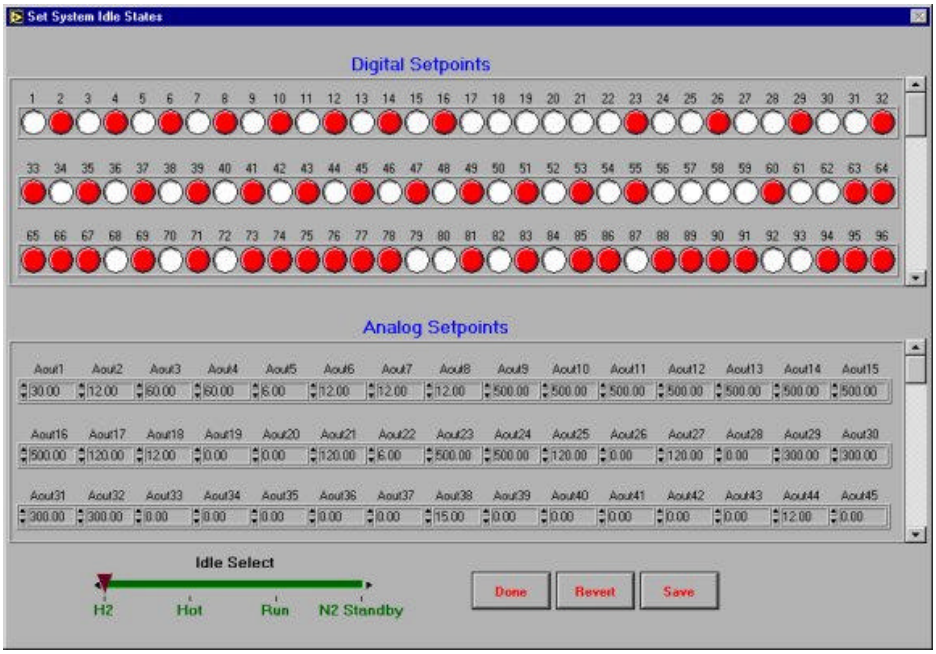


Figure 3.2. Idle States Settings Menu (H2 Mode)

3.1.3 Click on the brown slider on **Idle Select** slider bar and move it at the state (**H2**, **Hot**, **Run** or **N2 Standby**) for which you desire to set digital states and analog values.

3.1.4 To set digital setpoints, click on the white or red circle until the desired position is obtained. Red circles denote closed valves and white circles denote opened values.

3.1.5 To set analog setpoints, either click on the up or down arrows corresponding to the analog channel desired to be set until the desired value is displayed or type in the value in the associated box.

3.1.6 If the User makes an error and desires to go back to the previously saved valve positions or analog values, click on the **Revert** button.

3.1.7 Click on the **Save** button.

3.1.8 Click on the **Done** button to exit the screen.

NOTE: The **Copy** button appears when **Idle Select** slider is located in any setting other than **H2** (Figure 3.3). This button enables the User to copy digital setpoints from system idle to run idle and vice versa.

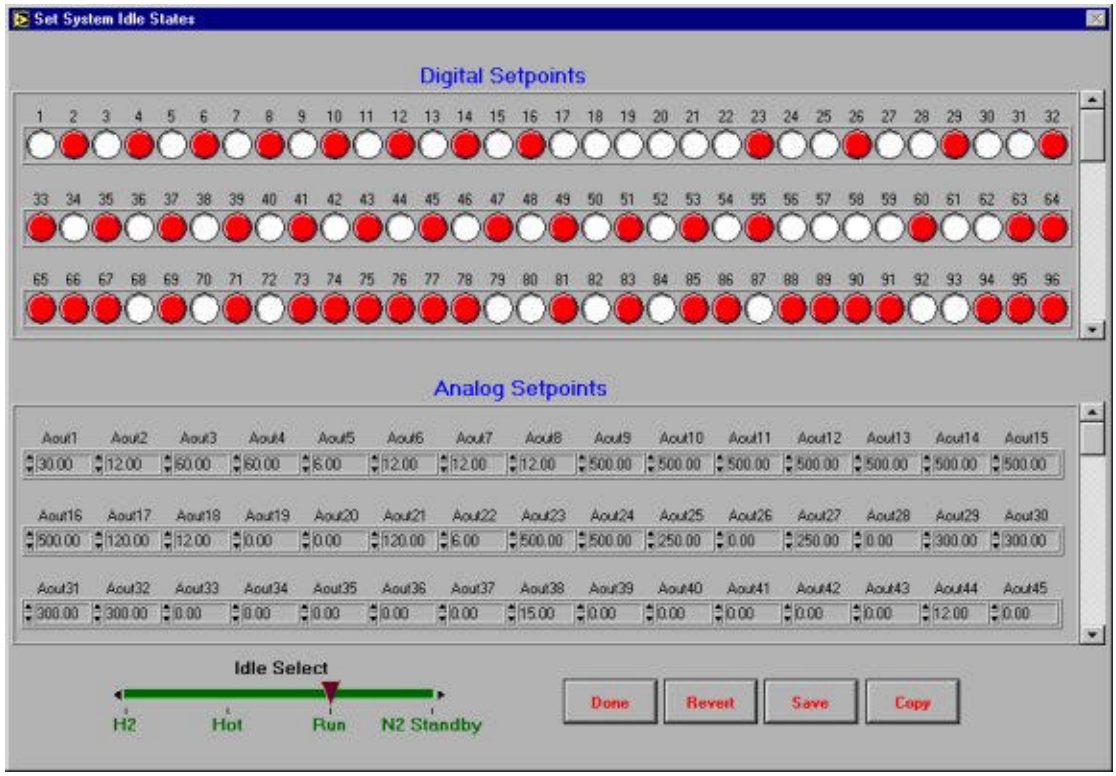


Figure 3.3. Idle States Settings Menu With Copy Button Shown (Run Mode)

3.1.9 Once you're back in the *System* menu, click on the **Save As Default** button and then the **Exit** button to implement changes made in screens accessed through the *System* menu (Figure 3.1).

Section 4 Idle Operating Modes

VEECO systems have three idle operating modes: H2 Idle, Hot Idle and N2 Standby. These operating modes are covered in the following procedures:

4.1 *H2 IDLE MODE*
4.2 *H2 HOT IDLE MODE*
4.3 *N2 STANDBY MODE*

4.1 H2 IDLE MODE

The H_2 Idle mode is a standby operating mode where all process flows are off and the reactor is under vacuum with H_2 flowing through purge and shroud lines. H_2 Idle is the basic operating mode for the system. When EpiVIEW is launched and initial login is performed, the system starts operating in H_2 Idle mode as indicated by *Idle Mode Selection* menu button (Figure 4.1).

Figure 4.1. Idle Mode Selection Menu on Main Menu Bar

Idle Mode Selection pulldown menu contains two choices: ***H_2* Idle** or ***H_2* Hot Idle** mode. Either of these modes can be selected by clicking on the *Idle Mode Selection* button and then clicking the desired mode.

4.2 H2 HOT IDLE MODE

Hot Idle operating mode is designed to keep the growth chamber at a temperature that is close to the process temperature when the system is not performing a process run. Reduction in thermal cycling (heating-cooling) results in consistency of growth conditions and better run-to-run repeatability. In Hot Idle mode, growth chamber temperature is ramped up to a user-defined setpoint (usually, 400°C), and the susceptor spins at 400 RPM. All other analog setpoints and valve positions are the same as in H_2 Idle mode.

The system is brought to Hot Idle mode by clicking on *Idle Mode Selection* button (Figure 4.1) and selecting **Hot Idle** from pulldown menu. The *Idle Mode Selection* button will now read **Hot Idle**. To bring the system back from Hot Idle to H_2 Idle, simply click on *Idle Mode Selection* button and select **H_2 Idle** from pulldown menu.

4.3 N2 STANDBY MODE

The N_2 Standby mode is the same operating mode as the H_2 Idle operating mode with the exception that nitrogen is flowing through the reactor purge and shroud lines. The N_2 Standby mode is used over the H_2 Idle to reduce hydrogen usage.

To enter the N_2 Standby mode, simply click on the blue **N2 Standby** button on the EpiVIEW Main Menu bar. Once the system switches to N2 Standby mode, the **N2 Standby** button turns red and the *Idle Mode Selection* button becomes inaccessible.

In order to put the system back into H2 Idle mode from N2 Standby mode, the following steps must be performed:

CAUTION: Do not attempt to put the system in the H_2 Idle mode unless the transfer arm fork is fully retracted from the growth chamber. The system cannot go into H_2 Idle while the transfer arm fork is inside the growth chamber.

4.3.1 Verify that the transfer arm fork is fully retracted from the growth chamber. If it's not, use the joystick to retract the transfer arm fork at this time.

4.3.2 Verify that the **CTS4** switch on the Logic Control Module (Figure 4.2) is in the down position.

Figure 4.2. Logic Control Module Front Panel

4.3.3 Toggle the position of the **RESET** switch (flip up then flip down) located on the Logic Control Module.

NOTE: System messages are displayed on the Status Line on the bottom of all EpiVIEW software screens (Figure 4.3).

Status Line With Message

Figure 4.3. EpiVIEW Status Line

NOTE: The messages listed in step 4.3.4 are normally displayed during the proper transition to H_2 Idle mode. Any failures experienced by the system during the transition to H_2 Idle may cause additional messages (failure indications) to be displayed.

NOTE: The actual messages and the values displayed in step 4.3.4 may vary depending on specific system configuration.

4.3.4 Verify that the following messages are displayed on the Status Line of the EpiVIEW software screen.

a. **WAIT FOR GATE VALVE TO CLOSE** (only displayed if the gate valve was open when the **RESET** switch was toggled).

b. **RAMP DOWN MOTOR SPEED**.

c. **RAMP DOWN GROWTH CHAMBER PRESSURE**.

d. **WAIT 5 SECONDS**.

e. **LL PRESSURE >15 TORR PUMP OFF 15 SECONDS**.

f. **TURN PUMP ON 20 SECONDS**.

g. **WAIT LL PRESSURE <15 TORR**.

h. **OK**.

4.3.5 The system is now back in H_2 Idle. **N2 Standby** button will turn blue again.

Section 5 Load Lock Routine

5.1 LOAD LOCK ROUITNE.

The purpose of the Load Lock (LL) routine is to allow the User to load and unload wafers to and from the wafer carrier. The current LL routine consists of following basic steps:

1) Backfilling LL to atmosphere with purified N2
2) Sniffing for toxics (optional on GaN systems)
3) Opening door or glove box gate valve
4) User performs the wafer loads/unloads
5) Closing of the door or glove box gate valve.
6) Pumping the LL down to vacuum.

To execute the LL routine, make sure that the system is in IDLE state. Enterprise systems allow the user to also invoke the LL routine while the system is in RUN state for higher throughput. When the system in Idle mode, follow the procedure below:

5.1.1 On Discovery systems place the **LL switch** in the up position. Please note that for the Enterprise systems the LL routine is invoked by pressing the glove box symbol on the **Transfer** screen.

5.1.2 Once the door or glove box opens up, users can perform appropriate wafer transfer.

5.1.2 To conclude the LL routine place the switch in the down position and for Enterprise systems click on the glove box symbol on the **Transfer** screen.

Section 6 Dynamic Gate Valve Routine

6.1 DYNAMIC GATE VALVE ROUTINE

The Dynamic Gate Valve Routine is used to prepare the system for transferring wafer carriers between the growth chamber and the load lock without disturbing the integrity of the growth chamber. This routine is fully automated requiring only the initiation from the User side.

This procedure instructs how to initiate Dynamic Gate Valve Routine to open and close the gate valve between the load lock chamber and the growth chamber for wafer transfer or maintenance tasks.

NOTE: This procedure can only be performed with the system in H_2 Idle or Hot Idle mode.

6.1.1 *On Discovery Series systems*, verify that the **GATE VALVE ROUTINE** switch on the Logic Control Module (Figure 5.1) is in the down (closed) position.

On Enterprise systems the routine is invoked by clicking on the GV symbol in the **Transfer** screen (Figure 5.2).

Figure 5.1. Logic Control Module Front Panel

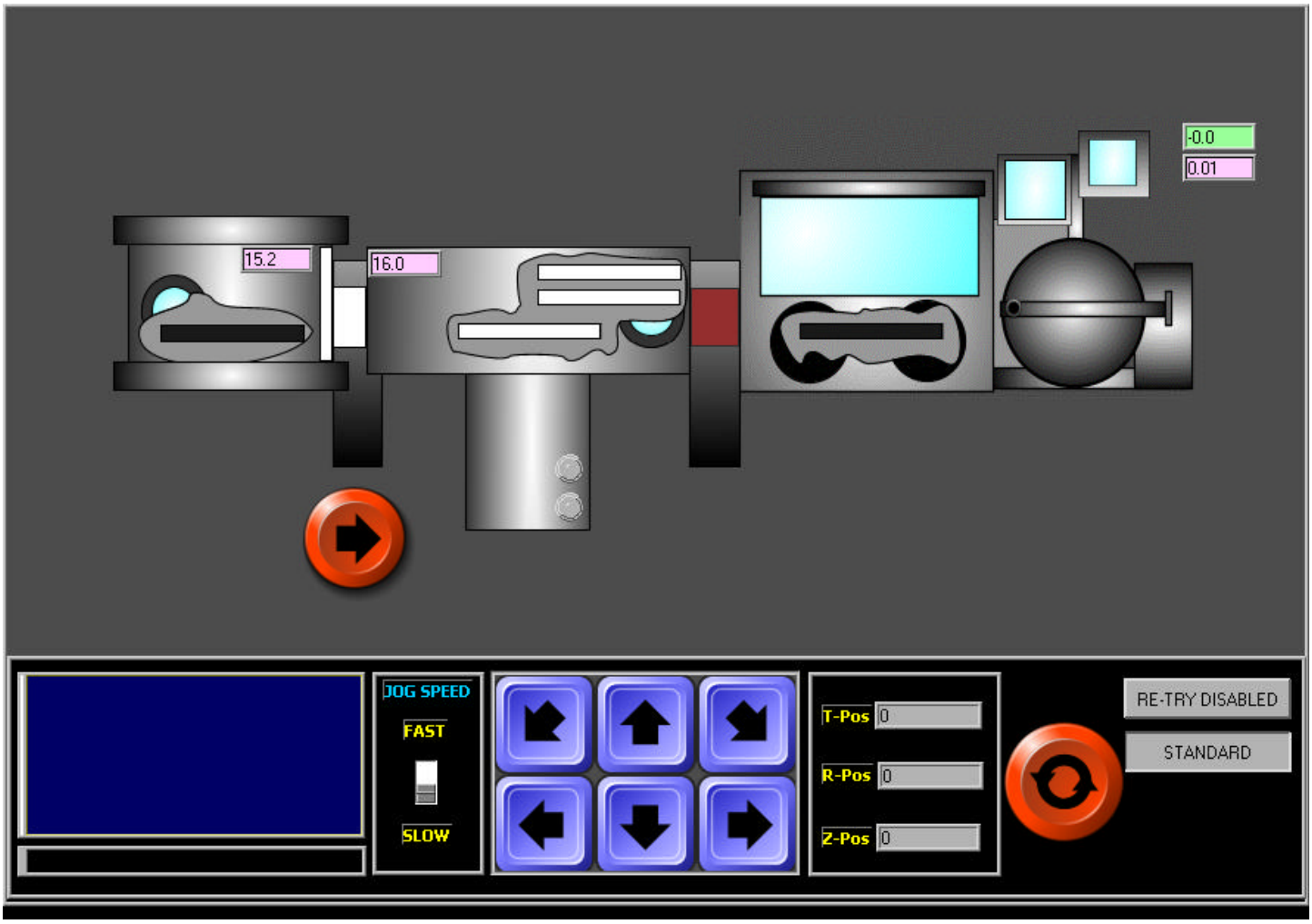


Figure 5.2. Enterprise Transfer Screen

6.1.2 Place the system in either H_2 Idle or Hot Idle mode (see *Section 4*).

6.1.3 Open the gate valve by placing the **GATE VALVE ROUTINE** switch on the Logic Control Module to the up (open) position.

6.1.4 The gate valve should now be open.

6.1.5 Load lock chamber is now isolated from gas flow. Growth chamber remains in idle mode with hydrogen flowing through it to ensure low particle generation.

6.1.6 To close the gate valve, place the **GATE VALVE ROUTINE** switch on the Logic Control Module to the down (closed) position.

6.1.7 The gate valve should now be closed.

Section 7 Creating and Editing Recipes

During an epitaxial growth run, EpiVIEW software controls the process operation of an VEECO system. Process control involves defining a program of a process (a *recipe*), loading the recipe into the computer control system and executing the recipe to produce a run where epitaxial layers are grown on a substrate. It should be understood that a recipe is a program of a growth process, while a run is an instance when a particular recipe is executed.

This section contains the following procedures:

7.1 *CREATING A RECIPE*
7.2 *USE OF CONDENSED VIEW TO FILL LAYERS WITH REPEATING VALUES*
7.3 *SAVING A RECIPE*
7.4 *OPENING A SAVED RECIPE*
7.5 *ADDING A CONTROL TO A RECIPE*
7.6 *ADDING A LAYER TO A RECIPE*
7.7 *DELETING A CONTROL OR LAYER FROM A RECIPE*
7.8 *ADDING IDENTICAL LAYERS - INSERT COMMAND*
7.9 *MOVING CONTROLS*
7.10 *MOVING LAYERS*
7.11 *FINDING LAYERS IN A RECIPE*
7.12 *RAMPING*
7.13 *LOOPS*
7.14 *ADDING A LOOP TO A RECIPE*
7.15 *SORTING LOOPS*
7.16 *REMOVING LOOPS*
7.17 *HOLDING LAYERS WHEN RUNNING A RECIPE*
7.18 *SKIPPING LAYERS WHEN RUNNING A RECIPE*
7.19 *RECIPE VIEWING OPTIONS*
7.20 *CONFIGURING CONTROLS AND VALVES IN A RECIPE, CONTROL DEFINITIONS SCREEN*
7.21 *RUNNING A RECIPE*
7.22 *ABORTING A RECIPE*
7.23 *COMMENT EDITOR*

7.1 CREATING A RECIPE

7.1.1 Click on the **Recipe** button on the EpiVIEW Main Menu bar. A **Recipe** menu and a recipe spreadsheet (two rows by two columns) will appear.

7.1.2 In **Recipe** menu, click **File**.

7.1.3 In **File** pulldown menu, click **New** or press Ctrl-N.

7.1.4 Click on **Edit** and a new pulldown menu will appear.

7.1.5 Click on the **Add** option, which will generate the *Add Control* pop-up box that will only display **Control** as an option until the recipe is further defined.

7.1.6 Click on the **Control** option or press Ctrl-T.

7.1.7 A box of control options will be displayed. To choose a control, position the arrow icon over the control desired to be added in the first layer and press the left mouse button. The chosen control will be highlighted. To choose a group of controls that are listed sequentially, click on the first desired control, then go to the last desired control, press and hold the *Shift* key and click on it. All the controls in the list from the first selected to the last selected will be highlighted. To select a group of controls that are not sequentially listed, click on the first desired control, then press and hold *Ctrl* key and click on the next desired control. To select more controls, keep clicking on them while holding *Ctrl* key. Once you've selected all the desired controls, click **OK** to return to the recipe spreadsheet.

NOTE: The first row of data for a particular control will always be the absolute value of the analog setpoint; and the second row of the data is always the ramp variable (which is set to 1 if it is a linear relationship) if ramping is available for that control.

7.2 USE OF CONDENSED VIEW TO FILL LAYERS WITH REPEATING VALUES

Each column in the recipe spreadsheet represents a layer. A layer is essentially a time interval during which analog setpoints for all controls either remain constant or vary (ramp) at a prescribed rate and all valve positions remain unchanged. If a setpoint for any particular control needs to be changed, it is necessary to introduce a new layer into the recipe. This new layer should either just specify a new setpoint for the control (step change in setpoint) or specify a new setpoint and ramp rate (ramped change in setpoint). In most cases, many different controls are present in a recipe. Among them, only a few receive new setpoints when switching from one layer to the next one while the setpoints for the rest of controls remain unchanged.

The *Condensed View* provides the user with convenience of only defining the setpoints at the layers where the set point change occurs. This can also be applied to ramp values, commands, deviation values and commands. Once the transition values have been defined the user can unselect the **Condensed View** (Ctrl-K) and all the empty cells to the right of the change values will be filled with appropriate values. Please note, that some users run their recipes in *Condensed View* for simplicity. Please follow an example below:

7.2.1 Add all of the desired control lines to the recipe and then add the desired number of layers.

Table 7.1. The table below illustrates how the recipe should look at this point.

	Layers	1	2	3	4	5	6
	Time (sec)	20.0	20.0	20.0	20.0	20.0	20.0
	Grow						
AsH3 #1	MFC43	100.000	100.000	100.000	100.000	100.000	100.000
	Ramp43	0	0	0	0	0	0
	DVComm43	Off	Off	Off	Off	Off	Off
	DVLimit43	0	0	0	0	0	0
	CMD43	IDLE	IDLE	IDLE	IDLE	IDLE	IDLE
AsH3 #1 DD	MFC44	20.000	20.000	20.000	20.000	20.000	20.000
	Ramp44	0	0	0	0	0	0
	DVComm44	Off	Off	Off	Off	Off	Off
	DVLimit44	0	0	0	0	0	0
AsH3 #1 Push	MFC42	50.000	50.000	50.000	50.000	50.000	50.000
	Ramp42	0	0	0	0	0	0
	DVComm42	Off	Off	Off	Off	Off	Off
	DVLimit42	0	0	0	0	0	0

7.2.2 On the Recipe Screen, go into the **View** menu and click on **Condensed view**. This will condense the recipe, i.e. clear all the setpoints from all the layers.

Table 7.2. The table below illustrates the recipe screen after it has been unpacked.

	Layers	1	2	3	4	5	6
	Time (sec)	**20.0**					
	Grow						
AsH3 #1	MFC43	100.000					
	Ramp43	0					
	DVComm43	Off					
	DVLimit43	0					
	CMD43	**IDLE**					
AsH3 #1 DD	MFC44	20.000					
	Ramp44	0					
	DVComm44	Off					
	DVLimit44	0					
AsH3 #1 Push	MFC42	50.000					
	Ramp42	0					
	DVComm42	Off					
	DVLimit42	0					

7.2.3 Enter the first absolute value of the analog on the control line(s) and then on the same control line(s), enter the next different value.

Table 7.3. The table below illustrates the recipe with new analog values added.

	Layers	1	2	3	4	5	6
	Time (sec)	**20.0**					
	Grow			As	As	As	
AsH3 #1	MFC43	100.000		50.000			
	Ramp43	0		1	0		
	DVComm43	Off					
	DVLimit43	0					
	CMD43	**IDLE**	**VENT**	**RUN**			**VENT**
AsH3 #1 DD	MFC44	20.000			50.000		
	Ramp44	0					
	DVComm44	Off	Warning	Hold		Abort	Off
	DVLimit44	0	10	5			
AsH3 #1 Push	MFC42	50.000			100.000		
	Ramp42	0					
	DVComm42	Off			Warning		
	DVLimit42	0			15		

7.2.4 Go to the **View** menu and click on the **Condensed view** command. This will populate the recipe.

Table 7.4. The table below illustrates the recipe once it has been packed.

	Layers	1	2	3	4	5	6
	Time (sec)	20.0	20.0	20.0	20.0	20.0	20.0
	Grow			As	As	As	
AsH3 #1	MFC43	100.000	100.000	50.000	50.000	50.000	50.000
	Ramp43	0	0	1	0	0	0
	DVComm43	Off	Off	Off	Off	Off	Off
	DVLimit43	0	0	0	0	0	0
	CMD43	IDLE	VENT	RUN	RUN	RUN	VENT
AsH3 #1 DD	MFC44	20.000	20.000	20.000	50.000	50.000	50.000
	Ramp44	0	0	0	0	0	0
	DVComm44	Off	Warning	Hold	Hold	Abort	Off
	DVLimit44	0	10	5	5	5	0
AsH3 #1 Push	MFC42	50.000	50.000	50.000	100.000	100.000	100.000
	Ramp42	0	0	0	0	0	0
	DVComm42	Off	Off	Off	Warning	Warning	Warning
	DVLimit42	0	0	0	15	15	15

7.3 SAVING A RECIPE

To save a recipe as the same file name as it already has been saved as once, click the **File** option and then click the **Save** (Ctrl-S) option, which will save the file over the file with the same name.

To save a recipe as a different name from the name it currently has, click on the **File** option and then click on the **Save As** option, which will prompt a list of current recipe files saved (as designated by the .rcp file extension). Type the new name of the file in the **File Name** box and click on the **OK** button.

The recipes can also be saved in the previous format that does not include the deviation alarm information. To do it go to **File** option then **Save As** and from the **Save As Type** field select **RecipePlus Data File**. Recipes saved in that format can be now used on EpiVIEW systems 20.08 or earlier. Please note that this will only work if the two system control line definitions are compatible.

7.4 OPENING A SAVED RECIPE

To open the existing recipe, click on the **File** option, which will generate a pull down menu of options. Click on the **Open** option, which will generate a file list containing the recipe directory. Highlight the file you want to open and click on the **Open** button.

An alternative way is to use the **Recently Opened Recipes** option under the **File** menu.

7.5 ADDING A CONTROL TO A RECIPE

All new control lines are added to the bottom of the spreadsheet's left-most column. To add a control line into the middle of the spreadsheet, first add the new control line at the bottom of the spreadsheet and then Cut and Insert it to the desired location. The preferred method is to highlight the control before which a new control is to be added and right click on the control name. Then select insert control from the mouse pull down. Once the appropriate control(s) are selected they will be added in front of the originally highlighted control.

7.5.1 Click on the **Recipe** button > **Edit** > **Add**. This will generate a box that allows the User to choose from either **Control** or **Layer**.

7.5.2 Click on the **Control** option.

7.5.3 A box of control options will be displayed. To choose a control, highlight the control desired to be added and click the **OK** button.

7.5.4 Type in the desired values in the columns or rows and press the **Enter** key after adding a value to each individual cell.

7.6 ADDING A LAYER TO A RECIPE

7.6.1 All new layers are added to the end of the recipe in the right-most column. To add a new layer into the middle of the spreadsheet, first highlight the layer before which the new layer with be inserted, then right click on it with the mouse and select **Insert layer**. The new layer will be placed to the left of the originally selected layer.

7.6.2 Click on the **Recipe** button > **Edit** > **Add**. This will generate a box that allows you to choose from **Control** or **Layer**.

7.6.3 Click on the **Layer** option, which will add a new layer to the right of the latest layer created.

7.6.4 Type in the desired values in the columns or rows and press the **Enter** key after adding a value to each individual cell.

NOTE: Layers can also be added by using the **Insert** command under the **Edit** menu. This command is useful when a recipe is completed and a layer with the same parameters as another layer is desired to be added.

7.7 DELETING A CONTROL OR LAYER FROM A RECIPE

7.7.1 Click on the **Recipe** button.

7.7.2 Highlight the column of the layer to be deleted or highlight the row of the control to be deleted.

7.7.3 Click on the **Edit** menu option and then click on the **Delete** menu option or press the **Delete** key on the keyboard. Optionally the same can be accomplished by using the right click menu on the mouse.

7.8 ADDING IDENTICAL LAYERS - INSERT COMMAND

The **Insert** command allows the User to add a layer with identical parameters to another layer. It is useful when a recipe has already been created and the User wants to add a layer that has many of the same parameters as another layer.

7.8.1 Open the recipe (if one is not already opened).

7.8.2 Highlight the layer immediately right to the desired insertion place by clicking twice on the layer number at the top of the column. The new layer will be inserted to the left of the column that is highlighted and will contain all of the values listed in the column immediately to the left from the highlighted one.

7.8.3 Go to **Edit** > **Insert**. A layer will be inserted to the left of the highlighted column with the same parameters as the layer to the left from the highlighted layer.

NOTE: The same can also be accomplished using the right click mouse menus, instead of using the RecipePlus menus.

7.9 MOVING CONTROLS

7.9.1 In a recipe, highlight a control name and the row of information associated with the control.

7.9.2 Go to **Edit** > **Cut**.

7.9.3 Position the arrow icon on the control row where you want to move the cut control to. Click on the control to highlight the row above which the control is to be inserted and then go to **Edit** > **Paste**.

NOTE: The same can also be accomplished using the right click mouse menus, instead of using the RecipePlus menus.

NOTE: If a selection is cut, but not pasted prior to exiting the program, it is automatically deleted.

7.10 MOVING LAYERS

7.10.1 In a recipe, highlight the desired layer to move by clicking twice on the layer number at the top of the column.

7.10.2 Go to **Edit** > **Cut**.

7.10.3 Position the arrow icon on the layer column where you want to move the cut layer to, click twice on the layer column and then go to **Edit** > **Paste**.

NOTE: The same can also be accomplished using the right click mouse menus, instead of using the RecipePlus menus.

7.11 FINDING LAYERS IN A RECIPE

7.11.1 Go to **Edit** > **Find**. A pull down menu with four options: ***First Layer***, ***Last Layer***, ***Layer***, ***Control*** will appear.

7.11.2 The following describes what happens when each of these options is clicked:

- ?? First Layer - Activates/highlights the first layer sequentially (layer #1) in a recipe
- ?? Last Layer - Activates/highlights the last layer sequentially in a recipe
- ?? Layer - Lists all available layers and highlights the layer that was chosen from this list
- ?? Control - Lists all available controls and highlights the control that was chosen from this lis t

7.12 RAMPING

7.12.1 Ramping number representations are defined below:

- ?? Ramp 0 = no ramp
- ?? Ramp 1 = linear
- ?? Ramp 2 = exponential
- ?? Ramp 1/2 = reverse exponential

7.12.2 The following equations explain the calculation of the ramping increments:

$$\textbf{Coefficient} = (\text{sampling/layer time})^P \times (\text{final setpoint} - \text{beginning Aout})$$

$$\textbf{New Aout} = \{(\text{sampling time} \times i)^P - [\text{sampling time} \times (i-1)]^P\}$$

where; P = ramp number input in recipe cell, Aout = analog out and i = the index for the incremental step

7.13 LOOPS

Loops are a simple way of repeating a block of consecutive layers. The block of layers may be repeated up to 30,000 times. A process can have numerous loops; however, overlapping loops are not allowed. Loops are shown on the recipe spreadsheet by a blue line extending from the first layer in the loop to the last layer in the loop. Loop number from the loop list and the number of times the loop is to be executed are shown above the blue loop line.

7.14 ADDING A LOOP TO A RECIPE

7.14.1 Go to **Recipe** > **Edit** > **Loop**. A box containing information necessary to develop a loop will appear.

7.14.2 Click on the **Add New** button at the bottom of the *Loop* box. A new row will appear. If this is the first time a loop is being added to a particular recipe, the number in the **Loop** column will be "1". Each time a new Loop is added, the number of the loop will automatically be generated sequentially and placed in the **Loop** column.

7.14.3 Enter the number of times you want the loop to repeat in the **Number** column.

7.14.4 Enter the layer number at which you want the loop to start in the **Start** column.

7.14.5 Enter the layer number at which you want the loop to end in the **End** column.

7.14.6 Click on the **Update** button in order to update the recipe screen to include the loop that was added.

NOTE: The same can also be accomplished using the right click mouse menus. First click and hold the left mouse button at the starting layer and drag the mouse cursor until the end layer is selected. Then right click on the selected layers and pick **Add Loop** option. The loop iteration number can then be changed by right clicking on the blue loop indicator and selecting **Loop Repetitions** from the menu. Lastly, enter the desired iteration and press **ENTER** key.

7.15 SORTING LOOPS

The Sort function in the Loop Screen sorts the loops according to their start layer (how they sequentially appear within a recipe starting with layer 1).

NOTE: The loops will automatically be sorted if the **Update** button is toggled.

7.16 REMOVING LOOPS

To remove the loop, right click on the blue loop bar and select **Remove Loop** option.

7.17 HOLDING LAYERS WHEN RUNNING A RECIPE

The **Hold** button allows the User to pause a layer when a recipe is being executed.

7.17.1 To hold a layer, click the **Hold** button at the bottom of the screen. (The **Hold** button will instead read **Resume until** it has been clicked).

7.17.2 A message will appear confirming that the User wants the hold on the current layer (the number of the layer will also be displayed). Click **Yes** to hold the layer. The status box in the *Status Monitoring* Toolbar to the right of the screen will show that the layer is being held. The timer in the status box will begin counting how long the layer is being held for.

7.17.3 To stop holding a layer, click on the **Resume** button at the bottom of the screen. The timer in the status box will resume counting from the time the hold was applied.

NOTE: Controls that are ramping during the paused layer will continue ramping until they reach their final setpoints.

NOTE: If the hold confirmation box is not closed before the layer switch occurs the box will be automatically closed.

7.18 SKIPPING LAYERS WHEN RUNNING A RECIPE

The **Next** button allows the User to go to the next layer in a recipe.

7.18.1 To go to the next layer when a recipe is running, click the **Next** button at the bottom of the screen.

7.18.2 A dialog box will appear stating how many seconds are remaining on the current layer and if the User wants to go to the next layer. Click the **Yes** button to go to the next layer.

7.19 RECIPE VIEWING OPTIONS

Recipes can either be viewed in their full form that lists all of the controls/analogs in a recipe or in a summary form that shows the user-selected controls/analogs.

7.19.1 To view recipes in a summary form, go to **Recipe** and then to the **Options** menu.

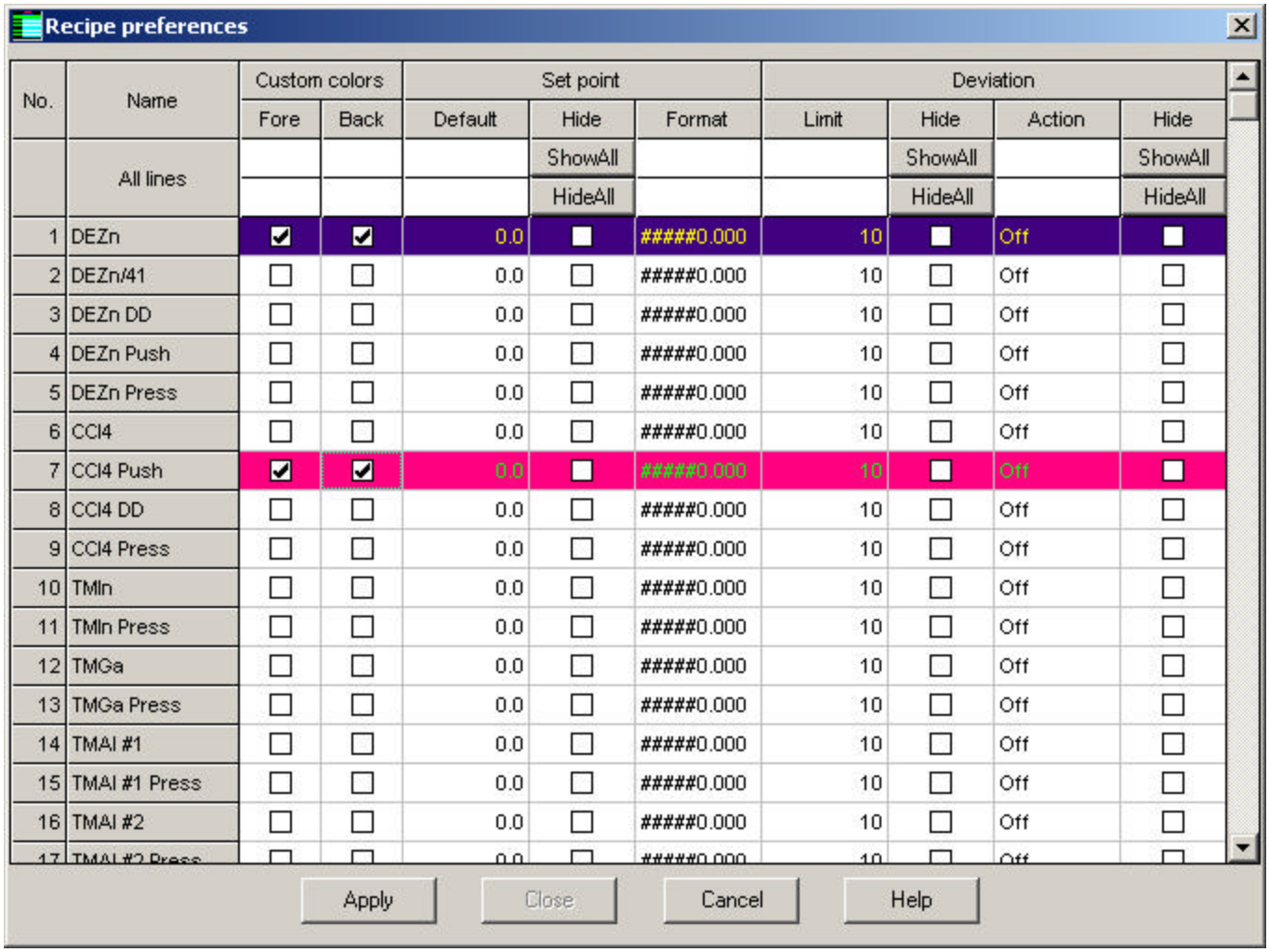
7.19.2 Click on the **Full/Summary Form** option. If summary controls have not been established yet, a box that will allow the User to add the summary controls will appear.

7.19.3 Highlight the control in the **Controls In Recipe** section that you want to add to the summary form and click on the **Add** button. This will add the control to the **Controls In Summary** list.

7.19.4 Once the summary of controls list is compiled, click on **OK** to preserve the additions or changes and return to the Recipe screen. The summary form will now be displayed.

NOTE: To change the controls/analogs that can be viewed in the summary form after a summary form has already been created, go to the **Select Summary** option, which prompts the box where the controls/analogs can be added to or removed from the summary form (see steps 7.19.1 through 7.19.3 above).

7.19.5 There are additional viewing options that were introduced with RecipePlus. To configure there options please go to **Options** menu and then select **Recipe Preferences** (Figure 7.5):



Recipe preferences

No.	Name	Custom colors		Set point			Deviation			
		Fore	Back	Default	Hide	Format	Limit	Hide	Action	Hide
	All lines				ShowAll / HideAll			ShowAll / HideAll		ShowAll / HideAll
1	DEZn	☑	☑	0.0	☐	#####0.000	10	☐	Off	☐
2	DEZn/41	☐	☐	0.0	☐	#####0.000	10	☐	Off	☐
3	DEZn DD	☐	☐	0.0	☐	#####0.000	10	☐	Off	☐
4	DEZn Push	☐	☐	0.0	☐	#####0.000	10	☐	Off	☐
5	DEZn Press	☐	☐	0.0	☐	#####0.000	10	☐	Off	☐
6	CCl4	☐	☐	0.0	☐	#####0.000	10	☐	Off	☐
7	CCl4 Push	☑	☑	0.0	☐	#####0.000	10	☐	Off	☐
8	CCl4 DD	☐	☐	0.0	☐	#####0.000	10	☐	Off	☐
9	CCl4 Press	☐	☐	0.0	☐	#####0.000	10	☐	Off	☐
10	TMIn	☐	☐	0.0	☐	#####0.000	10	☐	Off	☐
11	TMIn Press	☐	☐	0.0	☐	#####0.000	10	☐	Off	☐
12	TMGa	☐	☐	0.0	☐	#####0.000	10	☐	Off	☐
13	TMGa Press	☐	☐	0.0	☐	#####0.000	10	☐	Off	☐
14	TMAl #1	☐	☐	0.0	☐	#####0.000	10	☐	Off	☐
15	TMAl #1 Press	☐	☐	0.0	☐	#####0.000	10	☐	Off	☐
16	TMAl #2	☐	☐	0.0	☐	#####0.000	10	☐	Off	☐
17	TMAl #2 Press	☐	☐	0.0	☐	#####0.000	10	☐	Off	☐

Apply | Close | Cancel | Help

Figure 7.5. Recipe Preferences Configuration Screen

The *Recipe Preferences* configuration screen allows the user to configure additional viewing options for recipe:

1) Custom colors for both foreground and background, for each control line.

2) Define default values and format for all control lines as well as allowing the user to hide the setpoint field for easier viewing and editing.

2) Define custom deviation level and command for each of the controls as well as having ability to hide these fields.

NOTE: These setting are not saved in recipe file and are global settings thus the next opened recipe will be affected by these settings. If the user wishes to transfer these settings to another computer running the same version of the EpiVIEW, please copy *c:\emcore\programs\recipeplus.ini* file to the other computer.

7.19.6 In addition to *Recipe Preferences* there are some User settings. These settings can be found under **Options** in RecipePlus program (Figure 7.6).

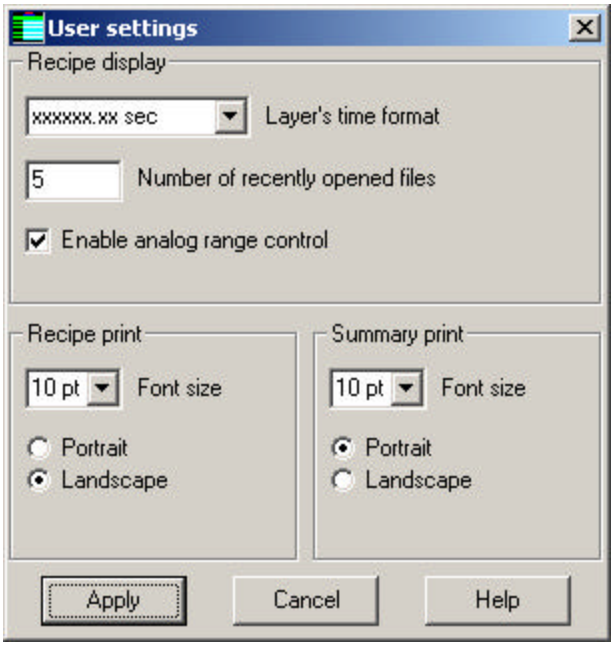


Figure 7.6. User Settings Configuration Screen

The parameters on this panel are defined below:

1) **Layer's Time format** – It allows the user to define the time format to display for layer time. Available formats are:
   hh:mm:ss.xx
   xxxxxx.xx sec
   xxx.xxx min
   xx.xxxx hour

2) **Number of recently opened files** – Controls the size of the recently opened files list that user can use to quickly open the recent recipe files.

3) **Enable analog range control** – This prevents the user from entering the invalid values (set point beyond the scaling values) by prompting the user when the exception had occurred. Please note this feature only works when editing current recipes and if older recipe with invalid values is loaded then it will not automatically check for proper ranges.

4) **Recipe print** and **Summary print** – These options allow users to determine the default font and layout for each of the reports. Font size is particularly helpful as it will allow users to control the number of pages being printed.

7.20 CONFIGURING CONTROLS AND VALVES IN A RECIPE, CONTROL DEFINITIONS SCREEN

To access the *Control Definitions Screen*, go to the **Recipe** > **Configure** > **Define Control**.

The Control Definitions screen is pre-defined by VEECO based on parameters established by the customer and the specific gas panel diagram. The screen establishes which valves will be activated during the run state; and which valves will be activated during idle flow and vent flow. In Idle flow, gases do not flow through the bubbler, while in Vent flow, gases flow through the bubbler to the exhaust.

NOTE: Controls and valves in the Control Definitions screen should only be added or edited by an VEECO software engineer. Access rights to changes in this screen are password protected. Please call VEECO's technical support to request assistance with configuring controls and valves in a recipe **(1-8-TURBODISC or 1-888-726-3472).**

7.21 RUNNING A RECIPE

7.21.1 Make sure that the growth chamber is in an idle state (Section 4 Idle Operating Modes).

7.21.2 On the *Recipe* screen, choose the **File > Open**. The file dialog box will appear.

7.21.3 In the dialog box, select the desired recipe by clicking on its file name and then click on **Open** button to load this recipe into EpiVIEW.

7.21.4 Click on the **Run** button in EpiVIEW Main Menu bar.

7.22 ABORTING A RECIPE

Once a recipe is running, the green **Run** button will turn into a red **Abort** button. If the **Abort** button is clicked, the recipe will be stopped and the **Log File Name** dialog box will appear to allow you to save the data from the portion of the recipe that was completed.

7.23 COMMENT EDITOR

A comment editor is accessed from the *Recipe* screen to enable the User to record recipe-related comments.

7.23.1 To access the *Comment Editor* screen, click on the **Recipe** button, which will generate the main spreadsheet recipe screen.

7.23.2 Click on the **Edit** pull-down menu and highlight the **Comments** option, which will generate the *Comments Editor* window.

7.23.3 Type comments in the box and click the **OK** button to save the comments.

The recipe comments generated in the comment editor will appear on the *Comments* screen generated from the **Comments** button, as well as on the recipe summary report.

Section 8 Source Label

In this panel the labels for all the Alkyls and the Hydrides are defined. Most of the time the labels are already properly assigned when the ####con.dat file is imported into LabVIEW part of the EpiVIEW design. Therefore please just verify that it is correct. Should there be any problems please check the 'Source' and 'Inject Blocks' configurations. This panel will not be accessible until the RecipePlus program is loaded. RecipePlus must be loaded first to ensure that the source label change will take effect also for the names of the control lines associated with the source.

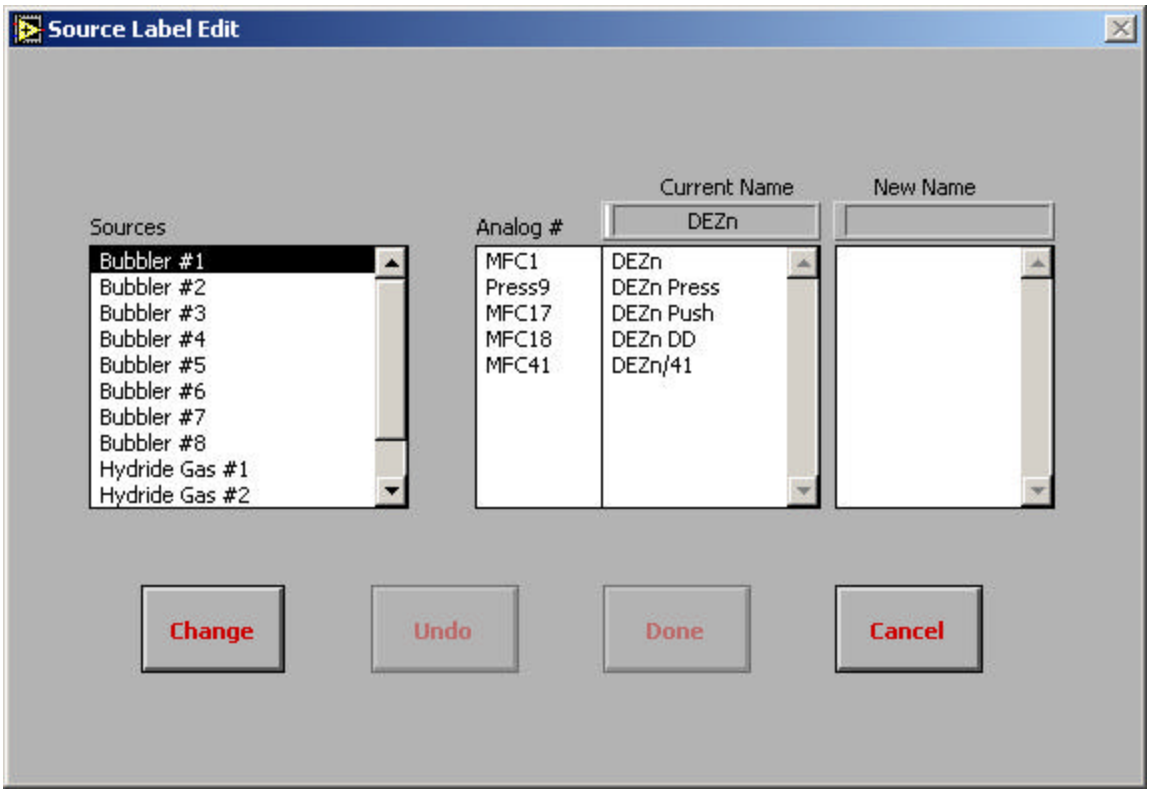


Figure 8.1. Source Label Setup Screen

Section 9 Facility Alarms

The Facility Alarms panel is used to configure the spare facility D/I alarms that interface with Veeco's system. In addition, to configuring the action type (shutdown, warning or disabled) it also allows the User to define the label for each of the spare facility inputs. Figure 9.1 illustrates the configuration panel for the Facility Alarms:

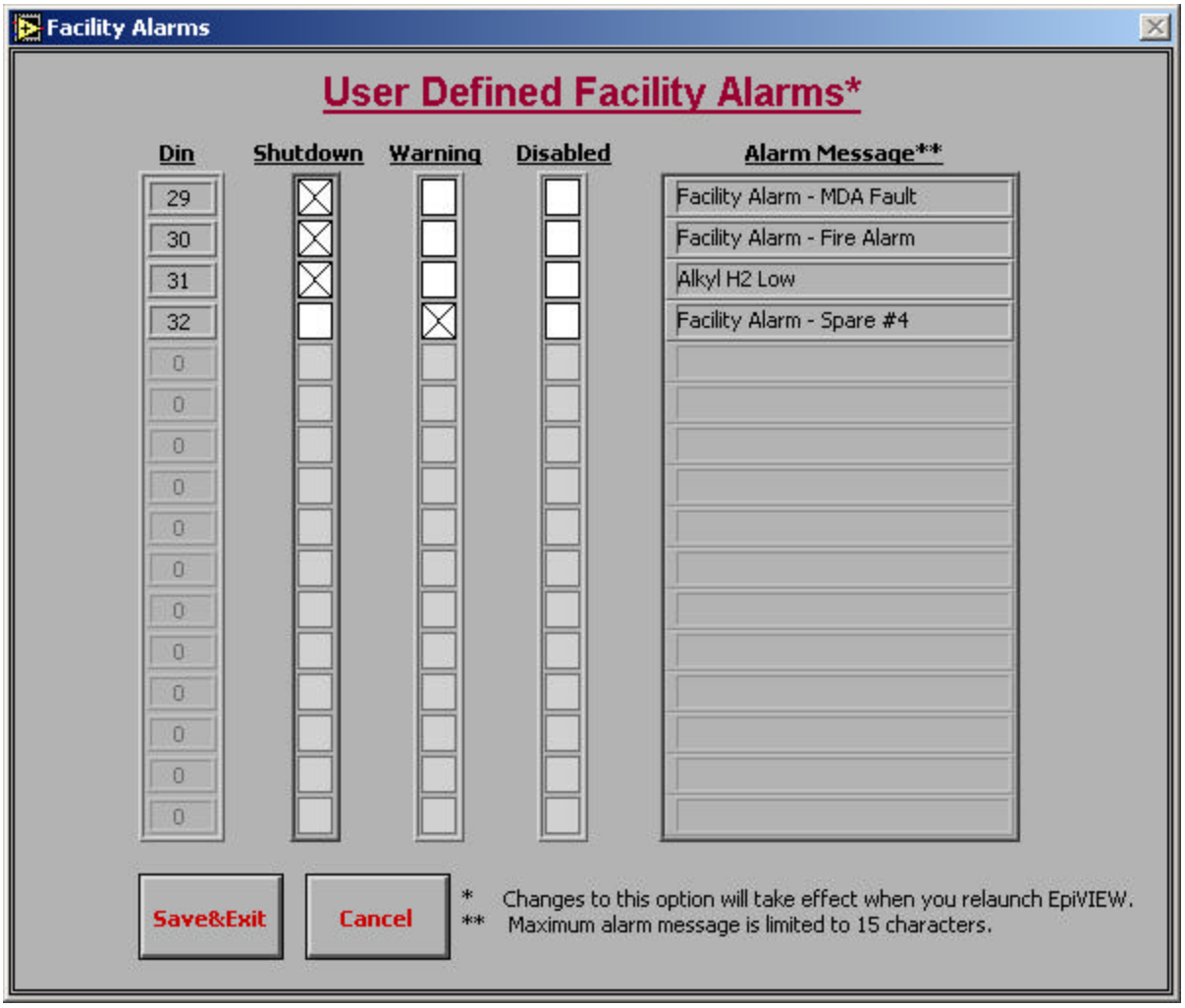


Figure 9.1. Facility Alarm Configuration Screen

NOTE: The new facility input configuration will not take change until EpiVIEW is restarted.

Section 10 Miscellaneous

The Miscellaneous screen (Figure 10.1) allows User to enters values for constants used in various routines. It is up to the User to determine the values. The only time the engineer would change them would be if the system is configured to display mbar as the pressure units. In that case multiply all the pressure settings by 1.33. Parameters associated with this screen are defined in Table 10.1.

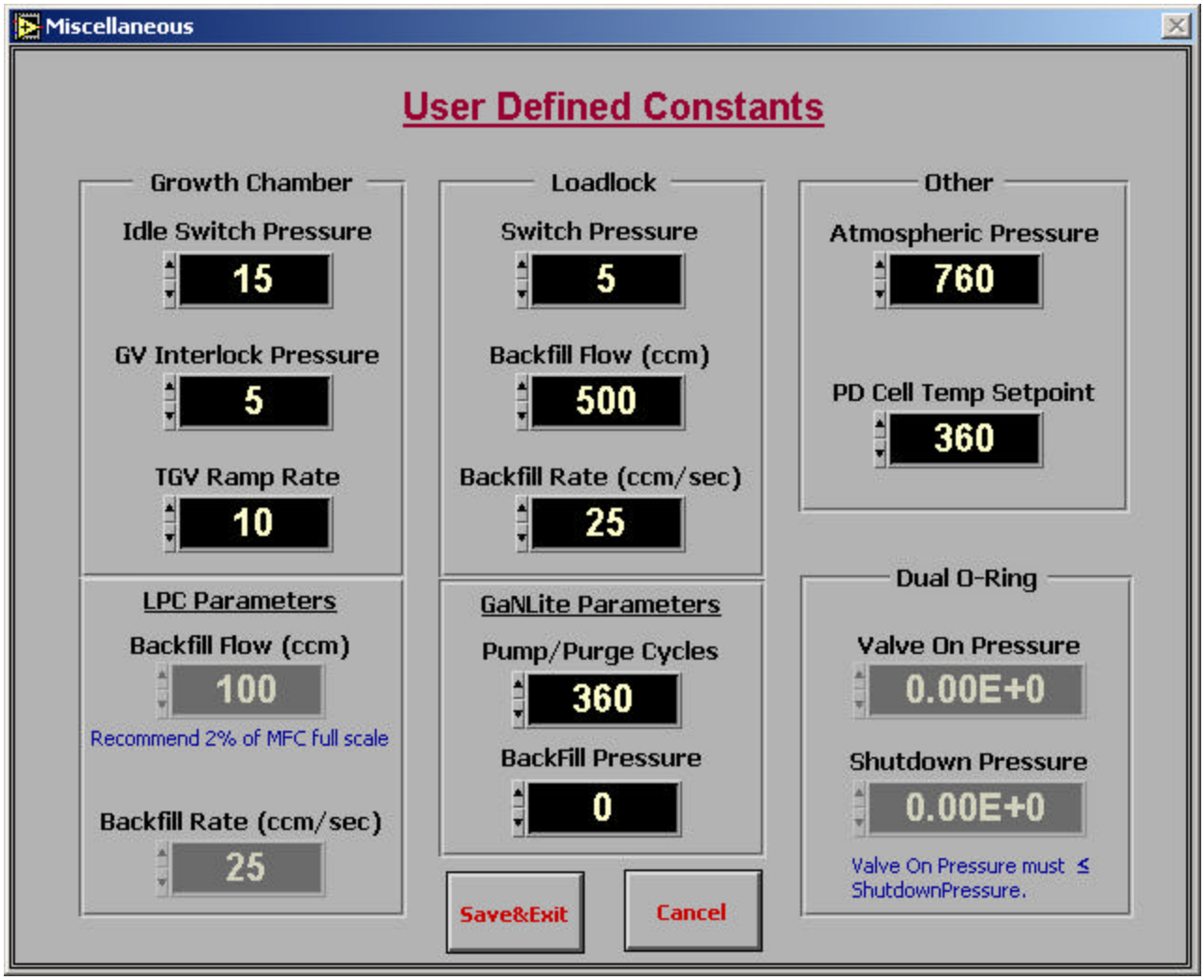


Figure 10.1. User Defined Constants Screen

Table 10.1. User Defined Constants

Subsystem	Setting	Function
Growth Chamber	*Idle Switch Pressure*	This is pressure is used to determine if the system is ready to go to IDLE. In another words when the pressure for the GC is below this level then give the IDLE settings to the system. This parameter used to be combined with the GV interlock Pressure and by setting it too low it would prevent the system from going back to IDLE after the run because of the amount of flow going into the reactor.
	GV Interlock Pressure	This is the pressure that is used a) to display the interlock message on the screen for the GV b) to determine whether or not the user can manually open the GV and sometime even in a routine like Chamber maintenance routine.
	TGV Ramp Rate	It is the rate at which the GC pressure ramps down when it needs to, ex: at the end of the run, chamber maintenance routine. Please use 10 as a default setting.
	Backfill Flow (ccm)	This is used only for the back fill option during the GV routine. It determines the final flow level of the backfill MFC. If left at 0 the max flow will be used.
	Transfer Pressure	Just like above this parameter is used with the backfill option. It determines final backfill pressure. It can only be used with the regular GV routine.
Loadlock	*Switch Pressure*	This pressure is used with turbo pump to determine the level at which to switch LL pumping to Turbo.
	Backfill Flow (ccm)	This parameter determines the final flow of the backfill MFC. If it is left at 0 then the max flow will be used
	Backfill Rate (ccm/sec)	It determines the rate at which the backfill MFC will backfill to its final flow value that is specified in Backfill Flow. The range for this Value is 25 ccm/sec to 300 ccm/sec.
LPC (Low Particle Count) parameters:	*Backfill Flow (ccm)*	Used only if the new LPC Routines are used. This is the final flow value that is used when backfilling the LL in the GV routine. The range is from 25 ccm to 100 ccm.
	Backfill Rate (ccm/sec)	Again used only with new LPC routines, and it is the rate at which the backfill MFC ramps to its final flow value specified in the above parameter. It allowable range is from 25 cc/sec to 75 ccm/sec.
GaNLite Paramaters	*Pump/Purge Cycles*	This parameter decides on how many pump purge cycles are performed before the system can go to idle.
	BackFill Pressure	Defines the pressure level for pump/purge cycles.
Other	*Atmospheric Pressure*	Since the atmospheric pressure varied with elevation this parameter is necessary for save operation of our tools. It the pressure for the LL or the GC exceed this parameter by 40 torr or more the EpiVIEW will shut the system down due to the overpressure. Default setting is 760 torr=1013 Mbr).
	PD Cell Temp Set point	Temperature of the operating pressure of the PD cell. It can deviate +/- 50 degrees before the system shuts down with the absolute range from 315 -> 415 degrees C. To bypass the PD Cell the set point value can be set to 0.
Dual O-Ring	*Valve On Pressure*	Once the pressure on the convectron gauge on the LL exhaust line goes below this level the valve to the dual 0-Ring will open. Default value = 1.00 E1
	Shutdown Pressure	Once the reading of the convectron gauge on the dual O-Ring line exceeds this level the system will shut down. Make sure that the Shutdown Pressure > Valve On Pressure. Otherwise the system will shutdown as soon as the valve on the dual O-Ring line in opened. Default value = 6.00E0

Section 11 File Path

The features and the purpose of this feature is explained below:

Figure 11.1. Default Save File Path Setup Screen

Option Features:

1. Allow the user to specify default locations for the recipeload and recipesave, datalog and rundata files.
2. The location can be local PC or the network.
3. Feature includes selection for manual and auto save feature. In the manual mode the operator will be prompted to enter the names for the appropriate files at the end of each run. In the auto feature the file names for the datalog and the rundata files will be generated and saved automatically without any user intervention at the end of the run to the previously defined default locations.
4. The filenames for recipe, datalog and rundata files will be generated in the following manner:

   Recipe0911001530.hed/txt***

   09-month
   11-day
   00-year
   15-hour in 24 hour format
   30-minutes

   Where:

   Recipe is the original recipe name.

In Auto mode with **Always Save Recipe After Run** selected, the recipe files will be saved regardless of whether they have changed or not during the run.

5. In AUTO mode ALL data files will be saved even if the run is aborted or the shutdown occurred.

6. The user can open recipes from *\RecipesSave* directory. If the user picks recipe that already has the time and date stamp attached to it, new time and date stamp will be attached to the existing recipe and other datafile names.

7. Recipe save and load directories can be the same. This is to encompass the existing functionality of the 'Default Path' feature within the new specification to satisfy customers in the field.

8. In AUTO mode with **Always Save Recipe After Run** selected, when the run is over and all files are saves (including recipe) the RecipePlus will unload the recipe from RecipePlus program. This will prevent the user from running the same recipe over again.

Setup:

In order for this feature to work a few parameters MUST be setup properly:

1. Default path must include logical drive (C:\, D:\ or any other existing letter, if storing on the network).
2. The appropriate directory tree must be created in the default location. For instance if the user is to store the data file in the *S:\systemX* directory on a network then this folder MUST have the following subdirectory structure:

   S:\SystemX\Recipes
   S:\SystemX\RecipesSave
   S:\SystemX\datalog
   S:\SystemX\datalog\config
   S:\SystemX\datalog\data
   S:\SystemX\runs
   S:\SystemX\runs\events
   S:\SystemX\runs\readback

   The settings in the File Path configuration panel would be as follows:

Load Recipe Path:	*S:\SystemX\Recipes*
Save Recipe Path:	*S:\SystemX\RecipesSave*
Save Run Data Path:	*S:\SystemX\runs*
Save Logging File Path:	*S:\SystemX\Datalog\data*

   The **Save Recipe Path** will only be used in auto mode. In manual mode, the default path for the recipe, if it has changed during the run, will also be the *\Recipes* directory.

3. The *File Path* configuration panel can ONLY be accessed if there is no recipe currently loaded into the RecipePlus program

4. If the User decides to revert settings to the default paths, then the User can click on the **Default Paths** button, which will revert it automatically. The confirmation box precedes this action.

Section 12 Analog Configuration

NOTE: The **Save as Default** button preserves/saves any of the changes that have been made on screens accessed through the **Options** > **System** menu, which includes *Analog Configuration* screen. If the **Save as Default** button is not toggled before exiting the system options menu, the changes that were made to any of the system options screens will not take effect and will not appear when the screens are generated.

This section contains the following procedures:

12.1 *ANALOG CONFIGURATION SCREEN*
12.2 *EDITING ANALOG PROPERTIES*
12.3 *SORTING THE CONFIGURED ANALOG LIST*

12.1 ANALOG CONFIGURATION SCREEN

The *Analog Configuration* screen enables Users to change such properties of analog controls as scale, units, offset values and minimum mV (millivolt) and maximum mV values. This screen can be accessed by clicking on the **Options** button on Main Menu bar and choosing **System** > **Analog Configuration**.

Users are not permitted to add or remove analog controls without the presence of a qualified VEECO software engineer. Please contact **VEECO, 1-8-TURBODISC (1-888-726-3472**) to add or remove analog controls. The **Add, Remove** and **Remove All** buttons are not functional on the *Analog Configuration* screen.

NOTE: Click on the **Save as Default** button and then the **Exit** button to implement changes made in screens accessed through the System menu option.

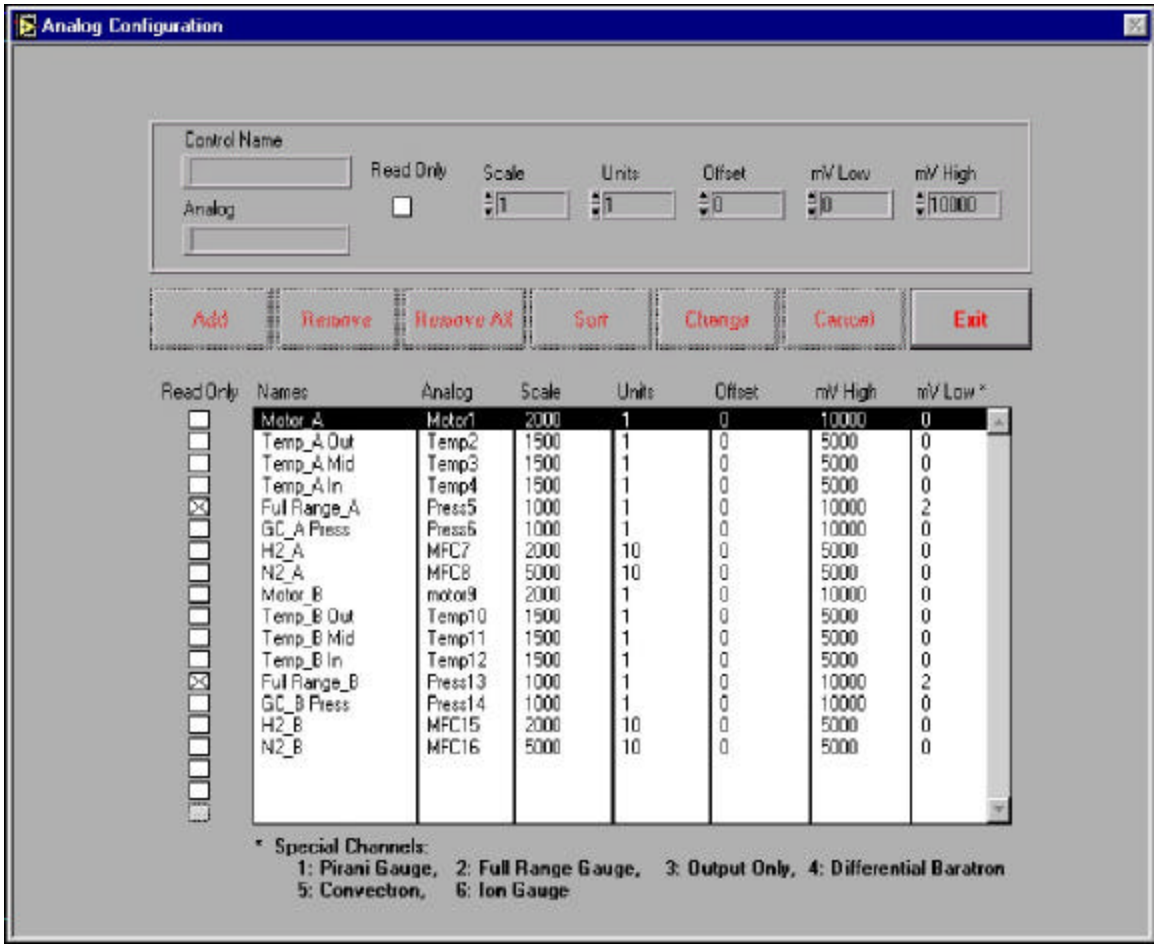


Figure 12.1. Analog Configuration Screen

The following section explains the features of the analog configuration screen. Refer to Figure 12.1, *Analog Configuration* Screen for the location of each property.

A. Read Only

There are only read back signals for the analog if the read only box is checked, no set point values.

B. Scale

The scale is the range of 0 (zero) to the maximum analog value listed in units represented by the type of analog. For example, pressure controllers will be read in torr. However, note that the conversion is made for the mV High and mV Low values.

C. Units

The Units item is similar to a multiplier and should be used for large scales.

D. Offset

The offset is typically set to 0 (zero) and should only be used in cases where the lowest value of the analog is not 0 (zero). It is intended to move the range horizontally across the x-axis of the graph. For example, to adjust the scale for a pyro

temperature range of 450×C to 950×C, the scale would be set at 500, the offset would be set 450; and the mV High and mV Low values would be 5000 and 0, respectively.

E. mV High

The mV High value represents the maximum value of the analog in millivolts.

F. mV Low

The mV Low value represents the minimum value of the analog in millivolts. Some functions will be preset by VEECO, to automatically adjust the software to use predetermined formulas for a particular instrument (e.g., the Pirani Gauge); therefore, in these cases, the value does not represent a minimum, rather it represents the implementation of the formula.

G. Sort Button

When clicked on, the sort button will display the analog list in ascending sequential order of the analog numbers (e.g., MFC 1 will be displayed first, followed by MFC 2, etc.).

12.2 EDITING ANALOG PROPERTIES

12.2.1 Go to the **Options** menu > **System** > **Analog Configuration**.

12.2.2 Double-click on the name of the analog to be edited.

12.2.3 Edit values by typing them in their respective boxes or by clicking on the up/down arrows.

12.2.4 Once values have been edited, click on the **Change** button, which will implement the stated changes.

12.2.5 Click on the **Exit** button.

12.2.6 Click on the **Save As Default** button to save changes made in the *Analog Configuration* screen.

NOTE: It is always necessary to click on the **Save As Default** button and then the **Exit** button to implement changes made in screens accessed through the *System* menu option.

12.3 SORTING THE CONFIGURED ANALOG LIST

12.3.1 Go to the **Options** menu > **System** > **Analog Configuration**.

12.3.2 To display the list of analogs sequentially, click on the **Sort** button, which will display the analog list in ascending sequential order of the analog numbers (e.g., MFC 1 will be displayed first, followed by MFC 2, etc.)

NOTE: Click on the **Save As Default** button and then the **Exit** button to implement changes made in screens accessed through the *System* menu option.

Section 13 Special Settings Screen

The *Special Settings* Screen is developed by VEECO based on parameters defined by the customer. If the customer has not defined specific information to be contained in the *Special Setting* screen then the screen will not be activated. An example of the *Special Settin*gs screen is the ability to activate the spare/future digitals on the screen level. Typical special setting screen is illustrated in Figure below:

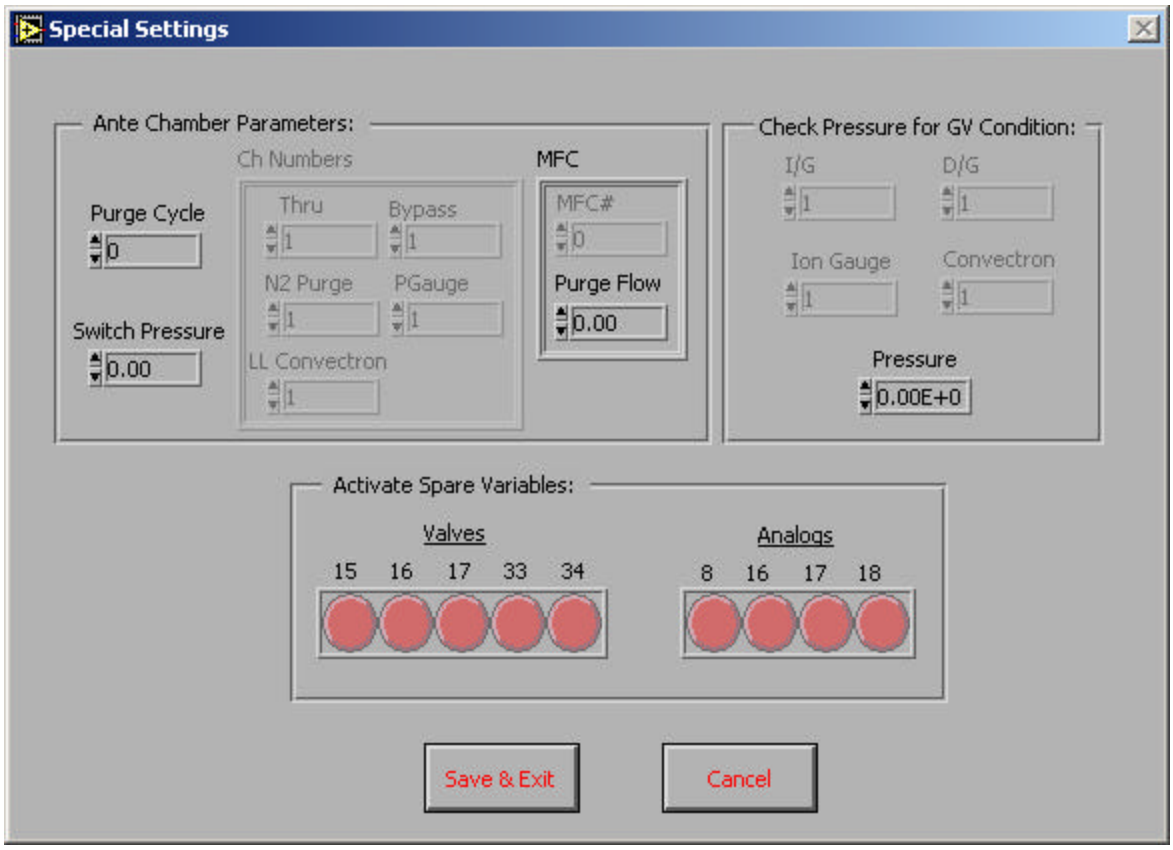


Figure 13.1. Typical Special Settings Screen

Section 14 Alarms and Shutdown

This section contains the following procedures:

14.1 *SYSTEM RESPONSES*
14.2 *SHUTDOWN ROUTINE*
14.3 *ALARM PANEL*
14.4 *WARNING PANEL*

14.1 SYSTEM RESPONSES

If during operation, an VEECO system encounters any abnormal condition or error, there are two possible responses: Warning and Alarm.

Warnings are issued to notify the User about any undesirable event that has occurred in the system. Such event may adversely affect the system operation or process run results but won't bear a direct hazard to the User or to the system. Therefore, the current state of the system remains unchanged after a Warning.

Alarms are activated as the consequence of any event that bears a direct hazard to the User or the system operation. Alarm activation initiates system shutdown routine. The system is brought to shutdown state and a large message appears on EpiVIEW Main Operation Screen indicating the alarm type and the system action. Alarm states are depicted in the *Alarm Panel* screen.

14.2 SHUTDOWN ROUTINE

The System shutdown routine is initiated when an Alarm event occurs or when the User depresses the Safety button. If a shutdown routine is initiated during a run, the system automatically ramps the motor rotation speed to 0 RPM and sets all temperature and MFC setpoints to 0.

System shutdown state has the following characteristics:

- ?? All valves are in their idle state as defined in Idle Settings (see Section 3)
- ?? All MFCs have setpoints of 0 and all gas flows are stopped
- ?? All system pumps remain on
- ?? All system components remain powered on, in their default states

14.3 ALARM PANEL

Click the **Screen 1** Main Menu button > select **Alarms** from pulldown menu.

The Alarm Panel displays the states of those components that have alarms. There are three component states that are distinguished by different colors.

Normal - Green

Special - Pink

Alarm - Red

The alarm activation shuts the system down. A message indicating the cause of the alarm is displayed on the Main Operation screen. To bring the system back to working order, the User must inspect and/or repair the system component(s) that had caused the alarm. Upon completion of the inspection/ repair, the User should put the system in *H2 Idle* mode (see Section 4).

14.4 WARNING PANEL

Click the **Screen 1** Main Menu button > select **Warnings** from pulldown menu.

The **Warning Panel** displays the states of those components that have warnings. The Warnings do not directly impact User safety or a process run; therefore, the Warnings do not cause system shutdown. Placing a check mark in the **Ignore** box associated with a particular Warning can ignore the Warnings that User deems irrelevant for a particular process run.

Usually, the Warnings notify the User about a particular system component being in certain state. If the current component state is acceptable to User, the User simply has to press **OK** on the Warning Message Box to acknowledge the warning and take no further action. If the current component state is not acceptable, the User may change the component state by changing the appropriate control states or issuing appropriate commands.

Section 15 Data Logging Configuration

This section contains the following procedures:

15.1 *DATA LOGGING CONFIGURATION SCREEN*
15.2 *ADDING OR SELECTING ADDITIONAL VARIABLES TO LOG*
15.3 *EDITING VARIABLES TO BE LOGGED*
15.4 *REMOVING VARIABLES TO BE LOGGED*
15.5 *CHOOSING A DATA OUTPUT OPTION*
15.6 *STARTING DATA LOGGING*
15.7 *LOG EVENTS WITH HISTORY*
15.8 *BURST INTERVAL, BURST TIME AND LOG INTERVAL*

15.1 DATA LOGGING CONFIGURATION SCREEN

The *Data Logging Configuration* screen is where users can select variables to log during a process run. Once the variables are selected, they are recorded throughout the recipe run and can then be viewed in real time in the *Data Logging* screen.

Variables must be selected prior to starting the run.

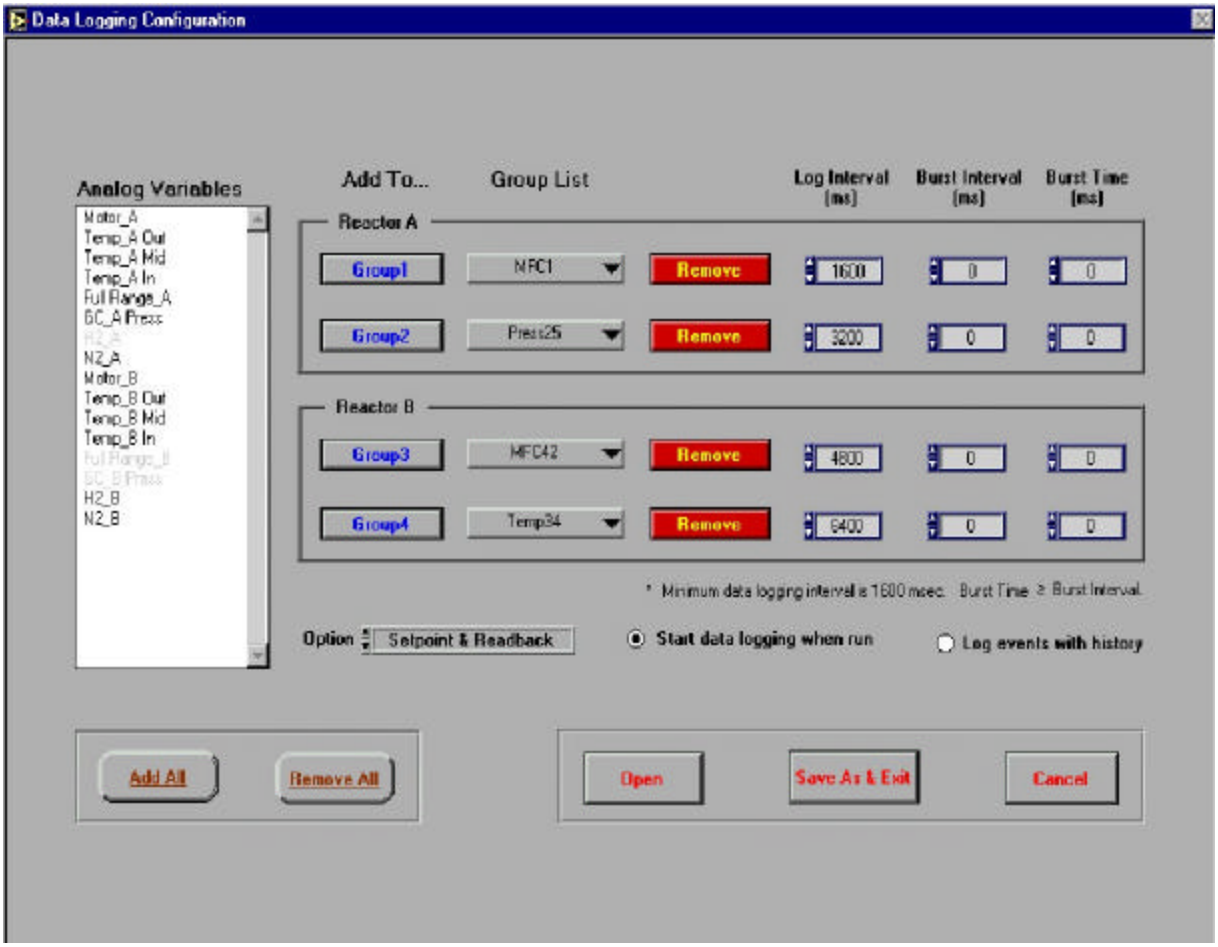


Figure 15.1. Data Logging Configuration Screen

15.2 ADDING OR SELECTING ADDITIONAL VARIABLES TO LOG

Groups have been created to enable the User to effectively organize analog variables for data logging configuration. The User is capable of defining and editing these groups.

15.2.1 Adding Single Analogs to a Group

15.2.1.1 Go to the **Options** menu > **Data Log**.

15.2.1.2 Click the desired variable in the analog variables list box.

15.2.1.3 Click on the Group number (1 through 5) box in the **Add To** column where you wish to add the variable to.

NOTE: Each group may only contain a variable that was not previously selected for another group. For example, if "GC Press" has been added as a Group 1 variable, it may not be selected as a Group 2, 3, 4 or 5 variable. Variables that are available for selection will be displayed in black, while variables that have been previously added to a group will be displayed in gray.

NOTE: It is recommended that when defining the contents of the data logging groups that the read-only analogs be placed either at the bottom of each group where they exist or preferably in a separate data log group.

15.2.2 Adding Multiple Analog Variables to a Group

15.2.2.1 Go to the **Options** menu > **Data Log**.

15.2.2.2 Hold the *Shift* key on the keyboard down and highlight the desired variables to compile a list.

15.2.2.3 Click on the **Group** number (1 through 5) box in the **Add To** column where you wish to add the variables to.

15.2.3 Adding All Analogs to One Group

15.2.3.1 Go to the **Options** menu > **Data Log**.

15.2.3.2 Click on the group that you want to add all of the variables to and click on the **Add All** button.

15.3 EDITING VARIABLES TO BE LOGGED

15.3.1 Go to the **Options** menu > **Data Log**.

15.3.2 Click on the **Group List** box where the variable is located that you desire to edit. If the User is unsure of what group the variable is located in, the User can look through the list by clicking on each of the 5 group boxes.

15.3.3 Type in the new log interval, burst interval or burst time information for each variable you want to edit.

15.3.4 Click the **Save As & Exit** button. A window will open to enable the User to either select the default file to save the configuration to, or the User can define a new file name for the new configuration.

NOTE: Click on the **Save As Default** button and then the **Exit** button to implement changes made in screens accessed through the System menu option.

15.4 REMOVING VARIABLES TO BE LOGGED

15.4.1 Go to the **Options** menu > **Data Log**.

15.4.2 Click on the **Group List** box where the variable is located that you desire to remove. If the User is unsure of what group the variable is located in, the User can look through the list by clicking on each of the 5 group boxes.

15.4.3 Once the **Group List** box has been clicked on, a list of variables associated with that group will appear.

15.4.4 Select the variable you wish to remove.

15.4.5 Click the **Remove** button to the right of the Group List you selected the variable from.

NOTE: Click on the **Save As Default** button and then the **Exit** button to implement changes made in screens accessed through the System menu option.

15.5 CHOOSING A DATA OUTPUT OPTION

The option function shown on Figure 15.1 allows the User to choose the format for the data output. There are three available output formats:

- ?? **Deviation** - Displays the data as the deviation percentage of the entered or setpoint value compared to the actual value of a particular variable.
- ?? **Readback Only** - Displays the data as the actual values of the variables selected.
- ?? **Setpoint & Readback** - Displays the data as the value that was entered for a particular variable (setpoint) and the actual value of the variable.

15.5.1 To select the type of data output, go to the **Options** menu > **Data Log**.

15.5.2 Click on the up or down arrow next to the box until the desired output option is shown.

NOTE: The data output option must be selected before the recipe is run.

15.6 STARTING DATA LOGGING

15.6.1 The User has the option to start data logging into a data file when a run starts or manually at their discretion. To start data logging when a run starts, in the *Data Logging Configuration* screen, check the circle labeled **Start Data Logging When Run**.

15.6.2 To manually start data logging, go to the *Data Scope* Screen (**Screen 1** menu > **Data Log**) and click on the **Pause** button in the *Logging Data to File* portion of the screen. If the **Resume** face of the button is showing then the data logging has started.

15.7 LOG EVENTS WITH HISTORY

*The **Log Events with History** option in the Data Logging Configuration* Screen allows users to record any alarms that have previously occurred and output them on the Report that is generated after each run. This feature extracts the information recorded in the *Events* screen; therefore, only those alarms that exist on the Events screen will be logged. If the **Clear** button has been pressed in the *Events* screen, the **Log Events with History** feature will not record alarms that previously occurred. Currently the history buffer is set to 1024 events, and any events past that will push the oldest events out of the list.

15.8 BURST INTERVAL, BURST TIME AND LOG INTERVAL

15.8.1 Burst Interval

The burst interval (specified in milliseconds) allows the User to establish the frequency samples that are recorded at the critical layer transition time. A single burst or a series of bursts with a specified interval starts at the layer transition phase and ends as the User-selected burst time elapses. If a burst time has not been specified, no bursts will be recorded.

15.8.2 Burst Time

The burst time (specified in milliseconds) is a time period during which the bursts of a specified interval are generated. For example, if a burst interval is set at 1000 ms and the burst time is set at 5000 ms, then 5000 / 1000 = 5 bursts will be generated. Once the burst time elapses, the sampling rate will continue at the User-specified log interval rate.

15.8.3 Log Interval

The log interval determines the frequency of sampling during a recipe run. The sampling rate is how many samples are taken per millisecond. Currently the fastest log interval that can be achieved in EpiVIEW is 1000 ms.

Section 16 Real-time Data Viewing

This section contains the following procedures:

16.1 *DATA SCOPE SCREEN*
16.2 *VIEWING OPTIONS - XY GRAPH OR TIME CHART*
16.3 *VIEWING VALVES ASSOCIATED WITH VARIABLES*
16.4 *DATA READBACK FUNCTIONS*
16.5 *PAUSING DATA LOGGING TO A FILE*
16.6 *DATA SCOPE LEGEND*

16.1 DATA SCOPE SCREEN

Click on **Screen 1** menu button > select **Data Log** menu item.

The *Data Scope* screen (Figure 16.1) displays a real-time trending graph that shows values of User-selected variables; however, does not record/save the values of the selected variables. The function of the screen is monitoring variables during a process run.

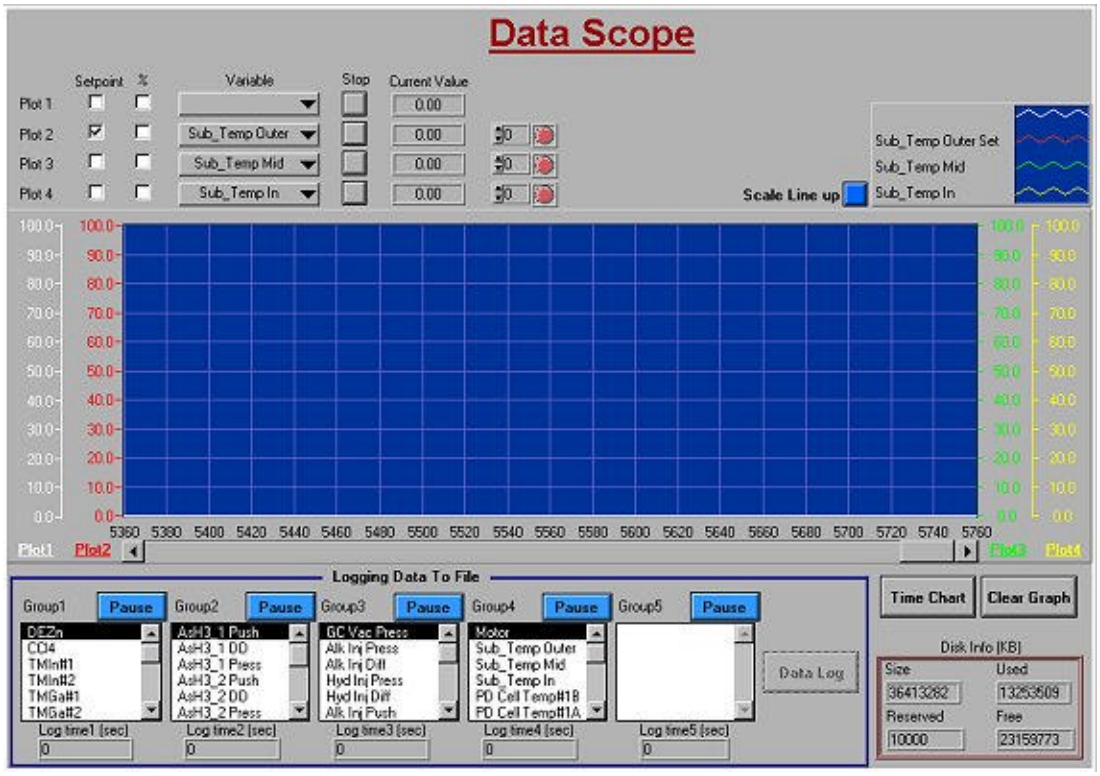


Figure 16.1. Data Scope Screen

Table 16.1. Data Scope Screen Functions

Item	Function/Purpose
Variable	Enables the User to select the analog variable to plot on the real-time graph. A pulldown list of all available analog variables will appear when the User clicks on the down arrow in the variable column. Up to four separate parameters can be looked at, at one time.
Setpoint and Percentage	Enables the User to select the data output format as either the setpoint of the analog or the analog values based on the maximum reading of an analog shown as a percent (as defined in the Analog Configuration Screen (**Section 12**)).
Stop Button	Stops data logging for current real-time variable.
Legend Box	Displays the name of the analog variable selected for plotting and its corresponding line color on the graph. When clicked on, Legend Box generates a pull-down menu of options for the User to establish line formatting according to their preference.
Time Chart and XY Graph Button	Enables the User to view the graph in an XY fashion, where two variables are selected and plotted against one another; or in a Time Chart fashion, where four variables can be viewed at once as a function of time.
Logging Data to File Box	Displays groups of variables defined in Analog Configuration screen (see **Section 12**) for data logging. Data for all groups are logged to data files during recipe run unless data logging for any particular group is interrupted by clicking on **Pause** button for that group.
Pause	Enables the User to pause the data logging for any group of variables defined in Data Logging Configuration screen (see **Section 10**) and displayed in Logging Data to File box. Once data logging has been paused, the Pause button will change its color and label from blue to yellow and from Pause to Resume, respectively. Click on the **Resume** button to resume data logging.
Data Log Button	Enables the User to start data logging manually (if the **Start Data Logging When Run** option was not selected in the *Data Logging Configuration* screen (see **Section 12**)). Note that once the **Data Log** button is clicked, the User should not click on the **Data Log** button again, as it will stop the data logging.

16.2 VIEWING OPTIONS - XY GRAPH OR TIME CHART

Variables can be viewed as percentages versus time (real time); or as an XY graph, where only two variables are selected and their relationship to one another is graphically represented. The Y axis of the graph always displays the variable as a percentage. For example, if the mass flow controller associated with the variable specified has a full set point of 250 cc and the graph scale of the Y axis has a maximum of 100, then 100 percent represent 250 cc.

16.2.1 XY Graph

To view two variables as an XY graph, click on the **Time Chart** button in the bottom right portion of the screen. The button label will now read **XY Graph** (see Figure 16.2). Two pulldown variable lists that now appear above the graph area enable User to select Y-axis variable and X-axis variable.

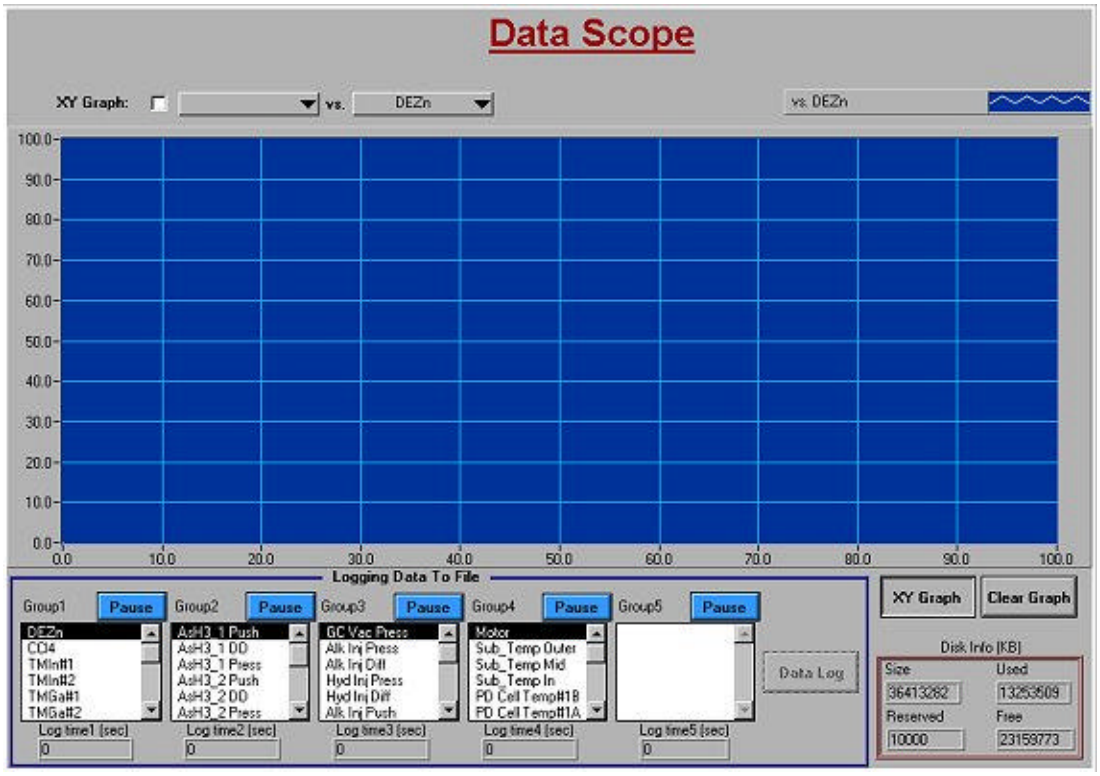


Figure 11.2: Data Scope Screen With XY Graph Shown

16.2.2 Time Chart

Time Chart allows the User to view up to four variables as a function of time. To return to Time Chart from the XY Graph, click on the **XY Graph** button. Its label will change back to **Time Chart** and the graph area will return to variable values vs. time format.

16.2.3 Changing Scales on the X and Y Axis

Axis changes can be made on the fly while recipe is running. The maximum and minimum values of the Y and X axis can be changed by highlighting the max or min value, deleting the value and then entering in a desired value. This allows the User to view information in smaller increments if the data is being plotted in a smaller range.

16.3 VIEWING VALVES ASSOCIATED WITH VARIABLES

To the right of each pulldown button with name of the selected variable, there is a gray box with up and down arrows, a pneumatic valve symbol and a box with valve number. This box displays all the numbers of all the valves associated with the selected variable. To view those numbers, position the hand icon on the up or down arrow and click. The number in the gray box represents the sequential number of the valve in that particular variable.

16.4 DATA READBACK FUNCTIONS

On the *Data Scope* screen, the User has the option to readback either setpoint data or values based on the maximum reading of an analog shown as a percent (as defined in the Analog Configure screen). To view setpoint values, check the **Setpoint** box. To view values based on the maximum reading of an analog shown, check the % box.

16.5 PAUSING DATA LOGGING TO A FILE

There are several groups of variables to log that were defined in Analog Configuration screen (see **Section 12**). Those groups are shown inside **Logging Data to File** box at the bottom of the *Data Scope* screen. To pause the logging of a group of variables to a file, click on the **Pause** button. To resume logging, click on the **Resume** button.

Note that if the **Start Data Log When Run** box is not checked in the *Analog Configuration* Screen, the User must manually begin data logging to a file. To begin manual data logging, click on the **Data Log** button in the *Data Scope* screen.

16.6 DATA SCOPE LEGEND

The Data Scope Legend enables the User to modify the format of the Data Logging graph. Click on the blue legend area to bring up a pull-down menu of legend options (Figure 16.3). Each legend option will generate pull-down menus that allow the User to modify the data format.

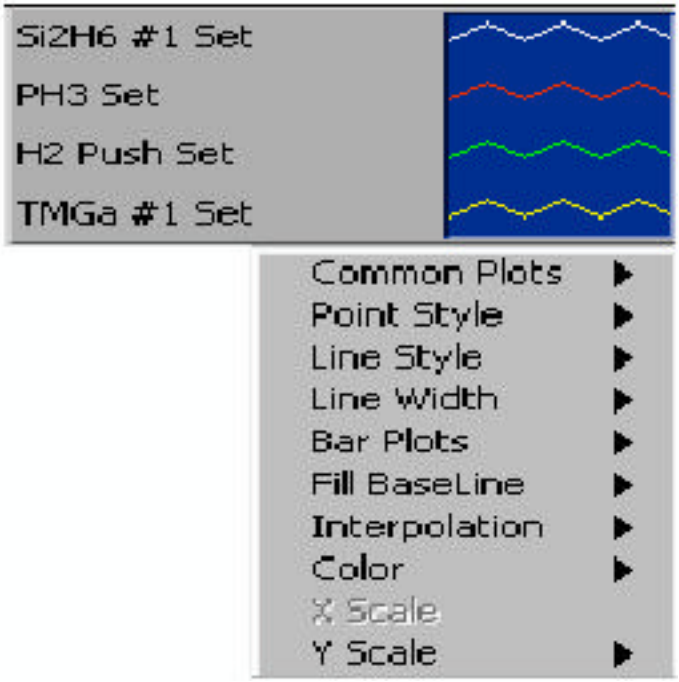


Figure 16.3. Data Scope Legend

Section 17 Using Data Logged Files

This section contains the following procedures:

17.1 *DATA VIEW SCREEN*
17.2 *OPENING DATA FILES*
17.3 *FINDING DATA RECORDS*
17.4 *SEARCHING DATA RECORDS BY LAYER NUMBER OR RUN TIME*
17.5 *SELECTING VARIABLES TO VIEW*
17.6 *EXPORTING DATA TO EXCEL*

17.1 DATA VIEW SCREEN

The *Data View* screen is a post-process analysis screen that allows the User to view previously logged files of completed process runs. It does not allow the User to view data being logged in real time. (To view data logging variables in real time, use the Data Scope screen (**Section 16**)). Once a data file has been opened, it can be viewed on the screen or the data can be exported to an Excel spreadsheet.

To access *Data View* screen, click on **Screen 1** menu button, and then select **Data View** from the pulldown menu. The *Data View* screen will appear (Figure 17.1).

The data file contains values of variables that have been selected for logging in the *Data Logging Configuration* screen (see **Section 15**).

The log interval, burst interval and burst time will be shown for the variables selected for viewing and/or exporting if these intervals and times were established for them in the *Data Logging Configuration* screen. If the log and burst intervals and burst times have not been selected in the *Data Logging* screen then the *Data View* screen values will default to the last values shown.

The Y axis scale is the absolute value of the analog, and the X axis scale is time (in seconds).

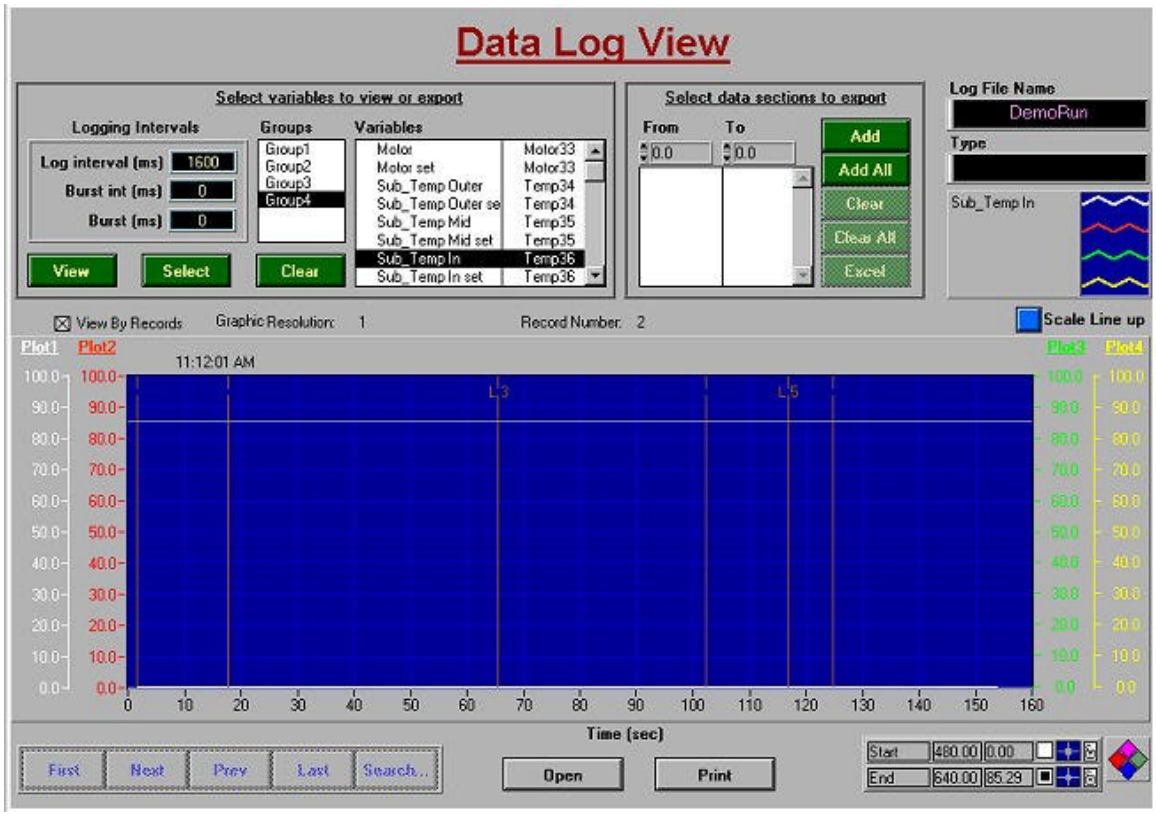


Figure 17.1. Data View Screen

Table 17.1. Data View Screen Functions

Item	Function/Purpose
Open Button	This button opens the selected data log file. When this button is clicked, **Open File** dialog box appears. Then, you may select the file of interest and click **Open** to open it.
Variable Selection Box	All the variables that were logged into the currently open data file are displayed in this box. In order to find the desired variable in the list, it is necessary to select the group that contains the desired variable.
Logging Intervals	Lists the data logging intervals as defined in the Data Logging Configuration screen. *Log Interval* - the frequency of sampling during a recipe run (# of samples taken per millisecond). *Burst int (interval)* - the frequency samples are recorded at the critical layer transition time. *Burst (time)* - the time period during which the frequency samples were generated.
View Button	Plots the variables, selected for viewing, on the graph.
Select Button	Selects the variables to be plotted on the graph. Highlight the desired variable in the list, then click on Select button. A check mark will appear next to this variable name. Variables can be selected one at a time through this technique.
Clear Button	Clears or deselects the highlighted variable that has been previously selected (as denoted with a check mark next to the variable name in the list).
Search Button	This button allows searching for a data record by a particular layer number or layering elapsed time.

Table 17.1. Data View Screen Functions - Continued

Item	Function/Purpose
Record Number Label	Lists the record number that is currently displayed as the record in the middle of the graph. For example, if Record Number: 2 is displayed, record number 1 precedes it on left side of the graph and record number 3 is located on the right side of the graph.
Data Section Selection Box	This box enables the User to select the variable values that were logged within the time period between the times defined in **From** and **To** boxes.
Add and Add All Buttons	**Add** - selects data points that lie within the time period established in the **From** and **To** boxes. The selected values are the values of the variables that were previously selected from the variable list in Variable Selection box. It is used to select the data range to export to excel. **Add All** - selects variable values for the entire run period (not for the defined time interval like the **Add** button). The selected data points are the values of the variables that were previously selected from the variable list in Variable Selection box. Automatically selects all data points to be exported to excel.
Print Button	Prints what is currently displayed on the screen (it is similar to performing the standard Print Screen operation).

17.2 OPENING DATA FILES

Each run may have several data files associated with it. They all have ".dat" extension and are stored in *C:\emcore\Datalog\data\Run ID* directory. However, it's not necessary to open each individual data file in order to view the logged data for that run. Each run has its own Custom Pattern file which, when selected, loads the entire run's data files onto Data View screen. This file has a name identical to a run ID name and ".hed" extension. Thus, if you wish to open the data files for any run, select this run's Custom Pattern ".hed" file.

17.2.1 Go to **Screen 1** menu > **Data View**.

17.2.2 Click on the **Open** button. A **File Open** dialog box will appear.

17.2.3 Click on the file that you want to view and then click on the **Open** button. The file name will appear in the **Log File Name** box. The data readback type (**Setpoint & Readback**; **Deviation**; or **Readback Only**) selected in the *Data Logging Configuration* Screen will be displayed in the **Type** box. The **Groups** box will list the groups of variables that belong to this data file. The **Variables** box will list the variables that belong to a currently highlighted group.

NOTE: Y axis values represent absolute values of the variable selected and the X axis values represent time.

17.3 FINDING DATA RECORDS

Each data file contains records for the variables selected for logging in the *Data Logging Configuration* screen. Each record consists of 100 data points.

The following buttons in the *Data View* screen allow the User to view different records of a data file.

17.3.1 **First** - Brings User to the first data record in the data file.

17.3.2 **Next** - Brings User to the next record sequentially from the record currently displayed.

17.3.3 **Prev** - Brings User to the previous record in sequence from the record that is currently displayed.

17.3.4 **Last** - Brings User to the last record of the data file.

NOTE: The **First**, **Next**, **Prev** and **Search** buttons will be grayed out if the data file selected can display all of the records (3 or less) on one graph).

17.4 SEARCHING DATA RECORDS BY LAYER NUMBER OR RUN TIME

Users can search for a data record by a particular layer number or time elapsed from start of the run.

17.4.1 Go to the **Screen 1** menu > **Data View**.

17.4.2 Click on the **Search** button.

17.4.3 Click on the black down arrow in the **Search By** box and choose the des ired search function.

17.4.4 To search by time, enter the time you are searching for and click the **OK** button.

17.4.5 To search by layer, enter the layer number you are searching for and click the **OK** button.

NOTE: The **Search** button will be grayed out if the data file selected can display the entire records (3 or less) on one graph).

17.5 SELECTING VARIABLES TO VIEW

17.5.1 Go to the **Screen 1** menu > **Data View**.

17.5.2 Open a data file (see paragraph 17.2).

17.5.3 Highlight the group where the variables you wish to view are located. If you are not sure where the desired variables are located, click on any particular group and its associated variables will appear in the variables box to the right. Keep checking the groups' variable listings until you find the variables you're interested in.

17.5.4 Either hold the **Shift** key down and highlight the variables that you wish to view (if listed in sequence) or choose individual variables by highlighting the variable and then clicking on the *Select* button.

17.5.5 Click on the **View** button, which will bring you to the first record in the data file.

NOTE: Only variables from the same group may be viewed simultaneously. And maximum of four can be view at one time.

NOTE: Once variables have been selected to view, they can be removed from the viewing list by highlighting the checked variable in the variable list and clicking on the **Clear** button.

17.6 EXPORTING DATA TO EXCEL

NOTE: Data can be exported to Excel without viewing it.

17.6.1 Go to the **Screen 1** menu > **Data View**.

17.6.2 Open a data file (see paragraph 17.2).

17.6.3 Highlight the group and variable to be exported in the **Select Variables to View or Export** section and click on the **Select** button. Continue to highlight and select all of the desired variables.

17.6.4 If you are interested in viewing variables for a specific time period, rather than for the entire run period, in the **Select Data Sections to Export** box, enter the time interval of interest in the **From** and **To** columns and click the **Add** button.

17.6.5 If you are interested in viewing variables for the entire run period, click the **Add All** button.

NOTE: It is not necessary to enter times in the **From** and **To** columns.

17.6.6 Once the list of variables to export to Excel has been added, click on the *Excel* button.

Section 18 Report Generating

This section contains the following procedures:

18.1 *GENERATING A REPORT*
18.2 *SELECTING LAYERS TO VIEW IN A REPORT*
18.3 *STANDARD DEVIATION EQUATION FOR REPORTS*

18.1 GENERATING A REPORT

18.1.1 To generate a report, click on the **Report** button on the EpiVIEW Main Menu bar. This will open the *Report Generator* window (Figure 18.1).

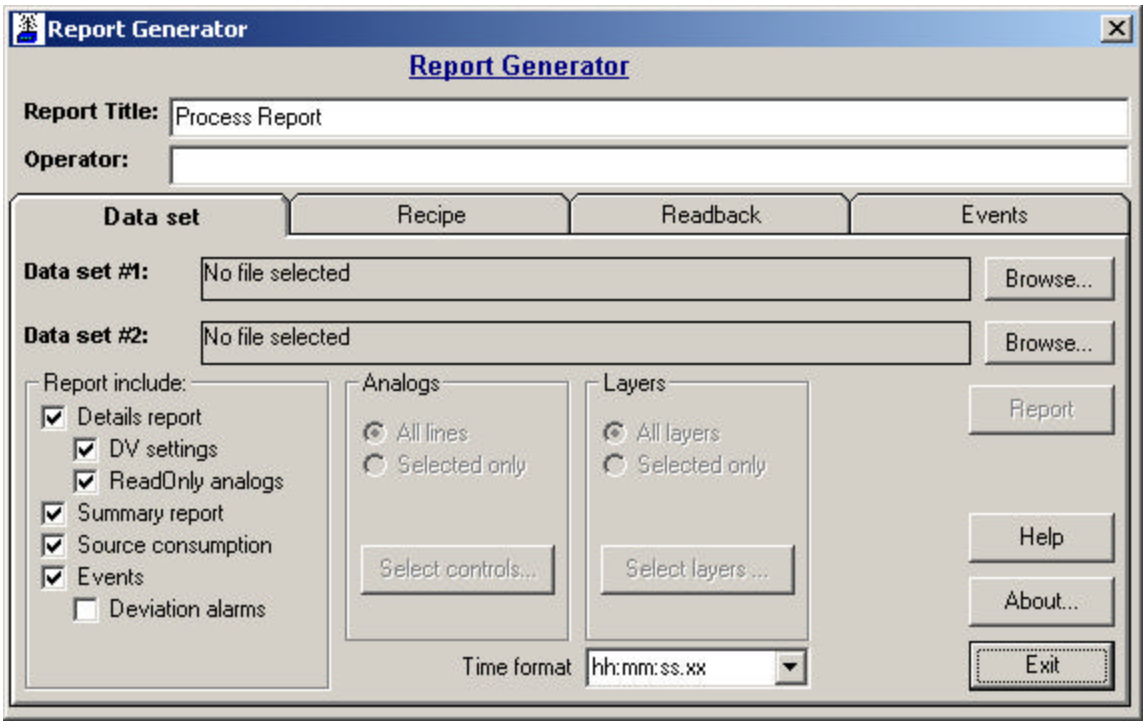


Figure 18.1. Report Generator Window

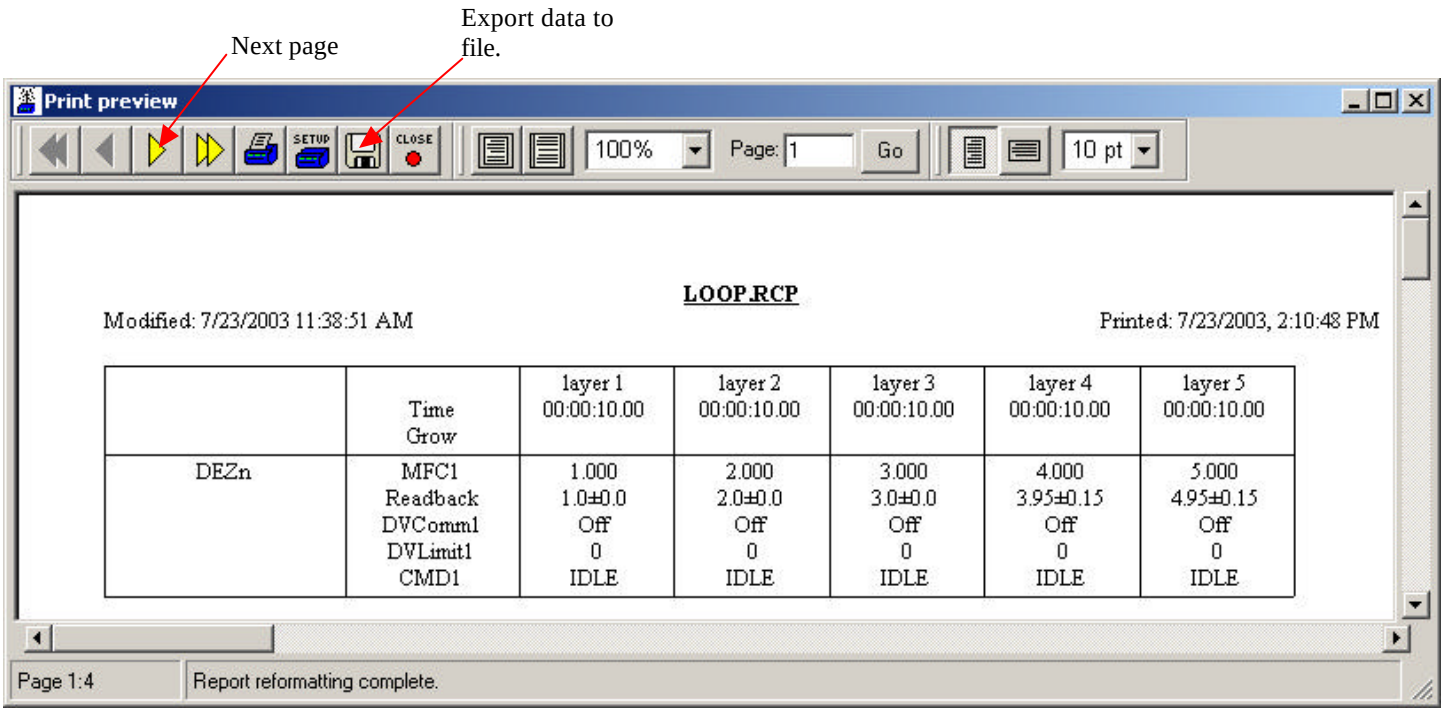
18.1.2 Click on the **Browse** button.

18.1.3 Click on the associated readback file. This will generate the controls in the recipe on the *Report Generator* screen. If the data was collected using the AutoSave feature, then the report program will attempt to find the recipe automatically based on the recipe name. It for whatever reason it could not find the recipe, it will prompt the user to find it in the *c:\emcore\recipes* directory.

18.1.4 Since the *Report Generator* will always default to including all layers of the recipe in the report, it may be necessary to select only those layers the User would like included in the report.

18.1.5 Select appropriate parameters that need to be included in the report from the **Report Include** section.

18.1.6 Press **Report** button.



	Time Grow	layer 1 00:00:10.00	layer 2 00:00:10.00	layer 3 00:00:10.00	layer 4 00:00:10.00	layer 5 00:00:10.00
DEZn	MFC1 Readback DVComm1 DVLimit1 CMD1	1.000 1.0±0.0 Off 0 IDLE	2.000 2.0±0.0 Off 0 IDLE	3.000 3.0±0.0 Off 0 IDLE	4.000 3.95±0.15 Off 0 IDLE	5.000 4.95±0.15 Off 0 IDLE

Figure 18.2. Report Printout Fragment

NOTE: For every analog control in every layer, the report lists the setpoint value, the average reading value and the standard deviation, command (if applicable), deviation value and command.

13.1.6 Once the report is generated it can be printer from by clicking on the **Print** button, or it can also be saved in tab separated text format. The default location for the text rundata reports is *c:\emcore\rundata\reports*.

18.2 SELECTING LAYERS TO VIEW IN A REPORT

18.2.1 Default Viewing

The default view is set to view ALL layers in a report. "ALL" will appear in the *Selected Layers* box when the Report Generator screen is prompted.

18.2.2 Viewing Selected Layers

Since the default is set to view ALL layers, it will be necessary to remove layers that are not needed for the report. To accomplish that, perform the following steps:

18.2.2.1 Click on the **Select Layers** button, which will generate the *Select Layers* window.

18.2.2.2 Highlight the layer to remove from the **Layers Selected** list and click the **Remove** button. (All layers listed in the **Layers In Recipe** list column will not be contained in the Report.)

18.2.2.3 Click the **OK** button to accept the changes and exit the screen.

18.3 STANDARD DEVIATION EQUATION FOR REPORTS

The following formulas are used to calculate the standard deviation for every analog signal measured during a run.

$$? \quad ? \sqrt{\frac{\sum_{i?1}^{n} x_i^2 ? n(\overline{x})^2}{n ? 1}}$$

$$\overline{x} \quad ? \frac{1}{n} \sum_{i?1}^{n} x_i$$

where $\overline{x}$ is an arithmetic mean value of analog signal readings over the duration of a layer, n is a total number of readings over the duration of a layer and x_i is a value of a single reading.

18.4 OTHER FEATURES OF THE REPORT

EpiVIEW 21 introduced new version of the report generator that in addition to supporting existing features and format it also included feature like:

1) Recipe compare

2) Run Data compare

3) Event file report

18.4.1 Performing Recipe compare.

Recipe compare can be accessed by starting the ReportPlus and clicking on the **Recipe** tab. Please refer to Figure 18.1 and the procedure below for details:

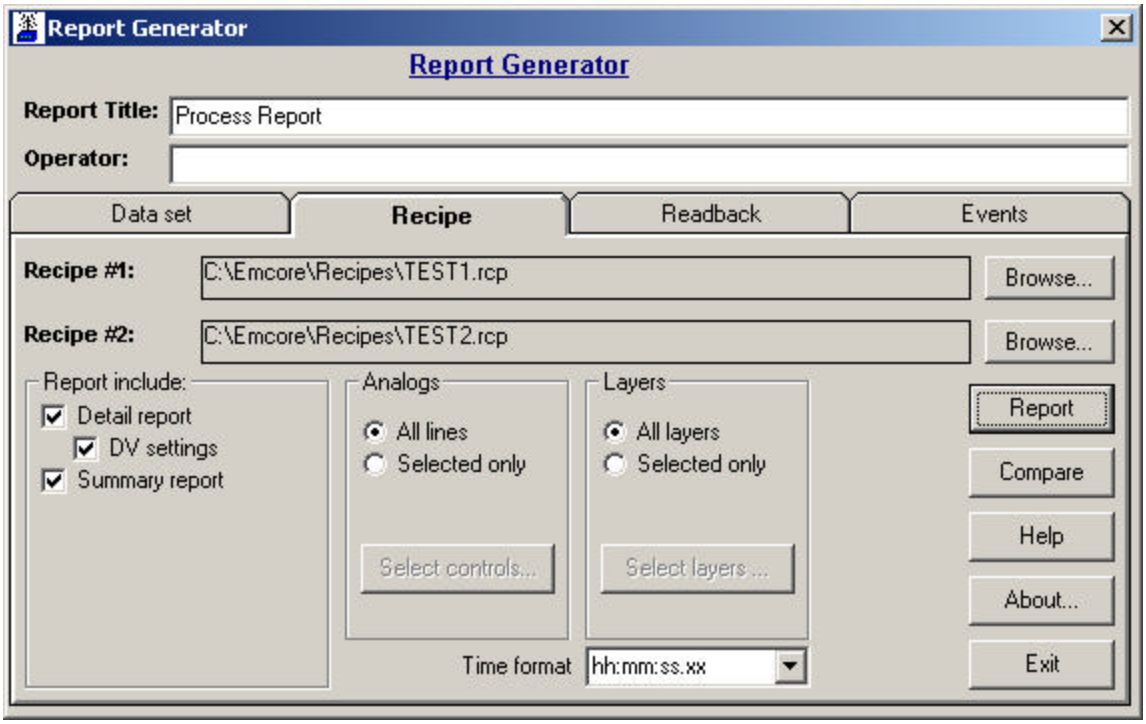


Figure 18.3. Report Generator Recipe Tab Menu

18.4.1.1 Select the first recipe by clicking on the top **Browse…** button.

18.4.1.2 Select second recipe by clicking on the bottom **Browse…** button.

18.4.1.3 Click on **Compare** button to obtain the comparison report. This report has the same interface and functionality as the standard rundata report, allowing the user to either print it or save it to text file. The report will be able to pick up things like:

- Missing control lines
- Missing layers
- Different values for all cells, including the time.

NOTE: The recipe comparison will work only for recipes that were designed on the same system. The exception may be when the recipes come from two identical systems.

NOTE: This screen can also be used to perform the recipe report by pressing the **Report** button. In that case the report will be generated only for the top recipe.

18.4.2 Performing Rundata comparison.

The procedure is very simple and similar to the recipe comparison. To access this feature start the ReportPlus and click on the **RunData** tab. Procedure details and Figure 18.4 are shown below:

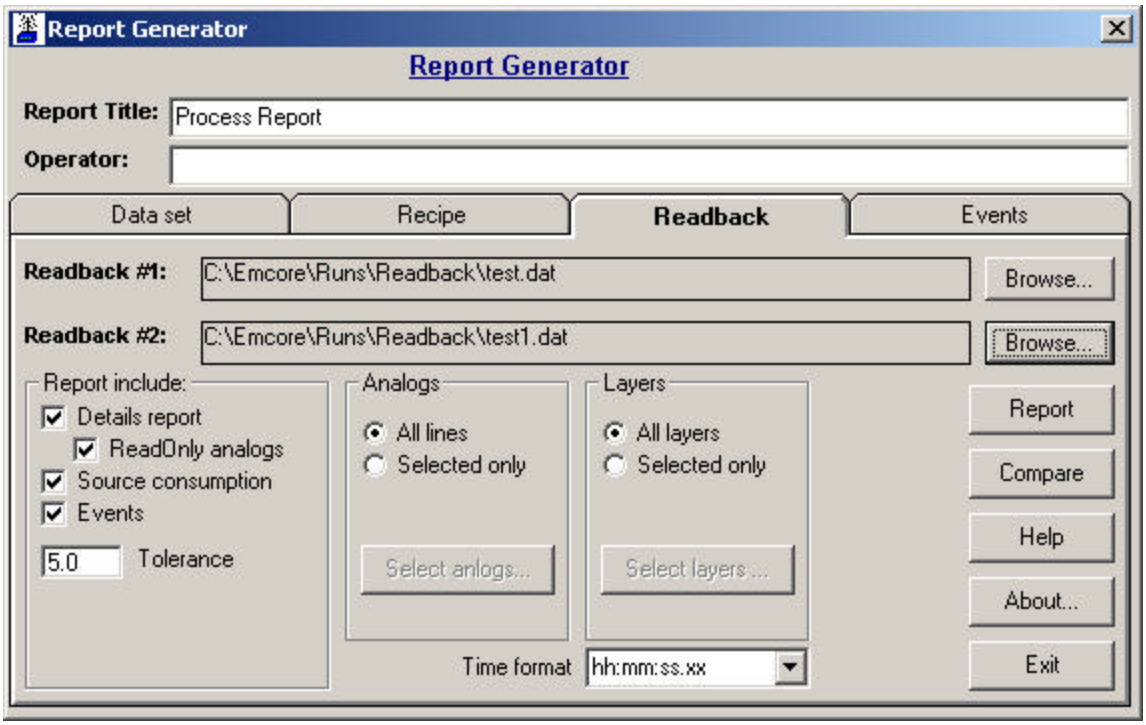


Figure 18.4. Report Generator Readback Tab Menu

18.4.2.1 Select the first rundata file by clicking on the top **Browse…** button.

18.4.2.2 Select second rundata file by clicking on the bottom **Browse…** button.

Click on **Compare** button to obtain the comparison report. This report has the same interface and functionality as the standard rundata report, allowing the user to either print it or save it to text file. The report will be able to pick up things like:

18.4.3 Generating Events report.

The last report that can be generated allows the user to perform the report on the system event file(s) that is either part of the standard run data set or the separate event file that was saved manually through the *Event* screen. Figure 18.5 below shows the screen shot:

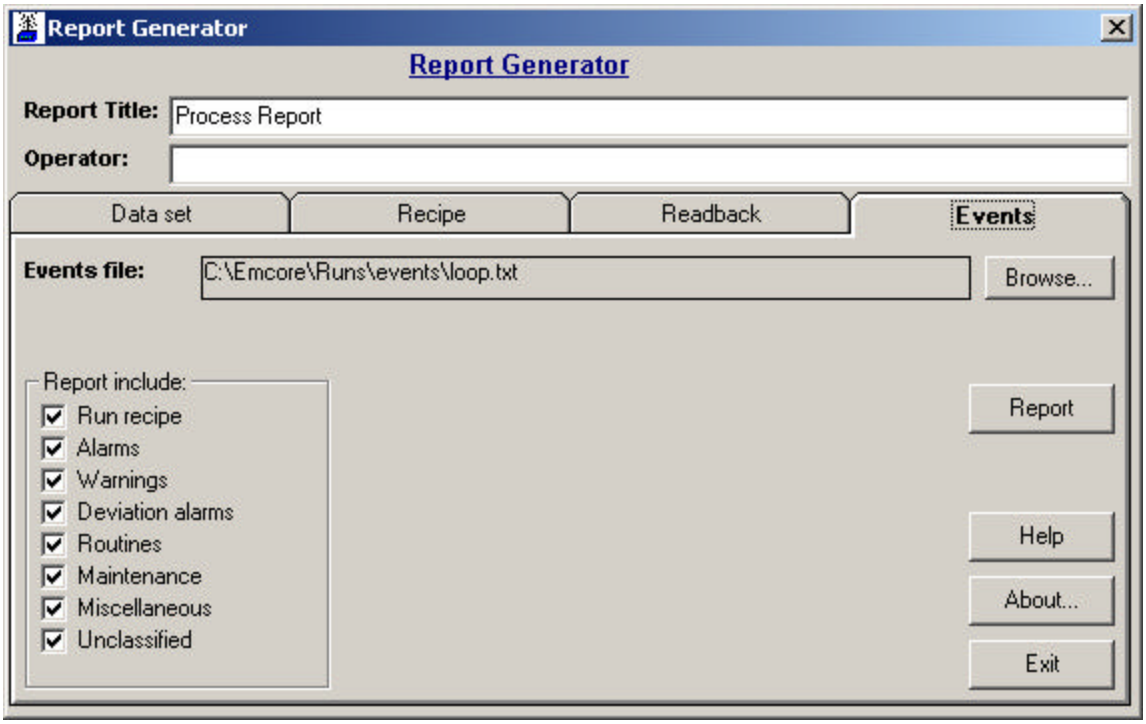


Figure 18.5. Report Generator Events Tab Menu

18.4.3.1 Select the event file by clicking on **Browse…** button. Note that for standard data sets this file will be automatically loaded when the read back file is selected.

18.4.3.2 Select types of events that need to be viewed on the *Report Include* panel.

18.4.3.3 Press **Report** button to generated report. Just like with the standard report, it can be prompted from the report preview as well as the file export capability is there for use too.

Section 19 File Zip / Unzip

This section contains the following procedures

19.1 *ZIPPING FILES*
19.2 *UNZIPPING FILES*
19.3 *DELETING ZIPPED FILES*

The File Zip/Unzip screen allows the User to compress data files to conserve hard disk storage space and decompress them for viewing and analysis.

19.1 ZIPPING FILES

19.1.1 Click **Options** menu button on Main Menu bar > choose **Zip/Unzip**. *File Zip/Unzip* screen (Figure 19.1) will appear.

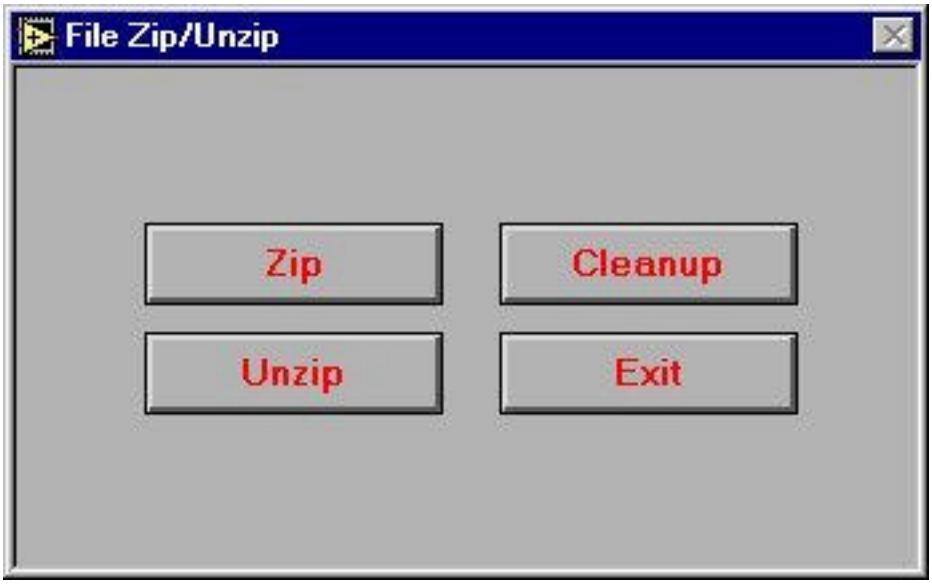


Figure 19.1. File Zip/Unzip Screen

19.1.2 Click on the **Zip** button. A message will appear asking if you want to "*Delete original files after zipping*?" Depending on your preference, click on the **Yes** button or the **No** button.

19.1.3 A dialog box containing *Select Files* box (Figure 19.2) will appear. This box contains a list of completed runs. Each run may have several data files associated with it. They all are stored in *C:\emcore\Datalog\data\Run ID* directory. When any particular run name is selected from the list, all data files associated with this run will automatically be selected for zipping. To select a run to zip, highlight its name in the *Select Files* box and click on the **OK** button. A message will appear stating "*Compressing Files*." The data files for this run which have ".dat" extension will be converted to zip files with ".zip" extension. Those zip files will be placed into the same *C:\emcore\Datalog\data\Run ID* directory.

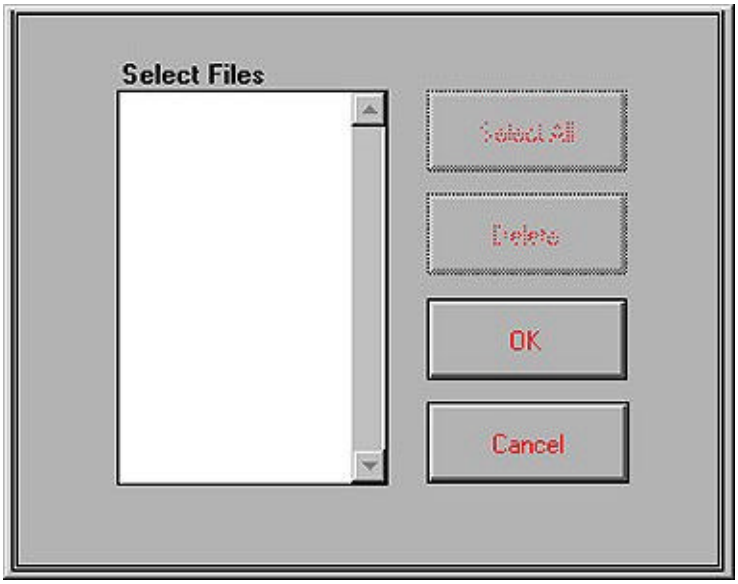


Figure 19.2. File Selection Dialog Box

19.2 UNZIPPING FILES

19.2.1 Click **Options** menu button on Main Menu bar > choose **Zip/Unzip**. *File Zip/Unzip* screen (Figure 19.1) will appear.

19.2.2 Click on the **UnZip** button.

19.2.3 A dialog box containing runs to select for unzipping will appear. To select the run to unzip, highlight its name in the *Select Files* box and click on the **OK** button. A message will appear stating "*Decompressing Files*." The zip files for this run which have ".zip" extension will be converted back to data files with ".dat" extension. Those data files will be placed back into *C:\emcore\Datalog\data\Run ID* directory.

19.3 DELETING ZIPPED FILES

19.3.1 Click **Options** menu button on Main Menu bar > choose **Zip/Unzip**. *File Zip/Unzip* screen (Figure 19.1) will appear.

19.3.2 Click on the **Cleanup** button. A box with the list of zipped runs will appear. Select the run that you want to delete by highlighting it.

19.3.3 Click on the **Delete** button.

19.3.4 To delete all of the zipped runs, click on the **Select All** button and click on the **Delete** button.

Section 20 EpiVIEW Shortcut Keys

20.1 SCREEN ACCESS SHORTCUT KEYES

The following Shortcut Keys can be used to navigate though the various EpiVIEW screens:

Esc:	Previous Screen
Home:	Screen1/Screen2
PageDown:	System Status
F1:	Toggle between recipe and other screens
F2:	Analog Display
F3:	Data Logging Screen
F4:	Data View Screen
F5:	Source Monitor Screen
F6:	Alarm Screen
F7:	Warning Screen
F8:	Event Logging Screen
F9:	Transfer screen on Enterprise systems.
F11:	Change Password
F12:	On-Line Help Screen

20.2 RECIPE EDIT SHORTCUT KEYS

The following Shortcut Keys can be used when edit a recipe on the EpiVIEW Recipe screen:

Ctrl A:	Refresh screen
Ctrl C:	Copy Layer(s)
Ctrl D:	Full/Summary form
Ctrl E:	Find the last layer
Ctrl F:	Find the first layer
Ctrl I:	Insert a layer or a control
Ctrl K:	Condensed view toggle
Ctrl L:	Fill Left
Ctrl N:	New recipe
Ctrl O:	Open existing recipe
Ctrl P:	Print Recipe
Ctrl R:	Fill Right
Ctrl S:	Save Recipe
Ctrl T:	Add a control
Ctrl V:	Paste a layer(s), control(s) or block of data
Ctrl X:	Cut selected layer(s) or control
Ctrl Y:	Add a layer
Ctrl Z:	Undo
Del:	Delete selected layers(s) or a control
Alt S:	Back to LabVIEW/Exit Recipe