USING THE SCREEN BUILDER PROGRAM

INTRODUCTION

The Screen Builder program allows you to create and modify files with the extension "MY". "MY" files, along with "MAP" files and "LAB" files, define dialog boxes for use in CHEMCAD. Dialog boxes allow users to set variables for unit operations. These dialogs are used with all types of unit operations (called "unitops"). Using the Screen Builder program, users may create custom dialogs to be used with calculator units, excel units, or user-added units. This document is to give you an overview into how the Screen Builder program is used. This document assumes a basic understanding of Windows and of Visual Programming concepts such as objects and properties, as well as a firm understanding of simulation in CHEMCAD.

Screen Builder is a separate program from CHEMCAD. To open this program, go to the "START" button, then to "Programs" then to "CHEMCAD" and finally to "Utilities". Select the "Screen Builder" program. You may also start this program from CHEMCAD, go to the "Edit" menu, and select "Screen Builder" and it will open the Screen Builder program.

HOW UNIT OPERATION DIALOGS WORK:

Unit operations in flowsheets usually require operating parameters to run, like "Operating Pressure" for example. These parameters are entered into dialog screens. The dialog screen stores the parameters in an array for each unit operation. The arrays are passed to the calculation block when the unitop is run.
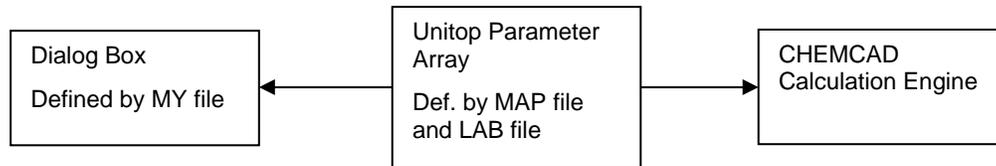
As you can see data transfer goes in both directions, meaning that calculated results for a unit are passed to the dialog in the same way that data is passed from the dialog into CHEMCAD. The Unitop Parameter Array performs any data conversions necessary, so that you might enter a value of 100 degrees Fahrenheit in a dialog, but the program sees a value of 559.67 degrees Rankine.

A dialog box (or screen) is used by CHEMCAD to set operating parameters for unit operations in a flowsheet. Dialog boxes are stored in three separate files. Files with the extension "MY" define the visual aspect of the dialog. Files with extension "MAP" define the data connections from the dialog box back to the unitop array. Files with the extension "LAB" define report labels and formatting. These files are typically stored either the program directory or the job directory.

All unit operations in CHEMCAD use this same dialog box structure. This means you have over fifty examples of unitop dialog boxes to draw from. All the standard dialog files are stored in the program directory (typically "C:\CC5") as read-only files.

IMPORTANT: Do not edit the files in your CC5 directory which are set to read-only, editing these files may affect the performance of your simulator. If you accidentally do this, reinstall CHEMCAD to replace the files. If you wish to look at the files, make a copy of them.

Creating new dialog boxes is a matter of:

- Designing the Unitop Parameter Array

- Creating a "MAP" file and "LAB" file based on the Array, Using Notepad

- Creating an "MY" file based on the "MAP" file, Using the Screen Builder

In this manual, we will get started with an example from CHEMCAD, the mixer dialog box. Then we will get started building a unitop parameter array for a very simple dialog. We will introduce you to the various objects in a dialog box, and give some overall design guidelines. We will then discuss more complex topics of screen editing, such as VB scripting.

THE MIXER DIALOG BOX: (AN EXAMPLE)

Like all other dialog boxes, the mixer dialog is composed of two files, a "MY" file and a "MAP" file. In this case the file names are "MIXE.MY", "MIXE.MAP", and "MIXE.LAB". "MIXE.MY" may be viewed and edited in the Screen Builder program; "MIXE.MAP" and "MIXE.LAB" may be opened by any text editor (such as Notepad or Wordpad).
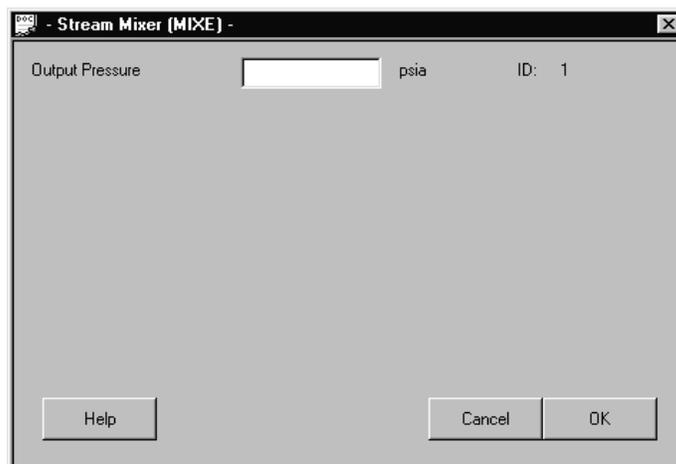
The Mixer dialog box

In CHEMCAD, the dialog appears as above. In this dialog, users may set the outlet pressure of the mixer. The "MY" file (which defines the appearance of the dialog box) assigns any value typed in this filed to a variable. The MIXE.MAP file defines that variable to be the first variable in the unitop array. CHEMCAD reads the values stored in the unitop array when running the simulation. We are going to examine this screen in detail by examining the "MAP" file and the "MY" file.

THE MIXE.MAP FILE

THE MIXE.MAP file defines the variables in the unit operation array which are passed back and forth from the dialog to CHEMCAD, and vice versa. THE MIXE.MAP file is a text file, like all "MAP" files, it may be viewed with Notepad.

```
MIXER

DICTIONARY      8
OPRESS          1       FLOAT   PRES
FRSTRM          2       FLOAT           LONG
PSTRM1          3       FLOAT           LONG
PSTRM2          4       FLOAT           LONG
PSTRM3          5       FLOAT           LONG
PSTRM4          6       FLOAT           LONG
PSTRM5          7       FLOAT           LONG
PHASE           8       FLOAT           LONG
→
```

The MIXE.MAP file

The structure of this file is as follows:

The first line is the name of the unitop, it is a MIXER.

The line "DICTIONARY 8" defines the array to have 8 members.

The next 8 lines define the members of the array. The first line describes a variable "OPRESS", which is the first element in the array, a floating-point double precision number, and it has units of pressure. A complete list of units is given in Appendix A. The second line describes a variable "FRSTRM", the second element in the array; it is a floating-point long integer type, with no engineering units. All of this will be described at greater length later. For now, just accept that this file defines an array of 8 numbers, the first of which is a floating-point number in the units of pressure.

Normally the mixer unitop only uses the first parameter "OPRESS" or operating pressure. All of the other variables are only used in AUTOCALC simulations or in electrolyte simulations, so they are normally hidden from view in the dialog box.

THE $MIXE.LAB FILE

The $MIXE.LAB file defines the report shown when you select "Results\UnitOps" in CHEMCAD. The file format is fixed width text:

```
Pos. Unit Type Fmat Req. Prn0    Label
   1    4    0    0    0    0    Output Pressure
   2    0    1    0    0    0    Back-calc Flow,  input #:
   3    0    1    0    0    0    Back-calc Press, input #:
   4    0    1    0    0    0    Back-calc Press, input #:
   5    0    1    0    0    0    Back-calc Press, input #:
   6    0    1    0    0    0    Back-calc Press, input #:
   7  0  1  0  0  0  Back-calc Press, input #:
   8  0  1  0  0  0  Optional output phase:
```

This file is organized into columns and rows. Each row under the first row defines an entry in the report. "Pos." refers to the data's position in the Unitop Array. "Unit" determines the engineering units. "Type" and "Fmat" determine how the number is displayed. Type=0, Fmat=0 displays a floating point number, Type=1 Fmat=0 displays an integer. "Req." and "Prn0" are for internal use only and should be left at 0 in your LAB files. "Label" shows the text label given on the report.

The most important thing to remember about the LAB file is to make sure the "Unit" entries correspond with the units displayed in the MAP file. A complete list of units is given in Appendix A.

THE MIXE.MY FILE

Installed with CHEMCAD are a number of utility programs used in conjunction with CHEMCAD. One of these, the Screen Builder program, allows users to edit "MY" files. To start the Screen Builder, either click on the "Screen Builder" item in the CHEMCAD "edit" menu, or start the Screen Builder program from the "Start Menu\Programs\CHEMCAD\Utilities" menu of your computer.

To open an existing MY file, copy the file from C:\CC5 to any temporary area and unmark the "Read Only" property of the file. This will allow us to edit the file. Choose the "open" command from the "File" menu and select the "MIXE.MY" file from your temporary folder.
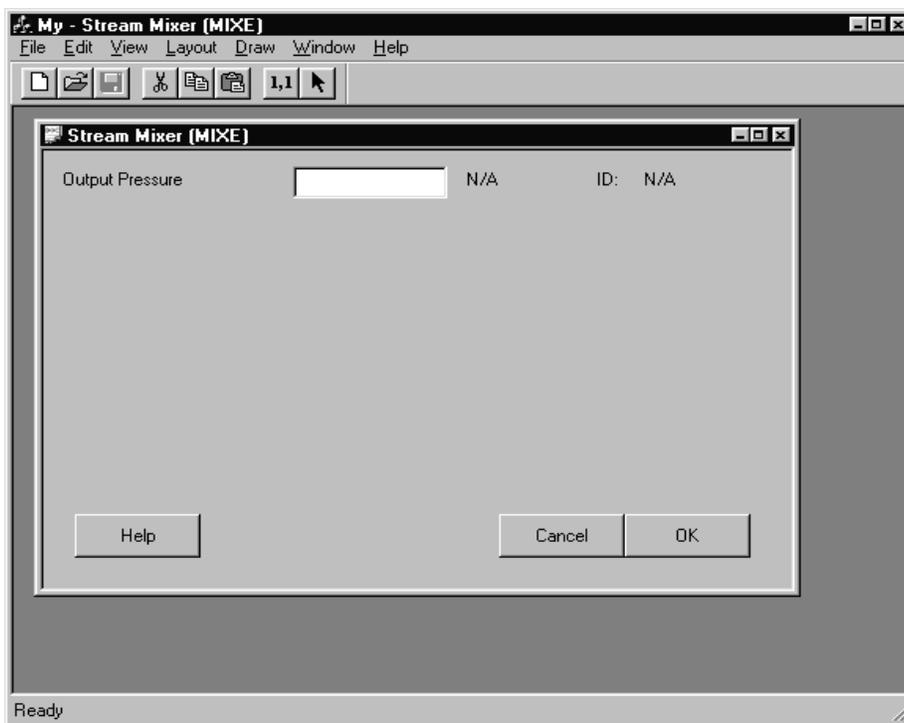
Run mode of Screen Builder

This displays the screen in run mode. Run mode means all visual basic scripting is active, so the screen performs much like it will in CHEMCAD. In order edit the screen, we must enter Edit mode. To do this, go to the "Layout" menu and select "Edit". The screen will change appearance to indicate you may now edit the dialog box:

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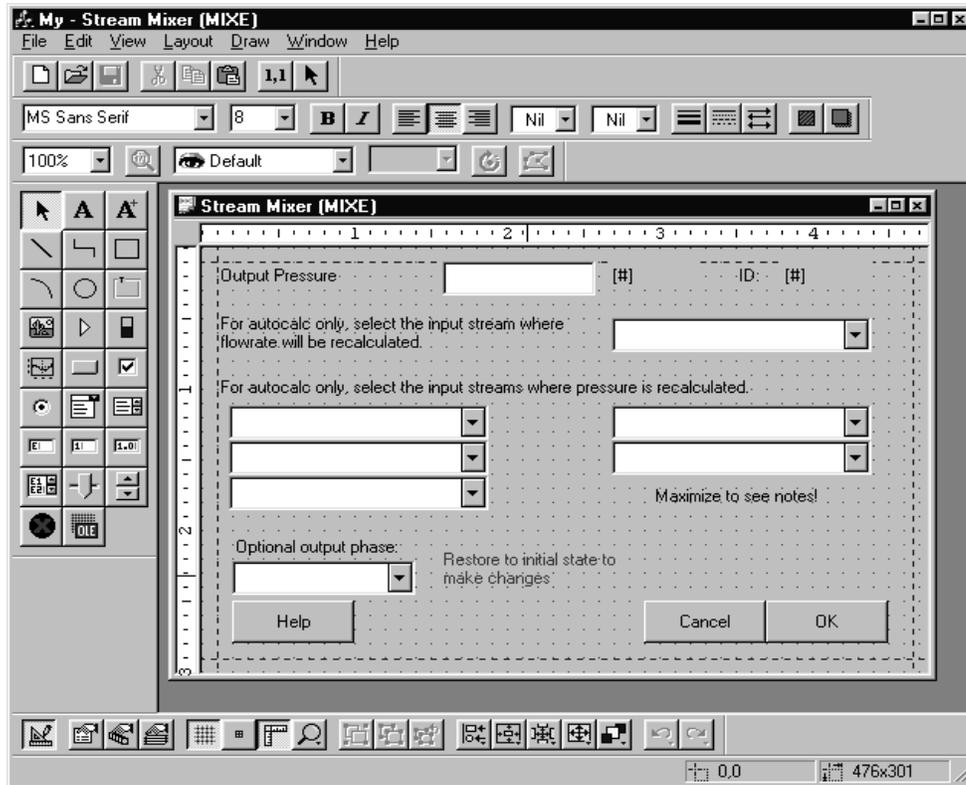
Editing mode of Screen Builder

Where did all that come from? Most of the objects on this dialog are hidden by VBScripts. VBScripts (Visual Basic Script) are simple visual basic code attached to the controls which can do many things, including making the object visible or invisible. Visual Basic Script is discussed later in detail.

OBJECTS, TEXT, AND CONTROLS

There's a lot on this screen, so lets focus on the top section first:

Upper part of MIXE dialog

This dialog is made of many types of objects. Each object has it's own set of properties and code. In the above section, you can find the following objects

Object Name	Object Type	Sample property of Object
Text1	Text	Text= "Operating Pressure"
EditDblBox1	Edit Double Box	ValueID=Double001
TextVar1	Text Variable	Value Eq=<Pres Str>
Text4	Text	Text="ID: "
TextVar2	Text Variable	Value Eq=<ID>

All of these objects can be selected, moved, shrunk, etc. using the mouse. Double clicking on an object brings up a list of all of its properties.

Basic object descriptions:

- Text objects display text; they are used for labels, like the "Operating Pressure" label above.

- TextVar objects are text which depend upon CHEMCAD. In the above screen, TextVar1 displays the current pressure units on the flowsheet. TextVar2 displays the unitop ID number.

- Edit Double Box objects are able to store floating-point double precision numbers and pass them to CHEMCAD through the unitop array. EditDblBox1 is set to pass its data through the first member of the array. This is identified in the Screen Builder as the valueID=Double001.
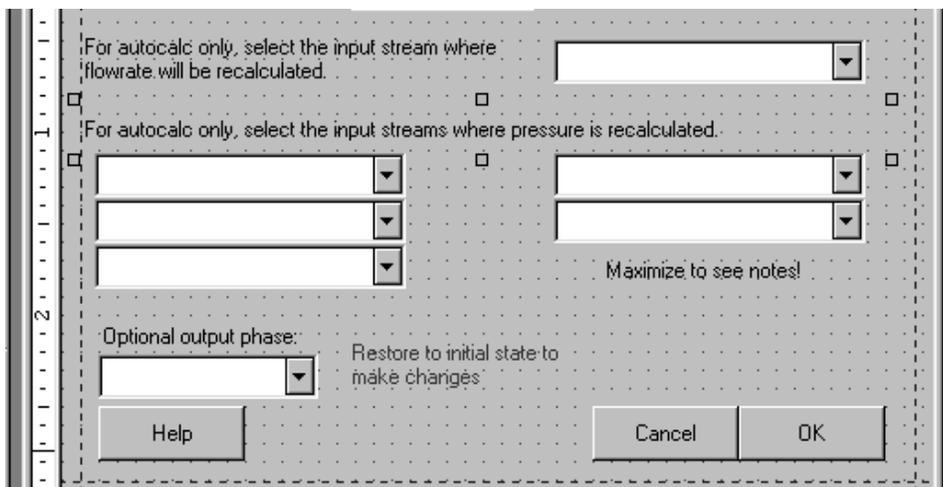
Lower part of MIXE dialog

In the middle section of the screen are many objects which vanish during normal runtime. These controls are only used under certain conditions. Each object has VB script instructing it to be visible only if AUTOCALC is on. A partial list of objects in this section would include:

Object Name	Object Type	Sample property of Object
Text6	Text	Text= "For autocalc only, select the input stream(…)"
ComboBox2	ComboBox	ValueID=long002
Button2	Button	ButtonType= OK button

ComboBox is an object, which allows users to pick from a list, and it stores the long integer result in the unitop array.

The **[OK]** button is a special button, which instructs the dialog box to close and save all data in the unitop array. The Cancel button is next, and will also close the dialog, but will not save changes to the array.

Text objects we've seen before, but this one has some Vbscript attached to it. Double click on the Text6 object to bring up its properties.
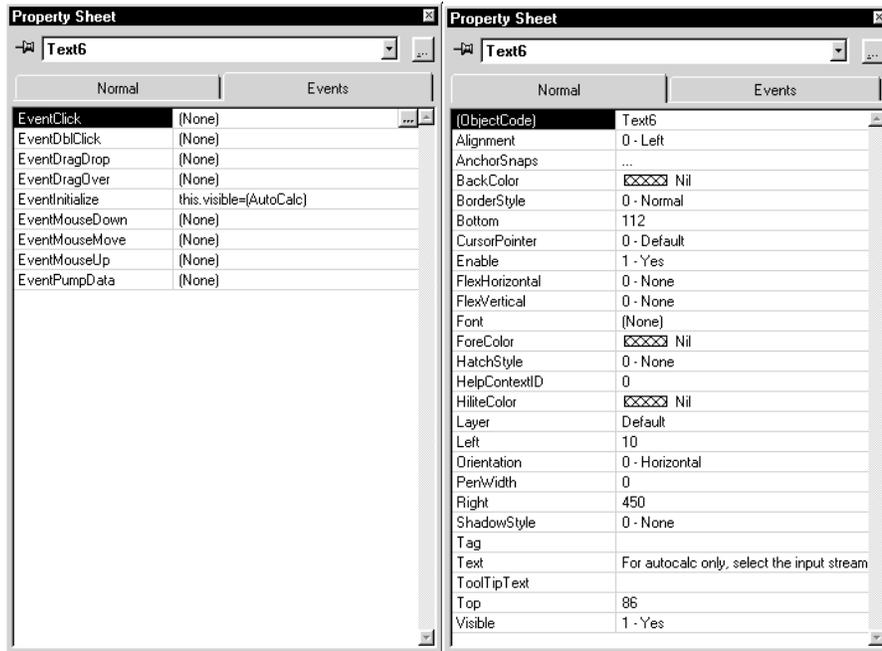
Properties and Events

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Notice the "Events" tab on the right. Events show different sections of Vbscript, which run under different conditions. The conditions for which scripts may be written are:

- EventClick: Mouse is left clicked over object

- EventDblClick: Mouse is double left clicked over object

- EventDrapDrop: Object is dragged over another object and released

- EventDragOver: Object is dragged over another object

- EventInitialize: Dialog is opened

- EventMouseDown: Left mouse button is held down

- EventMouseMove: Mouse is moved

- EventMouseUp: Mouse left button is released

- EventPumpData: some other piece of code calls the method "TheView.PumpData"

For almost all dialogs in CHEMCAD, the only conditions used are "EventInitialize" or "EventPumpData".

Getting back to our example above, the "EventInitialize" for Text6 shows some code "this.visible=(AutoCalc)". This VBScript shows that the text6 text object will only be visible if AutoCalc is on. AutoCalc is a global variable set by CHEMCAD when in AUTOCALC mode.

Now lets review how these files all work together. Lets say a CHEMCAD user opens a mixer dialog to change its pressure:

1. The user double clicks on a mixer icon in CHEMCAD.

2. CHEMCAD finds the unit operation array, as defined by the "MIXE.MAP" file and then opens the "MIXE.MY" file.

3. "MIXE.MY" runs the scripts on all of its internal object's "EventInitialize" events, causing some of the objects to not be visible.

4. The user sees the mixer dialog on the screen, enters an operating pressure, and clicks the [OK] button.

5. The "MIXE.MY" screen saves the data in the unit operation array and closes itself.

BUILDING A SIMPLE DIALOG BOX

This step-by-step guide will help you create a very basic dialog box with a minimum of effort. The dialog we are going to build is called CALC, and a copy is provided in the CC5\EXAMPLES\DIALOGS directory for your reference. This dialog is for a simple mixer, without all the extras the MIXE files provide.
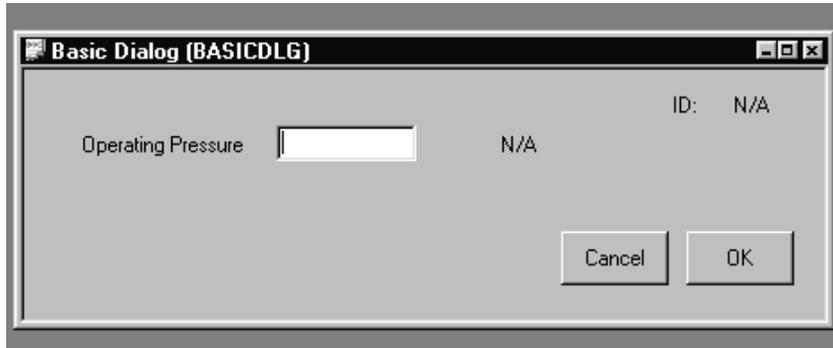
A Simple Dialog Box

To build this we must take the following steps:

- Define a MAP file

- Create a new MY file

- Edit the dialog

- Add objects to the dialog

- Test the dialog

Step 1: Define your MAP file.

The first thing the user must always do is identify the unitop array for this dialog. We do this by creating a MAP file. As we can see in the picture above, we have only one data entry field, "Operating Pressure". This will be a floating-point double precision number in the engineering units of pressure. Our MAP file is as follows:

```
BASICDLG

DICTIONARY       1
OPRESS           1         FLOAT    PRES
→
```

The "OPRESS" label is for our reference only, FLOAT defines a floating-point double precision number, and PRES indicates units of pressure.

Step 2: Create a new MY file

Start the Screen Builder program, either from the "Edit" menu in CHEMCAD or from the "Programs\CHEMCAD\Utilities" menu under the "Start" button.   Then, go to the "File" menu, select "New".
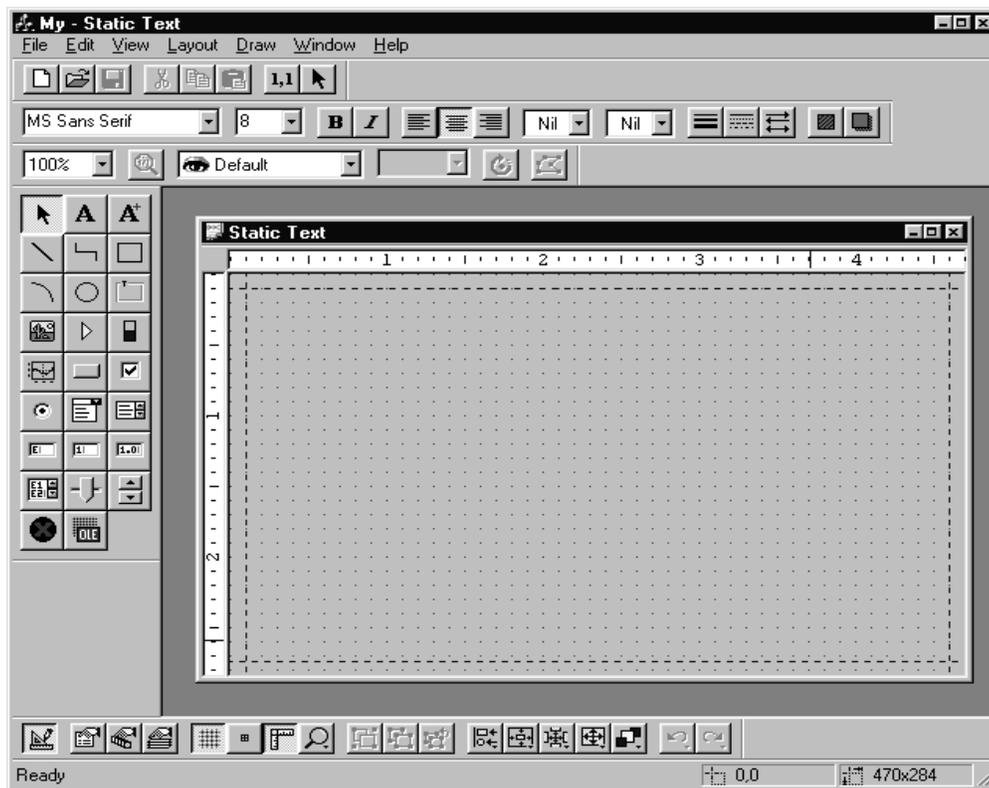
A new dialog in Screen Builder

This creates a new dialog in the Screen Builder program. As you can see, it is labeled "Static Text" and has no objects on it. We will move on to edit this dialog and add objects to it.

Step 3: Editing the dialog

Now we must make changes to the dialog's properties. Double click on the dialog to bring up the properties for TheFrame/TheView. We must change the "AutoRecord" Property to "2-Detach". This property controls how the dialog links to CHEMCAD, and it is the most important setting in your dialog. **If you do not set AutoRecord to Detach, your dialog will not work properly within CHEMCAD.**

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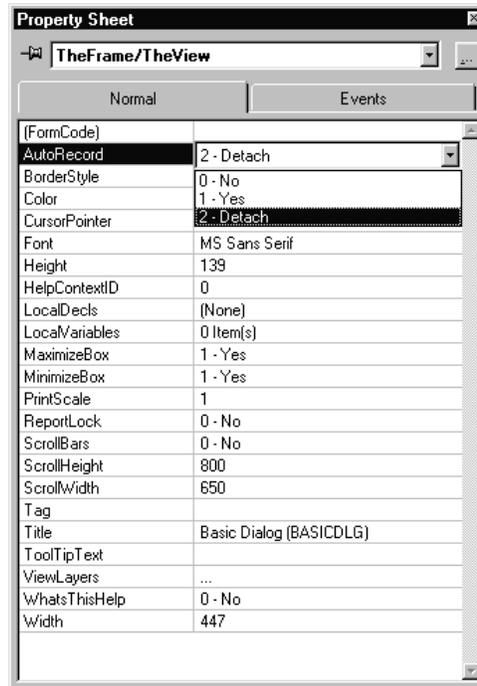
Setting the AutoRecord property

We can also change the title "Property" to "Basic Dialog (BASICDLG)". This title string is for the user's reference only; it is not used by CHEMCAD in any way.

Close the "Property Sheet" by clicking the small X in the upper right corner.

Step 4: Adding Objects to the Dialog

Now we need to add some objects to the dialog. To add a text box, click on the text button in the object toolbar (the letter "A"). Now draw a rectangle in the dialog screen. You have just created a new text object called text1.
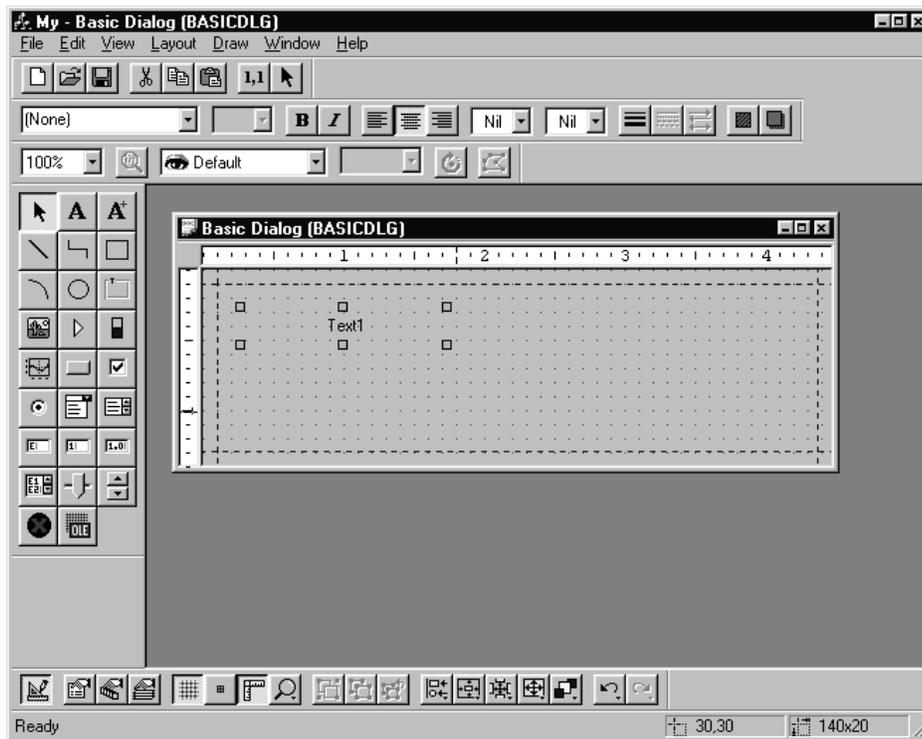
Creating a text object

Now we must change the text to "Operating Pressure". Double click on the text1object and change the text property to "Operating Pressure".

Now let's add a second text object to show the text "ID". This is done in the same way as the Text1 object.

We will need to add an EditDblBox object. The EditDblBox button is the 3rd button from the left in the 7th row down. Click this button and draw your EditDblBox in the same way as the text boxes. Change the "ValueID" property of your EditDblBox to "Double001"

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Property Sheet ⊠

⊣⊠ EditDblBox1 ▾ ⋯

Normal		Events	
Bottom	52		
CaseOrPassword	0 - None		
CursorPointer	0 - Default		
Enable	1 - Yes		
FlexHorizontal	0 - None		
FlexVertical	0 - None		
Font	(None)		
ForeColor	⊠⊠⊠⊠ Nil		
Group	0 - No		
HelpContextID	0		
HelpHotButton	0 - No		
Layer	Default		
Left	160		
MaximumEq	999999999999.0		
MinimumEq	-999999999999.0		
ReadOnly	0 - No		
Right	240		
Tabstop	1 - Yes		
Tag			
Text			
ToolTipText			
Top	30		
UseColors	1 - Yes		
ValueID	Double001		
Visible	1 - Yes		

Setting the EditDblBox properties

This instructs the dialog to send the data from this control into the first item in the unitop array. **Without this setting, there is no link between numbers entered and CHEMCAD.**

Now we will add a few text variables to pick up the pressure units and ID number. Text Variables appear on the palette as "A+" and are created just like text objects. Place one text variable to the right of your EditDblBox, another to the right of the text object "ID".
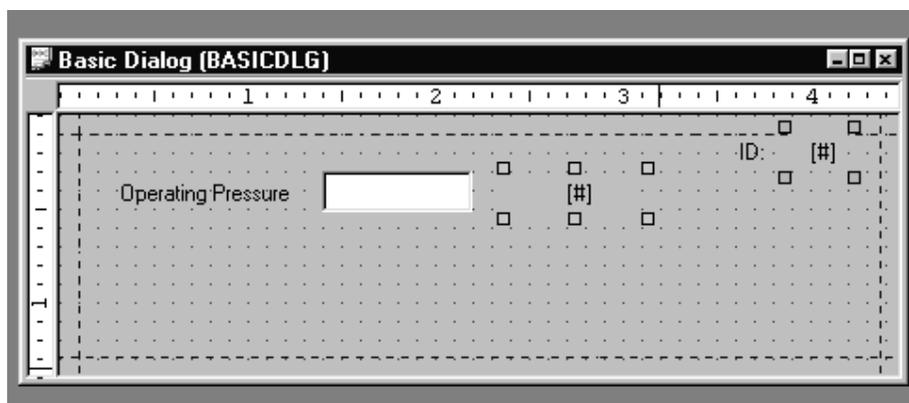
Placing the Text Variables

The Text Variable object next to the "ID" text must be set so that it's "ValueEQ" property is equal to "<ID>". The Text Variable to the right of the EditDblBox must be set so that it's "ValueEQ" property is equal to "<Pres Str>". In CHEMCAD, <ID> is a variable which is set to the unitop ID number, and <Pres Str> is set to the value of the current engineering units.

Now we will add two final objects, the OK and Cancel buttons. To create the buttons, select the button icon from the palette and draw the two buttons.
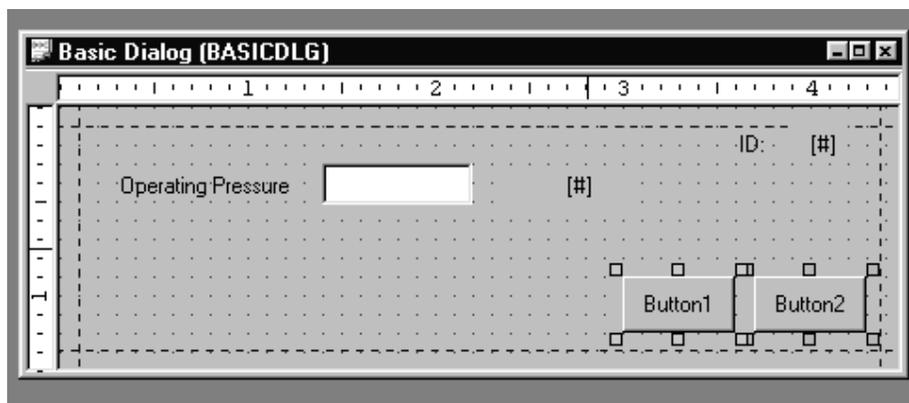
Creating Buttons

Change Button1's Text to "Cancel" and change it's ButtonType to "0-Cancel". Change Button2's Text to "OK" and it's ButtonType to "4-OK".

Property Sheet ⊠		Property Sheet ⊠	
-⋈ **Button1** ▾ …		-⋈ **Button2** ▾ …	
Normal	Events	Normal	Events
(ObjectCode)	Button1	(ObjectCode)	Button2
BackColor	⊠⊠⊠⊠ Nil	BackColor	⊠⊠⊠⊠ Nil
Bitmap	(None)	Bitmap	(None)
Bottom	280	Bottom	280
ButtonShape	0 - Normal	ButtonShape	0 - Normal
ButtonType	0 - Cancel ▾	ButtonType	4 - OK ▾
CursorPointer	0 - Cancel	CursorPointer	0 - Cancel
Default	1 - EventClick	Default	1 - EventClick
Enable	2 - Goto	Enable	2 - Goto
FlexHorizontal	3 - Help	FlexHorizontal	3 - Help
FlexVertical	4 - OK	FlexVertical	4 - OK
	5 - Record		5 - Record
Font	(None)	Font	(None)
ForeColor	⊠⊠⊠⊠ Nil	ForeColor	▬▬▬ 0.0.0
GotoPath	(None)	GotoPath	(None)
Group	0 - No	Group	0 - No
HelpContextID	0	HelpContextID	0
Layer	Default	Layer	Default
Layout	0 - Center	Layout	2 - Right
Left	290	Left	370
Right	370	Right	450
Tabstop	1 - Yes	Tabstop	1 - Yes
Tag		Tag	
Text	Cancel	Text	OK
ToolTipText		ToolTipText	
Top	250	Top	250

Changing Button Type Properties

Our dialog is completed, now save it as "CALC.MY" and we're ready to test .

Step 5: Testing the dialog

Testing the dialog is actually a two part process. First we must test the MY file, to make sure the VB scripts (if any) work properly. We do this by going to the "Layout" menu and unselecting "Edit". (You can do the same by pressing CTRL-E.) The toolbars will change and we will be running our dialog. Our simple dialog doesn't have any VB scripts, but it is always a good idea to run the dialog here before trying it in CHEMCAD.

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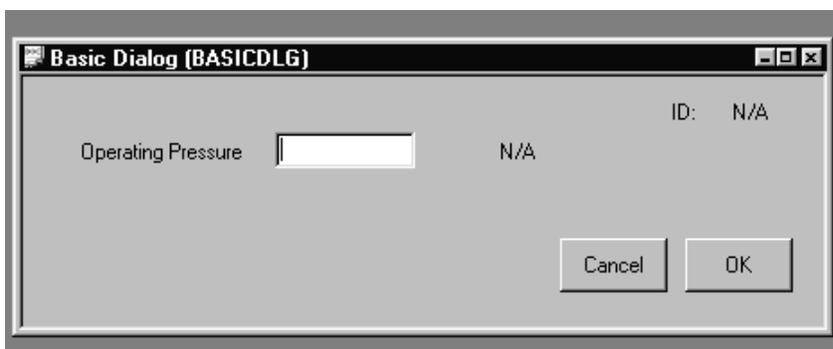
Running the dialog in the Screen Builder

The second part of the testing process is to test the dialog within CHEMCAD. To do this we must make a job with a calculator unit, and copy the CALC.MY and CALC.MAP into the job folder.
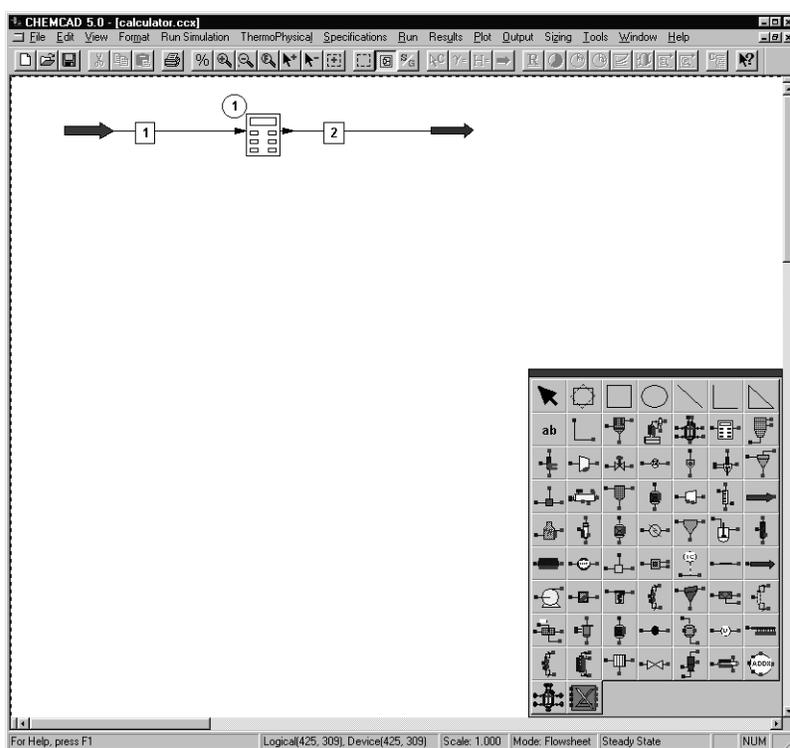
Creating a test flowsheet in CHEMCAD

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After creating this flowsheet, copy the MY and MAP files to the job subdirectory. Now go into "Run
Simulation" mode and double-click the calculator unit. Your custom dialog should appear. Enter a new
pressure here and press the **[OK]** button.
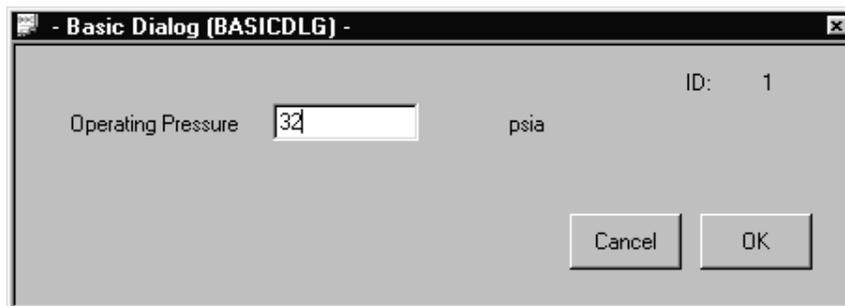
Changing the pressure to 32 psia

Now reopen the dialog box, and the entered pressure should appear as you typed it. This shows us that
CHEMCAD stored the number and retrieved it properly. Now close the dialog again and change your
engineering units to "psig".
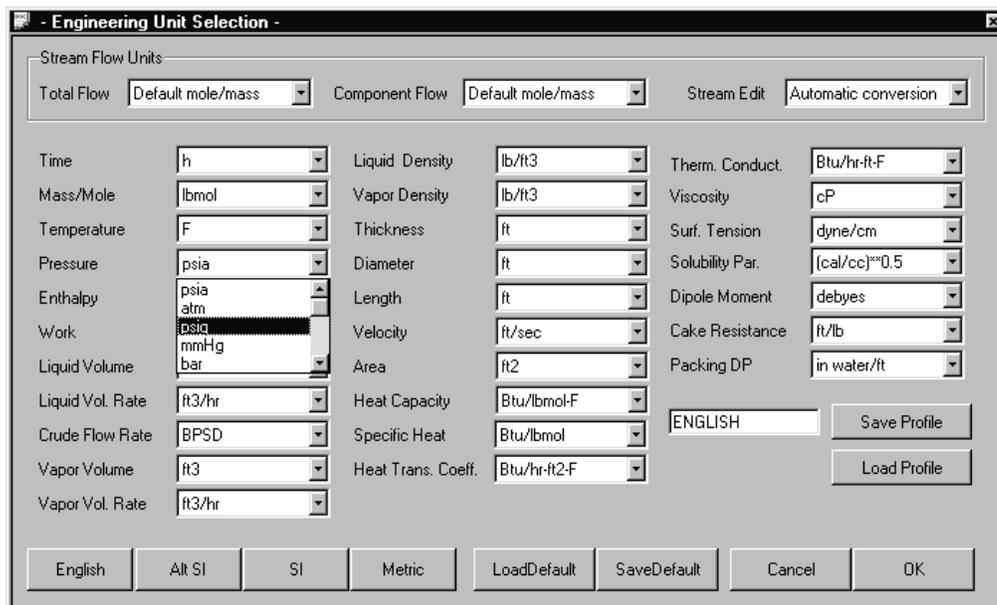
Changing the engineering units

When you reenter the dialog, it will change the pressure string to psig and convert the value for you. Demonstrating that CHEMCAD recognizes the number you entered as a pressure, thanks to the MAP file's "PRES" entry. If your dialog does not perform as expected, compare your MAP and MY files with those in the example job "Calculator" located in the examples subdirectory in you CC5DATA work folder.
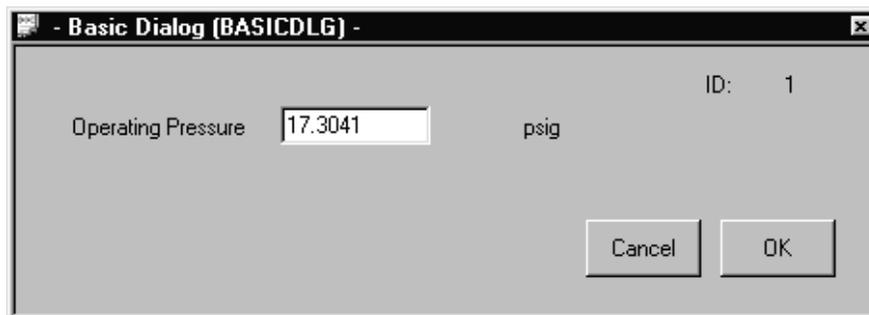
New pressure units

MAP FILES EXPLAINED

MAP files define the unitop array structure, and must be understood before moving on to dialog design. MAP files are simple text files, with white space (spaces or tabs) between fields. MAP files are edited with Notepad (Look in your "Accessories" program group under the START menu on your computer), or any text editor capable of saving files in a text format.

An example MAP file

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The first line of the MAP defines the unitop name. This is normally defined for you, such as "CALC" for calculators or Excel units, "ADD*x*" for User Added Module number *x*. After this line, you should add an extra line space for separation.

The next line of data defines the overall size of the array. "DICTIONARY *N*" where *N* is an integer between 1 and 300.

The next lines define each data member of the array. Each array member may have a name for your reference. The name of an array member may not include any spaces or special characters. Array Members are listed in order from 1 to *DICTIONARY*. Arrays members may be either double precision real numbers, designated as "FLOAT" or long integers, designated by "FLOAT LONG". Array Members may have any of the engineering units listed in Appendix A.

CHEMCAD uses the MAP file to make conversions from your current user-engineering units to the Internal units used in the actual code. Internal units are the engineering dimensions used in CHEMCAD's code, such as pounds, degrees Rankine, or cubic feet. Here's how that works. All the code in CHEMCAD was written using a single set of engineering units, as shown above. But users always like working in the units they're most comfortable with. The MAP files are used as a convenient translation layer between the user units and CHEMCAD's internal units.

When you enter a number in a dialog and press the OK button, CHEMCAD checks the MAP file for that member of the unitop parameter array to see if it has engineering dimensions (or units). It then makes any conversions needed to store the number converted into internal units.

DIALOG OBJECTS

Any of the following objects may be used in your dialog:

TEXT OBJECTS

- Text: Constant text or updated via VBScript
- Text Variable: Text updated by CHEMCAD

GRAPHICS OBJECTS

- Line: Single line segment
- PolyLine: Multiple line segments end-to-end
- Border: Rectangular border
- Arc: Ellipse segment
- Ellipse: includes circle
- Frame: a kind of typical 3d border with a text title line
- Bitmap: allows you to bring a bitmap into your dialog
- Gauge: represents a double precision number as a gauge

- Pointer: Pointer objects may not be used in user dialogs

- Graph: represents graphical data in your dialog

CONTROLS

- Button: 3D-enabled clickable button

- CheckButton: 3D check box indicator

- RadioButton: Similar to CheckButton, used where there are multiple options

- Combobox: selects one of multiple options

- ListBox: displays a list of multiple text items

- EditBox: allows users to enter text

- EditLongBox: Allows users to enter integers

- EditDblBox: Allows users to enter real (double precision) numbers

- Slider Box: For selecting a value within a bounded range

- Spinner Box: Same idea as a slider, different look

- ActiveX: embed ActiveX controls in your dialog

- OLE : Embed an OLE object in your dialog

GENERAL PROPERTIES

Almost all objects have the following basic properties:

Text Objects

Text: This simple object allows you to put text messages on your dialog. The text properties can be changed using VBScript.
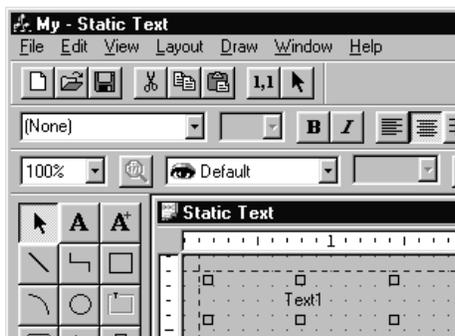
A simple Text variable

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Text Variable

TextVar: This is the Text Variable object. CHEMCAD uses certain variables to store data such as the current engineering units or the current unitop ID number. You can use the TextVar object to display these variables. Available variables include:

- Current engineering units labels

- Unitop ID number

- Component names from the component list

- Variables from the Unitop array

- Inlet stream ID numbers (inlets to this unit only)

- Outlet stream ID numbers (from this unit only)

- Generated from a VBScript

A full list of variables is given in Appendix A.

To set the value of the Text Variable, you must set the property labeled "Value_EQ". Double-clicking on this property will bring up the VBS editor to change your setting.
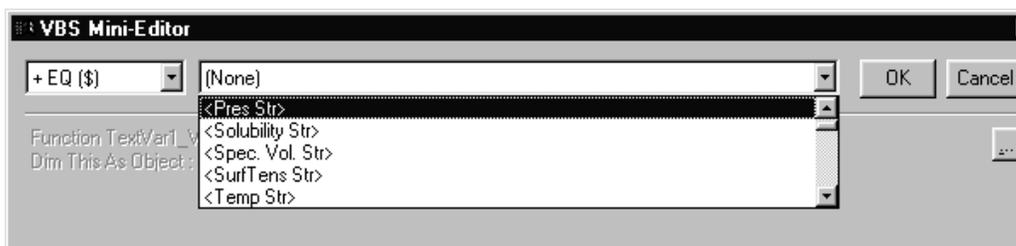
Setting the TextVar to display pressure units

Graphics Objects

Without graphics objects, every dialog box would be a bewildering collection of controls, with no apparent organization. Graphic objects, when used properly, help define your dialog and organize the controls and text.

Simple Graphics

Graphic objects allow you to display detailed graphics to help organize your dialog. The basic graphic objects are Lines, PolyLines, Borders, Arcs, Ellipses, and Frames.

Bitmap objects

In addition to these simple objects, you may import bitmap files into your dialog using the bitmap object. Your bitmap file must be included in the same directory the MY file is located in.
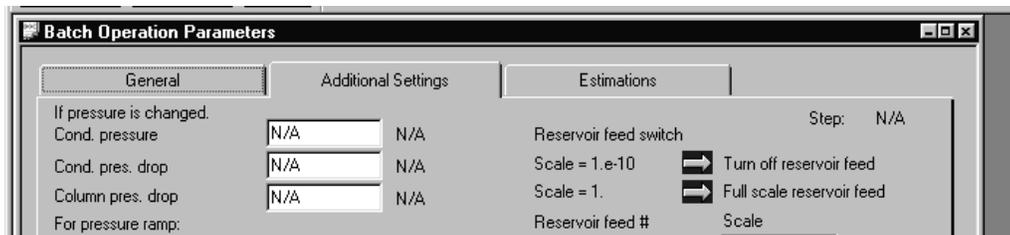
Bitmap objects (arrows) in the batch operation dialog

Gauge objects

Gauge objects allow you monitor variables that will remain between a range of values, such as a liquid level. Gauge objects are controlled by three main properties, MinimumEX, MaximumEQ, and ValueEQ. Set ValueEQ equal to the variable from the unitop array you wish to monitor. MinimumEQ defines the 0% point, MaximumEQ defines the 100% point.
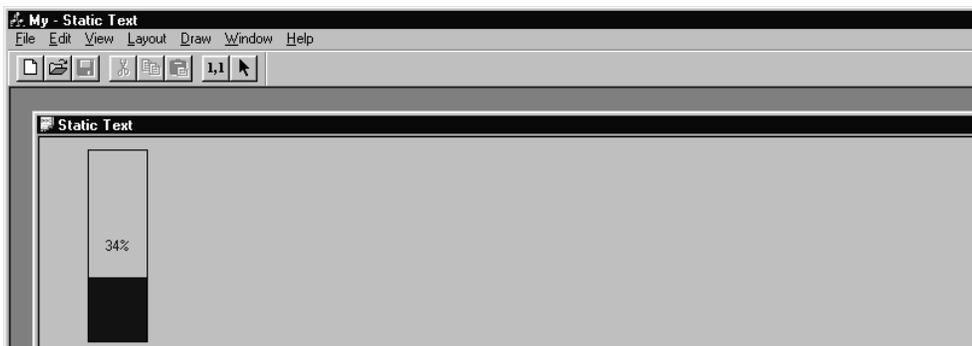
This gauge object is showing 34% full

Pointer

Pointers are not used in user added dialogs.

Control Objects

Most of the actual work of dialogs is done using control objects. Control objects are the only objects which can directly change a variable in the unitop array. These variables are listed by their number format and position in the array, i.e. "Double001" designates a Double precision number in position one of the array. You must set the "ValueID" property of the control object to the variable you wish to control with it.

Button

Button objects are designed to do something when pressed. The following things can be done with a button object:

- EventClick: EventClick lets you customize the button to do whatever you wish. When the button is clicked, it will run the script entered under the "EventClick". See the VBScript documentation for more details.

- Goto: Saves and closes this dialog, opening another dialog. This is used to create multi-page dialogs, like the SCDS dialog

- Help: Opens the help system to a particular topic defined by the HelpContextID property.

- OK: Saves the data and closes the dialog, passing the unitop array back to CHEMCAD

- Cancel: Closes the dialog without passing the unitop array back to CHEMCAD

- Record: Unused

- Goto Modal: Open a sub-dialog box, which will appear modally (like an error message, always on top)

Buttons also have many different shapes:
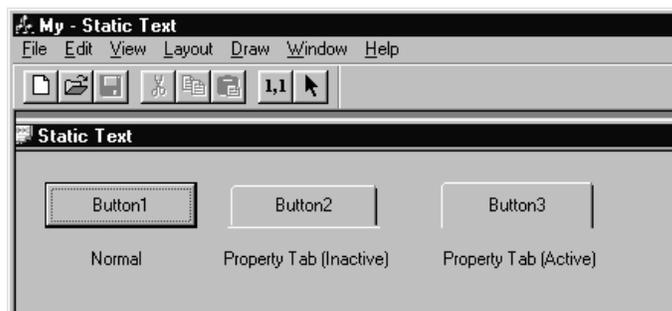
Three different button shapes

Most buttons use the default ButtonShape, "Normal". Goto buttons, on the other hand, are typically set to either "Property Tab (Inactive)" or Property Tab (Active)".   In this way, users can tab through multiple pages of a dialog, with each page as a separate MY file.

For example the SCDS screen has five pages, accessed by Goto buttons:

Five buttons on the SCDS page 1

This is done by having five MY files, all of the exact same size and shape, with different button shapes on them. The five files are SCDS.MY, SCDS2.MY, SCDS3.MY, SCDS4.MY, SCDS5.MY. The above screenshot comes from SCDS.MY. If we look into SCDS2.my, we see the same buttons, only with the second button set as the active button.

Five buttons on the SCDS page 2

When you double-click on the SCDS Icon in CHEMCAD, CHEMCAD opens SCDS.MY. If you select any of the top buttons, SCDS.MY will close and another will open. Clicking on the OK button in any of the screens will save the data back to CHEMCAD.

Feel free to explore the example dialogs in the Examples\Dialogs directory for more examples of using button objects.

One final note about buttons: **Each dialog should have at the very least, an OK button and a Cancel button. Otherwise data transfer back to CHEMCAD will not be possible.**

CheckButton

CheckButtons (also called checkboxes) are used as True/False indicators. The Checkbox stores data as a Long Integer, and returns either a 0 (False) or a 1 (True) to the unitop variable array member listed in the CheckButton's "ValueID" property. This is used to turn dialog features on and off.

RadioButton

RadioButtons are used to select a single option from a list of a few choices. Like the CheckBox, RadioButtons store data as long integers in the "ValueID" property of the RadioButton. The available choices are listed in the "ListItems" property of the RadioButton.

Combobox

Similar to the RadioButton, ComboBoxes are used instead of RadioButtons when the list of choices is too long to fit in the dialog. Like the RadioButton, the available choices are listed in "ListItems".

ListBox

Not used in user dialogs.

EditBox

EditBoxes are used to type in string data, they are not used much in user dialogs, because unitop arrays cannot hold string data, only float or integer data. One approach to circumvent this is to reserve space in your MAP file for a number of integers, and use a VBScript to convert a string into those integers and back again.

EditLongBox

EditLongBoxes are used to enter integer values, such as the number of trays in a column, etc. The value in the box is associated through the "ValueID" property to a member of the unitop array. Combined with a Text object showing a label, these are widely used in dialogs.

EditDoubleBox

EditDoubleBoxes are used to enter real (double precision) floating point numbers. The value in the box is associated through the "ValueID" property back to the unitoparray. These are normally used in conjunction with Text objects as labels and TextVar objects to display the units.

Sliders and Spinners

Sliders and spinners are used to select values from a range, they are not widely used in dialog boxes.

ActiveX and OLE objects

Implementing ActiveX and OLE are not currently supported in user dialogs.

APPENDIX A: ENGINEERING UNIT LISTINGS

The following table lists available Engineering units, MAP and LAB file designation, and the Internal units used by CHEMCAD.

Description	MAP file abbr.	LAB file number	Internal units
Area	AREA	8	ft^2
Cake resistance	CAKE	18	ft/lb
Crude flow rate	CRUDE	17	BPSD
Diameter	DIA	12	inches
Dipole moment	DMOMENT	21	debyes
Enthalpy rate	QRATE	6	MMBtu/hr
Enthalpy/Mass	MHEAT	36	Btu/lb
Enthalpy/Mole	MOLEHC	34	Btu/lbmol
Enthalpy/Mole or Enthalpy/Mass	SPHC	35	Btu/lbmol
Fouling factor (reserved)	FOULF	37	hr-ft^2-F/Btu
Heat (no time)	HEAT	33	Btu
Heat capacity mole or mass bases	HEATCAP	38	Btu/lbmol-F
Heat Flux	HEATFLUX		Btu/ft2-hr
Heat of reaction	HREAC	10	Btu/lbmol
Heat transfer coefficient	HTC	9	Btu/hr-ft2-F
Inverse liquid volume	ILV	39	1/ft^3
Length	LEN	11	feet
Liquid density	LDEN	13	lb/ft^3
Liquid volume rate	LVRATE	29	ft^3/hr
Mass (no time)	WTMASS	32	lb
Mass flow rate	MASS	16	lb/hr
Medium resistance	MRES	25	1/ft
Molar flow rate	MOLE	1	lbmol/hr

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Mole (no time)	WTMOLE	31	lbmol
Packed column pressure drop	PACKDP	26	in water/ft
Power	WORK	7	BTU/hr
Pressure	PRES	4	psia
Pressure difference	DELTAP	5	psia
Solubility	SOL	19	(cal/cc)^0.5
Specific heat capacity (mass base)	WHEAT	27	Btu/lb-F
Specific volume	SVOL	20	ft^3/lbmol
Surface tension	ST	15	dyne/cm
Temperature	TEMP	2	degrees R
Temperature difference	DELTAT	3	degrees F
Thermal conductivity	TCOND	28	Btu/hr-ft-F
Time	TIME	40	hr
Vapor density	VDEN	22	lb/ft^3
Vapor volume rate	VVRATE	30	ft^3/hr
Velocity	VEL	24	ft/s
Viscosity	VISC	14	cP
Volume	VOL	23	ft^3

APPENDIX B: VARIABLES FROM CHEMCAD

The following is a list of variables CHEMCAD uses to communicate with the dialog screen. These variables are typically used in TextVariable type objects or used to turn dialog features on or off. For example, in the MIXE dialog, many of the control are visible only if AUTOCALC is turned on, or in VBSCRIPT, if "AutoCalc=True".

IDS_VAR_DOUBLE300   "Double300"

IDS_VAR_LONG300   "Long300"

IDS_VAR_STR300   "a_String300"

IDS_C200NAME_STR   "Comp200Name"

IDS_MOLERATE_STR   "<MoleRate Str>"

```
    IDS_TEMP_STR          "<Temp Str>"
    IDS_DTMP_STR          "<Del Temp Str>"
    IDS_PRES_STR          "<Pres Str>"
    IDS_DPRS_STR          "<Del Pres Str>"
    IDS_ENTH_STR          "<EnthRate Str>"
    IDS_WORK_STR          "<Work Str>"
    IDS_AREA_STR          "<Area Str>"
    IDS_HTC_STR           "<HTC Str>"
    IDS_HRXN_STR          "<Hrxn Str>"
    IDS_LENGTH_STR        "<Length Str>"
    IDS_VAR_INS14         "Ins14"
    IDS_VAR_OUTS14        "Outs14"
IDS_DIA_STR          "<Diameter Str>"
    IDS_LDENS_STR         "<Liq Dens Str>"
    IDS_VIS_STR           "<Viscosity Str>"
    IDS_SFT_STR           "<SurfTens Str>"
    IDS_MASSRATE_STR      "<MassRate Str>"
    IDS_CRUDE_STR         "<CrudeRate Str>"
    IDS_CAKER_STR         "<Cake resis. Str>"
    IDS_SOLUB_STR         "<Solubility Str>"
    IDS_SPEV_STR          "<Spec. Vol. Str>"
    IDS_DIPOL_STR         "<Dipole M. Str>"
    IDS_VDENS_STR         "<Vap. Dens. Str>"
    IDS_VOL_STR           "<Volume Str>"
    IDS_VELOCITY_STR      "<Velocity Str>"
    IDS_INVLEN_STR        "<Inv. length Str>"
    IDS_PACKDP_STR        "<Pack DP Str>"
    IDS_WHEAT_STR         "<Mass heat cap. Str >"
IDS_TCOND_STR        "<Therm. cond. Str>"
    IDS_LVRATE_STR        "<Liq vol rate Str>"
```

    IDS_VVRATE_STR   "<Vap vol rate Str>"

    IDS_WTMOLE_STR   "<Mole (no time) Str>"

    IDS_WTMASS_STR   "<Mass (no time) Str>"

    IDS_HEAT_STR   "<Heat (no time) Str>"

    IDS_MOLEHC_STR   "<Enth/mole Str>"

    IDS_SPHT_STR   "<Enth/mole or /mass Str>"

    IDS_MHEAT_STR   "<Enth/mass Str>"

    IDS_FOULF_STR   "<Fouling fac. Str>"

    IDS_HEATCAP_STR   "<Heat cap mole or mass>"

    IDS_TIME_STR   "<Time Str>"

IDS_XID   "<ID>"

    IDS_XNAME   "<XName>"

IDS_AUTOCALC   "AutoCalc"

    IDS_ELEC   "Electrolyte"

APPENDIX C: ADVANCED CONTROLS

Many times, dialog boxes in CHEMCAD need advanced options for selecting components from a list, selecting a variable from another unit operation, or a stream property. Advanced controls are combinations of controls we frequently use in our own dialogs to make our interface the best in the world. This appendix explains each in detail.

COMPONENT LISTS

Frequently, users must select one of the components from the component list. This is usually done with a combobox control. The dialog box returns the ordinal position of the component selected (NOT THE COMPONENT ID NUMBER). For example, the user's flowsheet has the following component list

62   Water

41   Toluene

40   Benzene

The user selects Toluene from the combobox control on the dialog. The combo box returns a 2 to the associated unitop parameter, as Toluene is the 2nd component in the list. If the user selects no component, the box returns a 0.
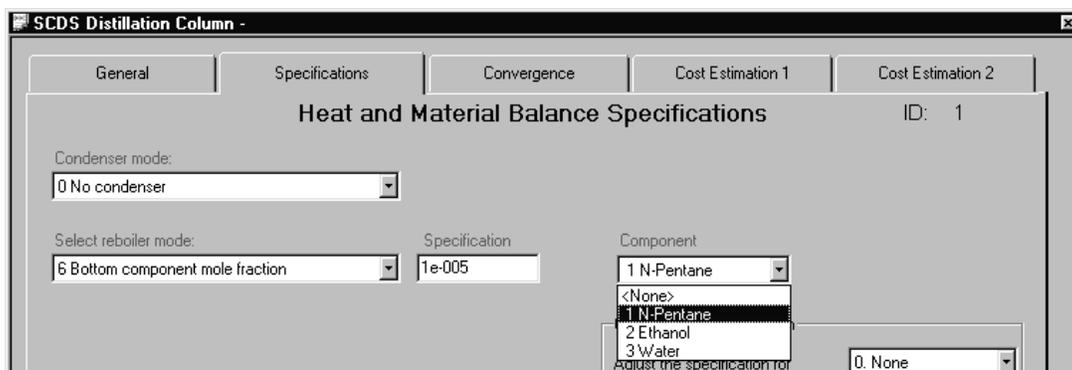
SCDS screen showing a component selection combobox

Basic Setup:

To create a component combobox you must do the following:

- In the MAP file, set up an integer parameter.

- Set TheFrame/TheView-EventInitialize method to "LoadComponentList".

- Create the Combobox, and set the "ListItems" property to "CompList 0". Link the combobox to the parameter in the MAP file.

ADDING TO THE MAP FILE

This adds a variable for the component list to return a value.

To add a parameter to your map file, add a line to the end of the MAP file as follows:

[ParameterName]   [Number]   FLOAT LONG

Where [parameterName] is any string you wish and [Number] is the parameter number you wish to use. Make sure that the "DICTIONARY" specification at the beginning of the MAP file is equal to the largest parameter number.

SET THEFRAME/THEVIEW-EVENTINITIALIZE

This method loads the component list into memory for the dialog to use.

Open the properties of TheView by double clicking on the dialog in edit mode. Go to the "Events" tab, and double click on "EventInitialize". Set this to "C++ Action" and "LoadCompList" as shown:

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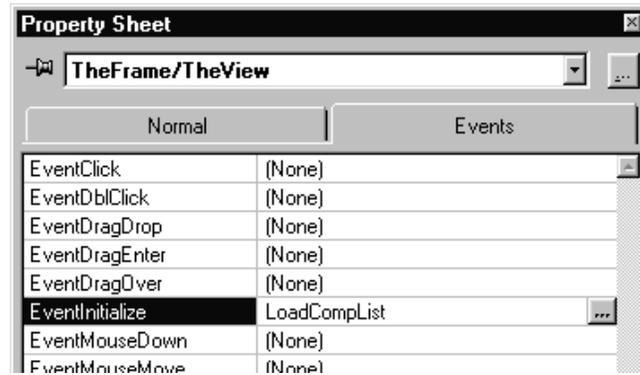
Events Tab for TheView
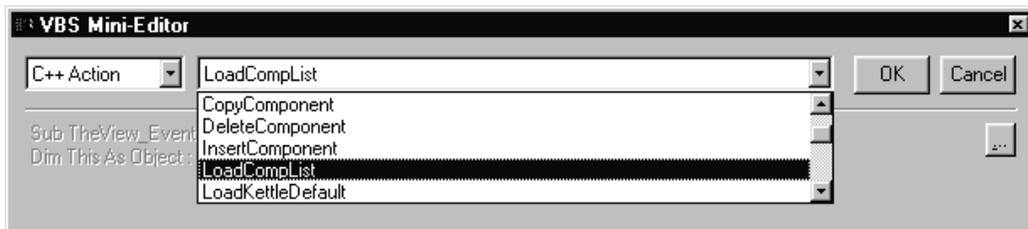
Selecting "LoadCompList" for the event.

CREATE THE COMBOBOX

Create the combobox in the normal fashion using the controls palette. After creating you combobox, double-click it to view it's properties sheet.   Set the "ValueID to correspond to the MAP file entry, and set the "ListItems" to "CompList" value 0.
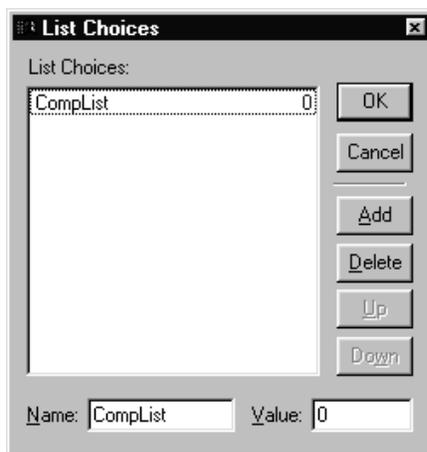
ListItems setting for a Component ComboBox

Using this kind of control, users can select any component in their simulations component list. CHEMCAD will store the ordinal number for that component in the parameter listed in the MAP file.

VARIABLE SELECTION BOX

A variable selection box allows your dialog to select a stream or unitop property. This is used in unitops like controllers.

A Variable selection box control is actually made of several controls. A Radiobutton control selects the type of object, stream or unitop. An EditLong box allows users to enter the Stream/Unitop ID. A ComboBox is used to select the variable from a list. If the variable is a stream variable, another Combobox will be needed to select a component. Finally, a hidden control is used to store the resulting integer value.

SETTING UP A VARIABLE SELECTION BOX

To create a variable selection box, we must do the following:

Add parameters to our MAP file for: Unit/Stream selection, Unit/Stream ID, and Variable number. We must also add two dummy parameters to our map file as placeholders for the Variable ComboBox, and the Component ComboBox.