

FactoryLink 7

Version 7.0



Client Builder Reference Manual

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Chapter 1

Overview

Client Builder is both the run-time and the design-time tool for FactoryLink graphics.

You can use Client Builder to create and maintain graphics for your FactoryLink application (FLAPP). Graphics can be animated by linking to a Tag in a running FLAPP. Client Builder can display data or information obtained from a FLAPP, as well as represent real world objects such as tanks, pumps, or anything else you want to represent. Real world objects can be drawn using the Client Builder drawing tools, or by inserting graphic images. Alarms can be displayed. Trends can be recorded and charted.

Client Builder is also the run-time environment for FactoryLink graphics. During run-time, a user can respond to alarms, view status or data, and interact with the graphic environment through animation, buttons, etc. Security can be set for individual users so only certain parts of the run-time environment can be accessed.

OVERVIEW

Chapter 2

Workspace

The Workspace

The Workspace is the name given to the main area of the Client Builder frame that occupies the screen of your PC. The workspace contains all the tools necessary to develop client applications and is the container for the child windows which form the User Interface at runtime. Within the workspace you will find the following features:

- Menu Bar
- Toolbars
- Scrollbars
- Status Bar
- Cursor Position
- Zoom Level

You can customize the workspace through the Workspace Properties. To display the Workspace Properties, either select the option from the **Display** menu, or right-click anywhere on the workspace background and select Workspace Properties.

Workspace Properties

Workspace Properties can be viewed from the **Display** menu. On the Workspace Properties dialog box, you can customize how the workspace looks and behaves. The workspace properties box has two tabs, Main Window and Regions.

On the **Main Window** tab, you can customize

- Position
- Size
- Appearance
- Title Bar
- Behavior
- Title

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The Workspace

On the **Regions** tab, you can customize

- Regions System
- Startup Region

Menu Bar

The menu bar provides access, using either the keyboard or the mouse, to all the development tools. The menu bar, like all other toolbars in Client Builder, is dockable. The menu bar can be dragged with the mouse and docked to any outside edge of the workspace, or it can be left anywhere in the middle as a floating menu bar.

To turn the menu bar off, right-click anywhere on the workspace background and select the **Menu Bar** option. A checkmark indicates the menu bar is visible.

The menu bar contains the following menu items:

- File
- Edit
- Display
- Insert
- Draw
- Arrange
- Animate
- Mode
- Tools
- Window
- ? (Help)

Toolbars

The toolbars give you instant access, via the mouse, to the most commonly used tools for mimic development and tools at runtime by the user. The toolbars can be floating or docked - that is locked to one of the borders of the workspace. Any toolbar can be dragged with the mouse and docked to any outside edge of the workspace, or it can be left anywhere in the middle as a floating toolbar.

You can specify which toolbars are available by right-clicking anywhere on the menu bar and selecting which toolbars you want to be visible. A check mark next to the name indicates a toolbar that is currently visible.

The available toolbars are:

- Standard
- Draw
- Mode
- Arrange
- Layers
- Animations

Scrollbars

The scrollbars are used to pan around a window when it is larger than the workspace.

Status Bar

The status bar is located at the bottom of the workspace, above any toolbars you may have docked there. It provides information on the current state of the workspace.

Cursor Position

The cursor position is located on the right of the status bar, just before the zoom level indicator. It gives you the X and Y coordinates in pixels of the current location of the cursor.

Zoom Level

The zoom level is located on the far right of the status bar and displays the percentage zoom of the active mimic.

Menu Commands

File Menu

The **File** menu gives you various options for working with drawing files.

Table 2-1 File Menu Parameters

Parameter	Definition
New	Creates a new mimic for drawing.
Open	Opens a mimic previously saved to disk.
Close	Closes the selected mimic.
Close All	Closes all open mimics.
Save	Saves the selected mimic.
Save As	Saves the selected mimic with a new name you can specify. If you save the mimic in the Mimic Templates folder, the mimic and drawings may be used as a template for other mimics.
Save All	Saves all open mimics.
Print Setup	Allows you to specify the printer options for printing the selected mimic.
Print Preview	Shows a preview of what the selected mimic will look like when printed.
Print	Prints the selected mimic.
Recent Files	Provides a list of most recently used files.
Exit	Exits Client Builder.

Note: Many of these options are also available on the Standard toolbar.

Edit Menu

The **Edit** menu lets you select various options for manipulating the selected drawing objects.

Table 2-2 Edit Menu Parameters

Parameter	Definition
Undo	Reverses the last change you have made, such as drawing, changing properties, moving, or copying. This option is also available on the Standard toolbar.
Redo	Reverses the changes made by Undo . This option is also available on the Standard toolbar.
Cut	Cut the drawing element and place it on the clipboard. This option is also available on the Standard toolbar.
Copy	Copy the drawing element to the clipboard. This option is also available on the Standard toolbar.
Paste	Paste any drawing elements from the clipboard to the selected mimic. Pasted drawing elements will appear in the exact same location in the selected mimic as the elements that were cut or copied to the clipboard. This option is also available on the Standard toolbar.
Delete	Deletes the drawing element.
Select All	Selects all drawing elements in the selected mimic.
Group	Creates a drawing group from the selected elements. This option is also available on the Arrange toolbar.
Ungroup	Returns a drawing group to its individual elements. This option is also available on the Arrange toolbar.
Lock	Locks the drawing element. When a drawing element is locked, no changes can be made to it. The element cannot be moved, resized, or deleted. This option is also available on the Arrange toolbar.
Unlock	Unlocks the drawing element. This option is also available on the Arrange toolbar.

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Menu Commands

Table 2-2 Edit Menu Parameters (Continued)

Create Symbol	Creates a symbol using the selected drawing elements. To include more than one drawing element in the symbol, the elements must be grouped. When you create symbols, they are stored in a "library" of symbols you have created. You can then add symbols to any mimic by dragging and dropping them from the Library. The Library can be viewed by using the Display menu or by inserting a symbol from the Insert menu or from the button on the Draw toolbar.
OLE Links	Used for embedding and linking objects such as a Word document or an Excel spreadsheet.
Properties	Displays the drawing element's properties box.

Note: Many of these options are also available on the drawing popup menu which can be accessed by right-clicking on a drawing element.

Display Menu

The **Display** menu lets you display various tools.

Table 2-3 Display Menu Parameters

Parameter	Definition
Color Palette	Opens the Color Palette. This option is also available on the Standard toolbar.
Graphic Explorer	Opens the Graphic Explorer. This option is also available on the Standard toolbar.
Properties List	Displays the properties list for the selected drawing element or mimic. This is similar to the Properties list used in many programming applications such as Microsoft Visual Basic or Visual C++. This list should only be used by more advanced users. You can also bring up the properties list from the Draw toolbar.
Library	Displays a "library" of symbols you have created. You can then add symbols to any mimic by dragging and dropping them from the Library. Symbols must first be created by using the Create Symbol option on the Edit menu.

Table 2-3 Display Menu Parameters (Continued)

Warnings	If Warnings is selected, various warning symbols may appear adjacent to drawings with animation. These symbols indicate that an animation has been applied, but a problem exists. Problems could include the variable name being unresolved, the variable name incorrectly spelled, or the server unavailable. If this option is not selected, warnings for unresolved animation will not appear.
Advanced Mode	If this option is checked, the Advanced Properties will be displayed every time you view a drawing element's properties. Otherwise, you will have to click on the down arrow in the properties box to display an element's advanced properties.
Status Bar	If this option is checked, the status bar will be visible at the bottom of the workspace. If this option is unchecked, the status bar will not be visible.
Arrange Iconized Windows	Indicates where you want iconized windows to be stacked. When you minimize windows, they can be minimized to the right, bottom, left, or top of the workspace.
Script Editor	Opens the Script Editor for VBA-like scripting. This option is also available on the Standard toolbar.
Workspace Properties	Displays the workspace properties dialog box.
Refresh	Refreshes the screen. As sometimes happens in Windows, the screen may not repaint itself properly. Use the Refresh option to correct this.

Insert Menu

The **Insert** menu allows you to insert various images, objects, and controls.

Table 2-4 Insert Menu Parameters

Parameter	Definition
Symbol	Inserts a symbol. Symbols must first be created by using the Create Symbol option on the Edit menu.
Image	Inserts an image such as a bitmap.

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Menu Commands

Table 2-4 Insert Menu Parameters (Continued)

ActiveX Control	Inserts an ActiveX control.
Favorite ActiveX Controls	Inserts an ActiveX control from your list of favorites. You can add ActiveX controls to your list of favorites under Tools > Preferences > ActiveX Controls .
OLE Object	Inserts an OLE object.
Trend	Inserts a trend chart. This is for real-time trending. For historical trending, use the USDATA ActiveX Trend Control.
USDATA Trend Control	Inserts the USDATA ActiveX Trend Control for historical trending.
USDATA Alarm Viewer Control	Inserts the USDATA ActiveX Alarm Viewer Control for setting up alarms.
USDATA Database Browser Control	Inserts the USDATA ActiveX Database Browser Control for browsing databases.

Note: These options are also available on the Draw toolbar.

Draw Menu

The **Draw** menu lets you select all the commonly used tools to produce drawing elements. (The **Arrange** menu may be used to align and manipulate drawing elements once they are produced.)

Table 2-5 Draw Menu Parameters

Parameter	Definition
Select	Selects, moves or sizes a drawing.
Rotate	Rotates a drawing while in design mode. Note: You can rotate lines, polygons, polylines, and bézier curves. You can also rotate text, but only if the <i>Do Not Auto Size</i> property on the Aspect tab is unchecked and the Regular appearance is chosen.

Table 2-5 Draw Menu Parameters (Continued)

Line	Draws a line.
Rectangle	Draws a rectangle. Hold down the Shift key while drawing, to constrain the drawing to a perfect square.
Rounded Rectangle	Draws a rounded rectangle. Hold down the Shift key while drawing, to constrain the drawing to a perfect rounded square.
Ellipse	Draws an ellipse or a circle. Hold down the Shift key while drawing, to constrain the drawing to a perfect circle.
1/2 Ellipse	Draws a 1/2 ellipse
1/4 Ellipse	Draws a 1/4 ellipse. Hold down the Shift key while drawing, to constrain the drawing to a perfect 1/4 circle.
Arc	Draws an arc. You can specify the Start and End angles of the arc on the Aspect tab. If the Start and End angles are both 0, the arc will be a complete ellipse.
Polygon	Draws a polygon.
Polyline	Draws a polyline.
Bézier Curve	Draws a Bézier curve.
Text	Inserts text.

Note: These same options can be selected from the Draw toolbar instead of the menu.

Arrange Menu

The **Arrange** menu lets you select all the commonly used tools for arranging and sizing drawing elements.

More than one drawing element can be selected at one time by holding the Shift key while selecting the drawing elements with the left mouse button.

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Menu Commands

Note: When more than one element is selected, the last one selected is used as the "reference" for some of these Arrange options.

Table 2-6 Arrange Menu Parameters

Parameter	Definition
Flip Horizontally	Flips a drawing element on its vertical axis. Note: Polygons, polylines, and Bézier curves must be part of a group before they can be flipped. To flip an individual polygon, polyline, or Bézier curve, select the element, make it a group by itself, and then you can flip it. You can ungroup it after it has been flipped.
Flip Vertically	Flips a drawing element on its horizontal axis. Note: Polygons, polylines, and Bézier curves must be part of a group before they can be flipped. To flip an individual polygon, polyline, or Bézier curve, select the element, make it a group by itself, and then you can flip it. You can ungroup it after it has been flipped.
Move to Front	Moves the selected drawing element to the front of all overlapping elements.
Move to Back	Moves the selected drawing element to the back of all overlapping elements.
Move Forward	Moves the selected drawing element in front of the element immediately on top of it.
Move Backward	Moves the selected drawing element behind the element immediately under it.
Align Left	Aligns elements horizontally so that the left edge aligns with that of the reference.
Align Right	Aligns elements horizontally so that the right edge aligns with that of the reference.
Align Top	Aligns elements vertically so that the top edge aligns with that of the reference.
Align Bottom	Aligns elements vertically so that the left bottom aligns with that of the reference.
Center Vertically	Aligns elements vertically so that the center aligns with that of the reference.
Center Horizontally	Aligns elements horizontally so that the center aligns with that of the reference.

Table 2-6 Arrange Menu Parameters (Continued)

Space Horizontally	Aligns elements horizontally so that they are evenly spaced.
Space Vertically	Aligns elements vertically so that they are evenly spaced.
Same Width	Resizes elements so the width matches that of the reference.
Same Height	Resizes elements so the height matches that of the reference.
Same Size	Resizes elements so the width and height match that of the reference.

Note: These same options can be selected from the Arrange toolbar instead of the menu.

Animate Menu

The **Animate** menu provides all the available commands to create animation. The **Animate** menu has the following seven menu items:

- Color
- Text
- Symbols
- Position
- Send
- Run
- Link

Under each of these menu items, a number of options are available. Each of these options is also available as a button on the Animations toolbar. For a more thorough description of these commands, see the section on the specific types of animation.

Mode Menu

The **Mode** menu is used to switch a mimic between run and design modes, and to zoom the view in and out.

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Menu Commands

Table 2-7 Mode Menu Parameters

Parameter	Definition
Design	Switches the selected mimic to design mode.
Run	Switches the selected mimic to run mode.
Reference Set 1	Switches the selected mimic to reference mode 1.
Reference Set 2	Switches the selected mimic to reference mode 2.
Test Set	Switches the selected mimic to test mode. In test mode, the real-time value of the database variables used in any animation may be manipulated without changing the value in the database.
Zoom In	Activates the zoom-in tool. Activating the zoom-in tool will change the cursor shape to a magnifying glass with a plus sign in the center. When you then click an opened mimic, the view will zoom in. To de-select the zoom-in cursor, select this menu item again.
Zoom Out	Activates the zoom-out tool. Activating the zoom-out tool will change the cursor shape to a magnifying glass with a minus sign in the center. When you then click an opened mimic, the view will zoom out. To de-select the zoom-out cursor, select this menu item again.
Normal View 1:1	Returns the selected mimic to normal view (1:1).

Note: These same options can be selected from the Mode toolbar instead of the menu.

Tools Menu

The **Tools** menu lets you select various options, preferences, and settings for Client Builder.

Table 2-8 Tools Menu Parameters

Parameter	Definition
Application	The Application menu item contains the following sub-menus: Save/Restore Project Notepad Paint Calculator
Project	The Project menu item contains the following sub-menus: Open Libraries Options
Security	The Security menu item contains the following sub-menus: Log On Log Off Change Password Configure
Preferences	The Preferences menu item contains the following sub-menus: Colors Blinking ActiveX Controls Decluttering
Language	From the Language menu item, you can select the language Client Builder uses for menu names, tool names, and tooltips. You can choose between English and French.
Keyboard Manager	Launches the Keyboard Manager which can be used to create your own accelerator keys.

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Menu Commands

Table 2-8 Tools Menu Parameters (Continued)

Expression Editor	Launches the Expression Editor which can be used to create mathematical expressions. You can assign an alias to each expression for easy use.
Servers	From the Servers menu item, you can configure FactoryLink servers and clusters for connection with Client Builder.
Options	From the Options menu item, you can specify how Client Builder handles various activities. For example, you can set whether files are saved in ASCII or Binary format.

Toolbars

Arranging the Toolbars

The toolbars may be docked or floating. A docked toolbar is embedded in one of the edges of the workspace. A floating toolbar may be placed anywhere on the desktop even outside of the workspace.

How to dock a toolbar

Click anywhere in the toolbar (outside of the buttons) and drag the toolbar to either the left, right, top or bottom edges.

How to float a toolbar

Click anywhere in the toolbar (outside of the buttons) and drag the toolbar to its new location.



How to re-shape a toolbar

Position the cursor on one of the toolbar's borders. Click and drag the border. The width and height of the toolbar will change together within the limitations of the buttons it is displaying.

Standard Toolbar

The Standard toolbar provides quick access to many of the commonly used options.

Table 2-9 Standard Toolbar Parameters

Parameter	Definition
	Creates a new mimic for drawing. This option is also available on the File menu.
	Opens a mimic previously saved to disk. This option is also available on the File menu.

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Toolbars

Table 2-9 Standard Toolbar Parameters (Continued)
















	Saves the selected mimic. This option is also available on the File menu.
	Saves all open mimics. This option is also available on the File menu.
	Closes the selected mimic. This option is also available on the File menu.
	Closes all open mimics. This option is also available on the File menu.
	Shows a preview of what the selected mimic will look like when printed. This option is also available on the File menu.
	Prints the selected mimic. This option is also available on the File menu.
	Reverses the last change you have made, such as drawing, changing properties, moving, or copying. This option is also available on the Edit menu.
	Reverses the changes made by Undo . This option is also available on the Edit menu.
	Cuts the drawing element and place it on the clipboard. This option is also available on the Edit menu.

Table 2-9 Standard Toolbar Parameters (Continued)

	<p>Copies the drawing element to the clipboard. This option is also available on the Edit menu.</p>
	<p>Pasts any drawing elements from the clipboard to the selected mimic. Pasted drawing elements will appear in the exact same location in the selected mimic as the elements that were cut or copied to the clipboard. This option is also available on the Edit menu.</p>
	<p>Opens the Color Palette. This option is also available on the Display menu.</p>
	<p>Opens the Graphic Explorer. This option is also available on the Display menu.</p>
	<p>Opens the Script Editor for VBA-like scripting. This option is also available on the Display menu.</p>
	<p>Exits Client Builder.</p>

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Toolbars

Draw Toolbar

The Draw toolbar provides quick access to all the commonly used tools to produce drawing elements. (The Arrange toolbar may be used to align and manipulate drawing elements once they are produced.)

Table 2-10 Draw Toolbar Parameters















Parameter	Definition
	Select, move or size a drawing.
	Rotates a drawing while in design mode. Note: You can rotate lines, polygons, polylines, and Bézier curves. You can also rotate text, but only if the <i>Do Not Auto Size</i> property on the Aspect tab is unchecked and the Regular appearance is chosen.
	Displays the properties box for the selected drawing element. On the properties box, you can adjust position, color, line style, etc. You can also bring up the properties box from the Edit menu, by right-clicking on the drawing element and selecting Properties from the popup menu, or by double-clicking on the drawing element.
	Displays the properties list for the selected drawing element or window. This is similar to the Properties list used in many programming applications such as Microsoft Visual Basic or Visual C++. This list displays properties in detail and should only be used by more advanced users. You can also bring up the properties list from the Display menu.
	Draws a line.
	Draws a rectangle. Hold down the Shift key while drawing, to constrain the drawing to a perfect square.

Table 2-10 Draw Toolbar Parameters (Continued)

	<p>Draws a rounded rectangle. Hold down the Shift key while drawing, to constrain the drawing to a perfect rounded square.</p>
	<p>Draws an ellipse or a circle. Hold down the Shift key while drawing, to constrain the drawing to a perfect circle.</p>
	<p>Draws a 1/2 ellipse.</p>
	<p>Draws a 1/4 ellipse Hold down the Shift key while drawing, to constrain the drawing to a perfect 1/4 circle.</p>
	<p>Draws an arc. You can specify the Start and End angles of the arc on the Aspect tab. If the Start and End angles are both 0, the arc will be a complete ellipse.</p>
	<p>Draws a polygon.</p>
	<p>Draws a polyline.</p>
	<p>Draws a Bézier curve.</p>

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Toolbars

Table 2-10 Draw Toolbar Parameters (Continued)











	Inserts text.
	Inserts a symbol. Symbols must first be created by using the Create Symbol option on the Edit menu.
	Inserts an image such as a bitmap.
	Inserts an ActiveX control.
	Inserts an ActiveX control from your list of favorites.
	Inserts an OLE object.
	Inserts a trend chart for real-time trending.

Table 2-10 Draw Toolbar Parameters (Continued)

	Inserts the USDATA ActiveX Trend control for historical trending.
	Inserts the USDATA ActiveX Alarm Viewer control.
	Inserts the USDATA ActiveX Database Browser control.

Note: The drawing tools can also be selected from the **Draw** menu instead of the toolbar. The tools for inserting images, ActiveX controls, etc. can be selected from the **Insert** menu.

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Toolbars

Mode Toolbar

The Mode tool bar is used to switch a mimic between run and design modes, and to zoom the view in and out.

Table 2-11 Mode Toolbar Parameters









Parameter	Definition
	Switches the selected mimic to design mode.
	Switches the selected mimic to run mode.
	Switches the selected mimic to reference mode 1.
	Switches the selected mimic to reference mode 2.
	Switches the selected mimic to test mode. In test mode, the real-time value of the database variables used in any animation may be forced without changing the value in the database.

Table 2-11 Mode Toolbar Parameters (Continued)

	<p>Activates the zoom-in tool. Clicking the zoom-in tool will change the cursor shape to a magnifying glass with a plus sign in the center. When you then click an opened mimic, the view will zoom in. To de-select the zoom-in cursor, click on the tool again.</p>
	<p>Activates the zoom-out tool. Clicking on the zoom-out tool will change the cursor shape to a magnifying glass with a minus sign in the center. When you then click an opened mimic, the view will zoom out. To de-select the zoom-out cursor, click on the tool again.</p>
	<p>Returns the selected mimic to normal view (1:1).</p>

Note: These same tools can be selected from the **Mode** menu instead of the toolbar.

Arrange Toolbar

The Arrange toolbar provides quick access to all the commonly used tools for arranging and sizing drawing elements.

More than one drawing element can be selected at one time by holding the Shift key while selecting the drawing elements with the left mouse button.

Note: When more than one element is selected, the last one selected is used as the "reference" for some of these Arrange options.

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Table 2-12 Arrange Toolbar Parameters
















Parameter	Definition
	Groups the selected drawing elements into one object. This single object can then be moved and resized like a single element.
	Ungroups a previously grouped object. This separates the group back into the original individual drawing elements.
	Locks the selected drawing element or group in place. Locked items cannot be moved, resized, or deleted.
	Unlocks a previously locked drawing element or group.
	Makes the window grid visible or invisible.
	Turns grid alignment on or off. If grid alignment is on, drawing elements that are moved or resized with "snap" to the grid.
	Flips a drawing element on its vertical axis. Note: Polygons, polylines, and bézier curves must be part of a group before they can be flipped. To flip an individual polygon, polyline, or bézier curve, select the element, make it a group by itself, and then you can flip it. You can ungroup it after it has been flipped.









Table 2-12 Arrange Toolbar Parameters (Continued)

	<p>Flips a drawing element on its horizontal axis. Note: Polygons, polylines, and bézier curves must be part of a group before they can be flipped. To flip an individual polygon, polyline, or bézier curve, select the element, make it a group by itself, and then you can flip it. You can ungroup it after it has been flipped.</p>
	<p>Moves the selected drawing element to the front of all overlapping elements.</p>
	<p>Moves the selected drawing element to the back of all overlapping elements.</p>
	<p>Moves the selected drawing element in front of the element immediately on top of it.</p>
	<p>Moves the selected drawing element behind the element immediately under it.</p>
	<p>Aligns elements horizontally so that the left edge aligns with that of the reference.</p>
	<p>Aligns elements horizontally so that the right edge aligns with that of the reference.</p>
	<p>Aligns elements vertically so that the top edge aligns with that of the reference.</p>

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Toolbars

Table 2-12 Arrange Toolbar Parameters (Continued)

	Aligns elements vertically so that the bottom edge aligns with that of the reference.
	Aligns elements vertically so that the center aligns with that of the reference.
	Aligns elements horizontally so that the center aligns with that of the reference.
	Aligns elements horizontally so that they are evenly spaced.
	Aligns elements vertically so that they are evenly spaced.
	Resizes elements so the width matches that of the reference.
	Resizes elements so the height matches that of the reference.
	Resizes elements so the width and height match that of the reference.

Note: The arrange tools can also be selected from the **Arrange** menu instead of the toolbar. The tools for grouping, ungrouping, locking, and unlocking can be selected from the **Edit** menu.

Layers Toolbar

The Layers toolbar lets you toggle among which layers are visible. By default, all layers are visible on a new mimic.

Animations Toolbar

The Animations toolbar is a shortcut for all the available commands on the **Animate** menu. The Animations tool bar has the following seven tabs:

- Color
- Text
- Symbols
- Position
- Send
- Run
- Link

On each of these tabs, a number of buttons are available. Each button corresponds to a command on the **Animate** menu. For a more thorough description of these commands, see the section on the specific types of animation.

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Toolbars

Chapter 3

Mimics, Windows, and Grids

Mimics and Windows

Using Mimics

The User Interface for your SCADA project is developed as a number of mimics. Windows are easily and quickly developed to form Menus, Overviews, Plant Mimics, Trend Displays, Alarm Displays, Reports and so on.

Normally, a hierarchical display structure is created by linking the mimics together with a special type of animation. This animation creates command buttons that are used at runtime to open and close mimics.

The properties of each mimic are individually selected including the size and position on the screen, the ability to move or resize the mimic, and the access level. Window properties may be changed at any time by any user with the necessary access rights.

Operational Modes

Each mimic you create may be displayed in one of two modes selected from the Mode toolbar:

- **Run Mode** - In run mode, the animated properties of drawing elements in the mimic are updated in real-time. It is not possible to change a mimic's properties or any drawing in it. This is the normal mode in which a mimic is opened by a user.
- **Design Mode** - In design mode, the properties of drawing elements do not update in real-time. The mimic properties may be changed and drawing elements added, modified, and deleted. This is the mode of operation used while developing a mimic.

It is possible to have multiple views of the same mimic open at the same time in both design and run mode.

Note: Besides using the Mode toolbar, you can also switch a mimic between design and run modes by right-clicking anywhere on the mimic background and making your selection from the popup menu.

MIMICS, WINDOWS, AND GRIDS

Mimics and Windows

Window Management Box

The window management dialog box is displayed when you save a mimic for the first time, save a mimic with a new name, and when opening a mimic from the OPEN button or **File** menu.

It provides a list of mimics, a thumbnail preview of the selected mimic, and options for selecting the mimic folder and library. The list may be switched between a simple or detailed format using the display buttons.

Options

Table 3-1 Window Management Box Parameters

Parameter	Definition
Folder	<p>Where the mimic files are stored. In your project's folder, there is a place to store Mimics and Mimic Templates. Use this drop-down list to select between these two locations.</p> <p>Normal mimic files should be stored in the folder for mimics. Files saved as a mimic template can be used to apply properties (such as size, position, background color, etc.) from the template to other mimics. For more information on applying templates to other mimics, see the section on templates under Window Properties.</p>
Library	<p>The name of the library in which the mimic file is to be saved or opened from. Shared libraries, which are available to multiple projects, can be setup under Project on the Tools menu.</p>
Name	<p>The name of the mimic to be opened or saved. You may type the name directly into this field or select it by clicking in the list.</p>
Filter	<p>Narrows the list of mimics displayed. The filter uses standard wildcard characters.</p>

Creating a New Mimic

To create a new mimic, click the NEW button on the Standard toolbar or select the command from the **File** menu. A blank untitled window will be created with default properties.

If you create a new mimic from the **File** menu, you will have the option to base the new mimic on an existing mimic template. Leave this field blank to create a new mimic that is not based on a template.

Note: There is also a field for selecting the "Branch". The branch option currently does not apply to FactoryLink applications and should be ignored.

Opening a Mimic

To open a mimic, perform the following steps:

- 1 Click the OPEN button on the Standard toolbar or select the command from the **File** menu.
- 2 Select the name of the mimic you want to open from the window management box.

Closing a Mimic

To close a mimic, click the CLOSE button on the Standard toolbar or select the command from the **File** menu.

If changes have been made to the mimic since it was opened and they have not been saved, you will be asked if you want to save the changes.

Note: If a mimic view is not displayed at 100% (normal) magnification, any changes to window size and position are not saved.

Saving a Mimic

To save a mimic, click the SAVE button on the Standard toolbar or select the command from the **File** menu.

If you are saving a mimic for the first time (one that you have just created) then the window management box will be displayed and you must enter a mimic name. This name will be used in the future when opening the mimic and is also the name of the file in which the mimic will be saved. Because it is also the name of the file, it must adhere to the file naming scheme of the operating system.

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To save an existing mimic with a different name, use the **Save As** command on the **File** menu.

To save all open mimics, click the SAVE ALL button on the Standard toolbar or select the command from the **File** menu.

Opening Multiple Views of the Same Mimic

It is possible to have several views of the same mimic open at the same time in both run and design modes. All views of the same mimic are automatically updated with any changes made. For example you could have :

One view in run mode and the other in design mode.

One view zoomed in to make fine changes to drawings and another view at full size to see the effect of those changes.

To Open Another View of a Mimic

- 1 Select the mimic by clicking anywhere in it.
- 2 From the **Window** menu select **New Window**.

Iconizing and Restoring a Window

Windows that have been iconized are displayed along the outer borders of the workspace. You can specify the borders where iconized windows should be arranged by selecting your preference on the **Display** menu. Iconized windows in run mode continue to be updated in real-time.

To Iconize a Window

Double click anywhere in the title bar of the window.

OR

Click the minimize button in the title bar.

To Restore an Iconized Window

Double click anywhere in the title bar of the iconized window.

Window Properties

Window Properties Box

The Window Properties box may be displayed either by selecting the option from the **Window** menu, or by right-clicking anywhere on a window's background and selecting **Window Properties**.

The window properties box has 5 tabs.

- Display
- Access Rights
- Included Window
- Links
- Template
- Advanced

Display Tab

The Display tab contains the main window properties that affect the window's appearance and behavior.

On the display tab, you can customize the following areas of a window:

- Position
- Size
- Background
- Title
- Style
- Grid
- Layers
- Decluttering

The *File* field lists the directory path and filename of the mimic. This field cannot be altered on the display tab.

MIMICS, WINDOWS, AND GRIDS

Mimics and Windows

Access Rights Tab

The Access Rights tab contains window properties that determine how the user may manipulate the window at runtime.

On the access rights tab, you can grant rights for the following:

- Level
- Zoom
- Layers
- Unauthorized Signal

Included Mimic Tab

This tab for window properties determines how the mimic behaves when it is opened as a child of another window or opened as a context window.

On the Included Mimic tab, the following options can be customized:

- Popup Behavior
- Opening Position

Links Tab

The window property options available from this tab determine which mimics are opened from link - open animations when using the substitution characters #M1 to #M10.

For more information, see the section on opening and closing windows under Control Zone Animation.

Template Tab

On this window property tab, you can select a mimic that has been saved as a template and then specify which properties should be inherited from the template by the current mimic.

In the *Template* field, enter the name of the template file to use. Or, click on the down arrow to select from a list of saved template files.

After providing the name of the template to use, put a check in the box next to each property you want inherited from the template.

Options**Table 3-2** Template Tab Parameters

Parameter	Definition
Position	Inherits the window position.
Size	Inherits the window size.
Background	Inherits the background style and color from the template mimic.
Title	Inherits the title of the template mimic.
Styles	Inherits the styles of the template mimic.
Grid	Inherits the grid visibility, alignment, size, and color.
Layers	Inherits which layers are displayed as default at runtime.
Access rights	Inherits the specified access rights from the template mimic.
Included mimic	Inherits popup behavior and opening position of child mimics.
Links	Inherits associated links from the template mimic.
Decluttering	Inherits the decluttering options from the template mimic.

Window Properties Advanced Tab

The Advanced tab lets you associate a bit with the window. When the bit changes to 1 or 0 it will produce a beep, depending on the settings you specify.

MIMICS, WINDOWS, AND GRIDS

Mimics and Windows

Drawing

Understanding Drawing

Drawing is the process by which you transform your blank windows into Menus, Overviews, Process Mimics, etc. You can draw in a window using three different mechanisms.

Using the workspace tools you can create mathematically defined drawing elements (geometric shapes) including rectangles, ellipses, lines, polygons, and text. Each element has a wide range of properties which allow you to quickly and easily change the appearance.

For example, a rectangle can appear as a button.

By importing bitmaps in BMP, JPG, or WMF format, you can display scanned images, standard Windows icons, etc.

Using OLE (Object Linking & Embedding) you can include information created in other applications, such as charts, graphics, and spreadsheet data.

You display the process you are supervising by attaching properties of the drawing elements to the real-time value of variables in the database.

For example, a polygon representing a valve can change color depending on the valve position. Attaching properties of drawing elements to the real-time value of variables is known as animation.

Geometric Shapes

The drawing elements produced by the workspace tools are defined as a set of coordinates plus properties describing color and style. They are, in effect, geometric shapes. The properties of geometric shapes are much easier to change and to attach to the value of variables in the database.

Pros

- Easy to draw and change.
- Very wide range of possibilities for dynamically changing properties.
- Window definition files containing only geometric shapes are very compact.
- Geometric shapes use memory efficiently when they are displayed.

Cons

- Pictures created with just geometric shapes do not normally look as "pretty" as those using bitmaps.

Bitmaps

A bitmap is literally a map of the area it occupies on the screen, with the color of each pixel (picture element) described by a number of digital bits. The number of bits used to define each pixel will depend on how many colors the picture is using. Eight bits per pixel can define 256 colors, 16 bits per pixel can define 64,000 colors, etc. Once a bitmap is created, there is very little that can be done to change it dynamically. You cannot, for example, attach an area of a bitmap to a database variable so that it changes color according to the value of the variable.

Pros

- There are many drawing and paint packages able to produce stunning pictures in bitmap format.
- Bitmaps may be created from "scanned in" pictures of real world objects.
- The number of colors which may be displayed in a bitmap is limited only by the capability of the host PC.

Cons

- Bitmaps, particularly those with lots of colors, need very large files to store them and use considerable amounts of memory (RAM) when they are displayed.
- Once they are created, bitmaps are difficult to change except in a paint or drawing package.
- Very limited possibilities for dynamically changing bitmaps according to the value of database variables.

Note: See also the section on Inserting an Image.

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Mimics and Windows

OLE

When linking or embedding information from another application, the information is displayed in the mimic in the same form as it would be in the original application.

For example, you could display a Word document. When you double-click on the object in design mode, the application in which the object was originally created is automatically opened with the object displayed and is ready for editing. When you return to Client Builder, the mimic reflects any changes you've made to the object.

Pros

- You can display information in virtually any form, as long as there is a Windows application, supporting OLE, capable of editing it.

Cons

- You must use the original application to change the object.
- Very limited possibilities for dynamically changing OLE objects according to the value of database variables.

Drawing Popup Menu

The drawing popup menu gives quick access to the most frequently used commands and to the drawing element properties box. The menu is accessed by right-clicking anywhere in a selected drawing element (or group of elements).

Note: The window in which the drawing element resides must be in design mode.

Options

Table 3-3 Drawing Popup Menu Parameters

Parameter	Definition
Cut	Cut the drawing element and place it on the clipboard.
Copy	Copy the drawing element to the clipboard.
Delete	Delete the drawing element.
Group	Create a drawing group from the selected elements.

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Ungroup	Return a drawing group to its individual elements.
Lock	Lock the drawing element. When a drawing element is locked, no changes can be made to it. The element cannot be moved, resized, or deleted.
Unlock	Unlock the drawing element.
Create Symbol	Create a symbol using the selected drawing elements. To include more than one drawing element in the symbol, the elements must be grouped. When you create symbols, they are stored in a "library" of symbols you have created. You can then add symbols to any mimic by dragging and dropping them from the Library. The Library can be viewed by using the Display menu or by inserting a symbol from the Insert menu or from the button on the Draw toolbar.
Arrange	Arrange the selected drawing elements. These same options are available on the Arrange menu or the Arrange toolbar.
View Script	Launches the Script Editor and lets you view any scripting associated with the selected drawing element.
Properties	Display the drawing element's properties box.

Drawing Grid

The grid is a tool to help you precisely position your drawing elements. It is an imaginary matrix of coordinates within each window.

When you create a drawing element, if grid alignment is turned on, the size and position of the drawing element will automatically adjust so that each of its corners is located on the nearest grid point.

When you move a drawing element, as you release the mouse button, the top left hand corner will automatically move to the nearest grid point.

MIMICS, WINDOWS, AND GRIDS

Mimics and Windows

Turning Grid Visibility On or Off

The grid visibility can be turned on or off using one of the following methods:

- Use the GRID button on the Arrange toolbar.
- Right-click on the window background and select **Grid** from the popup menu.
- Check or uncheck grid *Visible* on the display tab of the window properties box.

Note: Whether the grid is visible or not, does not affect its operation. If grid alignment is enabled, drawing elements will still snap to the grid even if the grid is not visible.

Turning Grid Alignment On or Off

For normal drawing, it is highly recommended that the grid alignment is always turned on. However, there are occasions when you may need to position a drawing in a location not on a grid point.

The grid alignment can be turned on or off using one of the following methods:

- Use the ALIGN button on the Arrange toolbar.
- Right-click on the window background and select **Align** from the popup menu.
- Check or uncheck grid *Enabled* on the display tab of the window properties box.

Changing the grid resolution

The standard grid resolution of 8 pixels is suitable for most applications. However, if you have a special requirement, you can change the X and Y pixel resolution from the display tab of the window properties box.

Chapter 4

Graphics, Drawing Elements, and Text Elements

Inserting an Image

Client Builder supports the use of images in standard BMP, JPG, WMF, or EMF format. The use of images can considerably enhance the appearance of your application. However, before using them, you should view the pros and cons of using bitmapped images.

Before you can insert an image, you must move it to the correct directory using the Windows Explorer or another file management tool. The image must reside in the "Bitmap Files" folder of your project directory.

An image is inserted as a reference. In other words, the name of the image is inserted in the window definition file. This means that even when it has been inserted into a window, an image may still be edited by Paint or any other drawing package. Any changes made will be visible the next time the window is opened. Therefore, if you need to make changes to an image that is used in several different locations, after you have made the changes, you will not need to re-insert the image.

To Insert an Image

To insert an image, perform the following steps:

- 1 Click the Insert Image button in the Draw toolbar or select the option from the **Insert** menu. A box will be displayed containing a list of available images and an area in which they may be previewed.
- 2 Select the library in which the image is located.
- 3 Select the name of the desired image from the list. If necessary, a filter may be entered to reduce the number of images displayed in the list.

GRAPHICS, DRAWING ELEMENTS, AND TEXT ELEMENTS

Inserting an Image

- 4 Click the Insert button to insert the image. The image will be placed at the top left hand corner of the mimic. Drag the image to move it to the desired location.

Note: **HINT:** To insert an image directly into the required location, drag the name of the image from the list, or drag the thumbnail of the image, and drop it on the desired location in the mimic.

Using Image Transparency

It is possible to define one of the colors that appears in an inserted image as transparent. This will let you see the background of the mimic or any drawing elements under the image through any area of the image that is defined as a transparent color.

Selecting a Transparent Color

To select a transparent color, perform the following steps:

- 1 Display the image properties box by double-clicking on it.
- 2 Put a check in the Transparent Color check box. The cursor will change shape to a small circle.
- 3 Click on the area of the bitmap that contains the color you want to make transparent.
- 4 Click the OK button to confirm the change.

Graphic Explorer

The Graphic Explorer provides a hierarchical view of all drawing elements, texts, animations, library objects, ActiveX controls, etc. forming a mimic. You can display the Graphic Explorer from the **Display** menu or from the Standard toolbar.

The Graphic Explorer provides the following information:

- A list of all mimics currently open.
- For each mimic, a list of drawing elements and the coordinates of their anchor point.
- For each drawing element, any animation that has been applied.
- For each animation, the name of any database variables used.

You can also display and change the properties for any drawing element by double clicking on its entry in the Graphic Explorer.

Renaming Elements

When you create drawing elements, text, etc. in a mimic, each item is given an internal default name (Shape1, Shape2, etc.) You can change these default names in the Graphic Explorer by selecting an element, waiting a moment, and clicking on the element again. Type in the new name and press Enter.



Color

Color Palette

The color palette is displayed each time you select a color property from any mimic or drawing element properties box. You can also view the color palette by selecting it from the **Display** menu.



You should understand how to use each area of the Color Palette before starting any drawing.

Table 4-1 Color Palette Parameters

Parameter	Definition
	<p>Selected Colors - This top portion of the Color Palette shows the colors currently in use.</p>
	<p>Transparent Color - Click here to choose transparent. When you use a transparent color for a drawing, the background will be seen through it.</p>

GRAPHICS, DRAWING ELEMENTS, AND TEXT ELEMENTS

Inserting an Image

	<p>Indexed Colors - When you color a drawing using one of the colors from this area, the color is saved in the drawing. If you change the color in the palette, the color in the drawing is not affected.</p>
	<p>Custom Colors - Clicking this button will show or hide a palette for custom colors. When you color a drawing using one of the colors from this area, the color is inserted as a reference. That is, if you change the color in the palette, the color of all drawings using it will also change.</p>

Changing a Color in the Palette

You can change any of the colors in the palette using the Color Picker. To display the color picker, double-click on the color in the palette that you want to change.

A color is defined by the three components of hue, saturation, and luminance.

- Hue describes the color's shade or tint. It is measured on a circular spectrum running from red to green to blue and returning to red.
- Saturation describes the hue's purity. A color with a saturation of 100% is bright and vivid, and a color with a saturation of 0% is a shade of grey.
- Luminance describes the color's brightness. A color with luminance of 100% is always pure white, and a color with luminance of 0% is always pure black.

Selecting a Blinking Color

Some drawing elements support blinking colors. A blinking color contains two color selections. At runtime the affected part of the drawing element will alternate between them at a predefined rate.

To select a blinking color, perform the following steps:

- 1 Check the Blinking Color check box.
- 2 Pick the first color and click the left down arrow button to select it.
- 3 Pick the second color and click the right down arrow button to select it.
- 4 Select a preset blink period from the Blink drop-down list.

Note: You can adjust the blink periods from the preferences on the **Tools** menu.
Choose Tools > Preferences > Blinking.

- 5 Click OK to apply the color

Defining a Color as Transparent

When a transparent color is applied to a drawing element, the affected property becomes invisible and the background or any drawing elements under it may be seen.

To define a color as transparent, perform the following steps:

- 1 Check the Transparent Color check box.
- 2 Click OK to apply the color.

Coloring a Drawing

The Color Palette may be used to Color a drawing directly or by changing the colors using the drawing's properties box.

Change a Drawing's Color Directly

To change a drawing's color directly, perform the following steps:

- 1 Open the Color Palette.
- 2 Select a drawing by clicking on it with the left mouse button. The palette will display the drawing's current colors in the Color Selection area.
- 3 To change the Color of the fill (or the background color of text) click on the new color with the left mouse button.

To change the Color of the border (or text) click on the new color with the right mouse button.

GRAPHICS, DRAWING ELEMENTS, AND TEXT ELEMENTS

Inserting an Image

Note: If you select more than one drawing, the color changes will be applied to all the selected drawings.

Change a Color in a Drawing Properties Box

To change a color in a drawing properties box, perform the following steps:

- 1 Display the drawing's properties box from the **Edit** menu, the Drawing Toolbar, or by right-clicking on the drawing and selecting Properties.
- 2 Click on the Color to change - the Color palette will be displayed.
- 3 Click on the Color in the palette with the left mouse button.
- 4 If you want the Color to blink select the second Color with the right mouse button.
- 5 Click OK on the drawing's properties box.

Copy the Colors from an Existing Drawing

To copy the colors from an existing drawing, perform the following steps:

- 1 Open the Color Palette.
- 2 Click on the drawing element from where the colors are to be copied. Subsequent drawings will be initially created using these colors

Note: The physical color which appears on the screen can vary slightly according to the graphic board and screen resolution of the PC. Therefore, for 100% accuracy, it is best to develop an application on a PC with the same specification as the one that will be used in the final system.

Drawing Geometric Shapes

Drawing a Rectangle, Ellipse, or Arc

Rectangles, rounded rectangles, ellipses, 1/2 ellipses, 1/4 ellipses, and arcs use the same basic drawing element but with different properties. The procedure to draw them all is as follows.

- 1 Click on the relevant button on the **Draw** toolbar.
- 2 Position the cursor on the screen where the drawing is to start.

- 3 Click and drag the cursor until the drawing is the required size.
- 4 Release the mouse button.

Note: If you hold down the Shift key while drawing a rectangle or ellipse, the height and width will be the same. Doing this lets you draw a perfect square or circle.

The method to draw a 1/2 ellipse or 1/4 ellipse is the same. The only difference is that the point at which the drawing is started will determine the orientation of the drawing element.

After drawing an arc, open the properties box and on the Aspect tab, specify the Start and End angles of the arc. If the Start and End angles are both 0, the arc will be a complete ellipse.

Drawing a Line

To draw a line, perform the following steps:

- 1 Select the Line button from the **Draw** toolbar.
- 2 Position the cursor on the screen where the drawing is to start.
- 3 Click and drag the cursor until the line is of the required length.
- 4 Release the mouse button.

Drawing a Polygon or Polyline

To draw a polygon or polyline, perform the following steps:

- 1 Select the Polygon or Polyline button from the **Draw** toolbar.
- 2 Position the cursor on the screen where the drawing is to start and click and release the mouse button.
- 3 Move the cursor to the next desired position and click and release the mouse button.
- 4 Continue adding as many points as desired to the drawing.
- 5 On the last point to be added, click the right mouse button to complete the drawing.

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Drawing a Bézier Curve

To draw a Bézier curve, perform the following steps:

- 1 Select the Bézier Curve button from the **Draw** toolbar.
- 2 Position the cursor on the screen where the beginning point of the curve is to start and click and release the mouse button.
- 3 Move the cursor to where you want the midpoint of the curve and click and release the mouse button.
- 4 Move the cursor to where you want the endpoint of the curve and click the right button to complete the drawing.

Dotted lines from each endpoint to the midpoint will appear. These lines are tangents. Click and drag the tangent handles to adjust the angle of the curve.

For more information, see [Changing the Shape of a Bézier Curve](#).

Drawing Properties

Properties Box

The properties box is displayed by several possible methods.

- Double-clicking on a drawing element or text.
- Selecting a drawing element and choosing Properties from the **Edit** menu or Draw toolbar.
- Choosing Properties from the drawing popup menu.

The contents of the box will vary slightly depending on the type of shape selected.

For single dimension elements (line or polyline) the box will contain only the Base drawing tab. This is for changing the basic properties such as color fill, line thickness, etc.

For two dimensional elements and text, the box will also contain an Aspect tab.

For animated elements (see section on Animation) the box will contain additional tabs, depending on the animation that has been applied.

Note: Some of the drawing elements have properties that are not frequently used. To keep things simple, these are not normally displayed in the properties box. If advanced properties are available, there will be a large button with a down arrow on it at the bottom of the properties tab. Clicking here will increase the size of the tab to display the Advanced Properties.

Drawing (Base) Tab

From the Base tab in the properties box, you can modify a drawing element's main properties such as its pattern styles, line styles, position, and size.

Pattern

The pattern properties define the fill of a solid drawing element such as a rectangle or polygon.

- *Color* - The color for the lines of a pattern or the fill color if the pattern is solid.
- *Style* - The pattern with which the shape is filled. The pattern can be
 - Solid
 - Diagonal 45° or -45°
 - Vertical or Horizontal hatch
 - Vertical & Horizontal hatch
 - Diagonal + and - 45°
 - Invisible
- *Background* - The color for the background if any pattern other than solid or transparent is selected.

Line

The line properties define the appearance of the outline or edge of a solid drawing element such as a rectangle or ellipse, and of a line or polyline.

- *Color* - The color of the line.
- *Style* - The style of the line. The style can be:
 - Solid
 - Invisible
 - Dashed
 - Dotted

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- Dash dot
- Dash dot dot
- Invisible
- *Thickness* - The width of the line in pixels.

Note: Only the solid line style is available for line thicknesses greater than 1.

Position and Size

The position is the X and Y location from the top left hand corner in pixels.

The size is the width and height of the drawing in pixels.

For a polygon or polyline, the position and size refer to an imaginary rectangle drawn around its extremities.

Aspect Tab (for drawing elements)

From the Aspect tab in the properties box, you can display and modify the properties that define the shape of the drawing element (rectangle, circle, etc.) and its appearance (button, shadow, etc.).

The Aspect tab is only available for two dimensional drawing elements.

Shape

- *Shape* - The shape of the selected drawing element. The drawing element can be one of the following:
- Rectangle
- Rounded Rectangle
- Ellipse
- 1/2 Ellipse
- 1/4 Ellipse
- Arc
- *Curvature* - The radius of corners of the shape.

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Note: The curvature option is only available if the shape is a rounded rectangle. For more information, see [Changing the Corner Radius of a Rounded Rectangle](#).

- *Border* - The border of a 1/2 or 1/4 ellipse or an arc can be Open or Closed. An open border leaves the ends of the ellipse or arc open. A closed border makes the ellipse or arc appear more like a solid shape.
- *Angles* - The Start and End Angles are used when drawing an arc. Specify the points on a 360° circle where the arc should start and end. If both are set to 0, the arc will be a complete ellipse.

Appearance

Appearance - Lets you quickly modify the appearance of a rectangle to one of the following:

- Shadow
- Button
- Colored Button
- Relief
- Inverse Relief

Note: To make buttons or colored buttons with text, use the Aspect Tab for Text.

Advanced Drawing Properties

Advanced Properties

Most of the drawing elements and text support additional advanced properties which are not normally displayed in the properties box. To display the advanced properties, click the down arrow button at the bottom of a property box. The box will change to show the advanced properties for that specific drawing element.

Note: To make these advanced properties always visible, select Advanced Mode from the **Display** menu. The advanced properties will be displayed every time you view a drawing element's properties.

Under the Advanced Properties, you can change any of the following:

- Visibility Bound
- Anchor

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- Layers
- Rotation Angle
- Locked or Unlocked

Visibility Bound

The display of drawing elements may be linked to a zoom level. That is, the drawing elements are not visible unless the mimic is displayed within a certain zoom range.

The main use of this technique is to keep large or complex mimics less cluttered. For example, if you have a mimic that is 1600 x 1200 pixels in size, you might normally move around it using the scroll bars. You can also zoom out so that the entire mimic is visible. In this case, you may now have so much activity on the screen that the most important information is no longer obvious. By linking some of the drawing elements to, for example, 100% (normal) view you can automatically reduce the amount of information visible so that the most important information is readily seen.

Linking the Display of a Drawing Element to a Zoom Threshold

To link the display of a drawing element to a zoom threshold, perform the following steps:

- 1 Display the drawing element's advanced properties.
- 2 Enter a Minimum Zoom and a Maximum Zoom.

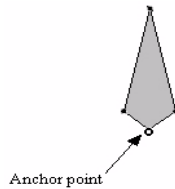
The drawing element will not be visible below or above this range. For example, if the Minimum Zoom is 100% and the Maximum Zoom is 200%, the drawing element will not be visible if the mimic is zoomed out below 100% or if it is zoomed in more than 200%.

Minimum Zoom cannot be less than 0%. Maximum Zoom cannot be more than 6400%.

- 3 Click OK to confirm the change.

Anchor Point

The X, Y coordinates represent the anchor point of a drawing element. The anchor point is the point around which the element can be rotated. In design mode, you can rotate lines, polygons, polylines, bézier curves, and text. In run mode, you can rotate all drawing elements except text. You can move the anchor point by using the mouse, or you can specify specific X, Y coordinates for the location of the anchor point.



Changing the Anchor

To change the anchor, perform the following steps:

- 1 Display the drawing element's advanced properties.
- 2 Enter the X and Y coordinates for the Anchor. The coordinates 0, 0 are the upper left-hand corner of the element. For polygons, polylines, and bézier curves, it is the upper left-hand corner of the imaginary rectangle enclosing the element.
- 3 Click OK to confirm the change.

Layers

Each mimic contains 16 display layers. At runtime, you can select which of the layers are displayed either manually, using the Layers toolbar, or automatically according to defined criteria (the current User, process conditions, etc.) The layers are completely independent of one another and you can choose to display one or more layers at any one time.

Each drawing element is placed in a layer. Any drawing elements not placed in the selected layers are not visible in the mimic.

By default, when a mimic is created, it displays all layers. Layer 0 is the default in which drawing elements are placed when they are first created. Therefore, if you do not intend to use layers, there is no action you need to take.

Placing a Drawing Element in a Specific Layer

To place a drawing element in a specific layer, perform the following steps:

- 1 Display the drawing element's advanced properties.
- 2 Select a layer level (from 0 to 15).

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- 3 Click OK to confirm the change.

HINT: If the drawing element seems to disappear and you can't find it again, make sure the layer to which it is assigned is visible. Use the Layers toolbar to make various layers visible or invisible.

Rotation Angle

Rotation is the process of rotating a drawing element about its anchor point. You can rotate polygons, polylines, bézier curves, and text. You can rotate these drawing elements freely using the Rotate command on the Draw toolbar or the **Draw** menu. Or you can provide an exact angle in degrees of rotation under Advanced Drawing Properties.

Entering an Exact Angle of Rotation

To enter an exact angle of rotation, perform the following steps:

- 1 Display the drawing element's advanced properties.
- 2 Enter the exact number of degrees you want to rotate the drawing element.

Note: You can provide positive or negative angles from -360° to 360° .

- 3 Click OK to confirm the change.

Locked or Unlocked

A drawing element that has been locked cannot be moved or changed. A drawing element can be locked or unlocked from the **Edit** menu, the Arrange toolbar, or the drawing popup menu. Or drawing elements can be locked or unlocked from the Advanced Drawing Properties box.

Locking and Unlocking from Advanced Properties

To lock and unlock a drawing element from Advanced properties, perform the following steps:

- 1 Display the drawing element's advanced properties.
- 2 Put a check in the box labeled Locked to lock the drawing element. Uncheck the box to unlock the drawing element.
- 3 Click OK to confirm the change.

Manipulating and Arranging Drawings

Selecting

A drawing element must be selected before you can do anything to it. A selected drawing element is surrounded by a number of small blocks known as handles. An anchor point, about which certain drawing elements may be rotated, is also displayed. The anchor point appears as a small black circle with a white center. The location of the anchor point may be changed by using the mouse.

Selecting a Single Drawing Element

- 1 Choose the Select tool from the Draw toolbar or the **Draw** menu.
- 2 Point to the drawing element and click.

Selecting Multiple Drawing Elements

- 1 Choose the Select tool from the Draw toolbar or the **Draw** menu.
- 2 Hold down the Shift key on the keyboard, then point and click on each drawing element you want to select.

OR

- 1 Choose the Select tool from the Draw toolbar or the **Draw** menu.
- 2 Click anywhere in the blank area of the mimic. As you drag the mouse, a box appears that you can drag around the elements you want to select. In some drawing applications, this is known as "rubberbanding." All drawing elements totally or partially within the rectangular area will be selected.

When selecting several drawing elements, each one is surrounded by handles with a white center except the last to be selected which has normal black handles. This element is known as the reference and in certain operations is used to provide new properties for the other elements.

Note: If you click anywhere outside of one of the selected drawing elements, all the drawing elements are deselected.

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Manipulating and Arranging Drawings

Select All Drawing Elements

Use the Select All command from the **Edit** menu to select all the drawing elements in the current mimic.

Grouping

A drawing group is a collection of one or more drawing elements that behave as if they were one. For example, when moving them within the window, their relative positions to each other remain the same although as a group they may be moved anywhere within the window. All the tools which operate on single drawing elements may also be used on a drawing group.

Note: You cannot arrange or align individual drawing elements that are grouped. You must ungroup them before individual manipulation can be performed.

Creating a Group

- 1 Select one or more drawing elements.
- 2 From the Drawing pop-up menu, from the **Edit** menu, or from the Arrange toolbar, select the Group command.

Ungrouping

- 1 Select a drawing group.
- 2 From the Drawing pop-up menu, from the **Edit** menu, or from the Arrange toolbar, select the Ungroup command.

Moving and Resizing

Moving a Drawing Element

- 1 Select the drawing element.
- 2 Click anywhere within the drawing element and drag it to its new location.

Note: You can drag the drawing element or group within the same mimic or to another mimic.

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Manipulating and Arranging Drawings

Nudging a Drawing Element

- 1 Select the drawing element.
- 2 Use the arrow keys on the keyboard to move the drawing one pixel at a time.

Resizing a Drawing Element

- 1 Select the drawing element.
- 2 Click and drag one of the drawing element handles to its new position. Clicking on one of the handles on the side of a drawing element changes its width. Clicking on one of the handles on the top or bottom of a drawing element changes its height. Clicking on one of the corner handles allows the width and height to be changed simultaneously.

Note: Hold down the Shift key while resizing a rectangle or ellipse from a corner handle to keep the height and width the same. Doing this lets you draw a perfect square or circle.

To resize a polygon, polyline or Bézier curve, group it, resize the group, and ungroup it.

Grouped elements can be moved or resized with the same methods.

Note: Hold down the CTRL key while resizing a group so the drawing elements will maintain the ratio of their size in relation to each other.

Copying and Pasting

Client Builder uses the standard Windows method of cut, copy, and paste. However, Client Builder can also duplicate drawing elements as described further below.

Copying to the Clipboard

Select one or more drawing elements.

From the Drawing pop-up menu, from the **Edit** menu, or from the Standard toolbar, select the Copy command. You can also press CTRL+C on the keyboard.

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Manipulating and Arranging Drawings

Cutting to the Clipboard

Select one or more drawing elements.

From the Drawing pop-up menu, from the **Edit** menu, or from the Standard toolbar, select the Cut command. You can also press CTRL+X on the keyboard.

Duplicating

- 1 Choose the Select tool from the Draw toolbar or the **Draw** menu.
- 2 Press and hold the CTRL key on the keyboard.
- 3 Click and drag on the drawing element.
- 4 Release the mouse button. A duplicate of the drawing element will be inserted at the cursor location.

Pasting the Clipboard Contents

- 1 Click in the mimic to select it.
- 2 From the Drawing pop-up menu, from the **Edit** menu, or from the Standard toolbar, select the Paste command. You can also press CTRL+V on the keyboard.

The contents of the clipboard will be pasted in the selected mimic. The location will be the same as that of the original drawing element.

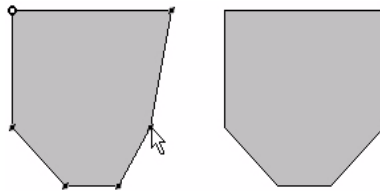
Pasting the Clipboard Contents to a Specific Location

- 1 Click in the mimic to select it.
- 2 Right-click on the mimic background where you want to paste the contents of the clipboard
- 3 Select the Paste Here command.

The contents of the clipboard will be pasted at the current cursor position.

Changing the Shape of a Polyline or Polygon

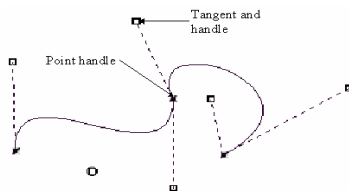
When a polygon or polyline is selected, instead of the normal eight handles (like on rectangles or ellipses), there will be a handle for each point. These handles may be used in the same way as for a normal drawing element, except that instead of resizing the drawing element, they are used to reshape it.



To resize a polyline or polygon group (so you have a group of just one drawing element), resize the group, and then ungroup it.

Changing the Shape of a Bézier Curve

The points which define the shape of a Bézier curve may be moved in the same way as for a polyline or polygon. In addition, each point has two tangents and associated handles which may be used to reshape the curve. The tangents are anchored at one end to each point and are parallel to the curve where they join it. By moving the tangent handles, you adjust the angle at which the curve intersects with each point and its radius.

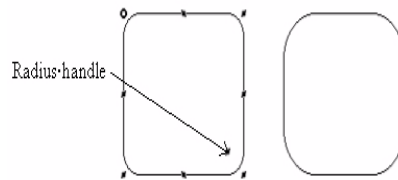


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Manipulating and Arranging Drawings

Changing the Corner Radius of a Rounded Rectangle

When you click on a rounded rectangle, you will notice that there is an additional handle in the lower right-hand corner. By clicking and dragging the handle, you can change the radius of the corner without having to display the Aspect tab of the drawing's properties.



Rotating

Rotation is the process of rotating a drawing element about its anchor point. In design mode, you can rotate lines, polygons, polylines, and bézier curves. You can also rotate text, but only if the *Do Not Auto Size* property on the Aspect tab is unchecked and the Regular appearance is chosen. In run mode, you can rotate all drawing elements except text by using Position Animation. Text cannot be rotated while in run mode.

Rotating a Drawing Element in Design Mode

Select the Rotate tool from the **Draw** menu or the Draw toolbar. The cursor will change shape to a circle with an arrow head.

Click within the drawing element you want to rotate and drag the cursor in a straight line in any direction. The angle of rotation is directly proportional to how far you move the cursor.

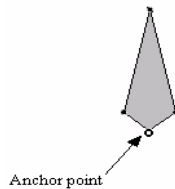
The drawing element rotates about its anchor point.

Release the mouse button when you have rotated the drawing to its new position.

Note: You can also specify an exact angle in degrees of rotation under the Advanced Drawing Properties box.

Moving the Anchor Point

- 1 Select the drawing element.
- 2 Move the cursor over the anchor point. The cursor will change shape to an anchor.
- 3 Click and drag the anchor point to its new location.



Note: Another way to move the anchor point is to change the X, Y coordinates of the Anchor under the Advanced Drawing Properties box.

Text

Inserting Text

Text is created in much the same way as any other drawing element except, as part of the process, the text string to be displayed must be typed in. When text is inserted, its dimensions are supplied by a supporting rectangle. This rectangle may or may not be visible depending on the appearance chosen for the text.

To Insert text

- 1 Select the Text command from the Draw toolbar or the **Draw** menu.
- 2 Position the cursor on the screen where the text is to start and click the left mouse button.
- 3 Type in the text to display.
- 4 Press the Enter key on the keyboard to confirm the text.

The text will initially appear with default properties. To change the text or its appearance, use the properties box.

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Text Properties

Text Tab

From the Text tab in the properties box, you can modify the text, color, size, and position.

- *Text* - The text to be displayed. Make changes to the text you have typed in this box. To make changes to the font, style, and point size, click on the button.

Text

- *Color* - The color of the text.

Background

- *Color* - The color of the background behind the text.

Position and Size

- *Position* - The X and Y location from the top left hand corner in pixels.
- *Size* - The width and height of the drawing in pixels.

For text, the position and size refer to an imaginary rectangle drawn around its extremities. If you change the appearance of the text on the Aspect tab, the rectangle may be visible; for example, as a button.

Aspect Tab (for text)

From the Aspect tab in the properties box, you can display and modify the properties that define the text and its appearance (button, shadow, etc.).

Text

- *Do Not Auto Size* - If this option is *not* checked, when you resize the box around the text, the text itself will grow or shrink in proportion. When this option is checked, resizing the box around the text does not change the size of the text itself.
- *Multiline* - If this option is *not* checked, all text will stay on one line. If you make the box around the text smaller than the text itself, the words will be cut off by the box. When this option is checked, as you resize the box around the text, the words will wrap to the next line as necessary in order to stay visible.

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- *Alignment* - How text is aligned within the box surrounding it. It can be one of the following:
 - Left
 - Center
 - Right
- *Margin* - How many pixels the text will allow between itself and the edge of the surrounding box.

Appearance

Appearance - Lets you quickly modify the appearance of the box surrounding the text to one of the following:

- Shadow
- Button
- Colored Button
- Relief
- Inverse Relief

Resizing Text

Resizing text is a way of changing the font size besides using the Text tab. If the *Do Not Auto Size* box on the Aspect tab is unchecked, the point size of the font automatically changes to fit the surrounding rectangle.

To Resize Text

To resize text, perform the following steps:

- 1 Select the text.
- 2 Click and drag one of the corner handles to its new position. The width and height of the surrounding rectangle and the point size of the font will change simultaneously.

GRAPHICS, DRAWING ELEMENTS, AND TEXT ELEMENTS

Manipulating and Arranging Drawings

Chapter 5

Animation and Expressions

Animation

What is Animation?

Animation is the process by which a drawing element is given the capability of interacting with the user. This interaction can be visual, or using the keyboard and mouse, or both. There are two distinct types of animation, although the principle of applying them both is the same.

Property animations connect a visual property of a drawing element, for example its color, to the database. At runtime, the appearance of the drawing element changes in real-time according to the database and the animation you have applied to it. Most of the time, you will be using animation to display the real-time value of variables. But it may also be used to display the result of an expression, an attribute such as a variable's Domain, or context information such as a database tag.

Control Zone animations create an area in a window from which a user may interact with the application using the keyboard and mouse. Control zones allow the user to change the value of variables, open and close mimics, run programs, etc.

How to Apply an Animation

The basic principle of applying all animations is the same. The following example is for applying a Color on Bit animation to a text string.

- 1 Open the mimic which is to contain animation and select design mode.
- 2 Select the drawing element you want to animate. A Color on Bit animation may be applied to all drawing elements except bitmaps and pre-animated objects.
- 3 From the menu bar, select **Animate > Color > Bit**.
- 4 The Drawing properties box will appear with a new tab called **Colors Bit**.

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Animation

- 5 Enter the name of the bit either by typing it in directly or by using the Variable selector. (The variable selector may be displayed by clicking the button at the end of the Bit field).
- 6 Check the boxes corresponding to the state of the bit (Off, On, or Unavailable) and the property it is to affect. The tab with the paint can symbol is for the background of the text, the tab with the pen for the text itself.
- 7 Select the colors corresponding to state of each selected property. Blinking and transparent colors may be used. For more information on selecting colors see the sections on color under drawing.
- 8 Select OK to confirm the animation.

Applying Multiple Animations

Sometimes you want to apply more than one animation to a drawing element. There are no restrictions on applying multiple animations, but before you do, you should take into account the following points:

Before applying more than one animation, double check that one of the standard animations will not meet your requirements. Many of them support combinations of animation using two or more database variables.

There is no way to prioritize animation. For example, if you apply two colors on bit animations to the same drawing element, the most recent bit change will provide the color.

Animations are only refreshed when the value of the attached database variable changes. With unusual combinations, such as a polygon that has rotation and a bargraph fill applied to it, this can produce unexpected effects.

When applying multiple animations, each animation will have its own tab in the drawing properties box.

Removing an Animation


To remove an animation without deleting the drawing element, perform the following steps:

- 1 Display the properties box for the drawing element.
- 2 Select the tab for the animation to be deleted.
- 3 Click the trashcan symbol.

- 4 Click OK to confirm the change.

Note: If you do not click OK to confirm the change, the animation will not be removed.

What Does the ! Symbol Mean?

If you see the  symbol adjacent to any drawing, it means that an animation has been applied, but the variable name is unresolved. While this may occur for many reasons, the following are the most common:

The variable name reason was entered incorrectly when the animation was created.

The variable has been deleted from the database.

Advanced Animation Properties

Some of the animations have properties that are not frequently used, such as bargraph, send, run, or link animations. To keep things simple, these are not normally displayed in the animation tab. If the animation you are using has advanced properties, there will be a large button with a down arrow on it at the bottom of the animation tab. Clicking here will increase the size of the tab to display all the properties.

Property Animation

Property Animation

Property animations connects a visual property of a drawing element, for example its color, to the database. At runtime, the appearance of the drawing element changes in real-time according to the database and the animation you have applied to it. Most of the time, you will be using animation to display the real-time value of variables. But it may also be used to display the result of an expression, an attribute such as a variable's Domain, or context information such as a database tag.

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Animation

Property animation on the **Animate** menu consists of:

- Color
- Text
- Objects
- Positions

Animate Color

Changing the color of a drawing element is one of the simplest and most commonly used ways of presenting process information to the user. You can use the status of bits or alarms and the value of register variables as the source of a color change. Some animations allow you to use a combination of variables, for example a bit and alarm.

All color animations allow you to independently change both the border and pattern (background and characters for text) of a drawing element. This gives a very wide range of color combinations. You may use the blinking and transparent options in your choice of colors. All the animations include the capability to select a special color to be used whenever any of the variables are invalid. (For example when communication to a PLC has failed).

Each color change animation is represented by a tab in the properties box of the drawing to which it is applied. Although the appearance of the tab will vary depending on the type of color animation chosen, all will contain two common symbols representing the pattern and border properties. The symbol representing patterns looks like a paint bucket. The symbol representing border properties looks like the tip of a pen.

The following table shows what type of color animation options you can apply. These options are available from the menu bar by selecting **Animate > Color**. They are also available on the Animations toolbar under the Color tab.

Table 5-1 Animate Color Parameters

Parameter	Definition
Bit	Color selection according to the status of a bit.
Bit Group	Color selection according to the binary combination of <i>up to</i> 4 bits.
Register Bit	Color selection by a bit masked from a register using a binary rank. For example, if you use the 3rd bit, when the binary representation of the register is xxxxxxxxxxx1xx the color selected for 1 will be displayed. When the binary representation of the register is xxxxxxxxxxx0xx the color selected for 0 will be displayed.
Bit and Alarm	Color selection according to the binary combination of the 2 states of a bit and 4 states of an alarm.
Weighted Bits	Color selection according to the binary combination of <i>up to</i> 8 bits. The values can then be weighted according to a level. For example, color will change only if the bit value is less than 20.
Register Value	Color selection according to the combination of <i>up to</i> 8 levels applied to a register. For example, color will change only if the register value is less than 20.
Bargraph	Color changes, or "fills", the selected drawing element according to an applied tag. As the value changes in the database, color moves. You can specify the maximum and minimum level as well as the direction (up, down, left, or right) that the color flows. HINT: Use this type of animation for such things as showing the level of liquid in a tank or the change in temperature.
Legend	Changes a rectangle to a legend or gauge. The upper and lower limits of the scale can be entered manually or it can be associated with a database tag. You can also specify the direction (up, down, facing left, or right) of the legend. HINT: Use this type of animation in conjunction with the bargraph animation. By adding both legend and bargraph animation to a rectangle, you can quickly and easily create a gauge that fills as the data changes.

ANIMATION AND EXPRESSIONS

Animation

Animate Text

Animating text provides real-time textual information to the user

All text animations use a text field as the drawing element. The text field provides the font, color and the style (inverse, button, etc.) properties.

Note: You cannot animate a text field that has been rotated.

Note: Each text animation is represented by a tab in the properties box of the text to which it is applied. The appearance of the tab will vary depending on the type of animation chosen. Those animations that combine two features, such as Text with Color on Bit will have two tabs in the properties box, one for each type of animation.

The following table shows what type of text animation options you can apply. These options are available from the menu bar by selecting **Animate > Text**. They are also available on the Animations toolbar under the **Text** tab.

Table 5-2 Insert Text Parameters

Parameter	Definition
Text	Displays text by obtaining the string from a specified tag. As the tag changes in the database, the text changes.
Text with Color on Bit	Displays text like above, as well as changing the color selection according to the status of a bit.
Label	Displays the label property of a tag. Note: This is only applicable to structured databases.
Label with Color on Bit	Displays a label like above, as well as changing the color selection according to the status of a bit.
Display Register	Displays a register value by obtaining the value from a specified tag. As the tag changes in the database, the text changes.
Display Register with Color on Bit	Displays a register value like above, as well as changing the color selection according to the status of a bit.

Animate Symbols

Any symbols you have created by using Create Symbol on the **Edit** menu, can be inserted into a mimic and then animated. When you animate a symbol, you can have the symbol that is shown change to another symbol in the Library.

Each symbol animation is represented by a tab in the properties box of the drawing to which it is applied. The appearance of the tab will vary depending on the type of symbol animation chosen.

The following table shows what type of symbol animation options you can apply. These options are available from the menu bar by selecting Animate > Symbols. They are also available on the Animations toolbar under the Symbol tab.

Table 5-3 Animate Symbol Parameters

Parameter	Definition
Bit	Symbol selection according to the status of a bit.
Bit Group	Symbol selection according to the binary combination of <i>up to 4</i> bits and with a choice of up to 4 Symbols.
Register Bit	Symbol selection by a bit masked from a register using a binary rank. For example, if you use the 3rd bit, when the binary representation of the register is xxxxxxxxxxx1xx the symbol selected for 1 will be displayed. When the binary representation of the register is xxxxxxxxxxx0xx the symbol selected for 0 will be displayed.
Register Value	Symbol selection according to the combination of <i>up to 4</i> levels applied to a register. For example, the symbol will change only if the register value is less than 20.

Animate Position

Each position animation is represented by a tab in the properties box of the drawing to which it is applied. The appearance of the tab will vary depending on the type of position animation chosen.

The following table shows what type of position animation options you can apply. These options are available from the menu bar by selecting Animate > Position. They are also available on the Animations toolbar under the Position tab.

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Table 5-4 Animate Position Parameters

Parameter	Definition
Single Axis Positioning	<p>Move a drawing element in one or two axes according to the value of one register. This is a linear movement.</p> <p>You can also set the value of a register by clicking on a drawing element and dragging it.</p> <p>The X and Y axis positioning is relative to the anchor point of the selected drawing element.</p> <p>HINT: Use Single Axis Positioning to create a slider like those found on the Windows Volume Control panel. This can be used to change a value by clicking and dragging with the mouse.</p>
2 Axes Positioning	<p>Move a drawing element in two axes according to the value of two registers. You can also set the value of two registers by clicking on a drawing element and dragging it two axes.</p> <p>The X and Y axis positioning is relative to the anchor point of the selected drawing element.</p> <p>HINT: Use 2 Axes Positioning to compare the relative values of two variables in a simple X, Y chart.</p>
Free Positioning	<p>Move a drawing element freely according to the value of two registers. One register provides the X axis value and the second register provides the Y axis value.</p> <p>In Free Positioning animation, the X and Y axis is an absolute value for the position on the screen. In this case, 0,0 is the upper-left position of the screen.</p>
Rotation	<p>Rotate a drawing element according to the value of a register. All drawing elements can be rotated with animation except text.</p> <p>To define the angle through which the drawing rotates, specify a minimum and maximum value for the register along with their corresponding angles. Rotation occurs around the anchor point of the drawing element.</p> <p>HINT: Use Rotation animation to move a needle in a simulated analog meter.</p>
Scaling	<p>Resize a drawing element according to the value of a register.</p>

Control Zone Animation

Control Zone Animation

A control zone is an area on the screen where a user may interact with the user interface.

Control zones provide the following actions:

- To send a value to a bit, register, or text database variable.
- To run a script, program, or application.
- To give a user access to timetables.
- To open and close mimics.

A control zone is created in the same way as any other animation by selecting a drawing element and applying an animation to it. At runtime, to draw attention to itself, when the cursor is over a control zone it changes shape and the drawing is highlighted with a button style border.

Control zone animations may be applied to any drawing element. However, because the highlight which appears around a control zone is rectangular and based on the dimensions of the drawing element, a rectangle, text field, or bitmap looks the best.

Control zone animation on the **Animate** menu consists of:

- Send
- Run
- Link

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Enabling and Disabling Control Zones

You can enable and disable each control zone that you create using a database bit. You may use the same or a different bit for each control zone.

A database bit is used because of the flexibility it gives you. The value of the bit could come from a piece of equipment such as a PLC, from another station on a local area network, or derived internally using an expression or script. You can choose to disable the control zone on either the 1 or 0 state of the bit.

By using the *Warning Box* and/or *Warning Beep* check boxes, you can display a warning message and/or produce a beep from the PC's speaker if a user attempts to use the control zone at run time when it is disabled.

These properties are available in the advanced section of the properties box.

ToolTips using the Comment Field

All of the animations used to create control zones have a text field called *Comment* in their properties tab. A string entered into the comment field, preceded by the @ character, will be displayed as a ToolTip when the cursor is positioned over the control zone.

Note: Without the @ character, text entered in the comment field will not show up as a ToolTip.

Animate Send

Each Send animation is represented by a tab in the properties box of the drawing element to which it is applied. The appearance of the tab will vary depending on the type of animation chosen. Animation which combines two features, such as Bit with Color, will have two tabs in the properties box, one for each type of animation.

The following table shows what type of send animation options you can apply. These options are available from the menu bar by selecting Animate > Send. They are also available on the Animations toolbar under the Send tab.

Table 5-1 Animate Send Parameters

Parameter	Definition
Bit	Allows the user to force the state of a single bit. The sent bit can be forced to 1 or 0. It can also be reversed. In other words, if the bit was 0 it becomes 1 or if it was 1 it becomes 0. The bit can also be sent directly without confirmation or with a label which requires confirmation.
Bit with Color	Allows the user to force the state of a single bit, like above. It is also combined with a color tab allowing color animation.
Double Bit	Allows the user to change the state of 2 bits at the same time. This is useful when a device requires separate signals to start and stop it. The command is always confirmed with a dialog box.
Register	Allows the user to change register values. The user can supply the information in four different ways. <ul style="list-style-type: none"> • Directly from the keyboard, • By incremental steps, • From a graphical keypad which appears and allows interaction with a mouse, • A default value can be supplied which the user can confirm or change. The value can also be entered directly into the text field of the drawing element when the user clicks on it.
Text	This animation may be applied to any of the solid drawing elements, but it is normally used with Text in which case the string may also be displayed. Strings may be entered either from the keyboard, or by using the mouse and a displayed keyboard.
Region	Specifies which region the mimic should be opened in. If you have multiple monitors attached to the same system, each monitor can be a different region.

Note: On the properties tab for each type of Send animation, you can provide a Hot Key. This is a series of keystrokes that can be used instead of clicking on the drawing element with the mouse. Leave the field set to None if you don't want to assign a Hot Key.

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Animate Run

The Run Application animation allows you to start another Windows application, such as Notepad, directly from a control zone.

The Run Application option is available from the menu bar by selecting Animate > Run. It is also available on the Animations toolbar under the Run tab.

The Run Application Properties Tab

- *Application* - The full path and name of the executable program required to run the application. The ellipsis button opens a file browser.
- *Arguments* - Optional command line arguments to be passed to the application. For example, the name of a file to open.
- *Working Directory* - The path of the directory that contains the original files or some related files. Sometimes an application needs to use files from a different location than that of its executable program.
- *Comment* - Any tooltip popup information.
- *Hot Key* - A series of keystrokes that can be used instead of clicking on the drawing element with the mouse. Leave the field set to None if you don't want to assign a Hot Key.
- *Startup Behavior* - Determines the appearance of the application when it is started. It can be one of the following options:
- *Normal Window* - The application starts in a window which is normal size for the application.
- *Iconic Window* - The application starts iconized. Depending on the access rights of the user and the configuration of the operating system, the icon may not be visible or accessible.
- *Full screen window* - The application starts maximized, in a window occupying the whole screen.

Note: the Startup Behavior is available under the Advanced Animation Properties.

Animate Link

Each Link animation is represented by a tab in the properties box of the drawing element to which it is applied. The appearance of the tab will vary depending on the type of animation chosen.

The following table below what type of Link animation options you can apply. These options are available from the menu bar by selecting **Animate > Link**. They are also available on the Animations toolbar under the Link tab.

Table 5-1 Animate Link Parameters

Parameter	Definition
Open	<p>The Link Open animation may be applied to any drawing element, although normally it will be applied to a text string with the text used as an indication to the user. The appearance on the Aspect tab of the text properties can be set to Button or Colored Button.</p> <p>The name of the mimic to be opened is selected using the <i>Mimic</i> drop down list box.</p> <p>You can also provide the X and Y coordinates in pixels for the position of the opened mimic. An absolute position opens the mimic at the X and Y coordinates specific to the screen. A relative position opens the mimic at the X and Y coordinates relative to the location where the mimic was originally saved. For example if the mimic was saved at position 50, 70 and a relative position of 30, 10 is supplied, the mimic will be opened at 80, 80.</p>
Close	<p>The Link Close animation may be applied to any drawing element, although normally it will be applied to a text string with the text used as an indication to the user.</p> <p>Specify the name of the mimic to be closed in the <i>Mimic</i> field.</p>
HyperLink	Allows you to create a link to a Web page.
Note	Allows a note to the user to be opened when the drawing element is clicked with the mouse. Provide the name and location of the file to be opened. The file type can be a .TXT or .RTF file. If the <i>Read Only</i> box is checked, the user will not be allowed to make changes to the note when it is opened. Otherwise, the user can make changes which can be saved.

Note: On the properties tab for each type of Link animation, you can provide a Hot Key. This is a series of keystrokes that can be used instead of clicking on the drawing element with the mouse. Leave the field set to None if you don't want to assign a Hot Key.Expressions

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What Are Expressions?

An expression allows the calculation of a value by using one or more variables, functions, operators, and constants. An expression is automatically evaluated each time any of the variables within it change.

Expressions may be defined and used in two ways.

- 1 They can be entered directly in any animation in the field normally used for a variable name. Expressions used in this way are only evaluated while the window containing the animation is open. An expression is differentiated from a variable name by preceding it with an equal (=) sign.
- 2 They can be entered in the Expression Editor where they are known as an expression model. Each model is identified by a name that is then used instead of a variable name. This is useful where the same expression is used a number of times. The animation uses the result of the expression (it does not take a copy of the expression and evaluate it) and hence if the expression is changed this is automatically reflected in any animation in which it is used.

Expression Syntax

An expression contains the name of at least one or more database variables, operators, functions and numeric constants.

The following rules must be observed when entering an expression.

Expressions are limited to 20 symbols. (A symbol is a database variable, a constant, an operator or a function).

A space, a bracket or an equal sign must always precede a function.

When an expression is entered directly in an animation it must be preceded by an equals sign. This tells the HMI to interpret the field as an expression and not as a reference to a variable.

When using an expression model in an animation it must be immediately preceded by an equal sign (no space).

Functions

Function	Operation	Syntax
SIN	Sine (degrees)	SIN(val)
COS	Cosine (degrees)	COS(val)
TAN	Tangent (degrees)	TAN(val)
ASIN	Arc sine	ASIN(val)
ACOS	Arc cosine	ACOS(val)
ATAN	Arc tangent	ATAN(val)
LOG	Natural log	LOG(val)
EXP	Exponential	EXP(val)
ABS	Absolute value	ABS(val)
FLOOR	Round down	FLOOR(val)
CEIL	Round up	CEIL(val)

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Operators

Operator	Operation	Syntax
+	Addition	Var1 + Var2
-	Subtraction	Var1 - Var2
*	Multiplication	Var1 * Var2
/	Division	Var1 / Var2
==	Equality	Var1 == Var2

!=	Inequality	Var1 != Var2
>	Greater than	Var1 > Var2
>=	Greater or equal	Var1 >= Var2
<	Less than	Var1 < Var2
<=	Less or equal	Var1 <= Var2
! or NOT	Logical NOT	! Var1 or NOT Var1
or OR	Logical OR	Var1 Var2 or Var1 OR Var2
&& or AND	Logical AND	Var1 && Var2 or Var1 AND Var2
~ or BNOT	Binary NOT	~ Var1 or BNOT Var1
or BOR	Binary OR	Var1 Var2 or Var1 BOR Var2
& or BAND	Binary AND	Var1 & Var2 or Var1 BAND Var2
POW	Power	Var1 POW Var2
MOD	Modulus	Var1 MOD Var2
>> N or RSHIFT N	Right shift (N bits)	Var1 >> N or Var1 RSHIFT N
<< N or LSHIFT N	Left shift (N bits)	Var1 << N or Var1 LSHIFT N

Expression Examples

- =CL:Motor1.Stop & CL:Motor1.Start | CL:Motor1.Fault
- =(CL:Inlet.Flow1 + CL:Inlet.Flow2)/100
- =CL:Tank1.Temperature & 65520
- =EXP(LOG(CL:Tank.Pressure)/2)

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Expression Editor

When the same expression is required in several places, it can be useful to centralize its definition using the Expression Editor to create an expression model. Once you have created an expression model it is used in an animation by inserting its name instead of that of a variable. The syntax of expression models is the same as that used when you enter an expression directly in an animation.

The Expression Editor is displayed from the **Tools** menu and contains two main areas.

- 1 A tree control area that is used to browse the expression models defined in the project. A right-click in this area displays a pop-up menu that allows you to create, copy, paste and delete expression models.
- 2 A configuration area that shows the definition of the selected element in the tree control area. If the root icon is selected, all expression models and their related definitions are displayed. Double clicking on an expression model displays a box in which it may be viewed and changed.

Creating an Expression Model

To create an expression model, perform the following steps:

- 1 Display the Expression Editor.
- 2 Right-click in the tree control area. Select the New command from the pop-up menu.
- 3 Enter the name by which the expression model will be known.
- 4 Double click on the model name in the right-hand pane. A box is displayed into which you enter the expression. The expression may be continued on several lines. The browser button may be used to select variable names.

Chapter 6

Servers

Servers and Clusters

When you create a new project, you will need to associate a set of servers and clusters with the project. Configuring the servers is done from the **Tools** menu.

Setting Up The OPC Server Type

To set up the OPC Server type, perform the following steps:

- 1 Right-click on SERVERTYPES and select New.
- 2 Provide a name for the Server Type.
- 3 From the Type drop-down list, select OPCDA20 for a data server, AlarmFW10 for an alarm server, or TrendFW10 for a trend server.
- 4 From the Computer drop-down list, select the computer that has the running server.

The Class ID and the Prog ID will be filled in automatically.

Note: If you select My Computer from the drop-down list, the local machine will always be used as the server. This means that if you move the Client Builder project to another machine, that new machine will be where the project looks for the server. However, if you browse the network and select your local machine by name, that *exact* machine will always be used as the server. This means that if you move the project to another machine, it will continue to look for the original machine for the server.

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Servers and Clusters

Adding a New Server

To add a new server, perform the following steps:

- 1 In the left-hand panel of the Servers Editor, right-click on the server type you have just created and select Add Server.
- 2 Provide any Name for your server.
- 3 In the Run Time section, from the Computer drop-down list, browse to the machine that has the running server, expand the tree under the computer, and select USDATA.Server for data servers, FLAlarmServer.AlarmServer for alarm servers, or TrendDSServer.Server for a trend server.
- 4 Repeat the process for the Design Time section.

The Run Time server is the server where Client Builder will get the data and variables when the project is running.

The Design Time server is the server where Client Builder will get the list of variables when creating animation and building the project. The Design Time server provides only a list of variables and is faster to access when in design mode.

Setting Up a Cluster

To set up a cluster, perform the following steps:

- 1 In the left-hand panel of the Servers Editor, right-click on CLUSTERS and select New.
- 2 Enter any Name for the cluster.
- 3 In the Server Type Name drop-down list, select the name of the SERVERTYPE you created earlier.
- 4 Click Set.

Adding a Server to the Cluster

To add a server to the cluster, perform the following steps:

- 1** In the left-hand panel of the Servers Editor, right-click on the cluster you have just created and select Add Member.
- 2** Provide any Name for the new member of the cluster, or keep the default name of the server you created earlier.

Note: The Rank option will be used for redundancy if you have multiple servers in the same cluster. All of the servers must be of the same type (data, alarm, or trend) and contain the same data. When a FactoryLink tag is referenced in Client Builder animation, Client Builder will check the cluster for the highest ranked server. If that server is unavailable, Client Builder will check the next highest ranked server until it finds an available server. The Rank option is not functional in this release.

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Servers and Clusters

Chapter 7

Security

Security

From the Security item on the **Tools** menu, you can perform one of the following:

- Log On - allows you to enter a user name and password to log on
- Log Off - allows you to log off as the current user
- Change Password - allows you to change the password as the user currently logged on. You will be prompted to enter your old password, a new password, and confirmation of the new password.
- Configure - allows you to configure the security for individual users and for user profiles.

Note: You must have Administration privileges to configure security.

Security Configuration

From the Security item on the **Tools** menu, you can configure Client Builder security.

Security configuration for Client Builder is similar to security configuration for Windows NT. First, set up profiles for various types of access, such as Administrator, User, Designer, and Guest, then set up user accounts and associate them with a profile.

Security User Manager

The User Manager is used to add and configure users and profiles. It is displayed from the **Tools** menu and contains two main areas:

- The left pane, which contains a tree control showing the users and allocated profiles. Right-clicking in this area will display a pop-up menu that may be used to add, copy, modify and delete users.
- The right pane, which contains a tree control showing the profiles and the users to which they have been assigned. Right-clicking in this area will display a pop-up menu that may be used to add, copy, modify and delete profiles.

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At the bottom is a list box from where you can select the default user.

Adding and Configuring a Profile

To add and configure a profile, perform the following steps:

- 1 Open the User Manager by selecting Tools >> Configure >> User Manager from the pull-down menu.
- 2 Right-click in the right pane of the User Manager box and from the pop-up menu select the New Profile option.
- 3 Enter a name for the new profile. This creates a new un-configured profile.
- 4 Right-click on the new profile and from the pop-up menu select the Edit Profile option. A box is displayed containing a list of user right categories. If you are configuring a new profile then none of the categories will have any rights selected.
- 5 To change a category double-click on its name in the list. The individual rights may then be enabled and disabled by selecting the corresponding check box. You can select other categories using the Category list box. ALL and NONE options are provided to quickly select all or none of the rights.
- 6 Confirm the changes by selecting the OK button in the Category box and the close button in the Profile box.

Adding and Configuring a User

To add and configure a user, perform the following steps:

- 1 Open the User Manager by selecting Tools >> Security >> Configure from the pull-down menu.
Result: Right-click in the left pane of the User Manager and from the pop-up menu select the New User option.
- 2 Enter a name for the new user. This creates a new un-configured user. User names are not case sensitive.
- 3 Right-click on the new user and from the pop-up menu select the Edit User command. A box is displayed containing the user properties.
- 4 Enter a password for the user in the Password field and confirm the password by entering it again in the Confirm Password field. Click the Set button to set the password. Passwords can contain any alphanumeric character plus the underscore. Passwords are case sensitive.
- 5 Allocate a profile by selecting it in the list of Not Member Of and selecting the << button. You can add more than one profile. The rights are combined using a logical OR.

Close the User Management box using the Close button when finished.

HINT: You can also add profiles to users by dragging and dropping them in the main User Management configuration box.

Selecting Additional Options When Configuring a User

You can select two other options when configuring a user:

- Selecting the option Must Change Password at Next Log On, will force a user to change the password the first log on after this option has been selected.
- Selecting the option User Cannot Change Password will disable the option for a user to change his/her own password.

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Security Categories

Table 7-1 Security Categories Parameters

Category	Options	Description
Administration	NONE or ALL	<p>When set to ALL, the user has access to the following menu commands.</p> <p>Tools\Security\Configure...</p> <p>Tools\Servers...</p> <p>Tools\Project\Open...</p> <p>Tools\Project\Options...</p> <p>When set to ALL, the "Administration" security category allows users to perform all operations they want to do (and this, even if other security categories are set to NONE).</p>
Preferences	NONE or ALL	<p>When set to ALL, the user has access to the following menu commands.</p> <p>Tools\Preferences\Colors...</p> <p>Tools\Preferences\Blinking...</p> <p>Tools\Preferences\ActiveX Controls...</p> <p>Tools\Preferences\Decluttering...</p>
Design	NONE or ALL	<p>When set to ALL, the user can modify the current project. That is, add / modify / delete windows, graphical elements, animations and scripts.</p>
Desktop	Only two: NONE or ALL	<p>When set to ALL, the user has access to the underlying operating system keys (example: Ctrl-Alt-Del).</p>
Print	Only two: NONE or ALL	<p>When set to ALL, the user has access to the print tools.</p>

Exit	Only two: NONE or ALL	When set to ALL, the user may shut down the HMI.
Zoom	Only two: NONE or ALL	When set to ALL, the user may zoom windows.
Layer	0 to 15	At runtime, a drawing layer is displayed only if the user has the corresponding layer level.
Window	0 to 63	At runtime, a window may be opened only if the user has the corresponding window access level.
Command	0 to 63	At runtime, the value of a variable may be forced (from a control zone animation) only if the user has the corresponding command level.

The ability for the user to add additional security categories is provided to allow security checking for 3rd party embedded ActiveX controls. Additional security categories are added using a special text file which can be located in either the program directory of the Human Machine Interface (HMI) or the Config Files directory of the project. The text file can be given any name as long as it has a .SEC extension.

The format of the files is similar to the .INI files used by Windows itself. A section named [Categories] defines new security categories with the associated number of levels. Each new category then has a section of its own which is used to provide the name of the category to the user in one or more languages. This information is in the form of :

- Language ID=Label
- Where the Language ID is that used by Windows. The following is an example of this file.
- [Categories]
AlarmViewer=1
AlarmAck=32
[Category\AlarmViewer]
0009-English=AlarmViewer
[Category\AlarmAck]
0000-Neutral=Alarm Acknowledge
0009-English=Alarm Acknowledge
040C-French Standard=Acquittement d'alarmes
0C0C-French Canadian=Acquittement d'alarmes

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Logging Users On and Off

To log on, enter a user's name and password in the Log On dialog box. This is displayed from the Tools >> Security pulldown menu. It may also be available from one of the keyboard function keys depending on the project configuration (see the topic on keyboard layout in Chapter 1). When you log on, the current user (if any) is automatically logged off. It is not necessary for the current user to log off as a separate operation.

You can, if necessary, log off manually from the Tools >> Security pulldown menu.

Default User Rights

When the current user logs off, the access rights revert to those specified by the default user (as configured by the User Manager).

If there is no specified default user and there are one or more users configured, then at start-up or when a user logs off, the Security Log On box is displayed and all rights are disabled until another user logs on.

Chapter 8

Scripting

Scripting Language

About The Scripting Language

The scripting language supplied as part of the Human Machine Interface, or HMI, is licensed from a third party software vendor and is known as Cypress Enable. It is a VBA (Visual Basic for Applications) and VBScript compatible Basic Scripting Language designed to be embedded in software applications to control their environment programmatically and to work with other applications using OLE automation.

Cypress Enable is not VBA but operates in a similar environment and provides similar functionality. Anyone that has used VBA should feel immediately at home with Cypress Enable.

The information in this section explains features of the scripting language specific to its implementation with the HMI. It does not provide general information on VBA or information on programming in general. If you are totally unfamiliar with VBA, then before attempting any programming in the HMI it is suggested that you first of all obtain and read one of the many VBA books available or contact your distributor for details of training courses.

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Scripting Language

Scripting Language Environment

The Scripting Language Environment

The editor in which you develop, debug, and run scripts can be displayed either from the **Display** menu or by pressing Shift+F11.

The scripting environment is made up of the following features:

- Menu Bar
- Toolbar
- Project Explorer
- Properties List
- Code Window
- Output Window
- Search Window

Scripting Menu Bar

The menu bar provides access, using either the keyboard or the mouse, to all development tools. The menu bar may be turned on and off using the Workspace pop-up menu (displayed by right-clicking anywhere in the Scripting Workspace).

Scripting Toolbar

The toolbar provides instant access, via the mouse, to the scripting tools. The toolbar can be floating or docked - that is locked to one of the borders and may be turned on and off from a pop-up menu displayed by right-clicking on the menu bar.

The toolbar buttons provide quick access to the following tools:

- Display the HMI workspace. The script editor remains open in the background.
- Save the script that is currently open in the code window.
- Cut the selected text.
- Copy the selected text to the clipboard.
- Paste the contents of the clipboard into the code window.
- Find a word or phrase in the script open in the code window.

- Search for all occurrences of a word or phrase. The result is displayed in the search window.
- Enable the auto comment facility.
- Undo the previous edit.
- Redo the previous undo.
- Display the Project Explorer window.
- Display the Output window.
- Display the Properties List window.
- Compile the script currently being edited in the code window.
- Compile all of the scripts in the project.
- Toggle between design and run modes.

Scripting Project Explorer

The Project Explorer displays a hierarchical list of all objects within a project. A single click on any of the objects will display its properties in the Properties List. Double-clicking on any of the elements will display the script associated with it (if any) in the Code Window. Scripts other than those associated with a mimic or any of the objects it contains are saved in the Script File sub-directory of the project. Scripts associated with a mimic are saved in the mimic file itself.

All of the objects have an identifier (ID) and an object type or class (except Modules). The following standard object types are displayed.

- ThisSystem As System: The ID of the current System Object providing the operating system name, screen resolution, etc. The corresponding scripts are saved in System.bas.
- ThisApplication As Application: The ID of the current Application object. The corresponding scripts are saved in Application.bas.
- ThisProject As Project: The ID of the current Project object. The corresponding scripts are saved in Project.bas.
- TheseWindows As Windows: The ID of the current Windows object providing the total number of displayed windows currently open. The corresponding scripts are saved in Windows.bas.
- TheseMimics As Mimics: The ID of the current Mimics object providing the total number of mimics currently open. The corresponding scripts are saved in Mimics.bas.

SCRIPTING

Scripting Language

- **TheseVariables As Variables:** The ID of the current Variables object providing the total number of variables permanently subscribed. The corresponding scripts are saved in Variables.bas.
- **Modules:** Modules is not an object - it is a container provided to display and manage script modules.

In addition to these standard objects, the Explorer will contain a list of the objects that are included in any of open mimics.

Scripting Properties List

The Properties List provides a list of properties, methods, and events for the object currently selected in the Project Explorer window. The Properties List behaviour is the same as the Properties List available in the HMI workspace.

Scripting Code Window

The Code window is used to write, display, and edit the scripting language code. You can open several Code windows concurrently so that you can copy and paste between them.

The list box at the top left of the Code window displays the ID of the currently selected object (in the Project Explorer), and in the case of a Mimic, any objects it contains.

The list box at the top right of the Code window lists all available events for the selected object. An item that appears in bold text indicates that code has been written for that event.

The procedure code for an object appears in the script area as a single scrollable list sorted alphabetically by name. Selecting a procedure using the drop-down list boxes at the top of the Code window moves the cursor to the first line of code in the procedure you select. If you declare a new procedure, its name is automatically inserted in the events and procedures list. The text of the procedure is color-coded according to the context.

- Blue is used for a key word.
- Green is used for a comment.
- Black is used for all other text.

In the script you can get and set object properties and call object methods. To access the properties of an object, type its unique name followed by a full stop and the name of the property. For native HMI graphic objects and ActiveX controls a pop-up list (known as the dot popup box) is automatically displayed from which you can select the properties and method for that object.

Scripting Output Window

The Output window displays the output from any Print methods in the script.

Scripting Search Window

The Search window displays results from the use of the Find command. Double-clicking on any of the lines in the Search window will automatically open the relevant script for editing.

SCRIPTING

Scripting Language

Chapter 9

Objects, Properties, Methods, and Events

Understanding Objects, Properties, Methods, and Events

Objects are the fundamental building block of the scripting language; nearly everything you do in the scripting language involves modifying objects. Every element of the Human Machine Interface -- HMI, windows, drawings, animations, ActiveX controls and so on can be represented by an object in the scripting language.

- Objects and Collections
- Properties
- Methods
- Events
- Returning an Object From a Collection
- Looping Through a Collection

Objects and Collections

An object represents an element of The HMI such as a window or drawing element. A collection is an object that contains several other objects, usually of the same type. Using properties and methods, you can modify a single object or an entire collection of objects.

OBJECTS, PROPERTIES, METHODS, AND EVENTS

Understanding Objects, Properties, Methods, and Events

Properties

A property is an attribute of an object or an aspect of its behavior. For example, properties of a window include its name, its size and position. To change the characteristics of an object, you change the values of its properties.

To set the value of a property, follow the reference to an object with a full stop, the property name, an equal sign, and the new property value. The following example changes the color of the drawing element "Shape_Red."

```
Shape_Red.BackColorPrimary = RGB(255, 0, 0)
```

You can retrieve information about an object by returning the value of one of its properties. The following example returns the height of a drawing object.

```
ObjHeight = Object_Truck.Height
```

In this example, Object_Truck refers to a drawing element. The height of that drawing element is assigned to the variable ObjHeight.

Note: Not all properties can be set – some are read only.

Methods

A method is an action that an object can perform. For example, just as a drawing element can be moved the drawing element object has a Move method. Methods normally have arguments that qualify how the action is performed. The following example moves the bitmap "Bitmap1" to a new location within its window.

```
Bitmap1.Move NewXPos, NewYPos
```

In most cases, methods are actions and properties are qualities. Using a method causes something to happen to an object, while using a property returns information about the object or it causes a quality about the object to change.

Events

An event is an action recognized by an object, such as clicking the mouse or pressing a key, and for which you can write code to respond. Events can occur for a number of reasons:

- A user action such as clicking a mouse or pressing a key.
- A subscribed variable changing value.
- Because of other program code.
- Something happening in the system.

Returning an Object from a Collection

Most objects are returned by returning a single object from the collection. For example, the Windows collection contains the open The HMI windows. You use the Windows property of the ActiveProject object to return the Windows collection.

After you've accessed the collection, you can return a single object by using an index value in parentheses (this is similar to how you work with arrays). The index value is usually a number or a name. The following example displays the name property of the first window opened in a message box.

```
Dim ObjWindow As Object
Set ObjWindow = Application.ActiveProject.Mimics
MsgBox "Name = " & ObjWindow(1).Name, vbInformation, sCaption
```

Looping Through a Collection

You can loop through the elements of a collection in a number of different ways. However, the recommended method for looping on a collection is to use the For Each...Next loop. In this structure, the scripting language repeats a block of statements for each object in a collection. The following example displays the name of each open window in the Windows collection.

```
For Each objMimic In Application.ActiveProject.Mimics
  _MsgBox "Name = " & objWindow.Name, vbInformation, sCaption
Next
```

OBJECTS, PROPERTIES, METHODS, AND EVENTS

Understanding Objects, Properties, Methods, and Events

Using OPC Variables in Programs

Before you can use the properties, methods and events of any OPC server variables in your programs, the variables must first be added to the TheseVariables collection. These variables are then said to be permanently subscribed.

Managing Subscribed Variables

Subscribed variables are managed using a box displayed by right clicking on the TheseVariables object in the Project Explorer and selecting the Edit option from the displayed pop-up menu.

The box that is displayed contains a list of variables already subscribed and allows you to add, edit and delete entries.

Adding a Subscribed Variable

To add a subscribed variable, perform the following steps:

- 1 Double click on the New Variable entry in the list or select the Variables.New command from the menu.
- 2 Enter a name for the variable in the Variable Name column. This is the name by which it will be known in any programs, not the name by which it is known in the OPC server.
- 3 In the Reference Name field enter the name by which the variable is known in the OPC server. You can either type in the variable name or, by clicking on the ellipsis button to the right of the field, select it from the OPC Variable Browser.
- 4 Select the expected type for the variable. This will affect which class you use to access the variable object in a script and hence the available properties. If you select the [Any] option the variable is not strongly typed and can only be accessed using the generic variable class Variable.
- 5 Select the OK command button to confirm your changes.

Note: If the expected type does not match the type in the OPC server then the status property of the variable will be set to fvVariableStatusConfigError.

Deleting (Removing) a Subscribed Variable

To delete a subscribed variable, perform the following steps:

- 1 Right click on the entry in the Variable Name field.
- 2 Select the Delete command from the displayed pop-up menu.

Suspending Events for a Subscribed Variable

De-select the tick box adjacent to the variable name.

Note: Using the menu you can suspend or resume events for all variables.

Programming Hints and Tips

The following hints & tips (not presented in any particular order) have been accumulated during the development of this manual. They do not concern programming techniques but more the way in which you use the environment. The novice programmer or HMI user may find them useful to read.

When you switch a window into design mode, the scripting engine does not automatically follow. If you are manipulating drawing elements programmatically then this will continue even in design mode until you stop the program.

If you are manipulating drawing element programmatically then you can put a test in your program to see if the window is in design or run modes and behave accordingly.

If you encounter a program error at runtime, an error box is displayed and you are prompted to open the script editor. The script editor is automatically switched to design mode. After you have corrected the problem remember to switch the script editor back to run mode before returning to the HMI workspace.

If a program you have created doesn't seem to be working at all, check that the script editor is in run mode.

Any script changes that you make are automatically compiled when returning to the HMI workspace – if there are any errors you are immediately prompted to open the script editor again. If you are making many changes (or are just prone to typing errors!) it is much better to manually compile the programs before returning to the workspace.

OBJECTS, PROPERTIES, METHODS, AND EVENTS

Understanding Objects, Properties, Methods, and Events

Chapter 10

The Client Builder Environment

Client Builder for FactoryLink

Opening Position

On the Window Properties Included Mimic Tab, the opening position determines where a mimic is opened relative to the parent window. Select the opening position by clicking on any of the hatched areas in the window graphic.

You can choose to open the mimic relative to one of the corners of the parent window, or relative to the support drawing element for the link - open animation. You can also open the mimic relative to the cursor position.

When opening the mimic relative to one of the corners, specify the distance, in terms of X and Y coordinates, from that corner.

If you do not select any opening position, the mimic will be opened at the position defined by its own X and Y coordinates (as in the display tab).

Popup Behavior

On the Window Properties Included Mimic Tab, put a check in the box to enable popup behavior for the included mimic.

Popup behavior is defined by the following characteristics:

- A popup mimic is always opened as a child of another window.
- A popup mimic automatically closes as soon as focus is returned to the parent window.
- A dashed box is displayed around the control zone from which the mimic is opened.

THE CLIENT BUILDER ENVIRONMENT

Client Builder for FactoryLink

Layer Access

If layer selection is allowed on the Window Properties Access Rights Tab, the user can change the layers that are displayed at runtime.

Level Access

From the drop-down list on the Window Properties Access Rights Tab, specify the access level that the user must have in order to open the mimic. Access levels range from 1 to 99.

Unauthorized Signal

Warning signals can be applied on the Window Properties Access Rights Tab.

When the *Warning Box* is checked, a warning box is displayed if the user attempts to change the zoom or layers display when it is not permitted.

When the *Warning Beep* is checked, a warning sound is produced if the user attempts to change the zoom or layers display when it is not permitted.

Window Background

This Window Property option lets you specify the background color of the window. Click on the color box and pick a color from the color palette.

Note: You can also change the background color of the window by right-clicking anywhere on the background and selecting **Background Color** from the popup menu.

Window Decluttering

This Window Property option lets you specify a decluttering template to be used with the selected window. A decluttering template specifies which layers will be visible at specific zoom levels.

Decluttering templates are created from the **Tools > Preferences** menu.

Window Grid

This Window Property option lets you customize the grid and how it functions.

If the grid is Visible, it is displayed as dashed lines in both horizontal and vertical planes.

If the grid is Enabled, all subsequently produced drawing elements are aligned with the grid.

The X and Y values let you specify the grid size in pixels.

To change the color of the grid lines, click on the color box and pick a color from the color palette.

Note: You can turn the grid visibility and alignment on or off by clicking the GRID button or the ALIGN button respectively, on the Arrange toolbar. These options can also be enabled or disabled by right-clicking anywhere on the window background and making your selection from the popup menu. The grid color can also be changed from the popup menu by right-clicking on the window background.

Window Layers

The layer buttons on the Window Properties Display Tab determine which of the mimic layers are displayed as default when the mimic is opened at runtime.

Note: You can also select which layers are displayed from the Layers toolbar.

Window Position

This Window Property option lets you specify the pixel positions for the top left corner of the window relative to the top left corner of the workspace.

X is the position of the top left hand corner of the window relative to the left hand side of the workspace.

Y is the position of the top left hand corner of the window relative to the top of the workspace.

Window Size

This Window Property option lets you specify the width and height in pixels for the window.

THE CLIENT BUILDER ENVIRONMENT

Client Builder for FactoryLink

Window Style

The window style properties are mainly used to change how the window behaves. For example, if it may be iconized or moved.

Options

Table 10-1 Window Style Parameters

Parameter	Description
Title Bar	Display a title bar. If the title bar is selected the window automatically has a border.
System Menu	Display the system menu icon on the title bar.
Iconizable	Display the iconise button on the title bar. If this option is unchecked, the window cannot be iconized.
Maximize	Display the maximize button on the title bar. If this option is unchecked, the window cannot be maximized.
Sizeable	Allow the window to be sized by clicking and dragging the border. If this property is selected the window will have a border.
Moveable	Allow the window to be moved by clicking and dragging the title bar.
Foreground	Keeps the window in the foreground.
Modal	The window will behave as a modal. It will retain focus until the window is closed. Nothing outside a modal window can be selected.
Close	Display the close button on the title bar. If this option is unchecked, the window cannot be closed.
Small Caption	Display a narrow title bar and use a small font for the window title.
Border	Display a standard border around the window.
Client Border	Display a client border around the window.
Static Border	Display a static border around the window.

Scale to Fit Size	Any drawing elements in the window will be scaled to fit if the window is sized when in run mode.
Cache	Stores the window in memory. This will make the window open faster the next time it is called. However, the more windows stored in cache, the slower your system will run. The default is to allow no more than 5 windows stored in cache. You can change the allowed cache size under Tools > Options .

Window Title

This Window Property option lets you customize the text that appears in the window title bar. If a title is not specified, the name of the mimic (the filename) will be used.

Zoom Access

If zoom is allowed on the Window Properties Access Rights Tab, the user can zoom the mimic between the specified minimum and maximum zoom levels.

Workspace Appearance

This option lets you specify the background color of the workspace. Click on the color box and pick a color from the color palette.

Note: You can also change the background color of the workspace by right-clicking anywhere on the workspace background and selecting **Desk Background** from the popup menu.

Workspace Behavior

These options let you customize how the main workspace window behaves.

- If Minimize, Maximize, or Close are checked, these standard window buttons will be available on the title bar.
- If Move is checked, you will be able to move the workspace around on your desktop.
- If Size is checked, you will be able to resize the workspace.
- If Automatic Scrollbars is checked, when a child window does not fit within the workspace, scrollbars will automatically appear so you can scroll to see all of the child window.

THE CLIENT BUILDER ENVIRONMENT

Client Builder for FactoryLink

Workspace Position

This option lets you specify the left and top pixel positions for the top left corner of the workspace.

Note: This option is unavailable if the workspace is set to display in Full Screen.

Workspace Regions System

This options lets you customize how many regions your system has. From the drop-down list, you can select a system with 1, 2, 3, or 4 regions.

Workspace Size

This option lets you specify the width and height in pixels for the workspace.

You can also set the size to Full Screen.

Workspace Startup Region

This options lets you pick which region should begin at startup on a system with multiple regions.

On a system with 2 or more regions, click on the region you want to begin at startup.

Workspace Title Bar

This option lets you pick whether there will be no title bar, a standard size title bar, or a small title bar for the workspace.

Workspace Title

The title option lets you customize the text that appears in the workspace title bar.

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