Key Concepts

3

In This Chapter. . . .

Projects

A project is the set of screens and data (such as PLC protocol, baud rate and panel type) managed under a specific project name. Each project can correspond to a specific application. The Project Tutorial has the example of an application in a pulp mill, so the project is titled 'Pulp'.

Screens (Global and Local)

In ScreenCreator, a screen is an image of the actual screen displayed on the *Direct*Touch panel. There are two types of screens, global and local.
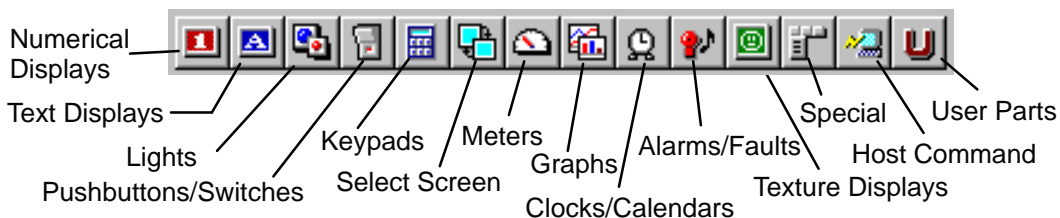
The Global Screen A project must have one, and only one, global screen. The global screen is created at the same time the project is created and has the same name as the project. The global screen can be used for displaying faults (alarms), or a clock/calendar. It functions like a window in front of any screen that is being displayed on the panel. So when nothing is being displayed on the global screen, it is transparent to the user.

Local Screens There can be *up to 1024 local screen names* in any given project. **The actual number of screens you can download to a panel depends on how much memory the screens use.** Local screens each function like a separate Operator Interface Panel having parts such as pushbuttons, meters and indicator lights, etc. When nothing is being displayed on the global screen, the current local screen is fully visible and functional.

Screen Objects

Anything that can be placed on a screen may be called a Screen Object, including Parts, Figures (circles, polygons, lines, etc.), Text, Bitmaps, and Textures. Figures may also be referred to as Drawing Objects or Patterns. This chapter also discusses Library Objects (Parts, Textures and Bitmaps in the Library), which are like Originals from which the Copies (Screen Objects) are made.

Screen Parts

Screen Parts are the most important type of Screen Objects. The major classes of parts are found in the Part Toolbar below.

Part Toolbar

Numerical Displays — Text Displays — Lights — Pushbuttons/Switches — Keypads — Select Screen — Meters — Graphs — Clocks/Calendars — Alarms/Faults — Special — Texture Displays — Host Command — User Parts

Access of a Part Access of a part refers to the way it is displayed within both ScreenCreator and on the panel.
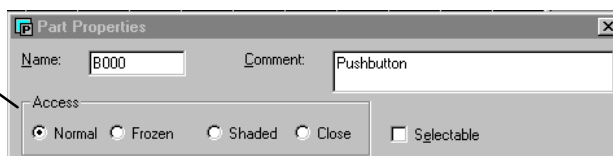
Normal: Displayed on the screen, including any data, and functional.

Frozen: Displayed as normal, but the pushbutton/switch is not functional.

**Shaded:** Displayed in shaded fashion, with no data or function.

Closed: Not displayed or functioning. (Must also be Selectable.)

Selectable: The access can be changed by a screen or part program. Before a part has closed access, it must be made Selectable.

A good example of a part made Closed and Selectable is a Ten–key pad being called by pressing a Numerical Input Display part. The Ten-key pad is opened by the part program of the display and closed by its own program once the *Ent* or *Esc* buttons are pressed.

Adding Parts to a Screen

When you click on any tool icon in the Part Toolbar, the Select Part window appears, with that type of part selected in the Class List. If you click on the Meters Tool, the window to the right comes up, allowing you to select one of the specific meter types below the 'Meters' heading. The Class List is much like a folder of folders in Windows 95/98 or NT.
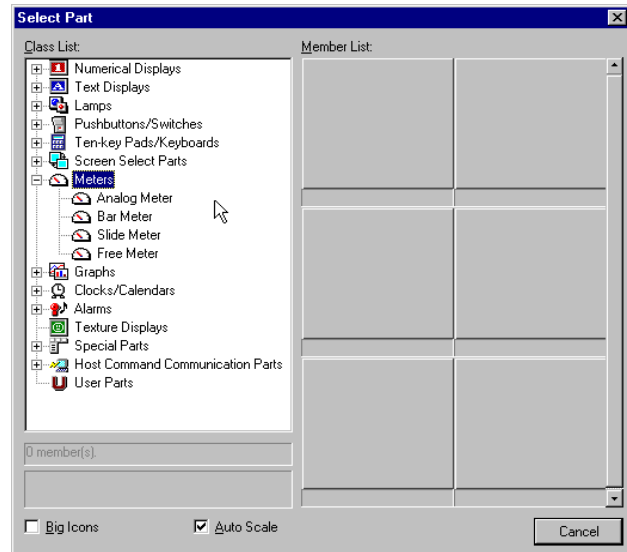
When you select the 'Analog Meter', the window then contains all the analog meters stored under that heading in the library.
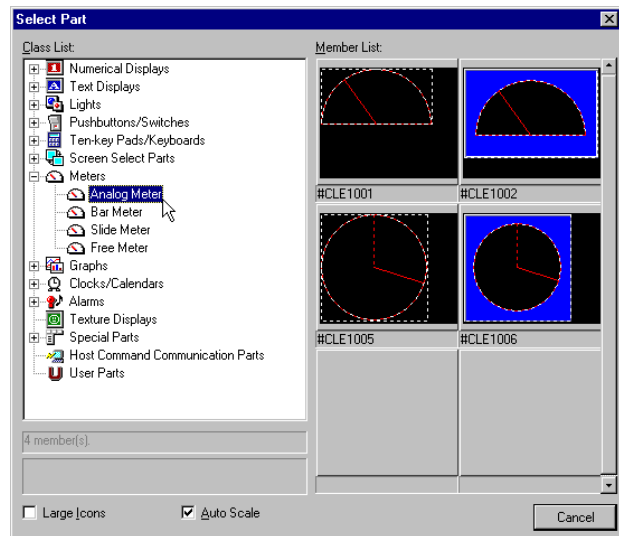
User Parts

The Class (or Heading) and Part Tool labeled 'User Parts' is reserved for any custom parts which you create. You may also store custom parts under any other heading if you prefer but it might not be as convenient. Creating new parts is covered in greater detail below.

Screen Parts versus Library Parts

The difference between what are called Screen Parts and what are called Library Parts is fairly simple. Screen Parts reside on a screen and have particular settings, like a PLC address referenced, BCD type, or a special color assigned. Whereas, Library Parts are like templates for creating actual Screen Parts— they have no specific PLC address but do have a default type, color and texture, etc. Library Parts are the Originals and Screen Parts are the Copies.
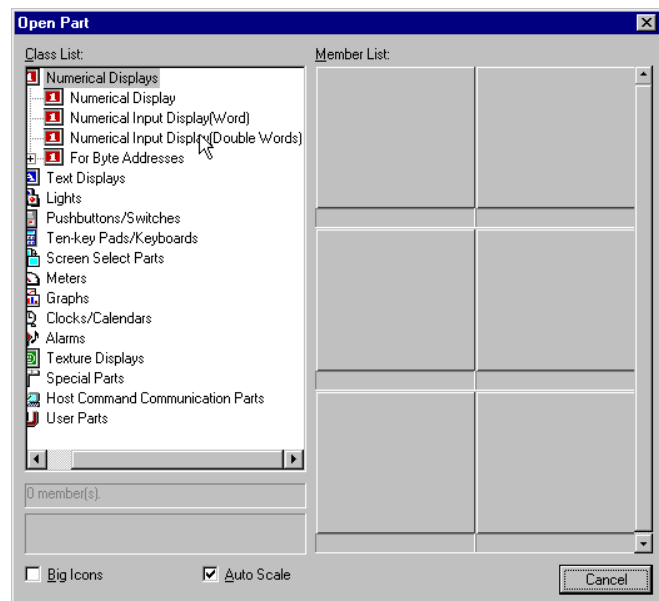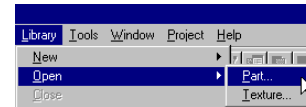
Library Parts

**Like Part
Templates**

All Library Parts are contained in the library file of ScreenCreator. Each part in the library is a template used to create actual parts on the screen. These library parts can be edited and saved as a new library part or edited and saved under the same name, overwriting the original part. Below you will find an example of editing and saving as a new name. Very often, this is how you will create a new library part (you will use an existing library part, change it and save it under a new name).

**Editing Library
Parts**

To edit a library part, click on **Library > Open > Part...** to bring up the Open Part window. This window looks just like the Select Part window, but the Open Part window opens the actual Library Part for editing. Be careful when opening a library part, because any changes you make will affect all future uses of that library part.

Remember, the Select Part window allows you to choose a Library Part to copy to the screen, but the Open Part window allows you to choose a Library Part to edit.

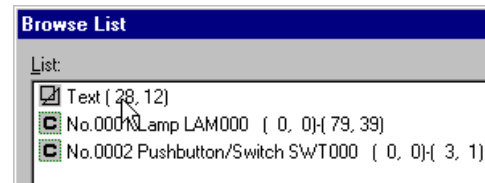**Creating a New Library Part from an Existing One**

To edit an existing Labeled Pushbutton w/ Light Part to create a new one with "CYCLE" on it. Select the Pushbutton as shown on the right (any with a label would do).
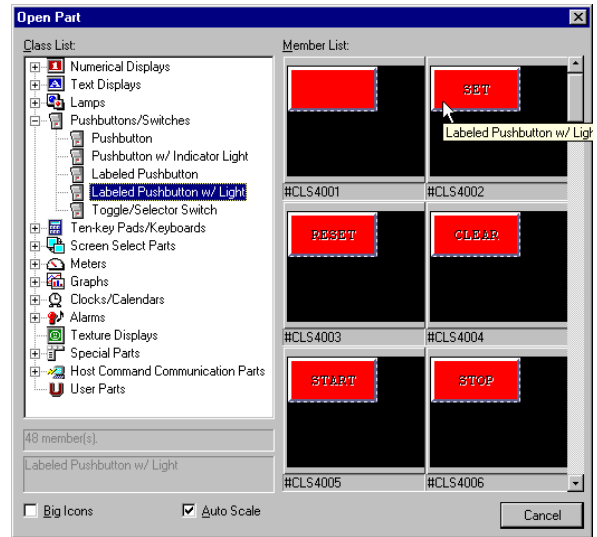

The Part window appears as shown on the right.

Click on the Browse List button to view the components of this part. Select the Text item and click Attributes/Properties to edit the Text. Remember, we want it to have "CYCLE" on the pushbutton.


Type "CYCLE" in place of "SET" and click OK. Notice that the new text is not centered on the part. Click and drag the text to center it (the pointer has four arrows when moving an object).
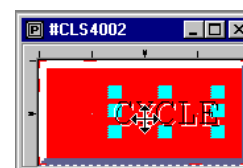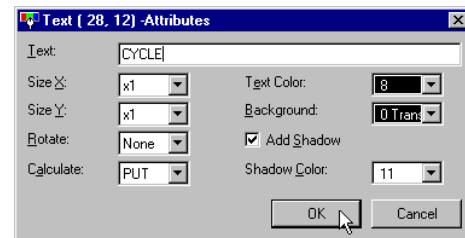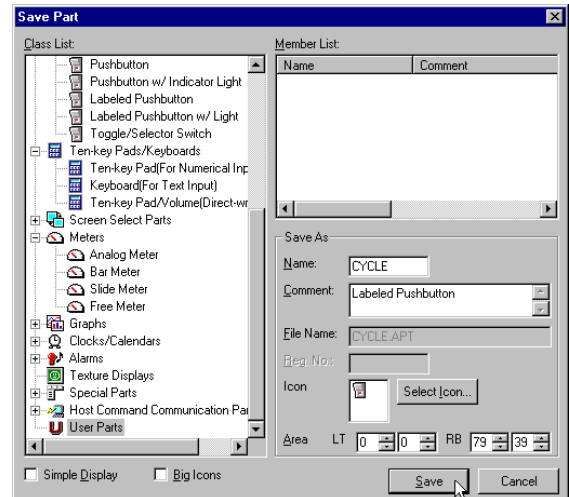
**Creating a New
Library Part from
an Existing One
(Continued...)**

Click the Save button and the
Save Part window appears with
the original heading "Labeled
Pushbutton w/Light" selected. If
we clicked Save, the changes
would be made to the original
library part: #CLS4002.
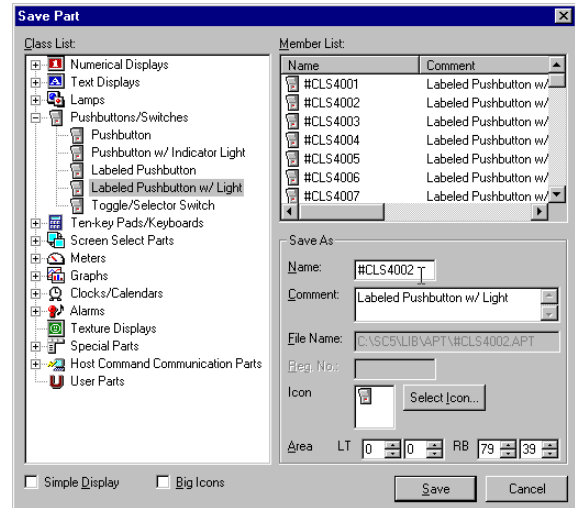
Instead, let's select the User Parts
class, change the name to CYCLE
and click Save.

Finally, click the **X** to close the new
Part window which is now labeled
CYCLE.

Creating a New Library Part from Scratch

What follows below are step-by-step instructions for creating a new library part.

In some cases, you may find it necessary to build a totally different type of Part. To create a brand new Library Part, click on **Library > New > Part...** and the Part Edit window appears, on the right. The Select Control tool is now active on the Drawing Toolbar and the control tools are colored and selectable in the Control Toolbar. This is because we are now editing a part, which can contain controls, versus a screen which cannot have controls alone.

Click the Size Window to Screen tool as shown above right, and the window becomes full sized with the dotted-line frame of the part.

Next, turn on the grid by clicking the Options tool in the Standard Toolbar. In the Options window, click to enable the Snap to Grid and enter 20 as the Grid Size. After clicking OK, notice the thin grid lines on the screen.

If the Controls Toolbar is not already open, select it from Tools > Display, and click New Default.

Click the Meter tool in the Control Toolbar which opens the Meter window and select medium for the needle thickness, then click the Arrangement and Color tab. Enter all of the settings as shown on the right and click Arrangement to place it on the window. The pointer becomes a mouse. Click the left mouse button and it becomes a cross–hair. Move the cross-hair to the upper left corner of the window and click to place the meter. This is what you should see.

If you do not see the outline of the meter, click on the the Display tool and select "Both" for View of Parts and View of Controls.
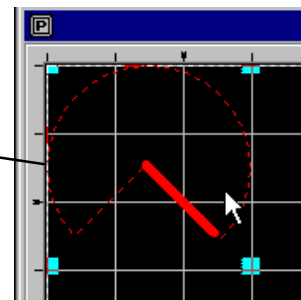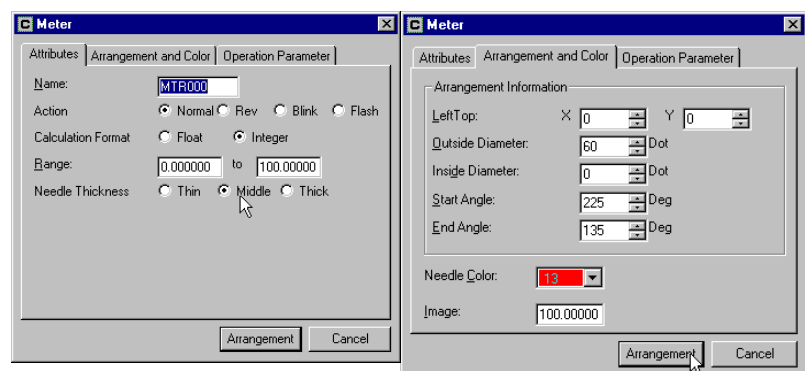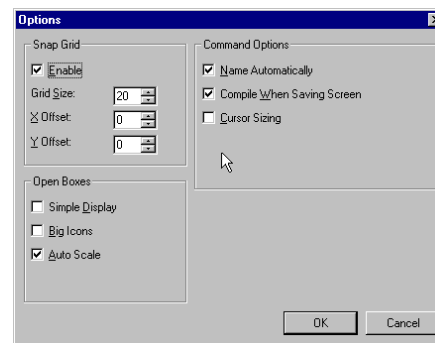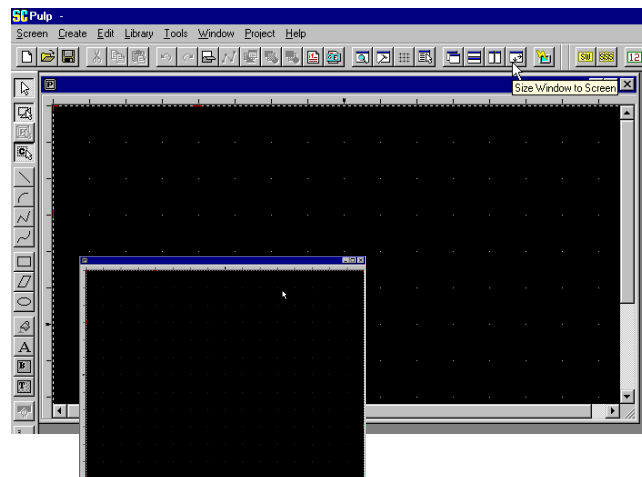
**Creating a New
Library Part from
Scratch
(Continued...)**

Now that the meter control has been built, we will create a Figure of 10 meter lines for the meter face. Click on the Circular Scale tool, enter 10 and click Create.
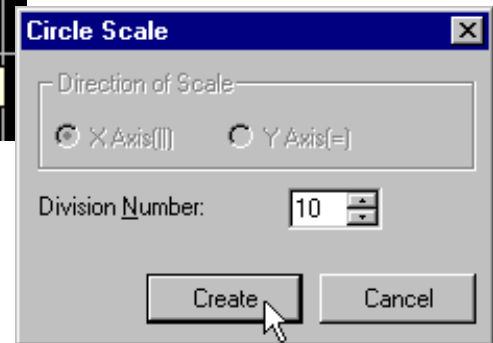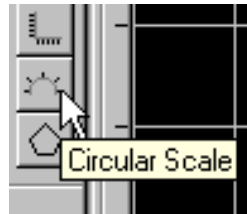
The cross-hair appears again. Click on the upper left corner as before and move the pointer to the bottom left until the white circle fits the meter, then click again and the outside diameter is set in place.
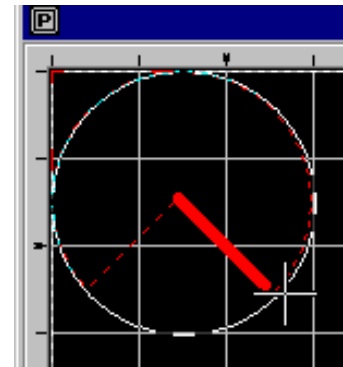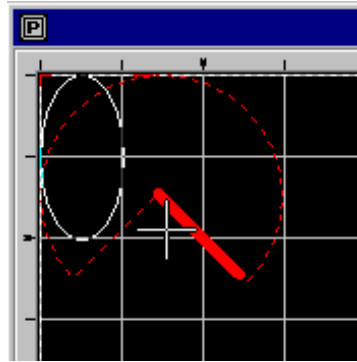
The cross-hair appears again. This time bring the inside circle to the center grid block as shown, and click.
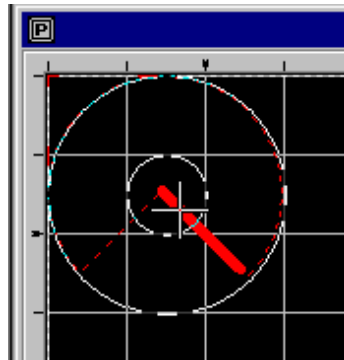
Now, carefully move the cross-hair to the bottom left line of the meter and click when the cursor line matches the meter line. Do the same for the bottom right line of the meter. The meter is finished now, but the cross–hair remains (in case you want to do another circular scale), so click the Selection Mode tool (pointer) to get the normal pointer back.
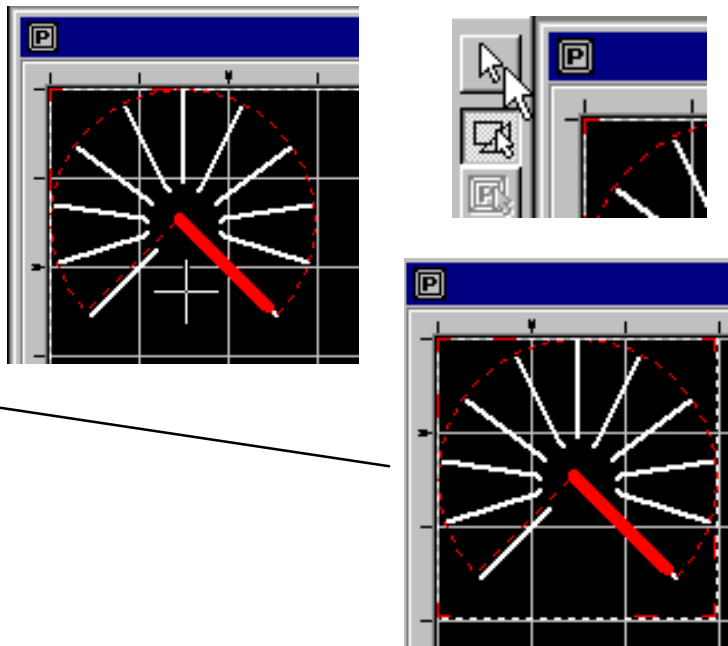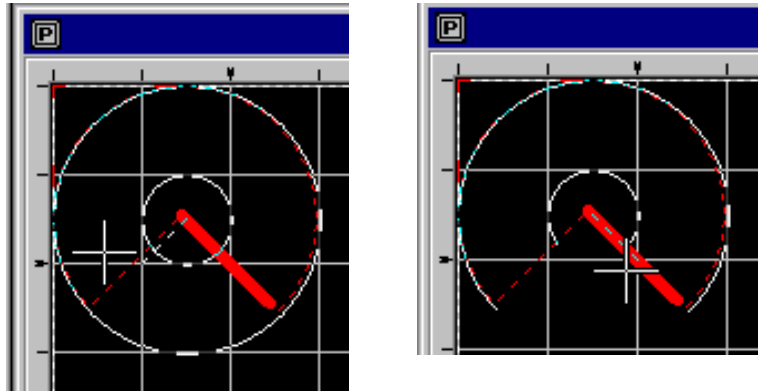
Lastly, press Shift + X which sizes the part boundary to the part.

At this point we could move all of the straight lines and the meter to the middle of the part boundary and add numbers (in text) around the meter face, but that's left for you to do later if you choose.

Finally, click the Save tool or **Library > Save As...** and save the meter as shown on the right. The meter icon can be found by clicking Select Icon. Enter 'MTR1' as the Name of this new part. Now the meter will appear in the User Parts class and can be added to screens like any other part.
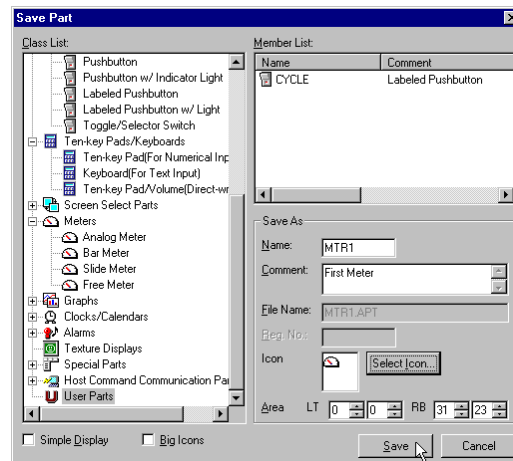
Inside a Part

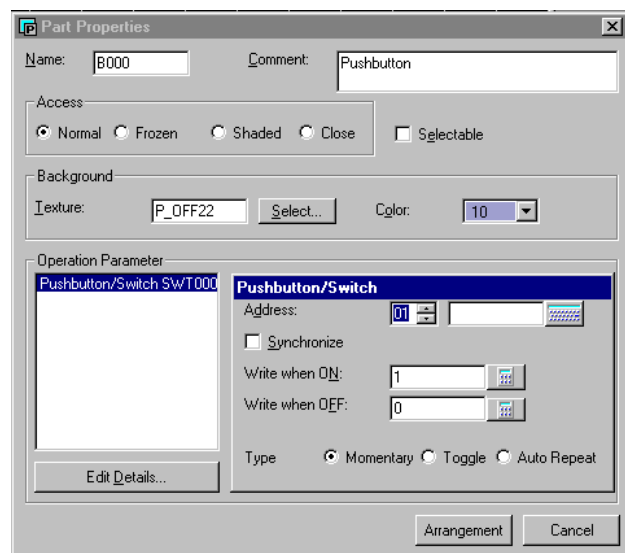Each Screen Part may have one or more **Control** component, and may have a **Part Program** (see the next page) and a **Background** (made up of Figures, Textures and colors).

Numerical Input Display Part

Displays data from the PLC

34.62
Control

PLC

Control Texture

Control Color

Figure (Text & Lines, etc.)

Background Texture

Background Color

**Part Program
Writes data to the PLC**

event

if...

endif

endevent

Part Background
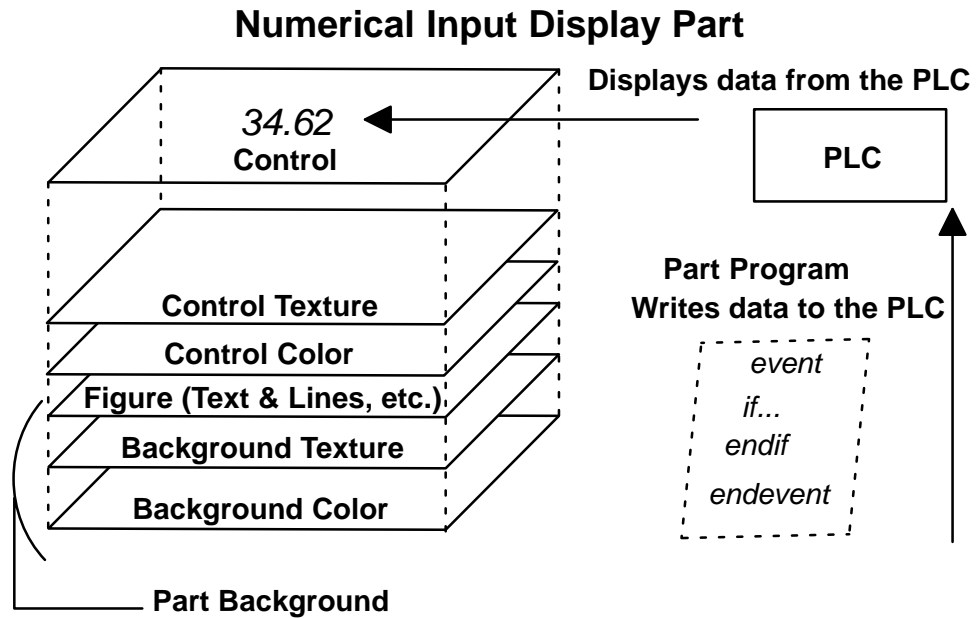
The components of a Part can be thought of as layers of lenses: some clear and some with Figures, colors, text or symbols.
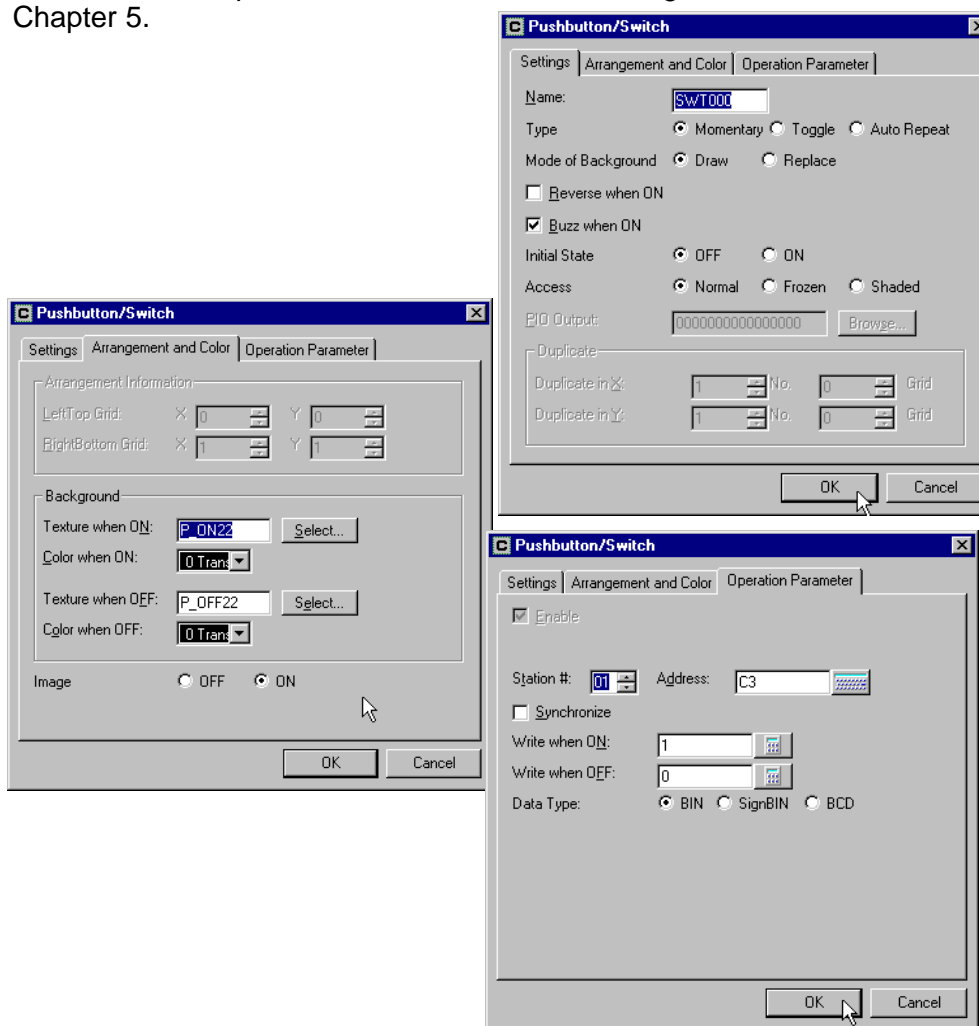
Control

The Control component of a part reads data from, and may write data to, the PLC address. In the Part Properties box, shown on the right, controls associated with a part are listed under *Operation Parameter*. The Operation Parameter settings for each control are found in the small box to the right of the list, when the specific control is selected. For the part shown on the right, there is only one control, a Pushbutton/Switch.

Part Properties

Name: B000   Comment: Pushbutton

Access
⊙ Normal ○ Frozen ○ Shaded ○ Close   □ Selectable

Background
Texture: P_OFF22   Select...   Color: 10

Operation Parameter
Pushbutton/Switch SWT000

Pushbutton/Switch
Address: 01
□ Synchronize
Write when ON: 1
Write when OFF: 0

Type ⊙ Momentary ○ Toggle ○ Auto Repeat

Edit Details...

Arrangement   Cancel

Control Texture and Color

The settings for a control may be accessed and edited by clicking on 'Edit Details'. This brings up the box below, with the three tabs: Settings, Arrangement and Color, and Operation Parameter. These settings are discussed in detail in Chapter 5.
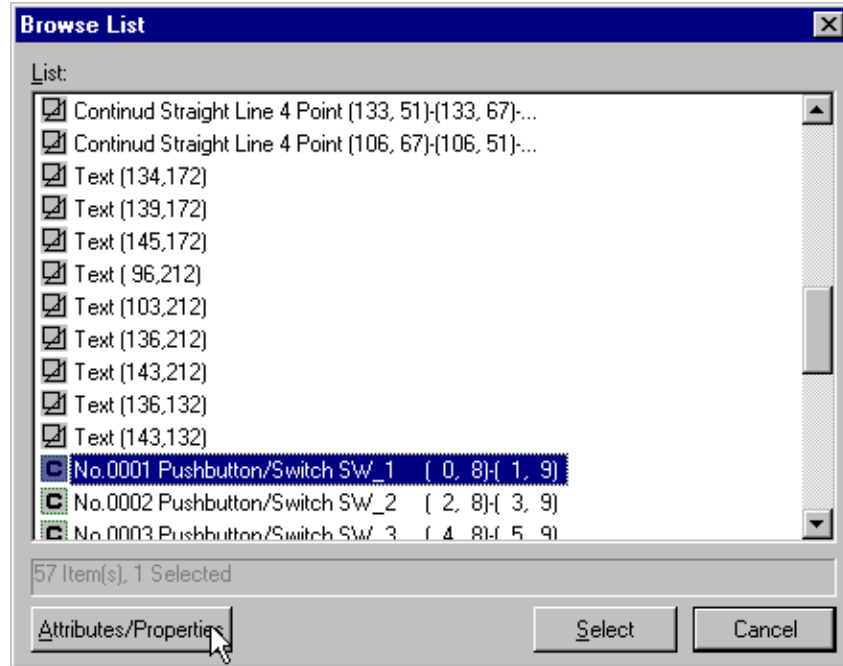
Part Background

The Part Background is made up of any Figures (Text, lines, etc.), Textures, and Colors that have been built into the Part.

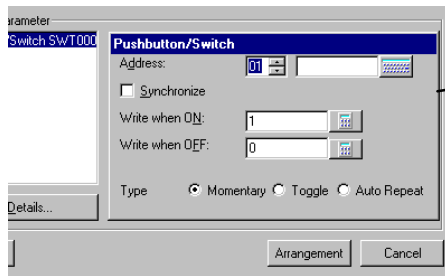**Viewing and Editing Part Components: Browse List**

To view the various Control(s), Figure(s) and Texture(s) of a given part, double–click the part on the screen and then click 'Edit Contents'. Now the part is displayed again in the editing window, click the Browse List tool and the Browse List box will appear. Figures and Text are denoted by a square and triangle icon and Controls are denoted by a **C** icon. The ten–key pad List, shown here, is an example with Figures, Text and Controls.
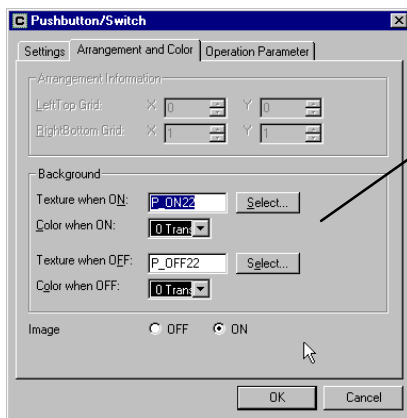
Browse List	✕
List:	

- Continud Straight Line 4 Point (133, 51)-(133, 67)-...
- Continud Straight Line 4 Point (106, 67)-(106, 51)-...
- Text (134,172)
- Text (139,172)
- Text (145,172)
- Text (96,212)
- Text (103,212)
- Text (136,212)
- Text (143,212)
- Text (136,132)
- Text (143,132)
- **C** No.0001 Pushbutton/Switch SW_1   (0, 8)-(1, 9)
- **C** No.0002 Pushbutton/Switch SW_2   (2, 8)-(3, 9)
- **C** No.0003 Pushbutton/Switch SW_3   (4, 8)-(5, 9)

57 Item(s), 1 Selected

Attributes/Properties   Select   Cancel

Click on a component, then click *Attributes/Properties* to edit it or click *Select* to identify it.
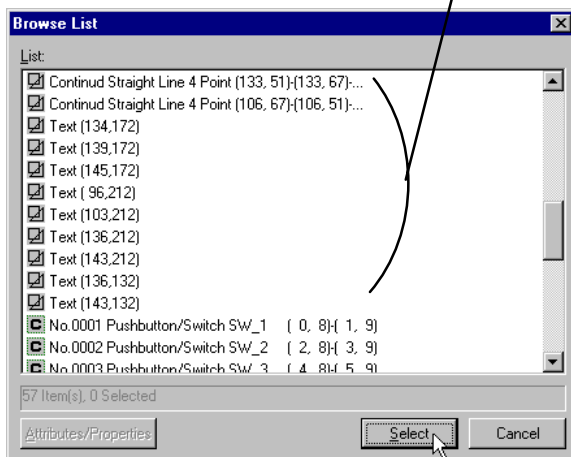
How the Components of a Part fit together

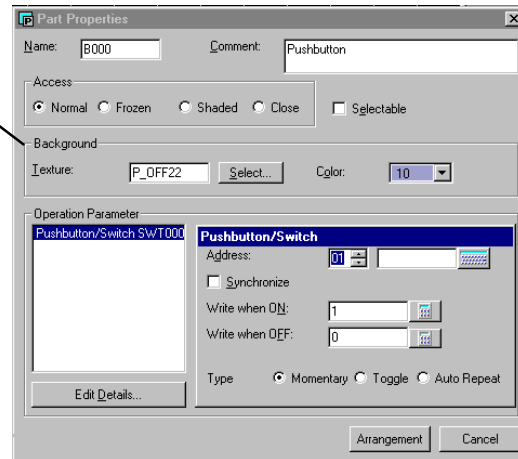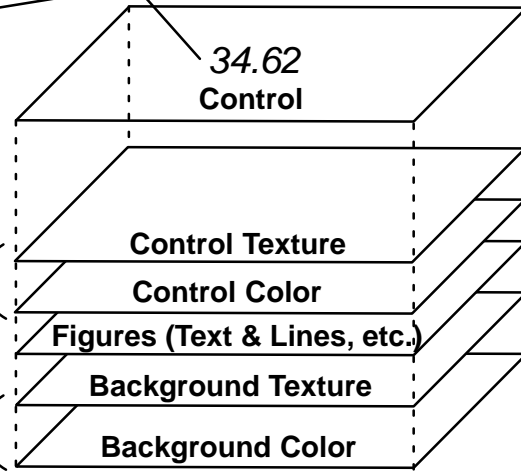The diagram below will help you understand the elements of a Part.

Any data from the PLC is displayed by the Control.

Numerical Input Display Part

34.62
Control

Control Texture

Control Color

Figures (Text & Lines, etc.)

Background Texture

Background Color

The Texture and Color for ON and OFF are specified here.

The Part Background Texture and Color.

How ON/OFF Colors work in a Part

This is a very important point to understand for using any parts that change color depending on the state of a bit (either ON or OFF). As an example we will use the pushbutton we created in the Project Tutorial.

The key is to know that when the bit is ON, the Control "ON Color" replaces anything that has the "OFF Color" (whether it is in a figure, like a circle or rectangle, or the part Background Color itself), and the "OFF Color" remains when the bit is OFF.

Consider the two examples below, which illustrate this concept.

Double-click on the pushbutton and the Part Properties window pops up.

Example 1: Part Background Color is the OFF Color.

Notice the Part Background Color.

Click on Edit Details, select the Arrangement and Color tab and move the Pushbutton/Switch window to the left as shown. This allows you to see both the Part Background Color and the OFF Color at the same time.

Notice that the Part Background Color is the same as the OFF Color. If it were different, the pushbutton color would not work (that is, it would not change from dark green to light green when it went from OFF to ON).

Also, the Image (ON/OFF) specifies which color to show on the part in *ScreenCreator only*, not on the panel itself.

Example 2: Another compoent is the OFF Color. (Locate the component with the OFF Color .)

For Example 2, add the pushbutton shown on the right to a screen, Edit Contents, then Browse List, select the second Circle and click Attributes/Properties. *In this case, the part background color is gray (the frame of the button) and not the same as the OFF color.*

Notice that the line and fill colors are the same as the OFF Color. See the Index for information on the Fore and Back Colors (Tile).
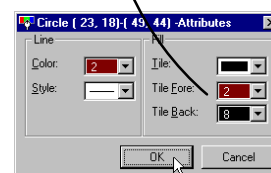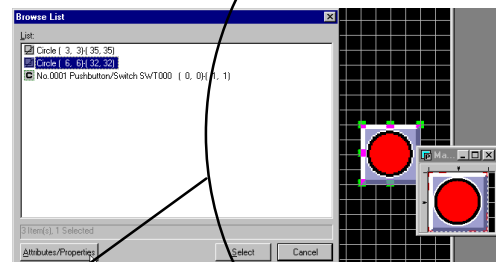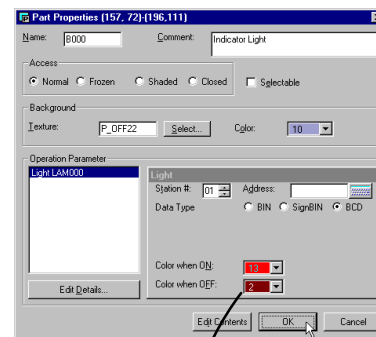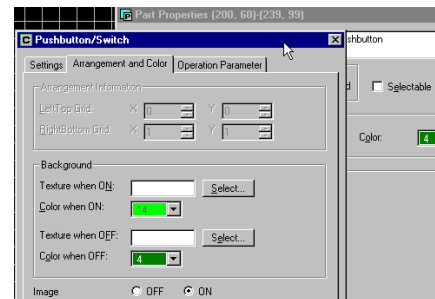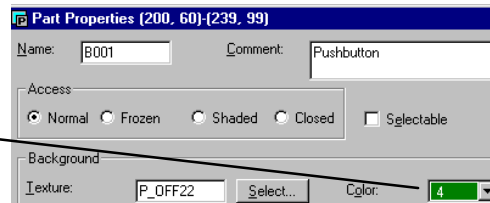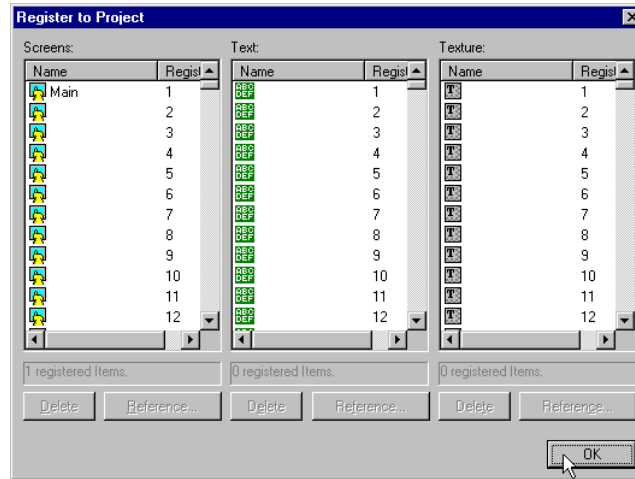
The Project Register: Screens, Registered Text and Textures

Every Project has a Register, containing Screens, Registered Text and Registered Textures.

<u>P</u>roject > <u>R</u>egister... opens the *Register to Project* dialog box for viewing the registered screens, text and textures of the current project. Note: these items cannot be edited from this window.

Screens

Screens, covered at the beginning of this chapter, must have both a unique name and a unique Registration number (except the Global screen, which is not registered).

Click the Register to display Screens in order of Registration number.
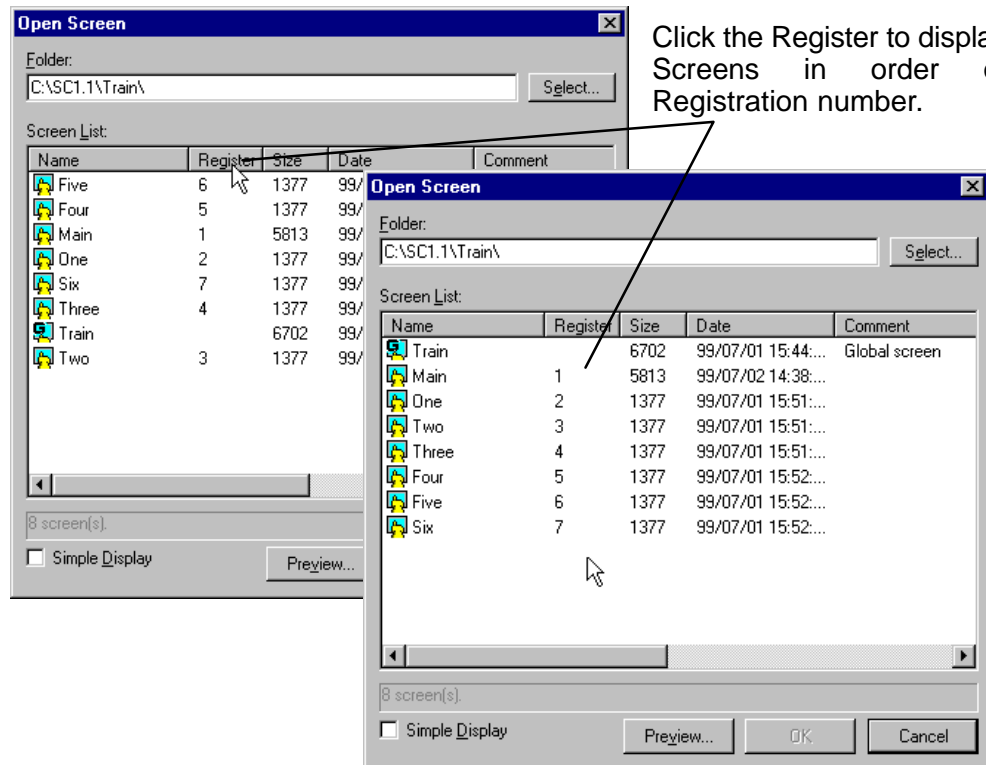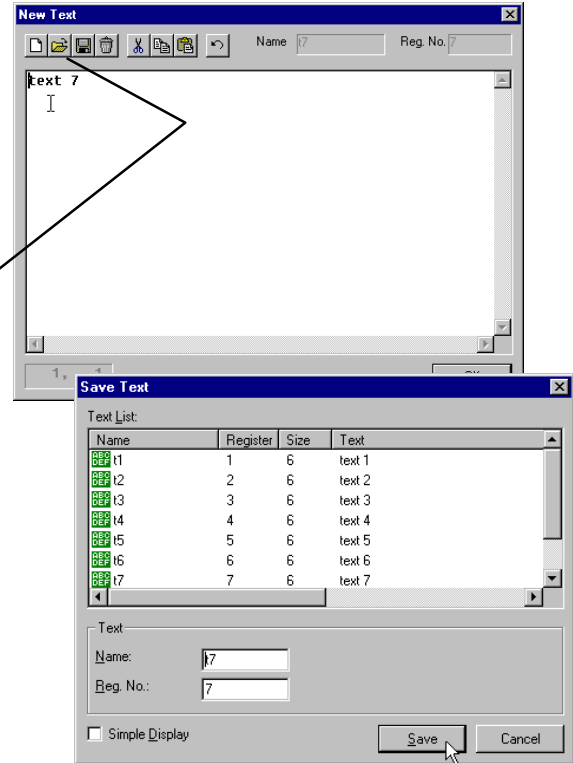
Registered Text

Screens, covered at the beginning of this chapter, must have both a unique name and a unique Registration number (except the Global screen, which is not registered).
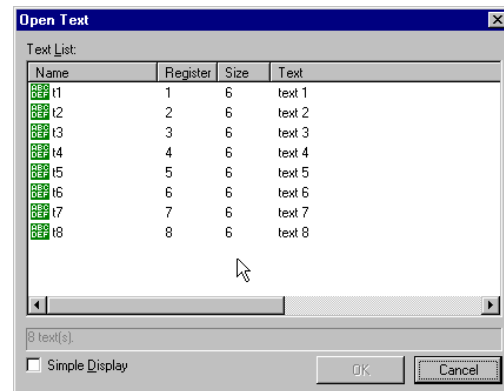
Creating or editing Registered Text

Select **Project > New Text...** to open the New Text window.

With the New Text window open, you can begin typing in the new text to be registered. Then click the save tool to save and assign a registration number.

Use the Open tool to open existing registered text, or to view all registered text.

Registered text is used in Registered Text Displays and Warning Displays to display text messages which correspond to the value in a PLC address (bit or word).
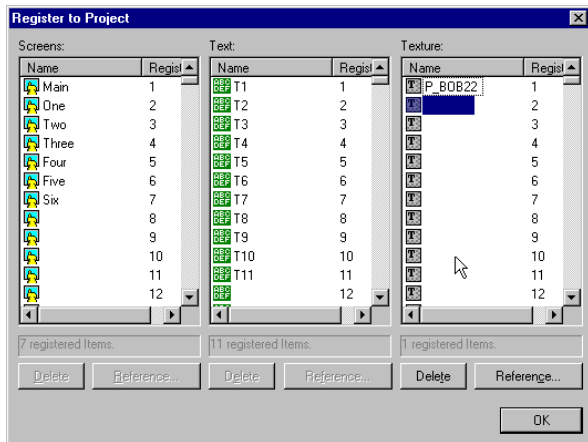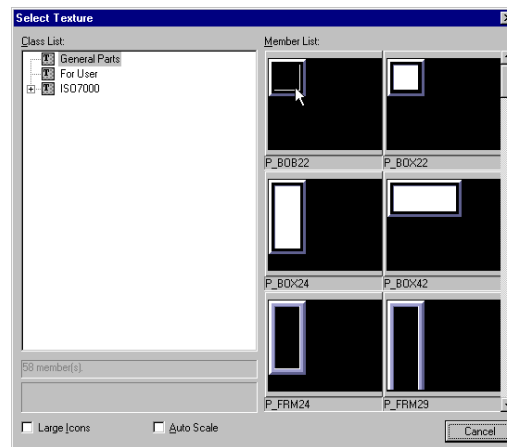
Registered Textures

Registered Textures are different from both Screens and Registered Text, in that they exist in the Library and may be registered as shown below.
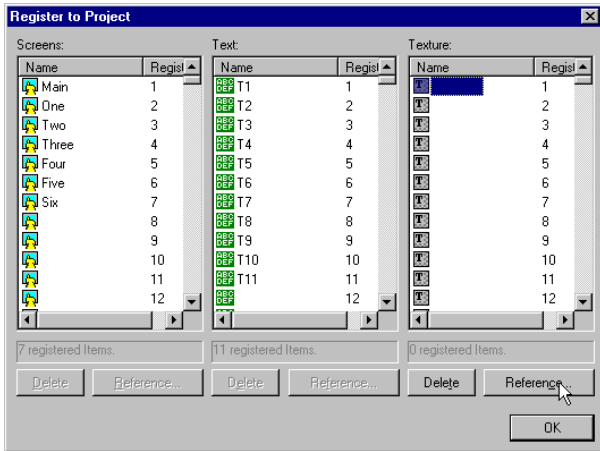
Select **Project > Register...** to open the *Register to Project* window. Select a Texture and click Reference...

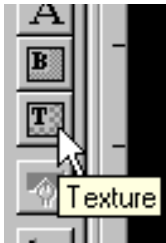Select a Texture and then click the Cancel button.

The Texture is now registered and may be used in the Registered Texture Display part.

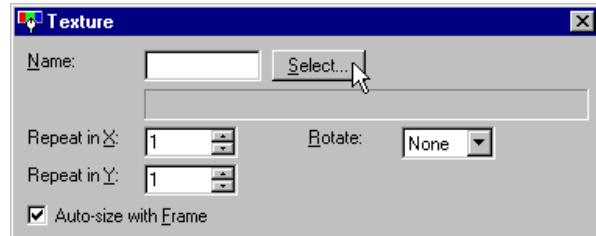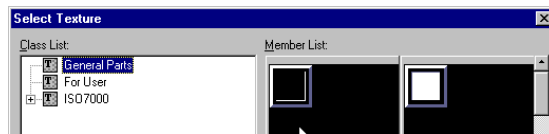## Textures

Textures are made up of lines, circles, rectangles and so on, grouped together as a single object. Often Textures are used as components of Parts, providing a visual image of some physical device such as a pushbutton or switch. Textures may also be placed on a screen directly, similar to Parts, but are typically only found inside a part.

Screen (or Part) Textures versus Library Textures

Textures are essentially identical to Parts (see the 'Screen Part versus Library Part' discussion above), except a texture may be placed in a part or on a Screen. The Library Texture are still the Originals and Screen or Part Textures are the Copies.
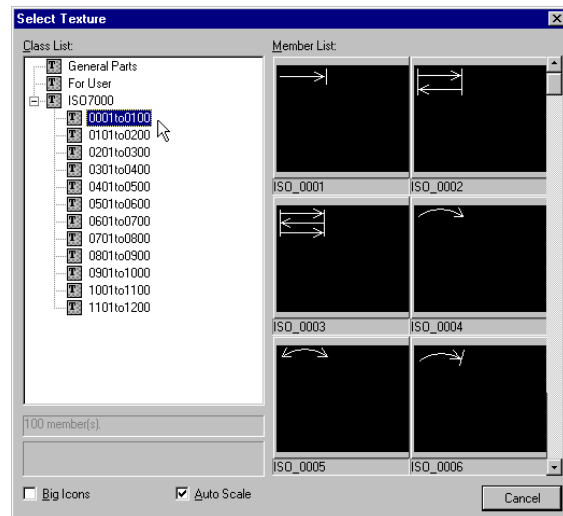
Adding Textures to a Screen or Part

When a screen or part is open, the Texture tool is active. After clicking it, the Texture dialog box appears; click Select to view and select from the Library. Use the Repeat in X or Y to duplicate the Texture horizontally or vertically.

The General Parts Class List of Textures are those textures used already in the built-in Library Parts.

The ISO 7000 Textures may be used as symbols on screens or in building new parts. Click on the different classes and scroll down to see all of the members of each class.

Click on the Texture that you want and place it on a screen or part as you would any Figure or object.

For help with adding Textures, see the **Library > Add from External File > Texture...** section in the Menus chapter
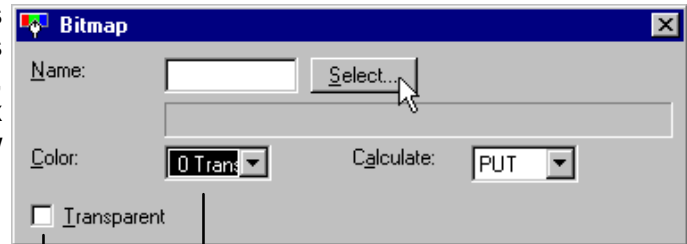
Bitmaps

Bitmaps may be used in a variety of ways including screen or part background, importing a company logo onto a screen or simply displaying a picture.

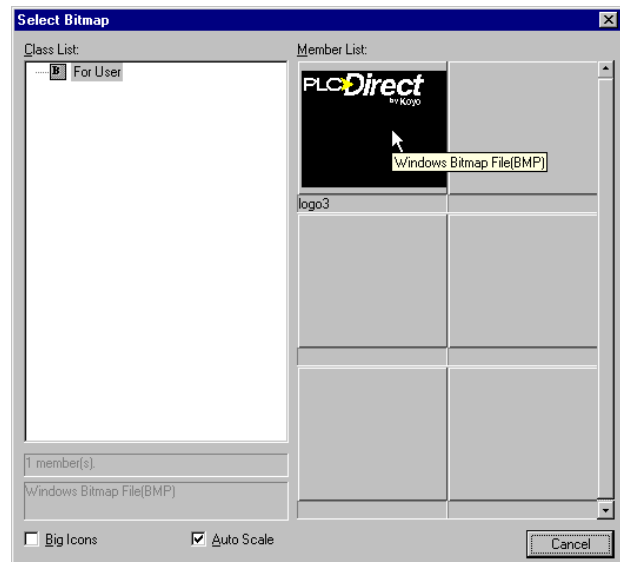**Adding Bitmaps to a Screen or Part**
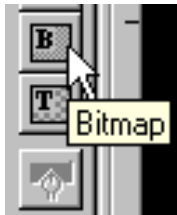
When a screen or part is open, the Bitmap tool is selectable. After clicking it, the Bitmap dialog box appears; click Select to view and select from the Library.

Converts all colors (except black) to this color.

Transparent makes all Black portions of the Bitmap transparent.

There are no bitmaps provided in ScreenCreator, since these tend to be custom images. So, when you open the Select Bitmap it will be empty (unless you have added bitmaps before this). For help with adding bitmaps, see the **Library > Add from External File > Bitmap...** section in the Menus chapter.

Figures (Drawing Objects)

Any Drawing Object (line or lines, ellipse/circle, rectangle, text, etc.) is referred to as a Figure since it may be used as a component in a Part.

Adding Figures to a Screen or Part

When a screen or a part is open, the Drawing tools are selectable. The individual tools are covered in greater detail in the Menus chapter. Two attributes common to many of the Drawing Objects are **Line** and **Fill (Tile)**, shown below.
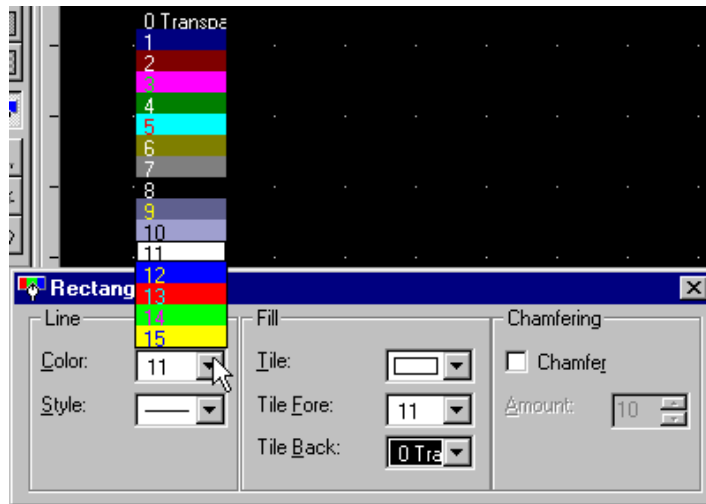
The Line of the object has a color (default is usually white) and a style (thin, dotted, and thick).
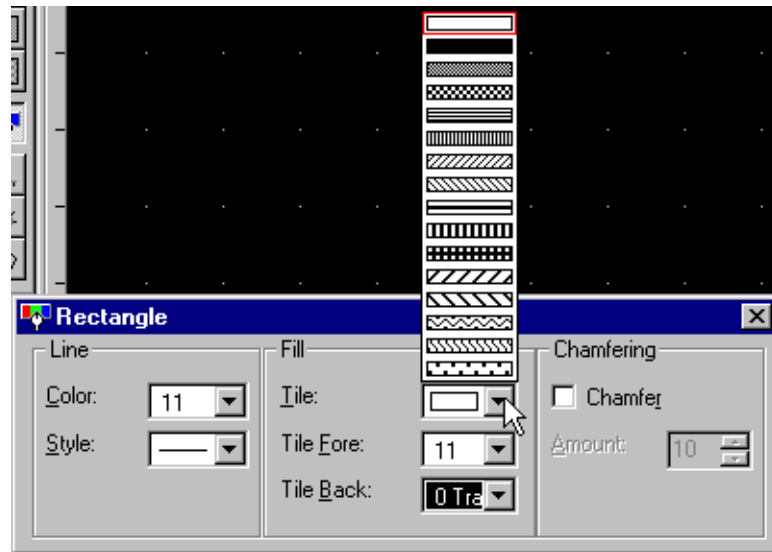
Tile Color (Fill)
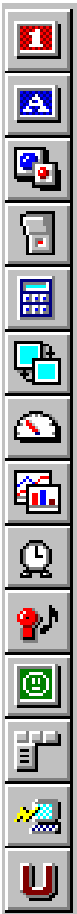
The Fill feature involves two colors "tiled" together by the selected Tile pattern. The white represents Tile Back color and the black represents Tile Fore color. One color is never actually in front or back of the other, but Fore and Back is just a means of distinguishing between the two. The default is usually as shown above, with Tile Back alone chosen (set as Transparent) and Tile Fore being white. By the way, since there is no Tile Fore in the mix, it could be any color. We recommend experimenting with lots of Tile Fill combinations to get a feel for how it works.

The Toolbars
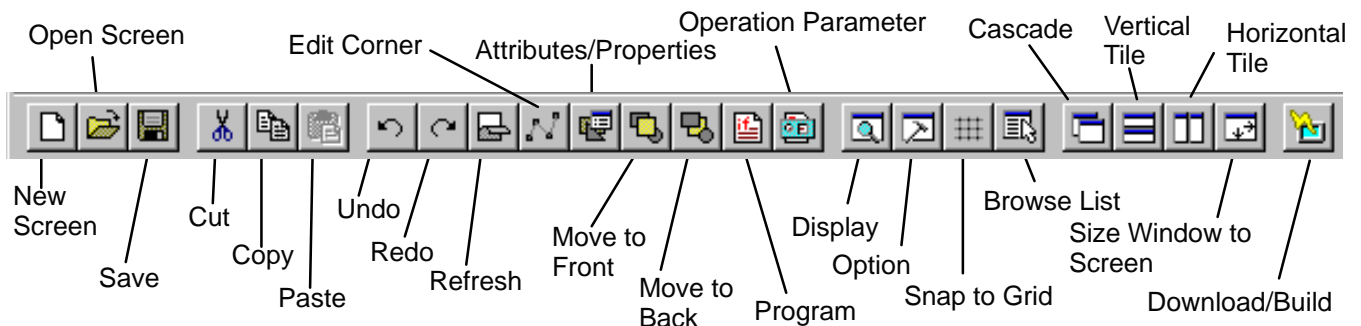
ScreenCreator has toolbars that give quick access to various menu items. The Standard Toolbar has the typical Windows tools (Cut/Paste/Undo etc.) along with Move to Front/Back, display and download options. The drawing, part and control toolbars have all of the tools associated with specific functions. There is also a Reference and a Status bar at the bottom of the window for programming and compiling. *Note: The drawing toolbar is shown both anchored and floating to show both options.* You can drag and drop the toolbars into place and move them around the desktop as needed or anchor them in any location around the application window, either horizontal or vertical.

Standard Toolbar

Drawing Toolbar

Current Project – Screen

Part Toolbar

Control Toolbar

Reference Bar

Status Bar
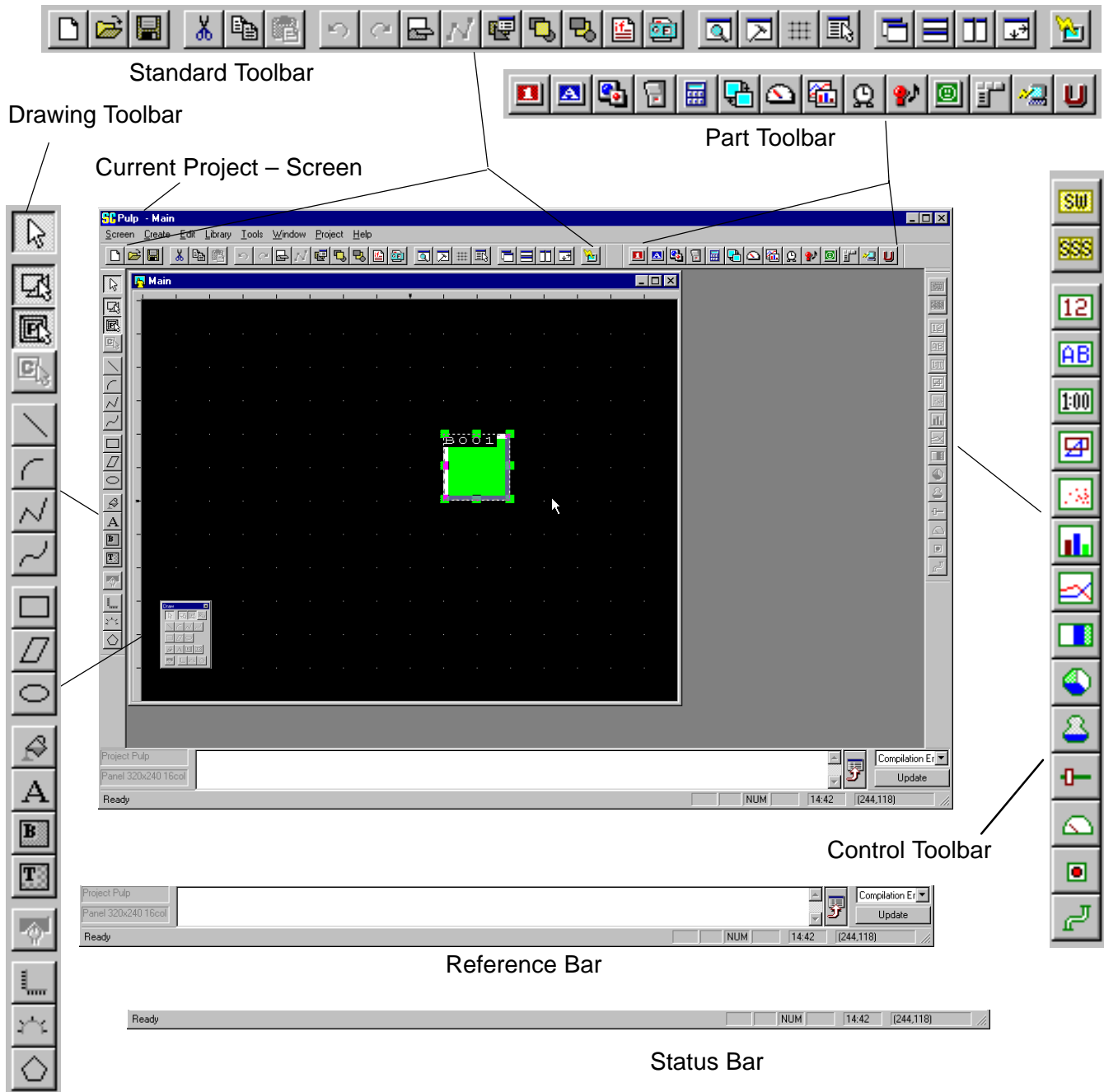
A Quick Reference for the Toolbars

	Selection Mode
	Select Figure
	Select Part
	Select Control
	Straight Line
	Arc
	Continuous Straight Line
	Spline
	Rectangle
	Parallelogram
	Circle/Ellipse
	Fill
	Text
	Bitmap
	Texture
	Set Attribute
	Line-shaped Scale
	Circular Scale
	Polygon

Drawing
Toolbar

	Numerical Displays
	Text Displays
	Lights
	Pushbuttons/ Switches
	Ten-Key Pads/ Keyboards
	Screen Select Parts
	Meters
	Graphs
	Clocks/Calendars
	Alarms (Errors/Faults/Warnings)
	Texture Displays
	Special Parts
	Host Command Communication Parts
	User Parts

Part
Toolbar

	Pushbutton/ Switch
	Selector Switch
	Numerical Display
	Text Display
	Clock Display
	Figure Display
	Plot
	Bar
	Dotted Line
	Band
	Circle
	Free
	Slider
	Meter
	Light
	Pipe

Control
Toolbar

Standard Toolbar   Like most Windows® programs, ScreenCreator has a standard toolbar with the normal tools and additional graphical and screen tools.

Open Screen

Edit Corner

Attributes/Properties

Operation Parameter

Cascade   Vertical Tile   Horizontal Tile

New Screen

Cut

Copy

Paste

Save

Undo

Redo

Refresh

Move to Front

Move to Back

Program

Display

Option

Snap to Grid

Browse List

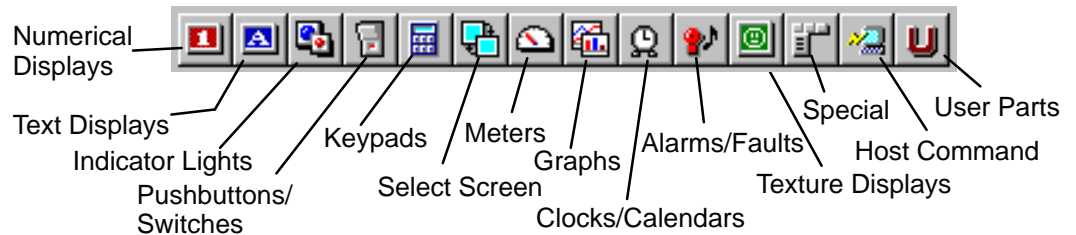Size Window to Screen

Download/Build

Drawing Toolbar The Drawing Toolbar has the standard drawing tools and provides separate selection for Drawing Objects (called Figures), Parts and Controls.
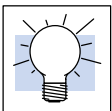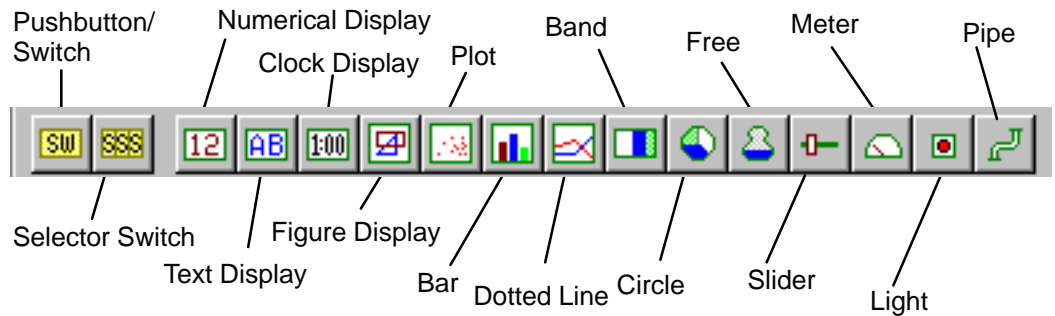
Selection Mode · Select Part · Straight Line · Continuous Straight Line · Circle/Ellipse · Text · Texture · Circle Scale

Select Drawing Object · Select Control · Arc · Spline · Rectangle · Parallelogram · Fill · Bitmap · Set Attribute · L-shaped Scale · Polygon
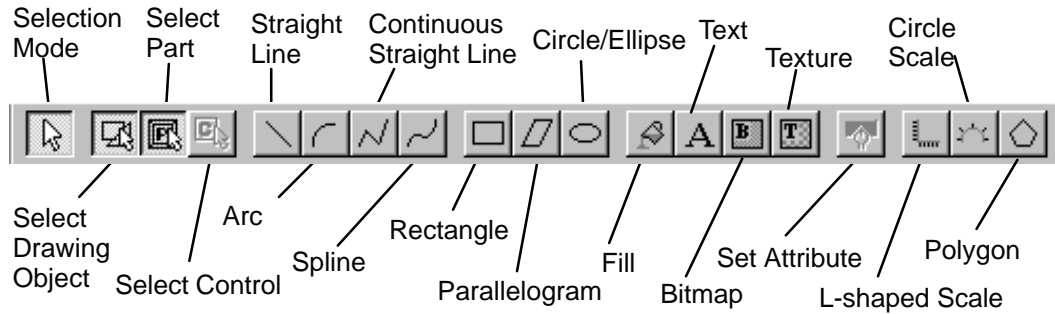
Part Toolbar The Part Toolbar, shown below horizontally , selects the various types of parts to be added to a screen.

Numerical Displays

Text Displays · Indicator Lights · Pushbuttons/ Switches · Keypads · Select Screen · Meters · Graphs · Clocks/Calendars · Alarms/Faults · Texture Displays · Special · Host Command · User Parts

Control Toolbar The Control Toolbar contains the controls which operate within a part. The controls can only be used when editing a library part (new or existing) or editing the contents of an existing screen part.

Pushbutton/ Switch · Numerical Display · Clock Display · Plot · Band · Free · Meter · Pipe

Selector Switch · Text Display · Figure Display · Bar · Dotted Line · Circle · Slider · Light

TIP: This is another reminder to get in the habit of using the various tools instead of selecting the functions through the menu bar. We promise you'll save a lot of time!